
1 Preface

SPOOL (Simultaneous Peripheral Operation On Line) is a BS2000/OSD subsystem. It organizes the usage of printers and also, in certain instances, magnetic tape devices.

These devices are relatively slow and can only process one job at any one time. To ensure that the task requesting these operations is not blocked until the input or output operation is completed, SPOOL carries out this procedure in the system background (asynchronously). For this purpose each input and output job has a separate TSN which only exists until the job is completed. The status of the current job can be monitored using the SHOW commands.

SPOOL consists of the following parts:

- the synchronous part used for processing commands and macros
- the asynchronous part used for internal control of SPOOL and job processing.

Spoolin and spoolout

The reading in of data is referred to as "spoolin", and output as "spoolout".

SPOOL supports a broad spectrum of hardware for spoolout, for example line printers, laser printers, LED printers and virtual printers and magnetic tape devices.

Parameter files and print resources

Information about the current SPOOL configuration, i.e. the names and settings of the available devices, paper formats, character sets etc., is stored in various parameter files. Systems support can use commands or utility routines to supplement or modify them. Printing resources are accessed using the PRM subsystem.

SPOOL can be extended by additional functions. To do this, the following subsystems must be implemented.

- RSO for output to remote printers
- Dprint for distributed printing within a computer network
- SPS for the implementation of APA printers
- SPCONV for the use of converters
- Spool&Print Explorer can be installed on PCs and used to provide a graphical user interface for Spool & Print administration purposes.

1.1 Brief product description of the Spool & Print services

The Spool & Print Services for BS2000/OSD consist of various subsystems and utilities.

Spool & Print subsystems

SPOOL

The local SPOOL (**S**imultaneous **P**eripheral **O**peration **O**n-**L**ine) is a BS2000 subsystem. It controls asynchronous output to printers and magnetic tapes. SPOOL is the fundamental component for the other products described below, which cannot run without it.

RSO

Remote **S**pool **O**utput controls output to decentralized printers (RSO printers) which are connected to remote systems. RSO allows only one point-to-point transfer of the data. For further details, see the "[RSO \(BS2000/OSD\)](#)" manual.

Dprint

Distributed **P**rint Services also controls output to printers which are connected to remote systems, but it uses the local SPOOL of the target system and retains control over the print output. For further details, see the "[Distributed Print Services \(BS2000/OSD\)](#)" manual.

SPS

SPOOL**A**P**A** **P**rinting **S**ystem can be attached to the SPOOL system as a subsystem and performs the task of a printer driver for APA printers. For further details, see the "[PRISMAproduction/BS2000 - SPS](#)" manual.

IDOM

Integrated **D**ocument and **O**utput **M**anagement is a subsystem in Spool & Print Services on BS2000/OSD. It extends the Spool & Print Services by allowing you to use document management facilities. For further details, see the "[IDOM \(BS2000/OSD\)](#)" manual.

Additional utility routines for administration

PRM

Print Resource Management creates and manages SPOOL print resources. PRM is mandatory for SPOOL Version 3.0 and higher, as all actions concerning the print resources are carried out via PRM. PRM is described in detail in the manual of the same name.

SNS

The **SPOOL Notification Service** provides a tool to send and to manage notifications in the frame of the BS2000. SNS is described in detail in the manual of the same name.

SPSERVE

SPSERVE allows systems support - and to a limited extent also RSO device administrators and nonprivileged users - to enter, modify, delete or display information in a SPOOL parameter file. SPSEVERVE is described in detail in the manual of the same name.

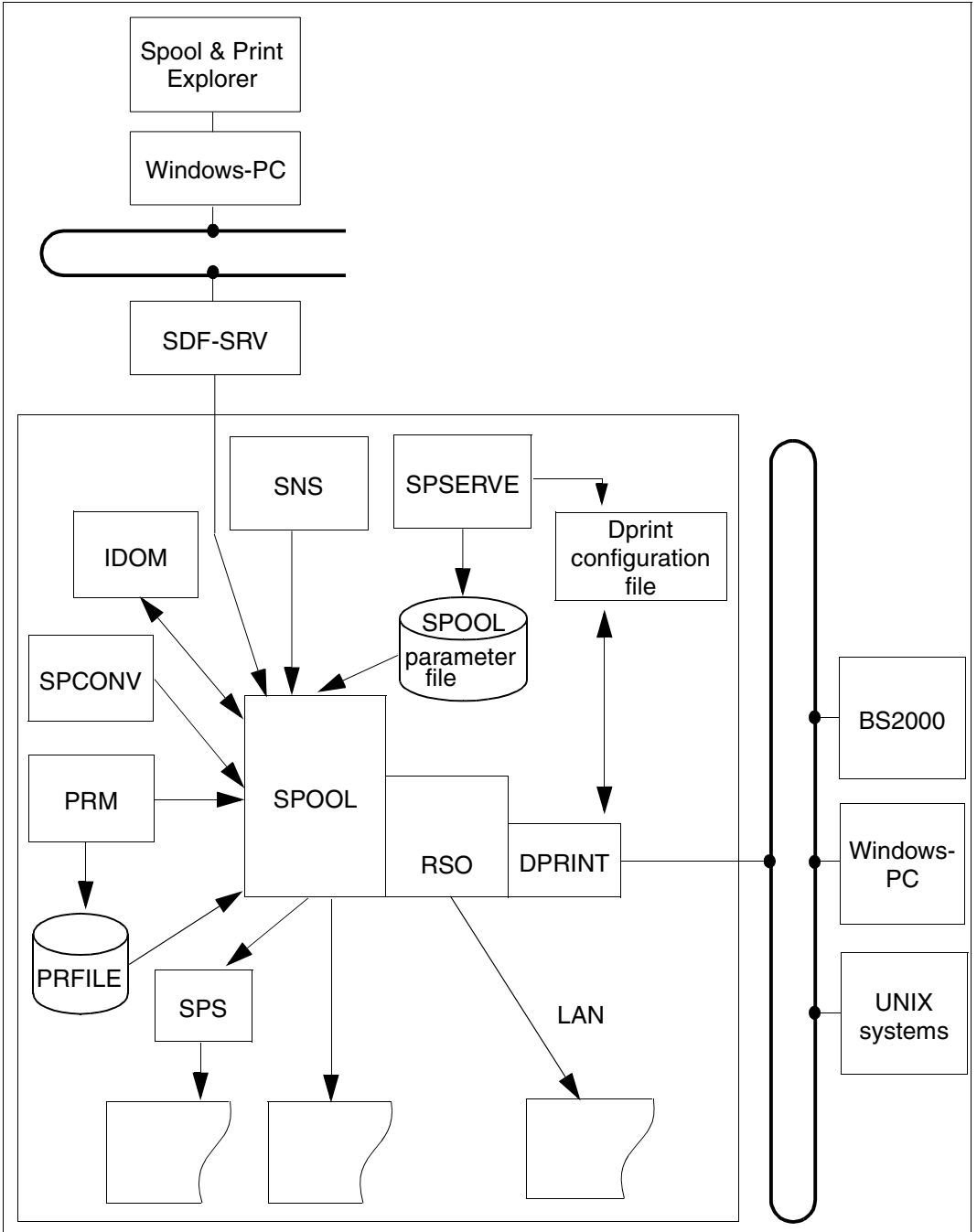
SPCONV

The SPOOL converter implements the filter technology for printing in distributed, heterogeneous environments with BS2000, UNIX systems and PC systems, i.e. it uses filters to change documents and print resources into formats which can be printed by the various printers. For further details on SPCONV, see the manual with the same title.

Spool&Print Explorer

The Spool&Print Explorer is the graphical user interface (GUI) for Spool & Print administration on BS2000 systems. The Spool&Print Explorer is a central, graphically-oriented administration program on a PC for Spool & Print administrators and/or end users. The Spool&Print Explorer is described in detail in [section "The Spool&Print Explorer" on page 32](#)).

The following diagram shows the components of the Spool & Print Services.



1.2 Target group

This manual is addressed to BS2000 systems support, SPOOL administrators (with the privilege PRINT-SERVICES-ADMINISTRATION), RSO device administrators and nonprivileged SPOOL users.

1.3 Summary of contents

The SPOOL manual consists of the following chapters:

Chapter "Preface"

contains a brief description of the BS2000 subsystem SPOOL and general information on how to use this manual.

The chapter "Working with SPOOL"

explains the internal architecture of SPOOL, the functions of the BS2000 subsystem SPOOL and important functions in the Spool & Print environment.

The chapter "Controlling print attributes (use of printers)"

describes what settings are available for outputting files to printers.

The chapter "Supported printers"

describes the printers supported by SPOOL.

The "Appendix"

contains an overview of the standard loops and the device type codes. It also describes the trailer page for local SPOOL.

At the back of this manual you will find a glossary, a list of related publications and an index.

1.4 Changes and additions since the last version of the manual

The changes that have been made since SPOOL V4.1 are outlined below:

- Support of large objects
Support of large volumes (> 32GB) is guaranteed for all Spool & Print products.
- Spool&Print Explorer V2.1
The Spool&Print Explorer has been improved to support distributed environments.
- Support of the SPOOL Notification Service
In the frame of Spool & Print, it is now possible to be notified of various events occurring during a printer session or during the lifetime of a print job. This functionality is available thanks to the software product SNS. In SNS V1.0B the notification by mail, by procedure or in a file is provided.
- Customizing header and trailer pages
Header and trailer pages of listings may be customized in a template file by using variables, conditional text and functions. Putting barcodes is supported as well.
- SYSSSI file
File for optional settings in the SPOOL processing.
- SCSIPCL
The product SCSIPCL is no longer supported as of SPOOL V4.3.

1.5 Notational conventions



This symbol indicates that the following indented text contains essential information.

Note

The word “*Note*” before an indented paragraph shows that the following paragraph contains important information.

“Reference”

References to chapters, sections or other manuals are enclosed in quotation marks.

[]

Square brackets in syntax notations: the characters inside the brackets may be omitted.

Bold type

Where syntax notations are explained, the lines currently being explained are printed in boldface.

Otherwise syntax notations conform to the rules as described in the corresponding chapters of the reference section.

SYNTAX/Example

Syntax notations and examples of inputs and outputs are highlighted by means of a different typeface. Syntax notations are also surrounded by a frame.

1.6 README file

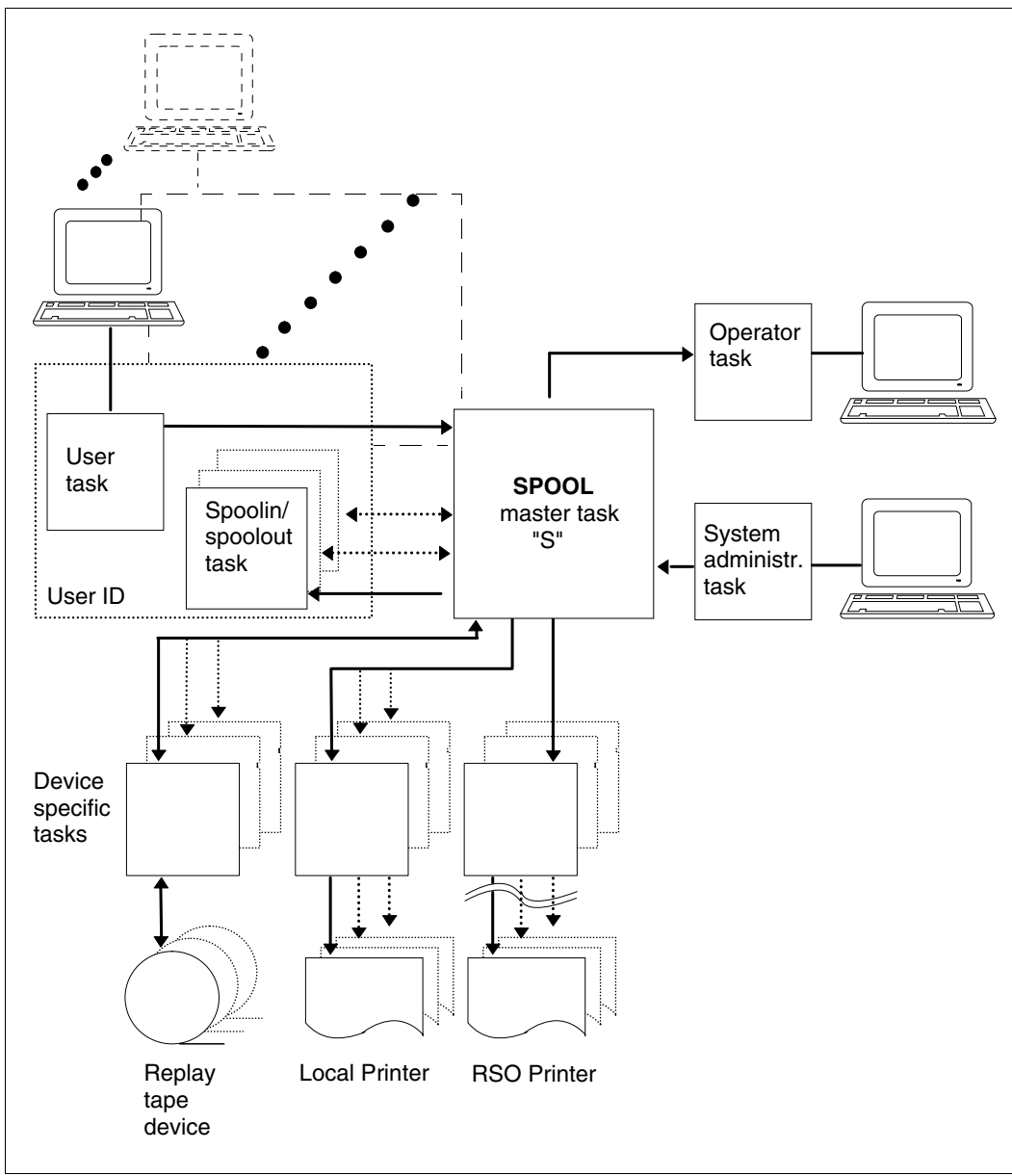
Functional changes and supplements to the current product version not documented in this manual are explained in the product-specific README file. The name of this file on your BS2000 host is SYSRME.SPOOL.041.E. Ask systems support for the user ID under which the README file is cataloged. You can view the README file by means of the SHOW-FILE command or in an editor of your choice, or you can use the following command to print the contents of the file on a standard printer:

```
/PRINT-DOCUMENT FROM-FILE=filename, -  
/DOCUMENT-FORMAT=*TEXT(LINE-SPACING=*BY-EBCDIC-CONTROL)
```

2 Working with SPOOL

2.1 Internal SPOOL control and job processing

SPOOL operation is controlled and monitored by a system task, known as the SPOOL master task. This master task always has the TSN "S". It generates a separate device task for each assigned device (see figure "[Internal SPOOL control and job processing](#)"). It also assigns the pending jobs to the assigned devices in accordance with the specifications of the job originator.



Internal SPOOL control and job processing

2.1.1 Defining the execution sequence

If more than one job is pending, SPOOL defines the sequence in which the jobs are to be executed. This definition of the execution sequence is known as scheduling. If there are several possible devices for a pending job, SPOOL selects a device to handle the job in question.

Selecting the output device

If it is possible to output a SPOOL job on more than one SPOOL device, SPOOL checks the weight (rank) of the features of each individual SPOOL device and selects the SPOOL device having the highest weight. The weight for a device is given by the sum of the weights specified on assignment of the device with the relevant START-... command.

The weights can be modified using the SPSERVE utility routine (MODIFY-SPOOL-PARAMETERS statement).

Defaults are defined for the device weights in the minimum configuration of the SPOOL parameter file (see [section "SPOOL parameter file" on page 94](#)).

Selecting the next SPOOL job to be executed

Changing paper, forms overlays and character sets should be kept to a minimum. For this reason, each job is given a certain priority which is used to define the sequence of the pending jobs. SPOOL calculates the priorities from the individual priorities of the print parameters specified. The job currently having the highest priority will be processed first. If more than one job with the same priority is pending, the job waiting longest for processing will be handled first.

The priorities are defaulted as follows:

Use current paper (FORM)	16
Use current film overlay	8
Use current FOB data overlay	4
Use current character set or character set pool	2
Use current rotation (ROTATION)	1

Priorities for SPOOL jobs

These priorities can be modified using the SPSERVE utility routine. You can thus specify, for example, that only the age of the jobs is to be taken into consideration for scheduling. For more detailed information, see the "[SPSERVE \(BS2000/OSD\)](#)" manual.

2.2 External SPOOL control

Systems support can influence operation of the SPOOL subsystem. This includes loading and unloading the subsystem, as well as controlling SPOOL jobs which have already started.

2.2.1 Loading/unloading SPOOL

SPOOL can be loaded and unloaded dynamically during the session. Following a system start, SPOOL must be loaded. If it is not loaded, no SPOOL jobs will be accepted by the system. SPOOL should therefore be loaded immediately after the system start. Systems support must decide whether a warm start, a cold start or a selective start is to be performed.

During a warm start, all SPOOL jobs still in the job queue are again readied for processing. In the case of a cold start, the remaining jobs from the previous session are deleted and only new jobs are added to the queue. A cold start is required if serious problems exist in the SPOOL queues (e.g. in the EQUISAMQ file). A message is displayed for systems support when loading has been completed. With a selective start, only those jobs that were defined in the START-SUBSYSTEM command are retained in the queue.

If the SHUTDOWN command is issued during loading, it will not be executed until loading of the SPOOL subsystem has been terminated.

Loading SPOOL

The command START-SUBSYSTEM SUBSYSTEM-NAME=SPOOL is used to initiate the loading of SPOOL. This presupposes the existence of the \$SYSSPOOL user ID. SPOOL is then loaded into class 4 memory (further information can be found in the "[Spool & Print - Commands \(BS2000/OSD\)](#)") manual).

The subsystems RSO and SPS can then be loaded, provided the relevant operands are specified in the START-SUBSYSTEM command. These subsystems are also loaded into class 4 memory.

The PRMMAN subsystem required to run SPOOL must be loaded before SPOOL. PRMMAN is responsible for all accesses of the print resources stored in the PRFILE resource library. If PRMMAN is not already loaded when SPOOL is loaded, SPOOL requests that it be loaded.

SPCONV is loaded automatically.

Unloading SPOOL

The command `STOP-SUBSYSTEM SUBSYSTEM-NAME=SPOOL` is used to unload the SPOOL subsystem. The RSO and SPS subsystems are first unloaded, assuming they were loaded in the first place.

During unloading, firstly all new user jobs are rejected and executing jobs are terminated; termination is forced if necessary. The storage space used by SPOOL is then released.

The PRMMAN subsystem can then be unloaded.

2.2.2 Assigning devices

The command `START-...-...` is used to define certain attributes for local SPOOL devices (operands `CHARACTER-SET-NUMBER`, `SPOOLOUT-CLASS`, `FORMS-OVERLAY`, `FORMS-OVERLAY-BUFFER`, `FORM-NAME`, `PRIORITY`, `ROTATION`, `ACCOUNT`, `SPOOLOUT-NAME`, `USER-IDENTIFICATION`). These attributes can be referenced by corresponding operands in the `PRINT-DOCUMENT` command for a SPOOL job and queried by means of the `SHOW-PRINT-JOB-ATTRIBUTES` command.

Only when the operand values specified in the `PRINT-DOCUMENT` command match the attributes of the desired device can the SPOOL job be executed on this local device.

2.2.3 Controlling started SPOOL jobs

Systems support can control jobs that have already been started, as follows:

- repeat an output for any device
- suspend an output until the next warm start
- suspend an output until it is explicitly released
- release a job held in the queue

For more information, see the descriptions of the `HOLD-PRINT-JOB` and `RESUME-PRINT-JOB` commands (see also the "[Spool & Print - Commands \(BS2000/OSD\)](#)" manual).

2.2.4 Subsystem parameter file SYSSSI

This section describes the different optional processings allowed within SPOOL. These are defined in the released subsystem parameter file (SYSSSI file). The specified values are valid for a complete SPOOL session (file is read during start-up).

The following file for optional settings in the SPOOL processing is shipped under the name SYSSSI.SPOOL.046.

```
*
* SYSSSI - SPOOL V04.6A00
*
* SOURCE IMPLEMENTATION OF PM A0293499
* FUNKTIONS-NAME: ENFORCE.FAMILY.PARAMETER.TO.NO=*NO/*YES
*   This function enforce the family parameter to the value NO in
*   order to enforce the distribution of the family but with a new TSN
*   for each job.
ENFORCE.FAMILY.PARAMETER.TO.NO=*NO
*
*
* SOURCE IMPLEMENTATION OF PM A0312261
* FUNKTIONS-NAME: PRINT.END.MSG.INSERT=*WORKING-FILENAME/*ORIGINAL-FILENAME
*   Put original filename as insert of MSG SPS0120
PRINT.END.MSG.INSERT=*WORKING-FILENAME
*
*
* SOURCE IMPLEMENTATION OF PM 90480914
* FUNKTIONS-NAME: WAITING.TIME.FOR.HP.INTERVENTION=*NORMAL/*DOUBLE
WAITING.TIME.FOR.HP.INTERVENTION=*NORMAL
*
*
* SOURCE IMPLEMENTATION OF PM A0353753
* FUNKTIONS-NAME: ACCESS.EXIT94.ON.CLIENT=*NO/*YES
*   EXIT#094 is also called on client host to permit the modification
*   of the resource location parameter. A information byte is provided
*   with the value X'F2' meaning "call on client" as well as the address
*   of the SCB.
ACCESS.EXIT94.ON.CLIENT=*NO
*
*
* SOURCE IMPLEMENTATION OF PM A0362072
* FUNKTIONS-NAME: DISTRIBUTION.SYSLST.SYSOUT.AT.LOGOFF.TIME=*YES/*NO
*   This parameter causes that the files printed at logoff time will
*   never be distributed when *NO is specified.
DISTRIBUTION.SYSLST.SYSOUT.AT.LOGOFF.TIME=*YES
*
*
* SOURCE IMPLEMENTATION OF PM A0410653
```

```
* FUNKTIONS-NAME: COMMAND-RC-WITH-SCP1029=*WITH-SCP1029/*WITHOUT-SCP1029
*   This parameter causes the SCP1029 message to be returned or not
*   in the command return code, when it is already displayed on sysout.
* Initial value is *WITHOUT-SCP1029
*
COMMAND-RC-WITH-SCP1029=*WITHOUT-SCP1029
*
* SOURCE IMPLEMENTATION OF PM A0425065
* FUNKTIONS-NAME: MOVE.SPOOL.REQUEST=*ABORT-REQUEST/*WAIT-MOVE
*
* The parameter MOVE.SPOOL.REQUEST specifies whether a /START/RESUME or
* /STOP/HOLD-SUBSYSTEM command has to wait or not until a currently
* processed /MOVE-PRINT-JOBS command is terminated or not.
* - the value *ABORT-REQUEST means: the command on SPOOL subsystem
*   will be rejected if a /MOVE-PRINT-JOB command, working with the
*   system EQUISAMQ file, is currently processed
* - the value *WAIT-MOVE means: the command on SPOOL subsystem will wait
*   until a /MOVE-PRINT-JOB command, working with the system EQUISAMQ
*   file is terminated.
* Initial value is *ABORT-REQUEST.
*
MOVE.SPOOL.REQUEST=*ABORT-REQUEST
*
*
* SOURCE IMPLEMENTATION OF PM A0373133
* FUNKTIONS-NAME: DPRINT.CUSTOMISATION.FOR.SBS=*OFF/*ON
*
* The parameter DPRINT.CUSTOMISATION.FOR.SBS allows (*ON value) or not
* (*OFF value) the following customisation for SBS:
* 1. allow processing admission for inter-cluster requests
* 2. if TSOS then password not mandatory in processing-admission
* 3. allow another mnemonic as V in show display concerning virtual
*   device
* 4. after call to EXIT#96, if daemon is selected the job, bypass server
*   resource validation and force acceptance of job on local SPOOL.
* 5. TEST ONLY THE FIRST BYTE FOR VIRTUAL
* 6. these reps also allow the spool administrator of a host to see the
*   print issued from his host to another cluster, if a specific
*   spoolout-name is specified in his /show-print-job-status command.
* Initial value is *OFF
*
DPRINT.CUSTOMISATION.FOR.SBS=*OFF
```

```
*
*
* SOURCE IMPLEMENTATION OF PM A0239748
* FUNKTIONS-NAME: JOB.SEPARATION=*YES/*NO
*
* The parameter JOB.SEPARATION specifies that a job separator mark is
* inserted on each listing printed on a laser HP printer. This mark
* has the form of a 1-2-3 mark printed of the paper edge. The first
* listing has a single mark printed on the paper edge, the second
* has 2 marks, the third one has 3 marks. After that it starts again
* with 1 mark
JOB.SEPARATION=*NO
*
*
* SOURCE IMPLEMENTATION OF PM A0452887
* FUNKTIONS-NAME: BYPASS-TIME-STAMP-UPDATE
*
* The parameter BYPASS-TIME-STAMP-UPDATE allows to bypass the update
* of the time stamp in the SPOOL PARAMETERS records.
* This may be done for performance reasons.
* The possible values are:
*   BYPASS-TIME-STAMP-UPDATE=*NO (initial value): no bypass will occur
*   (information in the spool parameters records will be updated)
*   BYPASS-TIME-STAMP-UPDATE=*YES : bypass will occur (information
*   in the spool parameters records will not be updated)
*
BYPASS-TIME-STAMP-UPDATE=*NO
*
*
* SOURCE IMPLEMENTATION OF PM A0452152
* FUNKTIONS-NAME: SYSTEM-FILE-RESOURCE-CLIENT
*
* The parameter SYSTEM-FILE-RESOURCE-CLIENT allows to use client
* resources/forms when printing distributed SYSLST/SYSOUT files.
* The possible values are:
*   SYSTEM-FILE-RESOURCE-CLIENT=*NO (initial value): the server
*   resources will be used
*   SYSTEM-FILE-RESOURCE-CLIENT=*YES the client resources will be used
*
SYSTEM-FILE-RESOURCE-CLIENT=*NO
```



```
*
*
* SOURCE IMPLEMENTATION OF PM A0461776
* FUNKTIONS-NAME: SUPPRESS-SPS0870
*
* The parameter SUPPRESS-SPS0870 allows to suppress the display
* of message SPS0870 at console.
* The possible values are:
*   SUPPRESS-SPS0870=*NO (initial value): the msg is sent
*
*   SUPPRESS-SPS0870=*YES : the msg is suppressed
*
SUPPRESS-SPS0870=*NO
*
*
* SOURCE IMPLEMENTATION OF PM A0351363
* FUNKTIONS-NAME: MODIFY-PRINTER-OUTPUT-SYNCHRO
*
* The parameter MODIFY-PRINTER-OUTPUT-SYNCHRO allows the command
* MODIFY-PRINTER-OUTPUT-STATUS to be accepted if in some case, it
* was rejected with message SCP0907.
* The possible values are:
*   MODIFY-PRINTER-OUTPUT-SYNCHRO=*NO (initial value): no modification
*
*   MODIFY-PRINTER-OUTPUT-SYNCHRO=*YES : the synchronization is changed
*
MODIFY-PRINTER-OUTPUT-SYNCHRO=*NO
*
*
*
* FUNKTIONS-NAME: VIRTUAL.HOST.SUPPORT
*
* Optional processing to support the virtual hosts within Spool&Print.
* If no virtual host is supported for the current system, the value
* *NONE must be specified (upper case); in this case, the real BCAM
* host name will still be used (compatibility).
* Otherwise, the name of the currently used virtual host must be
* specified; it consists of 8 characters, left-justified and
* blank padded.
*
* VIRTUAL-HOST-NAME=*NONE/<a1phanum-name_8..8>
*
VIRTUAL-HOST-NAME=*NONE
```

```
*
* SOURCE IMPLEMENTATION OF PM A0504496
* FUNKTIONS-NAME: USAGE-OF-BIG-FOBS
*
* Optional processing to support big fobs (>4032 sublines) for HP90
* printers.
*MAXIMUM-FOB-SUBLINES=4032/8064
*
MAXIMUM-FOB-SUBLINES=4032
*
*
* SOURCE IMPLEMENTATION OF PM A0511854
* FUNKTIONS-NAME: PRINT-JOB-CLASS.FOR.ANY.USER
*
* Optional processing to allow any user to use the "PRINT-JOB-CLASS"
* operand of the /PRINT-DOCUMENT command.
*PRINT-JOB-CLASS.FOR.ANY.USER=*NOT-ALLOWED/*ALLOWED
*
PRINT-JOB-CLASS.FOR.ANY.USER=*NOT-ALLOWED
*
```

2.3 Data output

2.3.1 Spoolout

The output of data is known as spoolout.

SPOOL supports a broad spectrum of hardware for spoolout. You can output your data on a line printer, laser printer, LED printer and virtual printers or on replay tape. For printer output, there are numerous options for controlling the print attributes. For details, see [chapter “Controlling print attributes \(use of printers\)” on page 69](#).

For the spoolout operation, systems support must first assign the output devices. This is done by means of the command `START-PRINTER-OUTPUT` or `START-TAPE-OUTPUT`. Subsequently any system user can initiate the output of data to one of the assigned devices. Output to a printer is effected by means of the `PRINT-DOCUMENT` command and to tape by the `WRITE-SPOOL-TAPE` command.

Device assignments no longer required are canceled by systems support with the command `STOP-PRINTER-OUTPUT` or `STOP-TAPE-OUTPUT`.

2.3.2 Support of large objects

Due to the continuously increasing capacity of disks and the fact that large disks are supported by most of the modern operating systems, the SPOOL-GA also supports large volumes (≥ 32 GB). This is achieved in a transparent way for the end user.

But it is necessary to distinguish between large volumes and large files. Indeed, one document occupying 32 GB can represent several millions of A4-pages and would need two weeks to be printed out on the fastest printer. In this context, no plausible usage model for printing such large files exists. The spoolout request of a large file will be rejected with a message at `PRINT-DOCUMENT` submission:

```
SCP1130 SPOOLOUT OF LARGE FILE NOT SUPPORTED. COMMAND OR MACRO REJECTED FOR  
FILE 'xxx'
```

No other modification appears at the user interface.

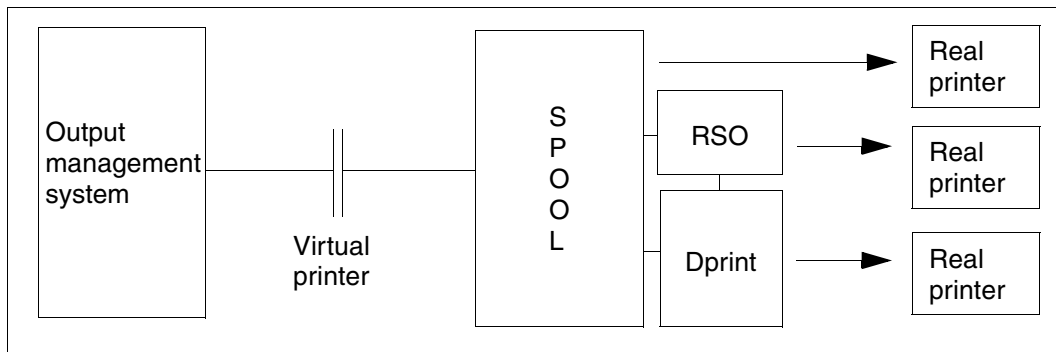
2.3.3 Working with magnetic tapes (replay)

Magnetic tape reels and magnetic tape cartridges can be used in BS2000.

To write to a tape or tape cartridge, systems support must first assign a tape device. The START-TAPE-OUTPUT command is used for this. To read data from a tape, issue the START-TAPE-REPLAY command. The OUTPUT-MODE operand lets you control whether the tape file is output direct to the printer or is first copied to a temporary file. Tape processing is terminated with STOP-TAPE-REPLAY.

2.4 Virtual printers

A virtual printer in Spool & Print Services is an object which is treated like a real device, although in actual fact it only exists as software that is addressed via a device name. Like a real device, a virtual printer can accept jobs from SPOOL. It forwards these jobs to a TU application (synchronous virtual device), which then processes them, or puts them in KEEP state (asynchronous virtual device).



One possible application of the virtual printer facility is to allow data created by the virtual printer to be processed further by another application. This application can be either a standard output management system or a proprietary output management system.

The virtual printer runs under the control of a TPR task (supervisor task), while the application runs under the control of a TU task (application task).

Virtual printers can be used in asynchronous or synchronous mode.

A virtual printer can be defined in a printer pool. In this case, there must be at least one real printer in the pool. This is necessary so that it is possible to check whether the resources entered in the print command are valid.

A virtual printer can be defined with the following SPSEIVE statement.

For asynchronous mode:

```
/ADD-SPOOL-DEVICE virtual-device, DEVICE-TYPE=*VIRTUAL,
DEVICE-ACCESS=*LOCAL-ACCESS(PROGRAM-NAME=*NONE,MNEMONIC=*V)
```

For synchronous mode:

```
/ADD-SPOOL-DEVICE virtual-device, DEVICE-TYPE=*VIRTUAL,
DEVICE-ACCESS=*LOCAL-ACCESS(PROGRAM-NAME=filename,MNEMONIC=xx)
```

where *filename* is the name of the procedure file containing at least the START-PROGRAM command for the application connected to the virtual printer.

xx represents two characters which have not been assigned to a real printer or tape device.

In asynchronous mode there is no communication between the virtual printer and the application. When starting the device, only a supervisor task is started, i.e. no application is started. This task switches the jobs which are accepted by the virtual printer to the KEEP status. The application is started independently and can have access to the list of jobs waiting to be processed via the SHOW-PRINT-JOB-STATUS command and the OPS variables. The processing of the jobs by the virtual printer is completely independent of the work of the associated application.

In synchronous mode, the virtual printer processes only one job at a time and passes on the information to the application. When starting the device, the supervisor task starts the procedure which is defined in the SPOOL parameter file and which contains the start command for the application. Each job scheduled by the virtual device is given immediately to the application. The virtual printer can only begin working on a new job when the application has finished processing the old job and has informed the virtual printer what is to happen with the old job.

The PRINT-DOCUMENT command and the PRNTDOC macro offer the VIRTUAL-PRINTER operand. The default value of this operand ('STD') means that the virtual printer is to receive the print job specified in the SPOOL parameter file. This value can be displayed by a SHOW-SPOOL-PARAMETERS command or SPSEIVE statement. This value can be modified using the SPSEIVE statement MODIFY-SPOOL-PARAMETERS.

For the VIRTUAL-PRINTER parameter in the PRINT-DOCUMENT command the user can specify the value *ALLOWED, *NOT-ALLOWED or *MUST(...) instead of *STD. A print job is allocated to a virtual printer as soon as the user specifies VIRTUAL-PRINTER=*ALLOWED or *MUST(...) in the PRINT-DOCUMENT command.

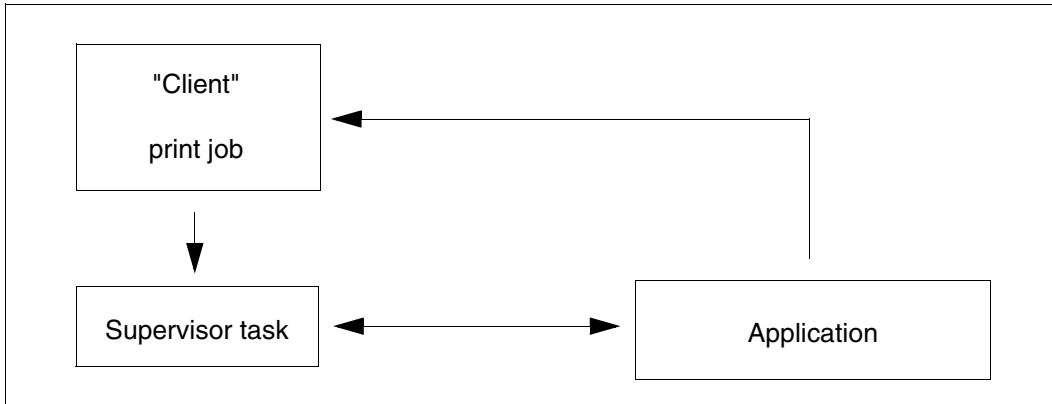
If the user specifies VIRTUAL-PRINTER=*MUST(NAME=*alphanum-name 1..8*, STRING=...), the print job is always allocated to the virtual printer specified under *MUST(...). In the PRNTDOC macro a certain virtual device can be requested by means of the new operand PROGRAM=(name,string).

If the user specifies VIRTUAL-PRINTER=*NOT-ALLOWED, the print job will not be allocated to a virtual printer.

The new device "VIRTUAL" is included in the DEVICE-TYPE operand of the SHOW-PRINT-JOB-STATUS command. Moreover, the result of this command shows without ambiguity the jobs active on the virtual device. The device type VIRT is displayed.

2.4.1 Virtual printers in asynchronous mode

To start the SPOOL virtual device in asynchronous mode, a START-PRINTER-OUTPUT command is given by the SPOOL administrator using a device name which has been associated with the device type *VIRTUAL and PROGRAM-NAME=*NONE. Selection criteria (FORM, SPOOL-NAME, SPOOL-CLASS,...) can be used in the command as for a real device to drive a subset of print jobs in the waiting state to the application task.



If the SPOOL virtual device is started, all the spoolout jobs are scheduled on its supervisor task if the weight associated with the scheduling criteria is the same for both the real device and the virtual one.

For real printers, the scheduling is forced on a specific device only if this device has a weight greater than the other active printers.

Jobs received by the virtual supervisor task are immediately put in the KEEP queue. The application can have access to the list of jobs waiting to be processed via the SHOW-PRINT-JOB-STATUS command.

To obtain more information about a specific print job, the application can use the SHOW-PRINT-JOB-ATTRIBUTES command. The application can store this information in its database and, using rules defined by the customers, submit the job again to SPOOL, cancel it, submit it to an RSO device or to a distributed environment. The MODIFY-PRINT-JOB-ATTRIBUTES command can be used too. Please note that the MODIFY-PRINT-JOB-ATTRIBUTES command with the VIRTUAL-PRINTER parameter forces a new validation of the PRINT-DOC command.

To increase the application capabilities, the new operand PRINT-JOB-CLASS under PRINT-JOB-CONTROL is also offered to the application in the PRINT-DOCUMENT command. This operand is restricted to the SPOOL administrator and systems support. It allows a specific job class to be assigned to a print job. Please note that to be allowed to handle these jobs, the application must run under a user ID which has the SPOOL administrator privilege.

2.4.2 Virtual printers in synchronous mode

In contrast to a virtual printer in asynchronous mode, the supervisor task and the application communicate with each other according to a predefined protocol. A special program interface is available for the dialog between the virtual printer and the application (see below).

The virtual printer accepts a print job and forwards it to the connected application. The application processes this job and then tells the virtual printer what is to happen with the job. For example, the job can be changed to the WAIT or KEEP status or can be canceled.

To add a virtual printer to the SPOOL configuration, the SPOOL administrator must define it in the SPOOL parameter file with SPSEVERE. This is done using the SPSEVERE statement ADD-SPOOL-DEVICE for a device name to which the device type *VIRTUAL is assigned. The name of an application to which the virtual printer is to be linked must be specified in the device definition. A file name is specified as the program name. This is the name of an SDF procedure that contains the start command of the application. This procedure is called during initialization of the supervisor task of the virtual device. If the name of the procedure contains a user ID, the application will run under this user ID. Otherwise, it runs under \$SYSSPOOL. The procedure must be stored there if the name does not contain a user ID.

To start a virtual printer in synchronous mode, the SPOOL administrator must enter the START-PRINTER-OUTPUT command with the name of the virtual printer.

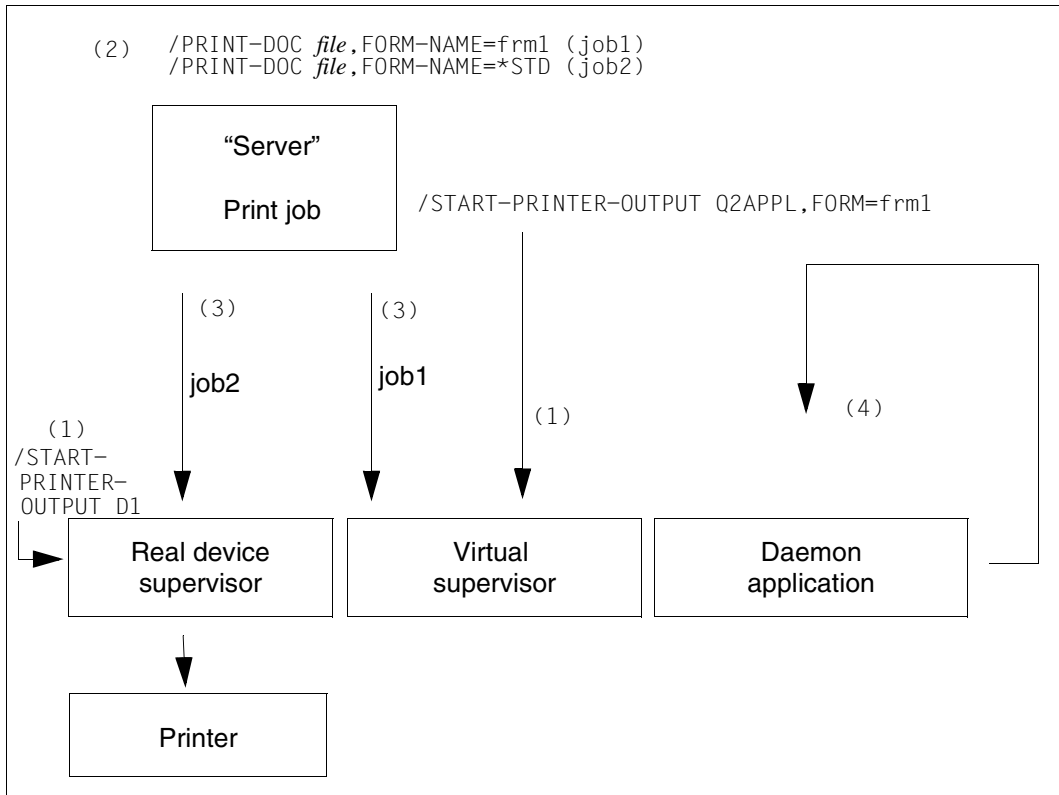
The same job allocation rules apply on synchronous virtual devices as on asynchronous virtual devices.

2.4.3 Usage models

2.4.3.1 Virtual printers in asynchronous mode

A new device Q2APPL is added to the SPOOL parameters file with device type *VIRTUAL. Its role is to manage a queue of print jobs that have some interest for the application APPL. This interest is featured by the selection criteria given when starting the device (e.g. all jobs with FORM-NAME=frm1).

At device startup, a supervisor task is created and acts as the guardian of all print jobs that match the selection criteria given earlier. In its turn, the application APPL can run a daemon process which scans the queue, retrieves info on the available print jobs, handles the jobs and cancels them. This daemon repeats this polling regularly until it is killed by the SPOOL administrator.

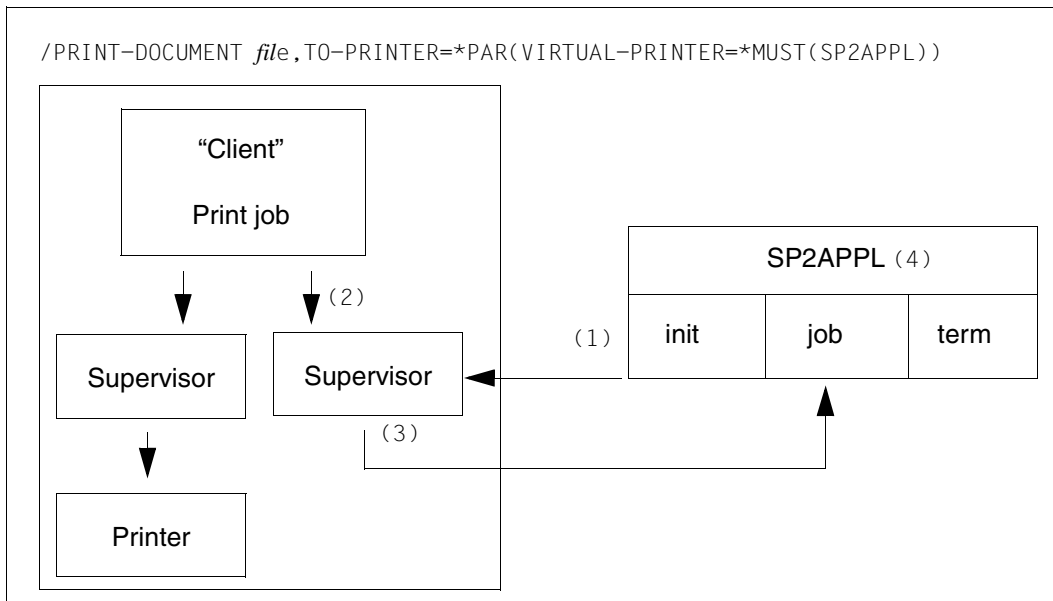


1. After having defined in the SPOOL parameters file both devices D1 as an HP and Q2APPL as a virtual printer, they are started with the appropriate selection criteria. Two supervisor tasks are ready to process received jobs.
2. Jobs 1 and 2 are submitted to the Spool & Print services, validated and given to a server for scheduling.
3. Job2 is scheduled to the real device and treated by the real device supervisor. Job1 matching the selection criteria FORM=frm1 is scheduled on the virtual device supervisor which changes the job status to KEEP.
4. The APPL daemon cyclically performs a list of jobs by means of the SHOW-PRINT-JOB-STATUS command with JOB-TYPE=*KEEP. For each job found, it issues a SHOW-PRINT-JOB- ATTRIBUTES command with the job identification to retrieve the job attributes.

The daemon then processes the print job. A CANCEL-PRINT-JOB for each processed job is entered, deleting the job from the Q2APPL queue and the KEEP queue.

2.4.3.2 Virtual printers in synchronous mode

A printer SP2APPL has been entered in the SPOOL parameter file with the device type *VIRTUAL in connection with a program. This program implements special handling of the jobs and the interface for the dialog with the supervisor of the virtual device.



1. When the virtual device starts, the supervisor task is created. During initialization, the supervisor task checks the definition of SP2APPL and reads the description of this program. An ENTER job of this file is being executed. This task runs under \$SYSSPOOL with the job class \$SYSJC (if no USERID has been specified in the procedure name), the preassigned priority and the job name SP2APPL, the unique ID for the logon procedure.
The user can program and structure the logon procedure as he/she wishes, except that during batch processing a TU program must be loaded and started in order to establish the dialog with the supervisor via the program interface.
2. Every command `PRINT-DOCUMENT file, TO-PRINTER=*PAR(VIRTUAL-PRINTER=*MUST(SP2APPL)` or every print job that matches the selection criteria specified when the virtual device was started becomes a job for the supervisor of the SP2APPL device.
3. The supervisor forwards the job to the application with an action code "job", the job attributes and optionally a character string which was generated at job allocation.
4. This information enables the application to process the job. The application then informs the supervisor that job processing is finished and how it is to proceed with the job. When the virtual printer is terminated, the application receives the action code "term".

2.4.4 Program interface for synchronous mode

In synchronous mode, a virtual printer communicates with a user application. To facilitate this communication, a program interface is available. This interface is described in the "[Spool & Print - Macros and Exits \(BS2000/OSD\)](#)" manual and handles four functions:

SPVDINI

initializes the dialog mechanism between the virtual printer and the user application.

SPVDRCV

receives data from the virtual printer belonging to the application.

SPVDRET

returns the result of processing the last query to the connected virtual printer.

SPVDEND

cancels the connection to the virtual printer.

2.5 Distributed printing in BS2000/OSD, UNIX systems and Windows systems

It is possible to print on any of the printers in the system using Distributed Print Services (Dprint for short) and Xprint, regardless of quality requirements, print volumes or special printer attributes. In this way a sample copy of a print file created on a PC can be printed on a local desktop printer, while a larger number of copies can be printed on a printer connected to BS2000.

Distributed Print Services implements print applications in a network of BS2000 hosts using the transport protocol TCP/IP, ISO or NEA. Dprint requires SPOOL as an execution unit, and increases the print options of SPOOL with regard to the use of "local" BS2000 highspeed printers between hosts and networks.

In a symmetrical client/server architecture, Distributed Print Services provides client and server functions on a BS2000 host, and analogous functions are implemented by corresponding products in UNIX systems and Windows systems. As of Dprint V1.0B, distribution on UNIX systems is supported by SINIX-SPOOL V4.2 and Xprint V1.2. Windows systems are supported as of Dprint V1.0C with Wprint as of V1.0.

This makes it possible to group together a number of computers in a cluster in order to define a transparent environment for printer accesses.

Each cluster system in a Dprint environment must have information on each member of the cluster and the general configuration of the cluster. This information is stored in a configuration file (by default \$SYSDPRINT.DPRINT.PARAMETERS) in the form of objects with specific attributes. All objects are administered exclusively by means of SPSERVE statements. Each object is linked to one or more type records in the configuration file. The attributes of the various objects correspond to operands of SPSERVE statements. (Refer to the "[SPSERVE \(BS2000/OSD\)](#)" manual for more detailed information.)

Dprint is designed on the client/server model and consists of the following components:

- DPRINT-CL (client component: creates the print job)
- DPRINT-SV (server component: manages the print job)
- DPRINT-CM (implements administration services, file transfer, communication, ...)

These components are installed as independent subsystems. DPRINT-CL and DPRINT-CM are shipped together as a single selectable unit, and DPRINT-SV is shipped as a separate selectable unit.

Dprint uses clusters as administration units. A cluster is a number of interconnected BS2000 hosts with their local printers. A cluster can be defined on a multi-network basis. There are local and remote clusters. The cluster configuration is created using SPSEVERE statements. The following applies to a cluster:

- single point of administration
- single point of configuration
- single system image
- cluster interoperability

Dprint can be used in the following software environment:

- BS2000/OSD-BC \geq V1.0 with SPOOL \geq V3.0
- DCAM \geq V11.0 and PDN \geq V8.0C
- FT-BS2000 \geq V5.0 and FTAC \geq V2.0

Note

Dprint versions $>$ V1.0 will allow cross-network access to printers in UNIX systems and interoperability between BS2000 and UNIX system based clusters.

Dprint versions as of V1.0C allow cross-network access to Windows printers and interoperability between BS2000 and Windows clusters.

Distributed Print Services is described in detail in the "[Distributed Print Services \(BS2000/OSD\)](#)" manual.

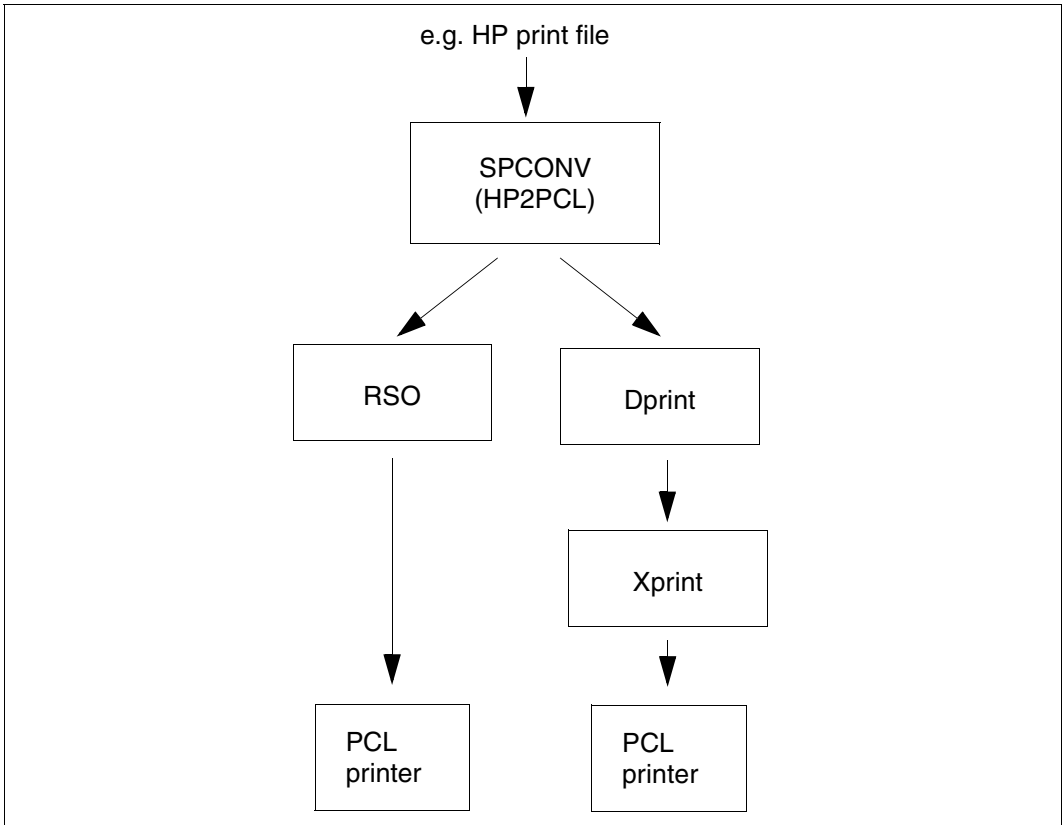
2.6 Use of filters

The SPCONV subsystem implements filter methods in the Spool & Print environment. Filters give documents and print resources the format they require so that the document can be output to a particular printer. Filters put the user in a position to start print jobs which cannot normally be executed because the document format is no longer supported or is not supported by any of the available printers.

SPCONV provides functions which can be used to define and activate filters (see the "[SPCONV \(BS2000/OSD\)](#)", "[SPSERVE \(BS2000/OSD\)](#)" and "[PRM \(BS2000/OSD\)](#)" manuals).

2.6.1 Usage models for filters

- When old remote printers are removed from an RSO configuration and replaced by modern printers with new capabilities, production can be redirected to the new printer without modifying existing applications. Only one filter must be defined to convert the old document format into the corresponding new format.
- The use of filters allows documents which exist in printer languages which are no longer supported to be migrated to documents which allow the format to be output on the printers available.
- It is sensible to refine the document during the creation process by printing sample copies, for example, on a client desktop PCL printer. You can then safely go ahead and print a large number of copies. Depending on the format of the document you will also require filter which converts it.



Printing HP files on PCL printers

2.7 The Spool&Print Explorer

The Spool&Print Explorer is the graphical user interface (GUI) for Spool & Print administration on BS2000 systems. The Spool&Print Explorer is a centrally and graphically-oriented administration program on a PC for Spool & Print administrators and/or end users.

The Spool&Print Explorer is based on DESK2000 and allows the user to browse BS2000 Spool & Print objects using a Windows or Windows NT Explorer. It is represented by a symbol on the desktop and is integrated in the Windows Explorer on the same level as the subdirectories "Files", "Jobs" and "Job Variables" of the BS2000 link object. (The DESK2000 Explorer is based on an expandable structure which it provides for the administration of certain BS2000 objects and communication methods along with the BS2000 server).

Spool&Print Explorer V2.1A recognizes SPOOL, RSO and DPRINT objects, as well as their resources, and offers administration functions and access to information about printers, printer pools and print jobs. As soon as the connection to DESK2000 has been set up, you can manage printers, printers pools and print jobs from the Windows Explorer.

Spool&Print Explorer V2.1 can be used with Windows 95 or higher or with Windows NT as of V4.0 and BS2000/OSD-BC as of V1.0.

The following products are needed to allow use of Spool&Print Explorer V2.1:

Windows:	Spool&Print Explorer V2.1
	DESK2000 as of V4.1A
BS2000/OSD:	SPOOL as of V4.3A
	RSO as of V3.1A (optional)
	DPRINT as of V1.0I (optional)
	SDF-SRV as of V3.0B
	SPOOLSYS V2.0B

It is usually possible to set up a connection to a BS2000 server which is configured with a different version of SPOOL or RSO, but this cannot be guaranteed:

- Connection to BS2000 with an earlier version:
The Spool&Print Explorer uses the API extension for SPOOL V4.1A which was introduced for device management purposes. Calls of this type are rejected. It is, however, possible to work using RSO V3.0. You must make sure that the new functions of RSO V3.1A (e.g. new device types) are known to the Spool&Print Explorer. Trying to use these functions with an earlier version of RSO will lead to error messages or to processing errors.
- Connection to BS2000 with a later version:
The new functions introduced in SPOOL and RSO products are not known to the Spool&Print Explorer.

The connection to the BS2000 server is managed using the appropriate emulation and communication functions of DESK2000.

The emulation allows you to define the TCP/IP address of the server host. If this is known to the emulation, the DESK2000 function ADD-CONNECTION can be used to establish the connection and to identify the profile of the initiator. This function queries the user ID, account and password. These specifications must be defined on the BS2000 system and are used to log on to the server. The authorizations associated with the user ID define the operations that the initiator is permitted to carry out. A normal user is only permitted access to their own objects. An RSO device manager may access his or her devices and the associated jobs. The SPOOL administrator has complete control over the Spool & Print objects that belong to that BS2000 session.

It is possible to create a range of connections during a single BS2000 session by executing the ADD-CONNECTION function under different user IDs.

The ADD-CONNECTION function can be executed from the same Explorer window several times and thus set up a connection to a different BS2000 server each time.

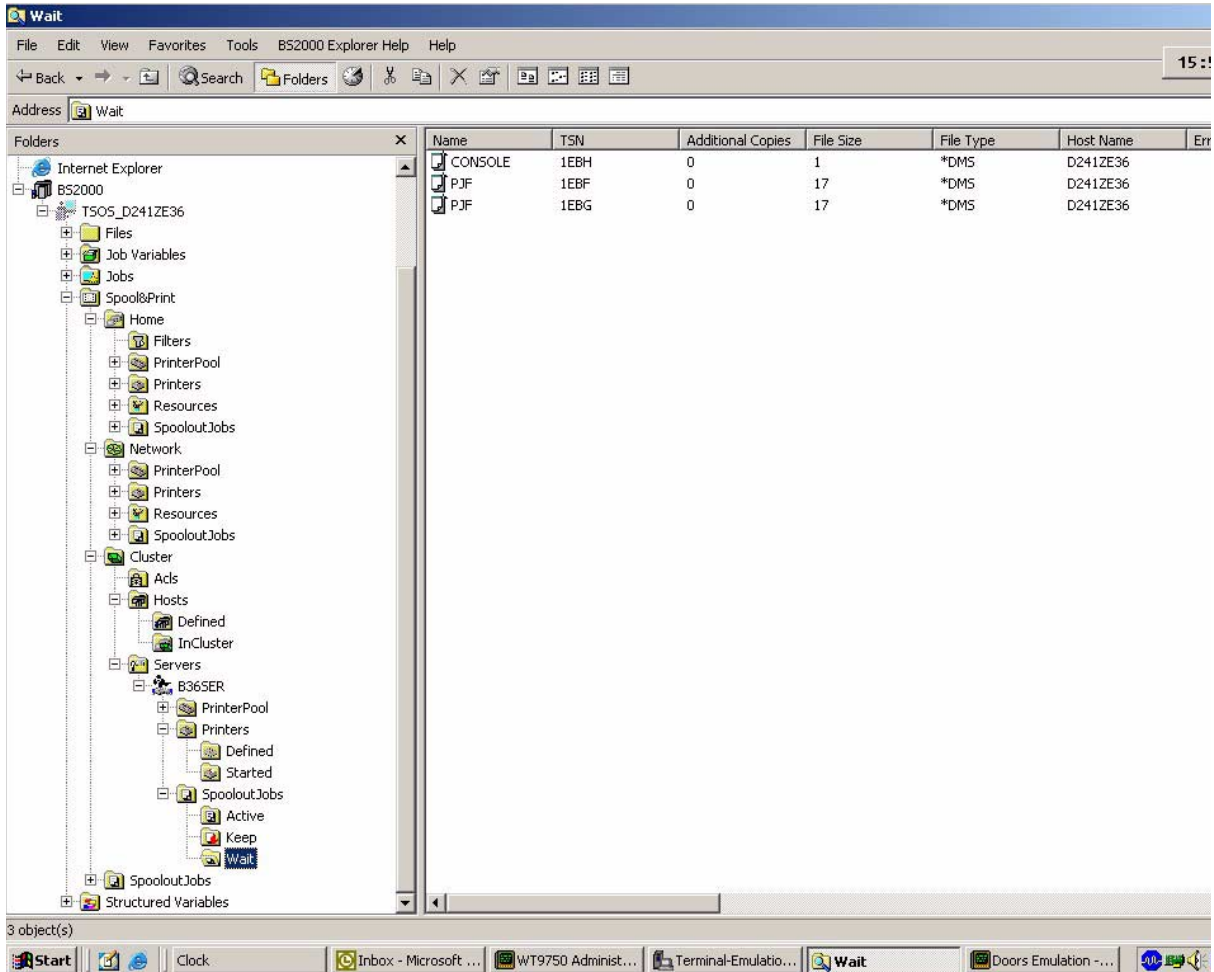
Note

A file (.drk) with emulation parameters (created using a DOORS emulation) can be passed when the ADD-CONNECTION function is executed. This parameter file may contain a “start script”. In this case the logon data given in the “start script” is used in place of the logon data specified in the ADD-CONNECTION function.

2.7.1 The Spool&Print Explorer concept

The Windows Explorer has two subwindows:

- the *tree view*, which shows a folder hierarchy through which the user can navigate.
- the *list view*, which shows information related to that folder which is currently selected in the *tree view*.



The *Spool&Print* folder forms the root directory for all Spool & Print objects. It is integrated as a subdirectory of the BS2000 connection on the same level as the subdirectories "Files", "Jobs" and "Job Variables".

The *Spool&Print* folder contains

- the subdirectory *Home*, the root directory for the SPOOL objects,
- the subdirectory *Network*, the root directory for the RSO objects,
- and the subdirectory *Spoolout Jobs*, which includes all the Spool & Print jobs on the server.

The data displayed in the *list view* depends on the folder selected in the *tree view*. The *list view* shows either subdirectories or elements. There are two types of element: printers and jobs. If you select the *Details* command from the *View* menu, the element attributes are also displayed in the list view.

You can open several Explorer windows simultaneously. You can run several BS2000 sessions at the same time, either from the same Explorer window or from different instances of the Explorer.

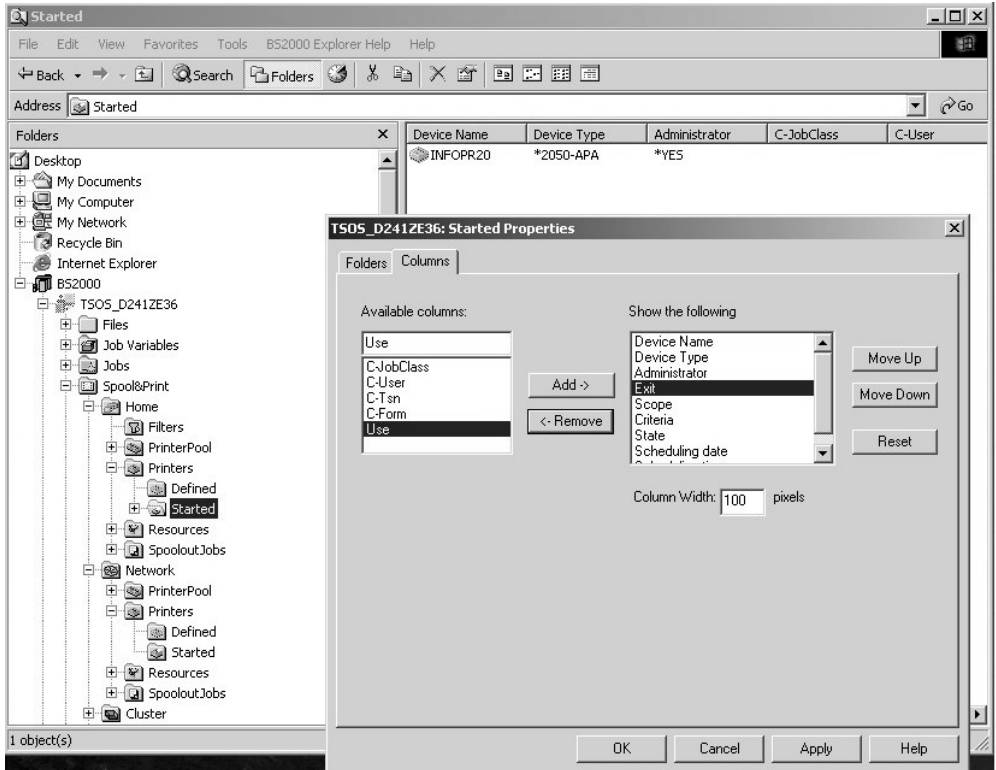
Properties window

There is a properties window for each folder and the elements that belong to it. You can access the properties window by selecting *File/Properties* from the menu or by right-clicking and selecting it from the popup menu. The properties window offers various tabs for folders and/or elements depending on their level in the hierarchy.

The following tabs are available:

- If the selected folder is not the lowest subdirectory in the hierarchy, the properties window contains a *Folder* tab where you can select the subdirectories that are to be displayed.

- If the selected folders contain elements that are to be displayed in the list view, the properties window contains a *Columns* tab which allows you to define the scope and sort sequence used to display the element attributes in the right-hand side of the Explorer window.



- The *Selection* tab allows you to filter the selected elements. The values specified in this tab are used for BS2000 queries in order to display those Spool & Print objects which correspond to the selection criteria.

TS05_D241ZE36: SpooloutJobs Properties

Folders Selection

Destination

Name Device name Device type

*ALL *ALL *ALL

Character set number

*ALL Low: 1 High: 32767

Form overlay buffer

*ANY Low: 0 High: 32767

Priority

*ALL Low: 30 High: 255

Userid *STD Spoolout class *ALL

Form name *ALL Spoolout name *ALL

Account number *ALL Rotation *ANY

Virtual printer name *ALL Format name *ALL

Error message *ANY

OK Cancel Apply Help

Each property window contains the following buttons:

- | | |
|---------------|--|
| <i>OK</i> | The changes made in the various tabs are applied and the dialog box is closed. |
| <i>Cancel</i> | No changes are made. |
| <i>Apply</i> | This has the same effect as the “OK” button, but the dialog box remains open. |
| <i>Help</i> | Calls the online help system. |

Spool & Print object methods

Actions relating to Spool & Print objects are controlled using the object type.

If you right-click on an object, a popup menu containing the possible methods for this object will appear. If available, an additional dialog box will appear containing the command setting options. The selection made by the user is then translated into BS2000 Spool & Print commands which are issued to the server.

The execution is done on the user's user-id and limited by his privileges. No privilege validation is done on the PC. Error messages are returned by the host if the privileges are not sufficient. The 'user-profiles' feature allows to reduce the interfaces to the correct functions (see [section "User profiles" on page 50](#)). The Spool&Print Explorer uses DESK2000 services to forward these messages to the PC. As a result of DESK2000 filtering, warning messages are not passed to the PC.

In addition to this, changes that are made by BS2000 to the Spool & Print configuration do not automatically cause the tree view and list view of the Spool&Print Explorer to be refreshed. You must explicitly request that the graphical data be refreshed by pressing the screen refresh function key (F5).

The following tables show the local and distributed objects and their possible methods. The following abbreviations are used:

- F = *Folder thumbnail*
- C = *Columns*
- V = *Selection*
- Ss = *Scheduling Settings*
- Ds = *Static Settings*
- S= *Settings*

Local objects

S&P Folder / Items	Start	Stop	Resume	Hold	Print	New	Delete	Redir.	Properties
SPOOL&Print									F, S
Network / Home	X	X	X	X					F,S
Filters	X	X	X	X		X			C,V
Printer Pool						X			F
<Named> Pool	X	X			X		X		S,C
Printers									F
Printers defined						X			C,V
Printers started	X								F,C
<Named> Printer		X		X	X			X	C,Ss,Ds
Resources									F
CharSets						X			C,V
Forms						X			C,V
Spoolout jobs									F,V
Spoolout Job active									C,V
Spoolout Job wait									C,V
Spoolout Job keep									C,V
<i>Charset Item</i>						X	X		S
<i>Filter Item</i>						X	X		S
<i>Form Item</i>						X	X		S
<i>Printer item</i>	X	X		X	X	X	X	X	Ss, Ds
<i>Spoolout Job item</i>			X			X	X	X	S

Distributed objects

S&P Folder / Items	S	S	Re	Show	Hold	Cre	A	Attach	Detach	New	Verify	Logg	Delete	Prop
	t	t	sume			ate	d					ing		erties
	a	o												
	r	p												
	t													
Cluster	X	X	X	X	X	X					X	X	X	F,S
Acls										X				C,V
Hosts														F
Hosts defined										X				C,V
Hosts in-cluster							X							C,V
Servers										X				S,V
<Named servers>													X	F,S
<i>Acl Item</i>										X			X	S
<i>Host Item</i>							X	X	X	X			X	S
<i>Printer item</i>	X	X			X					X			X	Ss, Ds
<i>Spoolout Job item</i>			X							X			X	S

Group processing

The Spool&Print Explorer allows you to select several objects at once. This, in conjunction with the Drag&Drop function, allows you to process a group of objects, which in turn makes management easier.

Multiple selection

You can select several jobs or device elements (using the mouse and the SHIFT or CTRL key).

Then right-click the mouse and select the method you wish to apply to all of the selected items.

If an error occurs for one of the selected elements, a BS2000 error message is issued followed by an error message sent to the Spool&Print Explorer.

Drag&Drop function

Drag&Drop operations are not possible between all Spool & Print objects. The Drag&Drop function can be executed for a range of objects (using multiple selection). There is a corresponding command in the popup menu of either the source or target object for each Drag&Drop operation.

You can carry out a Drag&Drop operation between two instances of the Explorer and between BS2000 sessions on the same host. Any attempt to Drag&Drop between two BS2000 sessions on different hosts will be rejected.

If the operation you are attempting to perform is not permitted, nothing will happen. No warning message is displayed.

Drag and Drop, local environment

The following table shows the permitted Drag&Drop operations, and the resulting commands. H stands for home, N for network and S for spoolout jobs:

From		To		<named> printer pool		Started printer		<named> printer		Printer item		Active job			Keep job			Wait job		
		H	N	H	N	H	N	H	N	H	N	S	H	N	S	H	N	S		
named Ppool	H			2																
	N				2															
named printer	H	8								4		4	5		5	6			6	
	N		8								4	4		5	5		6		6	
Printer item	H	8		1																
	N		8		1															
Keep job item	H	7						7									3		3	
	N		7				7	7										3	3	
	S	7	7				7	7	7											3
Wait job item	H	7						7												
	N		7				7		7											
	S	7	7				7	7	7											

The following BS2000 commands are carried out with the permitted Drag&Drop operations for all selected elements. The numbers in the table correspond to the numbers of the appropriate commands:

- 1 /START-PRINTER-OUTPUT
 - 2 /START-PRINTER-OUTPUT for each of the printers in the pool
 - 3 /RESUME-JOB JOB-ID=*TSN(TSN=*tsn*)
 - 4 /HOLD-PRINT-JOB JOB-ID=*DEV-NAME(DEV-NAME=*printer*),
RESUME-COND=*IMMEDIATE
 - 5 /HOLD-PRINT-JOB JOB-ID=*DEV-NAME(DEV-NAME=*printer*),
RESUME-COND=*BY-OPERATOR
 - 6 /HOLD-PRINT-JOB JOB-ID=*DEV-NAME(DEV-NAME=*printer*),
RESUME-COND=*BY-PRIO(PRIO=*n*)
 - 7 /REDIRECT-PRINT-JOB JOB-IDENTIFICATION=*TSN(TSN=*tsn*),TO-DEVICE= ...
 - 8 /START-PROG SPSERVE
- for each of the devices defined in the pool list:
//MOD-PRINTER-POOL POOL-NAME=*pool*, DEV-NAME=*ADD(NAME=*printer*)

Drag and Drop, distributed environment on the same host

To		In-cluster hosts	Hosts item	named servers	named printer pool	Started printer	Active job	Keep job	Wait job	Cluster
From		C	C	C	C	C	C	C	C	C
named Ppool	C					1				
named printer	C				2		12	10	11	
Printer item	H			4						
	C				2	3				
Acl item	C		5	6						
Host item	C	7								13
Keep job item	H			8						
	C			8					9	
	S			8						
Wait job item	H			8						
	C			8						
	S			8						

The following BS2000 commands and statements are carried out with the permitted Drag&Drop operations for all selected elements. The numbers in the table correspond to the numbers of the appropriate commands:

- 1 /START-PRINTER-OUTPUT for each device belonging to the distributed pool.
- 2 /START-SPSERVE
//ASSIGN *DPRINT-PARAMETERS
//MODIFY-DPRINT-PRINTER-POOL POOL-NAME=*target ppool*,
PRINTER-NAME=**ADD(selected distributed printer)*
- 3 /START-PRINTER-OUTPUT for the selected distributed printer
- 4 /START-SPSERVE
//ASSIGN *DPRINT-PARAMETERS
//ADD-DPRINT-PRINTER PRINTER-NAME=*name to be chosen*,
SERVER-NAME=*target named server*,
LOCAL-PRINTER-NAME=*selected local printer item*

```
5 /START-SPSERVE
  //ASSIGN *DPRINT-PARAMETERS
  //MODIFY-DPRINT-HOST HOST-NAME=target host item,
    ACCESS=selected acl item

6 /START-SPSERVE
  //ASSIGN *DPRINT-PARAMETERS
  //MODIFY-DPRINT-SERVER SERVER-NAME=target named server,
    ACCESS=selected acl item

7 /MODIFY-DPRINT-CLUSTER HOST-NAME=selected host item,ACTION=*ADD
8 /MODIFY-MULTIPLE-PRINT-JOBS
9 /RESUME-PRINT-JOB JOB-ID=*TSN(TSN=tsn)
10 /HOLD-PRINT-JOB JOB-ID=*DEV-NAME(DEV-NAME=printer),
    RESUME-COND=*BY-OPERATOR
11 /HOLD-PRINT-JOB JOB-ID=*DEV-NAME(DEV-NAME=printer),
    RESUME-COND=*BY-PRIO(PRIO=?)
12 /HOLD-PRINT-JOB JOB-ID=*DEV-NAME(DEV-NAME=printer),
    RESUME-COND=*IMMEDIATE
13 /CREATE-CLUSTER
```

Drag and Drop, Distributed environment, different hosts

	To Host2	Filters	Charsets	Forms	Defined printer	Acls	Defined hosts	Servers
From Host1		H	H	N	H	N	H	N
Filter item	H	4						
Charset item	H		3					
	N			3				
Form item	H				2			
	N					2		
Printer item	H						1	
	N							1
	C							
Acl item	C							
Host item	C							
Named server	C							

The following BS2000 commands and statements are carried out with the permitted Drag&Drop operations for all selected elements. The numbers in the table correspond to the numbers of the appropriate commands:

- 1 /START-SPSERVE on Host2
//ASSIGN *SPOOL-PARAMETERS
//ADD-SPOOL-DEVICE DEVICE-NAME=*selected printer item and its settings on Host1*
- 2 /START-SPSERVE on Host2
//ASSIGN *SPOOL-PARAMETERS
//ADD-SPOOL-FORM FORM-NAME=*selected form item and its settings on Host1*
- 3 /START-SPSERVE on Host2
//ASSIGN *SPOOL-PARAMETERSs
//ADD-SPOOL-CHARACTER-SET CHAR-NAME=*selected charset item and its settings on Host1*
- 4 /START-SPSERVE on Host2
//ASSIGN *SPOOL-PARAMETERS
//ADD-SPOOL-FILTER FILTER-NAME=*selected filter item and its settings on Host1*

- 5 //START-SPSERVE on Host2
//ASSIGN *DPRINT-PARAMETERS
//ADD-DPRINT-ACCESS-CONTROL CONTROL-NAME=*selected acl item and its settings on Host1*
- 6 /START-SPSERVE on Host2
//ASSIGN *DPRINT-PARAMETERS
//ADD-DPRINT-HOST HOST-NAME=*selected host item and its settings on Host1*
- 7 /START-SPSERVE on Host2
//ASSIGN *DPRINT-PARAMETERS
//ADD-DPRINT-SERVER SERVER-NAME=*selected named server and its settings on Host1*
- 8 /START-SPSERVE on Host2
//ASSIGN *DPRINT-PARAMETERS
//ADD-DPRINT-PRINTER SERVER-NAME=*selected named server and its settings on Host1*

User authorizations

The user ID used to establish the BS2000 connection determines the range of administrator functions available to the user. The BS2000 command handling routine of Spool & Print then either carries out the command on the basis of the user authorizations or not, as appropriate.

Normal users are permitted to access their own objects only. RSO device administrators are permitted to manage their devices and the jobs that belong to them. The SPOOL administrator has complete control over the Spool & Print objects in the BS2000 session.

2.7.2 Use of the Spool&Print Explorer

The introduction of the Spool&Print Explorer has brought with it several improvements in the administration of Spool & Print. The central monitoring based on the graphical user interface simplifies access to the data of complex configurations.

- The symbol structure allows you to recognize the Spool & Print object status.
- The option of modifying the view allows you to concentrate on particular configuration domains.

In addition, the multiple selection function in conjunction with Drag&Drop allows the administrator to select groups of objects to be processed, thus reducing administration and errors to a minimum. The majority of special administration scripts are no longer required.

Example

You wish to access three BS2000 hosts simultaneously, and log on to

- Host1 as a normal RSO user.
You want to monitor the progress of the jobs waiting to be processed, regardless of the type of job using the Spool & Print configuration. In addition to this, you wish to call up information on jobs organized by job name.
- Host2 as an RSO device administrator of 5 of the 11,000 defined devices.
You only want information relating to the five devices you are responsible for. The information may relate to definitions, time settings or status. You must be in a position to restart all jobs sent to *DEVHOST2* and which are on hold.
- Host3 as SPOOL administrator (with the authorization PRINT-SERVICE-ADMINISTRATION).
You must start all the RSO devices on *Floor Y*. (These devices are defined in the *Identification* field of the device set in the SPOOL parameter file for *Floor Y*.)
You must also divert all waiting jobs that use the *STDF1* form to the RSO device called *DEVHOST3*.

Until now you had to either contact each host directly or use emulations. Then you had to extract the information you require from the output data using various Spool & Print commands.

– On Host1:

This function is not possible without an administration script. You must analyze a SYSLST file or use the OPS variables to generate a JCL procedure:

SHOW-PRINT-JOB-STATUS for each TSN displayed,
to execute a SHOW-PRINT-JOB-ATTRIBUTES command
to extract the job name from the output information
to manage an internal table “TSN/Job name” to allow the display to be sorted.

– On Host2:

Administration scripts must be created for this task as well.

A separate SHOW-ACTIVE-SPOOL-DEVICES command must be executed for each of the managed devices, otherwise the command delivers information for every active device.

The SHOW-SPOOL-DEVICES command must be used to specify selection criteria to ensure that information is called for managed devices only.

To restart the jobs in DEVHOST2, the script must analyze the output of the SHOW-PRINT-JOB-STATUS command in order to be able to call the appropriate TSN and to issue a RESUME-TSN command for each job.

– On Host3:

As for the other hosts, an administration script must be written for this process.

This script must issue a SHOW-SPOOL-DEVICES command with “Identification=*Floor Y*” as a selection criterion. It must also extract the name of the workstation for each entry found and issue a START-PRINTER-OUTPUT command. A SHOW-PRINT-JOB-STATUS command should refer to all jobs using the *STDF1* form. For each TSN displayed, a MODIFY-PRINT-JOB-ATTRIBUTES command should be carried out to redirect the job to the *DEVHOST3* device.

The following section shows how the Spool&Print Explorer makes management simpler.

You must open an Explorer window to enter your BS2000 user ID, account number and password on HOST1, HOST2 and HOST3 to execute the three ADD-CONNECTION commands.

Then you must adapt the relevant folder view and select the appropriate records using the Drag&Drop method. All modifications remain valid until explicitly modified again, even if the PC is switched off. If the monitoring environment is defined, all you have to do is open the selected folders and examine the displayed and filtered information.

In our example, you must do the following:

- Open the folder *HOST1/Spool&Print/Spoolout Jobs/Wait* by clicking in the list view on the *Name* column.

If you only want to look at the folder *Spoolout Jobs*, you can open the folder *HOST1/Spool&Print* and click on *Properties/Folder* to reset the *Network* flag.

- Open the folder *HOST2/Spool&Print/Network/Printers/Defined* by clicking on *Properties/Selection*, set the user ID to **OWN* and then confirm to open the folder. The five devices are displayed in the list view. To define the device you must select the appropriate device and click on *Properties/Static Settings*.

Open the folder *HOST2/Spool&Print/Network/Printers/Started* by clicking on *Properties/Selection*, set the user ID to **OWN* and then confirm to open the folder. The subdirectory for started devices is included in the tree view. In order to define the device or to make time settings, you must simply select the appropriate device and click on *Properties/Static Settings* or *Properties/Scheduling Settings*.

Open the folder *HOST2/Spool&Print/Network/Spoolout Jobs/Keep* by clicking on *Properties/Selection*, set the user ID to **OWN* and set the device name to *DEVHOST2*. The affected jobs, as shown in the list view, can be selected and dragged to the *Wait* folder.

- Open the folder *HOST3/Spool&Print/Network/Printers/Defined* by clicking on *Properties/Selection*, set the identification to *Floor Y* and then confirm to open the folder. The affected devices are shown in the list view. You can select the ones you require and drag them to the started folder.

Open the folder *HOST3/Spool&Print/Network/Printers/Started*. The folder *DEVHOST3* will be included in the tree view.

Open the folder *HOST3/Spool&Print/Network/Spoolout Jobs/Wait* by clicking on *Properties/Selection*, set the form name to *STDF1*. The affected jobs shown in the list view can be selected and dragged to the folder *DEVHOST3*.

2.7.3 User profiles

In general, the Spool&PrintExplorer displays all possible methods, independently of the privileges of the current userid. The end user has thus the possibility to launch actions that are rejected by the host. On the other hand, the end user has the possibility to start complex actions, sometimes by a simple click or key press. The administrator has the possibility to control the operations that are allowed to an end user through a profile.

When installing the Spool&Print Explorer, the administrator is prompted to specify a path to the profile to be used. The location can be local to the concerned PC, or can be on another one in the network. the file specifies which actions on which objects are allowed. This path is kept in the user registry.

This feature is a filter, but does not provide an absolute security. The ultimate security is the one provided by the userid of the BS2000 task.

2.8 Support of the SPOOL Notification Service

In the context of Spool & Print, it is now possible to be notified of various events occurring during a printer session or during the lifetime of a print job. This functionality is available for SPOOL, DPRINT and RSO thanks to the software product SNS. Notification by mail, by procedure or in a file is provided.

This section describes the main guidelines for taking benefit of this functionality as easily as possible:

- SPOOL notification resources
- Supported print job attributes
- Dedicated privilege policy
- Support of the Notification Service in the PRINT-DOCUMENT command
- Support of the Notification Service in the program interface
- Usage models
- SNS installation
- Spool & Print registration
- How to receive my first notification?

For a detailed description of the SPOOL Notification Service, please refer to the [“SNS \(BS2000/OSD\)”](#) manual.

2.8.1 SPOOL notification resources

To exploit the SPOOL Notification Service, a user or administration has to subscribe to this service. A 'subscription' is made of:

- the object(s), that is job(s) or device(s) that are concerned
- the event(s) occurring to those object(s) that must be notified
- the method of notification, that is a mail, a procedure or a record in a file, with the attributes of the object(s) that must be reported

The SPOOL Notification Service provides the tool and interfaces to create such a 'subscription' and to register it.

In Spool & Print, the following types of print jobs are concerned:
local spool jobs, rso print jobs, and distributed print jobs.

In this section, local printers and local print jobs are addressed in detail.

2.8.1.1 Registration into the Notification Service

In order to make the notification for printers and print jobs available, it is necessary to define some notification resources that are specific to SPOOL. Those resources have to be registered in the Notification Service. A specific procedure has been released for this purpose: SYSPRC.SPOOL.046.NOTIF. This procedure has to be executed once, after the installation of SPOOL V4.6A and SNS as of V1.0A. See [section "Spool & Print registration" on page 64](#). See also the release notices of both products for details.

2.8.1.2 Object classes

The object class corresponding to local printers is named SPOPRNTR.

The object class corresponding to local print jobs is named SPOOLJOB. Both belong to the domain SPPRINT.

2.8.1.3 Events

The following events for printers and print jobs are supported by SPOOL:

Event names	Meaning
Events for printers	
PRINTERSTARTED	Raised when a printer is assigned for spoolout
PRINTERSTOPPED	Raised when the assignment for spoolout of a printer is cancelled
PRINTERINERROR	Raised when an error occurs on a printer (no paper, paper jam, etc.)
Events for print jobs	
PRINTJOBACCEPTED	Raised when a new print job is accepted
PRINTJOBMODIFIED	Raised when an existing print job is modified. This occurs after filtering or when one of the following commands is given: MODIFY-PRINT-JOB-ATTRIBUTES REDIRECT-PRINT-JOB
PRINTJOBSTARTED	Raised when a print job spoolout is started on a printer, a tape or a virtual device. This includes also the activation of a print job on a IDOM application entry.
PRINTJOBABORTED	Raised when a print job terminates abnormally. This occurs when: <ul style="list-style-type: none"> – a CANCEL-PRINT-JOB command is givent – a spoolout controller terminated a print job abnormally – a cold or selective start of the SPOOL subsystem is given
PRINTJOBCOMPLETED	Raised when a print job terminates successfully
PRINTJOBSUSPENDED	Raised when a spoolout controller interrupts the processing of a print job and puts it in wait state
PRINTJOBKEPT	Raised when a print job is put in keep state. This occurs when <ul style="list-style-type: none"> – a spoolout controller keeps a print job after an error – an EXPORT-PUBSET command is given
PRINTJOBRESUMED	Raised when a print job changes from keep state to wait state. This occurs when one of the following commands is given: <ul style="list-style-type: none"> – RESUME-PRINT-JOB – IMPORT-PUBSET

2.8.2 Supported attributes

At each raise event action triggered by the SPOOL processing, a set of attributes is made available for notification processing. This means that all of these attributes can be used in the text of the method templates as well as in creating the subscriptions provided that the exact attribute names described below are used.

All the attributes are present at each raised event. However, some of them may have no value because they are not relevant in the context. In this case, the returned value is one blank.

Supported printer attributes

These attributes are the same as those returned by a /SHOW-ACTIVE-SPOOL-DEVICES command:

Attribute names	Possible Values	Meaning
DEV-NAME	<dev-name>	Device name
STA	A / D / I / M / R / S / W	Printer status
CURR-USER-ID	<user-id>	User id of the current job
CURR-TSN	<tsn>	TSN of the current job
ERR-CODE	<error code>	Error code
ERR-MSG	<void>	Compatibility with RSO
EXIT	NO/YES	Is an exit activated for the specified device?
SRAM-TSK	<void>	Compatibility with RSO
CTRL-TSK	<void>	Compatibility with RSO
CURR-FORM	<form name>	Form name of the current job
SCOPE	*LOCAL *CLUSTER	Printer scope

Supported print job attributes

The print job attributes are the following:

- The same attributes as those provided as OPS variables resulting of a `SHOW-PRINT-JOB-ATTRIBUTES TSN=(XXXX), INFORMATION=ALL`

Examples

```
var(*LIST).TSN
=> attributes TSN
```

```
var(*LIST).OVERLAY-RESOURCE.OVERLAY.FACE
=> attribute OVERLAY-RESOURCE.OVERLAY.FACE
```

The returned values of those attributes are the same as those returned in the OPS variable.

- A set of additional attributes:

Attribute names	Possible Values	Meaning
FILE-TYPE	*OMF *PLAM *SYSLST *SYSOUT *EAM *UFS *BS2 *TMP	Type of the spoolout file
FCB-TYPE	*PAM *SAM *ISAM *EAM TAPE *BTAM	File access method
REC-FORM	*V *F *U	Record format
JOB-TYPE	*SPOOL-JOB DPRINT-JOB *CLIENT-COPY *SERVER-COPY	Print job type
RSO-PRINT-JOB	*YES *NO	Print job is RSO or not
CLUSTER-TYPE	*HOME *UNIX *BS2000	Cluster type from which the print job has been submitted

Attribute names	Possible Values	Meaning
SBSD-CALLER	*YES *NO	Print job has been processed by the BSD gateway
SYSLST-NUMBER	Syslst-number(1..2) Value 1..99	Syslst number
EAM-NUMBER	EAM number (1..5) Value 1..65535	Eam number
REC-SIZE	Number(1..5) Value 1..65535	Record size
BLOCK-SIZE	Number(1..5) Value 1..65535	Block size
FOB-SIZE	Number(1..5) Value 1..65535	Fob size
PRINTER-PAGE-NBR	Number(1..n)	Number of pages to be spooled out
ESTIM-SIZE	Number(1..n)	Estimated spoolout size
KEYPOS	Number(1..5) Value 1..65535	Key pos for ISAM file
KEYLEN	Number(1..3) Value 1..255	Key length for ISAM file
PPAGE-USED	Char(10)	Number of PAM pages used
SEQUENCE-NBR	Number(1..3) Value 0..255	Order number of family print jobs
MAILING-ADDRESS	Char(64)	Mailing address
CCSNAME	Char(8)	Coded character set
USERID	Char(8)	Userid
ACCOUNT	Char(8)	Account number
ACCOUNT-ID	Char(8)	Account id number
LONG-USER-ID	Char(1..255)	Long user id for print jobs in UNIX systems
LONG-HOST-NAME	Char(1..255)	Long host name for print jobs in UNIX systems
POSIX-FILE-NAME	Char(1..1024)	Full file name of POSIX file
RSO_PRINT_JOB	*YES *NO	RSO job indicator
CLIENT-HOSTNAME	Char(8)	Name of the client host

2.8.3 Dedicated privilege policy

A specific privilege policy checks if the owner of a subscription can be notified of the events of a specific local printer or of a print job. This policy is provided as a call back subroutine used by SNS.

Privilege rule for print jobs

A userid with the PRINT-SERVICE-ADMINISTRATION privilege can be notified of all the local printers defined in the system.

Privilege rules for print jobs

1. A userid with the PRINT-ADMINISTRATION privilege can be notified of
 - all its own print jobs
 - all the print jobs of all other users.
2. A userid without Spool & Print privileges can be notified of all its own print jobs.

2.8.4 Support of the Notification Service in SPSEVE

The following SPSEVE statements have been extended with the operand NOTIFICATION to support the notification service:

- ADD-SPOOL-DEVICE in order to support notification handling
- MODIFY-SPOOL-DEVICE in order to support notification handling
- SHOW-SPOOL-DEVICE
in order to select devices for which notifications are permissible

For details, refer to the SPSEVE documentation.

2.8.5 Support of the Notification Service in the PRINT-DOCUMENT command

In the PRINT-DOCUMENT command, the operand NOTIFICATION allows a user to request notifications at print job submission (temporary subscription).

The permanent subscriptions are realised asynchronously. In the PRINT-DOCUMENT command, the previous subscriptions can be discarded temporarily for the current print job by selecting NOTIFICATION=*NO.

It is also possible to temporarily associate a different subscription with the current print job by specifying the subscription attributes in the PRINT-DOCUMENT command.

For a detailed description of the NOTIFICATION parameter of the PRINT-DOCUMENT command see the “[Spool & Print - Commands \(BS2000/OSD\)](#)” manual.

2.8.6 Support of the Notification Service in the program interface

At the Spool & Print program interface the Notification Service is supported in the following way:

- PRNTDOC

The operand NOTIFPAR of the PRNTDOC macro allows the access to the Notification Service by program. With this operand a specific notification area described by the macro SNPPRNT can be anchored. For a detailed description of the NOTIFPAR parameter see the “[Spool & Print - Macros and Exits \(BS2000/OSD\)](#)” manual.

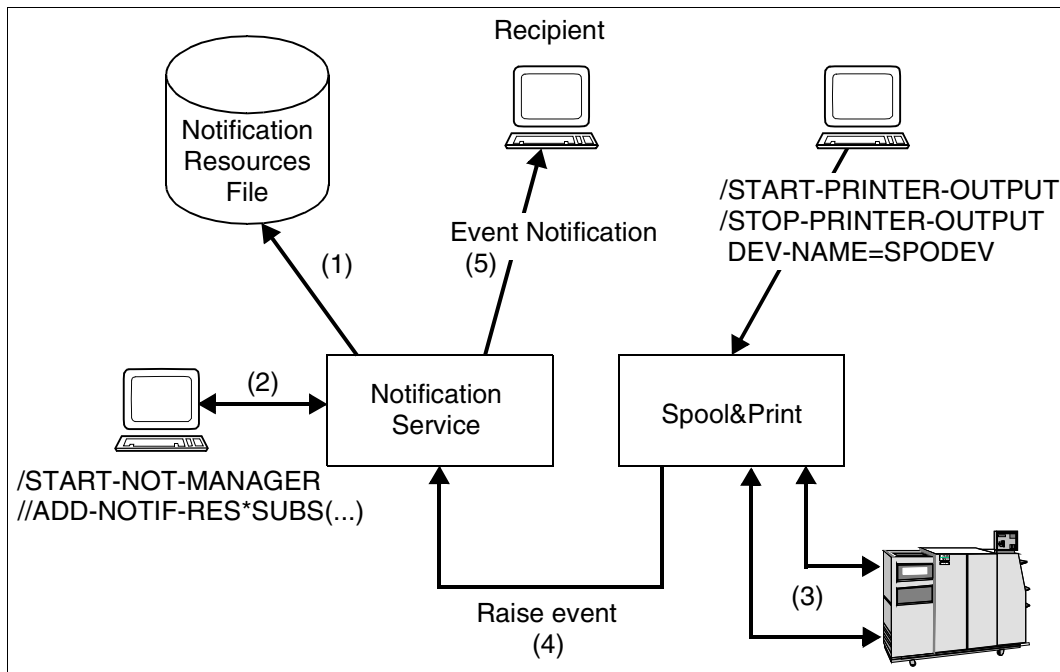
- SNPPRNT

The macro SNPPRNT describes a parameter list for the support of the Notification Service. For a detailed description of SNPPRNT see the “[Spool & Print - Macros and Exits \(BS2000/OSD\)](#)” manual.

2.8.7 Usage models

This section describes the usage models for local printer events (permanent subscription) and for local print job events (permanent and temporary subscriptions).

2.8.7.1 Local printer events - permanent subscription



Local printer events - permanent subscription

Setup of the notification environment (1)

A notification resources file contains all the notification resources necessary to allow the notification of local printer events or print job events. It has been updated by the procedure `SYSPRC.SPOOL.046.NOTIF` released with SPOOL V4.6A (1).

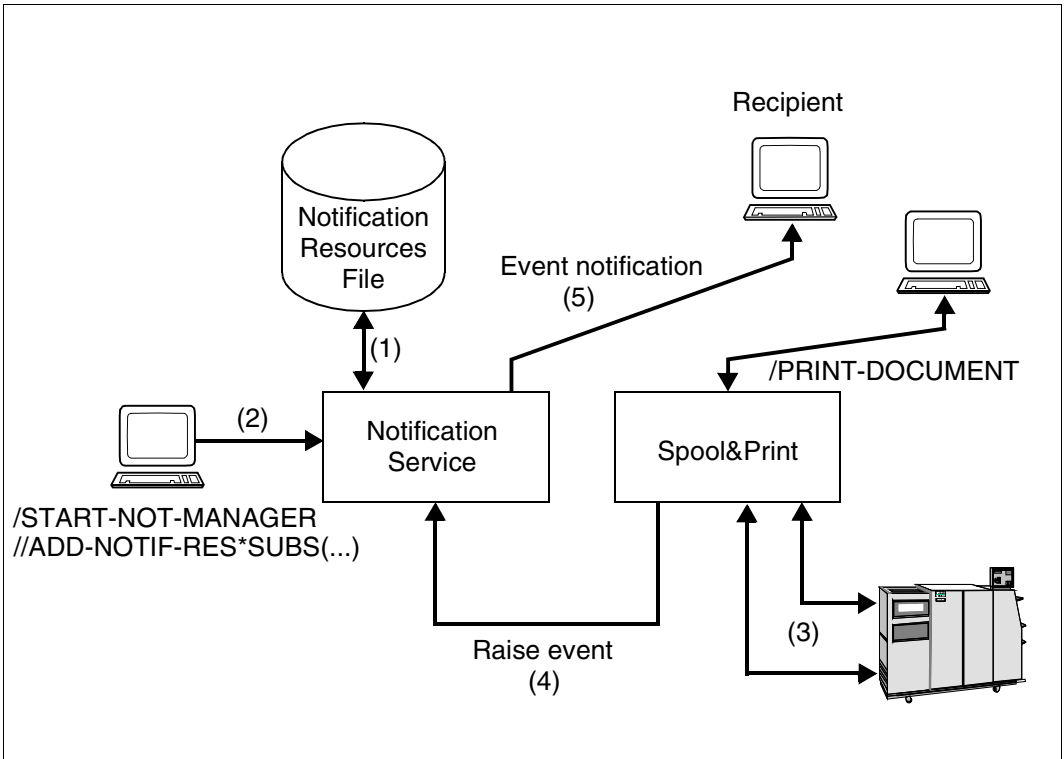
Permanent printer event subscription (2)

A permanent subscription must be created by means of the Notification Resources Manager program (2) and is valid for all local printers.

Event notification (3), (4), (5)

When an event has occurred (3), the Spool & Print products inform the Notification Service (4). The Notification Service finds all the subscription objects listening for the event. For each such subscription object, it generates an event notification according to the information specified in the subscription and the information provided by the raise event call. Then it delivers the event notification using the delivery method (for example the MAILTO method) and target specification given in the subscription object's recipient attribute (5).

2.8.7.2 Local print job events - permanent subscription



Local print job events - permanent subscription

Setup of the Notification environment (1)

Corresponds to [page 59](#).

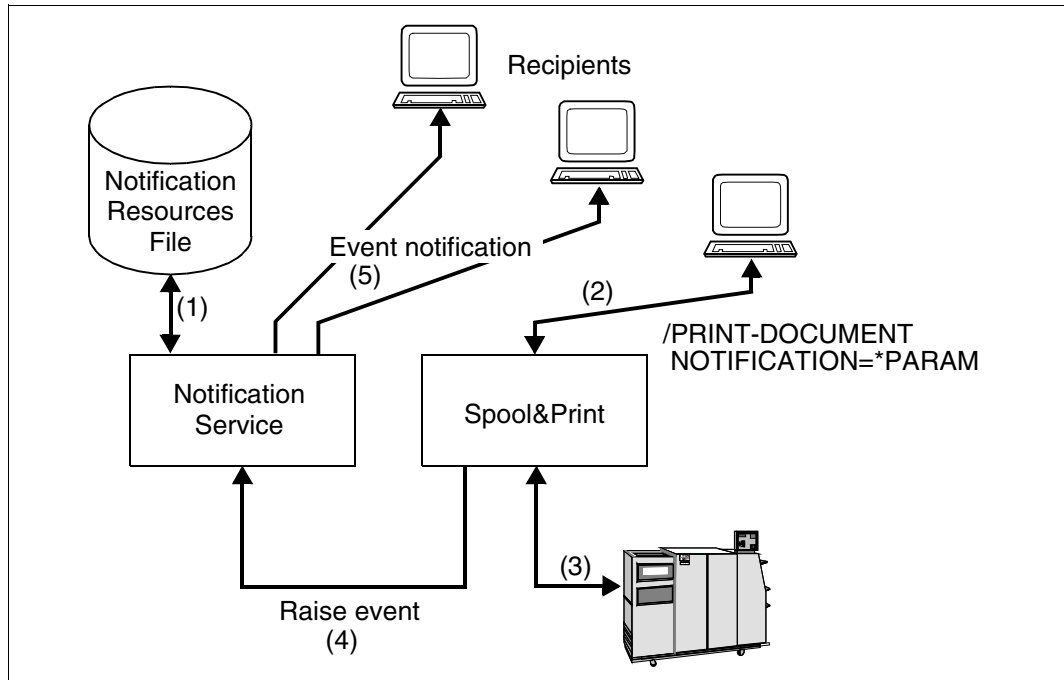
Permanent print job subscription (2)

A permanent subscription must be created by means of the Notification Resources Manager program (2) and is valid for all print job events.

Event notification (3), (4), (5)

Corresponds to [page 60](#).

2.8.7.3 Local print job events - temporary subscription



Local print job events - temporary subscription

Setup of the notification environment (1)

Corresponds to [page 59](#).

Print job subscription in the PRINT-DOCUMENT command (2)

A temporary subscription is created at the print job submission (2) and dedicated to a specific print job. It only exists during the print job life. The Notification Service erases it after the completion of the print job (either successfully printed or cancelled).

The Notification Service creates a subscription object associated with the newly created print job.

Event notification (3), (4), (5)

Corresponds to [page 60](#).

Several recipients are possible: the one specified in the temporary subscription but also those ones specified in possibly registered permanent subscriptions.

2.8.8 SNS installation and configuration

This section gives a short overview of SNS installation and the registration of the various Spool & Print products in SNS. This has to be done by the system administrator.

Installation of SNS

The installation of SNS is done as usual for BS2000 products the IMON installation monitor. After the installation, the subsystem SNRTP is available as well as a Notification Resources Manager tool, which can be started with the START-NOTIFICATION-MANAGER command. This tool allows to administer the resources used by the Notification Service.

Those resources are the object classes for which notifications will be possible, the events that will be notified, the methods used for the notification and the subscriptions specifying how and about what an end user wants to be notified.

The definition of the object classes and the events is called the registration to the Notification Service. In the frame of Spool & Print, this registration is done by a specific procedure released with each product (SPOOL, Dprint, and RSO), see [section “Spool & Print registration” on page 64](#). The definition of delivery methods is global for the Notification Service system and must be configured by the system administrator.

Definition of the userid SYSSNS

This userid must be defined on a non share PVS volume. It is the repository for the notification resources file.

Starting SNS

You can now start the SNS subsystem SNRTP with the START-SUBSYSTEM SNRTP command. Note that this command should be included in your system CMD file before the start of any Spool & Print subsystems.

Registration of the notification delivery methods

SNS V1.0B is released with different notification delivery methods (MAILTO, OPGMAIL, PROCEDURE, FILE).

For a complete description of the delivery methods and how to register them, see the [“SNS \(BS2000/OSD\)”](#) manual.

Configuration of the notification delivery methods

The delivery methods to be used may be configured and assigned a template, see the [“SNS \(BS2000/OSD\)”](#) manual.

2.8.9 Spool & Print registration

In the frame of Spool & Print, a set of notification resources has been defined for SPOOL, Dprint, and RSO. These notification resources must still be registered to SNS, i.e. they must be added to the notification resources file.

For each of these products, the registration is made by a specific registration procedure named `SYSPRC.product.version.NOTIF`. Before any run of the procedure, check that the SNRTP subsystem is started.

- **SPOOL registration:**
`/CALL-PROCEDURE $uid.SYSPRC.SPOOL.046.NOTIF`
 where `$uid` is the IMON installation userid for SPOOL.
- **Dprint registration:**
 Prerequisite: set the privilege `PRINT-SERVICE-ADMINISTRATION` to the userid `$$SYSDPRNT`.
`/CALL-PROCEDURE $uid.SYSPRC.DPRINTCM.011.NOTIF`
 where `$uid` is the IMON installation userid for DPRINTCM.
- **RSO registration:**
`/CALL-PROCEDURE $uid.SYSPRC.RSO.034.NOTIF`
 where `$uid` is the IMON installation userid for RSO.

You can visualize the registration with the Notification Resources Manager tool:

```
/START-NOTIFICATION-MANAGER
//SHOW-NOTIFICATION-RESOURCES
//END
```

Disabling notification resources

By default, all the object classes and events have the properties `STATE=*ENABLE`. This means that all objects and events will be notified. In order to avoid a too great amount of mails, you can disable some events that are less interesting for you.

Example

```
/START-NOTIFICATION-MANAGER
//MODIFY-NOTIFICATION-RESOURCE TYPE=*EVENT(NAME=PRINTJOBACCEPTED,
                                           OBJECT-CLASS-NAME=SPOOLJOB,
                                           STATE=*DISABLE)
//...
```

This way, you will never be notified of the `PRINTJOBACCEPTED` event for local spool jobs. Repeat this for all the events you do not want to be notified of.

2.8.10 How to receive my first notification

To be notified of print job events, you have to register a subscription into the Notification Service. Any user can register a notification. No specific privilege is needed. However, a user can only be notified of the print jobs for which he has privilege rights. In the frame of Spool & Print, the rules for being notified are the same as the rules applied for MODIFY-PRINT-JOB-ATTRIBUTES or CANCEL-PRINT-JOB.

A subscription allows a user to specify to the Notification Service that he wants to be notified of some events corresponding to a specific object class, the way he wants to be notified, and the object information.

There are two ways to create a subscription: permanent subscription and temporary subscription.

Permanent subscription with the Notification Resources Manager

```
/START-NOTIFICATION-MANAGER
//ADD-NOTIFICATION-RESOURCES
    TYPE=*SUBSCRIPTION(OBJECT-CLASS-NAME=SPOOLJOB,
        OBJECT-ID=*ALL,OBJECT-USER=*OWN,
        OBJECT-ATTRIBUTES=*NONE,EVENT-NAMES=*ALL,
        USER-DATA=*NONE,
        RECIPIENT=*PARAMETERS(ADDRESS=xxx@yyy.zz,METHOD-NAME=MAILTO))
//END
```

With this sample subscription, the user says that he wants to be notified of all events (EVENT-NAMES=*ALL) occurring to all his own local print jobs (own because OBJECT-USER=*OWN, all because OBJECT-ID=*ALL, local print jobs because OBJECT-CLASS-NAME=SPOOLJOB).

He also wants to be notified by the MAILTO method at the email address xxx@yyy.zz. This subscription will never be deleted from the notification resources file, see [page 60](#).

Temporary subscription with the PRINT-DOCUMENT command

```
/PRINT-DOCUMENT file,NOTIFICATION=*PARAMETERS(
    OBJECT-ATTRIBUTES=*NONE,
    EVENT-NAMES=*ALL,
    USERDATA=*NONE,
    RECIPIENT=*PARAMETERS(ADDRESS=xxx@yyy.zz,METHOD-NAME=MAILTO))
```

With this subscription, the user will be notified of just the same events as in the first example but ONLY for this print job, see [page 61](#).

This subscription will be suppressed at the end of the current print job.

Note that if the user has registered a permanent subscription in addition to this temporary subscription, he will be notified twice for each event, see [page 61](#).

2.9 Availability of print jobs

The Spool & Print administrator has the opportunity to use the MOVE-PRINT-JOBS command to extract print jobs from the EQUISAMQ file and to add them to a different file. Only the Spool & Print administrator is authorized to use the MOVE-PRINT-JOBS command. A detailed description of the MOVE-PRINT-JOBS command can be found in the “[Spool & Print - Commands \(BS2000/OSD\)](#)” manual.

The MOVE-PRINT-JOBS command allows the administrator to process important print jobs using another active system, this is particularly useful

- if the original system fails, or
- if the original system is active but overloaded.

The Spool & Print administrator can use the MOVE-PRINT-JOBS command in the following ways:

- The original system has failed. The EQUISAMQ file must be made available on the second system to ensure that the print jobs can be imported into the EQUISAMQ file on the active system.
- The original system is overloaded. Since the EQUISAMQ file cannot be made available, the print jobs are extracted from this file and put in a work file. The work file is then made available on the remote system. This ensures that the print jobs can then be added to the EQUISAMQ file of the second system.

The extracted print jobs are executed once only.

MOVE-PRINT-JOBS can also be integrated in a simple manner into a Hplex environment. This provides automated mechanisms for moving print jobs.

MOVE-PRINT-JOBS takes account of local and distributed print jobs:

It is possible to use selection criteria to specify which of the local print jobs (processed with SPOOL, RSO or SPS) must be imported:

- The PUBSET criterion allows you to limit the selection to print jobs that access the resources located on the various specified pubsets. The following resources are taken into account during selection: the file that is to be printed, the monitoring job variable (if specified), the file containing the user resources (if specified) and the translation table (if specified).
- The JOB-TYPE criterion is used to limit the selection to print jobs that have reached a specified status: *WAIT, *ACTIVE and *KEEP (a description of these states can be found in the “[Spool & Print - Commands \(BS2000/OSD\)](#)” manual under the MOVE-PRINT-JOBS command).

MOVE-PRINT-JOBS can also be used for distributed print jobs. There are two types of distributed print job:

- distributed print jobs on different clusters which are started by remote clusters (BS2000 or another system) and are currently being processed by the server on the gateway host (BS2000)
- distributed print jobs within a cluster which are started by the BS2000 client host and are currently being processed by the server on the same host.

The same selection criteria for the pubset and the type of print job apply for those print jobs taken into consideration within a cluster as for local print jobs. On the other hand, for print jobs on different clusters, only the selection criteria for the type of print job is important. However, access to the standard catalog-ID of the SYSDPRINT user ID must exist to enable this type of print job to be moved to the EQUISAMQ file of the system.

The printer administrator can now move both local and distributed print jobs (where Client/Gateway = Server) from one EQUISAMQ file (system file or otherwise) to another EQUISAMQ file (system file or otherwise). SPOOL must not be loaded for distributed print jobs, and may or may not be loaded for local print jobs.

In order to use the MOVE-PRINT-JOBS command the following minimum software requirements must be fulfilled:

- BS2000/OSD-BC as of V2.0 (including SPOOLSYS as of V02.0)
- SPOOL as of V04.0
- HIPLEX AF as of V01.0 (if the change-over functions of Hiplex AF are to be used for automation purposes).

The MOVE-PRINT-JOBS command offers the simplest method and unbeatable convenience when used in conjunction with HIPLEX. Otherwise the prerequisites already guaranteed by HIPLEX must also be fulfilled:

- The user environment of the original system must be available on the target system or must be reproduced.
- The pubset required for the import must be made available on the target system.
- Versions and standard files (including customer-specific files) of the Spool & Print subsystem must be compatible on the original system as well as on the target system.

3 Controlling print attributes (use of printers)

The PRINT-DOCUMENT command is used to output files on printers. Here it is possible to control the print attributes by explicitly specifying the print resources to be used (paper format, line feed, character set, character rotation, etc.). Some print attributes are printer-dependent, some are printer-independent.

The information about the names and linking of the available print resources is contained in the SPOOL parameter file. The print resources themselves are in the resource libraries (system PRFILE and user PRFILE).

3.1 Print attributes

3.1.1 Paper format

Several different paper formats are normally available for data output on a printer. You can specify which of the available paper formats are to be used for printing when issuing the print job (PRINT-DOCUMENT command, FORM-NAME operand). The paper format "STD" is used if nothing else is specified.

All available paper formats are entered in the SPOOL parameter file. In addition to the name of the paper format, each paper format entry also contains link information concerning the printer to be used, character set, line feed and header and trailer pages. These specifications act as defaults, i.e. they are employed when the job originator makes no other specifications (see the PRINT-DOCUMENT command). The paper format entries contained in the SPOOL parameter file can be displayed using the SHOW-SPOOL-FORMS command.

3.1.2 Setting form feed

In old impact printers, form feed is today still controlled with the aid of 12-channel paper tape loops, the punching indicating the line and page feeds. The printers supported by SPOOL now utilize electronic storage facilities instead of tape loops for form feed control. These electronic storages are known as vertical form buffers (VFB). For the sake of simplicity, however, the term "loop" has been retained for the feed information.

Loops specify the line height for each individual print line. They are contained in the loop entries of the resource library, and are loaded into the VFB when requested by a user for a print job.

A loop is referenced directly by specifying the loop name (PRINT-DOCUMENT command, LOOP-NAME operand), or indirectly by specifying a paper format (PRINT-DOCUMENT command, FORM-NAME operand) since one loop is assigned to each paper format as standard.

When specifying a loop directly, you should ensure that the loop length matches the length of the specified paper format.

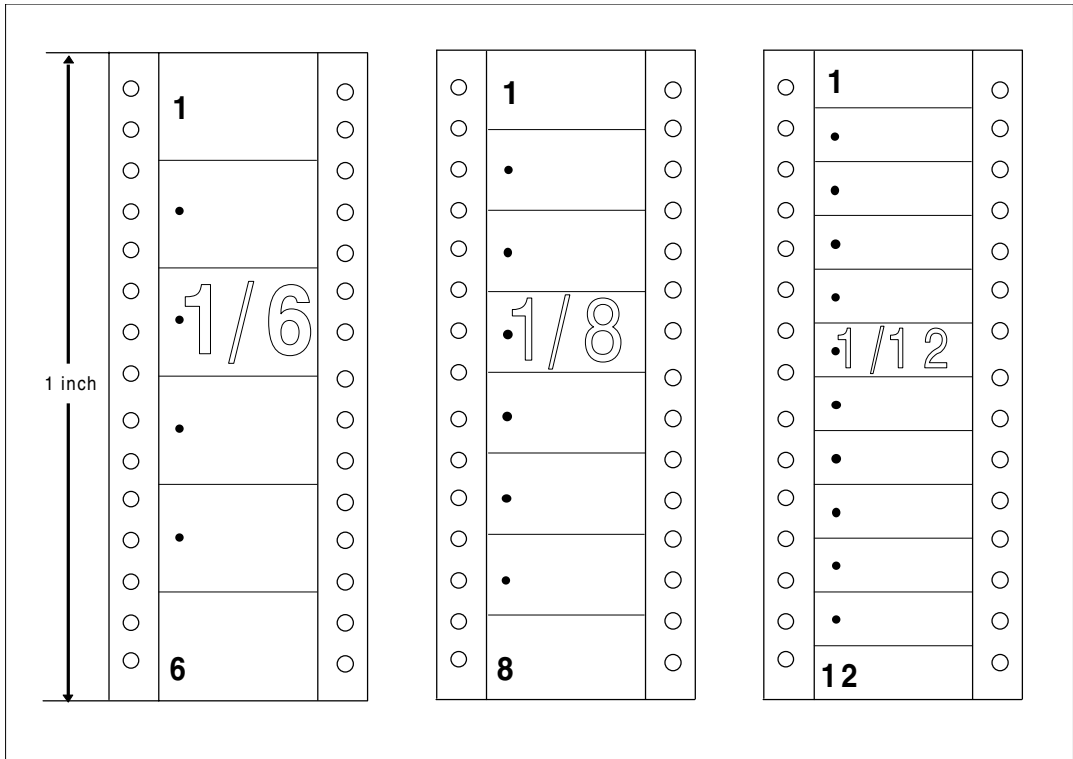
The LOOP-NAME operand has a higher priority than the FORM-NAME operand, i.e. when both operands are specified, the loop specified under the LOOP-NAME is the one used for the output.

If the text contains control characters, these will take priority over control information specified by commands or macros.

If neither the LOOP-NAME operand nor the FORM-NAME operand is specified in the PRINT-DOCUMENT command, SPOOL uses the paper format and loop with the designation "STD".

Since a certain line density is defined in a loop, only character sets having this or a higher line density are permitted.

An exception is that with the LP65 printer in line printer mode only the number of lines is evaluated, not the line density.



Controllable line spacing

The loop can also be used to change the line spacing from line to line within a print page.

The maximum number of lines per page is arrived at by multiplying the page length by the line density, minus the top and bottom margins. Thus the "Channel 1" vertical tabulator (the start of a page) is normally on line 3, and the bottom margin normally occupies 6 lines.

For forms with a page length of 12 inches, the maximum number of lines is as follows:

12-inch paper	
Line density	Max. number of lines
6 lpi	64 lines
8 lpi	88 lines
10 lpi	112 lines
12 lpi	136 lines
24 lpi	280 lines

The maximum number of lines is calculated in the same way for forms with other lengths.

The loops supplied as standard are listed in the appendix. You can also use the PRM utility routine to generate additional loops to satisfy your own requirements (see the "[PRM \(BS2000/OSD\)](#)" manual).

3.1.3 Selecting character sets

A character set (in PRM also known as a font) is a complete set of characters of a particular type and size.

With the impact printers supported by SPOOL mechanical considerations and the particular type band installed determine the available character set. With the nonimpact printers (laser printers and LED printers), however, it is possible to switch character sets as desired since these exist in the form of data which can be loaded into the printer as required.

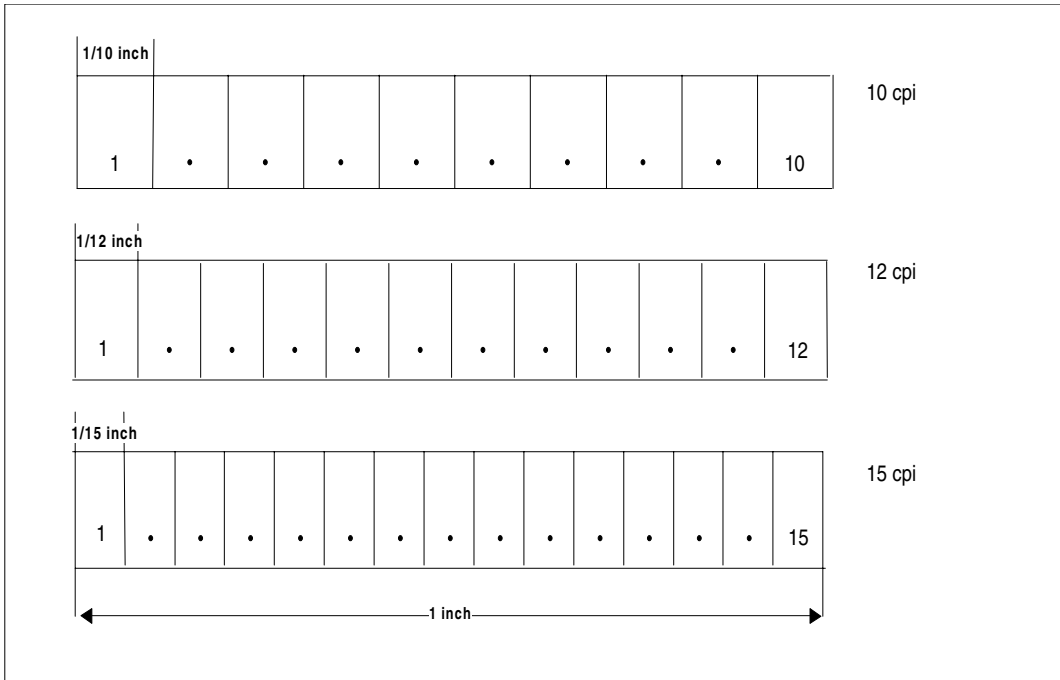
A number of standard character sets are available in BS2000 for the nonimpact printers, which you can use to print your data (see [chapter "Appendix" on page 177](#)). You can also use the PRM utility routine to generate your own character sets.

In BS2000 each character set is identified by the following information:

- character set name (1 - 3 letters or digits),
- character density (characters per inch, cpi) and
- line density (lines per inch, lpi).

How many lines per inch the printer actually prints, however, depends on what is specified in the loop used.

With HP and HP90 printers, data can be printed with a character density of 6, 10, 12, 15 or 20 cpi.



Different character spacings on HP/HP90 printers

Up to 64 character sets can be used for printing a file on a HP or HP90 printer, and it is also possible to switch character sets within a print line. The frequency of character set changes has no effect on the printing speed or print quality.

O CR-A	ABCD..Z,0123..9,ΥJH..
O CR-B	ABCD..Z,0123..9,abcd..z,()/-..
GOTIK 10	ABCD..Z,0123..9,()/..
GOTIK 12	ABCD..Z,0123..9,()/-..
GOTIK 15	ABCD..Z,0123..9,()/-..
GOTIK 15/12	ABCD..Z.0123..9.()/-..

Character sets for HP/HP90 printers

Character set pools

Up to 4 character sets can be specified individually in the PRINT-DOCUMENT command. If more than 4 character sets are required for a job (possible only with HP and HP90 printers), it is necessary to specify a character set pool. Character set pools are defined using the PRM utility routine (see the "PRM (BS2000/OSD)" manual) and may contain up to 64 character sets.

Character density

Other character sets with new character densities can be specified by means of control characters within the print data. However, it is also possible to print out one particular character set with different character densities. When a character set with a lower character density than specified in the character set entry is printed, the space between the individual characters is increased. However, if a higher character density is specified than is entered for this character set, then the characters will be truncated since each character is given less space than it actually requires.



Character sets for HP and HP90 printers can have character densities between 6 and 20 cpi (continuous). However, with HP control characters it is only possible to specify the character densities 6/10/12/15/20 cpi.

Character density of character set	Character densities that result in truncation of characters
10 cpi	12/15/20 cpi for HP printers
12 cpi	15/20 cpi for HP printers
15 cpi	20 cpi for HP printers

Character densities

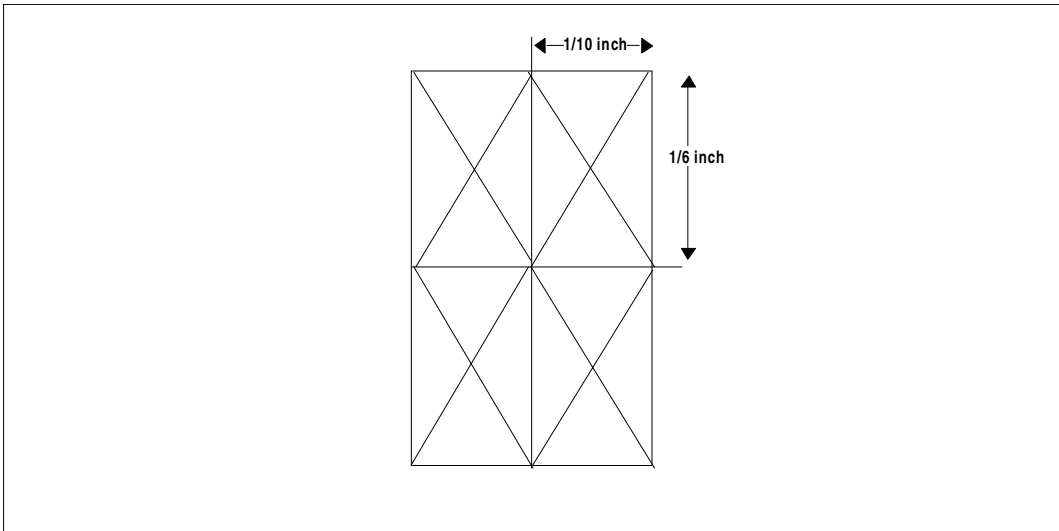
Standard character sets are available in the \$SYSSPOOL.PRFILE resource library and the \$SYSSPOOL.SYSPRT.SPS.021 print control file for HP/HP90 and APA printers respectively (see [chapter "Appendix" on page 177](#)).

Example

The actual line height and character density should be chosen to suit the character set used since the characters of each character set are defined for a particular line height and character density and require the corresponding space. This space is known as the character frame.

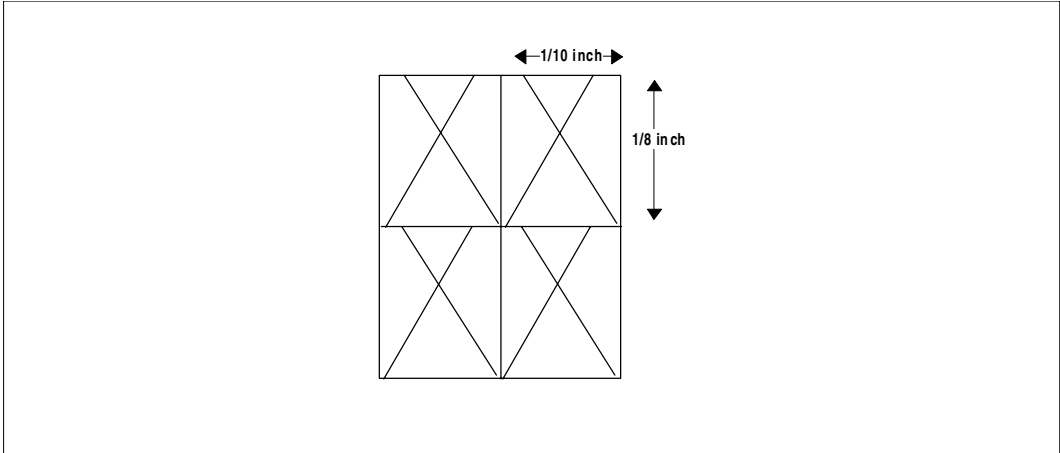
The following figures illustrate the consequences of discrepancies between the actual line height and/or character density and the specifications in the definition of the character set used.

In the first instance a character set defined for 6 lpi and 10 cpi is used. If the letter 'X' of this character set is printed at 6 lpi and 10 cpi, the print image then appears as follows:



Print line height and density as per character set definition

If the same characters are printed with a line density of 8 lpi, the print image then appears as follows:

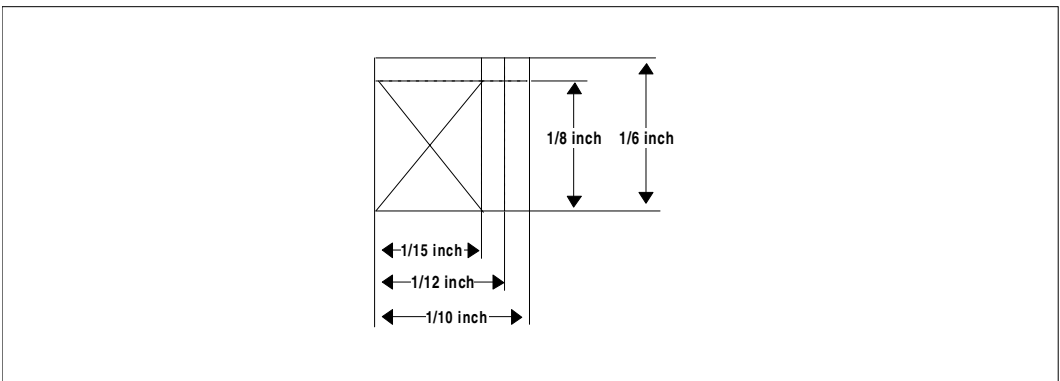


The characters are taller than the print line

Since the characters according to the character set definition are taller than the print line, the top of the letter is clipped by the letter above.

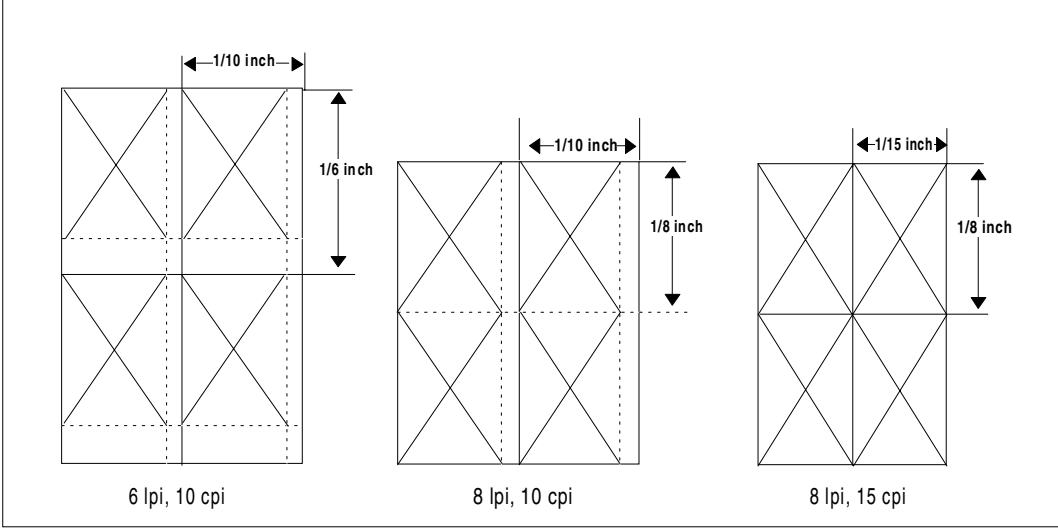
On the other hand it is always permissible to print characters which are smaller than the space available on the paper. This will be the case when the character set is defined for higher character and line densities than those used during printing.

The following figures show the letter 'X' as defined for a character density of 15 cpi and 8 lpi. Depending on which line and character densities are actually used for printing, a gap of differing size will occur between the 'X' and the characters situated above and to the right of the 'X'.



Character raster for different line and character densities

This illustration shows how the individual characters stand in relation to one another with different line and character densities.



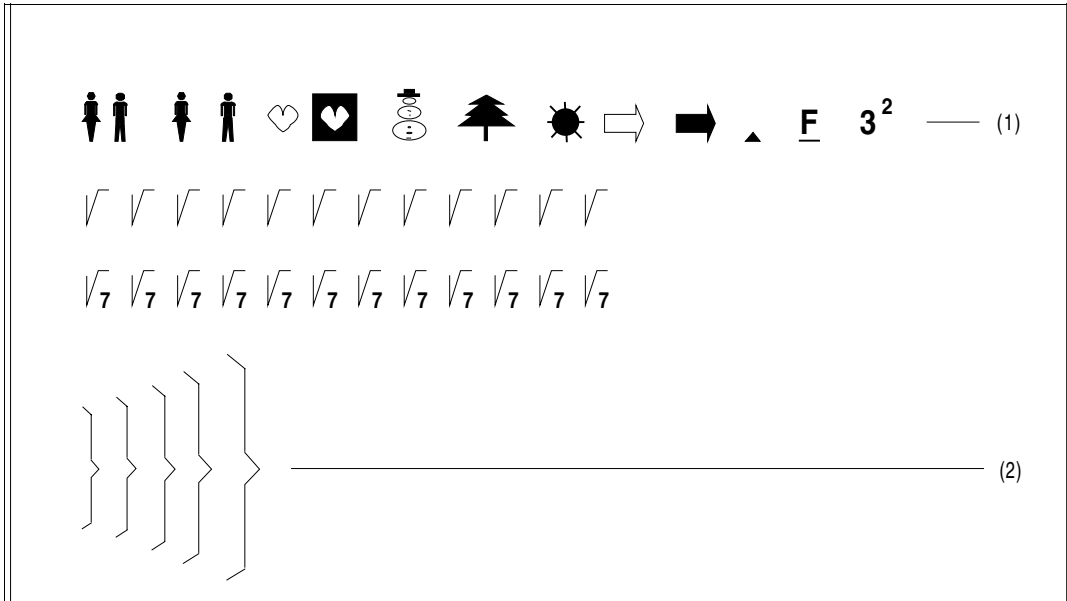
Character spacings with different line and character densities

User-generated character set

You can generate private character sets by using the PRM utility. PRM is described in the "PRM (BS2000/OSD)" manual. The following example shows which options are available to you.

Example: File containing user-generated characters

The characters shown here were generated using the PRM utility and stored as a character set.



User-generated characters

Explanation

- Each of these characters is stored under a character code. The character codes were assigned at random; for example, the character pair at the beginning of the line comprises two characters which have been stored under the codes '30' and '41'. The sequence of these character codes can, for example, appear as follows for the line shown:

30414030404140314032403340344037403840294027402840394035403640

2. The sequence of the character codes for the characters shown can, for example, appear as follows:

```
404040404040404028
404040404040284029
404040402840294029
404028402940294029
264031403140314031
404027402940294029
404040402740294029
404040404040274029
4040404040404027
```

You can thus also combine the characters over a number of lines so as to obtain larger or taller characters.

3.1.4 Record length and print line length

The number of characters that can be printed in one line depends on the paper width and the character density. If a record contains more characters than fit in one line, the excess characters are either truncated or printed in the next line, depending on what is defined by the LAST-CHARACTER operand in the PRINT-DOCUMENT command.

The maximum number of characters (print characters + control characters) per record is shown in the following table:

Printer symbol	Maximum number of lines
LP, LP48,LP-EMULATED	10 x paper width (inches)
HP printer, HP90 printer	(875 x paper width (inches)) / 17
LP65	8192

Record length and print line length

The above applies only to monospace fonts (characters of equal width). With a proportional font (characters of differing width) the number of print characters/control characters can be calculated from the number of microcolumns (smallest possible resolution).

A paper width of 13.6 inches and a printer resolution of 240 dots per inch gives the following maximum microcolumn value: 13.6 inches * 240 microcolumns = 3264 microcolumns.

If the \$SYSSPOOL.PRFILE resource library and \$SYSSPOOL.SYSPRT.SPS.021 print control file (for APA jobs) are nonshareable, only spoolout jobs under the systems support ID (\$TSOS) will be accepted and executed.

3.1.5 Using form overlays

On laser and LED printers you can overlay the variable output data with characters and patterns that are not contained in the print file. This is done by superimposing form overlays. These can exist either as a film negative or in the form of data.



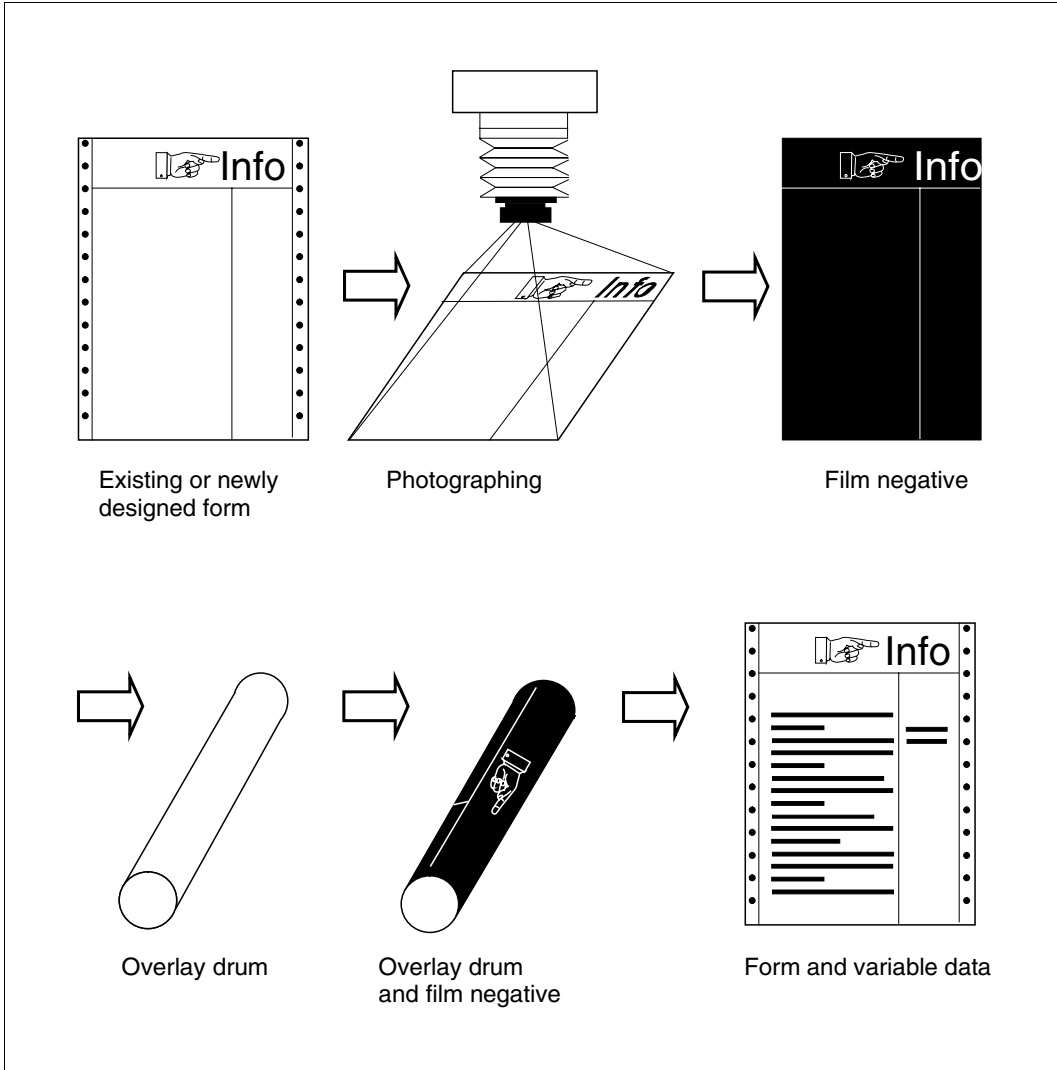
In order to avoid confusion between film and data overlays, appropriate conventions should be defined and selective START-PRINTER-OUTPUT commands prepared by systems support.

3.1.5.1 Film overlay (optical overlay)

Printers with a form overlay feature have an easily interchangeable form drum on which are mounted film overlays in the form of 1:1 film negatives. These film overlays can then be superimposed on individual pages or all pages of the file to be printed.

To request systems support to mount the film overlay "xy", enter the following command:

```
PRINT-DOCUMENT FROM-FILE=filename...,RESOURCE-DESCRIPTION=*PARAMETERS( -  
OVERLAY-RESOURCES=*PARAMETERS(ELECTRONIC-OVERLAY=xy)
```

Superimposing a film overlay (forms overlay feature)



Film overlays always relate to the physical print page, i.e. to the sheet of paper.

3.1.5.2 Data overlay

Printers with a graphics buffer can process overlays which exist in the form of data. Two types of data overlay can be differentiated:

- overlays which are stored in the relevant print control file. These overlays can comprise a number of parts which may also each be superimposed individually anywhere on the print page.
- overlays which are stored on disk and must be loaded into the printer by the operator as required. These can only be superimposed in their entirety and thus correspond to the film overlays with regard to handling and use.

To differentiate between these two types of data overlay in this manual, the first are referred to as FOB data overlays (associated operand: FORMS-OVERLAY-BUFFER) and the second are referred to as EFO data overlays (associated operand: OVERLAY).

FOB data overlay

An FOB data overlay is stored as a pixel graphic in the PRFILE, i.e. the image information is stored in the form of sublines. An FOB data overlay for HP printers may contain a maximum of 672 such sublines, while an FOB data overlay for HP90 printers may contain a maximum of 4032 sublines.

FOB data overlays can be used only with HP and HP90 printers.

EFO data overlay

An EFO data overlay is stored in the form of structured fields on a floppy disk.

Example: Using an FOB data overlay

You wish to overlay page copies 1, 2 and 3 of a specific page of your print file with the following four FOB data suboverlays at different positions on the print page:

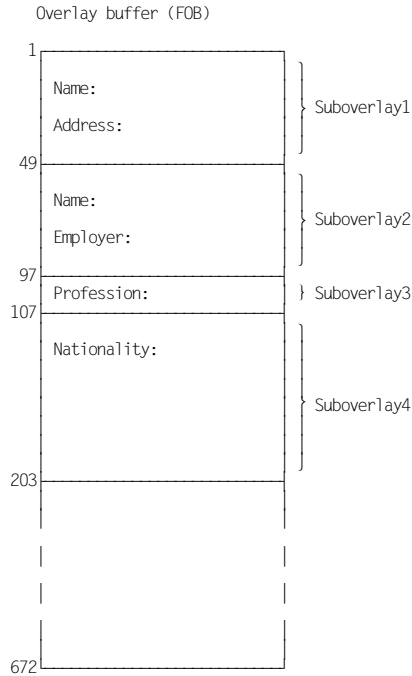
Name of the suboverlay	Subover.1	Subover.2	Subover.3	Subover.4
Number of sublines of the suboverlay	48	48	10	96
Number of the first subline of the suboverlay	100	80	300	400
Number of the first page copy to be overlaid with a suboverlay	1	3	1	2
Number of page copies to be overlaid with a suboverlay	2	1	3	2

The specifications in the table are contained in the FOB data overlay definition in the PROFILE.

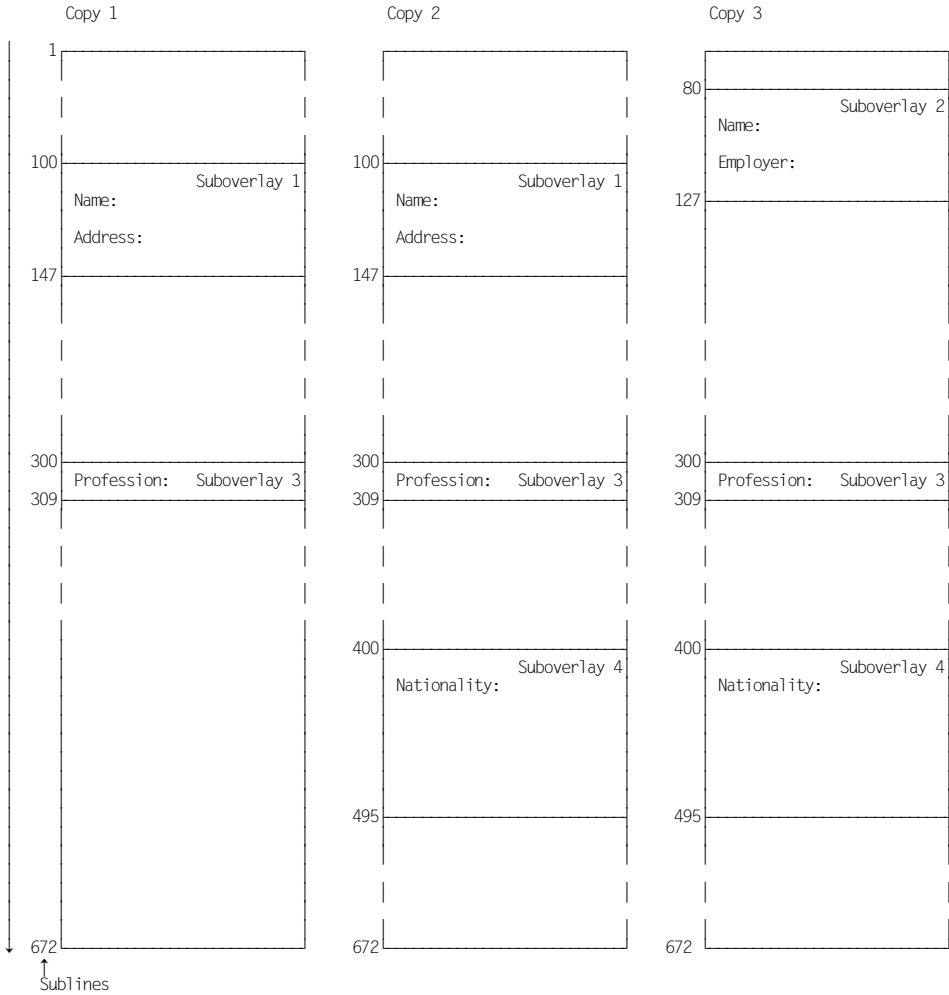


When defining FOB data overlays it should be noted that SPOOL starts counting at "0", whereas FGS starts at "1". The first copy of a print page is therefore numbered "0" in SPOOL and "1" in FGS.

The four suboverlays fill only part of the overlay buffer, which in the case of an HP printer can accommodate 672 sublines, and in the case of an HP90 printer 4032 sublines:



The four suboverlays are printed as follows in accordance with the overlay definition in the PROFILE:



FOB data overlays can be processed if either CONTROL-MODE=*PAGE-MODE or CONTROL-MODE=*PHYSICAL is specified. CONTROL-MODE=*PHYSICAL enables you to change the number of the page copy by means of control characters (copy reference number/byte no. 10 of the control character list).

Example

The definition of an FOB data overlay specifies that it is to be superimposed for 3 successive page copies, starting with page copy no. 10.

If you wish to print 5 copies of your file, you cannot process this FOB data overlay without modifying it if CONTROL-MODE=*PAGE-MODE is specified. With CONTROL-MODE=*PHYSICAL, however, it is possible to use the FOB data overlay without modification. For instance, page copy no. 2 can be redefined as page copy no. 10 by means of control characters. Page copies 2, 3 and 4 are then overlaid by the overlay without having to modify the overlay definition.



Any given page can be printed up to 255 times, i.e. 1 original plus 254 copies. This holds true even if REPEAT=255 is specified.

3.1.5.3 Generating forms overlays

FOB data overlay

PRM

An FOB data overlay can only be used if it is defined and stored in the PRFILE resource library. The PRM utility routine allows you to place FOB data overlays in a PRFILE or delete or list FOBs present in a PRFILE (see the "[PRM \(BS2000/OSD\)](#)" manual).

FGS

The software product "FGS" (Forms Generation System) allow you to generate raster forms overlays for the OPS (Ocè Printing Systems) high-resolution laser printing systems equipped with graphics buffer (offline, IBM-compatible and BS2000 online systems). A simple, problem-oriented language allows you to generate and modify forms overlays containing lines, texts, frames, shaded areas and graphics elements.

EFO data overlays

EFO data overlays can be generated using the software product FGL, FGS or SIEFORM, either on a PC or on a BS2000 computer, The data must then be stored on a 5.25-inch floppy disk. If you have been working on a BS2000 computer you must use FILE-TRANSFER, for example, to transfer the data to a PC so as to store it on floppy disk on the PC.

3.1.6 Printing multiple copies of individual pages

It is possible on all printers to print multiple successive copies of an entire file by specifying the `ADDITIONAL-COPIES` operand in the `PRINT-DOCUMENT` command. On nonimpact printers you can also print multiple copies of individual pages by specifying the `PAGE-COPIES` operand in the `PRINT-DOCUMENT` command.

It is possible to produce up to 255 (HP/HP90 and APA) copies of one print page; the number of multiple prints can be varied within a file (only when `CONTROL-MODE=*PHYSICAL` is specified).

The information at the beginning of the first record of a print page has priority over the `PAGE-COPIES` operand in the `PRINT-DOCUMENT` command.

3.1.7 Page rotation

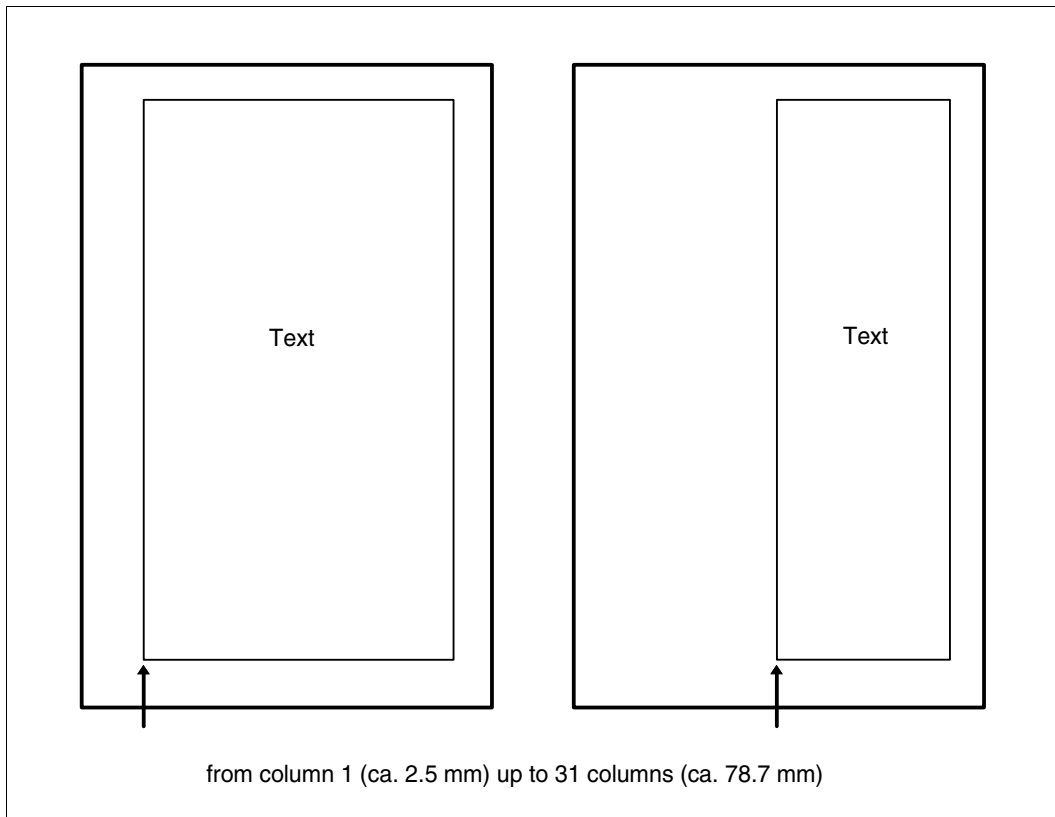
Page rotation is possible only if the printer used has a rotation module. If this is the case, the desired angle should be specified for the `ROTATION` operand in the `PRINT-DOCUMENT` command.

3.1.8 Indenting the output

The printed output can be indented up to 31 columns; the number of columns to be indented can be specified separately for each page.

The function can be initiated with the LEFT-MARGIN operand in the PRINT-DOCUMENT command and with control characters at the beginning of the print page.

The information at the beginning of the first record of a print page has priority over a LEFT-MARGIN specification in the PRINT-DOCUMENT command.



Print output indentation (HP printers)

3.1.9 Feed suppression

Depending on the printer type, the overprint and line merge functions are available for feed suppression.

3.1.9.1 Overprint

When the feed control characters present in the file are interpreted during printing and the feed control character X'00' (suppress line feed) occurs, with all printers (including APA printers but excluding HP and HP90 printers) this initiates the "Overprint" function. With the "Overprint" function, two successive records are printed in the same line. In this way, characters standing in the same column position are superimposed. This does not cause the printer to interrupt the continuous paper motion; the print data is requested more quickly.



Each line with a suppressed line feed must be followed by a line with a single-line feed. Also, the control characters must be paired in the same columns within the data to be printed out.

Examples

The file OV.PRINT contains a demonstration text with feed suppression control characters and escape characters for different character sets. The appearance of the listing of this file depends on the operands specified with the PRINT-DOCUMENT command. The control characters are only visible in the printout if PRINT-DOCUMENT FROM-FILE=OV.PRINT, DOCUMENT-FORMAT=*TEXT(OUTPUT-FORMAT=*HEXADECIMAL) is specified (see example 3).

1) PRINT-DOCUMENT FROM-FILE=OV.PRINT

```

AH \tuuuD 0
THIS IS LINE 1    THIS IS LINE 1    THIS IS LINE 1
THIS IS LINE +2  THIS IS LINE +2  THIS IS LINE +2
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
OVERPRINT CAN LEAD TO UNDERSCORE

```

Standard printout with no control character interpretation

Explanation

The file is printed with default values. The command contains no specifications concerning feed control characters. The feed control characters contained in the file are not interpreted.

3.1.9.2 Line merge (for HP and HP90 printers)

The selection (exclusive or) of characters in successive lines is performed according to the positions of the characters in the record, not according to their physical positions in the subsequent print line. For example, the tenth character of a line is merged with the tenth character of the next line without regard to where they will later appear in the printout due to differing character densities. (Normally, this involves two successive lines, but more than two may be involved.)

Line 1	Line 2	Result	
blank	printable character	printable character	
printable character	blank	printable character	
blank 1	blank 2	blank 1	
printable character 1	printable character 1	printable character 1	
printable character 1	printable character 2	printable character 1 + DATA CHECK	→ Special case 1
printable character	underscore X'2D'	printable char. with underscore (hardware)	→ Special case 2
underscore X'2D'	printable character	printable char. with underscore (hardware)	→ Special case 3
blank	underscore X'2D'	underscore (software)	→ Special case 4
underscore X'2D'	blank	underscore (software)	→ Special case 5

Line merge

Special case 1

Since the overprint function is not supported for HP and HP90 printers, special case 1 is not plausible for the printer and is rejected with DATA CHECK. However, SPOOL suppresses the error message to this effect and there is no error interrupt. Printable character 2 in the example is lost.

Special cases 2 and 3

In both of these special cases of line merging the HP and HP90 printers are able to perform the overprint function.

With the line merge function an MXM character coded under X'2D' loses its validity because the printer controller uses this code to make the overprint underscore function available. This underscore function is implemented by the printer hardware (exception: combination of underscore and blank, special cases 4 and 5). Once the line merge function has ended, the character loaded in MXM memory under the code X'2D' regains its validity.

Special cases 4 and 5

If an underscore and a blank are combined, the underscore is not implemented by the hardware. Instead, the character X'2D' from MXM memory is generated, i.e. the underscore is implemented by the software. This presupposes (for user-defined character sets) that the default code X'6D' has been defined for the underscore in the PRM utility routine.

i You can use the PRM utility routine to define which EBCDIC character is stored in MXM memory at location X'2D'. This is normally EBCDIC X'6D' (see the "[PRM \(BS2000/OSD\)](#)" manual).

Examples

The file LINEMERGE.PRINT contains a demonstration text for line merging on HP/HP90 printers. (The control characters are only visible in the printout if PRINT-DOCUMENT FROM-FILE=LINEMERGE.PRINT,DOCUMENT-FORMAT=*TEXT (OUTPUT-FORMAT=*HEXADECIMAL) is specified; see Example 4).

1) PRINT-DOCUMENT FROM-FILE=LINEMERGE.PRINT

```

AH \tuuuu
  THIS IS LINE 1   THIS IS LINE 1   THIS IS LINE 1
                +2                +2                +2
X X X X X X X X X X X X X X X X X X X X X X X X X X X X
X X X X X X X X X X X X X X X X X X X X X X X X X X X X
LINE MERGE CAN LEAD TO UNDERSCORE, BY ____ WAYS
                TWO
- IT   POSSIBLE   USE _____ CHARACTER   TO   A
- |   IS          TO   SEVERAL           SETS   COMPOSE LINE

```

Standard printout without control character interpretation

Explanation

With the default value for the PRINT-DOCUMENT command, neither feed control characters nor escape characters are interpreted.

2) PRINT-DOCUMENT FROM-FILE=LINEMERGE.PRINT, DOCUMENT-FORMAT=
 *TEXT(LINE-SPACING=*BY-EBCDIC-CONTROL)

```
H \tuuuu
THIS IS LINE 1+2 THIS IS LINE 1+2 THIS IS LINE 1+2
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
LINE MERGE CAN LEAD TO UNDERSCORE, BY TWO WAYS
| IT IS POSSIBLE TO USE SEVERAL CHARACTER SETS TO COMPOSE A LINE
```

Printout with feed control characters interpreted

Explanation

The feed control characters (i.e. the first characters in each record) are interpreted because of the operand setting LINE-SPACING=*BY-EBCDIC-CONTROL, resulting in the line merge process; escape characters are not interpreted.

3) PRINT-DOCUMENT FROM-FILE=LINEMERGE.PRINT,
 DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*PHYSICAL),
 RESOURCE-DESCRIPTION=*PARAMETERS(CHARACTER-SETS=(101,219)),
 TO-PRINTER=*PARAMETERS(PRINTER-NAME=*STD,
 PRINTER-TYPE=*HP-PRINTER)

```
0
THIS IS LINE 1+2 THIS IS LINE 1+2 THIS IS LINE 1+2
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
LINE MERGE CAN LEAD TO UNDERSCORE, BY TWO WAYS
IT IS POSSIBLE TO USE SEVERAL CHARACTER SETS TO COMPOSE A LINE
```

Printout with all control characters interpreted

Explanation

Both feed control characters and escape characters are interpreted.

3.2 SPOOL parameter file

The SPOOL parameter file contains information on:

- global SPOOL defaults for a system run of a given installation (GEN entry)
- RSO devices and local SPOOL devices (device entries)
- virtual devices
- APA printers
- forms in their links to device types, loop records and character sets (form entries)
- character sets that are also assigned to forms as default character sets (mandatory)
- SPOOL/RSO pools with the devices they contain (pool entries)
- filter definitions

It has the file name `$SYSSPOOL.SPOOL.PARAMETERS` and is created by means of the `SPSERVE` utility routine or when SPOOL is loaded, and is managed with `SPSERVE`.

The SPOOL parameter table is set up in class 5 memory of the SPMG task (SPOOL Parameter Manager) at loading time, and the GEN entry is set up in class 4 memory.

The global values and configurations valid for a session are retained for the next session, but can be modified during the session by systems support using the `SPSERVE` utility routine (see the "[SPSERVE \(BS2000/OSD\)](#)" manual).

You can request details of the current parameter list, existing forms and character sets with the aid of the following SPOOL commands:

```
SHOW-SPOOL-PARAMETERS
SHOW-SPOOL-DEVICES
SHOW-SPOOL-FORMS
SHOW-SPOOL-CHARACTER-SETS
SHOW-PRINTER-POOLS
SHOW-SPOOL-FILTER
```

This file exists as soon as the command `START-SUBSYSTEM SUBSYSTEM-NAME=SPOOL` has been issued. The information in this file is read into memory when SPOOL is loaded.

The STD form is entered for all printer types. In the case of RSO printers, different values apply for some printer types.

The file `$SYSSPOOL.SPOOL.PARAMETERS` is protected against deletion and overwriting (EXPASS).

A copy of the SPOOL parameter file (`$SYSSPOOL.SPOOL.PARAMETERS.COPY`) is created after SPOOL is loaded. If the SPOOL parameter file cannot be opened during startup (not even after `REPAIR-DISK-FILES`), the copy from the previous SPOOL session is used. However, this means that all changes made to the SPOOL parameter file during the previous session are lost. A corresponding message is displayed at the console.

If a DMS error prevents this file from being read, a message is displayed at the console. Systems support can restore the file (REPAIR-DISK-FILES, ARCHIVE,...).

The response Y (RETRY=YES) causes the parameter values in the file or copy to be saved and loaded into main memory, so that they are available in the next session. The response N (RETRY=NO) causes the current values to be overwritten by the minimum configuration and generation of the file called \$SYSSPOOL.SPOOL.PARAMETERS.PRESET.

PRINT-DOCUMENT command validation is based on the printer types entered for the form used. In order to minimize the validation effort, only forms for printers which actually exist should be entered (taking into account additional forms for replay tape processing).

3.2.1 Overview of contents

Overview of contents of file \$SYSSPOOL.SPOOL.PARAMETERS for SPOOL, SPS, and RSO:

GEN entry	Global specifications for SPOOL / RSO
Forms entries	Definitions of all form types used
Character set entries	Character set definitions for printers and the standard character sets for the forms
Device entries	SPOOL: configuration data for local SPOOL and APA printers RSO: Configuration data for RSO printers with administration rights
Pool entries	Entries for SPOOL and RSO device pools
Device pool entries	Entries with all pool links for every device

3.2.2 GEN entry

The GEN entry contains **general** predefined values for SPOOL operation.

If no SPOOL parameter file exists when SPOOL is loaded, the system generates a SPOOL parameter file with the minimum configuration. These predefined parameters can be changed by systems support by means of the SPOOL command MODIFY-SPOOL-PARAMETERS.

The minimum configuration contains the following values:

```

HEADER-PAGE:
    SPACE-AFTER-HEADER =          YES
    FAMILY-MEMBER-HEADER =        YES
    COPY-HEADER =                NO
    CHARACTER-SET =              DEFAULT
    PRINT-ACCOUNT-NUMBER =        YES
PRINT-CMD-DEFAULTS:
    LINE-SIZE =                  136
    LOCK-SIZE =                  NO
    LEFT-MARGIN =                0
    DESTINATION =                CENTRAL
    DPRINT-DESTINATION =        DESTINATION
    FAMILY-PROCESSING =          YES
    ACCEPT-EMPTY-FILES =        NO
    ERROR-PROCESSING = (TRUNC=IGNORE)
    RESOURCES-LOCATION =          *HOME
SPOOL-OUT-OPTIONS:
    REMOTE-BUFFER-SIZE =         4
    REMOTE-DEVICE-LIMIT =        0
    MAX-MSG-TASK-NUMBER =        20
    START-SPOOL-LOW-VAL =        50
    FORM-NAME-LENGTH =          6
    SECTION-TASK-LIMIT =         1
    DEFAULT-SYSLST-FORM =        STD
    DEFAULT-SYSOUT-FORM =        STD
    PRIORITY(REPLAY-SESSION)=    200
    PRIORITY(FROM-POSITIONING) = 200
    PRIORITY(SECTION-POSITIONING)=200
CHECKPOINT-INTERVAL:
    LINE-PRINTERS =             10
    PAGE-PRINTERS =             100
    REMOTE-PRINTERS =           10
DEVICE-TYPE:
    LP =                          NO
    HP =                          YES
        FORMS-OVERLAY-BUFFER =    0
        CHARACTER-SET-NUMBER =    4
        ROTATION =                NO
    LP65 =                        NO
    HP90 =                        NO
        FORMS-OVERLAY-BUFFER=1344
        CHARACTER-SET-NUMBER =    64
        FORMS-OVERLAY =          YES
        RASTER-PATTERN-MEM=      4096
        ROTATION =                NO

```



```

        APA =                                NO
        TWIN =                               NO
        VIRTUAL =                            NOT ALLOWED
        PCL =                                NO
        REC-RULES-PREFIX =                   $SYSSPOOL.SYSPAR.REC-RULES.
        PRINTER-PARAM-PREFIX =               $SYSSPOOL.SYSPAR.PRINTER-PARAM
        FILTER-TASK-LIMIT =                   16
SPOOLOUT-SIZE :
        LINES-FACTOR =                       14 (if SP-SIZE=LINES; 0 if PAM
        MIN-LINES-PER-PAGE =                 66 =(110 * 6/10); see note)
RSO-OPTIONS:
        CONTROLLER-LIMIT =                   10
        CONTROLLER-DEV-LIMIT =               50
        JOB-CONTROLLER-LIMIT                 10
        CHECK-PRINTER-TIME                   2
        RETRY-TIME =                         120
        RELEASE-MEMORY =                     YES
OLTP-OPTIONS:
        TASK-LIMIT =                         10
        TASK-DEVICE-LIMIT =                  50
DPRINT-OPTIONS:
        SERVER-TASK-LIMIT =                   16
        RESOURCES-TASK-LIMIT =               8
        REMOTE-JOB-PRIORITY                   240
        CONNECTION-TIMEOUT =                 32
        TRANSFER-ADMISSION =                 FTDPRINT
        DFTM-WAITING-TIME =                  65
CENTRAL-SCHEDULING:
        DEVICE-WEIGHT =                       ( PRIO=128,FORM=16,USERID=16,F-0=16,CLASS=16)
        JOB-SEQUENCE =                       ( FORM,F-0)
        JOB-PRIORITY =                       ( PRIO,AGE)
RSO-SCHEDULING:
        DEVICE-WEIGHT =                       ( )
        JOB-SEQUENCE =                       ( )
        JOB-PRIORITY =                       ( PRIO,AGE)
NEXT-CENTRAL-SCHEDULING:
        DEVICE-WEIGHT =                       ( PRIO=128,FORM=16,USERID=16,F-0=16,CLASS=16)
        JOB-SEQUENCE =                       ( FORM,F-0)
        JOB-PRIORITY =                       ( PRIO,AGE)
NEXT-RSO-SCHEDULING:
        DEVICE-WEIGHT =                       ( )
        JOB-SEQUENCE =                       ( )
        JOB-PRIORITY =                       ( PRIO,AGE)

```

3.2.3 Forms entries

The forms for the various printer control files are entered using the SPSEIVE utility routine (ADD-SPOOL-FORM statement).

Forms are implicitly assigned to the user ID under which they are generated (RSO device administrator or systems support); they can only be modified or removed from the SPOOL parameter file under the same ID.

For generating new form entries, there is a default form entry (name field with blanks and defaults in all other fields) for each device type used. See also the description of the ADD-SPOOL-FORM statement in the "[SPSERVE \(BS2000/OSD\)](#)" manual.

3.2.4 Character set entries

Every character set specified explicitly in the PRINT-DOCUMENT command or specified implicitly in the form used must be entered in the SPOOL parameter file. This applies equally to local printers and to RSO printers.

The SPOOL parameter file contains four character sets as standard

CHARACTER-SET-NAME =	101	199	208	224
COLOUR =	BLACK	BLACK	BLACK	BLACK
WEIGHT =	NORMAL	NORMAL	NORMAL	NORMAL
CHARACTER-TYPE =	NONE	FONT-1	DATA	COURIER
CHARACTER-STYLE =	STRAIGHT	STRAIGHT	STRAIGHT	STRAIGHT
UNDERSCORE =	NO	NO	NO	NO
CHARACTERS-PER-INCH =	10	10	12	10
LINES-PER-INCH =	6	6	6	6
LANGUAGE=	NONE	NONE	NONE	NONE
NEAR-LETTER-QUALITY =	NO	NO	NO	NO

3.2.5 Device entries

One device entry exists in the SPOOL parameter file for each device (local and RSO).

3.2.6 Pool entries

One pool entry with a list of the devices (local and RSO) contained in it exists in the SPOOL parameter file for each pool.

3.2.7 Device pool entries

One or more device pool entries exist in the SPOOL parameter file for each device that belongs to one or more device pools.

Device pools enhance the operational integrity (several devices available) and facilitate operation (specifications in the PRINT-DOCUMENT command).

Device pools are managed using the SPSEIVE statements ADD-PRINTER-POOL, MODIFY-PRINTER-POOL, REMOVE-PRINTER-POOL and SHOW-PRINTER-POOL, see the "[SPSERVE \(BS2000/OSD\)](#)" manual.

3.2.8 Filter entries

For each of the filters supported by SPOOL, a filter entry must exist in the SPOOL parameter file. You must specify which input format the filter processes and which output format the filtering process delivers. The location of the filter must also be specified.

3.3 The PRFILE resource library

Irrespective of their type, all print resources are stored in a single, device-neutral, central file, the PRFILE resource library.

Users therefore no longer need to know the assignment of print control files to known printer types in order to create or call the resources required for their printouts.

A PRFILE with the standard print resources for all users (the system PRFILE) is created under the user ID SYSSPOOL and is available to all users. The resources it contains are managed by SPOOL administration or systems support, but nonprivileged users can display all resource information.

The SPOOLFILE, HPFILE, NDFILE and PRFILE print control files

The SPOOLFILE, HPFILE and NDFILE print control files, which were required for printing on certain printers in SPOOL Version 2.7B and earlier versions, contain information on controlling spoolout.

Printer type	Resources	Print control files up to SPOOL V2.7B	Resource library as of SPOOL V3.0
HP	Loop HP font HP font pool FOB	HPFILE	
ND	Loop ND font	NDFILE	
LP	Loop CHAR-IMAGE BAND-ID TRANSL.-TAB Preform record	SPOOLFILE	
PCL	PCL font PCL Softfont PCL overlay PCL macro	--	
All printer types	TRANSL.-TABLE	SPOOLFILE	

A PRFILE containing standard print resources (the "system PRFILE") is created under the SYSSPOOL user ID and is available for all users. The SPOOL administrator or systems support is responsible for the resources contained in this file. Nonprivileged users can, however, display all information about these resources.

Users can create a user-specific PRFILE in which they can create and administer. The name of the file is user-definable, the only restriction being that it must comply with DMS conventions. If the file is to be read by SPOOL (i.e. if you specify this in the PRINT-DOCUMENT command), the file name must end with the suffix PRFILE.

Examples

```
$TEST.RESOURCES-FOR-LOOPS.PRFILE  
$USER1.SPOOL-RESOURCES.LOOPS.AND.FONTS.PRFILE  
$USER2.RESOURCES.PRFILE
```

If you want to use your own resources for the printout, you must specify the file name without the suffix ".PRFILE" in the PRINT-DOCUMENT command: PRINT-DOCUMENT ..., USER-RESOURCES-FILE= \$USER2.RESOURCES.

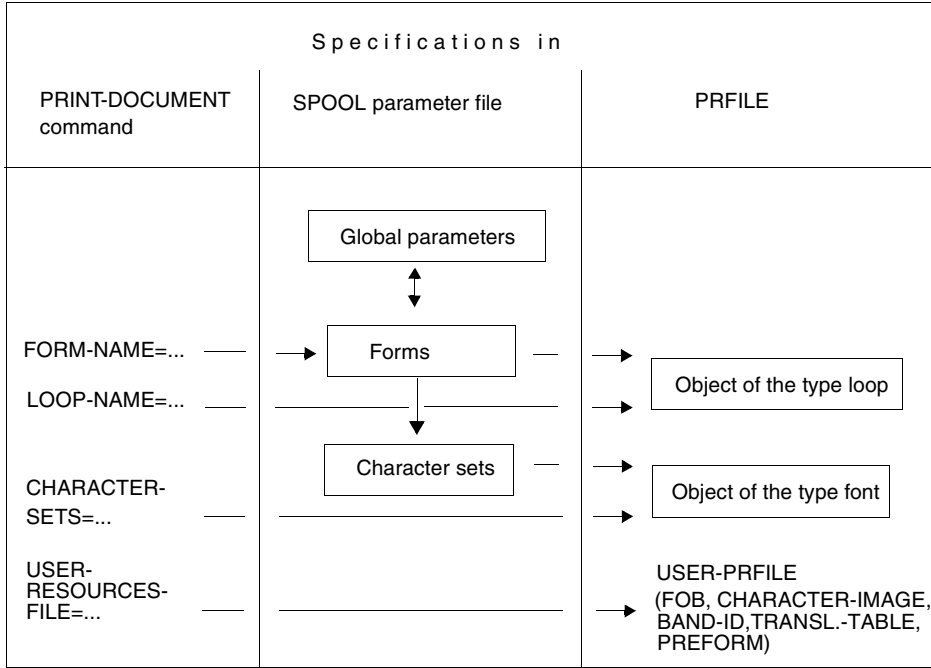
If this operand is not included or if the default operand value is used, the system PRFILE is accessed.

Resources of any kind can be stored in a user PRFILE, but when you use this file in the PRINT-DOCUMENT command, SPOOL only accesses resources for HP or ND printer types.

The utilities PRSERVE and SPOOLSERVE which are used to create and manage print resources in the print control files NDFILE/HPFILE and SPOOLFILE are still supported. However, as of V3.0 SPOOL can only process resources which are contained in a PRFILE resource library created by PRM. PRSERVE and SPOOLSERVE cannot access print resources contained in this file.

Existing procedures for creating and administering print resources with the PRSERVE and SPOOLSERVE utilities can therefore still be used. However, if these resources are to be processed by SPOOL V3.0, they must be converted from the NDFILE/HPFILE or SPOOLFILE to a PRFILE. PRM provides an easy-to-use, largely automated function for converting or migrating print control files (see the "[PRM \(BS2000/OSD\)](#)" manual).

Possible links between the specifications in the PRINT-DOCUMENT command, the SPOOL parameter file and the print resources in the resource library.



Controlling print output (PRFILE)

3.4 Printer control characters

Specifications in the PRINT-DOCUMENT command always apply to the entire file. You may also only define print attributes for the entire file in the PRINT-DOCUMENT command. But you may also have individual print pages or passages from individual print pages printed with different print attributes. This is done by inserting printer control characters within the data to be printed and by simultaneously specifying the operand DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*PAGE-MODE) in the PRINT-DOCUMENT command or CONTMOD=*PAGE-MODE in the PRNTDOC macro. If you do not specify these operands, then DOCUMENT-FORMAT=*TEXT (in the command) or CONTMOD=*STD (in the macro) will apply, i.e. any printer control characters present in the file will be ignored.

If printer control characters in the file are to be interpreted, the file must satisfy three conditions:

- The file must already be split into print pages.
- The first record of each print page must contain the control character list. Depending on the printer used, these are the first 6 or 11 bytes of this record which contain the control information for the printer. This control information may differ from one print page to another.
- The first character of each record must be a feed control character.

Control characters in the file have priority over control information specified in the PRINT-DOCUMENT command or in the PRNTDOC macro for the same print attribute.

A control character remains effective until it is canceled by another control character.

The control options depend on the printer used. With **HP and HP90 printers** you can control the following parameters:

- character spacing
- character set to be used
- underscoring
- inverse printing (HP printers only)
- spaced printing
- data compression
- page rotation (*)
- use of FOB (*)
- use of film overlays (*)
- multiple copy page function (*)
- indenting print output (*)

The items marked with an asterisk can only be controlled using the "control character list at the start of the print page".

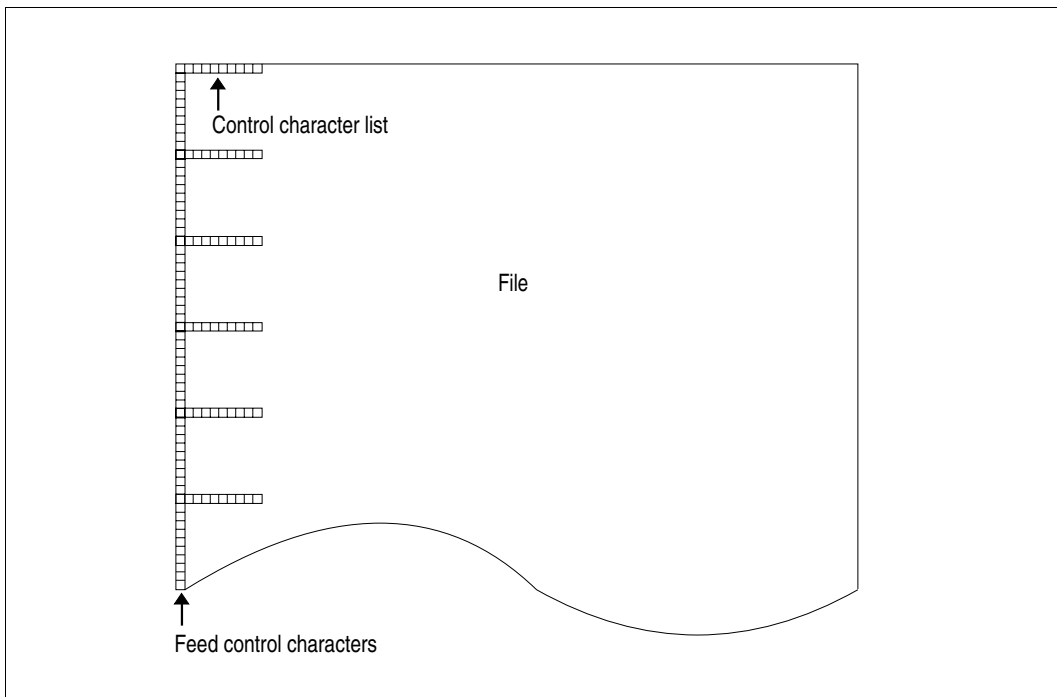
3.4.1 Control character list at the start of the print page

If, when listing the print job, you specify that control characters in the file are to be interpreted, then a control character list must be located at the start of each print page, at the beginning of the first record in each case.

This control character list must comprise 11 bytes if the file is to be output on an HP or HP90 printer.

The first character in the list is always a feed control character.

A file to be printed will then look something like this:



File with control character list on each print page

The control character lists will only be recognized as such in the case of HP and HP90 printers if you have specified the operand value `DOCUMENT-FORMAT=*PAGE-FORMAT (CONTROL-MODE=*PAGE-MODE)` in the `PRINT-DOCUMENT` command (or the operand `CONTMOD=*PAGE_MODE` in the `PRNTDOC` macro) and also specified `PRINTER-NAME=*STD`, `PRINTER-TYPE=*HP-PRINTER`. With APA printers, however, the operand value `DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*APA)` must be specified in the `PRINT-DOCUMENT` command.

Control character list for HP/HP90 printers

This control character list is equally effective for HP and HP90 printers. The file must be output by means of the following command:

```
PRINT-DOCUMENT FORM-FILE=file,DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*PAGE-MODE).
```

The control characters for HP and HP90 printers need not be repeated in the first record of successive pages unless the control information is modified.

.....Byte no.:.....											
1	2	3	4	5	6	7	8	9	10	11	Data and control characters

Where

Byte 1 Feed control character: X'C1' or X'81'.

Byte 2 Contents: ≠ X'C8' means old control character format (see conversion note)
Contents: = X'C8' means HP/HP90 character set format

Conversion note

Although the old format of the control character list for CONTROL-MODE=*PAGE-MODE is still supported, it should be converted by users with the aid of the following table:

"Old" format	"New" format
X'00ddccssmm'	X'C8ddccssmmA4A4A400A4'
X'04ddccssmm'	X'C8ddccssmm4002A400A4'
X'05ddccssmm'	X'C8ddccssmm4102A400A4'
X'06ddccssmm'	X'C8ddccssmm4202A400A4'
X'07ddccssmm'	X'C8ddccssmm4302A400A4'
X'08ddccssmm'	X'C8ddccssmm4003A400A4'
X'09ddccssmm'	X'C8ddccssmm4103A400A4'
X'0Addccssmm'	X'C8ddccssmm4203A400A4'
X'0Bddccssmm'	X'C8ddccssmm4303A400A4'
X'0Cddccssmm'	X'C8ddccssmm4004A400A4'
X'0Dddccssmm'	X'C8ddccssmm4104A400A4'
X'0Eddccssmm'	X'C8ddccssmm4204A400A4'
X'0Fddccssmm'	X'C8ddccssmm4304A400A4'

Format of control character list

Explanation

- 'dd' is the value of the control character that switches the film overlay on or off (X'00' or X'01').
- 'cc' is the value of the control character used to specify multiple printing of a print page (X'00' to X'FF').
- 'ss' is the value of the control character used to specify indentation of the print output (X'00' or X'E0' to X'FF').
- 'mm' is the value of the control character used to specify whether control characters within the text are to be interpreted (X'A3' or X'A4').

Byte 3 Forms overlay option

Control character for on/off control of the film overlay specified for ELECTRONIC-OVERLAY in the PRINT-DOCUMENT command for this page of the file. It is thus possible to print individual pages of a print file with a film overlay:

X'01' switches a film overlay on.
X'00' switches a film overlay off.

Byte 4 Multiple copy page function

Byte 4 specifies how many additional copies of this page are to be printed. Up to 254 additional copies are possible, which are printed one after the other. If X'00' is specified, no additional copies of the page concerned are produced.



Using the PAGE-COPIES operand in the PRINT-DOCUMENT command you can globally define for all pages of the file to be printed how many additional copies are to be printed. The information in byte 4, however, has priority over the specifications in the PRINT-DOCUMENT command (assuming that the operand CONTROL-MODE=*PAGE-MODE is also specified).

Byte 5 Print line indentation

The print lines can be indented up to 31 columns (1/10 inch per column) by specifying one of the control characters X'E0' through X'FF'.

The specification is valid for the relevant page.

Indentation of the print output for an entire file is defined by means of an appropriate specification for LEFT-MARGIN in the PRINT-DOCUMENT command.



When CONTROL-MODE=*PAGE-MODE is also specified, control byte 5 has priority over the value specified for LEFT-MARGIN in the PRINT-DOCUMENT command.

If inadvertently specified, the control character X'00' will be automatically converted by the SPOOL system into control character X'E0' (i.e. no indentation). Only the control characters X'00' and X'E0' through X'FF' are interpreted. For all other control characters, an error message is issued.

Byte 6 DATA MODIFICATION ON/OFF (control character interpretation on/off).

X'A3' DATA MODIFICATION=ON: the control characters in the text of the print page are interpreted by SPOOL.

X'A4' DATA MODIFICATION=OFF: the control characters in the text of the print page are not interpreted by SPOOL; they are treated as data. (Caution: the printer hardware interprets the control characters).

If the value X'00' is specified in byte 6, the status of the previous page will apply.



If byte 6 of the first page to be printed contains the value X'00' (for example, after RESUME-PRINT-JOB or PRINT-DOCUMENT .. ,DOCUMENT-FORMAT=*PARAMETERS(OUTPUT-PART=*RANGE(FROM=nn)), then SPOOL will insert the value X'A4' since no previous page exists. Any control characters present in the text are not interpreted in this case.

Byte 7 Control character for the character attributes (type 0):
character density, inverse print, spaced print, underscore
Contents X'A4' means unchanged

Default value:

character density of the character set in use

Inverse print off (inverse print is ignored by HP90 printers)

spaced print off

underscore off

Byte 8 Control character for character set selection (type 1)

Contents X'A4' means no character set changeover

Default value:

The first character set specified for the CHARACTER-SETS operand in the PRINT-DOCUMENT command.

Byte 9 Control character for overlay control (type 3), byte 1:

film overlay/EFO data overlay on/off; combined with copy reference number;

contents X'A4' means unchanged

Byte 10 Control character for overlay control (type 3), byte 2:

copy reference number

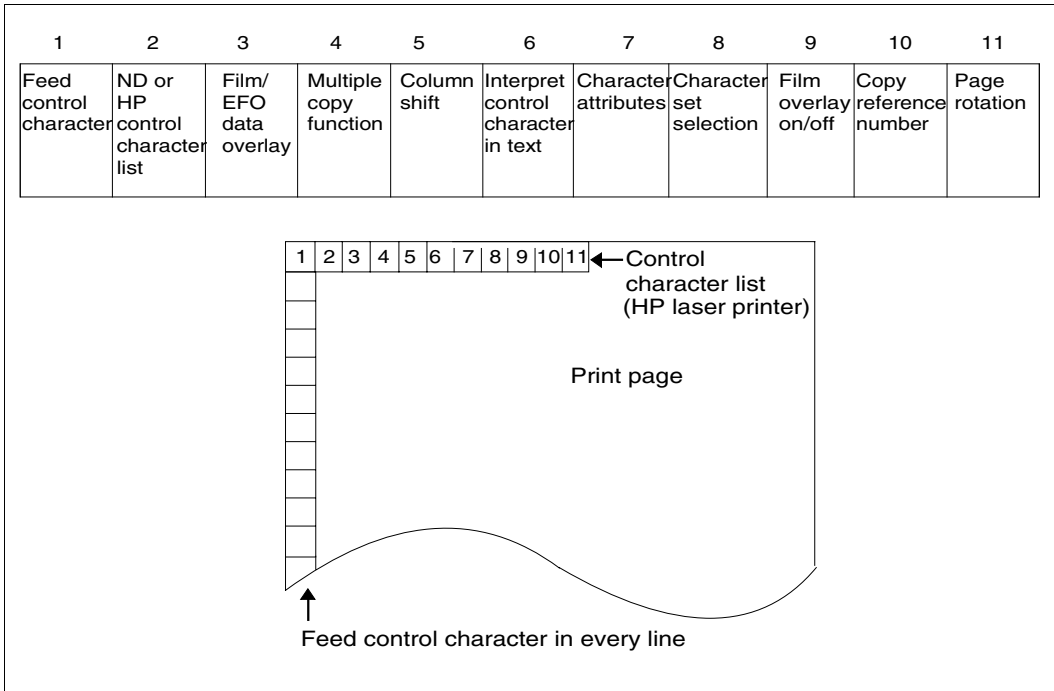
Byte 11 Control character for the page rotation module if that module is installed and ROTATION=*BY-CONTROL-CODES was specified in the PRINT-DOCUMENT command.

Possible values:

X'A4':	unchanged
X'F0':	no rotation
X'F1':	90 degree rotation clockwise
X'F2':	180 degree rotation clockwise
X'F3':	270 degree rotation clockwise



The values and meaning of control bytes 7, 8, 9, and 10 are identical with those of the corresponding control bytes following the escape character "FF" contained in the text, which references the same function.



Control character list for HP printers

3.4.2 Feed control characters

The feed control characters in the control character list enable you to set the line feed and tabulator stops. You must specify CONTROL-MODE=*PAGE-MODE in the PRINT-DOCUMENT command if you want these control characters interpreted. If you do not specify this operand, SPOOL handles feed control.

There are printer-dependent differences in the feed control characters.

Feed control characters	Meaning
X'00' to X'0F'	Line feed after printing (0 to 15 lines)
X'40' to X'4F'	Line feed before printing (0 to 15 lines) OPS printers: plus one line feed after printing
X'81' to X'8C'	Vertical tab after printing (vertical tabulator "channel 1" through "channel 12")
X'C1' to X'CC	Vertical tab before printing (vertical tabulator "channel 1" through "channel 12")

Feed control characters

Examples

X'03': 3-line feed after printing

X'41': 1-line feed before printing (with OPS printers: 1-line feed before printing and 1-line feed after printing).

X'83': Advance to vertical tab "channel 3" after printing

X'C1': Advance to vertical tab "channel 1" before printing



The vertical tab "channel 12" (X'CC') is automatically defined by SPOOL as the last line of a page (exception: HP and HP90 printers).

Specifying the vertical tab "channel 9" (X'C9') with laser printers causes printing to be interrupted, which in turn invokes the printer error handling routine. The print job subsequently continues to print correctly, but printer performance is naturally impaired.

In contrast to the description of the first record, the section 'Data and control characters mixed' may be omitted, i.e. the first record contains only control information and the print data starts from the second record.

Hardware differences mean that ASA and OPS feed control characters are not completely identical: OPS printers always advance one line **after** printing and not before (except in the case of feed suppression through control character X'00').

3.4.3 Control characters for HP and HP90 LED laser printers

With HP and HP90 printers you can control the following print attributes by means of control characters:

Print attribute	Control character at start of print page	Control character in the text
Character density	x	x
Character set selection	x	x
Physical forms overlay	x	-
Multiple page copy	x	-
Indentation of print output	x	-
Underscore	-	x
Inverse print	-	x (HP printers only)
Spaced print	-	x
Data compression	-	x
FOB data overlay start	x	-
Copy reference number (FOB)	x	-
Page rotation module	x	-

Controlling print attributes



If the data to be printed exclusively contains ND control characters, then the file can also be printed on an HP printer. Where necessary, SPOOL converts the ND control characters into HP control characters.

HP control characters within the data always consist of two parts, the escape character X'FF' and the actual control character (1 or 3 bytes). In files that are to be output on HP printers with control character interpretation, it is thus preferable to use X'FF' only as the escape character.

Note

Any other character can be used instead of the escape character "FF" in the file. Note, however, that since SPOOL recognizes only "FF" as the control character, the character you use must be translated into "FF" when the print job is processed. This function is discharged by a code translation table created with PRM and activated for the current print job by the command PRINT-DOCUMENT..., RESOURCE-DESCRIPTION=*PARAMETERS(TRANSLATION-TABLE=*PARAMETERS(NAME=)).

The contents of the two high-order bits 2^6 and 2^7 define the control character type of the actual control characters. Types 0, 1, 2 and 3 can thus be differentiated for the HP/HP90 control characters.

Type	2^7	2^6	Control function
Type 0	0	0	Character density setting (CPI) and print format (wide type/inverse type/underscoring)
Type 1	0	1	Character set selection
Type 2	1	0	Data compression
Type 3	1	1	Print page overlaying

Control character types for HP/HP90 printers

Control characters remain valid until superseded by a corresponding new control character in the text or in the control character list at the top of a subsequent page.

Control characters for the character attributes (type 0)

A control character for the character attributes consists of the escape character X'FF' and a control byte which sets the values for: spaced print, inverse print, underscore, character density. Each bit of the control byte has a specific function:

0	0	Spaced print	Inverse print	Under score	Char. density	Char. density	Char. density
Bit 2^7	Bit 2^6	Bit 2^5	Bit 2^4	Bit 2^3	Bit 2^2	Bit 2^1	Bit 2^0

Possible values and their functions

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Meaning
0	0	1	x	x	x	x	x	Spaced print on
0	0	0	x	x	x	x	x	Spaced print off
0	0	x	1	x	x	x	x	Inverse print on (for HP printers)
0	0	x	0	x	x	x		Inverse print off (for HP printers)
0	0	x	x	1	x	x	x	Underscore on
0	0	x	x	0	x	x	x	Underscore off
0	0	x	x	x	0	0	0	CPI value of current character set
0	0	x	x	x	0	0	1	6 cpi
0	0	x	x	x	0	1	0	10 cpi
0	0	x	x	x	0	1	1	12 cpi
0	0	x	x	x	1	0	0	15 cpi
0	0	x	x	x	1	0	1	20 cpi
0	0	x	x	x	1	1	0	Reserved; same effect as: 00xxx000

Values and effects of the control character bits

Bits 2^7 and 2^6 are set to "0" (specifies "type 0"). Bits 2^5 through 2^0 can be used in any combination.

Underscore, spaced print and inverse print are valid for the characters following the control character until the function is deactivated or until the beginning of the first line of the next page.



If, when page rotation is active, underscoring or inverse printing is not deactivated at the end of the page (if the last line was truncated due to excess length, for example), then the entire area from the last line of the current page to the first line of the following page will be printed underscored or in inverse mode.

Possible bit combinations

Spaced print	Inverse print	Underscore	Density	Control char.
n	n	n	CD	X'FF00'
n	n	n	6 cpi	X'FF01'
n	n	n	10 cpi	X'FF02'
n	n	n	12 cpi	X'FF03'
n	n	n	15 cpi	X'FF04'
n	n	n	20 cpi	X'FF05'
n	n	y	CD	X'FF08'
n	n	y	6 cpi	X'FF09'
n	n	y	10 cpi	X'FF0A'
n	n	y	12 cpi	X'FF0B'
n	n	y	15 cpi	X'FF0C'
n	n	y	20 cpi	X'FF0D'
n	y	n	CD	X'FF10'
n	y	n	6 cpi	X'FF11'
n	y	n	10 cpi	X'FF12'
n	y	n	12 cpi	X'FF13'
n	y	n	15 cpi	X'FF14'
n	y	n	20 cpi	X'FF15'
n	y	y	CD	X'FF18'
n	y	y	6 cpi	X'FF19'
n	y	y	10 cpi	X'FF1A'
n	y	y	12 cpi	X'FF1B'
n	y	y	15 cpi	X'FF1C'
n	y	y	20 cpi	X'FF1D'
y	n	n	CD	X'FF20'
y	n	n	6 cpi	X'FF21'
y	n	n	10 cpi	X'FF22'
y	n	n	12 cpi	X'FF23'
y	n	n	15 cpi	X'FF24'
y	n	n	20 cpi	X'FF25'
y	n	y	CD	X'FF28'
y	n	y	6 cpi	X'FF29'
y	n	y	10 cpi	X'FF2A'
y	n	y	12 cpi	X'FF2B'
y	n	y	15 cpi	X'FF2C'
y	n	y	20 cpi	X'FF2D'

Bit combinations in the control character list

Spaced print	Inverse print	Underscore	Density	Control char.
y	y	n	CD	X'FF30'
y	y	n	6 cpi	X'FF31'
y	y	n	10 cpi	X'FF32'
y	y	n	12 cpi	X'FF33'
y	y	n	15 cpi	X'FF34'
y	y	n	20 cpi	X'FF35'
y	y	y	CD	X'FF38'
y	y	y	6 cpi	X'FF39'
y	y	y	10 cpi	X'FF3A'
y	y	y	12 cpi	X'FF3B'
y	y	y	15 cpi	X'FF3C'
y	y	y	20 cpi	X'FF3D'

Bit combinations in the control character list

Explanation

y: yes

n: no

CD: Character density of the current character set

Control character for character set selection (type 1)

A control character for character set selection consists of the escape character X'FF' and a control byte. The byte following the escape character selects the character set.

0	1	x	x	x	x	x	x
Bit 2 ⁷	Bit 2 ⁶	Bit 2 ⁵	Bit 2 ⁴	Bit 2 ³	Bit 2 ²	Bit 2 ¹	Bit 2 ⁰

Bit 2⁷ is set to 0, bit 2⁶ is set to 1 (specifies "type 1"). Bits 2⁵ through 2⁰ contain the number of the selected character set (0 through 63) in binary form.

Possible values

Character set number	Control char.	Character set number	Control char.	Character set number	Control char.
1	X'FF40'	23	X'FF56'	45	X'FF6C'
2	X'FF41'	24	X'FF57'	46	X'FF6D'
3	X'FF42'	25	X'FF58'	47	X'FF6E'
4	X'FF43'	26	X'FF59'	48	X'FF6F'
5	X'FF44'	27	X'FF5A'	49	X'FF70'
6	X'FF45'	28	X'FF5B'	50	X'FF71'
7	X'FF46'	29	X'FF5C'	51	X'FF72'
8	X'FF47'	30	X'FF5D'	52	X'FF73'
9	X'FF48'	31	X'FF5E'	53	X'FF74'
10	X'FF49'	32	X'FF5F'	54	X'FF75'
11	X'FF4A'	33	X'FF60'	55	X'FF76'
12	X'FF4B'	34	X'FF61'	56	X'FF77'
13	X'FF4C'	35	X'FF62'	57	X'FF78'
14	X'FF4D'	36	X'FF63'	58	X'FF79'
15	X'FF4E'	37	X'FF64'	59	X'FF7A'
16	X'FF4F'	38	X'FF65'	60	X'FF7B'
17	X'FF50'	39	X'FF66'	61	X'FF7C'
18	X'FF51'	40	X'FF67'	62	X'FF7D'
19	X'FF52'	41	X'FF68'	63	X'FF7E'
20	X'FF53'	42	X'FF69'	64	X'FF7F'
21	X'FF54'	43	X'FF6A'		
22	X'FF55'	44	X'FF6B'		

Character set selection in the control character list

Character set selection depends on the order in which character sets are specified in the CHARACTER-SETS operand in the PRINT-DOCUMENT command.

The selected character set is used for printing until a new character set is selected by means of another control character either in the text or in the control character list of the next page.

Any attempt to address a character set which has not been specified in the PRINT-DOCUMENT command is rejected with the message "USER ERROR", and the incorrect control character is also output. This applies even if the character set concerned is loaded in the printer's matrix memory.

Control characters for compression of transfer data (type 2)

The control characters for compression of the transfer data are always contained within the text and never in the control character list at the start of a page.

This type of control character consists of the escape character X'FF' and the three following bytes.

In order to relieve the load on the transfer channel from the CPU to the printer, you can compress a string of identical characters (e.g. AAAAAAAAAA) into one control character before sending it to the printer. On output, the compressed character string is interpreted by the HP printer (not by SPOOL).

An incorrect control character for data compression in the file causes the printout to be interrupted and the message "WRONG CONTROL BYTE" to be output on the trailer page.

Byte 1

1	0	x	x	x	x	x	x
Bit 2 ⁷	Bit 2 ⁶	Bit 2 ⁵	Bit 2 ⁴	Bit 2 ³	Bit 2 ²	Bit 2 ¹	Bit 2 ⁰

Bit 2⁷ is set to 1, bit 2⁶ is set to 0 (specifies "type 2"). Bits 2⁵ through 2⁰ may be 0 or 1 (not checked).

Byte 2

x	x	x	x	x	x	x	x
Bit 2 ⁷	Bit 2 ⁶	Bit 2 ⁵	Bit 2 ⁴	Bit 2 ³	Bit 2 ²	Bit 2 ¹	Bit 2 ⁰

The second byte indicates the number of times the character (in byte 3) is to be printed consecutively (starting at the position of the control character on the print page).

Byte 3

The third byte contains the hexadecimal code of the compressed character.

Example

The control character X'FF800AC1' is contained somewhere in the text (but not in the control character list at the start of the print page).

The HP printer interprets as follows:

- FF: Escape character, i.e. a control code for interpretation follows, not a printable character.
- 80: Data compression on.
- 0A: 10 times.
- C1: Character C'A'.

The 4-byte control character in the file is replaced in the printout by the 10-byte character string "AAAAAAAAAA".

FOB data overlay control character (type 3)

The FOB data overlay control character consists of 2 bytes and is always contained in the control character list at the start of a page and never within the print data. No escape character is therefore required. The first byte indicates whether or not the overlay is to be used and whether or not the copy reference number is to be modified. Where applicable, the second byte contains the copy reference number



If this control character appears within the print data, this causes the printout to be interrupted and the message "WRONG CONTROL BYTE" to be output on the trailer page.

Byte 1

1	1	x	0	0	x	0	0
Bit 2 ⁷	Bit 2 ⁶	Bit 2 ⁵	Bit 2 ⁴	Bit 2 ³	Bit 2 ²	Bit 2 ¹	Bit 2 ⁰

Bits 2⁷ and 2⁶ are always set to 1 (specifies "type 3"). Bits 2⁴, 2³, 2¹ and 2⁰ are reserved. Thus only bits 2⁵ and 2² have a control function.

If **bit 2⁵ is set to 0**, the next byte is not interpreted as a control byte (i.e. the copy reference number in the FOB data overlay definition is not modified in this case). The specification of a copy reference number is meaningless if the overlay function is not active (FOB data overlay OFF).

If **bit 2⁵ is set to 1**, the contents of byte 2 are interpreted as the number of that page copy starting with which forms overlay is to be activated or deactivated (= copy reference number).

If **bit 2² is set to 0**, a forms overlay is implemented for this page (FOB data overlay ON).

If **bit 2² is set to 1**, forms overlay is suppressed for this page (FOB data overlay OFF).



With HP printers, the original is regarded as page copy no. 1. PAGE-COPIES=255 means 1 original + 254 copies.

Example

The definition of an FOB data overlay determines that it is to be used for overlaying a print page

- starting with copy no. 100 and
- for 3 consecutive page copies.

The 4th byte of the control character list at the start of a page (or in the PRINT-DOCUMENT command) indicates that a total of 21 successive copies of that page are to be printed. Forms overlay for 3 consecutive copies using the specified overlay is in this case performed only if the print page is declared as copy no. 100 or greater (in byte 10 of the control character list at the start of the page) and the relevant bits in byte 9 of the control character list are set (see below).

Possible values for byte 1

Byte contents	FOB data overlay	Copy reference number
X'C4'	off	No modification
X'E4'	off	Modification
X'C0'	on	No modification
X'E0'	on	Modification
X'A4'	Unchanged	
any other	Message "WRONG CONTROL BYTE"	

Possible values for byte 1 in the control character list

Byte 2

This byte is evaluated only if bit 2⁵ of the preceding byte is set to 1. Specification of a logical copy number as of which the forms overlay is to start (permits more flexible use of FOB data overlays).

Possible values for byte 2

0...255

Examples of FOB data overlay control characters

(1) X'C4' →

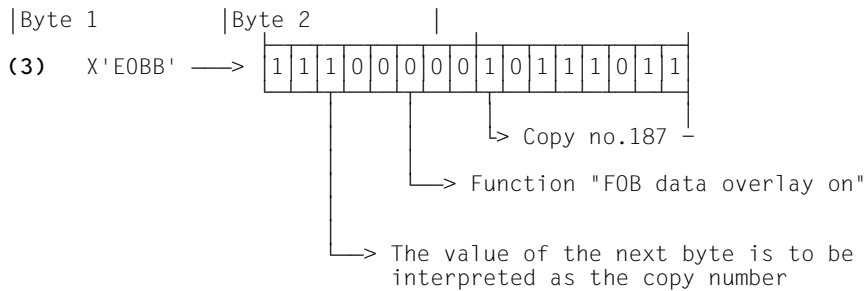
1	1	0	0	0	1	0	0
---	---	---	---	---	---	---	---

└─> Function "FOB data overlay off"

(2) X'E004' →

Byte 1				Byte 2									
1	1	1	0	0	0	0	0	0	0	0	1	0	0

└─> Copy no.4
└─> Function "FOB data overlay on"
└─> The value of the next byte is to be interpreted as the copy number



Example of HP control characters

X'FF04FF43' → '04' stands for 15 cpi
 '43' stands for font 4

Control characters within the print data are always interpreted by HP printers provided CONTROL-MODE=*PAGE-MODE is specified.

The individual character density for each character in a proportional font can be defined in the PRM utility routine.

The restrictions concerning copies and overprinting already described are also valid for CONTROL-MODE=*PAGE-MODE.

In files which may possibly be output on an HP printer, the character X'FF' is permitted only as the escape character, even if DATA MODIFICATION is deactivated in the control character list at the start of the print page upon output to the HP printer.

The blank at the end of a print line is always printed with the standard character set (and the corresponding character density) in order to ensure that the space character of the character set used really is the blank (X'40'). For the next line, the previously used character set is reactivated (up to the blank at the end of the print line etc.).

3.4.4 Incorporating control characters in a file

If neither procedures nor programs are at your disposal for preparing an existing file for printing with the laser printer, you can also enter the specific laser printer control characters in the file yourself. It is not absolutely essential here to key in each individual control character in hexadecimal form. If instead of these control characters you first insert special symbols in the file, you can then use a text editor (e.g. EDT) to convert these special symbols into the desired control characters with relative ease.

The following should be noted with regard to file processing:

- The maximum possible length of a record which can be printed in its entirety depends on the character density and the number of control characters (see [page 79](#)).
- The number of records per print page and the line densities of the character sets used must match the information in the loop used.
- Use the correct control characters. Do not switch to a higher character density than that specified in the definition of the character set used.
- The first record of each print page must contain the control information (control character list).
- In the case of errored printing, the operator receives system message EXC0860 with an error code on the console (see the BS2000 manual "[System Messages, Volumes 1 - 3](#)"). This code, which is recorded in the operator's console log, facilitates location of errors.

Example

Laser printer control characters are to be added to a file. This is done as follows:

- 1) The file is initially created without control characters. Special strings are inserted at the positions that will subsequently be occupied by the control characters. The same special string must always be used for a particular control character.
- 2) A feed control character is prefixed to each record.
- 3) The special strings contained in the file are converted into control characters with the aid of EDT.
- 4) As a check, the file is printed in hexadecimal format.
- 5) Finally, the file is printed out on a laser printer.

1) Creating the file

```
AH \tuuu00
THIS IS A SAMPLE THAT USES CŒNTRŒL CHARACTERS
DEMONSTRATION ŒF !SŒN! SPACED !RŒ! PRINTING
DEMONSTRATION ŒF !IŒN! INVERSE !RŒ! PRINTING
DEMONSTRATION ŒF !UŒN! UNDERSCORE !RŒ! PRINTING
DEMONSTRATION ŒF !CPI6ŒN! SIX CPI !RŒ! PRINTING
DEMONSTRATION ŒF !CPI15ŒN! FIFTEEN CPI !RŒ! PRINTING
THE CŒNTRŒL CHARACTERS !CS2!!SŒN! REMAIN VALID
UNTIL SUPERSEDED BY CŒRRESPONDING !CS1!!RŒ! NEW CŒNTRŒL CHARACTERS
DEMONSTRATION ŒF !MUL10!COMPRESSIŒN
```

Standard listing of a file with special character strings

The above listing contains special character strings in the text (enclosed in exclamation marks) which are not to be printed but are to be subsequently converted into control characters.

2) Inserting feed control characters

The EDT statement @PREFIX & W X'01' is used to prefix all records in the file with the feed control character X'01'.

3) Converting inserted special character strings into specific laser printer control characters

The following EDT statement is now used to convert the special strings into printer control characters:

```
@ON & C A 'special-character-string' TO X'control-character-code'
```

The following conversions are performed in this way:

Special string	Printer control characters	Meaning
X'01C1C8'	X'C1C8'	(removes line feed control character from beginning of control character list)
C'!RO!'	X'FF00'	(restores the original state)
C'!SON!'	X'FF20'	(switches spaced printing on)
C'!ION!'	X'FF10'	(switches inverse printing on)
C'!UON!'	X'FF08'	(switches underscore on)
C'!CPI6ON!'	X'FF01'	(prints the current character set at 6 cpi)
C'!CPI15ON!'	X'FF04'	(prints the current character set at 15 cpi)
C'!CS1!'	X'FF40'	(selects the first character set specified)
C'!CS2!'	X'FF41'	(selects the second character set specified)
C'!MUL10!'	X'FF800A'	(multiplies the next character by ten)

Conversion of special characters to printer characters

4) Printing the file in hexadecimal format as a check

The file is printed out for checking purposes, using the command

```
PRINT-DOCUMENT FROM-FILE=filename,DOCUMENT-FORMAT=*TEXT( -
  OUTPUT-FORMAT=*HEXADECIMAL)
```

```
0001  A H   \ t u u u D 0
      C1C8000E0A3A4A4A4C4F0
0001  T H I S   I S   A   S A M P L E   T H A T   U S E S   C O N T R O L   C H A R A C T E R S
      01E3C8C9E240C9E240C140E2C1D4D7D3C540E3C8C1E340E4E2C5E240C3D6D5E3D9D6D340C3C8C1D9C1C3E3C5D9E2
0001  D E M O N S T R A T I O N   O F   -   S P A C E D   -   P R I N T I N G
      01C4C5D4D6D5E2E3D9C1E3C9D6D540D6C640FF2040E2D7C1C3C5C440FF0040D7D9C9D5E3C9D5C7
0001  D E M O N S T R A T I O N   O F   -   I N V E R S E   -   P R I N T I N G
      01C4C5D4D6D5E2E3D9C1E3C9D6D540D6C640FF1040C9D5E5C5D9E2C540FF0040D7D9C9D5E3C9D5C7
0001  D E M O N S T R A T I O N   O F   -   U N D E R S C O R E   -   P R I N T I N G
      01C4C5D4D6D5E2E3D9C1E3C9D6D540D6C640FF0840E4D5C4C5D9E2C3D6D9C540FF0040D7D9C9D5E3C9D5C7
0001  D E M O N S T R A T I O N   O F   -   S I X   C P I   -   P R I N T I N G
      01C4C5D4D6D5E2E3D9C1E3C9D6D540D6C640FF0140E2C9E740C3D7C940FF0040D7D9C9D5E3C9D5C7
0001  D E M O N S T R A T I O N   O F   -   F I F T E E N   C P I   -   P R I N T I N G
      01C4C5D4D6D5E2E3D9C1E3C9D6D540D6C640FF0440C6C9C6E3C5C5D540C3D7C940FF0040D7D9C9D5E3C9D5C7
0001  T H E   C O N T R O L   C H A R A C T E R S   -   |   -   R E M A I N   V A L I D
      01E3C8C540C3D6D5E3D9D6D340C3C8C1D9C1C3E3C5D9E240FF41FF2040D9C5D4C1C9D540E5C1D3C9C4
0001  U N T I L   S U P E R S E D E D   B Y   C O R R E S P O N D I N G   -   -   N E W   C O N T R O
      01E4D5E3C9D340E2E4D7C5D9E2C3C4C5C440C2E840C3D6D9D9C5E2D7D6D5C4C9D5C740FF0040D5C5E640C3D6D5E3D9D6
0051  L   C H A R A C T E R S
      0340C3C8C1D9C1C3E3C5D9E2
0001  D E M O N S T R A T I O N   O F   -   C O M P R E S S I O N
      01C4C5D4D6D5E2E3D9C1E3C9D6D540D6C640FF800AC3D6D4D7D9C5E2E2C9D6D5
```

Printing the file with OUTPUT-FORMAT=*HEXADECIMAL

The listing shows that the special character strings initially contained in the file have been converted into control characters. The control character list (first line thereof) now contains the following control characters:

- 'C1' = Feed to vertical tab "channel 1" (in the standard loop this is a feed to the next page).
- 'C8' = Use HP/HP90 control characters.
- '00' = No forms overlay.
- '00' = No multiple copies of the print page.
- 'E0' = No indentation of text.
- 'A3' = Activation of control character interpretation.
- 'A4' = Presetting the character attributes.
- 'A4' = Presetting the character set.
- 'A4' = Presetting the overlay control.
- 'C4' = FOB data overlay: off, copy reference number: no modification
- 'F0' = No rotation.

5) Printing the file on a laser printer

The command

```
PRINT-DOCUMENT FROM-FILE=filename,
    DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*PAGE-MODE),
    RESOURCE-DESCRIPTION=*PARAMETERS(CCHARACTER-SETS=(101,219)),
    TO-PRINTER=*PARAMETERS(PRINTER-NAME=*STD,
    PRINTER-TYPE=*HP-PRINTER)
```

is used to issue the print job for the laser printer. The following character sets are used: 101 (OCR-B1/-A1) and 219 (SERIFA 12 ITALIC).

```
THIS IS A SAMPLE THAT USES CONTROL CHARACTERS
DEMONSTRATION OF SPACED PRINTING
DEMONSTRATION OF INVERSE PRINTING
DEMONSTRATION OF UNDERSCORE PRINTING
DEMONSTRATION OF SIX CPI PRINTING
DEMONSTRATION OF FIFTEEN CPI PRINTING
THE CONTROL CHARACTERS REMAIN VALID
UNTIL SUPERSEDED BY CORRESPONDING NEW CONTROL CHARACTERS
DEMONSTRATION OF CCCCCCCCCOMPRESSION
```

Laser printer listing with control characters interpreted

Result: The file is printed with two different character sets.

3.5 Header and trailer pages

This section describes the effect of form and character set selection on header and trailer pages as well as how header and trailer pages can be customized.

3.5.1 Effect of form and character set selection on header and trailer pages

The assignment of header and trailer pages to a form is performed by systems support or the RSO device administrator. You as a nonprivileged user have no control over this function.

If you specify the FORM-NAME and CHARACTER-SETS operands in the PRINT-DOCUMENT command, this affects the selection of character sets for output of the header and trailer pages on laser printers as follows:

PRINT-DOCUMENT	Entries in the SPOOL parameter file for			Printed with:
	forms	general parameters	character set	
FORM-NAME =form1	FORM-NAME= form1 HEADER-PAGE= NO TRAILER-PAGE=NO CHARACTER-SETS =ccc		ccc	Form 'form1' No header page No trailer page Data with character set ccc
FORM-NAME =form1	FORM-NAME= form1 HEADER-PAGE =YES TRAILER-PAGE =YES CHARACTER-SETS =ccc	HEADER-PAGE: CHARACTER-SETS=FILE	ccc	Form 'form1' Header page with char. set ccc Trailer page with char. set ccc Data with character set ccc
FORM-NAME =form1	FORM-NAME= form1 HEADER-PAGE=YES CHARACTER-SET =ccc	HEADER-PAGE: CHARACTER-SET=FILE	ccc	Form 'form1' Header page with char. set xxx Data with character set xxx
CHARACTER-SETS=xxx			xxx	
FORM-NAME =form1	FORM-NAME= form1 HEADER-PAGE=YES CHARACTER-SET =ccc	HEADER-PAGE: CHARACTER-SET=DEFAULT	ccc	Form 'form1' Data with character set xxx Header page with char. set ccc

Form and character set selection

PRINT-DOCUMENT	Entries in the SPOOL parameter file for			Printed with:
	forms	general parameters	character set	
CHARACTER-SETS=xxx	_____	_____	→ xxx	Data with character set xxx
CHARACTER-SETS=xxx	FORM-NAME=STD	HEADER-PAGE:		Form '**STD'
	HEADER-PAGE=YES	CHARACTER-SET=DEFAULT		Header page with char. set 101
	CHARACTER-SETS=101	_____	→ 101	Data with character set xxx
	_____		→ xxx	

Form and character set selection

CHARACTER-SET = ccc

This character set is used for printing the header and trailer pages on laser printers (unless in the SPOOL parameter HEADER-PAGE the operand value FILE was specified) and RSO devices.

It is also used for printing the data if no other character sets are specified in the CHARACTER-SETS operand of the PRINT-DOCUMENT command. The CHARACTER-SETS operand in the PRINT-DOCUMENT command is permitted for RSO or laser printers only.

HEADER-PAGE = YES/NO/ONE

If a header page is to be printed on a laser printer, the SPOOL parameter HEADER-PAGE (CHARACTER-SET=DEFAULT/FILE) is used to control whether the header page is to be printed

- using the character set specified in the form definition (CHARACTER-SETS=DEFAULT in the command PRINT-DOCUMENT(CHARACTER-SET=FILE))
- using the first character set specified in the CHARACTER-SETS=*POOL (...) in the command PRINT-DOCUMENT(CHARACTER-SET=FILE)
- using the first character set specified in the command PRINT-DOCUMENT(CHARACTER-SETS=*POOL(...))
- using the character set found under the index given with CHARACTER-SETS=*POOL (CHARACTER-SET=FILE)

With all other printers, this SPOOL parameter is not evaluated. Further information about the operand values can be found in the "[Spool & Print - Commands \(BS2000/OSD\)](#)" and "[SPSERVE \(BS2000/OSD\)](#)" manuals.

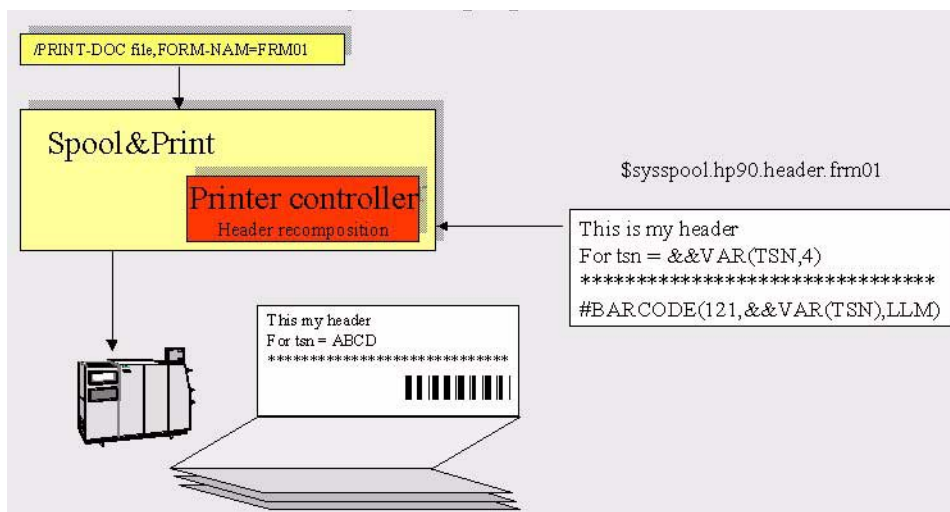
The trailer page is printed with the same character set as the header page. For the layout of the trailer page for local SPOOL, see [page 179](#).

3.5.2 Customizing header and trailer pages

As of SPOOL 4.6A, it is possible to use customized header and trailer pages. Header and trailer pages may be customized by means of:

- Variables
Specific print job properties may be included in the header and trailer pages
- Conditional text
- Functions
Specific function fields, such as date or time, may be included in the system pages
- Barcodes
Performed via specific fonts (supported only for HP/HP90 printers)

Customized header and trailer pages are defined in template files. Each template file is associated with a device type and a form name.



Example of customizing a header page

3.5.2.1 Template files for header and trailer pages

Template files are SAM files named:

- `$SYSSPOOL.<device type>.HEADER.<form name>` for a customized header page
- `$SYSSPOOL.<device type>.TRAILER.<form name>` for a customized trailer page

where `<device type>` is

LP65	for LP65 printers
LP48	for LP48 printers
HP	for HP printers
HP90	for HP90 printers
LP-EM	for LP-EMULATED printers
LP	for other LP printers

and `<form name>` is the name of the form (as defined in the spool parameters) that will be used for printing the file.

The template files have to be defined by the SPOOL administrator (privilege PRINT-SERVICE-ADMINISTRATION). If no corresponding template file exists, the common mechanism for header and trailer pages is used.

Each template file may contain the following elements (aside from texts)

- variable field references that specify which print job properties are to be included in the header or trailer page
- formatting or service functions, such as writing in big letters, writing a text with a different font, adding the date, the time, duplicate a string of characters, etc.
- a barcode function (`#BARCODE`) that allows bar codes to be inserted

3.5.2.2 Variables

Variable fields must be defined by `&&VAR(<variable name>[,length])`, where `<variable-name>` is the name of an object attribute and `length` is the maximum length of the displayed value.

Variable field values are output left-justified and padded with blank characters.

If no length has been specified, the value is written with default length (see table below). The maximum length allowed is 80; if a higher value is specified, 80 will be assumed.

If the variable name does not exist or is not specified correctly, no error message is sent and no value is returned, but the specified variable name is output.

The following variables may be used (table sorted alphabetically):

Variable Name	Length	Possible Values	Meaning
ACCOUNT	8	<account>	Account number for the spoolout job
ADDCOPIES	3	0..255	Number of additional copies
BLKSIZE	2	1..16	File block size
CHARPOOLINDEX	2	' ' / 1..64	Number of the character set in the character set pool
CHARPOOLNAME	4	' ' / <pool name>	Name of the character set pool
CHARSLIST	1..65	' ' / (<charset name>,...)	List of the character sets
CHECKPOINT	8	*PAGE / *SECTION	Checkpoint processing information
CLUSTER	7	*BS2000 / *SINIX / *LOCAL	Cluster type
CODEDCHARSET	8	' ' / <coded char set name>	Name of the coded character set
CONTRCHARPOS	4	' ' / 1..2040	Number of the data byte whose content is interpreted as pcc
CTRLCHAR	4	*NO / *YES	Control character bar present at the start of each page
CTRLCHARTYPE	11	*COMPATIBLE / *HP	Control characters must be converted in HP characters
CTRLMODE	12	*NO / *APA / *LOGICAL / *PHYSICAL / *LINEMODE / *PAGEMODE / *TRANSPARENT	Interpretation of control characters
DEFAULTCHAR	3	<charset name>	Name of the character set specified in the form
DELETEFILE	8	*NO / *YES / *DESTROY	File deleted after printing
DESTINATION	12	' ' / <destination name>	Name of the destination (pool name)
DIA	9	' ' / xx / (xxx,xxx)	Overlay name or number
DUPLEX	7	' ' / *NO / *YES / *TUMBLE	Single or double-sided page
ELEMNAME	64	' ' / <element library name>	Name of the PLAM library element
ELEMTYP	8	' ' / <element library type>	Type of the PLAM library element
ELEMVERSION	24	' ' / <element library version>	Version of the PLAM library element
ENDNO	10	' ' / 1..32767	Byte number up to which the data records of the file are output
FAMILY	4	*NO / *YES	Spoolout job belongs to a family or not (FAMILY-PRINTING)
FCBTYP	5	*SAM / *ISAM / *PAM / *EAM	File access method
FILENAME	54	' ' / <file name>	Name of the file to be output
FILESIZE	10	' ' / 1.. 2147483647	File size (in PAM pages)

Variable Name	Length	Possible Values	Meaning
FOB	4	' / <fob name>	Form Overlay Buffer name
FORM	6	<form name>	Name of the form
FROM	10	' / 1.. 2147483647	Number of the logical line or page as of which the printout begins
FROMTODIM	6	*PAGES / *LINES	Type of selection for the section of the file to be printed
HEADERLINE	20	*NO / *STD / *DATE / *FIRST / *PAGE / (*DATE,*FIRST) / (*DATE,*PAGE) / (*FIRST,*PAGE) / (*DATE,*FIRST,*PAGE)	Structure of the header line
HEADERNUM	10	0.. 2147483647	Number of the desired header page (for system exit)
HEADERTEXT	32	' / <text>	Text which appears on the header page under the mailing box
HOSTCLIENT	8	' / <host name>	Name of the host that issues the print request
HOSTNAME	8	<host name>	Name of the host
INPARTFRECID	60	' / <string id>	Output begins with the data record containing the string
INPARTFRECIDOCC	5	' / 1..32767	Number of the data record containing the string
INPARTFRECIDPOS	4	' / 1..2047	Position of the string within the first data record
INPARTFRECIDTYPE	5	*CHAR / *HEXA	String character format
INPARTFRECTYPE	14	*BEGIN-OF-FILE / *BY-STRING-ID / 1..2147483647	Type of print start within the first data record
INPARTLRECID	60	' / <string id>	Output ends with the data record containing the string
INPARTLRECIDOCC	5	' / 1..32767	Number of the data record containing the string
INPARTLRECIDPOS	4	' / 1..2047	Position of the string within the last data record
INPARTLRECIDTYPE	5	*CHAR / *HEXA	String character format
INPARTLRECTYPE	13	*END-OF-FILE / *BY-STRING-ID / 1..2147483647	Type of print start within the last data record
INSECTID	60	' / <string id>	File mark for structuring the input file
INSECTIDPOS	4	' / 1..2047	Position of the file mark
INSECTIDTYPE	5	*CHAR / *HEXA	File mark character format

Variable Name	Length	Possible Values	Meaning
INSECTSEL	13	*WHOLE-FILE / *BY-STRING-ID	File mark specification
INTRAY	8	' / 0..99 / *IGNORE / *MANUAL / *A3 / *A4 / *A5 / *B4 / *B5 / *C5 / *DLETTER / *EXEC / *FOLIO / *INVOICE / *MONARCH / *COM10 / *DL / *LEGAL / *LETTER	Paper input tray
JOBCLASS	3	*NO / 1..255	Job class for the spoolout job
JOBINTERRUPT	9	' / KEPT / RESPOOLED / SUSPENDED	Job interruption information
JOBNAME	8	<job name>	Job name for the spoolout job
JOBPRIORITY	3	<job priority>	Priority of the spoolout job
JOBSTARTEDTIME	8	hh:mm:ss	Time of the spoolout job creation
LEFTMARGIN	3	0..255	Number of columns by which the output text is indented
LEFTOFFSET	7	' / *IGNORE / 1..32767	Setting for the left offset
LIBNAME	54	' / <library name>	Name of the PLAM library
LINESPACING	3	1 / 2 / 3 / *NO / *E / *A / *I	Type of the printer control characters
LINESPERPAGE	5	' / 1..32767	Number of lines per print page
LOCKFILE	4	*NO / *YES	Protection of the file
LOOP	3	' / <loop name>	Name of the loop that controls the feed
MAILING	64	' / <mailing text>	Mailing address
MONJV	54	' / <job variable name>	Name of the job variable in which the job information is stored
OUTFORMAT	5	*CHAR / *HEXA	Output format of the data records
OUTTRAY	7	' / 0..99 / *IGNORE / *SORTER	Paper output tray
PAGECOPIES	3	0..255	Number of copies per page
PRINTERNAME	8	<printer name>	Name of the printer
PRINTERTYPE	8	<printer type>	Printer type
RECFORM	4	*VAR / *FIX / *UND	File record format
RECSIZE	5	' / 1..32767	File record size
REDIRECTION	4	' / *NO / *YES	Redirection of the spoolout job to a different printer is allowed
REQTSN	4	<tsn>	TSN of the job issuing the command

Variable Name	Length	Possible Values	Meaning
ROTATION	8	*NO / *YES / 0 / 90 / 180 / 270 / (0,180) / (90,270) / (180,0) / (270,90)	Rotation of the pages to be printed
ROLOOP	3	'' / <rotation loop name>	Name of the loop that controls the feed in case of rotation
SORTER	10	'' / *NO / *GROUP / *COLLATE / *STACKER / *AUTOMATIC	Sort mechanism for output tray
STARTNO	10	0..32767	Byte number as of which the data records of the file are output
TO	10	'' / 1.. 2147483647	Number of the last logical line or page
TOPOFFSET	7	'' / *IGNORE / 1..32767	Setting for the top offset
TRAILERNUM	10	0.. 2147483647	Number of the desired trailer page (for system exit)
TRANSTAB	8	'' / <translation table name>	Name of the code conversion table
TRUNCATION	7	*STD / *KEEP / *IGNORE	Behavior if lines are truncated
TSN	4	<tsn>	TSN of the spoolout job
USERID	8	<userid>	Owner of the spoolout job
USERRES	54	'' / <file name>	Name of the user resource file

3.5.2.3 Conditional text

Conditional text generation must be defined as:

```

&&IF(<condition>)
&&THEN
<text1>
&&ELSE
<text2>
&&ENDIF()

```

where:

<condition> **is** <operand><operator><operand>

<operand> **is** &&VAR(<variable-name>,[length]) **or** <c-string>

<operator> **is** EQ/NE/LT/LE/GT/GE

<text1> **and** <text2> **are free texts, variable fields values, functions or barcodes.**

&&IF, &&THEN, &&ELSE **and** &&ENDIF **must be specified at the beginning of a line.**

3.5.2.4 Functions

Function fields are defined as `#<function-name>(...)`
 where `<function-name>` is one of the following functions:

#BARCODE(,<value>,<LLM name>)

where:

`` name of a barcode font.
`<value>` value to be converted into a barcode:
 &&VAR(<variable-name>[,length]) or string of 1 to 24 characters.
`<LLM name>` name of the program that will be called to convert `<value>` into barcode.
 The LLM (hardware dependent) must be present in the library
`$SYSSPOOL.SYSLIB.BARCODES`



Due to the limitation of the number of fonts (max. 3) when the `/PRINT-DOCUMENT` command is submitted, the number of different fonts specified via the `#FONT` and `#BARCODE` functions is also limited to 3. However, the default header/trailer font is not taken into account in this limitation and can thus be additionally specified in the template. If the number of fonts exceeds 3 (4 including default), they are not taken into account; no error is reported.

#BIGLETTER(<text>)

where:

`<text>` one character or a string of characters

Each character is enlarged 10 times (10 chars / 10 lines). A `SKIPLINE()` function will be generated after each line except for the last one. For this one, the `SKIPLINE` or `SKIPCHAN` function specified to terminate the logical line (printed line) will be taken into account. Consequently you are advised to terminate the logical line (`SKIPLINE` or `SKIPCHAN` function) immediately after the function.



This function may only be used once per logical line (printed line).

#DATE(<format>)

where:

<format> *iso (date will be returned in the format yyyy-mm-ddiii)
 *american (date will be returned in the format mm/dd/yyyy)
 *german (date will be returned in the format dd.mm.yyyy)

If <format> is not specified, *iso is assumed.

iii day in current year (001..366)
 yy two-digit year number
 yyyy complete year number
 mm two-digit month number (01..12)
 dd day in current month (01..31)

#DUPLICATE(<text>,<number>)

where:

<text> one character or a string of characters. If not specified, blank is assumed.
 <number> duplication factor. The maximum permissible value for this parameter is 140.
 For all higher values, 140 will be assumed.
 If no number is specified, 1 is assumed.

#FONT()

where:

 name of a font to be used

If no fontname is specified, the default font is assumed.

#MESSAGE()

returns the information message(s) that normally appear on the trailer page.

A SKIPLINE() function will be generated after each message except for the last one. For this one, the SKIPLINE or SKIPCHAN function specified to terminate the logical line will be taken into account. Consequently you are advised to reserve one logical line for the function.

#RSOV()

returns the current version of the RSO subsystem in the format xx.x or ??.? if the subsystem is not active.

#SKIPCHAN(<number>)

where:

<number> number between 1 and 12. This number will be converted into a print control character X'8x' where x represents the number of the channel. The skip to the specified channel is performed after writing the data associated with the print control character.

If 0 or no number is specified, channel 1 is assumed.



Each logical line must be terminated by this function or by the `SKIPLINE` function.

#SKIPLINE(<number>)

where:

<number> number between 1 and 15. This number will be converted into a pcc x'8x' where x represents the number of lines to skip. The lines are skipped after writing the data associated with the pcc.

Note that a skip is a positioning to the next printable line. Thus the number of blank lines between two lines with data will be specified by <number> - 1.

If 0 or no number is specified, 1 is assumed.



Each logical line must be terminated by this function or by the `SKIPCHAN` function.

#SEASON()

returns W (standard time (winter time)) or S (Daylight Saving Time (summer time)).

#SPOOLV()

returns the current version of the SPOOL subsystem in the format xx.x

#TIME(<separator>)

where:

<separator> one character

If no separator is specified, : is assumed (time will be returned in the format hh:mm:ss).

3.5.2.5 Support of barcodes

Barcodes are supported via the `#BARCODE` function (see [page 133](#)).

Each barcode has to be implemented as a program (LLM). The different barcode programs (LLMs) must be included in the `$SYSSPOOL.SYSLIB.BARCODES` library. Take care that the LLM must be hardware dependent.

Each time a barcode font is referenced in a template with the `#BARCODE` function, the corresponding program (LLM) is loaded and called. The name of the program's entry must be identical to the name of the LLM.

The shipped `$SYSLIB.SPOOL.046.BARCODES` library contains templates (type S) for barcode implementation in TPR for S servers. The interface between SPOOL and the barcode program (LLM) is described in the SSVBARC macro, see the "[Spool & Print - Macros and Exits \(BS2000/OSD\)](#)" manual.

3.5.2.6 Example

The following example shows how to use a customized header page when printing a file on an HP90 printer.

Template file name: `$SYSSPOOL.HP90.HEADER.FORM01`, defined by the SPOOL Administrator.

Template file contents:

```
#DUPLICATE(*,15)~&&VAR(HOSTNAME)~#DUPLICATE(*,5)~SPOOL V#SPOOLV()~
#DUPLICATE (*,37)~#SKIPLINE()
#DUPLICATE (*,80)~#SKIPLINE()
&&IF(&&VAR(FILENAME) NE ' ')
&&THEN
** Filename : &&VAR(FILENAME,54)~#DUPLICATE(,10)**~#SKIPLINE()
&&ELSE
** Libname : &&VAR(LIBNAME,54)~#DUPLICATE(,10)**~#SKIPLINE()
** Element : &&VAR(ELEMNAME,30) #DUPLICATE (,34)**~#SKIPLINE()
&&ENDIF
#DUPLICATE(*,80)~#SKIPLINE()
```

Print command:

```
/PRINT-DOCUMENT MY.FILE,FORM-NAME=FORM01,PRINTER-TYPE=HP90,...
```

Resulting header page:

```
***** D016ZE04 ***** SPOOL V04.6 *****
*****
** Filename : MY.FILE **
*****
```


3.6 Separating print jobs

3.6.1 Processing with job separator sheets

Job separator sheets are necessary to use high-performance printers in conjunction with machines which cut the printed paper into manageable packages.

A special mechanism instructs SPOOL to print a separator sheet every n pages which the cutting machine can recognize.

To use this mechanism, proceed as follows:

1. Define a job variable with the name `$SYSSPOOL.SEPARATOR.MN`
MN is the two-byte mnemonic device name of the printer which is to print the separator sheets.
The content of the job variable is exactly four bytes long and contains the number of pages to be output before printing a separator sheet.
The four bytes of the job variable must contain exactly four digits. If the job variable contains either the value 0000 or a character which is not a digit (0-9), no separator sheet will be printed.
2. Define and activate system exit 091 (header page exit). This exit creates the contents of the separator sheet to be printed and sends a return code to the SPOOL module if a separator sheet is to be printed.
If this exit does not exist or is not activated, no separator page will be printed. If system exit 091 is active but a return code other than zero is returned, then no separator sheet will be printed.
Further information about system exits can be found in the "[Spool & Print - Macros and Exits \(BS2000/OSD\)](#)" manual.

3.6.2 Job separation characters for print jobs

In order to make things easier for the operator when using laser printers it is possible to insert a separation character for print jobs.

When using printers that use continuous paper the separation characters are printed as 1-2-3 characters along the edge of the paper. Separation characters can be controlled using the an optional parameter in file SYSSSI.SPOOL.041 (function name `JOB.SEPARATION=*YES/*NO`).

4 Supported printers

This chapter describes the various kinds of printers that are supported by SPOOL.

4.1 Overview of the supported SPOOL printers

SPOOL supports numerous different types of printers collectively known as "highspeed" printers. These include impact printers and nonimpact printers. Here is an overview of both types of printers supported by SPOOL:

Printer type	Designation	Emulation/ language	Third-party name	Internal symbol	Sub- system
Local printer with V24 (bus) connection					
4011		Generic Line data		LP-EMUL	SPOOL
4813	I1XX/I6XX	Generic Line data		LP-EMUL	SPOOL
4818		Generic Line data	Brother HL-6V	LP-EMUL	SPOOL
4819		Generic Line data		LP-EMUL	SPOOL
4820		Generic Line data		LP-EMUL	SPOOL
4822	P300	Generic Line data	Kyocera FS3500	LP-EMUL	SPOOL
4824		Generic Line data		LP-EMUL	SPOOL
4825	P650	Generic Line data		LP-EMUL	SPOOL
4830		Generic Line data		LP-EMUL	SPOOL
4850		Generic Line data		LP-EMUL	SPOOL
9001	2/xx	Generic Line data		LP-EMUL	SPOOL
9011		Generic Line data		LP-EMUL	SPOOL
9012		Generic Line data		LP-EMUL	SPOOL
9013		Generic Line data		LP-EMUL	SPOOL
9014		Generic Line data		LP-EMUL	SPOOL
9015		Generic Line data		LP-EMUL	SPOOL
9021		Generic Line data		LP-EMUL	SPOOL
9022	200	Generic Line data		LP-EMUL	SPOOL

Printer type	Designation	Emulation/ language	Third-party name	Internal symbol	Sub- system
9025		Generic Line data		LP-EMUL	SPOOL
9026		Generic Line data		LP-EMUL	SPOOL
9041		Generic Line data		LP-EMUL	SPOOL
9043		Generic Line data	A-ZD13	LP-EMUL	SPOOL
9044		Generic Line data	A-ZD14	LP-EMUL	SPOOL
9045	40	Generic Line data		LP-EMUL	SPOOL
9046		Generic Line data		LP-EMUL	SPOOL
9047		Generic Line data		LP-EMUL	SPOOL
9097		Generic Line data		LP-EMUL	SPOOL
2030		Generic Line data	2030-8	LP-EMUL	SPOOL
Local printer with channel connection					
3337-51	Band Printer	Generic Line data		LP-PR	SPOOL
3337-52	Band Printer	Generic Line data		LP-PR	SPOOL
3337-71	Band Printer	Generic Line data		LP-PR	SPOOL
3338-51	Band Printer	Generic Line data		LP-PR	SPOOL
3338-511	Band Printer	Generic Line data		LP-PR	SPOOL
3338-512	Band Printer	Generic Line data		LP-PR	SPOOL
3338-53	Band Printer	Generic Line data	DPC	LP-PR	SPOOL
3338-531	Band Printer	Generic Line data	DPC	LP-PR	SPOOL
3338-532	Band Printer	Generic Line data	DPC	LP-PR	SPOOL
3339-51	Band Printer	Generic Line data		LP-PR	SPOOL
3339-512	Band Printer	Generic Line data		LP-PR	SPOOL
3339-53	Band Printer	Generic Line data	DPC	LP-PR	SPOOL
3339-532	Band Printer	Generic Line data	DPC	LP-PR	SPOOL
3348-110x	Band Printer	Generic Line data		LP48-PR	SPOOL
3348-120D	Band Printer	Generic Line data	6262-014	LP48-PR	SPOOL
3348-120E	Band Printer	Generic Line data	6262-014	LP48-PR	SPOOL
3349-110x	Band Printer	Generic Line data		LP48-PR	SPOOL
3349-120D	Band Printer	Generic Line data	6262-022	LP48-PR	SPOOL
3349-120E	Band Printer	Generic Line data	6262-022	LP48-PR	SPOOL
3350-1	ND3	ND		ND3	SPOOL
3351-21	ND3-HPC	Model2 (E mode)		ND3-HPC	SPOOL

Printer type	Designation	Emulation/ language	Third-party name	Internal symbol	Sub- system
3351-211	ND3-HPC	Model2 (E mode)		ND3-HPC	SPOOL
3351-23	ND3-HPC	Model2 (E mode)	2200-2	HP-PR	SPOOL
3351-231	ND3-HPC	Model2 (E mode)	2200-2	HP-PR	SPOOL
3352-1	ND2	ND		ND-PR	SPOOL
3353-21	ND2-HPC	Model2 (E mode)		HP-PR	SPOOL
3353-211	ND2-HPC	Model2 (E mode)		HP-PR	SPOOL
3353-23	ND2-HPC	Model2 (E mode)	2300-2	HP-PR	SPOOL
3353-231	ND2-HPC	Model2 (E mode)	2300-2	HP-PR	SPOOL
3365-11	LIP	L mode	3365-11	LP65-PR	SPOOL
3365-12	LIP	L mode	3365-12	LP65-PR	SPOOL
2050-1xx	LIP	L mode	2050-1xx	LP65-PR	SPOOL
2050-2xx	APA2	IPDS	2050-2xx	2050-APA	SPS
2075-1xx	LIP	L mode	2075-1xx	LP65-PR	SPOOL
2075-2xx	APA2	IPDS	2075-2xx	2050-APA	SPS
2090-1	LIP	L mode	2090-1	LP65-PR	SPOOL
2090-2	APA1	Model2(E mode)	2090-2	HP-PR	SPOOL
2090-2	APA1	Model2(E mode)	2090-2	HP90-PR	SPOOL
2090-4	APA2	IPDS	2090-4	2090-APA	SPS
2090-4	APA2	IPDS	2090-4	2090-TWIN	SPS
2140-1	LIP	L mode	2140-1	LP65-PR	SPOOL
2140-2	APA1	Model2(E mode)	2140-2	HP-PR	SPOOL
2140-2	APA1	Model2(E mode)	2140-2	HP90-PR	SPOOL
2140-4	APA2	IPDS	2140-4	2090-APA	SPS
2140-4	APA2	IPDS	2140-4	2090-TWIN	SPS
2240-2	APA1	Model2(E mode)	2240-2	HP-PR	SPOOL
2240-2	APA1	Model2(E mode)	2240-2	HP90-PR	SPOOL
2240-4	APA2	IPDS	2240-4	2090-APA	SPS
2240-4	APA2	IPDS	2240-4	2090-TWIN	SPS
PS55	SRA	I mode	Océ Pagestream 55	2050-APA	SPS
PS55	SRA	L mode	Océ Pagestream 55	LP65-PR	SPOOL
PS75	SRA	I mode	Océ Pagestream 75	2050-APA	SPS
PS75	SRA	L mode	Océ Pagestream 75	LP65-PR	SPOOL

Printer type	Designation	Emulation/ language	Third-party name	Internal symbol	Sub- system
PS88	SRA	I mode	Océ Pagestream 88	2090-APA	SPS
PS88	SRA	E mode	Océ Pagestream 88	HP90-PR	SPOOL
PS88	SRA	L mode	Océ Pagestream 88	LP65-PR	SPOOL
PS 145	SRA	I mode	Océ Pagestream 145	2090-APA	SPS
PS 145	SRA	E mode	Océ Pagestream 145	HP90-PR	SPOOL
PS 145	SRA	L mode	Océ Pagestream 145	LP65-PR	SPOOL
PS 110 DC	SRA+	I mode	Océ Pagestream 110 DC	2090-APA	SPS
PS 110 DC	SRA+	L mode	Océ Pagestream 110 DC	LP65-PR	SPOOL
PS 158 DC	SRA+	I mode	Océ Pagestream 158 DC	2090-APA	SPS
PS 158 DC	SRA+	L mode	Océ Pagestream 158 DC	LP65-PR	SPOOL
PS 200 DSC	SRA	I mode	Océ Pagestream 200 DSC	2090-APA	SPS
PS 200 DSC	SRA	E mode	Océ Pagestream 200 DSC	HP90-PR	SPOOL
PS 200 DSC	SRA	L mode	Océ Pagestream 200 DSC	LP65-PR	SPOOL
PS 235	SRA	I mode	Océ Pagestream 235	2090-APA	SPS
PS 235	SRA	E mode	Océ Pagestream 235	HP90-PR	SPOOL
PS 235	SRA	L mode	Océ Pagestream 235	LP65-PR	SPOOL
PS 290 TWIN	SRA	I mode	Océ Pagestream 290 TWIN	2090-TWIN	SPS
PS 350	SRA	I mode	Océ Pagestream 350	2090-APA	SPS
PS 350	SRA	E mode	Océ Pagestream 350	HP90-PR	SPOOL
PS 350	SRA	L mode	Océ Pagestream 350	LP65-PR	SPOOL
PS 400 S Web	SRA+	I mode	Océ Pagestream 400 S Web	2090-APA	SPS
PS 440	SRA	I mode	Océ Pagestream 440	2090-APA	SPS
PS 440	SRA	E mode	Océ Pagestream 440	HP90-PR	SPOOL
PS 500 S Web	SRA	I mode	Océ Pagestream 500S Web	2090-APA	SPS
PS 470 TWIN	SRA	I mode		2090-TWIN	SPS
PS 700 TWIN	SRA	I mode	Océ Pagestream 700 TWIN	2090-TWIN	SPS
PS 880 TWIN	SRA	I mode	Océ Pagestream 880 TWIN	2090-TWIN	SPS

The 3351 and 3353 laser printers are more precisely referred to as nonimpact high-performance laser printers, or "HP printers" for short. For more information see [section "HP printers" on page 150](#). SPOOL does not use the above printer designations, but internal symbols covering one or more printers. The corresponding internal symbols also exist for RSO printers (see the "[RSO \(BS2000/OSD\)](#)" manual).

Note

The printer types 2090, 2140 and 2240 may be defined as HP90 printers (2090-2/2140-2/2240-2) or as APA printers (2090-4/2140-4/2240-4), depending on the selected function code. The HP mode (H mode) is supported as standard as of SPOOL V2.6A; the printer must be defined as an HP90-PRINTER. The APA mode is supported by the SPS subsystem; the printer must be defined as 2090-APA-PRINTER. If a printer is to be operated both in HP and in APA mode, the following points should be kept in mind:

- The printer must be defined as HP90-PRINTER and 2090-APA-PRINTER in the SPOOL parameter file (two entries), and this must be done under two different device names but under the same device mnemonic (STATION-NAME parameter).
- If the printer is operated in HP mode (i.e. the HP90 printer is defined with X'28'), SPS does not have to be available (in order that jobs for the APA printer may be managed).
- The printer may only be defined once in the system configuration, with device type code X'21'.
- Change of mode:
 - stop printer (STOP-PRINTER-OUTPUT command)
 - reload printer and initialize it with the required function code
 - start printer (START-PRINTER-OUTPUT command).

4.2 Comparison of impact and nonimpact printers

Impact printers

Impact printers produce characters on the paper by the mechanical impact of a character font on an inked ribbon. Since impact printers are also suitable for multiple-ply papers, several copies can be created at the same time as the original in one print operation. SPOOL supports powerful band printers.

Nonimpact printers

Nonimpact printers produce characters on the paper not by mechanical impact, but in various other ways. Nonimpact printers include the laser and LED printers supported by SPOOL, as well as thermal and inkjet printers for instance.

Laser printers and LED printers

Laser or LED printers can easily process print files for band printers (with restrictions for overprinting, see [page 88](#)). The appropriate loops and character sets are used. However, print files containing control characters for laser or LED printer functions can only be correctly printed out on these printers. Band printers interpret these control characters as printable or nonprintable characters and in some cases this can lead to difficulties.

The maximum length of the form is 14 inches in the case of laser printers, 16 inches in the case of HP90 printers (17 inches for pages rotated by 90/270°). Depending on the line density this page will contain approx. 84 (6 lpi) to 400 (24 lpi) lines. The options for line spacing on a page depend on the printer.

Bold type is only possible with laser or LED printers if special character sets are used. Feed suppression, which produces bold type on impact printers, causes "line merge" on 3351/3353 laser printers and HP90 printers (see [page 90](#)).

Laser and LED printers work only with single-ply paper, i.e. it is only possible to print out several copies of a page by means of special entries in the PRINT-DOCUMENT command or in the PRNTDOC macro or by incorporating interpretable control characters into the print data.

Laser and LED printer functions can be controlled in the following ways:

- commands or macros
- control characters at the beginning of the first record of the print page (control character list)
- control characters contained in the print data.

If DOCUMENT-FORMAT=*TEXT is valid for a spoolout job, control characters in the text are not interpreted by HP and HP90 printers. However, 3365 (LP65) printers have control characters that are interpreted even if DOCUMENT-FORMAT=*TEXT applies

When DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*PAGE-MODE) is specified, the control options for HP and HP90 printers depend on how the DATA-MODIFICATION byte in the control character list is set.

Function	Controlled by entry		
	DOCUMENT-FORMAT = *TEXT and following entries in the command/macro (applies to the whole file)	CONTROL-MODE= *PAGE-MODE and entry of DATA-MODIFICATION= (see "Byte 6" on page 107) OFF (control information in first record for each print page is interpreted)	ON (control characters in the print data are inter- preted)
Interpretation of control characters in print data	no	No control characters should be present within the file	yes
Selection of a character set	PRINT-DOCUMENT.., CHARACTER-SETS PRNTDOC ..., CHARSET=...	Selection of the current character set (the first character set specified is used)	
Line spacing control	PRINT-DOCUMENT.., FORM-NAME=... or LOOP-NAME=..., LINE-SPACING = *BY-EBCDIC-CONTROL/ *BY-ASA-CONTROL/ *BY-IBM-CONTROL PRNTDOC..., FORM=..., or LOOP=..., LINESP= *BY_EBCDIC_CONTROL / *BY_ASA_CONTROL / *BY_IBM_CONTROL	Feed control characters at beginning of each record	

Controlling laser printers and the HP90 printer

Function	Controlled by entry			
	<p>DOCUMENT-FORMAT = *TEXT and following entries in the command/macro (applies to the whole file)</p>	<p>CONTROL-MODE= *PAGE-MODE and entry of DATA-MODIFICATION= (see "Byte 6" on page 107)</p> <table border="1" data-bbox="700 386 1225 538"> <tr> <td data-bbox="700 386 952 538"> <p>OFF (control information in first record for each print page is interpreted)</p> </td> <td data-bbox="952 386 1225 538"> <p>ON (control characters in the print data are interpreted)</p> </td> </tr> </table>	<p>OFF (control information in first record for each print page is interpreted)</p>	<p>ON (control characters in the print data are interpreted)</p>
<p>OFF (control information in first record for each print page is interpreted)</p>	<p>ON (control characters in the print data are interpreted)</p>			
Character density control	<p>Specification of character sets to be used with PRINT-DOCUMENT..., CHARACTER-SETS=...</p> <p>PRNTDOC...,CHARSET=...</p>	<p>Can be altered by changing the character set; the cpi value can also be changed without changing the character set - with type 0 control characters (or type 1 within the file)</p>		
Display/omit forms overlay	<p>PRINT-DOCUMENT ..., ELECTRONIC-OVERLAY=...</p> <p>PRNTDOC..., OVERLAY=...</p>	<p>Can be switched on/off for each page</p>		
Print multiple copies of page	<p>PRINT-DOCUMENT..., PAGE-COPIES=n</p> <p>PRNTDOC..., PAGECOP=n</p>	<p>Can be defined for each print page</p>		
Indent print output	<p>PRINT-DOCUMENT..., LEFT-MARGIN=...</p> <p>PRNTDOC..., LEFTMAR=...</p>	<p>Can be redefined for each print page</p>		
Page rotation module	<p>PRINT-DOCUMENT... ROTATION=...i</p> <p>PRNTDOC..., ROT=i</p>	<p>Can be defined for each print page</p>		
FOB control	<p>PRINT-DOCUMENT=..., FORMS-OVERLAY-BUFFER=</p> <p>PRNTDOC...,FOB=...</p>	<p>Can be defined for each page</p>		

Controlling laser printers and the HP90 printer

4.3 Band printers

All the impact printers supported by SPOOL are band printers. Band printers are line-oriented printers.

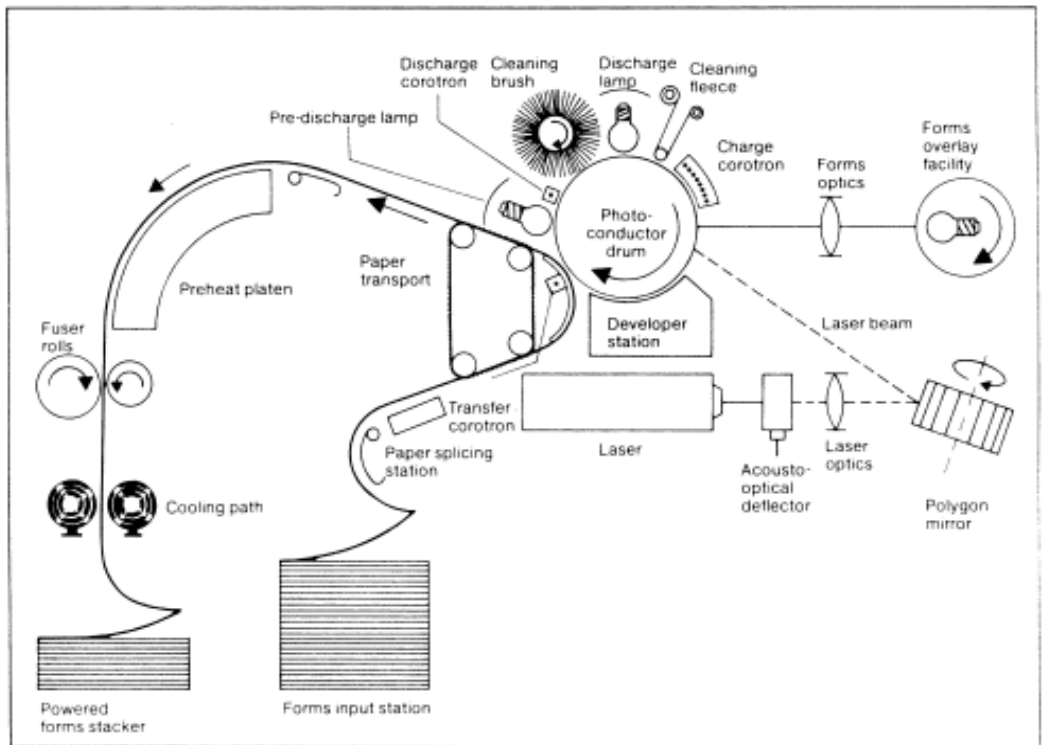
Band printers have a vertical format buffer (VFB) into which feed control characters can be loaded, thus enabling the line density and the position of the vertical tabs to be defined. Band printers can print 6 or 8 lines per inch (6/8 lpi). All the lines on a print page must be printed at the same density. It is not possible to change.

The character set the band printer uses to print is defined by the type band used. There must be an appropriate band entry in the PRFILE resource library corresponding to every band available. This consists of a table (band ID) which is used to convert the characters in a file into available print characters (characters on the type band).

Bold type, underscore and overscore are only possible using "Overprint" (see [page 88](#)).

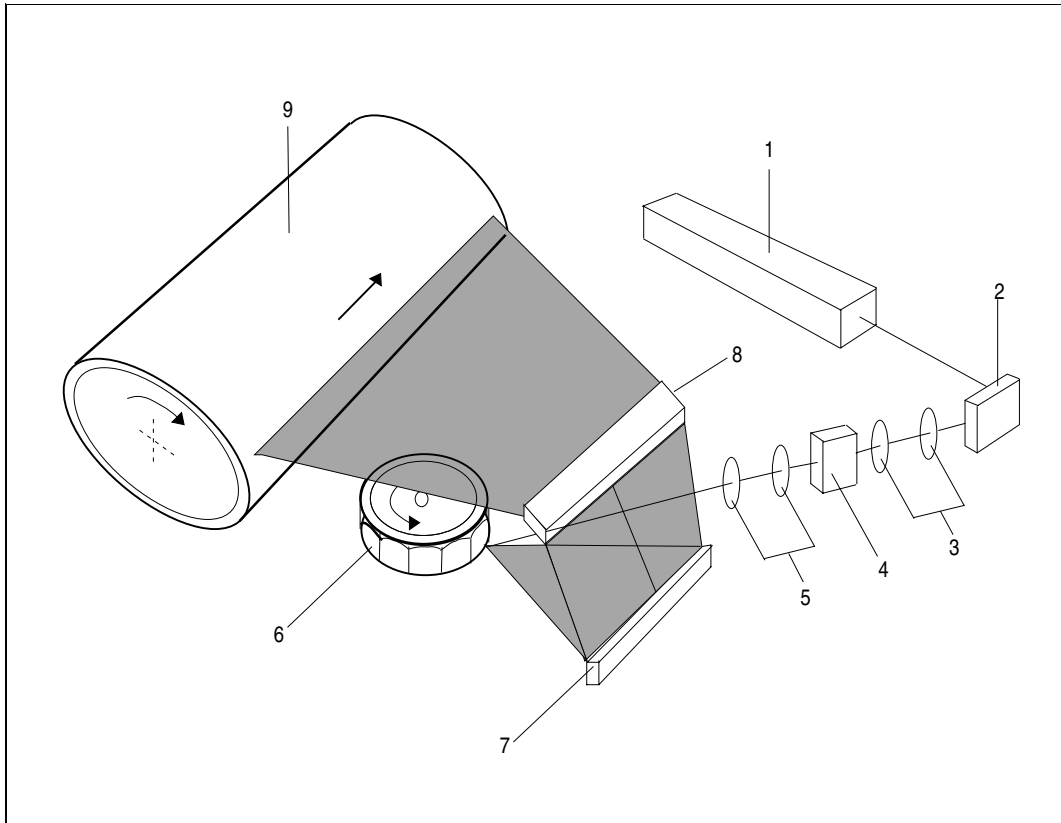
4.4 Laser printers

Laser printers use photoelectric technology. First of all, a photosensitive, rotating drum is electrically charged. The surface of the drum is then exposed point by point to a laser beam at the places that are to be printed black. The exposure process causes the electrical charge to disappear. A black toner powder is then introduced onto the drum. This only adheres to the uncharged areas. The paper to be printed is then passed over the drum and the toner is transferred to it. The toner is then fused permanently on the paper using heat or chemicals (ND3). An automatic paper stacker stacks the printed paper.



Basic principles of a laser printer

This procedure means that laser printers can only use single-ply paper.



Exposure of the photoconductor drum (laser printers)

Key

- | | |
|---------------------------|-----------------------|
| 1 Laser | 6 Polygon mirror |
| 2 Deflection mirror | 7 Deflection mirror |
| 3 Lens system | 8 Deflection mirror |
| 4 Acousto-optic modulator | 9 Photoconductor drum |
| 5 Lens system | |

4.4.1 HP printers

The 3351 (with chemical cold fusing, ND3) and 3353 (hot fusing, ND2) laser printers are extremely powerful devices. They are therefore known as "HP printers" (high-performance). (With regard to control characters in the text and feed suppression, see overlay/line merge in the table on [page 151](#).)

Note the following:

- a) A print file which also contains HP control characters can only be output on HP laser printers and in the following manner:

```
/PRINT-DOCUMENT FROM-FILE=filename ,  
      DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*PAGE-MODE(  
      CONTROL-MODE=*HP) ,  
      TO-PRINTER=*PARAMETERS(PRINTER-NAME=*STD, PRINTER-TYPE=*HP-PRINTER)
```

- b) The format of the loops and character sets is stored in the PRFILE resource library. The standard loops and character sets supplied with the PRFILE can be modified and extended individually by means of the PRM utility routine (see the "[PRM \(BS2000/OSD\)](#)" manual).

Overview of HP printers 3351/3353

Line spacing LPI	6/8/10/12/24
Character density CPI	$6 \leq \text{CPI} \leq 20$
Character matrix in the PRM utility routine (specification in microcolumns)	Maximum: 40 * 40; actual size depends on character density
/PRINT-DOCUMENT... ADDITIONAL-COPIES=max	COPIES = 254 + original = 255
Line overlay (printing without line feed)	Line merge <u>no</u> new characters can be generated, character strings can be underscored LINE MERGE can be applied to more than two lines
VT feed before printing and printer is already on the vertical tab (skip to channel xx immediately)	Printer remains on the VT until printing with line feed occurs
/PRINT-DOCUMENT ..., CONTROL-MODE= *PHYSICAL and DATA MODIFICATION=ON (control character list)	For CONTROL-TYPE=*HP, control characters are introduced by X'FF' (escape character). For CONTROL-TYPE=*COMPATIBLE, an older control character format is used (see "Conversion note" on page 152)
Interpretation of laser-printer-specific control characters	for the functions: - character density - underscore - spaced print - inverse print (i.e. light-dark inversion) - character set selection - data compression - print page overlay - copy reference number
Maximum character set repertoire	255 characters :X'00'-X'FE' Escape character : X'FF' (only for CONTROL-MODE=*PAGE-MODE)
Resource library	PRFILE

HP printer overview

Conversion note

Although the old format of the escape characters for CONTROL-MODE=*PAGE-MODE that is used with CONTROL-TYPE=*COMPATIBLE is still supported, it should be converted by users. For the new format, CONTROL-TYPE=*HP must be specified and the following details taken into consideration for the conversion:

"Old" format	"New" format	Meaning
X'04'	X'FF40FF02'	Character set #1, 10 cpi
X'05'	X'FF41FF02'	Character set #1, 10 cpi
X'06'	X'FF42FF02'	Character set #3, 10 cpi
X'07'	X'FF43FF02'	Character set #4, 10 cpi
X'08'	X'FF40FF03'	Character set #1, 12 cpi
X'09'	X'FF41FF03'	Character set #2, 12 cpi
X'0A'	X'FF42FF03'	Character set #3, 12 cpi
X'0B'	X'FF43FF03'	Character set #4, 12 cpi
X'0C'	X'FF40FF04'	Character set #1, 15 cpi
X'0D'	X'FF41FF04'	Character set #2, 15 cpi
X'0E'	X'FF42FF04'	Character set #3, 15 cpi
X'0F'	X'FF43FF04'	Character set #4, 15 cpi
X'10' through X'19'	no equivalent	Data suppression, no longer supported

Conversion of escape characters

4.4.2 Matrix memory

Because of how they work, laser printers create the characters to be printed from raster pixels with lines and columns, as with a television picture. This makes it possible to print with any character sets. These character sets containing pixel information are loaded into the laser printer's matrix memory from the PRFILE before printing. The different types of printer have different sizes of matrix memory.

HP printer matrix memory

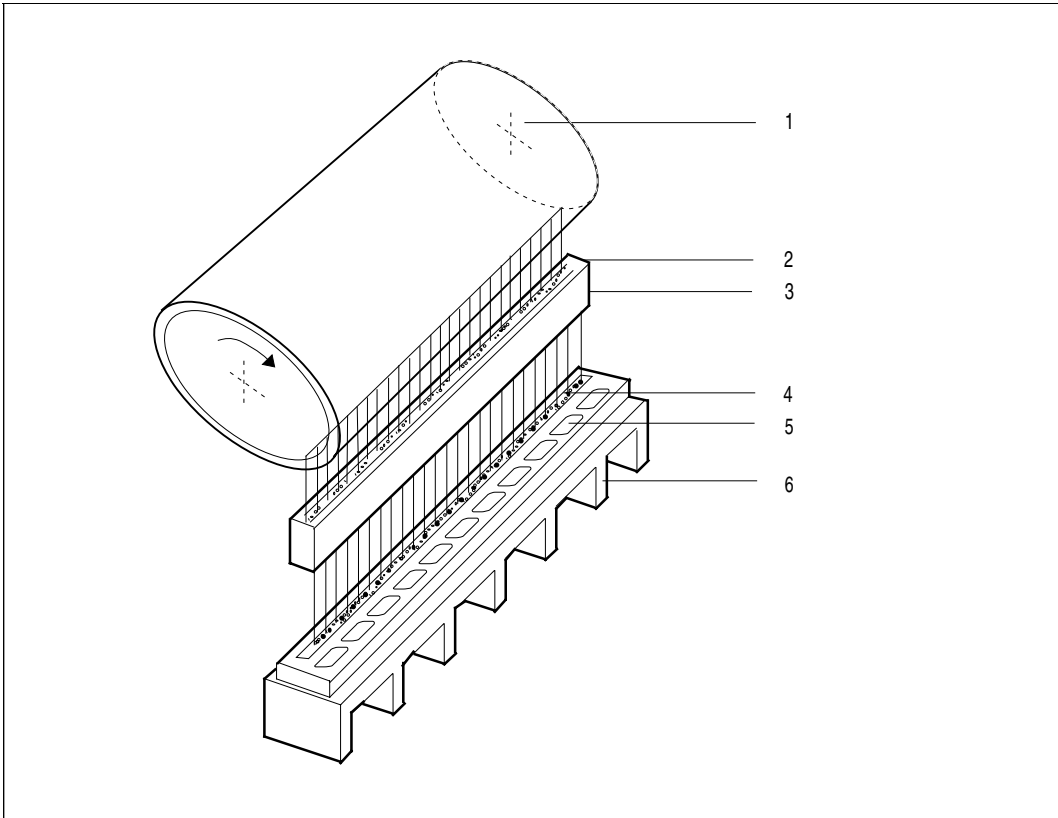
The matrix memory of an HP printer has 64 memory sections with 255 characters each.

Structure of the matrix memory for HP printers:

Character set 1:	255 characters
Character set 2:	255 characters
.	.
.	.
.	.
Character set 63:	255 characters
Character set 64:	255 characters

4.5 LED printers

Like laser printers, LED printers work on the photoelectric principle (cf. page 148). However, the light source is not a laser but an array of light-emitting diodes (LEDs). The points on an entire microline are exposed simultaneously, whereas the laser printer can only expose them one after the other using the moving laser beam. LED printers thus give even better performance than laser printers.



Exposure of the photoconductor drum (LED printers)

Key

- | | | | |
|---|---------------------|---|----------------------|
| 1 | Photoconductor drum | 4 | Logic and driver ICs |
| 2 | Imaging optics | 5 | Heat sink |
| 3 | LED field | | |

4.5.1 HP90 printers and PageStream printers in E mode

Type 2090, 2140 and 2240 continuous stationery printers are known as "HP90" in the SPOOL subsystem in so-called H mode and have the following attributes:

- paper format: length up to 16 inches, width up to 17 inches, continuous stationery processing
- EFO data overlays instead of film overlays (see [section "Film overlay \(optical overlay\)" on page 80](#))
- raster pattern memory for character sets and FOB data overlays; maximum FOB data overlay size: 4032 sublines (paper format 16 x 17 inches); up to 64 character sets (character set pool) can be loaded
- two-up printing: two pages printed side by side
- ROTATION (optional)
- the complete printer type (device record) must be entered in the SPOOL parameter file, using the ADD-SPOOL-DEVICE statement (see the "[SPSERVE \(BS2000/OSD\)](#)" manual).

HP90 printers and APA mode

If the BS2000 subsystem SPS is loaded, HP90 printers can also operate in IPDS mode. They are then designated and addressed as "2090-APA-PRINTER" by SPOOL.

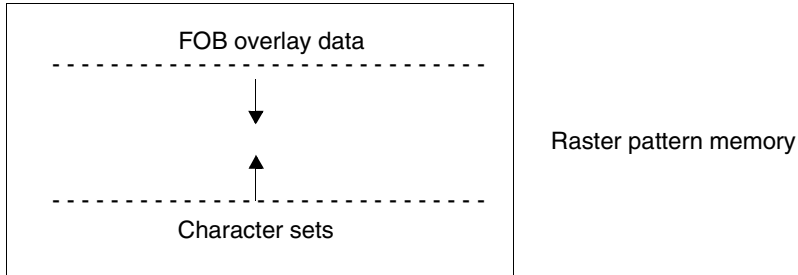
The printer types 2090, 2140 and 2240 may be defined as HP90 printers (2090-2, 2140-2, 2240-2) or as APA printers (2090-4, 2140-4, 2240-4), depending on the selected function code. The HP mode (H mode) is supported as standard as of SPOOL V2.6A; the printer must be defined as HP90-PRINTER. The APA mode is supported by the SPS subsystem; the printer must be defined as 2090-APA-PRINTER.

If a printer is to be operated both in HP and in APA mode, the following points should be kept in mind:

- The printer must be defined as HP90-PRINTER and 2090-APA-PRINTER in the SPOOL parameter file (two entries), under two different device names but using the same device mnemonic (STATION-NAME parameter).
- If the printer is operated in HP mode (i.e. the HP90 printer is defined with X'28'), SPS does not have to be available (in order that jobs for the APA printer may be managed).
- The printer may only be defined once in the system configuration, with device type code X'21'.
- Change of mode:
 - stop printer (STOP-PRINTER-OUTPUT command)
 - reload printer and initialize it with the required function code
 - start printer (START-PRINTER-OUTPUT command).

Raster pattern memory

On an HP printer FOB data overlays (maximum 672 underlines) and a character set pool (maximum 64 character sets) are stored independently of one another in different memories. In contrast, in the case of HP90 printers both are stored in the raster pattern memory (RPM). The number of character sets that can be loaded into the memory therefore depends on the size of the memory space that the overlay occupies, and vice versa.



A character set occupies 64 Kb in the RPM. 256 Kb of the RPM are in any case always reserved for character sets. You can use the PRM utility to determine the size of an FOB data overlay.

SPOOL checks jobs for HP90 printers for acceptability before execution. It does this in two ways: firstly by the number of character sets and by counting the FOB data overlay sublines, and secondly by the memory space requirement arising from the number of character sets and the space requirement of the FOB data overlay. The space requirement of an FOB data overlay is entered in the "Record 0" of the FOB data overlay entry in the PRFILE when it is generated with PRM.

The RPM can be expanded in several steps, in line with current requirements.



For reasons of performance, character sets already in the RPM are not unloaded by SPOOL. This can result in a shortage of memory space in the RPM. In this event SPOOL reinitializes the printer and reloads the currently required character sets and FOB data overlays. If this is necessary on a more frequent basis, particularly if large FOB data overlays and numerous character sets are being used simultaneously, the performance of the printer can be seriously affected.

Displaying overlays

HP90 printers provide various facilities for overlaying the data to be printed with standard overlays. The film overlay (film negative) familiar from HP printers corresponds in the HP90 printer to the EFO data overlay (see [section “Data overlay” on page 82](#)) that the operator loads into the printer from a floppy disk.

This EFO data overlay is loaded into the EFO overlay memory (not into the RPM!) with which the printer can be equipped as required. As with the film overlay, the EFO data overlay is oriented towards the physical page, i.e. the sheet size of the paper.

In the PRINT-DOCUMENT command the desired EFO data overlay is called using the RESOURCES-DESCRIPTION=*PARAMETERS(OVERLAY-RESOURCES=*PARAMETERS(ELECTRONIC-OVERLAY=...)) operand. If this operand is specified, the operator at the console is requested to load the overlay into the printer memory.

Note

ELECTRONIC-OVERLAY determines the film overlay to be used for HP and HP90 printers.

The HP90 printer also makes it possible to use FOB data overlays that relate to the logical page and therefore where necessary cover only a part of the physical page and in the two-up procedure (see [“Tandem printing \(“two-up printing”\) on page 158](#)) can appear twice on one sheet of paper. The data for the FOB data overlay is created using the PRM utility routine and must be located in the PRFILE. It is thus possible to use this overlay without intervention by the operator.

The FOB data overlay from the HPFILE is requested and loaded into the RPM by specifying the FORMS-OVERLAY-BUFFER operand (SDF structure; see above).



For performance reasons, character sets loaded once during a SPOOL run are not unloaded again from the printer memory. This means that there can be more character sets in the printer memory than needed for the current spoolout job. It can therefore occur that the RPM no longer contains sufficient space to load an FOB data overlay. In this event the printer must be reinitialized and reloaded. The following configurations ensure that the problem will not occur:

- If the printer has 8 MB RPM, the problem will not occur when the print job can be output to a 335x printer.
- If the printer has 16 MB RPM, the problem will not occur for any print job.

Performance is also impaired when large FOB data overlays and numerous character sets are required for a SPOOLOUT job. This means that both the size of the overlay and the number of character sets should be restricted when activating the printer (START-PRINTER-OUTPUT). The HP90 printer supports FOBs that contain up to 4032 sublines, but using more than 1344 sublines may lead to layout problems.

Tandem printing ("two-up printing")

The 2090, 2140 and 2240 printers (HP90 printers) can print two logical pages with a maximum width of 8.5 inches side by side on one sheet of paper ("two-up printing"). The pages can either be two logically consecutive pages (mode 1) or one logical page printed twice (mode 2)).

Two-up printing and its mode are defined in the forms definition (see the ADD-SPOOL-FORM statement in the "[SPSERVE \(BS2000/OSD\)](#)" manual). Calling a particular form therefore simultaneously selects two-up mode.

Mode 1

Two consecutive pages are printed on one form page:

Page n	Page n+1
--------	----------

Page n+2	Page n+3
----------	----------

⋮

Mode 2

Two identical pages are printed on one form page:

Page n	Page n
--------	--------

Page n+1	Page n+1
----------	----------

Example 1

Specifying the logical page size for two-up printing:

Paper size: Length: 12 inches, width: 14 inches. The logical paper size must now be declared with length = 12 inches and width = 7 inches in the ADD-SPOOL-FORM statement:

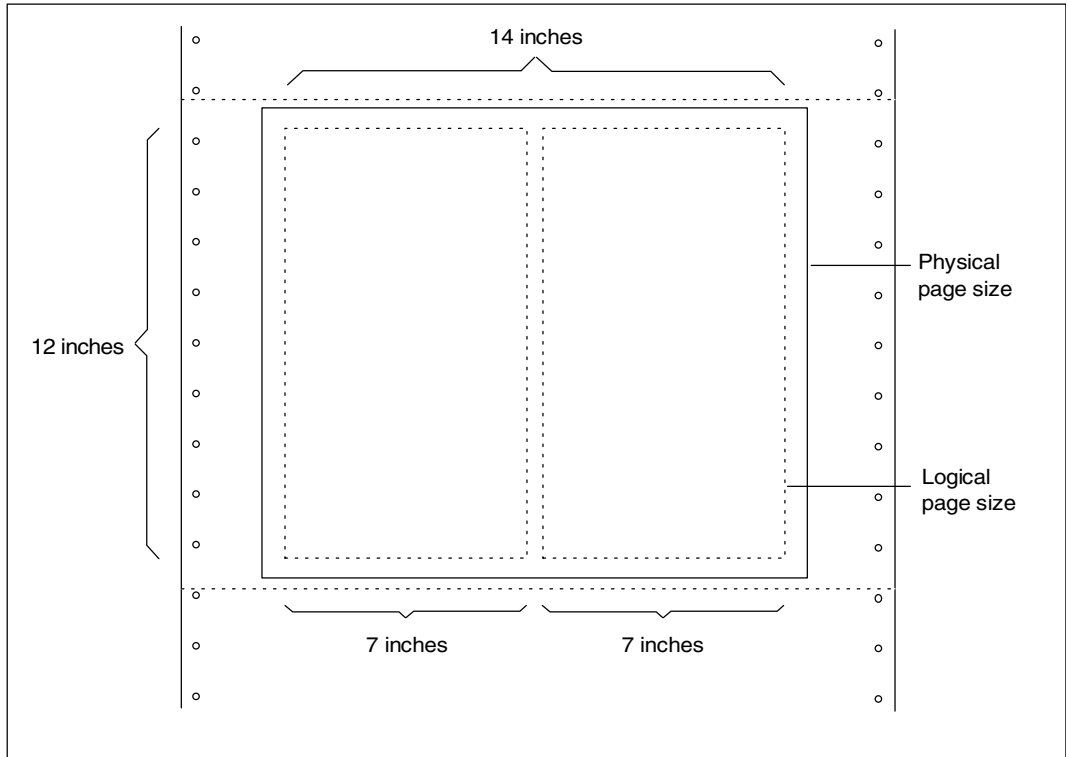
```
/ADD-SPOOL-FORM ... ,FORM-SIZE=(PAGE-SIZE=120,LINE-SIZE=70)
```

The length of the loop used must correspond to the logical paper size:

```
/ADD-SPOOL-FORM ... ,VERTICAL-CONTROL=*LOOP(LOOP-NAME=xxx)
                    ,ROTATION-CONTROL=*LOOP(LOOP-NAME=yyy)
```

where

- xxx is a 12-inch loop
- yyy is a loop having a length less than or equal to 7 inches

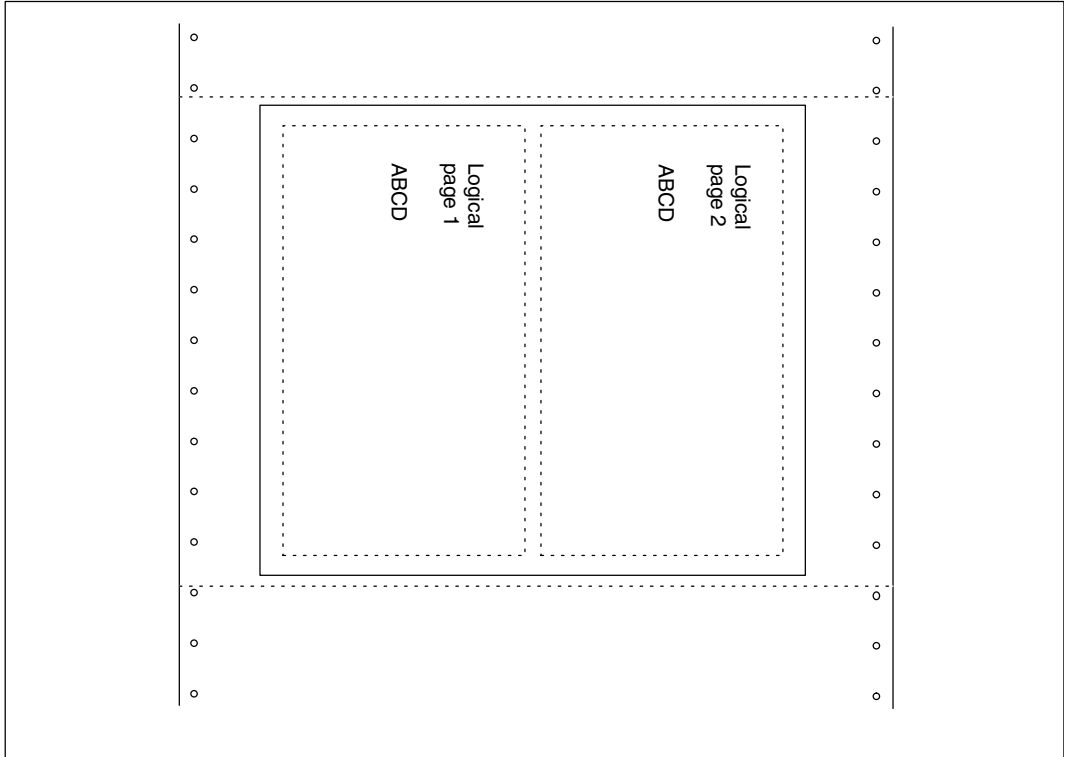


Two-up printing: logical page declaration with A-S-F

Example 2

Relating FOB control and ROTATION control to the logical page area with the PRINT-DOCUMENT command:

```
/PRINT-DOCUMENT . . . ,ROTATION=90
```

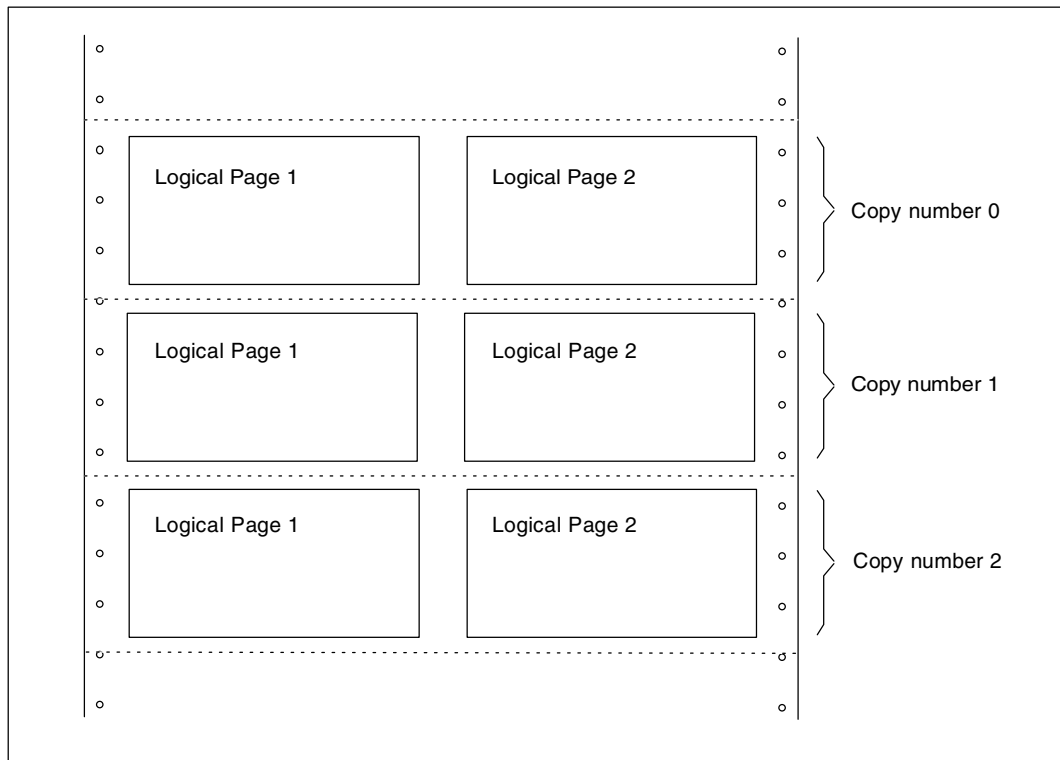


Relating FOB and ROTATION control to logical page area

Example 3

Relating page copy control and EFO control to the physical page area with the PRINT-DOCUMENT command:

```
/PRINT-DOCUMENT . . . ,PAGE-COPIES=2
```



Relating page copy and EFO control to physical page area

Compatibility between HP printers and HP90 printers

Some spoolout jobs can be printed only on HP printers, and others only on HP90 printers. The following print jobs can only be executed on HP printers:

- spoolout jobs whose memory requirements exceed the capabilities of the HP90 printer (even if the FOB data overlay in question is less than 672 sublines)
- files to be printed with CONTROL-MODE=*PAGE-MODE and which contain control characters for inverse printing.

The following jobs can only be executed on HP90 printers:

- spoolout jobs with overlays wider than 13.6 inches or longer than 14 inches
- spoolout jobs with overlays containing more than 672 sublines
- printing using the two-up procedure
- sheet formats over 14 inches long or 13.6 inches wide

HP90 printers are configured with the device type code X'21'.

Restrictions on HP90 printers

- Inverse printing is not supported.
- Page rotation by specifying the operands CONTROL-MODE=*PAGE-MODE and ROTATION=*BY-CONTROL-CODES is not supported in the two-up procedure.
- In two-up mode 1 the first logical page always starts on the left-hand side of the sheet, even when the operand is DOCUMENT-PART.
- In two-up mode 1 when CONTROL-MODE=*PAGE-MODE is simultaneously specified, there can be problems with canceled jobs or with jobs restarted by the operator (e.g. in the event of a paper jam etc.). SPOOL does not check whether, when printing a restarted job, it starts on a logical "left-hand" page. It can thus happen that logical pages to be printed on the right-hand half of the sheet suddenly appear on the left. To avoid this problem, insert a checkpoint record in the file at the start of each physical page and specify CHECKPOINT=*ON-SECTION-RECORD for the print job.
- When large FOB data overlays and numerous character sets are used at the same time, there can be a drastic reduction in printer performance, since when there is a shortage of space in the RPM the printer is reinitialized and reloaded by SPOOL. This can be avoided by limiting the FOB data overlay size and the number of character sets in the character set pool (START-PRINTER-OUTPUT command).
- There can be problems with the printer when using page rotation, if the form width and the loop for page rotation (ROTATION-CONTROL=*LOOP(...)) in a forms entry do not agree.

4.5.2 LP65 printers

In SPOOL, LP65 means the printer types 3365, 2090-LIP and 2140-LIP. Printer type 3365 is a single-sheet printer, whereas 2090-LIP and 2140-LIP printers use continuous paper. All these printer types offer the same functionality except for duplex output and selection of paper input and output trays. Only 3365 Printers permit this.

Feed control

Loops for LP65 printers must be defined in the PRFILE resource library using the PRM utility routine. The feed control for this type of printer is, however, different from all other printers supported in BS2000 that also use loops:

The printer takes its control statements from a control file, known as the PCL file (printer control language). SPOOL does not have direct access to the contents of this file.

A logical page is defined in the PCL file used to control feed. One of the operands via which the logical page is defined is the "base line increment", comparable with the LPI value in SPOOL. While the logical page is being defined or a new loop is being loaded, the loop is analyzed and internal feed information is built up in the printer. This generates the vertical position on the logical page for every vertical tabulator definition ("channel") of the loaded loop. This position is calculated by multiplying the number of lines by the "base line increment". The line spacing specified in the loop (6 or 8 lpi) is not analyzed when building up the internal feed information; the value can, however, be requested in the PCL file using "SPM" or "SJCEN" software. It is thus possible to define a number of logical pages (with different internal PCL LPI values), depending on the LPI value (6 or 8) of the loaded loop.

For an LP65 printer the number of lines defined in the loop determines the number of available lines on the logical page, but the length specification in the PRFILE (in inches) does not determine the length of the logical page.

The length of the available part of the logical page is calculated from the number of lines defined in the loop multiplied by the internal PCL LPI value.

The maximum number of lines in a loop for an LP65 printer is 255. If the loop contains more lines than the defined logical page can contain, loop loading is rejected by the printer.

Selecting a PCL file

A standard PCL file must be defined for every forms entry on an LP65 printer (see the "[SPSERVE \(BS2000/OSD\)](#)" manual: ADD-SPOOL-FORM... PRINTER-RESOURCES = LP65(PAGE-DEFINITION = ...). Printing the header and trailer pages is controlled via the standard PCL file, as is generally the output of the print file itself. You can select a PCL file that SPOOL must activate before it is possible to control the output of data using the PAGE-DEFINITION operand together with PRINTER-TYPE = *LP65-PRINTER in the PRINT-DOCUMENT command.

The operating mode of the printer must always be selected using the standard PCL file specified in the forms entry (mode 3211 with printer control characters or EXCCW mode). This is essential because the operating mode can only be determined via the PCL file. If the operating mode is changed with a PCL file called in the PRINT-DOCUMENT command, the standard PCL file must restore the original operating mode.

If certain functions, for example:

- selecting the paper input and output trays (only for 3365)
- printing in simplex or duplex mode (only for 3365)
- selecting a PCL file from the central computer system

fail to respond, this may be due to the PCL file. If this is the case, error-free operation of the printer by SPOOL is not possible.

Paper input and output trays (for 3365)

The paper input and output trays specified in the PRINT-DOCUMENT command are used to print the print file itself as well as the header and trailer pages. The paper format of the input tray must therefore be compatible with the definition of the logical page in the PCL file used to control the spoolout job (PCL file from the forms entry or command PRINT-DOCUMENT). For example, the definition of a logical A3 page is not compatible with A4 paper. Some standard input and output trays can be defined both in the LP65 device entries and in the PCL file.

The following hierarchy applies when selecting paper input and output trays:

1. specifications in the PRINT-DOCUMENT command.
2. specifications in the PCL file specified in the PRINT-DOCUMENT command.
3. specifications in the PCL file specified from the SPOOL parameter file in the forms entry of the form used.
4. standard values from the device entry.

Using the overlay

You can specify two EFO data overlays in PRINT-DOCUMENT for a spoolout job to be output on a 3365 Printer, one for the recto and one for the verso. The overlays selected must first be loaded into the overlay memory with the PCL file used.

Systems support can also load EFO overlays via the printer operating field and display them in the data to be printed. This does not depend on EFO data overlays specified and controlled by the user, i.e. there is a separate overlay data memory.

Printing multiple copies of individual pages

On an LP65 printer a maximum of 255 copies of a page can be printed one after the other. The specifications 254 and 255 in the PAGE-COPIES operand in the PRINT-DOCUMENT command both therefore result in 255 copies being printed.

Performance

To prevent the PCL file being loaded separately for each print job, the RESET parameter in the PROCESSING-CONTROL structure in the device entry of the SPOOL-PARAMETER file can be used.

RESET=*YES: the PCL file is loaded anew for each print job.

REST=*NO (default): the PCL file is only loaded upon explicit request.

Warning:

If you are printing in EXCCW mode, do not use the LEFT-MARGIN parameter of the PRINT-DOCUMENT command, as this can have unforeseeable results.

Link between EFO data overlay, duplex printing and duplicate pages

The three operands are linked to one another, since they are components of the same printer command. If only one of these three operands is specified, SPOOL must ascertain and set appropriate values for the other two functions.

These three functions can also be determined in a PCL file. The following table shows the effect of the various possible combinations of these three functions in the PCL file:

Page copies (PAGE-COPIES operand)	EFO data overlay (OVERLAY operand)	Simplex/duplex (TWO-SIDED operand)	Result
*STD	*STD	*STD	Values from the PCL file; if no corresponding values are available in the PCL file: No page copies, simplex mode, no overlay
n	*STD	*STD	n page copies, simplex mode, no overlay
*STD / n	FACE-SIDE = x	*STD	No / n page copies, simplex mode overlay x
*STD / n	REVERSE-SIDE = y	*STD	No / n page copies, duplex mode, no overlay on recto, overlay y on verso
*STD / n	FACE-SIDE = x, REVERSE-SIDE = y	*STD	No / n page copies, duplex mode, overlay x on recto, overlay y on verso
*STD / n	*STD	*NO	No / n page copies, simplex mode, no overlay
*STD / n	*STD	*YES	No / n page copies, duplex mode, no overlay
*STD / n	*STD	*TUMBLE	No / n page copies, tumble-duplex mode, no overlay
*STD / n	FACE-SIDE = x	*NO	No / n page copies, simplex mode, overlay x
*STD / n	REVERSE-SIDE = y	*NO	Spoolout job is rejected
*STD / n	FACE-SIDE = x REVERSE-SIDE = y	*NO	Spoolout job is rejected

How the functions are linked in the PCL file

Page copies (PAGE-COPIES operand)	EFO data overlay (OVERLAY operand)	Simplex/duplex (TWO-SIDED operand)	Result
*STD / n	FACE-SIDE = x	*NO/*TUMBLE	No / n page copies, tumble-duplex mode, overlay x on recto, no overlay on verso
*STD / n	REVERSE- SIDE = y	*NO/*TUMBLE	No / n page copies, tumble-duplex mode, no overlay on recto, overlay y on verso
*STD / n	FACE-SIDE = x REVERSE- SIDE = y	*NO/*TUMBLE	No / n page copies, tumble-duplex mode, overlay x on recto, overlay y on verso

How the functions are linked in the PCL file

Restart procedure (checkpointing)

A restart orientation mark is normally inserted on every logical page. This shows the possible restart point in the file in the event of an error.

Another method is restarting using so-called SECTION records (operand CHECKPOINT = *ON-SECTION-RECORDS). This new type of restart requires you to define SECTION records in your file. Consequently a section in the file (shown by a SECTION record at the start of the file and another one at the end) must contain at least one physical page and ideally not more than one physical page.

Restart using SECTION records is particularly useful for the following reasons:

- More than one logical page can be printed on a physical page on LP65 printers. With the standard restart procedure, based on logical pages, it can easily happen that restart is not at the beginning of a physical page, since SPOOL does not know the number of logical pages per physical page.
- Some control characters affect feed control or cause the printer to continue printing on the next page ("Execute Order Homestate", "Load Copy Control", "Execute Order Anystate" with 'discard buffered data'). If SPOOL encounters any of these control characters, the standard restart procedure is interrupted. In the case of large files this means that many pages are printed twice. Therefore, when using the above control characters, the restart procedure based on SECTION records should always be used.
- When printing on LP65 printers in EXCCW mode, the pages are only defined by control characters in the text (there is no control character list at the start of the page). Here too, the checkpointing procedure must be carried out on the basis of SECTION records.

Printing in EXCCW mode

To print a file in EXCCW mode, you can specify a PCL file to switch the printer to this mode. SPOOL only executes the checkpointing procedure in this mode if it is based on SECTION records (operand CHECKPOINT = *ON-SECTION-RECORDS in the PRINT-DOCUMENT command). If this is not explicitly specified, SPOOL restarts at the beginning of the file in the event of errors.

To minimize the exchange of PCL files, an EXCCW PCL file can be specified in the forms entry for the LP65 printer. In this event no header or trailer page is printed.

The operand STACKER-OFFSET or SEPARATOR-PAGE-TRAY can be used when defining the LP65 form to separate the individual spoolout jobs by means of offset output.

Sources of errors

SPOOL cannot directly administer the specific LP65 attributes. All actions initiated by PCL file printer commands are hidden to SPOOL; SPOOL does not know which of the LP65 attributes are currently available to the printer. This can result in difficulties, particularly if an LP65 attribute is defined for a single spoolout job. Possible sources of errors are

- "Font 10" is loaded via a user PCL file; at the end of the spoolout job the standard PCL file is again used by SPOOL, but "Font 10" is still in the printer memory. An error will occur if a subsequent spoolout job makes use of a PCL file that also calls "Font 10".



An LP65 attribute must always be deleted from the printer memory before it can be loaded again.

- An EFO data overlay is loaded with the aid of a user PCL file and is called in the print file. When the spoolout job has finished the standard PCL file is reused by SPOOL, but the EFO data overlay is still available in the printer memory. If the EFO data overlay is called by a subsequent spoolout job, it is also processed, i.e. printed. This can easily lead to security problems if the overlay, for instance, contains a signature.

Character sets and overlays for the LP65 printer are administered with the aid of the standard PCL file:

- Before loading a character set or EFO data overlay, the command delete character set or overlay must first be sent. This is required regardless of whether a character set or a data overlay is accessed within the data or in a PCL file.
- Since a job can overwrite character sets or overlay data already loaded into the printer, the standard PCL file must load all standard attributes to be used for the jobs.

- If data that requires particular protection is being processed, the standard PCL file must not only delete the character sets and overlay data that it is to replace by default values (e.g. standard character set etc.), but also those called by individual jobs. This may be done with the "Delete all EFO data overlays" and "Delete all character sets" commands. These commands are only allowed in a PCL file if the printer is not in EXCCW mode.

The standard PCL file must also reinstall the following control records:

- "Load Font Equivalence"
- "Load Page Description"
- "Load Page Position"
- "Execute Order Any state: Exception handling control"
- "Select printer mode"

Processing stages when using a PCL file

- Selecting the standard PCL file
- Switching on the offset paper output
- Printing a separator page
- Selecting the paper input and output trays
- Printing the header page
- Selecting the user PCL file
- Specifying the page copies, EFO data overlay and print mode (SIMPLEX, DUPLEX or TUMBLE DUPLEX)
- Printing the file
- Resetting the specifications for page copies, EFOs and print mode
- Calling the standard PCL file again
- Printing the trailer page

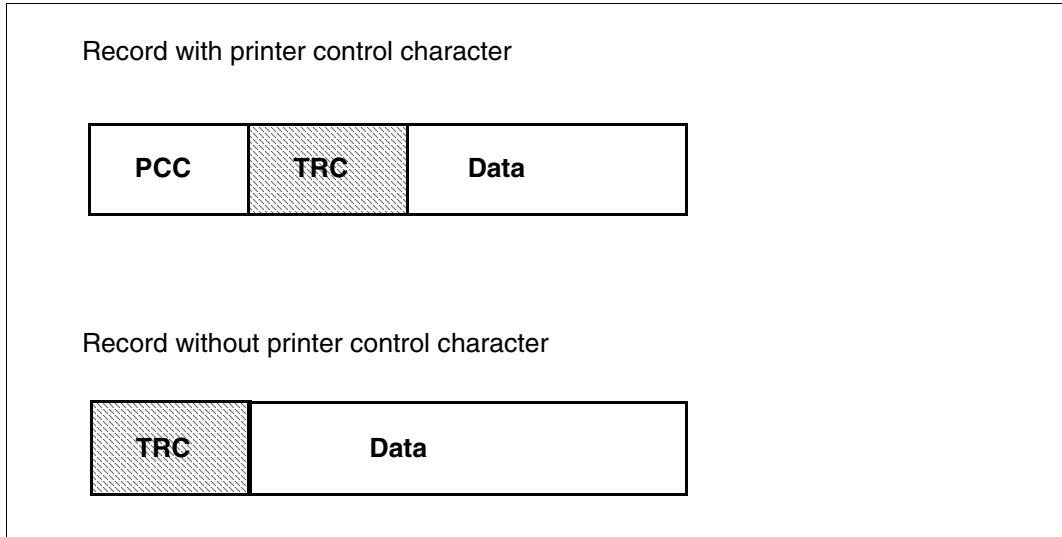


The layout of the trailer page for local SPOOL is shown on [page 179](#).

4.6 Font selection by means of control characters

In order to load the fonts necessary for printing out print data, users can insert a TRC (table reference character) in their records. A TRC is a character that references a font table.

This TRC is a single-byte value that can be stored in every record of a print file in the first or second field. This is the font to be used to print out the relevant record. If users use printer control characters (PCCs) in the data records, the TRC must follow this control character. If PCCs are not used, the TRC must occupy the first field of the record:



Each font to be used is represented by one byte in a possible range from X'00' to X'7F'. These values stand for the entries in a font list that the user must declare to SPS in order for the coded values to be linked to a specific font.

There are two options for declaring a font list: Entries in the PAGEDEF print resource or by means of the PRINT-DOCUMENT command. Which of these options is actually open to users depends on the assignment of the "font selection bit" in the structured field LND (line descriptor). For a detailed description of this structured field, see the "[Siemens Nixdorf Printer Data Stream \(SPDS\)](#)" manual.

If the font selection bit is **set**, one of four values (X'00' to X'03') can be entered in the TRC. Values higher than X'03' are treated as X'00'. Users can link these values to fonts using the PRINT-DOCUMENT command by specifying a maximum of four fonts in this command. If the fonts are not specified in the PRINT-DOCUMENT command, they are automatically replaced by the fonts stored in the current page definition (PAGEDEF) for printing.

If the font selection bit is **not set**, users can specify a font list in the PRINT-DOCUMENT command; the values specified in the TRC are linked to the font list of the currently valid PAGEDEF. In this case, however, the values can be located in the range from X'00' to X'7F' (i.e. selection of max. 127 fonts) where values > X'7F' are treated as X'00'.

Examples of linking TRC values to fonts

Example 1

The file to be printed out contains TRC values at the appropriate locations in the records. The user uses the PRINT-DOCUMENT command as follows:

```
/PRINT-DOCUMENT FROM-FILE=filename, LAYOUT-CONTROL=*PARAMETERS( -
    TABLE-REFERENCE-CHAR=*NO)
```

Thus, a list of font names is not specified in the command itself. In this case, SPS automatically links the TRC values to the names of the fonts anchored in the font list of the page definition PAGEDEF:

TRC in the records
X'00'
X'04'
X'06'
X'13'
X'05'
X'00'
X'19'
X'03'
X'03'

PAGEDEF font list	
Font#	Name
0001	Font01
0002	Font02
0003	Font03
0004	Font04
0005	Font05
0006	Font06
0007	Font07
...	...
0127	Font7F

Linking the two tables:

TRC	Font# in PAGEDEF								
	0001	0002	0003	0004	0005	0006	0007	0020
X'00'	x								
X'04'					x				
X'06'							x		
X'13'									x
X'05'						x			
X'00'	x								
X'19'	x								
X'03'				x					
X'03'				x					

Note

Any value higher than the number of entries in the font list is automatically diverted to the first entry in the list.

Example 2

The file to be printed out contains TRC values at the appropriate locations in the records. The user uses the PRINT-DOCUMENT command as follows:

```
/PRINT-DOCUMENT FROM-FILE=filename, LAYOUT-CONTROL=*PARAMETERS( -
    TABLE-REFERENCE-CHAR=*NO), RESOURCE-DESCRIPTION=*PARAMETERS( -
    CHARACTER-SETS=*BY-EXTENDED-NAME(NAME= -
    (XOFONTN1,XOFONTN2,XOFONTN3,XOFONTN4))
```

A list of font names is explicitly specified in the command itself. In this case, SPS automatically links the TRC values in the records to the names of the specified fonts:

TRC in the records
X'00'
X'04'
X'06'
X'13'
X'05'
X'00'
X'19'
X'03'
X'03'

List of font names in the command	
Font	Name
0001	Fontn1
0002	Fontn2
0003	Fontn3
0004	Fontn4

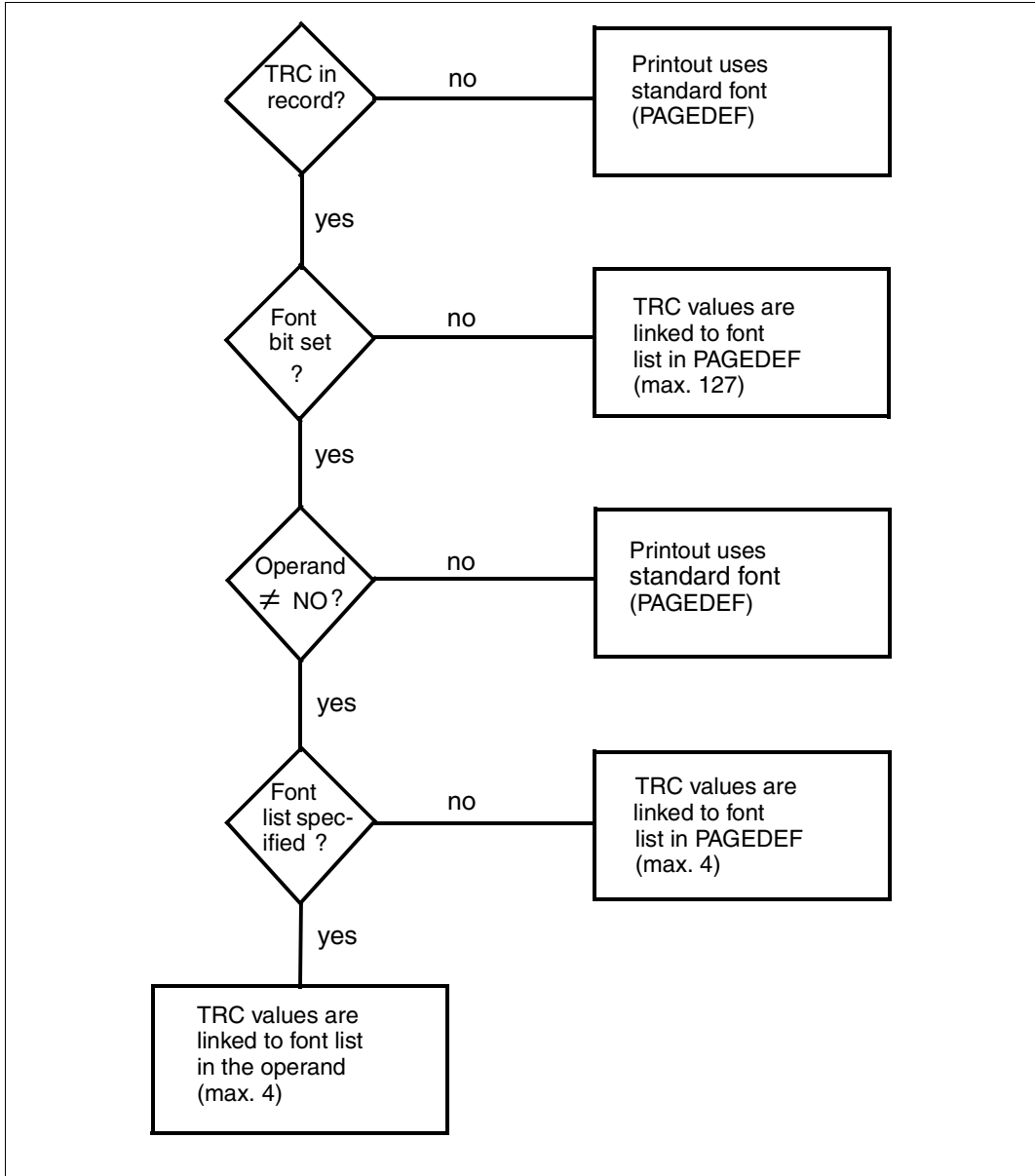
Linking the two tables:

TRC	Font name in the PRINT-FILE command			
	Fontn1	Fontn2	Fontn3	Fontn4
x'00'	X			
x'04'	x			
x'06'	x			
x'13'	x			
x'05'	x			
x'00'	x			
x'19'	x			
x'03'				x
x'03'				x

Note

Any value higher than the number of entries in the font list is automatically diverted to the first entry in the list.

Logic of font selection by means of control characters



4.7 Diagnostic support through an extended I/O trace

Using an I/O trace extended for APA jobs, all data relevant for a print job on an APA printer can be logged. This data contains device-specific information on the particular printer and corresponding information on the print job environment.

In addition to the general logging function, the main benefit of this trace is as a guaranteed instrument for efficient error diagnosis and analysis. The I/O trace can be switched on as needed by means of the operands of the same name in the START-PRINTER-OUTPUT and MODIFY-PRINTER-OUTPUT-STATUS commands.

4.8 Contents of the I/O trace

The extended I/O trace is divided into various areas representing the different types of information (device-specific, print job data, resources, etc.).

These areas are: CCB and DER, Translation Table, IDA Table, CCW and SCB.

The CCB and DER I/O trace areas

Channel control block (CCB) and device error recovery (DER) are tables used by the DJCTRL module (BS2000 module for physical input/output) and contain various items of information on the current input/output: device type, return codes and data pointer.

The Translation Table I/O trace area

The Translation Table is a code conversion table that translates all data in the print file before passing it to the printer. It basically serves to define a random hexadecimal character as an escape character in place of 'X'FF'. The use of a code translation table for a current print job, and thus the logging of this print job, depends on the setting of the TRANSLATION-TABLE operand in the PRINT-DOCUMENT command.

The IDA Table I/O trace area

The IDA Table is a table containing various pointers to data. It is used when the virtual memory is partitioned into a number of physical memory blocks.

The CCW I/O trace area

The physical I/O operations are logged in the form of CCWs (channel command words) from which the channel program is formed. The CCW trace area contains pointers to the transferred data or to the IDA Table.

The SCB I/O trace area

The SCB (spool control block) contains all information on the print job, i.e. the details of the PRINT-DOCUMENT command and the location of the resources.

4.9 The trace file

The I/O trace areas for the device specified in the START-PRINTER-OUTPUT command are logged in a trace file that is created under the system ID SYSSPOOL and has the following name: \$SYSSPOOL.SYSTRC.SPOOL.*dev-name*.YYYY-MM-DD.hhmm.

The individual components have the following meanings:

dev-name:

Name of the printer as it is stored in the SPOOL parameter file.

YYYY-MM-DD :

Date on which the START-PRINTER-OUTPUT command was used with the trace option.

hhmm :

Time at which the START-PRINTER-OUTPUT command was used with the trace option.

The order of entries in the individual I/O trace areas of the trace file depends on the sequence of inputs/outputs. Access to the trace file is limited to user IDs that also have access to the SYSSPOOL ID, i.e. SPOOL administration or systems support.

Note

Since a high volume of information is recorded in a trace file, the creation and updating of a file requires a correspondingly large amount of memory and computing power. For this reason, use of the extended I/O trace is recommended only for the purpose of error diagnosis.

5 Appendix

5.1 Standard loops

The C1 standard loop has the following attributes:

Line spacing: 6 lines per inch and vertical tab "channel 1" on line 3, form length: 12 inches.

This enables 70 lines per print page to be printed (the first two lines before the vertical tab "channel 1" are left blank).

For HP printers (3351/3353) several rotation loops are supplied in the HPFILE.

In the STD standard form, rotation loop R06 can also be used to output rotated pages.

The R06 standard rotation loop has the following attributes:

Line spacing: 6 lines per inch

Form length: 13.5 inches

5.2 Device type codes

F-C = Family code

T-C = Device type code

S/I = Device channel class

S: Block multiplexer channel type 1 (SBL) or
byte multiplexer channel type 1 (SBY)

I: Block multiplexer channel type 2 (IBL) or
byte multiplexer channel type 2 (IBY), or
byte multiplexer channel type 2 extended distance (IBO), or
emulation of multiplexer channel type 2 (bus channel)

Disk drives must always be connected to block multiplexer channels. Magnetic tape devices can be connected to block or byte multiplexer channels.

Device family	Family name	F-C	S/I	T-C	Device type	Device name/ product number
Highspeed printers	PRINTER	20	S	26	PRLS333	3337-51, 3338-51, -511, -512, 3339-51, -512, 3348-110, 3349-110
			I	2A	PRLI333	3338-531, -53, -532, 3339-53, -532
			S/I	21	STDPRINT	All other printers

Notes

1. The name of the host on which the print job was issued is output in the CLIENT-H field.
2. LOCAL is output in the CLUSTER field in the case of local jobs or distributed jobs within the same cluster. SINIX is output in the case of distributed jobs between clusters when the print job was started from a SINIX cluster. BS2000 is output in the case of distributed jobs between clusters when the print job was started from a BS2000 cluster.
3. The START TIME and END TIME fields have been updated to display summer and winter time.
4. The name of the coded character set used in the file is displayed in the CCSNAME field.
5. The create mode of the file is displayed in the FILE-CR-MODE field if the print job requested the product DSEM.

5.4 Printing in SR2000/SX series on 4830/4850/9045 Printers

This section describes the printing procedures in SR2000/SX series 4830/4850/9045 Printers connected as LP-EMULATED printers using LAN/TCP-IP.

SR2000 offers the option of using certain LAN printers as if they were line printers connected via a type 2 channel. This functionality is supported using an LP emulation function in the UNIX part of the system. Typically, this functionality is used in small installations with both modest volumes of printing and modest printing demands and for which a type 2 channel printer is not necessary.

Three types of LAN printer may be connected (4830, 4850 and 9045). These printers are managed by the SPOOL administrator as are the local printers.

5.4.1 LP emulated printers

The printers supported have a low to medium printing speed (maximum of 36 A4 ppm) for continuous paper and cut sheet printing. The printing technology includes impact and non-impact printing (laser and LED printers). The printer is connected to the system via Ethernet connectivity (SEH-ICxx).

The following printers are supported for LP emulation:

Model	Connection type
4830-FS7000P	LAN (IC59-SEH)
4830-FS9000P	LAN (IC59-SEH)
4850-P300	LAN (IC55-SEH)
9045-25/-50	LAN (IC55-SEH)

5.4.2 Configuring an LP emulated printer

The configuration of an LP emulated printer in SR2000 differs from a configuration in a 390 architecture in the following ways:

- The UGEN sets are replaced by a file in the UNIX system which is imported when the machine is started and is used to create BS2000 device tables.
- The technical properties of the printer and the network addresses are entered in the Xprint database (in order to avoid duplicating the interfaces and to ensure that the same printers can be used by Xprint).

To do this, entries must be made in three places:

- The technical description of the printer must be entered in the database of the Spooler in the UNIX system (Xprint) even if it is not used directly by Xprint. This file is used by the emulation.
- PRIMEPOWER or WebSysAdmin must be used to enter the following things in the emulation database: the mnemonic name of the printer that is to be used on the BS2000 side, the emulation options and the name (reference to the Xprint entry).
- The printer must be entered in the SPOOL parameter file with the correct mnemonic device name.

Xprint database

The printer description is created using the xpadding command:

```
xpadding -dev <Sinix-name> -da <IP address> <port number> -co <LAN> -pc <PCL emul>
```

Particular parameter values:

4830 Printer:

```
xpadding -dev 4830          <printer name>
-da "193.210.193.52 2900" <IP address and port number>
-co LAN                    <LAN connection>
-pc PJL-PCL5e-48xx        <printer type>
```

4850 Printer:

```
xpadding -dev 4850          <printer name>
-da "193.210.193.52 2900" <IP address and port number>
-co LAN                    <LAN connection>
-pc PJL-PCL5e-4850        <printer type>
```

9045 Printer:

```
xpadding -dev 9045          <printer name>
-da "193.210.193.52 2900" <IP address and port number>
-co LAN                    <LAN connection>
-pc A-ZD14                 <printer type>
```

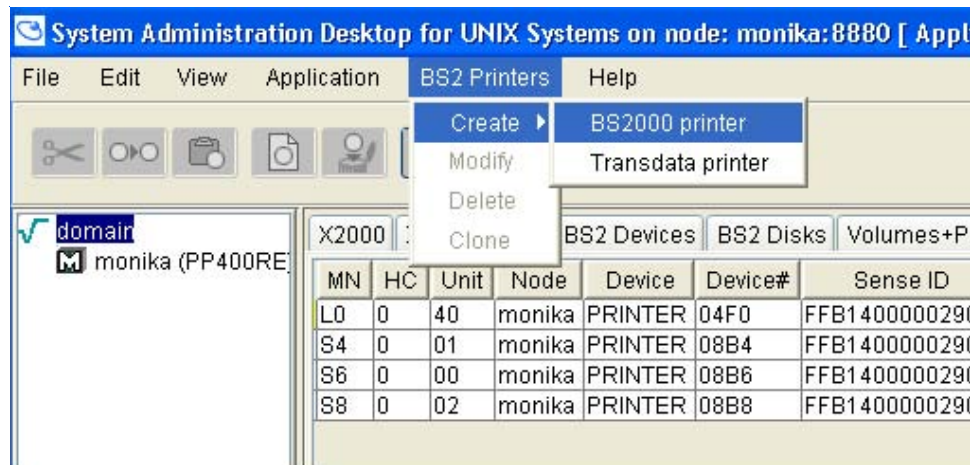
Emulation database

WebSysAdmin must be started under ROOT. The sequence on screen is as follows:

Selection of the “BS2Devices” tool



Creation of the printer



Specification of the parameters

Create a new BS2000 printer

Name: 4822 **Type**: HP-LASERJET

Node: leibniz

HC: 0 **Unit**: 02 **MN**: LU **Device#**: 04E4

Device: PRINTER **Sense ID**: FFB14000002900

active

Settings for a printer with serial interface

Protocol: **Speed**: **Bits**: **Parity**:

Device node: 172.25.205.157 2900 (LAN)

Emulation options: -trace=0 -seh -delay=3

Ok Cancel Help

BS2000 SPOOL parameter file

Under BS2000, the printer must be entered in the SPOOL parameter file along with the mnemonic device name:

```
//ADD-SPOOL-DEVICE DEV-NAME=<printer name>,
    DEVICE-TYPE=*LP-EMULATED,
    DEVICE-ACCESS=*LOCAL-ACCESS(Access-Type=*BUS-TYPE-1,
        MNEMONIC-NAME=<mnemonic device name>)
```


5.4.3 System printing services for LP emulated printers

In BS2000/OSD the printing services for LP emulated printers are realized via the SPOOL subsystem. The main function of SPOOL is to provide a device interface to the printer. An application can then send data to the SPOOL system. SPOOL offers the following functions: handling of print data and print resources, device drivers and error handling.

Handling the print data, PRINT-DOCUMENT command

Currently SPOOL accepts a single line-oriented flow of data for LP emulated printers. This is transferred in its entirety or partially, with or without changes to the target printer, depending on the type of layout functions specified in the document transfer. Print applications prepare documents appropriately.

The document format is record-oriented with or without feed control characters at the beginning of each record. Data and the positioning of the text on the page must be handled by the application itself.

The document format describes the way in which the document that is to be printed is structured, whereas the document production describes the way the document is transferred to Spool & Print Services for printing (layout functions, document segments, print resources,). The following PRINT-DOCUMENT operands are supported by LP emulated printers. Not all combinations of these parameters are available.

FROM-FILE	Name of the print file
DOCUMENT-PART	Specifies the part of the file that is to be printed
INPUT-SECTION	Division of the file into sections
INPUT-PART	First and last record to be output
RECORD-PART	First and last character of each record to be output
OUTPUT-PART	Logical lines or pages of the file prepared for printing
DOCUMENT-FORMAT	Type of document contents, regarding evaluation of control characters
*TEXT	No printer specific control characters. Line data
LINE-SPACING	Interpretation of line feed
LINE-PER-PAGE	Number of lines per page
HEADER-LINE	Header on each page
OUTPUT-FORMAT	Output in character format or hexadecimal format

PRINT-JOB-CONTROL	Control of print job processing
START-PROCESSING	Time printing begins
FAMILY-PROCESSING	Assignment of common TSN for several spoolout jobs
CHECKPOINT	Type of restart procedure
ON-PAGES	Standard restart procedure
PRINT-JOB-NAME	Specifies job name
PRINT-JOB-PRIORITY	Priority of the spoolout job
PRINT-JOB-CLASS	Job class of the spoolout job
MONJV	Is a job variable used to store information
JV-PASSWORD	Password used to protect the SPOOL job variable
PROCESSING-ADMISSION	Execution of the job under another user ID
FAILURE-PROCESSING	Handling of errors in the current processing session
LAYOUT-CONTROL	Specifies parameters for specifying the page layout
LEFT-MARGIN	Indent of the output text
COVER-PAGE	Specifications for printing of header and trailer page of a print job
RESOURCE-DESCRIPTION	Print resources to be used for printing
FORM-NAME	Name of the form
LOOP-NAME	Name of the loop
TRANSLATION-TABLE	Use of a code translation table for the document
RESOURCES-LOCATION	Use of print resources in a distributed environment
TO-PRINTER	Type of printer for output
ADDITIONAL-COPIES	Number of additional copies of the file
LOCK-FILE	Lock the file to protect it during printing
DELETE-AFTER-PRINT	Specifies whether the file is to be deleted after processing

Handling print resources

SPOOL manages the print resources required for printing (at least the forms and loops). This print resources are used by SPOOL to prepare the data stream from the user during the printing process. A form is a resource object which maps pages of a print file to the output medium. Forms for LP emulated printers have the following types of print control:

- Page and line lengths measured in 10ths of an inch
- Type and activation of the system header and trailer pages
- Reference to an assigned preform object. The preform object contains a set of attributes which permit the representation of control characters on a completed print job, including header and trailer pages. The product PRM (see the “[PRM \(BS2000/OSD\)](#)” manual) can be used to provide a set of predefined resources for this type of printer. The control options available with explicit keywords are:

DRAFT	Print in draft mode
LQ	Print in letter quality mode
PORTRAIT	Print in portrait mode
LANDSCAPE	Print in landscape mode
CPI=	The number of characters per inch: 10, 12, 15 or 17 (CPI)
LAN=	Use of a particular character set (In for standard international, As for standard ASCII, ...)

- Reference to an LP loop object. In this print resource the paper feed is controlled with the help of a limited line height/line spacing (6 or 8 lpi) and vertical tabulator (channel # 1 through 12). The loop (also called vfb) can also be specified directly when passing the print job to the printer.
- Code translation for the entire print file (including header and trailer pages) can be realized using a 256 byte code translation table (print resource CHARACTER-IMAGE).

SPOOL assigns this reference to an actual resource object that is taken from the standard resource library (PRFILE).

Device drivers

SPOOL operates LP emulated printers as the IBM 3338 printer model with type 2 channel connection.

This provides an appropriate protocol, buffering and commands for device management to ensure that data is transferred to the printer and the job is carried out by the printer. A subset of the 3338 HSI (Hardware/Software Interface) data stream offers a bi-directional communication path to the printer. This path is used by SPOOL to initialize the printer, load and manage print resources (send preform and vfb) and to validate reception and processing of each sent buffer.

Error handling

SPOOL offers a device-specific error handling procedure according to the principles for channel connection in BS2000. SPOOL monitors the device status, handles the restart process and carries out error handling procedures, as and when required, on a line-by-line basis and transparent for the application. This means that SPOOL ensures that the data is printed without involving the application.

However, this type of LAN printer does have a few weak points which cannot be eliminated simply by using the principles for channel connection in BS2000. For example, a larger printer buffer does not ensure the completeness of the output of a print job on paper (in particular when the printer is switched on/off).

Glossary

active environment group

Component of a logical page. An active environment group contains environment parameters, for example, map coded fonts, page segments, the size of a page (or of an overlay) and control data for composed text blocks.

AFP

Advanced Function Printing

AFPDS

See SPDS.

APA

APA stands for All Points Addressable. It denotes a printing technology based on unrestricted addressability of each pixel on the printed page.

APA print job

In BS2000, an APA print job is initiated using the PRINT-DOCUMENT command and consists of the following

- the print file
- the entries in the PRINT-DOCUMENT command
- the definitions in the SPSLIBs
- the definitions in the SPOOL parameter file
- the definitions in the device parameter files and the job parameter files

APA printer

Printer on which APA print files can be printed.

application program

Program which creates an APA print file in structured-fields format or line-data format.

asynchronous mode

Asynchronous means that the inputs and outputs are executed in background mode by the system and that the task requesting these operations is free for other functions during this time.

band ID entry

A band ID entry contains a translation table which specifies the character into which each of the INPUT characters is to be converted.

The currently required loop and the band ID entry are loaded into the hardware buffer of the line printer before printing according to the requirements of the user.

barcode data object

Object of a page segment or overlay which contains information for the construction of a barcode. SPS uses this information to create the barcode.

The size, position, rotation etc. of the barcode can be specified.

baseline axis

Baseline printing axis. This is the axis along which the lines of print are arranged.

bitmap format

Format for graphics and pictures in which the picture structure is determined by the number and arrangement of "black" and "white" dots.

cell

Subset of a complex image.

channel

Historical name for vertical tabulator. Each "channel" represents a line position on the form.

character density

An attribute of a font which is measured in characters per inch (cpi).

character set

A related set of print characters of the same size, font and type character. See also font.

code page

Print resource which assigns a one-byte code to each character of the font character set.

coded font

Print resource which links the code page to the font character set.

cold start

A cold start is necessary in the event of serious problems in the SPOOL queue. For a cold start the job queues must be completely recreated. A cold start means that all SPOOL jobs still in the job queue and which were not processed in the previous session are deleted without being processed.

Selective processing is possible, i.e. only specific queues are taken over. A cold start of SPOOL is also possible if the system was loaded with a warm start (i.e. only SPOOL jobs are deleted).

complex image

Special form of an image in which the whole picture is made up of several segments (cells). The advantage this has over a simplex image is that an unnecessarily large number of "white" pixels do not have to be saved along with the image, since cell boundaries can be drawn much closer to the actual "black" image.

composed text page

Logical page which is made exclusively of structured fields.

copy

The term "copy" is understood to include both the "original" and all additional copies.

copy group

See medium map.

cpi

cpi stands for Characters Per Inch. It is the unit of measurement used for the character density of a font.

data block

Initially an empty field, to which the relevant APA object can be transferred and then put into the required location. Group of variables and control data for the mixed entry of text and graphics.

data map

Component of a page definition; specifies the way in which a logical page is to be created using line data (synonym: page format).

data stream

There is a difference between incoming (SPDS) and outgoing (SIEMENSPDS) data streams. The incoming data streams are passed by the application to SPOOL. The corresponding printer driver (SPS) passes outgoing data stream to the driver.

device parameter file

Contains parameters for an APA printer. See also parameter file.

document

Component of an APA print file. A document is made up of logical pages.

dpi

dpi stands for Dots Per Inch. It is the unit of measurement for the resolution capability of printers.

duplex mode

Two-sided printing, that is printing on both the front and the reverse of a sheet of paper (in contrast to simplex printing).

duplex normal

See duplex option.

duplex option

These are options for two-sided printing of continuous paper on twin printers. Eight different types are possible, these are characterized by the different layout of the front and reverse of the page. The following duplex options are available:

- duplex normal
- duplex tumble
- reverse duplex normal
- reverse duplex tumble
- zigzag normal
- zigzag tumble
- reverse zigzag normal
- reverse zigzag tumble

enhanced N-UP

N-UP printing method which also supports the following functions:

- Logical pages can be placed anywhere on the front or reverse of a sheet of paper, with any possible rotation and in any size.
- The partition which the logical page occupies on the sheet of paper can be a different size for each logical page.
- Different overlay, offset and rotation settings can be made for each logical page.
- Overlays can be placed relative to the origin of each partition.
- Page feed is possible on a new partition or on a new sheet.

The enhanced-N-UP method can be defined in a form definition.

flip function

Function for printing on twin printers. The flip function allows you to exchange the output of the first printer with the output of the second, or in other words, the front of the page can be printed on the second printer and the reverse of the page on the first printer.

font

A font is (normally) available in different sizes and characters. For example: Helvetica (in which this manual is printed), Times, Garamond etc. See also character set.

font character set

Print resource which contains the pixels for each character of a font.

font list

List used when printing line data which is used to assign TRCs (Table Reference Characters) to the actual font which is then to be used to print the data. Font lists can be specified in a page definition or in the PRINT-DOCUMENT command.

font size

Size of a font. The size is given in points (1/72").

form

Entry in the SPOOL parameter file.

form definition (formdef)

Print resource which is used for composed text to create the link between the logical page and the physical page. You can use a form definition to specify how the logical page of the document is mapped on the physical page.

graphic object

Object of a page segment or an overlay. A vector graphic which is created by the printer from information contained in the graphic command and is automatically adjusted to match the printer resolution.

hard page segment

A page segment which is loaded into the printer and remains there until the print file has been processed.

header page

Cover sheet for a listing.

highspeed printer

A particularly powerful printer. All local printers used under BS2000 are highspeed printers.

HP printer

The BS2000 abbreviation for high-performance laser printer.

HPFILE

Control character file for high-performance laser printers (HP printers).

I axis

See inline axis.

image

See image data object.

image data object

Object of a page segment or overlay. Image data objects (images) are raster images which are usually produced when scanning, by digitalization or when using a pixel-based "paint" program. There is a difference depending on the way the image data objects are saved:

- IM image data object: saved in a bitmap format
- IO image data object: saved in a SAA image format

inch

Unit of measurement. 1 inch is equal to 2.54 cm.

inline axis

Character printing axis. The axis along which text characters are arranged.

inline resource group

Component of a print file, contains inline resources.

inline resources

Print resources which are integrated into a print file (within the inline resource group).

IPDS

See SIEMENSPDS.

job parameter file

Contains parameters for a print job. See also parameter file.

landscape

A page which is wider than it is high.

LCL file

Internal file for the LP65 printer (printer type 3365) which is located on a disk or on a hard disk. It contains, for example, the page definition and references to character sets and overlays.

line format page

Logical page made up of line data. The pages are defined using data lines which are specified by a print control character. An optional feature is that pages can also contain structured fields.

line merge

HP and HP90 printer procedure in feed suppression.

line printer

Line printers are used to output data. Unlike laser printers they print line by line.

local font identifier

Local name of the font, as used within a logical page.

logical page

Component of a print file, an area defined by the user for each printed page and which contains everything which is to be printed. Logical pages are made up of objects.

logo

Symbol used to identify a company, institution etc. and is often represented in the form of an image.

loop

A loop is loaded to control paper feed in the vertical format buffer (VFB) of a printer.

Each byte in the loop corresponds to a line on the form and contains information on the current line height and the number of the vertical tabulator (→ channel). The loop can either be accessed directly using the LOOP operand or indirectly using the FORM-NAME operand in the PRINT-DOCUMENT or ASSIGN-SYSLST command.

LP-EMUL printer

Printer that is emulated as printer type 3338 and addressed via a bus through appropriate SINIX software.

LPI

LPI stands for Lines Per Inch. It is the unit of measurement used when describing the line density of a font.

map coded font

Reference to a font resource which is stored within the print file. The map coded font is defined in the active environment group of the logical page and is a list of assignments between the local font identifier and the font resource. Two types of assignment lists are permitted:

- static: local font identifier - code page - font character set
- dynamic: local font identifier - coded font

medium map

Component of a form definition, specifies how the logical page of a document is to be mapped onto the physical page (synonym: copy group).

microline

A microline is the finest possible line. It depends on the resolution of which the printer is capable. The nonimpact printers supported by SPOOL (laser and LED printers) are capable of a resolution of 240 dots per inch. A microline is therefore 1/240 of an inch thick.

MULTIPLE-UP

Printing method for line files which corresponds with the N-UP method. The appearance of several pages on one sheet of paper is achieved by grouping sets of print lines on a logical page. The output itself is still one logical page on per front or reverse of a sheet of paper. The MULTIPLE-UP method is defined in a page definition.

nonimpact printer

Printers in which the characters are not created by mechanical impact (e.g. inkjet, thermal or laser printers).

N-UP

Printing method which allows one, two, three or four logical pages to be printed on one physical page which can be either the front or the reverse of a sheet of paper. The partition occupied by each logical page on the sheet is always the same size and has the same appearance. The N-UP method can be defined in a form definition. See also under enhanced N-UP.

object

Building block of a logical page. Objects can appear several times within a logical page and in any order. The following APA objects are available: text, image, page segment and overlay.

output medium

The medium to which the logical page is to be output. The output medium can be continuous or cut-sheet paper.

overlay

Overlays are prefabricated "building blocks" which are merged into the variable data when printing. Overlays are the electronic version of a preprinted form. Overlays have their own environment definitions. In contrast to the logical pages with which they are merged, overlays represent autonomous, fixed entities.

overprint

Print procedure using suppressed line feed (except HP printers, → line merge).

page definition (pagedef)

Print resource which creates the link between the logical and the physical page for line data. A page definition allows you to specify the way line data is to be printed.

page format

See data map.

page overlay

An overlay which is permanently loaded in the printer and remains saved there. It is defined in the page definition (synonym: hard-coded overlay).

page printer

Printer which constructs at least one complete page from the data the computer passes to it in the page memory of the printer before it begins to print.

page segment

Page segments are prefabricated "building blocks" which are merged with the variable print data when printing. Page segments do not have their own environment definitions, they instead use those which are active when the page segment is incorporated. The inserted text cannot now be distinguished from the variable text. There are two types of page segment:

- a hard page segment is permanently loaded in the printer
- on the other hand a soft page segment is loaded into the printer to print a page, then after printing the printer memory is released.

parameter file

Parameter files contain parameters which modify the behavior and the preset values of SPOOL, and which are not completely supported on the user interface. There are two types of parameter file, the one permits you to specify printer definitions, the other is for the print job:

- device parameter file - here you can specify the parameters for a printer
- job parameter file - here you can specify the parameters for a print job.

PCL document

Text files are formatted and printed by Spool & Print Services according to the description of the layout specified by the user.

PCL documents already contain a complete description of the appearance of the final document. This means that they are passed to the printer without further processing by Spool & Print Services.

PCL file

Internal file for the LP65 printer (printer type 3365) on floppy or hard disk. It contains, for example, the page definition and references to character sets and overlays.

physical page

The real page on the output medium. A physical page can contain several logical pages.

pixel

The smallest unit which can be printed by a printer. A pixel is 0.11 mm or 1/240 inch in size (synonym: pel).

portrait

A page which is higher than it is wide.

print file

File which is to be output to the printer.

print job

In BS2000 a print job is initiated using the PRINT-DOCUMENT command and consists of the following

- the print file
- the entries in the PRINT-DOCUMENT command
- the definitions in the PRFILES
- the definitions in the SPOOL parameter file
- the definitions in the device parameter files and the job parameter files

print resources

Tools which allow you to change the typeface design and page layout to arrange the optical or aesthetic appearance of the print file. Print resources can either be embedded in the print file (inline resources) or stored in libraries. The following print resources are available:

- form definition (formdef)
- page definition (pagedef)
- font
- page segment
- overlay

printer driver

System program used to drive a printer. It converts instructions given by the application program into printer-specific statements and is responsible for the exchange of information between the operating system and the printer.

printer resolution

See resolution.

PRFILE

Standard library which is delivered with PRM and contains a number of standard printing resources. If these standard definitions do not meet your requirements, you can create your own and store them in a user PRFILE.

PRM

Utility routine. A full description can be found in the “[PRM \(BS2000/OSD\)](#)” manual.

replay tape

The file to be printed is put onto tape and is later output to a printer. Control is via START-... commands.

Data is read from tape using START-TAPE-REPLAY, and a tape device is assigned for output with the START-TAPE-OUTPUT command. The OUTPUT-MODE operand (START-TAPE-REPLAY command) controls whether the data is output directly to the printer or is copied to a temporary (EAM) file before printing.

Replay tape reprocessing is terminated with STOP-TAPE-REPLAY.

The validity check for spoolout jobs takes into account the system configuration of the computer center in which the replay tape was created. Should this replay tape also be used in another computer center, the system configuration of this computer center must already have been taken into account when the replay tape was created.

resolution

Number of dots in a specified area. The specification is given in dots per inch (dpi).

resource

Component of the inline resource group or file in a resource library. See print resources.

reverse zigzag normal

See duplex option.

reverse zigzag tumble

See duplex option.

section record

Record which delimits a data section. This record is used for the restart procedure when there are printing problems.

SIEMENSPDS

SIEMENSPDS stands for Siemens Intelligent Printer Data Stream. Device-oriented data stream. Synonym: IPDS data stream (Intelligent Printing Data Stream).

SIEMPL

Conversion program which converts print files into structured-field format. SIEMPL can be executed on the BS2000/OSD, in UNIX systems, MVS and VSE operating systems.

simple image

Image where the whole picture comprises a simple rectangular area.

simplex mode

One-sided printing, only one side of the sheet of paper is to be printed (the opposite of duplex printing).

soft page segment

A page segment which is only loaded into the printer to print one page after which the printer memory is released.

SPDS

SPDS stands for Siemens Printer Data Stream. Data stream in structured-field format. Synonym: AFPDS data stream (Advanced Function Printing Data Stream).

SPOOL parameter file

The entries in the SPOOL parameter file `$$SYSSPOOL.SPOOL.PARAMETERS` basically cover those entries required for identification and definition of devices.

spoolout

Data is output as a background process. This is done on printers, floppy disks or tapes. Local or remote printers can be used.

SPS

SPS stands for SPOOLAPA Print System, a printer driver for APA printers which can be used as an additional component for BS2000 SPOOL. SPS is implemented as a subsystem and linked to SPOOL. However, the actual user interface for BS2000 users remains SPOOL.

SPSLIB

SPSLIB stands for SPOOLAPA PRINT SYSTEM LIBRARY. This is the standard library which is supplied with SPS and contains a number of standard print resources: form definitions, page definitions, some page segments and overlays as well as those character sets taken and converted from HPFILES. A standard SPSLIB is supplied with SPS for each printer resolution (240, 300, 600 dpi).

If these standard libraries do not meet your requirements, you can create your own print resources and store them in user SPSLIBs.

subsystem

To reduce the complexity of BS2000 operation, the operating system comprises functional units (subsystems). Depending on its type and function, the subsystem has the following characteristics:

- Each subsystem forms a self-contained unit.
- Subsystems can be activated, stopped, continued and deactivated during the in the course of the session.
- Each subsystem has a name and a version number.
- A newer version of a subsystem can be exchanged for an older one.
- Subsystems are administered using dynamic subsystem management (DSSM).

table reference character

Table reference characters are also known as TRCs. They are one-byte values which can be entered in the data record of a print file and used to select a font when printing line data. Each value stands for the font with which the data record is to be printed. The value in the TRC is assigned to the actual font using a font list.

text

Object of a logical page, page segment or overlay which only contains text. There is a difference between text and presentation items. The content is specified by data whereas the presentation can be varied by the flexible use of different character sets, line and character spacing and by changing the position or rotation.

trace file

File in which the trace area of the extended I/O trace is logged.

trailer page

The trailer page of a listing.

TransLib-Dialog

Utility used to administer print resources BS2000.

TRC

See table reference character.

twin mode

Printing on twin printers.

twin printers

Two APA printers which work together as a single entity. The most important use of twin printers is for duplex printing where double-sided printing is achieved by reversing the orientation of the paper web.

TWO-UP

Printing method in which two logical pages are printed next to each other on one page (tandem printing). This can be either be two consecutive logical pages (mode 1) or two copies of the same page (mode 2) or offset pages in conjunction with double-sided printing (mode 1 in conjunction with duplex mode). The TWO-UP method and this mode can be defined in a form definition.

user PROFILE

Library which contains the user's own print resources. See also PROFILE.

user SPSLIB

Library which contains the user's own print resources. See also SPSLIB.

vector graphic

Image which is created by the printer from graphic commands contained in the data stream of a graphic object.

virtual printer

A virtual printer is an object which is treated like a real device but only exists as an application which is addressed using a device name.

X-TWO-UP

Printing method in which two logical pages are printed next to each other on one sheet of paper. Unlike in the TWO-UP method where pages are printed from right to left, printing in the X-TWO-UP method is done left to right (inverted tandem printing). The X-TWO-UP method is defined in a form definition.

Related publications

Ordering manuals

The manuals are available as online manuals, see <http://manuals.fujitsu-siemens.com>, or in printed form which must be paid for and ordered separately at <http://FSC-manualshop.com>.

BS2000/OSD Softbooks English CD-ROM

Target group

BS2000/OSD users

Contents

The CD-ROM "BS2000/OSD SoftBooks English" contains almost all of the English manuals and README files for the BS2000 system software of the latest BS2000/OSD version and also of the previous versions, including the manuals listed here.

These Softbooks can also be found in the Internet on our manual server. You can browse in any of these manuals or download the entire manual.

BS2000/OSD-BC Introductory Guide to Systems Support User Guide

Target group

This manual is addressed to BS2000/OSD systems support staff and operators.

Contents

The manual covers the following topics relating to the management and monitoring of the BS2000/OSD basic configuration: system initialization, parameter service, job and task control, memory/device/system time/user/file/pubset management, assignment of privileges, accounting and operator functions.

BS2000/OSD-BC Commands, Volumes 1 - 5

User Guide

Target group

This manual is addressed to nonprivileged users and systems support staff.

Contents

Volumes 1 through 5 contain the BS2000/OSD commands ADD-... to WRITE-... (basic configuration and selected products) with the functionality for all privileges. The command and operand functions are described in detail, supported by examples to aid understanding. An introductory overview provides information on all the commands described in Volumes 1 through 5.

The Appendix of Volume 1 includes information on command input, conditional job variable expressions, system files, job switches, and device and volume types.

The Appendix of Volumes 4 and 5 contains an overview of the output columns of the SHOW commands of the component NDM. The Appendix of Volume 5 contains additionally an overview of all START commands.

There is a comprehensive index covering all entries for Volumes 1 through 5.

BS2000/OSD-BC Commands, Volume 6, Output in S Variables and SDF-P-BASYS

User Guide

Target group

This manual is addressed to programmers and users who write procedures.

Contents

Volume 6 contains tables of all S variables that are supplied with values by the SHOW commands in conjunction with structured output. Further chapters deal with:

- introduction to working with S variables
- SDF-P-BASYS

BS2000/OSD-BC System Messages, Volumes 1 - 3

User Guide

Target group

This manual is addressed to systems support staff, operators and users.

Contents

Chapter 1 deals with message processing in BS2000/OSD. Chapter 2 contains the system messages of the message classes for the basic configuration of the BS2000/OSD operating system. The messages are arranged in alphabetical order by message class and are accompanied by explanatory texts where appropriate.

Volume 2 and 3 contain the second and third part of system messages of the message classes for the basic configuration of the BS2000/OSD operating system.

CMX (Solaris)
Communications Manager for UNIX Systems
Operation and Administration
User Guide

Target group

System administrators

Contents

The manual describes the function of CMX as mediator between applications and the transport system. It contains basic information on configuration and administration of systems in network environments.

Distributed Print Services (BS2000/OSD)
Printing in Computer Networks
User Guide

Target group

This manual is intended for nonprivileged users, device administrators and systems support of BS2000/OSD.

Contents

The manual provides descriptions of the principles, use and administration of Distributed Print Services for each of these user groups. Possible uses of Distributed Print Services are illustrated by examples.

DSSM/SSCM
Subsystem Management in BS2000/OSD
User Guide

Target group

This manual addresses systems support staff and software consultants of BS2000/OSD.

Contents

The following are described: BS2000/OSD subsystem concept, dynamic subsystem management (DSSM), subsystem catalog management (SSCM) and the associated commands and statements.

HIPLEX AF (BS2000/OSD)
High-Availability of Applications in BS2000/OSD
Product Manual

Target group

This manual addresses system administrators and operators of BS2000/OSD.

Contents

The manual provides information on the requirements for switching applications and on operating HIPLEX AF and the component Live Monitor. As it provides concrete know-how on how applications can be made switchable (organisation, generation, adapting procedures), it can also be used in preparing applications for manual switching with maximum reliability.

IDOM (BS2000/OSD)
Integrated Document and Output Management
User Guide

Target group

The manual addresses nonprivileged users and system administrators of BS2000/OSD.

Contents

This manual describes the SPOOL subsystem IDOM, which offers document and output management in BS2000/OSD.

JV (BS2000/OSD)
Job Variables
User Guide

Target group

The manual addresses both nonprivileged users and systems support.

Contents

The manual describes management and possible uses of job variables. The command descriptions are divided according to function areas. The macro calls are described in a separate chapter.

POSIX (BS2000/OSD)
Commands
User Guide

Target group

This manual addresses all users of the POSIX shell.

Contents

This manual is designed as a work of reference. It describes working with the POSIX shell and the commands of the POSIX shell in alphabetical order.

POSIX (BS2000/OSD)

POSIX Basics for Users and System Administrators

User Guide

Target group

BS2000 system administrators, POSIX administrators, BS2000 users, users of UNIX workstations

Contents

- Introduction to and working with POSIX
- BS2000 software products in a POSIX environment
- Installing POSIX
- Controlling POSIX and administering file systems
- Administering POSIX users
- BS2000 commands for POSIX

PRISMAproduction/BS2000**SPS**

Benutzerhandbuch

GERMAN ONLY

Target group

The manual addresses SPOOL users and systems support.

Contents

This manual describes printing on APA printers with the SPOOL subsystem SPS. Installation of SPS and APA printers, creation and provision of print file and print resources, printing and page presentation methods, and error handling are described.

PRM (BS2000/OSD)

User Guide

Target group

The manual addresses SPOOL users, systems support and RSO device administrators.

Contents

This manual describes the PRM utility routine for creating and managing print resources for BS2000 SPOOL. The manual deals with the description of the two PRM user interfaces: the SDF statements for interactive and batch mode, and the FHS-based menu interface for interactive mode.

RSO (BS2000/OSD)
Remote SPOOL Output
User Guide

Target group

This manual is directed at nonprivileged users, RSO device administrators, SPOOL administrators and systems support of BS2000/OSD.

Contents

The manual describes the functions and options of the user groups with respect to utilizing and controlling decentralized printers (RSO printers) and deals with the technical characteristics of all RSO printers.

SDF (BS2000/OSD)
Introductory Guide to the SDF Dialog Interface
User Guide

Target group

BS2000/OSD users

Contents

This manual describes the interactive input of commands and statements in SDF format. A Getting Started chapter with easy-to-understand examples and further comprehensive examples facilitates use of SDF. SDF syntax files are discussed.

SDF-P (BS2000/OSD)
Programming in the Command Language
User Guide

Target group

The manual addresses BS2000/OSD users and systems support.

Contents

SDF-P is a structured procedure language in BS2000. The introduction is followed by a detailed description of commands, functions and macros.

Siemens Nixdorf Printer Data Stream (SPDS)
Model 4
Reference Manual

SNS (BS2000/OSD)
SPOOL Notification Service
User Guide

Target group

The manual addresses nonprivileged users and systems support of BS2000/OSD.

Contents

This manual describes the SNS subsystem, which provides a tool for sending and managing notifications in the frame of BS2000/OSD.

SPCONV (BS2000/OSD)

User Guide

Target group

This manual is intended for systems support staff and RSO device administrators.

Contents

The manual describes the SPCONV subsystem. Use of SPCONV is mandatory when working with SPOOL as of Version 3.2A. The manual describes the structure of the filter system and the use of filters.

Spool & Print - Commands (BS2000/OSD)

User Guide

Target group

This manual is intended for nonprivileged users, device administrators, cluster administrators, SPOOL administrators and system support staff.

Contents

The commands available for SPOOL, Dprint, RSO and SPS are described, but not those for subsystem management and job control.

Spool & Print - Macros and Exits (BS2000/OSD)

User Guide

Target group

The manual is intended for programmers who wish to address the Spool & Print Services in their programs directly.

Contents

The manual describes the macros and exits of the Spool & Print Services, including the macros for virtual printers. The description of the macros is arranged according to functions.

Spool & Print - Messages

User Guide

Target group

This manual addresses systems support, RSO device administrators and nonprivileged users.

Contents

Messages for SPOOL, RSO, SPSEVERE, PRM, SPCONV, SPS, SPOOLSYS, IDOM and Distributed Print Services. The English message texts and meaning and response texts are included in the manual. Guaranteed messages are marked.

SPSERVE (BS2000/OSD)

User Guide

Target group

This manual is addressed to nonprivileged users, RSO device administrators, Dprint cluster administrators and those responsible for BS2000/OSD system operation.

Contents

The manual describes the SPSEVER utility routine with all its statements. It takes account of all extensions to SPOOL, RSO, SPCONV, PRM, Distributed Print Services, and SPS.

Wprint (Windows)

Target group

Users who want to print from within Windows applications and system administrators of SINIX, UNIX systems and BS2000/OSD systems as well as SINIX Spool administrators.

Contents

This manual describes the operation and functions of the Wprint-Server and Wprint-Client components as well as their installation and configuration.

Xprint

Application Programming Interface (API)

User Guide

Target group

This manual is for programmers who want to make use of the Xprint functionality in their programs.

Contents

The manual contains a reference of all Xprint API functions and the corresponding macros. It describes how you can use the functions in your own programs.

Xprint

Menus

User Guide

Target group

Users of UNIX systems and system administrators, Xprint administrators

Contents

This manual describes how to use Xprint via the menu interface.

**Xprint
Reference Guide***Target group*

Users of UNIX systems and system administrators, Xprint administrators

Contents

This manual describes the Xprint commands in alphabetical order, and documents the Xprint messages, the configuration files for Xprint objects as well as the standard Xprint data formats. The manual also presents an overview of how the Xprint system works. In addition, basic information is provided about the Xprint system as well as concrete handling instructions using selected examples.

**Xprint
User and Administrator Guide***Target group*

Users of UNIX systems and system administrators, Xprint administrators

Contents

This manual provides information on the Xprint concept and documents the objects that make up to the Xprint. In addition, it describes how Xprint is installed as well as how it is used via the command interface.

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SPOOL V4.6 (BS2000/OSD)

User Guide

Target group

This manual is intended for nonprivileged users, Spool & Print administrators, RSO device administrators and systems support staff.

Contents

The manual describes the operation of SPOOL.

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Comments on SPOOL V4.6
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