# RSO V3.5A / V3.6A

Remote SPOOL Output

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## according to DIN EN ISO 9001:2000

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# 1 Preface

RSO (Remote Spool Output) is a subsystem within Spool & Print Services. It controls the output of print jobs to decentralized printers (RSO printers). The following diagram shows the components of Spool & Print Services.
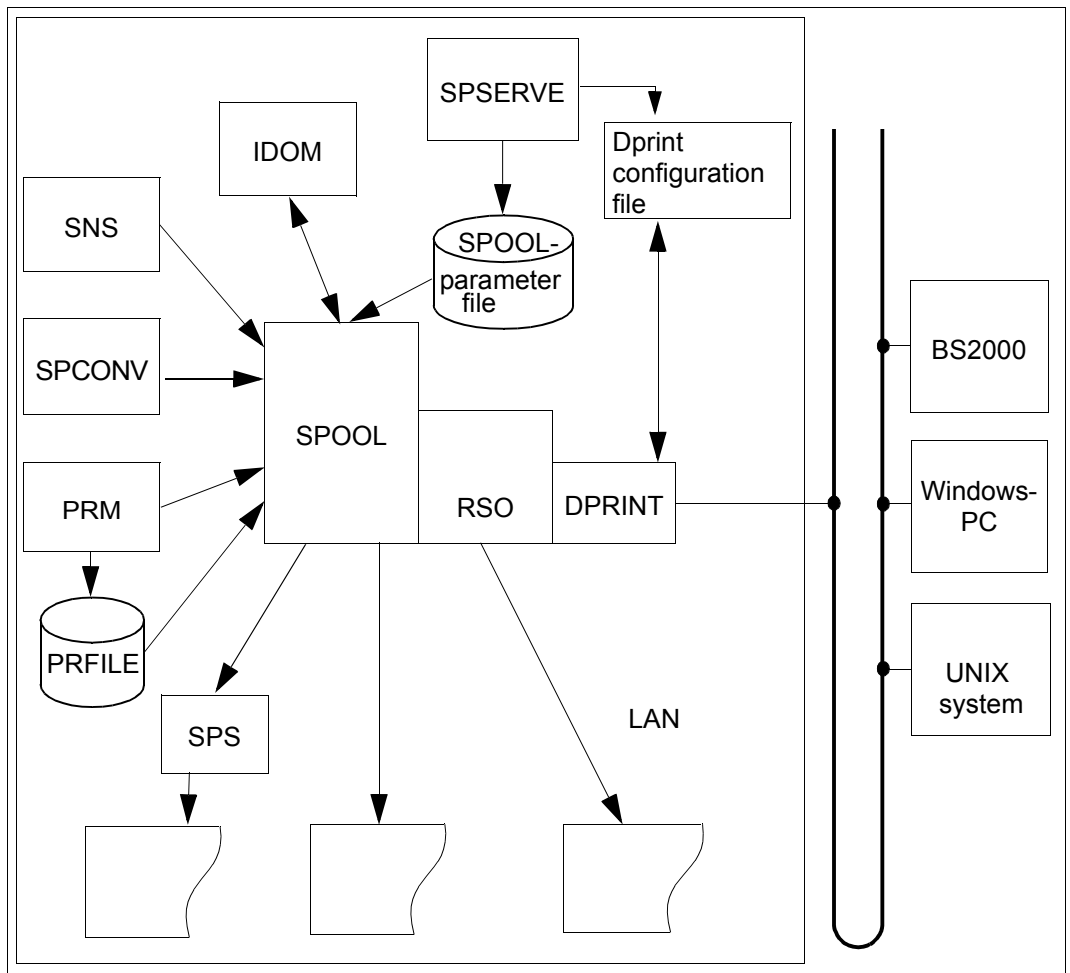


Figure 1: Components of Spool & Print Services

## 1.1   Brief product description of RSO

The software product RSO (Remote SPOOL Output) is a BS2000 subsystem. It is executable only with SPOOL.

RSO controls the output of remote SPOOL jobs to decentralized printers (RSO printers). A certain number of printers are controlled by a controller task. Each controller task is allocated a SRAM task which is responsible for transporting the data from a memory pool to the printer concerned. All controller tasks are monitored by a special administrator task.

The RSO printers can be operated in bypass mode at data display terminals or directly at the relevant controllers/communication computers in the TRANSDATA network (see figure 2). They can be managed as either public or private devices.

RSO also supports printers connected to a TCP/IP LAN:
–   by a TACLAN
–   by a SPOOL PC server (SPPCS) running on a DOS/Windows PC
–   by an Ethernet adapter card inserted in the printer
–   by a Windows NT station
–   or by a BSD-LPD server.
Users can access these printers directly, i.e. without an EMDS emulation on the UNIX host.

The following different user groups exist with respect to RSO operation. These three user groups have different tasks and capabilities with regard to using the RSO printers:
–   nonprivileged users
–   RSO device administrator (defined by systems support)
–   SPOOL administration and systems support.

The user interface for printing out files is analogous to the local SPOOL peripherals (PRINT-DOCUMENT command); the RSO printer must, however, be addressed directly via the DEVICE operand. RSO/SPOOL equalizes hardware dissimilarities between the individual printers to ensure that the print jobs are as portable as possible.

RSO printers have a number of features which distinguish them from local printers, such as size, printing speed, printer functions (font, style, stroke weight, graphics functions etc.).

The printers supported by RSO are shown in the following diagram.

RSO

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DCAM

| VR/DSR/8170/8171/9155 | VR/DSR/8171 | VR/DSR | LAN-Adapter |

MSV/BAM

HDLC/AFP    HDCL/AFP

| Ext. BAM | 8112 *) | 90037 | DSS 97xx | DSS 9763 | HAST 90010 | S I N I X | EMDS SPOOL | LAN |

S I N I X    EMDS SPOOL

| 4011 | 9013 | 8121 | 9003 | 4011 | 4812 | 9625 | 9645 | 9014 | 4011 | 2030-PCL | 2030-PCL |
|------|------|------|------|------|------|------|------|------|------|----------|----------|
| 4812 | 9014 | 9002 |      | 4813 | 4818-PCL | 9026-LJ | | | 4812 | 4011 | 4011 |
| 4813 | 9015 | 9003 |      | 9001 | 4821-PCL | 9026-RENO | | | 4813 | 4812 | 4812 |
| 4818-PCL | | | | 9001-31 | 4822-PCL | | | | 4818-PCL | 4813 | 4813 |
| 4821-PCL | | | | 9002 | 4824-PCL | | | | 4821-PCL | 4818-PCL | 4818-PCL |
| 4822-PCL | | | | 9003 | 4825-PCL | | | | 4822-PCL | 4821-PCL | 4821-PCL |
| 4824-PCL | | | | 9004 | 4830-PCL | | | | 4824-PCL | 4822-PCL | 4822-PCL |
| 4825-PCL | | | | 9011 | 9000-PCL | | | | 4825-PCL | 4824-PCL | 4824-PCL |
| 4830-PCL | | | | 9012 | 9001 | | | | 4830-PCL | 4825-PCL | 4825-PCL |
| 9000-PCL | | | | 9013 | 9001-31 | | | | 9000-PCL | 4830-PCL | 4830-PCL |
| 9001-31 | | | | 9014 | 9002 | | | | 9001-31 | 9000-PCL | 9000-PCL |
| 9011 | | | | 9097 | 9003 | | | | 9011 | 9000-PS | 9000-PS |
| 9012 | | | | | 9004 | | | | 9012 | 9000-PRO | 9000-PRO |
| 9021 | | | | | 9011 | | | | 9013 | 9000-EPFX | 9000-EPFX |
| 9022 | | | | | 9012 | | | | 9021 | 9000-EPLQ | 9000-EPLQ |
| 9022-200 | | | | | 9013 | | | | 9022-200 | 9000-EPSQ | 9000-EPSQ |
| 9097 | | | | | 9014 | | | | 9026-PCL | 9001 | 9001 |
| DJET | | | | | 9021 | | | | 9097 | 9001-31 | 9001-31 |
| | | | | | 9022 | | | | DJET | 9011 | 9011 |
| | | | | | 9022-200 | | | | | 9012 | 9012 |
| | | | | | 9097 | | | | | 9013 | 9013 |
| | | | | | DJET | | | | | 9014 | 9014 |
| | | | | | | | | | | 9015 | 9015 |
| | | | | | | | | | | 9021 | 9021 |
| | | | | | | | | | | 9022 | 9022 |
| | | | | | | | | | | 9022-200 | 9022-200 |
| | | | | | | | | | | 9025 | 9025 |
| | | | | | | | | | | 9026-PCL | 9026-PCL |
| | | | | | | | | | | 9026-RENO | 9026-RENO |
| | | | | | | | | | | 9045-ANSI | 9045-ANSI |
| | | | | | | | | | | 9046 | 9046 |
| | | | | | | | | | | 9097 | 9097 |
| | | | | | | | | | | DJET | DJET |

*) only one printer per 8112 for connections to 8170

RSO

SOCKETS

LAN-Adapter

TCP/IP LAN

91863-0    91863-R    DOS/Windows with SPPCS Wprint    Any platform supporting the BSDlpd protocol e.g. UNIX, Windows OS/2,...

Ethernet board | V24 | SS97 | V24 | Centronics | BSDlpd board | (Any platform)

| Ethernet board | V24 | SS97 | V24 | Centronics | BSDlpd board | Any platform |
|---|---|---|---|---|---|---|
| 4821-PCL | 2030-PCL | 4011 | 2030-PCL | 2030-PCL | 4821-PCL | 2030-PCL |
| 2822-PCL | 4011 | 4813 | 4011 | 4011 | 2822-PCL | 4011 |
| 4824-PCL | 4812 | 4821-PCL | 4812 | 4812 | 4825-PCL | 4812 |
| 4825-PCL | 4813 | 4824-PCL | 4813 | 4813 | 4830-PCL | 4813 |
| 4830-PCL | 4818-PCL | 9000-PCL | 4818-PCL | 4818-PCL | 4850-PCL | 4818-PCL |
| 4850-PCL | 4821-PCL | 9001 | 4821-PCL | 4821-PCL | 9014 | 4821-PCL |
| 9014 | 4822-PCL | 9001-31 | 4822-PCL | 4822-PCL | 9015 | 4822-PCL |
| 9015 | 4824-PCL | 9011 | 4824-PCL | 4824-PCL | | 4825-PCL |
| | 4825-PCL | 9012 | 4825-PCL | 4825-PCL | | 4830-PCL |
| | 4830-PCL | 9013 | 4830-PCL | 4830-PCL | | 4850-PCL |
| | 4850-PCL | 9014 | 4850-PCL | 4850-PCL | | 9000-PCL |
| | 9000-PCL | 9097 | 9000-PCL | 9000-PCL | | 9000-PS |
| | 9000-PS | DJET | 9000-PS | 9000-PS | | 9000-PRO |
| | 9000-PRO | | 9000-PRO | 9000-PRO | | 9000-EPFX |
| | 9000-EPFX | | 9000-EPFX | 9000-EPFX | | 9000-EPLQ |
| | 9000-EPLQ | | 9000-EPLQ | 9000-EPLQ | | 9000-EPSQ |
| | 9000-EPSQ | | 9000-EPSQ | 9000-EPSQ | | 9001 |
| | 9014 | | 9014 | 9014 | | 9001-31 |
| | 9015 | | 9015 | 9015 | | 9011 |
| | 9021 | | 9021 | 9021 | | 9012 |
| | 9022 | | 9022 | 9022 | | 9013 |
| | 9022-200 | | 9022-200 | 9022-200 | | 9014 |
| | 9025 | | 9025 | 9025 | | 9015 |
| | 9026-PCL | | 9026-PCL | 9026-PCL | | 9021 |
| | 9026-RENO | | 9026-RENO | 9026-RENO | | 9022 |
| | 9045-ANSI | | 9045-ANSI | 9045-ANSI | | 9022-200 |
| | 9046 | | 9046 | 9046 | | 9025 |
| | DJET | | DJET | DJET | | 9026-PCL |
| | | | | | | 9026-RENO |
| | | | | | | 9045-ANSI |
| | | | | | | 9046 |
| | | | | | | 9097 |
| | | | | | | DJET |

Figure 2: Connection options for the supported RSO printers

## 1.2  Target groups

This manual is intended for BS2000 systems support, the SPOOL administrator, the RSO device administrator and nonprivileged users of RSO printers.

## 1.3  Summary of contents

This chapter
> contains a brief description of the product RSO. It lists the target groups for the manual, summarizes the various chapters and shows the hierarchy of the Spool & Print Services manuals. It also outlines the changes made since RSO V3.0A, explains the notational conventions used in this manual and describes how to view or print the README file.

Chapter "The RSO concept"
> contains general information on the RSO product. Certain concepts such as RSO printers, RSO functions, RSO files and RSO operation are briefly explained.

Chapter "Use of RSO printers by the nonprivileged user"
> describes which facilities nonprivileged users have for controlling the printout of their files on RSO printers. These are the use of record types, prolog and epilog files, and RSO fonts. In addition, users can also control their jobs, request information, issue certain commands, and react in the event of certain errors.

Chapter "Responsibilities of the RSO device administrator"
> indicates which additional activities the RSO device administrator can perform when handling RSO printers, compared to the nonprivileged user. These concern the definition of character sets, linking fonts to character sets, and the definition of forms. The RSO device administrator also has additional capabilities in respect of job control, requesting information, command input and error response.

Chapter "Responsibilities of the SPOOL administrator and systems support"
> indicates which additional activities systems support can perform when handling RSO printers, compared to the nonprivileged user and to the RSO device administrator. These involve the installation of RSO, controlling the RSO subsystem, and definition of RSO configuration data. Systems support also has additional privileges in respect of command input and error response.

Chapter "RSO printers"
> lists the printer features for all printer types supported by RSO. The second part of this chapter describes the additional functionality of the 9025 and 9026-RENO Page Printers.

Chapter "Commands, macros, messages"
> describes the additions for RSO which have not yet been added to the manuals "Spool & Print - Commands (BS2000/OSD)" and "Spool & Print - Macros and Exits (BS2000/OSD)".

Appendix
> includes an example of PDN generation of an RSO printer with access mode TACLAN, the return codes for which the YDDFDB macro generates symbolic names, and general error codes.

Literature references in the text are in abbreviated form. The complete title of each publication referred to can be found under "Related publications" at the back of the manual, accompanied by a brief note on how to order manuals. The "Related publications" section is followed by an index.

## 1.4   Hierarchy of Spool & Print Services manuals

Spool & Print Services are documented in the following manuals:

**Subsystem manuals**

– SPOOL

– Distributed Print Services

– RSO (Remote Spool Output)

– PRISMAproduction/BS2000 - SPS

– IDOM

– SNS (SPOOL Notification Service)

**Utility routine manuals**

– PRM

– RSOSERVE

– SPSERVE

– SPCONV

**Additional manuals**

– Spool & Print - Macros and Exits

– Spool & Print - Commands

– Spool & Print - Messages

The complete titles of the above manuals as well as further SPOOL environment manuals are available in the list of related publications at the back of this manual.

## 1.5   Changes since the last version of the manual (RSO V3.4A)

The changes that have been made since RSO V3.4A are outlined below.

● 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.

● Support of Unicode Printing
In connection with the Unicode support in BS2000, RSO V3.5 introduces the support of
Unicode Printers.

● Support of Secure Printing
The support of the IPP protocol is extended by the SSL-based secure printing
(**only available in RSO V3.6**).

## 1.6   Software requirements for RSO V3.5A/V3.6A

The following products are needed for the use of RSO V3.5A respectively RSO V3.6A:

● BS2000/OSD-BC as of V5.0; for RSO V3.6A and for using Unicode: OSD-BC as of V6.0 with the following components:

– SPOOL as of V4.6A; for using Unicode and Secure Printing: V4.8A

– SPSERVE as of V2.7A; for using Unicode and Secure Printing: V2.9A

– SNS as of V1.0A for the Notifications

● openNet Server as of V3.0

● interNet Services as of V3.0 for OpenSSL (for using Secure printing)

● openUTM for the use of the OLTP interface

## 1.7  Notational conventions

$$\boxed{\mathbf{i}}$$

This symbol indicates that the following indented paragraph contains vital information.

⚠ **CAUTION!**

This symbol indicates warnings.

*Note*
The word "*Note*" before an indented paragraph indicates that the following paragraph
contains important information.

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

[ ]
Square brackets in syntax representations: the characters between the brackets may be
omitted.

**Bold face**
In explanations of syntax the lines that are currently being explained are shown in bold face.
Otherwise the rules applying to syntax representations are those described in the relevant
parts of the reference section at the end of the manual.

```
SYNTAX/Example
```
Syntax representations and examples of inputs and outputs are highlighted using different
fonts. Syntax representations are also enclosed in a frame.

## 1.8  Readme file

Information on any functional changes and additions to the current product version
described in this manual can be found in the product-specific README file.
You will find the README file on your BS2000 computer under the file name
SYSRME.RSO.version.E (version = 035 or 036).
The user ID under which the README file is cataloged can be obtained from systems
support. You can view the README file using the /SHOW-FILE command or an editor, or
you can print it out on a standard printer using the following command:

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

# 2 The RSO concept

This section gives an overview of the RSO concept. The following topics will be covered:

– RSO printers - their configuration and possible access modes

– the format of data to be printed and print presentation using control characters within the file

– presentation of the print format using control options outside the print file (using forms, character set, loop record, prolog/epilog/string and using the PRINT-DOCUMENT command)

– RSO functions (generating and starting print requests, controlling and monitoring RSO print requests and RSO printers)

– RSO files (RSO parameter files, RSOFILE, printer parameter files)

– utilities for RSO (SPSERVE, RSOSERVE)

– user groups (SPOOL administrators and systems support, RSO device administrators, nonprivileged users)

## 2.1 RSO printers

RSO controls the output of remote SPOOL jobs to decentralized printers. Decentralized printers are "office" printers that are connected either to a TRANSDATA network, or to a UNIX computer which is accessed by TRANSDATA via EMDS. Decentralized printers may also be connected to a TCP/IP LAN:
– by a TACLAN via a SPOOL PC server (SPPCS) running on a DOS/Windows PC
– by an Ethernet adapter card inserted in the printer
– or by a processor with a BSD line printer daemon (LPD) to control the printer.

Users can access these printers directly, i.e. without an EMDS emulation on the UNIX host. The access modes are described in detail below.

### 2.1.1   Printer configuration

The printer that is to be accessed must be described before RSO is able to recognize it as an RSO printer. This RSO printer description (also called "device record") must be defined using the SPSERVE product. This requires a large number of parameters, most of which have a default value.
From the RSO viewpoint, a printer is not only characterized by the features and the language that it supports; the printer access mode is an important aspect governing the manner in which the printer is supported by RSO. A printer can only be recognized by RSO, if the name, device type, access mode and network address have been specified for it using SPSERVE (see also section "SPSERVE" on page 43 and the "SPSERVE (BS2000/OSD)" manual).

**Name**

An RSO printer name can consist of up to eight alphanumeric characters.

**Device type**

A device type (also printer type) signifies the printer language and a definition of printer functions which are supported by RSO.

–   The printer language is a set of commands with a special syntax which permits the selection of printer functions and monitoring of the printout and the printer. These commands are usually known as printer control character sequence or printer control characters. Both expressions are used in this manual. Printer languages include PCL, PostScript, RENO etc., see also page 231).

–   Specification of the printer functions supported by RSO determines the printer functions which are actually supported by RSO via its user interface (e.g. through the PRINT-DOCUMENT command, VTSU codes, etc.). Printer functions are also known as printer features and determine, for example, the ability of the printer to print in italic or bold, or to select a feed tray etc..

You will find a list of the supported printer types on page 26. Detailed information on the device types and the printer functions supported by RSO for each device type is given in chapter "RSO printers" on page 365.

**Access mode**

The different access modes for RSO printers are described in section "Access modes for RSO printers" on page 23.

**Network address**

Specification of the name, device type and access mode for a printer is still not sufficient to allow access to the printer. Just as a mailman needs an address in order to deliver a letter, RSO needs the address of the printer within the network so as to be able to access it. In the case of printers connected using the TACLAN access mode, this address comprises the internet address and the port name (or port number). All other access modes use addresses comprising the processor name and the station name with which the printer is defined in the network. This information must also be stored in the device record (using SPSERVE, see the "SPSERVE (BS2000/OSD)" manual).

## 2.1.2  Access modes for RSO printers

The following access modes are currently supported by RSO:

**HARDCOPY**

Printers connected to a 975x or 976x Data Display Terminal or to an MS-DOS PC (through 9750 emulation) must be defined with access mode "HARDCOPY" in RSO.
Printing on these printers is fully monitored by RSO, i.e. RSO dialogs take place with the printer with the aid of the data display terminal, or the printer emulation that is running in the terminal.

**HARDCOPY-9751**

Because of the limitations of the 9751 Data Display Terminal (no compression of blanks, differences in the printer control character sequence, etc.), the HARDCOPY-9751 access mode has been introduced in order to define printers that are connected to this particular data display terminal.
Printing on these printers is fully monitored by RSO, i.e. RSO dialogs take place with the printer with the aid of the data display terminal.

**DIRECT**

With the DIRECT access mode, two data communication control procedures are supported: BAM and HDLC-AFP.

– BAM converter

  Instead of being connected to a data display terminal, printers can be connected with the aid of a BAM converter to a local cluster controller (LCC), a remote cluster controller (RCC), or a front-end processor (FEP). This BAM converter may either be integrated in the printer (e.g. printer types 9003, 9013 and 9014), or it may be an external device between printer and processor/controller.

  The BAM converter is not a standard access mode for printers, to the extent that a number of printer control character sequences are filtered and converted by the BAM converter. A BAM converter is thus highly dependent on the printer type. Apart from the integrated BAM converters, there currently exist versions for printer types 9001-31 (and compatible 9001), 9011 (and compatible 9097), 9012, 9021 (and compatible HP LaserJet), 9022 and 9025 (and RENO-compatible printers).

  Printing on these printers is fully monitored by RSO, i.e. RSO dialogs take place with the printer with the aid of the BAM converter.

– HDLC-AFP converter

  The HDLC-AFP converter may be regarded like a BAM converter, except that it employs a different method for sending and receiving signals.

  The HDLC-AFP converter is not a standard access mode for printers, to the extent that a number of printer control character sequences are filtered and converted by the HDLC-AFP converter. An HDLC-AFP converter is thus highly dependent on the printer type. There currently exist versions for printer types 9001-31 (and compatible 9001), 9011 (and compatible 9097), 9012, 9021 (and compatible HP LaserJet) and 9026-LJ.

  Printing on these printers is fully monitored by RSO, i.e. RSO dialogs take place with the printer with the aid of the HDLC-AFP converter.

**HDLC**

The HDLC V24 line is not a common access mode. It is currently supported only by the printer types 9025, 9026-LJ and 9026-RENO. Printing on these printers is fully monitored by RSO.

### APPLICATION

The APPLICATION access mode identifies a 9645 Printer that is connected to a
terminal computer (TC) by way of the application "RSOAP".
RSO accesses the 9645 Printer using the RSOAP application (running under TC control),
which comprises an APS program that executes various operations on the printer (OPEN,
WRITE, CLOSE, etc.). Printing on these printers is fully monitored by RSO.

### PC

The PC access mode relates to printers that are connected to a UNIX processor and that
can be made available to RSO by using an EMDS emulation running under UNIX systems.
This presupposes that the UNIX processor is connected to the TRANSDATA network or to
a LAN, which is in turn connected via a LAN adapter to a BS2000 processor.

With EMDS versions < V4.0, RSO cannot monitor printing on printers using the PC
access mode. The RSO dialogs take place under the TRANSDATA 810 protocol with the
EMDS application which collects all RSO messages (e.g. data for printing) in a file.
Although printing is regarded as successfully completed on the RSO side, nothing has yet
been printed on the target printer. From this time on, only the UNIX system command "lpr"
is executed by the EMDS application in order to move the file containing all the RSO
messages to the Xprint system, which monitors printing. RSO cannot therefore check
whether the file is actually printed.

As of EMDS V4.0, however, direct access to the printer can be made available, thereby
allowing RSO to monitor printing.

### TACLAN

With the TACLAN access mode, RSO provides the option of accessing printers directly
without, for example, having to go by way of an EMDS emulation on a UNIX processor.
These printers are connected to a TCP/IP LAN by a TACLAN, a DOS/Windows PC or an
Ethernet adapter card. This presupposes that DCM as of V11 is installed.
The TACLAN types that are currently supported are TACLAN 91863-R and 91863-O. This
manual combines the two types under the designation TACLAN-91863.

The TACLAN access mode also supports printers connected to a DOS/Windows PC on
which SPPCS is running, provided that the DOS PC is connected to a TCP/IP LAN.
SPPCS stands for SPOOL-PC server. This product runs on a PC (under MS-DOS or
Windows) and functions as a TACLAN printer server. RSO directly accesses these printers
which are connected via a V24 or Centronics interface without the use of Xprint or EMDS.
However, this presupposes that DCM V11 (or higher) is installed and that
SPPCS V1.0 (or higher) is running on the DOS/Windows PC.

The TACLAN access mode also supports printers connected to a TCP/IP LAN by
means of an Ethernet adapter card (e.g. 48245-210, as used in the 4824-PCL printer).

**LPD**

RSO permits access to printers that are interconnected by means of a BSD daemon. To achieve this, DCM as of V11 must be installed. The printer daemon is addressed via the TCP/IP LAN and controls the printer according to the statements from RSO.

The BSD-LPD protocol is based on TCP; it can therefore be activated by any host that supports TCP/IP. This presupposes that the particular host is entered in the file /etc/hosts.lpd on the processor running the print daemon lpd. The file /etc/hosts.lpd uses the print daemon to allow remote hosts to access the local printer.

The following table shows which access modes are supported for the individual printer types.

| Printer type | Access mode | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | DIRECT | HARDC. | APPLIC. | HDLC | PC | 9751 | TACLAN | LPD |
| 2030-PCL | | | | | | | X | X |
| 4011 | X | X | | | X | | X | X |
| 4812 | X | X | | | X | | X | X |
| 4813 | X | X | | | X | | X | X |
| 4818-PCL | X | X | | | X | | X | X |
| 4821-PCL | X | X | | | X | | X | X |
| 4822-PCL | X | X | | | X | | X | X |
| 4824-PCL | X | X | | | X | | X | X |
| 4825-PCL | X | X | | | X | | X | X |
| 4830-PCL | X | X | | | X | | X | X |
| 4850-PCL | | | | | | | X | X |
| 8121 | X | X | | | | | | |
| 9000 | X | X | X | X | X | X | X | X |
| 9000-PCL | X | X | | | X | | X | X |
| 9000-PRO | | | | | | | X | X |
| 9000-PS | | | | | | | X | X |
| 9000-EPFX | | | | | | | X | X |
| 9000-EPLQ | | | | | | | X | X |
| 9000-EPSQ | | | | | | | X | X |
| 9001 | X | X | | | X | X | X | X |
| 9001-31 | X | X | | | X | X | X | X |
| 9002 | X | X | | | | | | |

| Printer type | Access mode | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | DIRECT | HARDC. | APPLIC. | HDLC | PC | 9751 | TACLAN | LPD |
| 9003 | X | X | | | X | | | |
| 9004 | | X | | | X | X | | |
| 9011 | X | X | | | X | | X | X |
| 9012 | X | X | | | X | | X | X |
| 9013 | X | X | | | X | | X | X |
| 9014 | X | X | | | X | | X | X |
| 9015 | X | X | | | X | | X | X |
| 9021 | X | X | | | X | | X | X |
| 9022 | X | X | | | X | | X | X |
| 9022-200 | X | X | | | X | | X | X |
| 9025 | X | | | X | | | X | X |
| 9026-RENO | X | | | X | | | X | X |
| 9026-PCL | X | | | X | | | X | X |
| 9045-ANSI | | | | | | | X | X |
| 9046 | | | | | | | X | X |
| 9097 | X | X | | | X | | X | X |
| 9645 | | | X | | | | | |
| DJET | X | X | | | X | | X | X |

## 2.2   Data to be printed and control characters

The PRINT-DOCUMENT command forms the user interface for printing files in RSO, in the same way that it does for local SPOOL peripherals. The RSO printer must, however, be addressed directly via the TO-PRINTER operand.

RSO presupposes that the data for printing is in EBCDIC code (characters X'00' through X'FF'). The EBCDIC table can be divided into two parts:
–   the nonprintable part (all characters < X'40')
–   the printable part (all characters $\geq$ X'40').
A print file may contain any of these EBCDIC characters. However, since control codes (EBCDIC characters < X'40') may have unexpected side effects, RSO provides the user with certain filters that replace some or all of the nonprintable characters with blanks. These filters can be specified in the PRINT-DOCUMENT command via the DOCUMENT-FORMAT operand (see section "Use of record types (layout of the records)" on page 50 and the description of the PRINT-DOCUMENT command in the "Spool & Print - Commands (BS2000/OSD)" manual).

**VTSU codes**

Some of the nonprintable EBCDIC characters are used as standard control characters. The standard control characters can be mixed in the file with printable characters in order to execute certain printer functions (e.g. italic print). These standard control characters are known as VTSU codes. The advantage of using VTSU codes in place of printer control characters is that a file can be used unchanged on a different printer type. RSO recognizes the VTSU codes and translates them into the printer control characters for the target printer.

Since VTSU codes are part of the nonprintable EBCDIC characters, the way they are interpreted also depends on the DOCUMENT-FORMAT operand of the PRINT-DOCUMENT command. See the description of the PRINT-DOCUMENT command in the "Spool & Print - Commands (BS2000/OSD)" manual and section "Use of record types (layout of the records)" on page 50.

The following table gives a list of all the VTSU codes. Which VTSU codes are supported by the individual printer types is illustrated in detail in the descriptions of the printer types in chapter "RSO printers" on page 365.

| VTSU | X'xy' | Meaning |
|------|-------|---------|
| BS | 16 | Backspace: move left one column, except at left margin, where no action is performed. |
| PLD | 2B | Half line feed forward |
| PLU | 2C | Half line feed backward |
| LMxyz | 38FxFyFz | Set left margin to column xyz |
| PTS | 1A | Proportional spacing on |
| PTX | 1B | Proportional spacing off |
| HMi1 | 23F1 | Set character spacing |
| HMi2 | 23F2 | |
| HMi3 | 23F3 | |
| VMi1 | 24F1 | Set line spacing |
| VMi2 | 24F2 | |
| VMi3 | 24F3 | |
| VPAxyz | 29FxFyFz | Absolute vertical positioning to line xyz |
| HPAxyz | 2AFxFyFz | Absolute horizontal positioning to column xyz |
| ASFx | 21Fx | Automatic sheet feed: select feed tray |
| NP | 0C | New page (page feed) |
| ESC | 27 | Escape character; starts most printer control character sequences |
| DC4 | 3C | Printer control character; starts printer control character sequences |
| HT | 05 | Horizontal tab |
| VT | 0B | Vertical tab |
| EM1 | 1D | Layout control characters: italic, bold, shading, underscore, red, depending on the printer type |
| EM2 | 1F | |
| EM3 | 13 | |
| EM4 | 14 | |
| NL | 15 | New line (line feed): move to next print line and keep current column position |
| NOR | 1E | Normal layout: reset all printer functions which were temporarily set with EMx codes |
| SO | 0E | Switch to second character set |
| SI | 0F | Switch to standard character set |
| CR | 0D | Carriage return: move to left margin of current line |
| NLQ | 39 | Near Letter Quality on |

| VTSU | X'xy' | Meaning |
|---|---|---|
| NLX | 3B | Near Letter Quality off |
| MLL | 33 | Maximum number of character per line |
| MLN | 35 | Maximum number of lines per page |
| CAP | 20 | Continue at actual position |
| EXTd1d2 | 3EE300FxFy | Define a transparent string of length xy(d1=x'00', d2=x'FxFy') |
| EXTxyz | 3ED9FxFyxx | Repeat the character z xy times, where xx is the character code |

**User-defined printer control characters**

Apart from printable characters and VTSU codes, user-defined printer control character sequences may also be specified in the file. The disadvantage of this is that this file can only be correctly printed on a printer that can recognize these printer control character sequences. But the advantage is that all the printer capabilities can be fully utilized. The user must note here that the specification of the printer control character sequences must also be taken into consideration in the DOCUMENT-FORMAT operand of the PRINT-DOCUMENT command (see also ).

## 2.3   Print format

The RSO product is not only a "data transporter" that conveys data to a printer. It makes
available certain "objects" and tools (for defining these "objects"), which facilitate the utili-
zation of the majority of printer capabilities without the use of printer control character
sequences:
–   form
–   character set
–   loop record
–   Prolog / epilog / string
–   PRINT-DOCUMENT command

**Form**

A form is defined for each RSO print request by means of the FORM-NAME operand of the
PRINT-DOCUMENT command (the standard form is 'STD'). One form is assigned to one
printer type and is used for different purposes:

–   describing the length and width of the logical page (printing area) on the physical page
    (one sheet).

–   informing RSO whether a Header page is to be printed before the file and a Trailer page
    after the file.

–   informing RSO how form feed is to be performed (vertical paper motion). Either a line
    spacing can be specified (as a number of lines per inch), which remains the same over
    the entire page, or a LOOP record is specified (see below).

–   informing RSO how form feed is to be performed when printing in landscape format
    (paper rotated through 90$^{\text{o}}$).

–   informing RSO of the standard character sets for printing in portrait and landscape
    formats.

On the basis of the form definition, RSO can guarantee form feed (if so desired) and
determine possible line truncation procedures (for example, if the line to be printed is longer
than the paper is wide). The forms can be managed using the SPSERVE product (see the
"SPSERVE (BS2000/OSD)" manual).

**Character set**

At least one character set is defined for each RSO print request. If no character set is specified in the CHARACTER-SETS operand of the PRINT-DOCUMENT command, the character set that the form normally uses for printing is used for the print operation. Several print characteristics can be defined with one character set, such as:

–   color to be used for printing the file

–   character stroke weight to be used for printing the file (light, normal or bold)

–   font to be used for printing the file (some printers are equipped with additional fonts such as COURIER, OCR-A, OCR-B, etc.)

–   character style to be used for printing the file (normal, italic)

–   whether or not the characters to be printed should be underscored

–   pitch (numbers of characters per inch)

–   language in which the character set is to be used. Depending on the language selected, the graphical image of certain EBCDIC characters can differ (e.g. the character "backslash" (\) in the English character set is replaced by the character "ö" in the German character set).

–   whether or not printing is to be performed in "near-letter quality"

On the basis of the character set definition, RSO translates the desired print characteristics into the corresponding printer control characters for the target printer. If the operand DOCUMENT-FORMAT=*PAGE-FORMAT (CONTROL-MODE=*LOGICAL) is specified in the PRINT-DOCUMENT command, up to 16 different character sets can be used for printing. The character sets can be managed by using the SPSERVE product (see the "SPSERVE (BS2000/OSD)" manual).

**Loop record**

A loop record is another means of controlling form feed (vertical paper motion). It defines each line of the logical page, the line spacing for the page, and possibly a channel number. The loop record can be specified in the form definition, or directly in the PRINT-DOCUMENT command with the LOOP-NAME operand. For further information refer to the PRINT-DOCUMENT command in the "Spool & Print - Commands (BS2000/OSD)" manual, and the RSOSERVE utility routine in the "RSOSERVE" manual.

**Prolog / epilog / string**

RSO offers several opportunities for inserting data (any characters) at certain points of the print operation:

–   A prolog file allows the insertion of data between the Header page and the file. The prolog file is linked with a form and a device type (both are specified in the prolog file name). For further information, refer to section "Prolog and epilog" on page 607.

–   An epilog file allows the insertion of data between the Trailer page and the file. The epilog file is linked with a form and a device type (both are specified in the epilog file name). For further information, refer to section "Prolog and epilog" on page 607.

–   For each printer type, a string of up to 256 characters can be assigned to a character set by means of RSOSERVE. Each time a character set is called, the string (if defined) is sent unchanged and with priority to the printer in order to interpret the features of the character set. In this manual, the string is also synonymously referred to as "RSO string", "RSO font", "logical RSO font", "font string" or "RSO character string".

**PRINT-DOCUMENT command**

The PRINT-DOCUMENT command has many operands. It makes it possible, for example,

–   to print out only part of a file
–   to print in hexadecimal form
–   to specify a particular paper format
–   to activate a sort mode
–   to print on front and reverse sides of sheet (duplex mode))
–   to specify an overlay to be repeated on each page
–   to rotate through 90°
–   to specify the top and left margins
–   to specify a feed tray
–   to specify the output tray
–   to request multiple copies of the printout
–   to request multiple copies of each page of the file
–   to specify a translation table that changes certain characters, etc.

For further information see the PRINT-DOCUMENT command in the "Spool & Print - Commands (BS2000/OSD)" manual.

## 2.4  RSO functions

The RSO product offers the following application possibilities:

– Generating remote SPOOL requests
– Starting remote SPOOL requests on RSO printers
– Controlling and monitoring remote SPOOL requests and RSO printers.

**Generating RSO requests**

When RSO has been loaded, the user can generate RSO requests for RSO printers or for RSO pools (operand TO-PRINTER=*PAR(PRINTER-NAME=*rso-printer* or *rso-printerpool*) in the PRINT-DOCUMENT command). The files to be printed may contain four different types of records:

– records containing only printable characters: the record contains only data with or without feed control characters

– records with data mixed with VTSU codes, character set identifiers and printer control characters with or without feed control characters

– records with VTSU codes mixed with data with or without feed control characters

– records with printer control characters and data.

In accordance with these records, certain operands must be specified in the PRINT-DOCUMENT command.

*Which operand in the PRINT-DOCUMENT command?*

```
                                Printer control character sequence?
                        Y                                                N

              Multiple character sets?                          Multiple character sets?
         Y                          N                      Y                          N

PRINT-DOCUMENT ...,                               PRINT-DOCUMENT ...,
DOCUMENT-FORMAT=*PAGE-FORMAT                       DOCUMENT-FORMAT=*PAGE-FORMAT
(CONTROL-MODE=*LOGICAL),                           (CONTROL-MODE=*LOGICAL),
RESOURCE-DESCRIPTION=*PAR                          RESOURCE-DESCRIPTION=*PAR
(CHARACTER-SETS=(...,...))                         (CHARACTER-SETS=(...,...))

                          VTSU codes?                                       VTSU codes?
                   Y                  N                              Y                  N

                          PRINT-DOCUMENT ...,                 PRINT-DOCUMENT ...,
                          DOCUMENT-FORMAT=                     DOCUMENT-FORMAT=*PAGE-FORMAT
                          *SPECIAL-FORMAT,                     (CONTROL-MODE=*LOGICAL),
                          RESOURCE-DESCRIPTION=*PAR            RESOURCE-DESCRIPTION=*PAR
                          (CHARACTER-SETS=(...,...))           (CHARACTER-SETS=xyz)

   Line spacing control?
 Y                  N                                          PRINT-DOCUMENT ...,
                                                               DOCUMENT-FORMAT=*TEXT,
          PRINT-DOCUMENT ...,                                  RESOURCE-DESCRIPTION=*PAR
          DOCUMENT-FORMAT=*PAGE-FORMAT                         (CHARACTER-SETS=xyz)
          (CONTROL-MODE=*LOGICAL),
          RESOURCE-DESCRIPTION=*PAR
          (CHARACTER-SETS=(...,...))

   Print with graphics?
 Y                            N

PRINT-DOCUMENT ...,           PRINT-DOCUMENT ...,
DOCUMENT-FORMAT=*PAGE-FORMAT  DOCUMENT-FORMAT=*PAGE-FORMAT
(CONTROL-MODE=*PHYSICAL),     (CONTROL-MODE=*LINE-MODE),
RESOURCE-DESCRIPTION=*PAR     RESOURCE-DESCRIPTION=*PAR
(CHARACTER-SETS=xyz)          (CHARACTER-SETS=xyz)
```

For further information see the PRINT-DOCUMENT command in the "Spool & Print - Commands (BS2000/OSD)" manual.

**Starting RSO requests on RSO printers**

If the RSO printers, forms and character sets have been defined (files SPOOL.PARAMETERS, RSOFILE, etc.), the RSO printers can be started by systems support or the RSO device administrator, using the START-PRINTER-OUTPUT command.

A printer can also be activated indirectly by issuing a suitable command (START-PRINTER-OUTPUT) for one or more RSO pools to which the printer belongs. The printer is then activated and has the status 'A'.

The MODIFY-PRINTER-OUTPUT-STATUS command can be issued for a printer that is already active without overwriting the existing operand values. The new operand values are added.

**Starting UTM requests to RSO printers**

UTM applications can easily activate RSO printers by way of the OLTP interface in the RSO. UTM thereby gains access to all printers that are supported by RSO, e.g. also modern printer types connected via LAN or PC.
A detailed description of the OLTP interface of RSO is given in section "OLTP interface - printing on RSO printers from UTM" on page 346.

**Controlling RSO requests**

A user can use the following commands to control requests for a particular printer:

– HOLD-SPOOLOUT
– RESUME-SPOOLOUT
– REDIRECT-REMOTE-OUTPUT
– CANCEL-JOB

The requests are processed in sequence, assuming that RSO requests are queued as type 7. The printer then has the status 'R' with the TSN of the corresponding request. The request has the status 'ACT'.

After printing, the virtual connection is cleared down and the RSO printer is free again for other DCAM applications. The RSO master task automatically establishes a new connection for new requests.

**Monitoring RSO requests**

Users can monitor their devices, and information about them, by means of the SHOW-JOB-STATUS and SHOW-PRINT-JOB-STATUS commands. In addition, in the event of an error, all users can use these commands to obtain information about the cause of the error.

**Monitoring RSO printers**

Users can use the command SHOW-SYSTEM-STATUS INF=*REMOTE to obtain information about printer status.

**Operating RSO printers**

The printer switches are reset before and after each spoolout if this was specified for the device in the SPOOL parameter file entry made with SPSERVE (ADD-SPOOL-DEVICE/MODIFY-SPOOL-DEVICE). Here it is also possible to specify for each individual RSO device whether a form feed is to occur at the beginning of each spoolout.

Prolog and epilog can be defined for all RSO printer types and the corresponding forms. Irrespective of the mode specified in PRINT-DOCUMENT, prolog and epilog files are always passed to the printer in TRANSPARENT mode (see "Type E" on page 54f).

Each user can activate a code conversion table for a print job using the TRANSLATION-TABLE operand in the PRINT-DOCUMENT command. If the conversion table is held in a user RSOFILE, the prefix xxxx (up to 28 characters) of the file xxxx.RSOFILE must also be entered with the TRANSLATION-TABLE operand as the second operand.

If the print job is transferred to an RSO device for which a code conversion table (activated automatically for each spoolout on this printer) has already been defined in the CHARACTER-IMAGE operand in the device entry, both conversion tables are evaluated: TRANSLATION-TABLE first, then CHARACTER-IMAGE.
A conversion table defined in CHARACTER-IMAGE also affects the Header and Trailer pages; a TRANSLATION-TABLE does not affect the Header and Trailer pages.

The default value for the SHIFT operand is not specified system-wide in the GEN record, as in local SPOOL operation (see the "SPSERVE (BS2000/OSD)" manual), but is defined for each RSO device (in 1/10-inch entries) individually in the device entry.

It is likewise possible to specify for each RSO device individually whether the connection to a printer is to be cleared down whenever there are no more print requests waiting in the queue.

The values applicable for a given printer can be interrogated by means of the command SHOW-ACTIVE-SPOOL-DEVICES.

Systems support can specify SPOOL-wide with MODIFY-SPOOL-PARAMETERS whether auxiliary storage outside the memory pool is always to be released if there are no (more) PRINT commands queuing at an RSO device.

If forms are specified with ADD-/MODIFY-SPOOL-DEVICE, then precisely these forms are assigned as equivalent forms in the case of

```
START-PRINTER-OUTPUT DEV-NAME=*RSO-PRINTER(NAME= ,FORM-NAME=*STD)
```

## 2.5  RSO files

### 2.5.1  RSO parameter files

The RSO parameter files are divided among five different files, all cataloged under the SYSSPOOL user ID:

– SYSPAR.RSO.035.SYSTEM
– SYSPAR.RSO.035.CORR
– SYSPAR.RSO.035.WORK
– SYSPAR.RSO.035.USER
– SYSPAR.RSO.035

**SYSPAR.RSO.035.SYSTEM**

This file contains the internal tables for RSO and SRAM. Its contents include:

– the printer types and access modes supported

– the handling of the different errors (e.g. printer, DCAM, SOCKETS errors)

– conversion tables for converting VTSU codes and printer functions into the specific printer control characters for all printer types and access modes supported.

The file is supplied with the RSO product on the product tape.

File attributes: access method ISAM, key length 20, access right ACCESS=*READ.

**SYSPAR.RSO.035.CORR**

This file contains all the corrections, in any sequence, for the records of the file SYSPAR.RSO.035.SYSTEM.

The first byte of each record contains the character '*' or a blank. This determines whether the record is a comment line or not.

File attributes: access method SAM, record length 80 bytes, access right ACCESS=*READ.

**SYSPAR.RSO.035.WORK**

This file contains the converted records from SYSPAR.RSO.035.CORR to be merged with the records of SYSPAR.RSO.035.SYSTEM in order to obtain the result for SYSPAR.RSO.035. This file is the result of merging the data from system and correction files. The file does not contain any records marked with '*' as comment records and is automatically deleted when the internal tables have been generated.

**SYSPAR.RSO.035.USER**

This file contains the current management records which can be generated by systems support and the RSO device administrator:

For 9025 and 9026-RENO Printer management:

– device characteristics
– list of members connected with a form
– assignments of a 256-character string (RSO string) to a character set
– connection between DIA (forms overlay) name and DIA file
– connection between form name and prolog file
– connection between form name and epilog file
– connection between member name and the associated file

For the other printer types, this file also contains the records that define the connection between character set and 256-character string (RSO string).

The file is used by the RSOSERVE utility routine.

**SYSPAR.RSO.035**

This file contains the result of merging the data from SYSPAR.RSO.035.WORK and SYSPAR.RSO.035.SYSTEM. If the file is already present in the system at RSO startup time, no merge procedure is executed. The structure of the internal SRAM and RSO tables is based on information from this file.

When RSO has been loaded, a copy of this file ($SYSSPOOL.SYSPAR.RSO.035.COPY) is made automatically. If the subsystem has been unloaded and an unsuccessful attempt is made to reload it, a message is sent to the operator terminal asking whether the copy is to be used for a further attempt at loading. If loading is also unsuccessful with the copy, a message is sent to the operator terminal that the RSO subsystem is not available.

## 2.5.2  RSOFILE

There may be two types of RSOFILE, a system RSOFILE and a user RSOFILE.

### System RSOFILE

A system RSOFILE, which must be cataloged under TSOS.RSOFILE, may contain the
following elements:

– definition of conversion (translation) tables
– definition of loop records in the form definition for RSO devices
– definition of the character image tables
– band ID code tables for 9645 Printers.

Only systems support can access this file to update entries.

### User RSOFILE

By means of the RSOSERVE utility, users themselves can define the following elements in
a user RSOFILE cataloged under their user ID:

– conversion (translation) tables
– loop records
– character image tables

The contents of a user RSOFILE can be called in the PRINT-DOCUMENT command either
with the USER-RESOURCES-FILE operand (for loop records) or with the TRANSLATION-
TABLE operand.

```
PRINT-DOCUMENT ...,USER-RESOURCES-FILE=xxxx ---> $userid.xxxx.RSOFILE
                                            ---> $TSOS.xxxx.RSOFILE


PRINT-DOCUMENT ...,TRANSLATION-TABLE=PARAMETERS(FILE=xxxx)
                                            ---> $userid.xxxx.RSOFILE
                                            ---> $TSOS.xxxx.RSOFILE
```

If the file $userid.xxxx.RSOFILE does not exist, the system searches for
$TSOS.xxxx.RSOFILE.

A user RSOFILE can also be assigned a user-selected name consisting of up to 28 alpha-
numeric characters. RSO uses this file name with the suffix '.RSOFILE'. The string may
comprise a maximum of 28 characters (excluding catalog ID and user ID) to ensure that this
user file can be called from any user ID.
If the file name is specified without the user ID, the file is sought first under the caller's user
ID and then under TSOS.

**Changing the name of an RSOFILE when IMON is used**

The SPOOL as of V4.0 and RSO as of V3.1A subsystems support the administration of installation paths with IMON (Installation Monitor). IMON allows the SPOOL and RSO selectable units and the files created using them to be installed at any location; logical IMON IDs are assigned to the file names.

IMON does not affect the user except with regard to accessing RSOFILEs.

Up to RSO V2.4A and earlier versions, the system RSOFILE was located under the TSOS user ID. If a user specified a user RSOFILE without a user ID in a PRINT-DOCUMENT command, two different RSOFILEs were created:
$userid.xxxx.RSOFILE
$TSOS.xxxx.RSOFILE

The same applies as of RSO V2.4A, unless IMON is installed. If IMON is installed, the files created depend on the new location and the new name specified by systems support for the system RSOFILE.

For example, if systems support changes the file $TSOS.RSOFILE to $UIDNEW.RSOFILENEW, and if a user RSOFILE is specified without a user ID, the following two files are created:
$userid.xxxx.RSOFILE
$UIDNEW.xxxx.RSOFILENEW

If a user RSOFILE is specified with a user ID, the RSOFILE is created under this user ID only.

You will find more information on IMON in the manual of the same name.

## 2.5.3   Support for 4-Kbyte files

All files created by RSO are defined with BUFFER-LENGTH=*STD(SIZE=2). This concerns the following files:

– $TSOS.RSOFILE
– $TSOS.SYSENT.RSO.035
– $SYSSPOOL.SYSPAR.RSO.035.SYSTEM
– $SYSSPOOL.SYSPAR.RSO.035.WORK
– $SYSSPOOL.SYSPAR.RSO.035
– device trace files
– internal SRAM trace file
– prolog, epilog, member, forms overlay (DIA) files, etc. that are exported by the 9025 and 9026-RENO Printers.

Existing files that are read or modified by RSO are opened in accordance with their
BLKSIZE parameter in the catalog entry.

It should be noted however that SAM or ISAM files with BUFFER-LENGTH=*STD(SIZE=1)
can be created or read by the product EDT.

```
/SET-FILE-LINK  LINK-NAME=EDTSAM/EDTISAM
                ,FILE-NAME=filename
                ,BUFFER-LENGTH=*STD(SIZE=2)
/START-PROGRAM  FROM-FILE=$EDT
*@R'/       <-- Read SAM file
*@G'/       <-- Read ISAM file
*@W'/       <-- Create SAM file (write to disk)
*@S'/       <-- Create ISAM file (write to disk)
```

## 2.5.4  Printer parameter files

Printer parameter files contain parameters that either cannot be displayed or cannot be fully
displayed in the interface of the ADD-SPOOL-DEVICE command, e.g. because the value
is too long. Refer to section "Printer parameter files" on page 289 for a detailed description
of the printer parameter file.

# 2.6  **Utility routines for RSO**

## 2.6.1  **SPSERVE**

In the same way as for the local SPOOL, the configuration data for RSO is stored in the file $SYSSPOOL.SPOOL.PARAMETERS. The SPSERVE utility is used for managing the SPOOL.PARAMETERS file.

The configuration data for RSO comprises 4 parts:
– RSO printers
– RSO character sets
– RSO forms
– RSO pools

SPSERVE provides certain statements for defining, modifying, deleting and outputting these elements. Some of these statements are listed below. For further information on the SPSERVE statements, refer to the "SPSERVE (BS2000/OSD)" manual.

### RSO printers

An RSO printer is defined by systems support using one of the SPSERVE statements ADD-SPOOL-DEVICE or EDIT-SPOOL-DEVICE. Systems support can delegate a major part of the management functions to one or more (up to 8) RSO device administrators which it determines for the desired device by means of the ADD-SPOOL-DEVICE statement.

In RSO operation where an RSO device administrator is entered, we speak of private devices (private RSO printers). Devices for which no RSO device administrator has been determined are public devices (public RSO printers).

Modification and deletion of an RSO printer can be performed by using the statements MODIFY-SPOOL-DEVICE and REMOVE-SPOOL-DEVICE.

Any user can request information about RSO devices by using the command or SPSERVE statement SHOW-SPOOL-DEVICES.

### RSO character sets

Certain parameters affect the definition of RSO character sets: color, character stroke weight, font, character style, with/without underscore, pitch, language, and print quality.

Definition, modification and deletion are performed by systems support or the RSO device administrator using the following SPSERVE statements:

ADD-SPOOL-CHARACTER-SET
EDIT-SPOOL-CHARACTER-SET
MODIFY-SPOOL-CHARACTER-SET
REMOVE-SPOOL-CHARACTER-SET

Any user can request information about RSO character sets by using the command or SPSERVE statement SHOW-SPOOL-CHARACTER-SETS.

### RSO forms

Certain parameters affect the definition of RSO forms, such as: page and line lengths, Header pages, form feed control, standard character set, form feed control and standard character set for rotated print.

Definition, modification and deletion are performed by systems support or one of the RSO device administrators using the following SPSERVE statements:

ADD-SPOOL-FORM
EDIT-SPOOL-FORM
MODIFY-SPOOL-FORM
REMOVE-SPOOL-FORM

Any user can request information about the forms by using the command or SPSERVE statement SHOW-SPOOL-FORMS.

### RSO pools

RSO pools can be defined for RSO printers. The pools can be created, modified and deleted by systems support using the following SPSERVE statements:

ADD-PRINTER-POOL
EDIT-PRINTER-POOL
MODIFY-PRINTER-POOL
REMOVE-PRINTER-POOL

Any user can request information about the pools by using the SPSERVE statement SHOW-PRINTER-POOLS.

## 2.6.2   **RSOSERVE**

The RSOSERVE utility routine provides the following functions:

**General management of the RSO printers**

Management of loop records, character image tables and translation tables.

**Management of different printers**

– Management of character sets and fonts
– Management of band IDs for 9645 Printers
– Management of the 9025, 9026-RENO and 9645 Printers

**Output of information**

Some management records are stored in the system RSOFILE, others in the file
$SYSSPOOL.SYSPAR.RSO.035.USER. The information is output from these files.

The aforementioned functions are supported in (menu-driven) interactive mode by the
RSOSERVE utility routine. RSOSERVE also supports a batch mode for the management
of loop records, character images and translation tables. Batch mode is available for batch
jobs and for procedures.

For a detailed description of RSOSERVE, refer to the "RSOSERVE" manual.

## 2.7  User groups

The following user groups exist in RSO operation, which have different tasks and different possibilities for using RSO printers:
– SPOOL administrator and systems support
– RSO device administrator (determined by systems support)
– nonprivileged user

**SPOOL administrator and systems support**

As of SPOOL V3.0, within the framework of the decentralization of systems support tasks, the PRINT-SERVICE-ADMINISTRATION privilege is assigned to the user ID that is to be the SPOOL administrator. By default, this privilege is assigned to both the SYSSPOOL user ID and, for the sake of compatibility, the TSOS user ID.

The SPOOL administrator has the highest level of RSO privilege and can perform any activity that can be performed by RSO device administrators and nonprivileged users. The SPOOL administrator also specifies RSO device administrators. In addition, the user ID with the PRINT-SERVICE-ADMINISTRATION privilege is also responsible for the following:
– management of RSO printers
– management of RSO jobs
– management of SPSERVE
– management of RSOSERVE

Systems support under the TSOS user ID or the user ID with the SUBSYSTEM-MANAGEMENT privilege also loads, manages and unloads the RSO subsystem.

The responsibilities and functions of the SPOOL administrator and systems support are described in chapter "Responsibilities of the SPOOL administrator and systems support" on page 187.

**RSO device administrator**

Two types of devices are differentiated in RSO operation: public devices and private devices. Public devices are managed only by a user ID with the PRINT-SERVICE-ADMINISTRATION privilege, whereas private devices can be managed by the SPOOL administrator or an RSO device administrator.

The SPOOL administrator can define one or more RSO device administrators for the desired RSO device and thus delegate management functions. The RSO device administrator is a privileged user for one, several or all RSO devices; these privileges may be assigned to any user ID.

The RSO device administrator can do everything that the nonprivileged user can do, and can also perform the following additional functions:

– management of character sets with SPSERVE

– management of forms sets with SPSERVE

– management of character sets and devices in RSOSERVE

– management of RSO jobs (monitoring, redirecting, deferring/calling, stopping, resuming, releasing and canceling)

– interrogating the status of RSO jobs and RSO devices

RSO device administrator responsibilities and functions are described in chapter "Responsibilities of the RSO device administrator" on page 159.

**Nonprivileged user**

Nonprivileged users are not provided with any special privileges. They can generate RSO jobs by means of the PRINT-DOCUMENT command and control their jobs using the RESUME-SPOOLOUT and CANCEL-JOB commands.

Nonprivileged users can request information about their jobs by means of the SHOW-JOB-STATUS and SHOW-PRINT-JOB-STATUS commands. They can obtain information about RSO printers by means of the command SHOW-SYSTEM-STATUS INF=*REMOTE(*ALL/$printername$).

There are several possible ways in which nonprivileged users can influence the spoolout of their files; these are described in detail in chapter "Use of RSO printers by the nonprivileged user" on page 49.

# 3 Use of RSO printers by the nonprivileged user

This chapter describes how nonprivileged users can use RSO printers. Nonprivileged users are not provided with any special privileges. They may:

– print files on RSO printers
– use filters (see section "Using filters - SPCONV subsystem" on page 90)
– control their jobs (see section "Job control" on page 93)
– request information (see section "Requesting information" on page 94)
– use certain commands (see section "Commands for the nonprivileged user" on page 97)
– use the SPOOL Notification Service (see section "Using the SPOOL Notification Service in RSO" on page 98)
– print in the Internet Cafe (see section "Internet Cafe printing" on page 109)
– print on Unicode printer (see section "Support of Unicode printers" on page 115)
– use of secure printing (**only available in RSO V3.6**), (see section "Secure printing" on page 117)
– how to create Header/Trailer page template (see section "Customizing Header and Trailer pages" on page 122 )
– react to certain error situations (see section "Behavior in the event of errors" on page 132).

## 3.1 Printing files

There are several possible ways in which nonprivileged users can influence the spoolout of their files; these are described in detail in the following section.

– use of data record types (see page 50)

– use of prolog and epilog files (see page 56)

– use of generic prefix names for prolog, epilog, overlay text (DIA), member files and Header/Trailer page templates (see page 58)

– use of prolog, epilog, overlay text (DIA), member files and Header/Trailer page templates (see page 59)

– use of RSO fonts (see page 60)

- use of margin settings (see page 78)

- use of page rotation (see page 80)

- use of duplex printing (see page 82)

- use of resources created with PC tools (see page 89)

- use of large objects and files (see page 89)

## 3.1.1   Use of record types (layout of the records)

The following records can be output via RSO printers:

**Type A-1**

The record consists only of data, i.e. only of printable characters excluding control characters.

| D a t a |
|---|

The following PRINT-DOCUMENT command must be issued:

```
/PRINT-DOCUMENT FROM-FILE=...,
                DOCUMENT-FORMAT=*TEXT(LINE-SPACING=1/2/3),
                TO-PRINTER=*PAR(PRINTER-NAME=name)
```

**Type A-2**

The data record comprises a feed control character and the data. The CONTROL-CHAR-POS operand in the PRINT-DOCUMENT command defines which byte is to be interpreted as the feed control character.

The feed control character is evaluated by LINE-SPACING=*BY-EBCDIC-CONTROL(...)/*BY-ASA-CONTROL(...)/*BY-IBM-CONTROL(...).

| Feed control character | D a t a |
|---|---|

The following PRINT-DOCUMENT command must be issued:

```
/PRINT-DOCUMENT FROM-FILE=...,
                 DOCUMENT-FORMAT=*TEXT(LINE-SPACING=*BY-EBCDIC-
CONTROL(...)/              *BY-ASA-CONTROL(...)/*BY-IBM-CONTROL(...)),
                TO-PRINTER=*PAR(PRINTER-NAME=name)
```

*Notes*

The following is valid for record types A-1 and A-2:

– any nonprintable characters are replaced by blanks.

– RENO commands are not executed.

## Type B-1

The record consists of data mixed with VTSU codes, character set identifiers, printer control characters and possibly RENO commands. Character set identifiers cause all data following the identifier to be printed using the given character set. All character sets used in an RSO job must be entered in the PRINT-DOCUMENT command under CHARACTER-SETS.

A character set identifier has a length of 5 or 6 bytes, starting with '\' and ending with ';', and has the following format:

\CSi[j];

\           Command escape character (X'BC').

CS      Function identifier.

i[j];     Number of the character set; this corresponds to the order of the character sets specified in the PRINT-DOCUMENT command.

*Example*

\CS11; Switch to the 11th character set specified under CHARACTER-SETS in the PRINT-DOCUMENT command.

The record may have the following appearance:

| Character set identifier | Data mixed with VTSU codes, printer control characters, RENO commands | Character set identifier | . . . |
|---|---|---|---|

The following PRINT-DOCUMENT command must be issued:

```
/PRINT-DOCUMENT FROM-FILE=...,DOCUMENT-FORMAT=*PAGE-FORMAT
                (CONTROL-MODE=*LOGICAL(LINE-SPACING=1/2/3)),
                RESOURCE-DESCRIPTION=*PAR(CHARACTER-SETS=
                list-poss(16): <alphanum-name 1..3>),
                TO-PRINTER=*PAR(PRINTER-NAME=name)
```

### Type B-2

The record consists of a feed control character and the data mixed with VTSU code, character set identifiers, printer control characters and possibly RENO commands. All character sets to be used in the RSO job must be entered in the PRINT-DOCUMENT command under CHARACTER SETS. The CONTROL-CHAR-POS operand serves to determine which byte is to be interpreted as a feed control character.

The structure of the character set identifier is the same as for B-1.

The record may have the following appearance:

| Feed control character | Character set identifier | Data mixed with VTSU codes, printer control characters, RENO commands | Character set identifier | . . . |
|---|---|---|---|---|

The following PRINT-DOCUMENT command must be entered:

```
/PRINT-DOCUMENT FROM-FILE=...,DOCUMENT-FORMAT=*PAGE-FORMAT
                (CONTROL-MODE=*LOGICAL(LINE-SPACING=*BY-EBCDIC-CONTROL(...)/
                *BY-IBM-CONTROL(...)/*BY-ASA-CONTROL(...))),
                RESOURCE-DESCRIPTION=*PAR(CHARACTER-SETS=
                list-poss(16): <alphanum-name 1..3>),
                TO-PRINTER=*PAR(PRINTER-NAME=name)
```

*Notes*

The following conditions are valid for record types B-1 and B-2 (CONTROL-MODE=*LOGICAL(...) in the PRINT-DOCUMENT command):

– Character set identifiers are only evaluated by RSO for these record types.

– VTSU codes are evaluated by RSO except for the following, which are replaced by blanks: VPA, NP, VT, NL, CR.

– Each printer function invoked (via RENO command/VTSU code/ character set identifier) remains active until reset by an appropriate control character (RENO command/VTSU code/character set identifier).

– Nonprintable characters are replaced by blanks.

### Type C

The record contains print data mixed with VTSU codes, printer control characters (physical control characters starting with X'27' or X'3C') and RENO commands.

```
                      Data mixed with VTSU codes /
             printer control characters/ RENO commands
```

The following PRINT-DOCUMENT command must be issued:

```
/PRINT-DOCUMENT FROM-FILE=...,DOCUMENT-FORMAT=*PAGE-FORMAT
                (CONTROL-MODE=*LINE-MODE),
                TO-PRINTER=*PAR(PRINTER-NAME=name)
```

Users are responsible for the correctness of the control characters in their files, including feed control characters.
Each line and form feed must be entered explicitly in the file using printer control characters; loops are not evaluated.
RSO interprets all VTSU codes and sends all printer control characters and RENO commands to the printer for evaluation. All nonprintable characters in the print file with a hexadecimal value < X'40' are replaced by blanks.

### Type D-1

The record contains print data mixed with VTSU codes, printer control characters and RENO commands. Unlike type C, all nonprintable characters in the file are passed to the printer.

```
                      D a t a mixed with VTSU codes,
             printer control characters, RENO commands
```

The following PRINT-DOCUMENT command must be entered:

```
/PRINT-DOCUMENT FROM-FILE=...,DOCUMENT-FORMAT=*PAGE-FORMAT
                (CONTROL-MODE=*PHYSICAL(LINE-SPACING=*NO/1/2/3)),
                TO-PRINTER=*PAR(PRINTER-NAME=name)
```

Users are responsible for the correctness of the control characters in their files, including feed control characters.
Loops are not evaluated. Form feeds must be entered explicitly via VTSU codes for each new page. The value entered under LINE-SPACING is interpreted as a line feed. However, if the user explicitly specifies LINE-SPACING=NO, the line feed for each line must be given using VTSU codes.

### Type D-2

The record consists of a feed control character in the first byte, followed by print data mixed with VTSU codes, printer control characters and RENO commands.

| Feed control character | D a t a mixed with VTSU codes, printer control characters, RENO commands |
| --- | --- |

The following PRINT-DOCUMENT command must be entered:

```
/PRINT-DOCUMENT FROM-FILE=...,DOCUMENT-FORMAT=*PAGE-FORMAT
                (CONTROL-MODE=*PHYSICAL(LINE-SPACING=*BY-EBCDIC-CONTROL(...)/
                *BY-IBM-CONTROL(...)/*BY-ASA-CONTROL(...))),
                TO-PRINTER=*PAR(PRINTER-NAME=name)
```

The feed control character is interpreted with LINE-SPACING=*BY-EBCDIC-CONTROL either as a line feed (X'0x', X'4x') or as a form feed (X'C1', X'81').

*Note*

> For a form feed, channel 1 may only be entered in the record before (X'81') or after (X'C1') printing.

### Type E-1

The record contains any characters (apart from VTSU codes) which are to be evaluated by RSO.

| D a t a mixed with control characters |
| --- |

The following PRINT-DOCUMENT command must be entered:

```
/PRINT-DOCUMENT FROM-FILE=...,DOCUMENT-FORMAT=*SPECIAL-FORMAT
                (LINE-SPACING=*NO/1/2/3),
                TO-PRINTER=*PAR(PRINTER-NAME=name)
```

All characters are passed to the printer without being interpreted.

Users are responsible for the correctness of the control characters in their files, including feed control characters. Loops are not evaluated. A form feed must be entered explicitly for each new page using printer control characters. The value entered under LINE-SPACING is interpreted as a line feed. However, if the user explicitly specifies LINE-SPACING=*NO, the line feed must be given for each line, using printer control characters.

### Type E-2

The record contains a feed control character in the first byte, followed by any characters, apart from VTSU codes, that are to be evaluated by RSO.

All characters are passed to the printer without being interpreted, with the exception of the feed control characters, which are translated into the VTSU code LF or FF.

| Feed control character | D a t a mixed with control characters |
| --- | --- |

The following PRINT-DOCUMENT command must be issued:

```
/PRINT-DOCUMENT FROM-FILE=...,DOCUMENT-FORMAT=*SPECIAL-FORMAT
                (LINE-SPACING=*BY-EBCDIC-CONTROL(...)/
                *BY-IBM-CONTROL(...)/*BY-ASA-CONTROL(...)),
                TO-PRINTER=*PAR(PRINTER-NAME=name)
```

The feed control character is interpreted with LINE-SPACING=BY-EBCDIC-CONTROL either as a line feed (X'0x', X'4x') or as a form feed (X'C1', X'81').

*Note*

> In order to specify a form feed via the SPACE operand, only channel 1 may be entered in the record before (X'81') or after (X'C1') printing. RSO does not evaluate other values.

### General notes on the record types

–   Character set information (VTSU codes or printer control characters) remains in force until a new control character is encountered (i.e. it does not need to be repeated at the beginning of each line). The device types 8121-, 9002-, 9003- and 9004-REMOTE-PRINTER cannot store character set information. This is why RSO repeats the information at the beginning of each buffer for all the data record types except DOCUMENT-FORMAT=*SPECIAL-FORMAT. As a consequence of this behavior, users must be aware that all their specifications may be overwritten if they are not imported as VTSU codes or character set identifiers (see data record types B-1 and B-2).

–   The value X'01' in an input file is replaced by a blank at spoolout for all record types apart from E (DOCUMENT-FORMAT=*SPECIAL-FORMAT).

- In all record types, "data" can also contain RENO commands for the 9025/9026-RENO Printer. With DOCUMENT-FORMAT=*TEXT, the RENO commands included in the record are treated just like normal data and are not interpreted. Restrictions governing the use of the 9025/9026-RENO Printers must be borne in mind when using the overprint function.

- Nonprintable characters have a hexadecimal value < X'40'.

- As of V2.0, RSO uses the EBCDIC.DF04 code table; EBCDIC.SRV.10 codes are no longer converted (conversion may however be implemented via the CHARACTER-IMAGE function).

- A control character cannot extend over more than one line. It must fit in its entirety into one line.

## 3.1.2  Use of prolog and epilog files

Prolog and epilog files can be processed on all RSO printers, their contents being evaluated by the printer, not by RSO. These files may thus only contain printer control characters that the corresponding printer type can interpret.

A prolog is inserted after the Header page and before the print file. RSO ensures that the prolog is positioned at the beginning of the page. However, users themselves must ensure (in their prolog file) that the start of the subsequent print file is positioned at the beginning of the page.

An epilog is inserted between the print file and the Trailer page. RSO ensures that the epilog is positioned at the beginning of the page. However, users themselves must ensure (in their epilog file) that the Trailer page awaiting processing is positioned at the beginning of the page.

Irrespective of the mode specified in PRINT-DOCUMENT (DOCUMENT-FORMAT operand), prolog and epilog are always passed to the printer in TRANSPARENT mode. If no epilog file exists, a page feed is automatically inserted before the Trailer page is processed.

Prolog and epilog files can only be processed if they are linked to a form. As soon as a spoolout for an RSO printer occurs via a form to which a a prolog or epilog file is assigned for this printer type and this form, this file is automatically inserted before (prolog) and/or after (epilog) the print file. It is advisable to link only one prolog or epilog to a form.

Prolog and epilog files are linked to forms and printer types via the file names in accordance with the following rule:

PROLOG:          RPprintertype.PROLOG.formname

EPILOG:          RPprintertype.EPILOG.formname.

These files can be protected by means of ACL and GUARDS (as of BS2000/OSD-BC V1.0), but not by passwords.

Since RSO V3.5, the prolog and epilog file names can also be created with a generic prefix name (see ).

*Example*

A user enters the command:

```
/PRINT-DOCUMENT FROM-FILE=file,RESOURCE-DESCRIPTION=*PAR(FORM-NAME=STDF5),
                TO-PRINTER=*PAR(PRINTER-NAME=PRN27250)
```

RSO reads the device record for PRN27250, extracts the information DEVICE-TYPE=9001-31 and checks whether a prolog with the name RP9001-31.PROLOG.STDF5 and/or an epilog with the name RP9001-31.EPILOG.STDF5 exists. If they do, they are inserted before or after the print file respectively and processed by the printer.

The check for a corresponding prolog or epilog file takes place during the spoolout process, i.e. after scheduling of the appropriate RSO job. The check searches (in this order):

–    under the user ID of the user who entered the PRINT-DOCUMENT command

–    under the $SYSSPOOL user ID for a public device, or under the user ID of the RSO device administrator who was specified first for a private device

–    if a 9025/9026-RENO Printer is involved, in the printer memory as well, there would be a corresponding entry in the SYSPAR.RSO.035.USER file.

When a prolog/epilog is sent to a printer, that printer is allocated the largest buffer space possible for this process, regardless of the value defined under BUFFER-SIZE in the A-S-D/M-S-D statement (or corresponding command).

Users should not write any text in their prolog/epilog files; rather, only control characters to be interpreted by the printer.

### 3.1.3   Generic prefix names for prolog, epilog, overlay (DIA) , member files and Header/Trailer page templates

Normally, each prolog, epilog, overlay (DIA), member file or Header/Trailer page template is linked to a device or at least to a device type (see section "Customizing Header and Trailer pages"). The names of these files start with the character string 'RP*devicetype*', in which *devicetype* stands for an RSO device. Although the contents of the prolog, epilog, overlay (DIA), member or template files can be processed by all printers that support the same printer language, a copy of these files must be provided for each RSO device type. This applies, for example, to the printer language PCL4, which is supported by the 9021, 9022-200, 4821-PCL,4824-PCL and 9026-PCL printers.

To reduce the number of duplicates, generic prolog, epilog, overlay (DIA), member files or Header/Trailer page templates can be defined. These generic files can then be used by RSO device types that support the same printer language.

**Definition of generic prefix names**

Device administrators and systems support can freely define the prefix for each logical printer using the following parameter of the SPSERVE statement ADD-SPOOL-DEVICE:

PROCESSING-CONTROL=*PARAMETERS(
RESOURCE-FILE-PREFIX=*STD/<composed-name1..8>)

The value *STD means that the prolog, epilog, overlay (DIA), member files or Header/Trailer page template names start with the string 'RP*devicetype*'.
A value other than *STD means that the prolog, epilog, overlay (DIA), member file or Header/Trailer page template names start with the specified prefix, rather than with 'RP*devicetype*'.

*Note*

> Self-defined prefixes for printer resource files can only be used together with resource libraries. They determine the name of an element of a PLAM library.

*Example*

An individual prolog file contains several PCL printer control sequences that should be used for the PCL printers 9021, 9000-PCL, 4821-PCL and 4824-PCL. These prolog files could be named as follows:

`PCL.PROLOG.`*formname*

'PCL' here is the new prefix name. The device definition of the 9021, 9000-PCL, 4821-PCL and 4824-PCL printers must then be matched with RESOURCE-FILE-PREFIX=PCL, so that RSO searches for prolog, epilog, overlay (DIA) and member files whose names start with 'PCL'.

### 3.1.4  Prolog, epilog, overlay (DIA) and member files in common libraries

To avoid unnecessary duplicates of the prolog, epilog, overlay (DIA) and member files, these files may be stored in PLAM libraries.

All prolog, epilog, overlay (DIA) and member files, whether defined by the user, device administrator or systems support, can be stored in PLAM libraries as type P and are the responsibility of the particular owner. The rules for renaming the elements are the same as for naming prolog, epilog, overlay (DIA) and member files.

This PLAM library should be given the name SYSPAR.RSO-RESOURCES.LIB. This library can be stored either under any user ID (for user-defined prolog, epilog, overlay (DIA) and member files), under the user ID of a device administrator or under the user ID SYSSPOOL for systems support.

RSO searches for a printer resource as follows:

1.  The resource is searched for in the library under the user ID of the user of the PRINT-DOCUMENT command. The name prefix of the resource for the specified printer (if specified) is used to create the name of the resource.

2.  If the resource is not found, it is searched for in the library under the user ID of the user of the PRINT-DOCUMENT command. The name prefix is ignored and the standard method used to create the name of the resource.

3.  If the resource is not found, it is searched as a separate file under the user ID of the user of the PRINT-DOCUMENT command. The name prefix is ignored and the standard method used to create the name of the resource.

4.  If the resource is not found, it is searched for in the library under the user ID of the first device administrator responsible. The name prefix of the resource for the specified printer (if specified) is used to create the name of the resource.

5.  If the resource is not found, it is searched for in the library under the user ID of the first device administrator responsible. The name prefix is ignored and the standard method is used to create the name of the resource.

6.  If the resource is not found, it is searched for as a separate file under the user ID of the first device administrator responsible. The name prefix is ignored and the standard method is used to create the name of the resource.

7.  If the resource is not found and the printout made on a PUBLIC-RSO printer, it is searched for in the library under the user ID $SYSSPOOL. The name prefix of the resource for the specified printer (if specified) is used to create the name of the resource.

8.  If the resource is not found and the printout made on a PUBLIC-RSO printer, it is searched for in the library under the user ID $SYSSPOOL. The name prefix is ignored and the standard method is used to create the name of the resource.

9.  If the resource is not found and the printout made on a PUBLIC-RSO printer, it is searched for as a separate file under the user ID $SYSSPOOL. The name prefix is ignored and the standard method used to create the name of the resource.

## 3.1.5  Use of RSO fonts

An RSO font refers to a 256-character string that can be defined by systems support. It can be linked by systems support or an RSO device administrator to one or more character sets by means of RSOSERVE.

Whenever a character set is called for printing, if an RSO font is linked to the character set, the RSO font is sent unchanged and with priority to the printer for interpretation of the characteristics of the character set. For example, the character set parameters are first converted into the appropriate printer control character sequences.

RSO font is synonymous in this manual with "logical RSO font", "RSO string", "font string" and "RSO character string".

### 3.1.5.1 Font support for PCL printers

The following printer types support the printer language PCL: 2030-PCL, 4812, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9021, 9022-200, 9026-PCL and DJET

**Font characteristics**

A font is a set of characters with identical characteristics and is selected by the specification of these characteristics.

For 2030-PCL, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9021, 9022-200 and 9026-PCL printers, a font is defined by the following characteristics (in descending order of priority):

1. Symbol set (character set)

2. Spacing (fixed/proportional)

3. Pitch in cpi

4. Height in points ($\equiv$ 1/72 inch)

5. Style (straight/italic)

6. Stroke weight (light/medium/bold)

7. Typeface

For 4812 and DJET Printers, a font is defined by the following characteristics (in descending order of priority):

1. Symbol set (character set)

2. Placement (normal/subscript/superscript)

3. Spacing (fixed/proportional)

4. Pitch in cpi

5. Height in points ($\equiv$ 1/72 inch)

6. Style (straight/italic)

7. Stroke weight (medium/bold)

8. Typeface

9. Print quality (draft/letter)

*Orientation*

Possible values: portrait/landscape.

The selected value defines the orientation of the current primary and secondary fonts. The function determines the orientation of the logical page and the print direction for the physical page.

When the orientation is changed (from portrait to landscape or vice versa), the output of all previously received data is terminated with the control characters 'FF' (form feed) and 'CR' (carriage return).

The control character sequence for this function causes the following characteristics to be set in accordance with the user's default values:

– page length
– text length
– upper, right and left margins
– HMI value (HMI = Horizontal Motion Index, distance between characters)
– VMI value (VMI = Vertical Motion Index, distance between lines).

For landscape printing, only forms should be used for which the ROTATION-CONTROL= *LOOP/*SPACING and ROTATION-CHAR-SET operands were specified in SPSERVE for ADD-SPOOL-FORM.

*Symbol set*

A symbol set is a fixed arrangement of the characters in a font. If the specified symbol set does not exist, the printer continues to use the current set without sending a corresponding message. Some symbol sets can be used as language tables (ADD-SPOOL-CHARACTER-SET, LANGUAGE operand).

*Spacing*

Possible values: fixed/proportional.

*Pitch*

Pitch is defined as the number of characters that can be printed per inch. A font with 15 pitch means, for example, that 15 characters can be printed to an inch without overlapping each other. This value defines the width of a character in that font.

The value only applies to fonts with fixed (nonproportional) spacing. If the specified value is not available, the next larger pitch is selected; if no larger pitch is available, the next smaller value is selected - both without a message from the printer. (The pitch value of a 15 cpi font is larger than that of a 12 cpi font, and the pitch value of a 10 cpi font is smaller than that of a 12 cpi font.)

When a new font is loaded, the HMI value (the distance between characters) is automatically adjusted to the pitch value. When changes occur which the RSO recognizes (i.e. VTSU or character set changes), RSO cancels the adjustment, in other words, resets the old HMI value.

*Height*

The character height is given in points (1/72 inch).

If the specified height is not available, the nearest value will be selected, without a corresponding message from the printer. Since line spacing is independent of the character height, users can adjust the line spacing themselves (by altering the LPI value of the appropriate loop or form record) to obtain correct vertical alignment of the text.

*Style*

Possible values: straight/italic.

If the selected value is not available, the specification is ignored without a message from the printer. The function corresponds to the CHARACTER-STYLE operand in the ADD-SPOOL-CHARACTER-SET statement.

*Stroke weight*

Possible values: light/medium/bold.

If no font with the specified stroke weight value is available, the next heavier or next lighter available value is selected, without a corresponding message from the printer. The function corresponds to the WEIGHT operand in the ADD-SPOOL-CHARACTER-SET statement.

*Typeface*

This characteristic determines the design of the characters in a font.

If the specified value is not available, this font characteristic is not considered in the selection of the font; the printer does not send a corresponding message.

*Placement*

For DJET printers only.

Specifies how the character will be printed.

*Letter quality*

For DJET printers only.

Defines the quality of the printout: draft / letter. In RSO, 'draft' is supported by NEAR-LETTER-QUALITY=*NO and 'letter' by NEAR-LETTER-QUALITY=*YES in the ADD-SPOOL-CHARACTER-SET statement.

### Font management

These types of RSO printer include a table containing all the currently valid font characteristics. Whenever the printer receives a control character sequence modifying a font characteristic, it writes the new value in this table. The appropriate font is selected according to the order of priority of font characteristics set out above.

The printer first checks whether the specified value for the font characteristic with the highest priority in the table corresponds with the relevant definition in the fonts available.

If this applies to only one font, this font is selected. If it applies to several available fonts, the next lower font characteristic in the order of priority is used.

If both characteristics now only apply to one font, this font is selected, otherwise the next font characteristic is used and so on until the end of the list of characteristics defining the fonts is reached.

If several fonts still meet the selection criteria after all the font characteristics in the printer table have been checked against the characteristics of the available fonts, then the selection will be determined by the location of the font:
a loadable font (soft font) has priority over a cartridge font, which in turn has priority over a font installed permanently in the printer (internal font).

Each of the printer types in question contains not only one, but two independent tables in order to ensure trouble-free switching from primary to secondary font and vice versa.

The control characters SI (switching to the primary font) and SO (switching to the secondary font) are used to switch between the two fonts.

RSO implicitly supports the primary font, i.e. RSO takes all the font-related characteristics of the character set from the definitions of the first font.

In principle, to select a new font it is only necessary to specify the characteristics of the new font that distinguish it from the previous one. However, the user should note that after every font modification, the printer always checks all the available fonts (soft, cartridge and internal fonts) for one that meets the desired criteria, including the (priority) level of the characteristics that have been changed. If it finds one, the font in question is selected.

As an example, the current font for a 9021 Printer is to be changed on priority level 3 (spacing) (fixed – proportional). Once the printer has received the appropriate control character sequence, it checks all the fonts available to it.

If it finds a font whose characteristics for priority levels 1, 2 and 3 (orientation, character set and spacing) meet the criteria, this font is selected, irrespective of the values required at the lower levels of priority.

Thus the printer may possibly select a font whose values at lower priority levels do not correspond to the user's intentions.

If the printer does not find a font whose characteristics coincide with the values required at the priority level affected by the change (level 3) and all higher levels (1 and 2), the modification is ignored, and the printer continues to operate with the previous font, without sending a corresponding message.

*Example*

A 9022-200 Printer is equipped with the following two fonts:

| Name: | FONT1 | FONT2 |
|---|---|---|
| Orientation: | portrait | landscape |
| Symbol set: | Roman-8 | Roman-8 |
| Spacing: | fixed | fixed |
| Pitch: | 10 cpi | 10 cpi |
| Height: | 12 points | 12 points |
| Style: | straight | italic |
| Stroke weight: | medium | medium |
| Typeface: | Courier | Courier |

Assuming that FONT1 is the current selection and the printer receives the control character sequence for italic, this printer control character sequence does not lead to a change of font (although FONT2 does support the characteristic 'italic'), since the higher priority font characteristic 'orientation' does not match.

**Assigning a font ID number to a font**

Some fonts are supplied with the printer as internal fonts. Additional fonts can be made available from cartridges or as (loadable) soft fonts which are transferred from the processor to the printer memory when invoked.

Before it is transferred, each soft font should be assigned a font ID number for unique identification. It is then easy to define a soft font as the current primary or secondary font by specifying its ID number. This makes all the characteristics of this soft font, with the exception of its orientation, the new characteristics of the primary or secondary font.

With some printers with HP LaserJet II emulation (see printer manual), and with 2030-PCL, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9021, 9026-PCL and 9022-200 printers (but not with 4812 and DJET printers) internal fonts and cartridge fonts can also be assigned font ID numbers.

This can be done in one of two ways:

–    by defining a font as the primary font

–    by specifying printer control characters which, after storing the definitions of the active primary font, assign the font an ID number; the stored font can easily be defined as primary or secondary font by specifying its ID number (i.e. all stored characteristics of the font, with the exception of its orientation, become the characteristics of the current primary or secondary font).

Note that the various printer types behave differently with respect to orientation.

Most printers with HP LaserJet II emulation (such as the 9021) and all with HP LaserJet III emulation (or higher, such as the 2030-PCL) support fonts in both orientations (portrait and landscape). This means that on these printers a font ID can be called and defined as primary or secondary font irrespective of the current orientation value.

Some printers with HP LaserJet II emulation (such as the 9022-200) do not support different fonts for both orientations. With these printers, a font ID can only be defined as the primary or secondary font if the orientation value of the active font corresponds with the value stored when the ID number was assigned to the font (if it does not correspond, the current primary or secondary font remains defined as such).

### 3.1.5.2 Font support for 9025 and 9026-RENO Printers

The 9025 and 9026-RENO Printers support fonts and language tables. The 9026-RENO Printer also supports typefaces.

A font is a character set that can contain up to 1024 different characters in a particular style and a particular point size. All characters are stored in their precise size as bit patterns. A font can be selected by means of the RENO command '\FO<font>;', where <font> represents the font name (for example, a 10-cpi font can be selected by means of the command \FO'COURIER10:E.N.10';).

A typeface is a character set that can contain up to 1024 different characters in a particular style but with an available series of point sizes. All characters are stored in a mathematical formula to enable them to be adapted to the desired point size on printing. The typeface size can be simply selected by appending a point size value to the typeface name. The RENO command '\FO<typeface>;' is used for this purpose, where <typeface> stands for the typeface name and the point size (for example, the command \FO'COURIER.N.40'; selects the typeface COURIER with point size 40).

A language table converts the EBCDIC DF03 codes into the 1024 available characters of a font or typeface. It can be selected by means of the RENO command '\LA<language>;', where <language> stands for the name of the language table (for example, \LA'FRENCH'; selects the French language table).

If an RSO font is defined for a 9025 or 9026-RENO Printer, systems support must be informed in order that it may specify the font name or typeface name together with the language table.

### 3.1.5.3   Font support for the 9022 Printer

On 9022 Printers a font is a set of characters having the following characteristics:

– orientation (portrait/landscape)
– spacing (fixed/proportional)
– pitch in characters per inch
– height in points ($\equiv$ 1/72 inch)

Fonts may be permanently installed (internal) in the printer, or be held on cartridge, and can be selected by means of the printer control character sequence x'1C5Dabcd' (EBCDIC), where x'ab' and x'cd' stand for the font identification (for further information refer to the printer description for the 9022 Printer).

### 3.1.5.4   Font support for the other printer types

As of RSO V2.2A, the definition of RSO fonts has been expanded for some RSO printer types. Although 4011, 4813, 8121, 9000, 9001, 9001-31, 9000-PRO, 9000-EPFX, 9000-EPLQ, 9000-EPSQ, 9002, 9003, 9004, 9011, 9012, 9013, 9014, 9015, 9045-ANSI, 9046, 9097 and 9645 Printers are not "font printers", systems support nevertheless has the capability to define RSO fonts (also called RSO strings) for these printer types. So it can, for example, specify printer control character sequences in the 256-character string which set double height or double underscore.

### 3.1.5.5   Font support for the 9000-PS Printer

Systems support can also define RSO fonts for PostScript printer that are addressed using the printer type 9000-PS. This is achieved by entering the PostScript name of the desired character set in the 256-character string. RSO uses the font 'Courier' by default, as defined by PostScript. If you wish to print the text in Times, semi-bold, italic, for example, enter the RSO font 'Times-BoldItalic'.

### 3.1.5.6    Font support by RSO

A font is supported by RSO once the font characteristics have been linked to a character set name (the character set has been defined by systems support with the SPSERVE statement ADD-SPOOL-CHARACTER-SET in the file SPOOL.PARAMETERS). A font can be linked to several character set names by systems support or an RSO device administrator.

A nonprivileged user can only have the contents and specified characteristics of the RSO fonts output by using RSOSERVE, and can use these RSO fonts during the spoolout.

**Output of contents and specified characteristics of the RSO fonts**

Any user can request information about the available RSO fonts for any printer type by using the RSOSERVE utility routine.

*Output of character sets (CHARACTER-SET)*

Any user can have a list of all character sets, for which at least one RSO font has been specified, output for a particular printer type. If a character set name from this list is then specified, the description of the RSO font that was defined for this character type and this printer type is output. The name, comments and the contents of the 256-character string are output.
For further information refer to the "RSOSERVE" manual.

*Output of RSO fonts (FONT)*

Any user can have a list of all RSO font names, which have been specified for a particular printer type, output for this printer type. If a font name from this list is then specified, the description of the RSO font that was defined for this printer type is output. The name, comments and the contents of the 256-character string are output.

For further information refer to the "RSOSERVE" manual.

*Output of spoolout features*

Using RSOSERVE, any user can obtain the same information about RSO forms and RSO character sets as is possible with the SHOW-SPOOL-FORMS and SHOW-SPOOL-CHARACTER-SETS commands. Information about a character set name must be requested for a particular printer type. In addition to the output screen for SHOW-SPOOL-CHARACTER-SETS, any RSO fonts that may have been specified for the character set for this printer type are also output.
For further information refer to the "RSOSERVE" manual.

**Calling the logical font during spoolout**

The description of the logical font (i.e. the string of printer control character sequences) linked to the character set is passed to the printer in TRANSPARENT mode (without being modified or interpreted by RSO).

Whenever a reference is made to a character set during spoolout, i.e. at the beginning of the Header page, at the beginning of a prolog (if present), at the beginning of the print file itself, at the beginning of an epilog (if present) or at the beginning of the Trailer page, and whenever in CONTROL-MODE=*LOGICAL mode a character set is called via the control character \CSij in the text, etc., the printer control character sequence is sent to the printer, which interprets it (i.e. loads the corresponding font). Only then are the characteristics of the specified character set compared with the font characteristics.

Since the font definition already contains some character set characteristics (such as stroke weight, style, etc.), to prevent an undesired change of font by the printer it is advisable when linking the font to a character set to assign the value IGNORE to the characteristics of the character set (systems support and RSO device administrator privilege).

*Example*

The character set FO1 was linked to the font FONT1 via RSOSERVE.

FONT1 was defined with the characteristics

– weight: bold
– style: italic

FO1 was defined with the following characteristics:

```
C-S-N COLOR WEIGHT CH-TYPE CH-STYLE UND CPI LPI LANG NLQ
FO1   IGN   MEDIUM IGN     STRAIGHT IGN  O  ## IGN  IGN
```

First, FONT1 is loaded as the primary font. In the subsequent comparison of the character set characteristics with the loaded font, it is possible that the printer will replace FONT1 with a different font which supports the characteristics "medium stroke" and "straight style" of the character set linked to it. (The LPI value is not evaluated by RSO.) In order to prevent this happening, the character set should be defined as follows:

```
C-S-N COLOR WEIGHT CH-TYPE CH-STYLE UND CPI LPI LANG NLQ
FO1   IGN   IGN    IGN     IGN      IGN  O  ## IGN  IGN
```

Since all the characteristics of the character set are set to IGNORE, they cannot conflict with font characteristics, and hence a change of font will not occur.

**Support for an undetermined character set**

As of V2.2A, spoolout does not abort in the absence of a link between font and character set. Although most font characteristics describe character set characteristics (stroke weight, style, etc.) for some printer types, not all character set characteristics depend on the font (color, underscoring, etc.). Linking character sets that only support font-independent characteristics is unnecessary and serves no purpose.

For this reason, character sets for printing the Header page, file and Trailer page no longer have to be linked to a font as a matter of principle. If none of the character sets to be used for processing the spoolout job is linked to a font, the font used is either the font last loaded on the printer or the printer's default font. The default font is used if the settings on the printer are reset by RSO after every spoolout job, i.e. RESET=*YES is specified in the device entry.

*Example*

Character set FO1 is to correspond to the characteristics of font FONT1. For this to happen, it must be linked via RSOSERVE to the logical font FONT1 (in which process all the printer control characters for defining the font must be specified in the 256-byte string available). Character set FO1 should be defined as follows:

```
C-S-N COLOR WEIGHT CH-TYPE CH-STYLE UND CPI LPI LANG NLQ
FO1   IGN   IGN    IGN     IGN      IGN  0  ##  IGN  IGN
```

When the character set FO1 is called, FONT1 is loaded. The character set characteristics now correspond completely with the font (otherwise the font would be replaced).

Character set FO2 is intended simply to activate the 'underscore' function. Since this function does not depend on the font, i.e it is not one of the characteristics that define a font, it is not necessary to link this character set to a font. Character set FO2 should be defined as follows:

```
C-S-N COLOR WEIGHT CH-TYPE CH-STYLE UND CPI LPI LANG NLQ
FO2   IGN   IGN    IGN     IGN      YES 0  ##  IGN  IGN
```

When character set FO2 is called, no font is loaded, and only the function 'underscore' is switched on. All other character set characteristics remain unchanged.

### Support for the second font

2030-PCL, 4812, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9021, 9022-200, 9026-PCL and DJET Printers allow the user to work with two different fonts. Printer control character SO is used to switch from primary to secondary font, while printer control character SI switches from secondary to primary font.

When one of these types of printer is switched on, the characteristics of the two fonts are initially identical, and are either the printer's internal default font, a default font selected at the operator console by the user, or a cartridge default font. Control characters SI and SO always refer to the same font at this point.

RSO implicitly supports the primary font, i.e. RSO relates all font-dependent character set characteristics to the primary font. Changes to the characteristics of the primary font do not affect the definition of the secondary font (with the exception of orientation, i.e. portrait or landscape).

If the secondary font is not explicitly modified, it retains the characteristics of the internal default font at the moment when the printer was switched on. RSO does not directly support the secondary font, but the user can use a secondary font, with some restrictions. Three different methods can be used:

1. Primary and secondary fonts are defined by the same logical font name.

   This method enables any user to access a secondary font by means of the SI and SO control characters in his/her user file, by using a character set that has already been linked to a logical font for which systems support has, in the 256-byte string, specified printer control characters during font definition for loading a primary and a secondary font. Whenever this character set is called during spoolout, the printer control characters that define the linked logical font name are sent to the printer.

   The user could use the control characters SI and SO to switch between the primary and secondary fonts. The control characters SI and SO are not interpreted if the spoolout job is sent out with LINE-SPACING=*NO(...)/*BY-EBCDIC-CONTROL(...)/ *BY-IBM-CONTROL(...)/*BY-ASA-CONTROL(...), since in this case characters < X'40' are replaced by blanks.

*Example*

RSOSERVE
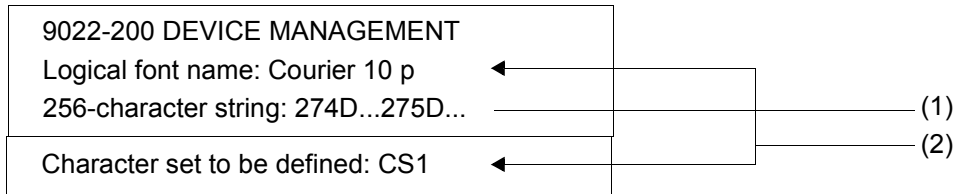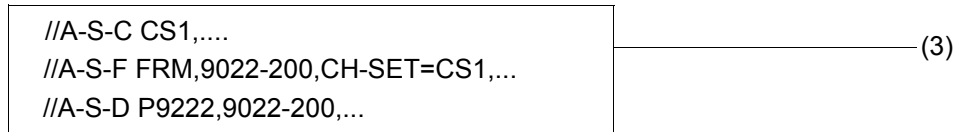
```
9022-200 DEVICE MANAGEMENT
Logical font name: Courier 10 p           ◀
256-character string: 274D...275D...

Character set to be defined: CS1          ◀
```
(1)
(2)

SPSERVE

```
//A-S-C CS1,....
//A-S-F FRM,9022-200,CH-SET=CS1,...
//A-S-D P9222,9022-200,...
```
(3)

The file ANYTHING contains the following record: ─────────── (4)
[SI]primary font selected [SO]secondary font selected

```
PRINT-DOCUMENT FROM-FILE=ANYTHING,TO-PRINTER=*PAR(PRINTER-
     NAME=P9222,RESOURCE-DESCRIPTION=*PAR(FORM-NAME=FRM) ── (5)
```

(1) Systems support defines first the logical font name and the printer control character sequence that enables the printer to load a primary font (control character sequence starts with '274D'x) and a secondary font (control character sequence starts with '275D'x).

(2) The logical font name is linked with a character set name by systems support or the RSO device administrator.

(3) Before the character set can be used for the spoolout, either systems support or the RSO device administrator must define the character set in the SPOOL parameter file.

(4) [SI] stands for '0F'x (shift in)
    [SO] stands for '0E'x (shift out)

(5) Both fonts (primary and secondary) are loaded when printing is started. The control character [SI] selects the primary font as the active font. The control character [SO] switches to the secondary font. This is why the string "primary font selected" is printed out when the primary font is used and the string "secondary font selected" when the secondary font is used.

2. The second font is defined in a prolog file.

   This method enables any user to define printer control characters for loading a second font in a prolog file. The prolog file is processed by RSO between the Header page and the user file. By using the control characters SI and SO in his user file, the user can switch from primary to secondary font and vice versa. (The control characters SI and SO are not interpreted if the spoolout job is sent out with DOCUMENT-FORMAT= *SPECIAL, since in this case, characters < X'40' are replaced with blanks.)

   *Example*

   RSOSERVE
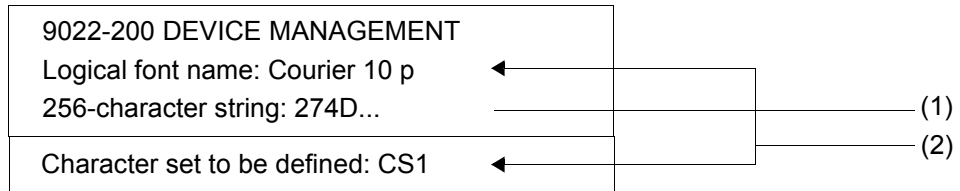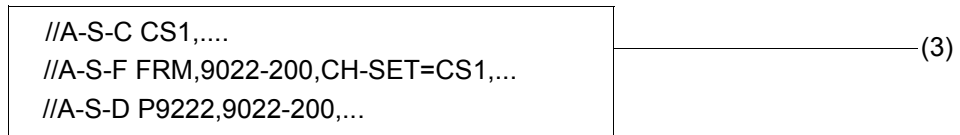
   ┌─────────────────────────────────────────────┐
   │ 9022-200 DEVICE MANAGEMENT                    │
   │ Logical font name: Courier 10 p      ◄        │
   │ 256-character string: 274D...                 │ ──── (1)
   ├─────────────────────────────────────────────┤ ──── (2)
   │ Character set to be defined: CS1     ◄        │
   └─────────────────────────────────────────────┘

   SPSERVE

   ┌─────────────────────────────────────────────┐
   │ //A-S-C CS1,....                              │
   │ //A-S-F FRM,9022-200,CH-SET=CS1,...           │ ──── (3)
   │ //A-S-D P9222,9022-200,...                    │
   └─────────────────────────────────────────────┘

   The file ANYTHING contains the following record: ──────────────── (4)
   [SI]primary font selected [SO]secondary font selected

   The file RP9022-200.PROLOG.FRM contains control character sequences, defining a secondary font: ´275D...´x

   ```
   /PRINT-DOCUMENT FROM-FILE=ANYTHING,TO-PRINTER=*PAR(PRINTER-
        NAME=P9222,RESOURCE-DESCRIPTION=*PAR(FORM-NAME=FRM) ──── (5)
   ```

   (1) Systems support defines first the logical font name and the printer control character sequence which enables the printer to load a primary font (control character sequence starts with '274D'x).

   (2) The logical font name is linked with a character set name by systems support or the RSO device administrator.

   (3) Before the character set can be used for the spoolout, either systems support or the RSO device administrator must define the character set in the SPOOL parameter file.

   (4) [SI] stands for '0F'x (shift in)
       [SO] stands for '0E'x (shift out)

(5) The primary font is loaded when printing starts. The secondary font is loaded between the Header page (if it exists) and user file by the prolog file. The control character [SI] selects the primary font as the active font. The control character [SO] switches to the secondary font. This is why the string "primary font selected" is printed out when the primary font is used and the string "secondary font selected" when the secondary font is used.

3. The use of two character image tables.

This method switches from the primary font to the secondary font and vice versa using two character image tables that have previously been defined in the RSOSERVE utility routine by systems support.

Once systems support has defined these two character image tables, they must be linked to a printer (2030-PCL, 4812, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9021, 9022-200, 9026-PCL, DJET, 9000-PCL) in the device entry, i.e. by specifying these character image tables in the CHARACTER-IMAGE operand in the ADD-SPOOL-DEVICE statement.

The first of these 256-byte tables determines the corresponding value in the primary font for each input character (in the user file). The second table supplies the corresponding value in the secondary font. RSO initially takes the corresponding value of the primary font for each character in the user file from the first character image table. If the value is ≠ 0, RSO transfers this value from the first table to the buffer. If the value is 0, RSO interprets it as a command for a change of font and inserts the control character SO before loading the character from the corresponding position in the second character image table into the buffer.

Once the second font is switched on, the characters from the user file will continue to be interpreted according to the second character image table until the corresponding position in the table again supplies the value 0 ('C3' in the example below). RSO again interprets this as a font change command, inserts the control character SI at this point in the user file (thus switching back to the primary font) and loads the corresponding value from the first character image table into the buffer ('B' in the example below).

This method has the advantage that the user does not need to write any SI and SO control characters into his user file. He need only define a secondary font by means of one of the two methods described above, and write his file according to the values of the first and second character image tables.

The two character image tables must be linked with the desired printer in the device entry by specifying these character image tables in the CHARACTER-IMAGE operand in the ADD-SPOOL-DEVICE statement (systems support and RSO device administrator privilege).

*Example*

CHARACTER-IMAGE=xxx
```
    0  1  2  3  ... E  F
0
1
2
.
.
C   C1      C2 ◄──────── Switch (3) ──────── C ──────── 00
D
E            00 ──────── Switch (2) ──────── E ──────────► 50
F
```
        │ (1)
        ▼
Primary font
```
    0   1   2  ...
0
1
.
.
.
C       A   B
D
```

CHARACTER-IMAGE=yyy
```
    0  1  2  3  ... E  F
0
1
2
.
.
C
D
E
F
```
        │
        ▼
Secondary font
```
    0   1   2  ...
0
1
.
.
5   P
.
F
```
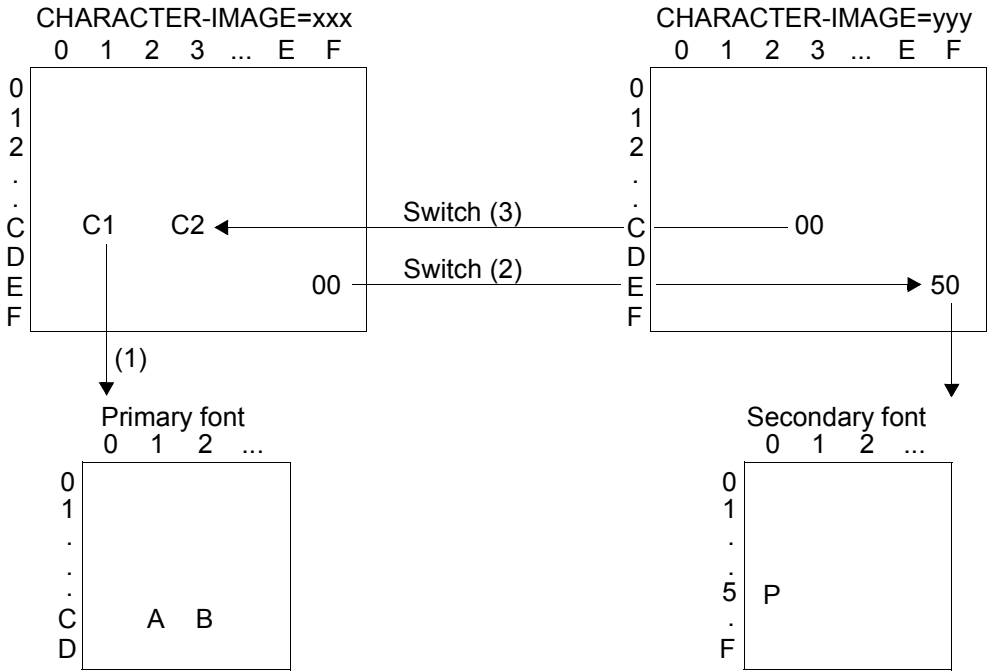
*Explanatory notes*

1. RSO finds the code X'C1' in the print data (the primary font is activated). The code X'C1' is found at the X'C1' position in the first CHARACTER-IMAGE table (xxx). This code is passed on and causes the character 'A' to be printed at printout because this character is assigned to code X'C1' in the primary font; the primary font remains activated.

2. The next character in the print data is X'EF'. Since this character is assigned X'00' in the code table, the second CHARACTER-IMAGE table (yyy) is used. In this code table, the incoming X'EF' code is assigned code X'50'.

   RSO therefore first switches to the secondary font (with SO) and then sends code X'50'. Since the character 'P' is assigned to code X'50' in the secondary font, 'P' is then printed. The secondary font remains activated.

3.  RSO then finds code X'C3' in the data. Since the value X'00' is assigned to code X'C3' in CHARACTER-IMAGE table yyy, RSO switches back to the first CHARACTER-IMAGE table xxx where it finds the assigned value X'C2' for code X'C3'.

    RSO therefore first switches to the primary character set with SI and then sends code X'C2'. Since this code is assigned the character 'B' in the primary font, a 'B' is printed. The primary font remains active.

*Notes*

–   All font characteristics should be specified when first defining a font for a spoolout job.

–   A print page should always be seen as a complete entity, i.e. all the features of a printed page, such as font characteristics etc., should be set out at the beginning of each page, so as to avoid confusion when earlier pages are repeated (e.g. with RESUME-SPOOLOUT).

*Example*

```
        .                    Bold
        .                     ..
      Bold                    ..
       ..                     ..
       ..                     ..
       ..                     ..
       ..                     ..

     Page 1                 Page 2
```
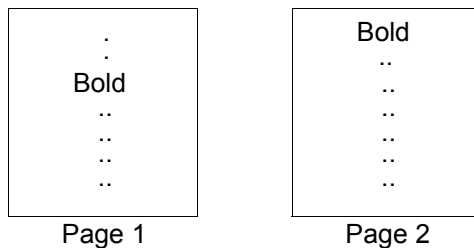
The repetition of the 'bold' function at the beginning of the second page ensures that this function is also switched on if the print job is repeated from page 2 onwards.

–   If a character set linked to a font is called, then first of all the control character sequences (defined in the RSOSERVE utility routine) for loading the font are sent to the printer. The characteristics of the character set (defined in the SPOOL parameter file) are then compared with the font characteristics. Systems support and the RSO device administrators are responsible for ensuring that the character sets are defined in such a way that they do not cause a change of font.

–   The contents of the definition of a logical font are not checked by RSO. Systems support must ensure that no problems can result from the definitions of the logical font.

## 3.1.6   Left and top margins

For printers that support the control language PCL, it is possible to define a horizontal or vertical blank strip at the left or top edge of the sheet. This margin is produced by shifting the logical page on the physical page. The definition of the blank strip at the edge of the sheet can be used in single or duplex printing and has the same effect in both cases, irrespective of the page orientation.

The values for setting the margin are relative to the preset position of the logical page on the sheet. These value are not specified relative to the current position.

*Note*

A false margin setting can mean that the logical page no longer fits onto the sheet and that the data therefore cannot be printed. In such cases, RSO does not issue a warning to the user.

### Supported printer types

The margins can be set for the following printer types: 2030-PCL, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9021, 9022-200 and 9026-PCL.

### 3.1.6.1   Setting the margins

The margins can be set using the operands TOP-OFFSET and LEFT-OFFSET when creating the print job with the PRINT-DOCUMENT command.

### TOP-OFFSET = <signed integer>

Defines the spacing in millimeters between the logical page and the top margin of the physical page.

The value defines the position of the logical page on the vertical axis (the longer edges) of the page. Values in the range -255 to 255 are permissible.

Independent of the orientation of page, positive values move the logical page down along the horizontal axis, whereas negative values move it up along the horizontal axis.

If the pages should be linked to the long edge of the pager for duplex printing, i.e. TWO-SIDED=*TUMBLE was specified. the margin setting on the reverse side of the sheet has the opposite effect. That is, positive values move the logical page up along the horizontal axis, whereas negative values move it down.

**LEFT-OFFSET = <signed integer>**

Defines the spacing in millimeters between the logical page and the left margin of the physical page.

The value defines the position of the logical page on the horizontal axis (the shorter edges) of the page. Values in the range -255 to 255 are permissible.

Independent of the orientation of page, positive values move the logical page to the right along the horizontal axis, whereas negative values move it to the left along the horizontal axis.

If the pages should be linked to the long edge of the pager for duplex printing, i.e. TWO-SIDED=*YES was specified. the margin setting on the reverse side of the sheet has the opposite effect. That is, positive values move the logical page to the left along the horizontal axis, whereas negative values move it to the right.

### 3.1.6.2   Interdependencies

**DOCUMENT-FORMAT**

It is not permissible to specify a margin setting for a print job initiated by means of DOCUMENT-FORMAT=*SPECIAL-FORMAT in the PRINT-DOCUMENT command. If the printout is to have this document format, printer control must not select any printer settings which contradict the settings made by the document.

The PRINT-DOCUMENT command is rejected if the TOP-OFFSET and LEFT-OFFSET operands are used with the value *IGNORE in conjunction with DOCUMENT-FORMAT=*SPECIAL-FORMAT.

**TWO-SIDED=*TUMBLE**

If the pages are to be joined at the short edge after two-sided printing, i.e. if TWO-SIDED=*TUMBLE was specified, the margin setting on the reverse side is inverted. In other words, positive values for TOP-OFFSET shift the logical page upwards, and negative values shift it downwards.

**TWO-SIDED=*YES**

If the pages are to be joined at the long edge after two-sided printing, i.e. if TWO-SIDED=*YES was specified, the margin setting on the reverse side is inverted. In other words, positive values for LEFT-OFFSET shift the logical page to the left, and negative values shift it to the right.

**Header and Trailer pages**

Header and Trailer pages are always printed without margins. The margins are set for the entire document and reset after the last page in the document.

**Printer resources**

Prolog, epilog, DIA, member and font strings are sent to the printer before the margins are set.

The value *IGNORE for TOP-OFFSET and LEFT-OFFSET stipulates that printer control does not send any margin settings to the printer. This means that the settings from the prolog file take effect for this print job.

## 3.1.7   Rotation

Pages can be printed in any of four formats (orientations): portrait, landscape, portrait (upside down) and landscape (upside down). For RSO, these formats correspond to rotating the page through various degrees.The following diagram shows the four formats. The X axis is parallel to the lines. The arrow on the X axis indicates the normal direction of writing from left to right. The Y axis is parallel to the columns. The arrow on the Y axis points from top to bottom, i.e. at right angles to the normal direction of writing.
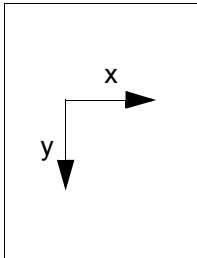
Rotation through 0°      Rotation through 90°     Rotation through 180°   Rotation through 270°
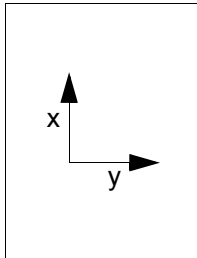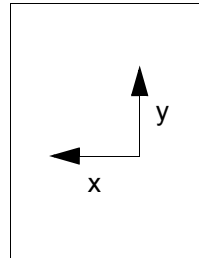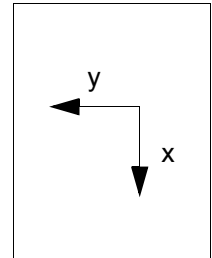
|                |                |                |                 |
| x              | x              | y              | y               |
| y              | y              | x              | x               |
| Portrait       | Landscape      | Portrait       | Landscape       |
| upright        | upright        | upside down    | upside down     |

### Supported printer types

Not all printers can print in all four page orientations. The following printers can only print upright in portrait and landscape modes: 4812, 9021, 9022-200, 9025 and DJET.

The following printers can print in all four page orientations: 2030-PCL, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 9000-PCL, 9026-PCL and 9026-RENO.

## 3.1.7.1  Using page rotation for a document

The page rotation value can be specified by means of the ROTATION operand of the PRINT-DOCUMENT command. When printing in both landscape modes, the page length becomes the page width. For this reason, two different loops for line and page feed control are required for portrait mode and landscape mode.

When printing in portrait mode, i.e. with ROTATION=0 or 180, the loop name specified in the LOOP-NAME parameter of the PRINT-DOCUMENT command applies. When printing in landscape mode, i.e. with ROTATION=90 or 270, the name specified in the ROTATION-LOOP-NAME parameter of the PRINT-DOCUMENT command applies.
Default values for the LOOP-NAME and ROTATION-LOOP-NAME parameters are stored in the relevant form record.

When printing with different page orientations, different character densities may be required. The character set specified via the CHARACTER-SET parameter is used with every selected page orientation. Nevertheless, there exist default values for two character sets. When printing in portrait mode (ROTATION=0 or 180), the character set specified in the CHARACTER-SET parameter of the SPOOL form record definition is used. When printing in landscape mode (ROTATION=90 or 270) the character set specified in the ROTATION-CHARACTER-SET of the SPOOL form record definition is used.

If ROTATION=*NO was specified in the PRINT-DOCUMENT command, printer control does not send a setting for page orientation to the printer. Accordingly, the page orientation setting corresponds either to the printer default value or to the setting from the prolog file.

In the case of a print job with ROTATION=*NO (default value), RSO checks whether the values for ROTATION-LOOP-NAME or ROTATION-CHARACTER-SET have been defined in the SPOOL form record definition. If values have been entered under these parameters, the specified loop and character set are used for this print job. If no values have been specified for the ROTATION-LOOP-NAME or ROTATION-CHARACTER-SET parameter of the SPOOL form record definition, the loop specified under LOOP-NAME and the character set specified under CHARACTER-SET are used.

### 3.1.7.2    Interdependencies

**DOCUMENT-FORMAT = *SPECIAL-FORMAT**

The PRINT-DOCUMENT command is rejected as soon as the operand
DOCUMENT-FORMAT=*SPECIAL-FORMAT is used together with ROTATION=0, 90, 180
or 270.

**TWO-SIDED = *NO / *YES / *TUMBLE**

The ROTATION parameter affects how the TWO-SIDED parameter works. For further
details see section "Two-sided printing (duplex mode)" on page 82.

**Header and Trailer pages**

Header and Trailer pages are always printed without rotation and in (upright) portrait mode.
Rotation is set before the document is printed and reset after the last page of the document
has been printed.

**Printer resources**

Prolog, epilog, DIA, member and font character strings are sent to the printer before rotation
is set.

## 3.1.8   Two-sided printing (duplex mode)

Printers such as HP-LaserJet, 9026 etc. are equipped with an optional device for two-sided
printing and for storing pages face down, and are thus capable of supporting both single-
sided and two-sided printing.

As well as specifying whether you want single-sided or two-sided printing, you must also
specify which edge is to be used for stapling or binding the paper. Here, you can choose
the short edge or the long edge. In total, therefore, there are four possible types of two-sided
printing.

**Supported printer types**

Two-sided printing is possible with the following printers and the optional device: 2030-PCL,
4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9026-PCL and
9026-RENO.

### 3.1.8.1    Duplex printing

The ROTATION and TWO-SIDED operands of the PRINT-DOCUMENT command define how duplex printing is to be performed.

The abbreviations are explained after the diagrams below.

**TWO-SIDED=\*YES together with ROTATION=\*NO, ROTATION=0 or ROTATION=180**

Orientation: portrait. The pages are bound along the long edge.
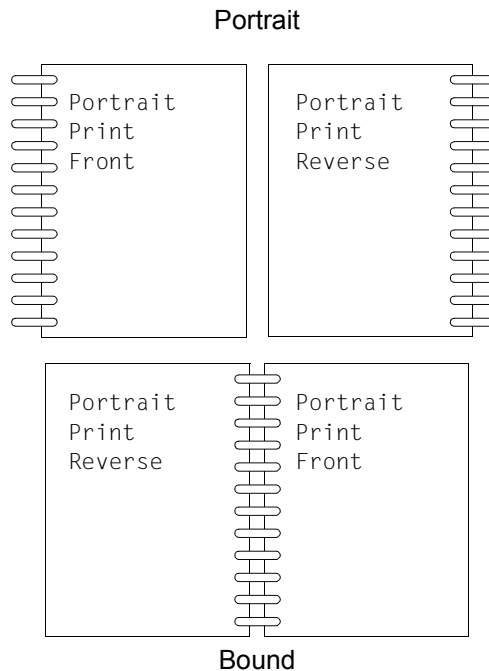
Portrait

```
Portrait          Portrait
Print             Print
Front             Reverse
```

```
Portrait          Portrait
Print             Print
Reverse           Front
```

Bound

**TWO-SIDED=*YES together with ROTATION=90 or ROTATION=270**

Orientation: portrait. The pages are bound along the short edge.

Landscape

```
Landscape
Print
Front
```

```
Landscape
Print
Reverse
```

```
Landscape      Landscape
Print          Print
Reverse        Front
```
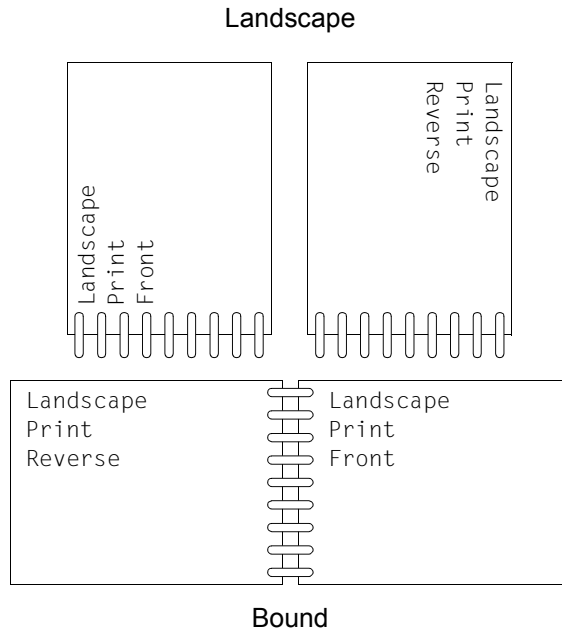
Bound

**TWO-SIDED=*TUMBLE together with ROTATION=*NO, ROTATION=0 or ROTATION=180**

Orientation: landscape. The pages are bound along the short edge.

Portrait

```
Portrait
Print
Front
```

```
Portrait
Print
Reverse
```

```
Portrait
Print
Reverse
```

```
Portrait
Print
Reverse
```
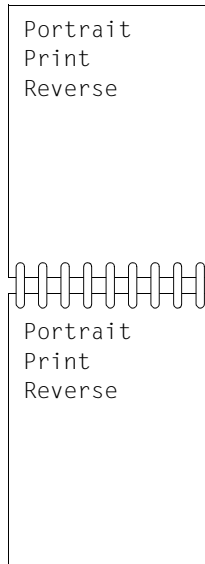
Bound

**TWO-SIDED=*TUMBLE together with ROTATION=90 or ROTATION=270**

Orientation: landscape. The pages are linked along the short edge.

Landscape



Bound
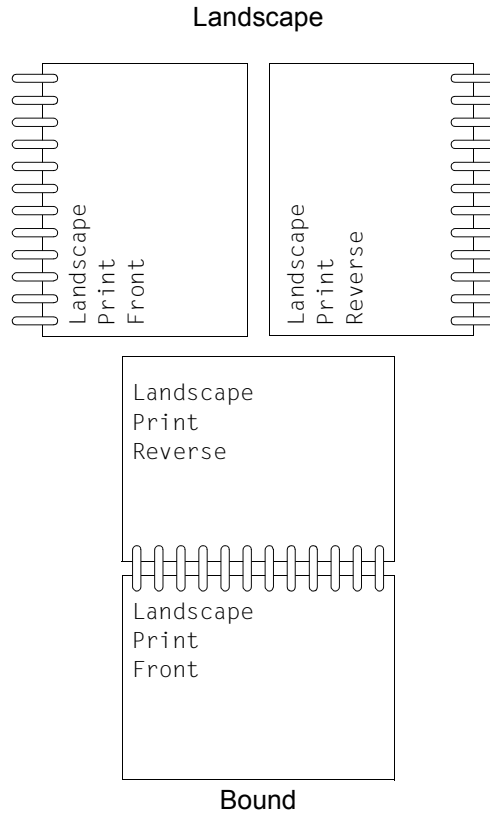
#### 3.1.8.2   Interdependencies

#### Document formats

Two-sided printing is not permissible for a print job initiated with the setting DOCUMENT-FORMAT=*SPECIAL-FORMAT of the PRINT-DOCUMENT command. If this document format is to be used for printing, printer control must not select any printer settings which contradict the settings made by the document.

The PRINT-DOCUMENT command is rejected if the operand TWO-SIDED=*NO, TWO-SIDED=*YES or TWO-SIDED=*TUMBLE is used together with DOCUMENT-FORMAT=*SPECIAL-FORMAT.

#### ROTATION=*IGNORE

This parameter specifies that rotation has to be set by RSO control. If ROTATION=*IGNORE was specified together with TWO-SIDED=*YES/*TUMBLE, control assumes that the printout is to be in portrait mode.

#### Restarting after a print error

After an error, it is sometimes necessary to restart the printout at a particular point within the print document. If the printout of the document was two-sided, the first page of the restarted job is a front side.

In the case of print jobs created with the operands DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*PAGE-MODE) or DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*PHYSICAL), the physical limits of the page within the document are not known. Consequently, the restart procedure is not able to ensure that the remainder of the print job starts with a front side.

#### FROM=<integer value>

If the parameter FROM=n of the PRINT-DOCUMENT command is used, printout of the document always begins with a front side. It does not matter what value was specified for TWO-SIDED or whether an even page number was requested for the first page.

#### Header and Trailer pages

Header and Trailer pages are always printed as single-sided printouts. The printer is switched to two-sided printing as soon as the user document is printed. Once this document has been printed, the printer is switched back to single-sided printing.

### Printer resources

Prolog, epilog, DIA, member and font strings are sent to the printer in single-sided print mode. The printer is switched to two-sided printing as soon as the user document is printed. Once this document has been printed, the printer is switched back to single-sided printing.

The parameter TWO-SIDED=*STD can likewise be specified. This instructs printer control to send settings for two-sided printing to the printer, so that the settings from the prolog take effect for this print job.

### Trailer pages for the 9026-RENO Printer

In the case of RENO printers, switching to single-sided printing does not set the print position to the front side of the following page. In order to print the Trailer page on a separate sheet, RSO printer control inserts a page feed command at the end of the document if the print job ends with a front side.

For certain document formats RSO printer control cannot identify which side of a page is the last one in a print job. In such cases, the page feed command is always inserted.

For print jobs with DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE= *PAGE-MODE) or DOCUMENT-FORMAT=PAGE-FORMAT(CONTROL-MODE= *PHYSICAL) the Trailer page may be preceded by an empty side.

### 3.1.9  Resources created with PC tools

When transferring resources such as DIA into BS2000, note that RSO can process resource files with a record length up to STD (2). For longer records, the structure of the resource file must be altered to comply with RSO requirements before RSO can use the resource.

### 3.1.10  Large objects and files

**Accessing large objects**

The ever-increasing capacity of disks makes it necessary for BS2000 also to support large volumes. Support for large volumes (> 32GB) is guaranteed for all Spool & Print products. This support is transparent to the end user because there are no changes to the interface.

**Accessing large files**

Large files are supported as of OSD V5.0.
A document that is 32 GB in size represents several million A4 pages and even the fastest printer would need two weeks to print it.
Since no plausible application models currently exist for printing such large files, Spool & Print services do not support large files as yet. Print requests for large files are rejected on evaluation of the print command and a message is issued.

## 3.2   Using filters - SPCONV subsystem

The SPCONV subsystem implements the filter technology in the Spool & Print environment. Filters convert documents and print resources into the format they require for the document to be output to a particular printer. They enable users to start print jobs which would normally not be executable because the document format is not supported by any of the available printers.

As of SPOOL V3.2A, the functions for defining and activating filters are available with SPCONV V1.0A (see the "SPCONV (BS2000/OSD)", "SPSERVE (BS2000/OSD)" and "PRM (BS2000/OSD)" manuals).

Filters can be used as of RSO V3.0B. Below you will find possible application models and an example of printing documents in HP format on an RSO-PCL printer.

*Note*

> When filters are used, the Trailer page no longer shows the user input, but instead any changes which have been caused by the filter.

### 3.2.1   Application models for filters

–   If old remote printers are taken out of an RSO configuration and replaced by modern printers with new capabilities, production can be redirected to these new printers without the need to change the existing applications. All you have to do is define a filter which converts the old document format into the corresponding new format.

–   Using filters, documents whose printer language is no longer supported can be migrated to documents whose format can be output by available printers.

–   Before printing large numbers of copies of a document, it makes sense to refine the document during the creation process by means of sample printing, e.g. on a client desktop PCL printer. Depending on the format of the document, this requires a filter which converts it.

## 3.2.2   Printing an HP document on an RSO-PCL printer

To print an HP document on an RSO-PCL printer, SPOOL V3.2A or higher, RSO V3.0B or higher and SPCONV V1.0 or higher must be installed and running on your system.

To activate the standard filter HP2PCL, systems support must proceed as follows:

►   Define an RSO printer which supports the printing of PCL documents and on which the filtered document will be printed. This is done using the following SPSERVE statement:

```
ADD-SPOOL-DEVICE DEVICE-NAME=DOSP1111,
                 DEVICE-TYPE=4821-PCL-REMOTE-PRINTER,
                 ...
                 SUPP-FORMAT-NAMES=(*TEXT,'PCL')
```

►   Define the HP2PCL filter with the following SPSERVE statement:

```
ADD-SPOOL-FILTER FILTER-NAME=HP2PCL,
                 FILTER-LOCATION=*SYSTEM,
                 OBJECT-NAME=HP2PCL,
                 INPUT-FORMAT-NAME=*HP,
                 OUTPUT-FORMAT-NAME='PCL',
                 REDIRECTION=*REMOTE(DEVICE-NAME=DOSP1111)
```

The name of the filter is HP2PCL. It can be found as an element of type L in the default filter library SYSLIB.SPCONV.010 or SRMLIB.SPCONV.010. The name of the L element must be the object name. This object name is also used as the filter entry. The filter accepts HP-formatted documents (PRINT-DOC *PAGE-MODE) as input and creates documents with the format name 'PCL'. The output is automatically sent to the PCL printer DOSP1111.

►   Define formats which correspond to those of the HP or HP90 and which are used for printing on the PCL printer.

```
ADD-SPOOL-FORM FORM-NAME=A4, DEVICE-TYPE=4821-PCL-REMOTE-PRINTER
```

All HP print jobs started in this example use the format A4.

►   Migrate the HP resources to the corresponding PCL resources.

If all HP resources used are present in the system PRFILE, systems support can migrate this PRFILE in order to generate the corresponding PCL resources. The statement

```
MIGRATE-PRINT-RESSOURCES *ALL,$SYSSPOOL.PRFILE
```

generates the corresponding PCL resources for all HP fonts and FOBs contained in the $SYSSPOOL.PRFILE.

► This sends all documents which have the *HP format to the HP2PCL filter, provided there is no HP or HP 90 printer in the local environment. This is the case, for example, with OSD-SVP V1.0, as no HP or HP90 printers can be connected to an SR2000 processor. The corresponding print jobs are sent to the printer DOSP1111.

*Examples of print jobs which are accepted and processed by the HP2PCL filter*

```
/PRINT-DOCUMENT MYFILE,DOC-FORMAT=*PAGE-MODE,-
                    RES-DESC=*P (FORM-NAME=A4)

/PRINT-DOCUMENT MYFILE,DOC-FORMAT=*PAGE-MODE,-
                    RES-DESC=*P (FORM-NAME=A4,LOOP=L1)

/PRINT-DOCUMENT MYFILE,DOC-FORMAT=*PAGE-MODE,-
                    RES-DESC=*P (FORM-NAME=A4,CHAR-SET=F1)

/PRINT-DOCUMENT MYFILE,DOC-FORMAT=*PAGE-MODE,-
                    RES-DESC=*P (FORM-NAME=A4,OVERLAY=*P(F-O-B=O1))

/PRINT-DOCUMENT MYFILE,DOC-FORMAT=*PAGE-MODE,-
                    LAYOUT-CONTROL=*P(PAGE-COPIES=5,ROTATION=90)
```

## 3.3  Job control

The user can generate RSO jobs for RSO printers or RSO pools with the PRINT-DOCUMENT command (PRINTER-NAME operand or via the pool name) or with the PRNTDOC macro.

RSO printers (and RSO pools, if necessary) must be entered in the SPOOL parameter file (ADD-SPOOL-DEVICE or EDIT-SPOOL-DEVICE statement for systems support in the SPSERVE utility routine). The user can obtain the name of the desired RSO device using the SHOW-SPOOL-DEVICES command.

**Controlling jobs**

The user can control jobs for a given printer using the commands:

– RESUME-SPOOLOUT

– REDIRECT-REMOTE-OUTPUT

– PRINT-DOCUMENT

– CANCEL-JOB

The jobs are printed sequentially, provided that RSO jobs of type 7 are waiting in the queue and the scheduling criteria (see START-PRINTER-OUTPUT) match when the printer was activated. The printer then has status "R" with the corresponding TSN, and the corresponding spoolout has status "ACT".

If there are no other SPOOL jobs, the physical connection (if defined for this device) is cleared down. The virtual connection remains intact.

When the physical connection is cleared down, the RSO printer is again available for another DCAM application (or for RSO started on another processor). The RSO master task automatically reestablishes the physical connection for new print jobs.

## 3.4  Requesting information

This section provides an overview of the information that can be requested by the user. Four types of information may be distinguished:
– information from the SPOOL.PARAMETERS file
– information from the RSOFILE and SYSPAR.RSO.035.USER files
– information about RSO jobs
– information about the status of RSO printers

**Information from the SPOOL.PARAMETERS file**

The commands and SPSERVE statements mentioned below are described in detail in the manuals "Spool & Print - Commands (BS2000/OSD)" and "SPSERVE (BS2000/OSD)".

*General entries*

Any user can interrogate the global RSO parameters by means of the SHOW-SPOOL-PARAMETERS command or SPSERVE statement.

*Device entries*

A device entry is defined in the SPOOL.PARAMETERS file by systems support for each RSO device. Any user can request the device information by means of the SHOW-SPOOL-DEVICES command or SPSERVE statement.

*Printer pool entries*

A printer pool entry is created in the SPOOL.PARAMETERS file whenever systems support defines an RSO pool for RSO printers. Any user can request information about all existing pools or a particular pool by means of the SHOW-PRINTER-POOLS command or SPSERVE statement.

*Form entries*

A form can be defined by systems support or by an RSO device administrator. The form describes the paper format on a particular printer type (with VFB and default character set). Any user can request information about RSO forms by means of the SHOW-SPOOL-FORMS command or SPSERVE statement.

*Character set entries*

For each character set that is used in the PRINT-DOCUMENT command or in a form entry, a character set entry must be defined in the SPOOL.PARAMETERS file. Any user can request information about character sets by means of the SHOW-SPOOL-CHARACTER-SETS command or SPSERVE statement.

**Information from the RSOFILE and SYSPAR.RSO.035.USER files**

All the information described below can be requested on the screen "ML1SHOW" (see the "RSOSERVE" manual) which appears when you select the action 4/DISPLAY in the initial screen of RSOSERVE.

*Character image*

A character image table consists of a conversion table that is used for every spoolout on a particular printer. A character image table must be defined in the $TSOS.RSOFILE file by systems support. A character image table is linked in the device entry to the RSO printer (by means of the SPSERVE statement ADD-SPOOL-DEVICE or MODIFY-SPOOL-DEVICE).

*Translation table*

A translation table specifies that the characters of the file to be printed are translated in accordance with the table that is specified in the PRINT-DOCUMENT command. A translation table can be defined by any user and must be stored in the system RSOFILE or in a user RSOFILE in order that it may be used during printing.

*Loop record*

A loop record is a means of controlling form feed (vertical paper motion). It defines each line of a "logical page". Each byte of a loop record corresponds to one line of the RSO form and contains information about the current line spacing and the channel number. A loop record can be specified by systems support or by an RSO device administrator in an RSO form, or by any user directly in the PRINT-DOCUMENT command with the LOOP-NAME operand. A loop record can be created by any user. It must be stored in the system RSOFILE or in a user RSOFILE in order that it may be used during printing.

*Band ID*

A band ID is a code table that is loaded into the 9645 Printer for printing, if so specified in the device entry.

*RSO character set and RSO font*

Any user can request information for any printer type about existing RSO fonts and their possible links with RSO character sets. RSO fonts are described on page 60ff.

*Member*

Any user can have the members listed that are linked with a form for an RSO printer. Members are described in section "Additional functionality of the 9025 and 9026-RENO Page Printers" on page 594ff.

**Information about RSO jobs**

Certain commands can be issued by any user in order to obtain information about RSO jobs. The scope of the information depends on the user's level of privilege (systems support, RSO device administrator, or nonprivileged) and on the command operands that are specified. The following commands provide information about RSO jobs:

– SHOW-JOB-STATUS

– SHOW-USER-STATUS JOB-TYPE=*RSO

– SHOW-PRINT-JOB-STATUS

For a detailed description of these commands, refer to the "Spool & Print - Commands (BS2000/OSD)" manual.

**Information about the status of RSO printers**

Certain commands can be issued by any user in order to obtain information about the status of RSO printers (for example, how the printer was started, whether it is currently printing, whether an error has occurred etc.). The scope of the information depends on the user's level of privilege (systems support, RSO device administrator, or nonprivileged) and on the command operands that are specified.

Information about the printer status can be requested with the following commands:

– SHOW-SYSTEM-STATUS INF=*REMOTE(*ALL)

– SHOW-SYSTEM-STATUS INF=*REMOTE(*rso-printer*)

– SHOW-ACTIVE-SPOOL-DEVICES *rso-printer*

– SHOW-ACTIVE-SPOOL-DEVICES DEST=*REMOTE

– SHOW-ACTIVE-SPOOL-DEVICES DEST=*PUBLIC-REMOTE

For a detailed description of these commands, refer to the "Spool & Print - Commands (BS2000/OSD)" manual.

# 3.5  Commands for the nonprivileged user

| Command | Function | Note |
|---|---|---|
| CANCEL-PRINT-JOB | Cancel or prevent start of an RSO job | 1. |
| CHANGE-TASK-PRIORITY | Change the priority of an RSO job | 1. |
| HELP-MSG-INFORMATION | Provide additional information on the screen for messages | |
| MODIFY-PRINT-JOB-ATTRIBUTES | Modify the parameters of the print job | 1. |
| PRINT-DOCUMENT | Initiate spoolout on the specified RSO device | |
| REDIRECT-PRINT-JOB | Forward RSO jobs from one printer to another | 1. |
| RESUME-PRINT-JOB | Resume an RSO job | 1. |
| SHOW-ACTIVE-SPOOL-DEVICES | Output information on active RSO devices | 2. |
| SHOW-JOB-STATUS | Output information on a job | 1. |
| SHOW-PRINTER-POOLS | Output information on RSO pools | |
| SHOW-PRINT-JOB-ATTRIBUTES | Display information on print job operands | 1. |
| SHOW-PRINT-JOB-STATUS | Display information to the user on RSO jobs | 1. |
| SHOW-SPOOL-CHARACTER-SETS | Display information on character sets | |
| SHOW-SPOOL-DEVICES | Display information on RSO printers | |
| SHOW-SPOOL-FORMS | Display information on forms | |
| SHOW-SPOOL-PARAMETERS | Display the current SPOOL parameter list | |
| SHOW-SYSTEM-STATUS | Output information on the system | 1. |
| SHOW-USER-STATUS | Output information on a group of user jobs | 1. |

*Notes*

1.  Nonprivileged users can only reference jobs running under their own user IDs.

2.  Nonprivileged users only receive information about devices, for which their user ID or *ALL is entered in the authorization list.

## 3.6    Using the SPOOL Notification Service in RSO

This document describes the support of the notifications for print jobs in the frame of the RSO V3.4A product. For details about the SPOOL Notification Service SNS V1.0A, refer to the manual "SNS (BS2000/OSD)".

The following aspects are described:

– The different object classes and their associated events
– The available object instance attributes
– The registration into the Notification Service
– The extensions in the PRINT-DOCUMENT command
– The extensions in the PRNTDOC macro
– Privilege policy
– Global usage models

*General remark*

Only notifications for print jobs and RSO printers are supported. In Spool & Print, the following types of print jobs are distinguished: local spool jobs, RSO print jobs, and distributed print jobs. In this section, only RSO print jobs are addressed. A new domain RSODEV has been defined for RSO printers.

### 3.6.1    RSO notification resources

This section describes the specific RSO notification resources and their registration in the Notification Service.

#### 3.6.1.1    Registration into the Notification Service

In order to make the notification for RSO jobs available, it is necessary to define some notification resources that are specific for RSO. Those resources have to be registered in the Notification Service. A specific procedure has been released for this purpose: SYSPRC.RSO.035.NOTIF. This procedure has to be executed once, after the installation of RSO V3.5A and SNS V1.0A. See the release notices of both products for details.

#### 3.6.1.2    Object class

The object class corresponding to remote print jobs is named RSOJOB and it belongs to the domain SPPRINT.

The object class corresponding to remote printers is named RSOPRNTR and it belongs to the domain RSODEV.

### 3.6.1.3   Events

The following events are supported by RSO:

| Event names | Meaning |
|---|---|
| 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:<br>–   MODIFY-PRINT-JOB-ATTRIBUTES<br>–   REDIRECT-PRINT-JOB |
| PRINTJOBSTARTED | Raised when a print job spoolout is started on an RSO printer. |
| PRINTJOBABORTED | Raised when a print job terminates abnormally.<br>This occurs when<br>–   CANCEL-PRINT-JOB command is given<br>–   spoolout controller terminated a print job abnormally<br>–   a cold or selective start of the RSO 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.<br>This occurs when<br>–   spoolout controller keeps a print job after an error<br>–   an EXPORT-PUBSET command is given |
| PRINTJOBRESUMED | Raised when a print job changes from keep state to wait state.<br>This occurs when one of the following commands is given:<br>–   RESUME-PRINT-JOB<br>–   IMPORT-PUBSET |
| PRINTERSTARTED | Raised when an RSO printer is assigned for spoolout |
| PRINTERSTOPPED | Raised when the assignment of an RSO printer is cancelled |
| PRINTERINERROR | Raised when an error occurs on a printer (no paper, paper jam, ...) |

## 3.6.2   Supported print job attributes

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

Those attributes are:

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

  *Examples*

  ```
  var(*LIST).TSN
  => attribute 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 name | Values | Meaning |
|---|---|---|
| FILE-TYPE | *OMF<br>*PLAM<br>*SYSLST<br>*SYSOUT<br>*EAM<br>*UFS<br>*BS2<br>*TMP | Type of the spoolout file |
| FCB-TYPE | *PAM<br>*SAM<br>*ISAM<br>*EAM<br>*TAPE<br>*BTAM | File access method |
| REC-FORM | *V<br>*F<br>*U | Record format |
| JOB-TYPE | *SPOOL-JOB<br>*DPRINT-JOB<br>*CLIENT-COPY<br>*SERVER-COPY | Print job type |
| RSO-PRINT-JOB | *YES<br>*NO | Print job is RSO or not |
| CLUSTER-TYPE | *HOME<br>*UNIX<br>*BS2000 | Cluster type from which the print job has been submitted |
| SBSD-CALLER | *YES<br>*NO | Print job has been processed by the BSD gateway |

| Attribute name | Values | Meaning |
|---|---|---|
| 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 page 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 UNIX print jobs |
| LONG-HOST-NAME | Char(1..255) | Long host name for UNIX print jobs |
| POSIX-FILE-NAME | Char(1..1024) | Full file name of POSIX file |
| CLIENT-HOSTNAME | Char(8) | Name of the client host |

All these 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.

### 3.6.3   Supported printer attributes for RSO printers

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

Those attributes are the same as those returned by the command
SHOW-SYSTEM-STATUS INFORMATION=*REMOTE(printername)

| Attribute name | Values | Meaning |
|---|---|---|
| DEV-NAME | <dev-name> | Device name |
| STA | "A"<br>"D"<br>"I"<br>"M"<br>"R"<br>"S"<br>"W" | Printer status |
| CURR-USER-ID | <user-id> | User id of the current print job |
| CURR-TSN | <tsn> | TSN of the current print job |
| ERR-CODE | <error code> | Error code |
| ERR-MSG | <error message> | Error message |
| EXIT | *NO<br>*YES | Are exits activated for the specified device? |
| SRAM-TSK | <tsn> | TSN of the SRAM task for the device |
| CTRL-TSK | <tid> | TID of the RSO controller task for the device |

All these 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.

## 3.6.4  Dedicated privilege policy

**Policy for print jobs**

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

The following privilege rules are implemented:

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 being DEVICE-ADMINISTRATOR of a set of RSO printers can be notified of:
   – all its own print jobs
   – all the print jobs of all other users addressed to one of its administered printers

3. A userid without Spool&Print privileges can be notified of all its own print jobs

**Policy for RSO printers**

A specific privilege policy checks if the owner of a subscription is entitled to be notified of the events of a specific RSO printer. This policy is provided as call back subroutine used by SNS.

The following privilege rules are implemented:

1. A userid with the PRINT-ADMINISTRATION privilege can be notified of all the RSO printers defined in its system

2. A userid being DEVICE-ADMINISTRATOR of a set of RSO printers can be notified of all its administered printers

### 3.6.5   Print job submission - extensions for the notification service

The PRINT-DOCUMENT command and the PRNTDOC macro have been extended to support the notification and the macro SNPPRNT is provided.

**PRINT-DOCUMENT command extension**

The PRINT-DOCUMENT command has been extended with the operand NOTIFICATION. This operand is to be used also for RSO jobs.  For details, refer to the manual "Spool & Print - Commands (BS2000/OSD)".

**PRNTDOC macro extension**

The PRNTDOC macro has been extended to support the notification service and the macro SNPPRNT is provided.  Use those macros for RSO jobs. For details, refer to the manual "Spool & Print - Macros and Exits (BS2000/OSD)" and the SPOOL V4.5 documentation.

### 3.6.6   SPSERVE - extensions for the notification service

The following SPSERVE statements have been extended:

–   The ADD-SPOOL-DEVICE statement has been extended with the parameter NOTIFICATION in order to support the notification handling. This parameter is to be used for RSO devices.

–   The MODIFY-SPOOL-DEVICE statement has been extended with the parameter NOTIFICATION in order to support the notification handling. This parameter is to be used for RSO devices.

–   The SHOW-SPOOL-DEVICE statement has been extended with the parameter NOTIFICATION in order to support the selection of devices for which notifications are allowed or not. This parameter is to be used for RSO devices.

For details on these statements, refer to the SPSERVE (BS2000/OSD) documentation.

## 3.6.7  **Usage models**

This section describes the usage models for RSO printing: permanent and temporary subscription. It also describes the usage model for the administration of RSO printers.

### 3.6.7.1  **RSO printing - permanent subscription**
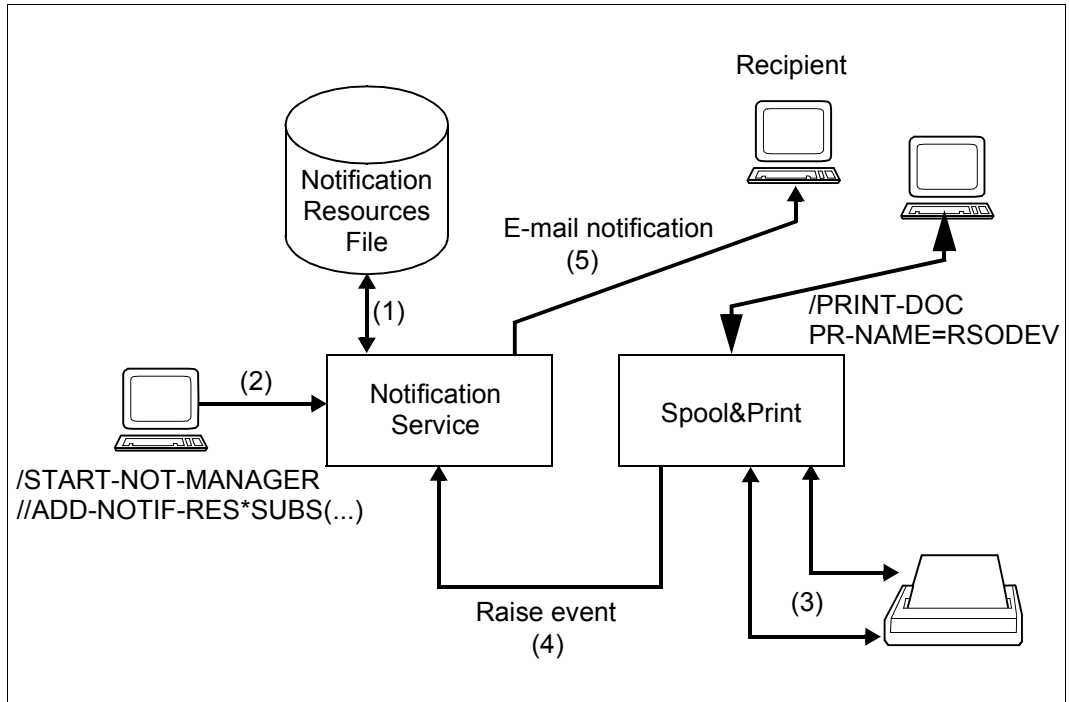


Figure 3: RSO printing - permanent subscription

**Set up of the notification environment (1)**

A notification resources file contains all the notification resources necessary to allow the notification of remote print job events. It has been updated by the procedure SYSPRC.RSO.035.NOTIF released with RSO V3.5A (1).

**Permanent print job subscription (2)**

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

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

When an event occurred (3), the Spool&Print products warn 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 (i.e. MAILTO) and target address identified in the recipient attribute of the subscription object (5).

## 3.6.7.2 RSO printing - temporary subscription
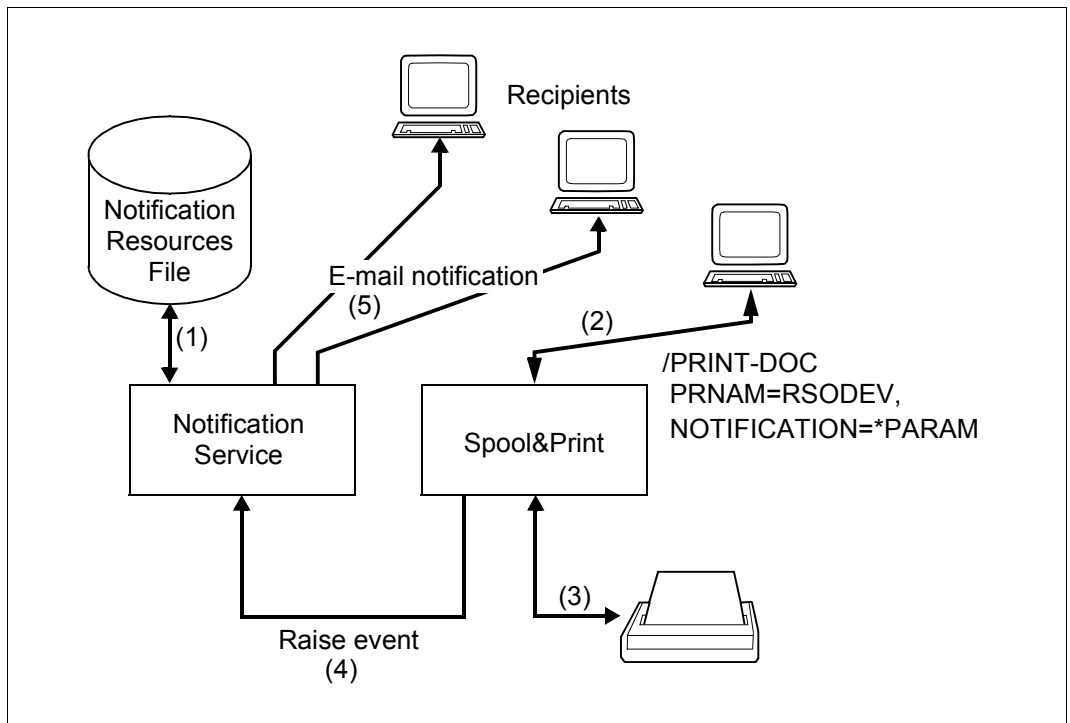


Figure 4: RSO printing - temporary subscription

### Set up of the notification environment (1)

A notification resources file contains all the notification resources necessary to allow the notification of remote print job events. It has been updated by the procedure SYSPRC.RSO.035.NOTIF released with RSO V3.5A (1).

**Temporary subscription in the PRINT-DOCUMENT command (2)**

A temporary subscription is created at print job submission (2) and dedicated to a specific print job. It only exists during the lifetime of the print job. The Notification Service erases it after the print job has been completed (either successfully printed or cancelled). The Notification Service creates a subscription object that is associated to the newly created print job.

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

When an event occurred (3), the Spool&Print products warn 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 (i.e. MAILTO) and target address identified in the recipient attribute of the subscription object (5).  Several recipients are possible: the recipient specified in the temporary subscription, but also the recipients specified in possibly registered permanent subscriptions.

### 3.6.7.3   RSO printer management - permanent subscription
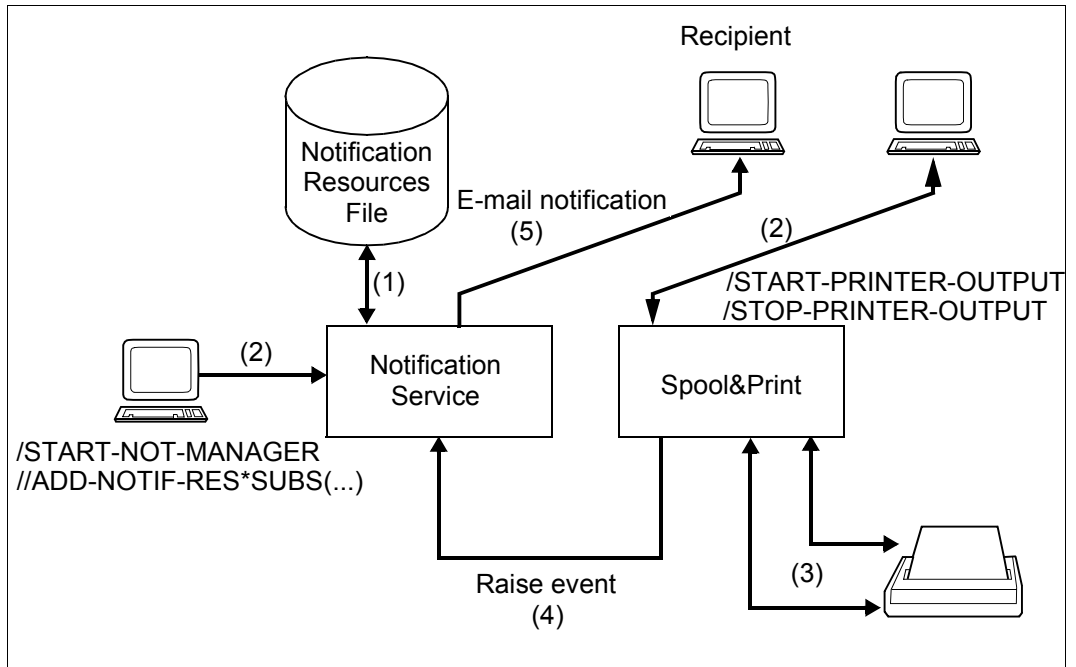


Figure 5: RSO printer management - permanent subscription

### Set up of the notification environment (1)

A notification resources file contains all the notification resources necessary to allow the notification of remote printer events. It has been updated by the procedure SYSPRC.RSO.035.NOTIF released with RSO V3.5A (1).

### Permanent print job subscription (2)

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

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

When an event occurred (3), the Spool&Print products warn 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 (i.e. MAILTO) and target address identified in the recipient attribute of the subscription object (5).

# 3.7  Internet Cafe printing

RSO allows printing on printers that have not been previously declared in the SPOOL parameter file, offering functionality similar to the BSD-LPD support: the one shot printing.

## 3.7.1  Usage model
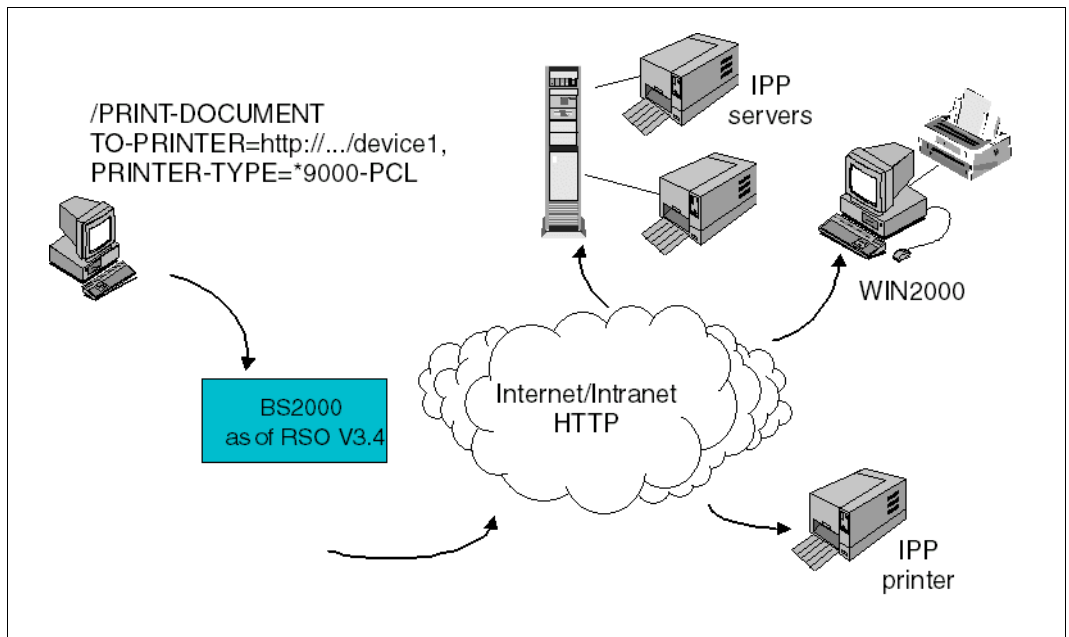


Figure 6: Internet Cafe printing

### 3.7.2  Print job submission

The end-user can generate RSO print jobs for RSO printers

– with the PRINT-DOCUMENT command or the PRNTDOC/PRNTRSO macros

– by changing the requested target device with the MODIFY-PRINT-JOB-ATTRIBUTES command or the MODPJAT/MODJRSO macros.

When accessing an IPP printer for which no definition is present in the SPOOL parameter file, the print job submissions must contain, rather than a printer name, the URI (Uniform Resource Identifier) of the IPP printer and the RSO device type corresponding to the real device.

**PRINT-DOCUMENT command**

```
/PRINT-DOCUMENT ...
      TO-PRINTER=*PARAMETERS(
          PRINTER-NAME=*IPP(URL=c-string_1..1023_with-lower-case)
          ),
      PRINTER-TYPE=<an RSO device type>,
   ...
```

These operands are described in section "PRINT-DOCUMENT - Print files or library elements on printer" on page 634.

**PRNTDOC/PRNTRSO macro**

```
%USE PRNTDOCI MF=...,
   , PRNAME=*IPP,
   ...
%USE PRNTRSOI MF=...,
   ...
   , URL=(URLPTR,URLLEN,PRTYPE)
```

where

URLPTR     is a pointer to an area containing the printer URL.

URLLEN     contains the area length.

PRTYPE     specifies the RSO device type of the target printer.

These operands are described in section "PRNTDOC - output file" on page 663 and section "PRNTRSO - define RSO parameters for PRNTDOC macro" on page 664.

### MODIFY-PRINT-JOB-ATTRIBUTES command

```
/MODIFY-PRINT-JOB-ATTRIBUTES ...
   TO-PRINTER=*PARAMETERS(
       PRINTER-NAME = *IPP(URL=c-string_1..1023_with-lower-case)
       ),
   PRINTER-TYPE=<an RSO device type>,

...
```

These operands are described in section "MODIFY-PRINT-JOB-ATTRIBUTES - Modify print job parameters" on page 632.

### MODPJAT/MODJRSO macro

```
%USE MODPJATI MF=...,
   , PRNAME=*IPP,
...
%USE MODJRSOI MF=...,
   ...
   , URL=(URLPTR, URLLEN, PRTYPE)
```

where

URLPTR      is a pointer to an area containing the printer URL.

URLLEN      contains the area length.

PRTYPE      specifies the RSO device type of the target printer.

These operands are described in section "MODPJAT - modify print job attributes" on page 639 and section "MODJRSO - define RSO parameters for MODPJAT macro" on page 640.

The value *IPP should be specified as PRINTER-NAME if the spoolout job is to be processed on an IPP printer addressed by its URI.

All printer objects and job objects are identified by an URI so that they can be persistently and unambiguously referenced. The IPP URI of the printer must be given instead of the printer name. Please consult the documentation that came with your printer or print server for the supported URI formats.

The RSO device type represents a printer language and a set of printer functions that are supported by RSO. To determine the RSO device type, check which language(s) and printer functions are supported by the target printer. If the printer does not support any printer language supported by RSO or if the conversion of the printer functions by RSO (through its user interface or VTSU codes) is not the same as is performed for an existing RSO printer type, it is advisable to select the printer type 9000.

### Supported printer types

The IPP connection type is supported for all RSO printer types that support the TACLAN access type:

2030-PCL, 4011, 4812, 4813, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000, 9000-EPFX, 9000-EPLQ, 9000-EPSQ, 9000-PCL, 9000-PRO, 9000-PS, 9001, 9001-31, 9011, 9012, 9013, 9014, 9015, 9021, 9022, 9022-200, 9025, 9026-PCL, 9026-RENO, 9045-ANSI, 9046, and 9097.

### System implications

For each print-job submitted with a variable URL, a "system" device is allocated. The print-job is addressed to an IPP printer whose name is *IPPttnnn* where IPP is a fixed prefix defined by a SYSSSI entry, *tt* is the printer type (for example, A4) and *nnn* is a sequence number (000-999). The corresponding URL is saved in a URL file.

A service task that will manage the table of "system" devices is created at the first print job submitted with a variable URL. It is started with the system TSN *RSIP* or the next free TSN if *RSIP* is already allocated.

These "system" devices are handled as public devices by RSO.

## 3.7.3   Controlling print jobs

The following commands and macros are allowed for print jobs submitted with a variable URL:

– CANCEL-PRINT-JOB command / CANPJOB macro.
  The corresponding URL file will be deleted if there is no other RSO job dedicated to that URL at the release of the device.
– RESUME-PRINT-JOB
– EXPORT-PUBSET
– IMPORT-PUBSET

The following commands are not allowed for print jobs submitted with a variable URL. The request will be rejected with the corresponding error message:

– REDIRECT-PRINT-JOB
– HOLD-PRINT-JOB

## 3.7.4  Requesting information

**Information about RSO jobs**

The following commands/macros provide information about RSO jobs:

– SHOW-JOB-STATUS
– SHOW-USER-STATUS JOB-TYPE=*RSO
– SHOW-PRINT-JOB-STATUS command / SHOPJST macro
– SHOW-PRINT-JOB-ATTRIBUTES command / SHOPJAT macro (1).

For the print jobs submitted with a variable URL, the destination of the print job displayed will be the system printer name *IPPttnnn*.

For the print jobs submitted with a variable URL, when *TO-PRINTER information is selected in a request information on print job operands (1), the variable URL value is returned too.

**Information about the status of RSO printers**

Information about the printer status can be requested with the following commands:

– SHOW-SYSTEM-STATUS INF=*REMOTE(*ALL)
– SHOW-SYSTEM-STATUS INF=*REMOTE(*rso-printer*)
– SHOW-ACTIVE-SPOOL-DEVICES *rso-printer*
– SHOW-ACTIVE-SPOOL-DEVICES DEST=*PUBLIC-REMOTE

The devices name is the system printer name *IPPttnnn*.

## 3.7.5  File name for the URL file

The file name for the URL file is made up as follows:

<prefix>.URL.<suffix>

| | |
|---|---|
| <prefix> | The prefix (common part) of the file name is defined by systems support via the PRINTER-PARAM-PREFIX parameter of the SPSERVE statement MODIFY-SPOOL-PARAMETERS. In this way, systems support defines the ID under which a printer parameter file must be catalogued so that it can be interpreted. Please refer to section "Cataloging the printer parameter file" on page 290 for more details. |
| <suffix> | The suffix (private part) of the file name is different for each URL file and follows the convention *IPPttnnn* where *IPP* is a fixed prefix defined by a SYSSSI entry, *tt* is the printer type (for example, A4) and *nnn* is a sequence number (000-999). |

### 3.7.6  Secure printing

For secure prining, the PRINT-DOCUMENT command must be modified as follows:

– ENCRYPTION=YES must be specified

– An FQDN must bei specified in the *IPP structure of the PRINTER-NAME parameter

# 3.8  Support of Unicode printers

## 3.8.1  Print-job submission

The end-user can generate RSO print jobs for Unicode printers with the PRINT-DOCUMENT command or the PRNTDOC/PRNTRSO macros.

When accessing an Unicode printer, no new parameter is required. The print-job is defined according to the file encoding available in the catalogue entry.

### Supported printer types

Unicode is presently supported by the Printronix P7000 printer with the ProPrinter and the EPSON-FX emulation.

### System implications

The support of Unicode implies some conversion from an encoding to another one. Those conversions are more expensive in cpu-time and memory than needed for conversions for the usual encoding (EBCDIC / ASCII). For the same reason, more memory will be needed for the construction of the buffers.

RSO supports the encoding utf-E, utf-8 and utf-16 (as well as EBCDIC and ASCII). The various control characters (Feed Control Characters, VTSU codes, Character set identifiers) must be given in the used encoding (see table in appendix).

When an Unicode encoding is used, the Feed Control Character must be in position 1 of the record. For the Line Spacing by EBCDIC-CONTROL or by ASA-CONTROL, please refer to the table in appendix.

**Note:** Line Spacing by IBM-CONTROL is not supported.
The use of the record-part parameters is very questionable, particularly with the encoding utf-8 or utf-E because RSO will consider the byte position in the record, and not the number of characters.

### 3.8.2   Controlling print jobs

The following commands/macros provide information about Unicode print jobs:

– CANCEL-PRINT-JOB command / CANPJOB macro
– RESUME-PRINT-JOB
– EXPORT-PUBSET
– IMPORT-PUBSET
– REDIRECT-PRINT-JOB
– HOLD-PRINT-JOB

### 3.8.3   Requesting information

**Information about RSO jobs**

The following commands/macros provide information about Unicode print jobs:

– SHOW-JOB-STATUS
– SHOW-USER-STATUS JOB-TYPE=*RSO
– SHOW-PRINT-JOB-STATUS command / SHOPJST macro
– SHOW-PRINT-JOB-ATTRIBUTES command / SHOPJAT macro.

The Unicode aspect is not displayed by the SPOOL/RSO interfaces. It will be provided when displaying the attributes of the file to be printed.

**Information about the status of RSO printers**

Information about the printer status can be requested with the following commands:

– SHOW-SYSTEM-STATUS INF=*REMOTE(*ALL)
– SHOW-SYSTEM-STATUS INF=*REMOTE(*rso-printer*)
– SHOW-ACTIVE-SPOOL-DEVICES *rso-printer*
– SHOW-ACTIVE-SPOOL-DEVICES DEST=*PUBLIC-REMOTE

The Unicode ability is given by the SHOW-SPOOL-DEVICES command.

```
--------------------DEVICE-INFORMATION--------------------
MONJV        :@@@@
NOTIFICATION:@@@@
ENCRYPTION[1] :@@@@
UNICODE      :@@@@
```

---

[1]  only available in RSO V3.6

# 3.9  Secure printing

Thanks to the IPP V1.1 protocol support in RSO V3.5, the files to be printed can be encrypted before being sent on the network.

## 3.9.1  Usage model

The secure printing concerns the declared printers with the IPP access and the „Internet Café" printers. When declaring an IPP printer, it is possible to specify a secure access protocol or not. In the first case, all jobs sent to the printer will be secure. In the second case, the job will only be secure when required by the ENCRYPTION parameter in the PRINT-DOCUMENT command.
In any case, the ENCRYPTION parameter can always be specified. The command will be rejected if the specified printer does not support the encryption. The job will thus be either secure or rejected.

## 3.9.2  Print job submission

IPP provides a transparent connection to SSL by calling the corresponding URL (a https URI connects by default to port 443).
When the https method is specified in the IPP URI of the printer, either in the print job submission (Internet Café printing) or in the printer parameters file associated to the printer (static definition), RSO will encrypt the connection to the IPP printer immediately.

**PRINT-DOCUMENT command**

Printing on an IPP printer located anywhere on the network is possible

– either by selecting a printer previously declared as such in Spool Parameter File. The IPP URI of the printer is defined in the printer parameter file associated to the device

– or by specifying the URL and the printer type, rather than a printer name in the print job submission.

„In case of declared printer", in which a http URI is specified, the ENCRYPTION parameter must be used:

```
/PRINT-DOCUMENT
   PRINT-JOB-CONTROL=*PARAMETERS(
   ...
      ENCRYPTION=*NO/*YES
      ),
```

For Internet Café printing, the user can specify a https URL. In this case no other parameter is required:

```
/PRINT-DOCUMENT
   TO-PRINTER=*PARAMETERS(
      PRINTER-NAME=*IPP(URL=c-string_1..1023_with-lower-case,
         FQDN=*NONE/c-string_1..1023_with-lower-case
      ),
      PRINTER-TYPE=<an RSO device type>
   PRINT-JOB-CONTROL=*PARAMETERS(
      ...
      ENCRYPTION=*NO/*YES
      ),
```

**PRNTDOC/PRNTRSO macro**

```
%USE PRNTDOCI MF=...,
   , PRNAME=*IPP,
   ...
%USE PRNTRSOI MF=...,
   ...
   , URL=(URLPTR,URLLEN,PRTYPE)
   , FQDN=(FQDNPTR,FQDNLEN)
   , ENCRYPT=*YES/*NO
```

where

URLPTR     is a pointer to an area containing the printer URL.

URLLEN     contains the area length.

PRTYPE     specifies the RSO device type of the target printer.

FQDNPTR   is a pointer to an area containing the domain name

FQDNLEN   contains the area length

These operands are described in and .

### MODIFY-PRINT-JOB-ATTRIBUTES command

The MODIFY-PRINT-ATTRIBUTES command allows to redirect a job from a secure printer to a non-secure one and vice versa. The ENCRYPTION parameter needs to be adapted accordingly:

```
/MODIFY-PRINT-JOB-ATTRIBUTES
   TO-PRINTER=*PARAMETERS(
      PRINTER-NAME=*IPP(URL=c-string_1..1023_with-lower-case,
         FQDN=*NONE/c-string_1..1023_with-lower-case
      ),
      PRINTER-TYPE=<an RSO device type>
   PRINT-JOB-CONTROL=*PARAMETERS(
      ...
      ENCRYPTION=*NO/*YES
      ),
```

When a job is redirected from an https printer to a non https one (either http or non IPP protocol), the user is responsible when the security is lost.
The same occurs when ENCRYPTION=YES has been specified in the command, and the job is redirected to a non-IPP printer.

### MODPJAT/MODJRSO macro

```
%USE MODPJATI MF=...,
   , PRNAME=*IPP,
   ...
%USE MODJRSOI MF=...,
   ...
   , URL=(URLPTR,URLLEN,PRTYPE)
   , FQDN=(FQDNPTR,FQDNLEN)
   , ENCRYPT=*YES/*NO
```

where

URLPTR     is a pointer to an area containing the printer URL.

URLLEN     contains the area length.

PRTYPE     specifies the RSO device type of the target printer.

FQDNPTR    is a pointer to an area containing the domain name

FQDNLEN    contains the area length

These operands are described in and .

**Supported printer types**

The IPP connection type is supported for all RSO printer types that support the TACLAN access type:

2030-PCL, 4011, 4812, 4813, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000, 9000-EPFX, 9000-EPLQ, 9000-EPSQ, 9000-PCL, 9000-PRO, 9000-PS, 9001, 9001-31, 9011, 9012, 9013, 9014, 9015, 9021, 9022, 9022-200, 9025, 9026-PCL, 9026-RENO, 9045-ANSI, 9046, and 9097.

Either those printers itself contain the IPP V1.1 support, or the printer is connected via a network card supporting IPP V1.1.

**System implications**

The encryption process has a cpu-time cost. The administrator must take this fact into account when allocating the printers to controller tasks.

## 3.9.3 Controlling print jobs

The following commands/macros provide information about secure print jobs:

– CANCEL-PRINT-JOB command / CANPJOB macro

– RESUME-PTINT-JOB

– EXPORT-PUBSET

– IMPORT-PUBSET

– REDIRECT-PRINT-JOB

– HOLD-PRINT-JOB

## 3.9.4 Requesting information

**Information about RSO jobs**

The following commands/macros provide information about RSO jobs:

– SHOW-JOB-STATUS
– SHOW-USER-STATUS JOB-TYPE=*RSO
– SHOW-PRINT-JOB-STATUS command / SHOPJST macro
– SHOW-PRINT-JOB-ATTRIBUTES command / SHOPJAT macro.

```
-----------------------PRINT-JOB-CONTROL----------------------
PR-JOB-NAME: PJF      PR-JOB-PRIO:  209    CHECKPOINT: *ON-PAGES
PR-JOB-CLASS:  O
ENCRYPTION: *YES
```

**Information about the status of RSO printers**

Information about the printer status can be requested with the following commands:

– SHOW-SYSTEM-STATUS INF=*REMOTE(*ALL)
– SHOW-SYSTEM-STATUS INF=*REMOTE(*rso-printer*)
– SHOW-ACTIVE-SPOOL-DEVICES *rso-printer*
– SHOW-ACTIVE-SPOOL-DEVICES DEST=*PUBLIC-REMOTE

The Encryption ability is given by the SHOW-SPOOL-DEVICES command.

```
---------------------DEVICE-INFORMATION---------------------
MONJV        :@@@@
NOTIFICATION:@@@@
ENCRYPTION   :@@@@
UNICODE      :@@@@
```

The devices name is the system printer name „IPPttnnn".


## 3.9.5  SPSERVE - extensions for the Encryption and Unicode service

The following SPSERVE statements have been extended:

– The ADD-SPOOL-DEVICE statement has been extended with the parameters
  ENCRYPTION and UNICODE in order to support the Encryption and Unicode handling.
  These parameters are to be used for RSO devices.

– The MODIFY-SPOOL-DEVICE statement has been extended with the parameters
  ENCRYPTION and UNICODE in order to support the Encryption and Unicode handling.
  These parameters are to be used for RSO devices.

– The SHOW-SPOOL-DEVICE statement has been extended with the parameters
  ENCRYPTION and UNICODE in order to support the selection of devices for which
  Encryption and Unicode are supported or not. These parameters are to be used for
  RSO devices.

For details on these statements, refer to the SPSERVE (BS2000/OSD) documentation.

## 3.10  Customizing Header and Trailer pages

As of RSO V3.5A, 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 specifics 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.
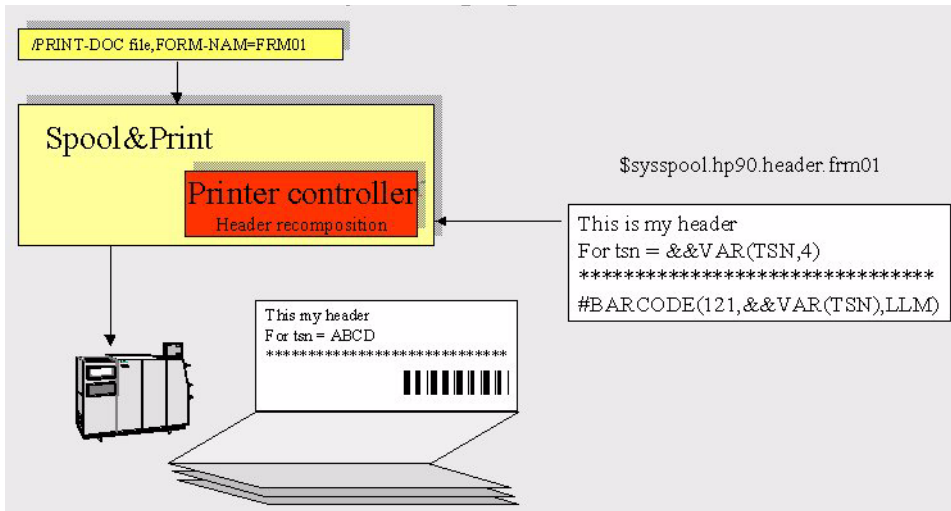


Example of customizing a Header page

## 3.10.1   Template files for Header and Trailer pages

To reduce the number of duplicates, global Header/Trailer page templates can be fefined.

Template files are SAM files named:

- `ALL.HEADER[.<form name>]` for a customized Header page
- `ALL-REMOTE.HEADER[.<form name>]` for a customized Trailer page
- ALL.TRAILER[.<form name>] for a customized Header page
- ALL-REMOTE.TRAILER[.<form name>] for a customized Trailer page
- RP<device type>.HEADER.<form name> for a customized Header page
- RP<device type>.TRAILER.<form name> for a customized Trailer page

where <device type> is:

- a specific RSO device type

  2030-PCL, 4011, 4812, 4813, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 8121, 9000, 9000-PCL, 9000-PRO, 9000-PS, 9000-EPFX, 9000-EPLQ, 9000-EPSQ, 9001, 9001-31, 9002, 9003, 9004, 9011, 9012, 9013, 9014, 9015, 9021, 9022, 9022-200, 9025, 9026-RENO, 9026-PCL, 9045-ANSI, 9046, 9097, 9645, DJET

- a generic prefix name (see section 3.1.1)

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

ALL.HEADER. / ALL.TRAILER. means that this template is associated to all Spool and RSO printers using the specified form name.

ALL-REMOTE.HEADER. / ALL-REMOTE.TRAILER. means that this template is associated to all RSO printers using the specified form name.

The template files have to be defined by the end user, the RSO device administrator or the SPOOL administrator (privilege PRINT-SERVICE-ADMINISTRATION).

The templates are searched:

- under the user ID of the user who entered the PRINT-DOCUMENT command
- under the $SYSSPOOL user ID for a public device, or under the user ID of the RSO device administrator who has specified first for a private device

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 text)

● 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

## 3.10.2  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 |

| Variable Name | Length | Possible Values | Meaning |
|---|---|---|---|
| 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 |
| ELEMTYPE | 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) |
| FCBTYPE | 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) |
| 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 |

| Variable Name | Length | Possible Values | Meaning |
|---|---|---|---|
| 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 |
| 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 |

| Variable Name | Length | Possible Values | Meaning |
|---|---|---|---|
| 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 |
| ROTATION | 8 | *NO / *YES / 0 / 90 / 180 / 270 / (0,180) / (90,270) / (180,0) / (270,90) | Rotation of the pages to be printed |
| ROTLOOP | 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 |

| Variable Name | Length | Possible Values | Meaning |
|---|---|---|---|
| USERID | 8 | <userid> | Owner of the spoolout job |
| USERRES | 54 | ''/ <file name> | Name of the user resource file |

## 3.10.3  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.

## 3.10.4  Functions

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

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

where:

<font name>    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

> **i** 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/yyiii`)
             `*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(<font name>)**

where:

`<font name>` 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`.

**#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.

> **i** 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.

> **i** 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`).

## 3.11  Behavior in the event of errors

This section contains basic information for troubleshooting when using RSO and should help in solving problems that do not require assistance from trained service personnel.

**Print job accepted but not started**

If a successful PRINT-DOCUMENT command has been issued, and everything appears ready for printing but nothing happens, the following measures may be attempted to solve the problem.

1. Check whether the print job is in KEEP status.

   If a problem has occurred, the print job may have been placed in the KEEP queue. Consequently it is not possible to start printing without first returning the job to WAIT status by means of the RESUME-SPOOLOUT command. The status of the print job can be ascertained with the following commands:

   ```
   /SHOW-JOB-STATUS TSN(tsn)
   /SHOW-USER-STATUS JOB-TYPE=*RSO
   /SHOW-SPOOL-JOB-STATUS
   ```

   *Example*

   ```
   /SHOW-JOB-STATUS TSN=1D1R

   TSN:     1D1R        TYPE:    7 KP      NOW:     1992-07-22.143233
   PNAME:   PCE         PRI:     209       FAMILY:  0001
   USERID:  PCE         FORM:    STD       SIZE/PR: 000003/000164
   DEVICE:  PRN27248    CLASS:   000       COPIES:  000/000
   RTSN:    1DXV        PVS:     K
   DEST:    PRN27248    CONTROL: NO
   FILENAME::K:$PCE.TOTO
   JVNAME:
   ERMSG:   SRO0968     ERCOD:
   ```

   The TYPE field indicates the current job status:

   7 WT    Print job in WAIT status

   7 KP    Print job in KEEP status

   7 ACT   Print job active

   The ERMSG field can assist in solving the problem if the user enters the command HELP-MSG-INFORMATION SRO0968. In this case the printer is offline and the user can issue the command RESUME-SPOOLOUT TSN=1D1R after setting the printer to online.

2. Check whether the printer is "logically" started

Checking whether the printer is started, i.e. in status 'A', can be done with the following command:

```
SHOW-SYSTEM-STATUS INF=*REMOTE(printername)
```

*Example*

```
/SHOW-SYSTEM-STATUS INF=*REMOTE(PRN27248)

DEVICE   A STA/PORT PROC/INT-ADD    USERID   TSN M ERCOD    ERMSG   E
PRN27248 A PRN27248 D241KR27        PCE      1D1R R         SR00968 Y
```

The state of the printer is displayed in output field "A":

A      Printer assigned (attached) but not active

R      Output of a spoolout job

M     Message pending for this device at the operator terminal

W     9025/9026-RENO/9645 Printer not accessible at present because currently in use by RSOSERVE routine

D      No virtual connection (detached)

I       No spoolout jobs present

T      Spoolout started on 9025/9026-RENO Printer

S      Printer halted due to fault

If the printer fails to start, systems support must be notified in order to initiate the start.

3. Check whether output of the print job is actually permitted on the activated printer.

A printer can be activated with lists of permitted forms, user IDs, account numbers etc. It is therefore necessary to check whether output of the print job is actually permitted on the printer. This information can be obtained with the following commands.

```
SHOW-JOB-STATUS TSN(tsn)
```

Certain characteristics of the print job are output, such as user ID, form, device name etc.

*Example*

```
/SHOW-JOB-STATUS TSN=1D1R

TSN:    1D1R        TYPE:    7 WT        NOW:     1992-07-22.143233
PNAME:  PCE         PRI:     209         FAMILY:  0001
USERID: PCE         FORM:    STD         SIZE/PR: 000003/000164
DEVICE: PRN27248    CLASS:   000         COPIES:  000/000
RTSN:   1DXV        PVS:     K
DEST:   PRN27248    CONTROL: NO
FILENAME::K:$PCE.TOTO
JVNAME:
ERMSG:              ERCOD:
```

SHOW-ACTIVE-SPOOL-DEVICES *printername*

Lists of the permitted user IDs, forms etc. are output.

*Example*

```
/SHOW-ACTIVE-SPOOL-DEVICES PRN27248

DEV-NAME: PRN27248 DEV-TYP:9001RP    REV:  1 SCHED:NEXT-JOB
C-USERID:           PRIORITY:  30/ 255 USE: OUT  C-TSN:
CLASSES (A):

FORM(PE):  AZER2  STD   STDF5  STDC06 STDC08 STDCC6 STDPCE

PNAME(P): XXXX

USER (A): SWN14

ACC  (A):

DESTS:

CURRENT-FORM:       TRACE:      EXIT: YES   SAMPLE: NO

PRINTER-STATE: A
```

The printer was started correctly with the form STD, but only print jobs with
PNAME=XXXX are started. The user must ask the RSO device administrator to change
the scheduling values for the printer and include PCE in the list of permitted job names.
For further information refer to the description of the SHOW-ACTIVE-SPOOL-DEVICES
command in the "Spool & Print - Commands (BS2000/OSD)" manual.

If output of the print job on the printer is not permitted, systems support or the RSO
device administrator should be consulted for the reasons.

4.  Check that the printer is not currently executing another print job.

    ```
    SHOW-JOB-STATUS TSN(tsn)
    ```

    The status of your own print job is output.

    ```
    SHOW-SYSTEM-STATUS INF=*REMOTE(printername)
    ```

    The print job currently executing is output.

5.  Check whether a fault has occurred on the printer. The printer status can be ascertained with the following command:

    ```
    SHOW-SYSTEM-STATUS INF=*REMOTE(printername)
    ```

    *Example*

    ```
    /SHOW-SYSTEM-STATUS INF=*REMOTE(PRN27248)

    DEVICE   A STA/PORT PROC/INT-ADD    USERID    TSN M ERCOD     ERMSG   E
    PRN27248 S PRN27248 D241KR27         PCE       1D1R R               SR00968 Y
    ```

    The fields "A", "ERCOD" and/or "ERMSG" indicate the printer status (see also "Device status for RSO printers" on page 156). For further information, refer to the next error situation.

6.  Check control character sequences for 9025/9026-RENO Printers

    If output is to be performed on a 9025 or 9026-RENO Printer, a check should be made as to whether the different control character sequences used in the file are the same as were specified in the device definition and on the control panel of the printer. This can be ascertained with the following command:

    ```
    SHOW-SPOOL-DEVICES DEVICE-NAME=printername
    ```

    The different control character sequences are displayed in the field "ESCAPE".

    The device administrator must then be asked for the different control character sequences that were defined on the control panel.

*Example*

```
SHOW-SPOOL-DEVICES SELECT=*PAR(DEVICE-NAME=PRN27311),INF=*ALL

DEVICE-NAME                            DEVICE-TYPE
PRN27311                               9025RP
----------------------DEVICE-ACCESS-----------------------------------
ACCESS PROC-NAME STAT-NAME INTERNET-ADDRESS
HDLC   D241KR27  PRN27311  *NONE
LPD-PRINTER-NAME   FROM-LOCAL-PORT#   TO-LOCAL-PORT#
*NONE                       721               731
----------------------REDIRECTION-------------------------------------
REDIRECTION
*NONE
----------------------DEVICE-INFORMATION------------------------------
ROT TRANS FONT FACE MAX-TRAY
NO  IGN   IGN  NO      1
----------------------ADMINISTRATOR-----------------------------------
IDENTIFICATION   PROC-NAME STAT-NAME
@@@@@@@@@@@@@@@@
USER-IDENTIFICATION   @@@@@@@@ @@@@@@@@ @@@@@@@@ @@@@@@@@
                      @@@@@@@@ @@@@@@@@ @@@@@@@@ @@@@@@@@
----------------------SPOOLOUT-CONTROL--------------------------------
SHIFT LINE-FEED-COMP BLANK-COMP ST-FORM-FEED ESCAPE LINE-SIZE
    0 YES            NO         YES          X'BC'       136
FORM-FEED DEF-TRAY OUT-TRAY SKIP-TO-CH SKIP-TO-NEXT CHAR-IMAGE
SING           1        0 NORMAL     BY-LINES     *NONE
----------------------PROCESSING-CONTROL------------------------------
CONTR-RES DISCONNECT BUFFER-SIZE RESET SYNCHRO TIMEOUT-MAX BAND-ID
NO        YES             2048 YES   PRINTER           2 NONE
 REPEAT-MESSAGE    RESTART-ACTION
TYPE LIMIT RETRY   LIMIT RETRY   LOAD MODULO2 POLLING RECOVERY-RULES
 SYS   NO   GLB      10   30     NO   NO      NO      *NONE
PRINTER-PARAM-FILE RESOURCE-FILE-PREFIX CONTROLLER-START
*SYSTEM          *SYSTEM                  AT-PRINTER-START
FORM-NAME = AZER2  STD    STDF5  STDC06 STDC08 STDCC6 STDPCE

----------------------CHARACTER-SET-POS-------------------------------
POS-1    POS-2    POS-3    POS-4    POS-5    POS-6    POS-7    POS-8

POS-9    POS-10   POS-11   POS-12   POS-13   POS-14   POS-15   POS-16

----------------------LANGUAGE-EXTENSION------------------------------
LANG-EXT-TYPE
*NONE
```

All three values (file, device definition and control panel) must match before printing can be performed correctly.

**The printer has the status "M"**

When a check is performed with the command /SHOW-SYSTEM-STATUS INF= *REMOTE(*printername*), the printer is in status "M" (below the "A" field in the example below). This means that a more or less serious problem has occurred and, since the printer is a public device (no RSO device administrator is assigned), a message is sent to the operator asking what action is to be performed (e.g. suppress spoolout...). The "M" status remains until the operator responds to this message.

*Example*

```
/SHOW-SYSTEM-STATUS INF=*REMOTE(PRN27248)

DEVICE   A STA/PORT PROC/INT-ADD     USERID    TSN M ERCOD     ERMSG   E
PRN27248 M PRN27248 D241KR27                   1D1R R          SR00968 Y
```

**The printer has the status "S"**

When a check is performed with the command /SHOW-SYSTEM-STATUS INF= *REMOTE(*printername*), the printer is in status "S" (below the "A" field in the example below). This means that a more or less serious problem has occurred.

*Example*

```
/SHOW-SYSTEM-STATUS INF=*REMOTE(PRN27248)

DEVICE    A STA/PORT PROC/INT-ADD     USERID    TSN M ERCOD     ERMSG    E
PRN27248  S PRN27248 D241KR27                   1D1R R          SR00968 Y
```

Before printing can be resumed, several actions must be performed:

1. Firstly, the problem must be corrected. The command HELP-MESSAGE-INFORMATION with the message number that was output under the ERMSG field can be entered in order to find the cause of the problem. If information is also displayed under the ERCOD field, it can be used as a supplement to the message. Depending on the message text that is output, the problem can either be corrected or the RSO device administrator or systems support can be informed so that they can correct the problem.

2. Once the problem is corrected, two further actions are possible depending on which print job was interrupted:

   – If the "TSN" field (see example below) contains the job number of your own print job, the print job can be resumed by means of the RESUME-SPOOLOUT command. You can obtain the list of your own jobs with the command SHOW-USER-STATUS JOB-TYPE=*RSO.

*Example*

```
/SHOW-SYSTEM-STATUS INF=*REMOTE(PRN27248)
DEVICE   A STA/PORT PROC/INT-ADD     USERID     TSN M ERCOD    ERMSG    E
PRN27248 S PRN27248 D241KR27         PCE        1D1R R         SR00968 Y

/SHOW-USER-STATUS JOB-TYPE=*RSO
NAME      TSN TYPE  PRI   SIZE  COPIES PRSIZE  RTSN DEVICE
PCE       1D1R 7 KP 209   1818      0    128   41F3 PRN27248

/RESUME-SPOOLOUT TSN=1D1R
%  SR00351 SPOOLOUT COMMAND PROCESSED FOR TSN '1D1R'

/SHOW-SYSTEM-STATUS INF=REMOTE(PRN27248)
DEVICE   A STA/PORT PROC/INT-ADD     USERID     TSN M ERCOD    ERMSG    E
PRN27248 R PRN27248 D241KR27         PCE        1D1R R                  Y

/SHOW-USER-STATUS JOB-TYPE=*RSO
NAME      TSN TYPE  PRI   SIZE  COPIES PRSIZE  RTSN DEVICE
PCE       1DIR 7 ACT 209   1818      0    640   41F3 PRN27248
```

– If the interrupted job is not your own, the device administrator or systems support must be informed so that they can restart the interrupted print job with the command RESUME-SPOOLOUT (as described above) or stop and restart the printer. For more information, consult the RSO device administrator.

**The print job is in the KEEP queue**

When your own RSO print jobs are checked, you find one or more jobs are in the KEEP queue ("7 KP" under the "TYPE" field).

```
/SHOW-USER-STATUS JOB-TYPE=*RSO
NAME      TSN TYPE  PRI   SIZE  COPIES PRSIZE  RTSN DEVICE
PCE       1D1R 7 KP 209   1818      0    128   41F3 PRN27248
```

This could be due to several causes. For instance, a printer problem occurred during printing or an RSO device administrator, an operator or systems support issued a HOLD-SPOOLOUT command in order to place the active print job in the KEEP queue.

In order to make the suspended print job available for printing again, it must be returned to the WAIT queue ("7 WT" under the "TYPE" field) with the aid of the RESUME-SPOOLOUT command:

```
/SHOW-USER-STATUS JOB-TYPE=*RSO
NAME      TSN TYPE  PRI   SIZE  COPIES PRSIZE  RTSN DEVICE
PCE       1D1R 7 KP

/RESUME-SPOOLOUT TSN=1D1R
%  SR00351 SPOOLOUT COMMAND PROCESSED FOR TSN '1D1R'
```

```
/SHOW-USER-STATUS JOB-TYPE=*RSO
NAME        TSN TYPE PRI   SIZE  COPIES PRSIZE   RTSN DEVICE
PCE        1DIR 7 WT 209   1818       0    128   41F3 PRN27248
```

**Some printed lines are truncated**

If printed lines are truncated, the following steps can be taken to try to determine the cause.

1.  Check the pitch values.

    The first things that must be checked are the LINE-SIZE value for the form that was specified in PRINT-DOCUMENT, and the CPI operand for the character set that was specified in PRINT-DOCUMENT, or the default value for the form.

    *Note*

    > If no form name was specified in the PRINT-DOCUMENT command, the form name "STD" must be specified for checking purposes, otherwise the form name that was specified in the PRINT-DOCUMENT command. If no character set was specified in the PRINT-DOCUMENT command, the SHOW-SPOOL-CHARACTER-SETS command must be issued for the character set that is defined in the form, otherwise for the character set that was specified in the PRINT-DOCUMENT command.

    *Example*

    ```
    PRINT-DOCUMENT FROM-FILE=filename,RESOURCE-DESCRIPTION=*PAR
                   (FORM-NAME=STDSP,CHARACTER-SETS=101),
                   TO-PRINTER=*PAR(PRINTER-NAME=PRN27311)
    ```

    The SHOW-SPOOL-DEVICES command can now be used to ascertain the device type in the field "TYPE".

    ```
    SHOW-SPOOL-DEVICES SELECT=*PAR(DEVICE-NAME=PRN27311),INF=*ALL

    DEVICE-NAME                       DEVICE-TYPE
    PRN27311                          9001RP
    ----------------------DEVICE-ACCESS----------------------------------
    ACCESS PROC-NAME STAT-NAME INTERNET-ADDRESS
    HCO    D241KR27  PRN27311  *NONE
    LPD-PRINTER-NAME   FROM-LOCAL-PORT#   TO-LOCAL-PORT#
    *NONE                         721                731
    ----------------------REDIRECTION------------------------------------
    REDIRECTION
    *NONE

    ----------------------DEVICE-INFORMATION-----------------------------
    ROT TRANS FONT FACE MAX-TRAY
    NO  IGN   IGN  NO        1
    ```

```
----------------------ADMINISTRATOR----------------------------------
IDENTIFICATION   PROC-NAME STAT-NAME
@@@@@@@@@@@@@@
USER-IDENTIFICATION    @@@@@@@@ @@@@@@@@ @@@@@@@@ @@@@@@@@
                       @@@@@@@@ @@@@@@@@ @@@@@@@@ @@@@@@@@
----------------------SPOOLOUT-CONTROL--------------------------------
SHIFT LINE-FEED-COMP BLANK-COMP ST-FORM-FEED ESCAPE LINE-SIZE
    0 YES             NO         YES          NONE       136
FORM-FEED DEF-TRAY OUT-TRAY SKIP-TO-CH SKIP-TO-NEXT CHAR-IMAGE
SING          1        0 NORMAL    BY-LINES     *NONE
----------------------PROCESSING-CONTROL------------------------------
CONTR-RES DISCONNECT BUFFER-SIZE RESET SYNCHRO TIMEOUT-MAX BAND-ID
NO        YES               2048 YES   PRINTER           2 NONE
 REPEAT-MESSAGE    RESTART-ACTION
TYPE LIMIT RETRY    LIMIT RETRY   LOAD MODULO2 POLLING RECOVERY-RULES
 SYS   NO   GLB       10   30     NO   NO      NO      *NONE
PRINTER-PARAM-FILE RESOURCE-FILE-PREFIX CONTROLLER-START
*SYSTEM            *SYSTEM              AT-PRINTER-START
FORM-NAME = AZER2  STD    STDF5  STDC06 STDC08 STDCC6 STDPCE

----------------------CHARACTER-SET-POS-------------------------------
POS-1    POS-2    POS-3    POS-4    POS-5    POS-6    POS-7    POS-8

POS-9    POS-10   POS-11   POS-12   POS-13   POS-14   POS-15   POS-16

----------------------LANGUAGE-EXTENSION------------------------------
LANG-EXT-TYPE
*NONE
```

The SHOW-SPOOL-FORMS command can now be issued with the device type.

```
/SHOW-SPOOL-FORMS FORM-NAME=STDSP,DEVICE-TYPE=9001,INF=*ALL

FORM-NAM DEV-TYPE   LI-S PA-S H-P T-P   VERT-CONTROL    ROT-CONTROL    OWNER
                                     L-N/LPI/C-P/C-S L-N/LPI/C-P/C-S
STDSP    9001RP       80  120 NO  INF      8    3  101
BAND-ID  PREFORM  PAGE-DEF FORM-DEF S-O S-P-T T-UP-P CH-IM F-OV  F-O-B
*NONE    *NONE         0 *NONE    NO      0 NO     *NONE *NONE *NONE
```

The pitch value of the character set can then be ascertained:

```
/SHOW-SPOOL-CHARACTER-SETS CHARACTER-SET-NAME=101

C-S-NAME COLOUR WEIGHT CH-TYPE CH-STYLE UND CPI LPI LANGUAGE NLQ OWNER
101      BLACK  NORMAL OCR-B   STRAIGHT NO   12  8 NONE      NO
```

2.  Calculate the maximum number of characters per line.

   a) Header and Trailer pages

   In the case of the Header and Trailer pages, the LINE-SIZE operand values of the device and form definitions and the CPI operand of the character set of the form definition are taken into account when calculating the maximum number of characters that can be printed per line.

   The maximum number of characters per line is initially calculated on the basis of the form definition and the CPI operand value of the character set of the form definition:

   $$\text{Max. \#chars./line} = \frac{\text{LINE-SIZE (form) * CPI value of the character set (form)}}{10}$$

   If CPI=*IGNORE is specified, CPI=10 applies (see 4. and 5. in the table below).

   The value calculated is then compared with the LINE-SIZE operand value of the device definition:

   –  If the LINE-SIZE operand value of the device definition is IGNORE or equal to or greater than the value calculated above, this remains the maximum number of characters per line for the Header and Trailer pages (see 1. and 2. in the table below).

   –  If the LINE-SIZE operand value of the device definition is less than the value calculated, this LINE-SIZE operand value becomes the maximum number of characters per line for the Header and Trailer pages (see 3. in the table below).

   *Examples*

| | A-S-F | | A-S-D | Max #characters/line = |
|---|---|---|---|---|
| | **FormLS** | **CPI** | **DeviceLS** | **minimum[FormLS*CPI/10,DeviceLS]** |
| 1. | 136 | 12 | IGN | Min[136*12/10,IGN] = 163 |
| 2. | 136 | 10 | 160 | Min[136*10/10,160] = 136 |
| 3. | 136 | 15 | 160 | Min[136*15/10,160] = 160 |
| 4. | 136 | IGN | 160 | Min[136*10/10,160] = 136 |
| 5. | 136 | IGN | IGN | Min[136*10/10,IGN] = 136 |

   Key:

   FormLS:     LINE-SIZE operand value of the form definition

   DeviceLS:   LINE-SIZE operand value of the form definition

   CPI:        CPI operand value of the character set of the form definition

b)  File

In the case of a file, the LINE-SIZE operand values of the device and form defini-
tions and the lowest CPI operand of the character sets used (i.e. character sets
specified in the CHARACTER-SETS operand of the PRINT-DOCUMENT command
or - if none are specified - the character set of the form definition) are taken into
account when calculating the maximum number of characters that can be printed
per line.

In contrast to Header and Trailer pages, the maximum number of characters per line
is only calculated for the file when LINE-SPACING=*NO/*BY- EBCDIC-
CONTROL/*BY-IBM-CONTROL/*BY-ASA-CONTROL is specified, so that any
truncated lines can be detected.

$$\text{Max. #chars./line} = \frac{\text{LINE-SIZE (form) * lowest CPI value of the character sets}}{10}$$

The value calculated is then compared with the LINE-SIZE operand value of the
device definition:

–   If the LINE-SIZE operand value of the device definition is IGNORE, 32767 is
    taken as the maximum number of characters/line, i.e. the highest value for
    preventing the truncation of lines (see 1. and 6. in the table below).

–   If the LINE-SIZE operand value of the device definition is equal to or greater
    than the value calculated above, this remains the maximum number of
    characters per line (see 2. and 3. in the table below).

–   If the LINE-SIZE operand value of the device definition is lower than the calcu-
    lated value, this LINE-SIZE operand value becomes the maximum number of
    characters per line (see 4. in the table below).

*Examples*

| | **A-S-F** | | **A-S-D** | **PRINT-DOC** | | **Max #characters/line = Min [FormLS*lowest.CPI/10,deviceLS]** |
|---|---|---|---|---|---|---|
| | **FormLS** | **CPI** | **Device LS** | **CPI 1** | **CPI 2** | |
| 1. | 136 | 12 | IGN | 10 | 15 | DeviceLS=IGNORE -> 32767 |
| 2. | 136 | 10 | 255 | 15 | 12 | Min[136*12/10,255] = 163 |
| 3. | 136 | 10 | 160 | - | - | Min[136*10/10,160] = 136 |
| 4. | 136 | 10 | 160 | 15 | 12 | Min[136*12/10,160] = 160 |
| 5. | 136 | 12 | 160 | IGN | IGN | Min[32767,160] = 160 |
| 6. | 136 | 10 | IGN | IGN | IGN | DeviceLS=IGNORE -> 32767 |

Key:

| | |
|---|---|
| FormLS: | LINE-SIZE operand value of the form definition |
| DeviceLS: | LINE-SIZE operand value of the device definition |
| CPI: | CPI operand value of the character set of the form definition (rotation character set, if there is one) |
| CPI 1/2: | CPI operand value of a first/second character set |
| -: | Character set not specified in the PRINT-DOCUMENT command |

3.  One of the following steps can now be performed:

    –   Change the file.

    –   Change the LINE-SIZE value.

    –   Use the LAST-CHARACTER operand in the RECORD-PART operand in the PRINT-DOCUMENT command in order to divide each record over several lines.

*Note concerning the DELETE-AFTER-PRINT operand of the PRINT-DOCUMENT command*

If *YES or *DESTROY was specified for the DELETE-AFTER-PRINT operand in the PRINT-DOCUMENT command, in the event of lines being truncated the file will only be deleted in the following cases:

–   if the operand LINE-TRUNCATION=*DELETE-FILE was also specified in the PRINT-DOCUMENT command or

–   if the operand LINE-TRUNCATION=*STD was specified in the PRINT-DOCUMENT command and the value ERROR-PROCESSING(TRUNCATION=*IGNORE) is defined in the SPOOL parameter file.

**Some character set features (italic, bold etc.) not executed**

If some character set features that are used for printing are not executed, the following measures may be attempted to solve the problem.

1. Check that the target printer currently supports the various character set features requested (e.g. italics, bold, language etc.).

2. Check that the character set used for the Header and Trailer pages is the same as that defined in the form used.

3. It must be noted when printing with DOCUMENT-FORMAT=*SPECIAL-FORMAT that the character set features are ignored by RSO, i.e. they are not sent to the printer. If a "font string" is linked to the character set, only this string will be sent.

4. It must be noted when printing with CONTROL-MODE=*LOGICAL that the character sets used must be called explicitly in the file by means of the command "\CSij". If the command "\CSij" is not specified, the file is printed with the character set that is defined in the form used.

5. Check when printing on "font printers" (e.g. 9021 Printer) that a font exists that supports the character set features.

**Some printer control character sequences not interpreted**

If some printer control character sequences have not been interpreted or have actually been partly printed, the following measures may be attempted to solve the problem.

1.  Check whether the print job was issued with the correct DOCUMENT-FORMAT and CONTROL-MODE values. RSO supports up to 5 different values: Each of them is characterized by whether it accepts printable and/or nonprintable characters, VTSU codes and printer control character sequences. For further information refer to the description of the PRINT-DOCUMENT command in the "Spool & Print - Commands (BS2000/OSD)" manual.

2.  Check whether the target printer supports the printer control character sequences that are specified in the file. For example, RENO commands are supported only by the 9025 or 9026-RENO Printers.

3.  Check that the device type of the target printer has been correctly defined in RSO. For example, a 9026 Printer must be defined as a 9026-RENO Printer in order to be able to support RENO commands, and as a 9026-PCL Printer in order to be able to support HP PCL4 control characters.


**Printed pages are displaced to the left or right**

If the print is displaced to the left or right over the physical width of the page, the following measures may be attempted to ascertain the cause.

1.  Check whether the paper was correctly positioned at the start of printing.

2.  Check whether any special LEFT-MARGIN value was specified in the PRINT-DOCUMENT command.

3.  Check whether any special SHIFT value was specified in the device definition. This SHIFT value is the default value and is always used for printing unless a SHIFT value has been specified in some other way (e.g. LEFT-MARGIN in the PRINT-DOCUMENT command). This check can be performed by means of the following command:

    ```
    SHOW-SPOOL-DEVICES printername
    ```

*Example*

```
SHOW-SPOOL-DEVICES SELECT=*PAR(DEVICE-NAME=PRN27248),INF=*ALL

DEVICE-NAME                          DEVICE-TYPE
PRN27248                             9001RP
-----------------------DEVICE-ACCESS---------------------------------
ACCESS PROC-NAME STAT-NAME INTERNET-ADDRESS
HCO    D241KR27 PRN27248 *NONE
LPD-PRINTER-NAME   FROM-LOCAL-PORT#   TO-LOCAL-PORT#
*NONE                       721              731
-----------------------REDIRECTION-----------------------------------
REDIRECTION
*NONE

-----------------------DEVICE-INFORMATION----------------------------
ROT TRANS FONT FACE MAX-TRAY
NO  IGN   IGN  NO       1
-----------------------ADMINISTRATOR---------------------------------
IDENTIFICATION   PROC-NAME STAT-NAME
@@@@@@@@@@@@@@@@
USER-IDENTIFICATION   @@@@@@@@ @@@@@@@@ @@@@@@@@ @@@@@@@@
                      @@@@@@@@ @@@@@@@@ @@@@@@@@ @@@@@@@@
-----------------------SPOOLOUT-CONTROL------------------------------
SHIFT LINE-FEED-COMP BLANK-COMP ST-FORM-FEED ESCAPE LINE-SIZE
    0 YES            NO         YES          NONE     136
FORM-FEED DEF-TRAY OUT-TRAY SKIP-TO-CH SKIP-TO-NEXT CHAR-IMAGE
SING            1        0 NORMAL      BY-LINES    *NONE
-----------------------PROCESSING-CONTROL----------------------------
CONTR-RES DISCONNECT BUFFER-SIZE RESET SYNCHRO TIMEOUT-MAX BAND-ID
NO        YES              2048 YES   PRINTER          2 NONE
 REPEAT-MESSAGE   RESTART-ACTION
TYPE LIMIT RETRY   LIMIT RETRY   LOAD MODULO2 POLLING RECOVERY-RULES
 SYS   NO   GLB      10   30     NO   NO      NO      *NONE
PRINTER-PARAM-FILE RESOURCE-FILE-PREFIX CONTROLLER-START
*SYSTEM            *SYSTEM              AT-PRINTER-START
FORM-NAME = AZER2   STD    STDF5  STDC06 STDC08 STDCC6 STDPCE

-----------------------CHARACTER-SET-POS-----------------------------
POS-1    POS-2    POS-3    POS-4    POS-5    POS-6    POS-7    POS-8

POS-9    POS-10   POS-11   POS-12   POS-13   POS-14   POS-15   POS-16

-----------------------LANGUAGE-EXTENSION----------------------------
LANG-EXT-TYPE
*SYSTEM
```

4. Check that the printer is not configured with a special left or right line margin. The device administrator must be requested to perform this check at the control panel.

---

**Blank pages are printed**

If the printout contains unexpected blank pages, the following measures may be attempted to solve the problem.

1. Check that two or more form feeds are not requested in succession in the file (e.g. if printing with CONTROL-MODE=*BY-EBCDIC-CONTROL(...) ). Two successive jumps to vertical tab "channel 1" (form feed) without any printing characters will, dependent on the SKIP-TO-CHANNEL value in the printer definition, result in a blank page being printed. If SKIP-TO-CHANNEL=*NORMAL was specified, the jump to "channel 1" is performed again, causing a blank page to be printed at this point. With SKIP-TO-CHANNEL=*OPTIMIZED, the jump to "channel 1" is not performed twice in succession.

2. Check that no unexpected form feeds (control characters or printer commands) are contained in a prolog, epilog or forms overlay (DIA) to be used for printing.

3. Check that no unexpected form feeds are contained in a "font string" that is linked to the character set to be used for printing.

4. Check that no "Dummy Test" message has been sent to the printer. A "Dummy Test" message consists of a form feed and is sent to the printer in the event of certain errors (low paper, printer in status "S" etc.). However, this only happens if the operand REPEAT-MESSAGE=PAR(TYPE=*DUMMY) was specified in the device definition. The check can be performed using the following command:

```
SHOW-SPOOL-DEVICES printername
```

*Example*

```
SHOW-SPOOL-DEVICES SELECT=*PAR(DEVICE-NAME=PRN27248),INF=*ALL

DEVICE-NAME                         DEVICE-TYPE
PRN27248                            9001RP
----------------------DEVICE-ACCESS----------------------------------
ACCESS PROC-NAME STAT-NAME INTERNET-ADDRESS
HCO    D241KR27  PRN27248  *NONE
LPD-PRINTER-NAME   FROM-LOCAL-PORT#   TO-LOCAL-PORT#
*NONE                        721               731
----------------------REDIRECTION-------------------------------------
REDIRECTION
*NONE
----------------------DEVICE-INFORMATION-----------------------------
ROT TRANS FONT FACE MAX-TRAY
NO  IGN   IGN  NO        1
```

```
------------------------ADMINISTRATOR-----------------------------------
IDENTIFICATION   PROC-NAME STAT-NAME
@@@@@@@@@@@@@@
USER-IDENTIFICATION   @@@@@@@@ @@@@@@@@ @@@@@@@@ @@@@@@@@
                      @@@@@@@@ @@@@@@@@ @@@@@@@@ @@@@@@@@
------------------------SPOOLOUT-CONTROL---------------------------------
SHIFT LINE-FEED-COMP BLANK-COMP ST-FORM-FEED ESCAPE LINE-SIZE
    0 YES             NO        YES          NONE       136
FORM-FEED DEF-TRAY OUT-TRAY SKIP-TO-CH SKIP-TO-NEXT CHAR-IMAGE
SING           1        0 NORMAL    BY-LINES     *NONE
------------------------PROCESSING-CONTROL-------------------------------
CONTR-RES DISCONNECT BUFFER-SIZE RESET SYNCHRO TIMEOUT-MAX BAND-ID
NO        YES             2048 YES   PRINTER          2 NONE
 REPEAT-MESSAGE    RESTART-ACTION
TYPE LIMIT RETRY    LIMIT RETRY   LOAD MODULO2 POLLING RECOVERY-RULES
 SYS   NO   GLB      10   30      NO   NO      NO     *NONE
PRINTER-PARAM-FILE RESOURCE-FILE-PREFIX CONTROLLER-START
*SYSTEM           *SYSTEM              AT-PRINTER-START
FORM-NAME = AZER2  STD    STDF5  STDC06 STDC08 STDCC6 STDPCE

------------------------CHARACTER-SET-POS--------------------------------
POS-1    POS-2    POS-3    POS-4    POS-5    POS-6    POS-7    POS-8

POS-9    POS-10   POS-11   POS-12   POS-13   POS-14   POS-15   POS-16

------------------------LANGUAGE-EXTENSION-------------------------------
LANG-EXT-TYPE
*SYSTEM
```

The Trailer page indicates whether one or more test messages have been printed.

5. For further information, refer to the next error situation.

**Printout with unexpected line and/or form feeds**

If the printout contains unexpected line or form feeds, the following measures may be attempted to solve the problem.

1.  Check when printing with CONTROL-MODE=*BY-EBCDIC-CONTROL(...), *BY-IBM-CONTROL(...), *BY-ASA-CONTROL(...) or equivalent that the file contains a valid PCC (feed control character) in every line and at the correct position. With these CONTROL-MODE entries, RSO uses the feed control character for the line and/or form feed. The position of the feed control character in each record is specified in the CONTROL-CHAR-POSITION operand.

2.  Check when using a loop record (defined implicitly in the form or specified explicitly) that the position of the channels within the loop record has been determined.

3.  For further information, refer to the next error situation.

**Print pages extend beyond the upper/lower edge of the physical page**

If problems occur with regard to the form length or form feed, the following measures may be attempted to ascertain the cause.

1.  Check that the paper was correctly positioned at the start of printing.

2.  Check the length of the paper loaded. The length in inches must be multiplied by 10 so as to obtain the correct value for the PAGE-SIZE operand of the SPSERVE statement ADD-/MODIFY-/EDIT-SPOOL-FORM. The value for PAGE-SIZE can be ascertained by means of the SHOW-SPOOL-FORM command.

*Example*

Paper length = 12 inches, PAGE-SIZE operand = 120 (12*10)

```
/SHOW-SPOOL-FORMS FORM-NAME=STDPCE,DEVICE-TYPE=9001,INF=*ALL

FORM-NAM DEV-TYPE  LI-S PA-S H-P T-P   VERT-CONTROL    ROT-CONTROL   OWNER
                                    L-N/LPI/C-P/C-S L-N/LPI/C-P/C-S
STDPCE   9001RP     80  120 NO  INF       8   3 101
BAND-ID  PREFORM  PAGE-DEF FORM-DEF S-O S-P-T T-UP-P CH-IM F-OV  F-O-B
*NONE    *NONE           0 *NONE    NO      0 NO     *NONE *NONE *NONE
```

The RSO device administrator can change the value by means of the following SPSERVE statement:

```
MODIFY-SPOOL-FORM FORM-NAME=name,DEVICE-TYPE=type,
                  FORM-SIZE=*PARAMETERS(PAGE-SIZE=size)
```

3. Check whether the length of the loop record differs from the length of the form. If differ-ences are found, the form feeds could be different. If the operand SKIP-TO-NEXT-PAGE=*BY-LINES was specified in the ADD-SPOOL-DEVICE statement, RSO counts the line feeds and takes account of the length of the loop record. However, if SKIP-TO-NEXT-PAGE=*BY-FORM-FEED was specified, RSO appends a feed control character to the page with the PAGE-SIZE value, and the next page is printed on the next physical page.

*Example*

```
SHOW-SPOOL-DEVICES SELECT=*PAR(DEVICE-NAME=PRN27248),INF=*ALL

DEVICE-NAME                           DEVICE-TYPE
PRN27248                              9001RP
-----------------------DEVICE-ACCESS----------------------------------
ACCESS PROC-NAME STAT-NAME INTERNET-ADDRESS
HCO    D241KR27  PRN27248  *NONE
LPD-PRINTER-NAME   FROM-LOCAL-PORT#   TO-LOCAL-PORT#
*NONE                        721             731
-----------------------REDIRECTION------------------------------------
REDIRECTION
*NONE
-----------------------DEVICE-INFORMATION-----------------------------
ROT TRANS FONT FACE MAX-TRAY
NO  IGN   IGN  NO       1
-----------------------ADMINISTRATOR----------------------------------
IDENTIFICATION   PROC-NAME STAT-NAME
@@@@@@@@@@@@@@@@
USER-IDENTIFICATION   @@@@@@@@ @@@@@@@@ @@@@@@@@ @@@@@@@@
                      @@@@@@@@ @@@@@@@@ @@@@@@@@ @@@@@@@@
-----------------------SPOOLOUT-CONTROL-------------------------------
SHIFT LINE-FEED-COMP BLANK-COMP ST-FORM-FEED ESCAPE LINE-SIZE
    0 YES            NO         YES          NONE        136
FORM-FEED DEF-TRAY OUT-TRAY SKIP-TO-CH SKIP-TO-NEXT CHAR-IMAGE
SING          1       0 NORMAL   BY-LINES     *NONE
-----------------------PROCESSING-CONTROL-----------------------------
CONTR-RES DISCONNECT BUFFER-SIZE RESET SYNCHRO TIMEOUT-MAX BAND-ID
NO        YES               4000 YES   PRINTER         2 NONE
 REPEAT-MESSAGE    RESTART-ACTION
TYPE LIMIT RETRY    LIMIT RETRY   LOAD MODULO2 POLLING RECOVERY-RULES
 SYS   NO   GLB       10   30     NO   NO      NO      *NONE
PRINTER-PARAM-FILE RESOURCE-FILE-PREFIX CONTROLLER-START
*SYSTEM           *SYSTEM              AT-PRINTER-START
FORM-NAME = AZER2  STD    STDF5  STDC06 STDC08 STDCC6 STDPCE

-----------------------CHARACTER-SET-POS------------------------------
POS-1    POS-2    POS-3    POS-4    POS-5    POS-6    POS-7    POS-8
```

```
    POS-9    POS-10   POS-11   POS-12   POS-13   POS-14   POS-15   POS-16

    ----------------------LANGUAGE-EXTENSION---------------------------
    LANG-EXT-TYPE
    *SYSTEM

    /SHOW-SPOOL-FORMS FORM-NAME=STDPCE,DEVICE-TYPE=9001

    FORM-NAM DEV-TYPE  LI-S PA-S H-P T-P   VERT-CONTROL     ROT-CONTROL    OWNER
                                          L-N/LPI/C-P/C-S L-N/LPI/C-P/C-S
    STDPCE   9001RP     80  120  NO  INF       8   3 101
    BAND-ID  PREFORM  PAGE-DEF FORM-DEF S-O S-P-T T-UP-P CH-IM
    *NONE    *NONE           0 *NONE    NO      0 NO     *NONE
```

The RSO device administrator must be requested to change the operands so that the job can be correctly printed.

**Calculating the actual number of lines per page**

The actual number of lines that can be printed per page can be calculated for a print job started with DOCUMENT-FORMAT=*TEXT/*PAGE-FORMAT(CONTROL-MODE= *PAGE-MODE(LINE-SPACING=(*BY-EBCDIC-CONTROL(...)/*BY-IBM- CONTROL(...)/*BY-ASA-CONTROL(...)))/*LOGICAL(...)) provided that the number was not explicitly specified in the LINES-PER-PAGE operand of the PRINT-DOCUMENT command. Two situations are differentiated when calculating the number of lines per page.

1.  No loop record is specified in the PRINT-DOCUMENT command and feed control was defined through specification of a line feed:

    ```
    /PRINT-DOCUMENT FROM-FILE=filename,
                    RESOURCE-DESCRIPTION=*PAR(FORM-NAME=form),
                    TO-PRINTER=*PAR(PRINTER-NAME=name)
    ```

    The specified form (or the standard form) can be output and the LPI value (lines per inch) in field LPI checked.

    *Example*

    ```
    /SHOW-SPOOL-FORMS FORM-NAME=STDPCE,DEVICE-TYPE=9001,INF=*ALL

    FORM-NAM DEV-TYPE  LI-S PA-S H-P T-P   VERT-CONTROL     ROT-CONTROL    OWNER
                                          L-N/LPI/C-P/C-S L-N/LPI/C-P/C-S
    STDPCE   9001RP     80  120  NO  INF       8   3 101
    BAND-ID  PREFORM  PAGE-DEF FORM-DEF S-O S-P-T T-UP-P CH-IM F-OV  F-O-B
    *NONE    *NONE           0 *NONE    NO      0 NO     *NONE *NONE *NONE
    ```

The number of lines per page can be calculated using the following formula:

Number of lines/page = (PS * LPI / 10 - x [- 6] [- 2]) [/ y]

where:

PS      Value of the PAGE-SIZE operand from the device definition (field PA-S in the output)

LPI     Value of the L-P-I operand from the device definition (field LPI in the output)

x       Number of lines before "channel 1". If "channel 1" is in line 3, then x=2.

[-6]    The number 6 must be subtracted if LINE-SPACING=1/2/3 was specified in the PRINT-DOCUMENT command.

[-2]    The number 2 must be subtracted if HEADER-LINE=*STD/*DATE/ *FIRST-RECORD/*PAGE-NUMBER was specified in the PRINT-DOCUMENT command.

y       Value of LINE-SPACING operand in the PRINT-DOCUMENT command (1/2/3). The default value is 1.

*Example*

```
/PRINT-DOCUMENT FROM-FILE=MYFILE,
                RESOURCE-DESCRIPTION=*PAR(FORM-NAME=STDPCE),
                DOCUMENT-FORMAT=*TEXT(LINE-SPACING=2,HEADER-LINE=*STD),
                TO-PRINTER=*PAR(PRINTER-NAME=P9001)
```

Number of lines/page = (120 * 8 / 10 - 2 - 6 - 2) / 2 = 43 lines

It must be noted that the form converts the number of printable lines per page (if, for example, a header is to be included).

The number of printable "user" lines is calculated as follows:

Number of printable "user" lines = number of lines/page [-2]

where:

[-2]    The number 2 must be subtracted if HEADER-LINE=*STD/*DATE/ *FIRST-RECORD/*PAGE-NUMBER was specified in the PRINT-DOCUMENT command.

In the above example this means:

Number of printable "user" lines = 43 - 2 = 41 lines

2. Either the LOOP-NAME operand was specified in the PRINT-DOCUMENT command, or no LOOP operand but a form (FORM-NAME operand or standard form) was specified for which a loop record was defined in the VERTICAL-CONTROL operand in the form definition.

*Example*

```
/PRINT-DOCUMENT FROM-FILE=filename,
                RESOURCE-DESCRIPTION=*PAR(LOOP-NAME=C6),
                TO-PRINTER=*PAR(PRINTER-NAME=name)
or
/PRINT-DOCUMENT FROM-FILE=filename,
                RESOURCE-DESCRIPTION=*PAR(FORM-NAME=form),
                TO-PRINTER=*PAR(PRINTER-NAME=name)
```

The specified form (or the standard form) can be output and the loop name checked in field L-N.

*Example*

```
/SHOW-SPOOL-FORMS FORM-NAME=STDPCE,DEVICE-TYPE=9001,INF=*ALL

FORM-NAM DEV-TYPE  LI-S PA-S H-P T-P   VERT-CONTROL    ROT-CONTROL    OWNER
                                       L-N/LPI/C-P/C-S L-N/LPI/C-P/C-S
FOLOOP   9001RP     80  120 NO  INF C6              101
BAND-ID  PREFORM  PAGE-DEF FORM-DEF S-O S-P-T T-UP-P CH-IM F-OV  F-O-B
*NONE    *NONE          0 *NONE     NO       0 NO    *NONE *NONE *NONE
```

The loop entry can now be output using the RSOSERVE utility routine.

```
/START-PROGRAM FROM-FILE=$RSOSERVE

Mask MLORMAIN: Select 4/DISPLAY

Mask ML1SHOW:  Select 4/LOOP

Mask SH2LOP:   Enter C6 and 2/SHOW

Mask SH3LOP:   The loop record is output with its form length (e.g.
               11), its number of lines per inch (e.g. 6) and its
               "channel 1" position (e.g. line 3 → n=2).
```

The number of lines per page can be calculated using the same formula as in case 1 above:

Number of lines/page = (PS * LPI / 10 - x [- 6] [- 2]) [/ y]

where:

| | |
|---|---|
| PS | Value of the PAGE-SIZE operand from the device definition (field PA-S in the output) |
| LPI | Value of the L-P-I operand from the device definition (field LPI in the output) |
| x | Number of lines before "channel 1". If "channel 1" is in line 3, then x=2. |
| [-6] | The number 6 must be subtracted if LINE-SPACING=1/2/3 was specified in the PRINT-DOCUMENT command. |
| [-2] | The number 2 must be subtracted if HEADER-LINE=*STD/*DATE/ *FIRST-RECORD/*PAGE-NUMBER was specified in the PRINT-DOCUMENT command. |
| y | Value of LINE-SPACING operand in the PRINT-DOCUMENT command (1/2/3). The default value is 1. |

*Example*

```
/PRINT-DOCUMENT FROM-FILE=MYFILE,
                RESOURCE-DESCRIPTION=*PAR(FORM-NAME=FOLOOP),DOCUMENT-
                FORMAT=*TEXT(HEADER-LINE=*STD,LINE-SPACING=*BY-EBCDIC-
                CONTROL),TO-PRINTER=*PAR(PRINTER-NAME=P9001)

LOOP C6 → length = 12", LPI = 6, "channel 1" position=2

Number of lines/page = (120 * 6 / 10 - 1) / 1 = 71 lines
```

It must be noted that the form converts the number of printable lines per page (if, for example, a header is to be included). The number of printable "user" lines is calculated as follows:

Number of printable "user" lines = number of lines/page [-2]

where:

| | |
|---|---|
| [-2] | The number 2 must be subtracted if HEADER-LINE=*STD/*DATE/ *FIRST-RECORD/*PAGE-NUMBER was specified in the PRINT-DOCUMENT command. |

In the above example this means:

Number of printable "user" lines = 71 - 0 = 71 lines

**Problems on printing the Header and Trailer pages**

*The Header and Trailer pages are requested, but they are not printed.*

1. Check whether "YES", "INFO" or "ONE" was specified in the form record for the Header and Trailer pages. If not, the RSO device administrator or systems support must be requested to change these operands with MODIFY-SPOOL-FORM:

```
/MODIFY-SPOOL-FORM FORM-NAME=name,DEVICE-TYPE=device-type,
                   HEADER-PAGE=*YES/ONE,TRAILER-PAGE=*YES/INFO
```

2. Check the loop length for the form. The loop length must have at least 24 lines available for the Header page and in excess of 13 lines for the Trailer page.

3. Check the number of possible characters per line. The number of characters is calculated from the line length of the form and the CPI value that is specified for the character set.

   *Example*

   The LINE-SIZE operand in the form definition was specified with a value of 80 in 1/10 inch.

   The CHARACTERS-PER-INCH operand in the character set definition was specified with a value of 12 (with IGNORE the CPI value would be 10).

   The number of characters per line is (80 * 12)/10 = 96.

   If the number of characters is less than 70, the Header and Trailer pages are not printed.

*A Header page is printed but:*

1. A blank page is printed between the Header page and the first page of the file.

   If SPACE-AFTER-HEADER=*YES was specified in the HEADER-PAGE operand in the global SPOOL.PARAMETERS file, then the form feeds performed following the Header page are dependent on the SKIP-TO-CHANNEL value that was specified under ADD-SPOOL-DEVICE. If SKIP-TO-CHANNEL=*NORMAL was specified, the branch to "channel 1" is performed again with the result that a blank page is printed at this point. With SKIP-TO-CHANNEL=*OPTIMIZED, the branch to "channel 1" is not performed twice in succession.

2. The Header and Trailer pages are not printed using the character set that was defined in the SPOOL.PARAMETERS file.

   In contrast to local SPOOL, the value FILE for the CHARACTER-SET operand in the global SPOOL.PARAMETERS file is ignored by RSO. The Header and Trailer pages are printed using the default character set.

### Unintentionally printed characters

If characters printed unintentionally render the printout unreadable, the following action should be attempted to solve the problem:

The RSO device administrator should be requested to check the printer configuration. The principal cause of the problem is probably associated with incorrect definition of the printer hardware and the interface configuration (transfer rate, data transfer format, transfer protocol, parity bit etc.).

### The ISAM keys of ISAM files are printed

If the ISAM keys of ISAM files are printed, the problem can be solved as follows:

If the ISAM key begins in column 1 of the record, the value (keylength + 1) must be specified for the FIRST-CHARACTER operand in the PRINT-DOCUMENT command. The ISAM key will not then be output. If, additionally, *BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ BY-ASA-CONTROL is specified for the LINE-SPACING operand, the control characters are interpreted and not printed.

If the ISAM key does not begin in column 1 of the record, column 1 contains the feed control character, which is not included in the output. The FIRST-CHARACTER operand need not be specified in the PRINT-DOCUMENT command.

### Device status for RSO printers

In the event of an error, systems support, the device administrator or the nonprivileged user can obtain information on the cause of the error pertaining to the particular job with the aid of the SHOW command. The field ERMSG then contains an RSO message code. In addition, the field ERCOD may contain direct error information:

– in the case of DCAM errors:
   FDB1, FDB2, FDB3, FDB4

– in the case of SOCKET errors:
   SOCKET return code

– in the case of errors on 9025, 9026-RENO Printers:
   RENO return code

– in the case of errors on 9645 Printers:
   NBZ, macro identifier, register R, register T

– in the case of errors on other printers:
   NBZ, RB1, RB2, STB

*where*

FDB1..4=          feedback

NBZ=              start-of-message character (German abbreviation)

RB1/RB2=          return bytes
                  (RB1=access mode(F1=DIRECT/PC;F2=HARDCOPY/HARDCOPY-9751)
                  RB2 = consecutive block number in ASCII, counted down from 7 to 0);

STB=              printer status byte.

Reg. R/T=         see the "DVS (TRANSDATA)" manual

**Automatic restart for private devices in the event of a printer fault**

In order to reduce the number of interventions required by the RSO device administrator in
the event of printer faults, printing continues automatically for public and private devices in
certain error situations once the fault has been eliminated.
Here, the user runs the risk of certain sections being printed twice ("double printing"); this
is drawn to his/her attention at the appropriate place in the printout by means of message
SRO1001 (POSSIBILITY OF DOUBLE PRINTING).

Until the error is recovered, the printer retains status 'R', while the print job has the status
'ACT'.
Information on the cause of the fault can be obtained from the contents of the ERCOD and
ERMSG fields when the SHOW command is used.

The recovery rules enable systems support to modify the standard recovery actions imple-
mented in the event of an error. The recovery actions supported and the general error codes
are described in detail on ff.

*Notes*

–   The function described above is different from the function of repeating connection
    setup in the event of an error (SRO0948, SRO0949). In this case, the printer has status
    "A" and the print job status 'ACT'.

–   If a CANCEL-JOB or HOLD-SPOOLOUT command is used on a print job which is in
    one of the above error situations, the command is not executed until the printer has
    been addressed cyclically. The same applies to the STOP-PRINTER-OUTPUT
    command, but here the job is also placed in the job queue without an error message
    being issued.

**Error documentation**

In the event of an error, the following documentation should accompany the error report:

– the RSO controller system dump (task which outputs the message 'JMS0066 JOB SRAM ACCEPTED ON ...') or the SRAM task dump, if available

– in the case of hung-up printers or similar problems: HELGA dump of the SRAM task and RSO controller with class 5/6 memory and class 4 system memory

– terminal log or CONSLOG file

– log of the PRINT-DOCUMENT command, of the SHOW command, and of the device, FORM and character set definitions from the SPOOL parameter file

– correction files SYSREP.RSO.035

– a printout of the file $SYSSPOOL.SYSPAR.RSO.035.USER with OUTPUT-FORMAT=*HEXADECIMAL and LAST-CHARACTER=2048.

– the file $SYSSPOOL.SYSPAR.RSO.035

– the $TSOS.RSOFILE or the user RSOFILE used for errors in connection with loop records, conversion tables, character image tables or type bands.

Certain errors may require the generation of additional documents or test REPs; consequently, the method of reproduction should always be specified if the error is reproducible.

*Note*

   If an RSO dump and a dump for TSN "S" are planned, recovery must first be effected for the SPOOL task (start dump and issue new START-SUBSYSTEM command with SUBSYSTEM-NAME=SPOOL).
   Error recovery for RSO cannot be started until the SPOOL task is running.

# 4 Responsibilities of the RSO device administrator

The SPOOL administrator or systems support may define RSO device administrators (operand ADMINISTRATOR in ADD-SPOOL-DEVICE) for the desired RSO devices and delegate administrative tasks by assigning this privilege.

The RSO device administrator is a privileged user for one, several or all RSO devices. More than one RSO device administrator may be defined for the same device. The user ID TSOS can also be defined as the RSO device administrator.

An RSO device administrator can work with RSO printers like nonprivileged users. He can also perform certain additional tasks which are described in this chapter:

– defining RSO character sets (see page 161)

– supporting RSO fonts (see page 164)

– defining RSO forms (see page 165)

– controlling RSO jobs (see page 176)

– requesting information (see page 177)

– using certain commands (see page 178)

– printing in the Internet cafe (see page 179)

– reacting in certain error situations (see page 180)

# 4.1 RSO printer management

## 4.1.1 Assigning a printer parameter file to a printer

The RSO device administrator is able to assign a printer parameter file to a printer by speci-
fying the private part of the file name for the device definition of the printer using the
SPSERVE statement MODIFY-SPOOL-DEVICE. A full description of the printer parameter
files and their assignment is contained in section "Printer parameter files" on page 289.

## 4.1.2 Releasing a printer for an OLTP application

The RSO device administrator is able to release a printer for an OLTP application using the
operand ALLOWED-ACCESSES of the START-PRINTER-OUTPUT command.

A full description of the OLTP interface of RSO is contained in section "OLTP interface -
printing on RSO printers from UTM" on page 346.

## 4.1.3 Configuring printers for connection via a BSD-LPD

The RSO device administrator is able to configure printers for connection via TCP/IP-LAN
and a BSD printer daemon (BSD-LPD = BSD line printer daemon). This is done using the
special parameters of the MODIFY-SPOOL-DEVICE statement of the SPSERVE tool.

A full description of this configuration is contained in section "Connecting printers via the
BSD-LPD protocol" on page 217.

## 4.1.4  Defining RSO character sets

Character sets can be defined for RSO printers with the following variations:

– color (default value: BLACK)
– intensity (default value: NORMAL)
– character style (default value: STRAIGHT)
– character type (default value: *NONE)
– with/without underscoring (default value: without)
– character spacing (default value: 10 characters per inch)
– print quality

The character sets are defined by systems support or an RSO device administrator with ADD-SPOOL-CHARACTER-SET/EDIT-SPOOL-CHARACTER-SET in the SPSERVE utility routine (see the "SPSERVE (BS2000/OSD)" manual). The character sets can be interrogated by means of the command SHOW-SPOOL-CHARACTER-SETS or the identically named statement in SPSERVE.

Once defined, a character set remains available until modified (MODIFY-SPOOL-CHARACTER-SET/EDIT-SPOOL-CHARACTER-SET) or deleted (REMOVE-SPOOL-CHARACTER-SET).

The definition and use of character sets linked to fonts is described in the following section and in the "RSOSERVE" manual.

**Rules for defining character spacings (CPI)**

A character spacing, or pitch, is determined for each character set (number of characters per inch). As of RSO V2.2A, all PRINT-FILE/PRINT-DOCUMENT commands requesting CPI values which are not actually supported by the target printer are rejected. If the destination is a pool of printers, the scheduling will be restricted to printer types from the pool which actually support the requested CPI values.

*Exceptions to the rule:*

1. 8121, 9002 and 9645 Printers are not provided with control character sequences that set character spacing (the hardware value is 10 cpi). Therefore, RSO only accepts a 10 cpi value on these printer types.

2. RSO cannot send any control character sequence setting the character spacing to 9000, 9025 and 9026-RENO Printers. The character spacing, however, can be set through a 256-character string (known as RSO font or RSO string) linked to the character set using the RSOSERVE utility routine. RSO nevertheless permits certain CPI values for these printer types. The values 1 through 100 can be specified in the CHARACTERS-PER-INCH operand of the SPSERVE statement ADD-SPOOL-CHARACTER-SET.

This value is not set by RSO, however, but is used for computing the line length, i.e. the maximum number of characters per line used for the Header and Trailer pages and for detecting possibly truncated lines.

The following table gives for each printer type the CPI operand values that are supported by RSO for the PRINT-DOCUMENT command and at the start of spoolout, and the CPI values that are translated by RSO into printer commands.

| Printer types | CPI values checked for PRINT-DOCUMENT and at start of spoolout (1) | CPI values translated by RSO and sent to the printer (2) |
|---|---|---|
| 2030-PCL | 1..100 | 1..100 |
| 4011 | 10/12/15/17/20 | 10/12/15/17/20 |
| 4812 | 1/2/3/4/5/6/8/10/12/15/20/24/30/40/60 | 1/2/3/4/5/6/8/10/12/15/20/24/30/40/60 |
| 4813 | 10/12/15/17/20 | 10/12/15/17/20 |
| 4818-PCL | 1.100 | 1..100 |
| 4821-PCL | 1..100 | 1..100 |
| 4822-PCL | 1..100 | 1..100 |
| 4824-PCL | 1..100 | 1..100 |
| 4825-PCL | 1..100 | 1..100 |
| 4830-PCL | 1..100 | 1..100 |
| 4850-PCL | 1..100 | 1..100 |
| 8121 | 10 | - |
| 9000 | 1..100 | - |
| 9000-PCL | 1..100 | 1..100 |
| 9000-PRO | 10/12/17 | 10/12/17 |
| 9000-PS | 1..100 | 1..100 |
| 9000-EPFX | 10/12/17/20 | 10/12/17/20 |
| 9000-EPLQ | 10/12/15/17/20 | 10/12/15/17/20 |
| 9000-EPSQ | 10/12/15/17/20 | 10/12/15/17/20 |
| 9001 | 10/12/17 | 10/12/17 |
| 9001-31 | 10/12/15/17 | 10/12/15/17 |
| 9002 | 10 | - |
| 9003 | 10/12/15 | 10/12/15 |
| 9004 | 1/2/3/4/5/6/8/10/12/15/20/24/30/40/60 | 1/2/3/4/5/6/8/10/12/15/20/24/30/40/60 |
| 9011 | 10/12/15/17 | 10/12/15/17 |

| Printer types | CPI values checked for PRINT-DOCUMENT and at start of spoolout (1) | CPI values translated by RSO and sent to the printer (2) |
|---|---|---|
| 9012 | 10/12/15/17 | 10/12/15/17 |
| 9013 | 10/12/15/18 | 10/12/15/18 |
| 9014 | 10/12/15/17/18/20 | 10/12/15/17/18/20 |
| 9015 | 10/12/15/17/18/20 | 10/12/15/17/18/20 |
| 9021 | 1..100 | 1..100 |
| 9022 | 1/2/3/4/5/6/8/10/12/15/20/24/30/40/60 | 1/2/3/4/5/6/8/10/12/15/20/24/30/40/60 |
| 9022-200 | 1..100 | 1..100 |
| 9025 | 1..100 | - |
| 9026-RENO | 1..100 | - |
| 9026-PCL | 1..100 | 1..100 |
| 9645 | 10 | - |
| 9045-ANSI | 10/12/13/15/17 | 10/12/13/15/17 |
| 9046 | 10 | - |
| 9097 | 10/12/15/17/20 | 10/12/15/17/20 |
| DJET | 1..100 | 1..100 |

(1)  The table gives for each printer type the CPI operand values of the character set that are supported by RSO as of V3.1A. This check is performed at PRINT-DOCUMENT command validation and print job scheduling time. The specification of other values leads to the following behavior.

–  For the PRINT-DOCUMENT command:
the command is rejected.

–  At the start of spoolout:
the print job is placed in the KEEP queue and the device is put into status "S".

(2)  Some printer types do not support any printer commands that set the horizontal density ('-' in the table). This means that the requested horizontal density is never set by RSO whatever the CPI operand value of the character set may be.

Nevertheless, on 9000, 9025 and 9026-RENO Printers, character spacing can be set through a 256-character string linked to a character set, using the RSOSERVE utility routine.

## 4.1.5  Supporting RSO fonts

A full description of the RSO fonts and their characteristics may be found in section "Use of RSO fonts" on page 60. That section also describes how the contents and assignments of fonts can be output, how a font is invoked for spoolout, and how a freely selectable character set or a second font is supported.

Only the additional actions performed by the RSO device administrator for font management are described below. RSO device administrators cannot define fonts. They can only have existing fonts output, and link existing fonts to a character set for those printer types for which they are entered as device administrator.

**Linking an RSO font to a character set name**

After an RSO font has been defined by systems support, it can be linked to one or more character set names by the RSO device administrator.

RSO does not check whether the desired character set is defined in the SPOOL.PARAMETERS file, nor does it check whether the character set that is used for the spoolout is linked to a font.

For a description of how an RSO font is assigned to a character set, refer to the "RSOSERVE" manual.

## 4.1.6  Defining RSO forms

Forms for RSO printers are defined with options regarding:

–   printer type
–   form size
–   Header pages
–   Trailer pages
–   feed control
–   standard character set
–   feed control for pages to be rotated before printing
–   standard character set for rotated printing.

The forms are defined by systems support or one of the RSO device administrators by means of ADD-SPOOL-FORM/EDIT-SPOOL-FORM in the SPSERVE utility routine (see the "SPSERVE (BS2000/OSD)" manual).

Systems support, RSO device administrators and nonprivileged users can have the characteristics of the forms written to SYSOUT using SHOW-SPOOL-FORMS (command or statement in SPSERVE).

A defined form remains valid until modified (MODIFY-SPOOL-FORM/EDIT-SPOOL-FORM) or deleted (REMOVE-SPOOL-FORM).

The SPOOL parameter file contains *STD default forms for certain printer types. The default values for these forms are described in the "SPSERVE (BS2000/OSD)" manual after the ADD-SPOOL-FORM statement.

Feed control for RSO printers can be implemented in two different ways:

–   Entering the line spacing:
    A default portrait format buffer is simulated:
    ADD-SPOOL-FORM...,VERTICAL-CONTROL=*SPACING,(L-P-I=...,C-P=...).
    The page size is divided by the standard line spacing.
    For possible entries for LPI, see table on page 173.

    The value to be entered is the inverse of the spacing required in inches.

    Printing begins at the line specified in the CHANNEL1-POSITION (C-P) operand (freely selectable).

–   Entering a loop record:
    ADD-SPOOL-FORM...,VERTICAL-CONTROL=*LOOP (LOOP-NAME = ...).
    As for laser printers, the channels 1 through 11 can be used.
    Channel 12 is reserved for RSO and is always on the last line. These loop records must be held in the $TSOS.RSOFILE.

The two options are mutually exclusive and must be defined by systems support or the RSO device administrator for each form (ADD-SPOOL-FORM/EDIT-SPOOL-FORM).

#### 4.1.6.1   Defining the print page in the form definition

The specification for PAGE-SIZE in the form definition (ADD-SPOOL-FORM) is the physical page size for printer types other than 2030-PCL, 4812, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9021, 9022-200, 9026-PCL and DJET.

The physical page size is defined in the ADD-SPOOL-FORM statement.

For forms to be printed in portrait orientation, the height of the page is specified in 1/10 inch in the PAGE-SIZE operand, for forms to be printed in landscape orientation (the ROTATION-CONTROL operand must also be specified) the page height is specified in the LINE-SIZE operand.

This value in conjunction with the specified line spacing value (LPI) determines the maximum number of lines that can be printed on a page. If, e.g. PAGE-SIZE=120 and a line spacing of 6 lpi is specified, a maximum of 72 lines can be printed on a page.

With 2030-PCL, 4812, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9021, 9022-200, 9026-PCL and DJET Printers, note that not the entire physical page can be printed. Half an inch at the top and the bottom of the physical page cannot be used. The logical page between these margins is the printable surface of the physical page:

| | |
|---|---|
| Top margin | } 1/2 inch |
| Printable area | } Logical page |
| Bottom margin | } 1/2 inch |
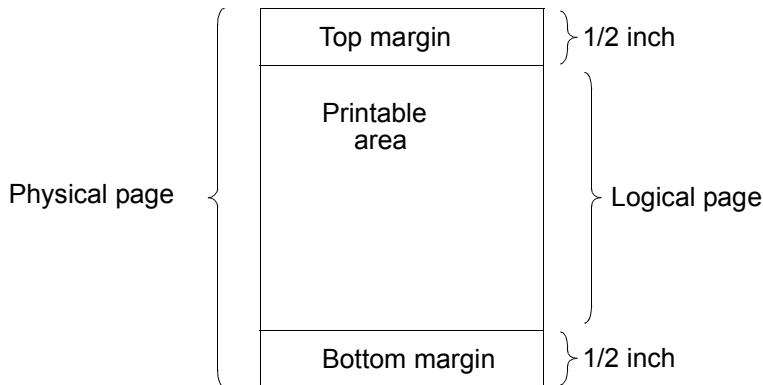
Physical page {

Hence, the maximum number of lines per page for these printer types depends not on the size of the physical, but of the logical page. The specification for PAGE-SIZE (portrait format) or LINE-SIZE (landscape format) must therefore refer to the height of the logical page and not to that of the physical page.

The following tables show the maximum values for the definition of the logical page that should be specified by systems support or RSO device administrators in the ADD-SPOOL-FORM statement for PAGE-SIZE (portrait format) or LINE-SIZE (landscape format), depending on the paper type and line spacing.

**2030-PCL, 4812, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 9000-PCL, 9021, DJET printers**

Portrait format: maximum values for PAGE-SIZE in ADD-SPOOL-FORM (the value in brackets is the maximum number of lines that can be printed on one page with this form).

| Paper type | Max. value for PAGE-SIZE, in brackets the maximum number of lines per page for a line spacing of: | | | | |
|---|---|---|---|---|---|
| | 3 lpi | 4 lpi | 6 lpi | 8 lpi | 12 lpi |
| A4 | 109 (32) | 109 (43) | 108 (64) | 107 (85) | 107 (128) |
| Letter | 103 (30) | 102 (40) | 101 (60) | 101 (80) | 100 (120) |
| Legal | 133 (39) | 132 (52) | 131 (78) | 131 (104) | 130 (156) |
| Exec | 96 (28) | 97 (38) | 96 (57) | 96 (76) | 95 (114) |

**9022-200 Printer**

Portrait format: maximum values for PAGE-SIZE in ADD-SPOOL-FORM (the value in brackets is the maximum number of lines that can be printed on one page with this form).

| Paper type | Max. value for PAGE-SIZE, in brackets the maximum number of lines per page for a line spacing of: | | | | |
|---|---|---|---|---|---|
| | 3 lpi | 4 lpi | 6 lpi | 8 lpi | 12 lpi |
| A4 | 109 (32) | 109 (43) | 108 (64) | 107 (85) | 107 (128) |
| Letter | 103 (30) | 102 (40) | 101 (60) | 101 (80) | 100 (120) |
| Legal | 133 (39) | 132 (52) | 131 (78) | 131 (104) | 130 (156) |
| B5 | 93 (27) | 92 (36) | 91 (54) | 92 (73) | 91 (109) |

**2030-PCL, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 9000-PCL, 9021 printers**

Landscape format: maximum values for LINE-SIZE in ADD-SPOOL-FORM (the value in brackets is the maximum number of lines that can be printed on one page with this form).

| Paper type | Maximum value for LINE-SIZE, in brackets the maximum number of lines per page for a line spacing of: | | | | |
|---|---|---|---|---|---|
| | 3 lpi | 4 lpi | 6 lpi | 8 lpi | 12 lpi |
| A4 | 76 (22) | 74 (29) | 73 (43) | 73 (58) | 72 (86) |
| Letter | 76 (22) | 77 (30) | 76 (45) | 76 (60) | 75 (90) |
| Legal | 76 (22) | 77 (30) | 76 (45) | 76 (60) | 75 (90) |
| Exec | 66 (19) | 64 (25) | 63 (37) | 63 (50) | 63 (75) |

**9022-200 Printer**

Landscape format: maximum values for LINE-SIZE in ADD-SPOOL-FORM (the value in brackets is the maximum number of lines that can be printed on one page with this form).

| Paper type | Maximum value for LINE-SIZE, in brackets the maximum number of lines per page for a line spacing of: | | | | |
|---|---|---|---|---|---|
| | 3 lpi | 4 lpi | 6 lpi | 8 lpi | 12 lpi |
| A4 | 76 (22) | 74 (29) | 73 (43) | 73 (58) | 73 (87) |
| Letter | 76 (22) | 77 (30) | 76 (45) | 76 (60) | 75 (90) |
| Legal | 76 (22) | 77 (30) | 76 (45) | 76 (60) | 75 (90) |
| B5 | 63 (18) | 62 (24) | 61 (37) | 62 (49) | 62 (74) |

A smaller value should be specified if the logical page is to be deliberately defined smaller in order to print fewer lines per page.
A higher value should not be specified since it is then not possible to print the pages evenly, as the following example shows.

*Example*

A value of 120 is specified for PAGE-SIZE for printing on A4 paper in portrait format, with a line spacing of 6 lpi. Tables 1 and 2 show that the maximum value is only 108 and that 64 lines can be printed on an A4 page with a line spacing of 6 lpi. In our example (PAGE-SIZE=120 and 6 lpi) a form feed occurs after 64 lines and the remaining 8 lines of the logical page are printed on the next page. A further form feed occurs after these 8 lines, and so on.

| Page 1 | Page 2 | Page 3 | Page 4 |
|---|---|---|---|
| Line 1<br>.<br>.<br>.<br>Line 64 | .<br>.<br>Line 72 | Line 73<br>.<br>.<br>.<br>Line 136 | .<br>.<br>Line 144 |
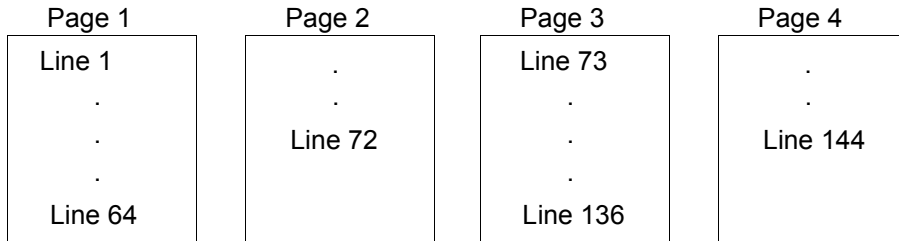
*Notes*

–  Channel 1 is on the line that is specified in ADD-SPOOL-FORM in the CHANNEL1-POSITION operand, or (if LOOP is being used) on the line on which channel 1 was defined in the loop record; the lines are counted from the beginning of the logical page, not the physical.

–  RSO does not change the values for the upper and lower margins, page height and text length. If the user changes the preset values, this can of course result in changes to the page structure.

–  RSO does not send the printer control character for the PAGE-SIZE function to a 4812, 4821-PCL, 4824-PCL, 9021, 9022-200, 9026-PCL, 9000-PCL or DJET Printer, since it is not possible in this way to define a page size different from that in the printer without a printer message requesting that the correct size of paper be fed into the printer.

–  Unless the user deliberately wants to reduce the page size in order to reduce the number of lines per page, the maximum values in the above tables should be specified for PAGE-SIZE (portrait format) or LINE-SIZE (landscape format).

–  The maximum value for the definition of the logical page should also serve as a standard value when generating loop records.

#### 4.1.6.2   Rules for defining form lengths

The new LPI concept as of RSO V2.2A has been introduced in order to eliminate a significant restriction in the previous forms concept:

When creating or modifying a form (with ADD-SPOOL-FORM and MODIFY-SPOOL-FORM), only the values 3, 4, 6, 8, 10, 12, 15 and 20 are permitted for the SPACING operand, whereas other values are supported by a number of printer types.

**Supported values**

| Printer type | Densities and supported values |
|---|---|
| 9000 | x/1" - x/999" (x = 1 - 999) |
| 9000-EPFX | x/72" (x=1 - 85)<br>x/180 (x=1 - 255) |
| 9000-EPLQ<br>9000-EPSQ | x/360" (x=1 - 255) |
| 9000-PRO | x/72" (x=1 - 85)<br>x/216 (x=1 - 255) |
| 9000-PS | x/72" (x=1 - 999) |
| 9001, 9001-31 | x/72" (x = 1 - 99) |
| 8121, 9002 | 1/6" |
| 9003 | x/96" (x = 1, 2, 4, 8, 12, 16) |
| 9004 | x/48" (x = 1 - 125) |
| 9011 | x/72" (x = 1 - 99) |
| 9012 | x/120" (x = 1 - 99) |
| 9013 | x/48" (x = 1, 2, 3, 4, 6, 8, 12, 16, 24, 48) |
| 4011, 4813, 9014, 9097 | in units of 1/48":<br>x/48" (x = 1, 2, 3, 4, 6, 8, 12, 16, 24, 48)<br>in LPI units:<br>1, 2, 3, 4, 6, 8, 12, 16, 24, 48, 60, 72, 90, 120, 144, 180, 360 |
| 4812 | x/48" (x = 1 - 126) |
| 2030-PCL, 4818-PCL, 4821-PCL, 4822-PCL, 4825-PCL, 4824-PCL, 9000-PCL, 9021, 9022-200, 9026-PCL, DJET | x/1" (x=1 - 682)<br>x/2" - x/999" (x=1 - 999) |
| 9015 | in LPI units:<br>1, 2, 3, 4, 6, 8, 12, 16, 24, 48, 60, 72, 90, 120, 144, 180, 360 |
| 9022 | x/48" (x = 1 - 125)<br>x/300" (x = 1 - 255) (NEC function) |

| Printer type | Densities and supported values |
|---|---|
| 9025 | x/406" (x = 1 - 999) |
| 9026-RENO | x/406" (x = 1 - 999) |
| 9045-ANSI | 3 LPI, 4 LPI, 6 LPI, 8 LPI |
| 9046 | 6 LPI, 8 LPI |
| 9645 | 6 LPI, 8 LPI |

It can be seen from the table that different printer types use different units, and that some printers offer a range of values while others can only offer a single value.

The line density is now determined by the number of lines per number of inches.

*Example*

LINES =     6   or   300   or   90
INCHES =    1   or    50   or   15        } corresponds to a density of 6 lpi

LINES =    48   or    96   or   480
INCHES =   10   or    20   or   100       } corresponds to a density of 4.8 lpi

*Notes*

1.  The values for INCHES can be specified in the range 1 through 999.

2.  The values for LINES can be specified as an integer value in the range 1 through 999 such that the corresponding value for the density is not greater than the maximum permitted page size (25 inches).

The new density can be specified in the SPSERVE statements ADD-SPOOL-FORM and MODIFY-SPOOL-FORM.

### Validation of the lpi values

Since SPSERVE cannot access the RSO tables, no checking of the values takes place on definition or modification of forms. The validation is performed by RSO for the PRINT-DOCUMENT command and at the start of spoolout.

Previously, no checking of the specified lpi values has taken place. An incorrect lpi value was ignored on printing, and the last correct line spacing was used for printing. With the extended lpi concept, validation of the lpi values was introduced.

The PRINT-DOCUMENT command is rejected if the specified line spacing is not actually supported by the printer. The line spacing is specified either indirectly in the LOOP-NAME operand of the PRINT-DOCUMENT command, or in the ADD-SPOOL-FORM statement with the SPACING or LOOP operand.

Certain line spacing values were accepted in earlier RSO versions but are not presently supported by printers. As of RSO V2.2A, such values are rejected.

### Exceptions to the rule

1.  8121 and 9002 Printers are not provided with escape sequences that set the line spacing (the sole hardware value is 6 lpi). Therefore, RSO only accepts a 6 lpi value for these printer types.

2.  The 9000 Printer type can be considered as an "open" printer type since several types of printer can be defined through it. Therefore, RSO cannot send any escape sequences that set the line spacing since the escape sequences may vary from one printer to another.

    Nevertheless, RSO needs to know the line spacing value used for printing in order to compute the number of lines to be printed per page, and then to control page feed. Therefore, although RSO does not send any escape sequences setting the line spacing to the 9000 Printer type, it accepts certain line spacing values on this printer type.

3.  On the 9025 and 9026-RENO Printers, line spacing values of approximately 6, 8, 10, 12, 15 and 20 lpi are supported by RSO. Approximately means that these values are translated into the units for the 9025 Printer (1/406") and are rounded to an integer value. So it is not the exact line spacing value requested that is used but an approximation of it.

    For reasons of compatibility, these line spacing values are still supported (rounded down), but only if specified in a loop record or as an "lpi" value in the SPACING operand of the ADD-SPOOL-FORM statement. If specified by means of DENSITY in the SPACING operand of the ADD-SPOOL-FORM statement, they are rejected.

The following table summarizes all the line spacing values that are permitted by RSO for each printer type.

| Printer types | LOOP or SPACING values (3/4/6/8/10/12/15/20) | Values for computation (SPACING=DENSITY...) |
|---|---|---|
| 4011 | 3/4/6/8/12 lpi | INCHES= 1/2/3/4/6/8/12/16/24/48 LINES = 48 or INCHES=1 and LINES=60 or INCHES=1 and LINES=72 or INCHES=1 and LINES=90 or INCHES=1 and LINES=120 or INCHES=1 and LINES=144 or INCHES=1 and LINES=180 or INCHES=1 and LINES=360 |
| 4812 | 3/4/6/8/12 lpi | INCHES= 1..126 LINES = 48 |
| 4813 | 3/4/6/8/12 lpi | INCHES= 1/2/3/4/6/8/12/16/24/48 LINES = 48 or INCHES=1 and LINES=60 or INCHES=1 and LINES=72 or INCHES=1 and LINES=90 or INCHES=1 and LINES=120 or INCHES=1 and LINES=144 or INCHES=1 and LINES=180 or INCHES=1 and LINES=360 |
| 2030-PCL 4818-PCL 4821-PCL 4822-PCL 4824-PCL 4825-PCL | 6/8/10/12/15/20 lpi | INCHES=1..682 and LINES=1 or INCHES=1..999 and LINES=2..999 |
| 8121 | 6 lpi | INCHES= 1 LINES = 6 |
| 9000 | 3/4/6/8/10/12/15/20 lpi (1) | INCHES= 1..999 LINES = 1..999 |
| 9000-PCL 4830-PCL 4850-PCL | 3/4/6/8/10/12/15/20 lpi | INCHES=1..682 and LINES=1 or INCHES=1..999 and LINES=2..999 |
| 9000-EPFX | 3/4/6/8/10/12/15/20 lpi | INCHES=1..85 and LINES=72 or INCHES=1..255 and LINES=180 |
| 9000-EPLQ 9000-EPSQ | 3/4/6/8/10/12/15/20 lpi | INCHES=1..255 and LINES=360 |

| Printer types | LOOP or SPACING values (3/4/6/8/10/12/15/20) | Values for computation (SPACING=DENSITY...) |
|---|---|---|
| 9000-PRO | 3/4/6/8/12 lpi | INCHES=1..85 and LINES=72 or INCHES=1..255 and LINES=216 |
| 9000-PS | 3/4/6/8/10/12/15/20 lpi | INCHES=1..999 and LINES=72 |
| 9001 | 3/4/6/8/12 lpi | INCHES= 1..99 and LINES = 72 |
| 9001-31 | 3/4/6/8/12 lpi | INCHES= 1..99 and LINES = 72 |
| 9002 | 6 lpi | INCHES= 1 and LINES = 6 |
| 9003 | 6/8/12 lpi | INCHES= 1/2/4/8/12/16 and LINES = 96 |
| 9004 | 3/4/6/8/12 lpi | INCHES= 1..125 and LINES = 48 |
| 9011 | 3/4/6/8/12 lpi | INCHES= 1..99  and LINES = 72 |
| 9012 | 3/4/6/8/10/12/15/20 lpi | INCHES= 1..99 and LINES = 120 |
| 9013 | 3/4/6/8/12 lpi | INCHES= 1/2/3/4/6/8/12/16/24/48 LINES = 48 |
| 9014 9015 | 3/4/6/8/12 lpi | INCHES= 1/2/3/4/6/8/12/16/24/48 LINES = 48 or INCHES=1 and LINES=60 or INCHES=1 and LINES=72 or INCHES=1 and LINES=90 or INCHES=1 and LINES=144 or INCHES=1 and LINES=180 or INCHES=1 and LINES=360 |
| 9021 | 3/4/6/8/10/12/15/20 lpi | INCHES=1..682 and LINES=1 or INCHES=1..999 and LINES=2..999 |
| 9022 | 3/4/6/8/10/12/15/20 lpi | INCHES=1..125 and LINES=48 or INCHES=1..255 and LINES=300 |
| 9022-200 | 3/4/6/8/10/12/15/20 lpi | INCHES=1..682 and LINES=1 or INCHES=1..999 and LINES=2..999 |
| 9025 | 6/8/10/12/15/20 lpi (2) | INCHES= 1..999 LINES = 406 |
| 9026-PCL | 3/4/6/8/10/12/15/20 lpi | INCHES=1..682 and LINES=1 or INCHES=1..999 and LINES=2..999 |
| 9026-RENO | 6/8/10/12/15/20 lpi (2) | INCHES= 1..999 LINES = 406 |

| Printer types | LOOP or SPACING values (3/4/6/8/10/12/15/20) | Values for computation (SPACING=DENSITY...) |
|---|---|---|
| 9045-ANSI | 3/4/6/8 lpi | Inches= 1 and LINES= 3<br>or<br>Inches= 1 and LINES=4<br>or<br>Inches= 1 and LINES=6<br>or<br>Inches= 1 and LINES=8 |
| 9046 | 6/8 lpi | Inches= 1 and LINES=6<br>or<br>Inches= 1 and LINES=8 |
| 9097 | 3/4/6/8/12 lpi | INCHES= 1/2/3/4/6/8/12/16/24/48<br>LINES = 48<br>or INCHES=1 and LINES=60<br>or INCHES=1 and LINES=72<br>or INCHES=1 and LINES=90<br>or INCHES=1 and LINES=120<br>or INCHES=1 and LINES=144<br>or INCHES=1 and LINES=180<br>or INCHES=1 and LINES=360 |
| 9645 | 6/8 lpi | INCHES= 1<br>LINES = 6 oder 8 |
| DJET | 3/4/6/8/10/12/15/20 lpi | INCHES=1..682 and LINES=1<br>or<br>INCHES=1..999 and LINES=2..999 |

(1) Although RSO does not send any control characters that set the line spacing to the 9000 Printer type, any line spacing values are allowed.

(2) Line spacing values 6, 8, 10, 12, 15 and 20 lpi are not correctly supported (values rounded down), but they are allowed for reasons of compatibility.

If the page size is not compatible with the specified LPI value (the page cannot be covered by an integer number of lines at the given density), a rounding error will occur at the end of the page. This error can range to a maximum of the size of one line.

## 4.2  Job control

After the RSO printers and the forms and character sets to be used have been defined, i.e. entered in the SPOOL parameter file, systems support or the RSO device administrator can activate them using the START-PRINTER-OUTPUT command. A printer can also be activated indirectly by entering an appropriate command (START-PRINTER-OUTPUT) for one or more RSO pools to which the printer belongs. The printer then has status "A".

All print requests which match the forms, user IDs and classes specified in the START-PRINTER-OUTPUT command are executed for this printer.

A MODIFY-PRINTER-OUTPUT-STATUS command can be issued for an already active RSO printer without overwriting the existing operand values; the new values are added (see the description of the command in the "Spool & Print - Commands (BS2000/OSD)" manual).

The STOP-PRINTER-OUTPUT command cancels the assignment of printers when the current spoolout has terminated.

**Automatic redirection of print jobs**

If there is a problem with a printer that cannot be corrected immediately, the device administrator can use the REDIRECT-PRINT-JOB command to redirect the print job to a different device.

The redirection does not apply to print jobs issued after this command. To prevent print jobs from remaining in the wait state, the device administrator must regularly change the destination of RSO jobs and, when necessary, redirect them.

A new parameter, REDIRECTION-DEVICE, has been added to the device record of the SPOOL parameter file for the automatic redirection of RSO jobs from one device to another.

When the device administrator detects the problem, he or she must use the STOP-PRINTER command to deactivate the device and then enter in the device record the name of the device to which jobs are to be redirected. All RSO jobs issued after the change are redirected automatically to the new target printer.

Jobs for which the operand REDIRECTION=*NO is specified in the PRINT-DOCUMENT command are not redirected; they keep their original target printer.

Redirection to a pool or a local device is rejected. All RESUME-PRINT-JOB-commands on RSO jobs and all START-PRINTER commands for devices whose device record contains a redirection device name are also rejected.

## 4.3 Requesting information

The RSO device administrator can request the same information as the nonprivileged user; see page 94ff.

With some SHOW commands, however, the administrator will receive more information than the nonprivileged user. With the SHOW-PRINT-JOB-STATUS command, for example, nonprivileged users receive only information about their own jobs, but RSO device administrators receive information about the jobs that are being processed on the devices for which they have been entered as RSO device administrators.

For detailed command descriptions, refer to the "Spool & Print - Commands (BS2000/OSD)" manual.

## 4.4  Commands and SPSERVE statements for the RSO device administrator

The RSO device administrator can also issue the commands and SPSERVE statements listed below in addition to the commands for the nonprivileged user (see page 97). For a detailed description of the commands or SPSERVE statements, see the manuals "Spool & Print - Commands (BS2000/OSD)" and "SPSERVE (BS2000/OSD)".

| Command | Function | Note |
|---|---|---|
| ADD-SPOOL-CHARACTER-SET | Define character sets | |
| ADD-SPOOL-FORM | Define forms | |
| HOLD-PRINT-JOB | Suspend RSO job | 1. |
| MODIFY-PRINTER-OUTPUT-STATUS | Change management parameters for RSO printers | 1. |
| MODIFY-SPOOL-CHARACTER-SET | Change character sets | 1. |
| MODIFY-SPOOL-DEVICE | Change device characteristics | 1. |
| MODIFY-SPOOL-FORM | Change forms | 1. |
| REMOVE-SPOOL-CHARACTER-SET | Delete character sets from the SPOOL parameter file | 1. |
| REMOVE-SPOOL-DEVICE | Delete RSO device entries from the SPOOL parameter file | 1. |
| REMOVE-SPOOL-FORM | Delete form entries from the SPOOL parameter file | 1. |
| START-PRINTER-OUTPUT | Allocate printer for RSO jobs | 1. |
| STOP-PRINTER-OUTPUT | Deactivate printer | 1. |

1. The statement or command is available to RSO device administrators in its full functional scope only
   – if they are the RSO device administrator for that particular device or
   – if they are the owner of the referenced form or character set.

## 4.5  Internet Cafe printing

For each print job submitted with a variable URL, a "system" device is allocated. The print-job is addressed to an IPP printer whose name is *IPPttnnn* where *IPP* is a fixed prefix defined by a SYSSSI entry, *tt* is the printer type (for example, A4) and *nnn* is a sequence number (000-999).

The service task SROSDIP that will manage the table of "system" devices is created at the first print job submitted with a variable URL.

These "system" devices are handled as public devices by RSO.

The following commands are not allowed for such devices. The request will be rejected with the corresponding error message.

–   START-PRINTER-OUTPUT
–   MODIFY-PRINTER-OUTPUT
–   STOP-PRINTER-OUTPUT

## 4.6  Behavior in the event of errors

RSO device administrators are primarily normal users who have been granted certain privileges. Thus they may also be confronted by the same problems as nonprivileged users. These are discussed in detail starting on . The present section contains only troubleshooting information that differs for the RSO device administrator and the nonprivileged user.

**Print job accepted but not started**

If a successful PRINT-DOCUMENT command has been issued, and everything appears ready for printing but nothing happens, the following measures may be attempted to solve the problem.

1. Check whether the print job is in KEEP status.

   If a problem has occurred, the print job may have been placed in the KEEP queue. Consequently it is not possible to start printing without first returning the job to WAIT status by means of the RESUME-SPOOLOUT command. The status of the print job can be ascertained with the following commands:

   ```
   /SHOW-JOB-STATUS TSN(tsn)
   /SHOW-USER-STATUS JOB-TYPE=*RSO
   /SHOW-SPOOL-JOB-STATUS
   ```

2. Check whether the printer is "logically" started

   Checking whether the printer is started, i.e. in status 'A', can be done with the following command:

   ```
   SHOW-SYSTEM-STATUS INF=*REMOTE(printername)
   ```

   If the printer fails to start, it can be activated by means of the following command:

   ```
   START-PRINTER-OUTPUT printername
   ```

3. Check whether output of the print job is actually permitted on the activated printer.

   A printer can be activated with lists of permitted forms, user IDs, account numbers etc. It is therefore necessary to check whether output of the print job is actually permitted on the printer. This information can be obtained with the following commands.

   ```
   SHOW-JOB-STATUS TSN(tsn)
   ```

   Certain characteristics of the print job are output, such as user ID, form, device name etc.

   ```
   SHOW-ACTIVE-SPOOL-DEVICE printername
   ```

   Lists of the permitted user IDs, forms etc. are output.

If output of the print job on the printer is not permitted, the printer definition can be changed with the following command:

```
MODIFY-PRINTER-OUTPUT-STATUS printername,...
```

4.  Check that the printer is not currently executing another print job.

```
SHOW-USER-STATUS JOB-TYPE=*RSO(printername)
```

A list of the print jobs for this printer is output.

5.  Check whether a fault has occurred on the printer. The printer status can be ascertained with the following command:

```
SHOW-SYSTEM-STATUS INF=*REMOTE(printername)
```

If a fault has occurred, it must be remedied before printing can be restarted.

6.  Check control character sequences for 9025/9026-RENO Printers

If output is to be performed on a 9025 or 9026-RENO Printer, a check should be made as to whether the different control character sequences used in the file are the same as were specified in the device definition and on the control panel of the printer. This can be ascertained with the following command:

```
SHOW-SPOOL-DEVICE DEVICE-NAME=printername
```

The different control character sequences are displayed in the field "ESCAPE".

The different control character sequences that were defined on the control panel must then be checked.

All three values (file, device definition and control panel) must match before printing can be performed correctly.

**A printer has the status "S"**

When a check is performed with the command /SHOW-SYSTEM-STATUS INF=
*REMOTE the printer is in status "S" (below the "A" field in the example below). This means
that a more or less serious problem has occurred.

```
/SHOW-SYSTEM-STATUS INF=*REMOTE
 DEVICE   A STA/PORT PROC/INT-ADD     USERID    TSN M ERCOD     ERMSG   E
 PRN27248 S PRN27248 D241KR27         PCE       1D1R R          SR00968 Y
 PRN27330 A PRN27330 D241KR27                        R                  Y
```

Before printing can be resumed, several actions must be performed:

1. Firstly, the problem must be corrected. The command HELP-MESSAGE-
   INFORMATION with the message number that was output under the ERMSG field can
   be entered in order to find the cause of the problem. If information is also displayed
   under the ERCOD field, it can be used as a supplement to the message. Depending on
   the message text that is output, the problem can either be corrected or the RSO device
   administrator or systems support can be informed so that they can correct the problem.

2. Once the problem is corrected, two further actions are possible:

   – The interrupted print job can be restarted by means of the RESUME-SPOOLOUT
     command. The job number is displayed under the "TSN" field when the command
     SHOW-SYSTEM-STATUS INF=*REMOTE is output.

```
/SHOW-SYSTEM-STATUS INF=*REMOTE
DEVICE    A STA/PORT PROC/INT-ADD     USERID    TSN M ERCOD     ERMSG   E
PRN27248  S PRN27248 D241KR27         PCE       1D1R R          SR00968 Y
PRN27330  A PRN27330 D241KR27                        R                  Y

/RESUME-SPOOLOUT TSN=1D1R
%  SR00351 SPOOLOUT COMMAND PROCESSED FOR TSN '1D1R'

/SHOW-SYSTEM-STATUS INF=*REMOTE
DEVICE    A STA/PORT PROC/INT-ADD     USERID    TSN M ERCOD     ERMSG   E
PRN27248  R PRN27248 D241KR27         PCE       1D1R R          SR00968 Y
PRN27330  A PRN27330 D241KR27                        R                  Y
```

   – The printer can be stopped and restarted. The printer is set to status "A", i.e. ready
     to print.

```
/SHOW-SYSTEM-STATUS INF=*REMOTE
DEVICE    A STA/PORT PROC/INT-ADD     USERID    TSN M ERCOD     ERMSG   E
PRN27248  S PRN27248 D241KR27         PCE       1D1R R          SR00968 Y
PRN27330  A PRN27330 D241KR27                        R                  Y

/STOP-PRINTER-OUTPUT DEVICE-NAME=*RSO-PRINTER(NAME=PRN27248)
%  SR00350 SPOOLOUT-COMMAND PROCESSED ON DEVICE 'PRN27248'
```

```
/SHOW-SYSTEM-STATUS INF=*REMOTE
DEVICE   A STA/PORT PROC/INT-ADD   USERID   TSN M ERCOD      ERMSG   E
PRN27330 A PRN27330 D241KR27                     R                  Y

/RESUME-SPOOLOUT TSN=1D1R
%  SR00351 SPOOLOUT COMMAND PROCESSED FOR TSN '1D1R'

/START-PRINTER-OUTPUT DEVICE-NAME=*RSO-PRINTER(NAME=PRN27248)
%  SR00350 SPOOLOUT-COMMAND PROCESSED ON DEVICE 'PRN27248'

/SHOW-SYSTEM-STATUS INF=*REMOTE
DEVICE   A STA/PORT PROC/INT-ADD   USERID   TSN M ERCOD      ERMSG   E
PRN27248 A PRN27248 D241KR27       PCE     1D1R R            SR00968 Y
PRN27330 A PRN27330 D241KR27                     R                  Y
```

*Note*

You must not forget to specify all necessary form names in the FORM-NAME operand of the START-PRINTER-OUTPUT command. For this reason, the command SHOW-ACTIVE-SPOOL-DEVICES *printername* should be issued before the printer is stopped with STOP-PRINTER-OUTPUT in order to display the forms that are assigned to the printer.

**No message about a printer problem was output**

Printing was not completed because of a printer problem (e.g. low paper) and no message was output. The following measures can be attempted:

1.  Check whether the print job is completed as far as RSO is concerned. However, a print job is regarded as having been completed as soon as RSO has received from the printer the last printer acknowledgment for the last message sent. This means that the printer has stored the message in its internal memory, but not that the message has actually been printed! From this point in time RSO considers the print job to have been successfully completed. But if a printer problem occurs subsequently, RSO will not then be informed about it. If the problem is remedied without turning off the printer, it is possible - depending on the printer type and/or the access mode - that the printer will clear its memory and thereby terminate the interrupted print operation.

2.  It is also necessary to check that the printer has not been defined with SYNCHRO= *NETWORK. This can be done as follows:

    SHOW-SPOOL-DEVICE *printername*

    If SYNCHRO=*NETWORK has been specified, no printer acknowledgment is returned by the printer. RSO is not therefore warned in the event of printer problems.

**Printer remains in status "A" although a print job is active**

If a printer remains in status 'A' although a print job is running on it, the connection to the printer was requested but has not yet been established. RSO allows a delay of 1.5 minutes for the connection to be established.

A possible timeout error condition is only detected if the printers are checked for this error condition. The time intervals (in minutes) at which printers are checked for the timeout error condition are displayed following the SHOW-SPOOL-PARAMETERS command in the field CHECK-PR-TIME.

**Printer remains in status "R" even though printing is not taking place**

If a printer remains in status 'R' although nothing is being printed, the following measures may be attempted to solve the problem.

1.  Check whether there is a PDN problem that could suppress messages which should be sent from RSO to the printer and vice versa. In this event, some considerable time may elapse before acknowledgments are received. Moreover, depending on the TIMEOUT-MAX value in the device definition and on the time interval for the check, a considerable time may elapse before a TIMEOUT error condition is detected.

    The TIMEOUT-MAX value for the maximum interval between sending a message and receipt of the acknowledgment can be requested by means of the SHOW-SPOOL-DEVICES command.

    The CHECK-PR-TIME value can be requested by means of the SHOW-SPOOL-PARAMETERS command.

2.  Check that the connection mode defined for the printer matches the connection mode actually used for connecting the printer. A typical example of an error is for a "DIRECT" connection to be defined for a 9025 or 9026-RENO Printer that is already connected via "HDLC". In this case, although actual printing of the file is completed, it is not regarded as completed by RSO (still active on the printer).

3.  Check when printing on 9025 or 9026-RENO Printers that the different control characters in the device definition match the control characters that were defined on the printers' control panels.

4.  If the waiting time is excessive, the print job can be interrupted by the following commands:

    HOLD-SPOOLOUT to place the print job in the KEEP queue or return it to the WAIT queue.

    STOP-PRINTER-OUTPUT to deactivate the printer.

**Printing on a 9025 or 9026-RENO Printer with a member**

A member was defined for a 9025 and/or 9026-RENO Printer but it was not used by the job. Once the external format of the symbol has been defined, the user has three possible ways of storing the member:

1. Under the user ID of the user starting the print job.

2. Under the user ID of the first RSO device administrator for the 9025/9026-RENO Printer in the case of a private device, or under the SYSSPOOL user ID in the case of a public device.

3. In the 9025/9026-RENO Printer's memory.

The file name must conform to the following convention:

RP9025.MEMBER.name or RP9026-RENO.MEMBER.name

There are two ways of using a member file:

1. It is copied into the printer's memory by using the IMPORT function of RSOSERVE. In this case, RSO takes no part in the process when a file is printed.

2. The member is linked to a form and this form is used during printing. In this case, processing of the member is performed as described below.

   If the user uses a member (symbol or text) with the aid of a form, RSO checks whether a member list has been linked to the selected form. In the case of public devices, the search is performed with the device administrator name "TSOS". Otherwise, the first record of each member in the list is contained in the file SYSPAR.RSO.035.USER. RSO searches for the corresponding member and copies it into the printer's memory.

   The search is begun under the user ID of the user who started the print job. If no file is found, the search is continued under the user ID of the first RSO device administrator for the printer. If this is still not successful and the printer is a public device, the search takes place under the SYSSPOOL user ID. If the file has not been found after that, RSO checks whether the member has a corresponding record in the file SYSPAR.RSO.035.USER.

### 4.6.1   Assigning a recovery rule file to a printer

The RSO device administrator has the option of assigning a recovery rule file to a printer by specifying the private part of the file name in the printer device definition with the SPSERVE statement MODIFY-SPOOL-DEVICE. For a detailed description of the recovery rule files and their assignment, see section "Generating recovery rules" on page 343.

# 5 Responsibilities of the SPOOL administrator and systems support

As of SPOOL V3.0, as part of the decentralization of systems support tasks, the PRINT-SERVICE-ADMINISTRATION privilege is assigned to the user ID that is to be the SPOOL administrator. By default, this privilege is assigned both to the SYSSPOOL user ID and, for reasons of compatibility, the TSOS user ID.

This functionality is only available with BS2000/OSD-BC as of V2.0. In BS2000/OSD-BC V1.0, it is assumed that the SPOOL administrator is the TSOS user ID.

The SPOOL administrator has the highest level of RSO privilege and can perform any function which can be performed by RSO device administrators and nonprivileged users. RSO device administrators are also defined by the SPOOL administrator. The user ID with the PRINT-SERVICE-ADMINISTRATION privilege also:

- defines RSO configuration data in the SPOOL parameter file (see page 274).
  Entries can be made for the following:
  - RSO printers (page 275)
  - RSO fonts (page 276)
  - bypassing of the evaluation of character set characteristics (page 278)
  - XHCS support (page 279)
  - RSO pools (page 286)
- manages RSO printers
- manages RSO jobs
- generates printer parameter files (see page 289)
- generates recovery rules (see page 343)
- prepares for printout via the OLTP interface (see page 346)
- prepares for Internet Cafe printing (see page 359)
- responds in certain error situations (see page 362)
- manages SPSERVE (see the "SPSERVE (BS2000/OSD)" manual)
- manages RSOSERVE (see the "RSOSERVE" manual)

Systems support under the TSOS user ID or the user ID with the SUBSYSTEM-MANAGEMENT privilege also manages the RSO subsystem. This involves:

– installing RSO (see page 189)
– loading and unloading the RSO subsystem (see page 272)

The commands that can be used by the SPOOL administrator and systems support are listed on page 287.

*Assignment of the PRINT-SERVICE-ADMINISTRATION privilege*

– The PRINT-SERVICE-ADMINISTRATION privilege is assigned both to the SYSSPOOL user ID and, for compatibility, the TSOS user ID.

– The privilege is also assigned to tasks that call system exit routines so that these exits can perform SPOOL administration activities.

– Systems support can assign or withdraw the privilege to or from other user IDs at any time via the SRPM interface.

– The batch job started automatically during the RSO loading operation to activate some printers implicitly is currently assigned to the TSOS user ID. Because the new SPOOL privilege can be withdrawn from this user ID, this RSO batch job is now assigned to the SYSSPOOL user ID. Systems support is therefore strongly advised not to remove the privilege from this user ID.

When RSO is started, the ENTER job $SYSSPOOL.RSO.START.DEVICES is executed under the user ID SYSSPOOL. This ENTER job is rejected if the user ID SYSSPOOL is locked. In this case, RSO printers cannot be started before SYSSPOOL has been unlocked with /UNLOCK-USER.

*Note*

Because of the limitations imposed by DSSM, the RSO subsystem cannot be loaded or unloaded with the new SPOOL privilege. Only user IDs with the SUBSYSTEM-MANAGEMENT privilege are permitted to use these commands.

# 5.1 Installation of RSO

This section explains what you need to look out for when installing RSO.

## 5.1.1 Requirements for RSO operation

The following requirements must be fulfilled before files can be output to RSO devices:

● The teleprocessing component must be loaded. The remote printers must be generated in PDN.

● The RSO configuration data must be entered in the SPOOL parameter file $SYSSPOOL.SPOOL.PARAMETERS (see section "Defining RSO configuration data in the SPOOL parameter file" on page 274f). If certain functions are to be supported (conversion tables, loop records, type bands), the RSOFILE under $TSOS is required additionally.

● The SPOOL and RSO subsystems must be loaded (see page 272). DCAM as of V11 must be loaded to enable support for printers which are connected as follows:

– to a TCP/IP LAN via a TACLAN

– via a Windows PC running Wprint

– via an Ethernet adapter card (i.e. printers defined with ACCESS-TYPE=*TACLAN)

– via a BSD line printer daemon (i.e. printers defined with ACCESS-TYPE=*LPD)

## 5.1.2 Initial installation

If RSO V3.5A is the first RSO version to be used, apart from updating the subsystem catalog, no special action is required for installation. The requisite files are supplied on the product tape, and the RSO subsystem can be loaded immediately (see section "Loading and unloading RSO" on page 272).

## 5.1.3  Version conversions

When converting from one RSO version to another, the first action must be to update the subsystem catalog with SSCM.

### 5.1.3.1  Converting user parameter files

Then depending on the type and direction of the conversion, the actions described in the following must be performed, using the RSOCONV conversion program.
RSOCONV effects the transformation of the existing records of an old version into the current structure (RSO V3.5A). The RSOCONV program reads a file that was previously linked by means of the LINK name RSOIN, and creates a file, that was previously linked by means of the LINK name RSOOUT. The input file is retains unchanged. The RSOCONV file to be invoked is called SYSPRG.RSO.035.RSOCONV.

### Converting from RSO V2.0A to V3.5A

The user entries from the RSO.PARAMETERS file must (in contrast to the system entries) be placed in the SYSPAR.RSO.035.USER file.
The RSO.PARAMETERS file is that of the user in Version 2.0A.
The SYSPAR.RSO.035.USER file is supplied on the product tape for RSO V3.5A.
The following commands must be entered for the RSOCONV run:

```
/SET-FILE-LINK LINK-NAME=RSOIN,FILE-NAME=$SYSSPOOL.RSO.PARAMETERS
/SET-FILE-LINK LINK-NAME=RSOOUT,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.035.USER
/START-PROGRAM FROM-FILE=SYSPRG.RSO.035.RSOCONV
```

### Converting from RSO V2.0B to V3.5A

The entries from the RSO.PARAMETERS.USER file must be converted into a new format. In this case, RSOCONV takes the RSO.PARAMETERS.USER file and uses it to create a new SYSPAR.RSO.035.USER file. The RSO.PARAMETERS.USER file is that of the user in Version 2.0B. The SYSPAR.RSO.035.USER file supplied on the product tape must be ignored. The following commands must be entered for the RSOCONV run:

```
/SET-FILE-LINK LINK-NAME=RSOIN,FILE-NAME=$SYSSPOOL.RSO.PARAMETERS.USER
/SET-FILE-LINK LINK-NAME=RSOOUT,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.035.USER
/START-PROGRAM FROM-FILE=SYSPRG.RSO.035.RSOCONV
```

### Converting from RSO V2.1B to V3.5A

The entries from the SYSPAR.RSO.USER file must be converted into a new format.
In this case, RSOCONV takes the SYSPAR.RSO.USER file and uses it to create a new
SYSPAR.RSO.035.USER file.
The SYSPAR.RSO.035.USER file supplied on the product tape must be ignored.
The following commands must be entered for the RSOCONV run:

```
/SET-FILE-LINK LINK-NAME=RSOIN,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.USER
/SET-FILE-LINK LINK-NAME=RSOOUT,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.035.USER
/START-PROGRAM FROM-FILE=SYSPRG.RSO.035.RSOCONV
```

### Converting from RSO V2.2A to V3.5A

The entries from the SYSPAR.RSO.022.USER file must be converted into a new format
(only the header is changed).
In this case, RSOCONV takes the SYSPAR.RSO.022.USER file and uses it to create a new
SYSPAR.RSO.035.USER file.
The SYSPAR.RSO.035.USER file supplied on the product tape must be ignored.
The following commands must be entered for the RSOCONV run:

```
/SET-FILE-LINK LINK-NAME=RSOIN,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.022.USER
/SET-FILE-LINK LINK-NAME=RSOOUT,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.035.USER
/START-PROGRAM FROM-FILE=SYSPRG.RSO.035.RSOCONV
```

### Converting from RSO V2.3A to V3.5A

The entries from the SYSPAR.RSO.023.USER file must be converted to a new format (only
the header is changed).
In this case, RSOCONV takes the SYSPAR.RSO.023.USER file and uses it to create a new
SYSPAR.RSO.035.USER file.
The SYSPAR.RSO.035.USER file supplied on the product tape must be ignored.
The following commands must be entered for the RSOCONV run:

```
/SET-FILE-LINK LINK-NAME=RSOIN,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.023.USER
/SET-FILE-LINK LINK-NAME=RSOOUT,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.035.USER
/START-PROGRAM FROM-FILE=SYSPRG.RSO.035.RSOCONV
```

### Converting from RSO V2.4A to V3.5A

The entries from the SYSPAR.RSO.024.USER file must be converted to a new format (only the header is changed).
In this case, RSOCONV takes the SYSPAR.RSO.024.USER file and uses it to create a new SYSPAR.RSO.035.USER file.
The SYSPAR.RSO.035.USER file supplied on the product tape must be ignored.
The following commands must be entered for the RSOCONV run:

```
/SET-FILE-LINK LINK-NAME=RSOIN,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.024.USER
/SET-FILE-LINK LINK-NAME=RSOOUT,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.035.USER
/START-PROGRAM FROM-FILE=SYSPRG.RSO.035.RSOCONV
```

### Converting from RSO V3.0A/V3.0B to V3.5A

The entries from the SYSPAR.RSO.030.USER file must be converted to a new format (only the header is changed).
In this case, RSOCONV takes the SYSPAR.RSO.030.USER file and uses it to create a new SYSPAR.RSO.035.USER file.
The SYSPAR.RSO.035.USER file supplied on the product tape must be ignored.
The following commands must be entered for the RSOCONV run:

```
/SET-FILE-LINK LINK-NAME=RSOIN,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.030.USER
/SET-FILE-LINK LINK-NAME=RSOOUT,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.035.USER
/START-PROGRAM FROM-FILE=SYSPRG.RSO.035.RSOCONV
```

### Converting from RSO V3.1A to V3.5A

The entries from the SYSPAR.RSO.031.USER file must be converted to a new format (only the header is changed).
In this case, RSOCONV takes the SYSPAR.RSO.031.USER file and uses it to create a new SYSPAR.RSO.035.USER file.
The SYSPAR.RSO.035.USER file supplied on the product tape must be ignored.
The following commands must be entered for the RSOCONV run:

```
/SET-FILE-LINK LINK-NAME=RSOIN,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.031.USER
/SET-FILE-LINK LINK-NAME=RSOOUT,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.035.USER
/START-PROGRAM FROM-FILE=SYSPRG.RSO.035.RSOCONV
```

### Converting from RSO V3.2A to V3.5A

The entries from the SYSPAR.RSO.032.USER file must be converted to a new format (only the header is changed).
In this case, RSOCONV takes the SYSPAR.RSO.032.USER file and uses it to create a new SYSPAR.RSO.035.USER file.
The SYSPAR.RSO.035.USER file supplied on the product tape must be ignored.
The following commands must be entered for the RSOCONV run:

```
/SET-FILE-LINK LINK-NAME=RSOIN,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.032.USER
/SET-FILE-LINK LINK-NAME=RSOOUT,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.035.USER
/START-PROGRAM FROM-FILE=SYSPRG.RSO.035.RSOCONV
```

### Converting from RSO V3.3A to V3.5A

The entries from the SYSPAR.RSO.033.USER file must be converted to a new format (only the header is changed). In this case, RSOCONV takes the SYSPAR.RSO.033.USER file and uses it to create a new SYSPAR.RSO.035.USER file. The SYSPAR.RSO.035.USER file supplied on the product tape must be ignored.
The following commands must be entered for the RSOCONV run:

```
/SET-FILE-LINK LINK-NAME=RSOIN,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.033.USER
/SET-FILE-LINK LINK-NAME=RSOOUT,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.035.USER
/START-PROGRAM FROM-FILE=SYSPRG.RSO.035.RSOCONV
```

### Converting from RSO V3.4A to V3.5A

The entries from the SYSPAR.RSO.034.USER file must be converted to a new format (only the header is changed). In this case, RSOCONV takes the SYSPAR.RSO.034.USER file and uses it to create a new SYSPAR.RSO.035.USER file. The SYSPAR.RSO.035.USER file supplied on the product tape must be ignored.
The following commands must be entered for the RSOCONV run:

```
/SET-FILE-LINK LINK-NAME=RSOIN,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.034.USER
/SET-FILE-LINK LINK-NAME=RSOOUT,FILE-NAME=$SYSSPOOL.SYSPAR.RSO.035.USER
/START-PROGRAM FROM-FILE=SYSPRG.RSO.035.RSOCONV
```

### Important notes on version conversion

1. When converting from V2.0A, V2.0B or V2.1B the output file (file having the LINK name RSOOUT) already exists, any data that may be present in the file is deleted before the conversion is performed.

2. The files must be cataloged with USER-ACCESS=*WRITE. Before the files are accessed, any passwords that may be present must be canceled. Remember to set the passwords again after the conversion.

3. RSOCONV does not check the file names. It accesses the files only via their LINK names (RSOIN and RSOOUT). The files can thus be cataloged without any effect amongst other names.

4. Fonts in RSO contain a comment field, provided to describe the effects of control character sequences. In the event of a conversion, this field is initialized to blanks.

5. 9025 character sets in RSO versions earlier than V2.2A differ from other character sets. During the conversion process, the 9025 character sets are converted in such a way that their structure in RSO V3.5A is identical with the other character sets.
The old format of the 9025 character set must therefore be used in order to create the new character set format with the linked font. The linked font receives the same name as the character set.

**Converting back from RSO V3.5A to an earlier version**

If RSO V3.5A is already installed but a version is to be used that has already been used previously, then the files from the earlier version must be used, e.g.
RSO.PARAMETERS.USER for RSO V2.0B,
SYSPAR.RSO.USER for RSO V2.1B,
SYSPAR.RSO.022.USER for RSO V2.2A,
SYSPAR.RSO.023.USER for RSO V2.3A,
SYSPAR.RSO.024.USER for RSO V2.4A,
SYSPAR.RSO.030.USER for RSO V3.0A/ V3.0B,
SYSPAR.RSO.031.USER for RSO V3.1A,
SYSPAR.RSO.032.USER for RSO V3.2A, and
SYSPAR.RSO.033.USER for RSO V3.3A
SYSPAR.RSO.034.USER for RSO V3.4A

It is not possible to access the new management records generated in the SYSPAR.RSO.035.USER file from RSO V2.0B, V2.1B, V2.2A, V2.3A, V2.4A and V3.0.

#### 5.1.3.2   Converting system RSOFILEs

When converting RSO versions to V3.5A, the old system RSOFILEs must also be merged with the new system RSOFILEs with the aid of RSOSERVE.

This means that the old system RSOFILE must be renamed RSOFILE.OLD and the RSOFILE provided must be copied.
RSOSERVE must then be called under the user ID TSOS and the following actions performed:

```
MLORMAIN: ACTION 3/MERGE
ML1MERGE: INPUT FILENAME = RSOFILE.OLD
          OUTPUT FILENAME = RSOFILE
          ALL = Y
           ACTION 2/MERGE
```

Following these actions, the new band IDs (code tables for the 9645 Printer) that were supplied in the system RSOFILE can be used.

The RSOFILE must be cataloged with USER-ACCESS=*SPECIAL and should either be protected by a write password (for ACCESS=*WRITE) or set to ACCESS=*READ. Write access must be allowed for merging.

## 5.1.4   Defining the RSO controllers

RSO can manage printers that were defined with DEVICE-ACCESS=*NEA-ACCESS or
*TCP-ACCESS. For technical reasons, RSO printers that were defined with DEVICE-
ACCESS=*NEA-ACCESS and RSO printers that were defined with DEVICE-
ACCESS=*TCP-ACCESS cannot be managed by the same RSO controller.

Consequently, if RSO printers with DEVICE-ACCESS=*NEA-ACCESS and RSO printers
with DEVICE-ACCESS=*TCP-ACCESS are both to be used, at least two RSO controllers
must be active, one for each access mode. The value of CONTROLLER-LIMIT in the
SPSERVE statement MODIFY-SPOOL-PARAMETERS must therefore be specified
accordingly.

## 5.1.5   RSO working with MX systems or TRANSIT-CD

Currently, due to EMDS restrictions (which do not allow variable application names in
EMDS V4.0), users using RSO with an MX system or with TRANSIT-CD can only work with
a maximum of 1024 printers. In other words, only one RSO controller task and one SRAM
task starting 8 applications (named SRA10000 through SRA80000) can be loaded.

As of RSO V2.2A, it is possible to work with one privileged application per SRAM task,
supporting up to 1024 connections instead of the 8 "normal" applications (each of which
supports up to 128 connections). In this way up to 8 RSO controllers can be created, each
of which can start one SRAM task, which in turn starts one privileged application. This
provides support for up to 8192 connections (8 x 1024) for one RSO system working with
an MX system or with TRANSIT-CD.

Independently of the value specified for the CONTROLLER-LIMIT operand of the
SPSERVE statement MODIFY-SPOOL-PARAMETERS, the first 8 active privileged SRAM
applications of the RSO controller managing the printers defined with DEVICE-ACCESS=
*NEA-ACCESS are created with the following names:

$SR10000, $SR20000, ..., $SR80000

These names must be specified or modified in CMX-TSNADMIN and in TRANSIT-CD. In
this case, the CONTROLLER-RESERVED operand value in the device definition is
ignored.

The privileged SRAM applications of the ninth or further active RSO controllers will be
created according to the following naming convention:

$SRA*tsn*          where *tsn* is the 'tsn' of the SRAM task starting the privileged application.

In this case, it is not possible to work with MX systems (EMDS V4.0) or with TRANSIT-CD
because the application names are variable.

### 5.1.6 Support for printers connected to a TCP/IP-LAN via an Ethernet adapter card

RSO supports printers that are connected to a TCP/IP LAN via an Ethernet adapter card (LAN board) inserted in the printer (e.g. 4824-PCL Printers).
RSO accesses these printer directly, i.e. without using Xprint or EMDS. However, this is possible only if DCAM V11 or higher is installed.
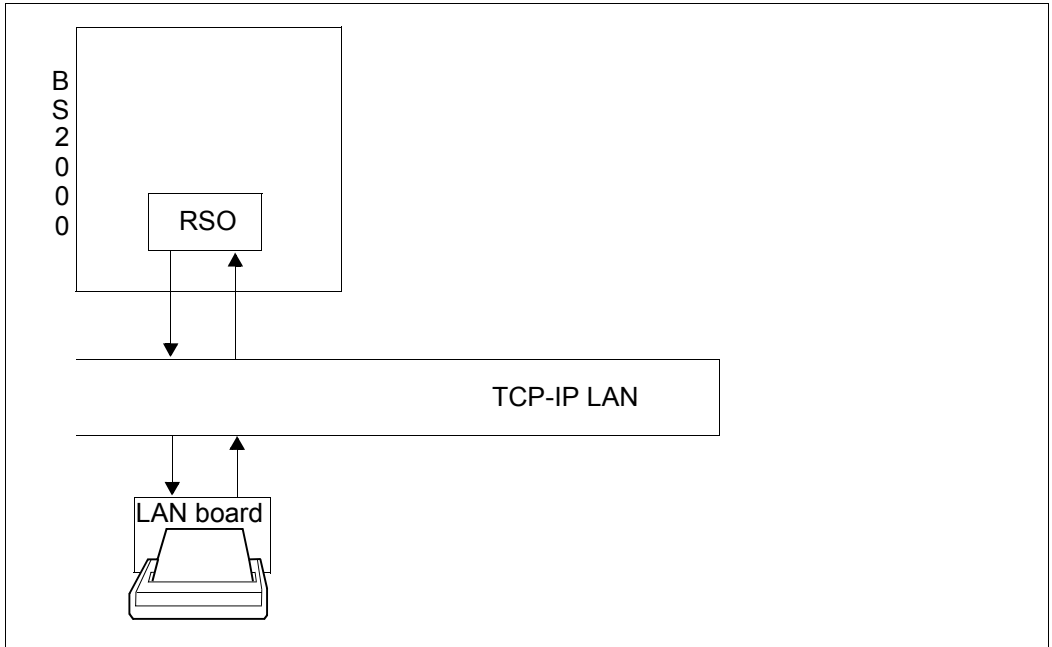


Figure 7: Connection of RSO printers via an Ethernet adapter card

The definition of these printers, the completeness and recovery of printouts and the printer communications facilities are identical to those for printers connected to a TACLAN. The description is given on page 198.

## 5.1.7 Support for printers connected to a TACLAN

RSO provides the option of accessing the printer directly without, for example, using an EMDS emulation on a UNIX computer.

This presupposes that DCM V11 is installed. The TACLAN types that are currently supported are TACLAN 91863-R and 91863-O. This manual combines the two types under the designation TACLAN-91863.
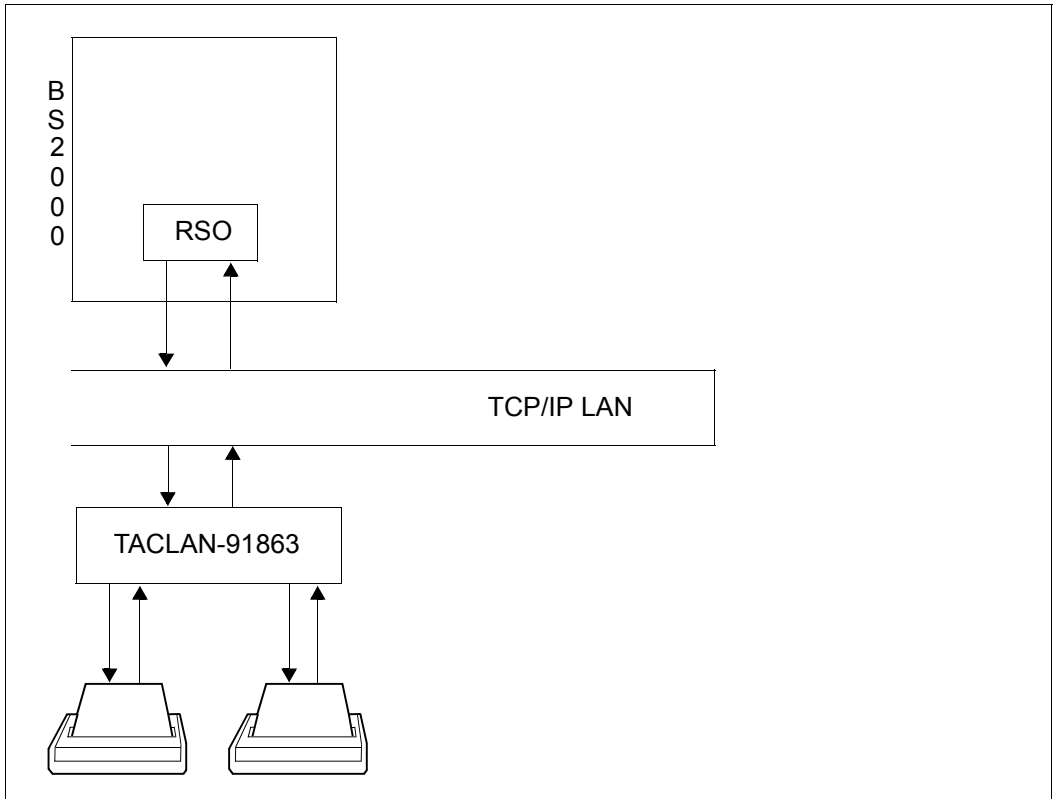


Figure 8: RSO printers connected via TACLAN

**Defining the printer**

A printer is defined using the SPSERVE statement ADD-SPOOL-DEVICE or the definition is modified with EDIT-/MODIFY-SPOOL-DEVICE.
The following operands of the ADD-SPOOL-DEVICE command (selected here by way of example) are relevant for printers connected to a TACLAN-91863:

```
//ADD-SPOOL-DEVICE...
 ,DEVICE-ACCESS = *TCP-ACCESS (...)
 | ACCESS-TYPE = *STD / *TACLAN
 | ,INTERNET-ADDRESS = *STD / <alphanum-name 1..32> / <composed-name 7..15>
 | ,PORT-NAME = *STD / <alphanum-name 1..8> )
 ...
 ,PROCESSING-CONTROL = *PARAMETERS (...
 ,SYNCHRONIZATION = *STD / *PRINTER / *NETWORK
 ,POLLING = *STD / *YES / *NO )
```

The complete syntax of these statements and a detailed description can be found in the "SPSERVE (BS2000/OSD)" manual.

**DEVICE-ACCESS = *TCP-ACCESS,(...**

**ACCESS-TYPE = *STD / *TACLAN**
ACCESS-TYPE=*TACLAN specifies that the printer is connected to a TACLAN-91863 and that RSO has direct access to this printer. Note that this direct access is possible only if DCM as of V11 is installed.

**INTERNET-ADRESS = *STD / <alphanum-name 1..32> / <composed-name 7..15>**
The internet address of the TACLAN to which the printer is connected must be specified for RSO to access the printer.
The address to be specified is either the IP address (in decimal-point notation, e.g. 150.42.0.27) or the socket host name of the TACLAN as generated by BCAM (see "openNet Server (BS2000/OSD)" manual).

**PORT-NAME = *STD / <alphanum-name 1..8>**
The port name of the TACLAN-91863 to which the printer is connected must be specified.

**SYNCHRONIZATION = *<u>STD</u> / *PRINTER / *NETWORK**
This operand determines whether printing is to be synchronized with the printer acknowledgment (PRINTER) or the network acknowledgment (NETWORK) after each buffer transfer. The default value is STD = *PRINTER.

**SYNCHRONIZATION = \*PRINTER**

Defines that acknowledgments received from the printer can be used for synchronization between messages sent (within a print job) and/or between print jobs (i.e. acknowledgments direct from printer, which, depending on the printer type, indicate whether the message was output successfully or stored in the printer memory).

For printers connected to TACLAN (i.e. defined with ACCESS-TYPE=\*TACLAN), this operand value specifies that the printer supports at least one of the methods below, that it is activated, and that it can be used by the printer to ensure synchronization within a print job and between print jobs:

ETX/ACK protocol
> RSO adds the control character ETX to the end of each message and waits for the acknowledgment ACK from the printer before sending the next message to the printer. This method of synchronization ensures that the print output can be continued correctly should problems occur.
> With the preset value, RSO supports the ETX/ACK protocol only for certain printers. Provided that your printer supports the ETX/ACK protocol, you can enter this protocol as supported in the printer parameter file for your printer (see section "Printer parameter files" on page 289).This allows the ETX/ACK protocol also to be used by printers not included in the preset parameters.

PCL ECHO command
> The newest PCL printers which support the PCL5e printer language provide a printer command that allows a value to be sent to the printer, which is then sent back after it has been received. RSO uses this printer command to synchronize the transmission of each message. This method of synchronization ensures that the print output can be continued correctly should problems occur.
> RSO uses the PCL ECHO command only for 4821-PCL, 4822-PCL, 4825-PCL, 4830-PCL, 4850-PCL and 9000-PCL printers. RSO does not permit use of this PCL command with other printer types.

PJL language
> The PJL language is supported by the newest PCL printers. RSO uses several commands to synchronize the start and end of the print job. This method of synchronization only ensures that the printer is ready to start a print job and that it has successfully received the complete job. It does not guarantee that the print job can restart correctly should problems occur.
> With the preset value, RSO supports the PJL language only for certain printers. Provided that your printer supports the full set of PJL commands, you can enter this language as supported in the printer parameter file for your printer (see section "Printer parameter files" on page 289 and section "Assigning a printer parameter file to a printer" on page 160).

RENO "close document" command
> For 9025 and 9026-RENO printers, which are the only ones that support the RENO printer language, RSO sends the RENO command "close document" at the end of each print job and waits until the printer responds before finally completing the print job. This method of synchronization only ensures that the printer is ready to start a print job and that it has successfully received the complete job. It does not guarantee that the print job can restart correctly should problems occur

SEH protocol
> The RSO support for the SEH protocol allows synchronization with the printer. For a detailed description of the SEH protocol, see the description of the keyword seh on page 332.

> In the default setting, RSO does not support the SEH protocol. If your printer supports the full configuration, you can enter this protocol as supported in the printer parameter file for your printer (see section "Printer parameter files" on page 289).

Specification of SYNCHRO=*PRINTER is reserved for systems support and RSO device administrators, who have to observe the following:

– Specification of SYNCHRO=*PRINTER for printer types connected via TACLAN, on which the ETX/ACK protocol is supported but currently deactivated, results in a timeout for all print jobs as RSO will wait in vain for an acknowledgment from the printer ("ACK" character).

– Specification of SYNCHRO=*PRINTER for printer types connected via the Centronics interface results in a timeout for all print jobs as RSO will wait in vain for an acknowledgment from the printer ("ACK" character or "close document").

**SYNCHRONIZATION = *NETWORK**
Defines that the synchronization between the transmission of two messages (within a print job) and/or between two print jobs can be carried out independently of the printer acknowledgments received (e.g. in the case where one printer is unable to send back acknowledgments.

For printers connected via TACLAN (i.e. defined with ACCESS-TYPE=*TACLAN), this value specifies that none of the methods listed under SYNCHRONIZATION=*PRINTER is supported or activated, or that the printer is connected via a Centronics interface, which cannot send back data.

As no synchronization is possible between the transmission of two messages (within a print job), RSO calculates an estimated print time, based on several parameters, for each message sent. This estimated print time is used as wait time before sending the next message (see also section "Printing completeness and recovery" on page 204). This print time can be influenced by way of the 'speed' setting in the printer parameter file (see section "Printer parameter files" on page 289).

If POLLING=*YES is specified (and supported) with SYNCHRO=*NETWORK, this mechanism attempts a more or less accurate recovery (given that no synchronization is possible) in the case of a printer malfunction.

If POLLING=*NO was specified with SYNCHRO=*NETWORK, it should be noted that there can be no guarantee of correct error handling in the case of a printer malfunction. Thus, for example, the print job may be deemed successful on the RSO side although no pages have been printed. Moreover, it is essential to realize that print jobs may be lost with certain printer types, especially for print jobs defined with DELETE-AFTER-PRINT=*YES/*DESTROY when the printer is switched off. A print job can be sent to the printer, deemed completed by RSO and no error detected, although the printer is switched off.

**POLLING = <u>*STD</u> / *YES / *NO**
This operand determines whether RSO can request the printer status or printer malfunctions. This operand applies only to printers connected to a TACLAN (i.e. defined with ACCESS-TYPE=*TACLAN). For other printers, it is ignored.

**POLLING = *YES**
This operand value determines that RSO can request the printer status in order to obtain information on possible printer malfunctions.

In order to check whether the printer is ready, RSO sends a printer status request at the beginning of each print job and waits to receive the acknowledgment before sending the print job. If the printer status acknowledgment is not received within the defined time period (TIMEOUT-MAX operand of the device definition and CHECK-PRINTER-TIME parameter of the global SPOOL.PARAMETERS file), a timeout is detected and the message SRO0987 is output. Otherwise, RSO sends the print job if the printer status is positive. For the sake of performance, however (in order to avoid a start/stop), RSO no longer waits to receive further printer status acknowledgments.

The printer status cannot be queried while data is being sent in transparent mode. This is the case when printing prolog and epilog files or when printing user files with DOCUMENT-FORMAT=*SPECIAL-FORMAT.

In the case of printers connected via TACLAN (defined with ACCESS-TYPE=*TACLAN), RSO uses one of the following methods to query the printer status:

Status command dependent on the printer language
> RSO appends a status command that is dependent on the printer language to the end of every message sent. Status commands that are dependent on the printer language are supported only by the following RSO printers: 4011, 4812, 4813, 4818-PCL, 4822-PCL, 4825-PCL, 9000-PS 9001-31, 9011, 9013, 9014, 9015, 9022, 9046, 9097 and DJET.

PJL language

> The PJL language is supported by the PCL printers. RSO uses various PJL commands to query the printer status.
>
> In the default setting RSO supports the PJL language only for certain printer types. If your printer supports the full set of PJL commands, you can enter PJL language support for your printer in the printer parameter file (see section "Printer parameter files" on page 42 and section "Assigning a printer parameter file to a printer" on page 160).

SEH protocol

> The RSO support for the SEH protocol allows synchronization with the printer. For a detailed description of the SEH protocol, see the description of the keyword seh on page 332.
>
> In the default setting, RSO does not support the SEH protocol. If your printer supports the full configuration, you can enter this protocol as supported in the printer parameter file for your printer (see section "Printer parameter files" on page 289 and section "Assigning a printer parameter file to a printer" on page 160).

PRESCRIBE language

> The PRESCRIBE language is supported by the KYOCERA printers. RSO uses various PRESCRIBE commands to query the printer status.
>
> In the default setting, RSO does not support the PRESCRIBE language. Provided your printer supports the full set of PRESCRIBE commands, you can enter the PRESCRIBE language as supported in the printer parameter file for your printer (see section "Printer parameter files" on page 289 and section "Assigning a printer parameter file to a printer" on page 160).

If the operand is specified for printer types that do not support this function (e.g. 9000, 9001), the command is not rejected but RSO automatically assumes POLLING=*NO.

Systems support or RSO device administrators are responsible for specifying POLLING=*YES while keeping in mind that in the case of printers that support the function but for which it is disabled, unforeseen side effects can result such as, for example, printing of the "printer status inquiry" escape sequence.

**POLLING = *NO**

This operand value determines that RSO cannot request the printer status. There are various reasons for specifying this operand:

–   The printer does not support this function (e.g. printer types 9000, 9001).

–   The printer supports this function but it is disabled (e.g. printer types 4011, 4813, 9001-31, 9011, 9012, 9097).

–   Although the printer supports this function, systems support or an RSO device administrator does not wish to be informed of printer malfunctions.

–   Although the printer supports this function, it is connected to a TACLAN via a Centronics interface and, therefore, no acknowledgments can be returned.

*Note*

Note that RSO does not use the POLLING operand for synchronization between the sending of two messages and/or between two print jobs. One exception to this is at the beginning of each print job when RSO waits until it receives a printer status acknowledgment before sending the print job. The synchronization between messages and/or print jobs must be specified by means of the SYNCHRONIZATION operand.
Please note that declaring a TACLAN device with CONTROLLER-START= *AT-JOB,SYNCHRONIZATION=*NETWORK can lead to loss of data.

**Printing completeness and recovery**

A correct recovery of printing can be performed only if synchronization is possible between the sending of two messages (within a print job) and/or between two print jobs (SYNCHRONIZATION=*PRINTER is specified and supported) and if printer malfunctions can be detected (POLLING=*YES is specified and supported).

The completeness of printing is assumed if a print job has been printed out in its entirety. When printing on printers connected to a TACLAN, note that printing completeness cannot be guaranteed in some cases, such as:

1.  If SYNCHRO=NETWORK and POLLING=*NO were specified

    In this case, RSO does not have the option of checking whether the printer is ready. Consequently, RSO can consider a print job to be successfully completed although the printer has not yet printed a single page because it is switched off! Therefore, it is advisable to avoid printing out files with DELETE-AFTER-PRINT=*YES/*DESTROY on such printers.

2. When disconnecting from the printer

   Depending on the DISCONNECTION operand of the device definition, RSO requests disconnection from the printer at various times:

   – If DISCON=*YES, disconnection is requested at the end of the last print job that is pending for the printer.

   – If DISCON=*NO, disconnection is requested only when the STOP-PRINTER-OUTPUT command is issued or the RSO subsystem is unloaded.

   – If DISCON=*FORCE, disconnection is requested at the end of each print job.

   Depending on the value of the DISCONNECTION operand, a disconnection is also requested when the RESTART action is requested in order to correct a printer problem (see section "Generating recovery rules" on page 343).

   It must be noted that in rare cases, disconnecting from printers connected to a TACLAN can result in a loss of data, i.e. the end of the last print job could be missing. This could be due to the fact that the data sent had not yet reached the printer at the time of disconnection and was therefore lost.

   In order to minimize the risk of data loss without affecting printing performance, two different settings must be taken into account:

1. Printer definition with CONTROLLER-RESERVED=*YES

   In this case, a SRAM task is reserved exclusively for managing the printer. The most secure disconnection possible can be performed.
   A certain wait time is allocated for the disconnection so that any remaining data can still reach the printer. However, the 30-minute wait time must be taken as a maximum value, i.e. disconnection is performed as quickly as possible.
   The wait time can be set with the keyword "speed" in the printer parameter file.

2.  Printer definition with CONTROLLER-RESERVED=*NO

In this case, a number of printers (up to 1024) can be managed by one SRAM task. Disconnection cannot be performed as securely as described above since the SRAM task and other printers managed by the SRAM task would then be hung-up. For this reason, only an "insecure" disconnection can be performed, i.e. discon-nection is immediate, thus increasing the risk of data loss.

In order to minimize this risk, RSO waits for a certain period of time before sending each message (but not too long in order to avoid a "start/stop"). For this purpose, an estimated print time is calculated for each message sent, based on various parameters:

–   The number of printable characters sent to the printer in data quality, NLQ or letter quality (provided that it is supported by the printer).
Printing in letter quality (with 9014 and 9015 Printers only) is performed if NEAR-LETTER-QUALITY=*NO or CHARACTER-TYPE=*OCR-A/*OCR-B has been defined for the character set used for printing.
Printing is in NLQ if NEAR-LETTER-QUALITY= *YES was defined for the printer types 4011, 4812, 4813, 9001-31, 9011, 9014, 9097 and DJET or if CHARACTER-TYPE=*FONT-2/*FONT-4 was defined for the 9012 Printer for the character set to be used for printing.
Printing in data quality is performed in all other cases.

–   The various printing speeds as a function of the different print qualities.

–   A rough estimate of the execution time for each of the printer features requested.

–   The number of "hardware" copies (from the PAGE-COPIES operand of the PRINT-DOCUMENT command).

**Printer communication options**

*EBCDIC-ASCII conversion*

Printers connected to a TACLAN (i.e. defined with ACCESS-TYPE=*TACLAN) expect data in ASCII code. However, BS2000 files contain data in EBCDIC. Since RSO accesses these printers directly, it must itself guarantee this EBCDIC-ASCII conversion. Note that this conversion is character-to-character conversion (i.e. each character is converted indepen-dently of any other). .

*Printer control information*

RSO sends BAM control character sequences to a 9022 Printer, regardless of the access mode (HARDCOPY, DIRECT or PC). These BAM control character sequences are converted to the DIABLO-630 printer language or to printer control characters by means of a printer emulation (in the case of HARDCOPY), by means of a BAM converter (in the case of DIRECT) or by means of an EMDS emulation (in the case of PC).

If the 9022 Printer is connected to a TACLAN, RSO must itself perform this conversion since it accesses the printer directly. Therefore, for reasons of compatibility, RSO converts each BAM control character sequence (e.g. from the user file, a prolog file or an epilog file) to the DIABLO-630 printer language or to printer control characters before sending it to the 9022 Printer.

**Example of a definition for a printer connected to a TACLAN**

A 9022 Printer (i.e. with a DIABLO-630 emulation) is connected to the second port of a TACLAN 91863-R with the internet address 150.42.0.27 via a V24 interface that permits dialog with the printer. From the RSO viewpoint, the printer must be defined as follows:

```
//ADD-SPOOL-DEVICE DEVICE-NAME=TAC9022,DEVICE-TYPE=9022-REMOTE-PRINTER
,DEVICE-ACCESS=*TCP-ACCESS
 (ACCESS-TYPE=*TACLAN,INTERNET-ADDRESS=150.24.0.27,PORT-NAME=7002)
,PROCESSING-CONTROL=*PARAMETERS(SYCHRONIZATION=*PRINTER,POLLING=*YES)
```

## 5.1.8    RSO spoolout to printers connected to a LAN via EMDS

RSO can access printers that are connected locally to a UNIX processor.
The UNIX processor must be connected to a TRANSDATA network or a LAN (ISO or
TCP/IP) which is in turn connected to a BS2000 processor via a LAN adapter. Additionally,
EMDS must be available on the UNIX processor.
The following information applies only to a UNIX processor that is connected to a LAN
which is connected to the BS2000 system via a LAN adapter.

### 5.1.8.1    ISO LAN

The UNIX processor is connected to an ISO LAN.

**Software configuration**

```
BS2000:       BS2000                V9.5 or later
              SPOOL                 V2.4 or later
              RSO                   V2.0B or later

UNIX system: SPOOL (UNIX system)    V3.1 or later
             CMX                    V3.0 or later
              EMDS                     V4.0 or later
```

**Definition of the environment**

1.  RSO definition

    The printer connected to the UNIX processor can be accessed by RSO via EMDS
    running on the UNIX processor. For RSO, the printer must be defined with its device
    type and the access mode 'PC', using SPSERVE.

    ```
    Example
    //A-S-D DEV-NAME=rso-devicename,
         DEVICE-TYPE=devicetype,
         DEVICE-ACCESS=*NEA-ACCESS(
            ACCESS-TYPE=*PC,
            PROCESSOR-NAME=unix-processorname,
            STATION-NAME=stationname)
            PROCESSING-CONTROL=PAR(MODULO2=*NO)
    ```

2.  Entry in the resource definition file (RDF)

    The UNIX processor to which the printer is connected must be entered in the resource definition file in BCAM by means of the XPRO macro. The processor name must match that used in the device definition (see above).

    ```
    Example
    XPRO  PRONAM=<unix-processorname>,...
    ```

    In order to enable access to the processor, the processor must be activated using the BCIN command.

3.  EMDS definition

    a)  Entry of the printer emulation in the TS directory

        An entry in the TS directory (TS = transport service) on the UNIX processor to which the printer is connected is required for the printer emulation. To this end a global name must be given for the printer emulation. A local name must be assigned to this global name, and this local name must match the station name from the device definition in RSO.

        ```
        Example
        RSO station name                     = EMDRS001 (BS2000)
        Global name of the printer emulation = drs_001  (Unix system)
        Local name                           = EMDRS001 (Unix system)
        ```

    b)  Starting the printer emulation in the UNIX system

        On the UNIX processor to which the printer is connected the printer emulation must be started with the following command:

        ```
        $EMDIR/em<drs> ic <name> "xpadd -job -de <printername> -rw"

        where
        <drs>         Desired emulated printer (e.g. 9001, 9021)
        <name>        Name of the printer emulation (e.g. drs_001)
        <printername>  Xprint printer name
        ```

        *Note*

        In SINIX-SPOOL versions < V4.0, "`xpadd -job...`" must be replaced by the command "`lpr -drn=<printername> +cat`".

4.  Xprint definition

    Once the printer emulation has received all the data from RSO, an Xprint print job is generated on the UNIX processor by means of the command
    'xpadd -job -de <printername> -rw'. This presupposes that a printer with the logical printer name <printername> has been defined in Xprint.

    ```
    Example
    xpadd -dev <printername> ...
    ```

**RSO spoolout example**

In the following example, the steps required to perform a spoolout with RSO to a printer connected to a UNIX system are illustrated in chronological order. The example is based on a type 9021 Printer.
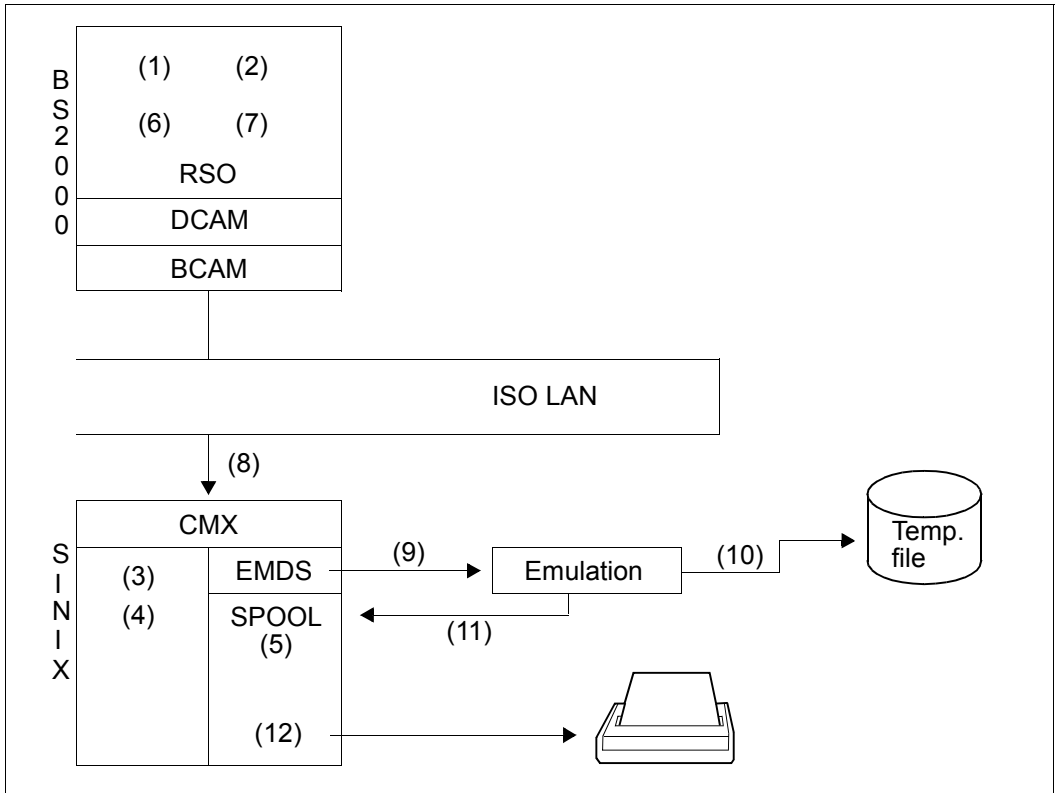


Figure 9: RSO spoolout to a printer connected to a UNIX processor (ISO LAN)

*Definition of the printer*

(1)     Defining a logical RSO device name, using SPSERVE:

```
//A-S-D D-N=PCL9021,DEV-TYPE=9021,
        D-A=*NEA-ACCESS(ACCESS-TYPE=*PC,PRO-NAME=D241S014,
                        STA-NAME=EMDRS001),
            PROCESSING-CONTROL=PAR(MODULO2=*NO)
```

(2)     Defining a UNIX processor as the processor:

```
XPRO PRONAM=D241S014,...
```

(3)     Establishing the link in the TS directory (with TNSADMIN) between the RSO station
        name (STATION-NAME operand in the ADD-SPOOL-DEVICE statement) and a
        printer emulation name in the UNIX system (drs_###).

```
EMDRS001 (RSO)  and  drs_001 (Unix system)

drs_01    is the global name
EMDRS001  is the local name
```

(4)     Assigning the name of the printer emulation for the EMDS 9021 printer emulation
        (HP LaserJet). In addition to activation of the emulation, the Unix system
        commands for outputting the print job on the 9021 Printer must also be chained
        (piping):

```
/usr/lib/emds/em9021 ic drs_001 "xpadd -job -de 9021pcl -rw"
```

*Note*

   In SINIX-SPOOL versions < V4.0, "`xpadd -job...`" must be replaced by the
   command "`lpr -drn=9021PCL +cat`".

(5)     A logical Xprint device name must be assigned to the 9021 Printer because the job
        is to be printed by Xprint.

```
xpadd -dev 9021pcl -pc HP_LASERJET
```

*Use of the printer*

(6)     Starting the logical RSO printer:

```
/START-PRINTER-OUTPUT DEV-NAME=PCL9021
```

(7)     Issuing the PRINT-DOCUMENT command:

```
/PRINT-DOCUMENT FROM-FILE=MYFILE,TO-PRINTER=*PAR(PRINTER-NAME=PCL9021)
```

(8)     RSO processes the print job and sends the data to the UNIX processor.

(9)     EMDS receives the data and sends it to the printer emulation 'drs_001' (EMDS
        9021 printer emulation) in accordance with the definition in the TS directory (link
        between EMDRS001 and drs_001).

(10)    The emulation backs up the data in a temporary file.

(11)    After it has received all the RSO data the printer emulation issues a command
        'xpadd -job -de 9021pcl -rw' causing Xprint to activate the print job. RSO considers
        the print job to have been successfully terminated although nothing has yet been
        output on the 9021 Printer. RSO receives the positive acknowledgment from
        EMDS.

(12)    The print job is processed by Xprint and output on the 9021 Printer, provided that
        the latter has been started with the command 'xpchange -dev 9021pcl'.

### 5.1.8.2  TCP/IP LAN (with DCAM as of V11)

Depending on the DCAM as of V11, some changes must be made to the definitions and sequence to support TCP/IP in BCAM.

**Software configuration**

```
BS2000:        BS2000/OSD-BC   V1.0 or later
               SPOOL           V2.4 or later
               RSO             V2.0B or later

DCAM:          V11 or later

Unix system:   Xprint          V3.1 or later
               CMX             V3.0 or later
                EMDS            V4.0 or later
```

**Definition of the environment**

1. RSO definition

   The printer connected to the UNIX processor can be accessed by RSO via EMDS running on the UNIX processor. For RSO, the printer must be defined with its device type and the access mode 'PC', using SPSERVE.

```
//A-S-D DEV-NAME=rso-devicename,
          DEVICE-TYPE=devicetype,
          DEVICE-ACCESS=*NEA-ACCESS(
            ACCESS-TYPE=*PC,
            PROCESSOR-NAME=unix-processorname,
            STATION-NAME=stationname,
          PROCESSING-CONTROL=PAR(MODULO2=*NO)
```

2. Entry in the resource definition file (RDF)

   The UNIX processor to which the printer is connected must be entered in the resource definition file in BCAM by means of the XPRO macro. The processor name must match that used in the device definition (see above).

```
Example
XPRO  PRONAM=<unix-processorname>,...
      PROFIL=(TCP,IP,ETHERNET),...
```

   In order to enable access to the processor, the processor must be activated using the BCIN command.

3. Routing definition

   The routing must be implemented by means of the BCMAP definition.

   ```
   Example
   BCMAP   SUBFUNCT=GLOBAL,NAME=stationname,
           ES=unix-processorname,PPORT#=3900
   ```

4. EMDS definition

   a) Entry of the printer emulation in the TS directory

      An entry in the TS directory (TS = transport service) on the UNIX processor to which
      the printer is connected is required for the printer emulation. To this end a global
      name must be given for the printer emulation. A local name must be assigned to
      this global name, and this local name must match the station name from the device
      definition in RSO.

      ```
      Example
      RSO station name                     = DRS0007   (BS2000)
      partport (PRINTLIST)                 = 3900      (BS2000)
      Global name of the printer emulation = drs_001   (Unix system)
      Local name                           = 3900      (Unix system)
      ```

   b) Starting the printer emulation in the UNIX system

      On the UINIX processor to which the printer is connected the printer emulation must
      be started with the following command:

      ```
      $EMDIR/em<drs> ic <name> "xpadd -job -de <printername> -rw"

      where
      <drs>          Desired emulated printer (e.g. 9001, 9021)
      <name>         Name of the printer emulation (e.g. drs_001)
      <printername>  Xprint printer name
      ```

      *Note*

      > In SINIX-SPOOL versions < V4.0, "`xpadd -job...`" must be replaced by the
      > command "`lpr -drn=<printername> +cat`".

5. Xprint definition

   Once the printer emulation has received all the data from RSO, an Xprint print job is
   generated on the UNIX processor by means of the command
   'xpadd -job -de <printername> -rw'. This presupposes that a printer with the logical
   printer name <printername> has been defined in Xprint.

   ```
   Example
   xpadd -dev <printername> ...
   ```

**Spoolout example**

In the following example, the steps required to perform a spoolout with RSO to a printer connected to a UNIX system are illustrated in chronological order. The example is based on a type 9021 Printer.
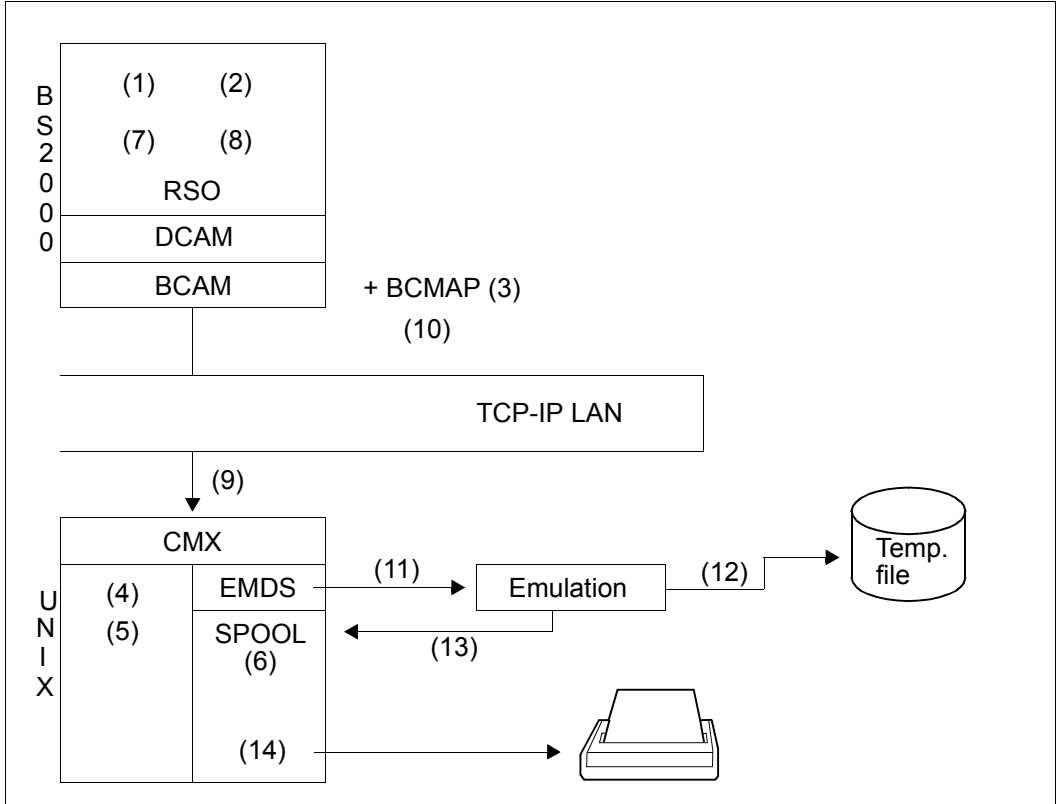


Figure 10: RSO spoolout to a printer connected to a UNIX processor (TC/IP LAN, DCM≥V11)

*Definition of the printer*

(1)    Defining a logical RSO device name, using SPSERVE:

```
//A-S-D D-N=PCL9021,DEV-TYPE=9021,
       D-A=*NEA-ACCESS(ACCESS-TYPE=*PC,PRO-NAME=D241S014,
                       STA-NAME=DRS0007),
       PROCESSING-CONTROL=PAR(MODULO2=*NO)
```

(2)    Defining a UNIX computer as the processor:

```
XPRO PRONAM=D241S014,...
     PROFIL=(TCP,IP,ETHERNET),...
```

(3)    Defining BCMAP:

```
BCMAP SUBFUNCT=GLOBAL,NAME=DRS0007,ES=D241S014,PPORT#=3900
```

(4)    Establishing the link in the TS directory (with TNSADMIN) between the RSO station
       name (STATION-NAME operand in the ADD-SPOOL-DEVICE statement) and a
       printer emulation name with the aid of the port number.

```
drs_01  / TSEL LANINET A '3900'

drs_01  is the global name
3900    is the local name
```

(5)    Assigning the name of the printer emulation for the EMDS 9021 printer emulation
       (HP LaserJet). In addition to activation of the emulation, the UNIX commands for
       outputting the print job on the 9021 Printer must also be chained (piping):

```
/usr/lib/emds/em9021 ic drs_01 "xpadd -job -de 9021pcl -rw"
```

       *Note*
       In SINIX-SPOOL versions < V4.0, "xpadd -job..." must be replaced by the
       command "lpr -drn=9021PCL +cat".

(6)    A logical Xprint device name must be assigned to the 9021 Printer because the job
       is to be printed by Xprint.

```
xpadd -dev 9021pcl -pc HP_LASERJET
```

*Use of the printer*

(7)     Starting the logical RSO printer:

```
/START-PRINTER-OUTPUT DEV-NAME=PCL9021
```

(8)     Issuing the PRINT-DOCUMENT command:

```
/PRINT-DOCUMENT FROM-FILE=MYFILE,TO-PRINTER=*PAR(PRINTER-NAME=PCL9021)
```

(9)     RSO processes the print job and sends the data to the UNIX processor.

(10)    The emulation server transfers the data to the UNIX computer.

(11)    EMDS receives the data and sends it to the printer emulation 'drs_01' (EMDS 9021 printer emulation) in accordance with the definition in the TS directory (link between drs_01 and the port number).

(12)    The emulation backs up the data in a temporary file.

(13)    After it has received all the RSO data the printer emulation issues a command 'xpadd -job -de 9021pcl -rw' causing Xprint to activate the print job. RSO considers the print job to have been successfully terminated although nothing has yet been output on the 9021 Printer. RSO receives the positive acknowledgment from EMDS.

(14)    The print job is processed by Xprint and output on the 9021 Printer, provided that the latter has been started with the command 'xpchange -dev 9021pcl'.

## 5.1.9   Connecting printers via the BSD-LPD protocol

The abbreviation BSD-LPD denotes a specific printer daemon which was originally designed for Unix systems but is now also available on other platforms. By means of a special protocol, the BSD-LPD protocol, this printer daemon controls print output from remote processors on printers controlled by the local printer. The BSD-LPD protocol described in ISO RFC 1179 is also supported by LAN printer servers and a number of printers.

The number of printers which are used in networks and which support the BSD-LPD protocol developed in Berkeley is constantly increasing. The BSD-LPD protocol is based on TCP and can therefore be accessed by all processors which support TCP/IP, provided that the processor in question has been entered in the system catalog of the processor running the printer daemon lpd. This system catalog uses the printer daemon to enable remote processors to access the printers attached to its own processor.

Under Unix systems, this system catalog is normally stored in the file `/etc/hosts.lpd`. With other operating systems it can be stored under a different name.
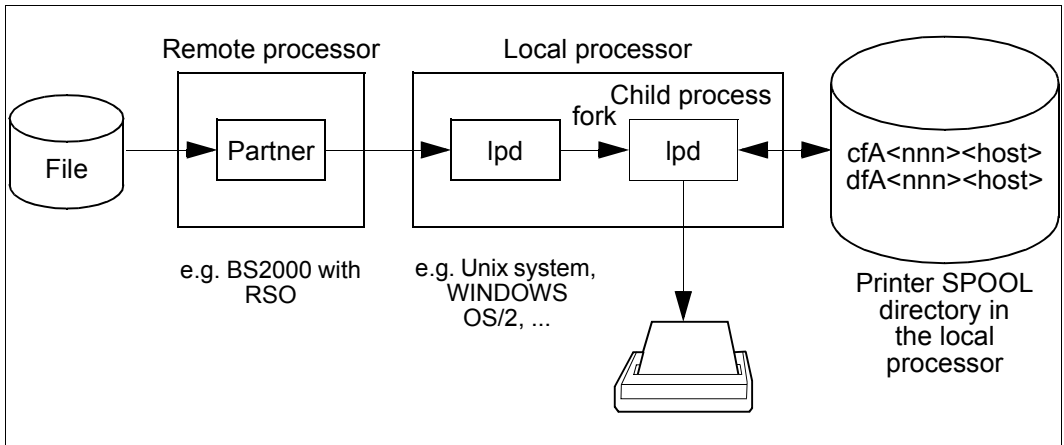


Figure 11: Print job from a remote processor to a BSD-LPD (lpd)

As of V3.0, RSO can access printers connected to a BSD-LPD, provided DCAM V11 or higher is installed. Access to a BSD-LPD can be seen as a new RSO access type.
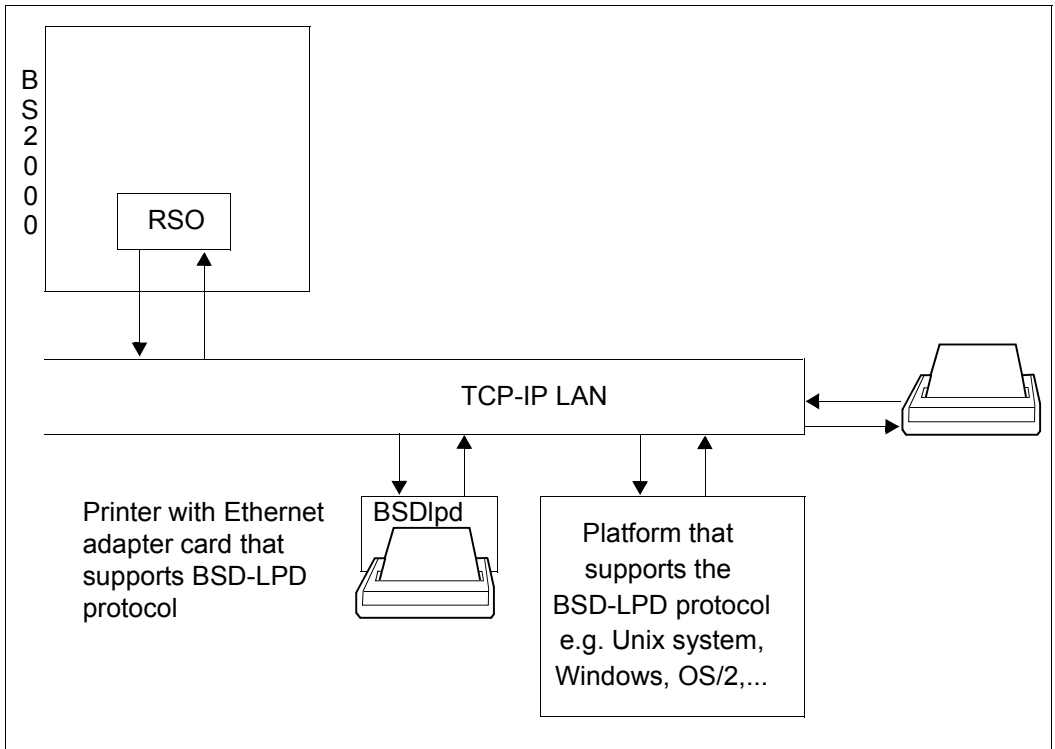
Figure 12: Connection of RSO printers via the BSD-LPD (BSDlpd)

**Supported printer types**

The following printers are supported by RSO when connected to a BSD-LPD:
2030-PCL, 4011, 4812, 4813, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL,
4830-PCL, 4850-PCL, 9000, 9000-EPFX, 9000-EPLQ, 9000-EPSQ, 9000-PCL,
9000-PRO, 9000-PS, 9001, 9001-31, 9011, 9012, 9013, 9014, 9015, 9021, 9022,
9022-200, 9025, 9026-PCL, 9026-RENO, 9045-ANSI, 9046, 9097, DJET

### 5.1.9.1    Connecting a printer to BSD-LPD

A printer that is connected to a BSD-LPD must be defined with the SPSERVE statement ADD-SPOOL-DEVICE or MODIFY-SPOOL-DEVICE. To do this, the following operands are used. These operands are described in the "SPSERVE (BS2000/OSD)" manual.

```
DEVICE-ACCESS = *TCP-ACCESS(...)
   ACCESS-TYPE = *LPD(...)
           LPD-PRINTER-NAME = *STD / <c-string 1..8>
           ,FROM-PORT-NUMBER = <integer 0..1024>
           ,TO-PORT-NUMBER = <integer 0..1024>
   INTERNET-ADDRESS = *STD / <alphanum-name 1..32> /<composed-name 7..15>
   PORT-NAME = *STD / <alphanum-name 1..8>
```

**Interdependencies with other operands**

SYNCHRONIZATION=*PRINTER is not rejected but simply ignored. RSO automatically assumes the setting SYNCHRONIZATION=*NETWORK. RSO does not receive any information direct from the printer. The dialog takes place exclusively between RSO and the BSD-LPD, i.e. synchronization is not possible between the sending of two messages (within the same print job).

Similarly, POLLING=*YES is not rejected but simply ignored. RSO automatically assumes POLLING=*NO, as printers administered by BSD-LPD cannot return information to RSO.

DISCONNECTION=*YES or DISCONNECTION=*NO is likewise not rejected but simply ignored. RSO automatically assumes DISCONNECTION=*FORCE, in order to request the closing of the connection at the end of each print job.

### 5.1.9.2    Completeness of printouts, restarting printouts

BSD-LPD printers and servers are supported only by the transfer of print jobs to the BSD-LPD server. This is because RSO cannot monitor the processing of the print jobs.

As soon as RSO receives a print request that is to be forwarded to a BSD-LPD server, the first thing RSO does is to create a temporary file containing all the data to be printed (Header page, user data, Trailer page, ...). This file is used to determine the value for the size of the print job. Once the temporary file has been created, RSO checks whether there is a BSD-LPD printer/server ready for a print job. If so, RSO reads the print data from the temporary file and sends it to the BSD-LPD printer/server together with certain BSD-LPD protocol commands.

If a DMS error occurs while creating the temporary file, the print request is returned to the KEEP queue. If the print request is rejected by the BSD-LPD printer/server, RSO resumes processing of the print request from the beginning.

If the print job is processed without errors, RSO clears the connection to the BSD-LPD printer/server and considers the print job to have been successfully completed. Nevertheless, the BSD-LPD printer/server does not check through its internal print request queue until the connection to RSO has been cleared. This means that RSO has no possibility of monitoring the printing of the data once it has been passed to the BSD-LPD printer/server.

⚠ **CAUTION!**

When printing to BSD-LPD protocol printers it is not possible to guarantee either a correct restart of the print operation or a complete printout of the data. This is because RSO has no possibility of communicating with the printer. As a result, it may happen that RSO regards a print job as successfully processed even though not a single page has actually been printed.

### 5.1.9.3  Restart rules

The printer error code "LpdJobAborted" has been introduced in order to draw attention to problems such as "request rejected", "timeout detected" etc. in dialog with a BSD-LPD. If this error code is displayed, the print job is entered in the KEEP queue. In addition, message SR00993 is issued if the printer status is queried by means of /SHOW-SYSTEM-STATUS INF=*REMOTE(...).

The standard restart action belonging to the error code "LpdJobAborted" is an automatic restart after detection of the error. Systems support can change this behavior by specifying a new restart rule. The general action codes available for this are STOP, SUSPEND and RESTART.

### 5.1.9.4  EBCDIC-ASCII character conversion

The BSD-LPD protocol expects data in ASCII code, but BS2000 files contain data in EBCDIC code. RSO has direct access to the BSD-LPD and therefore carries out this EBCDIC-ASCII conversion itself. It should be kept in mind that this conversion takes place character by character, i.e. each character is converted independently of the others. A conversion table can be found in section "EBCDIC-ASCII conversion table" on page 675.

### 5.1.9.5   Printing via an Xprint BSD-LPD server

**Minimum software configuration**

BS2000          BS2000 OSD-BC V1
                SPOOL V3.0B
                RSO V3.0A
                SPSERVE V2.0B
                DCAM V11.0

Unix system     Xprint V2.0A

*Note*

All the Xprint commands are described in the Xprint syntax.

**Defining the operating environment**

1.   RSO definitions

The target printer must be defined with SPSERVE in RSO:

```
//ADD-SPOOL-DEVICE DEVICE-NAME=logical-name
//                  DEVICE-TYPE=printer-type,
//                  DEVICE-ACCESS=*TCP-ACCESS(
//                      INTERNET-ADDRESS=lpd-internet-address,
//                      PORT-NAME=lpd-portnumber,
//                      ACCESS-TYPE=*LPD(
//                          LPD-PRINTER-NAME=lpd-printername,
//                          FROM-PORT-NUMBER=min. client-portnumber,
//                          TO-PORT-NUMBER=max. client-portnumber)),
//                  ...
```

*lpd-internet-address*
          The Internet address of the BSD-LPD server, for XPRINT the Internet
          address of the host running the BSD-LPD server. The address is either the
          IP address in point-decimal notation or the socket host name of the UNIX
          host as generated via BCAM (in the BS2000 RDF file or the SOCKETHOST
          address table).

*lpd-portnumber*
          The port number via which the BSD-LPD server is addressed. In RFC 1179,
          the value 515 is recommended. In Xprint, the same port number must be
          used, see *xpadd -gtw* command option *-ga*. This option has no preset value.

*lpd-printername*

> The name of the printer on which RSO should print via the BSD-LPD server.
> The printer name used in the configuration of the BSD-LPD server must be
> entered. For Xprint, this is any Xprint device name.

*min. client-portnumber*

> The smallest permissible port number from the BSD-LPD server for its BSD-
> LPD client (i.e. RSO); the preset value is 721. For Xprint, see
> option *-op* of the *xpadd -gtw* command.

*max. client-portnumber*

> The largest permissible port number from the BSD-LPD server for its
> BSD-LPD client (i.e. RSO); the preset value is 731. For Xprint, see option
> *-op* of the *xpadd -gtw* command.

2. BCAM definitions

The UNIX host running the BSD-LPD server must be defined and activated via the RDF
file or the SOCKETHOST address table.

3. Defining gateways for Xprint

Two different gateways must be defined: a local one that defines the BSD-LPD server,
and a partner gateway that RSO defines as client for the BSD-LPD server.

The local gateway is defined as follows:

```
xpadd –gtw    local gateway-name
              –aa
              –pp BSD
              –ga lpd-portnumber
              –ag permissible partner
              –ho BSD-LPD-server-hostname
              –op "PI=min. client-portno" "PA=max. client-portno"
```

*local gateway-name*

> Logical name of the local gateway, i.e. of the BSD-LPD server.

-aa        Automatically activates the local gateway, i.e. the BSD-LPD servers when
           Xprint is started. If *-aa* was not specified, the *xpchange -gtw* command must
           be specified explicitly.

*lpd-portnumber*

> The port number via which the local gateway, i.e. the BSD-LPD server is
> addressed. In RFC 1179, the value 515 is recommended.

*BSD-LPD-server-hostname*
> The name of the host running the local gateway, i.e. the BSD-LPD server. This name is defined as the Xprint 'Host' object.

*permissible partner*
> The list of permissible partner gateways, i.e. BSD-LPD clients (e.g. RSO) which are allowed to address the local gateway, i.e. the BSD-LPD server.

*min. client-portno*
> The smallest port number from the local gateway, i.e. the BSD-LPD server, that is permissible for the partner gateway (the BSD-LPD client, i.e. RSO).

*max. client-portno*
> The largest port number from the local gateway, i.e. the BSD-LPD server, that is permissible for the partner gateway (the BSD-LPD client, i.e. RSO).

The partner gateway is defined as follows:

```
xpadd –gtw partner-gateway-name
              –pp BSD
              –tp PARTNER
              –bl local gateway-name
               –ho BSD-LPD-client-hostname
```

*partner-gateway-name*
> Logical name of the partner gateway (the BSD-LPD client, i.e. RSO).

*local gateway-name*
> The name used to address the local gateway, i.e. the name of the BSD-LPD servers.

*BSD-LPD-client-hostname*
> The name of the host running the partner gateway, i.e. the BSD-LPD client RSO. The name that is also used in the file /etc/hosts or in the naming service (e.g. DNS) must be entered.

4. For Xprint: enter BS2000 system in /etc/hosts or in the naming service.

   The host name of the BS2000 system running RSO, and its Internet address must either be entered in the file /etc/hosts or in the naming service (e.g. DNS) of the UNIX host running the Xprint BSD-LPD server (the local gateway).

**Execution example**

The following example summarizes the definitions of the operating environment required to give RSO access to a 4822 Printer that is controlled from a UNIX host. RSO accesses the printer via the Xprint-BSD gateway server running on the UNIX host.

*Definition of the printer*

(1) Use SPSERVE to define a printer for BSD-LPD

```
//A-S-D DEV-NAME=LPDXPPCL,
        DEV-TYPE=*4822-PCL
        DEV-ACC=*TCP(
            INT-ADD=SNXH1,
            PORT-NAME=515,
            ACC-TYPE=*LPD(
                LPD-PR-NAME='pcl4822',
                FROM-PORT-NUM=0,
                TO-PORT-NUM=1023)), ...

//A-S-F STD,*4822-PCL, ...
```

(2) Define a UNIX host with a BSD-LPD server

```
/BCIN UNIX1,SOKHOST=SNXH1, ...
```

*Definitions in Unix system*

(3) Define the local gateway

```
xpadd -gtw BSDSRV
        -aa
        -pp BSD
        -ga 515
        -ag ALL
        -ho SNXH1
        -op "PI=0" "PA=1023"
```

(4) Define the partner gateway

```
xpadd -gtw BSDRSO
        -pp BSD
        -tp PARTNER
        -bl BSDSRV
        -ho BS2H1
```

(5) Mount the printer pcl4822 in Xprint

```
xpadd -dev pcl4822 ...
```

(6) Enter the BS2000 system in /etc/hosts or in the naming service

```
193.210.193.27 BS2H1
```

*Using the printer*

(7) Once these definitions have been made, it is possible for the BS2000 processor to initiate print jobs sent to the printer LPDXPPCL. The printer is controlled by the UNIX host SNXH1.

```
/PRINT-DOCUMENT myfile,PRINTER-NAME=LPDXPPCL, ...
```

However, it should be kept in mind that support of BSD-LPD printers by RSO covers only the allocation of print jobs. Execution of the jobs cannot be monitored. This means: once RSO has successfully passed a complete print job to the BSD-LPD server, it closes the connection and considers the job as having been processed, even though nothing has actually been printed yet. Not until the connection has been closed does the BSD-LPD server begin to search its queues for print jobs which contain the print request from RSO.

## 5.1.10   Transparent support for a new printer by RSO

Support for a new printer does not just mean installing the printer with the aid of the operating instructions. From the RSO viewpoint, a printer is characterized not only by the functions and language(s) that it supports. The access mode is an important aspect of how the printer in question is supported by RSO.

Printing a file does not simply consist in sending data to a printer. It involves establishing the virtual connection, the dialog with the printer controller (sending, and receiving return messages), sending the data (comprising text and print control characters) to the printer, and finally conversion of this data by the printer (according to the printer language).
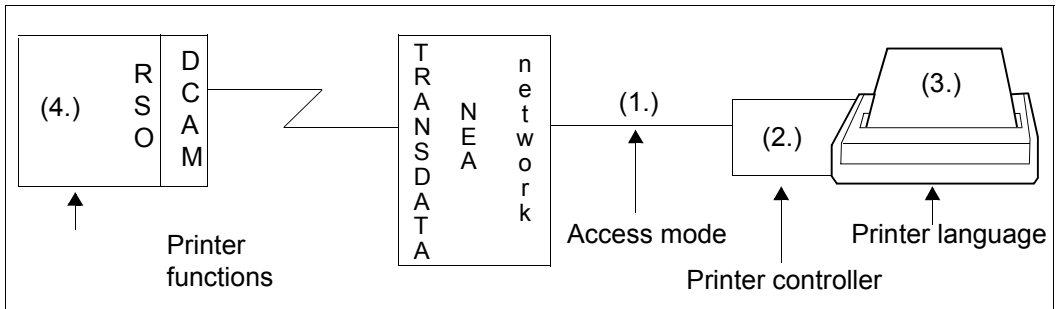


Figure 13: Sending data with RSO to printers accessed via the TRANSDATA-NEA network
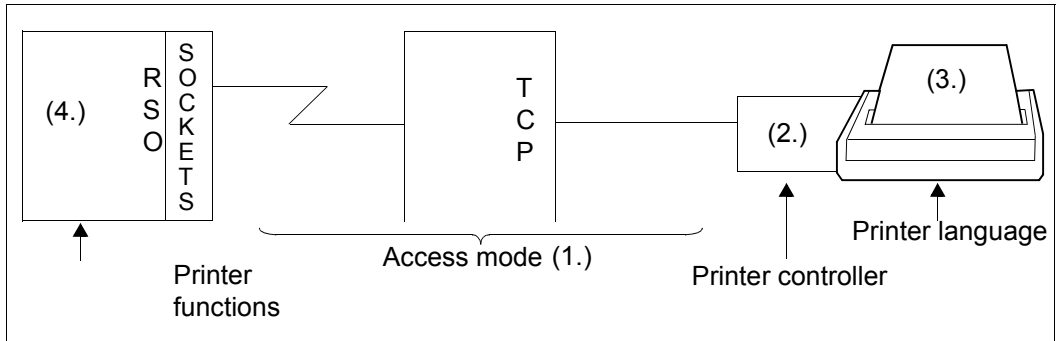


Figure 14: Sending data with RSO to printers accessed via a TCP/IP LAN

All aspects of significance with regard to support of a new printer for RSO are described below. The points are numbered as in the above diagram.

### 1. Establishing the connection

Before a dialog can commence with the printer controller, a logical connection must be established between RSO and the printer (definition of the communication attributes of the two partners).

In order to access the printer, RSO must know the communication attributes of the partner. The RSO access modes are used for this purpose. The RSO access mode actually serves a dual purpose in that it describes the communication attributes of the partner (for establishing the logical connection) and simultaneously defines which "header" (printer control protocol) must be prefixed to each message to the printer (for the printer controller dialog).

It is absolutely essential for operation of the printer that the RSO access mode definition for the printer match the definition of the printer in PDN (applicable to printers accessed via TRANSDATA-NEA). RSO currently supports the following different access modes:

1. HARDCOPY

2. HARDCOPY-9751

3. DIRECT
   – with BAM converter
   – with HDLC-AFP converter

4. HDLC

5. APPLICATION

6. PC

7. TACLAN

8. LPD

The access modes are described in section "Access modes for RSO printers" on page 23. A table giving the supported access modes for each printer type appears on page 26.

Any printer language can be supported by RSO via printer type 9000 since the printer functions that are supported by RSO through the user interface or VTSU codes are restricted to three functions via this printer type: FF (Form Feed), CR (Carriage Return), NL (New Line). However, this has nothing to do with the access mode. No "transparent" access mode exists for RSO. The access modes supported are restricted to the aforementioned types.

### 2. Dialog with the printer controller

As soon as the logical connection has been established, a printer controller dialog can take place; this comprises sending the data to the printer and receiving the return messages from the printer controller.

### Printers accessed via the TRANSDATA network
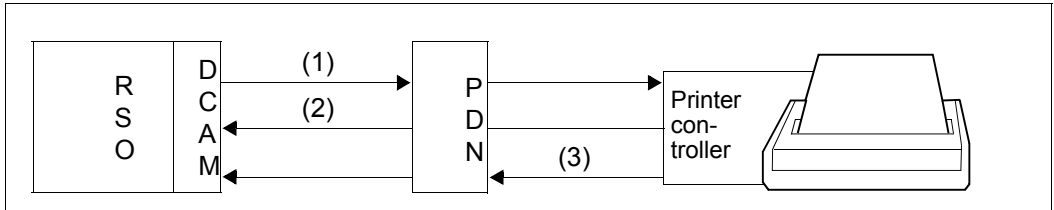


Figure 15:  PDN and printer controller dialog with RSO

RSO conducts the printer dialog with the aid of the DCAM interface. Before sending the message to the printer, RSO inserts a "header" which is required for the dialog with the printer controller. The contents of the header depend on the definition of the RSO access mode for the printer. For each message (generally the header plus a mixture of user data and printer control characters) that is sent to the printer, a transport acknowledgment (TACK) is expected. This TACK is returned by PDN in order to indicate whether or not the message has reached the partner.

Depending on the printer type (some printers offer printer commands for reporting the printer status, others do not), a printer acknowledgment (PACK) may be requested by the printer controller and sent in addition to the TACK and the access mode.

As of RSO V2.2A it is possible to use the SYNCHRONIZATION=*NETWORK/PRINTER operand of the SPSERVE statement ADD-SPOOL-DEVICE to specify for a printer whether only TACK (=*NETWORK) or TACK and PACK (=*PRINTER) is/are sent.

Specifying SYNCHRONIZATION=*NETWORK allows "transparent" handling of the return messages from the printer controller since these are then no longer returned.

It is not, however, possible to be "transparent" when sending the data (path (1) in figure 15) since each message that is sent to the printer must begin with a header matching the access mode of the printer.

RSO currently manages 3 different dialog protocols for the printer controllers. These protocols define the printer connection and specify how a printer acknowledgment is sent:

*TRANSDATA-810 protocol*

This mandatory protocol is used for access modes DIRECT (with BAM or HDLC-AFP converter), HARDCOPY, HARDCOPY-9751 and PC. The protocol does not provide RSO with any truly reliable dialog with the printer since the return message (PACK) always consists of a standard 4-byte structure, even if a particular printer status has been interrogated.

*HDLC-RENO connection protocol*

No system protocol is required for the HDLC access mode (unless specified otherwise, no printer acknowledgment is returned). In order to allow RSO to receive printer acknowledgments, a type of protocol was defined which is dependent on the printer language (i.e. also dependent on the device type and the access mode). The RENO printer language is currently supported for the printer types 9025 and 9026-RENO.

*RSOAP application protocol*

The APPLICATION access mode does not require a TRANSDATA protocol (unless specified otherwise, no printer acknowledgment is returned). In order to be able to pass information to the RSOAP application (which supports the printer type 9645) and to receive printer acknowledgments, a type of protocol between RSO and the RSOAP application was defined.

*Note*

> Transport acknowledgments are returned by the last line concentrator and are completely independent of the device and the access mode.

## Printers connected to a TCP/IP LAN

RSO can directly access printers connected to a TCP/IP LAN (by a TACLAN, an SPPCS running on a DOS PC, or an Ethernet adapter card or a BSD-LPD server). Once the connection has been set up, a direct printer dialog can be started. This dialog consists of sending data to the printer and receiving acknowledgments from the printer.
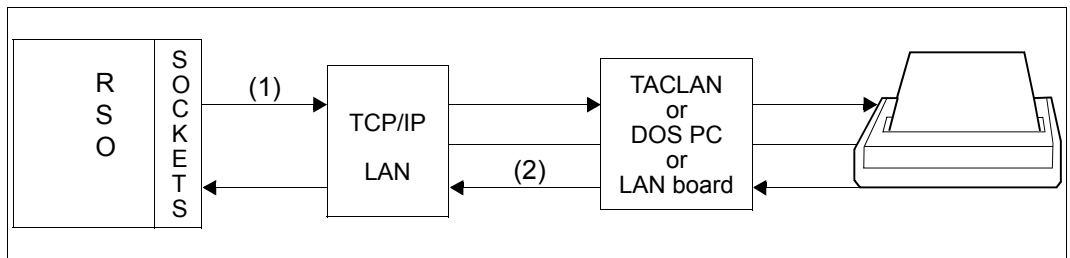


Figure 16: Dialog between RSO and printers connected to a TCP/IP LAN

RSO uses the SOCKETS interface to access the printers. At this juncture, a printer controller is not necessary for accessing these printers.

This is the reason why RSO uses one of the methods listed under SYNCHRONIZATION= *PRINTER (e.g. the ETX/ACK protocol) (see page 200ff) to synchronize the data for printers defined with ACCESS-TYPE=*TACLAN. The prerequisites for this dialog are as follows:

– The printer supports one of the synchronization methods listed under SYNCHRONIZATION=*PRINTER and this method is enabled.

– The connection to the printer is such that a dialog of this nature is possible (the Centronics interface, for example, does not permit a printer dialog).

– The RSO printer is defined with SYNCHRONIZATION=*PRINTER.

In order to poll the printer status and check for malfunctions, RSO can request the printer (path (1) in figure 16) to return printer status messages (path (2) in figure 16). The prerequisites for this dialog are as follows:

– The printer supports this feature and the feature is enabled.

– The connection to the printer is such that a dialog of this nature is possible (the Centronics interface, for example, does not permit a printer dialog).

– The RSO printer is defined with POLLING=*YES.

Sending data transparently (path (1) in figure 16) requires SYNCHRONIZATION= *NETWORK in the device definition. Receiving printer messages transparently (path (2) in figure 16) requires POLLING=*NO in the device configuration.

For printers defined with ACCESS-TYPE=*LPD, RSO uses only the BSD-LPD protocol for its dialog with the BSD-LPD server.
SYNCHRONIZATION=*NETWORK and POLLING=*NO are always set in this case.

### 3. Printer language

The printer language is a collection of statements having a certain syntax, which makes it possible to select printer functions and to monitor the printing operation and the printer. The statements normally relate to escape sequences or printer control characters.

The RSO device type represents a printer language and a set of printer functions that are supported by RSO:

| Printer type | Printer language |
|---|---|
| 2030-PCL | PCL5 |
| 4011 | ECMA |
| 4812 | PCL3 |
| 4813 | ECMA |
| 4818-PCL | PCL5 incl. HPGL/2 |
| 4821-PCL | PCL5e incl. HPGL/2 |
| 4822-PCL | PCL5e incl. HPGL/2 |
| 4824-PCL | PCL5 incl. HPGL/2 |
| 4825-PCL | PCL5e incl. HPGL/2 |
| 4830-PCL | PCL5e incl. HPGL/2 |
| 4850-PCL | PCL5e incl. HPGL/2 |
| 8121 | (1) |
| 9000 | any language (2) |
| 9000-PCL | PCL5e |
| 9000-PRO | IBM Proprinter |
| 9000-PS | PostScript |
| 9000-EPFX | EPSON-FX |
| 9000-EPLQ | EPSON-LQ |
| 9000-EPSQ | EPSON-SQ |
| 9001 | ECMA |
| 9001-31 | ECMA |
| 9002 | (1) |
| 9003 | (3) |
| 9004 | (3) |
| 9011 | ECMA |
| 9012 | ECMA |
| 9013 | ECMA |

| Printer type | Printer language |
|---|---|
| 9014 | ECMA |
| 9015 | ECMA |
| 9021 | PCL4 |
| 9022 | DIABLO-630 |
| 9022-200 | PCL4 |
| 9025 | RENO |
| 9026-RENO | RENO |
| 9026-PCL | PCL4 |
| 9045-ANSI | ANSI |
| 9046 | ANSI |
| 9097 | ECMA |
| 9645 | DP |
| DJET | PCL3 |

(1)     The printer languages for the printer types 8121 and 9002 provide few functions. They may be referred to as the '8121' and '9002' printer languages.

(2)     The 9000 Printer is the "open" printer type.
The only printer functions it supports are Form Feed (X'0C'), Carriage Return (X'0D') and New Line (X'15', converted into X'25' unless DOCUMENT-FORMAT= *SPECIAL-FORMAT(...) is specified in the PRINT-DOCUMENT command).

(3)     The printer languages for the printer types 9003 and 9004 are so specialized that they are referred to as the '9003' and '9004' printer languages.

Printer types that use the same printer language differ in the printer functions supported or in the way these printer functions are converted into the printer control characters transferred.

### 4. Printer functions supported by RSO

The set of printer functions that RSO supports denotes those printer functions that RSO actually supports by means of the user interface (i.e. PRINT-DOCUMENT command operands, VTSU codes etc.). However, printer functions also relate to printer attributes and denote, for example, the capability to print in italic or bold, select an input tray etc.

The RSO device types support a portion of the printer functions via the RSO user interface, dependent on the printer language and the functions offered by a particular printer.

The 9000 Printer can be regarded as a "transparent" printer type. The only printer functions is supports are Form Feed (X '0C'), Carriage Return (X'0D') and New Line (X'15', converted into X'25' unless DOCUMENT-FORMAT=*SPECIAL-FORMAT(...) is specified in the PRINT-DOCUMENT command).

### Support for a new printer by RSO

When a new printer is installed, the printer features listed below must be taken into consideration with regard to definition and use of the printer in RSO.

The following are important for determining the RSO device type:

– the printer language supported by the printer,
– the printer functions supported by the printer and
– whether these printer functions are supported by RSO.

When determining the RSO access mode it is necessary to know how the printer is connected.

When specifying the SYNCHRO=*NETWORK/PRINTER operand it is necessary to know

– whether printer acknowledgments (PACK) are returned by the printer and

– whether these printer acknowledgments are compatible with the printer controller protocol with respect to the connection, and are supported by RSO.

It is then possible to determine whether or not printer acknowledgments are to be expected and thus whether the printer should be defined with SYNCHRO=*NETWORK (i.e. no PACK) or SYNCHRO=*PRINTER (i.e. with PACK).

**Support for unbundled hardware releases**

Prerequisites for unbundled hardware release support:

– The printer supports a printer language that is already supported by RSO for an existing printer type.

– Conversion of the printer functions by RSO (through user interface or VTSU codes) is handled in exactly the same way as for the existing printer type.

– The type of printer connection can be defined by an existing RSO access mode for the printer type.

If these preconditions are met, the new printer can be defined in RSO under this existing printer type and the existing access mode.

**"Transparent" support**

To avoid any misunderstanding, the meaning of the operand DOCUMENT-FORMAT(...) of the PRINT-DOCUMENT command is stressed again at this point. It should be noted that the DOCUMENT-FORMAT operand describes only the process (filtering) that is applied to the user's input file. It does not relate to the printer controller dialog or to the connection.

If DOCUMENT-FORMAT=*SPECIAL-FORMAT(...) is specified, all characters from the input file are sent unmodified to the printer (for exceptions see below). This does not however mean that RSO sends no other printer commands to the printer.

Ahead of the data from the user file RSO sends certain escape sequences to activate or deactivate printer functions (provided they are supported by the RSO printer type and by the printer itself):

– Font string, possibly linked to the character set that is used for printing

– Default input tray number or desired input tray number (unless PRINT-DOCUMENT..., LAYOUT-CONTROL=*PAR(INPUT-TRAY-NUMBER=*IGNORE) is specified)

– Line spacing value (lpi)

– Number of copies (value from the operand ADDITIONAL-COPIES=... in the PRINT-DOCUMENT command)

– Form length (length of logical page) or FHG

In addition, a number of blanks are inserted at the beginning of each record from the user file. The length is equal to the value of LEFT-MARGIN (from the PRINT-DOCUMENT command or the default value from the device definition).

Depending on the value of the LINE-SPACING operand from the PRINT-DOCUMENT command (unless LINE-SPACING=*NO has been specified), RSO inserts certain printer commands (Carriage Return, New Line, Form Feed) between every record from the user file.

"Transparent" support for a new printer means that this printer is supported with the current RSO attributes, i.e. without waiting for a new RSO version. "Transparent" support also relates to the various aspects described in section "Transparent support for a new printer by RSO" on page 226.

*1. Transparency with regard to the logical connection*

A new printer can be supported by RSO only if the printer supports at least one of the seven possible RSO access modes that define the communication features. In contrast to the RSO printer type, there is no transparent RSO access mode that defines the communication features.

*2. Transparency with regard to the printer controller dialog*

*Printers accessed via the TRANSDATA-NEA network*

When the data is sent to the printer, a "header" (printer control protocol) for the dialog with the printer controller must be inserted at the beginning of each message. In addition to defining the communication features of the partner, the RSO access mode also describes the printer control protocol. A new printer can therefore be supported by RSO only if the printer supports one of the six available access modes for the TRANSDATA-NEA network that define the printer control protocol. In contrast to the RSO printer type, there is no transparent RSO access mode that defines a transparent printer control protocol.

Assuming that printer acknowledgments are expected from the printer and that these correspond to the printer control protocols that are supported by RSO, the printer can be defined with SYNCHRO=*PRINTER.

If the printer returns no printer acknowledgments of any kind or these are not compatible with the three supported printer control protocols, the printer must be defined with SYNCHRO=*NETWORK. The disadvantage of this definition is that RSO (and thus the user) is not warned in the event of printer problems (e.g. low paper, paper jam, cover open etc.).

*Printers connected to a TCP/IP LAN*

Assuming that the printer supports one of the synchronization methods listed under SYNCHRONIZATION=*PRINTER (e.g., the ETX/ACK protocol), the printer can be defined with SYNCHRONIZATION=*PRINTER. Otherwise, the printer should be defined with SYNCHRONIZATION=*NETWORK (see page 200ff).

Assuming that the printer returns printer acknowledgments compatible with those that RSO already supports for the current RSO printer types, the printer can be defined with POLLING=*YES. If this precondition is not met, the printer should be defined with POLLING=*NO.

*3. Transparency with regard to printer language and printer functions*

If the printer does not support any printer language supported by RSO or if the conversion of the printer functions by RSO (through its user interface or VTSU codes) is not the same as is performed for an existing RSO printer type, it is advisable to define the new printer as printer type 9000.

This printer type was introduced to enable "exotic" printers to be supported by RSO. The set of printer functions supported by RSO for this printer type is however restricted to Form Feed (X'0C'), Carriage Return (X'0D') and New Line (X'15', converted to X'25').

The user him-/herself must define additionally required printer functions in his own files, in prolog/epilog files, or in a font string that is possibly linked to a character set (the latter may only be performed by systems support).

**Example of transparent support for a new printer accessed via the TRANSDATA-NEA network**

```
/START—SPSERVE
//ADD—SPOOL—DEVICE DEVICE—NAME=P9000,DEVICE—TYPE=9000—R—P, —————————— (3)
                   DEVICE—ACCESS=*NEA—ACCESS(
                                 ACCESS—TYPE=connection type, —————————— (1)
                                 PROCESSOR—NAME=processor name,
                                 STATION—NAME=station name),
                   PROCESSING—CONTROL=*PARAMETERS(
                                 SYNCHRO=NETWORK) ——————————————— (2)
//ADD—SPOOL—FORM   FORM—NAME=*STD,DEVICE—TYPE=9000—R—P
//END

/START—PRINTER—OUTPUT DEVICE—NAME=*RSO—PRINTER(NAME=P9000)

/PRINT—DOCUMENT FROM—FILE=MYFILE,DOCUMENT—FORMAT=*SPECIAL—FORMAT,
                TO—PRINTER=*PAR(PRINTER—NAME=P9000) —————————————— (4)
```

(1)    As explained above, there is no "transparent" access mode for RSO. A new printer can therefore only be supported if it can be connected via an existing RSO access mode. It should be noted here that the RSO access mode must correspond to the definition of the printer in PDN (applicable to printers accessed via TRANSDATA-NEA) in order to allow use of the printer.

(2)    In order to be "transparent" with respect to the printer controller return messages, the printer must be defined with SYNCHRO=*NETWORK.

(3)    In order to be "transparent" with respect to the printer language and the printer functions that RSO supports via the user interface, the printer must be defined with printer type 9000. However, RSO supports only the printer functions Form Feed (X'0C'), Carriage Return (X'0D') and New Line (X'15', converted into X'25' unless DOCUMENT-FORMAT=*SPECIAL-FORMAT(...) was specified in the PRINT-DOCUMENT command for this printer type.

(4)    In order to be "transparent" with respect to the contents of the user file, the operand DOCUMENT-FORMAT=*SPECIAL-FORMAT(LINE-SPACING=*NO) must be specified in the PRINT-DOCUMENT command. Provided that the aforementioned conditions are also satisfied, the contents of the user file are sent by RSO to the printer unchanged and without insertion of printer escape sequences.

*Exception*

If a font string has been defined and assigned to a character set, this will be sent prior to the contents of the user file.

## 5.1.11   Support for mute printers by RSO

Printers are referred to as "mute" if data can only flow in one direction from the host to the printer. In particular, the printer does not send any return messages concerning its status or the status of the transferred print job. Together with *open*Net Server V1 (BCAM V15 as of BS2000/OSD-BC V2.0), more reliable data transfer is guaranteed for mute printers.

Mute printers present a big problem because RSO cannot control the data flow during transfer to the partner. When the printer closes the TCP session, RSO continues to send data to BCAM. If the BCAM buffers are full, BCAM sends a warning, i.e. RSO is requested to terminate the data transfer. If the connection is interrupted at this point, all temporary buffers are deleted, which always leads to loss of data.

RSO has only very little information on what has arrived at the partner; BCAM has more information because it receives transport acknowledgments. To eliminate the problem of data loss, RSO receives access to this information via the SOCKETS interface. In this way, RSO is informed of what has already been transferred to the partner and can determine more accurately where to restart.

RSO guarantees that the data arrives at the partner. This prevents loss of data and/or an overflow of the local BCAM buffer.

The following table shows how the use of the SOCKETS interface improves the reliability of the printers connected via a TCP/IP LAN:

|  | Printer access mode | | |
|---|---|---|---|
|  | TRANSDATA-NEA | TCP/IP LAN (without BCAM V15) | TCP/IP LAN (with BCAM V15) |
| Secure data transfer to the partner | guaranteed | not guaranteed | guaranteed |
| Secure printing of the data | guaranteed | not guaranteed | partially guaranteed [1] |
| Establishment of the printer status | guaranteed | not guaranteed | partially guaranteed [2] |
| Data flow in both directions | guaranteed | not guaranteed | partially guaranteed [3] |

[1] only possible with serial (V24) or Bi-tronics interfaces with the ETX/ACK, PCL5e/PJL or PRESCRIBE II protocols.

[2] only possible with serial (V24) or Bi-tronics interfaces with printer-language-dependent commands.

[3] only possible with serial (V24) or Bi-tronics interfaces.

### Activating the SOCKETS interface for RSO printers

To use the SOCKETS interface you require RSO as of V3.1A and *open*Net Server as of V1.0.

As of RSO V3.1A the SOCKETS interface is activated automatically for printers which were defined with ACCESS-TYPE=TACLAN, SYNCHRONIZATION=*NETWORK and POLLING=*NO. This means:

– None of the following methods are supported or activated for the printer: ETX/ACK protocol, PCL ECHO command, PJL printer language, RENO "close document" command, SEH protocol, PRESCRIBE II printer language.
– Or the printer is connected via the Centronics interface, which cannot return data.

### Advantages

– No buffer overflow with local TCP communication buffers

As no synchronization is possible between the transmission of two messages within a print job, RSO calculates an estimated print time, based on several parameters, for each message sent. This estimated print time is used as wait time before the next message is sent, and can be influenced by way of the 'speed' setting in the printer parameter file. This can lead to a buffer overflow if there are problems on the partner side.
Now, when the estimated print time expires, the SOCKETS interface is called in order to establish whether the partner has received all the data. If this is not the case, the system checks again later. If again no change in the number of bytes is detected, timeout processing is executed (see below).

– Security during data transfer

The security of the data transfer as far as the partner is guaranteed (RSO alone cannot determine whether all the data was transferred to the printer.

– Detecting a timeout on the printer/partner - no loss of print jobs

If it is established that the number of bytes confirmed by the partner has not changed, timeout processing is initiated. The message SRO0987 is output and, regardless of the device type or connection type, the default action "Stop" is executed.

Make sure during the restart that you execute the correct action, depending on what was actually printed. Because you are dealing with a mute printer, RSO has no possibility of restarting the interrupted print job correctly.

Please note also that the definition of recovery rules can influence recovery processing.

## 5.1.12  Printers connected to a Windows NT station

With the Open-LPD protocol, RSO offers users access to printers which are administered by Windows NT.
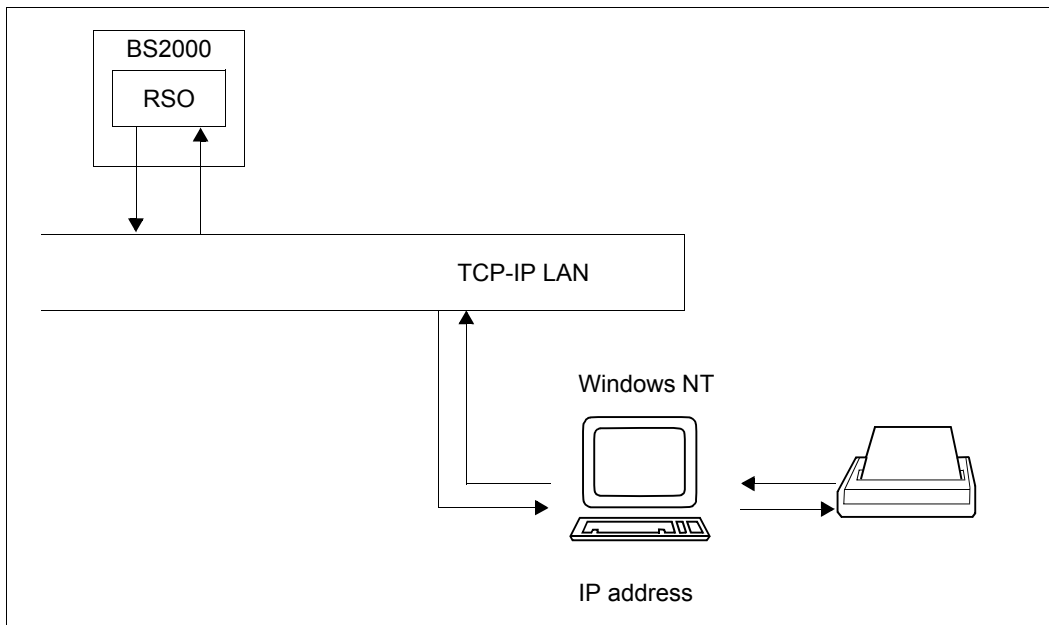


Figure 17: Dialog between RSO and printers connected to a Windows NT station

**Software configuration**

You must have the following minimum software configuration:

BS2000/OSD-BC V1
SPOOL V3.0B
RSO V3.0A
SPSERVE V2.0B
DCAM V11.0
Windows NT V4.0

**Definition of the environment**

1.  RSO definition

    The target printer must be defined in RSO with SPSERVE:

    ```
    //ADD-SPOOL-DEVICE DEVICE-NAME=logical-name
    //                 DEVICE-TYPE=printer-type,
    //                 DEVICE-ACCESS=*TCP-ACCESS(
    //                     INTERNET-ADDRESS=internet-address,
    //                     PORT-NAME=lpd-port-number,
    //                     ACCESS-TYPE=*LPD(
    //                         LPD-PRINTER-NAME=printer-name,
    //                         FROM-PORT-NUMBER=min. port-number,
    //                         TO-PORT-NUMBER=max. port-number)),
    //                         ...
    ```

    *logical-name*
    > The logical RSO name based on the NT target printer.

    *printer-type*
    > The RSO printer type of the target printer (e.g. 4822-PCL if the target printer is a 4822 Printer in PCL emulation mode).

    *internet-address*
    > The Internet address of the Windows NT workstation. The address is either the IP address in point-decimal notation or the socket host name of the workstation as generated via BCAM (in the BS2000 RDF file or the SOCKETHOST address table).

    *lpd-port-number*
    > The port number via which the Windows NT TCP/IP printer server is addressed (515).

    *printer-name*
    > The shared name of the NT printer

    *min. port-number*
    > The smallest permissible port number of the Windows NT TCP/IP printer server. The default is 721.

    *max. port-number*
    > The largest permissible port number of the Windows NT TCP/IP printer server. The default is 731.

As well as the printer definition, at least one form (e.g. STD) must be defined for the associated RSO printer type. If no form exists yet, one must be created with the SPSERVE statement ADD-SPOOL-FORM.

2.  BCAM definitions

    The address of the Windows NT workstation which manages the printer must be defined and activated via the RDF file or the SOCKETHOST address table.

3.  Windows NT definitions

    –   Activate TCP/IP printer server
        The NT administrator must start the TCP/IP printer server of the relevant Windows NT workstation with the help of the Windows NT Services interface on the control panel.

    –   Make NT printer "shared"
        To make the NT printer visible for external accesses, the NT administrator must specify a shared name for the NT printer under the printer characteristics (sharing table).

*Example*

From RSO a printer is to be accessed which is connected to an NT workstation with the IP address 191.85.32.209 and is addressed via the port number 515. The printer is to be given the logical RSO name NTPR2091, the printer type 4822-PCL and the shared name DOSP2091.

With the help of SPSERVE the printer is defined as follows:

```
/START-SPSERVE
//ADD-SPOOL-DEVICE DEVICE-NAME=NTPR2091
//                 DEVICE-TYPE=4822-PCL,
//                 DEVICE-ACCESS=*TCP-ACCESS(
//                     INTERNET-ADDRESS=191.85.32.209,
//                     PORT-NAME=515,
//                     ACCESS-TYPE=*LPD(
//                         LPD-PRINTER-NAME='DOSP2091',
```

The NT administrator starts the TCP/IP printer server via the Windows NT Services interface:



The NT administrator enters the shared name DOSP2091 for the NT printer in the printer characteristics (sharing table).



Now the BS2000 user can send print jobs to the 4822 Printer connected to Windows NT:

```
PRINT-DOCUMENT myfile,TO-PRINTER=NTPR2091
```

*Note*

> Please note that with printers which are connected to Windows NT, RSO only supports the creation of print jobs and not monitoring via a monitoring job variable. As soon as the print job has been successfully sent to the Windows NT workstation, RSO considers it successfully completed, even though nothing is printed via the workstation. In actual fact, the TCP/IP printer server does not begin to search its job queues (which contain the RSO print job) until the connection to RSO is closed.

## 5.1.13  Printing with RSO from a VM guest system on a C80-2

This section describes how you can print from any VM guest system on a C80-2 with RSO.

The definition involves three steps:

1.  SINIX/SYSADM-MASKE:

    The first step is C80-2-specific.

    Under Unix systems, SYSADM must be called (under root) and then the SYSADM mask SINIX-2000 V7.0A selected. The IP address for SINIX-2000, which is entered in this mask, must match the IP address (IPADR) used under /BCIN. The node name for SINIX-2000 must be used under /BCIN (see 2.) and in the printer definition as the processor name (see 3.).

    *Example*

    ```
    7                       LAN Host Connector:0 Unit:20
    Device                   LOCLAN
    Mnemonic:                Y0 Y1
    Devicenumber:            0A30            0A31
    Event-ID:                Y0              Y1
    Sense-ID:                FFB12000806D00
    ppa:                     0

                             BS2000              SINIX-2000
    MAC-Address:             08000609F290        080014101000
    IP-Address:              192.168.10.1        139.22.20.109
    Node-Name:               lbs20               lsin0

    Net-Name:                lnet0
    Readbuffer:              10

    active:                  YES
    ```

2.  BS2000 / BCAM / RDF:

    On the VM guest system a /BCIN is entered, which must be accompanied by the node name for SINIX-2000 from the SYSADM mask. IPADR must match the IP address for SINIX-2000 in the SYSADM mask. The LAN name of the guest system is used as the route.

    *Example*

    ```
    /BCIN LSIN0,GEN=N,ROUTE=D015B049,IPADR=(139,22,20,109), PROF=(TCP,IP)
    ```

    D015B049 is the LAN name of the guest system.

3.   BS2000 / RSO / SPSERVE:

On the VM guest system the SPSERVE statement ADD-SPOOL-DEVICE must be used to assign the node name for SINIX-2000 from the SYSADM mask to the RSO printer as the processor name (PROCESSOR-NAME is specified under *NEA-ACCESS(...) in the DEVICE-ACCESS operand).

*Example*

```
//ADD-SPOOL-DEVICE printer, DEVICE-TYPE=*ALL-REMOTE-PRINTERS,
DEVICE-ACCESS=*NEA-ACCESS(ACCESS-TYPE=*PC,PROCESSOR-NAME=LSIN0)
```

The output fields of the SPOOL command or the SPSERVE statement SHOW-SPOOL-DEVICES *printer* then look as follows for DEVICE-ACCESS:

```
--------------------- DEVICE-ACCESS -------------------------

ACCESS     PROC-NAME      STAT-NAME        INTERNET-ADDRESS
PC         LSIN0          E9014#03              *NONE

-------------------------------------------------------------
```

## 5.1.14   Printers connected to a Windows 2000 station

With the open standard LPD protocol RSO as of V3.0 offers users access to printers which are managed by Windows 2000.
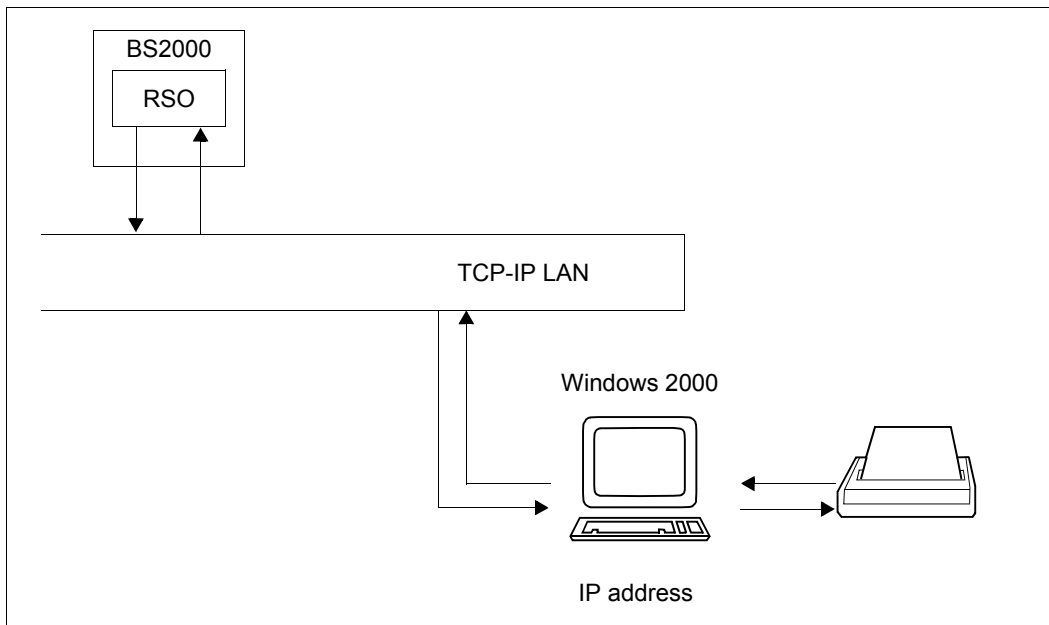


Figure 18: Accessing a printer from RSO via Windows 2000 TCP/IP Print Server

**Software Configuration**

You must have the following minimum software configuration:

BS2000/OSD-BC V1
SPOOL V3.0B
RSO V3.0A
SPSERVEV2.0B
DCAM V11.0
Windows 2000

**Definition of the environment**

*BS2000 definitions*

1.  RSO definition

    The target printer must be defined in RSO using the SPSERVE product:

    ```
    //ADD-SPOOL-DEVICE DEVICE-NAME=logical name,
    //DEVICE-TYPE=printer type,
    //DEVICE-ACCESS = TCP-ACCESS (
    //INTERNET-ADDRESS=internet address,
    //PORT-NAME=lpd port number,
    //ACCESS-TYPE=LPD (
    //LPD-PRINTER-NAME=printer name,
    //FROM-PORT-NUMBER=min. port number,
    //TO-PORT-NUMBER=max. port number)),
    //...
    ```

    Where

    *logical name*
    > The RSO logical name referring to the target Windows 2000 printer

    *printer type*
    > The RSO printer type of the target printer (e.g. 4822-PCL when the target printer is a 4822 printer in PCL emulation mode)

    *internet address*
    > The internet address of the Windows 2000 workstation. The address to be given is either the IP address (in dotted decimal notation) or the socket host name of the workstation as generated via BCAM (in BS2000 RDF file or SOCKETHOST address table)

    *lpd port number*
    > The port number via which the Windows 2000 TCP/IP Print Server is addressed (515 by default)

    *printer name*
    > The Windows 2000 printer name

    *min. port number*
    > The smallest permissible port number of the Windows 2000 TCP/IP Print Server (721 by default)

    *max. port number*
    > The largest permissible port number of the Windows 2000 TCP/IP Print Server (731 by default)

Beside the printer definition, at least one form (e.g. STD) must be defined for the corresponding RSO printer type (if not already existing) by using the ADD-SPOOL-FORM statement of the SPSERVE product.

2.  BCAM definition

The address of the Windows 2000 workstation managing the printer must be defined and activated (via RDF file or SOCKETHOST address table).

*Windows 2000 Definitions*

1.  TCP/IP Print Server Activation

Through the Windows 2000 Services interface, the Windows 2000 administrator must start the TCP/IP Print Server of the concerned Windows 2000 workstation.
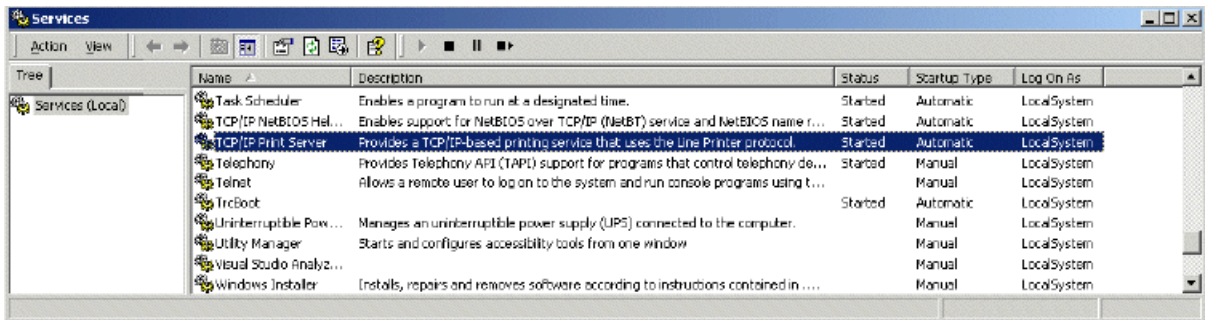


2.  Printer Definition

The Windows 2000 administrator must install the printer. Unlike the access to Windows NT printers via the shared name, the Windows 2000 printer is accessed via its local name.

*Example*

An IBM InfoPrint 20 printer is connected to a Windows 2000 workstation whose IP address is 191.85.32.209. The workstation print server is addressed via the port number 515. The printer is to be accessed from RSO. The logical RSO name INFOPCL is given to the printer with 9000-PCL as printer-type. With the help of SPSERVE the printer is defined as follows:

```
/START-SPSERVE
//ADD-SPOOL-DEVICEDEVICE-NAME=INFOPCL,
//DEVICE-TYPE=9000-PCL,
//DEVICE-ACCESS=TCP-ACCESS (
//INTERNET-ADDRESS=191.85.32.209,
//PORT-NAME=515,
//ACCESS-TYPE=LPD (
//LPD-PRINTER-NAME='IP20PCL')),
//...
```

The Windows 2000 administrator starts the TCP/IP Print Server via the Windows 2000 Services interface and defines the printer.
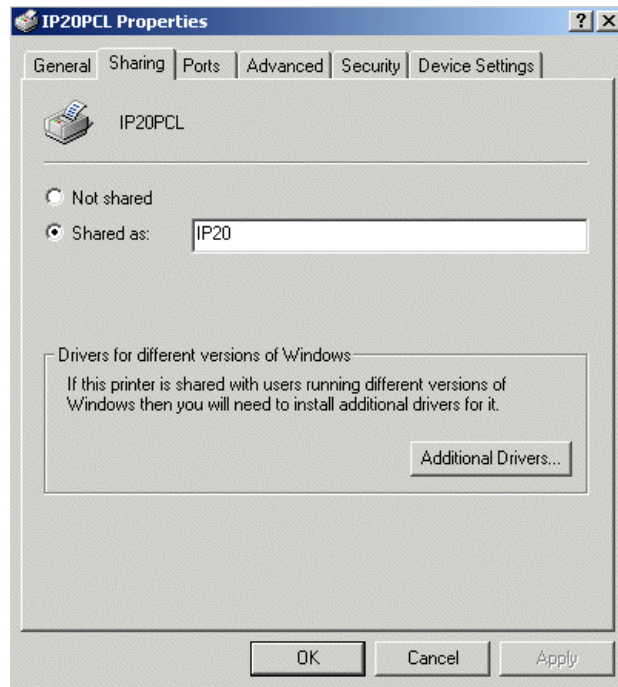
Now the BS2000 user can send print jobs to the IBM InfoPrint 20 printer connected to the Windows 2000:

`/PRINT-DOCUMENT` *myfile*`,TO-PRINTER=INFOPCL`

*Note*

Please note that this support by RSO only deals with print job submission. No job monitoring is possible. As soon as the print job (formatted data ...) has been success-fully sent to the Windows 2000 workstation, RSO considers this print job as being successfully completed, even though nothing has actually been printed out via the workstation. Indeed, the TCP/IP Print Server only starts scanning its queues (which contain the RSO print job) for printing when the connection to RSO is closed.

## 5.1.15   Connecting printers via the IPP protocol

The Internet Printing Protocol (IPP) is an application level protocol that can be used for distributed printing using the Internet tools and technologies. This protocol defines interac-tions between a client and a server. The protocol allows a client to:
–   inquire about capabilities of a printer
–   submit print jobs
–   inquire about the status of print jobs and printers
–   manage printers (pause, resume, purge jobs from printer) and print jobs (cancel, hold, release, restart).

The server for these requests is the printer; the printer is an abstraction of a generic document output device and/or a print service provider. Thus, the printer could be a real printing device, such as a computer printer or fax output device, or it could be a service that interfaces with output devices.

The Internet provides a channel between the client and the server/printer. Use of this channel requires flattening and sequencing the hierarchical model data. Therefore, the IPP also defines an encoding of the data in the model for transfer between the client and the server. This transfer of data may be either a request or the response to a request. Finally, the IPP defines a protocol for transferring the encoded request and response data between the client and the server/printer. The chosen mechanism for transmitting the encoded Model data is HTTP 1.1 Post (and associated response). More information about the IPP protocol can be found in RFC 2567/2568/2569/2910/2911/3196.

The IPP protocol is directly supported by a constantly increasing number of printers and by network printer's cards. Printing on such devices requires the ability to issue IPP requests.

RSO can access IPP printers (either printer or server), provided DCAM V11 or higher is installed. Access to an IPP printer can be seen as a new RSO access type, offering functionality similar to the BSD-LPD support: the one shot printing.

**Supported printer types**

The IPP connection type is supported for all RSO printer types that support the TACLAN access type:
2030-PCL, 4011, 4812, 4813, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000, 9000-EPFX, 9000-EPLQ, 9000-EPSQ, 9000-PCL, 9000-PRO, 9000-PS, 9001, 9001-31, 9011, 9012, 9013, 9014, 9015, 9021, 9022, 9022-200, 9025, 9026-PCL, 9026-RENO, 9045-ANSI, 9046 and 9097.

### 5.1.15.1 Usage model: Print through the Web for OLTP Applications

The IPP protocol allows printing through the Web, the Internet and the Intranet. As of RSO V3.0, UTM has access to all printers that are supported by RSO, including modern printer types connected via LAN or PC.

Thanks to the IPP support in RSO, an end-user connected to an OLTP application can access an IPP printer located anywhere on the network. The provided functionality is similar to the BSD-LPD protocol support in RSO: 'the one shot printing'.
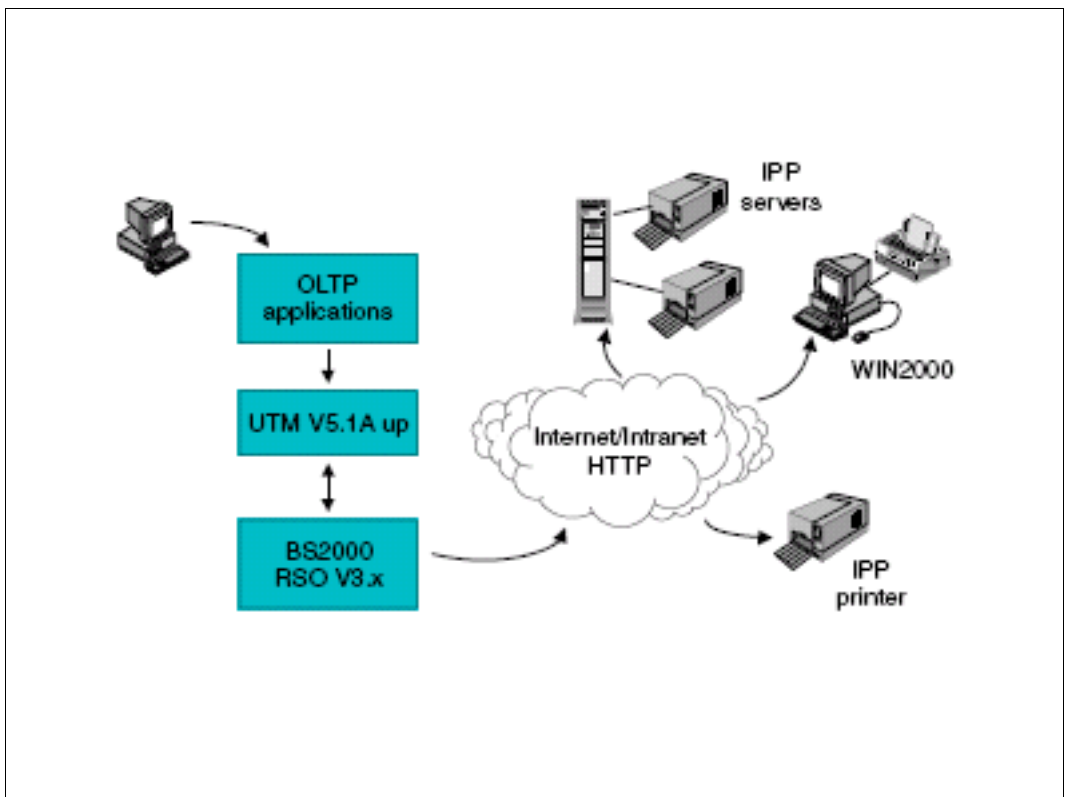


Figure 19: Print through the Web for OLTP applications

#### 5.1.15.2   Connecting a printer to IPP

The IPP Printer must be defined with the SPSERVE statement ADD-SPOOL-DEVICE or
MODIFY-SPOOL-DEVICE. To do this, the following operands are used. These operands
are described in the "SPSERVE (BS2000/OSD)" manual.

```
//ADD-SPOOL-DEVICE ...,
//    DEVICE-ACCESS=*TCP-ACCESS(
//        ACCESS-TYPE=*IPP
//        INTERNET-ADDRESS=*STD/<alphanum-name 1..32>/<composed-name 7..32>
//        PORT-NAME=*STD/<alphanum-name 1..8>
//        ),
// ...
//    PROCESSING-CONTROL=*PARAMETERS(...
//        PRINTER-PARAM-FILE=*STD/*SYSTEM/<composed-name 1..16>)
// ...
```

The value *IPP should be specified if the printer is accessed across the Internet via the IPP
protocol.
The operand INTERNET-ADDRESS defines the host running the printer. It is either a host
name or a host address. The use of IP addresses in URLs should be avoided whenever
possible.
The operand PORT-NAME is the network port number for the server. If PORT-NAME is
omitted, the default port number 631 is assumed.

All printer and job objects are identified by a Uniform Resource Identifier (URI) so that they
can be referenced persistently and unambiguously. The IPP URI of the printer must be
defined in the printer parameters file associated to the device. Please consult the documen-
tation that came with your printer or print server for the supported URI formats.


**Interdependencies with other operands**

The operand SYNCHRONIZATION=*PRINTER is not rejected but ignored. RSO automat-
ically assumes the setting SYNCHRONIZATION=*NETWORK. RSO does not receive any
information directly from the printer. The dialog takes place exclusively between RSO and
the IPP Printer, i.e. no synchronisation is possible between the sending of two messages
(within the same print job).

Similarly, POLLING=*YES is not rejected but ignored. RSO automatically assumes
POLLING=*NO, as printers administered by an IPP printer cannot return information to
RSO.

DISCONNECTION=*YES or DISCONNECTION=*NO is likewise not rejected but ignored.
RSO automatically assumes DISCONNECTION=*FORCE, in order to request the closing
of the connection at the end of each print job.

### 5.1.15.3  Completeness of printouts, restarting printouts

Only the transfer of print jobs to the IPP printers is supported. This is because RSO cannot monitor the processing of the print jobs.

After receiving a print request that is to be forwarded to an IPP printer, the first thing RSO does is to create a temporary file containing all the data to be printed (header page, user data, Trailer page...). This file is used to determine the size of the print job. After the temporary file has been created RSO checks whether there is a IPP printer ready for a print job. If so, RSO reads the print data from the temporary file and sends it to the IPP printer together with certain HTTP/IPP protocol commands.

If a DMS error occurs while creating the temporary file, the print request is returned to the KEEP queue. If the print request is rejected by the IPP printer/server, RSO resumes processing of the print request from the beginning.

If the print job is processed without errors, RSO clears the connection to the IPP printer and considers the print job to have been successfully completed. Nevertheless, it does not mean that the print job has been successfully printed out by the IPP printer. RSO has no possibility to monitor the printing of the data once it has been passed to the IPP printer.

> ⚠ **CAUTION!**
>
> When printing to IPP printers it is not possible to guarantee either a correct restart of the print operation or a complete printout of the data. This is because RSO has no possibility to communicate with the printer. As a result, it may happen that RSO regards a print job as successfully processed even though not a single page has actually been printed.

### 5.1.15.4  Restart rules

The printer error code "IppJobAborted" has been introduced in order to draw attention to problems such as "request rejected", "timeout detected" etc. in dialog with an IPP printer. If this error code is displayed, the print job is entered in the KEEP queue. In addition, the message SRO0994 is issued if the printer status is queried with the commands SHOW-SYSTEM-STATUS INF=*REMOTE (...) or SHOW-ACTIVE-SPOOL-DEVICE.

As the management of the IPP printer is done outside of RSO, the standard restart action belonging to the error code "IppJobAborted" is to stop after detection of the error. Systems support can change this behaviour by specifying a new restart rule. The general action codes available for this are STOP, SUSPEND and RESTART.

*Example*

```
/SHOW-PRINT-JOB-STATUS INFORMATION=*DESTINATION
TSN  SERVER  M STA R DEVICE   DESTIN   ERCOD   ERMSG   DEVICE TYPE
5953 *HOME    R KP  * IPP9000  IPP9000  FD010507 SRO0994  9000-PRO

/SHOW-SYSTEM-STATUS INF=*REMOTE(...).
%DEVICE   A STA/PORT PROC/INT-ADD    USERID    TSN M ERCOD    ERMSG    E
%IPP9000  S 631      10.29.167.19              5953 R FD010507 SRO0994 Y

/SHOW-ACTIVE-SPOOL-DEVICE IPP9000
DEV-NAME: IPP9000   DEV-TYP:9000-PRO  REV:   1 SCHED:NEXT-JOB
C-USERID:         PRIORITY:  30/ 255 USE: OUT  C-TSN:
CLASSES (A):

FORM(PE):  STD    STDF5

PNAME(A):

USER (A):

ACC  (A):

DESTS:


CURRENT-FORM:  STD    TRACE: YES   EXIT: YES    SAMPLE: NO
PRINTER-STATE:S      ERROR-MESSAGE:  SRO0994
ACCESSES : RSO  UTM
MONJV :
```

## 5.1.15.5 EBCDIC-ASCII character conversion

The IPP protocol expects data in ASCII code, but BS2000 files contain data in EBCDIC code. RSO has direct access to the IPP printer and therefore carries out this EBCDIC-ASCII conversion itself. It should be kept in mind that this conversion takes place character by character, i.e. each character is converted independently of the others. A conversion table can be found in section "EBCDIC-ASCII conversion table" on page 675.

### 5.1.15.6   Printing via SEH Print Server

SEH IC105 Fastpocket supports the IPP protocol and can be considered as an IPP server.

**Minimum software configuration**

The minimum software configuration required for performing this usage model is:

| | |
|---|---|
| BS2000/OSD-BC | V4.0 |
| SPOOL | V4.3A |
| RSO | V3.3A |
| SPSERVE | V2.6A |
| DCAM | V11.0 |
| SEH IC105 Fastpocket: | Software version 9.3.2, Hardware version 1.0 |

**Defining the operating environment**

1.  RSO definition

    The target printer must be defined in RSO by using the SPSERVE product:

    ```
    //ADD-SPOOL-DEVICEDEVICE-NAME=logical name,
    //                DEVICE-TYPE=printer type,
    //                DEVICE-ACCESS=TCP-ACCESS (
    //                     INTERNET-ADDRESS=internet address,
    //                     PORT-NAME=ipp port number,
    //                     ACCESS-TYPE = *IPP),
    //...
    //                PROCESSING-CONTROL=*PARAMETERS (...
    //                     PRINTER-PARAM-FILE=printer parameter file suffix),
    // ...
    ```

    Where

    *logical name*

    >   The RSO logical name referring to the target IPP printer

    *printer type*

    >   The RSO printer type of the target printer (e.g. 4822-PCL when the target printer is a 4822 printer in PCL emulation mode). It must correspond to the real device type as defined in Cups

---

*internet address*

> The internet address of the SEH print server. The address to be given is either the IP address (in dotted decimal notation) or the socket host name of the workstation as generated via BCAM (in BS2000 RDF file or SOCKETHOST address table)

*ipp port number*

> The port number via which the SEH Print Server is addressed (631 by default)

*printer parameter file suffix*

> The suffix of the associated printer parameter file where the IPP URI is defined

Beside the printer definition, at least one form (e.g. STD) must be defined for the corresponding RSO printer type (if not already existing) by using the ADD-SPOOL-FORM statement of the SPSERVE product.

The IPP URI of the printer must be defined in the printer parameters file associated to the device.

2. BCAM definition

The address of the SEH Print Server managing the printer must be defined and activated (via RDF file or SOCKETHOST address table).

**Execution example**

The following example summarises the definitions of the operating environment required to give RSO access to a 9017 printer connected to the LAN with a SEH IC105 Fastpocket. RSO accesses the printer via the IPP protocol.

*Definition of the printer*

1. Use SPSERVE to define the printer

```
//A-S-D DEV-NAME=IPP9000,
        DEV-TYPE=*9000-PRO,
        DEV-ACC=*TCP(
                INT-ADD=10.29.167.19,
                PORT-NAME=631),
       ACC-TYPE=*IPP,
       PROCESSING-CONTROL=*PARAMETERS(
                           PRINTER-PARAMETER-FILE = IPPURI)
//A-S-F STD,*9000-PRO, ...
```

2. Create the printer parameter file associated to the printer
   For example, $SYSSPOOL.SYSPAR.PRINTER-PARAM.IPPURI containing

   ```
   #
   # Give the printer uri for IPP printers.
   #
   ippuri=10.29.167.19:631/ipp,
   ```

3. Define the IPP printer in BCAM for example by defining an entry in the
   SYSDAT.BCAM.ETC.HOSTS and SYSDAT.BCAM.PROCESSORS.

*Using the printer*

4. Once these definitions have been made, it is possible for the BS2000 processor to
   initiate print jobs sent to the printer IPP9000.

   ```
   /PRINT-DOCUMENT myfile,PRINTER-NAME=IPP9000, ...
   ```

   However, it should be kept in mind that support of IPP printers by RSO covers only the
   allocation of print jobs. The execution of the jobs cannot be monitored. This means:
   once RSO has successfully passed a complete print job to the IPP printer, it closes the
   connection and considers the job as having been processed, even though nothing has
   actually been printed yet.

### 5.1.15.7  Printing via CUPS

CUPS (Common UNIX® Printing System) is a printing system for Unix based operating systems, developed by Easy Software Products. CUPS is based on the Internet Printing Protocol (IPP).

CUPS provides a complete IPP/1.1-based printing system that includes Basic, Digest and local certificate authentication: user, domain or IP-based access control and 128-bit encryption.

The CUPS software and documentation is available on the World Wide Web at "http://www.cups.org".

**Minimum software configuration**

The minimum software configuration required for performing this usage model is:

| | |
|---|---|
| BS2000/OSD-BC | V4.0 |
| SPOOL | V4.3A |
| RSO | V3.3A |
| SPSERVE | V2.6A |
| DCAM | V11.0 |
| CUPS | V1.1 |

**Definition of the operating environment**

1. RSO definition

   The target printer must be defined in RSO by using the SPSERVE product:

```
//ADD-SPOOL-DEVICE DEVICE-NAME=logical name,
//                 DEVICE-TYPE=printer type,
//                 DEVICE-ACCESS=TCP-ACCESS (
//                     INTERNET-ADDRESS=internet address,
//                     PORT-NAME=ipp port number,
//                     ACCESS-TYPE=*IPP),
//                 ...
//                 PROCESSING-CONTROL=*PARAMETERS (...
//                     PRINTER-PARAM-FILE=printer parameter file suffix),
//...
```

Where

*logical name*
> The RSO logical name referring to the target IPP printer.

*printer type*
> The RSO printer type of the target printer (e.g. 4822-PCL when the target printer is a 4822 printer in PCL emulation mode).

*internet address*
> The internet address of the CUPS Server. The address to be given is either the IP address (in dotted decimal notation) or the socket host name of the workstation as generated via BCAM (in BS2000 RDF file or SOCKETHOST address table).

*ipp port number*
> The port number via which the CUPS Server is addressed (631 by default).

*printer parameter file suffix*
> The suffix of the associated printer parameter file where the IPP URI is defined.

Beside the printer definition, at least one form (e.g. STD) must be defined for the corresponding RSO printer type (if not already existing) by using the ADD-SPOOL-FORM statement of the SPSERVE product.

The IPP URI of the printer must be defined in the printer parameters file associated to the device. Putting a complete URI is not supported by CUPS 1.1 as this is currently only used by proxy servers. CUPS 1.2 will probably correct this. However, for maximum compatibility with all IPP implementations (many of which are still incorrectly based on HTTP/1.0 servers), you should always use the path/resource rather than the complete URI.

2. BCAM definition

The address of the CUPS Server managing the printer must be defined and activated (via RDF file or SOCKETHOST address table).

3. CUPS definitions

– Install CUPS on the server platform according to the distribution mode.
– Configure the CUPS server and start it.
– Configure the printer in CUPS either with the command line interface or the Web interface.

### Execution example

The following example summarises the definitions of the operating environment required to give RSO access to a 4821 printer managed by a CUPS server. The printer has been configured in CUPS either with the command line interface or the Web interface and is named hp8000. RSO accesses the printer via the IPP protocol.

*Definition of the printer*

1. Use SPSERVE to define the printer:

```
//A-S-D DEV-NAME=IPP9001,
        DEV-TYPE=*4821-PCL,
        DEV-ACC=*TCP(
                INT-ADD=10.29.167.31,
                PORT-NAME=631),
        ACC-TYPE=*IPP,
        PROCESSING-CONTROL=*PARAMETERS(
                PRINTER-PARAMETER-FILE = IPPURI1)
//A-S-F STD, ...
```

2. Create the printer parameter file associated to the printer

   For example, $SYSSPOOL.SYSPAR.PRINTER-PARAM.IPPURI1 containing

```
#
# Give the printer uri for IPP printers.
#
ippuri=/printers/hp8000,
```

3. Define the IPP printer in BCAM by defining an entry in the SYSDAT.BCAM.ETC.HOSTS and SYSDAT.BCAM.PROCESSORS for example.

4. printer configuration in CUPS:
   The administrator adds a printer by following the printer wizard, filling in some information, selecting other information. Then he configures the default options for the printer. The following screenshots show some pages of the printer addition.
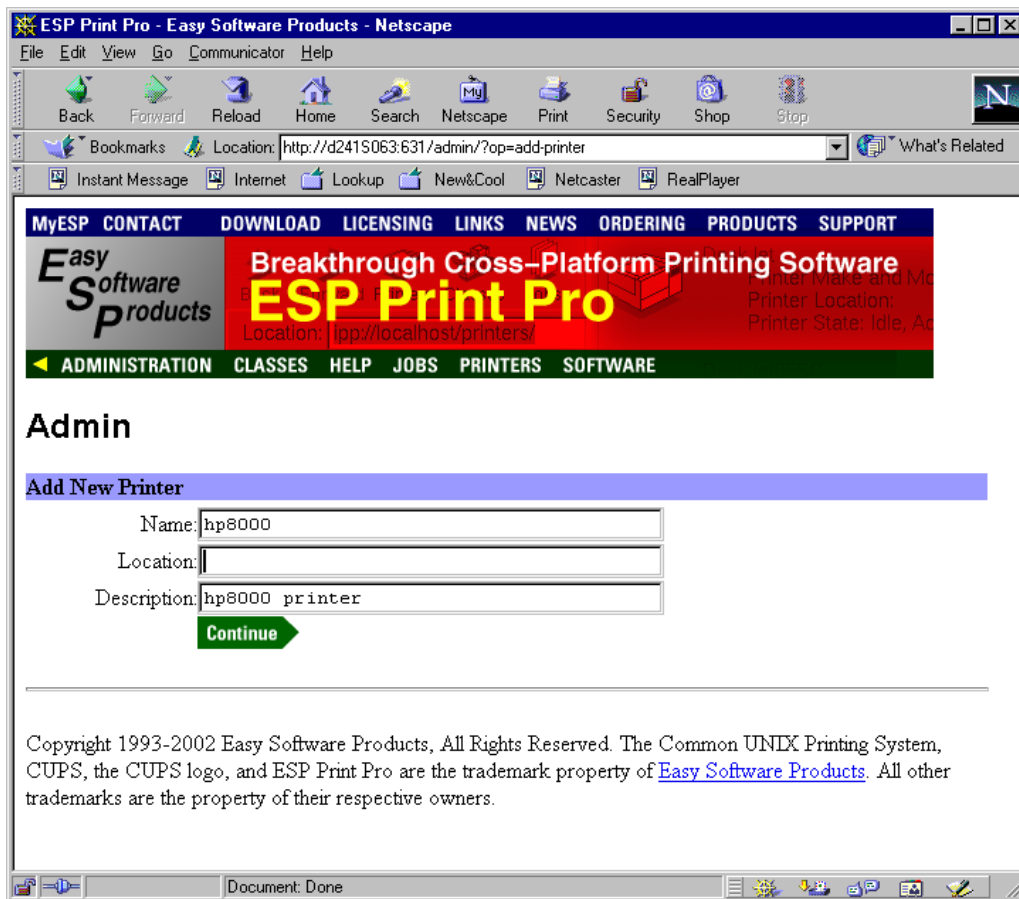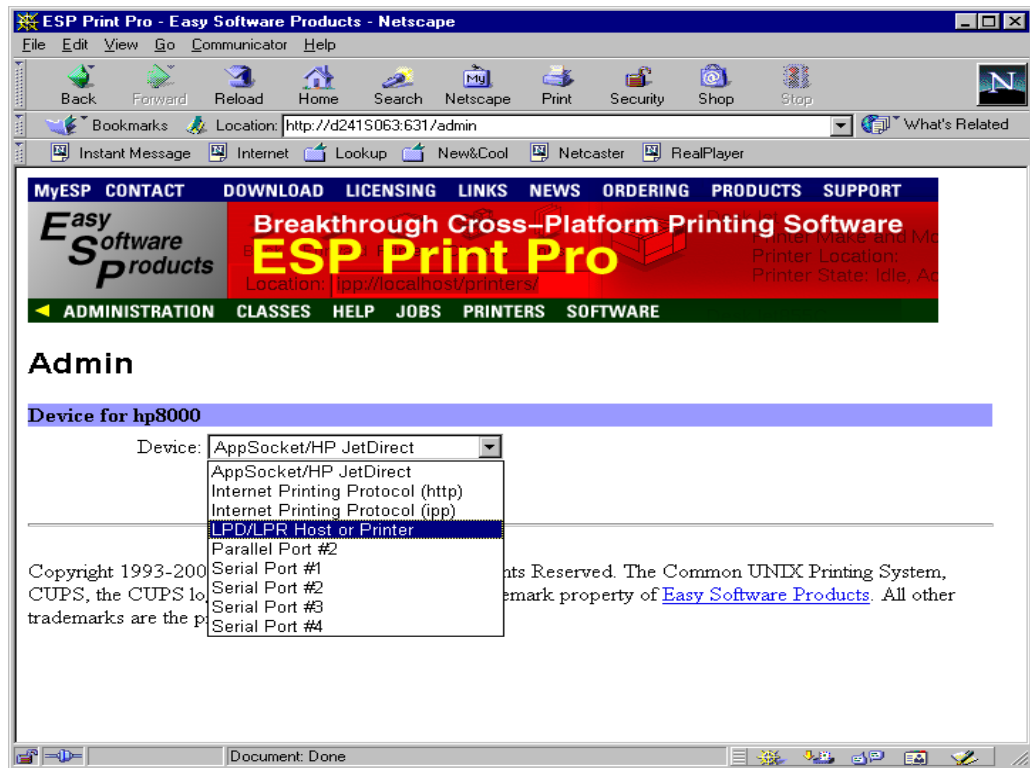
From the printer management page shown below you can perform all printer management tasks.
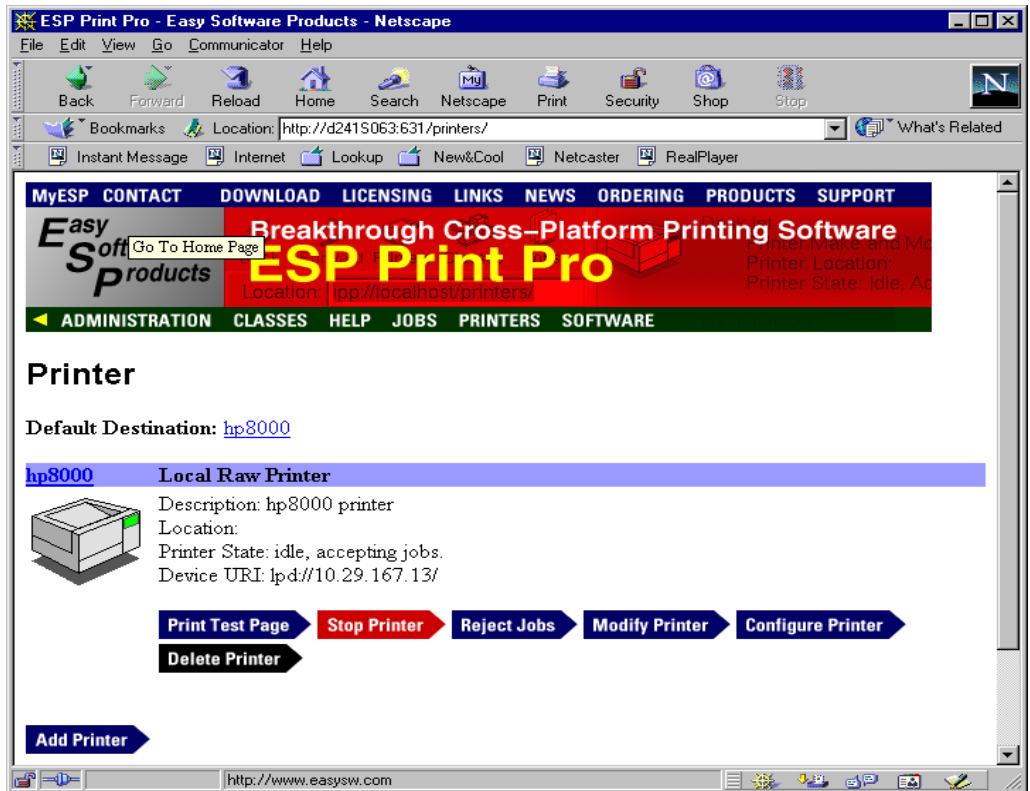
*Using the printer*

5.  Once the printer definitions have been made, it is possible for the BS2000 processor to initiate print jobs sent to the printer IPP9001.

```
/PRINT-DOCUMENT myfile,PRINTER-NAME=IPP9001, ...
```

However, it should be kept in mind that support of IPP printers by RSO covers only the allocation of print jobs. The execution of the jobs cannot be monitored. This means: once RSO has successfully passed a complete print job to the IPP printer, it closes the connection and considers the job as having been processed, even though nothing has actually been printed yet.

### Secure printing

For secure printing, the processing is the same, except that

– ENCRYPT=YES must be specified in the device entry in the Spool parameters

– and an FQDN must be specified in the printer parameter file (see section "Printer parameter files" on page 289).

#### 5.1.15.8  Printing via Windows 2000 Server

Windows 2000 supports Internet printing. This makes it possible to use printers located anywhere in the world by sending print jobs with the Hypertext Transfer Protocol (HTTP). Using Microsoft® Internet Information Services or a Web Peer Server, Windows 2000 creates a Web page that provides information about printers and provides the transport for printing over the Internet.By using the Internet, printers can be used to replace fax machines or postal mail.

Printers hosted by Windows 2000 servers with IIS or a Peer Web Server (Windows 2000 Professional running PWS) can receive jobs sent to them over the Internet Printing Protocol. Windows 2000 Internet print servers provide information to clients about the status of print jobs they have received, as well as about available printers.

Jobs on a server can be viewed and managed using the Internet print server's Web pages. These pages provide information about jobs that are waiting in the queue, including the job's name, status, owner, number of pages, size, and when it was submitted.

#### Minimum software configuration

The minimum software configuration required performing such a usage model is:

| | |
|---|---|
| BS2000/OSD-BC | V4.0 |
| SPOOL | V4.3A |
| RSO | V3.3A |
| SPSERVE | V2.6A |
| DCAM | V11.0 |

All printers that are shared on a Windows 2000-based server are automatically made accessible by using the Internet Printer Protocol (IPP) for printing. Clients that are running Microsoft Internet Explorer 4.01 and later with IPP printing support can print to the Internet printers. All versions of Windows 2000 have IPP printing support, and IPP printing is available as an add-on for Microsoft Windows 95 and Microsoft Windows 98 clients. Windows 98/95-based clients can install the Internet printing client from the Windows 2000 Server CD-ROM.

A Windows 2000 Server that is to process print jobs that contain URLs, must be running Microsoft Internet Information Services (IIS). For print servers implemented on Windows 2000 Professional, Microsoft Peer Web Services (PWS) must be running.

Print server security is provided by IIS or PSW, depending on whether you are running Windows 2000 Server or Windows 2000 Professional. The administrator must allow anonymous access. This is later used by RSO. You can also control access to Internet printers on basis of the requesting host rather than on basis of user credentials.

**Defining the operating environment**

1.  RSO definition

    The target printer must be defined in RSO by using the SPSERVE product:

```
//ADD-SPOOL-DEVICE DEVICE-NAME=logical name,
//          DEVICE-TYPE=printer type,
//          DEVICE-ACCESS=TCP-ACCESS (
//                 INTERNET-ADDRESS=internet address,
//                 PORT-NAME=ipp port number,
//                 ACCESS-TYPE=*IPP),
//          …
//          PROCESSING-CONTROL=*PARAMETERS (...
//                 PRINTER-PARAM-FILE=printer parameter file suffix),
// ...
```

    Where

    *logical name*

    > The RSO logical name referring to the target IPP printer

    *printer type*

    > The RSO printer type of the target printer (e.g. 4822-PCL when the target printer is a 4822 printer in PCL emulation mode). It must correspond to the real device type as defined in Windows 2000 Server

    *internet address*

    > The internet address of the Windows 2000 Server. The address to be given is either the IP address (in dotted decimal notation) or the socket host name of the workstation as generated via BCAM (in BS2000 RDF file or SOCKETHOST address table)

    *ipp port number*

    > The port number via which the Windows 2000 Server is addressed (631 by default)

    *printer parameter file suffix*

    > The suffix of the associated printer parameter file where the IPP URI is defined

Beside the printer definition, at least one form (e.g. STD) must be defined for the corresponding RSO printer type (if not already existing) by using the ADD-SPOOL-FORM statement of the SPSERVE product.

The IPP URI of the printer must be defined in the printer parameters file associated to the device. For Windows 2000, the printer name is the share name of the printer.

2. BCAM definition

The address of the Windows 2000 Server managing the printer must be defined and activated (via RDF file or SOCKETHOST address table).

3. Windows 2000 definitions

Explanations are given for IIS. Please refer to the documentation you received for PWS.

● Install IIS or PWS service according to the platform and start the service.

IIS is installed by default when you install Windows 2000 Server. However, if you chose not to install IIS during Windows Setup, follow these steps to install IIS:

1. Click "Start", point to "Settings", and then click "Control Panel".

2. In "Control Panel", double-click "Add/Remove Programs".

3. Click "Add/Remove Windows Components".

4. In the Windows Components Wizard, click to select the "Internet Information Services (IIS)" check box, and then click "OK".

5. Click "Next", and then click "Finish".

6. In the "Add/Remove Programs" dialog box, click "Close"

● Configure the port 631 for Internet printing

To configure the IPP port, use either Internet Services Manager or the IIS snap-in, and follow these steps:

1. Start "Internet Services Manager" or start the IIS snap-in.

2. Click to expand $*\,server\_name$, where $server\_name$ is the name of the server.

3. Right-click to expand "Default Web Site", and then click "Properties".

4. Click the "Web Site" tab, and then click "Advanced" under "Web Site Identification"

5. Click "Add" under "Multiple identities for this Web Site"

6. In the "Advanced Web Site Identification" dialog box that is displayed, specify the TCP port 631, and then click "OK".

7. Click "OK", and then quit Internet Services Manager or quit the IIS snap-in.

- Configure security for Internet printing

  To configure print server security, use either Internet Services Manager or the IIS snap-in. To configure the authentication method for Internet printing, follow these steps:

  1. Start "Internet Services Manager" or start the IIS snap-in.

  2. Click to expand * *server_name*, where *server_name* is the name of the server.

  3. Click to expand "Default Web Site", right-click "Printers", and then click "Properties".

  4. Click the "Directory Security" tab, and then click "Edit" under "Anonymous access and authentication".

  5. Click "Anonymous access" and deselect the other authentication methods, and then click "OK":
     When you use anonymous access, IIS automatically logs you on by using the anonymous user account (this account is IUSR_*computer_name*, by default). You do not require a user name and password. To change the user account that is used for anonymous access, click "Edit" under "Anonymous access".

  6. You can also control access to Internet printers on basis of the requesting host rather than on user credentials. To grant or deny access to specific computers, groups of computers, or domains, click "Edit" under "IP Address and Domain Name Restrictions".

  7. In the "IP Address and Domain Name Restrictions" dialog box that is displayed, complete one of the following procedures:

     – To grant access, click "Denied Access", and then click "Add".
       In the "Grant Access On" dialog box that is displayed, select the option that you want, and then click "OK" twice. The computer, group of computers, or domain that you selected is added to the "Granted" list.

     – To deny access, click "Granted Access", and then click "Add".
       In the "Deny Access On" dialog box that is displayed, specify the option that you want, and then click "OK" twice. The computer, group of computers, or domain that you specified is added to the "Denied" list.

  8. Click "OK", and then quit Internet Services Manager or quit the IIS snap-in.

- Configure the printer and share it.

  1. From the "Start" menu, point to "Settings", and the click "Printers".

  2. Double-click "Add Printer", and then follow the instructions.

**Execution example**

The following example summarises the definitions of the operating environment required to give RSO access to a 4821 printer managed by a Windows 2000 server. The printer has been configured in Windows and is named HP8000. RSO accesses the printer via the IPP protocol.

*Definition of the printer*

1.  Use SPSERVE to define the printer

```
//A-S-D DEV-NAME=IPP2000,
       DEV-TYPE=*4821-PCL,
       DEV-ACC=*TCP(
               INT-ADD=10.29.167.54,
               PORT-NAME=631),
       ACC-TYPE=*IPP,
       PROCESSING-CONTROL=*PARAMETERS(
                           PRINTER-PARAMETER-FILE = IPPURI2)
//A-S-F STD, ...
```

2.  Create the printer parameter file associated to the printer
    For example, $SYSSPOOL.SYSPAR.PRINTER-PARAM.IPPURI2 containing

```
#
# Give the printer uri for IPP printers.
#
ippuri=http://d241dom4:631/printers/HP8000sh/.printer,
```

3.  Define the IPP printer in BCAM by defining an entry in the SYSDAT.BCAM.ETC.HOSTS and SYSDAT.BCAM.PROCESSORS for example.

4.  Configure the Web server in Windows 2000:

    Allow the IPP port number (631)

| Advanced Multiple Web Site Configuration | | | ☒ |
|---|---|---|---|

**Multiple identities for this Web Site**

| IP Address | TCP Port | Host Header Name |
|---|---|---|
| (All Unassigned) | 80 | |
| (All Unassigned) | 631 | |

Add...    Remove    Edit...

**Multiple SSL identities for this Web Site**

| IP Address | SSL Port |
|---|---|
| (All Unassigned) | 443 |

Add...    Remove    Edit...

OK    Cancel    Help
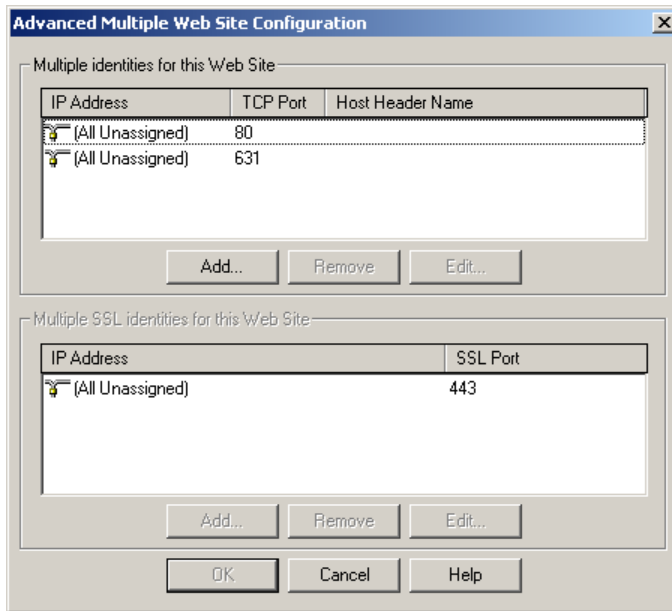
Configure security for Internet Printing
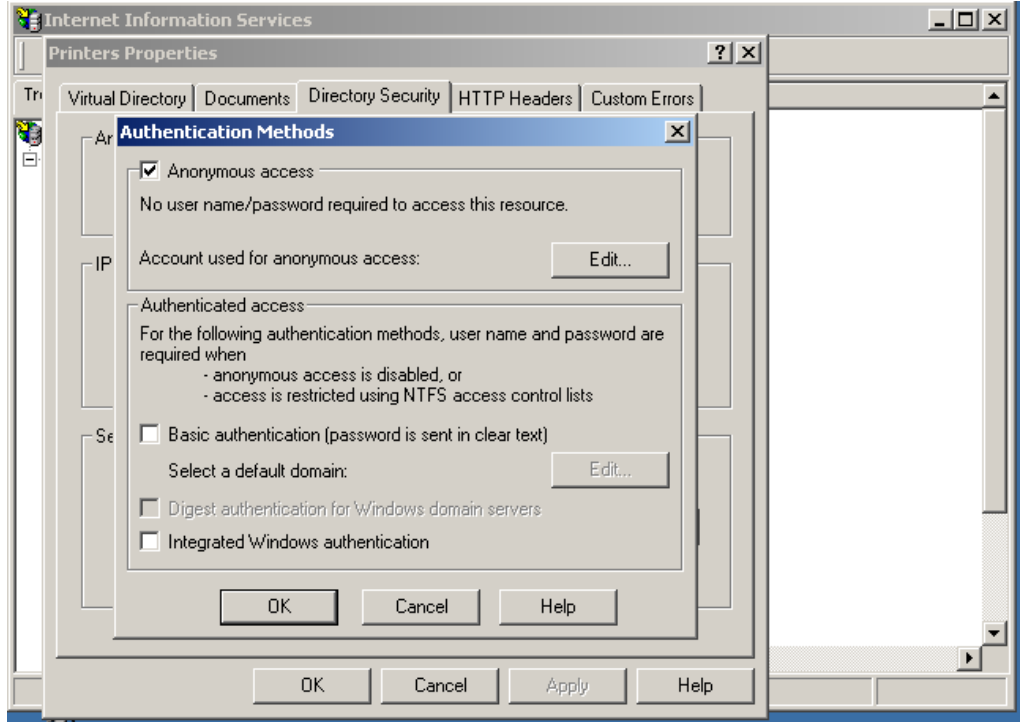
5. Configure the printer in Windows 2000:

   The printer is shown in the management page with its local printer name (e.g. HP8000) but its URI is based on the shared name (e.g. HP8000sh).
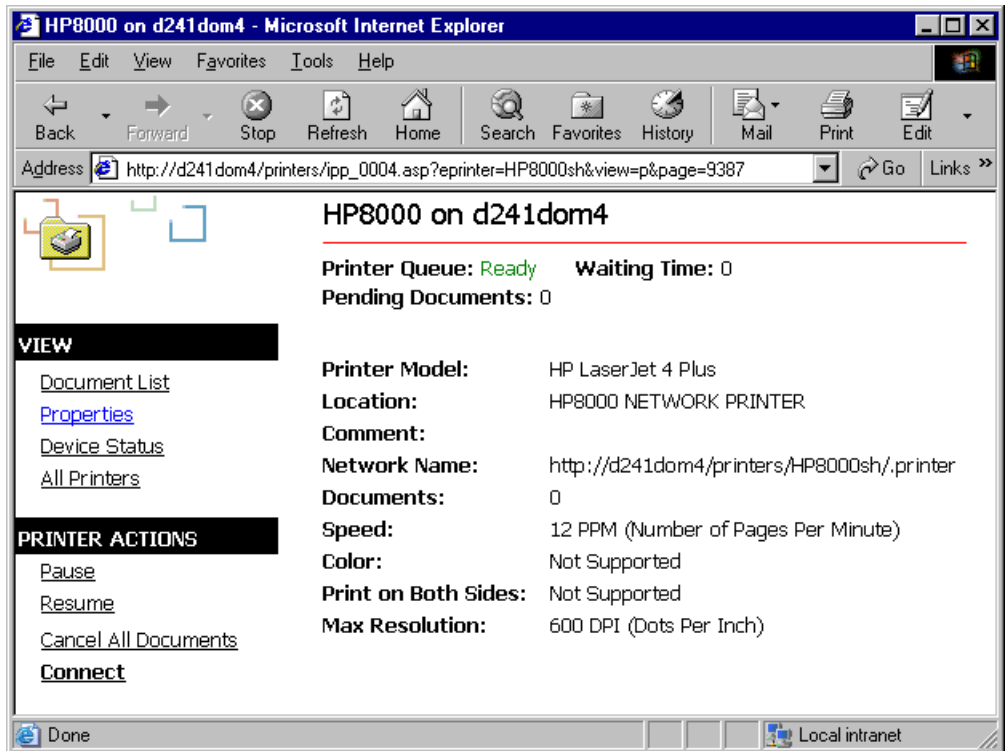


*Using the printer*

6. Once these definitions have been made, it is possible for the BS2000 processor to initiate print jobs sent to the printer IPP2000.

   ```
   /PRINT-DOCUMENT myfile,PRINTER-NAME=IPP2000, ...
   ```

   However, it should be kept in mind that support of IPP printers by RSO covers only the allocation of print jobs. The execution of the jobs cannot be monitored. This means: once RSO has successfully passed a complete print job to the IPP printer, it closes the connection and considers the job as having been processed, even though nothing has actually been printed yet.

## 5.2  Loading and unloading RSO

The software product RSO is a subsystem in BS2000. The dynamic management of subsystems (Dynamic Subsystem Management, DSSM) controls the loading, initialization, suspension, continuation and termination of subsystems in the session with the aid of the subsystem commands (see the "DSSM/SSCM" manual).

As is the case with all subsystems, RSO must be defined in the DSSM catalog before startup of the system session. DSSM makes it possible to unload RSO during a session and to reload the same or a different compatible version (using STOP-SUBSYSTEM and then START-SUBSYSTEM).

RSO is always dependent on SPOOL, i.e. it cannot execute alone. Unloading of the SPOOL subsystem automatically results in unloading of the RSO subsystem.
RSO can be loaded in two different ways:

*Together with the SPOOL subsystem*

When the SPOOL subsystem is loaded and started, the RSO subsystem can be automatically loaded and started at the same time if the following command is issued:

```
START-SUBSYSTEM SUBSYSTEM-NAME=SPOOL,STRING='RSO=*STD'
```

*SPOOL has already been started*

If SPOOL has already been started, the RSO subsystem can be started as follows:

– under BS2000/OSD-BC V1.0:

```
CREATE-SUBSYSTEM SUBSYSTEM-NAME=RSO,VERSION='03.4'
```

– as of BS2000/OSD-BC V2.0:

```
START-SUBSYSTEM SUBSYSTEM-NAME=RSO,VERSION='03.4'
```

A detailed description of DSSM may be found in the "DSSM/SSCM" manual.

Systems support and the operator control the availability of RSO by means of the following DSSM commands:

```
–   CREATE-SUBSYSTEM    (create subsystem)
–   START-SUBSYSTEM     (start and load subsystem)
–   HOLD-SUBSYSTEM      (suspend subsystem)
–   RESUME-SUBSYSTEM    (restart subsystem)
–   STOP-SUBSYSTEM       (stop and unload subsystem)
```

*Notes*

–   If an RSO subsystem is to be loaded and another RSO version is already loaded, the latter must first be unloaded by means of the STOP-SUBSYSTEM command. Only then can the files SYSPRG.RSO.035.SRAM and SYSENT.RSO.035, which are protected by ACCESS=*READ, be incorporated.

–   The files SYSLNK.RSO.035, SYSREP.RSO.035 and SYSENT.RSO.035 must not be present under the TSOS user ID. If they are present under a different user ID, they will however also be started under TSOS in order that they may have the necessary privileges. It should be noted that the files SYSENT.RSO.035 and SYSLNK.RSO.035 must have the same user ID; SYSLNK.RSO.035 and SYSREP.RSO.035 may have different user IDs.

–   During loading, automatic starting of RSO devices is possible. If the file RSO.START.DEVICES exists under the $SYSSPOOL user ID, RSO starts the command sequence in this file (all commands contained in the file are processed immediately) and message SRO0002 is sent to the operator terminal. For each entered RSO device to which forms have been assigned, this file should include the command that initiates automatic assignment of the default forms on starting the file:

    ```
    START-PRINTER-OUTPUT DEVICE-NAME=*RSO-PRINTER(NAME=name,FORM-NAME=*STD)
    ```

–   During loading, all created job variables which were assigned to an RSO device in an earlier RSO session are removed.

–   During loading, the path names of the most important RSO installation files are output on the console for information purposes.

–   During loading, RSO makes some consistency checks based on the versions of the SYSPAR file before a merge with user and correction parameters is performed in the system tables. Any inconsistencies are output on the console (SRO0035 or SRO0054) and the loading is aborted with corresponding messages (SRO0011).

## 5.3 Defining RSO configuration data in the SPOOL parameter file

Control data for local SPOOL and RSO is stored in the file $SYSSPOOL.SPOOL.PARAMETERS. The SPSERVE utility routine is used to maintain the SPOOL parameter file.

**RSO session**

The RSO subsystem is controlled by its own administrator task, which in turn manages a large number of controller tasks. Each RSO controller supports a set number of printers and each SRAM task is assigned to a controller. The maximum number of RSO printers managed by a controller is specified in the SPOOL parameter file for the duration of an RSO system run. A controller can be assigned exclusively to a high-speed RSO printer (e.g. 9645 printer) (see the ADD-SPOOL-DEVICE statement in the "SPSERVE (BS2000/OSD)" manual).

Systems support can specify the maximum number of controllers in the SPOOL parameter file in accordance with the device configuration in the computer center. If the upper limit is set at n controllers, RSO requires (2n + 1) tasks, namely 1 administrator task, n controller tasks and n SRAM tasks.

The following table shows the maximum number of RSO printers that can be active simultaneously (based on an estimated value of 58 K in class 5 memory for an RSO job) for XS systems with up to 16 Mb of user memory:

| RBS UM | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 5 | 13 | 20 | 28 | 36 | 43 | 51 | 58 | 66 | 73 | 81 | 89 | 96 | 104 | 111 | 119 |
| 8 | 5 | 11 | 18 | 25 | 32 | 38 | 45 | 52 | 59 | 65 | 72 | 79 | 86 | 92 | 99 | 106 |
| 16 | 4 | 9 | 15 | 20 | 26 | 31 | 37 | 43 | 48 | 54 | 59 | 65 | 70 | 76 | 81 | 87 |

UM:     user memory (Mb)

RBS:    RSO buffer size (Kb)

The following table shows the maximum number of devices controlled by a controller (for XS systems with up to 16 Mb of user memory if RELEASE-MEMORY=*YES is specified in the SPOOL parameter file).

| RBS UM | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 26 | 62 | 98 | 134 | 169 | 205 | 241 | 276 | 312 | 348 | 384 | 419 | 455 | 491 | 526 | 562 |
| 8 | 17 | 39 | 62 | 85 | 100 | 130 | 153 | 176 | 198 | 221 | 244 | 267 | 289 | 312 | 335 | 347 |
| 16 | 9 | 23 | 36 | 49 | 62 | 75 | 88 | 102 | 115 | 128 | 141 | 154 | 167 | 180 | 194 | 207 |

UM:     user memory (Mb)

RBS:    RSO buffer size (Kb)

A maximum of 1024 RSO devices are permitted per controller for an XS configuration.

*Note*

> Whenever an RSO controller is generated, an ENTER job called internally generates a corresponding SRAM task. This ENTER job, which is given the name SYSENT.RSO.035, must not be started from an operator console, since this would cause the destruction of the RSO environment and message SRO0029 would then be sent.

## 5.3.1  Defining RSO printers

Systems support defines an RSO printer with either the ADD-SPOOL-DEVICE or EDIT-SPOOL-DEVICE statement of the SPSERVE utility routine in the SPOOL parameter file.

Systems support can delegate most of the administration tasks to RSO device administrators specified for the relevant RSO device by means of ADD-SPOOL-DEVICE.
In RSO operation with a specified RSO device administrator, we talk of "private devices". Devices for which no RSO device administrator has been specified are called "public devices".

The entry remains valid until it is modified by MODIFY-SPOOL-DEVICE or EDIT-SPOOL-DEVICE, or deleted using the REMOVE-SPOOL-DEVICE statement.
The entry can only be modified for RSO devices which are **inactive** when the modification takes place (STOP-PRINTER-OUTPUT command).

Systems support, RSO device administrators and nonprivileged users can obtain information on RSO devices using SHOW-SPOOL-DEVICES (command or SPSERVE statement).

## 5.3.2    Definition of RSO fonts

A full description of the RSO fonts and their characteristics may be found in section "Use of RSO fonts" on page 60. That section also describes how the contents and assignments of fonts can be output, how a font is invoked for spoolout, and how a freely selectable character set or a second font is supported.

Only the additional actions performed by systems support for font management are described below.

### Definition of an RSO font and linkage to a character set name

Only systems support can define a logical font name. A special screen in the RSOSERVE utility routine allows systems support to enter the characteristics of the font in a 256-character input string.

If the device is a "font" printer, the string should be used for loading a font. For the other printers, the string will consist of interpretable printer control character sequences.

RSO does not check what is defined in this string by systems support; naturally, only printer control character sequences that are appropriate for the definition of a font may be entered.

Once a logical font has been defined, systems support and the RSO device administrator can link it to one or more character set names. On the other hand, a single character set name can be linked to several fonts, provided that these logical font names refer to different printer types.

With regard to the linkage, RSO does not check whether the character sets are already defined in the SPOOL.PARAMETERS file. Nor does it check whether the character set to be used for spoolout is linked to a font.

The definition of a font and its use can be summarized in the following stages:

RSOSERVE

```
9022-200 DEVICE MANAGEMENT
Logical font name: Courier 10 P          ◄─────────────────────── (1)
256-character string: 274D........

Character set to be defined: CS1         ◄─────────────────────── (2)
```

RSOSERVE

```
9021 DEVICE MANAGEMENT
Logical font name: TMS RMN 10 P          ◄─────────────────────── (1)
256-character string: 274D........

Character set to be defined: CS1         ◄─────────────────────── (2)
```

SPSERVE

```
//A-S-C CS1,....                                                  (3)
//A-S-F FRM,9022-200,CH-SET=CS1,...
//A-S-F FRM,9021,CH-SET=CS1,...
//A-S-D P9022,9022-200,...
//A-S-D P9021,9021,...
```
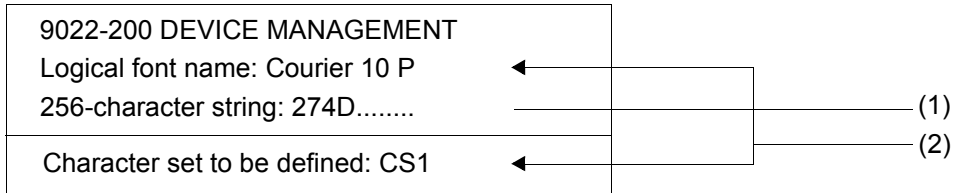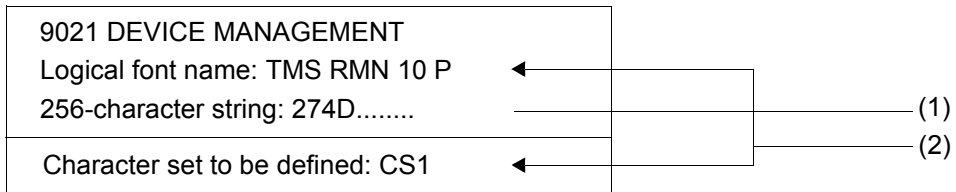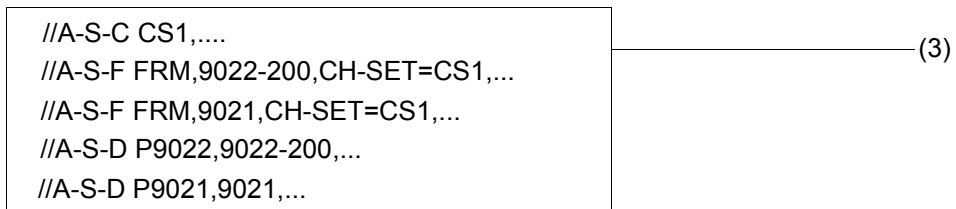
```
PRINT-DOCUMENT FROM-FILE=file,TO-PRINTER=*PAR(PRINTER-NAME=
         P9022-200,RESOURCE-DESCRIPTION=*PAR(FORM-NAME=FRM) ─────── (4)

PRINT-DOCUMENT FROM-FILE=file,TO-PRINTER=*PAR(PRINTER-NAME=
         P9021,RESOURCE-DESCPRIPTION=*PAR(FORM-NAME=FRM) ───────── (5)
```

(1)    Definition of a logical font name and the printer control character sequence that enables the printer to load the font, by systems support.

(2)    Linking the logical font name to a character set name, by systems support or the RSO device administrator. A single character set name can be linked to several logical font names if each of these fonts belongs to a different printer type.

(3)    Before the character set can be used for spoolout, it must be defined in the SPOOL parameter file, either by systems support or by the RSO device administrator.

(4)    The standard character set defined for the form is used to print the Header page, the file and the Trailer page. The printer control character sequences for loading the COURIER.10.P font are sent to the 9022-200 printer at the beginning of the Header page, the file and the Trailer page.

(5)      The standard character set defined for the form is used to print the Header page, the file and the Trailer page. The printer control character sequences for loading the TMS RMN.10.P font are sent to the 9021 printer at the beginning of the Header page, the file and the Trailer page.

## 5.3.3   Bypassing the evaluation of the character set characteristics

As already described above, every time a font is loaded, the printer compares the font characteristics with the character set characteristics. In order to prevent a different characteristic of the character set defined in the SPOOL parameter file (e.g. style: italic) resulting in an unwanted change of font, the font-dependent character set characteristics should be defined with the value IGNORE.

In this way, calling a character set that is linked to a font implements the character set characteristics of the font. The value IGNORE can be given in most operands in the ADD-SPOOL-CHARACTER-SET and MODIFY-SPOOL-CHARACTER-SET statements in the SPSERVE utility routine; if 0 is specified for the CPI operand, it is interpreted as a bypass specification, i.e. it is not evaluated.

Specifying CPI=0 has the following consequences for spoolout: The maximum value for the number of characters to be printed per line, which is needed in order to print the Header and Trailer pages, must be taken from the form definition: ADD-SPOOL-FORM, LINE-SIZE operand; the default value is a pitch of 10 cpi. Under these circumstances, the spoolout component does not check if lines are truncated.

*Notes*

●   We recommend that the default character set selected for spoolout is a character set that implements the HMI value by means of the value specified in the CPI operand in the ADD-SPOOL-CHARACTER-SET statement (or the value of the corresponding font linked to the character set).

●   With all printer types (except the 9025 and 9026-RENO) after requesting a new character set (PRINT-DOCUMENT command or using control character \CSi; in the print file), the validity of the character spacing defined in the character set definition is checked for the printer in question. If RSO does not support the CPI value requested for the character set on the device in question, the following occurs:

–   the spoolout job is interrupted

–   a Trailer page is output

–   the file is not deleted (even if PRINT-DOCUMENT-FROM-FILE=*file*, DELETE-AFTER-PRINT=*YES was specified)

–   message SRO0142 is output to the operator console

– message SRO0143 is printed out on the Trailer page.

*Note*

> If the rejected character set is the one for output of the Header and Trailer pages, only message SRO0142 is output to the operator console.

## 5.3.4 XHCS support in RSO

XHCS (Extended Host Code Support) is a subsystem that allows national character sets to be supported. XHCS is supported by RSO as of BS2000 Version 11.0. XHCS support in RSO can be divided into three parts:

1. Support for fonts in 8-bit format in conjunction with the 7-bit transmission protocol (e.g. BAM protocol)

2. Support for the new 8-bit ISO-8859-x tables

3. Support for "coded character set name" (CCSN)

**Support for 8-bit fonts with 7-bit transmission protocol**

Certain printers are equipped with 8-bit fonts. However, until now it has not been possible to fully utilize these fonts if the printer was connected to a 7-bit transmission protocol.

Two new operands have been introduced in the SPSERVE statements ADD-/MODIFY-SPOOL-DEVICE in order to guarantee full support for 8-bit fonts on printers (with 8-bit font support) that are connected to a 7-bit transmission protocol.

If TRANSMISSION=*7BIT and FONT-TYPE=*8BIT are specified, RSO prefixes each character (or each group of characters) of the EBCDIC-DF03 core with a control character 'SI' ('DLE' and 'SI' for printer types 4812, 9021, 9022-200, 9026-PCL, DJET and 9000-PCL). Each character (or each group of characters) not belonging to the EBCDIC-DF03 core is prefixed by the control character 'SO' ('DLE' and 'SO' for printer types 4812, 9021, 9022-200, 9026-PCL, DJET and 9000-PCL). The characters are then converted into the value of the EBCDIC-DF03 core that corresponds to the ASCII value for the character representation.

It should be noted that this conversion is performed for all file types (HEADER, PROLOG, DIA, user file...) and after other conversions (CHARACTER-IMAGE and/or TRANSLATION-TABLE).

*Example*

A 9014 printer and a 9021 printer have been defined with TRANSMISSION=*7BIT and
FONT-TYPE=*8BIT.

The user file contains: x'C1C243C3'

The following data is sent to the 9014 printer:

```
                      x'0FC1C20E840FC3'
                        |       | | |•
   Control char 'SI'──┘      | | └──────Control character 'SI''
        Control char 'SO'─────┘ └──────EBCDIC DF03 code for representing
                                        the ASCII value of the EBCDIC—DF04
                                        character x'43' (ä)
```

The following data is sent to the 9021 printer:

```
                      x'100FC1C2100E84100FC3'
                        |       |   | |
C.chars 'DLE' and 'SI'─┘      |   | └─Control characters 'DLE' and 'SI'
Control chars 'DLE' and 'SO'──┘   └──EBCDIC DF03 code for representing
                                        the ASCII value of the EBCDIC—DF04
                                        character x'43' (ä)
```
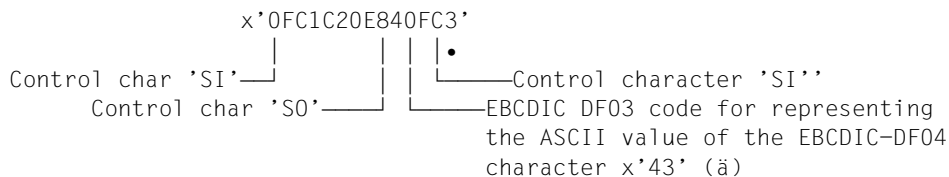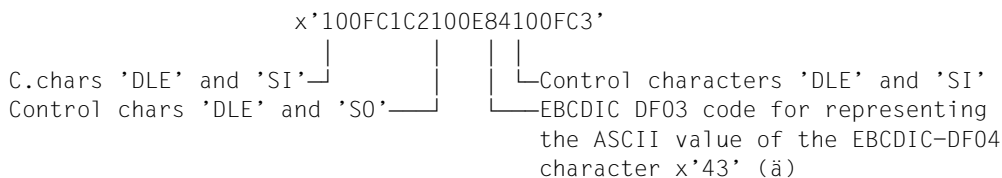
**Support for the ISO-8859-x tables**

Certain printer tables are provided with ISO-8859-x code tables (only available with 8-bit fonts).

The values ISO-8859-1, ISO-8859-2,..., ISO-8859-9 can be specified with the LANGUAGE operand of the SPSERVE statements ADD-/MODIFY-SPOOL-CHARACTER-SET. Users can thus select the version of the code table that is assigned to the section x'A0' through x'FF'.

The printer types supporting 8-bit fonts and ISO tables are listed in the following.

| Printer types | Supported ISO tables |
|---|---|
| 9001-31, | ISO-8859-1 |
| 9011, 9013 | When this table is requested, the national form of the ASCII table is selected instead. |
| 4011, 4813, 9014, 9015, 9097 | ISO-8859-1, -2, -5, -7 and -9<br>ISO-8859-1, -2, -5, -7 and -9<br>ISO-8859-1, -2, -5, -7 and -9 |
| 2030-PCL, 4812, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9021, 9022-200, 9026-PCL, DJET, 9000-PCL | ISO-8859-1<br>ISO-8859-1<br>ISO-8859-1<br>ISO-8859-1, -2 and -9<br>ISO-8859-1<br>ISO-8859-1<br>ISO-8859-1<br>ISO-8859-1<br>ISO-8859-1<br>ISO-8859-1<br>ISO-8859-1<br>ISO-8859-1<br>ISO-8859-1<br>ISO-8859-1, -2 and -9 |

Other printer types currently support neither 8-bit fonts nor ISO tables.

**Support for the coded character set name (CCSN)**

Depending on the coded character set name (CCSN) in the file catalog entry, RSO (with certain restrictions) converts this CCSN into a CCSN from the family which uniquely corresponds to an ISO-8859-x table. The following should be noted in this context:

– A CCSN in the file catalog entry or element entry (in the case of PLAM libraries) is not taken into consideration when a printer is assigned, during PRINT-DOCUMENT command validation, at the start of printing or in the case of redirection of a printout. It is advisable for a printer pool to contain only printers having the same capabilities.

– Files containing only text (no control characters) are translated, as in the case of the PRINT-DOCUMENT command without a DOCUMENT-FORMAT operand.

– The conversion is carried out only if the target printer supports 8-bit fonts, if the user has not requested a particular user translation table (TRANSLATION-TABLE operand in the PRINT-DOCUMENT command) and if the file has a CCSN.

– If the XHCS subsystem is not loaded when the request is made, the job is placed in the KEEP queue.

*Example*

Entries in SPSERVE:

```
//ADD-SPOOL-DEVICE DEVICE-NAME=P9014,DEVICE-TYPE=9014,TRANSMISSION=*7BIT,
                   FONT-TYPE=*8BIT,...
//ADD-SPOOL-CHARACTER-SET CHARACTER-SET-NAME=CS1,LANGUAGE=ISO-8859-2,...
//ADD-SPOOL-FORM FORM-NAME=FORM1,CHARACTER-SET=CS1,...
```

File 8BIT.FILE with CCSN=EDF042VA

```
/PRINT-DOCUMENT FROM-FILE=8BIT.FILE,RESOURCE-DESCRIPTION=*PAR(
                FORM-NAME=FORM1),TO-PRINTER=*PAR(PRINTER-NAME=P9014
or
/PRINT-DOCUMENT FROM-FILE=8BIT.FILE,RESOURCE-DESCRIPTION=*PAR(
                CHARACTER-SETS=CS1),TO-PRINTER=*PAR(PRINTER-NAME=P9014
```

RSO requests the table for conversion from EDF042VA to EDF042 from XHCS. For each user record that is read, RSO uses this conversion table to convert the data coded in EDF042A into data coded in EDF042. Ahead of the data, RSO sends the printer control characters selecting the ISO-8859-2 table to the printer.

## 5.3.5   Support for files in ASCII code

As of RSO V2.2A (under BS2000/OSD-BC V1.0A), XHCS allows EBCDIC special formats to be supported when the catalog entry of a BS2000 file is supplied the coded character set name (CCSN). RSO support of files with data in ASCII code is the extension of this mechanism to CCSNs beginning with ISO, which used to be rejected. This support has also been extended to the various resource files (prolog, epilog, forms overlay (DIA) and member).

**User files**

*Validity check*

The CCSN belongs to a given type and variant that depend on the XHCS definitions. The type can be either "E" (for files in EBCDIC code) or "I" (for files in ASCII code). The variant normally lies within the range 1 to 9 and corresponds to the various families.

The print validity check depends on the new DOCUMENT-FORMAT operand of the PRINT-DOCUMENT command. This is shown in the following table:

| DOCUMENT-FORMAT | E | | | I | | | U | | |
|---|---|---|---|---|---|---|---|---|---|
| | **1** | **#** | **U** | **1** | **#** | **U** | **1** | **#** | **U** |
| *TEXT | A | A | A | R | R | R | - | - | R |
| *SPECIAL-FORMAT | A | A | A | A | A | A | - | - | R |
| OTHERS | A | A | A | R | R | R | - | - | R |

–  E/I/U stands for the file type: EBCDIC/ASCII/UNKNOWN

–  1/#/U stands for the number of the variant: 1/other value (2-9)/UNKNOWN

–  A/R/- stands for accepted/rejected/impossible case

A file is regarded as being of a given type and variant depending on the information returned from XHCS on its CCSN. An empty CCSN (default when a new file is created) is regarded as the system default and is also sent to XHCS.

If XHCS is not available or cannot return any information on the given CCSN, the file type and variant number are set as shown in the following table:

| CCSNAME | TYPE | VARIANT |
|---------|------|---------|
| Empty | E | 1 |
| EDF03IRV | E | 1 |
| EDF041 | E | 1 |
| ISO88591 | I | 1 |
| EDF* | E | U |
| EEH* | E | U |
| ISO* | I | U |
| Other | U | U |

– E/I/U stands for the file type: EBCDIC/ASCII/UNKNOWN

– 1/#/U stands for the number of the variant: 1/other value (2-9)/UNKNOWN

– XXX* stands for all CCSNs whose names begin with XXX.

*Processing when the print job is started*

As before, no XHCS conversion is performed if a TRANSLATION-TABLE is specified in the PRINT-DOCUMENT command. An error message appears on the Trailer page.

The FONT operand of the ADD-SPOOL-DEVICE statement is no longer checked (7-bit fonts were previously rejected). The user must, however, take into account the limitations imposed by the hardware. For example, it is not possible to print files in 8-bit code on 7-bit printers or even on 8-bit printers connected via 7-bit lines (such as BCAM connections).

When an ASCII file whose variant is unknown is sent for printing with DOCUMENT-FORMAT=*SPECIAL-FORMAT, the print job is accepted, the ISO88591-to-EDF041 translation table is used, and a warning is sent to the Trailer page. This happens, for example, in the case of a CCSN such as ISOXYZ, which is assumed to be in ASCII code with an unknown variant.

When an EBCDIC file whose variant is unknown is sent for printing, the print job is accepted, no conversion is carried out, and a warning is sent to the Trailer page. This happens, for example, in the case of a CCSN that begins with EDF when XHCS is not loaded.

**Resource files**

The extension of files with data in ASCII code to the resource files is based on the same philosophy as for the user files, namely on the use of the CCSN. The resources concerned are prolog, epilog, forms overlay (DIA) and member files stored in BS2000.

*Validity check*

The CCSN is not checked when the command is entered and has no effect on the acceptance or rejection of the PRINT-DOCUMENT command.

*Processing when the print job is started*

Behavior is the same as for the user files (see above). However, each member whose CSSN leads to a processing error is ignored, and no message is printed on the header page.

**Limitations**

The introduction of ASCII files to BS2000, which is an EBCDIC world, is associated with a number of limitations:

– The values of the operands of user commands are always converted to EBCDIC. For example, if the user issues the PRINT-DOCUMENT command with SECTION-IDENTIFIER='ABCD' for a file in ASCII code, the file is searched for the string X'C1C2C3C4'.

– RSOSERVE allows files to be imported from BS2000 to the memory of a 9025 or 9026-RENO printer. When such files are sent to the printer, it is assumed that they contain data in EBCDIC code, and no check is performed. If there is a CCSN, it is ignored. It is assumed of all data managed by RSOSERVE that it is in EBCDIC code (strings sent to the printer, font string,...).

**Application models**

In providing support for files and resources in ASCII code, the following three application models were taken into account above all:

1. In the case of BS2000/Unix system interoperability (see the "Distributed Print Services (BS2000/OSD)" manual), files that come from a Unix system are transferred to RSO in ASCII format with DOCUMENT-FORMAT=*SPECIAL-FORMAT and the ISO88591 CCSN. To ensure that this functionality is always available, the ISO88591-to-EDF041 translation table is provided internally by SPOOL when XHCS is not available.

2. When files stored in the POSIX-supported UFS file system are sent for printing with DOCUMENT-FORMAT=*SPECIAL-FORMAT, the command is accepted and sent to RSO once the CCSN is set to ISO88591.

3. PCL files can now be created easily on PC systems, and it is possible to transfer these files in binary mode from the PC to a BS2000 host. These files can be used as prolog or epilog files once their CCSN is set to ISO88591. RSO converts ASCII (ISO88591) to EBCDIC (EDF041) itself.

## 5.3.6  Defining RSO pools

Pools can be defined for RSO printers.

The pools are created by systems support using ADD-PRINTER-POOL/ EDIT-PRINTER-POOL in the SPSERVE utility routine (see the "SPSERVE (BS2000/OSD)" manual).

Systems support, RSO device administrators and nonprivileged users can have the characteristics of the pools written to SYSOUT using SHOW-PRINTER-POOLS (statement in SPSERVE).

A defined pool remains valid until modified (MODIFY-PRINTER-POOL) or deleted (REMOVE-PRINTER-POOL).

A spoolout job for an RSO pool can only be written to device types in the pool that were present in the pool at the moment when the PRINT-DOCUMENT command was issued. Subsequent changes in the pool (by adding new device types or deleting existing device types) are not taken into account in the scheduling of the spoolout job.

*Example*

At the time of PRINT-DOCUMENT validation, a pool contains three devices G1, G2, G3 with the device type designations D1, D2, D3. The subsequent addition of device G4 with the new device type designation D4 is not taken into account in the scheduling of this spoolout job. It can only be written to devices G1, G2, G3. If the device type designation D4 of device G4 is the same as one of the device types D1, D2, D3, device G4 is allowed for in the scheduling of the job.

## 5.4 Commands and SPSERVE statements for the SPOOL administrator and systems support

Systems support can also issue the commands and SPSERVE statements listed below in addition to the commands for the nonprivileged user (see page 97) and the RSO device administrator (see page 178). For a detailed description of the commands or SPSERVE statements, refer to the manuals "Spool & Print - Commands (BS2000/OSD)" and "SPSERVE (BS2000/OSD)".

| Command | Function |
|---|---|
| ADD-SPOOL-DEVICE | Define RSO devices |
| HOLD-SUBSYSTEM | Suspend RSO subsystem |
| MODIFY-SPOOL-PARAMETERS | Change global SPOOL parameters |
| RESUME-SUBSYSTEM | Cancel wait state for RSO subsystem |
| START-SUBSYSTEM | Load SPOOL/RSO subsystems using standard DSSM commands |
| STOP-SUBSYSTEM | Unload RSO subsystem |

### 5.4.1 Controlling the SAMPLE function (sample printout)

The SAMPLE function for RSO printers defined as public devices is supported. When activating a printer (START-PRINTER-OUTPUT), systems support or the operator can determine that a sample printout shall be made of part of the original file for the first spoolout job. In this printout, all letters are replaced by 'X', and all digits by '0'.

```
START-PRINTER-OUTPUT DEVICE-NAME=*RSO-PRINTER(NAME=device,PRINT-SAMPLE=YES)
```

For the first spoolout job to be processed on this printer after the START-PRINTER-OUTPUT, message SRO0133 is sent to the operator at the operator console:

```
SRO0133 SAMPLE PRINTOUT REQUIRED ON DEVICE '(&00)' FOR PNAME '(&02)', TSN
'(&01)'? REPLY (Y=YES; N=NO; <N>=NUMBER OF PAGES FROM 1 TO 9)
```

If the response to this message is Y, the sample printout for this spoolout job is run, with the assumption that only one page is required. If the response is N, no further sample printouts are run until another command

```
START-PRINTER-OUTPUT DEVICE-NAME=*RSO-PRINTER(NAME=device,PRINT-SAMPLE=*YES)
```

is issued for this device. If the response to the message is $N$, a sample printout of $N$ pages of this spoolout job is performed ($N$=1...9).
Any other answer will be rejected.

At the end of the sample printout, message SRO0134 is sent to the operator terminal:

```
SRO0134 SAMPLE PRINTOUT '(&00)' OK ? REPLY (Y=YES; N=NO)
```

If the response to this message is Y, the spoolout job proper is started.

No further sample printout is run on the device until a further command
```
START-PRINTER-OUTPUT DEVICE-NAME=*RSO-PRINTER(NAME=device,PRINT-SAMPLE=*YES)
```
is issued for this device.
If the response is N, another sample printout of the current spoolout job is started. Any other answer will be rejected.

*Notes*

– In RSO operation, it is not permitted to run a sample printout on printers that are defined as PRIVATE DEVICE, nor on single-sheet printers.

– The SAMPLE function is of no use if DOCUMENT-FORMAT=*PAGE-FORMAT (CONTROL-MODE=*LINE-MODE/*PAGE-MODE/*PHYSICAL) or DOCUMENT-FORMAT=*SPECIAL-FORMAT is specified in the PRINT-DOCUMENT command, since in the sample printout all data, including the page positioning commands, are converted into the characters 'X' and '0'. However, RSO does not send an error message.

– We do not recommend specifying the operands SAMPLE and DESTINATION together in the START-PRINTER-OUTPUT command, since other spoolout jobs could reach the printer before the one requiring a sample printout.
However, RSO does not send an error message if both operands are specified.

# 5.5  Printer parameter files

The printer parameter files contain parameters that do not appear directly or completely in the interface of ADD-SPOOL-DEVICE, e.g. because the value is possibly too long.
The parameters of the printer parameter file can influence the following:
– escape sequences at the start or end of a print job
– escape sequences for the eject function and reset function
– operation of a printer with the ETX-ACK protocol
– operation of a printer with the SEH protocol
– operation of a printer with PJL commands
– operation of a printer with PRESCRIBE II commands
– associated URI for an IPP printer
– fully qualified Domain Name for an IPP printer
– select RSO as user identification for a BSD-LPD printer
– processing behaviour for the page copies function, the two-sided printing function, the orientation function and the sorter selection function
– a value sent to the printer on carriage return
– the name under which an overlay text (DIA) is stored in the printer
– the print speed of printer connected via LAN for which the ADD-SPOOL-DEVICE command is defined with SYNCHRO=*NETWORK
– escape sequences for the paper type selection function and the output tray selection function
– support of 2-byte distance escape characters for printing on IBM printers (type 328x) in the SNA network Printer parameter files are SAM files and, like recovery-rule files, can be created using any editor. They are assigned to a printer by means of the ADD-SPOOL-DEVICE command
– escape sequences related to the Unicode support

Standard keywords are available to systems support or the device administrator for specifying new printers, or modifying existing ones. These keywords are described in section "Keywords" on page 296. Before a printer parameter file can be interpreted, systems support or the device administrator must perform the following tasks:

| Create printer parameter file | Systems support |
|---|---|
| ↓ | |
| Catalog printer parameter file | Systems support |
| ↓ | |
| Assign printer parameter file to a printer | Systems support/ device administrator |
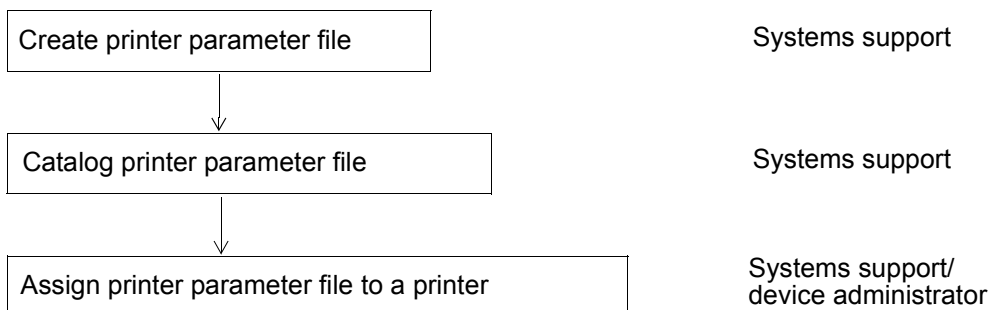
How and when a printer parameter file is interpreted, and what happens if an error occurs, is discussed in .

## 5.5.1  File name for the printer parameter file

The file name for the printer parameter file is made up as follows:

<prefix>.<suffix>

<prefix>

The prefix (common part) of the file name applies to a printer parameter files of a host and is defined by systems support via the PRINTER-PARAM-PREFIX parameter of the SPSERVE statement MODIFY-SPOOL-PARAMETERS.
In this way, systems support defines the ID under which a printer parameter file must be cataloged so that it can be interpreted.

<suffix>

The suffix (private part) of the file name is different for each printer parameter file and must have the form <composed-name 1..16>.
For RSO to use a printer parameter file, the file must be assigned to a printer.

### Examples of file names

Printer parameter file with standard prefix:
```
$SYSSPOOL.SYSPAR.PRINTER-PARAM.MYPARAMETERFILE
```

Printer parameter file with customized prefix:
```
:MYCATID:$MYUSERID.MYPARAMETERFILE
```

## 5.5.2  Cataloging the printer parameter file

The prefix of the file name for the printer parameter file is defined by systems support to specify the ID under which a printer parameter file must be cataloged so that it can be interpreted.

The prefix applies to all printer parameter files of a hosts and is defined by systems support by PRINTER-PARAM-PREFIX parameter of the SPSERVE statement MODIFY-SPOOL-PARAMETERS:

```
//MODIFY-SPOOL-PARAMETERS ...
 ,SPOOLOUT-OPTIONS=*PARAMETERS(...
   ,PRINTER-PARAM-PREFIX = *UNCHANGED / <partial-filename 2..38>)
```

<partial-filename 2..38> defines the prefix of the printer parameter files and should contain both a catalog ID and a user ID.
If no user ID is specified, the default user ID SYSSPOOL is taken. If no catalog ID is specified, the home PVS is assumed.

The preset value for the PRINTER-PARAM-PREFIX operand is $SYSSPOOL.SYSPAR.PRINTER-PARAM, i.e. all printer parameter files must be cataloged under the user ID SYSSPOOL and have the prefix SYSPAR.PRINTER-PARAM.

## 5.5.3  Assigning the printer parameter file to a printer

For RSO to use a printer parameter file, the file must be assigned to a printer.

This assignment is carried out by systems support or the RSO manager during device definition with the parameter PRINTER-PARAM of the SPSERVE statement ADD-SPOOL-DEVICE or MODIFY-SPOOL-DEVICE.
The suffix of the file name of the printer parameter file can be specified in this parameter:

```
//ADD-SPOOL-DEVICE ... (or //MODIFY-SPOOL-DEVICE ...)
 ,PROCESSING-CONTROL=*PARAMETERS(...
 ,PRINTER-PARAM-FILE=*STD/*SYSTEM/<composed-name 1..16>)
```

*STD            means that the standard device entry is used.

*SYSTEM         means that the permissible keywords for the RSO preset values in the printer parameter file are used.

<composed-name 1..16>
                    stands for the suffix of the file name of the printer parameter file.

## 5.5.4  Interpreting the printer parameter file

When the printer has been assigned to a printer parameter file, it is read by executing the START-PRINTER-OUTPUT command.

The RSO controller interprets the file contents and sets up a table with the compiled information of the printer parameter file in the part of the RSO memory responsible for the printer pool.

The values specified in the printer parameter file replace RSO default values.

If a problem is encountered when accessing the printer parameter file or when checking the file contents (e.g. an invalid keyword is used), a message is output to the console. RSO then ignores the entire contents of the printer parameter file.

## 5.5.5   Syntax of the printer parameter file

Printer parameters are specified in the printer parameter file with the aid of keywords.

The following keywords are available to systems support or the device administrator: boprt, cr, eject, eoprt, etx, intray, ippuri, lpdnotsn, outtray, ovlname, pcopies, pjl, prescrib, reset, rotation, seh, speed, sorter, 2byte, 2sided.

Keywords can have the data type "Boolean", "Numeric", "String", "LikeString" or "KeyStringList".

Printer parameter files are SAM files and, like recovery-rule files, can be created using any editor.

### General rules

1.   Each keyword must start at the beginning of the line.

2.   Keywords must be specified in lowercase, since the distinction between uppercase and lowercase is relevant in the syntax analysis of the printer parameter file.

3.   Parameter definitions must always be terminated with a comma (,).

4.   Comment lines are added to the file by placing the character (#) at the first position on the line.

5.   If you wish to add some escape sequences to the RSO preset value for a printer parameter, you should repeat the preset value in the printer parameter file.
    The preset values for the printer parameters are listed below the individual keywords.

### Keywords of data type Boolean

Keywords of the data type Boolean indicate whether a printer feature is supported or not.

The syntax of these keywords is not restricted to their names.
If the name of the keyword is specified, this means that the printer feature is supported:

<keyword>,

### Keywords of data type Numeric

Several printer features are assigned numerical values.

Keywords of data type numeric must be specified as follows:

<keyword>#<numerical value>[#<unit>],

The RSO keyword is followed by the character # and the permissible numeric value.

If a unit of measure is required for the specified keyword, the value and the unit must be separated by the character #.

For the value 0, no unit of measure is required.

**Keywords of data type String**

Keywords of data type String specify how a printer feature is selected. They must be specified as follows:

<keyword>=<string>,

The RSO keyword is followed by the character = and the corresponding string. The printer escape sequences that must be sent to activate the printer feature are normally specified as the string.

The string must be terminated with a comma (,). If a comma has to be used within a string, it must be preceded by a backslash (\).

A string can extend over several lines. In this case, the different parts are combined to form a single string. The string definition starts at the first character on each line that is not a blank, and ends at the end of the line. Blanks at the end of the string definition are part of the definition.
For example, the following file produces the string `c 'abcd 123'`:

```
keyword= abcd
         123,
```

The characters specified as a string in the printer parameter file are interpreted as follows:

| Character | Interpretation | EBCDIC code |
|---|---|---|
| \e | Escape character | x'27' |
| \E | Escape character | x'27' |
| \s | Blank | x'40' |
| \n | Line feed (new line) | x'25' |
| \r | Carriage return | x'0d' |
| \f | Form feed (new column) | x'0c' |
| \t | Horizontal tabulator | x'05' |
| \b | Backspace (one column to the left) | x'16' |
| \v | Vertical tabulator | x'0b' |
| \0 | Null character | x'00' |
| \\ | Backslash | x'bc' |
| \^ | ^ | x'6a' |
| \, | , | x'6b' |
| \: | : | x'7a' |
| ^A | Control A | x'01' |
| ^B | Control B | x'02' |
| . . . | . . . | . . . |
| ^Z | Control Z | x'1a' |
| \xhh | Two hexadecimal numbers (hh) | x'hh' |
| \Xhh | Two hexadecimal numbers (hh) | x'hh' |
| \xh | One hexadecimal number (h) | x'0h' |
| \Xh | One hexadecimal number (h) | x'0h' |
| other characters | are interpreted as specified | |

**Keywords of data type LikeString**

Keywords of data type LikeString allow the selection of a kind of treatment. They must be specified as follows:

<keyword>=like:<string>,

The RSO keyword is followed by the character "=", the constant " like:" and the string referring to an RSO printer type. The string must be terminated with a comma " ,".

RSO should treat the selected function like it does for the referred printer type.

The RSO printer types are:

4850-PCL, 4830-PCL, 4818-PCL, 9000-EPSQ, 9000-EPLQ, 9000-EPFX, 9000-PRO, 9000-PS, 9046, 9045-ANSI, 9015, 4825-PCL, 4822-PCL, 8121, 8122, 9001, 9002, 9003, 9004, 9025, 9645, 9013, 9000, 9001-31, 9011, 9012, 9022, 9014, 9021, 9022-200, 9022-300, 9000-PCL, DJET, 4824-PCL, 9026-RENO, 9026-PCL, 4812, 9097, 4011, 4813, 4821-PCL, 2030-PCL.

**Keywords of data type KeyStringList**

Keywords of data type KeyStringList specify how a printer feature is selected. They must be specified as follows:

<keyword>=[%<key>:<string>] ... ,

The RSO keyword is followed by the character "=" and the keyed-string list. The keyed-string list must be terminated with a comma " ,". Each list element begins with a percentage sign " %" used as delimiter character. If a percentage sign has to be used within a string, it must be preceded by a backslash "\".

The key consists of decimal digits interpreted as a number or a string of alphanumeric characters interpreted as a value. The string defines an "escape sequence" to be sent to the printer accordingly.

The keyed-string-list can extend over several lines. In this case, the different parts are combined to form a single keyed-string-list. The definition starts at the first character on each line that is not a blank, and ends at the end of the line. Blanks at the end of the string definition are part of the definition.

If a key value is present several times in the list, the escape sequence associated to the first one is taken into account.

*Example*

Selection of the manual tray and the tray 1 for a 4830 printer:

```
intray=%MANUAL:!R! PSRC 0; EXIT;
       %1:!R! PSRC 1; EXIT;,
```

## 5.5.6  Keywords

This section describes the keywords permitted in the printer parameter file. The purpose of the keyword, its data type and the default value are described as appropriate to the printer type.

The following keywords are available:

| Keyword | Description | Data type | Limits |
|---------|-------------|-----------|--------|
| boprt | defines an escape sequence sent at the start of the print job | String | 1024 characters |
| cr | specifies the value sent to the printer on carriage return | String | 255 characters |
| eject | defines an escape sequence for the eject function | String | 255 characters |
| eoprt | defines an escape sequence sent at the end of the print job | String | 1024 characters |
| etx | specifies whether a printer can be operated with the ETX-ACK protocol | Boolean | |
| intray | defines escape sequences for the paper type selection | KeyStringList | 255 characters for each sequence |
| ippfqdn | specifies the full qualified Domain Name for a secure printer | String | 1023 characters |
| ippuri | specifies the value of the IPP printer URI | String | 1023 characters |
| lpdnotsn | specifies whether the TSN must be used in the user ID. | Boolean | |
| outtray | defines escape sequences for the output tray selection | KeyStringList | 255 characters for each sequence |
| ovlname | specifies the names under which an overlay text (DIA) is stored in the printer | String | 8 characters |
| pcopies | selects the processing for page copies | LikeString | 9 characters |
| pjl | specifies whether a printer understands PJL commands | Boolean | |
| prescrib | specifies whether a printer understands PRESCRIBE commands | Boolean | |
| reset | defines an escape sequence for the reset function | String | 255 characters |
| rotation | selects the processing for orientation | LikeString | 9 characters |

| Keyword | Description | Data type | Limits |
|---------|-------------|-----------|--------|
| seh | specifies whether a printer understands the SEH protocol | Boolean | |
| sorter | selects the processing for sorter selection | LikeString | 9 characters |
| speed | specifies the print speed | Numeric with unit of measurement | 0-4095 |
| 2byte | specifies whether the 9003 Printer uses 2byte displacement escape characters | Boolean | |
| 2sided | selects the processing for two-sided printing | LikeString | 9 characters |

## boprt

The keyword boprt defines an escape sequence that is sent at the start of the print job.
For printers that support various emulations (e.g. if both PostScript and PCL are available
on the printer), boprt can be used to select a particular emulation.

*Syntax*

boprt has the data type String and can have a maximum length of 1024 characters.

*Default values*

| Printer type | Default values for boprt |
|---|---|
| 2030-PCL | \e%–12345X@PJL ENTER LANGUAGE = PCL\r\n |
| 4818-PCL | \e%–12345X@PJL ENTER LANGUAGE = PCL\r\n |
| 4821-PCL | \e%–12345X@PJL ENTER LANGUAGE = PCL\r\n |
| 4822-PCL | \e%–12345X@PJL ENTER LANGUAGE = PCL\r\n |
| 4824-PCL | \e%–12345X@PJL ENTER LANGUAGE = PCL\r\n |
| 4825-PCL | \e%–12345X@PJL ENTER LANGUAGE = PCL\r\n |
| 4830-PCL | \e%–12345X@PJL ENTER LANGUAGE = PCL\r\n |
| 4850-PCL | \e%–12345X@PJL ENTER LANGUAGE = PCL\r\n |

| Printer type | Default values for boprt |
|---|---|
| 9000-PS | ```%!PS—Adobe\n
%%BeginProcSet:"RSO internal definitions"
             "(3.0A)""O"\n
userdict begin\n
   /RsoInch {72 mul} def\n
  /RsoFont {scalefont setfont} bind def\n
   /RsoPL 11.3 RsoInch def\n
   /RsoY RsoPL def\n
   /RsoX 20 def\n
   /RsoVMI 12 def\n
   /RsoHMIold 1 def\n
   /RsoHMInew 12 def\n
   /RsoScale {RsoHMInew RsoHMIold div}
             bind def\n
   /RsoCR {\n
    RsoX RsoY moveto\n
   } bind def\n
   /RsoLF {\n
    /RsoY RsoY RsoVMI sub def\n
   } bind def\n
   /RsoLine {\n
    /RsoT exch def\n
    RsoCR\n
    RsoT show\n
   } bind def\n
 /#copies 1 def\n
 /Courier findfont RsoScale RsoFont\n
%%EndProcSet\n
%%EndProlog\n``` |
| 9004 | `\e/` |
| 9022-200 | `\x1CDa` |
| 9026-PCL | `\eE` |
| other printer types | |

*Example*

In the following example, the input is made in PostScript; internally, the printer language
PJL is used.

```
#
# Set PostScript emulation at the beginning of each print job
#
boprt=\e%-12345X@PJL ENTER LANGUAGE = POSTSCRIPT\r\n,
#
# End of printer parameter file
#
```

## cr

The keyword cr specifies the value used when a carriage return is to be sent to the printer.

*Syntax*

cr has the data type String and can have a maximum length of 255 characters.

*Default values*

The default value for cr depends on the device type and the access mode.

| Printer type | Access mode | Default values for cr |
|---|---|---|
| 9000-PS | TACLAN | RsoCR\n |
| | LPD | RsoCR\n |
| 9003 | DIRECT | \x11\r |
| | HARDCOPY | \x11\r |
| | PC | \x11\r |
| 9645 | APPLICATION | \n00 |
| other printers | | \r |

*Example*

On carriage return, the string \r is sent to the printer.

```
#
# 'carriage return' translation
#
cr=\r,
#
```

## eject

The keyword eject defines an escape sequence for the eject function.
The eject function is used for printers that have a single-sheet feed at the end of each print job.

*Syntax*

eject has the data type String and can have a maximum length of 255 characters.

*Default values*

The default value for eject depends on the device type and the access mode.

| Printer type | Access mode | Default values for eject |
|---|---|---|
| 2030-PCL | TACLAN | \e&l0H |
| | LPD | \e&l0H |
| 4011 | DIRECT | \f |
| | HARDCOPY | \f |
| | PC | \f |
| | TACLAN | \f |
| | LPD | \f |
| 4812 | DIRECT | \e&l0H |
| | HARDCOPY | \e&l0H |
| | PC | \e&l0H |
| | TACLAN | \e&l0H |
| | LPD | \e&l0H |
| 4813 | DIRECT | \f |
| | HARDCOPY | \f |
| | PC | \f |
| | TACLAN | \f |
| | LPD | \f |
| 4818-PCL | DIRECT | \e&l0H |
| | HARDCOPY | \e&l0H |
| | PC | \e&l0H |
| | TACLAN | \e&l0H |
| | LPD | \e&l0H |

| Printer type | Access mode | Default values for eject |
|---|---|---|
| 4821-PCL | DIRECT | `\e&l0H` |
| | HARDCOPY | `\e&l0H` |
| | PC | `\e&l0H` |
| | TACLAN | `\e&l0H` |
| | LPD | `\e&l0H` |
| 4822-PCL | DIRECT | `\e&l0H` |
| | HARDCOPY | `\e&l0H` |
| | PC | `\e&l0H` |
| | TACLAN | `\e&l0H` |
| | LPD | `\e&l0H` |
| 4824-PCL | DIRECT | `\e&l0H` |
| | HARDCOPY | `\e&l0H` |
| | PC | `\e&l0H` |
| | TACLAN | `\e&l0H` |
| | LPD | `\e&l0H` |
| 4825-PCL | DIRECT | `\e&l0H` |
| | HARDCOPY | `\e&l0H` |
| | PC | `\e&l0H` |
| | TACLAN | `\e&l0H` |
| | LPD | `\e&l0H` |
| 4830-PCL | DIRECT | `\e&l0H` |
| | HARDCOPY | `\e&l0H` |
| | PC | `\e&l0H` |
| | TACLAN | `\e&l0H` |
| | LPD | `\e&l0H` |
| 4850-PCL | TACLAN | `\e&l0H` |
| | LPD | `\e&l0H` |
| 9000-EPFX | TACLAN | `\f` |
| | LPD | `\f` |
| 9000-EPLQ | TACLAN | `\f` |
| | LPD | `\f` |
| 9000-EPSQ | TACLAN | `\f` |
| | LPD | `\f` |

| Printer type | Access mode | Default values for eject |
|---|---|---|
| 9000-PCL | DIRECT | `\e&l0H` |
| | HARDCOPY | `\e&l0H` |
| | PC | `\e&l0H` |
| | TACLAN | `\e&l0H` |
| | LPD | `\e&l0H` |
| 9000-PRO | TACLAN | `\f` |
| | LPD | `\f` |
| 9000-PS | TACLAN | `showpage\n`<br>`/RsoY RsoPL def n` |
| | LPD | `showpage r n`<br>`/RsoY RsoPL def\n` |
| 9001-31 | DIRECT | `\f` |
| | HARDCOPY | `\f` |
| | PC | `\f` |
| | HARD9751 | `\f` |
| | TACLAN | `\f` |
| | LPD | `\f` |
| 9003 | DIRECT | `\x0B` |
| | HARDCOPY | `\x0B` |
| | PC | `\x0B` |
| 9004 | HARDCOPY | `\e\x19J` |
| | PC | `\e\x19J` |
| | HARD9751 | `\e\x19J` |
| 9011 | DIRECT | `\f` |
| | HARDCOPY | `\f` |
| | PC | `\f` |
| | TACLAN | `\f` |
| | LPD | `\f` |
| 9012 | DIRECT | `\f` |
| | HARDCOPY | `\f` |
| | PC | `\f` |
| | TACLAN | `\f` |
| | LPD | `\f` |

| Printer type | Access mode | Default values for eject |
|---|---|---|
| 9013 | DIRECT | `\f` |
| | HARDCOPY | `\f` |
| | PC | `\f` |
| | TACLAN | `\f` |
| | LPD | `\f` |
| 9014 | DIRECT | `\f` |
| | HARDCOPY | `\f` |
| | PC | `\f` |
| | TACLAN | `\f` |
| | LPD | `\f` |
| 9015 | DIRECT | `\f` |
| | HARDCOPY | `\f` |
| | PC | `\f` |
| | TACLAN | `\f` |
| | LPD | `\f` |
| 9021 | DIRECT | `\e&l0H` |
| | HARDCOPY | `\e&l0H` |
| | PC | `\e&l0H` |
| | TACLAN | `\e&l0H` |
| | LPD | `\e&l0H` |
| 9022 | DIRECT | `\e\x19J` |
| | HARDCOPY | `\e\x19J` |
| | PC | `\e\x19J` |
| | TACLAN | `\e\x19J` |
| | LPD | `\e\x19J` |
| 9022-200 | DIRECT | `\e&l0H` |
| | HARDCOPY | `\e&l0H` |
| | PC | `\e&l0H` |
| | TACLAN | `\e&l0H` |
| | LPD | `\e&l0H` |

| Printer type | Access mode | Default values for eject |
|---|---|---|
| 9026-PCL | DIRECT | `\e&10H` |
| | HDLC | `\e&10H` |
| | PC | `\e&10H` |
| | TACLAN | `\e&10H` |
| | LPD | `\e&10H` |
| 9097 | DIRECT | `\f` |
| | HARDCOPY | `\f` |
| | PC | `\f` |
| | TACLAN | `\f` |
| | LPD | `\f` |
| DJET | DIRECT | `\e&10H` |
| | HARDCOPY | `\e&10H` |
| | PC | `\e&10H` |
| | TACLAN | `\e&10H` |
| | LPD | `\e&10H` |
| other printers | | `<empty string>` |

*Example*

The string `f` is defined as the escape sequence for the eject function.

```
#
# 'eject' (eject paper at end of job) translation
#
eject=\f,
#
```

## eoprt

The keyword eoprt corresponds to boprt and defines an escape sequence that is sent at the end of a print job.

For printers that support various emulations (e.g. if both PostScript and PCL are available on the printer), boprt can be used to select a particular emulation at the end of a print job.

*Syntax*

> eoprt has the data type String and can have a maximum length of 1024 characters.

*Default values*

| Printer type | Default values for eoprt |
|---|---|
| 9025 | `\\DF0;\\];` |
| 9045 | `\n00xFF` |
| 9026-RENO | `\\DF0;\\];` |
| 9026-PCL | `\eE` |
| other printer types | `<empty string>` |

*Example*

In the following example, the input is made in PostScript; internally, the printer language PJL is used.

```
#
# Set PCL emulation at the end of each print job
#
eoprt=\e%-12345X@PJL ENTER LANGUAGE = PCL\r\n,
#
# End of printer parameter file
#
```

## etx

The keyword etx specifies whether a printer can be operated with the ETX-ACK protocol.
In order to use ETX-ACK, the parameter SYNCHRONISATION=*PRINTER must also be
specified in the ADD-SPOOL-DEVICE command.

*Syntax*

etx has the data type Boolean.

*Default values*

| Printer type | Default values for etx |
|---|---|
| 4011 | on |
| 4813 | on |
| 9000 | on |
| 9001 | on |
| 9013 | on |
| 9001-31 | on |
| 9011 | on |
| 9012 | on |
| 9014 | on |
| 9015 | on |
| 9022 | on |
| 9022-200 | on |
| 9097 | on |
| other printers | off |

*Example*

The following example specifies that ETX-ACK is supported.

```
#
# Specify that the ETX-ACK is supported
#
etx,
#
```

## intray

An input tray can be selected in the PRINT-DOCUMENT command with the INPUT-TRAY-NUMBER operand. If the value *STD is given (default value), the input tray number specified by the SPOOL device definition (operand DEFAULT-TRAY-NUMBER) is used.

The keyword intray defines escape sequences for the paper type selection. It is useful for generic printer types for which either the function is not supported or restricted to two input trays selection.

Attention should be paid that the assigned values replace the default values defined by RSO for generic printer types. Furthermore, no validation of the escape sequence is performed by RSO. The input tray number given in the key is not validated against the available number in the target printer. Selecting a tray that does not exist may lead to printer errors.

*Syntax*

> intray has the data type KeyStringList.
> The key consists of decimal digits interpreted as a tray number or a string of alphanumeric characters interpreted as a paper type.
> The string defines an escape sequence to be sent to the printer accordingly and can have a maximum length of 255 characters.
>
> The keywords for paper types are:
>
> MANUAL, A3, A4, A5, B4, B5, FOLIO, INVOICE, EXEC, LEGAL, LETTER, DOUBLE-LETTER, MONARCH, COMMERCIAL-10, DL, and C5.

*Default value*

Please refer to the description of the INPUT-TRAY-NUMBER operand of the PRINT-DOCUMENT command for the default values available by device type (see the manual "Spool & Print - Commands (BS2000/OSD)").

*Example*

The following example shows how to select the manual tray and the tray 1 for a 9000-PCL printer, which is in reality a 4830-PCL printer.

```
#
# selection of the manual tray and the tray 1 for a 4830 printer.
#
intray=%MANUAL:!R! PSRC 0; EXIT;
   %1:!R! PSRC 1; EXIT;,
```

## ippfqdn

The keyword **ippfqdn** specifies the fully qualified Domain Name (FQDN) for an IPP printer.

*Syntax*

ippfqdn has the data type String and can have a maximum length of 1023 characters.

*Default values*

| Printer type | Default values for ippfqdn |
|---|---|
| all remote device types | |

*Example*

The following example shows a printer parameter file in which the printer path is given for the IPP printer.

```
#
# Give the FQDN for IPP printers.
#
ippfqdn=d241pic4.osl.oce.net,
```

## ippuri

The keyword ippuri defines the URI related to the IPP printer.

*Syntax*

ippuri has the data type String and can have a maximum length of 1023 characters.

*Default values*

| Printer type | Default values for ippuri |
|---|---|
| all remote device types | |

*Example*

The following example shows a printer parameter file in which the printer path is given for the IPP printer.

```
#
# Give the printer uri for IPP printers.
#
ippuri=10.29.167.19:631/ipp,
```

## lpdnotsn

If the keyword lpdnotsn is used in a printer parameter file, then the user ID 'RSO' is used in the LPD control file, provided that ACCESS-TYPE=LPD. If a different access type has been defined, the keyword lpdnotsn is ignored.

*Syntax*

lpdnotsn has the data type Boolean

*Default values*

| Printer type | Default value for lpdnotsn |
|---|---|
| all remote device types | off |

*Example*

lpdnotsn is activated in the following example.

```
#
# Select RSO as user identification
#
lpdnotsn,
#
```

## outtray

An output tray can be selected with the OUTPUT-TRAY-NUMBER operand of the PRINT-DOCUMENT command.

The keyword outtray defines escape sequences for the output tray selection. It is useful for generic printer types for which either the function is not supported or restricted to two output trays selection.

Attention should be paid that the assigned values replace the default values defined by RSO for generic printer types. Furthermore, no validation of the escape sequence is performed by RSO. The tray number given in the key is not validated against the available number in the target printer. Selecting a tray that does not exist may lead to printer errors.

*Syntax*

> outtray has the data type KeyStringList.
> The key consists of decimal digits interpreted as a tray number.
> The string defines an escape sequence to be sent to the printer accordingly and can have a maximum length of 255 characters.

*Default values*

Please refer to the description of the OUTPUT-TRAY-NUMBER operand of the PRINT-DOCUMENT command for the default values available by device type (see the manual "Spool & Print - Commands (BS2000/OSD)")..

*Example*

The following example shows how to select the lower output tray with activation of the sheet-cutter for every page for a 9000-PCL printer, which is in reality a 4850-PCL printer.

```
#
# selection of the lower output tray with each page cut.
#
outtray=%3:\e&l12G,
```

## ovlname

For several printer types, the operand OVERLAY of the PRINT-DOCUMENT command can be used to specify an overlay text (DIA).

The keyword ovlname defines the name under which the DIA is stored in the printer.

*Syntax*

> ovlname has the data type String and can have a maximum length of 8 characters.

*Default values*

| Printer type | Default values for ovlname |
|---|---|
| 2030-PCL | 32767 |
| 4818-PCL | 32767 |
| 4821-PCL | 32767 |
| 4822-PCL | 32767 |
| 4824-PCL | 32767 |
| 4825-PCL | 32767 |
| 4830-PCL | 32767 |
| 4850-PCL | 32767 |
| 9000-PCL | 32767 |
| 9021 | 32767 |
| 9022-200 | 32767 |
| 9026-PCL | 32767 |
| other printers | <empty string> |

*Example*

The example below specifies 100 as the name of the overlay.

```
#
# Specifies an alternate overlay name
#
ovlname=100,
#
```

## pcopies

The selection of the number of page copies is possible using the PAGE-COPIES operand of the PRINT-DOCUMENT command.

The keyword pcopies allows selecting an existing treatment when the page copies function is selected. It is useful for generic printer types for which the function is not supported.

Attention should be paid that the assigned values replace the default values defined by RSO for the original printer types.

*Syntax*

pcopies has the data type LikeString and the RSO-known printer type can have a maximum length of 9 characters.

*Default values*

The default value for pcopies depends on the device type and the access mode.

| Printer type | Access Mode | Default values for pcopies |
|---|---|---|
| 2030-PCL | TACLAN | `\e&l00X` |
| | LPD | `\e&l00X` |
| 4818-PCL | DIRECT | `\e&l00X` |
| | HARDCOPY | `\e&l00X` |
| | PC | `\e&l00X` |
| | TACLAN | `\e&l00X` |
| | LPD | `\e&l00X` |
| 4821-PCL | DIRECT | `\e&l00X` |
| | HARDCOPY | `\e&l00X` |
| | PC | `\e&l00X` |
| | TACLAN | `\e&l00X` |
| | LPD | `\e&l00X` |
| 4822-PCL | DIRECT | `\e&l00X` |
| | HARDCOPY | `\e&l00X` |
| | PC | `\e&l00X` |
| | TACLAN | `\e&l00X` |
| | LPD | `\e&l00X` |

| Printer type | Access Mode | Default values for pcopies |
|---|---|---|
| 4824-PCL | DIRECT | `\e&l00X` |
| | HARDCOPY | `\e&l00X` |
| | PC | `\e&l00X` |
| | TACLAN | `\e&l00X` |
| | LPD | `\e&l00X` |
| 4825-PCL | DIRECT | `\e&l00X` |
| | HARDCOPY | `\e&l00X` |
| | PC | `\e&l00X` |
| | TACLAN | `\e&l00X` |
| | LPD | `\e&l00X` |
| 4830-PCL | DIRECT | `\e&l00X` |
| | HARDCOPY | `\e&l00X` |
| | PC | `\e&l00X` |
| | TACLAN | `\e&l00X` |
| | LPD | `\e&l00X` |
| 4850-PCL | TACLAN | `\e&l00X` |
| | LPD | `\e&l00X` |
| 9000-PCL | DIRECT | `\e&l00X` |
| | HARDCOPY | `\e&l00X` |
| | PC | `\e&l00X` |
| | TACLAN | `\e&l00X` |
| | LPD | `\e&l00X` |
| 9000-PS | TACLAN | `/#copies\s000\sdef\n` |
| | LPD | `/#copies\s000\sdef\n` |
| 9021 | DIRECT | `\e&l00X` |
| | HARDCOPY | `\e&l00X` |
| | PC | `\e&l00X` |
| | TACLAN | `\e&l00X` |
| | LPD | `\e&l00X` |

| Printer type | Access Mode | Default values for pcopies |
|---|---|---|
| 9022 | DIRECT | `\x1C(00` |
| | HARDCOPY | `\x1C(00` |
| | PC | `\x1C(00` |
| | TACLAN | `\x1C(00` |
| | LPD | `\x1C(00` |
| 9022-200 | DIRECT | `\e&l00X` |
| | HARDCOPY | `\e&l00X` |
| | PC | `\e&l00X` |
| | TACLAN | `\e&l00X` |
| | LPD | `\e&l00X` |
| 9025 | DIRECT | `\\NC000;` |
| | HDLC | `\\NC000;` |
| | PC | `\\NC000;` |
| | TACLAN | `\\NC000;` |
| | LPD | `\\NC000;` |
| 9026-RENO | DIRECT | `\\NC000;` |
| | HDLC | `\\NC000;` |
| | PC | `\\NC000;` |
| | TACLAN | `\\NC000;` |
| | LPD | `\\NC000;` |
| 9026-PCL | DIRECT | `\e/\xFF0F\e&l00X` |
| | HDLC | `\e/\xFF0F\e&l00X` |
| | PC | `\e/\xFF0F\e&l00X` |
| | TACLAN | `\e/\xFF0F\e&l00X` |
| | LPD | `\e/\xFF0F\e&l00X` |
| Other printers | | `<empty string>` |

*Example*

The following example shows a printer parameter file in which the escape sequence sent for the 4821-PCL printers is to be used for the page copies processing.

```
#
# The escape sequence sent for the 4821-PCL printers is to be used.
#
pcopies=like:4821-PCL,
```

## pjl

The keyword pjl specifies whether a printer understands the full scope of PJL command.

If pjl is specified, RSO uses PJL commands to execute the following actions:

–   Select the printer language corresponding to the RSO printer type.
    Up to now, only a PCL emulation or a PostScript emulation could be selected.
    If, for example, pjl was set for a printer of type 9000-PS, this causes RSO to send the
    command that sets the PostScript emulation.

–   Output the string "RSO job:xxxx" on the printer display, where xxxx stands for the TSN
    of the RSO print job.

–   Query the printer status, if POLLING=*YES was specified.

–   If SYNCHRO=*PRINTER was specified, wait for PJL to confirm completion of each print
    job. This ensures that the print jobs are successfully completed.

*Syntax*

   pjl has the data type Boolean.

*Default values*

By default pjl is activated for the following printers:
4821-PCL, 4822-PCL, 4825-PCL, 4830-PCL, 4850-PCL

For all other printers, pjl is deactivated.

*Example*

The following example specifies that PJL commands are supported.

```
#
# Specify that the PJL is supported
#
pjl,
#
```

## prescrib

If the keyword prescrib is specified in a printer parameter file, RSO uses PRESCRIBE II commands to execute the following actions on Kyocera printers, e.g. 4822, 4825 or 4830 (provided that ACCESS-TYPE=TACLAN was specified):

– Select the printer language required for the RSO device type.
  Up to now, only a PCL emulation, an EPSON-LQ emulation, an IBM Proprinter emulation or a PostScript emulation could be selected for the RSO device types 9000-PCL, 9000-EPLQ, 9000-PRO and 9000-PS.

– Query the printer status (this requires POLLING=*YES to be specified in the device definition).

*Syntax*

prescrib has the data type Boolean.

*Default value*

By default prescrib is activated for all printers.

*Example*

1. A printer parameter file containing the keyword prescib is created with any editor (e.g. EDT):

```
#
# Activate prescribe II language for printer status echoes
#
prescrib,
#
```

2. This file is stored under the following name:

```
$SYSSPOOL.SYSPAR.PRINTER-PARAM.PRESCRIB
```

3. The RSO printer definition for an EPSON LQ emulation is modified by assigning the
   value '9000-EPLQ' as the device type and the suffix value 'PRESCRIB' (suffix of the
   printer parameter file) as the printer parameter file:

```
/START-SPSERVE
//OPEN-PARAMETER-FILE PARAMETER-FILE=*SPOOL-PARAMETERS
//MOD-SPOOL-DEVICE printer name,
//DEVICE-TYPE=9000-EPLQ,
//PRINTER-PARAM-FILE=PRESCRIB
//…
//POLLING=*YES
//END
```

4. When the printer is started, it is switched to the EPSON LQ emulation and the printer
   status outputs are handled in the PRESCRIBE II language.

*Notes*

– If the PJL printer language is used in the same printer parameter file (keyword pjl), the
  activation of PRESCRIBE II is ignored.

– Use of the keyword seh takes precedence over prescrib.

– Information on the printer status is sent via the serial interface or network interface -
  there is no specification for the parallel interface. If your printer is connected to the LAN
  via the parallel interface, POLLING=*YES should not be used together with the keyword
  prescrib in the printer parameter file.

– For the PRESCRIBE II start sequence, RSO uses the default value !R! set by the
  manufacturer. Any change to this value via the SRC or FRPO P9 commands causes
  RSO to output the PRESCRIBE II commands as normal text.

– An RSO trace containing PRESCRIBE II commands cannot be printed correctly on
  Kyocera printers because the printer interprets these commands. Use a different printer
  or edit the trace to change the string !R! into, for example, 'R'.

## reset

The keyword reset defines an escape sequence for the Reset function.
This escape sequence is sent between the header page and the document, and between the document and the Trailer page.

*Syntax*

> reset has the data type String and can have a maximum length of 255 characters.

*Default values*

The default value for reset depends on the device type and access mode.

| Printer type | Access mode | Default values for reset |
| --- | --- | --- |
| 2030-PCL | TACLAN | \e9\e&l1X\e*rB\eZ\e&s1C |
| | LPD | \e9\e&l1X\e*rB\eZ\e&s1C |
| 4011 | DIRECT | \r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6 |
| | HARDCOPY | \r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6 |
| | PC | \r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6 |
| | TACLAN | \r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6 |
| | LPD | \r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6 |
| 4812 | DIRECT | \e9\e&l1X\e*rB\eZ\e&s1C |
| | HARDCOPY | \e9\e&l1X\e*rB\eZ\e&s1C |
| | PC | \e9\e&l1X\e*rB\eZ\e&s1C |
| | TACLAN | \e9\e&l1X\e*rB\eZ\e&s1C |
| | LPD | \e9\e&l1X\e*rB\eZ\e&s1C |
| 4813 | DIRECT | \r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6 |
| | HARDCOPY | \r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6 |
| | PC | \r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6 |
| | TACLAN | \r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6 |
| | LPD | \r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6 |
| 4818-PCL | DIRECT | \e9\e&l1X\e*rB\eZ\e&s1C |
| | HARDCOPY | \e9\e&l1X\e*rB\eZ\e&s1C |
| | PC | \e9\e&l1X\e*rB\eZ\e&s1C |
| | TACLAN | \e9\e&l1X\e*rB\eZ\e&s1C |
| | LPD | \e9\e&l1X\e*rB\eZ\e&s1C |

| Printer type | Access mode | Default values for reset |
|---|---|---|
| 4821-PCL | DIRECT | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | HARDCOPY | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | PC | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | TACLAN | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | LPD | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| 4822-PCL | DIRECT | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | HARDCOPY | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | PC | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | TACLAN | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | LPD | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| 4824-PCL | DIRECT | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | HARDCOPY | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | PC | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | TACLAN | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | LPD | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| 4825-PCL | DIRECT | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | HARDCOPY | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | PC | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | TACLAN | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | LPD | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| 4830-PCL | DIRECT | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | HARDCOPY | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | PC | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | TACLAN | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | LPD | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| 4850-PCL | TACLAN | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | LPD | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| 8121 | DIRECT | `<empty string>` |
| | HARDCOPY | `<empty string>` |
| 8122 | DIRECT | `<empty string>` |
| | HARDCOPY | `<empty string>` |

| Printer type | Access mode | Default values for reset |
|---|---|---|
| 9000 | DIRECT | `<empty string>` |
| | HARDCOPY | `<empty string>` |
| | APPLICATION | `<empty string>` |
| | HDLC | `<empty string>` |
| | PC | `<empty string>` |
| | HARD9751 | `<empty string>` |
| | TACLAN | `<empty string>` |
| | LPD | `<empty string>` |
| 9000-EPFX | TACLAN | `\x12\x3C\e7\eB\0\eD\0\eH\el`<br>`\x01\ep0\eT\ew0` |
| | LPD | `\x12\x3C\e7\eB\0\eD\0\eH\el`<br>`\x01\ep0\eT\ew0` |
| 9000-EPLQ | TACLAN | `\x12\x3C\e7\eB\0\eD\0\eH\el`<br>`\x01\ep0\eT\ew0` |
| | LPD | `\x12\x3C\e7\eB\0\eD\0\eH\el`<br>`\x01\ep0\eT\ew0` |
| 9000-EPSQ | TACLAN | `\x12\x3C\e7\eB\0\eD\0\eH\el`<br>`\x01\ep0\eT\ew0` |
| | LPD | `\x12\x3C\e7\eB\0\eD\0\eH\el`<br>`\x01\ep0\eT\ew0` |
| 9000-PCL | DIRECT | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | HARDCOPY | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | PC | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | TACLAN | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| | LPD | `\e9\e&l1X\e*rB\eZ\e&s1C` |
| 9000-PRO | TACLAN | `\eI\0\eF\eH\e0\eW0\e-0\e_0\eP0`<br>`\x3C\eR\eX\x01x\r` |
| | LPD | `\eI\0\eF\eH\e0\eW0\e-0\e_0\eP0`<br>`\x3C\eR\eX\x01x\r` |
| 9000-PS | TACLAN | `/Courier findfont RsoScale`<br>` RsoFont\n` |
| | LPD | `/Courier findfont RsoScale`<br>` RsoFont\n` |

| Printer type | Access mode | Default values for reset |
|---|---|---|
| 9001 | DIRECT | `\r\e<\e[\sE\e[s\e[{` |
| | HARDCOPY | `\r\e<\e[\sE\e[s\e[{` |
| | PC | `\r\e<\e[\sE\e[s\e[{` |
| | HARD9751 | `\r\e<\e[\sE\e[s\e[{` |
| | TACLAN | `\r\e<\e[\sE\e[s\e[{` |
| | LPD | `\r\e<\e[\sE\e[s\e[{` |
| 9001-31 | DIRECT | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
| | HARDCOPY | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
| | PC | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
| | HARD9751 | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
| | TACLAN | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
| | LPD | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
| 9002 | DIRECT | `<empty string>` |
| | HARDCOPY | `<empty string>` |
| 9003 | DIRECT | `\e4` |
| | HARDCOPY | `\e4` |
| | PC | `\e4` |
| 9004 | HARDCOPY | `\eQ` |
| | PC | `\eQ` |
| | HARD9751 | `\eQ` |
| 9011 | DIRECT | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
| | HARDCOPY | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
| | PC | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
| | TACLAN | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
| | LPD | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
| 9012 | DIRECT | `\r\e<\e[\sE\e[s\e[{\e[=w\e\s3` |
| | HARDCOPY | `\r\e<\e[\sE\e[s\e[{\e[=w\e\s3` |
| | PC | `\r\e<\e[\sE\e[s\e[{\e[=w\e\s3` |
| | TACLAN | `\r\e<\e[\sE\e[s\e[{\e[=w\e\s3` |
| | LPD | `\r\e<\e[\sE\e[s\e[{\e[=w\e\s3` |

| Printer type | Access mode | Default values for reset |
|---|---|---|
| 9013 | DIRECT | \r\e<\e[\sE\e[s\e[{ |
| | HARDCOPY | \r\e<\e[\sE\e[s\e[{ |
| | PC | \r\e<\e[\sE\e[s\e[{ |
| | TACLAN | \r\e<\e[\sE\e[s\e[{ |
| | LPD | \r\e<\e[\sE\e[s\e[{ |
| 9014 | DIRECT | \r\e[100;100\sB\e[\sE\e[s\e[{ |
| | HARDCOPY | \r\e[100;100\sB\e[\sE\e[s\e[{ |
| | PC | \r\e[100;100\sB\e[\sE\e[s\e[{ |
| | TACLAN | \r\e[100;100\sB\e[\sE\e[s\e[{ |
| | LPD | \r\e[100;100\sB\e[\sE\e[s\e[{ |
| 9015 | DIRECT | \r\e[100;100\sB\e[\sE\e[s\e[{ |
| | HARDCOPY | \r\e[100;100\sB\e[\sE\e[s\e[{ |
| | PC | \r\e[100;100\sB\e[\sE\e[s\e[{ |
| | TACLAN | \r\e[100;100\sB\e[\sE\e[s\e[{ |
| | LPD | \r\e[100;100\sB\e[\sE\e[s\e[{ |
| 9021 | DIRECT | \e9\e&l1X\e*rB\eZ\e&s1C |
| | HARDCOPY | \e9\e&l1X\e*rB\eZ\e&s1C |
| | PC | \e9\e&l1X\e*rB\eZ\e&s1C |
| | TACLAN | \e9\e&l1X\e*rB\eZ\e&s1C |
| | LPD | \e9\e&l1X\e*rB\eZ\e&s1C |
| 9022 | DIRECT | \r\eT001\e*9\eQ\x1C(00 |
| | HARDCOPY | \r\eT001\e*9\eQ\x1C(00 |
| | PC | \r\eT001\e*9\eQ\x1C(00 |
| | TACLAN | \r\x0F\eT001\e*9\eQ\x1C(00 |
| | LPD | \r\x0F\eT001\e*9\eQ\x1C(00 |
| 9022-200 | DIRECT | \e9\e&l1X\e*rB\eZ\e&s1C |
| | HARDCOPY | \e9\e&l1X\e*rB\eZ\e&s1C |
| | PC | \e9\e&l1X\e*rB\eZ\e&s1C |
| | TACLAN | \e9\e&l1X\e*rB\eZ\e&s1C |
| | LPD | \e9\e&l1X\e*rB\eZ\e&s1C |

| Printer type | Access mode | Default values for reset |
|---|---|---|
| 9025 | DIRECT | `\\DF0;\\EA0;\\EL0;\\ET0;\\FA0;` `\\CD0;\\ALN;\\ATN;\\SS0;\\CBT;` `\\CFT;\\NC1;\\CA-1;\\M200;` `\\CR;\\UX1,1;\UY1,1;\\Y45;` |
|  | HDLC | `\\DF0;\\EA0;\\EL0;\\ET0;\\FA0;` `\\CD0;\\ALN;\\ATN;\\SS0;\\CBT;` `\\CFT;\\NC1;\\CA-1;\\M200;` `\\CR;\\UX1,1;\UY1,1;\\Y45;` |
|  | PC | `\\DF0;\\EA0;\\EL0;\\ET0;\\FA0;` `\\CD0;\\ALN;\\ATN;\\SS0;\\CBT;` `\\CFT;\\NC1;\\CA-1;\\M200;` `\\CR;\\UX1,1;\UY1,1;\\Y45;` |
|  | TACLAN | `\\DF0;\\EA0;\\EL0;\\ET0;\\FA0;` `\\CD0;\\ALN;\\ATN;\\SS0;\\CBT;` `\\CFT;\\NC1;\\CA-1;\\M200;` `\\CR;\\UX1,1;\UY1,1;\\Y45;` |
|  | LPD | `\\DF0;\\EA0;\\EL0;\\ET0;\\FA0;` `\\CD0;\\ALN;\\ATN;\\SS0;\\CBT;` `\\CFT;\\NC1;\\CA-1;\\M200;` `\\CR;\\UX1,1;\UY1,1;\\Y45;` |
| 9026-PCL | DIRECT | `\e9\e&l1X\e*rB\eZ\e&s1C` |
|  | HDLC | `\e9\e&l1X\e*rB\eZ\e&s1C` |
|  | PC | `\e9\e&l1X\e*rB\eZ\e&s1C` |
|  | TACLAN | `\e9\e&l1X\e*rB\eZ\e&s1C` |
|  | LPD | `\e9\e&l1X\e*rB\eZ\e&s1C` |

| Printer type | Access mode | Default values for reset |
|---|---|---|
| 9026-RENO | DIRECT | `\\DF0;\\EA0;\\EL0;\\ET0;\\FA0;`<br>`\\CD0;\\ALN;\\ATN;\\SS0;\\CBT;`<br>`\\CFT;\\NC1;\\CA-1;\\M200;`<br>`\\CR;\\UX1,1;\UY1,1;\\Y45;` |
|  | HDLC | `\\DF0;\\EA0;\\EL0;\\ET0;\\FA0;`<br>`\\CD0;\\ALN;\\ATN;\\SS0;\\CBT;`<br>`\\CFT;\\NC1;\\CA-1;\\M200;`<br>`\\CR;\\UX1,1;\UY1,1;\\Y45;` |
|  | PC | `\\DF0;\\EA0;\\EL0;\\ET0;\\FA0;`<br>`\\CD0;\\ALN;\\ATN;\\SS0;\\CBT;`<br>`\\CFT;\\NC1;\\CA-1;\\M200;`<br>`\\CR;\\UX1,1;\UY1,1;\\Y45;` |
|  | TACLAN | `\\DF0;\\EA0;\\EL0;\\ET0;\\FA0;`<br>`\\CD0;\\ALN;\\ATN;\\SS0;\\CBT;`<br>`\\CFT;\\NC1;\\CA-1;\\M200;`<br>`\\CR;\\UX1,1;\UY1,1;\\Y45;` |
|  | LPD | `\\DF0;\\EA0;\\EL0;\\ET0;\\FA0;`<br>`\\CD0;\\ALN;\\ATN;\\SS0;\\CBT;`<br>`\\CFT;\\NC1;\\CA-1;\\M200;`<br>`\\CR;\\UX1,1;\UY1,1;\\Y45;` |
| 9045-ANSI | TACLAN | `\e[0;0\sB\e\\\e[0m` |
|  | LPD | `\e[0;0\sB\e\\\e[0m` |
| 9046 | TACLAN | `\e[0;0\sB\e\\\e[0m` |
|  | LPD | `\e[0;0\sB\e\\\e[0m` |
| 9097 | DIRECT | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
|  | HARDCOPY | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
|  | PC | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
|  | TACLAN | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
|  | LPD | `\r\e<\e[\sE\e[s\e[{\e[=w\e!4\e!6` |
| 9645 | APPLICATION | `<empty string>` |
| DJET | DIRECT | `\e9\e&l1X\e*rB\eZ\e&s1C` |
|  | HARDCOPY | `\e9\e&l1X\e*rB\eZ\e&s1C` |
|  | PC | `\e9\e&l1X\e*rB\eZ\e&s1C` |
|  | TACLAN | `\e9\e&l1X\e*rB\eZ\e&s1C` |
|  | LPD | `\e9\e&l1X\e*rB\eZ\e&s1C` |

*Example*

The example below specifies the string `eQ` as the escape sequence for the reset function.

```
#
# 'Reset' translation
#
reset=\eQ,
#
```

## rotation

The selection of the orientation is possible using the ROTATION operand of the PRINT-DOCUMENT command.

The keyword rotation allows selecting an existing treatment when an orientation is selected. It is useful for generic printer types for which the function is not supported.

Attention should be paid that the assigned values replace the default values defined by RSO for the original printer types.

*Syntax*

> rotation has the data type LikeString and the RSO-known printer type can have a maximum length of 9 characters.

*Default value*

The default value for rotation depends on the device type and the access mode.

| Printer type | Access Mode | Default values for orientation |
|---|---|---|
| 2030-PCL | TACLAN | \e&l00 |
|  | LPD | \e&l00 |
| 4812 | DIRECT | \e&l00 |
|  | HARDCOPY | \e&l00 |
|  | PC | \e&l00 |
|  | TACLAN | \e&l00 |
|  | LPD | \e&l00 |
| 4818-PCL | DIRECT | \e&l00 |
|  | HARDCOPY | \e&l00 |
|  | PC | \e&l00 |
|  | TACLAN | \e&l00 |
|  | LPD | \e&l00 |
| 4821-PCL | DIRECT | \e&l00 |
|  | HARDCOPY | \e&l00 |
|  | PC | \e&l00 |
|  | TACLAN | \e&l00 |
|  | LPD | \e&l00 |

| Printer type | Access Mode | Default values for orientation |
|---|---|---|
| 4822-PCL | DIRECT | \e&100 |
| | HARDCOPY | \e&100 |
| | PC | \e&100 |
| | TACLAN | \e&100 |
| | LPD | \e&100 |
| 4824-PCL | DIRECT | \e&100 |
| | HARDCOPY | \e&100 |
| | PC | \e&100 |
| | TACLAN | \e&100 |
| | LPD | \e&100 |
| 4825-PCL | DIRECT | \e&100 |
| | HARDCOPY | \e&100 |
| | PC | \e&100 |
| | TACLAN | \e&100 |
| | LPD | \e&100 |
| 4830-PCL | DIRECT | \e&100 |
| | HARDCOPY | \e&100 |
| | PC | \e&100 |
| | TACLAN | \e&100 |
| | LPD | \e&100 |
| 4850-PCL | TACLAN | \e&100 |
| | LPD | \e&100 |
| 9000-PCL | DIRECT | \e&100 |
| | HARDCOPY | \e&100 |
| | PC | \e&100 |
| | TACLAN | \e&100 |
| | LPD | \e&100 |
| 9021 | DIRECT | \e&100 |
| | HARDCOPY | \e&100 |
| | PC | \e&100 |
| | TACLAN | \e&100 |
| | LPD | \e&100 |

| Printer type | Access Mode | Default values for orientation |
|---|---|---|
| 9022-200 | DIRECT | `\e&l00` |
|  | HARDCOPY | `\e&l00` |
|  | PC | `\e&l00` |
|  | TACLAN | `\e&l00` |
|  | LPD | `\e&l00` |
| 9025 | DIRECT | `\\PR0;\\PX;\\PY;` |
|  | HDLC | `\\PR0;\\PX;\\PY;` |
|  | PC | `\\PR0;\\PX;\\PY;` |
|  | TACLAN | `\\PR0;\\PX;\\PY;` |
|  | LPD | `\\PR0;\\PX;\\PY;` |
| 9026-RENO | DIRECT | `\\PR0;\\PX;\\PY;` |
|  | HDLC | `\\PR0;\\PX;\\PY;` |
|  | PC | `\\PR0;\\PX;\\PY;` |
|  | TACLAN | `\\PR0;\\PX;\\PY;` |
|  | LPD | `\\PR0;\\PX;\\PY;` |
| 9026-PCL | DIRECT | `\e&l00` |
|  | HDLC | `\e&l00` |
|  | PC | `\e&l00` |
|  | TACLAN | `\e&l00` |
|  | LPD | `\e&l00` |
| Other printers |  | `<empty string>` |

*Example*

The following example shows a printer parameter file in which the escape sequence sent for the 4822-PCL printers is to be used for the orientation processing.

```
#
# The escape sequence sent for the 4822-PCL printers is to be used.
#
rotation=like:4822-PCL,
```

## seh

The keyword seh specifies whether the SEH protocol is to be activated.
The SEH protocol is only supported by TCP/IP LAN printers which are connected to either
an SEH interface (InterCon IC3-ETHER Ethernet board for Kyocera printers,
IC4-ETHERBOX printer server or IC5-ETHERPOCKET) or a PSI interface (SEH Ethernet
board for 9014/9015 printers). This presupposes that the SEH firmware version 7.0.11F or
higher is installed.

The main advantage of the SEH protocol is improved reliability, in particular elimination of
the data loss problem. In addition, this protocol makes the printer status available, also via
the Centronics interface, so that printer problems can be detected more quickly and easily,
provided the printer itself supports this. If you have activated the SEH protocol for your
printer, these improvements will automatically be activated by RSO, regardless of the
values specified for the SYNCHRO and POLLING parameters.

With 9014/9015 printers connected via a PSI PM Ethernet board which uses the SEH
protocol, the ETX/ACK protocol is available. This protocol guarantees improved print
recovery and is used by RSO if SYNCHRO=PRINTER is specified.

The SEH protocol is supported for printers which were defined with ACCESS-
TYPE=TACLAN. The following table lists the RSO printer types which support the SEH
protocol, depending on the printer access mode. Also listed, irrespective of the SEH
protocol, are the possible values of the SYNCHRONIZATION and POLLING parameters,
depending on the printer language and interface (serial or Centronics).

| Printer type | IC3-ETHER for Kyocera | | IC4-ETHERBOX (V24 + Centronics) | | IC5-ETHERPOCKET (Centronics only) | | PSI PM-Ethernet (9014/9015) | |
|---|---|---|---|---|---|---|---|---|
| | SYNCH= PRINTER | POLLING =YES | SYNCH= PRINTER | POLLING =YES | SYNCH= PRINTER | POLLING =YES | SYNCH= PRINTER | POLLING =YES |
| 2030-PCL | | | [1) 3)] 4) | [1) 3)] 4) | - | - | | |
| 4011 | | | 2) 3) | 3) | - | - | | |
| 4812 | | | [2) 3)] 5) | 3) | - | - | | |
| 4818-PCL | | | 2) 3) | 3) | - | - | | |
| 4821-PCL | | | 1) 3) | 1) 3) | - | - | | |
| 4822-PCL | 1) | x | 1) 3) | 3) | - | - | | |
| 4824-PCL | | | [1) 3)] 4) | [1) 3)] 4) | - | - | | |
| 4825-PCL | 1) | x | 1) 3) | 3) | - | - | | |
| 4830-PCL | 1) | x | 1) 3) | 3) | - | - | | |
| 4850-PCL | | | 1) 3) | 3) | - | - | | |
| 9000-PCL | | | [1) 3)] 4) | [1) 3)] 4) | - | - | | |
| 9000-PS | | | [2) 3)] 5) | - | - | - | | |

| Printer type | IC3-ETHER for Kyocera | | IC4-ETHERBOX (V24 + Centronics) | | IC5-ETHERPOCKET (Centronics only) | | PSI PM-Ethernet (9014/9015) | |
|---|---|---|---|---|---|---|---|---|
| 9000-PRO | | | [2) 3)] 5) | - | - | - | | |
| 9000-EPFX | | | [2) 3)] 5) | - | - | - | | |
| 9000-EPLQ | | | [2) 3)] 5) | - | - | - | | |
| 9000-EPSQ | | | [2) 3)] 5) | - | - | - | | |
| 9014 | | | 2) 3) | 3) | - | - | 2) | - |
| 9015 | | | 2) 3) | 3) | - | - | 2) | - |
| 9021 | | | [2) 3)] 5) | - | - | - | | |
| 9022 | | | 2) 3) | 3) | - | - | | |
| 9022-200 | | | 2) 3) | - | - | - | | |
| 9025 | | | 3) | 3) | - | - | | |
| 9026-PCL | | | [2) 3)] 5) | - | - | - | | |
| 9026-RENO | | | 3) | 3) | - | - | | |
| 9045-ANSI | | | [2) 3)] 5) | - | - | - | | |
| 9046 | | | [2) 3)] 5) | 3) | - | - | | |
| DJET | | | [2) 3)] 5) | 3) | - | - | | |

x       supported

-       not supported. If it is specified anyway, this can cause the timeout message SRO0987 to be issued

1)      only supported if the printer supports the PCL5e/PJL language

2)      only supported if the printer supports the ETX/ACK protocol

3)      only supported via the serial interface (V24), not via Centronics

4)      only supported if the keyword pjl is specified in a printer parameter file assigned to the RSO device definition

5)      only supported if the keyword etx is specified in a printer parameter file assigned to the RSO device definition

Once it is activated, the SEH protocol is supported, regardless of the values specified for the SYNCHRO and POLLING parameters, i.e. the improvements due to the SEH protocol (prevention of data loss, display of printer status) are automatically available, even if SYNCHRO=*NETWORK and POLLING=*NO were specified.

SYNCHRO=*PRINTER and/or POLLING=*YES produce additional possibilities for print recovery (e.g. the restart page can be found more accurately) and for the display of the printer status (e.g. more types of printer malfunctions can be found). The completeness of the print job is not affected.

*Syntax*

seh has the data type Boolean.

*Default values*

By default seh is activated for all printers.

*Example*

Assuming that a printer is connected via an SEH/PSI interface, the SEH firmware version 7.0.11F or higher is installed and the SEH interface has been activated via the TCP/IP port number 2900, you instruct RSO as follows to monitor the printer with the SEH protocol:

1. A printer parameter file containing the keyword seh is created with any editor (e.g. EDT):

```
#
# Activate seh protocol for this printer
#
seh,
#
```

2. This file is stored under the following name:

```
$SYSSPOOL.SYSPAR.PRINTER-PARAM.SEH
```

3. The RSO printer definition is modified by specifying the value 2900 as the port number and the suffix value 'SEH' (suffix of the printer parameter file) as the printer parameter file:

```
/START-SPSERVE
//ASS
//MOD-SPOOL-DEVICE printer name,
//DEVICE-ACCESS=TCP(PORT-NAME=2900),
//PRINTER-PARAM-FILE=SEH
```

4. You can now start the printer; the SEH protocol will be activated automatically.

## sorter

A sorter mechanism can be selected with the OUTPUT-TRAY-NUMBER operand of the PRINT-DOCUMENT command.

The keyword sorter allows selecting an existing treatment when a sorter mechanism is selected. It is useful for generic printer types for which the function is not supported.

Attention should be paid that the assigned values replace the default values defined by RSO for the original printer types.

*Syntax*

sorter has the data type LikeString and the RSO-known printer type can have a maximum length of 9 characters.

*Default values*

The default value for sorter depends on the device type and the access mode.

| Printer type | Access Mode | Default values for sorter |
|---|---|---|
| 4822-PCL | DIRECT | `!R!\sxSTK;\s\s\s\sEXIT;` |
| | HARDCOPY | `!R!\sxSTK;\s\s\s\sEXIT;` |
| | PC | `!R!\sxSTK;\s\s\s\sEXIT;` |
| | TACLAN | `!R!\sxSTK;\s\s\s\sEXIT;` |
| | LPD | `!R!\sxSTK;\s\s\s\sEXIT;` |
| 4825-PCL | DIRECT | `!R!\sxSTK;\s\s\s\sEXIT;` |
| | HARDCOPY | `!R!\sxSTK;\s\s\s\sEXIT;` |
| | PC | `!R!\sxSTK;\s\s\s\sEXIT;` |
| | TACLAN | `!R!\sxSTK;\s\s\s\sEXIT;` |
| | LPD | `!R!\sxSTK;\s\s\s\sEXIT;` |
| 4830-PCL | DIRECT | `!R!\sxSTK;\s\s\s\sEXIT;` |
| | HARDCOPY | `!R!\sxSTK;\s\s\s\sEXIT;` |
| | PC | `!R!\sxSTK;\s\s\s\sEXIT;` |
| | TACLAN | `!R!\sxSTK;\s\s\s\sEXIT;` |
| | LPD | `!R!\sxSTK;\s\s\s\sEXIT;` |
| 9026-PCL | DIRECT | `\\OMO,;` |
| | HARDCOPY | `\\OMO,;` |
| | PC | `\\OMO,;` |
| | TACLAN | `\\OMO,;` |
| | LPD | `\\OMO,;` |

| Printer type | Access Mode | Default values for sorter |
|---|---|---|
| Other printers | | `<empty string>` |

*Example*

The following example shows a printer parameter file in which the escape sequence sent for the 4822-PCL printers is to be used for the duplex processing.

```
#
# The escape sequence sent for the 4822-PCL printers is to be used.
#
sorter=like:4822-PCL,
```

## speed

The keyword speed represents the print speed used by RSO for printers connected via LAN and defined with SYNCHRO=*NETWORK in the ADD-SPOOL-DEVICE command.

With the aid of the value specified in speed, RSO calculates a print time for each print buffer sent and waits this time before sending the next buffer.

*Syntax*

speed has a numerical value between 0 and 4095.
A unit must be specified. The following units may be specified:

| #p or #P | pages per minute |
| #l or #L | lines per minute |
| #c or #C | characters per second |

*Default values*

| Printer type | Default values for speed |
|---|---|
| 2030-PCL | #    30   #P |
| 4011 | #   300   #C |
| 4812 | #   160   #C |
| 4813 | #   600   #C |
| 4818-PCL | #     4   #P |
| 4821-PCL | #     8   #P |
| 4822-PCL | #    10   #P |
| 4824-PCL | #    16   #P |
| 4825-PCL | #    18   #P |
| 4830-PCL | #    28   #P |
| 4850-PCL | #    26   #P |
| 8121 | #    45   #C |
| 8122 | #    60   #C |
| 9000 | #   300   #C |
| 9000-PCL | #   400   #P |
| 9000-PRO | #   300   #C |
| 9000-PS | #   400   #P |
| 9000-EPFX | #   300   #C |
| 9000-EPLQ | #   300   #C |

| Printer type | Default values for speed |
|---|---|
| 9000-EPSQ | `#   300   #C` |
| 9001 | `#   150   #C` |
| 9001-31 | `#   200   #C` |
| 9002 | `#   270   #C` |
| 9003 | `#   250   #C` |
| 9004 | `#   30    #C` |
| 9011 | `#   300   #C` |
| 9012 | `#   400   #C` |
| 9013 | `#   300   #C` |
| 9014 | `#   600   #C` |
| 9015 | `#   700   #C` |
| 9021 | `#     4   #P` |
| 9022 | `#     8   #P` |
| 9022-200 | `#     8   #P` |
| 9025 | `#    20   #P` |
| 9026-PCL | `#    20   #P` |
| 9026-RENO | `#    20   #P` |
| 9045-ANSI | `# 1500   #L` |
| 9046 | `# 1200   #L` |
| 9097 | `#   180   #C` |
| 9645 | `#   250   #C` |
| DJET | `#   200   #C` |

*Examples*

In the following example, the print speed is specified as 123 characters per second.

```
#
# specific speed
#
speed # 123 #C,
#
```

The following example specifies that there is no wait time between sending individual print buffers. Since the value is 0, no unit need be specified.

```
#
# no wait between buffers
#
speed #0,
#
```

## 2byte

The keyword 2byte specifies whether the 9003 Printer uses the 2-byte displacement-escape characters.

With the aid of this keyword, it is possible to access IBM printers (type 328x) on the SNA network. These printers support only 2-byte displacement-escape characters.

With the aid of the keyword 2byte, the mode for printer driver is selected: 1-byte displacement-escape character or 2-byte displacement-escape character.

The keyword is valid only for the 9003 Printer; it is ignored by all other printers.

*Syntax*

> 2byte has the data type Boolean.

*Default value*

By default 2byte is deactivated.

*Example*

The following example shows a printer parameter file in which the 2-byte escape code is activated.

```
#
# Enable the double byte escape code
#
2byte,
#
```

## 2sided

The selection of the duplex type is possible using the ROTATION and the TWO-SIDED operand of the PRINT-DOCUMENT command.

The keyword 2sided allows selecting an existing treatment when two-sided printing is selected. It is useful for generic printer types for which the function is not supported.

Attention should be paid that the assigned values replace the default values defined by RSO for the original printer types.

*Syntax*

> 2sided has the data type LikeString and the RSO-known printer type can have a maximum length of 9 characters.

*Default values*

The default value for 2sided depends on the device type and the access mode.

| Printer type | Access Mode | Default values for 2sided |
|---|---|---|
| 2030-PCL | TACLAN | `\e&l0S` |
|  | LPD | `\e&l0S` |
| 4822-PCL | DIRECT | `\e&l0S` |
|  | HARDCOPY | `\e&l0S` |
|  | PC | `\e&l0S` |
|  | TACLAN | `\e&l0S` |
|  | LPD | `\e&l0S` |
| 4824-PCL | DIRECT | `\e&l0S` |
|  | HARDCOPY | `\e&l0S` |
|  | PC | `\e&l0S` |
|  | TACLAN | `\e&l0S` |
|  | LPD | `\e&l0S` |
| 4825-PCL | DIRECT | `\e&l0S` |
|  | HARDCOPY | `\e&l0S` |
|  | PC | `\e&l0S` |
|  | TACLAN | `\e&l0S` |
|  | LPD | `\e&l0S` |

| Printer type | Access Mode | Default values for 2sided |
|---|---|---|
| 4830-PCL | DIRECT | `\e&l0S` |
| | HARDCOPY | `\e&l0S` |
| | PC | `\e&l0S` |
| | TACLAN | `\e&l0S` |
| | LPD | `\e&l0S` |
| `4850-PCL` | TACLAN | `\e&l0S` |
| | LPD | `\e&l0S` |
| 9000-PCL | DIRECT | `\e&l0S` |
| | HARDCOPY | `\e&l0S` |
| | PC | `\e&l0S` |
| | TACLAN | `\e&l0S` |
| | LPD | `\e&l0S` |
| 9026-RENO | DIRECT | `\\OP0,,,0,,;` |
| | HDLC | `\\OP0,,,0,,;` |
| | PC | `\\OP0,,,0,,;` |
| | TACLAN | `\\OP0,,,0,,;` |
| | LPD | `\\OP0,,,0,,;` |
| 9000-PCL | DIRECT | `\e&l0S` |
| | HDLC | `\e&l0S` |
| | PC | `\e&l0S` |
| | TACLAN | `\e&l0S` |
| | LPD | `\e&l0S` |
| `Other printers` | | `<empty string>` |

*Example*

The following example shows a printer parameter file in which the escape sequence sent for the 4822-PCL printers is to be used for the duplex processing.
```
#
# The escape sequence sent for the 4822-PCL printers is to be used.
#
2sided=like:4822-PCL,
```

# 5.6  **Generating recovery rules**

Recovery rules can be used to change the way in which RSO handles errors that occur during connection setup to the printer and during printing. Thus, for example, RSO's standard reaction when a timeout occurs during printing is to place the print job in the KEEP queue and set the printer to the "STOP" status. A recovery rule assigned to the printer (by means of the device definition) could disable this standard reaction and instead cause the job to be repeated automatically as of the last, interrupted page.

Recovery rules are defined in a SAM file using any editor. A recovery rule is specified on each line of this file. Comment lines can be inserted in the file by setting the "#" character in the first position on each line. The lines with recovery rules have the following syntax:

<errorcode>,<actioncode>

<errorcode>            This code represents a "general" error that can either be a
                      connection problem (when RSO attempts to establish the
                      connection to the printer) or a current printer problem (when RSO
                      attempts to print on the printer).

<actioncode>          This code represents a "general" recovery action that is to be
                      performed when a "general" error occurs.

A description of the "general" error codes supported and the "general" recovery actions supported can be found in "General recovery actions" on page 678 and "General error codes" on page 679. When defining recovery rules, you must use the correct format, i.e. you must use uppercase and lowercase letters as they are given in the appendix.

The recovery rule method is similar to that for SINIX SPOOL V4.0. Consequently, care was taken to use the same "general" error codes and "general" recovery actions in RSO as in SINIX SPOOL V4.0.

*Example*

The following structure is typical of a recovery rule. This rule defines that RSO is to repeat the print job automatically as of the last, interrupted page if a timeout occurs during printing (e.g. if the printer has not responded within a certain period of time).

```
# This recovery rule file defines that RSO is to repeat the print job auto-
# matically as of the last, interrupted page if a timeout occurs.
#
PrinterTimeout,Restart
```

### Name of the recovery rule file

The names of the recovery rule files are composed of the following:

<public part>.<private part>

The public part must be the same for all recovery rule files, i.e. these files must be cataloged under the same catalog ID and the same user ID. In addition, a public prefix can be defined for recovery rule files. Systems support must define the public part using the SPSERVE statement MODIFY-SPOOL-PARAMETERS:

```
//MODIFY-SPOOL-PARAMETERS ...
 ,SPOOLOUT-OPTIONS=*PARAMETERS(...
 ,REC-RULES-PREFIX = *UNCHANGED / <partial-filename 2..38>)
```

The value for <partial-filename 2..38> determines the prefix of the recovery rule files. If no user ID is specified, the user ID TSOS is used as the default.

If the public part of the file name is not changed, the default value for the prefix is "$SYSSPOOL.SYSPAR.REC-RULES.". This means that all recovery rule files must be cataloged under the user ID SYSSPOOL and furnished with the prefix "SYSPAR.REC-RULES".

The private part of the file name identifies the individual recovery rule files. The next section describes how this part is defined and used.

### Using the recovery rule file

When the recovery rule file is generated, it must be assigned to a printer so that it can be used by RSO. For this purpose, systems support or an RSO device administrator can define the private part of the recovery rule file name in the device definition using the SPSERVE statement ADD-/MODIFY-SPOOL-DEVICE:

```
//ADD-SPOOL-DEVICE ... (or //MODIFY-SPOOL-DEVICE ...)
 ,PROCESSING-CONTROL=*PARAMETERS(...
 ,RECOVERY-RULES = *STD / *NONE / <composed-name 1..16>)
```

The value of <composed-name 1..16> represents the private part of the recovery rule file name. The entire file name is then formed by the public part defined in the SPOOL.PARAMETERS file (see above) and the private part specified here.

If a recovery rule file has been assigned to a printer, it is read when the START-PRINTER-OUTPUT command is issued. All recovery rules that are defined in the file replace the standard RSO actions specifically for this started printer.

If a problem occurs when the requested recovery rule file is accessed (e.g. a DMS error), message SRO0159 is output to the operator terminal. If the problem occurs when the contents of the recovery rule file are being analyzed (e.g. an invalid "general" action code), message SRO0157 is output to the operator terminal. In both cases, the requested recovery rule file is ignored and the standard RSO actions are performed in an error situation. The START-PRINTER-OUTPUT command is not rejected.

If more than one record is defined for the same "general" error code, only the first record is taken into account. However, if one of the other records is errored, the entire recovery rule file is rejected with message SRO0157.

If a printer error that has occurred is defined in the recovery rule file assigned to the printer, the associated recovery action is performed in any case, regardless of whether the RSO printer is a PUBLIC DEVICE (without a device administrator) or a PRIVATE DEVICE.

### Automatic restart after specific errors

As was described in the previous section, as of RSO V2.3A systems support can change the type of error handling used by RSO based on the recovery rule concept.

One of the "general" recovery actions that is supposed to occur after an error is an automatic restart. Depending on the type of error, the restart action performs one or more functions:

1.  Problems while setting up the connection to the printer

    If the problem occurs during the attempt to set up the connection to the printer, the restart action causes RSO to reattempt connection setup. If this retry is successful, printing starts automatically.

2.  Problems during printing

    If the problem occurs during printing, the restart action causes RSO to disconnect from the printer, reestablish the connection and repeat the print job as of the last, interrupted page.

The maximum number of attempts is determined in the device definition by means of the operand RESTART-ACTION=*PAR(LIMIT=NO/<1..255>). This operand replaces the "old" operand REPEAT-OPEN-CONNECT which, however, continues to be valid in batch jobs and procedures.

For a list of "general" error codes for which the restart action is defined as a standard recovery action, see "General error codes" on page 679.

## 5.7   OLTP interface - printing on RSO printers from UTM

OLTP (On Line Transaction Processing) is a message-oriented interface that is integrated in RSO in addition to the existing SPOOL&PRINT API interface.

As of RSO V3.0, OLTP applications can easily communicate with RSO printers using this OLTP interface. The OLTP interface in RSO can be used with the transaction monitor openUTM from V4.0.

Prior to the introduction of the OLTP interface, printer support for UTM was restricted to printers which were exclusively connected to terminal nodes in the TRANSDATA network and are accessible using the TRANSDATA-810 protocol.
The OLTP interface offers the advantage that UTM can use RSO to administer its printers, i.e. UTM has access to all printers that are supported by RSO, including, for instance, modern printer types connected via LAN or PC.

### 5.7.1   Assigning printers - UTM preparations

In order to print on an RSO printer from UTM, each desired printer must be defined as an RSO printer with an RSO name when generating UTM.

This is done with the operands PRONAM and PTYPE of the UTM control statement PTERM:

```
PTERM rso-name,
      PRONAM=*RSO,
      PTYPE=*RSO
```

UTM does not set up a transport link to these printers, but operates then via the OLTP interface of RSO. UTM reserves the printer from RSO and transfers the messages to be printed to RSO.

Detailed information on preparations to be made from UTM are given in the UTM documentation.

## 5.7.2  Assigning printers - RSO preparations

In order to print on an RSO printer from UTM, the following preparations must be made for RSO:

– each printer to be used for printing must be released for UTM

– the size of the RSO buffer must be matched to the size of the UTM message area.

**Releasing printers for UTM**

Before data can be sent from UTM to a printer supported by RSO, RSO systems support or the RSO device administrator must release the printer for UTM.

This is done using the ALLOWED-ACCESSES operand in the START-PRINTER-OUTPUT command. Which print jobs can be processed on which printers can be specified in a list.

```
/START-PRINTER-OUTPUT DEVICE-NAME=*RSO-PRINTER(),
                      ALLOWED-ACCESSES=*STD/list-poss(4): <c-string_1..4>
```

*STD means that the values 'RSO' and 'UTM' are set.

list-poss(4):<c-string_1..4>
specifies a list of allowed accesses. The following values are possible:

C'RSO'     RSO print jobs can be processed on the printer started.
C'UTM'     UTM print jobs can be processed on the printer started.

**Defining the RSO buffer size**

To printout messages of any length, the RSO buffer must be generated at least as large as the size of the message area in UTM.

Since the maximum size of the UTM buffer is 32 Kb, RSO systems support must also set the RSO buffer size to 32 Kb in a session in which UTM is running.

This is done using the REMOTE-BUFFER-SIZE operand in the MODIFY-SPOOL-PARAMETERS command:

```
/MODIFY-SPOOL-PARAMETERS ...
  ,SPOOLOUT-OPTIONS=*PARAMETERS(REMOTE-BUFFER-SIZE=32)
```

### 5.7.3  OLTP task management

OLTP task management is dynamic. It is not created automatically on starting RSO; rather an OLTP task that manages the requested printer and the associated buffer is created when the first RESERVE-PRINTER request is issued.

Several printers can be managed in one OLTP task. If several RESERVE-PRINTER requests are made, a new OLTP task is created.

An OLTP task is deleted when RELEASE-PRINTER statements have been issued for all the printers it manages.

In order to control the workload distribution between the OLTP interface and conventional spoolout jobs, RSO systems support can use the OLTP-OPTIONS operand in the SPSERVE statement MODIFY-SPOOL-PARAMETERS.

This operand can be used to influence the following:

– the maximum number of OLTP tasks allowed during a run
– the maximum number of printers served in an OLTP task

```
/MODIFY-SPOOL-PARAMETERS ...
,OLTP-OPTIONS=PARAMETERS(...)
   TASK-LIMIT=*UNCHANGED/<integer 1..200>
   TASK-DEVICE-LIMIT=*UNCHANGED/<integer 1..1024>
```

| | |
|---|---|
| TASK-LIMIT: | maximum number of OLTP tasks allowed during a run; the default value is 10. |
| TASK-DEVICE-LIMIT: | maximum number of printers served in an OLTP task; the default value is 10. |

## 5.7.4　Canceling printer assignments

With the aid of the STOP-PRINTER-OUTPUT command, RSO systems support and RSO device administrators are able to cancel printer assignments.

The STOP-PRINTER-OUTPUT command is issued even if a release-printer statement has not been issued by UTM. The printer is released and an appropriate message is sent to UTM.

## 5.7.5　Querying information on assigned printers

Users, RSO device administrators and RSO systems support can output information on the printer status using the following commands:

– SHOW-SYSTEM-STATUS
– SHOW-ACTIVE-SPOOL-DEVICES

These two commands can also be used to query information during spoolout of UTM messages.

If a printer is reserved by UTM, the fields for the user ID and TSN of the current job are returned by UTM:

– SHOW-SYSTEM STATUS command

    The field USERID contains the name of the UTM application (8 printable characters). The field TSN contains the keyword c'UTM' (4 printable characters).

– SHOW-ACTIVE-SPOOL-DEVICES command

    The C-USERID outputs the name of the UTM application (8 printable characters). The C-TSN field is empty.

## 5.7.6  Printer status when processing a UTM message

Depending on the value specified in the device definition (parameter DISCON-NECTION=*YES/*NO in the SPSERVE statement ADD-SPOOL-DEVICE or MODIFY-SPOOL-DEVICE), the START-PRINTER-OUTPUT command assigns the following modes to the printer:

A       the printer is attached but no connection has been established

I        the printer is attached and a connection has been established (idle)

This is reflected in the printer display by an A (Attached) or I (Idle).
The printer status can be queried during processing of spoolout jobs using the SHOW-SYSTEM-STATUS and SHOW-ACTIVE-SPOOL-DEVICES commands (see section "Querying information on assigned printers" on page 349).

If a RESERVE-PRINTER statement is issued by UTM, the following actions are performed depending on the printer status:

– if the device has the status A, a connection to the printer is set up and the printer status changes to I.

– if the device has the status I, merely a confirmation is returned to the calling UTM application.

If a RELEASE-PRINTER statement is issued by UTM, the device is reset to the status is had before the RESERVE-PRINTER statement was issued. This means that a RELEASE-PRINTER statement from UTM does not automatically lead to a connection cleardown.

The device status I can thus have two causes:

– the printer has the status I, due to the parameter DISCONNECTION=*YES in the START-PRINTER-OUTPUT command.

– the printer has the status A and was reserved by an UTM application.
In order to establish whether a printer was reserved by UTM, the fields USERID or TSN are available in the SHOW-SYSTEM STATUS and SHOW-ACTIVE-SPOOL-DEVICES commands.

## 5.7.7  Support of print options

When printing directly to RSO printers from UTM (i.e. the buffers are sent directly to the printer without scheduling), it is not possible to specify print options, as it is, for instance, when printing via the Spool & Print command interface or the macro interface. Print options can, however, be selected in other ways.

It is possible to distinguish the following categories of print options:

– Print options that require external resources, such as forms, electronic overlays, barcode resources, font definitions etc. These print options are not supported when printing via the OLTP interface.

– VTSU codes that can be added to a file or a message using escape sequences and define certain print functions, depending on the printer type, e.g. the selection of italic, bold, shading, underscore etc. RSO detects VTSU codes and translates them into the printer control characters for the particular target printer. See section "Support of VTSU codes" on page 351.

– RSO-internal VTSU codes that correspond to a number of standard print options, e.g. to the selection of orientation, feed/output tray, paper type and postprocessing method. The handling of these printer functions is described in section "Support of VTSU codes".

### 5.7.7.1  Support of VTSU codes

VTSU codes are standard control characters that can be added to a file or message and define certain print functions, depending on the printer type, e.g. layout control characters, that allow the user to select italic, bold, shading, underscore and red color. RSO detects VTSU codes and translates them into printer control characters for the particular target printer.

Prior to the introduction of the OLTP interface, when printing UTM messages that contained VTSU codes, UTM called the VTSU program to convert the VTSU codes into printer-dependent escape sequences. When printing UTM messages via the OLTP interface, conversion of the VTSU codes is performed by RSO. It should be noted in this context that the treatment of VTSU codes in RSO and UTM is not always identical:

– RSO does not detect VTSU display codes. If such VTSU codes are present in the buffer, they are output unchanged to the printer.

– Logical control characters for printer support are interpreted as described in RSO, not as described in VTSU.

– Line overflow is treated according to RSO rules.

RSO provides a translation table for conversion between RSO device types and the device types supported by FHS/VTSU.

All the VTSU codes are listed in a table in section "Data to be printed and control characters" on page 28. The VTSU codes supported by individual printer types can be found in the description of individual printer types in chapter "RSO printers" on page 365.

#### 5.7.7.2    Support of RSO-internal VTSU codes

There are RSO-internal VTSU codes that correspond to a number of standard print options, e.g to the selection of orientation, feed/output tray, paper type and postprocessing method. As of openUTM Version 05.1A20, there is the possibility of selecting such print options in a UTM application program. The print options are transferred from the UTM application program unit to UTM in the form of a parameter list and then forwarded to and evaluated in RSO. The RSO-internal VTSU codes are only interpreted if the printer supports these print options, otherwise they are ignored and do not influence the printout.
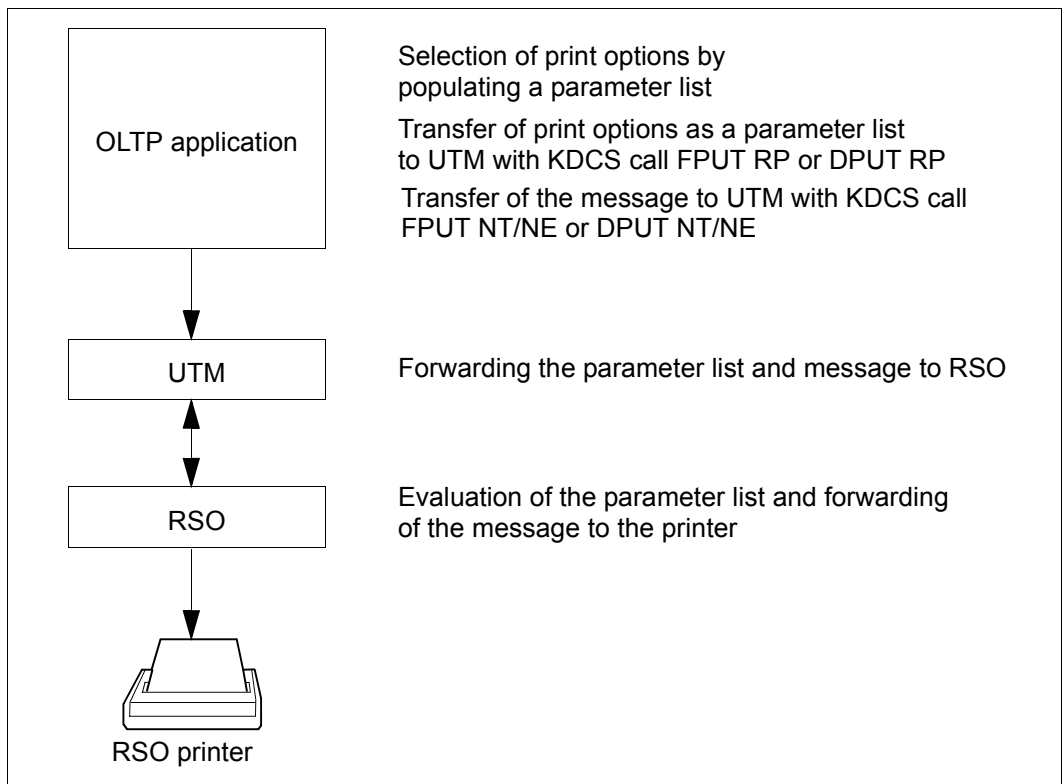
Figure 20: Selection and evaluation of print options

OLTP application:

Using the KDCS call FPUT or DPUT in a UTM application program unit, UTM programmers can create messages that are designed for output to a printer. If they want to use the OLTP interface for printing to RSO printers, they select print options for the printout and enter the appropriate values in a parameter list.

With the OLTPRQX macro, RSO makes data structures available for the parameter list for the following programming languages: Assembler, C, C++ and Cobol (you can find a description in section "Macros" on page 639). Using the OLTPRQX macro, the programmer can set the desired values for individual print options.

The UTM program unit passes the parameter list to UTM using the KDCS call FPUT RP or DPUT RP. The length of the OLTPRQX structure should be entered in the KCLM field of the KDCS parameter area in order to avoid undesirable side-effects.

The UTM program unit must pass the parameter list with the either the FPUT RP or DPUT RP call before it creates the message with the FPUT NT/NE or DPUT NT/NE call. Only one parameter list can be transferred per message:
*Example 1:* FPUT RP, FPUT NT, FPUT NT, FPUT NE
*Example 2:* DPUT RP, DPUT NE

A detailed description of the KDCS calls FPUT and DPUT can be found in the UTM manual "Programming Applications with KDCS for COBOL, C and C++". Information on programming the FPUT RP and DPUT RP calls can be found in the release notice and documentation for openUTM as of V5.1A20.


UTM:

UTM forwards the entries in the parameter list and the message to RSO unchanged.


RSO:

RSO interprets the parameter list and forwards the print message to the RSO printer. When using the enhanced OLTP user command interface P/L (OLTPRQX macro), the reset function is run at the beginning and end of the message, which resets the printer to the default values.

**Compatibility between RSO and UTM versions:**

There is no interdependence between RSO and UTM versions.
As of V3.2, RSO checks whether it has been called by a UTM version that supports the selection of print options or not.
UTM rejects FPUT RP calls if an RSO version < V3.2 is being used. UTM then sets the appropriate return codes for debugging, see UTM documentation.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO (through RSO SRAM internal VTSU codes). The printer function is selected by setting the field in the OLTPRQX P/L macro.

| Printer function | Value | Meaning |
|---|---|---|
| PAGE ROTATION | x'00' | No page rotation has been selected |
| | x'F1' | 0° (portrait) |
| | x'F2' | 90° (landscape) |
| | x'F3' | 180° (portrait, upside down) |
| | x'F4' | 270° (landscape, upside down) |
| INPUT TRAY | x'00' | No input tray has been selected |
| | x'01' <= value <= x'63' | Input tray number |
| | x'EF' | C5 |
| | x'F0' | DL |
| | x'F1' | COM10 |
| | x'F2' | Monarch |
| | x'F3' | Double Letter |
| | x'F4' | Letter |
| | x'F5' | Legal |
| | x'F6' | Exec |
| | x'F7' | Invoice |
| | x'F8' | Folio |
| | x'F9' | B5 |
| | x'FA' | B4 |
| | x'FB' | A5 |
| | x'FC' | A4 |
| | x'FD' | A3 |
| | x'FE' | Manual paper feed |

| Printer function | Value | Meaning |
|---|---|---|
| OUTPUT TRAY | x'00' | No output tray has been selected |
| | x'01' <= value <= x'63' | Output tray number |
| | x'81' | A sort mechanism is being used |
| TWO-SIDED PRINTING | x'00' | No simplex/duplex printing |
| | x'F1' | Single-sided printing (simplex) |
| | x'F2' | Double-sided printing (duplex) |
| | x'F3' | Tumble duplex |
| SORTER | x'00' | No sort mechanism has been selected |
| | x'F1' | No |
| | x'F2' | Group |
| | x'F3' | Collate |
| | x'F4' | Stacker |
| | x'F5' | Automatic |
| HARDWARE COPIES | x'00' | No copies |
| | c'001' <= value <= c'255' | Number of copies |
| LEFT OFFSET | c'+', c '-' or x'FF' (ignore) | Offset sign |
| | x'01' <= value <= x'FF' | Horizontal offset |
| TOP OFFSET | c'+', c-' or x'FF' (ignore) | Offset sign |
| | x'01' <= value <= x'FF' | Vertical offset |

## 5.7.8 Return codes of the OLTP interface

The following list contains possible return codes for the OLTP interface. The return codes are grouped in classes described by the subcode 1. Equates or symbolic names for these classes can be found in the standard header macros: FHDR, FHDRI, FHDRC and fhdr.h for ASS, SPL, CPP and C. In case of error, UTM issues these return codes in the K150 message (see the UTM manual "Messages, Debugging and Diagnostics" ).

| (SC2) | SC1 | MC | Meaning |
|-------|-----|-----|---------|
| X'00' | X'00' | X'0000' | The function has been correctly executed. |
| | X'01' | X'0003' | An invalid action has been specified in the macro. |
| | | X'0004' | Invalid extension length |
| | | X'0005' | OLTPRQX version error |
| | | X'0006' | OLTPRQX function or unit error |
| | | X'000A' | The buffer size specified in the MODIFY- SPOOL-PARAMETER command is too low. You must set this parameter to 32 when using the OLTP interface. |
| | X'02' | X'0006' | The requested printer is in a release process and will be soon available |
| | X'02' | X'FFFF' | Unit or function not supported. |
| | X'03' | X'FFFF' | Version not supported. |
| | X'20' | X'0001' | An error was reported during a memory request. |
| | | X'0003' | A RESERVE_PRINTER request for this printer has already been issued from another application. |
| | | X'0004' | A RESERVE_PRINTER request for this printer has already been issued from this application. |
| | | X'0005' | An error occurred during the creation of the OLTP controller. |
| | | X'0009' | An error occurred when using the bourse interface. |
| | | X'000F' | An error occurred when using the memory pool interface. |
| | | X'0010' | An internal table inconsistency has been detected. |
| | X'40' | X'0007' | The specified device has been started but is currently being used by RSO. Please wait until RSO has finished using the device. |
| | | X'000B' | An error occurred during access to the printer. |
| | | X'000D' | The device does not have the correct access rights. Use the MODIFY-PRINTER-OUTPUT command to add the keyword UTM to the list of access rights. |

| (SC2) | SC1 | MC | Meaning |
|---|---|---|---|
| | X'41' | X'0002' | RSO could not find the specified printer in its tables. Either the START-PRINTER-OUTPUT command has not yet been issued or finished executing, or UTM has not reserved the printer for the UTM application. |
| | | X'0006' | STOP-PRINTER-OUTPUT has been issued and the printer is currently being released. |
| | | X'0008' | The device is being internally released due to an internal error. |
| | | X'000C' | The request cannot be processed because an internal recovery has occurred. |
| | | X'FFFF' | Subsystem RSO not loaded. |
| | X'42' | X'FFFF' | Subsystem RSO not connected. |
| | X'80' | X'000E' | An error occurred during access to the printer but RSO will keep trying to satisfy the request. |
| | X'81' | X'FFFF' | Subsystem RSO temporarily unavailable. |
| | X'82' | X'FFFF' | Subsystem RSO suspended or stopped. |

## 5.7.9   Additional information on the OLTP interface

### Accounting information

Accounting is handled by UTM; therefore, no new account processing facility is included in RSO.

### SAT information

The information relating to the starting and stopping of RSO printers is generated because the assigned commands are processed as normal. No information on the processing of OLTP print jobs is stored.

### Processing of system exits

The system exits 90, 91 and 92 are not called when data supplied via the OLTP interface is called.

### Redirection of print jobs

RSO provides an option for specifying a device in the device definition, for redirection of RSO jobs (REDIRECTION-DEVICE parameter in the SPSERVE statement ADD-SPOOL-DEVICE). No redirection is performed for UTM jobs.

### Trace and diagnosis

By specifying TRACE=*YES in the START-PRINTER-OUTPUT command, systems support can request a trace file for diagnosis.

### Unloading RSO

In order to unload RSO, it is necessary to stop all printers that were started (including the UTM printer being used by RSO). If there is an RSO printer that is being requested by UTM, a warning will be sent to UTM that RSO is being unloaded.

## 5.8  Internet Cafe printing

For each print job submitted with a variable URL, a "system" device is allocated. The print-job is addressed to an IPP printer whose name is *IPPttnnn* where *IPP* is a fixed prefix defined by a SYSSSI entry, *tt* is the printer type and *nnn* is a sequence number (000-999).

The service task SROSDIP that will manage the table of "system" devices is created at the first print job submitted with a variable URL.

These "system" devices are handled as public devices by RSO. In order to minimize the risk of data loss, the "system" devices are generated with CONTROLLER-RESERVED=*YES. Consequently, the value of CONTROLLER-LIMIT in the SPSERVE statement MODIFY-SPOOL-PARAMETERS must be specified accordingly.

The following commands are not allowed for such devices. The request will be rejected with the corresponding error message.
–   START-PRINTER-OUTPUT
–   MODIFY-PRINTER-OUTPUT
–   STOP-PRINTER-OUTPUT

**Tuning of the system devices**

Some parameters must be defined in the SYSSSI for the tuning of the system devices:

–   IPP-PRINTER-NAME-PREFIX defines the prefix used to build the device name.
–   IPP-PRINTER-TIMOUT defines the maximum idle time for the system devices.
–   IPP-DEVICES-TRACE allows switching the tracing on.

These parameters are common to all system devices.

**Hints**

●   When selecting the IPP printer name prefix in the SYSSSI, please do not use a prefix that corresponds to existing printers in the SPOOL parameter file.

●   The IPP printer name prefix is valid for an RSO session. When changing it, please wait until there is no more print job submitted with a variable URL in the system. Then unload the subsystem RSO. Edit the SYSSSI file. Reload the subsystem RSO. For each print-job submitted with a variable URL, a "system" device is allocated with the new prefix.

●   Erasing or modifying the URL files is under the responsibility of the SPOOL adminis-trator. The print jobs submitted with the corresponding URL may end in error.

●   If RSO is unloaded when "system" devices are still active (but not running a job), the corresponding URL files will be released on the next session, if there is no new job for these devices.

## 5.9  Secure printing

Depending on the device, two methods are used to use a secure connection to the device:

- HTTPS method

  This method is used by SEH network cards; it operates parallel secured and unsecured servers by separate ports for each protocol variant.

  IPP provides a transparent connection to SSL by calling the corresponding URL (a https URI connects by default to port 443).

  In case of a https URI, RSO will encrypt the connection to the IPP printer immediately. RSO will set up the SLL/TLS support on the connection via the OpenSSL interface.

- HTTP upgrade method

  This method is used by CUPS servers; it upgrades the connection only when the client or server requests it.

  RSO will force to TLS encryption via the OpenSSL interface when the encryption of the file content is required at the print-job submission interface.

RSO provides a unique end-user interface for both methods. In both cases, it is necessary to declare two different devices in the Spool Parameters, for a secure and an insecure connection.

For more information, see the interNet Services V3.2A manuals.

### 5.9.1  Printer accessed via SEH

To build a secure connection specify the following:

– ENCRYPT = YES in the device entry in the spool parameters,

– an FQDN in the printer parameter file (see ),

– an IPPURI 'https=' in the printer parameter file (see ).

*Example*

```
#
#        set uri address for IPP device (any type)
#
ippuri=HTTPS://10.29.167.248:443/ipp/lp6,
ippfqdn=10.29.167.248,
```

### 5.9.2  **Printer accessed via CUPS**

To build a secure connection specify the following:

– ENCRYPT = YES in the device entry in the spool parameters,

– an FQDN in the printer parameter file (see page 310),

– an IPPURI (see page 311).

*Example*

```
#
#         set uri address for IPP device (any type)
#
ippuri=10.29.167.136:631/printers/km5035,
ippfqdn=d241pic4.osl.oce.net,
```

## 5.10  Behavior in the event of errors

Systems support primarily consists of normal users who have been granted a high level of privilege. These users may therefore also be confronted by the same problems as nonprivileged users and RSO device administrators. The problems facing the nonprivileged user are discussed in detail starting on page 132. The special considerations concerning error handling by the RSO device administrator are described starting on page 180. The present section contains only further general information and advice for the operator and systems support.

**A message is received on the operator console**

The operator can now:

– suppress spoolout

– set the job to KEEP, rectify the error and, after rectification of the error, reactivate the printer for the appropriate TSN by means of a RESUME-SPOOLOUT command

– terminate the job.

*Note*

Until such time as the operator responds to the message, field A contains the letter M for "message" in the case of /SHOW-SYSTEM-STATUS INF=\*REMOTE(...).

**RSO dump pending**

If an RSO dump is planned, RSO recovery is only possible if the SPOOL task is executing and a response to the message has been received. In the event of a dump for RSO and SPOOL, SPOOL recovery (take dump and issue new DSSM command) must be implemented first. In the course of RSO recovery, no CANCEL-JOB command may be issued for the SRAM task. Furthermore, all outstanding messages must be answered by RSO message tasks.

**Notes on transferring data to the printer**

– RSO supports only one printer per 8112 Printer Terminal Controller.
RSO functions with positive printer acknowledgments. If only one block is printed, the PDN generation for the printer must be checked.

– Message SRO0986 signals a missing transport acknowledgment (is the printer switched off?).

– Message SRO0987 is issued if no printer acknowledgment is received within a given time limit, which varies depending on the printer type. If this message is displayed repeatedly, the generation for this printer should be checked. Otherwise, the printer may have been halted with a full buffer or the network may be overloaded.

– It is possible that the printer acknowledgment will be sent back to RSO relatively late due to the spoolin function on 9025/9026-RENO Printers. For this reason, two-level time monitoring has been implemented for these printers. If no acknowledgment is received within the first period, SRO9013 is issued but the job is still in 'ACT' status. The printer is only placed in 'S' status with message SRO0987 if no acknowledgment has been received by the end of the second period.

# 6 RSO printers

## 6.1 Printer features

The following section gives the printer features for all printer types supported in RSO. These comprise:

- installation, where applicable
- selection of the code table (band ID), where applicable
- access modes
- VTSU codes
- supported printer functions
- control characters causing the printer switches to be reset, where applicable
- blank and line compression, where applicable
- error handling, where applicable
- shift function support

Information relating to the following features is given in the "SPSERVE (BS2000/OSD)" manual:

- standard device record
- standard form record
- character set definition

**Additional printer features**

Details of BDS-LPD mode are given in section "Connecting printers via the BSD-LPD protocol" on page 217.

Details of ROTATION, TWO-SIDED, ELECTRONIC-OVERLAY, INPUT-TRAY-NUMBER, TOP-OFFSET, LEFT-OFFSET are given in section "Printing files" on page 49 and under the PRINT-DOCUMENT command in the "Spool & Print - Commands (BS2000/OSD)" manual.

| Printer | BSD-LPD mode | ROTATION (page rotation) | TWO-SIDED (duplex mode) | ELECTRONIC-OVERLAY | INPUT-TRAY-NUMBER and paper format | OUTPUT-TRAY-NUMBER | TOP-OFFSET LEFT-OFFSET |
|---|---|---|---|---|---|---|---|
| 2030-PCL | X | X(4) | | X | X | X | X |
| 4011 | X | | | | | | |
| 4812 | X | X(2) | | | X | | |
| 4813 | X | | | | | | |
| 4818-PCL | X | X(4) | X | X | X | X | X |
| 4821-PCL | X | X(4) | | X | X | X | X |
| 4822-PCL | X | X(4) | X | X | X | X(Sorter) | X |
| 4824-PCL | X | X(4) | X | X | X | X | X |
| 4825-PCL | X | X(4) | X | X | X | X(Sorter) | X |
| 4830-PCL | X | X(4) | X | X | X | X | X |
| 4850-PCL | X | X(4) | | X | X | X | X |
| 8121 | | | | | | | |
| 9000 | X | | | | | | |
| 9000-PCL | X | X(4) | X | X | X | X | X |
| 9000-PRO | X | | | | | | |
| 9000-PS | X | | | | | | |
| 9000-EPFX | X | | | | | | |
| 9000-EPLQ | X | | | | X | | |
| 9000-EPSQ | X | | | | X | | |
| 9001 | X | | | | | | |
| 9001-31 | X | | | | | | |
| 9002 | | | | | | | |
| 9003 | | | | | | | |
| 9004 | | | | | X | | |

| Printer | BSD-LPD mode | ROTATION (page rotation) | TWO-SIDED (duplex mode) | ELECTRONIC-OVERLAY | INPUT-TRAY-NUMBER and paper format | OUTPUT-TRAY-NUMBER | TOP-OFFSET LEFT-OFFSET |
|---|---|---|---|---|---|---|---|
| 9011 | X | | | | | | |
| 9012 | X | | | | | | |
| 9013 | X | | | | X | | |
| 9014 | X | | | | X | | |
| 9015 | X | | | | | | |
| 9021 | X | X(2) | | | X | | X |
| 9022 | X | | | | X | | |
| 9022-200 | X | X(2) | | X | X | | X |
| 9025 | X | X(2) | | | | | |
| 9026-PCL | X | X(4) | X | X | X | X | X |
| 9026-RENO | X | X(4) | X | | X | X(Sorter) | |
| 9045-ANSI | X | | | | | | |
| 9046 | X | | | | | | |
| 9097 | X | | | | | | |
| 9645 | | | | | | | |
| DJET | X | X(2) | | | X | | |

X            The function is supported by the printer and by RSO.

X(2)         The printer supports only page rotation, i.e. 0° and 90°; it therefore prints only portrait and landscape formats.

X(4)         The printer supports rotation through 0°, 90°, 180° and 270°; it therefore prints portrait and landscape mode, both upright and upside down.

X(Sorter)    A sort mechanism can be selected in addition to an output tray.

### Format of the "Standard device record" and "Standard form record" tables

Both these tables have the same format for all printer types:

The left-hand column contains the operands of the relevant SPSERVE statement for the device or form entry.
The center column indicates whether the operand is (*) or is not (n.s.) supported for the printer type, and may include a note number.
The right-hand column indicates which default values are defined for the printer type.

### Meanings of the control characters in the tables

| Control characters | EBCDIC code | Meaning |
|---|---|---|
| BS | 16 | Backspace (one column to left) |
| CR | 0D | Carriage return |
| DC1 | 11 | Device control 1 |
| DC4 | 3C | Device control 4 |
| DLE | 10 | Data link escape |
| EM | 19 | End of message |
| ESC | 27 | Escape (physical control sequence) |
| FS | 1C | Field separator |
| FF | 0C | Form feed (new page) |
| HT | 05 | Horizontal tabulation |
| LF | 25 | Line feed (new line) |
| SI | 0F | Shift in (select primary symbol set) |
| SO | 0E | Shift out (select secondary symbol set) |
| SP | 40 | Space character (blank) |
| SUB | 3F | Substitute |
| VT | 0B | Vertical tabulation |
| \0 | 00 | Null character |
| \x$zz$ | zz | Hexadecimal code (direct specification of the hexadecimal value of a character as $zz$) |

## 2030-PCL-REMOTE-PRINTER

The 2030 Printer is compatible with the HP LaserJet III Si and has the following character-istics:

– 300-dpi LED printing mechanism

– up to 30 pages a minute

– two-sided printing

– PCL printer language (level 5) with the following special characteristics:

– automatic rotation for fonts and raster graphics; when the page is rotated, the print image is automatically rotated accordingly.

**Access modes**

The access modes of the 2030 Printer which are supported by RSO (ACCESS-TYPE operand for ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

TACLAN, LPD

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x (1) | Proportional spacing on |
| PTX | 1B | x (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line density |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |

| VTSU | X'xy' | | Effect |
|------|-------|------|--------|
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | n.s. | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics + underscore (1) | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second character set |
| SI | 0F | x | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Resume at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character string with a length of d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat the characters d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     implemented via font support (see section "Font support for PCL printers" on page 61).

(2)     the VTSU code can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

### Supported printer functions

The following table shows all the printer functions that are implicitly supported by RSO for the 2030 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case CONTROL-CHARACTERS=*NO/*EBCDIC/*IBM/*ASA must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog/epilog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies<br>Paper format selection | <br>ESCE<br>ESC&l#X<br>ESC&l#A |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC&l#H<br>ESC&l#G<br>ESC&a#L CR<br>ESC&k#H<br>ESC&l#C<br><not supported><br>ESC&l#U<br>ESC&l#Z<br>ESC&f#y#X |
| TWO-SIDED PRINTING (DUPLEX)<br>Single-sided printing (simplex)<br>Two-sided printing (duplex) | <br>ESC&l0S<br>ESC&l#S |
| ROTATION<br>0° (portrait)<br>90° (landscape)<br>180° (portrait, upside down)<br>270° (landscape, upside down) | <br>ESC&l0O<br>ESC&l1O<br>ESC&l2O<br>ESC&l3O |

| Function | Control character(s) |
|---|---|
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | ESC&a#R |
| Horizontal position (absolute and relative) in columns | ESC&a#C |
| Horizontal tab | HT |
| Relative horizontal tab (4) | ESC&a.#C |
| Vertical tab | \<not supported\> |
| Relative vertical tab (5) | ESC&a.#R |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESC= |
| Half line up | ESC&a-0.5R |
| New line | LF |
| Carriage return | CR |
| New page | FF |
| CHARACTER SET FEATURES (6) | |
| *Languages* | |
| International | ESC(2U |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | \<not supported\> |
| French | ESC(1F |
| Dutch | \<not supported\> |
| German | ESC(1G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | \<not supported\> |
| Spanish | ESC(2S |
| Swiss | \<not supported\> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0N |
| ISO-8859-2 to ISO-8859-9 | \<not supported\> |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |

| Function | Control character(s) |
|---|---|
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | ESC(s-3B |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |
| *Underscore* | |
| Not possible | ESC&d@ |
| Possible | ESC&d0D |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the start and end of each job if RESET=*YES was specified in the ADD-SPOOL-DEVICE statement during device definition.

(2) The horizontal spacing determines the spacing between the characters. This value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET) or from the VTSU code HMI.

   It must be noted with the 2030 Printer that the HMI value is set to the standard pitch value of the font whenever the font characteristics are modified. RSO has solved this problem by repeating the HMI value after any "detected" change of font characteristics. "Detected" means that the font was defined through a user VTSU code or through a character set. Any other type of modification of font characteristics, such as printer control character strings in the user file, results in the HMI value being set to the standard pitch value of the font and is thus the user's responsibility.

(3) The vertical spacing determines the spacing between the lines. This value is calculated either from the line spacing from the form definition, from the defined loop record, or from the VTSU code VMI.

(4) The relative horizontal tab is used to skip a number of blanks if BLANK-COMPRESSION=*YES has been specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used to skip a number of lines if LINE-FEED-COMPRESSION=*YES has been specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The table shows which font characteristics are set implicitly by RSO by the following specifications:

– LANGUAGE operand of the ADD-SPOOL-CHARACTER-SET statement (character set)

– VTSU codes PTS and PTX (spacing)

– CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SET statement (style)

– WEIGHT operand of the ADD-SPOOL-CHARACTER-SET statement (stroke weight)

– UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SET statement (underscore)

– VTSU codes EM1, EM2, EM3, EM4 and NOR.

With the aid of RSOSERVE font management it is possible to define more complete fonts with all font characteristics (form orientation, typeface,...).

**Shift function support**

If LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the output text for the 2030 Printer is indented by $n$ * 1/10 inch, without changing the currently valid character spacing.

## 4011-REMOTE-PRINTER

The 4011 Printer is a 24-needle printer that offers the same functionality as the 9097 Printer.

**Access modes**

The 4011 access modes supported by RSO (for the ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

HARDCOPY, DIRECT, PC, TACLAN, LPD

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

**VTSU codes**

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportion spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |

| VTSU | X'xy' | | Effect |
|------|-------|---|--------|
| VT | 0B | x | |
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second character set |
| SI | 0F | x | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | x | Near Letter Quality on |
| NLX | 3b | x | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Resume at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character string of the length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat the character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     the VTSU code EXIT is applicable only when printing via the OLTP interface. In all other cases, the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 4011 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/*BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL | |
| Reset (1) | ESCR SI |
| Number of copies | <not supported> |
| PAGE CONTROL | |
| Paper tray | ESC[#SPp |
| Output tray | <not supported> |
| Left margin | ESC[#s |
| Horizontal spacing (2) | ESC[#w |
| Vertical spacing (3) | ESC[#!w |
| Form length (FHG) | ESC[#p |
| Offset (left) | <not supported> |
| Offset (top) | <not supported> |
| Overlays | <not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | <not supported> |
| Horizontal position (absolute and relative) in columns | ESC[#` |
| Horizontal tab | HT |
| Relative horizontal tab (4) | ESC8# |
| Vertical tab | VT |
| Relative vertical tab (5) | ESC6# |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down (6) | ESCK or ESC*K |
| Half line up | ESCL or ESC*L |
| New line | LF |
| Carriage return | CR |
| New page | FF |
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | ESC(@ |
| English | ESC(A |
| USA | ESC(B |
| Belgian | ESC(8 |
| French | ESC(R |
| Dutch | <not supported> |
| German | ESC(K |
| Norwegian | ESC(E |
| Swedish | ESC(H |
| Danish | ESC(E |
| Spanish | ESC(3 |

| Function | Control character(s) |
|---|---|
| Swiss | ESC(5 |
| Italian | ESC(Y |
| ISO-8859-1 | ESC(BESC-A |
| ISO-8859-2 | ESC(BESC-B |
| ISO-8859-5 | ESC(BESC-@ |
| ISO-8859-7 | ESC(BESC-F |
| ISO-8859-9 | ESC(BESC-M |
| *Character spacing* | |
| Fixed | ESC[=w |
| Proportional | ESC[<w |
| *Style* | |
| Straight (7) | ESC4 or ESC*4 |
| Italic | ESC3 or ESC*3 |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESC!0 |
| Bold | ESC!1 |
| *Underscore* | |
| Not possible (8) | ESC9 or ESC*9 |
| Possible | ESC0 or ESC*0 |
| *Print quality* | |
| Low (NLQ=*NO) | ESC!9 |
| High (NLQ=*YES) | ESC!: |
| *Character type* | |
| FONT-1 | ESC,1 |
| FONT-2 | ESC,2 |
| OCR-A | ESC,3 |
| OCR-B | ESC,4 |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The control sequences ESC*K and ESC*L are sent if the 4011 Printer is connected in DIRECT access mode.

(7) The control sequences ESC*3 and ESC*4 are sent if the 4011 Printer is connected in DIRECT access mode.

(8) The control sequences ESC*9 and ESC*0 are sent if the 4011 Printer is connected in DIRECT access mode.

**Shift function support**

If LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ is specified in the ADD-SPOOL-DEVICE statement, the text output on the 4011 Printer is indented $n$ * 1/10 inch. To make this indentation of $n$ * 1/10 inch possible, the currently valid character spacing is changed at the beginning of each line to 10 cpi. The previously valid character spacing value (CPI operand in the character set definition) is automatically reset by RSO after the last indentation.
It is important to note that the previously set value is always reset by RSO, even if the user has requested another character spacing in the interim via the control sequences in the print file. The only exception is when the previously set CPI value was 0 (in other words, there is no character spacing for RSO to reset) and printing continues with a character spacing of 10 cpi.

## 4812-REMOTE-PRINTER

The 4812 Printer type supports PCL language (level 3). It functions in very much the same way as the DJET Printer. However, it has additional functions when compared with the DJET Printer:

– landscape orientation support

– support for continuous form feed

**Access modes**

The 4812 access modes supported by RSO (for the ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC, TACLAN, LPD

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

**VTSU codes**

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM | 38 | x | |
| d1d2d3 | | | |
| PTS | 1A | (1) | Proportional spacing on |
| PTX | 1B | (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | x | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | n.s. | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics (1) + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | x | Near Letter Quality on |
| NLX | 3b | x | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of characters per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Defines a transparent character string of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     implemented by means of font support (see section "Font support for PCL printers" on page 61).

(2)     the VTSU code EXIT is applicable only when printing via the OLTP interface. In all other cases, the code is ignored.

## Supported printer functions

The following table shows all the printer functions that are implicitly supported by RSO for the 4812 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset  (1)<br>Number of copies | <br>ESCE<br><not supported> |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC&l#H<br><not supported><br>ESC&a#L CR<br>ESC&k#H<br>ESC&l#C<br><not supported><br><not supported><br><not supported><br><not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION<br>0° (portrait)<br>90° (landscape)<br>180° (portrait, upside down)<br>270° (landscape, upside down) | <br>ESC&l0O<br>ESC&l1O<br><not supported><br><not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (4)<br>Vertical tab<br>Relative vertical tab (5)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page | <br>ESC&a#R<br>ESC&a#C<br>HT<br>ESC&a.#C<br><not supported><br>ESC&a.#R<br>BS<br>SP<br>ESC=<br>ESC&a-0.5R<br>LF<br>CR<br>FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES (6) | |
| *Languages (symbol sets)* | |
| International | ESC(2U |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | <not supported> |
| French | <not supported> |
| Dutch | <not supported> |
| German | ESC(0G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | <not supported> |
| Spanish | ESC(1S |
| Swiss | <not supported> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0N |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |
| *Underscore* | |
| Not possible | ESC&d@ |
| Possible | ESC&d0D |
| *Print quality* | |
| Low (NLQ=*NO) | ESC(s1Q |
| High (NLQ=*YES) | ESC(s2Q |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary font | SI |
| Select secondary font | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

It must be noted with the 4812 Printer that the HMI value is set to the standard pitch value of the font whenever the font characteristics are modified. RSO has solved this problem by repeating the HMI value after any "detected" change of font characteristics. "Detected" means that the font was defined through a user VTSU code or through a character set. Any other type of modification of font characteristics, such as printer control character strings in the user file, results in the HMI value being set to the standard pitch value of the font and is thus the user's responsibility.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The table shows which font characteristics are set implicitly by RSO through the following specifications:

– LANGUAGE operand of the ADD-SPOOL-CHARACTER-SETS statement (symbol set)

– VTSU codes PTS and PTX (proportional spacing on/off)

– CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SETS statement (character style)

– WEIGHT operand of the ADD-SPOOL-CHARACTER-SETS statement (character stroke weight)

– UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SETS statement (underscore)

– VTSU codes EM1, EM2, EM3, EM4 and NOR.

Font management under RSOSERVE allows the definition of more complete fonts with all font characteristics (orientation, typeface etc.).

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 4812 Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

## 4813-REMOTE-PRINTER

The 4813 Printer type is an ink-jet printer that is compatible with the 9097 Printer and has the following special characteristics:

– print head with 48 nozzles

– possible resolution of 360 dpi x 360 dpi

– large selection of character sets and fonts that can be supplemented by downloadable soft fonts

– low noise level (in normal operation < 47 dB)

– possibility of continuous forms and expansions of settings thanks to automatic sheet feeder (ASF) with 1 or 2 paths.

**Access modes**

The 4813 access modes supported by RSO (for the ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

HARDCOPY, DIRECT, PC, TACLAN, LPD

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

**VTSU codes**

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | x | |
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second character set |
| SI | 0F | x | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | x | Near Letter Quality on |
| NLX | 3b | x | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x: supported by RSO for this printer type.

n.s.: not supported by this printer type.

(1) the VTSU code EXIT is applicable only when printing via the OLTP interface. In all other cases, the code is ignored.

## Supported printer functions

The following table shows all the printer functions that are implicitly supported by RSO for the 4813 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies | <br>ESCR SI<br>\<not supported\> |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC[#SPp<br>\<not supported\><br>ESC[#s<br>ESC[#w<br>ESC[#!w<br>ESC[#p<br>\<not supported\><br>\<not supported\><br>\<not supported\> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (4)<br>Vertical tab<br>Relative vertical tab (5)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down (6)<br>Half line up<br>New line<br>Carriage return<br>New page | <br>\<not supported\><br>ESC[#`<br>HT<br>ESC[#a<br>VT<br>\<not supported\><br>BS<br>SP<br>ESCK or ESC*K<br>ESCL or ESC*L<br>LF<br>CR<br>FF |
| CHARACTER SET FEATURES<br>*Languages*<br>International<br>English<br>USA | <br><br>ESC(@<br>ESC(A<br>ESC(B |

| Function | Control character(s) |
|---|---|
| Belgian | ESC(8 |
| French | ESC(R |
| Dutch | <not supported> |
| German | ESC(K |
| Norwegian | ESC(E |
| Swedish | ESC(H |
| Danish | ESC(E |
| Spanish | ESC(3 |
| Swiss | ESC(5 |
| Italian | ESC(Y |
| ISO-8859-1 | ESC(BESC-A |
| ISO-8859-2 | ESC(BESC-B |
| ISO-8859-5 | ESC(BESC-@ |
| ISO-8859-7 | ESC(BESC-F |
| ISO-8859-9 | ESC(BESC-M |
| *Character spacing* | |
| Fixed | ESC[=w |
| Proportional | ESC[<w |
| *Style* | |
| Straight (7) | ESC4 or ESC*4 |
| Italic | ESC3 or ESC*3 |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESC!0 |
| Bold | ESC!1 |
| *Underscore* | |
| Not possible (8) | ESC9 or ESC*9 |
| Possible | ESC0 or ESC*0 |
| *Print quality* | |
| Low (NLQ=*NO) | ESC!9 |
| High (NLQ=*YES) | ESC!: |
| *Character type* | |
| FONT-1 | ESC,1 |
| FONT-2 | ESC,2 |
| OCR-A | ESC,3 |
| OCR-B | ESC,4 |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1)  The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2)  The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3)  The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4)  The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5)  The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6)  The control sequences ESC*K and ESC*L are sent if the 4813 Printer is connected in DIRECT access mode.

(7)  The control sequences ESC*3 and ESC*4 are sent if the 4813 Printer is connected in DIRECT access mode.

(8)  The control sequences ESC*9 and ESC*0 are sent if the 4813 Printer is connected in DIRECT access mode.

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 4813 Printer is indented $n$ * 1/10 inch. To make this indentation of $n$ * 1/10 inch possible, the currently valid character spacing is changed at the beginning of each line to 10 cpi. The previously valid character spacing value (CPI operand in the character set definition) is automatically reset by RSO after the last indentation.
It is important to note that the previously set value is always reset by RSO, even if the user has requested another character spacing in the interim via the control sequences in the print file. The only exception is when the previously set CPI value was 0 (in other words, there is no character spacing for RSO to reset) and printing continues with a character spacing of 10 cpi.

## 4818-PCL-REMOTE-PRINTER

The 4818 Printer is compatible with the HP LaserJet III and has the following special characteristics:
– 300-dpi LED printing mechanism
– Up to 4 DIN-A4 pages a minute
– PCL printer language (level 5), including HPGL/2-compatibility

The 4818 Printer supports additional emulations (e.g. EPSON LQ 850 and IBM Proprinter X24E). These emulations cannot be accessed via the RSO device 4818-PCL. They can be used in conjunction with the generic RSO printers 9000-EPLQ, 9000-PRO and similar printers.

**Access modes**

The 4818 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

HARDCOPY, PC, DIRECT, TACLAN, LPD

**VTSU codes**

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x (1) | Proportional spacing on |
| PTX | 1B | x (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |

| VTSU | X'xy' | | Effect |
|---|---|---|---|
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | n.s. | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics + underscore (1) | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second character set |
| SI | 0F | x | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     implemented by means of font support (see section "Font support for PCL printers" on page 61).

(2)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 4818 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case CONTROL-CHARACTERS=*NO/*EBCDIC/*IBM/*ASA must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog/epilog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies<br>Paper format selection | <br>ESCE<br>ESC&l#X<br>!R!SPSZ #;EXIT; |
| PAGE CONTROL<br>Paper tray<br><br>Output tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC&l#H or<br>!R!CASS#;EXIT;<br>ESC&l#G<br>ESC&a#L CR<br>ESC&k#H<br>ESC&l#C<br><not supported><br>ESC&l#U<br>ESC&l#Z<br>ESC&f#y#X |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION<br>0° (portrait)<br>90° (landscape)<br>180° (portrait, upside down)<br>270° (landscape, upside down) | <br>ESC&l0O<br>ESC&l1O<br>ESC&l2O<br>ESC&l3O |

| Function | Control character(s) |
|---|---|
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | ESC&a#R |
| Horizontal position (absolute and relative) in columns | ESC&a#C |
| Horizontal tab | HT |
| Relative horizontal tab (4) | ESC&a.#C |
| Vertical tab | <not supported> |
| Relative vertical tab (5) | ESC&a.#R |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESC= |
| Half line up | ESC&a-0.5R |
| New line | LF |
| Carriage return | CR |
| New page | FF |
| CHARACTER SET FEATURES (6) | |
| *Languages* | |
| International | ESC(2U |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | <not supported> |
| French | ESC(1F |
| Dutch | <not supported> |
| German | ESC(1G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | <not supported> |
| Spanish | ESC(2S |
| Swiss | <not supported> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0N |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | ESC(s-3B |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |

| Function | Control character(s) |
|---|---|
| *Underscore* | |
| Not possible | ESC&d@ |
| Possible | ESC&d0D |
| *Print quality* | |
| Low (NLQ=*NO) | \<not supported\> |
| High (NLQ=*YES) | \<not supported\> |
| *Character type* | \<not supported\> |
| *Color* | \<not supported\> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the start and end of each job if RESET=*YES was specified in the ADD-SPOOL-DEVICE statement during device definition.

(2) The horizontal spacing determines the spacing between the characters. This value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET) or from the VTSU code HMI.

It must be noted with the 4818-PCL Printer that the HMI value is set to the standard pitch value of the font whenever the font characteristics are modified. RSO has solved this problem by repeating the HMI value after any "detected" change of font character-istics. "Detected" means that the font was defined through a user VTSU code or through a character set. Any other type of modification of font characteristics, such as printer control character strings in the user file, results in the HMI value being set to the standard pitch value of the font and is thus the user's responsibility.

(3) The vertical spacing determines the spacing between the lines. This value is calculated either from the line spacing from the form definition, from the defined loop record, or from the VTSU code VMI.

(4) The relative horizontal tab is used to skip a number of blanks if BLANK-COMPRESSION=*YES has been specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used to skip a number of lines if LINE-FEED-COMPRESSION=*YES has been specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The table shows which font characteristics are set implicitly by RSO by the following specifications:

– LANGUAGE operand of the ADD-SPOOL-CHARACTER-SET statement (character set)

– VTSU codes PTS and PTX (spacing)

– CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SET statement (style)

– WEIGHT operand of the ADD-SPOOL-CHARACTER-SET statement (stroke weight)

– UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SET statement (underscore)

– VTSU codes EM1, EM2, EM3, EM4 and NOR.

With the aid of RSOSERVE font management it is possible to define more complete fonts with all font characteristics (form orientation, typeface,...).

**Shift function support**

If LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the output text for the 4818-PCL Printer is indented by $n$ * 1/10 inch, without changing the currently valid character spacing.

## 4821-PCL-REMOTE-PRINTER

The 4821-PCL Printer is compatible with the HP LaserJet IV and has the following special characteristics:

- Scalable character types for generating fonts of any point size up to 999.75 points with 1/4-point spacing. The printer has thirteen internal scalable character types for proportional spacing and fourteen internal fonts with fixed character widths in bit patterns.

- PCL printer language (level 5) with the following characteristics:
  – PJL command support
  – fully integrated support for HP-GL/2 vector graphics
  – expanded mapping capability, thus permitting many special effects such as white-on-black printing and patterned fonts
  – several print directions possible on the same page
  – compatibility with software that supports the 9021 and LaserJet II Printers.

- Automatic rotation of fonts and raster graphics. The print format is automatically rotated when the page orientation is rotated.

- Large number of character sets that can be selected from the printer´s control panel.

- A selection of five languages for printer message output: English, French, German, Italian or Spanish.

- Two font cartridge slots.

- Support for the full scope of PJL commands.

**Access modes**

The 4821-PCL access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

HARDCOPY, DIRECT, PC, TACLAN, LPD

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

### VTSU codes

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | (1) | Proportional spacing on |
| PTX | 1B | (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | n.s. | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics + underscore (1) | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second character set |
| SI | 0F | x | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |

| VTSU | X'xy' | Effect | | |
|------|-------|--------|---|---|
| NLX | 3b | n.s. | Near Letter Quality off | |
| MLL | 33 | n.s. | Maximum number of characters per line | |
| MLN | 35 | n.s. | Maximum number of lines per page | |
| CAP | 20 | n.s. | Continue at actual position | |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 | |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times | |

x:        supported by RSO for this printer type.

n.s.:     not supported by this printer type.

(1)       implemented by means of font support (see section "Font support for PCL printers" on page 61).

(2)       the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 4821-PCL Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL | |
| Reset  (1) | ESCE |
| Number of copies (2) | ESC&l#X |
| PAGE CONTROL | |
| Paper tray | ESC&l#H |
| Output tray | ESC&l#G |
| Left margin | ESC&a#L CR |
| Horizontal spacing (3) | ESC&k#H |
| Vertical spacing (4) | ESC&l#C |
| Form length (FHG) | <not supported> |
| Offset (left) | ESC&l#U |
| Offset (top) | ESC&l#Z |
| Overlays | ESC&f#y#X |
| TWO-SIDED PRINTING (DUPLEX) | |
| Single-sided printing (simplex) | ESC&l0S |
| Two-sided printing (duplex) | ESC&l#S |
| ROTATION | |
| 0° (portrait) | ESC&l0O |
| 90° (landscape) | ESC&l1O |
| 180° (portrait, upside down) | ESC&l2O |
| 270° (landscape, upside down) | ESC&l3O |
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | ESC&a#R |
| Horizontal position (absolute and relative) in columns | ESC&a#C |
| Horizontal tab | HT |
| Relative horizontal tab (5) | ESC&a.#C |
| Vertical tab | <not supported> |
| Relative vertical tab (6) | ESC&a.#R |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESC= |
| Half line up | ESC&a-0.5R |
| New line | LF |
| Carriage return | CR |
| New page | FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES (7) | |
| *Languages* | |
| International | <not supported> |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | <not supported> |
| French | ESC(1F |
| Dutch | <not supported> |
| German | ESC(1G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | <not supported> |
| Spanish | ESC(2S |
| Swiss | <not supported> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0N |
| ISO-8859-2 | ESC(2N |
| ISO-8859-3 to ISO-8859-8 | <not supported> |
| ISO-8859-9 | ESC(5N |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | ESC(s-3B) |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |
| *Underscore* | |
| Not possible | ESC&d@ |
| Possible | ESC&d0D |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1)  The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2)  The number of page copies is sent at the beginning of every job. The value is specified by the operand PAGE-COPIES in the PRINT-DOCUMENT command.

(3)  The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

It must be noted with the 4821-PCL Printer that the HMI value is set to the standard pitch value of the font whenever the font characteristics are modified. RSO has solved this problem by repeating the HMI value after any "detected" change of font characteristics. "Detected" means that the font was defined through a user VTSU code or through a character set. Any other type of modification of font characteristics, such as printer control character strings in the user file, results in the HMI value being set to the standard pitch value of the font and is thus the user's responsibility.

(4)  The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(5)  The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6)  The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(7)  The table shows which font characteristics are set implicitly by RSO through the following specifications:

    –  LANGUAGE operand of the ADD-SPOOL-CHARACTER-SETS statement (symbol set)

    –  VTSU codes PTS and PTX (proportional spacing on/off)

    –  CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SETS statement (character style)

    –  WEIGHT operand of the ADD-SPOOL-CHARACTER-SETS statement (character stroke weight)

    –  UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SETS statement (underscore)

–   VTSU codes EM1, EM2, EM3, EM4 and NOR.

Font management under RSOSERVE allows the definition of more complete fonts with all font characteristics (orientation, typeface etc.).

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 4821 Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

## 4822-PCL-REMOTE-PRINTER

The 4822 Printer is compatible with the HP LaserJet IV and has the following special characteristics:

– 600-dpi LED printing mechanism

– Up to 10 pages a minute

– optional two-sided printing

– optional output sorter

– PCL printer language (level 5e), including HPGL/2:

– support of the full scope of PJL commands.

The 4822 Printer supports additional emulations (e.g. EPSON LQ 850 and IBM Proprinter X24E). These emulations cannot be accessed via the RSO device 4822-PCL. They can be used in conjunction with the generic RSO printers 9000-EPLQ, 9000-PRO and similar printers.

**Access modes**

The 4822 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

HARDCOPY, PC, DIRECT, TACLAN, LPD

For a generation example, see .

### VTSU codes

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x (1) | Proportional spacing on |
| PTX | 1B | x (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | n.s. | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics + underscore (1) | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |

| VTSU | X'xy' | | Effect |
|------|-------|------|--------|
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:       supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     implemented by means of font support (see section "Font support for PCL printers" on page 61).

(2)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 4822 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case CONTROL-CHARACTERS=*NO/*EBCDIC/*IBM/*ASA must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog/epilog file.

| Function | Control character(s) |
|---|---|
| **JOB CONTROL** | |
| Reset (1) | ESCE |
| Number of copies | ESC&l#X |
| Paper format selection | !R!SPSZ #;EXIT; |
| **PAGE CONTROL** | |
| Paper tray | ESC&l#H or !R!CASS#;EXIT; |
| Output tray | ESC&l#G or !R!#STK;EXIT; |
| Left margin | ESC&a#L CR |
| Horizontal spacing (2) | ESC&k#H |
| Vertical spacing (3) | ESC&l#C |
| Form length (FHG) | <not supported> |
| Offset (left) | ESC&l#U |
| Offset (top) | ESC&l#Z |
| Overlays | ESC&f#y#X |
| **TWO-SIDED PRINTING (DUPLEX)** | |
| Single-sided printing (simplex) | ESC&l0S |
| Two-sided printing (duplex) | ESC&l1S |
| **ROTATION** | |
| 0° (portrait) | ESC&l0O |
| 90° (landscape) | ESC&l1O |
| 180° (portrait, upside down) | ESC&l2O |
| 270° (landscape, upside down) | ESC&l3O |
| **CURSOR POSITIONING** | |
| Vertical position (absolute and relative) in lines | ESC&a#R |
| Horizontal position (absolute and relative) in columns | ESC&a#C |
| Horizontal tab | HT |
| Relative horizontal tab (4) | ESC&a.#C |
| Vertical tab | <not supported> |
| Relative vertical tab (5) | ESC&a.#R |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESC= |
| Half line up | ESC&a-0.5R |
| New line | LF |
| Carriage return | CR |
| New page | FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES (6) | |
| *Languages* | |
| International | ESC(2U |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | <not supported> |
| French | ESC(1F |
| Dutch | <not supported> |
| German | ESC(1G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | <not supported> |
| Spanish | ESC(2S |
| Swiss | <not supported> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0N |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | ESC(s-3B |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |
| *Underscore* | |
| Not possible | ESC&d@ |
| Possible | ESC&d0D |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the start and end of each job if RESET=*YES was specified in the ADD-SPOOL-DEVICE statement during device definition.

(2) The horizontal spacing determines the spacing between the characters. This value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET) or from the VTSU code HMI.

(3) The vertical spacing determines the spacing between the lines. This value is calculated either from the line spacing from the form definition, from the defined loop record, or from the VTSU code VMI.

(4) The relative horizontal tab is used to skip a number of blanks if BLANK-COMPRESSION=*YES has been specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used to skip a number of lines if LINE-FEED-COMPRESSION=*YES has been specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The table shows which font characteristics are set implicitly by RSO by the following specifications:

   – LANGUAGE operand of the ADD-SPOOL-CHARACTER-SET statement (character set)

   – VTSU codes PTS and PTX (spacing)

   – CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SET statement (style)

   – WEIGHT operand of the ADD-SPOOL-CHARACTER-SET statement (stroke weight)

   – UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SET statement (underscore)

   – VTSU codes EM1, EM2, EM3, EM4 and NOR.

With the aid of RSOSERVE font management it is possible to define more complete fonts with all font characteristics (form orientation, typeface,...).

**Shift function support**

If LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the output text for the 4822 Printer is indented by $n$ * 1/10 inch, without changing the currently valid character spacing.

## 4824-PCL-REMOTE-PRINTER

The 4824-PCL Printer is compatible with the HP LaserJet IIISi and has the following special characteristics:

● High-quality output of up to 16 pages per minute

● Two paper input trays that can hold up to 500 sheets

● Two paper output trays with a "page upward/downward" mechanism and a sensor to indicate whether the output tray is full

● Scalable character types for generating fonts of any point size up to 999.75 points with 1/4-point spacing. The printer has thirteen internal scalable character types for proportional spacing and fourteen internal fonts with fixed character widths in bit patterns.

● PCL printer language (level 5) with the following characteristics:

  – fully integrated support for HP-GL/2 vector graphics

  – expanded mapping capability, thus permitting many special effects such as white-on-black printing and patterned fonts

  – several print directions possible on the same page

  – compatibility with software that supports the 9021 and LaserJet II Printers.

● Automatic rotation of fonts and raster graphics. The print format is automatically rotated when the page orientation is rotated.

● Large number of symbol sets that can be selected from the printer´s control panel.

● A selection of five languages for printer message output: English, French, German, Italian or Spanish.

● Two font cartridge slots.

**Access modes**

The 4824-PCL access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

HARDCOPY, DIRECT, PC, TACLAN, LPD

For a generation example, see .

### VTSU codes

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | (1) | Proportional spacing on |
| PTX | 1B | (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | n.s. | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics + underscore (1) | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second character set |
| SI | 0F | x | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |

| VTSU | X'xy' | | Effect |
|------|-------|------|--------|
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:       supported by RSO for this printer type.

n.s.:    not supported by this printer type.

(1)      implemented by means of font support (see section "Font support for PCL printers" on page 61).

(2)      the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 4824-PCL Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL | |
| Reset  (1) | ESCE |
| Number of copies (2) | ESC&l#X |
| PAGE CONTROL | |
| Paper tray | ESC&l#H |
| Left margin | ESC&a#L CR |
| Horizontal spacing (3) | ESC&k#H |
| Vertical spacing (4) | ESC&l#C |
| Form length (FHG) | \<not supported\> |
| Offset (left) | ESC&l#U# |
| Offset (top) | ESC&l#Z |
| Overlays | ESC&f#y#X |
| TWO-SIDED PRINTING (DUPLEX) | |
| Single-sided printing (simplex) | ESC&l0S |
| Two-sided printing (duplex) | ESC&l1S |
| ROTATION | |
| 0° (portrait) | ESC&l0O |
| 90° (landscape) | ESC&l1O |
| 180° (portrait, upside down) | ESC&l2O |
| 270° (landscape, upside down) | ESC&l3O |
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | ESC&a#R |
| Horizontal position (absolute and relative) in columns | ESC&a#C |
| Horizontal tab | HT |
| Relative horizontal tab (5) | ESC&a.#C |
| Vertical tab | \<not supported\> |
| Relative vertical tab (6) | ESC&a.#R |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESC= |
| Half line up | ESC&a-0.5R |
| New line | LF |
| Carriage return | CR |
| New page | FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES (7) | |
| *Languages (symbol sets)* | |
| International | <not supported> |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | <not supported> |
| French | ESC(1F |
| Dutch | <not supported> |
| German | ESC(1G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | <not supported> |
| Spanish | ESC(2S |
| Swiss | <not supported> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0N |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | ESC(s-3B) |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |
| *Underscore* | |
| Not possible | ESC&d@ |
| Possible | ESC&d0D |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The number of page copies is sent at the beginning of every job. The value is specified by the PAGE-COPIES operand in the PRINT-DOCUMENT command.

(3) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

It must be noted with the 4824-PCL Printer that the HMI value is set to the standard pitch value of the font whenever the font characteristics are modified. RSO has solved this problem by repeating the HMI value after any "detected" change of font characteristics. "Detected" means that the font was defined through a user VTSU code or through a character set. Any other type of modification of font characteristics, such as printer control character strings in the user file, results in the HMI value being set to the standard pitch value of the font and is thus the user's responsibility.

(4) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(5) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(7) The table shows which font characteristics are set implicitly by RSO through the following specifications:

   – LANGUAGE operand of the ADD-SPOOL-CHARACTER-SETS statement (symbol set)

   – VTSU codes PTS and PTX (proportional spacing on/off)

   – CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SETS statement (character style)

   – WEIGHT operand of the ADD-SPOOL-CHARACTER-SETS statement (character stroke weight)

   – UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SETS statement (underscore)

   – VTSU codes EM1, EM2, EM3, EM4 and NOR.

Font management under RSOSERVE allows the definition of more complete fonts with all font characteristics (orientation, typeface etc.).

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 4824-PCL Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

## 4825-PCL-REMOTE-PRINTER

The 4825 Printer is compatible with the HP LaserJet IV and has the following special characteristics:

– 600-dpi LED printing mechanism

– Up to 18 pages a minute, with optional two-sided printing

– Optional output sorter

– PCL printer language (level 5e), including HPGL/2:

– Support of the full scope of PJL commands.

The 4822 Printer supports additional emulations (e.g. EPSON LQ 850 and IBM Proprinter X24E). These emulations cannot be accessed via the RSO device 4825-PCL. They can be used in conjunction with the generic RSO printers 9000-EPLQ, 9000-PRO and similar printers.

**Access modes**

The 4825 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

HARDCOPY, PC, DIRECT, TACLAN, LPD

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|--------|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x (1) | Proportional spacing on |
| PTX | 1B | x (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |

| VTSU | X'xy' | | Effect |
|---|---|---|---|
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | n.s. | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics + underscore (1) | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Max. number of characters per line |
| MLN | 35 | n.s. | Max. number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     implemented by means of font support (see ).

(2)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 4825 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case CONTROL-CHARACTERS=*NO/*EBCDIC/*IBM/*ASA must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies<br>Paper format selection | <br>ESCE<br>ESC&l#X<br>!R!SPSZ #;EXIT; |
| PAGE CONTROL<br>Paper tray<br><br>Output tray<br><br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC&l#H or<br>!R!CASS#;EXIT;<br>ESC&l#G<br>!R!#STK;EXIT;<br>ESC&a#L CR<br>ESC&k#H<br>ESC&l#C<br><not supported><br>ESC&l#U<br>ESC&l#Z<br>ESC&f#y#X |
| TWO-SIDED PRINTING (DUPLEX)<br>Single-sided printing (simplex)<br>Two-sided printing (duplex) | <br>ESC&l0S<br>ESC&l1S |
| ROTATION<br>0° (portrait)<br>90° (landscape)<br>180° (portrait, upside down)<br>270° (landscape, upside down) | <br>ESC&l0O<br>ESC&l1O<br>ESC&l2O<br>ESC&l3O |

| Function | Control character(s) |
|---|---|
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | ESC&a#R |
| Horizontal position (absolute and relative) in columns | ESC&a#C |
| Horizontal tab | HT |
| Relative horizontal tab (4) | ESC&a.#C |
| Vertical tab | \<not supported\> |
| Relative vertical tab (5) | ESC&a.#R |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESC= |
| Half line up | ESC&a-0.5R |
| New line | LF |
| Carriage return | CR |
| New page | FF |
| CHARACTER SET FEATURES (6) | |
| *Languages* | |
| International | ESC(2U |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | \<not supported\> |
| French | ESC(1F |
| Dutch | \<not supported\> |
| German | ESC(1G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | \<not supported\> |
| Spanish | ESC(2S |
| Swiss | \<not supported\> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0N |
| ISO-8859-2 to ISO-8859-9 | \<not supported\> |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | ESC(s-3B |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |

| Function | Control character(s) |
|---|---|
| *Underscore* | |
| Not possible | ESC&d@ |
| Possible | ESC&d0D |
| *Print quality* | |
| Low (NLQ=*NO) | \<not supported> |
| High (NLQ=*YES) | \<not supported> |
| *Character type* | \<not supported> |
| *Color* | \<not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

   It must be noted with the 4825 Printer that the HMI value is set to the standard pitch value of the font whenever the font characteristics are modified. RSO has solved this problem by repeating the HMI value after any "detected" change of font characteristics. "Detected" means that the font was defined through a user VTSU code or through a character set. Any other type of modification of font characteristics, such as printer control character strings in the user file, results in the HMI value being set to the standard pitch value of the font and is thus the user's responsibility.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The table shows which font characteristics are set implicitly by RSO through the following specifications:

– LANGUAGE operand of the ADD-SPOOL-CHARACTER-SETS statement (symbol set)

– VTSU codes PTS and PTX (proportional spacing on/off)

– CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SETS statement (character style)

– WEIGHT operand of the ADD-SPOOL-CHARACTER-SETS statement (character stroke weight)

– UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SETS statement (underscore)

– VTSU codes EM1, EM2, EM3, EM4 and NOR.

Font management under RSOSERVE allows the definition of more complete fonts with all font characteristics (orientation, typeface etc.).

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 4825 Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

## 4830-PCL-REMOTE-PRINTER

The 4830 Printer (KYOCERA FS-7000 or FS-9000) supports the same functions as the 4825-PCL Printer. This printer is compatible with the HP LaserJet IV and has the following special characteristics:

– PCL printer language (level 5e) including HPGL/2:

– up to 28 (FS-7000) or 36 (FS9000) pages a minute

– 600-dpi LED printing mechanism

– single-sheet printing

– support for up to 8 feed trays

– two-sided printing (duplex)

– prints graphics and barcodes

The 4830 Printer supports additional emulations (e.g. EPSON LQ 850 and IBM Proprinter X24E). These emulations cannot be accessed via the RSO device 4830-PCL. They can be used in conjunction with the generic RSO printers 9000-EPLQ, 9000-PRO and similar printers.

### Access modes

The 4830 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

HARDCOPY, PC, DIRECT, TACLAN, LPD

### VTSU codes

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x (1) | Proportional spacing on |
| PTX | 1B | x (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | n.s. | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics + underscore (1) | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Max. number of characters per line |
| MLN | 35 | n.s. | Max. number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:        supported by RSO for this printer type.

n.s.:    not supported by this printer type.

(1)     implemented by means of font support (see section "Font support for PCL printers" on page 61).

(2)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 4830 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case CONTROL-CHARACTERS=*NO/*EBCDIC/*IBM/*ASA must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies<br>Paper format selection | <br>ESCE<br>ESC&l#X<br>!R!SPSZ #;EXIT; |
| PAGE CONTROL<br>Paper tray<br><br>Output tray<br><br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC&l#H or<br>!R!PSRC#;EXIT;<br>ESC&l#G or<br>!R!#STK;EXIT;<br>ESC&a#L CR<br>ESC&k#H<br>ESC&l#C<br><not supported><br>ESC&l#U<br>ESC&l#Z<br>ESC&f#y#X |
| TWO-SIDED PRINTING (DUPLEX)<br>Single-sided printing (simplex)<br>Two-sided printing (duplex) | <br>ESC&l0S<br>ESC&l1S |
| ROTATION<br>0° (portrait)<br>90° (landscape)<br>180° (portrait, upside down)<br>270° (landscape, upside down) | <br>ESC&l0O<br>ESC&l1O<br>ESC&l2O<br>ESC&l3O |

| Function | Control character(s) |
|---|---|
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | ESC&a#R |
| Horizontal position (absolute and relative) in columns | ESC&a#C |
| Horizontal tab | HT |
| Relative horizontal tab (4) | ESC&a.#C |
| Vertical tab | <not supported> |
| Relative vertical tab (5) | ESC&a.#R |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESC= |
| Half line up | ESC&a-0.5R |
| New line | LF |
| Carriage return | CR |
| New page | FF |
| CHARACTER SET FEATURES (6) | |
| *Languages* | |
| International | ESC(2U |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | <not supported> |
| French | ESC(1F |
| Dutch | <not supported> |
| German | ESC(1G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | <not supported> |
| Spanish | ESC(2S |
| Swiss | <not supported> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0N |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | ESC(s-3B |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |

| Function | Control character(s) |
|---|---|
| *Underscore*<br>Not possible<br>Possible<br>*Print quality*<br>Low (NLQ=*NO)<br>High (NLQ=*YES)<br>*Character type*<br>*Color* | <br>ESC&d@<br>ESC&d0D<br><br><not supported><br><not supported><br><not supported><br><not supported> |
| Select primary character set [SI]<br>Select secondary character set [SO] | SI<br>SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

It must be noted with the 4830 Printer that the HMI value is set to the standard pitch value of the font whenever the font characteristics are modified. RSO has solved this problem by repeating the HMI value after any "detected" change of font characteristics. "Detected" means that the font was defined through a user VTSU code or through a character set. Any other type of modification of font characteristics, such as printer control character strings in the user file, results in the HMI value being set to the standard pitch value of the font and is thus the user's responsibility.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The table shows which font characteristics are set implicitly by RSO through the following specifications:

– LANGUAGE operand of the ADD-SPOOL-CHARACTER-SETS statement (symbol set)

– VTSU codes PTS and PTX (proportional spacing on/off)

– CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SETS statement (character style)

– WEIGHT operand of the ADD-SPOOL-CHARACTER-SETS statement (character stroke weight)

– UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SETS statement (underscore)

– VTSU codes EM1, EM2, EM3, EM4 and NOR.

Font management under RSOSERVE allows the definition of more complete fonts with all font characteristics (orientation, typeface etc.).

**Font support**

Like the other PCL printers which are already supported by RSO, the 4830-PCL Printer supports fonts which are defined by the following characteristics (in descending order of priority):

1. Symbol set
2. Character spacing (fixed/proportional)
3. Pitch in characters per inch
4. Character height in points ($\equiv$ 1/72 inch)
5. Style (straight/italic)
6. Stroke weight (light/medium/bold)
7. Typeface

Some fonts are supplied with the printer as internal fonts. Additional fonts can be made available from cartridges or as (loadable) soft fonts which are transferred from the processor to the printer memory when invoked.

Before it is transferred, each soft font should be assigned a font ID number for unique identification. It is then easy to define a soft font as the current primary or secondary font by specifying its ID number. This makes all the characteristics of this soft font, with the exception of its orientation, the new characteristics of the primary or secondary font.

With a 4830-PCL Printer, internal fonts and cartridge fonts can also be assigned font ID numbers. This can be done in one of two ways:

– by defining a font as the primary font
– by specifying printer control characters which, after storing the definitions of the active primary font, assign the font an ID number; the stored font can easily be defined as primary or secondary font by specifying its ID number (i.e. all stored characteristics of the font, with the exception of its orientation, become the characteristics of the current primary or secondary font).

Note that the various printer types behave differently with respect to orientation. The 4830-PCL Printer supports fonts in both orientations (portrait and landscape). This means that on these printers a font ID can be called and defined as primary or secondary font irrespective of the current orientation value.

**Left and top margin**

For the 4830-PCL Printer, it is possible to define a horizontal or vertical blank strip at the left or top edge of the sheet. This margin is produced by shifting the logical page on the physical page. The definition of the blank strip at the edge of the sheet can be used in single or duplex printing and has the same effect in both cases, irrespective of the page orientation.

The margin can be defined when creating a print job with the PRINT-DOCUMENT command by specifying the TOP-OFFSET and LEFT-OFFSET operands.

**Rotation**

The 4830-PCL Printer supports page rotation in any of the following formats (orientations): portrait, landscape, portrait (upside down) and landscape (upside down).

**Two-sided printing (duplex mode)**

The 4830-PCL Printer is equipped with an optional device for two-sided printing and for storing pages face down, and is thus capable of supporting both single-sided and two-sided printing.

As well as specifying whether you want single-sided or two-sided printing, you must also specify which edge is to be used for stapling or binding the paper. Here, you can choose the short edge or the long edge. This is done using the ROTATION operand of the PRINT-DOCUMENT command. In total, therefore, there are four possible types of two-sided printing, see also .

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 4830 Printer is indented $n * 1/10$ inch without the currently valid character spacing being changed.

**Rules for defining the print page in a form**

The 4830-PCL Printer does not allow you to print out the whole physical page. A 1/2-inch margin at the top and bottom of the page cannot be printed on, so the printable area (logical page) is between these two margins.
For this reason, the maximum number of lines per page for this printer type does not depend on the size of the physical page but on the size of the logical page. The specification for PAGE-SIZE (portrait) or LINE-SIZE (landscape) must therefore be based on the height of the logical page and not the height of the physical page.

**Rules for defining character spacing**

The following rules apply when defining character spacing:

| Printer type | cpi value determined when PRINT-DOCUMENT is issued and at the start of spoolout | cpi value calculated and sent to the printer by RSO |
|---|---|---|
| 4830-PCL | 1..100 | 1..100 |

**Supported values for line spacing**

The following rules apply when defining line spacing:

| Printer type | LOOP or SPACING values (3/4/6/8/10/12/15/20) | Values for calculating (SPACING=DENSITY...) |
|---|---|---|
| 4830-PCL | 3/4/6/8/10/12/15/20 lpi | INCHES=1..682 and LINES=1 or INCHES=1..999 and LINES=2..999 |

## 4850-PCL-REMOTE-PRINTER

The 4850-PCL Printer is a new wide-format laser printer with continuous form feed, which can be used whenever high print speeds, high print quality and wide-format continuous paper are required. This printer is compatible with the HP LaserJet IV and has the following special features:

– PCL printer language (level 5)

– up to 26 pages a minute

– 300 x 300-dpi LED printing mechanism

– continuous paper up to 17" wide

The printer does not have single-sheet feed, but supports two feed trays, which allows output to two different listings. The listings can be cut into separate pages using a cutting machine on the output side of the printer.

**Access modes**

The 4850 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are: TACLAN, LPD

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x (1) | Proportional spacing on |
| PTX | 1B | x (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |

| VTSU | X'xy' | | Effect |
|---|---|---|---|
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | n.s. | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics + underscore (1) | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Max. number of characters per line |
| MLN | 35 | n.s. | Max. number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:       supported by RSO for this printer type.

n.s.:    not supported by this printer type.

(1)      implemented by means of font support (see section "Font support for PCL printers" on page 61).

(2)      the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 4850 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case CONTROL-CHARACTERS=*NO/*EBCDIC/*IBM/*ASA must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies<br>Paper format selection | <br>ESCE<br>ESC&l#X<br>ESC&l#A |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC&l#H<br>ESC&l#G<br>ESC&a#L CR<br>ESC&k#H<br>ESC&l#C<br><not supported><br>ESC&l#U<br>ESC&l#Z<br>ESC&f#y#X |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION<br>0° (portrait)<br>90° (landscape)<br>180° (portrait, upside down)<br>270° (landscape, upside down) | <br>ESC&l0O<br>ESC&l1O<br>ESC&l2O<br>ESC&l3O |

| Function | Control character(s) |
|---|---|
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | ESC&a#R |
| Horizontal position (absolute and relative) in columns | ESC&a#C |
| Horizontal tab | HT |
| Relative horizontal tab (4) | ESC&a.#C |
| Vertical tab | ESC&a.#R |
| Relative vertical tab (5) | <not supported> |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESC= |
| Half line up | ESC&a-0.5R |
| New line | LF |
| Carriage return | CR |
| New page | FF |
| CHARACTER SET FEATURES (6) | |
| *Languages* | |
| International | ESC(2U |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | <not supported> |
| French | ESC(1F |
| Dutch | <not supported> |
| German | ESC(1G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | <not supported> |
| Spanish | ESC(2S |
| Swiss | <not supported> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0N |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | ESC(s-3B |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |

| Function | Control character(s) |
|----------|----------------------|
| *Underscore*<br>Not possible<br>Possible | <br>ESC&d@<br>ESC&d0D |
| *Print quality*<br>Low (NLQ=\*NO)<br>High (NLQ=\*YES)<br>*Character type*<br>*Color* | <br><not supported><br><not supported><br><not supported><br><not supported> |
| Select primary character set [SI]<br>Select secondary character set [SO] | SI<br>SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=\*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

It must be noted with the 4850 Printer that the HMI value is set to the standard pitch value of the font whenever the font characteristics are modified. RSO has solved this problem by repeating the HMI value after any "detected" change of font characteristics. "Detected" means that the font was defined through a user VTSU code or through a character set. Any other type of modification of font characteristics, such as printer control character strings in the user file, results in the HMI value being set to the standard pitch value of the font and is thus the user's responsibility.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=\*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=\*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The table shows which font characteristics are set implicitly by RSO through the following specifications:

– LANGUAGE operand of the ADD-SPOOL-CHARACTER-SETS statement (symbol set)

– VTSU codes PTS and PTX (proportional spacing on/off)

– CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SETS statement (character style)

– WEIGHT operand of the ADD-SPOOL-CHARACTER-SETS statement (character stroke weight)

– UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SETS statement (underscore)

– VTSU codes EM1, EM2, EM3, EM4 and NOR.

Font management under RSOSERVE allows the definition of more complete fonts with all font characteristics (orientation, typeface etc.).

**Font support**

Like the other PCL printers which are already supported by RSO, the 4850-PCL Printer supports fonts which are defined by the following characteristics (in descending order of priority):

1. Symbol set
2. Character spacing (fixed/proportional)
3. Pitch in characters per inch
4. Character height in points ($\equiv$ 1/72 inch)
5. Style (straight/italic)
6. Stroke weight (light/medium/bold)
7. Typeface

Some fonts are supplied with the printer as internal fonts. Additional fonts can be made available from cartridges or as (loadable) soft fonts which are transferred from the processor to the printer memory when invoked.

Before it is transferred, each soft font should be assigned a font ID number for unique identification. It is then easy to define a soft font as the current primary or secondary font by specifying its ID number. This makes all the characteristics of this soft font, with the exception of its orientation, the new characteristics of the primary or secondary font.

With a 4850-PCL Printer, internal fonts and cartridge fonts can also be assigned font ID numbers. This can be done in one of two ways:

– by defining a font as the primary font
– by specifying printer control characters which, after storing the definitions of the active primary font, assign the font an ID number; the stored font can easily be defined as primary or secondary font by specifying its ID number (i.e. all stored characteristics of the font, with the exception of its orientation, become the characteristics of the current primary or secondary font).

Note that the various printer types behave differently with respect to orientation. The 4850-PCL Printer supports fonts in both orientations (portrait and landscape). This means that on these printers a font ID can be called and defined as primary or secondary font irrespective of the current orientation value.

### Left and top margin

For the 4850-PCL Printer, it is possible to define a horizontal or vertical blank strip at the left or top edge of the sheet. This margin is produced by shifting the logical page on the physical page. The definition of the blank strip at the edge of the sheet can be used in single or duplex printing and has the same effect in both cases, irrespective of the page orientation.

The margin can be defined when creating a print job with the PRINT-DOCUMENT command by specifying the TOP-OFFSET and LEFT-OFFSET operands.

### Rotation

The 4850-PCL Printer supports page rotation in any of the following formats (orientations): portrait, landscape, portrait (upside down) and landscape (upside down).

### Shift function support

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 4850 Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

### Rules for defining the print page in a form

The 4850-PCL Printer does not allow you to print out the whole physical page. A 1/2-inch margin at the top and bottom of the page cannot be printed on, so the printable area (logical page) is between these two margins.

For this reason, the maximum number of lines per page for this printer type does not depend on the size of the physical page but on the size of the logical page. The specification for PAGE-SIZE (portrait) or LINE-SIZE (landscape) must therefore be based on the height of the logical page and not the height of the physical page.

### Rules for defining character spacing

The following rules apply when defining character spacing:

| Printer type | cpi value determined when PRINT-DOCUMENT is issued and at the start of spoolout | cpi value calculated and sent to the printer by RSO |
| --- | --- | --- |
| 4850-PCL | 1..100 | 1..100 |

### Supported values for line spacing

The following rules apply when defining line spacing:

| Printer type | LOOP or SPACING values (3/4/6/8/10/12/15/20) | Values for calculating (SPACING=DENSITY...) |
| --- | --- | --- |
| 4850-PCL | 3/4/6/8/10/12/15/20 lpi | INCHES=1..682 and LINES=1 or INCHES=1..999 and LINES=2..999 |

### Cutting machine

The OUTPUT-TRAY-NUMBER operand of the PRINT-DOCUMENT command can also be used to activate the cutting machine:

| OUTPUT-TRAY-NUMBER | Effect |
| --- | --- |
| 1 | Selects the upper/topmost output tray and activates the cutting machine for each sheet |
| 2 | Selects the lower/bottommost output tray |
| 3 | Selects the lower/bottommost output tray and activates the cutting machine for each sheet |
| *STD | Default value of the device definition (IGNORE) |
| *IGNORE | RSO does not select an output tray. The last selection or the printer default remains unchanged. |

### Inverted landscape mode

If `CHANGE PROFILE -> PRINTING MENU -> LANDSCAPE-MODE=REVERSE` is set on the printer control panel instead of `PCL Compatible`, this automatically causes all pages in landscape format to be rotated 180° clockwise.

## 8121-REMOTE-PRINTER

**Access modes**

The 8121 access modes supported by RSO (for the ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY

**VTSU codes**

| VTSU | X'xy' | | Effect |
|---|---|---|---|
| BS | 16 | n.s. | |
| PLD | 2B | n.s. | |
| PLU | 2C | n.s. | |
| LM d1d2d3 | 38 | n.s. | |
| PTS | 1A | n.s. | Proportional spacing on |
| PTX | 1B | n.s. | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/10 | |
| HMI3 | 23F3 | 1/10 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/6 | |
| VMI3 | 24F3 | 1/6 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | n.s. | |
| ASFd | 21 | n.s. | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | x | |
| HT | 05 | n.s. | |
| VT | 0B | n.s. | |

| VTSU | X'xy' | | Effect | |
|---|---|---|---|---|
| EM1 | 1D | italics | Layout control characters | |
| EM2 | 1F | italics | | |
| EM3 | 13 | italics | | |
| EM4 | 14 | italics | | |
| NL | 15 | x | New line | |
| NOR | 1E | x | Normal layout | |
| SO | 0E | x | Switch to second symbol set | |
| SI | 0F | x | Switch to standard symbol set | |
| CR | 0D | x | Logical end-of-record | |
| NLQ | 39 | n.s. | Near Letter Quality on | |
| NLX | 3b | n.s. | Near Letter Quality off | |
| MLL | 33 | n.s. | Maximum number of characters per line | |
| MLN | 35 | n.s. | Maximum number of lines per page | |
| CAP | 20 | n.s. | Continue at actual position | |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 | |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times | |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)    implemented by means of font support (see section "Font support for PCL printers" on page 61).

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 8121 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL | |
| Reset | <not supported> |
| Number of copies | <not supported> |
| PAGE CONTROL | <not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | <not supported> |
| Horizontal position (absolute and relative) in columns | <not supported> |
| Horizontal tab | <not supported> |
| Relative horizontal tab (1) | ESC8# |
| Vertical tab | <not supported> |
| Relative vertical tab (2) | ESC6# |
| Backspace (one column to left) | <not supported> |
| Blank (space) | SP |
| Half line down | <not supported> |
| Half line up | <not supported> |
| New line | LF |
| Carriage return | CR |
| New page | FF |
| CHARACTER SET FEATURES | |
| *Languages* | <not supported> |
| *Character spacing* | |
| Fixed | <not supported> |
| Proportional | <not supported> |
| *Style* | |
| Straight | ESC4 |
| Italic | ESC3 |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | <not supported> |
| Bold | <not supported> |
| *Underscore* | |
| Not possible | <not supported> |
| Possible | <not supported> |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | ESC4 |
| Select secondary character set [SO] | ESC5 |

*Notes*

(1) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(2) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 8121 Printer is indented $n$ spaces at the currently valid character spacing.

## 9000-REMOTE-PRINTER

Type 9000 denotes a dummy type, i.e. the user can declare a new, freely selectable printer type for 9000.

**Access modes**

The 9000 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, APPLICATION, HDLC, PC, HARDCOPY-9751, TACLAN, LPD

**VTSU codes**

| VTSU | X'xy' | | Effect |
|------|-------|------|--------|
| BS | 16 | n.s. | |
| PLD | 2B | n.s. | |
| PLU | 2C | n.s. | |
| LM d1d2d3 | 38 | n.s. | |
| PTS | 1A | n.s. | Proportional spacing on |
| PTX | 1B | n.s. | Proportional spacing off |
| HMI1 | 23F1 | n.s. | Character spacing |
| HMI2 | 23F2 | n.s. | |
| HMI3 | 23F3 | n.s. | |
| VMI1 | 24F1 | n.s. | Line spacing |
| VMI2 | 24F2 | n.s. | |
| VMI3 | 24F3 | n.s. | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | n.s. | |
| ASFd | 21 | n.s. | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | x | |
| HT | 05 | n.s. | |
| VT | 0B | n.s. | |

| VTSU | X'xy' | | Effect |
|------|-------|---|--------|
| EM1 | 1D | n.s. | Layout control characters |
| EM2 | 1F | n.s. | |
| EM3 | 13 | n.s. | |
| EM4 | 14 | n.s. | |
| NL | 15 | x | New line |
| NOR | 1E | n.s. | Normal layout |
| SO | 0E | n.s. | Switch to second symbol set |
| SI | 0F | n.s. | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9000 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset<br>Number of copies | <br><not supported><br><not supported> |
| PAGE CONTROL | <not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |

| Function | Control character(s) |
|---|---|
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | <not supported> |
| Horizontal position (absolute and relative) in columns | <not supported> |
| Horizontal tab | <not supported> |
| Relative horizontal tab | <not supported> |
| Vertical tab | <not supported> |
| Relative vertical tab | <not supported> |
| Backspace (one column to left) | <not supported> |
| Blank (space) | SP |
| Half line down | <not supported> |
| Half line up | <not supported> |
| New line | LF |
| Carriage return | CR |
| New page | FF |
| CHARACTER SET FEATURES | |
| *Languages* | <not supported> |
| *Character spacing* | |
| Fixed | <not supported> |
| Proportional | <not supported> |
| *Style* | |
| Straight | <not supported> |
| Italic | <not supported> |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | <not supported> |
| Bold | <not supported> |
| *Underscore* | |
| Not possible | <not supported> |
| Possible | <not supported> |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | <not supported> |
| Select secondary character set [SO] | <not supported> |

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in
the ADD-SPOOL-DEVICE statement, the text output on the 9000 Printer is indented
$n$ spaces at the currently valid character spacing.

## 9000-PCL-REMOTE-PRINTER

The 9000-PCL Printer is a generic printer type that can be used to access PCL-compatible printers for which there exists no RSO device type.
RSO supports this printer family by means of a single device type, namely the 9000-PCL.

### Access modes

The 9000-PCL access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC, TACLAN, LPD

*Note*

> The HARDCOPY connection is supported only at 9763 terminals with a driver for LASERJET emulation.

For a generation example, see .

### VTSU codes

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x (1) | Proportional spacing on |
| PTX | 1B | x (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |

| VTSU | X'xy' | | Effect |
|------|-------|---|--------|
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | n.s. | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics + underscore (1) | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:     supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)    implemented by means of font support (see section "Font support for PCL printers" on page 61).

(2)    the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

### Supported printer functions

The following table shows all the printer functions that are implicitly supported by RSO for the 9000-PCL Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies<br>Paper format selection | <br>ESCE<br>ESC&l#X<br>ESC&l#A |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC&l#H<br>ESC&l#G<br>ESC&a#L CR<br>ESC&k#H<br>ESC&l#C<br><not supported><br>ESC&l#U<br>ESC&l#Z<br>ESC&f#y#X |
| TWO-SIDED PRINTING (DUPLEX)<br>Single-sided printing (simplex)<br>Two-sided printing (duplex) | <br>ESC&l0S<br>ESC&l#S |
| ROTATION<br>0° (portrait)<br>90° (landscape)<br>180° (portrait, upside down)<br>270° (landscape, upside down) | <br>ESC&l0O<br>ESC&l1O<br>ESC&l2O<br>ESC&l3O |

| Function | Control character(s) |
|---|---|
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | ESC&a#R |
| Horizontal position (absolute and relative) in columns | ESC&a#C |
| Horizontal tab | HT |
| Relative horizontal tab (4) | ESC&a.#C |
| Vertical tab | <not supported> |
| Relative vertical tab (5) | ESC&a.#R |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESC= |
| Half line up | ESC&a-0.5R |
| New line | LF |
| Carriage return | CR |
| New page | FF |
| CHARACTER SET FEATURES (6) | |
| *Languages* | |
| International | ESC(2U |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | <not supported> |
| French | ESC(1F |
| Dutch | <not supported> |
| German | ESC(1G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | <not supported> |
| Spanish | ESC(2S |
| Swiss | <not supported> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0N |
| ISO-8859-2 | ESC(2N |
| ISO-8859-3 to ISO-8859-8 | <not supported> |
| ISO-8859-9 | ESC(5N |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |

| Function | Control character(s) |
|---|---|
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | ESC(s-3B |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |
| *Underscore* | |
| Not possible | ESC&d@ |
| Possible | ESC&d0D |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The table shows which font characteristics are set implicitly by RSO through the following specifications:

– LANGUAGE operand of the ADD-SPOOL-CHARACTER-SETS statement (symbol set)

– VTSU codes PTS and PTX (spacing)

– CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SETS statement (character style)

– WEIGHT operand of the ADD-SPOOL-CHARACTER-SETS statement (character stroke weight)

– UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SETS statement (underscore)

– VTSU codes EM1, EM2, EM3, EM4 and NOR.

Font management under RSOSERVE allows the definition of more complete fonts with all font characteristics (orientation, typeface etc.).

**Error recovery**

The way in which reception is acknowledged varies depending on the printer access mode. When connected to a BAM converter, the 9000-PCL can send positive and negative acknowledgments. No matter what may actually have caused the printer error, it is always the same negative acknowledgment that is sent, namely: 'PRINTER ERROR'. The spoolout job is entered in the KEEP queue and the device is given the status 'S'.

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9000-PCL Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

# 9000-PRO-REMOTE-PRINTER

The 9000-PRO printer is a generic printer type which can be used to access printers which support the IBM Proprinter printer language.

### Access modes

The 9000-PCL access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

LPD, TACLAN

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

### VTSU codes

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| BS | 16 | x | |
| PLD | 2B | n.s. | |
| PLU | 2C | n.s. | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | n.s. | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | n.s. | |
| ASFd | 21 | n.s. | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |

| VTSU | X'xy' | | Effect |
|---|---|---|---|
| VT | 0B | x | |
| EM1 | 1D | underscore | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | bold + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | x | Near Letter Quality on |
| NLX | 3b | x | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x: supported by RSO for this printer type.

n.s.: not supported by this printer type.

(1) implemented by means of font support (see section "Font support for PCL printers" on page 61).

(2) the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

### Supported printer functions

The following table shows all the printer functions that are implicitly supported by RSO for the 9000-PRO Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL | |
| Reset (1) | <not supported> |
| Number of copies | <not supported> |
| Paper format selection | <not supported> |
| PAGE CONTROL | |
| Paper tray | <not supported> |
| Output tray | <not supported> |
| Left margin | ESCX# |
| Horizontal spacing (2) | DC2 oder ESC: oder ESCSI |
| Vertical spacing (3) | ESCA#ESC2 |
| Form length (FHG) | ESCC# |
| Offset (left) | <not supported> |
| Offset (top) | <not supported> |
| Overlays | <not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | <not supported> |
| Horizontal position (absolute and relative) in columns | <not supported> |
| Horizontal tab | HT |
| Relative horizontal tab | <not supported> |
| Vertical tab | VT |
| Relative vertical tab | <not supported> |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESCS1 |
| Half line up | ESCS0 |
| New line | LF |
| Carriage return | CR |
| New page | FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | \<not supported\> |
| *Character spacing* | |
| Fixed | ESCP0 |
| Proportional | ESCP1 |
| *Style* | \<not supported\> |
| *Stroke weight* | |
| Light | \<not supported\> |
| Medium | ESCF |
| Bold | ESCE |
| *Underscore* | |
| Not possible | ESC-\0 |
| Possible | ESC-\x01 |
| *Print quality* | |
| Low (NLQ=*NO) | ESCI\0 |
| High (NLQ=*YES) | ESCI\x02 |
| *Character type* | \<not supported\> |
| *Color* | \<not supported\> |
| Select primary character set [SI] | ESC7 |
| Select secondary character set [SO] | ESC6 |

*Notes*

(1)  The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2)  The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3)  The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9000-PRO Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

## 9000-PS-REMOTE-PRINTER

The 9000-PS Printer is a generic printer that can be used to access PostScript-compatible printers for which there exists no RSO device type.

**Document formats**

PostScript printers can be used to print two document formats:

Text files
> Text files contain only record types A-1 and A-2 (see section "Use of record types (layout of the records)" on page 50). These files must be printed on PostScript printers defined with printer type 9000-PS; the parameter DOCUMENT-FORMAT=*TEXT of the PRINT-DOCUMENT command must be used.

PostScript files
> PostScript files contain PostScript commands and comply with the PostScript document coding conventions. These files must be printed on PostScript printers defined with printer type 9000-PS; the parameter DOCUMENT-FORMAT=*SPECIAL-FORMAT(LINE-SPACING=1) of the PRINT-DOCUMENT command must be used.

**Printing parts of a PostScript file**

Via the FROM and TO operands of the PRINT-DOCUMENT command you can instruct RSO to print out selected parts of a given PostScript file.

Before RSO can print part of a PostScript file, the file must satisfy the minimum requirements stipulated by PostScript document structure conventions. This also applies in cases where RSO wishes to resume printing after a print error.

1. A PostScript file has two parts: the PostScript prolog (which contains essential definitions for the document script) and the document script (which contains a description of the pages to be printed). The PostScript prolog is not an RSO prolog but part of the file to be printed; it is integrated into the PostScript document to be printed.

2. The document script describes the print pages of a PostScript document. It uses the definitions of the PostScript prologs. The description of each print page should have the string c'%%Page:' as its first characters.

3. The first string matching c'%%Page:' to be found in the print file marks the end of the PostScript prolog and the start of the first page to be printed.

PostScript files created automatically by large Unix system or PC applications always satisfy the minimum requirements with regard to the PostScript document structure conventions. Consequently, it is a simple matter to print parts of such files with DOCUMENT-PART(*OUTPUT-PART=*RANGE/*LAST) in the PRINT-DOCUMENT command. The PostScript prolog is always sent to the printer, even if *OUTPUT-PART=*RANGE or *LAST was used.

**Access modes**

The 9000-PS access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

LPD, TACLAN

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

**Character set support**

An RSO font refers to a 256-character string which can be defined by systems support. With the aid of RSOSERVE, this string can be assigned to one or more character sets by systems support or a device administrator.

It is possible to define RSO fonts for PostScript printers which are accessed via printer type 9000-PS. This is done by entering the PostScript name of the required character set in the 256-character string. In accordance with the value provided by PostScript, RSO uses the character type Courier as its default font. If, for example, you want to print the text bold and italics in character type Times, you enter "Times-BoldItalic" in the RSO font.

**VTSU codes**

| VTSU | X'xy' | | Effect |
|------|-------|------|--------|
| BS | 16 | n.s. | |
| PLD | 2B | n.s. | |
| PLU | 2C | n.s. | |
| LM d1d2d3 | 38 | n.s. | |
| PTS | 1A | n.s. | Proportional spacing on |
| PTX | 1B | n.s. | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | n.s. | Line spacing |
| VMI2 | 24F2 | n.s. | |
| VMI3 | 24F3 | n.s. | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | n.s. | |
| ASFd | 21 | n.s | |
| NP | 0C | x | New page |
| ESC | 27 | n.s. | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | n.s. | |
| VT | 0B | n.s. | |
| EM1 | 1D | n.s. | Layout control characters |
| EM2 | 1F | n.s. | |
| EM3 | 13 | n.s. | |
| EM4 | 14 | n.s. | |
| NL | 15 | x | New line |
| NOR | 1E | n.s. | Normal layout |
| SO | 0E | n.s. | Switch to second symbol set |
| SI | 0F | n.s. | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |

| VTSU | X'xy' | | Effect |
|---|---|---|---|
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9000-PS Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility. They can call printer functions with PostScript commands within their user file, in prolog/epilog files, or in an RSO character set. In this case, however, they should be sure to observe the structure conventions for PostScript documents.

| Function | Control character(s) |
|---|---|
| JOB CONTROL | |
| Reset | <not supported> |
| Number of copies | x |
| Paper format selection | <not supported> |
| PAGE CONTROL | |
| Paper tray | <not supported> |
| Output tray | <not supported> |
| Left margin | <not supported> |
| Horizontal spacing (1) | x |
| Vertical spacing (2) | x |
| Form length (FHG) | <not supported> |
| Offset (left) | <not supported> |
| Offset (top) | <not supported> |
| Overlays | <not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | <not supported> |
| Horizontal position (absolute and relative) in columns | <not supported> |
| Horizontal tab | <not supported> |
| Relative horizontal tab | <not supported> |
| Vertical tab | <not supported> |
| Relative vertical tab | x |
| Backspace (one column to left) | <not supported> |
| Blank (space) | x |
| Half line down | <not supported> |
| Half line up | <not supported> |
| New line | x |
| Carriage return | x |
| New page | x |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | <not supported> |
| *Character spacing* | |
| Fixed | <not supported> |
| Proportional | <not supported> |
| *Style* | |
| Straight | <not supported> |
| Italic | <not supported> |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | <not supported> |
| Bold | <not supported> |
| *Underscore* | |
| Not possible | <not supported> |
| Possible | <not supported> |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | <not supported> |
| Select secondary character set [SO] | <not supported> |

*Notes*

(1) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(2) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

## 9000-EPFX-REMOTE-PRINTER

The 9000-EPFX printer is a generic printer type that can be used to access EPSON-FX-compatible printers for which no RSO device type exists.

### Access modes

The 9000-PS access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

LPD, TACLAN

For a generation example, see .

### VTSU codes

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | n.s. | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | n.s. | |
| ASFd | 21 | n.s. | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |

| VTSU | X'xy' | | Effect |
|------|-------|---|--------|
| VT | 0B | x | |
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second character set |
| SI | 0F | x | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | x | Near Letter Quality on |
| NLX | 3b | x | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:       supported by RSO for this printer type.

n.s.:    not supported by this printer type.

(1)      the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.


**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9000-EPFX Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/*BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL | |
| Reset (1) | ESC@ |
| Number of copies | <not supported> |
| Paper format selection | <not supported> |
| PAGE CONTROL | |
| Paper tray | <not supported> |
| Output tray | <not supported> |
| Left margin | ESCl# |
| Horizontal spacing (2) | ESCP or ESCM |
| | (+ ESCSO or ESCSI) |
| Vertical spacing (3) | ESC3# or ESCA# |
| Form length (FHG) | ESCC# |
| Offset (left) | <not supported> |
| Offset (top) | <not supported> |
| Overlays | <not supported> |
| TWO-SIDED PRINTING (DUPLEX) | |
| Single-sided printing (simplex) | <not supported> |
| Two-sided printing (duplex) | <not supported> |
| ROTATION | |
| 0° (portrait) | <not supported> |
| 90° (landscape) | <not supported> |
| 180° (portrait, upside down) | <not supported> |
| 270° (landscape, upside down) | <not supported> |
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | <not supported> |
| Horizontal position (absolute and relative) in columns | <not supported> |
| Horizontal tab | HT |
| Relative horizontal tab | <not supported> |
| Vertical tab | VT |
| Relative vertical tab | <not supported> |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESCS1 |
| Half line up | ESCS0 |
| New line | LF |
| Carriage return | CR |
| New page | FF |

| Function | Control character(s) |
|----------|----------------------|
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | <not supported> |
| English | ESCR\x03 |
| USA | ESCR\0 |
| Belgian | ESCR\x01 |
| French | <not supported> |
| Dutch | <not supported> |
| German | ESCR\x02 |
| Norwegian | ESCR\x09 |
| Swedish | ESCR\x05 |
| Danish | ESCR\x0a |
| Spanish | ESCR\x0b |
| Swiss | <not supported> |
| Italian | ESCR\x06 |
| ISO-8859-1 | ESCR\0 |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESCp0 |
| Proportional | ESCp1 |
| *Style* | |
| Straight | ESC5 |
| Italic | ESC4 |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESCF |
| Bold | ESCE |
| *Underscore* | |
| Not possible | ESC-0 |
| Possible | ESC-1 |
| *Print quality* | |
| Low (NLQ=*NO) | ESCx \0 |
| High (NLQ=*YES) | ESCx\x01 |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | ESC7 |
| Select secondary character set [SO] | ESC6 |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

## 9000-EPLQ-REMOTE-PRINTER

The 9000-EPLQ Printer is a generic printer type that can be used to access EPSON-LQ-compatible printers for which there exists no RSO device type.

### Access modes

The 9000-EPLQ access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

LPD, TACLAN

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

### VTSU codes

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | n.s. | |
| PLU | 2C | n.s. | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | n.s. | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| VT | 0B | x | |
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | x | Near Letter Quality on |
| NLX | 3b | x | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.


**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9000-EPLQ Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog/epilog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL | |
| Reset (1) | ESC@ |
| Number of copies | <not supported> |
| Paper format selection | <not supported> |
| PAGE CONTROL | |
| Paper tray | ESCEM# |
| Output tray | <not supported> |
| Left margin | ESCl# |
| Horizontal spacing (2) | ESCP or ESCM or ESCg (+ ESCSO or ESCSI) |
| Vertical spacing (3) | ESC+# |
| Form length (FHG) | ESCC# |
| Offset (left) | <not supported> |
| Offset (top) | <not supported> |
| Overlays | <not supported> |
| TWO-SIDED PRINTING (DUPLEX) | |
| Single-sided printing (simplex) | <not supported> |
| Two-sided printing (duplex) | <not supported> |
| ROTATION | |
| 0° (portrait) | <not supported> |
| 90° (landscape) | <not supported> |
| 180° (portrait, upside down) | <not supported> |
| 270° (landscape, upside down) | <not supported> |
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | <not supported> |
| Horizontal position (absolute and relative) in columns | <not supported> |
| Horizontal tab | HT |
| Relative horizontal tab | <not supported> |
| Vertical tab | VT |
| Relative vertical tab | <not supported> |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESCS1 |
| Half line up | ESCS0 |
| New line | LF |
| Carriage return | CR |
| New page | FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | <not supported> |
| English | ESCR\x03 |
| USA | ESCR\0 |
| Belgian | ESCR\x01 |
| French | <not supported> |
| Dutch | <not supported> |
| German | ESCR\x02 |
| Norwegian | ESCR\x09 |
| Swedish | ESCR\x05 |
| Danish | ESCR\x0a |
| Spanish | ESCR\x0b |
| Swiss | <not supported> |
| Italian | ESCR\x06 |
| ISO-8859-1 | ESCR\0 |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESCp0 |
| Proportional | ESCp1 |
| *Style* | |
| Straight | ESC5 |
| Italic | ESC4 |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESCF |
| Bold | ESCE |
| *Underscore* | |
| Not possible | ESC-0 |
| Possible | ESC-1 |
| *Print quality* | |
| Low (NLQ=*NO) | ESCx\0 |
| High (NLQ=*YES) | ESCx\x01 |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | ESC7 |
| Select secondary character set [SO] | ESC6 |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

## 9000-EPSQ-REMOTE-PRINTER

The 9000-EPSQ Printer is a generic printer type that can be used to access EPSON-SQ-compatible printers for which there exists no RSO device type.

### Access modes

The 9000-EPSQ access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

LPD, TACLAN

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

### VTSU codes

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | n.s. | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |

| VTSU | X'xy' | | Effect |
|------|-------|--|--------|
| VT | 0B | x | |
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second character set |
| SI | 0F | x | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | x | Near Letter Quality on |
| NLX | 3b | x | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:     supported by RSO for this printer type.

n.s.:  not supported by this printer type.

(1)    the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.


**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9000-EPSQ Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog/ epilog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL | |
| Reset (1) | ESC@ |
| Number of copies | <not supported> |
| Paper format selection | <not supported> |
| PAGE CONTROL | |
| Paper tray | ESCEM# |
| Output tray | <not supported> |
| Left margin | ESCl# |
| Horizontal spacing (2) | ESCP or ESCM or ESCg (+ ESCSO or ESCSI) |
| Vertical spacing (3) | ESC+# |
| Form length (FHG) | ESCC# |
| Offset (left) | <not supported> |
| Offset (top) | <not supported> |
| Overlays | <not supported> |
| TWO-SIDED PRINTING (DUPLEX) | |
| Single-sided printing (simplex) | <not supported> |
| Two-sided printing (duplex) | <not supported> |
| ROTATION | |
| 0° (portrait) | <not supported> |
| 90° (landscape) | <not supported> |
| 180° (portrait, upside down) | <not supported> |
| 270° (landscape, upside down) | <not supported> |
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | <not supported> |
| Horizontal position (absolute and relative) in columns | <not supported> |
| Horizontal tab | HT |
| Relative horizontal tab | <not supported> |
| Vertical tab | VT |
| Relative vertical tab | <not supported> |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESCS1 |
| Half line up | ESCS0 |
| New line | LF |
| Carriage return | CR |
| New page | FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | <not supported> |
| English | ESCR\x03 |
| USA | ESCR\0 |
| Belgian | ESCR\x01 |
| French | <not supported> |
| Dutch | <not supported> |
| German | ESCR\x02 |
| Norwegian | ESCR\x09 |
| Swedish | ESCR\x05 |
| Danish | ESCR\x0a |
| Spanish | ESCR\x0b |
| Swiss | <not supported> |
| Italian | ESCR\x06 |
| ISO-8859-1 | ESCRß0 |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESCp0 |
| Proportional | ESCp1 |
| *Style* | |
| Straight | ESC5 |
| Italic | ESC4 |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESCF |
| Bold | ESCE |
| *Underscore* | |
| Not possible | ESC-0 |
| Possible | ESC-1 |
| *Print quality* | |
| Low (NLQ=*NO) | ESCx\0 |
| High (NLQ=*YES) | ESCx\x01 |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | ESC7 |
| Select secondary character set [SO] | ESC6 |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

## 9001-REMOTE-PRINTER

**Access modes**

The 9001 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC, HARDCOPY-9751, TACLAN, LPD

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

**VTSU codes**

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | n.s. | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | n.s. | Proportional spacing on |
| PTX | 1B | n.s. | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/17 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | n.s. | |
| ASFd | 21 | n.s. | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | x | |
| HT | 05 | x | |
| VT | 0B | x | |

| VTSU | X'xy' | | Effect |
|------|-------|------|--------|
| EM1 | 1D | underscore | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | underscore | |
| EM4 | 14 | underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | n.s. | Switch to second symbol set |
| SI | 0F | n.s. | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9001 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies | <br>CR ESCR<br><not supported> |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br><not supported><br><not supported><br>ESC[#s<br>ESC[#w<br>ESC[#x<br>ESC[#p<br><not supported><br><not supported><br><not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (4)<br>Vertical tab<br>Relative vertical tab (5)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page | <br><not supported><br><not supported><br>HT<br>ESC8#<br>VT<br>ESC6#<br>BS<br>SP<br>ESCK<br>ESCL<br>LF<br>CR<br>FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | ESC(@ |
| English | ESC(A |
| USA | ESC(B |
| Belgian | <not supported> |
| French | ESC(R |
| Dutch | <not supported> |
| German | ESC(K |
| Norwegian | ESC(E |
| Swedish | ESC(H |
| Danish | ESC(E |
| Spanish | ESC(3 |
| Swiss | <not supported> |
| Italian | <not supported> |
| ISO-8859-1 | ESC(B |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | <not supported> |
| Proportional | <not supported> |
| *Style* | |
| Straight | <not supported> |
| Italic | <not supported> |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | <not supported> |
| Bold | <not supported> |
| *Underscore* | |
| Not possible (6) | ESC9 or ESC*9 |
| Possible | ESC0 |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | <not supported> |
| Select secondary character set [SO] | <not supported> |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calcu-lated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The control sequence ESC*9 is sent if the 9001 Printer is connected in DIRECT or HARDCOPY access mode.

**Control character that resets the printer switches**

X'0D27D9' or EBCDIC: CR ESC R

*Notes*

– If a 9001 Printer is to run under 8121 emulation with MS-DOS, it must be defined as an 8121 Printer with ACCESS=*DIRECT.

– If a 9001 Printer is to run under 8121 emulation with a Unix system, it must be defined as a
9001 Printer with ACCESS=*PC.

– These emulations do not support LINE-FEED-COMPRESSION or BLANK-COMPRESSION, should either be entered in the device definition.

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9001 Printer is indented $n$ spaces at the currently valid character spacing.

## 9001-31-REMOTE-PRINTER

**Access modes**

The 9001-31 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC, HARDCOPY-9751, TACLAN, LPD

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| BS | 16 | n.s. | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | n.s. | Proportional spacing on |
| PTX | 1B | n.s. | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | n.s. | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | x | |
| HT | 05 | x | |
| VT | 0B | x | |

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | n.s. | Switch to second character set |
| SI | 0F | n.s. | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9001-31 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks.

Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies | <br>ESCR<br><not supported> |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br><not supported><br><not supported><br>ESC[#s<br>ESC[#w<br>ESC[#x<br>ESC[#p<br><not supported><br><not supported><br><not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (4)<br>Vertical tab<br>Relative vertical tab (5)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page | <br><not supported><br>ESC[#`<br>HT<br>ESC8#<br>VT<br>ESC6#<br>BS<br>SP<br>ESCK<br>ESCL<br>LF<br>CR<br>FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | ESC(@ |
| English | ESC(A |
| USA | ESC(B |
| Belgian | ESC(8 |
| French | ESC(R |
| Dutch | <not supported> |
| German | ESC(K |
| Norwegian | ESC(E |
| Swedish | ESC(H |
| Danish | ESC(E |
| Spanish | ESC(3 |
| Swiss | ESC(5 |
| Italian | ESC(Y |
| ISO-8859-1 | ESC(B |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC[=w |
| Proportional | ESC[<w |
| *Style* | |
| Straight (6) | ESC4 or ESC*4 |
| Italic | ESC3 or ESC*3 |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESC!0 |
| Bold | ESC!1 |
| *Underscore* | |
| Not possible (7) | ESC9 or ESC*9 |
| Possible | ESC0 |
| *Print quality* | |
| Low (NLQ=*NO) | ESC!9 |
| High (NLQ=*YES) | ESC!: |
| *Character type* | |
| FONT-1 | ESC,1 |
| FONT-2 | ESC,2 |
| *Color* | <not supported> |
| Select primary character set [SI] | ESC,1 |
| Select secondary character set [SO] | ESC,2 |

*Notes*

(1)  The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2)  The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3)  The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4)  The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5)  The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6)  The control sequences ESC*3 and ESC*4 are sent if the 9001-31 Printer is connected in DIRECT or HARDCOPY access mode.

(7)  The control sequence ESC*9 is sent if the 9001-31 Printer is connected in DIRECT or HARDCOPY access mode.

**Control character that resets the printer switches**

X'27D9' or EBCDIC: ESC R

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9001-31 Printer is indented $n$ * 1/10 inch. To make this indentation of $n$ * 1/10 inch possible, the currently valid character spacing is changed at the beginning of each line to 10 cpi. The previously valid character spacing value (CPI operand in the character set definition) is automatically reset by RSO after the last indentation.
It is important to note that the previously set value is always reset by RSO, even if the user has requested another character spacing in the interim via the control sequences in the print file. The only exception is when the previously set CPI value was 0 (in other words, there is no character spacing for RSO to reset) and printing continues with a character spacing of 10 cpi.

## 9002-REMOTE-PRINTER

**Access modes**

The 9002 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| BS | 16 | x | |
| PLD | 2B | n.s. | |
| PLU | 2C | n.s. | |
| LM d1d2d3 | 38 | n.s. | |
| PTS | 1A | n.s. | Proportional spacing on |
| PTX | 1B | n.s. | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/10 | |
| HMI3 | 23F3 | 1/10 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/6 | |
| VMI3 | 24F3 | 1/6 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | n.s. | |
| ASFd | 21 | n.s. | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | x | |
| HT | 05 | x | |
| VT | 0B | x | |

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | italics | |
| EM4 | 14 | underscore + italics | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:        supported by RSO for this printer type.

n.s.:     not supported by this printer type.

(1)       the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9002 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset<br>Number of copies | <br><not supported><br><not supported> |
| PAGE CONTROL | <not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (1)<br>Vertical tab<br>Relative vertical tab (2)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page | <br><not supported><br><not supported><br>HT<br>ESC8#<br>VT<br>ESC6#<br>BS<br>SP<br><not supported><br><not supported><br>LF<br>CR<br>FF |
| CHARACTER SET FEATURES<br>*Languages*<br>*Character spacing*<br>Fixed<br>Proportional<br>*Style*<br>Straight<br>Italic<br>*Stroke weight*<br>Light<br>Medium<br>Bold<br>*Underscore*<br>Not possible<br>Possible<br>*Print quality*<br>Low (NLQ=*NO)<br>High (NLQ=*YES)<br>*Character type*<br>*Color* | <br><not supported><br><br><not supported><br><not supported><br><br>ESC4<br>ESC3<br><br><not supported><br><not supported><br><not supported><br><br>ESC4<br>ESC0<br><br><not supported><br><not supported><br><not supported><br><not supported> |
| Select primary character set [SI]<br>Select secondary character set [SO] | SI<br>SO |

*Notes*

(1) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(2) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9002 Printer is indented $n$ spaces at the currently valid character spacing.

## 9003-REMOTE-PRINTER

**Access modes**

The 9003 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC

*Notes*

–   When ACCESS=*HARDCOPY applies, FORM-FEED=*SINGLE-SHEET is not supported.

–   If RSO is to access printers of type 328x in SNA networks via the TRANSDATA-NEA network, this can be done by configuring these printers as 9003 Printers. In addition, the keyword "2byte" must be specified in the printer parameter file to ensure that the 328x printer can be selected correctly (see section "Printer parameter files" on page 289).

**VTSU codes**

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | n.s. | |
| PLU | 2C | n.s. | |
| LM d1d2d3 | 38 | n.s. | |
| PTS | 1A | n.s. | Proportional spacing on |
| PTX | 1B | n.s. | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | x | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | n.s. | |

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | x | |
| HT | 05 | x | |
| VT | 0B | x | |
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | rotation | |
| EM3 | 13 | italics | |
| EM4 | 14 | italics + rotation | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second character set |
| SI | 0F | x | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9003 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| **JOB CONTROL** | |
| Reset | <not supported> |
| Number of copies | <not supported> |
| **PAGE CONTROL** | |
| Paper tray | <not supported> |
| Left margin | <not supported> |
| Horizontal spacing (1) | DC4# |
| Vertical spacing (2) | DC4# |
| Form length (FHG) | ESC FF # |
| **CURSOR POSITIONING** | |
| Vertical position (absolute and relative) in lines | EM# |
| Horizontal position (absolute and relative) in columns | HT#SP |
| Horizontal tab | HT# |
| Relative horizontal tab (3) | ESC8# |
| Vertical tab | VT |
| Relative vertical tab (4) | ESC6# |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | <not supported> |
| Half line up | <not supported> |
| New line | LF |
| Carriage return (5) | DC1 CR |
| New page (6) | VT FF |
| **CHARACTER SET FEATURES** | |
| *Languages* | <not supported> |
| *Character spacing* | |
| Fixed | <not supported> |
| Proportional | <not supported> |
| *Style* | |
| Straight | ESC4 |
| Italic | ESC3 |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES (contd.) | |
| *Stroke weight* | \<not supported\> |
| *Underscore* | \<not supported\> |
| *Print quality* | \<not supported\> |
| *Character type* | \<not supported\> |
| *Color* | \<not supported\> |
| Black | ESC1 |
| Red | ESC2 |
| Select primary character set [SI] | ESC4 |
| Select secondary character set [SO] | ESC5 |

*Notes*

(1) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(2) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(3) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(4) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) On a 9003 Printer with single-sheet feed, the "Carriage return" function is converted into a simple "CR".

(6) On a 9003 Printer with continuous form feed, the "New line" function is converted into a simple "FF".

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9003 Printer is indented $n$ spaces at the currently valid character spacing.

## 9004-REMOTE-PRINTER

**Access modes**

The 9004 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

HARDCOPY, PC, HARDCOPY-9751

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | x | |
| HPA d1d2d3 | 2A | x | |
| ASFd (1) | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | x | |
| HT | 05 | x | |
| VT | 0B | n.s. | |

| VTSU | X'xy' | | Effect |
|------|-------|---|--------|
| EM1 | 1D | shadow printing | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:       supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)      possible values for ASF (automatic sheet feed): d = 0, 1, 2, 3.

(2)      the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9004 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies | <br>ESC CR P ESC/<br><not supported> |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin (2)<br>Horizontal spacing (3)<br>Vertical spacing (4)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC EM#<br><not supported><br>ESC9 or ESC*9<br>ESCH#<br>ESCS#<br>ESCF#<br><not supported><br><not supported><br><not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (5)<br>Vertical tab<br>Relative vertical tab (6)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page (7)<br>Eject paper | <br>ESCV#<br>ESCT#<br>HT<br>ESC8#<br><not supported><br>ESC6#<br>BS<br>SP<br>ESCU<br>ESCD<br>LF<br>CR<br>FF<br>ESC EM J |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | <not supported> |
| *Character spacing* | |
| Fixed | ESCQ |
| Proportional | ESCP |
| *Style* | |
| Straight | <not supported> |
| Italic | <not supported> |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESC& |
| Bold | ESCO |
| *Underscore* | |
| Not possible | ESCR |
| Possible | ESCE |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1)  The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2)  The control sequence ESC*9 is sent if the 9004 Printer is connected in HARDCOPY access mode.

(3)  The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(4)  The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(5)  The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(7) On a 9004 Printer with single-sheet feed, the "New line" function is converted into:

```
'FF ESC LF ESC LF ESC LF' or
'ESC EM# ESC LF ESC LF ESC LF' (if a paper tray is specified).
```

**Control character that resets the printer switches**

X'27ODD7' or EBCDIC: ESC CR P

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9004 Printer is indented $n$ * 1/10 inch. To make this indentation of $n$ * 1/10 inch possible, the currently valid character spacing is changed at the beginning of each line to 10 cpi. The previously valid character spacing value (CPI operand in the character set definition) is automatically reset by RSO after the last indentation.
It is important to note that the previously set value is always reset by RSO, even if the user has requested another character spacing in the interim via the control sequences in the print file. The only exception is when the previously set CPI value was 0 (in other words, there is no character spacing for RSO to reset) and printing continues with a character spacing of 10 cpi.

## 9011-REMOTE-PRINTER

**Access modes**

The 9011 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC, TACLAN, LPD

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

**VTSU codes**

| VTSU | X'xy' | | Effect |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | n.s. | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | x | |

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | n.s. | Switch to second symbol set |
| SI | 0F | n.s. | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | x | Near Letter Quality on |
| NLX | 3b | x | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:         supported by RSO for this printer type.

n.s.:      not supported by this printer type.

(1)        the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9011 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks.

Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies | <br>ESCR<br><not supported> |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin (2)<br>Horizontal spacing (3)<br>Vertical spacing (4)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC EM#<br><not supported><br>ESC9 or ESC*9<br>ESCH#<br>ESCS#<br>ESCF#<br><not supported><br><not supported><br><not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (4)<br>Vertical tab<br>Relative vertical tab (5)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down (6)<br>Half line up<br>New line<br>Carriage return<br>New page (7) | <br><not supported><br>ESC[#`<br>HT<br>ESC8#<br>VT<br>ESC6#<br>BS<br>SP<br>ESCK or ESC*K<br>ESCL or ESC*L<br>LF<br>CR<br>FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | ESC(@ |
| English | ESC(A |
| USA | ESC(B |
| Belgian | ESC(8 |
| French | ESC(R |
| Dutch | <not supported> |
| German | ESC(K |
| Norwegian | ESC(E |
| Swedish | ESC(H |
| Danish | ESC(E |
| Spanish | ESC(3 |
| Swiss | ESC(5 |
| Italian | ESC(Y |
| ISO-8859-1 | ESC(B |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC[=w |
| Proportional | ESC[<w |
| *Style* | |
| Straight (8) | ESC4 or ESC*4 |
| Italic | ESC3 or ESC*3 |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | <not supported> |
| Bold | <not supported> |
| *Underscore* | |
| Not possible (9) | ESC9 or ESC*9 |
| Possible | ESC0 or ESC*0 |
| *Print quality* | |
| Low (NLQ=*NO) | ESC!9 |
| High (NLQ=*YES) | ESC!: |
| *Character type* | |
| FONT-1 | ESC,1 |
| FONT-2 | ESC,2 |

| Function | Control character(s) |
|---|---|
| *Color*<br>Black<br>Magenta<br>Blue<br>Green<br>Yellow<br>Cyan<br>Red<br>Neutral | <br>ESC[0m<br>ESC[5m<br>ESC[4m<br>ESC[2m<br>ESC[3m<br>ESC[6m<br>ESC[1m<br>ESC[7m |
| Select primary character set [SI]<br>Select secondary character set [SO] | SI<br>SO |

*Notes*

(1)     The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2)     The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3)     The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4)     The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5)     The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6)     The control sequences ESC*K and ESC*L are sent if the 9011 Printer is connected in DIRECT access mode.

(7)     On a 9011 Printer with single-sheet feed, the "New line" function is converted into:

```
'FF ESCL ESCL ESCL ESCL ESCL ESCL' or
'FF ESC*L ESC*L ESC*L ESC*L ESC*L ESC*L' (DIRECT access mode)
```

(8)     The control sequences ESC*3 and ESC*L are sent if the 9011 Printer is connected in DIRECT access mode.

(9)     The control sequences ESC*9 and ESC*0 are sent if the 9011 Printer is connected in DIRECT access mode.

**Control character that resets the printer switches**

X'27D9' or EBCDIC: ESC R

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9011 Printer is indented $n$ * 1/10 inch. To make this indentation of $n$ * 1/10 inch possible, the currently valid character spacing is changed at the beginning of each line to 10 cpi. The previously valid character spacing value (CPI operand in the character set definition) is automatically reset by RSO after the last indentation.
It is important to note that the previously set value is always reset by RSO, even if the user has requested another character spacing in the interim via the control sequences in the print file. The only exception is when the previously set CPI value was 0 (in other words, there is no character spacing for RSO to reset) and printing continues with a character spacing of 10 cpi.

## 9012-REMOTE-PRINTER

**Access modes**

The 9012 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC, TACLAN, LPD

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | x | |
| HPA d1d2d3 | 2A | x | |
| ASFd (1) | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | x | |
| HT | 05 | x | |
| VT | 0B | x | |

| VTSU | X'xy' | Effect | |
|------|-------|--------|-|
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:     supported by RSO for this printer type.

n.s.:  not supported by this printer type.

(1)    possible values for ASF (automatic sheet feed): d = 1, 2.

(2)    the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9012 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies | <br>ESCR<br><not supported> |
| PAGE CONTROL<br>Paper tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG) | <br>ESC[#SPp<br>ESC[#;s<br>ESC[#w<br>ESC[#x<br>ESC[#p |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (4)<br>Vertical tab<br>Relative vertical tab (5)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page | <br>ESC[#d<br>ESC[#`<br>HT<br>ESC[#a<br>VT<br>ESC[#e<br>BS<br>SP<br>ESCK<br>ESCL<br>LF<br>CR<br>FF |
| CHARACTER SET FEATURES<br>*Languages*<br>International<br>English<br>USA<br>Belgian<br>French<br>Dutch<br>German<br>Norwegian<br>Swedish<br>Danish<br>Spanish<br>Swiss<br>Italian<br>ISO-8859-1<br>ISO-8859-2 to ISO-8859-9 | <br><br>ESC(@<br>ESC(A<br>ESC(B<br>ESC(8<br>ESC(R<br><not supported><br>ESC(K<br>ESC(E<br>ESC(H<br>ESC(7<br>ESC(3<br>ESC(5<br>ESC(Y<br>ESC(B<br><not supported> |

| Function | Control character(s) |
|---|---|
| *Character spacing* | |
| Fixed | ESC[=w |
| Proportional | ESC[<w |
| *Style* | |
| Straight | <not supported> |
| Italic | <not supported> |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESC!0 |
| Bold | ESC!1 |
| *Underscore* | |
| Not possible (6) | ESC9 or ESC*9 |
| Possible | ESC0 |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | |
| FONT-1 | ESC,1 |
| FONT-2 | ESC,2 |
| FONT-3 | ESC,3 |
| FONT-4 | ESC,4 |
| FONT-5 | ESC,5 |
| FONT-6 | ESC,6 |
| FONT-7 | ESC,7 |
| FONT-8 | ESC,8 |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The control sequence ESC*9 is sent if the 9012 Printer is connected in DIRECT or HARDCOPY access mode.

**Control character that resets the printer switches**

X'27D9' or EBCDIC: ESC R

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9012 Printer is indented $n$ * 1/10 inch. To make this indentation of $n$ * 1/10 inch possible, the currently valid character spacing is changed at the beginning of each line to 10 cpi. The previously valid character spacing value (CPI operand in the character set definition) is automatically reset by RSO after the last indentation.
It is important to note that the previously set value is always reset by RSO, even if the user has requested another character spacing in the interim via the control sequences in the print file. The only exception is when the previously set CPI value was 0 (in other words, there is no character spacing for RSO to reset) and printing continues with a character spacing of 10 cpi.

## 9013-REMOTE-PRINTER

**Access modes**

The 9013 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC, TACLAN, LPD

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x (1) | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 (1) | |
| HMI3 | 23F3 | 1/15 (1) | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | x | |
| HPA d1d2d3 | 2A | x | |
| ASFd (2) | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | x | |
| HT | 05 | x | |
| VT | 0B | x | |

| VTSU | X'xy' | | Effect |
|---|---|---|---|
| EM1 | 1D | underscore | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second character set |
| SI | 0F | x | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (3) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (3) | Repeat character d2 d1 times |

x:       supported by RSO for this printer type.

n.s.:    not supported for this printer type.

(1)      For the standard character sets (DATA, COURIER, OCR-A, OCR-B) the following VTSU codes (depending on the character set: CHARACTER-TYPE operand) lead to errors and must therefore not be included in a user file that is to be output on a 9013 Printer:

   PTS      proportional spacing on): for the character sets DATA, OCR-A, OCR-B

   HMI2    character spacing: 12 cpi): for the character sets OCR-A, OCR-B

   HMI3    character set: 15 cpi): for the character sets COURIER, OCR-A, OCR-B

(2)      possible values for ASF (automatic sheet feed): d = 1, 2, 3, 9 (9 = manual sheet feed)

(3)      the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9013 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies | <br>ESCR<br><not supported> |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC[#SPp<br><not supported><br>ESC[#;s<br>ESC[#w<br>ESC[#x<br>ESC[#p<br><not supported><br><not supported><br><not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (4)<br>Vertical tab<br>Relative vertical tab (5)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page | <br>ESC[#d<br>ESC[#`<br>HT<br>ESC[#a<br>VT<br>ESC[#e<br>BS<br>SP<br>ESCK<br>ESCL<br>LF<br>CR<br>FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | ESC(@ |
| English | ESC(A |
| USA | ESC(B |
| Belgian | ESC(4 |
| French | ESC(R |
| Dutch | <not supported> |
| German | ESC(K |
| Norwegian | ESC(E |
| Swedish | ESC(H |
| Danish | ESC(E |
| Spanish | ESC(3 |
| Swiss | ESC(5 |
| Italian | ESC(Y |
| ISO-8859-1 | ESC(B |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC[=w |
| Proportional | ESC[<w |
| *Style* | |
| Straight | <not supported> |
| Italic | <not supported> |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESC!0 |
| Bold | ESC!1 |
| *Underscore* | |
| Not possible (6) | ESC9 or ESC*9 |
| Possible | ESC0 |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | |
| DATA | ESC,1 |
| COURIER | ESC,2 |
| OCR-A | ESC,3 |
| OCR-B | ESC,4 |
| FONT-1 to FONT-14 | ESC,# |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The control sequence ESC*9 is sent if the 9013 Printer is connected in DIRECT or HARDCOPY access mode.

**Control character that resets the printer switches**

X'27D9' or EBCDIC: ESC R

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9013 Printer is indented $n$ * 1/10 inch. To make this indentation of $n$ * 1/10 inch possible, the currently valid character spacing is changed at the beginning of each line to 10 cpi. The previously valid character spacing value (CPI operand in the character set definition) is automatically reset by RSO after the last indentation.
It is important to note that the previously set value is always reset by RSO, even if the user has requested another character spacing in the interim via the control sequences in the print file. The only exception is when the previously set CPI value was 0 (in other words, there is no character spacing for RSO to reset) and printing continues with a character spacing of 10 cpi.

## 9014-REMOTE-PRINTER

**Access modes**

The 9014 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC, TACLAN, LPD

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | x | |
| HPA d1d2d3 | 2A | x | |
| ASFd (1) | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | x | |

| VTSU | X'xy' | | Effect |
|---|---|---|---|
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second character set |
| SI | 0F | x | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)      possible values for ASF (automatic sheet feed): d = 1, 2, 3, 9 (9 = manual sheet feed)

(2)      the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

### Supported printer functions

The following table shows all the printer functions that are implicitly supported by RSO for the 9014 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in this case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies | <br>ESCR<br><not supported> |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC[#SPp<br>ESC[#SPp<br>ESC[#;s<br>ESC[#w<br>ESC[#!w<br>ESC[#p<br><not supported><br><not supported><br><not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (4)<br>Vertical tab<br>Relative vertical tab (5)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page | <br>ESC[#d<br>ESC[#`<br>HT<br>ESC[#a<br>VT<br>ESC[#e<br>BS<br>SP<br>ESCK<br>ESCL<br>LF<br>CR<br>FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | ESC(@ |
| English | ESC(A |
| USA | ESC(B |
| Belgian | ESC(4 |
| French | ESC(R |
| Dutch | <not supported> |
| German | ESC(K |
| Norwegian | ESC(E |
| Swedish | ESC(H |
| Danish | ESC(E |
| Spanish | ESC(3 |
| Swiss | ESC(5 |
| Italian | ESC(Y |
| ISO-8859-1 | ESC(BESC-A |
| ISO-8859-2 | ESC(BESC-B |
| ISO-8859-5 | ESC(BESC-@ |
| ISO-8859-7 | ESC(BESC-F |
| ISO-8859-9 | ESC(BESC-M |
| *Character spacing* | |
| Fixed | ESC[=w |
| Proportional | ESC[<w |
| *Style* | |
| Straight | ESC[23m |
| Italic | ESC[03m |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESC[22m |
| Bold | ESC[01m |
| *Underscore* | |
| Not possible | ESC[24m |
| Possible | ESC[04m |
| *Print quality* | |
| Low (NLQ=*NO) | ESC!: |
| High (NLQ=*YES) | ESC!9 |
| *Character type* | |
| DATA | ESC,1 |
| COURIER | ESC,2 |
| OCR-A | ESC,3 |
| OCR-B | ESC,4 |
| FONT-1 to FONT-15 | ESC,# |

| Function | Control character(s) |
|---|---|
| *Color*<br>Black<br>Magenta<br>Blue<br>Green<br>Yellow<br>Cyan<br>Red<br>Neutral | <br>ESC[30m<br>ESC[34m<br>ESC[36m<br>ESC[32m<br>ESC[33m<br>ESC[31m<br>ESC[35m<br><not supported> |
| Select primary character set [SI]<br>Select secondary character set [SO] | SI<br>SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).


**Control character that resets the printer switches**

X'27D9' or EBCDIC: ESC R

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9014 Printer is indented $n$ * 1/10 inch. To make this indentation of $n$ * 1/10 inch possible, the currently valid character spacing is changed at the beginning of each line to 10 cpi. The previously valid character spacing value (CPI operand in the character set definition) is automatically reset by RSO after the last indentation.
It is important to note that the previously set value is always reset by RSO, even if the user has requested another character spacing in the interim via the control sequences in the print file. The only exception is when the previously set CPI value was 0 (in other words, there is no character spacing for RSO to reset) and printing continues with a character spacing of 10 cpi.

## 9015-REMOTE-PRINTER

The 9015 has the same characteristics as the 9014 Printer, with the following exceptions:

– The 9015 Printer does not have two continuous-paper drives which can feed the printer different types of paper.

– The 9015 Printer does not have single-sheet feed.

– The 9015 Printer supports a cutting machine which cuts the continuous paper once printing has been completed. The user can activate this cutting machine.

– The 9015 Printer does not support additional colors.

The 9015 Printer supports the printer languages ECMA, IBM Proprinter XL24 and EPSON-LQ. With this printer, RSO supports only ECMA. The other emulations can be used via the generic RSO printer types 9000-EPLQ, 9000-PRO etc.

### Access modes

The 9015 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC, TACLAN, LPD

### Cutting machine

The cutting machine of the 9015 Printer can be controlled by the selection of the output tray number. The value of the OUTPUT-TRAY operand of the PRINT-DOCUMENT command is used for this. The values have the following meanings:

OUTPUT-TRAY = 1
   The paper is deposited uncut in the rear output tray.

OUTPUT-TRAY = 2
   The paper is deposited cut in the rear output tray.

OUTPUT-TRAY = 3
   The paper is deposited uncut in the front output tray.

OUTPUT-TRAY = 4
   The paper is deposited cut in the front output tray.

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |
| ASFd (1) | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | x | |
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second character set |
| SI | 0F | x | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | x | Near Letter Quality on |

| VTSU | X'xy' | | Effect |
|---|---|---|---|
| NLX | 3b | x | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:       supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)      possible values for ASF (automatic sheet feed): d = 1, 2, 3, 9 (9 = manual sheet feed)

(2)      the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9015 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in this case CONTROL-CHARACTERS=*NO/*EBCDIC/*IBM/*ASA must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies<br>Paper format selection | <br>ESCR<br><not supported><br><not supported> |
| PAGE CONTROL<br>Paper tray<br>Output tray or cutting machine (2)<br>Left margin<br>Horizontal spacing (3)<br>Vertical spacing (4)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC[#;#;#SPp<br>ESC[#;#;#SPp<br>ESC[#;s<br>ESC[#w<br>ESC[#!w<br>ESC[#p<br><not supported><br><not supported><br><not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (5)<br>Vertical tab<br>Relative vertical tab (6)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page | <br>ESC[#d<br>ESC[#'<br>HT<br>ESC[#a<br>VT<br>ESC[#e<br>BS<br>SP<br>ESCK<br>ESCL<br>LF<br>CR<br>FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | ESC(@ |
| English | ESC(A |
| USA | ESC(B |
| Belgian | ESC(4 |
| French | ESC(1F |
| Dutch | <not supported> |
| German | ESC(K |
| Norwegian | ESC(E |
| Swedish | ESC(H |
| Danish | ESC(E |
| Spanish | ESC(3 |
| Swiss | ESC(5 |
| Italian | ESC(Y |
| ISO-8859-1 | ESC(BESC-A |
| ISO-8859-2 | ESC(BESC-B |
| ISO-8859-5 | ESC(BESC-@ |
| ISO-8859-7 | ESC(BESC-F |
| ISO-8859-9 | ESC(BESC-M |
| *Character spacing* | |
| Fixed | ESC[=w |
| Proportional | ESC[<W |
| *Style* | |
| Straight | ESC[23m |
| Italic | ESC[03m |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESC[22m |
| Bold | ESC[01m |
| *Underscore* | |
| Not possible | ESC[24m |
| Possible | ESC[04m |
| *Print quality* | |
| Low (NLQ=*NO) | ESC!: |
| High (NLQ=*YES) | ESC!9 |
| *Character type* | |
| Data | ESC,1 |
| Courier | ESC,2 |
| OCR-A | ESC,3 |
| OCR-B | ESC,4 |
| FONT-1 to FONT-15 | ESC,# |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of each job if RESET=*YES was specified in the ADD-SPOOL-DEVICE statement during device definition.

(2) The cutting machine can also be activated via the OUTPUT-TRAY-NUMBER operand of the PRINT-DOUMENT command.

(3) The horizontal spacing determines the spacing between the characters. This value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET) or from the VTSU code HMI.

(4) The vertical spacing determines the spacing between the lines. This value is calculated either from the line spacing from the form definition, from the defined loop record, or from the VTSU code VMI.

(5) The relative horizontal tab is used to skip a number of blanks if BLANK-COMPRESSION=*YES has been specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The relative vertical tab is used to skip a number of lines if LINE-FEED-COMPRESSION=*YES has been specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

## 9021-REMOTE-PRINTER

The 9021 Printer emulates the HP LaserJet IIP.

### Access modes

The 9021 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC, TACLAN, LPD

*Note*

> The HARDCOPY access mode is supported only on a 9763 Data Display Terminal with a driver for LASERJET emulation.

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

### VTSU codes

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x (1) | Proportional spacing on |
| PTX | 1B | x (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | x | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |

| VTSU | X'xy' | | Effect |
|---|---|---|---|
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | n.s. | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics + underscore (1) | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     implemented via font support (see section "Font support for PCL printers" on page 61).

(2)     the VTSU code can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

### Supported printer functions

The following table shows all the printer functions that are implicitly supported by RSO for the 9021 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies (2) | <br>ESCE<br>ESC&l#X |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (3)<br>Vertical spacing (4)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC&l#H<br><not supported><br>ESC&a#L CR<br>ESC&k#H<br>ESC&l#C<br><not supported><br>ESC&l#U<br>ESC&l#Z<br>ESC&f#y#X |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION<br>0° (portrait)<br>90° (landscape)<br>180° (portrait, upside down)<br>270° (landscape, upside down) | <br>ESC&l0O<br>ESC&l1O<br>ESC&l2O<br>ESC&l3O |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (5)<br>Vertical tab<br>Relative vertical tab (6)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page | <br>ESC&a#R<br>ESC&a#C<br>HT<br>ESC&a.#C<br><not supported><br>ESC&a.#R<br>BS<br>SP<br>ESC=<br>ESC&a-0.5R<br>LF<br>CR<br>FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES (7) | |
| *Languages (symbol sets)* | |
| International | ESC(2U |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | <not supported> |
| French | ESC(0F |
| Dutch | <not supported> |
| German | ESC(1G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | <not supported> |
| Spanish | ESC(2S |
| Swiss | <not supported> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0U |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | ESC(s-3B |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |
| *Underscore* | |
| Not possible | ESC&d@ |
| Possible | ESC&d0D |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary font | SI |
| Select secondary font | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The number of page copies is sent at the beginning of every job. The value is specified by the operand COPIES=(,n) in the PRINT-DOCUMENT command.

(3) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

It must be noted with the 9021 Printer that the HMI value is set to the standard pitch value of the font whenever the font characteristics are modified. RSO has solved this problem by repeating the HMI value after any "detected" change of font characteristics. "Detected" means that the font was defined through a user VTSU code or through a character set. Any other type of modification of font characteristics, such as printer control character strings in the user file, results in the HMI value being set to the standard pitch value of the font and is thus the user's responsibility.

(4) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(5) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(7) The table shows which font characteristics are set implicitly by RSO through the following specifications:

   – LANGUAGE operand of the ADD-SPOOL-CHARACTER-SETS statement (symbol set)

   – VTSU codes PTS and PTX (proportional spacing on/off)

   – CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SETS statement (character style)

   – WEIGHT operand of the ADD-SPOOL-CHARACTER-SETS statement (character stroke weight)

   – UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SETS statement (underscore)

   – VTSU codes EM1, EM2, EM3, EM4 and NOR.

Font management under RSOSERVE allows the definition of more complete fonts with all font characteristics (orientation, typeface etc.).

**Error handling**

The type of acknowledgment depends on the access mode of the printer. The 9021 Printer, which emulates the HP LaserJet IIP, can send positive and negative acknowledgments if it is connected to a BAM converter. No matter what the cause of a printer error may be, the same negative acknowledgment is always sent: 'PRINTER ERROR'. The spoolout job is placed in the KEEP queue and the device status is set to 'S'.

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9021 Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

## 9022-REMOTE-PRINTER

**Access modes**

The 9022 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, PC, HARDCOPY, TACLAN, LPD

*Notes*

– The HARDCOPY access mode is supported only on a 9763 Data Display Terminal with a driver for DIABLO emulation.

– The PC access mode of the 9022 Printer requires a special filter program in EMDS (Unix system).

For a generation example, see .

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | (1) |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | x | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | (2) |

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | x | |
| HT | 05 | x | |
| VT | 0B | x | |
| EM1 | 1D | shadow printing | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (3) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (3) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:     not supported by RSO for this printer type.

(1)     d1d2d3 are ignored in LM d1d2d3; the left-hand margin is set at the current print position.

(2)     possible values for ASF (automatic sheet feed): d = 1, 2.

(3)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

### Supported printer functions

The following table shows all the printer functions that are implicitly supported by RSO for the 9022 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies (2) | <br>ESC SUB I<br>FS(# |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin (3)<br>Horizontal spacing (4)<br>Vertical spacing (5)<br>Form length (FHG) | <br>ESC EM#<br><not supported><br>ESC9 or ESC*9<br>ESCH#<br>ESCS#<br>ESCF# |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (6)<br>Vertical tab<br>Relative vertical tab (7)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page<br>Eject paper | <br>ESCV#<br>ESCT#<br>HT<br>ESC8#<br>VT<br>ESC6#<br>BS<br>SP<br>ESCU<br>ESCD<br>LF<br>CR<br>FF<br>ESC EM J |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | FS Rb |
| English | FS Ri |
| USA | FS Ra |
| Belgian | FS Rd |
| French | FS Rd |
| Dutch | FS Ra |
| German | FS Rc |
| Norwegian | FS Rj |
| Swedish | FS Rf |
| Danish | FS Re |
| Spanish | FS Rh |
| Swiss | FS Rk |
| Italian | FS Rg |
| ISO-8859-1 | FS Ra |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESCQ |
| Proportional | ESCP |
| *Style* | |
| Straight | <not supported> |
| Italic | <not supported> |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESC& |
| Bold | ESCO |
| *Underscore* | |
| Not possible | ESCR |
| Possible | ESCE |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The number of page copies is sent at the beginning of every job. The value is specified by the operand COPIES=(,n) in the PRINT-FILE command.

(3) The control sequence ESC*9 is sent if the 9022 Printer is connected in DIRECT or HARDCOPY access mode.

(4) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(5) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(6) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(7) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

**Control character that resets the printer switches**

X'273FC9' or EBCDIC: ESC SUB I

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9022 Printer is indented $n$ * 1/10 inch at the currently valid character spacing.

## 9022-200-REMOTE-PRINTER

The 9022-200 Printer emulates the HP LaserJet+.

Its most important features are:

– high-quality laser printer

– 2 paper trays

– use of the PCL printer language (level 3), which standardizes printer characteristics and the corresponding commands; this PCL language is used on all HP printers and thus enables the support of different HP printers without difficulty (among other things, it allows the combination of several printer control characters)

– absolute and relative cursor positioning

– support of a large number of different fonts (internal, cartridge and soft fonts) that can be used on the same page

– raster graphics

– definition of macros containing several printer control character sequences and additional data for execution via a single command.

**Access modes**

The 9022-200 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC, TACLAN, LPD

*Note*

The HARDCOPY access mode is supported only on a 9763 Data Display Terminal with a driver for LASERJET emulation.

For a generation example see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |

| VTSU | X'xy' | | Effect |
|------|-------|---|--------|
| PTS | 1A | x (1) | Proportional spacing on |
| PTX | 1B | x (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | x | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | n.s. | |
| VT | 0B | n.s. | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics + underscore (1) | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     implemented by means of font support (see section "Font support for PCL printers" on page 61).

(2)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9022-200 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies (2) | <br>ESCE<br>ESC&l#X |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (3)<br>Vertical spacing (4)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC&l#H<br><not supported><br>ESC&a#L CR<br>ESC&k#H<br>ESC&l#C<br><not supported><br>ESC&l#U<br>ESC&l#Z<br>ESC&l#y#X |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |

| Function | Control character(s) |
|---|---|
| ROTATION | |
| 0° (portrait) | ESC&l0O |
| 90° (landscape) | ESC&l1O |
| 180° (portrait, upside down) | <not supported> |
| 270° (landscape, upside down) | <not supported> |
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | ESC&a#R |
| Horizontal position (absolute and relative) in columns | ESC&a#C |
| Horizontal tab | <not supported> |
| Relative horizontal tab (5) | ESC&a.#C |
| Vertical tab | <not supported> |
| Relative horizontal tab (6) | ESC&a.#R |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | ESC= |
| Half line up | ESC&a-0.5R |
| New line | LF |
| Carriage return | CR |
| New page | FF |
| CHARACTER SET FEATURES (7) | |
| *Languages (symbol sets)* | |
| International | <not supported> |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | <not supported> |
| French | ESC(0F |
| Dutch | <not supported> |
| German | ESC(0G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | <not supported> |
| Spanish | ESC(1S |
| Swiss | <not supported> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0U |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |

| Function | Control character(s) |
|---|---|
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | ESC(s-3B |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |
| *Underscore* | |
| Not possible | ESC&d@ |
| Possible | ESC&d0D |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary font | SI |
| Select secondary font | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The number of page copies is sent at the beginning of every job. The value is specified by the operand PAGE-COPIES in the PRINT-DOCUMENT command.

(3) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

It must be noted with the 9022-200 Printer that the HMI value is set to the standard pitch value of the font whenever the font characteristics are modified. RSO has solved this problem by repeating the HMI value after any "detected" change of font characteristics. "Detected" means that the font was defined through a user VTSU code or through a character set. Any other type of modification of font characteristics, such as printer control character strings in the user file, results in the HMI value being set to the standard pitch value of the font and is thus the user's responsibility.

(4) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(5) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(7) The table shows which font characteristics are set implicitly by RSO through the following specifications:

- – LANGUAGE operand of the ADD-SPOOL-CHARACTER-SETS statement (symbol set)
- – VTSU codes PTS and PTX (proportional spacing on/off)
- – CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SETS statement (character style)
- – WEIGHT operand of the ADD-SPOOL-CHARACTER-SETS statement (character stroke weight)
- – UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SETS statement (underscore)
- – VTSU codes EM1, EM2, EM3, EM4 and NOR.

Font management under RSOSERVE allows the definition of more complete fonts with all font characteristics (orientation, typeface etc.).

**Error handling**

The type of acknowledgment depends on the access mode of the printer.
The 9022-200 Printer, which emulates the HP LaserJet +, can send positive and negative acknowledgments if it is connected to a BAM converter. No matter what the cause of a printer error may be, the same negative acknowledgment is always sent: 'PRINTER ERROR'. The spoolout job is placed in the KEEP queue and the device status is set to 'S'.

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9022-200 Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

## 9025-REMOTE-PRINTER

**Access modes**

The 9025 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HDLC, TACLAN, PC, LPD

*Note*

> Device management with RSOSERVE (function 4 in mask ML1SPRN2; see the "RSOSERVE" manual) is not supported for 9025 Printers with the PC access mode.

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

For notes on installation of the 9025 Printer, see page 596.

**VTSU codes**

| VTSU | X'xy' | | Effect |
|------|-------|------|--------|
| BS | 16 | n.s. | |
| PLD | 2B | n.s. | |
| PLU | 2C | n.s. | |
| LM d1d2d3 | 38 | n.s. | |
| PTS | 1A | (1) | Proportional spacing on |
| PTX | 1B | (1) | Proportional spacing off |
| HMI1 | 23F1 | (1) | Character spacing |
| HMI2 | 23F2 | (1) | |
| HMI3 | 23F3 | (1) | |
| VMI1 | 24F1 | (2) | Line spacing |
| VMI2 | 24F2 | (2) | |
| VMI3 | 24F3 | (2) | |
| VPA d1d2d3 | 29 | (3) | |
| HPA d1d2d3 | 2A | (3) | |
| ASFd | 21 | (4) | |
| NP | 0C | x | New page |

| VTSU | X'xy' | | Effect |
|------|-------|---|--------|
| ESC | 27 | n.s. | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | x | |
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | n.s. | Switch to second character set |
| SI | 0F | n.s. | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (5) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (5) | Repeat character d2 d1 times |

x:     supported by RSO for this printer type.

n.s.:     not supported by this printer type.

(1)     supported by means of the font specified in the RSOFILE via the character set definition.

(2)     supported by the RENO command \LD...;

(3)     positioning in the input file using the RENO commands \X; and \Y;

(4)     supported by the RENO command \IN...;, which can be used to select the feed tray.

(5)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

### Supported printer functions

The following table shows all the printer functions that are implicitly supported by RSO for the 9025 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies (2) | <br><not supported><br>\NC#; |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (3)<br>Vertical spacing (4)<br>Form length<br>Offset (left)<br>Offset (top)<br>Overlays | <br>\IN#;<br><not supported><br>\M#.;<br><not supported><br>\LD#;<br><not supported><br><not supported><br><not supported><br>\CPHOST,MEN-#;\@#; |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION<br>0° (portrait)<br>90° (landscape)<br>180° (portrait, upside down)<br>270° (landscape, upside down) | <br>\PR0;\PX;\PY;<br>\PR3;\PX;\PYPD;<br>\PR2;\PXPW;\PYPD;<br>\PR1;\PXPW;\PY |

| Function | Control character(s) |
|---|---|
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | \Y#.; |
| Horizontal position (absolute and relative) in columns | \X#.; |
| Horizontal tab | HT |
| Relative horizontal tab (5) | \G(SW+CD)*#; |
| Vertical tab | VT |
| Relative vertical tab (6) | \YY+LD*#; |
| Backspace (one column to left) | <not supported> |
| Blank (space) | SP |
| Half line down | <not supported> |
| Half line up | <not supported> |
| New line | \YY+LD; |
| Carriage return | CR |
| New page | \FF; |
| Top of page | \Y45;\LF; |
| CHARACTER SET FEATURES | |
| *Languages* | <not supported> |
| *Character spacing* | <not supported> |
| *Style* | |
| Straight | \IT0; |
| Italic | \IT1; |
| *Stroke weight* | |
| Light | \BO0; |
| Medium | \BO1; |
| Bold | \BO2; |
| *Underscore* | |
| Not possible | \UL0; |
| Possible | \UL1; |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select second character set | <not supported> |
| Select standard character set | <not supported> |
| PROGRAMMING HINTS | |
| Display functions off | \DF0; |
| Display functions on | \DF1; |

*Notes*

(1) The "Reset" function is performed implicitly at the beginning and end of every job through sending of the control characters \[..; and \];.

(2) The number of page copies is sent at the beginning of every job before the data (except in the case of CONTROL=*TRANSPARENT). The value is specified by the operand COPIES=(,n) in the PRINT-DOCUMENT command.

(3) The character spacing is set implicitly when a font is activated by means of the RENO command \FO<name>;.

(4) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition or from the defined loop record.

(5) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

It should be noted that the "backslash" (\) used above is a variable control character. The control character can be changed to a different character provided it is defined on the printer control panel and in the device definition (ADD-SPOOL-DEVICE statement). Possible values:

x'BC' (\)
x'4C' (<)
x'6E' (>)
x'50' (&)
x'7F' (")
x'FF'
x'27'
x'6A'

**Blank and line compression**

The user can take advantage of the RSO-supported blank and line compression function for 9025 Printers by using the ADD-SPOOL-DEVICE statement. When used in conjunction with certain RENO commands for printer output control this function can, however, produce undesirable results in the print format. The following constraints and rules should therefore be observed:

*Character extension function*

This function is not supported by RSO and only implemented by certain RENO commands. The user can switch to horizontal character extension (RENO command \ELx;) and vertical character extension (RENO command \ETx;) for output to 9025 Printers.

For *horizontal character extension*, it is advisable to suppress the blank compression function in the ADD-SPOOL-DEVICE statement (BLANK-COMPRESSION operand). Blanks are then also extended appropriately and adjusted to the print format. If the blank compression function is nevertheless active, RSO automatically calculates the horizontal position of a string of blanks, ignoring the possible extension factor. RSO *always* uses the value 0 for character extension when the blank compression function is active.

*Vertical character extension* is always ignored by RSO for the line feed (RENO command \YY+LD;), regardless of the specified value for LINE-FEED-COMPRESSION in the ADD-SPOOL-DEVICE statement.

To summarize therefore, the following possible areas of conflict between RENO and RSO functions should be *avoided*:

| 9025 function | RSO function: | |
|---|---|---|
| | Blank compression activated (BLANK-COMPRESSION=*YES) | Line compression activated (LINE-FEED-COMPRESSION=*YES) |
| Horizontal character extension (\ELx; command) | X | |
| Vertical character extension (\ETx; command) | | X |

*Notes on performance*

For printer output performance reasons, it only makes sense to work with the blank compression function activated (BLANK-COMPRESSION=*YES) when the print file contains very large strings of blanks. Otherwise, the printer speed may be appreciably reduced because the 9025 Printer may need more time to compute the positioning of commands than to print a few small strings of blanks.

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9025 Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

## 9026-PCL-REMOTE-PRINTER

The 9026-PCL Printer supports the PCL language (level 4). This language differs from level 3 (supported by the HP Laser Jet) in respect of the functions discussed in the following.

*Resolution*

The 9026-PCL Printer offers a resolution of 400 dpi, whereas the HP Laser Jet operates with a resolution of 300 dpi. However, the 9026-PCL is also capable of operation at 300 dpi. RSO does not change the resolution and always uses the standard value set previously. If the resolution is changed, it should be noted that soft fonts always work with a resolution of 300 dpi.

*Orientation*

With the 9026-PCL Printer, it is possible to use the portrait and landscape modes of format orientation together on one page. HP Laser Jets can, however, accept only one format per page (any change in orientation results in the pending data being printed, a page feed and a carriage return). It is possible to suppress use of both orientation modes on the 9026-PCL (for example, to make it compatible with the HP Laser Jet). But RSO has no influence on this and always works with the standard value for the printer.

*Fonts and typefaces*

The 9026-PCL Printer fully utilizes its font characteristics. Its font selection mechanism is more constant and predictable than is the case with the HP Laser Jet. The fonts and typefaces of the 9026-PCL are very similar to HP fonts. There are only slight differences in respect of character spacings and scope.

The font for a 9026-PCL Printer is a character set that may contain up to 1024 different characters of a particular character type and a particular point size. All characters are stored as bit patterns in their exact size.

A typeface for a 9026-PCL Printer is a character set that may contain up to 1024 different characters of a particular character style but with an available range of point sizes. All characters are stored in the form of a mathematical formula so that they may be adapted to the desired point size on printing. The point size of the character set can thus be selected simply through defining a new character height.

The advantage of using fonts on 9026-PCL Printers is that they have been structured in accordance with the original design and scope of the HP fonts. The disadvantage is that where certain point sizes are not available the 9026-PCL Printer adapts the initial font to the requested point size, resulting in a loss of typographical quality in the printed characters.

The advantage of using typefaces on 9026-PCL Printers is that they offer optimum print quality, even for point sizes differing from the standard format. The scope and character spacings are not, however, fully compatible with the HP Laser Jet.

Typefaces are stored in the "TYPEFACES directory", while fonts are stored in the "FONT directory". Font selection and font characteristics are described in section "Use of RSO fonts" on page 60.

*Documents*

With the 9026-PCL Printer the print jobs must be recognized as documents, in the same way as they are for the 9025 Printer. In the RENO printer language, a document begins with a command to open the document and ends with a command to close the document.

It is necessary to define documents on the 9026-PCL Printer in order that the printer is released. Until the 9026-PCL Printer receives a document terminating command, the job remains linked to the printer's language interpreter (until a timeout occurs).

In the PCL printer language, all documents must be closed with the PCL 'RESET' command (x'27C5'). If this is not done, the PCL 'RESET' command is generated automatically by the printer when a timeout occurs. It should be noted that a PCL 'RESET' command causes the document number displayed on the control panel to be incremented. Moreover, when the PCL printer language is used, it is not possible to display the TSN of the print job on the control panel.

With the 9026-PCL Printer, all jobs are started and terminated with the 'RESET' control sequence (ESC E), regardless of which RESET operand was specified in the device definition.

*Paper size*

In contrast to the HP Laser Jet printers, specifying a feed tray for the 9026-PCL Printer takes priority over a specified paper size. When a valid feed tray is specified, the paper is taken from that tray even if the requested paper size has not been loaded.

*Underscore*

The "double underscore" function offered on the HP Laser Jet printer is not supported by the 9026-PCL Printer.

*Width of the space*

With the 9026-PCL Printer the backspace, blank and tab characters are always set and computed by using the space width of the current font or typeface.

*Shadow printing*

The 9026-PCL Printer offers 256 different shading levels, that are stored in the "PATTERNS directory". Shadow printing yields different results than with the HP Laser Jet since the 9026-PCL offers more options.

**Access modes**

The 9026-PCL access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HDLC, TACLAN, PC, LPD

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | (1) | Proportional spacing on |
| PTX | 1B | (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | x | |
| HPA d1d2d3 | 2A | x | |
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | n.s. | |

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics (1) + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | n.s. | Switch to second character set |
| SI | 0F | n.s. | Switch to standard character set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:       supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)      implemented by means of font support (see section "Font support for PCL printers" on page 61).

(2)      the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9026-PCL Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies (2) | <br>ESCE<br>ESC/<FF>0F ESC&l#X |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (3)<br>Vertical spacing (4)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlay | <br>ESC&l#H<br>ESC&l#G<br>ESC&a#L CR<br>ESC&k#H<br>ESC&l#C<br><not supported><br>ESC&l#U<br>ESC&l#Z<br>ESC&l#y#X |
| TWO-SIDED PRINTING (DUPLEX)<br>Single-sided<br>Two-sided | <br>ESC&l0S<br>ESC&l1S |
| ROTATION<br>0° (portrait)<br>90° (landscape)<br>180° (portrait, upside down)<br>270° (landscape, upside down) | <br>ESC&l0O<br>ESC&l1O<br>ESC&l2O<br>ESC&l3O |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (5)<br>Vertical tab<br>Relative vertical tab (6)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page | <br>ESC&a#R<br>ESC&a#C<br>HT<br>ESC&a.#C<br><not supported><br>ESC&a.#R<br>BS<br>SP<br>ESC=<br>ESC&a-0.5R<br>LF<br>CR<br>FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES (7) | |
| *Languages (symbol sets)* | |
| International | ESC(2U |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | <not supported> |
| French | ESC(0F |
| Dutch | <not supported> |
| German | ESC(1G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | <not supported> |
| Spanish | ESC(2S |
| Swiss | <not supported> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0U |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | ESC(s-3B |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |
| *Underscore* | |
| Not possible | ESC&d@ |
| Possible | ESC&d0D |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary font | SI |
| Select secondary font | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The number of page copies is sent at the beginning of every job. The value is specified by the operand PAGE-COPIES in the PRINT-DOCUMENT command.

(3) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

It must be noted with the 9026-PCL Printer that the HMI value is set to the standard pitch value of the font whenever the font characteristics are modified. RSO has solved this problem by repeating the HMI value after any "detected" change of font characteristics. "Detected" means that the font was defined through a user VTSU code or through a character set. Any other type of modification of font characteristics, such as printer control character strings in the user file, results in the HMI value being set to the standard pitch value of the font and is thus the user's responsibility.

(4) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(5) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(7) The table shows which font characteristics are set implicitly by RSO through the following specifications:

–   LANGUAGE operand of the ADD-SPOOL-CHARACTER-SETS statement (symbol set)

–   VTSU codes PTS and PTX (proportional spacing on/off)

–   CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SETS statement (character style)

–   WEIGHT operand of the ADD-SPOOL-CHARACTER-SETS statement (character stroke weight)

–   UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SETS statement (underscore)

–   VTSU codes EM1, EM2, EM3, EM4 and NOR.

Font management under RSOSERVE allows the definition of more complete fonts with all font characteristics (orientation, typeface etc.).

### Shift function support

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9026-PCL Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

### Error handling

The type of acknowledgment depends on the access mode of the printer. If the 9026-PCL Printer type is connected via an HDLC-AFP converter in DIRECT access mode, it can send positive and negative acknowledgments. No matter what the cause of a printer error may be, the same negative acknowledgment is always sent: 'PRINTER ERROR'. The spoolout job is placed in the KEEP queue and the device status is set to 'S'.

If the 9026-PCL Printer type is connected via an HDLC V24 line in HDLC access mode, it cannot send any receive acknowledgments. The printout of files on a 9026-PCL Printer connected via HDLC can therefore only be regulated through the transport acknowledgments (it is not necessary to specify SYNCHRO=*NETWORK in the device definition since RSO knows internally that 9026-PCL Printers connected via HDLC do not send any receive acknowledgments). It should be noted that no printer errors (low paper, paper jam etc.) can be detected and that no precise recovery of the printer and the print operation can be performed. It is therefore possible, for example, for RSO to consider a print job as having been successfully printed even though nothing was actually printed out on account of an internal paper jam. The 9026-PCL Printer nevertheless stores the print job in its memory and prints it as soon as the problem has been recovered, provided that the printer has not been switched off or reset.

## 9026-RENO-REMOTE-PRINTER

The 9026-RENO Printer supports the RENO V4 language. Compared with RENO V3 (supported by the 9025 Printer), this version offers the following additional functions:

*Orientation*

The 9026-RENO Printer offers 4 possible modes of format orientation: portrait format, landscape format, inverse portrait format, inverse landscape format. Also, fonts and typefaces are automatically rotated into the requested orientation. The rotations can be mixed in one page.

*Fonts and typefaces*

A font can be activated by specifying its name in the RENO command \FO<name>;. A font has a fixed point size. Specifying an incorrect point size (the point size is part of the font name) will result in an error message.
A typeface can be selected by means of the RENO command \FO<name>; by appending the required point size value to the typeface name. The point size is restricted to between 4 and 700 points.

*Double underscore*

The 9026-RENO Printer supports double underscore.

**Access modes**

The 9026-RENO access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HDLC, TACLAN, PC, LPD

*Note*

> Device management with RSOSERVE (function 4 in mask ML1SPRN2; see the "RSOSERVE" manual) is not supported for 9026-RENO printers with the PC access mode.

### VTSU codes

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| BS | 16 | n.s. | |
| PLD | 2B | n.s. | |
| PLU | 2C | n.s. | |
| LM d1d2d3 | 38 | n.s. | |
| PTS | 1A | (1) | Proportional spacing on |
| PTX | 1B | (1) | Proportional spacing off |
| HMI1 | 23F1 | (1) | Character spacing |
| HMI2 | 23F2 | (1) | |
| HMI3 | 23F3 | (1) | |
| VMI1 | 24F1 | (2) | Line spacing |
| VMI2 | 24F2 | (2) | |
| VMI3 | 24F3 | (2) | |
| VPA d1d2d3 | 29 | (3) | |
| HPA d1d2d3 | 2A | (3) | |
| ASFd | 21 | (4) | |
| NP | 0C | x | New page |
| ESC | 27 | n.s. | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | x | |
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | n.s. | Switch to second symbol set |
| SI | 0F | n.s. | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |

| VTSU | X'xy' | | Effect |
|------|-------|------|--------|
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (5) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (5) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     supported via the font used, which was specified in the RSOFILE by the character set definition.

(2)     supported via the RENO command \LD...;

(3)     positioning in the input file by means of the RENO commands \X; and \Y;

(4)     supported via the RENO command \IN...;, which allows selection of the input tray

(5)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9026-RENO Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. The user may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| **JOB CONTROL** | |
| Reset (1) | \<not supported\> |
| Number of copies (2) | \NC#; |
| **PAGE CONTROL** | |
| Upper paper tray (input-tray=4) | \IN1; |
| Middle paper tray (input-tray=3) | \IN3; |
| Lower paper tray (input-tray=2) | \IN4; |
| LCT (input-tray=1) | \IN0; |
| Output tray | \OM,#; |
| Left margin | \M#.; |
| Horizontal spacing (3) | \<not supported\> |
| Vertical spacing (4) | \LD#; |
| Form length | \<not supported\> |
| Page selection | \PS#; |
| Offset (left) | \<not supported\> |
| Offset (top) | \<not supported\> |
| Overlays | \CPHOST,NEN-#;\@#; |
| **TWO-SIDED PRINTING (DUPLEX)** | |
| Single-sided | \OP0,,,#,,; |
| Two-sided | \OP1,,,#,,; |
| **ROTATION** | |
| 0° (portrait) | \PR0;\PX;\PY; |
| 90° (landscape) | \PR3;\PX;\PYPD; |
| 180° (portrait, upside down) | \PR2;\PXPW;\PYPD; |
| 270° (landscape, upside down) | \PR1;\PXPW;\PY |
| **CURSOR POSITIONING** | |
| Vertical position (absolute and relative) in lines | \Y#.; |
| Horizontal position (absolute and relative) in columns | \X#.; |
| Horizontal tab | HT |
| Relative horizontal tab (5) | \G(SW+CD)*#; |
| Vertical tab | VT |
| Relative vertical tab (6) | \YY+LD*#; |
| Backspace (one column to left) | \<not supported\> |
| Blank (space) | SP |
| Half line down | \<not supported\> |
| Half line up | \<not supported\> |
| New line | \YY+LD; |
| Carriage return | CR |
| New page | \FF; |
| Top of page | \Y45;\LF; |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | \<not supported\> |
| *Character spacing* | \<not supported\> |
| *Style* | |
| Straight | \IT0; |
| Italic | \IT1; |
| *Stroke weight* | |
| Light | \BO0; |
| Medium | \BO1; |
| Bold | \BO2; |
| *Underscore* | |
| Not possible | \UL0; |
| Possible | \UL1; |
| *Print quality* | |
| Low (NLQ=*NO) | \<not supported\> |
| High (NLQ=*YES) | \<not supported\> |
| *Character type* | \<not supported\> |
| *Color* | \<not supported\> |
| Select second character set | \<not supported\> |
| Select standard character set | \<not supported\> |
| PROGAMMING HINTS | |
| Display functions off | \DF0; |
| Display functions on | \DF1; |

*Notes*

(1) The "Reset" function is performed implicitly at the beginning and end of every job through sending of the control characters \[..; and \];.

(2) The number of page copies is sent at the beginning of every job before the data (except in the case of CONTROL=*TRANSPARENT). The value is specified by the operand PAGE-COPIES in the PRINT-DOCUMENT command.

(3) The character spacing is set implicitly when a font is activated by means of the RENO command \FO<name>;.

(4) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition or from the defined loop record.

(5) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

It should be noted that the "backslash" (\) used above is a variable control character. The control character can be changed to a different character provided it is defined on the printer control panel and in the device definition (ADD-SPOOL-DEVICE statement). Possible values:

x'BC' (\)
x'4C' (<)
x'6E' (>)
x'50' (&)
x'7F' (")
x'FF'
x'27'
x'6A'

### Blank and line compression

The user can take advantage of the RSO-supported blank and line compression function for 9026-RENO Printers by using the ADD-SPOOL-DEVICE statement. When used in conjunction with certain RENO commands for printer output control this function can, however, produce undesirable results in the print format. The following constraints and rules should therefore be observed:

*Character extension function*

This function is not supported by RSO and only implemented by certain RENO commands. The user can switch to horizontal character extension (RENO command \ELx;) and vertical character extension (RENO command \ETx;) for output to 9026-RENO Printers.

For *horizontal character extension*, it is advisable to suppress the blank compression function in the ADD-SPOOL-DEVICE statement (BLANK-COMPRESSION operand). Blanks are then also extended appropriately and adjusted to the print format. If the blank compression function is nevertheless active, RSO automatically calculates the horizontal position of a string of blanks, ignoring the possible extension factor. RSO *always* uses the value 0 for character extension when the blank compression function is active.

*Vertical character extension* is always ignored by RSO for the line feed (RENO command \YY+LD;), regardless of the specified value for LINE-FEED-COMPRESSION in the ADD-SPOOL-DEVICE statement.

To summarize therefore, the following possible areas of conflict between RENO and RSO functions should be *avoided:*

| RENO function | RSO function: | |
|---|---|---|
| | Blank compression activated (BLANK-COMPRESSION=*YES) | Line compression activated (LINE-FEED-COMPRESSION=*YES) |
| Horizontal character extension (\ELx; command) | X | |
| Vertical character extension (\ETx; command) | | X |

*Notes on performance*

For printer output performance reasons, it only makes sense to work with the blank compression function activated (BLANK-COMPRESSION=*YES) when the print file contains very large strings of blanks. Otherwise, the printer speed may be appreciably reduced because the 9026-RENO Printer may need more time to compute the positioning of commands than to print a few small strings of blanks.

## Shift function support

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9026-RENO Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

## 9045-ANSI-REMOTE-PRINTER

The 9045-ANSI Printer is an ANSI-compatible matrix line printer with the following characteristics:

– print speed: 1400 lines per minute

– multiple fonts

– support of page rotation for printing

– bar code support

**Access modes**

The 9045-ANSI access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

TACLAN, LPD

**VTSU codes**

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | n.s. | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | n.s. | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | n.s. | |
| ASFd | 21 | n.s. | |
| NP | 0C | x | New page |

| VTSU | X'xy' | Effect | |
|------|-------|--------|--------|
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | x | |
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:       supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9045-ANSI Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case CONTROL-CHARACTERS=*NO/*EBCDIC/*IBM/*ASA must not then be specified, since with these operands characters below X'40' are replaced by blanks. The user may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies<br>Paper form selection | <br><not supported><br><not supported><br><not supported> |
| PAGE CONTROL<br>Paper tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br><not supported><br><not supported><br>ESC[#;#G<br>ESC[#;#G<br>ESC[#;0;0r<br><not supported><br><not supported><br><not supported> |
| TWO-SIDED PRINTING (DUPLEX)<br>Single-sided<br>Two-sided | <br><not supported><br><not supported> |
| ROTATION<br>0° (portrait)<br>90° (landscape)<br>180° (portrait, upside down)<br>270° (landscape, upside down) | <br><not supported><br><not supported><br><not supported><br><not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (4)<br>Vertical tab<br>Relative vertical tab (5)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page | <br><not supported><br><not supported><br>HT<br><not supported><br>VT<br><not supported><br>BS<br>SP<br>ESCK<br>ESCL<br>LF<br>CR<br>FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | \<not supported\> |
| English | ESC[7x |
| USA | ESC[0x |
| Belgian | \<not supported\> |
| French | ESC[2x |
| Dutch | ESC[5x |
| German | ESC[1x |
| Norwegian | ESC[9x |
| Swedish | ESC[16x |
| Danish | \<not supported\> |
| Spanish | \<not supported\> |
| Swiss | \<not supported\> |
| Italian | ESC[6x |
| ISO-8859-1 to ISO-8859-9 | \<not supported\> |
| *Character spacing* | |
| Fixed | ESC[0m |
| Proportional | ESC[6m |
| *Style* | |
| Straight | \<not supported\> |
| Italics | \<not supported\> |
| *Stroke weight* | |
| Light | \<not supported\> |
| Medium | ESC[0m |
| Bold | ESC[1m |
| *Underscore* | |
| Not possible | ESC[0m |
| Possible | ESC[4m |
| *Print quality* | |
| Low (NLQ=*NO) | \<not supported\> |
| High(NLQ=*YES) | \<not supported\> |
| *Character type* | \<not supported\> |
| *Color* | \<not supported\> |
| Select second character set | SI |
| Select standard character set | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

## 9046-REMOTE-PRINTER

The 9046 chain line printer has the following characteristics:

– print speed 1200 lines per minute

– continuous paper

**Access modes**

The 9046 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

TACLAN, LPD

**VTSU codes**

| VTSU | X'xy' | Effect | |
|------|-------|--------|--|
| BS | 16 | x | |
| PLD | 2B | n.s. | |
| PLU | 2C | n.s. | |
| LM d1d2d3 | 38 | n.s. | |
| PTS | 1A | n.s. | Proportional spacing on |
| PTX | 1B | n.s. | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | n.s. | |
| HMI3 | 23F3 | n.s. | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | n.s. | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | n.s. | |
| ASFd | 21 | n.s. | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |

| VTSU | X'xy' | | Effect |
|---|---|---|---|
| VT | 0B | x | |
| EM1 | 1D | n.s. | Layout control characters |
| EM2 | 1F | n.s. | |
| EM3 | 13 | n.s. | |
| EM4 | 14 | n.s. | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:       supported by RSO for this printer type.

n.s.:   not supported by this printer type.

(1)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9046 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case CONTROL-CHARACTERS=*NO/*EBCDIC/*IBM/*ASA must not then be specified, since with these operands characters below X'40' are replaced by blanks. The user may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL | |
| Reset (1) | ESCc |
| Number of copies | <not supported> |
| Paper form selection | <not supported> |
| PAGE CONTROL | |
| Paper tray | <not supported> |
| Left margin | <not supported> |
| Horizontal spacing | <not supported> |
| Vertical spacing (2) | ESC[# G |
| Form length (FHG) | ESC#T#ESC\ |
| Offset (left) | <not supported> |
| Offset (top) | <not supported> |
| Overlays | <not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | <not supported> |
| Horizontal position (absolute and relative) in columns | <not supported> |
| Horizontal tab | HT |
| Relative horizontal tab (3) | <not supported> |
| Vertical tab | VT |
| Relative vertical tab (4) | <not supported> |
| Backspace (one column to left) | BS |
| Blank (space) | SP |
| Half line down | <not supported> |
| Half line up | <not supported> |
| New line | LF |
| Carriage return | CR |
| New page | FF |
| CHARACTER SET FEATURES | |
| *Languages* | <not supported> |
| *Character spacing* | <not supported> |
| *Style* | <not supported> |
| *Stroke weight* | <not supported> |
| *Underscore* | <not supported> |
| *Print quality* | <not supported> |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(3) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(4) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

## 9097-REMOTE-PRINTER

The 9097 Printer functions in more or less the same way as the 9011 Printer, but with the following differences:

– it supports a character density of 20 cpi

– it supports more line densities

– it supports the OCR-A and OCR-B fonts

– it does not support color selection (as does the 9011)

**Access modes**

The 9097 access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

HARDCOPY, DIRECT, PC, TACLAN, LPD

For a generation example, see "Example of PDN generation of an RSO printer with access mode TACLAN" on page 673.

**VTSU codes**

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x | Proportional spacing on |
| PTX | 1B | x | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | x | |

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | x | |
| EM1 | 1D | italics | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold | |
| EM4 | 14 | italics + underscore | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | x | Near Letter Quality on |
| NLX | 3b | x | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:    not supported by this printer type.

(1)     the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

### Supported printer functions

The following table shows all the printer functions that are implicitly supported by RSO for the 9097 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies | <br>ESCR SI<br><not supported> |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC[#SPp<br><not supported><br>ESC[#s<br>ESC[#w<br>ESC[#!w<br>ESC[#p<br><not supported><br><not supported><br><not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (4)<br>Vertical tab<br>Relative vertical tab (5)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down (6)<br>Half line up<br>New line<br>Carriage return<br>New page | <br><not supported><br>ESC[#`<br>HT<br>ESC8#<br>VT<br>ESC6#<br>BS<br>SP<br>ESCK or ESC*K<br>ESCL or ESC*L<br>LF<br>CR<br>FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES | |
| *Languages* | |
| International | ESC(@ |
| English | ESC(A |
| USA | ESC(B |
| Belgian | ESC(8 |
| French | ESC(R |
| Dutch | <not supported> |
| German | ESC(K |
| Norwegian | ESC(E |
| Swedish | ESC(H |
| Danish | ESC(E |
| Spanish | ESC(3 |
| Swiss | ESC(5 |
| Italian | ESC(Y |
| ISO-8859-1 | ESC(BESC-A |
| ISO-8859-2 | ESC(BESC-B |
| ISO-8859-5 | ESC(BESC-@ |
| ISO-8859-7 | ESC(BESC-F |
| ISO-8859-9 | ESC(BESC-M |
| *Character spacing* | |
| Fixed | ESC[=w |
| Proportional | ESC[<w |
| *Style* | |
| Straight (7) | ESC4 or ESC*4 |
| Italic | ESC3 or ESC*3 |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESC!0 |
| Bold | ESC!1 |
| *Underscore* | |
| Not possible (8) | ESC9 or ESC*9 |
| Possible | ESC0 or ESC*0 |
| *Print quality* | |
| Low (NLQ=*NO) | ESC!9 |
| High (NLQ=*YES) | ESC!: |
| *Character type* | |
| FONT-1 | ESC,1 |
| FONT-2 | ESC,2 |
| OCR-A | ESC,3 |
| OCR-B | ESC,4 |
| *Color* | <not supported> |
| Select primary character set [SI] | SI |
| Select secondary character set [SO] | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The control sequences ESC*K and ESC*L are sent if the 9097 Printer is connected in DIRECT access mode.

(7) The control sequences ESC*3 and ESC*4 are sent if the 9097 Printer is connected in DIRECT access mode.

(8) The control sequences ESC*9 and ESC*0 are sent if the 9097 Printer is connected in DIRECT access mode.

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9097 Printer is indented $n$ * 1/10 inch. To make this indentation of $n$ * 1/10 inch possible, the currently valid character spacing is changed at the beginning of each line to 10 cpi. The previously valid character spacing value (CPI operand in the character set definition) is automatically reset by RSO after the last indentation.
It is important to note that the previously set value is always reset by RSO, even if the user has requested another character spacing in the interim via the control sequences in the print file. The only exception is when the previously set CPI value was 0 (in other words, there is no character spacing for RSO to reset) and printing continues with a character spacing of 10 cpi.

## 9645-REMOTE-PRINTER

**Installation**

Local 9645 devices can be serviced by means of PDN-DVS. For this reason, a user program is required in order to output data to the printer. This program is generated using the RSOAP macro (in RSO macro library SYSLIB.RSO.035) and must be linked into the corresponding PDN. A dummy station must also be generated in the PDN for each printer serviced, using STATTYP=AP. Apart from the dummy station, a real printer must also be generated, the link between the two being created by the pair of specifications <stn#>,<volid#> in the RSOAP macro.
In ADD-SPOOL-DEVICE, the dummy station must be entered under DEVICE-ADDRESS.

*Calling the macro*

| Name | Operation | Operands |
|------|-----------|----------|
| name | RSOAP | stn1,volid1[,stn2,volid2]...[,stn8,volid8][,TIME=300] [,BID=][,VOLID=SYSRES][,VOLTYPE=D][,FLENGTH=10] |

name           Name of the application to be generated; this name must be specified in the APNAM parameter of the dummy station.

stn1-8         Station number to be specified in the STATNUM operand of the dummy station.

volid1-8       Identification of the printer to be serviced via this station.

TIME           Waiting time after which automatic abortion is initiated in order to make the printer available for a new link.

BID            Band ID; four alphanumeric characters from:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1080, | 108B, | 1090, | 109B, | 1100, | 110A, | 110B, | 1110, | 111B, |
| 1120, | 112B, | 1130, | 1150, | 115B, | 1160, | 116B, | 1170, | 117B, |
| 1180, | 118B, | 1190, | 1221, | 2000, | 2013, | 3041, | 3051, | 3061, |
| 3063, | 3071, | 3081, | 3091, | 3101, | 3111, | 3121, | 3131, | 3141, |
| 3171, | 3181, | 3191, | 3201, | 3211, | 3221, | 3231, | 3271, | 3281, |
| 3291, | 3311, | 3341, | 3351, | 3371, | 3381, | 3471, | 4001, | 4011 |

The band ID (code table) specified in the BID operand is generated by means of the RSOAP macro. If this band ID has to be loaded (if it is specified in the device entry (ADD-SPOOL-DEVICE) in the BAND-IDENTIFICATION operand), the code table is taken from the macro generation and not from the LAM file.

If no entry is made in the BID operand, the RSOAP macro does not generate a band ID. If a band ID has to be loaded, the code table (assuming it exists) is taken from the LAM file.

VOLID        ID of the volume on which the LAM library must be generated in order to transfer the code table from processor memory to the APS program.

VOLTYPE      Type of the volume (VOLUME TYPE) on which the LAM file containing the BAND-IDs must be generated;
             D = hard disk, F = floppy disk

FLENGTH      Maximum size of the LAM file (in Kbytes).

*Notes*

– Although identical with the local 333x Printers, the 9645 Printer, when operated via RSO, does not start with the next line after an interruption but as a result of RSO error handling (and depending on the REPEAT-MESSAGE value) executes a form feed and then reprints the errored block.

– For partial restitution of compatibility, it is necessary to specify WARTEN=JA (wait=yes) in the XOPCH macro as well as increasing the TIMEOUT-MAX in //ADD-SPOOL-DEVICE PROCESSING-CONTROL=*PARAMETERS(...).

– If //ADD-SPOOL-DEVICE PROCESSING-CONTROL=*PARAMETERS(LOAD=*YES, BAND-IDENTIFICATION=*STD) is entered (which signifies *NONE since this is defined as such in the 9645 default device record), message SRO0906 with RC=41E60104 (printer not ready) is output when printing is started even through the printer has status 77 (online). In this (default) case, the band ID concerned is not determined from the form and transmitted to the printer.

– The band IDs 108B, 109B,... 118B should be reserved for printing on 9645-75 Printers.

**Selecting the code table (band ID)**

The code table for the 9645 Printer can be loaded into the printer memory in three ways:

1. PDN generation:
   A code table (band ID) is selected via the CODENUM operand of the KOGS macro XOPCH, which is to be loaded implicitly into the printer memory by the PDN. This code table is overwritten if the user selects another code table via the ADD-SPOOL-DEVICE statement.

2. ADD-SPOOL-DEVICE statement:
   The user can specify a code table via the BAND-ID operand in the ADD-SPOOL-DEVICE statement which is to be loaded into the printer memory instead of the PDN code table. The operand value *NONE specifies that no new code table is to be loaded by RSO and the PDN code table is to retain its validity.

3. RSOAP macro:
   A code table is specified via the BID operand in the RSOAP macro which is generated by the RSOAP macro. If necessary, RSO accesses the designated macro generation and not the LAM file (see also the macro description under "Installation"section "9645-REMOTE-PRINTER" on page 582).

**Access modes**

The 9645 access mode supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) is:

APPLICATION

**VTSU codes**

| VTSU | X'xy' | | Effect |
|------|-------|------|--------|
| BS | 16 | n.s. | |
| PLD | 2B | n.s. | |
| PLU | 2C | n.s. | |
| LM d1d2d3 | 38 | n.s. | |
| PTS | 1A | n.s. | Proportional spacing on |
| PTX | 1B | n.s. | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | n.s. | |
| HMI3 | 23F3 | n.s. | |
| VMI1 | 24F1 | n.s. | Line spacing |
| VMI2 | 24F2 | n.s. | |
| VMI3 | 24F3 | n.s. | |
| VPA d1d2d3 | 29 | n.s. | |
| HPA d1d2d3 | 2A | n.s. | |
| ASFd | 21 | n.s. | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | x | |
| HT | 05 | n.s. | |
| VT | 0B | n.s. | |

| VTSU | X'xy' | Effect | |
|------|-------|--------|--------|
| EM1 | 1D | n.s. | Layout control characters |
| EM2 | 1F | n.s. | |
| EM3 | 13 | n.s. | |
| EM4 | 14 | n.s. | |
| NL | 15 | x | New line |
| NOR | 1E | n.s. | Normal layout |
| SO | 0E | n.s. | Switch to second symbol set |
| SI | 0F | n.s. | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (1) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (1) | Repeat character d2 d1 times |

x:       supported by RSO for this printer type.

n.s.:    not supported by this printer type.

(1)      the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

**Supported printer functions**

The following table shows all the printer functions that are implicitly supported by RSO for the 9645 Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/* BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL | |
| Reset | <not supported> |
| Number of copies | <not supported> |
| PAGE CONTROL | |
| Paper tray | <not supported> |
| Output tray | <not supported> |
| Left margin | <not supported> |
| Horizontal spacing | <not supported> |
| Vertical spacing (1) | DC4# |
| Form length (FHG) | <not supported> |
| Offset (left) | <not supported> |
| Offset (top) | <not supported> |
| Overlays | <not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION | <not supported> |
| CURSOR POSITIONING | |
| Vertical position (absolute and relative) in lines | <not supported> |
| Horizontal position (absolute and relative) in columns | <not supported> |
| Horizontal tab | <not supported> |
| Relative horizontal tab (2) | HT# |
| Vertical tab | <not supported> |
| Relative vertical tab (3) | LF# |
| Backspace (one column to left) | <not supported> |
| Blank (space) | SP |
| Half line down | <not supported> |
| Half line up | <not supported> |
| New line | LF01 |
| Carriage return | LF00 |
| New page | VT01 |
| CHARACTER SET FEATURES | |
| *Languages* | <not supported> |
| *Character spacing* | |
| Fixed | <not supported> |
| Proportional | <not supported> |

| Function | Control character(s) |
|---|---|
| *Style* | |
| Straight | <not supported> |
| Italic | <not supported> |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | <not supported> |
| Bold | <not supported> |
| *Underscore* | |
| Not possible | <not supported> |
| Possible | <not supported> |
| *Print quality* | |
| Low (NLQ=*NO) | <not supported> |
| High (NLQ=*YES) | <not supported> |
| *Character type* | <not supported> |
| Select primary character set [SI] | <not supported> |
| Select secondary character set [SO] | <not supported> |

*Notes*

(1) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI. A loop record for printing on a 9645 Printer may contain no more than one line spacing value (6 or 8 lpi). In other words, RSO does not support mixed 6/8 lpi values within a single loop record for the 9645 Printer. Note that printing is not rejected, but the results may not be as anticipated.

(2) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(3) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

**Shift function support**

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the 9645 Printer is indented $n$ spaces at the currently valid character spacing. No corresponding execution error messages are output.

## DJET-REMOTE-PRINTER

The DeskJet Printer supports PCL language (level 3), standardizing printer characteristics and the corresponding commands. RSO supports this printer by means of the printer designation DJET.

### Access modes

The DJET Remote Printer access modes supported by RSO (ACCESS-TYPE operand in ADD-SPOOL-DEVICE, see the "SPSERVE (BS2000/OSD)" manual) are:

DIRECT, HARDCOPY, PC, TACLAN, LPD

*Note*

> The HARDCOPY access mode is supported only on a 9763 Data Display Terminal with a driver for LASERJET emulation.

For a generation example, see .

### VTSU codes

| VTSU | X'xy' | Effect | |
|---|---|---|---|
| BS | 16 | x | |
| PLD | 2B | x | |
| PLU | 2C | x | |
| LM d1d2d3 | 38 | x | |
| PTS | 1A | x (1) | Proportional spacing on |
| PTX | 1B | x (1) | Proportional spacing off |
| HMI1 | 23F1 | 1/10 | Character spacing |
| HMI2 | 23F2 | 1/12 | |
| HMI3 | 23F3 | 1/15 | |
| VMI1 | 24F1 | 1/6 | Line spacing |
| VMI2 | 24F2 | 1/8 | |
| VMI3 | 24F3 | 1/12 | |
| VPA d1d2d3 | 29 | x | |
| HPA d1d2d3 | 2A | x | |

| VTSU | X'xy' | Effect | |
|------|-------|--------|---|
| ASFd | 21 | x | |
| NP | 0C | x | New page |
| ESC | 27 | x | Physical control sequence |
| DC4 | 3C | n.s. | |
| HT | 05 | x | |
| VT | 0B | x | |
| EM1 | 1D | italics (1) | Layout control characters |
| EM2 | 1F | underscore | |
| EM3 | 13 | bold (1) | |
| EM4 | 14 | italics + underscore (1) | |
| NL | 15 | x | New line |
| NOR | 1E | x | Normal layout |
| SO | 0E | x | Switch to second symbol set |
| SI | 0F | x | Switch to standard symbol set |
| CR | 0D | x | Logical end-of-record |
| NLQ | 39 | n.s. | Near Letter Quality on |
| NLX | 3b | n.s. | Near Letter Quality off |
| MLL | 33 | n.s. | Maximum number of characters per line |
| MLN | 35 | n.s. | Maximum number of lines per page |
| CAP | 20 | n.s. | Continue at actual position |
| EXT d1d2 | 3EE3 | x (2) | Define a transparent character sequence of length d1d2 |
| EXT d1d2 | 3ED9 | x (2) | Repeat character d2 d1 times |

x:      supported by RSO for this printer type.

n.s.:     not supported by this printer type.

(1)      implemented by means of font support (see section "Font support for PCL printers" on page 61).

(2)      the VTSU code EXIT can only be used if the OLTP interface is used for printing; in all other cases the code is ignored.

### Supported printer functions

The following table shows all the printer functions that are implicitly supported by RSO for the DJET Printer (through VTSU codes, PRINT-DOCUMENT command, device definition, form definition and character set definition).

The other printer functions are not supported by RSO. They can, however, be used by users on their own responsibility, by defining printer control character sequences within the user file. But in that case LINE-SPACING=*NO/*BY-EBCDIC-CONTROL/*BY-IBM-CONTROL/ *BY-ASA-CONTROL must not then be specified, since with these operands characters below X'40' are replaced by blanks. Users may also define printer functions in a prolog file.

| Function | Control character(s) |
|---|---|
| JOB CONTROL<br>Reset (1)<br>Number of copies | <br>ESCE<br><not supported> |
| PAGE CONTROL<br>Paper tray<br>Output tray<br>Left margin<br>Horizontal spacing (2)<br>Vertical spacing (3)<br>Form length (FHG)<br>Offset (left)<br>Offset (top)<br>Overlays | <br>ESC&l1H<br><not supported><br>ESC&a#L CR<br>ESC&k#H<br>ESC&l#C<br><not supported><br><not supported><br><not supported><br><not supported> |
| TWO-SIDED PRINTING (DUPLEX) | <not supported> |
| ROTATION<br>0° (portrait)<br>90° (landscape)<br>180° (portrait, upside down)<br>270° (landscape, upside down) | <br>ESC&l00<br>ESC&l00<br><not supported><br><not supported> |
| CURSOR POSITIONING<br>Vertical position (absolute and relative) in lines<br>Horizontal position (absolute and relative) in columns<br>Horizontal tab<br>Relative horizontal tab (4)<br>Vertical tab<br>Relative vertical tab (5)<br>Backspace (one column to left)<br>Blank (space)<br>Half line down<br>Half line up<br>New line<br>Carriage return<br>New page | <br>ESC&a#R<br>ESC&a#C<br>HT<br>ESC&a.#C<br><not supported><br>ESC&a.#R<br>BS<br>SP<br>ESC=<br>ESC&a-0.5R<br>LF<br>CR<br>FF |

| Function | Control character(s) |
|---|---|
| CHARACTER SET FEATURES (6) | |
| *Languages (symbol sets)* | |
| International | ESC(2U |
| English | ESC(1E |
| USA | ESC(0U |
| Belgian | <not supported> |
| French | <not supported> |
| Dutch | <not supported> |
| German | ESC(1G |
| Norwegian | ESC(0D |
| Swedish | ESC(0S |
| Danish | <not supported> |
| Spanish | ESC(2S |
| Swiss | <not supported> |
| Italian | ESC(0I |
| ISO-8859-1 | ESC(0U |
| ISO-8859-2 to ISO-8859-9 | <not supported> |
| *Character spacing* | |
| Fixed | ESC(s0P |
| Proportional | ESC(s1P |
| *Style* | |
| Straight | ESC(s0S |
| Italic | ESC(s1S |
| *Stroke weight* | |
| Light | <not supported> |
| Medium | ESC(s0B |
| Bold | ESC(s+3B |
| *Underscore* | |
| Not possible | ESC&d@ |
| Possible | ESC&d0D |
| *Print quality* | |
| Low (NLQ=*NO) | ESC(s1Q |
| High (NLQ=*YES) | ESC(s2Q |
| *Character type* | <not supported> |
| *Color* | <not supported> |
| Select primary font | SI |
| Select secondary font | SO |

*Notes*

(1) The "Reset" function is performed at the beginning and end of every job if the operand RESET=*YES was specified with ADD-SPOOL-DEVICE in the device definition.

(2) The horizontal spacing defines the distance between the characters. The value is calculated from the cpi value of the character set (SPSERVE statement ADD-SPOOL-CHARACTER-SET), or from the VTSU code HMI.

It must be noted with the DJET Printer that the HMI value is set to the standard pitch value of the font whenever the font characteristics are modified. RSO has solved this problem by repeating the HMI value after any "detected" change of font characteristics. "Detected" means that the font was defined through a user VTSU code or through a character set. Any other type of modification of font characteristics, (such as printer control character strings in the user file) results in the HMI value being set to the standard pitch value of the font, and is thus the user's responsibility.

(3) The vertical spacing defines the distance between the lines. It is calculated on the basis of the line spacing from the form definition, from the defined loop record or from the VTSU code VMI.

(4) The relative horizontal tab is used for skipping a number of blanks if BLANK-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(5) The relative vertical tab is used for skipping a number of lines if LINE-FEED-COMPRESSION=*YES was specified in the device definition (in the SPSERVE statement ADD-SPOOL-DEVICE).

(6) The table shows which font characteristics are set implicitly by RSO through the following specifications:

– LANGUAGE operand of the ADD-SPOOL-CHARACTER-SETS statement (symbol set)

– VTSU codes PTS and PTX (proportional spacing on/off)

– CHARACTER-STYLE operand of the ADD-SPOOL-CHARACTER-SETS statement (character style)

– WEIGHT operand of the ADD-SPOOL-CHARACTER-SETS statement (character stroke weight)

– UNDERSCORE operand of the ADD-SPOOL-CHARACTER-SETS statement (underscore)

– VTSU codes EM1,EM2,EM3,EM4 and NOR.

Font management under RSOSERVE allows the definition of more complete fonts with all font characteristics (orientation, typeface etc.).

### Error handling

The type of acknowledgment depends on the access mode of the printer. The DJET printer can send positive and negative acknowledgments if it is connected to a BAM converter. No matter what the cause of a printer error may be, the same negative acknowledgment is always sent: 'PRINTER ERROR'. The spoolout job is placed in the KEEP queue and the device status is set to 'S'.

### Shift function support

When LEFT-MARGIN=$n$ is specified in the PRINT-DOCUMENT command or SHIFT=$n$ in the ADD-SPOOL-DEVICE statement, the text output on the DJET Printer is indented $n$ * 1/10 inch without the currently valid character spacing being changed.

## 6.2  Additional functionality of the 9025 and 9026-RENO Page Printers

The 9025 and 9026-RENO Electronic Page Printers differ from all other RSO printers in respect of their capabilities. Certain elements of these printers provide the user with an unusually wide range of variations in the layout of the printed output. These elements are described on page 602ff, and explained with the aid of examples.

The 9025 Printer supports the RENO V3 printer language. The 9026-RENO Printer supports the RENO V4 language, which offers additional functions compared with V3. Both these printers are also referred to as "RENO printers" for short in this section.

Some operands of SPOOL commands are superfluous for the 9025 and 9026-RENO Printers and are ignored (e.g.ADD-SPOOL-CHARACTER-SET, operand COLOUR). Some operand values are not checked for validity (e.g. PRINT-DOCMENT, CONTROL-MODE = *LINE-MODE operand and simultaneous specification of one or more of the operands FIRST-CHARACTER, HEADER-LINE, LAST-CHARACTER, LEFT-MARGIN, LINE-SPACING or LINE-PER-PAGE).

*General information on the 9025 Printer*

The 9025 is a single-sheet printer incorporating a feed stacker with a capacity of 2000 sheets, with an additional input tray with a capacity of 230 sheets.
The horizontal/vertical resolution of the printer is 400 dpi.

Three different configurations of the 9025 Printer can normally be used in TRANSDATA:

–   9025-1: basic configuration

–   9025-2: basic configuration + internal SPOOL + floppy disk

–   9025-3: basic configuration + internal SPOOL + floppy disk + hard disk

*General information on the 9026-RENO Printer*

The 9026-RENO Page Printer is an intelligent, high-resolution printer employing an electro-optical print engine. Its extremely high resolution (400 x 400 dpi) provides excellent print quality.

A wide range of paper formats (DIN A5 through DIN A3) and corresponding US formats offers the user a broad field of application and a high degree of flexibility. The flexible extension of fonts in both bitmap and online formats can satisfy the most demanding requirements of text organization. A 40-Mbyte disk allows resident storage of various fonts, diagrams and electronic forms.

If the printer is operated with the optional turning facility, the media used can be printed on both sides. If a second-color unit is additionally installed, a second color can be used for printing.

An optional sorter allows automatic sorting of print jobs.

*The following can be varied within a printed page on RENO printers:*

– different fonts

– printing in portrait and landscape modes. With the 9026-RENO Printer, printing is also possible in inverse portrait mode and inverse landscape mode.

– signatures, logos, graphics etc.

*Note*

Printing in landscape mode can be implemented via a prolog file (see section "Prolog and epilog" on page 607).

In portrait mode, it is also possible to manipulate the fonts electronically (bold and italic printing). Without special fonts, the user can also generate horizontal and vertical lines with various patterns, together with different gray shading and hatching.

A printout which is destroyed as the result of a paper jam is automatically repeated.

In the case of a 9025-2 or 9025-3 Printer with SPOOL, RSO can continue sending data to the printer even when the paper supply is exhausted. The data is stored in the printer and automatically printed when paper has been replenished.

A general point which should be noted for single-sheet printers is that the logical page must not exceed the dimensions of the physical page (DIN A4). For a RENO printer, each spoolout is a document. The mandatory commands OPEN DOCUMENT and CLOSE DOCUMENT are issued automatically by RSO; for this reason, the RSO user must not use these two RENO commands.

The current printer settings are stored in a series of system variables and other variables.

*Notes*

– The management data for the 9025 and 9026-RENO Printers must be entered in the file SYSPAR.RSO.035.USER (see page 39).

– Printers defined with DEVICE-ACCESS=*TCP-ACCESS or ACCESS-TYPE=*PC cannot be managed with RSOSERVE (function 4 in mask ML1SPRN2).

– As a result of the introduction of alphanumeric TSNs in the system and because RENO printers accept only numeric values for OPEN DOCUMENT, it may happen that the TSN on the printer's control panel and the TSN of the job differ.

**Installation of RENO printers**

The following steps must be taken when installing RENO printers:

► Define the printer in the SPOOL parameter file using ADD-SPOOL-DEVICE:

```
A-S-D ...,D-A=(ACC=*HDLC,S-N=...,P-N=...),F-F=*SINGLE
```

► Enter the printer in the SYSPAR.RSO.USER file using RSOSERVE:

– assign the printer (START-PRINTER-OUTPUT command)

– invoke RSOSERVE under the user ID of the RSO device administrator/systems support

– invoke device management for 9025/9026-RENO Printers

– enter the corresponding number of the printer

– invoke function 4: Define device characteristics

– update or confirm the values displayed

► Link the fonts and language tables with SPOOL character sets in the SYSPAR.RSO.USER file using the RSOSERVE utility routine:

– assign the printer (START-PRINTER-OUTPUT command)

– invoke RSOSERVE under the user ID of the RSO device administrator

– invoke function 2: Define a character set

– enter the name of the appropriate character set

– define the link between the font and the language table in the continuation screen

► Enter any newly defined character sets for printer types 9025/9026-RENO in the SPOOL parameter file using ADD-SPOOL-CHARACTER-SET.

## 6.2.1   9025 and 9026-RENO Printer command list

A RENO command consists of a character string enclosed between the command-escape character at the start (default value: \, see also page 600) and the semicolon as the end-of-command character.

A detailed description of the commands can be found in the user guides for the printers.

**Command overview**

```
Open document                          \[<documentnumber>;
Close document                          \];
```

*Note*

> In RSO, these two commands are generated implicitly and must not be used by the user.

*Text commands*

```
Font                            \FO<font>;
Language table                  \LA<language>;
Switch on extended ASCII        \EA1;
Switch off extended ASCII       \EA0;
Bold                            \BO<boldvalue>;
Italic                          \IT<slopevalue>;
Underline                       \UL<on off>;
Universal accents               \FA<on off>;
Expansion:
    –  horizontal               \EL<expansionfactor>;
    –  vertical                 \ET<expansionfactor>;
Print                            \!<charactercode>;
```

*Character formatting commands*

```
Space width                     \SW<space-width>;
Character distance (spacing)    \CD<character-distance>;
Cursor advance                  \CA<value>;
Advance cursor relative         \G<value>;
Tabulator token group relative  \T<value>;
Compact positioning command      \<bit 8 set to 1>;
```

*Positioning commands*

```
X positioning                          \X<x-position>;
Y positioning                          \Y<y-position>;
Margin                                 \M<x-position>;
Carriage return                        \CR;
Line distance (spacing)                \LD<line-distance>;
Line feed                              \LF;
Form feed                              \FF;
Alignment longitudinal                 \AL<long-alignment-type>;
Alignment transverse                   \AT<trans-alignment-type>;
Rotation                               \RO<rotation>;
      −  page rotation                 \PR<absolute-rotation>;
Page X offset                          \PX<x-offset>;
      −  Page Y offset                 \PY<y-offset>;
Tabulation:

      −  horizontal, activate          \HT<horizontal-tabulator-list;
      −  horizontal, deactivate        \TH;
      −  vertical, activate            \VT<vertical-tabulator-list>;
      −  vertical, deactivate          \TV;
Subscript and superscript              \SS<sub/superscript-value>;
Open segment                           \(;
Close segment                             \);
```

*Line commands*

```
Line horizontal                        \LX<line-length>;
Line vertical                          \LY<line-length>;
Line pattern                           \LP<line-type>;
Line thickness                         \LT<line-thickness>;
Line width                                \LW<line-width>;
```

*Color commands*

```
Color background                       \CB<color);
Background depth                        \BD<dimensions>;
Background height                       \BH<dimensions>;
Window in background                    \WB<window-width>,
                                       <window-height>,
                                       <color>;
Color foreground                       \CF<color>;
Window in foreground                    \WF<window-width>,
                                       <window-height>,
                                       <color>;
Priority                                  \PI<expression>;
```

*Programming commands*

```
Comment, start                          \{;
Comment, end                            \};
Print value                             \PV<expression1>,
                                        <expression2>;
Store value of expression in stack      \PU;
Assign value to a user/system variable  \PO;
Switch command output mode on/off       \DF;
Variable                                <variable-id>,
                                        <expression>;
Repeat until                            \REPEAT;
                                        <command-sequence>
                                        \UNTIL<expression>
                                        <comparison-operator>
                                        <expression>;
 If - then - else                       \IF<expression>
                                        <comparison-operator>
                                        <expression>;
                                        <command-sequence1>
                                        \ELSE;
                                        <command-sequence2>
                                            \END;
```

*File handling*

```
Copy file                               \CP<sourcefile-pathname>;

                                        <destinationfile-pathname>;
Include                                 \@<pathname>;
Delete                                  \DE<pathname>;
Directory listing                       \DC<pathname>;
Enter privileged mode                       \SY<code-number>;
```

*Status commands*

```
Error print fence
Error print fence, lower                \<lower-limit>;
Error print fence , upper               \<upper-limit>;
Switch on status report mode            \ST1;
Switch off status report mode           \ST0;
Status report fence
Status report fence, lower              \SL<lower-limit>;
Status report fence, upper              \SU<upper-limit>;
Send value                              \SV<expression1>,
                                        <expression2>;
Status inquiry                              \?;
```

*Miscellaneous commands*

```
Symbol selection                            \SM<symbolname>;
Input                                       \INt;
                                            \INc;
Paper size                                  \PS<format>;
Require paper                               \RP1;
                                            \RP0;
Number of copies                            \NC<count>
Number of lines per page                    \NL<linecount>
Page number                                 \PN<page-number>;
Define units
     -  units X direction                   \UX<unit-ID>;
     -  units Y direction                   \UY<unit-ID>;
Store defaults                                 \SD;
```

*Note*

> The status commands for controlling spoolout cannot be modified by the user. Use of these commands in a prolog, member, forms overlay or in a user file is entirely the responsibility of the user. Difficulties may arise while processing the current spoolout or subsequent outputs if status commands are used.

**Changing the command-escape character (default \)**

Every RENO command must begin with a command-escape character; the default value for this is "backslash" (\).

The problem is, however, that the visible form of the character can change depending on which language is being used for printing.

The facility has therefore been provided for changing this control character into a different character. The new character is defined on the printer control panel and in the device definition (ADD-SPOOL-DEVICE/MODIFY-SPOOL-DEVICE statement).

The following values can be defined as the command-escape character:

x'BC' (\)
x'4C' (<)
x'6E' (>)
x'50' (&)
x'7F' (")
x'FF'
x'27'
x'6A'

*Note the following:*

1.  The BS2000 files (user files, forms overlay, member, prolog or epilog) must be adapted to the new command-escape character before a print operation is started. It is the user's responsibility to ensure that the commands that began with the "old character" now begin with the "new character".

2.  Similarly, the RENO command files (forms overlay, member, prolog or epilog) stored on floppy disk, hard disk or in the printer memory must be converted.

    These must be brought into BS2000 and deleted from floppy disk, hard disk or from the printer memory. After the files have been provided with the new command-escape characters, they can be returned whence they came. This procedure is the responsibility of the RSO device administrator.

3.  Different printers may have different command-escape characters. The REDIRECT-REMOTE-OUTPUT command checks whether these characters are the same for two printers.

4.  When defining a printer pool, it is necessary to ensure that all printers in the pool support the same command-escape character.

5.  The value specified in SPSERVE as the new command-escape character is not checked. Checking is performed in the START-PRINTER-OUTPUT command.

    –   For the 9025 and 9026-RENO Printers, only the characters listed above can be defined.

    –   For all other printers, all characters are accepted unless they are used by RSO.

## 6.2.2  Font (character type) and typeface

The 9025 and 9026-RENO Printers support fonts and language tables. The 9026-RENO Printer additionally supports typefaces.

The character type of the printout is defined by linking a character set to a language table and a font. A font is a file which contains a table with up to either 512 characters (9025) or 1024 characters (9026-RENO), each of which is defined by its position code within the table.

A specific font for a 9025 or 9026-RENO Printer can be identified by its name, which consists of:

– typestyle name

– modification, e.g. bold, normal, etc.

– point size

– rotation, optional for 9026-RENO fonts

A font can be selected by means of the RENO command '\FO<font>;', where <font> stands for the font name (e.g. a 10 cpi font can be selected by the command \FO'COURIER10:E.N.10'; ).

A typeface is a character set that may contain up to 1024 different characters of a particular character type (style) but with an available range of point sizes. All characters are stored in the form of a mathematical formula so that they may be adapted to the desired point size on printing. The size of the typeface can thus be selected simply by appending a point size value to the typeface name. The RENO command '\FO<typeface>;' is used for this purpose, where <typeface> stands for the typeface name and the point size (e.g. the command \FO'COURIER.N.40'; selects the COURIER typeface with a point size of 40).

A language table converts the EBCDIC DF03 codes into the 1024 available characters of a font or typeface. This table can be selected by means of the RENO command '\LA<language>;', where <language> stands for the name of the language table (e.g. \LA'FRENCH'; selects the French language table).

*Example of a font*
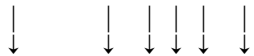
```
COURIER1O:E.N.1O.P
|         | | | | |
↓         ↓ ↓ ↓ ↓ ↓

1         2 3 4 5 6
```

1  Font family

2  Type width

3  Character set

4  Modification: Normal

5  Point size: 10 points/character (1 point = 1/72 inch)

6  Rotation: Portrait mode
   (optional for 9026—RENO fonts)

```
Print file              Language tables                    Font

┌─────────────┐                                ┌──────────────────────┐
│ INPUT CODES │                                │                      │
│             │         ┌──────────┐           │  A                   │
│             │         │    1     │───────────│                      │
│             │         └──────────┘           │                      │
│             │                                │                      │
│             │                                │                      │
│             │                                │                      │
│             │                                │                      │
│   X'C1' ────│──────┐                         │                      │
│             │      │                         │                      │
│             │      │  ┌──────────┐           │                      │
│             │      ├──│    2     │───────────│                  G   │
│             │      │  └──────────┘           │                      │
│             │      │                         │                      │
│             │      │  ┌──────────┐           │                      │
└─────────────┘      └──│    3     │───────────│  $                   │
                        └──────────┘           └──────────────────────┘
   128 characters
                                                     512 characters
```
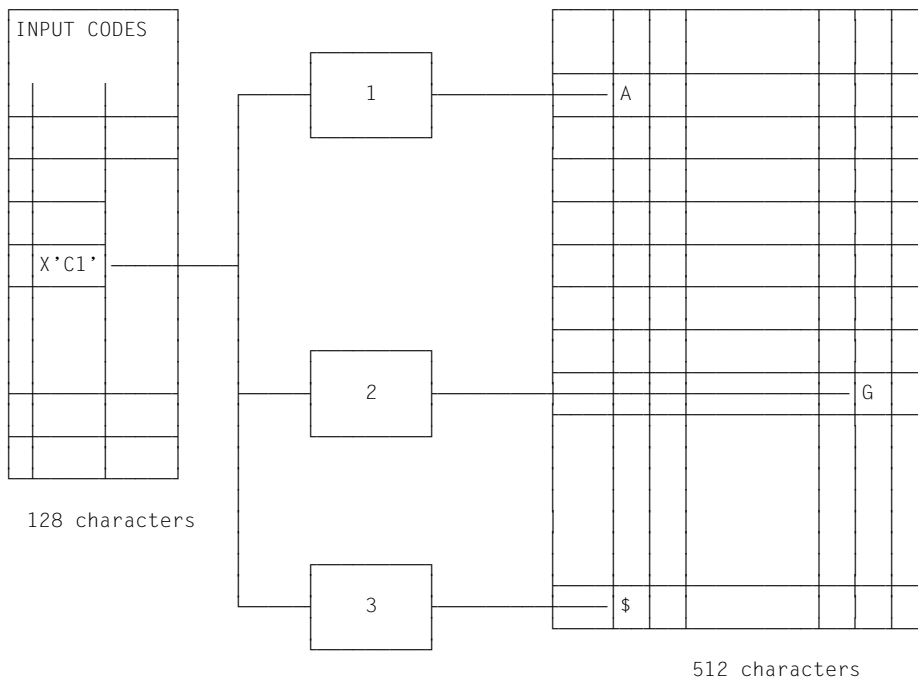
Input code X'C1' points via language table 1 to the letter A in the font, via language table 2 to the letter G, via language table 3 to the character $.

The following 9025 fonts are supplied as standard with the printer:

| 9025 fonts | LINES PER INCH (LPI) | CHARACTERS PER INCH (CPI) |
|---|---|---|
| BULLETIN.N.6.P | 10 | 22 |
| COURIER10:E.N.10.P | 6 | 10 |
| COURIER10:E.N.10.L | 6 | 10 |
| MODERN12:E.N.10.P | 6 | 12 |
| MODERN12:E.N.10.L | 6 | 12 |
| BASKERVILLE.N.12.P | 6 | proportional spacing |

*Notes*

● In order to implement a print job with a specific font, this font must always be in the memory of the printer. If a font device is specified on the printer (9025/9026-RENO parameterization), the printer automatically searches for the specified font on this device and loads it into the memory.

● If fonts with different character widths (pitches) are used for an RSO job, then no validity check of the line length is carried out for the following cases:

– PRINT-DOCUMENT ...,DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*LOGICAL)

– Proportional spacing (varying character width)

● If the operand VERTICAL-CONTROL=*LOOP was specified in the ADD-SPOOL-FORM command, RSO does not check whether the value matches the standard lpi value of the desired font.

### 6.2.3  Language table

A language table converts the character codes of the desired character set in a specific manner (depending on the table) into the font codes of the desired font.

Linking a character set to a font and a language table in RSOSERVE establishes a link from each of the 128 or 256 possible input codes of the character set to one of the addressable font codes (maximum 512/1024). Language tables must always be in the memory of the 9025/9026-RENO Printer.

The following language tables are supplied as standard with the printer:

QWERTY

INT003

INT303

DEUTSCH

BELGIUM

DANISH

DUTCH

FRENCH

ITALIAN

NORWEGIAN

SPANISH

SWEDISH

UKENGLISH

*Example*

Language table QWERTY (ASCII)

| | | More significant half byte | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| **L**<br>**e**<br>**s**<br>**s**<br><br>**s**<br>**i**<br>**g**<br>**n**<br>**i**<br>**f.**<br><br>**h**<br>**a**<br>**l**<br>**f**<br><br>**b**<br>**y**<br>**t**<br>**e** | **0** | | | | 0 | @ | P | | p | | | | | | | | |
| | **1** | | | ! | 1 | A | Q | a | q | | | | | | | | |
| | **2** | | | " | 2 | B | R | b | r | | | | | | | | |
| | **3** | | | # | 3 | C | S | c | s | | | | | | | | |
| | **4** | | | $ | 4 | D | T | d | t | | | | | | | | |
| | **5** | | | % | 5 | E | U | e | u | | | | | | | | |
| | **6** | | | & | 6 | F | V | f | v | | | | | | | | |
| | **7** | | | ' | 7 | G | W | g | w | | | | | | | | |
| | **8** | | | | 8 | H | X | h | x | | | | | | | | |
| | **9** | | | | 9 | I | Y | i | y | | | | | | | | |
| | **A** | | | * | : | J | Z | j | z | | | | | | | | |
| | **B** | | | + | ; | K | [ | k | { | | | | | | | | |
| | **C** | | | , | < | L | \ | l | \| | | | | | | | | |
| | **D** | | | - | = | M | ] | m | } | | | | | | | | |
| | **E** | | | . | > | N | ^ | n | ~ | | | | | | | | |
| | **F** | | | / | ? | O | - | o | | | | | | | | | |

Figure 21: Language table

## 6.2.4   Prolog and epilog

A prolog/epilog for a 9025 or 9026-RENO Printer contains a sequence of commands and can be created by any user. Combined with a form name, a prolog or epilog can be a component of a print file. In RSO mode, a prolog/epilog is always called implicitly: If an existing BS2000 file is to be printed with the same form to which a specific prolog or epilog is linked, then this prolog or epilog is automatically inserted into the BS2000 print file when the print job is started. The implicit call of the prolog/epilog is valid until the end of the RSO job (time: CLOSE DOCUMENT).

If the prolog/epilog is stored under the ID of the user, of the RSO device administrator or under $SYSSPOOL (public device), the file name must satisfy the following convention:

RP9025.PROLOG.formname
RP9026-RENO.PROLOG.formname
RP9025.EPILOG.formname
RP9026-RENO.EPILOG.formname

A prolog/epilog stored under the RSO device administrator's user ID must have the attribute (USER-ACCESS=*ALL-USERS) if nonprivileged users are to have access to it.

If the prolog/epilog is stored in the printer memory, it must be linked with a form via RSOSERVE. This link can only be implemented by systems support or the RSO device administrator. A prolog and epilog in the printer memory must not have fixed file names. This kind of link is advisable if a prolog/epilog is not to be processed for each available 9025/9026-RENO for this form, but only for one specific printer.

Before the file to be printed is transferred, the prolog is transferred (after printing of the file an epilog is transferred) to the 9025/9026-RENO Printer memory for the duration of execution.

A prolog/epilog is sought using the following search algorithm (priority sequence):

1.   User ID of the user who issued the PRINT-DOCUMENT command. If no suitable prolog is found, the search is continued under 2.

2.   User ID of the first RSO device administrator or $SYSSPOOL if this is a a public device. The prolog must be shareable (USER-ACCESS=*ALL-USERS) and have no password. If once again no suitable prolog is found, the search is continued under 3.

3.   A check is made as to whether the form is linked via RSOSERVE for this logical 9025/9026-RENO Printer with a prolog/epilog which is stored as a file in the printer memory. If it exists, the prolog is used.

If the search following this sequence yields no prolog/epilog, the file if printed nevertheless without an error message.
Conversely, prolog files may be stored in all three locations listed above; the highest-priority prolog is always the one that is processed.

*Example: Prolog for rotation on the 9025 (printing in landscape mode)*

Step 1:

In RSOSERVE the font must be defined with the desired font characteristics (landscape mode) and the language table.

```
 Level 3            9025      DEVICE  MANAGEMENT                ML3SNFND

  FONT NAME : RT

  COMMENT    : PRINTING IN ROTATION ON 9025------------------------------
               -------------------------------------------------------

         0         1         2         3         4         5         6         7
         1         0         0         0         0         0         0         0
  001 (\FO'MODERN12:E.N.10.L';\LA'QWERTY';)--------------------------------
  071 -------------------------------------------------------------------
  141 -------------------------------------------------------------------
  211 -------------------------------------------------------------------
  281 -------------------------------------------------------------------
  351 -------------------------------------------------------------------
  421 -------------------------------------------------------------------
  491 -------------------------------------------------------------------
  561 -------------------------------------------------------------------
  631 -------------------------------------------------------------------
  701 -------------------------------------------------------------------
     ACTION :  2-----      0/END          1/BACK          2/SAVE
                           ?/HELP         Ln/LEVELn
  @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
  @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```

Step 2:

With the aid of RSOSERVE, the character set is linked with the font:

```
 Level 3       9025     DEVICE MANAGEMENT.                    ML3SCHRD
                                                              Page: 1
  CHARACTER SET TO BE DEFINED:  RT  .

  FONTS ALREADY DEFINED:

         X RT@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
         _ @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
         _ @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
         _ @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
         _ @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
         _ @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
         _ @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
         _ @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@

  SELECTED FONT : ---------------------------------------------------

  ACTION :  2-----     0/END        4/NEXT      page    Ln/LEVELn
                       1/BACK       5/PREVIOUS  page    ?/HELP
                       2/SAVE       6/LAST      page
                       3/SHOW       7/FIRST     page

@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```

Step 3:

The prolog is called whenever a file is to be printed with the form to which the prolog is linked:

```
PRINT-DOCUMENT FROM-FILE=filename,RESOURCE-DESCRIPTION=*PARAMETERS
(FORM-NAME=formname),TO-PRINTER=*PARAMETERS(PRINTER-NAME=devicename)
```

It is also possible to transfer a prolog to printer memory. To do this, first select function 4 (Device Management) in mask ML1SPRN2.

```
  Level 1             R S O    S E R V I C E S                 ML1SPRN2
                    9025     DEVICE MANAGEMENT.
  SELECT FUNCTION :
      0/END          : END.
      1/BACK         : BACK.
      2/MEMBER-LIST  : MEMBER LIST LINKED TO A FORM.
      3/CHARACTER-SET : CHARACTER SET DEFINITION.
      4/DEVICE       : DEVICE MANAGEMENT.
      5/FONT         : FONT DEFINITION.
      ?/HELP         : HELP.

   ACTION  : 4-----------  (number or name of the selected function).
   @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
   @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```

In the next mask, SL2DL, you then select the printer to be used:

```
Level 2                   9025 DEVICE MANAGEMENT.                        SL2DL
                                                                     Page:001
    DEVICES UNDER YOUR RESPONSIBILITY :

    #    DEVICE      STATION     TYPE        #    DEVICE      STATION     TYPE

    1 NEW9025     PRN21311    PUB        @@@ @@@@@@@@    @@@@@@@@    @@@
    2 P9025       PRN21310    PUB        @@@ @@@@@@@@    @@@@@@@@    @@@
    3 P9025BIS    PRN21310    PUB        @@@ @@@@@@@@    @@@@@@@@    @@@
    4 P9025JPC    PRN21310    PUB        @@@ @@@@@@@@    @@@@@@@@    @@@
    5 P9025N4     PRN21310    PUB        @@@ @@@@@@@@    @@@@@@@@    @@@
    6 P9025TER    PRN21310    PUB        @@@ @@@@@@@@    @@@@@@@@    @@@
  @@@ @@@@@@@@    @@@@@@@@    @@@        @@@ @@@@@@@@    @@@@@@@@    @@@
  @@@ @@@@@@@@    @@@@@@@@    @@@        @@@ @@@@@@@@    @@@@@@@@    @@@
  @@@ @@@@@@@@    @@@@@@@@    @@@        @@@ @@@@@@@@    @@@@@@@@    @@@
  @@@ @@@@@@@@    @@@@@@@@    @@@        @@@ @@@@@@@@    @@@@@@@@    @@@

 DEVICE PASSWORD: 777   (1 to 64000)
 SELECTED DEVICE NUMBER: 1   (no action has to be filled to select a device)

 ACTION  : --------   0/END       2/NEXT         4/LAST      ?/HELP
                      1/BACK      3/PREVIOUS     5/FIRST     Ln/LEVELn
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```

In the next mask, SL3DMEN, you select File Management from the functions offered in the menu:

```
Level 3                  9025 DEVICE MANAGEMENT.                      SL3DMEN

            Selected device.: @@@@@@@@     Station: @@@@@@@@
            Processor.......: @@@@@@@@     Type...: @@@
            Escape code.....: x'@@' (@)

    SELECT FUNCTION :

    0 /END       : END  RSOSERVE.
    1 /BACK      : BACK.
    2 /FILE      : FILE  MANAGEMENT.
    3 /DIRECTORY : DIRECTORY  MANAGEMENT.
    4 /SEND      : SEND A STRING  OF PRINTER DATA.

    ? /HELP      : HELP.
    Ln/LEVELn    : RETURN  TO LEVEL n.


    ACTION  : 2-------- (number or name of selected function)


@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```

For the selected printer, the file type must be specified in the next mask, SL4DFT:

```
Level 4                    9025 DEVICE MANAGEMENT.                    SL4DFT
                              FILE MANAGEMENT

                  Selected device.: NEW9025      Station.: PRN21311
                  Processor.......: DS241F21      Type....: PUB
                  Escape code.....: x'BC' (\)


   SELECT ONE OF THE FOLLOWING  FILE TYPES    OR     FUNCTIONS  :


          2 /FONT                                    0 /END
          3 /LANGUAGE-TABLE                          1 /BACK
          4 /TEXT                                    ? /HELP
          5 /MEMBER-TEXT                             Ln/LEVELn
          6 /MEMBER-SYMBOL
          7 /DIA
          8 /PROLOG
          9 /EPILOG

      ACTION  : 8------------ (number or name of selected type / function)
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```

In the next mask, SL5DEP2, you can link the prolog to an old or new form:

```
Level 5            9025 DEVICE MANAGEMENT : PROLOG FILE MANAGEMENT   SL5DEP2

                  Selected device.: NEW9025      Station.: PRN21311    Page:001
                  Processor.......: DS241F21      Type....: PUB
                  Escape code.....: x'BC' (\)

   LIST OF FORM ALREADY DEFINED :

     NAME            NAME            NAME            NAME            NAME
   _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@
   _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@
   _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@
   _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@
   _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@
   _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@
   _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@
   _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@      _ @@@@@@@@

   SELECTED FORM: FORM1---

   ACTION :  2-------    0/END        3/NEXT     page    6/FIRST  page
                         1/BACK       4/PREVIOUS page    Ln/LEVELn
                         2/SELECT     5/LAST     page    ?/HELP
SRO2016: FILE DOES NOT CONTAIN ANY DATA OF THE SPECIFIED DATA TYPE
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```

```
Level 6     9025 DEVICE MANAGEMENT:  <dia/symb/form> MANAGEMENT    SL5DFIL

                Selected device.: NEW9025      Station.: PRN21311
                Processor.......: DS241F21      Type....: PUB
                Escape code.....: x'BC' (\)
                <dia/symb/form> name : FORM1


    Printer file information (mandatory) :
    Name.....: WO-PROLOG-ROT----------------------------------------

    Host file information (for import/export only) :
    Name.....: RP9025.PROLOG.FORM1-----------------------------------
    File type: _ (SAM/ISAM)
    Overwrite: _ (Yes/No)

    New printer file information (for copy/rename only) :
    Name.....: --------------------------------------------------


    ACTION :  2-----    0/END        3/EXPORT     6/COPY       9/UNLINK
                        1/BACK       4/PRINT      7/RENAME     ?/HELP
                        2/IMPORT     5/REMOVE     8/LINK       Ln/LEVELn
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```

The file RP9025.PROLOG.FORM1 is sent to the 9025 Printer and stored on the Winchester floppy disk (W0) under the name "ROT" in the directory "PROLOG".

In this case, the RP9025.PROLOG.FORM1 file can be deleted on the BS2000 processor. RSO finds the prolog on the Winchester floppy disk and transfers it to the printer memory before it sends the data to the printer.

*Notes*

A line spacing (\LD...;) specified in the prolog has no effect if DOCUMENT-FORMAT= *TEXT/*PAGE-FORMAT(CONTROL-MODE=*LOGICAL) is specified, since the value of the loop or line feed used to output the print file is assumed. In this case, the line feed is checked by RSO.

If CONTROL-MODE=*LINE-MODE is specified, the user must define and check the line spacing using RENO commands. An \LD command must be entered before the first \CR command is issued.

## 6.2.5 Forms overlay (DIA)

A forms overlay consists of a predefined sequence of RENO commands. The forms overlay file is either requested by specifying the ELECTRONIC-OVERLAY operand in the PRINT-DOCUMENT command or specified for a form by means of the SPSERVE statement ADD-SPOOL-FORM. In both cases, the forms overlay from the PRINT-DOCUMENT command is used. A forms overlay is valid for the duration of the print job, i.e. the forms overlay is inserted into the print file before the data for each page is printed.

Given the appropriate configuration, forms overlays may also reside on floppy disk or on a hard disk as part of the printer hardware (the printer handling required for this is described in the user guide for the relevant printer).

At the end of the forms overlay processing, note that RSO assumes itself to be located at the beginning of the page. The user is responsible for any RENO positioning commands (margin, character and line spacings, etc.) that may have been specified in the forms overlay definition.

*Note*

As of RSO V3.0A, this function is not only available for the 9025 and 9026-RENO Printers, but also for the following printers which use the same interface:

– 2030-PCL
– 4818-PCL
– 4821-PCL
– 4822-PCL
– 4824-PCL
– 4825-PCL
– 9000-PCL
– 9021
– 9022-200
– 9026-PCL

Refer to the description of the ELECTRONIC-OVERLAY operand in the PRINT-DOCUMENT command for details of this expansion.

As with prologs and epilogs, there is also a specific search algorithm for forms overlays:

1. The forms overlay is sought first under the ID of the user. If it is not found, the search continues under 2.

2. The forms overlay is then sought

   – under the ID of the RSO device administrator (private device)
   – and under $SYSSPOOL (public device).

   These files must be shareable (USER-ACCESS=*ALL-USERS). If the forms overlay is not found, the search continues under 3.

3.  The forms overlay is sought in printer memory.

In the first two instances, the file name must comply with the following naming convention:
RP9025.DIA.xy.
RP9026-RENO.DIA.xy.
The forms overlay is called in the PRINT-DOCUMENT command with ELECTRONIC-
OVERLAY=xy or by specifying a form linked to a forms overlay.
A forms overlay in the printer memory is stored under any name in the printer catalog. This
name must be linked by RSOSERVE to the two-character forms overlay identifier specified
with ELECTRONIC-OVERLAY=xy in the PRINT-DOCUMENT command or with FORMS-
OVERLAY=xy in the form definition.

*Note*

> If a forms overlay is defined as a segment (see the user guide for the printer), at the time
> "CLOSE SEGMENT" occurs the cursor is automatically in the same position it was in
> before the forms overlay was called.

*Example of the creation and implementation of a forms overlay*

Creation of a forms overlay file:

```
\PUX;\PUY;\PUBO;\PUFO;\Y8.;•XX+23.;
\LPO;\LT8;\LW8;\LX163.;\LY233.;\LX-163.;\LY-233.;
\FO'BULLETIN.N.6.P';\BOO;
\X160.;\Y245.;
PRINTED ON 9025-PRINTER
\XX-160.;\YY-245.;
\YY+21.;\XX+125.;\LX45.;
\YY+12.;\LX-163.;
\YY+190.;\LX163.;
\YY-215.;\XX-45.;\LY25.;
\YY+190.;\LY18.;
\XX-55.;\LY-18.;
\YY-190.;\LY-25.;
\POFO;\POBO;\POY;\POX;
```

The layout of the forms overlay can be checked as follows before it is used:

```
/PRINT-DOCUMENT FROM-FILE=RP9025.DIA.xy,DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-
 MODE=*LINE-MODE),TO-PRINTER=*PAR(PRINTER-NAME=...)
```

Printout of the forms overlay:

Figure 22: Forms overlay form

Page of the print file over which the forms overlay is to be placed:

```
F E L D - 1                    F E L D - 2              FELD-3-1
F E L D - 1                    F E L D - 2
F E L D - 1                    F E L D - 2              FELD-3-2
```

FELD-4

```
FELD-5                    FELD-6                    FELD-7
FELD-5                    FELD-6                    FELD-7
```

PRINTED ON 9025-PRINTER

Figure 23: Print page over which the forms overlay is placed

Printout of a page of the print file with the forms overlay inserted:

| | | |
|---|---|---|
| F E L D - 1<br>F E L D - 1<br>F E L D - 1 | F E L D - 2<br>F E L D - 2<br>F E L D - 2 | FELD-3-1 |
| | | FELD-3-2 |
| | FELD-4 | |
| FELD-5<br>FELD-5 | FELD-6<br>FELD-6 | FELD-7<br>FELD-7 |

PRINTED ON 9025-PRINTER

Figure 24: Print page with forms overlay inserted

## 6.2.6  Member

A member consists of a predefined data string. Each user can create his own member file. For RSO operation, a member must be linked to a form; this is performed by the RSO device administrator or systems support in the RSOSERVE utility routine. Users can insert the member at any required position in their print file with the appropriate RENO command.

The RSO controller temporarily copies the file into printer memory. Up to 50 member names can be linked to one form.

Members which are already in printer memory must not be linked to a form.
It is advisable to link the members to a form which is nonstandard in order to avoid unnecessary transfer times for the majority of the users. This form can, however, be specified additionally in the START-PRINTER-OUTPUT command.

Naming convention:
RP9025.MEMBER.membername
RP9026-RENO.MEMBER.membername

There are 2 types of members:

– member text

– member symbol

A member text is addressed with \@MEM-membername; .
A member symbol is addressed with \SM'membername'; .
'membername' may consist of up to 8 alphanumeric characters.

*Note*

Members on a BS2000 processor which are stored under the user ID of the RSO device administrator must have the attribute USER-ACCESS=*ALL-USERS if nonprivileged users are to have access to them. These files must not be password-protected, but may protected by means of ACL and GUARDS (as of BS2000 V11.0).

If a member linked to a form name is still in the processor memory when it is addressed, RSO automatically transfers it to 9025/9026-RENO memory before printing is started.

*Example of the creation and implementation of a member of type "text"*

Step 1:

You use your file editor to create a member file whose contents consist of RENO commands and data. The file name must comply with the following convention: RP9025.MEMBER.name

```
\CR;\LF;BEGIN OF MEMBER
\CR;\LF; . . . . . .
\CR;\LF; . . . . . .
\CR;\LF; . . . . . .
\CR;\LF;\LF;END  OF  MEMBER
```

The member file in the example is called RP9025.MEMBER.ABCDE

Step 2:

The member must now be linked to a form in the RSOSERVE utility routine.

Call the administration program (as the RSO device administrator) and select function 2 in the second mask:

```
Level 1              R S O   S E R V I C E S                ML1SPRN2

                        9025 DEVICE MANAGEMENT.

 SELECT FUNCTION :

     0/END          : END.

     1/BACK         : BACK.

     2/MEMBER-LIST  : MEMBER LIST  LINKED TO A FORM.

     3/CHARACTER-SET : CHARACTER SET  DEFINITION.

     4/DEVICE        : DEVICE  MANAGEMENT.

     5/FONT          : FONT DEFINITION.

     ?/HELP          : HELP.


 ACTION  : 2-----------  (number or name of the selected function).
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```

*Linking forms and members*

Now, in mask SL2FCL1, you can select an existing or new form name to which your member is to be linked.

You change an existing form name ('TRL') in order to link it to the member 'ABCDE':

```
Level 2                      9025 DEVICE MANAGEMENT                    SL2FCL1
                                                                       Page:001

   LIST OF FORMS LINKED TO MEMBERS.

        NAME            NAME            NAME            NAME            NAME

   _ LSCAPE        _ @@@@@@        _ @@@@@@        _ @@@@@@        _ @@@@@@
   _ STD           _ @@@@@@        _ @@@@@@        _ @@@@@@        _ @@@@@@
   _ STEIN         _ @@@@@@        _ @@@@@@        _ @@@@@@        _ @@@@@@
   _ TRL           _ @@@@@@        _ @@@@@@        _ @@@@@@        _ @@@@@@
   _ @@@@@@        _ @@@@@@        _ @@@@@@        _ @@@@@@        _ @@@@@@
   _ @@@@@@        _ @@@@@@        _ @@@@@@        _ @@@@@@        _ @@@@@@
   _ @@@@@@        _ @@@@@@        _ @@@@@@        _ @@@@@@        _ @@@@@@
   _ @@@@@@        _ @@@@@@        _ @@@@@@        _ @@@@@@        _ @@@@@@

   SELECTED FORM  : TRL---                    MODEL  : ------ (for ADD)

   ACTION  : 3-------   0/END    3/MODIFY   6/NEXT page      9/FIRST page
                        1/BACK   4/REMOVE   7/PREVIOUS page  ?/HELP
                        2/ADD    5/SHOW     8/LAST  page     Ln/LEVELn

@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```

Now you enter the member 'ABCDE' in the member list in mask SL2LOGO and save it:

```
Level 3                   9025 DEVICE MANAGEMENT.                        SL2LOGO

   LIST OF MEMBERS LINKED TO THE FORM TRL

     NAME            NAME            NAME            NAME            NAME

   ABCDE---        --------        --------        --------        --------
   --------        --------        --------        --------        --------
   --------        --------        --------        --------        --------
   --------        --------        --------        --------        --------
   --------        --------        --------        --------        --------
   --------        --------        --------        --------        --------
   --------        --------        --------        --------        --------
   --------        --------        --------        --------        --------
   --------        --------        --------        --------        --------
   --------        --------        --------        --------        --------


   ACTION :  2-----    0/END          2/SAVE           ?/HELP
                       1/BACK                          Ln/LEVELn

@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```

The member RP9025.MEMBER.ABCDE is now linked to the form TRL.

Step 3:

The member with the name ABCDE must now be inserted into the print file with the
RENO command \@MEM-name:

```
\LF;\LF;\LF;
\CR;\LF;DATA FROM INPUT FILE
\CR;\LF;DATA FROM INPUT FILE
\CR;\LF;DATA FROM INPUT FILE
\CR;\LF;DATA FROM INPUT FILE
\CR;\LF;DATA FROM INPUT FILE
\CR;\@MEM−ABCDE;
\CR;\LF;DATA FROM INPUT FILE
\CR;\LF;DATA FROM INPUT FILE
\FF;
```

If the print file is now to be printed on a remote 9025 Printer, RSO automatically
transfers the file RP9025.MEMBER.ABCDE to printer memory before printing is
started.

The printout has the following format:

```
DATA FROM INPUT FILE
DATA FROM INPUT FILE
DATA FROM INPUT FILE
DATA FROM INPUT FILE
DATA FROM INPUT FILE
BEGIN OF MEMBER
 . . . . . .
 . . . . . .
END OF MEMBER
DATA FROM INPUT FILE
DATA FROM INPUT FILE
```

*Note*

In order to guarantee automatic loading of a member file into the memory of a
9025/9026-RENO Printer, form and member name must be linked by the first named
RSO device administrator or TSOS in the device entry.

– PRIVATE DEVICES
  The first named RSO device administrator in the list (see device entry:
  ADD-SPOOL-DEVICE in the SPSERVE utility routine) or TSOS specifying the first
  RSO device administrator links the desired form to the desired member name.

– PUBLIC DEVICES
  TSOS links the desired form to the desired member name.

**Symbol/Logo**

A symbol (or logo) is a rectangular picture which can be loaded into printer memory and printed just like a character.
It must be linked to a form by means of RSOSERVE (see the "RSOSERVE" manual) and is loaded into printer memory before the data is printed.

The file name must comply with the following convention:
RP9025.MEMBER.name
RP9026-RENO.MEMBER.name

During copying from the processor into printer memory, the symbol is converted into an internal printer format. Conversion back to the original form is not possible. At the end of an RSO job for which the symbol was used (time: CLOSE DOCUMENT), the symbol is erased automatically from printer memory.

A symbol

– can be generated by the user with the aid of the scanner.

– can be generated by the user with the aid of a bit table (a detailed description of this can be found in the user guide for the printer).

There is no validity check for the length of the symbol.

Symbols on a BS2000 processor which were stored under the user ID of the RSO device administrator must have the attribute USER-ACCESS=*ALL-USERS if nonprivileged users are to have access to them.

Given the appropriate configuration, symbols may reside on floppy disk or on a hard disk as part of the printer hardware (the printer handling required for this is described in the user guide for the relevant printer).

*Example of a symbol*

```
\xm;     0   101b401b  401b511b  541b421b  501b4070
\xm;    10   1b40700a  41401b50  1b501b50  401b501b
\xm;    20   50301b50  1b50401b  501b5030  1b501b50
\xm;    30   401b4021  55555555  55555555  55555555
\xm;    40   5555550a  411b5020  1b501b50  1b501b50
\xm;    50   1b504020  1b50201b  501b5040  1b50301b
\xm;    60   501b501b  50201b50  1b402155  55555555
\xm;    70   55555555  55555555  55550a41  1b50401b
\xm;    80   501b501b  50401b50  1b501b50  1b501b50
\xm;    90   1b501b50  4020201b  501b501b  50301b40
\xm;    a0   21555555  55555555  55555555  55555555
\xm;    b0   0a41401b  501b501b  5030201b  50301b50
\xm;    c0   1b503020  1b501b50  1b501b50  1b501b50
\xm;    d0   401b4021  55555555  55555555  55555555
\xm;    e0   5555550a  40301b50  1b501b50  1b501b50
\xm;    f0   401b5030  1b501b50  1b50401b  50202040
\xm;   100   1b501b40  21555555  55555555  55555555
\xm;   110   55555555  0a411b50  201b501b  501b501b
\xm;   120   501b5040  1b50301b  501b501b  50401b50
\xm;   130   301b501b  501b5020  1b501b40  21555555
\xm;   140   55555555  55555555  55555555  0a41401b
\xm;   150   501b501b  50401b50  1b50301b  501b5040
\xm;   160   1b501b50  301b501b  50401b40  21555555
\xm;   170   55555555  55555555  55555555  20604549
\xm;   180   1a0a
```

Printout of the symbol:



Figure 25: SYMBOL

## 6.2.7   Notes on operation of the 9025 and 9026-RENO Printers

–   Unless otherwise specified, RSO sets a left-hand margin of 1/2 inch for the 9025/9026-RENO Printer. Each user has the option of setting the left-hand margin by means of an appropriate prolog or by using the appropriate RENO command. However, he must take this into account in the LINE-SIZE operand. If this is not done, black bars may be printed on the paper as a result. A form with LINE-SIZE=75 is generated by default.

–   In the LINE-MODE control mode, the print position at the start of page is the top left-hand corner (X=12.5 mm, Y=0 mm). Therefore the user must first implement vertical positioning. If this is not done, it may likewise lead to black bars being printed on the paper.

–   If an excessively long record is sent to the printer owing to an invalid form or character set definition, black bars on the paper may again result.

–   In the case of proportional spacing (e.g. FONT: BASKERVILLE.N.12.P), no line length check is performed.

–   When symbols are used, their length is not taken into account by RSO in the course of the line length check.

## 6.2.8 Access options

Files which contain a prolog, an epilog, a forms overlay or a member can be in one of three possible locations:

1. Stored under the user ID of the user who starts the print job;

   Prolog, epilog, forms overlay and member are accessible only to this user ID, but for all available RSO printers. In the case of a PRINT-DOCUMENT command, RSO automatically transfers the desired file to the specified 9025/9026-RENO Printer.

   The following conventions apply to the names assigned during creation of a prolog, an epilog, a forms overlay or a member:

$$\text{\$userid.} \begin{Bmatrix} \text{RP9025} \\ \text{RP9026-RENO} \end{Bmatrix} . \begin{Bmatrix} \text{PROLOG} \\ \text{EPILOG} \end{Bmatrix} \text{.formname}$$

$$\text{\$userid.} \begin{Bmatrix} \text{RP9025} \\ \text{RP9026-RENO} \end{Bmatrix} . \begin{Bmatrix} \text{DIA} \\ \text{MEMBER} \end{Bmatrix} \text{.name}$$

   'formname' can be up to 6 alphanumeric characters.

   'name' can be up to 2 alphanumeric characters for a forms overlay (DIA), and up to 8 alphanumeric characters for a member.

2. Stored under the user ID of the RSO device administrator for the printer (private device) or under the $SYSSPOOL user ID (public device);

   Prolog, epilog, forms overlay and member are accessible to all users who use a 9025/9026-RENO Printer under the responsibility of the specified device administrator. RSO automatically transfers the file to the memory of the 9025/9026-RENO Printer. Members, prologs, epilogs and forms overlays on a BS2000 processor which are stored under the user ID of the RSO device administrator must be shareable (USER-ACCESS=
   *ALL-USERS) if nonprivileged users are to have access to them.

   Naming convention:

$$\begin{Bmatrix} \text{RP9025} \\ \text{RP9026-RENO} \end{Bmatrix} . \begin{Bmatrix} \text{PROLOG} \\ \text{EPILOG} \end{Bmatrix} \text{.formname}$$

$$\begin{Bmatrix} \text{RP9025} \\ \text{RP9026-RENO} \end{Bmatrix} . \begin{Bmatrix} \text{DIA} \\ \text{MEMBER} \end{Bmatrix} \text{.name}$$

   'formname' can be up to 6 alphanumeric characters.

   'name' can be up to 2 alphanumeric characters for a forms overlay (DIA), and up to 8 alphanumeric characters for a member.

3.  In the memory of the printer.

    Prolog, epilog, forms overlay and member are available to any user issuing print jobs for this printer. The file will have been previously transferred to the printer memory by the RSO device administrator. Whenever a font, a language table, a forms overlay, a member etc. is transferred to or from printer memory, the information is recorded, i.e. entered, updated or deleted, in the SYSPAR.RSO.024.USER file.

**Prolog, epilog, forms overlay (DIA) and member files swapped out with HSMS**

In previous versions, when a controller task accessed a file swapped out with HSMS, other printers managed by the task were blocked until the file was retrieved. To prevent this happening, a number of improvements have been introduced in RSO. These improvements concern four types of resource files: forms overlay (DIA), prolog, epilog and member files.

*Forms overlay (DIA) file*

The swapping back of a swapped-out forms overlay file is initiated during checking of the PRINT-DOCUMENT command.

When command processing starts, a swapped-out forms overlay file is regarded as a user error. The job is terminated with corresponding information on the trailer page, and a message is sent to the console.

*Prolog/epilog file*

Nothing is done regarding swapped-out prolog/epilog files during checking of the PRINT-DOCUMENT command.

When command processing starts, a swapped-out prolog/epilog file is regarded as a user error. The job is terminated with corresponding information on the trailer page, and a message is sent to the console.

*Member file*

Nothing is done regarding swapped-out member files during checking of the PRINT-DOCUMENT command.

When command processing starts, a swapped-out member file is ignored.

### 6.2.9  Validity check

1. Forms overlay, member, prolog, epilog: during the spoolout operation, the following are searched in the specified sequence for the forms overlay, member, prolog or epilog file:

   a) user ID of the user issuing the PRINT command

   b) user ID of the RSO device administrator (private devices) and under $SYSSPOOL (public devices).

   If the file is not found under 1 or 2, no error message is displayed on the screen. RSO assumes that the forms overlay, member, prolog or epilog file is located in printer memory.
   The PRINT-DOCUMENT command is rejected if no forms overlay file is found in the printer memory either.
   If a member, prolog or epilog is not found, the spoolout job is processed and no error message is output.

2. Font, language table: RSO assumes that fonts and language tables are always in the memory of the 9025/9026-RENO Printer. The desired character set is not checked.
   If the name of a font and/or a language table was written incorrectly into the RSO parameter file, an error message appears on the print page when the PRINT job is started.

Sequence of commands and processing steps for output of a file to a 9025/9026-RENO Printer:

– Opening the document (\ [ ;)
  Setting of the margin spacing with the following value ($\equiv$ default setting on the printer): 200 points (MM244)
  Vertical positioning: 45 points (YY45)

– Definition of the various fonts and language tables with reference to the character set to be used

– Header page with spacing values and information on the various characteristics of the standard character set

– Processing of members

– Processing of the forms overlay

– Processing of the prolog

– Start of print file processing

– Processing of the epilog.

Before the trailer page is processed, the following printer values are reset:

– Command output mode deactivated: \DF0;

– Horizontal/vertical extension: \ET0; \EL0;

– Extended ASCII mode: \EA0;

– Universal accents: \FA0;

– Character spacing: \CD0;

– Cursor advance: \CA-1;

– Margin spacing: \M200;

– Vertical positioning: \Y45;

– Longitudinal/transverse alignment: \ALN; \ATN;

– Subscripts and superscripts: \SS0;

– Copies: \NC1;

– Background/foreground color: \CBT; \CFT;

– X and Y coordinates: \UX1,1; \UY1,1;

– Trailer page

Following processing of the trailer page, a document close command (\];) is issued (for a detailed description of the RENO commands refer to the user guide for the relevant printer).

# 7 Commands, macros, messages

This chapter describes the extensions for RSO which have not yet been added to the "Spool & Print - Commands (BS2000/OSD)" , "Spool & Print - Macros and Exits (BS2000/OSD)" and "Spool & Print - Messages" manuals.

## 7.1 Commands

This section describes the extensions for RSO, which have not yet been added to the commands manual. For a complete description of the individual commands, see the manual "Spool & Print - Commands (BS2000/OSD)".

# MODIFY-PRINT-JOB-ATTRIBUTES -
# Modify print job parameters

The PRINT-JOB-CONTROL operand of the MODIFY-PRINT-JOB-ATTRIBUTES command
has been modified in order to be able to specify the encryption or not.
(**only available in RSO V3.6**).

**Format**

---

**MODIFY-PRINT-JOB-ATTRIBUTES**

,**PRINT-JOB-CONTOL** = <u>**\*UNCHA**</u>NGED / **\*PAR**AMETERS(...)

   **\*PAR**AMETERS(...)

     │  **...**
     │  ,**ENCRYPTION** = <u>**\*UNCHA**</u>NGED / **\*YES** / **\*NO**

,**TO-PRINTER** = <u>**\*UNCHA**</u>NGED / **\*PAR**AMETERS(...)

   **\*PAR**AMETERS(...)

     │  **PRINTER-NAME** = <u>**\*UNCHA**</u>NGED / **\*STD** / <alphanum-name 1..8> / <c-string 1..8 with-low> /
     │                            **\*IPP**(...)
     │   **\*IPP**(...)
     │     │  **URL** =<u>**\*UNCHA**</u>NGED / <c-string 1..1023 with-low>
     │     │  ,**FQDN**=<u>**\*UNCHA**</u>NGED / **\*NONE** / c-string 1..1023 with-low

---

**Operands**

**PRINT-JOB-CONTROL = <u>\*UNCHANGED</u> / \*PARAMETERS(...)**
Specifies whether the parameters specified in PRINT-DOCUMENT for controlling the
processing of this print job are to be changed.

**PRINT-JOB-CONTROL = <u>\*PARAMETERS(...)</u>**

   **ENCRYPTION =<u>\*UNCHANGED</u> /\*YES / \*NO**
   Specifies whether encryption processing will be performed or not.

   **ENCRYPTION = \*YES**
   Encryption processing will be performed.

   **ENCRYPTION = \*NO**
   No encryption processing will be performed.

**TO-PRINTER = *<u>UNCHANGED</u> / *PARAMETERS(...)**
Describes the requested target devices for the print job, and thus allows you to change what was specified in PRINT-DOCUMENT.

**PRINTER-NAME = *<u>UNCHANGED</u> / *STD / <alphanum-name 1..8> /**
**<c-string 1..8 with-low> / *IPP(...)**
Specifies the requested target printer of the print job. You can specify a distributed local printer pool, a nondistributed local printer pool, an RSO printer pool, an RSO printer, a printer pool on a UNIX system, a printer on a UNIX system or an IPP printer.

**PRINTER-NAME = *IPP(...)**
The spoolout job is to be processed on an IPP printer addressed by its URL.

**URL = *<u>UNCHANGED</u> / <c-string 1..1023 with-low>**
The real address of the printer is given here.

**FQDN = *<u>UNCHANGED</u> / *NONE / <c-string 1..1023 with low**
The fully qualified domain name of the printer.

# PRINT-DOCUMENT - Print files or library elements on printer

The PRINT-JOB-CONTROL operand of the PRINT-DOCUMENT command has been modified in order to be able to select the encryption. The IPP target device corresponds to the selected RSO device type (**only available in RSO V3.6**).

**Format**

---

**PRINT-DOC**UMENT

,**PRINT-JOB-CONTROL** = **\*PAR**AMETERS(...)

   **\*PAR**AMETERS(...)

     |   **...**
     |   ,**ENCRYPTION** = <u>**\*NO**</u> / **\*YES**

,**TO-PRINTER** = **\*PAR**AMETERS(...)

   **\*PAR**AMETERS(...)

     |   **PRINTER-NAME** = <u>**\*STD**</u> / <alphanum-name 1..8> / <c-string 1..8 with-low> / **\*IPP**(...)
     |    **\*IPP**(...)
     |       <u>**URL**</u>= <c-string 1..1023 with-low>
     |       ,**FQDN** = <u>**\*NONE**</u> / c-string 1..1023 with-low

---

**Operands**

**PRINT-JOB-CONTROL = \*PARAMETERS(...)**
Specifies all the parameters for controlling print job processing.

   **ENCRYPTION = <u>\*NO</u> / \*YES**
   Specifies whether encryption processing will be performed or not.

   **ENCRYPTION = <u>\*NO</u>**
   No encryption processing will be performed.

   **ENCRYPTION = \*YES**
   Encryption processing will be performed.

**TO-PRINTER = \*PARAMETERS(...)**
Describes the requested target devices for the print job.

   **PRINTER-NAME = <u>\*STD</u> / <alphanum-name 1..8> / <c-string 1..8 with-low>/\*IPP(...)**
   Specifies the requested target printer of the print job. You can specify a distributed local printer pool, a nondistributed local printer pool, an RSO printer pool, an RSO printer, a printer pool on a UNIX system, a printer on a UNIX system or an IPP printer.

---

**PRINTER-NAME = *IPP(...)**
The spoolout job is to be processed on an IPP printer addressed by its URL.

**URL = <c-string 1..1023 with-low>**
The real address of the printer is given here.

**FQDN = <u>*NONE</u> / <c-string 1..1023 with low**
The fully qualified domain name of the printer.

# SHOW-PRINT-JOB-ATTRIBUTES - Request information on print job operands

For the print jobs submitted with encryption, when *PRINT-JOB-CONTROL information is selected in SHOW-PRINT-JOB-ATTRIBUTES, a new field "ENCRYPTION" is output containing the value *YES or *NO.
(**only available in RSO V3.6**).

**Output in S-variables**

The following variables are additionally generated:

| Output information | Name of the S variable | T | Contents | Condition |
|---|---|---|---|---|
| Encryption | ENCRYPTION | S | *YES / *NO | |

# SHOW-SPOOL-DEVICES -
# Request information on devices

This command is modified in order to allow the selection of all local or all RSO devices, on devices for which notifications are allowed or not allowed, on devices for which encryption and Unicode is supported or not supported.
(**ENCRYPTION is only available in RSO V3.6**).

---

**SHOW-SPOOL-DEV**ICES

---

,**SEL**ECT = <u>**\*ALL**</u> / **\*PAR**AMETERS(...)

   **\*PAR**AMETERS(...)

       **...**
       ,**ENCRYPTION** = <u>**\*ALL**</u> **/ \*NO / \*YES**
       ,**UNICODE** = <u>**\*ALL**</u> **/ \*NO / \*YES**

---

**Operands**

**SELECT = <u>\*ALL</u> / \*PARAMETERS(...)**
Specifies the criteria to be used for selecting the printers via which the information is to be output. Specifying \*ALL (default value) means that information is output via all printers entered.

**SELECT = \*PARAMETERS(...)**
The selection criteria are listed.

   **ENCRYPTION = <u>\*ALL</u> / \*YES / \*NO**
   Specifies whether encryption is supported or not by the device.

   **ENCRYPTION = \*YES**
   Encryption is supported by the device.

   **ENCRYPTION = \*NO**
   No encryption is supported by the device.

   **UNICODE = <u>\*ALL</u> / \*YES / \*NO**
   Specifies whether Unicode is supported or not by the device.

   **UNICODE = \*YES**
   Unicode is supported by the device.

   **UNICODE = \*NO**
   Unicode is not supported by the device.

---

Output format with INFORMATION = *DEVICE-INFORMATION.

DEVICE-NAME: @@@@@@@@
DEVICE-TYPE: @@@@@@@@@@@@@@@@
ACCESS-DATE: ###-##-##

----------------------------- DEVICE-INFORMATION------------------

MONJV: @@@@
NOTIFICATION: @@@@
ENCRYPTION: @@@@
UNICODE: @@@@

## Output in S-variables

The following variables are additionally generated:

| Output information | Name of the S variable | T | Contents | Condition |
|---|---|---|---|---|
| Encryption | ENCRYPTION | S | *YES / *NO | |
| Unicode | UNICODE | S | *YES / *NO | |

## 7.2  Macros

This section describes the extensions for RSO, which have not yet been added to the macros manual. For a complete description of the individual macros, see the "Spool & Print - Macros and Exits (BS2000/OSD)".

## MODPJAT - modify print job attributes

The PRNAME operand of the MODJAT macro has been modified in order to be able to specify a URL.

**Format**

| Operation | Operands |
|-----------|----------|
| MODPJAT   | ,PRNAME = <u>*UNCHANGED</u> / <var: char 1..8> / <c-string: c-string 1..8> / *STD / *IPP |

**Description of the operands**

**PRNAME = *IPP**
Only for RSO.
Indicates that the spoolout job is to be processed on an IPP printer addressed by its URL.

# MODJRSO - define RSO parameters for MODPJAT macro

The URL operand has been added to the MODJRSO macro in order to be able to specify
a URL.
(**ENCRYPTION is only available in RSO V3.6**).

**Format**

| Operation | Operands |
|-----------|----------|
| MODJRSO | URL=(*urlptr,urllen, prtype*)<br>    *urlptr*: <var: pointer> / *NONE / <u>*UNCHANGED</u><br>    *urllen*: <var: int 0..65535> / <integer 1..1023> / <u>*NONE</u><br>    *prtype*: <var: enum-of:1 _PRTYPE_SET> / *NONE / <u>*UNCHANGED</u><br>        / *4850_PCL / *4830_PCL / *4818_PCL / *9000_EPSQ /<br>        *9000_EPLQ / *9000_EPFX / *9000_PRO / *9000_PS /<br>        *9046 / *9045_ANSI / *9015 / *4825_PCL / *4822_PCL /<br>        *9001 / *9025 / *9013 / *9000 / *9001_31/ *9011 / *9012 /<br>        *9022 / *9014 / *9021 / *9022_200 /*9000_PCL /<br>        *4824_PCL / *9026_RENO / *9026_PCL / *4812 /<br>        *9097 / *4011 / *4813 / *4821_PCL / *2030_PCL<br><br>,ENCRYPT=<u>*UNCHANGED</u> / *STD / *YES / *NO /<br>    <var: enum-of: 1_encrypt_type_set><br><br>,FQDN=(*fqdnptr, fqdnlen*)<br>    *fqdnptr*:<u>*UNCHANGED</u> / *NONE / <var: pointer><br>    *fqdnlen*:<u>*NONE</u> / <var: int 0..65535> / <integer 1..1023> |

**Description of the operands**

**URL=(*urlptr, urllen, prtype*)**
Specifies the IPP printer addressed by its URL

    *urlptr*: **<var: pointer>**
    Specifies an area containing the printer URL.

    *urlptr*: **\*NONE**
    No printer URL has been specified.

    *urlptr*: **<u>\*UNCHANGED</u>**
    Operand default value. The current setting is not changed.

    *urllen*: **<var: int 0..65535>**
    Specifies the area length.

*urllen***: <integer 1..1023>**
Specifies the area length.

*urllen***: *NONE**
Operand default value. No URL has been specified.

*prtype***: <var: enum-of:1 _PRTYPE_SET>**
The printer type is not specified directly by means of an operand value; instead, it is specified indirectly by means of a field with constant contents (equate). An integer can be stored in the constant or the corresponding field. The following relationship exists between the values and the desired functions:

| value | printer type |
|-------|--------------|
| 72 | *4850_PCL |
| 73 | *4830_PCL |
| 74 | *4818_PCL |
| 75 | *9000_EPSQ |
| 76 | *9000_EPLQ |
| 77 | *9000_EPFX |
| 78 | *9000_PRO |
| 79 | *9000_PS |
| 7B | *9046 |
| 7D | *9045_ANSI |
| 7E | *9015 |
| 7F | *4825_PCL |
| 80 | *4822_PCL |
| 84 | *9001 |
| 88 | *9025 |
| 8A | *9013 |
| 8B | *9000 |
| 8C | *9001_31 |
| 8D | *9011 |
| 8E | *9012 |
| 8F | *9022 |
| A0 | *9014 |
| A1 | *9021 |
| A2 | *9022_200 |
| A4 | *9000_PCL |

| value | printer type |
|-------|--------------|
| A6 | *4824_PCL |
| A7 | *9026_RENO |
| A8 | *9026_PCL |
| A9 | *4812 |
| AA | *9097 |
| AB | *4011 |
| AC | *4813 |
| AD | *4821_PCL |
| AE | *2030_PCL |

*prtype*: **\*NONE**
No URL has been specified.

*prtype*: **\*UNCHANGED**
Operand default value. The current setting is not changed.

*prtype*: **\*4850_PCL / \*4830_PCL / \*4818_PCL / \*9000_EPSQ / \*9000_EPLQ / \*9000_EPFX / \*9000_PRO / \*9000_PS / \*9046 / \*9045_ANSI / \*9015 / \*4825_PCL / \*4822_PCL / \*9001 /\*9025 / \*9013 / \*9000 / \*9001_31 / \*9011 / \*9012 / \*9022 / \*9014 / \*9021 / \*9022_200 / \*9000_PCL / \*4824_PCL / \*9026_RENO / \*9026_PCL / \*4812 / \*9097 / \*4011 / \*4813 / \*4821_PCL / \*2030_PCL**
Specifies the RSO device type of the target printer

**ENCRYPT = \*UNCHANGED / \*STD / \*YES / \*NO / <var: enum-of: 1_encrypt_type-set>**
Specifies whether the encryption is to be turned on or off for the print job. It only applies to print jobs submitted to IPP printers.

**ENCRYPT = \*UNCHANGED**
The current setting is not changed.

**ENCRYPT = \*STD / \*NO**
No encryption is specified.

**ENCRYPT = \*YES**
Encryption is specified.

**ENCRYPT = <var: enum-of: 1_encrypt_type-set>**
The encryption is not specified directly by means of an operand value; instead it is specified indirectly by means of a field with constant contents (equate). An integer can be stored in the constant or the corresponding field. The following relationship exist between the values and the desired functions:

0 –> *STD

1 –> *YES

2 –> *NO

**FQDN =** *(fqdnptr, fqdnlen)*
Specifies the domain name.

> *fqdnptr:* **\*UNCHANGED**
> The current setting is not changed.

> *fqdnptr:* **\*NONE**
> No domain name has been specified.

> *fqdnptr:* **<var: pointer>**
> Specifies an area containing the domain name.

> *fqdnlen:* **\*NONE**
> No domain name has been specified.

> *fqdnlen:* **<var: int 0..65535>**
> Specifies the area length.

> *fqdnlen:* **<integer 1..1023>**
> Specifies the area length.

### Parameter list description

```
*    parameter list description
.
.
.
SROAENCR  DS    FL1             Specifies whether the encryption
*                              is to be turned on or off for the
*                              print job. It only applies to print
*                              jobs submitted to IPP printers.
*
SROAESTD  EQU   0
SROAEYES  EQU   1
SROAENO   EQU   2
*
SROAFDNL  DS    H               Length of the fully qualified domain name
SROAFDNP  DS    A               Address of the fully qualified domain name
```

# OLTPRQX - define UTM print parameters

**User group:** UTM applications
**programming languages:** Assembler, CPP, C, Cobol
**Macro type**: M, S

The OLTPRQX macro offers UTM applications the following options, when printing messages:

–   selecting the orientation: portrait, landscape, inverse portrait and inverse landscape

–   selecting the paper source by paper type (A4, A3 etc.) or by the input tray number.

–   selecting the output tray
    selecting the print presentation: offset of the logical page on the medium, simplex, duplex or tumble-duplex printing, number of copies of each page.

**Format**

| Operation | Operands |
|---|---|
| OLTPRQX | ,INTRAY=*IGNORE / <integer 1..99> / *BY-FORMAT |
| | ,INTRAYF=*C5 / *DL / *COMMERCIAL_10 / *MONARCH / *DOUBLE-LETTER / *LETTER / *LEGAL / *EXEC / *INVOICE / *FOLIO / *B5 / *B4 / *A5 / *A4 / *A3 / *MANUAL |
| | ,LOFSIGN=*LOFSPOS / *LOFSNEG |
| | ,LOFVAL=*IGNORE / <integer 1..255> |
| | ,OUTTRAY=*IGNORE / <integer 1..99> / *SORTER |
| | ,PAGECOP=*IGNORE / <c_string 3..3> |
| | ,ROT=*NO /*ROT_0 / *ROT_90 / *ROT_180 / *ROT_270 |
| | ,SRTMODE=*NO / *NO_SORTER / *GROUP / *COLLATE / *STACKER / *AUTOMATIC |
| | ,TOFSIGN=*TOPSPOS / *TOPSNEG |
| | ,TOFVAL=*IGNORE / <integer 1..255> |
| | ,TWOSIDE=*NO / *SIMPLEX / *DUPLEX / *TUMBLE |

**Description of operands**

**INTRAY=\*IGNORE / <integer 1..99> / \*BY-FORMAT**
Paper input tray for the RSO printers 2030-PCL, 4011, 4812, 4813, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9000-EPLQ, 9000-EPSQ, 9004, 9011, 9012, 9013, 9014, 9015, 9021, 9022, 9022-200, 9025, 9026-PCL, 9026-RENO, 9097 and DJET.

**INTRAY=\*IGNORE**
The printer default is used.

**INTRAY=<integer 1..99>**
The number of the input tray from which the paper for both the file itself and the header and trailer pages is taken. The value entered is not verified by RSO. Values between 1 and 99 are possible. Further information on the possible values that can be specified for individual printers can be found in the description of the PRINT-DOCUMENT command in the "Spool & Print - Commands (BS2000/OSD)" manual.

**INTRAY=\*BY-FORMAT**
The paper input tray is defined by means of a keyword for the format in the INTRAYF operand.

**INTRAYF=\*C5 / \*DL / \*COMMERCIAL_10 / \*MONARCH / \*DOUBLE-LETTER / \*LETTER / \*LEGAL / \*EXEC / \*INVOICE / \*FOLIO / \*B5 / \*B4 / \*A5 / \*A4 / \*A3 / \*MANUAL**
Selects the paper input tray by means of a keyword for the format. Further information on the possible values that can be specified for individual printers can be found in the description of the PRINT-DOCUMENT command in the "Spool & Print - Commands (BS2000/OSD)" manual.

**INTRAYF= \*MANUAL**
When the \*MANUAL operand is specified, the paper is fed manually and you must feed a new sheet of paper whenever a new page is printed or when the printer demands it. The following printers support manual paper feed: 9014, 9021, 9022, 9022-200, 9026-RENO, 9026-PCL, 4812, DJET, 4814-PCL, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL and 9000-PCL.

**LOFSIGN=\*LOFSPOS / \*LOFSNEG**
Specifies the offset sign: positive (\*LOFSPOS) or negative (\*LOFSNEG). If the value is positive, the first line is printed to the right; if the value is negative, the first line is printed to the left.

**LOFVAL=*<u>IGNORE</u> / <integer 1..255>**
Defines in millimeters the offset between the left margin of the print page and the left margin of the physical page. First, the print page is positioned on the paper, and then the text is rotated within the print page and positioned. This means that the text orientation within the print page is not considered, if the print page is displaced on the paper. This operand may only be specified for the following printers: 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9021, 9022-200, 9026-PCL and 2030-PCL.

**LOFVAL=*IGNORE**
The print page is not displaced horizontally on the paper.

**LOFVAL=<integer 1..255>**
The print page is displaced horizontally on the paper according to the value specified.

**OUTTRAY=*<u>IGNORE</u> / <integer 1..99> / *SORTER**
Specifies the paper output tray for the RSO printers 2030-PCL, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9014, 9015, 9026-PCL and 9026-RENO.

**OUTTRAY=*IGNORE**
The printer default is used.

**OUTTRAY=<integer 1..99>**
Specifies the paper output tray that is to be used for the current print job. Further information on the possible values that can be specified for individual printers can be found in the description of the PRINT-DOCUMENT command in the "Spool & Print - Commands (BS2000/OSD)" manual.

**OUTTRAY=*SORTER**
The sort mechanism specified in the SRTMODE operand is to be used for the current print job. The sort mechanism is valid for the following printers: 9026-RENO, 4818-PCL, 4822-PCL and 4825-PCL, and can be used for up to 20 output trays. It cannot be controlled by the defaults defined in the device entry.

**PAGECOP=*<u>IGNORE</u> / <c_string 3..3>**
Specifies how often each individual page is to be repeated. Only for the following RSO printers: 2030-PCL, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9021, 9022, 9022-200, 9025, 9026-PCL, 9026-RENO and DJET.

**PAGECOP=*IGNORE**
The printer default is used.

**PAGECOP=<c_string 3..3>**
Number of page copies. Possible values '000' .. '255'.
PAGECOP=255 has the same effect as PAGECOP=254: one original and 254 copies are printed.

**ROT=*NO /*ROT_0 / *ROT_90 / *ROT_180 / *ROT_270**
Specifies whether the pages of a print request are to be rotated, and if so, by how many degrees.

**ROT=*NO**
No page rotation is selected. Further information can be found in the description of the PRINT-DOCUMENT command in the "Spool & Print - Commands (BS2000/OSD)" manual.

**ROT=*ROT_0 / *ROT_90 / *ROT_180 / *ROT_270**
Each print page is rotated 0° / 90° / 180° / 270° (clockwise) and printed.
Rotation 0/90 is supported by printer types 2030-PCL, 4812, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9021, 9022-200, 9025, 9026-PCL, 9026-RENO and DJET.
Rotation 180/270 is supported by printer types 2030-PCL, 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9026-PCL and 9026-RENO.


**SRTMODE=*NO / *NO_SORTER / *GROUP / *COLLATE / *STACKER / *AUTOMATIC**
The sort mechanism is to be used for the current print job. The sort mechanism is valid for the following printers: 9026-RENO, 4818-PCL, 4822-PCL and 4825-PCL and can be used for up to 20 output trays. It cannot be controlled by the defaults defined in the device entry. Relevant examples can be found in the description of the PRINT-DOCUMENT command in the "Spool & Print - Commands (BS2000/OSD)" manual.

**SRTMODE=*NO**
The printer default is used.

**SRTMODE=*NO_SORTER**
All document pages are deposited in the sort trays from bottom to top.
Printer 9026-RENO is an exception: The print pages are sorted into a tray according to easiest accessibility.

**SRTMODE=*GROUP**
If SRTMODE=*GROUP together with PAGECOP is specified, each copy of a particular document page is sorted to a separate tray. Each subsequent document page is sorted on top of the previous page. At the end of the print job, each tray contains a complete copy of the printed document.

**SRTMODE=*COLLATE**
If SRTMODE=*COLLATE together with PAGECOP is specified, all copies of a particular document page are sorted to one tray. The copies of the next document page are sorted to the next tray. The sort trays are filled from bottom to top.

**SRTMODE=*STACKER**
Not applicable to printer 9026.
All printed pages are sorted to a mass output tray in the sort mechanism (to a maximum of 500 pages). This mode is available for printing a single copy of a very long document.

**SRTMODE=*AUTOMATIC**
Only applicable to printer 9026.
The method of sorting is automatically selected, according to the number of copies per page specified in PAGE-COPIES and the number of sort trays available. The printed pages can either be sorted or not. The printed pages are deposited unsorted as for *NO if the number of copies specified in PAGE-COPIES is exactly the same as the number of sort trays. The printed pages are sorted according to document as for *GROUP if the number of copies specified in PAGE-COPIES is smaller than the number of sort trays. The printed pages are sorted according to pages as for *COLLATE if the number of copies specified in PAGE-COPIES is larger than the number of sort trays.

**TOFSIGN=*TOPSPOS / *TOPSNEG**
Specifies the offset sign: positive (*TOPSPOS) or negative (*TOPSNEG). If the value is positive, the first line is printed lower; if the value is negative, the first line is printed higher.

**TOFVAL=*IGNORE / <integer 1..255>**
Defines in millimeters the offset between the top of the print page and the top of the physical sheet. First, the print page is positioned on the paper, and then the text is rotated within the print page and positioned. This means that the text orientation within the print page is not considered if the print page is displaced on the paper.
This operand is only valid for the following printers: 4818-PCL, 4821-PCL, 4822-PCL, 4824-PCL, 4825-PCL, 4830-PCL, 4850-PCL, 9000-PCL, 9021, 9022-200, 9026-PCL and 2030-PCL.

**TOFVAL=*IGNORE**
The print page is not displaced vertically on the paper.

**TOFVAL=<integer 1..255>**
The print page is displaced vertically on the paper according to the value specified.

**TWOSIDE=*NO / *SIMPLEX / *DUPLEX / *TUMBLE**
Defines for RSO printers whether printing is to be single-sided or double-sided.

**TWOSIDE=*NO**
The printer default is used.

**TWOSIDE=*SIMPLEX**
The print job is printed in simplex mode, i.e. single-sided.

**TWOSIDE=*DUPLEX**
The print job is printed in duplex mode, i.e. double-sided. The pages are bound along a vertical edge. Duplex mode is allowed for the following printers: 2030-PCL, 9026-PCL, 9026-RENO, 4822-PCL, 4825-PCL, 4824-PCL, 4830-PCL, 4850-PCL and 9000-PCL.

**TWOSIDE=*TUMBLE**
The document is printed in duplex mode, i.e. double-sided, and the pages are not turned from left to right, but from top to bottom. The tumble-duplex mode is allowed for the following printers: 2030-PCL, 9026-PCL, 9026-RENO, 4822-PCL, 4825-PCL, 4824-PCL, 4830-PCL, 4850-PCL and 9000-PCL.

### Structure layouts

### ASSEMBLER specifications

```
*    parameter area
OLTXHDR   FHDR  MF=(C,OLTX),EQUATES=NO    header layout
*
OLTXEXT   DS    0XL28                     extension part layout
OLTXROT   DS    FL1                       rotation code
*   description of the rotation codes
          AIF   ('&EQUATES' NE 'YES').Q01001
OLTXNROT  EQU   0                         no rotation given
OLTXROT0  EQU   241                       no rotation
OLTXR90   EQU   242                       rotation 90
OLTXR180  EQU   243                       rotation 180
OLTXR270  EQU   244                       rotation 270
.Q01001  ANOP
*
OLTXIT#   DS    0XL1                      intray
OLTXINT   DS    X                         input tray number
          ORG   OLTXIT#
OLTXITFS  DS    FL1                       input tray format
*   description of the input tray selection mode
          AIF   ('&EQUATES' NE 'YES').Q01002
OLTXITBF  EQU   255                       selection via a format name
OLTXITIG  EQU   0                         no input tray given
.Q01002  ANOP
*
          ORG   OLTXIT#
OLTXITRA  DS    FL1                       input tray code
*   description of given input tray
          AIF   ('&EQUATES' NE 'YES').Q01003
OLTXNITR  EQU   0                         no input tray given
OLTXITM#  EQU   99                        max num tray #
OLTXITC5  EQU   239                       x'EF' C5
OLTXITDL  EQU   240                       x'F0' DL
OLTXIC10  EQU   241                       x'F1' COM10
OLTXIMRC  EQU   242                       x'F2' monarch
OLTXIDBL  EQU   243                       x'F3' double letter
OLTXILET  EQU   244                       x'F4' letter
OLTXILEG  EQU   245                       x'F5' legal
OLTXIXEC  EQU   246                       x'F6' exec
OLTXIVCE  EQU   247                       x'F7' invoice
OLTXIFOL  EQU   248                       x'F8' folio
OLTXITB5  EQU   249                       x'F9' B5
OLTXITB4  EQU   250                       x'FA' B4
OLTXITA5  EQU   251                       x'FB' A5
```

```
OLTXITA4  EQU  252                    x'FC' A4
OLTXITA3  EQU  253                    x'FD' A3
OLTXIMAN  EQU  254                    x'FE' manual
.Q01003  ANOP
*
          ORG  OLTXIT#+1*
OLTXOT#   DS   0XL1                   outtray
OLTXOUTT  DS   X                      output tray number
          ORG  OLTXOT#
OLTXOTRA  DS   FL1                    output tray code
*   description of the output tray code
          AIF  ('&EQUATES' NE 'YES').Q01004
OLTXNOTR  EQU  0                      no output tray
OLTXOTM#  EQU  99                     output tray max #
OLTXOTSR  EQU  129                    x'81' otray sorter
.Q01004  ANOP
*
          ORG  OLTXOT#+1
OLTXSORT  DS   FL1                    sorter mode
*   description of the sorter codes
          AIF  ('&EQUATES' NE 'YES').Q01005
OLTXNSRG  EQU  0                      no sorter given
OLTXNSRT  EQU  241                    x'F1' sorter=no
OLTXSGRP  EQU  242                    x'F2' sorter=group
OLTXSCOL  EQU  243                    x'F3' sorter=collate
OLTXSSTK  EQU  244                    x'F4' sorter=stacker
OLTXSAUT  EQU  245                    x'F5' sorter=automat
.Q01005  ANOP
*
OLTXLOFS  DS   FL1                    left offset sign
*   description of the sign codes
          AIF  ('&EQUATES' NE 'YES').Q01006
OLTXPOSI  EQU  78                     positive
OLTXNEGA  EQU  96                     negative
.Q01006  ANOP
*
OLTXLOFT  DS   X                      left offset binary; x'00'=no
*                                     left offset
OLTXTOFS  DS   FL1                    top offset sign
OLTXTOFT  DS   X                      top offset binary; x'00'= no
*                                     top offset
OLTXDUPX  DS   FL1                    duplex
*   description of the twoside codes
          AIF  ('&EQUATES' NE 'YES').Q01007
OLTXNDUP  EQU  0                      no simplex/duplex
OLTXSPLX  EQU  241                    x'F1' simplex
OLTXDPLX  EQU  242                    x'F2' duplex
OLTXTDPX  EQU  243                    x'F3' tumble duplex
```

```
.Q01007  ANOP
*
OLTXHCOP  DS    CL3                      hdwr page copies; c'000' or
*                                        first position=x'00' means
*                                        no copies
OLTXRSV2  DS    CL16                     free for use
*
          AIF   ('&EQUATES' NE 'YES').Q01008
OLTX#     EQU   *-OLTXHDR
.Q01008  ANOP
```

**C++ specifications**

```
/* description of the rotation codes                          */
/* ENUM _rotation                                             */
#define OLTPRQXNO_ROT_GIVEN 0        /* no rotation given      */
#define OLTPRQXROT_0 241             /* no rotation            */
#define OLTPRQXROT_90 242            /* rotation 90            */
#define OLTPRQXROT_180 243           /* rotation 180           */
#define OLTPRQXROT_270 244           /* rotation 270           */

/* description of the input tray selection mode               */
/* ENUM _intray_sel                                           */
#define OLTPRQXBY_FORMAT 255         /* selection via a format */
                                     /* name                   */
#define OLTPRQXIGNORE 0              /* no input tray given    */

/* description of given input tray                            */
/* ENUM _input_tray                                           */
#define OLTPRQXNO_ITRAY 0            /* no input tray given    */
#define OLTPRQXI_TRAY_NR 99          /* max num tray #         */
#define OLTPRQXI_TRAY_C5 239         /* x'EF' C5               */
#define OLTPRQXI_TRAY_DL 240         /* x'F0' DL               */
#define OLTPRQXI_TRAY_COM10 241      /* x'F1' COM10            */
#define OLTPRQXI_TRAY_MONARCH 242    /* x'F2' monarch          */
#define OLTPRQXI_TRAY_DOUBLET 243    /* x'F3' double letter    */
#define OLTPRQXI_TRAY_LETTER 244     /* x'F4' letter           */
#define OLTPRQXI_TRAY_LEGAL 245      /* x'F5' legal            */
#define OLTPRQXI_TRAY_EXEC 246       /* x'F6' exec             */
#define OLTPRQXI_TRAY_INVOICE 247    /* x'F7' invoice          */
#define OLTPRQXI_TRAY_FOLIO 248      /* x'F8' folio            */
#define OLTPRQXI_TRAY_B5 249         /* x'F9' B5               */
#define OLTPRQXI_TRAY_B4 250         /* x'FA' B4               */
#define OLTPRQXI_TRAY_A5 251         /* x'FB' A5               */
#define OLTPRQXI_TRAY_A4 252         /* x'FC' A4               */
#define OLTPRQXI_TRAY_A3 253         /* x'FD' A3               */
#define OLTPRQXI_TRAY_MANUAL 254     /* x'FE' manual           */
```

```
        /* description of the output tray code                          */
        /* ENUM _output_tray                                            */
        #define OLTPRQXNO_OUTPUT_TRAY 0     /* no output tray           */
        #define OLTPRQXO_TRAY_NR 99         /* output tray max #         */
        #define OLTPRQXO_TRAY_SORTER 129    /* x'81' otray sorter        */

        /* description of the twoside codes                             */
        /* ENUM _simplex_duplex                                         */
        #define OLTPRQXNO_DUPLEX 0          /* no simplex/duplex        */
        #define OLTPRQXSIMPLEX 241          /* x'F1' simplex            */
        #define OLTPRQXDUPLEX 242           /* x'F2' duplex             */
        #define OLTPRQXTUMBLE_DUPLEX 243    /* x'F3' tumble duplex      */

        /* description of the sorter codes                              */
        /* ENUM _sorter                                                 */
        #define OLTPRQXNO_SORTER_GIVEN 0    /* no sorter given          */
        #define OLTPRQXNO_SORTER 241        /* x'F1' sorter=no          */
        #define OLTPRQXSORTER_GROUP 242     /* x'F2' sorter=group       */
        #define OLTPRQXSORTER_COLLATE 243   /* x'F3' sorter=collate     */
        #define OLTPRQXSORTER_STACKER 244   /* x'F4' sorter=stacker     */
        #define OLTPRQXSORTER_AUTO 245      /* x'F5' sorter=automat     */

        /* description of the sign codes                                */
        /* ENUM _sign                                                   */
        #define OLTPRQXPOSITIVE 78          /* positive                 */
        #define OLTPRQXNEGATIVE 96          /* negative                 */

        /* description of extension part                                */
        struct OLTPRQXext_mdl {
        #pragma aligned 1
                unsigned char rotation;     /* rotation code            */

                /* intray                                               */
                union /* intray_union */ {
                        unsigned char intray;   /* input tray number    */
                        unsigned char intray_format;
                                                /* input tray format    */
                        unsigned char input_tray;
                                                /* input tray code      */
                } intray_union;

                /* outtray                                              */
                union /* outtray_union */ {
                        unsigned char outtray;  /* output tray number   */
                        unsigned char output_tray;
                                                /* output tray code     */
                } outtray_union;
```

```
        unsigned char sorter;           /* sorter mode             */
        unsigned char left_offset_sign; /* left offset sign        */
        unsigned char left_offset;      /* left offset binary;     */
                                        /* x'00'=no left offset    */
        unsigned char top_offset_sign;  /* top offset sign         */
        unsigned char top_offset;       /* top offset binary; x'00'= */
                                        /* no top offset           */
        unsigned char duplex;           /* duplex                  */
        char hdwr_copies[3];            /* hdwr page copies; c'000' */
                                        /* or first position=x'00' */
                                        /* means no copies         */
        char reserved_2[16];            /* free for use            */
};

/* parameter area                                                  */
struct OLTPRQX_mdl {
#pragma aligned 4

        /* header layout                                           */
        struct ESMFHDR hdr;
        struct OLTPRQXext_mdl extension;
                                        /* extension part layout   */
};
```

### C specifications

The C interface implements the same functionality as the OLTPRQX Assembler macro. The header file is contained in the include file OLTPRQX.H. This file is located in the standard RSO library that is that is supplied with RSO.

The include file is divided into the following sections:
– definitions of constants for specific function groups
– complex data structures (records)
– a parameter list with references to complex data structures

The OLTPRQX.H file is included in the application program using an include call in a C application program, thus making the parameter list is available.

The standard header must be initialized with values that correspond to the interface.

| Macro name | Unit | Function | Version |
|------------|------|----------|---------|
| OLTPRQX    | 275  | 3        | 1       |

```
        /* description of the rotation codes                          */
        /* ENUM _rotation                                             */
        #define OLTPRQXNO_ROT_GIVEN 0          /* no rotation given    */
        #define OLTPRQXROT_0 241               /* no rotation          */
        #define OLTPRQXROT_90 242              /* rotation 90          */
        #define OLTPRQXROT_180 243             /* rotation 180         */
        #define OLTPRQXROT_270 244             /* rotation 270         */

        /* description of the input tray selection mode               */
        /* ENUM _intray_sel                                           */
        #define OLTPRQXBY_FORMAT 255           /* selection via a format */
                                               /* name                 */
        #define OLTPRQXIGNORE 0                /* no input tray given  */

        /* description of given input tray                            */
        /* ENUM _input_tray                                           */
        #define OLTPRQXNO_ITRAY 0              /* no input tray given  */
        #define OLTPRQXI_TRAY_NR 99            /* max num tray #       */
        #define OLTPRQXI_TRAY_C5 239           /* x'EF' C5             */
        #define OLTPRQXI_TRAY_DL 240           /* x'F0' DL             */
        #define OLTPRQXI_TRAY_COM10 241        /* x'F1' COM10          */
        #define OLTPRQXI_TRAY_MONARCH 242      /* x'F2' monarch        */
        #define OLTPRQXI_TRAY_DOUBLET 243      /* x'F3' double letter  */
        #define OLTPRQXI_TRAY_LETTER 244       /* x'F4' letter         */
        #define OLTPRQXI_TRAY_LEGAL 245        /* x'F5' legal          */
        #define OLTPRQXI_TRAY_EXEC 246         /* x'F6' exec           */
        #define OLTPRQXI_TRAY_INVOICE 247      /* x'F7' invoice        */
        #define OLTPRQXI_TRAY_FOLIO 248        /* x'F8' folio          */
        #define OLTPRQXI_TRAY_B5 249           /* x'F9' B5             */
        #define OLTPRQXI_TRAY_B4 250           /* x'FA' B4             */
        #define OLTPRQXI_TRAY_A5 251           /* x'FB' A5             */
        #define OLTPRQXI_TRAY_A4 252           /* x'FC' A4             */
        #define OLTPRQXI_TRAY_A3 253           /* x'FD' A3             */
        #define OLTPRQXI_TRAY_MANUAL 254       /* x'FE' manual         */

        /* description of the output tray code                        */
        /* ENUM _output_tray                                          */
        #define OLTPRQXNO_OUTPUT_TRAY 0        /* no output tray       */
        #define OLTPRQXO_TRAY_NR 99            /* output tray max #    */
        #define OLTPRQXO_TRAY_SORTER 129       /* x'81' otray sorter   */

        /* description of the twoside codes                           */
        /* ENUM _simplex_duplex                                       */
        #define OLTPRQXNO_DUPLEX 0             /* no simplex/duplex    */
        #define OLTPRQXSIMPLEX 241             /* x'F1' simplex        */
        #define OLTPRQXDUPLEX 242              /* x'F2' duplex         */
        #define OLTPRQXTUMBLE_DUPLEX 243       /* x'F3' tumble duplex  */
```

```
/* description of the sorter codes                              */
/* ENUM _sorter                                                 */
#define OLTPRQXNO_SORTER_GIVEN 0        /* no sorter given       */
#define OLTPRQXNO_SORTER 241           /* x'F1' sorter=no        */
#define OLTPRQXSORTER_GROUP 242        /* x'F2' sorter=group     */
#define OLTPRQXSORTER_COLLATE 243      /* x'F3' sorter=collate   */
#define OLTPRQXSORTER_STACKER 244      /* x'F4' sorter=stacker   */
#define OLTPRQXSORTER_AUTO 245         /* x'F5' sorter=automat   */

/* description of the sign codes                                */
/* ENUM _sign                                                   */
#define OLTPRQXPOSITIVE 78             /* positive               */
#define OLTPRQXNEGATIVE 96             /* negative               */

/* description of extension part                                */
struct OLTPRQXext_mdl {
        unsigned char rotation;        /* rotation code          */

        /* intray                                                */
        union /* intray_union */ {
                unsigned char intray;   /* input tray number     */
                unsigned char intray_format;
                                        /* input tray format     */
                unsigned char input_tray;
                                        /* input tray code       */
        } intray_union;

        /* outtray                                               */
        union /* outtray_union */ {
                unsigned char outtray;  /* output tray number    */
                unsigned char output_tray;
                                        /* output tray code      */
        } outtray_union;
        unsigned char sorter;          /* sorter mode            */
        unsigned char left_offset_sign; /* left offset sign      */
        unsigned char left_offset;     /* left offset binary;    */
                                        /* x'00'=no left offset  */
        unsigned char top_offset_sign; /* top offset sign        */
        unsigned char top_offset;      /* top offset binary; x'00'= */
                                        /* no top offset         */
        unsigned char duplex;          /* duplex                 */
        char hdwr_copies[3];           /* hdwr page copies; c'000' */
                                        /* or first position=x'00' */
                                        /* means no copies       */
        char reserved_2[16];           /* free for use           */
};
```

```
/* parameter area                                                */
struct OLTPRQX_mdl {

        /* header layout                                         */
        struct ESMFHDR hdr;
        struct OLTPRQXext_mdl extension;
                                        /* extension part layout       */
};
```

**COBOL specifications**

The COBOL interface implements the same functionality as the OLTPRQX Assembler macro.

The interface is called in COBOL with a call statement and a parameter area. The fields of this interface, described below, can be copied with the copy statement to the COBOL source text in the working storage structure. OLTPRQX-I-PL allows the initialization of the parameter list with default values.

OLTPRQXY is located in the standard RSO library that is supplied with RSO.

The macros esmhexay and fhdry are located in the standard SPOOL library that is supplied with SPOOL versions as of V3.0A.

```
000100***********************************************************************
000200* BEGIN-INTERFACE   OLTPRQX
000300*
000400* TITLE            OLTPRQ extension definition
000500* NAME             OLTPRQXY
000600* DOMAIN           RSO
000700* LANGUAGE         COBOL
000800* COPYRIGHT        (C) Fujitsu Siemens Computers GmbH 2001
000900*                      ALL RIGHTS RESERVED
001000* COMPILATION-SCOPE USER
001100* INTERFACE-TYPE   CALL
001200* RUN-CONTEXT      TU
001300*
001400* PURPOSE          Interface parameter for OLTPRQ extension
001500*
001600* SYNTAX           Syntax Variant 1:
001700*                  COPY OLTPRQXY
001800*
001900* REMARKS          Welcome to RSO
002000*
002100***********************************************************************
002200*
```

```
002300* VERSION           001
002400* CRDATE            2000-12-14
002500* AUTHOR            F. Langelez
002600* UPDATE            Original issue
002700*
002800* END-INTERFACE     OLTPRQX.
002900**********************************************************************
003000**********************************************************************
003100*      OLTPRQXY   - Declarations
003200**********************************************************************
003300* parameter area
003400 01  OLTPRQX-PL.
003500*    Standard header.
003600       COPY fhdry.
003700    02  OLTPRQX-EXTENSION.
003800*       extension part layout
003900       03  OLTPRQX-ROTATION          PIC X.
004000*         rotation code
004100          88  OLTPRQX-NO-ROT-GIVEN     VALUE SYS-X00.
004200*            no rotation given
004300          88  OLTPRQX-ROT-0            VALUE "1".
004400*            no rotation
004500          88  OLTPRQX-ROT-90           VALUE "2".
004600*            rotation 90
004700          88  OLTPRQX-ROT-180          VALUE "3".
004800*            rotation 180
004900          88  OLTPRQX-ROT-270          VALUE "4".
005000*            rotation 270
005100       03  OLTPRQX-INTRAY            PIC X.
005200*         input tray number
005300       03  OLTPRQX-INPUT-TRAY REDEFINES OLTPRQX-INTRAY PIC X.
005400*         input tray code
005500          88  OLTPRQX-NO-ITRAY         VALUE SYS-X00.
005600*            no input tray given (0)
005700          88  OLTPRQX-I-TRAY-NR        VALUE SYS-X63.
005800*            max num tray # (99)
005900          88  OLTPRQX-I-TRAY-C5        VALUE SYS-XEF.
006000*            x'EF' C5
006100          88  OLTPRQX-I-TRAY-DL        VALUE "0".
006200*            x'F0' DL
006300          88  OLTPRQX-I-TRAY-COM10     VALUE "1".
006400*            x'F1' COM10
006500          88  OLTPRQX-I-TRAY-MONARCH   VALUE "2".
006600*            x'F2' monarch
006700          88  OLTPRQX-I-TRAY-DOUBLET   VALUE "3".
006800*            x'F3' double letter
006900          88  OLTPRQX-I-TRAY-LETTER    VALUE "4".
007000*            x'F4' letter
```

```
007100              88  OLTPRQX-I-TRAY-LEGAL        VALUE "5".
007200*                 x'F5' legal
007300              88  OLTPRQX-I-TRAY-EXEC         VALUE "6".
007400*                 x'F6' exec
007500              88  OLTPRQX-I-TRAY-INVOICE      VALUE "7".
007600*                 x'F7' invoice
007700              88  OLTPRQX-I-TRAY-FOLIO        VALUE "8".
007800*                 x'F8' folio
007900              88  OLTPRQX-I-TRAY-B5           VALUE "9".
008000*                 x'F9' B5
008100              88  OLTPRQX-I-TRAY-B4           VALUE SYS-XFA.
008200*                 x'FA' B4
008300              88  OLTPRQX-I-TRAY-A5           VALUE SYS-XFB.
008400*                 x'FB' A5
008500              88  OLTPRQX-I-TRAY-A4           VALUE SYS-XFC.
008600*                 x'FC' A4
008700              88  OLTPRQX-I-TRAY-A3           VALUE SYS-XFD.
008800*                 x'FD' A3
008900              88  OLTPRQX-I-TRAY-MANUAL       VALUE SYS-XFE.
009000*                 x'FE' manual
009100         03  OLTPRQX-OUTTRAY                  PIC X.
009200*            output tray number
009300         03  OLTPRQX-OUTPUT-TRAY REDEFINES OLTPRQX-OUTTRAY PIC X.
009400*            output tray code
009500              88  OLTPRQX-NO-OUTPUT-TRAY      VALUE SYS-X00.
009600*                 no output tray given
009700              88  OLTPRQX-O-TRAY-NR           VALUE SYS-X63.
009800*                 output tray max # (99)
009900              88  OLTPRQX-O-TRAY-SORTER       VALUE SYS-X81.
010000*                 x'81' otray sorter
010100         03  OLTPRQX-SORTER                   PIC X.
010200*            sorter mode
010300              88  OLTPRQX-NO-SORTER-GIVEN     VALUE SYS-X00.
010400*                 no sorter given
010500              88  OLTPRQX-NO-SORTER           VALUE "1".
010600*                 x'F1' sorter=no
010700              88  OLTPRQX-SORTER-GROUP        VALUE "2".
010800*                 x'F2' sorter=group
010900              88  OLTPRQX-SORTER-COLLATE      VALUE "3".
011000*                 x'F3' sorter=collate
011100              88  OLTPRQX-SORTER-STACKER      VALUE "4".
011200*                 x'F4' sorter=stacker
011300              88  OLTPRQX-SORTER-AUTO         VALUE "5".
011400*                 x'F5' sorter=automat
011500         03  OLTPRQX-LEFT-OFFSET-SIGN         PIC X.
011600*            left offset sign
011700              88  OLTPRQX-LOFPOSITIVE         VALUE SYS-X4E.
011800*                 positive (78)
```

```
011900          88  OLTPRQX-LOFNEGATIVE          VALUE SYS-X60.
012000*             negative (96)
012100       03  OLTPRQX-LEFT-OFFSET            PIC X.
012200*          left offset binary;
012300*          x'00'=no left offset
012400       03  OLTPRQX-TOP-OFFSET-SIGN        PIC X.
012500*          top offset sign
012600          88  OLTPRQX-TOFPOSITIVE          VALUE SYS-X4E.
012700*             positive (78)
012800          88  OLTPRQX-TOFNEGATIVE          VALUE SYS-X60.
012900*             negative (96)
013000       03  OLTPRQX-TOP-OFFSET             PIC X.
013100*          top offset binary;
013200*          x'00'=no top offset
013300       03  OLTPRQX-DUPLEX-MODE            PIC X.
013400*          duplex
013500          88  OLTPRQX-NO-DUPLEX            VALUE SYS-X00.
013600*             no simplex/duplex
013700          88  OLTPRQX-SIMPLEX              VALUE "1".
013800*             x'F1' simplex
013900          88  OLTPRQX-DUPLEX               VALUE "2".
014000*             x'F2' duplex
014100          88  OLTPRQX-TUMBLE-DUPLEX        VALUE "3".
014200*             x'F3' tumble duplex
014300       03  OLTPRQX-HDWR-COPIES            PIC X(3).
014400*          hdwr page copies; c'000' or
014500*          first position=x'00' means no copies
014600       03  OLTPRQX-RESERVED-2             PIC X(16).
014700*          free for use
014800/
014900* parameter area (initialization)
015000 01  OLTPRQX-I-PL.
015100    02  OLTPRQX-I-HDR.
015200*       header layout
015300       03  OLTPRQX-I-IFID.
015400*          header layout
015500          04  OLTPRQX-I-UNIT              PIC S9(4) COMP
015600                                          VALUE 275.
015700*             unit number
015800          04  OLTPRQX-I-FUNCTION          PIC X
015900                                          VALUE SYS-X03.
016000*             function
016100          04  OLTPRQX-I-VERSION           PIC X
016200                                          VALUE SYS-X01.
016300*             version
016400       03  OLTPRQX-I-RC-NBR               PIC S9(9) USAGE BINARY
016500                                          VALUE -1.
016600*          return code
```

```
016700     02  OLTPRQX-I-EXTENSION.
016800*        extension part layout
016900     03  OLTPRQX-I-ROTATION          PIC X
017000                                     VALUE SYS-X00.
017100*            rotation code
017200     03  OLTPRQX-I-INTRAY            PIC X
017300                                     VALUE SYS-X00.
017400*            input tray number
017500     03  OLTPRQX-I-OUTTRAY           PIC X
017600                                     VALUE SYS-X00.
017700*            output tray number
017800     03  OLTPRQX-I-SORTER            PIC X
017900                                     VALUE SYS-X00.
018000*            sorter mode
018100     03  OLTPRQX-I-LEFT-OFFSET-SIGN  PIC X
018200                                     VALUE SYS-X4E.
018300*            left offset sign
018400     03  OLTPRQX-I-LEFT-OFFSET       PIC X
018500                                     VALUE SYS-X00.
018600*            left offset binary;x'00'=no left offset
018700     03  OLTPRQX-I-TOP-OFFSET-SIGN   PIC X
018800                                     VALUE SYS-X4E.
018900*            top offset sign
019000     03  OLTPRQX-I-TOP-OFFSET        PIC X
019100                                     VALUE SYS-X00.
019200*            top offset binary; x'00'=no top offset
019300     03  OLTPRQX-I-DUPLEX            PIC X
019400                                     VALUE SYS-X00.
019500*            duplex
019600     03  OLTPRQX-I-HDWR-COPIES       PIC 9(3)
019700                                     VALUE 000.
019800*            hdwr page copies; c'000' or
019900*            first position=x'00' means no copies
020000     03  OLTPRQX-I-RESERVED-2        PIC X(16)
020100                                     VALUE LOW-VALUES.
```

*Example*

```
IDENTIFICATION DIVISION.
PROGRAM-ID. tutmexcb.
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SPECIAL-NAMES.
    TERMINAL IS v-terminal,
    SYMBOLIC CHARACTERS
    COPY esmhexay.
DATA DIVISION.
WORKING-STORAGE SECTION.
COPY oltprqxy.
PROCEDURE DIVISION.
MAIN SECTION.
p-main.
    PERFORM s-test001.
    PERFORM s-test002.
p-exit.
    STOP RUN.
*
* TEST 001 : use default values
*
 s-test001 SECTION.
*----------------*
*
 p-test001-strt.
*--------------*
*
    DISPLAY "TEST1 (DFT VALUES) OF TUTMEXTCB" UPON v-terminal.
    MOVE oltprqx-i-pl TO oltprqx-pl.
    DISPLAY oltprqx-pl UPON v-terminal.
*
 p-test001-exit.
*--------------*
*
    EXIT.
*
* TEST 002 : initialise some fields
*
 s-test002 SECTION.
*----------------*
*
 p-test002-strt.
*--------------*
*
    MOVE oltprqx-i-pl TO oltprqx-pl.
```

```
     *
     * select rotation=0, input tray= 3, output tray=sorter stacker,
     * left offset of +4, top offset of -4,no duplex selection and one
     * hardware copy.
     *
         SET oltprqx-rot-0 TO TRUE.
         MOVE SYS-X03 TO oltprqx-input-tray.
         SET oltprqx-o-tray-sorter TO TRUE.
         SET oltprqx-sorter-stacker TO TRUE.
         SET oltprqx-lofpositive TO TRUE.
         MOVE SYS-X04 TO oltprqx-left-offset.
         SET oltprqx-tofnegative TO TRUE.
         MOVE SYS-X04 TO oltprqx-top-offset.
         SET oltprqx-no-duplex TO TRUE.
         MOVE "001" TO oltprqx-hdwr-copies.
     *
      p-test002-exit.
     *--------------*
     *
         EXIT.
```

# PRNTDOC - output file

The PRNAME operand has been modified in order to be able to specify an URL

**Format**

| Operation | Operands |
|-----------|----------|
| PRNTDOC   | ,PRNAME = <u>*STD</u> / <c-string: c-string 1..8> / <var: char 1..8> / *IPP |

**Description of the operands**

**PRNAME = *IPP**
Only for RSO.
Indicates that the spoolout job is to be processed on an IPP printer addressed by its URL.

# PRNTRSO - define RSO parameters for PRNTDOC macro

The URL operand has been added to the PRNTRSO macro in order to be able to specify a URL.
(**ENCRYPTION is only available in RSO V3.6**).

**Format**

| Operation | Operands |
|---|---|
| PRNTRSO | URL=(*urlptr,urllen,prtype*)<br>    *urlptr*: <var: pointer> / *NONE<br>    *urllen*: <var: int 0..65535>/ <integer 1..1023> / *NONE<br>    *prtype*: <var: enum-of:1 _PRTYPE_SET> / *NONE /<br>        *4850_PCL / *4830_PCL / *4818_PCL / *9000_EPSQ /<br>        *9000_EPLQ / *9000_EPFX / *9000_PRO / *9000_PS /<br>        *9046 / *9045_ANSI / *9015 / *4825_PCL / *4822_PCL /<br>        *9001 / *9025 / *9013 / *9000 / *9001_31/ *9011 / *9012 /<br>        *9022 / *9014 / *9021 / *9022_200 /*9000_PCL /<br>        *4824_PCL / *9026_RENO / *9026_PCL / *4812 /<br>        *9097 / *4011 / *4813 / *4821_PCL / *2030_PCL<br><br>,ENCRYPT= *STD / *YES / *NO /<var: enum-of: 1_encrypt_type_set><br><br>,FQDN=(*fqdnptr, fqdnlen*)<br>    *fqdnptr:* *NONE / <var: pointer><br>    *fqdnlen*:*NONE / <var: int 0..65535> / <integer 1..1023> |

**Description of the operands**

**URL=(*urlptr,urllen,prtype*)**
Specifies the IPP printer addressed by its URL

    *urlptr*: **<var: pointer>**
    Specifies an area containing the printer URL.

    *urlptr*: ***NONE**
    Operand default value. No printer URL has been specified.

    *urllen*: **<var: int 0..65535>**
    Specifies the area length.

    *urllen*: **<integer 1..1023>**
    Specifies the area length.

*urllen*: **<u>*NONE</u>**
Operand default value. No URL has been specified.

*prtype*: **<var: enum-of:1 _PRTYPE_SET>**
The printer type is not specified directly by means of an operand value; instead, it is specified indirectly by means of a field with constant contents (equate). An integer can be stored in the constant or the corresponding field. The following relationship exists between the values and the desired functions:

| value | printer type |
|-------|--------------|
| 72 | *4850_PCL |
| 73 | *4830_PCL |
| 74 | *4818_PCL |
| 75 | *9000_EPSQ |
| 76 | *9000_EPLQ |
| 77 | *9000_EPFX |
| 78 | *9000_PRO |
| 79 | *9000_PS |
| 7B | *9046 |
| 7D | *9045_ANSI |
| 7E | *9015 |
| 7F | *4825_PCL |
| 80 | *4822_PCL |
| 84 | *9001 |
| 88 | *9025 |
| 8A | *9013 |
| 8B | *9000 |
| 8C | *9001_31 |
| 8D | *9011 |
| 8E | *9012 |
| 8F | *9022 |
| A0 | *9014 |
| A1 | *9021 |
| A2 | *9022_200 |
| A4 | *9000_PCL |
| A6 | *4824_PCL |
| A7 | *9026_RENO |

| value | printer type |
|-------|--------------|
| A8 | *9026_PCL |
| A9 | *4812 |
| AA | *9097 |
| AB | *4011 |
| AC | *4813 |
| AD | *4821_PCL |
| AE | *2030_PCL |

*prtype*: **\*4850_PCL / \*4830_PCL / \*4818_PCL / \*9000_EPSQ / \*9000_EPLQ /
\*9000_EPFX / \*9000_PRO / \*9000_PS / \*9046 /\*9045_ANSI / \*9015 / \*4825_PCL /
\*4822_PCL / \*9001 / \*9025 / \*9013 / \*9000 /\*9001_31 / \*9011 / \*9012 / \*9022 / \*9014 /
\*9021 / \*9022_200 / \*9000_PCL / \*4824_PCL / \*9026_RENO / \*9026_PCL / \*4812 /
\*9097 / \*4011 / \*4813 / \*4821_PCL / \*2030_PCL**
Specifies the RSO device type of the target printer.

*prtype*: **\*NONE**
Operand default value. No URL has been specified.

**ENCRYPT = \*STD / \*YES / \*NO / <var: enum-of: 1_encrypt_type-set>**
Specifies whether the encryption is to be turned on or off for the print job. It only applies to
print jobs submitted to IPP printers.

**ENCRYPT = \*STD / \*NO**
No encryption is specified.

**ENCRYPT = \*YES**
Encryption is specified.

**ENCRYPT = <var: enum-of: 1_encrypt_type-set>**
The encyption is not specified directly by means of an operand value; instead it is specified
indirectly by means of a field with constant contents (equate). An integer can be stored in
the constant or the corresponding field. The following relationship exist between the values
and the desired functions:

0 –> *STD

1 –> *YES

2 –> *NO

**FQDN =** *(fqdnptr, fqdnlen)*
Specifies the domain name.

> *fqdnptr:* **\*NONE**
> Operand default value. No domain name has been specified.

> *fqdnptr:* **<var: pointer>**
> Specifies an area containing the domain name.

> *fqdnlen:* **\*NONE**
> Operand default value. No domain name has been specified.

> *fqdnlen:* **<var: int 0..65535>**
> Specifies the area length.

> *fqdnlen:* **<integer 1..1023>**
> Specifies the area length.

## Parameter list description

```
*   parameter list description
.
.
.
SROAENCR  DS    FL1              Specifies whether the encryption
*                                is to be turned on or off for the
*                                print job. It only applies to print
*                                jobs submitted to IPP printers.
*
SROAESTD  EQU   0
SROAEYES  EQU   1
SROAENO   EQU   2
*
SROAFDNL  DS    H                Length of the fully qualified domain name
SROAFDNP  DS    A                Address of the fully qualified domain name
```

# 7.3  Messages

This section describes the extensions for RSO which have not yet been added to the "Spool & Print - Messages" manual.

## 7.3.1  RSO new messages

**Customised system pages support**

SR00062     `Error '(&00)' for header / trailer customised page. Template file name: '(&01)'.`

**Meaning**
(&00): error code
00010001: wrong FCB type
00010002: unknown function
00010003: syntax error
00010004: IF misplacement
00010005: GTIME error
00010006: PBBIND error
00010007: BARCODE error
00010008: memory error
00010009: BIGLETTER error
0001000A: DMS error
0001000B: internal error
0001000C: FONT error
(&01): filename

**Response**
None

**Unicode**

SR00155     `Warning: at least one character contained in '(&00)' file has no equivalence`
            `XHCS unicode table.`

**Meaning**
(&00): USER, PROLOG, EPILOG or DIA
At least one character could not be converted. The XHCS default character has been used.

**Response**
None

SR00180    TSN '(&00)': The ccsname '(&02)' is incompatible with the device '(&01)'. Job
           suspended.

   **Meaning**
   (&00): job
   (&01): device name
   (&02): coded Character Set Name
   Some resources or the file to be printed are encoded in an incompatible way with the
   selected device.

   **Response**
   Use correct resources or redirect the job to a device compatible with the ccsname.

SR00181    TSN '(&00)': Warning: conversion applied on '(&01)' file.

   **Meaning**
   (&00): job
   (&01): USER, PROLOG, EPILOG or DIA
   The coded Character Set Name (CCSNAME) attached to the file is incompatible with the
   RSO process and a conversion to EDF041 or UTFE has been applied.

   **Response**
   None

SR0182     Warning: conversion applied on '(&00)' file.

   **Meaning**
   (&00): USER, PROLOG, EPILOG or DIA
   The coded Character Set Name (CCSNAME) attached to the file is incompatible with the
   RSO process and a conversion to EDF041 or UTFE has been applied.

   **Response**
   None

SR00184    User error: Invalid escape sequence used for the printer '(&00)'.

   **Meaning**
   '(&00)': device name. An invalid escape sequence is used in the file printed on the selected
   printer.

   **Response**
   Check and correct the print file.

SR00185    User error: UTFE/UTF8 conversion error during the printing of the file '(&00)'.
           Job suspended.

    **Meaning**
    '(&00)': file name. An UTFE/UTF8 conversion error occurs during the printing of the file on
    the selected printer.

    **Response**
    Check and correct the print file.

SR00186    User error: No escape table defined for this Unicode printer '(&00)'.

    **Meaning**
    '(&00)': device name. This printer cannot support Unicode feature.

    **Response**
    Check and correct the device printer.

SR00343    Incompatibility between file ccsname '(&00)' and the device '(&01)'. Command
           rejected.

    **Meaning**
    (&00): coded character set name
    (&01). device name
    The ccsname of the file is incompatible with the selected device.

    **Response**
    Select a device compatible with the file ccsname.

SR00344    Incompatibility between file ccsname '(&00)' and control mode. Command or macro
           rejected.

    **Meaning**
    (&00): Coded Character Set Name.

    **Response**
    None

SR00345    Incompatibility between file ccsname '(&00)' and specified RSO device types.
           Command or macro rejected.

    **Meaning**
    (&00): Coded Character Set Name.

    **Response**
    None

**Secure printing (only available in RSO V3.6)**

SRO0380    `Encryption required for printing on a device declared with ENCRYPTION=NO.`
           `Command rejected.`

**Meaning**
The specified device (or the devices contained in the specified printer-pool) is declared with
ENCRYPTION=NO. The job cannot be treated in a secure way.

SRO0381    `Encryption not required for printing on a device declared with ENCRYPTION=YES.`
           `Command rejected.`

**Meaning**
The specified device (or the devices contained in the specified printer-pool) is declared with
ENCRYPTION=YES. The job would be processed with an additional useless cpu-time.

SRO1011    `OpenSSL error '(&00)' during an OpenSSL function call.`

**Meaning**
OpenSSL error '(&00)' occured when performing an OpenSSL function.

**Response**
Ask the network administrator to check the IPP printer configuration.

# 8 Appendix

## Example of PDN generation of an RSO printer with access mode TACLAN

This example is based on PDN V9.0A.

```
*         D e f i n i t i o n   o f   t h e   L A N – A d a p t e r
*
          XTLNG UEPROZ=<connection protocol>,              (1)        –
                LTGNAM=<node name>,                                   –
                UEWEG=LAN,                                            –
                LANADR=<physical address of the LAN node>,           –
                DEVTYP=TRANSO,                                        –
                IPADR=<internet address of the node>,                –
                DEVMN=<Name(s) of the subchannel(s)>
*
          XKNOT KNOTNAM=<node name>
*
*         D e f i n i t i o n   o f   t h e   T A C L A N   o r   D O S   P C
*
          XPRO  PRONAM=<processor name>,                             –
                PROTYP=HOST,                                         –
                ROUTNAM=<connection name>,                          –
                NAKNO=YES,                                           –
                RARP=YES,                                            –
                PROFIL=(TCP,IP,ETHERNET),                            –
                IPADR=<internet address of the TACLAN or DOS PC>     –
                SOKHOST=<SOCKET hostname>
*
           .....
```

(1) CSMACD or FDDI

Activate the LAN adapter and all TACLAN and/or DOS PC definitions by issuing the command /BCIN <node-name>,INI=*ALL,ACT=*ALL.

## Return codes (YDDFDB macro)

The YDDFDB macro can be used to generate symbolic names for the following codes:

| Code (right-justified) in register 6 in the event of LOSCON (lost connection) | |
|---|---|
| X'00' | User requests connection cleardown |
| X'04' | Invalid combination of DEPROT and EDIT |
| X'08' | Processing error, e.g. fault on X.25 |
| X'0C' | Partner not available or terminal down |
| X'10' | Connection cleared due to outside intervention (by system operator) |
| X'14' | Network connection interrupt; renewed request for connection setup expected |
| X'18' | Connection cleared as a result of a crash or a communication network fault |
| X'1C' | Reserved |
| X'20' | Advance warning of connection cleardown |
| X'24' | Reserved |
| X'28' | Connection to partner canceled at the request of systems support |
| X'2C' | Error in station services connection |
| X'30' | Reserved |
| X'34' | Error in station services protocol |
| X'38' | Error in transport system |
| X'3C' | Reserved |
| X'40' | Error in station services connection message for the user |
| X'44' | Reserved |
| X'48' | Reserved |
| X'4C' | Reserved |
| X'50' | Suggested class of transport service not accepted by partner |
| X'54' | Suggested priority in communication network not accepted by partner |
| X'58' | Connection cleared due to insufficient DCM memory (too many negative transport acknowledgments not fetched) |
| X'5C' | VTSU of partner inactive |

| Code (right-justified) in register 4 in the event of COMEND (end communication) | |
|---|---|
| X'00' | Advance warning that the communication access system is about to be shut down |
| X'04' | Shutdown of communication access system |
| X'08' | Advance warning of forced termination of DCAM application |
| X'0C' | Forced termination of DCAM application |

# EBCDIC-ASCII conversion table

The following conversion table is used to convert BS2000 file contents before they are sent to a printer connected to a TACLAN.

|   | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 00 | 01 | 02 | 03 | 85 | 09 | 86 | 7F | 87 | 8D | 8E | 0B | 0C | 0D | 0E | 0F |
| **1** | 10 | 11 | 12 | 13 | 8F | 92 | 08 | 97 | 18 | 19 | 9C | 9D | 1C | 1D | 1E | 1F |
| **2** | 80 | 81 | 82 | 83 | 84 | 0A | 17 | 1B | 88 | 89 | 8A | 8B | 8C | 05 | 06 | 07 |
| **3** | 90 | 91 | 16 | 93 | 94 | 95 | 96 | 04 | 98 | 99 | 9A | 9B | 14 | 15 | 9E | 1A |
| **4** | 20 | A0 | E2 | E4 | E0 | E1 | E3 | E5 | E7 | F1 | 60 | 2E | 3C | 28 | 2B | 7C |
| **5** | 26 | E9 | EA | EB | E8 | ED | EE | EF | EC | DF | 21 | 24 | 2A | 29 | 3B | 9F |
| **6** | 2D | 2F | C2 | C4 | C0 | C1 | C3 | C5 | C7 | D1 | 5E | 2C | 25 | 5F | 3E | 3F |
| **7** | F8 | C9 | CA | CB | C8 | CD | CE | CF | CC | A8 | 3A | 23 | 40 | 27 | 3D | 22 |
| **8** | D8 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | AB | BB | F0 | FD | FE | B1 |
| **9** | B0 | 6A | 6B | 6C | 6D | 6E | 6F | 70 | 71 | 72 | AA | BA | E6 | B8 | C6 | A4 |
| **A** | B5 | AF | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 7A | A1 | BF | D0 | DD | DE | AE |
| **B** | A2 | A3 | A5 | B7 | A9 | A7 | B6 | BC | BD | BE | AC | 5B | 5C | 5D | B4 | D7 |
| **C** | F9 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | AD | F4 | F6 | F2 | F3 | F5 |
| **D** | A6 | 4A | 4B | 4C | 4D | 4E | 4F | 50 | 51 | 52 | B9 | FB | FC | DB | FA | FF |
| **E** | D9 | F7 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 5A | B2 | D4 | D6 | D2 | D3 | D5 |
| **F** | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | B3 | 7B | DC | 7D | DA | 7E |

## Layouts of the header and trailer pages

The following applies to both output layouts:

– To distinguish between summer and winter time, the appropriate letter (S or W) is added to the time in the PRINT STARTED AT, START TIME and END TIME fields.

– POSIX file names and file names on UNIX systems with a length of over 54 characters are truncated.

**Header page**

```
**********************************************************************
**********************************************************************
**
** USER IDENTITY  - @@@@@@@@              SPOOL TASK NUMBER - ####
** ACCOUNT NUMBER -                  REQUESTING TASK NUMBER - ####
** FILENAME: @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
** ELEMENT : @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
** MAILING ADDRESS:
**          @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
** SPOOL DATE    - ####-##-##          PRINT STARTED AT - ##:##:##@
**********************************************************************
**********************************************************************
```

## Trailer page

```
MAIL: @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
FILE: @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
ELEM: @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
      TYPE : @@@@@@@@   VERS : @@@@@@@@@@@@@@@@@@@@@@@@@
SPOOL DATE : ####-##-## HOST : @@@@@@@@   SPOOL TSN : ####
START TIME : ##:##:##@  U-ID : @@@@@@@@   REQ. TSN : ####
END   TIME : ##:##:##@  DEV. : @@@@@@@@   DEV. TYPE : @@@@@@@@


DIA    :@@ (@@)   FAMILY:@@@        LOOP  :(@@@,@@@) FORM :@@@@@@
STARTNO :#####    ENDNO :#####      FROM  :##########TO   :##########
SHIFT   :###      SPACE :@          BINARY:@@@       CONTR:@@@@@@@@@
DEL-FILE:@@@@@@@  LINES :#####      COPIES:(###,###) PRIOR:@@@
HEADER  :@@@  HDRNUM:########## TRLNUM:##########CCPOS:#####
PNAME   :@@@@@@@@ TEXT  :@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
LOCK    :@@@      DEST. :@@@@@@@@@@@          TRUNCATION:@@@@@@@@
IMAGE   :@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
MONJV   :@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
TRAY    :(IN :@@@@@@, OUT : @@@@@@)           CHECKPOINT:@@@@@@@
OFFSET  :(LEFT :###,TOP :###) DUPLEX :@@@ ROTATION :@@@
SECT : @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@'
                             POSITION   : ####
FIRST: @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@'
            NUMBER:#####     POSITION   : ####
LAST : @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@'
            NUMBER:#####     POSITION   : ####
TR-TABLE:(@@@@@@@@,@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@)
LAN-EXT :@@@@@@@(@@@@@@@@@@@@@@)
CHAR-MOD:@@@                  REDIRECTION : @@@
CHARS   :(@@@) (DFLT)


STATION :@@@@@@@@ PROC. :@@@@@@@@
PROLOG  :(  )     EPILOG:(  )


CLIENT-H:@@@@@@@@                 CLUSTER   : @@@@@@
FILE :SIZE=#######,FCBTYPE=@@@@,RECFORM=@,RECSIZE=#####,BLKSIZE=######
      CCSNAME=@@@@@@@@
PRNT :#LINES=########            COPY#=####    SPOOLOUT CLASS=@@@
```

# General recovery actions

The following table shows all general recovery actions that are available with RSO V2.3A.

| General action | Meaning |
|---|---|
| Suspend | – The interrupted print job is placed in the KEEP queue (TYPE 7 KP).<br>– The printer´s status indicator is set to "A" (see the SHOW-SYSTEM-STATUS command in the "Spool & Print - Commands (BS2000/OSD)" manual). This allows another print job to be printed out on the printer. |
| Stop | – The interrupted print job is placed in the KEEP queue (TYPE 7 KP).<br>– The printer´s status indicator is set to "S" (see the SHOW-SYSTEM-STATUS command in the "Spool & Print - Commands (BS2000/OSD)" manual). This allows another print job to be printed out on the printer until the interrupted print job is continued with RESUME-SPOOLOUT or the printer is disconnected with STOP-PRINTER-OUTPUT and then restarted with START-PRINTER-OUTPUT. |
| Restart | – If a problem occurs during the attempt to establish the connection to the printer, the restart action causes RSO to make another attempt at setting up the connection. If the connection is then established, printing starts automatically.<br>– If the problem occurs while printing, the RESTART action causes RSO to clear down the connection to the printer, reestablish it and then repeat the print job as of the last, interrupted page.<br>The maximum number of attempts is defined in the device definition by means of the RESTART-ACTION operand.<br><br>*Note*<br>The restart action affects the use of resources. In the event of a restart from the beginning of the print job (e.g. for a print request in transparent control mode, for BSD/LPD connectivity or when no printer sychronization is possible), the editing of the first buffer is the first step in this complete restart. Depending on the environment being used (prolog file, printer parameter file etc.), this can require a large number of catalog accesses and disk I/Os. |
| Ignore | – RSO considers the error to be only a warning and ignores it.<br>– Printing continues as though nothing has happened. |
| Wait | – The printer sends a positive acknowledgment as soon as the error is corrected. Consequently, this action causes RSO to wait for this positive acknowledgment. The maximum number of attempts is defined in the device definition by means of the REPEAT-MESSAGE=*PAR(LIMIT=...) operand.<br>– When the positive acknowledgment is received, printing is continued as though nothing has happened.<br><br>*Note*<br>The time required for correcting the problem (e.g. loading paper) cannot be defined and therefore a timeout cannot be detected. |

| General action | Meaning |
|---|---|
| Repeat | – Depending on the REPEAT-MESSAGE operand in the device definition, a system message (SRO1001) or a dummy message (form feed) is sent to the printer in order to check whether the problem has been corrected. The maximum number of attempts is defined in the device definition by means of the operand REPEAT-MESSAGE=*PAR(LIMIT=...).<br>– If REPEAT-MESSAGE=*NO was specified in the device definition, the "Stop" action is performed instead of "Repeat".<br>– As soon as the problem has been corrected, the print job is repeated as of the last, interrupted page (duplicate printing possible).<br><br>*Note*<br>The time required for correcting the problem (e.g. loading paper) cannot be defined and therefore a timeout cannot be detected. |

# General error codes

The list of general error codes that are supported can be divided into three different types, depending on whether the error has to do with a connection problem, with a current printer problem or with an invalid specification of a general action code.

**General error code for an invalid general action code**

The validity of the general action codes is checked when the START-PRINTER-OUTPUT command is issued. However, not all forms of incorrect specifications can be taken into account. Thus, for example, if the general action code "Wait" is specified for a printer whose status cannot be requested, RSO suspends printing with the general error code "InvalidAction".

Systems support can then change the standard action ("Stop") for the general error code "InvalidAction" by means of a recovery rule file. In this case, the general action codes "Stop", "Suspend" and "Restart" are allowed.

### General error codes for connection problems

The following table shows the general error codes supported for connection problems, i.e. error codes that occur when RSO attempts to establish a connection to the printer.

| General error code | Meaning |
|---|---|
| BrokenPipe | For printers connected via TCP-IP:<br>A BrokenPipe return code has been received from the Sockets interface, meaning that the connection has been either refused or cancelled by the partner. |
| ComSrvEnding | – DCM is terminated.<br>– Forced termination of the DCAM application that RSO opened for accessing the printers that were defined by means of DEVICE-ACCESS=*NEA-ACCESS(...). |
| ComSrvNotActive | DCM is not active. |
| ConCleared | The connection to the printer was cleared down. |
| ConYetOpened | The connection to the printer cannot be established since the printer is already being used by another partner. |
| LackOfSpace | The communication service is temporarily exceeding the memory in order to process RSO requests. |
| LosConError | The connection to the printer was lost. |
| OpnConRejected | – The request for a connection to the printer was rejected.<br>– The partner is not processing connection requests (the DCAM application that RSO opened for accessing printers that were defined by means of DEVICE-ACCESS=*NEA-ACCESS is in the STOP status).<br>– The printer cannot be accessed (from the communication service viewpoint). |
| OpnConTimeout | The connection request was not executed within the specified time period:<br>– from the system: time period defined by the BCTIMES command, CONN operand<br>– from RSO: within 1.5 minutes. |

Since these problems occur during the attempt to establish the connection to the printer, only the general actions "Suspend", "Stop" and "Restart" are allowed. Other general actions ("Ignore", "Wait" or "Repeat") must not be defined in a recovery rule file for a general error code for connection problems. Actions thus specified are ignored when the file is processed at the time that the START-PRINTER-OUTPUT command is issued. Instead, the RSO standard values are assumed and a warning message is issued on the operator console.

| General error code | Standard action | Error codes currently contained | Messages output |
|---|---|---|---|
| BrokenPipe | Stop | 00000020 | SR01009 |
| ComSrvEnding | Stop | 0820____<br>0824____<br>0828____<br>082C____<br>0838____<br>1008____<br>100C____ | SR00900<br>SR00916<br>SR00917<br>SR00901<br>SR00901<br>SR00965<br>SR00965 |
| ComSrvNotActive | Stop | 1010____<br>00000032<br>00000034 | SR00966<br>SR00991<br>SR00992 |
| ConCleared | Restart | 0C18____<br>0C78____ | SR00902<br>SR00902 |
| ConYetOpened | Restart | 0C08____<br>0C0C____<br>0C70____<br>0C88____<br>1410____<br>00000030<br>00000038 | SR00933<br>SR00902<br>SR00953<br>SR00902<br>SR00902<br>SR00935<br>SR00934 |
| LackOfSpace | Restart | 100400__<br>100404__<br>100408__<br>100420__<br>100424__<br>100428__<br>0000000C | SR00959<br>SR00959<br>SR00960<br>SR00961<br>SR00962<br>SR00963<br>SR00957 |
| LosConError | Restart | LOSCON error code | SR00914 |
| OpnConRejected | Restart | 0C40____<br>0C4C____<br>0C50____<br>0C5C____<br>0000003D | SR00902<br>SR00948<br>SR00949<br>SR00952<br>SR00951 |
| OpnConTimeout | Restart | 0C48____<br>0000003C<br>after 1.5 minutes | SR00947<br>SR00946<br>SR00922 |

## General error codes for printer problems

The following table shows the general error codes supported for printer problems, i.e. error codes that occur when RSO attempts to print out on a printer. The table is arranged from the highest error priority to the lowest. It describes the meaning and the associated printer-type-dependent return codes for each general error code for printer problems. Depending on whether or not the TRANSDATA-810 protocol is used for the dialog with the printer, RSO can receive two different types of printer error codes.

1. TD-810 error codes

   The TRANSDATA-810 protocol is the standard protocol for accessing printers that are defined with the DIRECT, HARDCOPY, HARDCOPY-9751 or PC access modes (except for the 9025, 9026-RENO and 9645 Printer types for which a PSM is currently received instead of a TD-810 error code; see below).

   TD-810 error codes comprise 4 bytes and describe the type of printer error (out of paper, off-line, format error and out of paper, cover open and off-line, etc.) in a standardized code. For more details, see the relevant printer descriptions.

2. PSM (printer status message)

   The TRANSDATA-810 protocol cannot be used for accessing printers that are defined with the HDLC, APPLICATION or TACLAN access mode. In such cases, RSO requests the current printer status message (PSM) from the printer.

   In the case of RENO Printers (9025 and 9026-RENO), the printer error codes are output with the format "Ennn;" where nnn represents a printable numeric value (from 0 to 255). For more information, see the descriptions of the 9025 and 9026-RENO Printers.

   The printer error codes of the 9645 Printer are converted by the RSOAP application to a "simulated" TD-810 syntax.

   The printer error codes of the 9022 Printer comprise 6 bytes that represent the requested status messages 1, 2, 3, 6, 7 and 8. The individual bits of these status messages are described in the 9022 manual.

   The printer error codes of the 4812 and DJET Printers have a length of 1 byte. The individual bits of this status byte can be found in the relevant printer manuals.

   The printer error codes of the 4011, 4813, 9001, 9001-31, 9011, 9012, 9013 and 9014 Printers comprise 4 bytes that represent the third status message requested. The individual bits of these 4 bytes are described in the relevant manuals.

| General printer error code | Meaning | Error codes contained | Message output |
|---|---|---|---|
| InvalidAck | Output by RSO when it receives an invalid transport or printer acknowledgment, e.g. <br>– the acknowledgment refers to an invalid message number <br>– the acknowledgment refers to a message number that RSO has not yet sent to the printer <br>– the acknowledgment is incorrect (e.g. does not match the sequence of messages sent) | – | SR00919 |
| NegativeTack | A negative transport acknowledgment was received. This can occur, e.g., when the terminal to which the printer is hardcopy-connected is switched off. | `00000001`<br>`00000008` | SR00986<br>SR00986 |
| PrinterTimeout | Output by RSO when a timeout occurs, i.e. the period of time from the sending of a message to the reception of its acknowledgment was too long. | – | SR00987 |
| PrinterError | A printer hardware or firmware error has occurred. | `42....41 (TD-810)`<br>`42....49 (TD-810)`<br>`...4.... (PSM)`<br>`41C40101 (9645)`<br>`41D60101 (9645)`<br>`41E60101 (9645)` | SR00968<br>SR00975<br>SR00968<br>SR00911<br>SR00911<br>SR00911 |
| DataOverflow | The message to the printer does not fit in its buffer. | `42....50 (TD-810)`<br>`42....56 (TD-810)`<br>`42....58 (TD-810)`<br>`........4....(9022-PSM)`<br>`...........8(9022-PSM)` | SR00972<br>SR00972<br>SR00979<br>SR00972<br>SR00972 |

| General printer error code | Meaning | Error codes contained | Message output |
|---|---|---|---|
| Maintenance | The printer requires maintenance. | `E75 (RENO-PSM)`<br>`.......4....(9022-PSM)`<br>`.........8..(9022-PSM)` | SR00908<br>SR00899<br>SR00899 |
| FormatError | A format error has occurred. | `41....48 (TD-810)`<br>`42....48 (TD-810)` | SR00988<br>SR00988 |
| Format+CoverOpen | A format error has occurred and the cover is open. The printer may also be out of paper and/or off-line. | `42....68 (TD-810)`<br>`42....6A (TD-810)`<br>`42....6C (TD-810)`<br>`42....6E (TD-810)` | SR00980<br>SR00980<br>SR00981<br>SR00981 |
| Format+OffLine | A format error has occurred and the printer is off-line. The printer may also be out of paper. | `41....4C (TD-810)`<br>`42....4C (TD-810)`<br>`42....4E (TD-810)` | SR00977<br>SR00977<br>SR00978 |
| Format+PaperEnd | A format error has occurred and the printer is out of paper. | `41....4A (TD-810)`<br>`42....4A (TD-810)` | SR00976<br>SR00976 |
| LineOverflow | A line overflow has occurred (some printer types automatically perform a forced CR and LF). | `....4.. (PSM)`<br>`...........2(9022-PSM)` | SR00898<br>SR00898 |
| InvalidData | The printer has received invalid escape sequences. | `...1.... (PSM)`<br>`...........4(9022-PSM)` | SR00897<br>SR00897 |
| Cover+OffLine | The cover or toner container is open and the printer is off-line. The printer may also be out of paper. Some printer types output a "CoverOpen" error as an "OffLine" error (check error codes contained). | `42....64 (TD-810)`<br>`42....66 (TD-810)`<br>`.....3.. (PSM)`<br>`1...1.......(9022-PSM)` | SR00974<br>SR00974<br>SR00974<br>SR00974 |
| Cover+PaperEnd | The cover or toner container is open and the printer is out of paper. Some printer types output a "CoverOpen" error as an "OffLine" error (check error codes contained). | `42....62 (TD-810)`<br>`...2.1.. (PSM)`<br>`.....1.4 (PSM)`<br>`1......1....(9022-PSM)`<br>`14..........(9022-PSM)`<br>`1..1........(9022-PSM)` | SR00974<br>SR00974<br>SR00974<br>SR00974<br>SR00974<br>SR00974 |

| General printer error code | Meaning | Error codes contained | Message output |
|---|---|---|---|
| CoverOpen | The cover or toner container is open. Some printer types output this error as an "OffLine" error (check error codes contained). | `42....60 (TD-810)`<br>`E60 (RENO-PSM)`<br>`.....1.. (PSM)`<br>`1...........(9022-PSM)` | SR00973<br>SR00907<br>SR00973<br>SR00973 |
| OffLine+PaperEnd | The printer is off-line (the STOP or OFFLINE button has been pressed) and is out of paper. Some printer types output this error when the cover is open. | `42....46 (TD-810)`<br>`...2.2.. (PSM)`<br>`.....2.4 (PSM)`<br>`.4..1.......(9022-PSM)`<br>`...11.......(9022-PSM)`<br>`....1..1....(9022-PSM)`<br>`.5 (4812/DJET-PSM)` | SR00971<br>SR00971<br>SR00971<br>SR00971<br>SR00971<br>SR00971<br>SR00971 |
| PaperEnd | The printer is out of paper. | `41....42 (TD-810)`<br>`42....42 (TD-810)`<br>`E68 (RENO-PSM)`<br>`E69 (RENO-PSM)`<br>`...2.... (PSM)`<br>`.......4 (PSM)`<br>`.......1....(9022-PSM)`<br>`...1........(9022-PSM)`<br>`.4..........(9022-PSM)`<br>`.1 (4812/DJET-PSM)` | SR00969<br>SR00969<br>SR00908<br>SR00908<br>SR00969<br>SR00969<br>SR00969<br>SR00969<br>SR00969<br>SR00969 |
| OffLine | The printer is off-line (the STOP or OFFLINE button has been pressed). Some printer types output this error when the cover is open. | `41....44 (TD-810)`<br>`42....44 (TD-810)`<br>`.....2.. (PSM)`<br>`....1.......(9022-PSM)`<br>`.4 (4812/DJET-PSM)`<br>`41C4020D (9645)`<br>`41D6020D (9645)`<br>`41E6020D (9645)` | SR00970<br>SR00970<br>SR00970<br>SR00970<br>SR00970<br>SR00912<br>SR00912<br>SR00912 |
| PaperSize | The requested form length exceeds the maximum form length for the paper used. | `E73 (RENO-PSM)`<br>`...........1(9022-PSM)` | SR00908<br>SR00896 |
| PaperJam | A paper jam has occurred. | `E64 (RENO-PSM)`<br>`E65 (RENO-PSM)`<br>`E66 (RENO-PSM)`<br>`E67 (RENO-PSM)`<br>`E72 (RENO-PSM)`<br>`...2........(9022-PSM)` | SR00908<br>SR00908<br>SR00908<br>SR00908<br>SR00908<br>SR00895 |
| OutputBinFull | The output bin is full. | `E70 (RENO-PSM)` | SR00908 |

| General printer error code | Meaning | Error codes contained | Message output |
|---|---|---|---|
| TonerEmpty | The printer toner container is empty. | `E71 (RENO-PSM)`<br>`.1...... (PSM)`<br>`.1..........(9022-PSM)` | SR00908<br>SR00894<br>SR00894 |
| TooCold | The printer is in the warm-up phase. | `E77 (RENO-PSM)`<br>`..........1..(9022-PSM)` | SR00908<br>SR00893 |
| TooHot | The printer is overheated. | `E76 (RENO-PSM)` | SR00908 |
| ParityError | A parity error occurred during transmission. | `E100 (RENO-PSM)`<br>`E101 (RENO-PSM)`<br>`E102 (RENO-PSM)`<br>`E103 (RENO-PSM)`<br>`E104 (RENO-PSM)`<br>`E105 (RENO-PSM)`<br>`.4...... (PSM)`<br>`......1.....(9022-PSM)` | SR00907<br>SR00907<br>SR00907<br>SR00907<br>SR00907<br>SR00907<br>SR00892<br>SR00892 |
| LpdJobAborted | The BSD-LPD server has aborted the RSO print job. | | SR00993 |
| IppJobAborted | The Print Job scheduled on the IPP printer has been aborted | | SR00994 |
| BrokenPipe | For printers connected via TCP-IP:<br>A BrokenPipe return code has been received from the Sockets interface, meaning that the connection has been either refused or cancelled by the partner. | `00000020` | SR01009 |

The following tables show the standard actions that are supported for each general printer error code, depending on the printer type and access mode. The abbreviations have the following meanings:

Access modes:

DIR     DIRECT

HA      HARDCOPY

AP      APPLICATION

HD      HDLC

H97     HARDCOPY-9751

TA      TACLAN

IPP     Internet Printing Protocol

Standard actions:

ST      Stop

SU      Suspend

RS      Restart

WT      Wait

IG      Ignore

RP      Repeat

--      Not supported

| General printer error code | 2030-PCL | | | 4011 | | | | | | 4812 DJET | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TA | LPD | IPP | DIR | HA | PC | TA | LPD | IPP | DIR | HA | PC | TA | LPD | IPP |
| BrokenPipe | ST | ST | ST | -- | -- | -- | ST | ST | ST | -- | -- | -- | ST | ST | ST |
| CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cover+OffLine | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cover+PaperEnd | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| DataOverflow | -- | -- | -- | ST | ST | ST | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| FormatError | -- | -- | -- | SU | SU | SU | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+OffLine | -- | -- | -- | RP | RP | RP | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+PaperEnd | -- | -- | -- | ST | ST | ST | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| InvalidAck | -- | -- | -- | ST | ST | ST | ST | -- | -- | ST | ST | ST | -- | -- | -- |
| InvalidData | -- | -- | -- | -- | -- | -- | SU | -- | -- | -- | -- | -- | -- | -- | -- |
| LineOverflow | -- | -- | -- | -- | -- | -- | SU | -- | -- | -- | -- | -- | -- | -- | -- |
| Maintenance | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NegativeTack | -- | -- | -- | RP | RP | RP | -- | -- | -- | RP | RP | RP | -- | -- | -- |
| OffLine | -- | -- | -- | WT | RP | RP | WT | -- | -- | -- | -- | -- | WT | -- | -- |
| OffLine+PaperEnd | -- | -- | -- | WT | RP | RP | WT | -- | -- | -- | -- | -- | WT | -- | -- |
| OutputBinFull | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperEnd | -- | -- | -- | WT | RP | RP | WT | -- | -- | -- | -- | -- | WT | -- | -- |
| PaperJam | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperSize | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ParityError | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PowerFailure | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PrinterError | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| PrinterTimeout | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| TonerEmpty | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooCold | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooHot | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| LpdJobAborted | -- | RS | -- | -- | -- | -- | -- | RS | -- | -- | -- | -- | -- | RS | -- |
| IppJobAborted | -- | -- | ST | -- | -- | -- | -- | -- | ST | -- | -- | -- | -- | -- | ST |

| General printer error code | 4813 | | | | | | 4818-PCL<br>4822-PCL<br>4825-PCL<br>4830-PCL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **DIR** | **HA** | **PC** | **TA** | **LPD** | **IPP** | **DIR** | **HA** | **PC** | **TA** | **LPD** | **IPP** |
| BrokenPipe | -- | -- | -- | ST | ST | ST | -- | -- | -- | ST | ST | ST |
| CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | WT | -- | -- |
| Cover+OffLine | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cover+PaperEnd | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| DataOverflow | ST | ST | ST | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| FormatError | SU | SU | SU | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+OffLine | RP | RP | RP | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+PaperEnd | ST | ST | ST | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| InvalidAck | ST | ST | ST | ST | -- | -- | ST | ST | ST | -- | -- | -- |
| InvalidData | -- | -- | -- | SU | -- | -- | -- | -- | -- | -- | -- | -- |
| LineOverflow | -- | -- | -- | SU | -- | -- | -- | -- | -- | -- | -- | -- |
| Maintenance | -- | -- | -- | -- | -- | -- | -- | -- | -- | SU | -- | -- |
| NegativeTack | RP | RP | RP | -- | -- | -- | RP | RP | RP | -- | -- | -- |
| OffLine | WT | RP | RP | WT | -- | -- | -- | -- | -- | WT | -- | -- |
| OffLine+PaperEnd | WT | RP | RP | WT | -- | -- | -- | -- | -- | -- | -- | -- |
| OutputBinFull | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperEnd | WT | RP | RP | WT | -- | -- | -- | -- | -- | WT | -- | -- |
| PaperJam | -- | -- | -- | -- | -- | -- | -- | -- | -- | WT | -- | -- |
| PaperSize | -- | -- | -- | -- | -- | -- | -- | -- | -- | WT | -- | -- |
| ParityError | -- | -- | -- | IG | -- | -- | -- | -- | -- | -- | -- | -- |
| PowerFailure | -- | -- | -- | ST | -- | -- | -- | -- | -- | -- | -- | -- |
| PrinterError | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| PrinterTimeout | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| TonerEmpty | -- | -- | -- | WT | -- | -- | -- | -- | -- | WT | -- | -- |
| TooCold | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooHot | -- | -- | -- | IG | -- | -- | -- | -- | -- | -- | -- | -- |
| LpdJobAborted | -- | -- | -- | -- | RS | -- | -- | -- | -- | -- | RS | -- |
| IppJobAborted | -- | -- | -- | -- | -- | ST | -- | -- | -- | -- | -- | ST |

| General printer error code | 4821-PCL 4824-PCL 9000-PCL | | | | | | 4850-PCL | | | 8121 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | DIR | HA | PC | TA | LPD | IPP | TA | LPD | IPP | DIR | HA |
| BrokenPipe | -- | -- | -- | ST | ST | ST | ST | ST | ST | -- | -- |
| CoverOpen | -- | -- | -- | WT | -- | -- | WT | -- | -- | -- | -- |
| Cover+OffLine | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cover+PaperEnd | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| DataOverflow | -- | -- | -- | -- | -- | -- | -- | -- | -- | ST | ST |
| FormatError | -- | -- | -- | -- | -- | -- | -- | -- | -- | SU | SU |
| Format+CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+OffLine | -- | -- | -- | -- | -- | -- | -- | -- | -- | RP | RP |
| Format+PaperEnd | -- | -- | -- | -- | -- | -- | -- | -- | -- | ST | ST |
| InvalidAck | ST | ST | ST | -- | -- | -- | -- | -- | -- | ST | ST |
| InvalidData | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| LineOverflow | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Maintenance | -- | -- | -- | SU | -- | -- | SU | -- | -- | -- | -- |
| NegativeTack | RP | RP | RP | -- | -- | -- | -- | -- | -- | RP | RP |
| OffLine | -- | -- | -- | WT | -- | -- | WT | -- | -- | RP | RP |
| OffLine+PaperEnd | -- | -- | -- | -- | -- | -- | -- | -- | -- | RP | RP |
| OutputBinFull | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperEnd | -- | -- | -- | WT | -- | -- | WT | -- | -- | RP | RP |
| PaperJam | -- | -- | -- | WT | -- | -- | WT | -- | -- | -- | -- |
| PaperSize | -- | -- | -- | -- | -- | -- | WT | -- | -- | -- | -- |
| ParityError | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PowerFailure | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PrinterError | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| PrinterTimeout | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| TonerEmpty | -- | -- | -- | WT | -- | -- | WT | -- | -- | -- | -- |
| TooCold | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooHot | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| LpdJobAborted | -- | -- | -- | -- | RS | -- | -- | RS | -- | -- | -- |
| IppJobAborted | -- | -- | -- | -- | -- | ST | -- | -- | ST | -- | -- |

| General printer error code | 9000 | | | | | | | | | 9000-PS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DIR | HA | AP | HD | PC | H97 | TA | LPD | IPP | TA | LPD | IPP |
| BrokenPipe | -- | -- | -- | -- | -- | -- | ST | ST | ST | ST | ST | ST |
| CoverOpen | ST | ST | ST | ST | ST | ST | ST | -- | -- | WT | -- | -- |
| Cover+OffLine | ST | ST | ST | ST | ST | ST | ST | -- | -- | -- | -- | -- |
| Cover+PaperEnd | ST | ST | ST | ST | ST | ST | ST | -- | -- | -- | -- | -- |
| DataOverflow | ST | ST | ST | ST | ST | ST | ST | -- | -- | -- | -- | -- |
| FormatError | SU | SU | SU | SU | SU | SU | -- | -- | -- | -- | -- | -- |
| Format+CoverOpen | ST | ST | ST | ST | ST | ST | -- | -- | -- | -- | -- | -- |
| Format+OffLine | RP | RP | RP | RP | RP | RP | -- | -- | -- | -- | -- | -- |
| Format+PaperEnd | ST | ST | ST | ST | ST | ST | -- | -- | -- | -- | -- | -- |
| InvalidAck | ST | ST | ST | ST | ST | ST | ST | -- | -- | -- | -- | -- |
| InvalidData | SU | SU | SU | SU | SU | SU | SU | -- | -- | -- | -- | -- |
| LineOverflow | ST | ST | ST | ST | ST | ST | ST | -- | -- | -- | -- | -- |
| Maintenance | ST | ST | ST | ST | ST | ST | ST | -- | -- | SU | -- | -- |
| NegativeTack | RP | RP | RP | RP | RP | RP | -- | -- | -- | -- | -- | -- |
| OffLine | RP | RP | RP | RP | RP | RP | WT | -- | -- | WT | -- | -- |
| OffLine+PaperEnd | RP | RP | RP | RP | RP | RP | WT | -- | -- | -- | -- | -- |
| OutputBinFull | WT | WT | WT | WT | WT | WT | WT | -- | -- | -- | -- | -- |
| PaperEnd | RP | RP | RP | RP | RP | RP | WT | -- | -- | WT | -- | -- |
| PaperJam | RP | RP | RP | RP | RP | RP | WT | -- | -- | WT | -- | -- |
| PaperSize | RP | RP | RP | RP | RP | RP | WT | -- | -- | WT | -- | -- |
| ParityError | IG | IG | IG | IG | IG | IG | IG | -- | -- | -- | -- | -- |
| PowerFailure | ST | ST | ST | ST | ST | ST | ST | -- | -- | -- | -- | -- |
| PrinterError | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| PrinterTimeout | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| TonerEmpty | RP | RP | RP | RP | RP | RP | WT | -- | -- | WT | -- | -- |
| TooCold | IG | IG | IG | IG | IG | IG | IG | -- | -- | -- | -- | -- |
| TooHot | IG | IG | IG | IG | IG | IG | IG | -- | -- | -- | -- | -- |
| LpdJobAborted | -- | -- | -- | -- | -- | -- | -- | RS | -- | -- | RS | -- |
| IppJobAborted | -- | -- | -- | -- | -- | -- | -- | -- | ST | -- | -- | ST |

| General printer error code | 9000-EPFX 9000-EPLQ 9000-EPSQ 9000-PRO | | | 9001 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | TA | LPD | IPP | DIR | HA | PC | H97 | TA | LPD | IPP |
| BrokenPipe | ST | ST | ST | -- | -- | -- | -- | ST | ST | ST |
| CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cover+OffLine | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cover+PaperEnd | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| DataOverflow | -- | -- | -- | ST | ST | ST | ST | -- | -- | -- |
| FormatError | -- | -- | -- | SU | SU | SU | SU | -- | -- | -- |
| Format+CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+OffLine | -- | -- | -- | RP | RP | RP | RP | -- | -- | -- |
| Format+PaperEnd | -- | -- | -- | ST | ST | ST | ST | -- | -- | -- |
| InvalidAck | -- | -- | -- | ST | ST | ST | ST | -- | -- | -- |
| InvalidData | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| LineOverflow | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Maintenance | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NegativeTack | -- | -- | -- | RP | RP | RP | RP | -- | -- | -- |
| OffLine | -- | -- | -- | WT | RP | RP | RP | -- | -- | -- |
| OffLine+PaperEnd | -- | -- | -- | WT | RP | RP | RP | -- | -- | -- |
| OutputBinFull | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperEnd | -- | -- | -- | WT | RP | RP | RP | -- | -- | -- |
| PaperJam | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperSize | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ParityError | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PowerFailure | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PrinterError | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| PrinterTimeout | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| TonerEmpty | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooCold | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooHot | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| LpdJobAborted | -- | RS | -- | -- | -- | -- | -- | -- | RS | -- |
| IppJobAborted | -- | -- | ST | -- | -- | -- | -- | -- | -- | ST |

| General printer error code | 9001-31 | | | | | | | 9002 | | 9003 | | | 9004 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DIR | HA | PC | H97 | TA | LPD | IPP | DIR | HA | DIR | HA | PC | HA | PC | H97 |
| BrokenPipe | -- | -- | -- | -- | ST | ST | ST | -- | -- | -- | -- | -- | -- | -- | -- |
| CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | ST | ST | ST | ST | ST | ST |
| Cover+OffLine | -- | -- | -- | -- | -- | -- | -- | -- | -- | WT | RP | RP | ST | ST | ST |
| Cover+PaperEnd | -- | -- | -- | -- | -- | -- | -- | -- | -- | RP | RP | RP | ST | ST | ST |
| DataOverflow | ST | ST | ST | ST | -- | -- | -- | ST | ST | ST | ST | ST | ST | ST | ST |
| FormatError | SU | SU | SU | SU | -- | -- | -- | SU | SU | SU | SU | SU | SU | SU | SU |
| Format+CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | ST | ST | ST | ST | ST | ST |
| Format+OffLine | RP | RP | RP | RP | -- | -- | -- | RP | RP | RP | RP | RP | RP | RP | RP |
| Format+PaperEnd | ST | ST | ST | ST | -- | -- | -- | ST | ST | ST | ST | ST | ST | ST | ST |
| InvalidAck | ST | ST | ST | ST | ST | -- | -- | ST | ST | ST | ST | ST | ST | ST | ST |
| InvalidData | -- | -- | -- | -- | SU | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| LineOverflow | -- | -- | -- | -- | SU | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Maintenance | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NegativeTack | RP | RP | RP | RP | -- | -- | -- | RP | RP | RP | RP | RP | RP | RP | RP |
| OffLine | WT | RP | RP | RP | WT | -- | -- | RP | RP | RP | RP | RP | RP | RP | RP |
| OffLine+PaperEnd | WT | RP | RP | RP | WT | -- | -- | RP | RP | WT | WT | RP | RP | RP | RP |
| OutputBinFull | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperEnd | WT | RP | RP | RP | WT | -- | -- | RP | RP | RP | RP | RP | RP | RP | RP |
| PaperJam | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperSize | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ParityError | -- | -- | -- | -- | IG | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PowerFailure | -- | -- | -- | -- | ST | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PrinterError | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| PrinterTimeout | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| TonerEmpty | -- | -- | -- | -- | WT | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooCold | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooHot | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| LpdJobAborted | -- | -- | -- | -- | -- | RS | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| IppJobAborted | -- | -- | -- | -- | -- | -- | ST | -- | -- | -- | -- | -- | -- | -- | -- |

| General printer error code | 9011 | | | | | | 9012 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DIR | HA | PC | TA | LPD | IPP | DIR | HA | PC | TA | LPD | IPP |
| BrokenPipe | -- | -- | -- | ST | ST | ST | -- | -- | -- | ST | ST | ST |
| CoverOpen | -- | -- | -- | -- | -- | -- | WT | RP | RP | WT | -- | -- |
| Cover+OffLine | -- | -- | -- | -- | -- | -- | WT | RP | RP | WT | -- | -- |
| Cover+PaperEnd | -- | -- | -- | -- | -- | -- | WT | RP | RP | WT | -- | -- |
| DataOverflow | ST | ST | ST | -- | -- | -- | ST | ST | ST | -- | -- | -- |
| FormatError | SU | SU | SU | -- | -- | -- | SU | SU | SU | -- | -- | -- |
| Format+CoverOpen | -- | -- | -- | -- | -- | -- | ST | ST | ST | -- | -- | -- |
| Format+OffLine | RP | RP | RP | -- | -- | -- | RP | RP | RP | -- | -- | -- |
| Format+PaperEnd | ST | ST | ST | -- | -- | -- | ST | ST | ST | -- | -- | -- |
| InvalidAck | ST | ST | ST | ST | -- | -- | ST | ST | ST | ST | -- | -- |
| InvalidData | -- | -- | -- | SU | -- | -- | -- | -- | -- | SU | -- | -- |
| LineOverflow | -- | -- | -- | SU | -- | -- | -- | -- | -- | SU | -- | -- |
| Maintenance | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NegativeTack | RP | RP | RP | -- | -- | -- | RP | RP | RP | -- | -- | -- |
| OffLine | WT | RP | RP | WT | -- | -- | WT | RP | RP | WT | -- | -- |
| OffLine+PaperEnd | WT | RP | RP | WT | -- | -- | WT | RP | RP | WT | -- | -- |
| OutputBinFull | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperEnd | WT | RP | RP | WT | -- | -- | WT | RP | RP | WT | -- | -- |
| PaperJam | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperSize | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ParityError | -- | -- | -- | IG | -- | -- | -- | -- | -- | IG | -- | -- |
| PowerFailure | -- | -- | -- | ST | -- | -- | -- | -- | -- | ST | -- | -- |
| PrinterError | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| PrinterTimeout | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| TonerEmpty | -- | -- | -- | WT | -- | -- | -- | -- | -- | WT | -- | -- |
| TooCold | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooHot | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| LpdJobAborted | -- | -- | -- | -- | RS | -- | -- | -- | -- | -- | RS | -- |
| IppJobAborted | -- | -- | -- | -- | -- | ST | -- | -- | -- | -- | -- | ST |

| General printer error code | 9013 9014 | | | | | | 9015 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **DIR** | **HA** | **PC** | **TA** | **LPD** | **IPP** | **DIR** | **HA** | **PC** | **TA** | **LPD** | **IPP** |
| BrokenPipe | -- | -- | -- | ST | ST | ST | -- | -- | -- | ST | ST | ST |
| CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cover+OffLine | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cover+PaperEnd | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| DataOverflow | ST | ST | ST | -- | -- | -- | ST | ST | ST | -- | -- | -- |
| FormatError | SU | SU | SU | -- | -- | -- | SU | SU | SU | -- | -- | -- |
| Format+CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+OffLine | RP | RP | RP | -- | -- | -- | RP | RP | RP | -- | -- | -- |
| Format+PaperEnd | ST | ST | ST | -- | -- | -- | ST | ST | ST | -- | -- | -- |
| InvalidAck | ST | ST | ST | ST | -- | -- | ST | ST | ST | ST | -- | -- |
| InvalidData | -- | -- | -- | SU | -- | -- | -- | -- | -- | SU | -- | -- |
| LineOverflow | -- | -- | -- | SU | -- | -- | -- | -- | -- | SU | -- | -- |
| Maintenance | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NegativeTack | RP | RP | RP | -- | -- | -- | RP | RP | RP | -- | -- | -- |
| OffLine | WT | RP | RP | WT | -- | -- | WT | RP | RP | WT | -- | -- |
| OffLine+PaperEnd | WT | RP | RP | WT | -- | -- | WT | RP | RP | WT | -- | -- |
| OutputBinFull | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperEnd | WT | RP | RP | WT | -- | -- | WT | RP | RP | WT | -- | -- |
| PaperJam | -- | -- | -- | -- | -- | -- | -- | -- | -- | WT | -- | -- |
| PaperSize | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ParityError | -- | -- | -- | IG | -- | -- | -- | -- | -- | IG | -- | -- |
| PowerFailure | -- | -- | -- | ST | -- | -- | -- | -- | -- | ST | -- | -- |
| PrinterError | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| PrinterTimeout | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| TonerEmpty | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooCold | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooHot | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| LpdJobAborted | -- | -- | -- | -- | RS | -- | -- | -- | -- | -- | RS | -- |
| IppJobAborted | -- | -- | -- | -- | -- | ST | -- | -- | -- | -- | -- | ST |

| General printer error code | 9021 9022-200 | | | | | | 9022 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DIR | HA | PC | TA | LPD | IPP | DIR | HA | PC | TA | LPD | IPP |
| BrokenPipe | -- | -- | -- | ST | ST | ST | -- | -- | -- | ST | ST | ST |
| CoverOpen | -- | -- | -- | -- | -- | -- | WT | RP | RP | WT | -- | -- |
| Cover+OffLine | -- | -- | -- | -- | -- | -- | WT | RP | RP | WT | -- | -- |
| Cover+PaperEnd | -- | -- | -- | -- | -- | -- | WT | RP | RP | WT | -- | -- |
| DataOverflow | -- | -- | -- | -- | -- | -- | ST | ST | ST | ST | -- | -- |
| FormatError | -- | -- | -- | -- | -- | -- | SU | SU | SU | -- | -- | -- |
| Format+CoverOpen | -- | -- | -- | -- | -- | -- | ST | ST | ST | -- | -- | -- |
| Format+OffLine | -- | -- | -- | -- | -- | -- | RP | RP | RP | -- | -- | -- |
| Format+PaperEnd | -- | -- | -- | -- | -- | -- | ST | ST | ST | -- | -- | -- |
| InvalidAck | ST | ST | ST | -- | -- | -- | ST | ST | ST | ST | -- | -- |
| InvalidData | -- | -- | -- | -- | -- | -- | -- | -- | -- | SU | -- | -- |
| LineOverflow | -- | -- | -- | -- | -- | -- | -- | -- | -- | SU | -- | -- |
| Maintenance | -- | -- | -- | -- | -- | -- | -- | -- | -- | SU | -- | -- |
| NegativeTack | RP | RP | RP | -- | -- | -- | RP | RP | RP | -- | -- | -- |
| OffLine | -- | -- | -- | -- | -- | -- | WT | RP | RP | WT | -- | -- |
| OffLine+PaperEnd | -- | -- | -- | -- | -- | -- | WT | RP | RP | WT | -- | -- |
| OutputBinFull | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperEnd | -- | -- | -- | -- | -- | -- | WT | RP | RP | WT | -- | -- |
| PaperJam | -- | -- | -- | -- | -- | -- | -- | -- | -- | WT | -- | -- |
| PaperSize | -- | -- | -- | -- | -- | -- | -- | -- | -- | WT | -- | -- |
| ParityError | -- | -- | -- | -- | -- | -- | -- | -- | -- | IG | -- | -- |
| PowerFailure | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PrinterError | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| PrinterTimeout | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| TonerEmpty | -- | -- | -- | -- | -- | -- | -- | -- | -- | WT | -- | -- |
| TooCold | -- | -- | -- | -- | -- | -- | -- | -- | -- | IG | -- | -- |
| TooHot | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| LpdJobAborted | -- | -- | -- | -- | RS | -- | -- | -- | -- | -- | RS | -- |
| IppJobAborted | -- | -- | -- | -- | -- | ST | -- | -- | -- | -- | -- | ST |

| General printer error code | 9025 9026-RENO | | | | | 9026-PCL | | | | | 9045-ANSI | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **DIR** | **HD** | **TA** | **LPD** | **IPP** | **DIR** | **HD** | **TA** | **LPD** | **IPP** | **TA** | **LPD** | **IPP** |
| BrokenPipe | -- | -- | ST | ST | ST | -- | -- | ST | ST | ST | ST | ST | ST |
| CoverOpen | ST | ST | ST | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cover+OffLine | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cover+PaperEnd | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| DataOverflow | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| FormatError | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+OffLine | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+PaperEnd | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| InvalidAck | ST | ST | ST | -- | -- | ST | ST | -- | -- | -- | -- | -- | -- |
| InvalidData | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| LineOverflow | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Maintenance | RP | RP | RP | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NegativeTack | RP | RP | -- | -- | -- | RP | RP | -- | -- | -- | -- | -- | -- |
| OffLine | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| OffLine+PaperEnd | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| OutputBinFull | WT | WT | WT | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperEnd | WT | WT | WT | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperJam | RP | RP | RP | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperSize | RP | RP | RP | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ParityError | IG | IG | IG | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PowerFailure | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PrinterError | ST | ST | ST | ST | ST | ST | ST | -- | ST | ST | ST | ST | ST |
| PrinterTimeout | ST | ST | ST | ST | ST | ST | ST | -- | ST | ST | ST | ST | ST |
| TonerEmpty | RP | RP | RP | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooCold | IG | IG | IG | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooHot | IG | IG | IG | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| LpdJobAborted | -- | -- | -- | RS | -- | -- | -- | -- | RS | -- | -- | RS | -- |
| IppJobAborted | -- | -- | -- | -- | ST | -- | -- | -- | -- | ST | -- | -- | ST |

| General printer error code | 9046 | | | 9097 | | | | | | 9645 |
|---|---|---|---|---|---|---|---|---|---|---|
| | TA | LPD | IPP | DIR | HA | PC | TA | LPD | IPP | AP |
| BrokenPipe | ST | ST | ST | -- | -- | -- | ST | ST | ST | -- |
| CoverOpen | WT | -- | -- | -- | -- | -- | ST | -- | -- | -- |
| Cover+OffLine | -- | -- | -- | -- | -- | -- | ST | -- | -- | -- |
| Cover+PaperEnd | -- | -- | -- | -- | -- | -- | ST | -- | -- | -- |
| DataOverflow | ST | -- | -- | ST | ST | ST | -- | -- | -- | -- |
| FormatError | -- | -- | -- | SU | SU | SU | -- | -- | -- | -- |
| Format+CoverOpen | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Format+OffLine | -- | -- | -- | RP | RP | RP | -- | -- | -- | -- |
| Format+PaperEnd | -- | -- | -- | ST | ST | ST | -- | -- | -- | -- |
| InvalidAck | -- | -- | -- | ST | ST | ST | ST | -- | -- | ST |
| InvalidData | SU | -- | -- | -- | -- | -- | SU | -- | -- | -- |
| LineOverflow | SU | -- | -- | -- | -- | -- | SU | -- | -- | -- |
| Maintenance | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NegativeTack | -- | -- | -- | RP | RP | RP | -- | -- | -- | RP |
| OffLine | WT | -- | -- | WT | RP | RP | WT | -- | -- | RP |
| OffLine+PaperEnd | -- | -- | -- | WT | RP | RP | WT | -- | -- | -- |
| OutputBinFull | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperEnd | WT | -- | -- | WT | RP | RP | WT | -- | -- | -- |
| PaperJam | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PaperSize | WT | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ParityError | -- | -- | -- | -- | -- | -- | IG | -- | -- | -- |
| PowerFailure | -- | -- | -- | -- | -- | -- | ST | -- | -- | -- |
| PrinterError | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| PrinterTimeout | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| TonerEmpty | -- | -- | -- | -- | -- | -- | WT | -- | -- | -- |
| TooCold | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TooHot | -- | -- | -- | -- | -- | -- | IG | -- | -- | -- |
| LpdJobAborted | -- | RS | -- | -- | -- | -- | -- | RS | -- | -- |
| IppJobAborted | -- | -- | ST | -- | -- | -- | -- | -- | ST | -- |

## EBCDIC Feed Control Characters

| Encoding | | | | | |
|------|-------|------|--------|------|---|
| UTF8 | UTF16 | UTFE | EDF041 | Char | |
| 20 | 0020 | 40 | 40 | V | Advance 0 lines before print |
| C2A0 | 00A0 | 6741 | 41 | | Advance 1 lines before print |
| C3A2 | 00E2 | 68B0 | 42 | â | Advance 2 lines before print |
| C3A4 | 00E4 | 689F | 43 | ä | Advance 3 lines before print |
| C3A0 | 00E0 | 6841 | 44 | à | Advance 4 lines before print |
| C3A1 | 00E1 | 68AA | 45 | á | Advance 5 lines before print |
| C3A3 | 00E3 | 68B1 | 46 | ã | Advance 6 lines before print |
| C3A5 | 00E5 | 68B2 | 47 | å | Advance 7 lines before print |
| C3A7 | 00E7 | 68B5 | 48 | ç | Advance 8 lines before print |
| C3B1 | 00F1 | 688F | 49 | ñ | Advance 9 lines before print |
| 60 | 0060 | 4A | 4A | ` | Advance 10 lines before print |
| 2E | 002E | 4B | 4B | . | Advance 11 lines before print |
| 3C | 003C | 4C | 4C | < | Advance 12 lines before print |
| 28 | 0028 | 4D | 4D | ( | Advance 13 lines before print |
| 2B | 002B | 4E | 4E | + | Advance 14 lines before print |
| 7C | 007C | 4F | 4F | \| | Advance 15 lines before print |
| 00 | 0000 | 00 | 00 | | Advance 0 lines after print |
| 01 | 0001 | 01 | 01 | | Advance 1 lines after print |
| 02 | 0002 | 02 | 02 | | Advance 2 lines after print |
| 03 | 0003 | 03 | 03 | | Advance 3 lines after print |
| C285 | 0085 | 04 | 04 | | Advance 4 lines after print |
| 09 | 0009 | 05 | 05 | | Advance 5 lines after print |
| C286 | 0086 | 06 | 06 | | Advance 6 lines after print |
| 7F | 007F | 07 | 07 | | Advance 7 lines after print |
| C287 | 0087 | 08 | 08 | | Advance 8 lines after print |
| C28D | 008D | 09 | 09 | | Advance 9 lines after print |
| C28E | 008E | 0A | 0A | | Advance 10 lines after print |
| 0B | 000B | 0B | 0B | | Advance 11 lines after print |
| 0C | 000C | 0C | 0C | | Advance 12 lines after print |

| Encoding | | | | | |
|---|---|---|---|---|---|
| **UTF8** | **UTF16** | **UTFE** | **EDF041** | **Char** | |
| 0D | 000D | 0D | 0D | | Advance 13 lines after print |
| 0E | 000E | 0E | 0E | | Advance 14 lines after print |
| 0F | 000F | 0F | 0F | | Advance 15 lines after print |
| 41 | 0041 | C1 | C1 | A | Advance to Channel 1 before print |
| 42 | 0042 | C2 | C2 | B | Advance to Channel 2 before print |
| 43 | 0043 | C3 | C3 | C | Advance to Channel 3 before print |
| 44 | 0044 | C4 | C4 | D | Advance to Channel 4 before print |
| 45 | 0045 | C5 | C5 | E | Advance to Channel 5 before print |
| 46 | 0046 | C6 | C6 | F | Advance to Channel 6 before print |
| 47 | 0047 | C7 | C7 | G | Advance to Channel 7 before print |
| 48 | 0048 | C8 | C8 | H | Advance to Channel 8 before print |
| 49 | 0049 | C9 | C9 | I | Advance to Channel 9 before print |
| C2AD | 00AD | 67CA | CA | | Advance to Channel 10 before print |
| C3B4 | 00F4 | 68BE | CB | ô | Advance to Channel 11 before print |
| 61 | 0061 | 81 | 81 | a | Advance to Channel 1 after print |
| 62 | 0062 | 82 | 82 | b | Advance to Channel 2 after print |
| 63 | 0063 | 83 | 83 | c | Advance to Channel 3 after print |
| 64 | 0064 | 84 | 84 | d | Advance to Channel 4 after print |
| 65 | 0065 | 85 | 85 | e | Advance to Channel 5 after print |
| 66 | 0066 | 86 | 86 | f | Advance to Channel 6 after print |
| 67 | 0067 | 87 | 87 | g | Advance to Channel 7 after print |
| 68 | 0068 | 88 | 88 | h | Advance to Channel 8 after print |
| 69 | 0069 | 89 | 89 | i | Advance to Channel 9 after print |
| C2AB | 00AB | 678A | 8A | {{ | Advance to Channel 10 after print |
| C2BB | 00BB | 678B | 8B | }} | Advance to Channel 11 after print |

## ASA Feed Control Characters

| ASA | | | | | |
|---|---|---|---|---|---|
| **UTF8** | **UTF16** | **UTFE** | **EDF041** | **Char** | |
| 30 | 0030 | F0 | F0 | 0 | Advance 1 lines before print |
| 2D | 002D | 60 | 60 | - | Advance 2 lines before print |
| 2B | 002B | 60 | 4E | + | Advance 0 lines after print |
| 31 | 0031 | F1 | F1 | 1 | Advance to Channel 1 before print |
| 32 | 0032 | F2 | F2 | 2 | Advance to Channel 2 before print |
| 33 | 0033 | F3 | F3 | 3 | Advance to Channel 3 before print |
| 34 | 0034 | F4 | F4 | 4 | Advance to Channel 4 before print |
| 35 | 0035 | F5 | F5 | 5 | Advance to Channel 5 before print |
| 36 | 0036 | F6 | F6 | 6 | Advance to Channel 6 before print |
| 37 | 0037 | F7 | F7 | 7 | Advance to Channel 7 before print |
| 38 | 0038 | F8 | F8 | 8 | Advance to Channel 8 before print |
| 39 | 0039 | F9 | F9 | 9 | Advance to Channel 9 before print |
| 41 | 0041 | C1 | C1 | A | Advance to Channel 10 before print |
| 42 | 0042 | C2 | C2 | B | Advance to Channel 11 before print |

# Parameter file for optional processing (SYSSSI)

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

```
*
* SOURCE IMPLEMENTATION OF PM A0315647
* FUNKTIONS-NAME=PRINT.END.MSG.INSERT=*WORKING-FILENAME /
*                                     *ORIGINAL-FILENAME
* This optional modification allows to insert the original filename
* in the right insert of the termination message SR00726, instead
* of the working filename.
*
PRINT.END.MSG.INSERT=*WORKING-FILENAME
*
*
* SOURCE IMPLEMENTATION OF PM A0324069
* FUNKTIONS-NAME=RSO.MSG.WITH.ANSWER.AT.CONSOLE=*REPEAT /
*                                               *NO-REPEAT
* This optional modification allows to avoid repeating at the console a
* message for which an answer is still expected.
*
RSO.MSG.WITH.ANSWER.AT.CONSOLE=*REPEAT
*
*
* SOURCE IMPLEMENTATION OF PM A0341032
* FUNKTIONS-NAME=PROCESSING.OPEN.CONNECTION.ERROR=*NORMAL /
*                                                 *BYPASS-POOL
* When an open connection error occurs on a printer belonging to a
* printer pool, the print job is put in the wait queue an a new
* scheduling request is asked so that the job can have a chance of
* being scheduled on another printer of a pool. This optional
* modification suppresses this processing, just like for jobs scheduled
* on printers that do not belong to a pool.
*
PROCESSING.OPEN.CONNECTION.ERROR=*NORMAL
*
*
* SOURCE IMPLEMENTATION OF PM A0343359
* FUNKTIONS-NAME=APPLY.CONVERSION.EEHCL2.FORM.F1.DEVICE.9011=*NO /
*                                                            *YES
* This optional modification allows to apply a conversion from EEHCL2
* (polish character set) to EDF04 if the print is issued on a 9011
* device type with the form F1.
*
```

```
APPLY.CONVERSION.EEHCL2.FORM.F1.DEVICE.9011=*NO
*
*
* SOURCE IMPLEMENTATION OF PM A0430761
* FUNKTIONS-NAME=BCAM.VIRTUAL.HOST.NAME=*STD /
*                                       HOSTNAME
* This optional modification allows to use BCAM virtual HOST name.
* The HOSTNAME is the BCAM virtual host name; when it is specified, it
* must be of length 8, in uppercase, eventually with trailing blanks on the
* right side.
*
BCAM.VIRTUAL.HOST.NAME=*STD
*
*
* SOURCE IMPLEMENTATION OF PM A0446841
* FUNKTIONS-NAME=AVOID.BCAM.POOL.SATURATION=*NO /
*                                           *YES
* This optional modification allows to avoid BCAM pool saturation in
* case of infinite connection for special processing of given
* customers for devices having a TCP/IP connection.
* When the device is defined as having a TACLAN connection,
* a network synchronisation and a max. timeout value set to '30',
* it is considered as an infinite timeout time.
* In case of timeout detection and an infinite timeout time,
* no flag is set neither the timeout is reported to RSO.
* A single connection is maintained.
* A SD use=no, force=yes is required to release the pended
* connection. An abortive close connection is issued.
*
AVOID.BCAM.POOL.SATURATION=*NO
*
*
* FUNKTIONS-NAME=IPP-PRINTER-NAME-PREFIX=IPP /
*                                        <alphanum3..3>
* This entry is used by RSO when printing on "IPP2" printers,
* for which the URL is given at /PRINT-DOC command; its usage is
* to give the 3 first characters to generate printer's names to
* be started automatically at print-job arrival.
* The prefix must be given in uppercase.

IPP-PRINTER-NAME-PREFIX=IPP
*
*
* FUNKTIONS-NAME=IPP-PRINTER-TIMOUT=1..2000
* This entry is used by RSO when printing on "IPP2" printers,
* for which the URL is given at /PRINT-DOC command; its usage is
* to give the time in seconds such a device may be started but
* "idling" before stopping it and removing it from url's table.
```

```
* The maximum permitted is 2000 seconds (33 minutes); if greater
* it will be reduced to 2000.
* Set by default to 10 minutes (600 seconds).
*
IPP-PRINTER-TIMOUT=600
*
*
* FUNKTIONS-NAME=IPP-DEVICES-TRACE=*NO / *YES
* This entry is used to let the "IPP2" devices start with or without
* TRACE=*YES, to be able to diagnose easier problems by customers.
* The default is set to *NO in official delivery.
*
IPP-DEVICES-TRACE=*NO
*
*
* SOURCE IMPLEMENTATION OF PM A0401216
* FUNKTIONS-NAME=BYPASS-SOCKETS-CHECK=*NO / *YES
* When BYPASS-SOCKETS-CHECK=*YES is given, the presence of the sockets
* subsystem is not checked at RSO printer start using sockets.
*
BYPASS-SOCKETS-CHECK=*NO
```

**The following tuning options should be appended for the OpenSSL support.**
```
*
*
* FUNKTIONS-NAME=SSL-CIPHER-SUITE=*DEFAULT / <Alphanum1..768>
* This entry is used to specify a cipher suite preference list.
* The default preference list is : ALL:!ADH:!LOW:!EXP:!MD5:@STRENGTH
* No space allowed in the entered value.
*
SSL-CIPHER-SUITE=*DEFAULT
*
*
* FUNKTIONS-NAME=SSL-CERTIFICATE-FILE=*NONE / <Filename1..54>
* This entry is used to specify a file containing the X.509 client
* certificate for client authentication in PEM format.
*
SSL-CERTIFICATE-FILE=*NONE
*
*
* FUNKTIONS-NAME=SSL-KEY-FILE=*NONE / <Filename1..54>
* This entry is used to specify a file containing the private
* client key in PEM format.
*
SSL-KEY-FILE=*NONE
*
*
* FUNKTIONS-NAME=SSL-CA-CERTIFICATE-FILE=*NONE / <Filename1..54>
* This entry is used to specify a file containing the CA certificates
* in PEM format which are required for server authentication.
* The individual PEM certificates are arranged sequentially in the file.
*
SSL-CA-CERTIFICATE-FILE=*NONE
*
*
* FUNKTIONS-NAME=SSL-CA-REVOCATION-FILE=*NONE / <Filename1..54>
* This entry is used to specify a file containing the CRLs
* (Certificate Revocation Lists) of the CAs (Certificate Authorities).
*
SSL-CA-REVOCATION-FILE=*NONE
*
*
* FUNKTIONS-NAME=SSL-USE-CRYPTO-HARDWARE=*NO / *YES
* This entry is used to define whether crypto hardware, for example
* a crypto box (see openCRYPT manual), is to be used for calculating
* cryptographic algorithms.
*
SSL-USE-CRYPTO-HARDWARE=*NO
*
*
```

```
* FUNKTIONS-NAME=SSL-VERIFY-SERVER=*NO / *YES
* This entry is used to define whether the server certificate should
* be verified. Setting this option to *NO makes you vulnerable to man
* in the middle attacks.
*
SSL-VERIFY-SERVER=*NO
*
*
* FUNKTIONS-NAME=SSL-VERIFY-DEPTH=*DEFAULT / <Number1..255>
* This entry is used to define the verification depth, in others words
* the maximum permissible number of certificates between the server
* certificate and the certificate which is known to the client.
* The default verification depth is : 1
*
SSL-VERIFY-DEPTH=*DEFAULT
```

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The manuals are available as online manuals, see *http://manuals.fujitsu-siemens.com*, or in printed form which must be paid and ordered separately at *http://FSC-manualshop.com*.

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