SAP Printing

Customer documentation

Volume 2 : [ZA0x]

The ZA0x (PCL) proprietary Device type family (Device type specification)

Version: 1.50

Abstract:
This document contains device-independent information about the proprietary SAP Device type family indicated above.
It explains the Device type in general, its Formats and Actions and special Print controls.

C o n t e n t s

Trademarks
Microsoft®, Windows® are registered trademarks of Microsoft Corporation in the United States and/or other countries.
PostScript® is a registered trademark of Adobe Systems, Incorporated.
PCL® is a registered trademark of Hewlett-Packard Company.
SAP® and SAP® R/3® are trademarks or registered trademarks of SAP AG in Germany and in several other countries.
Andale and WorldType are registered trademarks of Monotype Imaging, Inc.
Other product names used herein are for identification purposes only and might be trademarks of their respective companies. We disclaim any and all rights in those marks.

Important notice
Parts of this manual are subject to change without prior notice.

1. The Device type

The device type family described here is named **ZA0x**.
This documentation is valid for version **v016**.

There are 2 families: **ZA00** and **ZA01**, with their legacy versions **ZA04** and **ZA05**, respectively.

It consists of the following files:

Device type file	Character set
• **ZA0x1**vvv**.PRI**	1116 (Latin-1 / 0N)
• **ZA0x2**vvv**.PRI**	1416 (Latin-2 / 2N)
• **ZA0xU**vvv**.PRI**	4210 (Unicode / 18N)

The "vvv" in the name indicates the version number.

The device models supported by the device type, its features, and its limitations are indicated below.
A detailed specification is given in the next chapter.

Note: (Difference between ZA00 and ZA01)
The difference between them lies only in the support for barcoding.
Depending on the barcode solution, a different Device type has to be used.
For the "Barcode & OCR Package" (BOP), the Device type **ZA00**1vvv has to be used.
For the "Barcode & OCR Package - Intelligent version" (BOCR), the Device types **ZA01**cvvv (c=1,2,U) have to be used.
For non-barcode printing, the Device types **ZA00**cvvv (c=1,2,U) should be used.

Note: (Legacy versions ZA04 and ZA05)
From DTX v014+, ZA00 and ZA01 support arbitrary scaling of fonts.
For compatibility with the formerly discrete font sizes, which is needed for SAP R/3 releases 3.x, you may now use the legacy versions ZA04 and ZA05, respectively. Please contact Technical support for how to obtain these.

Deviations from HPLJ4

- It has been made more modular, and easier to configure for the customer.
- The places in the "Printer initialization" actions where to configure special device features listed below have been clearly marked.
- Some Print controls have been added to support our devices' input and output bins.
- A workaround for A5 printing has been implemented.
- Print controls have been added for specifying Paper type, Color mode, and Color selection.

1.1 Devices supported

For the devices supported by these device types, refer to the corresponding section in Volume 1.

1.2 Features supported

The following device features are implemented in a generic fashion.
The tags identify the places in the "Printer initialization" action where the settings can be configured.
Please note that some settings require consistent changes at more than 1 place.
The items marked in bold face are the most important ones.
The list is ordered by importance and logic.
For the order of settings as the commands are sent to the printer, see the section "The generic command sequence" below.

Tag	Feature	Affected output
`[PCL.01]*P  INPUT BIN`	**Input Bin**	Page
`[PJL.04]    PAPER TYPE 1/2`	**Paper Type / Fuser Control**	Page
`[PCL.12]    PAPER TYPE 2/2`	dto	Page
`[PJL.17]    DUPLEX MODE 1/2`	**Duplex Mode**	Page
`[PCL.03]*P  DUPLEX MODE 2/2`	dto.	Page
`[PJL.16]    OUTPUT BIN 1/2`	**Output Bin**	Page
`[PCL.02]*P  OUTPUT BIN 2/2`	dto	Page
`[PJL.13]    JOB OFFSET`	Job Offset	Job
`[PJL.02]*P  STAPLING MODE`	**Stapling Mode**	Job
`[PJL.03]*P  PUNCHING MODE`	**Punching Mode**	Job
`[PJL.01]    RESOLUTION 1/2`	Resolution	Job
`[PCL.14]    RESOLUTION 2/2`	dto	Job
`[PJL.15]    COPIES 1/2`	Number of Copies & Collation mode	Job
`[PCL.13]    COPIES 2/2`	dto	Job
`[PJL.14]*P  ECONOMODE`	Econo Mode / Toner Saving	Job

[PJL.12]	AUTOTRAYCHANGE	Auto Tray Change / Switching	Job
[PJL.11]	SMOOTHING	Edge Enhancement / Smoothing	Job
[PJL.06]	PAGE PROTECTION	Page Protection	Job
[PCL.30]*P	**COLOR : COLOR MODE**	**Color printing : Color/Monochrome mode**	Page
[PJL.20]	SLIPSHEET	Slip sheet	Job
[PJL.07]	**EDGE-TO-EDGE MODE**	**Edge-to-edge printing mode**	Page
[PJL.24]	**USERCODE**	**USERCODE**	Job
[PJL.27]*P	JOB SEPARATION	Job Separation	Job

The "Affected output" column indicates which portion of a document is affected by each feature/setting.
This determines the mechanism that needs to be employed in order to make it effective.
- A setting affecting the entire document/job needs to be configured only once, e.g. in the "Printer initialization" action.
- For settings affecting individual pages, paragraphs, or characters, Print controls exist which can be inserted flexibly at any place in the document.
Some of these features can be configured in the device type, for others SAP internal mechanisms exist.

Note: (*P)
Tags flagged with "*P" have POSS support in our Device type, i.e. if the SAP system supports POSS, this feature can be configured using the "Print Options for SAPscript and SmartForms". Refer to the separate section on POSS below.

Note: (Conflict of settings)
Please note that some settings may already be configured by the SAP mechanism and may thus come in conflict with settings made in the device type. This is documented in detail for each affected feature in the corresponding section below.

1.3 Limitations

This section lists the features that are not supported by this device type, independent of the device used.
For limitations related to our devices in general, and those specific for a certain device, see the "Limitations" chapter of the corresponding Volume 3.

SAP features not supported

- SAP Presentation graphics cannot be printed using this device type.
-
- The ABAP formats of these Device types are compatible with the HPLJ4 Device type; they use the standard ABAP list driver. For compatibility with the HPLJ4000 Device type, which uses the **HPL2 ABAP list driver**, which produces a nicer look of tables, please contact Technical support.

Device features not supported

The features below are not supported by this device type, for one or more of the following reasons:
- They are unlikely to be used in a SAP environment (because SAP has its own mechanisms, or it would get in conflict with them).
- Their nature is such that they are rarely changed and should thus rather be configured only once on the device itself.
- They have not been implemented in the device type.
- They cannot be implemented using the SAP device type mechanism.

- Document Server
- Proof Job (Sample print), "Hold print", "Stored print (private/shared)"
- Booklet Finisher : Booklet stapling
-

Note:
For support of device features which are not implemented, please contact Technical support.
For printing of Overlays and Watermarks, please contact Technical support.
For printing from a SAP system to a device with Enhanced Security Features enabled, please contact Technical support.

Note: (Incompatibility with Device types HPxxx regarding Input bins)
The ZA0x Device type is based on the HPLJ4 Device type. However, due to different PCL commands being necessary to address the input bins, the TRYxx Print controls implement a different mapping.

Other limitations

- Some SAPscript documents may appear truncated near the footer or at the right edge. This is inherent in the fact that devices of different manufacturers or models may have slightly different printable areas. It may be corrected by shifting the image a little.

2. The Specification

This chapter contains a detailed specification of the ZA0x device type.

2.1 The SAP printer drivers

One of the attributes specified by this device type is the SAP printer drivers that should be used for SAPscript & SmartForms (OTF) and for ABAP.

2.1.1 The OTF driver (HPL2)

The SAPscript/SmartForms OTF driver used by PCL-based device types is **HPL2**.

HPL2 automatically sends the following command sequence at the start of each page:

```
<...>              -- contents of the "Start of page" action
<esc>&l^^^A        -- paper select; only for standard formats (see below), empty otherwise; only sent initially before 1st page
<esc>&l^^^O        -- set orientation (Portrait/Landscape); only sent initially or when changing
<esc>&l48C         -- set VMI to 48/48" = 1 inch (necessary because the following command would be ignored if VMI was 0)
<esc>&l0E          -- set top margin to 0
<esc>&l0C          -- set VMI to 0
<esc>9             -- set left and right margins to 0
```

The paper select commands sent automatically by HPL2 for standard formats are as follows:

• DINA3	`<esc>&l27A`
• DINA4	`<esc>&l26A`
• DINA5	`<esc>&l25A`
• EXECUTIV	`<esc>&l1A`
• LEGAL	`<esc>&l3A`
• LETTER	`<esc>&l2A`

To achieve text formatting, the driver uses these <u>hard-coded PCL commands</u>:

```
<esc>&k^^^H        -- change HMI/cpi
<esc>&a^^^V        -- vertical positioning
<esc>&a^^^H        -- horizontal positioning
```

Note: (<u>Effect of the Color printer flag</u>)
If the Color printer flag is set in the Output device, the OTF driver behaves differently; this affects mainly TIFF graphics.

2.1.2 The ABAP list drivers (Standard, HPL2)

An ABAP list driver is responsible for converting an ABAP-generated spool request into a command stream in the target page description language.

For a PCL-based device type, one can select from two possible **ABAP list drivers** to be used.
- the **standard** driver ("Do not use printer driver for ABAP list print")
- the PCL-based driver named "**HPL2**" ("Printer driver for PCL-5 (black and white/color)")

The ABAP list driver to be used can be specified as an attribute of the entire device type, as well as of each individual ABAP format.

Initially the ZA0x device types specify that the **standard** ABAP list driver is to be used, with the device type and all its ABAP formats.

However, for specific situations (like colored list output) you may prefer to use the HPL2 driver instead.
Compared with the standard driver, it has the benefit of creating nicer looking output of tables, for example, boxes and background color (as filled rectangles).
On the other hand, only the PJL settings from the "Printer initialization" action of the device type will become effective; all PCL settings are overridden. It also requires a minor modification of the device type (see below).

<u>Modifications required in the Device type when using the HPL2 ABAP list driver</u>

The HPL2 ABAP list driver sends a few commands by itself; see the following table.
This has to be taken into account and compensated in the actions of the device type:

Command	Consequence
At the start of a job:	
• `<esc> E`	-- PCL reset

	=> Any PCL command prior to this, i.e. in the "Printer initialization" action, will not have any effect. Essentially this affects the Output bin, Input bin, and Duplex mode settings. You need to use the corresponding PJL command, if available. The TROxx, TRYxx and SPMxx print controls will still work for switching. See the corresponding sections of Volume 3 for more information.
• `<esc> & l 1 X`	-- force 1 copy => Specifying multiple copies in the device type is not possible.
At the end of each page:	
• `<FF>`	-- form feed => The "\f" in the "End of page" (ENDPAGE) action of every format used needs to be commented out. Otherwise an extra blank sheet would be ejected after each page.

Due to the fact that the HPL2 ABAP list driver sends some hard-coded PJL and PCL commands of its own, including a UEL, thus circumventing the Device type, the settings specified in PJL and PCL commands from the SETUP action of the Device type are voided or overridden.
As a consequence, any <u>PCL</u> commands from the SETUP action (e.g. tag [PCL.02] for output bin select) of the X_ll_cc format have to be (**re-**)**specified** in the **FRSTPAGE** action.
Likewise, in order to avoid voiding of the <u>PJL</u> commands from the SETUP action, it has to specify "**@PJL JOB**" at its beginning (tag [PJL.JOB]).
In that case, also "**@PJL EOJ**" should be specified at the end of the job (tag [PJL.EOJ] in the LEAVE action).
This will prevent the UEL from acting as a job boundary.

Color printing with ABAP

Note: (<u>Effect of the Color printer flag</u>)
The HPL2 ABAP list driver behaves differently, depending on the Color printer flag in the Output device.
If it is set, colored background rectangles are generated.
Otherwise these are simulated by grey patterns.
The standard ABAP list driver is not affected; it only features foreground color.

Note: (<u>Printing ABAP reports on color devices</u>)
For Device types ZA0x version v006 and less, the color "Black" is not printed with the standard ABAP list driver on color devices. As a workaround, the HPL2 ABAP list driver should be used instead.

2.2 The Formats

The ZA0x device type supports all common SAP standard format types, as indicated below.

In addition, it defines the following <u>non-standard formats</u>:
• ZLEDGER
• Z_AUX

The "Printer initialization" actions of the device formats have been modified to allow for configuring our device-specific settings; see below.

The following tables give the specification of each device format.

2.2.1 **SAPscript formats**

These formats are used by SAPscript and SmartForms.

Format	Cover page	Paper select command sent
• **DINA3**	default	`<esc>&l27A` -- (automatic / OTF driver)
• **DINA4**	default	`<esc>&l26A` -- (automatic / OTF driver)
• **DINA5**	default	`<esc>&l2000A` -- (explicitly) `<esc>&l25A` -- (automatic / OTF driver)
• **EXECUTIV**	default	`<esc>&l1A` -- (automatic / OTF driver)
• **LEGAL**	default	`<esc>&l3A` -- (automatic / OTF driver)
• **LETTER**	default	`<esc>&l2A` -- (automatic / OTF driver)
• **ZLEDGER** (*)	default	`<esc>&l6A` -- (explicitly)
• **POSS** (**)	yes	(automatic by OTF driver, depending on actual Page format)
• **INCH11**	none	none
• **INCH12**	none	none
• **INCH4**	none	none
• **INCH4C**	none	none
• **INCH6**	none	none
• **INCH8**	none	none
• **LINE_21**	none	none

• **LINE_22**	none	none									

Note: (*) (<u>ZLEDGER</u>)
This has been added as a non-standard SAPscript format to support the US Ledger (Tabloid, Double Letter) paper format for SAPscript and SmartForms.
However, before it can be used, a new Page format, named ZLEDGER, must be created first, for both Portrait and Landscape, with the measures of 11" x 17".
The "Printer initialization" action sends the paper select command "`<esc>&l6A`".
The default Cover page is used.
As text for the Comment field of the automatically generated Format type, you may want to specify something like "SAPscript US LEDGER (Double Letter)".

Note: (**) (<u>POSS</u>)
This format exists since DTX v016. It supports configuring settings without the need of changing the Device type. Refer to the separate section "POSS" below.

2.2.2 ABAP formats

These formats are used by ABAP list printing.
Same values as for HPLJ4.

<u>**For the standard ABAP list driver**</u> (in SETUP action)

Format	Orient.	Cover page	VMI (&l#C)	=> act'l lpi	HMI (&k#H)	=> act'l cpi	Font used (Courier / LetterGothic)	_h (Andale)	_v	actually (DIN A4)	fitting (Letter)
• **X_44_120**	-- L	default	8.0	6.0	10.0	12.0	10 cpi	12.00v		47 x 136	48 x 128
• **X_58_170**	-- L	default	6.0	8.0	7.0	17.1	16.67 cpi	9.00v		63 x 194	65 x 182
• **X_65_132**	-- L	default	5.2	9.2	9.2	13.0	16.67 cpi	9.00v		73 x 148	75 x 139
• **X_65_200**	-- L	default	5.4	8.9	6.3	19.0	18.94 cpi	7.20v			
• **X_65_255**	-- L	default	5.2	9.2	5.0	24.0	16.67 cpi	5.80v		73 x (255)	75 x (255)
• **X_65_80**	P --	default	7.2	6.66	11.0	10.9	10 cpi	12.00v		76 x 85	71 x 87
• **X_90_120**	P --	default	5.3	9.0	7.5	16.0	16.67 cpi	8.20v		103 x 125	97 x 128
• **X_PAPER**	P --	defined	7.5	6.4	11.0	10.9	10 cpi	12.00v		--	--
• **X_SPOOLERR**	P --	defined	7.5	6.4	11.0	10.9	10 cpi	12.00v		--	--

2.2.3 Graphics formats

Not supported.

2.2.4 Auxiliary formats

• **Z_AUX**
This format is used to define some "pseudo" actions containing useful command sequences.
The actions can be referred to from other actions of this device type using the \i inclusion mechanism, provided the SAP system version is R/3 4.0 or higher. They cannot be used directly.

Action name	Usage
• **XSUPPORT**	This action contains print job related information relevant for support. The data is obtained as values of common SAP system variables and embedded in the data stream as PJL COMMENT lines. If you don't wish to have this information disclosed to anyone, the \i line needs just to be commented out by prefixing a "#". Initially it is commented out.
• **XBARC**	This action contains commands used for initializing barcode printing. It is included in the "Printer initialization" (SETUP) action of each Device format. Please refer to the section "Barcodes and OCR text" below.

2.3 The Actions

Initially the actions have the following contents:

Action ID	Action name	Typical / Default contents (PCL)
• **ENDLINE**	"End of line"	"`<CR><LF>`"
• **ENDPAGE**	"End of page"	- (SAPscript): empty - (ABAP): "`<CR><FF>`"
• **FRSTPAGE**	"First page"	- (SAPscript): not existing - (ABAP): see (**) below

• `LEAVE`	"Reset after exit" (sent at end of job)	see 'The "Reset after exit" actions' below
• `SETUP`	"Printer initialization" (sent at beginning of job)	see 'The "Printer initialization" actions' below
• `TITLE`	"Cover page"	see 'The "Cover page" actions' below
• `XEDGEDGP` • `XEDGEDGL`	"XEDGEDGP" "XEDGEDGL"	see (*) below

All other actions are initially inactive/empty.

Note: (*) (The XEDGEDGP/L actions)
The formats "DINA3", "DINA4", "DINA5", "EXECUTIVE", "LEGAL", "LETTER", and "ZLEDGER", define the additional actions "XEDGEDGP" and "XEDGEDGL". These actions are used for edge-to-edge printing with HP-GL/2 (which is used for barcode printing). For where to get detailed information, please refer to the section "Barcodes and OCR Text" below.

Note: (**) (The FRSTPAGE actions for ABAP formats X_ll_cc)
The ABAP formats "X_ll_cc" define the additional action "FRSTPAGE" ("First page"). It needs (only) to be used when the HPL2 ABAP list driver is active, in order to re-specify any PCL commands from the SETUP action, which get voided, and to possibly override any other commands issued by that driver.
In particular, it may be used to force a different font typeface.
For the ZA0xU Device types, it allows to choose between Courier, Letter Gothic, and Andale_J (initial default).

2.4 The "Printer initialization" actions

Initially, for every format the **"Printer initialization" action** consists of the following parts:
1. Generic command sequence   (see the next section)
2. Format-specific commands   (see the following subsections)

Note: In a "Printer initialization" action, all PJL commands have to come before any PCL command.

2.4.1 The format-specific commands (SAPscript)

They contain the following commands:
1. UEL (Universal Exit Language)
2. Switch to PCL
3. PCL reset
4. Set character set
5. Disable perforation skip mode

They do NOT specify
- VMI / lpi
- HMI / cpi
- Font

2.4.2 The format-specific commands (ABAP)

They contain the following commands:
1. UEL (Universal Exit Language)
2. Switch to PCL
3. PCL reset
4. Set orientation
5. Set character set
6. Disable perforation skip mode
7. Set VMI / lpi
8. Define PCL macros 1 & 2 (used in Print Control COLxy to switch between normal (1) and bold (2) font)
9. Execute macro 1 to set normal font
10. Define PCL macros 460,...,470 (for box character drawing using elements from the 10U symbol set; these are called in character set 1116)

They do NOT specify
- Paper select

2.4.3 The Generic command sequence

The **generic command sequence** is similar to the output of the Windows drivers of our devices.

It has been designed with the following layout.

The two **top lines** are to indicate the column number and the maximal length (72). Please do not remove them.

```
#000000001111111111222222222233333333334444444444555555555566666666667777
#234567890123456789012345678901234567890123456789012345678901234567890012
```

The action is divided into several "**segments**", with one for every setting. A segment consists of a block of two or more lines surrounded by a pair of separator lines, which contains the code to specify a particular setting.

```
  ## ================================================
  ## [PCL.01] INPUT BIN
  #\e&l8H
  ## ================================================
```

The **separator lines** are to visually separate adjacent segments. They should not be removed.

The "#" is the SAP **comment** symbol.
If it is present, the command behind it will be ignored, that is it will not be sent. Thus current device setting will remain effective, unless it is overridden by a later command.
If it is absent, the command will be sent to the printer.
A "##" is to indicate that it should never be removed.

The **1st line** of a segment identifies the entry by the unique **tag** ("[PCL.01]") and the **feature name** ("INPUT BIN").
The tag uniquely identifies the PDL and the feature. It helps to quickly find the location where a particular setting is configured.

The **2nd line** (and possibly following lines) of a segment is the one the customer may (need to) edit.
Initially the command contains a default value, and may be commented out.
   [#] <command>
Since the device type is released in a generic fashion, that means suitable for any device, most commands are **initially** commented out and/or have default values.
The **syntax** of each **command** and possible **values** and their **interpretation** are device-specific information and hence explained in Volume 3.
If a segment contains more than one command, which may be used in a combined or exclusive manner, each is identified by the segment tag plus a 1-character extension, e.g. "[PJL.11a]".

Untagged segments should not and need not be modified.

The "**@PJL COMMENT ...**" lines contain the following information:
- name of the original device type family, e.g. (ZAxxcvvv)
- name of the original device type, e.g. (ZAxxcvvv)
- version = release date (yyyymmdd010000), e.g. (20001120010000)
- name of the format, e.g. (DINA4)
- real-time values of some relevant SAP system variables, e.g. $(SPOOLID)
These can be helpful with troubleshooting.

Note:
Please note that the spelling of commands is case-sensitive (uppercase/lowercase), and beware of possible extra trailing/leading blanks.
In particular, the values must be typed exactly as written.

Note: (Inclusion/reference mechanism)
From R/3 release 4.0+ a special **inclusion/reference mechanism** can be used to include the command sequence from another action of another device format of another device type.
The syntax is:
   \ i < <device type> **:** <device format> **:** <action> **>**
For example: "\i<HPLJ4:DINA4:SETUP>" or "\i<ZA001002:Z_AUX:XSUPPORT>".
To refer to a format of the referring device type itself, the character "*" or the SAP system variable "$(DRUCKERTYP)" can be used for <device type>.
For example: "\i<*:Z_AUX:XSUPPORT>".
For older releases (3.x) this command will not be interpreted and thus just be printed out as is.
In that case, please comment this line out.

The following listing shows the **<u>generic command sequence with the initial settings</u>**.

```
##00000001111111111222222222233333333334444444444555555555566666666667777
##3456789012345678901234567890123456789012345678901234567890123456789012
##======================================================================
## [---.01] uncomment for Troubleshooting ONLY
#\e&s0C\eY
##======================================================================
## -- UEL command: enter PJL
\e%-12345X@PJL\r\n
##======================================================================
@PJL COMMENT (ZAxxcvvv) ($model$ ) ($date$       ) ($format$) \r\n
##
## -- include SAP system variables for support
#\i<*:Z_AUX:XSUPPORT>
##
##======================================================================
## [PJL.JOB]
#@PJL JOB \r\n
#@PJL SET JOBNAME="$(USER) [$(SPOOLID).$(JOBNO)] $(DSN) $(SUFFIX2)"\r\n
##======================================================================
##======================================================================
## [PJL.24] USERCODE
#@PJL SET USERCODE = "01234567" \r\n
##======================================================================
## [PJL.06] PAGE PROTECTION
##@PJL SET PAGEPROTECT = AUTO \r\n
##======================================================================
## [PJL.15] COPIES 1/2
#@PJL SET QTY = 1 \r\n
#@PJL SET COPIES = 1 \r\n
```

```
##========================================================================
## [PJL.11] SMOOTHING
#@PJL SET SMOOTHING = ON \r\n
#@PJL SET RET = ON \r\n
##========================================================================
## [PJL.01] RESOLUTION 1/2
@PJL SET RESOLUTION = 600 \r\n
##========================================================================
## [PJL.07] EDGE-TO-EDGE MODE
#@PJL SET EDGETOEDGE = NO \r\n
##========================================================================
## [PJL.02] STAPLING MODE
###\p<POSSOPT:08>
#@PJL SET STAPLE = OFF \r\n
##========================================================================
## [PJL.03] PUNCHING MODE
###\p<POSSOPT:07>
#@PJL SET PUNCH = OFF \r\n
#@PJL SET PUNCHHOLE = xxx \r\n
##========================================================================
## [PJL.17] DUPLEX MODE 1/2
#@PJL SET DUPLEX = ON \r\n
#@PJL SET BINDING = LONGEDGE \r\n
##========================================================================
## [PJL.16] OUTPUT BIN 1/2
#@PJL SET OUTBIN = UPPER \r\n
##========================================================================
## [PJL.12] AUTOTRAYCHANGE
#@PJL SET AUTOTRAYCHANGE = ON \r\n
##========================================================================
## [PJL.20] SLIPSHEET
#@PJL SET SLIPSHEETPRINT = OFF \r\n
#@PJL SET SLIPSHEETPRINTTRAY = TRAY1 \r\n
#@PJL SET DOCBODYTRAY = BYPASS \r\n
#@PJL SET TRAY = BYPASS \r\n
##========================================================================
## [PJL.27] JOB SEPARATION
###\p<POSSOPT:05>
#@PJL SET JOBSEPARATION = OFF \r\n
##========================================================================
## [PJL.13] JOB OFFSET
#@PJL SET JOBOFFSET = OFF \r\n
##========================================================================
## [PJL.14] ECONOMODE (TONER SAVER)
###\p<POSSOPT:10>
#@PJL SET ECONOMODE = OFF \r\n
##========================================================================
## [PJL.04] PAPER TYPE 1/2
#@PJL SET FUSERCONTROL = PLAINPAPER \r\n
#@PJL SET MEDIATYPE = PLAIN \r\n
##========================================================================
##
@PJL ENTER LANGUAGE=PCL\r\n
## -- PCL reset
\eE
##========================================================================
## [PCL.91] BARCODE SUPPORT
## -- include barcode support
\i<*:Z_AUX:XBARC>##========================================================================
## [PCL.90] COLOR SUPPORT
## -- select Simple RGB color space; do NOT change
\e*r3U
##========================================================================
## [PCL.30] COLOR : COLOR MODE
###\p<POSSOPT:03>
#\e&b0M
##========================================================================
## [PCL.14] RESOLUTION 2/2
\e&u7200D
##========================================================================
## [PCL.13] COPIES 2/2
\e&l1X
##========================================================================
## [PCL.01] INPUT BIN
###\p<POSSOPT:01>
#\e&l7H
##========================================================================
## [PCL.02] OUTPUT BIN 2/2
###\p<POSSOPT:02>
#\e&l1G
##========================================================================
## [PCL.12] PAPER TYPE 2/2
#\e&n6WdPlain
##========================================================================
## [PCL.03] DUPLEX MODE 2/2
###\p<POSSOPT:04>
#\e&l0S
##========================================================================
```

```
##=========================================================================
## [PCL.92] UNICODE SUPPORT
!!include UNICODESUPPORT        -- (*1)
##=========================================================================
## [SAP specific]
##
## Defaults (may be overridden):
##
## -- Orientation = Portrait
\e&l0O
## -- Vertical spacing = 6 lpi
\e&l6D
## -- Top margin = 1
\e&l1E
## -- Character set = $cT$
$cH$
## -- skip perforation region off
\e&l0L
##
##
```

Note: The placeholders $...$ stand for the following:

• $model$ = Device type		SAP character set	HP symbol set	cH	cT
• ZAxx**1**vvv	Latin-1	1116	0N	\e(0N	(1116)
• ZAxx**2**vvv	Latin-2	1416	2N	\e(2N	(1416)
• ZAxx**U**vvv	Unicode	4210	18N	\e(18N	(4210)

- • $date$ = release date (yyyymmdd010000)
- • $format$ = name of Format type

Note: (*1) (`[PCL.92] UNICODE SUPPORT`)
The line "`!!include UNICODESUPPORT`" is mapped to:

- for ZA0xU :	`## -- Unicode: switch to UTF-8 mode`
	`\e&t83P`
- for ZA0xc (c=1,2) :	`## -- switch to SBCS mode`
	`\e&t0P`

Note: ("`###\p<POSSOPT:...>`")
These entries are only effective for the Format "POSS". Refer to the separate section on POSS below.

2.5 The "Reset after exit" actions

The **"Reset after exit"** action defines the command sequence sent at the end of a job.

```
## -- PCL reset
\eE
##=========================================================================
## [PJL.EOJ]
#\e%-12345X@PJL EOJ \r\n
##=========================================================================
## -- UEL
\e%-12345X
##
```

2.6 The "Cover page" actions

The **"Cover page" action** of the X_PAPER format defines the **default** cover page.
The text contains variables, so that the language can be switched.
The proper alignment of the text columns in all languages is achieved through the <TAB> character \x09.

This cover page is automatically used by any device format which doesn't define its own "Cover page" action, provided the user specified in the Print parameters dialog that a cover page should be printed at all.
In order to **suppress** the default cover page for a particular format, its "Cover page" action must be defined, but with an empty command sequence, e.g. "# no title".

Note: (Cover page suppression)
Because their odd size cannot fit the cover page as defined in X_PAPER, suppression is in effect in ZA0x for all endless paper SAPscript formats except INCH12, i.e. { INCH11, INCH4, INCH4C, INCH6, INCH8, LINE_21, LINE_22 }.

```
...

#
```

```
# -- force Portrait mode
\e&l0O
#
# -- print title page
\r\n
\r\n
\r\n
\r\n
\r\n
\r\n
------------------------------------------------------ -----------------
-\r\n
---- SSSSSSSSS ---------- AA ------- PPPPPPPPP ---- ----------------\r
\n
-- SSSSSSSSSSSSS ------- AAAA ------- PPPPPPPPPPP -- --------------\r\n
-- SSSSSS -- SS ------- AAAAAA ------ PPPP -- PPPP - ------------\r\n
--- SSSSSSS ---------- AAA  AAA ----- PPPP -- PPPP - ----------\r\n
----- SSSSSSS ------- AAAAAAAAAA ---- PPPPPPPPPPP -- ---------\r\n
------- SSSSSSS ---- AAAAAAAAAAA --- PPPPPPPPPP --- -------\r\n
-- SS --- SSSSSS -- AAAA ---- AAAA -- PPPP -------- -----\r\n
- SSSSSSSSSSSSSSS - AAAA ------ AAAA - PPPP -------- ---\r\n
--- SSSSSSSSSS --- AAAA ------ AAAA - PPPP -------- -\r\n
\r\n
\r\n
\r\n
$(TITEL)\r\n
\r\n
\r\n
\r\n
                $(TP_CLIENT)    \x09$(MANDANT)\r\n
\r\n
                $(TP_RECEVR)    \x09$(EMPFAENGER)\r\n
\r\n
                $(TP_DEPART)    \x09$(ABTEILUNG)\r\n
\r\n
\r\n
                $(TP_SPOREQ)    \x09$(DSN) $(SUFFIX1) $(SUFFIX2)\r\n
\r\n
                $(TP_SREQNO)    \x09$(SPOOLID)\r\n
\r\n
\r\n
                $(TP_DTABSE)    \x09$(DB)\r\n
\r\n
                $(TP_OWNER)     \x09$(EIGNER)\r\n
\r\n
                $(TP_DEVTYP)    \x09$(DRUCKERTYP)\r\n
\r\n
                $(TP_FORM)      \x09$(FORMULAR)\r\n
\r\n
                $(TP_PRIO)      \x09$(PRIO)\r\n
\r\n
\r\n
                $(TP_COUNT)     \x09$(ANZAHL)\r\n
\r\n
                $(TP_OUTREQ)    \x09$(DRUCKAUFTRAG)\r\n
                  $(TP_CREATE)  \x09 $(ERZEUGT)\r\n
                  $(TP_FROM)    \x09 $(BENUTZER)\r\n
                  $(TP_PRINT)   \x09 $(GEDRUCKT)\r\n
                  $(TP_HOST)    \x09 $(RECHNER)\r\n
                  $(TP_DEVICE)  \x09 $(DRUCKER)\r\n
\r\n
##              Original Spool ID   $(DSNOE)\r\n
\r\n
##              Time                $(SUFFIX1MD)\r\n
\f
#
#
```

Note:
The "Cover page" action should not specify any commands for Stapling, because the Cover page is only 1 page.

Note: (Cover page with POSS)
Under POSS, when printing specifying a SAPscript format, say DINA5, the cover page is determined as follows.
- If the "Cover page" action for Format POSS is defined in the Device type, it will be applied.
- If the "Cover page" action for Format POSS is undefined in the Device type, no cover page will be sent.
The existence and contents of the "Cover page" action of the original Format (e.g. DINA5) plays no role under POSS.

2.7 The Print controls

The following table contains those Print controls that ZA0x defines.
The "<esc>(0N" are replaced accordingly for other character sets.

Print control	Implementation / Effect		Command sequence (*5)
`CI___`	**=== HMI /CPI ===**		
CI005	24/120" = 5 cpi		`<esc>&k24H`
CI006	20/120" = 6 cpi		`<esc>&k20H`
CI008	15/120" = 8 cpi		`<esc>&k15H`
CI010	12/120" = 10 cpi (Default)		`<esc>&k12H`
CI012	10/120" = 12 cpi		`<esc>&k10H`
CI015	8/120" = 15 cpi		`<esc>&k8H`
CI016	7.5/120" = 16 cpi		`<esc>&k7.5H`
`CO___`	**=== Font colors ===**		
CO001	Black		`<esc>*v8S`
CO002	Red		`<esc>*v1S`
CO003	Blue		`<esc>*v4S`
CO004	Green		`<esc>*v2S`
CO005	Yellow		`<esc>*v3S`
CO006	Magenta		`<esc>*v5S`
`COL__`	**=== Font colors/intensity ===** (*1)		
COL0H	RGB Black,	execute macro 2	`<esc>*v8S<esc>&f2y2X`
COL0N	RGB Black,	execute macro 1	`<esc>*v8S<esc>&f1y2X`
COL0V	RGB Black,	execute macro 1	`<esc>*v8S<esc>&f1y2X`
COL1H	RGB Blue,	execute macro 2	`<esc>*v4S<esc>&f2y2X`
COL1N	RGB Blue,	execute macro 1	`<esc>*v4S<esc>&f1y2X`
COL1V	RGB Blue,	execute macro 1	`<esc>*v4S<esc>&f1y2X`
COL2H	RGB Black,	execute macro 2	`<esc>*v8S<esc>&f2y2X`
COL2N	RGB Black,	execute macro 1	`<esc>*v8S<esc>&f1y2X`
COL2V	RGB Black,	execute macro 1	`<esc>*v8S<esc>&f1y2X`
COL3H	RGB Yellow,	execute macro 2	`<esc>*v3S<esc>&f2y2X`
COL3N	RGB Yellow,	execute macro 1	`<esc>*v3S<esc>&f1y2X`
COL3V	RGB Yellow,	execute macro 1	`<esc>*v3S<esc>&f1y2X`
COL4H	RGB Cyan,	execute macro 2	`<esc>*v6S<esc>&f2y2X`
COL4N	RGB Cyan,	execute macro 1	`<esc>*v6S<esc>&f1y2X`
COL4V	RGB Cyan,	execute macro 1	`<esc>*v6S<esc>&f1y2X`
COL5H	RGB Green,	execute macro 2	`<esc>*v2S<esc>&f2y2X`
COL5N	RGB Green,	execute macro 1	`<esc>*v2S<esc>&f1y2X`
COL5V	RGB Green,	execute macro 1	`<esc>*v2S<esc>&f1y2X`
COL6H	RGB Red,	execute macro 2	`<esc>*v1S<esc>&f2y2X`
COL6N	RGB Red,	execute macro 1	`<esc>*v1S<esc>&f1y2X`
COL6V	RGB Red,	execute macro 1	`<esc>*v1S<esc>&f1y2X`
COL7H	RGB Magenta,	execute macro 2	`<esc>*v5S<esc>&f2y2X`
COL7N	RGB Magenta,	execute macro 1	`<esc>*v5S<esc>&f1y2X`
COL7V	RGB Magenta,	execute macro 1	`<esc>*v5S<esc>&f1y2X`
`FO___`	**=== Font select ===**		
FO000	Courier 12 (10cpi)		`<esc>(s10H<esc>(s12V<esc>(s0S<esc>(s0B<esc>(s3T<SI>`
FO001	Courier 12 (10cpi)		`<esc>(s10H<esc>(s12V<esc>(s0S<esc>(s0B<esc>(s3T<SI>`
FO002	Courier 12 (10cpi) bold		`<esc>(s10H<esc>(s12V<esc>(s0S<esc>(s3B<esc>(s3T<SI>`
FO003	Courier 12 (10cpi) italic		`<esc>(s10H<esc>(s12V<esc>(s1S<esc>(s0B<esc>(s3T<SI>`
FO004	Line Printer 8.5 (*4)		`<esc>(s16.66h8.5V<esc>(s0S<esc>(s0B<esc>(s0T<SI>`
`LI___`	**=== LPI ===**		
LI003	3 lpi		`<esc>&l3D`
LI004	4 lpi		`<esc>&l4D`
LI006	6 lpi		`<esc>&l6D`
LI008	8 lpi		`<esc>&l8D`
LI010	10 lpi		`<esc>&l10D`
LI012	12 lpi		`<esc>&l12D`
`S____`	**=== Character set select ===**		
S0000	standard font		<empty>
S1100	Latin-1 (ISO 8859-1)		<empty>
S1116	Latin-1 (ISO 8859-1)		`<esc>(0N`
S1160	Latin-1 (Windows 3.1)		`<esc>(19U`
S1401	Latin-2 (ISO 8859-2)		<empty>
S1404	Latin-2 (Windows 3.1)		`<esc>(9E`
S1416	Latin-2 (ISO 8859-2)		`<esc>(2N`
	-		
S1700			<empty>
S4001	OCR-A		<empty>
S4004	OCR-B		<empty>
`SB___`	**=== Barcode select ===** (*2)		
`SBP`00	BC_ESC		`<esc>`
SBP01	ARTNR		<solution-dependent>

SBP02	AUFNR	<solution-dependent>
SBP03	BARCLVS	<solution-dependent>
SBP04	KUNAUNR	<solution-dependent>
SBP05	KUNAUPS	<solution-dependent>
SBP06	MBBARC	<solution-dependent>
SBP07	MBBARC1	<solution-dependent>
SBP08	RSNUM	<solution-dependent>
SBP09	RSPOS	<solution-dependent>
SBP10	RUECKNR	<solution-dependent>
SBP11	BC_CD39	<solution-dependent>
SBP12	BC_EAN8	<solution-dependent>
SBP13	BC_EAN13	<solution-dependent>
SBP14	BC_I25C	<solution-dependent>
SBP15	BC_I25	<solution-dependent>
SBP16	BC_CD39C	<solution-dependent>
SBP17	BC_MSI	<solution-dependent>
SBP18	BC_MSIC	<solution-dependent>
SBP19	BC_MSIC1	<solution-dependent>
SBP20	BC_MSIC2	<solution-dependent>
SBP21	BC_C128B	<solution-dependent>
SBP22	BC_EANH	<solution-dependent>
SBP23	BC_PSN5	<solution-dependent>
SBP24	BC_PSN9	<solution-dependent>
SBP25	C128A_00/01	<solution-dependent>
SBP26	C128B_00/01	<solution-dependent>
SBP27	CD39C_00/01	<solution-dependent>
SBP28	CD39_00/01	<solution-dependent>
SBP29	BC_93	<solution-dependent>
SBP30	BC_PSN11	<solution-dependent>
SBP99	(unassigned)	<empty>
SBSxx	Barcode deselect	<solution-dependent>
SF___	**=== Font select ===** (*7)	Refer to the section "The Fonts" below.
SI___	**=== Font size / height (point) ===**	
SI001	12 pt	<esc>(s12V
SI002	10 pt	<esc>(s10V
SI003	8 pt	<esc>(s8V
SI098	16 pt	<esc>(s16V
SI099	14 pt	<esc>(s14V
TRO__	**=== Output bins ===** (*3)	
TRO01	(DEVICE-SPECIFIC)	<esc>&l1G
TRO02	(DEVICE-SPECIFIC)	<esc>&l100G
TRO03	(DEVICE-SPECIFIC)	<esc>&l101G
TRO04	(DEVICE-SPECIFIC)	<esc>&l2G
TRO05	(NOT SUPPORTED)	<esc>&l102G
TRO06	(NOT USED)	<empty>
TRO07	(NOT USED)	<empty>
TRO08	(NOT USED)	<empty>
TRO09	(NOT USED)	<empty>
TRO10	(DEVICE-SPECIFIC)	<esc>&l3G
TRO11	(DEVICE-SPECIFIC)	<esc>&l4G
TRO12	(DEVICE-SPECIFIC)	<esc>&l5G
TRO13	(DEVICE-SPECIFIC)	<esc>&l6G
TRO14	(DEVICE-SPECIFIC)	<esc>&l7G
TRO15	(DEVICE-SPECIFIC)	<esc>&l8G
TRO16	(DEVICE-SPECIFIC)	<esc>&l9G
TRO17	(DEVICE-SPECIFIC)	<esc>&l10G
TRO18	(DEVICE-SPECIFIC)	<esc>&l11G
TRO19	(DEVICE-SPECIFIC)	<esc>&l12G
TROST	(DEVICE-SPECIFIC)	<esc>&l1G
TRY__	**=== Input bins ===** (*3,*4)	
TRY01	(DEVICE-SPECIFIC)	<esc>&l8H
TRY02	(DEVICE-SPECIFIC)	<esc>&l1H
TRY03	(DEVICE-SPECIFIC)	<esc>&l4H
TRY04	(DEVICE-SPECIFIC)	<esc>&l30H
TRY05	(DEVICE-SPECIFIC)	<esc>&l5H
TRY06	(NOT USED)	<empty>
TRY07	(NOT USED)	<empty>
TRY08	(NOT USED)	<empty>
TRY09	(NOT USED)	<empty>
TRYB4	(DEVICE-SPECIFIC)	<esc>&l22H
TRYB5	(DEVICE-SPECIFIC)	<esc>&l23H
TRYB6	(DEVICE-SPECIFIC)	<esc>&l24H

TRYB7	(DEVICE-SPECIFIC)	`<esc>&l25H`
TRYEN	Envelope Feeder	`<esc>&l6H`
TRYME	Manual Envelope Feeder	`<esc>&l3H`
TRYMN	Bypass / Manual Tray	`<esc>&l2H`
TRYST	(DEVICE-SPECIFIC)	`<esc>&l0H`
	=== Miscellaneous / Other ===	
RESET		`<empty>`
RSTND		`<empty>`
S<<<<		`<empty>`
S>>>>		`<empty>`
SABLD	execute macro 2 (*1,*4)	`<esc>&f2y2X`
SAOFF	execute macro 1 (*1,*4)	`<esc>&f1y2X`
SAULN		`<empty>`
SESCP		`<esc>`
SLAND		`<esc>&l1O`
SLINE		`<CR><LF>`
SPAGE		`<FF>`
SPORT		`<esc>&l0O`
SPMDU		`<esc>&l1S`
SPMSI		`<esc>&l0S`
SPMTU		`<esc>&l2S`
SUL<<		`<esc>&d0D`
SUL>>		`<esc>&d@`
SC100	= 12/120" = 10 cpi	`<esc>&k12H`
SC120	= 10/120" = 12 cpi	`<esc>&k10H`
SC150	= 8/120" = 15 cpi	`<esc>&k8H`
SL040	= 12/48" = 4 lpi	`<esc>&l12C`
SL060	= 8/48" = 6 lpi	`<esc>&l8C`
SL080	= 6/48" = 8 lpi	`<esc>&l6C`
X0xxx	**=== General** (proprietary) **===**	
X000Y	start hex mode (with EOL wrap)	`<esc>&s0C<esc>Y`
X000Z	end hex mode	`<esc>Z`
XBxxx	**=== Barcodes** (proprietary) **===** (*2)	
XCxxx	**=== Color** (proprietary) **===**	
XCLR0	enter Monochrome mode (Color off)	`<esc>&b1M`
XCLR1	enter Color mode (Color on)	`<esc>&b0M`
	-- select text color (via palette index)	**Note:** This may not always work, e.g. if the palette is changed by the driver.
XCXX0	select color with index 0 (Black)	`<esc>*v0S`
XCXX1	select color with index 1 (Red)	`<esc>*v1S`
XCXX2	select color with index 2 (Green)	`<esc>*v2S`
XCXX3	select color with index 3 (Yellow)	`<esc>*v3S`
XCXX4	select color with index 4 (Blue)	`<esc>*v4S`
XCXX5	select color with index 5 (Magenta)	`<esc>*v5S`
XCXX6	select color with index 6 (Cyan)	`<esc>*v6S`
XCXX7	select color with index 7 (White)	`<esc>*v7S`
	-- select text color (direct via RGB)	**Note:** This redefines palette entry 0.
XCBLK	select color Black	`<esc>*v000a000b000c0I<esc>*v0S`
XCBLU	select color Blue	`<esc>*v000a000b255c0I<esc>*v0S`
XCCYA	select color Cyan	`<esc>*v000a255b255c0I<esc>*v0S`
XCGRN	select color Green	`<esc>*v000a255b000c0I<esc>*v0S`
XCMGT	select color Magenta	`<esc>*v255a000b255c0I<esc>*v0S`
XCRED	select color Red	`<esc>*v255a000b000c0I<esc>*v0S`
XCWHT	select color White	`<esc>*v255a255b255c0I<esc>*v0S`
XCYLW	select color Yellow	`<esc>*v255a255b000c0I<esc>*v0S`
XFxxx	**=== Font select** (proprietary) **===**	
XF00N	Latin-1	`<esc>(0N`
XF02N	Latin-2	`<esc>(2N`
XF10N	Cyrillic	`<esc>(10N`
XF12N	Greek	`<esc>(12N`
XF18N	Unicode	`<esc>(18N`
XTxxx	**=== Paper type** (proprietary) **===**	
XTBND	Bonds	`<esc>&n5WdBond`

XTCL1	User Color 1	<esc>&n7WdColor1
XTCL2	User Color 2	<esc>&n7WdColor2
XTCLR	Colored paper	<esc>&n6WdColor
XTCST	Cardstock	<esc>&n10WdCardstock
XTGLS	Glossy	<esc>&n7WdGlossy
XTLBL	Labels	<esc>&n7WdLabels
XTLTH	Letterhead paper	<esc>&n11WdLetterhead
XTPLN	Plain / Normal paper	<esc>&n6WdPlain
XTPNC	Prepunched paper	<esc>&n11WdPrepunched
XTPRN	Preprinted paper	<esc>&n11WdPreprinted
XTPXB	Plain (Duplex backside)	<esc>&n20WdPlainduplexbackside
XTRCY	Recycled paper	<esc>&n9WdRecycled
XTSPC	Special paper	<esc>&n8WdSpecial
XTTBS	Tabstock	<esc>&n9WdTabstock
XTTHK	Thick paper	<esc>&n6WdThick
XTTHN	Thin paper	<esc>&n5WdThin
XTTRL	Translucent paper	<esc>&n12WdTranslucent
XTTRS	Transparency/OHP sheet	<esc>&n13WdTransparency
XTTXB	Thick (Duplex backside)	<esc>&n20WdThickduplexbackside

Note:

- **(*1)**: Macros 1 and 2 are defined in the "Printer initialization" action of each X_ll_cc ABAP format. They select a normal (1) or bold (2) font. For SAPscript, they are empty.
  In the black-and-white case the color select commands (<esc>*v#S) are ignored by the controller.
  The COLxy Print controls are not used by the HPL2 ABAP list driver.

- **(*2)**: (SBxxx, XBxxx): These Print controls are specific to a particular barcode solution. Please refer to the section "Barcodes and OCR text" below.

- **(*3)**: The interpretation of most of the TRYxx and TROxx Print controls is device-specific; please refer to the "Input Bin" or "Output Bin" section of Volume 3 of the corresponding device.

- **(*4)**: Any deviations from the underlying HPLJ4 standard device type, such as corrections or additional entries, are marked underlined.

Note: (*5)

- The command sequences are given here in ASCII format. The actual definition of the Print Controls can use either ASCII or hexadecimal representation. Please refer to a standard ASCII table mapping the characters to the hexadecimal values.
- The following notation of control characters is used:

Character	Hex	Meaning
<esc>	<1B>	Escape
<SI>	<0F>	Shift In (select 1st font)
<SO>	<0E>	Shift Out (select 2nd font)
<CR>	<0D>	Carriage Return
<LF>	<0A>	Line Feed
<FF>	<0C>	Form Feed

Note: (*7) (SFxxx)
The Print controls SFxxx and their values depend on the Device type family and version. Please refer to the corresponding tables in the chapter "The Fonts" below.

2.8 The Fonts

This section specifies the support of SAP System fonts by our Device types.
The following information is provided:
- 1. the SAP Font families supported
- 2. the Font sizing methods (discrete-sized vs arbitrarily scalable)
- 3. the Characters and Character sets supported
- 4. the SFxxx Print controls (font selection commands)
- 5. the AFM Font metrics
- 6. miscellaneous

2.8.1 The SAP Font Families supported

The following SAP standard Font families are supported by the ZA0xc device types.
They are a subset of those fonts that are actually available on our devices.
To access other device fonts from SAP, please contact Technical support. For support of barcode and OCR text printing under SAP, please refer to the section "Barcodes and OCR text" below.
For the command sequence to be used to select a particular font, refer to the section on the SFxxx Print controls below.

Supported SAP Font families

Font family	c=	= U	= 1	= 2			
ANDALE_J	*U	+	--	--			
ANDALE_K	*U	+	--	--			
ANDALE_S	*U	+	--	--			
ANDALE_T	*U	+	--	--			
COURIER	*R	+	+	+			
COURCYR	*R	+	--	--			
COUR_I7	*R	+	--	--			
LETGOTH	*R	+	+	+			
HELVE	*R	+	+	+			
HELVCYR	*R	+	--	--			
HELV_I7	*R	+	--	--			
TIMES	*R	+	+	+			
TIMECYR	*R	+	--	--			
TIME_I7	*R	+	--	--			
LNPRINT	*R	+	+	+			
OCRA	*B	+	+	+			
OCRB	*B	+	+	+			

Legend:
- ***R** = device resident font
- ***U** = requires Andale fonts as part of the "Unicode Font Package"
- ***B** = requires OCR fonts as part of the "Barcode & OCR Package" (BOP or BOCR)

2.8.2 The Font Sizing methods

Font sizing

Two different mechanisms exist for a Device type to support different font sizes of a SAP Font family. Of course, a particular size of a typeface can only be supported if an SAP System Font is defined for it.

A **discrete-sized** Printer font defines one explicit entry for every font size to support. This means that if a System font is requested which is undefined in the Device type for the requested size, then it will be substituted with the nearest defined size.
This method is old and awkward. It must be used for SAP R/3 systems with release version lower than 4.0A. But it may also be used with newer systems. For example, it is used by Device type HPLJ4.

An **arbitrarily scalable** Printer font defines only 1 entry per Font family and weight (regular/bold) and style (regular/italic), with a generic font size of 000, i.e. independent of the size.
This method is much more flexible, but only available from SAP R/3 release 4.0A and higher. For example, it is used by Device types HPLJ4000 and HPUTF8.

Our ZA0xcvvv device types use both approaches, the former for legacy/compatibility reasons, as follows.

0x	c	vvv	Font sizing mechanism
- 00	**1,2**	001 .. 013	discrete
		014 .. inf	scalable
- 00	**U**	011 .. inf	scalable
- 01	1,2	006 .. inf	same as 0x=00
- 01	U	011 .. inf	same as 0x=00
- 04	1,2	014 .. inf	discrete
- 05	1,2	014 .. inf	same as 0x=04

The next 2 paragraphs show which SAP standard **System fonts** (i.e. which sizes for each Font family) are supported by the ZA0xc device types (in FO03) with each method (discrete vs scalable).

ZA0x Device types defining discrete-sized fonts

This method is used by ZA04 and ZA05, and by old versions of ZA00 and ZA01 (vvv < 014).

Font family	Sizes (height in deci-pt / cpi)
COURIER	| 060 | 080 | 100 | 120 | 140 | 160 | | 17.00 | 15.00 | 12.00 | 10.00 | 08.00 | 06.00 |
HELVE	060, 080, 100, 120, 140, 160, 180 (scalable)
LETGOTH	| 060 | 080 | 100 | 120 | 140 | 160 | | 21.00 | 19.00 | 15.00 | 12.00 | 11.00 | 9.00 |
LNPRINT	085 / 16.66 -- supports only symbol sets 0N, 2N;
TIMES	060, 080, 100, 120, 140, 160, 180 (scalable)
OCRA	120 / 10.00
OCRB	120 / 10.00

ZA0x Device types defining arbitrarily scalable fonts

This method is used by newer versions of ZA00 and ZA01 (vvv >= 014) and by ZA0xU.
This applies to fonts { ANDALE_x, COUR*, LETGOTH, HELV*, TIME* }.
The other fonts { LNPRINT, OCRA, OCRB } are by nature still discrete-sized.

2.8.3 The Characters & Character sets supported

Note: (Supported character sets, Supported characters)

The ZA0xcvvv device types support the following character sets:

Device type		SAP character set	MS codepage	HP symbol set
ZA0x1vvv	Latin-1	1116	--	0N
ZA0x2vvv	Latin-2	1416	--	2N
ZA0xUvvv	Unicode	4210	--	18N

The following character sets are not supported, because they don't support the SAP box characters:

SAP character set	MS codepage	HP symbol set
• 1160	1252	19U
• 1405	1250	9E

Note: (Support of the EURO character)
The proper **EURO symbol** (€) is not supported by the ZA0x device type (c=1,2), because the 0N and 2N symbol sets do not support it.
Therefore only a simulation as on overlay of "C" and "=" (C<BS>=) is implemented in the SAP character sets 1116 and 1416.

2.8.4 The SFxxx Print controls (font selection commands)

The Print controls SFxxx and their values depend on the Device type family and version.

There are 3 different sets:
- (**A**) **discrete-sized** non-Unicode   { ZA04c, ZA05c, old ZA00c & ZA01c (vvv < 014) } (c=1,2)
- (**B**) **arbitrarily scalable** non-Unicode   { new ZA00c & ZA01c (vvv >= 014) } (c=1,2)
- (**C**) arbitrarily scalable **Unicode**   { ZA0xU }

Note: (*8) (The symbol set)
In the tables below, the "<esc>(0N" is correct only for the Latin-1 version of the Device type ZA0x1 (c=1).
For other symbol sets, please refer to the following table.

- c = 1 :	<esc>(0N
- c = 2 :	<esc>(2N
- c = U :	<esc>(18N

(A) ZA0x Device types defining discrete-sized fonts (non-Unicode)

This method is used by **ZA04** and **ZA05**, and by old versions of **ZA00**c and **ZA01**c (c=1,2) (vvv < 014).
Compatible with **HPLJ4**.

SF___	Font	Command sequence (*8)
SF000	**Courier** 17cpi (6 pt)	<esc>(0N<esc>(s0p17h0s0b**4099T**
SF001	Courier 17cpi italic	<esc>(0N<esc>(s0p17h1s0b4099T
SF002	Courier 17cpi bold	<esc>(0N<esc>(s0p17h0s3b4099T

SF003	Courier 17cpi bold italic	`<esc>(0N<esc>(s0p17h1s3b4099T`
SF004	Courier 15cpi (8 pt)	`<esc>(0N<esc>(s0p15h0s0b4099T`
SF005	Courier 15cpi italic	`<esc>(0N<esc>(s0p15h1s0b4099T`
SF006	Courier 15cpi bold	`<esc>(0N<esc>(s0p15h0s3b4099T`
SF007	Courier 15cpi bold italic	`<esc>(0N<esc>(s0p15h1s3b4099T`
SF008	Courier 12cpi (10 pt)	`<esc>(0N<esc>(s0p12h0s0b4099T`
SF009	Courier 12cpi italic	`<esc>(0N<esc>(s0p12h1s0b4099T`
SF010	Courier 12cpi bold	`<esc>(0N<esc>(s0p12h0s3b4099T`
SF011	Courier 12cpi bold italic	`<esc>(0N<esc>(s0p12h1s3b4099T`
SF012	Courier 10cpi (12 pt)	`<esc>(0N<esc>(s0p10h0s0b4099T`
SF013	Courier 10cpi italic	`<esc>(0N<esc>(s0p10h1s0b4099T`
SF014	Courier 10cpi bold	`<esc>(0N<esc>(s0p10h0s3b4099T`
SF015	Courier 10cpi bold italic	`<esc>(0N<esc>(s0p10h1s3b4099T`
SF016	Courier 8cpi (14 pt)	`<esc>(0N<esc>(s0p08h0s0b4099T`
SF017	Courier 8cpi italic	`<esc>(0N<esc>(s0p08h1s0b4099T`
SF018	Courier 8cpi bold	`<esc>(0N<esc>(s0p08h0s3b4099T`
SF019	Courier 8cpi bold italic	`<esc>(0N<esc>(s0p08h1s3b4099T`
SF020	Courier 6cpi (16 pt)	`<esc>(0N<esc>(s0p06h0s0b4099T`
SF021	Courier 6cpi italic	`<esc>(0N<esc>(s0p06h1s0b4099T`
SF022	Courier 6cpi bold	`<esc>(0N<esc>(s0p06h0s3b4099T`
SF023	Courier 6cpi bold italic	`<esc>(0N<esc>(s0p06h1s3b4099T`
SF**1**00	**Helve** 6 pt	`<esc>(0N<esc>(s1p6v0s0b`**4148T**
SF101	Helve 6 pt italic	`<esc>(0N<esc>(s1p6v1s0b4148T`
SF102	Helve 6 pt bold	`<esc>(0N<esc>(s1p6v0s3b4148T`
SF103	Helve 6 pt bold italic	`<esc>(0N<esc>(s1p6v1s3b4148T`
SF104	Helve 8 pt	`<esc>(0N<esc>(s1p8v0s0b4148T`
SF105	Helve 8 pt italic	`<esc>(0N<esc>(s1p8v1s0b4148T`
SF106	Helve 8 pt bold	`<esc>(0N<esc>(s1p8v0s3b4148T`
SF107	Helve 8 pt bold italic	`<esc>(0N<esc>(s1p8v1s3b4148T`
SF108	Helve 10 pt	`<esc>(0N<esc>(s1p10v0s0b4148T`
SF109	Helve 10 pt italic	`<esc>(0N<esc>(s1p10v1s0b4148T`
SF110	Helve 10 pt bold	`<esc>(0N<esc>(s1p10v0s3b4148T`
SF111	Helve 10 pt bold italic	`<esc>(0N<esc>(s1p10v1s3b4148T`
SF112	Helve 12 pt	`<esc>(0N<esc>(s1p12v0s0b4148T`
SF113	Helve 12 pt italic	`<esc>(0N<esc>(s1p12v1s0b4148T`
SF114	Helve 12 pt bold	`<esc>(0N<esc>(s1p12v0s3b4148T`
SF115	Helve 12 pt bold italic	`<esc>(0N<esc>(s1p12v1s3b4148T`
SF116	Helve 14 pt	`<esc>(0N<esc>(s1p14v0s0b4148T`
SF117	Helve 14 pt italic	`<esc>(0N<esc>(s1p14v1s0b4148T`
SF118	Helve 14 pt bold	`<esc>(0N<esc>(s1p14v0s3b4148T`
SF119	Helve 14 pt bold italic	`<esc>(0N<esc>(s1p14v1s3b4148T`
SF120	Helve 16 pt	`<esc>(0N<esc>(s1p16v0s0b4148T`
SF121	Helve 16 pt italic	`<esc>(0N<esc>(s1p16v1s0b4148T`
SF122	Helve 16 pt bold	`<esc>(0N<esc>(s1p16v0s3b4148T`
SF123	Helve 16 pt bold italic	`<esc>(0N<esc>(s1p16v1s3b4148T`
SF124	Helve 18 pt	`<esc>(0N<esc>(s1p18v0s0b4148T`
SF125	Helve 18 pt italic	`<esc>(0N<esc>(s1p18v1s0b4148T`
SF126	Helve 18 pt bold	`<esc>(0N<esc>(s1p18v0s3b4148T`
SF127	Helve 18 pt bold italic	`<esc>(0N<esc>(s1p18v1s3b4148T`
SF**2**00	**Letter Gothic** 21cpi (6 pt)	`<esc>(0N<esc>(s0p21h0s0b`**4102T**
SF201	Letter Gothic 21cpi italic	`<esc>(0N<esc>(s0p21h1s0b4102T`
SF202	Letter Gothic 21cpi bold	`<esc>(0N<esc>(s0p21h0s3b4102T`
SF203	Letter Gothic 19cpi (8 pt)	`<esc>(0N<esc>(s0p19h0s0b4102T`
SF204	Letter Gothic 19cpi italic	`<esc>(0N<esc>(s0p19h1s0b4102T`
SF205	Letter Gothic 19cpi bold	`<esc>(0N<esc>(s0p19h0s3b4102T`
SF206	Letter Gothic 15cpi (10 pt)	`<esc>(0N<esc>(s0p15h0s0b4102T`
SF207	Letter Gothic 15cpi italic	`<esc>(0N<esc>(s0p15h1s0b4102T`
SF208	Letter Gothic 15cpi bold	`<esc>(0N<esc>(s0p15h0s3b4102T`
SF209	Letter Gothic 12cpi (12 pt)	`<esc>(0N<esc>(s0p12h0s0b4102T`
SF210	Letter Gothic 12cpi italic	`<esc>(0N<esc>(s0p12h1s0b4102T`
SF211	Letter Gothic 12cpi bold	`<esc>(0N<esc>(s0p12h0s3b4102T`
SF212	Letter Gothic 11cpi (14 pt)	`<esc>(0N<esc>(s0p11h0s0b4102T`
SF213	Letter Gothic 11cpi italic	`<esc>(0N<esc>(s0p11h1s0b4102T`
SF214	Letter Gothic 11cpi bold	`<esc>(0N<esc>(s0p11h0s3b4102T`
SF215	Letter Gothic 9 cpi (16 pt)	`<esc>(0N<esc>(s0p09h0s0b4102T`
SF216	Letter Gothic 9 cpi italic	`<esc>(0N<esc>(s0p09h1s0b4102T`
SF217	Letter Gothic 9 cpi bold	`<esc>(0N<esc>(s0p09h0s3b4102T`
SF**3**00	**Line Printer** (only 8.5 pt) (*4)	`<esc>(0N<esc>(s0p16.67h8.5v0s0b0T`
SF**4**00	**OCR-A** 10 cpi 12pt	`<esc>(0O<esc>(s0p10h0s0b`**104T**
SF**5**00	**OCR-B** 10 cpi 12pt	`<esc>(1O<esc>(s0p10h0s0b`**110T**

SF600	**Times** 6 pt	`<esc>(0N<esc>(s1p6v0s0b`**`4101T`**
SF601	Times 6 pt italic	`<esc>(0N<esc>(s1p6v1s0b4101T`
SF602	Times 6 pt bold	`<esc>(0N<esc>(s1p6v0s3b4101T`
SF603	Times 6 pt bold italic	`<esc>(0N<esc>(s1p6v1s3b4101T`
SF604	Times 8 pt	`<esc>(0N<esc>(s1p8v0s0b4101T`
SF605	Times 8 pt italic	`<esc>(0N<esc>(s1p8v1s0b4101T`
SF606	Times 8 pt bold	`<esc>(0N<esc>(s1p8v0s3b4101T`
SF607	Times 8 pt bold italic	`<esc>(0N<esc>(s1p8v1s3b4101T`
SF608	Times 10 pt	`<esc>(0N<esc>(s1p10v0s0b4101T`
SF609	Times 10 pt italic	`<esc>(0N<esc>(s1p10v1s0b4101T`
SF610	Times 10 pt bold	`<esc>(0N<esc>(s1p10v0s3b4101T`
SF611	Times 10 pt bold italic	`<esc>(0N<esc>(s1p10v1s3b4101T`
SF612	Times 12 pt	`<esc>(0N<esc>(s1p12v0s0b4101T`
SF613	Times 12 pt italic	`<esc>(0N<esc>(s1p12v1s0b4101T`
SF614	Times 12 pt bold	`<esc>(0N<esc>(s1p12v0s3b4101T`
SF615	Times 12 pt bold italic	`<esc>(0N<esc>(s1p12v1s3b4101T`
SF616	Times 14 pt	`<esc>(0N<esc>(s1p14v0s0b4101T`
SF617	Times 14 pt italic	`<esc>(0N<esc>(s1p14v1s0b4101T`
SF618	Times 14 pt bold	`<esc>(0N<esc>(s1p14v0s3b4101T`
SF619	Times 14 pt bold italic	`<esc>(0N<esc>(s1p14v1s3b4101T`
SF620	Times 16 pt	`<esc>(0N<esc>(s1p16v0s0b4101T`
SF621	Times 16 pt italic	`<esc>(0N<esc>(s1p16v1s0b4101T`
SF622	Times 16 pt bold	`<esc>(0N<esc>(s1p16v0s3b4101T`
SF623	Times 16 pt bold italic	`<esc>(0N<esc>(s1p16v1s3b4101T`
SF624	Times 18 pt	`<esc>(0N<esc>(s1p18v0s0b4101T`
SF625	Times 18 pt italic	`<esc>(0N<esc>(s1p18v1s0b4101T`
SF626	Times 18 pt bold	`<esc>(0N<esc>(s1p18v0s3b4101T`
SF627	Times 18 pt bold italic	`<esc>(0N<esc>(s1p18v1s3b4101T`

(B) ZA0x Device types defining arbitrarily scalable fonts (non-Unicode)

This method is used by newer versions of **ZA00c** and **ZA01c** (c=1,2) (vvv >= 014).
Compatible with **HPLJ4000**.

SF___	**Font**	**Command sequence** (*8)
SF001	Courier (scalable)	`4099`
SF100	Latin-1 symbol set	`<esc>(0N`
SF101	Helve (scalable)	`4148`
SF127	Helve 18 pt Bold Italic	`<esc>(0N<esc>(s1p18v1s3b4148T`
SF200	Letter Gothic	`<esc>(0N<esc>(s0p21h0s0b4102T`
SF201	dto.	`<esc>(0N<esc>(s0p21h1s0b4102T`
SF202	dto.	`<esc>(0N<esc>(s0p21h0s3b4102T`
SF203	dto.	`<esc>(0N<esc>(s0p19h0s0b4102T`
SF204	dto.	`<esc>(0N<esc>(s0p19h1s0b4102T`
SF205	dto.	`<esc>(0N<esc>(s0p19h0s3b4102T`
SF206	dto.	`<esc>(0N<esc>(s0p15h0s0b4102T`
SF207	dto.	`<esc>(0N<esc>(s0p15h1s0b4102T`
SF208	dto.	`<esc>(0N<esc>(s0p15h0s3b4102T`
SF209	dto.	`<esc>(0N<esc>(s0p12h0s0b4102T`
SF210	dto.	`<esc>(0N<esc>(s0p12h1s0b4102T`
SF211	dto.	`<esc>(0N<esc>(s0p12h0s3b4102T`
SF212	dto.	`<esc>(0N<esc>(s0p11h0s0b4102T`
SF213	dto.	`<esc>(0N<esc>(s0p11h1s0b4102T`
SF214	dto.	`<esc>(0N<esc>(s0p11h0s3b4102T`
SF215	dto.	`<esc>(0N<esc>(s0p09h0s0b4102T`
SF216	dto.	`<esc>(0N<esc>(s0p09h1s0b4102T`
SF217	dto.	`<esc>(0N<esc>(s0p09h0s3b4102T`
SF300	Line Printer	`<esc>(0N<esc>(s0p16.67h8.5v0s0b0T`
SF400	OCR-A	`<esc>(0O<esc>(s0p10h0s0b104T`
SF500	OCR-B	`<esc>(1O<esc>(s0p10h0s0b110T`
SF601	Times (scalable)	`4101`

(C) ZA0x Device types defining arbitrarily scalable fonts   (Unicode)

This method is used by **ZA0xU**.
Compatible with **HPUTF8**.

SF___	**Font**	**Command sequence** (*5)
SF000	font select command prefix (for Courier, Helve, Times)	`<esc>(18N`

SF001	**Courier**	4099
SF100	same as SF000 [not used]	<esc>(18N
SF101	**Helve**	4148
SF201	**Letter Gothic**	4102
SF300	**Line Printer** (only 8.5 pt) (*4)	<esc>(18N<esc>(s0p16.67h8.5v0s0b0T
SF400	**OCR-A** 10 cpi 12pt	<esc>(0O<esc>(s0p10h0s0b104T
SF500	**OCR-B** 10 cpi 12pt	<esc>(1O<esc>(s0p10h0s0b110T
SF601	**Times**	4101
SF**7**00	**Andale** font select command prefix	<esc>(18N
SF701	**ANDALE**_J	17004
SF702	ANDALE_K	17005
SF703	ANDALE_S	17007
SF704	ANDALE_T	17006

2.8.5 The AFM font metrics

For formatting SAPscript text as right-aligned or centered or as justified, for each affected line the correct position for the 1st character or some additional inter-word spacing must be calculated. Likewise, for normal/left alignment the position of the line breaks must be determined.
(This is neither required nor used by ABAP.)
This requires that the width of each character (in that line) must be known, for the given (proportional) font and font size.
Such font metrics information is provided as (size-independent) Adobe Font Metrics (AFM) tables in section FO04 of the Device type, for each supported (proportional) Printer font.
Moreover, the AFM of the space character determines the width of all inter-word spaces.

Note that depending on the language of the document and on the type of font, the width of a character may not be related to its entry in the AFM table of the Device type, but determined otherwise.
Note also that different Device types and versions thereof (as naturally exist on different SAP systems) may potentially specify different AFM values, thus resulting in different printout. (E.g. in more recent versions the HPUTF8 DT changed its AFM entry of "N space" from odd-looking 500(-) to better-looking 278(+).)

For more information or in case of problems please contact technical support.

2.8.6 Miscellaneous information

Note: (Supporting non-standard fonts)
See SAP note # 0012462 ("How can I define a new printer font?").

Note: (Printing fonts not supported by the Device type)
A System font requested in a SAPscript document for which no Printer font is defined in the Device type used, will be mapped to a Printer font supported by the Device type, according to the Font conversion mechanism of SAP.
Essentially, it works in the following way:
In general, a font which does not have the same size as a Printer font supported by the Device type used, will always be mapped to the next smaller size supported Printer font of the same typeface. E.g. HELVE 075 will be mapped to HELVE 060.
In particular, a font whose size is bigger than the biggest font size defined in the Device type, will always be mapped to the biggest available size. E.g. HELVE 480 will be mapped to HELVE 180.
Fonts whose size is smaller than the smallest Printer font supported by the Device type used, will be mapped to the smallest available size. E.g.: HELVE 025 will be mapped to HELVE 060.

Note:
For printing fonts in arbitrary sizes, please refer to standard SAP documentation, or contact Technical support.

Note: (Effective font)
In the SAPscript document/Form a certain System font is specified in order to yield a desired printout.
However, the actual effective font depends on several additional factors, e.g. the language of the document/Form and the "Language vectors" of the Font families. For details and in case of problems, please contact technical support.

2.9 Color printing

This device type supports both monochrome and color printing.
Most of the color-specific commands are ignored on a black-and-white device.

For which device models support color printing, refer to Volume 1, Appendix D, tag (Cx) in the "Remarks" column.

The definition of an Output device contains a **"Color printer" flag** which determines the behaviour of the SAPscript OTF driver and the ABAP list driver in printing graphics and background color, and text color (for SmartForms).

- For a **black-and-white device** :
  This flag must be unchecked. Otherwise colored graphics would appear garbled.
- For a **color device** :
  This flag should always be checked. To print on a color device in monochrome mode (e.g. for proofing purposes), the [PCL.30] command should be used.

Note: (How to force b&w printout on color devices)
For SAPscript or ABAP with the HPL2 list driver, just uncheck the Color flag.
For ABAP with the standard list driver, use the "`<esc>&b1M`" monochrome command at [PCL.30] and obey the following note.

Note: (Color to monochrome conversion I) [ABAP text with standard list driver on color devices]
If the "`<esc>&b1M`" command (tag [PCL.30]) is used to force monochrome printing on a color device, non-black color text is converted (by the device firmware) to some greyscale. This may in some cases make the text hard to read.
As a workaround, the affected COLxy Print controls in the Device type may be mapped to "`<esc>*v8S`", thus forcing pure black.
Or, instead, the HPL2 ABAP list driver may be used.

Note: (Color to monochrome conversion II) [SAPscript bitmap graphics on b&w devices]
If a color bitmap is to be printed on a monochrome printer device, it first needs to be converted to black-and-white, because the device cannot handle color data. This conversion is done automatically by the SAP system, if the "Color printer" flag is present (and not set).
If the quality of the conversion is bad, or if there is no Color flag, the bitmap needs to be converted to black-and-white externally with a 3rd party application, then re-imported into the SAP system.
From kernel 4.6D / patch level 692+, the automatic conversion takes the setting BMP_DITHER in table TSPOPTIONS as a parameter. Set it to YES, if you wish an error diffusion technique to be applied.

Note: (Specifying text colors in ABAP reports)
In ABAP, the colors are predefined and determined by the Print controls COLxy in the Device type.

Note: (Specifying text colors in SAPscript documents)
In SAPscript, the color of text may be specified by means of the proprietary Print controls XCxxx, with the syntax given below.
Only from SAP release R/3 v4.6D and higher, SmartForms allows specifying of color as a text property; refer to the separate note below.
However, you can always use Print controls.
The ZA0x device types provide proprietary Print controls **XCxxx**; see the section "Print controls" above.
(The SAP standard COLxy Print controls are designed only for internal use under ABAP; they should not be used.)

```
...
/ <text in old color>
/:PRINT-CONTROL 'XCxxx'
( <text in new color>
...
```

Note: (Specifying text colors in SmartForms)
In SmartForms, text color can be specified as an attribute of a Style, a Paragraph format, or a Character format.
- (style default):   <style> -> Header data -> (tab) Standard Settings -> (grp) Font -> Color
- (paragraph default):   <style> -> Paragraph formats -> <paragraph format> -> (tab) Font -> Color
- (per character):   <style> -> Character formats -> <character format> -> (tab) Font -> Color

For more information on color printing, refer to Volume 3.

2.10 Graphics

SAPscript TIFF graphics can be imported into the SAP system from external BMP or TIFF files using transaction SE78 or report RSTXLDMC.
Since SAP can internally handle only 256 colors, a conversion may be applied during the import.
Once imported, the image can be included in a SAPscript document or Form using the syntax "`/:BITMAP ...`" or "`/:INCLUDE ...`".

If the target printer cannot handle color image data, another conversion needs to be applied which maps the color data to black-and-white data. Depending on the SAP release version and certain settings, a different algorithm is used.

For SAP releases R/3 <v4.5A, or if the image is stored as a TEXT object,
the conversion has to be done explicitly manually using some external software.

For SAP releases R/3 v4.5A+, and if the image is stored as a GRAPHICS object,
the SAP OTF driver performs an automatic conversion, if the Color flag in the Output device definition is turned off.

From SAP R/3 kernel release v4.6D+ / patch level 692+,
the conversion routine takes as a parameter the global setting BMP_DITHER in the table TSPOPTIONS. It determines whether an error diffusion dithering method is to be applied. By default it is turned on.

If no dithering is applied, grey or color values above/below a certain threshold are just mapped to white/black. This way a lot of structural information may be lost, large patches of the image appearing just white, others just black. Since the result is usually not satisfactory; an explicit conversion is recommended by SAP.

If the error diffusion dithering algorithm is applied, the result is fairly good. For colored edges, however, this may yield a ragged-looking result.

See SAP note # 0410727 for further information.

SAP Presentation Graphics cannot be printed using this device type.

2.11 Barcodes and OCR Text

For which device models can support Unicode printing, refer to Volume 1, Appendix D, tag (Bx) in the "Remarks" column.

For the printers marked with (B+), please refer to Volume 2B to get RICOH's OCR text and barcode printing support under SAP,
For solution-specific information such as barcode related Print controls (SBPxx/SBSxx) and Actions (XBARC, ...), please refer to the User's
Manual of the corresponding product.
For more information or in need of help, please contact RICOH Technical support.

For the printers marked with (Bs), please read SAP Note 645158 to get the info of how to use the SAP New Barcode Printing.
For more information or in need of help, please contact SAP Technical support.

2.13 Unicode printing

For which device models can support Unicode printing, refer to Volume 1, Appendix D, tag (Ux) in the "Remarks" column.

For the printers marked with (U+), please read this section to get the info of how to print Unicode text from SAP on our devices.
For more information or in need of help, please contact RICOH Technical support.

For the printers marked with (Us), please read SAP Note 1812076 to get the info of how to use Unicode Printing Enhancement (UPE).
For more information or in need of help, please contact SAP Technical support.

2.13.1 [A] Unicode printing

Unicode is a standard defining code-points for most characters used (in languages) almost anywhere in the world.
The Unicode **code-point** of a character is usually specified/denoted as "**U+xxxx**" (where xxxx stands for up to 6 hex digits; leading 0's may be
omitted).

Unicode text in a file/document or a data stream can be encoded in various ways, by using a more appropriate byte sequence instead of the
mere U+ values. For printing, the most common encoding is UTF-8.

UTF-8 encodes a character as 1, 2, 3, or 4 bytes, depending on the U+ value range it belongs to.
This method uses little storage space and allows for efficient searching and string operations.
There is a simple algorithm to convert between the U+ value and the UTF-8 representation of a character.

For **Unicode printing** one has to consider the following data flow:
From some Unicode text contained in a file/document, the **issuing system** generates a print **data stream** (using some kind of driver) in (e.g.)
UTF-8 format and sends it to the printer. The **printer** (**firmware**) has to decode the (UTF-8) data back into the U+ values and use an appropriate
(Unicode) font to rasterize the character bitmaps.
As a prerequisite, both the issuing system and the receiving printer device need to be "**Unicode-enabled**", as explained further below.

For more details, please contact Technical support.

The following sections contain information specific to printing from SAP systems (R/3, mySAP ERP) and to our printer devices.

2.13.2 [B] Unicode printing on our printer devices

This section contains information related to printing Unicode text on our printer devices, independent of the type of issuing system.

As a prerequisite, the receiving printer device has to be "Unicode enabled", i.e. "support Unicode", as follows.

First, the firmware needs to (be able to) decode the incoming (e.g. UTF-8) data stream into a sequence of U+ code-points and possibly process
these further. Eventually each U+ code-point needs to be translated/mapped to the correct code-point of a suitable device font of the
desired/requested typeface and other parameters.

Second, a Unicode font may need to be installed, e.g. on the device's HDD.

Alternatively, an "SBCS re-mapping" mechanism may exist to allow for printing Unicode text with (typefaces of) non-Unicode SBCS/1-byte
fonts. This requires a reverse look-up table which translates Unicode code-points into SBCS code points of suitable SBCS codepages. I.e.
certain characters of a Unicode text may also be printed using a normal SBCS resident font, i.e. without the particular need for a Unicode font.
For such character its Unicode code-point has to be re-mapped to the code-point of an SBCS symbol set which contains that character and
which is supported by the desired typeface. This mechanism has to be supported/implemented by the firmware.

The Printer **firmware** of our devices can process UTF-8 data of up to 3(!) bytes per character, this corresponds to Unicode code-points up to
U+FFFF.
To activate that, initially the PCL command "**<esc>&t83P**" needs to be sent.
Note that upon illegal UTF-8 data, our devices print either no character or a blank space.

Our devices support 2 methods of printing Unicode text:

(1) ... with Unicode fonts
This requires the presence of the optional "Unicode Font Package for SAP®", which is explained below.
It may hereafter be also shortly referred to as "**Andale printing**".

(2) ... with resident fonts (i.e. without Unicode fonts)
This uses the SBCS re-mapping mechanism of the firmware and does not need any Unicode fonts, but relies on and maps to the 1-byte resident fonts. This is further explained below.
It may hereafter be also shortly referred to as "**18N printing**" or "**non-Andale printing**".

The Unicode Font Package for SAP®

Our optional "**Unicode Font Package for SAP**®" contains a set of 4 Unicode fonts named "Monotype Andale WorldType", or "Andale", for short.
These **Andale fonts** contain all approx. 49000 characters defined in Unicode standard v3.0.
They only differ by certain Kanji characters which look different for Japanese (ANDALE_**J**), Korean (ANDALE_**K**), Simplified Chinese (ANDALE_**S**), and Traditional Chinese (ANDALE_**T**). All others are the same.
The Andale typeface is sans serif.
The fonts are scalable ("`...__v...`"), and they come in the weights and styles Regular ("`...0s0b...`"), Italic ("`...1s0b...`"), Bold ("`...0s3b...`"), and Bold-Italic ("`...1s3b...`").
The Andale fonts are technically proportional fonts, i.e. they require "`...1p...`" in the PCL font select command.
However, they are actually designed to "locally" look fixed-width/monospaced. I.e. most characters of the same group/segment/language/region/script/alphabet appear with equal width. For example, all basic Latin-1 characters have the same width; but e.g. the Kanji characters are twice as wide.
The font select command needs to specify the typeface (T) parameter **17004/5/6/7** for ANDALE_J/K/T/S (i.e. "`...1700xT`").
I.e. to select an Andale font, the command "**`<esc>(s1p__v__s__b1700xT`**" needs to be issued (x=4|5|6|7); any specified symbol set select command is not necessary and hence ignored.
The package also contains a test file (ZAUSAMPLE.PRN) for printing a test sheet with the Andale fonts. For more information please refer to the accompanying documentation.

Unicode printing with resident fonts

This "**18N printing**" feature of the device firmware also allows to print Unicode text using any resident SBCS (1-byte) font typeface other than Andale.
This allows to and can be or has to be used to:
- (a) print Unicode text even if no Andale font is installed on the device (thus saving costs / for cost-saving reasons), or just to
- (b) use a particular desired nice-looking non-Andale typeface, even if an Andale font is installed (Andale fonts may be installed or not).
It is activated by selecting a (non-Andale) typeface with symbol set **18N**. (The name of this symbol set is an allusion to the acronym "i18n" commonly used for the term "internationalization", which consists of 1+18+1 characters.)
I.e. the SBCS re-mapping can be activated by specifying "**`<esc>(18N`**" before the corresponding (Andale or non-Andale) font select command, which can specify the desired typeface and other parameters.

Note: Of course, only those characters can be and are printed OK that are contained in the symbol sets supported by the selected font and that are supported by the specific 18N printing implementation of our device firmware.

Note: For the minimum firmware version required for each Unicode-supporting model please ask technical support.

Note: (Symbol set 18N vs 31H)
The PCL Font List shows the Andale fonts with symbol set "(31H". Note that this does not contradict the fact that
- a symbol set select command is not necessary to select an Andale font, nor that
- "(18N" needs to be used to activate 18N printing (in case Andale fonts are not present).

Note: (Symbol set 18N with Andale font select command)
18N printing is typically used with non-Andale typefaces.
If an Andale font select command is received with "`<esc>(18N`", but no Andale fonts are installed, the firmware maps it to either Arial (16602T) or Times New Roman (16901T), depending on the device model. In this case, since Arial is wider than Andale and the font metrics are too different, the text may extend beyond the right margin and thus be truncated. Also justification/centering/right-aligning would not be possible.
Refer to section [D] for how to force a mapping to Letter Gothic, which looks and behaves similar to Andale.

The PCL command stream

Summarizing the above, the command stream needs to contain these commands:
- "**`<esc>&t83P`**" :   initially once, to announce UTF-8 data and thus activate UTF-8 decoding
- "**`<esc>(18N`**" :   in front of a (non-Andale or Andale) font select command, to activate 18N printing
- "**`<esc>(s1p__v__s__b1700xT`**" : to select an Andale font (x=4/5/6/7) (a symbol set select command is ignored)

2.13.3 [C] Unicode printing under SAP

This section contains information related to printing Unicode text from SAP systems (R/3, mySAP ERP), independent of the receiving printer device.

As a prerequisite, the issuing SAP system has to be "Unicode enabled", i.e. "support Unicode". This means that:
- The underlying database can handle (store & retrieve) Unicode text.
- The SAP application can handle (process, display, ...) Unicode text.

- The SAP printer drivers (OTF driver, ABAP list drivers) can handle Unicode text and generate the (UTF-8) data stream.
- A Unicode font needs to be supported as SAP Font family / System font.
- A Unicode-based SAP character set needs to exist; e.g. 4210.
- A Device type based on that character set needs to exist.

Refer to standard SAP documentation for further information/details.

Unicode-enabled SAP systems

The following systems can be Unicode-enabled:
- R/3 v4.6C and higher
- R/3 Enterprise
- mySAP ERP 2004 and higher

Whether a system is Unicode-enabled or not, can be seen in:
   (main menu) -> System -> Status -> SAP data -> SAP system data -> Unicode system -> Yes/No.

SAP character sets for Unicode printing

A Unicode-enabled SAP system has several character sets related to Unicode. Their numbers are in the range 4xxx.
E.g. SAP character set **4210** maps each U+ code-point to its corresponding UTF-8 byte sequence.

System fonts for Unicode printing

Unicode-enabled SAP systems support the **ANDALE_x** Font families (x = J | K | S | T).
Their definition corresponds to the Andale fonts on our devices from the "Unicode Font Package for SAP®".

Device types for Unicode printing

By default, Unicode-enabled SAP systems contain the **HPUTF8 Device type**, which can be used for printing Unicode text to HP compatible devices.
Note that different versions exist.

SAP Unicode printing scenarios

The following parameters lead to different scenarios and resulting procedures for how to successfully set up Unicode printing.

The **SAP system** may be Unicode-enabled or not.

The **type of document** may be any of **SAPscript**, **SmartForms**, or an **ABAP** report.
The latter may be printed with either the standard (**STND**) or the **HPL2** ABAP list driver.

On the **Printer device**:
- The **firmware** may be Unicode-enabled or not.
- One or more (**Andale**) **Unicode fonts** may be installed or not. (E.g. no Andale fonts may be installed due to cost saving reasons.)
- An SBCS re-mapping / 18N printing mechanism may be present (in the firmware) or not.

For the printed text output, a certain **font typeface** is **desired**.
This may be **Andale**, or a device-resident **non-Andale** typeface font (e.g. for compatibility/legacy look).

Note that there is a potential discrepancy between
- (i) the **desired** font, i.e. the desired look on the printout,
- (ii) the **specified** font, i.e. as specified in the original document (*),
- (iii) the **requested** font, i.e. as appearing in the PCL data stream, and
- (iv) the actually resulting **effective** font, as realized by the firmware, and as eventually appearing on the printout.

Note: (*)
In the case of a SAPscript or SmartForms document/Form, the font is specified via a Character format tag mapped (in a Style) to a System font.
In the case of an ABAP report, the font can and needs to be determined in the corresponding SETUP (if STND) or FRSTPAGE (if HPL2) action of the Device type.

In section [D] below, common supported scenarios are discussed. For each is shown which Device type has to be used, and which modifications may be necessary in the Device type in order to yield the desired result.

2.13.4 [D] Unicode printing under SAP on our devices

This section contains information specific to printing Unicode text from an SAP system (R/3, mySAP ERP) to our printer devices.

The mechanism
In order to support Unicode text printing from an SAP system on the printer device, the following requirements/conditions need to be satisfied.
- The issuing system (SAP system) has to be "Unicode enabled", as outlined in [C] above.
- The printer device has to be "Unicode enabled", as outlined in [B] above.
- And the command stream needs to contain the appropriate commands, as outlined in [B] above.

First, our proprietary Unicode Device type (DT) ZA0xU is presented. Then, for common SAP Unicode printing scenarios, it is explained how to configure them with our Device type.
Specifically, how to configure 18N printing.

Our proprietary Unicode Device type ZA0xU

The **ZA0xUvvv** Device type is designed for printing Unicode text from Unicode-enabled SAP systems to our Unicode-enabled printer devices.
It accommodates the necessary commands in the **SETUP** and **FRSTPAGE** Actions and in the **SFxxx** Print controls.
It uses the 4210 SAP character set, which generates UTF-8 data.
Furthermore, it supports the **ANDALE_x** System fonts, mapping them to the correct Andale device font select sequences.
It is also prepared to support 18N printing for the other System fonts (HELVE, TIMES, COURIER, LETGOTH, LNPRINT).

It is based on the ZA0x Device type family for the generic (Unicode-independent) parts and on HPUTF8 for the Unicode-specific parts.
The deviations in the specification from ZA0xcvvv (c=1,2) are outlined in the Device type specification in Volume 2.
An essential difference is that the HPLJ4000 Device type based scalable font mechanism is used.

The ZA0xU Device type cannot be used on non-Unicode SAP systems, nor can it be used with non-Unicode printer devices.
In either case the ZA0xc (c=1/2) Device type has to be used.

Printing Unicode from SAP with Andale Fonts

Our "Unicode Font Package for SAP®" also contains a sample SAPscript document (ZAUSAMPLE.ITF) for printing a Unicode test sheet with the Andale fonts from SAP.

Printing Unicode from SAP with resident Fonts

Currently no test document is available.

Common SAP Unicode printing scenarios & how to configure them with our ZA0xU Device type

This section explains how to configure certain common **SAP Unicode printing scenarios** with our Device types, i.e. which Device type to use, and possible modifications needed.
It takes into account different conditions ...

- ... at the SAP system :
        - Unicode-enabled (yes vs no)
        - the type of document (SAPscript vs SmartForms vs ABAP)
        - the device type settings (ABAP list driver: STND vs HPL2)

- ... at the printer device :
        - firmware Unicode-enabled (with 18N printing): (yes vs no)
        - Andale font installed : (yes vs no)

- ... about the desired/requested output typeface :
        - Andale vs (resident) non-Andale

Use of Device type by SAP system
On non-Unicode SAP systems, the ZA0xc (c=1/2) Device type has to be used. ZA0xU cannot be used.
On Unicode-enabled SAP systems, the Device type to be used depends on the receiving printer device.

Use of Device type by Device
For non-Unicode devices, the ZA0xc (c=1/2) Device type has to be used. ZA0xU cannot be used.
For Unicode-enabled devices, the Device type to be used depends on the issuing SAP system.

Unicode-enabled SAP system with Unicode-enabled Device
The ZA0xU Device type can only be used in this scenario, and it is recommended for it.

(*10') Procedure for ABAP

For ABAP printing, only non-proportional fonts can be used; the ZA0xU Device type has been prepared to support Andale, Courier, and Letter Gothic, in the correct size, for each X_ll_cc format.
In the Device type, comment out the Andale entry and uncomment Courier or Letter Gothic instead, as desired:
- if with HPL2 ABAP list driver   => in the FRSTPAGE action
- if with STND ABAP list driver   => in the SETUP action (macros 1 & 2)
For details refer to (*10) below.

(*10) How to determine the font for ABAP printing with our ZA0xU Device type [ABAP only]

For ABAP printing, the Device type can be used with both ABAP list drivers, standard (STND) (default) or HPL2.
Below is explained how the font can be specified/influenced for each case.

For ABAP lists only fixed-width / non-proportional typefaces make sense, hence Courier (serif), Letter Gothic (sans-serif), or Andale (sans-serif, quasi fixed-width).
The correct font select sequences (with the correct sizing parameters) for these have been prepared in the Device type for each format X_ll_cc, as indicated below.

If there are characters to be printed that are not covered by the device's non-Unicode (resident) SBCS fonts through 18N printing, an Andale Unicode font has to be used.

Initially, the Andale font is already uncommented.

Note that the Andale font is actually nominally proportional.
But most characters of that font are designed to appear with equal width.
Yet, certain characters may cause misalignment of the listing.

If no Andale font is installed, but an Andale font select command is issued, the resulting Arial or Times New Roman typeface is proportional and thus inapt for ABAP. Read the appropriate section below for how to select Courier or Letter Gothic instead.

Using the standard ABAP list driver (default)

The desired font has to be specified in the 2 macro definitions MACRO 1 & 2 in the **SETUP** action of the X_ll_cc format.
The correct font select sequences (with the correct sizing parameters) for these have been prepared in the Device type as follows (here for MACRO 1, taken from the SETUP action of Format X_65_132).
For MACRO 2 (Bold font) analogously with 3b instead of 0b.

```
...
## -- MACRO 1 (Normal font):
\e&f1y0X
## -- Courier [16.67 cpi]            -- (*)
#\e(18N\e(s0p16.67h0s0b4099T\e&k9.20H
## -- Letter Gothic [16.67 cpi]      -- (*)
#\e(18N\e(s0p16.67h0s0b4102T\e&k9.20H
## -- Andale [9.00 pt]
\e(18N\e(s1p9.00v0s0b17004T
\e&f1X
...
```

Initially, the Andale font is already uncommented.

If you want a different typeface (and if all characters can be covered by that font), choose the desired command by uncommenting it (and commenting out the others).

Note: (*)
Some rare box characters are not supported by 18N printing and are therefore not printed with a non-Andale font thus resulting in misalignment.
I.e. a non-Andale font can only be used if such a character is not used.
Otherwise, the HPL2 list driver should be used instead.

Using the HPL2 ABAP list driver

The HPL2 ABAP list driver automatically forces Courier typeface (the default command issued is:
"\e(s0p6.5v12.52h0b0s4099T\e&k9.58H", i.e. Courier; here for the case of Format X_65_132).
If not desired, this may be overridden by specifying an appropriate alternative font select sequence.
This cannot be done in the SETUP action, but has to be done in the **FRSTPAGE** action of the X_ll_cc format in the Device type.
The correct font select sequences (with the correct sizing parameters) for these have been prepared in the Device type as follows (here taken from the FRSTPAGE action of Format X_65_132).

```
...
## -- Courier [12.52 cpi]
#\e(18N\e(s0p12.52h0s0b4099T\e&k9.58H

## -- Letter Gothic [12.52 cpi]
#\e(18N\e(s0p12.52h0s0b4102T\e&k9.58H

## -- Andale [11.40 pt]
\e(18N\e(s1p11.40v0s0b17004T
...
```

Initially, the Andale font is already uncommented.

Note, that the Andale font is a little bit taller than Courier; this may lead to partial vertical truncation on the 1st line.
(Affected formats are: { X_ll_cc}.)

If you want a different typeface (and if all characters can be covered by that font), choose the desired command by uncommenting it (and commenting out the others).
You may (also) modify the parameters s (style) and b (weight). Do NOT modify the parameters p,v,h,T.

(*2) How to realize requested ANDALE (if no Andale font installed) by Letter Gothic [SAPscript only]

The default re-mapping of an Andale font request, in the absence of any Andale font, by the device firmware, to Arial (16602T) or Times New Roman (16901T), depends on the device model. This does not look good (wider font metrics) and has some other draw-backs. To work around this, it should rather be explicitly mapped in FO03 to LETGOTH. This approach results in the correct pitch being automatically calculated by the OTF driver. Letter Gothic has a look similar to Andale. Please contact Technical support.

2.14 "Print Options for SAPscript and SmartForms" (POSS)

This feature of the SAP printing architecture was introduced by SAP in 2007.
It supports configuring settings using a single Device type, i.e. without the need for having one copy of the Device type for each combination of settings needed.

POSS only works for printing from SAPscript and SmartForms, not for ABAP list printing.

Without POSS, i.e. on old SAP systems or with old Device types, it was necessary to define 1 Device type for each combination of settings.
With POSS, i.e. on POSS-supporting SAP systems with a POSS-supporting Device type, 1 Device type suffices for multiple combinations of settings.

SAP systems support POSS as a standard for component SAP_BASIS v710 and higher; patches exist for v640 and higher.

Our family of Device types ZA00 and ZA01 support POSS from DTX v016 and higher. They are generically POSS-enabled (with all potentially configurable features and values). For the implementation of POSS in our Device types, refer to the sections on Formats and Actions above.

For which device models POSS is officially supported, is indicated in Appendix D of Volume 1.

The degree of POSS support for a given device model [DCxx] is explained in Appendix POSS of the corresponding Volume 3.

The degree of POSS support for a given feature is explained below and is also re-hinted in the corresponding section in each Volume 3.

In SAP POSS terminology, a (POSS) **Option** refers to a (configurable) feature/function of the device, and an (Option) **Value** refers to the particular setting of this feature. E.g. the "Output Tray" Option has the set of possible Values { "Tray 1", "Tray 2", ... }.

For general information on POSS, refer to these SAP notes:
- #1049778
- #1065801

Note: (Compatibility of POSS vs non-POSS Device types and SAP systems)
A POSS-supporting Device type may also be used on a non-POSS SAP system.
   The POSS format is then just not being addressed, nor is the additional button visible on the Print parameters dialog.
A non-POSS-supporting Device type may also be used on a POSS-supporting SAP system.
   Unless the system detects that a Device type supports POSS, the normal SAPscript Formats are used.

The procedures of configuring and using POSS

For the procedures to apply for configuring and using POSS, refer to section 3.5 below.

For the detailed exact procedures to apply for configuring and using POSS and the related screenshots, refer to Appendix 1P ("Configuration using POSS") below.

3. Installation and Configuration

This chapter contains information about installing and configuring printing under SAP, i.e. the Device types and their features, by the Administrator, i.e. work that is necessary before the User can print.

3.1 Basic procedure

The following is the standard procedure for manually installing a new printer device on a SAP system.
(**Note:** If an external Output Management System is present, the procedure may be different.)
(**Note:** Under POSS the procedure is different. Refer to the note below.)

1. Test the printer outside SAP, to verify its correct printing operation.

2. Test the printer in SAP, using a compatible standard device type (e.g. HPLJ5SI, POST2).

3. Import the proprietary device type (ZAxxcvvv) to use it as a template.

4. For each different device model to be used, and each combination of settings needed:

    4.1. Make a copy of ZAxxcvvv.
         Name it suitably (indicating which settings it will effect).

    4.2. For each Format to be used:
         Make the necessary modifications in the "Printer initialization" action, at the appropriate places.

5. For each combination of physical printer and device type created above:
    Create an Output device connecting to the physical printer and using the device type.
    Use a mnemonic name.

The necessary procedures are standard SAP procedures. Please refer to your SAP documentation, or see Appendix 1: "Installation and Configuration : Procedures".

Note: (Installing our devices as network printers)
Our devices can be installed as network printers, as follows:
1. In the "Host spool access method" field, specify "U".
2. In the "Host printer" field, specify the "Printer queue name" given in Volume 3.
3. In the "Destination host" field, specify its IP address.

Note: (Using "POSS")   -- [only for SAPscript & SmartForms]
If the Device type supports POSS ("Print Options for SAPscript and SmartForms"), it is not necessary to make a copy of the Device type for every combination of settings needed. (This is still necessary for ABAP list printing, though.) Instead, the mechanism is as follows:
For each Output Device referring to the Device type, the administrator can define which of the POSS features shall appear configurable to the user, or he may specify fixed settings.
Upon printing a print job, the user can click the "Additional Options" button in the Print Parameters dialog, and then select from the available settings.
For the extent of POSS support implemented, refer to the separate section "POSS" above.
For the related screens and procedures refer to Appendix 1P: "Configuration using POSS" below.

3.2 Examples

(**Note:** Under POSS the procedure is different. Refer to the note above.)

3.2.1 (Setting up the printing environment)

Assume your company has four departments DEP1, DEP2, DEP3, and DEP4, each producing the following three types of documents: Letters, Invoices, Article lists. Further assume your TCP/IP network has four identical printers LP1, LP2, LP3, LP4, each equipped with a Mailbox and a Finisher unit. Department DEP<i> uses only printer LP<i>. Assume further that the company have the following printing conventions:
*   Letters :   are to be output into a separate mailbox for each issuing person
*   Invoices :   are to be stapled
*   Article lists :   are to be printed duplex; they have 65 rows and 132 columns
*   Only A4 paper can be used.

Then you would define something like the following (for <m> = 1 ... 9, <i> = 1 ... 4):

-- (11 device types):
*   Z00MBX<m>   in the "Printer initialization" action of the DINA4 format, specify the command sequence for Mailbox Tray <m>
*   Z00STP   in the "Printer initialization" action of the DINA4 format, specify the command sequence for activating stapling
*   Z00DPX   in the "Printer initialization" action of the X_65_132 format, specify the command sequence for duplex printing

-- (44 output devices):

- PR<i>LTR<m>   configure to print to printer LP<i> using device type Z00MBX<m>
- PR<i>INV   configure to print to printer LP<i> using device type Z00STP
- PR<i>ART   configure to print to printer LP<i> using device type Z00DPX

The end user does not (need to) know about device types. For department DEP<i> you just tell them the following rules:
- Person <m> is to use printer PR<i>LTR<m> (m=1..9) for his/her Letters.
- Everyone is to use printer PR<i>INV for Invoices.
- Everyone is to use printer PR<i>ART for Article lists.

As a table, it looks like this:

Department	Person	Document type	Output device	Physical printer	Device type	Settings
DEP1	Person 1	Letters	PR1LTR1	LP1	Z00MBX1	Mailbox Tray 1
...	...	...	...	...	...	...
DEP1	Person 9	Letters	PR1LTR9	LP1	Z00MBX9	Mailbox Tray 9
DEP1	any	Invoices	PR1INV	LP1	Z00STP	Stapling
DEP1	any	Article lists	PR1ART	LP1	Z00DPX	Duplex
.						
.						
DEP4	Person 1	Letters	PR4LTR1	LP4	Z00MBX1	Mailbox Tray 1
...	...	...	...	...	...	...
DEP4	Person 9	Letters	PR4LTR9	LP4	Z00MBX9	Mailbox Tray 9
DEP4	any	Invoices	PR4INV	LP4	Z00STP	Stapling
DEP4	any	Article lists	PR4ART	LP4	Z00DPX	Duplex

3.2.2 (Configuring settings) Example 1

SAPscript, A4, Portrait, Book style --> Duplex=L, Staple=TLSP, Punch=LP

Target:
To print a multi-page SAPscript A4 Portrait document with Duplex, Staple and Punch.
The document shall be bound on the left edge.
Hence, the duplex mode needs to be long-edge binding, and the punching mode needs to be LP.
Assume that one staple shall be used in the top-left corner, in slanted orientation.

Configuration:
The desired settings require feeding the A4 paper in LEF direction, for example from the LCT.
Auto Tray selection will take care of this automatically.
Stapling requires printing into the Finisher Shift Tray.

Therefore, you need to make the following modifications in the "Printer initialization" action of the DINA4 format:

Tag		Command	Interpretation
• **[PJL.02]**	STAPLING MODE	**@PJL SET STAPLE = LEFTTOPSLANTPORT \r\n**	TLSP
• **[PJL.03]**	PUNCHING MODE	**@PJL SET PUNCH = LEFTPORT \r\n**	LP
• **[PCL.01]**	INPUT BIN	**\e&l7H**	Auto tray select
• **[PCL.02]**	OUTPUT BIN 2/2	**\e&l101G**	Finisher Shift Tray
• **[PCL.03]**	DUPLEX MODE 2/2	**\e&l1S**	Long-edge binding

Orientation and Paper size need not be configured, since this is automatically done by the SAPscript OTF driver.

```
   Table   Edit   Goto   System   Help

   Ⓥ                              ▣   ◁  🔚  |  ❮  ❮  ❷  |  🖥  🔛  🔝  |  🔝  🔝  🔝  🔝  |  🔲  🔝

   Printer init.

   🔜  🔳  🔍  ◇  🔜   Delete   Continue replace   Concatenate   Split line

   |

          ....+....1....+....2....+....3....+....4....+....5....+....6....+....7..
   000010 #00000000011111111112222222222333333333344444444445555555555666666666777
   000020 #23456789012345678901234567890123456789012345678901234567890123456789012
   000030 # ====================================================================
   000040 # UEL command
   000050 \e%-12345X
   000060 # ====================================================================
   000070 @PJL COMMENT (ZAFICxxx) (ZAFIC100) (20001120010000) (DINA4) \r\n
   ...
   000230 # ====================================================================
   000240 # [PJL.01] RESOLUTION 1/3
   000250 @PJL SET RESOLUTION=600\n
   000260 # ====================================================================
   ...
   000270 # [PJL.02] STAPLING MODE
   000280 @PJL SET STAPLE=LEFTTOPSLANTPORT\r\n
   000290 # ====================================================================
   000300 # [PJL.03] PUNCHING MODE
   000310 @PJL SET PUNCH=LEFTPORT\r\n
   000320 # ====================================================================
   ...
   000470 # ====================================================================
   000480 @PJL ENTER LANGUAGE=PCL\r\n
   000490 # PCL reset
   000500 \eE
   000510 # ====================================================================
   ...
   000570 # ====================================================================
   000580 # [PCL.01] INPUT BIN
   000590 #\e&17H
   000600 # ====================================================================
   ...
   000640 # ====================================================================
   000650 # [PCL.02] OUTPUT BIN 2/2
   000660 \e&l101G
   000670 # ====================================================================
   000680 # [PCL.12] PAPER TYPE 2/2
   ...
   000860 # ====================================================================
   000870 # [PCL.03] DUPLEX MODE
   000880 \e&l1S
   000890 # ====================================================================
   000900 # [PCL.15] RESOLUTION 3/3
   000910 \e*t600R
   000920 # --------------------------------------------------------------------
```

3.2.3 (Configuring settings) Example 2

SAPscript, Letter, Landscape, Report style --> Duplex=L, Staple=T2L, Punch=TL

Target:
To print a multi-page SAPscript Letter Landscape document with Duplex, Staple and Punch.
The document shall be bound on the top edge.
Hence, the duplex mode needs to be long-edge binding, and the punching mode needs to be TL.
Assume that two staples shall be used on the top edge.

Configuration:
The desired settings require feeding the Letter paper in LEF direction, for example from the LCT.
Auto Tray selection will take care of this automatically.
Stapling requires printing into the Finisher Shift Tray.

Therefore, you need to make the following modifications in the "Printer initialization" action of the LETTER format:

Tag		Command	Interpretation
• **[PJL.02]**	STAPLING MODE	**@PJL SET STAPLE = TOP2LAND \r\n**	T2L
• **[PJL.03]**	PUNCHING MODE	**@PJL SET PUNCH = TOPLAND \r\n**	TL
• **[PCL.01]**	INPUT BIN	**\e&l7H**	Auto tray select
• **[PCL.02]**	OUTPUT BIN 2/2	**\e&l101G**	Finisher Shift Tray
• **[PCL.03]**	DUPLEX MODE 2/2	**\e&l1S**	Long-edge binding

Orientation and Paper size need not be configured, since this is automatically done by the SAPscript OTF driver.

3.2.4 (Configuring settings) Example 3

ABAP, X_65_132 (Landscape), Book style --> Duplex=S, Staple=L2L, Punch=LL

Target:
To print a multi-page ABAP generated list on A4 paper with Duplex, Staple and Punch.
Assume the list has 60 columns and you want 130 lines per page. The output shall be bound on the left edge.
Hence, you can use format X_65_132 (Landscape).
The duplex mode needs to be short-edge binding, and the punching mode needs to be LL.
Assume further that two staples shall be used on the left edge.

Configuration:
The desired settings require feeding the A4 paper in SEF direction. This is not possible from the LCT; hence assume that A4 (SEF) paper is available in Tray 3.
Stapling requires printing into the Finisher Shift Tray.

Therefore, you need to make the following modifications in the "Printer initialization" action of the X_65_132 format:

Tag		Command	Interpretation
• **[PJL.02]**	STAPLING MODE	**@PJL SET STAPLE = LEFT2LAND \r\n**	L2L
• **[PJL.03]**	PUNCHING MODE	**@PJL SET PUNCH = LEFTLAND \r\n**	LL
• **[PCL.01]**	INPUT BIN	**\e&l4H**	Tray 3
• **[PCL.02]**	OUTPUT BIN 2/2	**\e&l101G**	Finisher Shift Tray
• **[PCL.03]**	DUPLEX MODE 2/2	**\e&l2S**	Short-edge binding

The command for Orientation is already sent at the end of the "Printer initialization" action of the X_65_132 format.
The Paper size needs to be specified explicitly, at [PCL.17], only if there is a problem.

3.5 Configuring features using POSS

This section explains how to configure device features using POSS by the User, and the preparatory configuration of POSS by the Administrator.

If POSS-unsupported features are involved, refer to the procedures above; this still requires to make copies of and modifications in the Device type itself.
For only POSS-supported features, it is not necessary to make modifications in the Device type itself. Rather do the following.

The Device type is installed as before.

Initially, the Administrator creates multiple Output devices, one for each logical printer, i.e. physical device and desired combination of settings (features, values) on it.
They can all refer to the same original Device type (no longer need to create copies of Device type and modify them).

- Some features can be disabled (so that the user cannot see and thus not change them).
- For each feature some values can be disabled (so that the user cannot see and thus not select/specify them).
- For each feature 1 value can be pre-selected as fixed (so that the user cannot change it).
- It is not possible for a feature to specify one value as default, other than "No selection" which implies the device default.

Upon printing, the User, in the Print Parameters dialog, specifies the Output device, then, to change the defaults, he can click the new button labeled "Additional Options".
There he can specify his desired combination of settings by a few clicks (only from those features and values that were not disabled and not fixed (pre-selected) by the Administrator).

Note: (ABAP)
When printing an ABAP report, POSS will not become effective. As with non-POSS Device types, settings need to be made in the SETUP ("Printer initialization") Action of the corresponding X_ll_cc Format.

1. Configuring POSS: initially once, by the Administrator

For each physical printer device, follow these steps:

a. Connect and test the printer device, as described further above.

b. From the device model and the installed options, determine the Device type to be used.
    If it is not available on the system yet, obtain and import it.

c. For each logical printer (corresponding to a combination of settings) to be defined for that device, follow these steps:

c1. Create an Output device, name it suitably, connect it to the printer, and map it to the above Device type.

c2. For each POSS Print Option (device feature), and for each of its Option Values (settings), determine:
          - whether it is physically available on the physical device. (Refer to Appendix POSS of the corresponding Volume 3.)
          - whether the User is supposed to configure it.

        If not, on the "Print Options" tab, disable it: **[_] Disable**.
        Alternatively, if only 1 fixed value is to be used, check **[X] Preselection**.
        This protects it against accidental or unwanted changes by the user.

For the procedure details, refer to Appendix 1P ("Configuration using POSS") below.

2. Using POSS: upon each printing, by the User

If the User prints from SAPscript or SmartForms, specifying a POSS-enabled Output device, the Print Parameters dialog will show an additional button labeled "**Additional options**".
If the User wants to override the device default settings of one or more POSS options which were not disabled by the Administrator, he may click the button and configure them.
Preselections by the Administrator appear greyed out and cannot be overridden.
If "**No selection**" is displayed, no command will be sent; i.e. the **device default** will become effective.

For the procedure details, refer to Appendix 1P ("Configuration using POSS") below.

Note: ("Volatility/Retention of settings")
The POSS settings made by the User for a particular Print job are retained across subsequent print jobs, within the same login session, but only until a different Output Device is specified or the same Output Device is being re-specified.
They are not retained e.g. after a restart of SO10, or across multiple concurrent sessions, or in subsequent login sessions, of the same user.

4. Troubleshooting

If there are problems with printing from a SAP system to our devices and/or using our device types, please find below some basic troubleshooting steps, before considering contacting SAP support or our support.

4.1 Types of trouble

The directly observed kinds of trouble can be manifold:
- The printout is "wrong" (paper wrong, output bin wrong, no duplex printing, wrong duplex binding, not stapled, stapling mode wrong, not punched, punching mode wrong, no job offset, number of copies wrong or uncollated, image on page not correct, output looks "garbled", resolution wrong, orientation wrong, font or symbol set wrong, single characters missing or appearing wrong, image shifted or cut off, margins wrong, vertical or horizontal spacing wrong, pages missing, paper jam, ...).
- The printer prints partially but then issues an error.
- The printer doesn't print (receives data but no output).
- The printer doesn't receive any data.

Record a clear description of what you observed.

4.2 Sources of trouble

Any printing problem is caused by problems in one or more of the following components of the printing process.
- Original document (SAPscript document, SmartForms Text module, ABAP report) or the SAPscript/SmartForms Style or Form used
- Output device (logical printer) definition
- Device type: (command sequence, ...)
- SAPscript printer driver
- SAP spooler (Spool Work Process, ...)
- Network connection
- Physical device (controller, hardware), paper jam, ...

4.3 Basic troubleshooting steps

<u>**Main steps**</u>
1. Get a clear picture of what is wrong, try to analyze the problem, and try to solve it by yourself.
2. Try to determine if the problem is related to SAP, the device, or the device type.
3. Prepare all information necessary to contact support.
4. Contact support.
5. Obtain additional information as requested by the support staff.

<u>**Step 1**</u> **:** (Get a clear picture of what is wrong, try to analyze the problem, and solve it by yourself.)

Before considering contacting external support to seek for help, try to analyze and solve the problem by yourself.
- Clearly describe what exactly is "wrong".
- Is it reproducible? Always? Under what conditions?
- Since when did it happen ? Did you change something in the printing environment before that?
- Does it happen with other device types?
- With which formats of the device types does it happen?
- Try to further isolate the problem: identify the source of trouble by successively eliminating possible sources performing the steps below.
- Check the correctness of all commands used for the setting that fails (misspelling ?, commented out ?).
  See under "Syntax" in the section for this setting in Volume 3.
- Check that there is no conflict with other settings used.
  See under "Dependencies/Constraints" in the section for this setting in Volume 3.

Also see the flow in the SAP R/3 Printing Manual: "Analyzing R/3 Printing Problems".

<u>**Step 2**</u> **:** (Try to determine if the problem is related to SAP, the device, or the device type.)

If you cannot solve the problem yourself, the next step is to determine if you should contact SAP support or the device vendor's support.
According to SAP policy, SAP support may not be contacted with problems related to non-standard devices and/or device types.

This is how to find out:

- **A**.
Try using a SAP standard device type (name not starting with "Y" or "Z"), such as HPLJ5SI, as a reference device type.
Just remap the Output device temporarily to the standard device type.

- **B**.
Try using a different or a reference device (e.g. HP LaserJet 5Si), if available.

If the problem still occurs with both A and B, then this problem is clearly only SAP related. In this case, please contact SAP support.

Otherwise, our device and/or our device type is causing the problem.

However, before you contact our support, please try to isolate the problem source further, using the following approaches:

- Try reproducing the problem using our device and a **reference device type** (if that makes sense).
  If it still occurs, it is only device-related.
  In all other cases, the problem may come from our device type.

- Try using a **standard document** (transaction SO10 -> SAPSCRIPT-xxxxTEST).

- If applicable, try to **print** to your device **from a different environment**.
  If possible, print from Windows using our Windows driver, and specify the same settings.

- Check the **command sequence** in the "Printer initialization" action of the Format used in the Device type used for misspellings.

- Check the **Spool requests** (transaction SP01).

- Check the **Output requests** (transaction SP01).

- Check the SAP system **Process Overview** (transaction SM50 -> in the "Type" column, click on "SPO").

- Check the **Spool Error Log**.

- Check the **Spool server Trace** (transaction SPAD -> Output devices -> <output device> -> [main menu] -> Goto -> Spool server trace -> Display).

- Check the SAP server **System Log** (transaction SM21).

Steps 3, 4, 5 : See the following sections.

4.4 How to contact our support

If you couldn't fix the problem by yourself, and you found the problem is not purely SAP related, you need to contact our technical support.
Please contact your local representative.

4.5 What information to prepare

If you do contact our support, please be prepared to have the following information ready:

Basic information

Category	Details
• Personal	• Your personal data (company, contact person, address, ...)
• Problem	• Clear and detailed description of symptoms, reproducibility, all your above findings, ...
• Physical device	• Model name, serial number, controller firmware version, Total RAM, installed printer options/accessories (Mailbox, Finisher, ...), ...
• Output device (logical printer)	• Verbal description of Access method (how is the printer connected ?) and device type used
• Device type	• Name of base device type (the one you originally derived your device type from) • Brief description of your modifications (in the "Printer initialization" actions or Print controls), if any • Description of intended effect/setting
• Document	• What kind (SAPscript/SmartForms, ABAP)? (if SAPscript/SmartForms): Which Form ? Which Style ? Which Page format ? • Which Format was used when printing?
• SAP system frontend environment	• Operating system • SAPGUI version **Note:** This information is displayed in the title of the SAPlogon screen.
• SAP system server environment	• "Host data" (Operating system, Codepage) • "Database data" (System, Release)

	• "SAP System Data" -> "Basis Release": e.g. 46B - Patch / Support package levels **Note:** This information can be obtained through (main screen) -> menu : System : Status, or through transaction SM51.

• "SAP System Data" -> "Basis Release": e.g. 46B
    - Patch / Support package levels
Note: This information can be obtained through (main screen) -> menu : System :
Status, or through transaction SM51.

5. Appendices

5.1 (Appendix 1): Installation and Configuration : Procedures

This chapter describes each step necessary for installing and configuring a printer and device type, as indicated in the previous chapter.
All procedures need to be performed by an administrator with sufficient rights.

The procedures described here are based on SAP release R/3 v4.6B, using the Windows-based SAPGUI.
For other release versions and platforms they may be different. Please refer to your release- and platform-specific SAP documentation.
The screenshots were made from the Windows SAPGUI. For user interfaces on other client platforms, e.g. Unix, refer to appropriate documentation.

General information

Most transactions have 2 modes:
- "**Display mode**" is used for viewing only. Most items appear greyed out.
- "**Change mode**" is needed for editing.
Usually there is a button on the tool bar to toggle between these modes. The glasses symbol switches to Display mode; the pen symbol switches to Change mode.

Any changes must be saved. There is a "**Save**" button on the tool bar.

Notation:
- Zxxxxxxx stands for any proprietary device type

5.1.1 How to create an Output device

This step can only be done after the following prerequisite steps:
- the device type to be used exists or has been defined (it can be modified later)
- the physical device has been connected (to the parallel port or the network), and correctly configured (assigned an IP address etc.)

The following procedure handles only the case of access method "C" (which means the print data is spooled locally on the application server).
For details for other access methods, please see the SAP R/3 Printing Manual.

1. On the SAP application server, for example R3SERV, define a local printer, for example LP01, which sends data to the physical printer.
    It may be attached to the local parallel port or on the network (IP address, Printer queue name (see Volume 3)).
    Check that you can properly print to this printer from some native (non-SAP) application (e.g. NotePad).
2. Run transaction SPAD (Spool administration).
    Press the button "Output devices".
    Enter "Create" mode.
    From the list, select an existing similar printer (if one exists).
3. Press <F5> ("Create from template").
4. On tab 1 (Device Attributes) configure the following:
    - Device type   = (enter name or select from list)
    - Spool server   = (select from list)
    On tab 2 (HostSpoolAccMethod) configure the following:
    - Host Spool Access Method   = "C: Direct operating system call"
    - Host printer   = LP01
    - Host name   = R3SERV
    On tab3 (Output attributes) configure the following:
    - SAP cover page   = on or off
5. Press the "Save" button.
    Repeat from step 3 to create another Output device .

Output device　*Edit*　*Goto*　*Extras*　*Utilities*　*System*　*Help*

Spool Administration: Output Device (Change)

Paper tray info

| Output device | AFC0 | Short name | AFC0 |

DeviceAttributes　　HostSpoolAccMethod　　Output attributes

Device type　　　　ZA001001: ZA00 family (Latin-1)

Spool server　　　　edsc01_IDS_00　　　edsc01

　　　　　　　　　　IDES-Schulungssystem

Device class　　　　Standard printer

Authorization group

Model　　　　(generic)

Location　　　Generic printer (prints to file)

Message

☐ Lock printer in SAP System

IDS (3) (800)　edsc01　INS

Output device   Edit   Goto   Extras   Utilities   System   Help

Spool Administration: Output Device (Change)

Paper tray info

Output device	AFC0		Short name	AFC0

DeviceAttributes   HostSpoolAccMethod   Output attributes

Host spool access method   C: Direct operating system call

Host printer   AF65

Host name   edsc01

Status confirmation via polling

☐ Do not query host spooler for output status

IDS (3) (800)   edsc01   INS
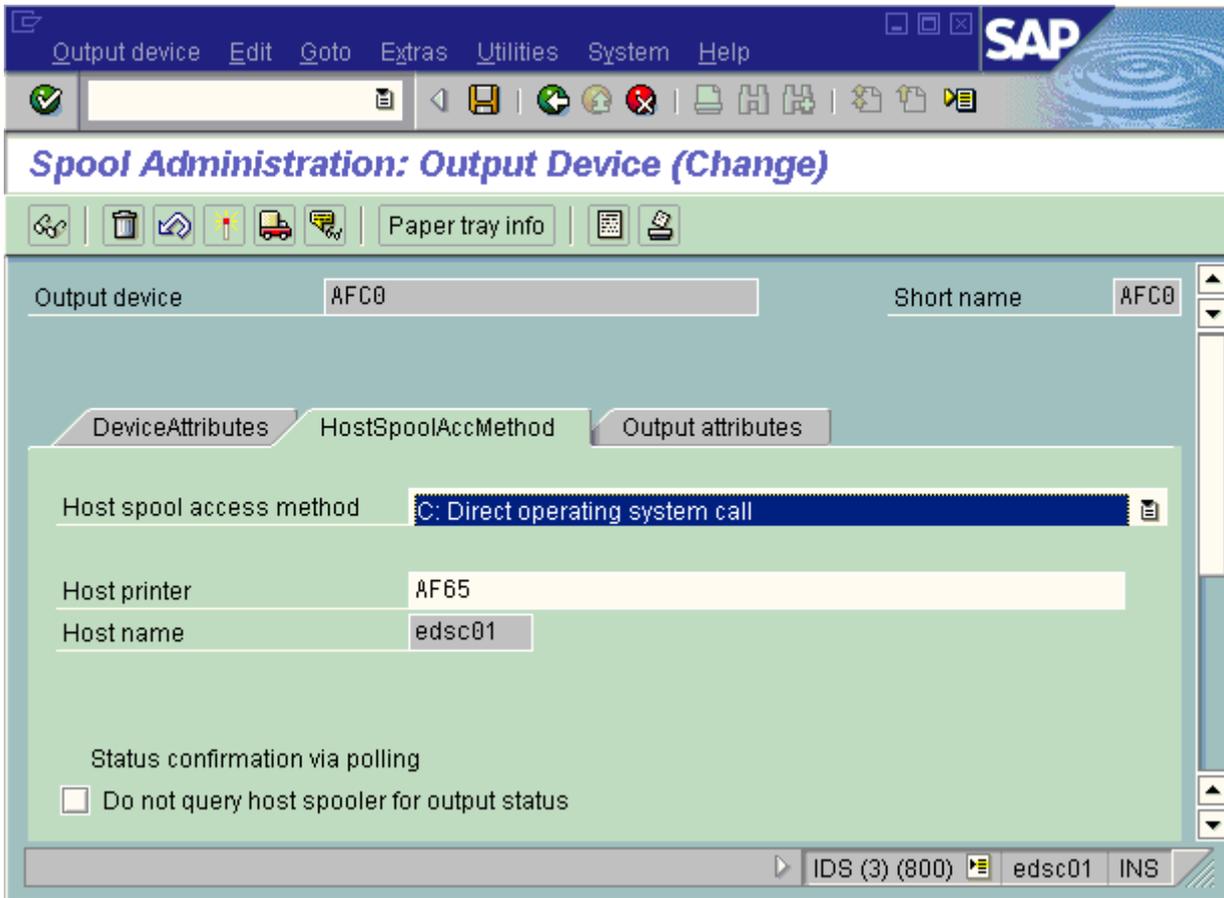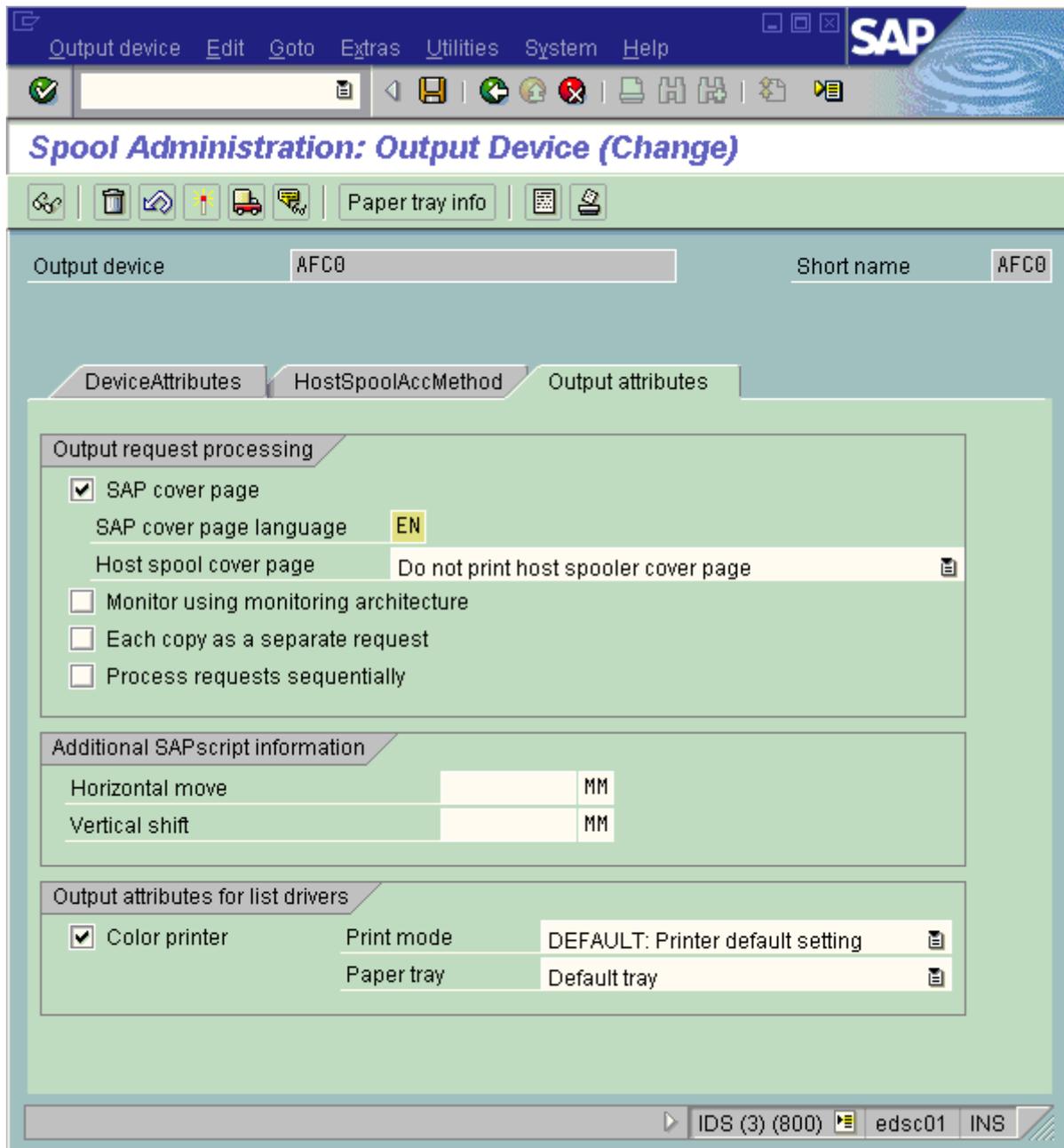
5.1.2 **How to import a Device type**

The following procedure describes how to import the proprietary device type Zxxxxxxx from an external file Zxxxxxxx.PRI into the SAP system.

1.   Login on your administrative client (typically 000).
2.   Copy the file Zxxxxxxx.PRI (*1) to some temporary directory of your SAP server or your frontend station, say C:\temp, or /tmp or
        /temp.
        Note: The file name characters must be all uppercase.
3.   Run transaction SE38 (ABAP Editor).
        Run the report RSTXSCRP.
        (Alternatively: SPAD -> menu -> Utilities -> For device types -> Import)
5.   Specify the following parameters:
                        - "From/on frontend" **OR** "From/on application server"
                        - Device type
                        - Object name = Zxxxxxxx
                        - Dataset name = C:\temp\Zxxxxxxx.PRI
                                Note: From SAP release R/3 v4.0, the automatic notation "C:\temp********&&&&" can be used.
                        - Binary file format = ASC
                        - Mode = IMPORT
6.   Press <F8> to Execute.
7.   Here you may be asked to create a transport request, if not already done before.

8.   Confirm:
                        - File name   = C:\temp\Zxxxxxxx.PRI
                        - Data format = ASC
        Press "Transfer".

The transfer may take some time.

9.   Now you should have these messages on your screen.

```
Transport object PRIN ZAFICxxx is being processed
Object successfully imported
Spooler informed of change
```

SAPscript Export to Dataset / SAPscript Import from Data...

Object selection and session ctrl

- ○ Form
- ○ Style
- ○ Standard text
  - Text ID   ST
  - Language   EN
- ● Device Type

Object name   ZA001001

Mode (EXPORT/IMPORT)   IMPORT

Ctrl parameters for file operation

- ● From/on frontend
- ○ From/on application server

Dataset name   C:\temp********&&&&

- ☐ Binary file format
- ☐ Display dataset contents

Control of language versions

Language vector

- ☐ Only export original language

IDS (3) (800) edsc01 INS

Note: (*1) (Device type was not imported: Error message: "Dataset does not contain Zxxxxxxx but ...")
For some SAP systems, it may be necessary that all lines of the file Zxxxxxxx.PRI end with <CR><LF> (Carriage Return / Line Feed) instead of only <LF>. To quickly convert it, just load it into WordPad and save it, before importing it.

Note:
- If a device type with the same name already exists, it will be overwritten without warning ! That also implies that in case of an update, the old one doesn't need to be deleted first.
- It is not possible to import multiple device types simultaneously. (The wildcard syntax e.g. Zxxx* is not allowed.) So each device type has to be imported individually.

If there are problems after importing, try performing the following steps (normally not necessary):
a) Reset the cache of SAPscript:
        Run report RSTXDELL (client='*') via transaction SE38.
b) Reset the Character Code Cache:
        Run transaction SP12 (TemSe administration).
        Menu: -> Character sets -> Conv.buffer(CCC) -> Invalidate CCC
        The reset is only valid on the actual instance.
        Therefore, you have to connect to the instance on which the Spool Work Process is running.
c) Restart the Spool Work Process:
        Run transaction SM50 (Process overview).
        Place a check mark on the "SPO" entry.
        Menu: -> Process -> Cancel without core

5.1.3 How to copy a Device type

Rather than creating a device type from scratch, use an existing device type as a template.
After importing an original proprietary device type, you need to make copies of it, in order not to overwrite the original.
You need to make a copy for every combination of settings that you need.
Name each copy in a mnemonic way, such that it reflects the settings it will effect.
The name must start with 'Z' or 'Y' and may consist of a maximum of 8 characters; e.g. Z123SP3.

1.　　Run transaction SPAD (Spool administration).
　　　Menu: Utilities -> For device types -> Copy device type
2.　　- "From device type" :　　Press <F4> and select the existing source device type from the list.
　　　- "To device type" :　　　Specify the new name.
　　　- "Use references" :　　　Uncheck this; otherwise you cannot make modifications later.
3.　　Press <F8> to execute.
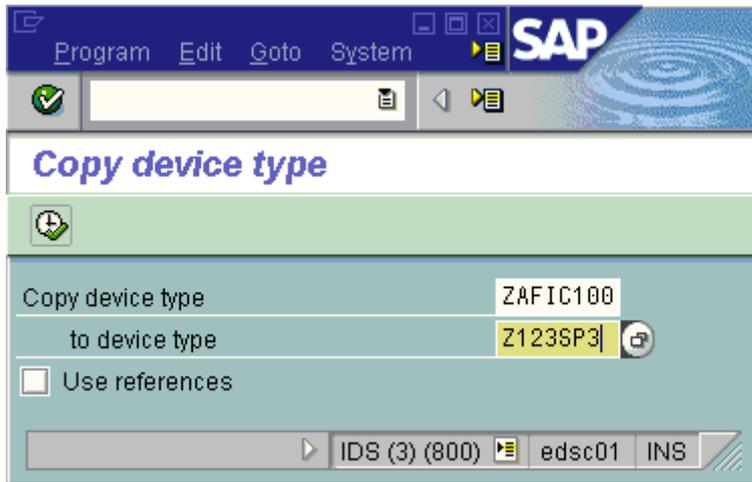
See also the SAP R/3 Printing Manual: "Copying a device type".

5.1.4 How to edit a Device type

After creating a copy, it needs to be modified in order to effect the desired settings.
That means, the correct printer command sequences have to be entered or modified.

1.　　Run transaction SPAD (Spool administration).
　　　Press the button "Full administration".
　　　Go to the tab "Device types".
　　　Press the button "Device types".
2.　　Select the device type to modify.
3.　　Enter "Change" mode.

Most likely you need only modify the "Printer initialization" action of some of the Formats; see the section "How to edit a Device format" below.
It is very unlikely that you would also need to edit or even add a Print control; for this see the sections "How to create/edit a Print control" below.

5.1.5 How to delete an entire Device type definition

If a device type is no longer needed, you may wish to delete the entire definition.

1. Run transaction SE38 (ABAP Editor).
2. Run report RSTXDPRI.
3. Specify name of the device type to delete
4. [X] Delete

Alternatively, you can delete the device type from SPAD. However, prior to this you first need to manually delete all its Formats and Print controls, and for all Output devices in which it is used the Device type entry needs to be changed.

5.1.6 How to create a Print control

To add a new Print Control, the following steps have to be taken:

1. Add a new Print control to the set of "Standard Print controls".

1. Run transaction SPAD -> "Full administration" -> "Device types" -> "Print Controls".
2. Enter "Change" mode.
3. Menu : "Standard PrCtrl" : "Create (using template)"
4. Specify:
   - The name (it should start with the letter "Y" or "Z")
   - A descriptive comment
   - Some additional parameters
5. Save.

2. Add the (new) Standard Print control to the Device Type.

1. See "How to edit a Device type" above.
2. Press the "Print controls" button.
3. Right mouse button -> "Insert standard print controls"
4. Select the new Print control to insert from the list.
5. Right mouse button -> "Choose"
6. Save.
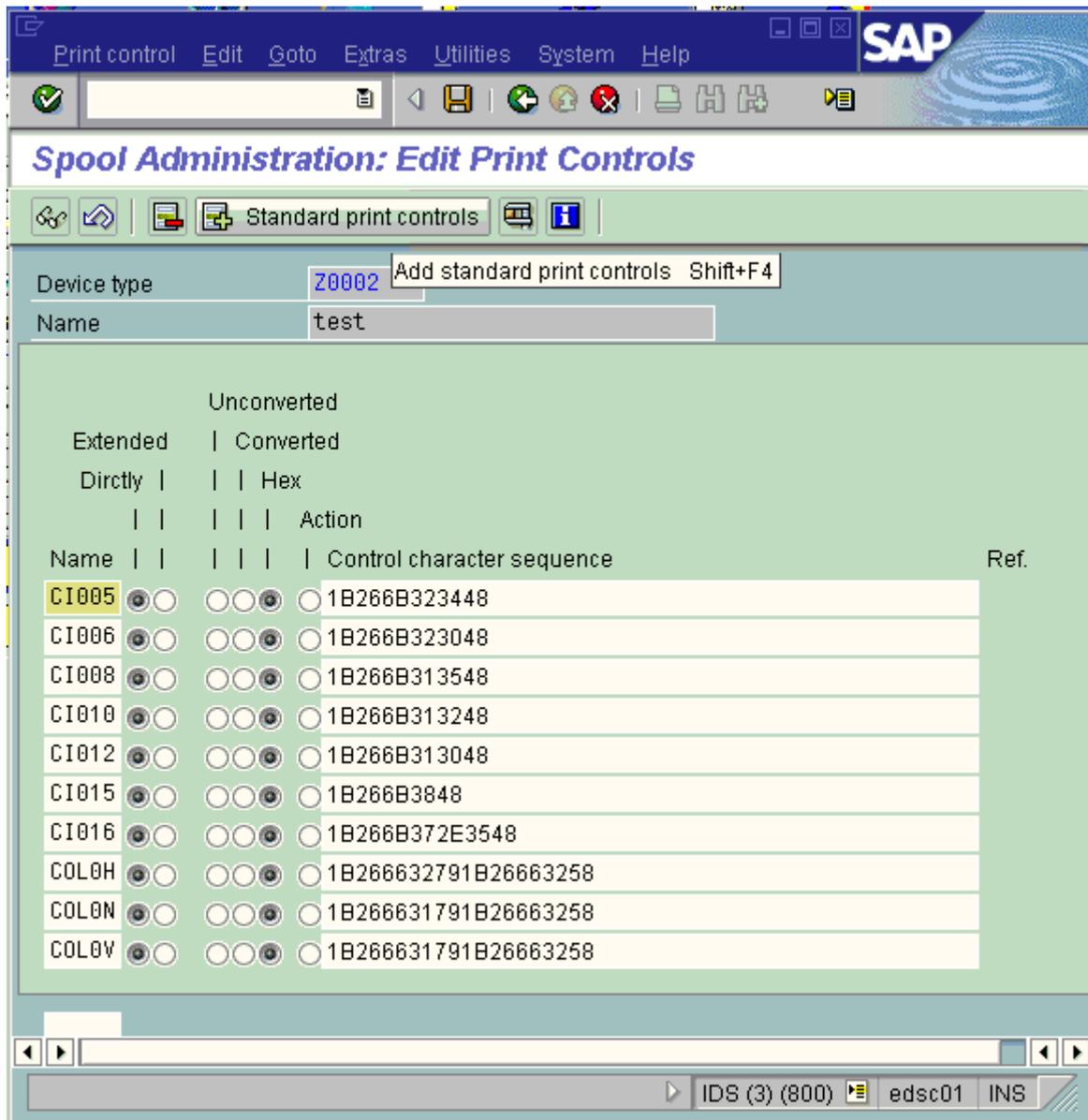
3. Edit the new Print control.

See the next section.

5.1.7 How to edit a Print control

1. See "How to edit a Device type" above.
2. Press the "Print controls" button.
3. Select the Print control to change.
4. Edit the hexadecimal command sequence.
5. Save.

5.1.8 How to create a new Format

You would need to add a new format for these reasons:
- (for SAPscript/SmartForms): to support a new paper size (Page format)
- (for ABAP): to add a new format X_ll_cc

This consists of two steps.
1. Create a new Format type, if it does not exist already.
2. Create the new Device format.

A **new Format type** is automatically created, when it is introduced by a non-standard Device format of a newly imported Device type.
In this case, you may only wish to modify the Comment string of the Format type.

1. To **create a new Format type** (this is independent of any device type):

1.   Run transaction SPAD (Spool administration).
        Press the button "Full administration".
        Go to the tab "Device types".
        Press the button "Format types"
2.   Enter "Change" mode.
3.   Menu : "Format" : "Create" (or via right mouse button)
4.   Specify:
        - The name of the new format
        - The type of the new format
        - Attributes (if applicable)

- A descriptive Comment
5. Save.
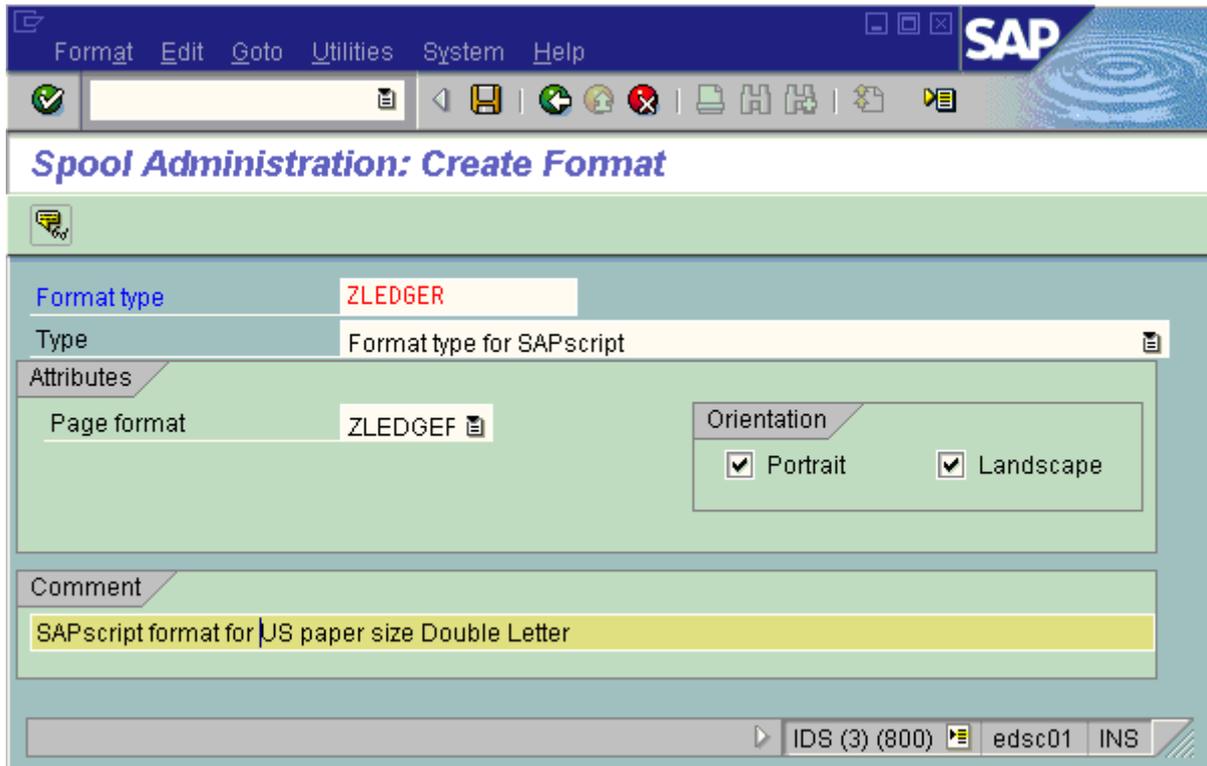
2. To **create a new Device format** (for a particular device type):

1. See "How to edit a device type" above.
2. Double-click the Device type to modify.
3. Press the "Formats" button.
4. Enter "Change" mode.
5. Right mouse button -> "Create"
6. Select the Format type from the list.
7. If there already exists a similar format, you can copy it:
   - Menu : "Device type formats" : "Copy format"
   - Specify source Device type and Format
   Otherwise, for each action to be used, see "How to add or edit an Action" below.
8. Save.

Note: (*)
For which settings should be made in case of X_ll_cc, please see the corresponding section below.

5.1.9 How to edit a Device format

1. See "How to edit a device type" above.
2. Double-click the Device type to modify.
3. Press the "Formats" button.
4. Enter "Change" mode.
5. Double-click the Format to modify.
6. See "How to add or edit an Action" below.
7. Save.

5.1.10 How to add or edit an Action

1. See "How to edit a Device format" above.
2. To add an action:
   - Right mouse button -> "Create action"
   - Specify a name and a description
   - Activate it.
   To modify the action, double-click it.
3. Specify the command sequence. (*)
   For the command sequence needed in an action, please see the corresponding information in Volumes 2 and 3.
4. Save.

Spool Administration: Create Action

Action   ZMYACT

Meaning   just for test

Device type formats   Action   Edit   Goto   Utilities   System   Help

Spool Administration: Maintain Format for Device Type

| Device type | Z0002 | Format | INCH12 |

Available actions for a format   Original

◇ End of line on odd page

● End of line

● ZMYACT: just for test

IDS (3) (800)   edsc01   INS
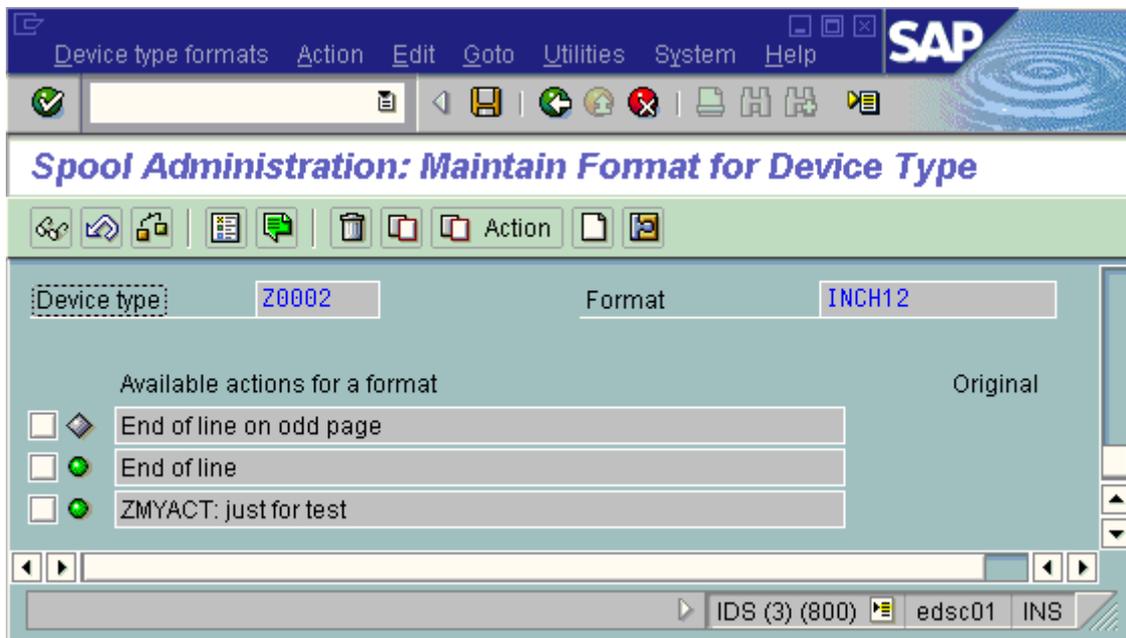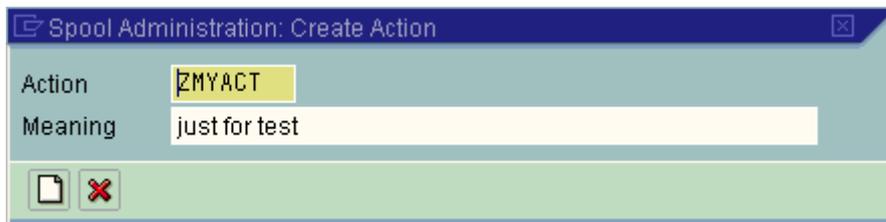
5.1.11 How to configure an ABAP X_ll_cc device format

This section explains how to configure (set or change) a Courier font to an appropriate size, and suitable vertical (VMI / lpi) and horizontal (HMI / cpi) spacing of an X_ll_cc format's "Printer initialization" action, in such a way that a page with printable region of given length PL and width PW can nicely fit a table of LINS lines across COLS columns.

The actual implementation depends on the PDL.

Given parameters:

Quantity	Name	Unit
• Page length	**PLEN**	inch (!)
• Page width	**PWID**	inch (!)
• # Lines /page to fit	**LINS**	#
• # Columns /line to fit	**COLS**	#

Quantities to configure:

Quantity	Name	Unit
• VMI	**LPI**	lpi
• HMI	**CPI**	cpi
• Font height	**FV**	pt = 1/72"
• Font pitch	**FH**	cpi

Restrictions:
- Courier: FV x FH = 120 (fixed spacing)
- CPI ~= FH = 120 / FV (">" = condensed, "<" = expanded)
- LPI << 72 / FV

Solution:
According to above restrictions, one can choose CPI, LPI, FV, and FH roughly as:
- LPI ~= LINS / PLEN
- CPI ~= COLS / PWID
- FV ~= 120 / CPI
- FH = 120 / FV

5.1.12 How to create a Page format

For commonly used paper sizes such as A4, Letter, etc., Page formats are predefined in SAP.
If you want to print on non-standard (e.g. Double Letter) or custom-size paper, you need to define a corresponding Page format first, one for each orientation (Portrait, Landscape). The name has to begin with a "Z".

1.   Run transaction SPAD (Spool administration).
       Press the button "Full administration".
       Go to the tab "Device types".
       Press the button "Page formats".
       (Alternatively, navigate to Menu : "Page formats" : "Create".)
2.   Enter "Change" mode.
3.   Specify:
          - Name
          - Orientation
          - Width & height, in {MM,CM,IN,PT}
4.   Press "Save".
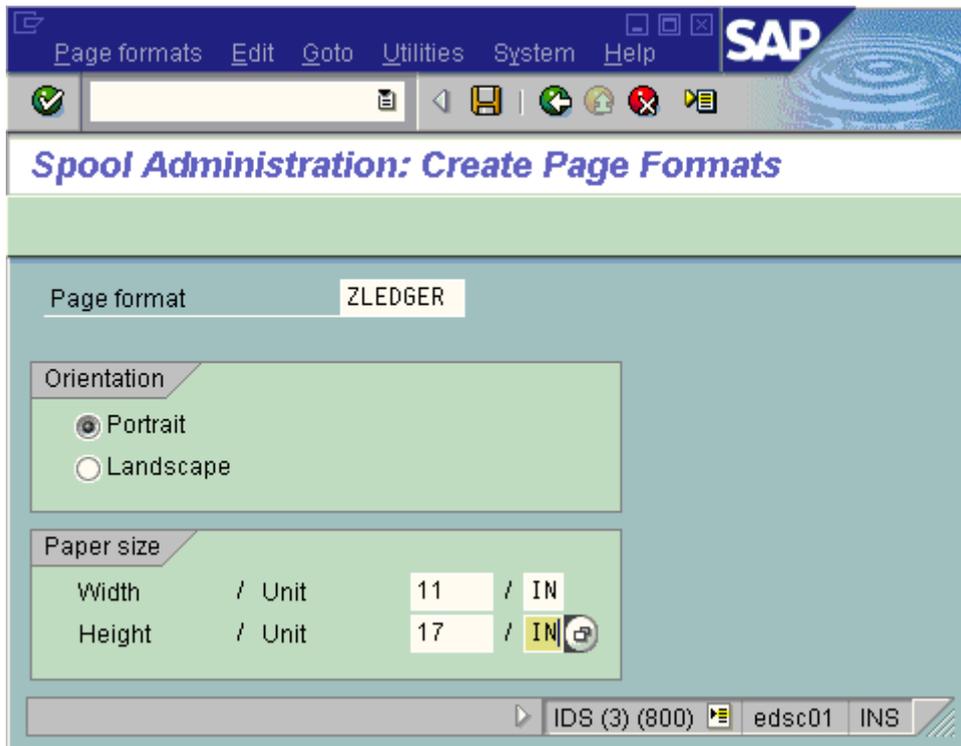
5.1.13 How to enable a non-standard font

If you wish to use a particular non-standard font (available as soft or hard font on your device), you have to follow these steps:
1. Create a font family using transaction SE73
2. Create a system font using transaction SE73
3. Create a printer font using transaction SE73
   Add the device font description into the device type
In the device type the Print Control indicated in step 3 must be defined, and it must contain a command sequence to activate the desired device font.
Please see SAP note # 0012462.

Note:
For printing fonts in arbitrary sizes, please refer to standard SAP documentation, or contact Technical support.

5.1.14 How to correct an image shift

Printers of different brands or models or even of the same family often may have slight differences in the printable region of the page.
If the same document has to be printed on all of these, the output may look different: The image may appear shifted, or items near the border may even vanish. This problem can only occur for SAPscript- or SmartForms-based documents, since the ABAP formats are designed to fit more lines and columns than are guaranteed.

Problems with the printable area when changing from one printer to another are a commonly known issue with SAP printing.

One can work around this in a limited way through the **Image shift mechanism** (see below), which one can define individually for each Output device.
However, if the document was already designed too tight near the edges of the paper, there are only 2 possibilities left:
- adjust the printable region on our devices / printer controller (if possible)
- adjust all SAPscript Forms of all affected SAPscript documents (this may be a lot of work)

In order to still allow printing the same document on all printers with similar results, SAP allows adjusting/adapting/correcting the position of the output image on the paper for each Output device (logical printer) individually, as follows:

1.   Run transaction SPAD (Spool Administration).
      Navigate to (tab 1) "Devices / servers" -> (button 1) "Output devices".
2.   Select the affected Output device.
      On (tab 3) "Output attributes":
      Enter "Change" mode.
3.   Under "Additional SAPscript information" :
         - Horizontal move: # MM (*)
         - Vertical shift: # MM (*)
4.   Press the "Save" button.

Note: (*)
Decimal places are not allowed. For measures below 1 mm please use PT (1 point = 1/72 inch = ca. 0.35 mm).
Also negative values are allowed: (< 0 = up & left, > 0 = down & right).
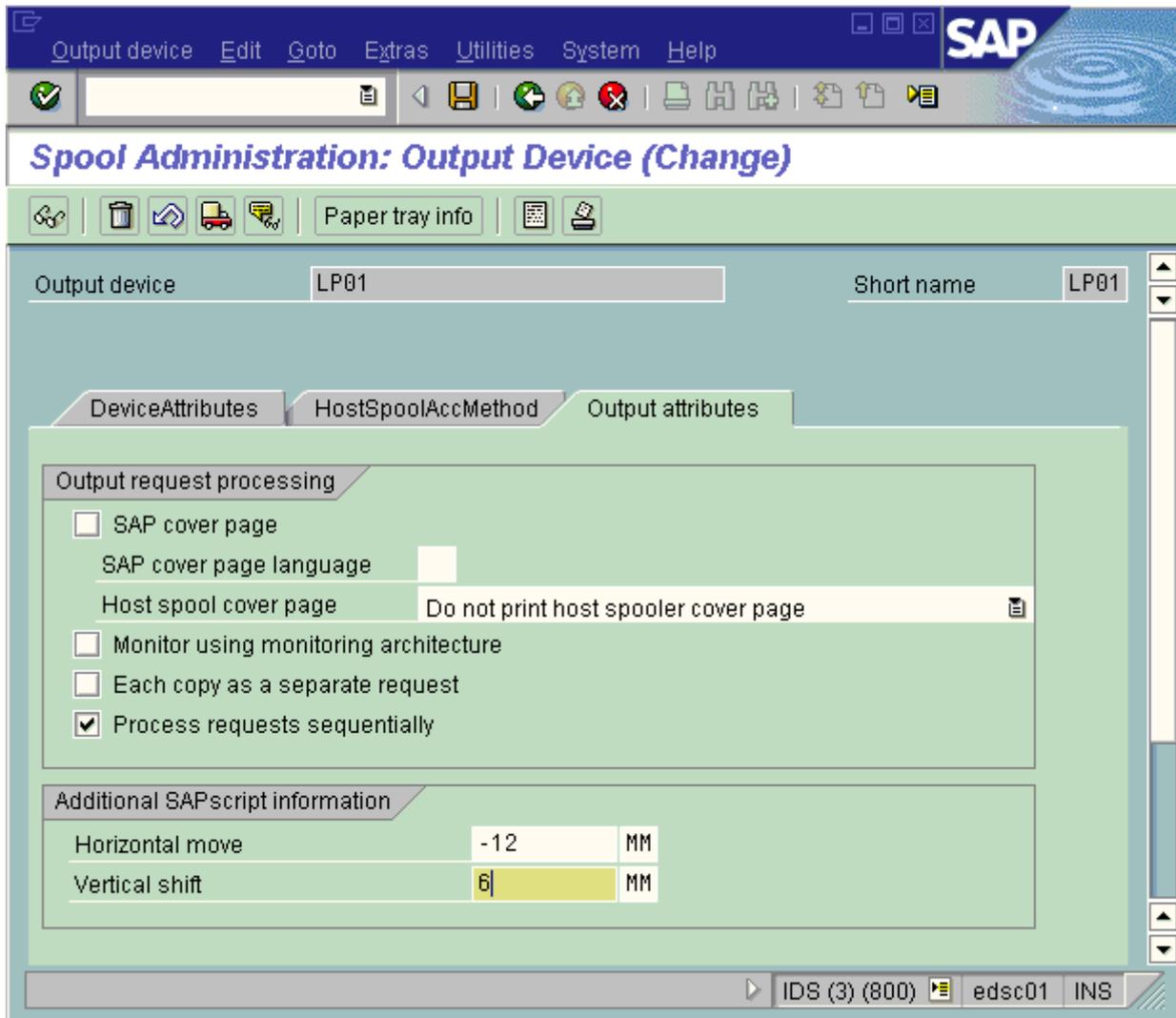
5.1.15 How to enable printing on a non-standard paper format

Commonly used paper sizes such as A4, Letter, etc., are fully supported by SAP.
In addition to these, the SAP administrator may need to support others, such as Double Letter, or envelopes.
Of course, this is only possible for those paper sizes that the device supports, as listed in the "Paper size" section of Volume 3.

This only applies to printing SAPscript- or SmartForms-based documents, since ABAP output is always designed to fit on A4/LTR paper.

To add support for another paper size, one needs to:

1.   Create a Page format with the corresponding measures; one for each orientation (Portrait, Landscape) to be used.
      By convention, the names of these have to start with a "Z", and may be a maximum of 8 characters long; hence Zxxxxxxx.
      => See the section "How to create a Page format" above.
2.   Create a Format type of type SAPscript with the same name (Zxxxxxxx), referring to the above Page format.
      => See the section "How to create a new Format" above.

3.   (For each Device type to be used):
   3a.   Add a Device format for the above Format type.

=> See the section "How to create a new Format" above.
3b. In the "Printer initialization" (SETUP) action of this Device format,
configure the correct command for the Paper size [PCL.17] setting.
=> See the section "How to add or edit an Action" above.
The Orientation setting is automatically being taken care of by the OTF driver.
The Input bin setting [PCL.01] may not be necessary.

5.2 (Appendix 1P): Configuration using POSS

This chapter describes the detailed specific procedures necessary for configuring an Output device using a POSS-enabled Device type.
The information from Appendix 1 still largely applies.

Note again, that this applies only to printing from SAPscript and SmartForms, not from ABAP.

5.2.1 Configuring POSS: How to configure an Output device for POSS [by the Administrator]

Under POSS an Output device can be configured (by the Administrator) to show to the User only those Print Options (device features) and their Option Values (settings) that are physically available on the device and to possibly restrict the choices available to the User even further.

This procedure can only be applied after the POSS-enabled Device type to be used has been installed on the system.

1. Using transaction SPAD (Spool administration), create an Output Device and map it to the POSS-enabled Device type.
    Follow the general steps of "How to configure an Output device" of Appendix 1 above.
    On tab 3 (Output Attributes) a POSS-enabled Device type must be specified.

2. POSS Options (features) and Values (settings) can then be configured on **tab 5 (Print Options)** (see the screenshot below).
    Note that this tab is not visible if the specified Device Type is not POSS-enabled.

    The Device Type defines all possible Options and Values (for a fully/maximally equipped model).
    So initially all Options and Values appear "[X] Enabled".

2a. For each **Option**, the Administrator may wish to **disable** it (i.e. make it invisible to the User), if
    - it is not available on the device, or
    - the User is not supposed to be able to configure it (even though it may be available on the device).
    In the **"Print Option Status" column** this is shown as "[   ] Disabled", and the entry appears greyed out.

2b. The same applies to each of the **Values** of a given (not disabled) Option.
    .

2c. Moreover, one of the Values of an Option may be tagged as "**preselected**".
    This implies that this value always becomes effective, and the User cannot see nor specify the other values.
    In the **"Preselection" column** this is shown as "[X]", and "[   ]" for all other values.

    Note that currently it is NOT possible to specify a value as **default** value (and still giving the User the choice of overriding it).

3. At the end, press the [Save] button.

The following screen shows all configurable Print options supported (using the Ricoh Device type) and initially enabled, on the "Print Options" tab of an Output Device definition under transaction SPAD.

Spool Administration: Output Device (Change)

Output Device	PRCU		Short name	PRCU

DeviceAttributes	Access Method	Output Attributes	Tray Info	Print Options

Print Option	Print Option Status	Preselection
▽ 🗀 Print Options for Printer PRCU		
▽ Input Tray	☑ Enabled	
Tray 1	☑ Enabled	☑
Tray 2	☑ Enabled	☐
Tray 3	☑ Enabled	☐
Tray 4	☐ Disabled	
Large Capacity Tray (LCT)	☑ Enabled	☐
Tray 5	☐ Disabled	
Tray 6	☐ Disabled	
Tray 7	☐ Disabled	
Bypass	☑ Enabled	☐
Auto Tray Select	☑ Enabled	☐
▽ Output Tray	☑ Enabled	
Inner Tray 1 (Lower Tray) (Standard Tray)	☑ Enabled	☐
Inner Tray 2 (Upper Tray) (Internal Tray 2)	☑ Enabled	☐
Finisher Shift Tray	☑ Enabled	☑
Finisher Proof Tray	☑ Enabled	☐
Finisher Booklet Tray	☑ Enabled	☐
Mailbox Proof Tray	☑ Enabled	☐
Mailbox Tray 1	☑ Enabled	☐
Mailbox Tray 2	☑ Enabled	☐
Mailbox Tray 3	☑ Enabled	☐
Mailbox Tray 4	☑ Enabled	☐
Mailbox Tray 5	☑ Enabled	☐
Mailbox Tray 6	☑ Enabled	☐
Mailbox Tray 7	☑ Enabled	☐
Mailbox Tray 8	☑ Enabled	☐
Mailbox Tray 9	☑ Enabled	☐
▽ Print in Color	☑ Enabled	
Color (default)	☑ Enabled	☑
Monochrome	☑ Enabled	☐
▽ Double-sided Printing	☑ Enabled	
Duplex (Long-Edge Binding)	☑ Enabled	☐
Duplex (Short-Edge Binding) (Tumble)	☑ Enabled	☐
Simplex	☑ Enabled	☐
Job Separation	☑ Enabled	☐
▽ Punch Function	☑ Enabled	
Left Edge (2 holes EU) (req LEF/SEF)	☑ Enabled	☐
Left Edge (4 holes EU) (req LEF/SEF)	☑ Enabled	☐
Left Edge (2 holes US) (req LEF/SEF)	☑ Enabled	☐
Left Edge (3 holes US) (req LEF/SEF)	☑ Enabled	☐
Left Edge (4 holes NE) (req LEF/SEF)	☑ Enabled	☐
Top Edge (2 holes EU) (req SEF/LEF)	☑ Enabled	☐
Top Edge (4 holes EU) (req SEF/LEF)	☑ Enabled	☐
Top Edge (2 holes US) (req SEF/LEF)	☑ Enabled	☐
Top Edge (3 holes US) (req SEF/LEF)	☑ Enabled	☐
Top Edge (4 holes NE) (req SEF/LEF)	☑ Enabled	☐
Off	☑ Enabled	☐
▽ Stapling Function	☑ Enabled	
Top-Left Corner	☑ Enabled	☐
Top-Left Corner (Slanted) (may req SEF/LEF)	☑ Enabled	☐
Left Edge (req LEF/SEF)	☑ Enabled	☐
Top Edge (req SEF/LEF)	☑ Enabled	☐
Off	☑ Enabled	☐
User Authentication	☑ Enabled	
Draft Print (Toner Saver)	☑ Enabled	☐

This Screen shows Print Options Supported by the Device Type

You can disable Options which are not available for the connected Printer

Example: Device Type supports Input Trays 1,2,3 but Printer has only 1,2

5.2.2 Using POSS: How to specify print options using POSS [by the User]

1. Follow the normal procedure for printing, from SAPscript or SmartForms.

2. On the Print Parameters dialog, press the button labeled "Additional Options".
   Note that this button does not exist unless the Output Device specified refers to a POSS-enabled Device type.
   (See the screenshot below.)

   This will show all POSS Options and their currently selected Values.
   (See the screenshot below.)

3. For each Option to be changed:
   Double-click the Option.
   At "Option Value" select or specify the desired Value.

   Note that:
   - Disabled Options are not listed at all.
   - Disabled Values of an Option are not listed at all.
   - If a Value is preselected for an Option, the entire Option is tagged as "Option Value is locked by Administrator" and appears greyed out.

4. When done, press the [OK] button.

The following screen shows the additional button "Additional Options" on the Print Parameters dialog, which is only shown when the Output Device specified refers to a POSS-enabled Device Type.

When you click the "Additional Options" button, the following screen "Edit Print Options" will appear.

Output Device | PRCU | POSS is available

Edit Print Options ⊠

Print Option	Option Value	Information
▽ 🗀 Print Options for Printer PRCU		
Input Tray	No Selection	
Output Tray	No Selection	
Print in Color	No Selection	
Double-sided Printing	No Selection	
Job Separation	No Selection	
Punch Function	No Selection	
Stapling Function	No Selection	
User Authentication	No Selection	
Draft Print (Toner Saver)	No Selection	

Option Value:

No Selection

✔ ✖

▷ PVD (2)

It shows all user-configurable Print Options (i.e. those not disabled by the Administrator).
For each Print Option, it shows the currently selected Option Value in the "Option Value" column.

For the highlighted entry, its selection can be changed at "Option Value" at the bottom of the screen.
This may be either a list box, a check box, or a field to enter a password.

For example:

For (01) Input bin

Print Option	Option Value
▽ 📁 Print Options for Printer PRCU	
Input Tray	No Selection
Output Tray	No Selection
Print in Color	No Selection
Double-sided Printing	No Selection
Job Separation	No Selection
Punch Function	No Selection
Stapling Function	No Selection
User Authentication	No Selection
Draft Print (Toner Saver)	No Selection

Option Value:

No Selection
No Selection
Tray 1
Tray 2
Tray 3
Tray 4
Large Capacity Tray (LCT)
Tray 5
Tray 6
Tray 7
Bypass
Auto Tray Select

For (02) Output bin

Print Option	Option Value
▽ 📁 Print Options for Printer PRCU	
Input Tray	No Selection
Output Tray	No Selection
Print in Color	No Selection
Double-sided Printing	No Selection
Job Separation	No Selection
Punch Function	No Selection
Stapling Function	No Selection
User Authentication	No Selection
Draft Print (Toner Saver)	No Selection

Option Value:

No Selection
No Selection
Inner Tray 1 (Lower Tray) (Standard Tray)
Inner Tray 2 (Upper Tray) (Internal Tray 2)
Finisher Shift Tray
Finisher Proof Tray
Finisher Booklet Tray
Mailbox Proof Tray
Mailbox Tray 1
Mailbox Tray 2
Mailbox Tray 3
Mailbox Tray 4
Mailbox Tray 5
Mailbox Tray 6
Mailbox Tray 7
Mailbox Tray 8
Mailbox Tray 9

(end)