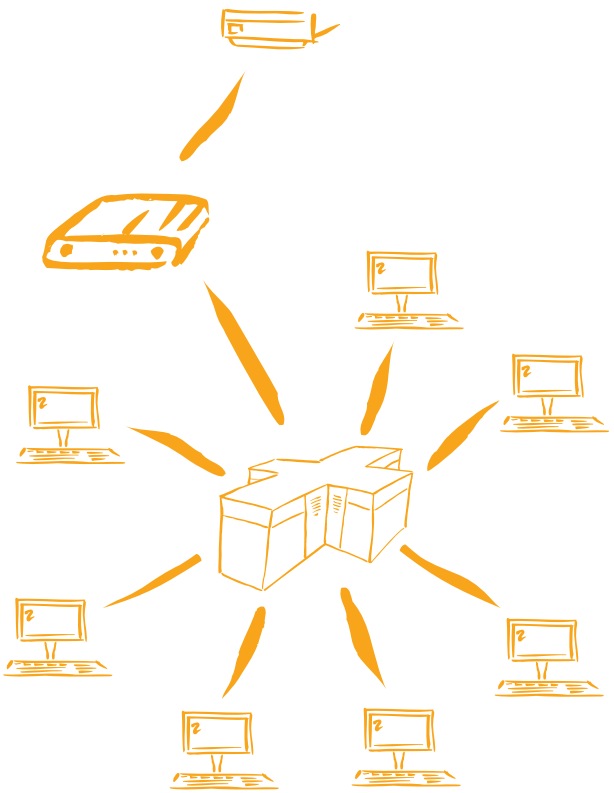
AXIS AX-7 Cobra+
Technical Reference



AXIS COMMUNICATIONS

PREFACE

Please refer to the User's Manual for installation and basic configuration procedures.

Every care has been taken in the preparation of this manual; if you detect any inaccuracies or omissions, please inform us at the address supplied.

Axis Communications AB cannot be held responsible for any technical or typographical errors and reserves the right to make changes in this manual and to the firmware without prior notice.

About Axis

Axis Communications, founded in 1984, is one of the world's fastest growing companies in the printer interface, network print server and CD-ROM server market. The head quarters are located in Lund, Sweden, with subsidiaries in Beijing, Shanghai, Singapore, Tokyo, Hong Kong and Paris. Please refer to How to contact Axis on page 163.

Axis Communications has a distributor network operating in more than 60 countries world-wide, marketing four product lines:

IBM Mainframe S/3x and AS/400 Printer Interfaces - These products include a wide range of plug-in interfaces and free standing box products such as the Cobra+ and the AFP IPDS-to-PostScript converter.

Network Print Servers - These intelligent Ethernet and Token Ring print servers support a wide range of LAN protocols. The AXIS NPS 530, 532, 550 and AXIS 150, 152, 540, 542, 560, 570 are Ethernet print servers, while the Axis NPS 630, 632, 650 and AXIS 640, 642, 660, 670 are Token Ring print servers.

CD-ROM Servers - Multiprotocol CD-ROM servers provide a flexible and cost-efficient solution for sharing CD-ROMs across the network. They are available in Ethernet and Token Ring versions.

Network Camera Server - The AXIS Neteye 200 Network Camera attaches directly to an Ethernet network. It supports TCP/IP and Internet-related protocols. This product replaces closed circuit video or PC with framegrabber, at a lower cost.

ABOUT THIS MANUAL

This manual contains a detailed technical description of the Axis protocol converters and how to use them in an IBM printing environment. The protocol converters covered belong to the Cobra family, they are:

AX-7 Cobra+, AXIS OKI HD, AX-4039/1, AXIS COBRA+ OEM and the AXIS 370 Cobra.

If you are not familiar with the basic functions of the protocol converters, refer to the User's Manual.

The sections and appendices of this manual cover the following topics:

- **THE IBM 3270 ENVIRONMENT**
  Describes the SNA and BSC communication methods, and how the protocol converter exchanges information with the IBM system.
- **IBM 3270 CONTROL CODES**
  Describes the LU-1 (SCS) and DSC/DSE Control Codes supported by the protocol converters.
- **THEORY OF OPERATION**
  Contains a functional description of the protocol converter.
- **EXTENDED EMULATION MODE**
  Configuration methods, Hex Transparency, advanced printer control, and bar codes.
- **PC-HOST SHARING**
  Using the same printer for both host and PC printouts.
- **AUTOMATIC ORIENTATION AND COR**
  Automatic adaptation of print orientation and scaling to the printer paper size.
- **SOLVING PROBLEMS**
  How to solve common problems.
- **PRINTER DRIVERS**
  A list of supported printer drivers.
- **THE PARAMETER LIST**
  A complete description of all parameters.
- **INTERNAL FUNCTIONS**
  Describes the functions available in the Extended Emulation Mode.
- **CHARACTER TABLES**
  National dependent EBCDIC tables and International Set 5.
- **IBM RPQs**
- **FRONT PANEL**
- **COMPATIBILITY WITH OTHER PRODUCTS**
- **USING THE MD-GRAFTEXT SOFTWARE**
- **CABLES**
- **UPGRADING FIRMWARE**
- **TEXHNICAL SPECIFICATIONS**
- **RELATED SPECIFICATIONS**
- **HOW TO CONTACT AXIS**
- **GLOSSARY**
- **INDEX**

EMISSION NOTICES

USA

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference. Shielded cables should be used with this unit to ensure compliance with the Class A limits.

CE

Europe

This digital equipment fulfils the requirements for radiated emission according to limit B of EN55022/1987, and the requirements for immunity according to EN50082-1/1992 residential, commercial, and light industry. (Compliance is not valid for unshielded network and printer cables.)

TRADEMARK ACKNOWLEDGEMENTS

IBM, Epson, Fujitsu, OKI Diablo, Philips, Mannesmann, Brother, Hewlett-Packard, LaserJet, Cannon, Xerox, are registered trademarks of the respective holders.

AX-7 Cobra+ Technical Reference Revision: 6.0

Part No: 12937 Dated: February, 1997

CONTENTS

SECTION 1

THE IBM 3270 ENVIRONMENT

This section describes the IBM environment in which the protocol converter is intended to operate in. For further details, refer to the documents listed in Appendix H.

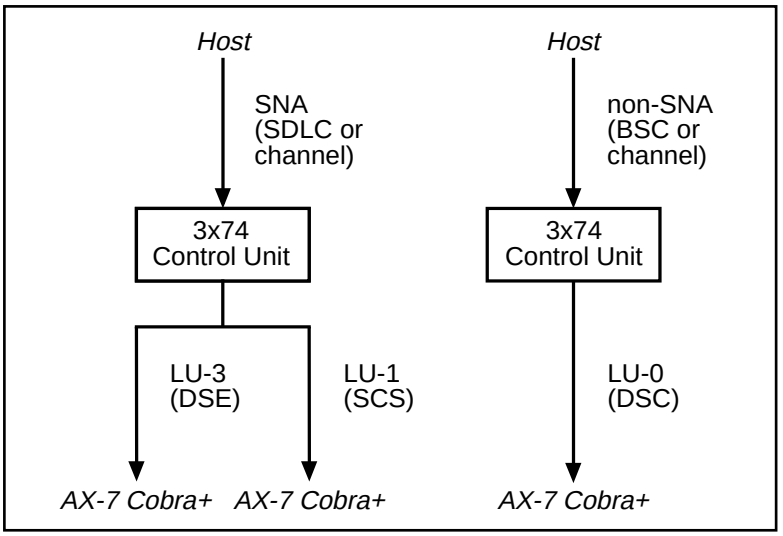
Copy Controls

There are three different operations that can cause the protocol converter to start a print operation:

- **Host Directed Copy:** The host sends print data directly to the protocol converter (normal print operation).
- **Host Initiated Local Copy:** The host sends the information displayed on a terminal to the protocol converter. This operation is activated by pressing the ‘Print Screen’ function key set up by the application.
- **Operator Initiated Local Copy:** The display station operator sends the information displayed on a terminal to the protocol converter by pressing the ‘Local copy’ key (application independent).

Communication Methods

The protocol converter communicates with the IBM 3270 environment through a 3x74 Control Unit using either SNA (*System Network Architecture*) or non-SNA (*Binary Synchronous Communication*, BSC) as shown in the diagram below.



System Network Architecture

The two SNA modes of communication are LU-1 and LU-3. LU-1 is the SCS (*SNA Character String*) mode, and uses EBCDIC Character Sets, 118 onwards. LU-3 is the DSE (*Data Stream Emulation*) mode and uses DBC Character sets, see page 116 and 117. DSE is the SNA equivalent to the DSC mode described below.

Binary Synchronous Communication

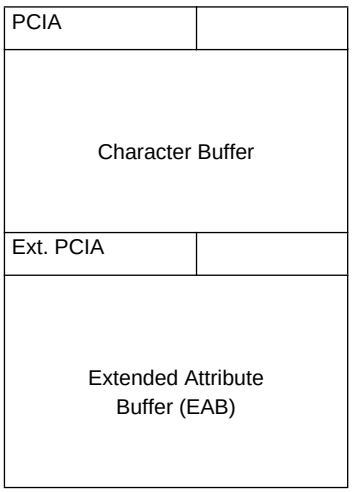
BSC has only one communication mode, which is DSC (*Data Stream Compatible*) mode. It uses DBC Character Sets, see page 116 and 117. In a BSC environment, all copy control operations use the same mode of communication.

The Communications Buffer

The protocol converter has an 8K storage area called the communications buffer. This buffer is a temporary storage for coax data, commands, and the controls necessary for the protocol converter operation.

The communications buffer contains a *character buffer* (also called the base buffer), and an extended attribute buffer (EAB) of 4K each. The first 80 bytes of the character buffer is the Printer Control Information Area (PCIA), and the first 80 bytes of the EAB is the extended PCIA.

The remainder of the character buffer is the message area, containing buffers of print data. The EAB contains additional information about how each character should be printed, see page 18



The communications buffer.

The Printer Control Information Area (PCIA)

The PCIA is the first 80 bytes of the character buffer. The first 16 bytes (addresses $0000 to $000F) is the Printer Output Area, which informs the host about the printer type and supported features.

The rest of the PCIA (addresses $0010 to $004F) is the Host Output Area, which informs the printer about the character buffer and EAB print data.

The following tables list the PCIA addresses, their functions, and a description of each bit or code. To view the contents of the PCIA, you can perform a system hex dump, see page 60

Note: 1. The bits are numbered as in the IBM documentation, *i.e.* bit 0 is the most significant, and bit 7 is the least significant.

The Printer Output Area

Address	Function	Bit/Code	Description
$0000	Status Register	Bit 0	0 - Address $0006 is reserved 1 - Address $0006 contains extended status
		Bit 1	Data check
		Bit 2	Order complete
		Bit 3	Equipment check *(hardware or PCIA error)*
		Bit 4	Operator intervention required
		Bit 5	Sense data available *(see address $0003)*
		Bit 6	Input code available *(see address $0002)*
		Bit 7	Valid switch transition *(see address $0001)*
$0001	Switch Status	Bit 0 - 2	Reserved
		Bit 3	0
		Bit 4	0
		Bit 5	0 - Monocase 1 - Dual Case
		Bit 6	0 - Single line spacing 1 - Double line spacing
		Bit 7	0 - 6 lines per inch 1 - 8 lines per inch
$0002	Switch Input Code	Code $50	Attention *(PA1 or PA2 pressed in receive state)*
		Code $5F	PA1 key pressed
		Code $5E	PA2 key pressed
		Code $5D	No PA key pressed
		Code $6B	Inbound data available
		Code $6C	DSC/DSE query reply *(partial)*
		Code $6D	DSC/DSE query reply *(complete)*
		Code $6F	LU-1 inbound data without FM header

Address	Function	Bit/Code	Description
$0003	Sense Data	Code $01	Cancel key pressed *(LU-1 mode)*
		Code $02	Invalid control code parameter
		Code $03	Invalid LU-1 (SCS) Control code
		Code $04	Order reject
		Code $05	Invalid PS selection
		Code $06	Invalid LCID selection
		Code $07	Invalid FM header
		Code $08	Invalid structured field *(DSC mode)*
$0004 to $0005	Inbound Message Length	-	-
$0006	Extended Status	Bit 0 - 6	Reserved
		Bit 7	0 - Order complete *(not deferred)*
			1 - Order complete *(deferred)*
$0007 to $0009	Reserved	-	-
$000A	Features	Bit 0	Underline supported
		Bit 1	Reverse video supported *(not applicable)*
		Bit 2	Blink supported *(not applicable)*
		Bit 3	Translate table required
		Bit 4 - 5	Reserved
		Bit 6	Save/Restore and Query List supported
		Bit 7	DSC/DSE Query supported
$000B	Printer Type and Character Set	Bit 0 - 3	0000 - Old Type *(i.e. 4214)*
			0001 - ADII 3287 or equivalent
			0010 - 4250 or equivalent
			0100 - 3268 or equivalent
			0101 - 3230 or equivalent
			0111 - 3262 or equivalent
			1001 - 5210 or equivalent
		Bit 4 - 7	0000 - APL *(All other codes are reserved)*
$000C	Features	Bit 0	Extended Attribute Buffer (EAB) installed
		Bit 1	APL/Text installed *(requires EAB)*
		Bit 2	PS installed *(requires EAB)*
		Bit 3	SCS EBCDIC installed *(always 1)*
		Bit 4 - 6	001 - Screen size = 960 bytes
			010 - Screen size = 1920 bytes
			011 - Screen size = 2560 bytes
			110 - Screen size = 3564 bytes
			111 - Screen size = 3440 bytes
		Bit 7	Unit ID *(always 1)*
$000D	Character Buffer Size	Code $08	2 K base buffer *(not including EAB)*
		Code $10	4 K base buffer *(not including EAB)*
		Code $20	8 K base buffer *(not including EAB)*

Address	Function	Bit/Code	Description
$000E	Extended ID	Bit 0 - 1 Bit 2 Bit 3 Bit 4 Bit 5 Bit 6-7	Reserved Color supported LU-1 FM header supported *(always 1)* Load Structured Field order supported CECP supported Reserved
$000F	Prog. Symbols	Bit 0 -1 Bit 2 - 7	00 - No PS installed 01 - 2 PS installed *(2 - 3)* 10 - 4 PS installed *(2 - 5)* 11 - 6 PS installed *(2 - 7)* 1xxxxx - triplane installed on PS no. 2 x1xxxx - triplane installed on PS no. 3 xx1xxx - triplane installed on PS no. 4 xxx1xx - triplane installed on PS no. 5 xxxx1x - triplane installed on PS no. 6 xxxxx1 - triplane installed on PS no. 7

The Host Output Area

Address	Function	Bit/Code	Description
$0010	Mode (1)	Bit 0 - 4 Bit 5 Bit 6 -7	Reserved Enable Set Attribute (SA) LU-1 control code 00 - Use the Base Color switch setting 01 - Disable Base Color *(override switch setting)* 10 - Enable Base Color *(override switch setting)* 11 - *Reserved*
$0011	Mode (2)	Bit 0 - 2 Bit 3 - 4 Bit 5 -7	Reserved 00 - Host Directed Copy 01 - Host Initiated Local Copy 10 - Operator Initiated Local Copy 11 - *Reserved* 000 - No mode 001 - Data stream Compatible Mode *(DSC)* 101 - Data stream Emulation Mode *(SNA - DSE)* 110 - LU-1 (SCS) mode (All other codes are reserved)
$0012 to $0013	Message Starting Address	(MSA)	These bytes define the character buffer address where the current message begins.
$0014 to $0015	Message Length	(ML)	These bytes define the length of the current message. If the length is zero, nothing is printed. In LU-1 mode, data will wrap from the end of the character buffer to address $0050. In DSC/DSE modes, no wrapping occurs.
$0016	Order	Code $01 Code $02 Code $03 Code $04 Code $05 Code $06 Code $07	Abort System Status Available Print/FM Header Processing DSC/DSE Load PS Load Translate Table DSC/DSE Query DSC Load Structured Field

Address	Function	Bit/Code	Description
$0017	LU-1 mode Order Parameters		The bits have different meanings for different orders
	Abort	Bit 0 - 7	Reserved
	System Status Available	Code $00 Code $02 Code $03	Mode change Enter send state Enter receive state
	Print/FM Header Processing	Bit 0	0 -Extended Order parameter not used 1 -Extended Order parameter *(see addr. $0022)*
		Bit 1	0 -Not first segment of first-in-chain 1 -First segment of first-in-chain
		Bit 2	0 -Not last segment of first-in-chain 1 -Last segment of first-in-chain
		Bit 3	0 -EBCDIC data code 1 -*Reserved*
		Bit 4 - 6	Reserved
		Bit 7	0 -SCS data stream 1 -FM Header data stream
	Load Translate Table	Bit 0 - 7	Reserved
	DSC/DSE mode order Parameters		The bits have different meanings for different orders:
	Print	Bit 0	Reserved
		Bit 1	0 -Data is in DBC Base Character code 1 -Data is in DBC CECP Character code
		Bit 2	Reserved
		Bit 3	0 -Control Codes $01 - $07 are valid regardless of the EAB byte value. 1 -Control Codes $01 - $07 are valid only if the EAB byte value equals xxxxx001 *(APL).*
		Bit 4	0 -Print without the EAB 1 -Print with the EAB
		Bit 5 - 6	00 - Use default for Mono/Dual case 01 - Monocase 10 - Dual case 11 - *Reserved*
		Bit 7	0 - Unformatted mode *(honor NL, EM, and CR)* 1 - Formatted mode *(ignore NL, EM, and CR)*

Address	Function	Bit/Code	Description
Load PS $0017	Bit 0	Reserved Bit 1 Bit 2 - 7	 0 -Continuation of Load PS order 1 -Beginning of Load PS order Reserved
	Load Translate Table	Bit 0 - 7	Reserved
	DSC/DSE Query	Bit 0 Bit 1 Bit 2 - 7	Reserved 0 -Continuation of query 1 -Beginning of query Reserved
	Load Struct. Field	Bit 0 - 7	Reserved

Address	Function	Bit/Code	Description
$0018	Maximum Print Position	-	This byte specifies the MPP for DSC/DSE modes. If zero, the default MPP setting is used.
$0019 to $0021	Reserved	-	-
$0022	Extended Order	Bit 0 Bit 1 Bit 2 - 7	Reserved 0 - Continue on error. Any unsupported LU-1 control code causes a hyphen to be printed. 1 - Stop on error. Any unsupported LU-1 control code causes a “Function not supported” to the host. Reserved
$0023 to $002F	Reserved		
$0030 $0031	LCID Table	Code $00 Code $00	Non-loadable character set *(always $00)*
$0032 $0033		Code $F1 Code $00	APL character set *(if installed)*
$0034 $0035		Value Value	LCID for PS 2 APA value for PS 2
$0036 $0037		Value Value	LCID for PS 3 APA value for PS 3
$0038 $0039		Value Value	LCID for PS 4 APA value for PS 4
$003A $003B		Value Value	LCID for PS 5 APA value for PS 5
$003C $003D		Value Value	LCID for PS 6 APA value for PS 6
$003E $003F		Value Value	LCID for PS 7 APA value for PS 7
$0040 to $0049	Reserved	-	-
$004A to $004D	Test Message	-	Test message from the Control Unit: e.g. $AA $32 $74 $AA (for 3274)
$004E to $004F	Reserved	-	-

3270 Host Configuration

The protocol converter supports non-SNA (LU-0) 3270 DSC, SNA LU-3 3270 DSE, and SNA LU-1 SCS data streams.

When printing in an SNA network, VTAM needs to be set up, depending on desired LU type. The following VTAM logon-mode entries apply to MVS, VM, and VSE.

The logon-mode entries are the same for all emulated IBM printers (selected by the protocol converter IBM Printer Emulation parameter).

SNA LU-1 SCS:

```
SCS          MODEENT  LOGMODE=SCS,FMPROF=X'03',TSPROF=X'03',PRIPROT=X'B1',
                      SECPROT=X'90',COMPROT=X'3080',RUSIZES=X'87C6',
                      PSERVIC=X'01000000E100000000000000',
                      PSNDPAC=X'01',SRCVPAC=X'01'
```

SNA LU-3 3270 DSE:

```
 DSC4K       MODEENT  LOGMODE=DSC4K,FMPROF=X'03',TSPROF=X'03',PRIPROT=X'B1',
                      SECPROT=X'90',COMPROT=X'3080',RUSIZES=X'8787',
                      PSERVIC=X'03000000000018502B507F00'
```

Note: 1. Continuation characters in column 72 are not shown

You also need to match the Printer Emulation setting in protocol converter with the setting of your 3270 printer driver software (JES/328x, VPS, CMA-Spool, RSCS, etc.).

SECTION 2

IBM 3270 CONTROL CODES

This section describes the emulation of IBM control codes in DSC/DSE and LU-1 (SCS) communication modes.

Control codes are the IBM 3270 equivalent to ASCII escape sequences. The LU-1 (SCS) mode has a large number of control codes, but the DSC/DSE mode supports only a few. Instead, print control is obtained by PCIA settings, base buffer attributes, and extended attributes.

See page 10 for an explanation of the PCIA settings.

Base buffer attributes appear in the *Character Buffer*, see page 9. They apply to all subsequent character and control codes.

Extended attributes appear in the *Extended Attribute Buffer*. An extended attribute applies only to the character or control code in the corresponding Character Buffer position. Extended attributes can only be used when the EAB function is enabled.

Note:

1. The DSC/DSE data stream is created by the control unit from the 3270 data stream sent from the host, see page 8.

DSC/DSE Base Buffer Attributes

All codes from $C0 and above are base buffer attributes. A base buffer attribute controls the interpretation of all subsequent character and control codes until cancelled by another base buffer attribute.

The attribute itself is treated as null, *i.e.* it prints as a space in unformatted mode.

The table below explains the meaning of the base buffer attribute bits (bit 7 is the most significant, and bit 0 is the least significant):

Bit	Description
7	Always 1
6	Always 1
5	0 - Unprotected field
	1 - Protected field
4	0 - Alphanumeric field
	1 - Numeric field
3 - 2	00 - Normal *(print)* field
	01 - Normal *(print)* field
	10 - Intensified *(print)* field
	11 - Invisible *(non-print)* field
1	Reserved
0	Reserved

- **Protected/unprotected:** This is a screen attribute. It affects printing in color mode only, see *Highlight* (parameter #019), see page 71.
- **Numeric/alphanumeric:** This is a screen attribute, it does not affect printing.
- **Normal:** Cancels an Intensified or Invisible attribute.
- **Intensified:** Prints as highlighted as determined by *Highlight* (parameter #019) see page 71.
- **Invisible *(non-print)*:** Character and control codes are treated as nulls.

Base Buffer Attributes	Printed color	
	Base Color: Black enabled	Base Color: Green enabled
Unprotected, Normal	Black	Green
Unprotected, Intensified	Red	Red
Protected, Normal	Blue	Blue
Protected, Intensified	Green	Black

This table shows the resulting print color for different base buffer attribute and base color combinations. See page 96, *Base Color* (parameter #128) for further details on base color settings.

All colors are printed as black on monochrome printers. You may substitute color with highlight features such as underscoring or bolding by programming the appropriate color sequences.

The following example assumes that the *Red Color Sequence* (parameter #132) has been programmed to Begin Underscore, and *the Black Color Sequence* (parameter #129) has been programmed to End Underscore.

Example: The following codes demonstrate the use of base buffer attributes ($B7 is the DBC code for X, $B8 is Y, $C8 is an Intensified attribute, and $C0 is a Normal attribute):

```
$B7 $B7 $B7 $C8 $B8 $B8 $B8 $C0 $B7 $B7 $B7
```

Resulting printout:

```
XXXYYYXXX   (formatted mode)

or

XXX YYY XXX (unformatted mode)
```

DSC/DSE Extended Attributes

When the EAB feature is enabled, all base buffer characters and attributes have a corresponding attribute designation in the Extended Attribute Buffer (EAB).

If the EAB modifies a character byte in the base buffer, it is a character attribute (CA). If the EAB modifies a field attribute in the base buffer, it is an extended field attribute (EFA).

The format of the character attribute (CA) is:

Bit	Description
7 - 6	00 - Revert to the EFA 01 - Blink Character *(ignored)* 10 - Reverse Video Character *(ignored)* 11 - Underline Character *(including spaces and nulls)*
5 - 3	Ignored
2 - 0	000 - Revert to the EFA 001 - APL Character Set

The format of the extended field attribute (EFA) is:

Bit	Description
7 - 6	00 - Normal Mode 01 - Blink Character *(ignored)* 10 - Reverse Video Character *(ignored)* 11 - Underline Character *(including spaces and nulls)*
5 - 3	Ignored
2 - 0	000 - Base Character Set 001 - APL Character Set

DSC/DSE Control Codes

The following control codes are valid in DSC/DSE mode:

Code	Value	Description	Page
NUL	00	Null	19
EM	01	End of Message	19
FF	02	Form Feed	19
NL	03	New Line	20
CR	05	Carriage return	20

Note: 1. These codes have different meanings in print and non-print fields in both formatted and unformatted modes, as explained below.

Null (NUL)

$00

A NUL causes no action in formatted mode. The table below shows how NUL is treated for different fields and modes:

	Formatted mode	Unformatted mode
Print field	NUL *(see note)*	Space
Non-print field	NUL *(see note)*	Space

Note: If True Screen Image (parameter #006) is set to ‘Yes’, NUL is treated as space in local copy mode.

End of Message (EM)

$01

EM stops printing, and the remainder of the print buffer is ignored in a unformatted print field. The table below shows how EM is treated for different fields and modes:

	Formatted mode	Unformatted mode
Print field	Space	EM
Non-print field	NUL	Space

Form Feed (FF)

$02

FF moves the print position to the Top of Form position on the next page in formatted and unformatted print and non-print fields:

	Formatted mode	Unformatted mode
Print field	FF	FF
Non-print field	FF	FF

New Line (NL)

$03

NL moves the print position to the left margin of the next line in an unformatted print field. The table below shows how NL is treated for different fields and modes:

	Formatted mode	Unformatted mode
Print field	Space	NL
Non-print field	NUL	Space

Carriage Return (CR)

$05

CR moves the print position to the left margin of the current line in an unformatted print field. The table below shows how CR is treated for different fields and modes:

	Formatted mode	Unformatted mode
Print field	Space	CR
Non-print field	NUL	Space

LU-1 (SCS) Control Codes

The following control codes are valid in LU-1 (SCS) mode:

Code	Value	Description	Page
VCS	04…	Vertical Channel Select	21
HT	05	Horizontal Tab	22
GE	08	Graphic Escape	22
VT	0B	Vertical Tab	22
FF	0C	Form Feed	22
CR	0D	Carriage Return	20
ENP	14	Enable Presentation	22
NL	15	New Line	23
BS	16	Back Space	23
IRS	1E	Interchange Record Separator	23
INP	24	Inhibit Presentation	23
LF	25	Line Feed	23
ESC	27	Escape	23
SA	28…	Set Attribute	23
BEL	2F	Bell	24
TRN	35…	Transparent	24
SHF	2BC1…	Set Horizontal Format	25
SVF	2BC2…	Set Vertical Format	26
SLD	2BC6…	Set Line Density	27
STO	2BD1…	Set Text Orientation	27
SPD	2BD2NN29…	Set Print Density	27
PPM	2BD2NN48…	Print Presentation Media	28

Vertical Channel Select (VCS)

$04	VS

VCS moves the print position to a vertical tab position specified by the Set Vertical Format (SVF) command. Vertical channels are defined by the Top Margin and the first 11 vertical tab stops.

The byte ‘VS’ selects the vertical channel. Valid values are:

Value	Description
$81	Vertical Channel 1
$82	Vertical Channel 2
$83	Vertical Channel 3
$84	Vertical Channel 4
$85	Vertical Channel 5
$86	Vertical Channel 6
$87	Vertical Channel 7
$88	Vertical Channel 8
$89	Vertical Channel 9
$7A	Vertical Channel 10
$7B	Vertical Channel 11
$7C	Vertical Channel 12

Notes:

1. Vertical channels are supported when IBM Printer Emulation (parameter #045) is set to ‘62’, ‘68’, or ‘24’. When set to ‘87’ or ‘14’, the VCS command is treated as a Line Feed (LF).
2. Channel 1 is always set to the TM value.

3. If no tab position is set for the selected channel number, the VCS command is treated as a Line Feed (LF).
4. If the selected channel specifies a line number less than or equal to the current line, the print position moves to the specified line on the next page.

Horizontal Tab (HT)

$05

HT moves the print position to the next higher tab stop specified by the Set Horizontal Format (SHF).

Notes:

1. If the current print position is greater than or equal to the highest tab stop, HT is treated as a space.
2. HT at MPP+1 moves the print position to Left Margin (LM) + 1 of the next line.

Graphic Escape (GE)

$08

GE indicates that the next byte represents an APL character.

Vertical Tab (VT)

$0B

VT moves the print position to the line specified by the next higher vertical tab stop.

Notes:

1. VT does not change the horizontal print position.
2. If the current line number is greater than or equal to the highest tab stop (or if no tab stops are set), VT is treated as a Line Feed (LF).

Form Feed (FF)

$0C

FF moves the print position to the next Top of Form.

Carriage Return (CR)

$0D

CR moves the print position to Left Margin. If the current print position equals the Left Margin, CR is ignored.

Enable Presentation (ENP)

$14

ENP has no effect on print operation.

New Line (NL)

$15

NL causes a Carriage Return (CR) and a Line Feed (LF).

Back Space (BS)

$16

BS moves the print position one column to the left (even if the current print position is equal to or less than Left Margin). BS in column 1 is ignored.

Interchange Record Separator (IRS)

$1E

IRS performs the same function as Line Feed (LF).

Inhibit Presentation (INP)

$24

INP has no effect on print operation.

Line Feed (LF)

$25

LF moves the print position to the next line without changing the horizontal print position.

Escape (ESC)

$27

Translates to ASCII $1B if parameter #40 (Extended Emulation Mode) =1 and parameter #41 (Escape Character) = 0.

Set Attribute (SA)

$28	TT	VV

SA specifies an attribute for all subsequent data. Each attribute is defined by two bytes following the SA control code. An attribute remains valid until changed by a new SA code, or a new SNA chain begins.

TT specifies the type of attribute. Valid values are:

Value	Description
$00	Reset
$41	Highlight
$42	Color
$43	Character Set

Reset (TT = $00): All attributes are reset to normal. Byte VV must be '$00'.

Highlight (TT = $41): Byte VV selects the type of highlight attribute. Valid values are:

Value	Description
$00	Normal
$F1	Blink *(ignored)*
$F2	Reverse image *(ignored)*
$F4	Underline

Color (TT = $42): Byte VV selects a color for subsequent printing. Valid values are:

Value	Description
$00	Black
$F1	Blue
$F2	Red
$F3	Magenta
$F4	Green
$F5	Cyan
$F6	Yellow
$F7	Black

Character Set (TT = $43): Byte VV selects normal or APL character set. Valid values are:

Value	Description
$00	Normal character set
$F1	APL character set

Bell (BEL)

$2F

BEL causes the protocol converter to send the *Bell Sequence* (parameter #120) to the printer.

Note:

1. By default, the Bell Sequence only results in a short beep, and the printer remains on-line. An IBM printer would go off-line, and the alarm would sound continuously.

Transparent (TRN)

$35	NN	$D_1...D_n$
$36	NN	$D_1...D_n$

TRN indicates the start of a transparent (pass-through) data stream. The count byte (NN) defines the number of data bytes to follow (excluding the count byte). Valid NN values are $01 - $FF.

Notes:

1. Character codes in the range $00 - $3F are printed as hyphens (-), *i.e.* control codes in the transparent data stream will not be recognized.
2. The protocol converter supports an extension of the TRN command, where the transparent data is interpreted as ASCII character codes. See parameter #042 *(Option Select 1, bit 6: Extended SCS Transparency).*

Set Horizontal Format (SHF)

$2B	$C1	NN	MPP	LM	RM	$T_1...T_n$

SHF sets the horizontal format control parameters: Maximum Print Position (MPP), Left Margin (Left Margin), Right Margin (RM), and up to 128 horizontal tab stops ($T_1...T_n$). The count byte (NN) defines the number of bytes to follow (including the count byte).

Note:

1. SHF should be followed by a New Line or Carriage Return to initialize the horizontal format control parameters.

Count (NN): Valid range for the count byte is $01 - $83.

- A count of $01 sets all horizontal format control parameters to their default values.

Maximum Print Position (MPP): Defines the number of characters per line.

- If MPP is $00 (or not specified, *i.e.* the count byte NN is $01), the Maximum Print Position is set to the default value, see note 1.

Notes:

1. The default MPP depends on the selected IBM Printer Emulation: IBM 3268 and IBM 4224 use the parameter #004 *(Maximum Print Position)* value, IBM 3287, IBM 3262 and IBM 4214 use the fixed value 132.
2. The MPP setting can be prevented by setting parameter #066, bit 3 (*Option Select 2, Lock MPP)* to 1.

Left Margin (LM): Defines the left-most print position. LM is the new print position after New Line, Carriage Return, or Form Feed.

- If LM is greater than $00 and less than or equal to MPP, then Left Margin is set to the LM value.
- If LM is $00, or not present (*i.e.* the count byte NN is less than $03), Left Margin is set to column 1.
- LM is stored as the first horizontal tab stop.

Right Margin (RM): The Right Margin is not used, and the RM value is ignored.

Horizontal Tab Stops ($T_1...T_n$): Defines the horizontal tab stops used by the Horizontal Tab (HT) control code.

- Valid tab stop columns are in the range from LM to MPP.
- If no tab stops are specified (*i.e.* the count byte NN is less than 5), the default is a tab stop at each column between LM and MPP.
- Tab stops may be defined in any order.

Set Vertical Format (SVF)

$2B	$C2	NN	FL	TM	BM	$T_1...T_n$

SVF sets the vertical format control parameters: Form Length (FL), Top Margin (TM), Bottom Margin (BM), and up to 128 vertical tab stops ($T_1...T_n$). The count byte (NN) specifies the number of bytes to follow (including the count byte).

Note:

1. SVF should be sent only in Top of Form position (*i.e.* after a Form Feed and before any control code or character that would change the current print position). SVF in any other position will generate a Form Feed.

Count (NN): Valid range for the count byte is $01 - $83.

- A count of $01 sets all vertical format control parameters to their default values.

Form Length (FL): Defines the number of lines per page.

- If FL is $00 (or not specified, *i.e. t*he count byte NN is $01), the Form Length is set to 1.

Note:

1. The FL setting can be prevented by setting parameter #099 *(Lock Form Length)* to 'Yes'.
2. If parameter #44 (Option Select 1) bit 5 ($20) is set, then Form Length is set to parameter #001.

Top Margin (TM): Defines the first print line on the page.

- If TM is $00 (or not specified, *i.e.* the count byte NN is less than $03), the Top Margin defaults to print line 1.

Bottom Margin (BM): Defines the last print line on the page.

- If BM is $00 (or not specified, *i.e.* the count byte NN is less than $04), the Bottom Margin is equal to Form Length.

Vertical Tab Stops ($T_1...T_n$): Defines the vertical tab stops used by the Vertical Tab (VT) and Vertical Channel Select (VCS) functions.

- Valid tab stop values are in the range from TM to BM.
- If no tab stops are specified (*i.e.* the count byte NN is less than $05), the default is a tab stop at each line between TM and BM.
- The TM value is stored as the first tab stop and the Vertical Channel 1.
- Tab stops T_1 through T_{11} are used for Vertical Channels 2 through 12.

Set Line Density (SLD)

$2B	$C6	NN	LD

SLD sets the number of lines per inch (LPI). The count byte NN specifies the number of bytes to follow (including the count byte).

Count (NN): Valid values are:

Value	Description
$01	LPI is determined by parameter #002 *(Line Density)*
$02	LPI is determined by the byte LD value

Line Density (LD): Valid values are:

Value	Description
$00	6 Lines per Inch
$18	3 Lines per Inch
$12	4 Lines per Inch
$0C	6 Lines per Inch
$09	8 Lines per Inch

Note: 1. Line Density setting can be prevented by setting parameter #111 *(Lock LPI)* to 'Yes'.

Set Text Orientation (STO)

$2B	$D1	$06	$83	XX	$00	$2D	$00

STO sets the print direction.

Print Direction (XX): Valid values are:

Value	Description
$00	Left-to-Right direction
$5A	Right-to-Left direction

Note: 1. STO is only used by Arabic and Hebrew languages.

Set Print Density (SPD)

$2B	$D2	NN	$29	$00	VV

SPD sets the number of characters per inch (CPI). The count byte NN specifies the number of bytes to follow (including the count byte).

Notes:
1. The SPD becomes effective immediately after it is received. Data following for the same print line will be printed with the new CPI setting,
2. A CPI change affects the current print position, the left margin (LM), the maximum print position (MPP), and the horizontal tab (HT) stop positions.
3. If CPI changes within a print line, a CR and spaces will sent to the printer to maintain the current print position.
4. The CPI setting can be prevented by setting parameter #110 *(Lock CPI)* to 'Yes'.

Count (NN): Valid values are:

Value	Description
$02	CPI is determined by parameter #004 *(Character Density)*
$04	CPI is determined by the byte VV value

Character Density (VV): Valid values are:

Value	Description
$00	10 Characters per Inch
$05	5 Characters per Inch
$0A	10 Characters per Inch
$0C	12 Characters per Inch
$0F	15 Characters per Inch
$10	17.1 Characters per Inch

Note: 1. 5 CPI is a non-IBM LU-1 (SCS) value.

Print Presentation Media (PPM)

$2B	$D2	NN	$48	$00 $00	FC	SD	$00 $00	PQ	$00 $00 $00

PPM selects a source drawer and also sets the print quality. The count byte NN specifies the number of bytes to follow (including the count byte).

Count (NN): Valid range is $02 through $0C.

Forms Mode (FC): Valid values are:

Value	Description
$00	No change from current selection
$01	Paper
$02	Envelope *(Envelope Feeder)*

Source Drawer (SD): Valid values are:

Value	Description
$00	No change from current selection
$01	Select primary cassette *(Sheet Feeder 1)*
$02	Select secondary cassette *(Sheet Feeder 2)*
$03 - $FF	No change from current selection

Print Quality (PQ): Valid values are:

Value	Description
$00	No change from current selection
$01	Data Processing Quality *(Draft)*
$02	Near Letter Quality *(NLQ)*

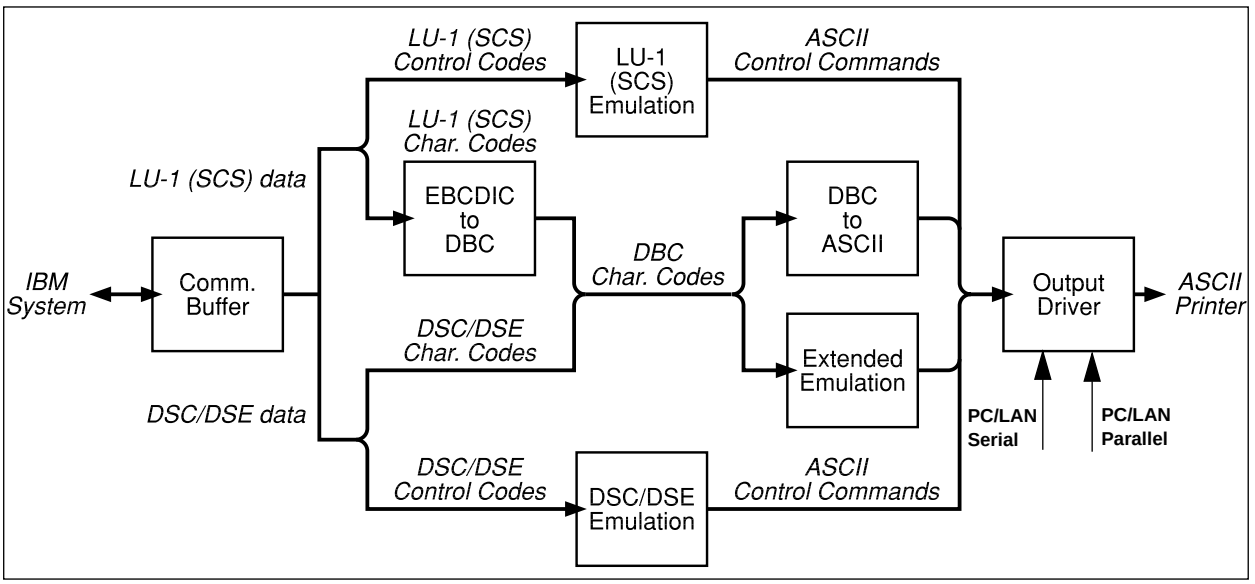
SECTION 3

THEORY OF OPERATION

The protocol converter receives IBM LU-1 (SCS) and DSC/DSE Character Codes and Control Codes, and translates them into ASCII Character Codes and Control Commands which are sent to an attached printer.

Data Flow Chart

The basic data flow is shown in the following diagram:



Data is temporarily stored in the *Communications Buffer* (note that the communications buffer also holds printer information data directed to the host, see the previous section).

As soon as a buffer of data is received, the protocol converter starts processing the data. The data takes different paths depending on the current mode, LU-1 (SCS), or DSC/DSE.

LU-1 (SCS) Data Processing

The data is separated into LU-1 (SCS) Control Codes ($00 - $3F), and Character Codes ($40 - $FF).

The Control Codes are passed through the LU-1 (SCS) Emulation, which translates them into ASCII Control Commands.

The Character Codes are translated into Device Buffer Code (DBC) using the EBCDIC to DBC translation table for further processing. DBC is the protocol converter internal character representation format, common to all print modes.

DSC/DSE Data Processing

The data is separated into DSC/DSE Control Codes ($00 - $07), Character Codes ($08 - $BF), and Base Buffer Attributes ($C0 - $FF).

Control Codes and Base Buffer Attributes are passed through the DSC/DSE Emulation, which translates them into ASCII Control Commands.

The Character Codes are translated into ASCII character codes using the DBC to ASCII translation table.

Extended Emulation

This module processes all non-IBM functions referenced in the data stream, such as Hex Transparency and Configuration Commands. These functions are explained later in this manual.

Output Driver

This module transfers the ASCII Character Codes and Control Commands to an attached printer using either the parallel (Centronics), *or serial (RS-232) interface. The interface type is automatically determined by the type of printer cable installed.

The Output Driver module also controls the PC-Host Sharing feature, described later in this manual.*

*** Does not apply to the AXIS 370 Cobra.**

Protocol Converters Data Processing Control

The function of the modules described here depends heavily on the protocol converter configuration. *i.e.* changing the IBM Printer Emulation, the ASCII Printer Driver, or utilizing some of the protocol converter internal functions will affect the data processing.

This is the reason why the protocol converter is so flexible; it may be configured to match virtually any host application and ASCII printer.

The Parameter List

The Parameter List is the complete set of parameters making up the protocol converter configuration. There are several different types of parameters:

- ***IBM System Parameters:*** *e.g.* IBM Printer Emulation, System Language, Intervention Time, and Character Buffer Size.
- ***Front panel switches:*** *e.g.* Form Length, Line Density, and Left Margin.
- ***Internal function controls:*** *e.g.* Extended Emulation Mode, Bar Code Driver, and PC-Host Sharing Time-out.
- ***ASCII Printer controls***: *e.g.* True Form Feed and ASCII Character Set.
- ***ASCII Control Commands:*** *e.g.* LPI, CPI and Underline Sequences.

Printer Drivers

A Printer Driver is mainly a subset of the Parameter List, containing all parameters of the groups ASCII Printer Controls and ASCII Control Commands, plus some of the Front Panel Switches and Internal Function Controls.

This means that selecting a driver matching your printer will preset all relevant parameters, so that no further configuration is necessary.

SECTION 4

EXTENDED EMULATION MODE

During normal mode of operation the protocol converter, together with your printer, emulates the IBM printer selected in your configuration. In addition, the Extended Emulation Mode gives you access to functions not available in standard IBM printers. These functions are:

- Hex Transparency
- Configuration From the System
- Advanced Printer Control
- Modification of the Character Translation Tables
- User Definable Strings
- String Substitutions
- Bar Code printing

The following parameters control the Extended Emulation Mode:

#040 Extended Emulation Mode

#041 Escape Character

#070 Transparency Lead-in Sequence

#071 Configuration Lead-in Sequence

#072 Transparency/Configuration Trailer Sequence

#104 Extended Emulation Control Sequence

The parameters are described on page 64. There are also a number of internal functions in the Extended Emulation Mode, page 106.

Using Extended Emulation Mode

To use the Extended Emulation Mode functions, the Extended Emulation Mode has to be activated. This is done by inserting the enter Extended Emulation Mode sequence in your document. Any number of extended emulation functions can then be used before Extended Emulation Mode is deactivated using the exit Extended Emulation Mode sequence.

Example:

```
&&??%%P      (enter Extended Emulation Mode) Note 1
%P           (Configuration Lead-In sequence, page 37)
=128,1       (program parameter #128. page 37)
=207,10      (internal function call. page 37)
%            (Transp./Config. Trailer Sequence, page 37)
%0C          (Single byte transparency (page 39) or User
             Defined string. (page 49))
%%1B"&a8L"%  (Multi-byte transparency. page 40)
&&??000      (exit Extended Emulation Mode) Note 2
```

Note:

1. This is the default enter Extended Emulation Mode sequence. The sequence can be altered if needed. See also page 34.
2. This is the default exit Extended Emulation Mode sequence. The sequence can be altered if needed. See also page 35.

Enter Extended Emulation Mode

The Extended Emulation Mode is entered by inserting the enter Extended Emulation Mode sequence into your document.

Syntax:

```
<EECS><a><b><c>
```

- <EECS> is the Extended Emulation Control Sequence (Parameter #104). The default sequence is '&&??'.
- <a>, <b> and <c> are three printable characters to be used for subsequent extended emulation functions.

Result:

Number	Title	New contents
#040	Extended Emulation Mode	2
#041	Escape Character	<a>
#070	Transparency Lead-in Sequence	<a><b>
#071	Configuration Lead-in Sequence	<a><c>
#072	TRN/Conf. Trailer Sequence	<a>

Note: 1. The characters <a>, <b> and <c> must be different from the characters in the <EECS> sequence.

The example below shows how Extended Emulation Mode can be entered using the default EECS ('&&??').

Example:

```
&&??%%P
```

Result:

Number	Title	New contents
#040	Extended Emulation Mode	2
#041	Escape Character	$2E (%)
#070	Transparency Lead-in Sequence	$2E $2E (%%)
#071	Configuration Lead-in Sequence	$2E $AF (%P)
#072	TRN/Conf. Trailer Sequence	$2E (%)

Exit Extended Emulation Mode

To exit the Extended Emulation Mode and to resume normal emulation, the exit Extended Emulation Mode sequence is used.

Syntax

```
<EECS>000
```

- <EECS> is the Extended Emulation Control Sequence (Parameter #104). The default sequence is '&&??'.

The example below shows how Extended Emulation Mode can be exited using the default EECS ('&&??').

Example:

```
&&??000
```

Result:

Number	Title	New contents
#040	Extended Emulation Mode	0
#041	Escape Character	$00
#070	Transparency Lead-in Sequence	<empty>
#071	Configuration Lead-in Sequence	<empty>
#072	TRN/Conf. Trailer Sequence	<empty>

Extended Emulation Mode Types

There are six different Emulation Mode types. This subsection briefly describes the main features of each type. More details will be given for each extended emulation function.

Type 0 (No Extended Emulation Mode)

This is the default mode. No extended emulation functions are active. The Escape character and the transparency and configuration lead-in sequences are printed as normal characters when received.

If the Extended Emulation Control Sequence is received, mode type 2 is entered.

Type 1 (Escape Character translates to $1B ASCII)

The Escape character is translated to the ASCII escape ($1B). The transparency and configuration lead-in sequences are printed as normal characters when received.

If the Extended Emulation Control Sequence is received, mode type 2 is entered.

Type 2 (The default Extended Emulation Mode)

This mode is entered when the Extended Emulation Control Sequence is received. The Escape character and the transparency and configuration lead-in sequences will start extended emulation functions, and will not be printed. See the respective extended emulation functions for details.

Type 3 (MPI transparency compatible mode)

This mode is used when replacing an existing MPI protocol converter, see page 145 for details.

Type 4 (Memorex 2068 transparency compatible mode)

This mode is used when replacing an existing Memorex Telex 2068 printer, see page 144 for details.

Type 5 (Maersk Data transparency compatible mode)

This mode is used with the Maersk Data MD-GRAFTEXT software, see page 146 for details.

Configuration from the System

This function enables you to configure the protocol converter without using the Configuration from a Terminal (described in the User's Manual). The configuration is done by including parameter programming commands and internal function calls in your document. To use these commands the Extended Emulation Mode has to be invoked, page 33.

Syntax:

```
<CLI>=<Parameter/Funct.1>[=<Parameter/Funct.2>...=<Parameter/Funct.n>]<TCT>
```

- <CLI>is the configuration Lead-In sequence (parameter #071). The default sequence is '%P'.
- <Parameter/Funct.$_n$> are parameter programming commands or internal function calls.
- <TCT> is the Transparency/Configuration Trailer Sequence (parameter #072). The default sequence is '%'.

Parameter Programming

The parameter programming command consists of an equal sign, a parameter number, a comma, and a parameter value. The command is valid only within a configuration sequence.

Syntax:

```
=<Parameter Number>,<Parameter Value or String>
```

Any number of parameters can be programmed before the TCT stop sequence.

Note: 1. Only decimal parameter numbers may be used.

Internal Function Calls

The internal function call consists of an equal sign, a function number, a comma, and a function parameter value. The command is valid only within a configuration sequence. The internal functions are described in Section 10, page 106:

Syntax:

```
=<Function Number>,<Argument (not all functions)>
```

Any number of functions can be called before the TCT stop sequence.

Data Representation and Delimiters during Configuration

Parameter and function numbers must always be specified as decimal values. Other data can use alternative representations but must, during Configuration from the System, be separated by a delimiter.

Data Type/Delimiter	Character Note 1	Example Of Use
Parameter Number	= ($11) # ($2C) § ($2B)	=120 #120 §120
Decimal Value	Note 2	12
Hexadecimal Value	$ ($1A) ¤ ($1F)	$0C or $0c ***Note 3*** ¤0C or ¤0c
Binary Value	* ($BF)	*00100111
Text String (ASCII char)	' ($12) " ($13)	'ASCII CODED TEXT' "ASCII CODED TEXT"
Text String (EBCDIC char)	/ ($14) % ($2E)	/DBC CODED TEXT/ %DBC CODED TEXT%
'Yes' Value	y ($98) Y ($B8)	y Y
'No' Value	n ($8D) N ($AD)	n N
Comment (start) Comment (stop)	(($0D)) ($0C)	(comments will be ignored) (comments will be ignored)
Delimiter	SP ($10) , ($33) . ($32) : ($34) ; ($BE)	=120 "DATA" ***Note 4*** =120,"DATA" =120."DATA" =120:"DATA" =120;"DATA"

Notes:

1. Character codes are the DBC codes that are valid. If you use SCS (LU-1) make sure that a System Language matching your host settings is used.
2. No character should be used to denote a decimal value.
3. When programming string parameters '$' or '¤' is only needed before the first hexadecimal value, *e.g.* $31,$32,$33,$34 is equivalent to $31323334.
4. Only valid if set in parameter #100 (option select 3).
5. Characters used in the parameters that control Extended Emulation Mode (see page 33) cannot be used as delimiters or data representation.

Hex Transparency

The transparency (*pass through*) function lets you send data directly to the printer without any conversion. The data could be ASCII printer commands not supported by the protocol converter (*e.g.* double height characters), or font data for downloading fonts to the printer.

There are two types of transparency functions: Single Byte and Multibyte. The Single Byte Transparency is included mainly to maintain compatibility with older Axis products, the Multibyte Transparency is the recommended method.

Single Byte Transparency

Single-Byte Transparency passes through one byte of data to the printer. The function is controlled by the Escape Character.

Syntax:

```
<ESC><Hexadecimal Value (two digits)>
```

- <ESC> is the Escape Character, (parameter #041). The default Escape Character is '%'.Example:

Syntax:

```
%1B&a8L
```

Result: This command will set the left margin to column 8 on HP LaserJet printers.

Error handling:

- Invalid data: If <ESC> isn't followed by two hexadecimal digits, then the Single Byte transparency is terminated, and the subsequent characters will be printed. The first table below shows the correct syntax, and the second table shows the results of a misplaced 'x' in different positions:

Intended sequence	Resulting printout	Character codes sent
%41	A	$41

Entered sequence	Resulting printout	Character codes sent
%x41	x41	$78 $34 $31
%4x1	x1	$04 $78 $31
%41x	Ax	$41 $78

Notes:

1. Single Byte Transparency is available in Extended Emulation Mode, types 2, 3, and 5.
2. User Definable Strings (described later in this section) overrides the Single Byte Transparency function. If you are using both User Definable Strings and transparency, use the Multibyte Transparency instead.
3. During Single-Byte Transparency, the hexadecimal value shall not be preceded by a '$' or '¤' character.
4. Extended Emulation Mode has to be active. See page 33.

Multibyte Transparency

Multi-Byte Transparency passes through any number of bytes to the printer. Once Extended Emulation Mode has been entered (see page 33), the function is controlled by the Transparency Lead-In Sequence and the Transparency/Configuration Trailer Sequence.

Syntax:

```
<TLI><Hexadecimal Value1>[<Hexadecimal Value2>...
<Hexadecimal Valuen>]<TCT>
```

or

Syntax:

```
<TLI>"<sequence of ASCII characters>"<TCT>
```

- <TLI> is the Transparency Lead-In Sequence (parameter #070). The default sequence is '%%'
- <TCT> is the Transparency/Configuration Trailer Sequence (parameter #072). The default sequence is '%'

Any number of hexadecimal values and sequences of ASCII characters can be sent to the printer before the <TCT> stop sequence.

Example: The three sequences below perform the function, sending the command 'EC& a 8 L' to the printer. (This is the HP LaserJet command to set the left margin to the 8th column).

```
%%1B2661384C%
or
%%1B"&a8L"%
or
%%1B%&a8L
```

The first sequence shows the hexadecimal format, where the ASCII character codes are given by their hexadecimal representation.

The second sequence shows a mixed hexadecimal and literal format, giving an improved readability.

In the third sequence, the printable characters are entered as normal text. This is generally not recommended, since a buffer break may disrupt the command by generating control codes.

Error handling:

- **Invalid data:** If the lead-in sequence isn't followed by hexadecimal digits, then the Multibyte transparency is terminated, and the subsequent characters will be printed. The first table below shows the correct syntax, and the second table shows the results of a misplaced 'x' in different positions:

Intended sequence	Resulting printout	Character codes sent
%%41%42	A42	$41 $34 $32

Entered sequence	Resulting printout	Character codes sent
%%x41%42	x41B	$78 $34 $31 $42
%%4x1%42	x1B	$04 $78 $31 $42
%%41x%42	AxB	$41 $78 $42

Notes:

1. Multibyte Transparency is available in Extended Emulation Mode, types 2, 3, and 5.
2. During Multi-Byte Transparency, the hexadecimal values shall not be preceded by a '$' or '¤' character.
3. Extended Emulation Mode has to be active. See page 33.

Sending Control Commands to the printer

The Multi Byte Transparency function can also be used for sending any control command sequences stored in the parameter list to the printer by referring to their parameter numbers. This function provides a versatile method of printer control, independent of the selected printer driver.

Syntax:

```
<TLI>=<Parameter Nr.1>[=<Parameter Nr.2>...
=<Parameter Nr.n>]<TCT>
```

- <TLI> is the Transparency Lead-In Sequence (parameter #070). The default sequence is '%%'
- <TCT> is the Transparency/Configuration Trailer Sequence (parameter #072). The default sequence is '%'

Example: The line below results in the Set Bold Face and Set Italic sequences being sent, the text 'Example:' is printed just as the title above, and the Exit Bold face and Exit Italic sequences are sent.

Syntax:

```
%%=56=114%Example:%%=57=115%
```

Error handling:

- **Invalid parameter number:** Undefined and non-sequence parameters are ignored.

Notes:

1. Extended Emulation Mode has to be active. See page 33.
2. Only decimal parameter numbers may be used.

Data Representation and Delimiters during Multi-Byte Transparency

Parameter numbers must always be specified as decimal values. Pass through data can be specified as either hexadecimal values or as ASCII data. Delimiters can be used during Multi-Byte Transparency but are not mandatory.

Data representation and delimiters during Multi-Byte Transparency:

Data Type/Delimiter	Character Note 1	Example Of Use
Parameter Number	= ($11) # ($2C) § ($2B)	=120 #120 §120
Hexadecimal Value	Note 2	0C or 0c
Text String (ASCII char)	' ($12) " ($13)	'ASCII CODED TEXT' "ASCII CODED TEXT"
Delimiter	SP ($10) , ($33) . ($32) : ($34) ; ($BE)	=120 "DATA" ***Note 3*** =120,"DATA" =120."DATA" =120:"DATA" =120;"DATA"
Suppress text & control codes Normal mode	+ ($31) - ($35)	+ ***Note 4*** - ***Note 4***

Notes:

1. Character codes are the DBC codes that are valid. If you use SCS (LU-1) make sure that a System Language matching your host settings is used.
2. No character should be used to denote a hexadecimal value.
3. Only valid if set in parameter #100 (option select 3).
4. See page 145.

Redefinition of Lead-in and Trailer Sequences

It is sometimes desirable to change the Transparency Lead-in and Trailer Sequences, *e.g.* when as existing application uses non-standard sequences. This is done either using a Configuration File, or using the Configuration from a Terminal.

Using a Configuration File

A configuration file is a document containing parameter programming commands and internal function calls (see page 37), setting up the protocol converter for different applications or printers.

Example: An application uses the sequences '!?<' and '>&' to start and stop hex transparency. The protocol converter can be set up for this application by the following configuration file:

```
&&??%%P      (Enter Extended Emulation Mode)
%P           (Configuration Lead-in Sequence)
=40,2        (Set Ext. Emulation Type 2 permanently)
=70,/!?</    (Redefine Transparency Lead-in Sequence)
=72,/>&/     (Redefine TRN/Conf. Trailer Sequence)
=207,10      (Initialize)
=207,12      (Save configuration permanently)
>&           (End of configuration - note the new sequence)
```

Notes:

1. The command '=40,2' is necessary since the Enter Extended Emulation command sets Type 2 only temporarily. If omitted, the Extended Emulation Mode will be '0' after the next Power up.
2. The Lead-in and Trailer sequences must be entered as DBC characters, hence the '/' quotation marks.

Using Configuration from a Terminal

The same configuration as in the previous example can also be obtained using the Configuration from a Terminal utility:

1. Start the Configuration from a Terminal as described in the User's Manual.
2. Select the 'Edit Parameters' entry in the Main Menu.
3. Move down to parameter #40 *(Extended Emulation Mode)*, and press *Right* to enter edit mode. Change the value to '2', then press *Enter*.
4. Move down to parameter #70 *(Transparency Lead-in Sequence).* Change this sequence to '$19, $18, $09', the DBC character codes for '!?<'.
5. Change parameter #72 *(Transparency/Configuration Trailer Sequence)* to '$08, $30', the DBC character codes for '>&'.
6. Press *Enter* to leave the parameter editor. When back to the Main Menu, select 'Save', and then 'Exit'.

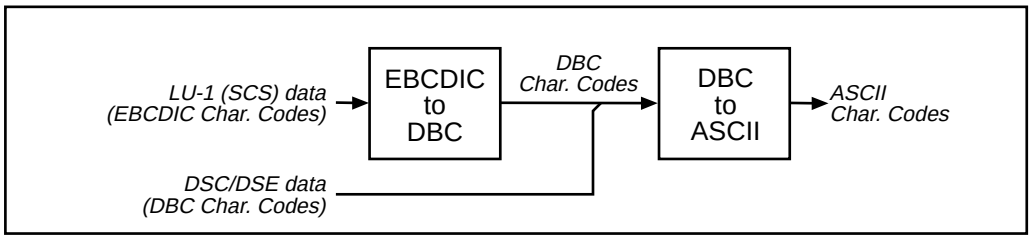
The configuration is now completed.

Modifying the Character Translation Tables

Normally, there is no need to modify the character translation tables, since the tables activated by the System Language and Printer Driver selections are designed to produce the same printouts as the emulated IBM printer.

If you should need to print characters not available in the standard translation tables, this section describes how to do the necessary modifications.

The diagram below is an excerpt from the data flow chart on page 29, showing the character translation process:



LU-1 data stream EBCDIC codes are first translated into DBC *(Device Buffer Code)*, which is the internal character representation format. The DBC codes are then translated into ASCII codes.

DSC/DSE data stream DBC codes are translated directly into ASCII codes.

Notes:

1. The active EBCDIC to DBC translation table depends on the selected System Language.
2. The active DBC to ASCII translation table depends on the selected ASCII Character Set, which is a part of the Printer Driver.

The DBC to ASCII Translation Table

The DBC to ASCII table is modified by the internal function #205 (see page 107). All table positions $00 trough $FF may be modified, but note that only positions $08 through $BF are used in DSC/DSE mode.

Each table position may contain either a single ASCII code, or a sequence of ASCII codes. The length of these sequences are only limited by the Free String Area.

Example: If the Printer Driver HP LaserJet III with the ASCII Character Set PC-850 is selected, the following commands replaces the '~' with a '♦' in the DBC to ASCII table. This will print the tilde character as a filled diamond in both LU-1 (SCS) and DSC/DSE modes.

Since the filled diamond is not available in PC-850, it is necessary to temporarily switch character sets:

```
%P
=205,$3B,$1B,$28,$36,$4D,$C1,$1B,$28,$31,$32,$55
=207,10
=207,12
%
```

- '=205' is the Edit DBC to ASCII Table function call.
- '$3B' is the table position for the tilde character.
- '$1B,$28,$36,$4D' is the PCL 4 command 'ᴇc (6M', which selects the Ventura Math as primary symbol set.
- '$C1' is the ASCII code for the filled diamond in the Ventura Math symbol set.
- '$1B,$28,$31,$32,$55' is the PCL 4 command 'ᴇc (12U', which selects the PC-850 as primary symbol set.

Note:

1. The ASCII codes $00, $03, $08, $0A, $0C, $0D, $0E, $1B, $20 and $5F have special meanings to the output driver. If a DBC code is translated to any of these codes, the ASCII code might be translated, buffered, or not sent to the printer at all. To avoid this, translate these DBC codes to an ASCII sequence. ASCII sequences are sent directly to the printer without any conversion by the output driver.

   Example: To translate DBC code $BF to ASCII $03, use '=205,$BF,$00,$03'. ($00 is ignored by most printers)

2. Extended Emulation Mode has to be active. See page 33.

The EBCDIC to DBC Translation Table

Most translation table modification requirements are well taken care of by editing the DBC to ASCII table. However, there are a few cases where the EBCDIC to DBC also has to be modified:

- A System Language not supported by the protocol converter (*e.g.* Greek or Hebrew) is used.
- Some characters should be translated differently in LU-1 and DSC/DSE modes.

The EBCDIC to DBC table is modified by the internal function #204 (see page 106). The table positions available for editing are $40 through $FF. Each position contains one DBC character code.

Example 1: In this example, the '~' prints as a'♦' in DSC/DSE mode (local copy), but still as a '~' in LU-1 mode (system printouts):

```
%P
=204,$A1,$E5
=205,$E5,$7E
=205,$3B,$1B,$28,$36,$4D,$C1,$1B,$28,$31,$32,$55
=207,10
=207,12
%
```

- The first command remaps the EBCDIC tilde ($A1) to the previously unused DBC position $E5.
- Next, the DBC position $E5 is defined as $7E, the PC-850 code for the tilde character.
- Finally, the DBC position $3B is defined as the filled diamond, as in the previous example.

Note: 1. Extended Emulation Mode has to be active. See page 33.

Example 2 This time the '~' prints as a '~' in DSC/DSE mode (local copy), and as a '♦' in LU-1 mode (system printouts):

```
%P
=204,$A1,$E5
=205,$E5,$1B,$28,$36,$4D,$C1,$1B,$28,$31,$32,$55
=207,10
=207,12
%
```

- The EBCDIC tilde ($A1) is remapped to the DBC position $E5.
- $E5 is then defined as the filled diamond.

Notes:

1. The DBC tilde does not have to be redefined in this case.
2. Extended Emulation Mode has to be active. See page 33.

How to create a Custom System Language

Using the information given in the previous sections, you can create a new System Language by following these steps:

1. Select the default System Language (US English), and the Printer Driver matching your printer. If you are using an ASCII language different from a Printer Driver default, you might need to modify the power-up sequence (parameter #060) to select the correct ASCII language in your printer.
2. Make a printout of the DBC to ASCII table.
3. Modify the table positions required.
4. When the DBC to ASCII table is correct, print out the EBCDIC to ASCII and EBCDIC to DBC (hex) tables.
5. Modify the EBCDIC to DBC table so that the EBCDIC to ASCII table prints correctly.

This method applies both to Configuration from the System, and Configuration from a Terminal. In the latter case, refer to the User's Manual.

User Definable Strings

There are 255 User Definable String available, commonly used for advanced printer control. The strings are programmed by internal function #209 (see page 111), and can be activated in your applications by using the Escape Character followed by the string number.

Application Example - Typeface Control

The following example demonstrates how the User Definable Strings can be used for HP LaserJet III typeface control:

Configuration file::

```
%P
=209,$01,$28,$73,$33,$54  (Select Courier typeface)
=209,$02,$28,$73,$30,$54  (Select Line Printer typeface)
=209,$03,$28,$73,$34,$54  (Select Helvetica typeface)
=209,$04,$28,$73,$35,$54  (Select Times Roman typeface)
=209,$05,$28,$73,$37,$54  (Select Script typeface)
=207,10
=207,12
%
```

This configuration file defines the User Definable Strings $01 through $05 as typeface selection using the PCL4 ‘ESC(s # T’ command, where ‘#’ is the typeface number.:

Example document:

```
%01         This line is printed with the Courier typeface
%02         This line is printed with the Line Printer typeface
%03         This line is printed with the Helvetica typeface
%04         This line is printed with the Times Roman typeface
%05         This line is printed with the Script typeface
```

A User Definable String is activated by the Escape Character followed by the string number in hexadecimal format, *without* a leading dollar sign.

Resulting printout:

```
This line is printed with the Courier typeface
This line is printed with the LinePrinter typeface
This line is printed with the Helvetica typeface
This line is printed with the Times Roman typeface
This line is printed with the Script typeface
```

This is how the HP LaserJet III prints the document.

Note

1. Extended Emulation Mode has to be active. See page 33.

String Substitutions

The String Substitution function searches the output data stream for specified sequences of ASCII characters *(Match Strings)*, and substitutes them other sequences *(Substitute Strings)*.

This function is part of the Output Driver (see the flowchart on page 29), meaning that all substitutions take place *after* the character and control code conversion.

The Match Strings and Substitute Strings are defined by the internal function #210, see page 112.

Application Example - Printer Replacement

If your documents contain printer control commands, you will have to replace these commands with new ones when the printer is replaced. Instead of changing the documents, you can let the protocol converter substitute the commands prior to printing.

The configuration file below makes the protocol converter substitute IBM Proprinter commands for start and stop underlining with the corresponding HP LaserJet III commands:

```
%P
=210,$01,$1B,$2D,$31       (Start underline - IBM Proprinter)
=210,$02,$1B,$26,$64,$44   (Start underline - HP LaserJet III)
=210,$03,$1B,$2D,$30       (Stop underline - IBM Proprinter)
=210,$04,$1B,$26,$64,$40   (Stop underline - HP LaserJet III)
=207,10
=207,12
%
```

Note: 1. Extended Emulation Mode has to be active. See page 33.

Bar Codes

The bar code function gives you access to a range of standard bar code types resident in the protocol converter. Each bar code printout can be individually defined regarding type, size, text below, and horizontal start position.

Bar codes are defined and printed by two internal functions:

- **#211 Define Bar Code**
- **#212 Print Bar Code Data**

These functions are described on page 113.

There are also two parameters controlling the bar code printouts:

- **#093 Bar Code Driver:** The graphics driver used for bar code printing.
- **#094 Bar Code Attributes:** Controls the appearance of the bar code printouts.

See page 90 for a description of these parameters.

The following bar code types are supported:

Type	Length *(characters)*	Valid characters	Check sum digit
1: Code 39	1 - 32	0 - 9,A - Z, Symbols	No
3: UPC-A	11	0 - 9	Yes
8: EAN8	7	0 - 9	Yes
9: EAN13	12	0 - 9	Yes
12: 2 of 5 Interleaved	1 - 32	0 - 9	No
13: Codabar Matrix	2 - 34 *(incl. start/stop)*	0 - 9, Symbols, A - D	No
*17: Code 128	1-32	Full 128 character ASCII set, 4 Func	Yes

***Applies to the AX-7 Cobra+ and the AXIS 370 Cobra only.**

Notes:

1. The symbols supported by Code 39 are plus (+), minus (-), period (.), slash (/), percent (%), dollar ($), apostrophe (') and space(‘ ’). The space character must be given in hex. Example: "Code", $20, "39".
2. The symbols supported by Codabar Matrix are plus (+), minus (-), period (.), slash (/), dollar ($), and colon (:). A - D can only by used as start and stop characters.
3. Bar codes can only be printed vertically, and only one bar code per line. By using page position commands on laser printers and reverse linefeeds on matrix printers more than one barcode can be printed on the same line.
4. Normal text can be printed both before and after the bar code
5. The text below is always printed in 12 CPI, regardless of the CPI setting.
6. The protocol converter will lose track of the vertical print position when printing bar codes. End bar code printouts with a Form Feed to maintain the page formatting.
7. Extended Emulation Mode has to be active. See page 33.
8. Applies to Code 128 only. To get all characters correctly printed it is assumed that Code Page 037 (English US) is used.

9. Applies to Code 128 only. Non printable characters must be entered in numeric form, according to the following table:

Character	ASCII	Character	ASCII
NUL	$00	DLE	$10
SOH	$01	DC1	$11
STX	$02	DC2	$12
ETX	$03	DC3	$13
EOT	$04	DC4	$14
ENQ	$05	NAK	$15
ACK	$06	SYN	$16
BEL	$07	ETB	$17
BS	$08	CAN	$18
HT	$09	EM	$19
LF	$0A	SUB	$1A
VT	$0B	ESC	$1B
FF	$0C	FS	$1C
CR	$0D	GS	$1D
SO	$0E	RS	$1E
SI	$0F	US	$1F
DEL	$7F		
FNC 1	$F1	FNC 2	$FD
FNC 3	$FC	FNC 4	$EF

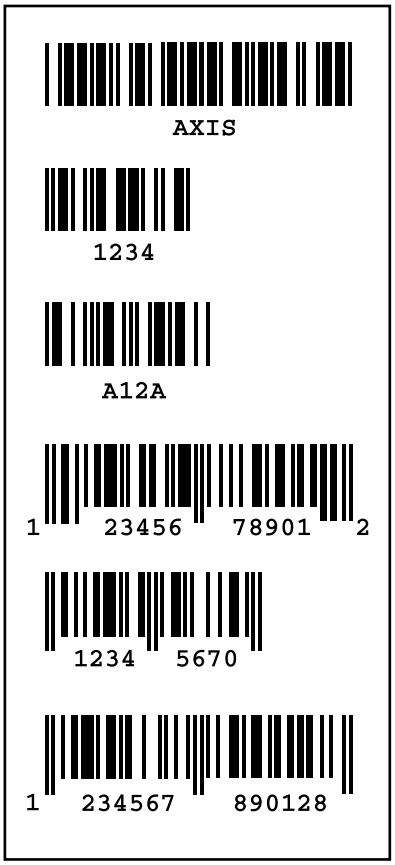
Example: The following lines define and print bar code samples:

```
%P

=211,1,2,2,1,10        (Define bar code type & size; Code 39)
=212,"AXIS"            (Print bar code data)

=211,12,2,2,1,10       (Define bar code type & size; 2 of 5
                       Interleaved)
=212,"1234"            (Print bar code data)

=211,13,2,2,1,10       (Define bar code type & size; Codabar
                       Matrix)
=212,"A12A"            (Print bar code data)

=211,3,2,2,1,10        (Define bar code type & size; UPC-A)
=212,"123456789012"    (Print bar code data)

=211,8,2,2,1,10        (Define bar code type & size; EAN8)
=212,"1234567"         (Print bar code data)

=211,9,2,2,1,10        (Define bar code type & size; EAN13)
=212,"123456789012"    (Print bar code data)

%
```

The function #211 calls select bar code types, module width 2/120", height 2/6", human readable text below, and start position 10/12" from the left margin.

The function #212 calls print the bar code data.

Resulting printout:



SECTION 5

PC-HOST SHARING

This section does not apply to the AXIS 370 Cobra.

The PC-Host Sharing function makes it possible to share the attached printer between up to three sources: Host input, serial PC input, and parallel PC input.

There are six parameters controlling the PC-Host Sharing:

- #136 PC-Host Time-out, page 97
- #137 PC-Host Sequence, page 98
- #138 Host-PC Serial Sequence, page 98
- #141 Host-PC Parallel Sequence, page 99
- #152 PC-Host TOF Sequence, page 102
- #154 Resend PC-Host Sequence, page 103

See the above referenced page number for parameter descriptions.

This function requires an optional 2-way or 3-way printer cable. For order numbers and configuration procedure, see appendix E and the User's Manual.

Using the PC-Host and Host-PC Parameters

These parameters are used when the PC printouts requires a different configuration (*e.g.* printer emulation or character set) than the Host printouts.

- The Host-PC Serial Sequence is sent before a serial PC printout. It may contain any printer control commands required by the PC application.
- The Host-PC Parallel Sequence is sent before a parallel PC printout. It may contain any printer control commands required by the PC application.
- The PC-Host Sequence is sent before a Host printout if the previous printout was PC serial or parallel. It must restore all printer controls changed by the Host-PC sequences.
- The PC-Host TOF sequence is sent before the PC-Host sequence if the PC printout did not end with a Form Feed command ($0C).

The yes/no parameter Resend Host-PC sequence forces the Host-PC serial or Host-PC parallel sequences to be sent between two PC printouts if the timer PC-Host Time-out has expired.

Using an External Printer Sharing Device

The protocol converter can also be used with an external printer sharing device. This function is similar to the internal PC-Host Sharing.

The parameters used for controlling the external printer sharing device are:

- #139 End of Job Time-out. Replaces the PC-Host Time-out.
- #140 End of Job Sequence. Replaces the Host-PC Serial or Host-PC Parallel Sequence.
- #151 Start of Job Sequence. Replaces the PC-Host Sequence.

SECTION 6

AUTOMATIC ORIENTATION AND COR

The automatic page orientation function calculates the page size based on the following page formatting parameters that are set by the host.

- Form length
- Line density
- Maximum print position
- Character density

If the parameters are not set by the host the values in the parameter list are used. The calculated page size together with the settings in parameters:

- #074 Automatic orientation (physical paper size)
- #148 Orientation (portrait, landscape or COR)

automatically select portrait or landscape orientation. If the calculated page size does not fit the physical page in portrait or landscape orientation, Computer Output Reduction (COR) mode is set if selected.

The COR mode is designed to facilitate the use of laser printers with traditional data processing applications requiring 66 lines of 132 columns per page. The following changes are made:

- The page is printed in landscape orientation.
- The line spacing is 70% of that specified.
- The character density is changed as follows:

  10 CPI ⇒ 13.3 CPI
  12 CPI ⇒15 CPI
  15 CPI ⇒ 20 CPI
  17 CPI ⇒ 27 CPI

- The top and left margins are set to 0.5"

The Auto orientation/COR function is available for the following printer drivers:

Number	Title
48	HP LaserJet II
49	HP LaserJet III
*50	Canon LBP-8 III
*51	IBM 4019 (PPDS)
*54	IBM 4029 (PPDS)
55	HP LaserJet 4
*56	IBM 4039 (PCL-5)

*** Does not apply to the Axis 370 Cobra.**

SECTION 7

SOLVING PROBLEMS

This Section helps you solve common problems that might arise when installing or using your protocol converter. There are two major areas of difficulty:

- Missing printouts
- Incorrect host printouts

Missing Printouts

If the installation has been done correctly and you still don't get printouts as expected, check the following steps for problem determination.

Q: Is the POWER indicator on?

A: No: Your printer cannot supply the protocol converter. You must use an external power supply.

Q: Is the attached printer on-line (Ready)?

A: No: Set the printer on-line (see the printer manual).

Q: Is the printer correctly attached?

A: Make sure that the protocol converter printer cable is connected to the proper port. If your printer has both parallel and serial input ports, the printer must be set up for the printer cable type (parallel/serial) you are using.

Q: For serial attached printers: Are the serial parameters correct?

A: Make sure that the baud rate, stop bits, parity and word length settings match your printer settings. If XON/XOFF protocol is used #136, PC-Host Time-out must be set to 0.

Q: System printouts: Is the SYSTEM indicator on?

A: No: The protocol converter is not correctly connected to the system, or the power-up routine has been disturbed. Restart the interface (power-off/power-on). If this doesn't help, make sure that the coax cable is properly connected between the interface and system. If the cable works with another 3270 printer, contact your distributor.
Flashing: The protocol converter is in Test Mode. To exit set the rotary switch to position ‘9’, or switch the protocol converter off and on.

Q: PC printouts: Is the PC-Host Sharing Configuration correct?

A: See Section 5.

Incorrect Host Printouts

There are five major types of incorrect printouts:

Some characters are printed incorrectly

- Characters like ä ü Ä Ü are printed as { } [ ]

  Most likely an incorrect System Language has been selected. Select the System Language matching your system configuration, or 'Load Translate Table' to make your Control Unit down-load the System Language for you.

- Characters like é ì ô ü are printed as e i o u

  Your printer has not been set up for the character set matching the ASCII Character Set selection in the Printer Driver. Make sure that you have selected the correct Printer Driver.

  If this doesn't help, your printer may not be able to print all the characters that the system produces. Print out the DBC-to-ASCII translation table , and compare it to the tables on page 116 and page 117. In some cases it is possible to edit the translation table as described on page 45, or to select another character set in your printer.

  If you have created your own DBC-to-ASCII translation, you might need to modify the power-up sequence (parameter #060) to select the correct ASCII table in your printer.

Corrupted printouts

This is generally caused by selecting a Printer Driver not matching your printer. The control commands will then be misinterpreted by the printer, causing corrupted printouts. If changing Printer Driver does not help, you can use the ASCII hexdump function described later in this section to locate the control commands causing the problem.

Incorrect page breaks

Most likely an incorrect Form Length setting. Recommended values are shown on page 64, parameter #001. Make sure that you have selected the correct Printer Driver.

Lost characters at end of line

Some laser printers cannot print a full line of 80 characters in 10 CPI. Change the Characters per Inch setting to 12 CPI, or modify the 10 CPI sequence contents to select a slightly higher CPI setting. For HP LaserJet II and III, select 10.266 CPI by using the following sequence:

```
$1B,$28,$73,$31,$30,$48,$1B,$26,6B,$31,$31,$2E,$36,$38,$39,$48
```

These are the commands ESC (s10H and ESC&k11.689H , selecting a 10 CPI font with Horizontal Motion Index of 11.689 .

Additional empty lines or spaces

Your system application may assume the utilization of an IBM RPQ. Several empty lines can be caused by an incorrect character buffer size setting, see parameter #026. The IBM RPQ settings supported are listed in Appendix A, page 136.

Incorrect Text Positioning

Text positioning using Carriage Return and spaces might cause unexpected results in conjunction with Hex Transparency sequences.

The following example will print TEXT from column 16 instead of 10, since the characters in the transparency sequence increases the position counter without affection the actual print position:

```
%1B&dD<CR><10 spaces>TEXT
```

The obvious solution is to avoid mixing text positioning and transparency sequences. If this is not possible, use one of the methods below to correct the text position:

- Compensate for the length of the transparency sequence by inserting additional spaces

```
%1B&dD<CR><16 spaces>TEXT
```

- Move the transparency sequence to the end of the line:

```
<73 spaces>%1B&dD<CR>
<10 spaces>TEXT
```

- Disable buffering of CR and spaces:

Set parameter #066, bit 5 *(Option Select 2)* to 1. This is only recommended when Multibyte Transparency is used (see also page 39):

```
%%1B,26,64,44%<CR><10 spaces>TEXT
```

Note: 1. Extended Emulation Mode has to be active. See page 33.

Reporting Problems

If you have an unsolved problem, you should contact your dealer/distributor for further instructions. The dealer/distributor may ask you to make an error report which should include:

- A printout with a description of the errors
- If possible, a correct printout
- A Parameter List
- A System hexdump
- An ASCII hexdump

Data sent to the protocol converter can also be recorded and analyzed with the Axis Emma System, see page 60.

You may also send questions and reports using Email to:

"info@axis.com" (Sweden), "info@axisinc.com" (USA), "info@axiscom.co.jp" (Japan) or "info@axis.com.hk (Hong Kong and Asia). See Appendix I on page 163 for more details.

Printing the Parameter List

The Parameter List shows the complete configuration. The parameters are described in Section 9, page 64. To print the Parameter List, do as follows:

Switch the protocol converter and printer off and on.

Make sure the printer is on line.

Set the rotary switch to '9', and wait for approx. 3 seconds until the SYSTEM indicator starts to flash. You are now in the Test Mode.

Set the rotary switch to '8' to start the printout.

Set the rotary switch to '9' when the printout is completed. The SYSTEM indicator will stop flashing.

Select position '0' to resume normal print operation.

Producing Hexdumps

A hexdump is a printout where the input data stream is printed as hexadecimal byte values rather than being interpreted as characters and control codes. The protocol converter features two different types of hexdump modes:

- **System hexdump**

  This mode will trap the input data before the character and control code conversion. The data is printed as EBCDIC or DBC hexadecimal values.

- **ASCII hexdump**

  The input data is converted to ASCII hexadecimal values before printing. This mode is useful if you want to see what printer control command a certain IBM control code corresponds to.

To produce a hexdump, do as follows:

Switch the printer and protocol converter off and on.

Set the rotary switch to '9', and wait for approx. 3 seconds until the SYSTEM indicator starts to flash. You are now in the Test Mode.

Select position '4' for system hexdump, or position '3' for ASCII hexdump.

Repeat your print job. The data will now be printed in hexadecimal form.

Set the rotary switch to '9' when the printout is completed. The SYSTEM indicator will stop flashing.

Select position '0' to resume normal print operation.

Example of ASCII hexdump

```
AX-7 Cobra+ Ver 5.41 960311
Printer Driver #49 HP LaserJet III


0001 1B 26 61 33 36 30 48 1B 26 61 35 32 38 56 1B 26 "-&a360H-&a528V-&"
0002 61 33 36 30 48 1B 26 61 35 32 38 56 54 45 53 54 "a360H-&a528VTEST"
```

The Emma System

If your dealer/distributor has an Axis Emma system, you can record data sent between the host and the protocol converter and send it for analysis. Contact your dealer/distributor for more information.

Error Messages

There are four different error conditions that will cause the protocol converter to print an error message on your printer:

```
BE-BAR CODE ERROR
```

Incorrect or insufficient bar code definition. The bar code must be specified with five values, see page 113, function #211.

```
BF-GDDM SUPPORT NOT ENABLED:   NOT ENOUGH ROOM IN FREE STRING
                               AREA; NEEDS 13283 ($33E3) BYTES
```

An attempt has been made to enable GDDM (#142) with insufficient free memory. You must remove some strings from your configuration (User Definable Strings, String Substitutions or String parameters in the Parameter List). The size of the available string area is printed in the Parameter List header, and is also displayed in all string programming menus.

```
E2-PERMANENT MEMORY CHECKSUM ERROR, FACTORY DEFAULTS SET
```

This message indicates that the non-volatile memory has been corrupted. The interface is automatically set to factory default state (your configuration is lost). If the message does not re-appear after power-off/power-on, configure the protocol converter.

```
E6-MEMORY OVERFLOW: FREE STRING AREA EXHAUSTED
```

The available string area is exhausted. You must remove some strings from your configuration (User Definable Strings, String Substitutions or String parameters in the Parameter List). The size of the available string area is printed in the Parameter List header, and is also displayed in all string programming menus.

SECTION 8

PRINTER DRIVERS

A Printer Driver is a device driver containing all the parameters, including command sequences and character sets, required to drive a particular range of printers. The following printer drivers are available as standard:

Number	Printer drivers in AX-7 Cobra+	
*30	Generic Printer	
31	IBM Graphics	
32	IBM Proprinter	
33	Epson FX/EX/DFX	
34	Epson LQ	
35	Fujitsu DL (DPL24C)	
36	Fujitsu DX (Epson FX)	
37	OKI 320 (Epson FX)	
38	OKI 390 (Epson LQ)	
39	OKI 393 (Epson LQ)	
40	OKI 2350/2410	
41	Diablo 630	
42	Philips GP300	
43	Mannesmann MT660	
44	IBM Matrix (PPDS)	***Note 1***
45	IBM 5577 (Japan)	
46	Epson ESC/P (Japan)	
47	Brother M-4018	
48	HP LaserJet II	
49	HP LaserJet III	
50	Canon LBP-8 III	
51	IBM 4019 (PPDS)	
52	Xerox 4045	***Note 1***
53	HP 7475/7550	
54	IBM 4029 (PPDS)	***Note 1***
55	HP LaserJet 4	
56	IBM 4039 (PCL-5)	
57	HP Color LaserJet	
62	HP PaintJet XL 300	

Notes: 1. (AX-7 Cobra+ only) Optional firmware is available for IBM PPDS printers supporting East European and Middle East countries and for XEROX printers, supporting XEROX Printer Access Facility (XPAF) ver 2.2 host software. Please contact your dealer/distributor.

Number	Printer drivers in Axis 370 Cobra
*30	Generic Printer
31	IBM Graphics
32	IBM Proprinter
33	Epson FX/EX/DFX
34	Epson LQ
35	Fujitsu DL (DPL24C)
44	IBM Matrix (PPDS)
48	HP LaserJet II
49	HP LaserJet III
52	Xerox 4045
55	HP LaserJet 4

Number	Printer drivers in Axis OKI-HD
*30	OKI/OKIDATA 393/395 Epson LQ (default)
31	OKI/OKIDATA 3410 Epson FX
32	OKI 393/395 Proprinter
33	OKIDATA 393 Proprinter
34	OKIDATA 395 Proprinter
35	OKI/OKIDATA 3410 Proprinter
36	Generic Printer

Number	Printer drivers in AX-4039/1
*30	HP PCL

SECTION 9

THE PARAMETER LIST

This section describes the parameters available in the protocol converters. All parameters can be edited either using the Configuration from the System, see page 37, or from the Edit Parameters entry in the Main Menu, see the User's Manual.

#001 Form Length

Selects the number of lines per page.

Value	Description
1 - 255	Form Length value in number of lines
0	Inhibit Form Length setting
48	8.5" fan fold
64	Letter size cut sheet
* 66	A4 size cut sheet and 11" fan fold *(default for laser printer drivers)*
* 72	12" fan fold *(default for matrix printer drivers)*

Notes:

1. When set to 0, line counting is inhibited, and no Form Length command will be sent to the printer.
2. The Form Length setting is overridden by the SCS SVF command. To avoid this, set Lock Form Feed (#099) to 'Yes'.
3. This parameter emulates an IBM printer front panel switch.
4. Line Feeds are buffered until a printable character is received or the last line of current form is reached, unless this parameter is set to '0'. At end of form, a Form Feed will be sent instead of the buffered Line Feeds unless *True Form Feed* (#013) is set to 'No'.

Related parameters:

#013 True Form Feed
#027 Form Length Header
#028 Form Length Format
#029 Form Length Tail
#099 Lock Form Length

#002 Line Density

Selects the number of lines per inch (LPI).

Value	Description
0	Inhibit Line Density setting
3	3 Lines per Inch
4	4 Lines per Inch
*6	6 Lines per Inch *(default)*
8	8 Lines per Inch

Notes:

1. When set to 0, no Line Density command will be sent to the printer.
2. The Line Density setting is overridden by the LU-1 (SCS) SLD command. To avoid this, set *Lock LPI* (#111) to 'Yes'.
3. 3 and 4 LPI are implemented as 6 and 8 LPI with double Line Feeds.
4. This parameter emulates an IBM printer front panel switch.

Related parameters:

#046 6 LPI

#047 8 LPI

#111 Lock LPI

#003 Maximum Print Position

Selects the number of characters per line.

Value	Description
1 - 255	Number of characters per line
0	Inhibit print position counter
*132	Factory default value

Notes:

1. A New Line command is sent to the printer when the specified print position is reached.
2. When set to '0', character counting is inhibited, and no New Line command will be generated.
3. The Maximum Print Position setting is overridden by the LU-1 (SCS) SHF command. To avoid this, set *Option Select 2* (#066), bit 3 to '1' (Lock MPP).
4. This parameter emulates an IBM printer front panel switch.

Related parameters:

#021 New Line

#066 Option Select 2 (bit 3, Lock MPP)

#004 Character Density

Selects the number of characters per inch (CPI).

Value	Description
0	Inhibit CPI setting
5	5 Characters per Inch
*10	10 Characters per Inch
12	12 Characters per Inch
15	15 Characters per Inch
17	16.7 Characters per Inch
99	Proportional Character spacing

Notes:

1. A Character Density command is sent to the printer at Power Up and Warm Start.
2. When set to ‘0’, no Character Density command is sent.
3. The Character Density setting is overridden by the LU-1 (SCS) SPD command. To avoid this, set *Lock CPI* (#110) to ‘Yes’.
4. This parameter emulates an IBM printer front panel switch.

Related parameters:

#048 5 CPI
#049 10 CPI
#050 12 CPI
#051 15 CPI
#052 16.7 CPI
#053 Proportional
#110 Lock CPI

#005 System Language

This parameter makes the EBCDIC-to-DBC translation table match the System Language configuration of your IBM system.

Value	Code Page	Description
*0	037	English (US)
1	037	Netherlands
2	037	Portuguese
3	037	Canadian Bilingual
4	260	Canadian French
5	273	Austrian/German
6	275	Brazilian
7	277	Danish/Norwegian
8	278	Swedish/Finnish
9	280	Italian
10	281	Japanese English
11	284	Spanish
12	284	Spanish Speaking
13	285	English (UK)
14	286	Austrian/German alt
15	287	Danish/Norwegian alt
16	288	Swedish/Finnish alt
17	289	Spanish alt
18	297	French
19	297	French AZERTY
20	500	International Set 5
21	500	New Swiss French
22	500	Belgian
23	290	Japanese Katakana*
30	420	Arabic*
31	424	Hebrew*
32	423	Greek*
33	1026	Turkish (Latin 5)*
35	880	Cyrillic*
36	870	East Europe*
37	875	Greek new*
38	834	Thai*
80	---	XBASIC (Arabic)*
81	---	XCOM2 (Arabic)*
99	---	Load Translate Table

Notes:

1. When set to ‘99’, the translate table will be downloaded from the control unit at Power Up.
2. US Language Group is only supported for Load Translate Table.
3. To use system languages marked * the matching ASCII Character Set, parameter #063, must be selected.

#006 True Screen Image

Controls NUL treatment in DSC/DSE mode print buffers.

Value	Description
Yes	NUL codes are replaced by Space characters
*No	NUL codes are suppressed

Note: 1. This parameter emulates an IBM RPQ (Null Suppression), see Appendix A, page 136.

#007 Form Feed before Hardcopy

Enables an optional Form Feed before a Local Copy print buffer.

Value	Description
Yes	Send a Form Feed before Local Copy print buffer
*No	Don't send a Form Feed before Local Copy print buffer

Note: 1. This function is not available in the emulated IBM printers.

#008 Form Feed after Hardcopy

Enables an optional Form Feed after a Local Copy print buffer.

Value	Description
*Yes	Send a Form Feed after Local Copy print buffer
No	Don't send a Form Feed after Local Copy print buffer

Note: 1. This parameter emulates an IBM printer front panel switch.

#009 Monocase

Print all characters in upper case.

Value	Description
Yes	Convert lower case characters to upper case
*No	Don't convert lower case characters

Note: 1. This parameter emulates an IBM printer front panel switch.

#010 Suppress Control Codes

Enables suppression of all LU-1(SCS) and DSC/DSE Control Codes. Use this parameter to lock out IBM 3270 commands when print formatting is controlled by pass-through Escape sequences.

Value	Description
Yes	Suppress all LU-1(SCS) and DSC/DSE Control Codes
*No	Don't suppress Control Codes

#011 True Line Feed

Controls the emulation of the LU-1 (SCS) and DSC/DSE LF commands.

Value	Description
Yes	Send Line Feed sequence only
No	Send Line Feed sequence + spaces

Notes:

1. The default setting depends on the selected printer driver.
2. Set this parameter to 'Yes' if your printer supports the Line Feed command.
3. When set to 'No' the number of spaces required to maintain the horizontal print position will be printed.

Related parameter: #023 Line Feed

#012 True Back Space

Controls the emulation of the LU-1 (SCS) BS command.

Value	Description
Yes	Send Back Space
No	Send Carriage Return sequence + spaces

Notes:

1. The default setting depends on the selected printer driver.
2. Set this parameter to 'Yes' if your printer supports the Back Space command.
3. When set to 'No' the number of spaces required to maintain the horizontal print position will be printed.
4. The Back Space command is '$08' (ASCII)

#013 True Form Feed

Controls the emulation of the LU-1 (SCS) and DSC/DSE FF commands.

Value	Description
Yes	Send Form Feed sequence
No	Send Line Feeds

Notes:

1. The default setting depends on the selected printer driver.
2. Set this parameter to 'Yes' if your printer supports the Form Feed and Form Length setting commands.
3. When set to 'No' the number of Line Feeds required to advance to the next Top of Form will be sent.

Related parameters: #001 Form Length, #020 Form Feed, #023 Line Feed

#015 Letter Quality

Controls the default Print Quality.

Value	Description
Yes	Set Letter Quality at Power Up and Warm Start
*No	Set Draft at Power Up and Warm Start

Notes:

1. The Letter Quality setting is overridden by the LU-1 (SCS) PPM command. To avoid this, set *Lock Print Quality* (#112) to 'Yes'.
2. This parameter emulates an IBM printer front panel switch.

Related parameters:

#053 Set Letter Quality

#054 Exit Letter Quality

#112 Lock Print Quality

#016 Left Margin

Adds a Left Margin by inserting a specified number of spaces.

Value	Description
0-255	Starting print position
*1	Factory default value (no Left Margin)
0	Same as '1'

Notes:

1. Setting a Left Margin greater than 1 might cause problems when using the pass-through function. To avoid this, set the margin as described in note 2.
2. The Left Margin width depends on the current CPI setting. To set a fixed Left Margin, adjust the paper path (matrix printers), or insert a Left Margin command in the Power Up Sequence (laser printers).
3. This parameter emulates an IBM printer front panel switch.

Related parameters:

#004 Character Density

#060 Power Up Sequence

#017 Sheet Feeder

Selects the default paper source.

Value	Description
*0	Select paper source defined by #82 (Sheet Feeder 0)
1	Select paper source defined by #61 (Sheet Feeder 1)
2	Select paper source defined by #62 (Sheet Feeder 2)
3	Select paper source defined by #83 (Envelope Feeder)

Note:

1. The specified paper source sequence will be sent at Power Up and Warm Start.

Related parameters:

#61 Sheet Feeder 1

#062 Sheet Feeder 2

#082 Sheet Feeder 0

#083 Envelope Feeder

#019 Highlight

Controls the emulation of DSC/DSE Base Buffer Attributes.

Value	Description
0	Ignore Base Buffer Attributes
*1	Use Boldface as highlight *(default)*
2	Use Underline as highlight
3	Use Color as highlight

Notes:

1. When set to '1', the *Set Boldface Sequence* (#056) is sent when an 'Intensified' attribute is received, and the *Exit Boldface Sequence* (#057) when a 'Normal' attribute is received.
2. When set to '2', the *Set Underline Sequence* (#058) is sent when an 'Intensified' attribute is received, and *Exit Underline Sequence* (#059) when a 'Normal' attribute is received.
3. When set to '3', a *Color Sequence* (#129 - #132) is sent according to the table below when an attribute is received.

Base Buffer Attribute	Printed color	
	Base Color: Black	Base Color: Green
Unprotected Normal	Black	Green
Unprotected Intensified	Red	Red
Protected Normal	Blue	Blue
Protected Intensified	Green	Black

Related parameters:

#056 Set Boldface
#057 Exit Boldface
#058 Set Underline
#059 Exit UnderLine
#129 Black Color Sequence
#130 Green Color Sequence
#131 Blue Color Sequence
#132 Red Color Sequence

#020 Form Feed Sequence

This sequence is sent to the printer to generate a Form Feed.

Value	Description
<any seq.>	Form Feed Sequence
<empty>	Suppress the FF command
*$0C	Factory default sequence

Notes:

1. This sequence is sent at receiving a LU-1 (SCS) or DSC/DSE FF command, and after the last line on the current form unless *Form Length* ($001) is set to '0'.
2. If *True Form Feed* (#013) is set to 'No', Line Feeds will be used to emulate a Form Feed.
3. To suppress the LU-1 (SCS) and DSC/DSE FF commands, empty the *Form Feed Sequence.*

Related parameters:

#001 Form Length

#013 True Form Feed

#021 New Line Sequence

This sequence is sent to the printer to generate a New Line.

Value	Description
<any seq.>	New Line Sequence
<empty>	Suppress the NL command
*$0D $0A	Factory default sequence

Notes:

1. This sequence is sent at receiving a LU-1 (SCS) or DSC/DSE NL command, and after printing at the *Maximum Print Position* unless Maximum Print Position (#003) is set to '0'.
2. To suppress the LU-1 (SCS) and DSC/DSE commands, empty the *New Line Sequence.*

Related parameter:

#003 Maximum Print Position

#022 Carriage Return Sequence

This sequence is sent to the printer to generate a Carriage Return.

Value	Description
<any seq.>	Carriage Return Sequence
<empty>	Suppress the CR command
*$0D	Factory default sequence

Notes:

1. This sequence is sent after receiving a LU-1 (SCS) or DSC/DSE CR command.
2. CRs and spaces are buffered to minimize print data unless *Option Select 2* (#066), bit 5 (Disable CR and spaces buffering) is set to '1'.
3. To suppress the LU-1 (SCS) and DSC/DSE CR commands, empty the Carriage Return Sequence.

Related parameter:

#066 Option Select 2 (bit 5, Disable CR and spaces buffering)

#023 Line Feed Sequence

This sequence is sent to the printer to generate a Line Feed (advance to the next line maintaining the horizontal print position).

Value	Description
<any seq.>	Line Feed Sequence
<empty>	Suppress the LF command
*$0A	Factory default sequence

Notes:

1. This sequence is sent after receiving a LU-1 (SCS) LF command.
2. Line Feeds are buffered until a printable character is received or the last line of current form is reached, unless *Form Length* (#001) is set to '0'. At end of form, a Form Feed will be sent instead of the buffered Line Feeds unless *True Form Feed* (#013) is set to 'No',.
3. If True Line Feed (#011) is set to 'No', CR, LF and spaces will be used to emulate a Line Feed.
4. To suppress the LU-1 (SCS) LF command, empty the Line Feed Sequence.

Related parameters:

#011 True Line Feed
#013 True Form Feed
#020 Form Feed Sequence
#022 Carriage Return Sequence

#024 Intervention Time

Specifies the maximum allowed time for a print buffer to complete before an Intervention Required status is reported to the Host.

Value	Description
0	Don't report Intervention Required status
2	Allow 2 minutes for a print buffer to complete
4	Allow 4 minutes for a print buffer to complete
6	Allow 6 minutes for a print buffer to complete
8	Allow 8 minutes for a print buffer to complete
*10	Allow 10 minutes for a print buffer to complete

Note:

1. Set to '0' to allow more than 10 minutes for a print buffer to complete, *e.g.* when using a plotter.

#025 Screen Size

Controls the Local Copy logical screen size, and the DSC mode buffer size.

Value	Description
1	960 bytes
2	1920 bytes
3	2560 bytes
6	3564 bytes
*7	3440 bytes

Notes:

1. This parameter has effect in DSC/DSE mode only.
2. VM users: The RSCS buffer size must not exceed the selected Screen Size (DSC mode only).
3. When this parameter is changed, the protocol converters must be restarted to allow the Control Unit to read the new Screen Size.

#026 Character Buffer Size

Selects the protocol converters character buffer size.

Value	Description
2	2 kbytes
*4	4 kbytes

Notes:

1. The selected size does not include EAB.
2. When this parameter is changed, the protocol converters must be restarted to allow the Control Unit to read the new Character Buffer Size.

#027 Form Length Lead-In Sequence

Specifies the part of the Form Length command that precedes the Form Length value.

Value	Description
<any seq.>	Form Length Lead-In Sequence

Notes:

1. The default setting depends on the selected printer driver.
2. The Form Length Sequences are only used when *True Form Feed* (#013) is set to 'Yes'.

Related parameters:

#013 True Form Feed

#028 Form Length Format Sequence

#029 Form Length Trailer Sequence

#028 Form Length Format Sequence

Specifies the format of the Form Length value in the Form Length command.

Byte no.	Value	Description
1	1	Set value as number of lines
	2	Set value as (no.of lines)/(lines per inch)*constant
2	1	Binary format. Add offset from byte 4
	2	Decimal format
3	0 - 255	Constant
4	0 - 255	Binary offset

Note:

1. The default setting depends on the selected printer driver.

#029 Form Length Trailer Sequence

Specifies the part of the Form Length command that succeeds the Form Length value.

Value	Description
<any seq.>	Form Length Trailer Sequence

Note:

1. The default setting depends on the selected printer driver.

#030 Inverted Busy

Does not apply to the AXIS 370 Cobra.

Controls the serial interface DTR (Ready/Busy) signal polarity.

Value	Description
Yes	DTR is low when printer is busy
*No	DTR is high when printer is busy

Note:

1. Set this parameter to 'Yes' when the printer's DTR signal polarity is inverted, *e.g.* for some plotters.

#031 Baud Rate

Does not apply to the AXIS 370 Cobra.

Controls the serial port baud rate.

Value	Description
1	100 baud
3	300 baud
6	600 baud
12	1200 baud
18	1800 baud
24	2400 baud
36	3600 baud
48	4800 baud
72	7200 baud
*96	9600 baud
192	19200 baud

Note: 1. The value 192 (19200 baud) cannot be used with PC-Host Sharing.

#032 Word Size

Does not apply to the AXIS 370 Cobra.

Set the serial port word size (number of bits).

Value	Description
7	7 bits
*8	8 bits

#033 Parity

Does not apply to the AXIS 370 Cobra.

Set serial port parity.

Value	Description
*0	No parity
1	Odd parity
2	Even parity

#034 Stop Bits

Does not apply to the AXIS 370 Cobra.

Selects the number of stop bits for the serial communication.

Value	Description
1	One stop bits
*2	Two stop bits

#035 XON/XOFF

Does not apply to the AXIS 370 Cobra.

Selects handshake protocol for serial communication.

Value	Description
Yes	XON/XOFF protocol
*No	Ready/Busy protocol

Related parameters: #036 XON Character

#037 XOFF Character

Note: 1. If a serial cable is used from the AX-7 Cobra+ family to the printer and XON/XOFF is set to 'Yes', parameter #136 (PC-Host Time-out) must be set to 0.

#036 XON Character

Does not apply to the AXIS 370 Cobra.

Selects the XON Character for serial communication.

Value	Description
$00 - $FF	XON Character
*$11	Factory default value

#037 XOFF Character

Does not apply to the AXIS 370 Cobra.

Selects the XOFF Character for serial communication.

Value	Description
$00 - $FF	XOFF Character
*$13	Factory default value

#038 Set Top of Form Sequence

This sequence is sent to the printer to set the Top of Form Position.

Value	Description
<any seq.>	Set Top of Form Sequence

Notes: 1. The default sequence depends on the selected printer driver.

2. This sequence is sent at Power Up, and when the Form Length setting is changed.

Related parameter: #001 Form Length

#039 Force Last Line Sequence

This sequence is sent to the printer to force out the line buffer.

Value	Description
<any seq.>	Force Last Line Sequence
*<empty>	Factory default sequence

Notes:

1. This sequence is sent after DSC/DSE buffers and Last in Chain LU-1 (SCS) buffers.
2. Use this sequence when the print job doesn't end with a line terminating command.
3. If your printer doesn't have a Print Line Buffer command, use a Carriage Return ($0D) instead.

#040 Extended Emulation Mode

Selects the default Extended Emulation Mode.

Value	Description
*0	No Extended Emulation Mode
1	Escape Char. translates to $1B ASCII
2	Default Extended Emulation Mode
3	MPI compatible mode
4	Memorex 2068 compatible
5	Maersk Data compatible mode

Notes:

1. See Section 4 for a detailed description of the Extended Emulation Modes.
2. The Extended Emulation Mode is automatically set to '2' when the Extended Emulation Control Sequence is received, and the previous value was '0' or '1'. If the previous value was '2' or higher, the Extended Emulation Mode is left unchanged.
3. A new Extended Emulation Mode setting will not take effect until the next Warm Start.

Related parameters:

#041 Escape Character

#104 Extended Emulation Control Sequence

#041 Escape Character

Selects the DBC character code used for Single Byte Transparency, User Definable Strings, and Extended Emulation Mode 1.

Value	Description
$10 - $BF	Escape Character (DBC character code)
*$2E	Factory default value
$00	Disable Escape Character ***Note 3***

Notes:

1. This parameter value must be entered as a DBC character code.
2. The Escape character is automatically set when the Extended Emulation Control Sequence is received.
3. If parameter #040 (Extended Emulation Mode) is set to 1 and this parameter is set to $00, SCS code $27 is translated to ASCII $1B.

Related parameters:

#040 Extended Emulation Mode

#104 Extended Emulation Control Sequence

#042 Option Select 1

Controls 8 independent switches. Each bit represents one switch.

Value	Description
$00 - $FF	See switch descriptions below
*$02	Factory default value

Bit 0 ($01): Reserved

Bit 1 ($02): Form Feed valid in 1st line

Value	Description
0	FF command not valid in 1st line
*1	FF valid in 1st line

Notes:

1. This switch is used in DSC/DSE mode only.
2. Set this switch to '1' to suppress empty forms *(default)*.
3. This switch emulates an IBM RPQ.

Bit 2 ($04): Reserved

Bit 3 ($08): SHF Maximum Print Position select.

Selects the Maximum Print Position to use after receiving a Set Horizontal Format LU-1 (SCS) command (see section 2.4) with no arguments.

Value	Description
*0	Use default Maximum Print Position
1	Use current Maximum Print Position

Bit 4 ($10): Reserved

Bit 5 ($20): SVF Maximum Page Length select.

Selects the Maximum Page Length to use after receiving a Set Vertical Format LU-1 (SCS) command (see section 2.4) with no arguments.

Value	Description
*0	Use default Maximum Page Length
1	Use current Maximum Page Length

Bit 6 ($40): Extended SCS Transparency

Value	Description
*0	SCS TRN data is interpreted as SCS character codes
1	SCS TRN data is interpreted as ASCII character codes

Bit 7 ($80): Action at coax communication loss

Value	Description
*0	No action at communication loss
1	Power On Reset will be sent 60 seconds after communication loss

Note:

1. This switch emulates an IBM printer front panel switch.

#045 IBM Printer Emulation

Selects the IBM Printer Emulation

Value	Description
*87	IBM 3287
68	IBM 3268
14	IBM 4214
62	IBM 3262
24	IBM 4224 non-IPDS mode
30	IBM 4230 (Applies to the AXIS 370 Cobra only)

Notes:

1. Select ‘87’ if you intend to use the Programmable Symbols feature (GDDM Support).
2. Select ‘68/14/62’ if you are replacing an IBM 3268/4214/3262 printer.
3. Select ‘4224’ if you intend to use CECP in DSC/DSE mode.
4. When this parameter is changed, the protocol converters must be restarted to allow the Control Unit to read the new IBM Printer Emulation.

#046 6 Lines per Inch Sequence

#047 8 Lines per Inch Sequence

One of these sequences is sent to the printer to activate the current Lines per Inch setting,

Value	Description
<any seq.>	6/8 Lines per Inch Sequence

Notes:

1. The default sequences depend on the selected printer driver.
2. The Lines per Inch sequence is sent at Power Up, Warm Start, and after receiving the LU-1 (SCS) SLD command unless *Lock LPI* (#111) is set to ‘Yes’.
3. 3 and 4 Lines per Inch are emulated by sending an extra Line Feed.

Related parameters:

#002 Line Density

#023 Line Feed Sequence

#111 Lock LPI

#048 5 Characters per Inch Sequence

#049 10 Characters per Inch Sequence

#050 12 Characters per Inch Sequence

#051 15 Characters per Inch Sequence

#052 16.7 Characters per Inch Sequence

One of these sequences is sent to the printer to activate the current Characters per Inch setting,

Value	Description
<any seq.>	5/10/12/15/16.7 Characters per Inch Sequence

Notes:

1. The default sequences depend on the selected printer driver.
2. The Characters per Inch sequence is sent at Power Up, Warm Start, and after receiving the LU-1 (SCS) SPD command unless *Lock CPI* (#110) is set to 'Yes'.
3. If your printer is equipped with different fixed pitch fonts, you might add commands to select default fonts to the Character per Inch sequences.

Related parameters:

#004 Character Density

#110 Lock CPI

#053 Proportional Sequence

#053 Proportional Pitch Sequence

This sequence is sent to the printer to activate proportional pitch characters.

Value	Description
<any seq.>	Proportional Pitch Sequence

Notes:

1. The default sequence depends on the selected printer driver.
2. This sequence is sent at Power Up and Warm Start when *Character Density* (#004) is set to '99' (Proportional).

Related parameter:

#004 Character Density

#054 Set Letter Quality Sequence

#055 Exit Letter Quality Sequence

These sequences are sent to the printer to activate the current Print Quality.

Value	Description
<any seq.>	Print Quality Sequence

Notes:

1. The default sequences depend on the selected Printer Driver.
2. A Print Quality sequence is sent at Power Up, Warm Start, and after receiving the LU-1 (SCS) PPM command unless *Lock Print Quality* (#112) is set to 'Yes'.

Related parameters:

#015 Letter Quality

#112 Lock Print Quality

#056 Set Boldface Sequence

#057 Exit Boldface Sequence

These sequences are sent to the printer to start and stop boldface printing.

Value	Description
<any seq.>	Set/Exit Boldface Sequence

Notes:

1. The default sequences depend on the selected printer driver.
2. The Set Boldface sequence is sent when a DSC/DSE Highlight attribute code is received and *Highlight* (#019) is set to '1' (Boldface).
3. The Exit Boldface sequence is sent at Power Up, Warm Start, and when a DSC/DSE Normal attribute code is received in Boldface active mode.

Related parameters:

#019 Highlight

#121 Set Simulated Bold Sequence

#122 Exit Simulated Bold Sequence

#058 Set Underline Sequence

#059 Exit Underline Sequence

These sequences are sent to the printer to start and stop underlining.

Value	Description
<any seq.>	Set/Exit Underline Sequence

Notes:

1. The default sequences depend on the selected printer driver.
2. The Set Underline sequence is sent after receiving the LU-1 (SCS) SA/ Underscore command, and when a DSC/DSE Highlight attribute code is received and *Highlight* (#019) is set to '2' (Underline).
3. The Exit Boldface sequence is sent at Power Up, Warm Start, LU-1 (SCS) SA/Default, and when a DSC/DSE Normal attribute code is received in Underline active mode.

Related parameter: #019 Highlight

#060 Power Up Sequence

This sequence is sent to the printer when the protocol converters is powered up.

Value	Description
<any seq.>	Power Up Sequence

Notes:

1. The default sequence depends on the selected printer driver.
2. The Power Up sequence is primarily used for selecting printer emulation and symbol set, but may also be used for downloading fonts and logos.
3. This sequence is sent *before* the Warm Start sequences.

#061 Sheet Feeder 1 Sequence

#062 Sheet Feeder 2 Sequence

These sequences are sent to the printer to select paper source.

Value	Description
<any seq.>	Sheet Feeder 1/2 Sequence

Notes:

1. The default sequences depend on the selected printer driver.
2. A Sheet Feeder sequence is sent at Power Up and Warm Start according to the *Sheet Feeder* parameter (#017).
3. The LU-1 (SCS) PPM/SD command will activate one of the Sheet Feeder sequences unless *Sheet Feeder* (#017) is set to '0'.

Related parameter: #017 Sheet Feeder

#063 ASCII Character Set

Selects the DBC to ASCII translation table.

Value	Description	
0	US English	*(7-bit symbol set)*
1	Swedish/Finnish	*(7-bit symbol set)*
2	Danish/Norwegian	*(7-bit symbol set)*
3	German	*(7-bit symbol set)*
4	UK English	*(7-bit symbol set)*
5	Italian	*(7-bit symbol set)*
6	French/Belgian	*(7-bit symbol set)*
7	Spanish	*(7-bit symbol set)*
8	Japanese	*(7-bit symbol set)*
9	XBASIC (Arabic)	*(8-bit symbol set)*
10	XCOM2 (Arabic)	*(8-bit symbol set)*
11	PC Set 2	*(8-bit symbol set)*
12	Roman-8	*(8-bit symbol set)*
13	PC-850	*(8-bit symbol set)*
14	ISO/ECMA94	*(8-bit symbol set)*
15	PC-942 Shift JIS*	*(8-bit symbol set)*
16	JIS X0201	*(8-bit symbol set)*
20	PC-864 Arabic	*(8-bit symbol set)*
21	PC-862 Hebrew	*(8-bit symbol set)*
22	PC-869 Greek	*(8-bit symbol set)*
23	PC-857 Turkish	*(8-bit symbol set)*
25	PC-855 Cyrillic	*(8-bit symbol set)*
26	PC-852 PC Latin 2	*(8-bit symbol set)*
27	PC-851 Greek	*(8-bit symbol set)*
28	PC-874 Thai	*(8-bit symbol set)*

Notes:

1. The default setting depends on the selected printer driver.
2. The selected Character Set must match the printer's symbol set. If this parameter is changed, the *Power Up Sequence* (#060) must be edited to select the corresponding symbol set.
3. The ASCII character set used must be supported by the printer.

Related parameter: #060 Power Up Sequence

#064 Left-to-Right Mode Sequence

#065 Right-to-Left Mode Sequence

These sequences are sent to the printer to activate Left-to-Right or Right-to-Left print mode.

Value	Description
<any seq.>	Print Direction Sequence
*<empty>	Factory default sequence

Notes:

1. These sequences are only used when Arabic and Hebrew Code Pages and ASCII Character Sets are selected.
2. These sequences are sent after receiving the LU-1 (SCS) STO command (used for Arabic and Hebrew Code Pages only).

Related parameters:

#005 System Language

#063 ASCII Character Set

#066 Option Select 2

Controls 8 independent switches. Each bit represents one switch.

Value	Description
$00 - $FF	See switch descriptions below
*$10	Factory default value

The following note applies to the Axis 370 Cobra:

Note: In the Xerox 4045 Printer Driver (52) is the Option Select 2 (#66) set to $30 by default.

Bit 0 ($01): Extended Emulation Control Syntax

Value	Description
*0	Three characters after Extended Emulation Control Sequence
1	One character after Extended Emulation Control Sequence

Note:

1. Set this switch to ‘1’ to emulate I-Data transparency.

Related parameter:

#104 Extended Emulation Control Sequence

Bit 1 ($02): True Screen Image in Host Direct Mode

Value	Description
*0	True Screen Image setting is valid for all Hardcopy modes.
1	Enable NUL suppression in Host Direct Mode.

Note:

1. Set this switch to ‘1’ and parameter #006, ‘True Screen Image’, to ‘Yes’ to enable NUL suppression in Host Direct Mode.

Related parameter:

#006 True Screen Image

#066 Option Select 2 (continued)

Bit 2 ($04):New Line or Carriage Return at MPP+1

Value	Description
*0	An additional NL is generated
1	No NL is generated

Notes:

1. This switch is used in DSC/DSE mode only.
2. This switch emulates an IBM RPQ.

Bit 3 ($08): Lock MPP

Value	Description
*0	MPP will be set by the LU-1 (SCS) SHF command
1	MPP is locked to the parameter setting

Related parameter: #003 Maximum Print Position

Bit 4 ($10): New Line after Extended Emulation Sequence

Value	Description
0	Suppress NL command after Ext. Emulation Sequence
*1	Don't suppress NL command after Ext. Emul. Sequence

Note:

1. Set this switch to '0' so suppress the LU-1 (SCS) and DSC/DSE NL command after all lines containing Extended Emulation Sequences.

Bit 5 ($20): CR and Space Character Buffering

Value	Description
*0	Buffer CR and space characters
1	Print CR and space characters immediately

Bit 6 - 7 ($40 - $80): Reserved

#070 Transparency Lead-In Sequence

This sequence bypasses the normal emulation, and starts a Multi-byte Transparency session.

Value	Description
<any seq.>	Multi-byte Transparency start sequence
<empty>	Multi-byte Transparency disabled
*$2E $2E	Factory default sequence

Notes:

1. This sequence will be automatically set when the Extended Emulation Control Sequence is received.
2. This sequence is valid in Extended Emulation Modes 2, 3, 4, and 5. In modes 0 and 1 the sequence will be interpreted as printable characters.
3. This sequence must be entered in DBC character codes or literally, *i.e.* <$2E,$2E> or </%%/> sets The Transparency Lead-In Sequence to '%%'.
4. If this sequence is empty, the Multi-byte transparency is disabled.

Related parameters:

#040 Extended Emulation Mode
#071 Configuration Lead-In Sequence
#072 Transparency/Config. Trailer Seq.
#104 Extended Emulation Control Seq.

#071 Configuration Lead-In Sequence

This sequence bypasses the normal emulation, and starts a Configuration from the System session.

Value	Description
<any seq.>	Configuration Lead-in Sequence
<empty>	Configuration disabled
*$2E $AF	Factory default sequence

Notes:

1. This sequence will be automatically set when the Extended Emulation Control Sequence is received.
2. This sequence is valid in Extended Emulation Modes 2, 3, 4, and 5. In modes 0 and 1 the sequence will be interpreted as printable characters.
3. This sequence must be entered in DBC character codes or literally, *i.e.* <$2E,$AF> or </%P/> sets The Transparency Lead-In Sequence to '%P'.
4. If this sequence is empty, the Multi-byte transparency is disabled.

Related parameters:

#040 Extended Emulation Mode
#070 Transparency Lead-In Sequence
#072 Transparency/Config. Trailer Seq.
#104 Extended Emulation Control Seq.

#072 Transparency/Configuration Trailer Sequence

This sequence ends a Multi-byte Transparency or Configuration from the System session, and resumes normal emulation.

Value	Description
<any seq.>	Configuration Trailer Sequence
*$2E	Factory default sequence

Notes:

1. This sequence will be automatically set when the Extended Emulation Control Sequence is received.
2. This sequence is valid in Extended Emulation Modes 2, 3, 4, and 5. In modes 0 and 1 the sequence will be interpreted as printable characters.
3. This sequence must be entered in DBC character codes or literally, *i.e.* <$2E> or </%/> sets The Configuration Lead-In Sequence to '%'.
4. Changing this sequence will take immediate effect, *i.e.* the current configuration session must be terminated with the new trailer sequence.
5. Do not empty this sequence. If you do, a Multi-byte Transparency or Configuration from the System session cannot be correctly terminated.

Related parameters:

#040 Extended Emulation Mode
#071 Configuration Lead-In Sequence
#070 Transparency Lead-In Sequence
#104 Extended Emulation Control Seq.

#074 Automatic Orientation

Controls the Automatic Orientation function. The following values can be selected:

Value	Description
*0	Automatic orientation off
1	Letter (8.5" ¥ 11")
2	Legal (8.5" 1 14")
3	A4 (8.27" ¥ 11.69"/297mm 2 210mm)
4	Executive (7.25" 3 10.5")
99	Custom. Auto orientation for Custom size paper. See #075.

Note:

1. If set to 0 (off) orientation is determined by #148.

Related parameters:

#075 Custom Page Size
#148 Orientation

#075 Custom Page Size

User definable paper size used by selection '99' above. A 4-byte hexadecimal sequence is used to set the paper size in 1/300" increments.

Byte no.	Value	Description
1	0-255	High byte, horizontal size
2	0-255	Low byte, horizontal size
3	0-255	High byte, vertical size
4	0-255	Low byte, vertical size

Notes:

1. The default setting is <empty>.
2. If the sequence doesn't contain four bytes, the custom page size defaults to 0 * 0.

Example: To set the custom paper size to 8.5" 10" = 2550 3000 (1/300") decimal = $09F6 $0BB8 hexadecimal, the sequence should be: $09,$F6,$0B,$B8.

#076 6 LPI-COR

#077 8 LPI-COR

Sequences used by the COR (Computer Output Reduction) function to obtain 70% compression of 6 and 8 LPI.

Value	Description
<any seq.>	6/8 COR Lines per Inch sequence

Note:

1. The default value depends on the selected printer.

Related parameter: #148 Orientation

#078 10 CPI-COR

#079 12 CPI-COR

#080 15 CPI-COR

#081 17 CPI-COR

Sequences used by the COR (Computer Output Reduction) function to obtain 13.3/15/20/27 CPI.

Value	Description
<any seq.>	13.3/15/20/27 COR Characters per Inch sequence

Notes:

1. The default value depends on the selected printer driver.
2. If your printer is equipped with different fixed pitch fonts, you might add commands to select default fonts to the Character per Inch sequences.

Related parameter: #148 Orientation

#082 Sheet Feeder 0 Sequence

This sequence is sent to the printer to select paper source.

Value	Description
<any seq.>	Sheet Feeder 0 sequence

Notes:

1. The default sequence depends on the selected printer driver.
2. The Sheet Feeder 0 sequence is sent at power Up and Warm Start if parameter #017, '*Sheet Feeder*', is set to '0'.

Related parameters:

#017 Sheet Feeder

#062 Sheet Feeder 2 Sequence

#061 Sheet Feeder 1 Sequence

#083 Envelope Feeder

This sequence is sent to the printer when Envelope Feeder is selected by the LU-1 (SCS) PPM command.

Value	Description
<any seq.>	Envelope sequence

Note:

1. The default sequence depends on the selected printer driver.

Related parameter:

#017 Sheet Feeder

#093 Bar Code Driver

Selects the driver used for bar code printing.

Value	Description
0	Off
1	IBM Proprinter/Epson FX
2	Epson LQ/Fujitsu DPL24C
8	HP-PCL

Notes:

1. The default value depends on the selected printer driver.
2. If this parameter is set to '0' (Off), an attempt to print bar code data will result in an error message (ERROR NO: BE - BAR CODE ERROR).

Related parameter:

#094 Bar Code Attributes

#094 Bar Code Attributes

Controls the appearance of printed bar code data.

Value	Description
*0	Normal
1	Thin
2	Bold
3	Thin and Bold

Notes:

1. The ‘Thin’ attribute reduces the bar width by 1/120" without affecting the overall width. This attribute is effective only when the horizontal expansion factor is set to ‘2’ or greater, see function #211, page 113.
2. The ‘Bold’ attribute results in a more dense printout by printing the bar code data twice.
3. For the HP-PLC driver the ‘Thin’ attribute reduces the bar width by 1/240" and the ‘Bold’ attribute increases the bar width by 1/360". The ‘Thin and Bold’ attribute has no effect.

Related parameter: #093 Bar Code Driver

#099 Lock Form Length

Controls the emulation of the LU-1 (SCS) SVF/MPL command.

Value	Description
*No	Form Length is set by the LU-1 (SCS) SVF/MPL command
Yes	Form Length is locked to the parameter value.

Related parameter: #001 Form Length

#100 Option Select 3

Controls 8 independent switches. Each bit represents one switch.

Value	Description
$00 - $FF	See switch descriptions below
*$02	Factory default value

Bit 0 ($01): Form Feed within the Print Buffer

Value	Description
*0	FF generates a space
1	No space is generated

Notes:

1. This switch is used in DSC/DSE mode only.
2. This switch emulates an IBM RPQ.

Bit 1 ($02): Form Feed at mode change

Value	Description
0	Generate a Form Feed between DSC/DSE and LU-1 (SCS) buffers
*1	Do not generate a Form Feed

#100 Option Select 3 (continued)

Bit 2 ($04):Valid Form Feed Positions

Value	Description
*0	FF is valid at 1st print position and MPP+1
1	FF is valid anywhere

Notes:

1. This switch is used in DSC/DSE mode only.
2. This switch emulates an IBM RPQ.

Bit 3 ($08): Automatic Function at End of Job

Value	Description
*0	NL is generated at end of print buffer
1	FF is generated at end of print buffer

Notes:

1. This switch is used in DSC/DSE mode only.
2. This switch emulates an IBM RPQ.

Bits 4 - 6 ($10 - $40): Reserved

Bit 7 ($80): Space as delimiter

Value	Description
*0	Spaces can not be used as delimiter in ext. emulation sequences
1	Spaces can be used as delimiter in ext. emulation sequences

#102 Physical Maximum Print Position

Selects the physical paper width for Right-to-Left print mode.

Value	Description
0 - 255	Physical paper width (max. print position)
*132	Factory default value

Notes:

1. This parameter is only active when an Arabic or Hebrew Code Page and ASCII Character Set is selected.

Related parameters:

#003 Maximum Print Position
#005 System Language
#063 ASCII Character Set
#065 Right-to-Left Mode Sequence

#104 Extended Emulation Control Sequence

This sequence starts and stops the Extended Emulation Mode.

Value	Description
<any seq.>	Extended Emulation Control Sequence
*$30 $30 $18 $18	Factory default sequence (&&??)

Notes:

1. This sequence must be entered in DBC character codes or literally *i.e.* $30,$30,$18,$18 corresponds to the characters '&&??'.
2. This sequence must be followed by 3 DBC character codes:
   '&&??%%P' - start Extended Emulation Mode
   '&&??000' - stop Extended Emulation Mode

Related parameters:

#040 Extended Emulation Mode
#041 Escape Character
#070 Transparency Lead-In Sequence
#071 Configuration Lead-In Sequence
#072 Transparency/Config. Trailer Seq.

#110 Lock CPI

Controls the emulation of the LU-1 (SCS) SPD command.

Value	Description
*0	CPI is set by LU-1 (SCS) SPD command
1	CPI is locked to the parameter value

Related parameter:

#004 Character Density

#111 Lock LPI

Controls the emulation of the LU-1 (SCS) SLD command.

Value	Description
*0	LPI is set by LU-1 (SCS) SLD command
1	LPI is locked to the parameter value

Related parameter:

#002 Line Density

#112 Lock Print Quality

Controls the emulation of the LU-1 (SCS) PPM/Q command.

Value	Description
*0	Print Quality is set by LU-1 (SCS) PPM/Q command
1	Print Quality is locked to the parameter value

Related parameter:

#015 Letter Quality

#114 Set Italic Sequence

#115 Exit Italic Sequence

These sequences are sent to the printer to start and stop italic printing.

Value	Description
<any seq.>	Set/Exit Italic Sequence

Notes:

1. The default sequences depend on the selected printer driver.
2. These sequences are not activated by host command.

#116 Set Elongated Sequence

#117 Exit Elongated Sequence

These sequences are sent to the printer to start and stop double width printing.

Value	Description
<any seq.>	Set/Exit Elongated Sequence

Notes:

1. The default sequences depend on the selected printer driver.
2. These sequences are not activated by host command.

#118 Sequence before Hardcopy

#119 Sequence after Hardcopy

These sequences are sent to the printer before/after a Hardcopy print buffer.

Value	Description
<any seq.>	Sequence before/after Hardcopy
*<empty>	Factory default sequence

Notes:

1. Use these sequences to print Hardcopies in a different pitch orientationor from another paper source etc.
2. These sequences are sent *before* an optional Form Feed before/after Hardcopy.

Related parameters: #007 Form Feed before Hardcopy #008 Form Feed after Hardcopy

#120 Bell Sequence

This sequence is sent to the printer to sound the bell.

Value	Description
<any seq.>	Bell Sequence
*$07	Factory default sequence

Note:

1. This sequence is sent after receiving the LU-1 (SCS) BEL command.

#121 Set Simulated Bold Sequence

#122 Exit Simulated Bold Sequence

These sequences are sent to the printer to simulate double strike printing on laser printers by setting/resetting microstep adjustment.

Value	Description
<any seq.>	Set/Exit Simulated Bold Sequence

Notes:

1. The default sequences depend on the selected printer driver.
2. These sequences are sent when a character is printed a second time at the same print position.

#123 Header Text

This sequence is printed on the second line of the Parameter List.

Value	Description
<any seq.>	Header Text
*<empty>	Factory default sequence

Note:

1. Use this sequence to add your own information to the Parameter List header.

#124 Extended Attribute Buffer

Controls the Extended Attribute Buffer (EAB) support as well as the following IBM System Features:

- APL
- Color
- SCS Save/Restore Formats
- DSC/DSE Queries
- Query List
- LU-1 FM Headers

Value	Description
0	EAB and IBM System Features disabled
1	EAB and IBM System Features enabled, APL characters are printed as normal characters.
2	EAB and IBM System Features enabled, APL characters are emulated by PC Set 2 characters.
3	Reserved
4	Reserved

Notes:

1. The default value depends on the selected printer driver.
2. When this parameter is changed, the protocol converters must be restarted to allow the Control Unit to read the new setting.
3. If this parameter is set to '1', ‘2’, '3' or '4', parameter #126, ‘APL Character Set Sequence’ and #125, ‘Normal Character Set Sequence’ are sent before and after APL characters to switch Symbol Sets.

Related parameters: #126 APL Character Set Sequence #125 Normal Character Set Sequence

#126 APL Character Set Sequence

These sequences are sent to the printer to switch symbol sets when printing APL characters.

Value	Description
<any seq.>	Normal/APL Character Set Sequence

Notes:

1. The default sequences depend on the selected printer driver.
2. These sequences are only active when Extended Attribute Buffer (#124) is set to '2'.

Related parameter: #124 Extended Attribute Buffer

#127 Enable Base Color

Controls the Base Color selection.

Value	Description
*Yes	Base Color is set by the Base Color parameter.
No	Base Color is set by the Host application.

Notes:

1. This parameter emulates an IBM printer front panel switch.
2. This parameter is valid in LU-1 (SCS) mode only.

Related parameter: #128 Base Color

#128 Base Color

Controls the interpretation of display colors.

Value	Description
*0	Base Color Black *(default)*
1	Base Color Green

Notes:

1. The table below shows the printout result of the display colors for different Base Color settings:

Displayed color	Printed color	
	Base Color: Black	Base Color: Green
Green	Black	Green
Red	Red	Red
Blue	Blue	Blue
White	Green	Black

2. This parameter emulates an IBM printer front panel switch.
3. This parameter is valid in LU-1 (SCS) mode only.

Related parameters: #127 Enable Base Color #131 Blue Color Sequence #129 Black Color Sequence #132 Red Color Sequence #130 Green Color Sequence

#129 Black Color Sequence

#130 Green Color Sequence

#131 Blue Color Sequence

#132 Red Color Sequence

#133 Magenta Color Sequence

#134 Cyan Color Sequence

#135 Yellow Color Sequence

These sequences are sent to the printer to select color printing.

Value	Description
<any seq.>	Color Sequence
*<empty>	Factory default

Notes:

1. These sequences are sent after receiving the LU-1 (SCS) SA/Color command unless *Extended Attribute Buffer* (#124) is set to '0'.
2. They are also sent after receiving a DSC/DSE Base Buffer Attribute if *Highlight* (#019) is set to '3'.
3. The printed colors may differ from the IBM colors depending on the color ribbon.
4. These sequences are sent when printing GDDM in color. (*GDDM Color* #143 set to 1 or 2).

Related parameters:

#019 Highlight
#128 Base Color
#124 Extended Attribute Buffer (EAB)

#136 PC-Host Time-out

Does not apply to the AXIS 370 Cobra.

A timer value controlling the automatic switching between PC and Host input.

Value	Description
0 - 255	Valid range
0	Host input only
*10	10 seconds delay *(default)*
254	254 seconds delay (maximum)
255	PC serial input only

Note:

1. When an input gains control the other inputs will be held busy until the PC-Host Time-out has expired.

Related parameters:

#137 PC-Host Sequence
#152 PC-Host TOF Sequence
#138 Host-PC Serial Sequence
#154 Resend Host-PC Sequence
#141 Host-PC Parallel Sequence

#137 PC-Host Sequence

Does not apply to the AXIS 370 Cobra.

Sent before a System Print Buffer preceded by a PC Serial or PC Parallel printout.

Value	Description
*<empty>	No sequence is sent *(default)*
<any seq.>	Printer control commands

Related parameters:

#136 PC-Host Time-out
#138 Host-PC Serial Sequence
#141 Host-PC Parallel Sequence
#152 PC-Host TOF Sequence
#154 Resend Host-PC Sequence

#138 Host - PC Serial Sequence

Does not apply to the AXIS 370 Cobra.

Sent before a PC Serial printout preceded by a System Print Buffer or PC Parallel printout.

Value	Description
*<empty>	No sequence is sent *(default)*
<any seq.>	Printer control commands

Related parameters:

#136 PC-Host Time-out
#137 PC-Host Sequence
#141 Host-PC Parallel Sequence
#152 PC-Host TOF Sequence
#154 Resend Host-PC Sequence

#139 End of Job Time-out

Controls the End of Job function.

Value	Description
*0	End of Job function disabled *(default)*
1 - 255	Time-out value in seconds

Notes:

1. Parameter #140 (End of Job Sequence) is sent if no Print Buffer is received within the specified time.
2. Parameter #151 (Start of Job Sequence) is sent when a Print Buffer is received after the End of Job Time-out has expired.

Related parameters:

#140 End of Job Sequence
#151 Start of Job Sequence

#140 End of Job Sequence

Sent to the printer if no Print Buffer is received for a specified amount of time.

Value	Description
<any seq.>	Printer control commands
*<empty>	No sequence is sent *(default)*

Note:

1. This sequence is sent when the timer value specified by *End of Job Time-out* (#139) has expired.

Related parameters:

#139 End of Job Time-out

#151 Start of Job Sequence

#141 Host-PC Parallel Sequence

Does not apply to the AXIS 370 Cobra.

Sent before a PC Parallel printout preceded by a System Print Buffer or a PC Serial printout.

Value	Description
<any seq.>	Printer control commands
*<empty>	No sequence is sent *(default)*

Related parameters:

#136 PC-Host Time-out

#137 PC-Host Sequence

#138 Host-PC Serial Sequence

#152 PC-Host TOF Sequence

#154 Resend Host-PC Sequence

#142 GDDM Support

Selects Programmable Symbols graphics driver. Supports IBM 3287-2C programmable symbols and color.

Value	Description
*0	Off *(default)*
1	Fujitsu DPL24C
2	Epson/Proprinter
3	HP LaserJet
4	HP LaserJet 2/3 size

Notes:

1. Select ‘1’ for the Fujitsu DL series printers.
   Select ‘2’ for Epson and Proprinter emulating printers.
   Select ‘3’ for HP LaserJet full size.
   Select ‘4’ for HP LaserJet reduced size.
2. The HP LaserJet drivers require HP PCL level 4.
   A 2 MB memory expansion board is recommended.
3. *Extended Attribute Buffer* (#124) must be ‘1’ or ‘2’ when GDDM Support is used.
4. When this parameter is changed, the protocol converters must be restarted.
5. When GDDM is selected the free string area is reduced by approximately 13kb

Related parameters:

#124 Extended Attribute Buffer (EAB)
#143 GDDM Color
#147 Graphic Line Feed Sequence
#153 Graphics Orientation
#155 String before GDDM
#156 String after GDDM

#143 GDDM Color

Selects Color or Monochrome GDDM graphics.

Value	Description
*0	Monochrome *(default)*
1	Four colors
2	Seven colors

Note:

1. When set to 1 or 2, the *Color Sequences* (#129 - #135) are sent to the printer to produce color graphics.

Related parameters:

#142 GDDM Driver
#129 - #135 Color Sequences

#147 Graphic Line Feed Sequence

Used by the Programmable Symbols graphics driver to advance the paper.

Value	Description
<any seq.>	Printer control commands

Note:

1. The default sequence depends on the selected Printer Driver.

Related parameter:

#142 GDDM Support

#148 Orientation

Controls the orientation when auto orientation is disabled, or when the calculated page size doesn't fit the calculated page size.

Value	Description
*0	Portrait *(default)*
1	Landscape
2	COR (Computer Output Reduction)

Note:

1. The Auto Orientation/COR function will not work properly under the following conditions:
   - Form Length (#001) is set to '0'
   - Line Density (#002) is set to '0'
   - Maximum Print Position (#003) is set to '0'
   - Character Density (#004) is set to '0', '5', or '99'
   - Suppress Control Codes (#010) is set to 'Yes'
   - Lock MPP (#066, bit 3) is set to '1'
   - Lock Form Length (#099) is set to 'Yes'
   - Lock CPI (#110) is set to 'Yes'
   - Lock LPI (#111) is set to 'Yes'
   - Page formatting is modified by extended emulation sequences

Related parameters:

#074 Automatic Orientation
#075 Custom Page Size
#076 6 LPI - COR
#077 8 LPI - COR
#078 10 CPI -COR
#079 12 CPI - COR
#080 15 CPI - COR
#081 17 CPI - COR
#149 Portrait Sequence
#150 Landscape Sequence

#149 Portrait Sequence

Sent to the printer to select Portrait orientation.

Value	Description
<any seq.>	Printer control commands
<empty>	No sequence is sent

Notes:

1. The default sequence depends on the selected Printer Driver.
2. This sequence is sent at Power Up and Warm Start if *Orientation* (#148) is set to '0' (Portrait).

Related parameters:

#148 Orientation
#150 Landscape Sequence

#150 Landscape Sequence

Sent to the printer to select Landscape orientation.

Value	Description
<any seq.>	Printer control commands
<empty>	No sequence is sent

Notes:

1. The default sequence depends on the selected Printer Driver.
2. This sequence is sent at Power Up and Warm Start if *Orientation* (#148) is set to '1' (Landscape).

Related parameters:

#148 Orientation

#149 Portrait Sequence

#151 Start of Job Sequence

Sent to the printer when a Print Buffer is received after a specified amount of time.

Value	Description
<any seq.>	Printer control commands
*<empty>	No sequence is sent *(default)*

Note:

1. This sequence is sent when a Print Buffer is received after the timer value specified by *End of Job Time-out* (#139) has expired.

Related parameters:

#139 End of Job Time-out

#140 End of Job Sequence

#152 PC-Host TOF Sequence

Does not apply to the AXIS 370 Cobra.

The PC-Host TOF String is sent when the PC printout did not finish with a Form Feed.

Value	Description
<any seq.>	Printer control commands
*$0C	Factory default

Note:

1. If your PC-printout ends with an other command (*e.g.* Printer Reset), you can empty this sequence to avoid empty forms

Related Parameters:

#136 PC-Host Time-out

#137 PC-Host Sequence

#138 Host-PC Serial Sequence

#141 Host-PC Parallel Sequence

#154 Resend Host_PC Strings

#153 Graphics Orientation

Controls the orientation of GDDM graphics.

Value	Description
*0	Same as text (default)
1	Portrait
2	Landscape

Related Parameters:

#148 Orientation

#149 Portrait Sequence

#150 Landscape Sequence

#154 Resend Host_PC Strings

Does not apply to the AXIS 370 Cobra.

Controls the resending of the Host-PC Serial/Parallel string after the PC-Host Time-out has elapsed, even if the data comes from the same PC input. Used to make sure the printer is correctly set before the next PC printout begins.

Value	Description
*No	Don't resend Host-PC string (default)
Yes	Resend Host-PC Serial or Parallel string

Note: The string is not sent before new data is present.

Related parameters

#136 PC-Host Time-out

#137 PC-Host Sequence

#138 Host-PC Serial Sequence

#141 Host-PC Parallel Sequence

#152 PC-Host TOF Sequence

#155 String before GDDM

String sent to the printer before GDDM printouts.

Value	Description
<any seq.>	Printer control commands

Related parameters

#142 GDDM Support

#156 String after GDDM

String sent to the printer after GDDM printouts.

Value	Description
<any seq.>	Printer control commands

Related parameters

#142 GDDM Support

#157 Disconn. if Power off

Applies to AXIS 370 Cobra only.

Controls the disconnection of the AXIS 370 if the printer is turned off. This is only valid when an external power supply is used. This function may not work with some printers.

Value	Description
*No	Keep host connected (default)
Yes	Disconnect if printer is off

#158 Xerox Font and Graphics

Applies to the AXIS 370 Cobra only.

Controls 8 independent switches. Each bit represents on switch.

Value	Description
$00 - $FF	See switch description below
*$00	Factory default value

Bit 0 ($01):	Enable Xerox Graphic Window Support
*0	Don't handle Graphic Windows
1	Handle Graphic Windows

Bit 1 ($02):	Use special character translation table for Graphic Window
*0	Use character translation table selected by #063
1	Use special Xerox font and graphics character translation table.

Bits 2-3 ($04-$08): Reserved

Bit 4 ($10):	Enable Xerox EBCDIC font Downloading
*0	Don't handle EBCDIC font downloading
1	Handle EBCDIC font downloading

Bit 5 ($20):	Use special character translation table foe Xerox EBCDIC-fonts
*0	Use character translation table selected by #063
1	Use special Xerox font and graphics character translation table. Recommended.

Bits 6-7 ($40-$80): Reserved

Example If you are using downloaded Xerox EBCDIC fonts but not the Xerox Graphic Windows, set #158 to $30.

If you are using downloaded Xerox EBCDIC fonts and Xerox Graphic Windows, set #158 to $33.

If you are using Xerox Graphic Windows without graphic data being translated using the special Xerox font and graphics character translation table, set #158 to $01.

SECTION 10

INTERNAL FUNCTIONS

This section contains a summary of the internal functions available in the protocol converter. The general syntax for function calls is described on page 37. An internal function call is only valid within a configuration sequence, as described on page 37.

Many of the internal functions are also accessible from the ‘Configuration from a Terminal’ described in the User’s Manual.

#105 Reserved

#106 Edit DBC to ASCII table

See function #205. Function #106 is available for compatibility only, and should not be used.

#107 Test functions

See function #207. Function #107 is available for compatibility only, and should not be used.

#108 Reserved

#109 Edit User Definable Strings (UDS)

See function #209. Function #109 is available for compatibility only, and should not be used.

#204 Edit EBCDIC to DBC Translation Table

This function allows you to modify the current EBCDIC to DBC translation table, analogous to the ‘View/Edit EBCDIC to DBC table’ entry in the Character Translation Menu.

Syntax:

```
=204,<EP>,<DV>
```

- <EP> is the EBCDIC to DBC table position.
- <DV> is the DBC Character Code value.

Notes:

1. The EBCDIC to DBC table positions range from $40 to $FF.
2. Changing the System Language overrides all table modifications.

#205 Edit DBC to ASCII Translation Table

This function allows you to modify the current DBC to ASCII translation table, analogous to the 'View/Edit DBC to ASCII table' entry in the Character Translation Menu.

Syntax: `=<DP>,<AV1>[,<AV2>,...<AVn>]`

- <DP> is the DBC to ASCII table position.
- <AV_1> through <AV_n> are ASCII Character Code values.

Notes:

1. The DBC to ASCII table positions range from $00 to $FF.
2. Positions $C0 through $FF are available in LU-1 (SCS) mode only.
3. Changing the System Language overrides all table modifications.
4. See also page 46.

#206 Edit DBC to ASCII APL Translation Table

This function allows you to modify the DBC to ASCII APL translation table. Syntax and notes are the same as for function #205.

#207,1 Print test functions and Printer Drivers

Produces a list of the available test functions and Printer Drivers.

#207,6 Reserved

#207,7 HPGL Line

Line sent to HP 7475/7550 compatible plotters to test communication.

#207,8 HPGL Loop

Repeated lines sent to HP 7475/7550 compatible plotters to test communication. Exited by turning the rotary switch to '9' and back.

#207,9 Initialize Printer

See function #207,10. Function #207,9 is available for compatibility only, and should not be used.

#207,10 Initialize Printer

This function performs a Warm Start, *i.e.* all current Control Commands, such as Form Length, CPI, and LPI, are sent to the printer.

#207,12 Save Current Configuration

This function saves the current configuration (*i.e.* the complete parameter list plus all User Definable Strings and String Substitutions) permanently. It is equal to the 'Save' entry in the Main Menu.

#207,13 Set System Hex Dump Mode

This function sets the protocol converter in System Hex Dump mode, *i.e.* all subsequent data is printed as EBCDIC/DBC hexadecimal values. It is equal to selecting rotary switch position 4 in Test Mode.

Normal print operation is resumed by power off/power on or by turning the rotary switch to '9' and back.

#207,14 Print the Parameter List

This function prints the complete parameter list plus all non-empty User Definable Strings and String Substitutions. It is equal to the 'Print Parameter List' entry in the Main Menu.

#207,15 Print DBC to ASCII Table

This function prints the DBC to ASCII translation table. It is equal to the 'Print DBC to ASCII table' entry in the Character Translation Menu.

#207,16 Print EBCDIC to ASCII Table

This function prints the EBCDIC to ASCII translation table. It is equal to the 'Print EBCDIC to ASCII table' entry in the Character Translation Menu.

#207,17 Print DBC to ASCII Table (hex)

This function prints the DBC to ASCII translation table as hexadecimal values. It is equal to the 'Print DBC to ASCII table (hex)' entry in the Character Translation Menu.

#207,18 Print EBCDIC to ASCII Table (hex)

This function prints the EBCDIC to ASCII translation table as hexadecimal values. It is equal to the 'Print EBCDIC to ASCII table (hex)' entry in the Character Translation Menu.

#207,20 Reserved

#207,21 Print EBCDIC to DBC Table (hex)

This function prints the EBCDIC to DBC translation table as hexadecimal values. It is equal to the 'Print EBCDIC to DBC table (hex)' entry in the Character Translation Menu.

#207,22 Exit ASCII Hex Dump Mode

This function resets the PCIA or ASCII Hex Dump Mode started by function #207,23 or #207,25 and resumes normal print operation.

#207,23 Set PCIA Hex Dump Mode

This function sets the protocol converter in PCIA Hex Dump mode. In this mode the PCIA data is printed as hexadecimal values, while print data is unaffected.

Normal print operation is resumed by function #207,22.

#207,25 Set ASCII Hex Dump Mode

This function sets the protocol converter in ASCII Hex Dump mode, *i.e.* all subsequent data is printed as ASCII hexadecimal values. It is equal to selecting rotary switch position 3 in Test Mode. PC-Host sharing is disabled when in ASCII Hex Dump mode.

Normal print operation is resumed by function #207,22.

#207,30 - 69 Load Printer Driver

This function loads a new printer driver, overriding the current configuration. It is equal to selecting a new entry in the Basic Configuration, Printer Driver Menu. See section 8 for a list of available drivers.

Selecting driver 30 ,Generic Printer, is the same as 'Set Factory Defaults' in the Main Menu or using the rotary switch.

If an undefined Printer Driver is specified, the Generic Printer Driver (30) will be loaded.

#207,70 - 81 Reserved

#207,82 Dump contents of RAM to printer

Advanced problem-solving.

#207,83 Dump contents of the permanent memory to printer

Advanced problem-solving.

#207,85 Dump Coax RAM to printer

Dumps the contents of the 4k coax buffer including the PCIA. Advanced problem-solving.

#207,86 Reserved

#207,87 Reserved

#207,90 Reserved

#207,99 Reset

Soft reset of the protocol converter. Equivalent to power on/off of the protocol converter. Note that host communication will be temporarily lost.

#207,108 Set Factory Defaults

Function #207,108 is available for compatibility only, and should not be used.

#207,109 Print User Defined Strings

Prints the user defined strings (as defined by function #209).

#207,115 Print DBC to ASCII APL Table

This function prints the DBC to ASCII APL translation table.

#207,116 Print EBCDIC to ASCII APL Table

This function prints the EBCDIC to ASCII APL translation table.

#207,117 Print DBC to ASCII APL Table (hex)

This function prints the DBC to ASCII APL translation table as hexadecimal values.

#207,118 Print EBCDIC to ASCII APL Table (hex)

This function prints the EBCDIC to ASCII APL translation table as hexadecimal values.

#207,121 Print EBCDIC to DBC APL Table (hex)

This function prints the EBCDIC to DBC APL translation table as hexadecimal values.

#207,200 Reserved

#207,210 Reserved

#207,215 Print DBC to ASCII CECP Table

This function prints the DBC to ASCII CECP translation table.

#207,217 Print DBC to ASCII CECP Table (hex)

This function prints the DBC to ASCII CECP translation table as hexadecimal values.

#207,220 Reserved

#207,221 Reserved

#207,230 Reserved

#207,231 Print firmware header

This function prints firmware revision information.

#207,232 Print current Printer Driver

This function prints name and number of current printer driver.

#207,238 Print Test Page

This function prints the test page. (Same as rotary switch position 8.)

#207,254 Wait until printer is ready

This function waits until the printer is ready. This can be useful with some printers before making internal test printouts.

#209 Edit User Definable Strings (UDS)

This function lets you program and delete the User Definable Strings, analogous to the User Definable Strings Menu.

Syntax, program

```
=209,$<SN>,<HV1>[<HV2>...<HVn>]
```

or

```
=209,$<SN>,"<AS>"
```

Syntax, delete:

```
=209,$<SN>
```

- <SN>is the string number, range $01 through $FF.
- <HV_1> through <HV_n> are ASCII character codes in hexadecimal format.
- <AS> is a sequence of ASCII characters.

Notes:

1. Quoted space characters are ignored. To insert spaces in a UDS, use the hexadecimal format ($20).
2. If the specified UDS already exists, it will be overwritten by the new data.
3. If the string number isn't followed by data, the specified UDS will be deleted.
4. If the string number is zero, all UDS will be deleted.
5. All UDS are deleted when a new printer driver is loaded, or when factory defaults are set.
6. All non-empty UDS are saved permanently by function #207,12.

#210 Edit String Substitutions

This function lets you program and delete Match Strings and Substitute Strings, analogous to the String Substitution Menu.

Syntax, program:

```
=210,$<SN>,<HV1>[<HV2>...<HVn>]
```

or

```
=210,$<SN>,"<AS>"
```

Syntax, delete

```
=210,$<SN>
```

- <SN>is the string number, in the range $01 through $FF, where odd numbers are Match Strings, and even numbers are Substitute Strings.
- <HV_1> through <HV_n> are ASCII character codes in hexadecimal format.
- <AS> is a sequence of ASCII characters.

Notes:

1. Quoted space characters are ignored. To insert spaces, use the hexadecimal format ($20).
2. The maximum Match String length is 50 bytes, while the Substitute String length is limited only by the Free String Area.
3. If the specified string already exists, it will be overwritten by the new data.
4. If the string number isn't followed by data, the specified string will be deleted.
5. If the string number is zero, all strings will be deleted.
6. All strings are deleted when a new printer driver is loaded, or when factory defaults are set.
7. All non-empty strings are saved permanently by function #207,12.

#211 Define Bar Code

This function specifies the Bar Code type and size for subsequent Bar Code printouts.

Syntax: `=211,<BT>,<MW>,<BH>,<RT>,<HP>`

- <BT> is the Bar Code Type.
- <MW> is the Module Width in multiples of 1/120".
- <BH> is the Bar Code Height in multiples of 1/6".
- <RT> Human Readable Text.
- <HP> is the Horizontal Start Position in multiples of 1/12".

Valid selections for Bar Code Type (BT)*:*

Value	Description
1	Code 39
3	UPC-A
8	EAN 8
9	EAN 13
12	2 of 5 Interleaved
13	Codabar Matrix
*17	Code 128

***Applies to the AX-7 Cobra + and the Axis 370 Cobra only.**

Valid selections for Module Width (MW) in multiples of 1/120":

Value	Description
1 - 32	Minimum Module Width 1/120", maximum Module Width 32/120"

Valid selections for Bar Code Height (BH) in multiples of 1/6":

Value	Description
1 - 32	Minimum Bar Code Height 1/6", maximum Bar Code Height 32/6"

Valid selections for Human Readable Text (RT):

Value	Description
0	No text
1	Text immediately below bar code
2	Text below bar code with a blank line between

Valid selections for Horizontal Start Position (HP) in multiples of 1/12":

Value	Description
1 - 255	Leftmost Start Position 1/12", rightmost Start Position 255/12"

#212 Print Bar Code Data

This function prints bar code data as specified by function #211.

Syntax:

```
=212,"LS"
```

- <LS> is a sequence of ASCII characters containing the bar code data.

Note:

1. Quoted space characters are ignored. To insert spaces, use the hexadecimal format ($20). Example: =212,"AXIS",$20,"INC" gives the bar code data for "AXIS INC".

SECTION 11

CHARACTER TABLES

This section contains the following character tables:

ASCII Symbol Sets:

DBC Base Character Set

Hex Digits 1st → 2nd ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	NUL		0	&	à	ä	À	Ä	a	q	A	Q		ð		Ð
-1	EM	=	1	-	è	ë	È	Ë	b	r	B	R		þ		Þ
-2	FF	'	2	.	ì	ï	Ì	Ï	c	s	C	S		ý		Ý
-3	NL	"	3	,	ò	ö	Ò	Ö	d	t	D	T				
-4		/	4	:	ù	ü	Ù	Ü	e	u	E	U				
-5	CR	\	5	+	ã	â	Ã	Â	f	v	F	V	¹	±		
-6		ǀ	6	¬	õ	ê	Õ	Ê	g	w	G	W	²	÷		
-7		¦	7	¯	ÿ	î	Y	Î	h	x	H	X	³	×		
-8	>	?	8	°	à	ô	A	Ô	i	y	I	Y	½	·		
-9	<	!	9	˅	è	û	E	Û	j	z	J	Z	¼	«		
-A	[	$	ß	^	é	á	E	Á	k	æ	K	Æ	¾	»		
-B	]	¢	§	˜	ì	é	I	É	l	ø	L	Ø	º	¿		
-C	)	£	#	¨	ò	í	O	Í	m	å	M	Å	ª	¡		
-D	(	¥	@	`	ù	ó	U	Ó	n	ç	N	Ç	¶	µ		
-E	}	Pts	%	´	ü	ú	Y	Ú	o	;	O	;	®			
-F	{	¤	_	¸	ç	ñ	C	Ñ	p	*	P	*	©			

Note: 1. The codes above $BF are only available for LU-1 (SCS) mode EBCDIC to DBC translation.

DBC CECP Character Set

Hex Digits 1st → 2nd ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	NUL		0	&	à	ä	À	Ä	a	q	A	Q		ð		Ð
-1	÷	=	1	-	è	ë	È	Ë	b	r	B	R		þ		Þ
-2		'	2	.	ì	ï	Ì	Ï	c	s	C	S		ý		Ý
-3	-	"	3	,	ò	ö	Ò	Ö	d	t	D	T				
-4	¼	/	4	:	ù	ü	Ù	Ü	e	u	E	U				
-5	¾	\	5	+	ã	â	Ã	Â	f	v	F	V	¹	±		
-6	®	l	6	¬	õ	ê	Õ	Ê	g	w	G	W	²	÷		
-7	©	¦	7	¯	ÿ	î	±	Î	h	x	H	X	³	×		
-8	>	?	8	°	þ	ô	Þ	Ô	i	y	I	Y	½	·		
-9	<	!	9	µ	ð	û	Ð	Û	j	z	J	Z	¼	«		
-A	[	$	ß	^	«	á	½	Á	k	æ	K	Æ	¾	»		
-B	]	¢	§	¯	¹	é	¿	É	l	ø	L	Ø	º	¿		
-C	)	£	#	¨	»	í	¡	Í	m	å	M	Å	ª	¡		
-D	(	¥	@	`	¶	ó	ª	Ó	n	ç	N	Ç	¶	µ		
-E	}	·	%	´	ý	ú	Ý	Ú	o	²	O	;	®			
-F	{	¤	_	¸	×	ñ	º	Ñ	p	³	P	*	©			

Notes:

1. This table is only available for the IBM 4224 emulation.
2. The light shaded areas are DSC/DSE CECP characters.
3. The codes above $BF are only available for LU-1 (SCS) mode EBCDIC to DBC translation.

Code Page number 037

English (US), Netherlands, Portuguese, and Canadian Bilingual

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	°	µ	~	{	}	\	0
-1		é	/	É	a	j	~	£	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	ä	ë	Ä	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	§	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	ß	Ñ	`	i	r	z	¾	I	R	Z	9
-A	¢	!	¦	:	«	ª	¡	[	-	¹	²	³
-B	.	$	,	#	»	º	¿	]	ð	û	Ô	Û
-C	<	*	%	@	ð	æ	Ð	¯	ô	ü	Õ	Ü
-D	(	)	_	'	ý	¸	Ý	¨	ò	ù	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F	±	¬	?	"	±	¤	®	×	õ	ÿ	Õ	

Notes:

1. This is the default system language.
2. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
3. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 260 — Canadian French

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	°	µ	¢	é	è	.	0
-1		é	/	É	a	j	~	£	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	ä	ë	Ä	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	§	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	ß	Ñ	`	i	r	z	¾	I	R	Z	9
-A	à	´	ù	:	«	ª	¡	¬	-	¹	²	³
-B	.	$	,	#	»	º	¿	!	ô	û	Ô	Û
-C	<	*	%	@	ð	æ	Ð	¨	ö	ü	Ö	Ü
-D	(	)	_	'	ý	¸	Ý	¨	ò	ù	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F	!	^	?	"	±	¤	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 273 Austrian/German

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	°	µ	¢	â	û	Ô	0
-1		é	/	É	a	j	ß	£	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	{	ë	[	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	@	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	¨	Ñ	`	i	r	z	¾	I	R	Z	9
-A	Ä	Ü	ô	:	«	ª	¡	¬	-	¹	²	³
-B	.	$	,	#	»	º	¿	!	ô	û	Ô	Û
-C	<	*	%	§	ð	æ	Ð	¯	¦	}	\	]
-D	(	)	_	'	ý	¸	Ý	¨	ò	ù	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F	!	^	?	"	±	¤	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 275 Brazilian

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	°	µ	¢	ô	é	\	0
-1		}	/	[	a	j	~	£	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	ä	ë	Ä	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	§	E	N	V	5
-6	^	î	@	Î	f	o	w	¶	F	O	W	6
-7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
-8	;	ì	]	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	ß	Ñ	ã	i	r	z	¾	I	R	Z	9
-A	É	$	ç	:	«	ª	!	¬	-	¹	²	³
-B	.	Ç	,	Õ	»	º	¿	¦	ô	û	Ô	Û
-C	<	*	%	Ã	ð	æ	Ð	¯	ö	ü	Ö	Ü
-D	(	)	_	'	ý	¸	Ý	¨	ò	ù	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F	!	^	?	"	±	¤	®	×	{	ÿ	#	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 277 — Danish/Norwegian

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	¦	@	°	µ	¢	æ	å	\	0
-1		é	/	É	a	j	ü	£	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	ä	ë	Ä	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	§	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	}	ï	$	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	ß	Ñ	`	i	r	z	¾	I	R	Z	9
-A	#	¤	ø	:	«	ª	¡	¬	-	¹	²	³
-B	.	Å	,	Æ	»	º	¿	!	ô	û	Ô	Û
-C	<	*	%	Ø	õ	[	Ð	~	ö	~	Ö	Ü
-D	(	)	_	'	ý	,	Ý	¨	ò	ù	Ò	Ù
-E	+	;	>	=	þ	]	Þ	´	ó	ú	Ó	Ú
-F	!	^	?	"	±	]	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 278 Swedish/Finnish

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	°	µ	¢	ă	å	É	0
-1		`	/	\	a	j	ü	£	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	{	ë	#	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	[	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	}	ï	$	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	ß	Ñ	é	i	r	z	¾	I	R	Z	9
-A	§	¤	ó	:	«	ª	¡	¬	-	¹	²	³
-B	.	Å	,	Ä	»	º	¿	!	ô	û	Ô	Û
-C	<	*	%	Ö	ð	æ	Ð	¯	¦	¯	@	Ü
-D	(	)	_	'	ý	¸	Ý	¨	ò	ù	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F	!	^	?	"	±	]	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 280 — Italian

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	[	µ	¢	à	è	ç	0
-1		]	/	É	a	j	]	#	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	ä	ë	Ä	Ë	c	l	t	·	C	L	T	3
-4	{	}	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	@	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
-8	\	~	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	ß	Ñ	ù	i	r	z	¾	I	R	Z	9
-A	°	é	ò	:	«	ª	¡	¬	-	¹	²	³
-B	.	$	,	£	»	º	¿	!	ô	û	Ô	Û
-C	<	*	%	§	ð	æ	Ð	¨	ö	ü	Ö	Ü
-D	(	)	_	'	ý	ª	Ý	¨	¦	`	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F	!	^	?	"	±	¤	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 281 Japanese English

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	°	µ	¢	{	}	$	0
-1		é	/	É	a	j	~	[	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	\	B	K	S	2
-3	ä	ë	Ä	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	§	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	ß	Ñ	`	i	r	z	¾	I	R	Z	9
-A	£	!	¦	:	«	ª	¡	^	-	¹	²	³
-B	.	¥	,	#	»	º	¿	]	ô	û	Ô	Û
-C	<	*	%	@	ð	æ	Ð	¨	ö	ü	Ö	Ü
-D	(	)	_	'	ý	¸	Ý	¯	ò	ù	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F		¬	?	"	±	¤	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 284 Spanish and Spanish Speaking

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	°	µ	¢	{	}	\	0
-1		é	/	É	a	j	~	£	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	ä	ë	Ä	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	§	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	¦	ß	#	`	i	r	z	¾	I	R	Z	9
-A	[	]	ñ	:	«	ª	¦	^	-	¹	²	³
-B	.	$	,	Ñ	»	º	¿	!	ô	û	Ô	Û
-C	<	*	%	@	ð	æ	Ð	¯	ö	ü	Ö	Ü
-D	(	)	_	'	ý	¸	Ý	¨	ò	ù	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F	|	¬	?	"	±	¤	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 285 English (UK)

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	°	µ	¢	{	}	\	0
-1		é	/	É	a	j	~	[	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	ä	ë	Ä	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	§	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	ß	Ñ	`	i	r	z	¾	I	R	Z	9
-A	$	!	¦	:	«	ª	¡	^	-	¹	²	³
-B	.	£	,	#	»	º	¿	]	ô	û	Ô	Û
-C	<	*	%	@	ð	æ	Ð	¨	ö	ü	Ö	Ü
-D	(	)	_	'	ý	¸	Ý	¯	ò	ù	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F	¦	¬	?	"	±	¤	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 286 Austrian/German alt

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	°	µ	¢	ă	ű	Ő	0
-1		é	/	É	a	j	ß	£	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	{	ë	[	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	@	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	¨	Ñ	`	i	r	z	¾	I	R	Z	9
-A	ð	ú	ßð	:	«	ª	¡	¬	-	¹	²	³
-B	.	Ú	,	Ă	»	º	¿	ł	ô	û	Ô	Û
-C	<	*	%	Ó	ð	æ	Đ	¯	¦	}	Ó	Ű
-D	(	)	_	'	ý	‚	Ý	¨	ò	ù	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F	ł	¬	?	ă	±	¤	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 287 Danish/Norwegian alt

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	!	@	°	µ	¢	æ	å	\	0
-1		é	/	É	a	j	ü	£	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	ä	ë	Ä	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	§	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	}	ï	$	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	ß	Ñ	`	i	r	z	¾	I	R	Z	9
-A	ø	å	¦	:	«	ª	¦	¬	-	¹	²	³
-B	.	Å	,	Æ	»	º	¿	¦	ô	û	Ô	Û
-C	<	*	%	Ø	ð	{	Ð	¯	õ	¯	Ö	Ü
-D	(	)	_	'	ý	‚	Ý	¨	ò	ù	Ò	Ù
-E	+	;	>	=	þ	[	Þ	´	ó	ú	Ó	Ú
-F	¦	¬	?	æ	±	]	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 288 Swedish/Finnish alt

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	°	µ	¢	ã	å	É	0
-1		`	/	\	a	j	ü	£	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	{	ë	#	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	[	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	}	ï	$	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	ß	Ñ	é	i	r	z	¾	I	R	Z	9
-A	õ	å	¦	:	«	ª	ì	¬	-	1	2	3
-B	.	Å	,	Ä	»	º	¿	]	ô	û	Ô	Û
-C	<	*	%	Õ	õ	æ	Ð	¯	¦	^	@	Ü
-D	(	)	_	'	ý	¸	Ý	¨	ò	ù	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F	¦	¬	?	å	±	]	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 289 — Spanish alt

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	°	µ	¢	{	}	\	0
-1		é	/	É	a	j	~	£	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	ä	ë	Ä	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	§	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	¦	ß	#	`	i	r	z	¾	I	R	Z	9
-A	¢	!	¦	:	«	ª	¡	^	-	¹	²	³
-B	.	$	,	Ñ	»	º	¿	!	ô	û	Ô	Û
-C	<	*	%	@	ð	æ	Ð	¯	ö	ü	Ö	Ü
-D	(	)	_	'	ý	¸	Ý	¨	ò	ù	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F		¬	?	ñ	±	¤	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 297 French and French AZERTY

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	[	`	¢	é	è	ç	0
-1		{	/	É	a	j	~	#	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	ä	ë	Ä	Ë	c	l	t	.	C	L	T	3
-4	@	}	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	]	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
-8	\	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	ß	Ñ	µ	i	r	z	¾	I	R	Z	9
-A	º	§	ù	:	«	ª	¡	¬	-	¹	²	³
-B	.	$	,	£	»	º	¿	!	ô	û	Ô	Û
-C	<	*	%	à	ð	æ	Ð	¯	ö	ü	Ö	Ü
-D	(	)	_	'	ý	¸	Ý	¨	ò	¦	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F	!	^	?	"	±	¤	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

Code Page 500 International Set 5, New Swiss French, and Belgian

Hex Digits 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		&	-	ø	Ø	°	µ	¢	{	}	\	0
-1		é	/	É	a	j	~	£	A	J	÷	1
-2	â	ê	Â	Ê	b	k	s	¥	B	K	S	2
-3	ä	ë	Ä	Ë	c	l	t	·	C	L	T	3
-4	à	è	À	È	d	m	u	©	D	M	U	4
-5	á	í	Á	Í	e	n	v	§	E	N	V	5
-6	ã	î	Ã	Î	f	o	w	¶	F	O	W	6
-7	å	ï	Å	Ï	g	p	x	¼	G	P	X	7
-8	ç	ì	Ç	Ì	h	q	y	½	H	Q	Y	8
-9	ñ	ß	Ñ	`	i	r	z	¾	I	R	Z	9
-A	[	]	¦	:	«	ª	¡	¬	-	¹	²	³
-B	.	$	,	#	»	º	¿	¦	ô	û	Ô	Û
-C	<	*	%	@	ð	æ	Ð	¯	ö	ü	Ö	Ü
-D	(	)	_	'	ý	¸	Ý	¨	ò	ù	Ò	Ù
-E	+	;	>	=	þ	Æ	Þ	´	ó	ú	Ó	Ú
-F	!	^	?	"	±	¤	®	×	õ	ÿ	Õ	

Notes:

1. The light shaded areas are CECP characters. They are only available if the CECP feature is supported by your IBM system.
2. The dark shaded areas are the language dependent characters that differs from the default system language (Code Page 037).

PC Set 2 (Code Page 437) ASCII Symbol Set

Hex Digits 1st → 2nd ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0				0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
-1			!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	β	±
-2			"	2	B	R	b	r	é	Æ	ó	▒	┬	╥	Γ	≥
-3			#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
-4			$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
-5			%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
-6			&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
-7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
-8			(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
-9			)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	θ	·
-A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
-B			+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
-C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	ⁿ
-D			-	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ	²
-E			.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	∈	■
-F			/	?	O	_	o	⌂	Å	ƒ	»	┐	╧	▀	∩	

Note: 1. This is the most common 8 bit symbol set.

PC-850 (Code Page 850) ASCII Symbol Set

Hex Digits 1st → 2nd ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0				0	@	P	`	p	Ç	É	á	░	└	ð	Ó	-
-1			!	1	A	Q	a	q	ü	æ	í	▓	┴	Đ	ß	±
-2			"	2	B	R	b	r	é	Æ	ó	▒	┬	Ê	Ô	‗
-3			#	3	C	S	c	s	â	ô	ú	│	├	Ë	Ò	¾
-4			$	4	D	T	d	t	ä	ö	ñ	┤	─	È	õ	¶
-5			%	5	E	U	e	u	à	ò	Ñ	Á	┼	ı	Õ	§
-6			&	6	F	V	f	v	å	û	ª	Â	ã	Í	µ	÷
-7			'	7	G	W	g	w	ç	ù	º	À	Ã	Î	þ	¸
-8			(	8	H	X	h	x	ê	ÿ	¿	©	╚	Ï	Þ	°
-9			)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨
-A			*	:	J	Z	j	z	è	Ü	¬	╩	╦	┌	Û	·
-B			+	;	K	[	k	{	ï	ø	½	╗	╤	█	Ù	¹
-C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	ý	³
-D			-	=	M	]	m	}	ì	Ø	¡	¢	═	¦	Ý	²
-E			.	>	N	^	n	~	Ä	×	«	¥	╬	Ì	¯	■
-F			/	?	O	_	o	⌂	Å	ƒ	»	┐	¤	▀	´	

Note: 1. This symbol set is used by the HP LaserJet III printer driver.

APPENDIX A

IBM RPQs

This Appendix describes the IBM RPQs supported by the protocol converter, how to activate them, and the corresponding IBM printer RPQ numbers.

Note: 1. The RPQs are used in DSC/DSE mode only.

Carriage Return at MPP+1

	Default setting	**RPQ setting**
	An additional NL is generated. The next print position will be current line+1, column 1.	No NL is generated. The next print position will be current line, column 1.
Protocol converter	#066, bit 2 = 0	#066, bit 2 = 1
IBM 4214	Option 15 = 2	Option 15 = 1
IBM 3268 mod. 2C	Standard	SC9501
IBM 3287 mod. 1, 2	Standard	RPQ S30219

New Line at MPP+1

	Default setting	**RPQ setting**
	An additional NL is generated. The next print position will be current line+2, column 1.	No NL is generated. The next print position will be current line+1, column 1.
Protocol converter	#066, bit 2 = 0	#066, bit 2 = 1
IBM 4214	Option 15 = 2	Option 15 = 1
IBM 3268 mod. 2C	Standard	SC9502
IBM 3287 mod. 1, 2	Standard	RPQ S30219

Form Feed within the Print Buffer

	Default setting	RPQ setting
	FF generates a space. The next print position will be next form, line 1, column 2.	No space is generated. The next print position will be next form, line 1, column 1.
Protocol converter	#100, bit 0 = 0	#100, bit 0 = 1
IBM 4214	Option 16 = 1	Option 16 = 2
IBM 3268 mod. 2C	Standard	SC9503
IBM 3287 mod. 1, 2	Standard	Not available

Null Suppression

	Default setting	RPQ setting
	Suppress Nulls.	Print Nulls as spaces.
Protocol converter	#006 ='No'	#006 = 'Yes'
IBM 4214	Option 18 = 1	Option 18 = 2
IBM 3268 mod. 2C	Standard	SC9505
IBM 3287 mod. 1, 2	Standard	SC3741

Valid Form Feed Positions

	Default setting	RPQ setting
	Form Feed valid at 1st Print Position and MPP+1 only.	Form Feed valid anywhere.
Protocol converter	#100, bit 2 = 0	#100, bit 2 = 1
IBM 4214	Option 19 = 2	Option 19 = 1
IBM 3268 mod. 2C	Standard	SC9506
IBM 3287 mod. 1, 2	Standard	SC3739

Automatic Function at End of Job

	Default setting	RPQ setting
	An additional NL is generated. The next print position will be current line+1, column 1.	An additional FF is generated. The next print position will be next form, line 1, column 1.
Protocol converter	#008 = 'No', #100, bit 3 = 0	#008 = 'No', #100, bit 3 = 1
IBM 4214	Option 20 = 1	Option 20 = 2
IBM 3268 mod. 2C	Standard	SC9507
IBM 3287 mod. 1, 2	Standard	SC3740

Automatic Function at End of Operator Initiated Local Copy

	Default setting	RPQ setting
	No FF is generated.	An additional FF is generated. The next print position will be next form, line 1, column 1.
Protocol converter	#008 = 'No', #100, bit 3 = 0	#008 = 'Yes'
IBM 4214	Option 20 = 1	Option 20 = 3
IBM 3268 mod. 2C	Standard	SC9508
IBM 3287 mod. 1, 2	Standard	SC3750

APPENDIX B

THE FRONT PANEL

The front panel of the AX-7 Cobra+ family of protocol converters has three indicators (POWER, SYSTEM and PC SHARE) and a rotary switch.

The front panel of the Axis 370 Cobra protocol converter has two indicators (POWER and SYSTEM) and a rotary switch.

The switch is used for accessing certain functions. In normal print operation it should be set to the device address.

The POWER indicator

This indicator (green) is lit when the protocol converter is switched on.

The SYSTEM indicator

This indicator (green) is lit when the protocol converter is connected to your IBM system. It can also flash under the following conditions:

- Flash during six seconds at power up.
- Flash in Test Mode (see below).
- Rapid flash during test function execution.

Note: 1. If the power up flashing continues, a hardware error has occurred. Contact your dealer/distributor.

The PC SHARE indicator

Does not apply to the Axis 370 Cobra.

This indicator (yellow) is lit during a PC printout. Any print job from host will be put on wait during the PC printout and for a subsequent delay time set by parameter #136 *(PC-Host Time-out).*

The Rotary Switch

The ten-position rotary switch is used to set start conditions for the protocol converter. It is also used to select and execute test functions during operation.

Start Conditions

The action when the protocol converter is switched on will be determined by the setting of the rotary switch, as follows:

Pos.	Description
0	Normal print operation. If a terminal is connected, the Terminal Set-up is started automatically.
1-7	Reserved.
8	Perform a test printout, then start normal print operation.
9	Perform a test printout ending with a Form Feed, then start normal print operation.

Test Mode

Test Mode is reached from normal print operation. It is used to access a number of internal functions. Normal print operation is inhibited.

Set the rotary switch to position '9'. When the SYSTEM indicator starts to flash, you can select one of the following Test Mode functions:

Pos.	Test Mode Function
0	**Restart** - same as power off/power on.
1	**Set Factory Default** - abandon the current configuration. **See note.**
2	**Print Character Translation Tables** - all active tables are printed.
3	**ASCII Hex Dump Mode** - trap the outgoing data stream and print characters and control commands as hexadecimal values.
4	**System Hex Dump Mode** - trap the incoming data stream and print characters and control codes as hexadecimal values.
5, 6	Reserved
7	**Configuration Mode** - run the Configuration Utility using a directly attached 3270 terminal, see the User's Manual.
8	**Print Parameter List** - print the complete configuration.
9	**Exit Test Mode** - resume normal print operation.

Do not forget to set the rotary switch to position '0' again for normal print operation.

Note: (**Applies to the AXIS 370 Cobra only**) To set factory default configuration requires a two step operation to avoid accidental activation and loss of configuration settings:

1. Set the rotary switch to position '1'
2. Within 2 seconds, set the rotary switch to position '2'

APPENDIX C

COMPATIBILITY WITH OTHER PRODUCTS

The protocol converter is designed to directly replace one of the emulated IBM printers. When replacing other printers or protocol converters, problems will often arise when these products diverge from the IBM specifications.

If the protocol converter to be replaced utilizes non-standard command code interpretation, the printout from the protocol converter will look different. The only way to solve this problem is to modify the host applications to fit the IBM specifications.

Another area of difficulties is when configuration commands are included in the applications. Since all protocol converter manufacturers use their own configuration method, the applications need to be modified also in this case. (This is a good cause for using configuration files separated from your applications).

However, in most cases it is possible to replace other protocol converters. The protocol converter can emulate many different hex transparency formats, which is the most common non-IBM function. You can also filter out configuration commands by using the string substitution function.

The following pages shows configuration file examples on how to achieve hex transparency compatibility with a number of different protocol converters.

Agile (6287 Ultra)

The 6287 Ultra uses two different hex transparency methods; the Cent Sign/Dollar Sign method and the Cent Sign/Count Byte method.

Use the following configuration file to emulate the Cent Sign/Dollar Sign method:

```
&&??%%P          (Enter Extended Emulation Mode)
%P               (Configuration Lead-in Sequence)
=40,2            (Set Extended Emulation type 2 permanently)
=70,/<155>$/     (Redefine Transparency Lead-in Sequence)
=72,/;/          (Redefine TRN/Conf. Trailer Sequence)
=207,10          (Initialize)
=207,12          (Save configuration permanently)
;                (End of configuration - note the new trailer
                 sequence)
```

The Cent Sign/Count byte method cannot be directly emulated by the protocol converter. However, if only a limited number of different Cent Sign/Count byte sequences are used, then the String Substitute function can be used to trap these sequences.

Example: The sequence ‘011B’ is used to generate the ASCII escape character. To emulate this function in the protocol converter, add the following lines to the configuration file above (before the Initialize command):

```
=41,$1B          (Redefine the Escape Character as the Cent sign)
=210,$01,$01,$1B (Define $01,$1B as Match String)
=210,$02,$1B     (Define $1B as Substitute String)
```

You must define string substitutions for all different Cent Sign/Count byte sequences that occurs in your applications.

Andrew (Malibu)

This protocol converter uses I-Data transparency formats, see the IDA 3270 below.

Avatar (MainPrint CG)

The MainPrint CG has one hex transparency method, which is similar to the protocol converter multibyte transparency. The default lead-in sequence is | ‘ (split vertical bar and backward apostrophe), and the default trailer sequence is $ (dollar sign). Use the following configuration file to emulate the MainPrint CG hex transparency:

```
&&??%%P          (Enter Extended Emulation Mode)
%P               (Configuration Lead-in Sequence)
=40,2            (Set Extended Emulation type 2 permanently)
=70,/ |`/        (Redefine Transparency Lead-in Sequence)
=72,/$/          (Redefine TRN/Conf. Trailer Sequence)
=207,10          (Initialize)
=207,12          (Save configuration permanently)
$                (End of configuration - note the new trailer
                 sequence)
```

Note: 1. MainPrint CG supports different sequences in LU-1 (SCS) and DSC/DSE modes. This can not be emulated by the protocol converter.

I-Data (IDA 3270)

IDA 3270 uses the same syntax for Single Byte and Multibyte transparency as the protocol converter. Assuming that the I-Data Escape Character is set to # (currency sign), the following configuration file will enable I-Data transparency:

```
&&??##P          (Enter Extended Emulation Mode)
#P               (Configuration Lead-in Sequence)
=40,2            (Set Extended Emulation type 2 permanently)
=207,10          (Initialize)
=207,12          (Save configuration permanently)
#                (End of configuration )
```

If only the Single Byte transparency is used, then the I-Data command for Defining a Temporary Escape Character (&&??#) can be used. This function is enabled by setting parameter #066, bit 0 (Option Select 2) to 1.

The I-Data User Defined String command is supported:

Syntax:

```
<ESC>Z<SN>
```

- <ESC> is the Escape Character.
- <SN> is the string number, given as a hexadecimal digit in the range 0 through C.

Note: 1. The string number 0 corresponds to the protocol converter string number $01, and C corresponds to $0D.

Memorex 2068

To activate the 2068 compatible mode, the Extended Emulation Mode, type 4, must be entered. Use the following configuration file:

```
&&??%%P          (Enter Extended Emulation Mode)
%P               (Configuration Lead-in Sequence)
=40,4            (Set Extended Emulation type 4 permanently)
=207,10          (Initialize)
=207,12          (Save configuration permanently)
%                (End of configuration )
```

The Memorex 2068 printer uses special commands for printer control:

Syntax:

```
<ESC><FC>
```

- <ESC> is the Escape Character (parameter #041).
- <FC> is the Function Code, see the table below.

Code	Function	Code	Function
10	Set Italic (toggle)	89	Set 12 CPI
1C	Set Boldface (toggle)	8A	Set 15 CPI
1D	Set Underline (toggle)	8B	Set 17 CPI
1E	Set Elongated (toggle)	8C	Set 2 LPI
1F	Reset attributes 10 - 1E	8D	Set 4 LPI
80	Set draft (fixed pitch)	8E	Set 6 LPI
81	Set NLQ (fixed pitch)	8F	Set 8 LPI
82	Set draft (proportional)	91	Select Sheet Feeder 1
83	Set NLQ (proportional)	92	Send UDS 12
84 - 87	Reserved	93	Select Sheet Feeder 2
88	Set 10 CPI	94	Send UDS 13

Note: 1. All other codes below 80 will be sent transparently to the printer.

MPI (AT 02)

AT 02 uses %% (two percent signs) both as transparency lead-in and trailer sequences. This is supported by Extended Emulation Mode, type 3, set by the following configuration file:

```
&&??%%P          (Enter Extended Emulation Mode)
%P               (Configuration Lead-in Sequence)
=40,3            (Set Extended Emulation type 3 permanently)
=207,10          (Initialize)
=207,12          (Save configuration permanently)
%%               (End of configuration - note the new trailer
                 sequence)
```

AT 02 uses two special sequences, which are also supported by the protocol converter : %%-%% and %%+%% . All character and control codes between these sequences are suppressed.

The MPI ‘Simple Pass Through’ function is equal to the protocol converter Single Byte Transparency.

APPENDIX D

USING THE MD-GRAFTEXT SOFTWARE

MD-GRAFTEXT© is a software package from Maersk Data A/S, offering DCF/SCRIPT users font selection and graphics capabilities.

The Extended Emulation Mode type 5 is designed for printing MD-GRAFTEXT applications. Use the following configuration file, assuming that the Escape Character is ` (backward apostrophe):

```
&&??``P          (Enter Extended Emulation Mode)
`P               (Configuration Lead-in Sequence)
=107,48          (Select the HP LaserJet II printer driver)
=40,5            (Set Extended Emulation type 5 permanently)
=41,/`/          (Redefine the Escape Character permanently)
=121             (Empty the Set Simulated Bold sequence)
=122             (Empty the Exit Simulated Bold sequence)
=207,10          (Initialize)
=207,12          (Save configuration permanently)
`                (End of configuration)
```

Note: 1. The protocol converter configuration can also be made from within MD-GRAFTEXT using the FIRSTL and LASTL entries in PRTGEN. Refer to the MD-GRAFTEXT documentation for further details.

APPENDIX E

CABLES

C.1 AX-7 Cobra+ Cables

This Section describes the pin-configuration for the different cables that can be used with the AX-7 Cobra+.

Overview

There are five different cables available for connecting the AX-7 Cobra+ to the printer and optionally to parallel or serial PC or LAN connections. The possible configurations are listed below:

Part No.	Description	PC-Host Sharing		Serial Protocol	
		Serial PC/LAN	Parallel PC/LAN	Cobra+ to Printer	PC/LAN to Cobra+
12755	Parallel Printer	No	No	N/A	N/A
12756	Serial Printer	No	No	Rdy/Bsy or Xon/Xoff	N/A
12757	Serial Printer, Serial PC/LAN	Yes	No	Rdy/Bsy	Rdy/Bsy
12758	Parallel Printer, Serial/Parallel PC/LAN	Yes	Yes	N/A	Rdy/Bsy or Xon/Xoff
12998	Parallel Printer, Parallel PC/LAN	No	Yes	N/A	N/A

Note: 1. The AX-7 Cobra+ PC-Host sharing cannot be used to connect a parallel PC or LAN to a serial printer.

Centronics Parallel Printer Cable

Centronics parallel printer cable (P/N 12755):

44 pin male connector (AX-7 Cobra+)		36 pin centronics connector (printer)	
1	-PR_STB	1	-STROBE
2	PR_DATA 0	2	DATA 0
3	PR_DATA 1	3	DATA 1
4	PR_DATA 2	4	DATA 2
5	PR_DATA 3	5	DATA 3
6	PR_DATA 4	6	DATA 4
7	PR_DATA 5	7	DATA 5
8	PR_DATA 6	8	DATA 6
9	PR_DATA 7	9	DATA 7
10	-PR_ACK	10	-ACK
11	PR_BUSY	11	BUSY
12	PR_PE	12	PE
13	PR_SELECT	13	SELECT
18	+5 V	18	+5 V
19	+5 V	18	+5 V
20	GND	19	GND
21	GND	20	GND
42	-PR.INIT	31	-INIT
41	-PR.ERR	32	-ERROR

RS-232 Serial Printer Cable

RS-232 Serial printer cable (P/N 12756):

44 pin male connector (AX-7 Cobra+)		25 pin male connector (printer)
22	RECEIVE	2 TRANSMIT
23	TRANSMIT	3 RECEIVE
25	CTS	20 CTS
20	GND	7 GND
18	+5 V	N/C (can be connected to +5V,200mA)
⌈ 9	PR_DATA 7	
⌊ 13	PR_SELECT	
⌈ 12	PR_PE/SER_BUSY	
⌊ 26	SER_BUSY	

PC-Host Sharing Cable (Serial Printer, Serial PC)

PC-Host Sharing cable (P/N 12757):

44 pin male connector (AX-7 Cobra+)		25 pin male connector (printer)	
23	TRANSMIT	3	RECEIVE
25	CTS	20	CTS
20	GND	7	GND
18	+5 V	N/C	(can be connected to +5V, 200mA)
44 pin male connector (AX-7 Cobra+)		**25 pin female connector (PC)**	
22	RECEIVE	2	TRANSMIT
24	DTR OUT	5	CTS
24	DTR OUT	6	DSR
21	GND	7	GND
⌈ 9	PR_DATA 7	⌈ 8	DCD
⌊ 13	PR_SELECT	⌊ 20	DTR
⌈ 12	PR_PE/SER_BUSY		
⌊ 26	SER_BUSY		

PC-Host Sharing Cable (Parallel Printer, Serial/Parallel PC)

PC-Host Sharing Cable (P/N 12758) - Centronics connector:

44 pin male connector (AX-7 Cobra+)		36 pin centronics connector (printer)	
1	-PR_STB	1	-STROBE
2	PR_DATA 0	2	DATA 0
3	PR_DATA 1	3	DATA 1
4	PR_DATA 2	4	DATA 2
5	PR_DATA 3	5	DATA 3
6	PR_DATA 4	6	DATA 4
7	PR_DATA 5	7	DATA 5
8	PR_DATA 6	8	DATA 6
9	PR_DATA 7	9	DATA 7
10	-PR_ACK	10	-ACK
11	PR_BUSY	11	BUSY
12	PR_PE	12	PE
13	PR_SELECT	13	SELECT
18	+5 V	18	+5 V
19	+5 V	18	+5 V
20	GND	19	GND
21	GND	20	GND
42	-PR.INIT	31	-INIT
41	-PR.ERR	32	-ERROR

PC-Host Sharing Cable (P/N 12758) - PC connectors:

44 pin male connector (AX-7 Cobra+)		25 pin female connector (PC)	
22	RECEIVE	2	TRANSMIT
23	TRANSMIT	3	RECEIVE
24	DTR OUT	5	CTS
24	DTR OUT	6	DSR
21	GND	7	GND
		8	DCD
		20	DTR

44 pin male connector (AX-7 Cobra+)		25 pin male connector (PC)	
27	-PC_STROBE	1	-STROBE
28	PC_DATA 0	2	DATA 0
29	PC_DATA 1	3	DATA 1
30	PC_DATA 2	4	DATA 2
31	PC_DATA 3	5	DATA 3
32	PC_DATA 4	6	DATA 3
33	PC_DATA 5	7	DATA 5
34	PC_DATA 6	8	DATA 6
35	PC_DATA 7	9	DATA 7
36	-PC_ACK	10	-ACKNLG
37	PC_BUSY	11	BUSY
38	PC_PE	12	PE
39	PC_SELECT	13	SELECT
20	GND	19	GND
21	GND	20	GND
40	-PC_INIT	16	-INIT
41	-PC_ERROR	15	-ERROR

PC-Host Sharing Cable (Parallel Printer, Parallel PC)

PC-Host Sharing Cable (P/N 12998) - Centronics connector:

44 pin male connector (AX-7 Cobra+)		36 pin centronics connector (printer)	
1	-PR_STB	1	-STROBE
2	PR_DATA 0	2	DATA 0
3	PR_DATA 1	3	DATA 1
4	PR_DATA 2	4	DATA 2
5	PR_DATA 3	5	DATA 3
6	PR_DATA 4	6	DATA 4
7	PR_DATA 5	7	DATA 5
8	PR_DATA 6	8	DATA 6
9	PR_DATA 7	9	DATA 7
10	-PR_ACK	10	-ACK
11	PR_BUSY	11	BUSY
12	PR_PE	12	PE
13	PR_SELECT	13	SELECT
18	+5 V	18	+5 V
19	+5 V	18	+5 V
20	GND	19	GND
21	GND	20	GND
42	-PR.INIT	31	-INIT
41	-PR.ERR	32	-ERROR

PC-Host Sharing Cable (P/N 12998) - PC connector:

44 pin male connector (AX-7 Cobra+)		25 pin male connector (PC)	
27	-PC_STROBE	1	-STROBE
28	PC_DATA 0	2	DATA 0
29	PC_DATA 1	3	DATA 1
30	PC_DATA 2	4	DATA 2
31	PC_DATA 3	5	DATA 3
32	PC_DATA 4	6	DATA 3
33	PC_DATA 5	7	DATA 5
34	PC_DATA 6	8	DATA 6
35	PC_DATA 7	9	DATA 7
36	-PC_ACK	10	-ACKNLG
37	PC_BUSY	11	BUSY
38	PC_PE	12	PE
39	PC_SELECT	13	SELECT
20	GND	19	GND
21	GND	20	GND
40	-PC_INIT	16	-INIT
41	-PC_ERROR	15	-ERROR

C.2 AX-7 Cobra+ Built in connector cables

This section describes the pin-configuration for the different cables that can be used with the Axis OKI HD, AX-4039 and AX-7 Cobra+ OEM built in connector cables.

Overview

There are three different cables available for connecting the Axis OKI HD-, AX-4039- and AX-7 Cobra+ OEM cables to parallel or serial PC or LAN connections. The possible configurations are listed below:

Part No.	Description	PC-Host Sharing Serial PC/LAN	PC-Host Sharing Parallel PC/LAN
12513	Serial PC/LAN	Yes	No
12514	Parallel PC/LAN	No	Yes
12516	Serial/Parallel PC/LAN	Yes	Yes

PC-Host Sharing cable (Serial PC)

PC-Host Sharing cable (P/N 12513):

20 pin high density connector (Axis OKI HD, AX-4039/1 and AX-7 Cobra+ OEM)		25 pin female connector (PC)	
1	RECEIVE	2	TRANSMIT
2	TRANSMIT	3	RECEIVE
3	DTR	⌈5	CTS
		⌊6	DSR
4	GND	7	GND
		⌈8	DCD
		⌊20	DTR

PC-Host Sharing cable (Parallel PC)

PC-Host Sharing cable (P/N 12514):

20 pin high density connector (Axis OKI HD, AX-4039/1 and AX-7 Cobra+ OEM)		25 pin male connector (PC)	
4	GND	18-25	GND
5	-STB	1	-STROBE
6	BUSY	11	BUSY
7	PE	12	PE
8	INDATA0	2	DATA 0
9	INDATA1	3	DATA 1
10	INDATA2	4	DATA 2
11	INDATA3	5	DATA 3
12	INDATA4	6	DATA 4
13	INDATA5	7	DATA 5
14	INDATA6	8	DATA 6
15	INDATA7	9	DATA 7
16	SELECT	13	SELECT
20	-ACK	10	-ACK

PC-Host Sharing cable (Serial/Parallel PC)

PC-Host Sharing cable (P/N 12516):

20 pin high density connector (Axis OKI HD, AX-4039/1 and AX-7 Cobra+ OEM)		**25 pin female connector (PC)**	
1	RECEIVE	2	TRANSMIT
2	TRANSMIT	3	RECEIVE
3	DTR	⌈5	CTS
		⌊6	DSR
4	GND	7	GND
		⌈8	DCD
		⌊20	DTR
20 pin high density connector (Axis OKI HD, AX-4039/1 and AX-7 Cobra+ OEM)		**25 pin male connector (PC)**	
4	GND	18-25	GND
5	-STB	1	-STROBE
6	BUSY	11	BUSY
7	PE	12	PE
8	INDATA0	2	DATA 0
9	INDATA1	3	DATA 1
10	INDATA2	4	DATA 2
11	INDATA3	5	DATA 3
12	INDATA4	6	DATA 4
13	INDATA5	7	DATA 5
14	INDATA6	8	DATA 6
15	INDATA7	9	DATA 7
16	SELECT	13	SELECT
20	-ACK	10	-ACK

C.3 AXIS 370 Cobra Cables

This section describes the pin-configuration for the different cables that can be used with the AXIS 370 Cobra.

Overview There are one cable available for connecting the AXIS 370 Cobra to the printer. The possible configuration are listed below:

Part No.	Description
13522	Printer Cable extension

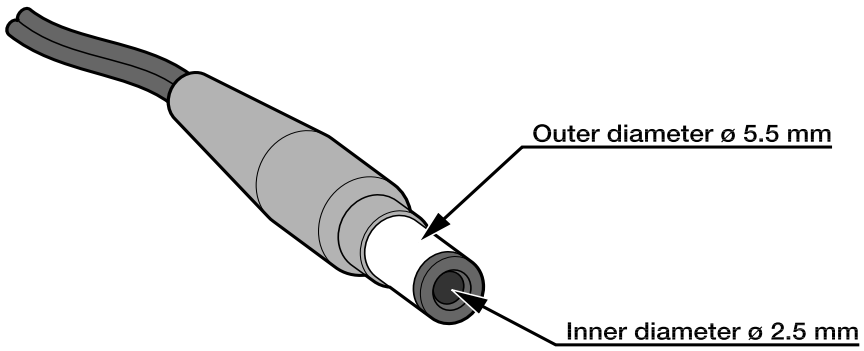
Printer Cable Extension

Printer Cable Extension (P/N 13522):

36 pin centronics female connector (AXIS 370 Cobra)		36 pin centronics male connector (printer)	
1	-STROBE	1	-STROBE
2	DATA 0	2	DATA 0
3	DATA 1	3	DATA 1
4	DATA 2	4	DATA 2
5	DATA 3	5	DATA 3
6	DATA 4	6	DATA 4
7	DATA 5	7	DATA 5
8	DATA 6	8	DATA 6
9	DATA 7	9	DATA 7
10	-ACK	10	-ACK
11	BUSY	11	BUSY
12	PE	12	PE
13	SELECT	13	SELECT
14	-AUTO FEED	14	-AUTO FEED
18	+5V	18	+5V
19-30	GND	19-30	GND
31	-INIT	31	-INIT
32	-ERROR	32	-ERROR
36	-SELECT IN	36	-SELECT IN

Power Connector

If power is supplied from an external source, a Japanese power plug with dimensions according to the illustration below should be used.



APPENDIX F

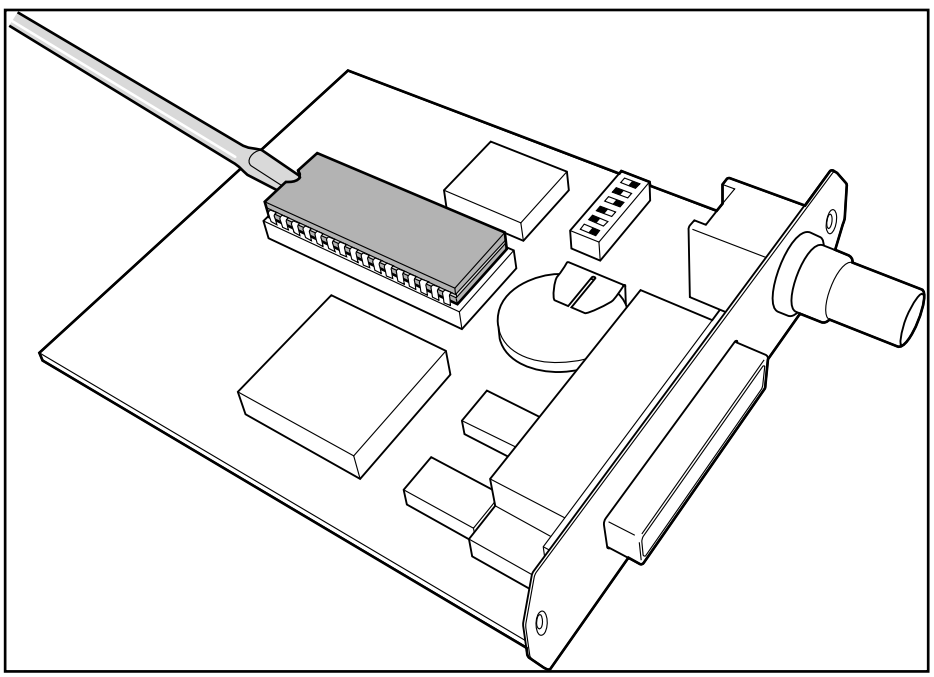
UPGRADING FIRMWARE

Does not apply to the Axis 370 Cobra.

The AX-7 Cobra+ firmware can easily be upgraded by replacing the EPROM chip located inside the unit. To replace the EPROM, proceed as follows:

Caution, The AX-7 Cobra+ circuit board is static-sensitive. Mishandling may cause permanent damage to its components. Make sure to take all recommended precautions related to static-sensitive devices.

1. **Turn off the AX-7 Cobra+** by removing the power supply connector.
2. Disconnect the system and printer connections.
3. Unscrew the two screws on the back panel.
4. Gently pull the back panel. The attached circuit board with the EPROM will slide out of the box.



5. Gently remove the EPROM from its socket using a flat screwdriver. *It is very important to insert the screwdriver from the edge facing the front panel.* See above illustration. If the screwdriver is inserted the wrong way, the battery could be short-circuited, causing permanent damage to the unit.

6. Carefully insert the new EPROM chip into the socket. The notch on the top of the chip should face the front panel. Make sure that all of the EPROM pins align with the socket and gently press the chip down.
7. Push the circuit board back into position inside the box.
8. Tighten the two screws on the back panel.
9. Attach the AX-7 Cobra+ to the printer and make a test printout. (See User's manual, section 2.2.) Please note that all user configurations will be lost and that the following error message will be printed as a normal consequence of a firmware upgrade:

```
E2-PERMANENT MEMORY CHECKSUM ERROR, FACTORY DEFAULTS SET
```

10. Attach the AX-7 Cobra+ to the system. (See User's manual, section 2.3)

Dip Switch Positions

The switch positions of the DIP switch located on the circuit board should not be altered. The correct positions are:

Switch no.	Position
1	off
2	on
3	on
4	on
5	off
6	off

Updating the software

Applies to the Axis 370 Cobra only.

Software that can be updated

- The Axis 370 Cobra software held in Flash ROM.

All software updates are free of charge.

Checking if an update is available

Contact your dealer to check if there has been any new issues of the software. You should have your present version numbers ready to compare against the latest software issues from Axis.

Alternatively go to the Axis WWW Home Page at **http://www.axisinc.com/** or **http://www.axis.com/**, where you can download the latest version of the software utilities. You can also get files and information through anonymous ftp: log in to the **ftp.axisinc.com** or **ftp.axis.com** and go to the /pub/axis directory.

Updating the Axis 370 Cobra Flash ROM

You can carry out an update to your Flash ROM

- through the parallel printer port of the Axis 370 Cobra, a special cable is needed.

Full instructions on how to carry out the update will be supplied with the software update kit: Part Number 14518.

Flash ROM: This is a special type of memory chip in the Axis 370 Cobra that controls the printing operations. Just like a normal ROM its contents are unaffected when the power is turned off. What makes it special is that its memory contents can be replaced during an update sequence; this will upgrade your Axis 370 Cobra's performance without having to replace any physical components.

APPENDIX G

TECHNICAL SPECIFICATIONS

Host Environments

- IBM S/370, S/390
- IBM 303x, 308x, 309x
- IBM 81xx
- IBM 47xx
- IBM 43xx
- IBM 937x

Attachments

- IBM 3174 Control Unit
- IBM 3274 type A Control Unit
- IBM 3276 Control Unit
- IBM 8775 Display Terminal
- IBM 4701/4702 Device Cluster Adapter
- IBM 4300 Printer Adapter
- IBM 9370 Subsystem Controller
- IBM 4361 Work Station Adapter
- IBM 4321 Display/Printer Adapter
- IBM 4331 Display/Printer Adapter
- IBM 4361 Display/Printer Adapter
- IBM ES/9370 Work Station Subsystem Controller
- IBM ES/9370 3270 Adapter
- IBM 3299 Multiplexer
- Equivalent PCM controllers

IBM Printer Emulations

- IBM 3287 mod. 1 and 2C
- IBM 3268 mod. 1 and 2
- IBM 4214 mod. 1
- IBM 3262 mod. 3 and 13
- IBM 4224 mod. 2 (non-IPDS mode)
- *IBM 4230 mod. 201

* **Applies to the Axis 370 Cobra only**.

IBM System Features

- SNA LU-1 (SCS), SNA DSE and BSC 3270/DSC data streams
- APL2/Text Feature
- LU-1 FM Headers Subset 1
- SCS Local/Remote Save/Restore Formats
- Extended Attribute Buffer (EAB)
- 3270/DSC/DSE Query Reply and LU-1 Query List
- IBM RPQs
- Load Translate Table
- Country Extended Code Pages (CECP)
- IBM 3287 mod. 2C Programmable Symbols (PS) and color
- Page Presentation Media
- Cut Sheet Feeder Command

AX-7 Cobra+ Additional Features

- Configuration from a Terminal or from the System
- 26 predefined Printer Drivers, fully editable
- Fully editable Character Translation Tables
- Intelligent 3-way PC-Host Sharing (parallel or serial PC)
- 255 User Definable Strings
- 127 String Substitutions
- Programmable Transparency Function (data pass-through)
- Bar Codes
- Start/End of Job Strings
- Automatic Orientation/COR
- XEROX XPAF support. (Optional)

Hardware Specifications
AX-7 Cobra+ family only:

- Size: 100x25x90 mm / 4.0"x1.0"x3.5"
- Weight: 0.25 kg/ 0.55 lb
- Power: Max 170mA at 5V DC supplied via Centronics printer cable, or 200mA at 9V AC/12V DC via optional External Power Supply

Axis 370 Cobra only:

- Size: 29x55x100 mm / 1.2"x2.2"x4.0"
- Weight: 0.15 kg/ 0.3 lb
- Power: 5 VDC, min 170 mA from printer parallel port or Axis power supply PS-A, 9 VAC, min 300 mA

Approvals

- EMI: FCC 15B class A, and CE: EN 50081-1, EN 50082-1
- Safety: EN 60950, UL, CSA. Approved power supply for all countries.

Environments

- Temp.: 5-40˚C/ 40-105˚F
- Humidity: 20-80% non-condensing

All specifications are subject to change without prior notice

APPENDIX H

RELATED DOCUMENTATION

Title	Part No.
AX-7 Cobra+ User's Manual	12821
IBM 3274 Control Unit Customizing Guide	GA23-0065-6
IBM 3174 Subsystem Control Unit Customizing Guide	GA23-0214-1
IBM 3174 Character Set Reference	GA27-3831-04
IBM 3287 Printer Models 1C and 2C Components Description	GA27-3229-2
IBM 3268 Printer Models 2 and 2C Description	GA27-3268-2
IBM 4214 Printer Model 1 Product Description	GC31-2563-1
IBM 3262 Printer Models 3 and 13 Components Description	GA24-3741-1
IBM 4224 Printer Models 1xx and 2xx Product and Programming Description Manual	GC31-2551-4
Axis 370 Cobra User's Manual	14368

APPENDIX I

HOW TO CONTACT AXIS

Technical Support

If you need technical support, please contact your dealer. If they can't help you, they will forward your request through the appropriate channels.

Axis on-line service

Use the Axis on-line service at any time to retrieve electronically distributed items. The material available includes the AX-7 Cobra+ Technical Reference, the Adobe Acrobat Reader (required for all Axis on-line documentation), company and product presentations, etc. All items are available on Internet by a WWW browser or FTP file transfer.

Internet and World Wide Web

If you are connected to Internet, have a look at the Axis WWW Home Page at **http://www.axisinc.com/** or **http://www.axis.com**. Here you can find information about the company and our products. You can also down-load on-line manuals, tools such as the Acrobat Reader for different platforms, and the latest versions of the software utilities. You can also get files and information through anonymous ftp: log in to **ftp.axisinc.com** or **ftp.axis.com** and go to the /pub/axis directory, or enter **ftp://ftp.axisinc.com/pub/axis** or **ftp://ftp.axis.com/pub/axis** in your WWW browser.

If you want to receive regular information about new products and product updates by e-mail, send and e-mail to Majordomo@axis.com with SUBSCRIBE AXIS-NEWS in the message body.

The Axis Offices To contact an Axis office, choose the one nearest to your region:

Europe, Middle East, South America, Africa, Australia

Axis Communications AB
Scheelevägen 16
S-223 70 Lund, Sweden
Phone: +46 46 270 18 00
Fax: +46 46 13 61 30
Email: info@axis.com
URL: http://www.axis.com/

North & Central America

Axis Communications Inc.
4 Constitution Way, Suite G,
Woburn, MA 01801-1030, USA
Phone: 1-800-444-AXIS, (617) 938-1188
Fax: (617) 938-6161
Email: info@axisinc.com
URL: http://www.axisinc.com/

France

Axis Communications SA
191 avenue Aristide Briand
94230 Cachan, France
Phone: +33 1 49 69 15 50
Fax: +33 1 49 69 15 59

Japan

Axis Communications K.K.
8th Center Plaza 5F,
1-10-16 Nihombashi Horidome-cho,
Chuo-ku, Tokyo 103, Japan
Phone: +81 3 3663 8801
Fax: +81 3 3663 8802
Email: info@axiscom.co.jp

Singapore, Southeast Asia, The pacific

Axis Communications Pte Ltd.
51 Thomson Road
187B Goldhill Centre
Singapore 307630
Phone: +65 250 8077
Fax: +65 352 1655
Email: info@axis.com.sg

Hong Kong, Asia (except Japan & Middle East)

Axis Communications Ltd.
Room 602, Asian House, 1 Hennessy Road,
Wanchai, Hong Kong
Phone: +852 2836 0813
Fax: +852 2573 5935
Email: info@axis.com.hk

China

Axis Communications Ltd. Beijing Office
Room 2203, 22/F, Everbright Building
6 Fu Xing Men Wai Street
Beijing 100045, China
Phone: +86 - 10 6856 1350
Fax: +86 - 10 6856 1359

Axis Communications Ltd. Shanghai Office
Room J, 6/F, World Trade Building
NO 1590 Yan An West Road
Shanghai 200052, China
Phone: +86 - 21 6280 8527
Fax: +86 - 21 6280 6892

GLOSSARY

3270	The IBM mainframe environment.
APL	A Programming Language. Requires special characters that can be emulated by the AX-7 Cobra+ by using the PC Set 2 Symbol Set.
APL2/Text	The IBM mainframe environment for MVS and VM.
ASCII	American Standard Code for Information Interchange. Originally a 7-bit character set, but also a common term for the various 8-bit character sets used in the IBM PC environment (as opposed to *e.g.* EBCDIC)
Attributes	Used is DSC/DSE mode to modify subsequent character and control codes (making up for the lack of LU-1 control codes). Base buffer attributes are the DBC codes $C0 - $FF, extended attributes are found in the EAB.
Base Buffer Attributes	See *Attributes.*
BSC	Binary Synchronous Communication. An old communications protocol. Widely used, but superseded by the SNA protocols.
CECP	Country Extended Code Page. The new IBM EBCDIC character tables, supported by IBM 4224 and other modern IBM printers. CECP tables are backward compatible with the old EBCDIC tables, the difference is that all previously undefined are now assigned. The AX-7 Cobra+ supports LU-1 (SCS) CECP for all IBM printer emulations, but DSC/DSE CECP is only available in the IBM 4224 emulation.
Character Buffer	The first half of the communications buffer.
Character Codes	The codes representing printable characters. LU-1 (SCS) character codes are $40 - $FF, DSC/DSE character codes are $08 - $BF.
Coax	Coaxial cable. The standard medium for connecting 3270 devices.
Code Page	The IBM term for character table. See also CECP.
Cold Start	The *Power-up Sequence* (#060) is sent to the printer, followed by the page formatting commands. A cold start occurs only at power up. See also *Warm Start.*
Communications Buffer	A buffer for temporary storage of print data. The first half is the character (or base) buffer, the second half is the extended attribute buffer (EAB)
Control Codes	Codes used for printer control, *e.g.* Carriage Return and Form Feed. LU-1 (SCS) control codes are $00 - $3F, DSC/DSE control codes are $00 - $07. The limited number of DSC/DSE control codes are partly compensated for by using *Attributes* for additional printer control.
COR	Computer output Reduction. Printout in landscape orientation with reduced horizontal and vertical spacing.
DBC	Device Buffer Code. The internal character representation in the AX-7 Cobra+, and also the character table used in DSC/DSE mode.
DSC	Data Stream Compatibility. The communication mode under the BSC protocol.
DSE	Data Stream Emulation, LU-3. The SNA equivalent to the DSC communication mode under the BSC protocol.

EAB	Extended Attribute Buffer. The second half of the communications buffer, used for printer control in DSC/DSE mode.
EBCDIC	Extended Binary Coded Decimal Interchange Code. This is the code used in LU-1 (SCS) mode.
Extended Emulation	A method of accessing AX-7 Cobra+ functions not available in the standard IBM environment.
Field Attributes	Same as *Base Buffer Attributes.*
FM Header	Function Management. An FM header data stream contains host-to-printer or printer-to-host information in structured fields rather than print data. See also *Structured Fields.*
GDDM	Graphical Data Display Manager. Widely used IBM mainframe package for creating, displaying, and printing graphic data. Requires Programmable Symbols (PS) support.
IBM	International Business Machines. A computer company.
Load Translate Table	When requested, the control unit will download the EBCDIC to DBC translation table to the AX-7 Cobra+, thus eliminating the need to select system language.
LU-1	*See SCS.*
LU-3	*See DSE.*
MVS	Multiple Virtual Storage. IBM's standard operating system for the mainframe environment.
PCIA	Printer Control Information Area. The first 80 bytes of the character buffer, used for exchanging information between host and printer.
PS	Programmable Symbols. A printer feature required for printing GDDM documents. PS is only available for the IBM 3287 emulation.
Query	At power up, the control unit exchanges information with the printer/AX-7 Cobra+ to determine which features that are supported. The Query/Query Reply handling is part of the *FM Header* processing.
RPQ	Request for Price Quotation. An IBM upgrade system, involving PROM or disk replacements for printers and control units. Most IBM printer RPQs are supported by the AX-7 Cobra+.
SCS	SNA Character String, LU-1. The main communication mode under the SNA protocol. Supports a large number of control codes for printer control.
SNA	System Network Architecture. A communications protocol, more modern than BSC, supporting the LU-1 (SCS) and DSE modes of communications.
Structured Fields	The format for exchanging information between the host and printer in LU-1 mode. A structured field may contain Queries/Query Lists, Query Replies, SCS Data, or Save/Restore Formats.
Transparency	Passing data from the application to the printer without any processing. The AX-7 Cobra+ supports two types: Hex Transparency, through Extended Emulation commands, and SCS Transparency, an IBM control code.
VM	Virtual Machine. An IBM mainframe operating system.
Warm Start	All page formatting commands are sent to the printer. A warm start occurs at communication mode changes, and when the *Initialize* (#207,10) command is executed.

INDEX

P

Q

R

S