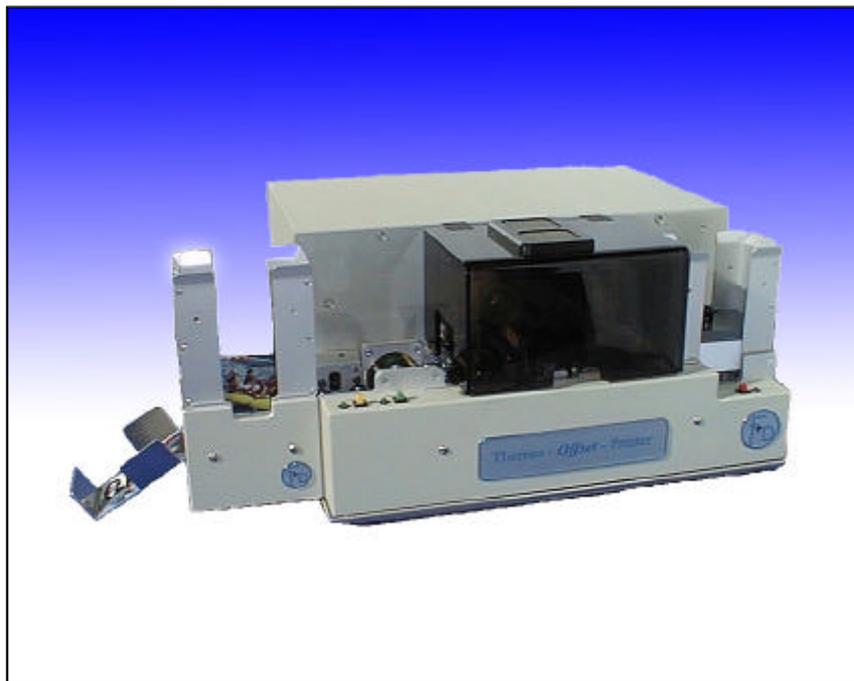


Software Manual

Color Card Printer

TOP



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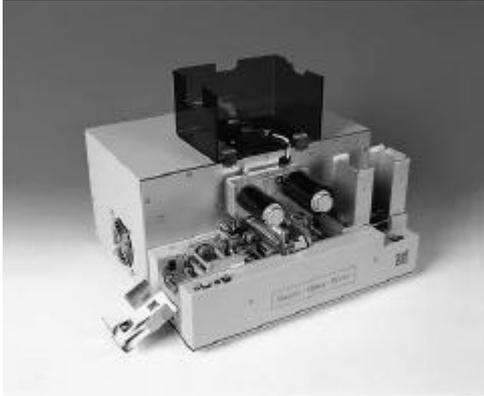
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1. Introduction

1.1 Description of the TOP



The **TOP** is a high speed, reliable, compact, full color edge to edge printer for plastic cards for industrial applications

As options the **TOP** has

- Magnetic Stripe Encoder
- Chip-Modul
- SCSI-Bus
- Automatic Output Hopper
- Flip-Over Module
- Laminator Unit.

The **TOP** can also works with other personalizing systems by using Win 3.11, 95, 98 or NT 4.0 drivers.

The **TOP** includes the features:

- Ultra fast 25 seconds full color, edge to edge printing
- Ribbon Saving Possibility
- Ease for operation
- Internal diagnostic software
- Easy access card cleaning
- Fito a variety of ribbon types from monochrome to color
- High precision mechanical assembly

1.2 Definition of Character used

The **TOP** color printer is being controlled by a number of defined ESC-Sequences. An ESC-Sequence is understood to be a data series which are transmitted by the application program directly to the printer through the Centronics-Interface. The sequence is always initiated by the character <ESC> (corresponds to the ASCII Code 27) and is finished by the character <CR> (corresponds to the ASCII Code 13). A certain sequence of transmission must be kept with many ESC-Sequences because otherwise they cannot be executed in an exact way by the printer. In the section '*Advises to the Printer Control*' you will find corresponding advises and examples thereto.

In the Description of the ESC-Sequences the following characters are being used for demonstration:

<Character>	a symbolic constant is being defined
'Character'	the corresponding character from the ASCII Code is being defined which is a firm part of the ESC-Sequence.
aaaa	a variable part of the ESC-Sequence is being demonstrated. Each letter stands for a byte in ESC-Sequence. The definition of the characters to be used takes place under the ESC-Sequence.



The following symbolic constants are being used:

Symbolic Constant	Decimal Value	Definition
<ESC>	27	ESC-Character, always initiates an ESC-Sequence
<CR>	13	CR-Character, always ends an ESC-Sequence
<EOT>	4	EOT-Character, is used for the feature of the card end
<SOH>	1	SOH-Character, is used for the feature of the card beginning
<SO>	14	SO-Character, is used as separator for the magnetic stripe information

The following character formats may be transmitted to the printer as part of the ESC-Sequence:

- ASCII Values

This form is mainly used for decimal values during transmission. Each decimal spot corresponds to one byte during transmission to the printer. For example, if the value 980 shall be transmitted as a 4-steady ASCII-Value the following bytes must be transmitted to the printer: 30h, 39h, 38h, 30h. If the amount of the decimal spots of the value to be transmitted is smaller than the amount set in the ESC-Sequence, leading zeros (figures) must be inserted. This has already been considered in the example.

- ASCII Character

This form is mainly used for the transmission of a character to the printer. If, for example, the letter 'A' shall be transmitted to the printer the following byte must be transmitted to the printer: 41h.

- Hexadecimal Values

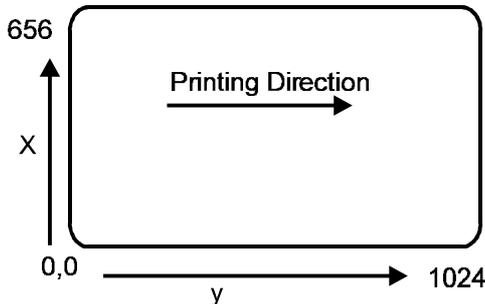
This form is mainly used for transmission of hexadecimal values to the printer. The amount of the transmitted values is dependent on the demand of the respective ESC-Sequence and is to be found in the definition of the respective ESC-Sequence. If, for example, the value 123h shall be transmitted to the printer as a 3 byte value the following bytes must be transmitted to the printer: 00h, 01h, 23h.

- ASCII Character String

This form is mainly used for transmission of ASCII-Characters as a character chain. Generally, the amount of the characters to be transmitted is not dictated as the character chain is limited by an end marking. If, for example, the character chain „ABCD“ shall be transmitted to the printer the following bytes must be transmitted: 41h, 42h, 43h, 44h.



1.3 Definition of the coordinate System



The printer may print a maximum of 656 X 1024 pixel. This way, a plastic card of the format 54mm X 86mm may be printed completely. In the edge area 2-4 pixel may be printed externally of the card. This way, tolerances of the various cards may be evened out.

In illustration the position of the coordinate system is shown. The coordinate system is defined in the upright format of the card. Therefore, the X and Y coordinates are exchanged in this illustration. The X-coordinate corresponds to the print line and the Y-coordinate runs in print direction.

2. Description of the ESC-Sequenzen

2.1 Printing Quality

With this ESC-Sequence general parameters are being transmitted to the printer which influence the quality of the printout. These are control values for the lightness and the contrast. Two different control sets are being distinguished. One defines the data for printing the color ribbon segments (Yellow, Magenta, Cyan) and the second one defines the data for printing the black ribbon segments. This way, an optimal setting of the print quality is possible.

2.1.1 ESC-Sequence for the Color Ribbon Segments

<ESC> 'D' aaaa bb ccc dddd <CR>

aaaa	Lightness value as 4 digit ASCII-Value (may be set in the area of 0 up to 500, whereas the value 0 corresponds to a very bright image and the value 500 to a very dark image).
bb	Value for the contrast as 2 digit ASCII-Value (may be set in the area of 1 up to 15, whereas the value 1 corresponds to a very low contrast and the value 15 to a very high contrast).
ccc	Test parameter which is not being valued in the printer. The value 0 should always be transmitted as 3 digit ASCII-Value.
dddd	The intensity parameter for the overcoat ribbon is transmitted as 4 digit ASCII-Value (may be set in the area of 100 up to 255, whereas the value 100 corresponds to a low print intensity and the value 255 to a maximum intensity).

Brightness value: with this parameter the lightness of the print image may be influenced. In the area of 200 up to 400 a good



print quality is achieved. In the printer the value 200 is installed as a standard.

Contrast: With this parameter the contrast of the print image may be influenced. In the area of 3 up to 6 optimal printing results are being achieved. In the printer the value 6 is installed as a standard.

- *Intensity parameter:* With this parameter the print quality is set, which is used for the printing of the overcoat ribbon. Values in the area of 100 up to 255 may be set. In the printer the value 192 is installed as a standard. A higher value means a higher print intensity (heat power). If the print intensity is set too high the overcoat becomes rough and does not shine. If the value, however, is set too low the overcoat may be missing in some parts. If the value was set optimally, you will achieve an even and shiny surface of the overcoat.

Note: If the brightness value and the contrast value are set with an intensity too high, the color ribbon may stick to the card or tear.

In the following sample the standard values used internally are being transmitted to the printer:

Brightness = 200
 Contrast = 6
 Test parameter = 0
 Intensity parameter = 192

The following bytes must be transmitted to the printer:

1Bh	44h	30h	32h	30h	30h	30h	36h	.D020006
30h	30h	30h	30h	31h	39h	32h	0Dh	0000192.

2.1.2 ESC-Sequence for the Black Ribbon Segment

As there is a different print technology being used with the black segment the printer may load a second parameter set. The ESC-Sequence is the same except for the first character after <ESC>. The last two parameters are not necessary for the black segment.

<ESC> 'd' aaaa bb ccc dddd <CR>

aaaa Lightness value as 4 digit ASCII-Value (may be set in the area of 0 up to 500, whereas the value 0 corresponds to a very bright image and the value 500 to a very dark image)

bb Value for the contrast as 2 digit ASCII-Value (may be set in the area of 1 up to 15, whereas the value 1 corresponds to a very low contrast and the value 15 to a very high contrast).



ccc	Test parameter which is not being valued in the printer. The value 0 should always be transmitted as 3 digit ASCII-Value.
dddd	This parameter is not used anymore. The value 0 should always be transmitted as 4 digit ASCII-Value.

Brightness value: For the black segment it is not necessary to set a lightness value. It should be set at value 0 to achieve a good print image.

Contrast: For the black segment the print quality may be set by this parameter. If the parameter is set too low, the fine structures are missing in the print image. If, however, the parameter is set too high, fine structures diffuse into black planes. In the printer the parameter is set on the value 12 as a standard.

2.1.3 Notes to the ESC-Sequence 'Printer Specific Parameter'

The two ESC-Sequences may be transmitted at the beginning of the card. The value are stored in two different storage in the printer and keep their validity until the transmission of a new ESC-Sequence or until turning the printer off. After turning the printer on, the standard values are loaded. The printer uses the right parameter set depending on the actual color ribbon segment.

2.2 Magnetic Stripe

With this ESC-Sequence the operation mode of the magnetic stripe reader is set. After turning on the printer, the magnetic stripe reader is turned off. By transmitting the ESC-Sequence 'Magnetic Stripe', the respective modus is turned on and stays active until the next ESC-Sequence 'Magnetic Stripe' follows.

```
<ESC> 'M' m '1' dd ... dd <SO> '2' dd ... dd <SO> '3' dd ... dd
<SO> <CR>
```

m Modus for the operation of the magnetic stripe reader as ASCII Character with the following values:

'W' → Magnetic stripe write and read

'R' → Magnetic stripe compare reading only with the data transmitted.

'Q' → Magnetic stripe is not read nor written. If this modus is turned on, only the character <CR> follows in the ESC-Sequence.

1,2,3 Track number to which the following data belong:



dd...dd Data as ASCII character chain per track.
The data must correspond to the standard DIN7811. If nothing should be written on one track, no character chain is transmitted to the track in question.

<SO> End mark of the data per track
<SO> → 0eh

The magnetic stripe reader may be operated in three different operation modes. The respective operation mode is set with the modus.

Operation Mode 'Write and Read'

In this operation mode the transmitted data are written and read on the magnetic stripe of the card. The read data are compared with the data transmitted and if necessary a second try of writing is taken. Should this fail as well the card is dispensed without printing and the next card is used. If three in a row are not printed, the printer shows an error message (the red LED light appears on the printer and the Error-Bit is set at the Centronics-Interface).

Operation Mode 'Read'

In this operation mode the data which are already on the magnetic stripe of the card to be printed are read and are compared with the data transmitted. If they do not correspond an error message appears (the red LED light appears on the printer and the Error-Bit is set at the Centronics-Interface).

Operation Mode 'Magnetic Stripe Reader Off'

In this operation mode the reader is not active. This operation mode takes place when turning on the printer.

Example

1. Turning-off the magnetic stripe reader

<ESC> 'M' 'Q' <CR>
results in the following bytes to the printer

1Bh	4Dh	51h	0Dh						.MQ.
-----	-----	-----	-----	--	--	--	--	--	------

2. Writing on all tracks a figure series '123'

<ESC> 'M' 'W' '1' '123' <SO> '2' '123' <SO> '3' '123' <SO>
<CR>

results in the following bytes to the printer

1Bh	4Dh	57h	31h	31h	32h	33h	0Eh	.MW1123.
32h	31h	32h	33h	0Eh	33h	31h	32h	2123.312
33h	0Eh	0Dh						3..



3. Reading a figure series '123' only from track 1

<ESC> 'M' 'R' '1' '123' <SO> '2' <SO> '3' <SO> <CR>

Results in the following bytes to the printer

1Bh	4Dh	52h	31h	31h	32h	33h	0Eh	.MR1123.
32h	0Eh	33h	0Eh	0Dh				2.3.

The ESC-Sequence for writing or reading the magnetic stripe must be transmitted before transmitting the ESC-Sequence 'Start Card'. If this is not paid attention to, errors will occur when writing or reading the magnetic stripe. When the magnetic stripe is activated, data for at least one track must be transmitted.

Setting HiCo

<ESC> '!' 'e' 'H' <CR>

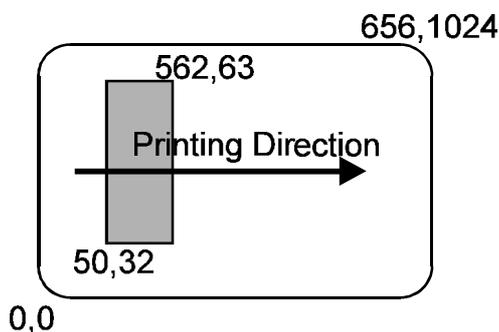
This settings will be saved as a default value in the **TOP**. This ESC-Sequence must be send before 'Start Document'.

Setting LoCo

<ESC> '!' 'e' 'L' <CR>

This settings will be saved as a default value in the **TOP**. This ESC-Sequence must be send before 'Start Document'.

2.3 Datatransmission YMCK



With the ESC-Sequence 'Data Transmission' image data may be transmitted to the printer or image storage partially deleted. The respective operation mode is set by the modus ('L' =Delete) and 'S' = Write. The data are transmitted line wise (X-direction) to the printer. In Illustration 1, Coordinate System **TOP** Printer, the coordinate system used by the printer is demonstrated. By setting the X- and Y-start position, entering image data may be started at any location in the image storage.

<ESC> 'e' f xxx yyyy '1' '1' aaaaaa bbbb m dd dd ... <CR>

f Color storage as ASCII-Character, may accept the following values:

- 'Y' → Information for the Yellow color storage
- 'M' → Information for the Magenta color storage
- 'C' → Information for the Black color storage
- 'K' → Information for the black color storage

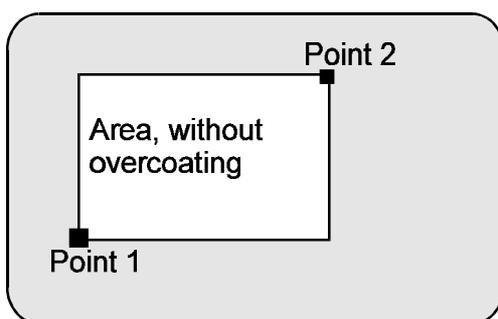


- xxx X-Start position in the image storage of the printer as 3 digit ASCII-Value (Value area 000-656)
- yyyy Y-Start position in the image storage of the printer as 4 digit ASCII-Value (Value area 0000-1024)
- aaaaaa Total amount of the following image data as 3 Byte Hex-Value, i.e. (640256 dec.) 09c500h → 09h, c5h, 00h)
- bbbb Amount of bytes for the image width (X-direction) (2 Byte Hex-Value, i.e. (656 dec.)0290h → 02h, 90h)
- m Modus as ASCII Character:
'S' = Write
'L' = Delete
- dd Image data as 1 Byte Hex-Value. The amount was set in the parameter 'aaaaa' total amount. If the modus 'Delete' was entered no image data follow.

In the following example image data is entered as of position 50,32 into the image storage of the color Yellow. In X-direction 512 (0200h) image dots are transmitted per line. A total of 31 lines are to be transmitted. Thus, the total amount of image dots results out of 512*31 = 15872 (3E00h) image dots transmitted. The rectangle thus defined is entered into the image storage as of position X-start position 50 and Y-start position 32. The location of the rectangle is shown in Ill.

1Bh	65h	59h	30h	35h	30h	30h	30h	.eY05000
33h	32h	31h	31h	00h	3Eh	00h	02h	3211.>..
00h	53h	0Dh	.S(image datas).

2.4 Overcoat



After printing all the colors the printer may laminate the card, i.e. a transparent protection coat is laminated on the card. As a standard the card is always laminated on the total surface of the card. However, this is not desirable in all cases (i.e. chip). With the ESC-Sequence 'Set Overcoat' it may be determined in which area the lamination may be activated or deactivated. The setting of these areas may be initiated by defining the coordinates of the rectangle to be laminated. This is defined by the lower left and the upper right edges. In Illustration the position of these edges is marked. Again, the coordinate system of the printer forms the basis as demonstrated in Illustration, Coordinate System **TOP** - Printer.

10 rectangles may be defined in total and transmitted to the printer. The rectangles are being processed in the sequence of the numbering set by the user. The sequence of the transmission of the rectangles to the printer has no impact on the print results. The defined rectangles keep their validity until overwritten by a new definition, the overcoat segment is deleted

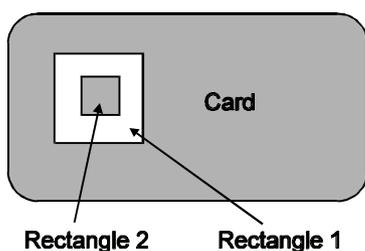


with the ESC-Sequence 'Delete Image Storage', of the printer is turned off

<ESC> 'e' 'O' a bbbb cccc dddd eeee f <CR>

- a Shows the number of the rectangle to be defined as 1 digit ASCII-Value. Values in the area of 0 (first rectangle) up to 9 (last rectangle) may be entered.
- bbbb Y-Position of the lower left edge of the rectangle as 4 digit ASCII-Value. Values in the area of 0 up to 1024 may be entered, however, it has to be made sure that the value is always smaller than the Y-Position of the upper right edge.
- cccc X-Position of the lower left edge of the rectangle as 4 digit ASCII-Value. Values in the area of 0 up to 656 may be entered, however, it has to be made sure that the value is always smaller than the X-Position of the upper right edge.
- dddd Y-Position of the right of the upper right edge of the rectangle as 4 digit ASCII-Value. Values in the area of 0 up to 1024 may be entered, however, it has to be made sure that the value is always bigger than the Y-Position of the lower left edge.
- eeee X-Position of the upper right edge of the rectangle as 4 digit ASCII-Value. Values in the area of 0 up to 656 may be entered, however, it has to be made sure that the value is always bigger than the X-Position of the lower left edge.
- f Shows if the lamination in the defined rectangle is activated or deactivated. An ASCII-Character is expected.

- '0' Sealing deactivated
- '1' Sealing activated



1Bh	65h	4Fh	30h	30h	31h	30h	30h	.eO00100
30h	31h	30h	30h	30h	33h	30h	30h	01000300
30h	33h	30h	30h	30h	0Dh	1Bh	65h	03000..e
4Fh	31h	30h	31h	35h	30h	30h	31h	O1015001
35h	30h	30h	32h	35h	30h	32h	35h	50025025
30h	31h	0Dh						01.

Illustration demonstrates an example (for better overviewing the coordinates are not shown). The area of rectangle 1 shall not be laminated. However, the area of rectangle 2 shall be laminated. Therefore, the following ESC-Sequences must be transmitted to the printer.

<ESC> 'e' 'O' '0' '0100' '0100' '0300' '0300' '0' <CR>, corresponds to rectangle 1

<ESC> 'e' 'O' '1' '0150' '0150' '0250' '0250' '1' <CR>, corresponds to rectangle 2



It must be noted that rectangle 1 gets a smaller position number than rectangle 2. If this is not paid attention to the area of rectangle 2 is overwritten by the area of rectangle 1 and therefore not laminated. The two ESC-Sequences result in the following bytes which are to be transmitted to the printer:

2.5 Delete „Image Memory“

With this ESC-Sequence the defined image storage is deleted. The value 0 is entered into the image storage of the colors Yellow, Magenta, Cyan and Black so that no impression develops. If Overcoat is entered all defined rectangles are deleted and therefore the complete card is laminated.

`<ESC> 'c' a <CR>`

a Shows the entered image storage as ASCII-Character.

'Y'	Yellow
'M'	Magenta
'C'	Cyan
'K'	Black
'O'	Overcoat

If only part of the image storage is to be deleted the ESC-Sequence for the 'Data Transmission must be used with the modus 'L'.

In the following example the image storage for the color Yellow is deleted.

1Bh	63h	59h	0Dh					.cY.
-----	-----	-----	-----	--	--	--	--	------

2.6 Printing one Color

This ESC-Sequence starts the printout of the set color. However, only under the condition that the affiliated image data have been transmitted into the corresponding image storage. The printing of the overcoat segment forms an exception. After deletion of the overcoat storage the whole card is laminated. Areas may be excluded from the lamination by a corresponding definition (ESC-Sequence 'Data Transmission Overcoat').

`ESC> 'a' c dddd <CR>`

C Color Storage which is to be printed as ASCII-Character. The following values are valid:

'Y', 'M', 'C', 'K', 'O'	
'Y'	Yellow
'M'	Magenta
'C'	Cyan
'K'	Black
'O'	Overcoat



dddd Number of copies as 4 digit ASCII-Value from 1 up to 9999 may be entered.

As the number of copies is transmitted at each print command and a card is usually printed in several colors, the number of copies last entered into the print command before the ESC-Sequence 'End Document' is always realized.

In the following example the color Yellow is printed with a copy.

1Bh	61h	59h	30h	30h	30h	31h	0Dh	.eY0001.
-----	-----	-----	-----	-----	-----	-----	-----	----------

In order to make an effective print possible the sequence of the print of the individual colors should correspond to the arrangement of those on the color ribbon. The colors arranged in the order Yellow, Magenta, Cyan, Black and Overcoat. Once a card has been laminated no other color may be printed on this card. Should one try it anyway, then the color ribbon will be destroyed.

2.7 Start Document

This ESC-Sequence commands the printer the beginning of a document (card). Once the printer receives the ESC-Sequence a card is conveyed into the print position. At that time the magnetic stripe or chip is programmed depending on the configuration of the printer. Further details may be obtained from the section 'Advises to the Printer Control'.

<ESC> <SOH> <CR> Beginning a document

The following bytes are transmitted to the printer when entering this ESC-Sequence:

1Bh	11h	0Dh						...
-----	-----	-----	--	--	--	--	--	-----

2.8 End Document

This ESC-Sequence informs the printer of the end of the document (card). Once the printer receives this ESC-Sequence a card is dispensed and the color ribbon is positioned to the beginning of the next Yellow-segment. Further details may be obtained from the section 'Advises to the Printer Control'.

<ESC> <EOT> <CR> End Document

The following bytes are transmitted to the printer when entering this ESC-Sequence.

1Bh	04h	0Dh						...
-----	-----	-----	--	--	--	--	--	-----



2.9 ESC-Sequences for the Chip-Modul

With this ESC-Sequence the chip reading or writing is activated or deactivated. The respective condition is kept until arrival of the next ESC-Sequence 'Chip' or 'Magnetic Stripe'. The ESC-Sequences 'Chip' and 'Magnetic Stripe' influence each other. When activating the chip reading or writing, the magnetic stripe is deactivated and when activating the magnetic stripe, the chip reader is deactivated. If the ESC-Sequence for the chip reader as well as for the magnetic stripe is transmitted then the last one transmitted is being processed.

<ESC> 'C' '0' <CR>

Deactivating chip reader

<ESC> 'C' '1' <CR>

Activating chip reader

This ESC-sequence is only for compatibility. With the next ESC-sequence you can also activate the chip-reader.

<ESC> 'C' '2' xxxxxx <CR>

xxxxxx time in which the chip contacts (value *4ms) stay on the chip as 6 digit ASCII-Value (4ms-1,11h).

<ESC> 'C' '3' <CR>

When the chip contacts are activated, this condition is interrupted by this ESC-Sequence.

This ESC-Sequence can be only executed, when between the Start Document and this ESC-sequence don't transmitted any other data's.

<ESC> 'C' '4' <CR>

When the chip is activated, this condition is interrupted by this ESC-Sequence. With the command End Document it is possible to move the card out of the printer without any printing.

These ESC-Sequences must be transmitted before transmitting the ESC-Sequence 'Start Document'. It is made sure, however, that the entered time will be definitely achieved. Should an error occur when chip reading or writing the card may be dispensed by the user with the ESC-Sequence 'End Document'.

2.10 ESC-Sequence 'Flip Over'

With this ESC-Sequence the printer is informed that the printing on the front side has ended and the printer is to flip over the card. Thus, the printer conveys the card out of the print shaft, flips it over and conveys the card back into the print position. Further details may be obtained from the section '*Advises to the Printer Control*'.

<ESC> 'f' <CR>

Print of the front side completed, flip over card and position it for printing the back side.



The following bytes are transmitted to the printer when entering this ESC-Sequence.

1Bh	66h	0Dh						.f.
-----	-----	-----	--	--	--	--	--	-----

2.11 Set SCSI-ID

With this ESC-Sequence the SCSI-ID may be changed (only devices which support SCSI). When delivered it is always set on ID 5.

<ESC> '!' 'S' x <CR>

X SCSI-ID as 1 byte hexadecimal value

3. Notes for the Printer Control

3.1 General Notes

The ESC-Sequences used for controlling the printer may be divided into the following 3 groups:

- Parameter transmission (print parameter, magnetic stripe)
- Document control (start document, flip over, and end document)
- Image data administration (load the image data, deletion of image storage and print of the image data)

In the following example the application and necessary sequence of the ESC-Sequences for an one-sided print are demonstrated:

1. Load printer specific parameter

<ESC> 'D'<CR> , Parameter for color segments

<ESC> 'd' <CR>, Parameter for black segments

2. Load data for magnetic stripe

<ESC> 'M' Modus <CR>Load data for the magnetic stripe with 'Modus' the receptive operation mode is set. If magnetic stripe is to be read or written 'Q' must be entered for the modus. This way it is assured that data possible existent from the previous card is deleted.

3. Start Document

<ESC> <SOH> <CR>

With this a card is conveyed out of the card stacker into the printer and at the same time the magnetic stripe is written (if magnetic stripe was activated). The card put into the print position.



4. Deletion of all Image Storage

<ESC> 'c' 'Y' <CR>
 <ESC> 'c' 'M' <CR>
 <ESC> 'c' 'C' <CR>
 <ESC> 'c' 'K' <CR>
 <ESC> 'c' 'O' <CR>

5. Load and Print Image Data

<ESC> 'e' 'Y' <CR> Loading the Image
 data for the Yellow color
 segment
 <ESC> 'a' 'Y' '0001' <CR> Printing the Yellow color
 segment
 <ESC> 'e' 'M' <CR> Loading the image
 data for the Magenta color
 segment
 <ESC> 'a' 'M' '0001' <CR> Printing the Magenta
 color segment
 <ESC> 'e' 'C' <CR> Loading the image
 for the Cyan color segment
 <ESC> 'a' 'C' '0001' <CR> Printing the Cyan color
 segment
 <ESC> 'e' 'K' <CR> Loading the image
 data for
 the Black color segment
 <ESC> 'a' 'K' '0001' <CR> Printing the Black color
 segment
 <ESC> 'e' 'O' <CR> In case the
 complete card should not be
 laminated the respective
 rectangles must be loaded
 now. If the complete card should
 be laminated this ESC-Sequence
 may be dropped.
 <ESC> 'a' 'O' '0001' <CR> Printing the overcoat color
 segment

6. End Document

<ESC> <EOT> <CR> With this the card is conveyed
 out of the printer after printing
 the last color (see example
 Overcoat)

7. Deletion of Data on Magnetic Stripe

<ESC> 'M' 'Q' <CR> The data on the magnetic stripe is
 deleted in the printer. Thus no
 identical card to the made card
 may be produced by manual print
 repetition. If this is not being used
 the ESC-Sequence may be
 dropped

As evident from this example the ESC-Sequences for
 parameter transmission by the ESC-Sequence 'Start
 Document'. The transmission of the image data and starting the
 printout takes place closed-up in the ESC-Sequences 'Start
 Document' and 'End Document'. If the ESC-Sequence is to be
 used for flipping over the card, 'Flip Over', it must take place



between the ESC-Sequence 'Start Document' and 'End Document'.
Below there are more examples for application of the ESC-Sequences.

3.2 Double-Sided Print of a Card with only one Color Ribbon Usage

On the front side of the card the colors Yellow, Magenta, Cyan, and Overcoat are printed and on the back side the color Black. The magnetic stripe is not applicated in this example.

1. Load printer specific parameter

<ESC> 'D'<CR> , Parameter for color segments

<ESC> 'd' <CR> , Parameter for black segments

2. Load data for magnetic stripe

<ESC> 'M' 'C' . <CR> Modus 'Q' to delete all data of the previous card and to prohibit writing on the magnetic stripe,.

3. Start Document

<ESC> <SOH> <CR> With this a card is conveyed out of the card stacker into the printer. The card put into the print position.

4. Deletion of all Image Storage

<ESC> 'c' 'Y' <CR>

<ESC> 'c' 'M' <CR>

<ESC> 'c' 'C' <CR>

<ESC> 'c' 'K' <CR>

<ESC> 'c' 'O' <CR>

5. Load and Print Image Data on he Front Side

<ESC> 'e' 'Y' <CR> Loading the Image data for the Yellow color segment

<ESC> 'a' 'Y' '0001' <CR> Printing the Yellow color segment

<ESC> 'e' 'M' <CR> Loading the image data for the Magenta color segment

<ESC> 'a' 'M' '0001' <CR> Printing the Magenta color segment

<ESC> 'e' 'C' <CR> Loading the image for the Cyan color segment

<ESC> 'a' 'C' '0001' <CR> Printing the Cyan color segment

<ESC> 'e' 'K' <CR> Loading the image data for the Black color segment

<ESC> 'a' 'K' '0001' <CR> Printing the Black color segment

<ESC> 'e' 'O' <CR> In case the complete card should not be laminated the respective rectangles must be loaded now. If the complete card should be laminated this ESC-Sequence may be dropped.



<ESC> 'a' 'O' '0001' <CR> Printing the overcoat color segment

6. Flip Over Card

<ESC> 'f' <CR> Printer flips the card over and moves back into the print position.

7. Deletion of all Image Storage

<ESC> 'c' 'Y' <CR>

<ESC> 'c' 'M' <CR>

<ESC> 'c' 'C' <CR>

<ESC> 'c' 'K' <CR>

<ESC> 'c' 'O' <CR>

8. Load and Print Image Data on the Back Side

<ESC> 'e' 'Y' <CR> Loading the Image data for the Yellow color segment

<ESC> 'a' 'Y' '0001' <CR> Printing the Yellow color segment

<ESC> 'e' 'M' <CR> Loading the image data for the Magenta color segment

<ESC> 'a' 'M' '0001' <CR> Printing the Magenta color segment

<ESC> 'e' 'C' <CR> Loading the image for the Cyan color segment

<ESC> 'a' 'C' '0001' <CR> Printing the Cyan color segment

<ESC> 'e' 'K' <CR> Loading the image data for the Black color segment

<ESC> 'a' 'K' '0001' <CR> Printing the Black color segment

<ESC> 'e' 'O' <CR> In case the complete card should not be laminated the respective rectangles must be loaded now. If the complete card should be laminated this ESC-Sequence may be dropped.

<ESC> 'a' 'O' '0001' <CR> Printing the Overcoat color segment

9. End Document

<ESC> <EOT> <CR> With this the card is conveyed out of the printer after printing the last color (see example Black)

3.3 Double-Sided Print of a Card with two Color Ribbon Usage

All colors are used on the front side as well as on the back side. The magnetic stripe is written only on track 1.

1. Load Printer Specific Parameter

<ESC> 'D'<CR> , Parameter for color segments

<ESC> 'd' <CR> , Parameter for black segments

2. Load Data for Magnetic Stripe

<ESC> 'M' 'W' '1' 'TEST' <SO> '2' <SO> '3' <SO> <CR>

To write track 1 on the card. For track 2 and 3 no data are transmitted and therefore are not written nor read.



3. Start Document

<ESC> <SOH> <CR>

With this a card is conveyed out of the card stacker into the printer and track 1 on the magnetic stripe of the card is written. The card is conveyed into the print position.

4. Deletion of all Image Storage

<ESC> 'c' 'Y' <CR>

<ESC> 'c' 'M' <CR>

<ESC> 'c' 'C' <CR>

<ESC> 'c' 'K' <CR>

<ESC> 'c' 'O' <CR>

5. Load and Print Image Data

<ESC> 'e' 'Y' <CR> Loading the Image data for the Yellow color segment

<ESC> 'a' 'Y' '0001' <CR> Printing the Yellow color segment

<ESC> 'e' 'M' <CR> Loading the image data for the Magenta color segment

<ESC> 'a' 'M' '0001' <CR> Printing the Magenta color segment

<ESC> 'e' 'C' <CR> Loading the image for the Cyan color segment

<ESC> 'a' 'C' '0001' <CR> Printing the Cyan color segment

<ESC> 'e' 'K' <CR> Loading the image data for the Black color segment

<ESC> 'a' 'K' '0001' <CR> Printing the Black color segment

<ESC> 'e' 'O' <CR> In case the complete card should not be laminated the respective rectangles must be loaded now. If the complete card should be laminated this ESC-Sequence may be dropped.

<ESC> 'a' 'O' '0001' <CR> Printing the overcoat color segment

6. To Flip Card Over

<ESC> 'f' <CR>

Printer flips the card over and moves back into the print position.

7. To Load and Print the Image Data on the Back Side

<ESC> 'e' 'K' <CR> Loading the image data for the Black color segment

<ESC> 'a' 'K' '0001' <CR> The color ribbon moves back up to the Black segment (has not been used yet for the front side) and the Black segment is being printed.

8. End Document

<ESC> <EOT> <CR>

With this the card is conveyed out of the printer after printing the last color (see example Black)



3.4 *Printing the same Image, but different resin black datas*

In the following example several cards are to be printed with a color image. On each card a different inscription is to be printed with the color Black.

1. Load Printer Specific Parameter

<ESC> 'D'<CR> , Parameter for color segments
 <ESC> 'd' <CR> , Parameter for black segments

2. Load Data for Magnetic Stripe

<ESC> 'M' 'Q' <CR> Modus 'Q' to delete all data from previous cards and to prohibit writing on the magnetic stripe.

3. Start Document (First Card)

<ESC> <SOH> <CR> With this a card is conveyed out of the card stacker into the printer. The card is conveyed into the print position.

4. Deletion of all Image Storage

<ESC> 'c' 'Y' <CR>
 <ESC> 'c' 'M' <CR>
 <ESC> 'c' 'C' <CR>
 <ESC> 'c' 'K' <CR>
 <ESC> 'c' 'O' <CR>

5. Load and Print Image Data for the First Card

<ESC> 'e' 'Y' <CR> Loading the Image data for the Yellow color segment
 <ESC> 'a' 'Y' '0001' <CR> Printing the Yellow color segment
 <ESC> 'e' 'M' <CR> Loading the image data for the Magenta color segment
 <ESC> 'a' 'M' '0001' <CR> Printing the Magenta color segment
 <ESC> 'e' 'C' <CR> Loading the image for the Cyan color segment
 <ESC> 'a' 'C' '0001' <CR> Printing the Cyan color segment
 <ESC> 'e' 'K' <CR> Loading the image data for the Black color segment
 <ESC> 'a' 'K' '0001' <CR> Printing the Black color segment
 <ESC> 'e' 'O' <CR> In case the complete card should not be laminated the respective rectangles must be loaded now. If the complete card should be laminated this ESC-Sequence may be dropped.



- <ESC> 'a' 'O' '0001' <CR> Printing the overcoat color segment
6. . End Document (First Card)
<ESC> <EOT> <CR> With this the card is conveyed out of the printer after printing the last color (see example Overcoat)
7. Start Document (Second Card)
<ESC> <SOH> <CR> With this a card is conveyed out of the card stacker into the printer. The card is conveyed into the print position.
8. Deletion of all Image Storage Black
<ESC> 'c' 'K' <CR> All other image storage must be kept as there will be always printed the same image.
9. To Print Image Data for the Second Card
<ESC> 'a' 'Y' '0001' <CR> Printing the Yellow color segment
<ESC> 'a' 'M' '0001' <CR> Printing the Magenta color segment
<ESC> 'a' 'C' '0001' <CR> Printing the Cyan color segment
<ESC> 'a' 'K' '0001' <CR> Printing the Black color segment
<ESC> 'a' 'O' '0001' <CR> Printing the Overcoat color segment
10. End Document
<ESC> <EOT> <CR> With this the card is conveyed out of the printer after printing the last color (see example Overcoat)

In this example the printing of 2 cards was demonstrated. The steps 7 to 10 may be , however, repeated as often as desired.

3.5 Saving the Image Datas

The color printer has four image storage. These may store all data, which are necessary for printing a card. The image storage are permanently installed for the colors Yellow, Magenta, Cyan, and Black. They have a resolution of 656 x 1024 pixel. Each pixel is stored with a resolution of 8 bit each. The image storage for Black also has a resolution of 8 bit. But since the inserted color ribbon for Black is a transfer segment only the values 0 and 255 may appear in the image storage. For lamination of the card the printer may store a total of 10 rectangles in which the lamination is activated or deactivated. The data entered in the storage remain until overwritten, deleted or turning off the printer.



When data are entered in the image storage the printer registers the input if the data and marks the corresponding image storage. When data are transferred as zeros (nothing will be printed) the printer does not mark the image storage. If a command is now initiated it will be ignored by the printer if not data are existent.

3.6 Control of the Magnetic Stripe Encoders

3.6.1 General Control

The printer writes the magnetic stripe when the card is conveyed from the feeder into the printer. Therefore, the data for the magnetic stripe must be available before the ESC-Sequence 'Start Document'. Therefore, the ESC-Sequence 'Magnetic Stripe' must be absolutely transferred before the ESC-Sequence 'Start Document', as otherwise the magnetic stripe will not be written.

The following samples are written in the C-language. Of course these functions are also available in other programming languages.

To control the magstripe under windows, there are some additional functions for the printer driver. These functions can be used from the windows-software with the function 'Escape'. Following is the description of the 'Escape' function:

```
int Escape(hdc, nEscape, cbInput, lpszInData, lpvOutData)
HDC hdc;                /* handle of device context */
int nEscape;            /* specifies escape function */
int cbInput;           /* size of structure for input */
LPCSTR lpszInData;     /* address of structure for input */
void FAR* lpvOutData;  /* address of structure for output */
                        */
```

The Escape function allows applications to access capabilities of a particular device that are not directly available through the graphics device interface (GDI). Escape calls made by an application are translated and sent to the driver.

Parameter	Description
hdc	Identifies the device context.
nEscape	Specifies the escape function to be performed.
cbInput	Specifies the number of bytes of data pointed to by the lpszInData parameter.
lpszInData	Points to the input structure required for the specified escape.
lpvOutData	Points to the structure that receives output from this escape. This parameter should be NULL if no data is returned.

The return value specifies the outcome of the function. It is greater than zero if the function is successful, except for the QUERYESCSUPPORT printer escape, which checks for implementation only. The return value is zero if the escape is not implemented. A return value less than zero indicates an error.



Errors

If the function fails, the return value is one of the following:

Value	Meaning
SP_ERROR	General error.
SP_OUTOFDISK	Not enough disk space is currently available for spooling, and no more space will become available.
SP_OUTOFMEMORY	Not enough memory is available for spooling.
SP_USERABORT	User terminated the job through Print Manager.

The following ESC-Sequences can be handled by the printer driver (with the function Escape):

Symbolic Name	Value
SETMAGTRACK1	4156
SETMAGTRACK2	4157
SETMAGTRACK3	4158
SETMAGMODE	4159

Setting the datas for the Magstripe

Datas can be set with the 'Escape' windows-function to the defined track:

SETMAGTRACK1	4156
SETMAGTRACK2	4157
SETMAGTRACK3	4158

Input Parameters: char far *

Values: The string must be finished by a 0. Allowed are only the characters defined by the standard ISO/IEC 7811-6 .

The printer driver accept all characters without the start and stop characters.

Output parameters: not used

Description: For reading and writing the magstripe all data's can be transmitted with this ESC-Sequences. The printer driver will check the values according to the standard:

Track 1: 32 - 95 without 37 and 63 (ASCII-characters)

Tracks 2 and 3 : 48 - 62 without 59

If there is a not allowed character in the string, then the data's will not be transmitted to the printer.

Setting the Mode

The mode is be setting by the 'Escape' windows-function:

SETMAGMODE	4159
------------	------

Input Parameters: char far *

Values: One character, which defines the mode of the magstripe.

'W' : Write and Verify

'R' : Read and Verify

'Q' : Deactivate the magstripe



Output Parameter: not used

Description: With this ESC-Sequence the magstripe can be controlled.

To read and or write one data-record for one track must be transmitted at least. In the other case the ESC-Sequence will be ignored.

Sample

In the following are written a very simplified sample. The 'Escape' windows-function handle over the datas for the magstripe and set the mode.

```
HDC hdc;
char *test;
/*prepare the DC of the Driver, pDriver, pDevice and pOutput
are parameters, which defined before (Drivername, interface
etc.)*/
hdc = CreateDC(pDriver,pDevice,pOutput,NULL);

/*Open Document*/
StartDoc(.....);

/*Now handle over the datas for the magstripe*/

/Define the string for track 1*/
test = "ABCDEFGG";
/*and handle over the datas to the driver*/
Escape(SETMAGTRACK1,4,test,NULL);

/ Define the string for track 2*/
test = "1234";
/* and handle over the datas to the driver */
Escape(SETMAGTRACK2,4,test,NULL);

/ Define the string for track 3*/
test = "56789";
/* and handle over the datas to the driver */
Escape(SETMAGTRACK3,4,test,NULL);

/*At last define the mode ('R' only read 'W' write and verify*/
Escape(SETMAGMODE,1,"W",NULL);

/*Now the GDI-commands for the prepare of the page*/
.....

/*Output the page*/
EndPage(hdc);
EndDoc(hdc);

/*and close the printer driver*/
DeleteDC(hdc);
```



3.6.2 Difference between Windows 95 and Win NT

The driver for windows 3.11., 95 and 98 is a 16 - bit software. For the commands are using only the ESC-sequences for the standard sequences as well as for the customized printer sequences (magstripe).

The driver for windows NT is a 32 - bit software. That means, there is a complete difference interface to the application compare with Win 95. There are existing two different functions (Escape and ExtEscape).

The Escape – sequences are using for windows standard functions (start of page).

Only the ExtEscape– sequences are using for the special printer functions.

Note: You can't use the same software for the NT and Win 95 to control the magstripe.

3.6.3 Control by a Textstring

The Magstripe-encoder can be controlled by a text-string. By this way you can transfer the data's to the encoder from a database or from MS Word.

	Start Sentinel	End Sentinel	Field Separator
Track 1	~1%	?	^
Track 2	~2;	?	=
Track 3	~3;	?	=

Sample:

Code the Track 1: IDNUMBER98014567
 Track 2: 1234567890
 Track 3 : 0987654321

You have to transfer the following text-string:

~1% IDNUMBER98014567?
 ~2;1234567890?
 ~3; 0987654321?

Note: Available in the driver-version 4.12 or higher.

