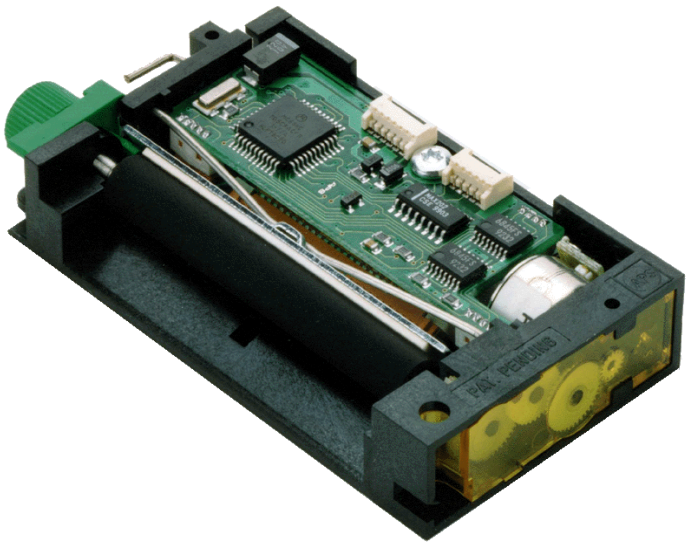
CP 205 MRS



1. TABLE OF CONTENTS

http://www.aps-printers.com/

This manual provides complete information about APS CP205MRS printer.

2. GENERAL FEATURES

The CP205-MRS printer is the first integrated printer in the size of a mechanism. This printer includes one CP205S print mechanism with an integrated controller board operating from a serial communication. Thanks to its optimization the volume of the complete printer is same as the print mechanism alone.

- **Ultra-compact printers**
  Total size W87 x H16 x D47
  No wire or connector exiting this volume
- **Fully hot plug printers**
- **Software programmable consumption**
  Dynamic division, and high speed (up to 60mm/s)
- **Full control over printing quality/speed**
  Speed clamping, acceleration smoothing… via control codes
- **External pluggable switches and LED for easy integration**
- **Single power supply**
  From 5 Volts to 8.5 Volts
- **RS232 Communication ports**
  Speed up to 115 200 Bds
- **Three internal fonts**
  Easy font update
- **Powerful Text Printing Modes**
  Up to 48 characters per line.
  Horizontal
  180 degree
  Double and Quadruple width and height printing
  Inverse video
- **Powerful Graphic Modes**
  Variable width and offset
  Double width and height
- **Hole / Mark Detection**
- **Cutter driving**
  Guillotine cutter type
- **10 Barcodes**
  Normal and 90 degree
- **Supports reflective and transmissive optocouplers**
- **Printing parameters can be saved in flash**
- **Supports easy single-sheet insertion /ejection**
- **Windows® drivers available**
- **Easy firmware upgrades** (please contact A.P.S)

3. REVISION HISTORY

Rev.	Date	Page	Revision item
A	02/Aug/98	-	First issue
B	19/Apr/99	-	Software Revision MRS 4.0
C	21/May/99	-	Software Revision (Label detection)
D	10/June/99	-	Software Revision (New font addition, Label detection upgrade) - MRS 4.1 or Masked
E	01/Sep/01	-	New control board + software : 5.0 Three internal fonts, inverse video, different widths mixed on same line, acceleration smoothing, text justification, rotated barcodes, support for both reflective and transmissive optocouplers.
F	15/Apr/02	-	5.2 and 5.3 firmware revision : enhanced opto support with calibration. 5.2 supports older hardware (saturated opto). 5.3 supports new hardware (linear opto).
G	15/Apr/03	-	5.42 and 5.52 firmware revision : minor enhancements.
H	20/Oct/03	-	5.46 and 5.56 firmware revision : Updated RS232 parameters saving.
I	04/Jun/04	-	Firmware revisions 5.47 / 5.57 : Added ticket eject direction (GS d n) Near end of paper hardware update.
J	05/Nov/04	-	Firmware revisions 5.48 / 5.58 Updated dynamic division parameter saving.
K	06/Apr/05	20, 22 and 24	Firmware revisions 5.49 / 5.59 Saving of mark length parameter (ESC s). Height change restriction (ESC ! n). Denmark character set (ESC R n).
L	28/Jul/05	29	Firmware revisions 5.60 / 5.70 UPC-E barcode enhancement.
M	10/Oct/05		Firmware revisions 5.61 / 5.71 Minor enhancements.

N	22/Mar/06	24	Firmware revisions 5.62 / 5.72 Text mode : a last character is possible even if next character spacing does not hold in the line. Minor enhancements.

4. GENERAL SPECIFICATIONS

ITEM	SPECIFICATION
Print method	Thermal dot-line printing
Dimension WxDxH (mm)	87 x 47 x 16
Total dots	384
Dot density	8 dots/mm
Paper width	58 mm
Print width (centered on paper)	48 mm
Heat element pitch	0.125 mm
Paper feed pitch	0.125 mm
Paper feed tension	50g or more
Paper hold tension	80g or more
Recommended Paper	KF50-HDA or equivalent
Voltage range	5Volts to 8.5Volts
Current consumption	From 1.5A to 5Amp (@5V)
Operating temperature	From -10°C to +60°C
Operating humidity (RH%)	20-85 (no condensation)
Storage temperature (°C)	From -40°C to +90°C
Storage humidity (RH%)	10-90 (no condensation)
EMC standard	Designed to comply with Level B – FCC - CE

5. PRINTER DEVICE INTERCONNECTION

Please refer to the drawing attached to back of this specification for connect or positions.
These printers are fully hot plug : any connector hereafter can be connected or disconnected without damaging the printer.

5.1. Power supply connector

Connector J1: MOLEX, 53048 Series 6 contacts. Female 51021 Series contacts 50079/50058.
Power supply (V bat) is from 5v to 8.5v DC. Maximum current is 5A @ 5V(peak for 3ms).

PIN NUMBER	SIGNAL NAME
1	Not Used
2	V bat
3	V bat
4	GND
5	GND
6	GND

IMPORTANT NOTE:
Wires AWG28 must be used in order not to increase the current losses

5.2. Serial communication connector

Connector J2: MOLEX, 53048 Series 5 contacts. Female 51021 Series contacts 50079/50058.

PIN NUMBER	SIGNAL NAME
1	Gnd
2	Transmit data (Txd, printer output)
3	Receive data (Rxd, printer input)
4	CTS/DSR (printer input)
5	RTS/DTR (printer output)

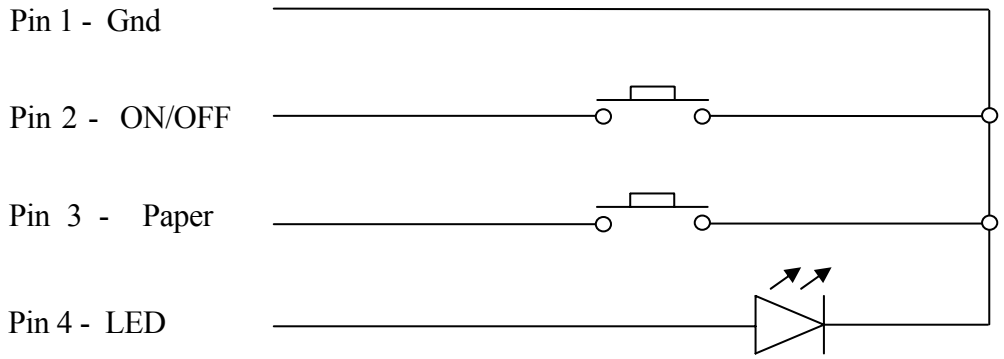
5.3. Switch/Led connector

Connector J3: MOLEX, 53048 Series 4 contacts. Female 51021 Series contacts 50079/50058.

PIN NUMBER	SIGNAL NAME
1	Gnd
2	ON/OFF line
3	Paper FEED
4	LED (cathode)

This connector allow you to design an external paper feed button, on-line off-line button, and status LED.

External circuitry is as follows:



(*) A serial resistor (470 Ohms) is on the printer, setting the LED current at about 7 mA.

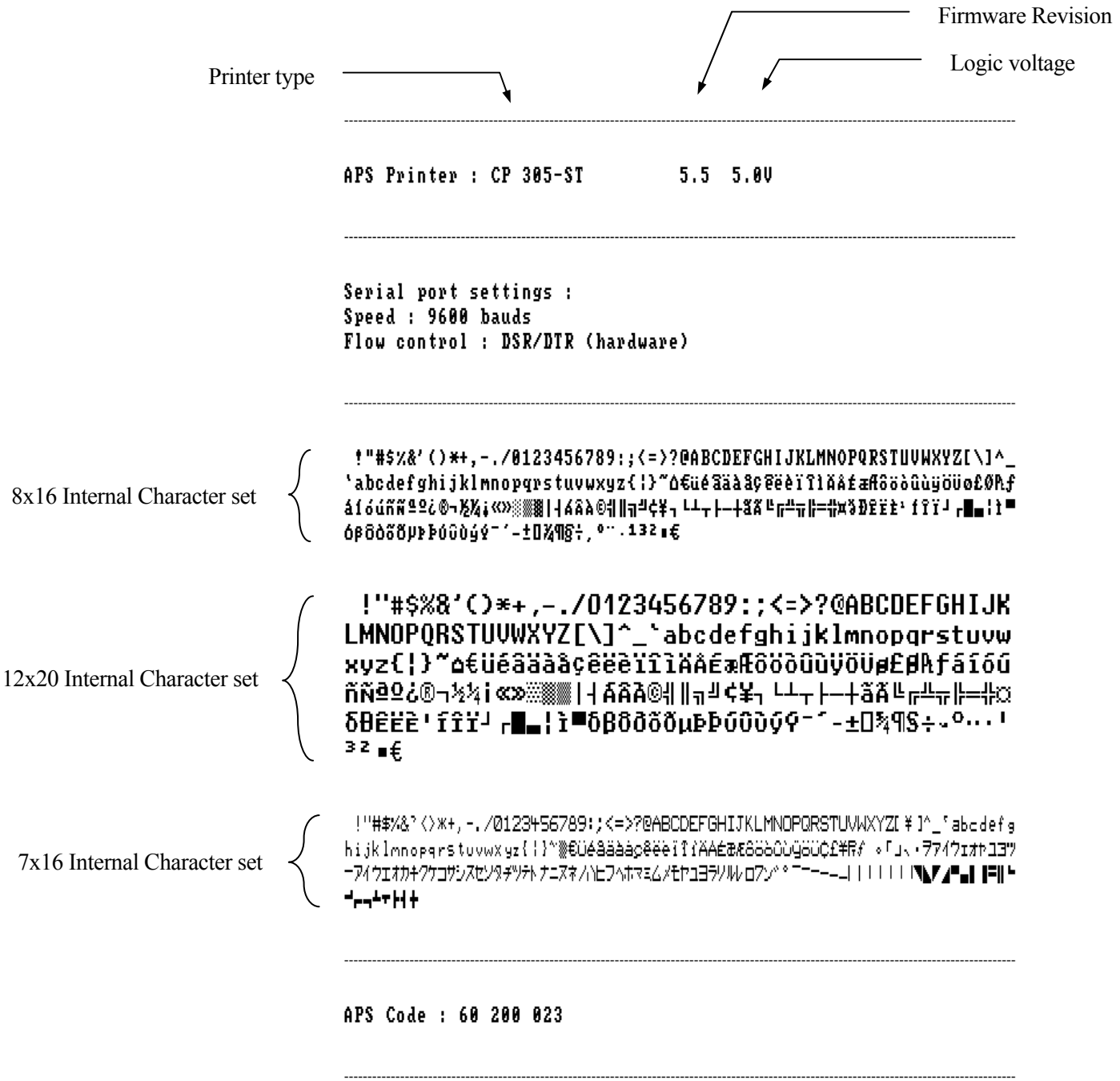
The Switches and LED functions are defined in the following table:

Printer Status	**OFF**	**OFF Line**	**On Line**	**Head-up**	**End of Paper**	**Over/Under Voltage or Temperature**
On/Off Line SW	Execute **self-test** if pressed during Power-On	On Line	Off Line	N/A		
		N/A				
Paper Feed Switch	N/A	Feeds Paper	Feeds Paper if not already printing	N/A		
LED	OFF	1 Flash "ON"	Always "ON"	2 Flash "ON"	3 Flash "ON"	4 Flash "ON"

6. PRINTER DEVICE OPERATIONS

6.1. Self test Mode

This mode is done by the combination of the 2 external switches (see section 5.3). It prints the printer type, the revision of the printer firmware, the logic voltage, the serial port settings, all internal character sets, and product code.



6.2. Paper loading

Paper loading can be achieved by two different methods:

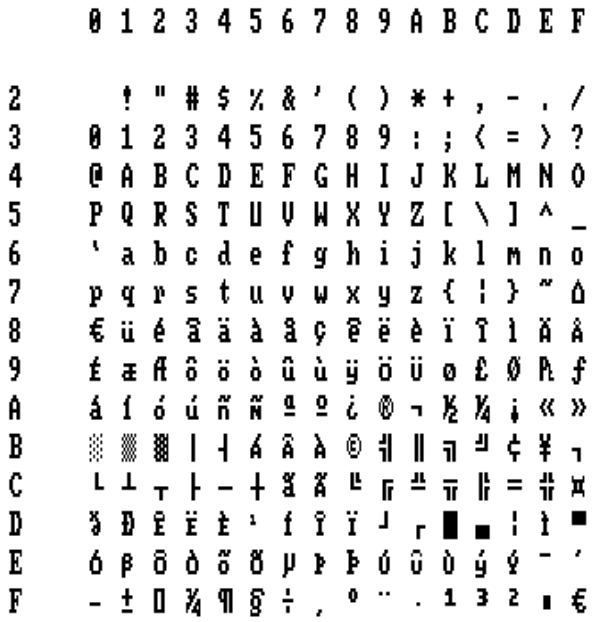
- **Automatic paper loading**: With the green head-up lever in the down position, insert the paper inside the printer, and then the roller will automatically feed the paper for about 40 mm. If the printer has a cutter, the cutter will cut the paper after the loading. The printer is then ready to print. This function can be achieved only if power supply is more than 5 volts. In mark detection mode, the paper is fed forward to the TOF position.

- **Manual paper loading**: Put the green head-up lever in the up position. Manually feed the paper into the printer until it exits between the thermal head and the roller. Turn the green lever to the head-down position. Now the printer is ready to print.

6.3. Text Printing format

The controller board has three resident sets of 224 characters : 8x16, 12x20, and 7x16.
The 8x16 and 12x10 fonts include the *Euro currency symbol (Position 128, 80h)*.
12 characters are selectable from the international character set : refer to ESC "R" command for more information.
All character bitmaps will be shown with their hexadecimal code (row being the most significant nibble, and column the least significant nibble). Example : ascii code for 'A' is 41 hex (or 65 decimal).

- **8x16 Character set**: Character size is 9 pixels (8 "active dots" plus one inter-character) x 20 pixels (16 "active" dots plus 4 interlines including underline), or 1.125mm x 2.5mm.
  With double and quadruple height and width, maximum character size can go up to 4.5mm width x 10mm height.
  Horizontal character spacing and line spacing may be adjusted via the software. Character per line is up to 64 in standard text, 32 in double width, and 16 in quadruple width.



- **12x20 Character set**: Character size is 13 pixels (12 "active dots" plus one inter-character) x 24 pixels (20 "active" dots plus 4 interlines including underline), or 1.625 mm x 3 mm.
  With double and quadruple height and width, maximum character size can go up to 6.5mm width x 12mm height.
  Horizontal character spacing and line spacing may be adjusted via the software. Character per line is up to 44 in standard text, 22 in double width, and 11 in quadruple width.

- **7x16 Character set** : Character size is 8 pixels (7 “active dots” plus one intercharacter) x 20 pixels (16 “active” dots plus 4 interlines including underline), 1 mm by 2,5mm.
  With double and quadruple height and width, maximum character size can go up to 4 mm width by 10mm height.
  Horizontal character spacing and line spacing may be adjusted via the software. Character per line is up to 48 in standard text, 24 in double width, and 12 in quadruple width.
  This font includes the Katakana characters set.

Note : In emulation mode (default at power up) the printer is compatible with previous CP205 that only had two fonts (8x16 and 7x16) so the order of the fonts is 8x16, 7x16, and 12x10. After setting the CP205 in full MRS mode, behaviour is compatible with all newer MRS printers, which means the order of the fonts is now 8x16, 12x10, 7x16. The order refers to the correspondence with values 0, 1 , 2… in the “Select internal font” command ESC % n.

6.4. Operating Control codes

Control codes are non-printable characters or sequences of characters that control the operation of the printer. Within the following description, a control code causes the printer to interpret the following byte as part of a command and not as a printable character.

6.4.1. *Control codes cross reference*

Setup and Hardware control

COMMAND	DESCRIPTION
GS / n	Set printing speed / maximum peak current
GS s n1 n2	Set maximum print out speed
GS a n	Set acceleration smoothing
GS D n	Set print intensity
ESC @	Reset printer
ESC v	Send printer status
ESC I	Send printer identity
GS B n	Serial communication settings
ESC o n	Set optocoupler type
GS O n1 n2	Start optocoupler calibration
ESC O	Send optocoupler parameters
GS o	Send optocoupler level
ESC f	Disables previous generation emulation
ESC s	Save setup parameters
ESC d	Default setup parameters
GS p n	Set paper loading pause
GS P n1 n2	Sets paper loading length
GS e n	Ejects paper
GS d n	Sets eject direction
GS M n1 n2	Sets paper loading speed

Text and General commands

COMMAND	DESCRIPTION
ESC % n	Select internal font
ESC R n	Select international character set
ESC 2 n	Set line pre-spacing
ESC 3 n	Set line spacing
ESC SP n	Set character spacing
ESC b n	Set inverse video printing
ESC c n	Set maximum number of columns
ESC C n	Set text justification
ESC ! n	Set print mode
ESC { n	Set/reset rotated characters
LF	Line feed
CR	Carriage return
ESC J n	Feed paper (n dot lines) forward
ESC j n	Feed paper (n dot lines) backward
CAN	Cancel print data buffer (text mode)

Graphics commands

COMMAND	DESCRIPTION
ESC * n1 n2 n3 n4 n5 (n6) data	Print graphics
ESC $ n1 n2	Horizontal dot positioning
ESC V n1 n2 n3 data	Horizontal bit image

Cutter commands

COMMAND	DESCRIPTION
ESC m	Partial cut
ESC i	Full cut

Bar code commands

COMMAND	DESCRIPTION
GS k n [Start] <data> NUL	Print bar code
GS h n	Barcode height
GS w n	Barcode magnification
GS H n	Text position in barcode
GS R n	Set/reset rotated barcode

Hole and black mark detection commands

COMMAND	DESCRIPTION
GS L n	Set mark length
GS T n1 n2	Set TOF position
GS E	TOF feed paper
GS Y n1 n2	Set opto to head dot line length
GS X n1 n2	Set mark to cut position
GS x n1 n2	Set cut line to head dot line length

6.4.2. *Setup and Hardware control*

GS / n

Description: Set printing speed / Maximum peak current / Dynamic division
Format: <1Dh> <2Fh> <n>
Comments: n = 1 to 32: (Default n = 5) Software programmable consumption (Dynamic division). The maximum number of black dots which are simultaneously heated is (n+1) x 8.
In default mode, n = 5.
Example : n = 5 Maximum black dots heated: (5+1)*8=48.
Printer Peak consumption @5V: (0.3A (Stepper Motor) + 5*48/160) = 1.8A
160 Ohms is the dot resistance.

GS s n1 n2

Description: Set maximum print speed
Format: <1Dh> <73h> <n1> <n2>
Comments: This control code may be used to reduce the print speed. Maximum print speed may be reduced in case of paper roll diameter above 60mm and/or if rewinding mechanism is connected to the printer. It can also help to reduce noise and improve print quality.
Bytes n1, n2, set the time T (in µs) between each step:
T = (256*n1) + n2. 1000 < T < 25000.
Default: T = 2000 : n1 = 7, n2 = 208.
Example: T = 2000 µs
Maximum print out speed:
(1/(8 * 2000e-6)) = 62.5 mm/s
8 dots/mm is the dot density.

GS a n

Description: Set acceleration smoothing
Format: <1Dh> <61h> <n>
Comments: n = 0 to 255: (Default n = 180) Software programmable acceleration smoothing. The print cycle time is limited to the cycle time of the previous cycle multiplied by the acceleration coefficient (coefficient = n/256). This improves print quality and reduces noise.
Example: n = 180: Cycle time can't be smaller than 70% of previous cycle time.

GS D n

Description: Set print Intensity
Format: <1Dh> <44h> <n>
Comments: n = 80h (128d) : (Default). Nominal print intensity
n > 80h (128d) : Printout becomes darker
n < 80h (128d) : Printout becomes lighter
(n from 0 to 255 (FFh)).

ESC @

Description: Resets printer
Format: <1Bh> <40h>
Comments: Clears data print buffer and initializes the printer with default values. This command is executed immediately after being received, even in case of buffer full (DTR/RTS or Xoff active).

ESC v

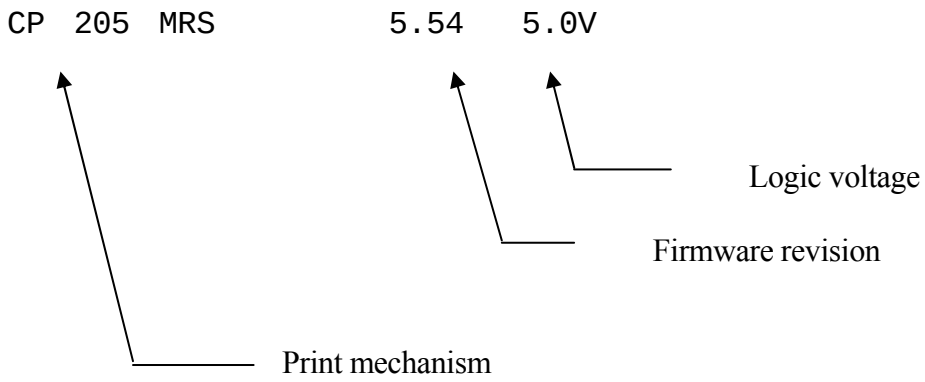
Description: Send printer status
Format: <1Bh> <76h>
Comments: The printer will transmit a single byte which reflects the status of the printer in accordance with the following table:

Bit	Function	Bit = 0	Bit = 1
0	Head temperature	OK	Too high or too low
1	Head-up	No	Yes
2	Paper out	No	Yes
3	Power supply	OK	Too high or too low
4	Printer in use	Ready	Action in progress
5	On/Off line	Off	On
6	Hole/Mark detection Error	No	Too short, too long or not found
7	Cutter failure	Yes	No

This command is executed immediately after being received, even in case of buffer full (DTR/RTS or Xoff active). Host must disable the handshaking controls to send the ESC v command.

ESC I

Description: Send printer identity
Format: <1Bh> <49h>
Comments: The printer returns a string ended by zero (00h) that reflects the printer identity.
The string is formed by the concatenation of print mechanism name, firmware revision, and logic voltage, like the following example:



Note: The identity string always has a fixed format, that is: the print mechanism name padded to 16 bytes, a space, then 5 bytes for the firmware revision (the dot being in the middle), a space, then the logic voltage (the string '5.0V') ended with zero.

GS B n

Description: Serial communication and mode settings
Format: <1Dh> <42h> <n>
Comments: Sets serial communication speed and mode
Bit 7: B7=0: Xon/Xoff mode (software control),
B7=1: RTS/DTR mode (hardware control).
Bit 6: Not used.
Bit 5: Stopbit; B5=0, 1 stopbit; B5=1, 2 stopbits.
Bit 4: Not used.
Bit 3: Not used.
Bit 2, 1, 0: Speed:

n	COMMUNICATION SPEED
0	1 200
1	2 400
2	4 800
3	9 600
4	19 200
5	38 400
6	57 200
7	115 200

(Default : n = 83h : RTS/DTR; Normal mode, 1 Stopbit, 9600 Bds, No Parity)

Note: Unused bits should be set to zero.

GS P n1 n2

Description: Sets paper feeding length in automatic paper loading
Format: <1Dh> <50h> <n1> <n2>
Comments: Sets the length of the paper fed during the automatic paper loading.
Bytes n1, n2, set the length L (in dot lines) of the feeding.
L = (256*n1) + n2.
Default : L = 40 mm : n1 = 1, n2 = 64.

ESC o n

Description: Sets the optocoupler type.
Format: <1Bh> <6Fh> <n>
Comments: n = 0: support for reflective optocoupler activated (default).
n = 1: support for transmissive optocoupler activated.

If the default optocoupler is replaced by the user, the distance between the opto and the printing line can be adusted by a control code – see "Hole / Black mark detection commands" section.

Note: Transmissive optocouplers are generally used in applications requiring hole or black mark detection.

GS O n1 n2

Description: Starts the optocoupler calibration procedure.
Format: <1Dh> <4Fh> <n1> <n2>
Comments: n1 specifies the length of paper loading before the actual calibration is done.
n2 specifies the length of paper used to calibrate the opto.
Length is in centimeters.
For details, please contact A.P.S for opto calibration application note.

ESC O

Description: Sends optocoupler parameters.
Format: <1Bh> <4Fh>
Comments: The printer responds by sending 6 bytes :

- opto type (0 for reflective, 1 for transmissive)
- black level
- mark/backing level
- paper level
- paper presence threshold
- mark detection threshold

All these parameters are determined automatically by the opto calibration procedure and should provide correct operation for most applications. This command is intended for test purposes.

GS o

Description: Sends the current level of the opto.
Format: <1Dh> <6Fh>
Comments: The printer responds with a byte representing the opto level.

ESC f

Description: Disables previous controller generation emulation.
Format: <1Bh> <66h>
Comments: The previous generation (as defined in revision D of this document) of the CP205 printer had a different controller and software (4.1). This generation supports a richer set of features, but powers up in an 'emulation mode' that is compatible with the previous generation.
The differences of operation are mainly :

- the number of bytes that define the graphic size in graphics commands.
- the order of the fonts as a function of the control code sent.

Older applications written for 4.1 revisions that print text and graphics should look the same.
It is possible to disable this emulation and enable the 'full' enhanced behaviour that is the same as all other newer A.P.S products.

Note : The mark detection feature is only supported in the 'full MRS' mode.

ESC s

Description: Save the setup parameters. (Applies to version 5.2 and higher)
Format: <1Bh> <73h>
Comments: The setup parameters are saved in the internal flash memory of the controller. They are not lost when power is removed or printer reset, and are recalled when power is applied again. At the end of the saving sequence, the printer returns a byte with value zero.

The following parameters are saved by this command:

- internal font
- pre line spacing
- line spacing
- character spacing
- print mode
- rotated
- maximum number of columns
- text justification
- maximum peak current
- intensity
- serial mode
- barcode height
- barcode magnification
- barcode text position

- barcode orientation
- paper loading length
- paper loading speed
- paper loading pause
- speed limitation
- mark length
- top of form position
- mark to cut position
- head to cut length
- opto to head length
- acceleration smoothing
- international character set

ESC d

Description:	Default setup parameters. (Applies to version 5.2 and higher)
Format:	<1Bh> <64h>
Comments:	Revert all parameters of the 'Save setup parameters' command to their factory default values. This action is temporary. If the printer is reset or power is cycled, the parameters will be initialized with the last set saved by the 'ESC s' command. If you want to permanently set the parameters to the factory defaults, you must send an 'ESC d' 'ESC s' sequence. Combining the use of these command and the 'reset printer' command enables you to compare the effects of the default and saved values without altering the saved values.

GS p n

Description:	Sets paper loading pause
Format:	<1Dh> <70h> <n>
Comments:	n = 0 to 255. Software programmable pause between the moment the printer detects the insertion of paper and the moment the roller starts turning. This allows accurate manual positionning of the paper. The value n is in 125 milliseconds units. Default: n = 0. Example: n = 16. The printer waits 2 seconds.

GS P n1 n2

Description:	Sets paper feeding length in automatic paper loading
Format:	<1Dh> <50h> <n1> <n2>
Comments:	Sets the length of the paper fed during the automatic paper loading. Bytes n1, n2, set the length L (in dot lines) of the feeding. L = (256*n1) + n2
Default :	L = 40 mm : n1 = 1, n2 = 64.

GS e n

Description: Ejects paper
Format: <1Dh> <65h> <n>
Comments: n = 0 to 255. The printer will feed the paper until an end of paper condition is detected. It will then feed an extra n millimeters, usefull for ejecting sheets totally.

GS d n

Description: Sets eject direction
Format: <1Dh> <64h> <n>
Comments: n = 0 : the eject direction is the forward feed direction (default)
n = 1 : the eject direction is the reverse feed direction
If n is not either 0 or 1, the command is ignored.

GS M n1 n2

Description: Sets paper loading speed
Format: <1Dh> <4Dh> <n1> <n2>
Comments: This control code may be used to adapt the loading speed to various conditions.
Bytes n1, n2, set the time T (in µs) between each step:
T = (256*n1) + n2. 1500 < T < 32000.
Default: T = 11520: n1 = 45, n2 = 0. Speed: (1/(8 * 11520e-6)) = 10.8 mm/s.

6.4.3. *Text and General commands*

ESC % n

Description: Switch the set of printable characters
Format: <1Bh> <25h> <n>
Comments: n = 0 : **8x16** Font Bank is selected.
n = 1 : **7x16** Font Bank is selected.
n = 2 : **12x10** Font Bank is selected.

This is the default behaviour. After sending the ESC f command, the order of the fonts will be as follows :

n = 0 : **8x16** Font Bank is selected.
n = 1 : **12x10** Font Bank is selected.
n = 2 : **7x16** Font Bank is selected.

The international character set selection (ESC R) is disabled.
Address from A0h to DFh : Katakana characters.

Note : 24 characters per lines can be performed by printing out in double width (ESC !) with a character spacing set to 1 (ESC SP).

ESC R n

Description: Select international character Set
Format: <1Bh> <52h> <n>
Comments: Modify the set of printable characters in accordance with the table below:

n	COUNTRY	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	USA	#	$	@	[	\	]	^	‘	{	|	}	~
1	France	#	$	à	°	ç	§	^	‘	é	ù	è	“
2	Germany	#	$	§	Ä	Ö	Ü	^	‘	å	ö	ü	ß
3	UK	£	$	@	[	\	]	^	‘	{	|	}	~
4	Denmark 1	#	$	@	Æ	Ø	Å	^	‘	æ	ø	å	~
5	Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6	Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
7	Spain 1	Pt	$	@	¡	Ñ	¿	^	'	"	ñ	}	~
8	Japan	#	$	@	[	¥	]	^	‘	{	□	}	~
9	Norway	#	¤	É	Æ	□	Å	Ü	é	æ	□	å	ü
10	Denmark 2	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11	Spain 2	#	$	à	¡	Ñ	¿	é	'	í	ñ	ó	ú
12	Latin Amer.	#	$	à	¡	Ñ	¿	é	û	í	ñ	ó	ú

ESC 2 n

Description: Set line pre-spacing
Format: <1Bh> <32h> <n>
Comments: Sets the line pre-spacing. (Default n = 0). n may vary from 0 to 15. The line spacing pitch is 1/8mm. Note : This is usefull when printing in inverse video if some character pixels are on the first dotline.

ESC 3 n

Description: Set line spacing
Format: <1Bh> <33h> <n>
Comments: Sets the character line spacing. (Default n=3). n may vary from 3 to 15. The character line spacing pitch is n/16mm.

ESC SP n

Description: Set character spacing
Format: <1Bh> <20h> <n>
Comments: Sets the character right spacing. (Default n=2). n may vary from 1 to 16. The character right spacing pitch is n/8mm. This spacing is proportionnal to double width (nx2) and quadruple width (nx4) commands.
Note: A last character is possible even if next character spacing does not hold in the line.

ESC b n

Description: Set inverse video printing
Format: <1Bh> <62h> <n>
Comments: The value of n (default 0) can be 1 (inverse video) or 0 (normal video). This setting is valid for the whole printing line. Spaces at the beginning of a line will be printed as a dark rectangle. In order to shift the black printing from the left margin, one can send the TAB (ascii 9) instead. This enables an accurate control of the placement of the edges of the inverted portion.

ESC c n

Description: Set maximum number of columns
Format: <1Bh> <63h> <n>
Comments: The value of n (default 255) is the maximum number of printable characters the printer accepts before automatically going to the next line.

ESC C n

Description: Set text justification
Format: <1Bh> <43h> <n>
Comments: The value of n specifies how text will be justified.
n = 0: text will be centered.
n = 1: text will be right justified.
n = 2: text will be left justified.
Default is left justification.

ESC ! n

Description: Set print mode
Format: <1Bh> <21h> <n>
Comments: The value of n (default 0) selects the various modes of printing as described in the table on the next page:

Bit	Function	Bit = 0	Bit = 1
0	Not used	-	-
1	Quadruple Height	Cancelled	Set
2	Quadruple Width	Cancelled	Set
3	Not used	-	-
4	Double Height	Cancelled	Set
5	Double Width	Cancelled	Set
6	Not used	-	-
7	Underlined	Cancelled	Set

Note: Different print widths can be mixed on the same line (8 changes per line maximum).
Only one print height is enabled per line. If height change request during a line already started, change will be taken into account only on the next line.

ESC { n

Description: Set/Cancel Rotated characters
Format: <1Bh> <7Bh> <n>
Comments: This command rotates by 180° the text being printed out.
n= 0 (default). Printout is normal
n=1 : Printout is rotated 180°

LF

Description: Line feed
Format: <0Ah>
Comments: Move the print position to the beginning of the next line

CR

Description: Carriage return
Format: <0Dh>
Comments: Move the print position to the beginning of the next line. Note : if CR is followed by LF, the printer will ignore the LF after CR. So, CR = LF = CR+LF.

ESC J n

Description: Feed paper (n dot lines) forward
Format: <1Bh> <4Ah> <n>
Comments: Paper is fed for n (n<256) dot lines (n times 0.125 mm). The print position is is at the beginning of the next line

ESC j n

Description: Feed paper (n dot lines) backward
Format: <1Bh> <6Ah> <n>
Comments: Paper is fed for n (n<256) dot lines (n times 0.125 mm) backward. The print position is at the beginning of the next line

CAN

Description: Cancel print data buffer (text mode)
Format: <18h>
Comments: The print buffer is cancelled and print position is at the beginning of the next line.

6.4.4. *Graphics commands*

6.4.4.1. Graphics command for emulation mode :

ESC * n1 n2 n3 n4 n5 <data>

Description: Print graphics
Format: <1Bh><2Ah><n1><n2><n3><n4><n5><datas>
Comments: Bytes n1 and n2 set the number of bytes N to be printed out : N = (256*n2) + n1

Byte n3 sets graphic operators on data byte and has the following meaning :
- n3=0 : print normal size data byte (full printer resolution)
- n3=1 : double width
- n3=2 : double height
- n3=3 : expanded (double width, double height)

Byte n4 sets the number of byte to be skipped before printing out the first graphic bit :
- 00 H : first graphic bit to be printed out is dot one on the head
- 01 to FF H : 1 to 255 bytes skipped (to be less than total number of head's bytes)

Byte n5 sets the width of the graphic to be printed out :
- 01 to FF H : width is 1 to 255 bytes (to be less than total number of head's bytes)

6.4.4.2. Graphics command for full MRS mode :

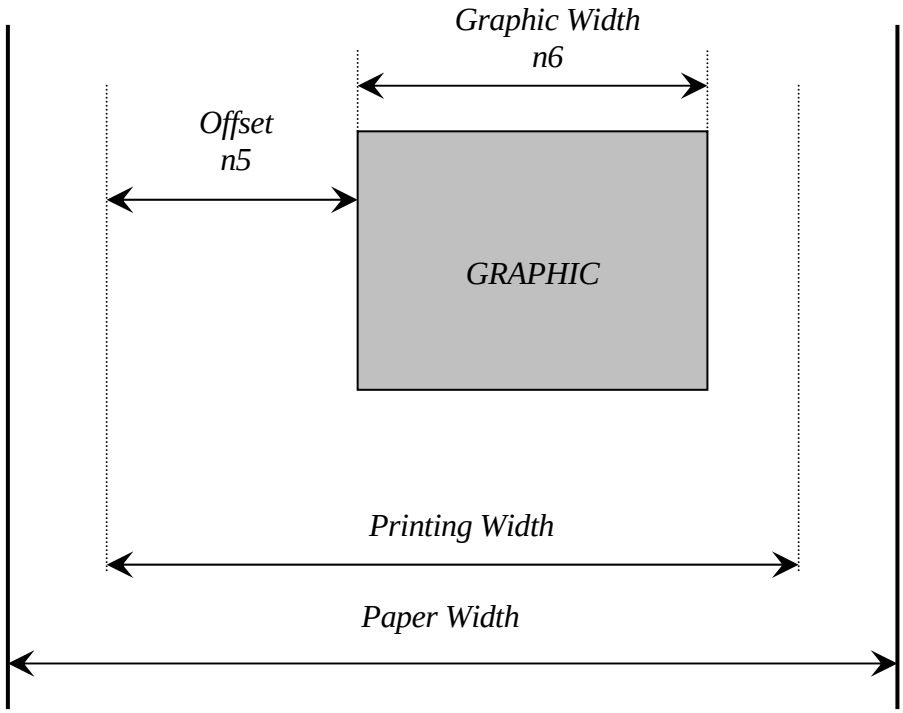
ESC * n1 n2 n3 n4 n5 n6 <data>

Description: Print graphics
Format: <1Bh><2Ah><n1><n2><n3><n4><n5><n6><data>
Comments: Bytes n1, n2 and n3 set the number of bytes N to be printed out :
N = (65536*n3) + (256*n2) + n1.

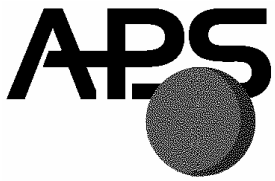
Byte n4 sets graphic operators on data byte and has the following meaning:
- n4 = 0 : print normal size data byte (full printer resolution).
- n4 = 1 : double width.
- n4 = 2 : double height.
- n4 = 3 : expanded (double width, double height).

Byte n5 sets the number of byte to be skipped before printing out the first graphic bit :
- 00 H : first graphic bit to be printed out is dot one on the head.
- 01 to FF H : 1 to 255 bytes skipped (to be less than total number of head's bytes)

Byte n6 sets the width of the graphic to be printed out :
- 01 to FF H : width is 1 to 255 bytes (to be less than total number of head's bytes).



Example : With the following bitmap :



Black and white, 1 dot per pixel, 368 pixels width and 242 pixels height, printed in full resolution, and centered,
Size = 368*242 / 8 = 11 132 bytes :

n1 = 124d, n2 = 43d, n3 = 0d, n4 = 0d, n5 = 1d, n6 = 46d
or n1 = 7Ch, n2 = 2Bh, n3 = 0h, n4 = 0h, n5 = 1h, n6 = 2Eh

ESC $ n1 n2

Description: Horizontal dot positioning
Format: <1Bh><24h><n1><n2>
Comments: Dot positioning command in bytes (to be used with ESC V). Dot position equals (n1 + 256*n2). n1 must be less than 48 (384/8), and n2 is always 0.

ESC V n1 n2 n3 <data>

Description: Horizontal bit image
Format: <1Bh><56h><n1><n2><n3><datas>
Comments: the number of bytes to be printed is equal to (n2+256*n3). n2 must be less than 48 (384/8), and n3 is always 0. n1 is the resolution: 0 is standard size, 1 is double width, 2 double height, 3 is expanded.

IMPORTANT NOTES FOR GRAPHICS:

- Please note that n5 (offset) + n6 (graphic width) needs to be less than the number of head's bytes (printing width). If it is greater, control code will be ignored.
- One dot line must be performed in less than 500ms. If not current into stepper is removed, affecting badly the print quality.
- It is recommanded for all graphics sequences to set up the communication speed at the maximum value.

6.4.5. *Cutter commands*

ESC i

Description:	Full cut
Format:	<1Bh> <69h>
Comments:	In continuous paper feed mode, this command performs a full cut (if cutter is present) at the current paper position. In hole/mark detection mode, the paper is fed forward to the next Cut position (GS X) and then cut.

ESC m

Description:	Partial cut
Format:	<1Bh> <6Dh>
Comments:	In continuous paper feed mode, this command performs a partial cut (if cutter is present) at the current paper position. In hole/mark detection mode, the paper is fed forward to the next Cut position (GS X) and then cut.

6.4.6. *Bar code commands*

GS k n [Start] <data> NUL

Description: Print bar code
Format: <1Dh> <6Bh> <n> [Start] <data> <00h>
Comments: n is barcode standard selection, as described in the following table. [Start] is an optional byte used only by Code 128.

n	Start byte	Bar code type
0	No Start	UPC-A
1	No Start	UPC-E
2	No Start	EAN 13
3	No Start	EAN 8
4	No Start	Code 39
5	No Start	Interleaved 2/5 (ITF)
6	No Start	Codabar
7	135	Code 128A
	136	Code 128B
	137	Code 128C

Note: <data> should be absolutely correct and suitable to bar code type. No checking is performed by printer before starting printing. So, if number of data bytes or checksum byte is wrong, printed bar code will be wrong. However, if checksum byte misses, printer will calculate it and add to data.
When UPC-E is selected, data to be transmitted can be either initial UPC-A data or directly corresponding compressed UPC-E data (checksum byte is then compulsory).

GS h n

Description: Select vertical height of bar code
Format: <1Dh> <68h> <n>
Comments: n from 1 to 255 in multiple of 1/8 mm (default is 128)

GS w n

Description: Select horizontal magnification of bar code
Format: <1Dh> <77h> <n>
Comments: n defines the number of 0.125mm units are used to define the module of each barcode symbol. The thick lines are set to twice n value. (n from 2 to 6, default is 3)

GS H n

Description: Select printing position of bar code text
Format: <1Dh> <48h> <n>
Comments: n is used to define the position of the characters which are printed with the bar code :

n	PRINTING POSITION
0	Not printed (Default)
1	Above bar code
2	Under bar code
3	Above and under bar code

Note: If the barcode width exceeds the printing width, it will be ignored.
The barcode text is printed out with the latest selected font (ESC %)

GS R n

Description: Set/reset rotated barcode
Format: <1Dh> <52h> <n>
n = 0: barcode is printed horizontally.
n = 1: barcode is printed vertically.

6.4.7. *Hole / Black mark detection commands*

GS L n

Description: Set Mark length
Format: <1Dh> <4Ch> <n>
Comments: Set Mark length and switch from continuous paper feed to mark detection.
n specifies the length of the mark in dot lines at 0.125mm. If n = 0 (Default) then the printer switches into continuous paper feed mode.
Example : If n = 24 the length of the mark is equal to 3mm, and the printer enters the mark detection mode.
The minimum mark length is 2mm and the maximum is 7 mm.

Note : Sending this command clears the hole/mark detection error bit in the printer status.

GS T n1 n2

Description: Sets top of form (TOF) position
Format: <1Dh> <54h> <n1> <n2>
Comments: Defines the number of dot lines N between the end of the mark and the first printable line (TOF).
N = (256*n1) + n2. By default, N = 0 dot lines.

Note: It is possible to define a negative top of form distance. The value is represented with the two's complement of the absolute value of the distance.
For example, to specify a – 5 mm distance, N = - 40 = 65536 – 40 = 65496. n1 = 255, n2 = 216.

GS E

Description: TOF feed paper
Format: <1Dh> <45h>
Comments: Makes paper feed to the next TOF position.

GS Y n1 n2

Description: Set opto to head dot line length
This code is to be used only if the opto position is different from that set on the printer by default.
Format: <1Dh> <59h> <n1> <n2>
Comments: Defines the number of dot lines N between the opto position and the head dot line.
N =(256*n1) + n2.
Values are a function of printer mechanism.

6.4.8. *Cutter settings Commands*

When executing partial or full cut, the ticket is fed to the next cut position and then cut.

To avoid advancing and losing one ticket during power Off/On sequence, please do the following:

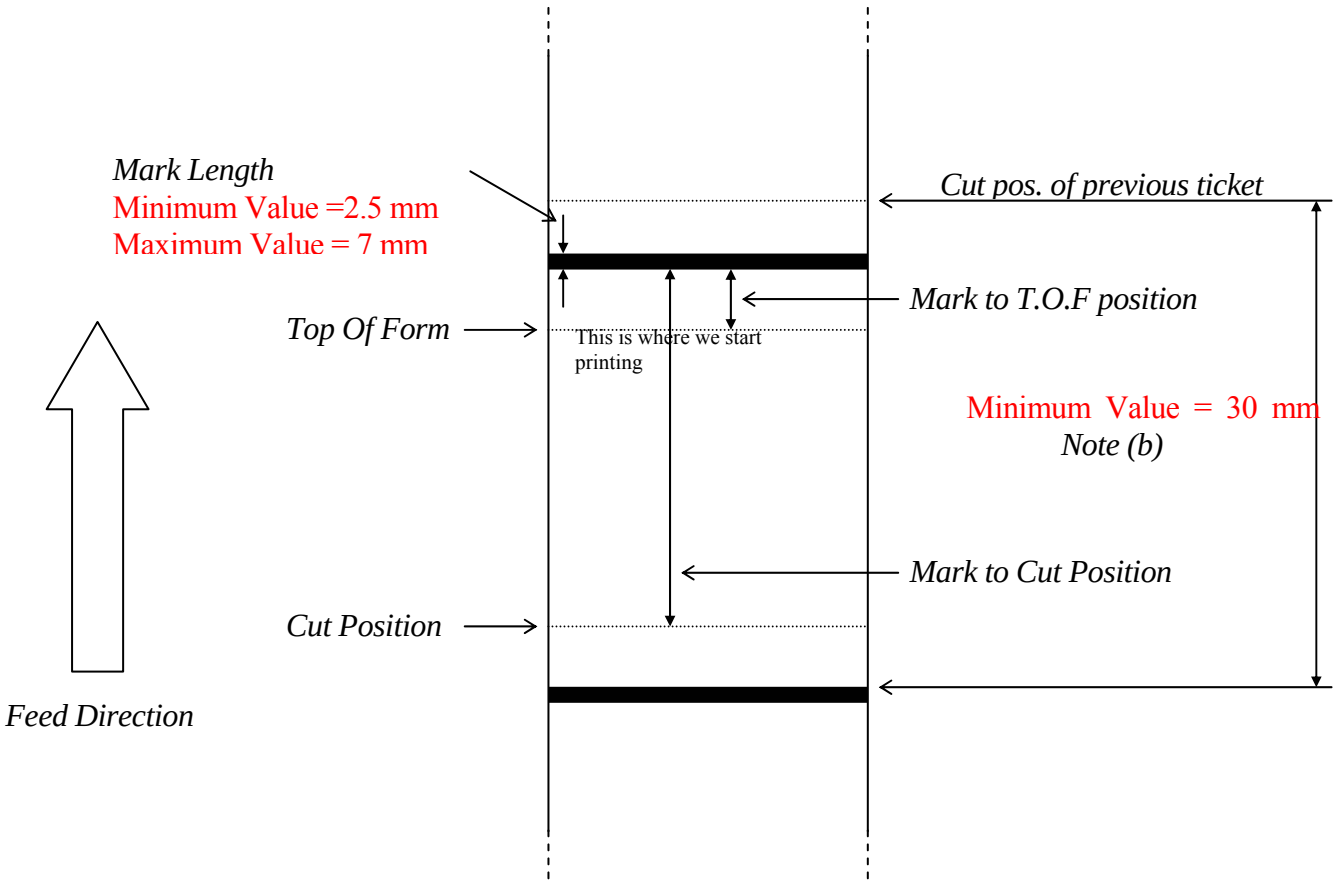
- Turn the printer off in top of form position.
- Turn the printer on and reconfigure the Hole / Mark detection by sending detection by sending all parameters (GS L, GS T, GS X and if necessary GS x).

GS X n1 n2

Description: Set mark to cut position length
Format: <1Dh> <58h> <n1> <n2>
Comments: Defines the number of dot lines N between the end of the mark and the Cut position. Y = (n1*256) + n2 (Default: N = 0).

GS x n1 n2

Description: Set cut line to head dot line length
This code is to be used only if the cutter's blade position is different from that set on the printer by default.
Format: <1Dh> <78h> <n1> <n2>
Comments: Defines the number of dot lines N between the cut position and the head dot line.
N =(256*n1) + n2. By default, N = 88 dot lines.



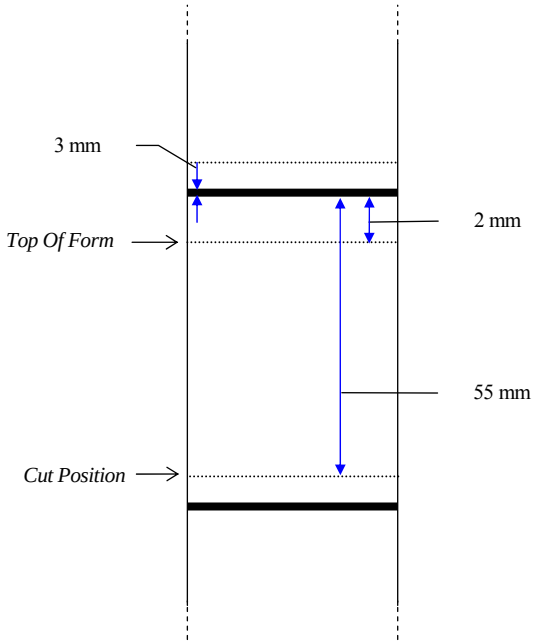
NOTES :

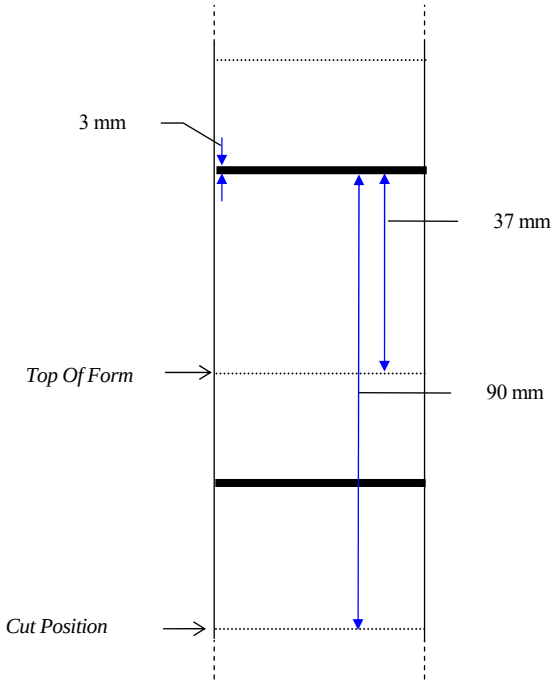
(a) Make sure that Hole/Black mark fully covers the opto sensor window, according to the paper path chosen (front or bottom).

(b) The distance between the cut postion of the previous ticket and the mark of the next ticket should be superior to the distance (in terms of paper path) between the cutter and the opto (default : 24.5mm). A minimum distance of 30mm should provide reasonable margin.

(c) For optimum performance, the paper should be guided, and in particular, the distance between the paper and the opto should be kept as constant as possible.

6.4.9. *Hole / Black mark detection examples*





7. ORDERING CODE

CP205MRS without cutter and bracket :	CP 205 MRS
CP205MRS with cutter and bracket :	CP 205 MRS / C