MCP8830 Infra-Red THERMAL PRINTER

Applications Datasheet

Features

- HP compatible IR interface
- IrDA and RS232 interfaces
- High speed, high resolution printing capability
- Quiet, non-impact system
- Maintenance-free
- Compact and light weight
- High reliability line head mechanism
- Versatile for use with text or graphics
- 24, 32 or 48 characters per line
- Barcode capability
- Low power mode
- Supports labels and dual ply paper

Introduction

The MCP8830 is a compact and lightweight thermal printer in a modern, elegant enclosure.

Designed for maximum flexibility, the printer is compatible with existing systems using HP infra-red communications whilst allowing many upgrades in terms of printing speed and functionality. IrDA and RS232 interfaces are also incorporated.

It is powered from Ni-Mh batteries and has maintenance free operation, only available with thermal printers. The standard unit may be continuously trickle charged from a mains power adapter, and a fast charge facility is incorporated. UK, Euro and US versions of the power adapter are available.

Many different modes of operation are possible, including numerous character sets, all selectable by software commands.

The MCP8830 is one of a family of thermal printers designed and manufactured in the UK by Martel. All units are built into robust ABS housings, with a choice of colours. We would be pleased to discuss the possibility of customising any aspect of the printer to specific requirements.

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Specification

Printing system	Thermal line head system
Max Characters per line	48 (Default 24)
Character matrix	24x16, 24x12 or 24x8
Character size	3mm x 2mm, 3mm x 1.5mm or 3mm x 1mm (Approx. 13, 17 or 25cpi)
Horizontal dot pitch	0.125mm (Approx. 200dpi)
Vertical dot pitch	0.125mm
Text line composition	24x384 dots
Printing width	48mm
Average printing speed	10 lines per second (max)
Dimensions	91mm x 185mm x 58mm
Weight	Approx. 425 grammes
Internal power supply	4 x 1.2V NiMh 1600mAH, AA cells
Paper width	58mm
Character set	Roman 8, ECMA 94, Aerial
Country codes	USA, France, Germany, UK, Denmark I/II, Sweden, Italy, Spain & Japan
Interface	
Data format	(a)RS232C (8 Data, 1 Stop, No Parity). (b) HP IR (1 start, 8 data, 4 error detection). (c) IrDA (V1.0 physical layer).
Buffer size	6 Kbytes
Environmental Conditions	
Operating range	0^{o}C to +50^{o}C
Storage range	-20^{o}C to +60^{o}C
Charging range	+10^{o}C to +45^{o}C
MTBF	Approx. 10 Million lines (20^{o}C, print ratio = 25%)

Printer Mechanism

The printer mechanism comprises a 384 element, thin film head and stepper motor driven transport. Battery voltage and head temperature compensation is utilised to provide constant print quality across the range of operating conditions.

Paper out: The printer will automatically detect when the printer paper has run out. The Status indicator will flash repeatedly to denote that the paper has run out. Use the Mode button to feed through the last few centimetres of paper and fit a new roll as described on page 5.

Head thermal limit: After extensive printing the print head temperature may rise to an unusable level. If this occurs the Status indicator will flash twice repeatedly and printing will be suspended until the head temperature returns to normal levels.

Infra-red Interface

The transmit/receive requirements for interfacing with the MCP8830 are compatible with existing systems, however higher transmission speeds and printing speeds are possible due to the incorporation of a large 6Kbyte buffer and a high speed thermal fixed head printer mechanism.

Higher print speed can be achieved by minimising the inter-frame delays in the transmission software, previously required when using a slower printer mechanism. Maximum distance for reliable infra-red communication between printer and host equipment is 45cm (18in). The infra-red port at the rear of the printer should be pointed directly at, and horizontal to, the port on the host equipment and the beam should not be obstructed.

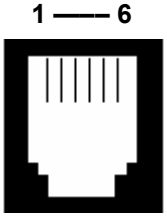
Serial Interface

The RS232C standard is used, and the baud rate is selectable via Configuration Option 2 (see page 4).

The printer is fitted with a 6-way RJ12 socket (Fig 1 illustrates the pin numbers for the connector), the pin assignments and interface signals are defined below.

PIN	Signal	I/0	Definition
1	GND	N/A	Signal ground
2	TxD	0	Transmitted data to host
3	RxD	1	Received data from host
4	CTS	0	Clear to Send
5	n/c	N/A	No connection
6	n/c	N/A	No connection

Fig 1: Pin Numbers for Serial Interface Connector



Power On Self Test

The self test procedure will check most of the printer functions, except for the serial Interface, i.e: Printer mechanism, Control circuitry, Firmware version, Print quality. When the printer is off, press and hold the Mode button depressed for approximately 2 seconds. Release the button, the printer will power on and print a self-test report.

Power Supply

Power is supplied to the printer from four Nickel-Metal Hydride AA cells. The Status indicator will flash three times repeatedly to show that the batteries are nearly exhausted and in need of re-charging. The mains adapter will trickle charge (16 hours) the printer when it is switched on, and will fast charge (up to 4 hours) the printer when it is switched off. Operation of the fast charge algorithm is indicated by a short flash of the Status indicator every second. There may be a delay before fast charging commences following switch off.

Power consumption

Sleep		4mA
Off		50uA
Standby		30mA
Running -	Min	0.4A
	Ave	1.3A
	Max	2.8A

Note: The peak current can reach a maximum of 4A.

Charge life Approx. 6000 lines (18m) of continuous printing

The MCP8850 should only be used in conjunction with an MPS101(UK), MPS102(EURO) or MPS103(US) power adapter. Users wishing to provide their own power source must contact Martel. ***The use of an unapproved source may void the printer's warranty.***

Battery Charging

Connect the MCP8830 printer to the MPS power adapter and recharge the batteries as soon as the Status indicator flashes three times repeatedly during printing.

If the batteries in the MCP8830 become exhausted, printing will become faint, erratic or not possible at all. ***Turn off*** the MCP8830 and recharge the batteries for at least 15 minutes before attempting further printing. The MPS adapter cannot supply the full power requirements for the MCP8850 during printing, so the batteries must be partially charged before printing is possible.

When the MCP8830 is first delivered there may be little or no charge in the printer's batteries. The MCP8830 should be ***turned off***, connected to the MPS adapter and allowed to charge for 16 hours before it is used for the first time.

It is permissible to leave the MCP8830 permanently connected to the MPS power adapter to trickle charge the batteries. If the printer is asleep it will wake up when the adapter is connected and will not sleep while it is connected. To fast charge the batteries, the printer must be off. The Status indicator will flash every second wile fast charge is operating.

Power on Procedure

Check the batteries are sufficiently charged or that the power supply is correctly fitted and operational. Open the paper cup lid and ensure that the roll is present and that there are no foreign objects inside the paper cup. Close the lid, ensuring that the paper passes through the paper exit slot.

When the Status indicator is off, the printer is off. A brief press of the Mode button turns the printer on, the Status indicator will illuminate and the printer mechanism will reset. A brief press of the Mode button will turn the printer off. When the printer is asleep, pressing the Mode button will wake up the printer.

Configuration Options

The printer incorporates a number of configurable *options*, each of which has a number of *settings*. The default settings of the standard printer are detailed in the table below in bold. To change the setting of any option, follow the procedure below:

1. Ensure the printer is OFF.
2. Press and hold the Mode button. After about five seconds, the Status light will flash five times to show that the printer is in *configuration mode*. Release the Mode button.
3. Press the Mode button the same number of times as the *option* that you wish to change (for example to change baud rate, press the Mode button twice).
4. After a short delay, the Status light will flash the same number of times as the option that you have chosen. If you have made a mistake at this stage, simply wait: after a delay, the printer will power-on without changing any options.
5. To proceed with configuration, press the Mode button the same number of times as the *setting* that you wish to make (for example, to set the baud rate to 19200, press the Mode button once).
6. After a short delay, the Status light will flash the same number of times as the setting that you have made.
7. After a further delay, the printer will power-on with the new setting.

Option Number	Option	Setting Number **(default in bold)**	Setting **(default in bold)**
0	**No option**		
1	**Communications Protocol**		
		0	No setting
		1	**RS232**
		2	IrDA Physical Layer (9600 baud)
		3	HPIR Mode
2	**RS232 Baud Rate**		
		0	No setting
		1	19200 baud
		2	**9600 baud**
		3	4800 baud
		4	2400 baud
		5	1200 baud
		6	600 baud
		7	300 baud
3	**Flow Control**		
		0	No setting
		1	**No flow control**
		2	Software flow control
		3	Hardware flow control
4	**Font**		
		0	No setting
		1	**Arial 24 CPL**
		2	Arial 32 CPL
		3	Arial 48 CPL
		4	Roman8 24 CPL
		5	Ecma94 24 CPL
5	**Character Scaling**		
		0	No setting
		1	**Normal**
		2	Double Width
		3	Double Height
		4	Double Width and Height
6	**Print Density**		
		0	No setting
		1	**Lowest**
		2	
		3	
		4	Highest
7	**Printer Current**		
		0	No setting
		1	**Maximum Current**
		2	
		3	
		4	Minimum Current
8	**Feed Control**		
		0	No setting
		1	**Standard paper, normal printing**
		2	Standard paper, upside down printing
		3	Labels, normal printing
		4	Labels, upside down printing
9	**Sleep Mode**		
		0	No setting
		1	**Never Sleep**
		2	Sleep after 1 minute
		3	Sleep after 2 minutes
		4	Sleep after 5 minutes
		5	Sleep after 10 minutes
		6	Off after 1 minute
		7	Off after 2 minutes
		8	Off after 5 minutes
		9	Off after 10 minutes

Software Selectable Functions

Underline
Double height
Double width
Graphics
Horizontal tab, plus setting
Form feed, plus setting
11 selectable international character sets
Reverse printing
Inverse printing
Reset
Barcodes

Control Codes and Escape Sequences (HP IR Mode)

Function	Code	Decimal	Hex
Horizontal tab	HT	9	09
Line feed	LF	10	0A
Form feed	FF	12	0C
Carriage return	CR	13	0D
Cancel	CAN	24	18
Double width on	SO	14	0E
Double width off	Si	15	0F
Set print mode	ESC NULL ! *n*	27 0 33 *n*	1B 00 21 *n*
Set barcode start position	ESC NULL $ *n1 n2*	27 0 36 *n1 n2*	1B 00 24 *n1 n2*
Set bit image (8 pin single density)	ESC NULL * 0 *n1 n2 [d]*	27 0 42 0 *n1 n2 [d]*	1B 00 2A 00 *n1 n2 [d]*
Set bit image (8 pin double density)	ESC NULL * 1 *n1 n2 [d]*	27 0 42 1 *n1 n2 [d]*	1B 00 2A 01 *n1 n2 [d]*
Set bit image (24 pin single density)	ESC NULL * 32 *n1 n2 [d]*	27 0 42 32 *n1 n2 [d]*	1B 00 2A 20 *n1 n2 [d]*
Set bit image (24 pin double density)	ESC NULL * 33 *n1 n2 [d]*	27 0 42 33 *n1 n2 [d]*	1B 00 2A 21 *n1 n2 [d]*
Underline on	ESC NULL – 1	27 0 45 1	1B 00 2D 01
Underline off	ESC NULL – 0	27 0 45 0	1B 00 2D 00
Reset	ESC NULL @	27 0 64	1B 00 40
Set page length	ESC NULL C *n*	27 0 67 *n*	1B 00 43 *n*
Set horizontal tabs	ESC NULL D *n*	27 0 68 *n*	1B 00 44 *n*
Set bit image	ESC NULL K *n1 n2 [d]*	27 0 75 *n1 n2 [d]*	1B 00 4B *n1 n2 [d]*
Country select	ESC NULL R *n*	27 0 82 *n*	1B 00 52 *n*
Double width on	ESC NULL W 1	27 0 87 1	1B 00 57 01
Double width off	ESC NULL W 0	27 0 87 0	1B 00 57 00
Compressed bit image graphics	ESC NULL Z *n1 [d1] … n24 [d24]*	27 0 90 *n1 [d1] … n24 [d24]*	1B 00 5A *n1 [d1] … n24 [d24]*
Print & feed paper	ESC NULL d *n*	27 0 100 *n*	1B 00 64 *n*
Label advance	ESC NULL f	27 0 102	1B 00 66
Reversed on	ESC NULL i 1	27 0 105 1	1B 00 69 01
Reversed off	ESC NULL i 0	27 0 105 0	1B 00 69 00
Double height on	ESC NULL w 1	27 0 119 1	1B 00 77 01
Double height off	ESC NULL w 0	27 0 119 0	1B 00 77 00
Inverse on	ESC NULL { 1	27 0 123 1	1B 00 7B 01
Inverse off	ESC NULL { 0	27 0 123 0	1B 00 7B 00
Graphics	ESC *n [d]*	27 *n [d]*	1B *n [d]*
Roman 8 character set	ESC <248>	27 248	1B F8
ECMA 94 character set	ESC <249>	27 249	1B F9
Underline off	ESC <250>	27 250	1B FA
Underline on	ESC <251>	27 251	1B FB
Normal width on	ESC <252>	27 252	1B FC
Double width on	ESC <253>	27 253	1B FD
Self test	ESC <254>	27 254	1B FE
Reset	ESC <255>	27 255	1B FF
Set barcode height (1 ≤ n ≤ 255)	GS h *n*	29 104 *n*	1D 68 *n*
Print UPC-A barcode	GS k 0 *[d]* NULL	29 107 0 *[d]* 0	1D 6B 00 *[d]* 00
Print UCP-E barcode	GS k 1 *[d]* NULL	29 107 1 *[d]* 0	1D 6B 01 *[d]* 00
Print EAN13 barcode	GS k 2 *[d]* NULL	29 107 2 *[d]* 0	1D 6B 02 *[d]* 00
Print EAN8 barcode	GS k 3 *[d]* NULL	29 107 3 *[d]* 0	1D 6B 02 *[d]* 00
Print Code 39 barcode	GS k 4 *[d]* NULL	29 107 4 *[d]* 0	1D 6B 04 *[d]* 00
Print 2 of 5 barcode	GS k 5 *[d]* NULL	29 107 5 *[d]* 0	1D 6B 05 *[d]* 00
Print Codabar barcode	GS k 6 *[d]* NULL	29 107 6 *[d]* 0	1D 6B 06 *[d]* 00
Print CODE128 barcode	GS k 7 *n [d]*	29 107 7 *n [d]*	1D 6B 07 *n [d]*
Set barcode magnification (2 ≤ n ≤ 4)	GS w *n*	29 119 *n*	1D 77 *n*

Control Codes and Escape Sequences (IrDA/RS232 Mode)

Function	Code	Decimal	Hex
Horizontal tab	HT	9	09
Line feed	LF	10	0A
Form feed	FF	12	0C
Carriage return	CR	13	0D
Double width on	SO	14	0E
Double width off	SI	15	0F
Cancel	CAN	24	18
Set print mode	ESC ! *n*	27 33 *n*	1B 21 *n*
Set barcode start position	ESC $ *n1 n2*	27 36 *n1 n2*	1B 24 *n1 n2*
Set bit image (8 pin single density)	ESC * 0 *n1 n2 [d]*	27 42 0 *n1 n2 [d]*	1B 2A 00 *n1 n2 [d]*
Set bit image (8 pin double density)	ESC * 1 *n1 n2 [d]*	27 42 1 *n1 n2 [d]*	1B 2A 01 *n1 n2 [d]*
Set bit image (24 pin single density)	ESC * 32 *n1 n2 [d]*	27 42 32 *n1 n2 [d]*	1B 2A 20 *n1 n2 [d]*
Set bit image (24 pin double density)	ESC * 33 *n1 n2 [d]*	27 42 33 *n1 n2 [d]*	1B 2A 21 *n1 n2 [d]*
Underline on	ESC – 1	27 45 1	1B 2D 01
Underline off	ESC – 0	27 45 0	1B 2D 00
Reset	ESC @	27 64	1B 40
Set page length	ESC C *n*	27 67 *n*	1B 43 *n*
Set horizontal tabs	ESC D *n*	27 68 *n*	1B 44 *n*
Bold on	ESC G	27 71	1B 47
Bold off	ESC H	27 72	1B 48
Set bit image	ESC K *n1 n2 [d]*	27 75 *n1 n2 [d]*	1B 4B *n1 n2 [d]*
Country select	ESC R *n*	27 82 *n*	1B 52 *n*
Double width on	ESC W 1	27 87 1	1B 57 01
Double width off	ESC W 0	27 87 0	1B 57 00
Compressed bit image graphics	ESC Z *n1 [d1] … n24 [d24]*	27 90 *n1 [d1] … n24 [d24]*	1B 5A *n1 [d1] … n24 [d24]*
Print & feed paper	ESC d *n*	27 100 *n*	1B 64 *n*
Label advance	ESC f	27 102	1B 66
Reversed on	ESC i 1	27 105 1	1B 69 01
Reversed off	ESC i 0	27 105 0	1B 69 00
Double height on	ESC w 1	27 119 1	1B 77 01
Double height off	ESC w 0	27 119 0	1B 77 00
Inverse on	ESC { 1	27 123 1	1B 7B 01
Inverse off	ESC { 0	27 123 0	1B 7B 00
Set barcode height ($1 \leq n \leq 255$)	GS h *n*	29 104 *n*	1D 68 *n*
Print UPC-A barcode	GS k 0 *[d]* NULL	29 107 0 *[d]* 0	1D 6B 00 *[d]* 00
Print UCP-E barcode	GS k 1 *[d]* NULL	29 107 1 *[d]* 0	1D 6B 01 *[d]* 00
Print EAN13 barcode	GS k 2 *[d]* NULL	29 107 2 *[d]* 0	1D 6B 02 *[d]* 00
Print EAN8 barcode	GS k 3 *[d]* NULL	29 107 3 *[d]* 0	1D 6B 02 *[d]* 00
Print Code 39 barcode	GS k 4 *[d]* NULL	29 107 4 *[d]* 0	1D 6B 04 *[d]* 00
Print 2 of 5 barcode	GS k 5 *[d]* NULL	29 107 5 *[d]* 0	1D 6B 05 *[d]* 00
Print Codabar barcode	GS k 6 *[d]* NULL	29 107 6 *[d]* 0	1D 6B 06 *[d]* 00
Print CODE128 barcode	GS k 7 *n [d]*	29 107 7 *n [d]*	1D 6B 07 *n [d]*
Set barcode magnification ($2 \leq n \leq 4$)	GS w *n*	29 119 *n*	1D 77 *n*

International Character Sets

(HP IR Mode)

Country	Code	Decimal	Hex
USA	ESC NULL R 0	27 0 82 0	1B 00 52 00
France	ESC NULL R 1	27 0 82 1	1B 00 52 01
Germany	ESC NULL R 2	27 0 82 2	1B 00 52 02
UK	ESC NULL R 3	27 0 82 3	1B 00 52 03
Denmark I	ESC NULL R 4	27 0 82 4	1B 00 52 04
Sweden	ESC NULL R 5	27 0 82 5	1B 00 52 05
Italy	ESC NULL R 6	27 0 82 6	1B 00 52 06
Spain	ESC NULL R 7	27 0 82 7	1B 00 52 07
Japan	ESC NULL R 8	27 0 82 8	1B 00 52 08
Norway	ESC NULL R 9	27 0 82 9	1B 00 52 09
Denmark II	ESC NULL R 10	27 0 82 10	1B 00 52 0A

(IrDA/RS232 Mode)

Country	Code	Decimal	Hex
USA	ESC R 0	27 82 0	1B 52 00
France	ESC R 1	27 82 1	1B 52 01
Germany	ESC R 2	27 82 2	1B 52 02
UK	ESC R 3	27 82 3	1B 52 03
Denmark I	ESC R 4	27 82 4	1B 52 04
Sweden	ESC R 5	27 82 5	1B 52 05
Italy	ESC R 6	27 82 6	1B 52 06
Spain	ESC R 7	27 82 7	1B 52 07
Japan	ESC R 8	27 82 8	1B 52 08
Norway	ESC R 9	27 82 9	1B 52 09
Denmark II	ESC R 10	27 82 10	1B 52 0A

Print Mode (ESC!)

Bit	Function	Value 0	Value 1
0	Character font		
1	(see below)		
2	Print density		
3	(see below)		
4	Double height	Cancelled	Set
5	Double width	Cancelled	Set
6	Undefined		
7	Underline	Cancelled	Set

Character Font	Bit 1	Bit 0
24 characters per line	0	0
48 characters per line	0	1
32 characters per line	1	0
Undefined	1	1

Print Density		Bit 3	Bit 2
Light	1 (Default)	0	0
	2	0	1
	3 (Label Default)	1	0
Dark	4	1	1

Low Power Mode

The MCP8830 incorporates a low-power mode which minimises the printer's power consumption after approximately ten minutes of inactivity. Further data transmitted to the printer will be ignored. If the host instrument transmits a NULL character one second before any report, the printer will wake-up in time to print the report.

The printer can be re-activated by pressing the Mode button. Printer mode settings and any data stored in the buffer will not be lost during this procedure. Low power mode will not be activated while the mains adapter is used.

Replacing Paper Roll

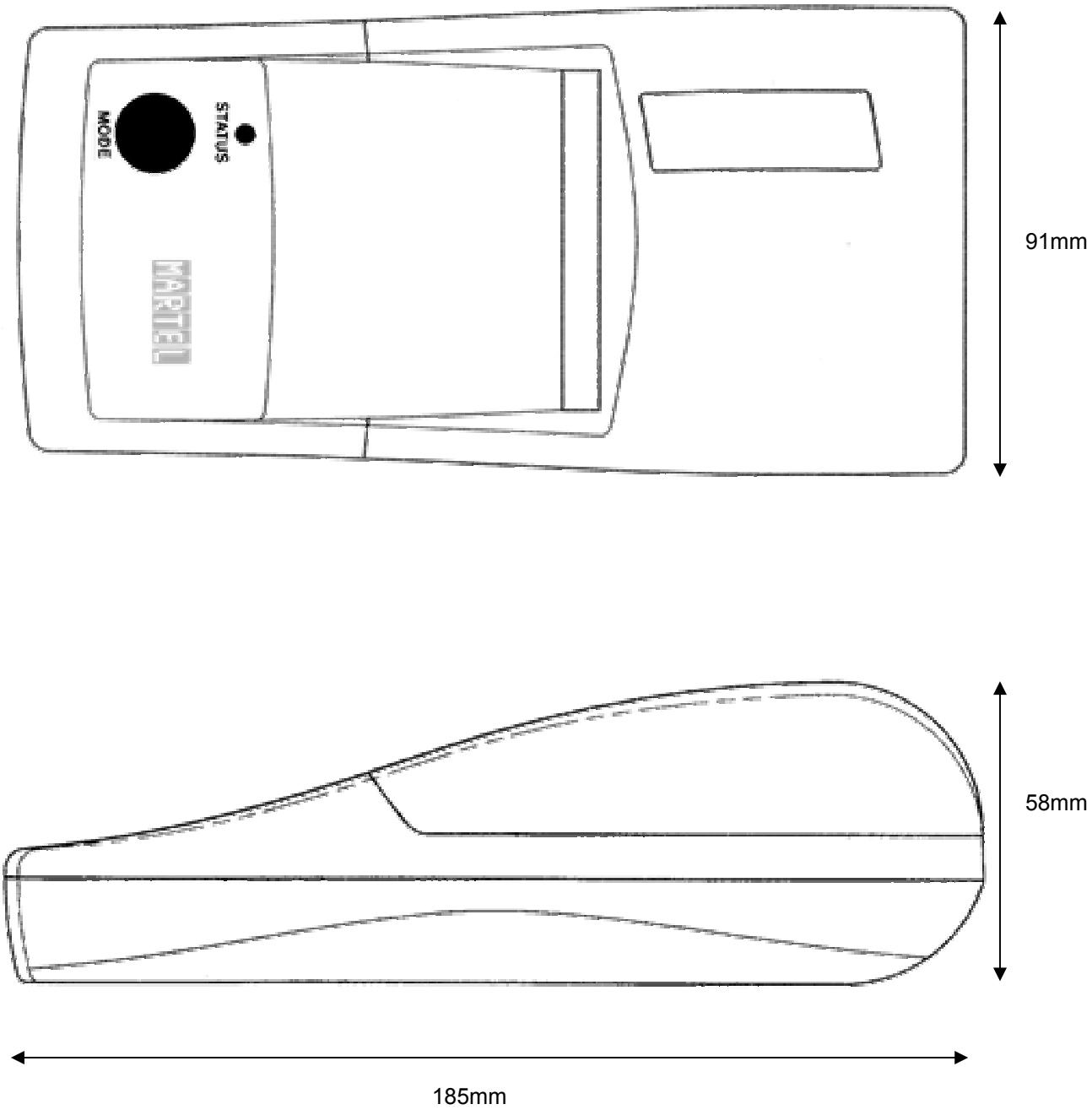
If the paper roll needs replacing, open the paper cup lid and remove the remaining paper using the Mode button, ***do not pull paper through the printer mechanism.*** Reel off a few centimetres from a new roll of paper and check that the end has a clean straight edge. Slide the leading edge of the paper through the paper entry slot, with the leading edge of the paper feeding forwards from the bottom of the roll, until you feel resistance. Press the Mode button and feed the paper through the printer mechanism. Keep the Mode button depressed until enough paper is fed through the printer mechanism to pass through the paper exit slot. Sit the new paper roll in the paper cup and close the lid.

Should the paper become creased or out of line when feeding in a new roll, cut the end off the paper roll, feed out the creased paper using the Mode button, and reload ensuring the paper has a clean straight edge.

Paper Tear Procedure

When removing printout from the printer, pull the printout toward the front of the printer and tear from one side to the other across the serrated edge.

Dimensions (mm)



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MCP8830/AD/A