

MCP7810 THERMAL PRINTER Series

Applications Datasheet



Features

- Easy-Load paper feature
- RS232 interface
- Power supply options
- High speed, high resolution printing capability
- Quiet, non-impact system
- Maintenance-free
- Ultra-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
- Range of configurable options
- Windows driver for XP and 2000
- Suitable for paper and label media
- Low Profile paper lid and range of mounting options available
- Vehicle approval to EEC Directive 72/245 (2006/28) for MCP7810V

MCP7810 Series

MCP7810	Rechargeable NiMH batteries
MCP7810B	Alkaline batteries
MCP7810V	external 10-35Vdc
MCP7810X	external 5Vdc UPS

Introduction

The MCP7810 is an ultra-compact, lightweight portable printer with an “easy-load” paper feature. Housed in a new innovative enclosure this printer has an RS232 serial interface via a 6-way RJ12 socket.

Designed for maximum versatility, the MCP7810 is compatible with existing systems whilst allowing many upgrades in terms of printing speed and functionality.

Power options include rechargeable NiMH batteries, alkaline batteries, an external 5Vdc Universal Power Supply or an external 10-35Vdc power supply. Rechargeable batteries may be continuously trickle charged from a mains power adapter, or a 12Vdc supply and a fast charge facility is incorporated.

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

The MCP7810 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.

1.1 Overall Specification

Printing system	Direct thermal line head
Max Characters per line	48, 32, 24(default)
Character matrix	24x8, 24x12 or 24x16
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), MCP7810B 5 lines per sec
Dimensions	85.5mm x 150mm x 55mm (45mm low profile printer)
Weight	400g approx (inc batteries and paper)

Power supply

MCP7810	internal 4 x 1.2V NiMH 1600mAH, AA cells
MCP7810B	internal 4 x 1.5V alkaline, AA cells
MCP7810V	external 10-35Vdc
MCP7810X	external 5Vdc

Paper width	58mm
Paper capacity	45mm dia. 25m (standard printer) 32mm dia, 10m (low profile printer)
Recommended paper	AF50KS-E

Character set	ASCII
Country codes	USA, France, Germany, UK, Denmark I/II, Sweden, Italy, Spain & Japan

Interface	RS232C (8 Data, 1 Stop, No Parity).
Data format	Connector 6-way RJ12 socket Baud rates 300, 600, 1200, 2400, 4800, 9600 & 19200 Handshaking Hardware (CTS line) or Software (XON/XOFF) Buffer size 5 Kbytes

Environmental Conditions

Operating range	0°C to +50°C	Storage range	-20°C to +60°C	Charging range	+10°C to +45°C
MTBF			Approx. 10 Million lines (20°C, print ratio = 25%)		

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

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

The RS232C standard is used, and the baud rate is selectable via Configuration Option 2 (see page 3).

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/O	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



1.3 Drivers

Windows : <http://www.martelinstruments.com/downloads/mtl2kxp.exe>

Linux : http://www.martelinstruments.com/downloads/martel_linux_driver_0.1.0.tar.gz

2. PRINTER CONFIGURATION

2.1 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 some 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

Option Number	Option Description	Setting Number (default in bold)	Setting (default in bold)
1	RS232 Protocol	1	8, No parity
		2	8, Odd parity
		3	8, Even parity
		4	7, Odd, parity
		5	7, Even Parity
2	RS232 Baud Rate	1	19200 baud
		2	9600 baud
		3	4800 baud
		4	2400 baud
		5	1200 baud
		6	600 baud
		7	300 baud
3	RS232 Flow Control	1	None
		2	Software
		3	Hardware
4	Font	1	Arial 16, 24 CPL
		2	Arial 12, 32 CPL
		3	Arial 8, 48 CPL
5	Character Format	1	Normal
		2	Double Width
		3	Double Height
		4	Double Width and Height
6	Print Density	1	Lowest
		2	
		3	
		4	Highest
7	Printer Current	1	Highest
		2	
		3	
		4	Lowest
8	Print Format	1	Standard paper, normal printing
		2	Standard paper, upside down printing
		3	Labels, normal printing
		4	Labels, upside down printing
9	Sleep / Wake-up	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, 1 min
		7	Off, 2 min
		8	Off, 5 min
		9	Off, 10 min

2.2 Software Selectable Functions

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

2.3 Control Codes and Escape Sequences

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 ! <i>n</i>	27 33 <i>n</i>	1B 21 <i>n</i>
Set barcode start position	ESC \$ <i>n1 n2</i>	27 36 <i>n1 n2</i>	1B 24 <i>n1 n2</i>
Set bit image (8 pin single density)	ESC * 0 <i>n1 n2 [d]</i>	27 42 0 <i>n1 n2 [d]</i>	1B 2A 00 <i>n1 n2 [d]</i>
Set bit image (8 pin double density)	ESC * 1 <i>n1 n2 [d]</i>	27 42 1 <i>n1 n2 [d]</i>	1B 2A 01 <i>n1 n2 [d]</i>
Set bit image (24 pin single density)	ESC * 32 <i>n1 n2 [d]</i>	27 42 32 <i>n1 n2 [d]</i>	1B 2A 20 <i>n1 n2 [d]</i>
Set bit image (24 pin double density)	ESC * 33 <i>n1 n2 [d]</i>	27 42 33 <i>n1 n2 [d]</i>	1B 2A 21 <i>n1 n2 [d]</i>
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 <i>n</i>	27 67 <i>n</i>	1B 43 <i>n</i>
Set horizontal tabs	ESC D <i>n</i>	27 68 <i>n</i>	1B 44 <i>n</i>
Bold on	ESC G	27 71	1B 47
Bold off	ESC H	27 72	1B 48
Move <i>n</i> dot lines forwards ($1 \leq n \leq 23$)	ESC J <i>n</i>	27 74 <i>n</i>	1B 4A <i>n</i>
Set bit image	ESC K <i>n1 n2 [d]</i>	27 75 <i>n1 n2 [d]</i>	1B 4B <i>n1 n2 [d]</i>
Country select	ESC R <i>n</i>	27 82 <i>n</i>	1B 52 <i>n</i>
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 <i>n1 [d1] ... n24 [d24]</i>	27 90 <i>n1 [d1] ... n24 [d24]</i>	1B 5A <i>n1 [d1] ... n24 [d24]</i>
Print & feed paper	ESC d <i>n</i>	27 100 <i>n</i>	1B 64 <i>n</i>
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
Move <i>n</i> dot lines backwards ($1 \leq n \leq 23$)	ESC j <i>n</i>	27 106 <i>n</i>	1B 6A <i>n</i>
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 <i>n</i>	29 104 <i>n</i>	1D 68 <i>n</i>
Print UPC-A barcode	GS k 0 [<i>d</i>] NULL	29 107 0 [<i>d</i>] 0	1D 6B 00 [<i>d</i>] 00
Print UCP-E barcode	GS k 1 [<i>d</i>] NULL	29 107 1 [<i>d</i>] 0	1D 6B 01 [<i>d</i>] 00
Print EAN13 barcode	GS k 2 [<i>d</i>] NULL	29 107 2 [<i>d</i>] 0	1D 6B 02 [<i>d</i>] 00
Print EAN8 barcode	GS k 3 [<i>d</i>] NULL	29 107 3 [<i>d</i>] 0	1D 6B 02 [<i>d</i>] 00
Print Code 39 barcode	GS k 4 [<i>d</i>] NULL	29 107 4 [<i>d</i>] 0	1D 6B 04 [<i>d</i>] 00
Print 2 of 5 barcode	GS k 5 [<i>d</i>] NULL	29 107 5 [<i>d</i>] 0	1D 6B 05 [<i>d</i>] 00
Print Codabar barcode	GS k 6 [<i>d</i>] NULL	29 107 6 [<i>d</i>] 0	1D 6B 06 [<i>d</i>] 00
Print CODE128 barcode	GS k 7 <i>n [d]</i>	29 107 7 <i>n [d]</i>	1D 6B 07 <i>n [d]</i>
Set barcode magnification ($2 \leq n \leq 4$)	GS w <i>n</i>	29 119 <i>n</i>	1D 77 <i>n</i>

2.4 International Character Sets

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

2.5 Print Mode (ESC!)

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

2.6 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

2.7 Print Density

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

3. Housing Colour

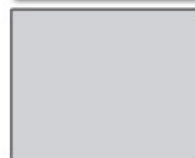
Printer housings are available in four standard colours as shown, all printers will be supplied in Black Grey colour unless specified to the contrary.

Other colours from the RAL colour chart can be supplied subject to a MOQ.

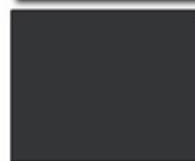
Custom colours can be moulded subject to discussion with Martel.



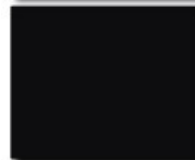
Cream—RAL9001



Grey White—RAL9002



Black Grey—RAL7021



Graphite Black—RAL9011

4. PRINTER OPERATION

MCP7810

4.1 Battery Charging

Insert the batteries ensuring the correct polarity positioning is followed. When the printer is first delivered there may be little or no charge in the printer's batteries. The printer 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 recommended to connect the printer to the MPS power adapter and recharge the batteries as soon as the Status LED indicates low battery.(5.2 Status LED, pg 7)

It is permissible to leave the printer 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.

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

The printer should only be used in conjunction with an MPS101(UK), MPS102(EURO), MPS103(US) or MPS160(UNI) 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.**

4.2 Power On Procedure

Ensure the NiMH batteries are sufficiently charged. 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.

MCP7810B

4.2 Power On Procedure

Insert the alkaline batteries ensuring the correct polarity positioning is followed. 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.

If the batteries in the printer become exhausted, printing will become faint, erratic or not possible at all

Batteries should be removed if the printer is to be left unused for long periods.

External PSU (optional)

The MCP7810B can be powered from the optional mains PSU, MPS180. The printer should be switched off when changing from battery to external power and vice-versa however the batteries do not need to be removed when using the MPS180.

MCP7810V

4.2 Power On Procedure

Power is supplied to the printer from a 10-35Vdc external supply via a 2.1/5.5mm connector (+ve OUTER). Insert the connector into the socket provided in the base of the printer. Power and data via the RJ12 connector can be arranged as a factory option on request.

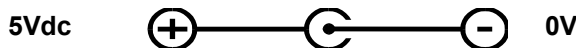


MCP7810X

4.2 Power On Procedure

Power is supplied to the printer from a 5Vdc external supply via a 2.1/5.5mm connector (+ve OUTER). The Martel MPS120 Universal Power Supply should be used and the use of an alternative source may void the printer's warranty

Insert the connector into the socket provided in the base of the printer.



4.3 Low Power Mode

The MCP7810 incorporates two low power modes; configured via option 9, page 3, however the printer will not enter low power mode if the charger is attached.

In **Sleep mode** the printer enters low power mode after a preset period of inactivity. Once asleep, the printer can be woken by sending a NULL character 1 sec before data to be printed, OR the printer can be woken by pressing the Mode button.

In **Auto off mode** the printer cannot be woken by data transfer and must be powered-on manually.

4.4 Paper Tear Procedure

When removing the 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.

5. PRINTER MAINTENANCE

5.1 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.

5.2 Status LED

LED Indication	Condition	Solution
On	Printer On	-
Off	Printer Off or Asleep	-
Short flash every second	Fast Charging	MCP7810 only
* * *	Paper out	Fit new paper
** ** *	Thermal head too hot	Allow head to cool
*** ** *	Battery cut-out (no charge remaining)	Recharge batteries – MCP7810
		Replace batteries — MCP7810B
		Check supply voltage — MCP7810V & MCP7810X
**** ** *	Battery low (approx. 20% charge remaining)	Recharge batteries—MCP7810
		Prepare to replace batteries — MCP7810B
		Check supply voltage — MCP7810V & MCP7810X

5.3 Paper Out

The printer will automatically detect when the printer paper has run out, and report this using the Status LED. Replace the paper roll as described below.

5.4 Head Thermal Limit

After extensive printing the print head temperature may rise to an unusable level. The Status LED will report when this occurs, and printing will be suspended until the head temperature returns to normal levels.

5.5 How to open Paper Reservoir Lid

Pull the lever upwards and forward until the lid is released from its locked position. To avoid damage do not use excessive force.

5.6 Replacing Paper Roll

If the paper roll needs replacing, open the paper reservoir lid and remove the remaining paper. Reel off a few centimetres from a new roll of paper, hold approximately 5cm of paper outside the printer as the roll is placed into the reservoir. Close the lid by applying equal amounts of pressure on each side until the lid is in the locked position. Now tear the surplus paper away.

5.7 Disposal

At the end of its working life the printer should be disposed of in accordance with The Waste Electrical and Electronic Regulations (“the WEEE Regulations), if in use within the EU, and in accordance with national requirements in other countries. The MCP7810 and MCP7810B printers contain batteries that should be disposed of by a qualified recycler or hazardous material handler.

6. ACCESSORIES & CONSUMABLES

MCP7810

6.1 Power Adaptors

Description	Use with	Part Number
Adaptor with UK plug	MCP7810	MPS101
Adaptor with Euro plug	MCP7810	MPS102
Adaptor with US plug	MCP7810	MPS103
Universal Power Adaptor	MCP7810	MPS160
Universal Power Supply	MCP7810X	MPS120
Universal Power Supply	MCP7810B	MPS180

6.2 Mains Leads

Description	Use with	Part Number
Mains Lead with US style plug	MPS120, MPS160 and MPS180	MGK50
Mains Lead with UK style plug	MPS120, MPS160 and MPS180	MGK51
Mains Lead with Euro style plug	MPS120, MPS160 and MPS180	MGK52

6.3 Paper / Labels

Description	Part Number
Thermal Paper Roll, 25m	MM58
Thermal Paper Roll, 10m	MM58/10
Continuous Thermal Label Roll, 6m	ML58/C48
54x25mm Thermal Paper Label Roll	ML59
54x50mm Thermal Paper Label Roll	ML60
54x75mm Thermal Paper Label Roll	ML61
54x25mm Thermal Weather-proof Label Roll (Polypropylene)	ML59P
54x50mm Thermal Weather-proof Label Roll (Polypropylene)	ML60P
54x75mm Thermal Weather-proof Label Roll (Polypropylene)	ML61P

6.4 Data Cables

Description	Part Number
Serial Cable, RJ12/D9	MGK20

6.5 Replacement Battery

Description	Use with	Part Number
Battery, AA 1.2V, Ni-MH (4 required)	MCP7810	MJ10
Battery, AA, 1.5V, Alkaline (4 required)	MCP7810B	MJ11

6.6 Mounting Options

Description	Part Number
Protective Boot with magnetic inserts	MPB500
Wall Mounting Kit including fixings	MFP97
Carry Case with shoulder strap and belt loop	MPH501

Low profile paper lid (10m paper roll capacity) and threaded insert options available on request.



MCP7810/AD/G

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