PRODUCT INFORMATION

MARTEL INSTRUMENTS

MCP7880 Bluetooth THERMAL PRINTER Series *Applications Datasheet*

MCP7880 Series

MCP7880	Rechargeable NiMH batteries
MCP7880B	Alkaline batteries
MCP7880V	external 10-35Vdc
MCP7880X	external 5Vdc UPS

Features

- Easy-Load paper feature
- Class 1 Bluetooth v 1.1 interface (SPP) RFCOMM protocol and 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
- Auto off mode
- Supports labels and dual ply paper
- Range of configurable options
- Windows driver for XP and 2000
- Low Profile paper lid and protective boot available

Introduction

The MCP7880 Series are ultra-compact, lightweight portable thermal printers with an “easy-load” paper feature. Housed in a new innovative enclosure these printers adopt a qualified Class 1 Bluetooth interface (SPP) and are configured to be found and connected by a Master device, they also have an RS232 serial interface via a 6-way RJ12 socket.

Designed for maximum versatility, the MCP7880 Series are 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 MCP7880 Series is from a range of thermal printers designed and manufactured in the UK by Martel Instruments. 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.

Martel Instruments Limited Stanelaw Way, Tanfield Lea Industrial Estate, Stanley, Durham DH9 9XG, UK
Telephone: +44 (0)1207 290266 Fax: +44 (0)1207 290239 http://www.martelinstruments.com

1. PRINTER SPECIFICATIONS

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)
Dimensions	85.5mm x 150mm x 55mm (45mm low profile printer)
Weight	400g approx (inc batteries and paper)
Power supply	
MCP7830	internal 4 x 1.2V NiMH 1600mAH, AA cells
MCP7830B	internal 4 x 1.5V alkaline, AA cells
MCP7830V	external 10-35Vdc
MCP7830X	external 5Vdc
Paper width	58mm
Paper capacity	45mm dia, 25m (std printer) 32mm dia, 10m (low profile printer)
Recommended paper	TF50-KS-E2D
Character set	ASCII
Country codes	USA, France, Germany, UK, Denmark I/II, Sweden, Italy, Spain & Japan
Interface	Bluetooth v 1.1, Class 1, RFCOMM RS232C (8 Data, 1 Stop, No Parity 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%)

1.2 Bluetooth Interface

In order for the Master (Client) device to connect to the printer it must know the printer's unique 12-digit Bluetooth Address. This can be automatically found by a Master using the Service Discovery Protocol, or can be viewed on the Printer's self-test report and manually entered into the Master.

Once the printer's Bluetooth Address is known, the Master can connect to the RFCOMM layer of the printer and then send data to be printed. At the end of each print session, the Master should drop the connection in order to conserve printer power.

1.3 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/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

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 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 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	**Auto Off**		
		1	**None**
		2	Off after 1 minute
		3	Off after 2 minutes
		4	Off after 5 minutes
		5	Off after 10 minutes
10	**Bluetooth Pairing**	**1**	**No password**
		2	Password is 1234

2.2 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

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 ! *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
Move n dot lines forwards ($1 \leq n \leq 23$)	ESC J *n*	27 74 *n*	1B 4A *n*
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
Move n dot lines backwards ($1 \leq n \leq 23$)	ESC j *n*	27 106 *n*	1B 6A *n*
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*

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	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

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

MCP7880

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.(4.2 Status LED, pg 9)

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.

MCP7880B

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

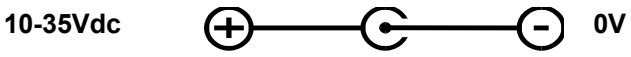
Batteries should be removed if the printer is to be left unused for long periods.

External PSU (optional)
The MCP7880B 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.

MCP7880V

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.

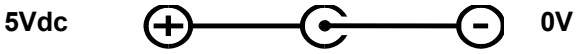


MCP7880X

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 Auto Off Mode

The MCP7880 incorporates a power off mode, configured via option 9, page 3.

In **Auto off mode** the printer cannot be woken by data transfer and must by 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

The printer incorporates an LED indicator to report its condition. If there is a fault, the LED will flash in sequence. The fault can be identified by counting the number of flashes.

LED Indication	Condition	Solution
On	Printer On	-
Off	Printer Off or Asleep	-
Short flash every second	Fast Charging	MCP7880 only
✷ ✷ ✷	Paper out	Fit new paper
✷✷ ✷✷ ✷✷	Thermal head too hot	Allow head to cool
✷✷✷ ✷✷✷ ✷✷✷	Battery cut-out (no charge remaining)	Recharge batteries – MCP7880
		Replace batteries — MCP7880B
		Check supply voltage — MCP7880V & MCP7880X
✷✷✷✷ ✷✷✷✷ ✷✷✷✷	Battery low (approx. 20% charge remaining)	Recharge batteries—MCP7880
		Prepare to replace batteries — MCP7880B
		Check supply voltage — MCP7880V & MCP7880X

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.

6. ACCESSORIES & CONSUMABLES

6.1 Power Adaptors

	Use with	Part Number
Adaptor with UK plug	MCP7880	MPS101
Adaptor with Euro plug	MCP7880	MPS102
Adaptor with US plug	MCP7880	MPS103
Universal Power Adaptor	MCP7880	MPS160
Universal Power Supply	MCP7880X	MPS120
Universal Power Supply	MCP7880B	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

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)	MCP7830	MJ10
Battery, AA, 1.5V, Alkaline (4 required)	MCP7830B	MJ11

6.6 Protective Boot

Description	Part Number
Protective Boot with magnetic Inserts	MPB500

Low profile paper lid (10m paper roll capacity) and M3 threaded insert options available on request.

Martel Instruments Limited
Stanelaw Way, Tanfield Lea Industrial Estate, Stanley, Durham DH9 9XG, UK
Tel: +44 (0) 1207 290266 Fax: +44 (0) 1207 290239 Email: sales@martelinstruments.com

USA Sales Office: 14892 Trojan Circle, Huntington Beach, CA 92647
Tel: (714) 892-0086 Fax: (714) 892-0096 Email: martelusa@earthlink.net

Website: www.martelinstruments.com

MCP7880/AD/D