SP1000
THERMAL PRINTER

ROBIN
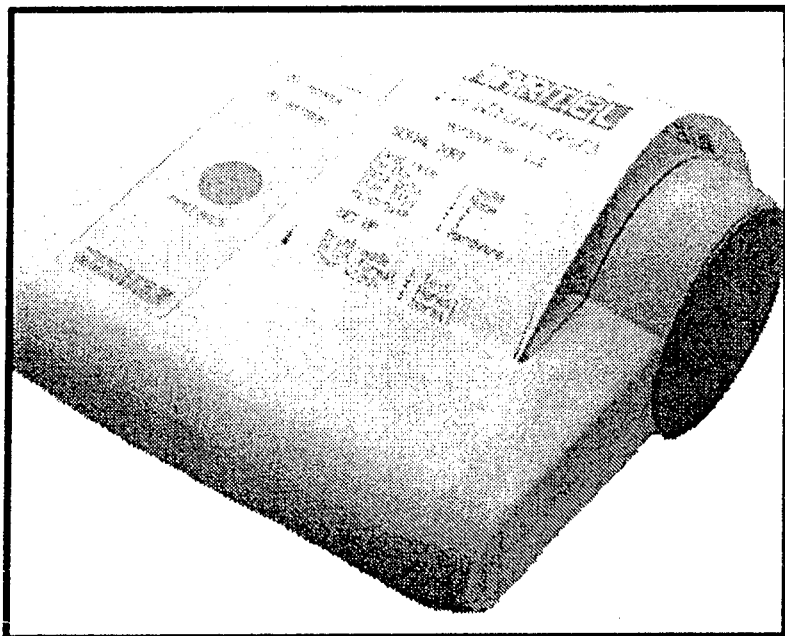
Features

- High speed, high resolution printing
- Quiet, non-impact system
- Maintenance-free
- Compact and light weight
- High reliability
- Versatile, for use with text or graphics
- 12, 16, 24, 32 or 48 characters per line
- Barcode capability
- Auto wake up facility
- Supports labels and dual ply paper

The SP1000 is a compact and light weight portable thermal printer with an RS232 serial interface via a 9-way D-type connector.

It is powered from internal Ni-Cd batteries and has maintenance free operation, only available with thermal printers. The standard unit is intended to be trickle charged from a mains power adapter.

Designed for maximum versatility, the SP1000 is capable of many different modes of operation with numerous character sets. Operation is controlled by a combination of switch settings and external software commands.

Specification

|	
Printing system	Thermal line head system
Max characters per line	48
Character matrix	24 x 16, 24 x 12 or 24 x 8
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	24 x 384 dots
Printing width	48mm
Average printing speed	10 lines per second
Dimensions	135mm x 130mm x 64mm
Weight	Approx. 425 grammes
Internal power supply	4.8V (600mAH, Ni-Cd battery pack)
Paper width	58mm
Character set	UK/United States (437)
Country codes	USA, France, Germany, UK, Denmark I/II, Sweden, Italy, Spain, & Japan
Interface	
Input data format	RS232C (1 Start, 8 Data, 1 Stop, No Parity)
Connector	9-way D-type socket
Baud rates	1200, 2400, 4800, & 9600
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%)

Serial Interface

The RS232 standard is used, and the baud rate is selectable from 1200, 2400, 4800, and 9600 bits per second via the DIP switches. *110, 300, 600 and 19200 baud rates can be made available as an option.*

The printer is fitted with a 9-way D-type 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	n/c	N/A	No connection
2	TxD	O	Transmitted data to host
3	RxD	I	Received data from host
4	n/c	N/A	No connection
5	GND	N/A	Signal ground
6	n/c	N/A	No connection
7	n/c	N/A	No connection
8	CTS	O	Clear to send
9	n/c	N/A	No connection

Fig. 1 Pin Numbers for Serial Interface Connector
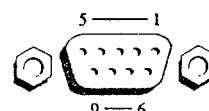
Printer Mechanism

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 paper has run out. The Low Battery indicator will flash (0.5sec on 0.5sec off) to denote that the paper has run out. Use the paper feed button to feed through the last few centimeters of paper and fit a new roll as described below.

Head thermal limit: After extensive printing the print head temperature may rise to an unuseable level. If this occurs the Low Battery indicator will flash (0.25sec on 0.5sec off) and printing will be suspended until the head temperature returns to normal levels.

Power Supply

Power is supplied to the printer from a 4.8V internal Nickel-Cadmium battery pack or from the external mains adapter. The mains adapter will trickle charge the batteries when the printer is turned on or off (charge time approx. 16 hours). The Low Battery indicator will light to show that the battery pack is nearly exhausted.

| Power consumption			Battery pack	
Sleep	130µA		Capacity	600mAH
Standby	40mA		Charge current	50mA (800mA optional fast charge)
Running - Min	0.4A		Weight	100g
Ave	1.3A		Battery life	Approx. 10000 lines (30m) of
Max	2.8A			continuous printing

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

The SP1000 should only be used in conjunction with an MPS101, MPS102 or MPS103 power adapter. Users wishing to provide their own power source must consult Martel. *The use of an unapproved source will void the printer's warranty.*

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 paper 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. Switch on the printer using power switch located on the left hand side of the printer. The Power indicator will light and the printer mechanism will reset.

Power Switch

OFF   ON
(Mains/Battery operation)
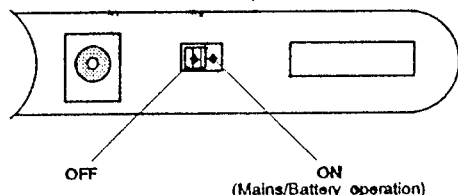
Trickle charging will take place when the printer is ON or OFF.

Power On Self Test

The self test procedure is initiated by turning on the printer with the Paper Feed button pressed. Release the Paper Feed button and the self test procedure will start. This will check most of the printer functions, except for the serial interface, i.e.

Printer mechanism
Control circuitry
Firmware version
DIP switch settings
Print quality

Battery Charging

Connect the SP1000 printer to the MPS power adapter and recharge the batteries as soon as the low battery LED lights continuously during printing.

If the batteries in the SP1000 become exhausted, printing will become faint, erratic or not possible at all. *Turn off* the SP1000 and recharge the batteries for at least one hour before attempting further printing. The MPS adapter cannot supply the full power requirements of the SP1000 during printing, so the batteries must be partially charged before printing is possible.

When the SP1000 is first delivered there may be little or no charge in the printer's batteries. The SP1000 should be *turned off*, connected to the MPS adapter and allowed to charge for 16 hours before it is used for the first time.

Although it is permissible to leave the SP1000 permanently connected to the MPS power adapter, constantly charging the printer's batteries between printouts, this is not recommended as battery capacity will gradually reduce due to the memory effect associated with NiCd batteries. If the printer is used in this way then the battery pack should be discharged and recharged every 2 to 3 months. Disconnect the power adapter and leave the printer turned on until the batteries are completely discharged (power LED goes out - approx. 15 hours), then *turn off* the printer, reconnect the power adapter and recharge for 16 hours before further use.

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
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 ≤ 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 UPC-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 03 [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

Print Mode (ESC !)

Bit	Function	Value 0	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

Replacing Paper Roll

If the paper roll needs replacing, open the paper cup lid (squeeze cup lid as shown in Fig. 3) and remove the remaining paper using the Paper Feed button, *do not pull paper through the printer mechanism*. Reel off a few centimetres from a new paper roll and check that the end has a clean straight edge (see Fig. 4). 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 paper feed button to feed the paper through the printer mechanism (see Fig. 5). Keep the paper feed 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 while feeding in a new roll, cut the end off the paper roll, feed out the creased paper using the Paper Feed button, and reload ensuring the paper has a clean straight edge.

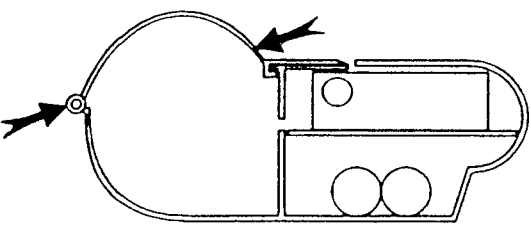*Fig. 3 Squeeze cup lid to gain access to paper roll*

Fig. 4 Cut the end off the paper roll so that the end has a clean straight edge
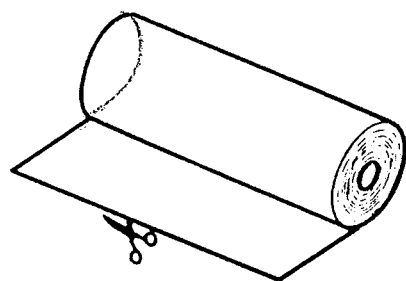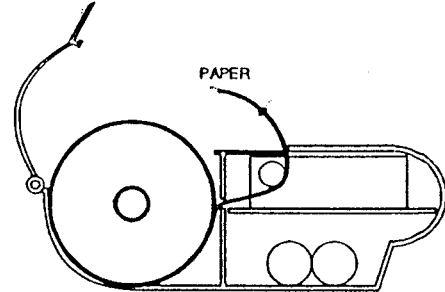

Fig. 5 Position of paper roll in printer

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All instruments designed & manufactured in Great Britain.
The manufacturers reserve the right to alter specification without prior notice.

Hardware Selectable Functions

These are set using the DIP switches and are only read when the printer is turned on.

SW - 1: Print format
SW - 2: Handshake protocol
SW - 3: Baud rate
SW - 4: Baud rate
SW - 5: Character height
SW - 6: Character width
SW - 7: Paper selection
SW - 8: Auto wake up

Default settings

Print format	Normal
Handshake protocol	Hardware
Baud rate	1200
Character height	Normal
Character width	Normal
Print mode	Text

Fig. 2 DIP switch default settings
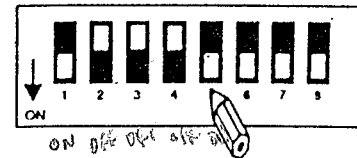
See below for a detailed explanation of the DIP switch settings (Fig. 2 illustrates the default DIP switch settings). To change the DIP switch settings, (make sure the printer is off before making any changes), use a pencil or similar thin pointed object.

	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8
24 Characters per line	ON							
48 Characters per line	OFF							
Software handshake		ON						
Hardware handshake		OFF						
1200 Baud			OFF	OFF				
2400 Baud			ON	ON				
4800 Baud			OFF	ON				
9600 Baud			ON	OFF				
Normal height					ON			
Double height					OFF			
Normal width						ON		
Double width						OFF		
Normal/Dual ply							ON	
Labels							OFF	
Auto wake up disabled								ON
Auto wake up enabled								OFF

Paper Selection

The setting of DIP switch 7 selects the type of paper being used. If the SP1000 is loaded with label stock, SW7 must be placed in the Up (OFF) position for correct operation to take place.

The 'ESC f' sequence, which advances to the next label, can only be used if SW7 is Up.

Since dual ply paper is less sensitive than normal thermal paper, the 'ESC !' sequence should be used to increase the print density to 4 when printing on dual ply (see **Print Density** for details).

Auto Wake Up

The SP1000 incorporates an auto wake up facility which minimises the printer's power consumption. If auto wake up is enabled, the printer will turn itself off after approximately five minutes of inactivity on the receive data line. The printer will then wake up only when activity is detected on the receive line.

To wake the printer up, the user should ignore the status of the CTS line and send a NUL character (00H) to the printer. The user should then wait at least 0.7 seconds for the printer to initialise before sending further data. Once the printer has initialised, handshaking should be resumed.

Since the NUL character is non-printable, this procedure may be followed even if the printer is awake and will not cause unwanted characters to be printed.

To enable the auto wake up facility, place DIP switch 8 in the UP position. If the switch is in the DOWN position the printer will remain operational until turned off via the power switch.

If auto wake up is enabled, the printer may not turn on when power is applied via the power switch. Sending a NUL character will cause the printer to power up normally.

Software Selectable Functions

Bold
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

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