



## ScanPal 2 Data Capture Unit



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## METROLOGIC ScanPal 2

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## **1. Introduction**

The ScanPal 2 is a compact, lightweight, high performance data terminal designed for all-day, everyday use.

It is powered by two AAA size batteries and supported by a rich set of development tools, including a Windows-based application generator, "C" and "Basic" compilers.

It uses a brightly lit, easy-to-read 128x64 graphic dot FSTN LCD with backlight and adjustable contrast settings to allow clear reading regardless of the ambient light.

With its integrated Laser/CCD barcode scanning unit and built-in RS-232 and IrDA port, the ScanPal 2 is ideal for inventory control, document tracking, shop floor management, asset tracking, warehousing and distribution operations.



## 2. General Features and Characteristics

Basic characteristics of the ScanPal 2 Portable Data Terminal are listed below,

### 2.1 Electrical

- Operation battery: two AAA size disposable or rechargeable batteries
- Backup battery: 3.0V, 7.0mAh, rechargeable Lithium battery for SRAM & calendar
- Working time: over 100 hours and more than 80,000 readings (with its CPU in low speed mode and 1 reading every 5 seconds).

### 2.2 Environmental

- Humidity (operating): non-condensed 10% to 90%
- Humidity (storage): non-condensed 5% to 95%
- Temperature (operating): -20 to 60 °C
- Temperature (storage): -30 to 70 °C
- EMC regulation: FCC class A, CE and C-Tick approved
- Shock resistance: 1.2m drop onto concrete

### 2.3 Physical

- Dimensions: 145mm (L) x 63mm (W) x 33.5mm (H)
- Weight: 180g (including batteries)
- Colour: Dark grey
- Material: ABS

### 2.4 CPU

- Toshiba 16-bit CMOS type CPU
- Dual clock, can be switched to Low Clock to save power (refer to the speed setting in section 5.3).

### 2.5 Memory

Program memory

- 1 M Bytes flash memory is used to store the program code, font, constant data, and so on.

Data memory

- 1 M Bytes SRAM.



## 2.6 Scanner

The ScanPal 2 Portable Data Terminal can be equipped with Laser or Long Range CCD scanners. Detail specifications are as following:

### ScanPal 2L (Laser)

- Light source: visible Laser diode operating at  $670\pm 15\text{nm}$
- Scan rate:  $36\pm 3$  scans per second
- Scan angle: 42° nominal
- Minimum print contrast: 20% absolute dark/light reflectance at 670nm
- Depth of field: 5 ~ 95 cm, depends on barcode resolution

### ScanPal 2C (CCD)

- Resolution: 0.15mm ~ 1.00mm
- Depth of field: 20cm
- Width of field: 45mm ~ 124mm
- Scan rate: 100 scans/sec
- Ambient Light Rejection:
  - 1200 lux (Direct Sun-light)
  - 2500 lux (Fluorescent Light)

## 2.7 Display

- 128x64 graphic dots FSTN LCD display with LED back-light

## 2.8 Keypad

- 21 rubber keys, including alphanumeric keys, arrow keys, function keys, and scan trigger key.

## 2.9 Indicator Buzzer

- Software programmable audio indicator, 1KHz to 4KHz, low power transducer type.

## LED

- Programmable, dual-colour (green and red) LED for status indication.

## 2.10 Communication

Two kinds of communication are provided: standard RS-232 and Infrared.

- RS-232: Transmission speed up to 115200bps
- Infrared: standard IrDA 1.0 and high speed IR.
  - Transmission speed up to 115200bps
  - Distance: 5 to 100 cm
  - View angle: 30 degrees

## 2.11 Programming Language

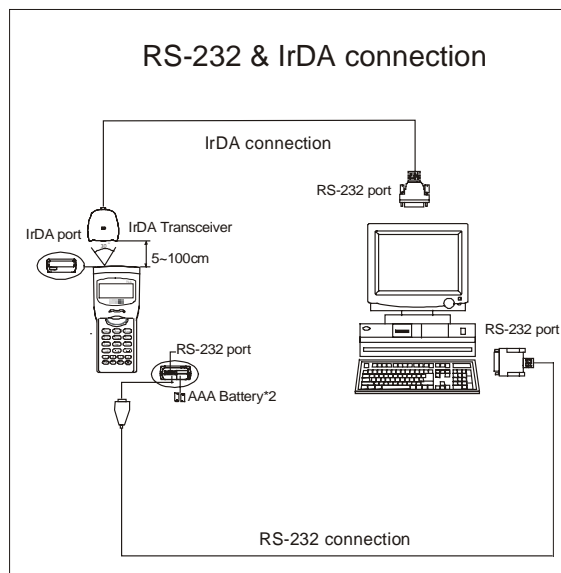
"C", "BASIC", and a Windows-based Application Generator

## 2.12 Accessories

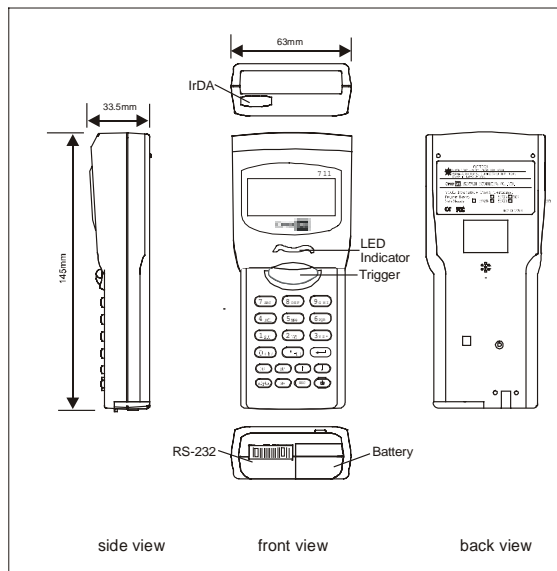
- RS-232 cable
- High speed IR Transceiver
- Cradle

### 3. Hardware Configuration

#### 3.1 Front, Back and Side View



#### 3.2 RS-232 connection & IrDA connection



## 4. Software Organization

The ScanPal 2 Portable Data Terminal system software consists of three modules: the kernel module, the system module and the application module.

### 4.1 Kernel module

Kernel module is the innermost core of the system. It has the highest security and is always protected by the system. Only the failure of flash memory or improperly power off during system restart after updating kernel will the kernel be destroyed. The kernel module ensures that user can always download their own program even the operating system was crashed by user's program. It provides the following services:

- Program download
- Update kernel
- Test & Calibrate

For detail operations, please refer to section 5.4.

### 4.2 System module (the operating system)

The system module provides the following system services

- Memory
- Setting
- Reader
- Battery
- Test
- Download
- Version

For detail operations, please refer to section 5.3.





### 4.3 Application module

The Application module runs on top of the System module. The ScanPal2 Portable Data Terminal is preloaded with an application module that runs upon powering the unit up. The following menu will be shown:

- Execute
- Clear Data
- Transmit Data
- Download Settings

The arrow keys can be used to select the menu item, and execute it by pressing the ENTER key. The function and meaning of each item are as follows:

<i>Execute</i>	<p>Start the data collection process.</p> <p>A new screen appears after Execute is selected and the ENTER key is pressed, showing the following two prompts:</p> <p>Item: Qty:</p> <p>Data can be input from keypad or barcode reader. Pressing the ENTER key after the Quantity has been entered will save the data and the system will show the same prompts until the ESC key is pressed, which will bring back the main menu.</p>
<i>Clear Data</i>	<p>To clear all the transaction data.</p> <p>A submenu will be shown asking to confirm this action. Once executed, the transaction data will be lost and cannot be retrieved. To abort this operation, No must be selected when asked to confirm the operation or by pressing the ESC key to go back to the main menu.</p>
<i>Transmit Data</i>	<p>To upload transaction data to the host PC.</p> <p>There are three ways to transmit the data: via RS-232 or Infrared or standard IrDA.</p> <p>Note: terminal COM port settings should match the host PC settings.</p>
<i>Download Settings</i>	<p>To download the menus and form prompts for the data collection process.</p> <p>The settings should be configured in the Application Generator, then downloaded to the terminal. The Application Generator allows to define menus and data input forms. For detail operation, please refer to the Application Generator's Operation Guide.</p>



#### 4.4 Build your own application module

There are three software tools available for developing application programs.

1. The Application Generator
2. The "BASIC" Compiler
3. The "C" Compiler

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## 5. Operations

Batteries must be fresh and properly loaded before start operation.

### 5.1 Keypad operations

The keypad of ScanPal 2 consists of 20 rubber keys and one trigger key. The functions of some special keys are as follows:

<i>ENTER</i>	Enter. This key is for command execution or input confirmation.
<i>BS</i>	Back Space. If pressed down longer than one second, a clear code will be sent.
<i>SP</i>	Space.
<i>UP</i>	Cursor up.
<i>DOWN</i>	Cursor down.
<i>Alpha</i>	The toggle key for Alphabet /Numeral input. When the system is in alpha-mode, a small icon will be shown on the display, and each numeral key can be used to generate one of the three capital letters. For example, numeral 7 can be used to produce A, B or C. Pressing the same key twice within one second, will call the letter B. Pressing the same key without halting longer than one second, will cause the three letters to be shown in a circulating way. Only when stop pressing the key for longer than one second or pressing another key, will the system send the real key code to the application program.
<i>FN</i>	The function key. This key cannot be activated alone, it must be pressed with one numeral key at the same time. For example, FN + 1 generates function #1, FN + 2 generates function #2, etc (up to 9 functions). Also, this key can be combined with the UP/DOWN arrow keys to adjust the contrast of the LCD. And when this key is combined with the ENTER key, it will turn ON/OFF the LCD backlit.
<i>ESC</i>	Escape. Usually this key is used to exit current operation.
<i>POWER</i>	Power On/Off. To prevent a faulty push, it needs about 1.5 sec continuous pressing to turn On/Off the power.

## 5.2 Application mode

This is the default operation mode when turning on the power. The operation depends on the application module. Please refer to section 4.4.

## 5.3 System mode

When pressing the 7, 9 and POWER keys simultaneously, the system will enter the System Mode with which provides the following services:

### 1. Memory

*Size Information* Includes the SRAM (Data memory) size and FLASH (Program memory) size in kilobytes.

*Initialize* To initialize the data memory (RAM). Note that the contents of the data space will be wiped out after memory initialization.

*Test* To test the data memory. For 256 KB SRAM, it takes about 15 seconds to finish the test. Note that the contents of the data space will be wiped out too after memory test.

### 2. Setting

*Clock* To set new date and time.

*Lighting* To set the intensity of LCD and the time the LCD is illuminated.  
Default: High intensity, the lights go off after 20 seconds.

*Speed* To set CPU running speed. There are five speeds available:  
Full speed, 1/2 speed, 1/4 speed, 1/8 speed and 1/16 speed; which need about 39mA, 22mA, 12mA, 7mA and 5mA, respectively, during normal operation (without scanning or data transmission). If high-speed operation is not required, selecting low CPU speed will save battery power.  
Default: Full speed

*Auto Off* Set time threshold for auto power-off when no operation is taking place during that specified period. If this value is set to zero, this function will be disabled.  
Default: 10 minutes

*Power On* There are two possible selections: Program Resume, which starts from the program being used during the last session before the last power-off; and Program Restart, which starts with a new program.  
Default: Program Resume



### 3. Reader

**Reading test** To test the reading performance of the scanner.  
The following are the default-enabled symbologies:

Code 39  
Industrial 25  
Interleave 25  
Codabar  
Code 93  
Code 128  
UPCE  
UPCE with ADDON 2  
UPCE with ADDON 5  
EAN8  
EAN8 with ADDON 2  
EAN8 with ADDON 5  
EAN13  
EAN13 with ADDON 2  
EAN13 with ADDON 5

Other symbologies must be enabled through programming.

### 4. Battery

*Main* Show voltage of the main battery power. If the main battery voltage is low, a battery icon (power-low indicator) will be shown on the LCD screen. The available power will be less than 25% of fresh batteries; the terminal will continue to work normally for a short period of time.

*Backup* Show voltage of the backup battery.

### 5. Test

*Buzzer* To test the buzzer with different Frequency/Duration. Press ENTER key to start / stop the test.

*LCD & LED* To test LCD display and LED indicator. Press ENTER key to start / stop the test.

*KBD* To test the rubber keys.  
Press a key and the result will be shown on the LCD display. Note that the FN key should be used in conjunction with numeral keys.



## 6. Download

<i>RS-232</i>	To download the user program via RS-232 port. The transmission speed can be up to 115200 bps.
<i>Docking</i>	To download the user program via communication cradle (charger). The transmission speed can be up to 115200 bps.
<i>IR</i>	To download the user program via high speed IR transceiver. The transmission speed can be up to 115200 bps.
<i>IrDA</i>	To download the user program via standard IrDA. The transmission speed can be up to 115200 bps.

## 7. Version

<i>Version Info</i>	To show version information, including Hardware version, Firmware version, Serial Number and Manufacturing Date.
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### 5.4 Kernel mode

Press the 7, 9 and POWER keys simultaneously to enter the System mode, then power off and press 1, 7 and POWER key simultaneously to enter the kernel mode which provides the following services:

<i>Program download</i>	To download user program. The download procedure is same as download program in system mode. Please refer to the above section.
<i>Update kernel</i>	To update system kernel. Sometimes the kernel might be changed for improving performance or other reasons. This function allows you to keep the kernel updated. The update procedure is same as download user program, but note that after updating the kernel, please do not power off until the system restart itself.
<i>Test &amp; Calibrate</i>	To perform a burn-in test and fine tuning the system clock. This function is for manufacture purpose only.

## 6. Troubleshooting

- a) Does not power up after pressing POWER key.
  - Change the batteries.
- b) Does not power up after changing batteries.
  - Check if the batteries are properly installed with battery cap firmly closed.
  - If problem persists, call for service.
- c) Battery-low indicator is on,
  - Change the batteries.
- d) Cannot download application program from the host to the ScanPal 2 Portable Data Terminal or vice versa, via RS-232 port.
  - Check if the RS-232 cable is plugged tightly, then,
  - Check if host communication parameters (COM port, baud rate, data bits, parity, stop bit) match the ScanPal 2 Portable Data Terminal's.
- e) Cannot download application program from the host to the ScanPal 2 Portable Data Terminal or vice versa, via IrDA port.
  - Check if the IrDA transceiver tightly connected to host's COM port, then
  - Check if host communication parameters (COM port, baud rate, data bits, parity, stop bit) matched portable's.
  - Check if the ScanPal 2 Portable Data Terminal is properly positioned within the reading range:  
(5 to 100cm, 30 degree solid angle) of the IrDA transceiver.
- f) Keypad does not work properly,
  - Turn off the power then press the 7, 9 and POWER keys simultaneously to enter the kernel mode operation.
  - From the system menu, select the Test and then its sub-item KBD.
  - Perform the key-in test.
  - If problem persists, call for service.
- g) Scanner does not scan,
  - Check if symbologies used are enabled, or
  - Check if battery-low indicator is shown on the LCD display. If yes, change the batteries.
  - If problem persists, call for service.
- h) Abnormal responses,
  - Open the battery cap and re-load the batteries.
  - Enter system menu by pressing 7, 9 and POWER keys simultaneously.
  - Check if the ScanPal 2 Portable Data Terminal can have a correct response by performing entering data.



- If problem persists, call for service.





### Metrologic Part Numbers and Kit Description

<b>SCANPAL 2C B-KIT</b>	Scanpal 2 with CCD Scanner, and RS232 Comm.Cable, 2 AAA alkaline batteries, CD, Manual
<b>SCANPAL 2C E-KIT</b>	Scanpal 2 with CCD Scanner, and RS232 Comm.Cable, download/charging cradle, power supply unit, 1 rechargeable battery, CD, Manual
<b>SCANPAL 2L B-KIT</b>	Scanpal 2 with Laser Scanner, and RS232 Comm Cable, 2 of AAA alkaline batteries, CD, Manual
<b>SCANPAL 2L E-KIT</b>	Scanpal 2 with Laser Scanner, and RS232 Comm. Cable download/charging cradle, power supply unit, 1 rechargeable battery, CD, Manual

<b>Metrologic Part Number (MLPN)</b>	<b>Description</b>
99-99001	Battery conditioner incl. 1 rechargeable battery and power supply unit
99-99002	Rechargeable battery pack
99-99003	Keyboard wedge cable
99-99004	Protective cover
99-99005	Infra Red Transceiver incl. RS232 cable and power supply unit
99-99006	Basic compiler
99-99007	C++ compiler
99-99008	Download/charging cradle incl. 1 rechargeable battery and power supply unit
99-99009	RS232 cable
99-99010	European power supply unit