

PT630 Portable Terminal

Operation Guide



V1.0

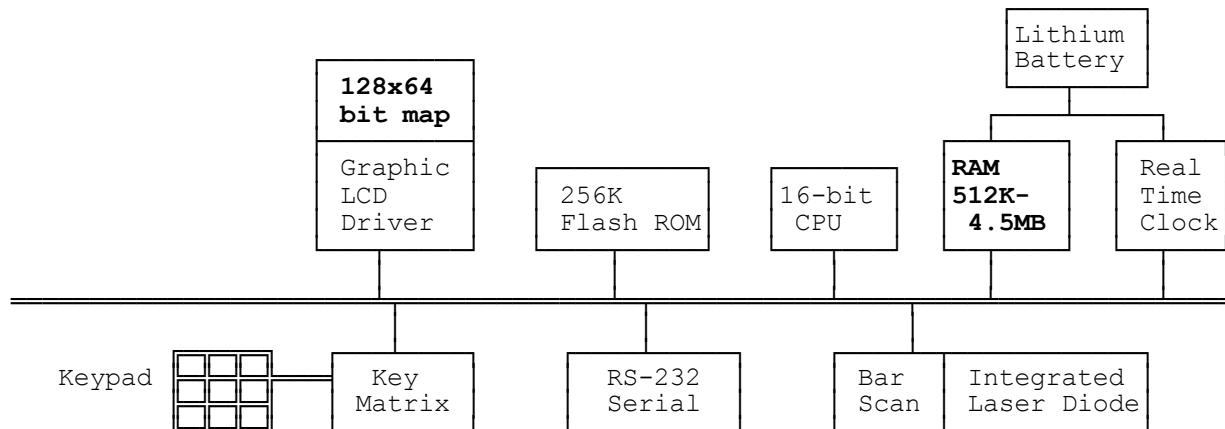
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Chapter 1. Introduction

The PT630 is a programmable and flexible data collection device that can be utilized in a variety of data acquisition applications. It can be used as a portable data entry device and it can also be used as a programmable dedicated computer that receives and runs application programs downloaded from a host computer.

The PT630 is controlled by a 16-bit INTEL 8088 compatible microprocessor, and has a 256K user programmable FLASH MEMORY that includes a rich set of DOS functions and device drivers for application development, including bar code decoding, display, keypad, communications, and real time clock/calendar.

PT630 BLOCK DIAGRAM



The PT630 can be purchased with **512K, 1.5MB, 2.5MB, 3.5MB or 4.5M** on-board RAM. All RAM memory is powered by the main **Li-ion** battery and a back-up lithium battery, which retains the data stored in RAM and real time clock when the main battery is drained. The PT630 has a **128x64** pixel backlit graphic LCD display, an integral **27-key** keypad, a built-in bar code laser scanner/CCD module and an RS-232 serial port for data communication with a host PC.

1.1 Programming

The PT630 system kernel includes three basic modules: 1. Device driver, 2 File manager and 3.DOS manager. The PT630 terminal can be programmed using an E-PROM resident application program called FormCaching, a Windows-based, high-level application generator JobgenPlus, Microsoft C, Borland C, Turbo C, Turbo Pascal and IBM PC macro assembler. The ROM based firmware of the terminal provides emulated MS/DOS function calls. The programmer can design the application programs by calling those functions just like in a DOS environment. The calling and parameter passing conventions are compatible to that of MS/DOS and the programs are in the EXE format. Programming details are included in the PT630 programming manual in this binder. The intelligence level of the terminal is determined by the configuration of the FormCaching application or the downloaded program generated by JobgenPlus or supported language compiler.

Once the program has been started up, the terminal operates as a stand-alone unit, storing transaction data in the RAM disk area or linked to a host/personal computer.

1.2 Subsystems

The following describes several subsystems and related I/O interface functions, the DOS manager and file manager functions. Detailed calling process is explained in the Programming Reference Guide included in this binder.

1.2.1 Keypad Subsystem

The keypad subsystem scans the key matrix, converts the scan code to its associated key value and stores the value in the keyboard input buffer for program utilization. The table below shows hexadecimal values assigned to each key.

KEY	VALUE	KEY	VALUE	KEY	VALUE	KEY	VALUE	KEY	VALUE
CLR	08H	-	2DH	=	3DH	M	4DH	Y	59H
ENTER	0DH	.	2EH	?	3FH	N	4EH	Z	5AH
→	10H	/	2FH	@	40H	O	4FH		5BH
←	11H	0	30H	A	41H	P	50H	\	5CH
↓	12H	1	31H	B	42H	Q	51H]	5DH
↑	13H	2	32H	C	43H	R	52H	F1	86H
SP	20H	3	33H	D	44H	S	53H	F2	87H
!	21H	4	34H	E	45H	T	54H	F3	88H
#	23H	5	35H	F	46H	U	55H	F4	89H
\$	24H	6	36H	G	47H	V	56H	F5	8AH
%	25H	7	37H	H	48H	W	57H	F6	8BH
&	26H	8	38H	I	49H	X	58H	F7	8CH
*	2AH	9	39H	J	4AH	Y	59H	F8	8DH
+	2BH	:	3AH	K	4BH	Z	5AH	EXIT	84H
,	2CH	;	3BH	L	4CH		5BH		

1.2.2 Display Subsystem

The PT630 display subsystem supports a character oriented **8-line by 20-character or 4-line by 16-character** LCD display. The origin (0,0) is always at the top-left hand corner. This subsystem provides the program interface functions to display characters, set cursor position, get cursor position and clear screen display.

1.2.3 Serial Port Subsystem

The PT630 terminal has an RS-232 serial port for data communication. The communication subsystem consists of point-to-point protocol for general processing and multi-point protocol for network processing. The PT630 also supports a built-in Kermit server for point-to-point communication.

1.2.4 Real Time Clock Subsystem

This subsystem allows users to set and obtain system date and time from the Real Time Clock Integrated Circuit (IC) in the PT630.

1.2.5 Bar Code Input Port

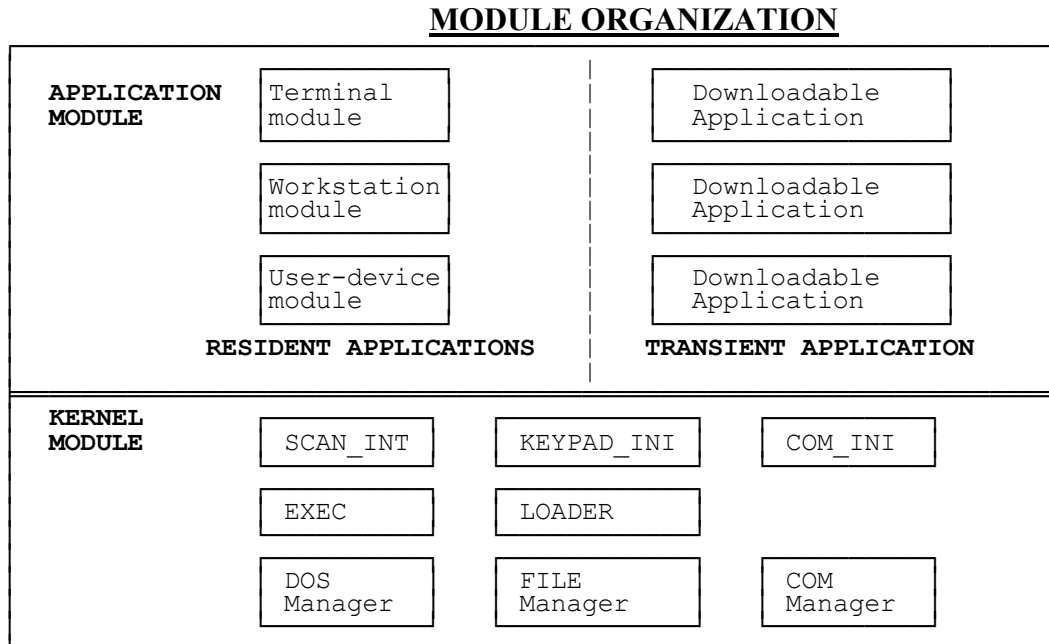
The PT630 has a built-in barcode decoder. The terminal reads bar code labels through an integrated laser scanner module, pen type module.

1.3 Diagnostics and Power-On-Test

The system diagnostic routines exercise the ROM validity check, test the RAM, system parameters, the keypad, the real time clock, the RS-232 port, LCD and scanner port. The power-on-test is a subset of the system diagnosis that only includes the ROM validity check, system parameter check sum test, and back-up battery level check.

Chapter 2. System Software Organization

The PT630 system software is organized into two modules: the kernel module and the application module (see diagram below).



2.1 Application Module

Although applications run on the PT630 are classified into resident and transient categories, the PT630 operation can not decipher the difference between them. The only difference is the location of the executable files. For resident applications, the Job Scheduling EXEC "jumps" to the entry point in the EPROM and begins execution. For transient applications EXEC "loads" the executable file from the RAM file into the RAM memory and then begins execution.

2.2 Kernel Module

The PT630 kernel provides basic system services. The kernel module includes the DOS Manager, File Manager, COM Manager and several interrupt service routines.

DOS Manager The DOS manager emulates most MS DOS function calls to control PT630 peripherals and files.

FILE Manager The File manager implements a DOS-like file subsystem to support essential file operations.

COM Manager The COM manager controls the communication link between the PT630 and the host through a RS232 serial port.

LOADER The function of the loader is identical to that of the MSDOS loader except for the memory allocation/deallocation scheme being simplified. The loader's operations are:

1. read .exe header
2. find enough memory for .exe
3. read binary into RAM
4. relocation based on RAM allocation
5. set up all registers
6. jump to the entry point

LCD Manager The LCD manager handles the cursor positioning and graphic pattern display. Two character pattern fonts are supported. PT630 can support both 6x8 font (**20 column by 8 lines**) and 8x16 font(**16 column by 4 line**).

EXEC The EXEC is the job scheduler. It manages top-level operation flow of the PT630 system. The EXEC program is analogous to the COMMAND.COM program in MS DOS-based machines.

2.3 Operation Flow

The EXEC program controls the PT630. When the portable terminal is powered up, EXEC performs the power-on-test (POT). EXEC proceeds to verify if the PT630 should make a warm or cold booting. A **warm boot** resets the system without clearing any RAM program or data files. Device configurations preserve the same values as they had before the warm boot. On the other hand, a **cold boot** will clear the RAM and initialize the PT630 to default values.

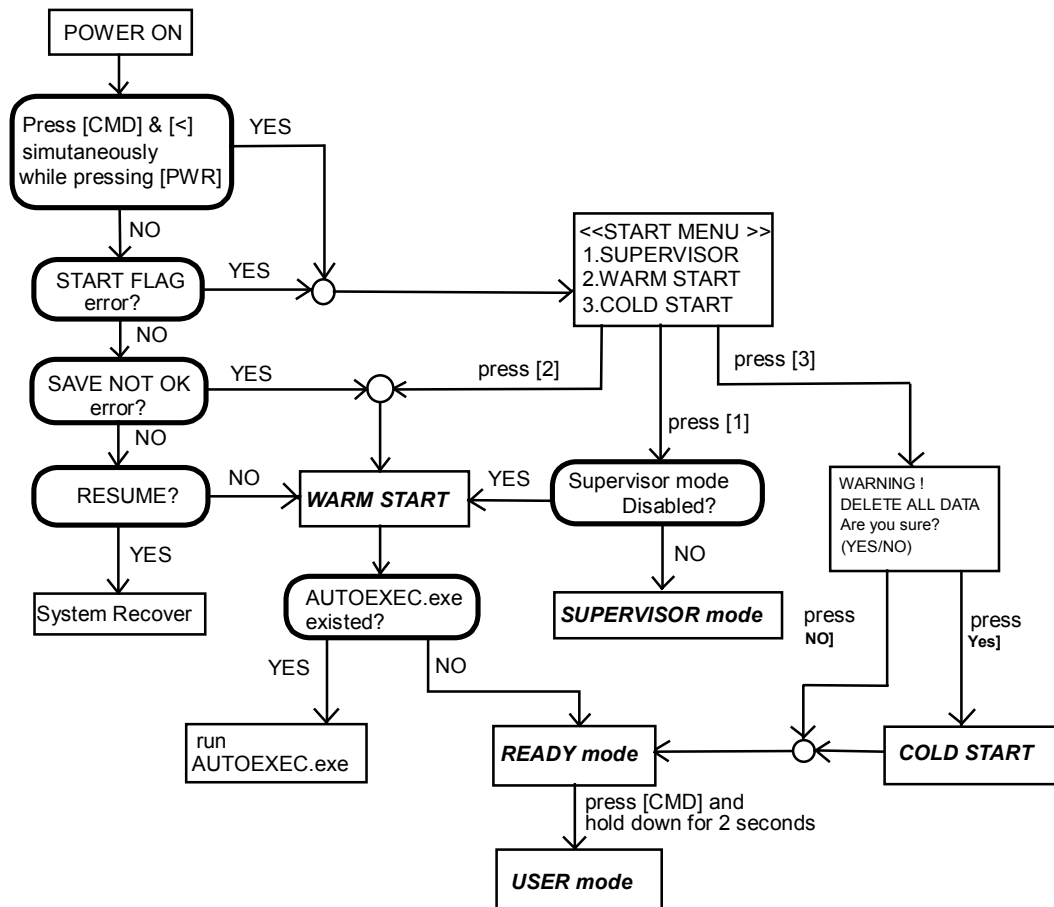
The PT630 is always testing its main and backup batteries. The LCD will display a warning message when the test fails.

<u>Power on Test</u>	<u>Test failure message</u>
Main battery test	"WARNING MAIN BATTERY LOW"
Backup battery test	"WARNING LITHIUM BATTERY LOW"

When the main battery is low, a warning message will be displayed on the LCD when PT630 is power on. For PT630, it can automatically detect battery status, a warning sign will be display on battery icon on the upper side of LCD.

During the start-up process, EXEC also initializes the PT630 barcode scanner and RS232 communication port, and creates all dynamic data structures; e.g. keypad queue and COM buffer. Once the initialization procedure has been completed, EXEC checks if a supervisor menu has been

requested. The supervisor menu can be requested if the operator holds down both [CMD] and [←] keys while powering up the PT630.



- NOTE:**
- 1) Cold start, will clear all data stored in the RAM and reinitialize the portable terminal to system default.
 - 2) There are two system flags, “Start” flag and “Save NOT OK” flag, which will be verified each time the unit is turned on.
 - 3) When the “Start” flag verification fails, it indicates that there is probably a defective RAM chip or that the backup battery power is low. A data back up and hardware diagnostics are recommended in these cases.
 - 4) The “Save NOT OK” flag is used to check if the previous turn-off process was made normally or not. The system will not return to the last turn-off point if the “System Resume” is set to On when this flag verification fails.

A program downloaded to the PT630 may be automatically executed each time the portable terminal is turned on. In order for the program to be auto-ran, it must be downloaded to PT630 with the name AUTOEXEC.EXE. When the PT630 is turned on, the system will scan the file directory and execute the program, otherwise it will enter a mode of operation called the READY mode. In this mode, the PT630 will standby for keypad-entered commands, or commands from the Host PC.

Chapter 3. OPERATING MODES

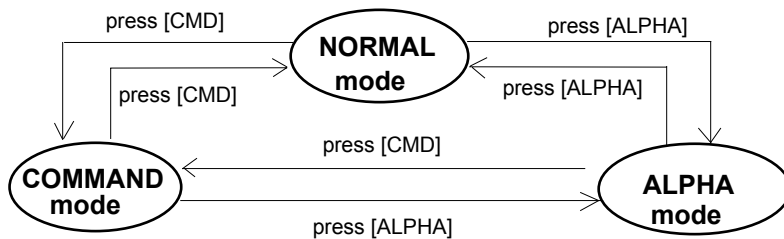
3.1 Keyboard Modes --- Using PT630's keyboard

The keypad of PT630 consists of 27 rubber keys, the ☉ key is used to switch on/off the unit and other 26 keys are used to control the unit and key in data. The use of keyboard is categorized to three modes: **normal mode**, **command mode**, and **alpha(betic) mode**. All keys except ☉ key may produce a sound (tone) when pressed. Keys of upper four rows have larger size for easier key-pressing to input numbers.

[☉] When the unit is off, pressing the ☉ key will turn on the unit. On the other hand, when the unit is on it is needed to press and hold down the ☉ key for about one second in order to turn the unit off.


[CMD] Pressing the [CMD] key sets the keyboard to Command mode. However pressing and holding down the [CMD] key for two seconds in Ready mode will enter the **User mode**. In User mode, users can invoke system commands by menu selection.


[CMD] then [Alpha] In **User mode** or **Supervisor mode**, pressing the [CMD] key and then pressing [ALPHA] key will exit from the current operation to the previous operation.

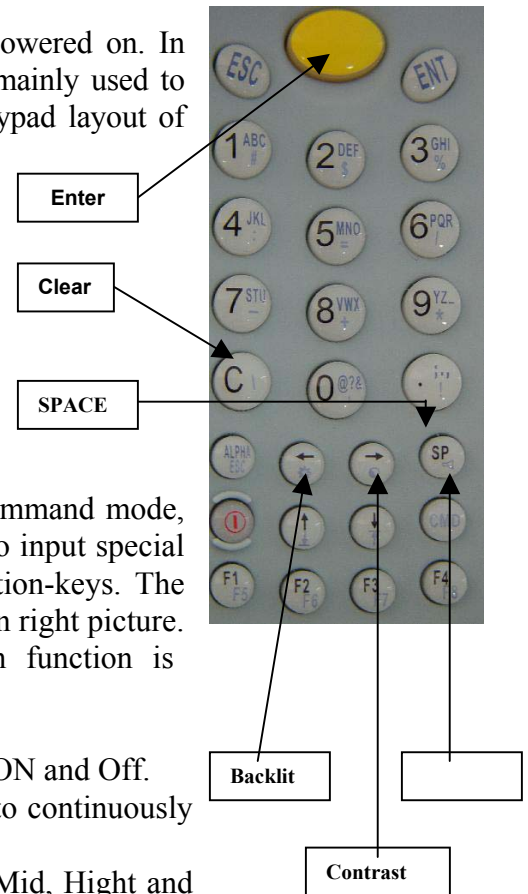


3.1.1 NORMAL mode

Keyboard of the PT630 is initialized to normal mode after powered on. In normal mode, the cursor is a block sign and the keyboard is mainly used to input numeric data and use F1-F4 four function-keys. The keypad layout of available keys in normal mode is shown on right picture.

 key for next data search


 key for last data search



3.1.2 COMMAND mode

Press [CMD] key sets the keyboard to command mode. In command mode, the cursor type keeps same and the keyboard is mainly used to input special characters, make hot-key function, and use F5-F8 four function-keys. The keypad layout of available keys on command mode is shown on right picture. There are three hot-key functions and the usage of each function is described below.

LCD Backlit On/Off : Hit []Key to toggle between ON and Off.

LCD Contrast : Press and hold down [] key to continuously change from light to dark.

Buzzer Volume : Hit [SP] key to toggle among Mid, Hight and None

3.1.3 ALPHA mode

Press [ALPHA] key to toggle between normal mode and alpha mode of keyboard In alpha mode, the cursor is an underscore sign and the keyboard is available to input upper case letters. In alpha mode, every numeric key contains 3 characters individually. Pressing the key to choose among three available characters.

For example :

First press [ALPHA] to switch the system to alpha mode, the cursor type will be changed from block to underscore

To enter 'A', hit [7] one time

To enter 'B', hit [7] twice.

To enter 'C', hit [7] three times.

3.2 PT630 Modes of Operation

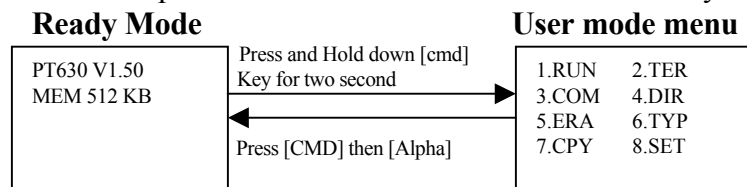
There are three modes of operation in the PT630:

- a. Ready Mode
- b. User Mode
- c. Supervisor Mode

3.2.1 Ready Mode

The Ready mode is the default resident operating mode. In the Ready mode the PT630 is configured as a portable programmable device, and is capable of receiving files (Download) from or transmitting files (Upload) to a Host PC. Data files or recorded information collected from the PT630 are uploaded to the host whenever the host program is ready to receive the collected data. Some applications may also require prepared data files (e.g. database information). These data files are loaded to the PT630 in the same manner as application programs are downloaded. The PT630 carries out upload and download operations through its built-in RS232 port. The operator can later select one of the executable applications to run in the portable terminal via the keypad or host command sequence.

After the **Warm Start**, the PT630 enters the Ready mode and shows the Ready mode screen as shown left. The first line indicates the model code and BIOS firmware version number. The second line shows the size of the installed RAM. The third line shows the prompt, ">" which indicates that the terminal passed the Power-on-test and is in the Ready mode of operation.



3.2.2 User Mode

The User Mode allows the operator to issue commands to the PT630. Pressing and holding down the [CMD] key for two seconds while in the **Ready Mode** will invoke the **User Mode** (see figure below). There are eight commands: 1.RUN, 2.TER, 3.COM, 4.DIR, 5.ERA, 6.TYP, 7.CPY, and 8.SET. Select the corresponding number, 1-8, or press [←] and [→] to move cursor then press [ENT] to select and issue the desired command to the PT630. Pressing [CMD] then [Alpha] key will return the system to the **Ready Mode**.

User Mode Commands:

<u>Command</u>	<u>Usage</u>
RUN	Runs the selected executable program
TER	Terminal emulation mode or Form Caching operation
COM	Kermit server mode
DIR	Display RAM disk file directory
ERA	Delete a file from RAM disk
TYP	Dump the content of a file to the LCD
CPY	Copy data from a device/file to another device/file
SET	Set real time clock, scanner type and power-on logo

3.2.2.1 RUN

<p>< RUN PROGRAM ></p> <p>Filename: NULL</p>
--

After a program is downloaded to the hand held unit, the user may invoke the RUN command and press [→] key to display the executable files stored in memory, then press [ENT] to run the program. Pressing [CMD] then [Alpha] and then pressing any key will return the PT630 to the User Mode menu.

3.2.2.2 TER

The **TER** command puts the PT630 in either Terminal Emulation operation or FormCaching operation. User will need to choose when the TER was selected and the PT630 execute the operation.

Terminal Emulation Operation. When EXEC transfers control to this EPROM-resident application program, the PT630 operates as a dumb ASCII terminal while exchanging data with a Host computer. Data input from scanning bar code labels or key-press will be sent to the portable terminal RS-232 port. In order to carry out a successful file transfer, communication parameter setting such as baud rate, data bits, parity, stop bits and flow control, must match the setting at the Host end. Data received from the serial port is displayed on the LCD screen.

The functionality of the PT630 in terminal mode depends on the format configured in the Terminal Control Table. The PT630 is either configured as free format processing or forms based processing. The PT630 examines the "data buffer" and determines if host data transfer is required. If a terminating condition exists by the reception of a terminating character, the PT630 outputs the buffer to its RS232 port. Data transfer between the host machine and the PT630 is primarily controlled by the terminating conditions specified in the Terminal Control Table.

In the terminal application, the program further distinguishes the character mode communication from block mode communication. Character mode communication dictates that the PT630 sends every key (one at a time) to the host. Normally character mode communication uses None protocol, otherwise there will be an overwhelming protocol overhead. The input character may come from the keypad or barcode scanner, whichever comes first. Data characters sent over from the host system

will always be displayed on the LCD screen. Host control commands, which have a special command header (ESC), will not be displayed on the LCD. The host commands are interpreted by the PT630 as they are received.

Block mode applications perform similar functions to character mode, except that the input characters will not be sent to the host one character at a time. Instead the PT630 holds the data in its internal buffer until a termination character is received. Specifying parameter *linepage*, *lineterm*, and *pageterm* in the terminal control table programs the termination character. The PT630 allows at most two termination characters.

FormCaching Operation. When EXEC transfers control to this EPROM-resident application program, it allows the user to create a data entry application program by simply specifying field prompt, type, length, input method and delimiter, etc. without having to write a comprehensive application program. FormCaching is enabled or disabled while the PT630 is in the Supervisor mode of operation.

3.2.2.3 COM

The **COM** command activates the PT630 Kermit server. Pressing *[CMD]* then *[Alpha]* returns the PT630 to the User Mode of operation. The following list shows the available Kermit commands in the Host/PC:

<u>Command</u>	<u>Description</u>
SEND <i>program</i>	Sends a file from the Host/PC to the PT630 and stores it in the PT630's RAM disk.
GET <i>data</i>	Gets a collected data file from the PT630 to the Host/PC disk.
REMOTE DIR	Lists PT630 RAM disk file directory.
REMOTE DEL <i>filename</i>	Deletes a program or data file from the PT630 RAM disk.
BYE	Exit Kermit Mode

Before making use of the Kermit server, switch the PT630 to the Supervisor mode and set the PT630 communication parameters to match the host/PC system. See Section 3.2.3.1 Device Configuration.

3.2.2.4 DIR

```

MYPRG.EXE
ITEM.DAT
<<END>>
2 File(s)

```

The **DIR** command shows RAM disk file directory with the following information:

- The list of file names stored in the RAM DISK.
- The amount of memory assigned to executable programs (Execution Area).
- The amount of free RAM DISK space left. (FREE DISK)

Press [ENT] to exit this screen and return to the User Mode menu.

3.2.2.5 ERA

```

< ERASE FILE >
Filename:
█

```

The **ERA** command allows the user to delete file by pressing [→] or [←] key to select an existence file then pressing [ENT]. When the selected file has been deleted, it can not be recovered. Press [CMD] then [Alpha] key to abort the ERA command and return to **User Mode Menu**.

3.2.2.6 TYP

```

< TYPE FILE >
Filename:
█

```

The **TYP** command dumps the contents of a file to the PT630's LCD. If the user tries to display a program or binary file, only unintelligible characters will be seen. When selecting the **TYP** command, the PT630 allows the user using [→] or [←] key to select an existence file then pressing [ENT]. The screen will display 160 (20 character x 8 line) characters at a time. Press any key to show the next page or press [CMD] then [Alpha], to warm start the PT630 and return to the **Ready Mode**.

3.2.2.7 CPY

The **CPY** command allows the user to make a copy of data from a source and transfer the information to destination. The source and destination can be a file or devices, such as COM, serial port or CON. The CON specifies LCD for destination and keyboard for source.

	<u>Source</u>	<u>Destination</u>	<u>Function</u>
Valid	file1	file2	copy file1 to file2
Source/	file1	COM	output content of file1 to serial port
Destination	file1	CON	output content of file1 to LCD
Combination	COM	file2	input data from serial port and store in file2
	CON	file2	input data from keyboard and store in file2, pressing [CMD] then [Alpha] to end the data input

3.2.2.8 SET

```
<SYSTEM SETUP>
1.DATE & TIME
2.SCANNER
3.DISPLAY
4.KEYPAD
5.EXIT
```

The **SET** command allows the user to set system date-time, select type of bar code scanner, assign laser module scanning method, enable double verification and specify whether to show power-on logo. Select the corresponding number, 1-4, to invoke a function. Pressing the [CMD] and then the [Alpha] key returns the portable terminal to the **User Mode** menu.

3.2.2.8.1 DATE & TIME Set System Clock/Calendar

By selecting “1.DATE & TIME” in the SET menu, you can set the PT630 date and time. The date and time can be used as the time stamp to be appended to an input data record by an application program. The second line shows the current system date in the format YYYY/MM/DD (year/month/day). For instance, 1998/01/01 indicates that date is January 1, 1996. If you want to reset the system date to August 31, 1997, then enter [1],[9],[9],[7],[0],[8],[3],[1]. Or press the [ENT] key to skip the system date setting.

```
DATE-TIME SETUP
1998/01/01
08:00:00
```

The third line shows the current time. The setting method is similar to setting the date. The time is expressed in the 24-hour system in the format HH:MM:SS (hours:minutes:seconds).

3.2.2.8.2 SCANNER

SCANNER The bar code input interface of the PT630 is compatible to all major bar code scanners that are available in the market including wand, CCD and laser diode scanners. Use the [→] key to toggle among **ENABLE** and **DISABLE**, then press [ENT].

LASER TRIG MODE : User can select whether pen is activate to read barcode label by one trigger/one scan or flash scan.

If it is set **NORMAL**, laser beam will be emitted to scan barcode and it will stop laser beam after successfully scan barcode. User need to release trigger key and then press again to scan next label.

If it is set to **FLASH**, user just press trigger and then release it, then scanner will automatically scan barcode. When it successfully read a barcode, scanner will continuously emit laser beam to read next label. User can press trigger again to stop automatic scanning.

LASER AIM When PT630 is equipped with SE1200LR engine, user can use this setting to activate aim beam before starting scanning barcode. It will be helpful for user to focus target barcode label. Use the [→] key to toggle among **ENABLE** and **DISABLE**, then press [ENT].

VERIFICATION When label quality is not good, and then cause error decoding. You can enable this function to let PT630 double verification input barcode. When it is set **ENABLE**, PT630 read barcode label twice to compare if it read the same data.

3.2.2.8.3 DISPLAY**Enable/Disable whether to show the Power-on LOGO.**

Power-on LOGO enabled is the default setting.

3.2.2.8.4 KEYPAD:**Setup up-case and low-case Alpha character input**

User can define upper-case or lower-case input on Alpha mode.

3.2.3 Supervisor Mode

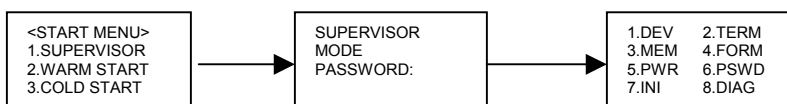
The PT630 **Supervisor mode** allows the user to configure and validate the PT630 hardware. To switch the PT630 to the **Supervisor mode of operation** do the following:

1. Turn off the PT630.
2. Press and hold down the [CMD] and [←] keys simultaneously, then switch on the PT630 by pressing the [⊙] key. The PT630 LCD first shows the 'START MENU' where the user has three (3) choices: 1. Enter the Supervisor mode, 2. Command the PT630 to execute a Warm Start, 3. Command the PT630 to execute a Cold Start.

After selecting 1, a password entry is requested from the user to prevent unauthorized users from accidentally changing configuration parameters. The system will return to the **Ready mode** after 5 unsuccessful tries. The default password is "630". The Supervisor mode menu will be shown on LCD after the correct password is keyed-in.

The **Supervisor Mode** function lets the user set the following functions:

1. DEV: Device Configuration
2. TERM: Terminal Configuration
3. MEM: Memory Configuration
4. FORM: FormCaching Define
5. PWR: Set Resume/Auto-Off/Alarm of program
6. PSWD: Password Change
7. SYS: System Initialization, update BIOS
8. DIAG: System Diagnostic



3.2.3.1 Device Configuration

```

<DEVICE CONFIG>
1.KEYPAD
2.SERIAL
3.BARCODE
  
```

When selecting the option "1.DEVICE", the LCD will offer the user 3 choices: 1) Set the keypad input Language setting, 2) Set the serial port communication parameters, and 3) Enable/disable supported bar code symbologies.

1.KEYPAD The PT630 supports several international language setting. The default language setting is ENGLISH. Press [←] or [→] to select different language setting. There are Sweden/Finland, Danish, Spanish, Franch, German, and Italian. Press [ENT] to confirm the setting and return to the previous manu.

2.SERIAL The PT630 supports one RS232 port on flat 12 pin connector. Data can be downloaded to and uploaded from the PT630 via the serial data communication

port. The communication parameters must be set correctly in order to send/receive data via the RS232 port. Default setting for the serial port is 19200 bps, 8 data bits, No parity, One stop bit

The settings for the communication parameters include:

<u>Category</u>	<u>Selection</u>	PT630 <u>Default</u>
◆ Baud Rate	150, 300, 600, 1200, 2400, 4800 9600, 19200, 38400, 57600.	19200
◆ Length	7, 8	8
◆ Parity	Even, Odd, None	None
◆ Stop bits	1, 2	1
◆ Flow Control	Xon/Xoff, CTS/RTS, None	None
◆ Protocol	MULTI, OFF (None)	MULTI
◆ Address	A~Y, 0~6	A

Press [→] to select the setting, [ENT] to confirm the setting.

3.BARCODE when selecting Option 3. BARCODE in the Supervisor Mode, Device Configuration menu, the LCD will display the BARCODE Setup as shown below.

```

<< BARCODE SETUP >>

CODE 39
ON
```

Press [→] or [←] to toggle between settings. Press [ENT] to set.

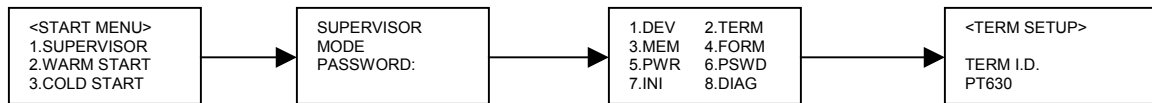
Setup decoding of PT630 supported bar code symbologies

<u>Symbology</u>	<u>Setup Category (default)</u>
Code 39	Enable/disable decoding (ON) Enable/disable full ASCII (OFF) Send/No-send Start/stop Character (NO SEND) Enable/disable Check Digit Verification (OFF)
I 2 of 5	Enable/disable decoding (ON) Enable/disable Check Digit Verification (OFF)
Codabar	Enable/disable decoding (ON) Send/No-send Start/stop Character (SEND) Enable/disable Check Digit Verification (OFF)
UPC-A	Enable/disable decoding (ON) Send/No-send Leading Digit (SEND) Send/No-send Check Digit (SEND)
UPC-E	Enable/disable decoding (ON)

	Send/No-send Leading Digit (SEND)
	Send/No-send Check Digit (SEND)
	Enable/disable Zero-Expansion (OFF)
EAN-13	Enable/disable decoding (ON)
	Send/No-send Leading Digit (SEND)
	Send/No-send Check Digit (SEND)
EAN-8	Enable/disable decoding (ON)
	Send/No-send Check Digit (SEND)
EAN/UPC ADD-ON	
	Disable/Optional/Required (DISABLE)
	Send/No-send Check Digit (SEND)
Code 128	Enable/disable decoding (ON)
EAN 128	Enable/disable decoding (ON)
Code 93	Enable/disable decoding (ON)
Code 32	Enable/disable decoding (ON)
User code 1	Enable/disable decoding (OFF)
User code 2	Enable/disable decoding (OFF)

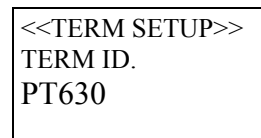
3.2.3.2 ASCII Terminal Configuration

The **TERM** command enables the PT630 to run a built-in Terminal emulator. The PT630 will operate as a dumb ASCII terminal when the user select this feature and disable the **FormCaching** menu.

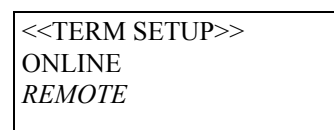


When the TERM SETUP menu (shown below) appears on the PT630 LCD, proceed to set up the portable terminal communication parameters. When finished go to the **User Mode** menu and press 2 (2.TERM) to make the PT630 operate as a dumb ASCII terminal.

Terminal ID Each PT630 "Terminal" can be identified by an 8-character string *Terminal ID* assigned by the user. Initially, the default *ID* is "PT630". Valid characters for assigning *Terminal ID* are alphanumeric characters ('A'-'Z', '0'-'9'). Hit [ENT] to make the selection.



Online Use the [->] key to toggle between REMOTE and LOCAL, then hit [ENT] to make the selection.



REMOTE The PT630 will output data gathered from the bar code port or keypad to its RS-232 port.

LOCAL The PT630 does not transmit gathered data to its RS232 port.

Echo Use the [→] key to toggle between ON and OFF, then hit [ENT] to make the selection. The collected data will be displayed on the PT630 LCD when *Echo* is set to ON, otherwise data will not be displayed when it is set to OFF.

AutoLF Use the [→] key to toggle between ON or OFF, then hit [ENT] to make the selection. When *AutoLF* is set to ON, the PT630 will append a LF (10 hex) character to the input data block.

Mode Use the [→] key to toggle between BLOCK and CHAR, then hit [ENT] to make the selection. See section 3.2.2 for the description of *Block* and *Character* modes.

Line/Page Use the [→] key to toggle among LINE, PAGE and BOTH, then hit [ENT] to make the selection.

The *Line/Page* parameter is useful only if dumb *terminal operation* has been specified as BLOCK mode. The *Line/Page* entry designates the termination character. The termination character can be set as:

LINE Line termination: CR (0D hex)

PAGE Page termination: CTRL-Z (1A hex)

BOTH Line termination and page termination both.

3.2.3.3 Memory Configuration

This feature allows the user to allocate available RAM between the Execution Program and RAM disk area, and **can only be done when there is no data stored in RAM.**

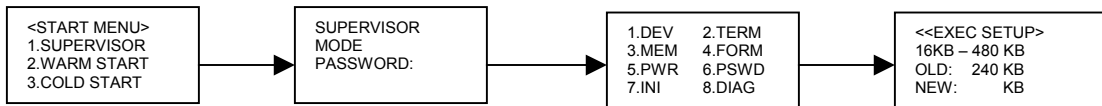
The RAM memory in the PT630 is divided into three sections:

- ◆ **System Variable** About 29KB of RAM memory is reserved for PT630 parameters.
- ◆ **RAM Disk Area** Area used to store programs and data files, similar to a physical disk of a PC.
- ◆ **Program Execution Area** Area where the applications and data are loaded, similar to the main memory in a PC.

To reallocate memory, go to the Supervisor Mode screen and press 3 (3.M_SIZE) to setup the Execution Program Area size, key in the new memory size then press [ENT].

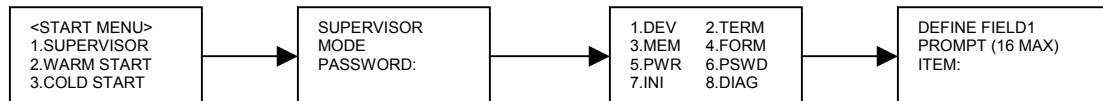
You can allocate available RAM between the Execution Program and RAM Disk area. The size of RAM Disk will decrease when you increase the size of the Execution Program area, and vice versa.

The second line in the EXEC MENU shows Min and Max number of kilobytes that can be allocated to the Execution Area.



3.2.3.4 FormCaching Application Program

FormCaching is a built-in application program that allows users to create a data entry application by specifying field prompt, field length, data type, input method and delimiter, etc. without writing a program and loading it (download or manually) to the PT630.



Enable the FormCaching application by selecting 4 (4.FORM) in the Supervisor mode menu. When FormCaching is enabled, the PT630 will first ask the user to specify data fields in four categories including *field prompt*, *data length*, and *data type* and *device type*. After defining all data fields, the user must [CMD] then [Alpha] key to end the setup of the data field.

FormCaching Specification

DATA FIELD DEFINITION: maximum field number=8			
	<i>Category</i>	<i>Range</i>	<i>Description</i>
1	FIELD PROMPT	Max.16 characters	set field prompting
2	MIN/MAX DATA LENGTH	1-48	set minimum field length and maximum field length
3	DATA TYPE	1.NUMERIC 2.ALPHANUM	numeric data (0~9) or alphanumeric data (20H~FCH)
4	DEVICE TYPE	1.KEY ONLY 2.SCAN ONLY 3.BOTH	input by keyboard only, bar code scanning only or both
DATA RECORD DEFINITION			
	<i>Category</i>	<i>Range</i>	<i>Description</i>
5	BETWEEN FIELD	1.APPEND SCREEN 2.CLEAR SCREEN	specify to clear or append screen between two fields
6	FIELD DELIMITER	1. , 2. ; 3.SPACE 4.TAB	assign field delimiter
7	RECORD DELIMITER	1.CR 2.LF 3.CRLF	assign record delimiter
8	DATE STAMP FIELD	1.NONE 2.YYYYMMDD 3.MMDD 4.MMDDYYYY 5.DDMM 6.DDMMYYYY	assign date stamp and specify the format of date stamp
9	TIME STAMP FIELD	1.NONE 2.HHMM 3.HHMMSS	assign time stamp and specify the format of time stamp
10	FIELD DELAY	0-6	specify time delay between each record input in second

When FormCaching is enabled, a data file named FORM.DAT will be created in the PT630. FORM.DAT stores the data as entered by the user after FormCaching is invoked. The PT630 will not allow the user to redefine the data fields in FormCaching once the FORM.DAT has been created. The file FORM.DAT must be deleted in order to implement any change in the configuration of FormCaching.

Running The Resident FormCaching Application Program

Enable the FormCaching, the PT630 built-in application can be ran by switching the portable terminal to the **User mode** of operation and selecting “2.TER”, select “2.FORMCACHING”. The FormCaching application program will follow the setting (as previously defined by the user) as it displays prompts, requests input, and stores data in the FORM.DAT file. Pressing **[CMD]** then **[Alpha]** key will abort the current record inputting action. The user may use [**←**] key to browse a previous input data record and press **[CLR]** key to clear the record and then input new values.

Pressing **[CMD]** then **[Alpha]** at the beginning of the first field of record input will abort the FormCaching application and the portable terminal will go to the Ready mode. After collecting data, the FORM.DAT file can be uploaded to a Host/PC either by invoking the Kermit server in the User mode or remotely through the Windows-based, communication utility Communication Manager.

PT630 FormCaching Defaults

The PT630 enables FormCaching by default, the following settings also apply:

DATA FIELD DEFINITION: field number=2	
<i>Category</i>	<i>Setting</i>
Field #1 FIELD PROMPT	ITEM:
DATA LENGTH	32
DATA TYPE	ALPHANUM
DEVICE TYPE	BOTH
Field #2 FIELD PROMPT	QTY:
DATA LENGTH	4
DATA TYPE	NUMERIC
DEVICE TYPE	KEY ONLY
DATA RECORD DEFINITION	
<i>Category</i>	<i>Setting</i>
BETWEEN FIELD	Append screen
FIELD DELIMITER	,
RECORD FELIMITER	CR
DATE STAMP FIELD	NONE
TIME STAMP FIELD	NONE
FIELD DELAY	0

3.2.3.5 POWER or ON-OFF

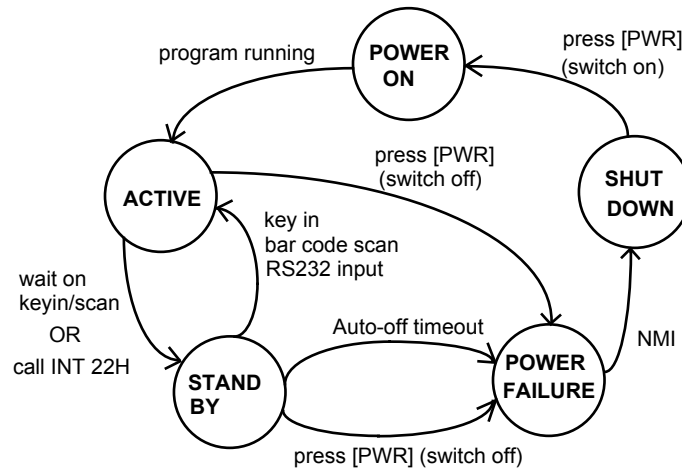
The PT630 provides system power on/off feature. Once **5** is selected, user can define the 1.)RESUME, 2.)AUTO OFF, 3.)ALARM

1.RESUME When the Resume function is enabled, the PT630 will resume program execution from the last turn-off point when it is powered on again. The default setting is ON (enabled).

1. Press 1 (1.RESUME)
2. At the STATUS SETUP Menu, use the [→] key to select between RESUME ON (enable Recovery) and RESUME OFF (disable recovery)
3. Press [ENT] to complete the setting

2.AUTO OFF Use the [→] key to set auto-off timeout from 1 to 9 minutes. The PT630 will turn itself off automatically after being idle for the time period specified in the AUTO OFF setting. The default setting of AUTO OFF is 5 minutes. The auto-off feature is disabled when set to 0 minutes.

A smart power management system is built in PT630 hardware and software to conserve battery power. The PT630 power transition flow is as follows:



- ◆ **Active** All system hardware is activated in *Active* mode. The system will enter *Stand-by* mode if it waits on input or call INT 22H.
- ◆ **Stand by** In the *Stand-by* mode, if a key is depressed, a bar code or RS-232 input occurs the PT630 will return to *Active* mode. Otherwise, the portable terminal will enter *Shutdown* mode if the PT630 has been idle for the specified timeout period as set in *AUTO OFF*.
- ◆ **Shut Down** In *Shutdown* mode, the main power is cut off from the PT630 excluding its RAM and Real Time Clock.

NOTE: To conserve battery power, keep the PT630 in *STAND BY* mode while waiting for input.

3.2.3.6 Password Definition

This function is used to create a password. The password is used to prevent an unauthorized user from entering the **Supervisor mode** and accidentally change the PT630 configuration parameters. The Password may consist of **maximum ten (10) alphanumeric characters** ('A'-'Z', '0'-'9'). The Default password is “600”.

OLD PASSWORD: 600 NEW PASSWORD: █
--

At the User Mode menu:

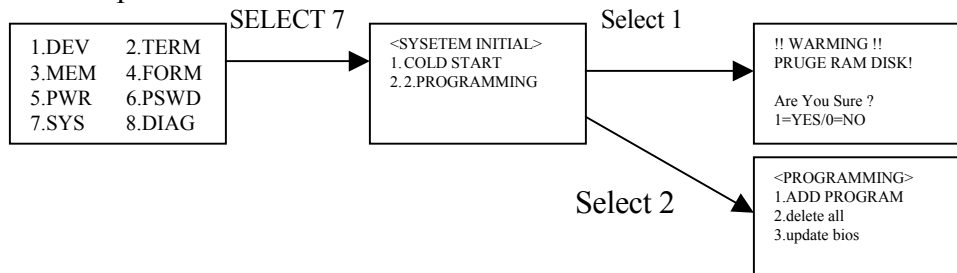
1. Press 6 (6.PSWD)
2. Enter the new password
3. Press [ENT] to change the Password

3.2.3.7 Initialization

The user can command the PT630 to execute a **Cold Start** that will clear all data stored in the RAM Disk and configure the terminal to default values.

Make sure your data has been backed up to a Host/PC before performing this function.

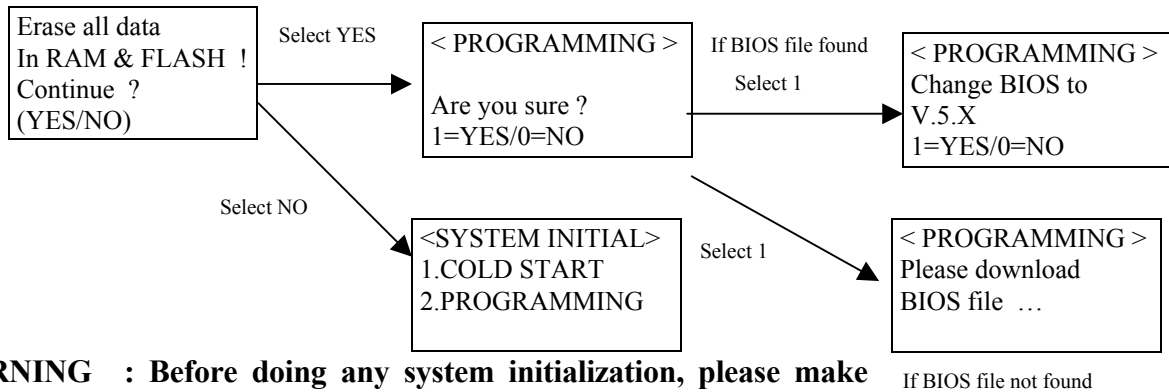
At the Supervisor Mode menu:



When **1.COLD START** is selected, press [1] for YES to confirm and execute a Cold Start, purge the RAM DISK and return to the Ready Mode menu. Press [0] for NO, abort Cold Start and return to User Mode Menu

When **2.PROGRAMMING** is selected, there is three items can be choose. This is one of the main feature provide by the PT630. User can select one of the program to add/erase user's program saved in the FlashROM of the PT630, or updating the PT630 system BIOS firmware.

- 1. ADD PROGRAM**, the PT630 allows user store the application program into the FlashROM. The size of the FlashROM for the application program is 128KB. When ADD PROGRAM was selected, the PT630 will shows the available FlashROM free information on the screen. User may save multiple application programs into the FlashROM if the free space is still available. User may move the application program from the RAM disk to the FlashROM and free up RAM disk for data storage. This feature will also prevent any application program lost due to any accidental system failure or cold start.
- 2. DELETE PROGRAM**, it allows user delete all of the application programs stored in the FlashROM. User will not allow to delete any single application program but delete all the application program store in the FlashROM. User will need to confirm the program delete twice in case of any accidental input.
- 3. UPDATE BIOS**, the PT630 allows the user to update or change system BIOS in the field. Once the UPDATE BIOS been selected, the PT630 will search for any update BIOS file in the RAM disk performing the update. If BIOS file is not found, the PT630 will wait for the file to be downloaded from the communication port. After the upgrading is completed, the PT630 will automatically execute a COLD START. When this function has been chose, you will see the following windows and do the selection;



WARNING : Before doing any system initialization, please make sure that you have already backup or upload all data files stored in the PT630 to your Host/PC.

3.2.3.8 Diagnostics

1. The PT630 has a built-in diagnostics program to test the terminal's hardware. The test routines are **data destructive**. Therefore, before running the diagnostic program, make sure you back up the data in the PT630.

When a H/W or S/W service has been made on the PT630, such as maintenance, repair or upgrade, it is strongly recommended to run the diagnostic program.

D diagnostic menu

```

0.All  1.RAM  2.KEY
3.232  4.LCD  5.RTC
6.SCANNER
7.RAM BKAUP
8.EXIT

SELECT (0-8)?_
  
```

At the **Supervisor Mode** menu:

1. Press 8 (8.DIAG)
2. The LCD will display the diagnostic menu as shown on the left
3. Select 0-8 to run the desired diagnostic routine

0. All

Run all diagnostic routines from 1 to 8 shown below.

1. RAM

- Fixed pattern stuck at fault check (00, FF, 55, AA).
- Address test: write odd, even address data into corresponding memory location, and verify it.

2. KEY

The LCD shows the legend of a key as it is pressed. Press [CMD], then [1] to return to the diagnostic menu.

3. 232

Loop back the PT630 RS232 port by connecting TxD and RxD pins together. All communication parameters are set to default values except baud rate is set to 57600 bps. The status of the tests is shown on the LCD.

4. LCD

Darken the dots of the LCD screen and cycle power to the LCD backlight to check if the LCD functions OK.

5. RTC

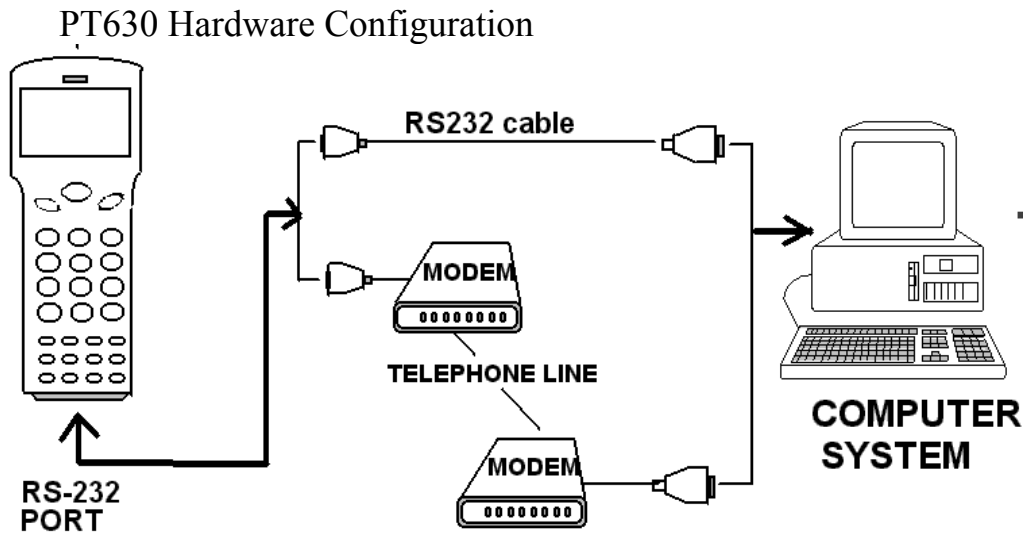
Current time/date is displayed. Verify. Press any key to return to the diagnostics menu.

- 6. SCANNER** Connect a bar code scanner to test bar code input by scanning bar code labels. Press any key to return to the diagnostics menu.
- 7. RAM BACKUP** Follow the instruction displayed on the LCD to press the [PWR] key to turn the power off and on to verify the memory backup.
- 8. EXIT** Return to the Ready mode of operation.

Chapter 4. HARDWARE OVERVIEW

4.1 INTRODUCTION

The PT630 is a handheld data terminal that has an integrated laser-scanning module or clip-on pen module for bar code reading. A rechargeable Li-ion battery pack power the PT630. A lithium backup battery preserves data stored in the RAM when the power main battery is used up or during the replacement of the main battery.



4.2 FEATURES

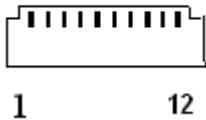
- 16-bit Microprocessor, 16Mhz Clock
- Real Time Clock Integrated Circuit (IC)
- **512 KB, 1.5MB, 2.5MB, 4.5MB** CMOS (RAM) Memory.
- **26** alphanumeric rubber keys with **1** scanner trigger switch
- **128x64** pixel graphic backlit LCD with selection between **16-column by 4-line in 8x16 font and 20-column by 8-line in 6x8 font**
- Power by **Li-ion @ 3.6V 880mAH** Rechargeable Battery-pack.
- 3V 190mAH Lithium Data Backup battery.
- Power Low Status Indicator for Main and backup batteries.
- 256KB Flash ROM, 128k for DOS-based system, the other 128K for user application program use.

4.3 I/O Ports

4.2.1 The PT630 has three interface ports:

An RS232 I/O serial port can be used to communicate with a host PC and normal charge from RS232 cable when cable is connected with **9VDC/1A** power adapter.

Pin	Signal	Direction	Description
1	DCD		Not support
2	RXD	Input	Receive date
3	TXD	Output	Transmit date
4	DTR	Output	Data Terminal Ready
5	GND	Reference	Ground
6	DSR	Input	Data Set Ready
7	RTS	Output	Request to send
8	CTS	Input	Clear to send
9	RI		Not support
10	Bat(+)		
11	Bat(-)		
12	Ext 9V		



4.2.2 Scanner

The PT630 has provision for an integrated high performance scan engine or CCD, and a built-in decoder for reading bar code labels. There are one **scanner-trigger** switches above the keypad. The scanning window of the integrated unit sits flush with the top surface of the portable terminal; with the PT630 standing in a right side up position, the scanning beam, fires off upward.

4.3.3 PT630 CHARGING/COMMUNICATION CRADLE

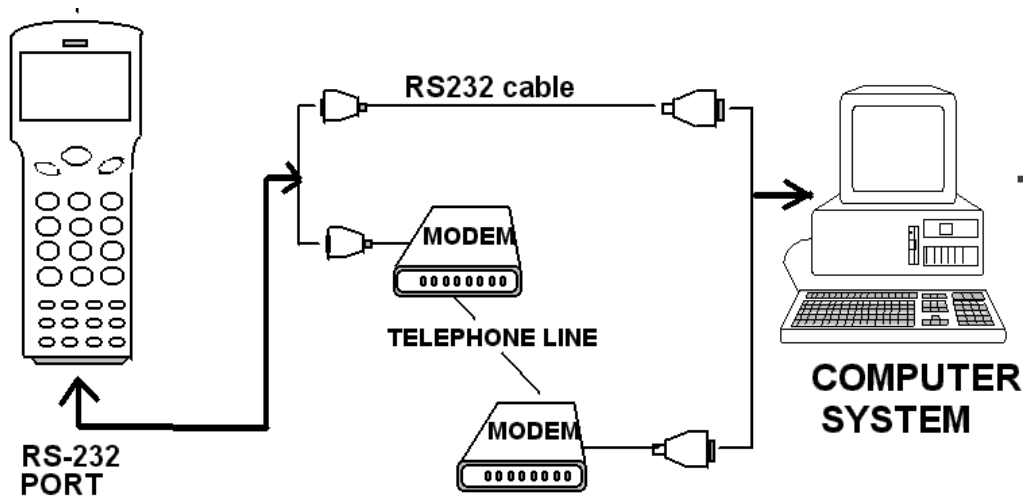
An optional charging/communication cradle (dock station), model PT063, gives users a convenient environment for daily use of the PT630. The cradle has provisions for a quick charge circuit to fully charge the Li-ion battery pack installed in the unit in about **2~3 hours**. The cradle also allows users to link the PT630 to host computer either through RS-232 point-to-point (PT063-1), RS-485 multi-point (PT063-2) connection or modem (PT063-3) for data communication. *For detail information of cradle, please refer to user manual of PT063.*

Chapter 5. COMMUNICATION

5.1 INSTALLATION

The RS-232 port of PT630 can communicate with the serial port of a host computer. There are two ways to carry out communication sessions:

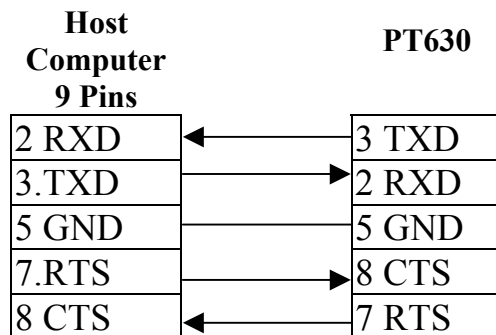
- (1) LOCAL : Directly connect to the serial port of your computer system.
- (2) REMOTE : Connected by two attached modems and one telephone line.



5.1.1 LOCAL CONNECTION:

In the Local connection method, the PT630 is directly connected by a null modem cable to the serial port of the host computer. This is the way to **download** or **upload** files **from/to** your PT630. Note that the communication parameters must be matched on your PT630 and host computer, otherwise, the communication will fail.

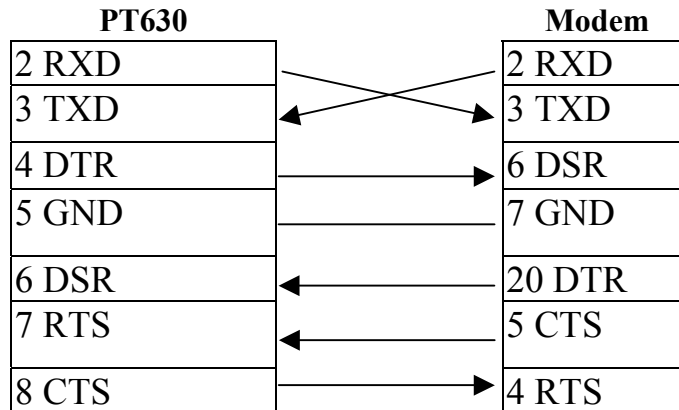
CONNECTING THE PT630 TO A HOST COMPUTER



When the flow control is set to CTS/RTS, the CTS (RTS) signal of one end is necessary to be linked to the corresponded RTS (CTS) on the other end.

5.1.2 REMOTE CONNECTION:

The remote connection of PT630 is established by linking a pair of modems through the telephone line. Once your PT630 has been connected with a modem to a telephone line, you can dial from the PT630 to a remote host computer. The computer needs to be attached to a modem through the telephone line. After the line is connected, the data communication process can start between PT630 and PC/Host as if the two were linked locally.

CONNECTING THE PT630 TO A external MODEM :

5.2 **DOWNLOADING AND UPLOADING**

The PT630 supports the MULTI protocol and ESC commands for serial data communication. Once the PT630 and PC are physically connected, a data communication processing will be established when a program running on the PC sends the ESC command consistent with the protocol specified in the PT630.

<u>Connection</u>	<u>Protocol supported</u>
Point-to-point	OFF, or MULTI
Multi-point	MULTI

Please refer to the PT630 Programming Reference Manual for detailed description of ESC commands.

Before you download or upload a file from the PC to the PT630, connect your PT630 and HOST using the LOCAL method.

5.2.1 Downloading a Jobgen Pro application from Host to PT630

This function downloads an existent JobGen Plus application from host to the PT630.

On PT630:

- Connect the RS-232 port of PT630 to the COM port of your PC by a null modem cable.
- Press [⊙] key to power up the PT630.
- Check the parameter settings of protocol and communication parameters of PT630. These settings must match the settings as defined in the configuration of JobGen Plus application program. If AutoSeek baud rate function is enable on JobGen Plus's PTComm Manager, you don't need to care about PT630's baud rate setting, but Protocol setting should be set as Multi and other's communication parameter should be "N,8,1".

On HOST:

- Run JOBGEN Plus program.
- Open Job file which is targeted to be run on PT630.
- Press F4 key (or click **Make Job** icon, or select **Built → Make Job**).

5.2.2 Uploading JobGen Plus from PT630 to HOST

Having collected the data into the PT630, the user can upload one or more collected data files to a PC.

On PT630:

- Connect the RS-232 port of PT630 to the PC's COM port PC with a null modem cable.
- Press [⊙] key to power up the PT630.
- Check the parameter settings of protocol and communication parameters of PT630. These settings must match the settings as defined in the configuration of JobGen Plus application program. If AutoSeek baud rate function is enable on JobGen Plus's PTComm Manager, you don't need to care about PT630's baud rate setting, but Protocol setting should be set as Multi and other's communication parameter should be "N,8,1"

On HOST:

- Run JOBGEN Plus program.
- Press F10 key (or click **PTComm Manager** icon, or select **Tools → PTComm Manager**
- Double click **Portable** icon on right-upper windows and it will list down all of files which is stored on PT630
- Click file which will be sent back to PC and drop it into left windows on right path.

5.2.3 Downloading a file from Host to PT630 using the Kermit Server

This function downloads a file from host to the PT630.

On PT630:

- Connect the RS-232 port of PT630 to the COM port of your PC by a null modem cable.
- Press [⊙] key to power up the PT630.
- Check the PT630 protocol and communication parameter settings.
- Press and hold down [CMD] key for 2 seconds to enter User mode, then select “3.COM” in User mode to enter Kermit server mode.(see On HOST to process file download from Host side).

Note : You can press [CMD] and [Alpha] to exit Kermit server and return to Ready mode

On HOST:

- Run KERMIT.EXE program on PC. The program is in the PT630 Communication Utility Diskette
- First set the communication parameters to match the portable's, then invoke download command by entering “SEND filename”.
- Enter [Q] to return to DOS.

5.2.4 Uploading files from PT630 to HOST using the Kermit Server

Having collected the data into the PT630, the user can upload one or more collected data forms to your PC.

On PT630:

- Connect the RS-232 port of PT630 to the COM port of your PC with a null modem cable.
- Press [⊙] key to power up the PT630.
- Check the PT630 protocol and communication parameter settings.
- Press and hold down [CMD] key for 2 seconds to enter User mode, then select “3.COM” in User mode to enter Kermit server mode. (see On HOST to process file download from Host side)

On HOST:

- Run KERMIT.EXE program on PC. The program is in the PT630 Communication Utility Diskette.
- First, set communication parameters to match the portable's. then invoke upload command by entering “GET filename”.
- Enter [Q] to return to DOS.

Chapter 6. Troubleshooting

1. *If power-low icon indicator of main battery shown on LCD screen,*

Plug in the 9V adapter to charge the battery pack for 2~3 hours.

2. *If can not power up PT630 after pressing [⊙] key,*

- Charge the battery pack for 2~3 hours.

3. *If can not power up PT630 after charging battery pack for 2~3 hours.*

- Check if the battery pack is placed and connected properly in the battery compartment, or
- Change the battery pack and charge it for 2~3 hours. If problem persists, call for service.

4. *If PT630 does not upload data to host,*

- Check if the PT630 communication parameters (COM port, baud rate, data bits, parity, stop bit) matched the Host's setting, or
- Check if the cable is plugged tightly, or
- Check if connectors (on cable) have correct pin assignment.

5. *If host can not download application program to PT630,*

- Check if the host communication parameters (COM port, baud rate, data bits, parity, stop bit) matched the portable's setting, or
- Check if the cable is plugged tightly, or
- Check if connectors (on cable) have correct pin assignment.

6. *If scanner does not scan,*

- Check if the type of scanner port is set correctly, or
- Check if symbology used is enabled, or
- If it still fails, call for service.

7. *If keypad does not work properly,*

- Verify operation steps with user's manual, or
- Power off and on your PT630, then press some keys to check if an audible beep is generated for each key pressed. If not, call for service.

8. *If encounter any other abnormal symptoms,*

Caution: *The following process will clear all data in PT630 RAM disk memory)*

Reset (cold start) the PT630, press [CMD], [←] and [⊙] simultaneously, press [3] in “Start Menu” press ENTER. See if symptoms went away. If not, call for service.

Chapter 7. POWER SOURCES

A **Li-ion battery** provide main power source. A Lithium battery is used to back up the system real time clock and content in the RAM memory when the main power source is not available.

NOTE. When using the PT630 for the first time, the main battery must be charged **for 3 hours**.

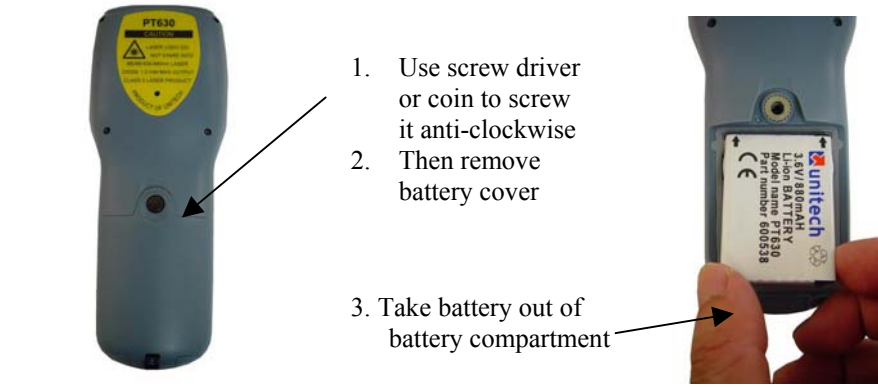
The PT630 checks the power level of the main battery when the portable terminal is in use; however, the backup battery is only checked during power-on-test. Both low battery conditions will be signal to the user by a warning message on the LCD.

When the main battery reaches a low condition, the LCD flashes a warning Message (“Main Battery Low”) at one minute intervals while the portable terminal is on. The main battery can continue to supply power in normal operation for approximately **10~30 minute** However, the level may reach the PT630 power cutoff point and automatically turn the Portable terminal off. In this situation, the lithium battery continues to back up data and application programs in RAM and the PT630 cannot be powered up until the main battery is recharged or replaced.

7.1 MAIN/BACKUP BATTERY REPLACEMENT AND INSTALLATION

Main Battery

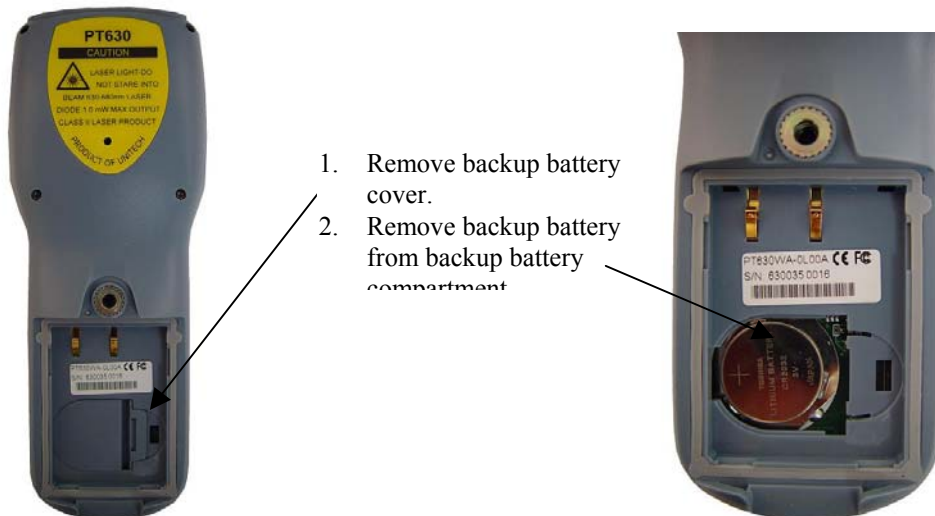
1. Make sure the unit is turned off.
2. Turn over the unit. Slide tab from right to left (see illustrations in next page).
3. Slide the main battery pack from battery compartment.
4. Insert the new main battery packet:



Lithium Back up Battery

1. Refer to the procedure in previous paragraph, un-screw the backup battery cover and as illustration above to remove the lithium battery.
2. Insert a new battery into the holder with correct orientation.
3. Put the battery cover back.

👉 Make sure to back up your data in PDT before making the replacement the lithium back up battery.



7.2 MAIN POWER BATTERY CHARGING WITH AC/DC ADAPTOR (Regular/Normal Charge)

When the PDT shows “Main battery low” message or icon , the battery pack in PT630 needs to be recharged. Plug one end of an **AC-9VDC/1A** power adapter into the DC-jack of RS232 cable and the other end into a wall outlet. The battery pack will be fully recharged after 2-3 hours.

The PT630 uses an internal Lithium battery to back up the RAM memory and system real time clock when the main battery stops supplying the required power.

7.3 MAIN BATTERY CHARGING WITH CRADLE

Connect power adapter to PT063 and insert PDT into the chamber of PT063. The battery of PDT can be fully charged in about 2~3 hours and the status of battery charging is indicated by the LED on the front panel of PT063.(please refer to PT063 manual for detail information.)

7.4 MAIN BATTERY STORAGE & SAFETY PRECAUTIONS

Charging Considerations

It is important to consider the surrounding temperature whenever you are charging the Li-ion battery pack. The process is most efficient at normal room temperature or slightly cooler. It is essential that you charge batteries within the stated range of 32°F to 113°F (0°C to 45°C). Charging batteries outside of the specified range could damage the batteries and shorten their life cycle.

Effects Of Overcharging Batteries

Overcharging may occur when a Li-ion rechargeable battery is charged in regular or quick charging rate after it has been fully charged, but there is no risk of overcharging while charged in trickle charging rate.

If Li-ion batteries of PT630 are charged by a power adapter plugged directly to its DC jack for too long, they can sustain a temporary reduction of capacity due to overcharging. A battery left to charge for several weeks may appear to have minimal capacity. This type of failure can be remedied by temporarily depleting the battery of its power and recharging it to rejuvenate it. This condition can be prevented by avoiding overcharging for long periods of time or always using PT063 to charge the batteries of PDT. The PT063 starts the charging process in quick charging rate and switches to trickle charging rate when it detects the battery is fully charged.

Storage and Safety Precautions

Batteries should be stored in an open circuit condition and placed where there is no risk of accidental shorting or other damage. Although charged Li-ion batteries may be left unused for several months, their capacity may be reduced due to back up and internal resistance. If this happens they will require recharging prior to use. Li-ion batteries may be stored at temperatures between -4°F and 158°F (-20°C to 70°C), however they may be depleted more rapidly at the high end of this range.