Blackroc Pro60 Thermal Printer Programming Manual

March 2007

V1.4

Revision	Date	Details
V1.0	November 2006	Initial release
V1.1	December 2006	Additional specifications added and form control codes clarified.
V1.2	January 2007	Added description of setup using the OPD menu system.
V1.3	March 2007	Added description of storing 'batch' files. Clarified graphic commands.
V1.4	March 2007	Clarified font selection command.

Table of Contents

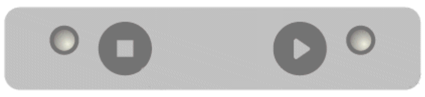
1 Introduction

The Pro60 printer is a self contained portable printer that may be optionally fitted to the rear of a PsionTeklogix Workabout Pro (7525) portable computer. The printer accepts rolls of paper that are 58mm wide and with a maximum outside dimension of 34mm. Connectivity is provided by a Bluetooth link.

2 Specifications

Printing method	Thermal
Number of dots	384
Resolution (dots/mm)	8
Resolution (dpi)	203
Printing width (mm)	48
Paper width (mm)	58
Max. paper thickness (um)	80
Paper loading	Easy loading
Printing speed (mm/s)	60
Paper detection	Opto sensor
Temperature detection	Thermistor
Head-up or Cover-open detection	Combined with opto sensor
Life/reliability	50km
Operating temperature (°C)	0 to 50
Operating humidity (%)	20 to 85 non condensing

3 Key Functions



NEXT ENTER

The keys can be used for different functions depending upon the mode of the printer. If the printer is in normal printing mode, the following table shows the key functions.

The last item in the table shows how to change mode and access the OPD menu.

Key 'ENTER'	Key 'NEXT'	Action
Pressed	Not Pressed	Feed paper one line
Held down for more than 2s	Not Pressed	Continuous paper feed
Pressed during power on for less than 1 s	Not Pressed	Reactivation, no paper feed
Held down during power on for more than 2s, with paper detected.	Not Pressed	Retrieval of T0 (self test)
Held down during power on for more than 2s, with no paper detected.	Not Pressed	Set in hex dump mode
Pressed whilst in hex dump mode	Not Pressed	End hex dump mode
Not Pressed	Key released after less than 1s in normal paper mode	Retrieval of T1 (form feed)
Not Pressed	Key held down for greater than 3s	Retrieval of T1 (immediate power down)
Pressed	Pressed	Calls OPD menu

4 OPD Menu

The Pro60 may be setup by use of the buttons on the front face of the unit. By pressing the buttons as instructed by the prompts printed on the paper. Various parameters can be set by use of the OPD (On Paper Display) menus.

The OPD menu is entered by pressing, holding, then releasing the ENTER and NEXT buttons. A 'welcome' print will be made on the paper, showing the menu of settings.

The menu may be exited by pressing again the ENTER and NEXT to save and exit, or it may be left for a period of time (10 minutes) after which it will automatically exit.

Items that may be changed are;

Density

20, **25**, 30, 35, 40, 45, 50, 90 (2 ply)

Speed/Quality

Low(32)/Medium, Medium(64)/Medium, **Medium(64)/Low**, High(96)/Low

Interface

Baudrate

COM-Params

Sleep Time

Off, **5s**, 30s, 1m, 10m, 1h, 12h, 32h

Font number

1, 2, 3, 4

Text orientation

Text Mode, Data Mode

Character Size

W0/H0, W0/H1, W0/H2, W0/H3, W1/H0, W1/H1, W1/H2, W1/H3

Character Spacing

0, 1, 2, 3, 4, 5, 6, 7

Print Width

48...32mm

The user is advised not to change the items shown in italics.

To change any parameter, the options may be stepped through by use of keys shown in the table below.

Key 'ENTER'	Key 'NEXT'	Action
Pressed	Not Pressed	Increase the parameter
Not Pressed	Pressed	Move to the next menu item
Pressed	Pressed	Close the menu and save the settings

5 Bluetooth Configuration

Before the printer can be used, it is necessary to setup a Bluetooth link using the SPP profile. This procedure will vary depending upon your host device. An example configuration for the Workabout Pro using Win CE 4.2 and Windows Mobile 2003 is shown in appendix A.

The printer meets the Bluetooth specification V1.1 class 2, attaining a transmission range of around 10-15m.

The printer responds to an enquiry scan with “BT-Printer”. It can also be accessed directly without a scan by use of its Bluetooth address. A BT Connect activates the printer. The printer will maintain a connection until it goes in to sleep mode. The sleep mode disconnects an active connection and goes in to sniff mode. In this mode, the printer scans for possible calls every 1.25 seconds. During these scans it remains visible and responsive. It will then take 2-3 seconds to establish a connection.

If you do not plan to operate the printer for several days, switch it off with the OFF/NEXT key. After the printer is turned on, it will take a minimum of 10 seconds for the printer to become ready to receive data.

The printer does not ask the master for any authentication. Should your transmitter require a PIN, type in '0000'.

Always set the host to communicate t 115200 baud, no parity, 8 data bits, with 1 stop bit.

Bluetooth Specification	V1.1			
RF Transmit Level	4 dBm (class 2)			
Range	Approx. 10-15m			
Profiles	SPP (Serial Port Profile)			
Power Consumption	(no printing)	**Min.**	**Typ.**	**Max.**
	Active Link/Data Traffic at 115kbps	50mA	62mA	85mA
	Active Link	25mA	35mA	45mA
	Idle	18mA	25mA	30mA
	Sniff Mode	1mA	1.5mA	2.5mA
	Power off	0uA	0.5uA	0.9uA

6 Escape Code Programming

The Pro60 printer may be controlled by 'escape' sequences sent over the air via the Bluetooth link. This relies on an initial virtual serial port being setup and in operation.

6.1 Print Commands

Command (ASCII)	**Command (hex)**	**Function**
<CR>	0D	Print the contents of the buffer to the paper and feed one line. An immediately following <LF> will be ignored.
<LF>	0A	Print the contents of the buffer to the paper and feed one line. An immediately following <CR> will be ignored.
<CR><LF>	0D 0A	Print the contents of the buffer to the paper and feed one line.
<LF><CR>	0A 0D	Print the contents of the buffer to the paper and feed one line.
Normal characters		When the line is full, additional characters will cause the text to be printed on the paper and the paper to feed one line. The number of characters printed is determined by the selected font and the effective print width. With the command <ESC> 'h' n, the effective print width can be reduced to less than the physical width of the mechanism (384 dots).
<ESC> 'h' n	1B 68 n	Set the effective print width of the printer mechanism in bytes. This command affects only text printing. All lines are left justified. n varies from 16 to the maximum print width of the mechanism.

6.2 Positioning

Command (ASCII)	Command (hex)	Function
<ESC> “F” lh ll	1B 46 lh ll	Forwards paper feed by l lines where l = (lh * 256) + ll This command can only be given at the start of a line or will be ignored. L must be less than 2400, this equals 300mm.
<ESC> “\” lh ll	1B 5C lh ll	Backwards paper feed by l lines where l = (lh * 256) + ll This command can only be given at the start of a line or will be ignored. L must be less than 2400, this equals 300mm.
<ESC> “N” ph pl	1B 4E ph pl	Absolute TAB from the left to the horizontal pixel position p, where p = (ph * 256) + pl p may range from 0 to 383. This positions the print start position to the specified dot on the line.
<ESC> “R” ph pl	1B 52 ph pl	Relative TAB forwards or reverse by p pixels where p = (ph * 256) + pl p is defined as an integer number and may have positive and negative values.

6.3 *Formatting Characters*

6.3.1 Selecting Character Sizes

Command (ASCII)	Command (hex)	Function
<ESC> “P” n	1B 50 n	Select character set n. All fonts can be mixed within the same line.

Set number	Char Matrix	Chars per Line
1	16 * 24	24
2	9 * 22	42
3	7 * 16	54
4	12 * 24	32

Command (ASCII)	Command (hex)	Function
<ESC> “H” “n”	1B 48 n	Print single/double/triple height characters. The parameter n may be specified in the range 0 to 7; 0 = Normal height; 1 = Double height; 2 = Triple height etc.
<ESC> “W” “1”	1B 57 31	Double print width. This command is valid until cancelled.
<ESC> “W” “0”	1B 57 30	Normal print width. This command is valid until cancelled.

6.3.2 Character Spacing & Colour

Command (ASCII)	Command (hex)	Function
<ESC> “I” “0”	1B 49 30	Print black/gray on white. This command is valid until cancelled. This mode is selected after reset.
<ESC> “I” “1”	1B 49 31	Print white in black/gray (inverted colours). This command is valid until cancelled.
<ESC> “L” “0”	1B 4C 30	Print without underline. This command is valid until cancelled.
<ESC> “L” “1”	1B 4C 31	Print with underline. This command is valid until cancelled.
<ESC> “M” “0”	1B 4D 30	Print black. This command is valid until cancelled.
<ESC> “M” “1”	1B 4D 31	Print gray. This command is valid until cancelled. This command does not affect graphics printing.
<ESC> “S” n	1B 52 n	Increase the horizontal spacing. Where n is in the range 0 to 15. All subsequent characters will be printed with an additional space of n pixels. This command can be given multiple times in the same line. Printing with n = 0 will be in effect after a reset.

6.3.3 Print Orientation & Density Adjustment

Command (ASCII)	Command (hex)	Function
<ESC> “D” “n”	1B 44 “n”	Select print orientation. With n = “0” the printing is displayed in normal orientation, the text may be read the 'right way around' if the print mechanism is at the bottom of the page. With n = “1” the printing may be read the 'right way around' if the print mechanism is at the top of the page.
<ESC> “Y” n	1B 59 n	Adjust the density of print. Where n is a factor between 0 (lighter) and 100 (darker). This is set to 25 at reset.

1.1.1 Graphic Commands

The following commands can be used to render graphics on the printer. The structure of the graphic data used by these commands corresponds to the PCL specification from version 3 onwards. The compression used is compatible with that used by MS-Windows.

The processing of compressed data takes approximately as long as pure bit map printing. As compressed graphics requires less data to be transferred, there is a clear advantage in speed compared to the process without compression (about a 1:3 ratio).

Command (ASCII)	**Command (hex)**	**Function**
<ESC> “m” n	1B 6D n	Set the current graphic mode n = 0x00: unencoded n = 0x01: run length encoded n = 0x02: TIFF 4.0 encoded n = 0x03: delta row encoded n = 0x04: x byte offset (see below) n = 0x05: reset delta row seed row (see below) x byte offset If n is set to 0x04, an additional parameter must be included. Where o is the offset from the left margin. Graphics will be shifted to the right with a left margin of o * 8 pixels. For example 1B 6D 04 0A would give a margin of 10 * 8 = 80 pixels. Graphics that are shifted beyond the right marin will be cut off. Reset delta row seed The command 1B 6D 05 clears the seed row of the delta row graphics. The seed row is the last line that was printed. After the new line is printed, it becomes the seed row. The command for clearing the seed row should always be given at the beginning of graphics that contain the delta row commands. This will not be necessary if the first graphic line is not delta row graphics.
<ESC> “g” n g_1...g_n	1B 67 n g_1 ...g_n	n := length of graphics data in bytes g_1 ...g_n graphic bytes to be printed MODE 0: Unencoded beginning from left of the paper, dot 0 is the MSB in the first byte, the dot furthest to the right is the LSB in the nth byte. A 1 in the relevant bit position represents a black dot in the line. After the nth byte, the printer automatically returns to character mode. It will ignore all commands whilst processing these n bytes. Mode 0 is the default mode for graphic printing. MODE 1: Run length encoded Run length encoding interprets the graphic information in byte pairs. Each first byte is a repeat count for the second byte. A 0 for the repetition count means that the following graphic byte will be printed once without being repeated. A 1 means the byte will be printed twice. The second byte is the graphic information that is to be printed. From left to right on the paper, the MSB of the data appears first. A 1 in the relevant bit position represents black dot on the line. After completing the line, the printer returns to text mode. MODE 2: TIFF encoded

		TIFF combines the features of unencoded and run length encoding. The graphic information is preceded by a control byte. The control byte indicates (sign bit) if the following byte is a graphic byte that is repeated (up to 127 times) or if a number of bytes follow (up to 127) that are to be printed as a bit map. A positive control byte expects bit map information, a negative control byte represents repeat byte. MODE 3: Delta row Delta row will pick out the bytes from a line that differ from the previous line, and transfer only these differences. If only one bit were to differ, just the respective byte would need to be transferred. The delta data consists of the command and 1 to 8 replacement bytes. The command byte contains two pieces of information, the number of replacement bytes (bits 7, 6, 5) and the relative left offset of the last byte that was cahnged (bit 4, 3, 2, 1 and 0). Value 31 as offset expects a following additional offset byte. The offset values are summed. In text mode, from left to right, the dot on the very right is the LS bit. A 1 in the respective bit position of a replacement byte represents a black dot in the line. After completing the line, the printer will automatically return to character mode. Mixing of text and graphics is not possible with delta row.

6.3.4 Form Control

The printer allows two types of form length control.

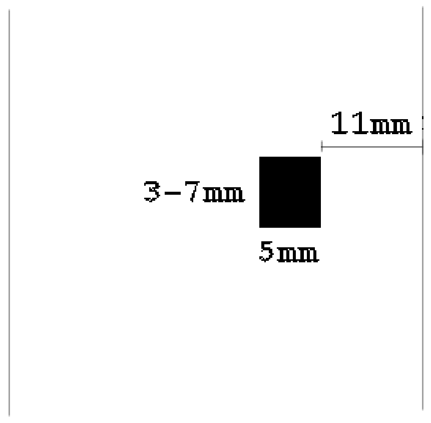
- Control by paper length
- Control by marker

6.3.4.1 Control by paper length

The length of the printout is set via the command <ESC> “l” xh xl. The paper length fed through the printer mechanism is measured and considered the end of form. Strictly speaking this is not a proper form control mechanism, it only defines a physical length of paper, starting from the current position to be a 'form'. A start position can be set at an arbitrary point on the paper. A FF command will cause the printer to advance to the length given by the xl,xh parameters regardless of its current printing position.

6.3.4.2 Control by Markers

Markers on the paper are recognised by a sensor. This method of form control can be performed with preprinted light absorbing marks on the front face of the printed paper.



The mark should be positioned as shown in the diagram opposite. It must be on the front (print) side of the paper and be positioned 11mm from the right hand edge of the paper. The mark must be 5mm wide, and have a height of between 3 and 7mm.

Command (ASCII)	Command (hex)	Function
<ESC> "l" <high feed> <low feed>	1B 6C xh xl	Set the page length in mm. Length = 0.125 * (xh * 256 + hl) This is the form feed length if no markers are used. If markers are used, it also sets a 'safety' maximum feed length. i.e. If the printer is set to recognise marks, but none i found, the printer will stop feeding after the length set by this command. When this command is processed by the printer, a set top of form command is also set.
<FF>	0C	Perform a form feed, feed paper until either a marker is reached, or the maximum preset form length is reached.
<ESC> "o"	1B 6F	Set the beginning of the page to be the current position. This command sets the internal form length counter to zero.
<ESC> "p" <distance> <flags>	1B 70 m n	Parameter m represents the distance between the marker and the tear off position in 0.5mm increments. Parameter n defines the form control method; 0x00 = no mark sensing. This is the default. 0x01 = mark sensing. A form feed will initiate search for the marker. When it is detected, the paper will automatically be fed by the distance given by m to place it in the required position for tear-off.

6.3.5 Batch Files

6.3.6 Batch Files Description

The user can store 'batch files' in the printer that can be later retrieved by a short command. A typical use for this functionality would be to store a graphic image that was to be later called up on every page printed.

Batch File Block 1

This block contains batch files T0-T9. These can contain user-specific macros, logos, they also have special functions;

T0: This file can be output after a RESET by holding down the FEED key for more than two seconds. By default, it is programmed with information about the printer.

T1:

T2-T9: No special functions assigned to them. These can be changed by the user at any time.

Batch File Block 2

This block contains locations A, Q, R and S

These work like the batch files T0-T9 but they can neither be erased or rewritten. They contain firmware status, serial numbers etc.

TA: Reserved

TQ: Firmware Identifier

TR: Reserved

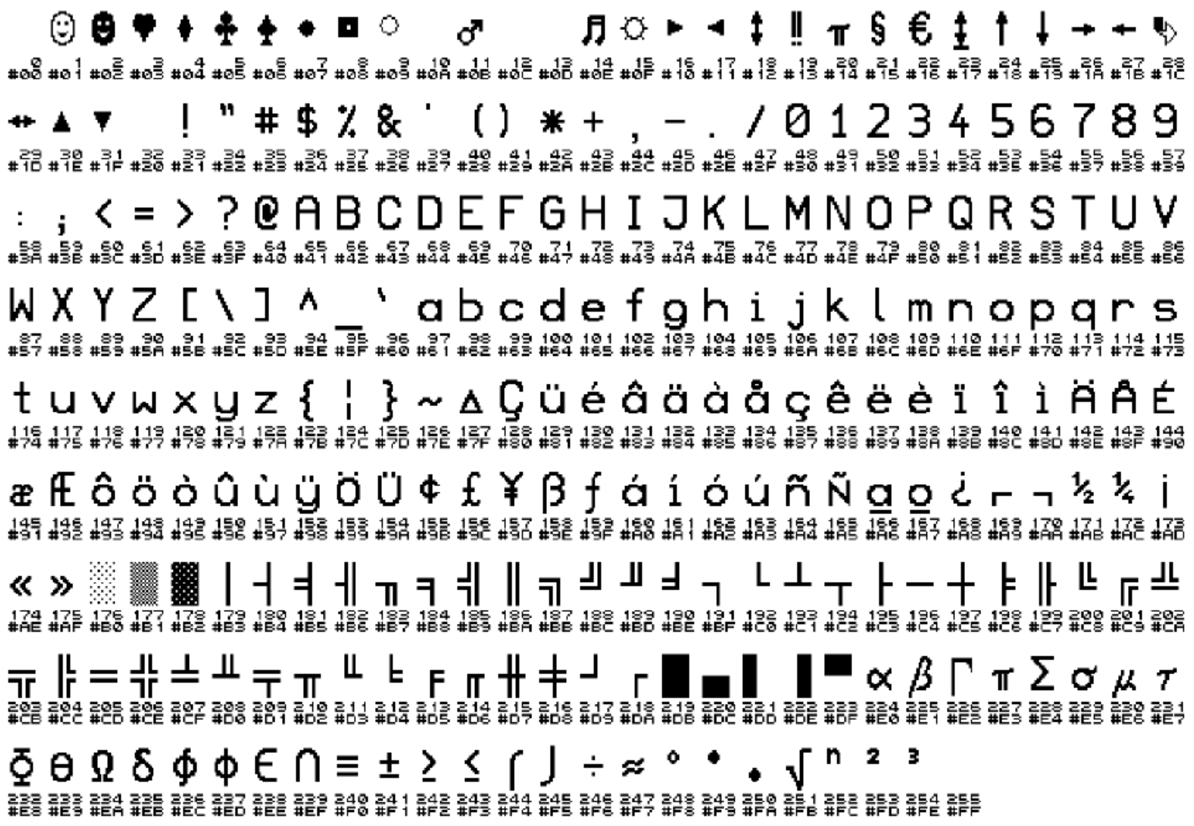
TS: Reserved

Batch File Commands

Command (ASCII)	**Command (hex)**	**Function**
<ESC> “T” “x”	1B 54 <x>	Print batch file from store 'x'. x := { “0”..”9”, “A”, “Q”,”R”,”S”}
<ESC> “n” <count> <data>	1B 6E n data	Send a string back to the host. This command can be used to cause the contents of the batch file to request further data from the host. Example: If T2 had the serial number “0123456789” stored in the batch file with the command 1B 6E 0A 30 31 32 33 34 35 36 37 38 39 With the command <ESC> “T” “2” , the batch file T2 is retrieved, the printer then will send the string “0123456789” to the host.

6.4 Character Set

The standard character set used by the printer in text mode printing is as shown below;



6.5 *Example WinCE Application – Escape Commands Version*

The following code sample describes an example WinCE application that will generate some simple output on the printer. The application assumes that a Bluetooth connection has been established between the handheld and the printer. The application therefore prints to a (virtual) serial port.

The application is available as part of the documentation pack, and is provided in source and compiled form. A suitable project file is also supplied to enable the code to be compiled using Microsoft Embedded Visual C 4.0 (eVC4). eVC4 is available for free download from Microsoft's internet site.

6.5.1 Source Code

```
#include <Windows.h>
#include "resource.h"
#include <string.h>

#define SERIAL_PORT     L"COM7:"
#define ERROR_TEXT      TEXT("Error")

static HANDLE ReadThreadHandle = NULL;
static HANDLE SerialChannel = INVALID_HANDLE_VALUE;

// -------------------------------------------------------------------------------------
// This gets called for every byte received

static void ProcessSerialChar(unsigned char Char)
            {
            // Do nothing with them at the moment
            }


// -------------------------------------------------------------------------------------
```

```
DWORD SerialReadThread(LPVOID lpvoid)
            {
            // Specify a set of events to be monitored for the port.
            SetCommMask (SerialChannel, EV_RXCHAR);

            while (SerialChannel != INVALID_HANDLE_VALUE)
                        {
                        DWORD CommStatus;

                        // Wait for an event to occur for the port.
                        WaitCommEvent (SerialChannel, &CommStatus, 0);

                        // Re-specify the set of events to be monitored for the port.
                        SetCommMask (SerialChannel, EV_RXCHAR);

                        if (CommStatus & EV_RXCHAR)
                                    {
                                    DWORD BytesTransferred;
                                    // Loop for waiting for the data.
                                    do
                                                {
                                                BYTE Byte;

                                                // Read the data from the serial port.
                                                ReadFile (SerialChannel, &Byte, 1,
                                                            &BytesTransferred, 0);

                                                // Display the data read.
                                                if (BytesTransferred == 1)
                                                            {
                                                            ProcessSerialChar(Byte);
                                                            }

                                                }
                                    while (BytesTransferred == 1);
                                    }

                        }

            return 0;
            }

// ---------------------------------------------------------------------------------------

int OpenPort(HWND ParentWindowHandle)
            {
            DWORD dwError;
            DCB PortDCB;
            COMMTIMEOUTS Timeouts;
            DWORD ThreadID;


            SerialChannel = CreateFile (SERIAL_PORT, GENERIC_READ | GENERIC_WRITE, 0, NULL,
                                                OPEN_EXISTING, 0, NULL);


            // If it fails to open the port, return FALSE.
            if (SerialChannel == INVALID_HANDLE_VALUE )
                        {
                        // Could not open the port.
                        MessageBox (ParentWindowHandle, TEXT("Unable to open the serial port"),
                                                            ERROR_TEXT, MB_OK);
                        dwError = GetLastError ();
                        return FALSE;
                        }

            PortDCB.DCBlength = sizeof(DCB);

            // Get the default port setting information.
            GetCommState (SerialChannel, &PortDCB);

            // Change the DCB structure settings.
            PortDCB.BaudRate = 115200;                            // Current baud
            PortDCB.fBinary = TRUE;                               // Binary mode; no EOF check
            PortDCB.fParity = FALSE;                        // Disable parity checking.
            PortDCB.fOutxCtsFlow = TRUE;                    // CTS output flow control
            PortDCB.fOutxDsrFlow = TRUE;                    // DSR output flow control
            PortDCB.fDtrControl = TRUE;                     // DTR flow control type
            PortDCB.fDsrSensitivity = FALSE;                // DSR sensitivity
            PortDCB.fTXContinueOnXoff = TRUE;               // XOFF continues Tx
            PortDCB.fOutX = FALSE;                          // No XON/XOFF out flow control
            PortDCB.fInX = FALSE;                           // No XON/XOFF in flow control
            PortDCB.fErrorChar = FALSE;                     // Disable error replacement.
            PortDCB.fNull = FALSE;                          // Disable null stripping.
            PortDCB.fRtsControl = TRUE;                     // RTS flow control
            PortDCB.fAbortOnError = FALSE;                  // Do not abort reads/writes on error.
            PortDCB.ByteSize = 8;                           // Number of bits/bytes, 4-8
            PortDCB.Parity = NOPARITY;                      // 0-4=no,odd,even,mark,space
            PortDCB.StopBits = ONESTOPBIT;                  // 0,1,2 = 1, 1.5, 2

            // Configure the port according to the specifications of the DCB structure.
            if (!SetCommState(SerialChannel, &PortDCB))
                        {
                        MessageBox (ParentWindowHandle, TEXT("Unable to configure the serial
                                                        port"), ERROR_TEXT, MB_OK);
                        dwError = GetLastError ();
                        return FALSE;
                        }

            // Retrieve the time-out parameters for all read and write operations on the port.
            GetCommTimeouts(SerialChannel, &Timeouts);

            // These timeout values have been changed: 2007-04-10
            Timeouts.ReadIntervalTimeout = 50L;             // Specify time-out between character
                                                            //for receiving.
            Timeouts.ReadTotalTimeoutMultiplier = 5L;       // Specify value that is multiplied by
                                                            // the requested number of bytes to be
                                                            // read.
            Timeouts.ReadTotalTimeoutConstant = 5000L;      // Specify value is added to the
                                                            // product of the
                                                            // ReadTotalTimeoutMultiplier member
            Timeouts.WriteTotalTimeoutConstant = 5L;        // Specify value that is multiplied by
                                                            // the requested number of bytes to
                                                            // be sent.
            Timeouts.WriteTotalTimeoutMultiplier = 5000L;   // Specify value is added to the
                                                            // product of the
                                                            // WriteTotalTimeoutMultiplier member

            SetCommTimeouts(SerialChannel, &Timeouts);

            // Set the time-out parameters for all read and write operations on the port.
            if (!SetCommTimeouts (SerialChannel, &Timeouts))
                        {
                        MessageBox (ParentWindowHandle, TEXT("Unable to set the time-out
                                                        parameters"), ERROR_TEXT, MB_OK);
                        dwError = GetLastError ();
                        return FALSE;
                        }


            // Create a read thread for reading data from the IrDA port
            if (ReadThreadHandle = CreateThread(NULL, 0, SerialReadThread, 0, 0, &ThreadID))
                        {
                        CloseHandle(ReadThreadHandle);
                        }
            else
                        {
                        // Could not create the read thread.
                        MessageBox(ParentWindowHandle, TEXT("Unable to create the serial read
                                                        thread"), ERROR_TEXT, MB_OK);
                        dwError = GetLastError ();
                        return FALSE;
                        }

            return TRUE;
            }


// ----------------------------------------------------------------------------------------
```

```
static void SerialWriteString(const char *Data, int Length)
            {
            DWORD dwError, NumBytesWritten;
            unsigned int BytesToPrint;

            if (Length == -1)
                        {
                        BytesToPrint = strlen(Data);
                        }
            else
                        {
                        BytesToPrint = Length;
                        }

            if (!WriteFile (SerialChannel, Data, BytesToPrint, &NumBytesWritten, NULL))
                        // Must be NULL for Windows CE
                        {
                        // WriteFile failed. Report error.
                        dwError = GetLastError();
                        }
            }


// -------------------------------------------------------------------------------------


static int ClosePort(void)
            {
            if (SerialChannel != INVALID_HANDLE_VALUE)
                        {
                        // Close the communication port.
                        if (!CloseHandle (SerialChannel))
                                    {
                                    return FALSE;
                                    }
                        else
                                    {
                                    SerialChannel = INVALID_HANDLE_VALUE;
                                    return TRUE;
                                    }
                        }

            return FALSE;
            }

// -----------------------------------------------------------------------------

static void PrintCharSet(void)
            {
            char Buffer[16];
            unsigned int Line = 2;

            // Print the 'printable' chars
            while (Line < 16)
                        {
                        unsigned int Row = 0;

                        while (Row < 16)
                                    {
                                    Buffer[Row] = (Line * 16) + Row;
                                    Row++;
                                    }

                        SerialWriteString(Buffer, 16);
                        SerialWriteString("\x0d", 1);
                        Line++;
                        }
            }

// -----------------------------------------------------------------------------

BOOL DataToPrinter(HWND ParentWindowHandle)
            {
            const char TextStr0[] = "Hello, Printer! This is a whole load of text which doesn't
really mean anything. It is used only to test the printout.\x0d";
            const char TextStr1[] = "The last try was not long enough so I have to type some
more. This much text should make sure we see wraps at the end of the lines.\x0d";

            OpenPort(ParentWindowHandle);

            // Send the data to the printer.
            SerialWriteString("\x1b\x50\x01", 3);
            SerialWriteString("\x1b\x49\x30", 3);
            SerialWriteString("\x1b\x4C\x30", 3);
            SerialWriteString("\x1b\x4D\x30", 3);

            SerialWriteString(TextStr0, -1);
            SerialWriteString(TextStr1, -1);



            SerialWriteString("\n  Blackroc Technology\n", -1);
            SerialWriteString("       Pro60 Printer\x0d\x0d", -1);

            // Set up for mark detection... also sets top of form
            SerialWriteString("\x1b\x70\x0a\x01", 4);
            SerialWriteString("Top of form set.\x0dMark detect set.\x0d", -1);

            SerialWriteString("\x0dCharacter Set...\x0d", -1);
            PrintCharSet();

            SerialWriteString("\x0d\x1b\x49\x31", 4);
            SerialWriteString("    This is inverse!    \x0d", -1);
            SerialWriteString("                        ", -1);
            SerialWriteString("Check for missing lines \x0d", -1);
            SerialWriteString("\x1b\x49\x30This is normal\x0d", 18);
            SerialWriteString("\x1b\x4c\x31This is underlined\x0d", 22);
            SerialWriteString("\x1b\x4c\x30This is normal\x0d", 18);

            SerialWriteString("Form feeding...\x0dlooking for mark\x0d", -1);
            SerialWriteString("\x0C", 1);
            SerialWriteString("After form feed\x0d", -1);

            Sleep(1000);

            ClosePort();

            return TRUE;
            }

// ----------------------------------------------------------------------------
```

7 WinCE Printer Driver Programming

The Pro60 is supplied with a suitable driver for WinCE. This driver is presently available for devices based upon the ARM processor.

Access to the printer is available to a programmer via a dll that must be present on the machine. This dll is invoked by the following code and is further illustrated in the example application described later in this document.

```
PrinterDC = CreateDC(L"Pro60_ArmI.dll", NULL, L"COM7:", &DeviceMode);
```

7.1 Example WinCE Application – Printer Driver Version

The following code samples describe an example WinCE application that will generate some simple output on the printer. The application assumes that a Bluetooth connection has been established between the handheld and the printer. The application therefore prints to a (virtual) serial port. It exercises some basic GDI functionality by drawing some text and some basic line graphics together with a bit map 'image'.

The application is available as part of the documentation pack, and is provided in source and compiled form. A suitable project file is also supplied to enable the code to be compiled using Microsoft Embedded Visual C 4.0 (eVC4). EVC4 is available for free download from Microsoft's internet site.

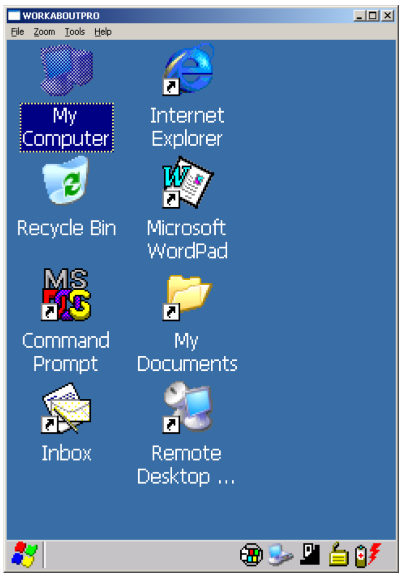
7.1.1 Source Code

The following source file implements a complete module that will write to the Pro60 printer from an application. The 'standard' WinCE application which calls this module is not shown, but may be found in the accompanying files in the documentation pack.

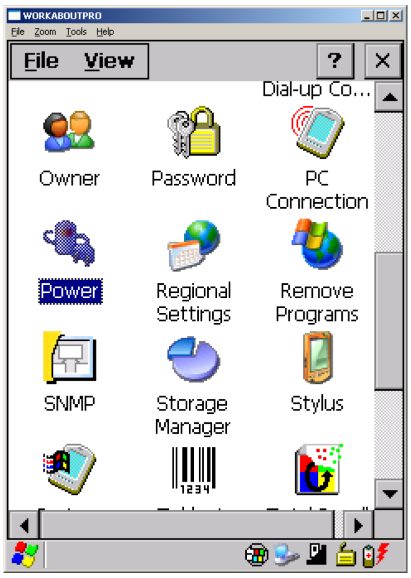
```
#include <Windows.h>
#include "resource.h"
#include <string.h>

#define PRO60_DRIVER    L"Pro60_ArmI.dll"

static wchar_t DriverName[16];

// ---------------------------------------------------------------------------

BOOL DataToPrinter(HINSTANCE hInst, int Pattern)
            {
            DOCINFO                 DocInfo;
            DWORD                   dwJob;
            DEVMODE                 DeviceMode;
            HDC                     PrinterDC;
            int                     xPage, yPage;
            static                  wchar_t TextStr[] = L"Hello, Printer! This is a whole load of
text which doesn't really mean anything. It is used only to test the printout. The last try was
not long enough so I have to type some more. This much text should make sure we see wraps at the
end of the lines.";
            RECT Box;
            HANDLE BitmapHandle;
            HDC MemoryDC;
            BITMAP BitmapInfo;

            wcscpy(DriverName, PRO60_DRIVER);

            DeviceMode.dmSize = sizeof(DEVMODEW);
            DeviceMode.dmOrientation = DMORIENT_PORTRAIT;
            DeviceMode.dmPaperLength = 384;
            DeviceMode.dmFields = DM_PAPERLENGTH;

            if (Pattern == 0)
                        {
                        BitmapHandle = LoadBitmap(hInst, MAKEINTRESOURCE(IDB_LOGO));
                        }
            else
                        {
                        BitmapHandle = LoadBitmap(hInst, MAKEINTRESOURCE(IDB_LOGO_LARGE));
                        }

            // Need a handle to the printer.
            PrinterDC = CreateDC(DriverName, NULL, L"COM7:", &DeviceMode);

            if(PrinterDC == NULL)
                        return FALSE;

            xPage = GetDeviceCaps (PrinterDC, HORZRES) ;
            yPage = GetDeviceCaps (PrinterDC, VERTRES) ;

             GetObject(BitmapHandle, sizeof(BITMAP), & BitmapInfo);
            // Fill in the structure with info about this "document"
            DocInfo.cbSize = sizeof(DOCINFO);
            DocInfo.lpszDocName = L"Test Document";
            DocInfo.lpszOutput = NULL;
            DocInfo.lpszDatatype = 0;
            DocInfo.fwType = 0;

            // Inform the spooler the document is beginning.
            if( (dwJob = StartDoc(PrinterDC, &DocInfo )) == 0 )
                        {
                        DeleteDC(PrinterDC);
                        return FALSE;
                        }

            // Start a page.
            if(!StartPage(PrinterDC))
                        {
                        EndDoc(PrinterDC);
                        DeleteDC(PrinterDC);
                        return FALSE;
                        }

            // Send the data to the printer.

            // ========================================================================
            // This is just a test sequence of drawing operations.....
            // Replace this code with something more useful in a production environment.

            // Outline the page border
            Rectangle (PrinterDC, 0, 0, xPage, yPage) ;

            // Draw a pair of diagonals through the page
            MoveToEx (PrinterDC, 0, 0, NULL) ;
            LineTo   (PrinterDC, xPage, yPage) ;
            MoveToEx (PrinterDC, xPage, 0, NULL) ;
            LineTo   (PrinterDC, 0, yPage) ;


            // Define a bounding box and output some text
            Box.left = xPage/30;
            Box.right = xPage - Box.left;
            Box.top = 2 * (yPage/8);
            Box.bottom = 6 * (yPage/8);
            Rectangle(PrinterDC, Box.left, Box.top, Box.right, Box.bottom);

            SetTextAlign (PrinterDC, TA_LEFT|TA_TOP) ;
            DrawText(PrinterDC, TextStr, -1, &Box, DT_LEFT | DT_WORDBREAK);

            // Copy a bitmap image to the printer device context.
            MemoryDC = CreateCompatibleDC(NULL);
            SelectObject(MemoryDC, BitmapHandle);
            BitBlt(PrinterDC, 0, 180, BitmapInfo.bmWidth, BitmapInfo.bmHeight,
                        MemoryDC, 0, 0, SRCCOPY);
            DeleteDC(MemoryDC);

            // End of test sequence
            // ========================================================================

            // End the page.
            if(!EndPage(PrinterDC))
                        {
                        EndDoc(PrinterDC);
                        DeleteDC(PrinterDC);
                        return FALSE;
                        }

            // Inform the spooler that the document is ending.
            if(!EndDoc(PrinterDC))
                        {
                        DeleteDC(PrinterDC);
                        return FALSE;
                        }

            // Tidy up the printer handle.
            DeleteDC(PrinterDC);
            DeleteObject(BitmapHandle);

            return TRUE;
            }

// ----------------------------------------------------------------------------
```

Appendix A
Bluetooth Configuration

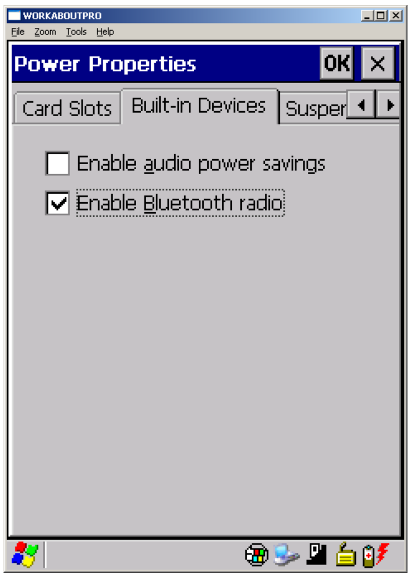
Windows CE .net 4.2



Initial Screen, select Control Panel

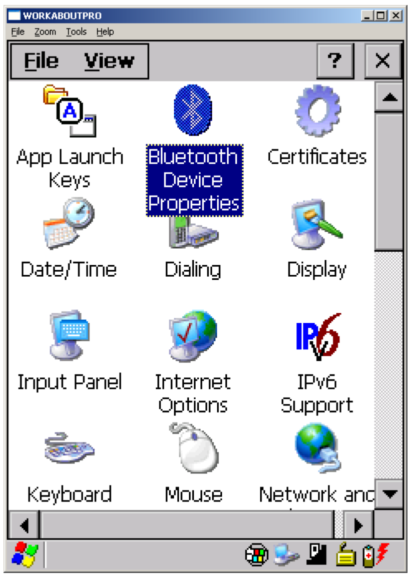


Select Power Properties

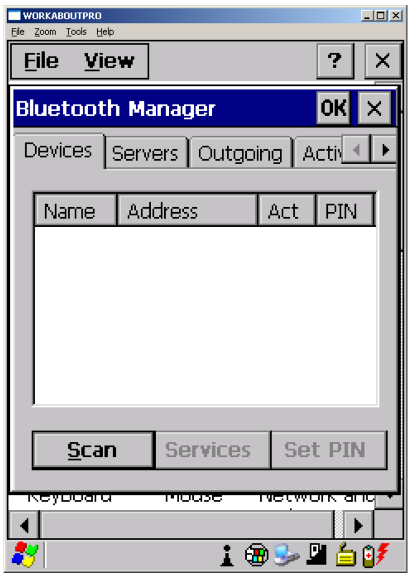


☐ Enable audio power savings
☑ Enable Bluetooth radio

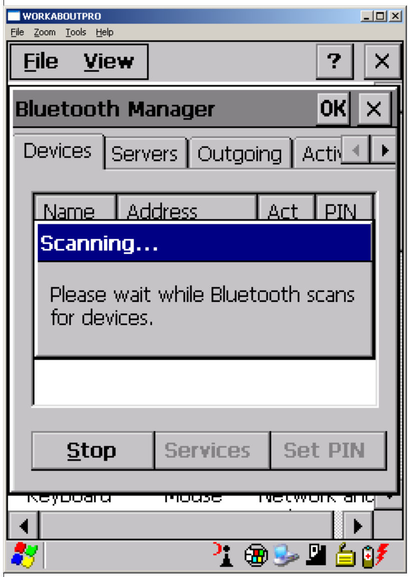
Select the Built-in devices tab and enable Bluetooth



Select Bluetooth Device Properties

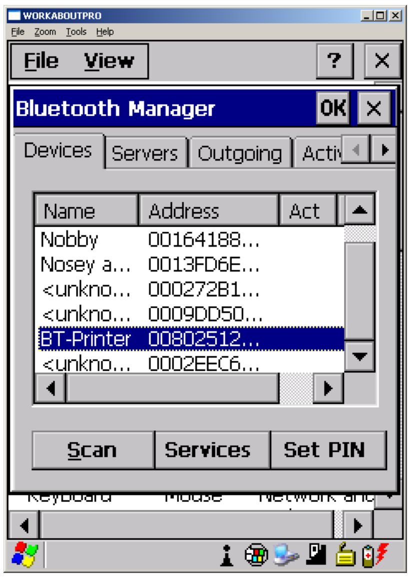


Press the Scan button



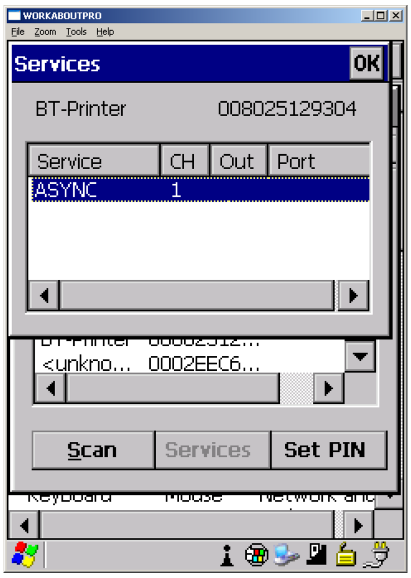
Please wait while Bluetooth scans for devices.

Wait for the Bluetooth scanning to complete



Name	Address	Act
Nobby	00164188…	
Nosey a…	0013FD6E…	
<unkno…	000272B1…	
<unkno…	0009DD50…	
BT-Printer	00802512…	
<unkno…	0002EEC6…	

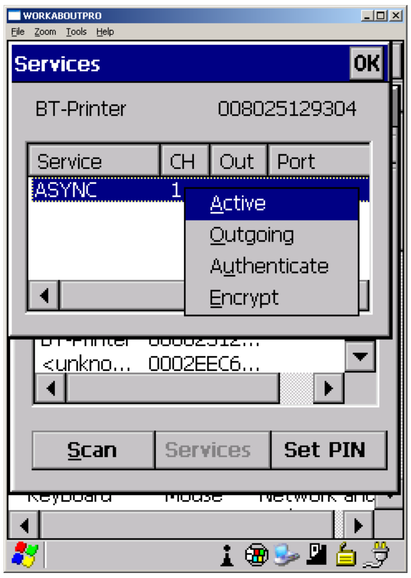
Locate the device 'BT-Printer'



BT-Printer 008025129304

Service	CH	Out	Port
ASYNC	1		

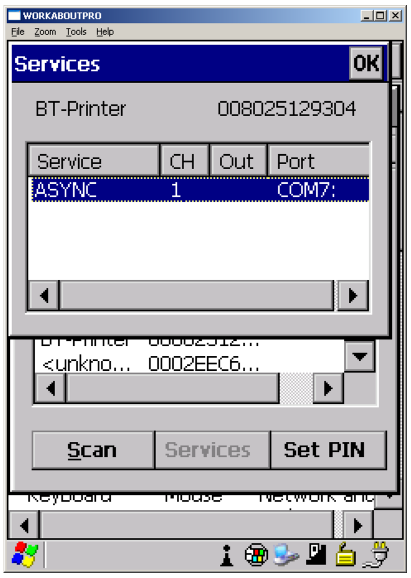
Double click ASYNC



BT-Printer 008025129304

Service	CH	Out	Port
ASYNC	1		

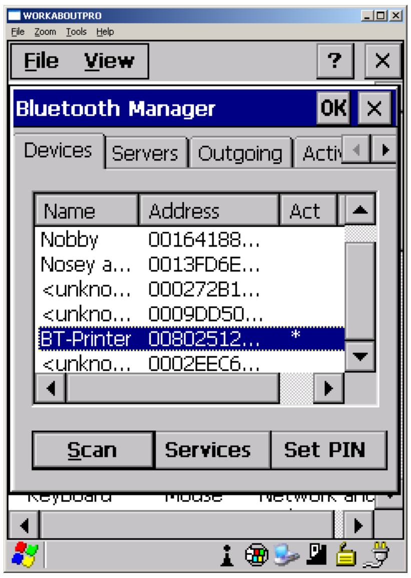
Select Active



BT-Printer 008025129304

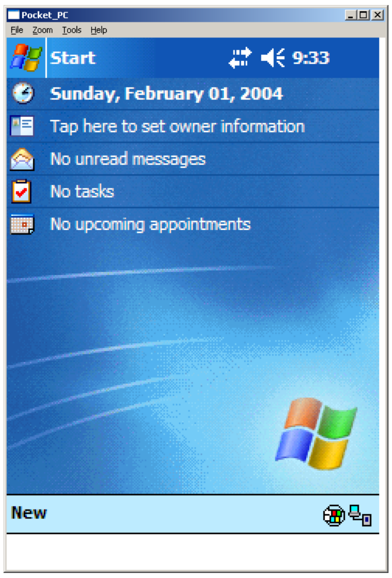
Service	CH	Out	Port
ASYNC	1		COM7:

The device should now show its active serial port

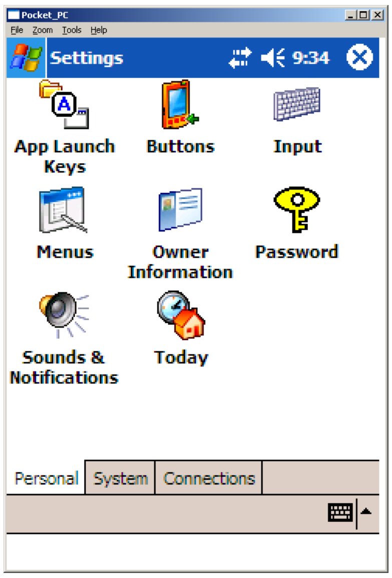


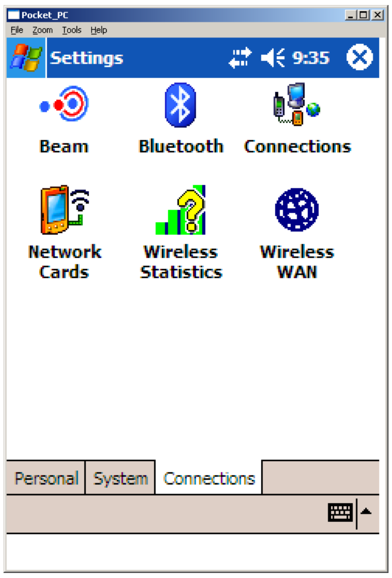
Name	Address	Act
Nobby	00164188…	
Nosey a…	0013FD6E…	
<unkno…	000272B1…	
<unkno…	0009DD50…	
BT-Printer	00802512…	*
<unkno…	0002EEC6…	

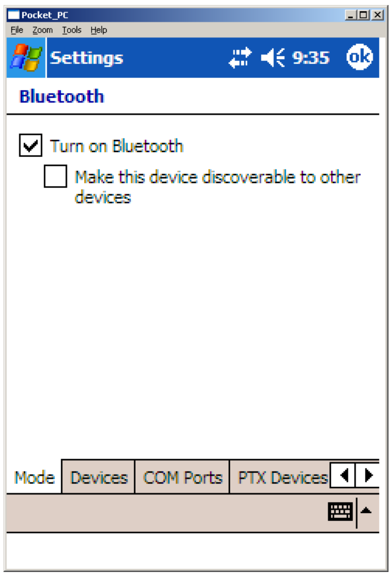
Windows Mobile 2003



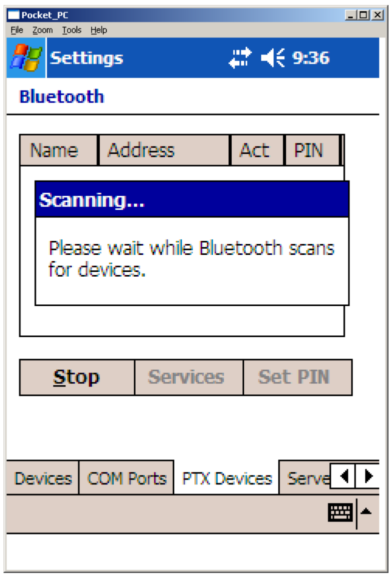
Sunday, February 01, 2004
Tap here to set owner information
No unread messages
No tasks
No upcoming appointments





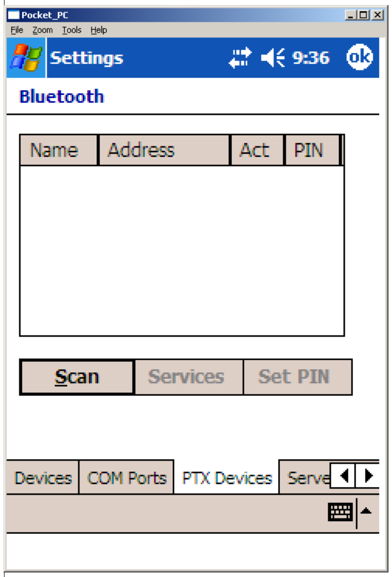


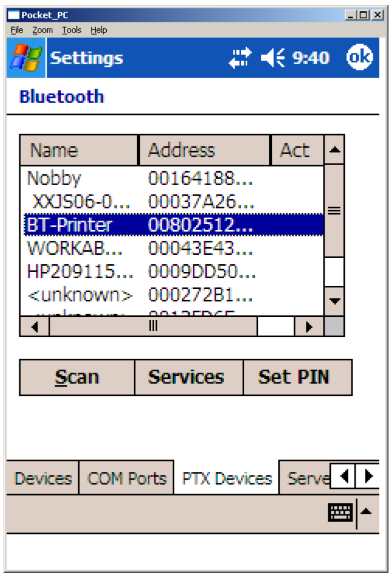
☑ Turn on Bluetooth
☐ Make this device discoverable to other devices



Scanning...

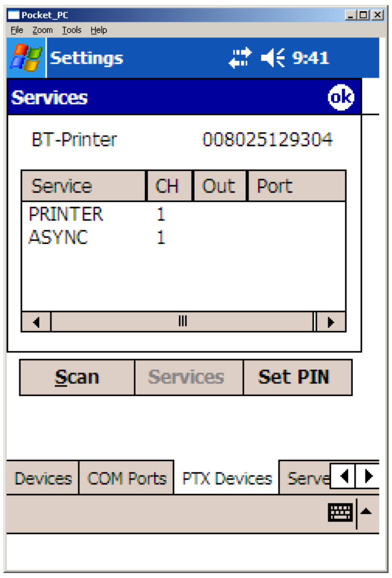
Please wait while Bluetooth scans for devices.





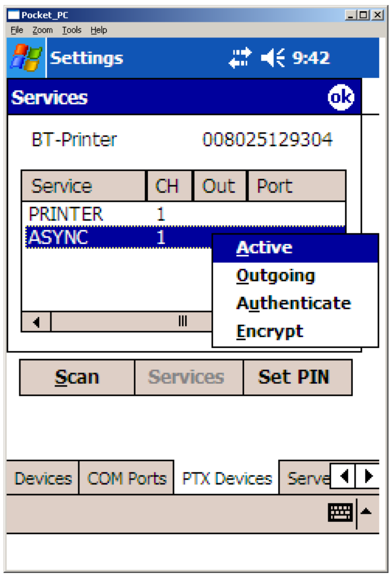
Bluetooth

Name	Address	Act
Nobby	00164188...	
XXJS06-0...	00037A26...	
BT-Printer	00802512...	
WORKAB...	00043E43...	
HP209115...	0009DD50...	
<unknown>	000272B1...	



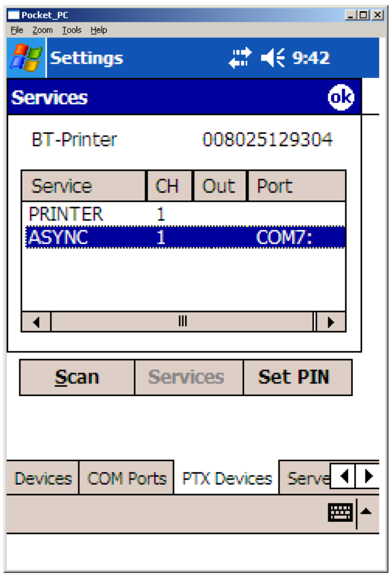
BT-Printer 008025129304

Service	CH	Out	Port
PRINTER	1		
ASYNC	1		



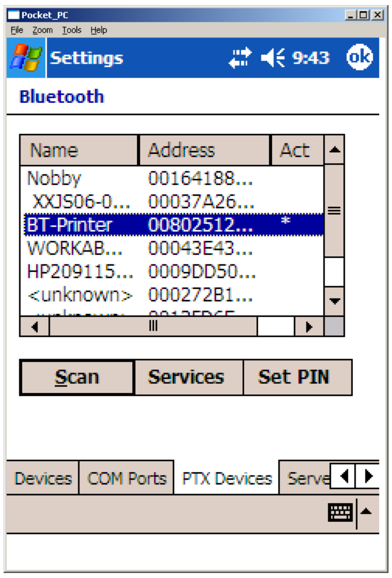
BT-Printer 008025129304

Service	CH	Out	Port
PRINTER	1		
ASYNC	1		



BT-Printer 008025129304

Service	CH	Out	Port
PRINTER	1		
ASYNC	1		COM7:



Bluetooth

Name	Address	Act
Nobby	00164188...	
XXJS06-0...	00037A26...	
BT-Printer	00802512...	*
WORKAB...	00043E43...	
HP209115...	0009DD50...	
<unknown>	000272B1...	

Alphabetical Index