Psion Teklogix
WORKABOUT PRO HDK

User Manual

September 12 2007 **Part No. 8100057.C**

ISO 9001 Certified
Quality Management System

PSION TEKLOGIX

Return-To-Factory Warranty

Psion Teklogix Inc. provides a return to factory warranty on this product for a period of twelve (12) months in accordance with the Statement of Limited Warranty and Limitation of Liability provided at www.psionteklogix.com/warranty. (If you are not already a member of Teknet and you attempt to view this warranty, you will be asked to register. As a member of Teknet, you will have access to helpful information about your Psion Teklogix products at no charge to you.) In some regions, this warranty may exceed this period. Please contact your local Psion Teklogix office for details. For a list of offices, see Appendix A: "Support Services / Worldwide Offices". The warranty on Psion Teklogix manufactured equipment does not extend to any product that has been tampered with, altered, or repaired by any person other than an employee of an authorized Psion Teklogix service organization. See Psion Teklogix terms and conditions of sale for full details.

Warning: Psion Teklogix warranties take effect on the date of shipment.

Service

Psion Teklogix provides a complete range of product support services to its customers. For detailed information, please refer to Appendix A: "Support Services / Worldwide Offices". This section also provides information about accessing support services through the Psion Teklogix web site.

Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

This Product, and its accessories, comply with the requirements of the Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC. If your end-of-life Psion Teklogix product or accessory carries a label as shown here, please contact your local country representative for details on how to arrange recycling.

For a list of international subsidiaries, please go to:

www.psionteklogix.com/EnvironmentalCompliance

Restriction On Hazardous Substances (RoHS) Directive 2002/95/EC

What is RoHS?

The European Union has mandated that high environmental standards be met in the design and manufacture of electronic and electrical products sold in Europe, to reduce hazardous substances from entering the environment. The “Restriction on Hazardous Substances Directive (RoHS)” prescribes the maximum trace levels of lead, cadmium, mercury, hexavalent chromium, and flame retardants PBB and PBDE that may be contained in a product. Only products meeting these high environmental standards may be “placed on the market” in EU member states after July 1, 2006.

RoHS Logo

Although there is no legal requirement to mark RoHS-compliant products, Psion Teklogix Inc. indicates its compliance with the directive as follows:

The RoHS logo located either on the back of the product or underneath the battery in the battery compartment (or on a related accessory such as the charger or docking station) signifies that the product is RoHS-compliant as per the EU directive. Other than as noted below, a Psion Teklogix product that does not have an accompanying RoHS logo signifies that it was placed on the EU market prior to July 1, 2006, and is thereby exempt from the directive.

Note: Not all accessories or peripherals will have a RoHS logo due to physical space limitations or as a result of their exempt status.

Disclaimer

Every effort has been made to make this material complete, accurate, and up-to-date. In addition, changes are periodically added to the information herein; these changes will be incorporated into new editions of the publication.

Psion Teklogix Inc. reserves the right to make improvements and/or changes in the product(s) and/or the program(s) described in this document without notice, and shall not be responsible for any damages, including but not limited to consequential damages, caused by reliance on the material presented, including but not limited to typographical errors.

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1 INTRODUCTION

1.1 About This Manual

This manual is supports developers of customized hardware for all variants of the Psion Teklogix Inc. WORKABOUT PRO hand-held computer.

Chapter 1: Introduction

is an overview of the WORKABOUT PRO Hand-Held Computer and the WORKABOUT PRO HDK.

Chapter 2: Hardware

describes, in general terms, the hardware of the WORKABOUT PRO.

Chapter 3: Software

gives an overview of the API for expansion devices, discusses installing device drivers.

Chapter 5: External Connectors

describes the external connectors on the WORKABOUT PRO, and accessories that connect to them.

Chapter 4: Mechanical Considerations

describes the space and mounting for expansion module devices.

Chapter 7: 100-Pin Connector

describes the electrical interface between the WORKABOUT PRO and expansion module devices.

Chapter 8: Scanner Connector

describes the scanner connector.

Chapter 9: Example: Scanner Converter Board

describes the interface between the scanner and the standardized scanner connector.

Chapter 10: Example: PCMCIA Expansion Module

describes an example of an expansion module that has a PCMCIA slot.

Chapter 11: Example: Multi-I/O Expansion Module

describes an example of an expansion module that makes the serial and USB connections on the 100-pin connector easily available.

Appendix A: Support Services / Worldwide Offices

provides the helpdesk phone number at Psion Teklogix Inc., Mississauga, Ontario, Canada office and details the support services available. This appendix also lists worldwide office addresses and their phone numbers.

Appendix B: Resources

contains a list of other publications and web sites where related information is available.

Appendix C: Specifications WORKABOUT PRO M

contains specifications for the WORKABOUT PRO M variant.

Appendix D: Specifications WORKABOUT PRO C, S & ME

contains specifications for the WORKABOUT PRO C, S, and ME variants.

Appendix E: WORKABOUT PRO 2nd. Generation

contains specifications for the WORKABOUT PRO 2nd. Generation C and S variants.

Appendix F: Specifications WORKABOUT PRO Radios
contains specifications for the WORKABOUT PRO radios.

Appendix G: Specifications Scanners And Imagers
contains specifications for the WORKABOUT PRO internal scanners and imagers.

Appendix H: Specifications WORKABOUT PRO Batteries
contains specifications for the WORKABOUT PRO batteries.

Appendix I: Hardware Developer Kit License Agreement
provides the text of the License Agreement that accompanies the HDK.

1.2 Text Conventions

Note: Notes highlight additional helpful information.

Important: These statements provide important instructions or additional information that is critical to the operation of the computer or other equipment.

Warning: These statements provide important information that may prevent injury, damage to the equipment, or loss of data.

An arrow next to field description information (usually in tables) indicates a recommended or suggested configuration setting.

1.3 Contents Of The HDK

The Hardware Development Kit (HDK) for the WORKABOUT PRO includes the following items:

- This manual.
- Libraries and sample programs for the APIs for managing expansion cards and scanner devices. See “The C++ Application Programming Interface” on page 25 for a description of these files.
- Drawings and engineering models of the backplates and endcaps available for the WORKABOUT PRO. The models can be customized. See Chapter 4: “Mechanical Considerations” for a description of these models.
- Sample schematics and drawings for expansion modules and scanner converter boards.

1.3.1 Files In The HDK

Table 1.1 Files in the HDK

Filename	Description
...\Mechanical\WORKABOUTPRO\G2\iges_files \G2_C_body.igs	Body shell—WORKABOUT PRO 2nd. Generation—C variant.
...\Mechanical\WORKABOUTPRO\G2\iges_files \G2_mounting_frame.igs	Mounting frame—WORKABOUT PRO 2nd. Generation C, and S variants.

Table 1.1 Files in the HDK (Continued)

Filename	Description
...\Mechanical\WORKABOUTPRO\G2\iges_files \G2_S_body.igs	Body shell—WORKABOUT PRO 2nd. Generation S variant.
...\Mechanical\WORKABOUTPRO\iges_files \backplate.igs	Backplate—all variants.
...\Mechanical\WORKABOUTPRO\iges_files \colour_mono_terminal.igs	Body shell—WORKABOUT PRO C, M, and ME variants.
...\Mechanical\WORKABOUTPRO\iges_files \endcap.igs	Endcap—all variants.
...\Mechanical\WORKABOUTPRO\iges_files \endcap_assembly.igs	Endcap assembly—all variants.
...\Mechanical\WORKABOUTPRO\iges_files \mounting_frame.igs	Mounting frame—WORKABOUT PRO C, M, ME. and S variants.
...\Mechanical\WORKABOUTPRO\iges_files \pcmcia_xmod.igs	Sample expansion card—all variants.
...\Mechanical\WORKABOUTPRO\iges_files \short_terminal.igs	Body shell—WORKABOUT PRO S variant.
...\Mechanical\WORKABOUTPRO\iges_files \stylus_pen.igs	Stylus pen—all variants.
...\Mechanical\WORKABOUTPRO\pdf \backplate.pdf	2D backplate—all variants.
...\Mechanical\WORKABOUTPRO\pdf \endcap.pdf	2D endcap—all variants.
...\Mechanical\WORKABOUTPRO\pdf \endcap_assembly.pdf	2D endcap assembly —all variants.
...\Mechanical\WORKABOUTPRO\pdf \endcap_assembly_ball.pdf	2D ball for endcap—all variants.
...\Mechanical\WORKABOUTPRO\pdf \endcap_assembly_ball_holder.pdf	2D endcap ball holder—all variants.
...\Mechanical\WORKABOUTPRO\pdf \endcap_assembly_ball_spring.pdf	2D endcap, and ball spring—all variants.
...\Mechanical\WORKABOUTPRO\pdf \endcap_assembly_stylus_rubber.pdf	2D stylus gasket for endcap—all variants.
...\Mechanical\WORKABOUTPRO\pdf \housing_body.pdf MISSING	2D body shell—WORKABOUT PRO S variant.
...\Mechanical\WORKABOUTPRO\pdf \internal_metal_frame.pdf	2D internal frame—WORKABOUT PRO C, M, and ME variants.
...\Mechanical\WORKABOUTPR\G2\pdf \mechanical_stop.pdf ADD TO LIBRARY	2D card stop—WORKABOUT PRO 2nd. Generation C, and S variants.
...\Mechanical\WORKABOUTPRO\pdf \stylus_pen.pdf	2D stylus—all variants.

Table 1.1 Files in the HDK (Continued)

Filename	Description
...\Electrical\WORKABOUTPRO\Samples \PCMCIAExpansionCard.pdf	Sample schematic PCMCIA expansion module—all variants.
...\Electrical\WORKABOUTPRO\Samples \SerialScannerInterfaceBoard.pdf	Sample schematic scanner interface board for a serial scanner—all variants.
...\Electrical\WORKABOUTPRO\Samples \USBScannerInterfaceBoard.pdf	Sample schematic scanner interface board for a USB scanner—all variants.

1.4 Obtaining The HDK

The HDK is available as a download from Psion Teklogix. If you have a Teknet usercode, the download is available on the Teknet site at:

www.PsionTeklogix.com/downloads

1.5 About the WORKABOUT PRO Hand-Held Computer

The WORKABOUT PRO Hand-Held Computer is an industrial hand-held computer.

The following WORKABOUT PRO variants are available:

Model	Variant	Description
WORKABOUT PRO	M (discon-tinued)	Monochrome screen, full keyboard, PXA255 processor.
	C	Colour screen, full keyboard, PXA255 processor.
	ME	Monochrome enhanced screen, full keyboard, PXA255 processor.
	S	Colour screen, short keyboard, PXA255 processor.
WORKABOUT PRO 2nd. Generation	C	Colour screen, full keyboard, PXA270 processor.
	S	Colour screen, short keyboard, PXA270 processor.

The specifications for these computers are in the following appendices:

- Appendix C: “Specifications WORKABOUT PRO M”
- Appendix D: “Specifications WORKABOUT PRO C, S & ME”
- Appendix E: “WORKABOUT PRO 2nd. Generation”

For details on the configuration and operation of the WORKABOUT PRO models consult the user manuals listed in Appendix B: “Resources”.

The following windows operating systems are available on the WORKABOUT PRO:

- Windows Mobile 2003
- Windows CE .NET 4.2
- Windows Embedded CE 5.0
- Windows Mobile 5
- Windows Mobile 6

Windows operating systems are available on the WORKABOUT PRO as follows:

Model	Windows Mobile 2003	Windows CE .NET 4.2	Windows Embedded CE 5.0	Windows Mobile 5	Windows Mobile 6
WORKABOUT PRO M (discontinued)	Yes	Yes			
WORKABOUT PRO C	Yes	Yes		Yes	
WORKABOUT PRO ME	Yes	Yes		Yes	
WORKABOUT PRO S	Yes	Yes		Yes	
WORKABOUT PRO 2nd. Generation			Yes		Yes

1.6 Discontinued Hardware

The WORKABOUT PRO M and some of the peripherals described in this manual are no longer available for purchase from Psion Teklogix. They are included in this manual for the benefit of developers who are continuing to support them alongside newer hardware. For currently available hardware consult the Accessories Catalog at www.PsionTeklogix.com/Accessories.

HARDWARE 2

2.1 Overview

This chapter gives an overview of the hardware of the WORKABOUT PRO.

2.2 Variants Of The WORKABOUT PRO

There are six variants of the WORKABOUT PRO. The specifications for all the variants are in the following appendices:

- Appendix C: "Specifications WORKABOUT PRO M"
- Appendix D: "Specifications WORKABOUT PRO C, S & ME"
- Appendix E: "WORKABOUT PRO 2nd. Generation"

For the specifications of the radio, scanner, and battery options see:

- Appendix F: "Specifications WORKABOUT PRO Radios"
- Appendix G: "Specifications Scanners And Imagers"
- Appendix H: "Specifications WORKABOUT PRO Batteries"

For setup, configuration, and operational details consult the user manual for your WORKABOUT PRO. A list of user manuals is included in Appendix B: "Resources".

2.2.1 Scanner Variants

The WORKABOUT PRO comes standard with no scanner. Consult the specifications for the scanners that are available for each WORKABOUT PRO variant.

The scanners and their housings fasten to the underside of the WORKABOUT PRO, replacing the backplate. The scanner connects through a flex cable to the scanner connector on the WORKABOUT PRO main logic board. The scanner may be installed by the end user; for instructions see *Psion Teklogix WA9000, WA9005, & WA9006 Scanner Module Installation* (Part number 8000030).

Only one internal scanner can be installed in a WORKABOUT PRO. The internal scanner can be triggered from the trigger switch on the WORKABOUT PRO handgrip (if present), from one of the [SCAN] buttons on the WORKABOUT PRO keyboard, or from an assigned keyboard key.

2.2.2 Expansion Card Variants

See the specifications for the WORKABOUT PRO variants for information on the expansion card slots that are available. Additional card slots can be installed by connecting to the internal 100-pin connector. Some card slots are accessed by removing the endcap.

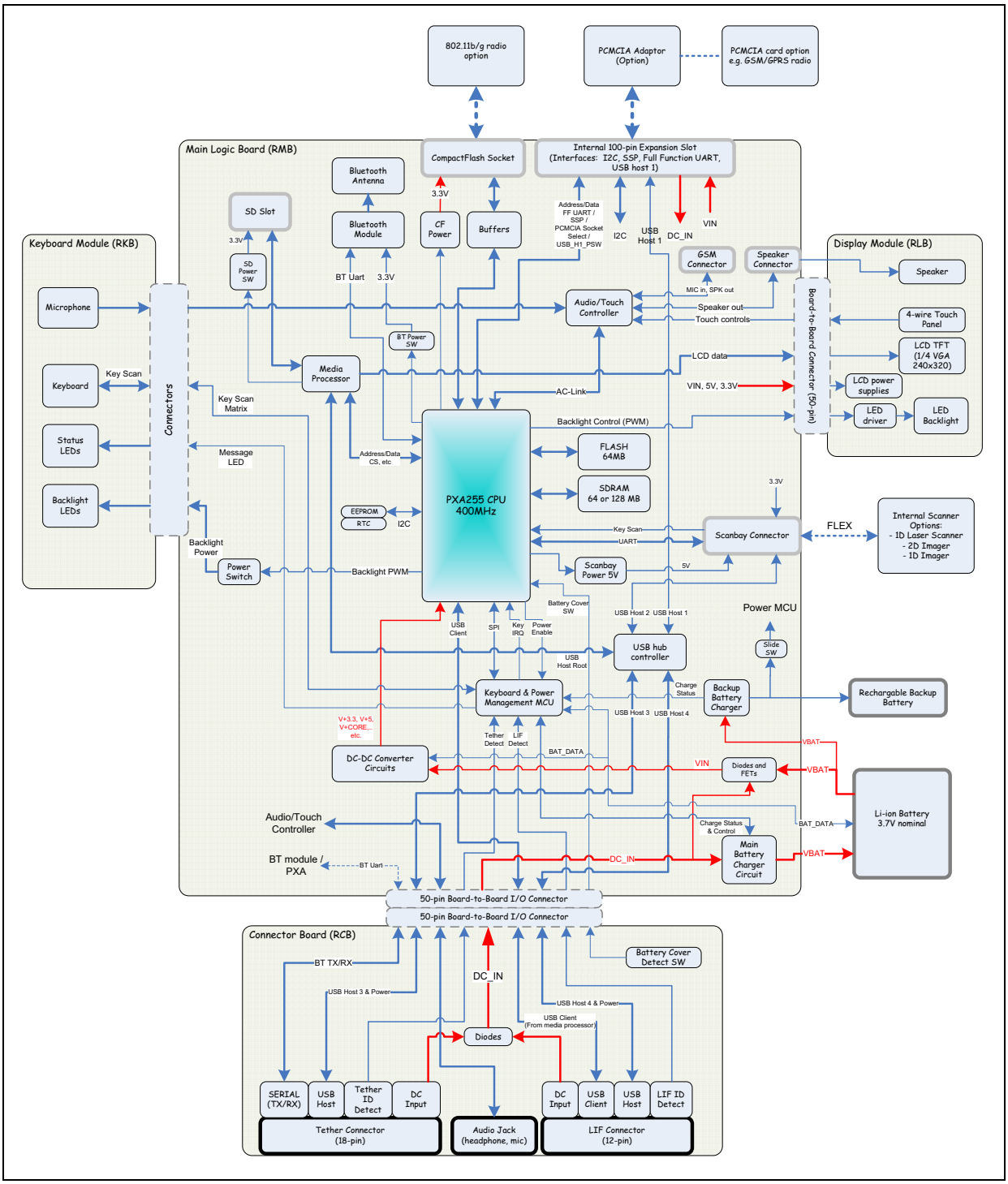
2.3 WORKABOUT PRO C, S, M, ME

See Figure 2.1 on page 12.

2.3.1 Main Processor

The WORKABOUT PRO is built around a 400 MHz Marvell X-Scale PXA255 processor. This processor can run binaries compiled for the ARMv4 and ARMv4i target processor.

Figure 2.1 WORKABOUT PRO C, S, M, ME Block Diagram



2.3.2 Peripheral Processors

MSP430MF133 Keyboard Processor

The WORKABOUT PRO has a keyboard processor, for controlling and monitoring the keyboard and signal LEDs, and the battery.

MQ1188 Multimedia Platform Controller

This processor handles connections to the liquid-crystal display module and the SD/MMC card slot. It also provides the USB host interface to the USB host (through the hub) and client connections.

ISP1122A USB Host Hub

The ISP1122A USB hub, together with individual current limited load switches, provides USB data lines and DC power to the USB ports on the following connectors:

- 100-pin expansion connector.
- Scanner connector.
- Tether connector.
- LIF connector.

The overcurrent sensing capability and DC power is not provided by the ISP1122A controller alone.

This controller integrates a Serial Interface Engine (SIE), hub repeater, hub controller, USB data transceivers, and a configurable number (2 - 5) of downstream ports. It has the following features:

- Complies with USB Specification 1.1.
- Full-speed (12Mbps) fully compliant.
- OHCI register compliant.
- Supports DMA.

WM9705 Audio Controller

The audio controller permits audio recording and playback to the AC97 specification. This chip also handles the touchscreen digitizing input.

2.4 WORKABOUT PRO 2nd. Generation C, S

See Figure 2.2 on page 14.

2.4.1 Main Processor

The WORKABOUT PRO is built around a 520 MHz Marvell X-Scale PXA270 processor. This processor can run binaries compiled for the ARMv4 and ARMv4i target processor.

2.4.2 Peripheral Processors

C8051F315 Keyboard Processor

The WORKABOUT PRO has a keyboard processor, for controlling and monitoring the keyboard and signal LEDs, and the battery.

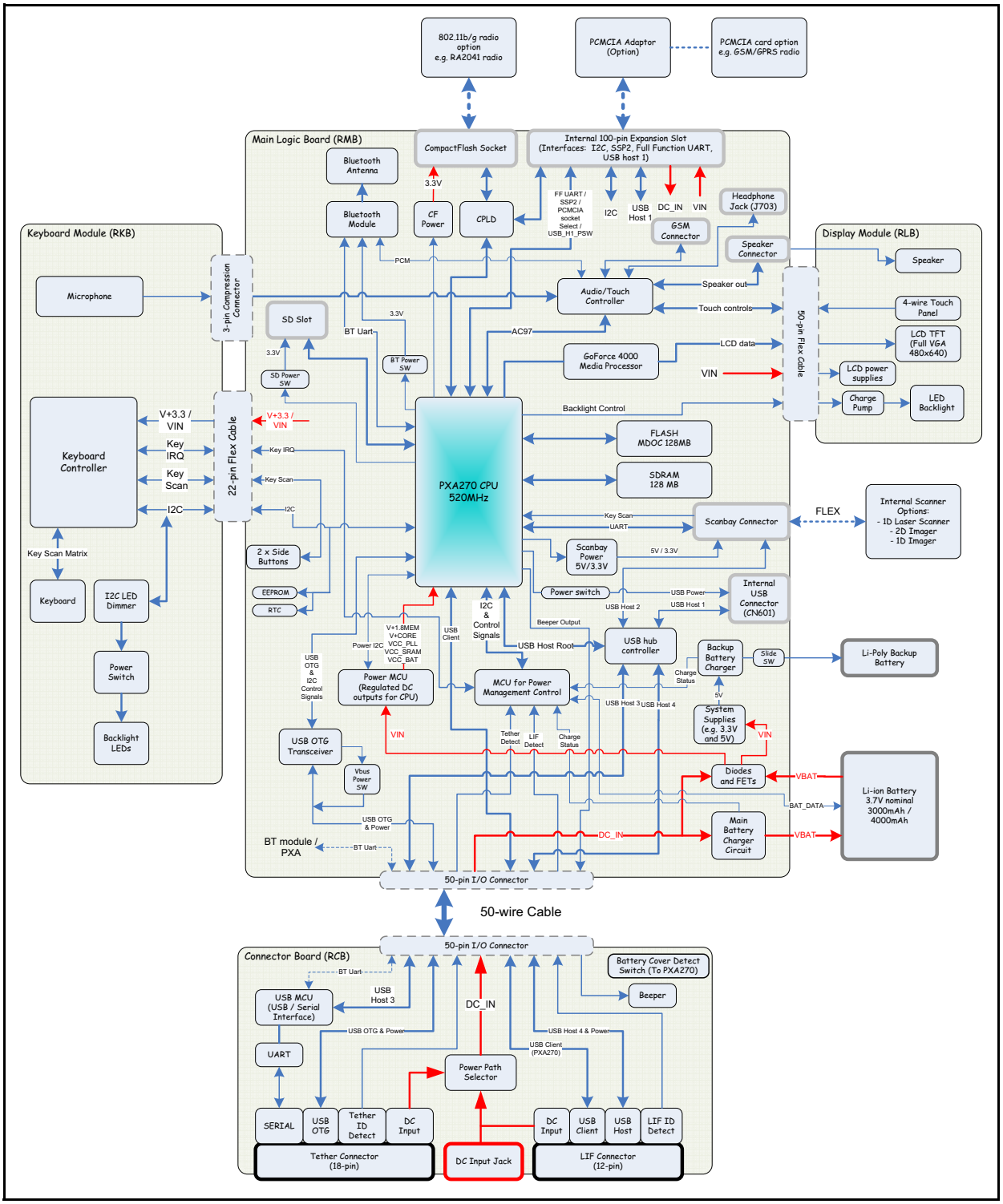
C8051F312 Microcontroller for Power Management Control

The C8051F312 controller is used for controlling and monitoring the power state of various components (e.g. Li-ion battery chargers) in the system. It also detects the presence of devices connected to the LIF port and the tether port.

LC4128ZC CPLD

This CPLD is used for interfacing Compact Flash and PC cards via the internal 100-pin expansion slot.

Figure 2.2 WORKABOUT PRO 2nd. Generation C, S Block Diagram



GoForce 4000 Media Processor

This provides the following:

- Video controller.

TUSB2046BI USB Hub

The TUSB2046BI USB hub, together with individual current limited load switches, provides USB data lines and DC power to USB ports on the following connectors:

1. 100-pin expansion connector.
2. Scanner connector.
3. Tether connector.
4. LIF connector.
5. Internal USB connector.

It provides one upstream port and four downstream ports in compliance with the USB 1.1 specification. Fully-compliant USB transceivers are integrated for all upstream and downstream ports. The downstream ports support both full-speed (12 Mbps), and low-speed (1.5 Mbps), devices by automatically setting the slew rate according to the speed of the device attached to the ports.

WM9713 Audio Controller

The audio controller permits audio recording and playback to the AC97 specification. This chip also handles the touchscreen digitizing input.

2.5 Identifying Hardware

An overview of the operating system and the installed hardware on the WORKABOUT PRO can be viewed using the Control Panel. Depending on the version of Windows installed, the Control Panel program is one of the following:

- System.
- About Device.

2.6 The LED

The WORKABOUT PRO has a two-coloured indicator LED to show power and charging state. This LED can be controlled by application programs.

2.7 Connectors

For information on the external connectors that are provided on the WORKABOUT PRO, see the specifications for each of the variants. For pinouts for the external connectors see Chapter 5: “External Connectors”.

For information on connecting devices to the 100-pin internal connector, see Chapter 7: “100-Pin Connector”, and for connecting devices to the internal scanner connector see Chapter 8: “Scanner Connector”.

2.8 Power Management

The WORKABOUT PRO is powered by a lithium-ion rechargeable battery pack. The WORKABOUT PRO can be powered from external power. When the WORKABOUT PRO is powered from external power, the battery pack also charges.

Use only power sources recommended or sold by Psion Teklogix for the WORKABOUT PRO.

2.8.1 Batteries

The battery is a single-cell lithium-ion battery, available with capacities between 1700 mAh and 4000 mAh. When the battery charge drops below 2.6 V, the battery shuts down.

When the battery output drops below preset values, the WORKABOUT PRO power management causes the following:

Table 2.1 Battery Threshold Voltages

Power State	Battery Voltage	
	WORKABOUT PRO C, S, M, ME	WORKABOUT PRO 2nd. Generation C, S
Suspend mode	Below 3.41 V	Below 3.1 V
Unit shuts down & V_IN switches to 0 V	Below 2.6 V	Below 3.0 V

2.9 Switching The Backup Battery Power On And Off

Power from the backup battery must be switched off before inserting or removing an expansion module. It must be switched on after the operation is complete. The backup battery switch location differs between the WORKABOUT PRO variants.

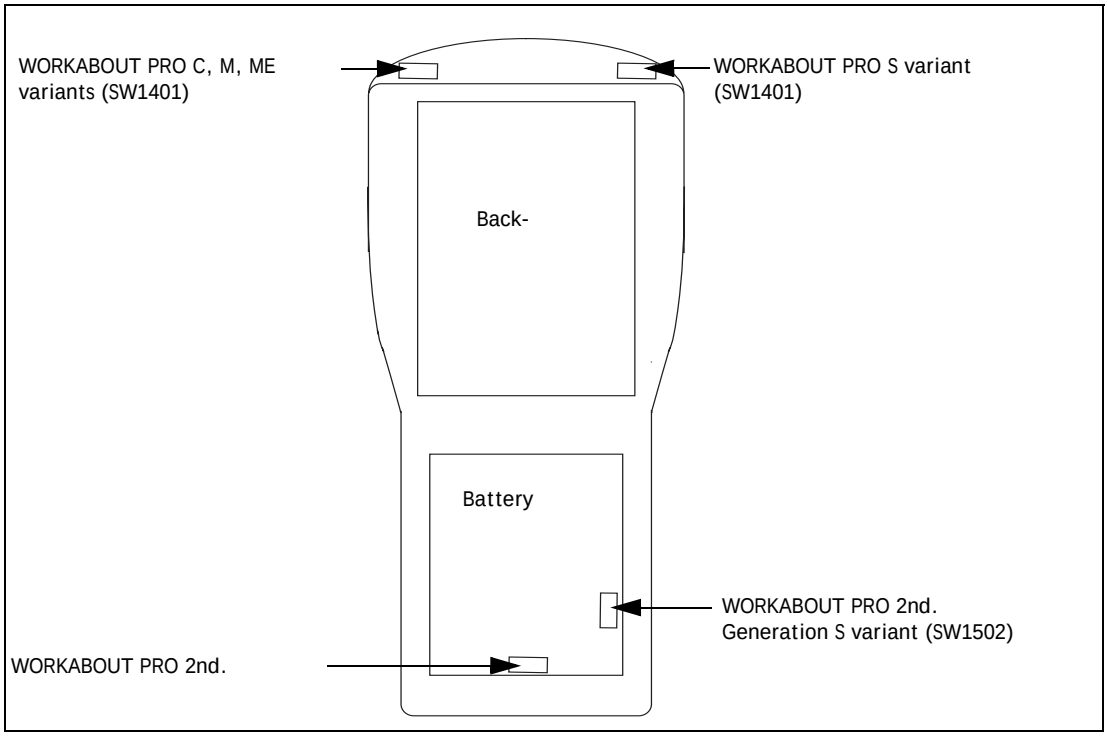
WORKABOUT PRO C, M, ME, and S

To access the on/off switch, remove the endcap. See Figure 2.3 on page 16 for the switch position.

WORKABOUT PRO 2nd. Generation C, and S

To access the on/off switch, remove the battery cover and remove the batteries. See Figure 2.3 on page 16 for the switch position.

Figure 2.3 WORKABOUT PRO back view showing the positions of the on/off switch



2.10 Connector Locations

The following diagrams show the positions of the electrical connectors on the main logic board for the WORKABOUT PRO and the WORKABOUT PRO 2nd. Generation computers.

Figure 2.4 Connector Locations On The WORKABOUT PRO C, M, And ME

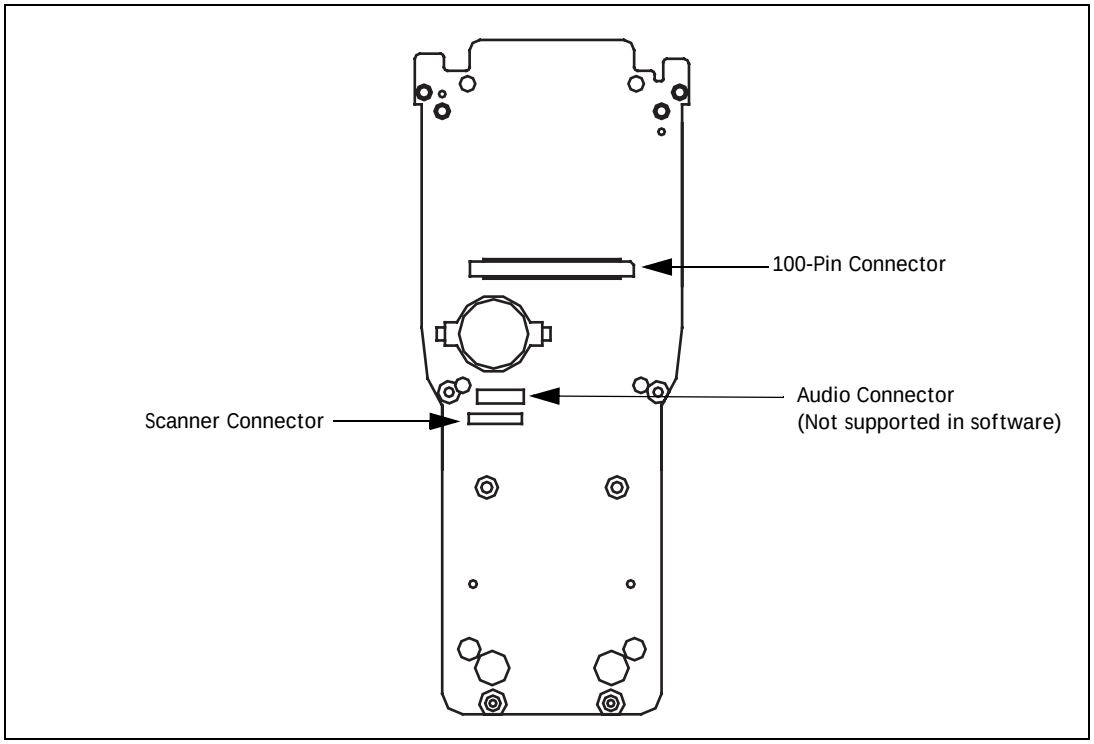


Figure 2.5 Connector Locations On The WORKABOUT PRO S

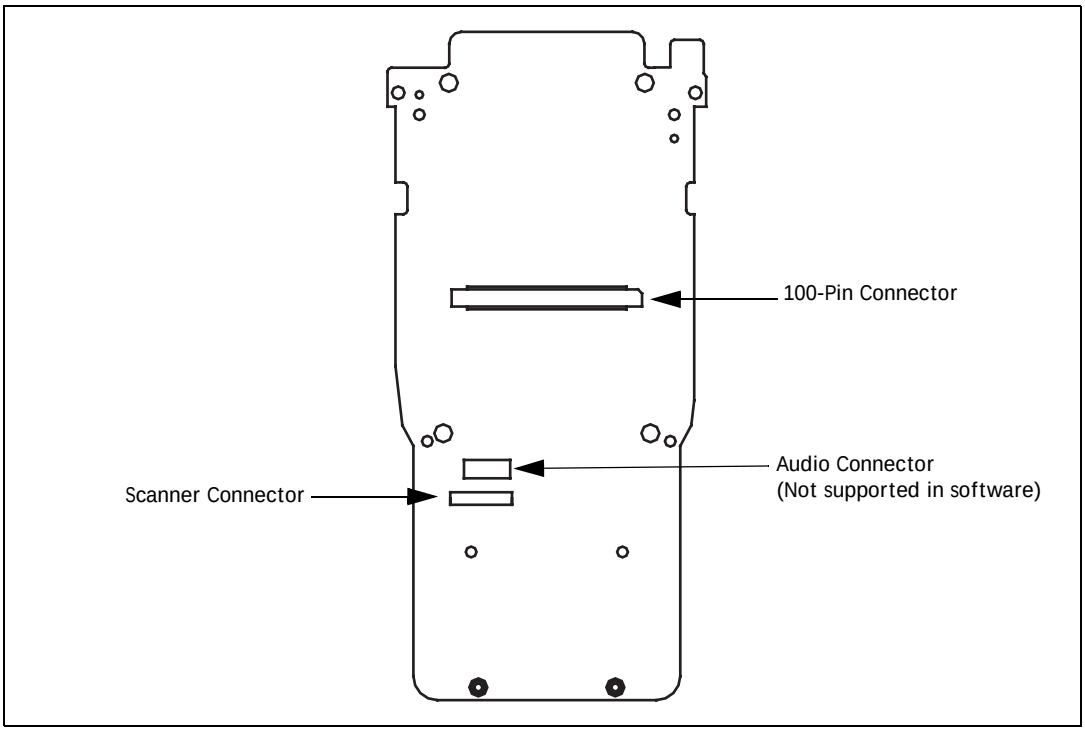
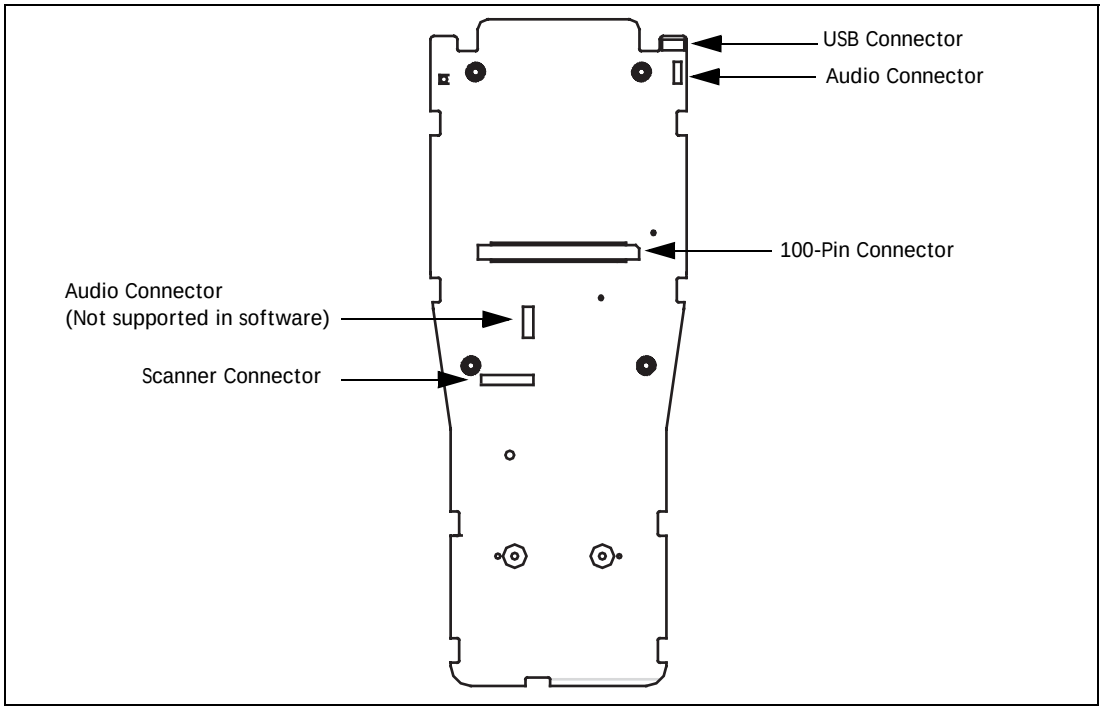


Figure 2.6 Connector Locations On The WORKABOUT PRO 2nd. Generation C And S



SOFTWARE 3

3.1 Overview

This chapter describes the software aspects of controlling expansion modules for the WORKABOUT PRO.

3.2 Windows Drivers

3.2.1 The Peripheral Control (PCO) Driver

Psion Teklogix provides the peripheral control driver (PCO), a driver for the 100-pin expansion slot. The PCO driver is a Streams driver activated very early at boot up time (it is loaded after the File devices driver and the I2C driver).

3.2.2 The PCMCIA Driver

Hardware containing a PCMCIA slot may be connected to the 100-pin expansion slot. The PCO driver determines whether this PCMCIA socket is present and enabled, and controls the loading of the PCMCIA driver.

The PCMCIA driver handles both the Compact Flash and the PCMCIA socket interfaces. Since the PCMCIA socket is itself an expansion module, the PCO driver must identify this hardware prior to activating the PCMCIA driver.

Non-Psion Teklogix drivers may not separately activate the PCMCIA socket. You may design interfaces using the PCMCIA memory specification and interface to the hardware using the predefined PCMCIA memory windows.

3.2.3 The Serial Port Driver

The PCO driver also controls the loading of the full-function UART serial port driver.

3.3 Non-Psion Teklogix Drivers

The Psion Teklogix platform loads some standard device drivers. If the expansion module uses standard drivers such as PCMCIA, serial, or USB, there is no need to load customized drivers. For information on specifying a Psion Teklogix driver see “Expansion Module EEPROM Fields” on page 75.

3.3.1 Installation

All non-Psion Teklogix drivers must be installed in permanent storage—not in RAM. This ensures that the driver can be activated after a cold reset.

There must be a registry entry for the driver and its parameters. For details see “Registry Keys” on page 22.

The name of the driver must be set in the **Manufacturer/Model** field in the expansion module EEPROM. For details see “Expansion Module EEPROM Fields” on page 75.

3.3.2 Drivers In Windows Mobile 6

The files required for signing drivers in Windows Mobile 6 are included in the HDK package.

3.4 System Initialization

During system startup the following occur:

1. The expansion module EEPROM is initialized and read.
2. If a non-Psion Teklogix device driver is required, it is identified from the EEPROM data and activated. For details of this process see “Loading Non-Psion Teklogix Device Drivers” on page 24.
3. The PCMCIA/Compact Flash card driver is activated if one of the following conditions exists:
   - The PCMCIA registry key is set. See “Registry Settings For Psion Teklogix Device Drivers” on page 23.
   - The **Hardware type** field in the expansion module EEPROM is set for a PCMCIA device. See “Expansion Module EEPROM Fields” on page 75.
4. The full-function UART (FFUART) serial port driver is activated if one of the following conditions exists:
   - The FFUART registry key is set. See “Registry Settings For Psion Teklogix Device Drivers” on page 23.
   - The **Hardware type** field in the expansion module EEPROM is set for a serial device. See “Expansion Module EEPROM Fields” on page 75.
5. The USB hub is activated if one of the following conditions exists:
   - The USB registry key is set. See “Registry Settings For Psion Teklogix Device Drivers” on page 23.
   - The **Hardware type** field in the expansion module EEPROM is set for a USB device. See “Expansion Module EEPROM Fields” on page 75.
   - A USB scanner is detected on the internal scanner port.
6. If a scanner is detected, the keyboard processor wakeup signals for the scan keys is set.

3.5 Registry Keys

3.5.1 Registry Settings For Controlling VGA

The WORKABOUT PRO VGA settings are located in the following registry subkey:

HKEY_LOCAL_MACHINE\Drivers\Display\NVDDI

Registry Values

QVGA mode (REG_DWORD)
00 = VGA

non-zero = QVGA

Note: This value is only available for the WORKABOUT PRO 2nd. Generation.

3.5.2 Registry Settings For Serial Ports

The WORKABOUT PRO serial settings are located in the following registry subkey:

HKEY_LOCAL_MACHINE\Drivers\PsionTeklogix\Serial

Note: These setting are specific to the platform and should be modified with care.

Registry Values

HardwareFlowBaud (REG_DWORD)

Setting this value enables hardware RTS/CTS on the FFUART of the WORKABOUT PRO 2nd. Generation.

non-zero = the minimum baud rate where hardware flow control is enabled. The maximum rate is 921.6 k baud.

00 = enable all baud rates.

Note: This value is only available for the WORKABOUT PRO 2nd. Generation.

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Setting this value moves the COM port to a different location.

3.5.3 Registry Settings For Psion Teklogix Device Drivers

The WORKABOUT PRO device driver settings are located in the following registry subkey:

HKEY_LOCAL_MACHINE\Drivers\PsionTeklogix\Expansion Slot

Registry Values

FFUART (REG_DWORD)

Setting this value enables hardware RTS/STS on the FFUART of the WORKABOUT PRO 2nd. Generation. If the key is absent, the FFUART COM1: port is not enabled.

1 = enables the full-function UART (FFUART) using the standard serial driver as COM1:.

0 = the FFUART COM1: port will not be enabled. (Default)

PCMCIA (REG_DWORD)

1 = enables the PCMCIA socket on the 100-pin connector—socket 1. The PCMCIA pins become unavailable for other uses. The pins defined for this slot have predefined meanings and must be adhered to in the hardware design.

0 = the PCMCIA socket is not be enabled. (Default)

USB (REG_DWORD)

1 = enables the USB hub and the 100-pin connector USB power control.

0 = neither the USB hub nor the USB power control signal will be enabled for the100-pin connector. (Default)

Note: If the USB value is absent or has a value of 0, the expansion module USB power control can still be controlled by the HDK API library.

3.5.4 Registry Settings For Non-Psion Teklogix Device Drivers

All non-Psion Teklogix device drivers must have a registry entry. These device driver entries are formatted as follows:

HKEY_LOCAL_MACHINE\Drivers\PsionTeklogix\Expansion Slot*EEPROM*

Where: *EEPROM* is the name of the device driver. This is the contents of the **Manufacturer/Model** field in the expansion module EEPROM. For details see “Expansion Module EEPROM Fields” on page 75.

3.5.4.1 Loading Non-Psion Teklogix Device Drivers

At system startup the following process is used to load non-Psion Teklogix device drivers:

1. The contents of the **Manufacturer/Model** field in the expansion module EEPROM are appended to the registry key
   HKEY_LOCAL_MACHINE\Drivers\PsionTeklogix\Expansion Slot

   For example, if the **Manufacture/Model** field contains:

   ACME gizmo

   then the following driver is loaded:

   HKEY_LOCAL_MACHINE\Drivers\PsionTeklogix\Expansion Slot\ACME gizmo
2. The **DriverActivate()** function uses this registry key to activate the driver.

No driver is loaded if:

- The **Manufacturer/Model** field is not valid, or it is empty.
- The derived registry key does not exist.

Note: If multiple device drivers are required for the same device, subkeys are defined. Only the first driver is automatically activated. The application must load and activate all additional device drivers.

3.6 COM Port Assignments

Table 3.1 Default COM-Port Assignment

COM Port	Default Assignment	
	WORKABOUT PRO	WORKABOUT PRO 2nd. Generation
COM0:		
COM1:	On 100-pin expansion connector.	On 100-pin expansion connector.
COM2:	**Cannot be reassigned.** Internal *Bluetooth* radio. If no *Bluetooth* is installed, or *Bluetooth* is disabled, this port goes to the serial lines on the tether port. An adapter is required to use these lines.	Virtual serial port of the tether port. No adapter is required to use these lines.
COM3:	**Cannot be reassigned.** Internal scanner or imager.	**Cannot be reassigned.** Internal scanner or imager.
COM4:	**Cannot be reassigned.** USB client port—used by ActiveSync.	**Cannot be reassigned.** USB client port—used by ActiveSync.
COM5:	RS-232 port A on port replicator, and serial port available on USB-to-serial adaptor. This port is removed in suspend and restored on resume.	RS-232 port A on port replicator, and serial port available on USB-to-serial adaptor. This port is removed in suspend and restored on resume.

Table 3.1 Default COM-Port Assignment

COM Port	Default Assignment	
	WORKABOUT PRO	WORKABOUT PRO 2nd. Generation
COM6:	RS-232 port B on port replicator. This port is removed in suspend and restored on resume.	RS-232 port B on port replicator. This port is removed in suspend and restored on resume.
COM7:	RS-232 port C on port replicator. This port is removed in suspend and restored on resume.	RS-232 port C on port replicator. This port is removed in suspend and restored on resume.
COM8:	Virtual port—for WWAN GSM	Virtual port—for WWAN GSM
COM9:	**Cannot be reassigned.** IRCOMM port.	**Cannot be reassigned.** IRCOMM port.
COM20	Not available.	**Cannot be reassigned.** Internal *Bluetooth* radio.
COM21	Not available.	Built-in USB-Serial adapter port. This port is removed in suspend and restored on resume.

All COM ports can be reassigned except those marked as **Cannot be reassigned**. Reassignment is done either using the Psion Teklogix COM Port Manager Control Panel program, or in the windows registry.

Serial ports on computers with user-accessible cards are assigned dynamically—at the lowest available COM port number—as the cards are inserted and removed.

On the WORKABOUT PRO, the maximum baud rate is 230.4 k. On the WORKABOUT PRO 2nd. Generation, the maximum rate is 921.6 k baud if RTS/CTS hardware flow control is enabled.

Bluetooth

BSP: can be used to add a *Bluetooth* virtual COM port. For setup instructions see the User Manual for your WORKABOUT PRO.

Psion Teklogix Serial Endcaps

Psion Teklogix supplies endcaps with serial ports for the WORKABOUT PRO and for the WORKABOUT PRO 2nd. Generation computers. These endcaps use the following serial ports:

- IrDA, TTL, and RS-232 serial endcap (BR1000)—COM9:, COM0:, COM1:, and COM8:
- RS-232 serial endcap (BR1001)—COM9: and COM1:
- IrDA serial endcap (BR1002)—COM9: and COM0:

3.7 The C++ Application Programming Interface

The WORKABOUT PRO HDK API library enables application programs to control custom-built hardware that connects to the 100-pin connector and the scanner connector.

3.7.1 Installing The Software

The WORKABOUT PRO HDK API library is installed as part of the Psion Teklogix Mobile Devices SDK.

3.7.2 Development Platforms

The following development platforms should be used with the WORKABOUT PRO HDK:

Windows	Development Environment
Windows Mobile 2003	Microsoft eMbedded Visual C++ 4.0 compiler. It is recommended that eMbedded Visual C++ 4.0 Service Pack 3 (SP3) be installed.
Windows CE .NET 4.2	
Windows Embedded CE 5.0	Microsoft Visual Studio 2005.
Windows Mobile 5	
Windows Mobile 6	

3.7.3 The Interrupts Namespace

This namespace is used to manage interrupts from the expansion module. The expansion module interrupt pins are also used by the PCMCIA socket.

The following program-accessible interrupt pins are provided on the 100-pin connector:

- InputPin63
- InputPin65

If the PCMCIA driver is in use, these interrupt pins are not available.

If these pins are not used as interrupts, or by PCMCIA, they are available as GPIO.

3.7.4 The ExpansionWakeup Namespace

This namespace manages the wakeup from suspend signal on pin 79 of the 100-pin connector. The wakeup can be enabled or disabled.

This signal is connected to the keyboard controller and is monitored from there. This pin wakes the processor but does not generate a software-accessible interrupt.

3.7.5 The GPIO Namespace

This namespace is used to manage access to the 100-pin connector general purpose input/output (GPIO) pins. These pins are listed in “General-Purpose I/O” on page 71.

If a full PCMCIA interface is used, some pins are not available for GPIO. These pins are identified on Table 7.1 Pinout of the WORKABOUT PRO 100-Pin Connector on page 64.

3.7.6 The EEPROM Namespace

This namespace contains functions that access the expansion module EEPROM.

This namespace handles EEPROMS of up to 256 bytes only. Accessing EEPROMs larger than this requires the use of the smBus namespace to communicate directly with the EEPROM. See “The smBus Namespace” on page 27.

3.7.7 The ExpansionUSB Namespace

This namespace manages the expansion USB power controls. The USB power control signal is output on pin 88 of the 100-pin connector.

Expansion USB power can also be enabled by the USB registry setting and by setting an appropriate value in the **Hardware type** field in the expansion module EEPROM. Functions in this

namespace do not override these settings. For details see “Registry Settings For Psion Teklogix Device Drivers” on page 23, and “Expansion Module EEPROM Fields” on page 75.

On the WORKABOUT PRO 2nd. Generation, the expansion USB is also available on the connector CN601 on the top of the unit. The 5 V power for this connector is also controlled by the USB power API.

If the USB hub it is not already enabled, enabling the expansion USB also enables the USB hub.

Expansion USB power is power-managed and is automatically disabled on suspend and re-enabled on resume (if it was previously enabled).

3.7.8 The USBhub Namespace

This namespace manages power to the USB hub.

3.7.9 The ScannerPort Namespace

This namespace is used to access the barcode scanner port if no internal scanner is detected.

If a built-in scanner is detected, it is managed by Scanner Control Services and the functions in this namespace are not available. Application programs can access Scanner Control Services through the Psion Teklogix Mobile Devices SDK.

3.7.10 The smBus Namespace

This namespace is used to manage access to I2C devices on the smBus. The smBus interface functions do not guarantee delivery as the addressed device may not be connected to the I2C bus. Functions return appropriate errors to indicate this.

For details of the I2C bus see “I2C Device Identification” on page 73.

3.7.11 The PCMCIA Namespace

This namespace is used to access PCMCIA bus functions, if a full PCMCIA function is not in use. Details of the PCMCIA interface can be found in the Marvell PXA255 and PXA270 Developer Manuals.

These functions return errors if the PCMCIA socket is already in use. In this case, the standard PCMCIA driver manages the memory windows.

The PCMCIA timing functions are processor specific and fail if called on the wrong platform.

MECHANICAL CONSIDERATIONS 4

4.1 Overview

This chapter describes the physical connectors, space, and mounting of an expansion module, a backplate-mounted device, and an endcap-mounted device.

4.2 HDK Mechanical Files

The Hardware Development Kit provides the following mechanical models and drawings:

WORKABOUT PRO All Variants

IGES Files

Description	File Name
Backplate	...\Mechanical\WORKABOUTPRO\iges_files \backplate.igs
Endcap	...\Mechanical\WORKABOUTPRO\iges_files \endcap.igs
Endcap assembly	...\Mechanical\WORKABOUTPRO\iges_files \endcap_assembly.igs
Stylus pen	...\Mechanical\WORKABOUTPRO\iges_files \stylus_pen.igs
Sample PCMCIA expansion card	...\Mechanical\WORKABOUTPRO\iges_files \pcmcia_xmod.igs

PDF Files

Description	File Name
2D backplate	...\Mechanical\WORKABOUTPRO\pdf \backplate.pdf
2D endcap	...\Mechanical\WORKABOUTPRO\pdf \endcap.pdf
2D endcap assembly	...\Mechanical\WORKABOUTPRO\pdf \endcap_assembly.pdf
2D ball for endcap	...\Mechanical\WORKABOUTPRO\pdf \endcap_assembly_ball.pdf
2D endcap ball holder	...\Mechanical\WORKABOUTPRO\pdf \endcap_assembly_ball_holder.pdf
2D endcap, and ball spring	...\Mechanical\WORKABOUTPRO\pdf \endcap_assembly_ball_spring.pdf
2D stylus gasket for endcap	...\Mechanical\WORKABOUTPRO\pdf \endcap_assembly_stylus_rubber.pdf
2D stylus pen	...\Mechanical\WORKABOUTPRO\pdf \stylus_pen.pdf

WORKABOUT PRO

IGES Files

Description	File Name
Body shell—WORKABOUT PRO C, M, ME	...\Mechanical\WORKABOUTPRO\iges_files \colour_mono_terminal.igs
Body shell—WORKABOUT PRO S	...\Mechanical\WORKABOUTPRO\iges_files \short_terminal.igs
Mounting frame	...\Mechanical\WORKABOUTPRO\pdf \internal_metal_frame.pdf
Mechanical card stop	...\Mechanical\WORKABOUTPRO\iges_files \mechanical_stop.igs

PDF Files

Description	File Name
2D Body shell—WORKABOUT PRO C, M, ME	...\Mechanical\WORKABOUTPRO\pdf \housing_body.pdf
2D Body shell—WORKABOUT PRO S	...\Mechanical\WORKABOUTPRO\pdf \housing_body.pdf
2D Mounting frame	...\Mechanical\WORKABOUTPRO\pdf \internal_metal_frame.pdf
2D mechanical card stop	...\Mechanical\WORKABOUTPRO\pdf \mechanical_stop.pdf FIX

WORKABOUT PRO 2nd. Generation

IGES FIles

Description	File Name
Body shell—WORKABOUT PRO 2nd. Generation C	...\Mechanical\WORKABOUTPRO\G2\iges_files \G2_C_body.igs
Body shell—WORKABOUT PRO 2nd. Generation S	...\Mechanical\WORKABOUTPRO\G2\iges_files \G2_S_body.igs
Mounting frame	...\Mechanical\WORKABOUTPRO\G2\iges_files \G2_mounting_frame.igs
Mechanical card stop	...\Mechanical\WORKABOUTPRO\G2\iges_files \mechanical_stop.igs

PDF FIles

Description	File Name
2D Mechanical card stop	...\Mechanical\WORKABOUTPR\G2\pdf \mechanical_stop.pdf

4.3 Installation

4.3.1 Endcap-Mounted Device Installation

The endcap is attached with four M2.6 x 8 screws. Removing and installing it requires a #1 Phillips screwdriver.

To remove the endcap:

1. Remove the four screws.
2. Remove the endcap.
3. If necessary, remove the card stop to gain access to the CF or PCMCIA cards.

To install the endcap:

1. Insert and fasten the card stop, if necessary.
2. Insert the endcap.
3. Insert and tighten the four screws. Torque them to 0.339 N m (3.0 lb in).

When a PCMCIA card or Compact Flash card is inserted into the WORKABOUT PRO, a mechanical card stop must be inserted before the endcap is attached, to prevent the card from moving out of place. This card stop is attached with either two or four M2 x 4 screws. Use a #1 Phillips bit for them, and torque to 0.226 N m (2.0 lb in).

4.3.2 Backplate-Mounted Device Installation

Customized hardware can be mounted on the inside of the backplate of the WORKABOUT PRO. Several Psion Teklogix scanner modules are mounted on scanner-specific backplates.

There are a number of scanner kits available for the WORKABOUT PRO. These include scanner backplates, scanner endcaps, and mounting hardware. For a list of Psion Teklogix scanner kits see the Accessories Catalog at www.PsionTeklogix.com/Accessories.

The backplate is fastened to the back of the WORKABOUT PRO using six M2.6 x 4 screws. Use a #1 Phillips screwdriver to insert and remove them.

Follow these steps:

Important: Make sure all external power is removed from the WORKABOUT PRO before starting to install the device.

1. Disconnect the WORKABOUT PRO from external power.
2. Remove the WORKABOUT PRO battery.
3. Switch off the backup battery power. For instructions see “Switching The Backup Battery Power On And Off” on page 16.
4. Remove the backplate of the WORKABOUT PRO.

5. Connect the device to the appropriate socket on the main logic board.
6. Place the new backplate assembly on the WORKABOUT PRO.
7. Fasten the six screws.They can be tightened in any order. Torque them to 0.283 N m (2.5 lb in).
8. Switch on the backup battery power. For instructions see “Switching The Backup Battery Power On And Off” on page 16.
9. Connect the WORKABOUT PRO to a power supply and/or insert the battery.

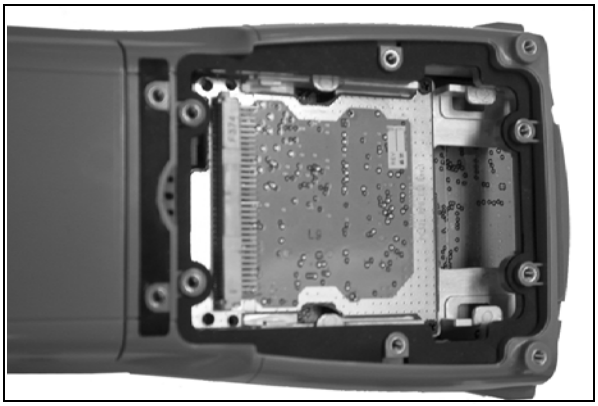
4.3.3 Expansion Module Installation

The expansion board is fastened to the metal frame inside the WORKABOUT PRO by four M2.6 x 4 screws. Installing it requires the following tools:

- #1 Phillips screwdriver.

To install the expansion module:

1. Disconnect the WORKABOUT PRO from external power.
2. Remove the WORKABOUT PRO battery.
3. Switch off the backup battery power. For instructions see “Switching The Backup Battery Power On And Off” on page 16.
4. Remove the backplate.
5. Insert the expansion module through the back of the computer as shown here:



6. Fasten the expansion module to the frame with four M2 x 4 screws.
7. Attach the backplate. Torque the 6 screws to 0.283 N m (2.5 lb in).
8. Switch on the backup battery power. For instructions see “Switching The Backup Battery Power On And Off” on page 16.
9. Connect the WORKABOUT PRO to a power supply and/or insert the battery.

4.4 Location And Construction

4.4.1 Materials

The recommended material for endcaps and backplates for the WORKABOUT PRO is GE C1200 plastic (standard black). The recommended texturing is AT-IM002, 0.035mm deep, or MT11030. Both the card stop and the ball holder used in the endcap assembly are also made of this material.

4.4.2 Backplate-Mounted Device

The backplate-mounted device must fit within the backplate of the WORKABOUT PRO. It can project inwards into the WORKABOUT PRO to a varying distance, depending on other options installed within the WORKABOUT PRO.

The greatest amount of room is found within a WORKABOUT PRO that has no expansion module installed. To prevent interference with expansion cards, the backplate-mounted device, or the backplate itself, must not protrude into the terminal plastic housing by more than 3 mm.

This HDK provides IGES models of the backplate, and of the bodies of the WORKABOUT PRO variants. See the list of IGES files in “HDK Mechanical Files” on page 31.

Consult the 2D drawing of the backplate for the backplate hole locations.

To maintain sealing, and the IP rating, the sealing rib of the backplate must have a height of 0.60 mm and a width of 0.5 mm.

To maintain compliance with the WORKABOUT PRO drop test specification, backplates and scanner devices must not weigh more than 90 g (0.2 lb) in total, the same weight as the SE1223 backplate/scanner module combination. The shape of the backplate influences the outcome of drop testing.

4.4.3 Expansion Module

Expansion modules must fit within the perimeter of the WORKABOUT PRO metal mounting frame. They cannot exceed a height of 5.5 mm, as measured from the underside of the module towards the display of the WORKABOUT PRO. The holes that connect the card stop must not be covered.

Only the 100-pin connector should be placed on the under side of the expansion board. Other components on the underside can interfere with the following:

- On the WORKABOUT PRO C, S, M, ME:
  - the backup battery, *or*
  - the CF card and socket.
- On the WORKABOUT PRO 2nd. Generation C, S:
  - the SD card slot, *or*
  - the CF card and socket.

In addition, it must be possible to insert the completed expansion card through the backplate opening of the WORKABOUT PRO. This is especially important if the card is longer than the backplate opening.

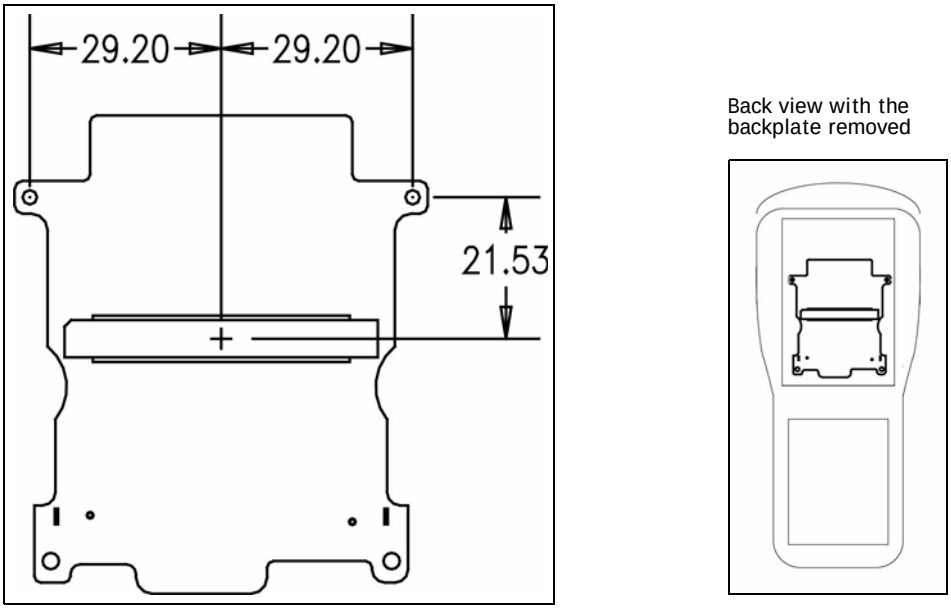
The HDK provides IGES models of the mounting frames for the WORKABOUT PRO variants. An IGES model for a sample PCMCIA expansion module is also included. See the list of IGES files in “HDK Mechanical Files” on page 31.

4.4.3.1 100-Pin Connector

The 100-pin connector on the WORKABOUT PRO main logic board is an FX6-100P-0.8SV2 header. The mating connector is an FX6-100S-0.8SV2.

The centre of the connector on the expansion module must be aligned on the centre line of the mounting frame. The connector is mounted in the following location on all WORKABOUT PRO variants:

Figure 4.1 Location Of 100-Pin Connector On Expansion Module (Measurements In mm)



4.4.3.2 Mounting Frame

There are some differences between the mounting frames for the WORKABOUT PRO and the WORKABOUT PRO 2nd. Generation. In particular, the mounting frame for the WORKABOUT PRO 2nd. Generation is 1mm higher. Refer to the IGES models for details.

The relative positions of the screw holes for attaching the expansion module to the mounting frame are the same for all variants of the WORKABOUT PRO.

4.4.4 Endcap, Card Stop, And Stylus

The endcap and card stop fit onto the end of the WORKABOUT PRO. The endcap assembly includes parts (a metal ball, a spring, and a plastic ball holder) to retain the stylus.

The IGES models of the bodies of the WORKABOUT PRO variants, show the hole for the stylus

See “HDK Mechanical Files” on page 31 for a list of detailed drawing and IGES models for the endcap assembly and all its parts as well as the IGES model of the WORKABOUT PRO bodies.

The standard endcap is 83.35 mm long, 25.40 mm wide, and 23.87 mm deep. To maintain the existing drop test specifications, customized endcaps must not weigh more than 22 g (0.05 lb).

To maintain IP sealing, the endcap sealing rib must have a height and width of 0.8 mm. If the stylus is to be used then it must be sealed against the stylus holder using the rubber stylus gasket. The shape of the endcap influences the outcome of drop testing.

It is important that the correct card stop is fitted. It must fit into the internal frame and housing with no interference to the endcap.

Consult the drawings for information on which card stops are used in each WORKABOUT PRO variant, and which card stops are used with each card type.

4.4.5 Bottom Footprint

The HDK provides models of the bases of the WORKABOUT PRO variants. These show the positions of the connectors. These models also provide the outside dimensions. See also Figure 5.1 on page 41 and Figure 5.3 on page 43.

These models are as follows:

Table 4.1 IGES Models Of The WORKABOUT PRO Body

Type Of Model	Filename
Body of WORKABOUT PRO (M, ME, and C variant)	colour_mono_terminal.igs
Body of WORKABOUT PRO (S variant)	short_terminal.igs
Body of WORKABOUT PRO 2nd. Generation (S variant)	G2_S_body.igs
Body of WORKABOUT PRO 2nd. Generation (C variant)	G2_C_body.igs

EXTERNAL CONNECTORS 5

5.1 Overview Of External Connectors, Cables, And Accessories

This chapter describes the connectors on the WORKABOUT PRO and on selected accessories. It also describes cables and accessories that connect to them, and how they function in the WORKABOUT PRO system.

5.2 External Connectors On The WORKABOUT PRO

5.2.1 WORKABOUT PRO C, S, M, ME

The WORKABOUT PRO computers have three external connectors:

- LIF connector.
- Tether connector.
- Audio connector.

The LIF connector connects the WORKABOUT PRO to docking stations and cradles. The tether connector connects to scanners, AC adaptors, USB or serial adaptors, and other accessories.

The audio connector accepts headphones and microphones.

Figure 5.1 WORKABOUT PRO Base Showing External Connectors

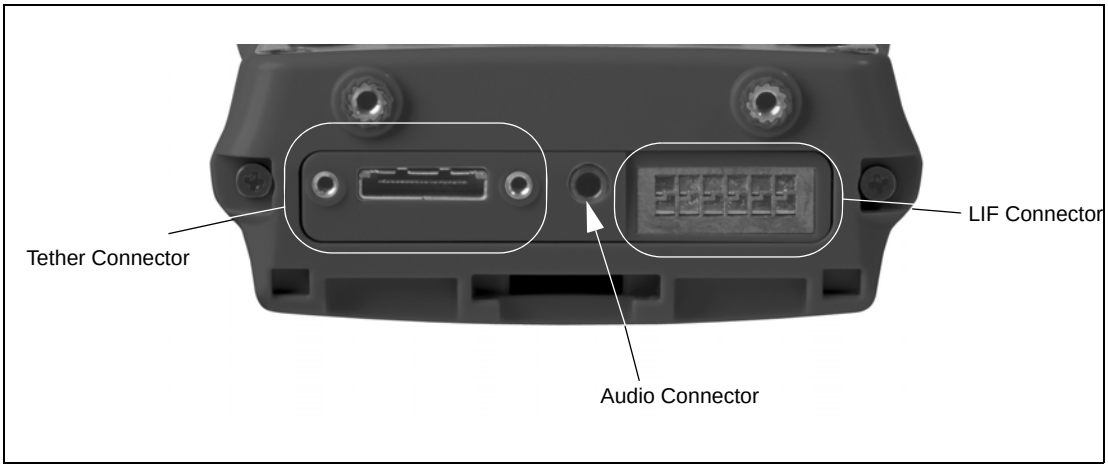
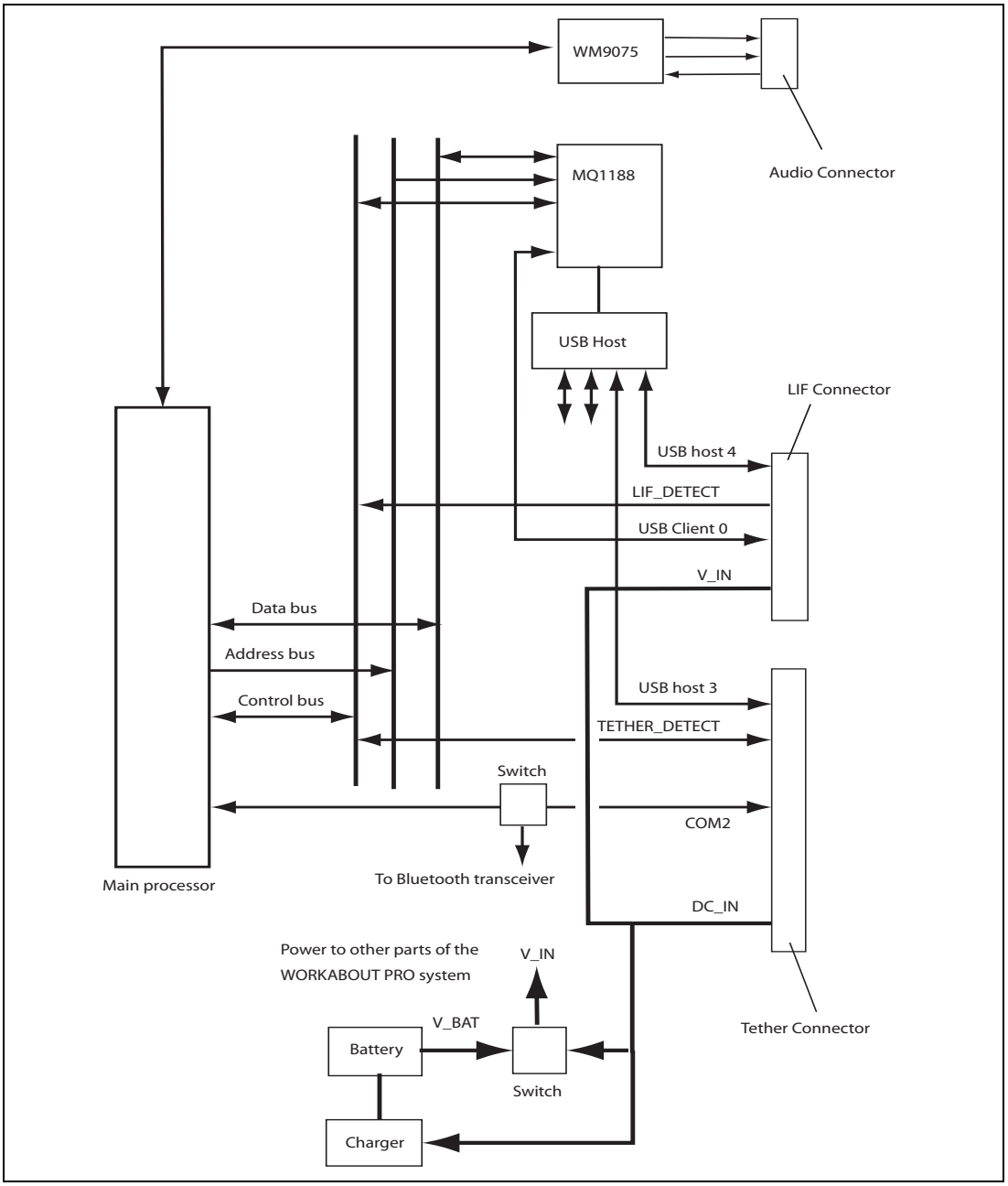


Figure 5.2 External Connectors On The WORKABOUT PRO C, S, M, ME



5.2.2 WORKABOUT PRO 2nd. Generation C, S

The WORKABOUT PRO 2nd. Generation computers have the following external connectors:

- LIF connector
- Tether connector.
- Power connector.

Figure 5.3 WORKABOUT PRO 2nd. Generation Base Showing External Connectors

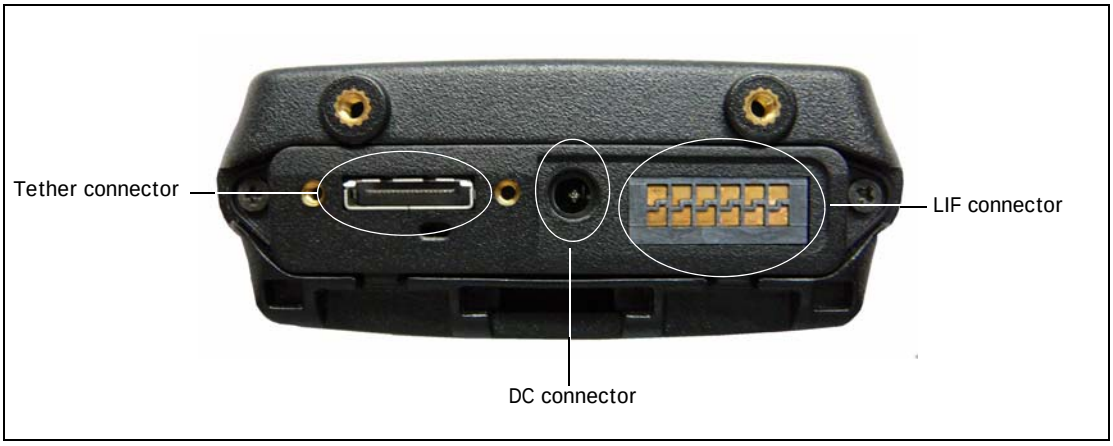
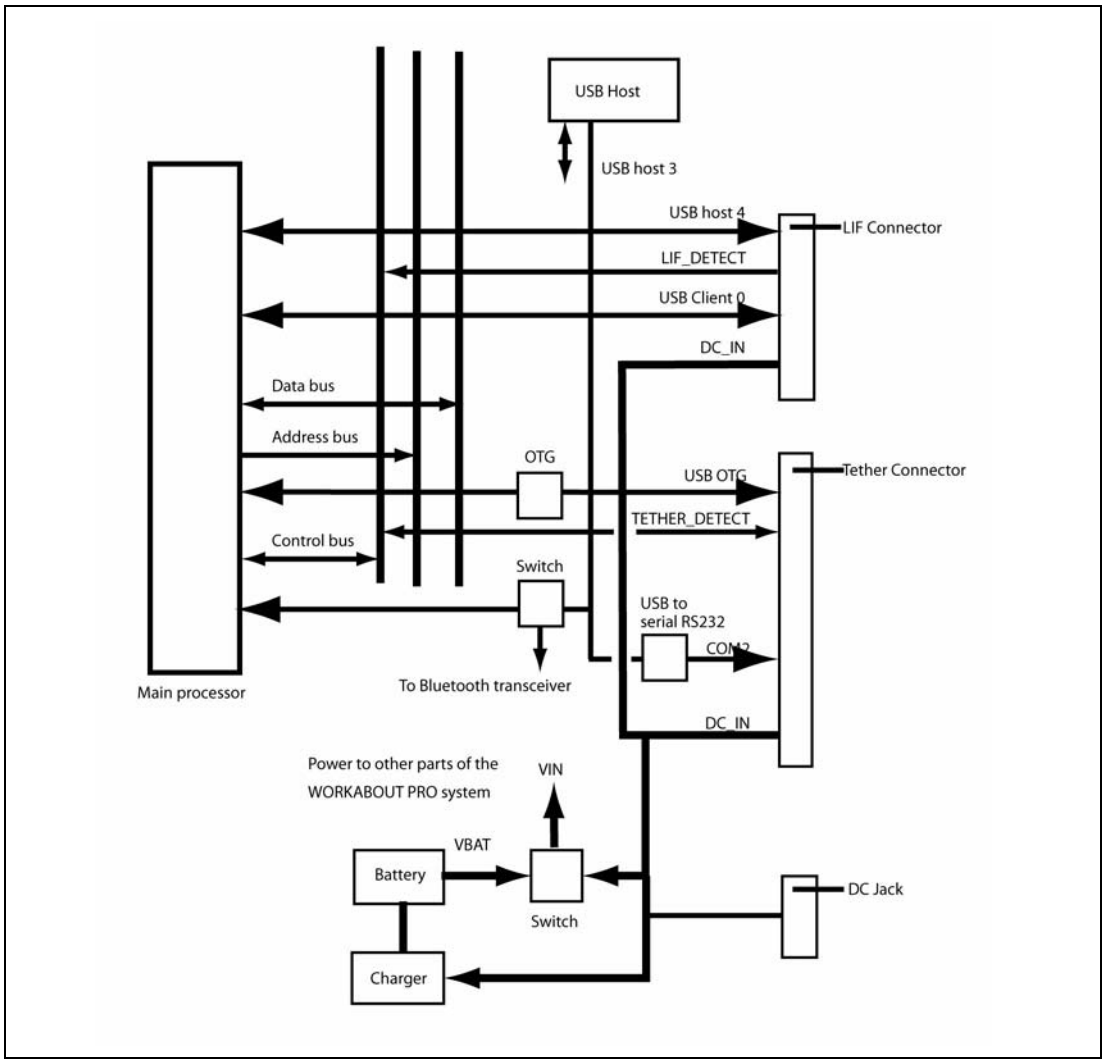


Figure 5.4 External Connectors On The WORKABOUT PRO 2nd. Generation C, S



5.3 The LIF Connector

The LIF connector gives access to the following:

- USB host port 4.
- USB client port 0.
- LIF port device detection.
- Power input to the WORKABOUT PRO.

5.3.1 Sensing Device Presence

For device identification the following pull-down resistor must be connected between LIF_DETECT (pin 8) and ground:

Pull-down Resistor	Device
100 kΩ, 1/8 W, 5%	USB host.

The Psion Teklogix Mobile Devices SDK enables a software application to detect and identify the connected device.

5.4 The Tether Connector

5.4.1 The WORKABOUT PRO C, S, M, ME Tether Connector

The tether connector gives access to the following:

- USB host port 3 (WORKABOUT PRO), or USB host or device (WORKABOUT PRO 2nd. Generation).
- COM2: data lines if *Bluetooth* not enabled.
- Tether port device detection.
- Power input to the WORKABOUT PRO.

Table 5.1 Pinout Of The WORKABOUT PRO Tether Connector

Pin	Name	Description	Direction	State When Active	State During Sleep	Pull-up Or Pull-down
1	GND	Ground.	Power	N/A	N/A	N/A
2	USB_H3_D+	USB Host port 3 D+.	Input/ output	B	Low	Pulled down 15 kΩ
3	USB_H3_D-	USB Host port 3 D-.	Input/ output	B	Low	Pulled down 15 kΩ
4	USB_H3_PWR	USB Host port 3 power.	Power	N/A	Off	N/A

Abbreviations:
N/A= not applicable;
B = both high and low.

Table 5.1 Pinout Of The WORKABOUT PRO Tether Connector

Pin	Name	Description	Direction	State When Active	State During Sleep	Pull-up Or Pull-down
5	TXD	COM2: available if *Bluetooth* is not enabled.	Output	B	Low	None
6	RXD	COM2: available if *Bluetooth* is not enabled.	Input	B	Pulled up	Pulled up 100 kΩ
7	TETHER_DETECT	Input for detection of device on tether connector.	Input	B	Pulled up	Pulled up 100 kΩ
8	DC_IN	Power supply to WORKABOUT PRO.	Power input	N/A	N/A	N/A
9						
10						
11	Reserved	Reserved. Do not connect.	N/A	N/A	N/A	N/A
12						
13						
14						
15						
16	PGND	Ground.	Power	N/A	N/A	N/A
17						
18						

Abbreviations:
N/A= not applicable;
B = both high and low.

5.4.1.1 COM2: Serial Port

For details of COM port assignments on the WORKABOUT PRO see “COM Port Assignments” on page 24.

WORKABOUT PRO M

The data lines on pins 5 and 6 are always available.

WORKABOUT PRO C and S

COM2: data lines are only available on pins 5 and 6 when the integrated *Bluetooth* feature is disabled.

Important: These serial lines are not at RS-232 specifications.

They are connected directly to the WORKABOUT PRO main logic board. They are at CMOS levels, between 3.3 V and ground, and are unbuffered.

Using Windows to enable and disable Bluetooth

For instructions consult the user manual for your WORKABOUT PRO. For a list of user manuals see Appendix B: "Resources".

Using BooSt to enable the serial lines on the tether connector

To enable the serial lines through the tether connector, issue the following command at the BooSt console prompt:

```
>config set flags
```

BooSt responds with a command-specific prompt:

```
Flags (hex or +/-bit#>)>
```

At this prompt, enter the command:

```
+0
```

This sets flag 0. The WORKABOUT PRO responds with:

```
bit0=NoBluetooth
```

The *Bluetooth* transceiver is now disabled.

Using BooSt to enable Bluetooth

The enable the integrated *Bluetooth*, issue the following command at the BooSt console prompt:

```
>config set flags
```

BooSt responds with a command-specific prompt:

```
Flags (hex or +/-bit#>)>
```

At this prompt enter the command:

```
-0
```

This clears flag 0. The WORKABOUT PRO responds with:

```
bit0=Bluetooth
>
```

The *Bluetooth* transceiver is now enabled.

5.4.1.2 Sensing Device Presence

For device identification, within the connected cable, one of the following pull-down resistors must be connected between TETHER_DETECT (pin 7) and ground:

Pull-down Resistor	Device
100 kΩ	USB host.
200 kΩ	USB client.
49.9 kΩ	USB serial.

The Psion Teklogix Mobile Devices SDK enables a software application to detect and identify the connected device.

5.4.2 The WORKABOUT PRO 2nd. Generation C, S Tether Connector

The tether connector gives access to the following:

- USB port.
- COM2:
- Tether port device detection.
- Power input to the WORKABOUT PRO.

Table 5.2 Pinout Of The WORKABOUT PRO 2nd. Generation Tether Connector

Pin	Name	Description	Direction	State When Active	State During Sleep	Pull-up Or Pull-down
1	GND	Ground.	Power	N/A	N/A	N/A
2	USB_D+	USB D+ (host or device)	Input/ output	B	Low	Pulled down 15 kΩ
3	USB_D-	USB D- (host or device)	Input/ output	B	Low	Pulled down 15 kΩ
4	USB_PWR	USB Device Power Detect	Power	N/A	Off	N/A
5	TXD	COM2:	Output	B	Low	None
6	RXD	COM2:	Input	B	Pulled up	Pulled up 100 kΩ
7	TETHER_DETECT	Input for detection of device on tether connector.	Input	B	Pulled up	Pulled up 49.9 kΩ
8	DC_IN	Power supply to WORKABOUT PRO.	Power input	N/A	N/A	N/A
9						
10						
11	CTS	COM2:	Input			
12	RTS	COM2:	Output			
13	DSR	COM2:	Input			
14	DTR	COM2:	Output			
15	DCD	COM2:	Input			
16	RI	COM2:	Input			
17	GND	Ground	Power			
18	GND	Ground	Power			

Abbreviations:
N/A= not applicable;
B = both high and low,

5.4.2.1 Sensing Device Presence

For device identification, in the connected cable, one of the following pull-down resistors must be connected between TETHER_DETECT (pin 7) and ground:

Pull-down Resistor	Device
200 kΩ	USB client.
100 kΩ	USB host.
49.9 kΩ	USB serial.

The Psion Teklogix Mobile Devices SDK enables a software application to detect and identify the connected device.

5.4.3 Cables For the Tether Connector

Psion Teklogix provides cables that connect to the tether port of the WORKABOUT PRO. For a complete list see www.PsionTeklogix.com/Accessories.

These cables include the following:

- Tether to RS-232-C cable for the WORKABOUT PRO 2nd. Generation.
- Tether to USB-B for the WORKABOUT PRO 2nd. Generation.
- Tether to USB-A for all WORKABOUT PRO variants.

5.5 The WORKABOUT PRO C, S, M, ME Audio Connector

The audio connector is only available on the WORKABOUT PRO C, S, M, and ME. It is not available on the WORKABOUT PRO 2nd. Generation computers.

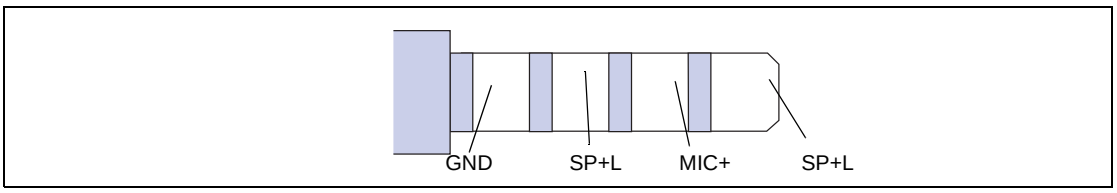
The audio connector has the following pinout:

Table 5.3 Pinout Of The Audio Connector

Pin	Signal Name	Description
1	SP+R	Right speaker positive.
2	MIC+	Microphone positive.
3	SP+L	Left speaker positive.
4	GND	Ground.

The audio connector accepts a standard 2.5 mm stereo minijack.

Figure 5.5 Audio Plug



5.6 Docking Stations

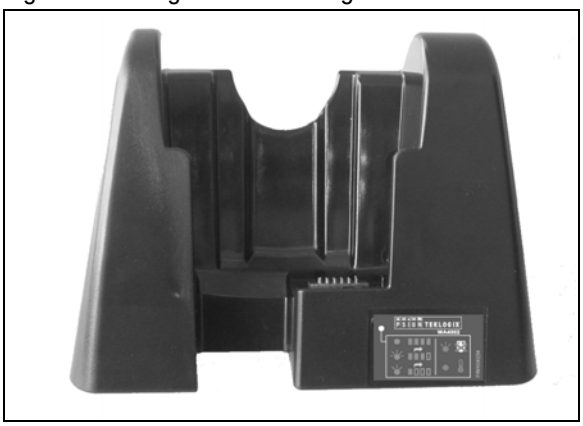
A docking station is a desk-top unit that can hold one or more WORKABOUT PRO computers. The docking station and the WORKABOUT PRO communicate through the LIF port.

Refer to the Accessories Catalog at www.PsionTeklogix.com/Accessories for the docking stations that are available for your WORKABOUT PRO model.

5.6.1 Single Unit Docking Stations

A single unit docking station can hold only one WORKABOUT PRO. The following illustration shows a typical single unit docking station:

Figure 5.6 Single Unit Docking Station



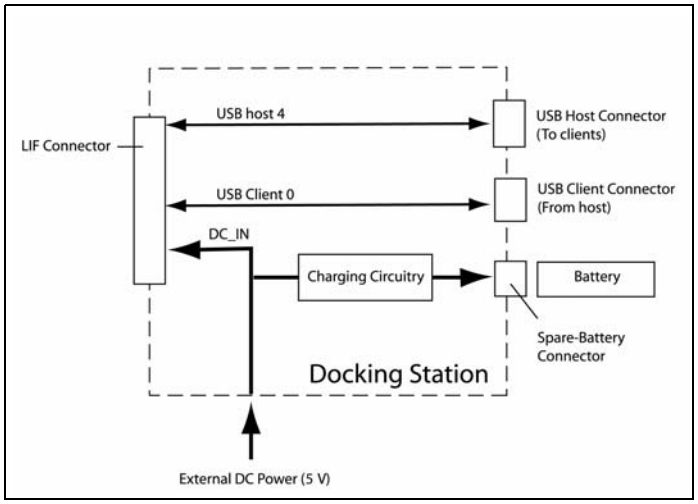
All single unit docking stations have the following connectors:

- USB host connector.
- USB client connector.
- DC input connector.

When external power is supplied to the docking station, the WORKABOUT PRO battery undergoes charging. These units also have a spare battery charging well.

If no external power is supplied to the docking station, the USB ports are still functional.

Figure 5.7 Docking Station Block Diagram



5.6.1.1 The USB Host Connector

The USB Host connector on the docking station connects the docked WORKABOUT PRO, as a USB host, to an external USB client device. It uses a USB Type A receptacle.

Figure 5.8 USB Host Connector

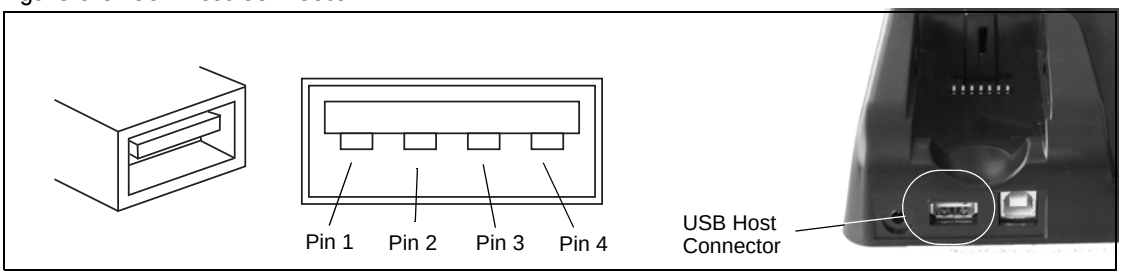


Table 5.4 Pinout Of The USB Host Connector

Pin	Pin On LIF Connector	Name	Description	Direction
1		Vbus	DC supply from the WORK-ABOUT PRO. Current 500 mA maximum; voltage minimum 4.35 V, maximum 5.25 V	Output to connected external device.
2	4	USB_H4_D-	USB Host port 4 D-.	Bidirectional (half-duplex).
3	3	USB_H4_D+	USB Host port 4 D+.	
4	2	Ground		

5.6.1.2 The USB Client Connector

The USB client connector on the docking station connects an external device, as a USB client, to the docked WORKABOUT PRO. It uses a USB Type B receptacle.

Figure 5.9 USB Client Connector

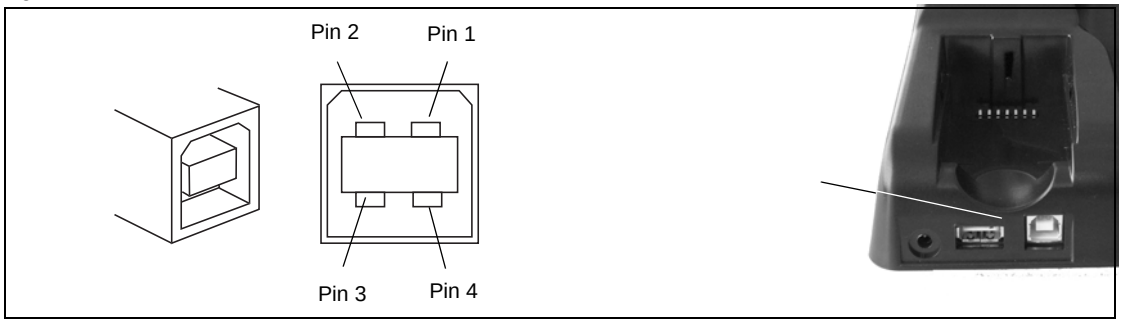


Table 5.5 Pinout Of The USB Client Connector

Pin	Pin On LIF Connector	Name	Description	Direction
1		Vbus	DC current from external host. This pin is unconnected inside the docking station.	Input from connected external device.
2	10	USB_C0_D-	USB Client port 0 D-.	Bidirectional (half-duplex).
3	9	USB_C0_D+	USB Client port 0 D+.	
4	2	Ground		

5.6.2 Four Unit Multi-Dock Docking Station (Quad Docker)

A multi-dock docking station can hold up to four WORKABOUT PRO computers. The docking station and the WORKABOUT PRO computers communicate through the LIF ports of the WORKABOUT PROs. The following illustration shows a typical multi-dock docking station:

Figure 5.10 A Multi-Dock Docking Station

All multi-dock docking stations have the following connectors:

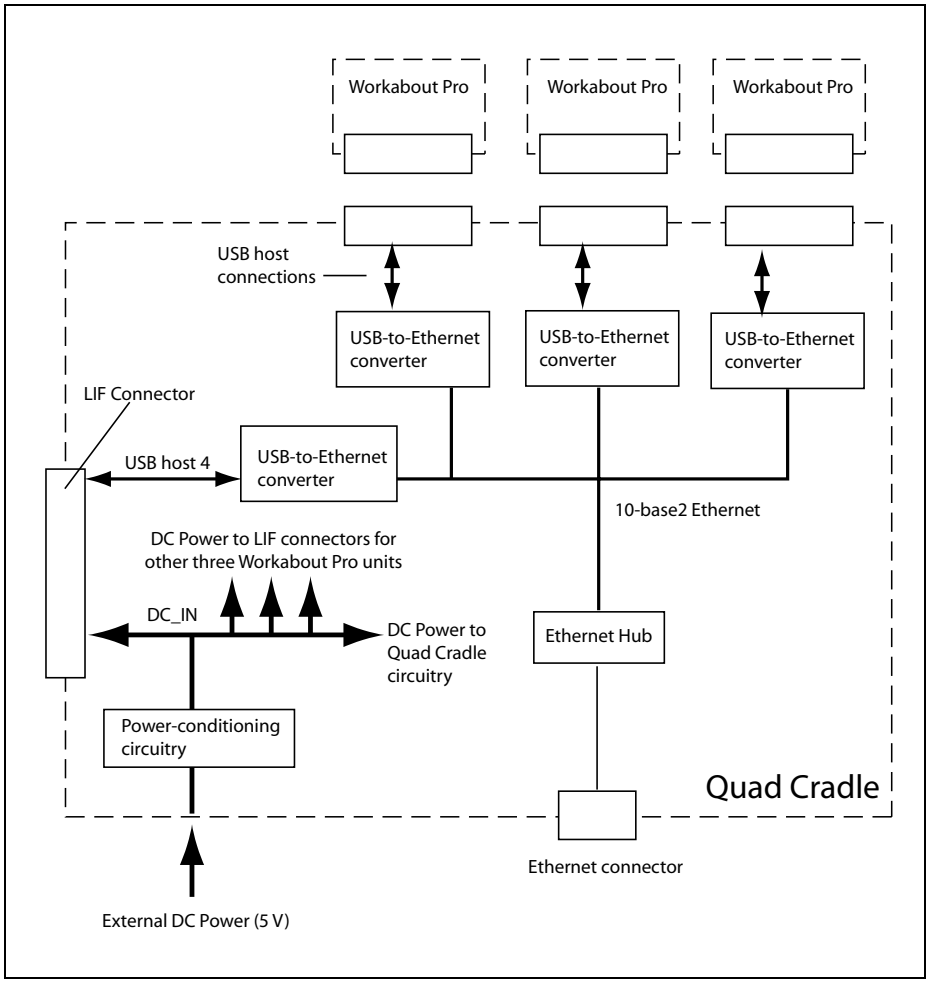
- Ethernet connector.
- DC input connector.

When external power is supplied to the docking station, the batteries in the WORKABOUT PROs undergo charging.

If no external power is supplied to the docking station, the ethernet port is still functional.

The USB Host interfaces from each WORKABOUT PRO are connected to USB-to-ethernet converters inside the docking station. Each USB-to-ethernet converter has a separate MAC address. All are connected to a common ethernet hub, which is connected to the single external ethernet connector. The ethernet connector is a standard 10BASE-T twisted pair connector.

Figure 5.11 The Multi-Dock Docking Station Block Diagram



5.7 Vehicle Cradles

A vehicle cradle holds a single WORKABOUT PRO. The cradle and the WORKABOUT PRO computer communicate through the LIF port of the WORKABOUT PRO.

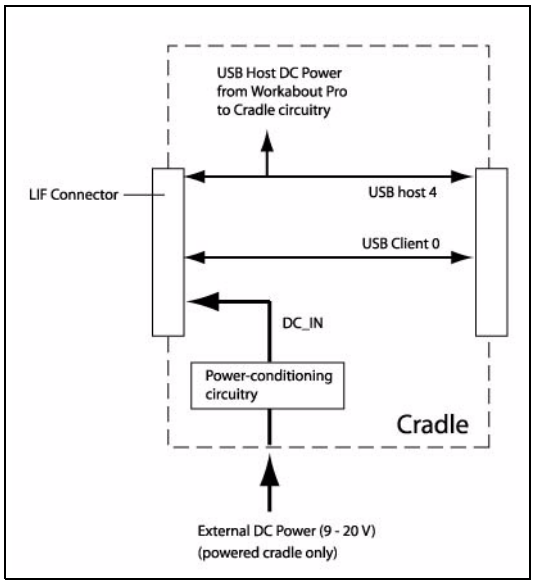
Every cradle has the following connector:

- 15-pin vehicle cradle connector.

Some cradles are powered from the vehicle battery: others are unpowered. For information on the cradles available for your WORKABOUT PRO see the Accessories Catalog at www.PsionTeklogix.com/Accessories.

Figure 5.12 Typical Vehicle Cradle

Figure 5.13 Vehicle Cradle Block Diagram



5.7.1 The Vehicle Cradle 15-Pin Connector

All cradles have an attached cable that is terminated by a female DE-15 connector.

Table 5.6 Pinout Of The Vehicle Cradle 15-Pin Connector

Pin	Pin On LIF Connector	Name	Description	Direction
1	1	PGND	Ground.	Power
2	2	GND	Ground.	Power
3	3	USB_H4_D+	USB host port 4 D+.	Bidirectional
4	4	USB_H4_D-	USB host port 4 D-.	Bidirectional
5	5	USB_H4_PWR	USB host port 4 power.	Power
6	6	DC_IN	Power supply to WORKABOUT PRO.	Power input
7	7			

Table 5.6 Pinout Of The Vehicle Cradle 15-Pin Connector

Pin	Pin On LIF Connector	Name	Description	Direction
8	8	LIF_DETECT	Input for detection of device on LIF connector	Input
9	9	USB_C0_D+	USB client port 0 D+.	Bidirectional
10	10	USB_C0_D-	USB client port 0 D-.	Bidirectional
11	11	GND	Ground.	Power
12	12	PGND	Ground.	Power
13				
14				
15				

5.8 Port Replicator

The port replicator allows peripherals to be attached to the powered and unpowered vehicle cradles. The WORKABOUT PRO and the port replicator communicate through the LIF port.

The port replicator has the following connectors:

- Three RS-232 ports.
- USB client connector.
- 15-pin vehicle cradle connector.

For information on the port replicators available for your WORKABOUT PRO see the Accessories Catalog at www.PsionTeklogix.com/Accessories

The port replicator provides three full-function RS-232 ports on DE-9 connectors. The RS-232 ports are connected to an internal processor which is connected as a client to the USB host interface of the WORKABOUT PRO. For the port assignments see “COM Port Assignments” on page 24.

For the pinout for the USB client connector see “The USB Client Connector” on page 50.

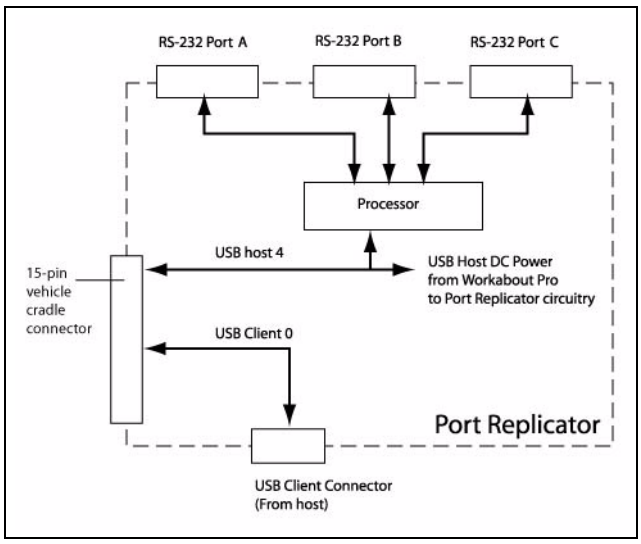
For the pinout for the 15-pin vehicle cradle connector see “The Vehicle Cradle 15-Pin Connector” on page 53.

The.WORKABOUT PRO supplies 5 V DC to the cradle and the port replicator through the 5 V DC supply associated with the USB host port (pin 5) on the LIF connector. The cradle switches this 5 V on when the WORKABOUT PRO is docked in the cradle. The port replicator draws a maximum of 50 mA when no peripherals are connected to it.

The DC input of the powered cradle is regulated and fed only to the power input of the WORKABOUT PRO.

Figure 5.14 The Port Replicator

Figure 5.15 Port Replicator Block Diagram



The cradle passes the USB Host and USB Client connections to the Port Replicator. The USB Host connection also supplies DC power to the Port Replicator.

Inside the port replicator, the USB host signals from the WORKABOUT PRO are connected to a processor that provides the three sets of serial port signals. The USB client lines are connected to the USB client connector.

5.8.1 The Serial Connectors

The three serial connectors use male DE-9 connectors and are DTE devices.

Table 5.7 Pinout Of The Serial Connector

Pin	Name	Description	Direction (relative to the Port Replicator)
1	CD	Carrier Detect	Input
2	RD	Receive Data: Data to the Port Replicator	Input
3	TD	Transmit Data: Data from the Port Replicator	Output
4	DTR	Data Terminal Ready	Output
5	Signal Ground	Ground	-
6	DSR	Data Set Ready	Input
7	RTS	Request To Send	Output
8	CTS	Clear To Send	Input
9	RI	Ring Indicator	Input

5.9 Other Cables And Adaptors

Psion Teklogix supplies several cables and adapters that connect to the WORKABOUT PRO, the docking station, and the vehicle cradle, ports. See the Accessories Catalog at www.PsionTeklogix.com/Accessories for information.

5.10 Mechanical Considerations

The WORKABOUT PRO HDK provides 3D models of the outsides of the WORKABOUT PRO variants to aid in sizing devices that accept the computer and in locating and aligning the connectors within them.

The tether connector is intended for free-standing cables. Clearance should be provided around it.

INTERNAL CONNECTORS 6

6.1 Overview

This chapter describes the WORKABOUT PRO internal connectors that are not described elsewhere in this manual. For a diagram of the locations of all the internal connectors see “Connector Locations” on page 17.

6.2 WORKABOUT PRO 2nd. Generation C, S Audio Connector

All WORKABOUT PRO 2nd. Generation computers have an internal audio connector. This connector accepts a 3.5 mm stereo connector. Psion Teklogix supplies a cable that connects to this socket. For information see the Accessories Catalog at www.PsionTeklogix.com/Accessories.

Table 6.1 Pinout Of The Internal Audio Connector

Pin	Name	Function	Notes
1	HPOUTR_C	Headset right channel	All different colours; do not use red.
2	HPOUTL_C	Headset left channel	
3	HSET_IN	Headset input detect	
4	GND	Ground	Recommended colour is black.
5	MIC_EXT	Microphone	Audio input for connection to a microphone. Full scale input signal level is 1 Vrms.
6	CONNECTOR_DETECT	Cable	This pin must be grounded within the cable, or connected to pin 4.

Pin 1 and pin 3 must not be connected on the cable.

When a cable is connected to this audio connector, the microphone on the keyboard is disconnected.

6.2.1 Cables

The following open-ended cable is available from Psion Teklogix:

- Part Number. 1050987.

6.3 WORKABOUT PRO 2nd. Generation C, S USB Connector

All WORKABOUT PRO 2nd. Generation computers have an internal USB connector. Psion Teklogix supplies a cable that connects to this socket. For information see the Accessories Catalog at www.PsionTeklogix.com/Accessories.

This connector shares signals with the 100-pin connector. So, it is described in the same chapter as the 100-pin connector. For details see “WORKABOUT PRO 2nd. Generation C, S USB Connector” on page 77.

6.3.1 Cables

The following cables are available from Psion Teklogix:

Part Number	Description
1050988	USB 4-wire cable—female to open-ended.
1051039	USB 4-wire cable—female to female.

6.4 100-Pin Connector

For details see Chapter 7: “100-Pin Connector”.

6.5 Scanner Connector

For details see Chapter 8: “Scanner Connector”.

100-PIN CONNECTOR 7

7.1 Overview

This chapter describes the electrical resources that the WORKABOUT PRO can supply to the expansion module connected to its 100-pin connector.

7.1.1 Signals On The 100-Pin Connector

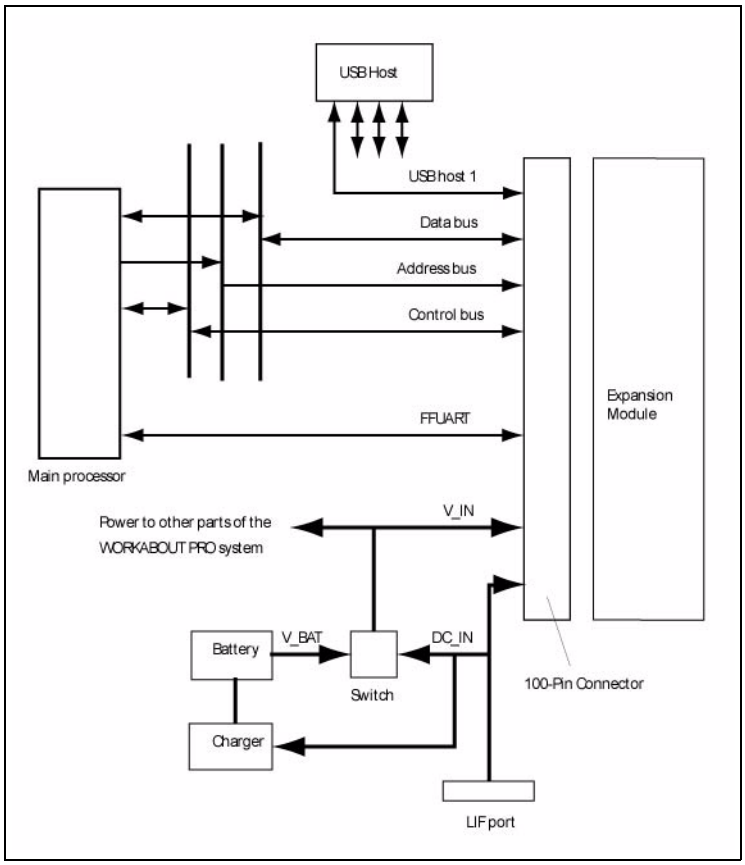
An expansion module connects to the 100-pin connector. The WORKABOUT PRO provides several groups of signals on this connector:

- DC power supply and ground.
- System data and address bus.
- Serial support.
- Connections to the WORKABOUT PRO USB host.
- Control signals.

These groups of signals are described in the following sections.

Note: Names listed here are those used by the WORKABOUT PRO. Signals may have other names in expansion modules, scanner converter boards, or other devices.

Figure 7.1 The WORKABOUT PRO 100-Pin Connector Block Diagram

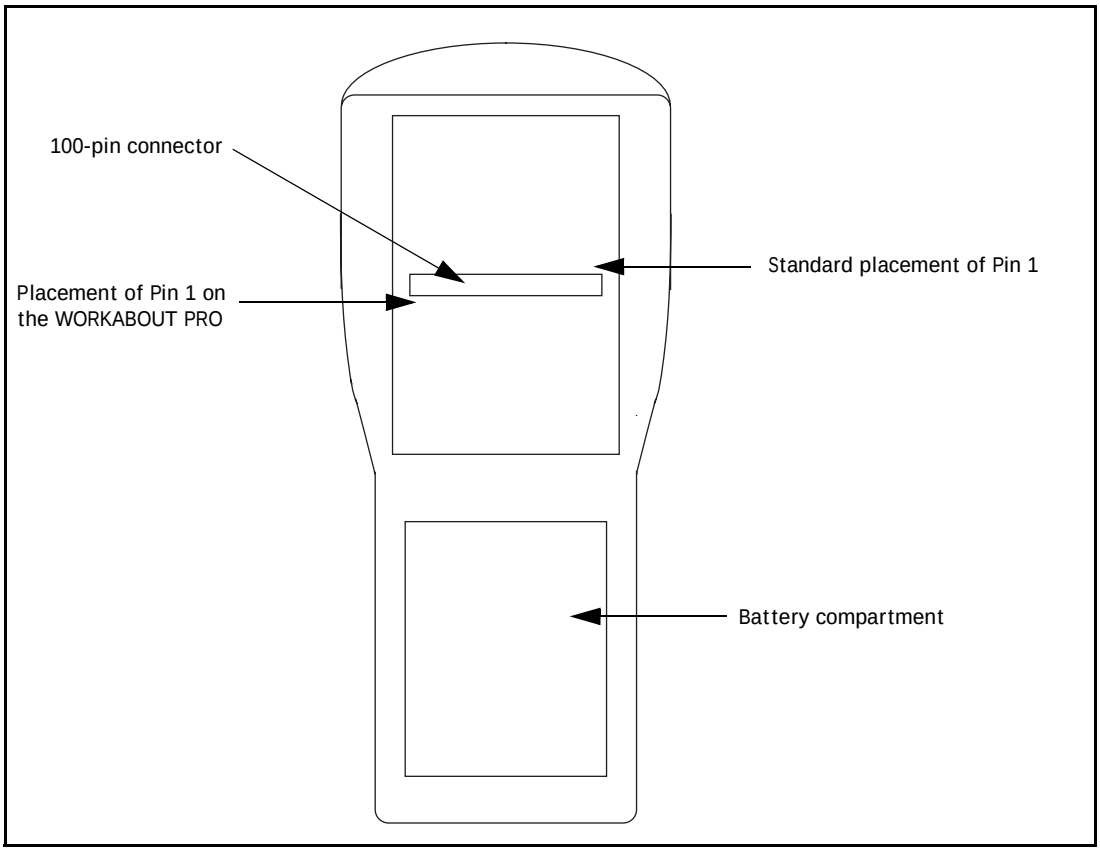


7.1.2 Connector Type

The 100-pin connector is an FX6-100S-0.8SV2 receptacle.

7.1.3 Connector Position And Orientation

Figure 7.2 WORKABOUT PRO Back View Showing The 100-pin Connector



7.2 100-Pin Connector Pinout

Pin names in the following table are those used on the WORKABOUT PRO.

Table 7.1 Pinout of the WORKABOUT PRO 100-Pin Connector

Pin	Name	Function	Signal Direction	Active	State During Reset	State During Sleep	Pull-up value (ohms)
1	V_IN	Power		N/A			
2	V_IN	Power		N/A			
3	V_IN	Power		N/A			
4	V_IN	Power		N/A			
5	SD0	System data bus	Input/output		Hi-Z	Low	
6	SA0	System address bus	Output		Low	Low	

Abbreviations:
N/A= not applicable;
B = both high and low,
Hi-Z = high impedance.

Table 7.1 Pinout of the WORKABOUT PRO 100-Pin Connector (Continued)

Pin	Name	Function	Signal Direction	Active	State During Reset	State During Sleep	Pull-up value (ohms)
7	SD1	System data bus	Input/output		Hi-Z	Low	
8	SA1	System address bus	Output		Low	Low	
9	SD2	System data bus	Input/output		Hi-Z	Low	
10	SA2	System address bus	Output		Low	Low	
11	SD3	System data bus	Input/output		Hi-Z	Low	
12	SA3	System address bus	Output		Low	Low	
13	SD4	System data bus	Input/output		Hi-Z	Low	
14	SA4	System address bus	Output		Low	Low	
15	SD5	System data bus	Input/output		Hi-Z	Low	
16	SA5	System address bus	Output		Low	Low	
17	SD6	System data bus	Input/output		Hi-Z	Low	
18	SA6	System address bus	Output		Low	Low	
19	SD7	System data bus	Input/output		Hi-Z	Low	
20	SA7	System address bus	Output		Low	Low	
21	GND			N/A			
22	GND			N/A			
23	SD8	System data bus	Input/output		Hi-Z	Low	
24	SA8	System address bus	Output		Low	Low	
25	SD9	System data bus	Input/output		Hi-Z	Low	

Abbreviations:
N/A= not applicable;
B = both high and low,
Hi-Z = high impedance.

Table 7.1 Pinout of the WORKABOUT PRO 100-Pin Connector (Continued)

Pin	Name	Function	Signal Direction	Active	State During Reset	State During Sleep	Pull-up value (ohms)
26	SA9	System address bus	Output		Low	Low	
27	SD10	System data bus	Input/output		Hi-Z	Low	
28	SA10	System address bus	Output		Low	Low	
29	SD11	System data bus	Input/output		Hi-Z	Low	
30	SA11	System address bus	Output		Low	Low	
31	SD12	System data bus	Input/output		Hi-Z	Low	
32	SA12	System address bus	Output		Low	Low	
33	SD13	System data bus	Input/output		Hi-Z	Low	
34	SA13	System address bus	Output		Low	Low	
35	SD14	System data bus	Input/output		Hi-Z	Low	
36	SA14	System address bus	Output		Low	Low	
37	SD15	System data bus	Input/output		Hi-Z	Low	
38	SA15	System address bus	Output		Low	Low	
39	GND			N/A			
40	GND			N/A			
41	nSLOT_WAIT_SRC	PCMCIA wait	Input	Low			100 k
42	SA16	System address bus	Output		Low	Low	
43	nSLOT_IOIS16	PCMCIA IOIS16	Input	Low			100 k[1] None[2]
44	SA17	System address bus	Output		Low	Low	

Abbreviations:
N/A= not applicable;
B = both high and low,
Hi-Z = high impedance.

Table 7.1 Pinout of the WORKABOUT PRO 100-Pin Connector (Continued)

Pin	Name	Function	Signal Direction	Active	State During Reset	State During Sleep	Pull-up value (ohms)
45	nPREG	PCMCIA REG	Output	Low			
46	SA18	System address bus	Output		Low	Low	
47	nPOE	PCMCIA OE	Output	Low			
48	SA19	System address bus	Output		Low	Low	
49	nPWE	PCMCIA WE	Output	Low			
50	SA20	System address bus	Output		Low	Low	
51	nPIOR	PCMCIA IOR	Output	Low			
52	SA21	System address bus	Output		Low	Low	
53	nPIOW	PCMCIA	Output	Low			
54	SA22	System address bus	Output		Low	Low	
55	nSLOT_PSKTSEL	Socket select	Output	*See note 4*			
56	SA23	System address bus	Output		Low	Low	
57	GND			N/A			
58	GND			N/A			
59	nPCE1	PCMCIA CE1	Output	Low			
60	SA24	System address bus	Output		Low	Low	
61	nPCE2	PCMCIA CE2	Output	Low			
62	SA25	System address bus	Output		Low	Low	
63	InputPin63	PCMCIA slot ready[5]	Input	High			100 k
64	InputPin64	GPIO	Input	Low			10 k
65	InputPin65	PCMCIA slot card detect[5]	Input	Low			100 k

Abbreviations:
N/A= not applicable;
B = both high and low,
Hi-Z = high impedance.

Table 7.1 Pinout of the WORKABOUT PRO 100-Pin Connector (Continued)

Pin	Name	Function	Signal Direction	Active	State During Reset	State During Sleep	Pull-up value (ohms)
66	InputPin66	GPIO	Input	Low			10 k
67	OutputPin67	PCMCIA slot reset[5]	Output	High	Float	Low	None
68	RDY	Peripheral ready	Input				
69	OutputPin69	PCMCIA slot power select[5]	Output		Float	Hi-Z	None
70	OutputPin70	PCMCIA slot power enable[5]	Output		Float	Low	None
71	OutputPin71	GPIO	Output		Float	Hi-Z	None
72	OutputPin72	PCMCIA slot buffer enable[5]	Output		Float	High	None
73	InputPin73	GPIO	Input	N/A			100 k
74	OutputPin74	GPIO	Output		Float	High	None
75	InputPin75	GPIO	Input	N/A			100 k
76	OutputPin76	GPIO	Output		Float	*See note 3*	None
77	GND			N/A			
78	GND			N/A			
79	nSLOT_WAKEUP	u-P GPI	Input	B			100 k
80	USB_H1_D+	USB host port 1 D+	Input/output				
81	FF_RXD	UART RXD	Input	N/A			100 k
82	USB_H1_D-	USB host port 1 D-	Input/output				
83	FF_TXD	UART TXD	Output	N/A		High	
84	GND			N/A			
85	FF_CTS	UART CTS	Input	Low			100 k
86	Not connected[1] PWR_EN[2]		Input				
87	FF_DCD	UART DCD	Input	Low			100 k
88	USB_H1_PSW	USB host power enable	Output				

Abbreviations:
N/A= not applicable;
B = both high and low,
Hi-Z = high impedance.

Table 7.1 Pinout of the WORKABOUT PRO 100-Pin Connector (Continued)

Pin	Name	Function	Signal Direction	Active	State During Reset	State During Sleep	Pull-up value (ohms)
89	FF_DSR	UART DSR	Input	Low			100 k
90	OutputPin90	GPIO	Output				
91	FF_RI	UART RI	Input	Low			100 k
92	OutputPin92	GPIO	Output				
93	FF_DTR	UART DTR	Output	Low		High	
94	OutputPin94	GPIO	Output				
95	FF_RTS	UART RTS	Output	Low		High	
96	InputPin96	GPIO	Input				100 k
97	DC_IN	DC power	Power	N/A			
98	I2C_SDA	I2C data	Input/output				4.7 k
99	DC_IN	DC power	Power	N/A			
100	I2C_SCL	I2C clock	Output				4.7 k

Abbreviations:
N/A= not applicable;
B = both high and low,
Hi-Z = high impedance.

Note 1: Applies only to the WORKABOUT PRO M, C, S, and ME variants.

Note 2: Applies only to the WORKABOUT PRO 2nd. Generation C and S variants.

Note 3: Pin 76, OutputPin76 sleep state:

- WORKABOUT PRO C, S, M, ME—state maintained.
- WORKABOUT PRO 2nd. Generation C, S—high impedance.

Note 4: Pin 55, nSLOT_PSKTSEL active states:

- High—PCMCIA slot selected.
- Low—Compact flash slot selected.

Note 5: When a full PCMCIA interface is in use, these pins are not available for GPIO.

7.3 Power And Ground

Powering An Expansion Module

The power supply pins are:

- DC_IN (an external DC supply to the WORKABOUT PRO) (pins 97 and 99).
- V_IN (nominal 5 V DC supply to the expansion module) (pins 1, 2, 3, and 4).
- Ground (pins 21, 22, 39, 40, 57, 58, 77, 78, 84).

The DC_IN line can accept DC power of the following specification:.

Pin Name	Nominal Voltage	Tolerance	Maximum Ripple	Maximum Current
DC_IN	5 V	5%	50 mV	2100 mA

V_IN conforms to the following specifications:

Pin Name	Voltage Minimum	Voltage Maximum	Maximum Current
V_IN	2.6 V	5 V	2000 mA

Hardware connected to the 100-pin expansion slot can be powered from the WORKABOUT PRO, using V_IN. Return is through the ground pins.

When the WORKABOUT PRO is on external power, the battery power is not used.

When the WORKABOUT PRO is powered by an external adaptor, V_IN is at the adaptor supply voltage minus a diode drop. The adaptor supplies 4.5 V to 5.5 V. After the diode drop, V_IN is 3.8 V to 4.8 V.

When the WORKABOUT PRO is powered by the battery, V_IN is at the battery voltage, which ranges from 2.6 V to 4.2 V (nominal 3.7 V).

For information on the battery power and the battery threshold voltages, see “Batteries” on page 16.

Powering The WORKABOUT PRO Through The 100-pin Connector

The WORKABOUT PRO can be powered from the 100-pin expansion connector as well, using the DC_IN pins (pins 97 and 99) as a power input. These pins are connected to the same line as the DC_IN input from the external adaptor.

Warning: Do not reverse the polarity of power supplied to the DC_IN input on the 100-pin connector. Such reversal will damage the WORKABOUT PRO.

7.4 Data And Address Buses

The system data and address buses include:

- Data bus (signals SD0-SD15).
- Address bus (signals SA0-SA25).

These signals are at CMOS levels (0 V to 3.3 V).

7.5 Serial

Serial expansion devices can be connected as modems through the following signals:

- FF_RXD (data from the expansion device) (pin 81).
- FF_TXD (data to the expansion device) (pin 83).
- FF_CTS (Clear To Send flow-control signal from the expansion device) (pin 85).
- FF_DCD (Data Carrier Detect flow-control signal from the expansion device) (pin 87).
- FF_DSR (Data Set Ready flow-control signal from the expansion device) (pin 89).
- FF_RI (Ring Indicator flow-control signal from the expansion device) (pin 91).
- FF_DTR (Data Terminal Ready flow-control signal to the expansion device) (pin 93).
- FF_RTS (Ready To Send flow-control signal to the expansion device) (pin 95).

These signals originate from the full-function UART (FFUART) in the PXA255, and PXA270, and are connected directly to the 100-pin connector. The signals are at CMOS levels (0 V to 3.3 V).

Table 7.2 Serial Ports

	WORKABOUT PRO C, S, M, ME	WORKABOUT PRO 2nd. Generation C, S
Maximum baud rate	230 k baud.	921.6 k baud.
Enabling hardware RTS/CTS		Requires a registry key setting. See “Registry Settings For Serial Ports” on page 22.

For a complete list of the default COM port assignments, see “COM Port Assignments” on page 24.

7.6 USB

The 100-pin connector provides the following signals from the WORKABOUT PRO USB host:

- USB_H1_D- (pin 82).
- USB_H1_D+ (pin 80).
- USB_H1_PSW (pin 88).

The WORKABOUT PRO 2nd. Generation USB host 1 port is also available on CN601. The CN601 connector provides switched 5 V power controlled by USB_H1_PSW. See Figure 2.6 on page 18 for the location of this connector.

Both full speed (12 megabits per second), and low speed (1.5 megabits per second), communication are supported.

The USB_H1_PSW signal can be used to control a power switch for the USB V+. The designer must provide the appropriate +5 V power supply and the switch. USB_H1_PSW is managed by software and can be controlled by the HDK software API.

These signals are at CMOS levels (0 V to 3.3 V).

7.7 General-Purpose I/O

A number of dedicated GPIO signals are provided.

These signals are pre-defined as outputs by Psion Teklogix:

- OutputPin71 (pin 71).
- OutputPin74 (pin 74).
- OutputPin76 (pin 76).
- OutputPin90 (pin 90).
- OutputPin92 (pin 92).
- OutputPin94 (pin 94).

These signals are pre-defined as inputs by Psion Teklogix:

- InputPin64 (pin 64).
- InputPin66 (pin 66).
- InputPin96 (pin 96).

The following PCMCIA signals can be used as GPIO outputs if the PCMCIA interface is not being used:

- OutputPin67 (pin 67).
- OutputPin69 (pin 69).
- OutputPin70 (pin 70).
- OutputPin72 (pin 72).

The following PCMCIA signals can be used as GPIO inputs if the PCMCIA interface is not being used:

- InputPin63 (pin 63).
- InputPin65 (pin 65).
- InputPin73 (pin 73).
- InputPin75 (pin 75).

These signals are at CMOS levels (0 V to 3.3 V).

7.8 General-Purpose Interrupts

The following signals can be used as general-purpose interrupts if the PCMCIA interface is not being used:

- InputPin63 (pin 63).
- InputPin65 (pin 65).

The active edge of these interrupts can be defined in software.

7.9 PCMCIA

The PCMCIA signals can be used as a standard PCMCIA interface. They can be also used to connect memory devices or SRAM-like variable-latency I/O devices.

Signals provided to devices supporting the PCMCIA interface are as follows:

- Data bus (signals SD0 to SD15).
- nSLOT_WAIT_SRC (pin 41).
- nPREG (pin 45).
- nPWE (pin 49).
- nPIOW (pin 53).
- nPCE1 (pin 59).
- SLOT_READY (pin 63).
- SLOT_RST (pin 67).
- SLOT_PWR_EN (pin 70).
- nSLOT_VS1 (pin 73).
- Address bus (signals SA0 to SA25).
- nSLOT_IOIS16 (pin 43).
- nPOE (pin 47).
- nPIOR (pin 51)
- nSLOT_PSKTSEL (pin 55).
- nPCE2 (pin 61).
- nSLOT_CD (pin 65).
- SLOT_3/5_SEL (pin 69).
- nSLOT_BUF_EN (pin 72).
- nSLOT_BVD1 (pin 75).

All of these signals are at CMOS levels (0 V to 3.3 V).

The PCMCIA control signals are named according to the PXA255/PXA270 naming convention, apart from the following:

Table 7.3 PCMCIA Control Signals That Do Not Follow The PXA255/PXA270 Naming Convention

PXA255/PXA270 Name	Name On WORKABOUT PRO	Notes
nPWAIT	nSLOT_WAIT_SRC	
PSKTSEL	nSLOT_PSKTSEL	Low = Expansion PCMCIA interface enabled

If the Psion Teklogix PCMCIA driver is used, all of the dual function pins (the general-purpose I/O and interrupt signals) that can be used by the PCMCIA interface will be reserved by the PCMCIA driver. All of these pins conform to the pin functions as defined by the PC Card Standard, Release 8.

A customized driver can be developed so that the dual function pins can be separated from the PCMCIA interface. Psion Teklogix does not supply such a driver.

Memory devices and variable latency IO devices (such as ASICs and FPGAs) can be connected to the PCMCIA interface. Timing of the interface is configurable. The nSLOT_WAIT_SRC signal may used to extend the bus cycle.

The data bus, address bus, and control signals should be buffered in the expansion device to prevent excessive loading. These traces should also be kept to the minimum possible length.

PCMCIA Interface Timing

The PCMCIA interface is fully compliant with the PCMCIA standard.

The **PsionTeklogix::WORKABOUTPRO_HDK::PCMCIA** namespace provides access to the following registers so that the timing can be configured by a software application.

Table 7.4 PCMCIA Timing Control

Register	Memory Region Controlled
MCMEM1	Common memory
MCATT1	Attribute memory
MCIO1	I/O space

Table 7.5 Controlling PCMCIA Interface Timing

	WORKABOUT PRO	WORKABOUT PRO 2nd. Generation
API	PCMCIA::SetTiming()	PCMCIA::SetTimingPXA27X()

7.10 Wakeup

A wakeup input is available so that expansion devices can signal the WORKABOUT PRO. This pin is:

- nSLOT_WAKEUP (pin 79).

This signals is at CMOS levels (0 V to 3.3 V).

This signal wakes the WORKABOUT PRO from its suspend state—it does not generate an interrupt that can be detected by a software application. Connect the source to an expansion-slot interrupt pin as well (InputPin63 or InputPin65), if an interrupt is also required.

7.11 I2C Device Identification

All expansion devices connected to the WORKABOUT PRO 100-pin expansion bus must contain an I2C EEPROM. The expansion EEPROM is used to identify the hardware and to load appropriate drivers. This information is displayed on the **Properties** tab of the Control Panel **System** program.

The 100-pin connector provides signals for an I2C bus:

- I2C_SDA (pin 98).

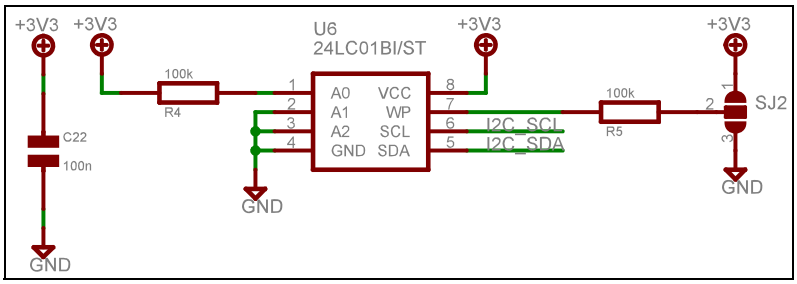
- I2C_SCL (pin 100).

These signals are at CMOS levels (0 V to 3.3 V).

This identifying EEPROM should be an I2C EEPROM of at least 128 bytes. Psion Teklogix recommends using a serial-access 1-kilobit (128 x 8) EEPROM, such as STMicroelectronics ST24C01 or similar. Larger EEPROMs may be used. The address of the device must be set to 0x01 by connecting the A0 pin to the expansion module's VCC and the A1 and A2 pins to ground.

An example of the circuit, as implemented on the sample Multi-I/O Expansion Module, is shown below:

Figure 7.3 EEPROM Circuitry



In this circuit, to write protect the EEPROM use the jumper at SJ2 to connect the WP line to the +3.3 V supply; to write enable the EEPROM use the jumper at SJ2 to connect the WP line to ground.

See "I2C Device Identification" on page 73 for a description of the contents of this EEPROM. Other I2C devices can also be connected to the I2C bus.

More information about the I2C bus can be found at:
http://www.nxp.com/products/interface_control/i2c/

7.11.1 I2C Addresses

I2C and smBus device addresses are 7 bits long.

The addresses defined here are shifted left by one bit to suit the device address format required by the Windows CE I2C driver. The following addresses are reserved:

Address	Notes	WORKABOUT PRO 2nd. Generation C, S only
0x20	Power Micro	Yes
0x22	Power Micro	Yes
0x64	Real-time clock	
0x66	Keyboard Micro	Yes
0x68	Keyboard Micro	Yes
0xa0	Psion Teklogix EEPROM address: E0, E1, E2 low	
0xa2	Expansion EEPROM address: E0 high, E1, E2 low	
0xe0	PXA255/270 configurable I2C address	

7.11.2 Expansion Module EEPROM Fields

The EEPROM has an internal address space of at least 128 bytes. Some of these bytes are pre-defined. Developers are free to use unused areas of the EEPROM for their own purposes.

Table 7.6 Fields Of The EEPROM In The Expansion-Module

Field	Address (decimal)	Size	Contents
Manufacturing test region	0-9	10 bytes	Reserved.
Revision	10	1 byte	ASCII ‘1’ (one).
Hardware revision	11	1 byte	ASCII ‘0’ - ‘9’, ‘A’ - ‘Z’, ‘a’ - ‘z’
Hardware type	12	1 byte	ASCII character.
Manufacturer/Model	13-32	20 bytes	ASCII text. Zero-delimited if less than 20 bytes. Character set is restricted to alpha-numeric plus space.
Serial number	33-44	12 bytes	ASCII text. Zero-delimited if less than 12 bytes.
Manufacturer-specific	45+	83+	Any.

Unused bytes are set to 0xFF. If a field is all 0xFF then **Unknown** is displayed for that field on the **Properties** tab of the Control Panel **System** program.

Manufacturing test region

This is reserved for the original board manufacturer. The manufacturing test region is provided to allow manufacturing test of the EEPROM. The contents are not used for any other purpose.

Revision

The version of the specification which defines the layout of the EEPROM and the contents of its 45 byte header. This value is specified by Psion Teklogix and is always set to 1.

Hardware revision

This is an ASCII character that defines the hardware revision. This field may be used by the driver to vary the operation of the device. An OEM may set the contents to any value.

To view the contents of this field, in the Control Panel, click **System**, then click **Properties**.

Hardware type

This field contains a single ASCII character. It defines the hardware type of the expansion module. Drivers for the hardware are loaded based on this value.

Table 7.7 Hardware Type Characters In The Expansion Module EEPROM

ASCII		Hardware Type		
Character	Code	PCMCIA	Serial	USB
		The hardware supports a PCMCIA socket. The PCMCIA socket will be enabled	The hardware supports the serial port. The serial FFUART (COM1) driver will be loaded.	The hardware supports the USB port. The USB hub and USB connection will be powered.
a	0x61	Yes		
b	0x62		Yes	
c	0x63			Yes
d	0x64	Yes	Yes	
e	0x65	Yes		Yes
f	0x66		Yes	Yes
g	0x67	Yes	Yes	Yes
s	0x73	See note.		
Any other value				
Note: An 's' or any undefined value means the hardware is standard, and the WORKABOUT PRO operating system will load drivers based on registry settings.				

Manufacturer/Model

This field defines the expansion slot hardware.

If the expansion module requires a non-Psion Teklogix device driver, this field contains the name of the device driver. The characters allowed in this field are restricted to those that are allowed in a Windows registry key. For further information see "Registry Settings For Non-Psion Teklogix Device Drivers" on page 23.

To view the contents of this field, in the Control Panel, click **System**, then click **Properties**.

Serial Number

This field contains the serial number of the expansion slot hardware.

To view the contents of this field, in the Control Panel, click **System**, then click **Properties**.

Manufacturer specific

This area is for the use by the manufacturer of the expansion card.

7.12 Example Expansion Modules

The HDK includes the following sample expansion modules:

- PCMCIA Expansion Module which supports a slot for adding PCMCIA cards. See Chapter 10: "Example: PCMCIA Expansion Module"for details.
- Multi-I/O Expansion Module which provides separate connectors for the USB and serial ports on both the 100-pin and scanner connectors. See Chapter 11: "Example: Multi-I/O Expansion Module" for details.

7.13 Psion Teklogix Serial Endcaps

Psion Teklogix supplies endcaps with serial ports for the WORKABOUT PRO and for the WORKABOUT PRO 2nd. Generation computers. These are provided as field-installable kits. For a list of available endcaps see www.PsionTeklogix.com/Accessories.

The endcap kit comprises the endcap, which includes an internal circuit board, an expansion module which fits on the WORKABOUT PRO 100-pin expansion connector, and installation instructions. The two components are joined by a flex cable. The expansion module and internal circuit board differ for each model of endcap.

The serial endcap has one or more of the following connectors:

- IrDA infrared serial connection.
- DE-9 female connector for TTL-level serial.
- DE-9 male connector for RS-232 serial.

Figure 7.4 The Three-Port Serial Endcap (Model BR1000)

7.13.1 Serial Port Assignments

For details of the serial port assignments for these endcaps see “COM Port Assignments” on page 24.

7.14 WORKABOUT PRO 2nd. Generation C, S USB Connector

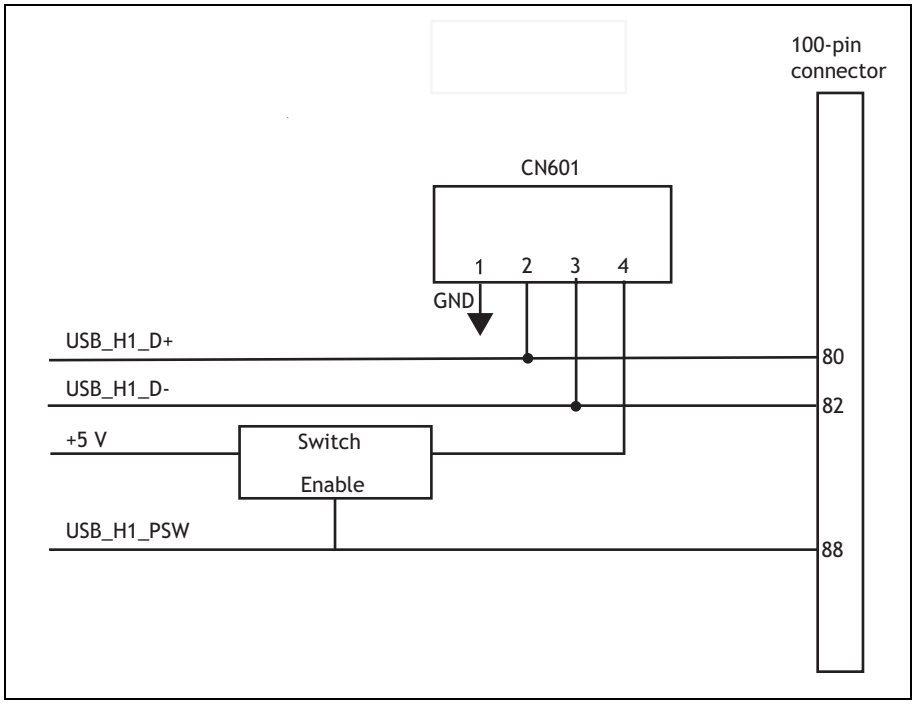
All WORKABOUT PRO 2nd. Generation computers have an internal USB connector. Psion Teklogix supplies a cable that connects to this socket. For information see the Accessories catalog at www.PsionTeklogix.com/Accessories. This connector uses the same USB port as the 100-pin connector.

Table 7.8 Pinout Of The Internal USB Connector

Pin	Pin On 100-pin Connector	Name	Description
1		Ground	
2	80	USB_H1_D+	USB host port 1 D+
3	82	USB_H1_D-	USB host port 1 D-
4	88	USB_H1_PSW	USB host power enable

See Figure 2.6 on page 18 for the location of this connector.

Figure 7.5 Internal USB Connector Block Diagram

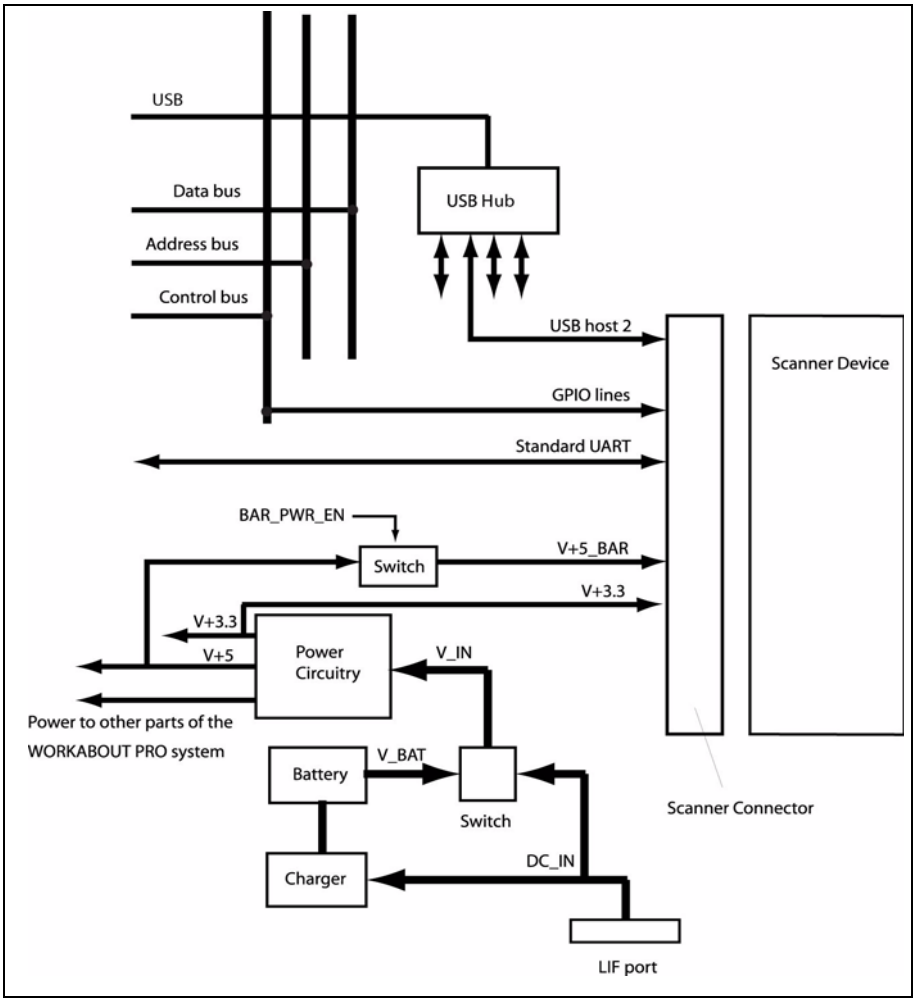


SCANNER CONNECTOR 8

8.1 Overview

This chapter describes the WORKABOUT PRO scanner connector and the devices that connect to it. Other devices besides scanners can be connected through the scanner port. The term *scanner device* applies to any hardware device that connects to the scanner port on the main logic board.

Figure 8.1 Scanner Connector Signals Block Diagram



Psion Teklogix provides scanners modules as either:

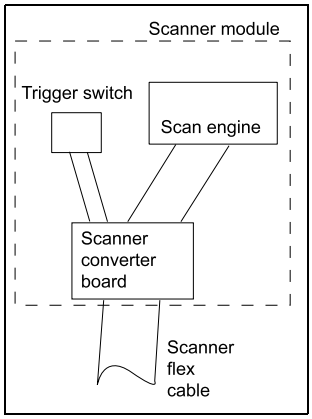
- A scanner pod, *or*
- A scanner endcap.

Scanner Pod

Scanners pods provided by Psion Teklogix have the following parts:

- Scan engine.
- Scanner converter board.
- Trigger switch (on some models only).

Figure 8.2 Scanner Pod Block Diagram



The scan engine is mounted on an appropriate backplate, which is then fastened to the WORKABOUT PRO.

Figure 8.3 The Scanner Pod In Place

Scanner Endcap

Scanner endcaps provided by Psion Teklogix have the following parts:

- Scan engine.
- Scanner converter board.

Scanner Converter Board

The scanner converter board interfaces the scan engine and the trigger switch to the WORKABOUT PRO system. Different scan engines may require different converter boards.

The scanner module is connected to the WORKABOUT PRO scanner connector by the scanner flex cable, using an interface defined by Psion Teklogix.

8.2 Scanner Kits

Psion Teklogix supplies several scanner kits. For a complete list see the Accessories Catalog at www.PsionTeklogix.com/Accessories.

8.3 Scanner Connector Location

For the location of the scanner connector on the main logic board see “Connector Locations” on page 17.

8.4 Scanner Connector Pinout

Table 8.1 Pinout Of The Scanner Connector

Pin	Name	Description	Direction	State When Active	State During Sleep	Pull-up Or Pull-down
1	V+5_BAR	+5 V bar code supply. Switchable. [3]	Power	N/A	Disabled	N/A
2	V+5_BAR	+5 V bar code supply. Switchable.[3]	Power	N/A	Disabled	N/A
3	IR_TXD[1] BAR_TXD[2]	Data from WORK-ABOUT PRO to scanner device.	Output	B	Low	None
4	USB_H2_D-	USB host port 2 D-.	Input/ output	B	Pulled down	15 kΩ
5	IR_RXD[1] BAR_RXD[2]	Data from scanner device to WORKA-BOUT PRO.	Input	B	Pulled up	100 kΩ[1] None[2]
6	USB_H2_D+	USB host port 2 D+.	Input/ output	B	Pulled down	15 kΩ
7	nBAR_CTS[1] BAR_CTS[2]	CTS from scanner device to WORKA-BOUT PRO.	Input	L	Pulled up	100 kΩ[1] 10 kΩ[2]
8	GND	Ground.	Power	N/A	N/A	N/A
9	nBAR_RTS[1] BAR_RTS[2]	RTS from WORK-ABOUT PRO to scanner device.	Output	L	Low	N/.A
10	Not used[1] BAR_3.3V [2]	Switchable.[2 3] Short circuit to ground detection for backward compatibility.[2]	N/A	N/A	N/A	N/A
11	GND	Ground.	Power	N/A	N/A	N/A

Abbreviations:
N/A= not applicable
A= according to design requirements of driver and scanner device
B = both high and low
L= active low
H= active high
Hi-Z = high impedance

Table 8.1 Pinout Of The Scanner Connector

Pin	Name	Description	Direction	State When Active	State During Sleep	Pull-up Or Pull-down
12	GND	Ground.	Power	N/A	N/A	N/A
13	KB_SCAN_R7[1] KB_SCAN_R2[2]	Keyboard row.	Input	N/A	Pulled down	1 MΩ[1] 10 kΩ[2]
14	V+3.3	3.3 V power supply. Not switchable.[1] Switchable.[2 3]	Power	N/A	Enabled	N/A
15	KB_SCAN_C0A[1] KB_SCAN_C7[2]	Keyboard column.	Output	N/A	Driven	None
16	BAR_PWRDWN	Power-down from scanner device to WORKABOUT PRO.	Input	H	Pulled up	100 kΩ[1] 10 kΩ[2]
17	BAR_TYPE	Not used.	Input	B	Pulled up	100 kΩ[1] 10 kΩ[2]
18	nBAR_WKUP	Wakeup signal to scanner device.	Output	H	A	None[1] 100 kΩ[2]
19	Not used[1] BAR_3.3V[2]	Switchable.[2 3] Short circuit to ground detection for backward compatibility.[2]	N/A	N/A	N/A	N/A
20	BAR_TRIG[1] nBAR_TRIG[2]	Trigger signal to scanner device.	Output	H	A	None
21	GND	Ground.	Power	N/A	N/A	N/A
22	GND	Ground.	Power	N/A	N/A	N/A

Abbreviations:
N/A= not applicable
A= according to design requirements of driver and scanner device
B = both high and low
L= active low
H= active high
Hi-Z = high impedance

Notes:

1: Applies only to the WORKABOUT PRO M, C, S, and ME variants.

2: Applies only to the WORKABOUT PRO 2nd. Generation C and S variants.

3: When controlled through software, pins 1, 2, 10, 14, and 19 are switched on and off together.

8.5 The Scanner Flex

The scanner connector accepts a flexible ribbon cable, which is supplied with the WORKABOUT PRO. The WORKABOUT PRO is supplied with the scanner flex already attached to the main logic board. The flex used with Psion Teklogix scanners has part number 1040017.

The scanner cable is inserted straight down into the connector on the main logic board, and folds over to connect to the scanner device. The cable can be inserted in the scanner device when it is pivoted away from the open back of the WORKABOUT PRO.

When the scanner device is in place, and the backplate is closed and fastened, the cable folds into the space above the expansion module.

8.6 Power And Ground

The WORKABOUT PRO provides the following power and ground connections to the scanner device:

- Ground (pins 8, 11, 12, 21, 22).
- V+5_BAR (pins 1 and 2).
- V+3.3 (pin 14, also pins 10 and 19 for WORKABOUT PRO 2nd. Generation C, S).

WORKABOUT PRO C, S, M, ME

V+5_BAR is +5 V supplied from a DC-DC converter fed by V+5, the main 5 V supply of the WORKABOUT PRO. It can be switched on and off by the BAR_PWR_EN signal while the WORKABOUT PRO is running, but is disabled when the WORKABOUT PRO is suspended.

V+3.3 is the main 3.3 V system voltage of the WORKABOUT PRO, supplied ultimately from V_IN via a DC-to-DC converter. V+3.3 remains powered when the WORKABOUT PRO is suspended.

These voltages have the following specifications:

Table 8.2 Voltages Supplied To The Scanner Device

Supply	Nominal Voltage	Continuous Current
V+5_BAR	5 V	300 mA
V+3.3	3.3 V	150 mA

V_IN is a diode OR of V_BAT (the DC voltage supplied by the WORKABOUT PRO battery), and DC_IN (the DC power input from the external AC-to-DC adaptor). V_IN feeds a DC-to-DC converter; the output of the converter is switched by the scanner power enable signal, and is known as V+5_BAR.

When the terminal is powered by an external adaptor, V_IN is at the supply voltage of the adaptor minus a diode drop. The adaptor supplies 4.5 V to 5.5 V; after the diode drop, V_IN is 3.8 V to 4.8 V.

When the terminal is powered by the battery, V_IN is at the battery voltage, which ranges from 2.6 V to 4.2 V (nominal 3.7 V).

For details of battery threshold voltages see “Batteries” on page 16.

WORKABOUT PRO 2nd. Generation C, S

V+5_BAR is +5 V supplied from a DC-DC converter fed by V+5, the main 5 V supply of the WORKABOUT PRO. It can be switched on and off by the 5VBAR_PWR_EN signal while the WORKABOUT PRO is running, but is disabled when the WORKABOUT PRO is suspended.

V+3.3 is the main 3.3 V system voltage of the WORKABOUT PRO, supplied ultimately from VIN via a DC-to-DC converter. V+3.3 remains powered when the WORKABOUT PRO is suspended. In the WORKABOUT PRO 2nd. Generation, the 3.3V supply to the scanner connector is disabled when the WORKABOUT PRO is suspended.

These voltages have the following specifications:

Table 8.3 Voltages Supplied To The Scanner Device

Supply	Nominal Voltage	Continuous Current
V+5_BAR	5 V	300 mA
V+3.3	3.3 V	1 A

VIN is a diode OR of VBAT (the DC voltage supplied by the WORKABOUT PRO battery), and DC_IN (the DC power input from the external AC-to-DC adaptor). VIN feeds a DC-to-DC converter; the output of the converter is switched by the scanner power enable signal, and is known as V+5_BAR.

When the terminal is powered by an external adaptor, VIN is at the supply voltage of the adaptor minus a diode drop. The adaptor supplies 4.5 V to 5.5 V; after the diode drop, VIN is 3.8 V to 4.8 V.

When the terminal is powered by the battery, VIN is at the battery voltage, which ranges from 2.6 V to 4.2 V (nominal 3.7 V).

For details of battery threshold voltages see “Batteries” on page 16.

8.7 Signals To The Scanner Device

The WORKABOUT PRO does not provide the data and address buses of its main processor (the PXA255 or PXA270) to the scanner port. Instead, communication to the scanner is provided by USB or serial lines.

All the serial signals are present to connect a decoded scanner. A USB host port is also provided so that USB peripherals can be connected via the scanner port.

These signals are at 3.3 V CMOS levels.

Serial scanner devices can be connected through the following signals on the WORKABOUT PRO:

- IR_TXD (data to the scanner device, pin 3).
- IR_RXD (data from the scanner device, pin 5).
- nBAR_CTS (Clear To Send flow-control signal from the scanner device, pin 7).
- nBAR_RTS (Ready To Send flow-control signal to the scanner device, pin 9).

Serial scanner devices can be connected through the following signals on the WORKABOUT PRO 2nd. Generation:

- BAR_TXD (data to the scanner device, pin 3).
- BAR_RXD (data from the scanner device, pin 5).

- BAR_CTS (Clear To Send flow-control signal from the scanner device, pin 7).
- BAR_RTS (Ready To Send flow-control signal to the scanner device, pin 9).

The assignment for this port is COM 3. It cannot be reassigned.

USB scanner devices can communicate through the following bidirectional data signals:

- USB_H2_D+ (pin 6).
- USB_H2_D- (pin 4).

Note: There is no USB power-enable signal on the scanner port.

In the WORKABOUT PRO 2nd. Generation, the 5V supply (V+5_BAR) is controlled by 5VBAR_PWR_EN.

In addition, there are control signals for both USB and serial scanner devices:

- BAR_PWRDWN (pin 16).
- nBAR_WKUP (pin 18).
- nBAR_TRIG (pin 20).

BAR_PWRDWN is an input to the main logic board. The scanner device can use this signal to inform the WORKABOUT PRO that it has shut down. Pull this signal high to enable it.

nBAR_WKUP and nBAR_TRIG are outputs from the main logic board. Their operation varies depending on the design of the scanner device and the device driver.

A pair of lines from the WORKABOUT PRO keyboard matrix are also provided:

- Input on pin 13.
- Output on pin 15.

Short these signals together for a minimum of 20 milliseconds to initiate a scan or to wake up the WORKABOUT PRO.

Note: nBAR_CTS and nBAR_RTS —BAR_CTS and BAR_RTS on the WORKABOUT PRO 2nd. Generation—are not hardware flow-control signals. CTS must be polled by software, and RTS has to be set / cleared by software.

Apart from V+5_BAR, the signals connected to the scanner port are at 3.3 V CMOS levels. Use a level translator before the scanner cable to connect 5 V signals to the WORKABOUT PRO main logic board.

EXAMPLE: SCANNER CONVERTER BOARD 9

9.1 Overview

Psion Teklogix provides a scanner converter board in WORKABOUT PRO units that incorporate a scanner. This board is attached to the scan engine, and differs depending on the installed scanner.

At a minimum, the scanner board physically connects the supply voltages and signal lines provided by the scanner flex to the scanner device. Different scanner devices require different regulation and switching.

This chapter describes the scanner converter board used with the SE1223 scanner, and its interface to the WORKABOUT PRO main logic board.

9.2 Example Scanner Boards

The schematics for two sample scanner boards are included in the HDK. Both boards work with the SE1223 scan engine. One provides serial output: The other provides USB output. These boards work with both the WORKABOUT PRO and the WORKABOUT PRO 2nd. Generation computers.

9.2.1 Serial Scanner Board

This board can be configured for use either with Symbol scan engines, or with Intermec scan engines.

This scanner board incorporates AND-gate buffers on the signal lines: a 74HCT08 buffers outbound signals, and a 74LVC08 buffers inbound signals.

The scanner board can be configured for the Symbol or Intermec scan engines by providing zero-ohm resistors (jumpers) in locations according to the following table:

Table 9.1 Configuration Resistors

Connects When Jumpered	Name	Provided For Symbol Scan Engines	Provided For Intermec Scan Engines
R10	HOST_TRIG to Symbol_TRIG		
R11	HOST_TRIG to Inter_TRIG		x
R12	HOST_WKUP to Inter_PWREn		x
R13	HOST_WKUP to Symbol_WKUP	x	
R14	RTS to Symbol_CTS	x	
R15	RTS to Inter_CTS		x
R16	CTS to Inter_RTS_Symbol_CTS		x
R17	CTS to Symbol_RTS	x	
R18	TXD to Inter_RXD		x
R19	TXD to Symbol_RXD_Inter_PWREn	x	
R20	Connects V+5 to JP1 pin 5 (Inter_Symbol_TXD)	x	
R21	Connects JP1 pin 8 and JP1 pin 11		x
Note: x = zero-ohm resistor (jumper) present			

Table 9.1 Configuration Resistors (Continued)

Connects When Jumpered	Name	Provided For Symbol Scan Engines	Provided For Intermec Scan Engines
PR1	V+5 to JP1 pin 2 (Inter_RXD)	x	
PR2	V+5 to JP1 pin 1		x
GR1	Gnd to JP1 pin 12 (Symbol_TRIG)		x
GR2	Gnd to JP1 pin 7 (Symbol_RTS)		x
GR3	Gnd to JP1 pin 3 (Inter_Trigger)	x	
Note: x = zero-ohm resistor (jumper) present			

The default configuration is for Symbol scan engines. The schematic is drawn this way.

This scanner converter board has three connectors:

- Host scanner connector.
- Scan engine connector.
- Trigger switch connector.

Host Scanner Connector

JP2 is a 22-pin connector that accepts the 22-pin flex cable from the WORKABOUT PRO main logic board. This connector has the following pins:

Table 9.2 Pinout Of Host Scanner Connector (JP2)

Pin	Name On WORKABOUT PRO	Name On Converter Board	Description	Direction	Active State	State During Device Sleep	Pull-up Or Pull-down
1	V+5_BAR	V+5	+5 V bar code supply	Power	N/A	Disabled	N/A
2	V+5_BAR	V+5	+5 V bar code supply	Power	N/A	Disabled	N/A
3	IR_TXD	TXD	Data from WORKA-BOUT PRO to scanner device	Output	B		None
Abbreviations: *N/A= not applicable;* *A=- according to design requirements of driver and scanner device,* *B = both high and low,* *L= active low,* *H= active high.*							

Table 9.2 Pinout Of Host Scanner Connector (JP2) (Continued)

Pin	Name On WORKABOUT PRO	Name On Converter Board	Description	Direction	Active State	State During Device Sleep	Pull-up Or Pull-down
4	USB_H2_D-	(Not connected.)	USB host port 2 D-	Input/ outputl	B	Pulled down	15 kΩ
5	IR_RXD	RXD	Data from scanner device to WORKA-BOUT PRO	Input	B	Pulled up	100 kΩ
6	USB_H2_D+	(Not connected.)	USB host port 2 D+	Input/ outputl	B	Pulled down	15 kΩ
7	nBAR_CTS	CTS	CTS from scanner to WORKA-BOUT PRO	Input	L	Pulled up	100 kΩ
8	GND	(Connected to ground.)	Ground	Power	N/A	N/A	N/A
9	nBAR_RTS	RTS	RTS from WORKA-BOUT PRO to scanner.	Output	L	Low	N/A
10	N/C	(Connected to ground.)	Do not connect.	N/A	N/A	N/A	N/A
11	GND	(Connected to ground.)	Ground.	Power	N/A	N/A	N/A
12	GND	(Connected to ground.)	Ground.	Power	N/A	N/A	N/A
13	KB_SCAN_R7	KB_SCAN_R7	Keyboard row 7	Input	N/A	Pulled down	1 MΩ
14	V+3.3	V+3.3	3.3V Power supply.	Power	N/A	Enabled	N/A
15	KB_SCAN_COA	KB_SCAN_CO A	Keyboard column 0.	Output	N/A	Driven	None

Abbreviations:
N/A= not applicable;
A=- according to design requirements of driver and scanner device,
B = both high and low,
L= active low,
H= active high.

Table 9.2 Pinout Of Host Scanner Connector (JP2) (Continued)

Pin	Name On WORKABOUT PRO	Name On Converter Board	Description	Direction	Active State	State During Device Sleep	Pull-up Or Pull-down
16	BAR_PWRWDWN	HOST_PWRDWN	Power-down from scanner device to WORKABOUT PRO.	Input	H	Pulled up	100 kΩ
17	BAR_TYPE	BAR_TYPE	Not used.	Input	B	Pulled up	100 kΩ
18	BAR_WKUP	HOST_WKUP	Wakeup signal to scanner device.	Output	A	Low	None
19	N/C	(Connected to ground.)		N/A	N/A	N/A	N/A
20	BAR_TRIG	HOST_TRIG	Trigger signal to scanner device	Output	A	Low	None
21	GND	(Connected to ground.)	Ground	Power	N/A	N/A	N/A
22	GND	(Connected to ground.)	Ground	Power	N/A	N/A	N/A

Abbreviations:
N/A= not applicable;
A=- according to design requirements of driver and scanner device,
B = both high and low,
L= active low,
H= active high.

Scan Engine Connector

JP1 is a 12-pin connector that accepts a cable that connects to the scan engine itself. This connector has different pinouts depending on whether the converter board is configured for Symbol, or Intermec, scan engines.

Table 9.3 Pinout Of Scan Engine Connector JP1 (Configured For Symbol)

Pin	Name On Converter Board	Description	Direction
1	V+5_BAR	+5V supply to scan engine	Power
2	V+5_BAR	+5V supply to scan engine	Power
3	GND	Ground	Power

Note: "Input" and "output" are relative to the WORKABOUT PRO main logic board.

Table 9.3 Pinout Of Scan Engine Connector JP1 (Configured For Symbol) (Continued)

Pin	Name On Converter Board	Description	Direction
4	Symbol_RXD_Inter_PWREn	Data from scan engine to WORKABOUT PRO.	Input
5	Inter_Symbol_TXD	Data from WORKABOUT PRO to scan engine.	Output
6	Inter_RTS_Symbol_CTS	CTS from scan engine to WORKABOUT PRO	Input
7	Symbol_RTS	RTS from WORKABOUT PRO to scan engine.	Output
8	Symbol_PWRDWN	Power-down signal from scan engine to WORKABOUT PRO.	Input
9	NC	Not connected.	
10	Symbol_CTS	CTS from scan engine to WORKABOUT PRO	Input
11	Symbol_WKUP	Wakeup signal to scan engine.	Output
12	Symbol_TRIG	Trigger signal to scan engine.	Output

Note: "Input" and "output" are relative to the WORKABOUT PRO main logic board.

Table 9.4 Pinout Of Scan Engine Connector JP1 (Configured For Intermec)

Pin	Name On Converter Board	Description	Direction
1	V+5_BAR	+5V supply to scan engine	Power
2	Inter_RXD	Data from scan engine to WORKABOUT PRO.	Input
3	Inter_Trigger	Trigger signal to scan engine.	Output
4	Symbol_RXD_Inter_PWREn	Wakeup signal to scan engine.	Output
5	Inter_Symbol_TXD	Data from WORKABOUT PRO to scan engine.	Output
6	Inter_RTS_Symbol_CTS	RTS from WORKABOUT PRO to scanner module	Output
7	GND	Ground	Power
8	Symbol_PWRDWN	Power-down signal from scan engine to WORKABOUT PRO. Connected to pin 11.	Input
9	NC	Not connected.	
10	Inter_CTS	CTS from scan engine to WORKABOUT PRO	Input
11	Symbol_PWRDWN	Power-down signal from scan engine to WORKABOUT PRO. Connected to pin 8.	Input
12	GND	Ground	Power

Note: "Input" and "output" are relative to the WORKABOUT PRO main logic board.

Trigger Switch Connector

CN3 is a three-pin header that allows connection to the trigger-switch lines fed from the WORKABOUT PRO's keyboard matrix.

9.3 Power And Ground

The WORKABOUT PRO provides the following power and ground connections to JP2 on the scanner board:

- Ground (pins 8, 11, 12, 21, 22 on the scanner flex).
- V+5_BAR (pin 1 and 2).
  This voltage is +5 V from a DC-DC converter fed by V_+5, the WORKABOUT PRO main 5 V supply. It is switched by the scanner power-enable signal BAR_PWR_EN.
- V+3.3 (pin 14):
  +3.3 V from the WORKABOUT PRO internal DC-to-DC converter.

These voltages have the following specifications:

Table 9.5 Supply Voltages For The Scanner

Supply	Nominal Voltage	Continuous Current	Peak Current	Max Peak Duration
V+5_BAR	5 V	300 mA	500 mA	100 mS
V+3.3	3.3 V	150 mA	1000 mA	N/A

The voltage VIN is fed by a diode OR of V_BAT (the DC voltage supplied by the WORKABOUT PRO battery), and DC_IN, the DC power input to the terminal. VIN feeds a DC-to-DC converter; the output of the converter is switched by PWR_EN and is known as V+5_BAR.

V+5_BAR is maintained by the DC-to-DC converter at 5V. V+5_BAR can be switched on and off by software while the WORKABOUT PRO is running, but it is disabled when it is suspended.

V+3.3 remains powered when the WORKABOUT PRO is suspended.

On this scanner board, V+5_BAR controls an Atmel AAT4250 switch to switch V+3.3 to the scanner module itself. The switched 3.3 V power is V+3.3_BAR.

9.4 Signals To The Scanner Module

The WORKABOUT PRO does not provide the data and address buses of its main processor (the PXA255) to the scanner port. Instead, communication to the scanner is provided by USB or serial lines. All the serial signals are present to connect a decoded scanner. A USB host port is also proved so that USB peripherals can be connected via the scanner port.

9.4.1 Serial Signals

This scanner board is configured to use serial communications with the Symbol SE1223 scanner series. When the scanner board is configured to use serial communication, the scanner uses the following signals from JP2, the 22-pin scanner flex that connects to the WORKABOUT PRO:

- IR_TXD (data to the scanner device, pin 3 on JP2).
- IR_RXD (data from the scanner device, pin 5).
- nBAR_CTS (Clear To Send flow-control signal from the scanner device, pin 7).
- nBAR_RTS (Ready To Send flow-control signal to the scanner device, pin 9).

These signals are buffered through U1, a 74LVC244A octal buffer. The buffered signals connected to the scanner itself (through the 12-pin JP1) are, in the same order:

- BAR_TXD (data to the scanner device, pin 5 on JP1).
- BAR_RXD (data from the scanner device, pin 4).
- BAR_CTS (Clear To Send flow-control signal from the scanner module, pin 6).
- BAR_RTS (Ready To Send flow-control signal to the scanner device, pin 7).

Note: nBAR_CTS and nBAR_RTS are not hardware flow-control signals, CTS must be polled by software, and RTS has to be set / cleared by software.

Apart from V+5_BAR, the signals connected to the scanner port are 3.3 V CMOS. Use a level translator before the scanner cable to connect 5 V signals to the WORKABOUT PRO main PCB.

9.4.2 USB Signals

When the scanner board is configured to use USB communication, the scanner uses the following signals from JP2, the 22-pin scanner flex that connects to the WORKABOUT PRO:

- USB_H2_D+ (pin 6 on JP2).
- USB_H2_D- (pin 4).

These signals are buffered through U1, and use the following pins on JP1, in the same order:

- Pin 6.
- Pin 4.

Note: The WORKABOUT PRO does not provide a USB power-enable signal to the scanner board.

9.4.3 Control Signals

There are control signals used for both USB and serial scanner devices:

- BAR_PWRDWN (pin 16 on JP2).
- BAR_WKUP (pin 18).
- BAR_TRIG (pin 20).

BAR_PWRDWN is an input to the main logic board. The scanner can use this signal to inform the WORKABOUT PRO that it has shut down.

BAR_WKUP is an output from the main logic board. This signal is buffered through U1 and is provided to the scanner module as BAR_WKUP.

BAR_TRIG is an output from the main logic board. This signal is buffered through U1 and is provided to the scanner module as BAR_TRIG.

The operation of these signals is dependent on the driver controlling them.

A pair of lines from the WORKABOUT PRO keyboard matrix are also provided through JP2:

- KB_SCAN_R7 (an input, pin 13 on JP2)
- KB_SCAN_C0A (an output, pin 15)

These signals can be shorted together for a minimum of 20 milliseconds to initiate a scan or wake up the terminal. On the scanner board, these signals are connected directly to CN3.

EXAMPLE: PCMCIA EXPANSION MODULE 10

10.1 Overview

This chapter describes a PCMCIA Expansion Module available for the WORKABOUT PRO—part number 1030248, model WA9001. The instructions in this chapter build on the information in Chapter 4: “Mechanical Considerations” and Chapter 7: “100-Pin Connector”.

The PCMCIA expansion module allows the user to connect a Type I or Type II PCMCIA card to the WORKABOUT PRO. The expansion module accepts 3.3 V and 5 V PCMCIA cards.

The card must fit within the enclosure of the WORKABOUT PRO when the endcap and card stop are installed, although a custom endcap can be created for extended PCMCIA cards.

This expansion module plugs into the WORKABOUT PRO 100-pin expansion connector.

The PCMCIA expansion module is available as a kit. The kit includes the following items:

- PCMCIA adaptor board (part number 1030313).
- Mechanical stop for the PCMCIA card (part number 1030224).
- Eight M2 x 4 screws (part number 9001906).
- Installation instructions (part number 8000037).

A metal frame for mounting the expansion module is already provided in the WORKABOUT PRO. It also serves as a guide for the PCMCIA card.

10.2 Installation

To install the PCMCIA Adaptor Expansion Module:

1. Install the expansion module as shown in “Expansion Module Installation” on page 34.
2. Remove the WORKABOUT PRO end-cap.

Note: This sample PCMCIA Expansion Module does not use the mounting frame screw holes. Instead, it is attached along its lower edge using the screws that hold the mounting frame in place. These screws must be removed in order to position the expansion module, and replaced once it is positioned.

To insert a PCMCIA card, slide it in through the end of the WORKABOUT PRO. When the PCMCIA card is inserted, it is restrained by a plastic card stop. This card stop is fastened to the body of the WORKABOUT PRO by four M2 x 4 screws. The endcap fits over the top of the card stop.

10.3 Dimensions

An IGES model of the PCMCIA expansion model is in **...\Mechanical\WORKABOUTPRO\iges_files\pcmcia_xmod.igs**. In this model the lower screw holes are positioned so that the module attaches to the mounting frame using the mounting frame screws. Unless you want to attach your expansion module in this way, use the IGES model of the mounting frame to determine the screw locations.

10.4 Expansion Module Connectors

The expansion module connects to the WORKABOUT PRO 100-pin connector. It also has an unkeyed PCMCIA connector.

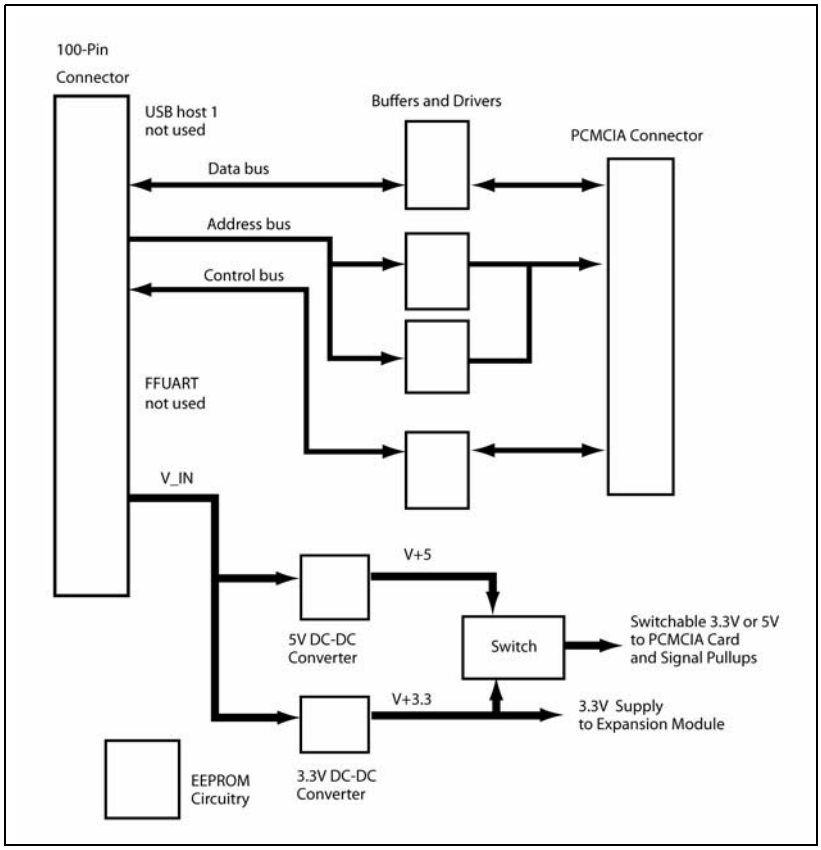
The PCMCIA connector is aligned parallel to the expansion board, on the opposite side to the 100-pin connector.

When installed inside the WORKABOUT PRO, the PCMCIA Expansion Module can accept PCMCIA Type I and Type II cards. The cards are secured by the PCMCIA card stop. Extended Type I and Type II cards can be accommodated if the WORKABOUT PRO endcap and card stop are removed.

10.5 Electrical

The schematics for this PCMCIA expansion module are in **...\Electrical\WORKABOUTPRO\Samples\PCMCIAExpansionCard.pdf**.

Figure 10.1 The PCMCIA Expansion Module Block Diagram



The PCMCIA Expansion Module serves as a PCMCIA host bus adaptor for the WORKABOUT PRO, buffering the system data and address buses from the 100-pin connector to the PCMCIA connector.

The expansion module incorporates a Psion Teklogix-standard serial EEPROM for identification to the WORKABOUT PRO system.

10.5.1 PCMCIA Compatibility

The PCMCIA Expansion Module implements a subset of the PCMCIA standard. Depending on driver support in the WORKABOUT PRO, it can handle the following PCMCIA Card interfaces:

- Memory
- Memory or I/O

The Expansion Module can supply a maximum of 750 mA to the PCMCIA card through the VCC pins.

The handling of some other signals is described in the following sections which use the signal names on the schematic of the Expansion Module, referencing pin names at the connectors only when necessary.

10.5.2 The Card Detect Signals

The two Card Detect signals from the PCMCIA connector (nPC_CD1 and nPC_CD2, active low) are pulled low when a card is inserted. On the expansion card, they are ORed through buffer U208 to become the nSLOT_CD signal (active low). This signal goes to the 100-pin connector, and it is also used elsewhere in the module.

10.5.3 The Buffer Enable Signals

The nSLOT_CD signal is ORed with nSLOT_PSKTSEL and nSLOT_BUF_EN (active-low and from the 100-pin connector) to create the nSLOT_BUF_OE signal. This signal, active low, enables the data-bus, control-bus, and address-bus buffers on the expansion module.

The data-bus buffer, U201, is bidirectional. The signal nCARD_D_DIR (active low) specifies which direction U201 will forward data.

10.5.4 The Slot Power Enable Signal

The SLOT_PWR_EN signal from the 100-pin connector (active high) is ANDed with a number of other signals as they cross the Expansion Module.

The nPC_VS1, nPC_BVD1 signals from the PCMCIA connector, active low, become nSLOT_VS1 and nSLOT_BVD1 respectively at the 100-pin connector. The PC_READY signal from the PCMCIA connector, active high, becomes the SLOT_READY signal at the 100-pin connector

The SLOT_RST signal from the 100-pin connector, active high, becomes the PC_RST signal at the PCMCIA connector.

All of these signals require the SLOT_PWR_EN signal to be asserted (high) before they are forwarded.

10.5.5 Selectable Card Supply Voltage

The supply voltage for the PCMCIA card is selectable (3.3 V or 5 V) through the SLOT_PWR_SEL and SLOT_5V_EN signals from the 100-pin connector.

The SLOT_PWR_SEL signal, when active (high), enables the supply voltage to the PCMCIA card.

When asserted (high), the SLOT_5V_EN signal switches the 5 V output of U301 to the V+3.3/V+5 line. When SLOT_5V_EN is low, the 3.3 V module supply voltage from U303 is switched to the V+3.3/V+5 line.

The V+3.3/V+5 line provides the PCMCIA card supply voltage, VCC, on pins 17 and 51 of the PCMCIA connector. It also serves to pull the PC_READY, nPC_BVD1, nPC_VS1, nPC_WAIT_SRC, and nPC_IOIS16 lines high, maintaining compatibility between these signals and the PCMCIA card.

10.6 EEPROM Data

The EEPROM fields are described in “Expansion Module EEPROM Fields” on page 75. In the PCMCIA Expansion Module they are programmed as follows:

Table 10.1 EEPROM Contents Of PCMCIA Adaptor Expansion Module

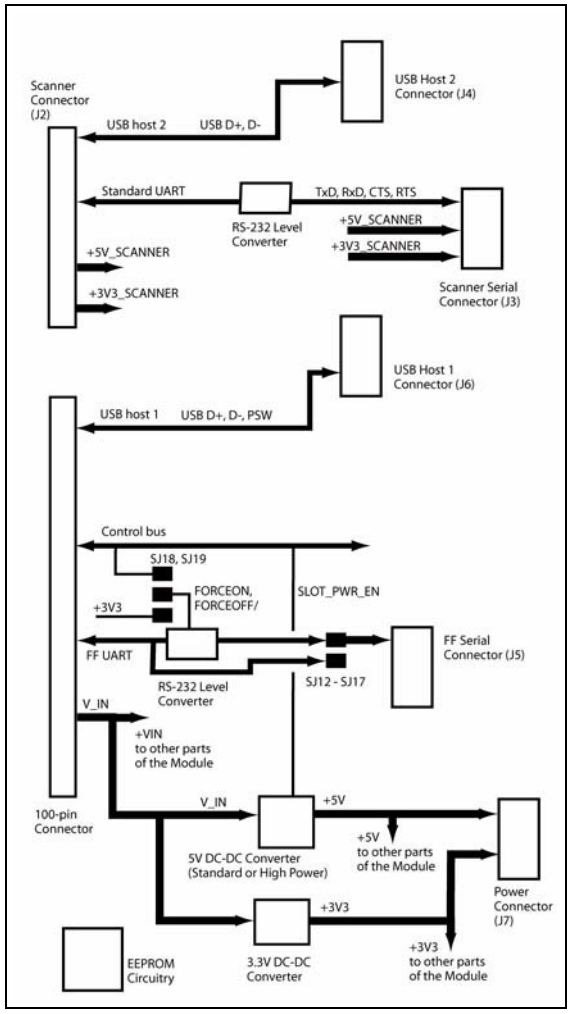
EEPROM Field	Address	Size	Contents
1) Manufacturing test region	0-9	10 bytes	
2) Revision	10	1 byte	ASCII ‘1’ (0x31)
3) Hardware revision	11	1 byte	ASCII ‘0’ (0x30) for revision ES0, ASCII ‘1’ (0x31) for revision ES1
4) Hardware type	12	1 byte	ASCII ‘a’ (0x61)
5) Manufacturer/Model	13-32	20 bytes	ASCII text ‘PsionTeklogix PCMCIA’: .0x50, 0x73, 0x69, 0x6f, 0x6e, 0x54, 0x65, 0x6b, 0x6c, 0x6f, 0x67, 0x69, 0x78, 0x20 0x50, 0x43, 0x4d, 0x43, 0x49, 0x41
6) Serial number	33-44	12 bytes	ASCII text, as appropriate. Example: ‘1234’ is 0x31, 0x32, 0x33, 0x34, 0x00. The remaining locations are not programmed, and contain 0xff
7) Manufacturer-specific	45+	83+	All 0xff

EXAMPLE: MULTI-I/O EXPANSION MODULE 11

11.1 Overview

This chapter describes the Multi-I/O Expansion Module for the WORKABOUT PRO. This product is no longer supplied by Psion Teklogix. These instructions are intended to give you guidance in the design and implemention of an expansion module for the WORKABOUT PRO. They build on the information in Chapter 4: “Mechanical Considerations”, Chapter 7: “100-Pin Connector”, and Chapter 8: “Scanner Connector”.

Figure 11.1 Multi I/O Expansion Module Block Diagram



The Multi-I/O Expansion Module fits inside the WORKABOUT PRO and is designed to connect to the 100-pin connector, and optionally to the scanner connector, of the WORKABOUT PRO. It allows easy access (through low profile SMT MOLEX connectors): to the WORKABOUT PRO full-function UART (FFUART) at TTL or RS-232 level; to the scanner port UART (at RS-232 level); and to two USB host connections.

The Multi-I/O Expansion Module can provide power to the devices connected to it. Two options are available, one to supply 5 V, and one to supply 3.3 V. The standard current supply is limited to 100 mA, whereas the high-current power option provides a 4 A at 5 V. This supply can be software controlled.

Features of the Multi-I/O Expansion Module include:

- Interface to the WORKABOUT PRO 100-pin connector:
  - FFUART serial connections.
  - 3 General-Purpose I/O signals.
  - +VIN DC supply.
- Interface to the WORKABOUT PRO scanner connector:
  - Scanner serial connections.
  - USB host 2 connections.
  - 3.3 V and 5 V for the scanner device.
- Conversion of the serial data and control lines for the FFUART and the scanner UART from CMOS levels to RS-232 levels. The conversion for the FFUART can be bypassed.
- Provision of regulated 5 V, and 3.3 V, DC supplies from the WORKABOUT PRO unregulated supply voltage VIN:
  - 5 V at 100 mA standard.
  - 3.3 V at 50 mA standard.
  - 5 V at 4 A optional.
- Optional loading of extra drivers through the I2C EEPROM.

11.2 Schematics

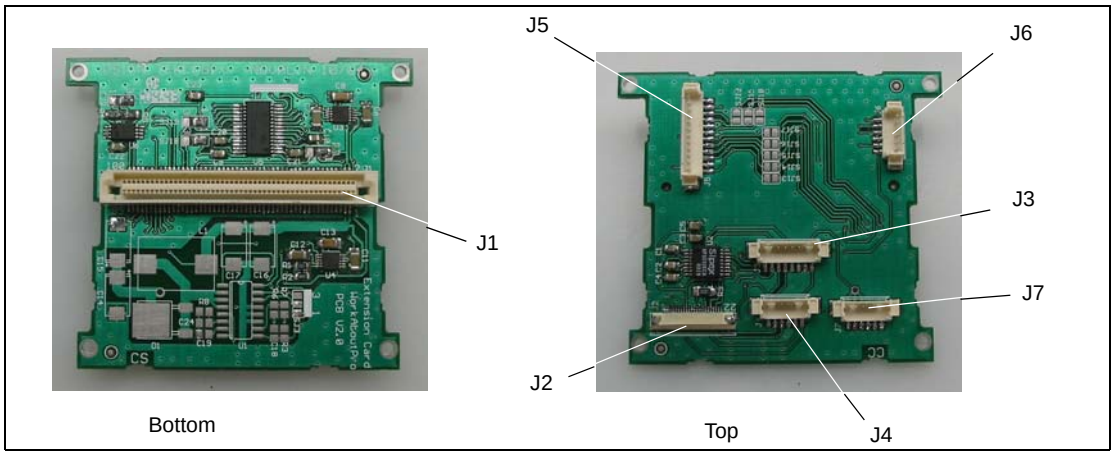
The schematics for the Multi I/O Expansion Module are in **...\Electrical\WORKABOUTPRO\Samples\MultiIOBoard.pdf**.

11.3 Connectors

The Multi-I/O Expansion Module has the following connectors:

- 100-pin connector to the WORKABOUT PRO main logic board (J1).
- Scanner connector to the WORKABOUT PRO main logic board (J2).
- Connector for the scanner-port UART (J3).
- Connector for the scanner-port USB host (USB host 2) (J4).
- Connector for the UART on the 100-pin connector (the FFUART) (J5).
- Connector for the USB host on the 100-pin connector (USB host 1) (J6).
- Power connector (Ground and +5V) (J7).

Figure 11.2 Connector Locations



11.3.1 Main Logic Board 100-Pin Connector (J1)

The full pinout is listed in "Table 7.1 Pinout of the WORKABOUT PRO 100-Pin Connector" on page 64.

11.3.2 Main Logic Board Scanner Connector (J2)

The full pinout is listed in "Table 8.1 Pinout Of The Scanner Connector" on page 83.

11.3.3 Scanner-Port Serial Connector (J3)

The serial connector (from the UART on the WORKABOUT PRO scanner-port) has the following pinout:

Table 11.1 Pinout Of Scanner-Port Serial Connector (J3)

Pin	Name	Description	Direction	Active State	State During Sleep	Pull-up Or Pull-down
1	+3V3_SCANNER	Regulated 3.3 V supply from WORKABOUT PRO	Power	N/A	N/A	N/A
2	TX_232	Data from WORKABOUT PRO to scanner device. At RS-232 levels	Output	B		
3	GND	Ground	Power	N/A	N/A	N/A
4	RX_232	Data from scanner device to WORKABOUT PRO. At RS-232 levels	Input	B		None
6	+5V_SCANNER	Regulated 5 V supply from WORKABOUT PRO	Power	N/A	N/A	N/A

Abbreviations:
N/A= not applicable;
B = both high and low,
L= active low

Table 11.1 Pinout Of Scanner-Port Serial Connector (J3)

Pin	Name	Description	Direction	Active State	State During Sleep	Pull-up Or Pull-down
7	CTS	CTS from scanner device to WORKABOUT PRO. At RS-232 levels.	Input	L	Pulled up	100 kΩ
8	RTS	RTS from WORKABOUT PRO to scanner device. At RS-232 levels.	Output	L	Low	N/A

Abbreviations:
N/A= not applicable;
B = both high and low,
L= active low

11.3.4 USB Host Port 2 Connector (J4)

The USB Host 2 connector (from the WORKABOUT PRO scanner connector) has the following pinout:

Table 11.2 Pinout Of USB Host 2 Connector (J4)

Pin	Name	Description	Direction	Active State	State During Sleep	Pull-up Or Pull-down
1	+3V3_SCANNNER	Regulated 3.3 V supply from WORKABOUT PRO	Power	N/A	N/A	N/A
2	USB_H2_D+	USB host port 2 D+	Bidirectional	B	Pulled down	15 kΩ
3	GND	Ground	N/A	N/A	N/A	N/A
4	USB_H2_D-	USB host port 2 D-	Bidirectional	B	Pulled down	15 kΩ
5	+5V	Regulated 5 V supply	Power	N/A	Disabled	N/A
6	+V_IN	Unregulated DC supply from WORKABOUT PRO	Power	N/A	N/A	N/A

Abbreviations:
N/A= not applicable;
B = both high and low

11.3.5 The FF UART Serial Connector (J5)

The serial connector from the FF UART (on the WORKABOUT PRO 100-pin connector) has the following pins:

Table 11.3 Pinout Of FF UART Connector (J5)

Pin	Name	Description	Direction	Active State	State During Sleep	Pull-up Or Pull-down
1	+V_IN	Unregulated DC supply from WORKABOUT PRO	Power			
2	+3V3	Regulated 3.3 V supply from expansion module.	Power	N/A	N/A	N/A
3	FF_RTS	Ready To Send signal from WORKABOUT PRO to scanner device. Configurable for RS-232 or TTL levels through SJ12.	Output	L	Low	N/A
4	FF_DTR	Data Terminal Ready signal from WORKABOUT PRO to scanner device. Configurable for RS-232 or TTL levels through SJ11.	Output	L	Low	N/A
5	GND	Ground	N/A	N/A	N/A	N/A
6	FF_TXD	Data from WORKABOUT PRO to scanner device. Configurable for RS-232 or TTL levels through SJ10.	Output	L	Low	N/.A
7	FF_RI	Ring Indicator signal from scanner device to WORKABOUT PRO. Configurable for RS-232 or TTL levels through SJ17.	Input	L	Pulled up	100 kΩ
8	FF_DSR	Data Set Ready signal from scanner device to WORKABOUT PRO. Configurable for RS-232 or TTL levels through SJ16	Input	L	Pulled up	100 kΩ
9	FF_DCD	Data Carrier Detect signal from scanner device to WORKABOUT PRO. Configurable for RS-232 or TTL levels through SJ15	Input	L	Pulled up	100 kΩ
10	FF_CTS	Clear To Send signal from scanner device to WORKABOUT PRO Configurable for RS-232 or TTL levels through SJ14	Input	L	Pulled up	100 kΩ

Abbreviations:
N/A= not applicable;
L= active low

Table 11.3 Pinout Of FF UART Connector (J5)

Pin	Name	Description	Direction	Active State	State During Sleep	Pull-up Or Pull-down
11	GND	Ground	N/A	N/A	N/A	N/A
12	FF_RXD	Data from scanner device to WORKABOUT PRO. Configurable for RS-232 or TTL levels through SJ13.	Input			

Abbreviations:
N/A= not applicable;
L= active low

11.3.6 The USB Host 1 Connector (J6)

The serial connector from the FF UART (on the WORKABOUT PRO's 100-pin connector) has the following pinout:

Table 11.4 Pinout Of USB Host 1 Connector (J6)

Pin	Name	Description	Direction	Active State	State During Sleep	Pull-up Or Pull-down
1	+V_IN	Unregulated DC supply from WORKABOUT PRO	Power	N/A	Disa-bled	N/A
2	USB_H1_PSW	Power Enable signal from the WORKABOUT PRO's USB hub	Output			
3	GND	Ground	N/A	N/A	N/A	N/A
4	USB_H1_D-	USB host port 1 D-	Bidirec-tional	B	Pulled down	15 kΩ
5	USB_H1_D+	USB host port 1 D+	Bidirec-tional	B	Pulled down	15 kΩ
6	+3.3V	Regulated 3.3 V supply from expansion module.	Power	N/A	N/A	N/A

Abbreviations:
N/A= not applicable;
B = both high and low

11.3.7 The Power Connector (J7)

Connector J7 carries power and ground. This connector has the following pinout:

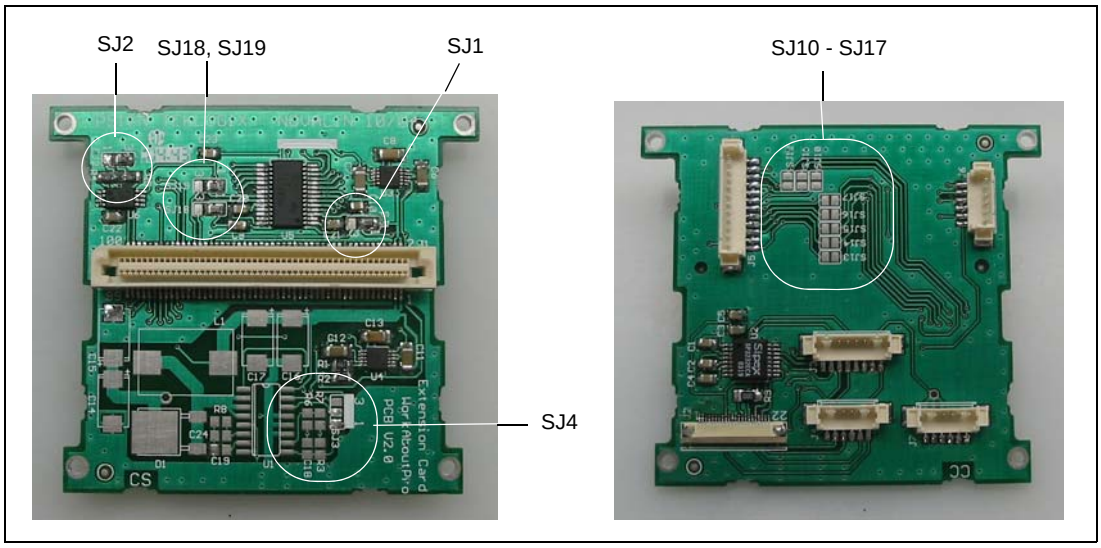
Table 11.5 Pinout Of Power Connector (J7)

Pin	Name	Description	Direction	Active State	State During Sleep	Pull-up Or Pull-down
1, 2, 3	GND	Ground	Power	N/A	N/A	N/A
4, 5, 6	VOUT	Output supply voltage. See Section 11.4.4 and Section 11.4.3 for configuration details.	Power	N/A	N/A	N/A

11.4 Configuration

The Multi-I/O Expansion Module has a number of jumpers and resistors, (SJ1 through SJ19, plus R1, R2, R6, and R7), for configuration of its hardware. Several sets of components are optional depending on how the board is configured:

Figure 11.3 Location Of Configuration Jumpers And Resistors



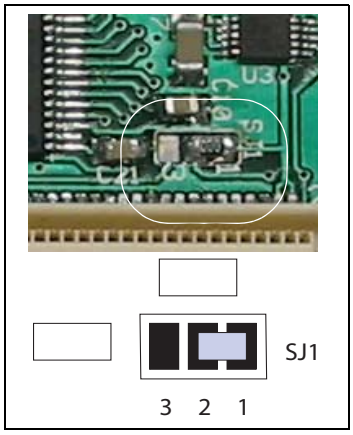
The jumpers and resistors configure the following options:

- Enable or disable software control of power to the expansion module. (See “Slot Power Control” on page 114.)
- Select write control for the EEPROM. (See “EEPROM Write Control” on page 114.)
- Configure the output voltage for the high-power option. (See “Voltage Configuration For Standard-Power Output” on page 115.)
- Configure the output voltage for the standard-power option. (See “Voltage Configuration For Standard-Power Output” on page 115.)
- Configure the FORCEON and FORCEOFF/ control signals for the RS-232 converter on the FFUART port. (See “Control Signals For FFUART Level Converter” on page 117.)

- Connect the TTL-level signals from the WORKABOUT PRO's main logic board directly to the FFUART output connector (J5). (See "TTL Output Option For Scanner Serial Port" on page 118.)

11.4.1 Slot Power Control

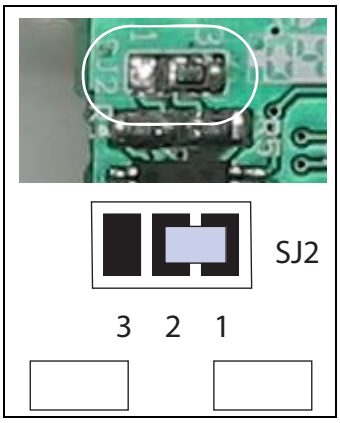
Jumper SJ1 enables or disables control by the WORKABOUT PRO of power to the expansion module.



Jumper Between	State	Notes
no jumper	Power not enabled	
1 and 2	Power controlled by SLOT_PWR_EN	
2 and 3	Power always enabled	Pad 2 is pulled up to +VIN.

11.4.2 EEPROM Write Control

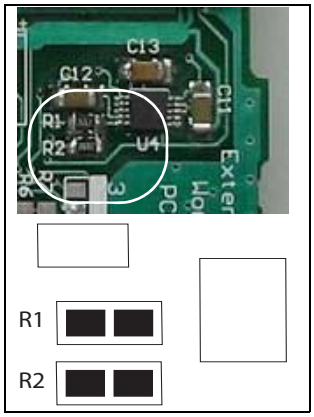
Jumper SJ2 selects write control for the EEPROM.



Jumper Between	State	Notes
no jumper	The write behaviour depends on the type of EEPROM installed.	
1 and 2	Writing to the EEPROM is disabled	Pad 2 is pulled down to ground.
2 and 3	Writing to the EEPROM is enabled	Pad 2 is pulled up to +3 V.

11.4.3 Voltage Configuration For Standard-Power Output

R1 and R2 set the output voltage for the standard-power supply option of the Expansion Module.



Desired Voltage	R1	R2
3.3V	Open	Jumpered (zero-ohm resistor)
5V	261 kΩ	86.6 kΩ
Configurable voltage	See text	

To determine the values of R1 and R2, given the desired output voltage Vout:

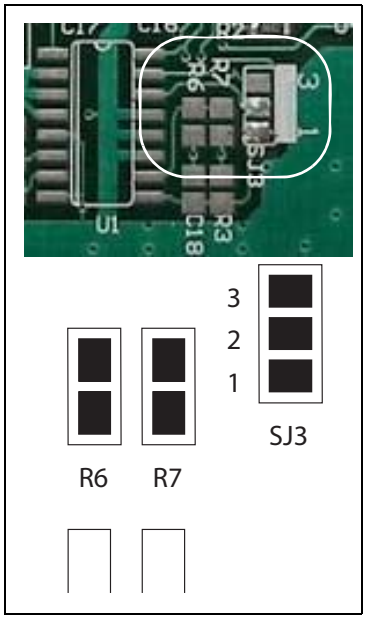
1. Select a value for R2. (R2 should be between 50 kΩ and 100 kΩ.)
2. R1 can be found according to the following equation:

$$R1 = R2\left(\frac{Vout}{1.235} - 1\right)$$

Important: Use these resistors and jumpers ONLY if U4 and its associated components for the standard-power output are installed. These components are indicated as "Option Standard Power (SP)" in the schematic on page B-3.

11.4.4 Voltage Configuration For High-Power Output

Jumper SJ3, along with R6 and R7, set the output voltage for the Expansion Module high-power supply option.



Desired Voltage	Jumper Between	R6	R7
3.3 V	2 and 3	jumpered (zero-ohm resistor)	open
5 V	1 and 2	jumpered (zero-ohm resistor)	open
Configurable voltage	2 and 3	see text	

To determine the values of R6 and R7, given the desired output voltage Vout:

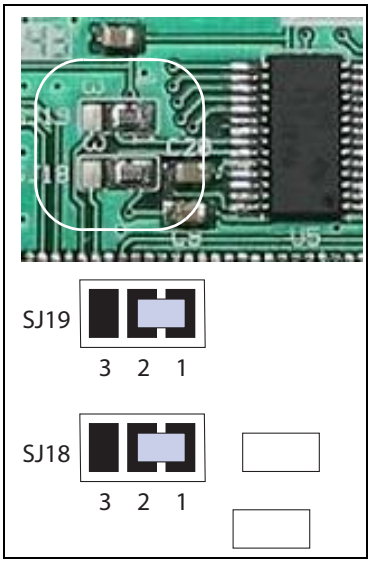
1. Select a value for R6. (R6 should be less than 50 kΩ.)
2. R7 can be found according to the following equation:

$$R7 = R6\left(\frac{Vout}{1.24} - 1\right)$$

Important: ***Use these resistors and jumpers ONLY if U1 and its associated components for the high-power output are installed. These components are indicated as "Option High Power (HP)" in the schematic.***

11.4.5 Control Signals For FFUART Level Converter

Jumpers SJ18 and SJ19 configure the FORCEON and FORCEOFF/ control signals for the MAX3243 RS-232 level-converter that handles the signals from the FFUART to J5.



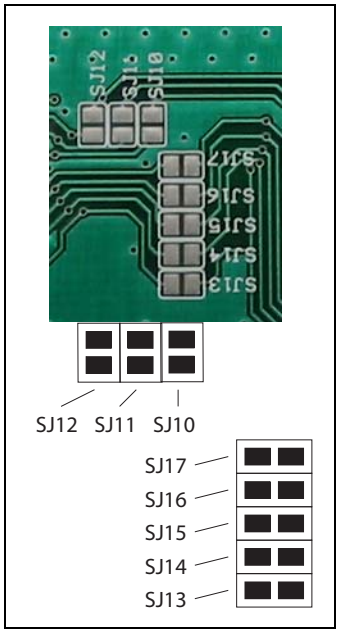
Jumper Between	SJ18 Signal State
no jumper	FORCEON signal not connected.
1 and 2	FORCEON signal controlled by GPIO43 (pin 74 on the 100-pin connector)
2 and 3	FORCEON signal tied to 3.3 V.

Jumper Between	SJ19 Signal State
no jumper	FORCEOFF/ signal not connected.
1 and 2	FORCEOFF/ signal controlled by GPIO44 (pin 76 on the 100-pin connector).
2 and 3	FORCEOFF/ signal tied to 3.3 V.

Note: Refer to the data sheet for the MAX3243 for the use of these signals.

11.4.6 TTL Output Option For Scanner Serial Port

Jumpers SJ10 through SJ17 connect the TTL-level serial lines for the scanner serial port from J2 directly to their output connector J5.



Jumper State	State
No jumper (default)	Signal input on J2 is NOT connected directly to output on J5.
Jumper present	Signal input on J2 is connected directly to output on J5.

The jumpers are assigned to individual signal lines as follows:

Jumper Number	SJ10	SJ11	SJ12	SJ13	SJ14	SJ15	SJ16	SJ17
Signal Line	FF_TXD	FF_DTR	FF_RTS	FF_RXD	FF_CTS	FF_DCD	FF_DSR	FF_RI

Important: ***U5 (the MAX3243 RS-232 level converter), and its associated components, MUST NOT be mounted on the board if these jumpers are to be used. These components are indicated as "Option 232" on the schematic.***

11.5 Power And Ground

The WORKABOUT PRO provides the following power and ground connections to the Multi-I/O Expansion Module:

Through the scanner connector (J2):

- Ground (pins 1, 2, 11, 12, 15).
- +5V_SCANNER (pins 21and 22).

  This voltage is +5 V from a DC-DC converter fed by V_IN, the WORKABOUT PRO main supply. It is switched by the scanner power enable signal.

- +3V3_SCANNER (pin 9)

  +3.3 V from the WORKABOUT PRO internal DC-to-DC converter.

Through the 100-pin connector (J1):

- Ground (pins 21, 22, 39, 40, 57, 58, 77, 78, 84).
- +VIN (pins 1, 2, 3, 4).

  This voltage is the WORKABOUT PRO unregulated DC supply.

Ground for both of these connectors is tied together.

These voltages have the following specifications:

Table 11.6 Voltages Supplied To The Multi-I/O Expansion Module

Supply	Nominal Voltage	Minimum Voltage	Maximum Voltage	Continuous Current
+V5_SCANNER	5 V			300 mA
+3V3_SCANNER	3.3 V			100 mA
VIN		2 V	5 V	

The voltage VIN is fed by a diode OR of V_BAT (the DC voltage supplied by the WORKABOUT PRO battery), and DC_IN, the DC power input to the terminal. VIN feeds a DC-to-DC converter; the output of the converter is switched by the and is known as V+5_BAR.

When the terminal is powered by a DC power supply, VIN will be at 5 V minus a diode drop. When the terminal is powered by the battery, VIN is at battery voltage, minus a diode drop. (Nominal battery voltage is 3.7 V.) VIN has a minimum of 2 V and a maximum of 5 V.

+5V_SCANNER is maintained by the WORKABOUT PRO DC-to-DC converter at 5 V. +5V_SCANNER can be switched on and off by software while the WORKABOUT PRO is running, but it is disabled when the WORKABOUT PRO is suspended.

+3V3_SCANNER remains powered when the WORKABOUT PRO is suspended.

11.6 EEPROM Data

The EEPROM in the Multi-I/O Expansion Module must be programmed. See “I2C Device Identification” on page 73 for details.

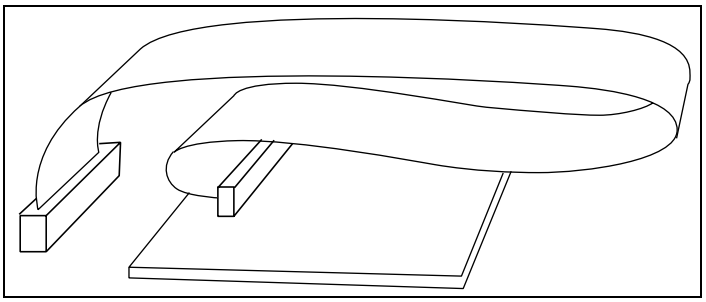
11.7 Installation

The Multi-I/O Expansion Module fits in the WORKABOUT PRO expansion slot, and fastens to the metal mounting frame:

The Multi-I/O Expansion Module fastens to the mounting frame with the standard screws (M2 x 4). When used for development, it is easiest to leave the backplate or endcap off for access to the connectors on the Multi-I/O Expansion Module. The Multi-I/O Expansion Module needs only a normal backplate to function, but for exterior cable access, a custom backplate may be needed.

The scanner cable fits straight between the scanner connector in the WORKABOUT PRO and the scanner connector on the Multi-I/O Expansion Module. It may need to be folded.

Figure 11.4 Arrangement Of Cable Between Main Logic Board And Multi-I/O Expansion Module



APPENDIX A

SUPPORT SERVICES / WORLDWIDE OFFICES

Psion Teklogix provides a complete range of product support services to its customers worldwide. These services include technical support and product repairs.

A.1 Technical Support

For technical support in North America:

Call Toll free:	+1 800 387 8898	Option 3,
		or
Direct Dial:	+1 905 813 9900 Ext. 1999	Option 3

For technical support in EMEA (Europe, Middle East and Africa), please contact the local office listed in the web site below:

http://www.psionteklogix.com/EMEASupport

For technical support in Asia, please contact the local office listed in the web site below:

http://www.psionteklogix.com

Technical Support for Mobile Computing Products is provided via e-mail through the Psion Teklogix customer and partner extranets. To reach the web site, go to www.psionteklogix.com, and click on the appropriate Teknet link on the home page. Then click on the “Login” button or the “Register” button, depending on whether you have previously registered for Teknet. Once you have logged in, search for the “Support Request Form”.

A.2 Product Repairs

For repair service in North America:

Call Toll free:	+1 800 387 8898	Option 2,
		or
Direct Dial:	+1 905 813 9900 Ext. 1999	Option 2

For repair service in EMEA (Europe, Middle East and Africa), please contact the local office listed in the web site below:

http://www.psionteklogix.com/EMEASupport

For repair service in Asia, contact the local office listed in the web site below:

http://www.psionteklogix.com

A.3 Worldwide Offices

A.3.1 Company Headquarters

Psion Teklogix Inc.

2100 Meadowvale Boulevard
Mississauga
Ontario
Canada L5N 7J9

Tel:	+1 905 813 9900
Fax:	+1 905 812 6300
E-mail:	salescdn@psion.com

A.3.2 Canadian Service Centre

Psion Teklogix Inc.

7170 West Credit Ave., Unit #1
Mississauga, Ontario
Canada L5N 7J9

Tel:	+1 800 387 8898	Option 2,
		or
Direct:	+ 1 905 813 9900 Ext. 1999	Option 2
Fax:	+ 1 905 812 6304	
Web:	www.psionteklogix.com	

A.3.3 North American Headquarters And U.S. Service Centre

Psion Teklogix Corp.

1810 Airport Exchange Boulevard
Suite 500
Erlanger, Kentucky
USA 41018

Tel:	+1 859 371 6006
Fax:	+1 859 371 6422
E-mail:	salesusa@psion.com

A.3.4 International Subsidiaries

See also www.psionteklogix.com/Subsidiaries.

Psion Teklogix S.A.

La Duranne
135 Rue Rene Descartes
BP 421000
13591 Aix-En-Provence
Cedex 3; France

Tel:	+33 4 42 90 88 09
Fax:	+33 4 42 90 88 88
E-mail:	tekeuro@psion.com

APPENDIX B

RESOURCES

B.1 Psion Teklogix WORKABOUT PRO User Manuals

The following user manuals are available at www.PsionTeklogix.com/manuals:

- Psion Teklogix. 2004. *WORKABOUT PRO M/C Hand-Held Computer User Manual* (Part number 8000024).
- Psion Teklogix. 2005. *WORKABOUT PRO Hand-Held Computer With Windows Mobile 2003 SE User Manual* (Part number 8100058).
- Psion Teklogix. 2006. *WORKABOUT PRO Hand-Held Computer With Windows Mobile 5.0 User Manual* (Part number 8100107).
- Psion Teklogix. 2007. *WORKABOUT PRO Hand-Held Computer With Windows Embedded CE 5.0 User Manual* (Part number 8000140).
- Psion Teklogix. 2007. *WORKABOUT PRO Hand-Held Computer (Model No. 7527) With Windows Mobile 6 Classic & Professional User Manual* (Part number 8000144).
- Psion Teklogix. 2005.*WA9000, WA9005, WA9006 Scanner Module Installation* (Part number 800030).

B.2 Other Psion Teklogix Manuals

The following manuals are available at www.PsionTeklogix.com/manuals:

- Psion Teklogix, 2006, *Mobile Devices SDK Developers Guide* (Part number 8100016).
- Psion Teklogix, 2005, *Psion Teklogix WA9000, WA9005, & WA9006 Scanner Module Installation* (Part number 8000030).

B.3 Psion Teklogix Downloadable Software

The following software is available at www.PsionTeklogix.com/downloads:

- Psion Teklogix USB setup utility.
- Mobile Devices SDK.

B.4 Psion Teklogix Accessory And Parts Information

- The catalog of accessories and parts for the WORKABOUT PRO is available at www.PsionTeklogix.com/Accessories.

  On the **Accessories** page:

  1. In the **Choose a product** box select the WORKABOUT PRO variant.
  2. In the **Choose a category** box select the accessory type.

APPENDIX C

SPECIFICATIONS WORKABOUT PRO M

C.1 Hand-Held Computer Specifications WORKABOUT PRO M

Note: Performance specifications are nominal & subject to change without notice.

Note: The WORKABOUT PRO M is no longer available from Psion Teklogix.

Model

- WORKABOUT PRO M - Model 7225M

Size

- Length: 8.7" (221mm)
- Width: 3" (76mm) at grip area tapering to 3.5" (90mm) at display area.
- Depth: 1.2" (31mm) at grip area tapering to 1.7" (44mm) at display area.
- Keypad area: 3" (75.5mm) width x 1.4" (36mm) depth

Weight

- With battery: 454g (16 oz):
  - add with scanner expansion module: 75 g (2.6 oz).
  - add with 802.11b CF card radio 19 g (0.7 oz).

Display

- Monochrome touch screen display.
- 16 levels of grey.
- Backlight: on/off control.

Keyboard

- 55-key alphanumeric keyboard.
- Keyboard backlight.
- High durability, hard-topped keys.

Operating System

Microsoft Windows CE .NET Version 4.2

Processor

- XScale PXA255 @ 400 MHz Processor.

Memory

- 64 MB RAM.

Audio

Indicators

Power Management

- 3.8 V Standard Capacity Li-ion rechargeable battery - up to 8 hours of operation.
- 3.8 V High-Capacity Li-ion rechargeable battery - up to 12 hours of operation.

- Advanced Smart Battery with gas gauge.
- Quick swap battery packs.
- Built-in fast charger.
- Rechargeable, user-replacable internal coin battery.
- Also accepts 3 AA alkaline batteries.

Communication

Ports	USB Host port on base for tethered USB devices (printers, etc.) Low Insertion Force Docking Station Port with: - USB Device Port - USB Host port - Power in/out

Environmental

Operating Temperature	14°F to 122°F (-10°C to +50°C)
Storage Temperature	-13°F to 140°F (-25°C to +60°C)
Rain And Dust Resistance	IEC 529, classification IP54.
Humidity	5% - 95% RH non-condensing
Shock	Multiple 4 ft. (1.2m) drops to polished concrete.

Approvals

Safety	UL60950-1, CSA C22.2 No 60950-1
EMC	FCC Part 15 Class B EN 55022 EN 55024
Laser	IEC 60825-1, Class 2 FDA 21 CFR 1040.10, 1040.11 Class II
In Vehicle Cradle	E Mark

C.2 Radio Specifications

802.11b Direct Sequence Spread Spectrum

Transmit Power	100mW max for USA 50mW max for EU countries
Frequency Range	2.400-2.474 for USA, Canada 2.400-2.484GHz for EU
Channels	1 to 11 for USA, Canada 1-13 for EU countries 1-13 or 14 for Japan
Data Rates	1,2,5.5 and 11Mbps

C.3 Scanner Options

For details of this scanner see Appendix G: "Specifications Scanners And Imagers".

- SE 1223HP

C.4 Battery Specifications

For details of the following batteries see Appendix H: "Specifications WORKABOUT PRO Batteries".

- Standard Capacity–2000 mAh (Model WA3000-G1)
- High-Capacity 3000mAh (Model WA3006)
- Maxell ML2032 Rechargeable Coin Battery

C.4.1 Standard Battery Pack

Chemistry Capacity	Lithium Ion Polymer Battery (Li-Polymer)
	1750 mAh nominal at 350mA discharge 20 °C (68° F) to 2.8V(minimum)
Voltage	3.7V nominal (2.8V min. to 4.2V max.)
Cell Configuration	1S2P (2 parallel connected cells)
Cell Type	Lithium-ion Polymer Battery
Max. Discharge Current	1A (-10° C to 60° C) -- (14° F to 140° F)
Charge Algorithm	CC to CV
Max. Charge Voltage	4.2V +/- 0.05V
Max. Charge Current	800 mA
Discharge Cut-off	2.6V min – DS2761 protection circuit initiates
Recommended Fast Charge	1550 mA for 2.5hrs
Max. Fast Charge Time	3.0 hrs.
Recommended Termination Taper Current	50 - 100 mA
Recommended Charge Termination Timeout	30 min.
Charge Temperature	0° C to 45 °C (32° F to 113° F)
Discharge Temperature	-20° C to 60° C (-4° F to 140° F)
Recommended Termination Taper Current	50 - 100 mA
Recommended Charge Termination Timeout	30 min.
Charge Temperature	0° C to 45 °C (32° F to 113° F)
Discharge Temperature	-20° C to 60° C (-4° F to 140° F)
Storage Temperature	-20° C to 60° C (-4° F to 140° F) Storing battery at elevated temperatures is not recommended.

Cycle Life	300 cycles minimum with no degradation below 80% of nominal capacity based on standard charge / standard discharge rates (to 2.8V) @ 25ºC
Impedance	45 mΩ max. @ 1kHz AC only the battery cell
Total Internal Resistance	200 mΩ max., fully charged new pack (including cell resistance and protection circuit resistance) @ 1kHz AC
High Temperature Recovery	>60% nominal capacity after 20 days @ 60° C (full charge) -- (140° F)
Low Temperature Recovery	>80% nominal capacity after 72 hours @ -20° C (full charge) -- (-4° F)
Capacity recovery	-20° C to 60° C (-4° F to 140° F) >80% capacity recovery within 1 month -20° C to 45° C (-4° F to 113° F) >75% capacity recovery within 3 month -20° C to 20° C (-4° F to 68° F) >70% capacity recovery within 1 year

C.4.2 High-Capacity Battery Pack

Chemistry Capacity	Lithium Ion Polymer Battery (Li-Polymer)
	2625 mAh nominal at 350mA discharge 20 °C (68° F) to 2.8V(minimum)
	1800 mAh nominal at 300mA discharge at –20 °C to 2.8V (minimum)
Voltage	3.7V nominal (2.8V min. to 4.2V max.)
Cell Configuration	1S3P (3 parallel connected cells)
Cell Type	Lithium-ion Polymer Battery
Max. Discharge Current	1.7A (-10° C to 60° C) -- (14° F to 140° F) 0.5C (-20° C to 60° C) -- (-4° F to 140° F)
Charge Algorithm	CC to CV
Max. Charge Voltage	4.2V +/- 0.05V
Max. Charge Current	900 mA
Discharge Cut-off	2.6V min – DS2761 protection circuit initiates
Recommended Fast Charge	2325 mA for 4.0 hrs
Max. Fast Charge Time	5.0 hrs
Recommended Termination Taper Current	50 - 100 mA
Recommended Charge Termination Timeout	30 min.
Charge Temperature	0° C to 45 °C (32° F to 113° F)
Discharge Temperature	-20° C to 60° C (-4° F to 140° F)

Recommended Termination Taper Current	50 - 100 mA
Recommended Charge Termination Timeout	30 min.
Charge Temperature	0° C to 45 °C (32° F to 113° F)
Discharge Temperature	-20° C to 60° C (-4° F to 140° F)
Storage Temperature	-20° C to 60° C (-4° F to 140° F) Storing battery at elevated temperatures is not recommended.
Cycle Life	300 cycles minimum with no degradation below 80% of nominal capacity based on standard charge / standard discharge rates (to 2.8V) @ 25ºC
Impedance	35 mΩ max. @ 1kHz AC only the battery cell
Total Internal Resistance	210 mΩ max., fully charged new pack (including cell resistance and protection circuit resistance) @ 1kHz AC
High Temperature Recovery	>60% nominal capacity after 20 days @ 60° C (full charge) -- (140° F)
Low Temperature Recovery	>80% nominal capacity after 72 hours @ -20° C (full charge) -- (-4° F)
Capacity recovery	-20° C to 60° C (-4° F to 140° F) >80% capacity recovery within 1 month -20° C to 45° C (-4° F to 113° F) >75% capacity recovery within 3 month -20° C to 20° C (-4° F to 68° F) >70% capacity recovery within 1 year

APPENDIX D

SPECIFICATIONS WORKABOUT PRO C, S & ME

D.1 Hand-Held Computer Specifications

Note: ***Performance specifications are nominal & subject to change without notice.***

D.1.1 Model Variants

- WORKABOUT PRO C - Model 7525C
- WORKABOUT PRO S - Model 7525S
- WORKABOUT PRO ME (monochrome enhanced) - Model 7525ME

D.2 WORKABOUT PRO C Variant

Size

- Length: 221 mm (8.7").
- Width: 76 mm (3") at grip area, tapering to 92 mm (3.6") at display area.
- Depth: 31 mm (1.2") at grip area, tapering to 42 mm (1.7") at display area.

Weight

- With battery: 454 g (16 oz);
  - with SE 1223HP scanner expansion module: add 75 g (2.6 oz).
  - with 802.11g CF card radio: add 19g (0.7 oz).

Display

- Colour touch screen display
- Diagonal measurement: 8.9 cm (3.5 in).
- ¼ VGA: 240 pixels by 320 pixels.
- 16-bit colour.
- Transflective, portrait mode TFT.
- High reliability LCD backlight:
  - On/off control.
  - Contrast control.
- Sunlight readable.
- Passive stylus or finger operation.
- Signature capture capability.

Keyboard

- 55-key alphanumeric keyboard.
- Keyboard backlight.
- High durability, hard-topped keys.

Memory

- 64 MB Flash.
- 128 MB RAM.

D.3 WORKABOUT PRO S Variant

Size

- Length: 190 mm (7.5”).
- Width: 75 mm (2.9”) grip area tapering to 98 mm (3.8") at display area (including side scan buttons).
- Depth: 31 mm (1.2") at grip area tapering to 44 mm (1.7") at display area.

Weight

- With battery: 421 g (13.5 oz);
  - with SE 1223HP scanner expansion module: add 75 g (2.6 oz).
  - with 802.11g CF card radio: add 19 g (0.7 oz)

Display

- Colour touch screen display
- Diagonal measurement: 8.9 cm (3.5 in).
- ¼ VGA: 240 pixels by 320 pixels.
- 16-bit colour.
- Transflective, portrait mode TFT.
- High reliability LCD backlight:
  - On/off control.
  - Contrast control.
- Sunlight readable.
- Passive stylus or finger operation.
- Signature capture capability.

Keyboard

- 29-key numeric keyboard.
- Keyboard backlight.
- High durability, hard-topped keys.

Memory

- 64 MB Flash.
- 128 MB RAM.

D.4 WORKABOUT PRO ME Variant

Size

- Length: 221 mm (8.7").
- Width: 76 mm (3") at grip area, tapering to 92 mm (3.6") at display area.
- Depth: 31 mm (1.2") at grip area, tapering to 42 mm (1.7") at display area.

Weight

- With battery: 454 g (16 oz);
  - with SE 1223HP scanner expansion module: add 75 g (2.6 oz).
  - with 802.11g CF card radio: add 19g (0.7 oz).

Display

- Monochrome touch screen display.
- Diagonal measurement: 8.9 cm (3.5 in).
- ¼ VGA: 240 pixels by 320 pixels.
- Transflective, portrait mode TFT.
- High reliability LCD backlight:
  - On/off control.
  - Contrast control.
- Sunlight readable.
- Passive stylus or finger operation.
- Signature capture capability.

Keyboard

- 55-key alphanumeric keyboard.
- Keyboard backlight.
- High durability, hard-topped keys.

Memory

- 64 MB Flash.
- 64 MB RAM.

D.5 WORKABOUT PRO C, S, and ME Variants

Processor

- PXA255, 400 MHz processor.

Operating System

- Microsoft Windows CE .NET 4.2
- Microsoft Windows Mobile 5.0
- Microsoft Windows Mobile 2003 SE

Audio

- Internal speaker with volume control.

Indicators

- LED indicating battery charge status (programmable).

Power Management

- 3.7 V Standard Capacity Li-ion rechargeable battery - up to 8 hours of operation.
- 3.7 V High-Capacity Li-ion rechargeable battery - up to 12 hours of operation.
- Advanced Smart Battery w/ gas gauge.
- Quick swap battery packs.
- Built-in fast charger.
- Rechargeable, user-replacable internal coin battery.
- Also accepts 3 AA alkaline batteries.

Expansion Slots

- One SD/MMD memory card slot (user accessible).
- endcap USB interface supports GPS interface.
- 100-pin expansion interface supports:
  - PCMCIA (type II).
  - GSM/GPRS EDGE.
  - Customized expansion modules developed using the WORKABOUT PRO HDK.
- Flex cable interface with robust connector supports
  - Scanner (serial) modules.
  - Imager (USB) modules.
- One CF card slot (type II).

Communication

Ports	USB Host port on base for tethered USB devices (printers, etc.) Low Insertion Force Docking Station Port with: - USB Device Port - USB Host port - Power in/out

Environmental

Operating Temperature	14°F to 122°F (-10°C to +50°C)
Storage Temperature	-13°F to 140°F (-25°C to +60°C)
Rain And Dust Resistance	IEC 529, classification IP54.
Humidity	5% - 95% RH non-condensing
Shock	Multiple 4 ft. (1.2m) drops to polished concrete.

Approvals

Safety	UL60950-1, CSA C22.2 No 60950-1
EMC	FCC Part 15 Class B EN 55022 EN 55024
Laser	IEC 60825-1, Class 2 FDA 21 CFR 1040.10, 1040.11 Class II
Bluetooth:	1.1 on C & S models
In-Vehicle Cradle	E Mark

D.6 Radio Options

For details of these radios see Appendix F: "Specifications WORKABOUT PRO Radios".

- 802.11g Direct Sequence Spread Spectrum (Model Number RA2040)
- 802.11g Direct Sequence Spread Spectrum (Model Number RA2041)
- Variants C and S only: Integrated *Bluetooth* class II, version 1.2.

D.7 Scanner Options

For details of these scanners and imagers see Appendix G: "Specifications Scanners And Imagers".

- SE 1223HP, LR, ALR
- SE955HP
- EV15 Imager
- HHP5180 Imager
- SX5393 Imager

D.8 Battery Options

For details of these batteries see Appendix H: "Specifications WORKABOUT PRO Batteries".

- Standard Capacity–2000 mAh (Model WA3000-G1.)
- High Capacity–3000 mAh (Model WA3006).
- Maxell ML2032 Rechargeable Coin Battery.

APPENDIX E

WORKABOUT PRO 2ND. GENERATION

E.1 WORKABOUT PRO Specifications

Note: ***Performance specifications are nominal & subject to change without notice.***

Model Variants

- WORKABOUT PRO C – Model 7527C-G2
- WORKABOUT PRO S – Model 7527S-G2

E.1.1 WORKABOUT PRO C Variant

Size

- Length: 223 mm (8.775").
- Height: 75 mm (2.95") grip area tapering to 100 mm (3.94") at display area (including side scan buttons).
- Depth: 31 mm (1.22") at grip area tapering to 42 mm (1.65") at display area.

Weight Without Battery Pack

- 455 g (1.0 lb).

Keyboard

- 55-key alphanumeric keyboard.
- Keyboard backlight.
- High durability, hard-topped keys.

E.1.2 WORKABOUT PRO S Variant

Size

- Length: 200 mm (7.87").
- Height: 75 mm (2.95") grip area tapering to 100 mm (3.94") at display area (including side scan buttons).
- Depth: 31 mm (1.22") at grip area tapering to 42 mm (1.65") at display area.

Weight Without Battery Pack

- 390 g (0.859 lb).

Keyboard

- 29-key numeric keyboard.
- Keyboard backlight.
- High durability, hard-topped keys.

E.1.3 WORKABOUT PRO All Variants

Display

- Colour touch screen display
- Diagonal measurement: 9.144 cm (3.6 in).
- Full VGA: 480 pixels by 640 pixels.
- Transflective, portrait mode TFT.

- Adjustable backlight.
- Sunlight readable.
- High reliability LCD backlight.
- Passive stylus or finger operation.
- Signature capture capability.
- Bezel: replaceable and customizable.

Processor

- PXA270 @ 520 MHz, 32 bit RISC CPU
- 128 MB flash, 128 MB RAM

Operating System

- Microsoft® Windows® CE 5.0
- Microsoft® Windows® Mobile® 6 Classic
- Microsoft® Windows® Mobile® 6 Professional

Audio

- Mono speaker.
- Mono microphone.
- High volume 92 db beeper.

Indicators

- LED indicating battery charge status (programmable).

Wireless Communication

Optional expansion modules for:

- 802.11b/g (via Compact Flash) operating in the 2.4GHz band.
- Supports IEEE 802.11b data rates of 1,2,5.5 and 11Mbps using Direct Sequence Spread Spectrum (DSSS).
- Supports IEEE 802.11g data rates of 6,9,12,24,36,48 and 54Mbps, using Orthogonal Frequency Division Multiplexing (OFDM) base band modulation.
- GSM/GPRS EDGE (via expansion interface).
- Quad-Band – 850/900/1800/1900
- Voice and Data.
- GPRS Class B, Multi-Slot Class 12
- EGPRS Class B, Multi-Slot Class 12
- Integrated *Bluetooth* class II, ver 1.2
- Working Range:16.4 ft.to 32.81 ft. (5 m to 10 m).

Note: 802.11b/g, GSM, and Bluetooth are available simultaneously.

Bar Code Applications

- Optional 1D imager expansion module
- Optional 2D imager expansion module
- Optional 1D SE955 laser scanner expansion module
- Optional 1D SE1223 High Performance laser scanner expansion module
- Optional bolt-on pistol grip

Note: All are user upgradeable

RFID Modules

- HF Module
- Frequency: 13.56 MHz
- Tags supported: ISO 15693, Philips ICode™; TI TagiIt™; Tagsys (C210,C220,C240,C270)
- Read/write range up to: 3.15 in.(80 mm)
- MIFARE module
- Frequency: 13.56 MHz
- Tags supported: ISO 14443 A&B, Mifare
- Read/write range up to: 1.97 in.(50 mm)
- LF module
- Frequency: 125 KHz, 134.2 KHz
- Tags supported: EM 4x0x, EM 4x50; Hitag 1 & 2; ISO HDXA & FDXB
- Read/write range up to: 2.756 in.(70 mm)
- UHF module
- Frequency: 868 MHz or 915 MHz
- Read range: up to 4.92 ft.(150 cm) [915MHz] and up to 2.62 ft.(80 cm) [868 MHz]
- Tag supported: EPC Class 1 Gen 2, other protocols depending on regions

User Interface

- Colour Touch Screen Display 3.6 in.(9.144 cm) diagonal
- Full VGA 480x640 resolution
- Transflective, portrait mode TFT
- Adjustable Backlight
- Sunlight readable (for outdoor use)
- High reliability LED backlight
- Easily replaceable and customizable bezel
- Touchscreen
- Passive stylus or finger operation
- Signature capture
- Keyboards
- Full Alpha-Numeric (C model)
- Numeric (S model)
- Ergonomically enhanced for ambidextrous, one-hand operation
- Backlit, high durability hard-capped keys

- Indicators And Controls
- LED indicates battery charge status

Programming Environment

- Psion Teklogix Mobile Devices SDK
- Hardware Development Kit (HDK)
- .NET and C++ programming using Microsoft® Visual Studio® 2005
- Java programming supporting JDK 1.2.2 or higher
- Standard Protocol APIs
- Windows sockets (CE .NET)

Application Software

- Internet Explorer 6.0 incl.with Windows CE 5.0
- Unique Psion Teklogix Voice Dialer and Contacts Manager incl.Windows CE 5.0
- PTX Connect VoIP
- Optional Open TekTerm terminal emulation software, supports IBM 5250,IBM 3270, HP2392, ANSI and TESS
- Mobile Control Center (MCC) device management

Expansion Slots

- One SD/MMC memory card slot (user accessible).
- Endcap USB Interface supports GPS expansion module.
- 100-PIN expansion interface supports:
  - PCMCIA (type II).
  - GSM/GPRS EDGE modules.
  - Customized expansion modules developed using Psion Teklogix WORKABOUT PRO HDK.
- Flex cable interface with robust connector, supports:
  - Scanner (serial) modules.
  - Imager (USB) modules.
- One Type II CF Card Slot.

External Connectors

- One Tether connection with full RS-232 and USB 1.1 functionality
- One Low-Insertion Force (LIF) docking connector
- DC Power Jack

Power Management

- Optional 3.7V, 3000 mAh High Capacity Battery Pack
- Optional 3.7V, 4000 mAh Super High Capacity Battery Pack
- Advanced Smart Battery with gas gauge
- 3 power source options: Runs off battery, AC power, or automotive power supplies
- Built-in charger
- Rechargeable, user replaceable backup battery pack

Environmental

- Withstands 26 drops (on 12 edges,8 corners, 6 faces) at 5 ft.(1.5 meters) to polished concrete while powered on and configured with accessories such as CF radio, scanner/imager, and pistol grip
- Rain/Dust: IP65,IEC 60529
- Operating Temperature: 14°F to 122°F (-10°C to +50°C)
- 5%-95% RH non-condensing
- Storage Temperature: -40°F to 140°F (-40°C to +60°C)

Physical Dimensions And Weight

- WORKABOUT PRO C:
- 8.775 in. x 2.95/3.94 in. x 1.22/1.65 in. (223 mm x 75/100 mm x 31/42 mm)
- WORKABOUT PRO S:
- 7.87 in. x 2.95/3.94 in. x 1.22/1.65 in. (200 mm x 75/100 mm x 31/42 mm)
- Weight (w/o battery pack):
- WORKABOUT PRO C:1 lbs (455 g)
- WORKABOUT PRO S:.859 lbs (390 g)

Power Accessories

- AC power supply (charge & operate hand-held)
- Automotive power supply (charge & operate hand-held)
- Single and Quad slot battery pack chargers
- Powered cradle for vehicle mount applications

Communication Accessories

- Quad Dock (4-site) with 10/100 BaseT Ethernet and charge functions
- Desktop Docking Station (charges hand-held & spare battery) provides USB1.1 host and device ports and supports optional plug-on expansion modules supporting 10/100 BaseT Ethernet or RS-232 connections
- USB cable supports Active Sync without requiring a docking station
- Optional endcaps supporting RS-232, TTL, and IrDA

Carrying Accessories

- Hand-strap, pistol grip with trigger, holster and various protective carrying cases and pouches.

Approvals

Safety:	CSA/UL60950-1, IEC 60950-1, EN60950-1
EMC:	FCC Part 15 Class B
	EN 55022
	EN 55024
	EN 301 489
Laser:	IEC 60825-1, Class 2
	FDA 21 CFR 1040.10.
	1040.11 Class II

Bluetooth:	1.2
RF:	Bluetooth and 802.11b/g: EN300 328, Part 15.247
GSM/GPRS:	EN301 511; EN50360/361, NAPRD03; 3GPP51.010; FCC Parts 22 & 24; Industry Canada; RSS-132 & 133
In-Vehicle Cradle:	e Mark

E.2 Radio Options

For details of these radios see Appendix F: "Specifications WORKABOUT PRO Radios".

- Integrated *Bluetooth* class II, version 1.2.
- Optional expansion models:
  - 802.11b/g DSSS radio- Model RA2041.
  - GSM/GPRS/EDGE radio - Model RA3030-G2.

E.3 Battery Options

For details of these batteries see Appendix H: "Specifications WORKABOUT PRO Batteries".

- High-Capacity (Model WA3006)
- Super High-Capacity (Model WA3010)

E.4 Scanner Options

For details of these scanners and imagers see Appendix G: "Specifications Scanners And Imagers".

- SE 1223HP, LR, ALR
- SE955HP
- EV15 Imager
- HHP5180 Imager

E.4.1 Scanner/Imager Model Numbers

Scanner / Imager Engine	Kit Model Number	Form Factor
1D Laser SE955	WA9102-G1	Endcap without GSM
	WA9112-G1	Endcap with GSM
	WA9002-G1	Pod
1D Laser SE1223HP	WA9000-G1	Pod
1D Laser SE1223LR	WA9005-G1	Pod
1D Laser SE1223ALR	WA9006	Pod (non-RoHS)

Scanner/Imager Engine	Kit Model Number	Form Factor
1D Imager EV15	WA9103-G1	Endcap without GSM
	WA9113-G1	Endcap with GSM
	WA9003-G1	Pod
2D Imager SX5393	WA9010	Pod (non-RoHS)
	WA9007-G1	Slim Pod
2D Imager HHP 5180	WA8010-G1	Endcap without GSM
	WA8110-G1	Endcap with GSM
	WA9012-G1	Slim Pod

APPENDIX F

SPECIFICATIONS WORKABOUT PRO RADIOS

F.1 Radio Specifications

Note: Performance specifications are nominal & subject to change without notice.
Consult the Accessories Catalog at www.PsionTeklogix.com/Accessories to ensure that a specific device is still available.

This appendix describes all the radios that are available in the following WORKABOUT PRO variants:

- WORKABOUT PRO C
- WORKABOUT PRO S
- WORKABOUT PRO ME
- WORKABOUT PRO 2nd. Generation C
- WORKABOUT PRO 2nd. Generation S

Consult the specifications for your WORKABOUT PRO to find out which radios are compatible with it.

F.2 802.11g Direct Sequence Spread Spectrum (Model RA2040)

Form Factor	Compact Flash
Antenna Port	Single U.FL jack, no diversity
Transmit Power	20 mW
Frequency Range	2.400 - 2.4835 GHz, all versions
Channels	1 - 11 for USA, Canada 1- 13 for EU countries
RX Sensitivity	(8% BER, 1024 bytes packet) = -89dBm @ 1Mbps, -87dBm @ 11Mbps, -83dBm @ 6Mbps, -72dBm @ 54Mbps
Data Rates	6, 9, 12, 18, 24, 36, 48 & 54Mbps

F.3 802.11b/g Direct Sequence Spread Spectrum (DSSS) (Model RA2041)

Form factor	Compact Flash Type I extended
Antenna port	Two Hirose U.FL connectors for antenna diversity
Transmit Power	802.11g: 32mW maximum (+15 dBm) 802.11b: 80mW maximum (+19 dBm)
Frequency Range	2.400 - 2.4897 GHz
Channels	FCC: 11 ETSI: 13 TELEC: 13
RX Sensitivity	-96dBm @ 1Mbps, -90dBm @ 11Mbps, -94dBm @ 6Mbps, -75dBm @ 54Mbps
Data Rates	802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11b: 1, 2, 5.5, 11 Mbps

F.4 GSM/GPRS/EDGE Radio (Model RA3030-G2)

Quad-Band GSM 850/900/1800/1900 MHz

EDGE (E-GPRS) multi-slot class 10

GPRS multi-slot class 12

GSM release 99

Output power:	- Class 4 (2 W) for EGSM850
	- Class 4 (2 W) for EGSM900
	- Class 1 (1 W) for GSM1800
	- Class 1 (1 W) for GSM1900

Control via AT commands (Hayes 3GPP TS 27.007 and 27.005)

SIM Application Toolkit (release 99)

TCP/IP stack access via AT commands

Internet Services:	TCP, UDP, HTTP, FTP, SMTP, POP3
Supply voltage range:	3.2 to 4.3 V

Specifications for:

EDGE data transmission:	EDGE class 10: max 236.8 kbps (downlink)
	Mobile station class B
	Modulation and coding scheme MCS 1-9
GPRS data transmission:	GPRS class 12
	Mobile station class B
	PBCCH support
	Coding schemes CS 1-4
CSD data transmission:	Up to 14.4 kbps
	V.110
	Non-transparent mode
	USSD support
SMS:	Point-to-point MO and MT
	SMS cell broadcast
	Text and PDU mode
Fax:	Group 3, class 1
Voice:	Triple-rate codec for HR, FR, and EFR
	Adaptive multi-rate AMR
	Basic hands-free operation
	Echo cancellation
	Noise reduction

Interfaces:	Hirose U.FL-R-SMT 50 ohm antenna connector
	Antenna solder pad
	Molex 80-pin board-to-board connector
	- Power supply
	- Audio: 2x analog, 1x digital
	- 2 x serial interface (ITU-T V.24 protocol)
	- USB 2.0 full speed
	- SIM card interface 3 V, 1.8 V
	- I2C bus

F.5 *Bluetooth* Radio

Embedded (920 kbps serial interface)

Bluetooth Version	1.2 compliant (features Adaptive Frequency Hopping for better co-existence with 802.11 radio)
Chip Antenna	2dBi peak
Transmit Power	-3dBm (0.5mW) minimum, +4dBm (2.5mW) max
Frequency Range	2.400 - 2.4835 GHz
RX Sensitivity	-80dBm max
(BER<=0.1%)	
Data Rate	732.2 kbps and 57.6 kbps asymmetric, 433.9 kbps symmetric

APPENDIX G

SPECIFICATIONS SCANNERS AND IMAGERS

G.1 Scanner and Imager Specifications

Note: Performance specifications are nominal & subject to change without notice. Consult the Accessories Catalog at www.PsionTeklogix.com/Accessories to ensure that a specific device is still available.

This appendix describes all the scanners and imagers that are available in the following WORKABOUT PRO variants:

- WORKABOUT PRO C
- WORKABOUT PRO S
- WORKABOUT PRO ME
- WORKABOUT PRO 2nd. Generation C
- WORKABOUT PRO 2nd. Generation S

Consult the specifications for your WORKABOUT PRO to find out which radios are compatible with it.

G.2 Scanner Specifications

G.2.1 SE 1223HP, LR, ALR And SE 955HP Specifications

Scan Engine	SE 1223HP	SE 1223LR	SE 1223ALR	SE 955HP
Scan Angle	42º ± 2º	23º ± 2º	13º ± 2º	47° ± 3° default / 35° ± 3° reduced
Scan Rate	35 (± 5) scans/sec (bi-directional)	35 (± 5) scans/sec (bi-directional)	35 (± 5) scans/sec (bi-directional)	104 (± 12) scans/sec (bi-directional)
Scan Pattern	Linear	Linear	Linear	Linear
Wavelength	650nm	650nm	650nm	650nm
Input Voltage	5.0 VDC ± 10%	5.0 VDC ± 10%	5.0 VDC ± 10%	3.0-5.5 VDC ± 10%
Input Current	110 mA typical	115 mA typical	115 mA typical	65 mA typical
Standby Current	130 µA typical	70 µA max.	70 µA typical	8 µA max
Operating Temperature	-40ºC to 60ºC -40ºF to 140ºF	-30º to 55ºC -22ºF to 131ºF	-30°C to 55°C -22ºF to 131ºF	-20° to 60° C -4° to 140° F
Print Contrast	Minimum 20% absolute dark/light reflectance measured at 650 nm	Minimum 40% absolute dark/light reflectance measured at 650 nm	Minimum 40% absolute dark/light reflectance measured at 650 nm	Minimum 25% absolute dark/light reflectance measured at 650 nm

Scan Engine	SE 1223HP	SE 1223LR	SE 1223ALR	SE 955HP
Dimensions	1.93 cm max. H x 3.84 cm max. W x 3.51 cm max. D 0.76 in. max. H x 1.51 in. max. W x 1.38 in. max. D	1.93 cm max. H x 3.84 cm max. W x 3.51 cm max. D 0.76 in. max. H x 1.51 in. max. W x 1.38 in. max. D	1.93 cm max. H x 3.84 cm max. W x 3.51 cm max. D 0.76 in. max. H x 1.51 in. max. W x 1.38 in. max. D	1.21 cm H x 2.16 cm W x 1.55 cm (max) 0.47 in. H x 0.85 in. W x 0.61 in. D (max)
Symbologies	UPC/EAN, Code 128, Code 39, Code 93, I 2 of 5, Discrete 2 of 5, Codabar, MSI UCC/EAN 128, TriOptic Code 39	UPC/EAN, Code 128, Code 39, Code 93, I 2 of 5, Discrete 2 of 5, Codabar, MSI UCC/EAN 128, TriOptic Code 39	UPC/EAN, Code 128, Code 39, Code 93, I 2 of 5, Discrete 2 of 5, Codabar, MSI UCC/EAN 128, TriOptic Code 39	UPC/EAN, Code 128, Code 39, Code 93, I 2 of 5, Discrete 2 of 5, Codabar, MSI Plessey

G.2.1.1 SE 1223HP Decode Zone

4,844 Lux to 86,112 Lux				
	Minimum range	Width of field	Maximum range	Width of field
Mil Size	Inches	Inches	Inches	Inches
5	2.75	1.25	7	3
7.5	2.25	1	11	4
10	1.75	0.5	15.75	6
UPC	2	1	22	9
15	2	1	25	10
20	2	1	30	12.5
40	3.75		56	23
55	5		66	25

G.2.1.2 SE 1223LR Decode Zone

4,844 Lux to 86,112 Lux				
	Minimum range	Width of field	Maximum range	Width of field
Mil Size	Inches	Inches	Inches	Inches
10	11	2	24	5
High quality symbols in normal room light.				

4,844 Lux to 86,112 Lux				
	Minimum range	Width of field	Maximum range	Width of field
Mil Size	Inches	Inches	Inches	Inches
15	7.5	1	39	8
20	7.5	1	48	10
40	10	2	90	19
55	10	2	120	24
70 reflective	48		200	40
100 reflective	60		240	48
High quality symbols in normal room light.				

G.2.1.3 SE 1223ALR Decode Zone

4,844 Lux to 86,112 Lux				
	Minimum range	Width of field	Maximum range	Width of field
Mil Size	Inches	Inches	Inches	Inches
UPC	19	2	39	4
15	20	2	50	6
30	33	4	98	11
55	27	2	115	12
70 reflective	114	12	250	28
100 reflective	125	14	360	41
High quality symbols in normal room light.				

G.2.1.4 SE 955HP Decode Zone

Decode Zone Typical	
4 mil	1.0 in. - 5.5 in. / 2.54 cm - 13.97 cm
5 mil	1.25 in. - 8 in. / 3.18 cm - 20.32 cm
7.5 mil	1.5 in. - 13.25 in. / 3.81 cm - 33.66 cm
10 mil	1.5 in. - 17.5 in. / 3.81 cm - 44.45 cm
UPC 100%	1.5 in. - 23.5 in. / 3.81 cm - 59.69 cm
15 mil	1.5 in. - 29.5 in. / 3.81 cm - 74.93 cm
** dependent on width of bar code*	

Decode Zone Typical	
20 mil	1.75 in. - 35.5 in. / 4.45 cm - 90.17 cm
40 mil	* - 40 in. / * - 101.6 cm
55 mil	* - 55 in. / * - 139.7 cm
** dependent on width of bar code*	

G.3 Imager Specifications

G.3.1 EV15 Imager Specifications

Parameter	EV15
Light Source	617nm Highly Visible LED
Scan Angle	40º
Minimum Print Contrast	Minimum 25%
Minimum x Dimension	0.1 mm (4 mils)
Reading Distance	Up to 90cm (35 in)
Symbologies	UPC (E&A), EAN, RSS, Code 39, Code 128, UCC/EAN 128, ISBN, ISBT, Interleaved, Matrix, Industrial and Standard 2 of 5, Coda-bar, Code 93/93i, Code 11, MSI, Plessey, Tel-epen, PDF417, Micro PDF417
Ambient Light	Works in any lighting conditions, from 0 to 100,000 lux
Shock	2000G, 0.7ms, half sinus, 3 axes
Vibration	50G r.m.s

G.3.1.1 EV15 Imager Decode Zone

0 Lux to 100,000 Lux		
	Minimum range	Maximum range
Mil Size	Inches	Inches
5	2.5	7
10	3	14
UPC	2	14.5
20	2.5	22
40	3	35.5
High quality symbols in normal room light.		

G.3.2 HHP5180 Imager Specifications

Parameter	HHP5180
Image Sensor	752 X 480 CMOS sensor
Motion Tolerance	4 in. (10.2cm) per second
Rotational Sensitivity	360°
Viewing Angle	±40°
Ambient Light	Total darkness to 100,000 lux (full sunlight)
Illumination LEDs	626nm ±30nm
Aiming:	LEDs: 526nm ±30nm Laser: 650nm ±10nm
Symbologies supported	2D: PDF417, MicroPDF417, MaxiCode, Data Matrix, QR Code, Aztec, Aztec Mesa, Code 49, UCC Composite Linear: Code 39, Code 128, Codabar, UPC, EAN, Interleaved 2 of 5, RSS, Code 93, Codablock Postal: Postnet (US), Planet Code, BPO 4 State, Canadian Post, Japanese Post, KIX (Netherlands) Post OCR Fonts: OCR-A, OCR-B
Size	1.78cm Depth x 2.79cm Width (without mounting tabs) x 1.21cm Height 0.7 in. Depth x 1.1 in. Width (without mounting tabs) x 0.475 in. Height
Weight	5.9 grams (.21 ounces)
Operational Input Voltage:	Imager: 3.3 VDC ±5% (23°C) Illumination + Aimer 5300: 3.0 VDC to 5.5 VDC (23°C)
Current Draw:	Imager: Operating Current: 100 mA Standby Current: 100 µA
Operating Temperature	-30° to +50°C (-34° to 122°F)
Storage Temperature	-40° to +70°C (-40° to 158°F)
Humidity	up to 95% RH, non-condensing at 122° F (50°C)
Shock	18 shocks of 3,500 G for 0.5 msec at 23°C (73° F)

G.3.2.1 HHP5180 Imager Decode Zone

Performance	
Focal Point	
SR	7 inches (17.8 cm) from lens plate
SF	4.5 inches (11.4 cm) from lens plate
**Data characterized at 23°C and 0 lux ambient light.*	

Performance						
Focal Point						
SR Working Range*	8.3 mil Linear (.020 cm)	10 mil PDF417 (.025 cm)	13 mil UPC (.033 cm)	15 mil Data Matrix (.038 cm)6	15 mil QR (.038 cm)	35 mil Maxi-code (.089 cm)
Near	3.5 in. (8.9 cm)	3.1 in. (7.9 cm)	2.1 in. (5.3cm)	2.3 in. (5.8 cm)	2.1 in. (7.9 cm)	2.0 in. (5.1 cm)
Far	7.6 in. (19.3cm)	9 in. (22.9 cm)	13.2 in. (33.5 cm)	10.2 in. (25.9 cm)	8.8 in. (22.4 cm)	13.0 in. (33 cm)
SF Working Range*	6.6 mil PDF417 (.017 cm)	7.5 mil Linear (.019 cm)	8.3 mil Data Matrix (.021 cm)	8.3 mil QR (.021 cm)6	10 mil Linear (.025 cm)	13 mil UPC (.033 cm)
Near	2.8 in. (7.1cm)	2.5 in. (6.4cm)	3.4 in. (8.6cm)	3.4 in. (8.6cm))	2.2 in. (5.6cm)	2.0 in. (5.1cm)
Far	6 in. (15.2cm)	6.5 in. (16.5cm)	5.7 in. (14.5cm)	5.4 in. (13.7cm)	7.6 in. (19.3cm)	8.9 in. (22.6cm)
**Data characterized at 23°C and 0 lux ambient light.*						

G.3.3 SX5393 Imager Specifications

Parameter	SX5393
Optical Resolution	1024H x 1024V
Field of view at 6 inches	5.12 in. x 5.12 in.
Pitch Angle	±45°
Skew Angle	±45°
Ambient Light	0 to 100,000 lux (full sunlight) 300 lux nominal.
Minimum Contrast	10%
Targeting	Intuitive range finding 626 nm Red LED.
Self Illumination	Red LED
Supply Voltage	5 V ± 10%
Power Supply	3.6 Volt DC nominal (2.7 - 5 Volts DC)
Connectivity	USB 1.1 or serial async
Connector to the interface board	Molex 52892-1295 or HiRose FH12-12S-.5SH
**Data characterized at 23°C and 0 lux ambient light.*	

Parameter	SX5393
Symbologies Supported	Code 39; Code 39 Full ASCII; UPC-A, -A2, -A5; UPC-E, -E2, -E5; EAN-8 -13; JAN; I2of5; Code 128; Codabar/NW7; RSS 14, RSS Limited, RSS Expanded, RSS 14 Truncated, PDF417, microPDF417; Composite, CC-A, CC-B, CC-C; image capture and signature capture, Data Matrix; QR Code; Maxicode; Aztec Code; Planet; Postnet; Royal Mail 4SCC; 4 State postal codes from Australia, Canada, Japan; Korean Post 3of5
Operating Temperature	-20° to +50°C (-4° to 122°F)
Storage Temperature	-30° to +60°C (-22° to 140°F)
Humidity	5% to 95% (non-condensing)
Weight	Image engine 4.1 grams Co-processor board 6.80 grams
Shock	15 drops, 5 ft to concrete at room temperature when integrated correctly into end-user packaging
**Data characterized at 23°C and 0 lux ambient light.*	

G.3.3.1 SX5393 Imager Decode Zone

2D Bar Codes

300 Lux With Good Quality Bar Codes		
	Minimum range	Maximum range
Mil Size*	Inches	Inches
10	4.6	5.7
15	3.8	9.2
15**	4	9.7
20.8	2.6	11.7
**QR code* ***Data Matrix*		

1D Bar Codes

300 Lux With Good Quality Bar Codes		
	Minimum range	Maximum range
Mil Size	Inches	Inches
Code 39	Minimum range	Maximum range
Mil Size	Inches	Inches
7.5	4.1	8.4
10	3.1	10.9
15	4	9.7

G.3.4 SX5400 Imager Specifications

Parameter	SX5400
Optical Resolution	752H x 480V
Field of view at 160mm	120mm (H) x 78mm (V) 41.1° (H) x 27.4° (V)
Pitch angle	±45°
Skew angle	±45°
Ambient light	0 to 100,000 lux (full sunlight 300 lux nominal
Minimum contrast	10%
Targeting	Intuitive range finding 626 nm LED
Self Illumination	Red LED (standard) White LED (optional)
Supply voltage	5 V ± 10%
Power supply	3.6 Volt DC nominal (2.7 - 5 Volts DC)
Connectivity	USB 1.1 or serial async
Connector to the interface board	Molex 52892-1295 or HiRose FH12-12S-.5SH

Parameter	SX5400
Symbologies supported	Code 39; Code 39 Full ASCII; UPC-A, -A2, -A5; UPC-E, -E2, -E5; EAN-8 -13; JAN; I2of5; Code 128; Codabar/NW7; RSS 14, RSS Limited, RSS Expanded, RSS 14 Truncated, PDF417, microPDF417; Composite, CC-A, CC-B, CC-C; image capture and signature capture, Data Matrix; QR Code; Maxicode; Aztec Code; Planet; Postnet; Royal Mail 4SCC; 4 State postal codes from Australia, Canada, Japan; Korean Post 3 of 5.
Operating temperature	-20° to 50 °C (-4° to 122°F)
Storage temperature	-30° to 60°C (-22° to 140°F)
Relative humidity	5% to 95% (non-condensing)
Weight	Image engine 4.1 grams Co-processor board 6.80 grams
Shock	15 drops, 5 ft to concrete at room temperature when integrated correctly into end-user packaging.

G.3.4.1 SX5400 Imager Decode Zone

Symbology	Size (mil)	Minimum (inches)	Maximum (inches)	Average Depth Of Reading (inches)
C39	7.5	4.0	7.0	3.0
C39	10	2.75	9.25	6.5
C39	15	2.25	11.0	8.75
PDF6.6	6.6	4.0	6.5	2.5
PDF10	10	3.25	9.0	5.75
PDF15	15	2.25	10.75	8.5
DM15	15	3.0	8.0	5.0
QR15	15	3.75	7.5	3.75
UPC	12.5	3.0	9.5	6.5
Typical performance at 300 lux for the SX5400 @160mm focus				

APPENDIX H

SPECIFICATIONS WORKABOUT PRO BATTERIES

H.1 Battery Specifications

Note: Performance specifications are nominal & subject to change without notice. Consult the Accessories Catalog at www.PsionTeklogix.com/Accessories to ensure that a specific device is still available.

This appendix describes all the batteries that are available in the following WORKABOUT PRO variants:

- WORKABOUT PRO C
- WORKABOUT PRO S
- WORKABOUT PRO ME
- WORKABOUT PRO 2nd. Generation C
- WORKABOUT PRO 2nd. Generation S

Consult the specifications for your WORKABOUT PRO to find out which batteries are compatible with it.

H.2 Standard Capacity-2000 mAh (Model WA3000-G1)

H.2.1 Electrical Specifications

Note: The electrical specifications apply for ambient temperature TAMB of 0° to +40°C unless otherwise stated.

Description	Specification	Remark
Interface Chipset	Maxim DS2762	-
Rated Voltage	3.7V	Typical
Rated Capacity	2000mAh	Typical
Rated Charge Current	1.0A	Maximum
Charge Voltage	4.2 +/- 0.05V	Maximum
Discharge Cut-off voltage	2.6V	Typical
Charge Method	Constant voltage Current limited	-
Discharge Current	0.5C (-20°C to 60°C)	Typical
Internal Resistance	150 mΩ	Maximum

Battery Pack Electrical Specifications

Description	Specification		
	Minimum	Typical	Maximum
Over voltage detection voltage	4.325V	4.350V	4.375V
Charge enable	4.10V	4.15V	4.20V
Under voltage detection voltage	2.5V	2.6V	2.7V

Description	Specification		
Over current detection current	2.97A	3.17A	3.36A
Short-circuit detection current	9.9A	13.33A	16.83A
Short-circuit detection voltage	150mV	200mV	250mV
Over voltage delay time	0.8s	1s	1.2s
Under voltage delay time	90ms	100ms	110ms
Over current delay time	5ms	10ms	20ms
Short-circuit delay time	160µs	200µs	240µs
Recovery charge current	0.5mA	1mA	2mA

H.2.2 Standard Discharge

Note: Standard charge is defined as charging with constant voltage limit of 4.2V and constant current limit of 0.9A; the termination charge occurs when the current drops to 45mA.

Standard discharge is defined as discharging at a constant current of 350mA until the battery protection circuit switches the battery output off in over-discharge mode.

Acceptance Test Specifications

Description	Condition	Standard
Open circuit voltage	After standard charge, measured within 24 hours.	4.15V or more
Internal resistance	After standard charge, measured within 24 hours.	150 mΩ max.
Capacity_1	After standard charge, measured time taken for a fast discharge.	110 minutes or more
Charge/Discharge cycle	After repeating standard charge and fast discharge, measured the fast discharge time after 300 discharge cycles.	90 minutes or more
Capacity_2	After standard charge, measured the time taken for a standard discharge.	500 minutes or more
Over discharge	After standard charge, apply a standard discharge followed by a standby discharge. Then measured capacity after carrying out standard charge and then a fast discharge.	110 minutes or more
Self discharge	After a standard charge, keep battery at 25°C for 30 days. Measured the time taken for a fast discharge.	100 minutes or more

Description	Condition	Standard
Temperature	Perform a standard charge and fast discharge at 0°C, 25°C and 40°C and measured the time taken for a fast discharge at 25°C.	100 minutes @ 0°C 110 minutes @ 23°C 105 minutes @ 40°C
Tempera-ture/Humidity cycle	After standard charge, carry out 5 cycles: 65°C and 90% humidity for 8 hrs. 25°C and 65% humidity for 4 hrs. -20°C for 8 hrs. 25°C and 65% humidity for 4 hrs.	100 minutes or more
Dry heat	After standard charge, keep the battery at 60°C for 8 hrs. Carry out a fast discharge, standard charge and then a fast discharge, measured the time taken for the second dis-charge.	100 minutes or more
Electro-Static Dis-charge	EN61000-4-8: A. Contact Discharge:+/- 8kV for each contact pad by 10 times. B. Air Discharge:+/- 15kV for 10 times.	No damage

H.2.3 Environmental Test

Description	Test Reference	Test Condition/Result
Drop	(mechanical)	Drop sample battery on all faces from height of 1.2 meters onto concrete floor No explosion, fire, vent, leakage and open circuit voltage higher than 3.7V.
Storage at high temp.	EN60068-2-2 Test	+60°C dry for 240 hours No explosion, fire, vent or leakage.
Storage at low temp.	EN60068-2-1 Test	-20°C dry for 240 hours No explosion, fire, vent or leakage.
Storage at high temp. and humidity	IEC68-2-3 Test	+40°C at 90%RH for 240 hours. No explosion, fire, vent or leakage.
Storage temp. cycling	IEC68-2-14 Test	+60°C (2C) for 1 hr. (T1), -20°C (2C) for 1 hr. 3 mins. maximum allows for change between T1 and T2, 10 cycles. No explosion, fire, vent or leakage.
Vibration resistance	BS2011 Part 2.1 FDC (IEC68-2-37)	After standard charge, tested under the following conditions: Random vibra-tion 5Hz-500Hz ASD 0.02g2/Hz in 3 axis for 15 mins. Followed by stand-ard discharge, charge, discharge. No parting joints/cracks or damage to connectors. No leakage or critical damage.

Description	Test Reference	Test Condition/Result
Impact shock resistance	-	3 cycles of 50G 11ms, 1/2 sine pulse acceleration applied in 6 directions. 18 shocks total.
ESC protection	-	Accordance with EN61000-4-8

H.3 High-Capacity 3000mAh (Model WA3006)

H.3.1 Electrical Specifications

Note: The electrical specifications apply for ambient temperature TAMB of 0° to +40°C unless otherwise stated.

Item	Description	Specification	Remark
1	Interface Chipset	Maxim DS2762	-
2	Rated Voltage	3.7V	Typical
3	Rated Capacity	3000mAh	Typical
4	Rated Charge Current	1.5A	Maximum
5	Charge Voltage	4.2 +/- 0.05V	Maximum
6	Discharge Cut-off voltage	2.6V	Typical
7	Discharge Current	Constant voltage Current limited	-
8	Discharge Current	0.5C (-20°C to 60°C)	Typical
9	Internal Resistance	200 mΩ	Maximum

Battery Pack Electrical Specifications

Description	Specification		
	Minimum	Typical	Maximum
Over voltage detection voltage	4.325V	4.350V	4.375V
Charge enable	4.10V	4.15V	4.20V
Under voltage detection voltage	2.5V	2.6V	2.7V
Over current detection current	-	3.5A	-
Short-circuit detection current	5.0A	8.0A	11.0A
Short-circuit detection voltage	150mV	200mV	250mV
Over voltage delay time	0.8s	1s	1.2s
Under voltage delay time	90ms	100ms	110ms
Over current delay time	5ms	10ms	20ms
Short-circuit delay time	160µs	200µs	240µs
Recovery charge current	0.5mA	1mA	2mA

H.3.2 Standard Discharge

Note: Standard charge is defined as charging with constant voltage limit of 4.2V and constant current limit of 0.9A; the termination charge occurs when the current drops to 45mA.

Standard discharge is defined as discharging at a constant current of 350mA until the battery protection circuit switches the battery output off in over-discharge mode.

Acceptance Test Specifications

Description	Condition	Standard
Open circuit voltage	After standard charge, measure within 24 hours.	4.15V or more
Internal Resistance	After standard charge, measure within 24 hours.	200 mΩ max.
Capacity_1	After standard charge, measure time taken for a fast discharge.	110 minutes or more
Charge/Discharge Cycle	After repeating standard charge and fast discharge, measure the fast discharge time after 300 discharge cycles.	90 minutes or more
Capacity_2	After standard charge, measure the time taken for a standard discharge.	500 minutes or more
Over Discharge	After standard charge, apply a standard discharge followed by a standby discharge. Then measure capacity after carrying out standard charge and then a fast discharge.	110 minutes or more
Self discharge	After a standard charge, keep battery at 25°C for 30 days. Measure the time taken for a fast discharge.	100 mins or more
Temperature	Perform a standard charge and fast discharge at 0°C, 25°C and 40°C and measured the time taken for a fast discharge at 25°C.	100 minutes @ 0°C 110 minutes @ 23°C 105 minutes @ 40°C
Temp./Humidity Cycle	After standard charge, carry out 5 cycles of the following: 65°C and 90% humidity for 8 hrs. 25°C and 65% humidity for 4 hrs. -20°C for 8 hrs. 25°C and 65% humidity for 4 hrs. Following that, perform a fast discharge, standard charge and then a fast discharge. Measure the time taken for the second discharge.	100 minutes or more
Dry heat	After standard charge, keep the battery at 60°C for 8 hrs. Carry out a fast discharge, standard charge and then a fast discharge, measured the time taken for the second discharge.	100 minutes or more

Description	Condition	Standard
EMC/CE Testing	The battery will need to pass the requirements of the EMC directive 89/336/EEC (and amendments) when fitted into the product: Emissions to EN55022 Class B (1998) Immunity to EN55024 (1998)	Test to be performed by manufacturer.
Electro-Static Discharge Test	EN61000-4-8: A. Contact Discharge: +/-8kV for each contact pad by 10 times. B. Air Discharge: +/-15kV for 10 times (the discharge test point is for around battery casing.)	No damage

H.3.3 Safety Data

Description	Condition	Test Condition/Result
Short Circuit Test	After a standard charge, short terminals and discharge for 1 hr.	Protection circuit board to operate. No explosion, fire, smoke, or leakage.
Over Charging Test	After a standard charge, charge continuously at 4.2V and 4A for 8 hrs.	Protection circuit board to operate. No explosion, fire, smoke, or leakage.
Reverse Charging Test	After a standard discharge, reverse-charge continuously at 4.2V and 4A for 8hrs.	Protection circuit board to operate. No explosion, fire, smoke, or leakage.

H.3.4 Safety License

Item	License	Standard
1	UL 1642	The lithium-ion cell has been listed and pass the UL1642 standard by UL Lab.
2	UL 2054	The battery pack is in the process to apply the UL 2054 battery standard.
3	89/336 EEC-EMC directive.	The battery pack is in the process to apply this standard: -EN55022 -LVD 72/23 EEC -EN55024 -EN61326
4	RoHS Directive	The battery pack is in the process to apply the RoHS directive applicable report by SGS Lab.

H.3.5 Environmental Test

Description	Test Reference	Test Condition/Result
Drop	(mechanical)	Drop sample battery on all faces from height of 1.2 meters onto concrete floor. No explosion, fire, vent, leakage and the open circuit voltage higher than 3.7V.

Description	Test Reference	Test Condition/Result
Storage at high temp.	EN60068-2-2 Test	+60°C dry for 240 hours No explosion, fire, vent or leakage.
Storage at low temp.	EN60068-2-1 Test	-20°C dry for 240 hours No explosion, fire, vent or leakage.
Storage at high temp. and high humidity	IEC68-2-3 Test	+40°C at 90%RH for 240 hours. No explosion, fire, vent or leakage.
Storage temp. cycling	IEC68-2-14 Test	+60oC (2C) for 1 hour (T1), -20oC (2C) for 1 hour. 3 minutes Max allowed for change between T1 and T2. Cycle 10 times No explosion, no fire, no vent, and no leakage.
Vibration resist-ance	BS2011 Part 2.1 FDC (IEC68-2-37)	After standard charge, tested under the fol-lowing conditions: Random vibration 5Hz-500Hz ASD 0.02g2/Hz in 3 axis for 15 mins. After which, carry out a standard discharge, charge, discharge. No parting joints/cracks or damage to connectors. No leakage or critical damage.
Impact shock resistance	-	3 cycles of 50G 11ms, 1/2 sine pulse accel-eration applied in 6 directions. 18 shocks total.
ESD protection	-	Accordance with EN61000-4-8

H.4 Super High-Capacity (Model WA3010)

H.4.1 Electrical Specifications

Note: The electrical specifications apply for ambient temperature TAMB of 0° to +40°C unless otherwise stated.

Item	Description	Specification	Remark
1	Interface Chipset	Maxim DS2762	-
2	Rated Voltage	3.7V	Typical
3	Rated Capacity	4000mAh	Typical
4	Rated Charge Current	1.2A	Maximum
5	Charge Voltage	4.2 +/- 0.05V	Maximum
6	Discharge Cut-Off Voltage	2.6V	Typical
7	Charge Method	Constant voltage Current limited	-
8	Discharge Current	0.5C (-20°C to 60°C)	Typical

Item	Description	Specification	Remark
9	Internal Resistance	150 mΩ	Maximum
10	Charging Temperature	0 to 40	Typical

Battery Pack Electrical Specifications

Item	Description	Specification		
		Minimum	Typical	Maximum
1	Over voltage detection voltage	4.325V	4.350V	4.375V
2	Charge enable	4.10V	4.15V	4.20V
3	Under voltage detection voltage	2.5V	2.6V	2.7V
4	Over current detection current	2.97A	3.17A	3.36A
5	Short-circuit detection current	9.9A	13.33A	16.83A
6	Short-circuit detection voltage	150mV	200mV	250mV
7	Over voltage delay time	0.8s	1s	1.2s
8	Under voltage delay time	90ms	100ms	110ms
9	Over current delay time	5ms	10ms	20ms
10	Short-circuit delay time	160µs	200µs	240µs
11	Recovery charge current	0.5mA	1mA	2mA

H.4.2 Standard Discharge

Note: Standard charge is defined as charging with constant voltage limit of 4.2V and constant current limit of 0.9A; the termination charge occurs when the current drops to 45mA.

Standard discharge is defined as discharging at a constant current of 350mA until the battery protection circuit switches the battery output off in over-discharge mode.

Acceptance Test Specifications

Description	Condition	Standard
Open circuit voltage	After standard charge, measure within 24 hours.	4.15V or more
Internal Resist-ance	After standard charge, measure within 24 hours.	150 mΩ max.
Capacity_1	After standard charge, measure time taken for a fast discharge.	110 minutes or more
Charge/Discharge Cycle	After repeating standard charge and fast dis-charge, measure the fast discharge time after 300 discharge cycles.	90 minutes or more

Description	Condition	Standard
Capacity_2	After standard charge, measure the time taken for a standard discharge.	500 minutes or more
Over Discharge	After standard charge, apply a standard discharge followed by a standby discharge. Then measure capacity after carrying out standard charge and then a fast discharge.	110 minutes or more
Self discharge	After a standard charge, keep battery at 25°C for 30 days. Measure the time taken for a fast discharge.	100 minutes or more
Temperature	Perform a standard charge and fast discharge at 0°C, 25°C and 40°C and measured the time taken for a fast discharge at 25°C.	100 minutes @ 0°C 110 minutes @ 23°C 105 minutes @ 40°C
Temp./Humidity Cycle	After standard charge, carry out 5 cycles of the following: 65°C and 90% humidity for 8 hrs. 25°C and 65% humidity for 4 hrs. -20°C for 8 hrs. 25°C and 65% humidity for 4 hrs. Following that, perform a fast discharge, standard charge and then a fast discharge. Measure the time taken for the second discharge.	100 minutes or more
Dry heat	After standard charge, keep the battery at 60°C for 8 hrs. Carry out a fast discharge, standard charge and then a fast discharge. Measure the time taken for the second discharge.	100 minutes or more
EMC/CE Testing	The battery will need to pass the requirements of the EMC directive 89/336/EEC (and amendments) when fitted into the product: Emissions to EN55022 Class B (1998) Immunity to EN55024 (1998).	Test to be performed by manufacturer.
Electro-Static Discharge Test	EN61000-4-8: A. Contact Discharge: +/-8kV for each contact pad by 10 times. B. Air Discharge: +/-15kV for 10 times (the discharge test point is for around battery casing.)	No damage

H.4.3 Safety Data

Description	Condition	Test Condition/Result
Short Circuit Test	After a standard charge, short terminals and discharge for 1 hr.	Protection circuit board to operate. No explosion, fire, smoke, or leakage.

Description	Condition	Test Condition/Result
Over Charging Test	After a standard charge, charge continuously at 4.2V and 4A for 8 hrs.	Protection circuit board to operate. No explosion, fire, smoke, or leakage.
Reverse Charging Test	After a standard discharge, reverse-charge continuously at 4.2V and 4A for 8hrs.	Protection circuit board to operate. No explosion, fire, smoke, or leakage.

H.4.4 Safety License

Item	License	Standard
1	UL 1642	The lithium-ion cell has been listed and pass the UL1642 standard by UL Lab. File No. MH12383
2	UL 2054	The battery pack is in the process to apply the UL 2054 battery standard. File No. MH29921.
3	89/336 EEC-EMC directive	The battery pack is in the process to apply this standard: -EN55022 -LVD 72/23 EEC -EN55024 -EN61326
4	RoHS Directive	The materials of battery pack are used in accordance with the European RoHS directive.

H.4.5 Environmental Test

Description	Test Reference	Test Condition/Result
Drop	(mechanical)	Drop sample battery on all faces from height of 1.2 meters onto concrete floor. No explosion, fire, vent, leakage and the open circuit voltage higher than 3.7V.
Storage at high temp.	EN60068-2-2 Test	+60°C dry for 240 hours No explosion, fire, vent or leakage.
Storage at low temp.	EN60068-2-1 Test	-20°C dry for 240 hours No explosion, fire, vent or leakage.
Storage at high temp. and high humidity	IEC68-2-3 Test	+40°C at 90%RH for 240 hours. No explosion, fire, vent or leakage.
Storage temp. cycling	IEC68-2-14 Test	+60°C (2C) for 1 hour (T1), -20oC (2C) for 1 hour. 3 minutes Max allowed for change between T1 and T2. Cycle 10 times No explosion, no fire, no vent, and no leakage.

Description	Test Reference	Test Condition/Result
Vibration resistance	BS2011 Part 2.1 FDC (IEC68-2-37)	After standard charge, tested under the following conditions: Random vibration 5Hz-500Hz ASD 0.02g2/Hz in 3 axis for 15 mins. After which, carry out a standard discharge, charge, discharge. No parting joints/cracks or damage to connectors. No leakage or critical damage.
Impact shock resistance	-	3 cycles of 50G 11ms, 1/2 sine pulse acceleration applied in 6 directions. 18 shocks total.
ESD protection	-	Accordance with EN61000-4-8

H.5 Maxell ML2032 Rechargeable Coin Battery

Model	ML2032
System	Lithium Ion
Nominal Voltage (V)	3 V
Nominal Capacity (mAh*)	65
Nominal Discharge Current (µA)	200
Depth of Discharge = 10%	1,000 (6.5 mAh discharge) (total capacity 6,500 mAh)
Depth of Discharge = 20%	300 (13 mAh discharge) (total capacity 3,900 mAh)
Temperature Ranges	
Operating	-10° C to 60° C (14° F to 140° F)

*Nominal capacity indicates duration until the voltage drops down to 2.0V when discharged at a nominal discharge current at 20° C (68° F).

H.6 WORKABOUT PRO 2nd. Generation (C And S) Internal Battery

System	Lithium Ion
Nominal Voltage (V)	3.7 V
Nominal Capacity (mAh*)	140 mAh typical, 130 mAh minimum.
Maximum continuous discharge current	260 mA
Operating Temperature Range	-20° C to 60° C (-4° F to 140° F)
Charging Temperature Range	0° C to 45° C (32° F to 113° F)

APPENDIX I

HARDWARE DEVELOPER KIT LICENSE AGREEMENT

I.1 HARDWARE DEVELOPER KIT LICENSE AGREEMENT

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WE DISCLAIM ALL WARRANTIES AND INDEMNITIES, EXPRESS, IMPLIED OR STATUTORY, FOR PATENT OR COPYRIGHT INFRINGEMENT.

I.8 CONFIDENTIALITY

You agree not to use or disclose any proprietary information provided by us, except for the purposes of this Agreement. You agree not to reproduce any of the copyrighted materials unless expressly permitted by this Agreement.

I.9 ENDING THIS AGREEMENT

We may terminate this Agreement and your license immediately without notice if (a) you fail to comply with any term of this Agreement, or (b) your rights are assigned by you, by operation of law or otherwise. In such event, you must return or destroy all copies and component parts of the HDK and documentation, as well as any other Psion Teklogix proprietary information in your possession, within fourteen (14) days of the date of termination. Any rights and obligations under this Agreement that by their nature continue after it ends, will remain in effect until they are completed.

I.10 GENERAL

The laws of the Province of Ontario and the federal laws applicable therein, excluding the conflict of laws provisions, govern this Agreement. If any provision of this Agreement is deemed invalid or unenforceable by any country, that particular provision will be deemed modified to the extent necessary to make the provision valid and enforceable, and the remaining provisions will remain in full force and effect. Failure by us to insist on strict performance or to exercise a right when entitled, does not prevent us from doing so at a later time, either in relation to that default or any subsequent one.

No modifications of this Agreement shall be effective unless in writing and approved by us.

You acknowledge that you have read this Agreement, understand it, and that it is the complete agreement between you and Psion Teklogix with respect to the subject matter hereof and supersedes all prior agreements, oral or written.

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