Innovator™ Development Kit
for the Texas Instruments OMAP™ Platform

Deluxe Model User's Guide

Document Number: 715-0003-203

Version 1.0

October 14, 2002

IMPORTANT NOTICE

Preface

Read This First

About This Manual

This manual describes the Innovator™ Development Kit for Texas Instruments OMAP™ Platform Deluxe Model. Innovator combines hardware, software, firmware, and documentation to form a standalone platform. This platform can be used in developing and testing applications designed for wireless devices that use popular operating systems.

Chapter 1   **Introduction**
Introduces the Innovator™ Development Kit Standard Model concept.

Chapter 2   **Innovator™ Development Kit Components**
Describes at a high level each of the components that make up Innovator.

Chapter 3   **User Interfaces**
This section covers all of the connectors and buttons that the user will interact with on the Innovator System.

Chapter 4   **Innovator Out of Box**
This section covers the unpacking and initial checkout of the Innovator Development Kit to be done upon receipt of the system.

Chapter 5   **Innovator Disassembly and Assembly Procedures**
Describes how to disassemble and reassemble the Innovator.

Chapter 6   **Innovator Breakout Board**
This chapter provides details about the Innovator Breakout Box.

Please read each caution and warning carefully.

FCC Warning

This equipment is intended for use in a laboratory test environment only. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to subpart J of part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case the user at their own expense will be required to take whatever measures may be required to correct this interference.

Trademarks

Code Composer Studio Integrated Development Environment (IDE) is a trademark of Texas Instruments.

Innovator™ Development Kit is a trademark of Texas Instruments.

IBoot and IBoot Host are pending trademarks of Productivity Systems, Inc.

OMAP™ is a trademark of Texas Instruments.

Microsoft, Windows, Windows CE, Windows CE Platform Builder, and Windows NT are trademarks of Microsoft Corporation.

Other trademarks are the property of their respective owners.

Contents

Contents (cont.)

List of Figures

List of Figures (cont.)

List of Tables

Chapter 1 – Introduction

1.0   Introduction

This manual describes the Innovator™ Development Kit from a technical standpoint and is targeted at the user of the system. It provides detailed information about the system to be used by personnel that are developing hardware and software for the OMAP310, OMAP710, and OMAP1510 devices.

NOTE: Please be sure and read the Errata Sheet on the Innovator™ Development Kit CD for exceptions to this manual and for other useful information.

1.1   Overview

The Innovator™ Development Kit is designed to run embedded operating systems and provide a generic wireless communication chipset interface. The OMAP™1510 device supports the development and testing of wireless device applications that use Microsoft Windows CE, Symbian EPOC or other operating systems. Innovator™ Development Kit provides developers with an application development platform.

The OMAP™1510 device is based on dual-processor architecture with external memory shared between the two processors through the use of a memory and traffic controller. The two processors are:

- A TI Reduced Instruction Set Computer (RISC) microprocessor unit (MPU) subsystem. The MPU subsystem is based on the TI925T control processor, peripherals, and other components. The TI925T processor is based on the Advanced RISC Machine's (ARM™) ARM9 technology.

- A TI Digital Signal Processor (DSP) Subsystem. The DSP subsystem incorporates a TI TMS320C55x™ DSP, peripherals, and other components.

The following matrix gives an overview of the goals of the Innovator™ Development Kit.

Table 1. Innovator™ Development Kit Overview Matrix

IS	*IS NOT*
A development platform for OMAP™1510 devices with 289 pins.	Offering full pin count visibility for debug
Cost optimized.	Enables process voltage limits tests
A small form factor.	Optimal memory configurations
Optimal mechanical form factor for demonstration.	A bench for power consumption measurements (operation and leakage)
A Production Module	
Providing a basic peripheral set for wireless computing solutions	
Offering opportunity for OMAP™1510 modules development	
A development platform for OMAP™1510 peripheral drivers	
A development platform for application oriented software	

The Innovator™ Development Kit is comprised of several different modules:

- Processor Module (PM): Memory, power and support logic for the OMAP™1510 device.

- Standard Interface Module (IM) that supports the buttons, LCD display, touch screen, support logic (front light and power supplies), battery management, audio, USB and Serial Interfaces. Chapter 2 provides an illustration of different Interface Module configurations.

- Standard Expansion Module (EM) that sits between the Processor and Interface Modules. It supports various add-on functions. The Standard EM has an IrDA and a stereo Audio Input jack.

- Breakout Board provides Ethernet, Keyboard/Mouse support, advanced debugging capabilities.

- The CAMERA Module supports a CIF CMOS camera - (output formats of YCrCb 4:2:2, GRB 4:2:2, or RGB raw data. The module is not physically the same as on the OMAP™1510DCEVM)

The Innovator™ Development Kit is delivered in a plastic case with a keypad and an LCD/Touch-Screen Panel.

1.2 Purpose and Scope

The purpose of this document is to specify and provide the reader with guidelines to configure the Innovator™ Development Kit, and to develop software to drive the hardware on the Innovator™ Development Kit. The intended audiences for this document include anyone installing, using, or developing on the Innovator™ Development Kit system.

1.3 Innovator™ Development Kit Features

- OMAP™1510 289-pin chip.

- Five button Keypad.

- Dual UART interface with voltage adaptation to connectors.

- Clock Generation: 32 KHz and 12 MHz.

- Embedded Flash memory.

- JTAG interfaces MPU.

- Thin film Transistor (TFT) Liquid crystal display (LCD) with Quarter Video Graphics Array (QVGA) 240x320 resolution and 16-bit color. Touch screen mounted over LCD.

- USB Client & Host Interface.

- Multi Media Card Interface.

- I2S Audio Codec AIC 23 power amplifier, speaker, headphones, and microphone connections.

- CIF resolution (352x288) CMOS image sensor that acts as a camera.

- 12.288MHz and 16.934MHz Oscillators, software controlled

- One configuration DIP switch.

- Power and reset circuitry monitor.

- Stand-alone operation.

- Complete set of interface cables

- Reset/status LED on the front.

- Option switch on the back

- Reset button on the back.

- Ethernet Interface (Deluxe Model Only).

- PS/2 Keyboard and Mouse interface (Deluxe Model Only).

1.4   Innovator™ Development Kit Configuration

The Innovator™ Development Kit is supplied in two configurations: Innovator and Innovator Deluxe. Table 2 shows the components that are available with each configuration. Figure 1 shows a picture of the assembled Innovator Module. This manual is for the deluxe version of Innovator.

Table 2. Innovator™ Development Kit Product Matrixes

Component	Part Number
Innovator	
Standard Interface Module	110-0002-001
Processor Module	110-0005-001
Standard Expansion Module	110-0006-001
Enclosure	110-0012-001
Stand	240-0020-001
Accessories	See List
Innovator Deluxe	
Standard Interface Module	110-0002-001
Processor Module	110-0005-001
Standard Expansion Module	110-0006-001
Enclosure	110-0012-001
Stand	240-0020-001
Camera Module	120-0001-001
Breakout Board	110-0007-001
Accessories	See List
Processor Modules	
Processor Module	110-0005-001
Interface Modules	
Standard 2432 NC Interface Module	110-0002-001
Standard 2432 NL Interface Module	110-0002-001
Expansion Modules	
Standard Expansion Module	110-0006-001
Accessories	
Power Supply	330-0002-001
USB Host Cable	220-0003-001
USB Client Cable	220-0001-001
Dual Serial Port Cable	220-0002-001
Headphones	315-0002-001
Headset	315-0001-001
Audio Cable	325-0002-001
Speakers	320-0001-001
Breakout Board (Deluxe Only)	110-0007-001
Keyboard w/touchpad (Deluxe Only)	310-0001-001
Ethernet Cable (Deluxe Only)	325-0003-001

Left Side   **Right Side**

Figure 1. Innovator Module, Front and Side Views

Figure 2. Innovator Module, Top and Rear Views

1.5   Feature/Capability Matrix
The following tables show the different features for each configuration.

Table 3. Standard Interface Module Feature Matrix

Feature	*Type*
LCD	240x320, TFT
LCD Colors	65,535
Touchscreen	4-Wire
Frontlight	CCFL or LED
Audio CODEC	AIC23
Headphone/Headset	3.5mm/2.5mm
Integrated Speakers (2)	On-board
Navigation Button	5-Pole
Four User Defined Buttons	Momentary
USB Port	1 Client/2 Host
Serial Ports	2
On/Off Switch	Recessed
Sleep/Wake Button	Momentary
Microphone	Omni Directional
Camera Interface	Dual Placement

Table 4. Processor Module Feature Matrix

Feature	*Type*
Processor	OMAP™1510
SDRAM	32MB
User Flash	32MB
External Memory Interface	SD/MMC
Boot Flash/RAM	4MB/256K

Table 5. Standard Expansion Module Feature Matrix

Feature	*Type*
Communications	IrDA
Stereo Input	2.5mm

1.6   Innovator Modules

The modules included with the standard system are an Interface Module, a Processor Module and an Expansion Module. Figure 3 shows an exploded view of the module assembly.

Interface Module

Expansion Module

Processor Module
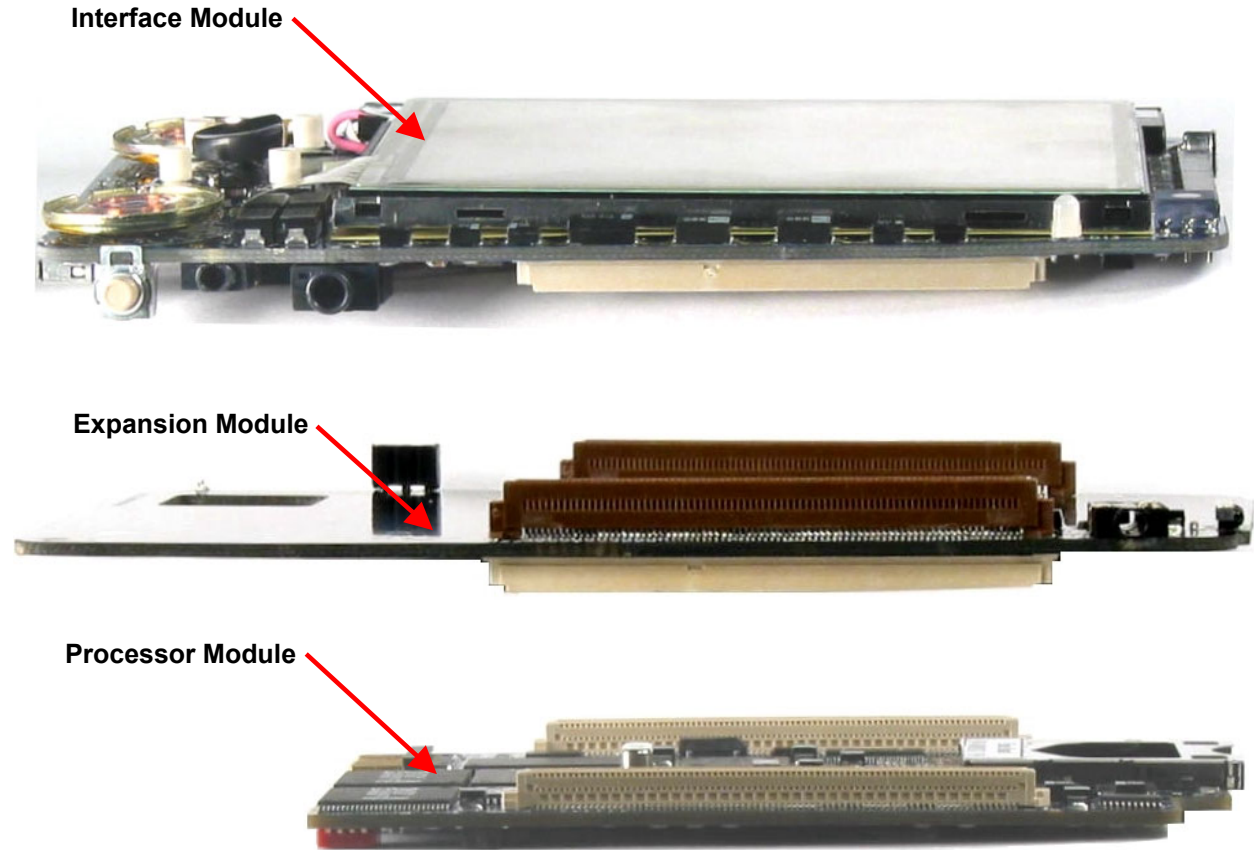
Figure 3. Innovator Module, Exploded View

1.7   Innovator™ Development Kit Breakout Board

The Innovator™ Development Kit Breakout Board (BoB) is designed to allow full access to each module. It is useful for checking out Expansion Modules that may be designed to plug into the Innovator™ Development Kit. Its unique design allows access to both sides of each of the modules. The Processor, Standard Interface, and Standard Expansion Modules can be installed on the BoB, as shown in Figure 5.
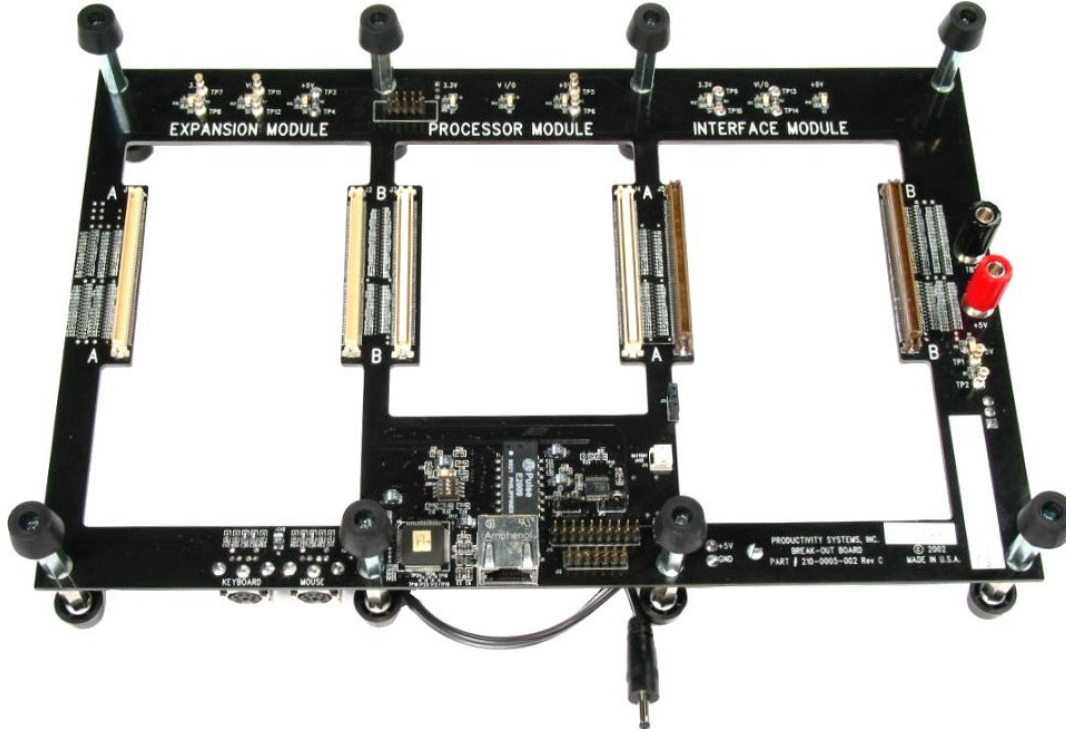
Figure 4. Innovator Development Kit Breakout Board
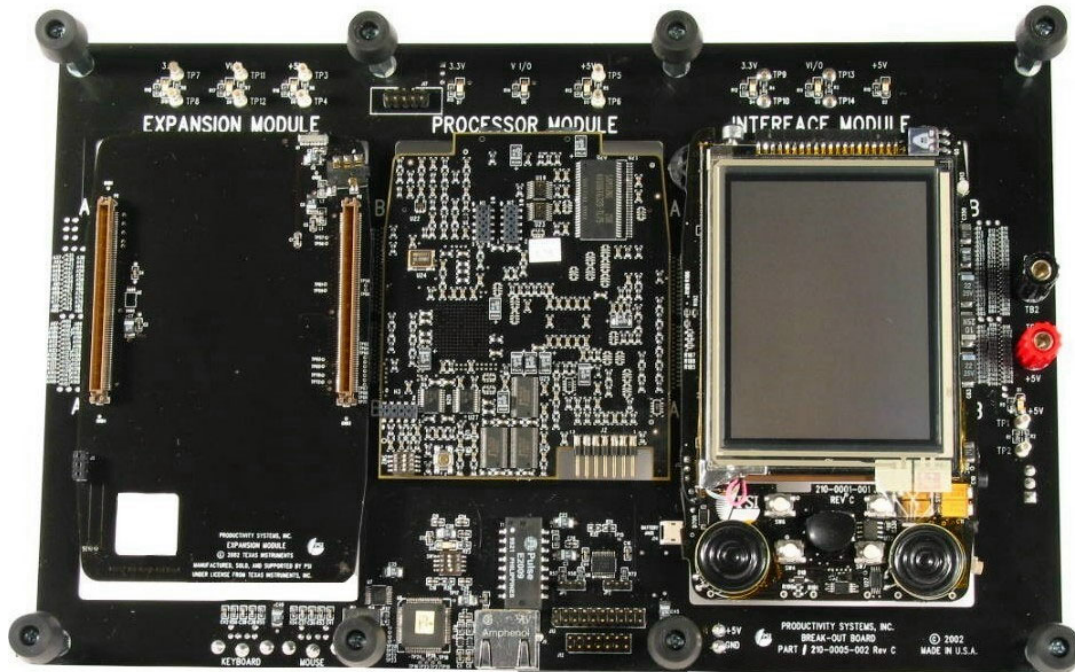
Figure 5. Innovator™ Development Kit Breakout Board with Modules Installed

1.7.1   BoB Test Point Board

The Test Point Board serves as an access point to test the signals that pass between the modules in the system.
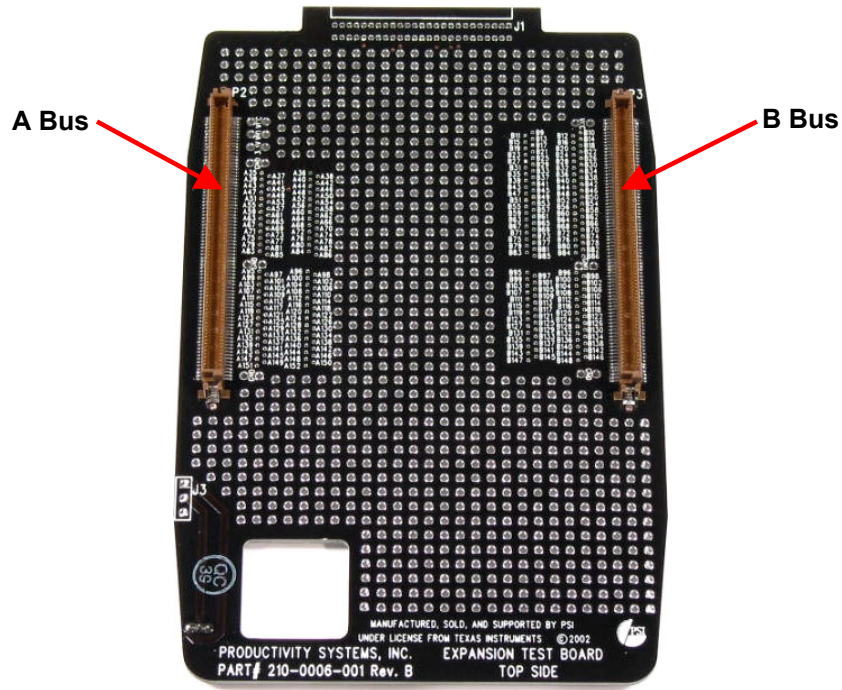
Figure 6. Test Point Board, Top Side
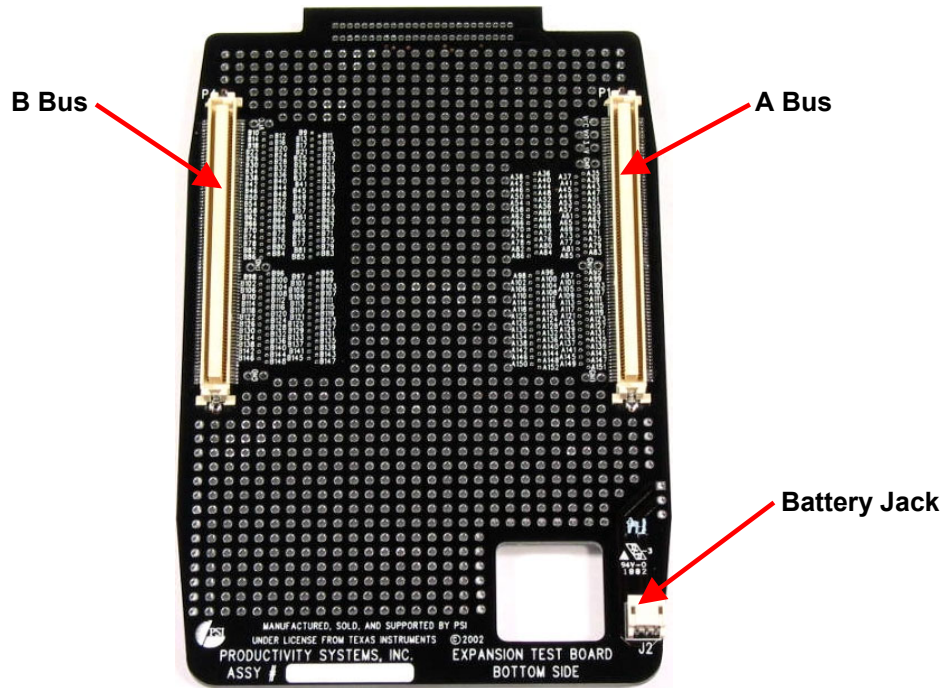
Figure 7. Test Point Board, Bottom Side

1.7.2   Keyboard

The keyboard is a Mini-Input 88/89 key keyboard with embedded numeric keypad, 12 dedicated function keys and a built-in touch-pad.

Figure 8. Keyboard

1.7.3   Ethernet Cable

The Ethernet cable is used primarily to assist developers in performing debug functions using the Innovator BoB.

Figure 9. Ethernet Cable

1.7.4   JTAG to Multi-ICE Adapter

The JTAG to Multi-ICE Adapter converts one type of connector to the other. The Breakout Board has both types of connectors, so this adapter is not needed when using the BoB.
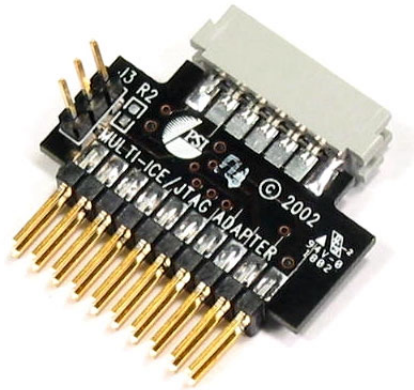
Figure 10. JTAG to Multi-ICE Adapter

Chapter 2 – Innovator™ Development Kit Components

2.0   Innovator™ Development Kit Components

This chapter provides a high-level description of the components that make up the Innovator™ Development Kit.

2.1   Processor Module

The heart of the Innovator platform is the Processor Module. Figure 11 shows the current Processor Module. Additional Processor Module designs may appear later, as new processors may be introduced. Figure 13 illustrates the Processor Module Naming Convention.
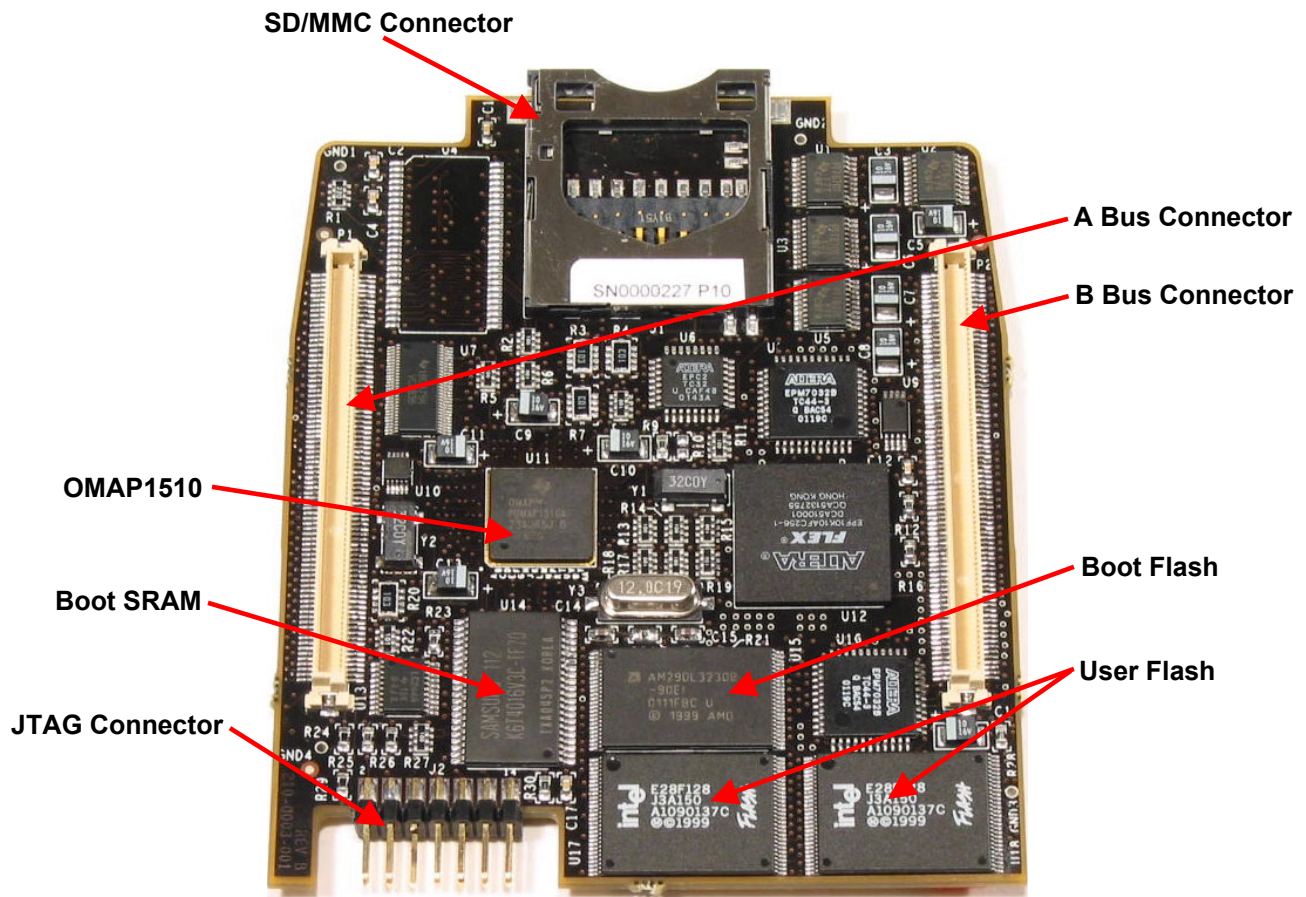
Figure 11. Processor Module, Front View
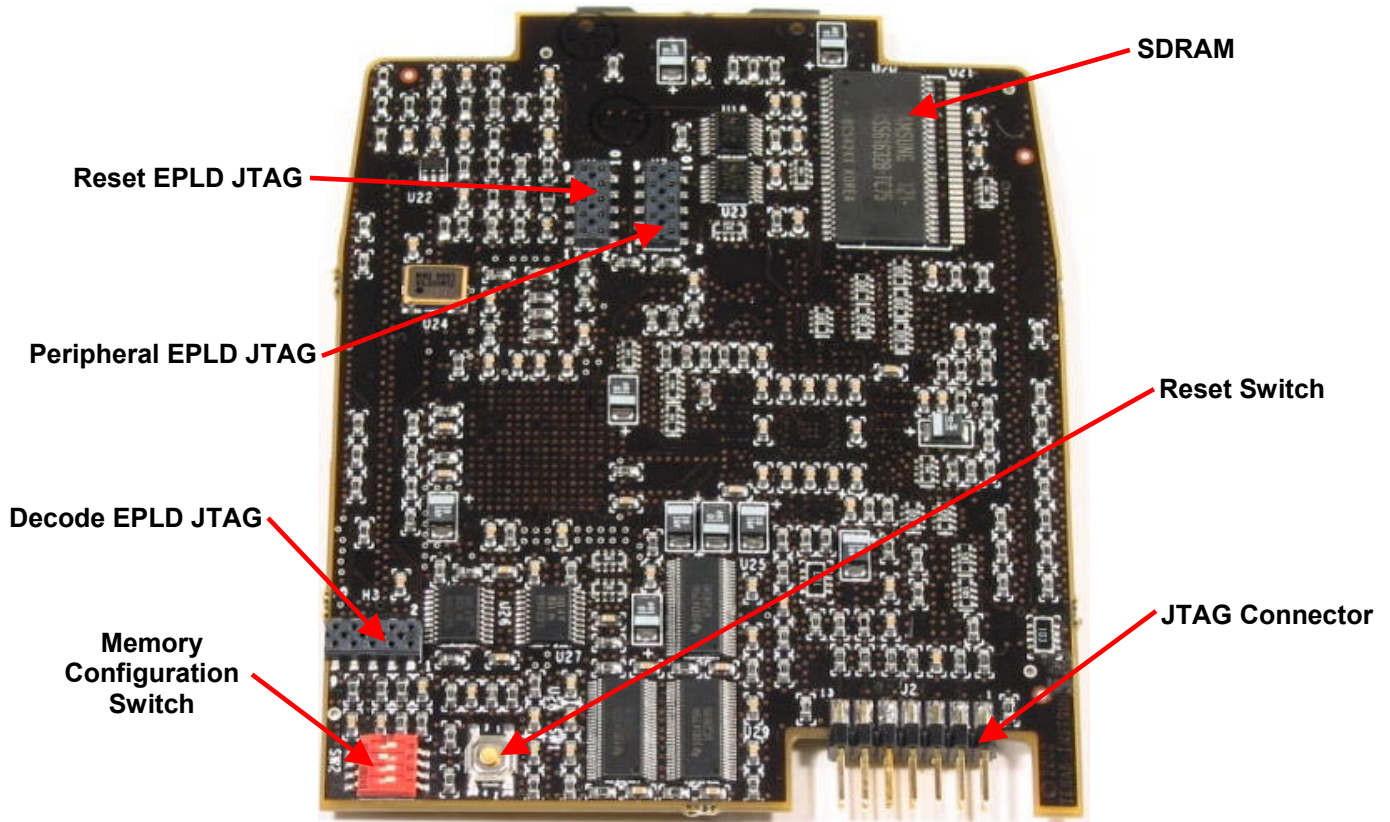
Figure 12. Processor Module, Bottom View

The following table defines the features of the Processor Module.

Table 6. Processor Module Features

Feature
OMAP™ 1510 Processor
32MB SDRAM
32MB User Flash
SD/MMC Interface
4MB/256K Boot Flash/RAM
Real Time Clock
JTAG Connector
Expansion Connectors
Reset Switch
Memory Configuration Switch

PM-1510 R 32 32-00

Processor Module ⎯⎯⎯⎯⎯ Reserved

Processor ⎯⎯⎯ User Flash Size

Flash Type ⎯⎯⎯ SDRAM Size
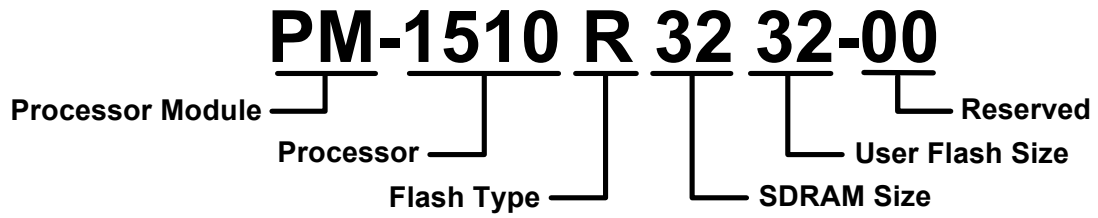
Options:

Processor:	Flash Type:	SDRAM Size:	User Flash Size:
1510 = OMAP1510	**R** = NOR	**64** = 64MB	**32** = 32MB
	N = NAND	**32** = 32MB	**16** = 16MB
		16 = 16MB	

00 = Reserved for Future Use

Figure 13. Processor Module Naming Convention

2.2   Standard 2432 NC Interface Module

The Standard 2432 NC Interface Module is the first interface module developed. Other interface modules will be added to accommodate additional LCD and switch configurations. Figure 16 illustrates the Interface Module Naming Convention.
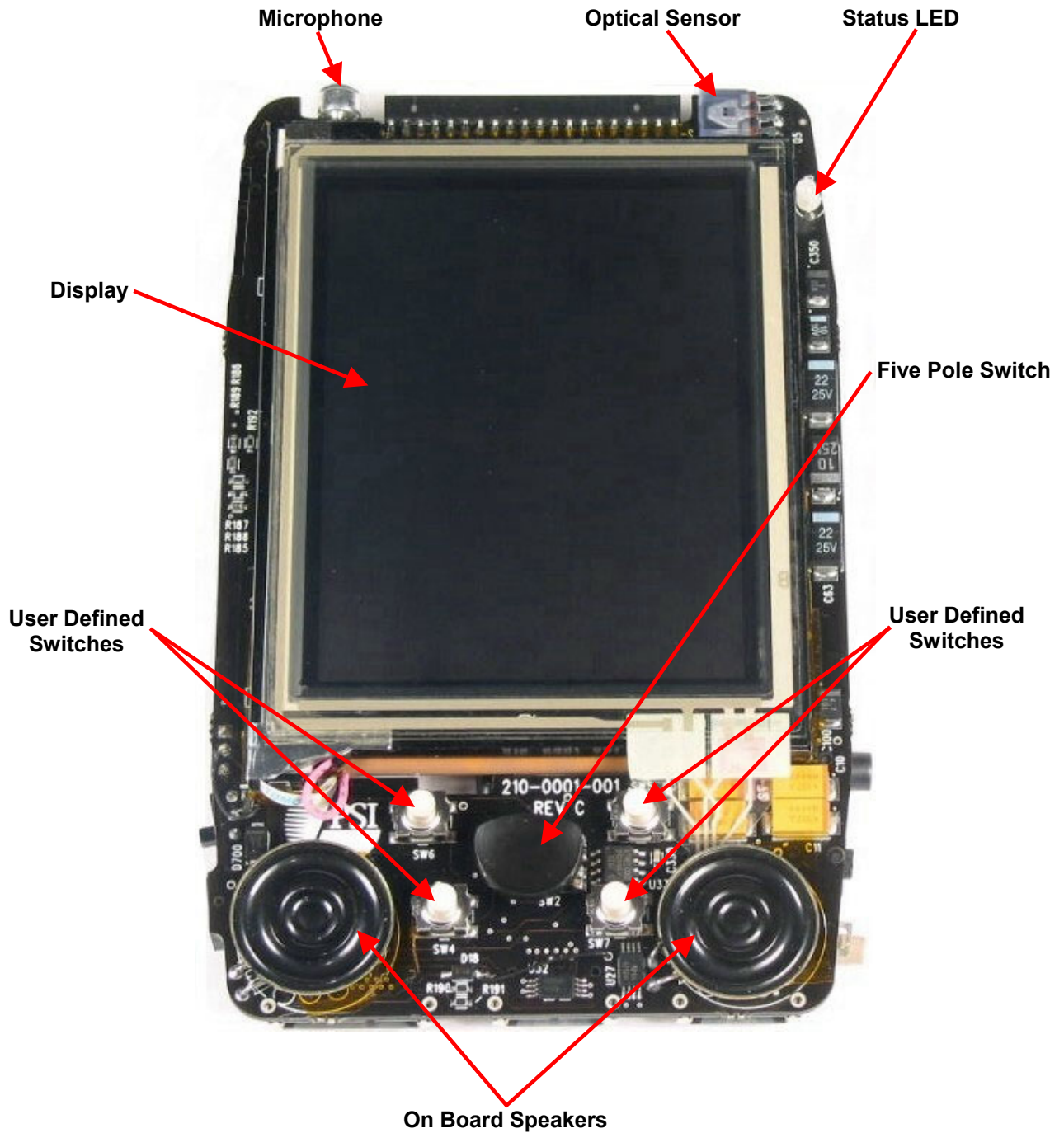
NOTE: DO NOT PICK UP THE INTERFACE MODULE BY THE SPEAKERS

Figure 14. Standard 2432 NC Interface Module, Top View

Camera Interface   Microphone

B Bus Connector   A Bus Connector

Headphone Jack   Battery Jack

                                                                         Recessed
                                                                         On/Off Switch

Headset Jack

                                                                         DC Input Jack

Sleep/Wake
Button

Client USB Port   Serial Port

Host USB Port
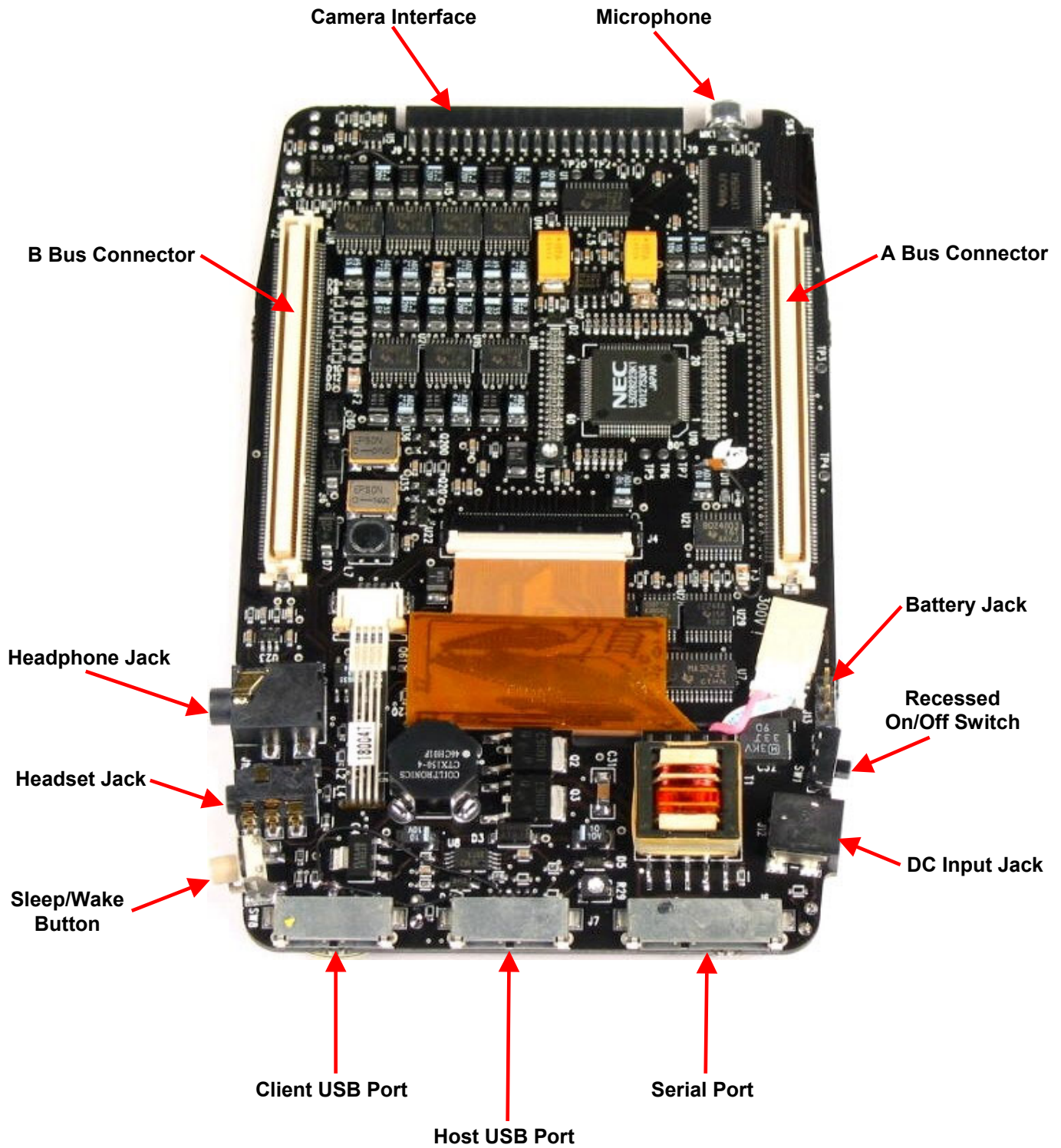
Figure 15. Standard 2432 NC Interface Module, Bottom View

The features of the Standard 2432 NC Interface Module are listed in the following table.

Table 7. Standard 2432 NC Interface Module Features

Feature	*Specification*
LCD	
Display	240 x 320
Size	3.5" Diagonal
Display Colors	64K
Frontlight	CCFL
Overlay	4-Wire Touchscreen
Buttons	
User Defined (4)	Momentary, Single Pole
Navigation	Five Pole Switch
On/Off	Recessed Slide Switch
Sleep/Wake	Momentary, Single Pole
Interfaces	
Audio	AIC23 Stereo Codec
Stereo	2.5mm, Stereo Amp
UART	Dual Serial Port Connector
USB	Client & Host
Headphone Jack	3.5mm, Stereo
Headset Jack	2.5mm, Mono
Power	
Battery Supply	3.7V Li-ION Battery[1]
DC Input	AC/DC Converter, Battery Charger
Indicator	Red/Green LED

IM-3.5 L N C-00

Interface Module ——

Screen Size

Mode ——

Lighting

LCD Manufacturer

Reserved

Options:

Screen Size:	**Mode:**	**LCD Manufacturer:**	**Lighting:**
3.5 = 3.5"	**L** = Landscape	**N** = NEC	**L** = LED
3.2 = 3.2"	**C** = Portrait	**S** = Sharp	**C** = CCFL
2.2 = 2.2"		**G** = Samsung	
		E = Epson	

00 = Reserved for Future Use

Figure 16. Interface Module Naming Convention

---

[1] **All batteries in the field have been recalled and should be returned to PSI immediately.**

2.3   Standard 2432 NL Interface Module

The Standard 2432 NL Interface Module is the first interface module developed. Other interface modules will be added to accommodate additional LCD and switch configurations.

Microphone　　　　　　　　　　　　　　　　　　**Status LED**

Display

Five Pole Switch

User Defined Switches　　　　　　　　　　　　　　**User Defined Switches**

On Board Speakers
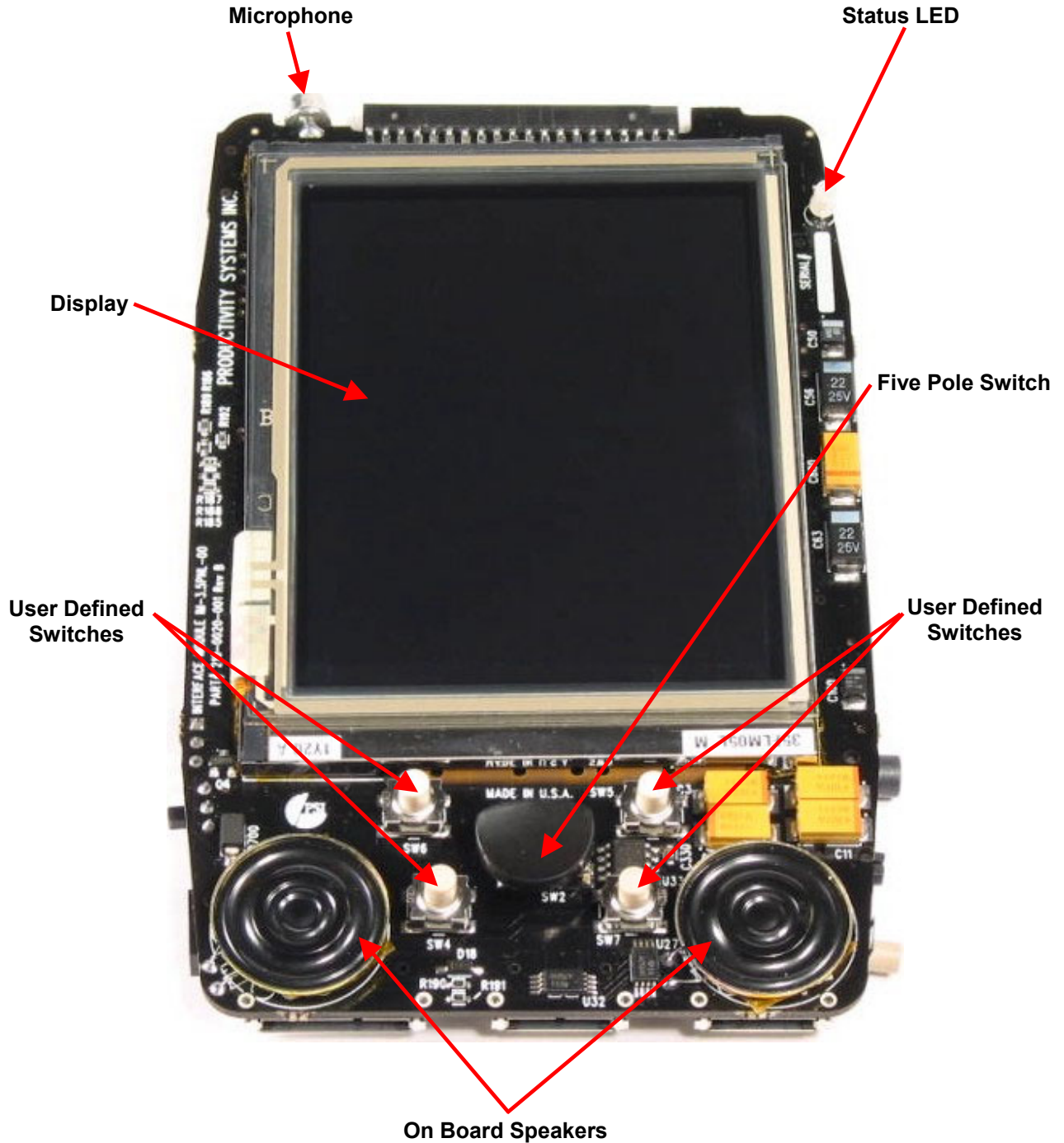
NOTE: DO NOT PICK UP THE INTERFACE MODULE BY THE SPEAKERS

Figure 17. Standard 2432 NL Interface Module, Top View

Camera Interface

Microphone

B Bus Connector

A Bus Connector

Battery Jack

Headphone Jack

Recessed
On/Off Switch

Headset Jack

DC Input Jack

Sleep/Wake
Button

Client USB Port

Serial Port

Host USB Port
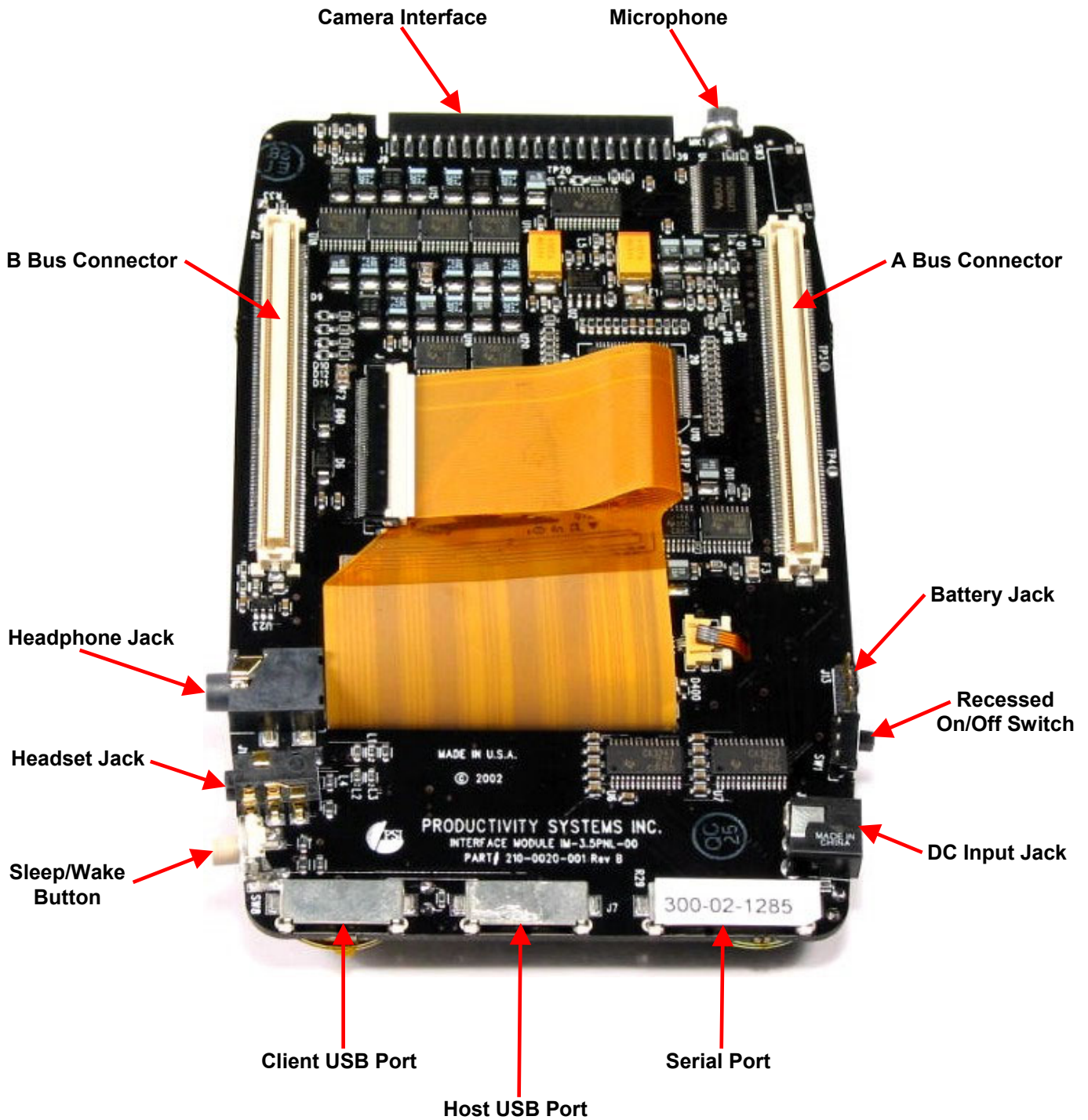
Figure 18. Standard 2432 NL Interface Module, Bottom View

The features of the Standard 2432 NL Interface Module are listed in the following table.

Table 8. Standard 2432 NL Interface Module Features

Feature	*Specification*
LCD	
Display	240 x 320
Size	3.5" Diagonal
Display Colors	64K
Frontlight	LED
Overlay	4-Wire Touchscreen
Buttons	
User Defined (4)	Momentary, Single Pole
Navigation	Five Pole Switch
On/Off	Recessed Slide Switch
Sleep/Wake	Momentary, Single Pole
Interfaces	
Audio	AIC23 Stereo Codec
Stereo	2.5mm, Stereo Amp
UART	Dual Serial Port Connector
USB	Client & Host
Headphone Jack	3.5mm, Stereo
Headset Jack	2.5mm, Mono
Power	
Battery Supply	3.7V Li-ION Battery[1]
DC Input	AC/DC Converter, Battery Charger
Indicator	Red/Green LED

---

[1] **All batteries in the field have been recalled and should be returned to PSI immediately.**

2.4   Standard Expansion Module

The Expansion Module provides for the addition of various mass storage and expansion interfaces. The Standard Expansion Module provides an IrDA interface and a 2.5mm Stereo input interface. Figure 21 illustrates the Expansion Module Naming Convention.
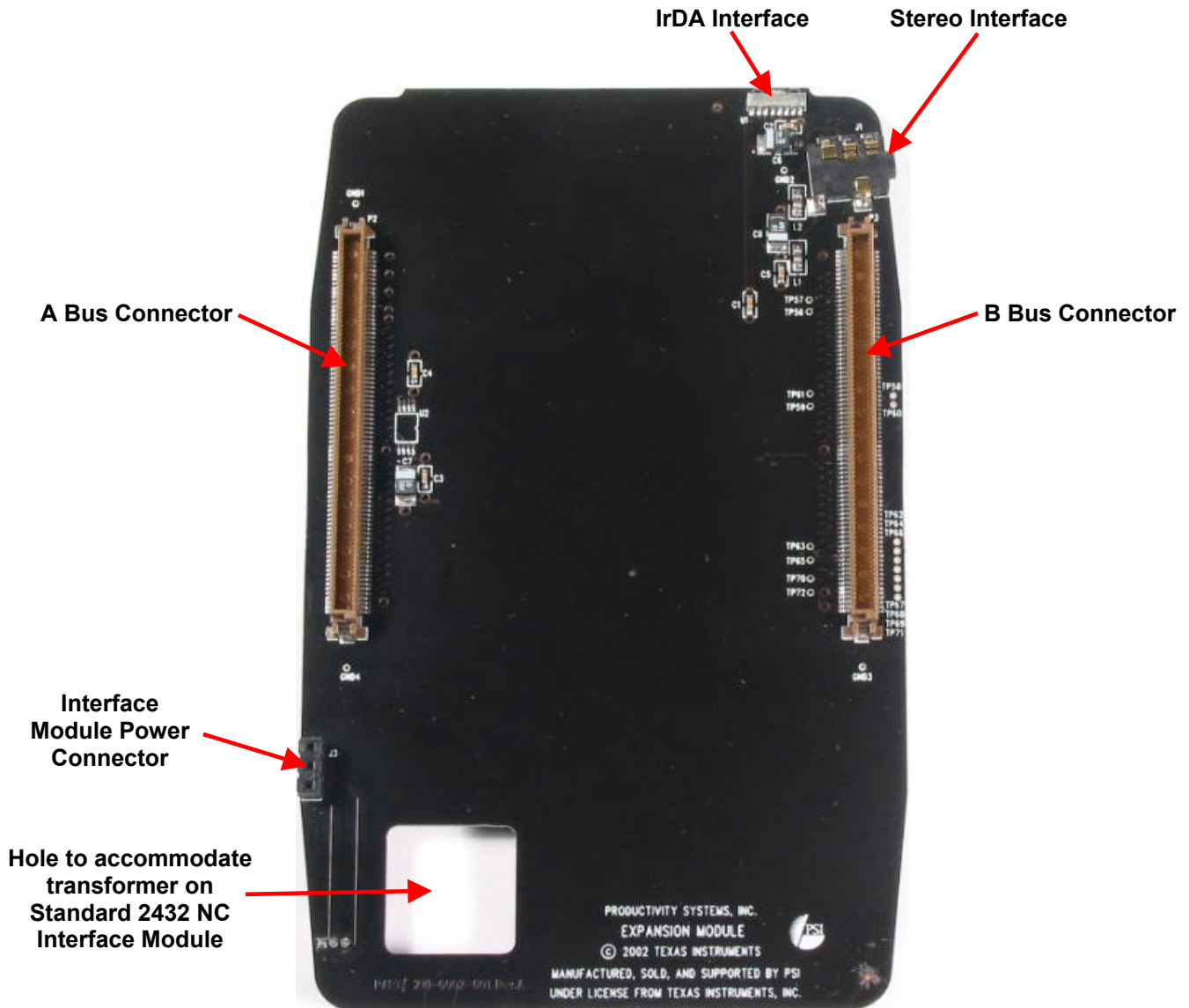
Figure 19. Standard Expansion Module, Top View

B Bus Connector →   ← A Bus Connector

Battery Connector →

Figure 20. Standard Expansion Module, Bottom View

EM-STD-00

Expansion Module ⎯⎯⎯⎯⎯⎯⎯   ⎯⎯⎯⎯⎯⎯ **Reserved**
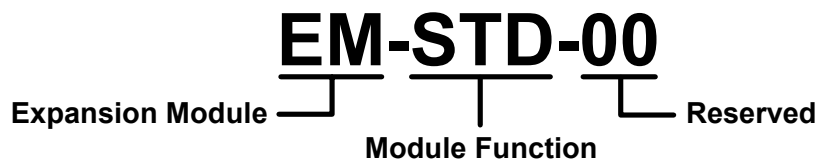
Module Function

Module Function:

STD = Standard	**GSM** = GSM Modem	**VGA** = VGA Adapter
BT = Bluetooth	**CFC** = Compact Flash	**TST** = Test Point Board

00 = Reserved for Future Use

Figure 21. Expansion Module Naming Convention

2.5   Innovator™ Development Kit Accessories

The following sections describe the accessories that are supplied with each Innovator System.

The Innovator™ Development Kit has its own set of accessories that are shipped with each unit. Your accessory model may vary from the pictures shown below. The accessories included with the Innovator™ Development Kit are:

- ❑   AC/DC Power supply
- ❑   Stand
- ❑   Two Stylus
- ❑   Keyboard/Touch Pad Combo
- ❑   A pair of powered speakers w/batteries
- ❑   Stereo headphones
- ❑   Stereo headset
- ❑   Dual Serial Cable
- ❑   USB Client Cable
- ❑   USB Host Cable
- ❑   Stereo Audio Cable
- ❑   Camera Module (Deluxe only)

2.5.1   AC/DC Power Supply

The power supply converts an input range of 100 – 240Vac, 50 or 60Hz to the 5Vdc needed by the Innovator System.

Figure 22. ASTRODYDNE AC/DC Power Supply

2.5.2   Stand and Stylus

The stand is used to hold the Innovator Module in an upright position. The back cover of the Innovator Module is slotted to fit over the brads on the stand. The stylus can be used as a writing device or as a navigation and selection tool.

Figure 23. Stand and Stylus

2.5.3   Powered Speakers

The active speaker system provides up to 2W of stereo audio. Speakers can be powered through an AC adapter, or in some cases using AA batteries. The AC adapter is not provided with the system, but can be purchased at locations where powered speakers are sold.

Figure 24. Sony SRS-A21 Speakers

2.5.4   Headphones
The headphones provide a frequency response of 80 to 18,000 Hz and an impedance of 32 ohms.

Figure 25. Koss KTX-1 Headphones

2.5.5   Headset
The headset provided is a headband style headset with outside-the-ear speaker and boom mic. The rotating boom microphone adjusts to either side of the head.

Figure 26. Jensen JTH940 Headset

2.5.6   USB Client Cable
This cable is used to connect to the USB interfaces. A dongle is used to convert the 10-pin connector from the Innovator™ Development Kit to a client USB cable.

Figure 27. USB Client Cable

2.5.7   USB Host Cable
The USB Host Cable passes the USB transceiver's digital inputs and outputs to transmit and receive USB signals.

Figure 28. USB Host Cable

2.5.8 Dual Serial Port Cable

The connectors for each of the serial ports are 9-pin PDA I/O female low profile connectors. A dongle is used to convert the 9-pin connectors to the male/female DB9 connectors labeled COM1 and COM2. COM2 is used as a null modem interface. COM1 and COM2 connectors can be connected together to perform loop-back testing.

COM1 Pin Configuration   **COM2 Pin Configuration**
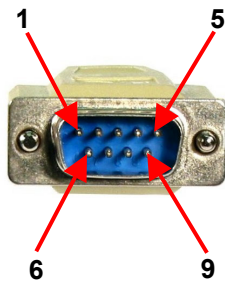
Pin	Signal
1	DCD
2	RX
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI
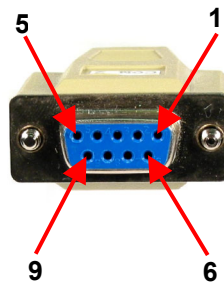
Pin	Signal
1	DCD
2	TX
3	RX
4	DSR
5	GND
6	DTR
7	CTS
8	RTS
9	RI

Figure 29. Dual Serial Port Cable

2.5.9   Stereo Input Cable

The Stereo Input Cable connects the Innovator to a PC audio out jack. It is equipped with a 2.5mm connector on one end and a 3.5mm connector on the other end. The 2.5mm end of the cable plugs into the stereo input jack on the Expansion Module. These cables are used to connect the 3.5mm jack from CD players, stereos, speakers, PC/TV tuners and other audio devices to the Innovator.

Figure 30. Stereo Input Cable

2.5.10   Camera Module

The Camera Module is a CMOS CIF Color Digital Camera with a ¼ inch lens. It has a dual placement connector so it can be plugged in either direction. This affords the ability to face the camera towards or away from the user. No matter which way it is plugged in, the pinout of the Interface Module connector will be compatible with the Camera Module. The camera should not be plugged in with power connected.
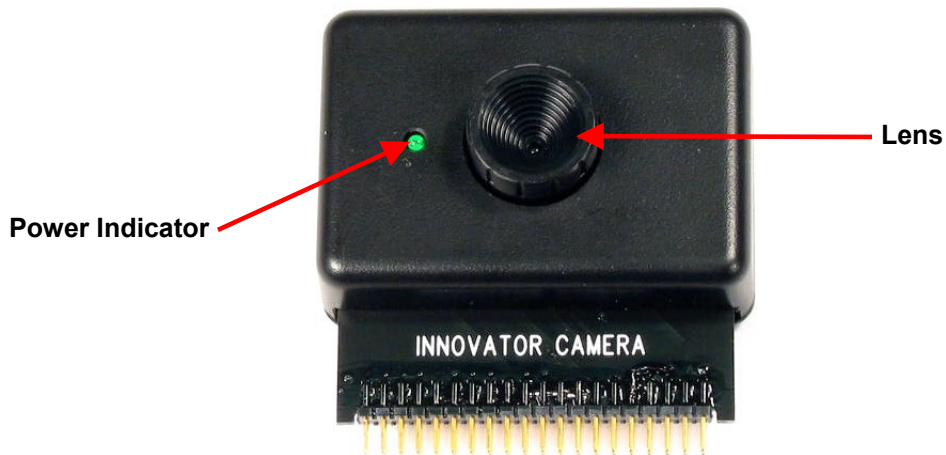
Figure 31. Camera Module

Table 9. Camera Features

Feature	Specification
Array Element – CIF 　　　　　　(QCIF)	352x288 (176x144)
Data Format	YCrCb 4:2:2, GRB 4:2:2, RGB Raw Data
Image Area	3.1mm x 2.5mm
8/16 bit Video Data	ITU-601, ITU-656, ZV Port
Max. Frames/Second	60 FPS
Image Enhancement	Brightness, Contrast, Gamma, Saturation, Sharpness
Synchronization	Internal/External
Gamma Correction	0.45/0.55/1.00
SCCB Programmable	Color Saturation, Brightness, Contrast, White Balance, Exposure Time, Gain
Scan Mode	Progressive
S/N Ratio	> 48dB (AGC off, Gamma = 1)
Power Supply	3.0 – 3.6Vdc 5Vdc/3.3Vdc (DIO)
Power Requirements	< 20mA Active, < 10µA Standby
Package	48-pin LCC

Chapter 3 – User Interfaces

3.0   User Interfaces

This section covers all of the connectors and buttons that the user will interact with on Innovator Module.

SD/MMC Connector

Camera Interface (J9)   **IrDA Interface**

Optical Sensor (CCFL Displays)

Microphone (MK1)

Stereo Input Jack

Status LED (D13)

Five Pole Switch (SW2)

User Defined Button (SW6)   **User Defined Button (SW5)**

Recessed On/Off Switch (SW1)

Headphone Jack (J11)

Headset Jack (J10)

DC Input Jack (J12)

Sleep/Wake Button (SW8)

User Defined Button (SW4)

User Defined Button (SW7)

Serial Port (J6)

Client USB Port (J8)

Host USB Port (J7)

Figure 32. User Interfaces, Front View

Camera Interface   SD/MMC Connector   IrDA Interface

Top View

Stereo Input

Recessed
On/Off Switch

Headphone Jack

Headset Jack

DC Input Jack

Sleep/Wake Button

Left Side   Right Side

Figure 33. User Interfaces, Top and Side Views

3.1   Battery Compartment

The Innovator™ Development Kit will operate off of a 3.7V Lithium Ion Rechargeable Battery[1]. The battery is installed and replaced by removing the back cover. Plug the Battery into battery jack on the Expansion Module with the pins on the plug facing the circuit board. Push the plug all the way into the connector.
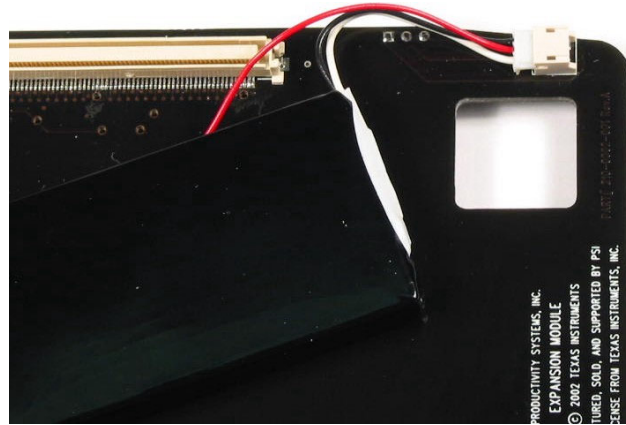
Figure 34. Battery Connection

When the modules are assembled, the battery should be positioned as shown below. Tuck the wires up underneath the Processor Module to keep them from getting pinched when the cover is put on.
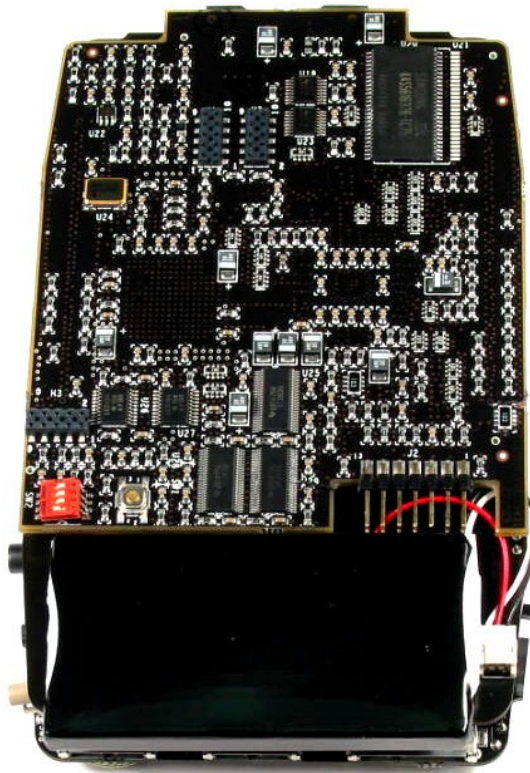
Figure 35. Battery Position

---

[1] **All batteries in the field have been recalled and should be returned to PSI immediately.**

3.2   DC Input Jack (J12)

A +5V 2Amp supply provides power to the system through the DC Input Jack on the Interface Module. Note that the plug is a **1.3mm center negative** connector.

Figure 36. DC Input Jack

3.3   Recessed On/Off Switch (SW1)

The On/Off switch is a recessed slide switch that turns power On in the up position and turns power Off in the down position. This switch is meant to be used as the initial power-up switch for the Innovator. Once the Innovator is turned on, the Sleep/Wake button should be used to cycle power on and off if the OS supports this function. Use the Stylus as shown below to power-up the Innovator Module.

Figure 37. Recessed On/Off Switch

3.4   Five Pole Switch (SW2)

The Five Pole Switch is a sub-miniature navigation tact switch with up to five single pole normally open contacts. Actuating the shaft in the up, down, right or left direction individually closes four momentary contacts, which provide the scanning function. The fifth contact is a push-to-select contact.

3.5   Microphone (MK1)

The microphone is an omni directional microphone and is mounted on the Interface Module. The microphone is automatically disabled when a Headphone is plugged into J11.

3.6   Camera Interface (J9)

A camera can be mounted on the top of the Innovator and can be plugged in either direction. This will allow the camera to be facing toward or away from the user.

Figure 38. Camera Installation, Facing Forward

Figure 39. Camera Installation, Facing Backward

3.7   IrDA Interface

The Innovator provides a two-way cordless infrared light transmission data port for high-speed short range, line of sight, point-to-point cordless data connectivity between devices of all types.

3.8   Optical Sensor (CCFL Displays)

The Optical Sensor on CCFL Displays is used to detect the ambient light level. This information can be used to adjust the brightness of the LCD Display as ambient light changes. The actual changing of the LCD brightness on the CCFL Display is under software control.

3.9   Status LED (D13)

The Status LED illuminates green when power is applied, even while the Innovator is in Sleep Mode. When power switch is in the off position and power supply is plugged in, the LED will illuminate red, and if a battery is installed, the battery will be charging. The LED color can also be controlled by certain software functions.

3.10   Sleep/Wake Button (SW8)

The Sleep/Wake button is used as the Innovator's On/Off switch if supported by the OS. When pressed, it will put the Innovator into sleep mode, or restore (wake) the Innovator from sleep mode. This is a way to conserve power (battery life) without removing power from the unit.

3.11   User Defined Buttons (SW4, SW5, SW6 and SW7)

These four buttons are provided for user-defined functionality. Buttons SW4-SW7 are low profile SMT devices that lay flat onto the board. They are configured as momentary single pole devices with tactile feedback.

3.12   Headphone Jack (J11)

A stereo headphone or external speakers can be connected to the headphone jack. This provides for stereo audio to be heard through a pair of headphones or external powered speakers. The headphone jack is a standard 3.5mm jack and will accept any commercially available devices intended for audio use. When the headphone jack is used, the Innovator's on-board speakers are disabled.

Figure 40. Headphone Connection

Figure 41. Speakers Connection

3.13 Headset Jack (J10)
The headset jack is a 2.5mm jack used with a headset. This jack used to connect a combination earphone and microphone. It features a single audio output and a built-in microphone input. When installed, it removes the connection to the Innovator's built-in microphone and disables the Innovator's on-board speakers.

Figure 42. Headset Connection

3.14 Stereo Input
The Stereo Input jack is a standard 2.5mm jack and will accept any commercially available 3.5mm devices intended for audio use when used with the audio cable. When the Stereo Input jack is used, the Innovator's on-board speakers are disabled.

Figure 43. Stereo Input Connection

3.15 Reset Switch

The reset switch is accessible from the rear of the Innovator case or the back of the Processor Module. It is a dual function reset switch in that it can generate an ARM only reset or full Power On reset. When switch is just pressed and released, it generates an ARM reset. When pressed and held for at least 2 seconds, it generates a Power On reset.
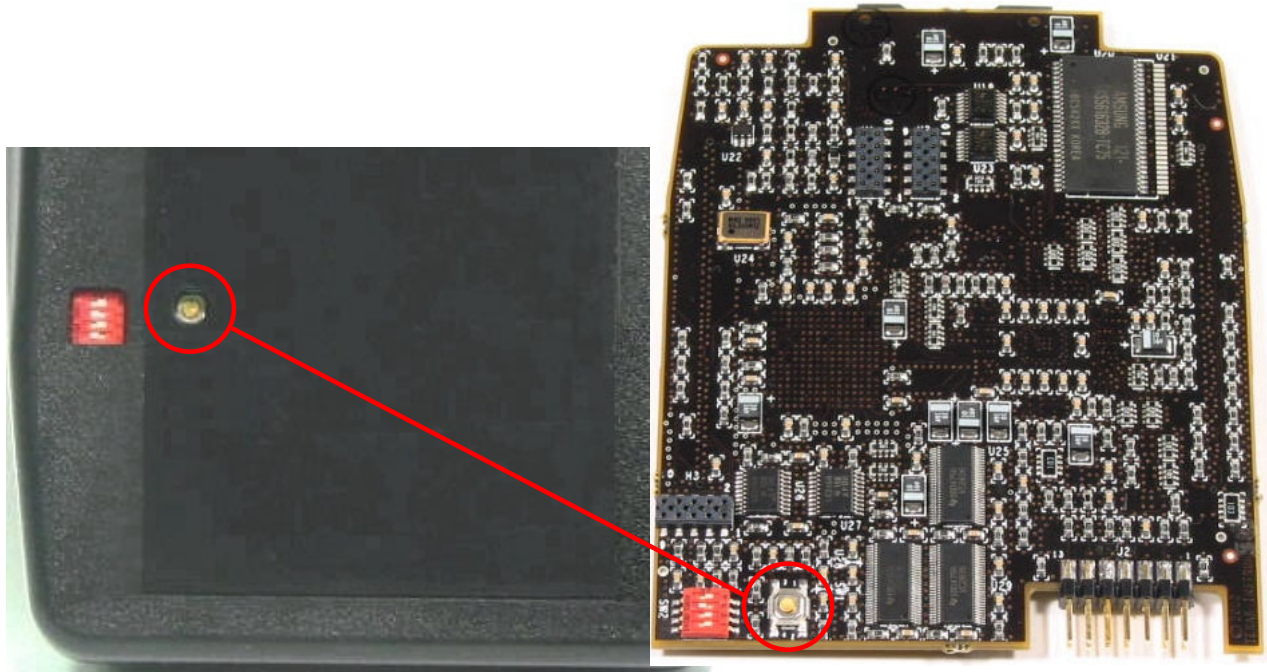
Figure 44. Processor Module Reset Switch

3.16 Memory Configuration Switch

Figure 45shows the location of the Memory Configuration switch. This switch is used to allow the running of the IBoot application. IBoot is use to run diagnostics or to flash the User Flash with an operating system. Table 10 lists the function of each switch. Innovator has the ability to flash two OSs in the User Flash as long as they do not exceed 32MB each. This switch is used to select which of these OSs is run when the Innovator is reset.
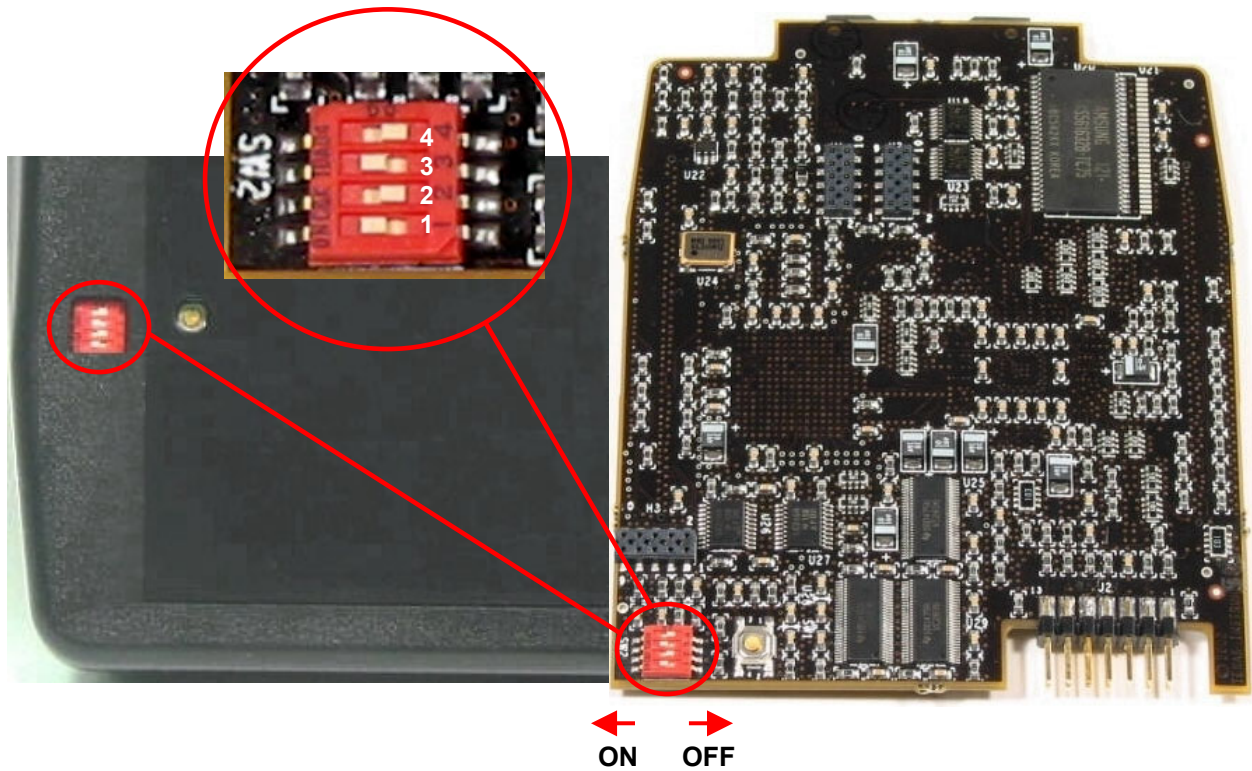
ON   OFF

Figure 45. Memory Configuration Dipswitch

Table 10. Memory Configuration Switch

Mode	SW1	SW2	SW3	SW4
Boot RAM	Off	Off	Off	Off
Run Image in User Flash0	Off	Off	On	Off
Run Image in User Flash1	Off	Off	On	On
IBoot (Boot Flash)	On	Off	Off	Off

3.17   USB Interface

There are two types of cables supplied to connect to the USB interfaces. One is for the Client function and the other is for the Host function.

3.17.1   Client USB Interface

The table below defines the pin connections from the Interface Module connector to the Client USB connector. The figures below show how the USB Client is installed.

Table 11. Client USB Interface

Pin name	Pin	Definition
USB_DP	1	
USB_DM	2	
Not Used	3	Not Used
VCC_USB	4	VCC
Ground	5	Ground
Not Used	6	Not Used
Not Used	7	Not Used
Not Used	8	Not Used
Not Used	9	Not Used
Not Used	10	Not Used

Figure 46. USB Client Cable Installation

Press in on both sides to insert and release the cable
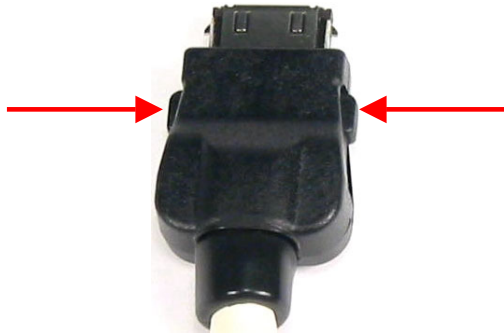
Figure 47. USB Connector Installation

3.17.2   Host USB Interface
The table below defines the pin connections from the Interface Module connector to the Host USB connector.

Table 12. Host USB Interface

Pin name	Pin	Definition
Not Used	1	Not Used
USB1D+	2	
USB1D-	3	
5VCC_MAIN	4	VCC
Ground	5	Ground
Ground	6	Ground
Ground	7	Ground
VCC_USB	8	VCC
USB2D+	9	
USB2D-	10	

Figure 48. USB Host Cable Installation

3.18 Dual Serial Port Interface
UART1 from the Processor Module is used as the serial port referred to as COM1. UART2 from the Processor Module is used as the serial port referred to as COM2. Figure 49 and Figure 50 show the location of Connector Pin 1. Table 12 lists the pin names and signal descriptions.
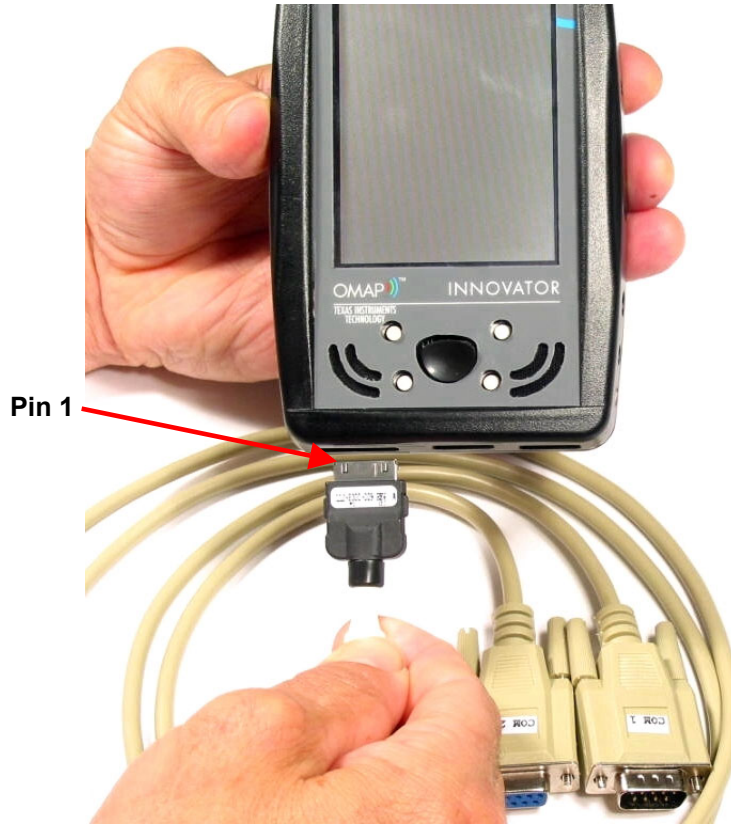

Figure 49. Serial Cable Installation
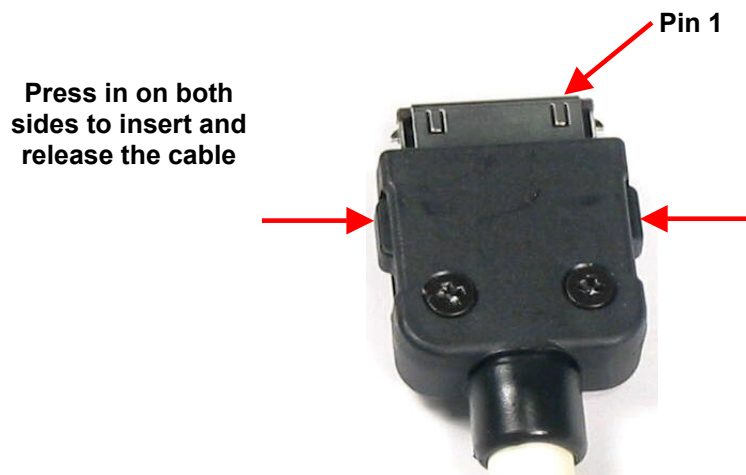
Figure 50. Serial Connector Installation

Table 13. Serial Cable Connector Pinouts

Pin name	Pin	Definition
DTR_SUBD2	1	Data terminal ready
TX_SUBD2	2	Transmit Signal. Data output
RTS_SUBD2	3	Request to send
CTS_SUBD2	4	Clear to send
RI_SUBD2	5	Ring input
DCD_SUBD2	6	Data Carrier Detect
DSR_SUBD2	7	Data set ready
RX_SUBD2	8	Receive signal. Data input
Ground	9	Ground
Ground	10	Ground
DTR_SUBD1	11	Data terminal ready
TX_SUBD1	12	Transmit Signal. Data output
RTS_SUBD1	13	Request to send
CTS_SUBD1	14	Clear to send
RI_SUBD1	15	Ring input
DCD_SUBD1	16	Data Carrier Detect
DSR_SUBD1	17	Data set ready
RX_SUBD1	18	Receive signal. Data input

Chapter 4 – Innovator™ Development Kit Out of Box

4.0   Innovator™ Development Kit Out of Box

This chapter provides information on unpacking Innovator and verifying that it is operational upon receipt by the user.

4.1   Unpacking Innovator

The figures below show the Innovator™ Development Kit as it is shipped. Open the box and remove the top layer of foam material to expose the contents as you see below. The Power Supply is located beneath the Innovator Module (see Figure 52).

Innovator™ Development Kit CD   **Innovator Module**   **Cables**

Stand   **Headphone & Headset**   **Speakers**

Figure 51. Innovator™ Development Kit Package

Power Supply

Figure 52. Power Supply Location

4.2   Connecting Power

To connect power to the Innovator Module, insert connector from power supply into jack as shown in the picture below. DO NOT force the power connector into the jack as it may cause damage to the jack.

NOTE: It is normal on the NC Version for the power connector to be exposed.

Figure 53. Power Supply Connection

4.3   Turning the Innovator Module Power Switch On

To apply power to the Innovator, put the stylus into opening on the case as shown below. Push upward on power switch until the Power On LED illuminates green.

Figure 54. Turning On the Innovator Module Power Switch

4.4   Innovator Operating System Verification
Operating Systems (OS) may be preloaded at the factory. The OS may be loaded in either User Flash location (User Flash 0 or User Flash 1), or in some cases both User Flash locations (User Flash 0 and User Flash 1). If no operating system is loaded, refer to the IBoot System Software User's Guide.

4.4.1   Running an Operating System from User Flash 0
To enable the OS from User Flash 0, insure the Memory Configuration switch on the back of the unit is set as shown below. Before changing a switch setting, the Innovator should be turned off. If the Innovator is left on when switch settings are made, you must use the reset button to do a power reset before switch settings will take affect.
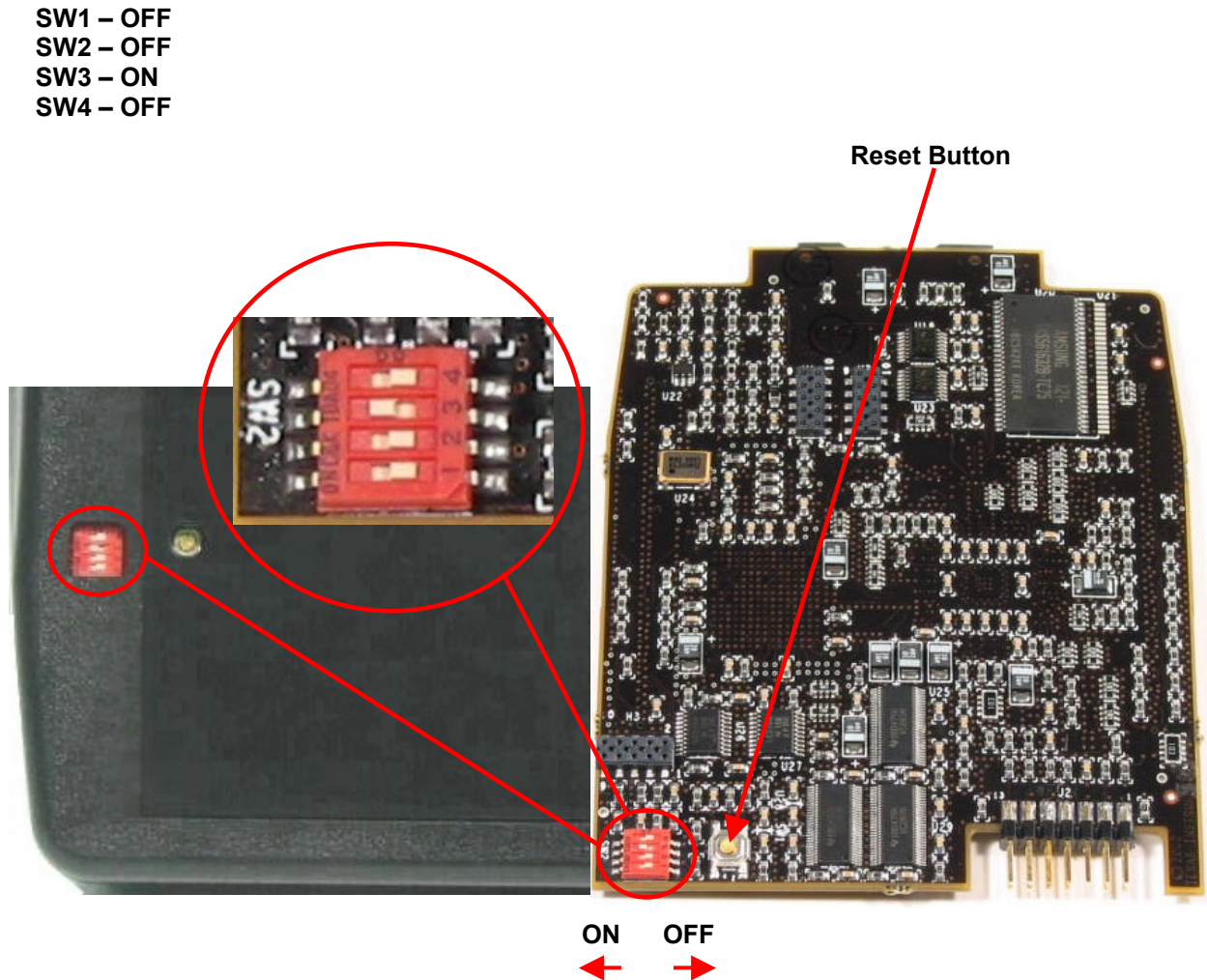
SW1 – OFF
SW2 – OFF
SW3 – ON
SW4 – OFF

Figure 55. User Flash 0 Switch Settings

After setting the switches, turn the Innovator on, or press the Reset Button to display the OS.

4.4.2   Running an Operating System from User Flash 1

To enable the OS from User Flash 1, insure the Memory Configuration switch on the back of the unit is set as shown below. Before changing a switch setting, the Innovator should be turned off. If the Innovator is left on when switch settings are made, you must use the reset button to do a power reset before switch settings will take affect.

SW1 – OFF
SW2 – OFF
SW3 – ON
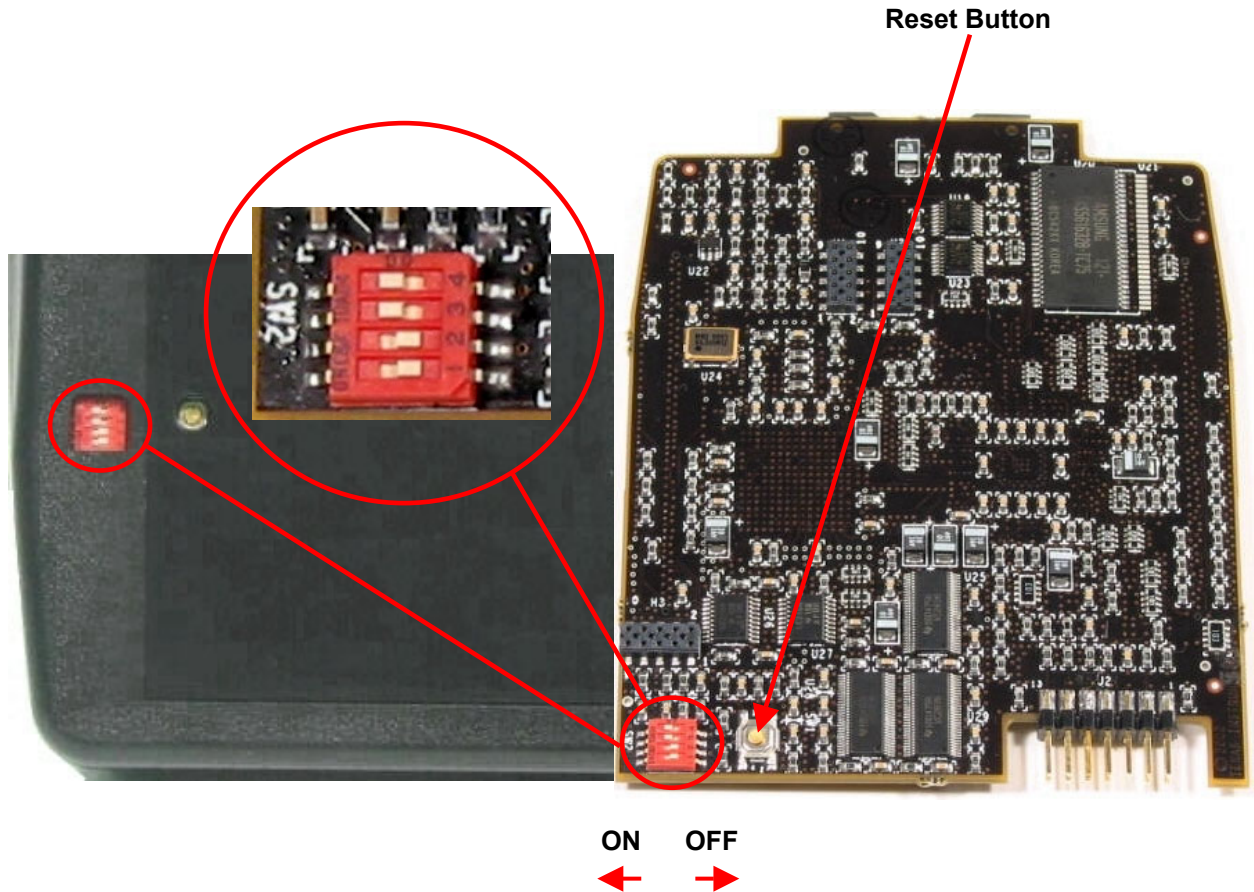**SW4 – ON**

Reset Button

ON   OFF

Figure 56. User Flash 1 Switch Settings

After setting the switches, turn the Innovator on, or press the Reset Button to display the OS.

4.4.3   Running IBoot

IBoot is the third bootable kernel in Innovator. This should be run to use the diagnostics and insure that the Innovator system is operating properly. For instructions on how to load and use the Innovator IBoot kernel, please refer to the IBoot System Software User's Guide.

4.5   Registering Innovator

In order to receive technical support for your Innovator™ Development Kit, you **MUST** register your individual unit. To register your Innovator™ Development Kit, follow the instructions on the Registration Card included with the Innovator™ Development Kit.

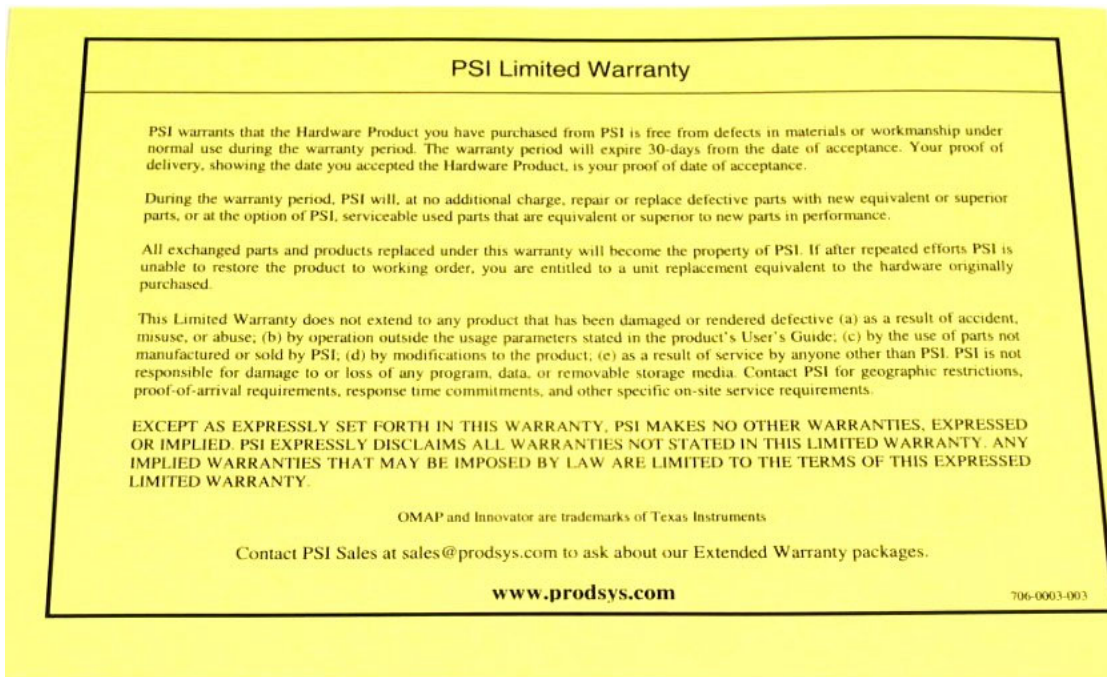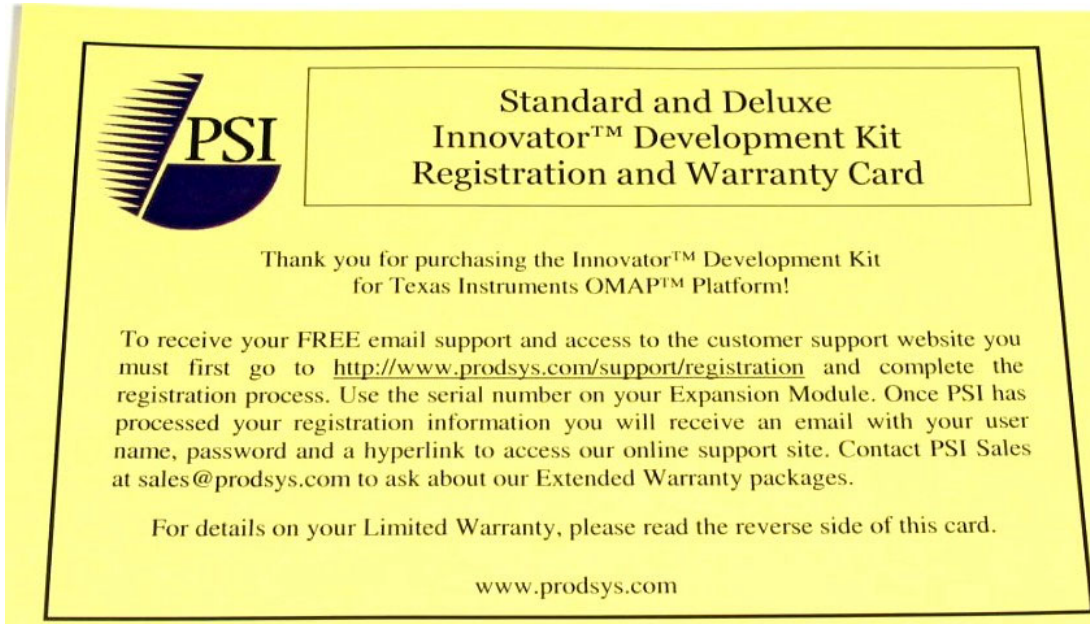**NOTE: Your registration card may appear differently than the one shown below.**

Figure 57. Sample Registration Card, Front and Back

Chapter 5 – Innovator Disassembly/Assembly

5.0   Innovator Disassembly and Assembly Procedures
This chapter describes how to disassemble and reassemble the Innovator. This is normally done when moving from the case to the Breakout board or from the Breakout Board to the case.

5.1   Innovator Disassembly
To disassemble the Innovator, proceed as follows:

Caution: To avoid damage to the Innovator, please read each step carefully and completely before proceeding with that step.

Step 1:   Using a Philips Screwdriver, remove four Philips Head screws from back cover and set cover aside. **Do not** remove screws from front cover.

          Left Side   **Right Side**

Figure 58.   Back Cover Philips Head Screws

Step 2: Remove Processor Module and set it aside.

Step 3: Remove Expansion Module.

Step 4: Unplug battery from Expansion Module connector. Grip plug with fingernail and thumbnail and remove plug from connector. Set battery aside.
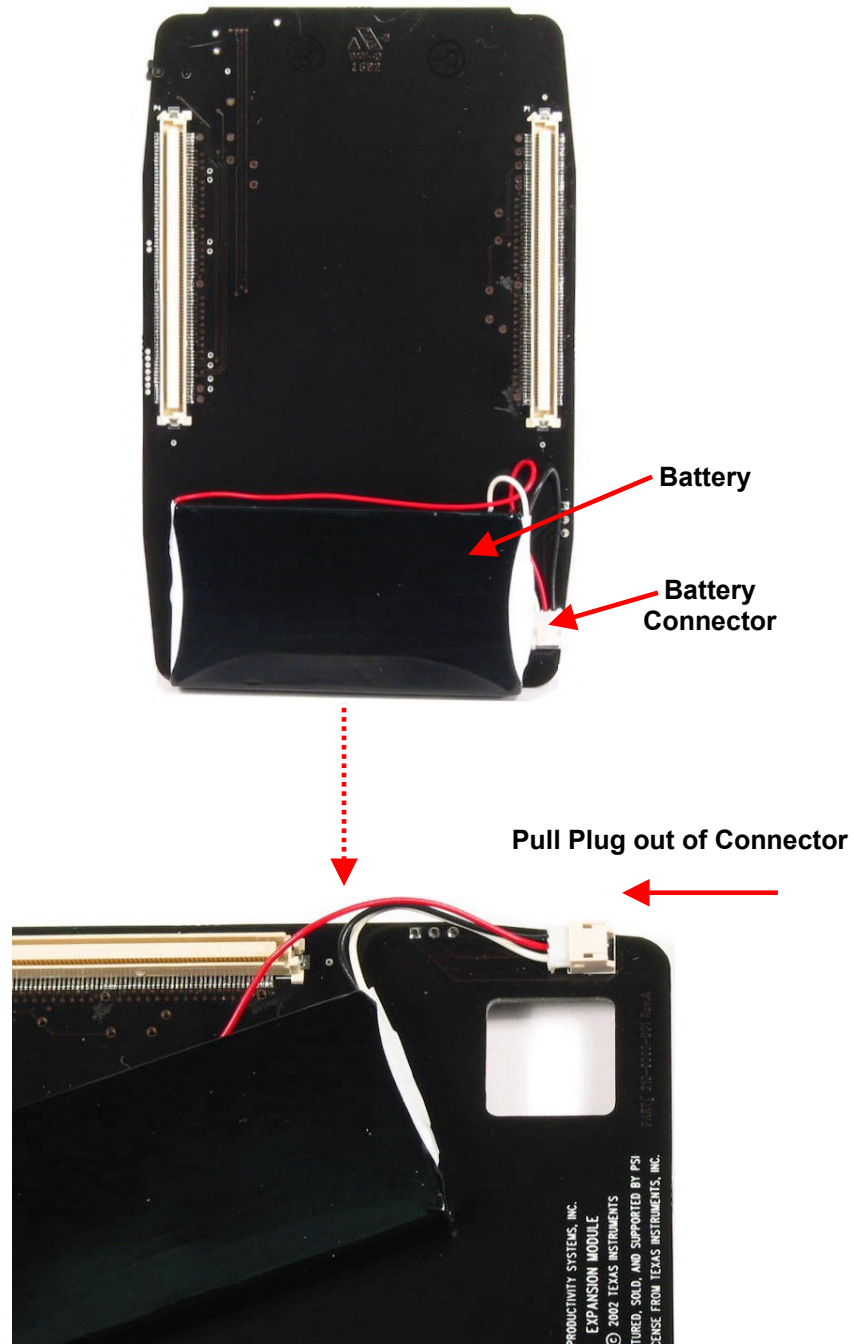

Figure 59. Battery[1] Removal

---

[1] **All batteries in the field have been recalled and should be returned to PSI immediately.**

Step 5: Using a small flat blade screwdriver, slide blade in between Headphone Jack, Headset Jack and front cover, and gently pry the Interface Module loose from the front cover. If necessary, depress the Sleep/Wake Button to clear the opening in the cover. Remove Interface Module from front cover.
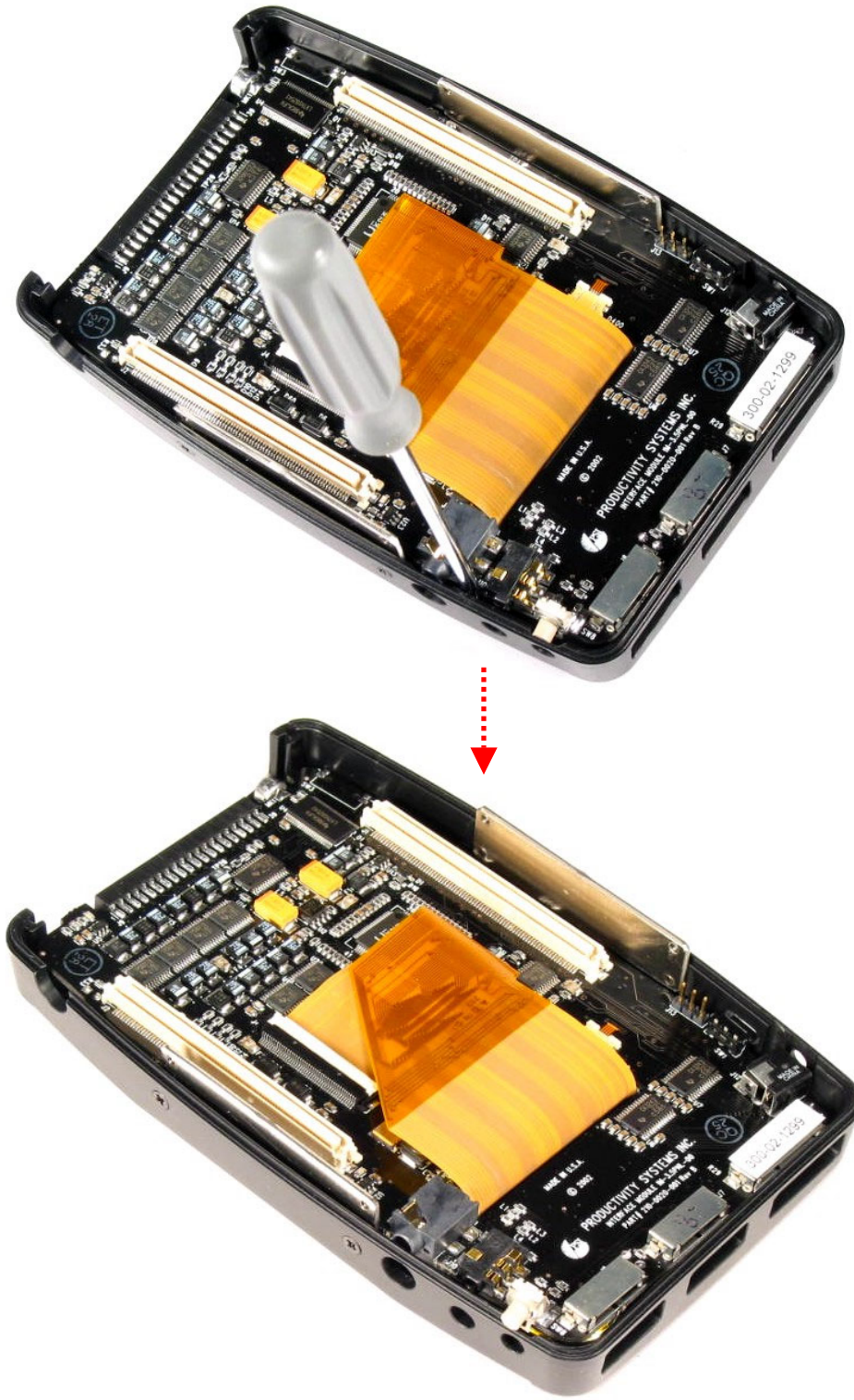

Figure 60. Removing Interface Module

5.2   Innovator Assembly

To assemble the Innovator, proceed as follows:

Caution: To avoid damage to the Innovator, please read each step carefully and completely before proceeding with that step.

Step 1:   Locate connectors P2 and P3 on Expansion Module, place the Interface Module connectors over Expansion Module connectors and press the two modules together until they fit tight.
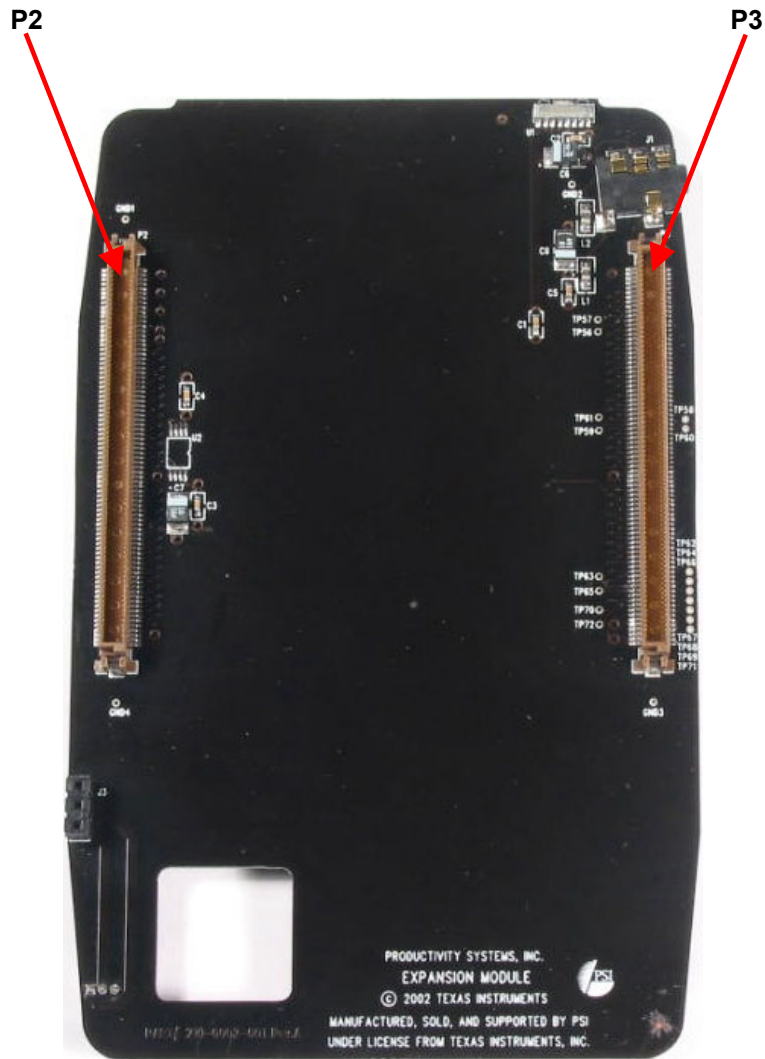

Figure 61. Expansion Module Connectors P2 and P3

Step 2:   Orient the Processor Module so that SD/MMC connector will be at the top when assembled. Place the Processor Module connectors over Expansion Module connectors and press the two modules together until they fit tight. If the connectors do not mate, check to make sure Processor Module is oriented properly.

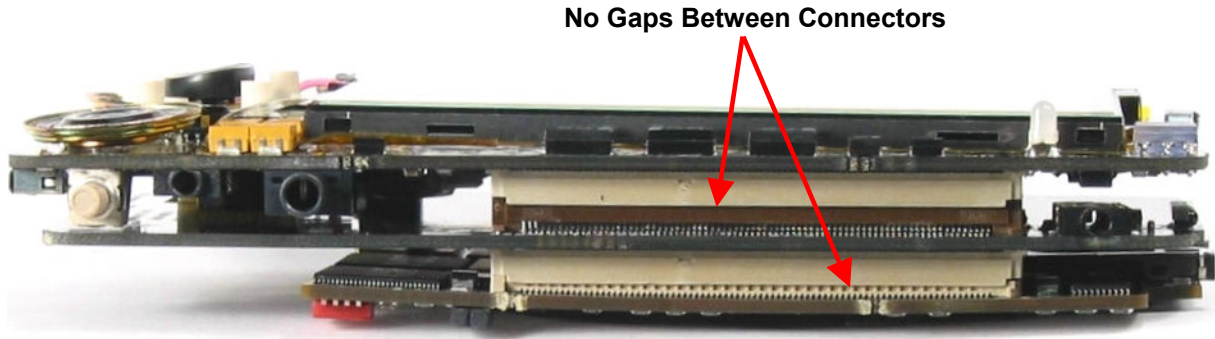**Step 3:**   Squeeze all module connections once more to insure there are no gaps in the connections.

No Gaps Between Connectors

Figure 62. Module Connections

Step 4:   Plug the Battery[1] into battery jack on the Expansion Module with the pins on the plug facing the circuit board. Push the plug all the way into the connector. The battery should be positioned as shown below. Tuck the wires up underneath the Processor Module to keep them from getting pinched when the cover is put on.
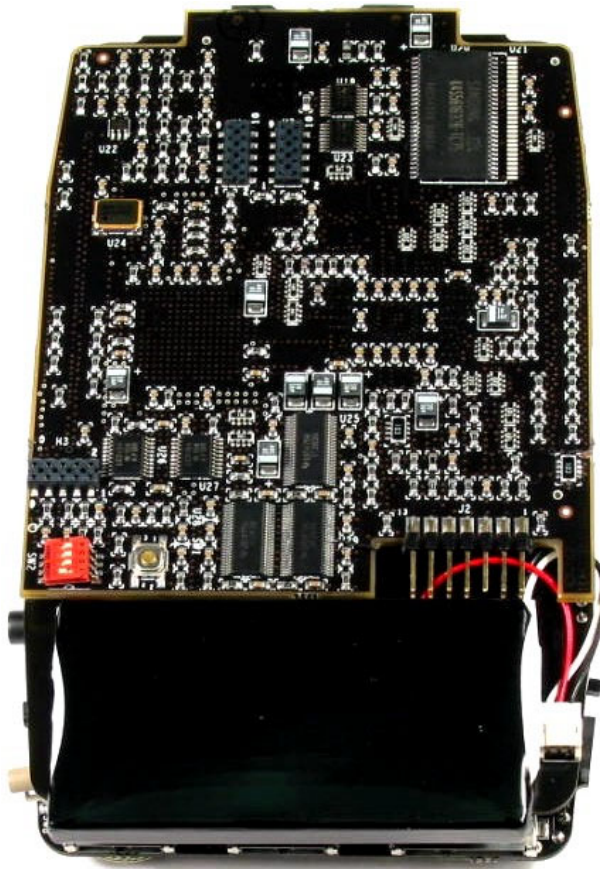

Figure 63. Battery Installation

----

[1] **All batteries in the field have been recalled and should be returned to PSI immediately.**

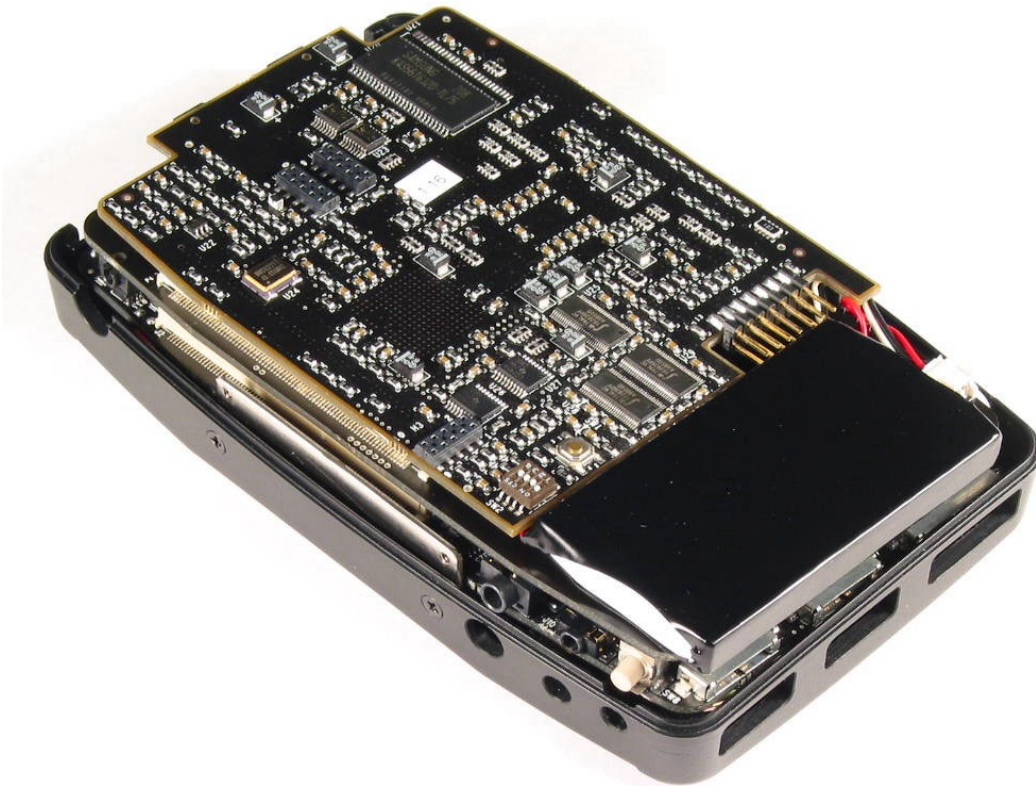**Step 5:**   Insert the assembled modules into the front cover.

Figure 64. Assembled Modules Installation

Step 6:   Push the other side of the assembled modules into the cover so that it snaps into place, with the audio jacks and Sleep/Wake button properly aligned with the opening in the cover. Care should be taken not to damage the Sleep/Wake button, depress switch if necessary. Bow the cover out slightly using a small screwdriver or other device so the button will clear the front cover.

Step 7:   Once the Sleep/Wake button clears the front cover, it may take a little more force to completely seat the assembled modules in place. You should hear a "snap" when this happens.

Step 8:   Slide the top insert into the top of the front cover so that the openings line up with the connectors on the Interface and Processor modules.

Figure 65. Top Insert Orientation

Step 9: Ensure the battery wires are up underneath the Processor Module. If wires are exposed, the back cover may not fit properly.

Step 10: Place the back cover over the Processor Module.

Step 11: Using a Philips Screwdriver, secure back cover in place using two (2) Philips head screws on each side.

Back Cover

Philips Head Screws

Left Side   Right Side

Figure 66. Back Cover Philips Head Screw Locations

Chapter 6 – Innovator Breakout Board (BoB)

6.0   Innovator Breakout Board (BoB)

This chapter explains the Innovator Breakout Board (BoB). The Innovator Breakout Board (BoB) is designed to allow full access to each module. It is useful for checking out Expansion Modules that may be designed to plug into the Innovator™ Development Kit. Its unique design allows access to both sides of each module plugged directly into it.

NOTE: SW1 dipswitch 4 must be set to ON to apply power to the BoB's onboard circuitry. See Figure 70 for a close-up view of SW1.
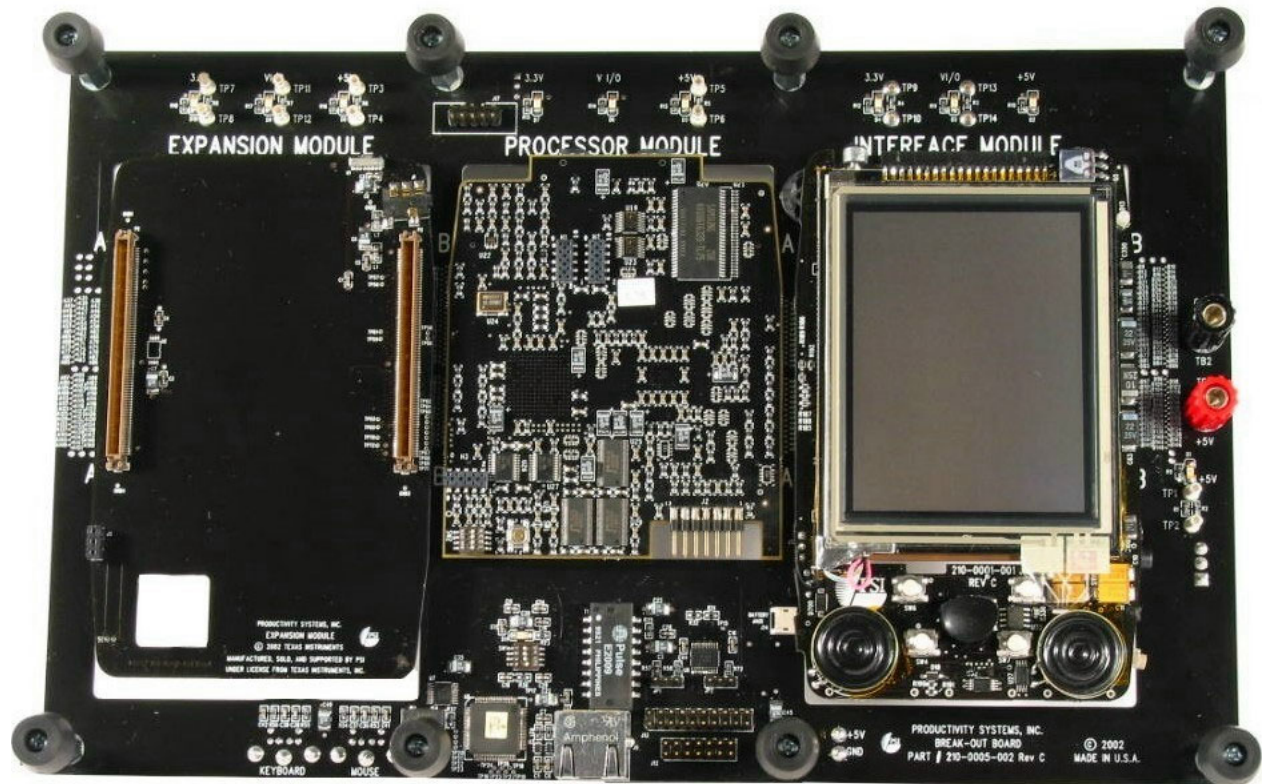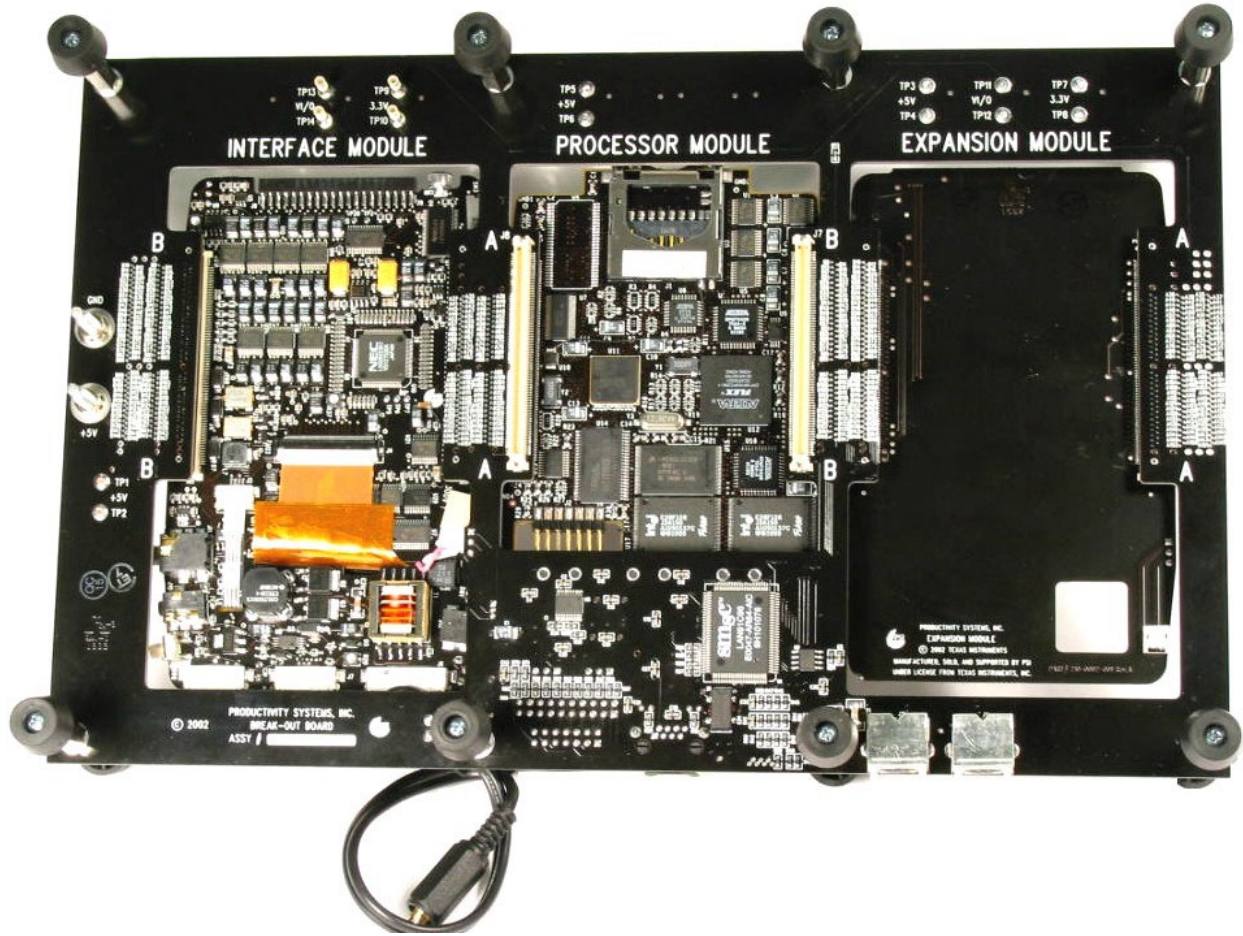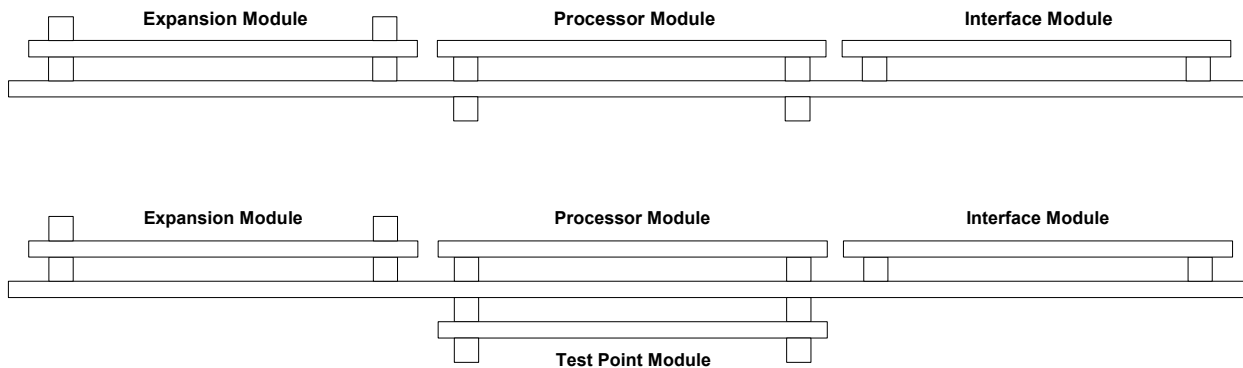

Figure 67. Breakout Board, Top View

Figure 68. Breakout Board, Bottom View

6.1 BoB Module Configurations
For testing purposes, modules can be configured on the BoB in a number of different ways. The diagrams below show most all of the configuration possibilities.
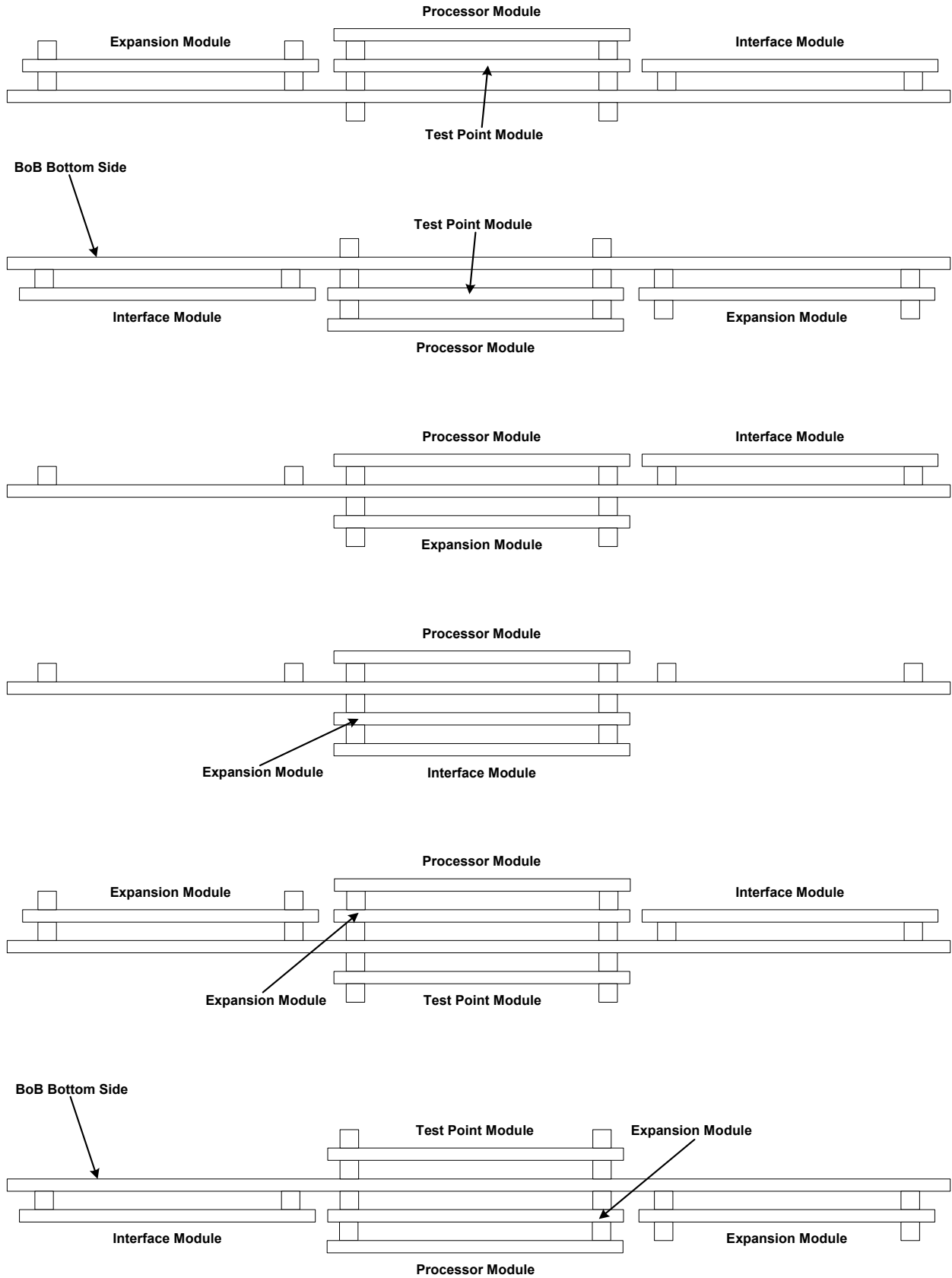
Figure 69. BoB Module Configurations

6.2   Breakout Board Top Side Features
This section describes the components, test points and connections featured on the topside of the BoB.
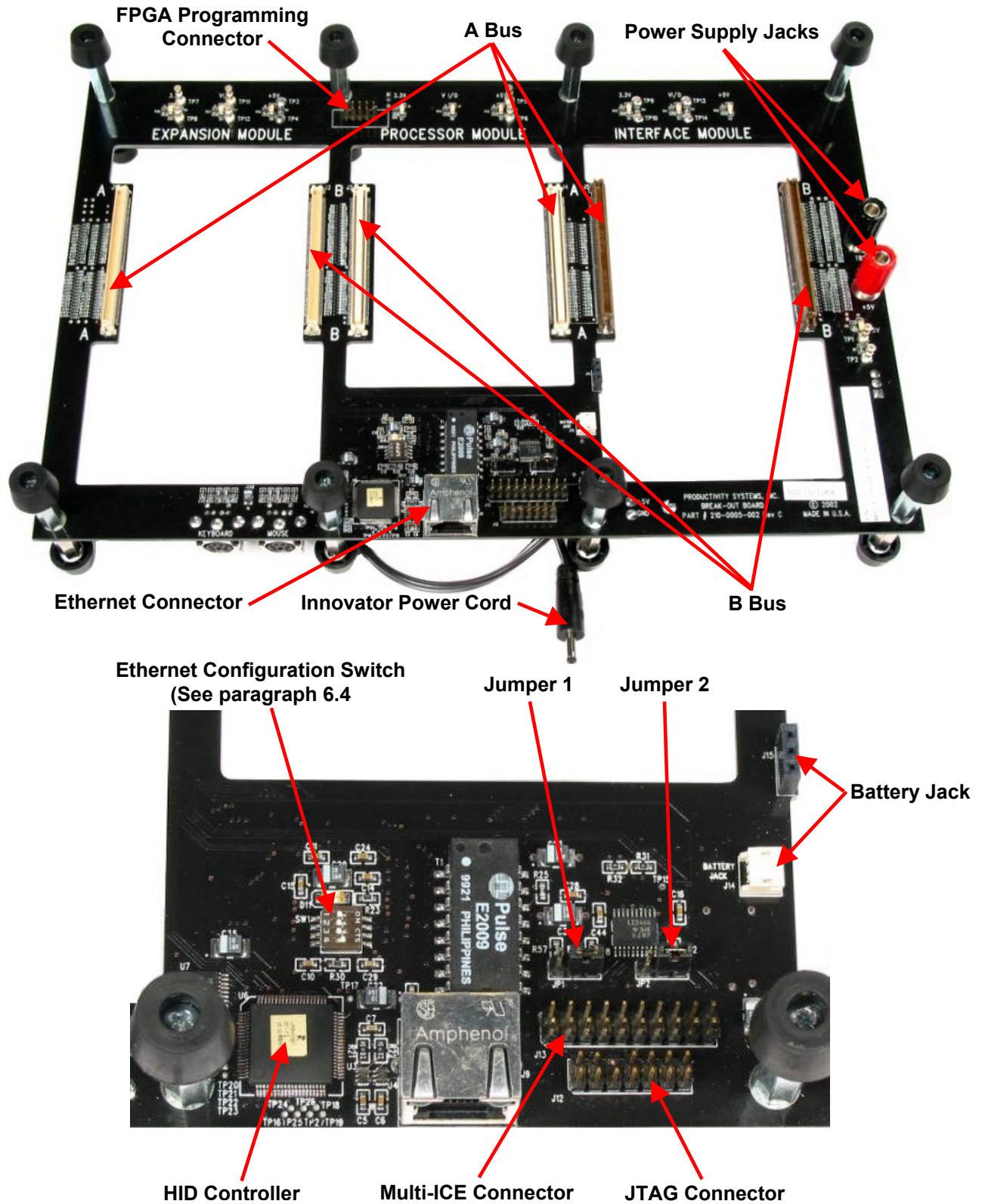

Figure 70. Breakout Board Top Side

6.3 Breakout Board Bottom Side Features

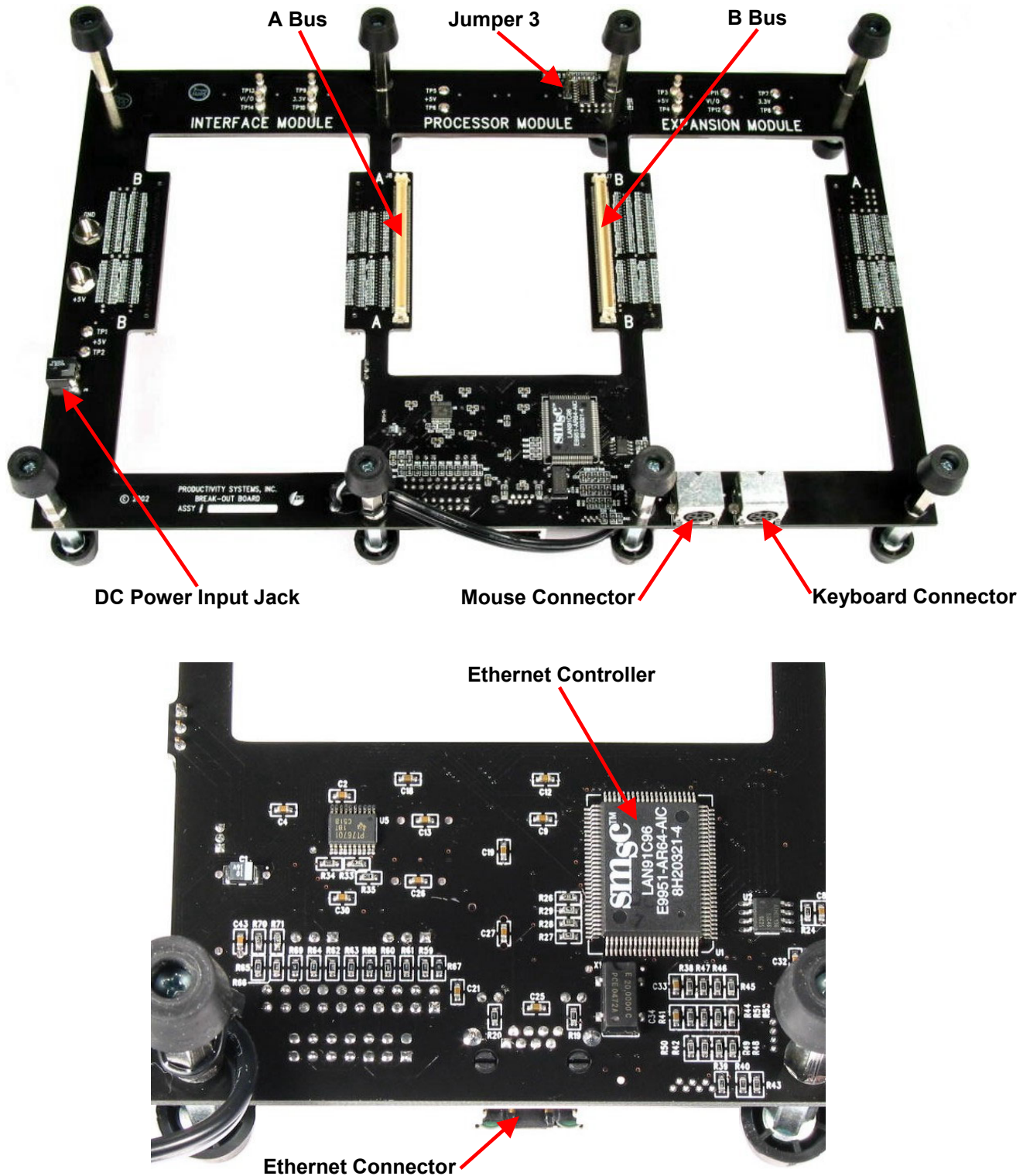This section describes the components, test points and connections featured on the bottom side of the BoB.

Figure 71. Breakout Board Bottom Side

6.4   Ethernet Configuration Switch

Switch SW1 sets different configurations of Ethernet. Dipswitch 4 **must** always be set to **ON** to apply power to the BoB's onboard circuitry.

Table 14. SW1 Dipswitch Settings

SW1-4	SW1-3	SW1-2	SW1-1
ON	OFF	OFF	OFF

6.5   Jumper Settings

JTAG and Multi-ICE are selected using Jumpers 1 and 2. The table below shows the jumper positions and the connector that is activated.

Table 15. Breakout Board Jumper Settings

Jumper	Pin #s	Connector
JP1	1-2	Multi-ICE
JP1	2-3	JTAG
JP2	1-2	Multi-ICE
JP2	2-3	JTAG

6.6   Test Points

The table below shows the signals that appear at each test point.

Table 16. Breakout Board Test Points

Test Point	Signal
TP1	External Power Supply
TP2	Power Connector Voltage
TP3	Interface Module 5V Supply
TP4	Expansion Module 5V Supply
TP5	Interface Module 5V Supply
TP6	Processor Module 5V Supply
TP7	Processor Module 3.3V Supply
TP8	Expansion Module 3.3V Supply
TP9	Processor Module 3.3V Supply
TP10	Interface Module 3.3V Supply
TP11	Processor Module V I/O
TP12	Expansion Module V I/O
TP13	Processor Module V I/O
TP14	Interface Module V I/O

6.7   Breakout Board Equipment Connections
The following illustrations show how external equipment and accessories are connected to the BoB.

6.7.1   JTAG Connection
A JTAG is connected to J12. Before using, Jumper 1 and Jumper 2 should be placed in accordance with Table 15.
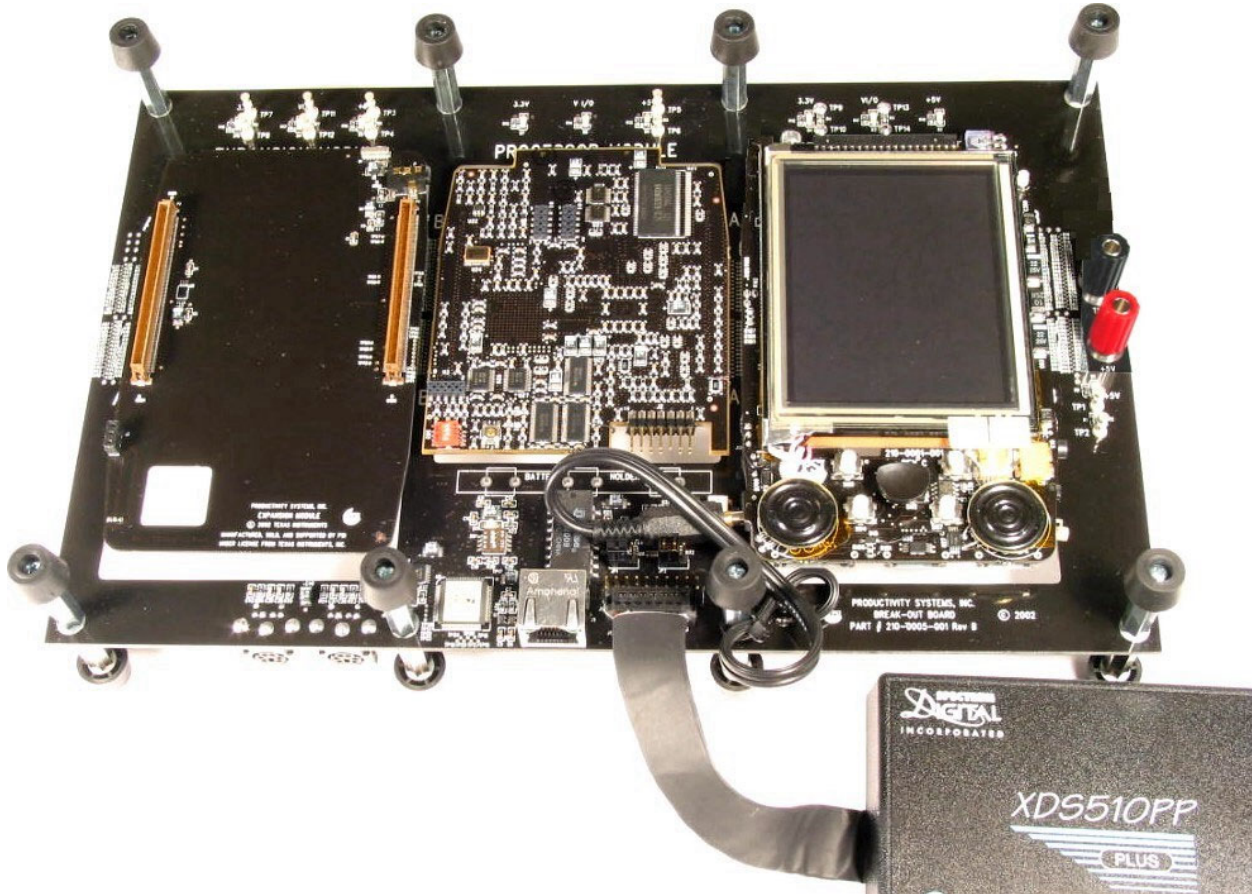

Figure 72. JTAG Connection

6.7.2   Multi-ICE Connection

The Multi-ICE Emulator is connected to J13. Before using, Jumper 1 and Jumper 2 should be placed in accordance with Table 15.

NOTE: The Power Supply shown in the figure below is not included with the Breakout Board.

Figure 73. Multi-ICE Connection

6.7.3   Keyboard and Ethernet Connections
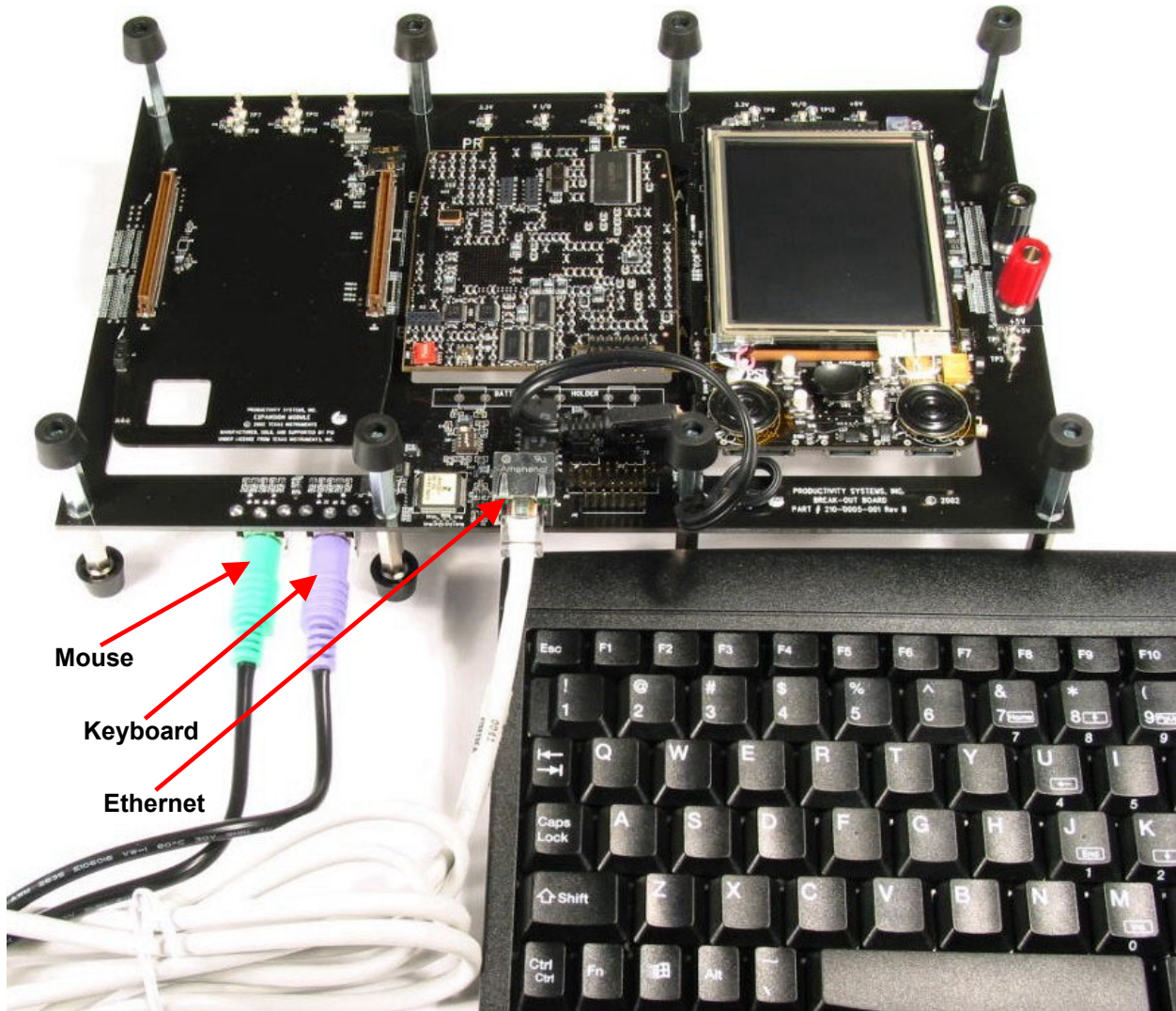

Figure 74. Keyboard and Ethernet Cable Connections

6.8   BoB Test Point Module

The Test Point Module serves as an access point to test the signals that pass between the modules in the system. The illustration below shows the location of the A and B Bus connectors. Adjacent to each connector are test point that allow you to monitor the signals that are present on each bus. The pins at the top of the module allow access to all of the LCD connections.
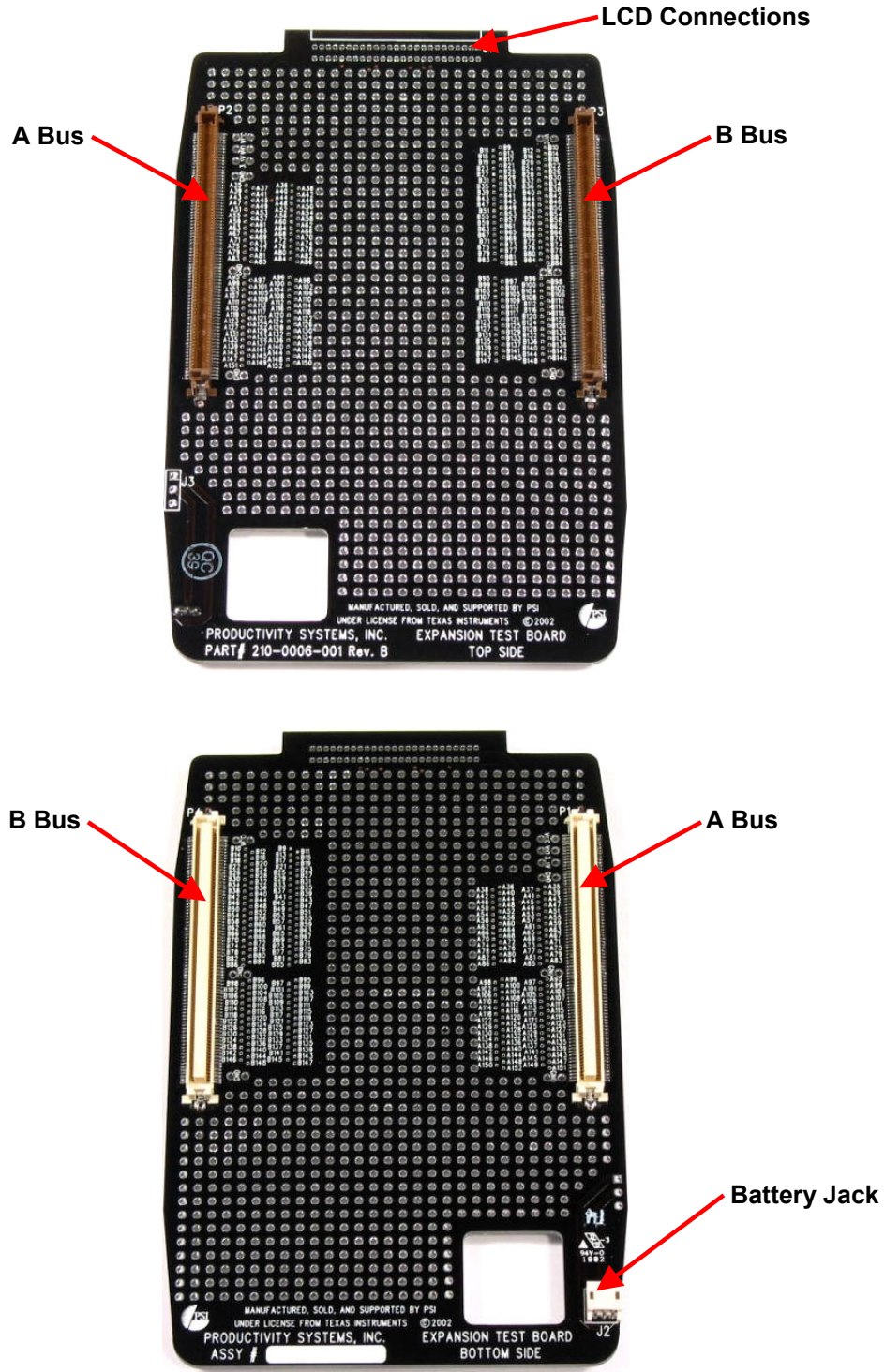

Figure 75. Test Point Module, Top and Bottom