



## **XoByte miniSpark™ User Guide and Data Sheet** **Personal Computer Startup/Shutdown Controller** **featuring Wake-On-LAN (WOL)**

### **Features:**

- PC Standby/Shut-Down/Hibernate control via Ethernet Wake-On-LAN
- PC Startup/Shut-Down via ACPI Protocol
- Programmable Start-up/Shut-down delay
- Graphic-based Software Application for User Configuration & System Monitoring
- Microprocessor Control
- Reverse Voltage Protection
- PC-based firmware upgrade capability (updates available through [xobyte.com](http://xobyte.com))
- Capable of driving two independent 12Volt DC relays for sequencing other electronics
- Power Management
- XoByte Application Programming Interface provided to allow you to integrate miniSpark™ functionality into custom software applications.
- Status LED

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## 1.0 Overview of miniSpark™

miniSpark™ is a user configurable PC Startup-Shutdown Controller and a power sequencing device featuring the industry standard Ethernet Wake-ON-LAN (WOL) to wake a PC. If the PC does not support WOL, miniSpark™ can be configured to use ACPI signaling.

Two General Purpose inputs (GPINs), referred to as WAKE sources, are provided. They control the startup or shutdown of devices connected to miniSpark™. Users can determine what source will drive the GPINs. Some examples are a car ignition, a remote key-fob, and a toggle-switch.

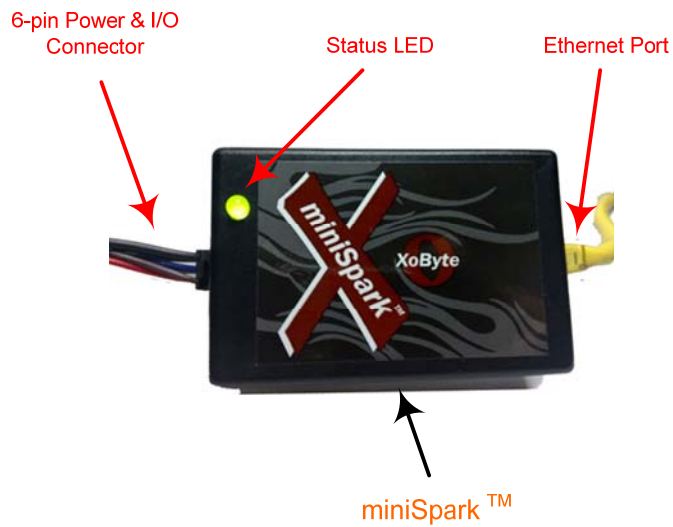
miniSpark™ supports two General Purpose outputs (GPOUTs). They can be used with external relays to control the supply of power to a variety of devices. Examples such as an automotive camera, and an LCD touch screen are highlighted in the [Installation Examples](#) section of this document.

A custom software application, the **miniSpark™ Control Center**, runs on the user's PC to provide configuration and display status. The [Control Center Software Application](#) section of this document describes aspects of this program in greater detail. Some of the configurable elements of miniSpark™ are PC turn-on/off delay, the type of Windows shutdown event (Hibernate, Standby, Shut-Down, or Log-off), and wake sources enabling.

Other features of miniSpark™ include a custom enclosure, internal fuse protection, and voltage suppression logic. These features aim to ensure product longevity. Please refer to the [Electrical Specification](#) section of this document for additional technical details.

## 2.0 miniSpark™ Product Images

### Top View



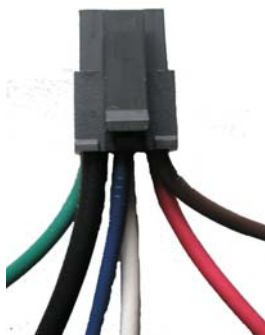
### Left Side View (6-Pin Connector)



### Right Side View (Ethernet)



### Connector Cable

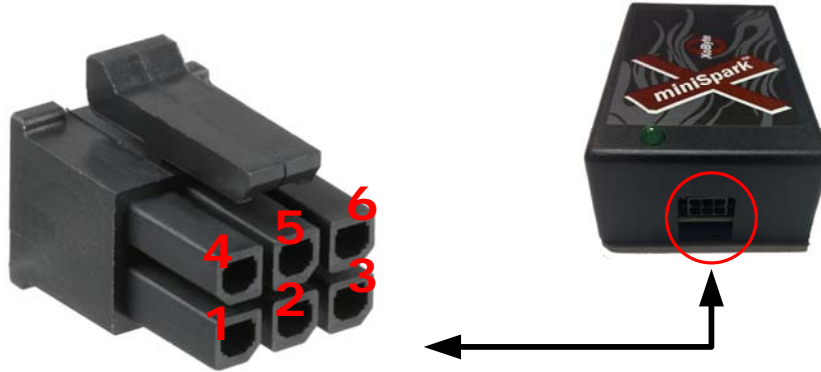


### Side View



## 3.0 Power and I/O Connector Pinout

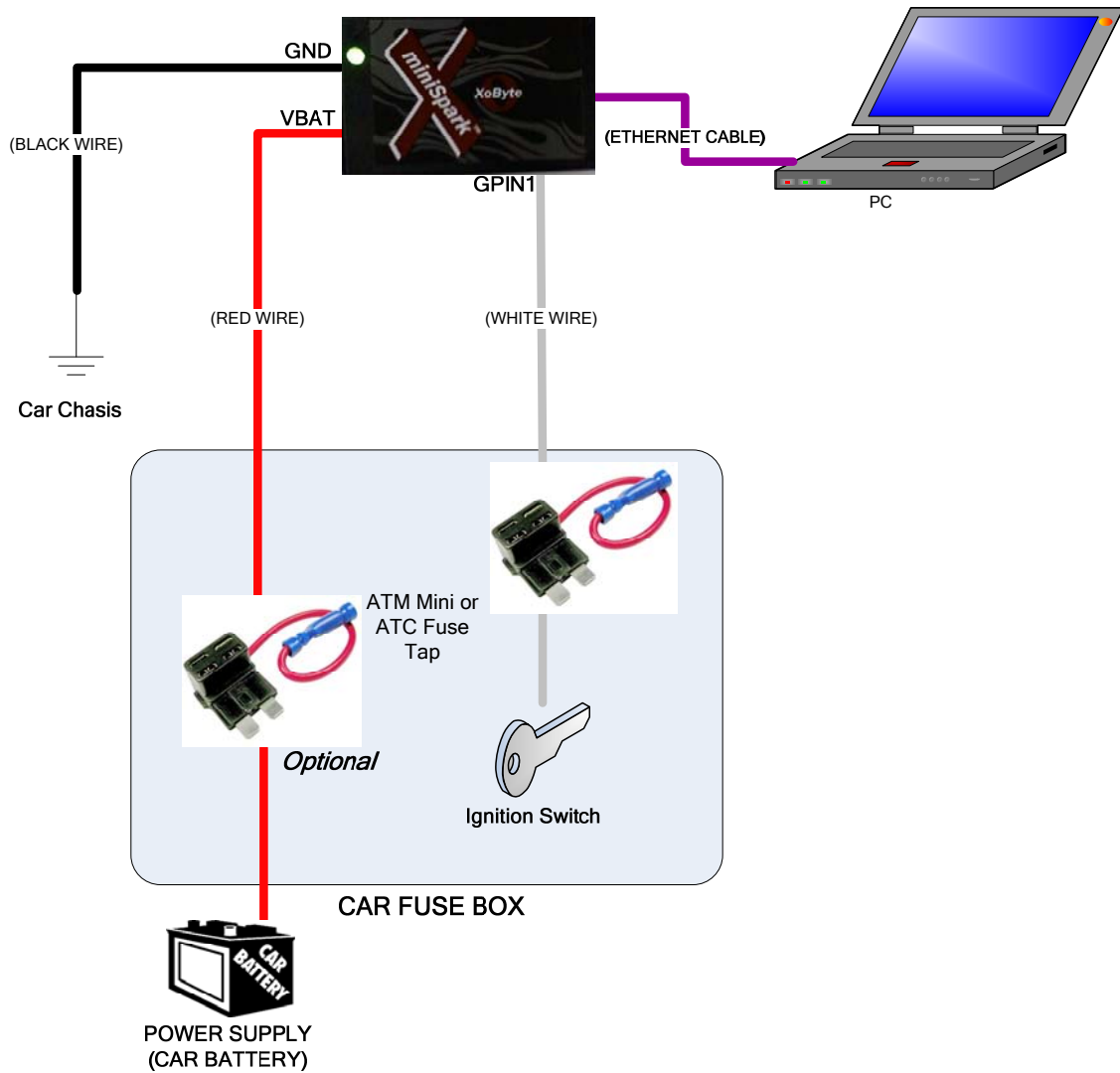
The image below of the connector and the following table explain each pin of the **miniSpark™** 6 pin connector. Use this table when connecting your system.



Pin #	Name	Wire Color	Description
1	VBAT	Red	Power input. <i>Typically connected to +12V power of vehicle battery.</i>
2	GPIN1	White	Programmable wakeup input #1. <i>Typically connected to vehicle ignition controlled signal.</i>
3	GPIN2	Green	Programmable wakeup input #2. Functionally identical to GPIN1. <i>Connect to auxiliary wakeup source.</i>
4	GPOUT1	Brown	Programmable wakeup output #1. Open collector output with 500mA sink capability. <i>Can be used to control external power relay or ACPI compliant power switch for non-WOL capable devices</i>
5	GPOUT2	Blue	Programmable wakeup output #2. Functionally identical to GPOUT1. <i>Can be used to control external power relay or ACPI compliant power switch for non-WOL capable devices</i>
6	GND	Black	Ground connection.

## 4.0 Installation Examples

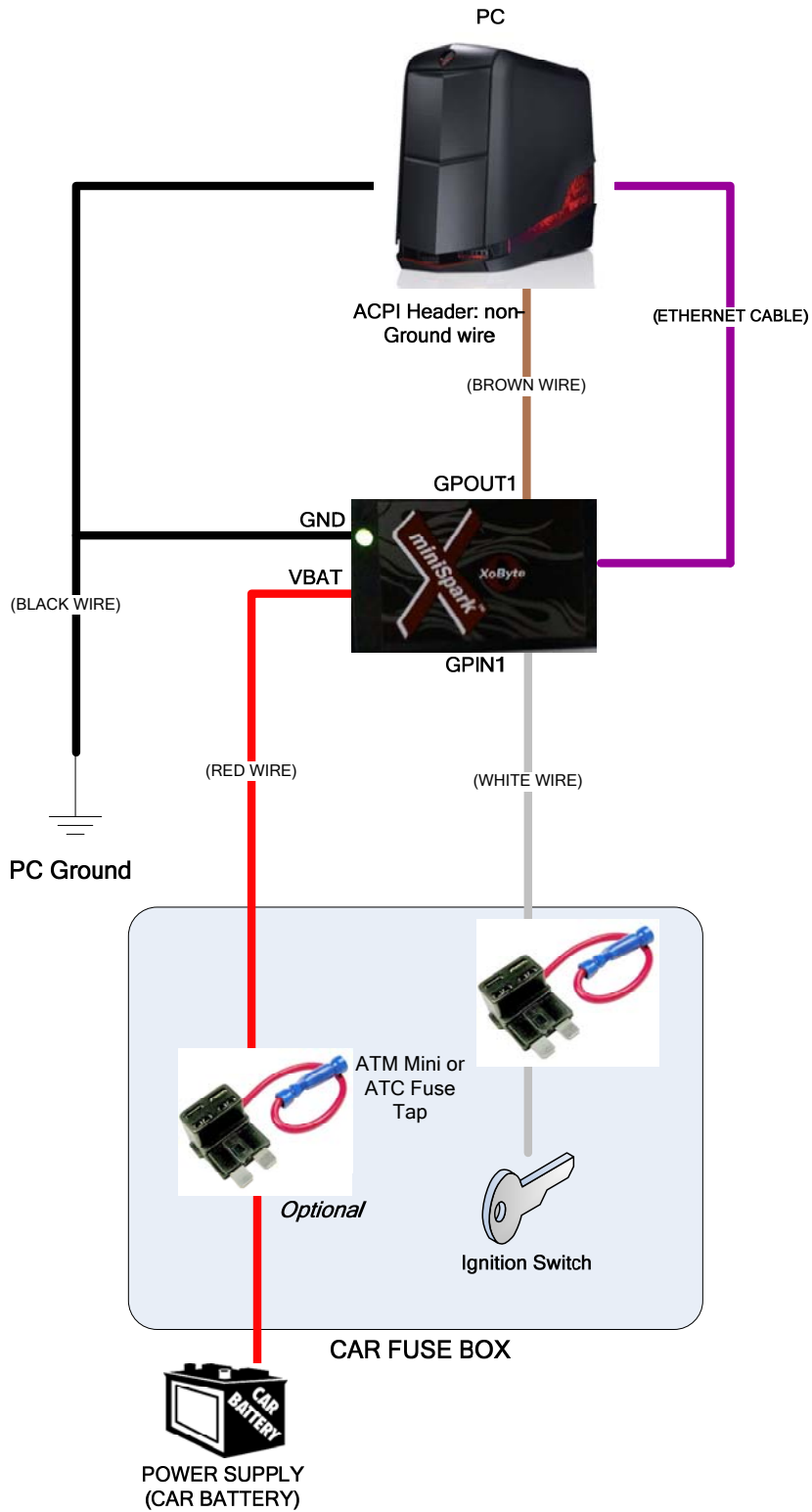
### WOL Installation Example



## WOL Installation Diagram Explained:

- The **Red** wire powers **miniSpark™**. This wire can be connected directly to the battery or via a fuse tap (ATM Mini or ATC) to an always powered fuse slot. If running a connection longer than 10 feet to **miniSpark™** a heavier gauge wire (10 or 12 AWG) should be used.
- The **Black** wire grounds **miniSpark™**. In the above example, the **Black** wire is connected to the car chassis. It is also possible to connect the **Black** wire to the car battery.
- The **White** wire is GPIN1. It is used to initiate programmed actions by **miniSpark™**. In the above example the **White** wire is connected to a fuse slot that is powered with the car's ignition.
- A standard Ethernet cable is connected between the **miniSpark™** Ethernet port and a Personal Computer. The Ethernet cable is used for WOL and all other communication between **miniSpark™** and the PC.

# ACPI Installation Example

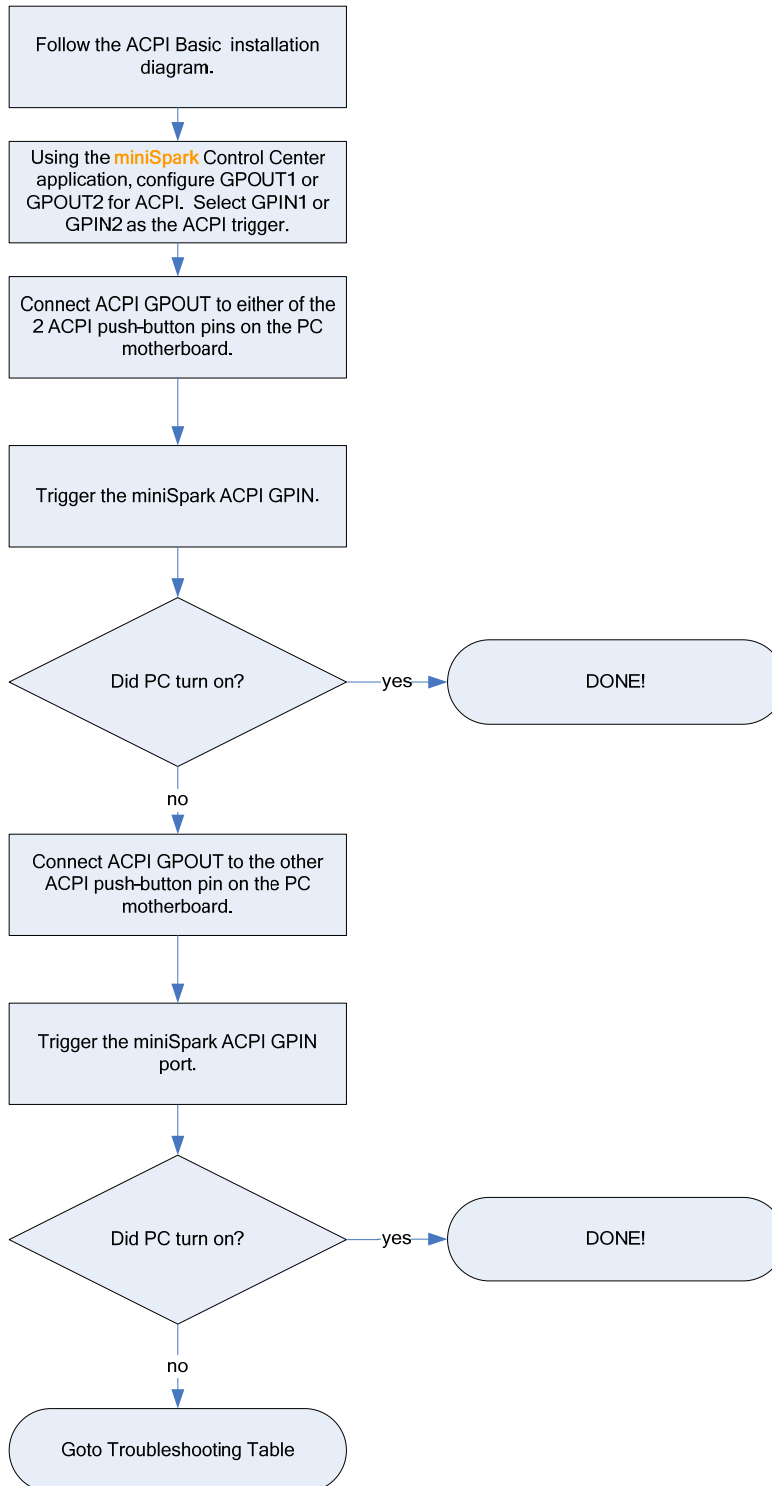


## ACPI Installation Diagram Explained:

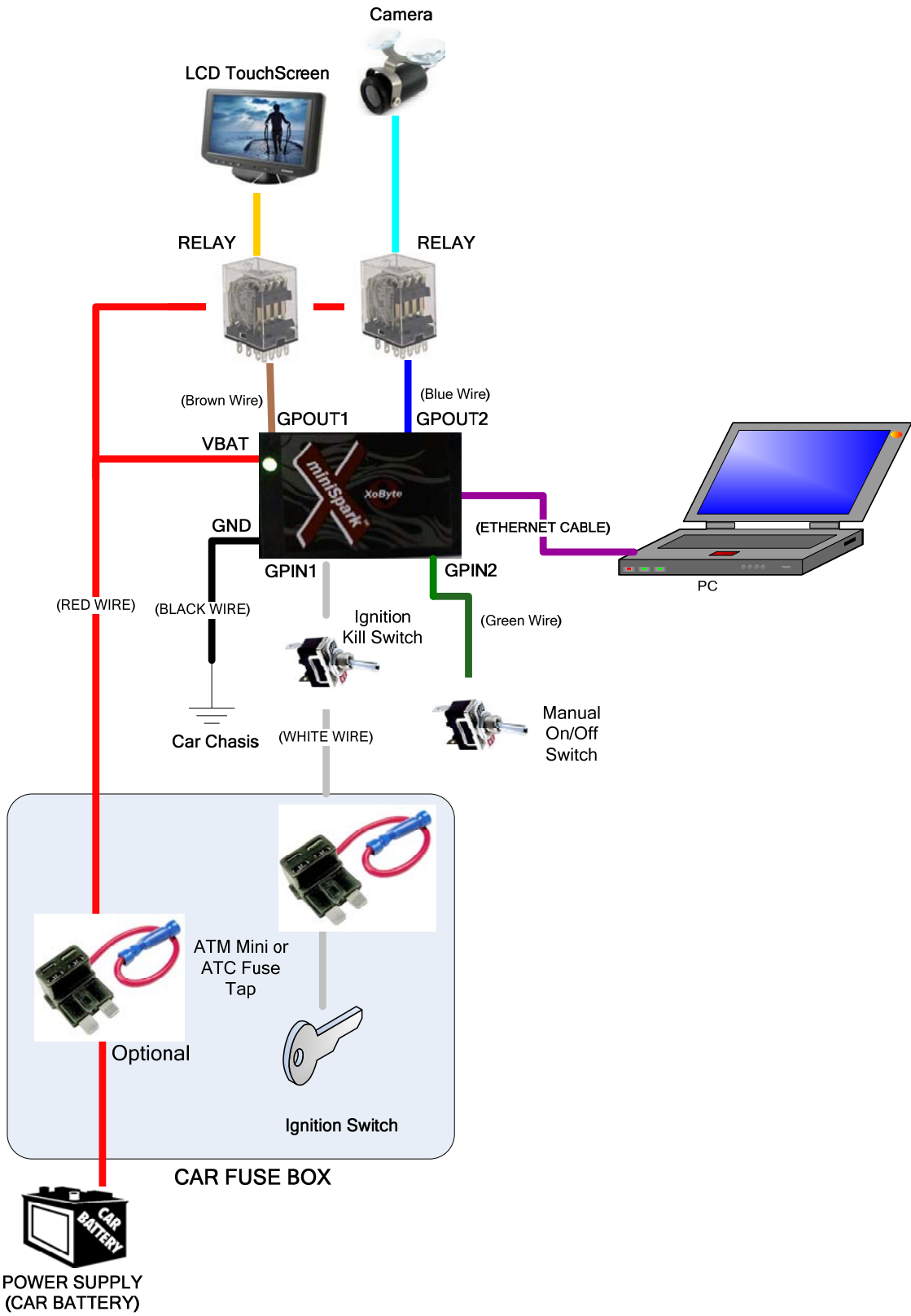
- The **Red** wire powers **miniSpark™**. This wire can be connected directly to the battery or via a fuse tap (ATM Mini or ATC) to an always powered fuse slot. If running a connection longer than 10 feet to **miniSpark™** a heavier gauge wire (10 or 12 AWG) should be used.
- The **Black** wire grounds **miniSpark™**. In the above example the **Black** wire must be connected to the same ground used by the PC.
- The **White** wire is GPIN1. It is used to initiate programmed actions by **miniSpark™**. In the above example the **White** wire is connected to a fuse slot that is powered with the car's ignition.
- The **Brown** wire is GPOUT1. It is activated by **miniSpark™** once a programmed delay elapses following an Input Trigger event. In the above example, it is connected to the non-ground wire of the PC's ACPI header.
- A standard Ethernet cable is connected between the **miniSpark™** Ethernet port and a Personal Computer. The Ethernet cable is used for communication between **miniSpark™** and the PC.

# ACPI Installation FlowChart:

**NOTE: WHEN USING THE ACPI CONNECTOR USE THE NON GROUND WIRE OF THE ACPI HEADER.**



## Advanced WOL Installation Example



## Advanced WOL Installation Diagram Explained:

- In the above example, the **Red** wire powers **miniSpark™** as well as two external relays. This wire can be connected directly to the battery or via a fuse tap (ATM Mini or ATC) to an always powered fuse slot. If running a connection longer than 10 feet to **miniSpark™** a heavier gauge wire (10 or 12 AWG) should be used.
- The **Black** wire grounds **miniSpark™**. In the above example, the **Black** wire is connected to the car chassis. It is also possible to connect the **Black** wire to the car battery.
- The **White** wire is GPIN1. It is used to initiate programmed actions by **miniSpark™**. In the above example the **White** wire is connected to a fuse slot that is powered with the car's ignition. An ignition kill-switch can be installed inline between **miniSpark™** and the fusetap. This switch will turn the PC off if it is running, and prevent the ignition from affecting the state of the PC.
- The **Green** wire is GPIN2. It is also used to initiate programmed actions by **miniSpark™**. In the above example the **Green** wire is connected to a manual on/off switch. The manual on/off switch should only be used when the ignition is off, or if the ignition kill-switch is engaged. Under the above conditions the manual on/off switch will turn the PC on/off.
- The **Brown** wire is the GPOUT1. It is activated by **miniSpark™** once a programmed delay elapses after an Input Trigger is detected. In the above example, it is connected to the coil input of an external relay that powers a LCD touchscreen.
- The **Blue** wire is the GPOUT2. It is activated by **miniSpark™** once a programmed delay elapses after an Input Trigger is detected. In the above example, it is connected to the coil input of an external relay that powers an Automotive Camera.
- A standard Ethernet cable is connected between the **miniSpark™** Ethernet port and a Personal Computer. The Ethernet cable is used for communication between **miniSpark™** and the PC.

## 5.0 miniSpark™ Control Center – Software Application

Download the latest miniSpark™ Software Application from our website:

<http://www.xobyte.com/support>

DURING INSTALLATION, SOME OPERATING SYSTEMS (VISTA/WIN7) MAY REQUIRE THAT THE APPLICATION BE GIVEN ACCESS TO PRIVATE AND PUBLIC NETWORKS TO FUNCTION PROPERLY. PLEASE MAKE SURE THIS ACCESS IS GRANTED.

**XoByte miniSpark™ Configuration**

**XoByte miniSpark™** 169.254.55.54

**Status**

- Input State 1
- Input State 2
- Output State 1
- Output State 2

**Legend**

- Armed
- Triggered
- Disabled
- Unknown

**Ethernet - Wake On LAN / Shutdown**

- Trigger On Input 1
- Trigger On Input 2

Delay On (s)  Delay Off (s)

Power Off Action

**GP Output 1**

State Control:  Manual  Automatic

- Manual On/Off State
- Trigger On Input 1
- Trigger On Input 2

Delay On (s)  Delay Off (s)

ACPI/Pulse Control

- ACPI Enable
- Pulse Width

**GP Output 2**

State Control:  Manual  Automatic

- Manual On/Off State
- Trigger On Input 1
- Trigger On Input 2

Delay On (s)  Delay Off (s)

ACPI/Pulse Control

- ACPI Enable
- Pulse Width

OK Cancel Apply

NOTE: "APPLY" OR "OK" MUST BE CLICKED FOLLOWING ANY CONFIGURATION SETTING CHANGE.

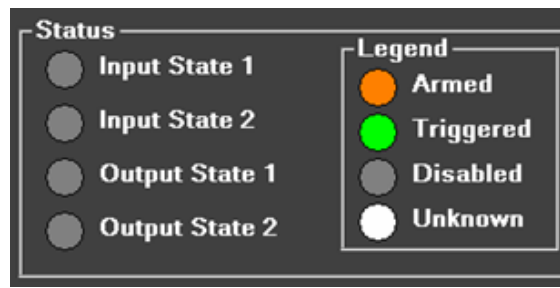
## Application GUI Explained

### Device IP Address Frame



The active miniSpark™ IP address should appear in the combo box at the top right of the GUI.

### Status Frame



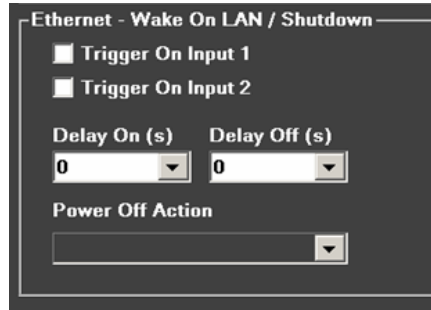
#### Legend

Armed	Triggering is enabled.
Triggered	The specified event has been detected.
Disabled	Triggering is not enabled.
Unknown	miniSpark™ not yet detected.

#### Status

Input State 1	State of GPIN1 (White Wire)
Input State 2	State of GPIN2 (Green Wire)
Output State 1	State of GPOUT1 (Brown Wire)
Output State 2	State of GPOUT2 (Blue Wire)

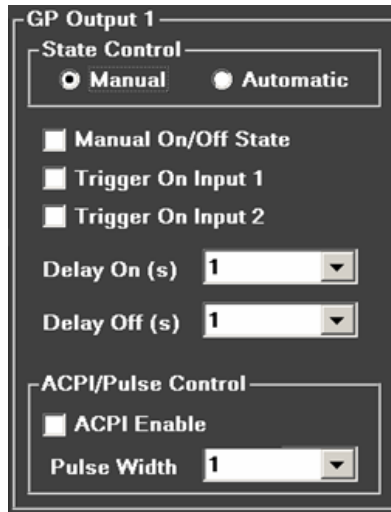
## Ethernet – Wake On LAN / Shutdown Frame



<b>Trigger On Input 1</b>	When checked, driving GPIN1 high causes a Wake-On-LAN packet to be issued. Driving GPIN1 low causes a shutdown packet to be issued.
<b>Trigger On Input 2</b>	When checked, driving GPIN2 high causes a Wake-On-LAN packet to be issued. Driving GPIN2 low causes a shutdown packet to be issued.
<b>Delay On</b>	Sets the delay (in seconds) from GPIN1/GPIN2 triggered and sending of the Wake-On-LAN packet.
<b>Delay Off</b>	Sets the countdown delay (in seconds) from the reception of the shutdown command to when the PC invokes the configured Power Off Action.
<b>Power Off Action</b>	<p>Specifies what action the PC takes when a Shutdown Command is received from miniSpark™.</p> <p>Options:</p> <ul style="list-style-type: none"> <li>Shutdown</li> <li>Restart</li> <li>Hibernate</li> <li>StandBy</li> <li>Log-off</li> <li>No Action</li> </ul>

**NOTE:** IF “TRIGGER ON INPUT 1” AND “TRIGGER ON INPUT 2” ARE BOTH CHECKED, A WAKE-ON-LAN PACKET WILL BE SENT WHEN EITHER GPIN1 OR GPIN2 ARE DRIVEN HIGH.  
 THE SHUTDOWN PACKET WILL BE SENT WHEN GPIN1 AND GPIN2 ARE DRIVEN LOW.

**GP Output 1 Frame**



**State Control**

<b>Manual</b>	When checked, GPOUT1 ( <b>Brown Wire</b> ) can only be controlled via the “Manual On/Off State” checkbox.
<b>Automatic</b>	Allows GPOUT1 ( <b>Brown Wire</b> ) control based on the “Trigger on Input 1” and/or “Trigger on Input 2” checkboxes.

<b>Manual On/Off State</b>	When in Manual State Control, this checkbox determines the GPOUT1 ( <b>Brown Wire</b> ) State. Checked will sink = Pull low, Unchecked = Floats
<b>Trigger On Input 1</b>	When checked (and ACPI Enable is NOT checked), driving GPIN1 ( <b>White Wire</b> ) high will pull GPOUT1 ( <b>Brown Wire</b> ) low. When GPIN1 ( <b>White Wire</b> ) is driven low, GPOUT1 ( <b>Brown Wire</b> ) will float.
<b>Trigger On Input 2</b>	When checked (and ACPI Enable is NOT checked), driving GPIN2 ( <b>Green Wire</b> ) high will pull GPOUT1 ( <b>Brown Wire</b> ) low. When GPIN2 ( <b>Green Wire</b> ) is driven low, GPOUT1 ( <b>Brown Wire</b> ) will float.
<b>Delay On</b>	Delay (in seconds) from a GPIN being driven high to GPOUT1 ( <b>Brown Wire</b> ) being pulled low.
<b>Delay Off</b>	Delay (in seconds) from a GPIN being driven low to GPOUT1 ( <b>Brown Wire</b> ) floating.

**NOTE: IF "TRIGGER ON INPUT 1" AND "TRIGGER ON INPUT 2" ARE BOTH CHECKED, GPOUT1 (BROWN WIRE) WILL BE DRIVEN LOW WHEN EITHER GPIN1 OR GPIN2 ARE DRIVEN HIGH. GPOUT1 (BROWN WIRE) WILL FLOAT WHEN GPIN1 AND GPIN2 ARE DRIVEN LOW.**

### ACPI/Pulse Control

<b>ACPI Enable</b>	When checked, a pulse is generated on GPOUT1 ( <b>Brown Wire</b> ) whenever the selected GPIN(s) change state.
<b>ACPI Pulse Width</b>	Specifies the width (in seconds) of the ACPI pulse. Pulse width can be adjusted in 0.5 second increments. A value of 1 second is recommended

## GP Output 2 Frame

### State Control

<b>Manual</b>	When checked, GPOUT2 ( <b>Blue Wire</b> ) can only be controlled via the “Manual On/Off State” checkbox.
<b>Automatic</b>	Allows GPOUT2 ( <b>Blue Wire</b> ) control based on the “Trigger on Input 1” and/or “Trigger on Input 2” checkboxes.

<b>Manual On/Off State</b>	When in Manual State Control, this checkbox determines the GPOUT2 ( <b>Blue Wire</b> ) State. Checked will sink = Pull low, Unchecked = Floats
<b>Trigger On Input 1</b>	When checked (and ACPI Enable is NOT checked), driving GPIN1 ( <b>White Wire</b> ) high will pull GPOUT2 ( <b>Blue Wire</b> ) low. When GPIN1 ( <b>White Wire</b> ) is driven low, GPOUT2 ( <b>Blue Wire</b> ) will float.
<b>Trigger On Input 2</b>	When checked (and ACPI Enable is NOT checked), driving GPIN2 ( <b>Green Wire</b> ) high will pull GPOUT2 ( <b>Blue Wire</b> ) low. When GPIN2 ( <b>Green Wire</b> ) is driven low, GPOUT2 ( <b>Blue Wire</b> ) will float.
<b>Delay On</b>	Delay (in seconds) from a GPIN being driven high to GPOUT2 ( <b>Blue Wire</b> ) being pulled low.
<b>Delay Off</b>	Delay (in seconds) from a GPIN being driven low to GPOUT2 ( <b>Blue Wire</b> ) floating.

**NOTE:** IF "TRIGGER ON INPUT 1" AND "TRIGGER ON INPUT 2" ARE BOTH CHECKED, GPOUT2 (Blue Wire) WILL BE DRIVEN LOW WHEN EITHER GPIN1 OR GPIN2 ARE DRIVEN HIGH. GPOUT2 (Blue Wire) WILL FLOAT WHEN GPIN1 AND GPIN2 ARE DRIVEN LOW.

### ACPI/Pulse Control

<b>ACPI Enable</b>	When checked, a pulse is generated on GPOUT2 (Blue Wire) whenever the selected GPIN(s) change state.
<b>ACPI Pulse Width</b>	Specifies the width (in seconds) of the ACPI pulse. Pulse width can be adjusted in 0.5 second increments. A value of 1 second is recommended

## 7.0 Application Update

To update the application on your **PC**, please visit our website: <http://www.xobyte.com/support> and follow our online instructions or invoke “Update App” from the **miniSpark™** Control Center System Tray.

## 8.0 LED Status

**miniSpark™** is equipped with a single **GREEN** LED used to indicate the device’s operating status. The following table describes the three possible states of the LED:

LED Behavior	Status
ON (solid green color)	Device Hung, or Firmware being updated.
OFF	Device not powered, or device hung
BLINKING	Device operating normally

If the LED is stuck in either the ON or OFF state, please refer to the Troubleshooting section of this document for help.

## 9.0 Troubleshooting

Problem	Possible Remedy
LED OFF (never blinks)	<ul style="list-style-type: none"> <li>• Ensure <b>(Red)</b> wire is properly connected to battery power and secured to the 6-pin Connector.</li> <li>• Ensure <b>(Black)</b> wire is properly connected to ground and secured to the 6-pin Connector.</li> <li>• <b>miniSpark™</b> may be locked-up. Disconnect 6-pin Connector from <b>miniSpark™</b> and re-connect to reset the device.</li> </ul>
LED always ON (solid green)	<ul style="list-style-type: none"> <li>• <b>miniSpark™</b> is locked-up. Disconnect 6-pin Connector from <b>miniSpark™</b> and re-connect to reset the device.</li> </ul>
PC does not turn OFF using WOL	<ul style="list-style-type: none"> <li>• Ensure <b>(White/Green)</b> GPIN wires are connected to source properly. Check that wires to 6-pin Connector are secure.</li> <li>• Ensure Ethernet cable is connecting PC and <b>miniSpark™</b></li> <li>• In the <b>miniSpark™</b> Control Center GUI check the following: <ul style="list-style-type: none"> <li>- GPIN Status is presented as “Triggered” in the Global Status frame.</li> <li>- “Trigger on Input 1/2” box in the Ethernet – Wake-On-LAN/Shutdown frame is checked.</li> <li>- Proper Shutdown action is selected in the Power Off Action pull-down.</li> </ul> </li> <li>• In Windows look under the Device Manager → Network Card → Properties → Power Management tab and select “allow this device to bring the computer out of standby” setting. In Advanced Settings ensure the Wakeup Capabilities is set to “Magic Frame”</li> <li>• Ensure that <b>miniSpark™</b> application is running. The program icon should appear in your Windows System Tray.</li> <li>• Ensure that the <b>miniSpark™</b> application is listed in the Windows Startup folder.</li> </ul>
PC does not turn ON using WOL	<ul style="list-style-type: none"> <li>• Ensure <b>(White/Green)</b> GPIN wires are connected to source properly, and check that wires to 6-pin Connector are secure.</li> <li>• Ensure Ethernet cable is connecting PC and <b>miniSpark™</b></li> <li>• In the <b>miniSpark™</b> Control Center GUI check the following: <ul style="list-style-type: none"> <li>- GPIN is presented as “Triggered” in the Global Status frame.</li> <li>- “Trigger on Input 1/2” box in the Ethernet – Wake-On-LAN/Shutdown frame is checked.</li> </ul> </li> <li>• In the PC BIOS make sure computer is set to use WOL</li> </ul>

	<ul style="list-style-type: none"> <li>• In Windows look under the Device Manager → Network Card → Properties → Power Management tab and select “allow this device to bring the computer out of standby” setting, and Un-Select "Only Allow Magic Packet to Wake Computer"</li> <li>• In Windows look under the Device Manager → Network Card → Properties → Advanced Settings ensure the Wakeup Capabilities is set to “Magic Frame” "</li> </ul>
<p>PC does not turn ON/OFF using ACPI</p>	<ul style="list-style-type: none"> <li>• Ensure (White/Green) GPIN wires connected to source properly. Check that wires to 6-pin Connector are secure.</li> <li>• Check that GPOUT is properly connected to ACPI header.</li> <li>• Ensure that GPOUT is tied to the non-ground wire of the Power Button ACPI header.</li> <li>• Ensure that the miniSpark™ ground is the same as PC ground</li> <li>• In the miniSpark™ Control Center GUI check the following: <ul style="list-style-type: none"> <li>- GPIN Status is presented as “Triggered” in the Global Status frame.</li> <li>- GPOUT is configured in “Automatic Mode” with the proper GP Input Selected as a Trigger with “ACPI Enable” checked.</li> <li>- Experiment with Increase/Decrease the duration of the ACPI Pulse Width.</li> </ul> </li> <li>• Ensure that miniSpark™ application is running. The program icon should appear in your Windows System Tray.</li> <li>• Ensure that the miniSpark™ application is listed in the Windows Startup folder.</li> </ul>
<p>miniSpark™ IP Address not displayed properly</p>	<ul style="list-style-type: none"> <li>• Make sure Ethernet cable is connected to miniSpark™ and the PC.</li> <li>• Reboot the PC.</li> <li>• Try “REPAIR” Ethernet connection using Windows network options.</li> <li>• Disable the Wireless Network Connection Radio in PC</li> <li>• Invoke Discovery Process from the Windows SysTray menu</li> </ul>
<p>GPOUT(s) not pulling low</p>	<ul style="list-style-type: none"> <li>• Ensure that the GP Output wires (Brown/Blue) are connected securely to the 6-pin Connector on miniSpark™.</li> <li>• In the miniSpark™ Control Center GUI check the following: <ul style="list-style-type: none"> <li>- Check that actual GPOUT being used (Brown/Blue) matches selected GPOUT</li> <li>- Check that GPOUT Global Status frame indicates a “Triggered” State.</li> </ul> </li> </ul>
<p>External Relay not working</p>	<ul style="list-style-type: none"> <li>• Check that GPOUT wire is connected to the correct pin.</li> <li>• Make sure that the Relay is not defective</li> <li>• Go through the “GPOUTs not pulling low” troubleshooting.</li> </ul>

<p>PC using ACPI turns ON/OFF incorrectly</p>	<ul style="list-style-type: none"><li>• PC may have hung and not shut down properly by miniSpark™ when the Input Trigger was asserted/removed.</li></ul> <p>In the miniSpark™ Control Center GUI do the following:</p> <ol style="list-style-type: none"><li>1) Put the GPOUT being used for ACPI in “Manual Mode”.</li><li>2) Toggle Manual On/Off State to turn on/off the PC. System should now be in Sync.</li><li>3) Change GPOUT being used for ACPI back to “Automatic Mode”</li></ol> <ul style="list-style-type: none"><li>• Ensure that miniSpark™ application is running. The program icon should appear in your Windows System Tray.</li><li>• Ensure that the miniSpark™ application is listed in the Windows Startup folder.</li></ul>
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## 10.0 Electrical Specifications

### Absolute Maximum Ratings

Description	Max
Power input (+12VDC)	+/-24.0V
Input voltage (IN1, IN2)	+/-36.0V
Output Load (OUT1, OUT2)	600mA

**NOTE:** OPERATION BEYOND ABSOLUTE MAXIMUM RATINGS IS NOT GUARANTEED AND MAY RESULT IN PERMANENT DAMAGE TO THE DEVICE.

### Typical Ratings

Description	Min	Typ	Max	Notes
Operating voltage (VIN)	4.0V	13.8V	16.0V	
Reverse voltage protection (VIN)	-1.0V		0V	Unit is protected against reverse polarity power connection
Over voltage protection (VIN)	16.1V		16.4V	If over voltage condition exists for extended period of time miniSpark™ will enter failsafe mode and all functionality will be disabled.
Fault Current (VIN)	0.8A	1.3A	1.75A	Current into VIN which trips self-resetting fuse during over voltage or reverse voltage condition
Operating Current		46mA		
V <sub>IH</sub> (IN1, IN2)	2.9V			
V <sub>IL</sub> (IN1, IN2)			2.0V	
V <sub>OH</sub> (OUT1, OUT2)			0.5V	T <sub>A</sub> = 25C I <sub>out</sub> = 500mA
Output current (OUT1, OUT2)			500mA	Open drain outputs are capable of safely driving relays
Output leakage current (OUT1, OUT2)			100uA	Output disabled
Operating and storage temperature	-40C		85C	

## 11.0 Technical Specifications

Enclosure Dimensions	3.25" x 2.125" x 1.2"
Connector Assembly	6" length, 20AWG
Operating Temperature	-40°C - 85°C
Interfaces Supported	LAN 10Base-T, RJ-45

## 12.0 Revision History

Revision	Publicaiton Date	Description
1.0	December, 2009	Initial Release
1.1.1	February, 2010	Updated Troubleshooting section