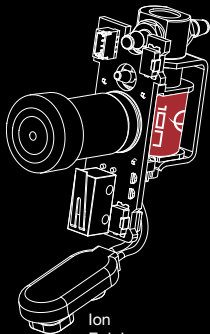
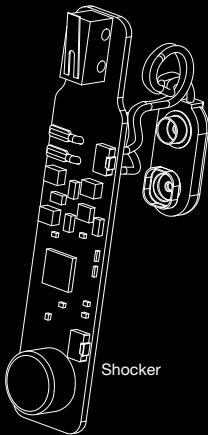


Installation and Adjustment Instructions

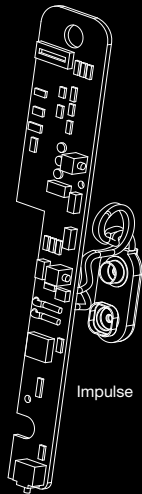
manual version 2.0



Ion
Epiphany
SP-8



Shocker



Impulse

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The Blackheart circuit board upgrade is available for the Smart Parts Impulse, Ion, SP-8, Epiphany, Shocker SFT, Nerve and Shocker NXT. It provides a significant increase in electronic control, adjustment and ease of programming.

While every effort has been made to ensure that the information contained in this guide is accurate and complete, no liability can be accepted for errors or omissions. Smart Parts, Inc. reserves the right to change the specifications of the Blackheart at any time without prior notice. The latest version of this manual may be downloaded free of charge at www.SmartParts.com.



BLACKHEART SELECTION

The Blackheart upgrade is in the form of a replacement for your marker's stock circuit board. It is available in three versions for use with different Smart Parts markers. The Ion version is designed for use with Ion, SP-8 and Epiphany markers. The Shocker version is compatible with the Shocker NXT, Shocker SFT and Nerve. As its name implies, the Impulse Blackheart board works with the Impulse.

INSTALLING THE BLACKHEART

To install the Blackheart, follow the disassembly instructions in your marker's manual, remove the circuit board, and replace it with the Blackheart. It is recommended that you download the most recent manual for your marker at www.SmartParts.com.

OPTIMIZING DWELL

The default Dwell settings of the Blackheart board are designed to provide reliable operation with your marker. Optimizing the dwell setting will maximize the gas efficiency of your marker. Using the adjustment instructions in this manual, follow the dwell optimization procedure in your marker's manual to achieve the ideal dwell setting for your particular marker configuration.

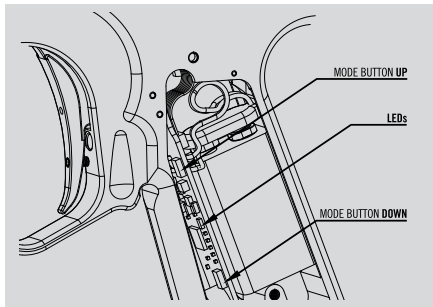
EPIPHANY NOTES

Ion Blackheart boards manufactured after the Fall of 2006 are equipped with hoses and a solenoid valve that are rated to operate in the pressure ranges utilized by the Epiphany as well as the Ion. These newer boards are easily identified by the protective wrapping on their solenoid coil. Epiphany certified Blackheart boards have a black Ion logo on a red background. Older Blackheart boards have a black wrap with a red logo, and should not be used in an Epiphany or Epiphany converted Ion or SP-8.



SHOCKER OPERATION

These Instructions Apply to the Blackheart Upgrade for the Shocker NXT, Shocker SFT And Nerve



Pressing and holding both buttons for 1 second activates the Shortcut Key. This will automatically calculate and set the correct ROFDelay setting necessary to cap your marker's rate of fire just below 15 balls per second. The board will chirp, and the red and yellow LEDs will stay on to identify that the 15 bps cap has been activated.

OPERATION

Press the Power Button. The board will chirp and then power on, entering Vision firing mode. Press and hold the button for two seconds to power off the marker.

If your Vision eyes become blocked by paint or debris, you may wish to switch to non-vision firing mode until you have time to clean and inspect them. The Power Button can be used to switch back and forth from non-Vision firing mode to Vision mode by pressing the button quickly and observing the chirp and change in light pattern from a steady glow to an interrupted blinking sequence.



SHOCKER ADJUSTMENT

See the Modes section to learn what affect each Blackheart adjustment will have on your marker.

ADJUSTMENT TABLE

Modes	Light Color	Mode Down Button	Mode Up Button	Range
Dwell	Solid Yellow	Down	Up	3ms-20.5ms; 25ms steps
ROF (Rate of Fire) Delay	Solid Red	Down (faster)	Up (slower)	15-70ms; 1ms steps
Firing Modes	Single Blink Yellow	Down	Up	1 - 4
Debounce	Single Blink Red	Down	Up	0 - 25
BSA (Bolt Stick Adjust)	Double Blink Yellow	Down	Up	0 - 25
Kick-In Rate Adjust	Double Blink Red	Down	Up	1sps - 10sps
Sustain Rate Adjust	Fast Blink Yellow	Down	Up	1sps - 10sps
Number of Shots to Enter Firing Mode	Fast Blink Red	Down	Up	1 pull - 10 pulls
Vision Type	Long Blink Yellow	Down	Up	1 - 4*
Shortcut Key - hold both buttons	Yellow & Red	15 bps cap	15 bps cap	N/A

*Vision Modes 3 and 4 are only available on Blackheart Boards manufactured after August 2006.

ADJUSTMENT

To access the Mode Buttons inside the grip frame, remove the screws from the rubber grip on the left side of the gun. By pressing the Mode Down Button once, the board will enter into an Adjustment Mode. A solid yellow light indicates you are in Dwell Adjustment Mode. As you continue pressing the Mode Down Button, you will cycle through the modes which are each defined by a specific color and flash sequence (see table).



SHOCKER ADJUSTMENT

These Instructions Apply to the Blackheart Upgrade for the Shocker NXT, Shocker SFT And Nerve

ADJUSTMENT (cont.)

While in any of these modes, wait 4 seconds and the speaker will chirp to identify the current setting value for that mode. For example, if it was in the Dwell Setting Mode and the Dwell was set to 30, after 4 seconds the speaker would chirp 30 times.

If you decide to leave the adjustment table without making any changes, simply pull and release the trigger one time, and the board will go back into its base (non-Vision) firing mode. **CAUTION: If there is air charged in the gun, it will not be able to fire while in an Adjustment Mode. However, as soon as you release the trigger, you will be able to fire the gun.**

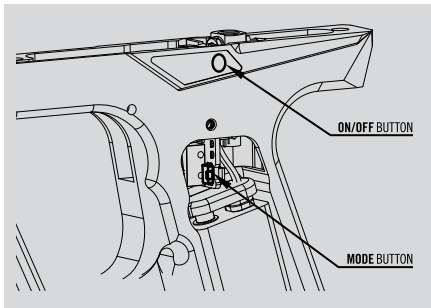
To change settings while the board is in any of the modes listed in the adjustment table, complete the following steps:

- 1. Pull and hold the trigger for 3 seconds;** the speaker will chirp 5 times to indicate that you can make adjustments.
- 2. While the trigger is still being held, make an adjustment by pressing the Mode Down Button to adjust down, or the Mode Up Button to adjust up.** The speaker will make a high pitched chirp for each adjustment up, and a low pitched chirp for each adjustment down.
- 3. Once you have reached your desired setting, releasing the trigger will put the board back into non-Vision firing mode and save your new setting.** The board will chirp rapidly when it can't go any higher or lower in the adjustment range.



ION OPERATION

These Instructions Apply to the Blackheart Upgrade for the Ion, SP-8, and Epiphany



Pressing and holding both buttons for 1 second activates the Shortcut Key. This will automatically calculate and set the correct ROFDelay setting necessary to cap your marker's rate of fire just below 15 balls per second. The board will chirp, and the red and yellow LEDs will stay on to identify that the 15 bps cap has been activated.

OPERATION

Press the Power Button. The board will chirp and then power on, entering Vision firing mode. Press and hold the button for two seconds to power off the marker.

If your Vision eyes become blocked by paint or debris, you may wish to switch to non-vision firing mode until you have time to clean and inspect them. The Power Button can be used to switch back and forth from non-Vision firing mode to Vision mode by pressing the button quickly and observing the chirp and change in light pattern



ION ADJUSTMENT

See the Modes section to learn what affect each Black-heart adjustment will have on your marker.

ADJUSTMENT TABLE

Modes	Light Color	Mode Down Button	Power Button	Range
Dwell	Solid Yellow	Down	Up	8-52ms - 5 ms steps
ROF (Rate of Fire) Delay	Solid Red	Down (faster)	Up (slower)	25-70ms - .5ms steps
Firing Modes	Single Blink Yellow	Down	Up	1 - 4
Debounce	Single Blink Red	Down	Up	0 - 25
BSA (Bolt Stick Adjust)	Double Blink Yellow	Down	Up	0 - 25
Kick-In Rate Adjust	Double Blink Red	Down	Up	1sps - 10sps
Sustain Rate Adjust	Fast Blink Yellow	Down	Up	1sps - 10sps
Number of Shots to Enter Firing Mode	Fast Blink Red	Down	Up	1 pull - 10 pulls
Shortcut Key - Hold both buttons	Yellow & Red	15 bps cap	15 bps cap	N/A

ADJUSTMENT

To access the Mode Buttons inside the grip frame, remove the screws from the rubber grip on the left side of the gun. By pressing the Mode Down Button once, the board will enter into an Adjustment Mode. A solid yellow light indicates you are in Dwell Adjustment Mode. As you continue pressing the Mode Down Button, you will cycle through the modes which are each defined by a specific color and flash sequence (see table).



ION ADJUSTMENT

These Instructions Apply to the Blackheart Upgrade for the Ion, SP-8, and Epiphany

ADJUSTMENT (cont.)

While in any of these modes, wait 4 seconds and the speaker will chirp to identify the current setting value for that mode. For example, if it was in the Dwell Setting Mode and the Dwell was set to 30, after 4 seconds the speaker would chirp 30 times.

If you decide to leave the adjustment table without making any changes, simply pull and release the trigger one time, and the board will go back into its base (non-Vision) firing mode. **CAUTION: If there is air charged in the gun, it will not be able to fire while in an Adjustment Mode. However, as soon as you release the trigger, you will be able to fire the gun.**

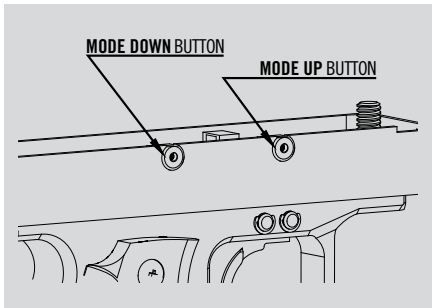
To change settings while the board is in any of the modes listed in the adjustment table, complete the following steps:

- 1. Pull and hold the trigger for 3 seconds;** the speaker will chirp 5 times to indicate that you can make adjustments.
- 2. While the trigger is still being held, make an adjustment by pressing the Mode Down Button to adjust down, or the Mode Up Button to adjust up.** The speaker will make a high pitched chirp for each adjustment up, and a low pitched chirp for each adjustment down.
- 3. Once you have reached your desired setting, releasing the trigger will put the board back into non-Vision firing mode and save your new setting.** The board will chirp rapidly when it can't go any higher or lower in the adjustment range.



IMPULSE OPERATION

These Instructions Apply to the Impulse Blackheart Upgrade.



Pressing and holding both buttons for 1 second activates the Shortcut Key. This will automatically calculate and set the correct ROFDelay setting necessary to cap your marker's rate of fire just below 15 balls per second. The board will chirp, and the red and yellow LEDs will stay on to identify that the 15 bps cap has been activated.

OPERATION

Press the Power Button. The board will chirp and then power on, entering Vision firing mode. Press and hold the button for two seconds to power off the marker.

If your Vision eyes become blocked by paint or debris, you may wish to switch to non-vision firing mode until you have time to clean and inspect them. The Power Button can be used to switch back and forth from non-Vision firing mode to Vision mode by pressing the button quickly and observing the chirp and change in light pattern from a steady glow to an interrupted blinking sequence.



IMPULSE ADJUSTMENT

See the Modes section to learn what affect each Black-heart adjustment will have on your marker.

ADJUSTMENT TABLE

Modes	Light Color	Mode Down Button	Mode Up Button	Range
Dwell	Solid Green	Down	Up	1-89
ROFDelay	Solid Red	Down (faster)	Up (slower)	1-91
Firing Modes	Single Blink Green	Down	Up	1 - 4
Debounce	Single Blink Red	Down	Up	0 - 25
BSA (Bolt Stick Adjust)	Double Blink Green	Down	Up	0 - 25
Kick-In Rate Adjust	Double Blink Red	Down	Up	1sps - 10sps
Sustain Rate Adjust	Fast Blink Green	Down	Up	1sps - 10sps
Number of Shots to Enter Firing Mode	Fast Blink Red	Down	Up	1 pull - 10 pulls
Shortcut Key - Hold both buttons	Green & Red	15 bps cap	15 bps cap	N/A

ADJUSTMENT

To access the Mode Buttons inside the grip frame, remove the screws from the rubber grip on the left side of the gun. By pressing the Mode Down Button once, the board will enter into an Adjustment Mode. A solid yellow light indicates you are in Dwell Adjustment Mode. As you continue pressing the Mode Down Button, you will cycle through the modes which are each defined by a specific color and flash sequence (see chart).



IMPULSE ADJUSTMENT

These Instructions Apply to the Impulse Blackheart Upgrade.

ADJUSTMENT (cont.)

While in any of these modes, wait 4 seconds and the speaker will chirp to identify the current setting value for that mode. For example, if it was in the Dwell Setting Mode and the Dwell was set to 30, after 4 seconds the speaker would chirp 30 times.

If you decide to leave the adjustment table without making any changes, simply pull and release the trigger one time, and the board will go back into its base (non-Vision) firing mode. **CAUTION: If there is air charged in the gun, it will not be able to fire while in an Adjustment Mode. However, as soon as you release the trigger, you will be able to fire the gun.**

To change settings while the board is in any of the modes listed in the adjustment table, complete the following steps:

- 1. Pull and hold the trigger for 3 seconds;** the speaker will chirp 5 times to indicate that you can make adjustments.
- 2. While the trigger is still being held, make an adjustment by pressing the Mode Down Button to adjust down, or the Mode Up Button to adjust up.** The speaker will make a high pitched chirp for each adjustment up, and a low pitched chirp for each adjustment down.
- 3. Once you have reached your desired setting, releasing the trigger will put the board back into non-Vision firing mode and save your new setting.** The board will chirp rapidly when it can't go any higher or lower in the adjustment range.



DWELL

This adjusts how long solenoid valve is activated for each shot, and how long the bolt stays forward on each firing cycle. Too low of a Dwell will not allow the marker to fire, or cause it to fire with inconsistent velocity. If the Dwell is set too high you will lose gas efficiency. Refer to your marker's manual for instructions to optimize your Dwell value.

ROFDELAY

This adjusts the minimum time the marker must wait between shots. Increasing the ROFDelay will raise the pause, slowing down how fast the marker can fire. Lowering the ROFDelay will decrease the pause, allowing the marker to shoot faster.

FIRING MODE

There are 4 different modes that you can cycle through while in the Firing Mode adjustment stage. Here are the different modes and their descriptions:

1. [Semi-Auto] This mode is strictly semi-auto only. The kick-in rate and sustain rate are not applicable in this mode. Use this mode for playing in the NPPL Super 7 or any other field or event which doesn't allow any ramping software. This mode is adjustable with DEBOUNCE and ROF.
2. [3-Shot Burst] This firing mode is mostly for fun, and generally not legal at any tournaments or most paintball fields. For each pull of the trigger the gun will fire 3 shots. This mode is adjustable with ROF.
3. [NXL Full-Auto] The name is just what it suggests, it fires one shot per trigger pull initially until a set number of trigger pulls have been completed, at which point holding down the trigger will result in repeated firing. If you happen to release the trigger, you have just under one second to pull it again and jump right back into Full Auto without the normally required kick-in shots. This mode is fully adjustable with KICK-IN RATE, NUMBER OF SHOTS TO ENTER FIRING MODE and ROF.



4. [Rebound] This firing mode makes it much easier for any user to fire as fast as possible. It fires one shot per trigger pull at low rates of fire, but as the user pulls the trigger more frequently, Rebound responds by firing more rapidly. Rebound mode can be fully adjusted with KICK-IN RATE, SUSTAIN RATE, NUMBER OF SHOTS TO ENTER FIRING MODE and ROF.

DEBOUNCE

This setting will affect all firing modes, although it is normally only effective in Semi-Auto Mode. The lower you set the Debounce, the more sensitive it makes the trigger. If you set the Debounce too low and pull the trigger slowly, the kick of the marker might make it shoot more than once, which is not allowed in some tournaments and paintball fields. If you set the Debounce to 0, a Full Auto condition will result, which is prohibited at many fields and tournaments.

BSA (Bolt Stick Adjustment)

This setting affects all firing modes and is used to help compensate for any first shot drop-off (FSDO.) FSDO is when a gun's first shot is very low in velocity compared to the subsequent shots - usually due to the bolt sticking in place. After the gun sits for 10 seconds, the board will increase the Dwell setting to alleviate any first shot drop. The increase is based on the value of your BSA setting. If you do not experience any drop-off, then you should be at the lowest setting within the BSA to avoid the risk of hot gun penalties.

KICK-IN RATE

This setting affects REBOUND and NXL FULL AUTO; it refers to the shots per second you must reach by pulling the trigger before the board will "kick-in" to NXL Full Auto or Rebound. The higher the setting, the harder it will be to kick into either of the modes. The lower the setting, the easier it will be to kick in.



SUSTAIN RATE

This setting affects REBOUND; it refers to the shots per second you must sustain by pulling the trigger to keep the board “kicked in” to Rebound. The higher the setting, the faster you will have to pull the trigger to sustain the Rebound.

NUMBER OF SHOTS TO ENTER FIRE MODE

This setting affects REBOUND and NXL FULL AUTO; it adjusts how many shots are needed to be pulled in order for it to kick into Full Auto or Rebound Modes. You can adjust it from 1–10 pulls. This means that if it is set to 10, you must pull the trigger 10 times before it will kick into the chosen mode.

VISION TYPE (Shocker Version Only)

This setting tells the Blackheart what type of Vision eye it will use. Type 1 - Shocker SFT Reflective Vision. Type 2 - Nerve. Type 3 - Shocker NXT Breakbeam Vision. Type 4 - Shocker NXT Toggle Vision. Types 3 and 4 are only supported on Blackheart boards manufactured after August 2006. See the Shocker NXT manual for more information on Vision options.

SHORTCUT KEY

This affects all firing modes and is a handy feature. The Shortcut key will read the Dwell value and automatically calculate and set the ROF value to cap your marker at a maximum of 14.7 balls per second, for use where tournaments allow a maximum of 15 balls per second. The Shortcut Key allows for a 0.3 bps margin of error. If you wish to bypass this margin of error and get as close as possible to a 15 ball per second cap as possible, adjust the ROFDely value manually.



TOURNAMENT SETTINGS

PLEASE READ CAREFULLY

IDEAL SETTINGS FOR MAJOR TOURNAMENT LEAGUES

These settings are based on 2007 season rules. Check leagues for rule updates.

NXL Mode: NXL
Kick-In Rate: 1
Number of Shots to Enter Firing Mode: 3
Use Shortcut Key to calculate and set ROFDelay for 15 bps limit

PSP Mode: Rebound
Kick-In Rate: 1
Sustain Rate: 1
Use Shortcut Key to calculate and set ROFDelay for 15 bps limit
Number of Shots to Enter Firing Mode: 3.

NPPL Mode: Semi-auto
Rebound: As low as possible without causing the trigger to “bounce”
ROFDelay: minimum value that provides reliable operation.

Millennium Series Mode: Rebound
Kick-In Rate: 8
Sustain Rate: 8
Use Shortcut Key to set ROF
Number of Shots to Enter Firing Mode: 3.

CFOA Mode: Rebound
Kick-In Rate: 1
Sustain Rate: 1
Use Shortcut Key to calculate and set ROFDelay for 15 bps limit
Number of Shots to Enter Firing Mode: 3

