BLACKHEART™ INSTALLATION

FOR ENVY™ AND G-1™

WARNING The eNVy™ and G-1™ Blackheart™ upgrades are not interchangeable. The two versions feature different length vertical ASA hoses, to each fit their particular marker correctly.

WARNING The internal gas lines and electronic components of the eNVy™ and G-1™ are well protected inside their bodies—however they are delicate and may be damaged by improper handling or re-installation. For this reason it is highly recommended that installation of the Blackheart™ upgrade be performed by an airsmith with GOG-Paintball factory training. Reusing internal hoses after they have been removed from their barbed fittings will result in leaks due to stretching of the hose end.

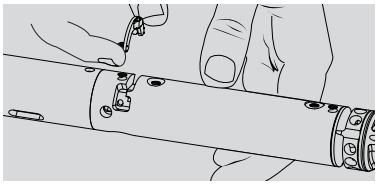
STEP 01 UNLOAD/DE-GAS Begin by unloading and de-gassing the marker following the directions found in its maintenance and operation manual, and removing its barrel. If you do not have a copy of this manual, you may download a free copy from GOGpaintball.com.

STEP 02 REMOVE GRIP FRAME Remove the stock or rear cover plate from the G-1, and following the Advanced Maintenance instructions in the marker's maintenance and operation manual removed the marker's grip frame.

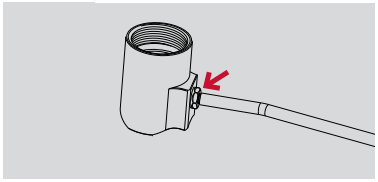
STEP 03 REMOVE CIRCUIT BOARD Remove original circuit board from the marker, by unscrewing both the breech screw to release the vertical ASA and the banjo fittings attaching the circuit board to the breech, as described in the Advanced Maintenance portion of the marker's maintenance and operation manual.

STEP 04 REMOVE BREECH Also following the Advanced Maintenance section of the marker's maintenance and operation manual, remove the breech from the body cover. Take advantage of the marker's disassembled state to inspect and if necessary clean or replace its ball detents, as worn detents can lead to double-feeding, chopped paintballs and other problems.

STEP 05 INSTALL VISION™ CIRCUIT BOARD Inspect, and if necessary clean the Vision™ circuit board slot in the marker's breech. Make certain the two eye openings on either side of the slot are clear and unobstructed, as debris or paint in these passages will prevent the Vision™ system from working correctly. Seat the Vision™ circuit board in its slot. Install the Blackheart™ breech back into the marker's body cover. This is most easily accomplished by holding both parts upside down, so that the Vision™ board does not fall out of its slot.



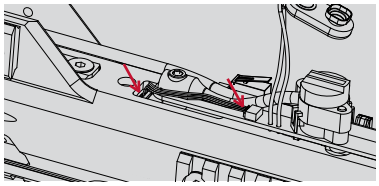
STEP 06 TRANSFER VERTICAL ASA Using an open end wrench or adjustable wrench, unscrew the original circuit board's brass barb from the vertical ASA. Connect the vertical ASA to the brass barb fitting on the Blackheart™. Take care not to over-tighten the brass fitting. It must only fit snug, as its o-ring will provide a proper seal. Over-tightening will result in permanent damage to the fitting.



If the marker was equipped with a Quick Exhaust Valve (QEV) or a new QEV is being installed, it should be connected to the Blackheart™ board at this time. Remove the front banjo fitting from the Blackheart™ circuit board and connect the QEV using a new length of internal hose. Do not re-use the original hose, as once its end has been stretched over a barbed connection and removed it will no longer be able to maintain a long lasting seal.

STEP 06 REINSTALL BREECH, CIRCUIT BOARD AND VERTICAL ASA Following the Advanced Maintenance section of the marker's maintenance and operation manual, reinstall the breech in the marker's protective body shell then install the Blackheart™ circuit board and vertical ASA. Take extreme care not to cross-thread or over-tighten the banjo fittings, as permanent, unrepairable damage may result.

STEP 07 CONNECT VISION™ CABLE Connect the Vision™ circuit board to the Blackheart™ Circuit Board with the Vision™ cable (shown with optional 360 QEV™). Either end of the cable may be plugged into either circuit board. Make sure the connectors are fully seated, or the Vision™ anti-chop system will not work properly.



STEP 08 REASSEMBLE MARKER Refer again to the reassembly notes in the Advanced Maintenance section of the marker's maintenance and operation manual and reassemble the marker. Be certain not to force the grip frame against the body or clamp it down with the grip frame screws if it does not readily fit flush against the marker's body shell, as damage to the Blackheart™ circuit board, wiring or other components may result. If the grip frame does not seat flush against the marker's body shell, make sure all hoses and wires are tucked into their correct positions and not blocking reassembly. If the breech is not correctly aligned with the body shell, the barrel may be installed and used to carefully reposition the breech for reassembly.

BLACKHEART™ OPERATION

FOR ENVY™ AND G-1™

POWER Once installed, your marker will operate as before. Press the power button to turn it on (live) or press and hold it to turn the marker off.

BATTERY LEVEL Each time the marker is turned on, the power button LED will blink 5 times rapidly, with its color indicating the estimated charge level of the battery. Green indicates a charge level between 75% and 100%. Yellow denotes a charge level between 50% and 75%, while red flashing indicates that the remaining charge is estimated to be below 50%. It is important to note that different types and even brands of rechargeable batteries will give different readings than alkaline batteries., so experience will be the best teacher as to how much remaining use to expect once a reduced charge level is indicated.

VISION™ Your marker is now equipped with a Vision™ break-beam anti-chop system, allowing it to acheive the highest possible rates of fire without chopping or mis-feeding paintballs.

When a paintball drops down the feedneck into the breech, it breaks the light beam between the two sides of the Vision™ circuit board, and the Blackheart™ circuit board detects its presence. When the Vision™ system is activated, the marker™ will not fire until it "sees" a paintball in the breech. This prevents the marker from dry firing or firing before the ball is completely loaded, which would result in the paintball being chopped.

There may be times when it is desirable to bypass the Vision™ system, such as dry-firing the marker™ to test electronic adjustments, or when de-gassing.

While the marker is turned on, pressing and holding the power button for approximately one-half second will turn the Vision™ system off, allowing the marker to fire whenever the trigger is pulled, whether or not there is a paintball in the breech. Pressing for approximately a half second will also turn Vision™ back on.

When Vision™ is on, the power button will glow green. When it is off, the button will glow red.

BLACKHEART™ PROGRAMMING

FOR ENVY™ AND G-1™

WARNING All Blackheart™ programming and adjustment must be performed with the marker unloaded and de-gassed. Follow the unloading and de-gassing instructions in the marker's manual prior to changing electronic settings.

LOCKING/UNLOCKING Most paintball tournaments, scenario games and fields have rules which do not allow a player to make adjustments that can affect velocity (such as dwell) or change firing mode settings during a game. These rules require that a marker be locked so that such adjustments can not be made without using tools, which are not allowed on-field.

To lock or unlock the marker, following the battery replacement directions in the marker's maintenance and operation manual, remove the wraparound rubber grip, unplug and remove the marker's 9-volt battery. Hold down the trigger while plugging the battery back in. The power LED will light red to indicate that the Blackheart™ board is locked, or green to indicate that it has been unlocked. Repeat the procedure to lock or unlock the marker.

PROGRAMMING MODE Changes are made to the Blackheart™'s electronic settings in programming mode. To enter programming mode, press the power button to turn on the marker while pressing and holding the trigger back. Once in programming mode, pull the trigger to cycle through the available parameters, which are indicated by the color and blinking of the power button LED. If the marker will not switch into programming mode, the Blackheart™ board is locked. The board will need to be unlocked before changes can be made.

When the desired parameter is selected, enter its new value by pulling and holding the trigger until the power LED turns off, then pulling the trigger a number of times corresponding to the desired setting. The LED will blink a number of times to confirm the new value that has been set. To exit programming mode, press the power button, turning the marker off.

PROGRAMMING PARAMETERS

FOR ENVY™ AND G-1™

The following parameters may be adjusted via the BlackheartTM board's programming mode:

FIRING MODES (Power Button LED Glows solid red) - Sets Firing Mode:

1 - SEMI-AUTOMATIC: This mode fires one shot per trigger pull, as fast as the trigger is pulled. The BPS cap has no effect on Semi-Automatic mode. This is the default firing mode for the eXTCy™.

2. CAPPED SEMI-AUTOMATIC: This mode operates the same as semi-automatic, but is limited by the BPS Cap setting.

3. NXL: Fires one shot per trigger pull until the trigger is pulled three times in quick succession, at which point it operates as if in fully automatic mode, firing repeatedly as fast as the Vision™ and BPS Cap will allow, until the trigger is released for a moment, at which point the cycle begins again firing one shot per trigger pull.

4. PSP: Fires one shot per trigger pull until the trigger is pulled three times in quick succession at which point it switches into a ramping mode firing more than one shot per trigger pull while the player pulls the trigger repeatedly. After one second of inactivity PSP mode reverts to its beginning single shot per pull operation.

5. Millennium: Fires one shot per trigger pull until the trigger is pulled at a rate of 5 times per second or faster, at which point it begins firing more than one shot per trigger pull. When the user pulls the trigger at rates below 5 times per second, Millennium mode reverts to firing one shot per trigger pull.

6. CFOA: Fires one shot per trigger pull until the trigger is pulled three times at a rate of 5.5 times per second or faster at which point more than one ball is fired per trigger pull, until the rate of trigger pulls drops below 5.5 per second, at which point CFOA mode reverts to firing 1 shot per trigger pull.

7. Auto Response: Fires on both the pull and release of trigger.

8. Select Fire: Allows for in-game selection between semi-automatic, burst and full-automatic firing modes without the use of tools, during a game. When using Select Fire mode, the power button LED will indicate which of the three modes is operational. The LED will glow solid for semi-automatic, blink slowly for burst mode or rapidly for full-automatic. Pressing the power button quickly will cycle through the three modes.

9. Burst: Fires a user selected number of shots each time the trigger is pulled and held.

10. Full-Automatic: Fires when the trigger is pulled and continues firing repeatedly at a rate defined by the BPS Cap and Vision™ system until the trigger is released.

11. Rebound™: Begins firing one shot per trigger pull, but begins firing more than one shot per trigger pull as the player pulls the trigger more rapidly, reverting to one shot per trigger pull when the rate of trigger pulls decreases.

12. Billy-Ball™: This mode restricts eXTCy™'s rate of fire to make it less intimidating to new paintball players, or create an even playing field with pump-action paintguns. Billy-Ball™ also can be used by experienced players to train for reliance on stealth, accuracy and movement instead of of rate of fire.

VISION™ (Power Button LED glows solid green) - Sets how the Vision™ system operates:

1. CLASSIC: The marker will not fire unless there is a ball in the breech, breaking the Vision™ beam. This is the default Vision™ mode.

2. DELAYED: If the breech is empty when the trigger is pulled, the marker will wait up to ½ second for a ball to load before the marker fires. At the end of the delay period, the eXTCy™ will fire, even if no paintball is detected. Delayed mode effectively allows the eXTCy™ to fire "blind" at a reduced rate of fire if the Vision™ system is fouled by debris or paint.

3. FORCED DELAY: This mode works the same as the Delayed Vision™ mode, but may also fire when the breech is empty, by holding the trigger down for a full second. Forced delay mode allows for easy de-gassing of the eXTCy™ without having to switch Vision™ off.

PROGRAMMING PARAMETERS

FOR ENVY™ AND G-1™

DWELL: (Power Button LED glows solid yellow) - Adjusts how long the solenoid valve is held open to fire each shot. Dwell is adjustable from 5 to 65 milliseconds in 1 millisecond increments. Raising dwell can improve shot to shot consistency (drops in velocity when rapid firing). Raising the dwell higher than necessary can reduce the eXTCy™'s and or cause shoot-down under rapid firing, especially on CO_2. When experimenting with lowered dwell settings, inconsistent velocity during rapid firing, skipped shots or first-shot drop-off are all signs that the dwell must be increased. The default value is 33ms.

BPS CAP: (Power Button LED blinks fast red) - In all firing modes except semi-automatic and Billy-Ball™, this setting limits the eXTCy™'s maximum rate of fire. BPS cap is adjustable from 4 to 20 balls per second in 1 bps increments. The default value is 13 bps.

BPS FINE ADJUST: (Power Button LED blinks fast green) - This parameter allows for fine-tuning of the BPS cap by adding a small value to it. Settings from 0 to 3 add from 0, 0.25, 0.5 or 0.75 BPS to the BPS Cap. For example, setting BPS Cap to 13, and BPS Fine Adjust to 2, will result in a maximum rate of fire of 13.5 bps. The default BPS Fine Adjust setting is 0.

BURST COUNT: (Power Button LED blinks fast yellow) - This selects the number of shots fire per trigger pull when the maker is in burst mode. The burst number may be set to values between 2 and 4 shots. The default Burst Count value is 3 shots.

PULLS TO ENTER: (Power Button LED blinks slowly red) - For Rebound™ Mode, the Pulls To Enter determines how many times the trigger must be pulled before marker ramps up to more than one shot per trigger pull. Pulls to enter may be set between 1 and 5 pulls.

ENTER RATE: (Power Button LED blinks slowly green) - For Rebound™ Mode, the Enter Rate determines how frequently the trigger must be pulled before the marker ramps up to more than one shot per trigger pull. Enter rate may be set between 4 and 12 trigger pulls per second.

SUSTAIN RATE: (Power Button LED blinks slowly yellow) - For Rebound™ Mode, the Sustain Rate determines how frequently the trigger must be pulled to continue ramping more than one shot per trigger pull after ramping has begun. Sustain Rate may be set between 1 and 10 trigger pulls per second.

FSDO COMPENSATION: (Power Button LED blinks slowly red and green) - When a marker rests, its bolt may stick in position and cause a low-velocity shot the next time it is fired. This is known as First Shot Drop-Off, or FSDO. FSDO Compensation increases the dwell time of the first shot of a group, providing additional time to break friction between the breech and the bolt's o-rings before the bolt moves forward. FSDO Compensation may be adjusted from zero (off) to 15 milliseconds in 1 millisecond increments. When the marker rests for 20 seconds or more, the next shot fired will have the FSDO Compensation value added to its dwell time. The default FSDO setting is 20 milliseconds.

VISION™ HARDWARE: (Power Button LED blinks slowly yellow and green) - This setting provides compatibility between the Blackheart™ circuit board and other markers with different style Vision™ sensors. A setting of 1 is for use with the eXTCy™ style wired Vision™ eyes. The default setting of 2 isbe used for compatibility with the included circuit board style Vision™ eyes for the G-1™ and eNVy™.

PROGRAMMING NOTES

FOR ENVY™ AND G-1™

PROGRAMMING EXAMPLE To change the Blackheart™'s BPS Cap to 13 bps, make sure the marker is unloaded, de-gassed and that the Blackheart™ board is unlocked.

Enter programming mode by turning the marker on while holding the trigger back. Release the trigger when the power button glows solid green.

Pull the trigger three times, waiting between each pull to see what color the power button LED is flashing. After the third pull, the power button will be flashing red, indicating that the ROF Cap has been selected.

Press and hold the trigger until the power button stops glowing. Pull the trigger 13 times to set the ROF Cap value to 13 balls per second.

Wait, and watch as the power button blinks 13 times to confirm the 13 BPS value.

Press and hold the power button until it stops gloing to turn the marker off.

Once programming is complete, re-lock the Blackheart™ board so that it will be "field legal."

FACTORY RESET The Blackheart™ circuit board can be quickly and easily reset to its factory-default settings. This is can be an important step in diagnosing unusal firing patterns or odd behavior on the field, especially if using a marker that was previously adjusted by someone else.

To reset the Blackheart™ board, first unload and de-gas the marker following the instructions its maintenance and operation manual, and make sure the circuit board is unlocked.

With the marker turned off, pull the trigger, then press the power button while continuing to hold the trigger back. Continue holding the trigger for ten seconds until the power button LED flashes orange.

Release the trigger and all programming parameters will have been reset to their factory default values.

SETTING A ZERO VALUE When setting a whole BPS number for the maximum rate of fire, or turning off FSDO compensation, values of zero must be set.

To set a value of zero, once the Power Button LED is blinking to indicate the desired parameter, pull and hold the trigger to select, then do nothing, and the Blackheart™ circuit board will accept zero as the new value.

RECOMENDED DWELL VALUES The optimal dwell setting depends on the configuration of the marker. The following dwell values are recommended for the best possible speed and gas efficiency without sacrificing reliability.

Using CO_2 under ideal conditions*: 35ms

Using CO_2 in cold weather: 52ms

Using HPA with standard valving: 27ms

With QEV upgrade and HPA: 17ms

* When using a CO_2 tank properly configured to prevent feeding liquid to the marker in warmer weather (see gasses section of this manual), the lower CO_2 dwell rate can be used. In colder weather, or if the marker begins showing signs of drop-off or mis-fires, the dwell must be increased for reliable operation.