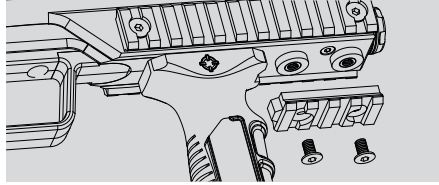


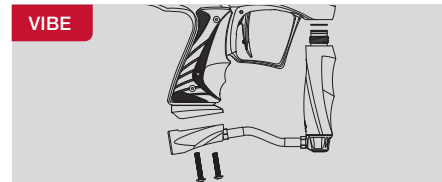
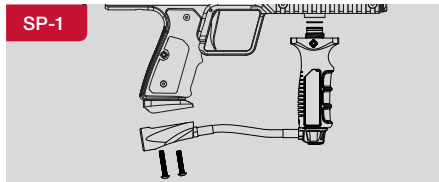
WARNING The Vibe and SP-1 Blackheart upgrades are not interchangeable. You must use the Vibe version to upgrade a Vibe or the SP-1 version to upgrade an SP-1.

WARNING The internal gas lines and electronic components of the Vibe and SP-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 armsmith with Smart Parts factory training. Removal of internal hoses from their barbed fittings and re-use will stretch them and cause leaks.

STEP 01 UNLOAD/DEGAS Begin by unloading and degassing the marker, following the directions found in its Quick Start Manual, and removing its barrel. If you do not have a printed version of this manual, it may be downloaded free of charge at SmartParts.com.



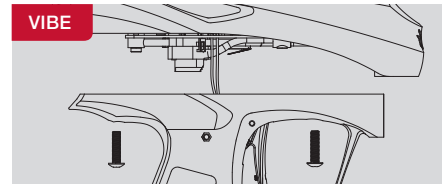
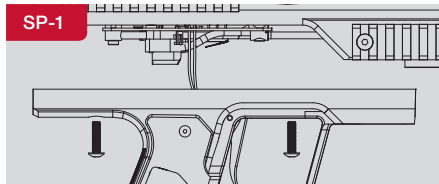
SP-1: Following its Quick Start Manual, remove the rear-cover plate. Use a 1/8-inch allen wrench to remove the bottom tactical rail from the front of the marker. The bottom rail serves as a lock to prevent the Max-Flo R vertical regulator's cover from rotating. With the rail removed, the regulator may be unscrewed from the marker, though it will still remain attached to the bottom-line adapter via its braided hose. Take care not to lose the filter screen that is inside the vertical ASA.



STEP 02 MAX-FLO R Using a 1/8-inch allen wrench, remove the screws holding the bottom-line adapter to its mounting wedge or from the grip frame if directly mounted. Notice the varying screw lengths used for bottom-line mounting, so that the bottom-line may be reinstalled later with the screws in the same positions.

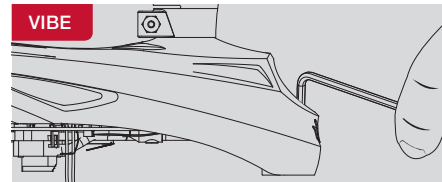
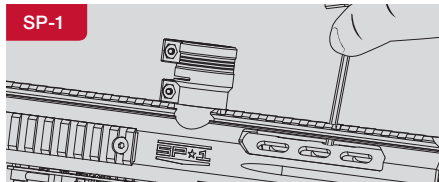
Unscrew the Max-Flo R vertical regulator from the vertical ASA. Take care not to lose the filter screen that is inside the vertical ASA.

Following the directions in the Quick Start Manual, remove the wraparound rubber grip, unplug and remove the marker's 9-volt battery.



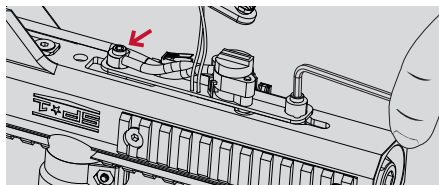
STEP 03 GRIP FRAME Use a 1/8-inch allen wrench to remove the front and rear grip frame screws, then carefully remove the grip frame from the body. Be aware that the clear power button fits loosely into its position in the side of the grip frame. Be careful not to drop or lose it. Watch to make sure the 9-volt battery clip does not snag in the grip frame as the two components are separated.

STEP 04 VERTICAL ASA The body flat cap screw serves to lock the marker's vertical ASA in place. Use a 1/8-inch allen wrench to remove it.

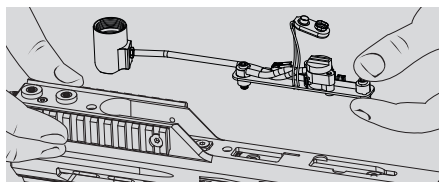


SP-1: Reach the long end of your allen wrench through the hole in the top tactical rail, down into the head of the body flat cap screw.

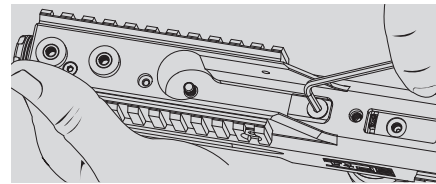
VIBE: The Vibe's body flat cap screw is visible directly above the vertical ASA where the vertical regulator mounts in the body.



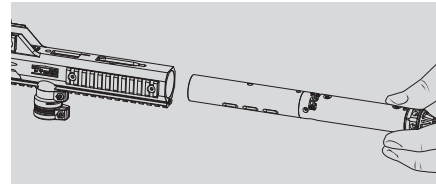
STEP 05 BANJO BOLTS Using a 1/8-inch allen wrench, unscrew the two banjo bolts which connect the marker's circuit board to the aluminum breech inside the fiber-reinforced nylon body shell.



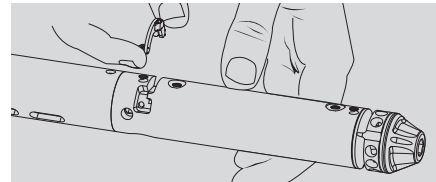
STEP 06 CONTROL ASSEMBLY Lift out the pneumatic control assembly.



STEP 07 BODY STOP Use a 1/8-inch allen wrench to remove the body stop screw, located on the bottom of the body, just behind where the vertical ASA mounts. Lift out the rectangular body stop.

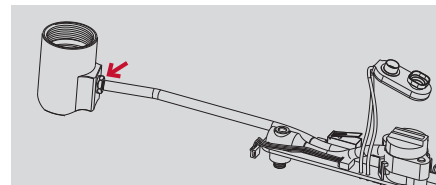


STEP 08 BODY Slide the inner aluminum body/breech out the back of the body shell. Following the guidance of your Quick Start Manual, remove the bolt sleeve, bolt stop and bolt from the body/breech. Clean and lubricate these parts with SL33K before installing them in the Blackheart body/breech.

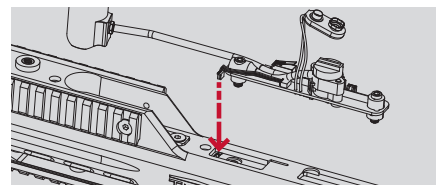


STEP 09 VISION Seat the Vision circuit board in its slot in the new Blackheart body/breech. Make sure the black rubber ball detents are firmly seated in the Blackheart body/breech.

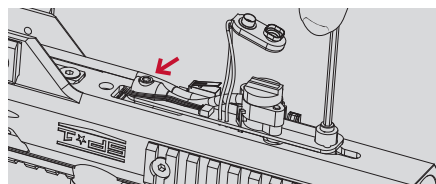
Install the Blackheart breech into the marker's body cover. This is most easily accomplished by holding both parts upside down, so that the Vision board does not fall out of its slot.



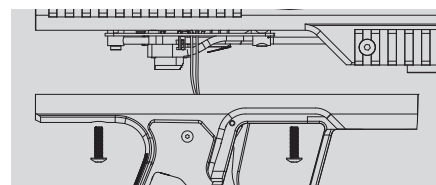
STEP 10 SUPPLY HOSE Unscrew the brass barbed fitting from the vertical ASA. In its place, screw in the new brass barbed fitting that is attached to the supply hose and Blackheart circuit board.



STEP 11 VISION CABLE Reinstall the rectangular body stop and body stop screw. Gently plug one end of the Vision wiring harness into the Vision circuit board, where its socket is visible through the bottom of the body cover. Notice that the cable is keyed and will only plug in facing one direction—do not force the plug into the socket.



STEP 12 SECURE PNEUMATICS Reinstall and secure the vertical ASA back into the body with the body flat cap body screw. Carefully align the Blackheart's quick-exhaust valve and rear banjo bolt with the aluminum breech and screw both into place with the long end of a 1/8-inch allen wrench. Take extreme care not to over-tighten or cross-thread the gas-through bolts. Ensure that the Vision wiring harness is securely plugged into its socket on the Blackheart circuit board, next to the trigger switch.



STEP 13 GRIP FRAME INSTALL When installing the grip frame to the body, first guide the battery clip down into the grip frame. Next ensure that the hose from the vertical ASA and the Vision cable are in place, tucked up against the Blackheart Quick Exhaust Valve and away from the sides of the body.

Make sure the clear power button is in its place in the grip frame. Face the left side of the marker down while fitting the grip frame and body together, so that gravity keeps the power button where it

belongs. If the power button does come free, make sure it is facing the correct direction when reinstalled. The raised power logo should have its central line facing upward.

Carefully slide the grip frame into position against the body, taking care not to pinch wires or hoses in the process. It may be necessary to use an allen wrench or pick to position the front hose or cable so that they are not pinched by the edge of the grip frame.

WARNING If the breech assembly inside the marker's body shell is misaligned, the circuit board may prevent the grip frame from seating properly. This is remedied by installing the marker's barrel and pushing or pulling on it as needed to position the breech assembly within the body shell. Do not force the grip frame against the body or circuit board damage may result!

STEP 14 AIR SYSTEM Secure the grip frame to the body with the two grip frame screws.

The filter screen must be placed back into the vertical ASA, making sure that it sits flat while the Max-Flo R vertical regulator is screwed into place. The bottom-line adapter is then reinstalled.

SP-1: Reinstall the rear cover plate and lower tactical rail.

BLACKHEART OPERATION

FOR VIBE & SP-1 TACTICAL

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 As the marker turns on, the button LED will blink 5 times rapidly, with its color indicating the charge level of its battery. Green indicates a charge level between 75% and 100%. Yellow denotes a charge between 50% and 75% percent, while red flashing indicates that the battery's charge has dropped 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 long any particular brand of battery will last once reduced power levels are indicated. If your marker is exhibiting trouble firing and the Blackheart board turns on with any color other than green, test it again with a brand new alkaline battery as your first troubleshooting step.

VISION While the marker is turned on, pressing the power button for approximately one-half second will turn the Vision system off, allowing your 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. Turning off the Vision anti-chop system is useful when degassing the marker following the instructions in the marker manual. If the Vision eye system's blue glow is not visible through the open feedneck when the marker is turned on, verify that both ends of the Vision wiring harness are plugged in securely. When Vision is on, the power button will glow green. When it is off, the button will glow red.

BLACKHEART PROGRAMMING

FOR VIBE & SP-1 TACTICAL

WARNING All Blackheart programming and adjustment must be made with the marker unloaded and degassed. Follow the unloading and degassing procedures in the marker's Quick Start Manual.

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 Blackheart board, following the directions in the marker's Quick Start 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.

ENTERING PROGRAMMING MODE Enter programming mode by holding the trigger back, and then pressing the power button to turn the marker on. Once in programming mode, pull the trigger to cycle through the available parameters. 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.

FIRING MODES (LED: *Solid Red*) This parameter sets the marker's firing mode:

- 1. Semi-Automatic:** One shot per trigger pull (uncapped.) This is the Blackheart's default firing mode.
- 2. Capped Semi-Automatic:** One shot per trigger pull, limited by 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 a fully automatic mode, until the trigger is released for a moment, at which point the cycle begins again as semi-automatic.
- 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 8 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 8 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, burst and full-auto firing modes without the use of tools, during a game. In use, the power LED will indicate which mode is selected. 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 per pull.
- 10. Full-Automatic:** Fires when the trigger is pulled and continues firing repeatedly 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.

VISION (LED: *Solid Green*) Sets Vision operation method:

- 1. Classic:** The marker will not fire unless there is a ball in the break, 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 it fires. At the end of the delay period it will fire, even if no ball is detected.
- 3. Forced Delay:** This mode works the same as the Classic Vision mode, but may also fire when the breech is empty by holding the trigger down for a full second.

DWELL (LED: *Solid Yellow*) Adjusts how long the solenoid valve is held open to fire each shot. Adjustable from 5 to 65 milliseconds in 1 ms increments. For best performance use the Dwell Optimization procedure described below. If time does not permit dwell optimization, reliable operation can be achieved with a setting of 22 ms when using CO₂, or 17 ms with compressed air.

BPS CAP (LED: *Fast Blinking Red*) In all modes except semi-automatic, this setting limits the marker's maximum rate of fire. BPS Cap is adjustable from 4 to 20 balls per second in 1 bps increments. The default setting is 13 bps.

BPS FINE ADJUST (LED: *Fast Blinking Green*) This parameter allows for fine-tuning of the BPS Cap, by adding a small value to it. Values of 1 to 9 add from 0.1 to 0.9 bps to the BPS Cap. For example, setting BPS Cap to 13, and BPS Fine to 2 will result in a total cap of 13.2 BPS. The default BPS Fine Adjust setting is 0.

BURST COUNT (LED: *Fast Blinking Yellow*) Selects the number of shots fired per trigger pull when the marker is in burst mode. The burst number may be set from 2 to 4. The default burst value is 3.

FSDO (LED: *Slow Blinking Red*) When a marker rests, its bolt may stick in position, causing a low-velocity shot the next time it is fired as the bolt un-sticks (First Shot Drop-Off.) FSDO compensation increases the dwell time on the first shot in a group in order to compensate for bolt-stick. FSDO may be adjusted from 0 (off) to 15 milliseconds in 1 ms increments. When the marker rests for 20 seconds or more, the next shot fired will have the FSDO value added to its dwell time. The default FSDO setting is 5 ms.

DWELL OPTIMIZATION

FOR VIBE & SP-1 TACTICAL

The stock circuit board uses a simplified dwell setting to select between pre-set values designed to give the most reliable operation with the stock bolt using compressed air or CO₂ as a power source. The adjustable dwell of the Blackheart board allows full dwell adjustment to optimize performance with aftermarket bolts and at various pressure ranges.

To optimize your dwell setting, wear proper paintball protective goggles and gas up your marker with a barrel blocker in place, with no paint or hopper. Make sure the Blackheart board is set to use Forced Vision mode. Turn on the marker and take a dry-fired test-shot (hold the trigger down for a full second, forcing it to fire without paint.) Decrease the dwell time and test-fire until the marker can no longer complete a full firing cycle (bolt does not close all the way.) Increase the dwell value and test-fire repeatedly until you hear the marker fire a full volume shot (bolt closes and gas is released.) Increase the dwell by an additional 5 milliseconds for the ideal balance between gas efficiency and reliability. Lower settings may improve gas efficiency while sacrificing velocity consistency and reliability.

If your new setting causes an increase in first shot drop off, where only the first shot in a group has a low velocity, increase the FSDO setting to compensate.