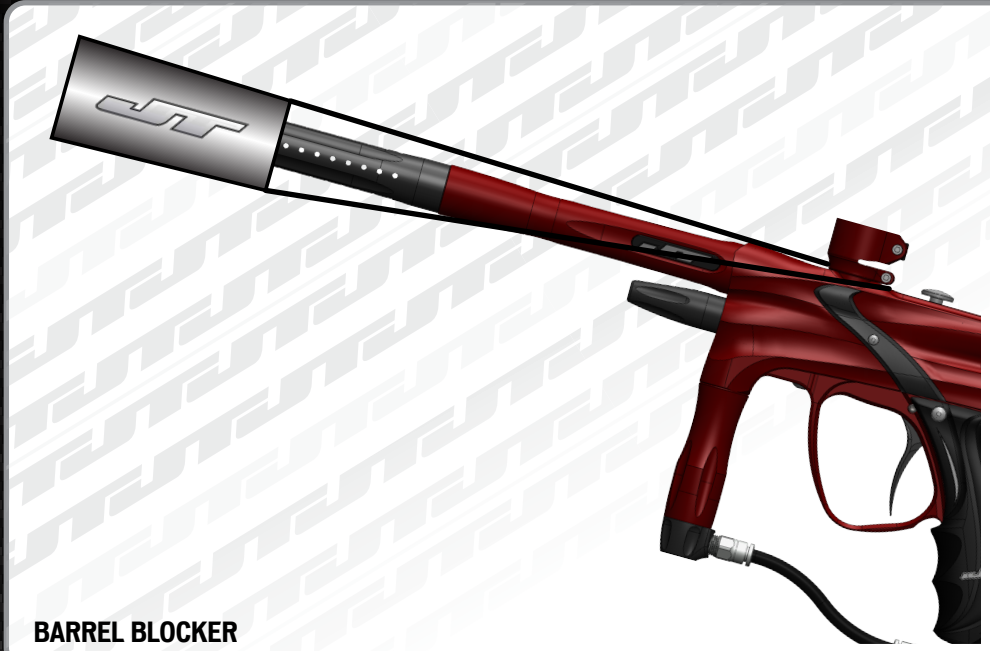
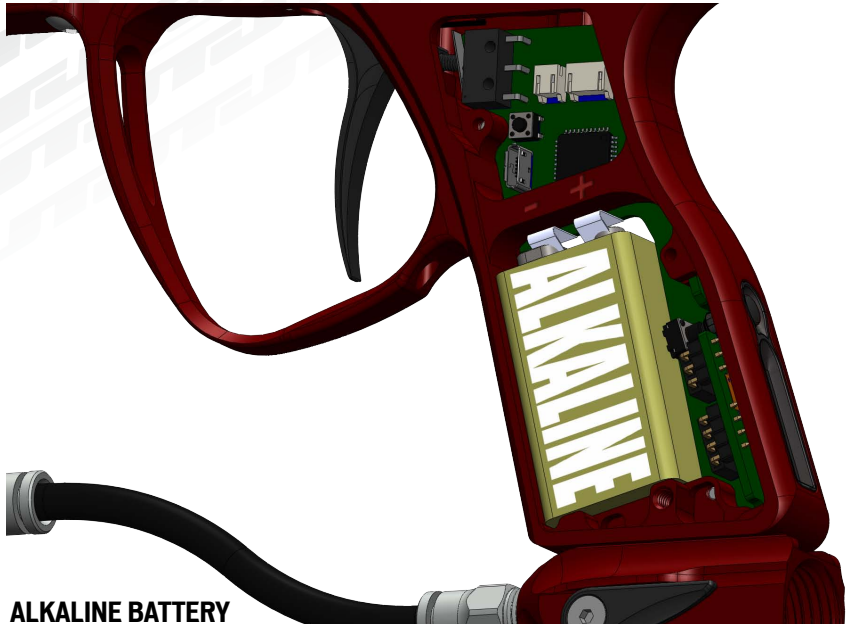
JT IMPULSE MAINTENANCE AND OPERATION MANUAL

⚠ WARNING

- THE IMPULSE IS NOT A TOY.
- MISUSE OF THE IMPULSE MAY RESULT IN SERIOUS INJURY OR DEATH.
- EYE PROTECTION DESIGNED FOR PAINTBALL USE MUST BE WORN BY THE USER AND ANY PERSON WITHIN RANGE OF THE IMPULSE.
- JT PAINTBALL RECOMMENDS THAT THE IMPULSE ONLY BE SOLD TO PERSONS 18 AND OLDER.
- THOROUGHLY READ THE IMPULSE OPERATION AND INSTRUCTION MANUAL BEFORE OPERATING.
- TREAT EVERY PAINTBALL MARKER AS IF IT WERE LOADED.
- NEVER LOOK DOWN THE BARREL OF A PAINTBALL MARKER.
- KEEP YOUR FINGER OFF THE TRIGGER UNTIL READY TO SHOOT. NEVER POINT THE IMPULSE AT ANYTHING YOU DON'T INTEND TO SHOOT.
- KEEP THE IMPULSE ON SAFE (POWER OFF) UNTIL READY TO SHOOT (SEE QUICK START).
- KEEP THE BARREL BLOCKING DEVICE ON THE IMPULSE'S MUZZLE WHEN NOT SHOOTING (SEE BARREL BLOCKER SECTION).
- ALWAYS REMOVE PAINTBALLS AND DE-GAS THE IMPULSE BEFORE DISASSEMBLY (SEE DE-GASSING SECTION).
- STORE AND TRANSPORT THE IMPULSE UNLOADED AND DEGASSED IN A SECURE PLACE.
- FOLLOW ALL MANUFACTURER'S WARNINGS AND INSTRUCTIONS FOR PROPELLANT SOURCE HANDLING, STORAGE AND FILLING.
- DO NOT SHOOT FRAGILE OBJECTS SUCH AS WINDOWS.
- ALWAYS MEASURE THE VELOCITY OF PAINTBALLS FIRED BY THE IMPULSE BEFORE USE, AND NEVER ADJUST TO FIRE ABOVE 300FPS (91.44M/S).



BARREL BLOCKER



ALKALINE BATTERY

BARREL BLOCKER The barrel blocker is a very important piece of safety equipment – as important as goggles. It is used any time the Impulse (or any other paintball marker) is connected to an air source and is in an area where people are not protected by paintball goggles or paintball field netting.

The barrel blocker performs a very simple function. If the Impulse is accidentally fired, the barrel blocker catches the paintball to prevent accidental injury or damage. Although turning off the Impulse does serve as a safety mechanism to prevent it from firing, the barrel blocker has an advantage in that it is clearly visible to everyone that it is in use. It is important to make sure that the barrel blocker is securely in place when it is used. To put the barrel blocker on the Impulse, slide it over the end of the barrel and loop the cords over the back of the marker. Adjust the cord lock so that the barrel blocker is held snugly in place and cannot slip free.

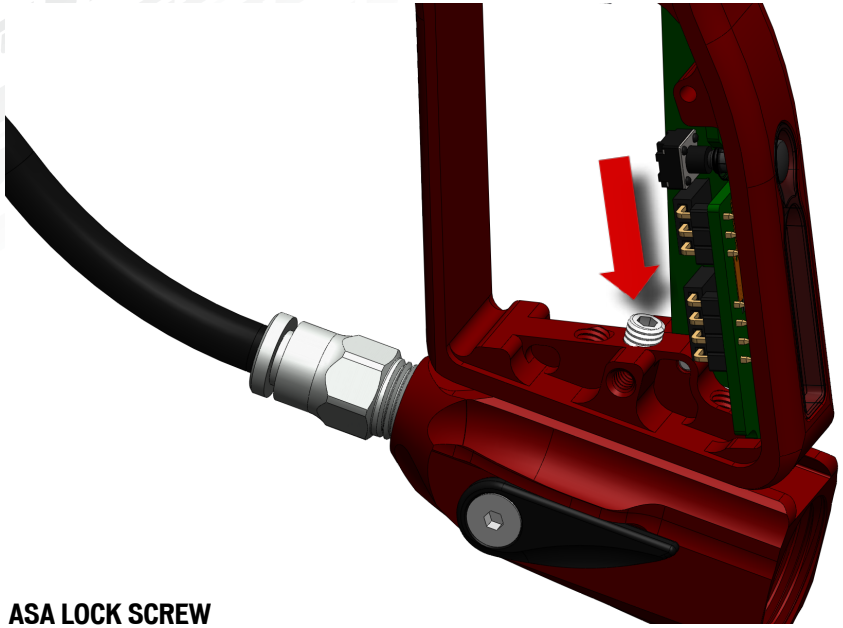
BATTERY The electronic components in the Impulse are powered by a single rectangular 9-volt battery. For optimal performance, alkaline batteries (ANSI type 1604A) should be used. Lower cost "heavy duty" zinc/carbon batteries do not last nearly as long, or deliver amperage as reliably and should be avoided. Most "9v" style rechargeable batteries will work with the Impulse, but their charge levels may not be accurately reported on the Impulse display. It is advisable to gain experience with any particular rechargeable battery before trusting an important game to it.

Installing or changing the battery in the Impulse is simple. Use a 5/64-inch allen wrench to remove the two grip screws from the left side of the marker and open the rubber grip. The battery simply slides into place, contact side up. Battery orientation is important. The positive terminal of the battery (smaller of the two snap conectors) should be aligned towards the Impulse display screen, while the negative terminal (larger snap) should be towards the barrel. With the battery in place, close the grip and secure it with the two grip screws. Make sure the circuit board's battery contacts are pressed firmly under spring pressure against the battery terminals. If the fit is loose, slight bending of the contacts may be necessary. Because the Impulse circuit board draws a very small amount of current from the battery even when it is turned off, it is best to remove the battery if the marker is going to be stored for a few weeks or more.

PRO TIP: Because the barrel blocker is visible to everyone and works with all markers, it is the standard safety device used any time the Impulse is handled in safe zones where goggles are off.

ASA OFF

ASA ON



ASA LOCK SCREW

HPA The Impulse is designed to be powered by a high pressure compressed air (HPA) system only. Use of carbon dioxide (CO_2) to power the Impulse is likely to cause damage to sensitive internal seals and will result in a voided warranty.

Paintball HPA systems consist of an air storage cylinder rated to 3,000 psi or 4,500 psi and an integrated regulator/valve installed in the neck of the cylinder. HPA systems are typically divided into high-output (800 psi) and low-output (400 psi) models. Either type will work with the Impulse, though use of a high-output model will often deliver more consistent velocity at high rates of fire.

HPA systems are shipped empty, and must be filled by properly trained persons. Once filled, the HPA system is attached to the Impulse by screwing it in to the bottom-line ASA (See ASA).

ASA The Impulse is equipped with a bottom-line style venting on/off Air System Adapter (ASA). Before screwing an HPA system into the ASA, make sure the ASA is turned off by turning the on/off lever forward. After screwing in the HPA system, the ASA may be turned on by turning the on/off lever back parallel with the ASA body. The ASA lever should be turned on slowly, so that the gas pressure inside the Impulse rises gently, rather than with a sudden "pop."

When turning the ASA off, gas trapped between the ASA and vertical regulator will be released with a brief hissing sound. This is normal. Turning off the ASA does not completely de-pressurize the Impulse and may leave enough gas inside the marker to fire 2 or more shots (see de-gassing).

The ASA may be replaced with other similar gas mounts or fittings. To replace the ASA, first unload and de-gas the marker, then remove the HPA system. Use a 3/32-inch allen wrench through the middle hole in the bottom of the grip frame to loosen the ASA setscrew. Temporary thread locking compound (Blue Loctite 242 or equivalent) is used to keep the ASA lock screw in place. The ASA may be replaced by one of a similar design which uses a 3/4-inch dovetail mounting rail, or an ASA which uses traditional center aligned 10-32 ASA mounting screws.

WARNING: When removing an HPA System from the ASA watch carefully to make sure the HPA system regulator is unscrewing from the ASA and that the HPA cylinder is not unscrewing from the HPA regulator.

WARNING: Never put oil or other hydrocarbon products in an HPA system or its fill nipple.

FEEDNECK OPEN

FEEDNECK CLAMPED

FINE ADJUSTMENT

PAINT The Impulse is a high-end tournament grade paintball marker designed to give players the winning edge at all levels of competition from intense scenarios and weekend walk-on play to professional level tournaments. Getting top level performance out of the Impulse depends on using a top quality paintball. Paintballs which are old, misshapen, have been stored in hot areas or open containers will not work as well as fresh top-grade paint. Moreover the gentle bolt pressure and Vision anti-chop system in the Impulse are optimized to work well with thin and brittle shelled tournament grade paintballs that break more easily on their targets without breaking in the marker.

HOPPER / FEEDNECK The Impulse can only fire fast if it is loaded quickly with paintballs. Best performance will be achieved with force-feed loaders which actively drive paintballs into the marker each time it is fired. Due to its Vision anti-chop system and low bolt pressures the Impulse can also make use of agitating or even non-powered loaders without unusual risk of chopped or broken paintballs, but its rate of fire will be limited to how fast it receives paintballs from the loader.

The lever-action clamping feedneck on the Impulse allows for quick removal or installation of a loader. Simply pull the lever away from the feedneck to open the clamp, releasing its grip.

Due to differences in loader neck sizes, the feedneck may need adjustment. If the feed-neck will not clamp on to a loader's feedneck with a reasonable amount of pressure on its latch, or doesn't clamp tight enough, it can be adjusted for a perfect fit. Quick adjustments can be made by opening the lever and turning one full turn it to tighten or loosen its position on the clamp adjustment screw. Fine adjustments of less than a full turn may be made by using a 7/64-inch allen wrench to turn the clamp adjustment screw for a perfect fit.

PRO TIP: Choosing the right hopper is critical to getting the best performance from your Impulse. Take a tip from the Pros - XSV uses JT and Empire hoppers exclusively because they are both fast and reliable.

POWER BUTTON

POWER ON

GAME TIMER IN USE

POWER Press and hold the power button for approximately one second (until the JT logo appears on the display screen) to turn on the Impulse. When the Impulse is on, it is "live" and ready to fire. The Impulse may be turned off by pressing and holding the power button for approximately two seconds (until the display screen goes dark).

FIRING Once the Impulse is charged with gas and switched live, it may be fired by pulling the trigger. Turning the Impulse electronics on or off is the equivalent of setting the safety on a mechanical paintball marker. Like all safety mechanisms, it should used in addition to, not in place of a barrel blocker.

When the Impulse is live, the display screen will show the approximate charge level of the battery, the tournament lock status (see programming) the Vision status, the currently selected firing mode and rate of fire cap (except in semi-automatic mode which is uncapped). In addition, if the game timer is engaged, the countdown timer will be displayed.

Approximate battery charge level is indicated by anywhere from 0 to 5 bars being appearing in a battery symbol on the Impulse display screen. Be aware that many rechargeable batteries have different discharge characteristics than alkaline batteries. A lithium-ion battery for example may appear only partially full when freshly charged, and give the same reading before "emptying" rapidly at the end of its useful charge. If using any battery type other than alkaline, it is recommended to learn how it will interact with the Impulse charge level indicator before relying on it in a game.

TIMER The Impulse game timer is set through trigger based programming (see programming). When the timer is engaged, the display screen will show the pre-set time value when the marker is turned on. Pulling the trigger to fire a shot at the beginning of a game starts the timer's countdown. When the timer reaches 00:00 it will remain at 00:00. Turning the Impulse off then back on again resets the timer for the next game.

PRO TIP: Take a few minutes to practice turning the Impulse on and off, as well as navigating its programming menu. Being more familiar with your equipment in advance will let you focus on your game at the field.

BREECH EMPTY | BREECH FULL | EYE FAULT | VISION OFF

VISION The Impulse is equipped with the latest generation Vision™ break-beam anti-chop eye system. Multiple Vision modes may be selected (see programming) and the Vision™ status can be read from the display screen.

An open eye with a light pupil indicates that Vision is on and no paintball is detected in the breech. An open eye that is filled in, with a dark pupil indicates that Vision is on and a paintball is in the breech of the Impulse, ready to fire.

The text "EYE FAULT" indicates a Vision error, which may be due to paint or debris blocking the Vision beam (see Vision cleaning), disconnected Vision™ wiring (See disassembly) or Vision component damage.

Vision may be turned on or off while the Impulse is live. Simply press and hold the power button for approximately ½ second to turn Vision off or back on. A diagonal slash through the eye in the Impulse display screen indicates that Vision has been turned off.

PRO TIP: The Vision system is critical to achieving high rates of fire without chopping paint. Make sure the Vision sensors are kept clean with their breech openings unobstructed.

VELOCITY ADJUSTMENT

VELOCITY The velocity, or speed at which the Impulse fires a paintball must be measured and adjusted each day before use – both for fairness of the game and player safety. In an area where it is safe to fire paintballs, while wearing ASTM compliant eye and face protection for paintball, fire three or four shots over a chronograph to measure the velocity of the paintballs. Commercial paintball fields have an area with chronographs set aside for this purpose.

If the velocity is above the paintball field's limit, or above 300 feet per second (the internationally accepted safe velocity limit for 68 caliber paintballs), it must be reduced. If the velocity is much below the field's limit, adjusting it up closer to the limit will give the Impulse the most range possible as well as the best chance of breaking each paintball on target.

If velocity adjustment is needed, use a 5/32-inch allen wrench to turn the velocity adjuster located in the bottom of the vertical regulator. Turn the allen wrench clockwise to increase velocity and counter-clockwise to decrease. Take three or four shots after every adjustment to allow the gas pressure inside the Impulse to stabilize then fire over the chronograph again to take another measurement. Adjust and re-check as needed until the desired velocity is reached. For safety reasons, never adjust the Impulse to fire at greater than 300 feet per second.

PRO TIP: Checking velocity is an important safety procedure which must be performed every time the Impulse is taken to the field. For safety the velocity must be kept under 300 feet per second, but getting as close to the field's limit as possible will maximize effective range.

VISION OFF

DRY FIRE TO DE-GAS

UNLOADING DEGASSING At the end of each day's use, and before performing cleaning or maintenance work on the Impulse, it must be unloaded and de-gassed. Take the Impulse to an area where it is safe to shoot, such as the chronograph area of a paintball field. While wearing paintball goggles, remove the hopper from the Impulse. By turning the Impulse upside down, any extra paintballs can be emptied from the chamber and feed-neck.

Turn the Impulse on, then de-activate the Vision anti-chop system by pressing the power button for one-half second until the eye icon in the Impulse display screen switches to an eye with a diagonal line through it.

Dry fire the Impulse for 2 or three shots in a safe direction to be certain that there are no paintballs in the chamber or barrel.
Turn off the HPA system by turning the bottom-line ASA lever out and away from the grip.

⚠ WARNING

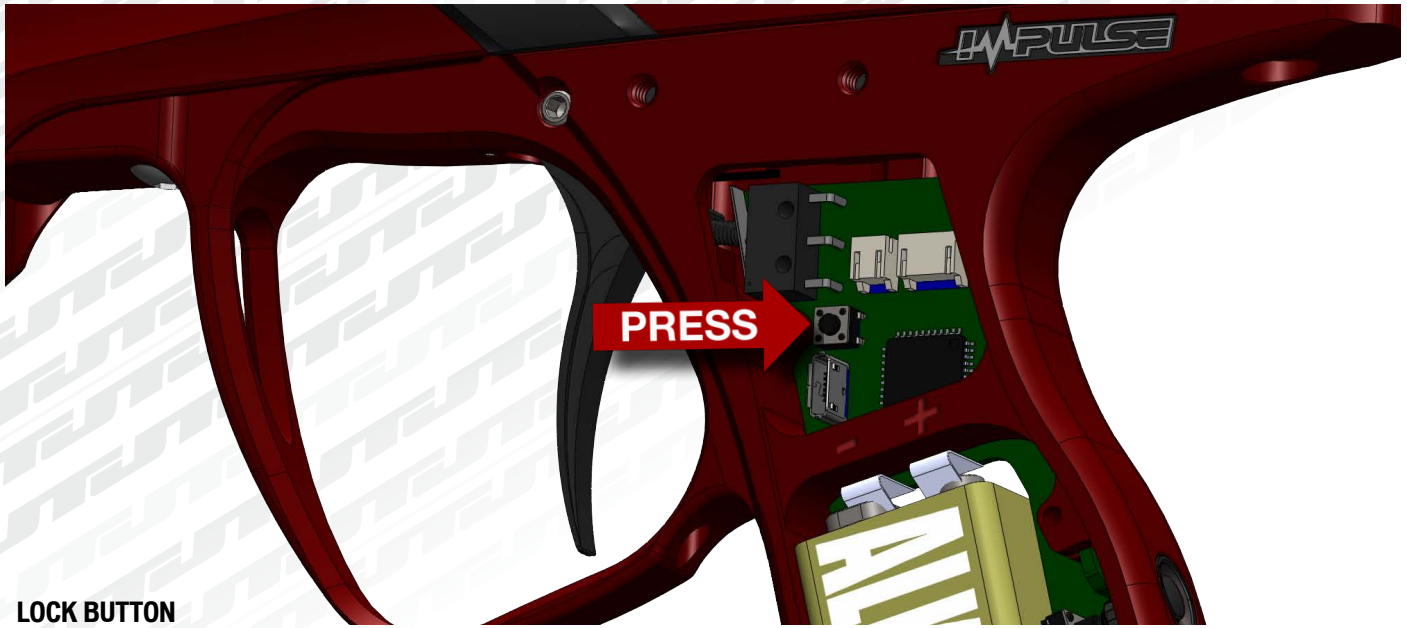
Even after the ASA has been turned off and the HPA system is removed, the valve chamber inside the Impulse may still be charged with enough pressure to fire 2 or more shots.

Continue to dry fire the Impulse in a safe direction until all of the gas pressure inside has been released. The only sound to be heard when pulling the trigger should be the faint click of the solenoid valve inside the grip frame.

Turn off the Impulse.

Unscrew the HPA system from the bottom-line ASA.

PRO TIP: Always unload and de-gas the Impulse before transporting it to or from the field in a vehicle. In addition to being a good safety practice, some states require it by law.



LOCK BUTTON

UNLOCKED

LOCKING/UNLOCKING To comply with paintball field and tournament rules, the Impulse is equipped with a programming lock feature. When the Impulse is locked, the electronic settings which impact firing modes, rate of fire and velocity may not be changed. Because the lock button cannot be accessed without tools, the Impulse complies with all major tournament and scenario rules as well as common paintball field practices.

Impulse lock status can be easily checked by looking at the display screen when the marker is turned on. A padlock symbol appears closed while the marker is locked, and open while it is unlocked. To lock or unlock the Impulse, use a 5/64-inch allen wrench to remove the grip screws and open the left side grip (see Battery Installation). With the marker turned on, momentarily press the lock button, located just below the trigger switch to switch back and forth between locked and unlocked status.

PRO TIP: The programming lock feature isn't just for tournaments. Most commercial paintball fields require that all markers be locked in such a way that their firing modes and any adjustments which can affect velocity (including dwell) cannot be accessed on the field without tools.

PROGRAMMING

CHANGING FIRING MODE

NAVIGATION/SETTING The Impulse uses firing mode based programming. Several different settings may be adjusted for each of the marker's seven firing modes. This allows each firing mode to act as a pre-set for various league rules. For example, Semi-Automatic mode can be set with a low trigger bounce tolerance, 7-minute game clock and no rate of fire cap for one league, while setting PSP mode with a 12 minute timer, more trigger bounce and 12 bps cap for another. Simply switch the firing mode and the rest of the settings adjust with it.

To program electronic settings in the Impulse, first unload and de-gas the marker, then make sure the circuit board is unlocked (see locking/unlocking). Turn the marker on (press and hold power button for one second) while holding the trigger down. Programming mode will be indicated by the disappearance of the battery level, lock and Vision icons.

When in programming mode, the first setting to be displayed is the firing mode. Pressing the trigger cycles through all of the available settings for the currently selected firing mode. To change any setting, momentarily press the power button. This will invert the display screen to dark text and symbols on a light background. At this point, pressing the trigger will cycle through the available choices for the selected setting. Momentarily pressing the power button again chooses the current value for the setting. When programming is complete, press and hold the power button to turn the Impulse off, saving the settings.

PROGRAMMING EXAMPLE After unloading and de-gassing the Impulse and making sure the circuit board is unlocked, enter programming mode by turning the Impulse on while pressing and holding the trigger. Notice the currently selected firing mode and press the power button for a moment so that the screen is back lit and the firing mode can be changed. Pull the trigger multiple times until the firing mode "NXL" is selected. Press the power button momentarily to return the screen to light text on a dark background then pull the trigger as many times as is needed to reach the Timer Engage setting ("TIMER EN"). Press the power button for a moment to change this setting, and pull the trigger changing the setting to "ON." Press the power button momentarily to lock in the setting, then press and hold it to turn off the Impulse. The Impulse has now been changed to the NXL firing mode with the game timer turned on.

PRO TIP: Sometimes a lot of little adjustments can add up to cause problems. Factory reset returns the Impulse to its default settings for most reliable operation. Perform a factory reset by holding back the trigger for five seconds while entering programming mode.

FIREMODE – Fire Mode Menu – The Impulse features 7 firing modes. Additional firing modes may be available through downloadable updates (see Settings>Version).

- **SEMI** – Semi-automatic – This mode fires one shot for each complete pull and release of the trigger. There is no rate of fire cap on this mode.
- **CAP SEMI** – Capped Semi-automatic – This mode fires one shot for each complete pull and release of the trigger, but its maximum rate of fire is limited by the BPS Max and BPS Fine settings.
- **PSP** – Paintball Sports Promotion – Based on the rules used in PSP divisional level competitions, PSP mode fires one shot per pull and release of the trigger. When three trigger pulls are made in rapid succession, PSP mode fires repeatedly and continuously as long as the trigger is pulled and released at least once per second. If the trigger remains in one position (pulled or released) for more than one second, this mode resets and fires one shot per trigger pull until 3 shots are fired in rapid succession.
- **NXL** – National X-Ball League – Based on the rules of the NXL, this mode begins operation like semi-automatic, firing one shot for each complete cycle of the trigger. After three trigger pulls in rapid succession NXL mode begins firing repeatedly and continuously as long as the trigger is held down. If the trigger is released and not pulled for a short time, NXL mode resets and fires one shot per trigger pull until three shots are fired in rapid succession, repeating the process.
- **MILL** – Millennium – Based on the rules of the Millennium series, Millennium mode fires one shot per pull and release of the trigger until the user pulls the trigger at a rate of 5 times per second or faster, at which point the Impulse will fire more than one shot per trigger pull as long as the trigger is pulled repeatedly at a rate of 5 times per second or faster. When the rate of trigger pulls drops below 5 per second, Millennium mode returns to firing only one shot per pull and release of the trigger.
- **TRAINING** – Training mode fires the Impulse with significantly reduced dwell timing so that very little gas is used. When properly configured, Training mode will not provide a sufficient release of gas to fire a paintball, but it will provide a feel and response in the Impulse to practice pulling the trigger at high rates of fire. Training mode should be used with the anti-chop Vision system turned off.
- **RAMPING** –This mode is similar to the league modes in that it fires one shot per trigger pull initially and then engages to add additional shots to deliver more fire power when certain criteria are met. The activation criteria for ramping mode are adjustable, allowing it to be adapted easily to future tournament rules. Kick In, Ramping Rate and Shots To Sustain Ramping settings adjust the activation requirements for Ramping mode.

DWELL – The dwell setting determines the amount of time, in milliseconds, that the Impulse circuit board energizes the coils in the marker's solenoid valve to fire each shot. The ideal dwell setting holds the solenoid valve open long enough for the piston to move forward closing the bolt and completely opening the balanced valve. A dwell time that is too low will result in low velocity or incomplete cycling of the marker. A dwell time that is too high will continue to press the piston into the valve and hold it open releasing more gas even after the paintball has left the barrel, resulting in reduced gas efficiency. Shorter dwell times have the advantage of returning the piston and bolt to their rest state faster, for higher potential rates of fire. Dwell may be adjusted from 4 to 25 and has a default value of 12 milliseconds.

TR DWELL – Training Dwell – The training dwell setting is used when the Impulse is in training firing mode. Training dwell should be set to the lowest value that will create a noticeable puff of gas when dry-firing the Impulse.

EYE MODE – The Vision system in the Impulse may be configured to run in one of two different modes:

- **FORCED** – The forced Vision mode only fires if the Vision system detects a paintball in the chamber. This is the default Vision mode.
- **DELAYED** – The Delayed Vision mode will fire a shot if a paintball falls into the breech within a half-second of the time the trigger was pulled.

LOAD DLY – Loader Delay – The Loader Delay setting specifies the amount of time, in milliseconds, that the Impulse must wait to fire after the Vision system has detected a paintball. This delay allows a small amount of time for the paintball to settle into position. It is adjustable from 0 to 20 milliseconds and has a default value of 8. Loader Delay typically needs to be increased when using agitating or non-electronic loaders that do not force the ball into the chamber quickly.

BPS MAX – Balls Per Second Maximum – This setting is the whole number value of the Impulse's rate of fire cap. It may be set from 4 to 25 balls per second, and is set to 12 by default. BPS MAX is added to BPS FINE to create the cap. For example, with BPS MAX set at 12, and BPS FINE set at 5, the Impulse will be capped to fire at a maximum of 12.5 balls per second.

BPS FINE – Balls Per Second Fine – This setting is a fine-tuning of the Impulse's rate of fire cap. Adjustable from 0 to 9, with a default setting of 5, this setting adds 10ths of a ball per second to the rate of fire cap (see BPS MAX).

BPS BYP – Balls Per Second Bypass. This setting places an additional cap on the Impulse's maximum rate of fire when the Vision system is bypassed, slowing the marker down to reduce the risk of chopping a paintball while firing "blind." Balls Per Second Bypass has a default value of 10bps and is adjustable between 6 and 15 balls per second.

KICK IN – Ramping Kick In – This setting applies only to the Ramping firing mode. Adjustable between 3 and 10, with a default value of 3, this setting determines how many shots must be fired at the Ramping Rate in order to begin firing more than one shot per trigger pull.

RATE - Ramping Rate - This setting applies only to the Ramping firing mode. This is the rate at which the trigger must be pulled before the Ramping mode begins adding shots to ramp up the rate of fire beyond one shot per trigger pull. Ramping rate ranges between values of 3 and 10 trigger pulls per second with a default value of five.

SUSTAIN – Shots To Sustain Ramping – This setting applies only to the Ramping firing mode. Shots To Sustain determines how frequently the trigger must be pulled to maintain ramping once it has started. Ramping mode will continue to fire multiple shots per trigger pull until the rate of trigger pulls drops below the Shots To Sustain Ramping value. Shots To Sustain Ramping is adjustable between 3 and 10 trigger pulls per second, with a default value of 5.

TRIGG DB – Trigger Debounce – When the Impulse trigger is pulled, the trigger switch inside the grip frame will make a series of rapid electrical pulse, called "switch noise" at the beginning of its signal to the circuit board's microprocessor. Debounce functions in the Impulse software are used to filter out this switch noise so that it is not misinterpreted as multiple trigger pulls. Signals from the trigger switch which last longer than the Trigger Debounce value (in milliseconds) are considered to be valid trigger pulls. The Trigger Debounce setting can be adjusted from 1 to 25 milliseconds, with a default value of 7 milliseconds.

MECH DB – Mechanical Debounce – When depending on how the various aspects of the Impulse are configured, it can be possible for vibration from the firing cycle to bounce the trigger against the trigger switch and create a runaway firing condition. The Impulse software guards against this with its Mechanical Debounce function. Due to the low recoil of the Impulse, mechanical debounce is not usually needed, so this setting is normaly set at zero (off). Mechanical Debounce may be activated by setting its value to 1 (lowest), 10 (highest) or anywhere in-between.

FSDO – First Shot Drop-Off Compensation – When a paintball marker is at rest between shots, there can be a tendency of the seals on moving parts to build up friction. This can result in the first shot fired being at a slightly lower velocity than those following immediately after. First Shot Drop-Off Compensation counter-acts this effect by increasing the dwell time of only the first shot after the marker has been at rest. The default FSDO setting is 20 milliseconds, and it is adjustable between 0 and 25 milliseconds.

FSDO TMR – First Shot Drop-Off Compensation Timer – This setting adjusts the amount of time the Impulse must be at rest before the First Shot Drop-Off Compensation is used. The FSDO Timer is adjustable between 20 and 120 seconds, with a default value of 6.

AUTO SD – Automatic Shutdown – Using the Impulse can be so fun and exhilarating that it can be easy to forget to turn it off. Automatic Shutdown turns off the Impulse to protect its battery if it is left on, but not being used. Automatic Shutdown can be turned off (value of 0) or set between 1 and 30 minutes. The default Automatic Shutdown time is 30 minutes.

DISP BRT – Display Brightness – When adjustments are being made to the Impulse, its display screen will illuminate at full brightness. After a while of rest it will reduce its brightness to conserve battery power. This setting determines how dim the display becomes. A value of 1 is the dimmest, while 8 is the brightest (no dimming). The default value for this setting is 1.

TIMER EN – Game Timer Engage – This setting turns the game timer on or off.

TIMER - Game Timer – This setting is the number of minutes that will be on the game timer when the Impulse is turned on. The timer will begin counting down after the first shot is fired. The game timer is adjustable between 1 and 60 minutes, and its default value is 7 minutes.

VERSION – This value indicates the version number of the installed Impulse software. It is useful for troubleshooting and making sure the Impulse software is upgraded to the current release version.

BARREL

BOLT

BARREL The Impulse barrel may be removed from the body by simply unscrewing it. This will provide fast and easy access to both ends of the barrel to allow cleaning with a pull-through squeegee.

BOLT REMOVAL The impulse bolt serves two functions - it pushes each paintball through the breech and into the barrel, and it seals the breech, providing a path for gas to flow from the balanced firing valve to the barrel where the gas expands to propel the paintball.

The Impulse bolt may be removed while the marker is still charged with gas. Like the barrel though, paintball goggles must be worn while handling the marker if it is charged. Before removing the barrel, remove the hopper, or at least turn it off before removing the bolt.

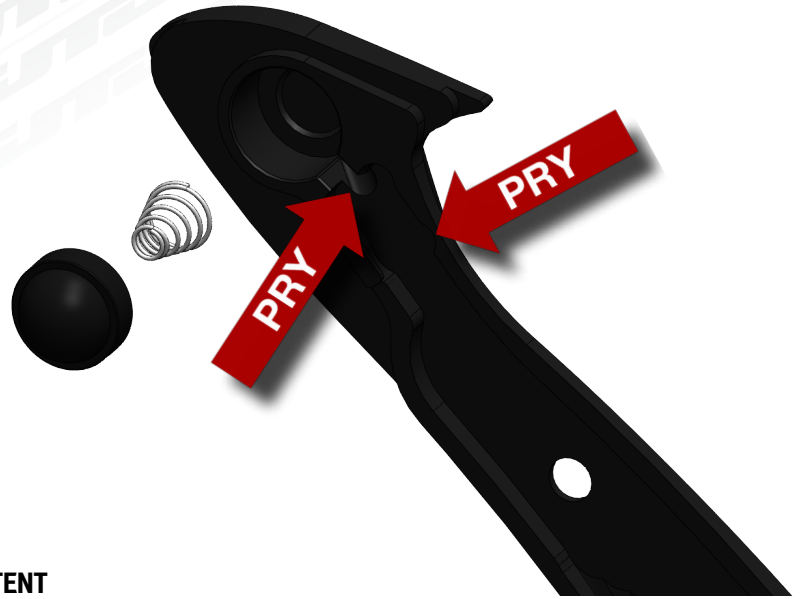
Lift up on the link pin to disconnect the bolt from the piston, and slide the bolt out the back of the Impulse. If the barrel is still attached, this will allow a pull-through squeegee to be used on both the breech and the bolt, in one pass. It will also allow for more thorough cleaning with a stick squeegee or fleece squeegee than simply swabbing through the barrel.

When the bolt is out, inspect its o-rings and replace any that are damaged or torn. Do not lubricate the bolt or bolt o-rings. Exposure to oil or grease can swell these parts, increasing friction.

When re-installing the bolt, take care to make sure the link pin is aligned with the piston before pressing it down to lock the bolt in place. When the Impulse is charged with gas, the piston will be in the rear position. If the Impulse is not charged, locating the piston position is important to be sure that the link pin locks correctly into its groove in the piston.

PRO TIP: Nothing will get in the way of your game more than a paintball broken in the breech or barrel. Until it is cleaned, you will face a drop in accuracy and often more breaks. When using old or poorly stored paintballs, a folding squeegee can be your best friend on the field.

VISION



BALL DETENT

VISION COVERS Vision covers on either side of the Impulse body protect the Vision wiring as well as the Vision sensor and emitter and the ball detents. These covers may be removed off the field while the Impulse is unloaded and de-gassed, by using a 1/16-inch allen wrench to remove each Vision cover screw, and then lift the Vision cover to expose the Vision components and detents. Vision Components and detents will typically stay in the Vision cover and may be pried out with a small allen wrench or o-ring pick through the groves noted above. When re-installing the Vision covers, take care not to cross-thread their screws, and make sure the Vision wires are in place. If the Vision wires are pinched between the cover and body, do not tighten down the Vision cover screws - remove the cover, align the wires, and reinstall.

VISION SENSOR The Vision sensor array consists of a light emitting diode and a light detector, placed on opposite sides of the breech. The LED shines a beam of invisible infrared light across the breech which is sensed by the detector. When the beam is blocked by a paintball, the Vision software in the circuit board knows that the breech has been loaded. These may be lifted out of their pockets in the body and cleaned gently with a non-abrasive cloth. Take care not to scratch the surfaces of either component. If the Vision sensors or their wiring harness need to be replaced, the grip frame must be removed to provide access. Do not bend the Vision wiring sharply. Once the sensor components and their openings to the breech have been cleaned, re-seat them in their pockets.

BALL DETENTS A pair of spring-loaded piston style ball detents sit on either side of the breech and prevent the chambered paintball from rolling forward into the barrel until it is fired. If either of the detents is worn, damaged, or blocked with debris, double-feeding or broken paintballs may result. After cleaning, reinstall the detents taking care not to bend or damage their springs.

Once reinstalled, inspect the detents to make sure they protrude into the breech. Press each detent into the side of the breech with a fingertip to be sure it collapses smoothly and pops immediately back out when released. If a newly installed detent does not move freely, check for any burrs or flash along its sides, and if necessary use a file to remove.

PRO TIP: The Vision sensors and ball detents are important to the Impulse's ability to fire fast and reliably. If they are exposed to broken paint, they should be cleaned as soon as practical, even if not performance problems are noticed.

PRE-TRAVEL

POST-TRAVEL

ACTIVATION POINT

RESISTANCE

4-POINT ADJUSTMENT The Impulse trigger features four adjustment points, allowing its feel to be customized to a variety of tastes. From the factory, the trigger is adjusted for maximum reliable operation. Fine tuning will allow you to get the best possible performance out of your Impulse. All adjustments are made with a .050-inch allen wrench.

PRE-TRAVEL This adjustment determines the trigger's position when it is at rest. The pre-travel adjustment screw is accessed by sliding an allen wrench up through a hole in the base of the trigger guard and then into an opening in the grip frame. Turning the screw inward adjusts the trigger back, shortening the trigger pull. It is important that the trigger be allowed to swing far enough forward that it consistently resets after each shot, or the Impulse may fail to fire.

POST-TRAVEL This adjustment determines how far back the trigger may be pulled. The post-travel adjustment screw is located in the top of the trigger area of the grip frame, just forward of the front of the trigger cut-out. Turning this screw inward shortens the trigger pull. It is important that the trigger be adjusted so that it comes to a stop against this screw. Allowing the trigger to be stopped by impacting the circuit board's trigger switch instead may result in damage to the circuit board, especially if the trigger is pulled aggressively.

ACTIVATION POINT Once the length of the trigger pull has been adjusted with its start and stop points, the activation point adjustment may be modified to change the point during the trigger pull at which this Impulse fires. This adjustment screw is located in the center of the trigger's face. Turning the screw inward moves the activation point closer to the start of the trigger pull. It is important to make sure that the combination of the post-travel adjustment and activation point adjustment allow the trigger to be stopped by the post-travel screw and not the activation point screw pressing against the trigger switch, or non-warranty damage to the trigger switch and or circuit board may occur.

RESISTANCE The trigger resistance adjustment consists of a screw located in the top, front of the trigger. Turning this screw inward moves it closer to the trigger return magnet, increasing trigger resistance and improving trigger reset speed.

PRO TIP: The shortest and lightest trigger pull isn't always the best trigger pull. Firing quickly requires a trigger pull that is long enough to be easily felt and has enough resistance that the trigger resets quickly for the next shot.

SECONDARY REGULATOR

VERTICAL REGULATOR

BALANCE The velocity and maximum firing rate of the Impulse depend on a balance of three settings. The dwell setting determines how long the Impulse will power its solenoid valve to drive the firing piston into the pressure balanced poppet valve. The pressure setting of the vertical regulator will determine the pressure of the gas used to fire the paintball. The pressure setting of the secondary regulator will determine the force behind the firing piston when it strikes the poppet valve.

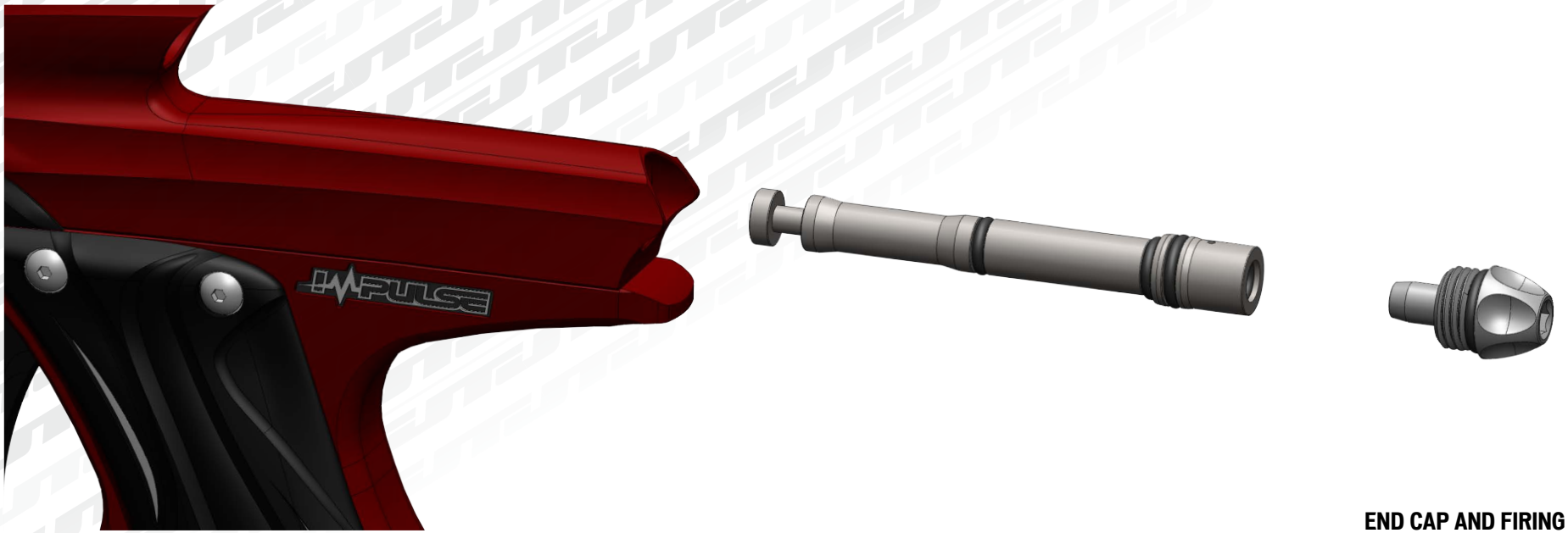
The relationship of these three settings all affect how hard and how quickly the bolt and firing piston move, as well as the force and length of the burst of gas which fires the paintball through the barrel. These have a direct effect on the feel, sound signature, possible rates of fire and efficiency of the Impulse.

If the secondary regulator is turned up (clockwise) too high, the Impulse will not shoot as smoothly. If the secondary regulator is turned down too low, velocity consistency will suffer. For best all-around performance, JT Paintball recommends the following initial set-up procedure for balancing, dwell and pressure settings. Further adjustments to personal taste may be made from there. If additional adjustments make the marker feel unbalanced when firing or cause inconsistency, performing the pressure balancing procedure will restore smooth, reliable operation.

With the Impulse unloaded and de-gassed, use a 1/8-inch allen wrench to turn the adjustment screw in the secondary regulator clockwise until it backs out flush with the front edge of the regulator's body. Set the Impulse to fire in semi-automatic mode (see Programming) with a dwell value of 12 milliseconds (default dwell value).

While wearing goggles, and in an area where it is safe to fire a paintball marker (such as the chronograph range at a paintball field) use a 5/32-inch-inch allen wrench to adjust the vertical regulator as needed until the Impulse fires paintballs over a chronograph consistently at 300 feet per second. Next, turn the secondary regulator's setting inward (counter-clockwise) and test fire and adjust until velocity decreases to 285 to 290 fps.

Further adjustment for a different desired velocity may be made by adjusting the vertical regulator. For safety reasons never adjust the Impulse to fire at greater than 300 feet per second.



END CAP AND FIRING PISTON

END CAP The body end cap provides a rear stopping point for the firing piston and protects the piston chamber from debris. After unloading and de-gassing the Impulse, unscrew the end cap by hand to remove. Inspect the end cap o-ring and replace if damaged. Do not lubricate this o-ring, it provides friction to keep the end cap in place. When reinstalling the end cap, take care not to cross-thread it into the body.

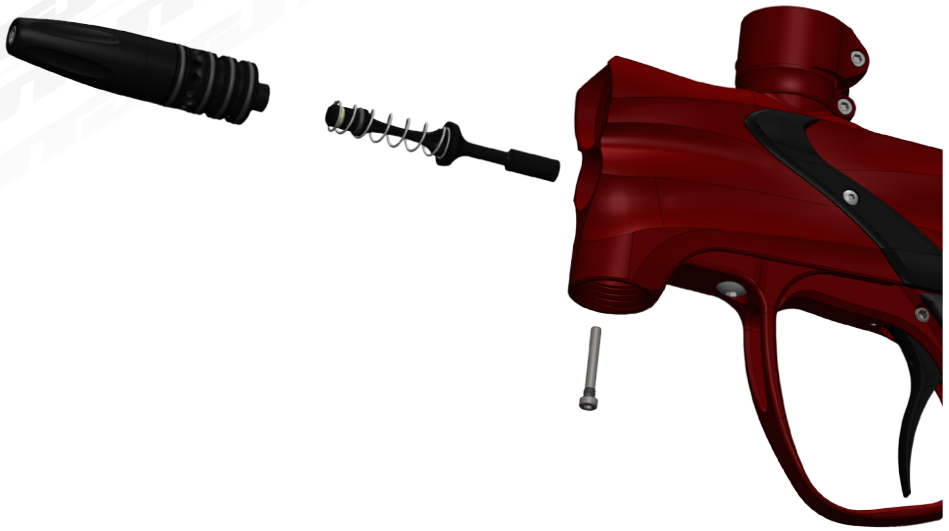
FIRING PISTON The firing piston is the primary moving part that drives the Impulse firing mechanism. Reduced pressure gas drives the piston forward or back as needed to fire the marker. When the Impulse is charged, the firing piston is held in its rear position. When the Impulse is fired gas flow controlled by the solenoid valve drives the firing piston forward. When this happens, the link pin which is locked into the firing piston drives the bolt forward chambering a paintball and sealing the breech before the firing piston presses on the balanced firing valve, opening it to release the gas which will fire the shot.

With the bolt and body end cap removed, the firing piston should slide out the back of the Impulse body, simply by tipping the marker up. If the firing piston does not slide out easily, this is a sign of contamination with paint or debris or over-lubrication. In these cases the piston may need to be pushed out by using a soft tool like a wooden chopstick to push at it through the bolt link pin slot. Do not use a hard tool like a screwdriver as this may scratch and damage the interior of the firing piston chamber.

Clean the firing piston with a soft cloth and inspect its o-rings for damage, replace if necessary. Also inspect the firing piston bumper, located in a hollow in the back of the piston. If damaged or missing the bumper must be replaced. Firing the Impulse without the bumper can cause permanent damage to the end cap. Lubricate the firing piston's o-rings with low temperature paintball grease and reinstall it into the body smooth end first.

PRO TIP: Hard dives into bunkers and competing in sand or mud can eventually deposit debris around the firing piston, resulting in inconsistent velocity. The firing piston and piston chamber should be cleaned after a day's use or a dive into lose dirt or mud.

VERTICAL REGULATOR



SECONDARY REGULATOR

VERTICAL REGULATOR The vertical regulator is the primary regulator for the Impulse, setting the pressure of the air used to launch paintballs from the barrel. Once the Impulse has been unloaded and de-gassed, removing the regulator is a simple task. Press the release ring on the macroline hose fitting at the bottom of the regulator and remove the hose. The regulator may then be unscrewed from its vertical adapter.

When the vertical regulator is removed, also clean and inspect the filter screen which protects the Impulse's internal components from dust or rust which may accompany "dirty" air fills. Be sure to lubricate the vertical regulator's top o-ring with Dow-33 paintball marker grease and fully seat the filter screen before reinstalling the vertical regulator.

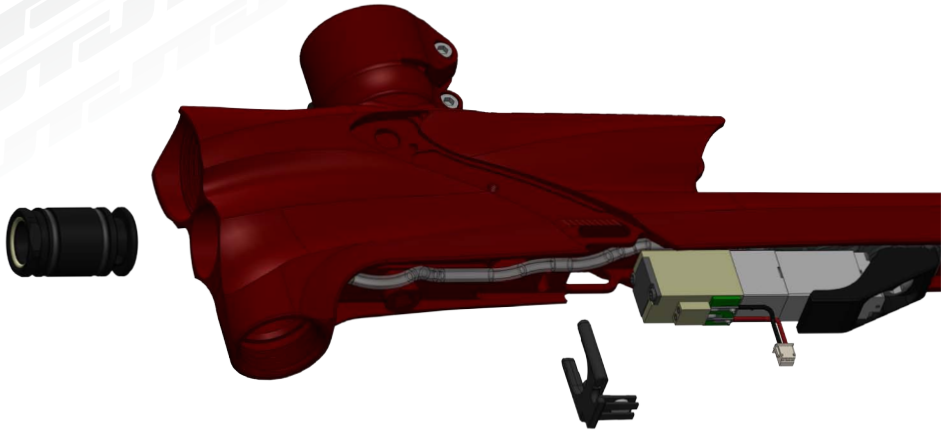
SECONDARY REGULATOR The secondary regulator is fed by low pressure air from the vertical regulator and reduces its pressure even further, to provide the lower pressure gas used to move the firing piston back and forth. The secondary regulator may be removed for cleaning or to access the Impulse balanced firing valve.

With the vertical regulator removed, unscrew the regulator lock screw from the vertical adapter. Gently twisting and pulling the secondary regulator will remove it from the front of the Impulse body. This will also provide access to the firing valve core and valve spring.

Carefully clean and inspect all parts before reassembly, replacing any damaged or torn seals, or the valve piston if it shows signs of wear. Upon re-assembly, be sure the secondary regulator is properly seated before reinstalling the regulator lock screw. If the regulator lock screw does not turn easily into its fully seated position, do not force it. Reposition the secondary regulator to make sure its retention slot is properly lined up with the lock screw.

PRO TIP: Old-school paintballers will think of the second stage as an LPR, or Low Pressure Regulator, but the vertical regulator already drops the air pressure to low levels, thanks to the Impulse's balanced firing valve.

GRIP FRAME



VALVE BODY

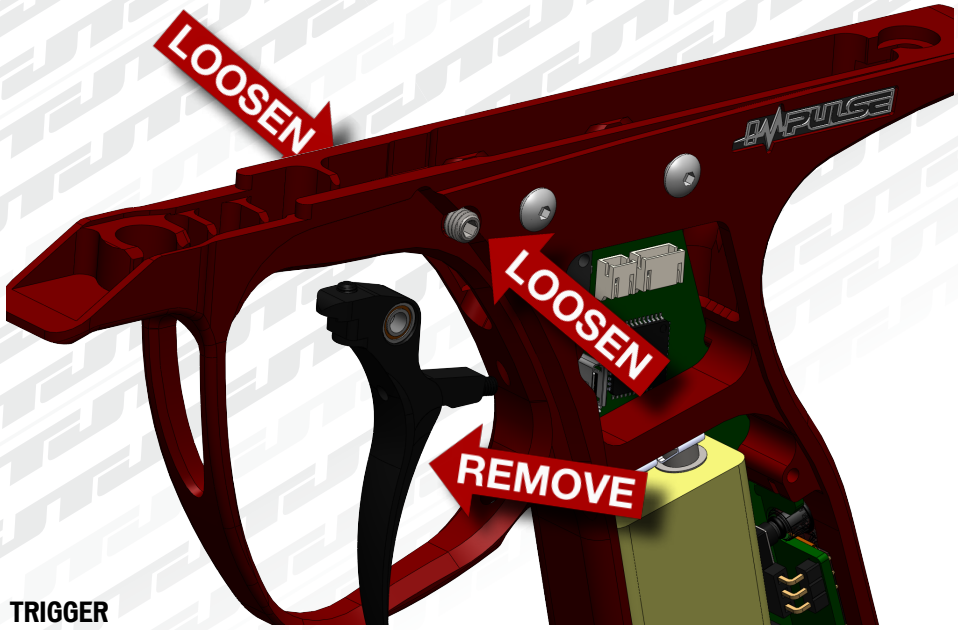
GRIP FRAME It is necessary to remove the Impulse grip frame to remove the trigger, Vision wiring harness, solenoid valve or Impulse balanced valve body. Unnecessary removal of the grip frame should be avoided. To remove the grip frame from an unloaded and de-gassed Impulse, first unscrew the vertical regulator or remove the bottom-line hose. Next, remove the rubber grip, then unplug the solenoid valve and Vision wiring harnesses from the circuit board. Remove both grip frame screws and slide the grip away from the body. Be careful not to snag the wiring connections on the frame and strain the wires.

When reassembling the grip to the body, be sure the wires are tucked correctly in place. Also be sure that the wires and internal hose are not pinched between the frame and the body or solenoid valve. If the grip frame does not fit flush to the body, it is probably due to a pinched wire, hose or both. Do not over-tighten the grip screws to force it. Back the grip frame out and reposition the wires.

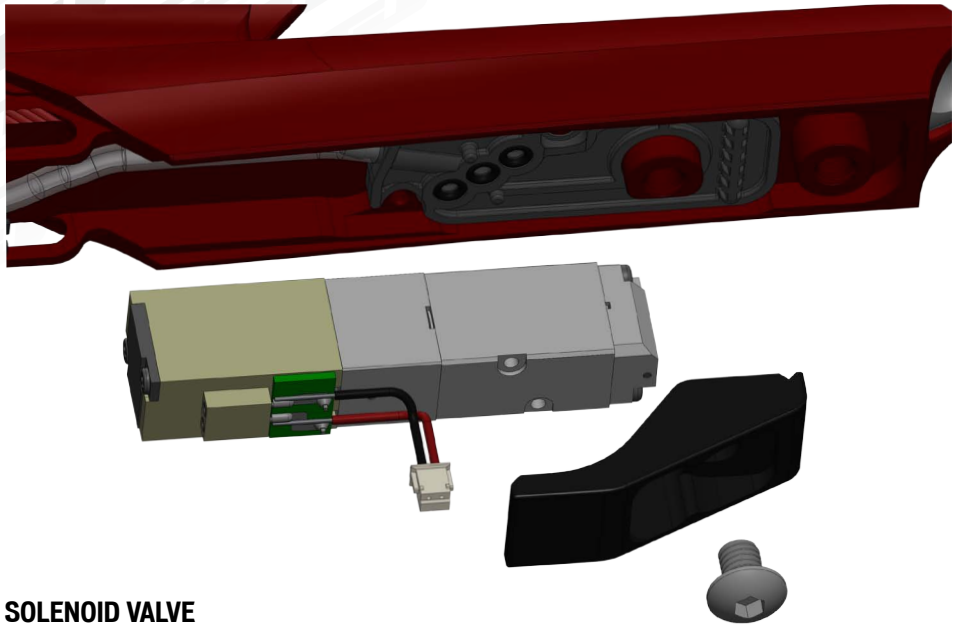
VALVE BODY In normal operation, there should rarely if ever be a need to remove the balanced firing valve body. If this becomes necessary, first remove the grip frame and regulators. Slide the solenoid valve supply hose out of its notch in the valve retainer clip and pull the valve retainer clip out from the bottom of the body. Note that the retainer clip also holds the trigger return magnet. With the retainer clip removed, the valve body may be slid out the front of the Impulse body. Do not use a hard tool like a screwdriver to push the valve body, as this may scratch and damage the smooth surfaces inside the Impulse body, causing a leak. When the valve is out, inspect its o-rings and replace any that are damaged. Lightly lubricate the o-rings with Dow-33 based paintball marker grease prior to reassembly.

When reassembling, the end of the valve body with wrench flats faces the front of the Impulse. Make sure the valve body is lined up properly with the Impulse body. A small hole in the bottom of the valve body must be lined up with a locator pin in the middle of the U shaped valve retainer clip. If the valve is not lined up correctly, the retainer clip will not slide all the way into the body. Once the valve retainer clip is reinstalled be sure to wedge the solenoid valve supply hose back into the retainer clip's notch so that it does not become pinched between the body and grip frame.

PRO TIP: A pressure balanced firing valve is the key to the Impulse's smooth firing cycle. Opposing piston faces balance atmospheric pressure against the firing gas pressure for a valve that can be opened with very little force by a light firing piston. Without a heavy ram or hammer to shake the Impulse off target, it shoots smooth as silk.



TRIGGER



SOLENOID VALVE

TRIGGER Aftermarket triggers are a common customization accessory. To change out the Impulse trigger, first remove the grip frame, Next, use a 3/32-inch allen wrench to loosen the two trigger-pivot screws on either side of the grip frame. The trigger pivot screws do not need to be removed, just backed out far enough that they release the trigger. Lower and rotate the trigger out the out grip frame.

When installing a new trigger, be sure it is designed for the JT Impulse. Triggers designed for earlier generation Impulse markers are not compatible. Screw the trigger mount screws in evenly from each side. The screws should just be tight enough to hold the trigger securely in place. Do not overtighten the trigger pivot screws or binding of the trigger bearings may result.

See the trigger adjustment section of this manual for proper adjustment of a new trigger. Incorrect adjustment may result in damage to the Impulse circuit board.

SOLENOID VALVE As with the trigger, the grip frame must be removed to replace the Impulse solenoid valve. Generally, removal of the solenoid valve should be avoided except when necessary for replacement. To remove the solenoid valve, use a 1/8-inch allen wrench to unscrew the solenoid valve bracket screw and lift away the solenoid valve bracket.

Three small o-rings rest in grooved openings in the manifold plate, creating a seal between it and the solenoid valve. Two similar o-rings seal the plate to the body. These o-rings must be clean and undamaged - if they are not, they should be replaced. Lubrication of these o-rings is not necessary, but a very thin bit of Dow-33 paintball marker grease may be used to help them stay in their slots during re-assembly. Take extreme care here, as any excess grease can clog and damage the solenoid valve. A new solenoid valve is installed by pressing it up against the Impulse body, then locking it in place with the solenoid valve bracket and bracket screw. The hose connecting the manifold plate to the secondary regulator output is a single-use hose. If it is removed from the brass barb at the front of the body, or the barb on the manifold plate it will have stretched and must be replaced. It is very likely to leak if re-used.

PRO TIP: Old school paintballers will typically refer to the solenoid valve simply as a solenoid, but there is a difference. A solenoid uses electromagnetic energy to provide a pushing or pulling force. A solenoid valve contains a small solenoid which opens or closes a valve that controls gas flow. Low-end electronic grip markers use solenoids. Tournament level electropneumatic markers feature solenoid valves.

IMPULSE WILL NOT TURN ON:

- Test using a brand new alkaline 9v battery.
- Open the rubber grip, as when changing the battery, and inspect to make sure no debris is preventing the power button from pressing the power switch on the Impulse circuit board.

BREAKING PAINT:

- Paint to barrel match is wrong. The paint you are using has absorbed moisture and grown too large for the barrel you are shooting it through.
- Ball Detents are damaged or missing. See manual section on ball detents. Inspect and replace detents if damaged or missing.
- Paint is too low quality, improperly shipped, stored or too brittle. Switch to fresh JT or Empire paintballs.
- Turn on the Vision anti-chop system.
- Check the Impulse battery. It may be low, causing incomplete cycling.
- Loader may not be keeping up. Check loader batteries or use a faster loader.

IMPULSE TURNS ON BUT WILL NOT FIRE:

- Test using a brand new alkaline 9v battery.
- Make sure the trigger adjustments allow the trigger to activate the trigger switch when pulled, and reset when released.
- Make sure the bolt pin is correctly seated in the firing piston.
- Clean the bolt and breech.
- Reset the dwell setting to default with a factory reset.
- Increase the secondary regulator pressure.

AIR LEAKS DOWN THE BARREL WHEN GASSING UP THE IMPULSE:

- The rear face of the firing valve core is dirty or damaged. See the regulator removal section of this manual, clean and inspect the firing valve core, replace if damaged.
- Make sure valve spring is installed correctly.

IMPULSE: FIRES, BUT VELOCITY DROPS UNDER RAPID FIRE:

- Make sure the Impulse battery is fully charged.
- Increase the secondary regulator pressure.
- If problem persists, clean and inspect regulators.

REGULATOR LEAK OR CLIMB IN PRESSURE:

- Clean both regulators, inspect, and if necessary replace their piston seats.

LEAK IN THE GRIP FRAME, NEAR THE REGULATORS:

- Clean and inspect both regulators.
- Inspect and replace any o-rings that show signs of damage.

LEAK BETWEEN GRIP FRAME AND BODY:

- Inspect and if damaged replace the firing piston o-rings.
- If leak continues, inspect and if damaged replace the solenoid valve o-rings.

LEAK FROM FRONT OF MARKER

- Inspect, lubricate, and if damaged, replace the front o-ring on the secondary regulator.

THE IMPULSE HAS FIRST SHOT DROP OFF (FSDO)

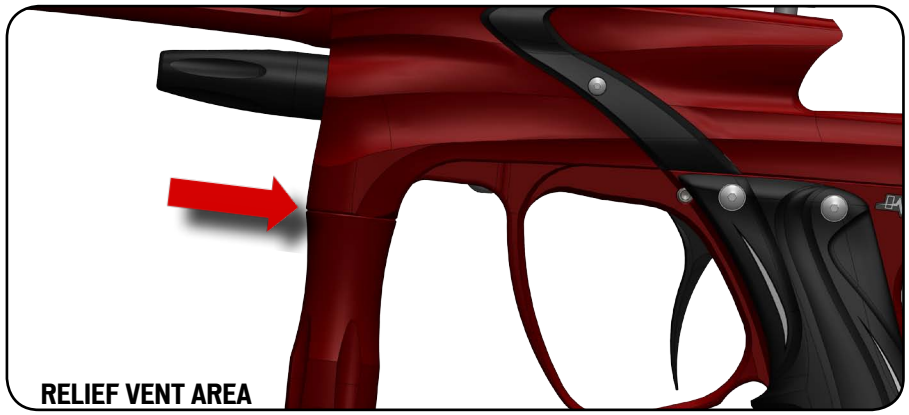
- Clean, lubricate and inspect the bolt, firing piston and firing valve core.
- Increase the second-stage regulator pressure.
- Reset circuit board to factory default settings.
- Increase the FSDO setting value.

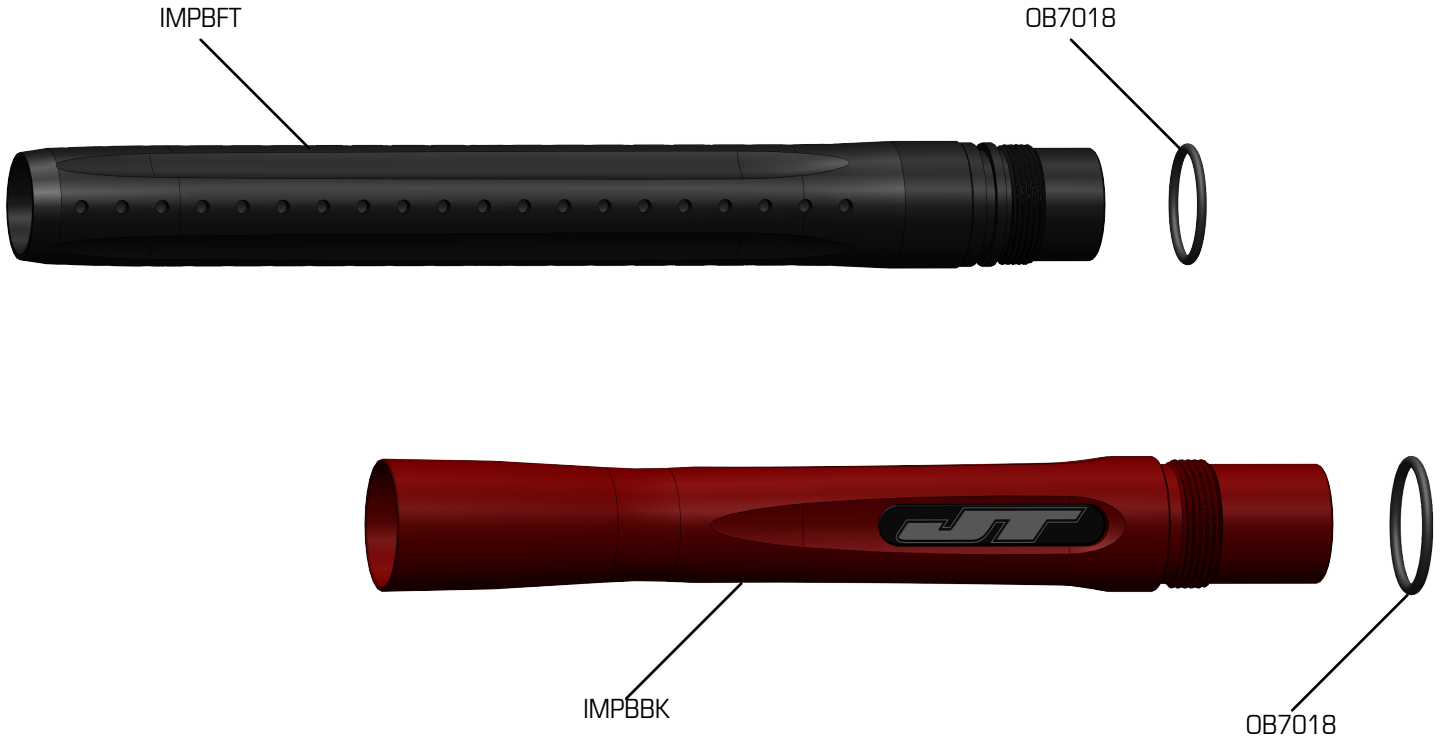
TRIGGER IS STUCK AND WILL NOT MOVE FREELY:

- Make sure the trigger mount screws have not been overtightened. Loosen them slightly.
- Remove the grip frame and remove the trigger. Clean any debris that may be impeding trigger movement.

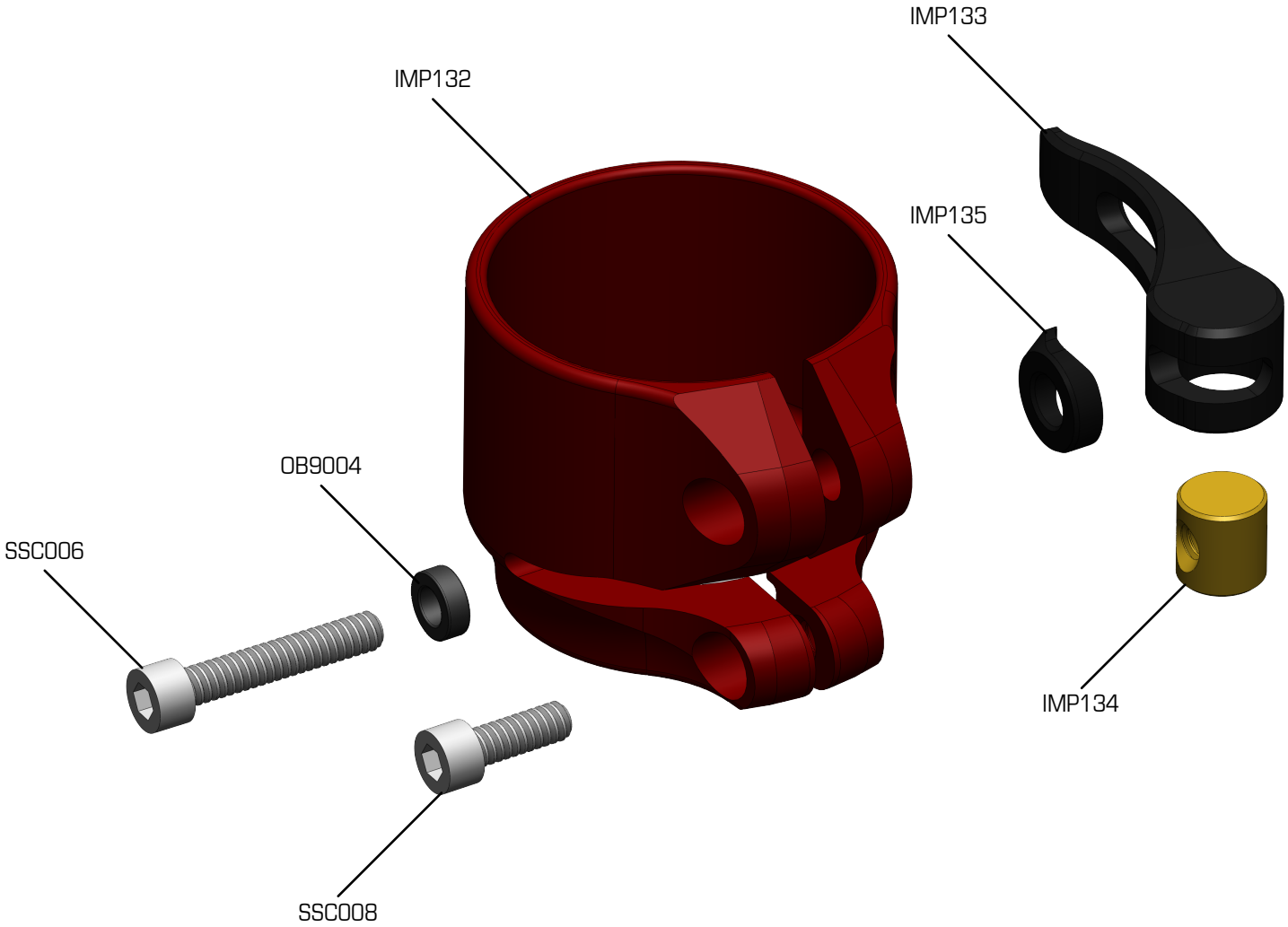
THE IMPULSE LEAKS FROM TOP OF VERTICAL REGULATOR:

- The pressure setting of the vertical regulator may be too high, resulting in excess pressure being vented from the pressure relief valve to protect the solenoid valve. Reduce the pressure setting as when reducing velocity.
- Check the ASA o-ring at the top of the vertical regulator. Replace if necessary.
- The pressure relief valve may be leaking. See a qualified JT service center for assistance in repairing the vertical regulator.

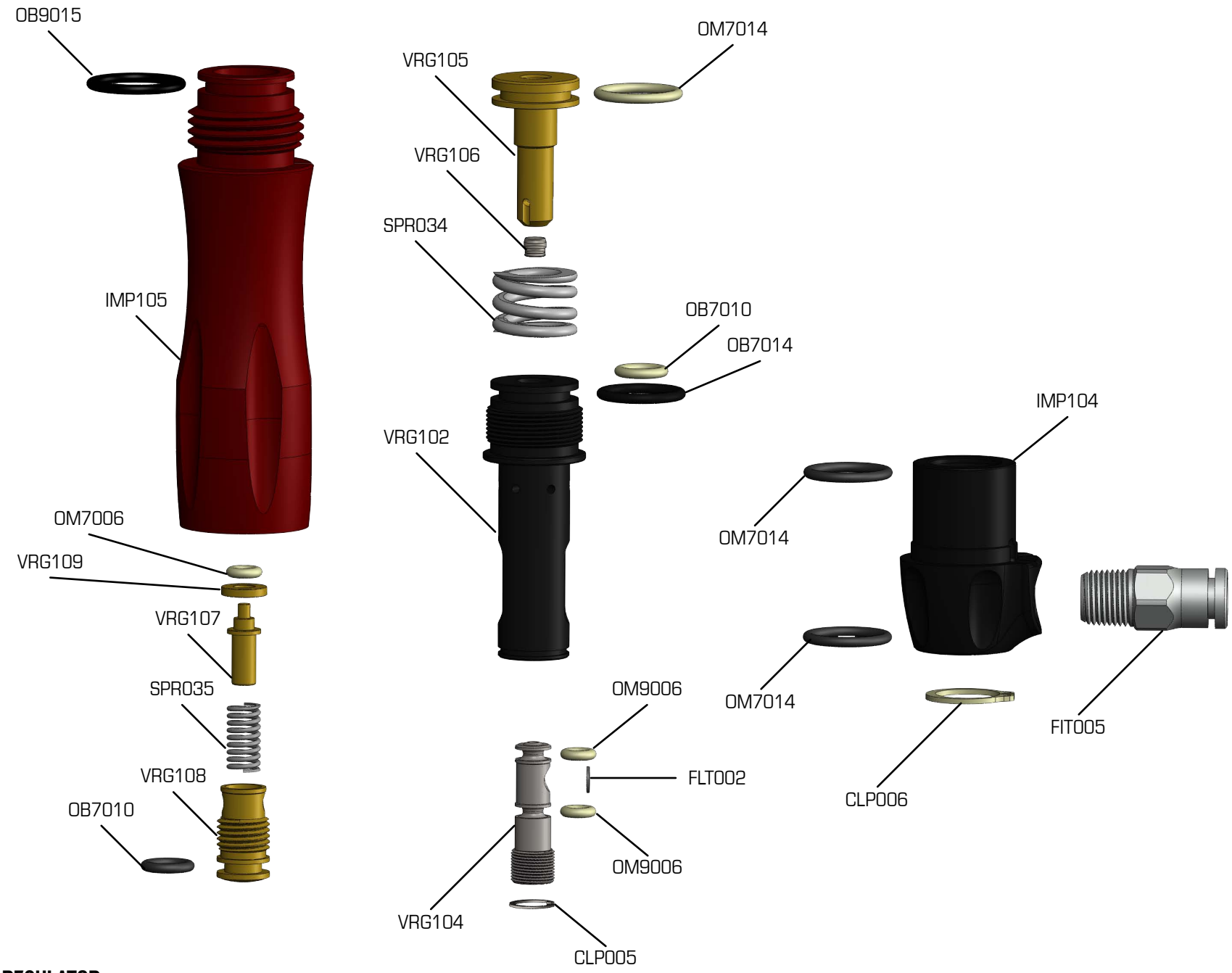




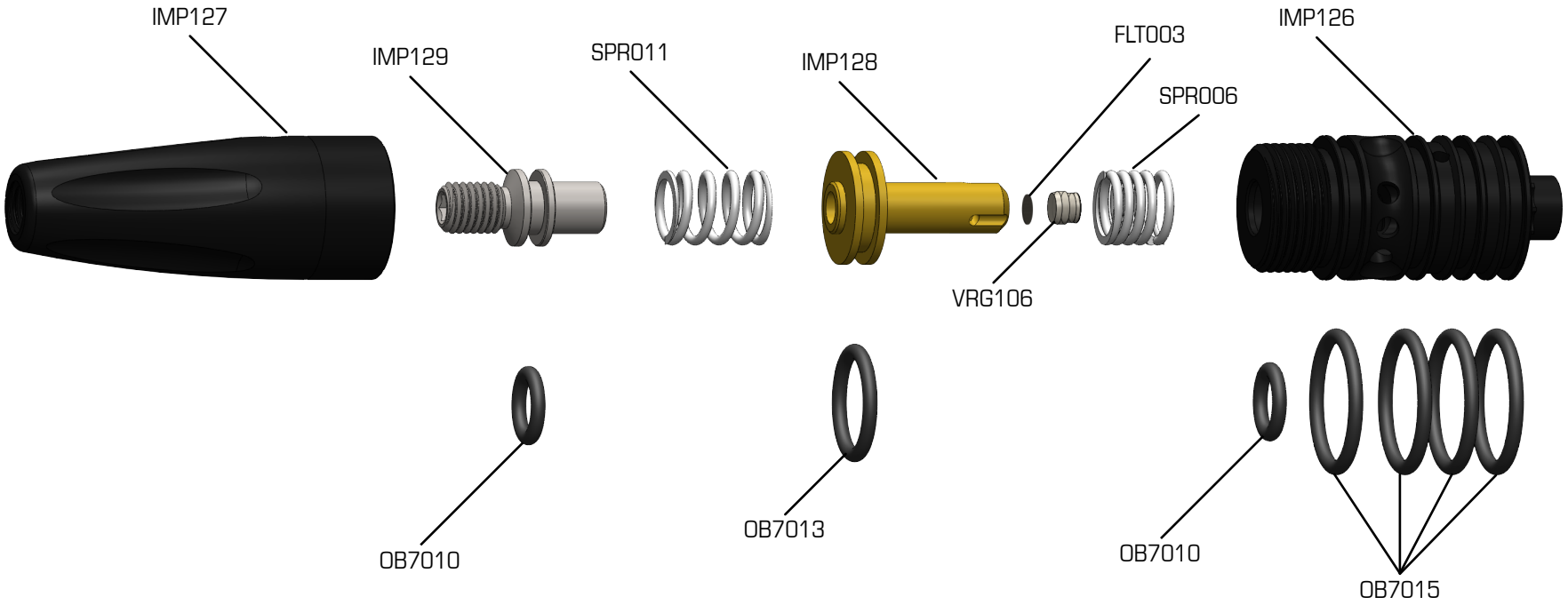
BARREL



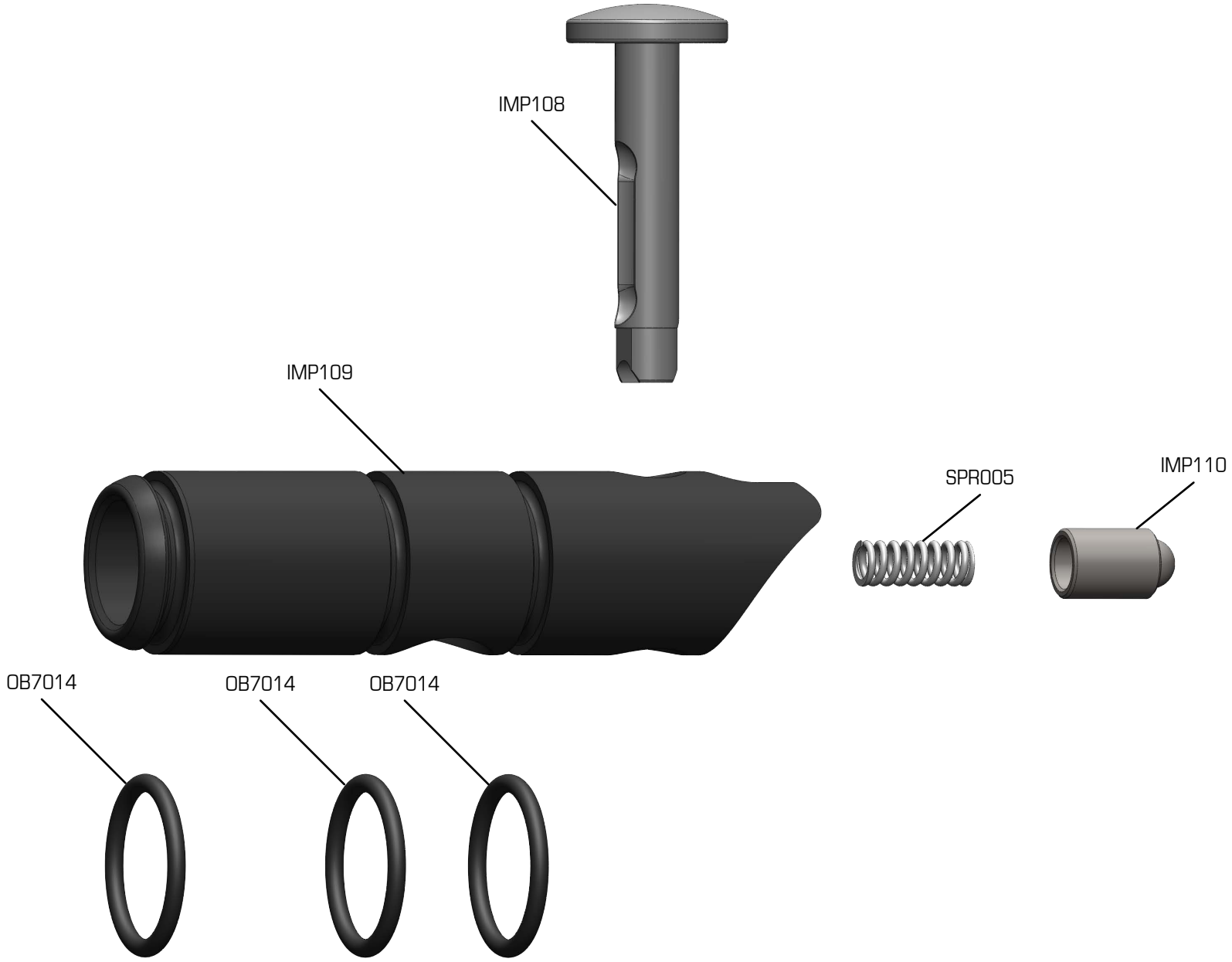
CLAMPING FEEDNECK



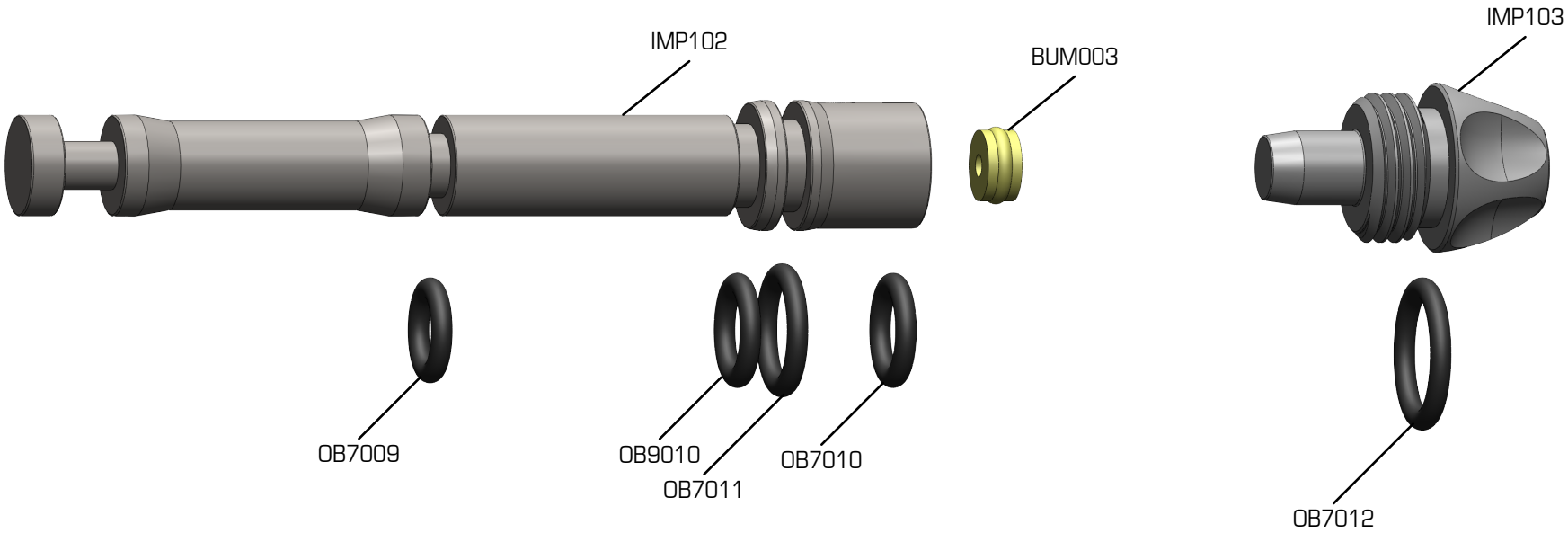
VERTICAL REGULATOR



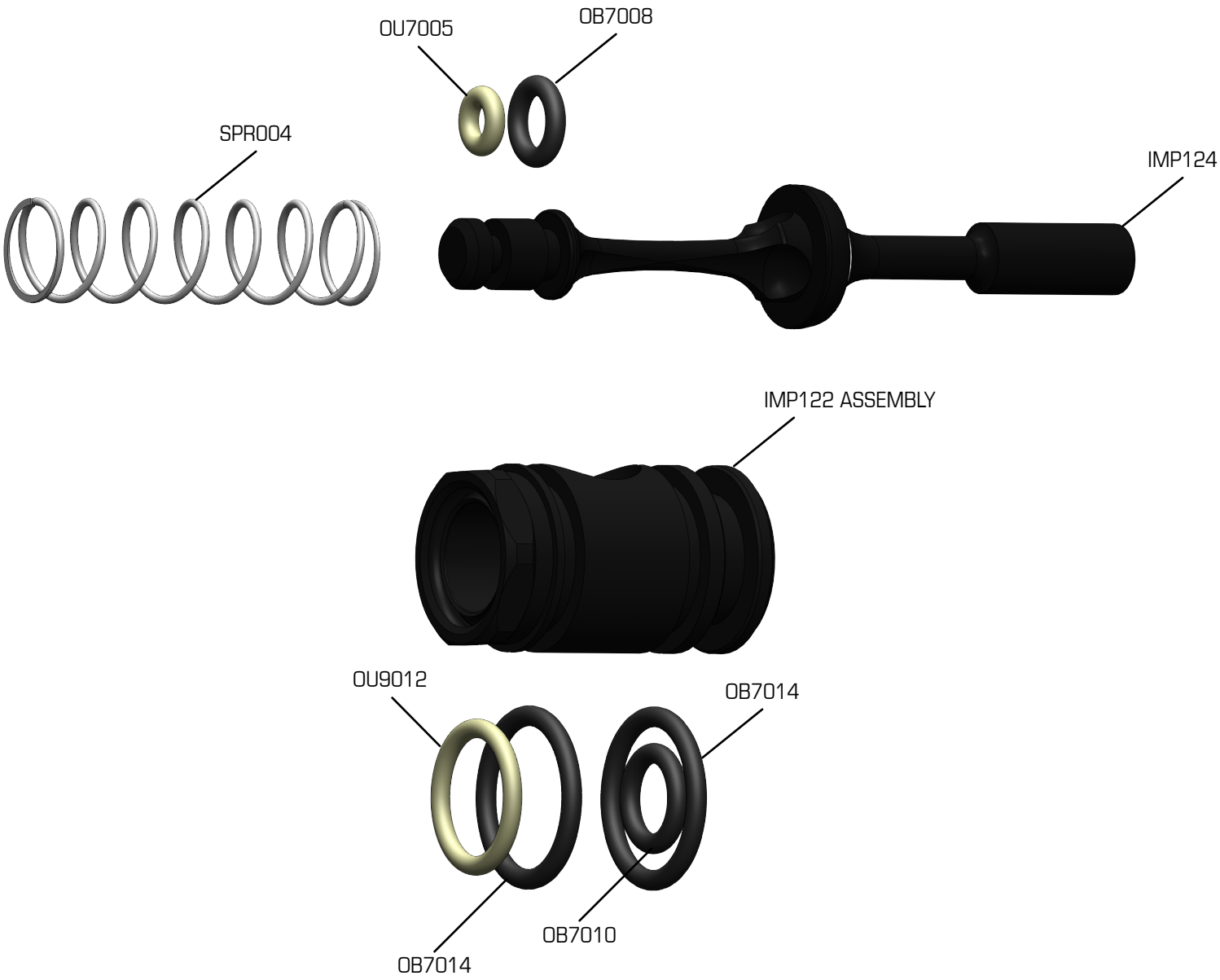
SECONDARY REGULATOR



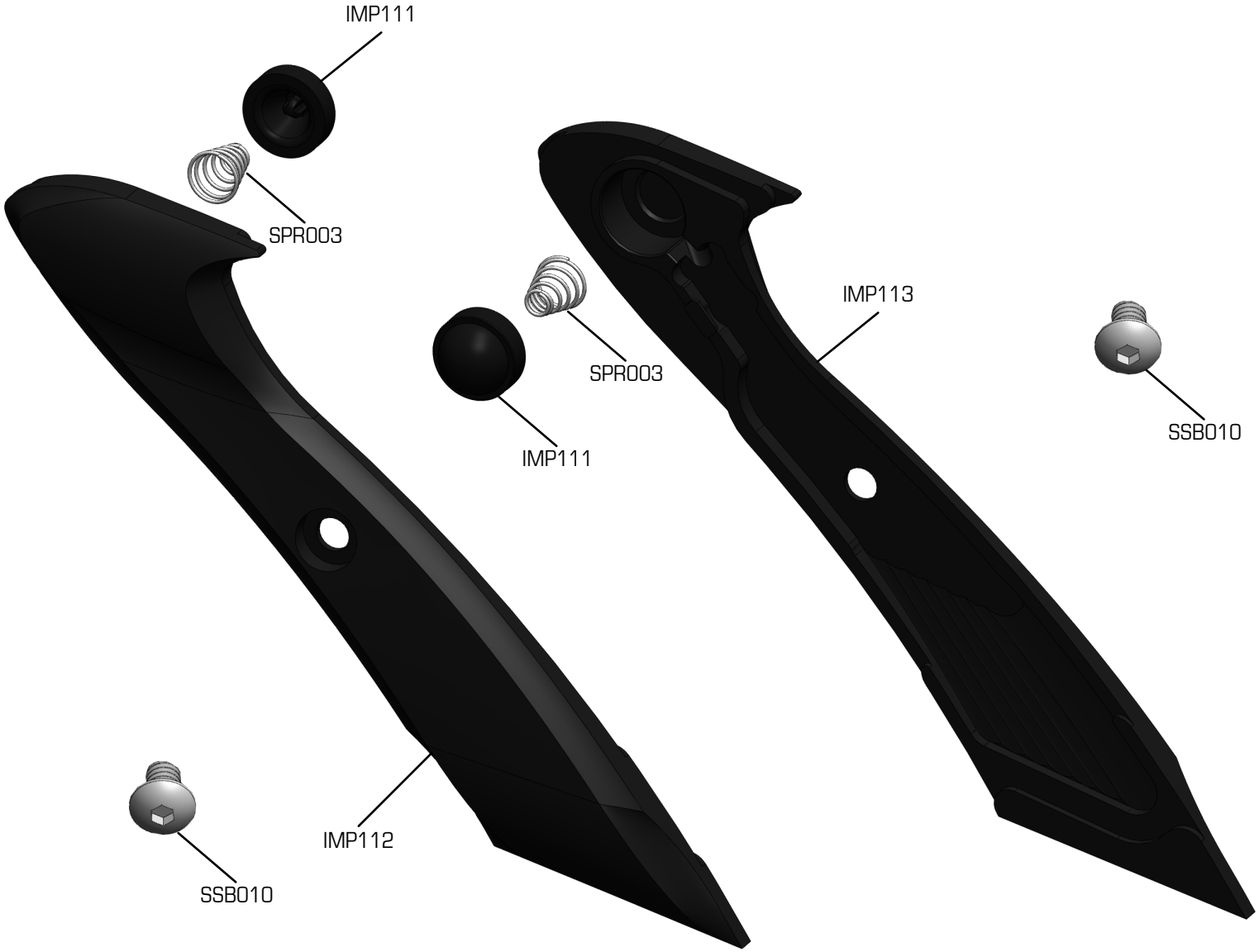
BOLT



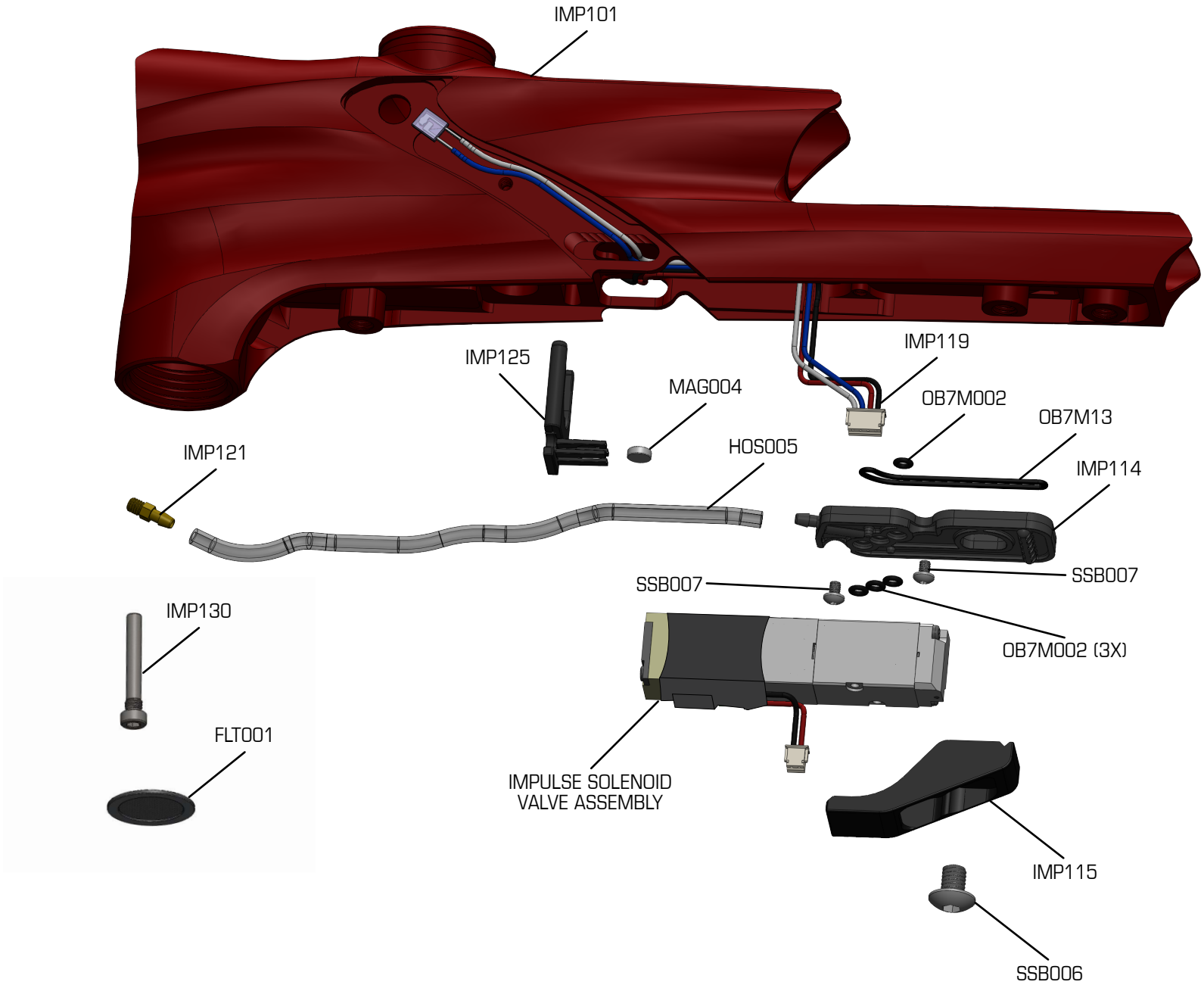
PISTON



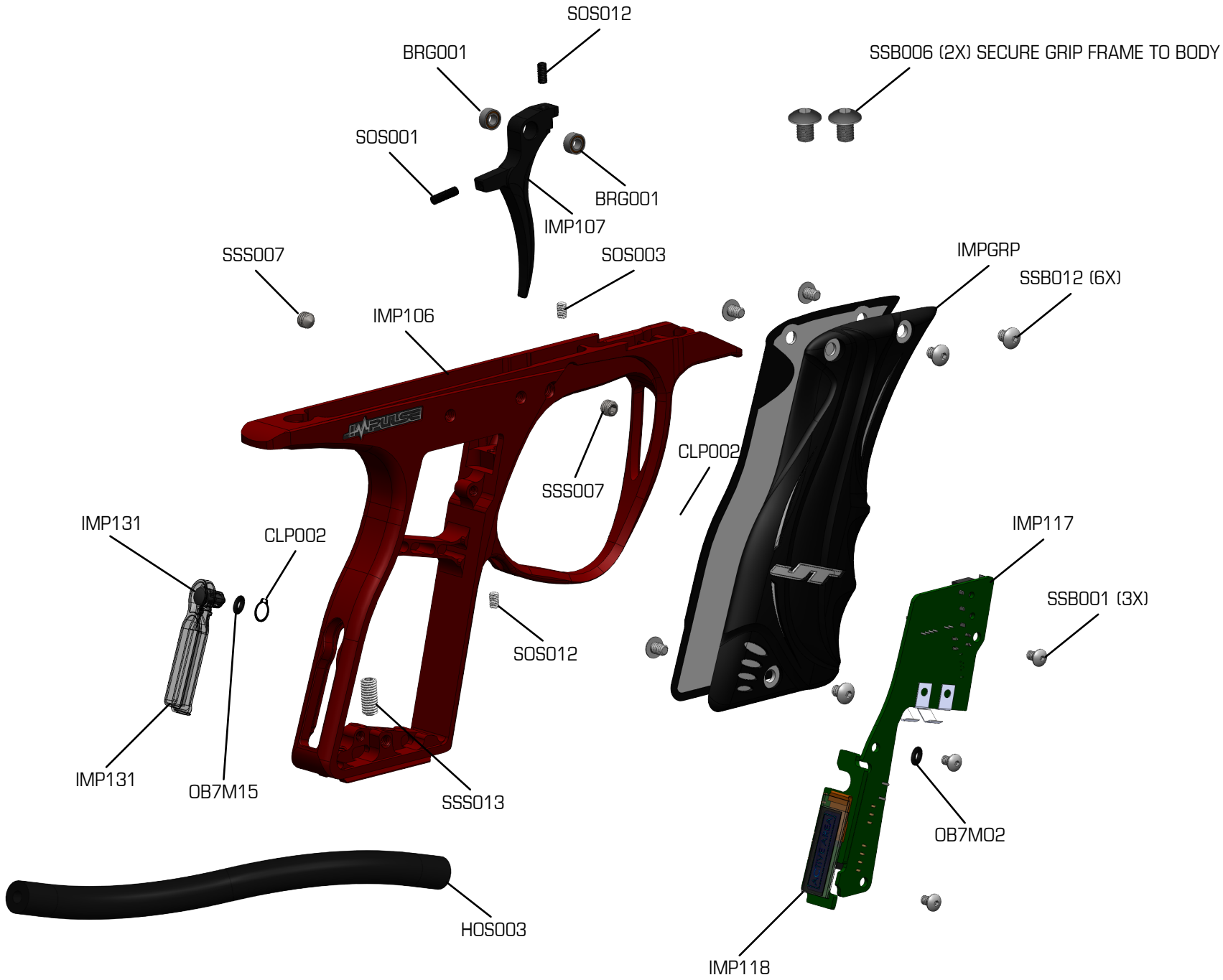
VALVE



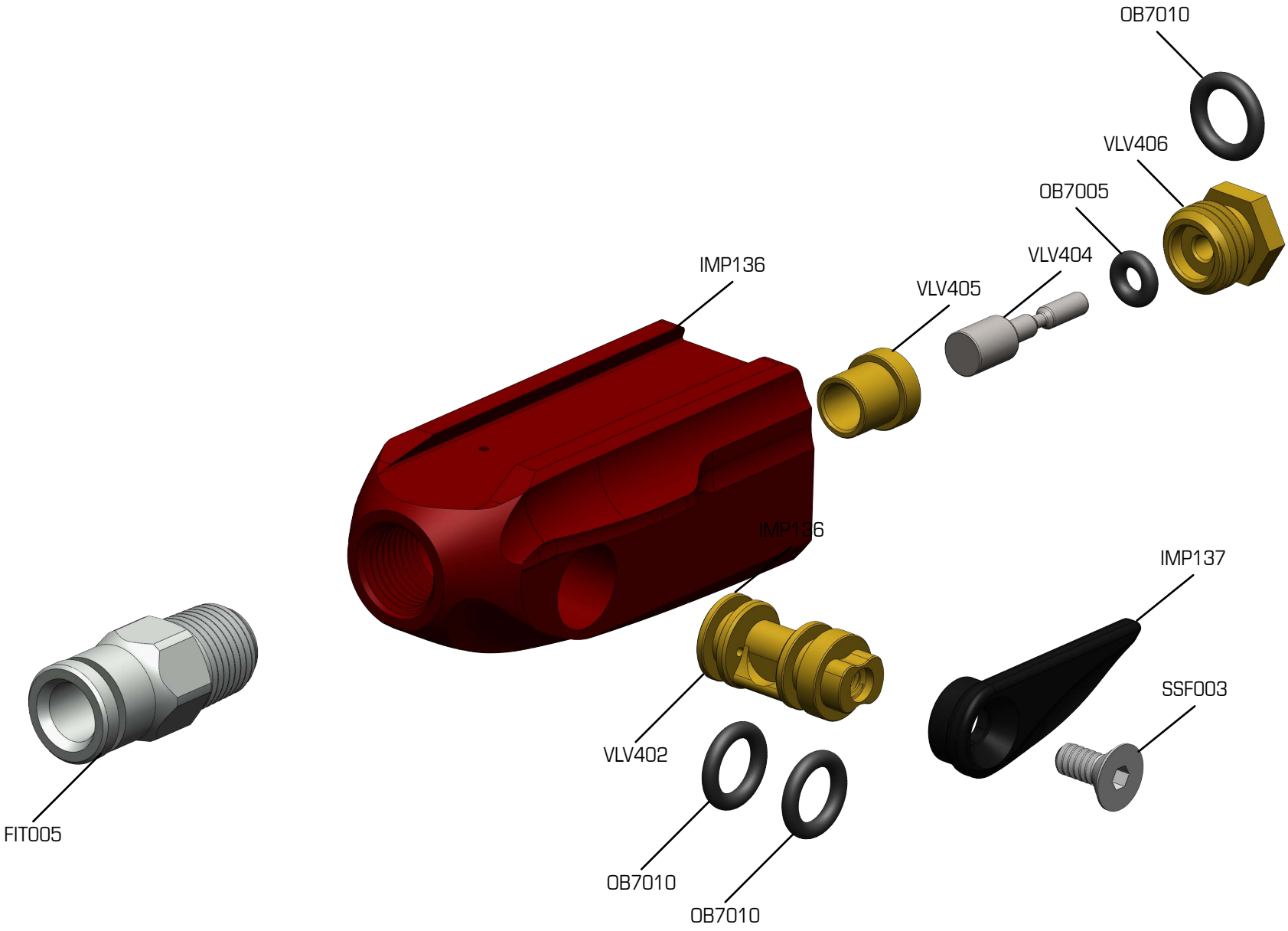
VISION COVERS / DETENTS



BODY



GRIP FRAME



BOTTMLINE ASA

LIMITED LIFETIME WARRANTY INFORMATION

(ORIGINAL PURCHASE RECEIPT REQUIRED)

KEE Action Sports ("KEE") warrants that this product is free from defects in materials and workmanship for as long as it is owned by the original purchaser, subject to the terms and conditions set forth below. KEE Action Sports will repair or replace with the same or equivalent model, without charge, any of its products that have failed in normal use because of a defect in material or workmanship.

KEE Action Sports is dedicated to providing you with products of the highest quality and the industry's best product support available for satisfactory play.
Purchaser should register product to activate warranty. Register your product by:
1. Online at www.paintballsolutions.com
2. Complete the product registration card (if applicable) and mail along with a copy of your receipt to Paintball Solutions, 11723 Lime Kiln Rd., Neosho, MO 64850.

WHAT THIS WARRANTY DOES NOT COVER
This warranty does not cover problems resulting from abuse, the unauthorized modification or alteration of our product, problems resulting from the addition of aftermarket products and scratches or minor superficial imperfections. Due to the nature of paintball products it is important that the product be maintained by the user as indicated in the product manual to remain in good operating condition. Your Limited Lifetime Warranty will be void if you fail to maintain the product as recommended in the product instruction manual. In addition, certain parts of a product may be subject to wear through regular usage. Replacement and repair of such parts is the responsibility of the user throughout the life of the product. These parts are not covered under the Limited Warranty. Examples of this type of part include (but are not limited to) goggle lens, straps, O-ring seals, cup seals, springs, ball détentes, batteries, hoses, drive belts, gears and any part of a product subject to continuous impact from paintballs. Hydrotesting of air cylinders is not covered under this warranty.

The Limited Lifetime Warranty also does not cover incidental or consequential damages. This warranty is the sole written warranty on KEE's product and limits any implied warranty to the period that the product is owned by the original purchaser.

Some states, provinces and nations do not allow the limitation of implied warranties or of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state, province to province, nation to nation. If you should encounter any problems with your product and you have added aftermarket parts on your product, please test it with the original stock parts before sending it in.

Always unload and remove air supply before shipping markers. Do not ship your air supply tank if it is not completely empty. Shipping a pressurized air supply tank is unsafe and unlawful. Remove all batteries from products prior to shipping.

This Limited Warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Some states do not allow the exclusion of incidental or consequential damages.

For Warranty parts, service, information or manuals in other languages, (where applicable) go to:
Paintball Solutions: www.paintballsolutions.com
E-Mail: tech@paintballsolutions.com
Telephone: 1-800-220-3222
11723 Lime Kiln Rd., Neosho, MO 64850