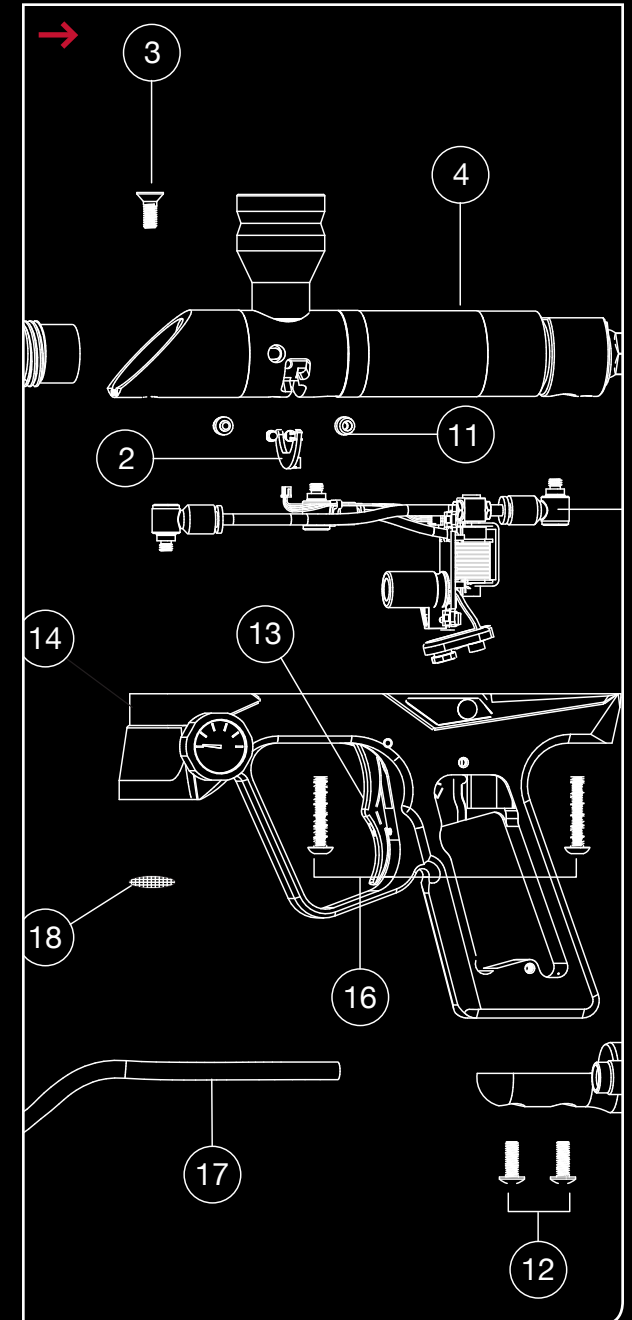
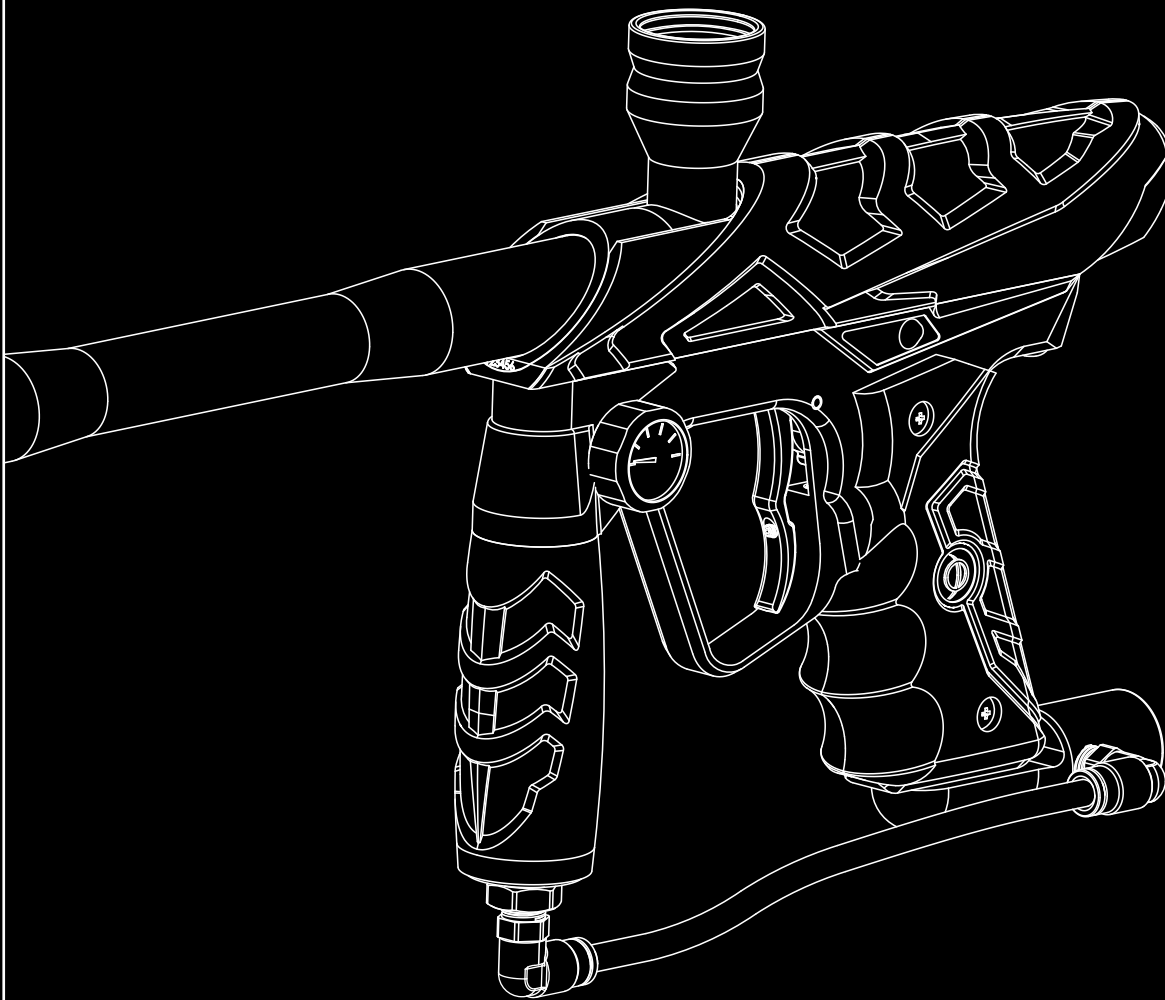


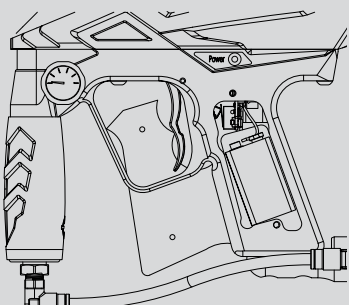
Operation and adjustment instructions



QUICK START

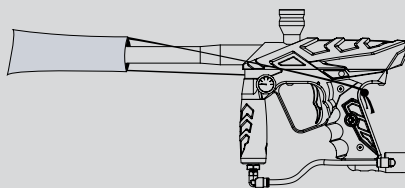
PLEASE READ CAREFULLY

01 BATTERY



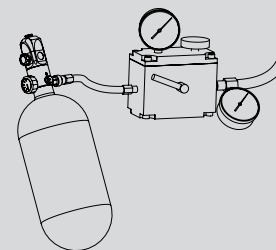
Using a #1 Phillips Screwdriver, remove the two screws from the left side of the rubber grip and lift the panel open. Attach a fresh 9-volt alkaline battery to the battery clip. Position the battery in the grip frame, tucking the battery wires into the space above the battery. Close the grip and reinstall the screws.

02 BARREL BLOCKER



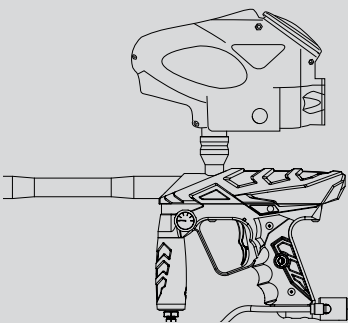
Screw the included barrel into the Ion. Put the supplied barrel blocker over the end of the barrel, securing its cord as far back on the Ion body as possible, and cinching it tight.

03 FILL TANK



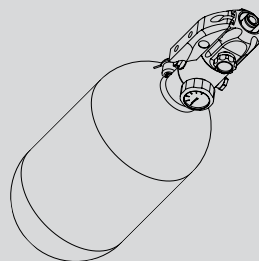
Have your compressed air (HPA) or CO₂ tank filled by a person who is properly trained to do so. If using an HPA system with an on/off valve, such as the Max-Flo or Max-Flo Micro, make sure it is in the OFF position.

04 LOADER



Insert your loader into the feedneck and make sure it is secure. Due to the high rates of fire that the Ion can achieve, we recommend the use of a modern high-performance loader. Be sure the loader fits securely and is twist-fit in place with a clockwise motion (see the Hopper section.)

05 TURN ON AIR

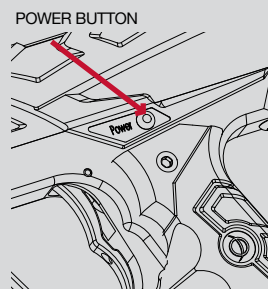


Gently gas up the marker by slowly turning on the air system or ASA's on/off valve, or slowly screwing the CO₂ or compressed air system into the ASA.

WARNING

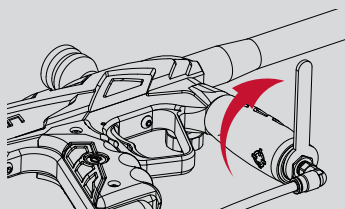
A gentle rise in pressure is important, as a sudden blast may reduce the service life of the Ion's internals.

06 TURN ON ION



Turn on the marker by holding the power button down for approximately 2 seconds. The marker will turn on with Vision mode activated. The light will blink slowly if there is no paintball in the breech, or rapidly if there is. To de-activate Vision mode, press the power button briefly and it will blink in a double-tap sequence. Press it briefly again to re-activate Vision mode. Press and hold the power button for approximately 2 seconds to turn the Ion off.

07 ADJUST VELOCITY



Fill the loader with paint and turn it on. While wearing ASTM compliant paintball goggles, in an area where all bystanders are protected, remove the barrel blocker and fire over a chronograph to measure the velocity. Using a 5/8-inch open-end wrench or adjustable wrench on the flats at the bottom of the vertical regulator, turn clockwise to increase velocity/pressure, and counter-clockwise to decrease. Take three or four shots after every adjustment to allow the gas pressure inside the Ion to stabilize. Adjust until the marker is firing consistently within the limits for the field where you are playing (for safety reasons, never adjust the Ion to fire at greater than 300 feet per second.) As you adjust, check the marker's pressure gauge to be certain you stay below the Ion's operating limit of 200 psi. Depending on what modes of fire are allowed at the field where you are playing (semi-automatic, rebound, etc.) you may need to adjust the Ion's firing mode. See the Electronic Adjustment section for more information. Shoot out the competition, hang the flag and win the game.



TABLE OF CONTENTS

Quick Start	00
Getting Familiar	02
Barrel Blocker/Hopper	03
Gases	04-05
Gas System Mounting	06
Paint/Velocity	07
Vision/Degassing	08
Electronic Adjustment	09
Dwell	10
ROF Delay/Fire Modes	11
Trigger Adjustment	12
Ion Parts	13
Disassembly	14-15
Reassembly	16
Solenoid	17
Regulator	18
Ball Detents	19
Troubleshooting	20-23
Warranty/Tech Support	23
CPS Table	24

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

//////////⚠️WARNING

- THE ION IS NOT A TOY
- MISUSE OF THE ION MAY RESULT IN SERIOUS INJURY OR DEATH.
- EYE PROTECTION SPECIFICALLY DESIGNED FOR PAINTBALL USE MUST BE IN COMPLIANCE WITH ASTM SPECIFICATION F1776 AND MUST BE USED BY THE USER AND ANYONE WITHIN RANGE OF THE ION.
- SMART PARTS RECOMMENDS THAT THE ION ONLY BE SOLD TO PERSONS 18 AND OLDER.
- THOROUGHLY READ THE ION 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 ION AT ANYTHING YOU DON'T WISH TO SHOOT.
- KEEP THE ION ON SAFE (POWER OFF) UNTIL READY TO SHOOT. (SEE QUICK START)
- KEEP THE BARREL BLOCKING DEVICE ON THE ION'S MUZZLE WHEN NOT SHOOTING. (SEE BARREL BLOCKER SECTION).
- ALWAYS REMOVE PAINTBALLS AND DEGAS THE ION BEFORE DISASSEMBLY. (SEE DEGASSING SECTION.)
- STORE AND TRANSPORT THE ION 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 ION BEFORE USE, AND NEVER ADJUST TO FIRE ABOVE 300FPS (91.44 M/S.)

GETTING FAMILIAR

→ STATISTICS

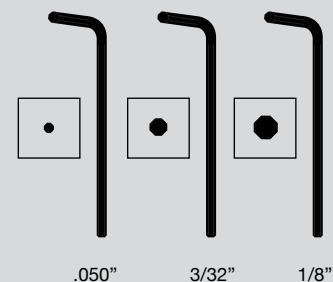
LENGTH/HEIGHT/WEIGHT:	18 Inches (with stock 12" barrel) / 8.5 Inches (with ASA) / 2lbs, 2oz (marker only)
OPERATING PRESSURE:	Approx. 180 psi, 200 psi max
PAINTBALLS:	.68 caliber –Compliant to ASTM F1979 Specification
POWER SOURCE:	9-volt alkaline battery
PROPELLANT:	CO ₂ or Nitrogen/Compressed air
RATE OF FIRE:	17 bps maximum – 20 bps max with optional Blackheart board
OPERATION:	Low pressure electropneumatic
MODES OF FIRE:	Full Auto, 3-shot burst, Semi automatic and Rebound
ANTI CHOP SYSTEM:	Break Beam Vision
BARREL THREAD:	Smart Parts (Impulse/Ion)
GAS EFFICIENCY:	1200 shots (68ci, 4500psi tank), 800 shots (20oz. ANTI-SIPHON tank) – Efficiency will vary with paint, barrel and setting combinations.
LUBRICANT:	For proper and consistent operation, the Ion should only be lubricated with SL33K lubricating grease.

MAINTENANCE

The Ion has been designed with simplicity in mind so that you can concentrate on your game instead of your marker. It has a minimal number of moving parts and seals so that you can maintain the marker with little effort. This DOES NOT mean that you should neglect your marker. If you take care of it off the field, your Ion will take care of you on the field. For best performance, clean and grease your Ion frequently. Many players clean their marker after every use. While this may seem a bit extreme, being vigilant in the upkeep of your marker will extend its useful life considerably. Playing in the rain will not damage your Ion, but you should NEVER immerse it in water. If your marker should become waterlogged, remove the barrel, body cover and rubber grips and allow them to dry out, then follow the disassembly instructions for full cleaning. Clean out mud and paint with a damp cloth and alcohol. Grease the Ion ONLY with SL33K pneumatic grease. For best performance, use high quality paintballs.

PLEASE READ CAREFULLY

→ REQUIRED ALLEN WRENCHES



→ ADDITIONAL REQUIRED ITEMS

- 5/8" OPEN OR ADJUSTABLE END WRENCH
- 9/16" DEEP WALL SOCKET AND WRENCH
- #1 PHILLIPS SCREWDRIVER



BARREL BLOCKER/HOPPER

BARREL BLOCKER

The Barrel Blocking Device is a critical piece of paintball safety equipment - nearly as important as paintball goggles. The Barrel Blocker serves to protect against accidental discharge of a paintball by catching it before it can cause harm. A Barrel Blocker is included with the Ion, and must be used every time the marker is handled in an area where people or property are not properly protected by paintball goggles or paintball field netting. To use the Barrel Blocker simply slip it over the end of the barrel and stretch its cord back over the back of the marker or the rearmost part over which it can be securely looped. Use the strap's adjuster to cinch the strap tight, so that the Barrel Blocker can provide protection against accidental discharge of a paintball.

//////////⚠️WARNING

The Barrel Blocker should only be removed when the marker is on a "live" paintball field and all persons involved are wearing proper paintball protection.

HOPPER

The Ion is a high performance tournament grade paintball marker. The break-beam Vision system means that you won't need to worry about chopping paint because your trigger finger is faster than your hopper. However, if you want to realize the marker's maximum firepower potential, you will need to use a high performance loader. High performance loaders, especially those which provide force-feeding, will yield the best results with the Ion.

Depending on the dimensions of your hopper you may choose to remove one or more of the friction o-rings from inside the feed tube, and or to sand down the hopper's feed neck. The fit should be snug, but not excessively tight. Always twist hoppers clockwise when installing or removing, to avoid unscrewing the feedtube from the body breech.

PLEASE READ CAREFULLY

FIG. 1 → BARREL BLOCKER IN USE

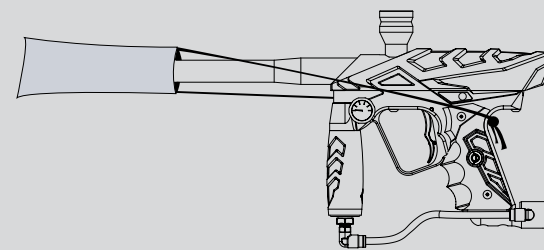
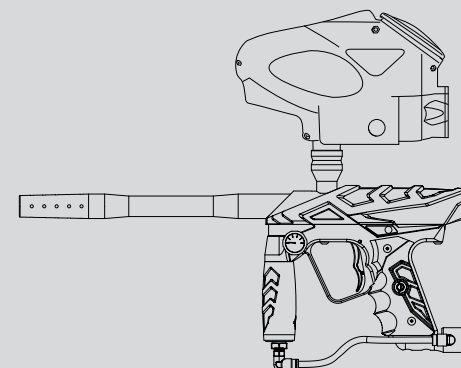


FIG. 2 → USE HIGH PERFORMANCE LOADER



GASES

The Ion is a low-pressure paintgun. It operates optimally at 180 psi, which means it can function well with either compressed air or CO₂ as a power source. Proper set up of your gas system will help you obtain the best possible performance.

High Pressure Air systems (HPA) are the most common power source used with the Ion, as they are unaffected by temperature fluctuations and do not have the potential for liquid problems. HPA systems consist of a tank and a regulator, and are typically rated to store air or nitrogen (while pure nitrogen is almost never used in paintball, many players call compressed air “nitro” as air is made of more than 70% nitrogen) at pressures of 3,000 or 4,500 psi.

There are two main types of HPA systems, those on which the output pressure is adjustable, and those for which their regulator is pre-set to a fixed output pressure. HPA systems designed to screw into an ASA are usually pre-set to deliver either 400 psi (low pressure output) or 800 psi (high pressure output.)

//////////⚠WARNING

Never use oil or any petroleum based cleaner or lubricant in a compressed air regulator or tank. Exposure to pressurized air increases oil's flammability and can cause a serious safety hazard. Only use manufacturer recommended lubricants with compressed air systems, and follow the manufacturer's maintenance and operation instructions explicitly.

If you are using your Ion with an adjustable output compressed air system, it should be adjusted to deliver about 650 psi to the marker's vertical regulator. The Ion's regulator can accommodate a wide range of input pressures, so exact adjustment of the air system is not critical, and either low output, or high output pre-set HPA systems may be used as well.

While CO₂ can also be used, it is less popular, since its pressure fluctuates with temperature and use. The important thing to remember when using CO₂ is that liquid CO₂ must not be delivered to the marker. If liquid CO₂ were to make it past the vertical regulator, it could expand into gas form inside the paintgun, raising the pressure levels high enough to cause damage to internal seals, hoses or the solenoid valve. Because liquid CO₂ is heavier than CO₂ gas, it is easily blocked through the use of gravity.

//////////⚠WARNING

Never put oil in a compressed air regulator or tank—only apply manufacturer specified lubricants.

FIG. 3 → HPA TANK BEING FILLED

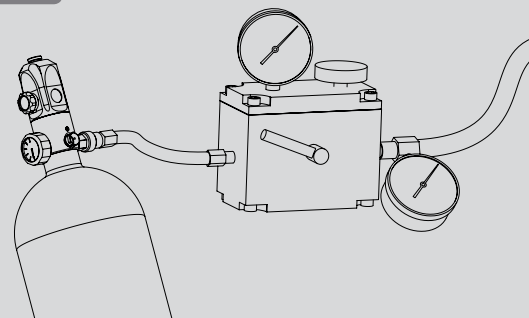


FIG. 4 → COMPRESSED AIR

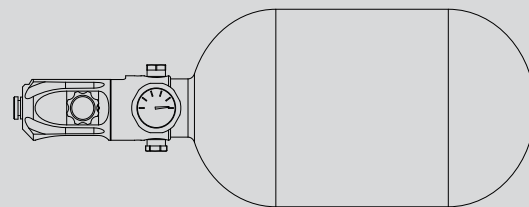
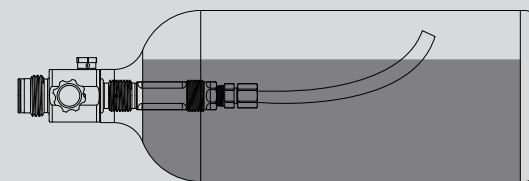


FIG. 5 → CO₂ WITH ANTI-SIPHON [CUTAWAY VIEW]



GASES

PLEASE READ CAREFULLY

Two easy ways to properly use CO₂ with the Ion are an anti-siphon tank or a remote line.

Anti-siphon tanks have a J shaped tube professionally installed inside. When the tank is screwed into a bottom line ASA, such as the one that is standard on the Ion, the tube delivers gas only. The anti-siphon tube works like a diver's snorkel, repositioning the gas intake from the valve to the top side of the tank. When an anti-siphon tube is installed in a tank, the airsmith will usually mark the valve, to indicate the position of the tube. When the tank is screwed into a marker, this mark must be oriented to the top.

A remote hose allows a standard (non-siphoned) CO₂ tank to be carried in a player's pack. Not only does this reduce the total weight of the marker, but it also allows the tank to be placed vertically, so that its valve is at the top while gravity holds the liquid CO₂ at the bottom. It is important to note that lying down on the field or crawling while using a remote can cause liquid CO₂ to be fed to the paintgun as the tank is turned on its side.

Whether using compressed air or CO₂ it is important that the marker is not exposed to sudden "pops" of pressure. If using a standard ASA with a screw in HPA system or CO₂ tank, screw the tank in slowly, so that the valve opens slowly and the pressure rises gently. If using an ASA with a built in on/off valve, screw in the tank fully, then open the valve slowly. If using an HPA system or CO₂ tank with its own on/off valve, open that valve slowly. Be gentle to the internals of your marker and they will reward you with a long service life.

IMPORTANT

CO₂ can also be used with remote hose with-out Anti-Siphon. [Not Shown]

GAS SYSTEM MOUNTING

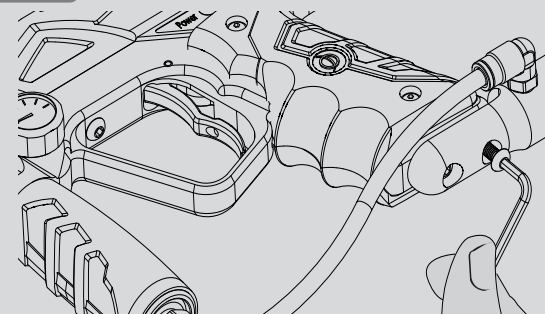
The Ion uses paintball industry standard gas system mounting. At the bottom of the grip frame, it has a pair of 10-32 screw holes.

The Ion is preconfigured with a standard duckbill style ASA mounted on bottom of the grip frame. To remove this ASA, degas and unload the marker. Use a 1/8" allen wrench to remove the two ASA mount screws. The ASA can be replaced with a mounting rail or drop forward to place the gas source in a position that is most comfortable for you.

PLEASE READ CAREFULLY

FIG. 6

→ BOTTOM OF GRIP FRAME



PAINT / VELOCITY

PAINT

Even the best quality paintballs will vary in size from one batch to the next and as weather conditions change. While your marker will work well even with a poor paint to barrel fit, optimal performance will be achieved with a proper fit. Paintgun barrels are available in a variety of bore sizes to allow the user to select the best possible fit, and barrel kits like The Freak allow for easy adjustment to paint of different diameters.

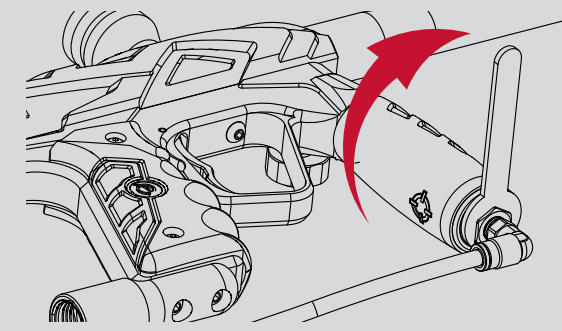
The ideal fit between the paintball and the barrel is when the ball is inserted in the bore (the end that screws into the marker) and does not slip or roll through to the muzzle (the business end) on its own. The ball should sit in place, even when the barrel is pointed straight down. If the paintball can roll out on its own, the fit is too loose. The ball should be able to be expelled from the barrel by blowing it out like a blowgun, using a minimal amount of breath. If the ball is difficult to blow through, the fit is too tight, which can lead to ball breakage.

VELOCITY

The velocity, or speed at which a marker fires a paintball, must be measured and adjusted to below the paintball field's velocity limit immediately before each day of play. This is required for player safety. If CO₂ is used, velocity should be checked and adjusted multiple times during the day. While wearing proper paintball specific goggles and protective equipment, and in an area in which all persons and property are properly protected, fire three or four shots over a chronograph and if necessary change the velocity by adjusting the vertical regulator with a 5/8-inch open-end or adjustable wrench. Turn clockwise to increase velocity/pressure, and counter-clockwise to decrease. Take three or four shots after every adjustment to allow the gas pressure inside the marker to stabilize. Adjust until the marker is firing consistently within the limits for the field where you are playing. For safety reasons, never adjust the marker to fire at greater than 300 feet per second. As you adjust, check the pressure gauge to be certain you stay within the Ion's operating pressure range of 160 to 200 psi. Optimal pressure is 180 psi.

PLEASE READ CAREFULLY

FIG. 9 → INCREASING VELOCITY



VISION/DEGASSING

VISION INSTRUCTIONS

When the Ion is turned on it will be in Vision mode. The internal infra-red eye will be used to detect whether or not a paintball is in the breech. This feature practically eliminates the possibility of a chopped paintball. Vision mode is indicated by a rapid blinking of the light in the power button when there is a paintball in the breech, or a slow blinking when it is empty. Vision mode can be de-activated by pressing the power button quickly while the marker is on. Vision mode off is indicated by a double-tap blinking pattern on the power button light. Vision mode may be turned back on by once again pressing the power button briefly.

DEGASSING

At the end of each day's use and before performing maintenance work on your marker, it will need to be degassed, and all paintballs must be removed. In an area where it is safe to shoot (such as the chronograph area at a paintball field) and while wearing paintball goggles, remove the hopper from the feedneck. By turning the marker upside down, you can empty any extra paintballs from the feedneck into your hand. Turn the marker on, then deactivate Vision mode by pressing the power button momentarily. Dry-fire 2 or 3 shots in a safe direction to ensure that no paintballs remain in the marker. Turn off the compressed air system or on/off ASA, or unscrew the compressed air system or CO₂ tank far enough to close its pin valve.

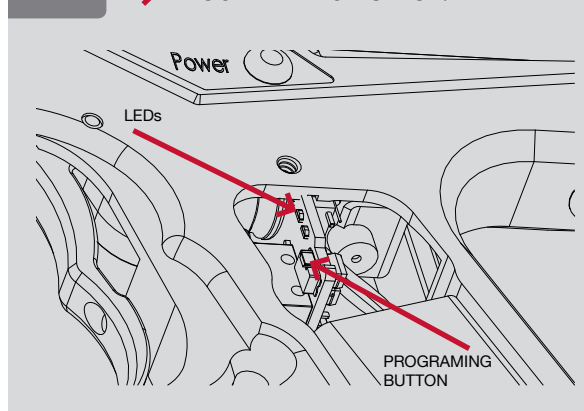
Continue to dry fire the marker in a safe direction until all of the gas pressure inside has been released. At this point the only sound you should hear when you pull the trigger is the click of the solenoid valve. Turn off the Ion by pressing and holding the power button for two or more seconds.

If using a CO₂ tank or screw in HPA system, unscrew it the rest of the way.

If the marker is to be stored for an extended period of time, remove the 9-volt battery from the grip frame.

PLEASE READ CAREFULLY

FIG. 10 → PROGRAMMING BUTTON/LED



WARNING

Even with no CO₂ tank or compressed air system attached, the marker may still have enough gas pressure stored in the regulator and fire chamber to fire 2 or more shots. You must degas your marker before storage or maintenance.



ELECTRONIC ADJUSTMENT

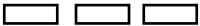
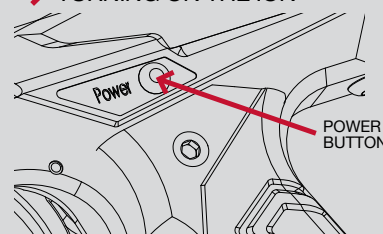
SETTING	LIGHT INDICATION	MODE FUNCTION
ONE		Dwell Up [solid yellow]
TWO		Dwell Down [solid red]
THREE		ROF Delay Up [shoot slower/blink yellow]
FOUR		ROF Delay Down [shoot faster/blink red]
FIVE		Firing Modes Up [double blink yellow]
SIX		Firing Modes Down [double blink red]

FIG. 11

→ TURNING ON THE ION



ELECTRONIC ADJUSTMENT

Dwell, Rate of Fire Delay and Mode adjustments are made using the marker's programming button and power button. Removing the two grip screws on the left side of the Ion's grip frame and folding the grip back provides access to the programming button. The button is small, gray and rectangular in shape. It is mounted on the circuit board facing the left edge for easy access. A notch in the board helps to identify the button and make it easier to press.

Yellow and red light emitting diodes (LEDs) are located on the circuit board just above the programming button. The patterns which flash on these buttons indicate the function the power button will perform when pressed.

To enter the programming modes, make sure the Ion is completely degassed and unloaded, with a barrel blocker properly in place. Turn the marker on and note that the programming LEDs are not lit or flashing. This indicates that the Ion is in operational mode rather than a programming mode. To select one of the programming modes, press the programming button and note the sequence of blinking LEDs to determine which mode you have selected. The yellow LED indicates that you have selected to increase a setting, and the red LED indicates that you have chosen to decrease a setting. The LED will be lit solidly for adjustment of the dwell, single blink for adjustment of the ROF Delay and double blink for adjustment of the firing mode.

To change a particular setting, choose the appropriate mode, then press the power button. Both LEDs will blink to acknowledge that the adjustment has been made. When only the red LED blinks after pressing the power button, this indicates that you have reached the lower limit of adjustment. Similarly only the yellow LED will blink to indicate that the upper adjustment limit has been reached. Pull the trigger to exit the programming mode and save your new settings.

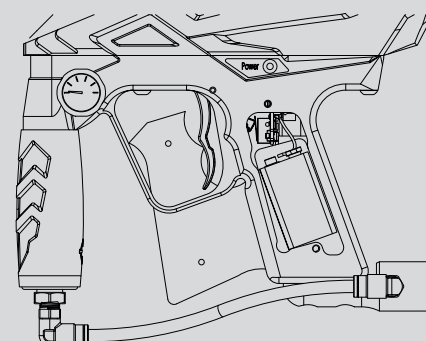
IMPORTANT

PROGRAMMING EXAMPLE

To set a dwell value of 18ms, first press the programming button as many times as needed to light the red programming LED solidly. Then press and hold the power button until the red LED blinks alone, indicating that the bottom of the adjustment range (8ms) has been reached. Press the programming button again to cycle through the programming modes until the yellow LED is lit solidly indicating Dwell Up function. Then, press the upper power button 20 times ($20 \text{ button presses} \times 0.5\text{ms} = 10\text{ms increase or } 18\text{ms total.}$) Pull the trigger to exit the programming mode and save the setting.

FIG. 12

→ REMOVE RUBBER GRIP



DWELL

The dwell setting determines how long the Ion holds open its solenoid valve, which ultimately affects how much gas is released to fire each shot. It is important to balance the dwell and the operating pressure (the setting of the vertical regulator). Too high of a dwell with a low operating pressure will cause poor gas efficiency and velocity drop-off. Too low of a dwell will leave the marker unable to properly cycle through a full firing sequence. Dwell adjustment should be performed after changing internal components such as the bolt or installation of a quick exhaust valve (QEV.) Dwell setting changes should not be used to adjust velocity.

The dwell value can be adjusted between 8 milliseconds (1ms = 0.001 seconds) and 52ms in 0.5ms increments. To adjust the dwell, make sure the marker is already turned on, select the proper adjustment mode for Dwell Up or Dwell Down and press the power button once for every .5ms change desired.

To optimize your dwell setting, wear proper paintball protective goggles and gas up your Ion with a barrel blocker in place, with no paint or hopper. Turn on the Ion and press the power button once to de-activate Vision mode. Decrease the dwell time (solid red adjustment mode) until the Ion can no longer complete a full firing cycle (bolt does not close all the way) each time you pull the trigger. Increase the dwell value (solid yellow adjustment mode) one button press at a time, test firing after each change until you hear the Ion fire a full volume shot. Increase the dwell by an additional 15 to 20 button presses to reach the setting for best gas efficiency.

If your new setting causes an increase in first shot drop off, where the marker is at rest for an extended period of time and has reduced velocity or will not fire on the first shot but fires fine after that, first disassemble, clean and lubricate the Ion bolt assembly and repeat the dwell setting procedure. If this does not eliminate the problem, further increase the dwell setting until there is no longer a sluggish first shot.



ROF DELAY/FIRING MODES

ROF DELAY

The Rate of Fire Delay (ROFDelay) adjustment determines how long the Ion must wait after it shoots, before the next shot can be fired. This delay allows time for the bolt to return to its rear position, gas pressure in the fire chamber to be recharged, and for a new paintball to fall into the breech. Increasing the Rate Of Fire Delay setting will decrease the maximum rate of fire the marker is capable of achieving. Many players will set the ROFDelay to its minimum, relying on the Vision system to determine when the marker is ready to fire. Setting a higher ROFDelay can be useful if there is a Vision problem, or when playing at tournaments or fields which limit players to shooting 15 balls per second or slower.

The Rate of Fire Delay setting is adjustable from 25ms to 70ms in 0.5ms intervals. To change the rate of fire setting, while the Ion is turned on, press the programming button to select the ROFDelay Up mode (single blink yellow – SLOWER) or ROFDelay Down mode (single blink red - FASTER.)

As with the dwell settings blink of only the red or yellow light only when the power button is pressed indicates you have reached the limit of adjustment.

FIRING MODES

The Ion features four distinct firing modes which can all be selected by increasing (double blink yellow) or decreasing (double blink red) the firing mode setting. Mode 0 is Semi-Automatic and fires one shot per trigger pull. Mode 1 is Rebound and fires more than one shot per trigger pull when the trigger is pulled at a constant, rapid pace. Mode 2 is 3-Shot Burst which fires up to three consecutive shots when the trigger is pulled and held. If the trigger is released before the 3 shots have been fired, the marker will stop firing. Mode 3 is Full-Automatic, which will fire repeatedly while the trigger is held back. The maximum rates of fire that can be achieved in semi-automatic and Rebound modes will depend on the marker's Dwell and Rate of Fire Delay settings. Both 3-shot burst and full-automatic fire at a rate of 10 shots per second. Ions manufactured for the United Kingdom can be identified by a green (instead of red) power button LED and do not include 3-shot burst or full auto modes.

To select Semi-Auto mode, degas and unload the marker as with other mode adjustments. Turn the power on, and press the programming button as many times as needed to cycle the programming LEDs to a red double-blink pattern (Firing Modes Down.) Press and hold the power button until the LEDs blink red, indicating that the lowest mode (0- Semi-Automatic) is reached. Tap the trigger to exit programming mode. To select other modes, first set the Ion to semi-automatic mode, but do not press the trigger. Then press the programming button 5 times to choose Firing Modes Up (double blink yellow) and press the power button the number of times needed to select the desired mode – once for Rebound, twice for 3-Shot Burst, and three times for Full Auto.

//////////⚠WARNING

RATE OF FIRE

It is important to remember that the ROF setting is not the same as a rate of fire cap, or the maximum rate of fire the Ion can achieve. The maximum rate of fire or Cycles Per Second (CPS) is calculated from a combination of the Dwell setting and the ROF setting.

→ **Cycle Time (milliseconds) = Dwell + ROF**

The length of time needed for one complete cycle equals the Dwell time plus the ROF time (time in milliseconds, not number of chirps.)

→ **Cycle Time (Seconds) =
Cycle Time (milliseconds) / 1,000**

To calculate the maximum CPS, the cycle time will need to be converted from milliseconds to seconds. This is done by dividing it by 1,000.

→ **CPS = 1 Second / Cycle Time (seconds)**

The maximum cycle rate of an Ion, for any given Dwell and ROF settings can be easily calculated. Divide one second by the cycle time to arrive at the number of shots per second.

For fields or tournaments which require paintguns be limited to a maximum rate of fire, you will need to make sure the Dwell of your marker is properly adjusted and then calculate the proper ROF value to create the desired CPS limit. See the CPS table for examples.

TRIGGER

The Ion features two trigger adjustment points to best suit your style of play. It may be tempting to set your Ion to the shortest trigger pull possible. Many players however, opt for a slightly longer pull. This allows them to walk the trigger to higher rates of fire. Use of Blue Loctite 242 or equivalent thread locker on the adjustment screws will ensure that trigger adjustments do not vibrate out of place.

PRE-TRAVEL

This adjustment is located in the trigger guard where it meets the grip frame and is adjusted with a 1/8-inch allen wrench. Turning this adjustment clockwise shortens the distance the trigger travels before it activates the trigger switch. Counterclockwise adjustment has the reverse effect. Care must be taken not to adjust this screw in too far or the trigger will not reliably reset after each shot.

POST-TRAVEL

How far the trigger can travel after it activates the trigger switch is determined by the post-travel adjustment screw. This screw is located on the lower front face of the Ion trigger and is adjusted with a 0.050-inch allen-wrench.

ADJUSTMENT

FIG. 13 → PRE-TRAVEL ADJUSTMENT

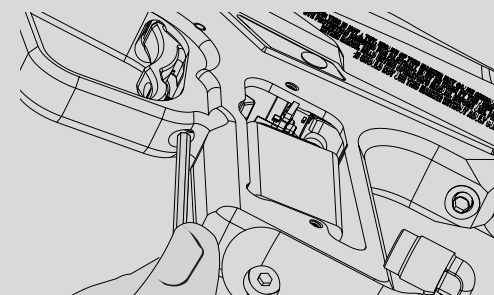
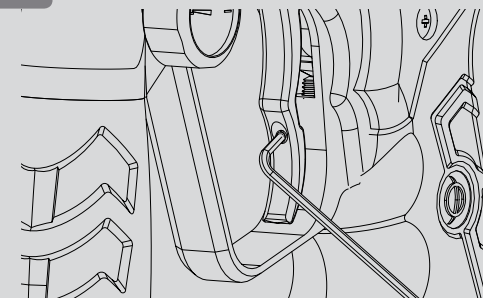


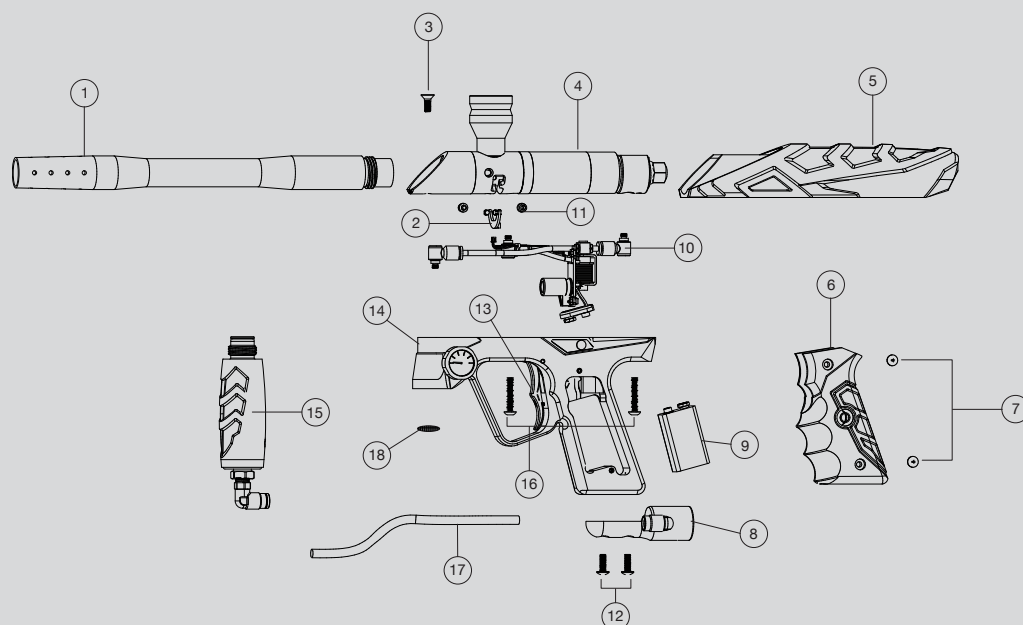
FIG. 14 → POST-TRAVEL ADJUSTMENT



ION PARTS

EXPLODED DIAGRAM

FIG. 16 → MAJOR ION COMPONENTS

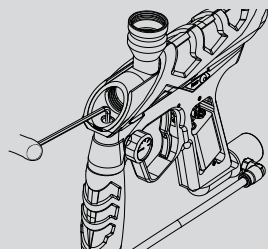


- | | |
|--|--|
| 1 ION3012 - Ion Barrel | 11 ION108 - Ball Detents (2x) |
| 2 ION117UPRVSN - Ion Vision Board | 12 SCRN1032X0500BS - 10-32 Button Head Cap Screws (2x) |
| 3 SCRN1032X0500V0 - Body Flat Cap Screw | 13 ION107 - Ion Trigger |
| 4 Inner Body Assembly (Page 16) | 14 ION106BLK - Ion Grip Frame |
| 5 ION101 - Ion Body Cover | 15 Ion Vertical Regulator (Page 18) |
| 6 GRPSTD - Ion Grip | 16 SCRN1032X100BS - Grip Frame Screws (2X) |
| 7 SCRN0632X0313XTS - 6-32 Grip Screws (4x) | 17 HOST14BLK - Black Macroline Hose |
| 8 ION130 - Bottom Line | 18 ION120 - Body Filter |
| 9 Alkaline 9-volt Battery | |
| 10 Circuit Board Assembly (Page 17) | |

DISASSEMBLY

PLEASE READ CAREFULLY

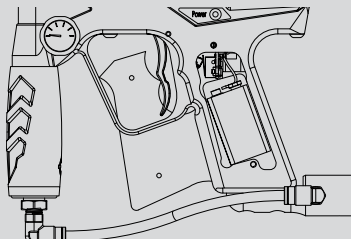
01



WARNING

Use a 1/8-inch allen wrench to remove the body flat cap screw which is normally concealed by the barrel.

02

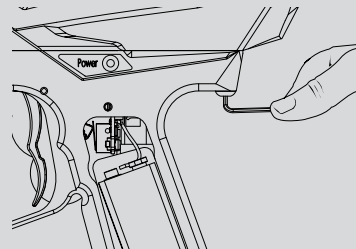


Remove both left side (gauge side) grip screws with a #2 phillips screwdriver and open the flexible wraparound grip. Remove the battery from the grip frame. Grasp the battery in one hand and with the other hand grasp the battery clip by the sides and unplug it from the battery. Remove the right side grip screws and the flexible grip, as the upper right grip screw may catch on the circuit board, making its removal difficult.

WARNING

Do not pull on the battery wires or circuit board to unplug the battery as this may cause significant damage.

03



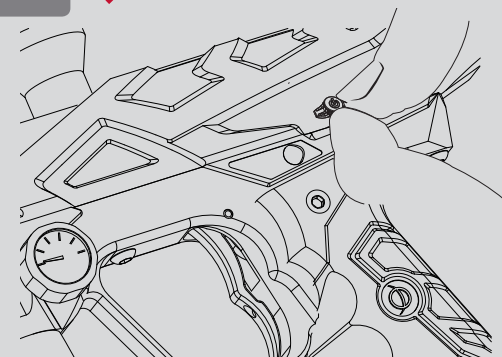
Remove the front and rear grip frame screws using a 1/8-inch allen wrench.

WARNING

Before beginning any maintenance or repair procedures, completely unload and degas the marker following the instructions in the Degassing section of this manual. Choose a clean, stable and protected work area where small parts will not be lost, such as a table covered with a towel to prevent parts from rolling. Remove the barrel.

Some lons may be equipped with a hard removable power button, rather than the membrane style power button. During normal maintenance the hard power button does not need to be and should not be removed. If it becomes damaged or requires replacement, grip it between a fingernail and thumbnail and wiggle it out, rear side first.

FIG. 17 → REMOVE HARD POWER BUTTON



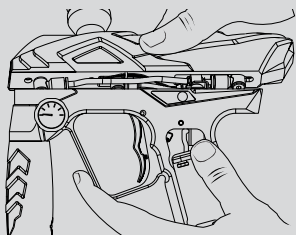
→ [CONTINUED ON PAGE 15]



DISASSEMBLY

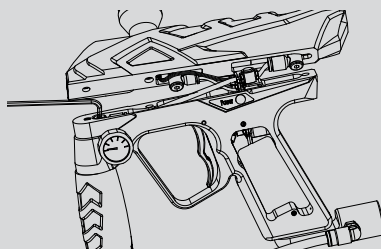
DISASSEMBLY CONTINUED

04



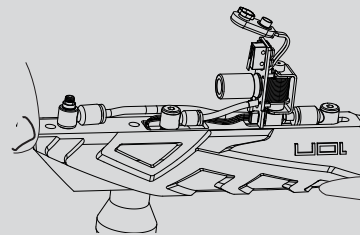
Grasp the body with one hand and the grip frame with the other. Slowly pull the body away from the grip frame, rolling it slightly to the side, exposing the top of the grip frame and banjo fitting. It can be helpful to gently push on the bottom of the circuit board with a thumb, helping it to slide upward.

05



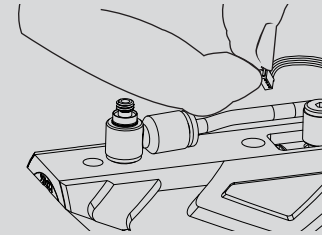
Remove the front banjo fitting from over the vertical adapter with a 1/8-inch allen wrench. The center of the banjo fitting will turn with the wrench, pivoting inside the rest of the fitting.

06



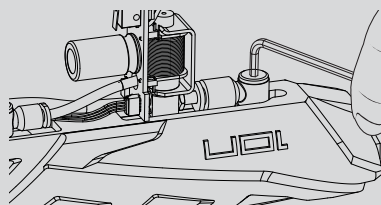
Gently complete the process of separating the body from the grip frame. Take care to make sure that the circuit board slides out of the grip frame without being strained, and that the battery wires and battery clip follow without catching on the grip frame. Set the grip frame aside, and hold the body upside down (with the feedneck facing down.)

07



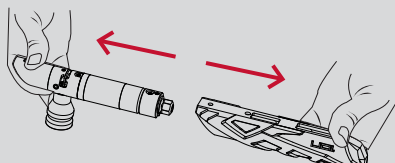
Locate the Vision wiring harness. This group of four black wires runs from the lower circuit board to the Vision circuit board in the body breach. Unplug the Vision wiring harness from the body end, being careful not to strain the wires by tugging on them. As much as possible, pull on the connector directly.

08



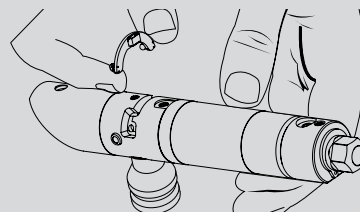
Remove the remaining two banjo fittings from the body with a 1/8-inch allen wrench.

09



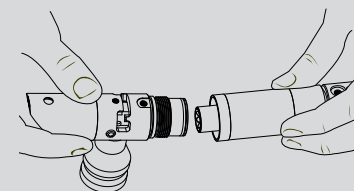
Keeping the body upside down, slide the inner receiver components out of the body cover.

10



Remove the Vision circuit board from the body breach and set aside carefully. This circuit board is shaped like the letter C, and should come easily out of place. Take care to make sure that the infra-red emitter and detector (these look like clear LEDs) are not set on anything that can scratch them.

11



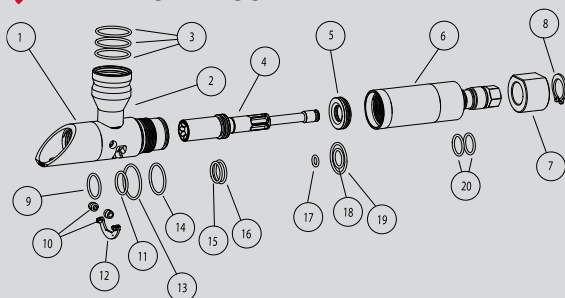
Unscrew the body breach from the fire chamber, and remove the bolt from inside. If the bolt stop does not come out with the bolt, pull it out with a finger.

REASSEMBLY

CLEANING AND REASSEMBLY

01	02	03	04	05	06
Use a soft cloth to clean all parts of paint and dirt as well as old oil or grease.	Make sure the Vision circuit board and its components are clean and undamaged. Make sure no dirt or debris is blocking the Vision holes in the body breech – use a cotton swab to clean these openings if necessary.	Use SL33K to grease all of the o-rings on the bolt and bolt stop. Apply only a thin coating, do not over-grease.	Place the bolt stop inside the fire chamber. Make sure the concave side of the bolt stop (shaped like the inside of a cone) faces the back of the marker.	Slide the bolt into the bolt stop inside the fire chamber until it stops.	Screw the fire chamber into the body breech.
07	08	09	10		
Place the Vision circuit board into its slot in the body breech. Its plug should be on the side of the board facing the rear of the marker. The clear emitter and detector should be on the side facing the front of the body breech.If necessary, rotate the swivel donut so that its screw holes are on the bottom of the receiver, lined up with the screw holes in the body breech.	Slide the inner receiver assembly into the body cover while holding both up-side down to prevent the Vision circuit board from falling out, then plug the Vision wire harness back into the Vision circuit board, and reconnect the center and rear banjo fittings to the receiver, being careful not to cross thread them.	Carefully pass the battery clip down into the grip frame and slide the circuit board into place before reinstalling the forward banjo fitting to its position in the grip frame, again taking care not to cross-thread.	Reposition the body and grip frame together being careful not to pinch any wires or hoses. Reinstall the grip frame screws, and flat cap body screw, then tighten all three with an 1/8-inch allen wrench. Reinstall the battery, taking care not to pinch the battery wires, and flexible the rubber grip and its screws.		

FIG. 18 → INNER BODY ASSEMBLY



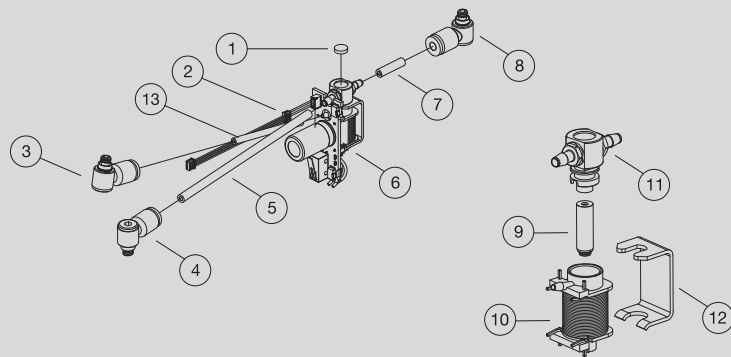
- 1 ION102 – Body Breech
- 2 ION103 – Feed Tube
- 3 ORN02552070BU – Feed Tube Friction O-Rings (3x)
- 4 ION109 – Bolt
- 5 ION11 – Bolt Stop
- 6 ION104 – Fire Chamber
- 7 ION110 – Swivel Donut
- 8 CLP004 – Donut Clip
- 9 ORN0179OUR – SFT O-Ring
- 10 ION108 – Ball Detents (2x)
- 11 ORN1170HN – Rear Breech O-Ring
- 12 ION117UPRVSN – Vision Circuit Board
- 13 ORN02270BU – Body Breech Friction O-Ring
- 14 ORN02070BU – Body Breech Seal O-Ring
- 15 ORN0159OUR – Bolt Bumper
- 16 ORN0162070HN – Bolt Middle O-Ring
- 17 ORB01070UR – Bolt Rear O-Ring
- 18 ORN01470UR – Bolt Stop Inner O-Ring
- 19 ORN02070BU – Bolt Stop Outer O-Ring
- 20 ORN01570UR – Swivel Donut O-Rings (2x)



SOLENOID VALVE

DISASSEMBLY AND MAINTENANCE

FIG. 20 → SOLENOID EXPLODED VIEW



- 1 BUM006 – Foam Disk
- 2 ION118 – Vision Wiring Harness
- 3 ELB1032X18PTCBNJ – 1/8" Banjo Fitting
- 4 ELB1032X532PTCBNJ – 4mm Banjo Fitting
- 5 HOS4MMCLR4025 – 4mm Ion LP Hose
- 6 EPY117LOVUSASM – Ion Circuit Board
- 7 HOS4MMCLR875 – 4mm Ion LP Hose
- 8 ELB1032X532PTCBNJ – 4mm Banjo Fitting
- 9 Solenoid Armature
- 10 SOL3UPG – Solenoid Coil
- 11 Solenoid Head
- 12 Solenoid Bracket
- 13 HOS18CLR1985 – 1/8" Ion LP Hose

The solenoid valve is the heart of the Ion. When the circuit board supplies it with power, it redirects gas flow to allow the bolt to close and fire the marker. During normal maintenance the solenoid valve should not need to be disassembled. However, if it becomes clogged or develops a leak it is simple to disassemble for cleaning or repair.

01

Follow the disassembly instructions to remove the circuit board from the Ion. Using a 3/32-inch allen wrench, hold the circuit board and solenoid body then pry the bracket from the back of the solenoid valve. Place the wrench between the bracket and the upper, black section of the solenoid valve body.

WARNING

Do not pry against the red solenoid coil or the Blackheart heat shrink coil protector, as this will cause damage.

02

After the solenoid bracket is removed, lift the solenoid head straight out, wiggling if necessary to loosen it.

03

Tip the circuit board over and allow the armature to fall into your hand. The armature fits loosely in the center of the coil, and should fall out easily.

04

Clean the inside of the solenoid with a cotton swab, and clean the armature with a soft cloth, removing any debris, oil or grease.

05

Reassemble the solenoid valve. Place the armature back in the coil with the armature facing down.

06

Push the solenoid head back into the solenoid valve body, making sure that the long hoses and Vision wiring harness are aligned on the same side of the circuit board as the trigger switch.

07

Replace the solenoid bracket, pressing it back into place. The bent bracket section goes over the bottom side of the solenoid.

WARNING

A very light layer of SL33K lubricating the hose barb will make the installation of new hoses easier, but extreme care must be taken that no excess grease is able to enter the solenoid valve. Holding the solenoid head with a box end or small adjustable wrench over the hose barb will allow the hose to be pulled away from the wrench which will hold back the solenoid head.

REGULATOR

PLEASE READ CAREFULLY

01

WARNING

Parts of the Ion's vertical regulator use left-handed threads. These parts must be turned counter-clockwise to screw them in, and clockwise to unscrew them – the opposite direction of normal screws.

02

Degas the marker, and remove the macroline hose from the regulator. Unscrew the regulator from the Ion's vertical ASA. Remove and clean the metal filter screen which is located between the regulator and the vertical ASA. Slide the regulator body out of its sleeve.

03

Use a 5/8-inch open-end wrench or adjustable wrench to turn the adjuster cap on the bottom of the regulator, as if you were adjusting velocity, until the safety screw is visible in the vertical safety screw slot. The safety screw ensures that the regulator will not be unscrewed too far during normal use.

04

Use a 3/32-inch Allen wrench to remove the safety screw. The adjuster cap is left-hand threaded. Turn it clockwise to unscrew it from the vertical regulator body. Use the open end or adjustable wrench to completely remove the adjuster cap.

05

Locate the lock screw halfway up the side of the regulator body, and remove it with a 3/32-inch Allen wrench. The lock screw secures the spring platform in place. Now that it is unlocked, use a 9/16-inch deep well socket and ratchet to remove the spring platform by unscrewing it clockwise (the spring platform is also left-hand threaded.) The hex faces on the spring platform are short, so you will need to exert a steady pressure on the socket to maintain contact.

06

The regulator spring should fall easily out of the regulator body once the spring platform is removed.

WARNING

The Regulator piston may require light pressure from an allen wrench through the top of the regulator body for removal. Use a gentle hand here, as the brass of the regulator piston can be scratched by hard tools.

07

Clean all of the regulator parts with a soft cloth or paper towel. Inspect all o-rings and the regulator seat (the clear part on the end of the piston) for damage, and replace if necessary. Lubricate the o-rings on the piston assembly with SL33K.

WARNING

Do not lubricate the regulator seat or the o-ring on the adjuster cap.

08

Place the regulator spring on the regulator piston assembly. Hold the regulator body ASA side down, and slide the two parts into the body. Lower the spring platform into the regulator body nut side up, and use the 9/16-inch deep well socket to screw it into place with a counter-clockwise motion.

09

When the spring platform is fully seated, it will be visible through the lock screw hole in the side of the regulator. Lock it in place by reinstalling the lock screw. Reinstall the pressure adjuster cap by screwing it counter-clockwise into the regulator body. Turn it until the safety screw aligns with the safety screw slot. Put a small amount of blue Loctite 242 threadlocker or equivalent (even clear fingernail polish can do in a pinch) on the safety screw. Reinstall the safety screw.

WARNING

Be certain that the safety screw is fully seated and the adjuster cap can turn freely.

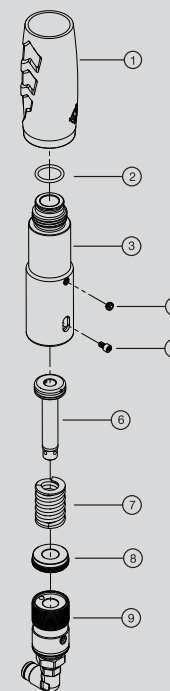
10

Place the regulator inside the sleeve. Do not lubricate the regulator body or inside of the sleeve, or the regulator will become extremely difficult to remove from the Ion. Reinstall the regulator into the vertical ASA of the Ion. Reconnect the macroline, and be sure to use a chronograph to re-adjust the marker's velocity before use.

WARNING

Service and adjustments to the regulator will cause changes in its output pressure. Adjust the regulator to deliver between 160 and 200 psi then repeat the velocity adjustment procedure.

FIG. 21 → REGULATOR



- 1 IRG106 – Vertical Regulator Grip
- 2 ORN0159OUR – Regulator ASA O-Ring
- 3 IRG101BLK – Ion Vertical Regulator Body
- 4 SCRN1032X0125SCO – Lock Screw
- 5 SCRN0440X0188CO – Safety Screw
- 6 IRG105ASM – Piston Assembly
- 7 SPR022 – Ion Regulator Spring
- 8 IRG 102 – Spring Platform
- 9 IRG104 ASM – Pressure Adjuster Cap



BALL DETENTS

INSPECTION, CLEANING AND REPLACEMENT

01

Degas and disassemble the marker (see disassembly section.)

02

Look into the body breech. The tip of each ball detent should extend approximately 1/16 of an inch into the breech area. If either detent does not reach this far into the breech, it should be replaced.

//////////⚠WARNING

To avoid risk of eye injury, even while wearing goggles, do not look into the barrel or breech of an assembled marker.

03

Reach a finger into the body breech and press out against the detent. It may then be removed by prying or gripping with fingernails, needle-nosed pliers, an o-ring pick or even a 0.050-inch allen wrench. Inspect the ball detents for tears or damage. If they are damaged, replace them. If not, clean them with a soft cloth, and clean the detent openings in the body breech with a cotton swab.

04

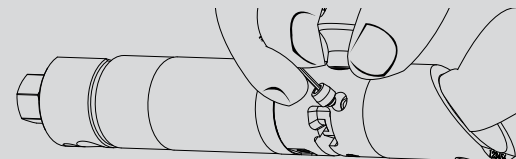
Reinstall the detents by pressing them into place with a thumb.

05

Reassemble the marker.

FIG. 22

→ PRYING OUT DETENT



TROUBLESHOOTING

IMPORTANT

ION IS LEAKING INTERNALLY.

- Pneumatic hoses may be loose, damaged or not fully connected. Replace hoses with Smart Parts Ion or Epiphany hoses only.
- One or more of the banjo fittings may be loose or have a damaged seal. Inspect and tighten fittings. Replace if necessary with Smart Parts Ion/Epiphany banjo fittings only.
- Solenoid armature is damaged or overpressurized. Make sure operating pressure is under 200psi. Inspect solenoid valve and replace armature if necessary.

ION IS LEAKING DOWN THE BARREL.

- One or more of the bolt o-rings and/or the bolt stop o-rings are damaged. Inspect and replace.

ION IS LEAKING FROM THE MACROLINE AIR FITTINGS.

- Macroline may not be fitted properly. Degas the marker and make sure the macroline is properly locked into its fittings. If the macroline shows signs of damage, replace it with a new piece. Be sure to cut clean ends, and if using diagonal cutters, dress the end with a small needle file to be certain it is not crimped partially closed.

ION IS LEAKING FROM IN OR AROUND THE REGULATOR.

- The ASA o-ring at the top of the regulator may be damaged. Remove the regulator to inspect. If this o-ring is damaged it may be replaced with a standard CO₂ bottle o-ring available at most paintball shops.
- The regulator seat may be contaminated and/or damaged. Inspect and clean the regulator seat (see Regulator section of this manual.) If the regulator seat is damaged, it may be flipped over to use the back side. If both sides are damaged, it must be replaced.

ION EXHIBITS FIRST SHOT DROP-OFF (FSDO).

- FSDO is a low velocity, or non-firing first shot followed by normal shooting, and is often caused by debris in the bolt or a poorly lubricated bolt. Clean the bolt, body breech, fire chamber and bolt stop, and lubricate them with SL33K (See the Disassembly section of this manual.)
- FSDO can also be caused by too low of a dwell setting. Follow the procedure for optimal dwell adjustment and or increase the dwell setting (see the Electronic Adjustment section of this manual.)



ION HAS INCONSISTENT VELOCITY OR DROPS SIGNIFICANTLY DURING RAPID FIRING.

- Barrel to paint match may not be correct. Check the fit of the paintballs to the barrel (see Paint section of this manual.) If it is a poor fit, switch paintballs, barrel, or barrel insert for a better fit.
- Gas source could be low. Fill gas source and make sure valve is turned on.
- Battery may be low. This will be most noticeable with velocity dropping, and then entire shots not firing during rapid fire. Replace with a name brand alkaline 9-volt battery.
- Regulator seat may be contaminated and/or damaged. Inspect and clean the regulator seat (see Regulator section of this manual.) If the regulator seat is damaged, it may be flipped over to use the back side. If both sides are damaged, it must be replaced.
- Pressure may be low. Optimal operating pressure is 180 psi - maximum is 200 psi.
- SFT o-ring may be damaged, swollen or missing. Inspect and if necessary replace the SFT o-ring (see Assembly diagram.)
- Liquid CO₂ may be entering the regulator. Only use CO₂ with an anti-siphon tank in the ASA, or a standard tank placed vertically in a pack with a remote. Alternatively, switch to compressed air.

ION WILL TURN ON BUT WILL NOT FIRE.

- Battery may be low or dead. Replace with a name brand alkaline 9-volt battery.
- Solenoid valve may be blocked with debris. Disassemble solenoid, clean armature, and inside solenoid body, then reassemble without lubricant (see Solenoid Disassembly/Maintenance section of this manual.)
- One or more of the trigger set screws may be mis-adjusted. The trigger switch should be heard clicking when the trigger is pulled with the marker turned off. Back pre and post-travel screws out until trigger will activate the marker then set properly (See the Trigger section of this manual.)
- Trigger switch may be damaged. - Visit your nearest Smart Parts Authorized Dealer or contact Smart Parts for circuit board repair or replacement.
- Regulator output pressure may be too high (above 200 psi) Decrease the pressure (see Velocity Adjustment section of this manual.) If pressure slowly rises after being set, inspect, clean and if necessary replace the regulator seat (See Regulator section of this manual.)
- Liquid CO₂ may be entering the regulator. Only use CO₂ with an anti-siphon tank in the ASA, or a standard tank placed vertically in a pack with a remote. Alternatively, switch to compressed air.

TROUBLESHOOTING

IMPORTANT

ION'S POWER BUTTON LIGHT FLASHES IN VISION MODE BUT WILL NOT FIRE.

- Possible chamber obstruction. Hold the power button down to put the marker into non-Vision mode. While wearing paintball mask/goggles in an area where it is safe to fire, fire the marker to clear any possible chamber obstructions.
- Paint or debris may be blocking the Vision eye from “seeing” the breech. Remove the Vision circuit board. Carefully clean the infrared emitter and detector with a damp, soft cloth and clean the Vision ports in the body breech with a cotton swab (see Disassembly section of this manual.)
- Wiring harness may be disconnected. Check to make sure that the wiring harness running from the solenoid circuit board in the grip frame to the Vision circuit board in the body is plugged in at both ends, and is not bent, crimped, broken or frayed (See Disassembly section of this manual.)
- Vision reflector may be damaged or missing. Inside of polymer Ion body covers on the right hand side is a reflective mylar sticker. This sticker must be clean and intact for proper Vision operation.

THE ION IS BREAKING PAINT.

- Battery may be low or dead. Replace with a name brand 9-volt alkaline battery.
- Ball detents may be worn or damaged. Inspect and if necessary replace (See Ball Detent section of this manual.)
- Barrel to paint match may not be correct. Check the fit of the paintballs to the barrel (see Paint section of this manual.) If it is a poor fit, switch paintballs, barrel, or barrel insert for a better fit.
- Dwell setting may be too high. Lower the dwell setting in three click increments and retest, or reset to the optimum dwell value (see the Dwell section of this manual.)
- Vision mode may be turned off. This will be indicated by a double-blink pattern on the power button. Turn Vision on by pressing the power button.
- Paint or debris may be partially blocking the Vision eye from properly “seeing” the breech. Remove the Vision circuit board. Carefully clean the infrared emitter and detector with a damp, soft cloth and clean the Vision ports in the body breech with a cotton swab (see Disassembly section of this manual.)
- Vision reflector may be damaged or missing. Inside of plastic body covers, on the right hand side is a reflective mylar sticker. This sticker must be clean and intact for proper Vision operation.
- Wiring harness may be damaged. Check to make sure that the wiring harness running from the solenoid circuit board in the grip frame to the Vision circuit board in the body is plugged in at both ends, and is not bent, crimped, broken or frayed (See Disassembly section of this manual.)
- Vision board may be damaged from improper installation. Replace Vision board (See Disassembly section of this manual.)
- Liquid CO₂ may be entering the regulator. Only use CO₂ with an anti-siphon tank in the ASA, or a standard tank placed vertically in a pack with a remote. Alternatively, switch to compressed air.



TROUBLESHOOTING

ROF IS TURNED UP ALL THE WAY AND ION WILL NOT FIRE RAPIDLY.

- The ROFDelay setting of the Ion circuit board controls how long the marker must wait between shots. Increasing the delay (yellow blinking) will slow the Ion down. Decreasing the delay (red blinking) will allow it to shoot faster (see Electronic Adjustment section of manual.)
- The Ion's break-beam Vision system prevents it from firing until a paintball has been properly loaded. Non-motorized or agitating hoppers will not feed paintballs as quickly as a modern force-feed loader, resulting in a restricted rate of fire.

AFTER DISASSEMBLING THE ION, THE GRIP FRAME AND BODY BREECH FLAT TOP SCREW HOLES NO LONGER LINE UP CORRECTLY WITH THE GRIP FRAME.

- If the bolt stop is installed backwards during re-assembly, the body breech can not screw all the way into the fire chamber. This will prevent the two parts from sealing properly and change the alignment of screw holes to the grip frame. Reinstall the bolt stop with the concave surface facing into the fire chamber.

A REFEREE SAYS THE ION IS SHOOTING TOO FAST (BALLS PER SECOND)

- Some tournaments and paintball fields limit the rate of fire allowed. Many tournaments, for example, limit players to a maximum of 15 balls per second. The marker's rate of fire can be limited by increasing the ROFDelay setting (see Electronic Adjustment section of manual and the CPS Table.)

REFEREE SAYS THE ION IS SHOOTING TOO FAST (MORE THAN 1 SHOT PER TRIGGER PULL)

- Many tournaments, scenario games and paintball fields limit players to shooting in true semi-automatic mode. Set the marker's firing mode to 0-Semi-Automatic (see Electronic Adjustment section of manual.)

A REFEREE SAYS THE ION NEEDS A TOURNEY CAP.

- Tournaments, scenario games and paintball fields all require that a paintgun's velocity may not be adjusted without tools, and do not allow tools on field. While it is extremely difficult, some referees may claim that a very strong person will be able to adjust the Ion's regulator with bare hands. These referees may require that an additional locking device be used. A velocity locking cap is available for Smart Parts Authorized Dealers to further secure the regulator setting.

IMPORTANT

TECH SUPPORT

Our Technical Support Department is open Monday through Friday, from 10am to 6pm EST, and can be reached at 724-539-2660. Additional support and downloadable product manuals are available through our web site, www.smartparts.com.

WARRANTY

Smart Parts warrants for one (1) year to initial retail purchaser that the paintball marker and regulator are free from defects in materials and workmanship. Disposable parts (batteries, o-rings, seals, etc.) are not warranted. The valve assembly is warranted for six (6) months. The solenoid and electronics on the marker are warranted for six (6) months, plus an additional warranty of six months for electronic parts only (installation and labor are not included.) This warranty does not cover surface damages (scratches and nicks), misuse, improper disassembly and re-assembly, attempts made to drill holes or remove metal from the external surfaces which could degrade performance and reduce pressure safety factors of the marker. Do not make changes to the basic marker parts without written approval. The only authorized lubricant for the marker is SL33K Lubricant. Use of any other lubricant could result in voiding your warranty. Paintball markers are non-refundable. This warranty is limited to repair or replacement of defective parts with the customer to pay shipping costs. This warranty is effective only if the customer returns the warranty registration card enclosed with the marker. The warranty is non-transferrable. Do not attempt to alter the trigger assembly in any way, as this will void your Smart Parts Inc. warranty. Trigger alteration of any kind may result in serious injury.

CPS TABLE

This table provides a cross reference between Ion settings and the resulting maximum possible cycles per second. To limit an Ion to shoot at or below 15 balls per second, look up its dwell setting in the dwell column, then look across to find a CPS value that is comfortably below 15, and up to find the appropriate ROFDelay value needed.

Stock Dwell Value: 52 clicks from bottom
Stock ROFDelay Value: 50 clicks from bottom

DWELL

NOTE: THE ION CIRCUIT BOARD WILL FIRE AT A MAXIMUM OF 17 CYCLES PER SECOND.

ROF D E L A Y	Clicks	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	88
	Ms	8	10.5	13	15.5	18	20.5	23	25.5	28	30.5	33	35.5	38	40.5	43	45.5	48	50.5	52
0	25.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.5	15.9	15.3	14.7	14.2	13.7	13.2	13.0
3	26.5	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.1	15.5	14.9	14.4	13.9	13.4	13.0	12.7
6	28.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.4	15.7	15.2	14.6	14.1	13.6	13.2	12.7	12.5
9	29.5	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.7	16.0	15.4	14.8	14.3	13.8	13.3	12.9	12.5	12.3
12	31.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.3	15.6	15.0	14.5	14.0	13.5	13.1	12.7	12.3	12.0
15	32.5	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.5	15.9	15.3	14.7	14.2	13.7	13.2	12.8	12.4	12.0	11.8
18	34.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.1	15.5	14.9	14.4	13.9	13.4	13.0	12.6	12.2	11.8	11.6
21	35.5	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.4	15.7	15.2	14.6	14.1	13.6	13.2	12.7	12.3	12.0	11.6	11.4
24	37.0	17.0	17.0	17.0	17.0	17.0	17.0	16.7	16.0	15.4	14.8	14.3	13.8	13.3	12.9	12.5	12.1	11.8	11.4	11.2
27	38.5	17.0	17.0	17.0	17.0	17.0	16.9	16.3	15.6	15.0	14.5	14.0	13.5	13.1	12.7	12.3	11.9	11.6	11.2	11.0
30	40.0	17.0	17.0	17.0	17.0	17.0	16.5	15.9	15.3	14.7	14.2	13.7	13.2	12.8	12.4	12.0	11.7	11.4	11.0	10.9
33	41.5	17.0	17.0	17.0	17.0	16.8	16.1	15.5	14.9	14.4	13.9	13.4	13.0	12.6	12.2	11.8	11.5	11.2	10.9	10.7
36	43.0	17.0	17.0	17.0	17.0	16.4	15.7	15.2	14.6	14.1	13.6	13.2	12.7	12.3	12.0	11.6	11.3	11.0	10.7	10.5
39	44.5	17.0	17.0	17.0	16.7	16.0	15.4	14.8	14.3	13.8	13.3	12.9	12.5	12.1	11.8	11.4	11.1	10.8	10.5	10.4
42	46.0	17.0	17.0	16.9	16.3	15.6	15.0	14.5	14.0	13.5	13.1	12.7	12.3	11.9	11.6	11.2	10.9	10.6	10.4	10.2
45	47.5	17.0	17.0	16.5	15.9	15.3	14.7	14.2	13.7	13.2	12.8	12.4	12.0	11.7	11.4	11.0	10.8	10.5	10.2	10.1
48	49.0	17.0	16.8	16.1	15.5	14.9	14.4	13.9	13.4	13.0	12.6	12.2	11.8	11.5	11.2	10.9	10.6	10.3	10.1	9.9
51	50.5	17.0	16.4	15.7	15.2	14.6	14.1	13.6	13.2	12.7	12.3	12.0	11.6	11.3	11.0	10.7	10.4	10.2	9.9	9.8
54	52.0	16.7	16.0	15.4	14.8	14.3	13.8	13.3	12.9	12.5	12.1	11.8	11.4	11.1	10.8	10.5	10.3	10.0	9.8	9.6
57	53.5	16.3	15.6	15.0	14.5	14.0	13.5	13.1	12.7	12.3	11.9	11.6	11.2	10.9	10.6	10.4	10.1	9.9	9.6	9.5
60	55.0	15.9	15.3	14.7	14.2	13.7	13.2	12.8	12.4	12.0	11.7	11.4	11.0	10.8	10.5	10.2	10.0	9.7	9.5	9.3
63	56.5	15.5	14.9	14.4	13.9	13.4	13.0	12.6	12.2	11.8	11.5	11.2	10.9	10.6	10.3	10.1	9.8	9.6	9.3	9.2
66	58.0	15.2	14.6	14.1	13.6	13.2	12.7	12.3	12.0	11.6	11.3	11.0	10.7	10.4	10.2	9.9	9.7	9.4	9.2	9.1
69	59.5	14.8	14.3	13.8	13.3	12.9	12.5	12.1	11.8	11.4	11.1	10.8	10.5	10.3	10.0	9.8	9.5	9.3	9.1	9.0
72	61.0	14.5	14.0	13.5	13.1	12.7	12.3	11.9	11.6	11.2	10.9	10.6	10.4	10.1	9.9	9.6	9.4	9.2	9.0	8.8
75	62.5	14.2	13.7	13.2	12.8	12.4	12.0	11.7	11.4	11.0	10.8	10.5	10.2	10.0	9.7	9.5	9.3	9.0	8.8	8.7
78	64.0	13.9	13.4	13.0	12.6	12.2	11.8	11.5	11.2	10.9	10.6	10.3	10.1	9.8	9.6	9.3	9.1	8.9	8.7	8.6
81	65.5	13.6	13.2	12.7	12.3	12.0	11.6	11.3	11.0	10.7	10.4	10.2	9.9	9.7	9.4	9.2	9.0	8.8	8.6	8.5
84	67.0	13.3	12.9	12.5	12.1	11.8	11.4	11.1	10.8	10.5	10.3	10.0	9.8	9.5	9.3	9.1	8.9	8.7	8.5	8.4
87	68.5	13.1	12.7	12.3	11.9	11.6	11.2	10.9	10.6	10.4	10.1	9.9	9.6	9.4	9.2	9.0	8.8	8.6	8.4	8.3
90	70.0	12.8	12.4	12.0	11.7	11.4	11.0	10.8	10.5	10.2	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	8.3	8.2



SMARTPARTS

800.922.2147 100 Station St. Loyalhanna, PA 15661 www.smartparts.com manual version 2.0