2004

Excalibur and Viking Manual

Version 3.0
Nov 2003

CONTENTS

Introduction:

Congratulations on purchasing an EXCALIBUR® or VIKING™ paintball marker. We hope you enjoy using this marker. Please read the information in the manual and get familiar with you marker before use.

This manual covers both the EXCALIBUR® and VIKING™ series of paintball markers as well as covering the SIDEWINDER® regulator and the SCM™ low pressure pneumatics regulator. This manual includes information for both the 2000-2003 and the 2004 models of EXCALIBUR® and VIKING™. This manual is a work in progress and will be continuously updated as needed. If you have suggestions to help improve this manual contact us through e-mail and let us know. We decided to place the manual on disk for the simplicity of keeping it up to date and to eliminate paper waste.

The specifications and photographs in this material are for information and general guidance purpose only. Our products are continually updated and changes may be made to specification, design or appearance from time to time. These changes are subject to change without notice. AKALMP reserves the right to revise and improve its products as it sees fit.

I. SAFETY GUIDELINES & INSTRUCTIONS.

SAFETY GUIDELINES & INSTRUCTIONS FOR SAFE HANDLING OF EXCALIBUR® & VIKING™ MARKERS.

- The EXCALIBUR® and VIKING™ are not toys.
- Careless or improper use, including failure to follow instructions in the operators manual, could cause serious injury or death.
- Paintball industry standard head/face/throat/eye/ear protection designed specifically for paintball meeting ASTM standard F1776 must be worn by user and any person within range of any paintball marker.
- Do not shoot at a person at close range.
- Observe all local laws, regulations and guidelines.
- Use only on paintball fields where safety rules are strictly enforced.
- You must be at least 18 years of age to purchase the EXCALIBUR® or VIKING™.

- Individuals under 18 years of age must have adult supervision when using or handling the EXCALIBUR® or VIKING™.
- Use only nitrogen and compressed air from approved storage bottle. Do not use CO2.
- Do not exceed 850 psi input pressure.
- Read operator's manual before use and comply with all safety instructions.
- Use .68 caliber paintballs only.
- Always keep EXCALIBUR® or VIKING™ turned off when not in use.
- Always switch gas source off when EXCALIBUR® or VIKING™ is not in use.
- Treat ever EXCALIBUR® or VIKING™ as if it is loaded.
- Never point the EXCALIBUR® or VIKING™ at anyone or anything you do not intend to shoot.
- Use approved barrel blocking devices on the EXCALIBUR® or VIKING™ when not in use.
- Never shoot at velocities in excess of 300 FPS.
- Never put fingers or any foreign objects into the paintball feed tube.
- Always remove all paintballs from the EXCALIBUR® or VIKING™ when not in use on or off the field.
- Regulators and LPR's can store gas after the bottle has been removed. Always degas EXCALIBUR® or VIKING™ when not in use or before working on the markers.
- When adjusting, servicing or using the Excalibur, ALWAYS WEAR EYE PROTECTION
- Before doing any work to the Excalibur® (pat pend), make sure it is turned off, the air source has been removed, and all paintballs have been removed.
- Seek professional assistance for advice if you are unsure of anything.

II. SPECIFICATIONS.

2000-2003 EXCALIBUR SPECS:

- **Model:** Excalibur®(pat. pending)
- **Version:** A
- **Caliber:** .68
- **Action:** Closed Bolt Electro-pneumatic Operation
- **Gas Source:** Compressed air or Nitrogen
- **Power Supply:** 9 Volt battery
- **ROF (Cyclic Rate):** 13+BPS
- **Standard Barrel Length:** 12.0" Javelin (AC Threads)
- **Length:** 8.0 inches
- **Height:** 8.4 inches (Top of feed tube to bottom of grip)
- **Width:** 1.75 inches
- **Weight:** 3. lbs (Without battery & barrel)
- **Operating Pressure:** 140-180 PSI @ 280 FPS (depending on paint size)
- **Input PSI to SIDEWINDER:** 400-850 PSI
- **Pneumatics Pressure:** 65-85 PSI

Features:

- Tornado® Valve(Pat. #5791328)
- Lightning® Bolt (Delrin) with Quick Release Pin
- Javelin™ Barrel
- 45 Grip
- Wire Ball Detent
- Built-In Vertical Mount
- SIDEWINDER®(pat pend) Vertical Pressure Reg.
- Threaded Vertical Feedtube
- Adjustable Trigger (3 adjustment points)
- Adjustable WAS circuit board
- Adjustable Pneumatics Low Pressure Regulator (LPR).
- Pull Through Cleaning
- Easy Disassembly & Low Maintenance
- Rugged Design
- Barrel Plug
- Carrying Case

2004 EXCALIBUR SPECS:

- **Model:** Excalibur®(pat. pending)
- **Version:** B
- **Caliber:** . 68
- **Action:** Closed Bolt Electro-pneumatic Operation
- **Gas Source:** Compressed air or Nitrogen
- **Power Supply:** 9 Volt battery
- **ROF (Cyclic Rate):** 13+ BPS (unlimited ROF with EYE's)
- **Standard Barrel Length:** 12.0" Javelin (AC Threads)
- **Length:** 7.25 inches
- **Height:** 8.3 inches (Top of feed tube to bottom of grip)
- **Width:** 1.75 inches
- **Weight:** 3 lbs (Without battery & barrel)
- **Operating Pressure:** 140-180 PSI @ 280 FPS (depending on paint size)
- **Input PSI to SIDEWINDER:** 400-900 PSI
- **Pneumatics Pressure:** 65-85 PSI

Features:

- Tornado® Valve(Pat. #5791328)
- Lightning® Bolt (Delrin) with Quick Release Pin
- Javelin™ Barrel
- 45 Grip
- Dual ball Detent for centering the ball in the breech
- Built-In Vertical Mount
- SIDEWINDER®(pat pend) Vertical Pressure Reg.
- AKA Threaded Vertical Feedtube
- Adjustable Trigger (3 adjustment points)
- Adjustable WAS circuit board
- Ready to install Anti-chop eyes.
- Adjustable SCM™ Low Pressure Regulator (LPR).
- Pull Through Cleaning
- Easy Disassembly & Low Maintenance

2001-2003 VIKING™ SPECIFICATIONS:

- **Model:** Viking™(pat pend)
- **Version:** A
- **Caliber:** . 68
- **Action:** Open Bolt Electro-pneumatic Operation
- **Gas Source:** Compressed air or Nitrogen
- **Power Supply:** 9 Volt battery
- **ROF (Cyclic Rate):** 13+BPS (unlimited ROF with EYE's)
- **Standard Barrel Length:** 12.0" Javelin (AC Threads)
- **Length:** 8.0 inches
- **Height:** 8.4 inches (Top of feed tube to bottom of grip)
- **Width:** 1.75 inches
- **Weight:** 3. lbs (Without battery & barrel)
- **Operating Pressure:** 140-180 PSI @ 280 FPS (depending on paint size)
- **Input PSI to SIDEWINDER:** 400-850 PSI
- **Pneumatics Pressure:** 65-85 PSI

Features:

- Tornado®Valve (Pat. #5791328)
- Lightning® Bolt(Delrin) with Quick Release Pin
- Javelin™ Barrel
- 45 Grip
- Wire Ball Detent
- Built-In Vertical Mount
- SIDEWINDER®(pat pend) Vertical Pressure Reg.
- Threaded Vertical Feedtube
- Adjustable Trigger (3 adjustment points)
- Adjustable Equalizer circuit board
- Adjustable Pneumatics Low Pressure Regulator (LPR).
- Pull Through Cleaning
- Easy Disassembly & Low Maintenance
- Rugged Design
- Barrel Blocking Device
- Carrying Case

2004 VIKING™ SPECIFICATIONS:

- **Model:** Viking™(pat pend)
- **Version:**B
- **Caliber:** .68
- **Action:** Open Bolt Electro-pneumatic Operation
- **Gas Source:** Compressed air or Nitrogen
- **Power Supply:** 9 Volt battery
- **ROF (Cyclic Rate):** 13+BPS (unlimited ROF with EYE's)
- **Standard Barrel Length:** 12.0" Javelin (AC Threads)
- **Length:** 7.5 inches
- **Height:** 8.3 inches (Top of feed tube to bottom of grip)
- **Width:** 1.75 inches
- **Weight:** 3. lbs (Without battery & barrel)
- **Operating Pressure:** 140-180 PSI @ 280 FPS (depending on paint size)
- **Input PSI to SIDEWINDER:** 400-850 PSI
- **Pneumatics Pressure:** 65-85 PSI

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- Easy Disassembly & Low Maintenance

III. OPERATING INSTRUCTIONS.

A. POWER SUPPLY:

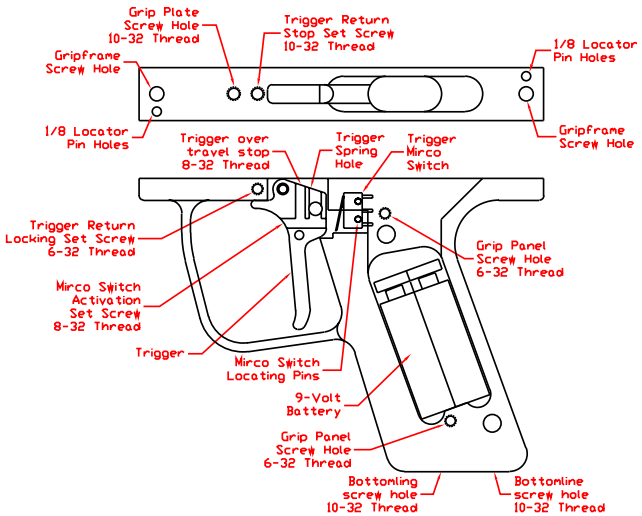
The ECALIBUR® and VIKING™ uses a 9-volt battery stored in the grip as its power supply. For maximum number of shots and velocity stability you should only use high quality alkaline batteries.

Installing a Battery:

Step 1: Make sure the marker is unloaded, de-gassed and turned off. Remove one of the two screws holding the grip panel on the left side of the marker. Rotate the panel out of the way. Remove the 9-volt battery from the battery cable. Make sure not to pull the battery cable apart.

Step 2: Install the new 9-volt battery on the battery cable and place it back into the grip frame. Make sure no wires on the battery cable are pinched. Gently loop the wiring and lay it on the side of the battery.

Step 3: Rotate the grip panel back into place. Then replace the grip panel screw. Your EXCALIBUR® and VIKING™ is now powered and ready to use.



B. COMPRESSED AIR/NITROGEN SUPPLY.

The EXCALIBUR® and VIKING™ are designed to operate on nitrogen or compressed air. It requires a high flow of CLEAN gas. Most adjustable nitrogen systems or preset bottle systems, will work fine. The EXCALIBUR® and VIKING™ are supplied with a SIDEWINDER® regulator which has been designed to work at the low pressure range in which the EXCALIBUR® and VIKING™ operate. The input pressure to the SIDEWINDER® regulator should be 400 to 500psi if you have an adjustable nitrogen system. If you have a preset bottle then the 850 psi input is okay but the Low Pressure 450 nitrogen bottles are better.

CAUTIONS:

Air supplied at fields and tournaments is often dirty if a compressor is used. Scuba air is not always clean either. This dirty air is one reason for paintball guns and regulator failures. Next time your gun or regulator fails at a tournament, stop - before blaming the manufacturer of the paintball gun or regulator, and check your air supply. Some of this dirt eventually ends up in the marker. Electronic markers with solenoid valves are particularly vulnerable to dirt. For this reason, we recommend a portable filter such as the GUARDIAN™ for filling your nitrogen system or a nitrogen system with a built-in filter when using the EXCALIBUR® or VIKING™.

Most metal fittings and steel braided hoses are nickel-plated brass which can leave metal shaving in your marker when you install a hose. Always run air through the hoses and fittings before attaching them to a marker to make sure the air line is clear of debris. Metal shaves can damage the internals of the marker.

Use only steel braided hose and stainless steel quick disconnects or Macro-line. Micro-line restricts airflow and unsafe for use in paintball.

DO NOT USE TEFLON TAPE. Improper use of Teflon tape can result in pieces of tape going through the regulator and into the marker. This can cause blockages and damage to solenoid valves.

Do not use of pro-connects and fittings like those, they restrict airflow which can cause a drop in efficiency or can cause drop off problems while firing the EXCALIBUR® or VIKING™. They do not have a high enough airflow for low pressure markers.

C. Turning "ON" the marker.

1. After making sure the marker is unloaded and de-gassed and you have installed the battery.

2. Turn on the air source. On the EXCALIBUR®, if the bolt is not in its forward position it will now move forward closing the breech. The bolt on the VIKING™ will move to the rear of the marker.

3. Pointing the marker in a safe direction away from you and others. Turn the marker "ON" using the recessed power switch on the side of the marker or in the back of the marker. When the LED starts blinking then the marker is ready to fire.

4. The paintball marker is now ready to fire.

5. Simply point in a safe direction and pull the trigger. Always keep your finger out of the trigger guard when you are not firing the paintball marker.

D. Velocity adjustment.

The velocity of the EXCALIBUR® and VIKING™ is controlled directly through the SIDEWINDER®(pat pend) regulator mounted vertically in front of the trigger frame. The SIDEWINDER®(pat pend) regulator is standard on the EXCALIBUR® and VIKING™ and is adjusted in this fashion while looking at the bottom of the SIDEWINDER®(pat pend) regulator. When making velocity adjustments you should use extremely fine adjustments so as not to go past the desired velocity. If you are unsure where your operating pressure is, simply turn the pressure down until the velocity drops to about 200 fps then slowly turn the pressure back up.

Do not exceed a velocity of 300 FPS.

1. Turning the adjuster screw clockwise will lower the pressure, thus lowering the velocity.

2. Turning the adjuster screw counter-clockwise will increase the pressure raising the velocity.

IV. ELECTRONICS:

Equalizer™

Installation and Usage Manual for

AKA Viking and Excalibur

Equalizer™ is a trademark of Wicked Air Sportz

WICKED AIR SPORTZ

Introduction

Thank you for purchasing the Equalizer™ board. This board is a direct replacement for the stock circuit board found in your AKA marker.

Please read through this **entire** manual **before** you attempt the installation of your Equalizer™ board!

Installation Requirements

To install your Equalizer™ board, you will need the appropriate sized allen wrenches and a flat, clean, work surface.

The installation of the Equalizer™ board is not difficult. If after reading through this manual, you believe you cannot perform the installation, please seek someone who can assist you.

This manual should provide ample information and clarity to install this product.

Warranty Information

The Equalizer™ board carries a limited lifetime warranty. Units subject to improper installation, misuse, abuse, or modifications will not be covered under this warranty.

Wicked Air Sportz may at its discretion either repair or replace the unit. The customer will pay all freight charges to and from Wicked Air Sportz.

All defective units will be returned to the customer via USPS Priority Mail. At the time of printing this manual, this rate is $4.40. This amount must be included with any unit to be repaired, or the unit will be returned UPS COD/ Freight collect.

Liability

By using this product, you agree to hold Wicked Air Sportz free from any type of liability either directly or indirectly due to the use of this product.

SECTION 1 – INSTALLATION

Step 1 – Removing the Grip Frame

Before disassembling the marker, make sure the marker power switch is in the off position.

Remove the two screws that hold the grip frame to the body.

Step 2 – Removing the Circuit Board From the Grip Frame Tray

Two plastic screws are used to hold the circuit board in place. Using the proper size flat tipped screw driver, carefully remove the screws that holds the circuit board in place.

Once the screws are removed, gently pull up on the circuit board assembly to give yourself enough room to grab a hold of it.

Step 3 – Disconnecting/Connecting the Plugs

Carefully remove each connector from the stock board (one by one) and place each connector in the same socket location on the Equalizer board. Refer to Figure 1 for proper plug placement.

Step 4 – Mounting the Board Into the Grip Frame Tray

Carefully press the Equalizer™ into the area designed for the circuit board to fit in. Make sure that you do not pinch any wires in the harness. Line up the holes (opposite corners of the Equalizer™). Now, insert the plastic screws into the holes and tighten the screws until they are just snug. DO NOT OVERTIGHTEN!

Step 5 – Testing the Board

Before reassembling the marker, you should do a quick test to make sure that connections are correct and that the board is working. Making sure that nothing is grounding the grip frame, move the power switch to the on position. If everything is working, you should see the LED light up orange. If this occurs, turn the power switch to the off position and continue to step 6.

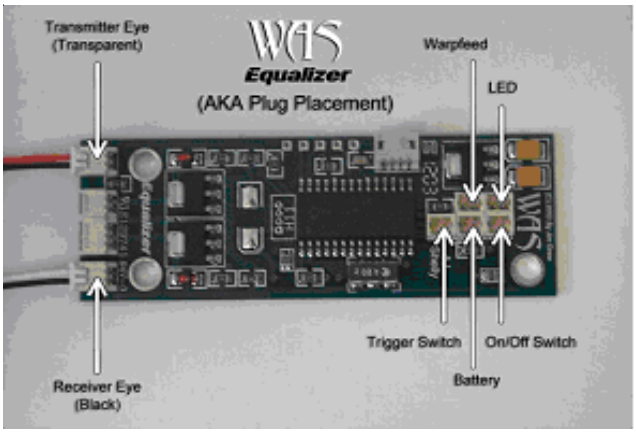
If you don't see the LED light up, make sure your battery is connected. If that is not the problem, then check the connector plugs. If you require further assistance, please email the technical support department (tech@wickedairsportz.com).

Step 6 – Reassemble the Marker

Reassemble your marker by attaching the grip frame to the body, and using the two screws to hold them together.

Congratulations! You have now successfully completed the installation of your Equalizer™ board!

NOTE: The Equalizer board can be used with either the Viking or Excalibur markers. The Equalizer detects which marker it is installed in, and adjusts parameters to handle the different firing sequences and eyes modes.



SECTION 2 – USAGE

The Equalizer™ has numerous features, which can be a bit overwhelming to those that are not use to having so much flexibility.

The Boot Sequence

When the Equalizer™ boots up, the LED will light up orange and then either green (NORMAL mode) or red (COMPETITION mode).

Feature Descriptions

Dwell

Dwell is the amount of time that the solenoid will be activated. This time is measured in milliseconds (1/1000th of a second). The user can alter the Dwell only when in NORMAL mode. In COMPETITION mode, it is not possible to change settings via the trigger programming. The factory default is 8.0ms. Changes can be made in .1ms units via the Equalink.

Increasing your Dwell will increase the velocity of your marker. If you are experiencing a great variance in your chrono results, try increasing your Dwell. If your dwell is too low, consistency will suffer greatly.

Debounce

Debounce is the amount of time the trigger switch must be stable in the up position before checking for another trigger pull. This time is measured in milliseconds. The user can alter the Debounce only when in NORMAL mode. Possible values are from 1ms to 255ms. The factory default is 10ms. Changes are made in 1ms units.

If you find that your marker is double firing, increase the Debounce time. To make your marker fire faster due to being more

responsive to the trigger, decrease the Debounce time.

Remember, if you pull the trigger once and the recoil causes your marker to fire again by itself, it is NO LEGAL for tournament play and is a SEVERE SAFETY HAZARD!

Eye Mode

The Eye Mode is can be set to one of four different modes for the Viking™:

Bypass - The anti-chop system is disabled. When this occurs, the maximum rate of fire is limited to 13 balls per second to help prevent chopping of balls in the breech.

Delayed – This is like the normal method of firing used in the original Intimidator select fire and semi-only boards. If you pull the trigger and noball is found in the breech within ¾ of a second, the marker is fired anyways. If a ball is found before the time expires, the marker will immediately fire (before the ¾ of second time is up). This is the default eye mode.

Forced – In this mode, the marker will not fire unless there is a ball in the breech. In this mode, your marker will not "dry fire" ever. This is the recommended eye mode.

Simulate – In this mode, a ball is simulated to be in the breech. This allows you to fire the marker with just air, at the full speed that the marker is capable of firing! This mode can be used for practicing trigger pull methods, without wasting paint. DO NOT SHOOT PAINT IN THIS MODE!

It is highly recommended that tournament players use the Forced mode. Ifyou have a hopper jam or something hangs up in the feed tube, and you are using Delayed mode, it is possible to chop a ball if one breaks free at the instant the firing sequence starts. Although this is not common, this does happen enough to justify the creation of this mode. The factory default is Delayed.

The Eye Mode can be set to one of four different modes for the Excaliburâ:

Bypass - The anti-chop system is disabled. When this occurs, the maximum rate of fire is limited to 10 balls per second to help prevent chopping of balls in the breech.

Normal – In this mode, the chambered ball will fire (if there is one) and the bolt will open for up to ¾ of a second before automatically closing. If a ball is found before this time expires, the bolt will immediately close. This is the default eye mode.

Classic – In this mode, the chambered ball will fire (if there is one), and the bolt will stay open as long as you keep holding the trigger (just like a stock Autococker).

Sniper – In this mode, the chambered ball will fire (if there is one), and the bolt will not cycle until you release the trigger. When the trigger is released, bolt will open for up to ¾ of a second before automatically closing. If a ball is found before this time expires, the bolt will immediately close.

NOTE: IN ALL CASES, IF YOU DO NOT HAVE AN EYE SYSTEM, THE COMPUTER WILL AUTOMATICALLY SWITCH TO BYPASS MODE!

Hopper Trigger

The Equalizer™ hardware has the ability to generate a positive or negative going pulse, for a duration that is user programmable. Although the Equalizer™

cannot supply power to your hopper to run it (in place of its own batteries), it can provide a trigger that could force activation for a programmable period of time. More information about the interface to the Equalizer™ will be provided in separate documentation. Possible values are .1 to 2.0 seconds, with either a positive or negative going pulse. The factory default is positive pulse, lasting 1.0 second. **This configuration was designed to work directly with the Warpfeed from Air Gun Designs. Changes to these parameters require the Equalink cable.**

LED Colors and Meanings

The LED is a type that can light up in one of 3 different colors. The Equalizer™ uses this to indicate to the user when certain events are occurring. This is a breakdown of what the LED states represent:

- **Solid Green - In or entering programming mode.**
- **Blinking Green - Normal operation, anti-chop system is enabled.**
- **Blinkin g Orange - Normaloperation, anti-chop system is disabled.**
- **Blinking Red - Battery is low.**
- **Red/Green toggle - There is an error with the anti-chop system.**

General Usage Tips

The LED boot sequence is as follows: solid orange (booting), solid green (normal mode) or solid red (competition mode

You can manually bypass the anti-chop system by moving the bolt forward (blocking the infrared beam) and pulling the trigger 3 times. When the anti-chop system is bypassed the LED will blink orange (instead of green).

The first two times you pull the trigger, the LED will toggle red/green to let you know that an error occurred with the anti-chop system. If a shell fragment entered the breech, it could be cleared on the next shot. Thus, disabling the anti-chop system immediately on the first problem is something that the Equalizer™ does not do.

With an eye system, the rate of fire is limited only by how fast the pneumatics will cycle, how fast you can pull the trigger, and how fast your loader can feed your marker.

Because the Equalizer™ can easily exceed the feed rate of standard agitated hoppers, it is recommended that you use an advanced hopper (TurboRev equipped Revolution) or a force-feed type of hopper for the best possible performance.

While in programming mode, the marker's ability to shoot is completely disabled.

Tournament Lock

It is possible to put the Equalizer™ into a tournament lock (COMPETITION) mode. You can do this by making sure the power switch is in the off position, grounding (connecting) the two center pins on the Equalink interface connector, and then moving the power switch to on position. Each time you 'reboot' with the pins grounded, the NORMAL and COMPETITION modes will toggle. The marker will not fire with the jumper in place! Removing the jumper will allow the normal operation of the marker.

Programming the Dwell, Debounce, and Eye Mode Using the Trigger

The Dwell, Debounce, and Eye Mode functions are programmable by following these instructions:

Make sure the power switch is on the off position. During programming, make sure that your marker has a barrel condom in place or the air supply shut off. Although it is not possible to fire the marker while in

programming mode, it is always good to practice safe marker handling.

Pull the trigger, and hold it in the back position. Now, turn the power switch to the on position. The LED will light green. Now, immediately release the trigger. The LED will light red.

Pulling and releasing the trigger will toggle the LED color between red, green, and orange.

Red indicates you are in the Dwell programming mode, green indicates you are in the Debounce programming mode, and orange indicates you are in the Eye Mode programming mode. Once you have reached orange, an additional trigger pull will start the sequence of colors over again. This is also known as the "programming starting point".

When you decide which programming mode you want, pull the trigger and hold it until the LED goes out and then release the trigger. There will be a 2 second pause, and then the LED will flash the same color of the programming mode you are in (red=Dwell, green=Debounce, orange=eye mode).

For the Dwell and Debounce programming modes, each flash represents 1ms (millisecond) of time. For example, if you were programming the Dwell and the settings were the default, you would see the LED flash red 8 times in a row, indicating the dwell is set to 8ms. The flashing of the LED shows you the current setting before **you program it.**

For the Eye Mode programming mode, the total number of flashes represents the mode of the anti-chop system.

Dwell and Debounce

Once the LED stops flashing, you can now pull and release the trigger once for every 1ms of time you want the setting to be. For example, if you were programming the Debounce for 5ms, you would pull and release the trigger 5 times. On each pull of the trigger, the LED will light up (indicating that the pull has been detected). If you have decided not to program this mode, simply do not touch the trigger for 5 seconds. The LED will toggle green/red alternately to indicate there was a programming error, and then go back to the programming starting point.

Eye Mode

Once the LED stops flashing, you can now pull and release the trigger the number of times necessary to set the Eye Mode.

The following is a list of the possible Eye Modes and the flashes (also trigger pulls required):

- **1 flash – Bypassed mode (for Viking and Excalibur)**
- **2 flashes - Delayed mode (Viking) or Normal mode (Excalibur)**
- **3 flashes – Forced mode (Viking) or Class mode (Excalibur)**
- **4 flashes - Simulate mode (Viking) or Sniper mode (Excalibur)**

If you pull and release the trigger more than 4 times, then the LED will toggle green/red alternately to indicate there was a programming error, and then go back to the programming starting point.

Programming Complete

Once you pulled and released the trigger the number of times necessary to set the function, wait a few seconds. The LED will flash red/green/orange in rapid succession (numerous times) to let you know that the new setting has been saved. After this, the

LED will return to the color representing what the current programming mode is. At this point, you can once again press and release the trigger to toggle between Dwell, Debounce, and Eye Mode programming modes.

You can perform a complete reset of the Dwell, Debounce, and Eye Mode to the factory defaults when you are in the program starting point (where you can toggle the programming mode).
To do this, just hold down the trigger for 5 full seconds. It does not matter what programming mode you are currently in (Dwell, Debounce, or Eye Mode). The LED will start flashing red, letting you know that a reset operation is being performed. After this occurs, you will be back to the programming starting point.

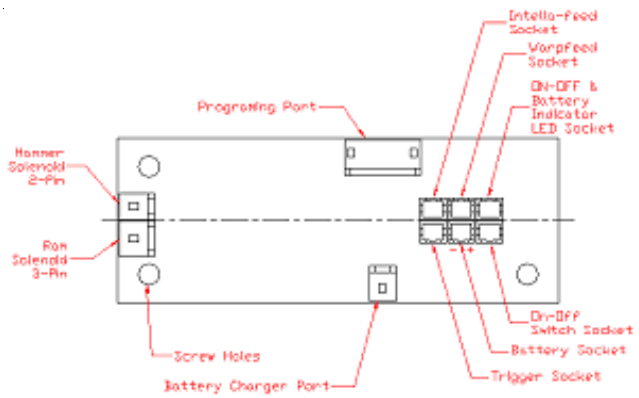
B. NELSON BOARDS.

Note: As of April 2003 these boards are no longer being used or produced for the EXCALIBUR® or VIKING™ this section is only being include as a reference for people still using the old Nelson boards.

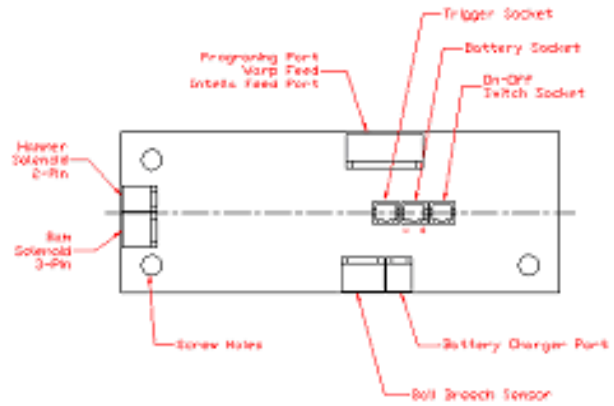
(The Excalibur®(pat pend) is controlled by a state of the art software driven computer board. The board is equipped with many features that are not found on other electronic paintball markers. First the board is equipped with a special voltage regulation and control system not found on any other electronic marker. This system will increase the life span of the battery. The board is made with connectors for every attachment necessary. No soldering of wires is needed. If the trigger micro switch goes bad just unplug it and replace with a new one. The same goes for the battery plug, the LED, the on-off switch, and the solenoid valves. There is also a programming port and a recharging port. When using rechargeable batteries you don't have to remove the battery just use an adaptor and recharge the battery. There is also a port that will support a Warp Feed and an Intella-feed system. The circuit board is protected against moisture, but do not immerse the Viking™(pat pend) in water. The Viking™(pat pend) is tournament legal, as the board operates in semi-automatic mode only.)

Circuit board schematics:

2nd GENERATION NELSON CIRCUIT BOARD.



1st GENERATION NELSON CIRCUIT BOARD.



Rate of Fire adjustment:

The only way for the EXCALIBUR® and VIKING™ parameters to be changed is through adjusting the software via a computer. The only way to adjust the rate of fire is to adjust the dwell settings. This does three things:

First, it allows for very fine adjustment to the dwell settings. You can adjust each parameter a millisecond at a time if you like.

Second, whenever there is an update, instead of having to change the board you can just download the new software.

Third, it makes the marker completely tournament legal since there is no physical way on the board to adjust the firing parameters.

EXCALIBUR® factory dwell parameters:

- Hammer drive: 10ms

The HAMMER DRIVE is the total amount of time that the hammer solenoid stays turned on pushing the hammer forward against the Tornado®(Pat # 5791328) valve thus also opening the valve and releasing air to shoot the paintball.

******NEW, READ CAREFULLY, NEW******

- Hammer Draw Enable: 10ms

This is a new type of dwell setting not

seen before in an electronic paintball marker. This setting is used with a new feature that has been added to the circuit board that increases battery life. This dwell setting is used in conjunction with the hammer drive dwell setting to control the amount of time that the circuit board draws power from the battery to charge the coils on the hammer solenoid and to charge up the capacitors that will continue to power the hammer solenoid after the circuit board stops drawing power from the battery.

Example. The hammer fires for 10 milliseconds and the Hammer Draw Enable dwell is set for 7 milliseconds. This means that during the 10 milliseconds that the hammer is activated the battery is only supplying power to the solenoid for the first 7 milliseconds of the hammer cycle the rest is from the capacitors.

- Hammer release: 5ms

The HAMMER RELEASE is the amount of time after the hammer is fired before the bolt is activated. It delays the activation of the bolt, thus allowing the ball to clear the barrel and eliminates blow back through the feed tube.

- Bolt drive: 55ms

The BOLT DRIVE is the amount of time that the bolt solenoid stays turned on, thus controlling the time that the bolt stays open allowing a ball to drop into the breech.

******NEW, READ CAREFULLY, NEW******

- BOLT Draw Enable: 20ms

This is a new type of dwell setting not seen before in an electronic paintball marker. This setting is used with a new feature that has been added to the circuit board that increases battery life. This dwell setting is used in conjunction with the bolt drive dwell setting to control the amount of time that the circuit board draws power from the battery to charge the coils on the bolt solenoid and to charge up the capacitors that will continue to power the bolt solenoid after the circuit board stops drawing power from the battery.

Example. The bolt fires for 55 milliseconds and the Bolt Draw Enable dwell is set for 20 milliseconds. This means that during the 55 milliseconds that the bolt is activated the battery is only supplying power to the solenoid for the first 20 milliseconds of the bolt cycle the rest is from the capacitors.

- Bolt release: 25ms

The BOLT RELEASE is the amount of time after the bolt solenoid has turned off for the bolt to return to the closed position loading a paintball in the process. This setting allows the bolt to completely close and seal the ball into the barrel of the marker. If this time is set too short the marker may skip during high rate of fire (ROF) and the effectiveness of the ball shot will drop off. You should never have to change this setting.

The software will calculate the max rate of fire with the dwell settings you have chosen. These numbers control the rate of fire of the Excalibur®(pat pend). You can change these numbers directly to change the rate of fire.

VIKING™ factory dwell parameters:

- Hammer drive: 17ms

The HAMMER DRIVE is the total amount of time that the hammer solenoid stays turned on pushing the hammer forward against the Tornado®(Pat # 5791328) valve thus also opening the valve and releasing air to shoot the paintball.

******NEW, READ CAREFULLY, NEW******

- Hammer Draw Enable: 17ms

This is a new type of dwell setting not seen before in an electronic paintball marker. This setting is used with a new feature that has been added to the circuit board that increases battery life. This dwell setting is used in conjunction with the hammer drive dwell setting to control the amount of

time that the circuit board draws power from the battery to charge the coils on the solenoid and to charge up the capacitors that will continue to power the solenoid after the circuit board stops drawing power from the battery.

Example. The hammer fires for 17 milliseconds and the Hammer Draw Enable dwell is set for 10 milliseconds. This means that during the 17 milliseconds that the hammer is activated the battery is only supplying power to the solenoid for the first 10 milliseconds of the hammer cycle the rest is from the capacitors.

- Hammer release: 60ms

The HAMMER RELEASE is the amount of time that the bolt takes to retract and allow a ball to drop into the chamber.

The software will calculate the max rate of fire with the dwell settings you have chosen. These numbers control the rate of fire of the Viking™(pat pend). You can change these numbers directly to change the rate of fire.

Dwell adjustments:
To change the firing parameters of the marker, first make sure the marker is unloaded, de-gassed and turned off. Refer to the programmer instructions.

Warp Feed and Intella feed:
The Warp Feed and Intella-Feed ports allows you to attach the Warp Feed system from Air Guns Designs and/or an Intella-Feed style system to your hopper. If a second board is designed to go into a VL loader that will use the same signal as the Warp Feed system but run the VL loader off of its own power supply this will give you an Intella-feed system.

Removing the circuit board:
To remove the circuit board, simply remove the two screws holding the grip frame and grip plate onto the marker body. Then carefully pull the grip assembly straight away from the marker body. There are two locating pins in the grip plate so the grip plate and grip cannot move sideways. This is why the grip assembly must be pulled straight away from the marker. Then carefully unplug the two solenoid valves from the connector sockets on the circuit board. Place the marker body to the side. Remove the two plastic screws that hold the circuit board to the grip plate. Carefully lift the circuit board out of the grip plate. Unplug the plugs from the connector sockets that are for the trigger switch, battery connector, LED and on-off switch.

When plugging the connectors back in, the order from the back end of the board moving forward is as follows. The on-off switch, then the battery, and finally the trigger switch.

When connecting the solenoids the three-pin connector is the bolt and the two pin connector is the hammer.

Be careful not to pinch or bind the wires. On the battery cable it is best to make a loop and then lay the loop on the side of the battery. This will reduce the movement of the battery and keep the wires from getting damaged.

V. MAINTENANCE.

A. CLEANING.

A clean marker is a happy marker. The barrel on the EXCALIBUR® and VIKING™ can be cleaned during a game by either unscrewing the barrel from the marker or by removing the bolt and swabbing through the marker and the barrel.

The bolt can be field-stripped from the EXCALIBUR® and VIKING™ while the marker is pressurized with gas. This allows you to clean the marker and oil the bolt when needed.

The Excalibur® and VIKING™ should be cleaned externally using a cotton cloth.

All external and internal moving parts should be lubricated using light synthetic oil only. Oil can be added by placing a few drops in the input quick disconnect on the SIDEWINDER®(pat pend) regulator and then dry firing the gun. A few drops should also be placed on the o-rings on the Lightning bolt. **This should be done every time you play, and the bolt should be oiled throughout the day of play.**

Recommended lubricants: Extreme-lube from AKALMP or Palmer Pursuits paintball gun oil. **Under no circumstances should you use Vaseline, WD-40, Grease of any kind (ie. NO DOW 33), Engine Oil, 3-in-1, gun oils, and any similar oils. If you have a question about the type of paintball gun oil you are using e-mail us.**

The electronics are protected against moisture, but the EXCALIBUR® and VIKING™ electronic components should never be immersed in water or damage may occur.

All the threads on the EXCALIBUR® and VIKING™ are American threads. All setscrews are American sizes.

If the EXCALIBUR® is to be stored for more then a few months, remove the valve spring. This will increase the spring's lifespan. It is a good idea to do this with both hammer and valve springs on any paintball gun that is to be stored for a long time.

B. SIDEWINDER®(Pat Pending) REGULATOR.

The SIDEWINDER®(Pat Pend) regulator was originally designed specifically for use on the EXCALIBUR® because of its extremely low operating pressure of approximately 140-180 psi. This regulator will work well on other guns also. The design of the regulator permits the air hose to be connected to the gun in any location the user wishes within a 360 degree circle around the base of the regulator, while still allowing the regulator to be externally adjusted from the bottom. The top end cap of the regulator can be replaced with different length ones to allow the user to adjust total length of the reg.

SIDEWINDER®(pat pend) Specifications:

- **Model:** SIDEWINDER®(pat pend)
- **Version:** B
- **Gas Source:** Compressed air, Nitrogen or CO2
- **Length:** 4.875 inches
- **Width:** 1.00 dia main body/1.125 dia swivel sleeve
- **Weight:** .275 lbs (With quick disconnect)
- **Externally Adjustable Output Pressure:** 0-700 PSI
- **Input pressure:** 0-900 PSI

Adjusting the SIDEWINDER®(pat pend) Regulator:

Decrease output:

Looking at the regulator from the bottom, turn the allen wrench clockwise to decrease the pressure.

Increase output:
Looking at the regulator from the bottom, turn the allen wrench counter clockwise to increase the pressure.

Dead Zone:
Since the SIDEWINDER®(pat pend) regulator was designed to go down to zero psi output, there is space after it reaches zero that the adjuster screw can be turned farther. If you turn the adjuster screw gently until it bottoms out, then it will be 3 to 4 turns counter clockwise until the pressure starts to rise again. This is the dead zone.

Side Notes and Troubleshooting:
Remember to shoot the gun several times after any adjustment to the SIDEWINDER®(pat pend) regulator so you can make sure the velocity stabilizes.

If the regulator creeps in pressure range, check to make sure there is not a piece of debris in between the regulator seat and the regulator piston. If it continues to creep replace the regulator core.

If the regulators pressure drops and then slowly creeps back up the reg. seat may need to be replaced.

When using the SIDEWINDER®(pat pend) with CO2 you will have to oil the regulator on a more regular basis. The CO2 carries the oil away from the moving parts quickly.

Make sure the vent hole on the side of regulator body middle is open and clean. If it is plugged the regulator will not function properly.

The SIDEWINDER®(pat pend) regulator is only designed for a maximum input pressure of 900 psi.

Use only steel braided hose and stainless steel quick disconnects or Macro-line. Micro-line restricts airflow and is unsafe for use in paintball.

Disassembly of SIDEWINDER®(pat pend) Regulator:
To properly disassemble the SIDEWINDER®(pat pend) regulator and not scratch the outside, you will need a few items: Two pieces of 2x4s about 4 inches long, a cloth strap wrench which can purchased at a hardware or automotive store, a bench vise, a good adjustable wrench and a set of allen wrenches. The strap wrench can be used on many different things outside of paintball so its handy to have around. Just follow the instructions and it will be easy.

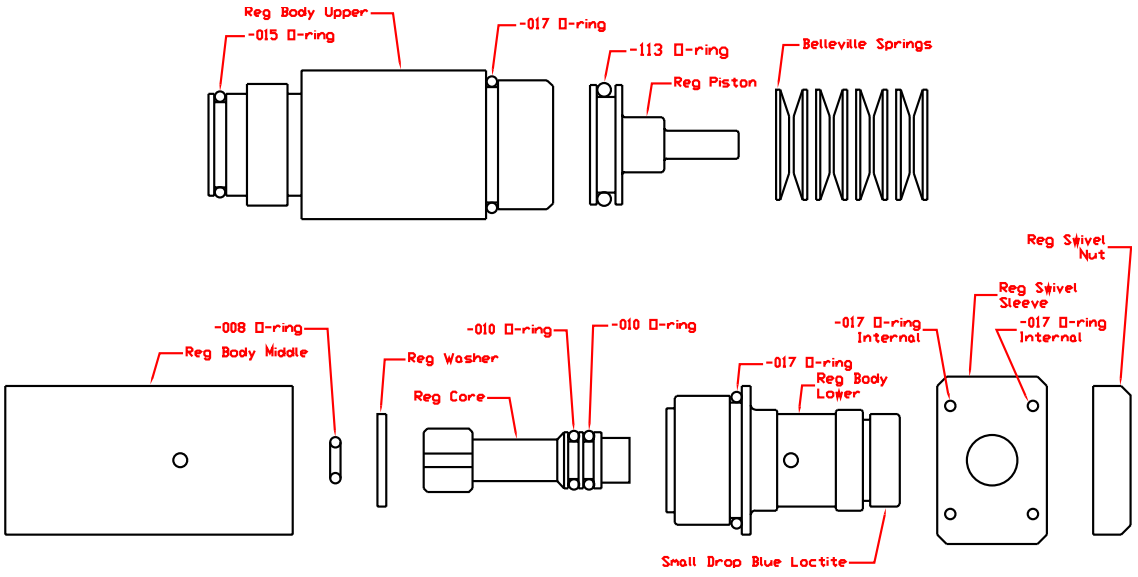
1. Remove all air sources.
2. Clamping the reg. upside down. Clamp the reg. body upper and reg. middle between the two pieces of wood. The wood will keep the regulators outside surface from getting scratched up.
3. Using the adjustable wrench on the swivel nut un-screw the swivel assembly from the bottom of the regulator. Once loose, unscrew the two pieces. Be careful not to lose the reg. washer that is inside this portion of the regulator.
4. Reclamp the regulator between the two pieces of wood, clamp on the reg. body upper. Using the strap wrench loosen the reg. body middle from the reg. body upper. Inspect the o-rings for damage or wear. Replace if needed.
5. Once the two halves are separated you can remove the piston and springs from the regulator body middle. Be careful not to damage the piston or the o-rings. Remember in what order the parts came out of the regulator. Replace o-rings or springs if needed.

6. To disassemble the swivel joint, clamp the threaded end of the swivel between the two pieces of wood. Use the adjustable wrench to loosen the swivel nut. The swivel nut is BLUE LOCTITED in place.
7. Using a gentle twisting action gently pull the swivel sleeve from the regulator body lower. Inspect the o-rings for damage or wear. Replace if needed.
8. Use an allen wrench and unscrew the regulator core from the regulator body lower. The core comes out through the front of the regulator body lower. Do not try backing it out. Be careful not to damage any o-rings. If needed replace the o-rings or if the reg. seat is damaged replace the whole core assembly.
9. You can now replace the major components to the regulator if needed. The regulator goes back together easily. Use the strap wrench to tighten. Do not over-tighten, just snug down and use a drop of blue Loctite on the threads of the swivel nut to keep it tight. When installing the lower swivel assembly keep the regulator upside down so the brass washer stays in the counter-bore inside the reg. body middle. If this is not done damage to the washer and piston may accure.

SIDEWINDER®(pat pend) Parts Chart:
SIDEWINDER®(pat pend) Regulator:

Part:	Qty:	Part Number:
Regulator body upper	1	
-017 o-ring	1	ORB017-0000
-015 o-ring	1	ORU015-0000
Regulator body middle	1	
-008 o-ring	1	ORU008-0000
Regulator piston	1	
-113 o-ring	1	ORU113-0000
Belleville springs	8	
Regulator washer	1	
Regulator Sleeve	1	
-017 o-ring	2	ORB017-0000
Male Quick Disconnect	1	
Regulator body lower	1	
-017 o-ring	1	ORB017-0000
Regulator core	1	
-010 o-ring	2	ORU010-0000
10-32 cap screw	1	

SIDEWINDER® REGULATOR



C. BALL DETENTS.

2004 EXCALIBUR® & VIKING™ BALL DETENT.

The '04 EXCALIBUR® and '04 VIKING™ has been supplied with a dual ball detent to keep paintballs from double feeding and to keep paintballs centered directly in the breech for better detection by eyes when installed.

Replacement of dual ball detent:
The dual ball detent may need cleaning or become worn or broken over time. This is normal. The '04 EXCALIBUR® and '04 VIKING™ detents are available through your local dealers or AKA.

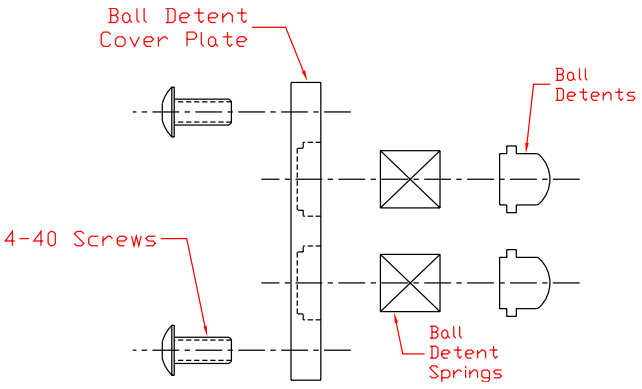
To replace the detent.

1. Remove the two 4-40 button head screws.
2. Lift the cover plate away from the body of the EXCALIBUR® or VIKING™
3. Remove the detent springs.
4. Remove the ball detents.
5. Clean and replace parts that are needed.
6. Re-install the ball detents, the springs, the cover plate and the two screws. Do not over tighten, just snug them down.

Ball Detent Parts Chart:

Part Description:	Qty:	Part Number:
Ball detent cover plate	1	
Plastic ball detents	2	
Detent springs	2	
4-40x.250 Button head screws	2	

2004 EXCALIBUR® and VIKING™ DETENT



2000-2003 EXCALIBUR® and VIKING™ WIRE BALL DETENT.

The EXCALIBUR® and VIKING™ has been supplied with a wire ball detent to keep paintballs from double feeding.

Replacement of ball detent:

The wire ball detent may need cleaning or become worn or broken over time. This is normal. The EXCALIBUR® and VIKING™ uses an F4 wire nubbin. They are available through your local dealers or AKA.

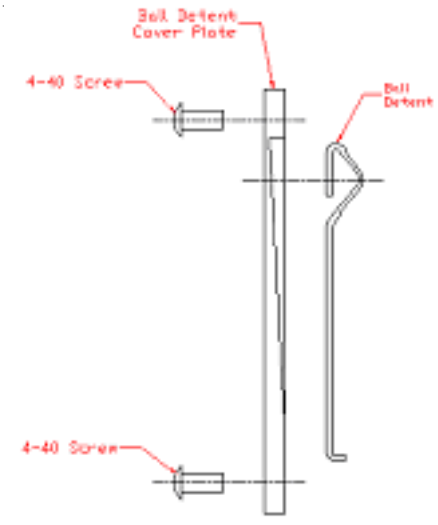
To replace the detent.

1. Remove the two 4-40 button head screws.
2. Lift the cover plate away from the body of the EXCALIBUR® or VIKING™.
3. Remove the detent and replace with a new one.
4. Re-install the cover plate and the two screws. Do not over tighten, just snug them down.

Ball Detent Parts Chart:

Part Description:	Qty:	Part Number:
Ball detent cover plate	1	
F4 ball detent	1	
4-40x.250 button head screws	2	

2000-2003 EXCALIBUR® and VIKING™ WIRE DETENT.



D. SCM™ & LPR's

SCM™ PNEUMATICS REGULATOR: (SODA CAN MOD)

The SCM™ is a modular pressure compensating low pressure regulator that supplies air for the pneumatics of the paintball markers. It can fit a large number of different paintball markers.

The SCM™ pneumatics regulator controls the air pressure fed to the solenoid valves, which in turn operate the rest of the marker. The maximum operating pressure of the solenoid valves is 100 psi., but the components of the EXCALIBUR® and VIKING™ needs only 60-85 psi to operate. Use of the SCM™ pneumatics regulator keeps the solenoid valves from receiving too high a pressure, and will keep them operating properly for many years.

The SCM™ pneumatics regulator is preset to 80-85 psi at the factory and should left at this setting when the marker is brand new. Once the marker is broken in the SCM™ pneumatics regulator can be adjusted down to a lower pressure setting ranging from 60 to 70 psi. If a replacement regulator is installed you need to check the pressure. The regulator cartridge can be removed from the EXCALIBUR® and VIKING™ without causing the pressure settings to change. The adjuster screw is on the front side of the regulator and should never be adjusted on the field or by a non-qualified person.

The pneumatics regulator should be set at 80-85 psi output when the marker is brand new.

Do not adjust the pressure without a gauge, you can easily over- pressurize the system and damage the solenoid valves.

Do not install an external adjusting knob, this is an illegal way of adjusting the velocity. If an SCM™ is sent in for repairs with an external adjusting knob installed, it will be removed and you will be charged for replacement of the Adjusting Cap. THE KNOB WILL NOT BE SENT BACK.

To adjust the SCM™ regulator:

1. De-gas the marker.
2. Unscrew the hammer cartridge or end cap from the back of the marker.
3. Install the pneumatics regulator test chamber into either the hammer tube or the pnuematics tube depending on what marker you are testing. Then install the low pressure gauge on the test chamber.
4. Gas up the marker, set the SIDEWINDER™(pat pend) regulator to and output of 200 psi.
5. Adjust the SCM™ to the desired pressure. Once the correct pressure is achieved, turn the air on and off and cycle the marker several times to make sure the pneumatics regulator stays at the new setting.

Disassembly of the Pneumatics Regulator:

1. Unscrew the pneumatic regulator from the front of the EXCALIBUR® or VIKING™ make sure to look into the vertical mount to verify that you are not clipping any o-rings as you remove the SCM™. Only remove the SCM™ from the marker if you need to change o-rings otherwise

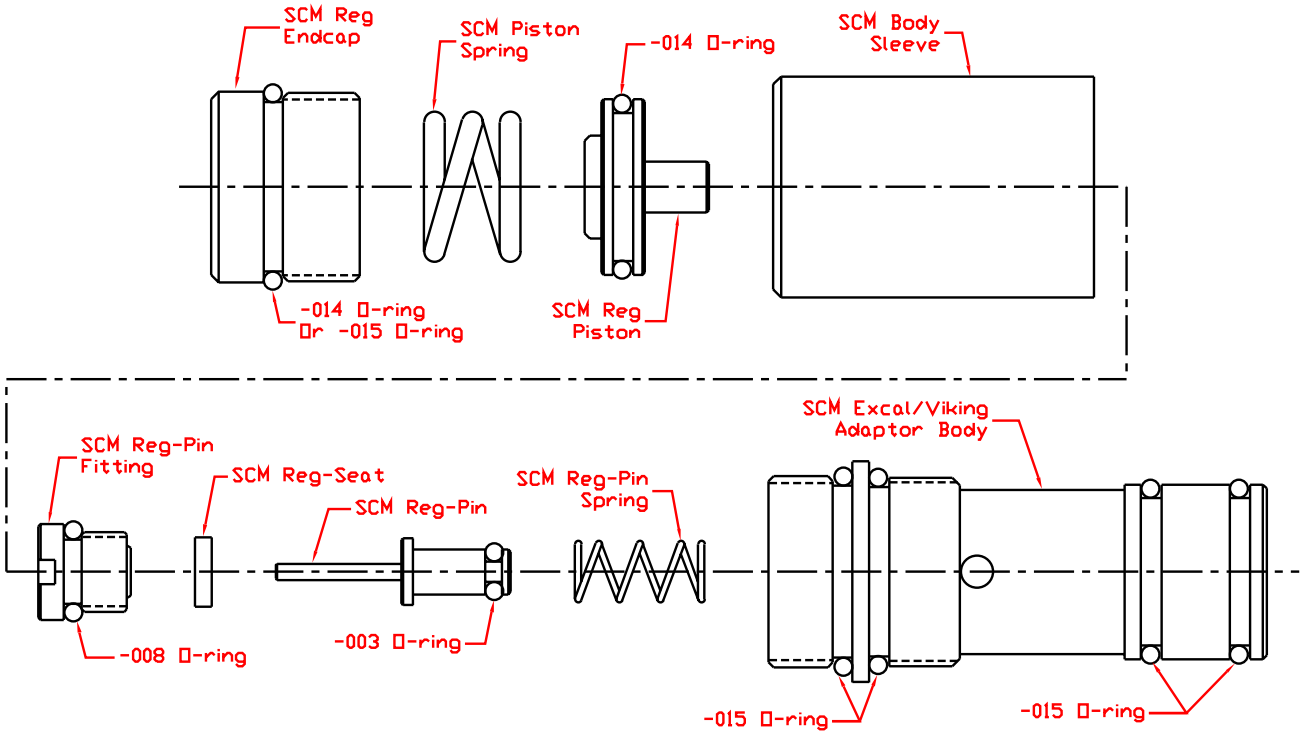
maintenance to the SCM™ can be done on the marker.
2. Unscrew the “Reg End cap” from the front of the SCM™.
3. Using a small set of needle nose pillars gently pull the spring and piston out of the “Body Sleeve”. Now you can change the “Reg Piston” o-ring if needed.
4. Using a SCM™ tool or a small set of needle nose pillars gently unscrew the “Reg-pin Fitting” from the SCM™. The rest of the parts underneath should come with it when you remove it. You can change o-rings and seats at this point.
5. Re-assemble in reverse, and lightly oil the parts as you install them.

Troubleshooting:
Air leaking from the front of the regulator:
1. Check the o-ring around the piston.

SCM™ Reg Parts Chart:

Part:	Qty:	Part Number:
Reg endcap	1	
-014 o-ring Buna	1	ORB014-0000
Reg spring	1	
Reg piston	1	
-014 o-ring	1	ORB014-0000
Body Sleeve	1	
Reg-pin Fitting	1	
-008 O-ring	1	ORU008-0000
Reg-Seat	1	
Reg-pin	1	
-003 O-ring	1	ORB003-0000
Reg-pin Spring	1	
Adaptor Body	1	
-015 O-ring (buna)	2	ORB015-0000
-015 O-ring	2	ORU015-0000

EXCALIBUR® and VIKING™ SCM™.



2000-2003 Stock EXCALIBUR® and VIKING™ LPR

The pneumatics regulator controls the air pressure fed to the solenoid valves, which in turn operate the rest of the gun. The maximum operating pressure of the solenoid valves is 100 psi, but the components of the EXCALIBUR® and VIKING™ needs only 60-85 psi to operate. Use of the pneumatics regulator keeps the solenoid valves from receiving too high a pressure, and will keep them operating properly for many years.

The pneumatics regulator is preset to 80-95 psi at the factory and should left at this setting when the marker is brand new. Once the marker is broken in the pneumatics regulator can be adjusted down to a lower pressure setting ranging from 60 to 70 psi. If a replacement regulator is installed you need to check the pressure. The regulator cartridge can be removed from the EXCALIBUR® and VIKING™ without causing the pressure settings to change. The adjuster screw is on the front side of the regulator and should never be adjusted on the field or by a non-qualified person.

This regulator stores air in the marker when the gas source is shut off. The stored gas is enough to cycle the gun one or two times.

The pneumatics regulator should be set at 80-90 psi. output when the marker is brand new.

Do not adjust the pressure without a gauge, you can easily over- pressurize the system and damage the solenoid valves.

Do not install an external adjusting knob, this is an illegal way of adjusting the velocity. If an Excalibur®(pat pend) is sent in for repairs with an external adjusting knob installed, it will be removed and you will be charged for replacement of the pneumatics regulator core. THE KNOB WILL NOT BE SENT BACK.

To adjust the regulator:

1. De-gas the marker.
2. Unscrew the hammer cartridge from the back of the marker.
3. Install the pneumatics regulator test chamber into the hammer tube. Then install the low pressure gauge on the test chamber.
4. Gas up the marker, set the SIDEWINDER™(pat pend) regulator to and output of 200 psi.
5. Adjust the LPR, once the correct pressure is achieved, turn the air on and off and cycle the marker several times to make sure the pneumatics regulator stays at the new setting.

Disassembly of the Pneumatics Reg:

1. Using the pneumatics reg. removal tool, unscrew the pneumatic reg from the front of the Excalibur®(pat pend).
2. Gently clamp the Pneu-reg body between the two pieces of wood.
3. Use the pneumatic reg removal tool and a wrench and break the BLUE Loctite seal between the two halves.
4. Unscrew the pneu-reg endcap. Remove the

reg-washer and o-ring from the end of the pneu-reg body. You can also unscrew the reg core from the pneu-reg endcap through the back of it, but not through the front.
5. Using snap ring pliers remove the snap ring from the end of the pneu-reg body. (only needed on early version pneumatics regulators)
6. Gently push the reg piston and spring out of the pneu-reg body using something soft like a plastic cap from a ball point pen which will not damage the sealing area of the regulator piston.
7. You can now replace all o-rings and springs, if needed, and reassemble in reverse.

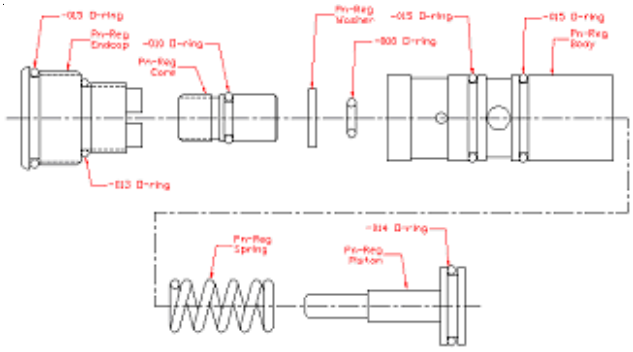
There are two sides to snap rings and it is important which side faces out of the pneu-reg body. One side has squared off, sharp edges and one side has edges that are rolled over. When installing the snap ring make sure the sharp square edge faces to the outside of the pneu-reg body.

Troubleshooting:
Air leaking from the front of the regulator:
- 1. Check the o-rings around the reg-core.

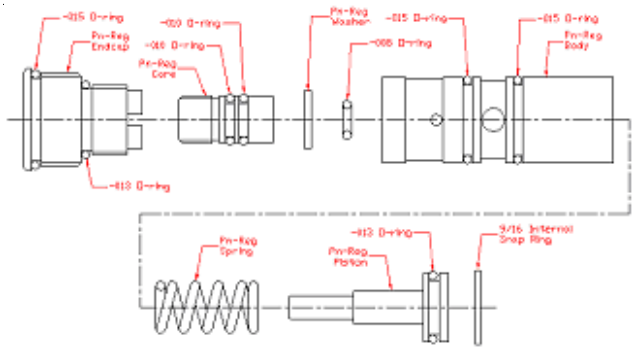
Pneumatics Reg Parts Chart:

Part:	Qty:	Part Number:
Reg endcap	1	
-015 o-ring	1	ORU015-0000
-013 o-ring	1	ORB013-0000
Reg core	1	
-010 o-ring	2	ORU010-0000
10-32 setscrew	1	
Reg washer	1	
Reg body end	1	
-008 o-ring	1	ORU008-0000
-015 o-ring	2	ORU015-0000
Reg piston	1	
reg spring	1	
-013 o-ring	1	ORB013-0000
9/16 internal snap-ring	1	

2002-2003 Pneu-reg



2000-2001 Pneu-reg



E. TORNADO VALVE®(Patent #5791328).

The TORNADO®(pat #5791328) valve is used in the EXCALIBUR®, VIKING™ and MERLIN™. This version of the TORNADO® valve is a bigger, stronger and more efficient version then the original TORNADO® valve designed for the cockers. The TORNADO®(pat #5791328) valve has a lifetime warranty that covers replacement of the valve unless you modify the valve.

Valve stem removal and maintenance:
Remove the valve chamber endcap by unscrewing it from the marker body using the 3-pin wrench in the tool kit. Then slide the endcap out. The valve spring and valve stem should come out with it. This will allow you to change the valve stem if there is a problem.

To remove the valve body:
With the valve chamber endcap, valve spring and valve stem removed. Unscrew the hammer from the back of the EXCALIBUR® or VIKING™. Then unscrew the setscrew on the side of the marker that holds the TORNADO® valve body in place.

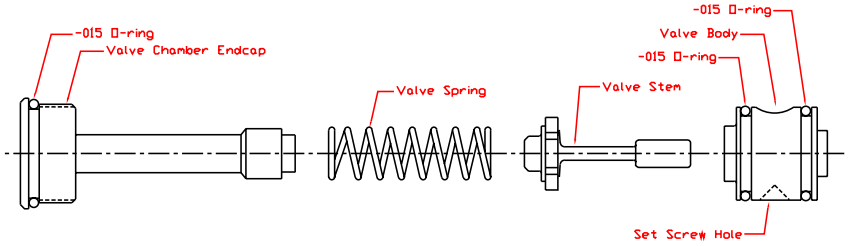
Using a plastic dowel rod, gently push the valve body out either end of the marker. When reinstalling the valve body, use a drop of BLUE Loctite on the setscrew that holds the valve body in the marker.

Troubleshooting:
Air leaking down the barrel:
1. Check the valve stem, it may need to be replaced.
2. Air may be leaking by the o-ring on the valve body. Take a 5/32 allen wrench and loosen the valve retaining setscrew about a 1/8 of a turn. If the leak stops, tighten the screw back. What happens is that the o-ring sometimes shifts just a little and loosening the screw allows it to shift back.

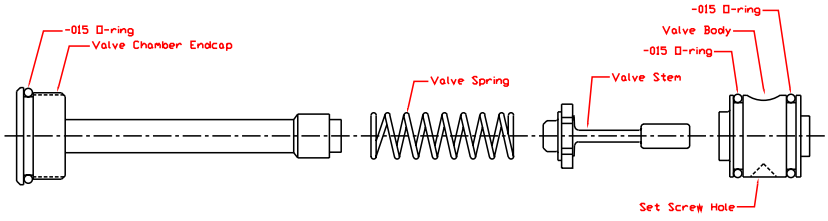
TORNADO® Valve(Patent #5791328) Parts:
2004 EXCALIBUR® and VIKING™

Part:	Qty:	Part Number:
Valve Chamber endcap (Excal)	1	
Valve Chamber endcap (Viking)	1	
-015 o-ring buna 70D	1	ORB015-0000
Valve Spring	1	
Valve Body	1	
valve Stem	1	
-015 o-ring	2	ORU015-0000
5/16-24 setscrew	1	

2004 EXCALIBUR® TORNADO® VALVE & SPRING



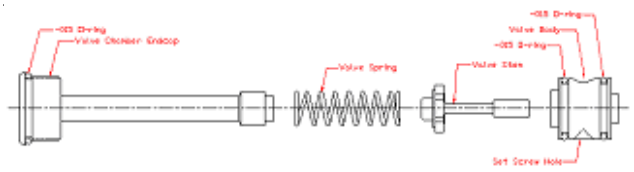
2004 VIKING™ TORNADO® VALVE & SPRING



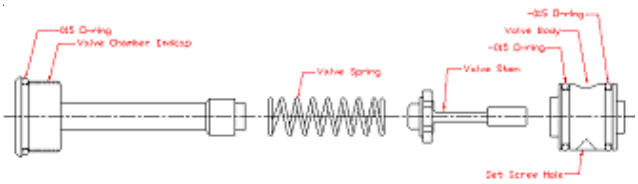
TORNADO® Valve(Patent #5791328)
Parts:
2000-2003 EXCALIBUR® and VIKING™

Part:	Qty:	Part Number:
Valve Chamber endcap (Excal)	1	
Valve Chamber endcap (Viking)	1	
-015 o-ring buna 70D	1	ORB015-0000
Valve Spring	1	
Valve Body	1	
valve Stem	1	
-015 o-ring	2	ORU015-0000
5/16-24 setscrew	1	

2000-2003 EXCALIBUR® TORNADO® VALVE & SPRINGS



2002-2003 VIKING™ TORNADO® VALVE & SPRINGS



F. LIGHTNING® BOLT.

The only part on the EXCALIBUR® and VIKING™ that may experience any possibility of wear is the LIGHTNING® bolt and pull pin. The LIGHTNING® bolt is made of Delrin to help save wear and tear on the gun body. Paintball gelatin is actually very abrasive and can cause wear on the bolt. The pull pin is designed with two flats milled on it. These two flats fit into the H-bar on the ram or hammer, this design reduces wear on the pin.

To remove the bolt:
Pull the bolt pull pin knob straight up from the bolt and gun body. The pin is designed to stay in the bolt. Then, slide the bolt out the back of the marker. To install the bolt, slide it into the bolt bore to the location of the hammer or H-bar.
Then push the bolt pull pin down until it latches into the hammer or H-bar.

The setscrew in the back of the bolt adjusts the tension and locking of the bolt pull pin. You can adjust this to suit your feel. BUT, if you do adjust the tension, do not adjust the tension too loose or the pin may not lock into the hammer or H-bar.

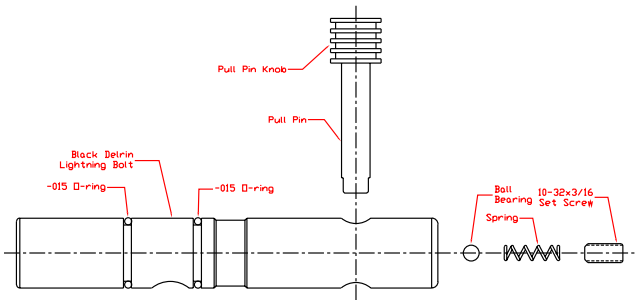
Troubleshooting:
Pull Pin stuck:
1. Check the tension on the ball bearing or ball plunger in the back of the bolt, it may be adjusted to tight.

Bolt not sliding smoothly:
1. Check the o-rings on the bolt to make sure they are not swollen. Replace them or properly oil them. Make sure bolt and bolt bore is clean.

2004 Excalibur® Bolt Parts:

Part Description:	Qty:	Part Number:
Black Delrin Lightning™ bolt	1	
-015 o-rings (buna)	2	ORB015-0000
5/32 ball bearing	1	
Spring (short)	1	
10-32x3/8 Setscrew	1	
pull pin w/ knob	1	

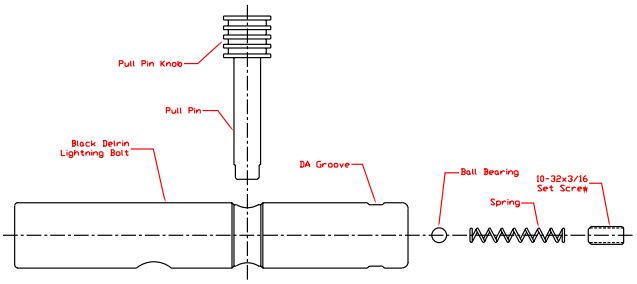
2004 EXCALIBUR® BOLT



2004 Viking™ Bolt Parts:

Part Description:	Qty:	Part Number:
Black Delrin Lightning™ bolt	1	
5/32 ball bearing	1	
Spring (long)	1	
10-32x3/8 Setscrew	1	
pull pin w/ knob	1	

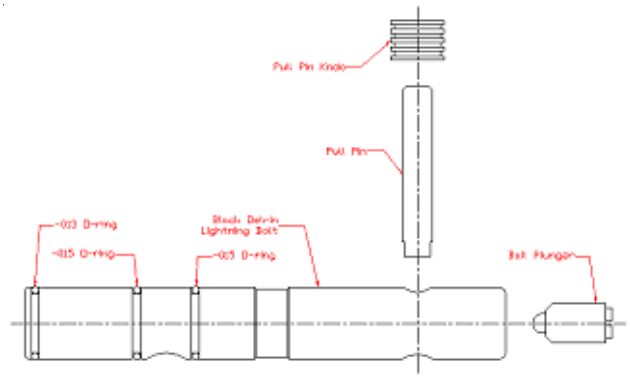
2004 VIKING™ BOLT



2000-2003 Excalibur® Bolt Parts:

Part Description:	Qty:	Part Number:
Black Delrin Lightning™ bolt	1	
-015 o-rings	2	ORB015-0000
-013 o-ring	1	ORB013-0000
ball plunger	1	
pull pin w/ knob	1	

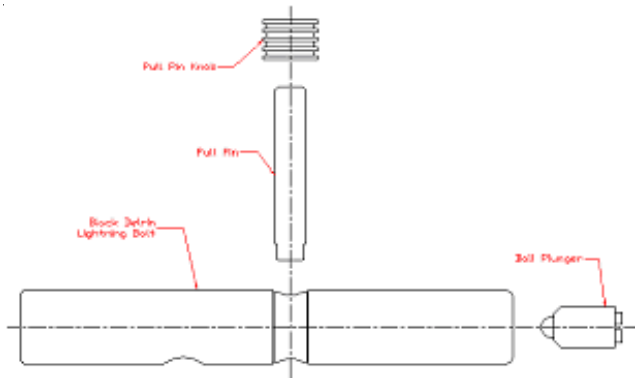
2000-2003 EXCALIBUR® BOLT



2002-2003 Viking™ Bolt Parts:

Part Description:	Qty:	Part Number:
Black Delrin Lightning™ bolt	1	
ball plunger	1	
pull pin w/ knob	1	

2002-2003 VIKING™ BOLT



G. 2004 EXCALIBUR HAMMER.

Mechanical Hammer adjustment:
There is no mechanical adjustment to the hammer itself. Simply screw the hammer cartridge in until it stops against the body.

Hammer maintenance:
The '04 EXCALIBUR's hammer uses 2 quad-rings instead of o-rings. This gives the hammer a smoother action. It is important to keep the quad-ring on the hammer in good working order and properly oiled when needed.

If the quad-rings need to be replaced pull the hammer cartridge out of the EXCALIBUR®. Using the pneumatics reg removal wrench and unscrew the hammer cartridge. Then gently pull it out the back of the EXCALIBUR®(pat pend).

Using a 5/8 wrench and the pneumatics reg removal wrench loosen the hammer endcap. Unscrew the endcap from the hammer cartridge and gently pull the pieces apart. You can now replace the quad-rings if needed.

Re-assemble in reverse order. Oil the quad-rings when you re-assemble the hammer also use a small drop of blue-loctite on the threads that hold the hammer cap on the hammer cartridge to keep the hammer cap from coming loose.

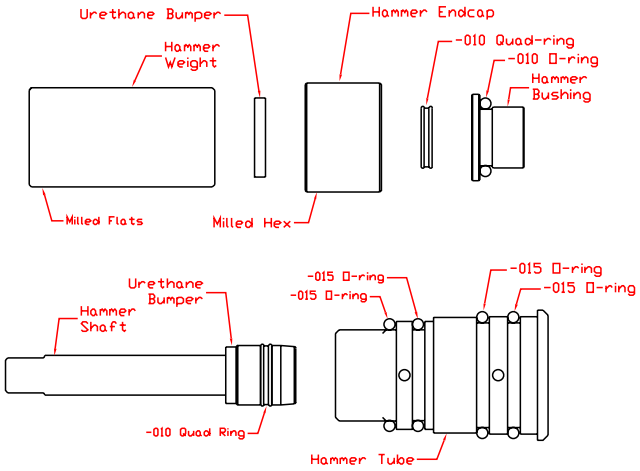
Troubleshooting:
Air leaking from solenoid:
1. Check the solenoid valve, it may need to be replaced.
2. Check the hammer piston quad-ring. Air may be leaking around it. If air is leaking around it, replace the hammer piston quad-ring.

Air leaking around the front of the hammer:
1. Check the quad-ring seal around the hammer shaft. It may need to be replaced.
2. Check the o-rings on the outside of the cartridge.

'04 Excalibur® Hammer Parts:

Part:	Qty:	Part Number:
Hammer Weight	1	
Hammer Endcap	1	
Urethane bumper	1	
-010 quad-ring	1	
Hammer Bushing	1	
-010 o-ring	1	ORU010-0000
Hammer Shaft	1	
-010 quad-ring	1	
Urethane bumper	1	
Hammer tube	1	
-015 o-ring	4	ORU015-0000

2004 EXCALIBUR® HAMMER



2000-2003 EXCALIBUR HAMMER.
Mechanical Hammer adjustment:
There is no mechanical adjustment to the hammer itself. Simply screw the hammer cartridge in until it stops against the body.

Hammer maintenance:
The o-ring on the hammer piston is sized to maintain a constant friction to the inside of the bore of the hammer cartridge. Keeping a constant friction on the bore is important to keep a consistent velocity. If the o-ring wears out, the friction will change and in turn change the consistency of force with which the hammer strikes the valve. So, it is important to keep that o-ring in good order and properly oiled.

To pull the hammer cartridge out of the marker: Use the pneumatics reg removal wrench and unscrew the hammer cartridge. Then gently pull it out the back of the EXCALIBUR®(pat pend).

Use the hammer spanner wrench and an allen wrench to loosen the hammer endcap. Unscrew the endcap from the hammer cartridge and gently pull pieces apart. You can now replace the o-rings. Re-assemble in reverse order.

Carefully re-install everything and tighten down the hammer endcap. Be careful not to

over-tighten. Make sure the -013 o-ring on the endcap is in good condition. It will keep the nose from coming loose. You will also want to put a small drop of BLUE Loctite on the threads as you re-assemble the hammer cartridge.

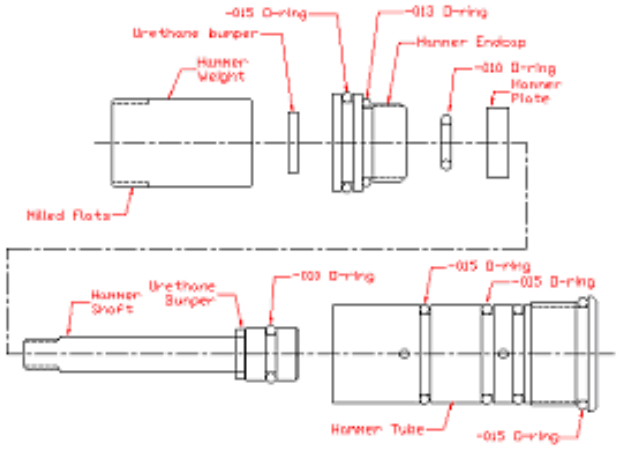
Troubleshooting:
Air leaking from solenoid:
1. Check the solenoid valve, it may need to be replaced.
2. Check the hammer piston o-ring. Air may be leaking around it. If air is leaking around it, replace the hammer piston o-ring.

Air leaking around the front of the hammer:
1. Check the o-ring seal around the hammer shaft. It may need to be replaced.
2. Check the o-rings on the outside of the cartridge.

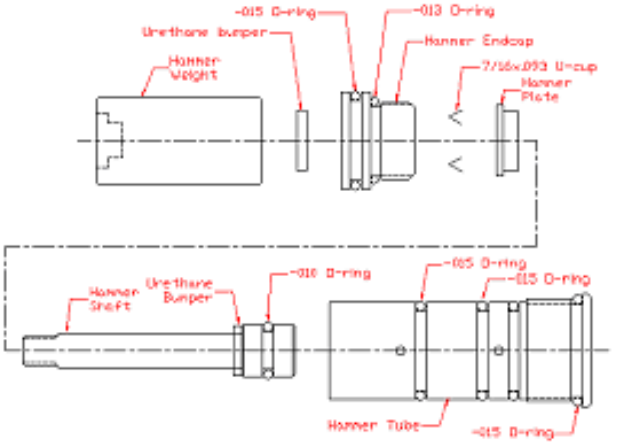
2000-2003 EXCALIBUR® Hammer Parts:

Part:	Qty:	Part Number:
Hammer Weight	1	
Hammer Endcap	1	
Urethane bumper	1	
-013 o-ring	1	ORU013-0000
-015 o-ring	1	ORU015-0000
-010 o-ring	1	ORU010-0000
Hammer Plate	1	
Hammer Shaft	1	
-010 o-ring	1	ORU010-0000
Urethane bumper	1	
Hammer tube	1	
-015 o-ring	4	ORU015-0000

2001-2003 EXCALIBUR® Hammer



2000-2001 EXCALIBUR® Hammer



H. 2004 VIKING™ HAMMER.

Mechanical Hammer adjustment:
There is no mechanical adjustment to the hammer itself. Simply screw the hammer cartridge in until it stops against the body.

Hammer maintenance:
The '04 VIKING™ hammer uses 2 quad-rings instead of o-rings. This gives the hammer a smoother action. It is important to keep the quad-ring on the hammer in good working order and properly oiled when needed.

If the quad-rings need to be replaced pull the hammer cartridge out of the VIKING™. To pull the hammer cartridge out of the marker: Use the pneumatics reg removal wrench and unscrew the hammer cartridge. Then gently

pull it out the back of the VIKING™(pat pend).

Using a 5/8 wrench and the pneumatics reg removal wrench loosen the hammer endcap. Unscrew the endcap from the hammer cartridge and gently pull the pieces apart. You can now replace the quad-rings if needed. Re-assemble in reverse order. Oil the quad-rings when you re-assemble the hammer also use a small drop of blue Loctite on the threads that hold the hammer cap on the hammer cartridge to keep the hammer cap from coming loose.

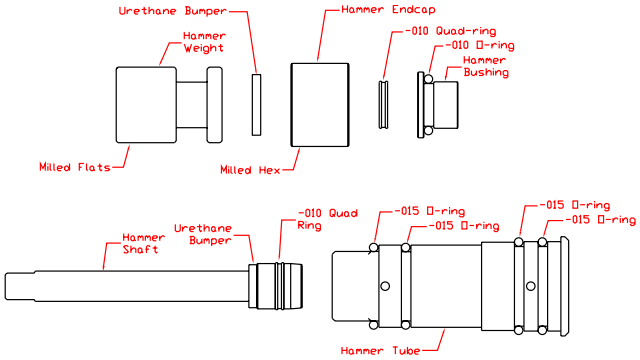
Troubleshooting:
Air leaking from solenoid:
1. Check the solenoid valve, it may need to be replaced.
2. Check the hammer piston o-ring. Air may be leaking around it. If air is leaking around it, replace the hammer piston o-ring.

Air leaking around the front of the hammer:
1. Check the u-cup or o-ring seal around the hammer shaft. It may need to be replaced.
2. Check the o-rings on the outside of the cartridge.

2004 VIKING™ Hammer Parts:

Part:	Qty:	Part Number:
Hammer Weight	1	
Hammer Endcap	1	
Urethane bumper	1	
-010 quad-ring	1	
Hammer Bushing	1	
-010 o-ring	1	ORU010-0000
Hammer Shaft	1	
-010 quad-ring	1	
Urethane bumper	1	
Hammer tube	1	
-015 o-ring	4	ORU015-0000

2004 VIKING™ HAMMER



2002-2003 VIKING™ HAMMER.
Mechanical Hammer adjustment:
There is no mechanical adjustment to the hammer itself. Simply screw the hammer cartridge in until it stops against the body.

Hammer maintenance:
The o-ring on the hammer piston is sized to maintain a constant friction to the inside of the bore of the hammer cartridge. Keeping a constant friction on the bore is important to keep a consistent velocity. If the o-ring wears out, the fricton will change and in turn change the consistency of force with which the hammer strikes the valve. So, it is important to keep that o-ring in good order and properly oiled.

To pull the hammer cartridge out of the marker: Use the pneumatics reg removal wrench and unscrew the hammer cartridge. Then gently pull it out the back of the Viking™(pat pend).

Use the hammer spanner wrench and an allen wrench to loosen the hammer endcap. Unscrew the endcap from the hammer cartridge and gently pull pieces apart. You can now replace all the o-rings. Re-assemble in reverse order.

Carefully re-install everything and tighten down the hammer endcap. Be careful not to over-tighten. Make sure the -013 o-ring on the endcap is in good condition. It will keep the nose from coming loose. You will also want to

put a small drop of BLUE Loctite on the threads as you re-assemble the hammer cartridge.

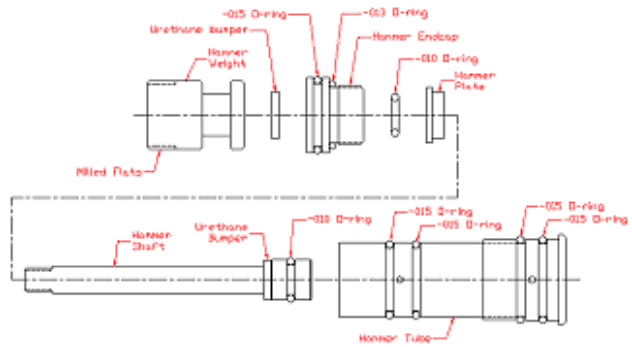
Troubleshooting:
Air leaking from solenoid:
1. Check the solenoid valve, it may need to be replaced.
2. Check the hammer piston o-ring. Air may be leaking around it. If air is leaking around it, replace the hammer piston o-ring.

Air leaking around the front of the hammer:
1. Check the u-cup or o-ring seal around the hammer shaft. It may need to be replaced.
2. Check the o-rings on the outside of the cartridge.

2002-2003 VIKING™ Hammer Parts:

Part:	Qty:	Part Number:
Hammer Weight	1	
Hammer Endcap	1	
Urethane bumper	1	
-013 o-ring	1	ORU013-0000
-015 o-ring	1	ORU015-0000
-010 o-ring	1	ORU010-0000
Hammer Plate	1	
Hammer Shaft	1	
-010 o-ring	1	ORU010-0000
Urethane bumper	1	
Hammer tube	1	
-015 o-ring	4	ORU015-0000

2002-2003 VIKING™ HAMMER.



I. 2004 EXCALIBUR® RAM.

Removal of Ram:
De-gas the marker and remove all paint. Remove the bolt, the body endcap, and SCM™ pneumatics regulator. Then remove the ram retaining pin that holds the ram in place. Using a plastic dowel rod, gently push the ram out through the back of the marker body.

Disassembly.
Insert a 1/4" dia metal rod in the ram retaining pin hole on the body of the ram cartridge. You may have to polish the 1/4" rod just a little to get it to fit properly. Then, using a 5/8 wrench, unscrew the front endcap from the ram tube by using the 1/4" dia rod to turn the ram tube. Pull the two halves apart. You can now replace the two Quad-rings if need be. Re-assemble in reverse order. Oil the quad-rings when you re-assemble the ram also use a small drop of blue-loctite on the threads that hold the endcap on the ram cartridge to keep the endcap from coming loose.

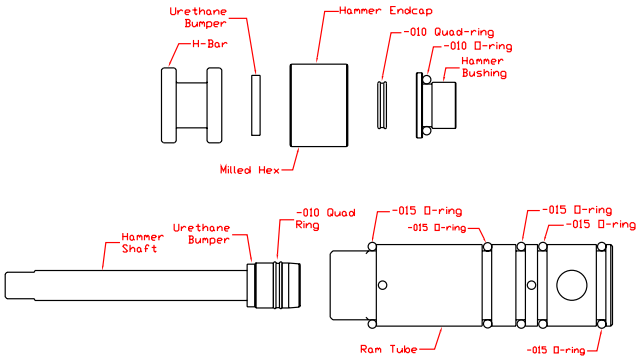
When you re-install the ram it is a must that you use BLUE loctite on the ram retaining pin threads to keep it from coming loose when the gun is in use. Do not over-tighten the ram retaining pin.

Troubleshooting:
Air leaking from solenoid:
1. Check the solenoid valve, it may need to be replaced.
2. Check the ram piston quad-ring. Air may be leaking around it. If air is leaking around it, replace the ram quad-ring.

2004 EXCALIBUR® Ram Parts:

Part Description:	Qty:	Part Number:
H-bar	1	
Ram Endcap	1	
Urethane bumper	1	
-010 quad-ring	1	
Ram Bushing	1	
-010 o-ring	1	ORU010-0000
Ram Shaft	1	
-010 quad-ring	1	
Urethane bumper	1	
Ram tube	1	
-015 o-ring	5	ORU015-0000
Ram Retaining Pin	1	

2004 EXCALIBUR® Ram



2000-2003 EXCALIBUR RAM.

Removal of Pneumatic Cyclinder (ie: the Ram):

De-gas the marker and remove all paint. Remove the bolt, the body endcap, and pneumatics regulator. Then remove the ram retaining pin that holds the ram in place. Using a plastic dowel rod, gently push the ram out through the back of the marker body.

Disassembly.

Insert a 1/4" dia metal rod in the setscrew pin hole. You may have to polish the 1/4" rod just a little to get it to fit properly. Then, using an adjustable wrench, unscrew the front nose from the ram tube by using the 1/4" dia rod to turn the ram tube. Pull the two halves apart. You can now replace most of the O-rings and U-cups if need be. Reassemble in reverse and tighten down gently. You must use a small drop of BLUE Loctite on the threads to keep everything tight. When you re-install the ram it is a must that you use BLUE Loctite on the ram retaining pin threads to keep it from coming loose when the gun is in use. Do not over-tighten the ram retaining pin.

Troubleshooting:

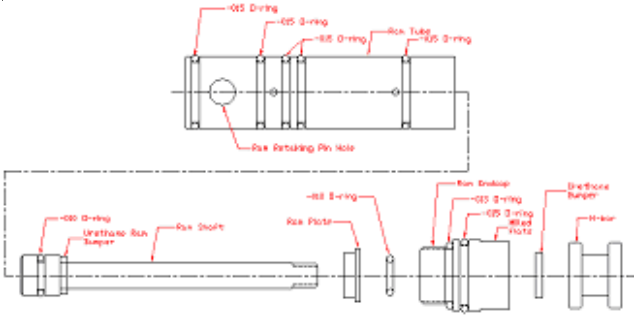
Air leaking from solenoid:

1. Check the solenoid valve, it may need to be replaced.
2. Check the ram piston o-ring. Air may be leaking around it. If air is leaking around it, replace the ram piston o-ring.

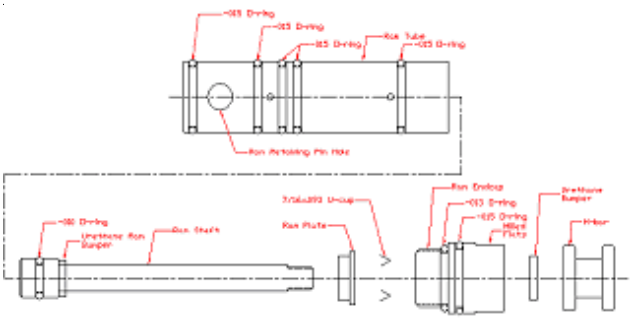
2000-2003 EXCALIBUR Ram Parts:

Part Description:	Qty:	Part Number:
Ram tube	1	
-015 o-ring	5	ORU015-0000
Ram Shaft	1	
Urethane bumper	1	
-010 o-ring	1	ORU010-0000
Ram Plate	1	
Ram Encap	1	
-015 o-ring	1	ORU015-0000
7/16x.093 u-cup	1	
-010 o-ring	1	ORU010-0000
-013 o-ring	1	ORB013-0000
Urethane bumper	1	
H-bar	1	
Ram Retaining Pin	1	

2001-2003 EXCALIBUR® Ram



2000-2001 EXCALIBUR® Ram



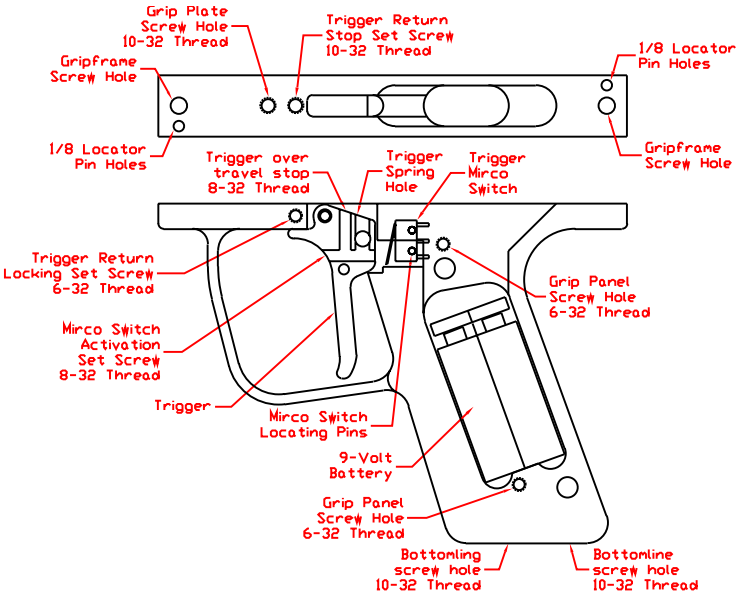
J. TRIGGER FRAME.

Adjusting the trigger pull:

There are 3 set screws for adjusting the total trigger movement: (1) forward stop, (1) rearward stop and (1) micro-switch activation screw.

When adjusting the trigger, start with the forward and rearward trigger stops. Adjust the trigger until you have the amount of movement you want. Then adjust the micro-switch screw until it activates the micro-switch during the trigger pull. Make sure to use a small amount of BLUE Loctite to keep the setscrews from coming loose. Whenever you make any adjustments to the trigger you should always make sure the micro-switch activates when you pull the trigger and re-sets when you release the trigger.

EXCALIBUR® & VIKING™ GRIPFRAME



When adjusting the spring tension on the trigger, it is best to leave some spring tension so normal movement during play will not accidentally activate the trigger. The spring can be interchanged with those used on AC™ triggers so you can personalize it to your own spring tension.

****Do not cut the trigger guard off.****

Troubleshooting:

The electronics are on but the gun won't fire.
1. Check to make sure that none of the trigger setscrews have moved out of adjustment.

Grip frame and trigger Parts:

Part:	Qty:	Part Number:
Grip frame (Double trig.)	1	
Blade trigger	1	
6-32 setscrew	1	
8-32 setscrew	2	
8-32 setscrew	1	
10-32 setscrew	1	
1/8 dia pin (short trigger pin)	1	
1/8 dia pin (long grip tray pins)	2	
6-32 button head screws	4	
10-32 button head screw	1	
Grip panels	2	

K. SOLENOID VALVES.

2004 EXCALIBUR® and VIKING™ SOLENOID VALVES.

Removal of the solenoid valves:
Remove the grip frame and grip plate as one piece. Carefully pull the grip and grip plate straight away from the body. The grip plate locates on two pins in the marker body.

Carefully unplug the solenoid valves from the circuit board. Using an allen wrench, remove the screws holding solenoid valve you want to replace. Lift the valve and manifold straight out of the marker body. Be careful not to lose the small o-rings that seal the solenoid to the body.

Place the o-rings back into the o-ring grooves on the body. Place the correct solenoid valve on the solenoid valve mounting bosses and tighten down screws. The hammer solenoid valve cannot be installed in the bolt socket and the bolt solenoid valve cannot be installed in the hammer socket. **Do not over tighten the screws.**

Plug the solenoid valve back into the circuit board and gently put the grip frame back onto the marker making sure not to pinch any wires. Re-install the grip frame screws.

Do not try to work on the solenoid valves. Do not try to exchange parts from one solenoid to another. The parts on the solenoid valves are matched to each other when they are assembled at the factory and can not be mixed with other valves. If the solenoid valves parts are mixed they may not work properly.

Troubleshooting:
Air leaking from the solenoid valve:
1. Check the o-rings sealing the valve to the body.
2. Check to see if the air is leaking through the solenoid valve. If air is leaking through the valve, replace the valve or check the o-rings of the hammer or ram.

L. SCREWS & O-RINGS

There are various screws and o-rings used in the EXCALIBUR®, VIKING™, SIDEWINDER® and SCM™ this list is for reference. If you are unsure which o-ring or screw to use check with a certified airsmith.

SIDEWINDER® O-rings:
-008 o-ring
-010 o-ring
-015 o-ring
-017 o-ring
-113 o-ring

SCM™ O-rings:
-003 o-ring
-008 o-ring
-014 o-ring
-015 o-ring

2004 EXCALIBUR® and VIKING™ O-rings.
Serial # 1500+
3.3x1.0mm o-ring
-008 o-ring
-010 o-ring
-010 quad ring
-015 o-ring

2004 EXCALIBUR® Screws & Pins.

Serial # 1500+

Quanity:	Type:	Location:
1	5/16-24 x .3125 setscrew	valve retaining screw
2	10-32 x 1.000 Button head screws	grip frame
4	6-32 x .250 Button head screws	grip panels
1	10-32 x .375 setscrew	trigger stop
2	8-32 x .5 Setscrews	trigger stop
1	6-32 x .250 setscrew	trigger stop lock
1	10-32 x .375 button head screw	grip plate/frame
4	4-40 x .5 button head screws	solenoid valves
4	4-40 x .250 button head screws	detent cover/on-off switch
4	4-40 x .187 button head screws	data cover/solenoid valves
1	10-32 x .1875 setscrews	pneumatics air passage plug
1	5/16-24 x 1.125 modified setscrew	ram pin
2	4-40 x .250 plastic flat head screws	circuit board
3	8-32 x .1875 setscrews	air passage plug
1	1/4-20 x .250 setscrew	air passage plug
2	1/8 x .750 dowel pins	grip alignment pins
1	1/8 x .500 dowel pin	trigger pivot pin
2	2x18mm pins	micro-switch pins

2004 VIKING™ Screws and Pins.

Serial # 1500+

Quantity:	Type:	Location:
1	5/16-24 x .3125 setscrew	valve retaining screw
2	10-32 x 1.000 Button head screws	grip frame
4	6-32 x .250 Button head screws	grip panels
1	10-32 x .375 setscrew	trigger stop
2	8-32 x .5 setscrews	trigger stop
1	6-32 x .250 setscrew	trigger stop lock
1	10-32 x .375 button head screw	grip plate/frame
2	4-40 x .5 button head screws	solenoid valves
4	4-40 x .250 button head screws	detent cover/on-off switch
4	4-40 x .187 button head screws	data cover/solenoid valve
1	10-32 x .1875 setscrews	pneumatics air passage plug
2	4-40 x .250 plastic flat head screws	circuit board
3	8-32 x .1875 setscrews	air passage plug
2	1/8 x .750 dowel pins	grip alignment pins
1	1/8 x .500 dowel pin	trigger pivot pin
2	2x18mm pins	micro-switch pins

2000-2003 EXCALIBUR® Screws and Pins.

Quantity:	Type:	Location:
1	5/16-24 x .3125 setscrews	valve retaining screw
2	10-32 x 1.000 Button head screws	grip frame
4	6-32 x .250 Button head screws	grip panels
1	10-32 x .375 setscrew	trigger stop
2	8-32 x .500 Setscrew	trigger stop
1	6-32 x .250 setscrew	trigger stop lock
1	8-32 x .125 setscrew	pivot pin screw
1	10-32 x .375 button head screw	grip plate/frame
4	4-40 x .5 button head screws	solenoid valves
2	4-40 x .250 button head screws	detent cover plates
4	4-40 x .187 button head screws	electronics cover plates
1	10-32 x .1875 setscrews	air passage plug
1	5/16-24 x 1.125 setscrew	ram pin
2	4-40 x .250 plastic flat head screws	circuit board
2	2-56 x .1875 cap head screws	on-off switch
2	8-32 x .1875 setscrews	air passage plug
1	8-32 x .500 setscrew	air passage plug
1	1/4-20 x .500 setscrew	air passage plug
2	1/8 x .750 pins	grip alignment pins
1	1/8 x .500 pin	trigger pivot pin
2	2x18mm pins	micro-switch pins

2002-2003 VIKING™ Screws and Pins.

Quantity:	Type:	Location:
1	5/16-24 x .3125 setscrews	valve
2	10-32 x 1.000 Button head	grip
4	6-32 x .250 Button head	grip panels
1	10-32 x .375 setscrews	trigger stop
2	8-32 x .500 Setscrews	trigger stop
1	6-32 x .250 setscrew	trigger stop lock
1	8-32 x .125 setscrew	pivot pin screw
1	10-32 x .375 button head	grip plate/frame
2	4-40 x .5 button head	solenoid valves
2	4-40 x .250 button head	detent cover plates
4	4-40 x .187 button head	electronics cover plates
1	10-32 x .1875 setscrew	air passage plug
2	4-40 x .250 plastic flat head screws	circuit board
2	2-56 x .1875 cap head screws	on-off switch
2	8-32 x .1875 setscrew	air passage plug
2	1/8 x .750 pins	grip alignment pins
1	1/8 x .500 pin	trigger pivot pin
2	2x18mm pins	micro-switch pins

VI. TROUBLESHOOTING

Troubleshooting:

EXCALIBUR® or VIKING™ will not fire.

- Is there a battery in the marker?
- Is there air/nitrogen or CO2 gas present?
- Was the compressed air or nitrogen clean?
- Is the marker turned on?
- Is the trigger adjusted correctly?
- Is the bolt stuck?
- Is the SCM™/LPR regulator working?
- Is the circuit board working?
- Are the dwells set correctly?
- Are the wires damaged.
- Are the solenoids working correctly?

Velocity too Low or too High.

- Is output pressure from SIDEWINDER®(pat pend) regulator set correctly?
- Is hammer dwell set correctly?
- Is hammer sticking?
- Is the SCM™/LPR regulator set correctly?
- Is the battery fresh and new?
- Is the Hammer solenoid working correctly?

Chopping paintballs

- Is your hopper working correctly?
- Is your bolt/hammer dwell set correctly
- Is your ball detent working?
- Is the SCM™/LPR regulator set correctly?
- Is the battery fresh and new?
- Is the bolt/hammer solenoid working correctly?

Firing too slow

- Is your rate of fire (ROF) set correctly?
- Are the dwell settings correct?
- Is the SCM™/LPR regulator set correctly?
- Is the battery fresh and new?

Excessive gas consumption

- Is hammer dwell set correctly?
- Is there a leak?

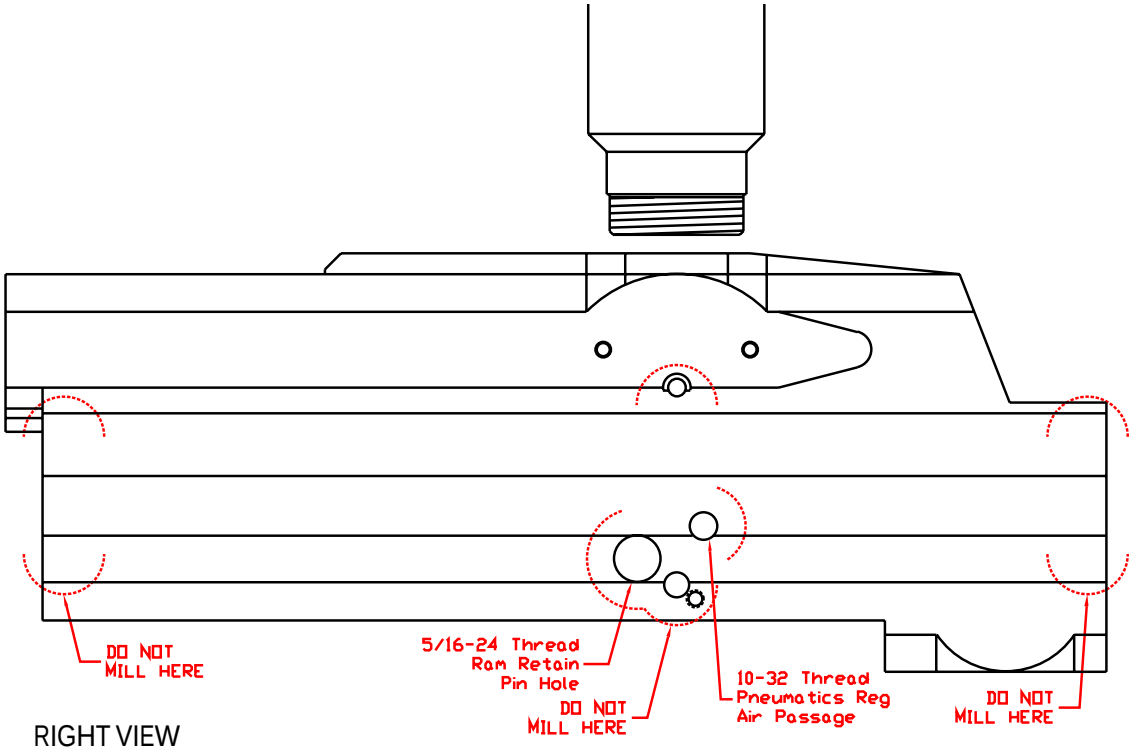
Gas leaking

- Leaking from TORNADO®(pat # 5791328) valve?
- Leaking from ram (Excalibur®)?
- Leaking from hammer (Excalibur® & Viking™)?
- Leaking from SCM™/LPR regulator?
- Leaking from SIDEWINDER®(pat pend) Regulator?
- Leaking from solenoid valves?

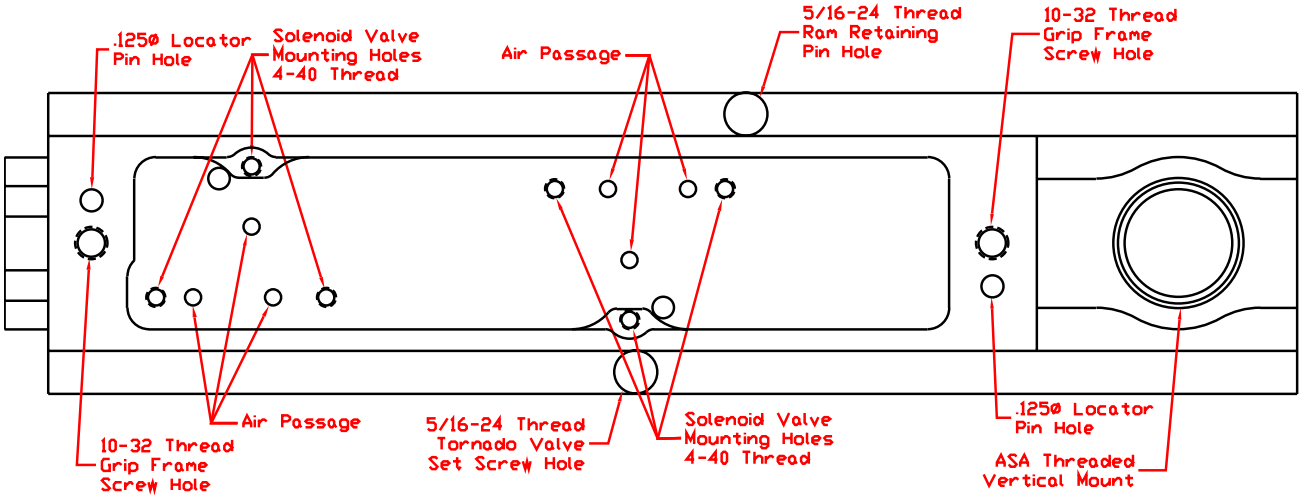
Electronic problems

- Check battery power level.
- Check for damaged wiring.
- Check circuit board dwell settings.

2004 EXCALIBUR® SCHEMATICS

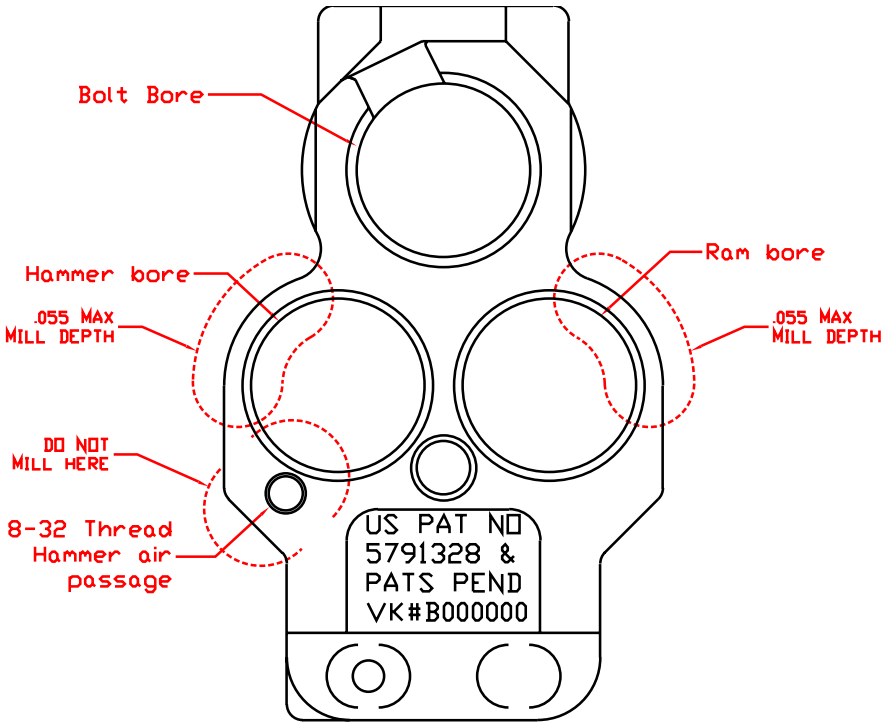


RIGHT VIEW

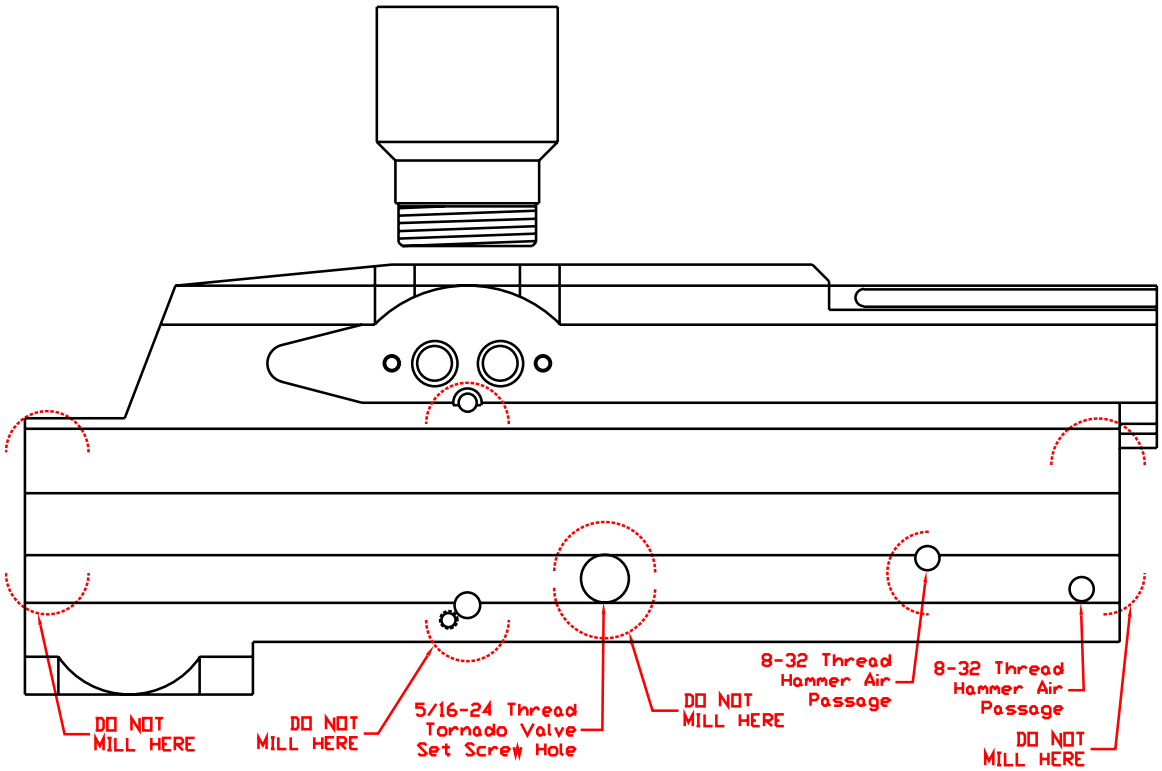


BOTTOM VIEW

2004 EXCALIBUR® SCHEMATICS

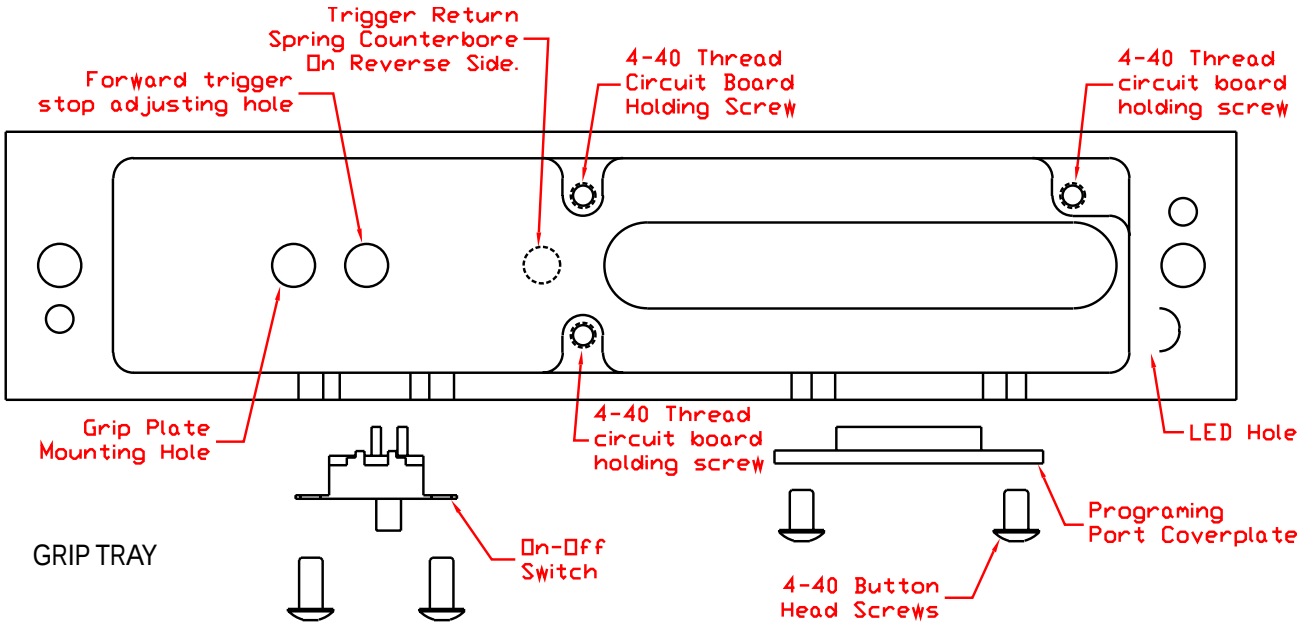


BACK VIEW

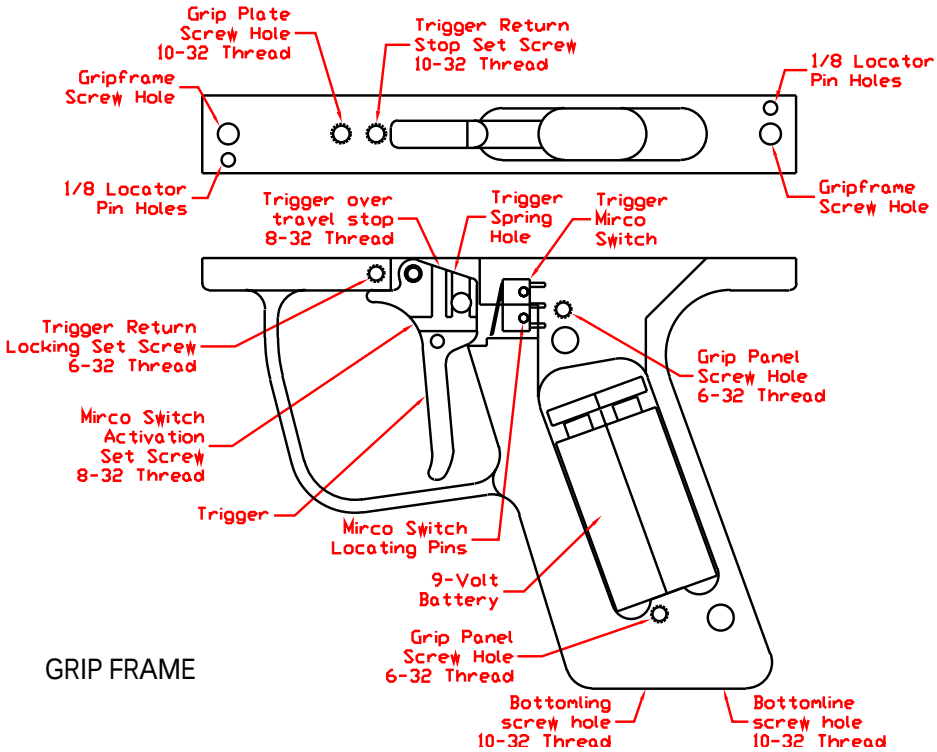


LEFT VIEW

2004 EXCALIBUR® & VIKING™ SCHEMATICS

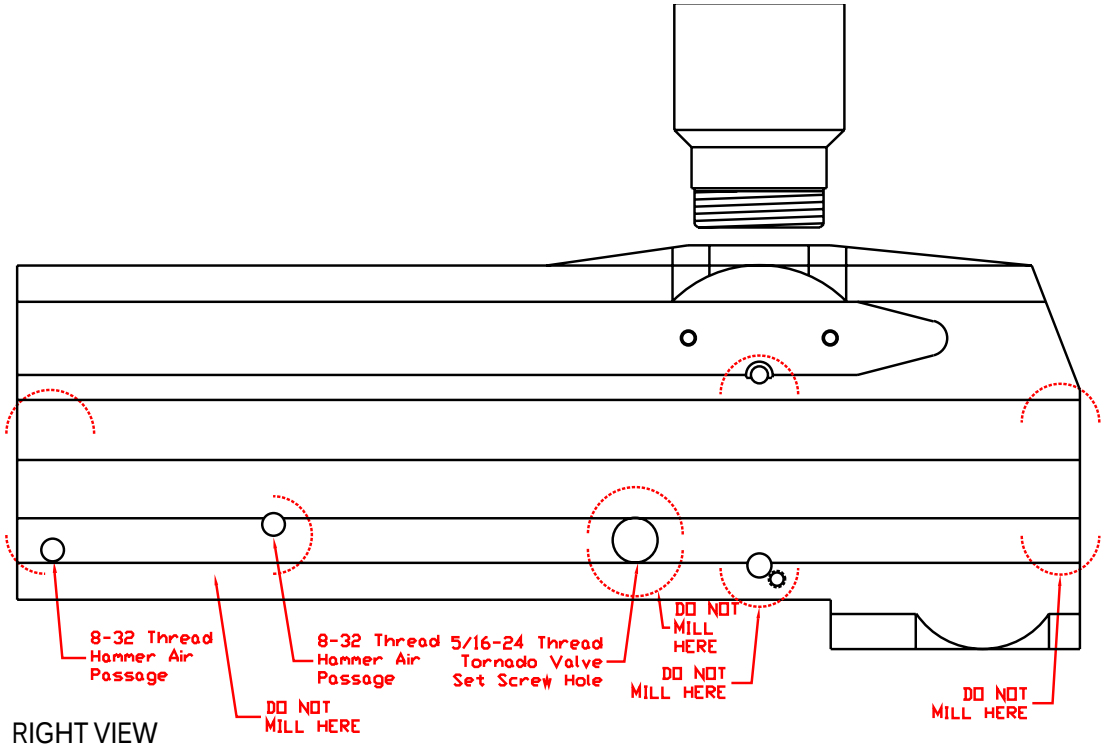


GRIP TRAY

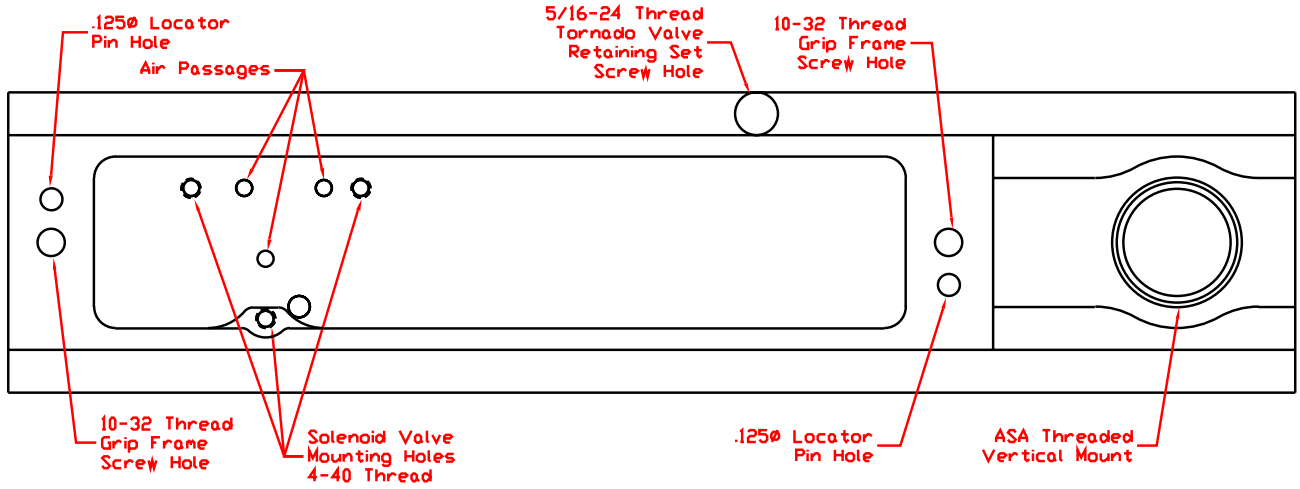


GRIP FRAME

2004 VIKING™ SCHEMATICS

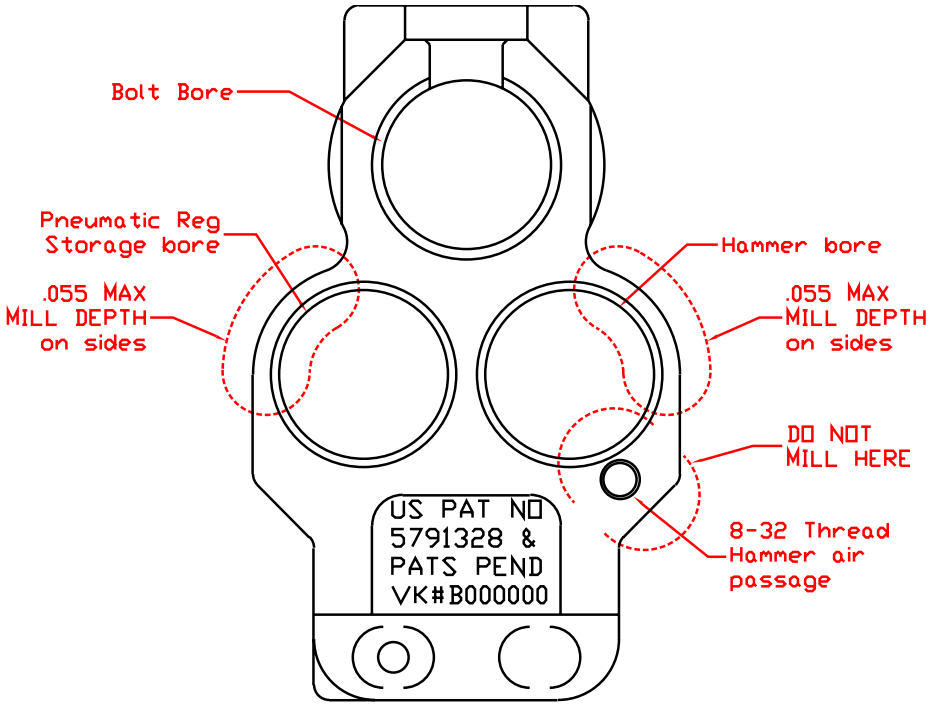


RIGHT VIEW

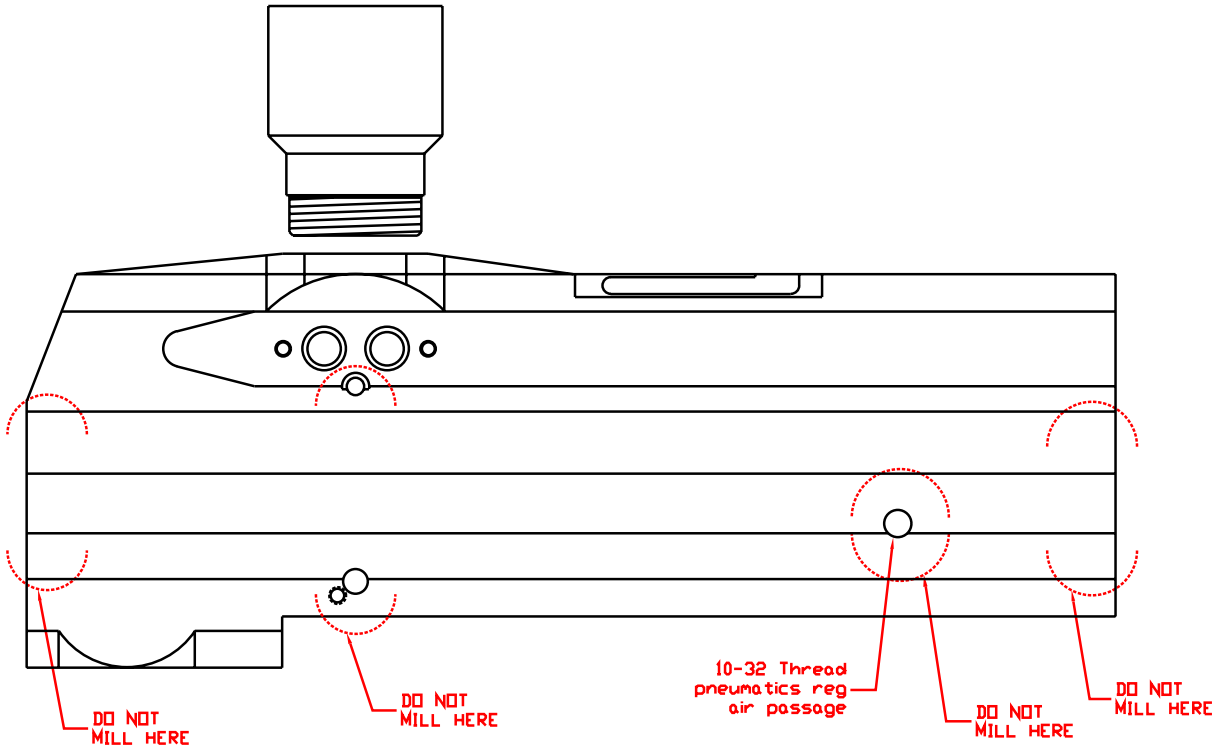


BOTTOM VIEW

2004 VIKING™ SCHEMATICS



BACK VIEW;



LEFT VIEW

VIII. Warranty, Liability and Contact Information

THIS WARRANTY WILL NOT BE HONORED WITHOUT A COMPLETED PRODUCT WARRANTY REGISTRATION CARD ON FILE WITH AKALMP, INC. PRIOR TO A WARRANTY CLAIM.

The EXCALIBUR® or VIKING™ is warranted to be free from **manufacturing** defects for life. AKALMP, Inc. expressly excludes coverage of defects and/or damage as a result of normal wear and tear, accidents, additions, alterations, inadequate maintenance, misuse, modifications, or other factors not directly related to the original manufacture of the EXCALIBUR® or VIKING™ marker.

Circuit Boards and Solenoids are warranted by the original manufacturer.

Customer is responsible for all shipping costs, duties and taxes.

This warranty is extended to the original owner and is **not transferable.**

BUYER assumes the risk of damages, including but not limited to bodily injury, from the use of this product. AKALMP, Inc. expressly disclaims any and all liability for any direct, indirect, incidental, or consequential damages of any kind or nature arising from the use of this product.

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