BUSHMASTER 2000 / 2K2 (LCD) MANUAL

BushMaster 2000 Overview

The BushMaster 2000 is a quality marking instrument specially designed to meet the needs of the professional style tournament player. The BushMaster 2000 is an electronic solenoid actuated computer controlled marking device. The major components of the BushMaster 2000 are machined from solid, air crafted-grade aluminum, then hard anodized per military specifications. No castings are used in the construction of the BushMaster 2000, thereby providing the end user with a high quality, precision engineered marking instrument.

Paintball markers get a lot of abuse. Indian Creek Design, Inc., has built the BushMaster 2000 with this in mind. All internal parts, wear and contact surfaces have been heat treated or hard anodized. The toughest and most resilient materials and components have been used in the design of the instrument.

The BushMaster 2000 uses a single standard 9 volt battery for operation. The circuitry is a micro-processor based digital controller.

The BushMaster 2000 does not need tools in order to field-strip it. Removing the field-strip link-pin of the bolt enables the removal of the entire bolt assembly.

The BushMaster 2000 offers "low-pressure" operation. The main operating pressure is 225-275 PSI nominally adjusted visually via the gauge on the primary regulator. The secondary pressure is factory pre-set and regulated to 85-95 PSI. Gas usage is controlled through these 2 internal regulators. The unique feature of this gun is the regulator adjustment. This allows precise adjustment for the velocity control of the gun and for gas efficiency.

The BushMaster 2000 comes with a removable barrel system. This feature allows the user to select a barrel that is most suitable for the playing conditions. All barrels are mirror-honed with a muzzle break, step-bore and porting and stock length is 12".

OPERATION

Read the entire manual before you prepare your BushMaster 2000 for firing. Safety and safe gun handling are the most important aspects of paintball sports. Please practice each of the following steps with an **unloaded** gun before attempting to charge your gun with compressed air and paint pellets. Do not load compressed air and paint pellets into your BushMaster 2000 until you feel completely confident with your ability to handle your BushMaster 2000 safely.

Keep your finger out of the trigger guard and away from the trigger, point the muzzle of the gun in a safe direction at all times. Keep the gun turned off until ready to operate. The BushMaster 2000 does not have a mechanical safety, only an on-off switch! **Always keep your BushMaster 2000 pointed in a safe direction. Always use a barrel plug.**

INSTALLING THE 9 VOLD POWER SOURCE

The BushMaster 2000 requires a single 9 volt battery supply as the electronic power source. The use of long life batteries is recommended. The 9 volt battery is located in the frame (or 'tray') above the trigger and on-off switch.

OLDER NON-LCD BUSHMASTERS WITHOUT THE EXTERNAL BATTERY DOOR ON THE SIDE OF THE TRAY:
Before removing the tray, remove the grip frame side panel on the left side, exposing the CPU an switches. Note the blue wires looped down into the PCB cavity. This loop is to allow the necessary distance between the tray and upper body to change the battery. This loop must be maintained when re-assembly is completed. To remove the tray use a 7/64 allen wrench and remove the four 6-23x1" screws around the bottom of the 'tray'. Gently separate the upper section from the lower section being careful not to put stress on the wiring harness (blue looped wires) connected to the solenoid valve on the upper section. Place the battery into the terminal connector and with the wires in the down-ward direction place the battery and terminal into the tray, sliding them ALL the way toward the front of the tray. Place the tray and upper body together being

careful not to pinch any wires in the body. Bring the blue wire loop back to its original position. Turn the main on-off switch to the on position and be sure the LED lights up, then turn off. Replace the four 6-32x1" screws and the grip panel.
BUSHMASTER 2000'S AND LCD'S WITH THE EXTERNAL BATTERY DOOR ON THE TRAY:
If you have an LCD Bushmaster 2000 or a newer revision of the Bushmaster 2000, you will probably have a black battery door on the side of your tray. Use an allen wrench to undo one of the screws. Then swing the door up 90 degrees to expose the battery connector. Pull the connector out and attach your 9v battery. Insert the battery into the tray and secure the door by screwing it back in place.

CO2, NITROGEN OR COMPRESSED AIR USAGE

The BushMaster 2000 comes with a male quick disconnect adapter on the inner side of the regulator. The BushMaster 2000 can be set up to use nitrogen or compressed air systems. CO2 is **NOT recommended** for use as a propellant, although it may be used. Be aware that under the conditions of CO2 the results may not be as expected. Consult the place where you purchased your BushMaster 2000 or a recognized and competent airsmith for instruction on safe handling of compressed air cylinders before connecting one to your BushMaster 2000. The input pressure from your compressed air system should be regulated down to 350-500 PSI output pressure. If your compressed air system does not have an output pressure gauge on it's regulator we do not recommend its use.

REMEMBER: co2, compressed air or nitrogen systems can be extremely dangerous if misused or improperly handled. Use only D.O.T. certified tanks.

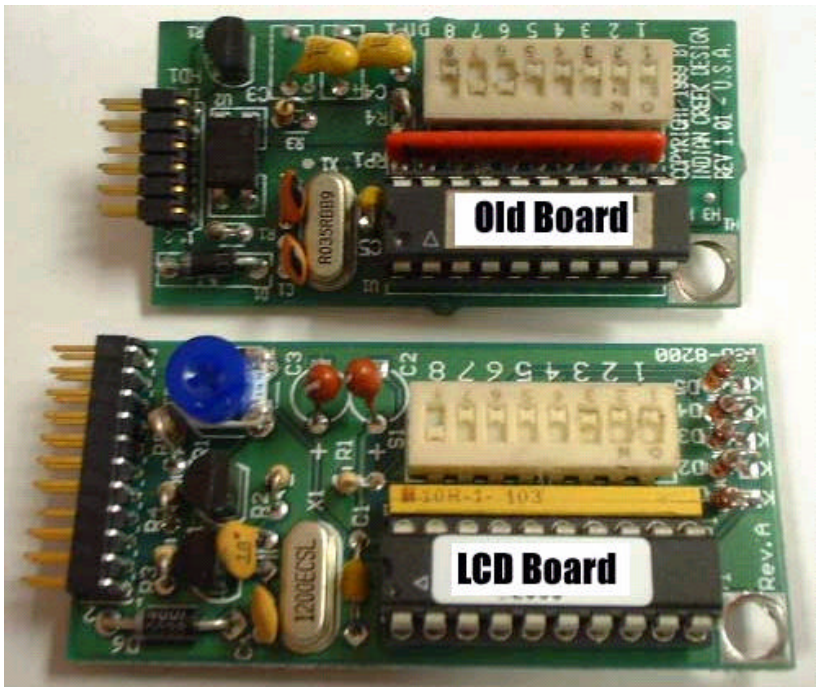
Before pressurizing your BushMaster 2000, check to make sure that you have a barrel plug in place and there is not paint in the gun. The on-off switch should be OFF. Air can now be applied, the gun will become pressurized.

PAINTBALL AND LOADER USAGE

The BushMaster 2000 comes equipped to accept 1.05" OD, standard-gravity feed loaders. Fit the loader directly into the vertical feed tube. Always twist it down in the CLOCKWISE direction. Always twist it off in a CLOCKWISE direction as well. The BushMaster 2000 uses .68 caliber, water-soluble paint pellets. The pellets are gravity fed from the loader through the direct vertical feed nipple and into the breech of the gun.

DIP SWITCH SETTINGS - MODES - RATES OF FIRE

Rate of fire is dependant on the mod and switch settings of the DIP switches on the PCB. What switches adjust what is dependant on what board you have, the new style or the old style. Here's a picture to help you determine



OLD BOARD:

1. Semi-auto (one single shot per trigger pull)
2. 3 shot (3 shots if the trigger is pulled and not released with single shot capabilities)
3. 6 shot (6 shots if the trigger is pulled and not released with single shot or any amount capabilities)
4. Full auto (as long as the trigger is pulled it will cycle)

Mode selection is done via switches #1 and #2

#1	#2	
OFF	OFF	- Semi mode
ON	OFF	- 3 shot mode
OFF	ON	- 6 shot mode
ON	ON	- Full auto mode

Rate of fire timing is as follows:

Dip switch #3 and #4 adjusts solenoid ON time in milliseconds (amount of time valve is held open)

#3	#4	
OFF	OFF	- 06 ms
ON	OFF	- 08 ms
OFF	ON	- 10 ms
ON	ON	- 12 ms

Dip switches #5, #6 and #7 adjusts the solenoid OFF time in milliseconds (delay time between cycles)

#5	#6	#7	
OFF	OFF	OFF	- 70 ms
ON	OFF	OFF	- 80 ms
OFF	ON	OFF	- 90 ms
ON	ON	OFF	- 100 ms
OFF	OFF	ON	- 110 ms
ON	OFF	ON	- 120 ms
OFF	ON	ON	- 130 ms
ON	ON	ON	- 140 ms

Dip switch 8 doesn't do anything.

As you see, calculating the cycles per second is easy and precise. For instance, if, S3 is off and S4 is on, S5 and S6 are off and S7 is on, the rate is calculated is .010 + .110 = .120. A total of cycle times of .120 = 8.33 cycles per second (1 divided by .120). This is the calculation for semi-auto Cycles Per Second mode. 3 shot, 6shot and full-auto cycle rates are adjusted to meet the paintball industries rate of fire maximum requirements. To calculate CPS for 3,6, and full, simply multiply the switch settings for #5, #6, #7 by 1.5. For example, #5 off, #6 off, #7 off = 70ms. 70ms X 1.5 = .105 ms. So to calculate your total CPS rate if #3,#4,#5,#6,#7 are all switched off the calculation would be as follows
.07 (solenoid off time) X 1.5 = .105
.105 + .006 (solenoid ON time) = .111
1 divided by .111 = 9 Cycles per Second which is the fastest for 'enhanced' fire modes.

NEW BOARD:

1. Semi-auto (one single shot per trigger pull)
2. 2 shot (2 shots if the trigger is pulled and not released with single shot capabilities)
3. 3 shot (3 shots if the trigger is pulled and not released with single shot capabilities)
4. 6 shot (6 shots if the trigger is pulled and not released with single shot or any amount capabilities)
5. Auto-Response (2 shots per trigger pull, one on the pull and one on the release)
6. Turbo (3 shots for every 2 pulls when shooting fast, single shot capabilities if shot slow)
7. Zip (starts at 8bps and increases to 12bps within a 6 shot burst. Single shot capable)
8. Full auto (as long as the trigger is pulled it will cycle)

Mode selection is done via switches #1, #2 and #3

#1	#2	#3	
OFF	OFF	OFF	- Semi auto
ON	OFF	OFF	- 2 shot
OFF	ON	OFF	- 3 shot
ON	ON	OFF	- 6 shot
OFF	OFF	ON	- Auto Response
ON	OFF	ON	- Turbo
OFF	ON	ON	- Zip
ON	ON	ON	- Full Auto

Rate of fire timing is as follows:
Dip switch #4 and #5 adjusts solenoid ON time in milliseconds (amount of time valve is held open)

#4	#5	
OFF	OFF	- 06 ms
ON	OFF	- 08 ms
OFF	ON	- 10 ms

ON	ON	- 12 ms

Dip switches #6, #7 and #7 adjusts the solenoid OFF time in milliseconds (delay time between cycles)

#6	#7	#8	
OFF	OFF	OFF	- 70 ms
ON	OFF	OFF	- 80 ms
OFF	ON	OFF	- 90 ms
ON	ON	OFF	- 100 ms
OFF	OFF	ON	- 110 ms
ON	OFF	ON	- 120 ms
OFF	ON	ON	- 130 ms
ON	ON	ON	- 140 ms

As you see, calculating the cycles per second is easy and precise. For instance, if, S3 is off and S4 is on, S5 and S6 are off and S7 is on, the rate is calculated is .010 + .110 = .120. A total of cycle times of .120 = 8.33 cycles per second (1 divided by .120). This is the calculation for semi-auto Cycles Per Second mode. 3 shot, 6shot and full-auto cycle rates are adjusted to meet the paintball industries rate of fire maximum requirements. To calculate CPS for 3,6, and full, simply multiply the switch settings for #5, #6, #7 by 1.5. For example, #5 off, #6 off, #7 off = 70ms. 70ms X 1.5 = .105 ms. So to calculate your total CPS rate if #3,#4,#5,#6,#7 are all switched off the calculation would be as follows
.07 (solenoid off time) X 1.5 = .105
.105 + .006 (solenoid ON time) = .111
1 divided by .111 = 9 Cycles per Second which is the fastest for 'enhanced' fire modes.

FIRING THE BUSHMASTER 2000

Keep your finger out of the trigger guard and away from the trigger, point the muzzle of your gun in a safe direction at all times during this process. Be sure your goggles are securely in place. Pus the on-off switch to the OFF position.

Always keep your BushMaster 2000 pointed in a safe direction!

1. Place the empty loader onto your gun. Be sure that it's securely mounted in place
2. Apply the compressed gas, pressurizing the gun
3. Put the paintballs into the loader
4. Remove the barrel plug
5. Aim the gun at the target
6. Push the on-off switch to the ON position, the LED with light up
7. Place your finger on the trigger
8. Pull the trigger with a smooth squeezing motion. **BANG ....**

UNLOADING THE BUSHMASTER 2000

Keep your finger out of the trigger guard and away from the trigger, point the muzzle of your gun in a safe direction during the entire process. **always keep your BushMaster 2000 pointed in a safe direction!**

1. Push the on-off switch to the off position, the LED will turn off
2. Place the barrel plug into the end of the barrel
3. Remove the pressurized gas from the marker carefully
4. Tilt the marker so that the loader is lower than the body of the gun
5. Remove the paintball loader from the direct vertical-feed tube, turning the loader in the clockwise direction
6. Inspect the inside of the direct vertical feed tube to be sure that a ball does not remain inside the breech.

BUSHMASTER 2000 2K2 (LCD) LCD SCREEN OPERATION

The LCD is located at the rear of the gun in the tray below the black ram housing. Software and an on-board connector for the infrared sensors (anti-chop eye) are already built in so adding these features later will be easier.

When the BushMaster 2000 is first turned on, the LCD will show the current fire mode set on the dip switches. It with then change automatically to show you the rate of fire the gun is set to on the dip switches. The screen will change a 3rd time and go into a count up game timer and shot counter and will remain here until you turn the BushMaster 2000 off. The top number is the count up timer which will start counting immediately. The bottom number is the shot counter which increments with every shot.

To bypass the first 2 screens, turn the BushMaster 2000 on while holding the trigger in. When the game whistle sounds, release the trigger and the game timer/shot counter screen will appear and the timer will start counting.

MAINTENANCE

CAUTION: Before attempting to perform any maintenance operations or any gun disassemble, make sure that all the paint pellets and sources of propellants have been removed from the gun. Insert a barrel plug, push the on-off switch to the OFF position and keep the gun in its "SAFE" mode.

SIMPLE MAINTENANCE

Keep your BushMaster 2000 clean and lubricated to eliminate the friction that would prevent reliable operation. Clean an lube the gun before each use, and do not put it away dirty. Do NOT use petroleum based lubricants in the lubrication of this gun. Teflon or silicon spray lubricants are the recommended types for the lubrication of the BushMaster 2000. The main housing bolt slide area may be lubricated.

CLEANING PAINT FROM THE BARREL

Unscrew the barrel with approximately on and on half revolutions to remove the barrel for swabbing/cleaning. Keep the barrel clean to insure the continued accuracy of the BushMaster 2000. Gelatin from the paintballs has a tendency to build up in the barrel. As part of your cleaning ritual, wash out the barrel with soapy water and rinse it well.

REMOVING THE BOLT ASSEMBLY (FIELD STRIPPING)

Remove the paint and pressurized gas from the gun. **The gun can be field stripped while it's pressurized.**

1. Remove (pull) the knurled pin from the top of the marker. Pull the bold body out the back of the main body.

Once the bold assembly is removed, it is possible to clean the entire upper receiver of the gun, including the breech and feed tube area. You may slightly lubricate the rear section of the bolt and bolt chamber with light synthetic liquid or spray lubricant before re-installing the bolt. Do NOT use petroleum/oil-based lubricants; DO use Teflon or silicone based lubricants. The 'bolt' is NOT a simple plastic, it is a natural Derlin acetate material which is a Dupont 3M material developed specifically for this type of application. The use of a metal type of bolt will void warranties.

2. Point the barrel downward and slide the bolt in until the link pin hole lines up with the slot in the hammer and install the link pin again.

STORAGE AND TRANSPORTATION

-Your BushMaster 2000 must be clear of all paint and propellant when not being used
-Be sure the on-off switch is off and the LED is not lit
-Put the barrel plug in place
-Make sure the gun is clean
-Store your BushMaster 2000 in a clean, cool, dry place
-Keep your BushMaster 2000 away from children

Your BushMaster 2000 must be clear of all paint and any source of propellant during transportation to and from the playing field. Keep your barrel plug in place. Keep the on-off switch off. Protect your BushMaster 2000 from excessive heat during transportation. Observe and obey all local, state and federal laws concerning the transportation of paintball guns. For information concerning any of the laws in your area, contact your nearby friendly law enforcement agency.

IMPORTANT: Never carry your BushMaster 2000 uncased when not on a playing field. The non-playing public and law enforcement personnel may not be able to distinguish between a paint marking device and a firearm. For your own safety and to protect the image of the sport, always carry your BushMaster 2000 in a suitable gun case or in the box in which it was shipped.

If you must ship your BushMaster 2000 for any reason, the box in which you purchased the gun is acceptable to all major carriers. Never ship charged CO2 or pressurized gas containers.

BUSHMASTER 2000 TUNING GUIDE

High pressure regulator adjustment:
The BushMaster 2000 has a totally new and innovative system. The pressurized gas is regulated internally. The pressure regulator is externally adjustable via the screw with the slot in the bottom of the high pressure regulator. A cap for the screw has been provided to keep access to this screw restricted. To increase the pressure, thus increasing the velocity of your projectile, remove the cap. Using a wide screw driver, or even a Quarter, insert into the slot and turn clockwise.

NOTE: Only slight turns are needed to accomplish changes in the pressure used to shoot the paintball, thus changes in the velocity at which it is propelled.

To decrease the velocity of your shots, turn the screw counter-clockwise. You must take a 'clearing' shot before the change in the decreasing direction can be registered.

A pressure gauge has been installed into the regulator body to indicate the exact operating pressure of the marker. This gauge is extremely useful. At the factory we set the regulator gauge to 226-275 PSI with a input pressure of 400 PSI using compressed air as the base propellant. Under normal circumstances these settings will produce paintball velocities approximately 280-300 fps. The input pressure from your tank should be set to 350-400 PSI. Higher input pressures will not provide increased performance.

Low pressure regulator adjustment:
The low pressure regulator is externally adjustable via the adjustment screw with the slot hole on the front of the gun. The low pressure regulator is pre-set at the factory to 85-95 PSI to operate the 4-way solenoid actuated valve. It may be necessary to re-adjust the low pressure regulator from time to time. Bench adjusting the regulator can be done by

pressurizing the gun and then turning the adjustment screw inward (clockwise) until you hear a leak coming from the 4 way valve. The 4 way valve has an over-pressurization relief valve that will start to bleed off at approximately 125 PSI. Once you hear the leak start, back off the adjustment screw 1/2 turn and the leak will stop and that will approximate the pressure to about 90 PSI.

This gun was designed with safety and safety standards in mind. If you attempt to shoot paintballs higher than established safety standards, the gun will not function properly.

NOTE1: You may notice that if you attempt to operate the gun at extremely high velocities, the internals will not function properly!

NOTE2: This gun is not designed to shoot above the safety limits established by the industry

LEAK RELATED PROBLEMS

1. The BushMaster 2000 has a leak down the barrel. Reason: gas is leaking through or around the valve pin seal or O ring area.

    A. The valve seal is marred/scratched or worn out or dirt has gotten to it. Oil and or replace it.

2. The BushMaster 2000 has a leak around the high pressure regulator seam. Reason: the seal between the regulator body and the main body is bad

    A. Tighten the regulator to the body
    B. Check and/or replace the O ring

3. The BushMaster 2000 has a leak around the low pressure regulator seam. Reason: the seal between the regulator body and main body is bad or the regulator has loosened up

    A. Tighten the regulator into the body
    B. Check and/or replace the O ring gasket sized -019.

4. The BushMaster 2000 has a leak inside the grip/battery area. Reason: the solenoid is leaking

    A. Tighten the 4 way valve to the manifold
    B. Check for over-pressurization from the low pressure regulator
    C. Replace the O rings on the cylinder assembly sized -015.
    D. Replace the piston O ring sized -011.
    E. Replace the solenoid/valve assembly

BALL BREAKAGE PROBLEMS

1. The ball breaks in the breech

    A. The balls in your loader can bind, messing up your trigger timing. Use an agitated loader
    B. As you run and shoot, you actually unweigh the gravity-fed balls in your loader. This can cause a ball to hesitate in its drop. This affects trigger timing.
    C. If the ball detente doesn't move freely, the balls will crush against it or it may have stuck in the depressed position allowing double feeding. Check the detente.
    D. If the ball detente is too sloppy, the ball will not be held in proper position. This may allow the next ball to enter the path of the bolt, subjecting it to impact
    E. Increase the timing of the solenoid ON time will decrease the possible blowback

that is created when the ball is expelled. Or increase the solenoid off time to increase the time that the bolt stays back to let another ball drop into the breech.

REGULATOR RELATED PROBLEMS

1. The gauge reads correctly when charged, but climbs in pressure after a few moments

    A. The regulator seal has been contaminated. Disassemble the regulator and clean the seal with a Q-tip and alcohol. If you need assistance in the disassembly of the regulator call 208-468-0446

2. The gauge reads correctly when charged, but drops in pressure after a few shots

    A. The regulator may not be adjusted correctly. Remove all pressurized gas and back-off the regulator adjustment screw 3 turns. Pressurize the system and adjust the pressure back up to the desired pressure.

3. The gauge reads correctly when charged, but drops in pressure after a few shots and is slow to climb back to normal pressure.

    A. The recovery side of the regulator is sluggish and may need cleaning and lubrication. If you need assistance in the disassembly of the regulator, please call 208-468-0446.
    B. The regulator seal needs to be replaced if it has a deep groove in it from the regulator cup.

INDIAN CREEK DESIGNS, INC.
LIMITED WARRANTY

Indian Creek Design, Inc., warrants the replacement of any original part due to defect in materials and/or workmanship of this air gun. This warranty will be in effect for twelve (12) months for parts and twelve (12) months for labor following the original date of purchase for the original purchaser. Such warranty service will be provided only if the warranty registration card included with this manual is filled in completely and on file at Indian Creek Design. Inc. All other service will be duly charged for and returned via UPS C.O.D.

Indian Creek Design. Inc., will replace without charge any original part that is determined by Indian Creek Design. Inc. to be defective under the terms of this warranty. However, shipping charges are not covered hereunder. Failure due to an accident, abuse, neglect, modification, normal wear, maintenance by other than an authorized Indian Creek Design. Inc.dealer, or use of parts inconsistent with the use originally intended for the air gun as sold, is not covered by this warranty.

There are no other warranties or guarantees, expressed or implied, made by Indian Creek Design. Inc. on this airgun. The sole and exclusive liability of Indian Creek Design. Inc. and/or it's authorized dealers, affiliates, or agents pursuant to this warranty will be for repair or replacement of the effective part; incidental or consequential damages are expressly excluded hereunder.

Indian Creek Design. Inc., it's authorized dealers, affiliates, or agents, will not be liable under this warranty, nor under any state or federal law, or the common law or otherwise for any damage or failure, including personal injury, resulting from such use and/or alteration. The warranty gives you specific legal rights, and you may also have other rights which may vary from state to state.

For warranty parts, service of information contact
Indian Creek Design. Inc.
1019 First Street North
Nampa, Idaho 83687
208-468-0556