

# The VM-68 FAQ to-end-all-FAQs

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Disclaimer: This Document is Public-Domain and can be distributed freely. I made this FAQ for those who love paintball and their VMs. I do not care if its copied and hacked up, but I would appreciate it if my name and Doug's were kept in it somewhere. Thanks.

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## 1. GENERAL

### a. What is the VM?

The VM is a .68 caliber, true blow-back semi, firing from an open bolt. The VM is a 'Sheridan based' paintball gun. In many ways, the VM has the same basic internal structure as the PGP, PMI-x, KP-x, and Sheridan BB guns. Other famous guns that are derivatives of the Sheridan design are: BudOrr Sniper/Cocker, Promasters, F1/2s, Sterlings (a hybrid), and Spydys. The VM is well known for its extreme reliability, durability and upgradability. The term 'VM' is actually a family of guns rather than just one (VMX, EXC, Magnum, etc). Throughout the FAQ I will simply refer to the 'VM' and point out exceptions where necessary.

### b. The Sheridan VM Family

#### i. VM-68

The name means 'Virtual Machine.' The VM-68 is a slightly upgraded PMI-3, and represents the backbone of the Sheridan line of paintball guns. Despite being the 'base' gun of the VM-family, the VM-68 does come with a lot of nice features.

#### Pros:

- Durable (works in any condition)
- Feeds very well
- Inexpensive
- Reliable (doesn't need a lot of tinkering)
- "Upgradable" (This feature sets it apart from other low cost semis)
- Ambidextrous safety/cocking lug

#### Cons:

Heavy  
Inefficient with CO2  
Poor brass barrel  
Difficult field-stripping  
Front C/A position (NOTE: All Sheridan 'base' guns have had the CO2 source located in the front. The VM was the first to use C/A which makes it difficult to use tanks larger than 12oz).

A stock VM-68 runs around \$150-200 new and a used VM-68 runs \$75-150. The VM-68, by far, has the largest number of aftermarket parts available. Every single individual part of a VM has at least 3 aftermarket equivalents. In fact, it is possible to build a custom VM out of nothing but aftermarket parts (like a Harley).

#### ii. PMI-3

The name means "Pursuit Marketing Inc., version 3". Before '92, all Sheridan products were distributed by PMI. For the most part, the PMI3 is identical to the VM-68 except for some small internal differences that should be noted. First generation PMI-3s were NOT ambidextrous (the cocking knob could NOT be reversed). Plus, many early PMI-3s had a separate safety and cocking knob. Some PMI-3s had bolts which could be installed upside down. Most PMI-3s had the 'old' style cupseal. This cupseal was of weaker construction and was not friendly to liquid CO2. All 'old' cupseals can be upgraded to the 'new' kind, but the valve might have to be slightly modified. None of the PMI-3s had ambidextrous feed blocks (as well as some VMs). The 'body' of a PMI-3 is identical to a VM-68, and thus can accept any aftermarket mod.

#### iii. VM Magnum

The name 'Magnum' refers to the large 14.5"x1" barrel that the Magnum uses. The Magnum is internally identical to the VM-68, however, it does have some external differences:

1. 1'OD Aluminum barrel
2. Back Bottle ASA (Front ASA retained for DUAL C/A)
3. Sight Rail
4. Ambidextrous Feed block
5. Field strip screws

New VM-Magnums range from \$200-250 (w/3.5oz) and used Magnums range \$150-200. Since the VM-Magnum is simply an upgraded VM-68, it can accept most AFTERMARKET mods designed for a VM. Though, the Back- Bottle ASA does restrict some mods.

#### iv. VM EXC

The name 'EXC' means 'EXpansion Chamber.' The VM-EXC is Sheridan's attempt to solve all of the VM-68's problems. The VM-EXC is internally identical to the VM-68, but it does come with some nice external features:

1. Expansion Chamber (500+ shots per 7oz)
2. Raised Sight Rail
3. Bottom Line

4. Field strip screws
5. Ambidextrous feed block

New EXCs range from \$160-250 and used EXCs range from \$125-160. The EXC is an excellent beginner/mid-range paintball gun. The expansion chamber allows the VM to run forever and the bottom line allows for a well balanced gun. Since the VM-EXC is simply an upgraded VM-68, it can accept most aftermarket mods designed for a VM. The VM-EXC uses an odd grip/bottomline. If an aftermarket GRIP is to be added, a new bottom line will likely also have to be added (and vice-versa).

#### v. EQUALIZER

The Equalizer is the latest gun from Sheridan (based on the unique Phoenix design). It is completely different externally and internally to the VM. I will only briefly mention it here to note that it takes VM-aftermarket barrels, feedblocks, and sightrails.

### c. AFTERMARKET VMs

Aftermarket-VMs are VM-68 paintball guns, with aftermarket parts, sold as a complete unit from a noted pro-shop (like a BobLong Cocker).

#### i. Pro-Comp

The Pro-Comp is by far the most famous Custom-VM, most likely because it was the first (built in the early '90s). You could of either had your VM upgraded, or bought a Pro-Comp as a unit. The Pro-Comp has the following features:

1. Lightened Body- The front ASA was chopped off and a permanent bottom line was added. Plus, the sides were shaved.
2. Custom Internals- A super-light hammer (external adjust and rear cocking), light bolt, heavy duty valve/seal, and trigger job were added.
3. Misc. External- A body was anodized (usually white), plus a sightrail, barrel extension and side panels were added.

The Pro-Comp went out of business many years ago, but the Pro-Comp guns are still around being used and traded. Pro-Comp guns originally sold for ~\$520 new (\$300 for the upgrade) and they generally sell for \$250-400 used (depending on condition). Pro-Comp has recently come back into business selling 'cocker parts and finished a 'drop-in' version of the pro-comp upgrade (light internals, rear cocking, etc). The kit has been released as the Pro-Comp v.3 by Airgun Dynamics.

#### ii. VM-VMX

The name 'VMX' comes from 'VM F/X'. The VM-VMX is well known as an aftermarket body for the VM-68. It is also available as a complete unit full of aftermarket parts. The VMX body is made from lightweight aluminum, with a built in VERTICAL ASA and 1/8" side-tap. The VM-VMX unit comes with some nice aftermarket parts:

1. Pro-Shot spring kit (External Velocity Adjust)
2. PhazzeII Hammer (Lighter and Quicker)
3. Venturi bolt (more range, less breakage)
4. Rifled barrel (no-name variety, but fine)
5. Powerfeed (opinions are mixed)

The VM-VMX body ranges from \$75-150 and the VM-VMX unit cost \$250(?) new (which was much less than buying all the parts separate). Used VM-VMX units are rare, since they tend to get sold for parts, rather than whole, but they generally range \$175-250(?). Since the VMX was designed to use the stock VM internals, it can accept most VM aftermarket parts. There has been compatibility problems with earlier VMX versions, such as valve and bolt misalignments, but later versions seem to have the problems fixed (most early versions had a front ASA instead of a VERTICAL ASA). Despite common misconception, VMX bodies are made from aluminum alloys, not polymers.

### iii. CAR-68

The name CAR-68 refers to the CAR-15 rifle of which it emulates. The CAR-68 is being promoted as a 'Law-Enforcement Training Tool', but it is really just a VM-68 with cosmetic accessories. The aftermarket parts include:

1. CAR-Stock (Nearly identical to the stock on the Car-15)
2. Unique Barrel (The Barrel is aluminum, with a handguard similar to that of a CAR-15)
3. Raised SightRail (Like that of a Car-15)
4. Permanent Vertical ASA (no Dual ASA)
5. M-16 grip with conventional trigger guard

The CAR-68 does look very distinctive, but I would recommend that you do not buy it for paintball, only law-enforcement training. The 'military' appearance can only lead to trouble. The price for a new CAR-68 was \$450 and they run ~\$350 used. NOTE: You could buy a stock VM, CAR-Stock, good barrel, sightrail, and vertical ASA for much less than \$450. The internals are all stock, and the CAR-68 will accept most aftermarket parts.

### iv. Carter-VM

The Carter-VM is another well known custom VM from the early '90s. It was used by the likes of Dave Youngblood for many years. For the most part, all the mods on the Carter-VM were cosmetic. They include:

1. Carter-Barrel (aluminum w/muzzle)
2. Machined Vertical ASA
3. Aluminum grip (installed in old front ASA).
4. SightRail
5. Sides Shaved (along with the signature Carter 'slots')
6. Everything anodized shades of gray

There are a lot of Carter-VMs in circulation, which is unusual considering that Carter stopped making them many years ago. Despite having no performance parts, the Carter-guns were popular as a status symbol. They came out in a time when ALL guns were black, except the Carter guns. (which were all gray/silver). Back in '92, a Carter-VM cost ~\$650 (back when the PMI3 cost \$400) and they sell used for ~\$350-500. The used price tends to be high, as many Carter-VMs are considered one-of-a-kind collectible paintball guns. All internal parts are stock, but the Carter-VM will accept most aftermarket parts.

### v. Palmer-VM

The Palmer Pro-Shop ([www.palmer-pursuit.com](http://www.palmer-pursuit.com)) is very well known, but their custom VMs are not. Palmer's Pursuit Shop has always

specialized in custom Sheridan guns (ie Typhoon, Hurricane, etc), and lately have started customizing VMs. A Palmer-VM has a good balance between performance parts and cosmetic parts. They include:

1. Lightened Body (Chopped ASA, Shaved sides)
2. Stock bolt modified (wide-mouthed)
3. Hammer modified (lightened)
4. Barrel honed (to .690 - .696)
5. Valve job
6. Misc. (The 'Misc.' is the most important part. It includes your personal preferences, like specific machining, anodizing, aftermarket parts, low-pressure etc)

The price of a Palmer-VM is based on the work it has, but the work runs \$150-250 (not including gun). All the work is done by Dan Debone, who is also working on a Pro-Comp style 'drop-in' kit for the VM (which includes a custom hammer). A Palmer-VM will accept most aftermarket accessories (depending on the specific options). NOTE: The airsmith at Palmer that did the custom work on VM's has left due to a "difference of opinion".

Even though Dan left Palmer's, they will still do work on VMs. They may not have a specific machinist for VMs, but they still do excellent work.

#### vi. Other

Nearly every Pro-Shop offers some kind of custom VM. Below is a short list of Custom Shops that do VM work that I HAVE NOT tested, but have heard positive things.

1. Doc's Machine and Airsmith Services ([www.docsmachine.com](http://www.docsmachine.com))  
Doc will attempt to do almost anything you can imagine, assuming you have the money to pay for it. From machine work to custom double finger triggers, Doc should meet most peoples needs.
2. Olympic Paintball  
Olympic Paintball specializes in exotic machine work. (If you have seen one of their cockers, you would know what I mean). I have heard that they chop a high-percentage of the metal off of the body.
3. I&I Sports ([www.iisports.com](http://www.iisports.com))  
I&I does all the usual stuff like: "Tune-Ups", trigger jobs, lighter bolt/hammer, field-strip kit, anodizing, and machine work.

#### vii. BENJAMIN/SHERIDEN

Sheriden has been around for a very long time, but was bought by CrossMan airguns. (Rather like Daisy buying BrassEagle). Also, up until 1992, all Sheriden paintball guns were distributed by Pursuit Marketing Inc. (hence: PMI-x). This is only important because it means all the phone numbers and addresses may be different than when you originally bought the marker. The current address and phone number is:

CROSSMAN CORPORATION  
BENJAMIN SHERIDEN  
Routes 5 & 20  
East BloomField, N.Y. 14443

1-800-724-7486  
Between 8:00 am and 4:30 pm  
(Eastern Time) Monday through Friday

www.sheridanusa.com  
technical questions: tech@sheridanusa.com  
service issues in the US: usservice@sheridanusa.com  
service issues outside the US: intlservice@sheridanusa.com

#### d. MAINTENANCE/TROUBLESHOOTING

Unlike most others semi's, the VM requires no general maintenance. This is often the main reason why people choose the VM over the semi's available. However, its important to keep the gun clean and well lubricated.

##### a. LUBRICATION

In my years, I have talked to 1000 people about their VMs. Each one of them has their own separate idea on proper VM lubrication. 2-E of the AllAmerican's says that Sesame seed oil for the internal/external hoses (if any), keeps any liquid CO2 from clogging up the system. The VM manual suggests vegetable oil, or Vaseline, which I don't suggest. Some local VM teams use a thin layer of AXLE grease, mixed with vegetable oil. However, I have found that ordinary gun lubricant, like GOLD-CUP or 3in1, works plenty fine. For the most part, ANY lubricant will work fine, just as long as it doesn't contain 2 things: 1. Anything petroleum based, 2. Thicken when it gets colder. This means DON'T put WD-40 in your VM. All petroleum based lubricants EAT o-rings. While I realize VMs have far fewer O-rings than many other GUNS. When your CUP-SEAL goes in the middle of a battle, you'll wish you didn't use that WD-40. Also, LITHIUM grease, and other automotive lubricants tend to thicken in cold weather, causing cycling problems (see below). Plenty of fine paintball-only lubricants are available, though, are expensive.

##### b. VELOCITY ADJUSTMENT

You would be surprised the number of newbies I find who cannot properly adjust the velocity of a VM. Don't feel bad, though. The VM is by far the most complicated paintball gun to change the velocity on (even more then 'Nelson' springs). There are 2 methods of adjusting the velocity on a stock VM: the bolt and the valve. (plus a few 'trick' methods further in the FAQ)

##### BOLT ADJUSTMENT

The BOLT velocity screw is the easiest and most common way. You simply run the velocity adjustment tool down the barrel and turn. If the tool is not available, an allen wrench can be used (with the barrel removed).

The trick is that the screw MUST be within a 'click', which is every 1/2 turn. If it is NOT, a small bearing will push against one of the BOLT o-rings, causing the VM to CYCLE poorly. Adjusting the BOLT screw can change velocity by about +50fps. (About 10-15 fps for each CLICK) NOTE: If you use an expansion chamber, the screw needs to be as far open as possible to take advantage of the chamber. If velocity is too high, change the 'time' on the VALVE.

### VALVE ADJUSTMENT

The VALVE adjustment is somewhat more tricky, but is only needed a couple times a year. The valve can be set in one of 4 positions, called 3,6,9, and 12 o'clock. Each one has a different velocity level. (12 is highest, and 3 lowest, counter clockwise). Each 'time' represents about 40 fps.

To change the position, first make sure the VM is NOT PRESSURIZED!! (I can tell you horror stories!) Next, completely strip the VM (bolt/hammer/ springs etc). Look at the FACE of the VALVE to see what 'time' it is. Decide where you want the 'time', then INSERT your VM valve TOOL. (You might have to depress the trigger). Once the tool is all the way in, turn the TOOL until you feel friction. Next unscrew the VALVE screws and turn the tool. Look into the hole where the VALVE screws used to be, you should be able to see the valve and a hole in which the valve screw threads into. Now, turn the TOOL. Every hole you see go by represents 45 degrees on the valve face and a 'time' on the clock. Once the valve is in the position you want, SCREW in the VALVE screws, then, unscrew the tool and pull it out.

Re-assemble the gun and CRONO it. If the VM VALVE TOOL is not available, then a VERY long 3/8(?) bolt (course threads) can also do the trick. The VM valve tool is available from CROSSMAN and nearly ever paintball store for ~\$10.

Another less invasive option to increase velocity: when the valve is set at 12:00 (max) and the bolt velocity screw is also maxed out, if the velocity is still not going up satisfactory then you can increase the velocity by adding a few spacers behind the bolt (or behind the spring). This in effect "extends" the length, hence the strength of the main spring so when the hammer travels forward and hits the valve, the valve will remain open longer delivering more CO2. This trick may poorly effect cycling performance and CO2 efficiency.

### c. CUP-SEAL/LEAKS

If your VM leaks for any reason, 99% of the time it is the CUP-SEAL (other wise its a valve o-ring or bottle o-ring). The cup-seal is a small cup-shaped seal, attached to a pole and a spring, that sits inside the valve. In VM's, its the ONLY thing that holds the CO2 inside the gun.

All VMs made after May, 1992, have the 'new' cup seal. It's the same as the old one, except its much shorter and friendlier to liquid. Either way, any of them can go bad. If you ever screw in your bottle and CO2 flies out of your gun like crazy (turning the VM into an aluminum ICE CUBE), or even a small leak is coming out of your barrel, that means the CUP-SEAL is going bad. If a new cup-seal is unavailable, there are 2 temporary solutions. First, disassemble the gun completely and cover the cup seal with a THICK lubricant, like WHITE LITHIUM or Vaseline (temporary). Re-assemble and pressurize. If this doesn't work, disassemble the VM again and SQUEEZE the VALVE and CUP-SEAL tightly while turning, to make a better 'seat' for the cup-seal. Re-assemble and pressurize. If this doesn't work, you must get a new one. If you had the older style, get the new style, they last longer.

In desperate emergencies, a cup-seal from some other Sheridan based gun (Sniper/Cocker/Pmi-x/etc) may or may not work. I have had mixed results. Borrowing someone's spare cup-seal is a lot better then going home without playing.

#### d. VM CYCLING

It seems that everyone has had a problem with their VM cycling at one time or another (the 'full' auto effect). Below is a step-by-step guide to solving the cycling problem.

#### e. VM Cycling/Cold Weather MINI-FAQ v2.8

- i. Manually cycle the gun (with no air) to see if it has an excess amount of friction. For example: remove the main-spring and see if the hammer/bolt will freely slide from gravity alone. If it does, then excess friction is not a problem. If it is a problem, it could be a couple things:
  - A. Lubrication. I see lots of people who either don't lubricate their VM or use the wrong kind (ie petroleum based). If the gun has been sitting a long time, it's a good idea to strip it completely and lube it with a some sort of oil designed for Paintball guns. Paintball gun oil is designed for cold temp. Normal oils (ie petro based or lithium) get thicker when they get cold, making it harder for the gun the cycle.
  - B. Hardened paint. If the VM has been sitting awhile, there is a good chance that some paint left on it when it was last used, has dried, and is now making a lot of friction for the upper bolt when cycling. Solvents are useful in getting old paint out, but keep it away from the o-rings.
  - C. Bad Trigger. The VM has one of the most complicated triggers I have seen on paintball guns. When VMs get old, sometimes the sear gets out-of-line and puts extra friction onto the lower bolt (hammer). Also, many people neglect to clean the triggers (simply wash with water then lube). In fact, most old VMs (3 years +) have had there triggers replaced.
  - D. Dirty Trigger. It is good to clean out the trigger mechanism once in a while with solvent. Occasionally, cold weather will cause the trigger to malfunction if it is "gummed" up.
  - E. Wrong Spring. Although this is unlikely, some VMs are sent with 2 springs (upper bolt) for summer/winter. There is a chance that a VM with the lighter spring (summer), playing in the winter might have problems cycling. Some people also use a lighter valve spring and a heavy bolt spring during the winter. You'll want a lighter bolt spring back in the winter for efficiency reasons.
  - F. Check the velocity screw in the bolt to make sure it's within a 'click'. Otherwise the screw will push up against a bearing creating friction. Its odd that a lot of newbies don't realize that the velocity screw HAS to be within a click to work.
  - G. Bad O-RINGS. The O-rings on the bolt should be replaced about every 12 months. They become worn, cracked, and can even cause the VM to jam. Replacement o-rings are in the VM parts kit, plus fancy aftermarket teflon o-rings are available.

#### ii. VALVE

- A. The valve both directs pressure to the bolt to fire the paintball plus recocks the hammer. When the valve is at 12, velocity is highest, but pressure to the hammer is lowest. Often lowering the clock will help VM cycling (though, will also lower velocity, but turning in the BOLT screw can help maintain adequate velocity levels).
- B. Drill the Valve out. There are 2 methods to drilling a valve: First, to raise velocity, one of the clock holes can be drilled larger to allow for more CO2 to go to the bolt (though decreases cycling performance). Second, to improve cycling, the recocking jet can be drilled larger to allow more CO2 to recock the VM. Either MOD is bad for CO2 performance, but is a good LAST-RESORT for improving cold-weather performance. Have a professional modify the valve (or see the homebrew section).
- C. Clean the Valve. It is possible that the valve might have a lot of 'gunk' in it. (perhaps you tried to use lithium grease.) Just pull the valve out, clean it, and replace it. (note the time on the valve).
- D. Valve Spring. VM/PMI3s all basically have the same VALVE SPRING. If the spring was CUT, or a lighter one was used, then the velocity would increase and cycling would improve. For a cheap fix, you can remove the Valve Spring. This works unless you have a bad cup-seal, in which the cup-seal will not seat properly without a spring. So avoid removing the valve spring, unless its an emergency.
- E. Cup-Seal. When a Cup-Seal goes on a VM, it goes in STYLE. Cup-Seals are either the 'old' kind or the 'new' kind. Most PMI3s using the 'old' kind can upgrade to the 'new' kind. The new kind is supposed to be more durable, though, being shorter, it's rather tricky to put in. While not directly related to velocity, bad ones leak and can really make for a bad day. Usually running lubricant through the c/a system is a good temporary fix until a replacement is possible.
- F. Valve Screws. When the hammer hits the valve, a specific amount of CO2 is released. A lot of PMI3s, mostly old ones, lose A LOT of CO2 out the valve screw holes. By simply putting a lot of teflon tape on the Valve Screws, or using a small o-ring around the screw you help the VM cycling A LOT. Plus, it helps keep all the lube from coming out the side onto your hands.....

### iii. MISC.

- A. O-RINGS. The stock upper bolt has 4 rubber o-rings. Some times they get worn, BLOATED, or are the wrong size (replacements) . If this happens, make sure they are replaced (with the right size). Make sure to also check the o-ring on the lower bolt (hammer), and the o-rings on the valve (which should never go bad). Aftermarket O-ring kits can IMPROVE cycling a lot.
- B. Air Flow. 2-E of All Americans, told me that VMs that have hoses (ie bottom lines, remotes, etc), sometimes get clogged with lubricant. Sometimes the problem is that liquid runs through the hoses and gets the lubes so cold that it makes the lube so thick that it slows/stops the air flow into the valve. He said that best thing was to run sesame seed oil through the HOSE. (2-E of AA said this). Plus, running a solvent through the gas line will dissolve the lubricant (and hopefully not the o-rings).
- C. Liquid. VMs were designed to run straight vapor. But are capable of running liquid (siphon tanks) to gain all the advantages of using liquid. The important advantage being velocity and pressure gain. VMs with cycling problem can usually be fixed (at least temporarily) by putting on a SIPHON tank. Note, excess liquid in a VM can also make the o-rings on the upper-bolt expand (so I

am told). Also, older PMI3s have cheaper CUP-SEALS that will leak when using a siphon bottle, though, replacements are VERY cheap. NOTE: The VM-EXC cannot make use of a SIPHON tank, because it has a EXPANSION CHAMBER, or any VM with an expansion chamber or regulator.

- D. Expansion Chambers, Regulators, and Remotes. There is a misconception that a EC/Reg/Remote will fix cycling problems. What they will do is slow the drop in tank pressure when rapid firing. This is useful in cold weather because the pressure in the tank drops close to the minimum cycling pressure. However, if the VM has a cycling problem during normal firing, a EC/Reg/Remote will not help much.
- E. Nitrogen. The great thing about NITROGEN is that its a GREAT improvement over CO2. If the VM has a cycling problem while running NITRO, then just TURN UP THE PRESSURE! Presto! Plus, NITROGEN is NOT effected by TEMPERATURE/WEATHER like CO2.
- F. Delrin bolts. I have heard that a lot of people have problems with the frictionless, and o-ringless Delrin Bolts. The problem is 2-FOLD. First, I heard that Delrin bolts SWELL when they get cold, especially when they come in contact with LIQUID CO2, creating friction in the VMs cycle. I have had a delrin bolt in my VM for many years and never had problem like this. Second, since the delrin bolts have no o-rings, the OD of the bolt has to match the ID of the barrel. In theory this works fine, but its possible that if you pinch a ball, you could get a piece of shell between the bolt and breech, jamming the gun. This has happened to me in a tournament, and the VM jammed so bad, that I needed to use a hammer to get the bolt unstuck!!
- G. COLD WEATHER. Most of the VM cycling problems are encountered in cold weather. This is do to the bottle pressure being lower (with far fewer usable shots), and LUBRICANT thickening. A lot of people tell me (like SP), that the VM is a warm weather gun, not to be used in cold weather. I tell them "GARBAGE!" The VM can function in cold weather just as well as an ICON Z1/2 or a PRO-AM/LITE (especially with a siphon). Most of you are probably saying, "But my VM doesn't function in cold weather??" Well, if you go through my ENTIRE MIMI-FAQ to make sure your VM is running MINT, then it should work well below 0 degrees. Even without a SIPHON or NITROGEN. I live in MAINE and Doug lives in Michigan, we know COLD weather. In January I put away the 'cocker and use the VM as a WINTER GUN! Running SIPHON or NITROGEN will greatly improve the winter performance.
- H. New VMs. I have seen a lot of COMPLETELY NEW VMs, straight from TASO-EAST, that go CYCLIC (full-auto) for NO APPARENT reason. I told my friends to RETURN their guns, which they did. The new ones they received worked fine. I suspect that since SHERIDEN is UNDER Crossman CORP now, the Quality Control is NOT-AS-GOOD as it used to be. I understand that they are selling them for ~\$180 now, but that is no reason for them to sell low-quality products. The people from TASO East felt the same way, they don't want to loose customers because Crossman is cutting corners.
- I. Cold tank. If the tank is very cold the pressure in the tank is lower than normal, which will effect velocity. You can get a cold tank soon after its filled (that's why you should wait a few minutes before screwing a new tank on). Plus, your tank will also get very cold if you rapid fire.

J. Overfilled tank. If the tank is overfilled, the pressure inside the tank will be lower than normal. This is because the CO2 cannot expand properly. If your tank is overfilled, just dry- fire then gun (in a safe place).

K. After market add-ons. There is a PLETHORA of aftermarket stuff for VMs, that are advertised to help a VM cycling. Some do, and some don't. Read the up-grade section for these.

## f. MISCELLANEOUS TROUBLESHOOTING

- i. Screws. Keep in mind that the body of a VM is made from soft aluminum and magnesium. It is very easy to strip the threads for a screw. If the threads become stripped, they need to be re-drilled and tapped to a larger size. Plus, it is also easy to strip the faces of the allen-bolts from over-tightening (which means you can't get the screw out). If this happens, try using a bolt-removal tool. If this fails, the bolt needs to be drilled out, as well as the hole, then re-tapped to a larger size. This is a good reason to buy the field-strip kit for the VM. It is much harder to strip the screws with it.
- ii. Bolt-Stick. Bolt-stick is a very rare occurrence of a bolt 'stopping' within mid-cycle. This often occurs with aftermarket parts and can come from a variety of places. Often the bolt orings will become worn and cracked (especially stock), and can sometimes create enough friction to stop the bolt. Sometimes paintshells can get behind the bolt, and jam it (especially delrin). Some after-market hammers cause this. Probably because the sear is getting caught when sliding across the hammer (or maybe its the sear release pin).
- iii. Double-Feeding. Double feeding can only mean one thing. Your "Magic Fingers" have gone bad. The Magic Fingers is my name for the rubber ball-detent found in the feed block. They can become damaged for a variety of reasons (including aftermarket bolts). Fortunately, they are cheap and you can get them at most pro-shops.
- iv. Excessive Ball Breakage. The VM rarely breaks paint, so if ball breakage becomes excessive, something might be broke. First: The VM might be double-feeding (see above). Second: You might be missing a bolt o-ring. Missing a bolt o-ring would cause excessive CO2 to enter the feed elbow when firing, slowing the feed rate, pinching balls. Third: the stock brass barrels bends easily if dropped. Plus, check inside the barrel for excessive scratches. See if you can easily BLOW a paintball through the barrel with your lungs. Forth: Perhaps you are using bad paint, or even firing the VM faster then it can feed (unlikely).

## e. UPGRADES

### a. GOING 'STOCK'

I just want to make this note about a stock VM. A stock VM is a fine gun. The only reason 'mag owners, and 'cocker owners make fun of it is that they paid \$1000+ for their guns, and are jealous that some newbie's \$200 gun is just as good!

i. --Price List for STOCK PARTS.

--Prices and parts are subject to change without notice. List updated 8/00.

## VM-68 PARTS AND PRICE LIST

<u>Part Number</u>	<u>Qty. Per</u>	<u>Part Name</u>	<u>Cost</u>
10864	1	Ball Retainer	\$4.28
10007	1	Trigger	\$2.39
105-039	1	Steel Ball	\$.50
68AT-003	1	Cylinder Cap Pin (was P606)	\$.50
68AT-006	4	Trigger Rail Screw (was VMS-903)	\$.50
68SC-009	1	Velocity Adjustment Ball (was P624)	\$.50
68SC-010	1	Velocity Adjustment Screw (was P622A)	\$2.27
CH-4	1	O-Ring	\$2.46
EB17-011	1	Lock Washer (was VMS-103)	\$.50
F105	1	Filler Cap Washer	\$.50
G3397-011	1	Chamber Spring (was F503)	\$.50
HB17-048	1	Safety Spring (was E621)	\$.50
PGP-019	1	Font Sight (was P700)	\$.55
VMS-102	2	Screw	\$.50
VMS-111	1	Air Chamber Body	\$15.78
VMS-112	1	Valve Guide	\$.50
VMS-201A	1	Bolt Connecting Pin	\$.54
VMS-231	4	Upper Bolt O-Ring	\$2.47
VMS-241A	1	Upper Bolt	*
VMS-242A	1	Upper Bolt Stress Nut	\$4.30
VMS-251A	1	Lower Bolt	\$24.60
VMS-252	1	Lower Bolt O-Ring	\$.81
VMS-253	1	Ballast	\$1.22
VMS-255	1	Safety Washer	\$2.03
VMS-256	1	Safety Ring	\$5.03
VMS-257A	1	Safety Sleeve	\$3.38
VMS-258	1	Safety Fastener	\$.50
VMS-301	1	Bulk Gas Adapter	\$5.54
VMS-302	1	O-Ring	\$1.93

VMS-403	1	Lower Bolt Plug	\$4.32
VMS-404	1	Upper Bolt Plug	\$7.74
VMS-405	1	Plug Retaining Bolt	\$.50
VMS-5010	1	Grip Lug	\$15.08
VMS-502	3	Screw	\$.50
VMS-503	1	Screw	\$.50
VMS-510	1	Pistol Grip	\$11.48
VMS-520	1	Screw	\$.50
VMS-601	1	Ball Feed Adapter	\$13.86
VMS-603	1	Ball Retainer (use 10864)	*
VMS-604	2	Ball Feed Spacer	\$.50
VMS-605	1	Ball Feed Finger Plate	\$1.50
VMS-606	2	Screw	\$.50
VMS-609	1	Ball Insert Tube	\$1.21
VMS-610	1	Ball Feed Fastener	\$.50
VMS-700	1	Main Spring	\$2.16
VMS-701	1	Main Spring Guide	\$2.39
VMS-800	1	Trigger Guard	\$7.22
VMS-9011	1	Trigger Housing	\$17.01
VMS-904	1	Primary Sear	\$4.02
VMS-905	1	Primary Sear Pin	\$1.22
VMS-906	1	Primary Sear Spring	\$2.16
VMS-909	1	Secondary Sear	\$1.58
VMS-90A	1	Secondary Sear Pin	\$1.40
VMS-90B	1	Secondary Sear Spring	\$1.94
VMS-90D	1	Trigger Pin	\$1.06
VMS-90E	1	Trigger Spring	\$1.76
VMS-910	1	Right Trigger Rail	\$2.73
VMS-911	1	Left Trigger Rail	\$2.73

VMSA003	1	Barrel Retaining Nut	\$7.98
VMX-111	1	Air Chamber Ass'y	\$27.93
VMX-121	1	Exhaust Valve Ass'y	\$5.94
VMX-241A	1	Upper Bolt Ass'y	\$25.34
VMX-251A	1	Lower Bolt Ass'y	\$37.75
VMX-301	1	Bulk Gas Adapter Ass'y	\$8.75
VMX-601	1	Ball Feed Adapter Ass'y	\$24.29
VMX-A01	1	Receiver Ass'y	\$183.12
VMX-9011	1	Trigger Assembly	\$46.31
VMXA200	1	Barrel Ass'y	\$13.57
VMXSTOR	1	Velcity Adjustment Tool	\$6.93

\* Not available.

Use the address for Sheriden to order these parts or go through a local dealer. The later is advisable since Crossman prefers dealing with retailers over customers.

## b. BARRELS

### i. General/Stock

Paintball barrel design is a center of huge debate. Some believe that different barrels affect accuracy and range differently. Other believes that all barrels perform nearly identical. For the purpose of this FAQ, I will only cover the barrels which I have personally used and tested. I will use terms such as "Turbulence," "distortion," and "wobble" which are all HIGHLY debated.

I will just say this once. The stock VM barrel is garbage (except the Magnum barrel). The finish is always poor, and brass barrels get scratched VERY easily. Plus, the ID is .690 which is way to tight for big bore paint (ie Nelson, Bullseye). However, the STOCK barrel can be easily modified to shoot good. All it really needs is to be bored to .692 and honed/polished. A good honing kit will do both. An airsmith can also hone the barrel for you, but it might actually cost less to simply buy a new one.

For the most part, any barrel is a good replacement over the stock barrel. From my experiences, for best performance a VM barrel should have these 3 characteristics:

1. External Rifling- Studies have shown that blowbacks (like the VM) work best with external rifling because they port the highly turbulent gas inherent to blowbacks.
2. Medium to Large bore- The high pressure blast of a VM distorts the paintball, and is less likely to break in the barrel with a larger bore (internal diameter). Between .692-.696 is recommended.

3. Barrel length 14-16"- It was discovered a few years ago that the most efficient length of a paintball barrel was 14". Anything above or below that would be wasting CO2. However, with external rifling and/or siphon tanks, its more efficient to use a 16" barrel (for less "wobble").

ii. SP

Smart Parts barrels are considered the best barrels for the VM. Smart Parts uses a special externally rifled barrel designed to reduce turbulence around the ball, keeping the ball stable, thus providing more range and accuracy. Lately there has been a lot of fuss over SP barrels. Many 'mag and 'cocker owners didn't see the same results when they put the SP barrels on their new fancy semis. This is because 'Mags and 'Cockers have less turbulent air, however blowbacks, like VMs, have lots of turbulence, hence a SP barrel. SP barrels made within the last few years all have a NEW teflon coating which is believed to increase accuracy, but many believe that it hurts range. This may or may not be true, but the teflon can be removed by soaking the barrel in ammonia based cleaners or solvents. Modern SP barrels come in a variety of shapes, including their new 'tear' drop rifled barrels. The average price is ~\$50-125, and are my pick for the best barrels for a VM. Keep in mind that SP barrels lower the velocity 30-50fps, as with all externally rifled barrels, and are very difficult to clean when a ball is broken, but greatly reduce barrel noise.

iii. J&J

J&J barrels have come along way. 4 years ago, J&J barrels were considered low quality. But in the last 2 years, they have made some leaps. IMO, top of the line J&J barrels are the second best barrel that money can buy, and perhaps the best for closed- bolt guns. (I mean the externally rifled, HARD CHROME plated, brass w/ muzzle break). J&J also makes smoothbore (to any ID), plain brass, and internally rifled. You can even get J&J barrels with SP rifling. The HARD CHROME barrels are nice because they are impossible to scratch. These run ~\$75-80 for rifled. \$25-35 for smoothbore, and an extra ~\$25 for Hardchromed.

I have heard that some J&J barrels do not fit properly into the VM. Either they don't screw in all the way or come loose (and fall out) while firing. This is probably true, considering what I hear about J&J's quality control. If you ever get a bad J&J barrel, simply return it and ask for another (scream a little, maybe you'll get it for free).

Plus, early J&J barrels did NOT screw in. They required the barrel brace that is used on the stock barrel. However, if you send it to J&J, they will modify the barrel, so that it threads in. (NOTE: they did ask me to cover return-shipping).

iv. ARMSON

PCRI rated Armson barrels to be more accurate than any other, when tested on a 'Cocker and 'Mag. Armson barrels are internally rifled, based on a similar scheme used in muzzle-loading firearms. Unlike mags/cockers they don't work as well on a VM. However, they do still work very well. But, as with all INTERNALLY rifled barrels, they are very sensitive to PAINT. Unlike SP barrels, Armson barrels do not lower velocity, and are easier to clean. These run ~\$85-99. BTW, ARMSON barrels are VERY loud on a VM (any gun for that matter). An ARMSON 'bark' is very distinct.

v. LAPCO

Lapco has become a leader in the barrel business. They also make a barrel adapter for VMs. The barrel adapter allows you to use any AutoCocker barrel with your VM. This is very good news for VM owners since good VM barrels are so hard to find these days.

Manufactures have begun to neglect the VM, but with this adapter, you are now able to use a HUGE variety of barrels. Stainless, Carbon fiber, and Titanium barrels are now all available.

#### vi. OTHERS

Everybody and their mother makes barrels these days. My advice is to buy quality name brand barrels. If possible, test a barrel before you buy it. Different barrels have different IDs (internal diameters), which are more friendly to different kinds of paint and climates. Other fine barrel manufactures include ,B.O.A., DYE, and Palmer's Pursuit Shop. If you can't afford a \$100 barrel, smoothbore barrels (no rifling) are still an improvement over the stock barrel. Carter Machine and BudOrr make FINE SMOOTHBORE barrels for ~\$20-40. BTW, STEEL barrels are very heavy, so they might not be the best idea for the heaviest gun on the market.

Sheridan's Equalizer also had VM threads.

#### vii. BRUIZER BARRELS

Older style Bruizers like the Pro, Pro XP, Sport, and Patrol models have VM barrel threads. This means that you can use any VM barrel with a Bruizer and vica vera. It should be noted that newer Bruizers like the Bandit, S.O.B. (TNT), Apocalypse S.O.B., Outlaw, and Fugitive have Spyder threads so make sure to check if the barrel is for newer or older Bruizers. Also worth noting is that there are some old Wiseguy models that used VM barrels but most Wiseguy's have Spyder barrel threads.

There are also two Bruizer look-a-likes that use VM barrels. They are the PG-1 Pro and the Tornado.

### c. C/A

#### i. SETUPS

For some odd reason, ALL SHERIDEN guns take in CO2 from the front of the gun. (Piranhas, VM-EXC, and VM-Magnums don't count since they are custom versions of front-CO2 Sheriden's.) During the 12gram days, this was no problem. Unfortunately, the front-bottle system on the VM severely limits it. In the stock form, only a 7-12oz can be used.

Fortunately, there are many options for bottle re-placement. The most common is BOTTOM-LINES. Plus there are also BACK-BOTTLE setups. Both these have versions that allow for dual-bottle setups. Many VMs experience problems with screws loosening with back-bottles, you may need to use LOC-TOURNAMENT or LOC-TITE on the field strip screws. Plus, the bottle can be run on remote or the bottle can be retained in the frontal position, but at a 90 degree, or 45 degree angle. Still yet are intruder systems, which put the bottle on a bottom line, but on a frontal grip.

The VM has more c/a setup options than ANY OTHER GUN. This allows the VM some freedom, as well as some distinct looks. All these allow the VM to use a CO2 bottle of 3-40oz. Most people opt for the bottom line, with an expansion chamber (like the Black-Rain). Bottle re-placement kits are usually inexpensive, around \$30-50. You can also use on/off valves, filters, and quick disconnects. These little brass pieces can run from \$5-\$30. IMO filters are a waste of money, and I have NEVER HEARD of a VM going down because of dirty CO2.

## ii. EFFICIENCY

The most common complaint of the VM is its CO2 efficiency. A stock VM, with 7oz usually gets 100-220 shots from a 7oz. The large range in shots is due to weather, temp., and condition of the VM. This is hardly enough for a game, let alone for a whole day. Different setups can be used to allow for bigger or multiple bottles, but, special CO2 devices can be used to allow for 350-450 shots from a 7oz. These devices are expansion chambers, regulators and/or remotes.

### A. EXPANSION CHAMBERS

Expansion chambers allow the CO2 to pre-expand before being used, thus more efficient. There is a number of different types, some do very little while others are very helpful. The most common is the original Black-Rain system (by AirAmerica), which can be setup in a BACK-BOTTLE (Terrorist) or BOTTOM-LINE setup. This is the best chamber, and most expensive at \$100-\$160. If you already have a DUAL-BOTTLE setup, and a 3oz (ie MAGNUM), COOPER-T makes a special valve, that fits on the 3oz, that turns it into an expansion chamber. I hear this works well. Taso makes many different styles of CHAMBERS ranging from small (\$20) to large (\$100), all are quality devices. Avoid cheap small chambers, they're not worth the money. Also, a remote system also works as a partial expansion chamber. SmartParts makes a REMOTE/EXPANSION CHAMBER for about ~\$100. The Chamber (designed by AIR- AMERICA) fits on the bottle and also features a quick-disconnect, allowing it to switch from gun to gun (great deal). Taso and I&I also sell similar setups.

### B. REGULATORS

Paintball regulators are basically the same that are on soda CO2 tanks and welding machines, but are more precise. They allow you to control the pressure of CO2 coming out of a tank, and keep that pressure level. This is useful because it keeps wasteful liquid from entering your VM, and keeps the operating pressure at the perfect point for a VM (550-650psi) instead of 900-1000psi. Using a regulator can also mean less ball breakage, due to the lower operating pressure. The best REG around is the AirAmerican UNIREG, but its also the most expensive, around \$250. Other people make quality cheaper ones like Palmer Pursuits, Sheridan, and Paintball Mania Supplies. A regulator is a great idea if you plan on upgrading to NITROGEN in the future (since the REG is a must).

## iii. SIPHON

The one cure-all for velocity problems, cycling problems, cold weather problems, and consistent velocity problems is to use a SIPHON tank. Siphon tanks allow the VM to drink straight LIQUID CO2. This allows for a GREATER operating pressure. Most other blow- back semis use SIPHON tanks (ICON Z1/2, PROAM/Lite). The only drawback is efficiency. With a siphon, expect only 100-150 shots from a 7oz. This means a 20/32/40oz is a MUST. Although, if the VALVE it drilled out bigger, you'll get 130-175 shots from the 7oz. VMs CANNOT run on a SIPHON and EXPANSION chamber at the same time, as they are contradictions (people really ask me that). Plus, the VM will blow giant VAPOR clouds which impress the newbies (and give away your position). Make sure your VM was made after MAY 1992, as it may have the 'old' cup-seal. Siphon tanks are the same as regular PV tanks, except have a special \$10-15 SIPHON VALVE. (TIPPMANN or TPI make the best). It should be noted that since running on a SIPHON means your velocity rises when rapid firing, you should chrono this way, to get an accurate fps reading. NOTE: Most tournaments require you to chrono this way if you use SIPHON, which is a GOOD thing because its nearly IMPOSSIBLE to get a HOT shot if you chrono on 'liquid'.

## iv. NITROGEN/HPA

The VM can run on NITROGEN/HPA just like the 'mag. Many quality kits (ie expensive) will allow the VM to get nearly 1000 shots

between fills. Running on NITROGEN has the same benefits that SIPHON tanks provide like stable velocity, and all-weather performance (without the cloud). Most NITRO kits run from about \$200 (low pressure), to about \$500 (High pressure). I should point out that NITROGEN is quickly becoming the choice of tournament players. Mostly because 'Cockers and 'Mags are sensitive to liquid CO2 (unlike the VM). So if you are worried about the availability of nitrogen in the future, I wouldn't worry. I predict all tournaments, and most fields will have NITROGEN capabilities in the near future.

The VM is an UNUSUAL gun, in that it can run on an EXPANSION CHAMBER and NITROGEN like a 'mag or 'cocker, with great results. Plus also run on SIPHON like a ICON Z1/2 or PROAM/LITE also with good results. This ability makes the VM an EXCEPTIONAL paintball GUN.

#### d. INTERNALS

##### i. VALVE.

###### A. Magna-Port/Turbo Valve.

The Magna-Port valve is probably the most common replacement valve for the VM. The valve was designed to improve cold weather performance. It does this by having only ONE large 'clock' hole bored much bigger than the 12 o'clock hole on the stock valve. This increases velocity. The recocking hole is also enlarged to increase cycling performance. This degrades efficiency by 10-15% over a stock VM and 30-45% over a VM with an expansion chamber. This valve is only useful if used in cold temperatures where siphon tanks are unavailable. Magna-Ports have been known to fit poorly in VMX's. The Magna-Port also comes with a delrin cupseal, which is supposed to last much longer.

###### B. Tru-Flow valve.

For the most part, the Tru-Flow valve is much like the Magna-Port valve. Both the recock jet and 12 o'clock hole are bigger than the stock valve. However, the holes are smaller than the Magna-Port. This was done to retain some efficiency, while still giving moderate cold weather performance.

###### C. Carter/other.

A lot of pro-shops make custom VM valves, which are all basically the same. The #3 (smallest) hole is bored slightly larger than the #12 (largest) hole, and "Venturi-style" jets are drilled around the recocking jet to provide for better cycling, at the expense of efficiency. The Carter valves are the most common "custom" valves.

Airgun Dynamics is also working on a new valve that will "really make a difference."

##### ii. CUP SEAL.

Apart from 'new' style and 'old' style replacement cup seals, there is also the NELSON cup-seal for the VM. This clever aftermarket device uses a NELSON CUP-SEAL in your VM. This means that if your CUP- SEAL goes, you need only to get a replacement NELSON-based seal, and not the whole device like before. However, before using it, make sure that you use LOC-TITE on the PIN as you screw it into the cup-seal. When I first used mine, the PIN managed to work itself loose from the CUP-SEAL, jamming the GUN (in a GAME!!).

### iii. BOLTS.

#### A. DELRIN BOLTS

Delrin BOLTS are made from DELRIN, a fancy plastic, and are light. They usually contain no o-rings, so expect more blow-back exhaust in the feed elbow. Cooper-T makes an unusual DELRIN bolt called Maximizer, designed to give the ball a backspin, and an extra 150' range. Results, though, are mixed. (I have one, and they work, but most people have had problems with Maximizer bolts). Some Venturi bolts have oversized OD's (causing cycling problems) and I typically find that delrin bolts usually cause more problems than they fix. Usually. NOTE: You should check the face of the delrin-bolt often. The high-pressure CO2 often causes the face to distort, which will brake paint.

The bolt with the Pro-Comp v.3 is widemouth Delrin bolt, not a venturi. The technical information on the Pro-Comp v.3 makes it sound like the bolt is venturi, but it isn't. I have a Pro-Comp v.3 and the bolt has similar performance to my other TASO venturi.

#### B. VENTURI/STARFIRE/WIDEMOUTH BOLTS

I have these bolts grouped together because they are all virtually identical, except for the face.

Venturi bolts are usually ALUMINUM, like the stock, but contain fewer o-rings. Venturi bolts try to reduce the turbulence behind the ball using the 'Venturi Effect,' providing better range and reduced ball breakage. Both TASO, NPS, APS, OTP, I&I, etc. distribute venturi bolts. Aftermarket bolts can run from \$20-40, and often reduce/eliminate ball breakage. Quality control varies from company to company, so try to buy from well known companies. Try it on YOUR gun if possible before buying.

Starfire bolts are similar to the Venturi-style bolts, with a star-shaped bolt face. For the most part, they are identical to the venturi style. NOTE: 'Real' Starfire bolts are only made by StarFire inc. Avoid the cheap copies on the market.

Widemouth bolts have a VERY large blast hole. The theory is that the blast will evenly disburse onto the ball, lowering the chance of breakage. The majority of 'Widemouth' bolts are simply modified stock bolts.

#### C. GRAPHITE COMPOSITE

In theory, graphite-composite bolts have nearly 0 friction, meaning no-oil or o-rings needed. Paintball Dave's sells them (often with there PhazzeII hammer). Being the 'new' product on the block, its not thoroughly tested yet. Its not well known how the graphite-composite reacts with high-pressure or liquid CO2.

#### D. NYLATRON BOLTS

Nylatron bolts are very similar to delrin bolts. They're both a space-age 'polymer.' However, unlike the delrin bolts, the nylatron does not distort the way that delrin does under high-pressure, so they brake less paint. NOTE: They tend to cost more.

#### E. STOCK BOLTS

A word about the stock bolt. The stock bolt's biggest benefit is also its biggest drawback: its o-rings. The 4 orings on the stock-bolt allow the VM to feed very fast because VERY LITTLE CO2 goes into the feed elbow when firing. At the same time, most bolt problems come from the bolt's o-rings (bloating/cracking). Another drawback is the flat face of the bolt. Most aftermarket bolts

have concave faces to reduce ball-breakage. With all that in mind, having an air-smith modify your stock-bolt will usually make it as good as any aftermarket bolt.

#### iv. HAMMER

##### A. Stock Hammer

The STOCK hammer on the VM is FINE for the most part. It is made from solid stainless steel. It is very heavy, which makes for very reliable feeding/cycling. However, the heavy weight makes for slow cycling and inefficient CO2 use. The stock hammer can be modified to cycle faster by drilling holes into it (lengthwise), but velocity will have to be increased to make up for the lighter hammer.

##### B. PhazzeII

This is the most common aftermarket hammer, made by Paintball Dave's. Early versions of the PhazzeII were chromed stainless. It was assumed that a chromed stainless bolt would retain all the benefits of the stock bolt, but also cycle faster. Later versions of the PhazzeII lightened (slightly) chromed stainless hammers (without 'bumpers').

##### C. Maximizer

This is an unusual hammer from Cooper-T. The Maximizer is made from machined aluminum and is incredibly light. The benefit of this is a theoretical cycle speed faster than a mag. The downside is that the valve needs to be drilled out to get velocity up to 300fps, and it will jam easily. Unlike other hammers, the Maximizer includes an external velocity adjuster. Also unlike other hammers, the Maximizer is NOT a drop in kit. In order to use it, the valve needs to be drilled, the sear needs to be sanded (or it will scar the aluminum hammer), and a hole needs to be drilled (for the velocity adjuster).

##### D. Misc.

For the most part, aftermarket hammers fall in 3 categories: 1- Chromed solid steel, 2- Chromed drilled steel, and 3- Hybrids (Steel w/ aluminum inserts). The only real difference with hammers is their weight. If you want reliability, go with the heavier hammers (or even stay with the stock). If you want performance, go with the lighter hammer, but be prepared to modify your valve.

##### E. Pro-Comp v.3 Hammer

The hammer with the Pro-Comp v.3 is made of brass and Delrin. From the end that strikes the valve to the point that the sear catches is brass. The rest is Delrin. It is an interesting combination and works well.

#### v. MAIN SPRING

##### A. ProShot kit.

The kit replaces the stock VM spring with an AUTOMAG spring behind the HAMMER (instead of behind the bolt). The kit reduces recoil and wear on internal parts. Plus, the kit also allows for external velocity adjustment by adjusting spring pressure. The kit is available from TASO for ~\$25. (If you have an automag spring, look in the Homebrew section for a homemade ProShot kit).

##### B. Pro-Comp v.3 Spring

The Pro-Comp v.3 includes a new spring behind the hammer. It is not an AutoMag spring and is not adjustable like the ProShot.

The spring and hammer are actually intergrated into one unit. The new spring reduces recoil A LOT, almost completely. The first time I shot my VM with it, I was absolutely amazed.

## e. EXTERNALS

### i. POWERFEED

The purpose of the powerfeed is to allow for faster feeding of paint from the loader into the breech by making use of exhaust CO2. On a STOCK VM this is NOT USEFUL, as it cycles much too slowly to make use of the blowback effect. However, many custom VMs can cycle very fast, faster than the loader can feed, requiring a powerfeed to prevent ball chopage. Some people argue that POWERFEEDS were designed for 'mags and simply don't work on VMs. But many others say different. If you can fire your VM faster than it can feed, get a POWERFEED, if it doesn't work, send it back. Pro-line makes both a VM powerfeed and a UNIVERSAL powerfeed (which fits on the VM and is \$20 cheaper!). POWERFEEDS run ~\$25.

(Now for my opinion.) I have never seen a VM powerfeed that worked. The problem is that it doesn't line the balls in the correct 45degree angle (like in the automag PF). As a result, it actually slows down the rate of feed. Plus, if your bolt orings are bad, you will get the 'popcorn' effect from the powerfeed. The exhaust CO2 will actually PUSH the balls into the loader. Instead of a powerfeed, you are better off to have holes drilled into the feed block. This will allow for faster firing without the 'popcorn' affect.

### ii. GRIP

The VM uses the BASIC M-16 Lonestar grip and will accept ANY aftermarket grip designed for LONESTAR grips. This includes RAM-LINE grips and 'European' style grips at around \$10. .45 grips and IVORY grips are around \$50 and may require special adapters. Keep in mind that different grips use different style bottom lines. A bottom line designed to fit on a stock M-16 Lonestar grip, will NOT fit on a custom .45 grips. (Though, .45 grips take the well known mag/cocker style 'duck bill' bottom line.)

### iii. SIGHTRAIL

The VM comes with NO SIGHT RAIL (except MAGNUM and EXC). Some aftermarket sightrails SLIDE on, while others require drilling/tapping. If you want to use a sight, you need a sightrail (or DUCKTAPE, which I have also used). Most are around \$10-20. Keep in mind that the feed-block gets in the way of most sights and a raised sight rail is often needed. Raised sight rails are usually designed to attach to the existing sightrail, meaning that a VM owner would have to buy both to use some sights.

### iv. SIGHTS

(see iii). Fancy hunting scopes look nice, but are of little use to a paintball gun IMO. Any scope/sight that allows for quick sighting is fine. This includes point sites (\$15), dot sights (\$30-100), and Armson sights (~\$80). The ADCO Square-Shooter and model 2000 are highly recommended.

### v. FIELD STRIP SCREWS

The VM needs to be field striped very often. Unfortunately, the VM has MANY screws. Using field strip screws allows the screws to be taking off with the fingers very quickly. The Magnum comes with this and worth the ~\$10. On behalf of all the techs that work on VMs, PLEASE BUY FIELD STRIP SCREWS.

## vi. ELBOW

Those stock brass elbows are HORRIBLE. Pro-team and Armson make quality aftermarket elbows (that DON'T REQUIRE DUCK-tape to stay on!). Aftermarket elbows are a MUST when using LARGE bulk loaders. (Though, some COME WITH elbows.)

## vii. LOADERS

### A. Standard

A standard 'non-motorized' loader is fine for a VM. The heavy hammer creates enough recoil to keep the loader feeding fast enough to keep up with most people. The only time a standard loader will be inadequate is if the internals are lightened and cycling speed is increased. If this is the case, go with a motorized loader.

### B. Motorized

If you do have lightened internals and/or increased cycle rate, then a motorized loader is recommended. Motorized loaders contain a device that senses when the loader is jammed, and automatically unjams it. Motorized loaders run from \$50 to \$125.

### C. Turbo-Loader

The Turbo-Loader is a special loader specifically designed for the VM. The turbo-loader is very similar to a stock loader, except that it has a small hose that runs from the loader to the small hole behind the feed-block. What this does is allow excess CO2 to be channeled into the loader to keep the balls unjammed. In theory, this is a very good design, but I've heard that it tends to break balls in the feeder.

## viii. STOCKS

With the m-16 (lonestar) GRIP, it is difficult to get a stock that will fit a VM. Because of this, most people run a bottom-line or back-bottle and use the bottle as a stock. However, there are 3 stocks available that -cannot- be found on ANY OTHER paintball gun that attach directly to the VM.

The first is the CAR-15 stock. The CAR-15 3-position adjustable stock, a direct copy of the stock found on the military-issue M16 Carbine, is made mostly of a synthetic material of comparable strength to high-grade plastic. It provides for maximum support and range of adjustability while retaining structural integrity without excessive weight (~8 oz., or 1.1 kg). The four inches of travel over three positions should accommodate the shooting preference of players of any physical stature. The stock attaches to the receiver via a metal assembly the same size as the lower rear cylinder and has the appropriate mounting holes machined. Before purchasing, keep in mind that this stock may not be compatible with certain aftermarket hammers and spring/cocking-kits. It is available from I&I and Taso for ~\$35.

The second is the THOMPSON stock. This wooden stock is the same used on the Infamous 'Tommy' gun rifles and makes the VM look like a mid-east terrorist weapon. Like the Car-15 stock, the 'Tommy' attaches to the 2 holes on the back of the VM. It is available from TASO for ~\$35.

The third is the SKS stock. This is a folding fiberglass stock that attaches to the rear of the VM (like the previous 2). It is called the 'SKS' stock because it is made from actual SKS folding stocks (which were illegalized in the crime bill) and modified to attach to a VM. I&I is having a sale on them for ~\$50.

Keep in mind that the Car15, Tommy, and SKS stock are all 'military' style stocks. If you are worried about the image of paintball, these might not be the best stocks to get. However, I enjoy the fact that these stocks are only available to VM owners.

If you have a DUAL-BOTTLE adapter, but DO NOT need the rear adapter, SMART PARTS makes an expensive STOCK that fits in the REAR C/A adapter for ~\$50-90 (designed for 'mags, but works fine for VMs). Some versions also have a Quick-Disconnect on the side to allow the use of a remote while using the STOCK.

Also, if you switch to a .45 style grip (or have a VM-EXC), you can use -ANY- stock designed for 'Mags and 'Cockers. Occasionally I see a wire stock that uses the m-16 grip, or the 2 holes in the back, but I was unable to find a company that sells them. :(

## f. MISC

### i. RATE OF FIRE.

There are 2 basic ways to increase the VMs cycle rate. First is lighter INTERNALS (see above), second is a better trigger. The VM trigger is slow, complicated, and tends to break down. For a trigger job, I recommend that the trigger be sent to a professional, as it is very easy to break (I KNOW, I have broken 2!). A trigger job usually includes a lighter pull spring and a block behind the trigger. Trigger jobs are around \$30.

#### A. Double 'FIRE' Trigger

Another option is the Double Trouble, double trigger (like the AUTO-RESPONSE on the Automag). This trigger does work, but trigger pull is long and uncomfortable. I am told that the .45 grip makes the pull more comfortable. Either way, a powerfeed is a must. The DOUBLE TRIGGER is currently \$120, which is too much for most VM users. Once the price drops and I hear better results, I'll recommend it. (NOTE: as of 10/03/98 Double Trouble triggers are VERY rare. Put that \$120 probably doesn't apply any more.)

#### B. Double 'Shoe' Trigger

The 'double trigger' shoe is becoming popular. Basically, it's just a trigger shoe that allows you to use 2 fingers to pull the trigger instead of one. The reasoning is that two fingers have more strength than one and thus can pull faster. The 'Double-Trigger' shoe has never been proven to work, however, the VM is the ONLY gun that doesn't need 'machine' work to use one. Smart Parts sells them for ~\$30.

#### C. Carter-Trigger

I hear on the grapevine that Carter is working on Drop-In custom trigger for the VM. Last I heard, it was 'still in progress.'

#### D. Pro-Comp Trigger

The Pro-Comp v.3 includes a free trigger upgrade that reduces trigger pull by about half. The trigger pull is significantly shorter than stock. However, following some of the trigger shortening techniques in this FAQ will give you similar results.

### ii. WEIGHT.

I remember hearing people complain about the weight of a custom PGP. The VM is HEAVY, but not unbearable. I ran my VM on two

20oz's for about a year, but I am a big guy. Fortunately, there are 2 options to weight reduction on a VM. One simple, one complicated. The easiest is using a remote, which takes a couple pounds off the weight. To reduce any more weight will require MACHINE work. PRO-COMP, ABC paintball, and Palmer all do great work. They trim a couple more pounds of weight from the VM, making the VM resemble a pro-master. Lots of people have their VMs redone by CARTER MACHINE (That SILVER Youngblood gun). Note, Carter doesn't reduce any weight, in fact, he adds more. But they look cool (I have one). Custom work can range from \$50-350.

If you don't want to desecrate your VM with machine work, there is a CUSTOM body available. The VMX is a replacement body for the VM. It's made from 'durable' plastic, and makes use of existing VM internals (much like 'mag and 'cocker F/X bodies). I have heard that many people have problems with their internals fitting into the VMX, while others LOVE it. There have been reports of bodies cracking also. From what I have heard, there is a new version of the VMX redesigned to fix the old problems. The new version is apparently made from metal, comes with a built-in vertical line, and all the valve holes are guaranteed to fit. The new version strips with one thumb-screw, and is as durable as the original VM. The STOCK VM trigger, and Double TRIGGER have to be modified to fit the VMX body (cut with a hacksaw), but most other upgrades fit with no problem.

### iii. Pro-Comp v.3

In February 98, Airgun Dynamics ([www.airgundynamics.com](http://www.airgundynamics.com)) released the Pro-Comp v.3 total conversion kit for VMs. The kit includes the lower bolt, main spring, and rear plug, which are one component. The lower bolt is made of brass and Delrin. The upper bolt (also Delrin), velocity adjuster, and cocking knob are also integrated into one component. The kit also includes slot covers for the side since the cocking knob is relocated to the back.

The kit greatly reduces noise, recoil, reduces operating pressure (250 psi), and lightens the gun by a half pound. The kit, while worth the money for a serious player is probably too expensive for a rec player, costing \$150.

The kit also includes a trigger kit and is a free upgrade for those who have purchased the kit. It reduces trigger throw by about half.

Unfortunately, Airgun Dynamics has gone out of business. Hopefully someone will pick up where they left off and continue making this great upgrade.

## VM HOME-BREW

### g. POOR-MANS Custom-work

If you're like me, you think you can save money by doing custom work yourself (and you probably don't read the manual for anything either). A lot of the CUSTOM work below was summarized because the full length description took up too much space. If you email me, I'll be happy to explain the idea's more fully.

#### i. TRIGGER.

The easiest thing you can do is drill a hole in the block behind the trigger, and tap a screw into it. This keeps the trigger from going back a certain distance. Next, if you are BRAVE/STUPID you can take the trigger apart, shave down the sear, and adjust the spring, making the trigger pull short and crisp. (I broke mine doing this). In fact, when I called Sheriden, as soon as I mentioned the word 'trigger', they simply said "send it in!" Keep in mind that its usually best to send the trigger to someone else. That way, if he breaks it, he buys a new

one, not you! Also, the hammer cycles about 1/4" past the sear before it catches. For a slight increase in rate-of-fire, putting spacers behind the bolt shortens the cycle.

ii. GUN-WEIGHT.

Apart from using a remote, you'll need access to machining equipment, drills, and/or hacksaws (ie shop class). Keep in mind that reducing the weight of a VM could permanently damage the gun if you're not careful. Unless you are an experienced machinist, I would skip this section and send you VM to a pro shop. Its possible to drill holes in your HAMMER (heavy steel), thus making it lighter and will also INCREASE THE CYCLE rate. However, this will decrease velocity and you will have to port the valve to adjust for this. A very popular mod is side shaving. The body of a VM has VERY thick walls (almost 1/2" thick!). A lot of weight can be lost by shaving the sides and top (like Palmer/Carter). I have personally chopped the rear 1.5 inches off of my VM. I also had to chop the rear 1.5 inches off of my HAMMER to make adequate room for the spring-kit. Its also possible to TOTALLY chop off the C/A adapter (nearly a pound of aluminum) and thread a brass quick-disconnect to a remote (ie like PRO-COMP/PALMER).

iii. BARREL.

If you have machining equipment, making BARRELS is fairly simple and cheap. Friends have made them in shop class and they all broke paint (but they also watch Beavis & Butthead). None-the-less, I have seen fancy brass rifled barrels made for about \$5 at shop class. (It is possible.) Plus, you can also polish your stock barrel using a 12 gauge cleaning swab attached to a drill and a little oil.

iv. COLOR.

Don't Laugh, I have seen anodization advertised at \$100-150 in APG. If you look in your phone book, you can probably find a local gun-shop that will anodize, or even NICKEL plate, for \$30-45. If you are just plain weird, you can spray-paint your VM. NOTE: this will eventually sweat off and be careful not to spray any inside the VM.

v. C/A SETUP.

If you have looked up hoses and fittings in your local paintball store or paint-mag, you might have noticed they are EXPENSIVE. If you want a cheap alternative, go to your local hardware store for BRASS 1/8" fittings. You'll find that high-pressure hoses, elbows, on/off valves, and misc. fittings usually cost 30% the price found at paintball stores. Make sure you get HIGH-PRESSURE brass fittings and don't get steel or aluminum.

vi. ADJUSTABLE AUTOMAG SPRING KIT.

With a little ingenuity just about anything is possible. You can use an AUTO-MAG bolt spring instead of the stock VM spring behind the hammer. This nearly eliminates the VM from CHATTERING and eliminates most of the recoil. You basically take out your STOCK SPRING and replace the AUTOMAG spring behind the HAMMER. However, it won't fit unless you make some space. Remove the rear hammer bumper (the white thing) and run a 1" long bolt in its place. Its also possible to make an adjustable version which allows for velocity change by controlling spring pressure. (I made something like this for mine, which I still use). Experiment with this.

vii. REAR COCKING KNOB/EXTERNAL VELOCITY ADJUSTER KIT.

If you are tired of getting dirt inside your VM, you can install a rear-cocking knob by drilling a hole at the center of the block behind the hammer and replacing the screw in the hammer with a longer one that extends out the back. Then find something to cover the side-ports (after you remove the side cocking knob). Or, if you want external velocity adjustment, take out your hammer and drill a hole though the

middle (there already is a hole 1/4" partly through the block). Then, tap it to 1/4-1/8" and insert a screw about 5" long (or 3 inches if you want a tourney legal internal velocity adjuster) into the hammer until the screw appears at the far end (the part that hits the valve). Then put the hammer back into the VM and test fire. Turning the screws control how far the VALVE opens.

viii. MORE EXTERNAL VELOCITY ADJUSTER KITS.

Another trick for external velocity adjustment: the top bolt velocity screw is replaced with an allen screw at 90 degrees from the hole that lets CO2 in. Its set into the bolt to keep it from hitting walls of the receiver, but long enough and wide enough that it could close up the hole which lets in CO2. The gun then has two holes drilled into the side where the upper bolt velocity screw had just been placed, in order to get to the allen screw. One hole was in the uncocked position of the bolt, the other in the cocked position. It seemed to work well, but may have loosened during play much as the other allen screws tend to loosen all over the gun.

ix. PORTING THE VALVE.

If you use a LIGHTENED hammer (or drilled the stock one), you may find that the MAXIMUM velocity is much lower than it used to be. One easy way to fix that is to REMOVE the valve and drill one of the 'clock' holes to some width slightly bigger than 12 o'clock. This does raise your velocity, but has side effects. If you are using an expansion chamber, you will get slightly less shots per ounce of CO2. However, if you are using a SIPHON tank, porting the valve will raise the shots per ounce. Also, cycling performance will be slightly less, since more CO2 is diverted behind the ball, instead of the hammer. You can improve cycling by drilling out the recocking hole (what the cup-seal rod sits in) to increase the recocking pressure). Also, if you plug up the other unused 'clock' holes with recessed allen bolts, it will slightly increase velocity and cycling performance. These 2 valve tricks will produce a valve similar to the MAGNA-PORT, and PRO-VALVES.

x. INTERNAL EXPANSION CHAMBER

Many people say that Expansion Chambers are cumbersome and get in the way. However, it is possible to put an INTERNAL Expansion Chamber INSIDE the VM itself. To do this, you need either access to machining equipment or a drill press. Behind the front ASA sits about 1 inch of solid aluminum. It is possible to machine that space out, to allow CO2 to expand before entering the valve. Plus, it will also catch any liquid CO2 before it enters the valve. The actual machining is difficult, but I have seen it done before. Depending on how it is done, it will be completely invisible to an observer.

Send me any "HOMEBREW" VM ideas if you have any.

I'll add them to the FAQ 'cus I love 'em!!

f. **OVERVIEW**

a. Various Custom Setups

Often I get E-MAIL from people asking how they should customize their VM and I always tell them, "Any way you want." Below are some examples of custom 'HOT-ROD' VM configurations from different rec.sport.paintball posters. (plus, you can find pictures of all these guns and more at my WEB page)

Nick Brassard (HEH! That's ME!)

1st gen. PMI3, body work by CARTER-MACHINE, smooth-bore, 2" J&J HardChrome Rifled (672ID!), body anodized Blue/Silver/Gray, Front ASA chopped off and sides shaved, Ivory grips, Delrin bolt (back-spin), Aluminum Hammer (Cooper-t), rear 1.5 inches CHOPPED off, Automag Spring kit, Nelson Cup seal, Rear Pull-Cock kit, an Adco Square shooter, and VL2000 sitting on top.

Jay Tu

VM-EXC, body work by PALMER PURSUITS (lightened), Black Rain Expansion chamber (instead of stock EXC E.C.), OTP Venturi Bolt, PHAZZE II hammer, J&J Internally Rifled Hard-Chrome, PRO-LINE powerfeed, and a VL-2000.

Doug Seman

3rd gen. VM-68, body work by PRO-COMP (lightened), PRO-COMP venturi bolt, PRO-COMP lightened hammer, PALMER REGULATOR (for CO2 or nitro), Smart-parts externally rifled barrel, PRO-COMP powerfeed, and a VL-2000.

Tim (packrat) Wood

VMX body, with venturi bolt, Pro-Shot (auto-mag spring) kit, Air American EC (custom modified), Indian Creek .45 grip, remote w/15oz tank, and 14" SP barrel (or 8" Armson).

b. Should I buy a VM?

Before buying ANY paintball gun ask yourself, "how much do I plan on playing?" Also ask, "do I want the ability to upgrade in the future?" For the NEWBIE, there are basically 5 choices of ENTRY level SEMIs: 1 Stingray (\$100), 2: VM (\$200), 3: PRO-LITE (\$250), 4: F1/2 (\$250), 5: SPYDER (\$200). If you plan to play a couple times a year, with friends, perhaps the STINGRAY is best, but otherwise I would recommend the VM. Its cheaper than the PRO-LITE and F2 and can be UPGRADED much further than the SPYDER and is superior in many ways to all 4 guns. BEFORE you make the choice, go to your local field and ask to TRY some guns out. Different people have different opinions.

c. General

Information in this FAQ came from a variety of places. Much came from my 4 years of experience with a VM. Also Doug Seman, author of the original FAQ, David Bowden, Brian Quan, C. Allen Lee, Jay Tu, and whatever stuff I could swipe from WARPIG. The VM can range from the ENTRY LEVEL marker to the TOURNAMENT level mega-marker. This is the main reason why there are more VMs than any other paintball gun. Sure, the VM has its idiosyncrasies and may not be the gun for some, but it is a fine gun, made from one of the oldest paintball/bb gun companies. No matter how you look at it, the VM is a piece of QUALITY and HISTORY.

d. LastWord

In the last 9 years of playing paintball, I have used nearly every paintball gun ever made. Out of all of these, the VM remains my favorite. I still have the first one I bought 4 years ago (though it has been hacked up). My teammates think I am crazy, which I am. Plus, being my teams TECH-man/Air-Smith (guy who gets to fix all the guns), I have a rather good idea about a VM also. I would love any suggestions or ideas to be added/deleted.

"You can't use that much paint in a single game!"  
Typical newbie response to my one-man-ambush tactics...

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