

# PyroShot High Speed



Photo Courtesy of the  
National Interagency  
Prescribed  
Fire Training Center

## Preliminary Operators Manual

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04 Nov. 2009

**US Patent # 7275529**

Rev. #0

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Attachments:

MSDS... Potassium Permanganate

MSDS... Ethylene Glycol

**Introduction:**

The PyroShot High Speed is designed to charge and propel Delayed Chemical Ignition Devices (DCIDs) to various distances to assist wild land fire professionals in the intentional initiation of fire. It is designed to be used only by wild land fire professionals.

**WARNING!**

**THE PYROSHOT HIGH SPEED IS INTENDED FOR USE BY PROPERLY TRAINED PERSONNEL ONLY.**

Improper use of this device may result in **serious injury** or **destruction of property**.

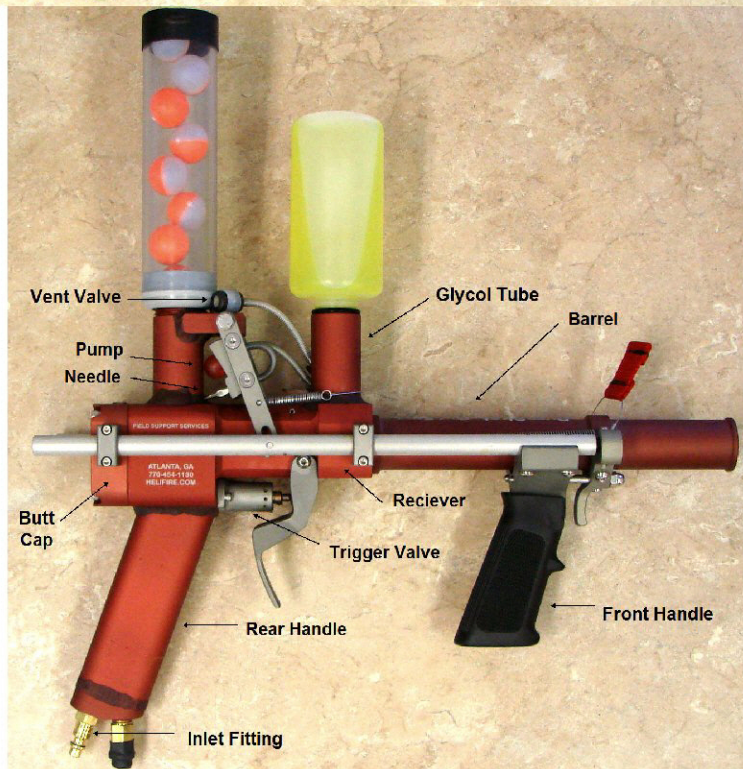
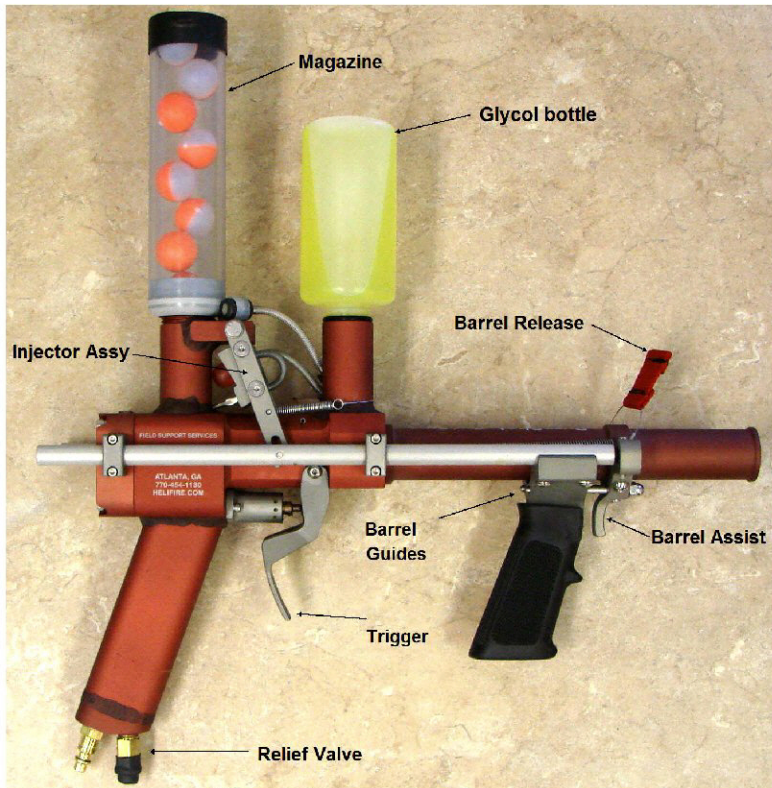
The PyroShot High Speed propels Delayed Chemical Ignition Devices using a burst of compressed gas in a manner similar to that of a nail gun. In addition to the compressed gas, it utilizes hazardous chemicals and combustible ammunition. Muzzle velocities are as high as five hundred feet per second, so always treat the PyroShot High Speed as you would a firearm. Know where it is pointed at all times. Do not inject a sphere unless you intend to launch it immediately. Do not connect compressed gas to the HS until you are sure that the mechanism is functioning properly and that all ammunition is properly contained and clear of the propulsion mechanism and barrel.

Always wear proper unit required Personal Protective Equipment when using this device including gloves and ballistic eye protection.

**Specifications:**

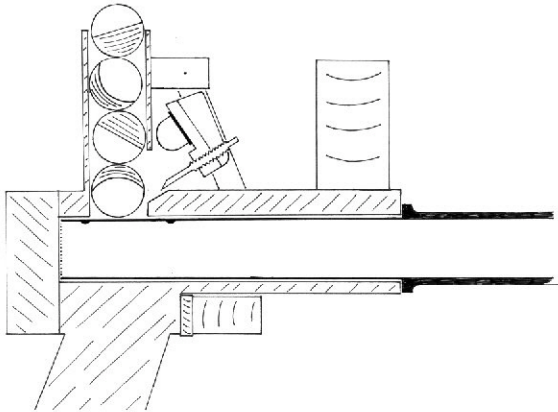
Empty weight	2.35kg = 5lb 3oz
Length of assembly	44.45cm = 17 ½ inches
Gas volume	164cc = 10 cubic inches (receiver plus handle)
Magazine capacity	10 rounds standard (150 optional magazine available)
Glycol capacity	250 ml
Glycol per cycle	0.7cc
Rounds per 250 ml	350
Gas pressure operating range	40 to 135psi (pressure relief valve is set at 140psi)
Range at best trajectory	50 to 340 feet (depending on configuration)

**Nomenclature:**

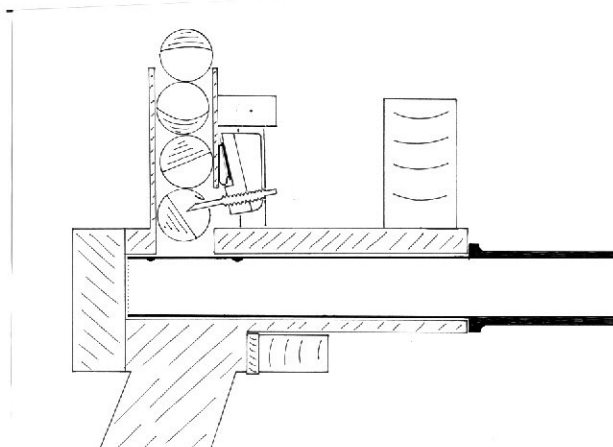


## Operating Cycle:

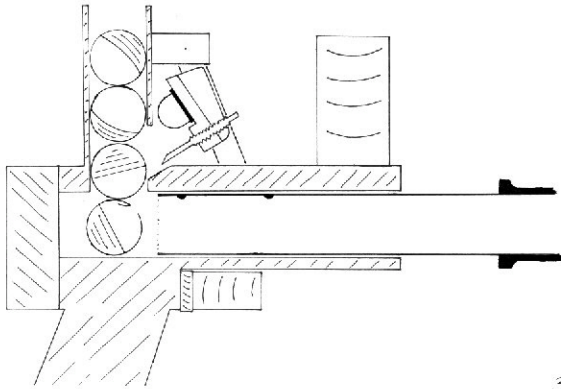
Figures 1: With the PyroShot HS slide assembly relaxed in the neutral position, spheres are loaded into the feed tube via the magazine, but cannot enter the receiver because the barrel is in the full aft position, blocking the bottom of the feed tube.



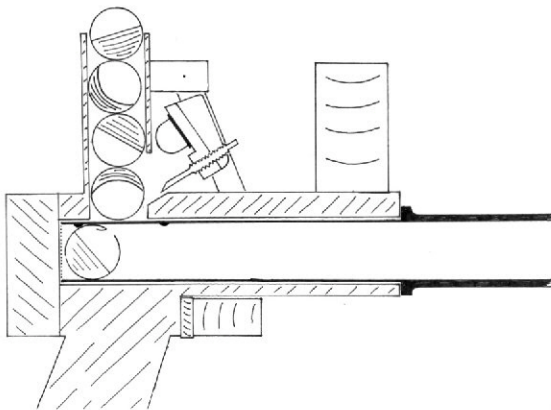
Figures 2: As the injector mechanism is moved aft, the needle pierces the bottom-most sphere and then the pump presses against the surface of the feed tube, injecting the sphere with ethylene glycol. The sphere is now “charged” and will ignite in approximately twenty seconds (or more, depending on ambient temperature).



Figures 3: The injector mechanism is moved forward to the neutral position, extracting the needle from the sphere. The barrel is then moved forward in the receiver, allowing the injected sphere to drop into the receiver. (If two spheres are to be launched, a second sphere may be injected and loaded at this point. The chamber is designed for two rounds.)



Figures 4: The barrel is returned to the neutral position, capturing the sphere as it moves aft. The index finger on the forward hand should be used to ensure that the barrel has seated. The sphere is now ready to be launched by momentarily pulling the trigger lever aft, releasing a burst of compressed gas behind the sphere(s) and propelling it (them) out of the barrel.



### **Removing the barrel:**

The barrel is easily and very quickly removable from the receiver. In the event that a charged round(s) cannot be fired due to low gas pressure or malfunction, the barrel should be removed before the round(s) functions to prevent damage to the receiver valve.

In the event that the barrel is removed with charged spheres, it should be held vertically with the muzzle upward. The charged rounds will fall from the chamber as they shrink when they start to react. Use appropriate tools to deal with the small resultant plastic fires on the ground. (Proper foot gear works well.)

Anytime the barrel needs to be removed, follow the instructions below:

Grip the barrel release and pull it forward and up.

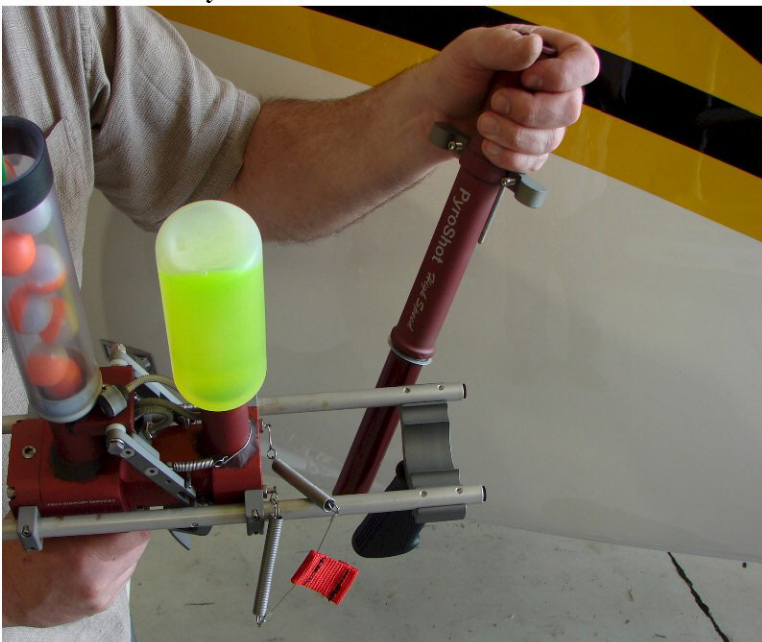




Pull the barrel straight out of the receiver.



Hold a charged barrel muzzle up and away from the body. Charged rounds will fall from the barrel as they react.



### **Reinstalling the barrel:**

The receiver has a very close fitting wiper installed to insure proper seal for the lubricant on the barrel and in the receiver. To reinstall the barrel, this wiper needs to be compressed on one side to allow the barrel to re-enter the bore. By applying a twisting motion with the barrel cocked off center, the barrel can be inserted into the receiver.



### **Pre-use inspection:**

1. Ensure that the PyroShot High Speed (HS) is not connected to any compressed gas source. Remove the barrel from the receiver by unhooking the forward ends of the barrel retention springs and sliding the barrel forward until it clears the receiver. Unload any Dragon Eggs inadvertently left in the magazine and barrel. If the glycol bottle was not removed after the last use, remove it now and clear any glycol from the pump by compressing the pump bulb several times with your finger. Look over the HS for cleanliness and general condition, and security of slide handle, springs, fittings and injection mechanism. Reinstall the barrel by placing the aft end of the barrel at an angle in the forward receiver seal and twisting gently until the barrel enters the receiver. Then slide the barrel into the receiver, ensuring that the alignment pins engage the slide handle alignment holes. Reconnect the forward ends of the barrel retention springs.
2. The HS normally rests in the neutral (firing) position with the barrel flange contacting the forward end of the receiver and the injector assembly slightly engaged, but with the needle completely clear of the inside bore of the sphere feed tube and the pump bulb not touching the forward surface of the vertical feed tube. Grip the aft handle with one hand (without grasping the trigger) and the slide (forward) handle with your other hand, engaging the barrel “helper” bracket with the index finger of your forward hand.
3. Now disengage the index finger of your forward hand from the barrel “helper” bracket by pointing your finger forward. This is necessary to complete the injection cycle. Move the slide handle aft about 1 1/8 (one and an eighth) inches until the injector levers stop against the receiver base. In this position the needle should be well inside the sphere feed tube and the pump should be fully compressed.

4. Move the slide handle forward, allowing the injector springs to return the mechanism to the neutral (firing) position.
5. Re-engage your index finger around the barrel “helper” bracket and move the slide handle forward about 1 ½ (one and a half) inches until the slide mechanism contacts the bumper stops. The polished portion of the barrel that is now exposed should appear clean and well lubricated.
6. With the forward index finger still wrapped around the barrel “helper” bracket, move the slide handle aft. The barrel contacting the forward surface of the receiver will be felt as a “click,” indicating that the mechanism has returned to the neutral (firing) position.
7. Any sticking, roughness of operation or malfunction up to this point should be addressed before moving on to step eight. Refer to the lubrication instructions on page 16.
8. Ensuring that the HS is pointed in a safe direction, and **not** pointed toward personnel, carefully connect your compressed gas source. Any evidence of gas leakage should be investigated and corrected before any further action.
9. Ensuring that the HS is pointed away from personnel and that there is no ammunition in the barrel, activate the trigger by pulling it aft to ensure that the firing mechanism is operating properly. Do not hold the trigger after activating. Release it as soon as the HS fires a burst of gas out of the barrel. The burst of gas should be crisp and the main valve should close quickly after release of the trigger. Holding the trigger does not harm the mechanism, but does waste gas.
10. The compressed gas should now be disconnected so that the glycol bottle can be installed and ammunition loaded.

### **Loading:**

To charge the glycol delivery system, turn the HS upside down and screw the glycol bottle directly into the glycol tube until the o-ring is slightly compressed. Turn the unit right side up; point the muzzle up about 60 degrees so that the base of the pump is horizontal and using your finger compress the pump several times until you have purged the air all the way to the needle. You can observe the movement of the air and glycol through the clear tubing. Avoid pumping glycol directly into the barrel. A check valve is connected to the glycol tube to allow air to replace lost glycol volume. Bubbles may be observed rising in the glycol bottle; this is normal.

To load the magazine, simply push the spheres into the top of the clear magazine tube until they drop below the retainer string at the top. This is easy to do with a handful of 4 to 6 spheres.

## **Launching Spheres:**

Spheres are launched following the Operation Cycle instructions on pages 6 & 7. The operator must insure that these separate actions are accomplished in the proper sequence. The operator must insure that the barrel is stroked far enough forward to allow the charged ball to drop into the receiver and that the barrel is fully seated before pulling the trigger.

NOTE: Failure to feed a charged round into the receiver will result in a fire in the bottom of the magazine tube. Failure to close the barrel can result in the charged round being propelled upward and out to the top of the magazine.

The PyroShot High Speed (HS) is designed for various ranges. The operating pressure range of the HS is 40 to 135 psi. By reducing the gas pressure applied to the HS, a considerable reduction in gas used per shot can be realized. In many applications 100 feet or so of range is plenty, so this can be valuable in extending the number of shots per gas cylinder. This pressure adjustment can be easily accomplished at any time to allow for the range required. Experimentation will soon give the operator a good feel for the ranges available for various pressures.

## **Volume reduction**

The volume of the receiver and handle (also known as the 'shot tank') can be reduced from ten cubic inches to less than six cubic inches to save gas expended per shot when long range is not required. By reducing the shot tank volume as well as the operating pressure, a considerable savings in gas can be realized, still with a range of 100 feet or more. This is especially attractive for remote operations using small gas canisters.

Adjusting the volume of the shot tank should be completed in a clean work environment before beginning the day's operations, so the available gas supply and the conditions likely to be encountered should be considered before deciding how much reduction to make, if any.

To reduce the shot tank volume, first disconnect the gas source from the HS. Then remove the 90 degree air tube fitting from the valve housing (back cap) with a flat tip screwdriver, using a 5/16 open end wrench to hold the fitting body while unscrewing the center piece of the fitting. Be careful not to lose the little o-ring that seals the fitting to the valve housing.



Gently bend the air tube out of the way of the valve housing, then remove the four cap screws that retain the valve housing, using a 5/32 allen wrench. The valve housing can now be removed by carefully sliding it directly aft until the slide rod bushings clear the slide rods.





Insert 1-1/2" length by 3/8" diameter polyurethane rods into the handle and receiver to reduce the shot tank volume. The maximum number of rods is 26, sixteen in the handle and ten in the receiver. It is a little tricky getting the 16 rods into the handle, and requires a bit of patience and manipulation. The ten in the receiver are straightforward, as they are inserted straight in around the barrel circumference.



Each length of rod displaces 0.165 cubic inches, so you can calculate the amount of shot tank volume reduction. That is approximately 1 cid per 6 pieces or a bit more than 4 cid for all 26 pieces supplied.

The unreduced shot tank volume is ten cubic inches.

Reinstall the valve housing onto the receiver by engaging the slide rod bushings onto the slide rods, then sliding the valve housing forward into place. Install the four cap screws to hold the valve housing into place, re-connect the air tube fitting, making sure the o-ring is in place. Use a 5/16 open end wrench to hold the fitting in proper orientation while snugging the center portion with a flat tip screwdriver.

Note: The main valve will often remain inside the valve housing during this operation, which means that it is simple to slide the valve housing back into position. However, sometimes the valve will pop out because of spring tension, and must be held in the valve housing before sliding the valve housing against the receiver, or the valve will cock and prevent proper seating. To retain the valve inside the valve housing, first push it all the way into the housing against the spring pressure. Then place your finger or a piece of electrical tape over the air tube fitting hole on the back of the valve housing to retain a vacuum behind the valve. This will hold the valve in position long enough to get the valve housing seated in place against the receiver.



In addition to a 5/32 hex wrench, the volume reduction kit (or “stuff kit”) includes a wire hook tool for extracting the rods from the receiver and handle and several spare O-rings.

After reassembly, complete the Pre-Use Inspection before operating the HS, especially listening for air leaks around the valve housing and at the air tube fittings.

## Cleaning, Lubrication and Storage:

Soap and water is all that is required to clean any part of the HS. A bottle brush works well on the inside of the barrel and receiver.

Three different lubricants should be applied to the appropriate points. Use the guidance that follows to keep your HS working smoothly:

#1 Light machine oil. Apply to the injector pivot points, the trigger pivot points, each of the four slide bushings and the front bushing of the trigger valve.

#2 Bearing grease. Apply to the O-rings and wiper in the receiver, the portion of the barrel that slides into the receiver and to the back of the trigger where it contacts the rod from the trigger piston.

#3 Air tool oil. Apply three or four drops into the inlet fitting every 300 to 500 rounds and before starting each days use.

Always store your PyroShot HS clean, lubricated and with all glycol removed.

