

PyroShot High Speed (HS)

Including Long Range and BackFire options
Serial Numbers HS-301 and above



Photo Courtesy of the
National Interagency
Prescribed
Fire Training Center

Operators Manual

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Attachments:

MSDS... Potassium Permanganate

MSDS... Ethylene Glycol

Introduction:

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

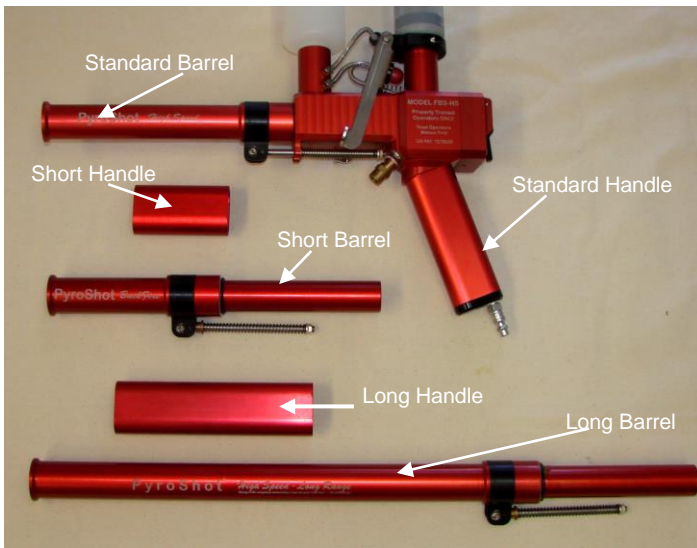
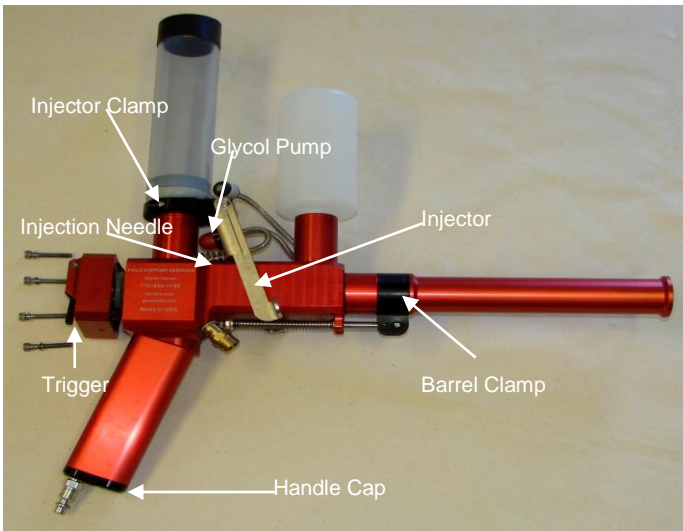
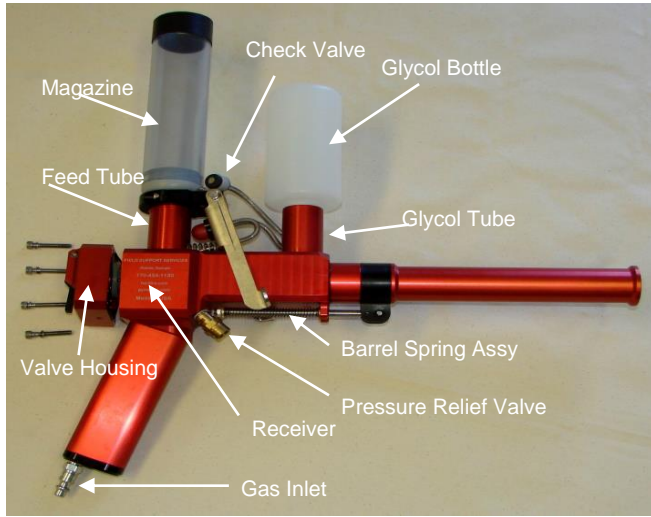
The PyroShot High Speed propels Delayed Chemical Ignition Devices using a burst of compressed gas in a manner similar to that of a nail gun. In addition to the compressed gas, it utilizes hazardous chemicals and combustible ammunition. Muzzle velocities are as high as six hundred feet per second, so 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 required Personal Protective Equipment when using this device, including gloves and ballistic eye protection.

Specifications:

Empty weight	1660gm = 3.65 pounds (HSBF) 1740gm = 3.83 pounds (standard HS) 1984gm = 4.36 pounds (HSLR)
Length of assembly	35cm = 13 ¾ inches (HSBF) 43cm = 17 inches (standard HS) 67.5cm = 26 ½ inches (HSLR)
Gas volume	132cc = 8.0 cubic inches (receiver plus short handle) 54cc = 3.3 cubic inches (fully stuffed) 161cc = 9.8 cubic inches (receiver plus standard handle) 67cc = 4.1 cubic inches (fully stuffed) 195cc = 11.9 cubic inches (receiver plus long handle) 79cc = 4.8 cubic inches (fully stuffed)
Magazine capacity	10 rounds standard (150 round optional magazine available)
Glycol capacity	250 cc (standard bottle) 125cc (small bottle)
Glycol per cycle	0.6cc
Rounds per glycol bottle	400 (standard bottle) 200 (small bottle)
Gas pressure operating range	35 to 155 psi (pressure relief valve is set at 165psi)
Range at best trajectory	15 to 150+ meters (depending on configuration) 50 to 500+ feet (depending on configuration)

Nomenclature:



Operating Cycle:

Figures 1: With the PyroShot HS 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.

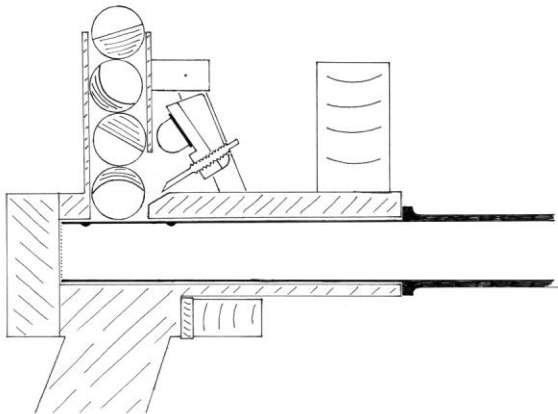


Figure 2: As the injector mechanism is moved aft, the needle pierces the bottom-most sphere and then the pump presses against the surface of the feed tube, injecting the sphere with ethylene glycol. The sphere is now “charged” and will ignite in approximately twenty seconds (or more, depending on ambient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

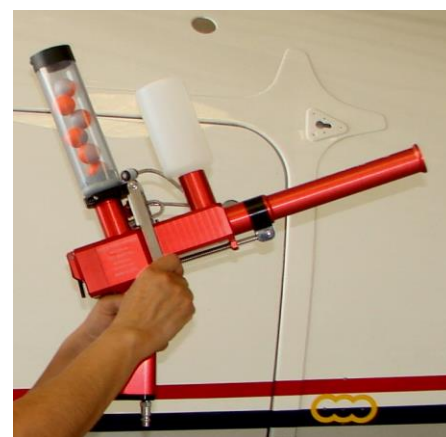
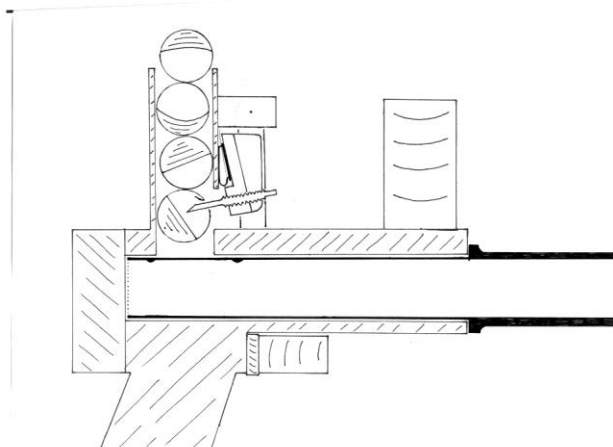
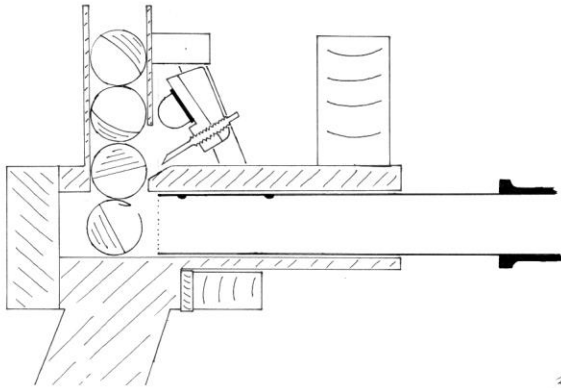


Figure 3: The injector mechanism is moved forward to the neutral position, extracting the needle from the sphere. The barrel is then moved forward in the receiver, allowing the injected sphere to drop into the receiver. (If two spheres are to be launched, a second sphere may be injected and loaded at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

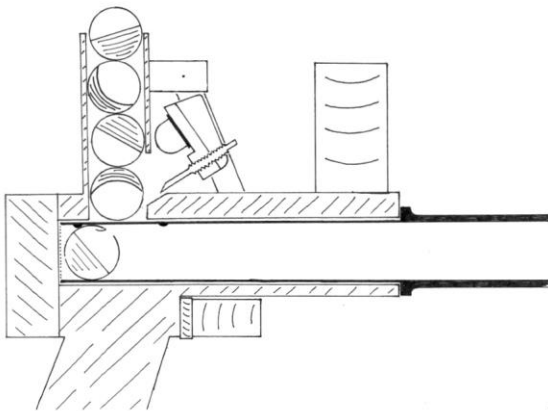


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Figure 4: The barrel is returned to the neutral position, capturing the sphere as it moves aft. The sphere is now ready to be launched by momentarily tapping the trigger, releasing a burst of compressed gas behind the sphere(s) and propelling it (them) out of the barrel.

The trigger is mounted on the valve housing at the rear of the unit and is thumb operated. A momentary tap of the trigger lever is all that is needed to launch a sphere.



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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. (The bottom surface of sturdy foot gear works well.)

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

Release the barrel retention spring by grasping it and pulling down to clear the receiver flange.



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, all models:

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 to 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. The thumb can also be used to put a light side load on the barrel to facilitate insertion.



Pre-use inspection:

- 1.** Ensure that the PyroShot HS is not connected to any compressed gas source. Remove the barrel from the receiver by moving the retaining spring down to clear the receiver, then pull the barrel forward and out of 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 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 and move the retaining spring bushing into position in the flange on the bottom of the receiver.
- 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 resting against the stop pin. The needle should be completely clear of the inside bore of the sphere feed tube. Also, the pump bulb should not be touching the forward surface of the vertical feed tube. Grip the aft handle with one hand and the barrel with the other hand.
- 3.** Using the ‘barrel hand’ grasp one of the injector lever ears and move it aft about 2 (two) 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 injector assembly forward, allowing the injector spring to return the mechanism to the neutral (firing) position.
- 5.** Grasp the barrel and move it forward about 1 1/8 (one and an eighth) inches until it stops. The polished portion of the barrel that is now exposed should appear clean and well lubricated. Look into the feed tube with the barrel full forward. The aft end of the barrel should be completely forward of the feed bore to prevent any interference with dropping spheres.
- 6.** Now move the barrel aft until it contacts the receiver. The barrel contacting the forward surface of the receiver will be felt as a “click,” indicating that the barrel 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 15.
- 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 tapping it with the thumb 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, all models:

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 seats. Do not overtighten. 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 and the pump bulb. 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 7 & 8. 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.

Pressure reduction

The operating pressure range of the HS is 40 to 155 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 approximate ranges available for various pressures.

Volume reduction

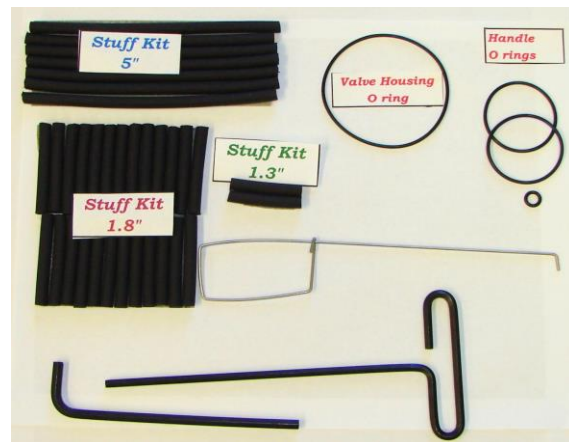
The volume of the receiver and handle (also known as the 'shot tank') can be reduced to save gas expended per shot when long range is not required. By reducing the shot tank volume as well as the operating pressure, a considerable savings in gas can be realized, still with a range of 100 feet or more. 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 during the mission 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 four cap screws that retain the valve housing, using a 5/32 allen wrench.



Stuff kit



The valve housing can now be removed. Be careful not to drop the valve or spring. Keep these parts clean during this process.

Lubricate the short volume reduction kit ("stuff kit") rods with air tool oil to facilitate insertion, then slide them into the receiver around the center barrel hole.



Lubricate the threads of the valve housing retaining screws with light machine oil, then reinstall the valve housing.



Remove the handle using a 3/16 allen wrench. The long stuff kit rods can now be inserted into the handle tube.



Reinstall the handle, ensuring that the orings are in good condition and seal properly.

Rods can be installed in the handle and/or receiver for whatever reduction is desired, depending on conditions.

In addition to 5/32 and 3/16 allen wrenches, the stuff kit includes a wire hook tool for extracting the rods from the receiver and several spare orings.

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

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.

From time to time after cleaning the PyroShot with soap and water, it is advisable to use Sodium Bisulfite for deep cleaning and stain removal. Sodium Bisulfite is a white powder and is used for food preparation and preservation. Just dissolve several tablespoons of Sodium Bisulfite in a basin of warm water and use fine scotch-brite and a bottle brush for cleaning. Then rinse with fresh water. Don't forget to completely lubricate the PyroShot after cleaning and drying.

Note: There is no problem submerging the PyroShot for cleaning or leak checks. Just make sure it is *dry and well lubricated inside and out* before returning to service.

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 and the trigger pivot point. Also apply a few drops to the barrel retainer spring and rod. In addition, apply a drop or two to the threads of all screws before installation. This will make removal much easier later on.

#2 **Bearing grease.** Apply liberally to the two O-rings and the *interior* surface of the wiper in the receiver, sparingly to the portion of the barrel that slides into the receiver.

#3 **Air tool oil.** Apply three or four drops into the inlet air fitting every 300 to 500 rounds and before starting each day's use. Also liberally to the Santoprene rods when stuffing the receiver.

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

