

F2 System Overview

Thank you for your purchase and welcome to the PolarStar family! The F2 is a closed bolt, dual solenoid system that is a drop-in conversion for an AEG gearbox shell. Dual solenoids allow for the nozzle and the poppet valve to be adjusted independently of each other for unparalleled control over both the loading time and air volume used.

The FCU (Fire Control Unit) is used to adjust the timing of the engine such as your rate of fire, burst mode as well as poppet dwell and nozzle dwell. The default settings loaded onto the FCU will allow for proper operation in most cases so there is generally no need to adjust the FCU settings prior to use. For more information on the FCU functions and how to adjust settings, please refer to the FCU manual which includes a tuning guide.

The velocity of the F2 is controlled by input pressure from your air rig. The recommended operating pressure range of the F2 is 45psi to 145psi. The velocity which can be achieved within that pressure range will depend greatly on the configuration and quality of the replica it is installed into.

With any kind of gun that uses compressed gas (HPA, Green Gas, CO2), the length of the barrel greatly affects the velocity the system can produce. The affect is much greater than with an AEG since AEG's operate with very limited air volume and the initial acceleration of the BB is slower.

We use a standard VFC M4 to benchmark the specifications for our systems and that rifle uses a 6.05x380mm barrel. As an example, with that barrel the F2 produces ~250fps - 480fps w/ .2g within the 45psi - 145psi operating pressure range. If you go down in barrel length the velocity adjustment range will shift down so your maximum potential velocity will decrease. If you use a longer barrel, everything shifts up.

Air System

The F2 system is designed to operate with input pressure between 45psi and 145psi using either HPA (High Pressure Air) or Nitrogen. A suitable air system will be required. This includes a compressed air tank, regulator(s), remote line and fittings. We only recommend running our systems on HPA or Nitrogen. While liquid propellants such as CO2 technically can be used, it is required that the air delivery system be specifically designed to use CO2 such as our UGS and CGS CO2 inserts. These properly utilizes an expansion chamber which is large enough to safeguard the system from pressure spikes.

Installation

The best results are usually obtained when the replica body and gearbox are the same brand and model. When combining components from different manufacturers there can be complications due to varying tolerances which can affect function and overall performance.

Preparation

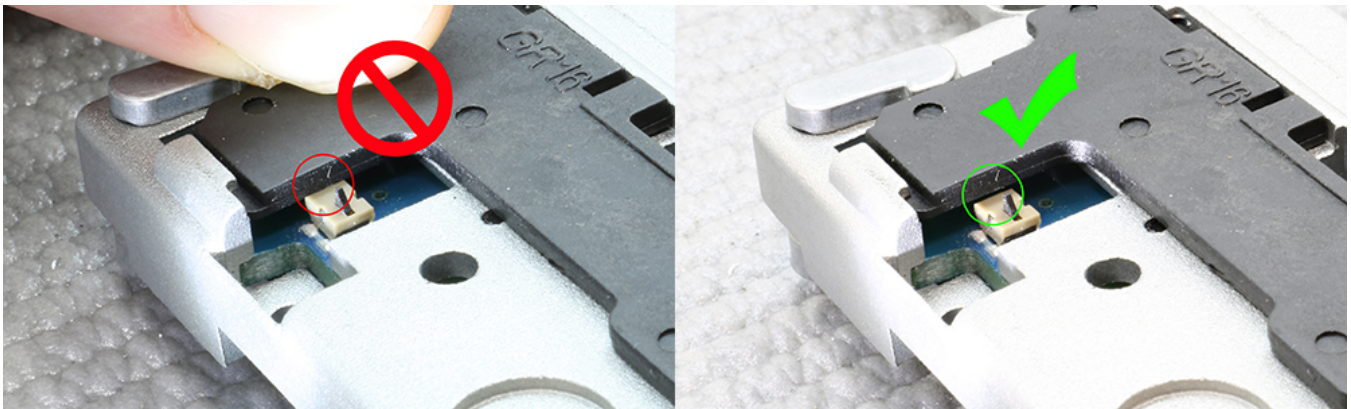
Before installing the F2, the unused components must be removed from the gearbox and the remaining grease should be cleaned out. In most cases, the only remaining parts will be the trigger, safety mechanism, selector plate, spring guide (if applicable) and cutoff lever (if applicable). Keep the mounting screw from the AEG trigger contacts as this will be used to mount the PolarStar switchboard in the same location.

Switchboard and Cylinder (V2)

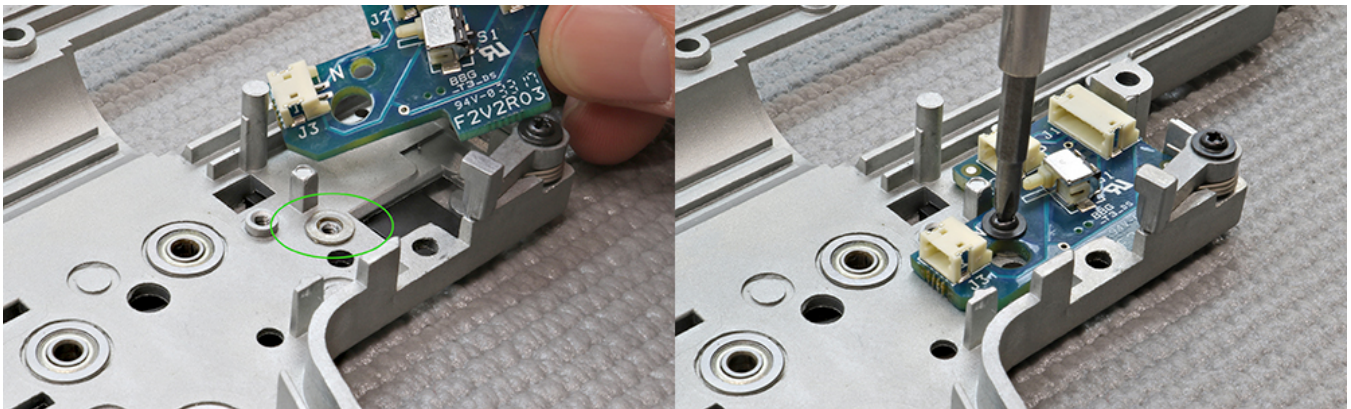
Once the gearbox has been prepared, install the switchboard into the gearbox shell and secure it using the screw saved from disassembly. For V2 installations, ensure that the back of the selector plate is smooth and that there is proper clearance between the selector plate and the microswitch. If there is a rough edge on the selector plate, or if the plate hits the side of the microswitch housing, THE SWITCH WILL BE DAMAGED.

First check the back of the selector plate for any rough areas or indentations that could snag the switch. The plate should be completely smooth on the back so if you ran your fingernail over it then it would not catch on anything. If a rough area is found, smooth the surface with a file fine grit sandpaper to remove any rough/uneven areas. Also, check the leading edge of the plate that meets the switch. Run your fingernail across the back of the plate and over the edge to make sure nothing catches as you go over the edge. Again, smooth the edge if needed.

Once the plate has been checked, install the switchboard into the gearbox shell and secure it using the screw saved from disassembly. Ensure proper clearance between the selector plate and the microswitch by sliding the plate back over the microswitch manually. Apply light pressure to the selector plate as often the plate is pressed against the inside of the receiver which can push it inward towards the microswitch further.



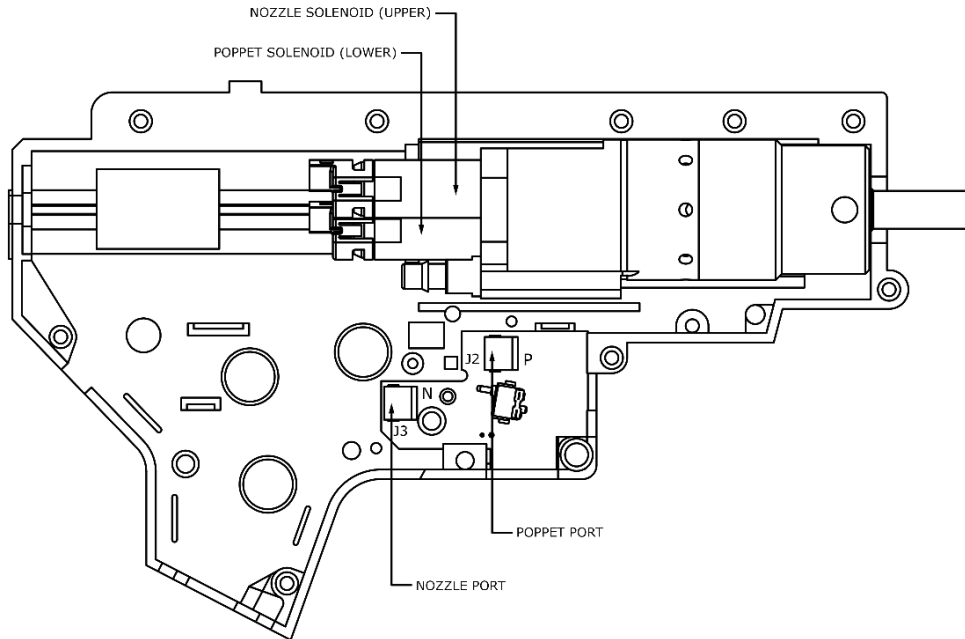
If the plate catches on the microswitch housing, use a gear shim to space the board away from the gearbox shell to give the plate proper clearance over the housing while still engaging the switch. The shim can be placed over the screw hole on the gearbox and then place the switchboard on top of it so that the screw which secures it passes through the center of the shim.



Place F2 in the cylinder window of the gearbox and plug the solenoid wires into the switchboard ports. The headers on the V2 switchboard are labeled P = Poppet, N = Nozzle.

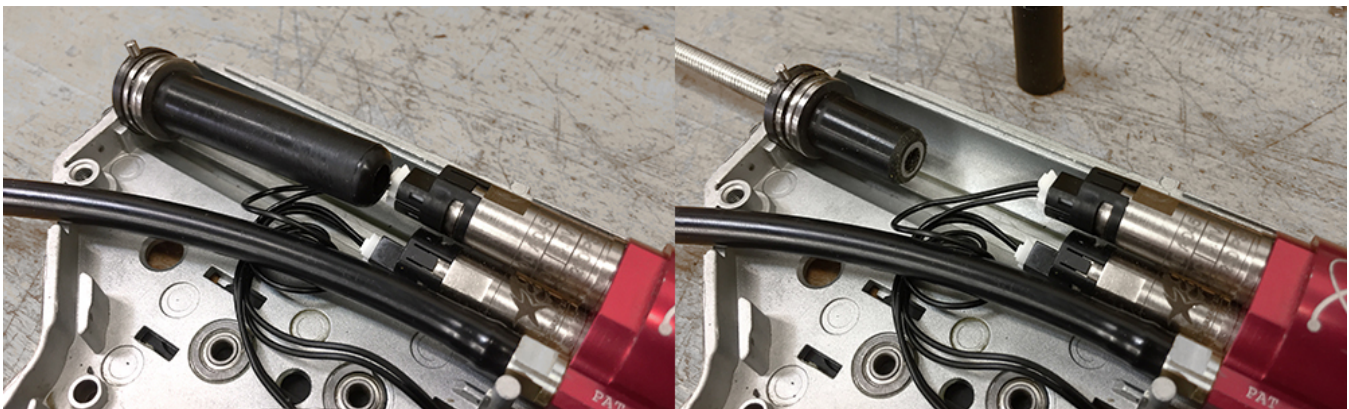
Ensure that the solenoids are plugged into the proper headers by referencing the below diagram. The connector for the Poppet Solenoid will have a black mark on it from the factory for easy identification. If the solenoids are plugged into the headers in reverse order, the engine will still seem to function normally but it WILL NOT FEED PROPERLY or REFUSE TO FEED AT ALL.

TIP: If after installation you are having feeding issues and suspect it could be caused by reversed solenoids, an easy way to determine if that is the cause would be to go into your settings and turn the nozzle dwell all of the way down to dn00. With the nozzle dwell turned all of the way down the nozzle should not retract when the system is fired but air should still come out of the nozzle. If you find that the nozzle still retracts but very little or no air comes out, then your solenoids are plugged into the incorrect headers and need to be swapped.



Spring Guide

If the spring guide is needed to secure the buffer tube, reinstall it in the gearbox, otherwise it can be omitted. The spring guide can be manipulated more easily during reassembly if the bolt from the stock/buffer tube is threaded into the rear. Make sure that end of the spring guide does not reach past the end of the solenoid end caps. Without proper clearance between those parts, the spring guide will CAUSE DAMAGE TO THE SOLENOIDS when the gearbox is reassembled.



Gearbox Assembly

Reinstall the trigger and trigger spring. Route the airline and wire harness out of the gearbox and carefully replace the other half of the gearbox shell. If the shell does not want to close fully, STOP AND CHECK YOUR WIRES. It is common for wires to

get pinched between the two halves of the gearbox shell, especially if the gearbox has reinforcements around the spur gear. If the gearbox is screwed together and the wires are pinched, the wires can be damaged or cut.

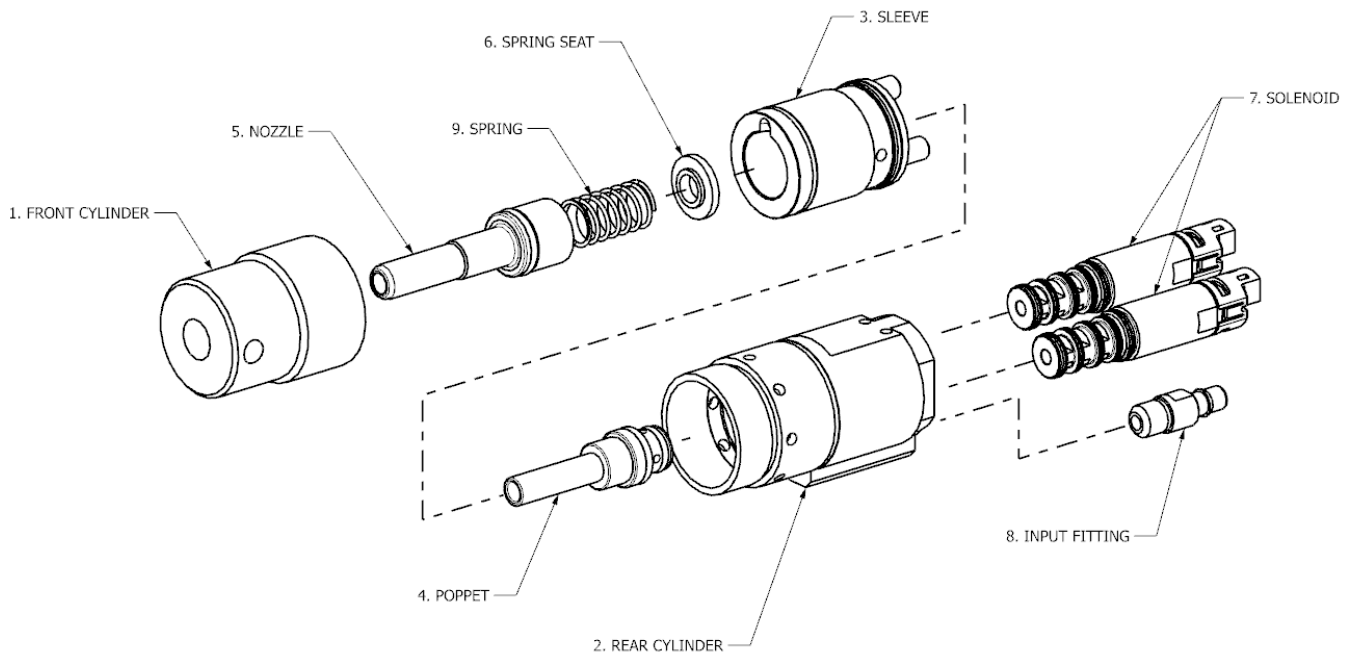
Alignment

Once the gearbox has been installed in the replica body, verify that the nozzle is aligned with the hopup and inner/outer barrels. This can be done by looking down the barrel with a flashlight. If the nozzle is not centered within the barrel some shimming of the gearbox may be required.

MAKE SURE THE RIFLE IS UNLOADED AND DISCONNECTED FROM ANY AIR SOURCE WHEN CHECKING ALIGNMENT

Disassembly and Maintenance

F2 units can be disassembled for maintenance by unscrewing the front cylinder and removing the internal components. A complete Maintenance Video can be found on our website under HPA Systems / F2 as well as in YouTube channel Technical Video library.



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