

# XL .80RFS & XL .91RFS SERIES AIRCRAFT ENGINE QUICK-START AND TROUBLESHOOTING GUIDE

## OUR RECOMMENDATIONS

The following items are recommended for use with your XL RFS series engine. These items are recommended for initial start-up and running. Please read through the Operating Instructions for further details.

**Fuel:** We suggest Power Master 10% 2-Stroke Blend (P/N 275180) for break-in.

We suggest Power Master 15% 4-Stroke Blend (P/N 275200) for normal use.

We suggest using Power Master brand fuels. Power Master fuel comes in 10% and 15% nitromethane contents that can be used in your XL RFS series engine. Power Master fuels are blended using only high-quality nitromethane, methanol, Castor Oil and synthetic lubricants to provide high power output, along with easy starting and unmatched lubricating and heat dissipation qualities. For the extra lubrication necessary for break-in, use 10% 2-stroke blend. After break-in, for extra performance, use 15% 4-stroke blend.

**Fuel Tank:** Dubro 14oz. Fuel Tank (P/N 568543)

Dubro fuel tanks are a perfect match for your XL RFS series engine. This size recommendation will give you about 10-15 minutes of run-time at full throttle, and they are possibly the easiest fuel tanks to assemble and maintain.

**Glow Plug:** Thunderbolt Four-Stroke Glow Plug (P/N 115490)

The Thunderbolt Four-Stroke glow plug is designed to be used in four-stroke engines using fuels containing 10% - 15% nitro content and in any environment. It is a "hot" type of glow plug for easy starting, excellent transition and incredible top end. The glow plug is also very durable and able to withstand repeated use, day after day.

**Propeller:** APC 13 x 6 Propeller (P/N 609288) for XL .80RFS

APC 14 x 6 Propeller (P/N 609560) for XL .91RFS

We have found that XL RFS series engines run best using APC brand props. They are designed to be very efficient and run quiet at high rpm's, and they are also durable. Use this size prop to break in your engine, then change to the prop that best suits your application. Use the guide in the Operating Instructions to help you find the right size propeller.

**Glow Driver:** Magnum Glow Starter w/Meter (P/N 237438)

The Magnum glow starter is an excellent choice for heating the glow plug. It uses a Sub-C NiCD, includes a meter to determine the quality of your glow plug, and it also includes a charger to recharge the battery. It's a very economical product to purchase and can be used with any engine that uses a glow plug.

**Engine Mount:** Magnum Adjustable Engine Mount (P/N 279950)

The Magnum adjustable engine mount is an aluminum beam mount that mounts to a plywood firewall in the model. It is easy to install and is adjustable to fit different sized engines, and it comes complete with mounting hardware.

The following information is provided to get your new Magnum XL RFS series engine running right away with minimal effort. We have listed our recommendations for fuel, propeller, starting procedures and other recommended accessories. Also included is general information about the accessories needed for the engine that we hope you will find helpful.

This Quick-Start Guide should not be used as a replacement for the Operating Instructions included; rather, it should be used along with the Operating Instructions. We highly recommend reading through the Operating Instructions to familiarize yourself with each part of the engine, along with the proper procedures for engine break-in and tuning.

## QUICK-STARTING PROCEDURES

### Engine Preparation

- ❑ 1) Mount the engine to the recommended engine mount. A strong wood beam mount built into the airframe would also be sufficient.
- ❑ 2) Install the muffler and exhaust pipe onto the engine using the cinch nuts provided. The exhaust pipe can be rotated to better suit the installation in your model. Be sure to tighten the cinch nuts securely to prevent the muffler and exhaust pipe from loosening.
- ❑ 3) Install the propeller to the engine using the propeller washer, propeller nut and the safety nut provided. Tighten the nuts securely using an adjustable wrench.
- ❑ 4) Connect the fuel lines to the carburetor and to the muffler. Do not connect any fuel line to the breather nipple on the bottom of the crankcase.

### Engine Starting

- ❑ 1) Carefully turn the high speed needle valve in completely until it stops, then turn the needle valve out 2-1/2 turns. This is the mixture setting for initial starting. Do not adjust the low speed needle valve.
- ❑ 2) If hand starting, prime the engine by opening the throttle barrel completely, closing the choke valve and flipping the prop through compression 2 -3 times. If you will be using an electric starter, **do not** prime the engine. The starter will turn the engine over fast enough to draw fuel on its own.
- ❑ 3) Connect the glow starter to the glow plug. Open the carburetor barrel to about 1/4 throttle and start the engine. If you are starting the engine by hand, you will need to vigorously flip the prop several times before the engine will start. Once the engine begins running, immediately turn the high speed needle valve in about a 1/4 turn to keep the engine running.
- ❑ 4) Advance the throttle to full while turning the high speed needle valve in to keep the engine running. The engine should be producing a very noticeable white exhaust from the muffler and sound like it is running rough. Allow the engine to run for only about 5 minutes, then shut the engine off.
- ❑ 5) Now that you have started your engine, it must be properly broken in. Proper break-in will seat all of the moving parts, particularly the piston ring, sleeve and valve assemblies. This procedure takes about 45 minutes of run-time and is highly recommended. An engine that is properly broken in will produce more power, be more user-friendly and last much longer than an engine that does not receive a break-in period. For this reason we highly recommend following the break-in procedure detailed in the Operating Instructions before you run the engine further.

This troubleshooting guide has been provided to help you diagnose and solve most problems that you may encounter with your XL RFS series engine. Most problems encountered can be solved by carefully following the problem-cause-solution sections below. If you cannot solve the problem using this troubleshooting guide, please feel free to contact us at the address or phone number listed below.

PROBLEM	CAUSE	SOLUTION
1) Engine does not start	A) Failed glow plug B) Glow starter not charged and/or faulty C) Engine not being turned over fast enough D) Low speed needle valve set too lean E) Old or contaminated fuel F) Engine flooded with too much fuel G) Faulty fuel tank and/or stopper assembly H) Air leak in fuel system and/or engine I) Valves out of adjustment	A) Replace glow plug with new one B) Fully charge glow starter and/or replace C) Use an electric starter to start engine D) Reset low speed needle valve to factory setting E) Replace with new fuel F) Remove glow plug and expel fuel from cylinder G) Check and/or replace fuel tank assembly H) Replace fuel lines and/or tighten all engine bolts I) Readjust valves to proper setting
2) Engine does not draw fuel	A) Air leak in fuel system and/or engine B) High speed needle valve fully closed C) Low speed needle valve set too lean D) Fuel lines kinked E) Defective fuel tank	A) Replace fuel lines and/or tighten all engine bolts B) Reset high speed needle valve to factory setting C) Reset low speed needle valve to factory setting D) Check and straighten fuel lines E) Replace fuel tank
3) Engine vibrates excessively	A) Propeller out of balance B) Engine and/or engine mount loose	A) Balance propeller B) Tighten engine mounting bolts
4) Engine does not transition	A) Failed and/or wrong type glow plug B) Old and/or wrong type fuel C) High speed needle valve set too rich D) Low speed needle valve set too lean E) Low speed needle valve set too rich F) Air leak in fuel system and/or engine G) Propeller too large H) Valves out of adjustment	A) Replace with new recommended glow plug B) Replace with new recommended fuel C) Set high speed needle valve to leaner setting D) Set low speed needle valve richer E) Set low speed needle valve leaner F) Replace fuel lines and/or tighten all engine bolts G) Replace with one size smaller propeller H) Readjust valves to proper setting
5) Throttle barrel does not close completely	A) Throttle servo linkage out of adjustment B) Idle stop screw out of adjustment	A) Adjust throttle linkage to close throttle barrel completely B) Readjust idle stop screw to allow throttle to close
6) Engine overheats	A) Engine running too lean B) Cowl too restrictive C) Wrong type of fuel used D) Engine not fully broken in	A) Richen high speed needle valve B) Open larger vents in cowl to allow air to exit C) Use fuel with recommended oil content D) Allow engine further break-in time
7) Engine stops abruptly	A) Engine running too lean B) Piston & sleeve out of tolerances C) Engine Overheating	A) Richen high speed needle valve B) Return engine to Global Services C) See # 6 above

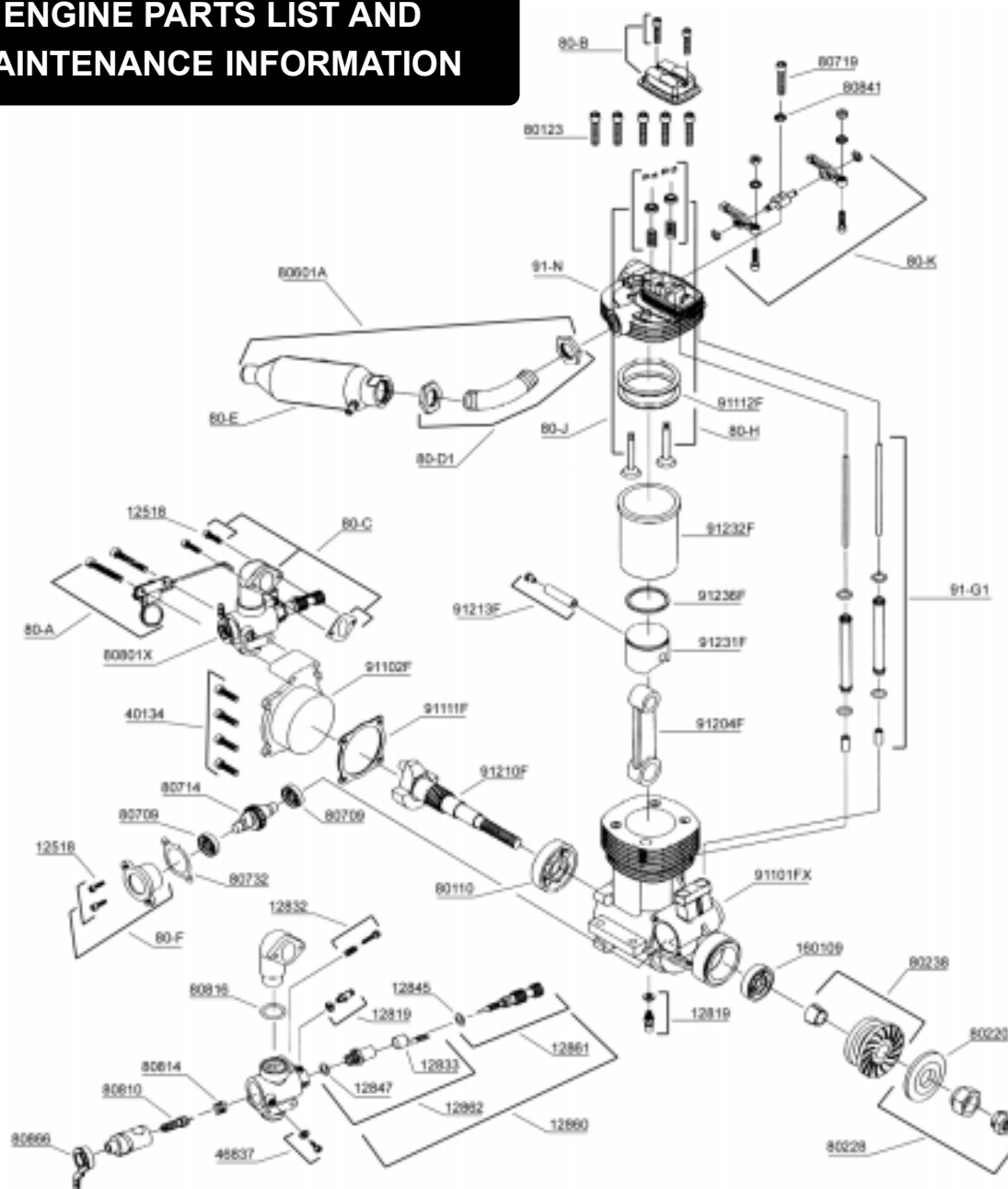
## RETURNING YOUR ENGINE FOR WARRANTY SERVICE

All Magnum engines returned for warranty service must be within the warranty terms as stated on the warranty card provided with your engine. Do not return the engine to the place of purchase. They are not authorized or equipped to perform warranty work on Magnum products. When requesting warranty service, please observe the following guidelines:

- Always send the complete engine including the carburetor and muffler. The engine must be removed from the model.
- Include a note detailing the problem or service you are requesting. Service cannot be provided without this information. Include your daytime phone number in the event we need more details pertaining to the service requested.
- You may request an estimate of services at the time you return your engine for service. An omission of this request implies permission for the Magnum Service Center to service your engine at our discretion.
- Include a method of payment for any service charges. If not specified, the unit will be returned to you C.O.D.
- Send the engine to us by United Parcel Service, Federal Express or by Insured Mail. Postage is not refundable. Send to:

**Global Services • 18480 Bandilier Circle • Fountain Valley, CA 92708**  
**Phone (714) 963-0329 • Fax (714) 964-6236 • Email: [service@globalhobby.com](mailto:service@globalhobby.com)**

# XL .91RFS AIRCRAFT ENGINE PARTS LIST AND MAINTENANCE INFORMATION



12518	Intake Pipe & Cam Gear Cover Screw Set (2)
12819	Fuel Nipple w/Gasket
12832	Idle Stop Screw w/Spring
12833	Detent Spring
12845	High Speed Needle Valve O-Ring
12847	High Speed Needle Valve Holder Gasket
12860	High Speed Needle Valve Assembly - Complete
12861	High Speed Needle Valve Only - w/O-Ring
12862	High Speed Needle Valve Holder - Complete
40134	Backplate Bolt Set (4)
46837	Rotor Bolt w/Gasket
80110	Rear Ball Bearing
80123	Head Bolt Set (5)
80220	Propeller Washer Only
80228	Propeller Washer & Nuts Set
80231	Piston
80238	Drive Washer & Collet
80709	Cam Ball Bearing (1) - 2 Required
80714	Cam Gear
80719	Rocker Screw
80732	Cam Bearing Cover Gasket
80810	Low Speed Needle Valve
80814	Carburetor Barrel Spring
80816	Carburetor O-Ring
80841	Split Washer
80866	Throttle Arm
160109	Front Ball Bearing
80601A	Muffler Assembly - Complete
80801X	Carburetor Assembly - Complete (No Intake Pipe)
80-B	Rocker Cover w/Screws
80-C	Intake Pipe Set w/Screws & Gasket
80-D1	Exhaust Pipe w/Cinch Nuts
80-E	Muffler Only
80-F	Cam Bearing Cover w/Bolts
80-H	Intake Valve Set
80-J	Exhaust Valve Set
80-K	Rocker Arm Set
91101FX	Crankcase
91102F	Backplate
91111F	Backplate Gasket
91112F	Head Gasket Set
91204F	Connecting Rod
91210F	Crankshaft
91213F	Wrist Pin w/Retainer
91232F	Cylinder Sleeve
91236F	Piston Ring
91-G1	Pushrod Assembly - 1 Set
91-N	Cylinder Head w/Valve Assemblies

# XL .91RFS AIRCRAFT ENGINE MAINTENANCE INFORMATION

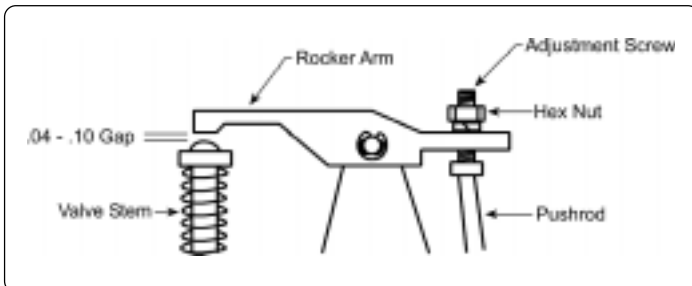
This maintenance information is provided to help you keep your new XL RFS series aircraft engine running in top form. Following this maintenance information will ensure the long life and dependability you expect from your engine.

## ADJUSTING THE VALVES

The valve clearances are preset from the factory, but do require periodic adjustment. Reset the valves after the first 1 hour of engine run-time. After that, the valves can be checked and adjusted about every 8 hours of run-time. The valves will need adjustment if you notice a severe loss of power or after you have repaired and/or reassembled the engine.

**IMPORTANT** Always adjust the valves with the engine cold.

- ❑ 1) With the engine cold, remove the rocker cover on top of the cylinder head by unscrewing the two socket-cap screws.
- ❑ 2) Rotate the crankshaft until the piston is at top-dead center. Both valves will be closed at this point.
- ❑ 3) The required valve clearance is between .04mm and .10mm, measured between the valve stem and the rocker arm. Use feeler gauges to check the clearance. The .04mm feeler gauge should pass through the gap with only slight friction. The .10mm feeler gauge should be tight.



- ❑ 4) Working with one valve at a time, loosen the locking nut, using a small wrench. Use a screwdriver to turn the adjustment screw counterclockwise about 1/2 turn. This will open the gap slightly. Slide the .04mm feeler gauge between the rocker arm and the valve stem. Carefully turn the adjustment screw clockwise until the rocker arm touches the feeler gauge. Using a small wrench, tighten the lock nut.
- ❑ 5) Remove the feeler gauge and double check the gap. Repeat step # 4 if necessary to achieve the correct setting, then repeat the process for the second valve assembly.

## MAINTENANCE

Engine maintenance should be done on a regular basis to ensure that you keep the engine running in top form, especially over time. Following these simple maintenance practices will ensure the long life and dependability you expect from your engine.

- Avoid running the engine under dusty conditions. If you are in a dusty environment, we suggest using an air filter over the carburetor.
- At the end of every flying day, purge the engine of fuel by disconnecting the fuel line from the carburetor and allowing the engine to run dry of fuel.

- Use a high-quality after-run oil in the engine after you have purged the engine of fuel. Inject the oil into the engine through the carburetor and through the glow plug hole. Rotate the crankshaft several times to distribute the oil throughout the engine. This will prevent rust from forming inside the engine, especially on the ball bearings.
- Wipe the outside of the engine dry using a soft cloth.
- Use a fuel filter between the fuel tank and the carburetor.
- Periodically check to make sure all of the engine bolts are tight, including the muffler and exhaust pipe cinch nuts.
- Periodically check your fuel system, including the plumbing inside the fuel tank, for leaks or cracks. We recommend changing the silicone fuel tubing inside and outside the fuel tank at the start of every flying season or about once a year.
- If you have attached a length of fuel tubing to the crankcase breather nipple, periodically check the tubing for any blockage.

## Long-Term Storage

If you will not be using your engine for a long period of time, such as during the winter, we suggest you take the following precautions to preserve the reliability of your engine:

- Run the engine completely dry of fuel as described above. This is extremely important.
- Remove the rocker cover and cam gear cover and apply a generous amount of after-run oil on and around the rocker arm assembly and the cam gear. Reinstall the covers.
- Remove the engine backplate and apply a generous amount of after-run oil to the engine crankcase and to the rear ball bearing, then reinstall the backplate.
- Apply a generous amount of after-run oil to the joint between the carburetor barrel and the carburetor housing to prevent the barrel from sticking.
- Remove the glow plug and apply a generous amount of after-run oil into the cylinder head. Reinstall the glow plug and turn the crankshaft over several times to distribute the oil.
- Once that is done, place the engine in a sealed baggie and remove as much air from the baggie as possible. Your engine can now be stored for a long period without worrying about rust or engine degradation.

## Resetting the Timing

The timing must be reset if the crankshaft and/or cam gear has been disassembled. To reset the timing, rotate the crankshaft until the piston is at top-dead center. (Verify this by looking through the glow plug hole.) With the piston at top-dead center, install the cam gear with the small punch mark facing toward you and pointing straight down toward the bottom of the crankcase. Reinstall the cam gear cover and tighten the screws.