MAGNUM XL .61RFS

OPERATING INSTRUCTIONS

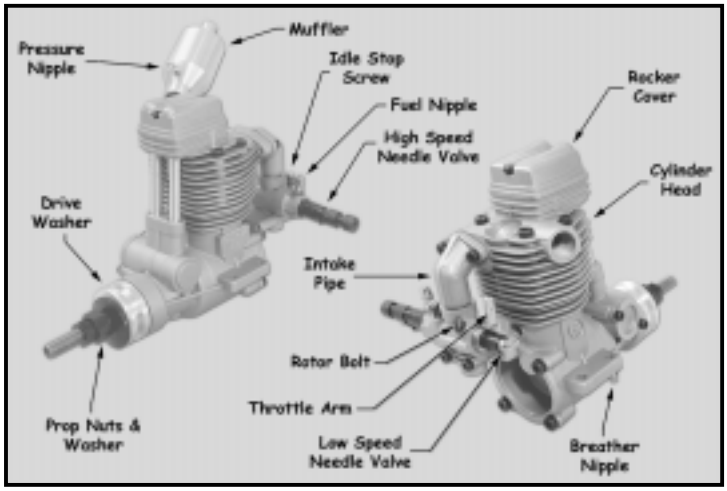
Bore:	24.8mm	Practical RPM:	2,000 - 12,000
Stroke:	20.6mm	Weight w/Muffler:	15.5oz.
Displacement:	.61cu.in.		

INTRODUCTION

The Magnum XL .61RFS is a single cylinder, overhead valve, four stroke engine incorporating ringed piston technology for long life and high power output. A dual needle valve carburetor is employed for easy and precise mixture adjustments. A polished aluminum muffler is included to keep the noise to a minimum without sacrificing power. The engine was designed by expert engineers and built by master craftsmen using only the highest quality materials and CNC machinery. These qualities provide the long life and dependability you have come to expect from an engine of this caliber.

BECOMING FAMILIAR WITH YOUR XL .61RFS ENGINE

If you are familiar with the operation of model engines or just can't wait to run your new engine, please read through the Quick Starting Guide included. This guide will help you get started right away and includes some good recommendations, also. We do recommend reading through this instruction sheet in its entirety to familiarize yourself with the features and operation of your new engine. We have also included a Troubleshooting Guide should you encounter any problems. Please use the photo below to familiarize yourself with the components of your new XL .61RFS engine.



WARNINGS

Magnum model engines will consistently give you dependable performance and reliability and will be a source of satisfaction and pleasure if you follow these instructions for the engine's proper and safe use. You alone are responsible for the safe operation of your engine, so act sensibly and with care at all times. This Magnum model engine is not a toy. It is a precision built machine whose power is capable of causing serious injury to yourself and others if abused, misused or if you fail to observe proper safety precautions while using it.

☛ Keep spectators, especially small children, at least 20 feet away from the engine while it is running.

☛ Mount the engine securely in the airplane or on a suitable engine test stand to run the engine. Follow the mounting instructions in your kits instruction manual or on the plans for individual mounting recommendations. Do not clamp the engine in a vise to test run it.

☛ Use the recommended size propeller and follow the proper procedure for mounting the propeller. Use an adjustable wrench to tighten the propeller nut and the safety nut. Do not use pliers.

☛ Inspect the spinner, propeller and propeller nuts on a regular basis, looking for any signs of nicks, cracks or loosening.

☛ To stop the engine, adjust the throttle linkage to completely close the throttle barrel and therefore cut off the fuel/air supply. You can also pinch the fuel line to stop the engine, but only if it is accessible. Do not throw anything into the spinning propeller or attempt to use your hands to stop the engine.

☛ While the engine is running stand behind the engine to make any adjustments to the needle valves. Do not reach over or around the propeller. Do not lean towards the engine. Do not wear loose clothing or allow anything to be drawn into the spinning propeller while the engine is running.

☛ Do not use tight fitting cowls over the engine. They can restrict air from flowing over the engine and result in engine damage from overheating.

ENGINE INSTALLATION

❑ Engine Orientation

The Magnum XL .61RFS engine can be orientated in any position on the firewall. Keep in mind that if you mount the engine inverted, carburetor adjustments will need to be made differently and the fuel tank may need to be lowered. (See fuel tank size and orientation to carburetor on next page.) Engines mounted inverted tend to run richer during idle and transition to full throttle, and are generally more difficult to set up and tune properly.

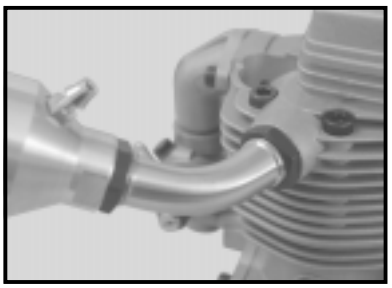
❑ Engine Bolts and Firewall Requirements

The XL .61RFS engine should be mounted to a glass filled or metal motor

mount (Dave Brown Products # 218141 recommended) or to an integrated wood beam mount built into the fuselage structure of the aircraft. Use only high quality # 6 sheet metal screws and washers to mount the engine to a glass filled mount. Use 6-32 socket cap screws, washers and locknuts to mount the engine to a wood beam mount. If using a glass filled mount, the firewall in the airplane should be aircraft grade plywood no less than 1/4" thick. The firewall should also be reinforced to meet the torque and power of the engine.

❑ Muffler and Exhaust Pipe Installation

The muffler threads onto the exhaust pipe, which then threads into the side of the cylinder head. Both assemblies are held in place using two nuts.



First, thread one nut onto one end of the exhaust pipe, then thread the muffler onto the exhaust pipe. The muffler should be threaded on no less than 1/4" to prevent vibration from damaging the threads. Once you have threaded the muffler onto the exhaust pipe, use an open end wrench and tighten the nut up against the muffler. This will prevent the muffler from loosening. Thread the second nut onto the exhaust pipe, then thread the exhaust pipe into the cylinder head. The pipe should be threaded in no less than 1/4" to prevent vibration from damaging the threads. The exhaust pipe is adjustable to better match the scale appearance and installation of your particular model. Once you have threaded the exhaust pipe into place and into the proper position for your application, use an open end wrench to tighten the nut against the cylinder head. This will prevent the exhaust pipe from loosening.

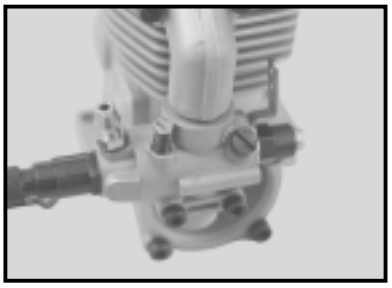
❑ Fuel Tank Size and Orientation to Carburetor

Ideally the stopper in the fuel tank should be even with the high speed needle valve or just slightly below it. Most models will only allow the fuel tank to be mounted higher than the ideal location. A fuel tank that is positioned higher than the ideal location usually doesn't pose any problem except when it is mounted excessively higher and/or used in conjunction with an inverted mounted engine or during extreme aerobatic flight. If you mount your engine inverted, it is advised to lower the fuel tank so that the stopper assembly is slightly below the high speed needle valve. Doing this will prevent fuel from siphoning into the engine and flooding it when the fuel tank is full. If you cannot lower the fuel tank far enough, we suggest lowering it as far as possible in your particular application.

The size of the fuel tank used should be 10oz. - 12oz. depending on the model and the length of flights desired. Use of a 10oz. tank will provide between 15 - 20 minutes of run time at full throttle. Use of a fuel tank any larger than 12oz. can lead to excessive leaning of the engine during flight and is not recommended.

❑ Idle Stop Screw, Rotor Bolt & Breather Nipple

The idle stop screw adjusts the closure of the throttle barrel. Turning the



idle stop screw clockwise will make the throttle barrel stay open more. Turning it counter-clockwise will allow the throttle barrel to be closed more. Adjust the idle stop screw so that you can close the throttle barrel completely to shut off the engine. The rotor bolt holds the throttle barrel in the carburetor body and prevents the throttle barrel from being over-rotated in either direction. It does not need adjustment. The breather nipple on the bottom of the crankcase should be left open. If necessary, a piece of fuel tubing can be attached to it to vent excess oil out of the cowling. NEVER use it as a pressure tap.

❑ Carburetor Orientation

In some cases the particular installation of the engine in your model may make it necessary to change the position of the carburetor. You may want the throttle arm on the opposite side from how it comes preinstalled. You can remove the carburetor and reinstall it in the opposite direction with no effect on performance. To remove the carburetor loosen the two screws holding the intake manifold in place. Next, remove the two screws holding the carburetor to the engine. Remove the carburetor by gently pulling it down off the intake pipe. To reinstall the carburetor reverse the process. We highly recommend applying machine oil to the o-ring inside the carburetor mounting base and to the carburetor mounting flange on the intake pipe. This will prevent the o-ring from being damaged when you reinstall the carburetor.

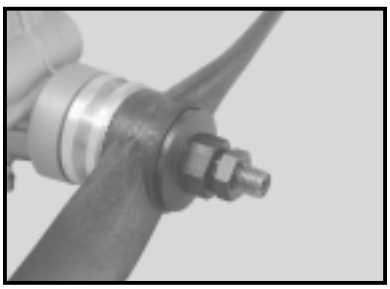
❑ Needle Valve Extension

If an extension is required to adjust the high speed needle valve, use a 1.5mm diameter wire of the necessary length. Loosen the set screw in the side of the needle valve, insert the wire into the end of the needle valve and tighten the set screw firmly. If the extension is more than 3" long we recommend supporting the outer end of the extension to prevent it from vibrating excessively.

❑ Propeller Installation

Note: Before installing any propeller it must be properly balanced. Running an engine using an out-of-balance propeller can lead to excessive vibration which will cause excessive stress and wear on both the engine and the airframe. Overall performance will be reduced, also. Balance the propeller using the recommended method stated by the propeller manufacturer. Several products are available to properly balance propellers. Ask your local retailer for more information about these items.

Using a 1/4" drill bit or a prop reamer, drill out the hole in the propeller



hub to fit the crankshaft. The crankshaft is 1/4" in diameter. Slide the propeller onto the crankshaft and up against the drive washer, then slide the propeller washer up against the propeller. Thread the prop nut onto the crankshaft and tighten it completely to secure the propeller in place. Thread the safety nut into place and tighten it securely. Use the proper size open end wrench or adjustable wrench. Do not use pliers.

Note: If you are installing a spinner onto your engine, the cone of the spinner must not rub against the propeller. If the spinner cone rubs against the propeller, this could lead to propeller damage and eventual propeller failure.

PROPELLER, FUEL & GLOW PLUG

❑ Glow Plug Recommendation

Glow plugs can make a big difference in how your engine performs. For the XL .61RFS we recommend using a "hot" type of glow plug intended specifically for four cycle engines. Do not use "cold" glow plugs or those intended for two cycle engines. Using the wrong type of glow plug will cause the engine to run erratic and make it difficult to tune properly.

❑ Propeller Recommendation

The diameter and pitch of the propeller needed for the XL .61RFS will vary greatly depending on the application the engine is used in. The weight, drag and the type of model and how you intend to fly it are all factors in determining the correct size of propeller to use. Experimentation will be necessary to find the optimal size propeller for your particular application.

Ideally you want to use a propeller that the engine will turn in the 9,000 - 12,000 R.P.M. range on the ground, yet power the airplane sufficiently. Using a propeller that is too small will cause the engine to run at too high an R.P.M. Using a propeller that is too large will cause the engine to run at too low an R.P.M., causing the engine to lug down too much. In both instances this will lead to difficulty in making needle valve adjustments, premature engine wear and eventual engine failure.

Acceptable Propellers		
11 x 8	11 x 9	11 x 10
12 x 6	12 x 7	12 x 8
13 x 5	13 x 6	13 x 7

Use a 12 x 6 propeller for the break-in procedure

❑ Fuel Recommendation

Fuel can make a big difference in the way your engine performs. We recommend using two types of fuel with the XL .61RFS. For the break-in period you must use a fuel containing no more than 10% nitromethane and no less than 20% Castor Oil lubricant. Use of fuel containing more than the recommended percentage of nitromethane or any synthetic lubricants will cause the engine to run too hot and result in excessive wear and engine failure in a very short period of time. Once the engine has been adequately broken in (about 1 gallon of the recommended break-in fuel), a fuel containing up to, but no more than 15% nitromethane and no less than 16% Castor Oil and synthetic lubricant blended fuel can be used.

Note: We do not recommend using fuels that contain only synthetic lubricants. Synthetic lubricants have a much lower flash point than Castor Oil lubricants. Flash point is the point at which the lubricant begins to actually burn and loses its lubricating qualities. Using fuels containing a blend of Castor Oil and synthetic lubricants results in an engine that runs cooler and lasts longer. One lean run using a fuel containing only synthetic lubricants can cause engine failure. Using fuels with a Castor Oil and synthetic blend of lubricants greatly reduces this chance.

HIGH & LOW SPEED NEEDLE VALVES

❑ High Speed Needle Valve

The high speed needle valve is used to meter the air/fuel mixture at full throttle. Turn the needle clockwise to lean the mixture or turn the needle counterclockwise to richen the mixture. When you start the engine for the very first time the needle valve should be turned in completely, then backed out 2-1/2 turns. When you start the engine after that, leave the needle valve in the same position it was in when you shut down the engine.

❑ Low Speed Needle Valve

The low speed needle valve meters the air/fuel mixture at idle and during transition from idle to full throttle. Turn the low speed needle clockwise to lean the mixture. Turn it counterclockwise to richen the mixture. The low speed needle valve is preset from the factory, but minor adjustments may need to be made to suit your application (i.e., fuel used, glow plug and environment all contribute to the setting). To reset the low speed needle valve to the factory setting open the carburetor barrel completely. While holding the barrel open, turn the needle in until it stops. From this point, turn the needle out 2 complete turns. This is the factory setting. It is possible to turn the idle mixture so lean that the engine will not draw fuel.

STARTING PROCEDURE

The XL .61RFS can be started using an electric starter or it can be started by hand. For safety and ease of starting, especially when the engine is brand new, we recommend using an electric starter. The following two procedures should be done with the power to the glow plug off.

❑ Starting by Hand

When starting the engine by hand always use a chicken stick. If you must use your finger, wear a good leather glove to prevent the propeller from cutting you. Never use your bare hand or serious injury could result. To make the engine easier to start by hand it should first be primed. This is done by opening the carburetor completely and choking the engine by putting your finger over the muffler opening. With your finger over the muffler opening, "pull" the propeller through the compression stroke 2 - 3 times. This will draw fuel into the engine. Over-priming the engine can cause the engine to "hydro-lock" or flood. This is a result of too much fuel in the engine before it actually fires. Remove your finger from over the muffler opening and "pull" the propeller through the compression stroke once to check for a hydro-locked condition. Never try to start the engine if it is in a hydro-locked state. This could cause serious damage both to yourself and to the engine.

❑ Starting with an Electric Starter

When using an electric starter it is not necessary to prime the engine. The starter turns the engine over fast enough that the engine draws fuel on its own. Priming the engine prior to using an electric starter can cause the engine to "hydro-lock" or flood. This is a result of too much fuel in the engine before it actually fires. Trying to start the engine with an electric starter while the engine is flooded can cause extreme damage to the engine and/or cause your propeller assembly to come loose. "Pull" the propeller through the compression stroke one time by hand to check for a hydro-locked state before applying the starter.

Note: If the engine becomes hydro-locked, do not force the propeller through the compression stroke. Remove the glow plug and quickly flip the propeller, or apply an electric starter, to expel the fuel from the cylinder.

BREAK-IN PROCEDURE

Note: The XL .61RFS engine is a ringed engine. A ringed engine is designed differently from a typical ABC designed engine that you might be more familiar with; therefore, you will not feel much hesitation as the piston moves through the top of the stroke. A ringed engine does not have any taper in the sleeve. Ring tension is what seals the combustion chamber. When the engine is brand new, it will not feel like it has much compression. This is because the ring has not yet been seated with the sleeve. After the engine has been broken-in, compression will increase. The break-in procedure will guide you through the steps necessary to properly break in your new XL .61RFS ringed engine. Please follow the steps closely.

The break-in process allows the engine parts to perfectly fit to each other and properly protect each part from premature wear. The engine should be broken in using a fuel that contains no more than 10% nitromethane and no less than 20% Castor Oil lubricant. Synthetic lubricant fuels should not be used during the break-in procedure. For the break-in procedure we recommend mounting the engine into the airplane it will be used in. This way the muffler, fuel tank and throttle linkage can all be tested in combination with the engine. If your airplane uses a cowling, it should be removed during the break-in procedure.

❑ 1) Turn the high speed needle valve out 2-1/2 turns from the fully closed position.

❑ 2) If you are using an electric starter to start the engine, follow the corresponding procedure in the previous section. If you are starting the engine by hand, follow the appropriate procedure in the previous section.

❑ 3) Open the throttle barrel to approximately 1/4 throttle. Connect the power to the glow plug. Start the engine using an electric starter or by hand. If starting by hand you will need to vigorously flip the propeller through the compression stroke several times before the engine will start.

❑ 4) Once the engine starts open the throttle barrel to about 1/2 throttle. You may need to lean the high speed needle valve in about 1/4 turn to keep the engine running at half throttle.

❑ 5) After the engine has been running for about 1 minute, remove the power from the glow plug. Advance the throttle barrel to full throttle. Adjust the high speed needle valve so that the engine is running very rich. You should notice excessive white smoke coming from the exhaust and the engine should sound like it's running very rough. Let the engine run for approximately 5 minutes, then stop the engine.

❑ 6) Let the engine cool for approximately 10 minutes, then restart it. Set the high speed needle valve mixture to a slightly leaner setting, about 1/4 turn more in. Let the engine run for about 5 minutes at this setting, then stop the engine and let it cool for approximately 10 minutes.

❑ 7) Repeat the procedure in step # 6, while leaning the needle valve slightly more each time. In all, you should run the engine about a total of 30 minutes of actual running time. After 30 minutes of run time the engine is ready for flight. Fly the airplane with the engine set as rich as possible, but with adequate power to fly the airplane. After each flight, lean the mixture slightly. Continue to do this for about 5 flights. At this point the engine should hold a good setting on the high speed needle valve and you can begin to fine tune the needle valve settings to increase performance.

FINE TUNING THE XL .61RFS

Now that your engine has been broken in, you can set the high and low speed needle valves for optimum engine performance.

Note: Be careful to never lean out the engine too much. Remember that the lubricants for your engine are suspended in the fuel. If you lean out the fuel mixture too much you will also be lowering the amount of lubricant entering your engine. Less lubricant means more chance of your engine overheating and possible engine failure.

❑ Setting the High Speed Needle Valve

❑ 1) Start the engine and remove the power from the glow plug. Allow the engine to warm up for about 1 minute.

❑ 2) After the engine has warmed up, slowly lean the high speed mixture until the engine reaches peak R.P.M. After reaching peak R.P.M. richen the mixture slightly until an audible drop in R.P.M. is heard. If you are using a tachometer this should be between a 200 - 300 R.P.M. drop.

❑ 3) With the engine running at full power, carefully lift the nose of the airplane about 45º into the air. The mixture should not become too lean, but you may hear a slight increase in R.P.M. This is normal. If the engine sags, or loses R.P.M. when you hold the nose up, the mixture is too lean.

Note: R.P.M. will increase about 10% - 30% in the air. This is due to the forward motion of the aircraft as it is flying. Because of this more air is entering the carburetor, at a higher force, and causes the mixture to lean out. Additionally, as the fuel level in the fuel tank goes down, fuel draw becomes more difficult for the engine, especially during aerobatics, also causing the mixture to go lean. It is imperative that you set the mixture rich while on the ground to compensate for the leaning tendencies that will happen in the air. Always watch the exhaust during your flight. The engine should leave a noticeable white smoke trail at all times. It there is no smoke trail, the engine is running too lean. You should land immediately and reset the mixture.

❑ Setting the Low Speed Needle Valve

❑ 1) Start the engine and lean out the high speed needle valve as per the previous steps. Close the throttle until the slowest reliable idle is reached. Allow the engine to idle for about 30 seconds.

❑ 2) Quickly advance the throttle to full. If the engine just stops running as soon as the throttle is advanced, the idle mixture is too lean. With the engine stopped, richen the idle mixture about 1/8 of a turn.

❑ 3) Repeat steps # 1 and # 2 until the engine will transition from idle to full throttle smoothly. Minor hesitation in the transition is normal.

❑ 4) If you quickly advance the throttle from idle to full throttle and the engine seems to be very rich during transition (i.e., lots of smoke coming from the exhaust and very rough sounding), the mixture is too rich. With the engine stopped, lean the idle mixture about 1/8 of a turn.

❑ 5) Repeat steps # 1 and # 4 until the engine will transition from idle to full throttle smoothly. Minor hesitation in the transition is normal.

VALVE ADJUSTMENTS

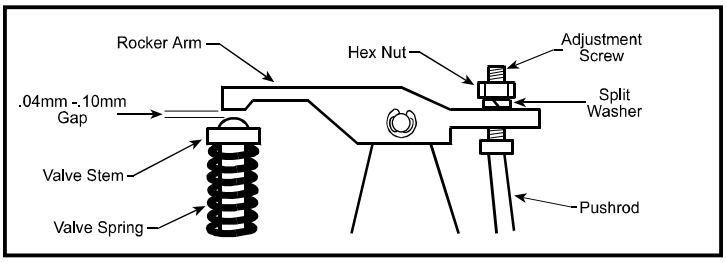
❑ Adjusting the Valves

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

❑ 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 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 hex nut using a small wrench. Use a screwdriver and 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 hex nut.

❑ 5) Remove the feeler gauge and double check the gap. Repeat step # 4 if necessary to achieve the correct setting. Repeat for the second valve.

MAINTENANCE

❑ Avoid running the engine under dusty conditions. If you are in a dusty environment we suggest using an air filter over the carburetor. A small piece of women's nylon stocking placed over the carburetor opening and held in place with a small rubber band works well.

❑ At the end of every flying day, purge the engine of fuel by disconnecting or pinching the fuel line 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. (Remove the glow plug.) Flip the propeller several times to distribute the lubricant inside the engine. After-run oil will coat the internal parts of the engine, most importantly the ball bearings, preventing rust from building up.

❑ Wipe the outside of the engine dry using a soft cloth.

❑ Use a fuel filter between the fuel tank and the carburetor to prevent debris from getting into the carburetor's spray bar assembly.

❑ After about every 20 flights, use the two hex wrenches provided with the engine to double check the tightness of all of the engine bolts.

MAGNUM XL .61RFS

QUICK START and TROUBLESHOOTING GUIDE

The following information is provided to get your new Magnum XL .61RFS 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 Magnum XL .61RFS engine that we hope you will find helpful.

This Quick Start Guide should not be used as a replacement to 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, tuning, care and maintenance.

OUR RECOMMENDATIONS

The following items are recommended for use with the XL .61RFS engine. These items are recommended for initial start-up and running. Please read through the Operating Instructions for further details.

❑ Fuel: Power Master 10% 2-Stroke Blend (# 275180) for break-in. Power Master 10% 4-Stroke Blend (# 275185) for normal use.

We suggest using Power Master brand fuels. Power Master fuels come in 10 % and 15% nitromethane contents that can be used in the XL .61RFS 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 10% - 15% 4-stroke blend.

❑ Fuel Tank: Dubro 10oz. Fuel Tank (# 568501)

The Dubro 10oz. fuel tank is a perfect match for the XL .61RFS. It is large enough to give you about 15 - 20 minutes of run-time at full throttle, and is very easy to assemble and maintain.

❑ Glow Plug: Thunderbolt 4-cycle (# 115490)

The Thunderbolt 4-cycle glow plug is designed to be used in four stroke engines using fuels containing 10% - 20% nitro content and in any environment. It is a "hot" type of glow plug perfect for easy starting, excellent transition and incredible top end. The plug is also very durable and able to withstand repeated use.

❑ Propeller: APC 12 x 6 Propeller (# 608660)

We have found that the engine runs at its best using APC brand props. They are designed to be very efficient and run quiet at high R.P.M.'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 (# 237438)

The Magnum glow starter is an excellent choice for heating the glow plug. It uses a Sub-C Nicad, 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.

❑ Motor Mount: Dave Brown Products Motor Mount (# 218141)

The Dave Brown Products motor mount is a glass filled type that mounts to a plywood firewall in the model. It is easy to install and rugged, yet, in the event of a crash, will break away to minimize damage to the engine and/or airframe.

QUICK STARTING

❑ Engine Preparation

❑ 1) Mount the engine to the recommended motor mount. A wood beam mount built into the airframe would also be sufficient.

❑ 2) Install the muffler and exhaust pipe onto the engine using the two nuts provided. The muffler assembly can be rotated to better suit the installation in your model. Be sure to tighten the two nuts securely to prevent the muffler from loosening.

❑ 3) Using a 1/4" drill bit, drill out the center hub in the propeller. Install the propeller to the engine using the propeller washer and nuts provided. Tighten the propeller nut securely using an adjustable wrench.

❑ 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.

❑ 2) If hand starting, prime the engine by opening the throttle barrel completely, placing your finger over the muffler opening and flipping the propeller 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 propeller several times before the engine will start. Once the engine begins running, immediately turn the high speed needle valve in about 1/4 turn to keep the engine running.

❑ 4) Advance the throttle to full while slowly 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 very rough. Allow the engine to run only for about 5 minutes, then shut the engine off.

❑ 5) Now that you have started your XL .61RFS engine it must be properly broken-in. Proper break-in will seat all of the moving parts, particularly the piston ring and valves. This procedure takes about 30 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.

TROUBLESHOOTING GUIDE

This troubleshooting guide has been provided to help you diagnose and solve most problems that you may encounter with your Magnum XL .61RFS 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, phone number or email address 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) Idle mixture screw 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 a new one B) Fully charge glow starter and/or replace C) Use an electric starter to start engine D) Reset idle mixture screw 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 correct setting
2) Engine does not draw fuel	A) Air leak in fuel system and/or engine B) High Speed Needle Valve fully closed C) Idle mixture screw 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 idle mixture 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 motor mount loose	A) Balance propeller B) Tighten all motor 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) Idle mixture set too lean E) Idle mixture 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) Reset high speed needle valve to leaner setting D) Set idle mixture richer E) Set idle mixture leaner F) Replace fuel lines and/or tighten all engine bolts G) Replace with one size smaller propeller H) Readjust valves to correct 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 B) Readjust idle stop screw so throttle barrel closes
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 cowling 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	A) Richen high speed needle valve

RETURNING FOR 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:

☛ 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.

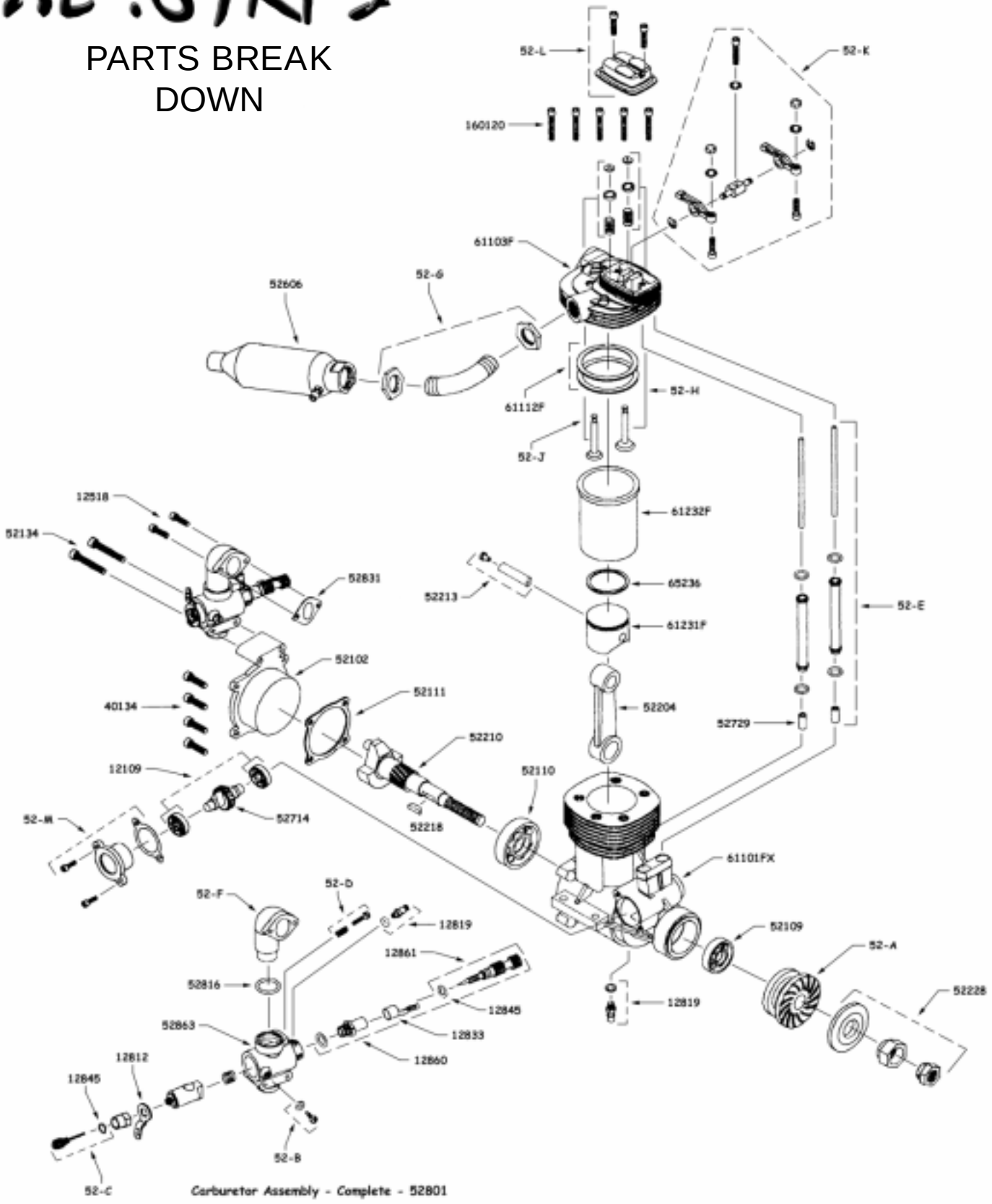
☛ Include a method of payment for any service charges. If not specified, the unit will be returned to you C.O.D.

☛ Send the engine to us by United Parcel Service, Federal Express or by Insured Mail. Postage is not refundable. Send to:

Magnum Service Center
18480 Bandilier Circle
Fountain Valley CA 92728
Phone (714) 963-0329 Fax (714) 964-6236 E mail: service@globalhobby.net

XL .61RFS

PARTS BREAK DOWN



XL .61RFS

PARTS LIST

To order replacement parts, visit your nearest Magnum Engines dealer or call the Magnum Engines Service Center direct at 1-714-963-0329. Parts are listed below in numerical order.

52-A	Drive Washer w/Woodruff Key
52-B	Rotor Bolt
52-C	Idle Needle Valve w/O-Ring
52-D	Idle Stop Screw
52-E	Pushrod Set (1)
52-F	Intake Pipe w/Gasket
52-G	Exhaust Pipe Set
52-H	Intake Valve Set
52-J	Exhaust Valve Set
52-K	Rocker Arm Set
52-L	Rocker Cover Set
52-M	Cam Gear Cover Set
12109	Cam Gear Bearing Set
12518	Intake Pipe Bolt Set
12812	Throttle Arm
12819	Fuel Nipple w/Gasket
12833	Detent Spring
12845	Needle Valve O-Ring
12860	Needle Valve Assembly - Complete
12861	Needle Valve w/O-Ring
160120	Head Bolt Set
40134	Backplate Bolt Set
52102	Backplate
52109	Front Bearing
52110	Rear Bearing
52111	Backplate Gasket
52134	Carburetor Bolt Set
52204	Connecting Rod
52210	Crankshaft
52213	Wrist Pin Set
52218	Woodruff Key
52228	Prop Nuts and Washer Set
52606	Muffler Assembly
52714	Cam Gear
52729	Cam Lifter Set (2)
52801	Carburetor Assembly
52816	Carburetor O-Ring
52831	Intake Pipe Gasket
52863	Carburetor Body w/Spray Bar
61103F	Cylinder Head w/Valves Installed
61112F	Head Gasket Set
6123F	Sleeve Only
65236	Piston Ring
61231F	Piston Only
61101FX	Crankcase