MAGNUM

FT-160

25 cc - Twin Cyl. Engine
Operating Instructions

Distributed In Australia By :-

Tates Performance Hobbies

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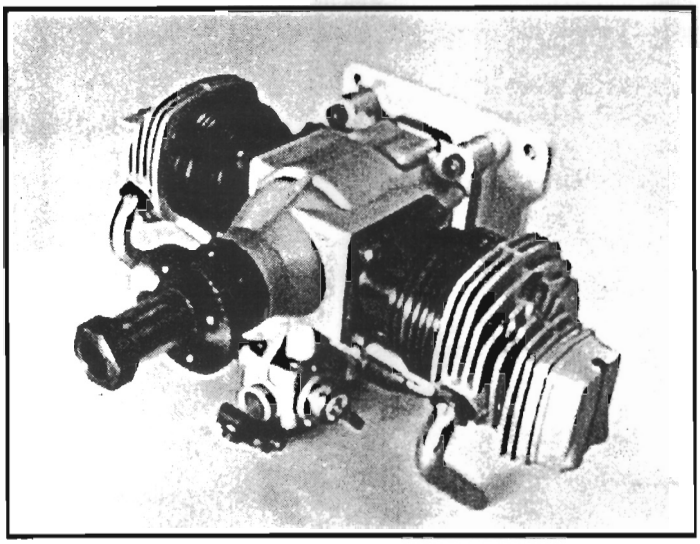
Instructions for

Magnum XL 160 Twin Cylinder Ringed Four Stroke Engine



The Magnum 160 XL is a horizontally opposed twin-cylinder, overhead-valve four cycle engine with a dual needle carburetor. It is designed by experienced engineers and craftsman with only the best materials and CNC machinery to provide the reliability and long life you need and expect from an engine of this caliber.

Important: Before attempting to operate your engine, please read through these instructions to familiarize yourself with the operations and features of this technical, fully operational four cycle engine. The Magnum 160 XL engine is designed for experienced modelers familiar with operating four cycle engines. Please read through the entire manual before operating this engine. Pay particular attention to the Safety Instructions and Warnings section of the manual.

Specifications

Displacement:.....12.8cc x 2 (.78 cu.in. x 2)
Bore.....26.5MM (1.043 in)
Stroke:.....23.2mm (.913 in)
Practical RPM:..... 2000 to 10000
Weight:.....1280gr (45.1 oz)

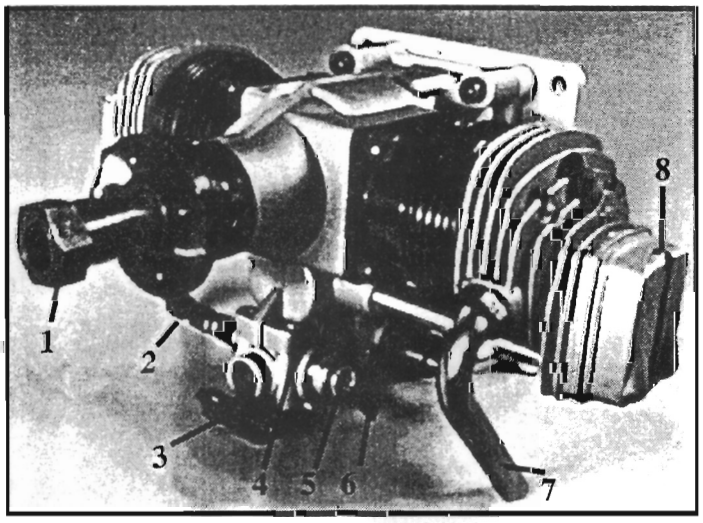
Safety Instructions and Warnings:

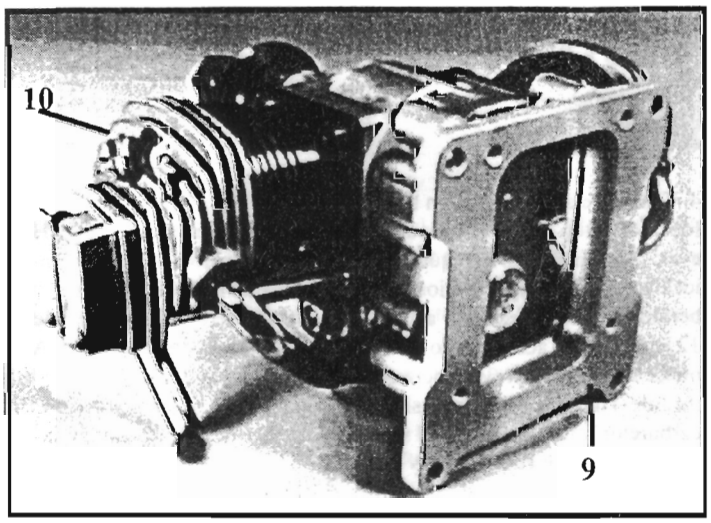
Magnum model engines will give you dependable performance and will be a source of satisfaction and pleasure if you follow these instructions as to the engine's proper and safe use. **Do not let pleasure turn into injury and/or tragedy!** You alone are responsible for the safe operation of your engine, so act sensibly and with care at all times. This engine is a precision built machine whose power is capable of causing harm to you and others if abused, misused, or if you fail to observe proper safety precautions.

At All Times:

- Keep spectators, especially small children, who can be hurt when the engine is running at least twenty feet away from the operating engine.
- Mount the engine securely in the plane, or on a proper engine test stand. Follow the mounting recommendations on the airplane's plan and/or instruction manual, or in the test stand described in the directions. DO NOT clamp this engine into a vise!
- Use the correct size propeller and follow the recommended mounting procedures. Use a proper wrench to tighten the propeller nut. Do NOT use pliers.
- Inspect the propeller and propeller nut regularly for nicks, breaks, and loosening.

Safety Instructions continue on the next page....





1. Propeller Nut
2. High Speed Needle Valve
3. Choke
4. Carburetor
5. Low-End Needle
6. Throttle Arm
7. Exhaust Tube
8. Rocker Cover
9. Engine Mount
10. Cylinder Head

Safety Instructions and Warnings continued...

■ To stop the engine, adjust the throttle linkage to close the carburetor barrel and cut off the air supply. An alternative method is cut off the fuel supply by pinching the fuel line. NEVER use your hands or any other foreign, object like a towel, to stop the engine.

■ Stand behind the engine when performing adjustments. NEVER reach over or around the propeller. NEVER lean toward the engine. Keep your face, body, and any objects or spectators away from the path of the propeller when starting and running the engine.

■ If you decide to carry your model while the engine is running, be very cautious. Be aware of the propeller and keep it away from you and all others.

■ Do not have tight fitting cowlings or oversized spinners, as they will impede airflow to the engine. Reduced airflow will cause damage to the engine due to overheating.

■ Do not fly your model near or under high tension lines (power lines).

Installation

1. Engine Orientation.
The Magnum 160 Twin should be mounted with the carburetor below the crankcase and the cylinders level or performance and scale appearance may be compromised.

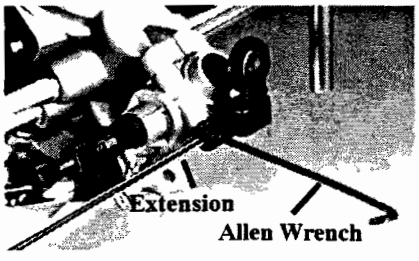
2. Engine Bolts Supplied and Firewall Requirements.
Heavy duty cap screws and blind nuts have been provided for mounting the engine to a flat firewall. The firewall must be reinforced or designed to meet the torque and weight of a large displacement engine. If the provided screws are too short or need replacement, use screws of the same or higher rated size and strength.

3. Exhaust Pipe Direction Adjustment.

The exhaust pipes are adjustable to better match the scale appearance and installation of your particular application.
To adjust the pipes, use an open end 12mm wrench to loosen the cinch nut, position the pipe as needed, and re-tighten the nut while holding the pipe in position.

4. Tank Size and Orientation to Carburetor.
Ideally, the top of the tank should be 3/8 inch above the needle valve. However, most models will require the tank to be positioned higher than the ideal location. A high positioned tank will pose no normal problem but can betroublesome for extreme aerobatic flight. The size tank used should be 12 to 16 ounces according to the model and length of flights desired. A 12 ouncetank should provide between 10 and 12 minutes of run time at full throttle.The fuel pick-up inside the tank should be connected to the carburetor's fuel nipple. The vent for the tank is just a vent and is not connected to the engine in any way.

5. Choke Valve Extension Installation.



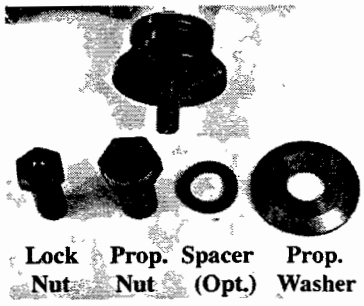
The Magnum XL 160 Twin is equipped with a choke valve. Attach the "L" shaped extension wire to the choke with the set screw. Adjust the length if necessary. For choke usage, see the engine starting and operations sections.

6. Needle Valve Extension.
Similar to the choke, the high end needle valve can have an extension to make necessary adjustments. Adjust the provided flex cable to the correct length and secure to the needle with the set screw provided. The needle valve extension should be supported at its outer end.

7. Crankcase Breather Tube.
Positioned on the crankcase is a crankcase breather that has a nipple attached. A tube can be attached to the nipple to run the expelled lubricants out of the cowling. The tube's inside diameter should be no smaller than 3/16 inch and no longer than 4 inches. Do not plug or use the pressure tap as a pressure tap

8. Propeller Installation
The main propeller nut (part of the locking nut system) fits through the propeller hub. (We recommend using the locking propeller nut for safety.)

Important Note: Balance the propeller according to the propeller manufacturer's directions.



Drill the propeller hole to 12mm for the nut to fit.
Slide the nut through the propeller washer and through the propeller. Install the nut and the propeller onto the engine shaft. (A spacer has been provided in the event that the propeller is too thin.) Use a 17mm wrench to properly tighten the nut.
Install the locking nut. Use a 14mm wrench to tighten the nut. **This nut will lock the main nut in place to reduce the risk of the propeller loosening.**
The end of the lock nut has a threaded hole to use as a spinner nut for spinners that have a center screw. The threads are for a 4mm size machine screw.

Note: if using a spinner, the cone of the spinner must not rub against the propeller. The spinner may need to be balanced in the same manner as the propeller. Note; The crankshaft size is: 5/16-24

Propeller, Fuel, and Glowplug Recommendations

Propeller Recommendations
Size: The diameter and pitch of the propeller needed for the Magnum 160 Twin depends on the application. Weight, size, drag, etc. are all factors in determining the correct size. Some experimentation will be necessary. Please keep your selection within the size parameters listed here:

14 x 9,10,11; 15 x 8.9,10; 16 x 6,7,8; 17 x 6; 18 x 6
Use 16 x 6 for break-in procedures.

Note: Do NOT use a propeller that has not been properly balanced. An improperly balanced propeller will lead to engine damage as well as reduced life for the engine and airframe.

Glowplug Type and Wiring.
Glowplug Type: Use a glowplug intended for four cycle engines such as the Thunderbolt Four Cycle plug. Dp not us plugs designed for two cycle engines. Included with your Magnum 160 Twin is wiring to assist you in installing on board glow/remote glow in your model.
Remote Glow: Many times, the engine will be installed inside a cowling. To make power connection for the glow plugs easier, a remote glow connection can be made.

Remote Glowplug Wiring Assembly:

1. Find a plug set (such as a mono stereo jack). These types of connections can usually be found at an electronics store. Find an external and inconspicuous place to mount the jack.
2. The wires with the clips and black boots connect to the stem of the glow plug. These wires should be wired together and connected to the positive (+) pole on the electrical connector.
3. A separate wire should be run from the negative (-) terminal of the jack to a common ground point on the engine. A motor mount screw is a perfect location for the ground wire.
4. Wire the plug (for the jack mounted in your plane) to a power source to "light" the glowplugs. Because two plugs are to be powered at once, a battery of 1.2 to 1.5 volts with at least 2,000 mah rating should be utilized. According to the ground position and the length of the leads, a larger capacity battery may be necessary.
5. Remember that the glowplugs have power when the battery is connected. The engine can start anytime the glowplugs have power. Make sure the propeller is clear at all times when power is connected.

On Board Glow

Idle and transition can sometimes be improved with the use of an onboard glow system. Essentially the model carries a power source for the glowplugs that can be engaged when the throttle is positioned below a certain point (usually ¼ throttle). Because of the quality of many electronic onboard glow systems available today, we do not describe a mechanical system here but recommend the purchase of a twin cylinder electronic onboard glow system available commercially.

Fuel

We Reccommend Cool Power Synthetic Oil only. The Multi Viscosity (Purple) is the best at 15% to 20%.
The 160 will run much better with 15% to 25% Nitro - improving its idle and smooth running. Cool Power Heli Low Smoke 20% fuel is Ideal.

Starting Procedure

The Magnum 160 Twin can be started with a high power electric starter or can be "hand-cranked". When using the electric starter, the possibility of hydro-locking is possible. (Hydro-locking is a condition where too much fuel is in the combustion chamber or other cavities of the engine. So much so that attempting to force the engine to turn over will result in damage.) Always "pull" the propeller through the compression strokes 2 or three times with the power for the glow plug disconnected to check for a hydro-locked condition before applying the starter. If hand-cranking the engine, always use a "chicken stick". NEVER use your hand or other body parts to start the engine. See the safety section for more details. Always read the safety section completely before attempting to run a Magnum model engine.

When starting the engine for the first time, refer to the Break-In Section before continuing to adjust the engine.

1. Disconnect the power to the glow plugs.
2. Open the throttle and open the needle valve 2 ¼ turns from the fully closed position.
3. Keep the carburetor adjustments in position and close the choke. Turn the engine over two revolutions to draw fuel from the tank into the engine. Turning the engine over more than twice can result in flooding, making the engine difficult to start.

Note: NEVER apply an electric starter to this engine with the choke closed. This can result in hydro-locking which can result in severe damage to the engine.

4. Release the choke while immediately continuing to turn the engine over three to five more times. This draws the fuel on into the cylinders without flooding.
5. Set the carburetor to approximately ¼ throttle. Connect the power to the glowplugs.
6. Turn the engine over with the chicken stick or electric starter. If the engine doesn't start, check that the fuel is reaching the engine. Repeat steps 1-4. (If this still fails, check the glowplugs and electrical connections.)
7. Once the engine starts, open the throttle to full. Slight adjustments (no more than ¼ turn) can be made to the high end needle valve to keep the engine running.
8. After 20 to 40 seconds, disconnect the battery. Then slowly turn the needle valve to "lean" the mixture and increase Rpm's. Over adjusting or abrupt adjustments will "over lean" the engine and cause it to stall and possibly to damage the engine. If this is the first or an early run for the engine, refer to the Break-In section of the manual before continuing.
9. To restart when warm, simply connect the power to the glowplugs and turn the engine over. Do Not apply the choke as this will flood the engine. If the engine is very hot, it may need to be re-primed. Only commence in re-priming the engine if it does not fire without the prime. A hot engine can sometime burn the prime prematurely. If the engine is that hot, you may wish to let it cool a few minutes before restarting. You may also wish to reevaluate your needle valve setting. It may be too lean.

High-End Needle Valve

A special note about four stroke and ringed engines: A ringed four cycle engine with its many moving parts is more dependent on the oils in the fuel for lubrication than most two cycle engines. Therefore, it is imperative to the life of your 160 Twin that it never be run too lean. One lean run can ruin an engine. Therefore, please read the directions carefully to ensure proper operation of your Magnum 160 Twin.

1. This needle is used to set the fuel/air mixture at full throttle. **Never over lean the engine.** An over lean condition will decrease the fuel and therefore the oil, being ingested into the engine. Too little oil will lead to a damaged engine.
2. The high-end needle should be set rich, 200 to 300 rpm lower than "peak" rpm. To facilitate carburetor adjustments, you may wish to use a digital tachometer.
3. With the model's nose positioned high (60 to 90 degrees up from the ground) the engine should not become too lean but may increase in rpm slightly from the setting in step 2. In the nose high position, the mixture should not lean past the "peak" setting.
4. Always watch the exhaust during flight. The exhaust should leave a slight trail of smoke (it is often blue in color). If the engine is too lean, it will not leave any trail.

Low-End Needle Valve

1. The idle/transition mixture is metered by the Low-End Needle Valve. This is the fuel/air mixture setting when the carburetor is not fully opened. It is located opposite the high end needle.
2. Initially, this needle should not be adjusted until the break-in process is finished.
3. While the engine is running, close the carburetor until the slowest reliable idle rpm is reached.
4. Pinch the fuel line until the engine's rpm changes.
5. If the RPM increases considerably, the mixture is too rich. Turn the idle mixture screw in (clockwise) 1/8th turn at a time.
6. Rechecked the idle RPM after each adjustment.
7. If the engine stops, will not idle or will not accelerate, the idle mixture setting is too lean. Unscrew (counterclockwise) the idle mixture (1/8 turn).
8. Once a satisfactory idle has been set (approximately 2500 rpm), check the high speed needle valve again.
9. Flying Conditions

When flying, the running environment changes for the engine. For this reason, it is critical to watch the plane and listen to the engine. Needle valve adjustments may be necessary once the plane has flown.

Break-in Procedure Details

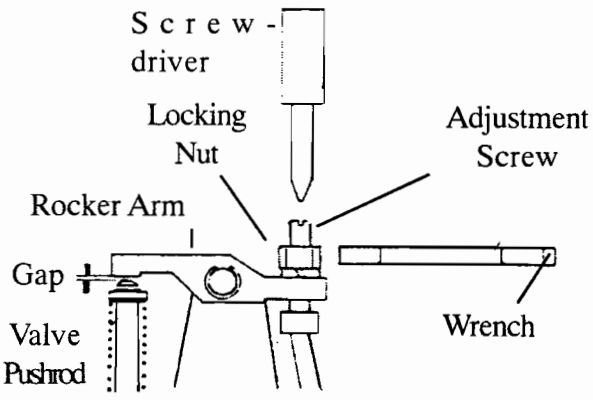
Special Note: The Magnum 160XL Four Stroke engine is a ringed engine. Break-in procedures and normal operation requires special care to ensure the engine's long life and performance. Please read this section closely,

1. The break-in process allows the engine parts to perfectly fit to each other and properly protect the parts against unnecessary wear. The engine should be broken in using a fuel with no more than a 10% nitromethane content and no less than a 20% castor lubricant content. Castor is important to the break-in process. Fuels with an all synthetic oil content should not be used. Do not mount the engine in a vise or similar device. The most effective place to break in the engine in the plane in which the engine will be used. This way, the muffler, tank, and throttle linkage that will be used during flight will be tested in combination with the engine.
2. Refer to the propeller chart and select the correct propeller.
3. Start the engine as described in the starting procedures section.
4. Once the engine has started, at a full throttle setting, adjust the high speed needle valve to a very (or "sloppy") rich position. Let the engine run for two to three minutes. Stop the engine.
5. Once the engine has cooled, restart the engine. Set the mixture to a slightly leaner setting. Let the engine run for a few minutes and then let it cool.
6. Repeat this process while slowly leaning the mixture during each short run.
7. After approximately 30 minutes of actual run time, the engine should be ready to fly.
8. Fly the plane with the engine set as rich as possible, but with adequate power.
9. After each flight, lean the engine slightly. Continue to do this until at the end of ten flights, the engine is holding a normal needle valve setting.

WARNING: Do NOT run the engine in a lean condition and always let the engine cool. This will prevent any premature wear or damage to the ring.

Valve Adjustment

Valve clearances are correctly set before the 160 Twin leaves the factory and, in normal use, will seldom require adjustment. However, if after a considerable amount of run time has accumulated, a loss of power is detected, or if the engine has to be disassembled or repaired as the result of a crash, valve clearances should be checked and readjusted as necessary.



1. With the engine COLD, remove the rocker cover from each cylinder head by unscrewing the two socket-head cap-screws on the rocker cover with an Allen key.

2 Turn the propeller two revolutions counter clockwise to watch the movement of the valves. The propeller turns approximately 260 degrees between when the inlet valve stops and the exhaust valve begins to move (in other words, both valves are closed.)

3. Now turn the propeller clockwise approximately 130 degrees from when the exhaust valve begins to move. The piston should now be at top dead center.

4. The required valve clearance is between .04 mm and .1 mm measured between valve stem and the rocker arm. Use feeler gauges to check these clearances. The .04mm gauge should pass through the gap. The .10mm gauge should not pass through the gap.

5. Carefully slacken the nut on one rocker arm (always adjust only one valve at a time.)

6. Turn the adjusting screw ½ turn counterclockwise to open the gap.

7.Insert the .04mm gauge. Between the valve stem and the rocker arm. Gently turn the adjusting screw clockwise until it stops.

8. Retighten the locking nut while holding the adjusting screw with a screwdriver.

9. Remove the gauge and rotate the propeller exactly two revolutions.

10. Recheck the gap. If the gauge does not fit properly, repeat the steps above.11.Check and adjust all the valves as necessary.

Lubrication

When the engine is properly set, the fuel provides plenty of lubrication while the engine is running. After the last run of the day, the engine should be run dry of fuel and an after run engine oil should be applied to the engine's internal parts through the carburetor and glow plug openings. This will protect the engine's moving parts from rust and other deterioration.

Care and Maintenance

To ensure that you obtain long life and peak performance from your engine, observe the following:

1. Avoid running the engine under dusty conditions.
2. Clean the fuel tank with fuel before installation.
3. Install a fuel filter between the fuel tank and the fuel inlet.
4. Clean the filters periodically.
5. At the end of the flying session, do not leave raw fuel in the tank or in the engine. Use an after run oil in the engine once the fuel has been expelled.
6. Clean the outside of the engine with a soft, dry cloth to prevent debris from discoloring the engine.
7. **Do not take the engine apart as this will void all warranty.**

Service

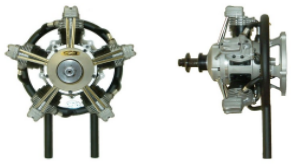
All units returned for warranty service must be within the warranty terms explained on the warranty card included with your engine. Do not return your engine to the place of purchase, as they are not authorized or equipped to do warranty service on Magnum products. When requesting any service, please observe the following:

1. Always send the complete engine when service is required. The engine must be removed from the model.
2. Include a note detailing the problem or service you are requesting. Service cannot be provided without this information.
3. If the product has been modified, disassembled, or serviced by anyone other than the Magnum Engine Service Center, the warranty is voided, and you will be charged for any and all service.
4. You may request an estimate at the time you submit your equipment for service. An omission of this request implies permission for service at our discretion.
5. Include method of payment for any service charges. If not specified, the unit will be returned C.O.D.
6. Please include $6.50 to cover postage and handling for the return of the engine.
7. Send the engine either by United Parcel Service or by insured US Mail to:

Tates Performance Hobbies
135 Shannon Ane Geelong West VIC, 3218
Ph 03 52224201

KELEO Exhausts - ORDER FORM

Ph 03 52227958 Fax 03 52231257

Kit No	Code	Kit Description			NEW	Order Qty
KORADIAL	**22145**	Exhaust Ring for Magnum Radial				
KOMAG160	**22146**	Exhaust Scale Type for Magnum FS 160 Twin				
KOMAGFS80	**22147**	Exhaust Scale Pitts Style for Magnum FS 80				
KOMAGFS91	**22148**	Exhaust Scale Pitts Style for Magnum FS 91				
KOMAGFS120	**22149**	Exhaust Scale Pitts Style for Magnum FS 120				
KOYS160	**22150**	Exhaust Scale Pitts Style for YS 140 - 160