

## OPERATING INSTRUCTIONS LASER ENGINES

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All Laser engines are test run and the carburettor has been set. Slight adjustment may be necessary to suit your fuel and installation. The Laser engine does have some different characteristics to other engines and the following notes are the result of experience gained from the use of Laser engines in our own models and, more important those of other Laser owners. We want you to enjoy using your Laser and ensure reliable performance.

The carburettor and silencer for the single cylinder engines are packed separately to avoid damage.

The main needles are removed on the Vee Twins. They should be fitted 4 turns open for initial adjustment..

PLEASE phone or fax any queries , most problems can be solved by a simple call.

### RUNNING IN

Careful running in will ensure a powerful and reliable engine with a very long life. LUBRICATE as described. Run the engine for 15 to 30 minutes at varying speeds up to full power before flying. Do not allow the engine to overheat. Do not overload the engine with a large propeller. Check valve clearances and LUBRICATE. Run for 30 seconds at full power. If the engine maintains full power go and fly. Only use full throttle for short periods for the first hour running. Full performance and reliability will be achieved after a minimum of 3 hours running.

### OILS, FUEL and general LUBRICATION

Laser engines do not demand special fuels.

The ideal fuel is: 85% Methanol 15% Synthetic oil.

Oil is essential to prevent excessive wear and seizure. It keeps the engine clean inside by removing particles created by normal running including by-products of combustion.

SYNTHETIC OIL will generally give better performance than castor oil as it does not produce carbon or lacquer. Used correctly, synthetic oil is preferred to castor but it will not withstand overheating and may not protect as well against corrosion. 1 - 2% Castor oil added to synthetic oil can give additional protection against corrosion and seizure. Make sure the engine is LUBRICATED as described below.

CASTOR OIL gives better protection against corrosion and overheating than

synthetic oil but creates carbon that can clog the exhaust ports and silencer and a lacquer that can cause the valves to stick. An excessive build up on the piston and cylinder can cause overheating. It can burn on the outside of the engine and reduce cooling efficiency. LUBRICATE the rockers and through the breather nipple to lubricate the crankcase and bearings.

LUBRICATE through the BREATHER NIPPLE on the rear of the crankcase before and after the initial running in and after every 3 hours running. Lubricate the engine if it is not to be used for some time and before running again. The breather nipple can be extended with tubing. Oil may come out of the front bearing if the breather is restricted, there is a lot of oil in the crankcase or the engine is left with the nose down. This will not harm the engine.

Methanol does not vaporize if the temperature is near freezing and the engine may not start. 5% Nitromethane or 5% petrol will improve starting in these conditions.

#### GLOW PLUGS

Most standard 2-stroke 'Hot' plugs work well. We use Super Tigre and Model Technics F5-7 but experiment with your favourite type first. O.S. and Enya 4-stroke plugs work well. The Fox Miracle plug and some others do not work with the Laser.

Make sure that the plug is in good condition, the element is bright and not distorted. Change if in doubt. Always use a separate glow battery for starting.

If the plug is faulty or not a suitable type the engine will not achieve or maintain full power or will miss fire. A faulty plug can cause detonation which may cause overheating or severely damage the engine.

#### VALVE CLEARANCE

Set valve clearance .002" - .004" .05 - .1 mm. Clearance will increase as the engine warms up. Check after every 3 hours running when you lubricate the engine. Clearance is not critical.

#### PROPELLERS and FUEL TANKS

Engine	70	80	100	120	150
Propeller	12x7	13x8	15x8	15x8	16x8
Fuel tank	7oz	8oz	9oz	11oz	12oz
	200ml	250ml	300ml	350ml	400ml
Vee twin	160	200	240	300	
Propeller	15x8	16x8	16x12	20x8	
Fuel tank	200ml x2	250ml x2	300ml x2	350ml x2	

Only use glass reinforced plastic propellers. Propeller and tank sizes are a guide only. Experiment with propellers to suit the performance of your model. For maximum power run the 70 and 80 at 9-10,000rpm and the 100, 120 and 150 at 8-9,000rpm on the ground. Good makes of propeller do not need balancing unless damaged. Do not exceed propeller manufacturers speeds.

For general reliability the fuel tank should have an open vent, pressure is not necessary. Ensure that the open tank vent is facing forwards. If the vent is facing to the rear, side or down a vacuum may be created in the fuel tank which will cause erratic running or the engine to stop. The tank

should be as near the engine as possible and on the centreline of the carburettor. Position is very important if the model is highly aerobatic.

If you prefer to use silencer pressure you may fit a pressure tapping on the silencer. Using silencer pressure will not overcome an incorrect tank position but can sometimes help. Contaminated oil can pass from the silencer to the fuel tank, pressure will be lost if oil blocks the connecting pipe and the engine will stop if the pipe is broken or destroyed by heat.

#### CARBURETTOR

The carburettor is a conventional twin needle type. Screwing in the needles leans the mixture. Once the main and slow running needles are set little adjustment should be necessary unless you change fuel type or there is a fault such as a blocked spraybar.

The main needle assembly can be removed for cleaning by undoing the hexagonal nut. The fuel nipple can be removed but do not attempt to remove the spraybar. If the screw holding the throttle barrel in position is removed it should be re-secured with 'Loctite'.

If an extension is needed on the main needle it should be made from 20 gauge piano wire soldered onto the existing needle. Brass tube or heavy extensions should not be used as they may cause the needle to fracture or vibrate causing the mixture to vary.

#### STARTING THE ENGINE

The engine will start easily if it is at idle position and is well primed. Make sure that the model is fully restrained for safety.

Make sure the plugs are disconnected during priming and before running at full power. If the carburettor is accessible it can be primed by blocking the inlet with a finger and turning the engine over a few times. If the inlet is not accessible open the throttle fully and spin the engine over with an electric starter to prime the engine. The throttle should then be set to idle position and the glow plug connected for starting. If the carburettor is inaccessible fuel can be forced into the carburettor by blowing into the open vent of the tank using a piece of fuel tubing.

If silencer pressure is used the engine can be primed by placing a finger over the silencer and spinning the engine over. This will pressurise the fuel tank and force fuel into the carburettor.

#### FAULT FINDING and DISMANTLING

WARNING - Do not remove the backplate or the timing may be lost.

Most erratic running or reliability problems are caused by faulty glowplugs, fuel blockage in the spraybar or the tank vent not facing forwards. Check the glowplugs and replace if in doubt. Check power supply to the plugs. A supply from a 12v system often gives problems, always use a separate 1.2 - 2v supply to suit the glowplug used. Check fuel supply and clean the spraybars. Check tank vent position and fuel lines

Poor performance can be caused by a build up of carbon in the exhaust port or silencer if castor oil is used. The engine will sound very quiet if restricted. If the silencer is restricted by carbon it should be replaced.

Overheating is often caused by poor cowl design. Baffles should be fitted in the cowl if necessary like 'full size' engines to force cooling air through the fins on the cylinder and head.

The air outlet should be at least 1.5 x the area of the inlet. In some model designs the outlet is on the bottom of the cowl and actually faces forwards preventing air flow through the cowl. A lip should be formed on the leading edge of this type of outlet to give a venturi to extract the air from the cowl. The full size 'Pitts' has this arrangement. Overheating can also be caused by poor lubrication, running the engine lean, carbon build up, faulty glowplug causing pre-ignition or using a propeller that is too large and overloads the engine.

Overheating can seriously damage an engine, this is not covered by guarantee, do not allow your engine to overheat.

If the cylinder head bolts become loose this is a positive symptom of overheating.

Lack of compression can be caused by lacquer build-up on the exhaust valve if castor oil is used, causing it to stick, or dirt on the valve seat. The engine can often be started with an electric starter which may cure the problem if it is through dirt. Check valve leakage by putting a finger over the exhaust outlet and turning the engine over. If you feel slight pressure then the valve is leaking, Repeat with the inlet.

If the problem persists the valve must be removed and cleaned. When removing the valves work with the cylinder head in a polythene bag. This will contain the springs, collets and retainers. Mark all the components so that they are replaced in exactly the same position. The rocker shaft is retained by the special screw that also holds the rocker cover. The valves are released by compressing the springs and releasing the collets just like a full size engine. Use a nylon scouring pad to clean the valves and seats. Do not use grinding paste as this is likely to get into the valve guides and cause severe wear. Reassemble using plenty of 2-stroke motor oil. Never dismantle unless necessary..

The backplate fitted to single cylinder engines can be removed provided the cam followers are in position as they will hold the cams. If the cams are removed they can be reset so the inlet valve starts opening at approximately 400 before top dead centre (TDC) and the exhaust closes at 300 after TDC. There are no markings on the cams for timing.

Do not dismantle the engine unless absolutely necessary. Always tighten screws in sequence, head bolts 1,3,5,2,4, and front housing and backplate 1,3,2,4.

Occasionally check the head bolts and the bolts holding the front housing.

Vibration on single cylinder engines can be affected by the engine mounting. We suggest a Glass filled nylon engine mount which will give slight flexibility. The mount may be cut into two halves to suit the width of the crankcase. Metal mounts are not recommended. You will have to experiment if soft mounts are used, they can create more vibration and cause the engine to shake. Good quality propellers should not need balancing unless damaged. An out of balance propeller may cause vibration and it is possible that vibration may occur at certain speeds due to harmonics set up with your engine mount, model and propeller. Vibration may be reduced by rotating the

propeller through 1800 or changing or balancing. A faulty glow plug will also cause more vibration.

VEE TWINS Installation and setting carburettors.

Laser Vee Twins are designed to be mounted direct to the firewall. They are much smoother running than single cylinder engines. Each cylinder should be considered as a separate engine and a separate fuel tank should be used for each cylinder. If a single tank is used it should have two 'clunks' so the fuel feeds are not connected.

The carburettors must be carefully synchronised to close together. It is very important that each carburettor has the same amount of opening at idle position. The barrels can be closed onto a piece of copper wire used as a gauge to check the positions.

When you receive the engine the main needles are removed to avoid damage, they should be fitted about 4 turns open. The engine has been test run and the slow running needles will be set. Slight adjustment may be necessary to suit your installation and fuel.

Start the engine at idle position and allow to warm up. Open up to full power and tune one carburettor for maximum speed. Next adjust the second carburettor. Re-adjust the first carburettor and then re-adjust the second. If a cowl is fitted to the model the needles must be adjustable from the outside as airflow through a cowl will often affect the settings of the main needles. The cowl will not affect the settings of the slow running needles.

The same procedure is used for adjustment to the slow running needles. Adjusting one carburettor will affect the other.