



Inside this box is your new LEO 21-EP Car/Marine engine. It is a high quality, miniature engine and will pay you back dividends if the following recommendations, hints and tips are read, understood and followed

**Fuel;** Use a fuel with 17-20% oil content (by volume) which includes a small percentage, say 2% min. of first pressing castor oil (available from most chemists)  
5-10% nitro is all that is required. Increasing the nitro content may cause pre-ignition, over heating and rapid component failure. The modest power increase is in my opinion not worth the risk!

**Running in;** The ABC piston and liner is quite 'tight' when new. Careful running over the first 15 minutes is strongly advised. Use your car (with no body shell for improved cooling) and run it as follows; or set the engine up on a test bench and use a balanced propeller of either 8x6 or 9x4 size.

The first thing to do is to fit a standard medium sport plug. Open the main needle 2-2½ turns. Open the carburettor to fully open and choke the carb with your finger and draw fuel through by turning the engine over 6-8 times. Set the carb barrel at approx. ¼ open and start. We recommend the use of 'electric starters' for starting if engine is on a chassis and the use of either electric starters or 'chicken sticks' if using a prop.. Run 2-3minutes of the first tank through at this carb setting (very rich 2 stroking, but not '4-stroking'), so as to 'bed in' and lubricate all the parts. Then allow the engine to cool and just check the tightness of ALL bolts (and tighten if necessary). Run the 2<sup>nd</sup> / 3<sup>rd</sup> tanks through at approx. ½ throttle, again with a rich mixture (now coming onto a solid 2-stroke setting). 4<sup>th</sup> tank onwards - set the carb fully open (yes, fully open) and run the engine at this setting.....**ensuring that you can still feel unused oil on your finger tips**, exiting the silencer. (This is particularly important if you are running in on a pipe). This allows the engine to get to operating temperature and rpm high enough to allow the piston to 'run-in' against the liner, whilst still ensuring sufficient lubrication. Allow the engine to cool between runs. Gradually lean the mixture over the next few tanks until the engine is happy operating at full throttle and rpm. **Lock tight the head bolts after initial running and make sure the engine casing is not to be tightened onto the chassis, put washers under the engine posts to ensure this.**

**Carb.;** The engine is provided with a twin needle 'slide' carburettor. It is called a 'slide' carb as the barrel slides in and out of the body. The main needle – used to set top end rpm mixture is the vertical needle. Setting of the engine's idle rpm (with the brake on) is by adjustment of the sprung bolt at the back of the carb body. Screwing this in increases rpm, screwing this out decreases it. The 'idle needle' (the screw at the side of the carb body) is used to set fuel mixture at idle and for transition to around ¼ open.

**Carb setting;** Tip; paint (or cut/file) a marker on the main needle, to improve the visibility of its position.

The general starting place for the needle valve is 2-2½ turns and leave the low speed/bottom end screw at its factory setting. A good test is to attach fuel tube onto the carb and blow into it – at an 'idle setting' (say 1/8<sup>th</sup> open), you should be able to hear a little hiss of air escaping into the carb. If you can't... open the bottom end screw until you can! Once ran in - adjust the main needle so that the engine operates normally at full rpm without faltering. Once (and only once) the main needle has been set, should you attempt to adjust the low speed ('bottom end') idle needle setting. Low Speed setting: Close the carb until the idle speed you require, is achieved. Then fully open the carb to full rpm. If the engine cuts, the engine is normally too 'lean' at the bottom end. Open the bottom end (¼ of a turn at a time), by turning it anticlockwise. Repeat the process - but allow a few seconds at full power and at idle, before opening the throttle, to test the setting. This allows the fuel flow to 'normalise' and be as close to that encountered, when racing the car/boat. If the engine coughs and splutters it's way to full power, the engine is too 'rich' at the bottom end. Close the bottom end (¼ of a turn at a time), by turning it clockwise. Do this until adequate transition between idle and full power is achieved. Once a very close setting is achieved, turn needle at 1/8 or even 1/16 of a turn at a time.

**Glow Plugs;**

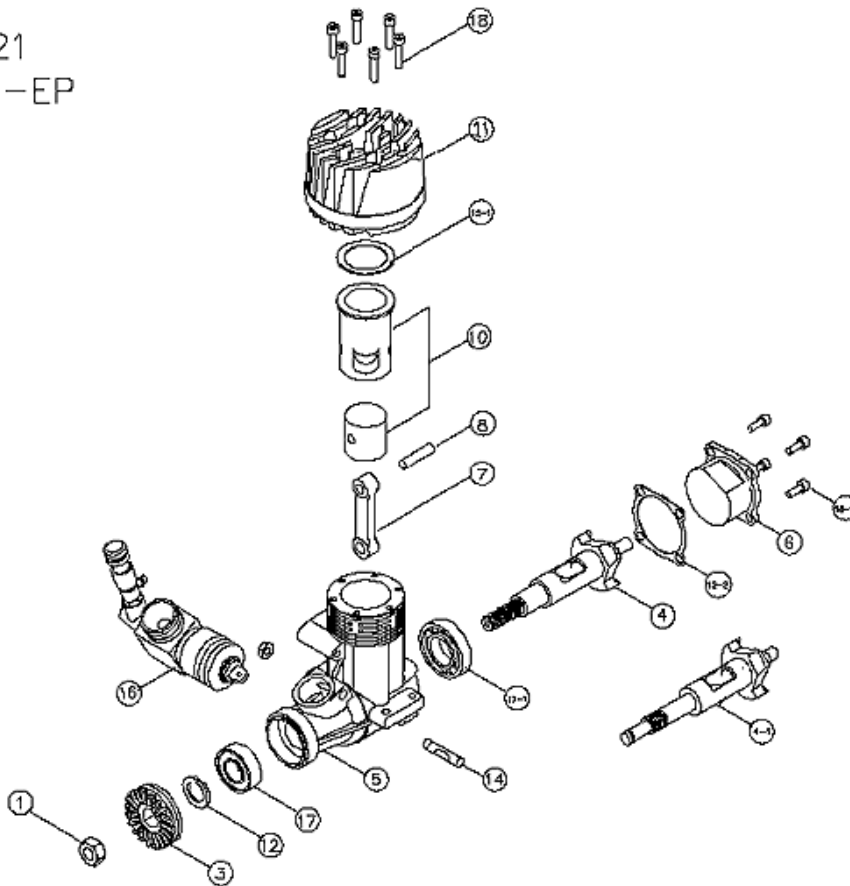
Some experimentation with glow plugs will be necessary to achieve successful runs. The golden rule is hot engine = cold plug. Start with a medium plug and 5% nitro. If you increase the nitro (or are running on a very hot day) try a slightly cooler plug to keep the engine operating nicely on the power band. If practicing on a cold winter day, try a slightly hotter plug to make starting and running easier

**Cooling;**

Always ensure that you get sufficient cooling to the engine's head, the case and the carb. (or on a hot day fuel will vaporise before it gets inside the engine!). Always allow the hot air created by the engine running to exit the chassis and body shell. Always set the cooling fins on the engine to be parallel with the car sides to maximise cooling to the engine.

Leo .21;  
Type 721  
Name 21-EP ABC  
Displacement (c.c.) 3.46  
Bore (mm) 16.60  
Stroke (mm) 16.00  
Power (Ps or HP/r.p.m.) 1.20/28,000  
Practical Range (r.p.m.) 2,500-30,000  
Weight (g) 290

721  
21-EP



1	NUT	AA2101B
3	DRIVE WASHER	AA2103
4	CRANKSHAFT	AA2104
4-1	CRANKSHAFT (5G)	AA2104(GS)
5	CRANK CASE	AA2106
6	CRANK CASE COVER	AA2107
7	CONNECTING ROD	AA2108
8	PISTON BOLT	AA2111
10	CYLINDER AND PISTON	D21
11	CYLINDER HEAD	AA2113
12	GASKETS SET	AA2115
12-1	GASKETS SET	AA2116
12-2	GASKETS SET	AA2117
14	CARB RETAINING POST	AA2119B
16	THROTTLE SET	12D
17	BEARINGS	89822
17-1	BEARINGS	HMC8801
18	SCREWS SET	HMC2612
18-1	SCREWS SET	HMC2807
No.	DESCRIPTION	CODE No.