IRVINE

OPERATING INSTRUCTIONS

INTRODUCTION

Thank you for purchasing a new Irvine engine. All Irvine engines are produced using the very latest production methods and computer controlled (CNC) machinery. Because of the close tolerances used, which are the only assurance of long life, it is essential this engine is correctly run-in and operated.

Model engines can be potentially dangerous if not operated in a thoughtful and safe manner. Please ensure that you read these instructions carefully *BEFORE* attempting to run the engine. Pay particular attention to *ALL* safety matters.

Make sure that you keep these instructions safe and accessible at all times. Do not hesitate to refer to them if you are in doubt about any aspect of operation.

Whilst potentially dangerous, model engines can be operated safely by all age groups providing these instructions are followed carefully.

Dirt is one of the greatest enemies which your engine has to face, and we cannot stress too strongly the importance of keeping the engine and fuel lines clean at all times. It is particularly important for car engine owners to fit an effective air filter. We would also recommend this course of action to aircraft/helicopter users operating their engines in dusty/sandy environments.

We strongly recommend that you join the national body representing your branch of the hobby in order to keep updated with all safety matters (legal). These organisations operate good guidelines for modellers and their advice is sound.

We also recommend that you join a responsible local club as the wealth of experience there can help dramatically in the learning stages. The enlistment of an experienced modellers help in first running your engine is highly desirable.

SAFETY – WARNING

Model engines are not toys and if operated in a thoughtless manner could cause serious injury. The suitability of this engine to be operated by children is covered on the accompanying data sheet under item 1.

It is vitally important that your new engine be operated exactly according to these instructions and that the following important actions are adhered to:-

1. Always mount the engine securely by means of the bolts specified in the data sheet (item 2) and on the specified mounts.
2. Use the correct size of propeller (see data sheet item 3) and ensure that it is free from damage and has been balanced. Rotating propellers are *EXTREMELY DANGEROUS,* be on your guard at all times. Discard any damaged propellers.
3. Use only the correct fuel specified (see section 'fuel'). Please note that glow fuel is highly volatile and flammable. *NEVER* expose fuel to *ANY* form of naked flame. When not in use keep fuel container tightly sealed.
4. When starting the engine we recommend the use of an electric starter, however, if you wish to 'flick' start it is advisable to use a 'chicken stick'. Please note that when using an electric starter, a flooded engine can be damaged through hydraulic locking (combustion chamber full of fuel). Check that the engine is free to turn *BEFORE* applying the glow lead and using the starter.
5. When adjusting either the main or secondary needles be particularly careful to keep fingers away from the propeller (or rotating parts such as flywheels). Make all adjustments from behind the engine.

6. Model engines become very hot. Take care not to touch the cylinder head or silencer of an engine that is running or has been recently run.
7. Do not operate the engine above its designed maximum speed (see data sheet item 4) as serious damage or even injury could result.
8. This engine should only be operated by children under the supervision of an adult. This does not imply that there should be direct supervision but that an adult should know where it is being used and the circumstances and should also have control over other children who might be present.
9. Always stop the engine before attempting to refuel it.
10. Make sure that all flying is carried out well away from power cables. This is particularly important for control line flying.
11. Try to avoid 'pusher' type installations however, if the engine is mounted in a 'pusher' configuration, take particular care with hand launches and preferably wear a strong pair of gloves.

GLOWPLUGS

Most types of long reach glowplugs are suitable for Irvine engines and an idle bar is not usually necessary. The grade of plug will depend upon the fuel you are using and the weather. Experimentation is the only way to select the best plug for your conditions but generally speaking the higher the nitromethane content in the fuel the colder the plug needs to be.

We have found the following long reach plugs to be suitable for a wide variety of conditions and general sport uses.

Taylor Standard or competition long reach
O.S. No. 8
K & B 1L.
Fox 1.5v standard long reach

With some engines/propeller/fuel configurations you may find an idle bar plug to be beneficial, however this will be a very small number of occasions and generally standard type plugs are satisfactory.

FUEL

1. *FOR RUNNING-IN*
   75% methanol
   25% castor oil
2. *FOR SPORT FLYING*
   80% methanol
   20% castor oil

   (b) 75% methanol
   20% castor oil
   5% nitromethane
3. *FOR CONTEST FLYING*
   65% methanol
   20% castor oil
   15% nitromethane

NOTE: A good quality synthetic oil may be used in place of castor oil but *DO NOT* reduce the total percentage content below 18%. We would also recommend that even when using synthetic oil, that you retain at least 5% of the total oil as castor.

Use of the incorrect fuel could result in serious damage to your engine and will invalidate the guarantee. Only use a fuel where you are *SURE* that the contents meet the above criteria.

ENGINE MOUNTING

It is most important that the engine is mounted rigidly and securely on a true flat surface. We recommend that you bolt the engine to a good metal engine mount or metal plate. Wood or nylon engine mounts lack

rigidity and are detrimental to engine performance and longevity. Check very carefully, *BEFORE* you tighten the bolts down, that the engine mounting lugs are lying flat on the mount, otherwise you may distort or crack the crankcase. Do not force the engine down onto the mount and then bolt it up.

Rubber isolation type mounts can be detrimental to engine performance and may result in stress induced crankcase fractures.

The recommended bolt size for your engine is listed on the data sheet item 2.

The same general rules apply for fitting to an engine test bed.

> *NOTE: NEVER* mount your engine in the jaws of a vice in any way at all. This will certainly distort the crankcase and result in extensive and costly damage. It could also result in serious injury.

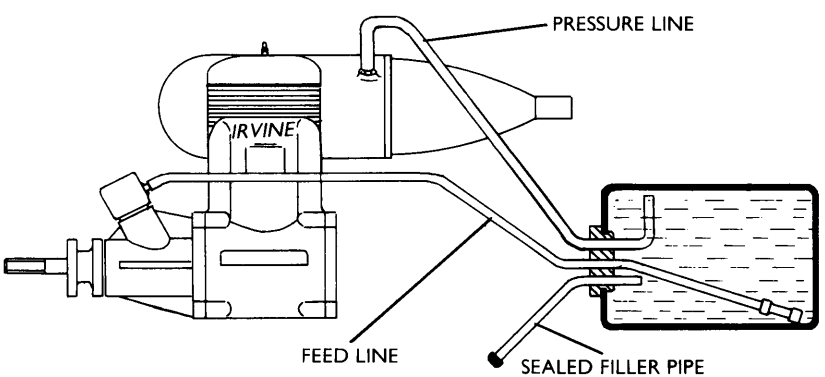
Always use the silencer provided whenever running the engine, as unsilenced engines are extremely noisy. Rear exhaust engines require a special type of silencer or tuned pipe depending upon their installation.

Mounting Of The Fuel Tank

Place the fuel tank as near as possible to the engine when installing it in the model or on the bench. This is most important in aircraft due to the alterations in fuel height caused by attitude changes. Ideally, the centreline of the fuel tank should correspond with the centreline of the main needle valve. In cars and helicopters the fuel tank position has usually been determined by the manufacturer of the kit and is generally correct for most engines.

All Irvine R.C. glow engines are designed to run using exhaust back pressure to pressurise the fuel tank/fuel supply. Standard Irvine silencers are equipped with a pressure bleed nipple. Silencers used on rear exhaust, marine or car engines are not supplied as standard and may need a nipple to be fitted. Check with the silencer manufacturer to ascertain the correct location. See diagram below for details of the pipe layout/tank installtion.

Ask your model shop for advice if you are in doubt.



Propellers

Aero engines: Do not use *NYLON ONLY* type propellers. The recommended sizes for your engine are listed on the data sheet item 3.

The best propeller for flight use will be as dependant on the model type and flight characteristics as the engine itself. Best results can only be achieved after flight trials.

Helicopter engines: For running in purposes use the propeller listed for aero engines. Final set-up is also best accomplished using an aero propeller on the bench.

Car engines: As helicopters.

SPECIAL NOTE FOR CAR/HELICOPTER ENGINES

When fitting the clutch assembly *DO NOT* insert anything into the piston/cylinder to aid tightening. Remove the carburettor and use the largest piece of beech wood (or similar) that will go into the crankshaft inlet passage to lock the crank. *DO NOT USE ANY FORM OF METAL BAR.*

Marine engines: Use the propeller size recommended for the boat with, if possible, a little less pitch to reduce load on the engine in the early stages.

CONTROLS

Fit the carburettor using the grub screws provided with the fuel inlet nipple facing backwards. The 'Jetstream' carburettor fitted to all Irvine engines has four controls (see diagram below).

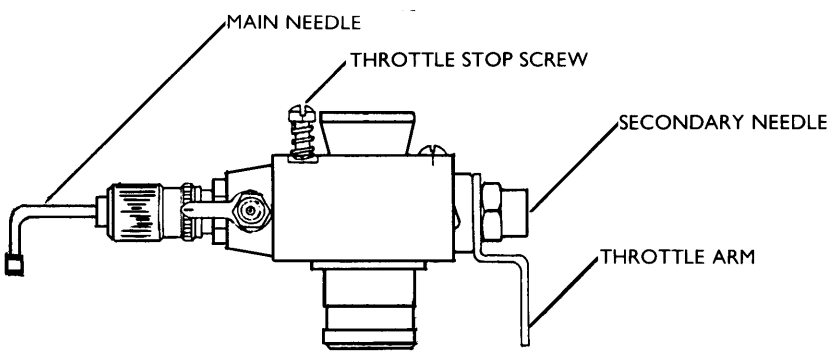
1. Main jet needle: The large brass thumb adjustable 'screw' on the left of the engine looking from behind (vertical screw in brass sleeve on car engines and some marine engines) controls high speed mixture.

2. Secondary jet needle: The small screw located on the right side of the carburettor (looking from behind the engine) inside a brass nut controls low/mid speed mixture.

3. Throttle stop screw: Small angled screw next to the air intake with a spring under it, limits the closure of the throttle barrel to prevent stopping the engine. Mainly relevant to cars using brakes. Do not remove this screw, as doing so will bleed air in at idle. This is not fitted to some Jetstream carburettors.

4. Throttle lever: Cranked steel arm on right side of carburettor to control engine speed via throttle servo.

NOTE: Stunt engines are only fitted with air venturis and a main jet needle.



RUNNING INSTRUCTIONS

RUNNING-IN

The purpose of 'running-in' is to allow the close tolerance components in your Irvine engine to mate together under controlled and sympathetic conditions. That is to say, with sufficient lubrication and cooling, yet without too much load.

Ringed engines require a different procedure to ABC engines.

With a ringed engine the idea is to run it *VERY* rich for the first few tankfulls punctuated by small bursts of leaner running to allow speeds to build up for short periods. This should be carried out at *FULL* throttle using the main jet needle to control speed changes. After the first tankful the model can be flown. Cars and boats should be driven from the first tankful.

As more running is achieved the leaner periods can be prolonged until about one hours running has been accomplished. The engine should then hold full power without fading. If the engine shows signs of slowing, richen the main mixture immediately. If the model is being flown/driven, close the throttle and bring it back to you to adjust. Running-in of aero, helicopter and car engines is best done on the bench using an aero propeller. This also allows you to find the optimum settings prior to installation in the helicopter/car. Marine engines should be run in the boat due to the need for cooling water for the cylinder head.

ABC engines should also be run in at full throttle but with a far less rich mixture than a ringed engine. In order to operate correctly the ABC piston/liner must be brought up to operating temperature quickly. *JUST* breaking into clean two stroke running is about right for initial running on an ABC engine (this is a crisper exhaust note and quite a significant jump in power). If an ABC engine is run too cool (rich) it will try to seize itself just as easily as it would if it were too lean. Run the engine for short periods of two to three minutes with intervening cooling down periods.

STARTING

AERO (helicopter and car on bench)

Open the main jet needle by the number of turns listed on the data sheet item 5. The idle mixture (secondary needle) has been approximately pre-set at the factory and should not be adjusted at this stage. Close the throttle and if possible place your finger over the carburettor air intake. Gently turn the engine over anti-clockwise three or four times (looking at the front) to draw up fuel to the carburettor.

Open the throttle to about ¼ and connect up the glow lead. Flip the engine smartly anti-clockwise with a chicken stick or use an electric starter. It is advisable to have an ammeter connected to your glow plug power to show if the glow plug is drawing current.

The engine should at least fire or show signs of life at this stage and will probably run. Pull the starter away as soon as the engine fires to allow it to run on its own.

If the engine does not fire remove the glow clip and rechoke the inlet. Alternativley, squirt two or three drops of fuel directly down the carburettor air inlet.

When fuel is present in the combustion chamber and the glow plug is connected there should be a faint sizzling sound which is correct for starting the engine. If you cannot hear this but feel that fuel is present, remove the glow plug and check that it is actually glowing. It should glow dull orange if all is well. If all's well replace the glow plug and connect the power supply again. Repeat the start up procedure. If a solid resistance is felt at any time do not force the engine. Disconnect the glow lead, remove the glow plug and flip/spin the engine over to remove the excess fuel. Keep your head (eyes) clear of the line of the glow plug as excess fuel will be ejected. Re-fit glow plug and commence starting again.

Idle adjustment is pointless until the engine is run-in. Once the running in procedure is complete bring the throttle back to idle and adjust the idle mixture to obtain a smooth tickover and responsive pick-up. To set the secondary needle we suggest the use of a piece of 16 swg (1.5mm) wire to help set the aperture size when the throttle is closed, adjust the throttle stop screw home so that when the wire is removed the barrel will not close any more. Run the engine at full throttle and set the main jet needle for optimum mixture. Close the throttle and set the secondary needle for maximum rpm (Note: the secondary needle response is slower than the main needle). Open the throttle quickly and listen for the response. If, when you open the throttle the engine hesitates and then picks up the idle is too lean. Screw the idle needle out (anti-clockwise) about 20° and check throttling again. If the engine splutters and smokes heavily as you open the throttle the idle mixture is too rich. Screw the idle in (clockwise) about 20°. Carry on with this procedure using smaller movements until idle and throttling are correct.

When satisfied with the response re-set the throttle stop screw for a slow idle of about 3000 rpm. Leave at idle for at least 1 minute to check that this is consistant and then check the throttle response. Repeat idle adjustments if necessary.

STUNT/COMBAT ENGINES

The only control is for the main jet, all other comments for idle and throttle do not apply.

BOATS

The same general procedure applies to boats but make sure the boat is in the water and the propeller is under load.

CARS

The driven wheels of the car must be on the ground when the engine is throttled up so it will take time to set main and idle needles as you will need to drive the car after each adjustment. This is why it is preferable to set up a car engine on the bench with an aero propeller and leave only the final fine adjustment until after installation in the car. Do not attempt to throttle up the car with the drive wheels off the ground as this could cause seizure of the big end and subsequent extensive damage.

HELICOPTERS

With helicopters, it is far easier to set the engine up on the bench using an aero propeller as adjustments once in the helicopter are difficult. Choose a propeller which allows the engine to run at its normal airborne rpm. This is calculated by using the specified helicopter head rpm and main gear ratio. Your model shop can help you here.

CLEANING THE ENGINE

How you care for your engine is as important as how you use it. An engines life can be greatly extended by following a few simple procedures.

1. After each operating session re-fit the carburettor bung to prevent dust etc. entering the engine. (This does not apply to cars due to the use of an air filter).
2. After each session run the engine dry of fuel by squeezing the fuel line whilst the engine is running. Remembering to empty the tank also.
3. Keep the outside of your engine clean and free from dirt and dust at all times. Use methanol, or similar to clean the engine. Do not use cellulose thinners as this will react with the plastic and silicon parts with disastrous results.
4. Unburnt and burnt fuels (particulary those containing nitromethane) are highly corrosive and we recommend that your engine be cleaned after each operating session and lubricated with a light machine oil such as 3 in 1 or WD 40. Work this around the inside of the engine by turning it over slowly.

SERVICING

DO *NOT* attempt to take your engine apart or modify it in any way as this will invalidate the guarantee and may well remove evidence as to the cause of a particular problem.

All engines should be returned to:
Irvine Engines Ltd,
Unit 2,
Brunswick Industrial Park,
Brunswick Way,
New Southgate,
London,N11 1JL

or for overseas customers, to the authorised Irvine distributor for your country.

Please state the problem, its symptoms and the nature of what you require to be done. Do not forget to include your name and address and if possible a daytime telephone number. Please enclose a nominal handling charge of £5.00 to cover the cost of sundry items and return post and packing. Overseas customers should contact the authorised distributor to verify the handling charge.

For repairs claimed under guarantee you may need to provide proof of date of purchase.

No estimate of the cost of repair will be supplied unless specifically requested.

MANUFACTURER:
Irvine Engines Limited,
Unit 2, Brunswick Ind. Park,
Brunswick Way,
New Southgate,
London, N11 1JL,
England.
Tel: 0181-361 1123
Fax: 0181-361 8684

OVERSEAS DISTRIBUTOR