

2-Stroke Terminology

Come to terms with the language and principles of R/C car engines

Two stroke IC engines

Ever since the first publication of 'Model Cars' as a quarterly magazine, Engine Tests have formed an integral part of the magazine. All of these engine tests can provide the informed readers with a wealth of mechanical and performance data on the engine under scrutiny but the emphasis has been on the adjective — informed.

There are many terms and definitions that younger readers particularly may find puzzling and even readers who have been handling such engines for quite some time, do not fully understand. In an endeavour to help readers gain more from reading these tests, the following explanation and glossary of terms is presented.

Two stroke principles

A more accurate definition is probably used by Americans, they call these engines, '2-Cycle' motors for reasons which will soon become clearer. Without wishing to go into the history of 2-stroke development and origins too deeply, the engine is based on the 'Otto' cycle named after its inventor. At its very simplest the 2-stroke has just four moving parts if the Gudgeon pin is counted. They are ... Crankshaft, Connecting Rod, Piston and Gudgeon Pin. The cycle of operation is...

(1) The piston moves up the cylinder producing a decrease in pressure in the crankcase thus causing a mixture of fuel and air to be drawn into the crankcase.

(2) The piston moves back down the cylinder compressing the fuel/air mixture which is then forced into the combustion chamber.

(3) The fuel/air mixture is compressed then ignited by the glow-plug whereupon it burns, expands and drives the piston downwards.

(4) Expanded gases are expelled through the exhaust port.

In practice operations 1 & 3 occur simultaneously as the piston goes up, 2 & 4 likewise as the piston moves down therefore the two cycles are Compression/Induction and Combustion/Transfer. See Fig. 1.

There are various methods of admitting the fuel/air mixture into the crankcase normally described as Side Port, Front Rotary, Rear Rotary or Reed Valve each of which has peculiar advantage and disadvantages. For the purpose of this glossary Front Rotary systems will be covered, the remaining systems should be readily understood once the front rotary principle is grasped.

Fig. 1

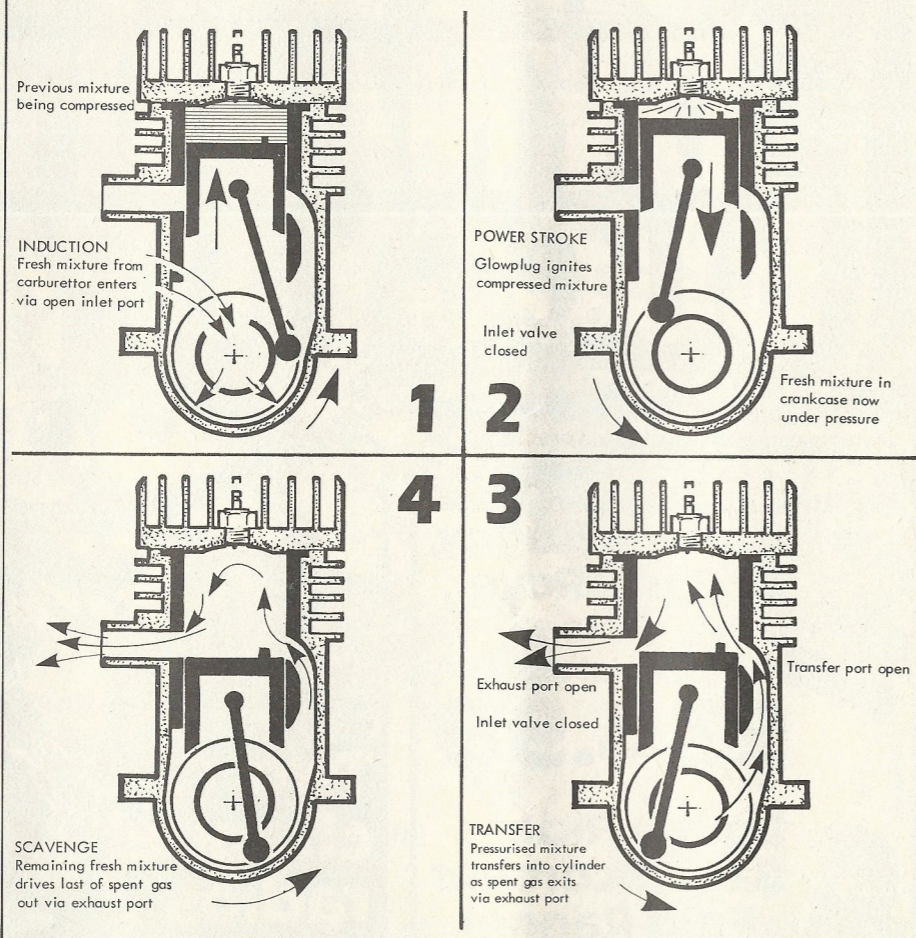
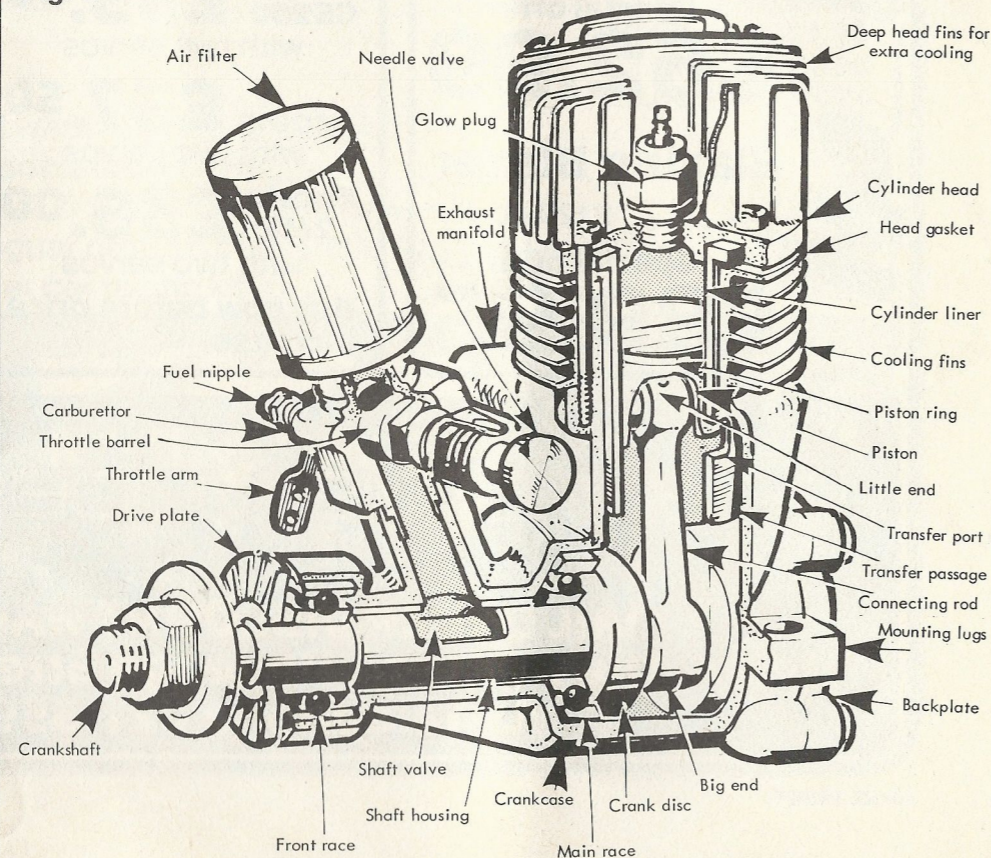


Fig. 2



Glossary of Terms

A

AAC — Aluminium, Aluminium Chrome. Cylinder/Piston material combination. (See ABC).

ABC — Aluminium, Brass, Chrome describes the materials used for cylinder/piston manufacture i.e. an aluminium piston running in a Chromed Brass Cylinder. Cuts down friction losses associated with ring sealed pistons.

B

BIG-END — the larger or lower end of the connecting rod (con-rod) which runs on the crankshaft crankpin.

BOTTOM END — usually refers to the crankshaft, crankshaft bearings and connecting rod of the engine.

BEARINGS — these are the contact areas between moving parts of the engine usually the rotating parts are referred to. Can be either plain metal bushes or ball bearings or roller bearings. High performance engines are usually fitted with ball bearing mounted crankshafts.

BACK-PLATE — cover which seals the rear crankcase opening.

BOTTOM DEAD CENTRE — piston at the lowest extent of its travel in the cylinder.

BRONZE — Aluminium Bronze or Phosphor Bronze both used as bearings materials for Big end bearings. An alloy based on Copper.

BORE — Internal diameter of the cylinder.

C

CONNECTING ROD — transfers the reciprocating motion of the piston to the Crankshaft.

CYLINDER — tubular barrel that forms the combustion chamber in which the fuel/air mixture is burnt and also incorporates openings to form inlet, transfer and exhaust ports. Can be made from a variety of materials, aluminium, steel or brass.

CRANKSHAFT — converts the reciprocating movement of the piston into rotary motion. In front induction motors incorporates the inlet timing, porting.

CRANKCASE — houses all the separate parts of the engine and incorporates the mounting lugs.

CARBURETTOR — mixes the fuel and air for combustion and controls the quantity admitted to the engine.

COMBUSTION CHAMBER — area at the top of the cylinder where the fuel/air mixture burns. Given its shape by a cavity in the cylinder head.

CYLINDER HEAD — seals the top of the cylinder and houses the glowplug.

COMPRESSION RATIO — ratio of the volume of the cylinder with the piston at Bottom Dead Centre to the volume with the piston at Top Dead Centre.

CAPACITY — the swept volume of the engine i.e. the volume displaced by the piston moving from TDC to BDC.

CIRCLIPS — A spring retaining device frequently found holding a gudgeon pin into piston.

D

DIESEL — principle of internal combustion developed by German scientist Diesel. Compression heats the fuel/air mixture up to ignition point. No spark or glowplug required for pure diesel engine which needs a compression ratio in excess of 16.5:1 to generate sufficient heat.

E

END FLOAT — small amount of free movement of the engine crankshaft to promote free running. Not usually needed on ball race supported crankshaft.

EXHAUST PORT — opening in the cylinder wall to allow exhaust gases to escape.

EXHAUST TIMING — expressed in degrees of rotation, the period during which the exhaust port remains open.

EXHAUST MANIFOLD — a fitment to couple the exhaust of the engine to a silencer.

F

FRONT ROTARY — a system of control for inlet of fuel/air mixture to the engine which uses a port cut in the crankshaft to admit gasses.

G

GUDGEON PIN — joins the piston to the little (small) end of the connecting rod.

GLOWPLUG — incandescent elements which ignites the fuel/air mixture.

GLOW IGNITION — converts pure diesel into Semi Diesel by supplementing the heat generated by compression with a glow plug to allow use of lower compression ratios and less volatile fuels.

I

Internal Combustion (IC) a system where the combustion and conversion of fuel into work is carried out in an enclosed space. A glow motor is Internal Combustion, a steam engine features external combustion.

J

JET — an orifice through which fuel is metered into the carburettor.

L

LITTLE END — the upper end of the connecting rod.

M

MOUNTING LUGS — lugs for bolting the engine to the model complete with holes drilled to accept suitable size bolts.

MAGNESIUM — very lightweight metal used for items such as heatsinks.

METHANOL — major constituent of glow fuel.

MINI PIPE — exhaust silencer which imparts a tuning effect on the engine and boosts power output.

O

'O' RINGS — a circular sealing ring usually made from neoprene.

P

PISTON — reciprocating item upon which the expanding gases act during combustion process and which also compresses the fuel/air charge during compression stroke.

PLUG — see glow-plug.

PORT — an opening in cylinder or crankshaft to admit or pass gases involved in the two stroke cycle.

PAD — low friction pad which when fitted into the piston prevents the gudgeon pin from scoring the cylinder walls.

PISTON RING — a hard springy sealing ring fitted to the aluminium piston.

R

ROTARY VALVE — crankshaft valve which admits fuel/air mixture to the crankcase.

RING — See Piston Ring.

S

SHAFT — See Crankshaft.

SQUISH BAND — area around the periphery of the combustion chamber which has a very small clearance from the piston at TDC which causes the compressed gases to be very actively swirled into the combustion area.

SCHNEURLE PORT — a system of transfer porting which enables additional fuel/air mixture to be injected into the cylinder.

SEAL — the close fit of the cylinder to piston that is essential for good induction and compression.

SYNTHETIC OIL — a chemically engineered lubricating oil which is not petroleum based.

STROKE — the travel of the piston.

T

THROTTLE — See Carburettor.

TORQUE — rotary force generated by the engine.

TDC — Top Dead Centre — of the piston.

TUNED PIPE — a power boosting exhaust system.