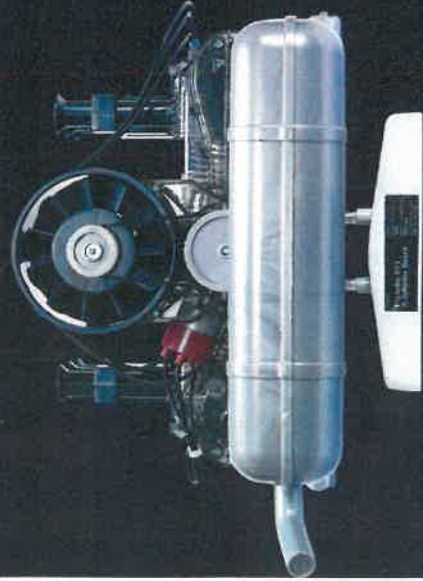




PORSCHE 911



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Flat-Six Boxer ENGINE

Build your own
working, classic
Porsche 911
flat-six engine
model!



Designed by John Anson for:
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Germany

Item number:
PE01



Made in China.

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For Ages
10+

Instruction MANUAL

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Please retain the information in this manual for future reference.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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Flat-Six Boxer Engine

Build your own working, classic Porsche 911 flat-six engine model!

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INTRODUCTION

The car that was to become the Porsche 911 was first unveiled at the 1963 Frankfurt motor show, intended as a larger, more comfortable, successor to the legendary 356. As well as a new chassis and suspension, a completely new, six cylinder, overhead cam boxer engine was designed (called the Type 901), to replace the four cylinder, overhead valve unit used in the 356. Design of the new engine was led by Hans Mezger, a German automotive engineer who became a key part of Porsche's development programme for 35 years.

The primary reason for using the new 6-cylinder engine was to utilise the inherent smoothness offered by the boxer configuration. Because it consisted of three pairs of pistons moving backwards and forwards in opposite directions, with each pair spaced at 120 degrees of crankshaft rotation, the design minimised first and second order vibrations (vibrations that occur once and twice per engine revolution). In addition, the short length of the engine, low centre of gravity, and effectiveness of air cooling made it ideal for the rear-engine 911.

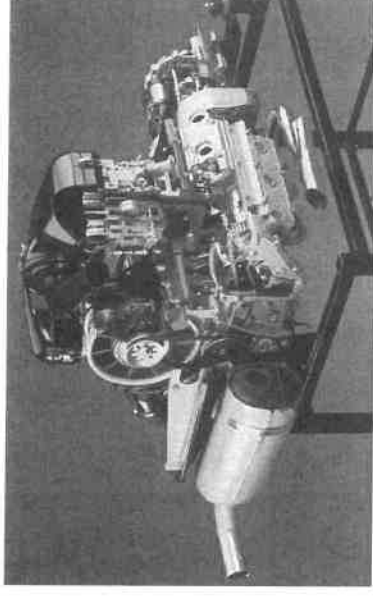
To meet the high bending stresses at very high revolutions, the forged crankshaft was supported with eight main bearings. The crankcase was split vertically, and like all of the major components, was made from aluminium (even the cooling fins of the cylinders were aluminium, with cast iron sleeves inside them). Each row of three cylinders had an overhead camshaft, these being driven by a duplex chain running around intermediate gears on a layshaft (itself gear driven from the crankshaft). Accurate valve timing and smooth operation were achieved by using a hydraulic cam chain tensioning wheel and rubber guide ramps. The valves were arranged in a V-shape, which allowed the use of a hemispherical combustion chamber with a small, smooth and heat-absorbing surface. Initial versions of the engine used Solex overflow-type carburettors, and although these had the benefit of being relatively insensitive to forces caused by hard cornering, problems with these, including a flat spot at low engine speeds, led to them being changed for Weber carburettors in 1966.

An 11 bladed axial fan, with the alternator inside it, was mounted on top of the engine to improve cooling by helping to ensure the air was more evenly distributed to both sets of cylinders.

In its original form (Type 901/01), the engine had a capacity of 1,991 cubic centimetres, with a cylinder bore of 80 mm and a stroke of 66 mm.

Power output was 130 hp (96 kW) at 6,100 rpm. Subsequent developments led to the 901/02, 901/03 and other versions, each having different specifications depending on the intended use (sports, touring etc). The Carrera six engine (Type 906) was developed simultaneously to the Type 901, the main differences being the use of twin spark plugs per cylinder, higher-compression pistons, and the use of lighter weight (magnesium and titanium) components. A major change came in 1970, with the capacity of the engine being increased to 2,200 cubic centimetres (2.2 litres) by increasing the bore to 84 mm. The original engine configuration was still being used until 1972, when it was superseded by the even larger 2,341 cubic centimetre engine.

The model in this kit is intended as representation of the Type 901 engine used in the early 911. Although it lacks the fine details of the real engine, it includes a realistic crankshaft, a working cooling fan, and accurate valve and ignition timing. Even the distributor works correctly, being driven from the crankshaft using bevel gears, with its red colour closely matched to the real thing.



An early Porsche 911 engine, with cut-away sections to show the internal components. The engine shown is part of the Porsche museum collection in Stuttgart.

NOTES AND ADVICE

References to the **left** or **right** side of the engine mean the left or right side when viewed from the **fan end**. Cylinders 1-3 are on the left side of the engine and cylinders 4-6 are on the right.

Identify the various parts by looking at the list of components and the corresponding illustrations. Use a sharp knife to trim any excess plastic from the components after they have been removed from their carrier frames.

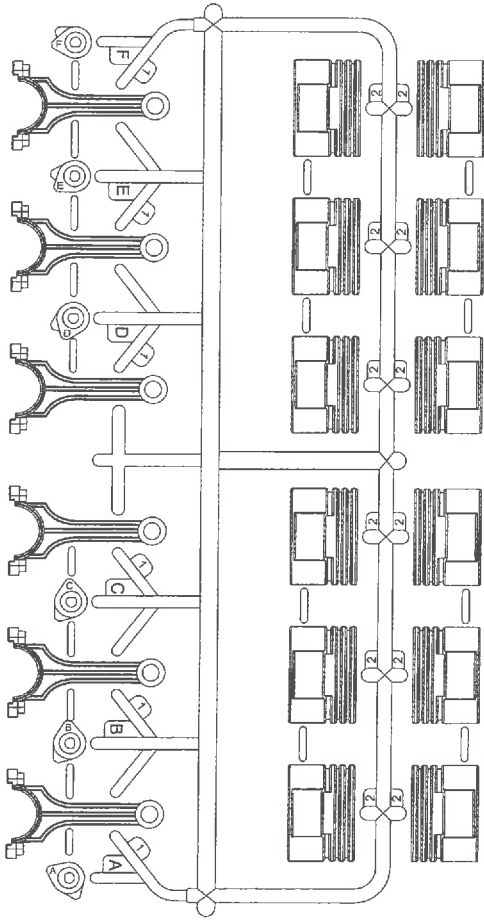
Take care not to over-tighten the screws as this may permanently damage the plastic.

- Non-rechargeable batteries are not to be recharged.
- Rechargeable batteries are only to be charged under adult supervision.
- Rechargeable batteries are to be removed from the toy before being charged.
- Do not mix old and new batteries.
- Do not mix alkaline, standard (carbon-zinc), or rechargeable (nickel-cadmium) batteries.
- Batteries are to be inserted with the correct polarity.
- Exhausted batteries are to be removed from the toy.
- The supply terminals are not to be shorted-circuited.

PARTS LIST

No.	Description	Qty	No.	Description	Qty
1	Connecting rod	6	47	Crankcase upper	1
2	Piston half	12	48	Crankcase lower	1
	Cams (labelled A - F)	6	49	Cylinder barrels	2
4	Bearing cap	6	50	Cylinder head left	1
5	Rocker arm	6	51	Cylinder head right	1
6	Timing tool	1	52	Upper cylinder head left	1
7	Valve stem	6	53	Upper cylinder head right	1
9	Valves	12	54	Large cylinder head plate	2
10	Crankshaft sprocket A	1	55	Small cylinder head plate	2
11	Crankshaft sprocket B	1	56	Crankcase rear	1
12	Camshaft sprocket	2	57	Cylinder head plate upper	2
13	Gudgeon (piston) pin	6	58	Cylinder head plate lower	2
15	Carburettor outer	2	59	Cam belt tunnel left inner	1
16	Carburettor inner	2	60	Cam belt tunnel right inner	1
19	Exhaust muffler upper	1	61	Cam belt tunnel left outer	1
20	Exhaust muffler lower	1	62	Cam belt tunnel right outer	1
21	Exhaust pipe left upper	1	63	Cam belt tunnel middle	1
22	Exhaust pipe left lower	1	67	Drive gear	1
23	Exhaust pipe right upper	1	68	Crankshaft gear	1
24	Exhaust pipe right lower	1	69	Distributor gear	1
25	Crankshaft pulley	1		Cam timing belt	2
26	Fan pulley	1	72	Spark plug lead mounting clip	1
27	Oil return pipes	4	74	Distributor bushing	1
28	Exhaust manifold left upper	1	75	Crankshaft gear B	1
29	Exhaust manifold left lower	1	76	Crankshaft gear C	1
30	Exhaust manifold right upper	1	77	Timing alignment pin	2
31	Exhaust manifold right lower	1	78	Fan housing rear cover	1
32	Oil cooler outer	1		Valve spring	12
33	Oil cooler inner	1		Cam shaft (140 mm)	2
34	Fan housing	1		Rocker shaft (118 mm)	4
37	Idler pulley	2		Metal shaft (37 mm)	1
41	Crankshaft	1		Head gasket	2
42	Cooling fan	1		Base	1
				Distributor/spark plug assembly	1
				Label	1

PARTS LIST



PARTS LIST

