CAINES, PRINTERS, BROADWAY, PLAISTOW, LONDON, E. 13

BRITISH JUNIOR ENGINE

as fitted to

ROTARY HOE "GEM"

WORKING INSTRUCTIONS

AND

HINTS ON MAINTENANCE

ILLUSTRATED PARTS LIST

MANUFACTURED BY

ROTARY HOES LTD.

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B. J. ENGINE

ENGINE SPECIFICATIONS

BORE AND STROKE
3″ 5 X 4.25 4-stroke

C. CAPACITY
660 c.c.

ROTATION
Anticlockwise viewed from flywheel driving end

R.P.M.
1,500—1,800

CONNECTING ROD BEARING
Continuous Roller

LUBRICATION
Dry sump with forced feed to connecting rod bearing

COOLING
Turbo Fan with cowling round cylinder

CARBURETTOR
Amal

Hints on operating and making adjustments to be read in conjunction with lubricating instructions given in "Gem" handbook.

STARTING

Turn on petrol and (where fitted) oil tap. Open throttle slightly, engage starting handle, retard ignition by moving magneto control lever *upwards*, raise exhaust valve lifter lever with left hand, swing engine smartly and drop exhaust lifting lever. When engine has started advance ignition by moving magneto control lever *downwards* to full extent.

ADJUSTING VALVE TAPPETS

It is essential to check clearance of valve tappets occasionally. These should be set at 10/1000ths of an inch for exhaust valve and 8/1000ths of an inch for inlet valve. After adjusting make sure that locknut is securely tightened up to tappet head.

DECARBONISING

As a general rule engine should be decarbonised and valves ground in after every 200 hours of work.

IGNITION TIMING

Should it become necessary to remove magneto it can be easily refitted and retimed in the following way. Turn engine over slowly until the punch mark on magneto drive coupling appears in line with a similar mark on camshaft bearing housing. The piston will then be at T.D.C. Then with the ignition control lever fully retarded and magneto resting on platform turn rotor of magneto until the points of contact breaker are just commencing to open. In this position align the dog on the magneto end coupling with the slot in fibre centre coupling and lock coupling on to magneto shaft by tightening the nut. Now gently push magneto towards engine until dogs are fully engaged in slots and clamp down by means of the four set screws located under magneto platform.

OIL SYSTEM

This is of the dry sump type with gear driven plunger pump. The left hand end of plunger forces oil into main and big end bearings while the right end scavenges the used oil from the engine sump and returns it through the filter back to the tank. The pump is simple and positive in action and normally requires no attention and any failure of oil to return to tank need not necessarily be caused by faulty pump. In the event of trouble first check all oil pipe connections for air leaks. Not only union nuts but joints of nipples and pipes should be closely inspected. More failures in oil circulation are attributable to air leaks than to any other cause. Bent or flattened pipes which may impose restrictions in oil flow also are common causes of faulty circulation.

When satisfied that no air leaks exist, next inspect the oil pump fulcrum, which is a screw with screw-driver slot located on the pump body on right centre of timing cover. This screw has a plain unthreaded end which locates in a helically cut groove in pump plunger and its function is to give the necessary reciprocating action to the pump while the latter is rotating. If this screw becomes loose or lost the pump ceases to function. See that it is always kept tightly screwed home and that the fibre washer under the head is in good condition. If the adjustments above outlined fail to correct faults in oil system the services of an experienced mechanic should be called in.

TROUBLE CHART

There are several different things which might produce any one of the various troubles commonly experienced in operating a petrol engine. This chart shows the most common causes of engine trouble:—

LOSS OF POWER

Engine spark occurring too late.
Dirty sparking plugs.
Poor or dirty connections to plugs.

IGNITION

Breaker points on magneto dirty or out of adjustment.
(These can be adjusted by spanner provided).
High tension carbon brushes dirty or springs sticking.

FUEL

Mixture too weak or too rich.
Petrol supply pipe partly clogged.
Leaks around induction pipe.
Valve tappets out of adjustment and water in petrol.

ENGINE CYLINDER

Inferior or insufficient lubricating oil.
Lack of compression (worn rings, etc.).
Leaks around cylinder head gaskets.
Valves sticking, worn, pitted, or not seating properly.

MISFIRING

IGNITION

Poor connections.
Dirty spark plugs.
Dirty breaker points or carbon brushes.

FUEL

Mixture too lean.
Water in petrol.
Stoppage in petrol pipe.

ENGINE

Lack of compression.

CYLINDERS

Valves sticking or not working properly.

EXPLOSIONS IN EXHAUST PIPE

IGNITION

Sparks too late (if engine backfires and stops, spark may be too early).
Short circuit.

FUEL

Weak mixture.
Occasionally rich mixture (dirty jets).

ENGINE

Stuck or leaky valves.

CYLINDER

Carbon deposits.
Leaky air connections to carburettor.

OVERHEATING

IGNITION

Retarded spark.

FUEL

Mixture too rich.

ENGINE

Insufficient lubricating oil.

CYLINDER

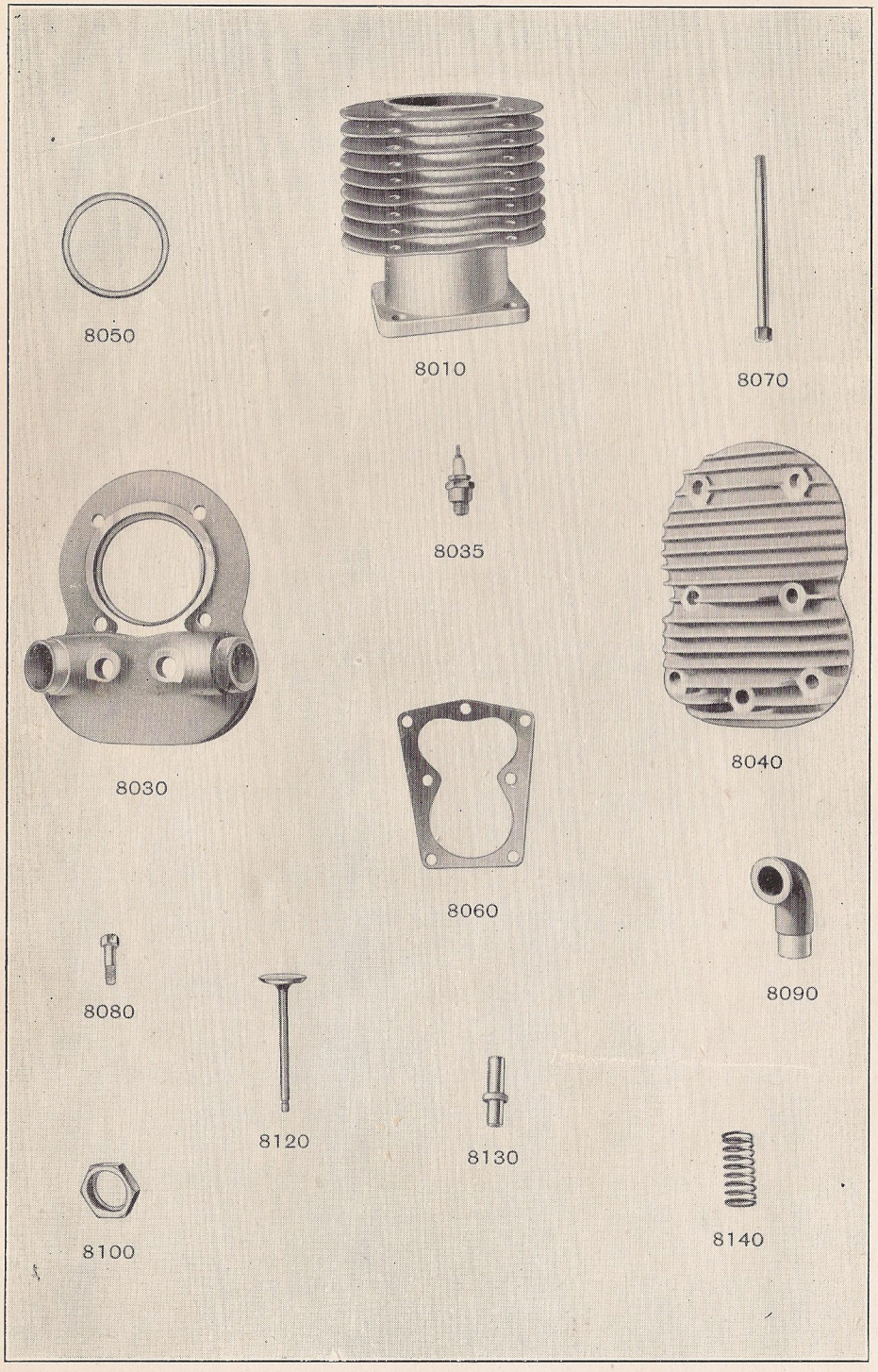
Oil pump out of order.
Carbon in cylinder head.

BLACK SMOKE indicates too rich a mixture.

BLUISH SMOKE (in quantities) indicates too much lubricating oil.

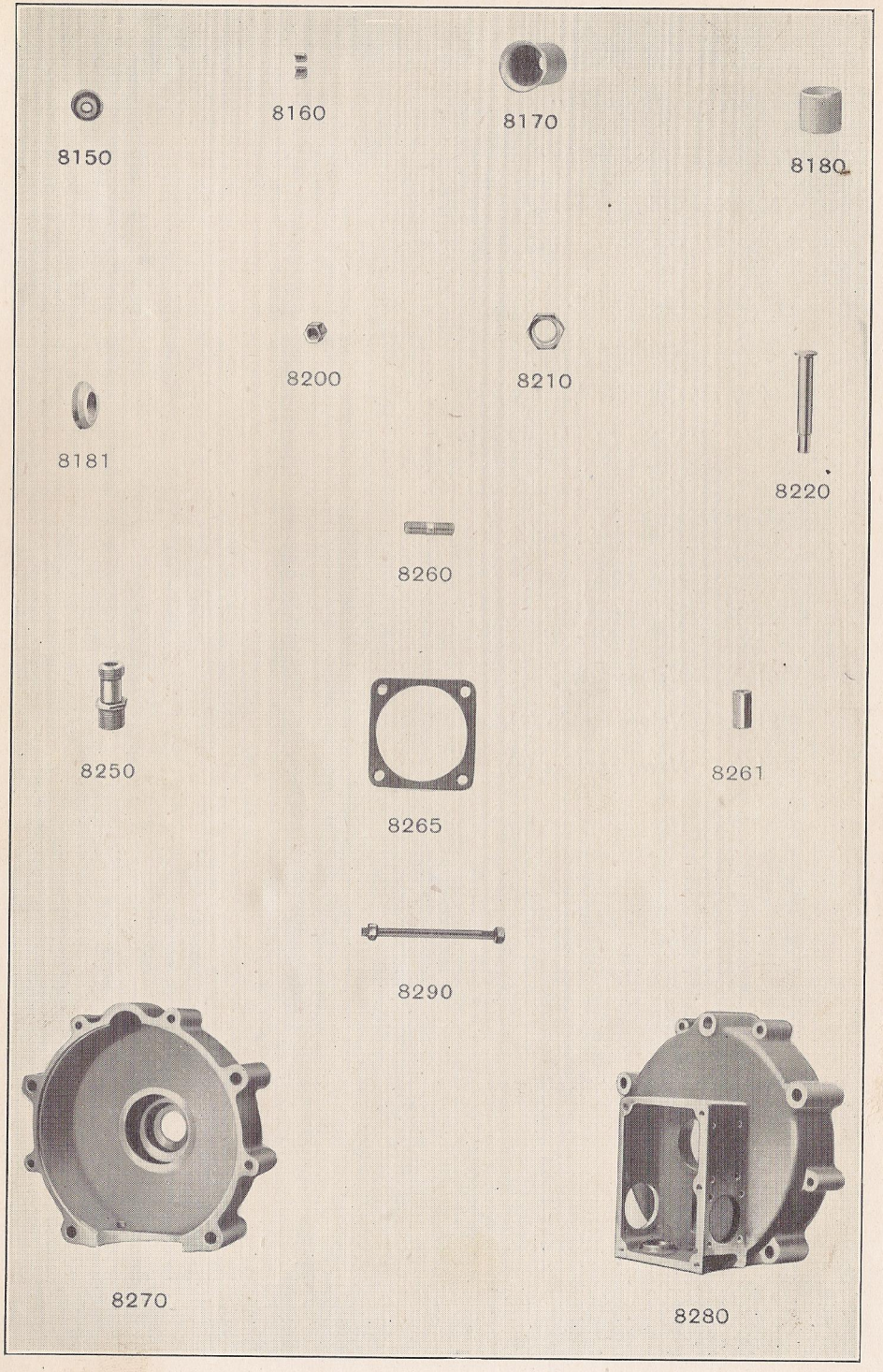
ENGINE USES TOO MUCH FUEL

Main jet needle valve open too far.
Idling jet adjusting screw too far in.
Spark occurs too late.
Leaky valves.
Insufficient lubricating oil.
Engine running too slow.

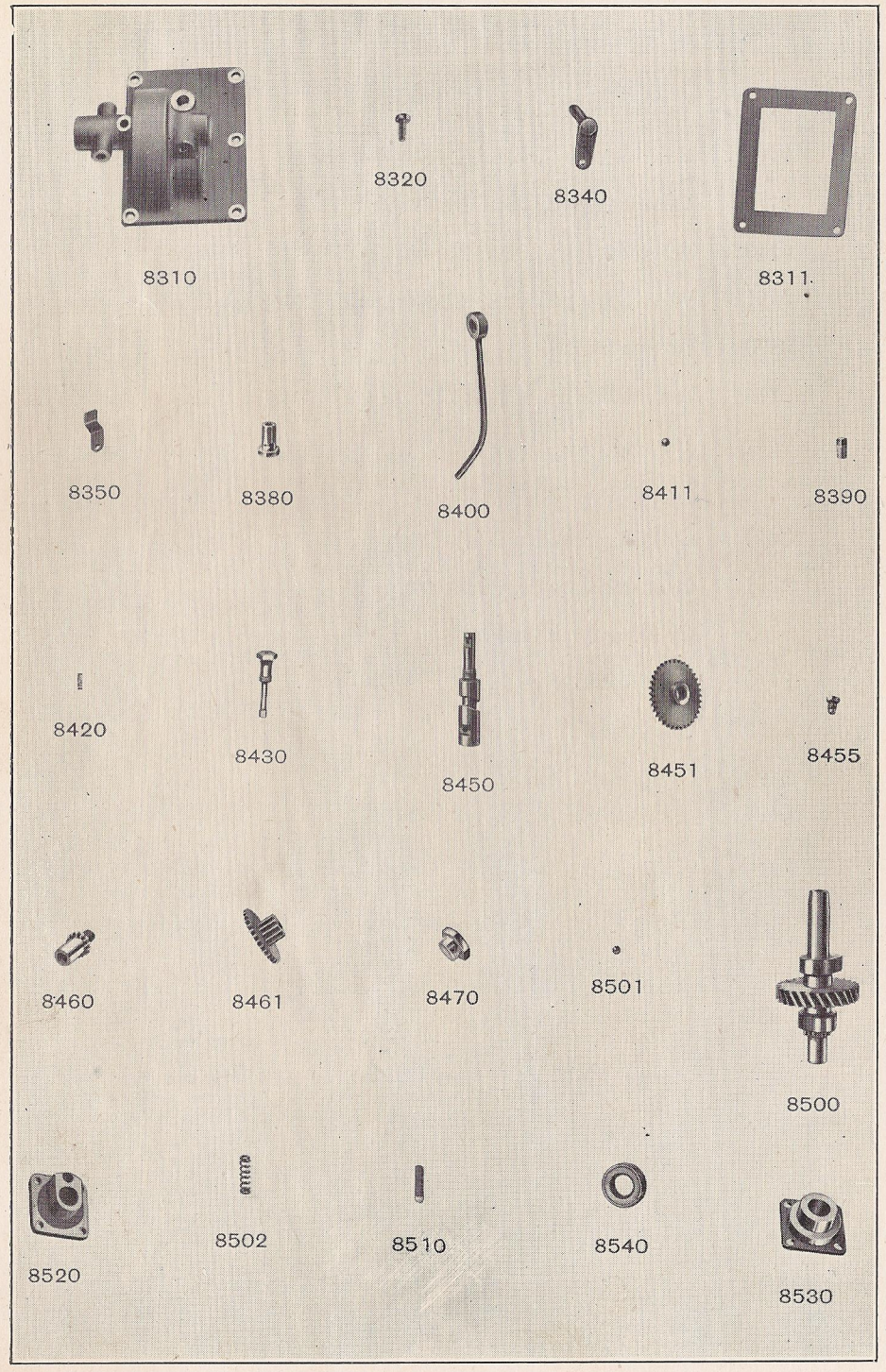


PARTS LIST OF
BRITISH JUNIOR " ENGINE.

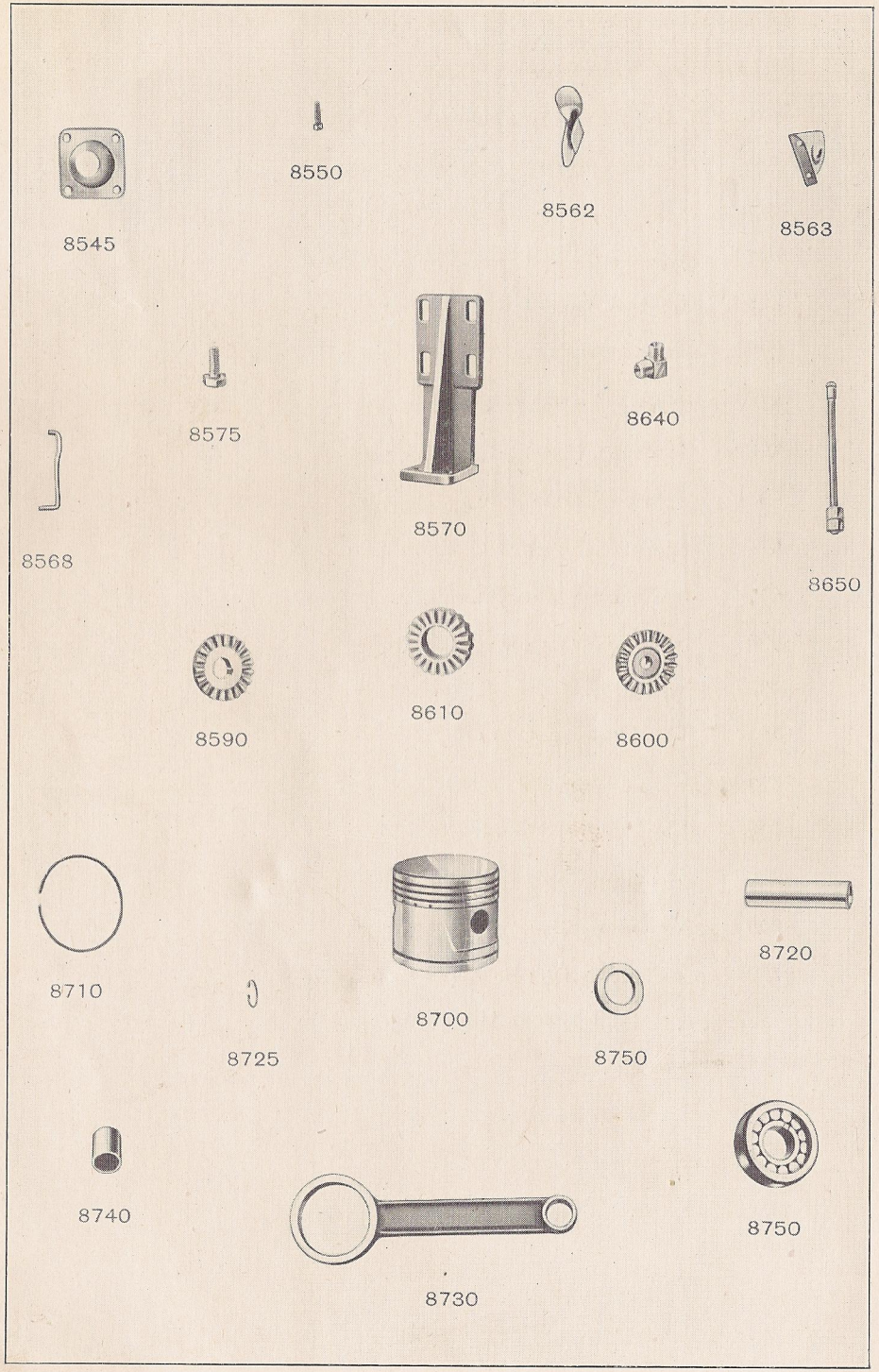
Part No.	*Part Name.*
8010	Cylinder Barrel.
8030	Valve Chamber.
8035	Spark Plug.
8040	Cylinder Head.
8050	Cylinder Head Gasket.
8060	Valve Chamber Gasket.
8070	Cylinder Head Studs (4).
8080	Cylinder Head Bolts (3).
8090	Induction Pipe.
8100	Induction Pipe Nut.
8120	Valves (2).
8130	Valves Guide (2).
8140	Valve Springs (2).



Part No.	Part Name.
8150	Valve Spring Cups (2).
8160	Valve Spring Collets, 2 Pairs per Set.
8170	Valve Spring Upper Cover (2).
8180	Valve Spring Bottom Cover (2).
8181	Valve Spring Bottom Cover Locking Nut (2).
8200	Tappet Caps (2).
8210	Tappet Cap Lock Nut (2).
8220	Tappet (2).
8250	Tappet Guides (2).
8260	Cylinder Base Stud (4).
8261	Cylinder Base Stud Nut (4).
8265	Cylinder Base Gasket.
8270	Crankcase Drive Side.
8280	Crankcase Timing Side.
8290	Crankcase Clamping Bolts (4).



Part No.	*Part Name.*
8310	Timing Case Cover and Oil Pump Body.
8311	Timing Case Cover Gasket.
8320	Timing Case Cover Screws (5).
8340	Exhaust Valve Lifting Spindle and Arm.
8350	Exhaust Valve Lifting Spindle Clip.
8380	Breather Core.
8390	Breather Core Plug.
8400	Breather Pipe.
8411	Breather Valve Ball.
8420	Breather Valve Ball Spring.
8430	Crankshaft Oil Feed Screw.
8450	Oil Pump Plunger.
8451	Oil Pump Drive Gear.
8455	Oil Pump Fulcrum Pin.
8460	Oil Pump Drive Pinion.
8461	Oil Pump Intermediate Gears.
8470	Oil Pump Body Plug.
8500	Camshaft.
8501	Camshaft Thrust Ball.
8502	Camshaft Thrust Ball Spring.
8510	Camshaft Key.
8520	Camshaft Bearing.
8530	Camshaft Magneto Bearing.
8540	Camshaft Oil Seal.



Part No.	*Part Name.*
8545	Camshaft Oil Seal Holder.
8550	Camshaft Bearings Set Screws (8).
8562	Magneto Control Hand Lever.
8563	Magneto Control Hand Lever Bracket.
8568	Magneto Control Hand Lever Connecting Link.
8570	Magneto Platform.
8575	Magneto Platform Screws.
8590	Magneto Coupling Camshaft Half.
8600	Magneto Coupling Magneto Half.
8610	Magneto Rubber Coupling.
8640	Crankcase Suction Elbow.
8650	Crankcase Suction Pipe to Pump.
8700	Piston.
8710	Piston Ring (4 per set).
8720	Gudgeon Pin.
8725	Gudgeon Pin Circlip (2).
8730	Connecting Rod.
8740	Connecting Rod Top End Bush.
8750	Connecting Rod Bottom End Bearing.

Part No.	*Part Name.*
8760	Flywheel, Timing Side.
8770	Flywheel, Drive Side.
8780	Crankshaft Timing Side.
8790	Crankshaft Timing Side Key.
8800	Crankshaft Timing Side Nut.
8810	Crankshaft Timing Gear.
8820	Crankshaft Timing Gear Bush.
8830	Crankshaft Timing Gear Bush Key.
8840	Crankshaft Timing Gear Bush Nut.
8850	Crankshaft Timing Side Ball Bearing.
8860	Crankshaft Timing Side Oil Seal Disc. (Large).
8861	Crankshaft Timing Side Oil Seal Disc. (Small).
8870	Crankpin.
8880	Crankpin Key.
8890	Crankpin Flywheel Bush.
8900	Crankpin Flywheel Bush Key.
8910	Crankpin Nut.
8920	Crankshaft Drive Side.
8930	Crankshaft Drive Side Nut.
8940	Crankshaft Drive Side Key.
8950	Crankshaft Drive Side Ball Bearing.
8960	Crankshaft Drive Side Oil Seal.
8980	Magneto.