THE FAGEOL MARINE ENGINE

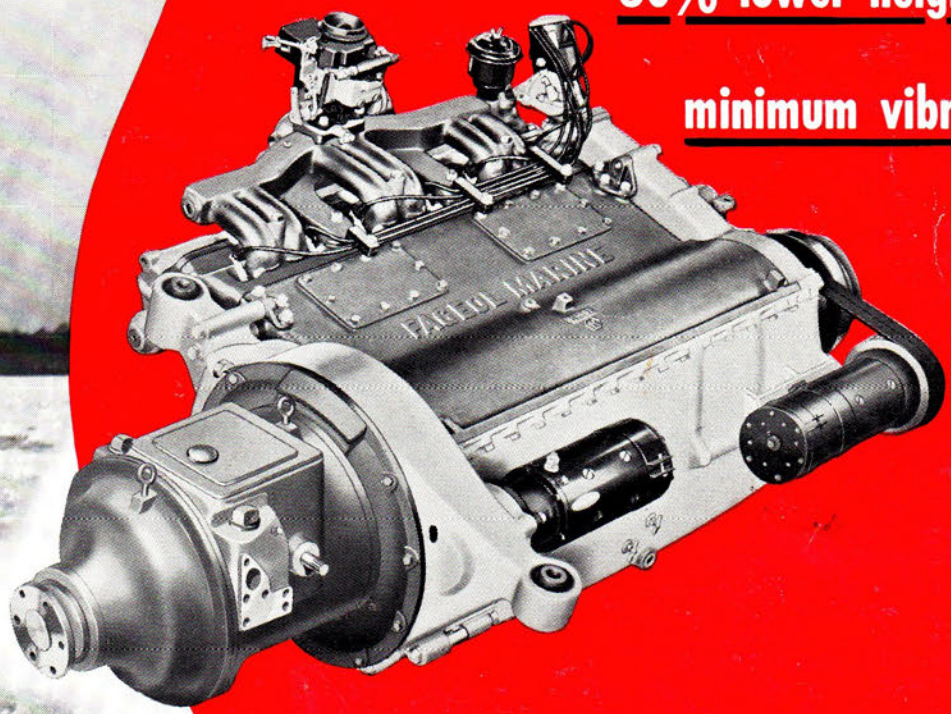
horizontal design

30% less weight

lower fuel consumption

30% lower height

minimum vibration



GASOLINE MODELS
FM 225 and FM 200

FAGEOL PRODUCTS COMPANY
KENT, OHIO
Marine Division

FASTER . . . SMOOTHER . . . MORE ECONOMICAL BOAT PERFORMANCE

Boat design and performance are largely governed by four fundamental engine characteristics: *weight . . . height . . . fuel consumption . . . and vibration.* A reduction in any one of them greatly improves the performance of your boat.

In the new horizontal Fageol marine engine, you find major reductions in ALL — not just one — of these factors. For the Fageol engine has been specially designed to make cruiser and runabout performance faster . . . smoother . . . more economical.

saves 30% in weight

Fageol gasoline engines weigh only 965 lbs. (less accessories). Model FM 225 produces 225 H.P.; model FM 200 produces 200 H.P. Thus, Fageol engines weigh only two-thirds as much as ordinary engines with comparable power output. As a result, you can increase the speed of your boat *without increasing engine horsepower.* The power-to-weight ratios of Fageol engines are higher.

saves 30% in height

Horizontal Fageol design inclines cylinders 10 degrees from horizontal. Over-all engine height is greatly reduced. Distance from crankshaft to top of engine is only 10 inches. Cabin height can be reduced, making possible lower, more rakish hull design without sacrificing adequate headroom.

Fageol engines are equally efficient when mounted vertically for replacement installation.

cuts fuel consumption approximately 30%

Operating efficiency, which results from several design features, reduces fuel consumption approximately 30% at normal cruising speed. For fuel economy at other speeds, see the performance curves on page 5.

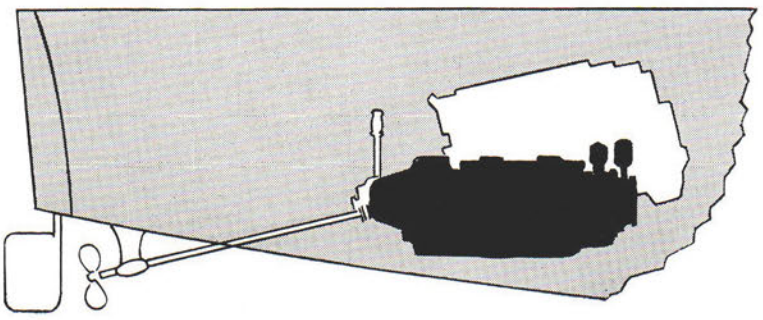
smoother boat performance

Full engine counterbalancing practically eliminates engine vibration and assures a smoother, quieter boat.

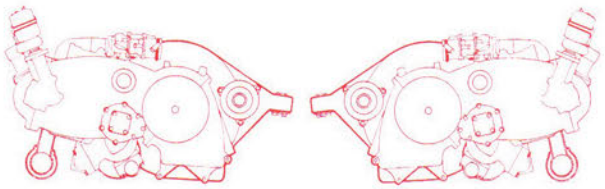
The crankshaft is fully counterweighted to absorb 80% of the reciprocating weight of the connecting rod and piston assembly.

greater installation flexibility

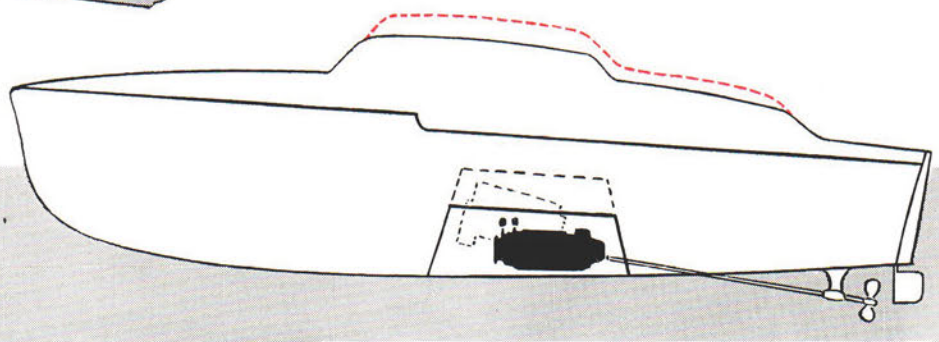
Standardized Fageol engine design permits right or left hand installation from the same engine block, head, etc. This is accomplished in assembly by use of right or left hand pan, bell and chain housing. All other parts are interchangeable.



Sketch above illustrates the extensive height saving obtained with a horizontal engine, compared with conventional vertical design.



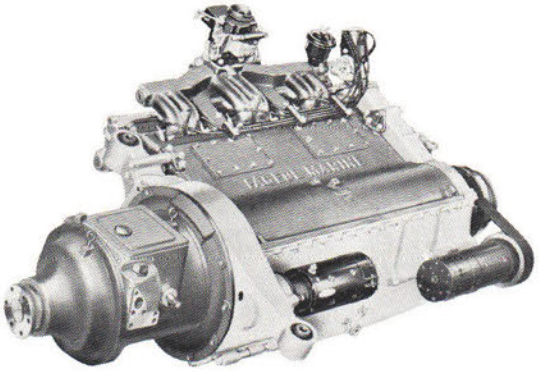
Compact dual engine installation features low over-all height and weight economy.



Notice how much cabin height can be lowered as a result of horizontal engine design.

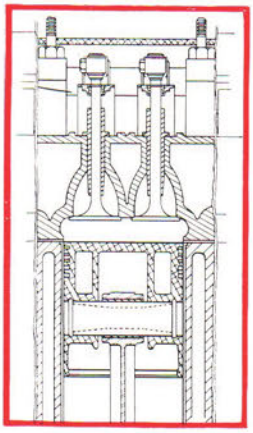
FAGEOL MARINE KENT·OHIO

improved basic engine design . . .



Simple refinements of orthodox engine design account for the amazing performance of the Fageol marine engine. It delivers more power for each cubic inch of displacement and for each pound of weight than any other commercial marine engine.

Higher thermal efficiency and lower friction losses boost power output. With its patented combustion chamber, the Fageol engine produces more power with present octane fuels and takes full advantage of 80 to 90 octane gasoline.



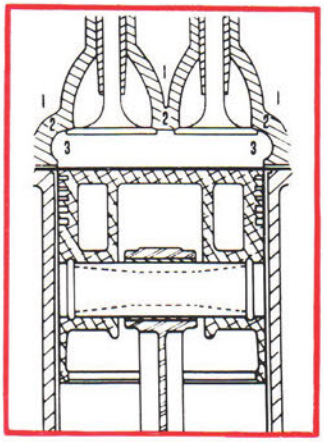
Coolant circulation is full wash, under pressure and metered around cylinders, valve seats, patented combustion chamber, intake and exhaust ports.

uniform engine temperature

Power costly "hot spots" in the block and head commonly destroy engine efficiency. Inadequate cooling often causes temperatures to rise more than 50 degrees above coolant at critical points in block and head.

The Fageol marine engine *has no "hot spots."* Consequently, engine efficiency is higher. Proper circulation and uniformity of metal thicknesses hold temperature variation to a 3 degree maximum.

FAGEOL MARINE KENT·OHIO



Positive temperature control is maintained by:

1. Fully cooled exhaust and intake valve seats.
2. Uniform thickness of inner walls.
3. Fillets and curves instead of edges.
- Water heated intake manifold.

higher volumetric efficiency

Higher volumetric efficiency means "more mixture in cylinders before compression." A concentrated charge produces more power per stroke.

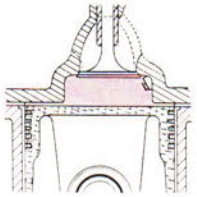
Volumetric efficiency in the Fageol engine is higher because positive temperature control prevents pre-expansion of the mixture. This results in a larger, more effective charge.

higher compression ratio

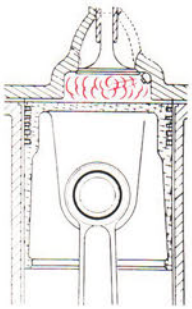
Greater power output from higher compression ratios without increased bearing loads is the result of the Fageol patented combustion chamber. Power output is smooth and velvet-like.

In addition, the combustion chamber enables the engine to produce *more power* from ordinary octane fuels and to take full advantage of 80 to 90 octane gasoline.

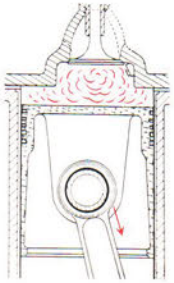
You can readily understand the combustion chamber's principle of operation from these sketches:



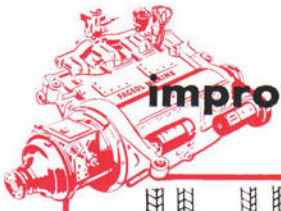
Combustion chamber is small compared with cylinder bore.



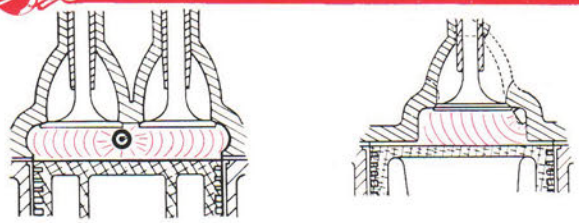
Detonation suppression space between piston and cylinder head reduces by one-third area of piston head exposed to explosion and cuts bearing loads.



Pressure on piston head increases gradually as force expands from chamber, reaching maximum force when crank is at point of most effective leverage.



improved basic design . . .



These sketches show position of the spark plug midway between ports in combustion chamber, slightly nearer exhaust port. Use of this patented chamber also eliminates necessity for dual ignition.

controlled combustion of mixture

Premature ignition of the gaseous charge wastes useful engine power. This occurs when gases ignite from spontaneous combustion before the flame front reaches them.

In the Fageol engine, combustion is controlled. The spark plug centers at the hottest part of the patented combustion chamber. High turbulence propels the flame front throughout the charge, preventing pre-ignition by controlling temperature rise.

lower friction losses

Careful design of reciprocating parts and metal thicknesses has reduced friction losses substantially.

Equal thicknesses of metal at all vital points throughout the engine has eliminated distortion by assuring equal expansion and contraction. This uniformity assures alignment and minimizes friction loss.

The extremely rigid crankshaft prevents friction loss due to misalignment. The shaft is stressed for 4000 R.P.M., although the Fageol engine normally operates at a maximum speed of 3400 R.P.M. The shaft is fully counterbalanced and equipped with a torsional vibration dampener.

A four strand roller chain is used for the camshaft and accessory drive, together with ball and roller bearing mounted sprockets. This helps to reduce friction losses.

To reduce friction in the cylinder head, the camshaft turns in seven align bored bearings, submerged in oil. Rocker arms have ground and hardened rollers with ball joint valve pushers.

faster, simplified maintenance

overhead cam

The Fageol engine utilizes valve-in-head construction to simplify maintenance operations. When valve grinding becomes necessary, the head can be quickly removed.

hand removable cylinder sleeves

Replacement of cylinder sleeves is fast and simple. Special tools and boring operations are totally unnecessary.

After the head and pistons have been removed, cylinder sleeves can be slipped out easily *by hand*. All sleeves are factory finished, precision turned. Pistons and rings can also be replaced when the head is removed.

dual idler sprockets

Dual idler sprockets take up slack proportionately on both sides of camshaft sprocket. Timing chain slack adjustments automatically return camshaft sprocket to normal position for perfect engine timing.

easy pan removal

To simplify its removal, the oil pan and engine block are designed to mate at a 30 degree angle. Crankshaft, connecting rod and main bearings are easily accessible.

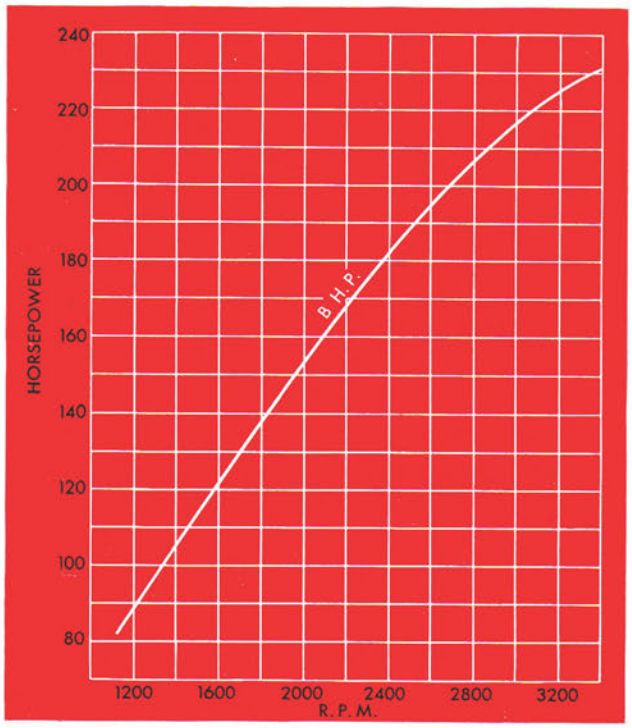
RESERVE POWER AND STAMINA

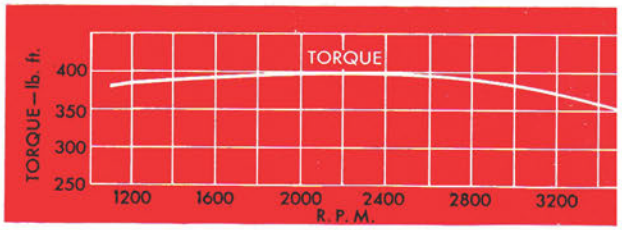
While not classified as a racing engine, the FM 225 has repeatedly demonstrated its reserve power and stamina.

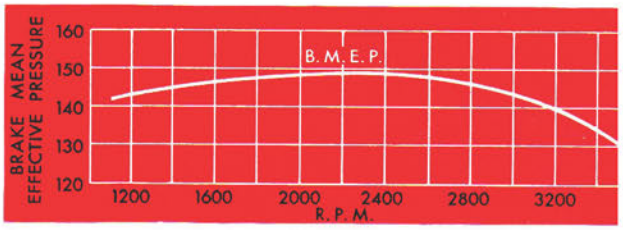
In September, 1946, L. J. Fageol, president of Fageol Products Company, powered his boat "So-Long, Jr." with an FM 225 to win the Silver Cup Race in Detroit.

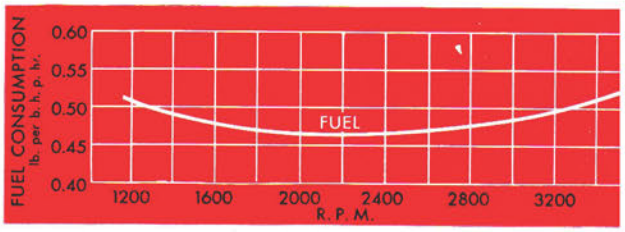
More recently, "So-Long, Jr." averaged 72 miles per hour over a closed two and one-half mile course at New Martinsville, West Virginia, to win the Viking Trophy. On straight stretches, top speed was approximately 100 M.P.H.; engine developed 275 horsepower at 4000 R.P.M. The conservative rating of Fageol marine engines assures a greater factor of safety and longer life.

performance curves



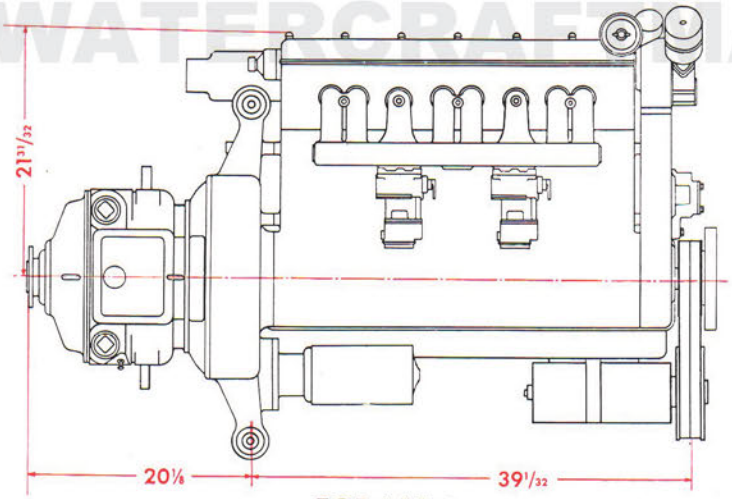




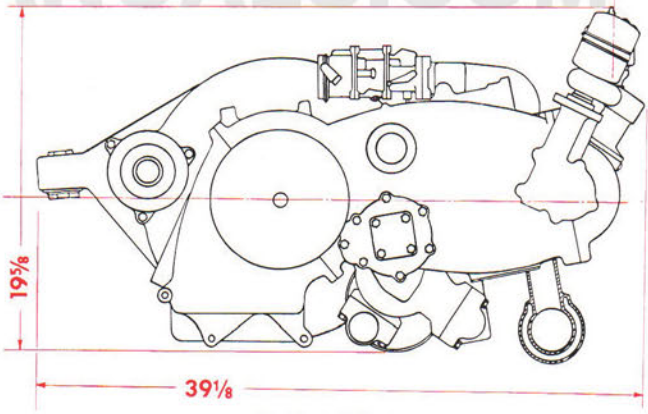


Model—FM 225. *No. Cyl.*—6. *Bore*—4¼". *Stroke*—4¾". *Displ.*—404 cu. in. *Comp. Ratio*—8.5:1. *Octane No.*—80.

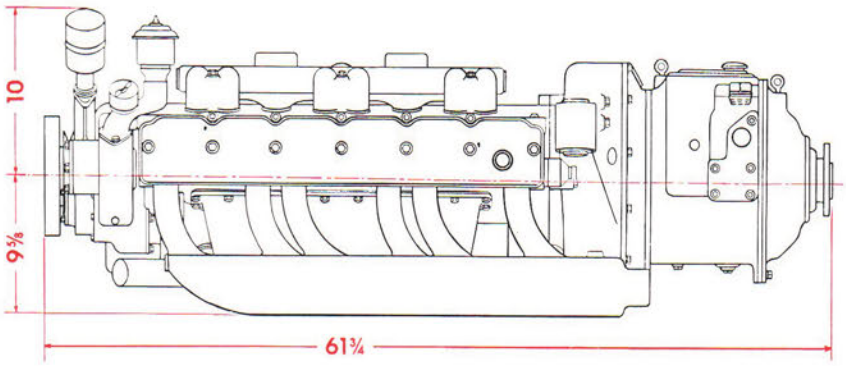
dimensions



TOP VIEW

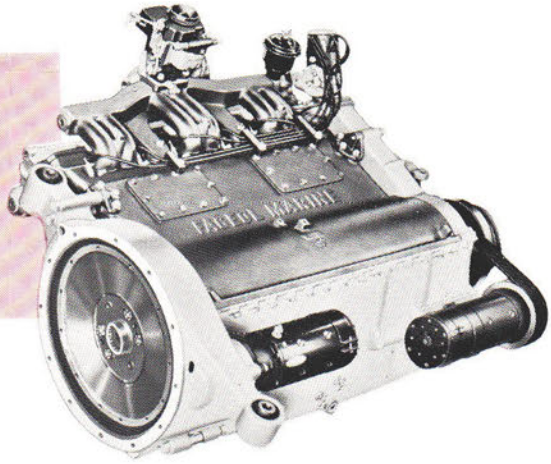


END VIEW

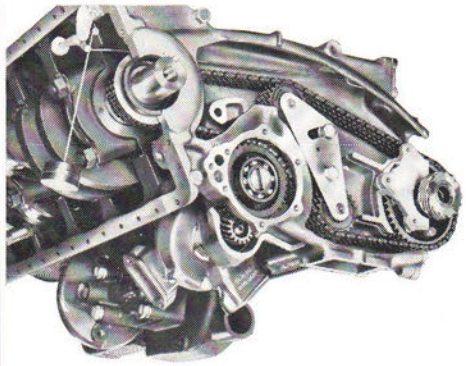


SIDE VIEW

FAGEOL MARINE KENT·OHIO



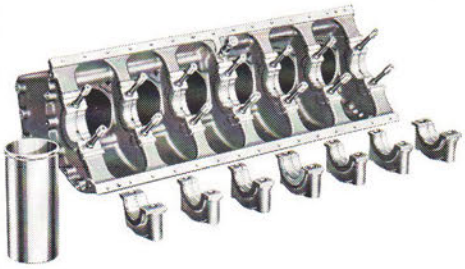
Fageol Marine Engine (without reverse gear unit).



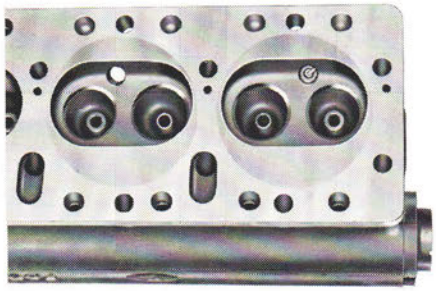
Timing chain slack adjuster. Crank sprocket at left; cam sprocket at right.

Piston and connecting rod assembly.

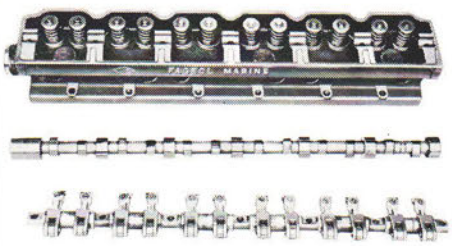
Crankshaft (showing counterbalances).



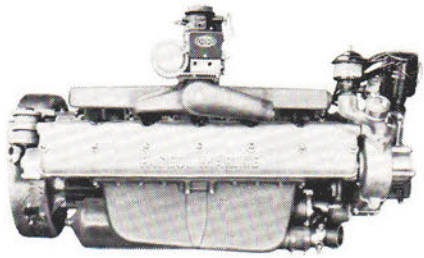
Cylinder block (showing main bearings, caps and cylinder sleeve).



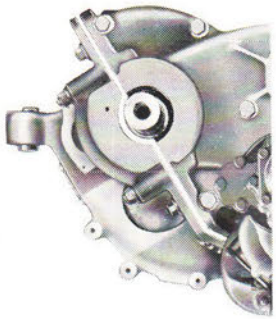
Patented combustion chamber.



Cylinder head (showing camshaft, rocker arms and cam bearings).

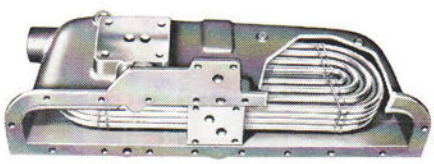


Head side of engine (exhaust manifold removed to show oil cooler).

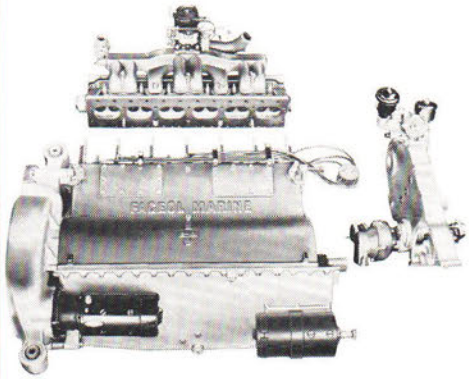


Oil pan.

Oil filter.



Oil cooler (cutaway view).



Cylinder head, block and chain housing.

specifications

Models FM 225 and FM 200

construction

General—Total engine weight less accessories and gear unit is 965 lbs. Models FM 225 and FM 200 are identical in all respects except that FM 200 is intended for operation at maximum recommended 3200 R.P.M., producing 200 H.P. FM 225 delivers 225 H.P. at maximum recommended 3400 R.P.M. For racing installations, engines are available with all aluminum alloy construction, including block and head.

Accessory Drive—⅜″ pitch 4 strand roller chain, 51″ long, which drives camshaft, water pump and oil pump.

Crankshaft—Tocco hardened SAE 1050 steel, statically and dynamically counterbalanced within 80% of reciprocal weight and equipped with torsional vibration dampener. Crankshaft and rod assembly stressed for speeds far beyond any expectancy.

Connecting Rods—Heavily ribbed drop forged SAE 1040 steel, carefully balanced. Accurate placement of bearing cap assured by special cap bolts ground to hole size of cap and rod.

Cylinders—Six cylinders, 4¼″ bore and 4¾″ stroke with 404 cu. in. displacement. 3/32″ wall thickness dry type sleeves of special alloy iron, hand removable, with .002″ clearance. Sleeves are machined to .0005″ tolerance, with interior wall honed to 20 micro inch finish.

Cylinder Block—Special annealed high nickel alloy cast iron, cast integral with upper crankcase. Block carefully cored for complete cooling around cylinders. Passages drilled in block for oil circulation. Block designed for use as either right or left hand engine.

Cylinder Head—Special high nickel alloy cylinder iron. Head is overhead cam type. Head removable without disturbing timing. Carefully cored around valve ports for complete cooling. Camshaft is CWC alloy material, Tocco hardened. Camshaft operates in oil. Head contains patented combustion chamber.

Exhaust Manifold—Water cooled. Designed to eliminate back pressure.

Flywheel—Drop forged, heat treated SAE 1035 steel.

Intake Manifold—Water cooled high nickel cylinder iron. Mounted on head. Maintains uniform fuel temperature at all cylinder intake ports.

Main Bearings—Seven Tri-metal bearings with lead indium plating. Bearing area 96.9 sq. in. Heavily ribbed webs. Cap shoulders assure absolute alignment.

Mounting—Three point rubber mounting, either horizontal or vertical.

Oil Pan—Heat treated cast aluminum alloy.

Pistons—Solid skirt, cam ground, low expansion, special aluminum alloy. Three compression rings (3/32″) and one oil ring (⅛″). Rugged lands. Floating, locked-in wrist pin centers in piston to prevent "rocking."

Thrust Bearing—End thrust bronze bearings on center main bearing.

Tachometer—SAE type drive from camshaft at ½ engine speed.

Valves—Intake SAE 3140 forged steel; 1⅝″ dia., 45 degree seat. Exhaust XCR high temperature and corrosion resistant; 1½″ dia., 45 degree seat. Safety ring on stems prevents "swallowing." Ball joint valve pushers.

lubrication system

Full Pressure Circulation—All oil galleries and lines are drilled passages, which eliminate external and internal piping.

Oil Cooler—Multiple ⅜″ copper tubing coils. Oil cooler cover mounts on block as integral part of water jacket. Cooler may be cleaned chemically at overhaul period.

Oil Filter—Winslow full flow type with replaceable element. Easily removable. No oil line connection. Filter area 4 times normal requirements, insuring longer life.

Oil Pump—Eaton type driven by timing chain at 65% engine speed. Delivers minimum of 8 gallons per minute at maximum recommended engine speed.

fuel system

Carburetor—Optional dual or single down draft. Balanced design Holley type with double venturi and float construction to prevent surging under tilt conditions.

Fuel Filter—Optional, as specified.

Fuel Pump—Optional, as specified.

cooling system

Circulation—Optional closed or open system.

electrical system

Generator—Optional, as specified. High output types available up to 120 Amps. Belt driven from crankshaft.

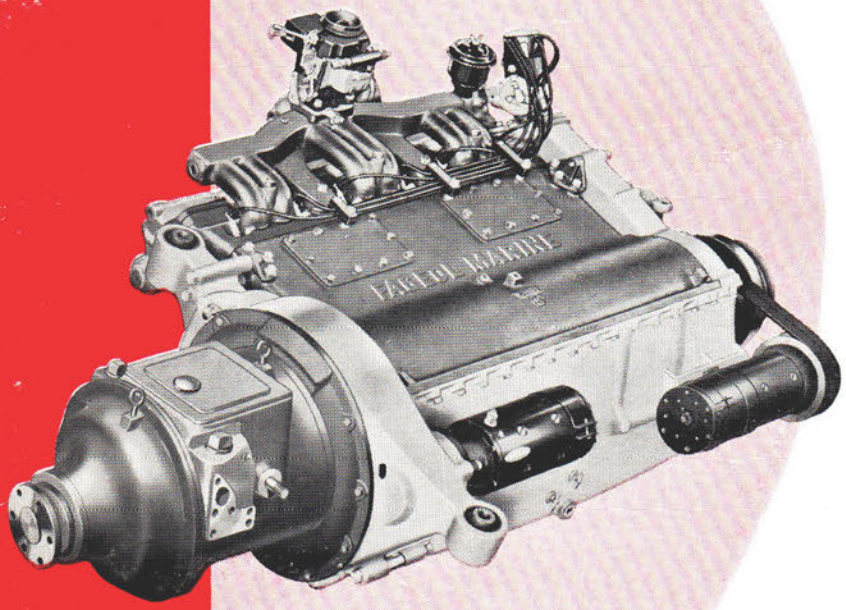
Ignition—Delco-Remy distributor. Coil is oil impregnated winding in armored case.

Starter—Delco-Remy single reduction type with Bendix drive.

clutch and reverse gear

Direct Drive—Optional make.

Reduction Gear—Optional make. Reduction ratios up to 3 to 1.



FAGEOL
MARINE
KENT·OHIO

FAGEOL PRODUCTS COMPANY

KENT, OHIO

Marine Division

P-1003 2M-1-47 Printed in U.S.A.