

MODERN ENGINES ARE GEARED FOR LONG WEAR AND FUEL EFFICIENCY

By Ruth E. Messinger, Contributing Editor

As the longevity of tree and lawn care equipment becomes an economic necessity to Green Industry businessmen, engine quality assumes major importance. Not only reliability, but durability, ease of maintenance, fuel costs, and availability of replacement parts are factors to weigh carefully before making an initial investment.

The demand for diesel engines, with their lower fuel consumption, has been growing recently. Some gasoline engine manufacturers have added diesel engines to their regular lines.

"Diesel is the way to go in the future," says Ken Lorch of Onan Corporation. "Diesel engines last longer, they are easier to maintain, and they do heavy duty and maintain better fuel economy."

"Fuel in diesel consumption is one-half that of gasoline," says Orville McDonner, vice president of research and development of Bunton & Goodall. The company uses a Teledyne Wisconsin diesel engine on one of its tractors. "Diesel has a longer life span than gasoline, requires less maintenance."

Kohler Company's John Clark, vice president of engineering, Gravely Division, disagrees. "The smaller diesel engines really require more care and maintenance than gasoline engines and are not as forgiving of dirt," he says. "We see a demand for diesel, but we have not taken much action yet. We were thinking of it for Europe, but recently the demand for it disappeared there, because the price of diesel caught up with the price of gasoline. A number of big commercial operators with big tractors demand diesel on smaller machines so they don't have to handle two kinds of fuel. We may consider it in the future."

"For every forty-two gallon barrels of oil that are taken from the ground," says Briggs & Stratton's Executive Vice President, L. W. Dewey, "thirteen are made into gasoline and eight into diesel fuel. When more diesel goes on the market, it will cost just as much as gasoline." Briggs & Stratton is developing a diesel engine which it expects to introduce in two or three years.

Manufacturers of both gasoline and diesel models are assuring long engine life with rugged construction, protection for tough wear areas, and fewer major moving parts.

Among the new gasoline engines is Tecumseh's (301) 1000-hour, four-horsepower engine for heavy-duty rotary mowers. Its cast-iron cylinder liner lengthens cylinder life. The cast-iron bore is made to show less wear and retain better oil control. And the Stellite-faced exhaust valve and seat provide good sealing for extended service. Like other models in the TVS system, it

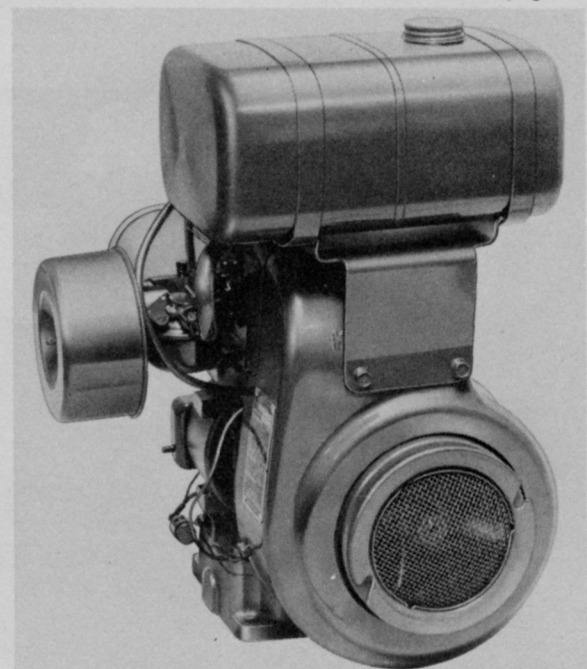


Tecumseh OH four-cycle engines are available in 12 to 18 horsepower.

features rustproof fuel tanks with integral-filter screen.

Tecumseh also offers a line of snow-throwing engines, from two-cycle models for lightweight equipment through big power models for larger, two-state drift busters with 7, 8, and 10 horsepower.

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Kohler 141 six-horsepower, four-cycle engine.

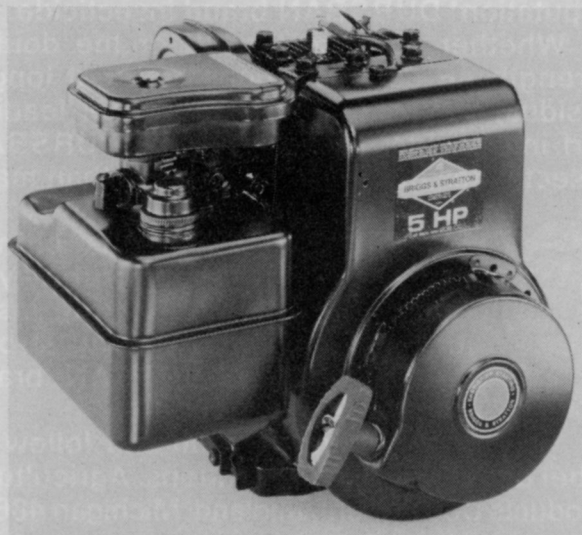
Kohler (302) has added a trio of two-cylinder gasoline engines with 17, 19, and 21 horsepower suitable for lawn and garden equipment. The heavy-duty, air-cooled engines have rugged cast-iron components. All are four-cycle models, and many parts are interchangeable in the series.

Each engine has an opposed cylinder design with cast-iron cylinder barrels. The crankshaft on the 17-horsepower model is made of ductile iron, and the others are of forged steel. Each engine also has an automotive-type oil pump, a replaceable dry-type air cleaner, and high carbon steel intake valves.

"We've styled these engines for easy servicing," says J. O. Kohl, director of customer service. "The cylinder barrels are removable and breaker points, condenser, spark plugs, and dipstick are all on top of the engine for easy access."

The entire Kohler line includes one- and two-cylinder models ranging from 4 to 23 horsepower. "We are going into the twin cylinder engine in the 16 horsepower and above," says John Clark.

Briggs & Stratton (303) engines for lawn and garden care include 3-, 3½-, 4-, and 5-horsepower lawnmower models. They are available



Briggs & Stratton five-horsepower, four-cycle engine.

with an automatic compression release Easy Spin starter or an optional ignition key type, 12-volt electric starter with rechargeable battery pack. An automatic choke provides metered fuel to meet any load without priming or manual adjustments.

This company also offers four-cycle tiller engines of 16 and 18 horsepower that eliminate fuel-line breakage or clogging through carburetor/fuel tank integration. The air cleaner is located away from heavy dust and dirt areas.

Briggs & Stratton's drift busters, the two- and four-cycle Sno/Gard engines, feature ultra-high

torque and are available with 3 to 11 horsepower. The 3-horsepower 102 cc two-cycle model has a 6.2 cubic-inch displacement for lightweight portability and power. The four-cycle is available with 4, 5, 7, 8, or 11 horsepower. All are weather-shielded to block snow and moisture from cooling air intake, carburetor and governor, starter clutch, and spark plugs. Their ceramic magneto ignition produces high voltage at starting speeds.

Twin engines in 16 and 18 horsepower are designed to handle rugged jobs with smoothness. Cast-iron sleeves and ball bearings are standard on the 18-horsepower horizontal crankshaft engine and optional on the 16-horsepower horizontal crankshaft model.

Kawasaki's (304) four-cycle, air-cooled gasoline engines have a range from 3.4 to 20 horsepower. Model KF53DS with a 4.7 horse-



Kawasaki 6.4-horsepower, four-cycle KF 64 engine.

power has a bore of 2.59 inches (66 mm) and a stroke of 2.09 inches (53 mm). The 20-horsepower Model KF200DS has a bore and stroke of 85 x 70 mm (3.35 x 2.76 inches) and lubrication is force-fed by trochoid pump.

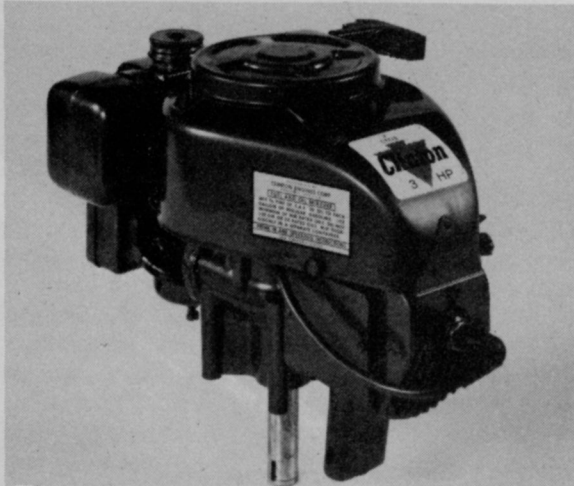
Onan (305) manufactures one-, two-, and four-cylinder air- and water-cooled gasoline engines with 12.9 to 25 horsepower and a line of heavy-duty, air- and water-cooled diesel-powered engines with 7.2 to 40 horsepower.

The two-cylinder B Series gasoline engines, which operate best between 2600 and 3600 rpm, are for use where light weight and low noise are needed. Their crankcases are made of die-cast aluminum to minimize heat build-up around the exhaust valve seats and cylinder bores. The crankshafts are of ductile iron with hardened journals.

The Onan CCK Series engines operate best in open air applications, where speed variations are short and wide (1800 to 4000 rpm). Each model has an air cleaner with replaceable dry element, a lube oil pump, an oil level indicator, a mechanical fuel pump, a manual choke, and twin mufflers with exhaust connectors.

Model T260G, with its 24 bhp (flywheel or brake horsepower), is recommended for both variable speed and continuous duty. It includes an electric starter, a mechanical flyball governor, a replaceable dry-element, two-stage air cleaner, and a spin-on, full-flow lube oil filter.

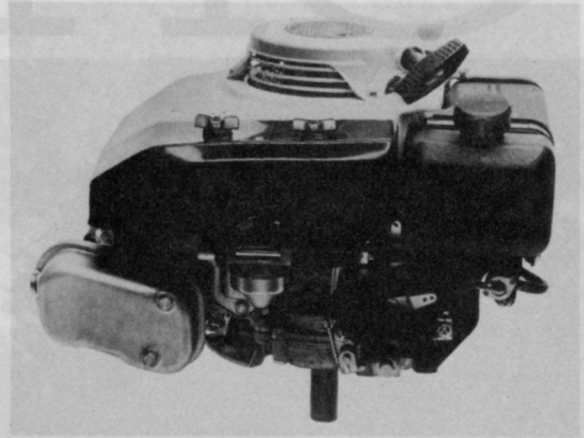
Clinton Engines Corporation (306) produces 16 basic engines, used principally on power lawnmowers with 2½ to 10.3 horsepower. These engines are available in two- and four-cycle designs, with horizontal and vertical crankshaft.



Clinton's vertical shaft, three-horsepower, two-cycle Series 501 engine.

The 500 and 501 series comprise several single-cylinder, two-cycled models with 3 horsepower. The 500 model has a bore of 2½ inches and a stroke of 1½ inches. The 501 has a bore of 2½ inches and a stroke of 1½ inches. Both are air-cooled and their piston displacement is 5.76 cubic inches. The 4.5-horsepower, four-cycle Series 498 engines are suitable for tillers and made of cast-iron alloy. They have a bore of 2-15/32 inches, a stroke of 2½ inches, and a piston displacement of 10.2 cubic inches.

American Honda Company (307) offers a new 5-horsepower vertical engine (GV200) for lawn and garden equipment which includes several features for durability. The top ring is hard-chrome-plated, the cylinder sleeve and valve guides are cast iron, and a trochoid oil pump provides positive lubrication. This model also has a dual-element air cleaner for higher efficiency, and a one-piece crankshaft which is hot-forged and heat-treated with ball bearings at both ends.



Honda GV200 five-horsepower, four-cycle engine.

The oil ring of the GV200 is a three-piece combination type, a design which has proved to reduce oil consumption. And the mechanical governor and fixed jet carburetor insure a consistently even fuel/air mixture and a stable output at both high and low speeds.

A single-cylinder, four-stroke engine from American Honda, the G-100, is currently being used to power its edgers. This two-horsepower, forced-air-cooled engine has a .36 gallon fuel tank that supplies power for approximately two hours. Piston displacement is 76 cc (4.6 cubic inches); bore and stroke are 46 mm x 46 mm (1.8 inches x 1.8 inches).

Teledyne Wisconsin Motor (308) offers air-cooled Robin gasoline engines in the 3 to 16.8 horsepower range. Two new single-cylinder, four-cycle models, W1-1340 and W1-1390, are equipped with heavy cast-iron cylinder liners and cast-iron camshafts with induction-hardened lobes.

Model W1-1340 is rated at 9 horsepower at 3600 rpm. It has a displacement of 20.4 cubic inches (334 cc), a bore of 3.07 inches (78 mm), and a stroke of 2.76 inches (70 mm).

Model W1-1390 is rated at 11 horsepower, also at 3600 rpm. Its displacement is 23.7 cubic inches (38 cc), with a bore of 3.307 inches (84 mm) and a stroke of 2.76 inches (70 mm).

A group of V-type, air-cooled engines from Teledyne Wisconsin is suitable for use with natural gas, gasohol, and even alcohol on special order. The two-cylinder, 25 horsepower model W2-1230 has a displacement of 75 cubic inches (1230 cc), and the four-cylinder 50 horsepower model W4-2460 has a 150-cubic-inch displacement. Both models have a 3.75-inch bore x 3.4-inch stroke, with a 6.8:1 compression ratio. They are available with an optional flywheel alternator rated 30 amperes at 12 volts.

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Distributor ignition and 12-volt electric start are standard on these V-type models. Inlet valves are made of Austenitic steel, and exhaust valves are of long-life, heat-resistant alloy. Positive-type valve rotators on the exhaust valves reduce the possibility of valve burning and contribute to longer valve life. Other standard features are a dry-type replaceable element air cleaner, mechanical diaphragm-type fuel pump, exhaust mufflers, and conveniently located fuel panel.

Teledyne Wisconsin has also introduced a new family of diesel engines. Model WD2-860 was selected by FMC Corporation to power its Bolens HT20D Diesel hydrostatic tractor, which it rates at 19.9 horsepower. This air-cooled engine is a twin-cylinder, four-cycle unit with cast-iron cylinders and forged crankshaft. It features full pressure lubrication and direct, open chamber combustion. The governor automatically presets the fuel injection pump to assure easy starting after shutdown. Automatic bleed valves eliminate air in the injection system.

Onan expects to have an L Series of diesel engines in production by the middle of this year. A two-cylinder model with 27.5 horsepower and a three-cylinder model with 41 horsepower will be ready some time in 1982.

Allis Chalmers (309) manufactures diesel engines which have cylinder heads designed with a cross flow. Because the intake and exhaust ports are located on opposite sides of the combustion chamber, both chamber and valves are cooled better. And with the combustion chamber actually in the piston head, there is a highly turbulent, swirling air mass at the time of injection, resulting in a more complete burning of fuel.

Model 213 delivers 27 horsepower at 3000 rpm for continuous-duty operation and is suitable for irrigating a lawn. Model 320 runs on 40 horsepower at the same rate.

How do gasoline and diesel engines compare in an actual performance test? Guido Gallioli, marketing manager for the Teledyne Wisconsin diesel, says, "We ran a comparison test between the 18.2-horsepower gasoline and 19 horsepower diesel. The initial additional cost of the diesel is offset in about 650 hours. After that, the use of a diesel becomes more economical in cost of fuel. Maintenance and tune-ups are fewer because diesel does not have electrical components. The injection pump is more precision-built than the carburetor and doesn't have to be adjusted — it stays tuned longer. The average life is at least double with the heavy-duty gasoline model. With the light-duty type, it's ten times longer. As a rule of thumb, the diesel makes sense economically for somebody who runs the equipment commercially or industrially."

Once the proper engine has been selected, it is

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important to know how it works and to understand its three basic needs — fuel-air mixture, compression, and ignition — in order to keep it running as economically as possible. Every manufacturer provides owner and service manuals for its engines which should be followed carefully.

A failed engine can be easily overhauled and rarely needs to be replaced. However, P. H. Scholten, Kohler's service manager, advises in the company's "EM" (Equipment Management) publication: "Before rebuilding an air-cooled engine, a systematic analysis of the failure should be conducted to determine the cause and ascertain whether or not it was preventable."

When an engine must be completely replaced, the Hustler Corporation can interchange models on its lawn care equipment with only slight modifications, except for an 18 horsepower model. The company puts Kohler models K532 (20 horsepower) and K582 (23 horsepower) on its lawnmower models 275 and 285. It mounts a Briggs & Stratton 18-horsepower, air-cooled engine on another mower and also uses a Teledyne Continental water-cooled engine with 25 h.p.

"We basically have the same frame on all our units," says John Austin of Hustler's Service De-

partment, "and with relocation of the motor mounts, we can pull a Kohler out and put a Continental engine in."

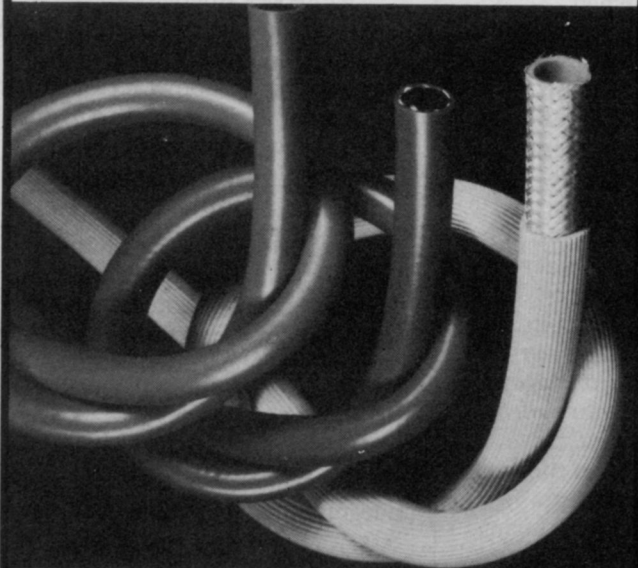
Tuflex uses Briggs & Stratton 5 and 8 horsepower and advises replacement with the same engine.

Bunton & Goodall equips its mowers with Briggs & Stratton and Tecumseh engines. The company uses a Teledyne Wisconsin diesel with 19 horsepower on one tractor and a Kohler gasoline, 20-horsepower engine on another. "You can swap some engines," says Orville McDonner. "It's about an hour's job."

Toro uses a variety of engines on its equipment, including Kohler, Chevrolet, Teledyne Continental, and Briggs & Stratton. The air-cooled are most often replaced.

"To stretch air-cooled engine life," writes P. H. Scholten, "There are only three simple rules to follow: Keep the engines clean on the outside, keep them clean on the inside, and keep them supplied with oil. Air-cooled engines are built to withstand severe punishment . . . The successful extension of air-cooled engine life depends not on how well the shop can repair them, but on how well the man using them can perform a basic inspection, and on routine service." **WTT**

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