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Summary Article: **marine engine**

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machine for the propulsion of watercraft. The earliest marine power plants, reciprocating steam engines, were used almost exclusively until the early 1900s. In later ship construction these were largely replaced by the steam turbine and the internal-combustion engine (see also diesel engine). For some applications, notably ferries, electric motors are used to allow greater maneuverability. Steam turbines having 1,000 shaft horsepower and more are used for the most powerful ships. Diesel engines may supply power for vessels ranging in size from small boats to medium-size ships requiring as much as 40,000 total horsepower. Gas turbines and fast diesels usually have a reduction-gear drive making it possible to run them at high speeds (for maximum economy) while the propeller turns at low speeds (for maximum efficiency). Gas turbines have been used experimentally in merchant ships and naval patrol boats. Some submarines, merchant ships, and icebreakers have nuclear power plants in which a nuclear reactor replaces the boiler of a steam turbine plant. Conventional submarines have a diesel-electric drive and run on batteries when submerged. Small boats usually have gasoline outboard engines that clamp on the stern or inboard engines to drive propeller shafts. Shallow-draft boats for use in swamps have aircraft engines and air propellers. A few small boats are propelled by a pumped jet of water. The inboard-outboard motor for small vessels incorporates features of both types: the engine, the reduction gearing, and the vertical propeller shaft compose a self-contained unit that is mounted with the engine inboard, usually just forward of the transom; the gear housing projects through an opening in the transom and the propeller shaft extends down from it. This arrangement makes possible the combination of a relatively large power plant with the convenience and maneuverability of an outboard installation; e.g., the propeller may be tilted up in order to beach the boat.

See Miller, C. , *Small Boat Engines* (1961);

Flack, J. E. et al., *Marine Combustion Practice* (1969);

Rowland, K. T. , *Steam at Sea* (1971).

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