DIESEL POWER of
M.S. HENRY FORD II

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THE motorship Henry Ford II is of the lake type with engine room aft, having a length of 612 feet, a beam of 62 feet, a draft of 24 feet, gross tonnage 8877 tons, and net tonnage 7074 tons. The crew consists of 34 men, of whom 11 are assigned to the engine room.

In a normal season of about 8 months, extending from April 1 to December 1, the vessel carries approximately a million tons of cargo to the Ford Rouge plant.

The cargoes consist of iron ore, limestone, and coal, the ore being loaded at Lake Superior ports. It requires about 4 hr to load and about 9 hr to unload at the plant. The limestone is loaded at Calcite, Mich., and the coal at Toledo, Ohio. It is not unusual for the vessel to carry a 15,000-ton cargo to the plant. The amount of the load depends somewhat upon the depth of the Rouge River which varies as much as 18 in. during the season. On the run from the Rouge plant to where the cargo is taken aboard the vessel takes on water ballast which amounts to about 4000 tons. This ballast is pumped out as the cargo is received. The average speed of the vessel is 13 mph with cargo and 14 1/2 mph with water ballast.

The foregoing details will give some conception of what is required of the power plant. The engine-room crew is employed the year around as the 4 months' lay-up is required to overhaul the machinery which is always kept in first-class condition. The crew's quarters and the food are on a par with the best hotels.

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After a season's run, with the oil as specified, when the engine is opened up, no traces of tarry deposits are found in the cylinders, and the piston rings are perfectly free in their grooves. The piston heads are also found to be quite free from carbon or other deposits.

Each of the two auxiliary generator engines is operated alternately every 30 days. They supply the current for all the auxiliaries on the vessel, which are 70 in number, including 6 mooring winches, an anchor windless, 2 steering gears, 2 refrigerating machines, 2 hatch winches, and all the service pumps. All the service pumps are in duplicate and are used alternately.

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There are two Worthington air compressors which supply the air for starting purposes; the air is pumped into air bottles or chambers and used as needed; the air pressure in these bottles is constantly kept at 650 psi.

**Diesel Operating Suggestions**

A few hints on successful operation of Diesel engines follow:

1. It is important to keep the lubricating oil clean and free from water and dirt; also to keep the engine water jackets free from scale and grease.

2. Keep the piston clearances as specified by the engine builders.

3. A constant check of the exhaust temperature is essential. If it rises above normal it indicates excessive fuel consumption or improper timing and may cause considerable trouble.

Fig. 2 shows a set of indicator, compression, and valve-lift cards taken on the main engine of the motorship Henry Ford II on Lake Superior; ship loaded, 19-ft draft, strong head wind. The valve-lift cards were taken on 1 to 10 control for the front valves and 3 to 10 control for the back valves; Table 1 contains the data. Conditions of the run were as follows: Fuel pressure, 5000 psi; control on No. 7; engine revolutions, 82.4 per min; speed, 13.4 mph; fuel consumption, 140 gph.

### Table 1: Data from Engine-Operating Cards

<table>
<thead>
<tr>
<th>Indicated horse-power, psi</th>
<th>Ignition pressure, psi</th>
<th>Valve open front B.D.C., A.D.C., deg</th>
<th>Valve open back B.D.C., A.D.C., deg</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1 cyl.... 812</td>
<td>509</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>No. 2 cyl.... 809</td>
<td>514</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>No. 3 cyl.... 789</td>
<td>514</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>No. 4 cyl.... 796</td>
<td>512</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong>........ 3208</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fuel consumption = \[
\frac{140 \times 7.46}{3208} = 0.325 \text{ lb per hphr}
\]