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WAR DEPARTMENT

TECHNICAL MANUAL

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ORDNANCE MAINTENANCE

GENERAL MOTORS TWIN DIESEL 6-71 POWER PLANT FOR MEDIUM TANKS M3A3, M3A5, AND M4A2

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Prepared under the direction of the
Chief of Ordnance

CONTENTS

ORDNANCE MAINTENANCE—GENERAL MOTORS TWIN DIESEL 6-71 POWER PLANT FOR MEDIUM TANKS M3A3, M3A5 AND M4A2

Section I

INTRODUCTION

1. PURPOSE AND SCOPE.

These instructions are published for the information and guidance of the ordnance personnel charged with the maintenance and repair of this materiel. They contain a description of the General Motors 6-71 dual Diesel Engine Model 6046 for Medium Tanks M3A3, M3A5 and M4A2, all of its component parts and accessories, and the clutch and propeller shaft, as well as detailed instructions for their disassembly, inspection, servicing, and assembly.

2. CONTENT AND ARRANGEMENT OF THE MANUAL.

Section I covers the purpose and scope of the manual and gives references to other technical manuals. Sections II to XXIV give information for ordnance personnel on the maintenance of the engine, its accessories, and the propeller shaft and universal joints.

3. REFERENCES.

Section XXV at the end of this technical manual lists all standard nomenclature lists, technical manuals, and other publications for the materiel described herein. This power plant is used on three models of medium tanks. Information concerning Medium Tank M3A3 and M3A5 will be found in TM9-753 and that concerning Medium Tank M4A2 in TM9-758.

Section II

ENGINE

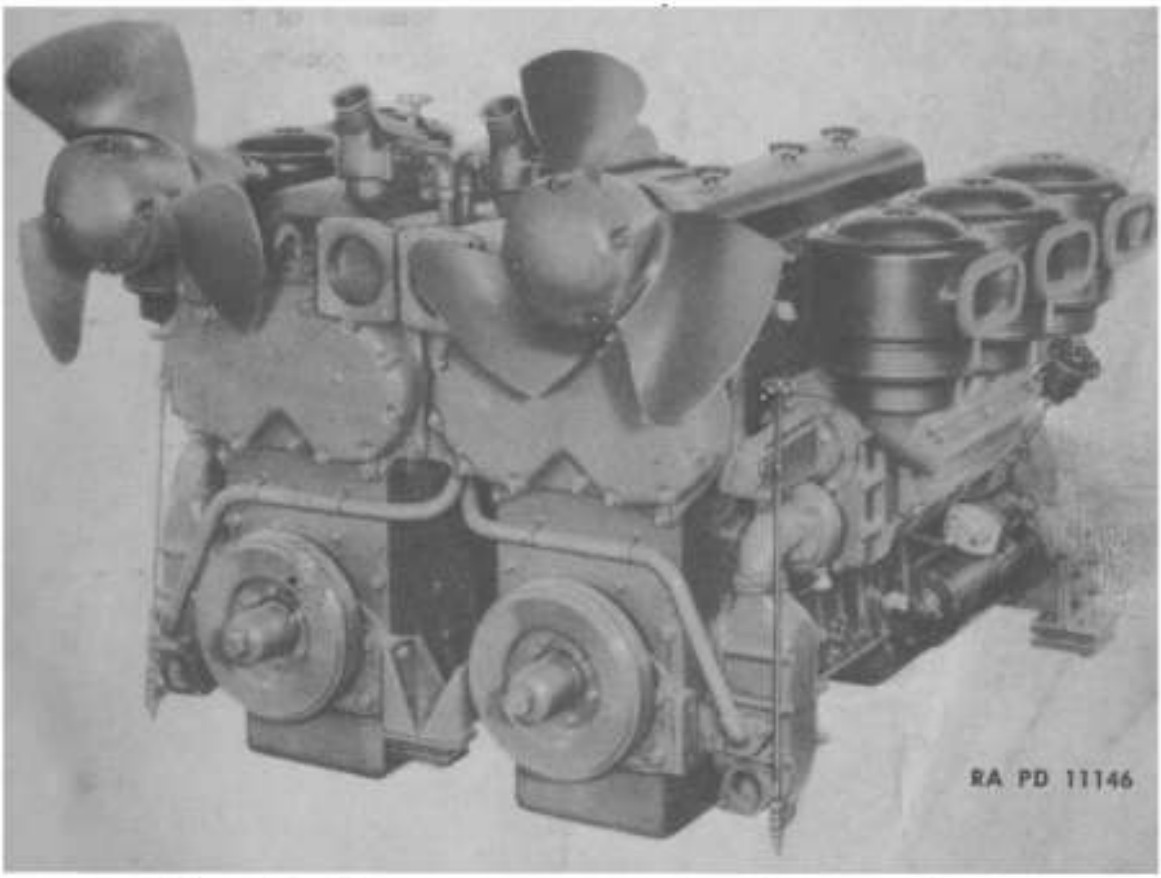

Figure 1—Three-quarter Rear View of Power Plant

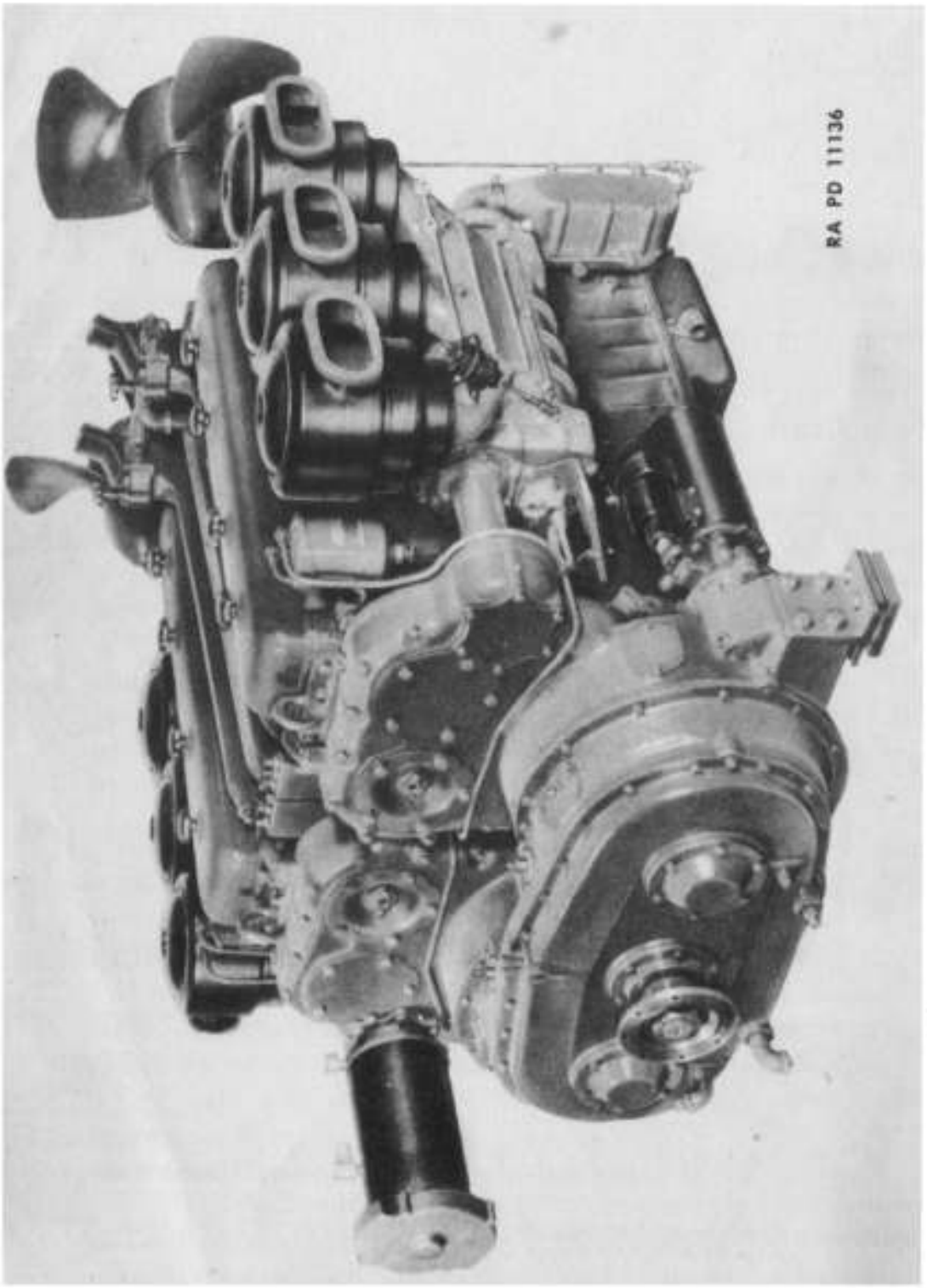

Figure 2—Three-quarter Front View of Power Plant

ENGINE

4. SERIAL NUMBERS.

Power plant serial numbers start with 6046-1 and run consecutively. The power plant serial number appears on a plate on the transfer gear housing. Individual engine serial numbers are not available.

5. MODEL DESIGNATION (figs. 1 through 14).

NOTE: The term power plant is used to designate the twin engine assembly. Individually, the engines are designated as Model 671LA24M and Model 671LC24M. In the following description and throughout this manual all references to the left and right side of the power plant or of either engine are established as follows: The fan end is the rear end and the left side is that side nearest the left side of the tank. The transfer gear housing end is the front end and the right side is that side nearest the right side of the tank. Both of these engines are right-hand rotation as established from the front of the engine. The engine on the right side of the tank is the LA engine and the engine on the left side is the LC engine.

6. GENERAL.

a. The twin Diesel power plant discussed in this text consists of two six-cylinder engines paired together by a transfer gear train. Both engines have the same bore and stroke and use the same parts wherever possible. Thus the major working parts such as injectors, pistons, connecting rods, and all bearings and other numerous parts are interchangeable. See paragraph 27 **b** for non-interchangeable parts.

b. Although certain accessories and subassemblies can be mounted only on one side of the engine, the blower, water pump, oil cooler, oil filter, governor and fuel pump can be located on either the right or left side of each engine. This flexibility in the arrangement of parts is obtained by having both the cylinder block and cylinder head symmetrical at both ends and with respect to each other.

c. Power from each engine is transmitted through its clutch to its drive shaft and gear. The drive gears of the two engines jointly drive a single driven gear, which transmits the power to the propeller shaft.

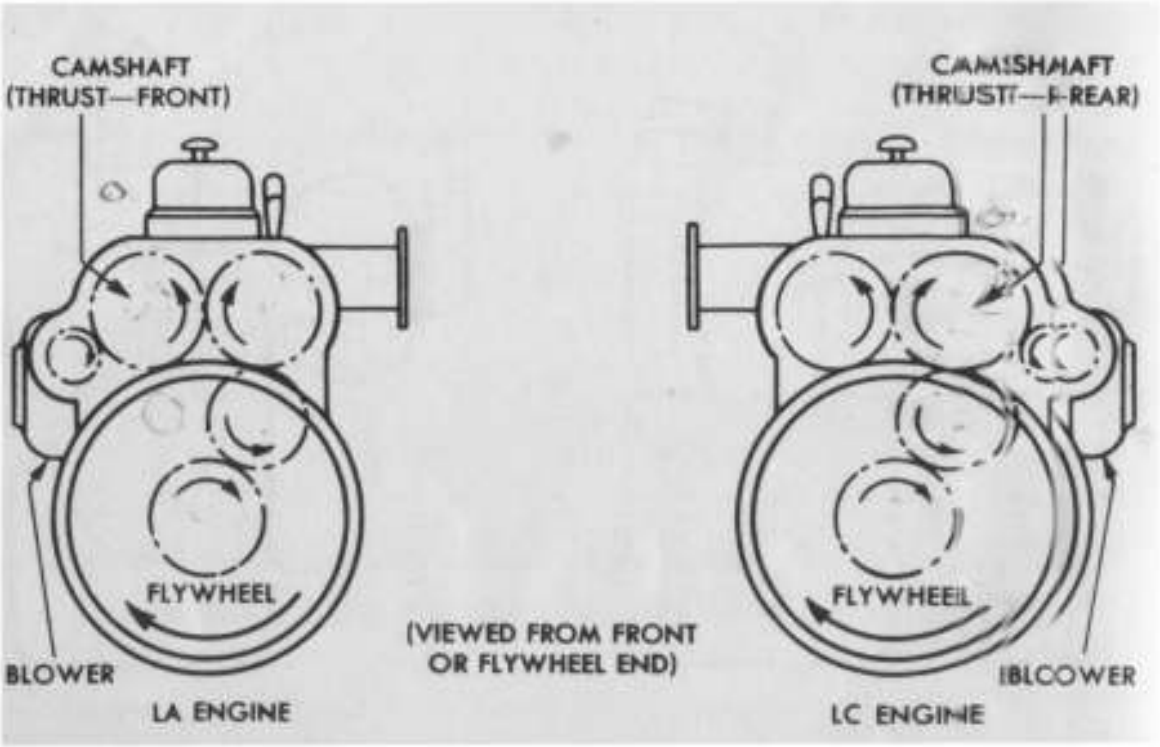

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Figure 3—Rotation Diagrams of LA and LC Engines

7. THE DIESEL PRINCIPLE.

a. The Model 6046 Diesel power plant consists of 2 two-stroke cycle, internal combustion engines. An internal combustion engine converts the heat of fuel into work energy in the cylinder of the engine.

b. The Diesel engine differs from the gasoline engine principally in the method used to introduce and ignite the fuel. The gasoline engine draws a mixture of fuel and air through the carburetor into the combustion chamber, where it is ignited by an electric spark. In the Diesel engine, air alone is compressed in the cylinder. A charge of fuel is sprayed into the cylinder after the air has been compressed, and ignition is accomplished by the heat of compression (fig. 4).

c. In the LA24M and LC24M Diesel engines, intake and exhaust take place during part of the compression and power strokes. Since a two-stroke cycle engine does not function as an air pump, an external means of supplying the air is provided. Specially designed blowers, bolted to the side of each engine, force air into the cylinders, thus expelling the exhaust gases and filling the cylinders with fresh air for combustion.

d. A series of ports in double rows of 32 each and equally spaced and staggered cut into the cylinder walls and the cylinder liners. These

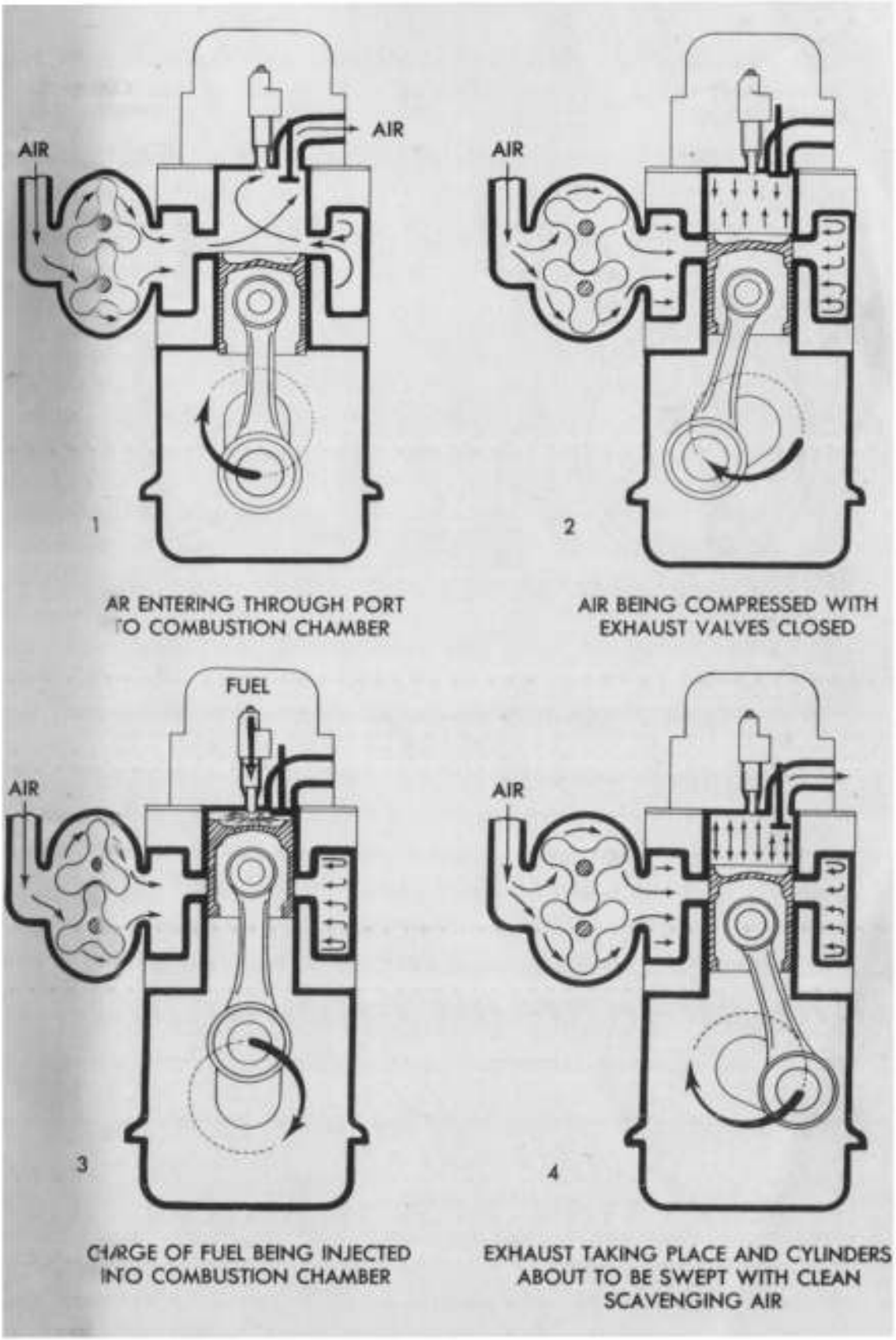

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Figure 4—Operating Cycle of the 6046 Power Plant

ports admit air from the blower into the cylinder as soon as the top face of the piston uncovers the ports. The inrush of fresh air toward the exhaust valves produces a scavenging effect. This eliminates the burnt gases and leaves the cylinders full of clean air when the piston again covers the inlet ports (fig. 4, diagram 1).

e. As the piston continues on the upward stroke, the exhaust valves close and the charge of fresh air is subjected to compression (fig. 4, diagram 2). The engines have a 16 to 1 compression ratio.

f. Shortly before the piston reaches its highest position, a measured amount of fuel is sprayed into the combustion chamber by the fuel injector (fig. 4, diagram 3). The intense heat generated by the high compression of the air ignites the fine fuel spray immediately, and the combustion continues as long as the fuel spray lasts. Combustion forces the piston downward, and the exhaust valves are again opened as the effective part of the power stroke is completed (fig. 4, diagram 4). The burnt gases escape into the exhaust manifold and the downward moving piston uncovers the inlet ports. As these ports are uncovered, the cylinder is again swept with clean scavenging air. Combustion is completed in each cylinder once for each revolution of the crankshaft. The entire combustion cycle is completed in each cylinder in each revolution of the crankshaft, or in other words, in each two strokes.

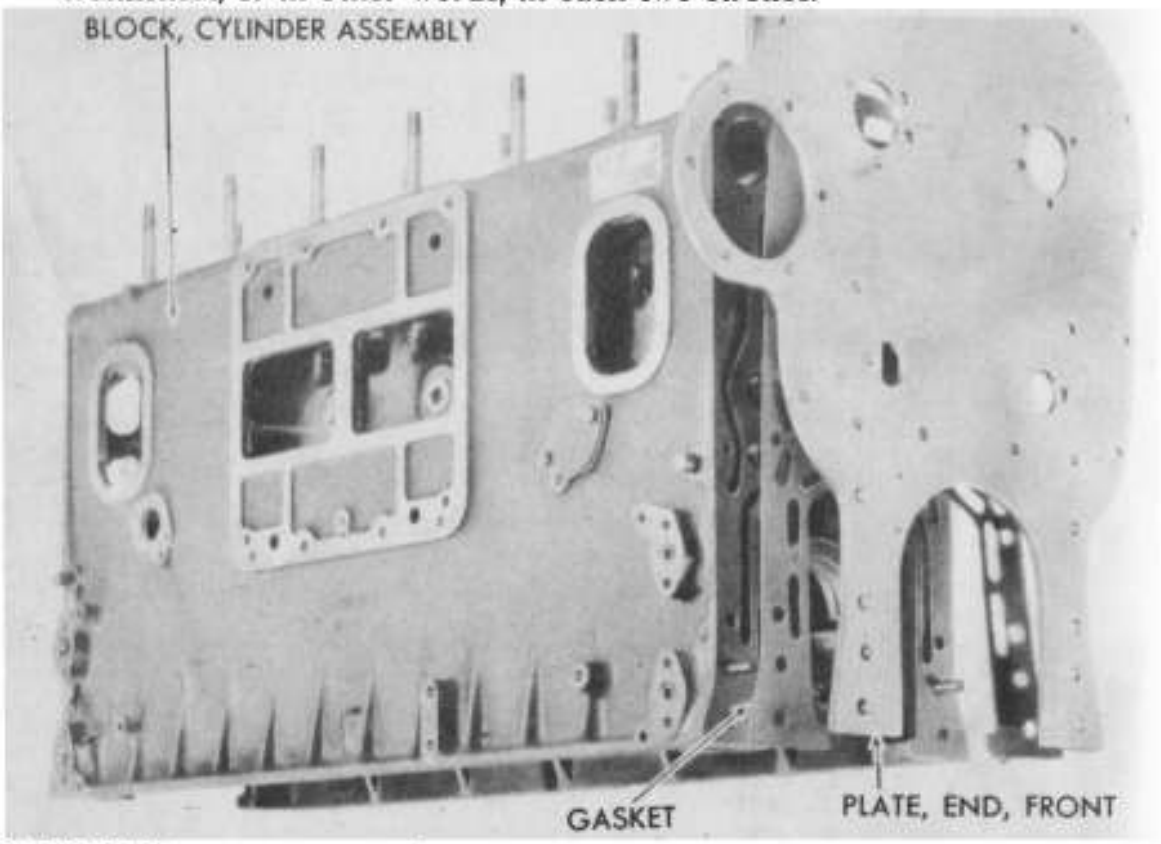

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Figure 5—Cylinder Block

ENGINE

8. CYLINDER BLOCK AND CRANKCASE.

a. The cylinder block and crankcase, which is the main structural part of the engine, is a box-like, one-piece casting made of alloy cast iron (fig. 5). The two ends of the block are identical, so that the flywheel housing and gear train can be put on either end.

b. Each cylinder is bored to receive a cylinder liner, which has a number of air inlet ports drilled into it. The water jackets extend the full length of the bores and are divided into upper and lower sections, which are connected by hollow struts. Cooling water enters at the bottom of the water jacket from the water pump and leaves at the top through holes which line up with corresponding openings in the cylinder head. Surrounding the water space is an air chamber which conducts the air from the blower to all inlet ports.

c. The camshaft and balancer shaft are located near the top of the cylinder block.

d. The upper halves of the main bearing seats are cast integrally with the block. Drilled passages in the block, which carry lubricating oil to all moving parts, eliminate exterior piping. Handhole plates on the side opposite the blower provide access to the air chamber. Also, there are two handhole plates on the blower side.

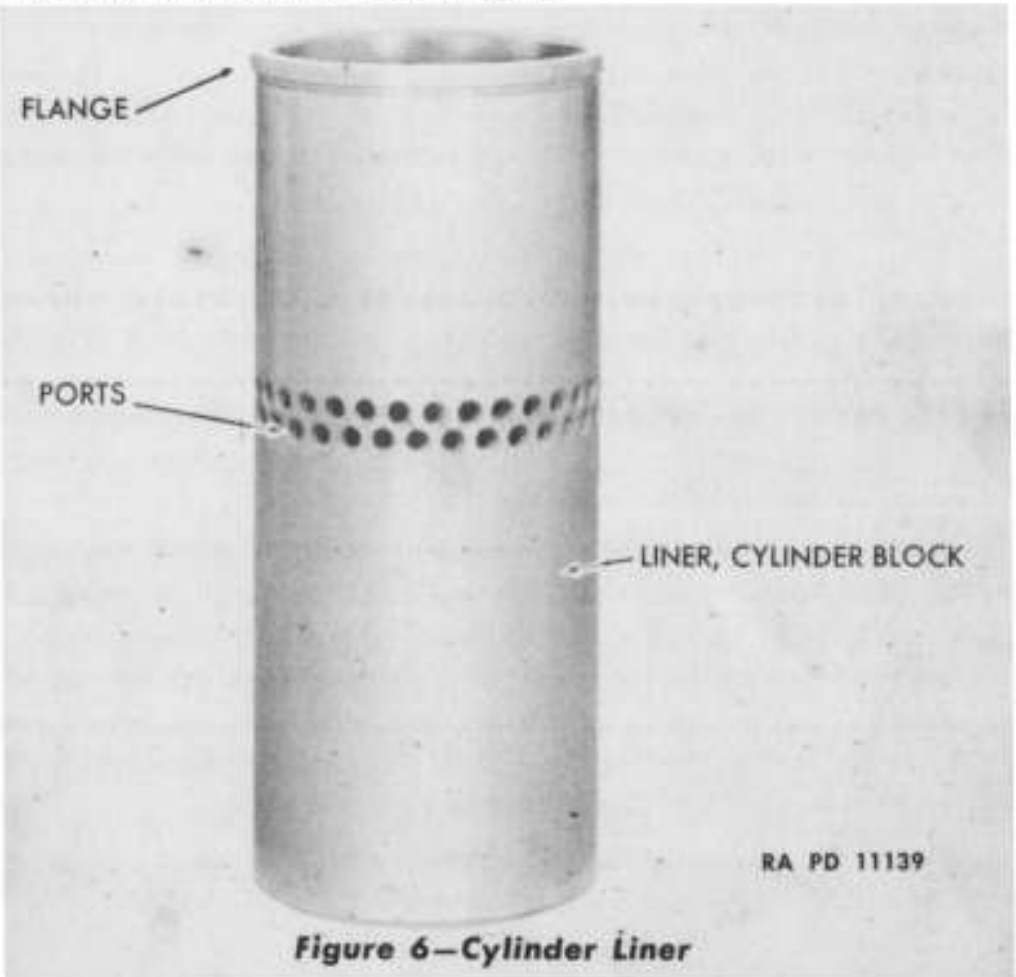

Figure 6—Cylinder Liner