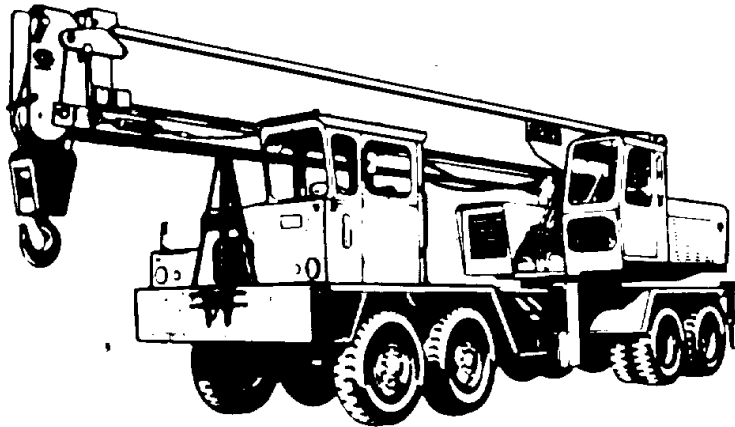


TECHNICAL MANUAL

**ORGANIZATIONAL, DIRECT SUPPORT AND
GENERAL SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS LIST
AND SPECIAL TOOLS LIST)**

FOR

**CRANE, TRUCK MOUNTED
HYDRAULIC 25 TON (CCE)
GROVE MODEL TM S-300-5
(NSN 3810-01-054-9779)**



**VOLUME 3
(ENGINE)**

HEADQUARTERS, DEPARTMENT OF THE ARMY

8 MAY 84

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Technical Manual }
No. 5-3810-300-24 & P3 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 8 May 1984

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AND GENERAL SUPPORT MAINTENANCE MANUAL
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25 TON (CCE)
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Procured under Contract No. DSA 700-77-C-8511

REPORTING OF ERRORS

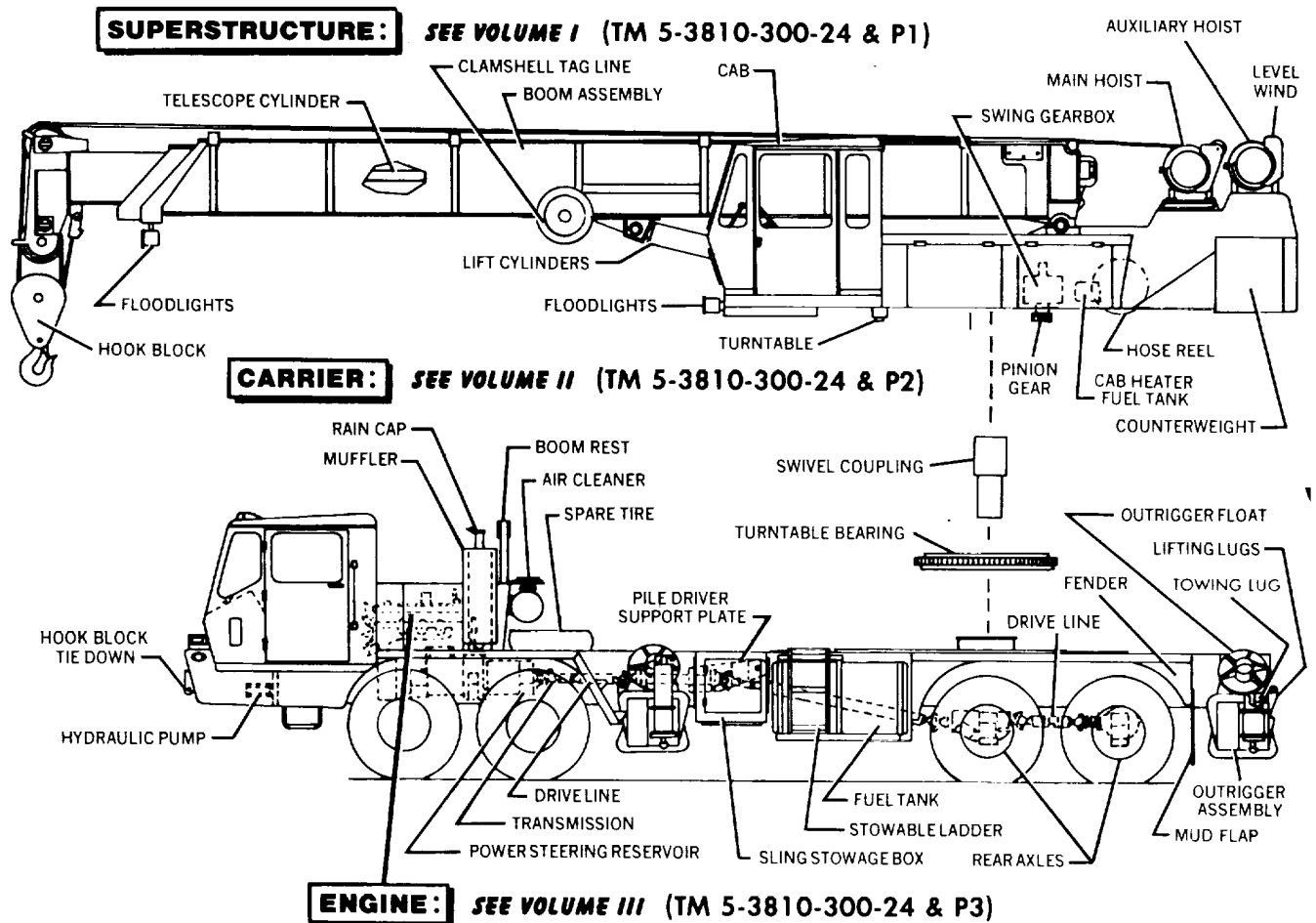
You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 20282 located in the back of this manual direct to: Commander, US Army Tank Automotive Command, ATTN: DRSTA-MB, Warren, MI 48090. A reply will be furnished direct to you.

**VOLUME III
(ENGINE)**

Engine Operation, Description	CHAPTER I
Service and Maintenance (In-Line 71 Engine)	CHAPTER II
Parts Catalog (In-Line 71 Engine)	CHAPTER III
Numerical Parts List and Quantity for Grove Model TMS 300-5 Engine	CHAPTER IV

This technical manual is an authentication of the manufacturers commercial literature and does not conform with the format and content specified in AR 3103, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

Illustration I TMS300-5 Component Location.



IMPORTANT MAINTENANCE INFORMATION

The quarterly Equipment Improvement Report and Maintenance Digest TB 43-0001-41 series contains valuable field information on the equipment covered in this manual. The information in TB 43-0001-41 series is compiled from some of the Equipment Improvement Reports (SF 368) that you prepared on the vehicle covered in this manual. Many of these articles result from comments, suggestions, and improvement recommendations that you submitted to the EIR program. The TB 430001-41 series contains information on equipment improvements, minor alternations, proposed Modification Work Orders (MWO's), actions taken on some of your DA Form 2028's, and advance information on proposed changes that may affect this manual.

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CHAPTER I

General Information

PRINCIPLES OF OPERATION

The diesel engine is an internal combustion power unit, in which the heat of fuel is converted into work in the cylinder of the engine.

In the diesel engine, air alone is compressed in the cylinder; then, after the air has been compressed, a charge of fuel is sprayed into the cylinder and ignition is accomplished by the heat of compression.

The Two Cycle Principle

In the two-cycle engine, intake and exhaust take place during part of the compression and power strokes respectively as shown in Fig. 1. In contrast, a four-cycle engine requires four piston strokes to complete an operating cycle; thus, during one half of its operation, the four-cycle engine functions merely as an air pump.

A blower is provided to force air into the cylinders for expelling the exhaust gases and to supply the cylinders with fresh air for combustion. The cylinder wall contains a row of ports which are above the piston when it is at the bottom of its stroke. These ports admit the air from the blower into the cylinder as soon as the rim of the piston uncovers the ports as shown in Fig. 1 (scavenging).

The unidirectional flow of air toward the exhaust valves produces a scavenging effect, leaving the cylinders full of clean air when the piston again covers the inlet ports.

As the piston continues on the upward stroke, the exhaust valves close and the charge of fresh air is subjected to compression as shown in Fig. 1 (compression).

Shortly before the piston reaches its highest position, the required amount of fuel is sprayed into the combustion chamber by the unit fuel injector as shown in Fig. 1 (power). The intense heat generated during the high compression of the air ignites the fine fuel spray immediately. The combustion continues until the fuel injected has been burned.

The resulting pressure forces the piston downward on its power stroke. The exhaust valves are again opened when the piston is about half way down, allowing the burned gases to escape into the exhaust manifold as shown in Fig. 1 (exhaust). Shortly thereafter, the downward moving piston uncovers the inlet ports and the cylinder is again swept with clean scavenging air. This entire combustion cycle is completed in each cylinder for each revolution of the crankshaft, or, in other words, in two strokes; hence, it is a "two-stroke cycle".

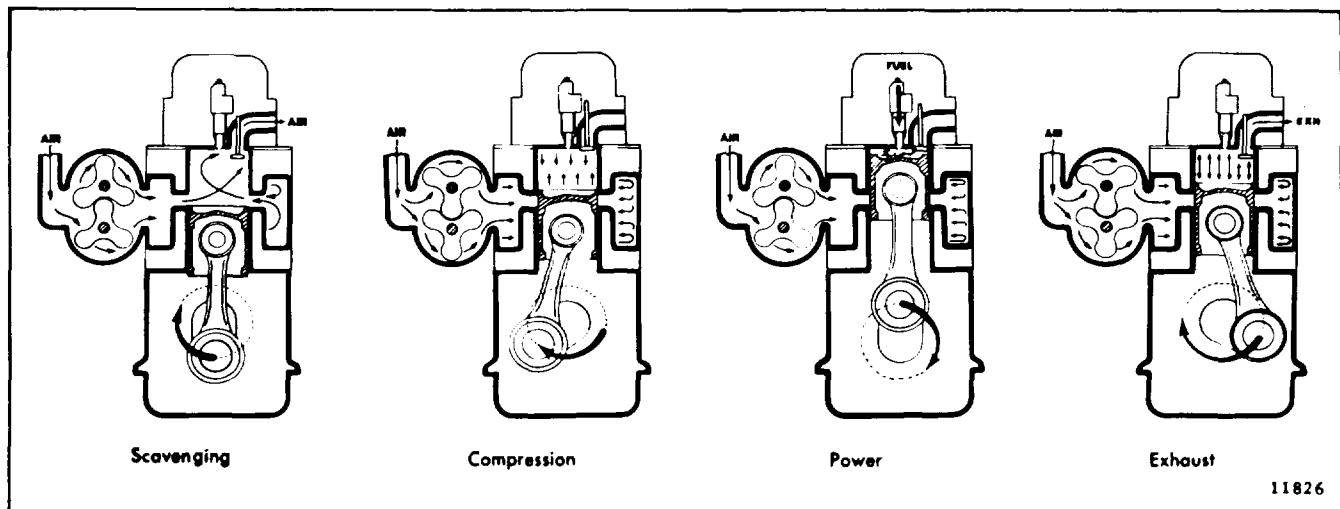


Fig. 1 - The Two-Stroke Cycle

GENERAL DESCRIPTION

The two-cycle diesel engines covered in this manual are produced in 3, 4 and 6 cylinder models having the same bore and stroke and many of the major working parts such as injectors, pistons, connecting rods, cylinder liners and other parts that are interchangeable.

The blower, water pump, governor and fuel pump form a group of standard accessories which can be located on either side of the engine. Further flexibility in meeting installation requirements can be had by placing the exhaust manifold and the water outlet manifold on either side of the engine (Fig. 2). This flexibility in the arrangement of parts is obtained by having both the cylinder block and the cylinder head symmetrical at both ends and with respect to each other.

Each engine is equipped with an oil cooler, full-flow lubricating oil filter, fuel oil strainer, fuel oil filter, air cleaner, governor, fan and radiator, and starting motor.

Full pressure lubrication is supplied to all main, connecting rod and camshaft bearings, and to other moving parts within the engine. A gear-type pump draws oil from the oil pan through an intake screen, through the oil filter and then to the oil cooler. From the oil cooler, the oil enters a longitudinal oil gallery in the cylinder block where the supply divides; a portion entering the by-pass filter, if used, and then draining back into the oil pan, part going to the cam and balance shaft end bearings and cylinder head, with the remainder going to the

main bearings and connecting rod bearings via the drilled crankshaft.

Coolant is circulated through the engine by a centrifugal-type water pump. Heat is removed from the coolant, which circulates in a closed system, by the radiator. Control of the engine temperature is accomplished by a thermostat which regulates the flow of the coolant within the cooling system.

Fuel is drawn from the supply tank through the fuel strainer by a gear-type fuel pump. It is then forced through a filter and into the fuel inlet manifold in the cylinder head and to the injectors. Excess fuel is returned to the supply tank through the fuel outlet manifold and connecting lines. Since the fuel is constantly circulating through the injectors, it serves to cool the injectors and also carries off any air in the fuel system.

Air for scavenging and combustion is supplied by a blower which pumps air into the engine cylinders via the air box and cylinder liner ports. All air entering the blower first passes through an air cleaner.

Engine starting is provided by an electric starting motor energized by a storage battery. A battery charging generator, with a suitable voltage regulator, serves to keep the battery charged.

Engine speed is controlled by a mechanical governor.

GENERAL SPECIFICATIONS

	6-71
Type.....	2 Cycle
Type.....	2 Cycle
Number of Cylinders	6
Bore (inches)	4.25
Bore (mm).....	108
Stroke (inches)	5
Stroke (mm).....	127
Compression Ratio (Nominal) (Standard Engines)	17 to 1
Compression Ratio (Nominal) ("N" Engines)	18.7 to 1
Total Displacement - cubic inches	426
Total Displacement - litres	6.99
Firing Order - R.H. Rotation	1-5-3-6-2-4
Number of Main Bearings	7

1 0 6 7 - 7 0 0 1

SERIES 71 IN-LINE ENGINE	NUMBER OF CYLINDERS	APPLICATION DESIGNATION (see below)	BASIC ENGINE ARRANGEMENT AND DRIVE SHAFT ROTATION (see below)	DESIGN VARIATION (see below)	SPECIFIC MODEL NUMBER
		<u>APPLICATION DESIGNATION:</u>	<u>DESIGN VARIATIONS:</u>		
		1067-7001 VEHICLE F-F	1067-7001	4 VALVE HEAD ("N" ENGINE)	
			1067-7101	2 VALVE HEAD ENGINE	
			1067-7201	4 VALVE HEAD ("E" ENGINE)	
			1067-7301	TURBOCHARGED ENGINE	
			1067-7501	CUSTOMER SPEC. ENGINE	
			1067-7700	CONSTANT HORSEPOWER	
		<u>BASIC ENGINE ARRANGEMENTS:</u>			
		Rotation: L (left) and R (right) designates rotation viewed from the front of the engine. Type A-B-C-D designates the accessory arrangements.			
<p>RA (XXXX-5XXX)</p>	<p>RB (XXXX-6XXX)</p>	<p>RC (XXXX-7XXX)</p>	<p>RD (XXXX-8XXX)</p>		
<p>ALL VIEWS FROM FLYWHEEL REAR END OF ENGINE ENGINE ROTATION DETERMINED BY VIEWING ENGINE FROM BALANCE WEIGHT COVER (FRONT) END</p>					
					11734A

Fig. 2 - Model Numbering (Current Engines), Rotation and Accessory Arrangements

ENGINE MODEL, SERIAL NUMBER AND OPTION PLATE

Engine Model and Serial Numbers

On all current Series 71 engines, the engine serial number and the engine model number are stamped on the cylinder block (Figs. 3 and 4). The engine serial number and model number are also stamped on the Option Plate (when used) attached to the valve rocker cover.

Engine Serial Number

The engine serial number is prefixed by numerals indicating the number of cylinders and the letter "A" which designates a Series 71 engine.

Engine Model Number

Current Series 71 engines are identified by an eight digit model number (Fig. 2). The engine model number 10677001 illustrated is interpreted as follows: Series 71 Inline engine (1), six-cylinder (06), vehicle engine (7), right-hand rotation with "C" accessory arrangement (7), four-valve head "N" engine (0) and specific model variation No. 1 (01).

Option Plate

An option plate, attached to the valve rocker cover, carries the engine serial number and model number and, in addition, lists any optional equipment used on the engine (Fig. 5). An exhaust emission certification label, separate from the option plate, is mounted

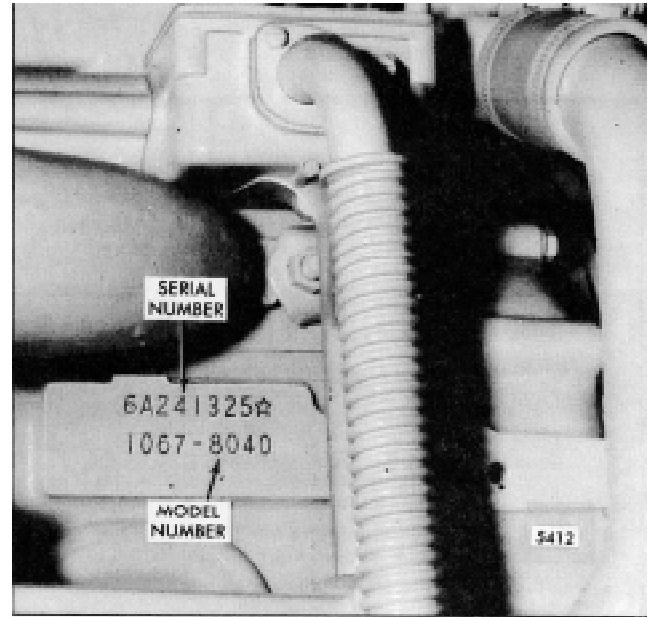


Fig. 4 Typical Engine Serial Number and Model Number As Stamped on Cylinder Block (Current Engines)

permanently in the option plate retainer. The current label includes information relating to an engine family for the maximum fuel injector size and maximum speed. Refer to Section 14 for further information regarding emission regulations.

With any order for parts, the engine model number and serial number must be given. In addition, if a type number is shown on the option plate covering the equipment required, this number should also be included on the parts order.

All groups of parts used on an engine are standard for the engine model unless otherwise listed on the option plate.

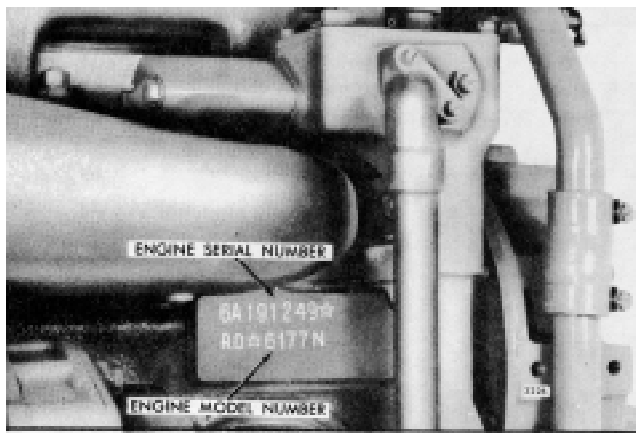


Fig. 3 Typical Engine Serial Number and Model Number as Stamped on Cylinder Block (Former Engines)

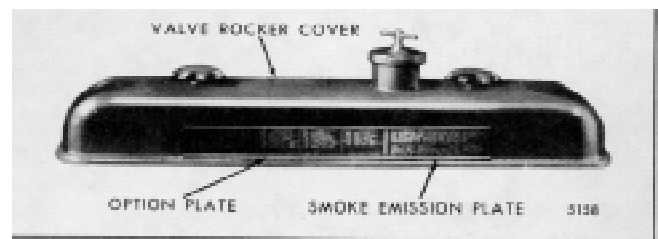


Fig. 5 - Option Plate