1/4 6d U13 i Tm 1944

TM 9-1785A

WAR DEPARTMENT TECHNICAL MANUAL

U.S. Dept of Army

ORDNANCE MAINTENANCE

Engine, Engine Accessories, and Torque Converter for 18-Ton M4 and 38-Ton M6 High Speed Tractors

UNIVERSITY of CALIFORNIA LIBRARY OCT 27 1947 DOCUMENTS DIVISION

WAR DEPARTMENT • *27 MARCH 1944*

FOR ORDNANCE PERSONNEL ONLY

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:45 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

WAR DEPARTMENT TECHNICAL MANUAL

TM 9-1785A

ORDNANCE MAINTENANCE

Engine, Engine Accessories, and Torque Converter for 18-Ton M4 and 38-Ton M6 High Speed Tractors

WAR DEPARTMENT • *27 MARCH 1944*

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:45 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

WAR DEPARTMENT

Washington 25, D. C., 27 March 1944

TM 9-1785A, Ordnance Maintenance: Engine, Engine Accessories, and Torque Converter for 18-ton M4 and 38-ton M6 High Speed Tractors, is published for the information and guidance of all concerned.

[A.G. 300.7 (13 Aug 43)
O.O.M. 461/(TM9) Rar. Ars. (3-30-44)]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION: R 9 (4); C 9 (8); Bn 9 (2).

(For explanation of symbols, see FM 21-6.)

Generated on 2016-07-15 17:46 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

U113
.2
TM 9-1785A
1944

CONTENTS

M5746[illegible]
Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:46 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

ORDNANCE MAINTENANCE—ENGINE, ENGINE ACCESSORIES, AND TORQUE CONVERTER FOR 18-TON M4 AND 38-TON M6 HIGH SPEED TRACTORS

CHAPTER 1

INTRODUCTION

1. SCOPE.

a. This manual is published for the information and guidance of ordnance maintenance personnel. It contains detailed instructions for inspection, disassembly, assembly, maintenance, and repair of the Waukesha Model 145 GZ gasoline engine and the Twin-disk Model T-10010 torque converter used in both the 18-ton M4 and 38-ton M6 High Speed Tractors (Allis-Chalmers). This manual does not contain information which is intended primarily for the using arms, since such information is available to ordnance maintenance personnel in 100-series TM's and FM's.

b. Chapter 2 contains information for disassembling, inspecting, and rebuilding the engine and accessories in the 18-ton High Speed Tractor M4. Chapter 3 contains maintenance instructions for the clutch housing assembly and propeller shaft, and chapter 4 contains information for the maintenance of the torque converter. Special tools required for disassembly and assembly operations are listed in chapter 5.

c. TM 9-785 contains operating and second echelon maintenance information for the 18-ton High Speed Tractor M4.

d. TM 9-788 contains operating and second echelon maintenance information for the 38-ton High Speed Tractor M6.

e. TM 9-1785B contains descriptive and maintenance procedure information as outlined in subparagraph **b** above for the cab and seats, and power train which consists of the transmission, differential, speedometer drive, final drives, suspensions, winch and controls, power take-off and main frame, fuel tank and pintles.

f. Maintenance information for standard engine equipment or accessories is not included in this manual but is available in the following manuals:

Cranking motor, generator, regulator, and ignition system (Delco-Remy) ..... TM 9-1825A
Carburetors (Zenith) ..... TM 9-1826C
Air compressor (Bendix-Westinghouse) ..... TM 9-1827A
Fuel pump (A-C) ..... TM 9-1828A

2. DIFFERENCES BETWEEN M4 AND M6 TRACTORS.

a. Engine. The 18-ton High Speed Tractor M4 is powered by one engine while the 38-ton High Speed Tractor M6 is powered by two. The two engines in the M6 are both right-hand rotation engines and are mounted side by side in the same relative position in the hull

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:46 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

as in the M4. They are tilted away from each other at the top at a 10-degree angle. Each M6 engine has exactly the same accessories and internal components mounted in the same manner as in the M4 with only three exceptions, namely:

(1) Right and left flywheel housing are used to provide for mounting of each cranking motor on outer side of each engine.

(2) A long jack shaft and bevel gear fan drive shaft housing extending across the top of both engines is used instead of two separate L-shaped fan-drive assemblies.

(3) Only one generator is used, and it is mounted in the conventional place on the right-hand engine instead of on the fuel tank as in the M4. The engine controls are operated in unison by the same controls in cab of tractor. The release and engagement of the clutches of the two engines is accomplished by a common shaft. Provision, however, is made for operation of either clutch individually in the event either engine becomes inoperative. Separate cooling radiators and fans, one on each side of tractor, provides for cooling. Maintenance, disassembly, repair, and assembly of the engine in the M6 tractor will be the same as for the engine in the M4 tractor.

b. Torque Converter. Two torque converters are used in the M6 tractor; only one is used in the M4 tractor. These are the same and the information contained in Chapter 4 of this manual will apply in all ways to the torque converters in either tractor.

3. MWO AND MAJOR UNIT ASSEMBLY REPLACEMENT RECORD.

a. Description. Every vehicle is supplied with a copy of AGO Form No. 478 which provides a means of keeping a record of each MWO completed or major unit assembly replaced. This form includes spaces for the vehicle name and U. S. A. Registration Number, instructions for use, and information pertinent to the work accomplished. It is very important that the form be used as directed and that it remain with the vehicle until the vehicle is removed from service.

b. Instructions for Use. Personnel performing modifications or major unit assembly replacements must record clearly on the form a description of the work completed and must initial the form in the columns provided. When each modification is completed, record the date, hours and/or mileage, and MWO number. When major unit assemblies, such as engines, transmissions, or transfer cases, are replaced, record the date, hours and/or mileage and nomenclature of the unit assembly. Minor repairs and minor parts and accessory replacements need not be recorded.

c. Early Modifications. Upon receipt by a third or fourth echelon repair facility of a vehicle for modification or repair, maintenance personnel will record the MWO numbers of modifications applied prior to the date of AGO Form No. 478.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:46 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

CHAPTER 2

ENGINE AND ACCESSORIES (18-TON HIGH SPEED TRACTOR M4)

Section I

DESCRIPTION AND TABULATED DATA

4. GENERAL DESCRIPTION.

a. General. The Model 145 GZ 6-cylinder gasoline engine is of high compression, 4-cycle, water-cooled type, with two down-draft carburetors and electric ignition system. The crankcase and cylinder block is cast in one unit with ribs and baffles for controlling circulation of coolant. The drop forged steel crankshaft, supported by seven main bearings is carried in the crankcase section. Cylinder heads of twin valve-in-head type are interchangeable, front or rear. Main and connecting rod bearings are of the replaceable precision type and do not require reaming or hand scraping when installed.

b. Lubrication. All moving parts of the engine are lubricated by a positive pressure system. There are few outside oil lines, the oil being delivered by a gear-type combination scavenger and pressure pump to the various operating parts through drilled passages in the cylinder block and head, crankshaft, connecting rods, camshaft, and rocker arm assemblies. Oil pressure is regulated by pressure relief valves located in the oil pump and cylinder block oil gallery.

c. Cooling. The engine is cooled by circulation of water through the cylinder head and block by a large capacity water pump. A cooling radiator and fan cools the water delivered to the engine by the water pump. Engine temperature is controlled by a thermostat assembly at outlet of water manifold.

d. Location of Accessories. The electric cranking motor, oil cooler, water pump, and air compressor are mounted on exhaust manifold side of engine; the ignition coil, distributor, carburetors, fuel pump, and governor on the opposite side. The L-shaped fan drive, bolted to side of cylinder block, provides a means of driving the cooling fan.

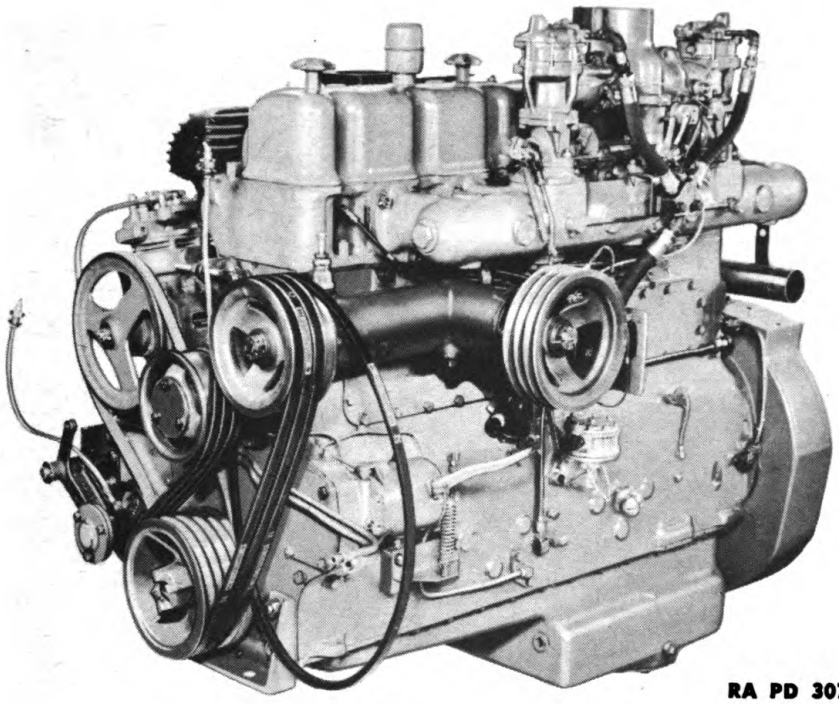
5. TABULATED DATA.

a. General.

Make	Waukesha
Model and series	145 GZ
Type	Gasoline, water-cooled
Number of cycles	4

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:46 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

ENGINE AND ACCESSORIES (18-TON HIGH SPEED TRACTOR M4)



RA PD 307801

Figure 1 — Engine — Left Front

Number of cylinders	6
Firing order	1-5-3-6-2-4
No. 1 cylinder location	At end opposite flywheel
Bore and stroke	5⅜ in. x 6 in.
Piston displacement	817 cu in.
Compression ratio	5.95 to 1
Rated speed	2,100 rpm
Rated brake horsepower	210 at 2,100 rpm
Governed speed (full load)	2,100 rpm
Maximum torque	550 ft-lb at 1,700 rpm
Rotation of crankshaft (viewing end opposite flywheel)	Clockwise
Dimensions:	
Over-all length	55¼ in.
Over-all height	48 in.
Over-all width	35 in.
Weight:	
With accessories	Approx. 2,150 lb
Less accessories	Approx. 1,800 lb

b. Direction of Rotation of Accessories or Components (Viewed from Flywheel End).

Cranking motor	Clockwise
Generator	Counterclockwise

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:46 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

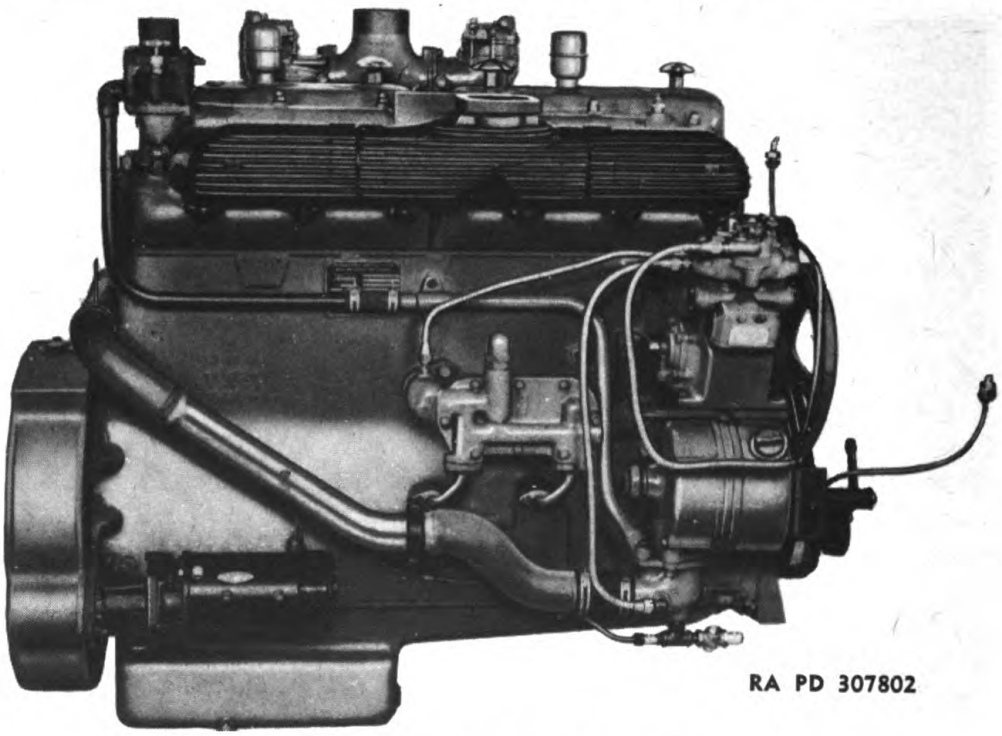


Figure 2 — Engine — Right Side

Water pump	Counterclockwise
Oil pump (looking down on shaft)	Counterclockwise
Distributor (looking down on shaft)	Clockwise
Governor	Clockwise
Air compressor	Counterclockwise

c. Ratio of Drive to Crankshaft Speed.

Cranking motor	20.65 to 1
Generator	1.2 to 1
Water pump	0.5 to 1
Oil pump	0.77 to 1
Distributor	0.5 to 1
Governor	1.5 to 1
Air compressor	0.85 to 1

d. Ignition System.

(1) CRANKING MOTOR.

Make	Delco-Remy
Model	644

(2) COIL.

Make	Delco-Remy
Model	1115252

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:47 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

ENGINE AND ACCESSORIES (18-TON HIGH SPEED TRACTOR M4)

(3) DISTRIBUTOR.

Make	Delco-Remy
Model	1110162
Breaker point gap	0.018 in.

(4) SPARK PLUGS.

Make	Champion
Model	6 Com.
Size	18 mm
Gap	0.025 in.

(5) GENERATOR.

Make	Delco-Remy
Model	1105906

(6) GENERATOR REGULATOR.

Make	Delco-Remy
Model	5641

e. Fuel System.

(1) FUEL PUMP.

Make	A-C
Model	D-8274
Pressure at outlet end of pump	3½ to 4 lb

(2) CARBURETORS (TWO).

Make	Zenith
Model	29 BW and 29 BBW
Type	Down-draft, fixed jet

(3) FUEL FILTER.

Make	A-C
Model	T-2
Type	Laminated disk

(4) GOVERNOR.

Make	Waukesha
Type	Mechanical-centrifugal
Setting	Spring tension

f. Cooling System.

(1) WATER PUMP.

Make	Waukesha
Model	145
Type	Centrifugal

(2) THERMOSTAT.

Type	Thermal expansion
Location	At outlet of water manifold

g. Lubricating System.

(1) OIL PUMP.

Make	Waukesha
Model	145
Relief valve opening pressure setting	55 to 60 lb

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:47 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(2) OIL FILTER..

Make	A-C
Model	Standard military
Type	Replaceable cartridge

h. Clutch.

Make	Long
Model	17

6. IGNITION SYSTEM.

a. The ignition system consists of a source of power (generator or battery), the ignition distributor, ignition coil, wiring, and spark plugs. The ignition system, operating through a set of points in the distributor, supplies pulsations of direct current to the ignition coil. The coil converts these to high-voltage surges which are produced at the correct intervals and with the correct timing to the engine. Each high-voltage surge produces a spark, at the spark plug gap, which ignites the mixture of air and fuel that has been drawn into the cylinder. When the contact points are closed, current flows through them to the ignition coil, causing a magnetic field to build up in the coil. When the contact points open, the current stops flowing, the magnetic field collapses, causing a high-voltage surge to be induced. This high-voltage surge is led through the wiring, distributor cap, and rotor to the correct spark plug.

7. FUEL SYSTEM.

a. Fuel is drawn from the supply tank through a disk-type fuel filter and delivered to the carburetors by the mechanical fuel pump located on carburetor side of engine. The pump is operated by a lever which contacts a cam on the engine camshaft. Air is drawn from the atmosphere through a precleaner and oil-bath air cleaner and mixed with fuel in the carburetors. The combustible mixture of gasoline and air is then drawn through the intake manifold into the cylinders where it is ignited and furnishes power.

8. COOLING SYSTEM.

a. The cooling system of the engine consists of the water passages in cylinder block and head, water outlet manifold, thermostat assembly, water pump, oil cooler assembly, radiator (center one of the three in radiator assembly), and cooling fan, as well as the necessary water lines for circulation of cooling liquid. The water is circulated by the water pump driven by the timing gears. It draws the cooled water from the radiator and forces it, through the oil cooler, to cool the oil delivered to the engine, and thence into the cylinder block and cylinder head, and then out into the water outlet manifold. The thermostat (if engine is equipped with thermostat) remains closed,

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:47 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

and water circulates through a by-pass tube and through engine only until engine reaches operating temperature. As operating temperature is reached, the thermostat automatically opens to let the water pass into the water outlet manifold, and to the radiator to be cooled. Part of the heated water also circulates through the fuel and air intake manifold to heat the fuel and air as it is drawn into the cylinders. A by-pass line in the system provides for circulation of water through the air compressor to cool it. The heated water is delivered to the radiator, and the cooling fan draws air through the radiator, thus dissipating the heat and lowering the temperature of the water, while it passes through the radiator from top to bottom.

9. LUBRICATING SYSTEM.

a. The engine is lubricated by a positive pressure oiling system. Oil is drawn from the crankcase oil pan sump through a screen and inlet at the bottom of the pump and through a scavenger pipe from the pump gear housing extending to the front shallow area of the oil pan. The pump maintains a pressure of, from 55 to 60 pounds. Oil is forced by the pump through an outlet pipe to a connection in the crankcase wall which leads to the oil cooler. Cooling water from the radiator is forced through the cooler housing, and surrounds the unit through which the lubricating oil flows. The cooled oil is then conducted through a drilled passage, across the cylinder block, to the main drilled oil header in the block, and distributed to the main bearings, camshaft bushings, and connecting rod bearings by the drilled passages in crankshaft and cylinder block.

b. Oil delivered to the connecting rod bearings is forced up through rifled drilled passages in the connecting rods to the piston pin bushings to lubricate these bushings, then runs back down the inside of the pistons and cylinders, carrying heat away from the pistons and cylinder walls, and lubricating the pistons and cylinder walls.

c. The oil is delivered to the camshaft bushings, lubricates these bushings and is forced through passages in the cylinder block from the first and fourth camshaft bushing through a line to each of the two rocker arm bushings. Excess oil from the rocker arms lubricates the upper push rod seats and flows over the valve stems to lubricate the stem guides. The intake valve stem guides are tapered 45 degrees to an edge around the valve stem to cause excess oil to flow down around the guide and drain back to the oil pan.

d. The timing gear train is lubricated by oil flowing from the front camshaft bushing through a hole drilled in the camshaft journal and a hole drilled in the hub of the camshaft gear. From the hub in the gear, centrifugal force drives the oil across the inner surface of the gear, and through three holes drilled between the gear teeth. The meshing gear teeth distribute the oil to the entire gear train.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:47 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

e. A hole drilled from the front camshaft bushing through the crankcase casting and across the diameter of the governor support bearing to an outside fitting and copper line, delivers oil to the support bearing and through the line to the drilled governor shaft bushing. From the shaft bushing excess oil drains to the crankcase.

f. To provide ample lubrication to the engine bearings in the event of clogged filters or lines and to prevent failure of pump gears or fittings, the oiling system is provided with three pressure relief valves. A valve in the pump body housing is set at around 55 to 60 pounds. The main oil-header relief valve is set to open at about 40-pounds pressure with oil hot and engine running at 2,100 revolutions per minute. A by-pass valve in the oil cooler is set to open at 6 to 7 pounds pressure.

g. The tappet assemblies are lubricated by spray from the crankshaft and also by the oil running down the push rods from the rocker arm seats.

h. As the oil returns to the sump, part of it is bypassed through two cartridge type filters where dirt and sludge are removed from it.

10. ELECTRICAL SYSTEM.

a. Electrical equipment for the engine consists of the cranking motor, generator, generator regulator, ignition coil, distributor, spark plugs, and radio filter. The cranking motor provides a means of cranking the engine for starting. The generator replaces energy drained from the battery by cranking motor, lights, and other electrical equipment, and is regulated by the generator regulator. The ignition system is explained in paragraph 6. The above units are described in detail in TM 9-1825A. The radio filter eliminates interference created by the electrical system.

11. INTAKE AND EXHAUST SYSTEM.

a. Air Intake System. The air intake system consists of the air precleaner, oil-bath air cleaner, and connecting tube. The air drawn from the atmosphere is first drawn through the air precleaner where most of the dirt is trapped, then through the oil-bath air cleaner, where it passes through oil-filled mats, and the remaining dirt is removed before air passes through the connecting tube to the carburetors. Fuel from the carburetors mixes with the air as it is drawn through the carburetors, making a combustible mixture which is drawn into the cylinders of the engine through the intake manifold and intake valves.

b. Exhaust System. After the combustible mixture of air and gasoline is ignited and burned on the power stroke of the pistons, the burned gases are discharged from the cylinders through the exhaust valves into the exhaust manifold. They then pass through the exhaust pipe elbows and muffler to the atmosphere.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:47 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Section II

ENGINE REMOVAL

12. ENGINE REMOVAL.

a. Procedure for removal of engine from tractor, high-speed, 18-ton, M4 is outlined in the operator's manual TM 9-785. Removal from tractor, high-speed, 38-ton, M6 is covered in the operator's manual TM 9-788.

Section III

CLEANING AND INSPECTION OF ASSEMBLED ENGINE

13. CLEANING.

a. After engine has been removed from vehicle, the dirt, oil, etc. must be removed from engine before it is disassembled. Before cleaning, cover openings such as openings in water manifold, carburetor air inlet, and exhaust manifold, to prevent dirt from entering them, and plug fuel, or oil fittings that are open. The use of soapy water or steam will usually prove to be successful in cleaning the exterior parts of the engine. Information regarding other cleaning agents will be found in TM 9-850.

14. INSPECTION.

a. After engine has been cleaned, and before disassembling, make as complete an inspection of engine as possible to determine the extent of disassembly necessary to replace, or repair, worn or damaged parts. Review any reports available regarding cause of failure of the engine that made removal of the unit necessary. Observe if components or accessories on engine that may have been replaced previously, were correctly installed, or alined, or if proper adjustments have been maintained. Report irregularities found.

Section IV

REMOVAL OF ACCESSORIES AND EXTERNAL COMPONENTS

15. REMOVAL OF ACCESSORIES AND EXTERNAL COMPONENTS.

a. General. The following procedure outlines the most logical sequence of operations for the removal of the various units preparatory to disassembling engine. Use separate boxes or pans for the

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:48 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

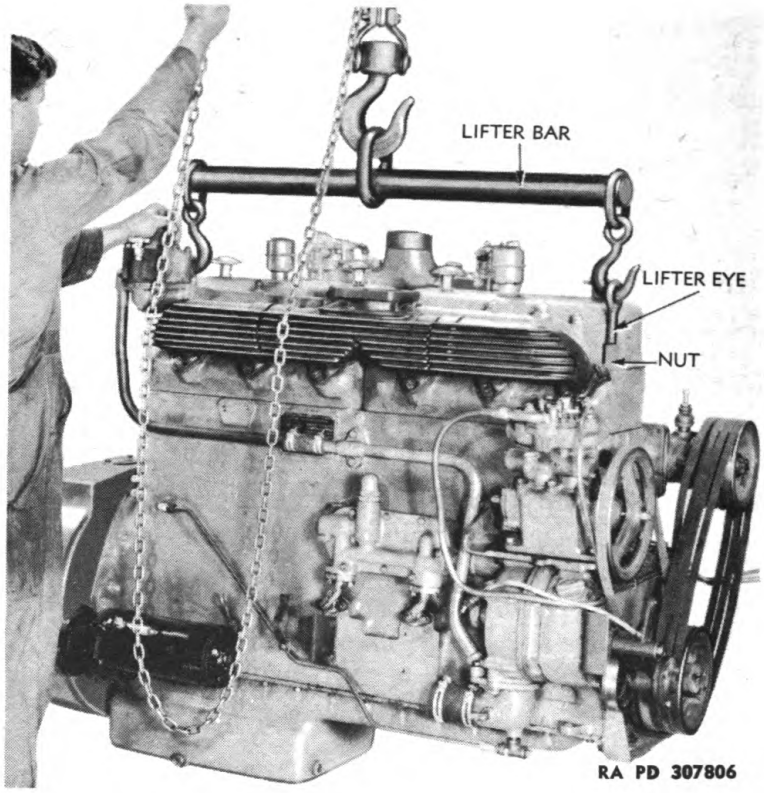


Figure 3 — Lifting Engine, With Lifting Sling 41-S-3831-810

parts and bolts so the cap screws and bolts for each component will be readily found when accessories are again installed. Make a list of new gaskets and parts that will be needed for reassembly as parts are removed. Use an engine stand or, if a stand is not available, use suitable blocks or a bench to support engine in positions stated below.

b. Install Lifter Eyes. Remove nut from center cylinder head stud at flywheel end of engine, and nut from cylinder head stud at opposite end of engine, and install the lifter eyes of special engine lifter (41-S-3831-810) on these two studs. Hook lifter into eyes, with shorter end of bar towards flywheel end of engine as shown in figure 3, and lift engine onto stand, blocks, or bench. Remove engine lifter and lifter eyes.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:48 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

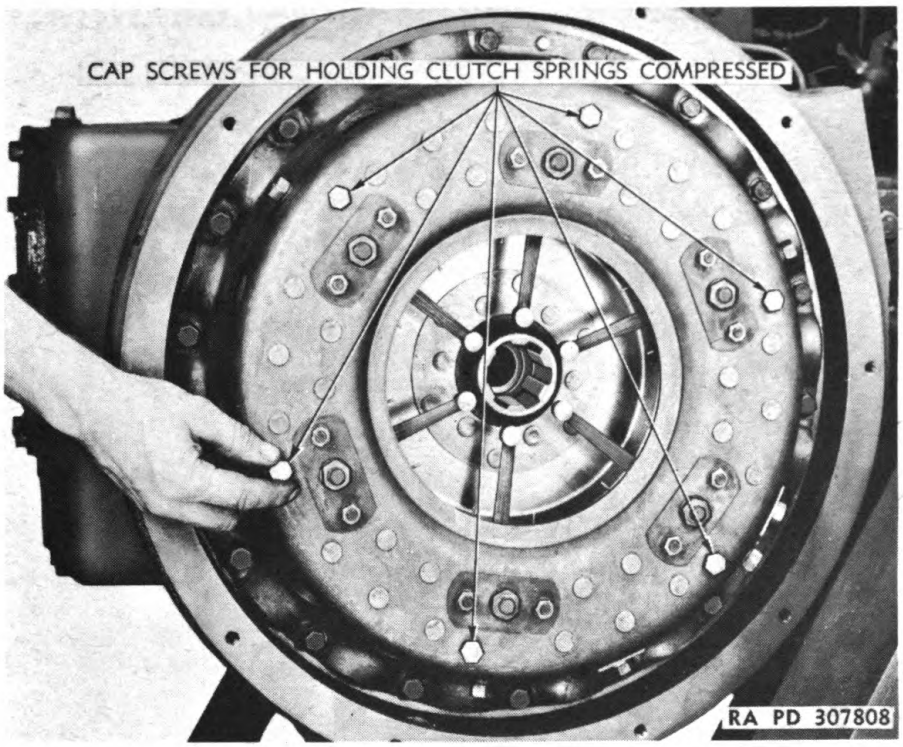


Figure 4 — Installing Cap Screws To Hold Clutch Springs Compressed

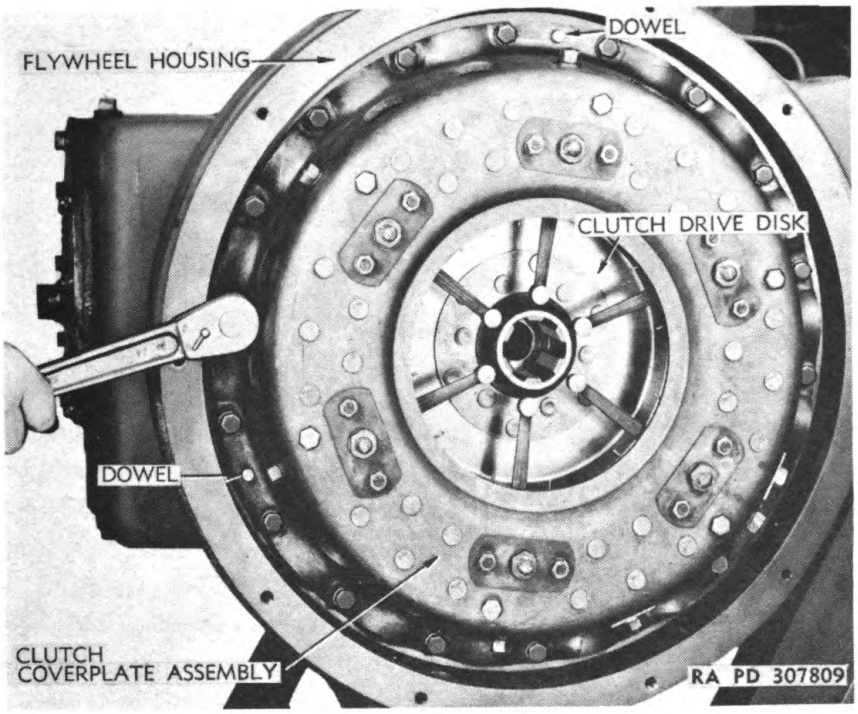


Figure 5 — Removing Clutch Assembly

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:48 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

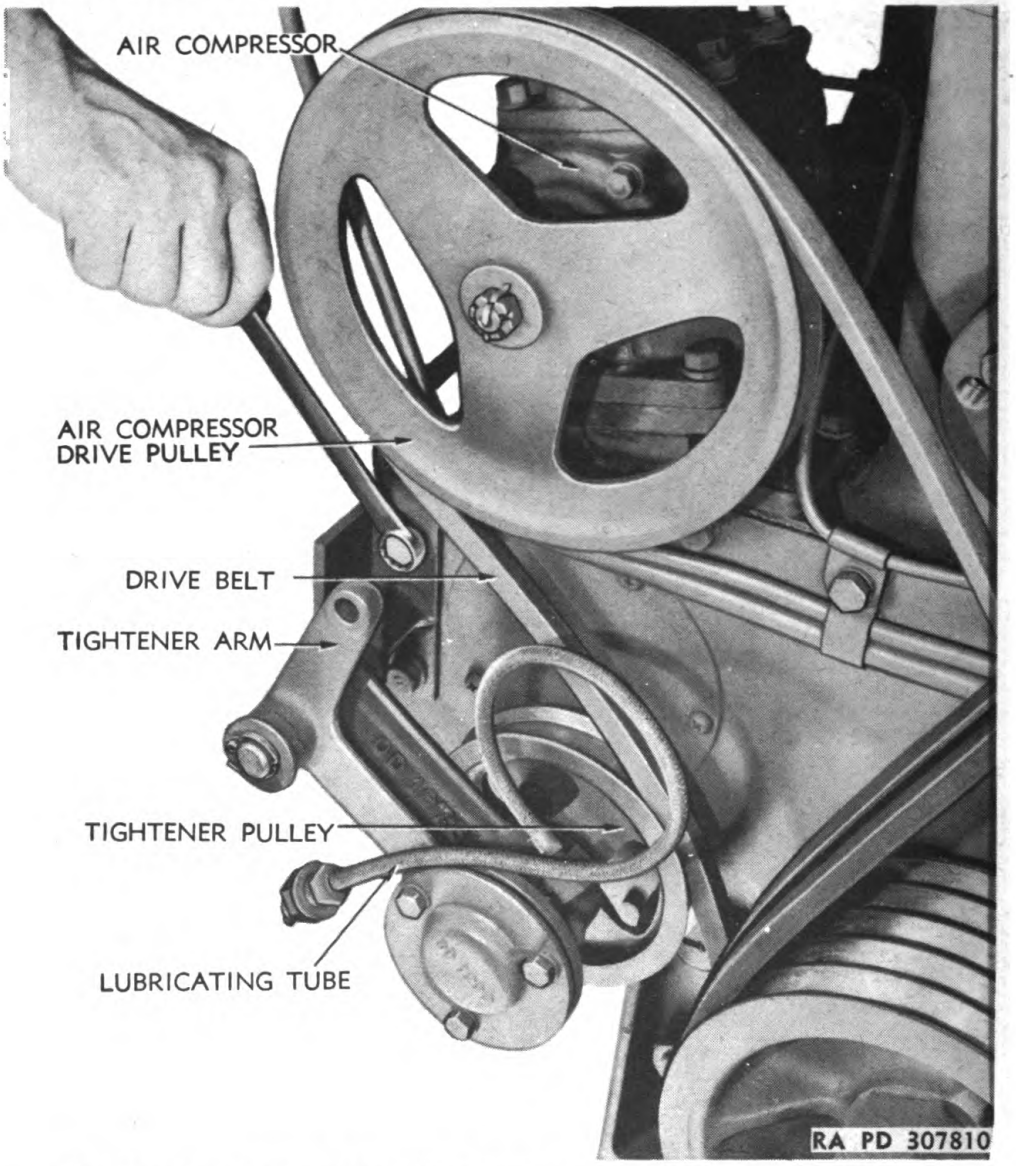


Figure 6 — Removing Air Compressor Drive Belt Tightener

c. Remove Master Clutch Assembly. Insert six 3/8- x 1½-inch NC cap screws through holes in clutch coverplate and screw them into tapped holes in bosses of pressure plate (fig. 4) until the heads of the cap screws are against coverplate. These are to hold clutch springs compressed while clutch is removed. Remove the 18 cap screws attaching clutch assembly to flywheel and remove clutch cover plate and pressure plate assembly (fig. 5). Clutch drive disk will be removed at same time. Do not lose small coverplate dowels which may pull out of flywheel with coverplate.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:48 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

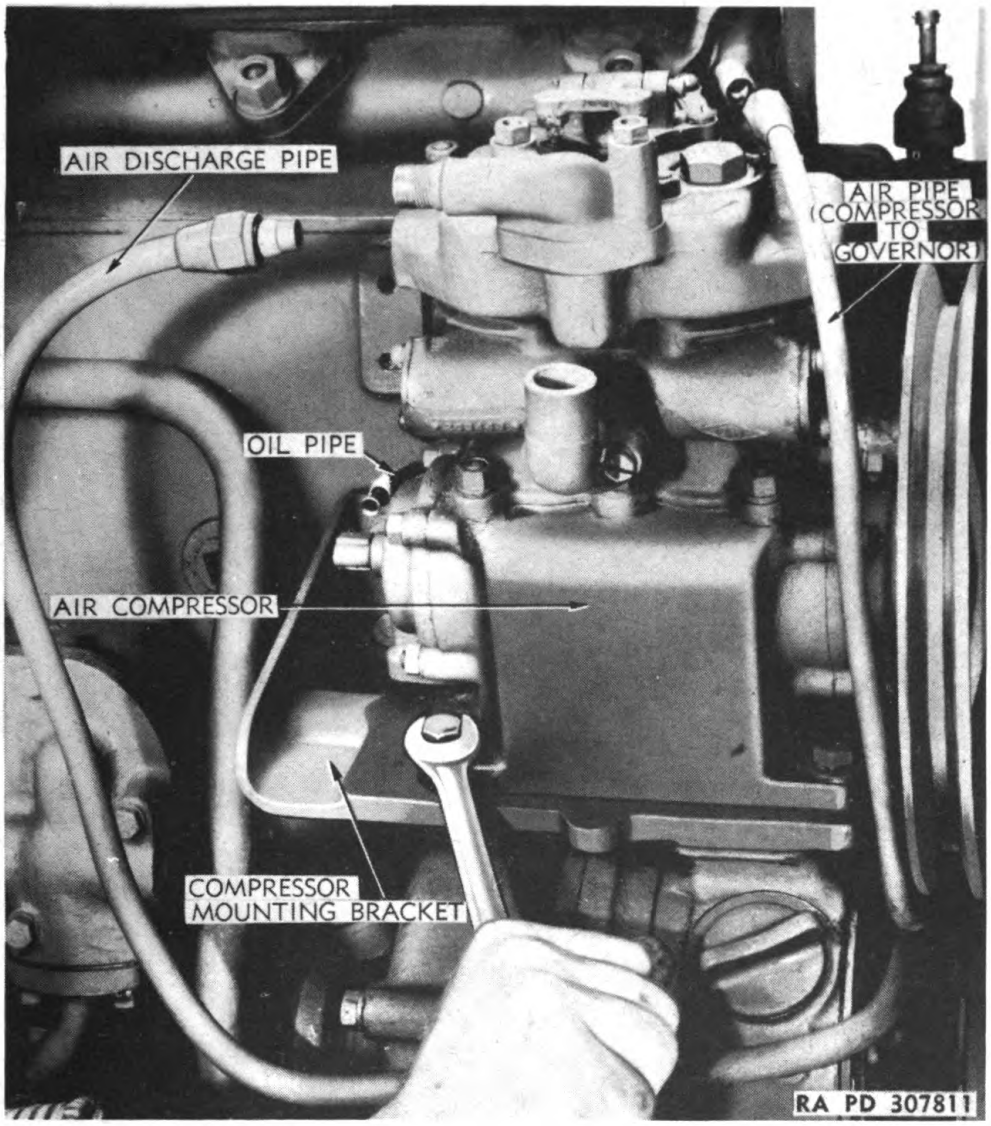


Figure 7 — Removing Air Compressor

d. Remove Compressor Drive Belt Tightener Assembly. Remove two cap screws and lock washers attaching tightener assembly to timing gear housing (fig. 6), and remove tightener assembly from engine.

e. Remove Air Compressor. Disconnect all air, oil, and water lines from compressor, remove the four cap screws attaching compressor to mounting bracket (fig. 7) and lift off compressor.

f. Remove Exhaust Manifold. Remove the eighteen nuts and washers from manifold studs (fig. 8) and lift manifold assembly and gaskets from studs.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:48 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

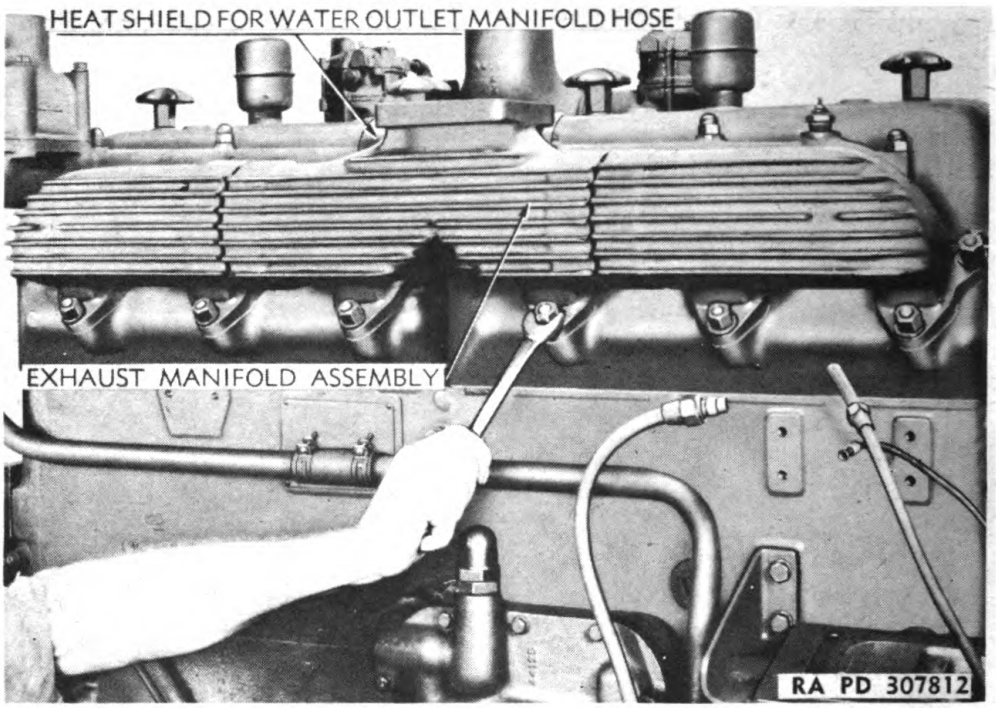


Figure 8 — Removing Exhaust Manifold Assembly

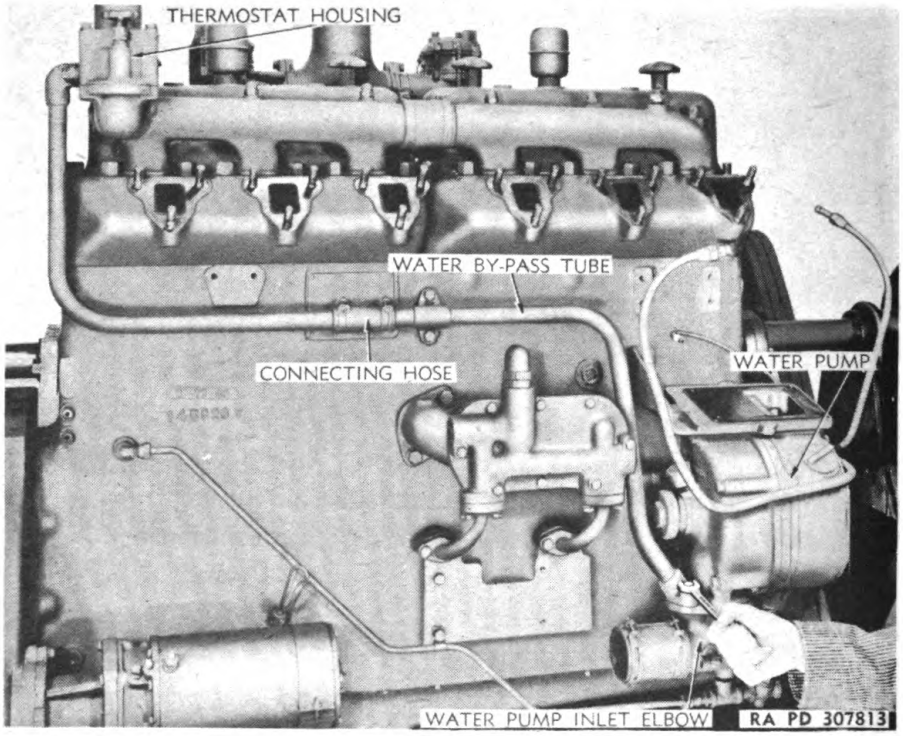


Figure 9 — Disconnecting Water By-pass Tube at Water Pump

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:48 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

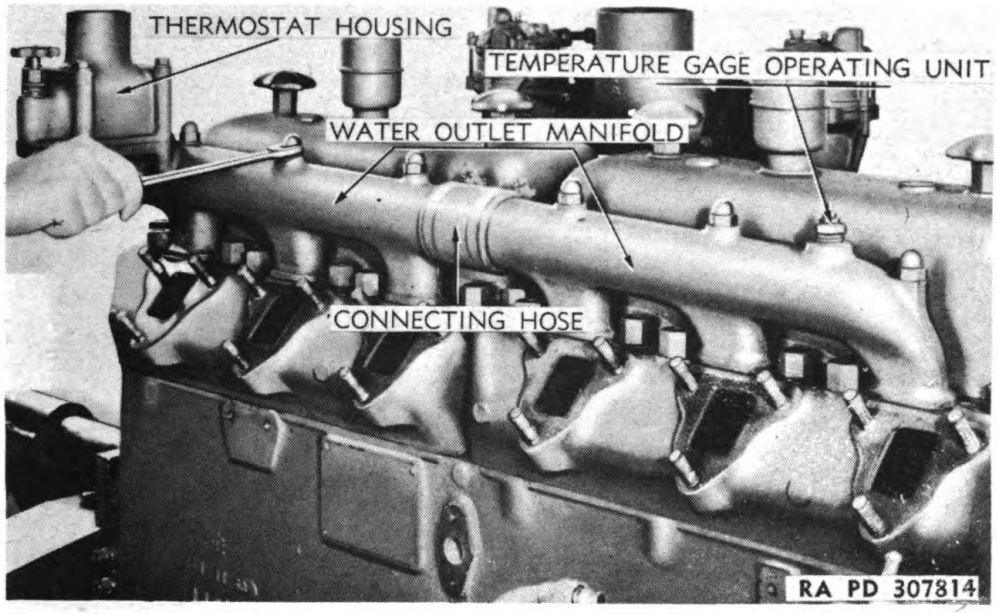


Figure 10 — Removing Water Outlet Manifold Assembly

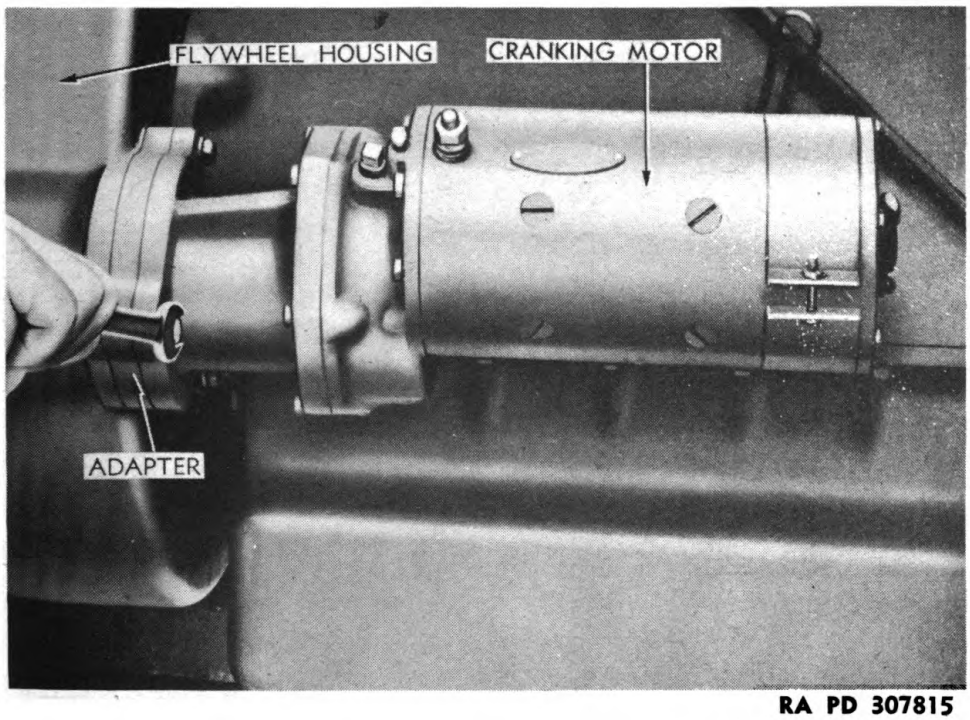


Figure 11 — Removing Cranking Motor

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:48 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

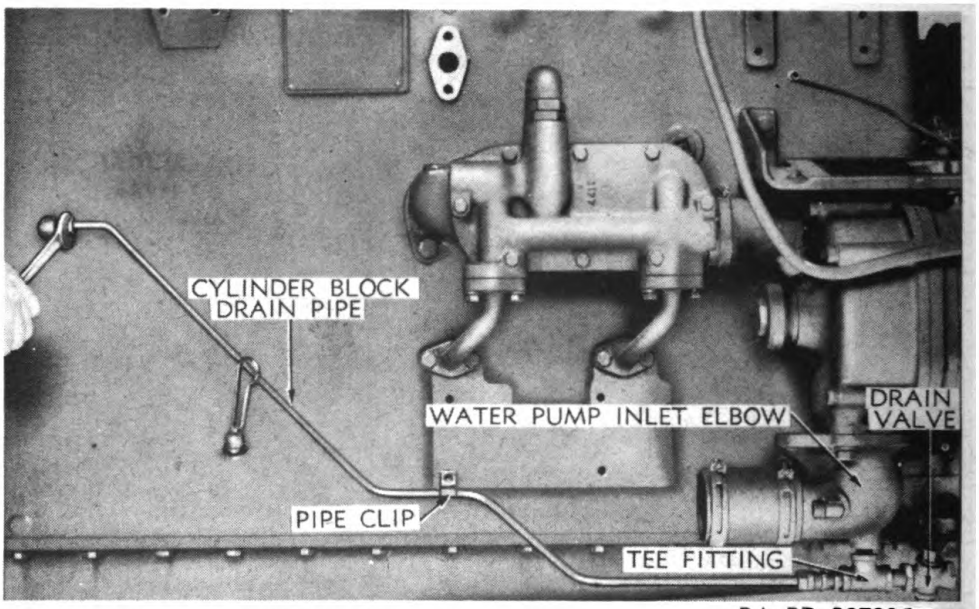


Figure 12 — Removing Cylinder Block Water Drain Pipe

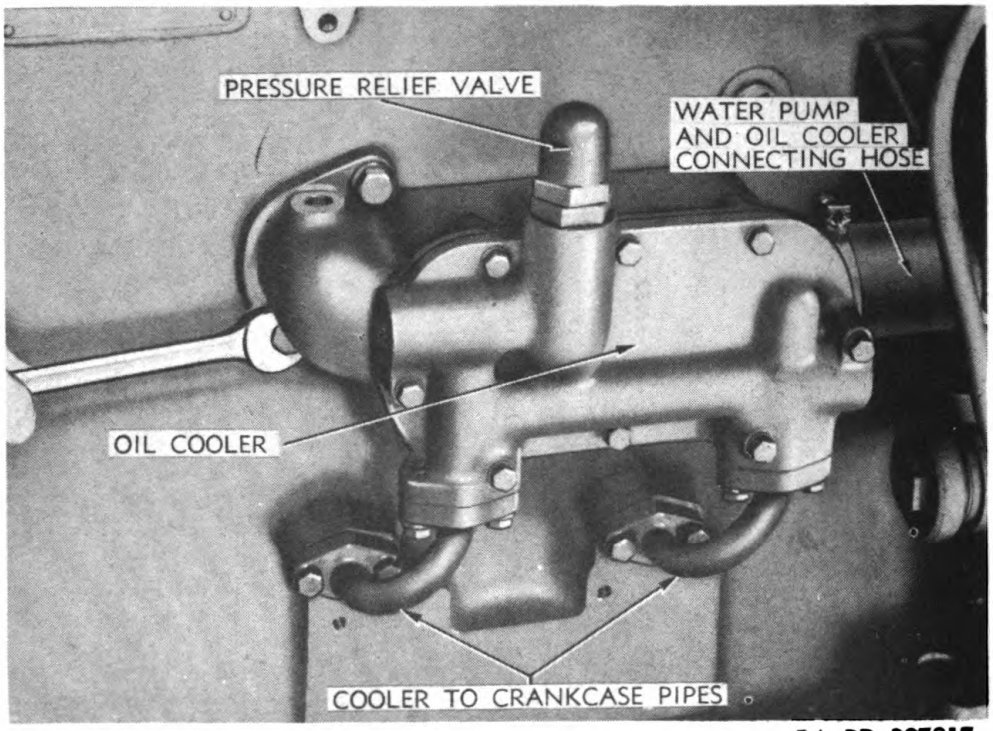


Figure 13 — Oil Cooler Removal

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2016-07-15 17:49 GMT / http://hdl.handle.net/2027/uc1.b3243980
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google