TM 9-1785A

WAR DEPARTMENT TECHNICAL MANUAL

ORDNANCE MAINTENANCE

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

WAR DEPARTMENT • *27 MARCH 1944*

FOR ORDNANCE PERSONNEL ONLY

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*

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.)

CONTENTS

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

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.

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

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

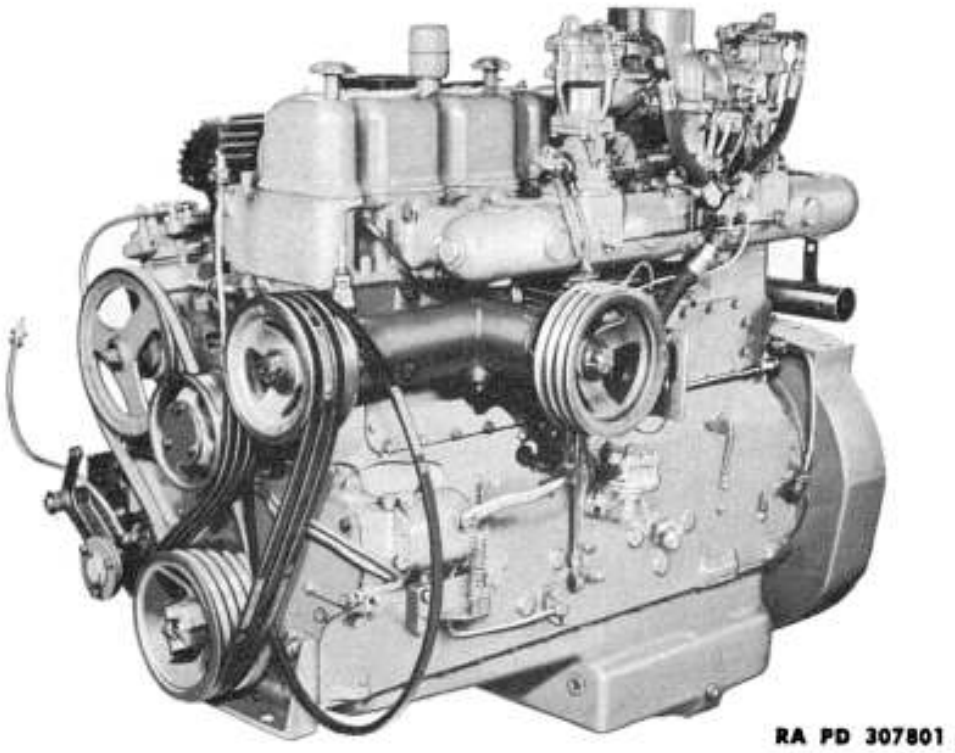

Figure 1 — Engine — Left Front

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

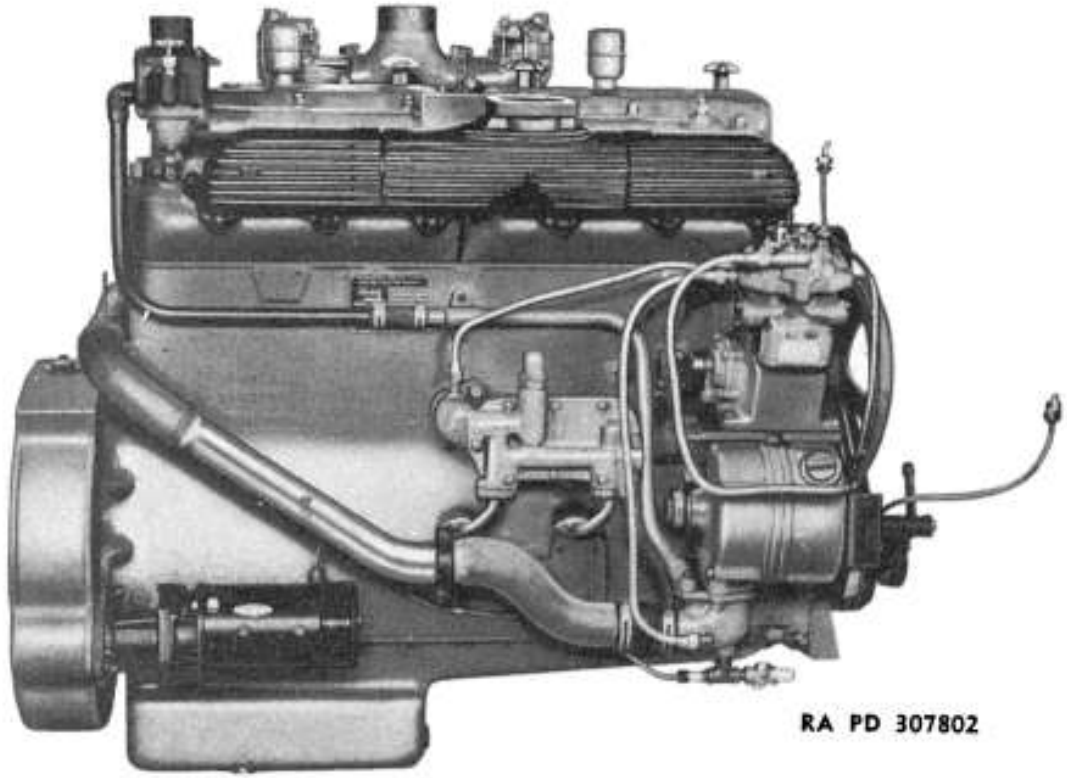

Figure 2 — Engine — Right Side

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