

TECHNICAL MANUAL

**DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL
(INCLUDING DIRECT SUPPORT, AND GENERAL SUPPORT
REPAIR PARTS LIST AND DEPOT MAINTENANCE ALLOWANCES)**

FOR

**ENGINE, DIESEL, WITH ACCESSORIES
CUMMINS MODEL V8-300
(2815-910-8217)**

This copy is a reprint which includes current pages from Changes 1 and 2.

**HEADQUARTERS, DEPARTMENT OF THE ARMY
FEBRUARY 1972**

TECHNICAL MANUAL }
}

No. 9-2815-21334

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D.C., 2 February 1972**DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
(INCLUDING DIRECT SUPPORT AND GENERAL SUPPORT
REPAIR PARTS LIST AND
DEPOT MAINTENANCE ALLOWANCES)**

FOR

**ENGINE, DIESEL, WITH ACCESSORIES
CUMMINS MODEL V8-300
(2815-910-8217)**

		Paragraph	Page
CHAPTER	1. INTRODUCTION		
Section	I. General.....	1-1	1-1
	II. Description and Data.....	1-4	1-1
CHAPTER	2. MAINTENANCE INSTRUCTIONS		
Section	I. Repair Parts, Special Tools and Equipment	2-1	2-1
	II. General Maintenance	2-4	2-1
	III. Removal of Engine Components	2-8	2-3
CHAPTER	3. REPAIR INSTRUCTIONS		
Section	I. General.....	3-1	3-1
	II. Repair of Cylinder Block.....	3-2	3-1
	III. Repair of Crankshaft	3-7	3-3
	IV. Repair of Connecting Rod and Piston Assembly	3-13	3-5
	V. Repair of Front Cover.....	3-19	3-8
	VI. Repair of Oil Pump Assembly	3-24	3-9
	VII. Repair of Camshaft	3-30	3-11
	VIII. Repair of Crankshaft Adapter.....	3-36	3-12
	IX. Repair of Flywheel Housing and Spacer Plate.....	3-40	3-12
	X. Repair of Oil Pan	3-46	1-3
	XI. Repair of Flywheel.....	3-52	3-13
	XII. Repair of Valve and Injector Tappets.....	3-58	3-14
	XIII. Repair of Cylinder Head	3-64	3-16
	XIV. Repair of Fuel Injectors	3-71	3-23
	XV. Repair of Rocker Arm Assembly and Push Rods	3-80	3-33
	XVI. Repair of Push Rod Cavity Covers.....	3-86	3-35
	XVII. Repair of Cylinder Head Covers.....	3-91	3-35
	XVIII. Repair of Air Compressor and Drive Assembly.....	3-96	3-36
	XIX. Repair of Fuel Pump and Fuel Lines.....	3-102	3-6
	XX. Repair of Water Crossover Pipe and Lifting Eyes.....	3-110	3-52
	XXI. Repair of Air Intake, Preheater Assembly and Intake Manifolds	3-114	3-52
	XXII. Repair of Water Pump Assembly	3-120	3-53
	XXIII. Repair of Fan Drive Pulley, Vibration Damper and Water Pump Pulley Assembly	3-125	3-2
	XXIV. Repair of Thermostat Assembly	3-131	3-54
	XXV. Repair of Fan, Fan Hub, and Bracket Assembly	3-137	3-56
	XXVI. Repair of Hydraulic Pump and Mounting Brackets	3-143	3-56
	XXVII. Repair of Alternator Assembly and Mounting Bracket	3-149	3-56
	XXVIII. Repair of Starter Assembly	3-155	3-56

*This manual supersedes TM 9-2015-213-34, 13 April 1966 including all changes.

		Paragraph	Page
CHAPTER	3. REPAIR INSTRUCTIONS--Continued		
	XXIX. Repair of Oil Cooler.....	3-157	3-56
	XXX. Repair of Exhaust Manifolds	3-162	3-57
	XXXI. Engine Removal from Engine Rebuild Stand.....	3-162	3-57
	XXXII. Engine Test and Adjustment	3-167	3-57
	XXXIII. Repair and Rebuild Standards	3-174	3-62
APPENDIX	A. REFERENCES		
	B. REPAIR PARTS AND SPECIAL TOOLS LIST		
Section	I. Introduction.....		B-1
	II. Repair Parts List.....		B-4
Group	01 -ENGINE		
	0100 Engine Assembly.....		B-4
	0101 Block and Cylinder Head.....		B-5
	0102 Crankshaft		B-7
	0103 Flywheel Assembly.....		B-7
	0104 Piston and Connecting Rod.....		B-8
	0105 Valves and Camshaft		B-8
	0106 Engine Lubrication System.....		B-10
	0108 Manifolds		B-13
Group	03 -FUEL SYSTEM		
	0301 Fuel Injector.....		B-14
	0302 Fuel Pump		B-15
	0304 Air Cleaner		B-20
	0311 Starting Aids		B-20
Group	05 -COOLING SYSTEM		
	0503 Thermostat		B-21
	0504 Water Pump		B-22
	0505 Fan Assembly.....		B-22
Group	06 -ELECTRICAL SYSTEM		
	0601 Generator		B-22
Group	12 -BRAKES		
	1209 Air Compressor and Drive Mechanism		B-23
Group	14 -STEERING		
	1410 Hydraulic Pump Assembly		B-23
Group	33 -SPECIAL PURPOSE KITS		
	3301 Reusable Shipping Containers.....		B-24
Group	47 -GAGES		
	4701 Tachometer		B-24
Section	III. Special Tools List		
Group	26 -TOOLS AND TEST EQUIPMENT		
	2604 Special Tools.....		B-25
	2606 Test Equipment		B-27
Section	IV. Index-Federal Stock Number and Reference Number Cross-Reference to Figure and Item Number		Index-1

LIST OF ILLUSTRATIONS

Number	Title	Page	Number	Title	Page
1-1.	Model V8-300 Engine Assembly 3/4 Left Front View	1-2	3-12.	Piston Ring Gap Check	3-7
1-2.	Model V8-300 Engine Assembly 3/4 Right ... Rear View	1-3	3-13.	Rod Side Clearance Check	3-8
1-3.	Engine Assembly Rear Sectional View	1-6	3-14.	Crankshaft Oil Seal-Removal/Installation	3-9
2-1.	Exhaust Manifold-Removal/Installation	2-4	3-15.	Front Cover Bore Alinement Check	3-9
2-2.	Oil Cooler-Removal Installation	2-5	3-16.	Front Cover to Block Alinement Check	3-9
2-3.	Engine Rebuild Stand-Removal/ Installation	2-5	3-17.	Drive Gear Backlash Check	3-10
2-4.	Fan Hub and Bracket Assembly- Removal/Installation	2-5	3-18.	Camshaft End Play Check	3-11
2-5.	Thermostat Assembly-Removal/ Installation	2-6	3-19.	Crankshaft Gear Backlash Check	3-11
2-6.	Drive Pulleys and Vibration Damper- Removal/Installation	2-6	3-20.	Crankshaft Adapter Tightening Sequence	3-12
2-7.	Water Pump Assembly-Removal Installation	2-6	3-21.	Flywheel Housing Concentricity Check	3-13
2-8.	Air Intake Crossover and Preheater Assembly-Removal/Installation	2-7	3-22.	Flywheel Tightening Sequence	3-14
2-9.	Intake Manifold, Fuel Pump and Fuel Lines-Removal/Installation	2-7	3-23.	Flywheel Bearing Bore and Wobble Limits	3-14
2-10.	Water Crossover Pipe and Lifting Eye Removal/Installation	2-8	3-24.	Tappet Assembly Test	3-15
2-11.	Oil Dipstick Tube Assembly-Removal/ Installation	2-8	3-25.	Cylinder Head in Holding Fixture	3-16
2-12.	Cylinder Head Covers-Removal/ Installation	2-9	3-26.	Valve Assemblies-Removal/Installation	3-16
2-13.	Crankcase Breather Tube Removal/ Installation	2-9	3-27.	Injector Sleeves-Removal/Installation	3-16
2-14.	Push Rod Cavity Covers-Removal/ Installation	2-9	3-28.	Crosshead Guide-Removal/Installation	3-16
2-15.	Rocker Arms and Push Rods-Removal/ Installation	2-10	3-29.	Valve Seat Removal Sectional View	3-17
2-16.	Injector Clamps Removal/Installation	2-10	3-30.	Injector Sleeve Holder Installation	3-17
2-17.	Fuel Injector and Hold-Down Clamp	2-10	3-31.	Injector Tip Protrusion Measurement	3-17
2-18.	Valve Crossheads-Removal/Installation	2-11	3-32.	Valve Head and Collet Check	3-18
2-19.	Cylinder Head-Removal/Installation	2-11	3-33.	Crosshead Guide Check	3-18
2-20.	Valve and Injector Tappets-Removal/ Installation	2-11	3-34.	Valve Guide Check	3-18
2-21.	Flywheel-Removal/Installation	2-12	3-35.	Valve Spring Test	3-18
2-22.	Crankshaft Adapter-Removal/Installation	2-12	3-46.	Valve and Injector Counterbore Measurements	3-19
2-23.	Flywheel Housing-Removal/Installation	2-13	3-37.	Cylinder Head Regrooving	3-19
2-24.	Camshaft Gear, and Spacer Plate- Removal/Installation	2-13	3-38.	Valve Guide Installation	3-20
2-25.	Oil Pan-Removal/Installation	2-13	3-39.	Crosshead Guide Installation-	3-20
2-26.	Oil Pump Assembly-Removal/Installation	2-13	3-40.	Injector Sleeve Installation	3-20
2-27.	Front Cover-Removal/Installation	2-14	3-41.	Injector Sleeve Rolling-Upper Portion	3-21
2-28.	Connecting Rod and Piston Assembly- Removal/Installation	2-14	3-42.	Injector Sleeve Rolling-Lower Portion	3-21
2-29.	Crankshaft and Main Bearings-Removal/ Installation	2-14	3-43.	Injector Sleeve Seat Cutting	3-21
3-1.	Camshaft Bushing Removal	3-1	3-44.	Valve Seat Insert Counterbore	3-21
3-2.	Cylinder Sleeve Removal	3-1	3-45.	Intake Valve Port Swirl Plate Installation	3-22
3-3.	Main Bearing Bore Alinement Check	3-2	3-46.	Valve Seat Insert Peering	3-22
3-4.	Cylinder Sleeve Seals Installation	3-2	3-47.	Valve Seat Test.3	3-22
3-5.	Crankshaft Dimensions	3-4	3-48.	Cylinder Head Tightening Sequence	3-23
3-6.	Crankshaft End Clearance Check	3-5	3-49.	Fuel Injector PT (Type C)	3-24
3-7.	Bearing Cap to Block Clearance Check	3-5	3-50.	Injector Cup-Removal/Installation	3-24
3-8.	Side Bolt Tightening Sequence	3-5	3-51.	Injector Link-Removal/Installation	3-24
3-9.	Piston and Ring Assembly	3-6	3-52.	Plunger Seat Pattern	3-24
3-10.	Connecting Rod Check	3-6	3-53.	Fuel Injector-Exploded View	3-26
3-11.	Ring Groove Wear Check	3-7	3-54.	Injector Check Ball Seating	3-26
			3-55.	Injector Body O-Ring Installation	3-26
			3-56.	Injector Body and Plunger Markings	3-27
			3-57.	Injector Cup Markings	3-27
			3-58.	Injector Plunger Seat Test	3-27
			3-59.	Injector Test Stand-	3-29
			3-60.	Alining Timing Wheel and Pointer	3-29
			3-61.	Hydraulic and Air Valves	3-29
			3-62.	Air Pressure Adjustment	3-30
			3-63.	Master Injector Installation-	3-30
			3-64.	Fuel Inlet Installation	3-30
			3-65.	Injector Mounted in Test Stand	3-30
			3-66.	Test Stand Air Pressure Connection	3-31
			3-67.	Load Cell Test	3-31
			3-68.	Ball Seat Resurfacing	3-32
			3-69.	Orifice Hole Burnishing Tool Installation	3-33
			3-70.	Orifice Plug Burnishing	3-33
			3-72.	Injector Push Rod Timing	3-33
			3-72.	Air Compressor Drive Gear Timing Mark	3-37

LIST OF ILLUSTRATIONS-Continued

Number	Title	Page	Number	Title	Page
3-73.	Fuel Pump PT (Type G)	3-38	3-108.	Gear Train-Points of Measurement	3-67
3-74.	Mounting Plate and Ball Joint Vise.....		3-109.	Oil Pressure Regulator and Oil Pump- Point of Measurement	3-39
	Installation.....	3-39	3-110.	Cylinder Head-Points of Measurement	3-69
3-75.	Governor Weights Assembly-Removal/ ..		3-111.	Tappets and Push Rod/Points of Measurement	3-69
	Installation.....	3-39	3-112.	Rocker Arms and Shaft-Points of Measurement	3-70
3-76.	Governor Shaft Oil Seals-Removal/		3-113.	Water Pump-Points of Measurement	3-71
	Installation	3-39	3-114.	Assembly Data-Points of Measurement.....	3-72
3-77.	Tachometer Drive Assembly-Removal/...		B-1.	Engine and Container Assembly.....	B-39
	Installation.....	3-39	B-2.	Cylinder Block and Head Assembly	B-40
3-78.	Plunger Assembly-Removal/Assembly ...	3-40	B-3.	Crankshaft Main Bearing and Drive Pulley	B-41
3-79.	Fuel Pump Test Stand Equipment	3-42	B-4.	Flywheel Assembly.....	B-42
3-80.	Fuel Pump Test Stand	3-43	B-5.	Connecting Rod, Piston and Rings	B-43
3-81.	Mounting Pump on Test Stand	3-44	B-6.	Cylinder Head, Valves, Rocker Arms and Covers.....	B-44
3-82.	Engaging Stand Drive Shaft	3-45	B-7.	Front Cover and Camshaft.....	B-45
3-83.	Pump Preparation for Test and Calibration	3-46	B-8.	Engine Lubrication System (crankcase breather).....	B-46
3-84.	Fuel Pump Nameplate.....	3-46	B-9.	Engine Lubrication System (oil pan)	B-47
3-85.	Scribing Governor Barrel.....	3-47	B-10.	Engine Lubrication System (pump)	B-48
3-86.	Reaming Mainshaft Bushing	3-47	B-11.	Engine Lubrication System (oil cooler)	B-49
3-87.	Throttle Shaft O-ring Installation	3-47	B-12.	Manifold intake and Exhaust.....	B-50
3-88.	Throttle Assembly Installation	3-47	B-13.	Fuel Injector	B-51
3-89.	Thrust Washer-Drive Plunger Governor..		B-14.	Fuel Pump Assembly	B-52
	Clearance	3-48	B-15.	Fuel Pump Housing (exploded)	B-53
3-90.	Main Throttle Shaft Shim Check	3-49	B-16.	Fuel Pump Gear and Damper Assembly ...	B-54
3-91.	Weep Hole Leakage.....	3-49	B-17.	Fuel Shut-off and Solenoid Valve and Governor Spring Pack Assembly	B-55
3-92.	Governor Spring Shimming	3-50	B-18.	Governor Assembly (main shaft cover)	B-56
3-93.	Throttle Stop Screw Adjust.....	3-50	B-19.	Air Intake Components	B-57
3-94.	Idle Speed Setting	3-51	B-20.	Glow Plug and Heater Accessories	B-58
3-95.	Valve Timing Marks.....	3-58	B-21.	Thermostat and Crossover Tube	B-59
3-96.	Engine Firing Order.....	3-59	B-22.	Water Pump	B-60
3-97.	Crosshead Adjustments	3-59	B-23.	Fan, Hub, and Bracket	B-61
3-98.	Engine Blow-By Check	3-63	B-24.	Generator.....	B-62
3-99.	Manifold Fuel Pressure Check	3-63	B-25.	Air Compressor and Drive Mechanism	B-63
3-100.	Fuel Flow Rate Check	3-63	B-26.	Power Steering Pump	B-64
3-101.	Performance Curve	3-64	B-27.	Tachometer Drive	B-65
3-102.	Cylinder Block-Points of Measurement ...	3-65	B-28.	Special Tools.....	B-66 B-74
3-103.	Crankshaft and Bearings Points of.....		B-29.	Test Equipment.....	B-75 B-76
	Measurement	3-65			
3-104.	Connecting Rod-Points of Measurement	3-66			
3-105.	Piston-Points of Measurement	3-66			
3-106.	Cylinder Sleeve-Points of Measurement.	3-67			
3-107.	Camshaft and Bearings-Points of				
	Measurement	3-67			

LIST OF CHARTS

Number	Title	Page	Number	Title	Page
3-1.	Injection Timing.....	3-33	3-2.	Fuel Pump Troubleshooting.....	3-51

CHAPTER 1 INTRODUCTION

Section I. General

1-1. Scope

a. This technical manual contains instruction for direct and general support maintenance of the Cummins Diesel Engine, Model V8-300, (fig. 1-1 and 1-2). It contains descriptions of, and procedures for, disassembly, inspection, repair, rebuild, and assembly of the engine.

b. Appendix A contains a list of current refer ences, including supply manuals, forms, technical manuals, and other available publications applicable to the engine.

c. Appendix B lists repair parts, special tools, and test equipment required for the performance of direct and general support maintenance of the engine.

1-2. Forms and Records

Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

1-3. Reporting of Equipment Publication Improvement

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028, Recommended Changes to Publications, and forwarded direct to the Commanding General, U.S. Army Tank-Automotive Command Attention: ASMTA-4, Warren, MI 48090.

Section II. Description and Data

1-4. Description

a. General.

(1) In this manual the following terms will be used to identify the location for engine parts and assemblies:

(a) *Front*-fan end of engine.

(b) *Rear*-flywheel end of engine.

(c) *Right and Left*-are identified as viewed from the rear.

(2) The model V8-300 diesel engine is as eight cylinder, V-type, Valve-in-head, water cooled, compression-ignition engine, using the four stroke cycle principle of operation. The four strokes consist of intake, compression, power and exhaust. Intake and exhaust valves, and fuel injectors, are operated from a single camshaft. The intake stroke of the cycle brings filtered, heated air to the cylinders. The compression stroke compresses the air (17:1 compression ratio) to 500-600 p.s.i, and raises the cylinder temperature to approximately 1000 degrees Fahrenheit. During the top of the compression stroke and start of the power stroke, a metered charge of diesel fuel is injected into the cylinders. The high temperature within the cylinders ignites the diesel fuel resulting in the power stroke. The fourth stroke of the cycle exhausts the burned

gases from the cylinders. Proper engine operation depends upon the high compression of the intake air and the timed injection of the correct measure of diesel fuel into the cylinder.

b. *Engine Assembly*. The model V8-300 engine (fig. 1-1 and 1-2) is a diesel eight cylinder V-type, valve in head, water cooled, compression ignition engine. The engine is rated 300 horsepower at 3000 rpm and will operate on diesel fuel.

c. *Engine Systems*.

(1) *Fuel System*. The system consists of a filter, fuel pump with governor, fuel passages, and injectors (one for each cylinder). The system is designed so that the volume of liquid flow is proportionate to the fluid pressure, the time allowed to flow, and the size of the orifice fuel flows through. The pump draws fuel from the vehicle supply tank and delivers it to each injector. A governor controls the flow of fuel from the gear pump, as well as the idle and maximum engine speed.

(2) *Lubrication System*. All working parts of the engine are pressure lubricated. Oil is supplied by a dual-type gear driven lubricating pump located below the crankshaft and driven by the crankshaft gear. On completion of the lubrication cycle, oil is accumulated in the oil pan sump by gravity and is drawn from this sump by the oil

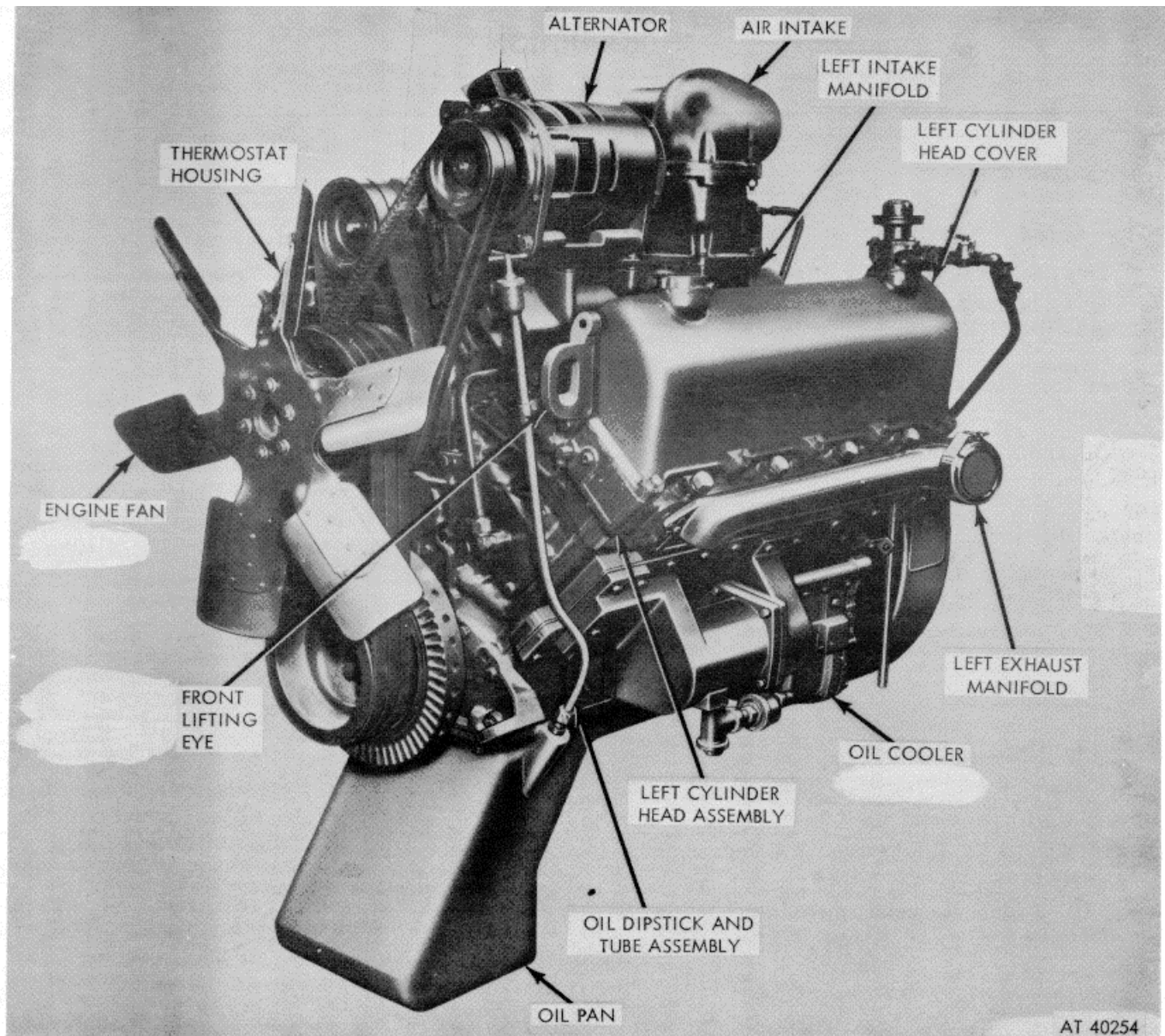


Figure 1-1. Model V8-300 engine assembly--3/4 left front view.

pump. Oil is delivered to all working parts of the engine through drillings in the block, cylinder head, crankshaft, and rocker levers. Lubricating oil is forced through the crankshaft to lubricate the main and connecting rod bearings. Lubricating oil pressure is controlled by a regulator which is an integral part of the oil pump assembly. The air compressor receives pressure lubrication from the engine oil supply. The oil flow cycle is as follows.

(a) Oil is drawn to oil pump through suction tube, in oil pan. It is then pumped through a passage in rear of block through right bank water header cover to front of the block.

(b) The oil flow crosses in front of block to left bank through oil filter and into cooler. From cooler, oil flows to left bank oil drilling at rear of engine. The oil pump by-pass dumps oil directly into pan.

(c) From left bank oil drilling, at rear of engine, oil flows to no. 4 cam bushing and no. 4 main bearing which in turn supplies no. 3 and 7 connecting rods.

(d) Right bank rocker arms are oiled intermittently through no. 5 cam bushing.

(e) From left bank oil drilling, oil flows to left bank tappets, to no. 2 and 3 cam bushings, and no. 2 and 3 main bearings. No. 3 main bear-