

# GROUP 2

## ENGINE

### SECTIONS IN GROUP 2

Section	Subject	Page	Section	Subject	Page
2-A	Engine Specifications . . . . .	2-1	2-E	Replacement of Crankshaft and Connecting Rod Bearings. Replacement of Piston, Rings, and Pins . . . . .	2-30
2-B	Engine Description . . . . .	2-7	2-F	Cooling and Oiling Systems Service . . . . .	2-38
2-C	Engine Tune-Care and Trouble Diagnosis . . . . .	2-15	2-G	Engine Mounting Adjustment Flywheel Replacement Thread Repair . . . . .	2-44
2-D	Cylinder Head and Valve Mechanism . . . . .	2-20			

## SECTION 2-A

### ENGINE SPECIFICATIONS

#### CONTENTS OF SECTION 2-A

Paragraph	Subject	Page	Paragraph	Subject	Page
2-1	Engine Tightening Specifications . .	2-1	2-3	Engine Dimensions, Fits and Adjustments . . . . .	2-3
2-2	Engine General Specifications . . .	2-2			

### 2-1 ENGINE TIGHTENING SPECIFICATIONS

Use a reliable torque wrench to tighten the parts listed to prevent straining or distorting the parts

or possibly damaging the threads. These specifications are for clean and lubricated threads only. Dry or dirty threads produce increased friction which prevents accurate measurement of tightness. It is important that these

torque specifications be strictly observed. Overtightening to any extent may damage threads, thus preventing proper torque from being attained, requiring replacement or repair of the damaged part.

Part	Application	Thread	Torque Ft. Lbs	
			V-6	V-6
Plug	Spark . . . . .	14mm	25-35	25-35
Plug	Crankcase drain . . . . .	1/2 -20	- - -	25-35 - - -
Bolt	Water pump and timing chain cover to block . . . . .	5/16-18	- - -	20-25 - - -
Bolt	Water pump cover to timing chain cover . . . . .	1/4 -20	- - -	6-9 - - -
Bolt	Water outlet to intake manifold . . . . .	5/16-18	- - -	20-25 - - -
Bolt	Intake manifold gasket clamp to block . . . . .	5/16-18	10-15	- - -
Bolt	Intake manifold to cylinder head . . . . .	3/8 -16	- - -	25-35 - - -
Bolt	Exhaust manifold to cylinder head . . . . .	3/8 -16	- - -	10-15 - - -
Bolt	Carburetor to intake manifold . . . . .	5/16-18	- - -	12-15 - - -
Bolt	Fuel pump to timing chain cover . . . . .	5/16-18	- - -	20-25 - - -
Bolt	Camshaft Sprocket to camshaft . . . . .	7/16-20	- - -	40-45 - - -
Bolt	Rocker arm shaft bracket to cylinder head . . . . .	3/8 -16	25-30	25-35
Screw	Rocker arm cover to cylinder head . . . . .	1/4 -20	- - -	3-5 - - -
Bolt	Cranking motor to cylinder block . . . . .	3/8 -16	30-35	30-35
Bolt	Distributor clamp to timing chain cover . . . . .	3/8 -16	- - -	14-17 - - -

Part	Application	Thread	Torque Ft. Lbs.	
			V-8	V-6
Bolt	Crankshaft bearing cap to crankcase . . . . .	1/2 -13		
	All except rear . . . . .		50-55	65-70
	Rear . . . . .		65-70	65-70
Plug	Cylinder block water drain . . . . .	1/4 -18pt.	- - - 15-20	- - -
Bolt	Cylinder head to block . . . . .	7/16-14	65-70	
			(Lube-perfect seal Part #980456 or equivalent)	
Bolt	Upper flywheel housing to cylinder block. . . . .	3/18-16	- - - 30-40	- - -
Bolt	Lower flywheel housing to block and upper flywheel housing . . . . .	5/16-18	- - - 8-12	- - -
		7/16-20	- - - 50-60	- - -
Bolt	Flywheel to crankshaft . . . . .	7/16-20	- - - 140-160	- - -
Bolt	Harmonic balancer to crankshaft . . . . .	5/8 -18	- - - 60-75	- - -
Nut	Connecting rod bolt . . . . .	11/32-24	- - - 6-9	- - -
Bolt	Oil pan to block . . . . .	5/16-18	- Initial -	6-15-
Bolt	Oil screen housing pipe and flange assembly to block . . . . .	1/4 -20	- - - 6-9	- - -
		5/16-18	- - - 20-25	- - -
Bolt	Timing chain cover to block. . . . .	5/16-18	- - - 25-35	- - -
Cap	Oil pressure relief valve. . . . .		- - - 8-12	- - -
Screw	Oil pump cover assembly to timing chain cover. . . . .	1/4 -20	- - - 8-10	- - -
Switch	Oil pressure. . . . .		- - - 15-25	- - -
Bolt	Fan and pulley to water pump hub . . . . .	5/16-24	- - - 15-25	- - -
Bolt	Pulley and reinforcement to harmonic balancer . . . . .	5/16-18	- - - 50-55	- - -
Bolt	Engine mount to cylinder block . . . . .	7/16-14	- - - 55-65	- - -
Bolt	Engine mount to frame bracket . . . . .	7/16-20		

2-2 ENGINE GENERAL SPECIFICATION

Item	225 Cubic Inch V-6 Engine	300 Cubic Inch V-8 Engine
Type - No. of Cylinders . . . . .	90° V-6	90° V-8
Valve arrangement . . . . .	- - - - - In Head	- - - - -
Bore and stroke . . . . .	3.750 x 3.400	3.750 x 3.400
Piston displacement. . . . .	225 cubic inches	300 cubic inches
Compression ratio		
Standard . . . . .	9.0 to 1	9.0 to 1
Power Pack . . . . .	No power pack	11.0 to 1
Export . . . . .	7.6 to 1	7.6 to 1
Brake Horsepower at RPM		
Standard . . . . .	155 @ 4600	210 @ 4600
Power Pack . . . . .	No power pack	250 @ 4600
Foot Pounds Torque at RPM		
Standard . . . . .	225 @ 2400	330 @ 2400
Power Pack . . . . .	No power pack	352 @ 300
Octane Requirement		
Standard . . . . .	84	84
Power Pack . . . . .	Motor 93 Research	Motor 93 Research
Export . . . . .	No power pack	88 Motor 99 Research 83 Research
Taxable Horsepower . . . . .	33.748	45.0
Cylinder Numbers Front to Rear		
Right Bank . . . . .	2-4-6	2-4-6-8
Left Bank . . . . .	1-3-5	1-3-5-7
Firing Order . . . . .	1-6-5-4-3-2	1-8-4-3-6-5-7-2
Cylinder Block Material . . . . .	Cast Iron	Cast Iron
Cylinder Liners . . . . .	None	None
Engine Manifold Vacuum at Idle		
Crankshaft Bearings Number and Type . . . . .	4 replaceable liners	5 replaceable liners
Material . . . . .	- - - - - Durex 100A	- - - - -
Bearing Which Takes End Thrust . . . . .	No. 2	No. 3
Connecting Rod Bearings - Type . . . . .	- - - - - Replaceable Liner	- - - - -
Material . . . . .	- - - - - Durex 100A	- - - - -
Piston Material and Surface Treatment. . . . .	- - - Aluminum Alloy - Tin Plated	- - -
Piston Pin Offset . . . . .	.040"	.040"
Compression Rings Material and Surface Treatment		
#1 . . . . .	Iron - Chrome Plated	Iron - Chrome Plated
#2 . . . . .	Lubrited - - - - -	Lubrited - - - - -

Item	225 Cubic Inch V-6 Engine	300 Cubic Inch V-8 Engine
Oil Ring - Type . . . . .	Dual Steel Rail With Spacer	Dual Steel Rail Chrome Plated
Oil Ring Expander . . . . .	Steel Hump Type	Steel Spacer-Expander
Location of all Piston Rings . . . . .	- - - - - Above Piston Pin - - - - -	- - - - - Above Piston Pin - - - - -
Camshaft Type and Material . . . . .	- - - - - Cast Alloy Iron - - - - -	- - - - - Cast Alloy Iron - - - - -
Camshaft Drive . . . . .	- - - - - -Chain - - - - -	- - - - - -Chain - - - - -
Number and Type of Camshaft Bearings . . . . .	4 Steel Backed Babbit	5 Steel Backed Babbit
Valve Lifter Type . . . . .	- - - - - Hydraulic - - - - -	- - - - - Hydraulic - - - - -
Valve Spring Type . . . . .	- - - - - Single Helical - - - - -	- - - - - Single Helical - - - - -
Oiling System Type . . . . .	- - - - - Forced Feed - - - - -	- - - - - Forced Feed - - - - -
Oil Supplied to Bearing Surfaces		
Crankshaft, Camshaft and Connecting Rods . . . . .	- - - - - Full Pressure - - - - -	- - - - - Full Pressure - - - - -
Piston, Pins . . . . .	- - - - - Splash - - - - -	- - - - - Splash - - - - -
Cylinder Walls . . . . .	- - - - - Splash and Nozzle - - - - -	- - - - - Splash and Nozzle - - - - -
Valve Lifters . . . . .	- - - - - Full Pressure - - - - -	- - - - - Full Pressure - - - - -
Rocker Arms . . . . .	- - - - - Low Pressure - - - - -	- - - - - Low Pressure - - - - -
Normal Oil Pressure . . . . .	- - - - - 30# at 2400 RPM - - - - -	- - - - - 30# at 2400 RPM - - - - -
Oil Reservoir Capacity - Quarts . . . . .	- - - - - 4 (5 with Dry Filter) - - - - -	- - - - - 4 (5 with Dry Filter) - - - - -
Oil Filter, Make and Type . . . . .	- - - - - (A C Type PF - 7) - - - - -	- - - - - (A C Type PF - 7) - - - - -
Cooling System Type . . . . .	- - - - - Pressure (15# Radiator Cap) - - - - -	- - - - - Pressure (15# Radiator Cap) - - - - -
Water Temperature Control . . . . .	- - - - - Thermostat - - - - -	- - - - - Thermostat - - - - -
Thermostat Opens at (° F.) . . . . .	- - - - - 180° - - - - -	- - - - - 180° - - - - -
Cooling System Capacity (Quarts)		
Less Heater . . . . .	11.5 - - - - -	13.5 - - - - -
With Heater . . . . .	13 - - - - -	15 - - - - -
Fan Diameter, Number of Blades		
Regular . . . . .	20.00" - 4 (Shrouded)	20.00" - 4
With Air Conditioning . . . . .	18" - 7 (Shrouded)	18" - 7
With Air Conditioner Modification . . . . .	20.00" - 4 (Shrouded)	20.00" - 4
Fan Drive		
Regular . . . . .	- - - - - Water Pump Shaft - - - - -	- - - - - Water Pump Shaft - - - - -
With Air Conditioning . . . . .	- - - - - Torque and Temperature - - - - -	- - - - - Torque and Temperature - - - - -
	- - - - - Sensitive Clutch - - - - -	- - - - - Sensitive Clutch - - - - -
With Air Conditioner Modification . . . . .	- - - - - Water Pump Shaft - - - - -	- - - - - Water Pump Shaft - - - - -

**2-3 ENGINE DIMENSIONS, FITS AND ADJUSTMENTS**

NOTE: These dimensions and limits for fit of parts apply to new parts only.  
"T" means tight and "L" means loose.

Item	225 Cubic Inch V-6	300 Cubic Inch V-8
Crankshaft journal diameter . . . . .	- - - - - 2.2992 - - - - -	- - - - - 2.2992 - - - - -
Crankshaft journal to bearing clearance . . . . .	- - - - - .0005 - .0021 - - - - -	- - - - - .0005 - .0021 - - - - -
Crankshaft end play at thrust bearing . . . . .	- - - - - .004" - .008" - - - - -	- - - - - .004" - .008" - - - - -
Crankshaft bearing effective length		
#1 . . . . .	- - - - - .864" - - - - -	- - - - - .864" - - - - -
#2 . . . . .	- - - - - 1.057" - - - - -	- - - - - .864" - - - - -
#3 . . . . .	- - - - - .864" - - - - -	- - - - - 1.051" - - - - -
#4 . . . . .	- - - - - .864" - - - - -	- - - - - .864" - - - - -
#5 . . . . .	- - - - - None - - - - -	- - - - - .864" - - - - -
Crankpin journal diameter . . . . .	- - - - - 2.000" - - - - -	- - - - - 2.000" - - - - -
Crankpin journal to bearing clearance . . . . .	- - - - - .002" - - - - -	- - - - - .0022" - - - - -
Connecting rod end play on crankpin . . . . .	- - - - - .005" - .012" (Total both rods) - - - - -	- - - - - .005" - .012" (Total both rods) - - - - -
Connecting rod bearing length . . . . .	- - - - - .820 - - - - -	- - - - - .820 - - - - -
Piston clearance in bore . . . . .	- - - - - .0002" - .0023" - - - - -	- - - - - .0002" - .0023" - - - - -
Piston pin diameter . . . . .	- - - - - .8747 - .9394 - - - - -	- - - - - .8747 - .9394 - - - - -
Piston pin length . . . . .	- - - - - 2.960 - - - - -	- - - - - 3.060 - - - - -
Piston pin fit at 70° F in piston . . . . .	- - - - - .0007" - .0015" Press - - - - -	- - - - - .0007" - .0015" Press - - - - -
Piston pin fit in connecting rod . . . . .	- - - - - .003" - .005" - - - - -	- - - - - .003" - .005" - - - - -
Compression ring . . . . .	- - - - - .035" - - - - -	- - - - - .035" - - - - -
Oil Ring . . . . .	- - - - - .0095" - - - - -	- - - - - .0095" - - - - -

Item	225 Cubic Inch	300 Cubic Inch
	V-6	V-8
Piston ring gap, compression ring in bore . . . . .	- .010"-.020"	- - - - -
Oil ring in bore . . . . .	- .015"-.035"	- - - - -
Camshaft bearing journal diameter		
#1 . . . . .	- 1.755" - 1.756"	- 1.785" - 1.786"
#2 . . . . .	- 1.725" - 1.726"	- 1.755" - 1.756"
#3 . . . . .	- 1.695" - 1.696"	- 1.725" - 1.726"
#4 . . . . .	- 1.665" - 1.666"	- 1.695" - 1.696"
#5 . . . . .	- - - - -	- 1.665" - 1.666"
Camshaft journal clearance in bearings . . . . .	- - - .0005"	- .0035"
Valve lifter diameter . . . . .	- - .8422"	- .8427"
Valve lifter clearance in crankcase . . . . .	- - - .0015"	- .003"
Valve lifter leakdown rate, in test fixture . . . . .	- - - - -	- 12 to 60 sec.
Rocker arm ratio . . . . .	- - - - -	- 1.6 to 1
Rocker arm clearance on shaft . . . . .	- - - .0017"	- .0032"
Valve head diameter inlet . . . . .	- - - - -	- 1.625"
Valve head diameter exhaust . . . . .	- - - - -	- 1.3125"
Valve seat angle inlet and exhaust . . . . .	- - - - -	- 45°
Valve stem diameter inlet . . . . .	- - - .3412"	top .3407" bottom
Valve stem diameter exhaust . . . . .	- - - .3407"	top .3402" bottom
Valve stem clearance in guide		
Inlet . . . . .	- - - top .001"	- .003"
	- - - bottom .0015"	- .0035"
Exhaust . . . . .	- - - top .0015"	- .0035"
	- - - bottom .002"	- .004"
Valve Spring		
Valve closed pounds @ length . . . . .	- - - - -	- 64 @ 1.640"
Valve open pounds @ length . . . . .	- - - - -	- 168 @ 1.260"
Fan belt adjustment . . . . .	- - - - -	- See Figures 2-55 and 2-56

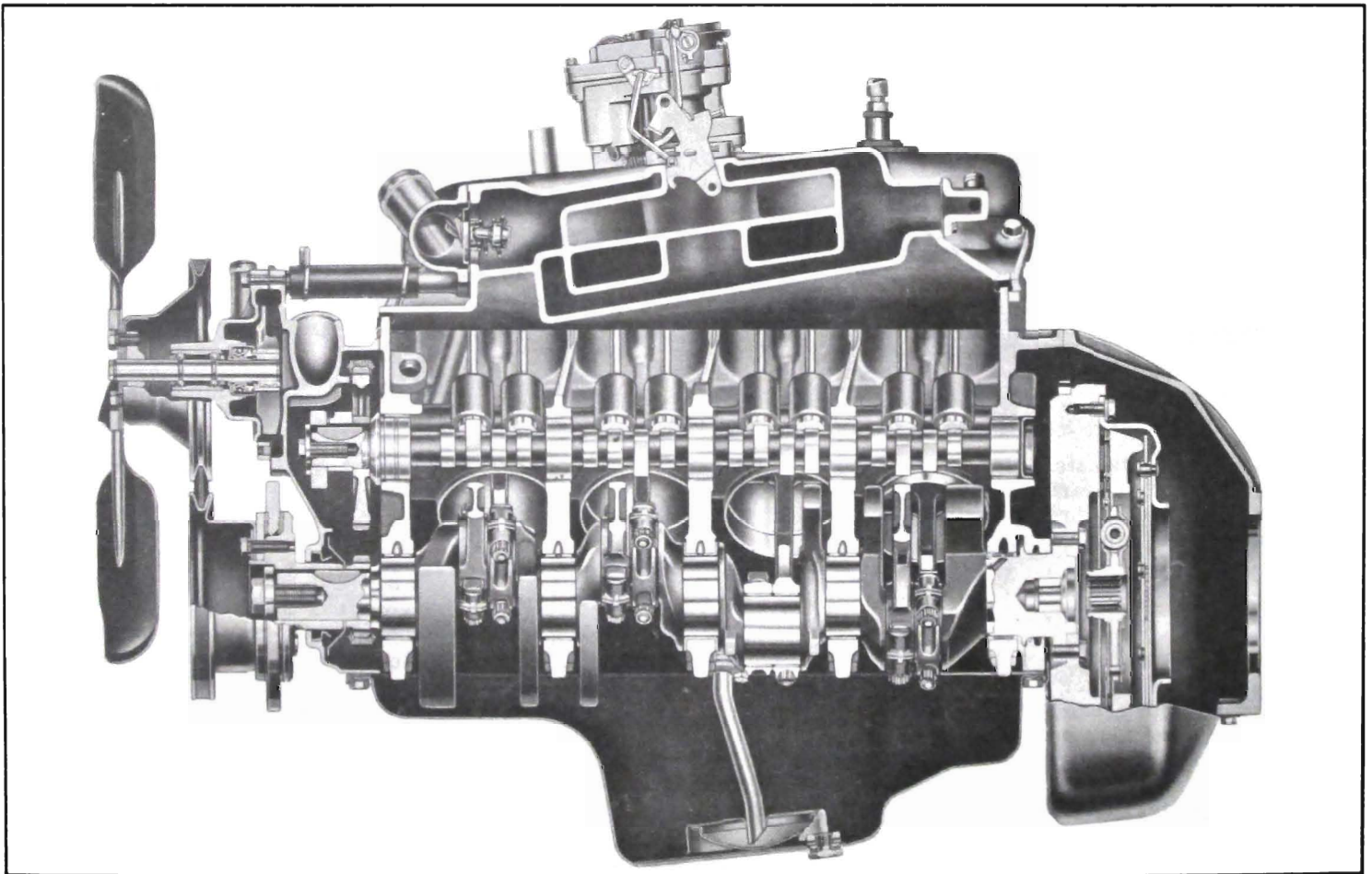


Figure 2-1—V-8 Engine Side Sectional View

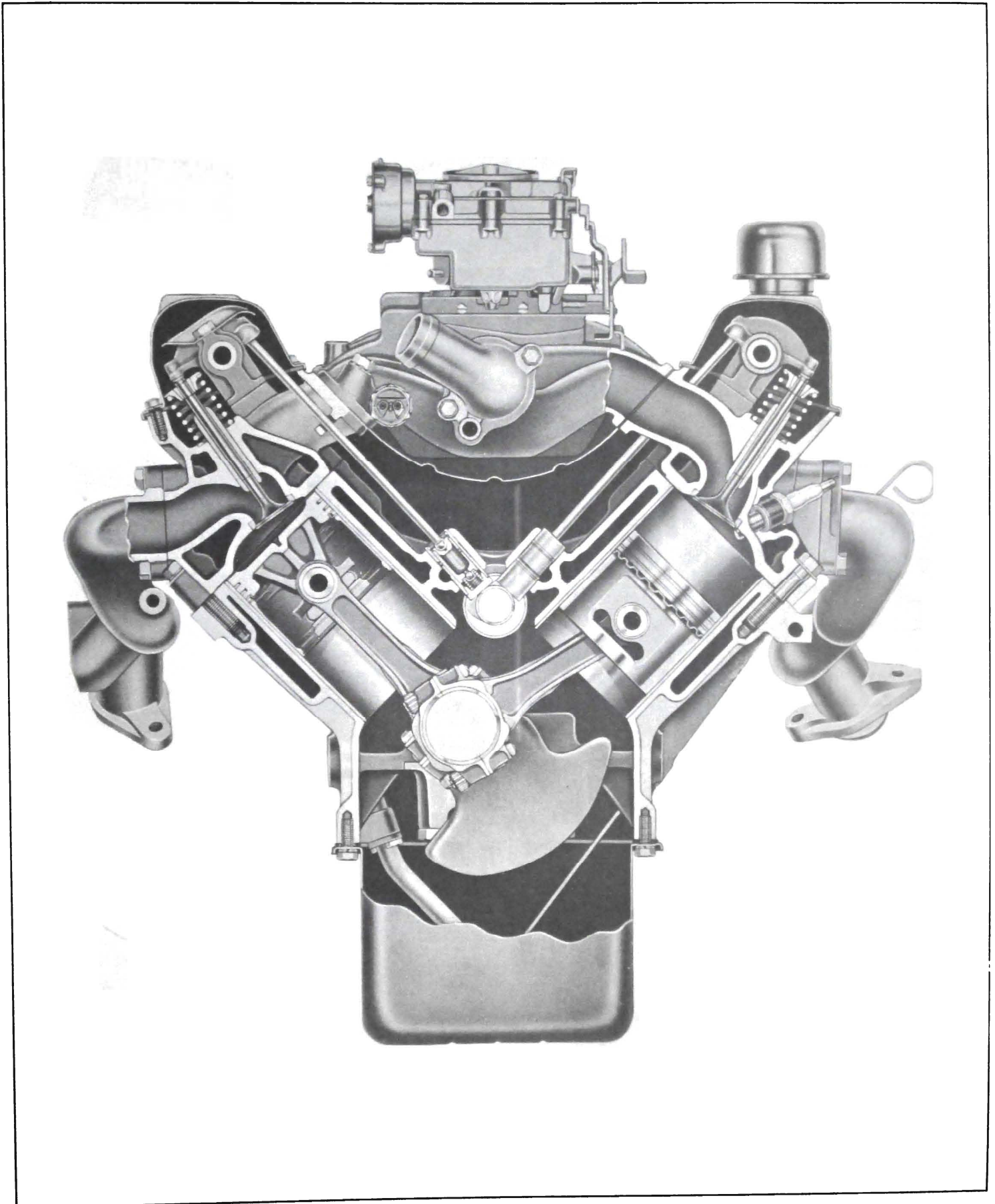


Figure 2-3— Engine End Sectional View

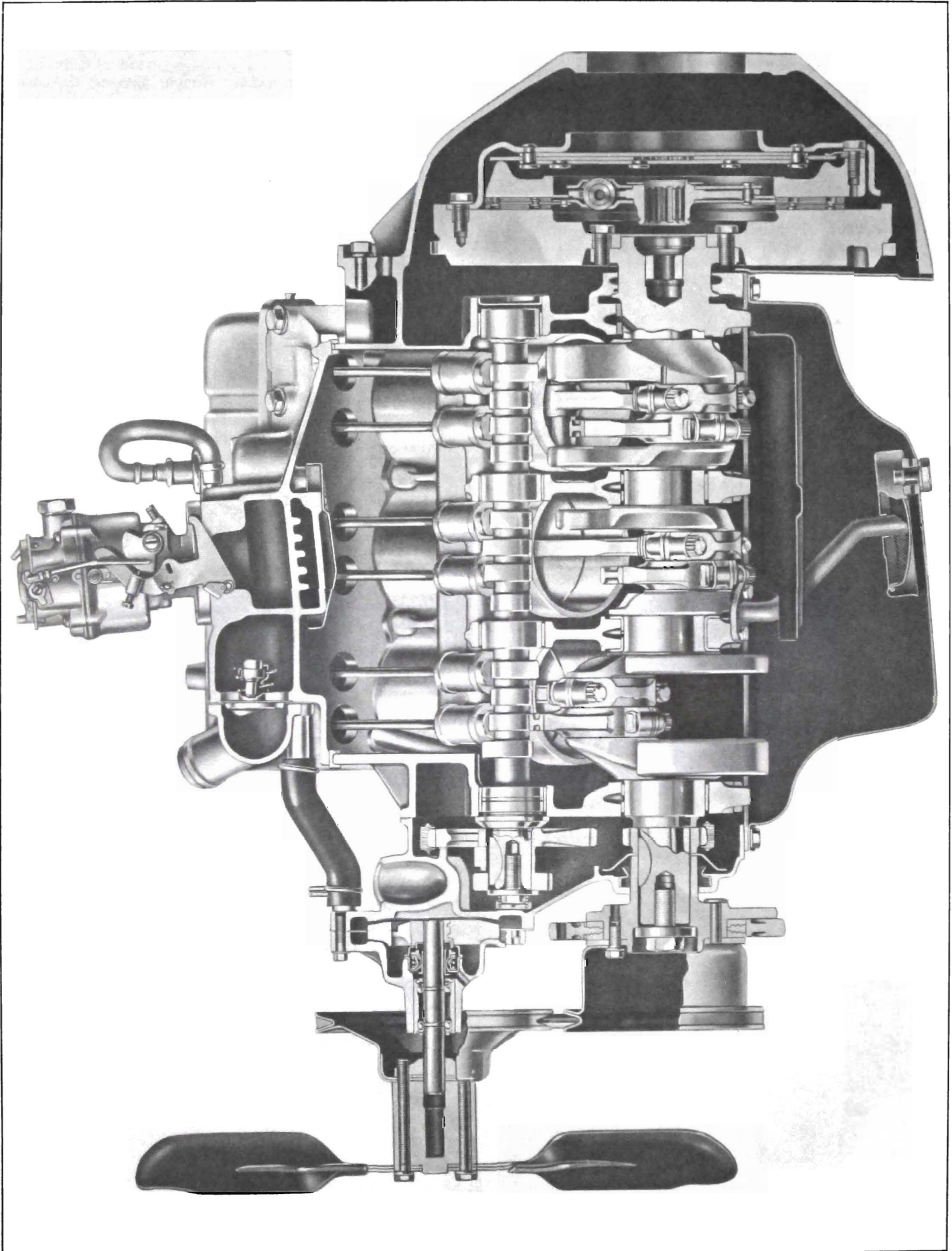


Figure 2-2—V-6 Engine Cross Section View