GROUP 2

ENGINE

SECTIONS IN GROUP 2

SECTION 2-A

ENGINE SPECIFICATIONS

CONTENTS OF SECTION 2-A

2-1 ENGINE BOLT TORQUE SPECIFICATIONS

Use a reliable torque wrench to tighten the parts listed. This will insure that the proper torque is obtained without straining or distorting the parts. The specifications are for clean and lightly lubricated threads only. Dry or dirty threads produce increased friction which prevents accurate measurement of torque.

a. Torque Specifications for 401 and 425 Cubic Inch Engines

Part Location	Torque ft. lbs.
Main Bearing Caps to Cylinder Block	95-120
Cylinder Head to Cylinder Block Bolts	65-80
Harmonic Balancer to Crankshaft	200 Min.
Fan Driving Pulley to Harmonic Balancer	18-25
Flywheel to Crankshaft (Auto. & Synchro.)	50-65
Connecting Rod	40-50
Oil Pan to Cylinder Block	9-13
Oil Pan Drain Plug	25-35
Oil Pump Cover - Body	6-12
Oil Screen Housing & Pipe to Block	6-9
Oil Pump to Block	30-40
Oil Gallery Plug	25-35
Oil Filter to Block	30-40
Timing Chain (& Water Pump Cover) to Block	17-23
Water Pump Cover to Timing Chain Cover	6-8
Fan Driven Pulley	17-23
Water Outlet to Manifold	17-23
Intake Manifold to Cylinder Head	25-35
Exhaust Manifold to Cylinder Heads	10-15
Carburetor to Intake Manifold	10-15
Air Cleaner Stud	17-23 lb. in.
Air Cleaner Wing Nut	17-23 lb. in.

a. Torque Specifications for 401 and 425 Cubic Inch Engines (Cont'd.)

Part Location	Torque Ft.-Lbs.
Fuel Pump to Cylinder Block	25-35
Motor Mount to Block	25-40
Push Rod Cover to Cylinder Block	3-5
Fuel Pump Eccentric & Timing Chain Sprocket to Camshaft	40-55
Rocker Arm Covers to Cylinder Head	3-5
Rocker Arm Shaft Bracket to Cylinder Head	25-35
Delcotron Bracket to Cylinder Head	65-80
Delcotron Bracket Brace	18-25
Delcotron Pivot Bolt	30-40
Starting Motor to Cylinder Block	40-55
Distributor Clamp to Cylinder Block	10-15
Spark Plugs	25-35
Ignition Coil to Intake Manifold	9-13
Water Manifold to Cylinder Head	25-35
Flywheel Housing to Cylinder Block	45-60
Automatic Transmission Case to Block	45-60

b. Torque Specifications for 300 Cubic Inch Engine

Part Location	Torque ft. lbs.
Crankshaft Bearing Caps to Cylinder Block	95-120
Connecting Rods	30-40
Cylinder Head to Cylinder Block	65-80
Harmonic Balancer to Crankshaft	140 Min.
Fan Driving Pulley to Harmonic Balancer	18-25
Flywheel to Crankshaft (Auto. & Synchro.)	50-65
Oil Pan to Cylinder Block	9-13
Oil Pan Drain Plug	25-35
Oil Pump Cover to Timing Chain Cover	8-12
Oil Pump Pressure Regulator Retainer	25-30
Oil Screen Housing to Cylinder Block	6-9
Oil Pan Baffle to Cylinder Block	9-13
Oil Gallery Plugs	20-30
Filter Assembly to Pump Cover	10-15
Timing Chain Cover to Block	17-23
Water Pump Cover to Timing Chain Cover	6-8
Fan Driven Pulley	17-23
Thermostat Housing to Intake Manifold	17-23
Intake Manifold to Cylinder Head	25-35
Exhaust Manifold to Cylinder Head	10-15
Carburetor to Intake Manifold	10-15
Air Cleaner Stud	17-23 Lb. In.
Air Cleaner Wing Nut	17-23 Lb. In.
Fuel Pump to Cylinder Block	17-23
Motor Mount to Cylinder Block	50-75
Fuel Pump Eccentric and Timing Chain Sprocket to Camshaft	40-55
Rocker Arm Cover to Cylinder Head	3-5
Rocker Arm Shaft Bracket to Cylinder Head	25-35
Delcotron Bracket to Cylinder Head	30-40
Delcotron Bracket to Water Pump & Timing Chain Cover	18-25
Delcotron Mounting Bracket Thru Delcotron to Cylinder Head at Pivot Location	30-40
Starting Motor to Block	30-40
Starting Motor Brace to Block	9-13
Starting Motor Brace to Starting Motor	9-13
Distributor Holddown Clamp	10-15
Spark Plugs	25-35
Synchromesh Lower Flywheel Housing Cover	9-13

2-2 ENGINE GENERAL SPECIFICATIONS

a. General Description & Specifications for 401 and 425 Cubic Inch V-8's

Item	401 Cu. In.	425 Cu. In.
Type - No. of Cylinders	V-8	V-8
Valve Arrangement	In Head	In Head
Bore and Stroke	4.1875 x 3.640	4.3125 x 3.640
Piston Displacement	401 Cu. In.	425 Cu. In.
Compression Ratio - Standard	10.25:1	10.25:1
Compression Ratio - Export	8.75:1	N.A.
Taxable Horsepower	56.11	59.51
Max. Brake Horsepower @ RPM	325 @ 4400	340 @ 4400*
Engine Torque @ RPM	445 @ 2800	465 @ 2800
Octane Requirements	99 Research 90 Motor	99 Research 90 Motor
Firing Order	1-2-7-8-4-5-6-3	1-2-7-8-4-5-6-3
Crankshaft Bearings - No. & Type	5 Steel-Backed	5 Steel-Backed
Material	#1 - #4 M-400 #5 Durex 100A	#1 - #4 M-400 #5 Durex 100A
Bearing Taking End Thrust	#3	#3
Connecting Rod Bearing Type	Steel Backed	Steel Backed
Material	M-400	M-400
Piston Material	Cast Aluminum Alloy	Cast Aluminum Alloy
Compression Rings - Material	Lubrited Cast Iron	Lubrited Cast Iron
Oil Rings - Type	Hump Type Expander	Hump Type Expander
Material	Steel	Steel
Location of All Rings	Above Pin	Above Pin
Camshaft	Cast Alloy Iron	Cast Alloy Iron
Camshaft Drive	Chain	Chain
Camshaft Bearings	5	5
Valve Lifter - Type	Hydraulic	Hydraulic
Valve Spring - Type	Inner & Outer Helical	Inner & Outer Helical
Lubrication System		
Oil Supplied to Bearing Surfaces	Pressure	Pressure
Oil Supplied to Crankshaft & Camshaft	Pressure	Pressure
Oil Supplied to Connecting Rods	Pressure	Pressure
Oil Supplied to Pistons & Pins	Splash	Splash
Oil Supplied to Cylinder Walls	Splash & Nozzle	Splash & Nozzle
Oil Supplied to Valve Lifters, Rocker Arms, and Valves	Pressure	Pressure
Normal Oil Pressure	40 @ 2400	40 @ 2400 RPM
Oil Reservoir Capacity	3	3
Dry Engine	4	4
Oil Filter	Full Flow	Full Flow
Cooling System		
Water Temperature Control	Thermostat	Thermostat
Thermostat Opens At	180°	180°
Cooling System Capacity		
Less Heater	14 Qts.	14-1/2 Qts.
With Heater	14-3/4 Qts.	15-1/4 Qts.
With A/C	15-1/4 Qts.	15-1/4 Qts.
Fan Diameter, No. of Blades		
Standard	18" x 4	18" x 4
Air Conditioning	20" x 7	20" x 5
Fan Drive		
Standard	Water Pump Shaft	Water Pump Shaft
Air Conditioning	Thermostatic Controlled Clutch	Thermostatic Controlled Clutch

*On 425 Engine with 2 - 4 Barrel Carburetors, Max. BHP is 360 @ 4400 RPM

b. General Description & Specifications for 300 Cubic Inch V-8

Item	300 Cubic Inch V-8 Engine
Engine Type	90° V-8
Valve Arrangement	In Head
Bore and Stroke	3.750 x 3.400
Piston Displacement	300 Cu. In.
Compression Ratio	
2-Barrel Carburetor	9.0 to 1
4-Barrel Carburetor	11.0 to 1
Brake Horsepower @ RPM	
Standard Compression	210 @ 4600
High Compression	250 @ 4600
Torque @ RPM	
Standard Compression	310 @ 2400
High Compression	335 @ 3000
Octane Requirements	
Standard Compression	84 Motor Method, 93 Research Method
High Compression	90 Motor Method, 99 Research Method
Taxable Horsepower	45.0
Cylinder Numbers - Front to Rear	
Left Bank	1-3-5-7
Right Bank	2-4-6-8
Firing Order	1-8-4-3-6-5-7-2
Cylinder Block Material	Cast Iron
Cylinder Head Material	Cast Iron
Engine Idle Speed	
Synchromesh	550 RPM
Automatic	550 RPM (In Drive)
A/C Cars	600 RPM (Automatic In Drive)

Ring Specifications

Compression Ring Material & Surface Treatment	
#1	Cast Iron - Chrome Plated
#2	Cast Iron - Lubrited
Oil Ring Type	Dual Steel Rail With Spacer
Oil Ring Expander	Steel Humped Ring
Location of Rings	Above Piston Pin

Crankshaft Specifications

Material	Pearlitic Malleable Iron
Bearings	5-All Replaceable
Bearing Material	M-400 Aluminum (#1, #2, #3, and #4) M-100 Durex (#5)
Bearing Taking End Thrust	#3

Camshaft Specifications

Material	Cast Iron Alloy
Bearings	Steel Backed Babbit
Number of Bearings	5
Camshaft Location	Above Crankshaft At Center of "V"
Type of Drive	Chain
No. of Links	54
Crankshaft Sprocket	Sintered Iron
Camshaft Sprocket	Nylon Coated Aluminum

Valve Specifications

Intake Valve Material	SAE 1041 Steel
Exhaust Valve Material	GM-N82152 (21-4N)
Valve Lifter Mechanism	Hydraulic
Valve Spring	Single Helical

Lubrication System Specification

Type of Lubrication	
Main Bearings	Pressure
Connecting Rods	Pressure
Piston Pins	Splash
Camshaft Bearings	Pressure
Timing Chain	Splash & Nozzle
Cylinder Walls	Splash & Nozzle
Oil Pump Type	Gear Driven
Normal Oil Pressure	30 lbs. @ 2400 RPM
Oil Pressure Sending Unit	Electrical
Oil Intake	Screened Tube
Oil Filter System	Full Flow
Filter Type	Throw-Away Element & Can
Crankcase Capacity	
Less Filter	3 qts.
With Filter	4 qts.

Cooling System Specifications

System Type	Pressure
Radiator Cap Relief Pressure	15 psi
Thermostat	Choke Type Opening at 180°
Water Pump	
Type	Centrifugal
GPM @ RPM	14 @ 1000
Drive	V-Belt
Bearings	Double Row
By-Pass Recirculation Type	External
Cooling System Capacities	
With Heater	11.4 qts.
W/O Heater	10.6 qts.
With Air Conditioning	12.5 qts.
Fan Diameter and Number of Blades	
Less AC	18" x 4
With AC	18" x 7
Fan Drive	
Less AC	Water Pump Shaft
With AC	Torque and Temperature Sensitive Clutch

Piston and Piston Pin Specifications

Piston Material	Cast Aluminum Alloy
Piston Treatment	Tin Plated
Piston Pin Material	SAE 1018 or 1118 Steel
Piston Pin Type	Pressed In Rod

Connecting Rod Specifications

Material - Rod	Pearlitic Malleable Iron
Bearing Type	Removable Steel Backed
Bearing Material	M/400 Aluminum

2-3 ENGINE DIMENSIONS, FITS AND ADJUSTMENTS

a. 401 and 425 Cubic Inch Engines

Item	401 Cu. In.	425 Cu. In.
Crankshaft Journal Diameter	See Chart at End of this Subpar.	
Crankshaft Journal to Bearing Clearance	.000 - .0019	.000 - .0019
Crankshaft End Play at Thrust Bearing	.004 - .008	.004 - .008
Crankshaft Journal Diameter	2.2495	2.2495
Crankpin Journal to Bearing Clearance	.0002 - .0023	.0002 - .0023
Connecting Rod End Play on Crankpin	.005 - .012	.005 - .012
Connecting Rod Bearing Length	.820	.820

a. 401 and 425 Cubic Inch Engines (Cont'd.)

Item	401 Cu. In.	425 Cu. In.
Cylinder Bores - Standard Size	4.1875	4.312
Piston Pin Diameter	.9994 - .9997	.9994 - .9997
Piston Pin Length	3.520	3.520
Piston Pin Fit (In Connecting Rod)	Press	Press
Piston Ring Gap - Compression Ring in Bore	.015 - .025	.015 - .025
Piston Ring Gap - Oil Ring in Bore	.015 - .035	.015 - .055
Camshaft Bearing Journal Dia.		
#1	1.785 - 1.786	1.785 - 1.786
#2	1.755 - 1.756	1.755 - 1.756
#3	1.725 - 1.726	1.725 - 1.726
#4	1.695 - 1.696	1.695 - 1.696
#5	1.665 - 1.666	1.665 - 1.666
Valve Lifter Diameter	.8425	.8425
Valve Lifter Clearance in Crankcase	.0015 - .0030	.0015 - .0030
Rocker Arm Ratio	1.6:1	1.6:1
Rocker Arm Clearance on Shaft	.0027 - .0042	.0027 - .0042
Valve Head Diameter - Inlet	1.875	1.875
Valve Seat Angle - Inlet	45°	45°
Valve Stem Diameter - Inlet	.373T - .372B	.373T - .372B
Valve Head Diameter - Exhaust	1.500	1.500
Valve Seat Angle - Exhaust	45°	45°
Valve Stem Diamter - Exhaust	.372T - .3715B	.372T - .3715B
Valve Stem Clearance in Guide		
Inlet	.001 - .003 Top, .002 - .004 Bottom	Same as 401
Exhaust	.0015 - .0035 Top, .0025 - .0045 Bottom	Same as 401
Valve Spring - Outer		
Valve Closed (Lbs. @ Length)	46 @ 1.600"	46 @ 1.600"
Valve Open (Lbs. @ Length)	101 @ 1.160"	101 @ 1.160"
Valve Spring - Inner		
Valve Closed (Lbs. @ Length)	25.5 @ 1.690"	25.5 @ 1.690"
Valve Open (Lbs. @ Length)	76 @ 1.250"	76 @ 1.250"

Note: All Measurements in Inches Unless Otherwise Specified.

b. 300 Cubic Inch Engines

Item	300 Cu. In.
Piston Clearance Limits	
Top Land	.0215 - .0295
Skirt - Top	.0005 - .0011
Skirt - Bottom	.0005 - .0021
Ring Groove Depth	
#1 - Compression Ring	.1880 - .1955
#2 - Compression Ring	.1905 - .1980
#3 - Oil Ring	.1905 - .1980
Ring Width	
#1 - Compression Ring	.0785 - .0790
#2 - Compression Ring	.0770 - .0780
#3 - Oil Ring	.181 - .187
Ring Gap	
#1 - Compression Ring	.010 - .020
#2 - Compression Ring	.010 - .020
#3 - Oil Ring	.015 - .035
Piston Pin Length	3.060
Diameter of Pin	.9394 - .9397
Clearance	
In Piston	.00005 - .0001
In Rod	.0007 - .0015 Press
Direction & Amount Offset In Piston	.040 Toward High Thrust Side

*All Measurements In Inches Unless Otherwise Specified.

b. 300 Cubic Inch Engines (Cont'd.)

Item	300 Cu. In.
Connecting Rod Specifications	
Bearing Length	.737
Bearing Clearance (Limits)	.0020 - .0023
End Play - Total for both Rods	.006 - .014
Crankshaft Specifications	
End Play at Thrust Bearing	.004 - .008
Main Bearing Journal Diameter	2.4995
Crankpin Journal Diameter	2.0000
Main Bearing Overall Length	
#1	.864
#2	.864
#3	1.057
#4	.864
#5	.864
Main Bearing to Journal Clearance	.0004 - .0018
Camshaft Specifications	
Bearing Journal Diameter	
#1	1.785 - 1.786
#2	1.755 - 1.756
#3	1.725 - 1.726
#4	1.695 - 1.696
#5	1.665 - 1.666
Journal Clearance in Bearings	.0005 - .0025 (#1), .0005 - .0035 (#2, #3, #4, & #5)
Valve System Specifications	
Rocker Arm Ratio	1.6 to 1
Rocker Arm Clearance On Shaft	.0017 - .0032
Valve Lifter Diameter	.8422 - .8427
Valve Lifter Clearance In Crankcase	.0015 - .003
Valve Lifter Leakdown Rate	12 to 60 Sec. in Test Fixture
Intake Valve	
Head Diameter	1.625
Seat Angle	45°
Stem Diameter	.3412 Top - .3407 Bottom
Clearance In Guide	Top .001 - .003 Bottom .0015 - .0035
Exhaust Valve	
Head Diameter	1.3125
Seat Angle	45°
Stem Diameter	.3407 Top - .3402 Bottom
Clearance In Guide	Top .0015 - .0035 Bottom .002 - .004
Valve Spring	
Valve Closed - Pounds @ Length	64 @ 1.640
Valve Open - Pounds @ Length	168 @ 1.260

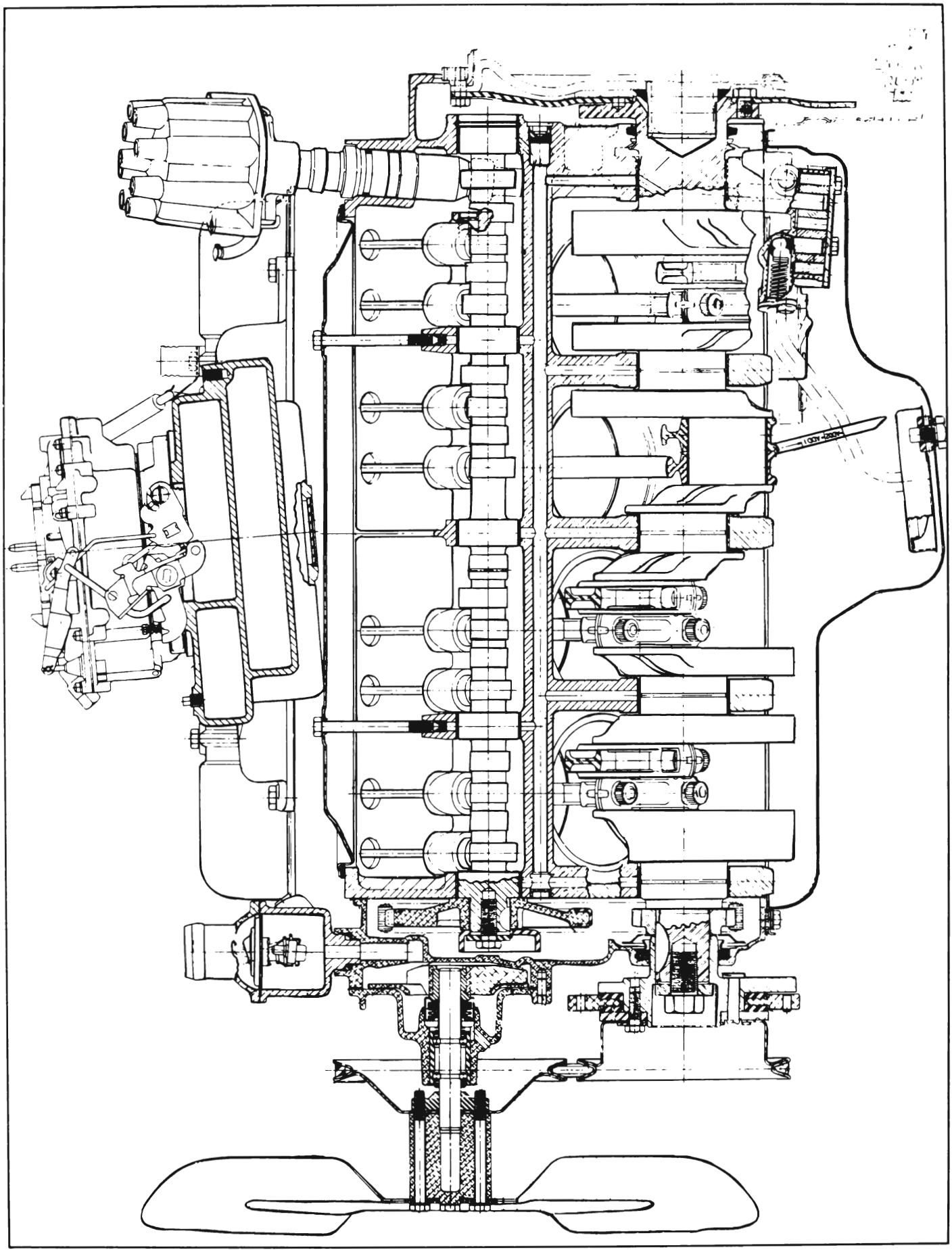

Figure 2-1—401 Cu. In. Engine Cross Section (Side View)

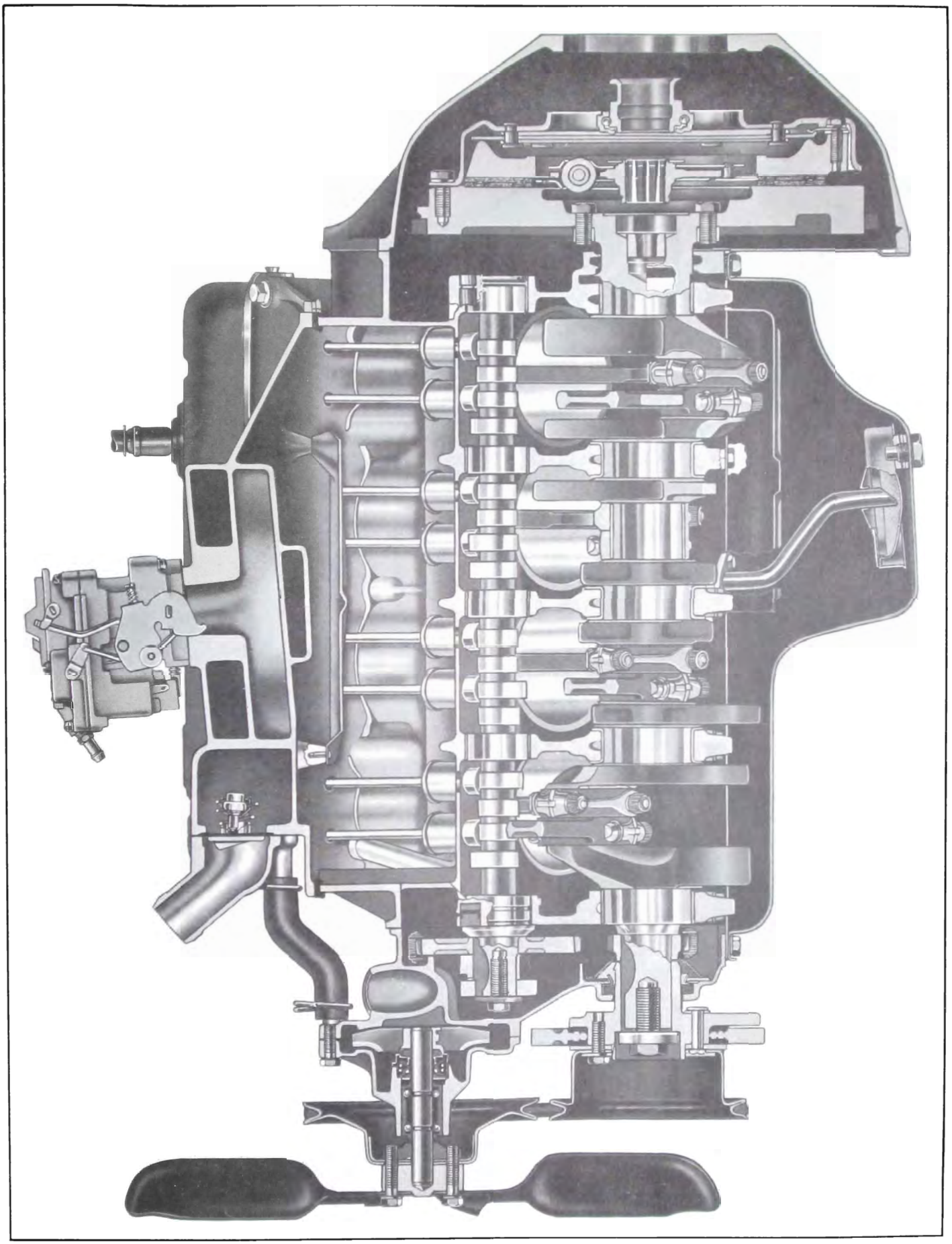

Figure 2-2—300 Cu. In. Engine Cross Section (Side View)

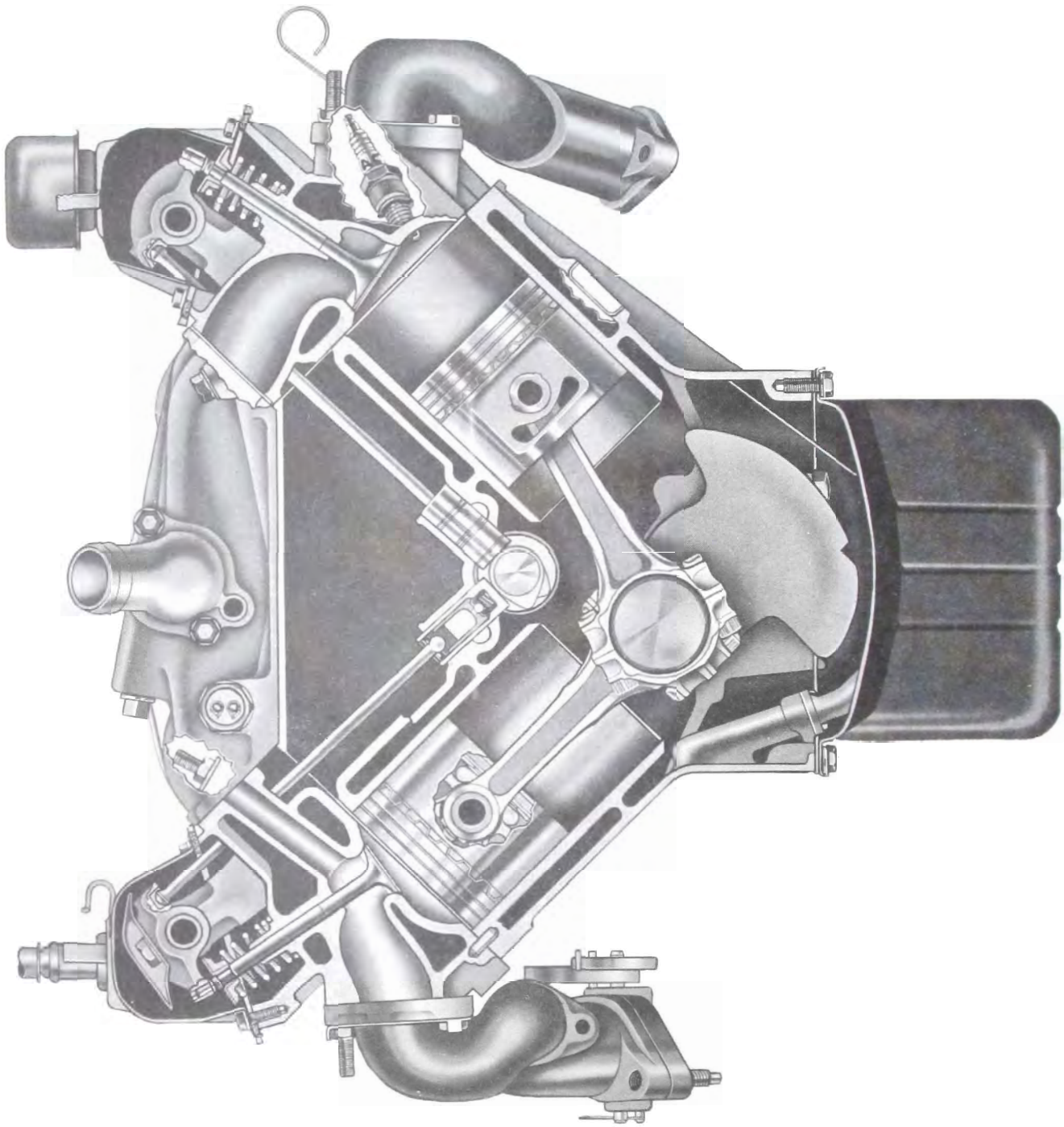

Figure 2-3—300 Cu. In. Engine (Front View)