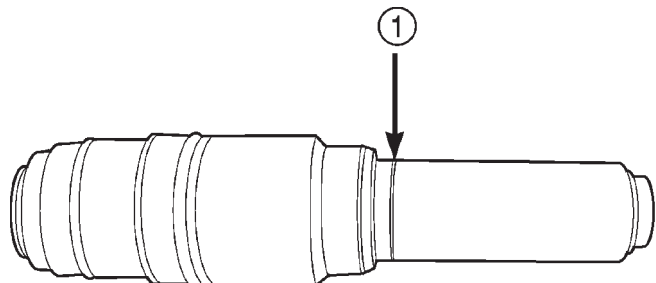


CLEANING AND INSPECTION (Continued)

sion. If a machined groove on the plunger is visible (Fig. 118), the timing chain and/or related components are worn or stretched to service limits.

(3) Inspect all chain guides, sprockets and tensioners for wear. Replace as necessary following the procedures this section.



80be46ca

**Fig. 118 Primary Timing Chain Tensioner**

1 - MAXIMUM WEAR INDICATOR GROOVE

SPECIFICATIONS

2.7L ENGINE

DESCRIPTION	SPECIFICATION
<b>General Specifications</b>	
Type	60° DOHC V-6 24-Valve
Displacement	2.7 Liters (167 Cubic Inches)
Bore & Stroke	86.0 x 78.5 mm (3.386 in. x 3.091 in.)
Compression Ratio	9.67:1
Lead Cylinder	#1 Right Bank
Firing Order	1-2-3-4-5-6
<b>Cylinder Block</b>	
Cylinder Bore Diameter	86.0 mm (3.3859 in.)
Out of Round (Max.)	0.076 mm (0.003 in.)
Taper (Max.)	0.051 mm (0.002 in.)
<b>Pistons</b>	
Material	Aluminum Alloy
Piston Diameter	85.981 mm ±0.013 (3.3851 in. ±0.0006)

DESCRIPTION	SPECIFICATION
Clearance at Size Location	- 0.0016 to +0.0396 mm (- 0.0001 to +0.0016 in.)
Piston Weight	316-326 grams (11.1466-11.4994 oz.)
Piston Ring Groove Diameter—No. 1	77.65-77.85 mm (3.0571-3.065 in.)
Piston Ring Groove Diameter—No. 2	75.72-75.92 mm (2.9811-2.989 in.)
Piston Ring Groove Diameter—No. 3	77.42-77.62 mm (3.0481-3.0559 in.)
<b>Piston Pins</b>	
Type	Full Floating
Pin Diameter	21.997-22.000 mm (0.8661-0.8662 in.)
Clearance in Piston	0.002-0.010 mm (0.0001-0.0004 in.)
Clearance in Rod	0.007-0.018 mm (0.0003-0.0008 in.)
<b>Piston Rings</b>	
Ring Gap—Top Compression Ring	0.20-0.36 mm (0.008-0.014 in.)
Ring Gap—2nd Compression Ring	0.37-0.63 mm (0.0146-0.0249 in.)
Ring Gap—Oil Control (Steel Rails)	0.25-0.76 mm (0.010-0.030 in.)
<b>Piston Ring Side Clearance</b>	
Compression Rings—Top and Second	0.040-0.080 mm (0.0016-0.0031 in.)
Oil Ring (Steel Rails)	0.061-0.207 mm (0.0025-0.0082 in.)
<b>Piston Ring Width</b>	
Compression Rings—Top and Second	1.47-1.49 mm (0.0579-0.0587 in.)
Oil Ring (Steel Rails)	0.445-0.470 mm (0.0176-0.0186 in.)
<b>Connecting Rods</b>	
Bearing Clearance	0.024-0.064 mm (0.001-0.0026 in.)
Side Clearance	0.13-0.38 mm (0.0052-0.015 in.)

## SPECIFICATIONS (Continued)

DESCRIPTION	SPECIFICATION
Side Clearance (Max.)	0.4318 mm (0.017 in.)
Piston Pin Bore Diameter	22.007–22.015 mm (0.8665–0.8668 in.)
Bearing Bore Out of Round (Max.)	0.004 mm (0.0002 in.)
Total Weight (Less Bearing)	529.9 ±7 grams (18.6917 ±0.247 oz.)
<b>Crankshaft Main Bearing Journals</b>	
Diameter	63.49–63.51 mm (2.4997–2.5004 in.)
Bearing Clearance	0.035–0.053 mm (0.0014–0.0021 in.)
Bearing Clearance (Max.)	0.087 mm (0.0034 in.)
Out of Round (Max.)	0.015 mm (0.0006 in.)
Taper (Max.)	0.015 mm (0.0006 in.)
End Play	0.0475–0.2725 mm (0.0019–0.0108 in.)
End Play (Max.)	0.43 mm (0.017 in.)
<b>Connecting Rod Journals</b>	
Diameter	53.51–53.49 mm (2.1067–2.106 in.)
Bearing Clearance	0.024–0.064 mm (0.001–0.0026 in.)
Out of Round (Max.)	0.015 mm (0.0006 in.)
Taper (Max.)	0.015 mm (0.0006 in.)
<b>Camshaft</b>	
Bore Diameter	24.050–24.071 mm (0.9469–0.09476 in.)
Bearing Journal Diameter	24.000–23.981 (0.9449–0.9441 in.)
Bearing Clearance	0.05–0.09 mm (0.0020–0.0035 in.)
Bearing Clearance (Max.)	0.13 mm (0.0051 in.)

DESCRIPTION	SPECIFICATION
End Play	0.13 mm (0.0051–0.0110 in.)
<b>Valve Timing—Intake Valve</b>	
Opens (ATDC)	2°
Closes (ABDC)	44°
Duration	222°
<b>Valve Timing—Exhaust Valve</b>	
Opens (BBDC)	36°
Closes (ATDC)	4°
Duration	220°
Valve Overlap	2°
<b>Cylinder Head</b>	
Gasket Thickness (Compressed)	1.50 mm ±0.05 (0.0591 in. ±0.002 in.)
Valve Seat Angle	44.5°–45°
Valve Seat Runout (Max.)	0.05 mm (0.002 in.)
Intake Valve Seat Width	1.00–1.5 mm (0.0394–0.0591 in.)
Exhaust Valve Seat Width	1.25–1.75 mm (0.0492–0.0689 in.)
Guide Bore Diameter (Std.)	5.975–6.00 mm (0.2353–0.2363 in.)
Valve Guide Height*—Intake & Exhaust	13.25–13.75 mm (0.5217–0.5414 in.)
*Measured from cylinder head surface to top of guide	
<b>Valves</b>	
Face Angle	45–45.5 mm
Head Diameter—Intake	33.67–33.93 (1.3256–1.3358 in.)
Head Diameter—Exhaust	27.67–27.93 mm (1.0894–1.1000 in.)
Length—Intake (Overall)	107.89–108.39 mm (4.2476–4.2673 in.)
Length—Exhaust (Overall)	105.88–106.38 mm (4.1685–4.1882 in.)
Stem Diameter—Intake	5.934–5.952 mm (0.2337–0.2344 in.)
Stem Diameter—Exhaust	5.906–5.924 mm (0.2326–0.2333 in.)

SPECIFICATIONS (Continued)

DESCRIPTION	SPECIFICATION
Stem-to-Guide Clearance—Intake (New)	0.023–0.066 mm (0.0009–0.0026 in.)
Stem-to-Guide Clearance—Exhaust (New)	0.051–0.094 mm (0.002–0.0037 in.)
Stem-to-Guide Clearance—Intake (Max., Rocking Method)	0.29 mm (0.0114 in.)
Stem-to-Guide Clearance—Exhaust (Max., Rocking Method)	0.370 mm (0.0146 in.)
Valve Lift—Intake (Zero Lash)	9.0 mm (0.3543 in.)
Valve Lift—Exhaust (Zero Lash)	8.0 mm (0.3150 in.)
Valve Stem Tip Height—Intake	47.120 ±0.467 mm (1.8551 ±0.00184 in.)
Valve Stem Tip Height—Exhaust	48.672 ±0.467 mm (1.9162 ±0.00184 in.)
<b>Valve Spring</b>	
Free Length—Intake & Exhaust (Approx.)	45.63 mm (1.7965 in.)
Spring Force—Intake & Exhaust (Valve Closed)	249–284 N @ 38.0 mm (56.0–64.0 lbs. @ 1.4961 in.)
Spring Force—Intake (Valve Open)	658–721 N @ 29.0 mm (147.9–162.1 lbs. @ 1.1417 in.)
Spring Force—Exhaust (Valve Open)	614–671 N @ 30.0 mm (138.0–150.8 lbs. @ 1.1811 in.)
Number of Coils—Intake & Exhaust	7.35
Wire Diameter—Intake & Exhaust	3.861 mm (0.1520 in.)
Installed Height—Intake & Exhaust (Spring seat to bottom of retainer)	38.0 mm (1.4961 in.)
<b>Oil Pump</b>	
Clearance Over Rotors (Max.)	0.077 mm (0.003 in.)
Cover—Out-of-Flat (Max.)	0.025 mm (0.001 in.)

DESCRIPTION	SPECIFICATION
Inner & Outer Rotor Thickness	9.475–9.500 mm (0.3731–0.3741 in.)
Outer Rotor Clearance (Max.)	0.39 mm (0.015 in.)
Outer Rotor Diameter (Min.)	89.175 mm (3.5109 in.)
Tip Clearance Between Rotors (Max.)	0.20 mm (0.008 in.)
<b>Oil Pressure</b>	
Pressure @ Curb Idle Speed*	34.7 kPa (5 psi)
Pressure @ 3000 rpm	170–724 kPa (25–105 psi)
*CAUTION: If oil pressure is zero at idle, DO NOT run engine at 3000 rpm.	

**TORQUE**

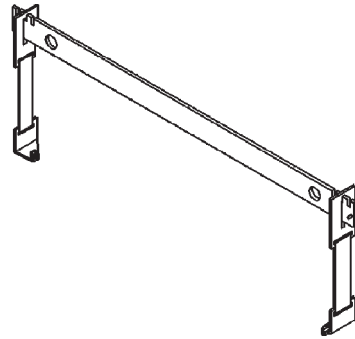
DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
A/C Compressor to Engine—Bolts	28	21	—
Camshaft Sprocket—Bolts	28	—	250
Camshaft Chain Tensioner (Secondary)—Bolts	12	—	105
Camshaft Bearing Cap—Bolts	12	—	105
Connecting Rod Cap—Bolts	27 +¼ Turn	20 +¼ Turn	—
Crankshaft Main Bearing Cap			
—Tie Bolts	28	—	250
—Inner Cap Bolts	20 +¼ Turn	15 +¼ Turn	—
—Outer Cap Bolts	27 +¼ Turn	20 +¼ Turn	—
Crankshaft Damper—Bolt	170	125	—
Cylinder Head—Bolts	Refer to Procedure		
Cylinder Head Cover—Bolts	12	—	105
Exhaust Manifold—Bolts	23	—	200
Exhaust Manifold Heat Shield—Bolts	12	—	105
Exhaust Manifold to Catalytic Converter V-Band Clamp	11	—	100

SPECIFICATIONS (Continued)

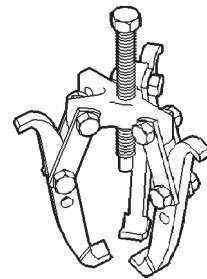
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Engine Mount Bracket to Block—Bolts	61	45	—
Engine Mount Isolator—Nuts	61	45	—
Intake Manifold (Upper and Lower)—Bolts	12	—	105
Generator Bracket—Bolts	41	30	—
Oil Pan			
—Bolts	28	—	250
—Nuts	12	—	105
Oil Pan Drain—Plug	28	—	250
Oil Filter	20	15	—
Oil Pump to Block—Bolts	28	—	250
Oil Pump Cover—Bolts	12	—	105
Oil Pump Pick Up Tube—Bolt	28	—	250
PCV Valve	7	—	60
Crankshaft Rear Seal Retainer—Bolts	12	—	105
Spark Plugs	20	15	—
Starter Mounting—Bolts	41	30	—
Structural Collar	Refer to Procedure		
Thermostat Housing/Water Inlet Connector—Bolts	12	—	105
Throttle Body—Bolts	12	—	105
Timing Chain Cover			
—M6 Bolts	12	—	105
—M10 Bolts	54	40	—
Timing Chain Tensioner (Primary)	54	40	—
Timing Chain Guide Access Plug	20	15	—
Water Pump—Bolts	12	—	105
Cooling System Bleed Screw	12	—	110
Water Outlet Housing—Bolts	12	—	105

SPECIAL TOOLS

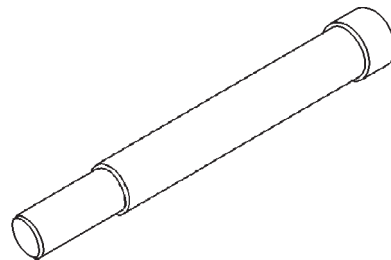
2.7L ENGINE



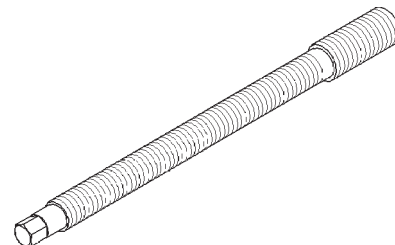
**Engine Lifting Fixture 8342**



**Puller 1023**



**Crankshaft Damper Remove Insert 8194**



**Crankshaft Damper Installer Screw 8179**