1972-73 CHEVROLET LUV PICKUP 4 CYLINDER

GENERAL SPECIFICATIONS										
Year	Displ.		Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke	
	cu. ins.	cc					in.	mm	in.	mm
1972-73	110.8	1816	2-Bbl.	75@5000	88@3000	8.2-1	3.31	84	3.23	82

ENGINE IDENTIFICATION

Engine number is located in casting on right upper center portion of cylinder head.

ENGINE REMOVAL

1) Disconnect battery cables, drain crankcase and cooling system. Disconnect carburetor linkage, all necessary water and fuel hoses, vacuum lines, and electrical leads. Also disconnect exhaust pipe at manifold flange. Remove radiator.

2) Disconnect drive shaft at differential and remove from transmission. Install plug in transmission tailshaft or drain oil. Disconnect clutch slave cylinder, and speedometer cable at transmission. Remove exhaust pipe bracket from clutch housing. Disconnect shift linkage and remove gearshift lever assembly. Connect a suitable hoist to engine lift hangers and lift engine slightly. Remove front and rear engine mounts. Remove engine and transmission as an assembly. Carefully hoist engine and check that all components have been disconnected. To install engine, reverse removal procedure.

INTAKE & EXHAUST MANIFOLD REMOVAL

1) Remove air cleaner and carburetor. Disconnect PCV valve, power brake vacuum line and exhaust pipe from exhaust manifold. Note for reinstallation position of lifting hanger.

2) Remove nuts, lock washers and flat washers holding manifolds to cylinder head. Slide manifolds off together. Once off, manifolds can be separated by removing exhaust manifold mounting studs. To install, reverse removal procedure.

CAMSHAFT SPROCKET

Removal – Remove bolts retaining camshaft carrier front cover. Position crankshaft pulley timing marks on TDC so mark on camshaft flange indexes with mark on camshaft thrust plate. Mark position of camshaft sprocket pin for reinstallation in same hole. Disconnect oil line from secondary chain tensioner. Remove chain tensioner and spring. Remove both upper secondary timing chain damper bolts located in front of cylinder head. Remove bolt and washer from camshaft sprocket. Separate sprocket from camshaft with chain. Carefully remove sprocket from chain. *CAUTION – Do not allow sprocket pin to fall into engine.* Tie chain up with wire or cord.

Installation – With crankshaft and camshaft in same positions as when sprocket was removed, install camshaft sprocket in chain so pin will align sprocket and camshaft in original hole position. Install pin, sprocket washer and tighten bolt. Check crankshaft and cam timing marks for correct timing. To install remaining components, reverse removal procedure.

CAMSHAFT CARRIER

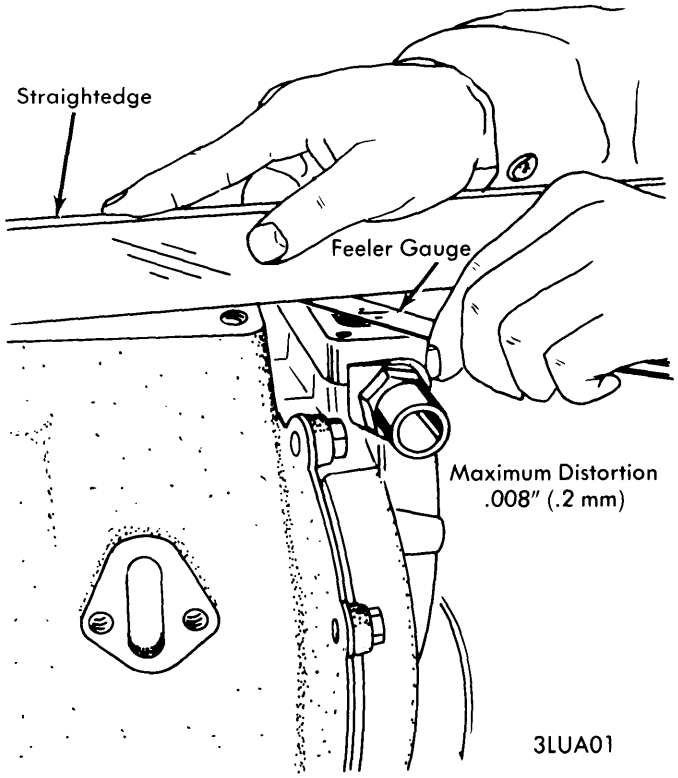
Removal – Remove air injection manifold and tubes. Remove bolts retaining camshaft carrier cover. Remove camshaft sprocket as previously outlined. *NOTE – Camshaft carrier is under tension from valve springs.* Loosen all bolts alternately in sequence so no single bolt receives tension of valve springs. Remove all bolts and lift camshaft carrier (with cam) off head. *NOTE – Avoid losing camshaft carrier locating dowels.*

Installation – Align index mark on camshaft flange with mark on thrust plate. Install camshaft carrier. Install "O"rings and hand tighten bolts retaining dowels. *NOTE – Install longest bolt in position of dowel.* Install carrier mounting bolts and tighten evenly. Install air injection components. Install camshaft sprocket as previously outlined.

CYLINDER HEAD

Removal – Remove camshaft sprocket, and camshaft carrier as previous outlined. Remove three bolts retaining timing gear case to cylinder head. With suitable extension bar wrench (J-24239), loosen cylinder head bolts in progressional sequence and remove head.

Installation – Before installing head, check block and timing gear case cover with a straight edge across block and cover. Correct or replace timing case cover if distortion is .008" (.2 mm) or more (see illustration). Install secondary chain tensioner so side with thicker shoe is turned up. Install head gasket on block with "TOP" side up. Insert "O" rings into oil ports. Install cylinder head on block and tighten bolts to first



CHECKING CYLINDER BLOCK-TO-TIMING GEAR CASE SURFACE

1972-73 CHEVROLET LUV PICKUP 4 CYLINDER (Cont.)

torque as specified. Then loosen all bolts completely and retighten all bolts to second torque step as specified. Tighten timing gear case bolts. Install camshaft carrier and camshaft sprocket as previously outlined.

VALVES

Engine & Valve	Head Diam. In. (mm)	Face Angle	Seat Angle	Seat Width In. (mm)	Stem Diameter In. (mm)	Stem Clearance In. (mm)	Valve Lift In. (mm)
1972-73 1816 cc							
Intake	1.69 (43)	45°	45°	.047-.063 (1.19-1.60)	.315 (8)	.0016 (.04)	....
Exhaust	1.30 (33)	45°	45°	.047-.063 (1.19-1.60)	.315 (8)	.002 (.05)	....

VALVE ARRANGEMENT

E-I-I-E-E-I-I-E

VALVE GUIDE REMOVAL

1) Inspect inner face of valve guide for grooves or uneven wear. Check clearance between valve stem and valve guide. Replace both guide and valve if clearance is beyond .008" (intake) or .010" (exhaust).

2) Drive valve guides toward upper face of cylinder head, using suitable valve guide replacer (J-24237). *NOTE — Valve guides can not be driven downward; they are held in position by snap rings.*

3) To install, oil circumference of valve guide. Press new guide into place against snap ring, using suitable tool (J-24237). *NOTE — Maximum interference between valve guide and cylinder head is .0016".*

VALVE STEM OIL SEALS

Inspect valve stems for wear. Discard used oil seals at time of overhaul and install new seals.

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm) Valve Closed	Valve Open
1972-73 1816 cc			
Inner	1.78 (45)	17.8 @ 1.50 (8 @ 38)	....
Outer	2.05 (52)	47.4 @ 1.58 (21.5 @ 40)	....

VALVE SPRING INSTALLED HEIGHT

Visually check valve springs for damage and replace as necessary. Measure free length of valve springs using suitable calipers and replace if measured value is beyond limit. With a valve spring tester check valve spring tension and compare it with values in chart, replace as necessary.

NOTE — Install springs with close wound coils next to cylinder head.

VALVE SPRING REMOVAL

Using suitable valve compressor tool (J-8062), remove spring retainer half clip. Remove upper valve seat, inner valve spring, outer valve spring and lower valve seat. *NOTE — Ensure screw rod of valve replacer is in contact with center portion of valve head.* Remove pivot only if necessary.

ROCKER ARM ASSEMBLY

Remove rocker arm positioning spring. Lift rocker arm from pivot bolt. Inspect pivot socket and cam shoe for wear or damage. To install, reverse removal procedure.

ROCKER ARM PIVOT STUDS

With rocker arms removed, inspect pivot studs for wear, damage or looseness. Do not remove pivot studs unless replacing them. When installing new pivot studs, tighten to specification.

VALVE CLEARANCE ADJUSTMENT

Valve clearance should be adjusted with engine cold. Turn crankshaft to bring either No. 1 or No. 4 cylinder piston to TDC and adjust valves in sequence shown in table. Adjust intake valves to .004" (.102 mm) and exhaust valves to .006" (.152 mm).

Valve Adjustment Sequence

Application	Intake/Cylinder	Exhaust/Cylinder
No. 1 @ TDC	1,2	1,3
No. 4 @ TDC	3,4	2,4

1972-73 CHEVROLET LUV PICKUP 4 CYLINDER (Cont.)

PISTONS, PINS, RINGS						
Engine	PISTONS	PINS		RINGS		
	Clearance In. (mm)	Piston Fit In. (mm)	Rod Fit In. (mm)	Rings	End Gap In. (mm)	Side Clearance In. (mm)
1972-73 1816 cc	.0018-.0026 (.046-.066)	①	.0024 (.061)	1st Comp.	.008-.016 (.20-.41)	.0012-.0028 (.03-.07)
				2nd Comp.	.008-.016 (.20-.41)	.0012-.0028 (.03-.07)
				Oil	.012-.039 (.30-.99)	.0008-.0024 (.02-.06)

① — Press fit, heat piston to 158-212°F.

OIL PAN REMOVAL (1972-73 SERIES)

Drain oil and remove mounting bolts. Carefully insert a screwdriver between oil pan and crankcase and pry downward to break gasket seal. Lower pan from vehicle, rotating it as necessary. To install, reverse removal procedure.

CRANKCASE REMOVAL (1972 SERIES)

To remove crankcase, invert engine and withdraw oil pan (if applicable). Extract bolts securing crankcase. Insert edge of screwdriver into cutaway portions of crankcase and pry downward. To install, reverse removal procedure.

PISTON & ROD ASSEMBLY

1) Position cylinder body so flywheel side is down. Using suitable tool, scrape carbon from upper part of cylinder wall.

2) Remove connecting rod bearing cap nuts and bearing cap. Using a wood rod, push piston, together with connecting rod, upward. Removal sequence is 1, 4, 2, & 3. *NOTE — Ensure piston and connecting rod are pulled parallel to cylinder wall.*

3) To install piston and rod assembly, space piston ring gaps, oil assembly and clamp rings with suitable ring compressor. Install short lengths of rubber hose on rod cap studs before installing piston to protect crankshaft from nicks. Position piston so notch mark on crown of piston is facing front of engine. Align cylinder number marks on connecting rods so they are to right of piston notch mark. Press piston into cylinder, remove rubber hose pieces, install rod cap and tighten bolts.

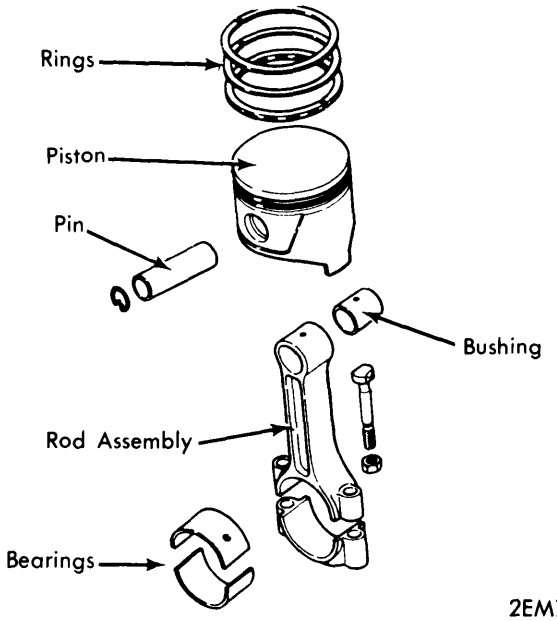
PISTON PIN REMOVAL

1) With piston and rod assembly installed in vise, remove piston pin snap rings. Drive out piston pin with a hammer and punch. Piston and rod can now be separated.

2) Inspect inner surface of connecting rod bushing, if it is worn or grooved, replace bushing. After installing new bushing ream to .8662-.8665".

3) To assemble rod and piston, heat piston to 158-212°F and insert snap ring. Align rod so index mark is on right side of groove in piston crown. Push pin into bore until seated and install second snap ring.

4) Using suitable ring expander, assemble rings to piston. Insert rings into grooves so "NPR" or "TOP" mark faces up. Coat whole piston assembly with engine oil and ensure each ring is free to turn.



PISTON ASSEMBLY

FITTING PISTONS

1) Check piston clearance by inserting piston pull-scale with .0018-.0026" feeler gauge, one inch long, into cylinder. Fit piston, crown first, into cylinder so feeler gauge is wedged by piston.

2) Holding piston to prevent side thrust, withdraw gauge with a steady pull on scale. Clearance is correct when gauge reads 1.1-2.2 lbs. *NOTE — It is advisable to take several readings.*

3) Measure weight of assembled pistons and compare the values. Ensure values between pistons are within .2 ozs. If value is exceeded, make necessary adjustments by selecting a connecting rod of suitable weight or by grinding.

Piston Size & Grade Classification

Piston Size	Piston Grade	Piston Diameter
Standard	A	3.3049-3.3053"
Standard	B	3.3053-3.3057"
Standard	C	3.3057-3.3061"
Standard	D	3.3061-3.3065"

NOTE — Pistons are available in .005" (.127 mm), .010" (.254 mm), .020" (.508 mm), .030" (.762 mm), .040" (1.016 mm), .050" (1.27 mm), and .060" (1.52 mm) oversizes.

1972-73 CHEVROLET LUV PICKUP 4 CYLINDER (Cont.)

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS							
Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam. In. (mm)	Clearance In. (mm)	Thrust Bearing	Crankshaft End Play In. (mm)	Journal Diam. In. (mm)	Clearance In. (mm)	Side Play In. (mm)
1972-73 1816 cc	2.205 (56)	.0016 (.04)	3	.006 (.15)	1.929 (49)	.002 (.05)	.011 (.29)

MAIN & CONNECTING ROD BEARING SERVICE

1) Remove engine, clutch, flywheel, timing cover, timing sprockets, chains, oil pan, and oil pump. Remove main and connecting rod bearing caps, marking them for reinstallation.

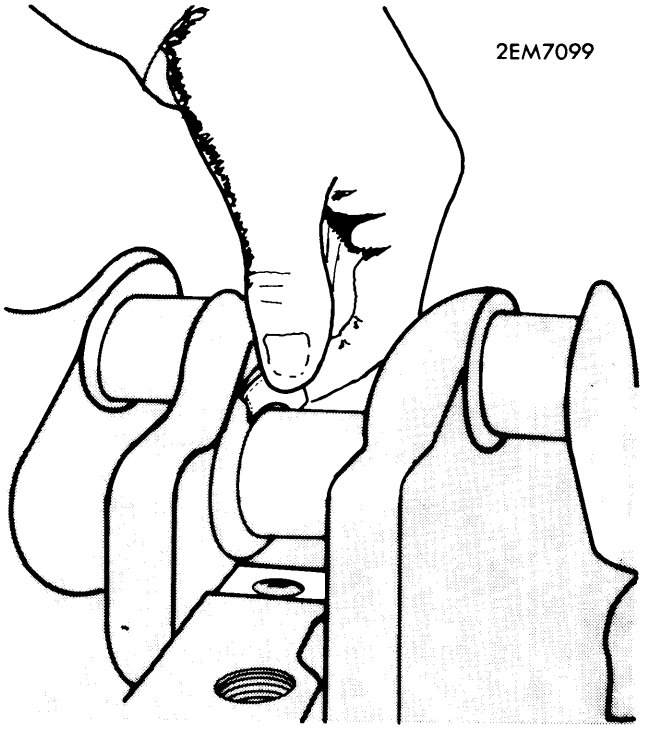
2) Inspect connecting rod and main bearing inner surfaces for score marks, pin holes or separations. If any one bearing is bad, replace all bearings.

3) Check surfaces of connecting rod and main bearing journals for signs of scoring or seizing. If journals are severly damaged they must be ground to accept any one of five undersize bearings.

4) Using Plastigage method, check connecting rods and main bearing clearances. Refer to the following table and determine if bearings need replacing.

Plastigage Chart

Plastigage	Clearance
Type PR-1 (Red)	.0020-.0060"
Type PB-1 (Blue)	.0040-.0090"
Type PG-1 (Green)	.0010-.0030"



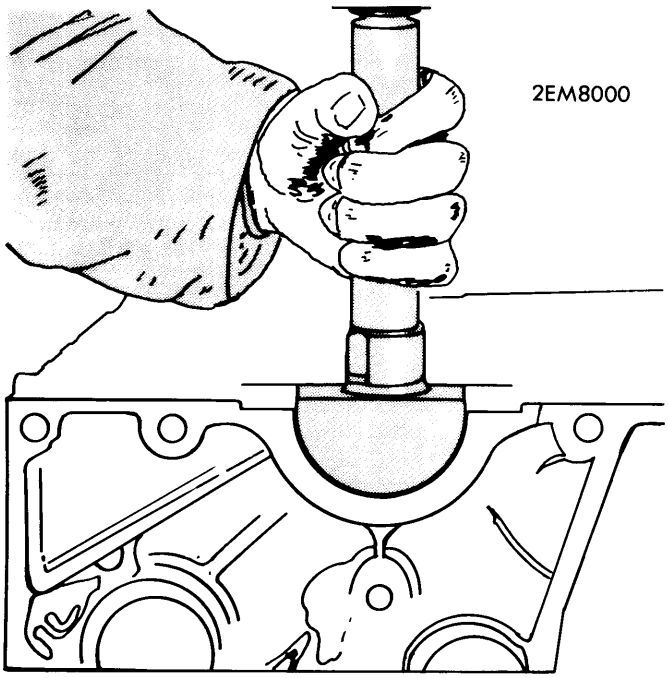
INSTALLING THRUST BEARING

5) Place crankshaft on two "V" shaped blocks at No. 1 and No. 5 journals. Hold dial indicator in contact with No. 3 journal and slowly turn crankshaft, recording highest point on journal. Replace crankshaft if bend exceeds .0039". Standard assembly value is .0012" or less.

6) To check crankshaft end play, place bearings and crankshaft in position. Install thrust bearing on both sides of No. 3 crankshaft journal. Shift crankshaft endwise and measure clearance between thrust bearing and shaft end. If clearance exceeds .0059" install oversize thrust bearing. Standard assembly value is .0012".

REAR MAIN OIL SEAL SERVICE

Using suitable tool (J-24272), seat new seal. Holding seal with tool, trim excessive portion of seal. Seal is properly installed when only 15-22 ft. lbs. are required to turn crankshaft.



SEATING REAR MAIN SEAL

TIMING CHAIN COVER & OIL SEAL

1) Drain cooling system. Remove radiator and fan belt. Extract crankshaft pulley, lower timing cover bolts, access cover, and bolt on inner face of cover.

2) Insert screwdriver into cutaway sections and free timing gear cover. Remove upper camshaft cover by extracting six mounting bolts.

1972-73 CHEVROLET LUV PICKUP 4 CYLINDER (Cont.)

3) After removing worn oil seal and inspecting cover, install new seal. Fill lips of oil seal with grease and, using suitable tool (J-24273), install new seal. To install timing gear cover, reverse removal procedure.

CAMSHAFT			
Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
1972-73 1816 cc	1.89 (48)	.0024 (.06)	① 1.534 (39)

① — Measured from heel of cam.

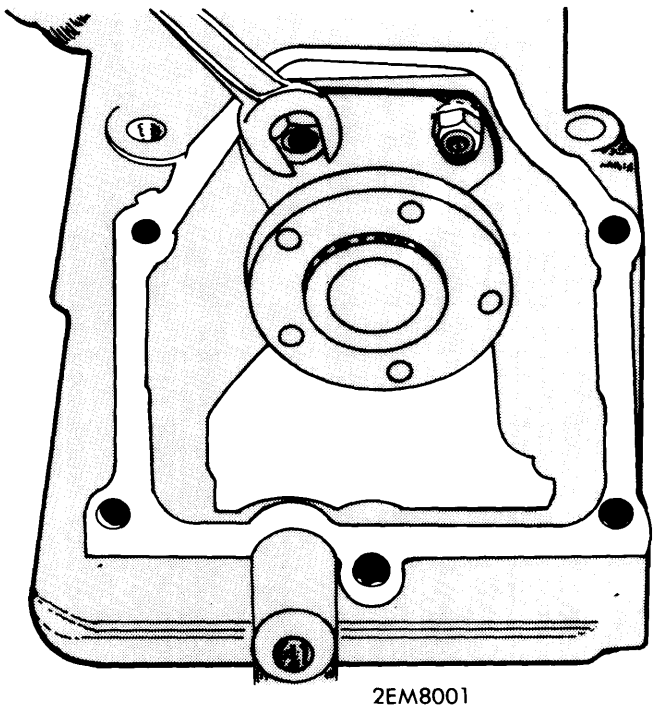
SECONDARY TIMING SPROCKET & CHAIN

Removal — Remove camshaft sprocket as previously outlined. Remove bolts retaining timing gear case access cover. Remove bolt retaining secondary sprocket to intermediate shaft. To remove sprocket from shaft, screw two bolts into threaded holes in sprocket and turn bolts evenly to press sprocket from shaft. Remove sprocket from chain and remove chain from top. Remove secondary chain tensioners from cylinder head.

Installation — To install chain and sprockets, reverse removal procedures. Check crankshaft-to-cam timing. See *Crankshaft & Camshaft Timing procedure*.

TIMING CHAIN INSPECTION

With chain removed from engine, straighten out chain and pull it with a force of 40 lbs. Measure distance of 40 chain lengths at pin centers. Standard value for assembly is 15", limit for use is 15.160". Discard chain if distance between measured pins is beyond the standard value.



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INSTALLING CAMSHAFT THRUST PLATE

CAMSHAFT REMOVAL & INSPECTION

1) Remove camshaft sprocket and camshaft carrier as previously outlined. With camshaft carrier removed from cylinder head, remove two bolts retaining cam thrust plate and withdraw cam from carrier.

2) Check camshaft journals and cams for wear or damage. Measure height of cams with a micrometer and replace if height is less than 1.514". If working faces of cams have slight scores or steps, eliminate them by honing. Measure outside diameter of camshaft journals in two directions, using a micrometer. If any of measured values are beyond 1.87", replace camshaft.

CAMSHAFT END PLAY

Measure camshaft end play with thrust plate installed in thrust groove. Replace thrust plate if end play is found to exceed .008". Standard assembly value is .0032".

CAMSHAFT BEARING REPLACEMENT

Camshaft bearings are not replaceable. Camshaft rides in a carrier. If clearance is beyond limits, replace camshaft carrier.

PRIMARY TIMING SPROCKET & INTERMEDIATE SHAFT

Removal — Remove secondary timing chain, sprocket, and timing chain cover. Remove nuts retaining primary chain tensioner and remove tensioner. Remove primary timing sprockets with chain, by inserting bolts in threaded holes of intermediate sprocket and turning evenly to press off sprocket. Remove ignition distributor and bolts from intermediate shaft thrust plate. Carefully remove intermediate shaft from cylinder block to protect bearing.

Installation — Install intermediate shaft and thrust plate. Torque bolts as specified and set sprocket timing. See *Crankshaft & Camshaft Timing procedure*. To install remaining components, reverse removal procedures.

VALVE TIMING				
	INTAKE		EXHAUST	
Engine	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
1972-73 1816 cc	31°	67°	59°	23°

CRANKSHAFT & CAMSHAFT TIMING

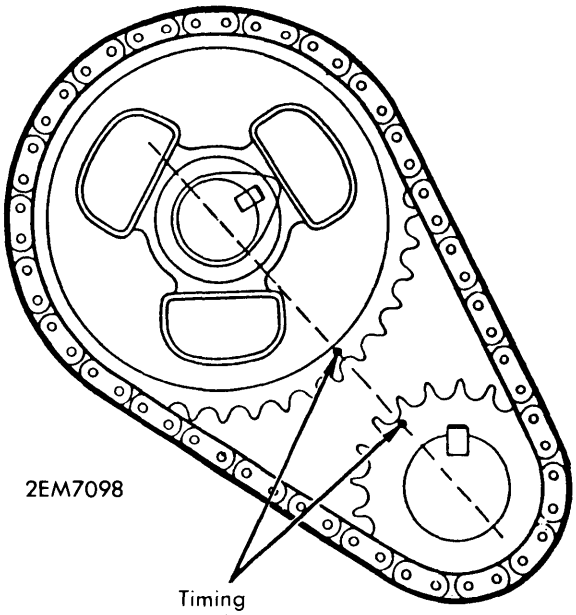
1) Set number four piston at TDC on compression stroke and align marks of crankshaft and camshaft sprockets (see illustration). Install sprockets and chain by tapping lightly on each sprocket. *NOTE — To prevent intermediate shaft from moving into cylinder block while installing sprocket, hold shaft through fuel pump opening.*

2) With primary sprockets timed and number four piston at TDC on compression stroke, align camshaft flange timing mark to camshaft thrust plate index mark. Install secondary timing chain and intermediate shaft sprocket. Timing mark of intermediate shaft sprocket should line up with intermediate shaft key (Approximately 2 o'clock position).

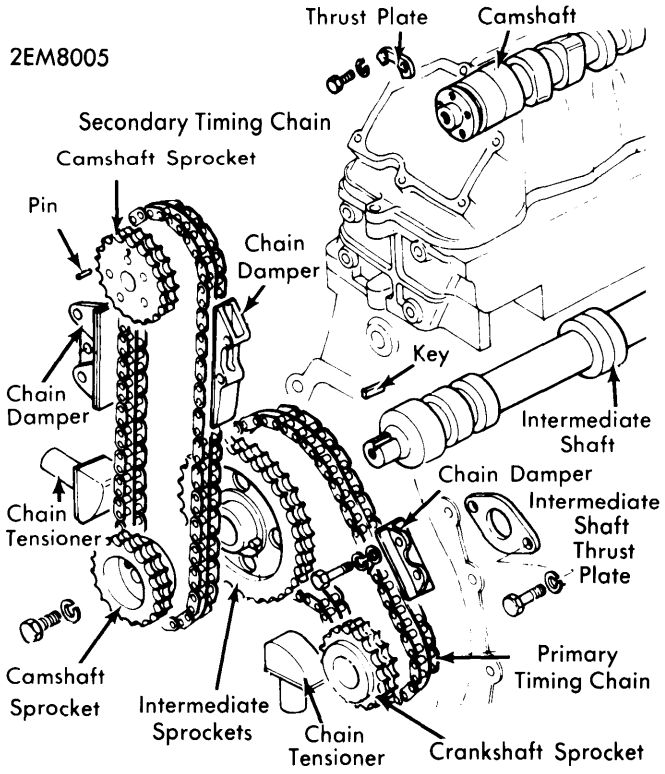
3) Install camshaft sprocket in timing chain so sprocket punch mark is located at 12 o'clock position. Hold parts in their relative positions. Look through each of five holes in camshaft timing sprocket to find a hole in alignment with hole in camshaft flange and insert pin into that hole. *NOTE — Pin*

1972-73 CHEVROLET LUV PICKUP 4 CYLINDER (Cont.)

should go into original hole as marked during disassembly. When camshaft sprocket is correctly installed, punch mark on sprocket will advance to 6° 20′ from top when drive side of timing chain is tensioned by pushing on tensioner shoe.



CRANKSHAFT & INTERMEDIATE SPROCKET ALIGNMENT



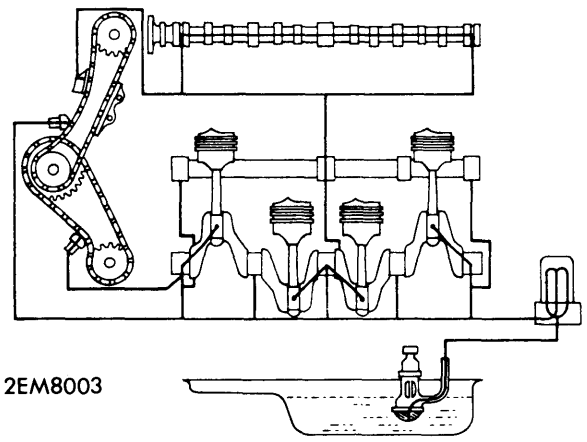
TIMING CHAINS & COMPONENTS

ENGINE OILING

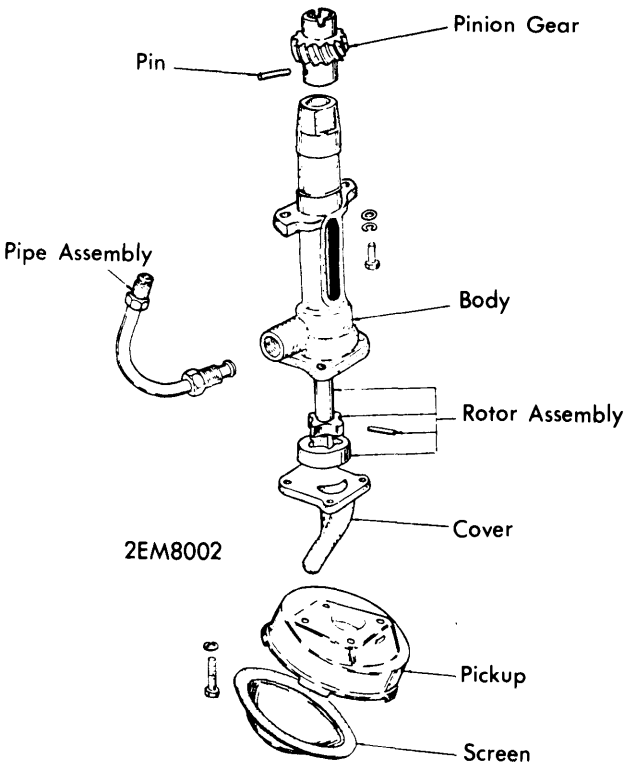
Crankcase Capacity – 4.2 quarts.
Oil Filter – Full-flow disposable canister type.
Normal Oil Pressure – 57 psi.
Relief Valve – Located on side of cylinder block near oil filter. Opening pressure of relief valve is 61-67 psi.

ENGINE OILING SYSTEM

Trochoid type oil pump is designed to deliver 4.75 gallons of oil per minute through the engine at a pump speed of 1400 RPM. At normal operating temperature, using 30 SAE oil, temperature will be 122°F. Lubricating system is designed to deliver oil at a rate of 57 psi.



OILING CIRCUIT



OIL PUMP ASSEMBLY

1972-73 CHEVROLET LUV PICKUP 4 CYLINDER (Cont.)

ENGINE OILING (Cont.)

OIL PUMP

1) Drain crankcase. Remove bolts retaining crankcase and remove crankcase. Disconnect oil feed pipe. Remove two oil pump mounting bolts and lift out oil pump.

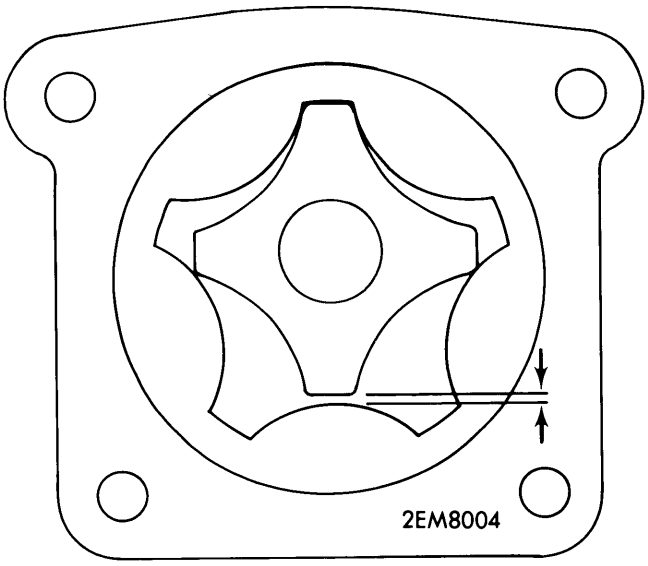
2) Bend out tab from case. Remove bolts, strainer case and pump body. Carefully remove vane to prevent scratching it. Remove pin and pinion from rotor shaft. Drive pin from rotor and remove rotor from shaft.

3) Measure tip clearance with a feeler gauge and replace rotor or vane if measured value is beyond .0050". Standard assembly value is .0012-.0059".

4) Measure clearance between vane and inner wall of pump body with a feeler gauge. Replace either pump body or vane if clearance exceeds .008-.011".

5) Using a straightedge and a feeler gauge, measure clearance between rotor, vane and pump body. If clearance exceeds .006", replace necessary components. Standard assembly clearance is .0016-.0035".

6) Using a micrometer, measure outside diameter of rotor and inside of rotor shaft bore. Clearance should not exceed .008". Standard assembly clearance is .0016".



MEASURING TIP CLEARANCE

ENGINE COOLING

Cooling System Capacity – 6.4 quarts.

Thermostat – Thermostat begins to open at 177-182°F and is fully open at approximately 203°F.

WATER PUMP

Drain cooling system, disconnect all necessary water hoses and remove radiator shroud and belts. Remove fan, pulley and spacer. Loosen, but do not remove bolt behind timing gear cover next to water pump. Remove bolts holding water pump and remove pump and gasket. To install, reverse removal procedure.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Cylinder Head Bolts	
Step 1	43 (6)
Step 2 (loosen & Retorque)	58 (8)
Camshaft Carrier	15 (2)
Camshaft Sprocket	33 (4.6)
Intermediate Timing Sprockets	33 (4.6)
Rocker Arm Pivot Studs	90 (12.4)
Main Bearings	72 (10)
Connecting Rod Bearings	43 (6)
Flywheel (1972)	36 (5)
Flywheel (1973)	69 (9.5)
Crankcase-to-Block (1972)	15 (2)
Oil Pan	4 (.6)
Intermediate Shaft Thrust Plate	9 (1.2)