1971-73 PINTO 2000 cc ENGINES

GENERAL SPECIFICATIONS							
Year	Displ. Cu. Ins.	Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore	Stroke
1971	122	2-Bbl.	100@5600	120@3600	8.6-1	3.575"	3.029"
1972-73①	122	2-Bbl.	86@5400	103@3200	8.2-1	3.575"	3.029"

① – Horsepower, Torque and Compression Ratio figures given for 1972 only.

►*NET HORSEPOWER & TORQUE NOTE: Horsepower and Torque figures given for 1972 are NET. NET Horsepower and Torque represent power at the flywheel when the engine is installed in vehicle, with wide open throttle and all systems operating such as; air cleaner, exhaust system, water pump, generator, oil pump and air conditioning.*

ENGINE IDENTIFICATION

Engine identification may be established from the official Vehicle Identification Number. This number is stamped on a metallic tab fastened to the instrument panel close to the windshield on the drivers side of the car and is visible from outside. The Identification Number contains eleven characters and digits. Example; 1S10W10000. The first digit determines the model year and the fifth character establishes engine identification.

Pinto Engine	Engine Code
2000 cc	X

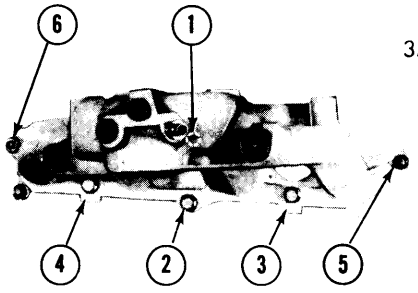
ENGINE REMOVAL

See Engine Removal at end of ENGINE Section.

INTAKE MANIFOLD

Removal – Remove air cleaner and disconnect fuel line from carburetor. Disconnect vacuum lines and crankcase ventilation hose at intake manifold. Remove attaching nuts and lift manifold, carburetor and decel valve off as an assembly.

Installation – Clean gasket material from cylinder head and manifold. Install new gasket on cylinder head and install manifold. Tighten nuts to specification in sequence shown in illustration.



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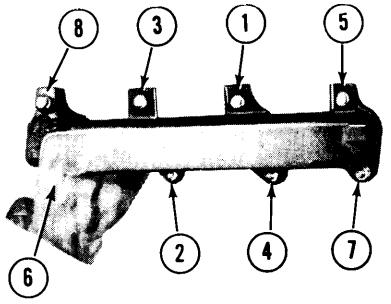
INTAKE MANIFOLD TIGHTENING SEQUENCE

EXHAUST MANIFOLD

Removal – Remove air cleaner and two attaching nuts from top of exhaust manifold shroud. Remove attaching nuts from muffler inlet pipe and manifold and remove exhaust manifold.

Installation – Apply light film of graphite grease on exhaust manifold and install manifold. Tighten nuts to specification in sequence shown in illustration.



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EXHAUST MANIFOLD TIGHTENING SEQUENCE

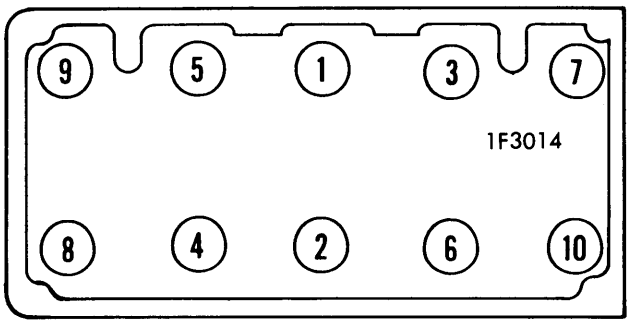
CYLINDER HEAD REMOVAL

Correct procedure to remove cylinder head is as follows:

1) Drain cooling system, remove air cleaner and rocker arm cover.

2) Remove exhaust manifold. Remove intake manifold, carburetor and decel valve as an assembly. Remove camshaft drive belt cover.

3) Loosen drive belt tensioner and remove belt. Remove the water outlet elbow from the head. Remove ten head bolts and lift head and camshaft assembly from engine.



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← FRONT

CYLINDER HEAD TIGHTENING SEQUENCE

1971-73 PINTO 2000 cc ENGINES (Cont.)

VALVES							
Engine & Valve	Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	Stem Clearance	Valve Lift
2000 cc							
1971 Int.	1.653"	45°	44°	.060-.075"	.3159-.3166"	.0008-.0020"	.3993"
Exh.	1.417"	45°	44°	.060-.075"	.3156-.3163"	.0018-.0035"	.3993"
1972 Int.	1.655"	45°	44°	.060-.079"	.3159-.3167"	.0008-.0025"	.3993"
Exh.	1.415"	45°	44°	.060-.079"	.3149-.3156"	.0018-.0035"	.3993"
1973 Int.	1.653"	45°	44°	.060-.079"	.3159-.3167"	.0008-.0025"	.3993"
Exh.	1.417"	45°	44°	.060-.079"	.3149-.3156"	.0018-.0035"	.3993"

VALVE ARRANGEMENT

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

VALVE GUIDES

If valve guides become worn they may be reamed to install a new valve with oversize stem. When going from a standard size stem to oversize, always use reamers in sequence to obtain final desired bore. The valve seat must be refaced after a guide has been reamed, and a suitable tool used to break the sharp corner (ID) of the guide.

VALVE STEM OIL SEALS

With valve in head, place plastic installation cap over end of valve stem. Start stem seal carefully over cap and push seal down until jacket touches top of valve guide. Remove plastic cap and bottom seal on valve guide.

VALVE SPRING INSTALLED HEIGHT

Measure the assembled height of the valve spring from the surface of the spring pad to the underside of the spring retainer. If the height is greater than 1.417" install .030" spacer(s) between spring and pad to obtain recommended dimension.

Do not install spacers unless necessary. Excess use of spacers will result in overstressing the valve springs and overloading the camshaft lobes, causing spring breakage and worn camshaft lobes.

VALVE SPRINGS			
Engine	Free Length	PRESSURE (LBS.)	
		Valve Closed	Valve Open
2000cc			
1971	1.77"	62@1.417"	144@1.059"
1972-73	1.73"	69@1.417"	177@1.02"

VALVE TAPPET ADJUSTMENT

Rotate crankshaft until No. 1 cam lobe is in the upper-most position. Check and adjust the clearance by loosening the lock nut and turning the adjustment screw in or out to obtain the specified clearance. Clearance specification (engine cold) is .008" intake valves; .010" exhaust valves, between the cam lobe and the rocker arm.

PISTONS, PINS, RINGS						
Engine	PISTONS Clearance	PINS		RINGS		
		Piston Fit	Rod Fit	Rings	End Gap	Side Clearance
2000 cc 1971	.001-.002"	.0002-.0004"	.0007-.0015"	1&2 3	.0189-.021" .0160-.055"	.0019-.0038" Snug
1972	.001-.002"	.0002-.0004"	.0008-.0016"	1&2 3	.0189-.021" .0160-.055"	.0019-.0038" Snug
1973	.001-.002"	.0002-.0004"	.0008-.0016"	1&2 3	.015-.0229" .016-.0550"	.0019-.0038" Snug

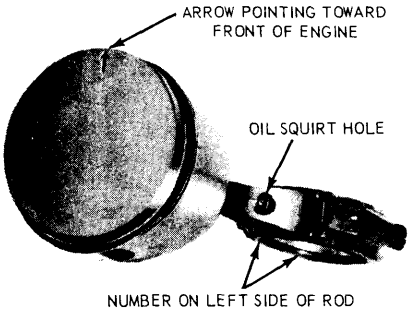
1971-73 PINTO 2000 cc ENGINES (Cont.)

PISTON PIN REPLACEMENT

Piston pin bore and OD of piston pin must be within specifications. Remove old pin using an arbor press and suitable piston support and driver tool. Assemble piston to rod with the oil squirt hole in the rod on the right hand side of the piston with the arrow pointing forward (see illustration). Use arbor press to press pin into piston and connecting rod.

FITTING PISTONS

Check piston to cylinder bore clearance by measuring the piston and bore diameters. Refer to specifications for correct clearance. Measure the OD of the piston at the centerline of the piston pin bore and at 90° to the pin bore axis. Oversize pistons are available at .003", .020" and .030" oversize.



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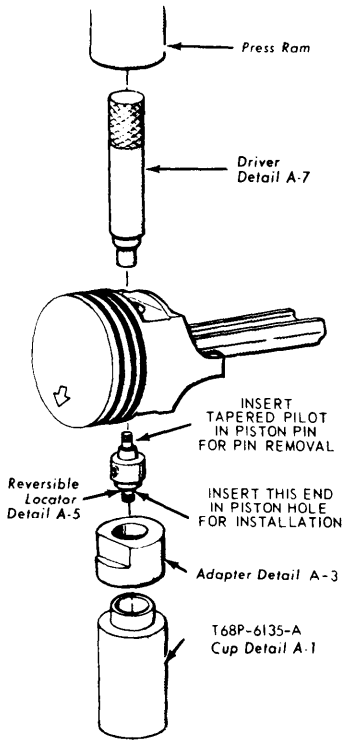
PISTON & ROD ASSEMBLY



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REMOVING & INSTALLING PISTON PIN

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam.	Clearance	Thrust Bearing	Crankshaft Endplay	Journal Diam.	Clearance	①Sideplay
2000 cc							
1971	2.2432-2.2440"	.0005-.0015"	No.3	.003-.011"	2.0464-2.0772"	.001-.0015"	.010-.024"
1972-73	2.2432-2.2440"	.0006-.0016"	No.3	.003-.011"	2.0464-2.0772"	.006-.0015"	.004-.010"

① – Total two rods.

OIL PAN REMOVAL

See Oil Pan Removal at end of ENGINE Section.

MAIN BEARINGS

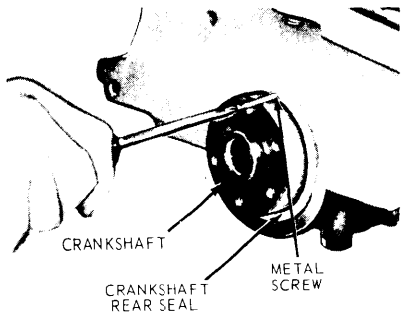
Determine crankshaft journal clearance in bearing by use of Plastigage. Place a jack under counterweight adjoining bearing being checked so that weight of crankshaft will not aid air in compressing Plastigage and provide an erroneous reading.

If bearing clearance using standard size bearing inserts is excessive, a .002" undersize bearing half may be used in combination with a standard size bearing half. If .002" undersized bearings are used on more than one journal, they must be positioned in the cylinder block rather than in the bearing cap. If standard and .002" undersize combinations do not bring bearing clearance within specified limits (see Specifications), the crankshaft will have to be refinished and undersize bearings installed.

REAR MAIN BEARING OIL SEAL

Removal – Remove transmission, clutch and flywheel or the auto. trans., converter and flywheel. Remove old seal with a sheet metal screw as shown in accompanying illustration.

Installation – Use suitable tool (see illustration) to drive new seal in place.



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REMOVING REAR MAIN OIL SEAL

1971-73 PINTO 2000 cc ENGINES (Cont.)

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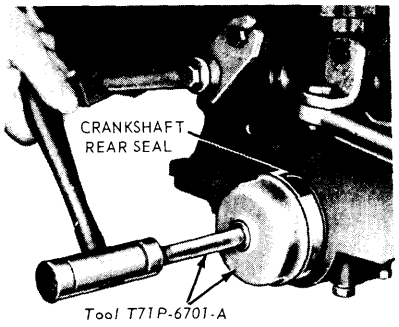
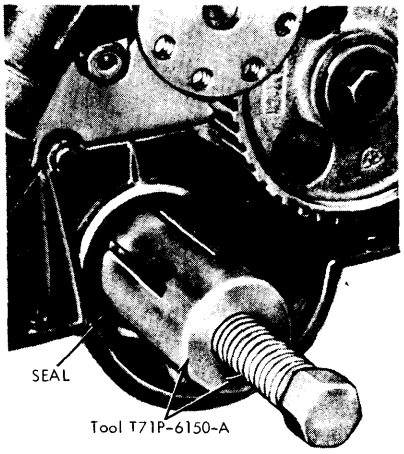


INSTALLING REAR MAIN OIL SEAL

FRONT CRANKSHAFT OIL SEAL REPLACEMENT

After removing the alternator belt, remove the crankshaft pulley. Remove the camshaft drive belt (see Camshaft Drive Belt Replacement). Remove the drive belt sprocket and belt guide. Use suitable tool (see illustration) to remove and replace oil seal.



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REMOVING FRONT CRANKSHAFT OIL SEAL

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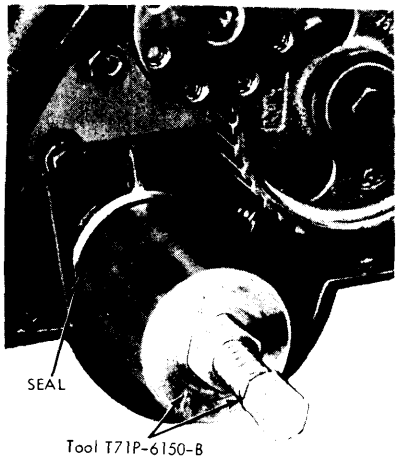


INSTALLING FRONT CRANKSHAFT OIL SEAL

CAMSHAFT			
Engine	Journal Diam.	Clearance	Lobe Lift
2000 cc			
1971 #1	1.6532-1.6538"	.001-.0025"	.2519"
#2	1.7565-1.7570"		
#3	1.7713-1.7719"		
1972 #1	1.6531-1.6539"	.001-.0025"	.2512"
#2	1.7563-1.7571"		
#3	1.7713-1.7720"		
1973 #1	1.6531-1.6539"	.001-.0025"	.2493"
#2	1.7563-1.7571"		
#3	1.7713-1.7720"		

CAMSHAFT & BEARING

Removal – Remove rocker arms. Remove camshaft gear and belt guide plate from camshaft Remove thrust plate from rear of cylinder head and carefully slide the camshaft out from the rear of the cylinder head.

Installation – Pull new bearings into place with a suitable tool, making sure the lube hole in the bearing is aligned with the one in the journal. Carefully slide the camshaft into place and attach the thrust plate. Check camshaft for proper endplay (see Specifications). If endplay is excessive, replace the thrust plate.

CAMSHAFT DRIVE BELT REPLACEMENT

Removal – Loosen belt tensioner adjustment bolt and force tensioner to one side to relieve belt tension. Hold tensioner in this position and tighten bolt to hold tensioner. Lift belt off sprockets. *NOTE – Do not rotate crankshaft or camshaft with belt removed. Valve and ignition timing will be lost if this occurs.*

Installation – Place new belt over sprockets and loosen tensioner adjustment bolt to place tension on belt. Rotate crankshaft two complete turns to place timing marks in proper position and to remove all slack from the belt. Torque tensioner adjustment bolt and pivot bolt to specification. Start engine, check and adjust ignition timing.

AUXILIARY SHAFT SPROCKET REPLACEMENT

Removal – Remove camshaft drive belt. Remove the tensioner adjustment bolt, pivot bolt and spring. Do not pry tensioner spring free from stud. Remove sprocket bolt and washer and slide sprocket off shaft.

Installation – Place sprocket on shaft and install the tensioner pivot bolt with spring and the adjustment bolt. Snug up adjustment bolt to hold tensioner out of the way Make sure the timing marks are aligned and install drive belt on sprockets. Loosen tensioner bolt and rotate crankshaft two complete turns to place timing marks in position again and take slack from belt. If timing marks are OK, locate the tension spring under the anchor. Then torque the adjustment and pivot bolts to specification.

1971-73 PINTO 2000 cc ENGINES (Cont.)

AUXILIARY SHAFT & BEARING REPLACEMENT

Removal – Remove camshaft drive belt and auxiliary shaft sprocket. Remove the distributor, fuel pump and the three shaft cover bolts and remove the cover. Remove the thrust plate screws and plate, and remove the auxiliary shaft. Remove bearing from block with suitable tool, if worn.

Installation – Align oil holes in bearing with those in block and drive bearing into place with suitable tool. Install shaft and thrust plate, distributor, fuel pump and sprocket (see Auxiliary Shaft Sprocket Replacement).

CAMSHAFT LOBE LIFT

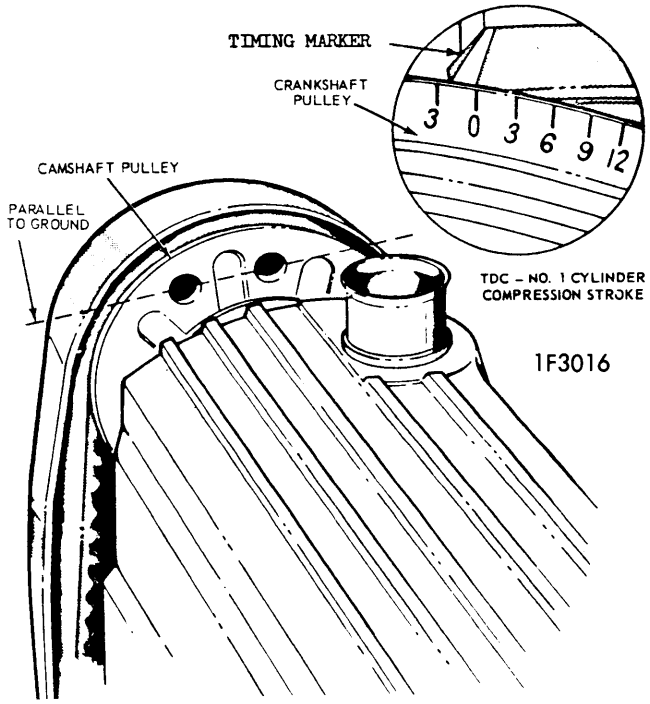
Measure the distance between the major and minor diameters of each cam lobe with a micrometer. Difference in readings is the lobe lift. If readings vary or do not meet specifications, replace the camshaft.

VALVE TIMING

Loosen drive belt tensioner and rotate crankshaft until No. 1 cylinder is at TDC on compression stroke. Align timing marks on crankshaft pulley with timing pointer. Turn camshaft to align camshaft timing mark with pointer.

Apply tension to belt with tensioner. Rotate crankshaft two complete turns to place timing marks in position again and take slack from belt. If timing checks OK, torque tensioner adjustment and pivot bolts to specifications.

A quick check for proper camshaft timing can be made visually. Turn the engine over until the two round locating holes in the camshaft pulley are visible from left rear of engine and parallel to the ground. At this time the timing pointer should point to TDC (0°). If the camshaft drive belt is mislocated, the crankshaft damper will be retarded or advanced 19 per tooth of misplacement (see illustration).



VISUAL CAMSHAFT TIMING CHECK

ENGINE OILING

Crankcase Capacity – 4 Qts. Add 1 Qt. with filter change.

Oil Pressure (Hot) – 50 Lbs. @ 1500 RPM.

Pressure Relief Valve – Not Adjustable.

ENGINE OILING SYSTEM

Oiling system is force feed type using a full flow oil filter. Oil enters the main oil gallery from the oil filter and flows to the main bearings and camshaft bearings. Connecting rod bearings are supplied from the front and rear main bearings via inclined passages. A squirt hole in each rod bearing end supplies oil to the piston thrust side of a cylinder. The auxiliary shaft is connected with the main oil gallery.

The distributor shaft receives oil from a passage drilled in the auxiliary shaft. Cams and cam follower arms are supplied from the center camshaft bearing (which is provided with a groove 180 around its periphery) via an oil line.

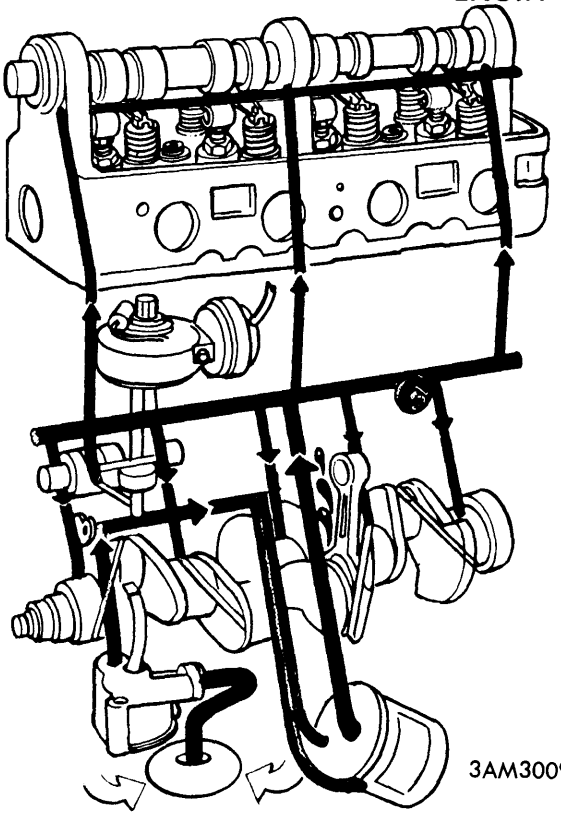
OIL PUMP

If oil pump has been disassembled for cleaning and inspection, be sure the identification mark on the rotor and on the outer race both face to the bottom of the pump when reassembling. The inner rotor and shaft and the outer race are serviced as an assembly only. See following table for oil pump unit clearances.

Relief Valve Spring Tension	13.6-14.7 @ 1.39"
Drive Shaft to Bearing Clearance	.001-.002"
Relief Valve Clearance	.001-.002"
Rotor Assembly End Clearance	.001-.004"
Outer Race to Housing (Radial)	.005-.011"

1971-73 PINTO 2000 cc ENGINES (Cont.)

ENGINE OILING (Cont.)



ENGINE OILING SYSTEM

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Auxiliary Shaft Gear	32-36
Auxiliary Shaft Thrust Plate	5-8
Belt Tensioner	32-36
Camshaft Gear	32-36
Camshaft Thrust Plate	5-8
Connecting Rod	29-34
Crankshaft Pulley	39-43
Cylinder Head	①
Exhaust Manifold to Cyl. Head	15
Flywheel to Crankshaft	47-51
Front Cover	6-9
Intake Manifold to Cyl. Head	12-15
Main Bearing Cap	65-75
Oil Pan to Block (Snug up Bolts First)	4-6
Rocker Arm Ball Stud	32-36
Rocker Arm Cover	②
Timing Belt Cover	7-9
Water Pump to Cyl. Block (M8)	12-15
Water Pump to Cyl. Block (M10)	26-31

① – Step one, 14-29. Step two, 36-50. Step three, 68-70. Step three for 1973 is 65-80.

② – Step one, 6 rear bolts, rear to front, 4-6. Step two, front vertical bolts, 1-2. Step three, 2 lateral bolts, 4-6. Step four, 2 front vertical bolts, 4-6.

ENGINE NOTES

►*TIMING BELT CAUTION* – Do not rotate the 2000 cc engine counterclockwise. If rotated in this direction, the timing belt can and may jump the camshaft sprocket one or two teeth.

►*CAMSHAFT DRIVE BELT JUMPING TIMING:* The camshaft drive sprocket should be checked for being oversize in diameter when a timing belt has jumped timing without an obvious mechanical reason. To check sprocket, wrap drive belt around sprocket at least 300°. Drive belt cogs will not seat properly between teeth of an oversize sprocket.

►*ENGINE KNOCK CAUTION:* Engines exhibiting sounds like a main bearing knock, should be checked for the proper flywheel-to-crankshaft flange bolt torque before checking the engine bearings.