1971-73 PINTO 1600 cc ENGINES

GENERAL SPECIFICATIONS							
Year	Displ. Cu. Ins.	Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore	Stroke
1971	98	1-Bbl.	75@5000	96@3000	8.0-1	3.188"	3.056"
1972-73①	98	1-Bbl.	54@4600	80@2400	8.0-1	3.188"	3.056"

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: 1S10X100001. The first digit determines the model year and fifth character establishes engine identification.

Pinto Engine	Engine Code
1600 CC	W

ENGINE REMOVAL

See Engine Removal at end of ENGINE Section.

INTAKE MANIFOLD REMOVAL

1) After draining cooling system, remove the air cleaner and disconnect the throttle shaft from the carburetor. Disconnect the fuel line, decel valve pipe and vacuum line from the carburetor.

2) Disconnect the water outlet hose and the crankcase ventilation hose from the intake manifold. Remove the attaching nut and bolts and remove the manifold.

CYLINDER HEAD REMOVAL

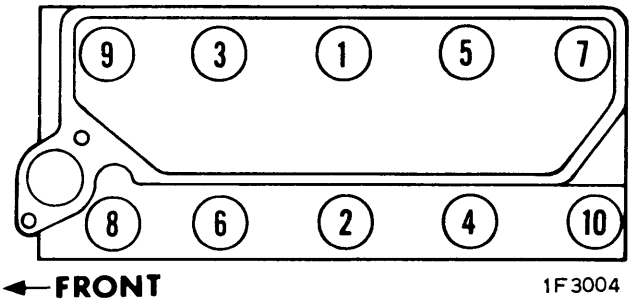
1) After draining cooling system, disconnect hot air and crankcase ventilation hoses at the air cleaner. Remove air cleaner and disconnect the fuel line at the carburetor and fuel pump.

2) Disconnect hoses at the intake manifold and choke housing. Disconnect temperature gauge wire at sender unit.

3) Disconnect exhaust pipe and disconnect the throttle linkage and distributor vacuum advance pipe from the carburetor.

4) Remove thermostat, rocker arm cover and gasket. Remove rocker arm shaft bolts evenly and remove rocker arm assembly. Remove push rods and keep them in correct order for proper replacement.

5) Remove head bolts and remove head and gasket. *CAUTION – Do not lay head flat on its face as damage to spark plugs or gasket surface can occur.*



CYLINDER HEAD TIGHTENING SEQUENCE

VALVES								
Engine & Valve		Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	Stem Clearance	Valve Lift
1600cc								
1971	Int.	1.497"	45°	44°	.055-.060"	.3098-.3105"	.0008-.0027"	.2967"
	Exh.	1.240"	45°	44°	.075-.080"	.3089-.3096"	.0017-.0036"	.3199"
1972-73	Int.	1.502"	44°	45°	.050-.065"	.3098-.3105"	.0008-.0027"	.2967"①
	Exh.	1.239"	44°	45°	.070-.085"	.3089-.3096"	.0017-.0036"	.3199"②

① — 1973 .3246" ② — 1973 .3351"

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1971-73 PINTO 1600 cc ENGINES (Cont.)

VALVE ARRANGEMENT

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

VALVE GUIDES

Valve guides may be either integral in the head or installed in the head as individual units. In either case, the bores may be reamed to .015" oversize and valves with .015" oversize stems installed. *NOTE – Intake valves are aluminized and must not, under any circumstances be faced, ground or lapped in. Replace intake valves that are burned or pitted.*

VALVE SEALS

Insert valve into guide and fit rubber seal to the valve stem with the open end to the head. Seal is retained by a snap ring over the valve guide boss.

VALVE SPRINGS

Engine	Free Length	PRESSURE (LBS.) Valve Closed	PRESSURE (LBS.) Valve Open
1600 cc			
1971-72	1.48"	48-53@1.263"	118-128@.955"
1973	1.48"	48-53@1.263"	118-127@.957"

VALVE SPRING ASSEMBLED HEIGHT

Valve spring installed height is measured from the valve spring pad to the bottom of the retainer. Assembled height should be 1.263". If height not correct, valve spring shims may be installed to obtain correct height. If correct height not obtainable with 1/16" shim, replace valve.

ROCKER ARM ASSEMBLY

Removal & Disassembly – Remove rocker arm shaft attaching bolts evenly, lift off assembly. Remove cotter pin from one end of shaft, slip flat washer, crimped washer and second flat washer off shaft. Rocker arm shaft supports, rocker arms and springs can now be removed from shaft.

Reassembly & Installation – In proper sequence, place shaft supports, rocker arms and springs on shaft. The bolt hole in the rocker arm shaft support must be on the same side as the tappet screw in the rocker arm. Rocker arms are right and left handed, the rocker pads being inclined towards the support. Place the assembly on the cylinder head and tighten bolts evenly in sequence, until proper torque (see Tightening Specifications) has been obtained.

VALVE TAPPET ADJUSTMENT

Adjust valve tappet clearance to the following specifications:

Intake Valves – Hot .010"; Cold .008-.010"
Exhaust Valves – Hot .017"; Cold .018-.020"

To correctly check and adjust tappet clearances, turn the crankshaft until the valves listed in the first column of the following table are fully open. Then adjust the valves listed in the second column of the table.

Valves Open	Adjust Valves
1 & 6	3 & 8
2 & 4	5 & 7
3 & 8	1 & 6
5 & 7	2 & 4

PISTONS, PINS, RINGS

Engine	PISTONS ①Clearance	PINS Piston Fit	PINS Rod Fit	RINGS Rings	RINGS End Gap	RINGS Side Clearance
1600 cc						
1971	.0016-.0022"	.0001-.0003"	.0001-.0003"	1 & 2	.009-.014"	.0016-.0036"
				3	.009-.014"	.0018-.0038"
1972-73	.0016-.0022"	.0001-.0003"	.0001-.0003"	1 & 2	.009-.014"	.0016-.0036"
				3	.009-.014"	.0018-.0038"

① – No. 4 Bore .0019-.0024"

PISTON PIN INSTALLATION

After correctly installing piston rings on pistons, assemble the piston to the connecting rod. *Be sure that the "Front" marking on the rod is on the same side of the assembly as the arrow in the piston crown.* Heat the piston in water or oil prior to inserting the piston pin. Retain the piston pin with the snap rings.

FITTING PISTONS

1) Measure cylinder bore 2 11/32" from top face of cylinder block, across the axis of the crankshaft.

2) Check piston clearance in bore by inserting a piston pull scale tool with a ½" wide blade (feeler gauge) .002" thick into the cylinder bore the full length of the blade. Slide the piston, crown first, into the cylinder and trap the feeler blade at the largest diameter of the piston.

3) Hold the piston steady (without side thrust) and withdraw the feeler blade with a steady pull on the piston pull scale, observing the pounds pull required to remove the feeler blade. If piston clearance is correct, 7 to 11 lbs. pull will be required to withdraw the feeler blade.

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1971-73 PINTO 1600 cc ENGINES (Cont.)

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS							
	MAIN BEARINGS				CONNECTING ROD BEARINGS		
Engine	Journal Diam.	Clearance	Thrust Bearing	Crankshaft Endplay	Journal Diam.	Clearance	①Sideplay
1600 cc							
1971	2.1253-2.1261"	.0005-.0015"	No. 3	.003-.011"	1.9368-1.9376"	.0001-.0015"	.004-.010"
1972-73	2.1253-2.1261"	.0005-.0015"	No. 3	.003-.011"	1.9368-1.9376"	.0004-.0015"	.004-.010"

OIL PAN REMOVAL

See Oil Pan Removal at end of ENGINE Section.

MAIN BEARING

Crankshaft is supported by five main bearings. The intermediate and rear bearing caps are identical, but their positions must not be interchanged. When disassembling an engine, make sure that bearing caps are numbered (with the exception of the rear bearing). The rear main cap is not numbered. All caps must be fitted with cast arrows pointing forwards.

Use Plastigage to determine crankshaft clearance in bearings. If bearing clearance using standard bearings is excessive, a .002" undersized bearing may be used in combination with a standard bearing. 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 the standard and .002" undersize combination does not bring the bearing clearance within specified limits (see Specifications), the crankshaft will have to be refinished and undersize bearings installed.

CONNECTING ROD NUMBERS

Rod number is stamped on lower end of rod and its bearing cap, on the camshaft side. When a piston and rod assembly is installed with the numbers together it will be in its original position in the engine assembly. It is advisable, when removing piston and rod assemblies, to be sure each rod is stamped. Stamp any rod without a cylinder number on it.

REAR MAIN BEARING OIL SEAL

1) Remove transmission, clutch pressure plate and flywheel. Remove oil pan (see Oil Pan Removal). Remove the rear oil seal retainer.

2) Install new seal in carrier using a suitable remover/replacer tool (Ford T70P-6165).

3) With a new gasket on the carrier, use a suitable jointing compound at the ends and fit the carrier to the block rear face. Use the remover/replacer tool to align the seal on the crankshaft seal surface. With the tool in place, tighten the carrier bolts evenly and remove the tool. Replace the oil pan, using new gaskets and jointing compound.

ENGINE FRONT COVER & OIL SEAL

1) Drain cooling system, disconnect radiator hoses at engine and remove radiator. Remove fan belt, fan and water pump pulley.

2) Remove the water pump, then use a suitable puller and remove the crankshaft pulley. Remove the front cover.

3) Install new oil seal in cover using suitable tool. When replacing front cover, align the cover to the cylinder block with an aligning tool. Tighten cover bolts evenly and then remove aligning tool.

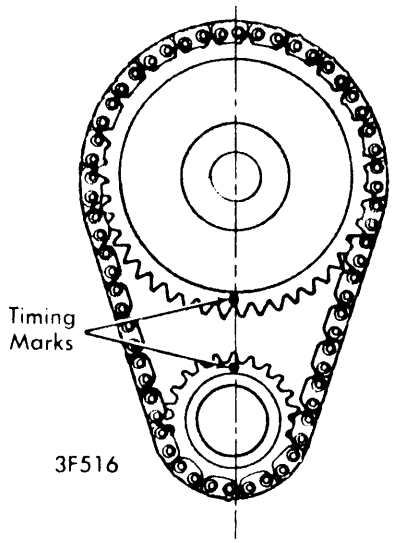
CAMSHAFT			
Engine	Journal Diam.	Clearance ①	Lobe Lift
1600cc 1971-73	1.5597-1.5605"	.0010-.0023"	Int. .2108" Exh. .2176"

① – Wear Limit .006".

CHECKING CAM LOBE LIFT

Check lift of each camshaft lobe in consecutive order as follows:

1) Remove rocker arm shaft assembly, making sure each push rod is in the valve lifter socket. Install a dial indicator so that the ball socket adapter of the indicator rests on the end of push rod and in the same plane as the push rod movement.



VALVE TIMING MARKS

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1971-73 PINTO 1600 cc ENGINES (Cont.)

CAMSHAFT & TIMING CHAIN

Camshaft – Engine must be removed from vehicle to replace camshaft bearings or camshaft (see Engine Removal). Replacement of camshaft or bearings requires that front and rear crankshaft oil seals also be replaced. Use suitable bearing remover/replacer tool and adapters to install new bearings. The splits in the new bearings should be upwards and outwards at 45° to the vertical. Front and rear bearings are approximately 3/4" wide, the front having an additional oil hole for the rocker arm shaft oil feed, and the center bushing is approximately 5/8" wide.

Timing Chain – Single row, with automatic mechanical tensioner. Tensioner has synthetic rubber pad that runs directly on rollers of chain. *NOTE – Do not dress surface of pad to remove grooves worn in by chain links.* Camshaft and crankshaft sprockets have timing marks indented on face of sprocket. When replacing timing chain, be sure timing marks are correctly aligned (see illustration). Install new crankshaft front oil seal in front engine cover before replacing cover.

ENGINE OILING

Type System – Full force feed with full-flow oil filter.

Crankcase Capacity – 3 Qts. Add ½ Qt. with filter change.

Oil Pressure (Hot) – 35-40 Lbs. @ 2000 RPM.

Pressure Relief Valve – Not adjustable.

OIL PUMP

Two types of pumps are used in production; a "vane-type" and an "eccentric bi-rotor type". Pumps are directly interchangeable, differing only in their internal design. Pumps may be identified on the engine by the difference in their end covers. The eccentric bi-rotor has four recesses cast in the cover, the vane type being flat. Either type may be removed with the engine in place by removing three bolts attaching the oil pump and filter assembly and withdrawing the assembly from the engine.

Oil Pump Specifications – Rotor Type

Max. Clearance, Inner & Outer Rotors	.006"
Max. Clearance, Outer Rotor to Housing	.010"
Max. Clearance, Face of Rotors to Face of Housing	.005"
Relief Valve Spring Tension @ 1.04"	7.5-8.5 Lbs.
Clearance, Shaft to Housing Bearing	.002-.004"
Clearance, Relief Valve	.001-.003"
End Clearance, Rotor Assembly	.001-.004"
Clearance (Radial), Outer Race to Housing	.005-.075"

Oil Pump Specifications – Vane Type

Max. Clearance, Face of Rotor & Vanes to Housing Face	.005"
Max. Clearance, Side of Rotor to Side of Housing	.005"
Max. Clearance, Vane to Pump Body	.010"
Max. Clearance, Vane to Side of Locating Groove	.005"

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Cylinder Head Bolts	①
Main Bearing Caps	65-70
Connecting Rod Bolts	30-35
Crankshaft Pulley Bolt	24-28
Flywheel to Crankshaft Bolts	50-55
Rocker Arm Shaft Support	25-30
Camshaft Sprocket to Camshaft	12-15
Front Engine Cover	5-7
Exhaust Manifold to Cyl. Head Studs	9-12
Exhaust Manifold to Cyl. Head Nuts	15-18
Exhaust Manifold to Cyl. Head	9-12
Intake Manifold to Cyl. Head Bolts	12-15
Intake Manifold to Cyl. Head Nuts	12-15
Intake Manifold to Cyl. Head Studs	9-12
Oil Pump to Cyl. Block	13-15
Oil Pan to Cyl. Block Bolts	②
Tappet Adjusting Self Lock Screws	10-25
Water Pump to Cyl. Block (¼")	5-7
Water Pump to Cyl. Block (5/16")	12-15
Decel Valve Adaptor to Manifold	30-33
Decel Valve Adaptor to Decel Valve	27-30

① – Step one, 5 Ft. lbs. Step two, 25 Ft. lbs. Step three, 52 Ft. lbs. Step four, 65-70 Ft. lbs.

② – Step one, finger tighten corner bolts. Step two, tighten all bolts enough to clamp gasket. Step three, tighten all to 7 Ft. lbs.

ENGINE NOTES

►*INTAKE VALVE CAUTION* – Intake valve faces are aluminized and must NOT, under any circumstances be faced ground or lapped in. *Replace intake valves that are burned or pitted.*

►*NEW OIL PUMP ASSEMBLY:* Where necessary to relieve a tendency of oil pressure build up, a new oil pump with a deeper relief valve bore in the pump body is available. (Part No. DIFZ 6600 C).

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