900 4-CYLINDER

ENGINE CODING

ENGINE IDENTIFICATION

Engine number is stamped on engine block and is located in the left front corner of the engine compartment. The 4th character of the number indicates whether the engine is turbo-charged or normally aspirated, the 5th character indicates automatic or manual transmission.

Engine Identification

Application	Code
900	
Manual Trans.	B20IMUC
Auto. Trans.	B20IAUC
Turbo	
Man. Trans.	B20SMUC
Auto. Trans.	B20SAUC

ENGINE & CYLINDER HEAD

ENGINE

NOTE – *Engine and transaxle assembly are removed as a unit. Transaxle housing is engine lower crankcase (pan).*

Removal – 1) Disconnect and remove battery. Disconnect windshield washer hose. Remove hood and drain cooling system. Disconnect ground strap between engine and chassis and disconnect positive cable from starter motor. Disconnect servo vacuum hose at manifold and remove bellows between air flow sensor and intake manifold.

2) Clean area around fuel distributor lines and detach at connectors. Cover openings and plug fuel line ends. Remove air cleaner assembly along with mixture control unit. Disconnect EGR system (if equipped). Disconnect upper and lower radiator hoses and heater hoses.

3) Disconnect all ignition wiring connectors as well as sensors, emission control and electrical power connections between chassis and engine. Disconnect heating system and vacuum hoses. Disconnect throttle control wire. Disconnect 2 hydraulic lines at power steering pump (if equipped).

4) On manual transmission models, disconnect clutch line from slave cylinder. Cap hose and slave cylinder opening, put gear lever in neutral, and drive front taper pin from shift rod joint. Separate joint from gear shift rod.

5) On automatic transmission models, remove protective cover from exhaust manifold (if equipped), and place gear selector in "P" position. Remove selector cable retaining screw, push back spring loaded sleeve on shift rod, and disconnect cable.

6) On all models, disconnect exhaust pipe at manifold. Disconnect speedometer cable at transmission. Loosen clamps and remove bellows from inner universal joints at transaxle. Place spacer tool (83 93 209) between upper control arm and body so front suspension will be unloaded when car is raised.

7) Raise and support vehicle, then remove lower end piece from right side control arm. Remove rear engine mounting bolts and loosen the front engine mounting nut so mount can be lifted from the bracket. Attach lifting sling and slightly raise engine.

8) Move engine to the right and remove left universal joint, then move engine to left and remove right universal joint. Ensure that all cables and lines are free from engine and remove entire power unit from vehicle.

Installation – 1) Ensure that universal joints are packed with grease. Fit new gaskets to the exhaust pipe flanges. Suspend engine and balance it so the front engine mount will locate in its bracket before the rear. Lower the assembly, guiding the front mount into its bracket and continue to lower engine until rear of engine is 2" (50-60 mm) above mountings.

2) Move the engine to the right and guide in the left universal joint. Lower the engine carefully, guiding it into the mountings, and at the same time aligning the right universal joint. Ensure that exhaust pipe flanges line up. Refit the right end piece to the control arm. Tighten universal joints and install rear engine mounting bolts. Tighten all engine mountings. To complete installation, reverse removal procedures.

CYLINDER HEAD

Removal – 1) Remove battery leads. Drain cooling system. Remove upper radiator hose. Remove PCV hose from valve cover. Remove wiring from distributor and temperature sending unit. Remove warm-up regulator and auxilliary air valve from cylinder head.

2) Rotate crankshaft to TDC position on firing stroke of No. 1 cylinder. Remove valve cover. Place a jack under the transmission case. Detach the stay between right engine mount and cylinder head and rotate it to one side.

3) Jack up engine slightly and support it with a piece of wood between cross member and transmission case. Detach and support the intake and exhaust manifolds. Detach the chainwheel from the camshaft but keep the chain hanging on the chainwheel.

4) Place the chainwheel between the chain guide and tensioner. Remove 2 timing cover-to-cylinder head bolts. Remove cylinder head bolts in the reverse of sequence shown in *Fig. 1*. Lift the cylinder head off block and remove from vehicle.

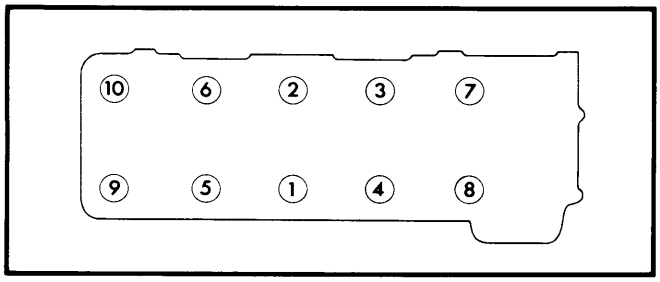

Fig. 1 Cylinder Head Tightening Sequence (Loosen in Reverse Order)

Installation – 1) Place a new gasket on engine block. With crankshaft at "0" position, temporarily install the camshaft chainwheel and place camshaft at TDC position on No. 1 cylinder firing stroke. Position the chain on the chainwheel and place chain between chain guide and tensioner.

2) Install the cylinder head and tighten the bolts in 2 stages in the sequence shown in *Fig. 1*. Install the cylinder head-to-timing cover bolts. Take tension off of timing chain tensioner by in-

900 4-CYLINDER (Cont.)

serting tool (83 93 357) into tensioner catch and pulling upward. See *Fig. 2*.

3) Place the chainwheel on the camshaft so that the marks on bearing cap, chainwheel, and screw holes align. If necessary, alter position of chain. Install the camshaft chainwheel retaining bolts using flat washers. Using tool (83 93 357), push tensioner catch down to tension chain. To complete installation, reverse removal procedures.

NOTE – *Cylinder head bolts should be retightened in the following manner. Run engine till warm and allow to cool 30 minutes. Slightly loosen each head bolt following sequence and retighten. Then tighten each bolt and additional ¼ turn (90°), following the proper sequence.*

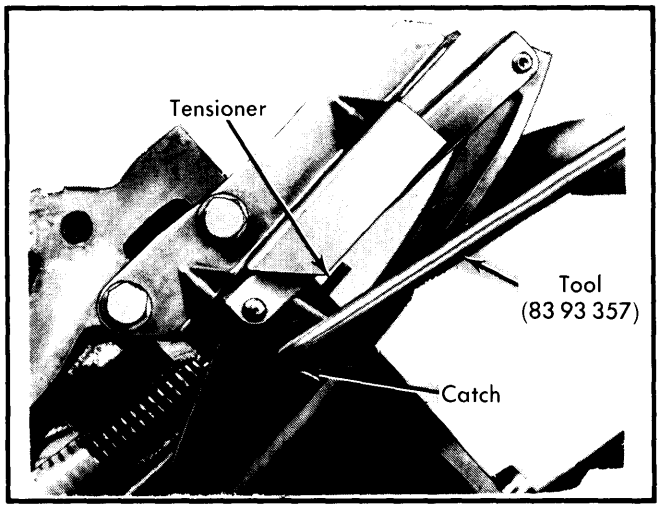

Fig. 2 Chain Tensioner and Tensioner Tool (Tension Release Position)

CAMSHAFT

CAMSHAFT

Removal – Remove valve cover and camshaft chainwheel. Hang chainwheel and chain between tensioner and chain guide. Remove camshaft bearing caps and lift out camshaft.

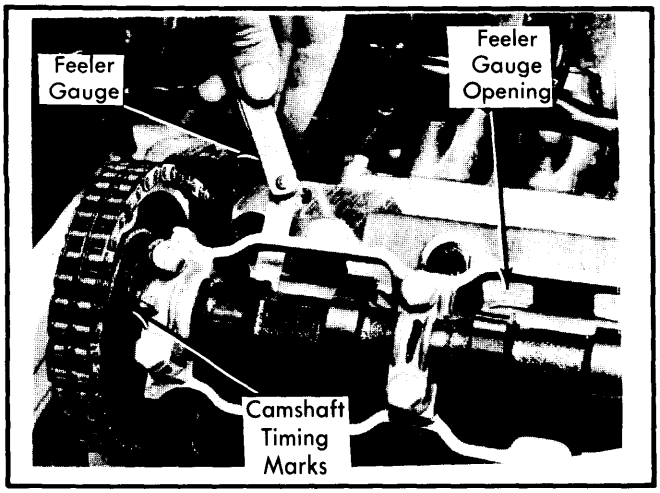

Fig. 3 Camshaft Timing Marks

Installation – Install camshaft and bearing assembly so that feeler gauge openings are at top. Ensure that crankshaft is still at TDC for No. 1 cylinder and reverse removal procedure.

TIMING CHAIN ASSEMBLY

Removal – 1) With engine removed from vehicle, place cylinder No. 1 at TDC of compression stroke. Remove valve cover. Remove chainwheel from camshaft and hang between tensioner and chain guide.

2) Remove crankshaft pulley and oil pump. Remove water pump. See Oil Pump and Water Pump Removal procedures. Remove 2 cylinder head-to-timing cover bolts.

3) Remove timing cover bolts and remove timing cover. Remove timing chain, camshaft chainwheel, tensioner and chain guide.

Installation – 1) Ensure that both crankshaft and camshaft are in TDC position for No. 1 cylinder compression stroke. Install chain tensioner and chain guide. Temporarily install camshaft chainwheel. Position the chain on the camshaft and crankshaft chainwheels and between the tensioner and chain guide.

2) Install the timing cover, oil pump and water pump. Take the tension off of the timing chain by inserting tool (83 93 357) into tensioner catch and pressing down. Place the chainwheel on the camshaft sprocket so that marks on the camshaft bearing cap, chainwheel and screw holes align. Install the camshaft chainwheel using flat washers.

3) Tension chain by inserting tool (83 93 357) into tensioner catch and pushing down to turn catch over latch arm. See *Fig. 2*. To complete installation, reverse removal procedures.

VALVES

VALVE ARRANGEMENT

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

VALVE SPRINGS

NOTE – *Valve spring replacement is possible without removing cylinder head from engine.*

Removal & Installation – Remove camshaft as previously described. Remove camshaft bearing support assembly. With cylinder head installed, take spark plug out of cylinder and fit air hose connector. Supply air pressure to keep valve from dropping into cylinder. Remove valve depressors and adjusting pallets. Use a valve compressor and remove retainers (keepers) with a magnet. To install, reverse removal procedures.

VALVE GUIDE SERVICING

To check for wear, pull valve about .12" (3 mm) from its seat and check radial play at valve head. If play exceeds .020" (.5 mm), replace valve and/or guide. To replace guide, run hot water through head and pull guide from head using suitable puller (8392631). To install, ensure that head is warm as in removal. Use guide tool (8392631) and press in new guide from the top.

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VALVE CLEARANCE ADJUSTMENT

1) Check clearance with valve cover removed by rotating crankshaft so that cam lobe of valve to be measured points away from valve. Measure clearance with feeler gauge between heel of cam and follower. Clearance should be between .006-.012" (.15-.30 mm) for intake and .014-.020" (.35-.50 mm) for exhaust. Turbo exhaust valve clearance is .016-.020" (.40-.50 mm).

2) If any valve clearance is beyond limits, direct measurement of all valve clearance is required. Use tool (8391450) and a dial indicator to measure actual clearance. Record clearance readings on all valves. Adjust intake clearances if beyond .008-.010" (.20-.25 mm) and exhaust clearances if beyond .016-.018" (.40-.45 mm). Turbo exhaust clearance should be adjusted if beyond .018-.020" (.45-.50 mm).

3) Remove camshaft, followers and adjusting pallets of any valve requiring adjustment. Measure pallet thickness and add noted valve clearance to determine total clearance. Subtract proper valve clearance to find needed pallet thickness. Install new pallets. Install followers and camshaft and recheck valve clearance.

PISTONS, PINS & RINGS

PISTON & ROD ASSEMBLY

Removal – With cylinder head and pan removed, note that rods and rod caps are numbered. Remove carbon or wear ridge from top of cylinders. Remove bearing caps and place plastic sleeves over rod bolts. Push piston/rod assembly out of cylinder.

Installation — Ensure that ring gaps are staggered and install ring compressor. Compression ring gaps should be equally spaced from each other. Notch on piston top must face timing cover and connecting rod numbers face exhaust side.

PISTON PIN REPLACEMENT

Pistons are retained by circlips. Remove circlips and press out piston pins. Check pins and bearings for wear or damage and replace as required.

FITTING PISTONS

1) To fit pistons to cylinder bores, use a feeler gauge .500" (12.7 mm) wide and .0005-.0016" (.014-.040 mm) thick. Oil cylinder lightly and insert piston without rings.

2) Attach feeler gauge to a spring scale. Insert feeler gauge between piston and cylinder wall at right angles to piston pin. When feeler gauge can be pulled out of cylinder with a force of 1.8-2.6 lbs. (.816-1.18 kg), piston clearance has been determined.

3) Repeat test at several different depths in cylinder bore. Graded standard and non-graded oversize pistons are available.

Piston Specifications

Application	Diameter In. (mm)
Std. (AB)	3.5425-3.5427 (89.980-89.986)
Std. (C)	3.5433-3.5437 (89.999-90.010)
1st Oversize	3.5619-3.5625 (90.472-90.487)
2nd Oversize	3.5816-3.5822 (90.972-90.987)

4) Check piston rings for end gap and side clearance, using an inverted piston to position ring in bore. On worn bores, measure at lower end of bore.

5) Install rings on pistons, staggering ring gaps. Compression ring gaps should be located above piston pin (180° from each other). Oil ring gaps should be equally spaced from each other.

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

BEARING SERVICE

1) Remove connecting rods and main bearing caps. Measure journals with a micrometer. Out-of-round should not exceed .002" (.051 mm). If crankshaft is near or over stated limit of wear, regrind journals and fit undersize bearings.

2) Using "V" blocks and a dial indicator check crankshaft for bend. If bend exceeds .002" (.051 mm), replace or repair crankshaft.

3) Using Plastigage method, check main bearing and connecting rod bearing journals. If clearance is found excessive, combine suitable undersize bearings to correct clearance. Undersize bearings are available in various thicknesses.

THRUST BEARING ALIGNMENT

Center main bearing is thrust bearing. Check crankshaft endplay. If beyond specifications, replace thrust washers with oil grooves facing crankshaft.

ENGINE OILING

Crankcase Capacity – 3.7 quarts with filter (4.5 quarts for turbocharged engine).

Oil Filter – Full-flow type.

Normal Oil Pressure – 43 psi (3.0 kg/cm^2) @2000 RPM.

Pressure Regulator Valve – Non-adjustable; opens at 51-74 psi (3.6-5.2 kg/cm^2).

ENGINE OILING SYSTEM

Oil pressure is generated by a gear type oil pump with one gear wheel and an eccentric ring gear. The pump is mounted on the timing cover and is driven by a crankshaft mounted driving plate. Oil is forced through a full flow filter and oil channels to crankshaft main and connecting rod bearings and valve train.

OIL PUMP

Removal – Clean area around pump. Immobilize crankshaft by attaching locking device (83 92 987) to flywheel ring gear.

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Remove crankshaft pulley retaining bolt and remove pulley from crankshaft. Remove oil pump retaining bolts and extract the pump.

Inspection – Using a straight edge and feeler gauge, check end float between pump body and gear wheel.

Installation – Oil the gear wheels. Install the ring gear so that the mark on its face is visible. Fit a new sealing ring in groove in pump body. Prime pump with oil and install to engine. Remove oil filter adapter casting and fill passage with oil. Reinstall casting.

NOTE – *It may be necessary to extract the pump gear slightly to locate it on driving plate.*

ENGINE COOLING

Cooling System Capacity – 10.8 quarts.

Thermostat – Thermostat begins to open at approximately 190°F (88°C).

Radiator Cap — Opens at 12.9-17.1 psi (.907-1.2 kg/cm^2).

WATER PUMP

Removal – Drain coolant. Remove driving belt. Remove water pump attaching screws and remove water pump.

Installation – Clean gasket mating surfaces and install a new gasket. Install pump to timing cover. Install pulley and driving belt.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N·m)
Main Bearings	79 (108)
Rod Bearings	40 (54)
Camshaft Bearing Caps	13 (18)
Crankshaft Pulley	137 (190)
Cylinder Head ①	
Step 1	45 (60)
Step 2	65 (90)
Flywheel	43 (59)
Oil Pump	13 (18)
Camshaft Sprocket	14 (20)
Intake Manifold	13 (18)
Exhaust Manifold	18 (25)

① Retighten as described in Installation procedures.

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Year	Displ.		Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke	
	cu. ins.	cc					in.	mm	in.	mm
1981										
900	121	1985	Fuel Inj.	110 @ 5200	119 @ 3500	9.25:1	3.54	90	3.07	78
Turbo	121	1985	Fuel Inj.	135 @ 5000	160 @ 3500	7.20:1	3.54	90	3.07	78

CAMSHAFT

Engine	Journal Diam. In. (mm)	Clearance In. (mm) ①	Lobe Lift In. (mm) ②
1985 cc	1.139 (28.94)	.....	Int. .421 (10.8) Exh. .433 (11.0)

① – End play is .003-.010" (.08-.25 mm).

② – Turbo lobe lift is .358" (9.1 mm) for intake, .413" (10.5 mm) for exhaust.

VALVE TIMING

Engine	INTAKE①		EXHAUST②	
	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
1985 cc				
99 & 900	10°	54°	46°	18°
Turbo	12°	40°	62°	2°

① – With .014" (.35 mm) valve clearance.

② – With .022 (.55 mm) valve clearance.

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
1985 cc	1.700 (43.1)	.....	170-183@1.161 (77-83@29.5)

900 4-CYLINDER (Cont.)

ENGINE SPECIFICATIONS (Cont.)

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)
1985 cc							
Int.	1.654 (42.0)	44.5°	45°	.004-.008 (1-2)	.313-.314 (7.960-7.975)	0.02 (0.5)	.....
Exh.	1.398 (35.5)	44.5°	45°	.004-.008 (1-2)	.313-.314 (7.955-7.980)	0.02 (0.5)	.....

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)
1985 cc	.0006-.0016 ② (.014-.040)	.0002-.0006 (.005-.014)	①	No. 1	.014-.021 (.35-.55)	.002-.003 (.050-.082)
				No. 2	.012-.018 (.30-.45)	.0016-.003 (.040-.072)
				Oil	.015-.055 (.38-1.40)	.....

① — Interference fit.
② — Turbo clearance .024-.050" (.61-1.27 mm).

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)
1985 cc	2.283-2.284 (57.981-58.000)	.001-.002 (.020-.062)	Center	.003-.011 (.08-.28)	2.046-2.047 (51.981-52.000)	.001-.002 (.026-.062)	.....