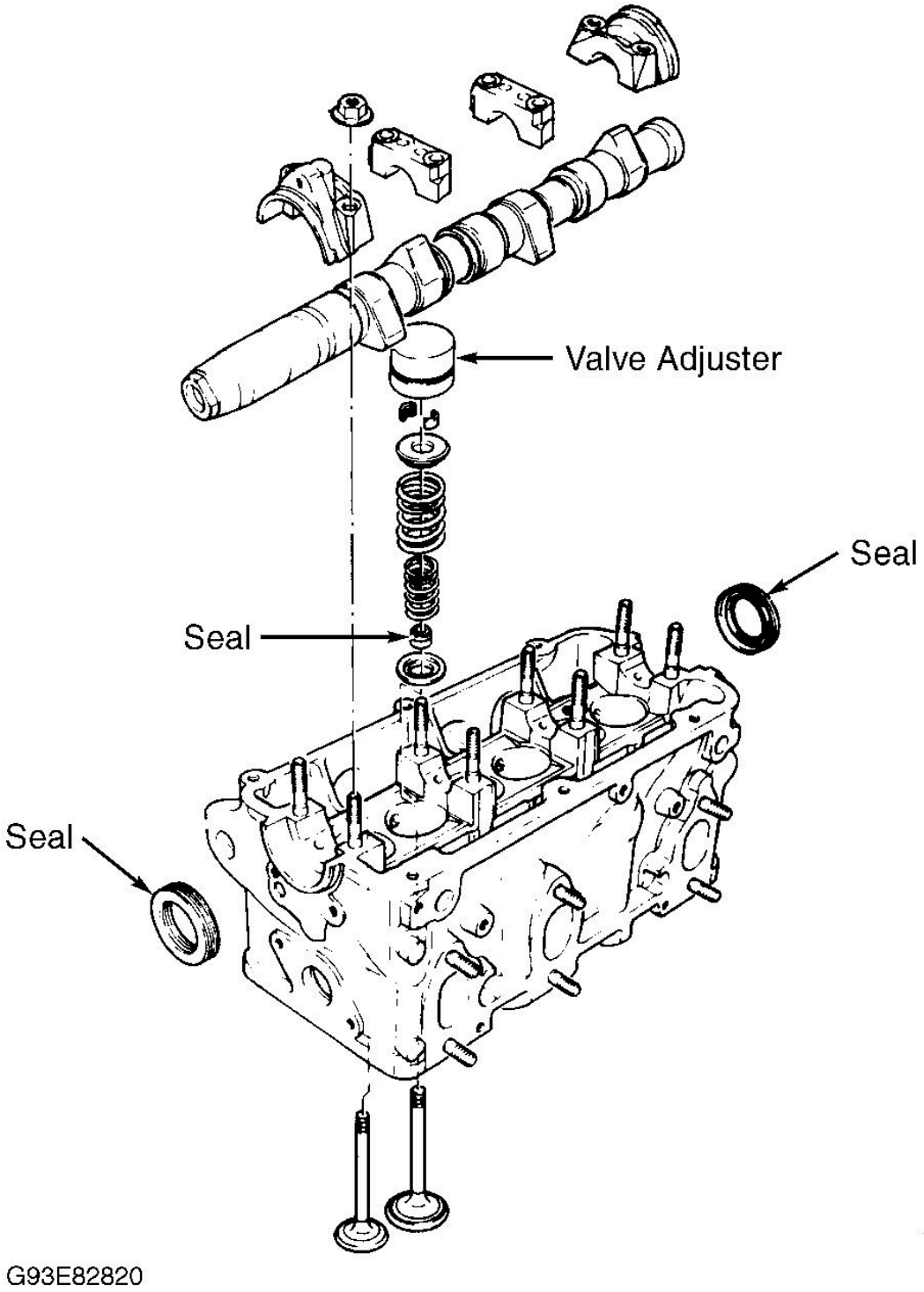

Fig. 6: Exploded View Of Valve Train Components
Courtesy of AUDI OF AMERICA, INC.

CAMSHAFT SEAL

Removal & Installation

1. Remove timing belt. See **TIMING BELT**. Remove valve cover. See VALVE COVER. Remove rear timing belt guard. Remove seal with Seal Extractor (3240). Clean sealing surfaces. DO NOT oil sealing lip or outer edge of seal.
2. To install seal in left cylinder head, use Seal Installer (3241) to press seal into bore until bottomed. To install seal in right cylinder head, install extraction sleeve onto camshaft end. Use Seal Installer (3241) to press seal into bore until even with head surface. To complete installation, reverse removal procedure.

CYLINDER HEAD REAR END SEALS

Removal & Installation (Left)

Remove Hall sender. Loosen Hall sender housing. Remove Hall sender mounting plate screw. Carefully pry out Hall sender mounting plate with a screwdriver. Screw in Seal Extractor Holder (2085/1). Withdraw seal with Seal Extractor (3240 or 2085) and Screw (2085/1). Clean bearing and sealing surfaces. DO NOT oil sealing lip or outer edge of seal. Use Seal Installer (3241) to press seal into bore until bottomed.

Removal & Installation (Right With Vacuum Pump)

Remove vacuum pump. Remove transfer flange. Pull piston out of camshaft end. Replace all "O" ring seals. To install, reverse removal procedure.

Removal & Installation (Right Without Vacuum Pump)

Remove end cover. Replace "O" ring seal. To install, reverse removal procedure.

CRANKSHAFT REAR OIL SEAL

Removal & Installation

Remove transmission. See appropriate article in CLUTCHES (M/T) or see REMOVAL & INSTALLATION article in TRANSMISSION SERVICING (A/T). Remove flexplate (A/T) or flywheel (M/T). Using Pull-Out Hook (10-221), remove seal. Apply light coat of oil to sealing lip and outer edge of seal. Using Pull-In Installer (2003/3) with flexplate/flywheel bolts, install seal. When installing flywheel, ensure alignment marks are aligned. See **Fig. 7**. To complete installation, reverse removal procedure.

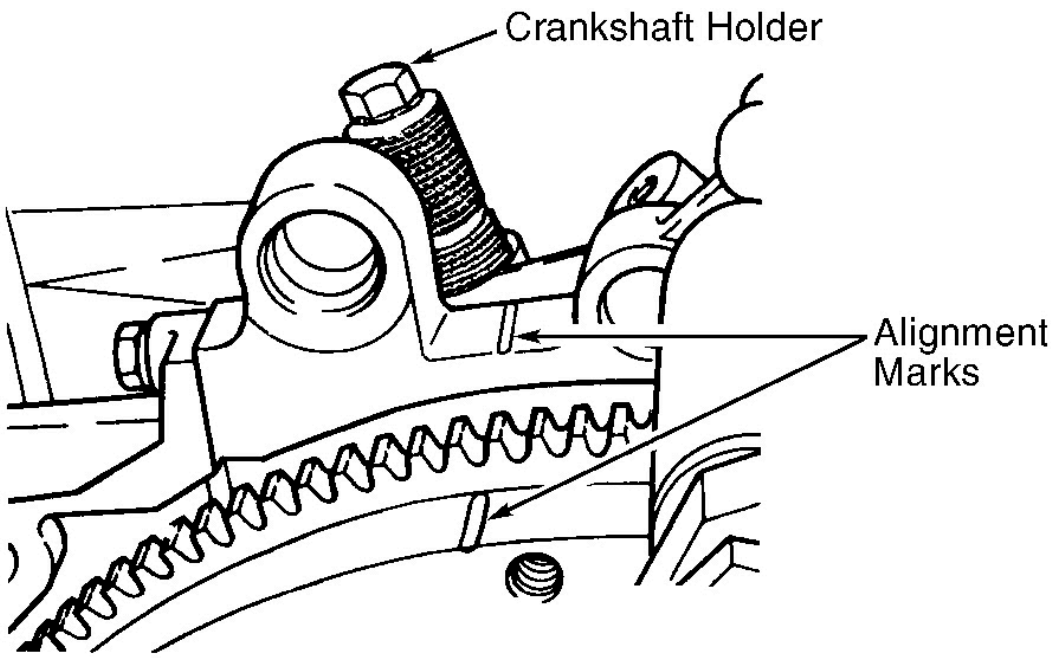

Fig. 7: Aligning flywheel
Courtesy of AUDI OF AMERICA, INC.

WATER PUMP

Removal & Installation

Remove timing belt. See **TIMING BELT**. Remove water pump bolts and water pump. To install, reverse removal procedure. Fill and bleed cooling system. See **COOLING SYSTEM BLEEDING**.

OIL PAN

NOTE: Use illustration for removal and installation. See Fig. 8.

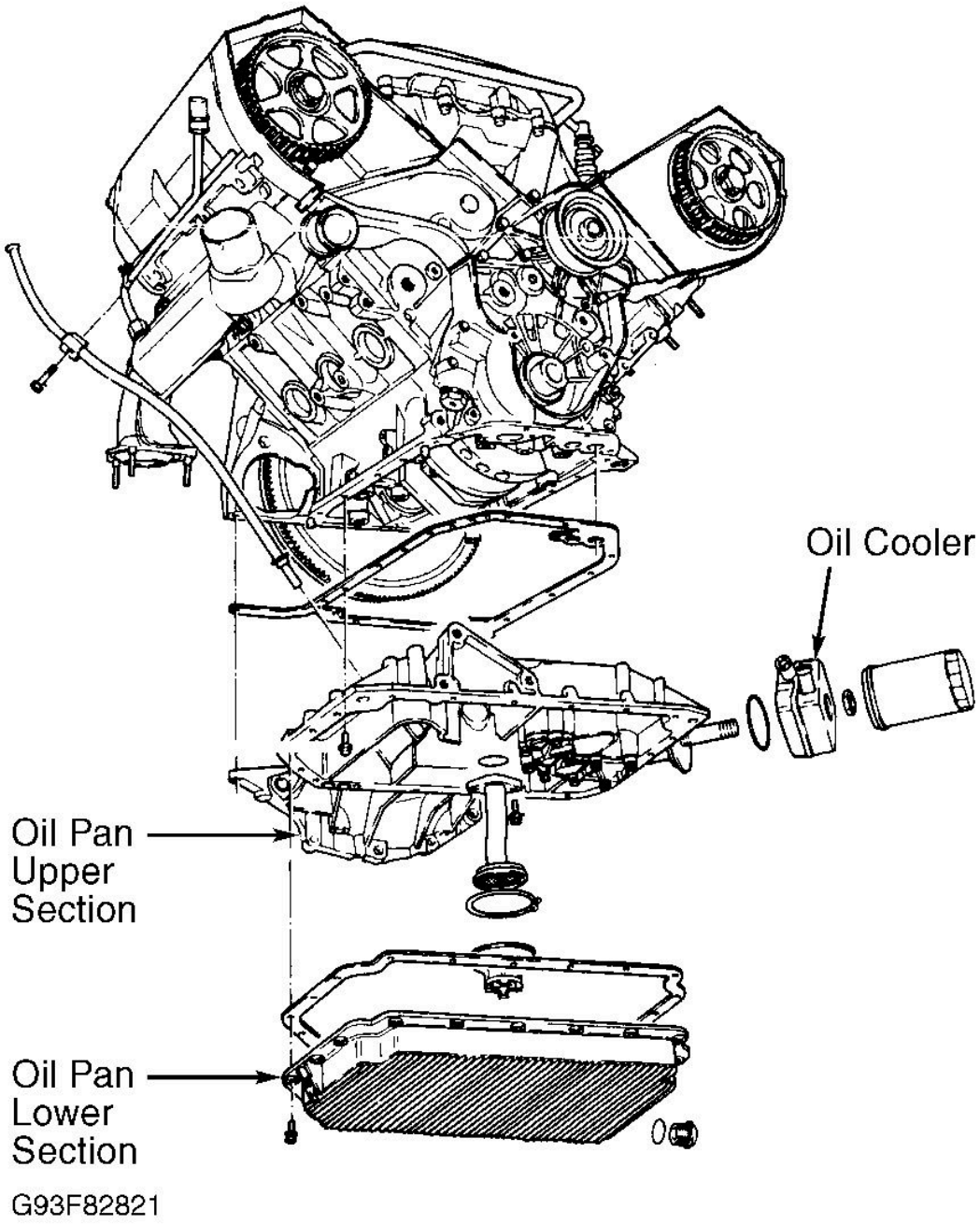

Fig. 8: Removing & Installing Oil Pan Upper & Lower Sections
Courtesy of AUDI OF AMERICA, INC.

OIL RETENTION VALVES

NOTE: Oil retention valves prevent oil from draining out of valve adjusters when engine is not running. If irregular valve noise can be heard during stop-and-go driving but cannot be heard during cruise, replace retention valves.

Removal & Installation

Remove intake manifold. Remove cover under intake manifold. Remove oil retention valves. See **Fig. 9**. To install, reverse removal procedure. Tighten oil pan check valves to specification. See **TORQUE SPECIFICATIONS**.

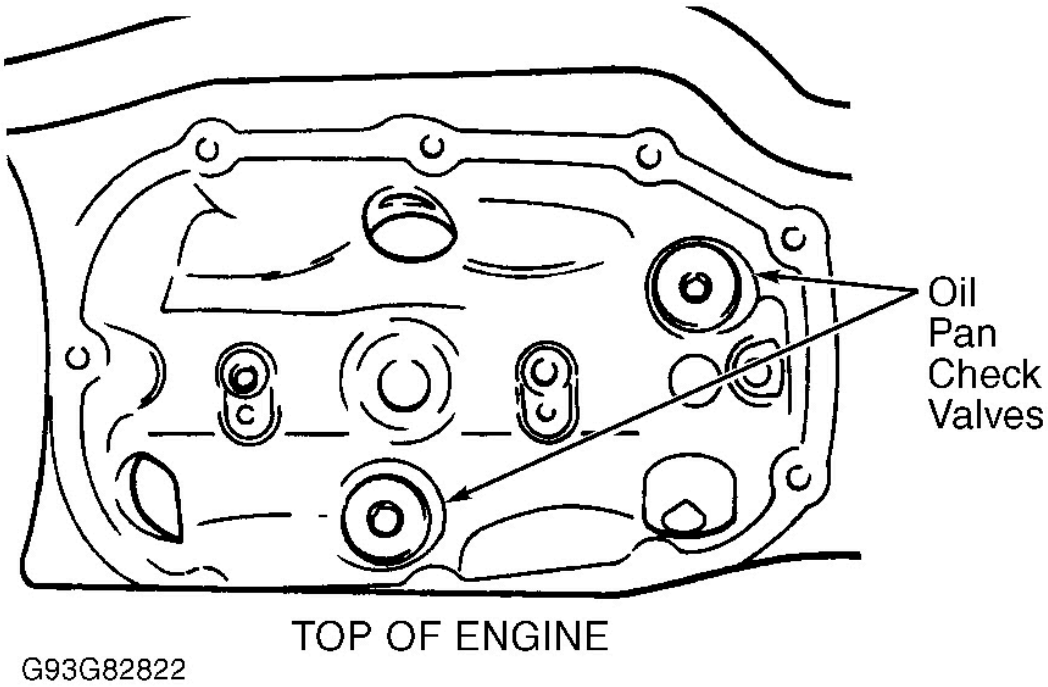

Fig. 9: Locating Oil Retention Valves
Courtesy of AUDI OF AMERICA, INC.

OVERHAUL

CYLINDER HEAD

Cylinder Head

Measure cylinder head warpage. If warpage exceeds specification, machine cylinder head. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS. If machining causes cylinder head height to be less than specification, replace cylinder head.

Valve Springs

Remove and install valve springs using Compressor (2036), Valve Lever (541/1) and Adapter (541/4).

Valve Stem Oil Seals

Remove seal with slide hammer and Adapter (3047 A). Before installing seal, slide plastic sleeve over valve guide and apply oil to seal.

NOTE: Intake valve stem diameter differs from exhaust valve stem diameter. Use appropriate valve when measuring valve guide wear.

Valve Guides

1. To measure valve guide wear, attach dial indicator to cylinder head. Insert new valve into guide until valve stem tip is even with top end of guide. Lightly push edge of valve head against dial indicator tip. Zero dial indicator. Push valve away from dial indicator, in direction opposite of camshaft axis. Maximum allowable deflection is .04" (1.0 mm) on intake valve, and .05" (1.3 mm) on exhaust valve.
2. If deflection does not exceed specification, guide is okay. If deflection exceeds specification, remove guide. To remove guide, press guide out through top of cylinder head using Adapter (10-206). To install guide, coat guide with oil. Press into bore through top of cold cylinder head using Drift (3121). Press guide until shoulder contacts cylinder head. Ream guide using Reamer (3120) and liberal quantity of cutting fluid. Machine valve seats.

Valve Seat

1. Lightly machine seat if seat is rough or seat width is not within specification. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS. Before machining, insert valve into guide. Press valve tightly against valve seat. Lay a straightedge across valve cover gasket surface of cylinder head. Measure distance between valve stem tip and up to bottom of straightedge. This is valve installed height.
2. Replace valve and/or cylinder head as necessary if valve stem height is less than 1.33" (33.8 mm) on intake valve, or 1.34" (34.1 mm) on exhaust valve. If valve stem height exceeds specification, seat can be machined; however, DO NOT machine enough material away from seat to cause valve stem height to be less than minimum specification.

Valves

Ensure intake valve face angle, minimum margin and face width are within specification. See **ENGINE SPECIFICATIONS**. DO NOT machine exhaust valves. Lap exhaust valves if necessary.

Valve Seat Correction Angles

Upper correction angle is 30 degrees.

CYLINDER BLOCK ASSEMBLY