1969-73 BMW 2500, 2800, 3.0 & BAVARIA 6 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
1969-71	151.2	2478	2x2-Bbl.	170@6000	156@3700	9.0-1	3.385	86	2.185	71.6
1969-71	169	2769	2x2-Bbl.	192@6000	174@3700	9.0-1	3.385	86	3.150	80
1972-73	181	2965	2x2-Bbl.	200@6000	188@3700	9.5-1	3.504	89	3.150	80

ENGINE IDENTIFICATION

Engine serial number is same as chassis serial number. Engine serial number is stamped in crankcase above starter.

ENGINE REMOVAL

1) Remove hood and disconnect battery ground cable. Remove radiator, windshield washer reservoir and air cleaner. Disconnect primary lead and coil wire from distributor. Remove ground wire from valve cover.

2) Remove fan and note position of drive pulley for installation. Disconnect vacuum and fuel lines at carburetors. Disconnect electrical connections at automatic choke and disconnect water hoses.

3) Disconnect wires from starter and alternator. Disconnect accelerator linkage. Remove nuts from engine mounts. Remove protective cover from under engine. Remove power steering pump (if equipped). Attach a hoist to lifting holes at front and rear of engine.

4) Remove transmission. *See Manual Transmission Removal and Automatic Transmission Removal.* On Manual Transmission models, push back rubber boot on slave cylinder, remove circlip and pull slave cylinder out toward front. Disconnect exhaust pipes at front and rear manifolds.

5) Remove throw-out bearing lever and bearing from clutch housing. Raise engine and swing out to right to remove. To install, reverse removal procedure. Install drive pulley in correct position and lubricate contact surfaces of throw-out bearing lever with Molykote Longterm 2 paste.

MANUAL TRANSMISSION REMOVAL

1) Pull up boot from shift lever, remove circlip and pull shift lever up and out. Remove exhaust pipe support bracket. Disconnect drive shaft at transmission, loosen threaded coupling of drive shaft at rear of center support bearing.

2) Remove center support bearing and pull drive shaft from transmission. Remove speedometer cable and disconnect back-up light switch connection. Disconnect transmission from clutch housing. Support engine between front axle supports, remove transmission crossmember and transmission.

3) To install, reverse removal procedure. When installing drive shaft, push center support bearing rearward .08" (2 mm) and tighten nuts. *CAUTION – To avoid stress in flexible coupling at transmission, tighten nuts only while holding bolts stationary.*

AUTOMATIC TRANSMISSION REMOVAL

1) Disconnect accelerator cable from reverse lever and drain transmission. Remove oil filler tube and plug opening. Remove exhaust system and disconnect lines to transmission. Disconnect wire harness to transmission.

2) Rotate torque converter and remove four bolts securing converter to drive plate. Disconnect shift rod from lever. Disconnect drive shaft coupling at rear of transmission and loosen threaded coupling at rear of center support bearing.

3) Remove center support bearing and pull drive shaft down and out to remove. Disconnect speedometer cable and back-up light connection. Remove transmission crossmember, allowing engine oil pan to rest on front axle crossmember.

4) Place a jack under transmission and remove ground strap. Separate transmission from engine, making sure torque converter stays in housing in transmission. Remove transmission.

5) To install, reverse removal procedure. When installing, make sure center support of torque converter is below edge of transmission. Push center support bearing rearward .08" and tighten nuts. Adjust accelerator cable lever.

FRONT INTAKE MANIFOLD REMOVAL

1) Disconnect battery ground cable and drain cooling system. Remove air cleaner and disconnect fuel and vacuum lines to carburetor. Disconnect accelerator linkage and support bracket.

2) Disconnect electrical connection from automatic choke. Remove vacuum hose for brake servo and water hoses from cover. Loosen dip stick support bracket. Remove intake manifold.

3) To install, reverse removal procedure. Make sure rotary shaft has some side clearance.

REAR INTAKE MANIFOLD REMOVAL

1) Disconnect battery ground cable and drain cooling system. Remove air cleaner and disconnect fuel and vacuum lines to carburetor. Disconnect thrust rod and support bracket.

2) Disconnect electrical connections at automatic choke and remove choke cover. Remove water hoses and intake manifold. To install, reverse removal procedure and make sure rotary shaft has some side clearance.

CYLINDER HEAD REMOVAL

1) Remove air cleaner, spark plug wire tube and valve cover. Disconnect battery ground cable and drain cooling system. Disconnect fuel line at fuel pump and accelerator linkage.

2) Disconnect electrical connections at automatic chokes. Disconnect vacuum line for brake servo. Remove dip stick support bracket. Rotate engine until number one piston is at TDC of compression stroke.

3) Remove upper front engine cover. *See Upper Front Engine Cover Removal.* Bend back lock tabs and remove camshaft sprocket bolts and sprocket. Remove timing chain tensioner plug, spring and piston. Disconnect water hoses at base of intake manifolds.

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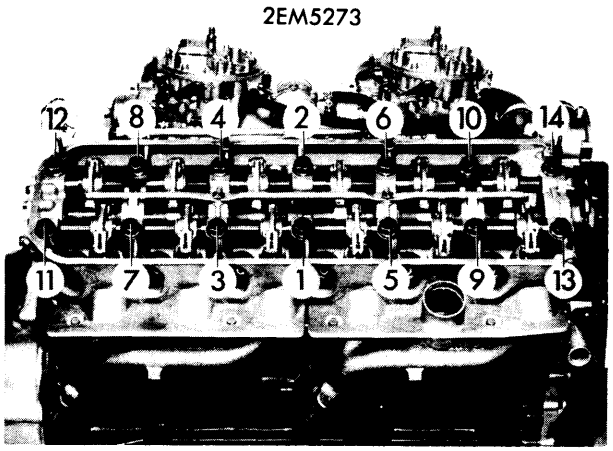
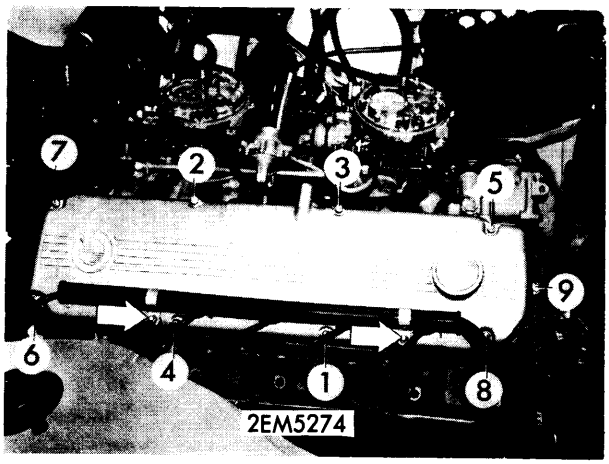
4) Disconnect exhaust pipes. Remove cylinder head bolts and install aligning pins to keep rocker arm shafts from moving. Remove cylinder head.

5) To install, reverse removal procedure. Thoroughly clean mating surfaces and install a new gasket with sealer. Tighten bolts to specifications in sequence shown in illustration.



CYLINDER HEAD TIGHTENING SEQUENCE

6) Install camshaft sprocket and timing chain in correct position. *See Timing Chain Replacement.* Install valve cover and tighten nuts to specification in sequence shown in illustration.



VALVE COVER TIGHTENING SEQUENCE

7) After installation is complete and engine has run for a short time, shut off and allow to cool to approximately 100°F. Retighten cylinder head bolts to specifications in same sequence.

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)
1969-73							
Intake	1.811 (46)	45°	46°	.063-.079 (1.6-2.0)	.3133-.3140 (7.960-7.975)	.0010-.0022 (.025-.055)	.....
Exhaust	1.496 (38)	45°	46°	.079-.094 (2.0-2.4)	.3128-.3133 (7.945-7.960)	.0016-.0028 (.040-.070)	.....

VALVE ARRANGEMENT

Left Side – Intake valves.

Right Side – Exhaust valves.

VALVE GUIDE SERVICING

1) With valve removed, check inside diameter of valve guide. If size exceeds specifications, drive guide out through combustion chamber with a suitable driver (No. 609).

2) Check size of valve guide bore in cylinder head, if size exceeds .5591", an oversize guide must be installed. Guides are available in .5551", .5591" and .5630" oversize.

3) Guides require a .0006" to .0017" press fit in cylinder head, with head heated to 430-480°F. Ream head accordingly to oversize guide being used.

4) Using a suitable driver (No.610), drive guide into cylinder head from top until top of guide protrudes .5808". Ream valve guide until correct clearance with valve is obtained.

VALVE STEM OIL SEALS

A rubber umbrella type oil seal is installed on valve stem before valve spring is installed.

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
1969-73	1.713 (43.5)	64@1.48 (29@37.6)	154@1.12 (70@28.5)

VALVE SPRING REMOVAL

1) With rocker arms and shafts removed, use suitable valve spring compressor (No. 7003) to compress spring. Remove valve keepers, release spring compressor and remove spring and retainer.

2) Check valve spring free length, if less than specified, replace valve spring. Check spring in spring tester. With spring compressed to a length of 1.12", tester should measure 154 lbs. of pressure.

3) Install spring with green paint stripe end (tight coil end) against cylinder head. If spring has a yellow paint stripe instead of green, replace valve spring. To install, reverse removal procedure.

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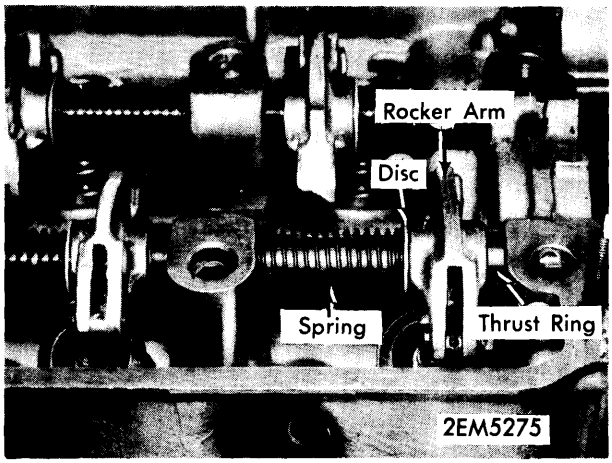
ROCKER ARM ASSEMBLY

1) Remove camshaft. See *Camshaft Removal*. Push rocker arms and thrust rings against springs and remove circlips from front rocker arm shafts.

2) Remove two countersunk rocker arm shaft locking bolts next to number one bearing bore of camshaft. Install a suitable removing tool (No. 7004) in shaft and pull out of cylinder head. Remove rocker arms, thrust rings, springs and discs.



ROCKER ARM ASSEMBLY COMPONENTS

3) Check rocker arm shaft for wear. If diameter is less than .6087", replace rocker arm shaft. Check cam follower on rocker arms. If loose, replace rocker arm.

4) Install spring, disc, rocker arm and thrust ring. Install rocker arm shafts and adjust so that recesses in shafts are aligned with cylinder head bolt holes in cylinder head.

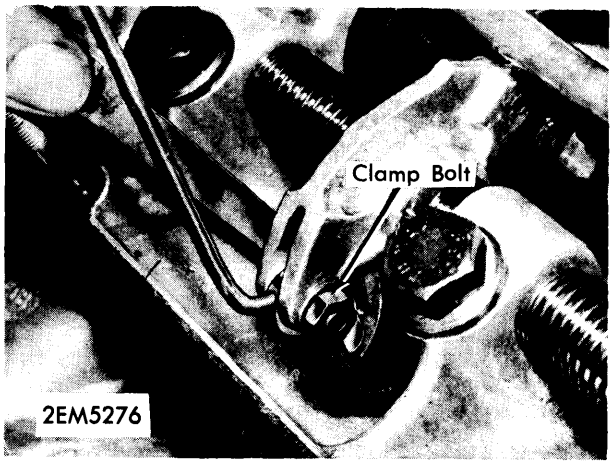
5) To disassemble rear rocker arm assemblies, remove rear cover on cylinder head. Use same procedure for rear shafts as used for front. Install self sealing discs on bolts for rear cover plate and use Cabritol sealer on plate gasket.

VALVE CLEARANCE ADJUSTMENT

Remove valve cover and rotate engine until piston of valves being adjusted is at TDC of compression stroke. Loosen nut on rocker arm and rotate adjustment cam until correct clearance is obtained.

Valve Clearance Adjustment

Valve	Clearance
All	
(Hot)	.012-.014" (.30-.35 mm)
(Cold)	.010-.012" (.25-.30 mm)



VALVE CLEARANCE ADJUSTMENT

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)
1969-73	.0016 (.04)	.00004-.0002 (.001-.005)	.0002-.0005① (.005-.013) .0003-.0006② (.008-.016)	No.1	.0118-.0177 (.30-.45)	.0006-.0011 (.015-.029)
				No.2	.0118-.0177 (.30-.45)	.0005-.0009 (.012-.022)
				Oil	.0098-.0157 (.25-.40)	.0004-.0010 (.011-.025)

① — White color code.

② — Black color code.

OIL PAN REMOVAL

1) Remove protective cover from under engine, drain oil and remove front suspension stabilizer. Loosen alternator and remove belt.

2) Remove power steering pump (if equipped) from bracket but do not disconnect hoses. Remove bolt securing power steering pump bracket to side of oil pan.

3) Loosen power steering bracket until oil pan bolts can be reached. Detach support bracket above slave cylinder from crankcase. Rotate crankshaft until number six connecting rod is above oil pan mating surface of crankcase.

4) Remove oil pan retaining bolts, lower front of oil pan, turn rear of pan towards support bracket and remove oil pan. To install, reverse removal procedure. Clean mating surfaces and apply Atmosit Sealer to junctions of crankcase and timing cover, and flywheel end cover.

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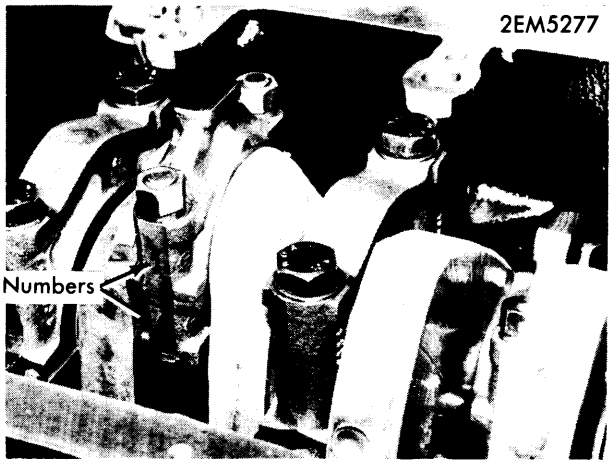
PISTON & ROD ASSEMBLY

1) With cylinder head and oil pan removed, remove connecting rod cap. Push piston and rod assembly up and out through top of engine.

2) To install, insert bearing halves in rod and rod cap. Position rings so that ring gaps are approximately 180° apart from each other.

3) Compress piston rings and install piston in cylinder with arrow toward front of engine. Push piston into cylinder and make sure bearings are properly seated against crankshaft journal.

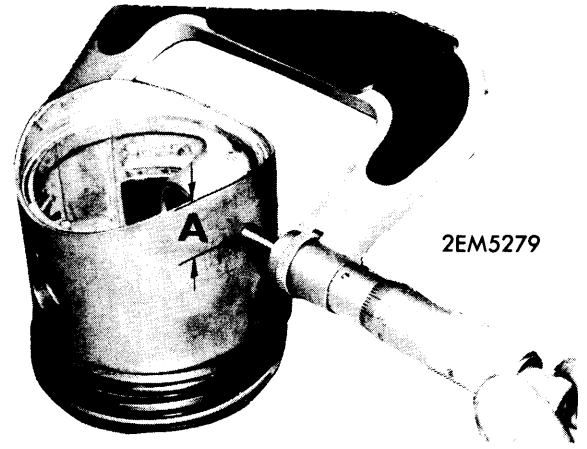
4) Match numbers on rod and rod cap and install on same side. Tighten nuts to specifications.



CONNECTING ROD CAP INSTALLATION

FITTING PISTONS

1) With piston removed and disassembled from connecting rod, measure diameter of piston. Measure with micrometer positioned at correct distance down from bottom of skirt on piston (see illustration). Distance **A** is different, depending on manufacturer.



PISTON DIAMETER MEASUREMENT

Piston Measuring Distance

Application	2500 cc Engine In. (mm)	2800 cc Engine In. (mm)
Mahle Pistons	.81 (20.5)	.58 (14.7)
KS Pistons	1.03 (26.25)	.95 (24.05)

2) Measure inside diameter of bore in crankcase. If clearance exceeds specification, crankcase bore must be bored for next oversize piston. Pistons are available in .010" and .020" oversize.

3) Check piston ring side clearnace and end gap. If new rings are installed, install with word "TOP" stamped in ring toward top of piston.

PISTON PIN REPLACEMENT

1) With piston and rod assembly removed, remove circlips from piston pin hole in piston. Drive out piston pin and separate piston from connecting rod. Thoroughly clean and inspect rod and piston.

2) Piston pins are manufactured in two classes. Pin class is designated by color code on pin or a letter stamped in pin. A corresponding letter is stamped in piston. Pin-to-piston clearance is same for each class of pin, but pin-to-rod clearance varies depending on class of pin. *See Specifications.*

Piston Pin Class Designation

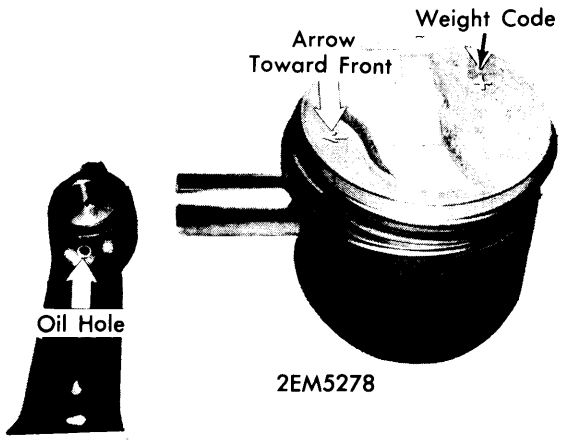
Application	Pin Diameter
White, or "W"	.8660-.8661" (21.997-22.000 mm)
Black, or "S"	.8659-.8660" (21.994-21.997 mm)

3) Classes of pins and pistons must not be interchanged. If piston or pin is replaced, it must be replaced with one of a corresponding class and weight. Weight classification is designated by a "+" or a "-" stamped in top of piston.

4) Check pin-to-piston clearance, if clearance exceeds that specified and pin is not worn, replace piston. Check pin-to-rod clearance, if clearance exceeds that specified, depending on pin class, new bushing must be installed.

5) Press out old bushing and install new one with split in bushing rotated 90° from oil hole in connecting rod. Drill through oil hole in connecting rod. Ream bushing to specified clearance with piston pin.

6) If connecting rod is replaced, replace with rod which is within 4 grams of rod being replaced. Position piston on connecting rod with arrow on piston facing in same direction as oil hole in connecting rod. Lubricate and install piston pin and circlips.



PISTON & CONNECTING ROD ASSEMBLY & MARKINGS

1969-73 BMW 2500, 2800, 3.0 & BAVARIA 6 CYLINDER (Cont.)

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

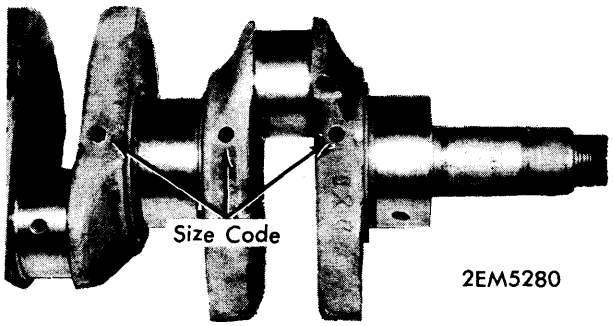
Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam. In. (mm)	Clearance In. (mm)	Thrust Bearing	Crankshaft End Play In. (mm)	Journal Diam. In. (mm)	Clearance In. (mm)	Side Play In. (mm)
1969-73							
Red Code	2.3614-2.3618 (59.98-59.99)	.0012-.0028 (.030-.070)	No.4	.0033-.0069 (.085-.174)	1.8890-1.8894 (47.98-47.99)	.0013-.0027 (.033-.069)	.....
Blue Code	2.3610-2.3614 (59.97-59.98)	.0012-.0027 (.030-.068)					

MAIN & CONNECTING ROD BEARING SERVICE

1) With engine removed, remove clutch, flywheel, cylinder head, oil pan and timing chain. See *Timing Chain Replacement*. Remove rear main bearing oil seal mount.

2) Remove pistons and connecting rods. Remove main bearing caps and lift out crankshaft. Thoroughly clean and inspect crankshaft. Blow out oil passages with compressed air.

3) Main bearings journals are manufactured in two standard sizes. Sizes are designated by a colored dot on crankshaft balance weight next to individual journal (see illustration). Color code designation is given is specifications.



CRANKSHAFT MARKINGS

4) Check main and connecting rod bearing clearance with the Plastigage method. If bearing clearance is more than specified, crankshaft must be ground to next undersize. Bearings for undersize crankshafts are available in .010" (.25 mm) and .020" (.50 mm) undersize.

5) Install bearing halves in crankcase and bearing caps. Lubricate crankshaft bearing journals and install crankshaft in crankcase.

6) Install bearing caps with numbers on caps running from one through six in order from front to rear. Install caps with bearing locks on same side as bearing locks in crankcase.

7) Tighten caps to specifications. Check crankshaft endplay. See *Thrust Bearing Alignment*. To install remaining components, reverse removal procedure.

THRUST BEARING ALIGNMENT

1) With flywheel installed, check crankshaft end play. If end play exceeds .0069" (.174 mm), an oversize thrust bearing must be installed.

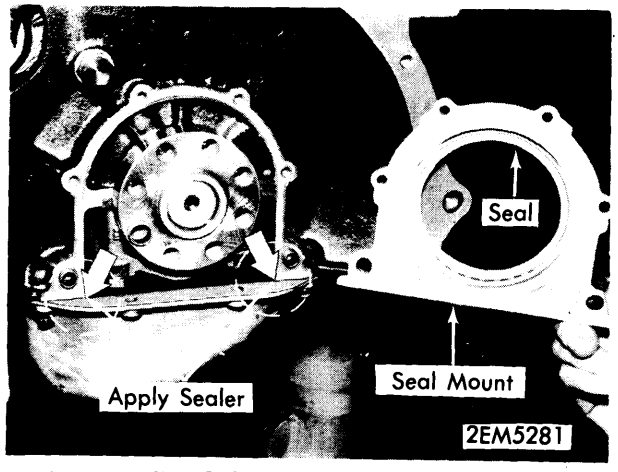
2) Standard thrust bearing width is 1.1820-1.1836". Thrust bearings are available with widths 1.1900-1.1915" and 1.1980- 1.1996" oversize.

REAR MAIN BEARING OIL SEAL REPLACEMENT

NOTE – To replace rear main bearing oil seal in vehicle, transmission must be removed.

1) Remove clutch and flywheel and drain engine oil. Remove bolts securing oil pan to rear main bearing oil seal mount.

2) Loosen all oil pan bolts and carefully loosen oil pan gasket around seal mount, taking care not to damage gasket. Remove bolts securing seal mount to crankcase and remove mount.



REAR MAIN BEARING OIL SEAL INSTALLATION

3) Pry out old seal and install new one making sure it is fully seated in mount. Apply Atmosit sealer to junction of oil pan and seal mount. To install mount, reverse removal procedure.

ENGINE FRONT COVER AND OIL SEAL

Upper Front Engine Cover – 1) Remove distributor cap and valve cover. Remove thermostat housing and thermostat. Rotate crankshaft until number one cylinder is at TDC of compression stroke. Distributor rotor should point to notch in distributor.

2) Remove timing cover bolts, push rotor in clockwise direction and remove cover with distributor drive. Pull distributor drive out of front cover.

3) To install, thoroughly clean mating surfaces and use new gasket with sealer. Install distributor drive in camshaft. Rotate rotor counter clockwise approximately 1.38" from notch in distributor and install cover.

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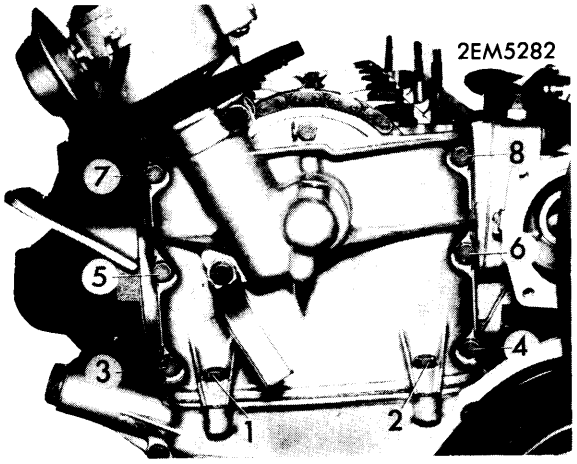
4) Lightly tighten bolts one and two (see illustration), then tighten remaining bolts to specification in sequence shown in illustration. Tighten bolts one and two to specification. To install remaining components, reverse removal procedure.



UPPER FRONT ENGINE COVER TIGHTENING SEQUENCE

Lower Front Engine Cover – 1) Remove upper front engine cover as previously outlined. Remove timing chain tensioner piston, fan clutch and crankshaft pulley. Remove lower front engine cover.

2) Replace oil seal. To install cover, reverse removal procedure. Thoroughly clean mating surfaces and use new gasket with sealer. Tighten bolts to specification.

NOTE – Oil seal can be replaced without removing lower front engine cover.

3) Remove protective cover from under engine. Remove alternator drive belt. Place a piece of cardboard in front of crankshaft pulley, against radiator.

4) Remove crankshaft pulley nut and remove pulley. Pry out old seal and install new one. If sealing portion of pulley has a groove worn in it, install seal so that sealing edge does not run in groove.

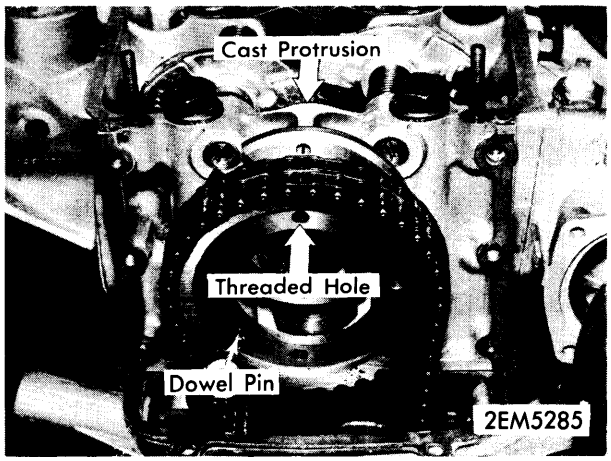
CAMSHAFT

Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
1969-73 Journal No. 1	1.3764-1.3772 (34.96-34.98) 1.7307-1.7315 (43.96-43.98) 1.7701-1.7710 (44.96-44.98) 1.8014-1.8102 (45.96-45.98)	.0013-.0030 (.034-.075)	.2696 ① (6.847) .2802 (7.116)

① – 2500 Engine only.

TIMING CHAIN REPLACEMENT

1) Rotate crankshaft until number one cylinder is at TDC of compression stroke. Rotor should point to notch in distributor. Remove front engine covers as previously outlined. Mark front side of timing chain for installation.



TIMING CHAIN INSTALLATION

2) Bend over lock tabs and remove camshaft sprocket with timing chain. Timing chain is pre-stretched and significant wear should not be apparent before 30,000 miles. Replace sprockets if worn or damaged.

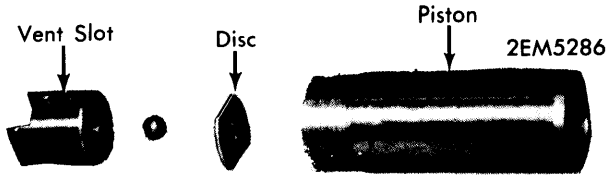
3) To replace crankshaft sprocket, remove oil pan, oil pump sprocket and chain. Remove Woodruff key and "O" ring and pull off crankshaft sprocket with a suitable puller (No. 7006). To install, reverse removal procedure. Adjust oil pump chain tension. *See Oil Pump Removal.*

4) To install timing chain, reverse removal procedure, making sure number one cylinder is at TDC of compression stroke. Line up tapped hole in sprocket hub with cast protrusion in cylinder head and install timing chain and sprocket.

TIMING CHAIN TENSIONER REMOVAL

1) Remove tensioner plug, spring and piston. Check length of spring and piston assembly. Length of spring should be 6.122". Piston assembly length should be 2.260 ± .004".

2) Check piston with compressed air to see if air vent slots (see illustration) are plugged. Clean slots if air does not pass through. When assembling piston, do not block air vents with disc.



TIMING CHAIN TENSIONER PISTON COMPONENTS

3) Remove valve cover to vent air from piston, install piston, spring with conical end toward plug and slightly tighten plug. Fill oil well with engine oil. Move tensioning rail back and forth until oil comes out at plug. Tighten plug and reverse removal procedure to install remaining components.

CAMSHAFT REMOVAL

1) Remove cylinder head as previously outlined. Remove fuel pump and fuel pump push rod. Remove oil distribution pipe. With camshaft still positioned at TDC for number one cylinder, open intake valve clearance on number two and four cylinders.

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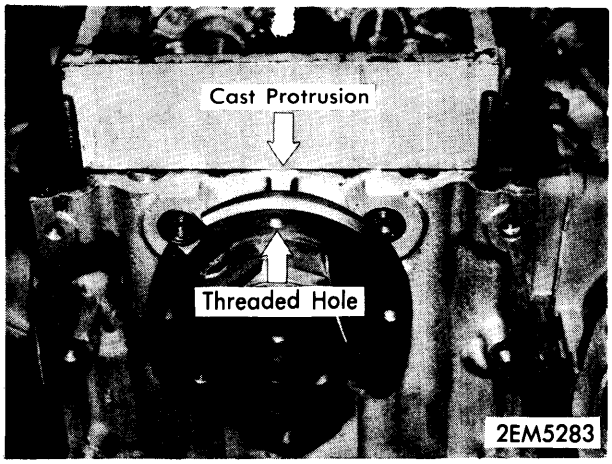
2) Attach a suitable pressure frame (No. 7003) to cylinder head to open all valves. Remove bolts securing camshaft thrust plate to cylinder head and carefully withdraw camshaft.

3) Install camshaft in cylinder head and tighten down thrust plate. Set cylinder six to overlap and release pressure plate. The tapped hole in sprocket flange must align with cast protrusion in cylinder head (see illustration). Check camshaft endplay.



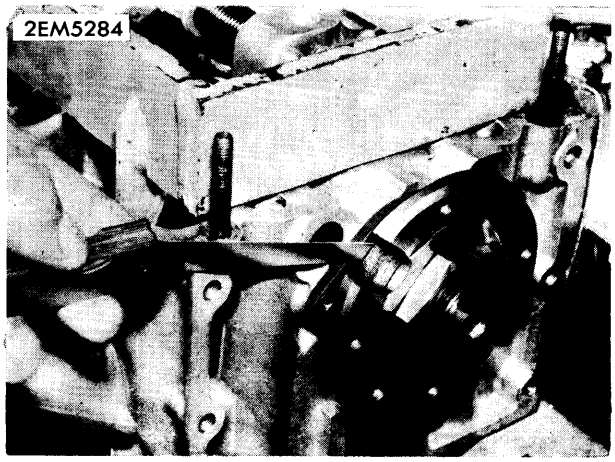
CAMSHAFT INSTALLATION

4) Install oil pipe, making sure seals are installed above and below pipe at points where it is bolted to head. Front portion of pipe must measure 6.476-6.517" (164.5-165.5 mm) from middle of oil hole to front of pipe. Rear portion of pipe must measure 6.083-6.122" (154.5-155.5 mm). If pipe is not positioned correctly, camshaft will not be properly lubricated.

5) To install remaining components, reverse removal procedure.

CAMSHAFT END PLAY

Check camshaft end play with a feeler gauge. If end play exceeds .001-.007" (.03-.18 mm), replace camshaft thrust plate.



CHECKING CAMSHAFT END PLAY

VALVE TIMING

Engine	INTAKE Open (BTDC)	INTAKE Close (ABDC)	EXHAUST Open (BBDC)	EXHAUST Close (ATDC)
2500 ①	6°	50°	50°	6°
2500 ②	18°	62°	62°	18°
2800 & 3.0 ①	14°	54°	54°	14°
2800 & 3.0 ②	26°	66°	66°	26°

① – With .02" (0.5 mm) clearance between heel of camshaft and rocker pad.

② – With .015" (0.37 mm) clearance between heel of camshaft and rocker pad.

ENGINE OILING

Crankcase Capacity – 5.3 qts. (5 ltr). With oil filter add .8 qts. (.75 ltr).

Oil Filter – Full flow, paper element type filter.

Normal Oil Pressure – 26-29 psi (1.86-2.07 kg/sq cm) at normal idle. 74 psi (5.17 kg/sq cm) at maximum engine speed.

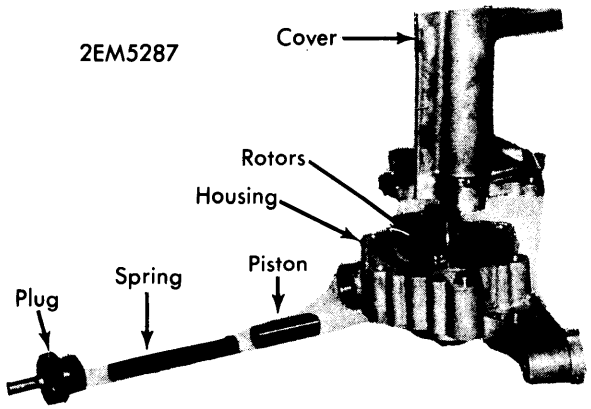
Pressure Regulator Valve – Mounted in oil pump. *See Oil Pump Overhaul.*

ENGINE OILING SYSTEM

Full pressure oil system, utilizing a chain driven Eaton rotor type oil pump, a full flow oil filter and a pressure regulator valve.

OIL PUMP REMOVAL

1) Remove oil pan, front engine covers and timing chain as previously outlined. Remove oil pump drive sprocket and chain. Remove oil pump.

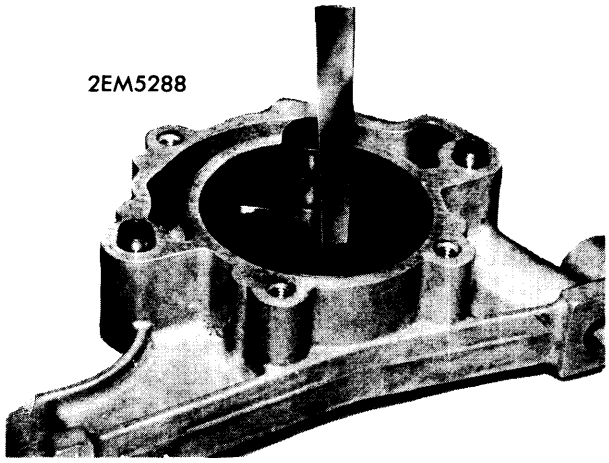


OIL PUMP COMPONENTS

1969-73 BMW 2500, 2800, 3.0 & BAVARIA 6 CYLINDER (Cont.)

ENGINE OILING (Cont.)

2) Remove pressure regulator plug, spring and piston. Remove pump cover and thoroughly clean and inspect all components. Check clearance between inner and outer rotors. If clearance exceeds maximum specified, replace rotors.



CHECKING ROTOR CLEARANCE

3) Check clearance between outer rotor and pump body and clearance between rotor sealing face and mating surface of pump body and pump cover. If either clearance exceeds maximum specified, replace pump body.

4) To remove sprocket flange, pull off with a puller. Install flange so that distance between sprocket side of flange and sealing side of inner rotor is 1.744 ± .004".

5) Check free length of regulator spring, if less than specified, replace spring. To assemble pump, reverse removal procedure. Attach oil pump to crankcase and install sprocket and chain. Chain should slightly depress when pushed in with thumb.

6) If chain depresses more than recommended, remove pump and install shims between pump and crankcase mounting points. Make sure oil holes line up on front shim. Rear shim must be same thickness as front. To install remaining components, reverse removal procedure.

Oil Pump Specifications

Application	Measurement
Rotor-to-Rotor Clearance	.0047-.0118" (.120-.300 mm)
Rotor-to-Housing Clearance	.0029-.0049" (.075-.125 mm)
Sealing Face-to-Housing Clearance	.0020-.0036" (.050-.091 mm)
Regulator Spring Free Length	2.68" (68 mm)

ENGINE COOLING

Thermostat – Starts opening at 183°F.

Cooling System Capacity – 12.7 qts.

WATER PUMP

Remove clutch fan, pulley, side bar and connecting hose. Remove water pump. To install, reverse removal procedure. Use new gaskets and sealer.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Cylinder Head Bolts (Hot)	
First Stage	25-32 (3.5-4.5)
Second Stage	43-47 (6.0-6.5)
Third Stage	53-55 (7.3-7.7)
Main Bearing Bolts	42-46 (5.8-6.3)
Rod Cap Nuts	38-41 (5.2-11.5)
Camshaft Thrust Plate	101-108 (14-15)
Upper Front Engine Cover	7-8 (.9-1.1)
Lower Front Engine Cover	7-8 (.9-1.1)
Oil Pan Bolts	7-8 (.9-1.1)
Timing Chain Tension Plug	22-29 (3-4)
Rocker Arm Clamp Bolt	7-8 (.9-1.1)
Flywheel Bolts①	72-84 (10-11.5)
Crankshaft Pulley Nut	
Flat Nut	173-188 (24-26)
Shoulder Nut	318-333 (44-46)
Regulator Valve Plug in Oil Pump	18-22 (2.5-3.0)
Camshaft Oil Pipe Hollow Bolt	8-10 (1.1-1.3)

① – Install with Loctite red code No. 41 and activiator 1.