1964-72 MERCEDES-BENZ 6.3 LITER V8

GENERAL SPECIFICATIONS										
Year	Displ.		Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke	
	Cu. ins.	cc					in.	mm	in.	mm
1964-72 600 (100)	386.3	6332	Fuel Inj.	300@4100	434@3000	9.0-1	4.05	103	3.74	95
1968-71 300SEL/8 6.3	386.3	6332	Fuel Inj.	300@4100	434@3000	9.0-1	4.05	103	3.74	95

ENGINE IDENTIFICATION

First six digits of engine identification number, located on tag on engine crankcase, identify engine as follows:

Model	Code
300 SEL/8 6.3	100.981
600 (100)	100.980

ENGINE REMOVAL

Removal – 1) Remove hood, using felt pads at rear corners to prevent paint damage. Disconnect battery ground cable and engine harness connector at firewall. Remove spark plug leads and both ignition cable conduits.

2) Remove fan and fan guard. Disconnect heater hoses, water hoses and automatic transmission oil cooler lines. Install dummy plugs in automatic transmission oil lines. Drain radiator and engine at left and right sides.

3) Drain power steering reservoir and finger-tip hydraulic system (600). Disconnect all fuel, oil, air and vacuum lines. Seal off unions with dummy plugs. Disconnect oil pressure line at left cylinder head. Remove air conditioning compressor and set aside.

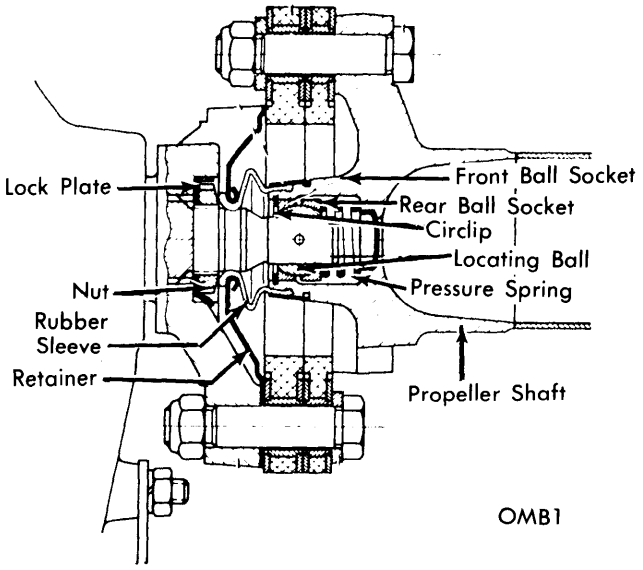
CAUTION – Air conditioning lines are pressurized, DO NOT disconnect.

4) Remove relay with bracket at front panel and solenoid switches at both intake manifolds. Disconnect thermometer, accelerator linkage, upper section of air cleaner. On 300 SEL/8, remove regulating linkage by pushing in direction of front panel.

5) On 600, remove front axle torsion bar. Disconnect alternator cables and starter ground strap. Remove exhaust pipes at manifolds. On 300 SEL/8, disconnect hand brake cable assembly. Loosen shift rod, speedometer shaft, kick-down, starter lock and back-up light switch on transmission.

6) Remove left and right front engine mounting bolts. It is necessary to remove oil filter base to gain access to left-hand bolt. Support engine by means of a six foot lifting cable threaded through space in left exhaust manifold between cylinders five and six, under oil pan and through space in right manifold between cylinders three and four.

7) Remove engine mounting bolt and engine carrier, marking position for reassembly. Release propeller shaft intermediate bearing. Disconnect universal joint at transmission flange and push rearward (see illustration). Use care not to damage rubber sleeve between crankshaft flange and universal joint.



UNIVERSAL JOINT

8) Lift engine and transmission into a tilted position of 45°. Lift engine out and place on a suitable work stand.

Installation – To install reverse removal procedures. Fill cooling system, hydraulic system reservoirs and engine. Start engine and check for leaks.

CYLINDER HEAD REMOVAL

Removal – 1) Drain coolant from radiator and crankcase. Disconnect spark plug cables and set aside. Disconnect electrical leads from coil, distributor, ballast resistor and idle throttle switch on venturi control unit.

2) Remove coil and mounting bracket from camshaft cover. Pull crankcase breather line from camshaft cover. Loosen cylinder head crankcase breather line and venturi control unit. Unscrew vacuum line on venturi control unit.

3) Disconnect injection lines on cylinder head and injection pump and cover connections. Remove right-hand longitudinal regulating shaft and bearing bracket, together with engine regulating shaft.

4) Disconnect venturi control unit heater, water inlet and return pipes. Remove intake scoop between intake manifold and air cleaner. Remove fuel line, air line and electrical connection on starting valves. Disconnect air line between air cleaner and injection pump. Remove the three rubber coupling hoses between intake manifolds.

1964-72 MERCEDES-BENZ 6.3 LITER V8 (Cont.)

5) Remove water return pipe mounting bracket on left-hand intake manifold stud. Loosen drive belt and unscrew carrier and air conditioning compressor on cylinder head.

NOTE – Do not disconnect lines on air conditioning compressor.

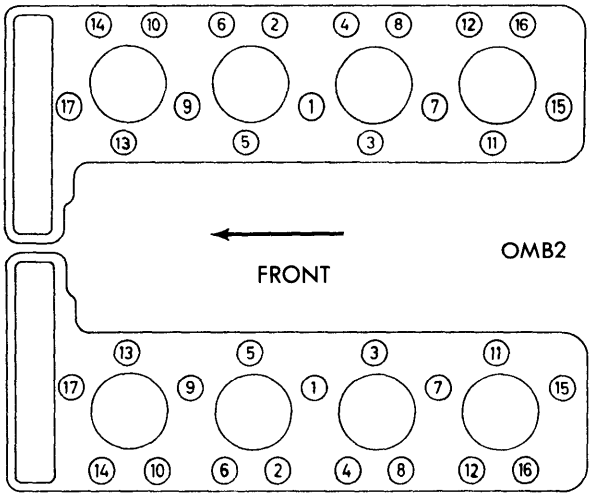
6) Loosen drive belt and remove mounting bracket, air compressor and high pressure oil pump. Drain power steering reservoir. Disconnect oil pressure line, intake and compressed air line on air compressor and high pressure expanding and return hose on high pressure oil pump.

7) Remove master cylinder so rear outside cylinder head bolt can be removed. Disconnect thermometer, lead from thermo-time switch and thermometer switch. Disconnect oil pressure gauge line at union.

8) Disconnect water inlet pipe. Remove engine damper. Disconnect exhaust manifold and remove camshaft cover. Remove mounting bracket for camshaft cover. Rotate engine to TDC mark, turning engine clockwise only.

9) Remove camshaft chain tensioner. Mark camshaft sprockets and chain for reassembly. Remove camshaft sprockets. Remove cylinder head bolts and bottom row of camshaft bearing attaching bolts, which also act as cylinder head bolts. Lift off cylinder head and gasket.

Installation – Position head gasket and install cylinder head over two locating sleeves. Tighten cylinder head bolts to specifications (see illustration). Check valve clearance and reverse removal procedures for remaining components.



CYLINDER HEAD TIGHTENING SEQUENCE

VALVES							
Engine & Valve	Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	Stem Clearance	Valve Lift
1964-72							
Int.	1.925-1.929"	45°	45°+	.059-.078"	.3522-.3531"	.002"	-----
Exh.	1.649-1.657"	45°	45°+	.059-.078"	.4697-.4704"	.003"	-----

VALVE ARRANGEMENT

Right Side I-E-I-E-I-E-I-E (front to rear).
Left Side E-I-E-I-E-I-E-I (front to rear).

VALVE GUIDE SERVICING

1) Clean valve guide and remove all hard carbon. Using suitable go and no-go plug gauges, (636 589 00 21 00) intake and (186 589 00 21 00) exhaust, check valve guide clearance.

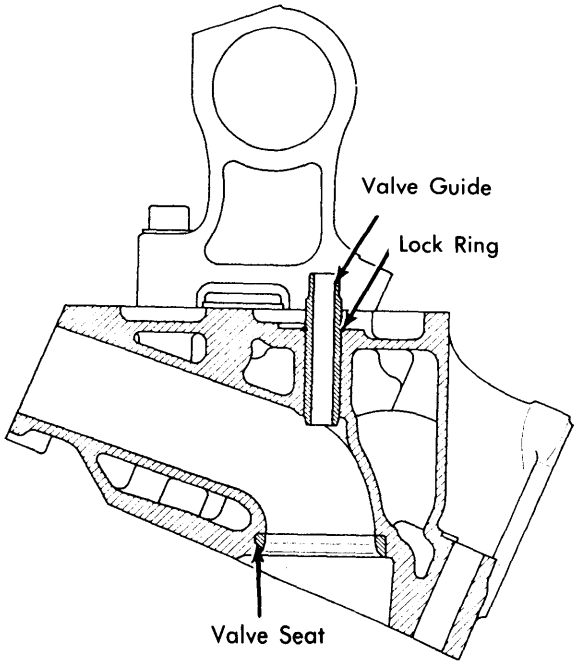
2) Drift out old guide using suitable drift, (136 589 00 39 00) intake and fabricated exhaust guide drift. Check bore in cylinder head and ream to oversize if necessary.

3) Heat cylinder head to 176-194°F in water and chill valve guide. Coat guide bore in head with tallow. Drive valve guide in until lock ring is seated against cylinder head (see illustration). Allow cylinder head to cool and check guide fit in head.

Replacement Valve Guides (In.)

Application①	Intake O.D.	Exhaust O.D.
Std. Green	.5516-.5520	.6301-.6305
Std. Brown	.5520-.5523	.6305-.6309
Interm. Grey/Green	.5523-.5527	.6309-.6312
Interm. Grey/Brown	.5527-.5530	.6312-.6315
1st. O.S. Red	.5595-.5602	.6380-.6387
2nd. O.S. White	.5674-.5681	.6459-.6466

① – Guides have an interference fit of .0005" (intake) and .0003" (exhaust) in cylinder head.

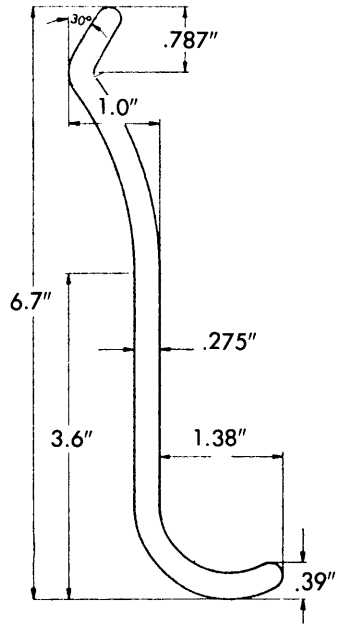


VALVE GUIDE INSTALLATION

1964-72 MERCEDES-BENZ 6.3 LITER V8 (Cont.)

VALVE STEM OIL SEALS

Removal – 1) Remove camshaft cover. Remove rocker arm. See *Rocker Arm Assembly*. Remove spark plug and insert valve retaining lever (see illustration) or rotate engine until both valves are closed and supply compressed air to spark plug hole to hold valves closed, preventing valves from falling into cylinder.



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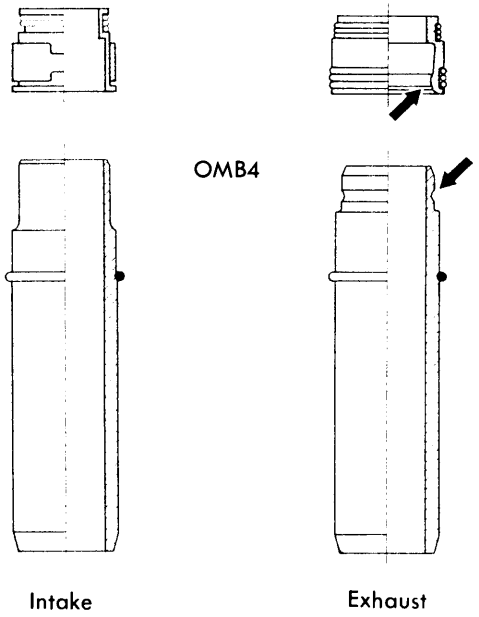
VALVE RETAINING LEVER

2) Compress valve springs, using suitable tool (112 589 08 61 00). Remove valve keepers, collar, springs and valve stem oil seal.



VALVE STEM OIL SEALS

Installation – 1) Slide a suitable plastic sleeve (589 00 93) over valve stem. Shorten plastic sleeve .040" for intake stem. Install valve stem oil seal. On intake guide, position coil spring at top and clamping strap at bottom. On exhaust, place installation bead on bottom next to valve guide (see illustration).

2) Install springs, collars and keepers, using suitable spring compressor. Install rocker arm and check tappet clearance. Replace camshaft cover and tighten attaching nuts.

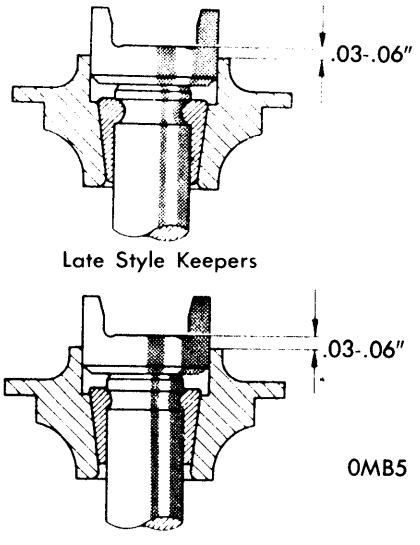
VALVE SPRINGS

Engine	Free Length	PRESSURE (LBS.) Valve Closed	PRESSURE (LBS.) Valve Open
600 (100)	2.08"	68.34@1.75"	190.0@1.39"
300SEL/8 6.3	2.20"	93.25@1.15"	150.3@1.39"

VALVE SPRING REMOVAL

1) With head and rocker arms removed, compress valve springs with suitable tool (112 589 08 61 00). Remove valve keepers, collar and springs. While work on valve springs is being done, an inspection of valve keepers should be carried out on 600 models.

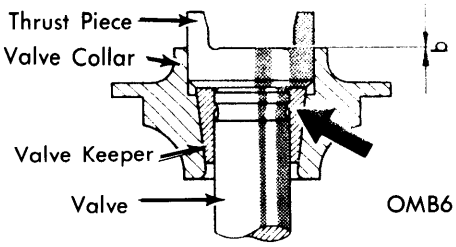
2) Inspect valve keepers of 600 models prior to chassis end number 000 838 for possible shearing. After chassis number 000 838 keepers with larger lugs were installed (see illustration).



VALVE KEEPER IDENTIFICATION

1964-72 MERCEDES-BENZ 6.3 LITER V8 (Cont.)

3) Measure distance between thrust piece and top of valve retaining collar. It should be .03-.06". If it is at or near zero, valve keepers are shearing and must be replaced (see illustration).



SHEARED VALVE KEEPERS

4) If sheared valve keepers are discovered, they should be updated to late style keepers, valves and thrust pieces. To determine if modification has already been done, check valve stem part number. Late style part numbers are 100 053 04 01 (intake) and 100 053 04 05 (exhaust). To install, reverse removal procedures.

ROCKER ARM ASSEMBLY

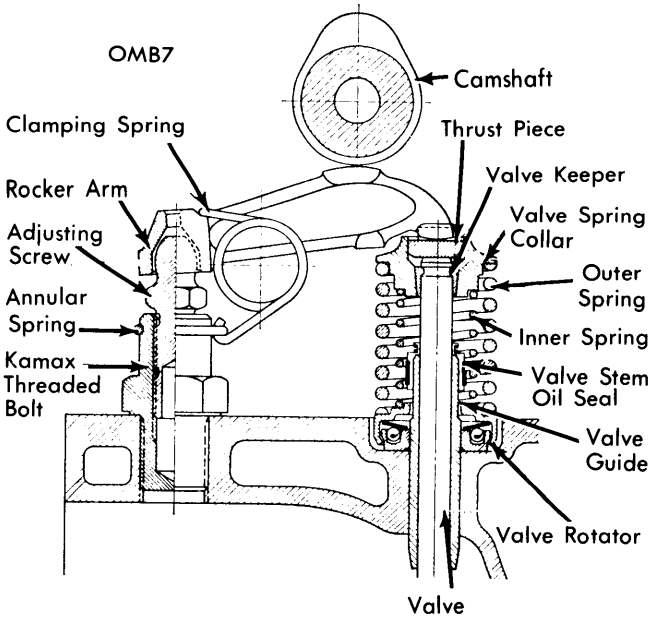
Removal – 1) Remove battery and camshaft cover. Rotate camshaft until base circle is next to rocker arm. Lift spring clamp out of groove and remove it from rocker arm.

NOTE – Do not rotate camshaft by sprocket nut, use crankshaft only.

2) Using suitable tool (112 589 08 61 00) between camshaft and valve spring collar, lever valve downward until rocker arm can be lifted off of ball pin.

Installation – 1) Position suitable tool (112 589 08 61 00) between camshaft and valve spring. Lever valve downward and place rocker arm in position engaging ball pin.

2) Install spring clamp on rocker arm and press it into its groove. Check tappet and adjust tappet clearance if necessary. Replace camshaft cover and battery.



VALVE TRAIN ASSEMBLY

VALVE CLEARANCE ADJUSTMENT

With engine cold, adjust valve clearance by turning adjusting screw until clearance between cam base circle and rocker arms meets specifications (see illustration).

NOTE – Do not rotate engine by camshaft sprocket nut. Use crankshaft to turn engine.

Valve Clearance (In.)

Intake	Exhaust
.004"①	.010"

① – Adjust to .005" if amvient temperature is below -13°F.

PISTONS, PINS, RINGS

Engine	PISTONS	PINS		RINGS		
	Clearance	Piston Fit	Rod Fit	①Rings	End Gap	Side Clearance
All Models	.001"	-.0004 to +.0004"	.0003-.0007"	No. 1	.021-.027"	.002-.003"
				No. 2	.018-.023"	.001-.003"
				No. 3	.011-.018"	.001-.003"
				Oil	.011-.018"	.002-.003"

① – Ring gap is .006-.008" less with molybdenum filled rings.

OIL PAN REMOVAL

1) Drain engine oil. Disconnect and plug transmission oil cooler lines. Place air suspension system in center position. Loosen front torsion bar and remove oil filter.

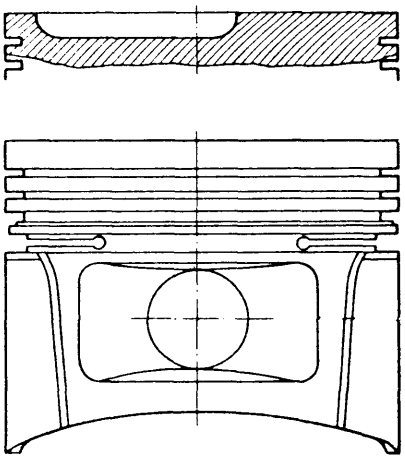
2) Loosen guide tube for oil dipstick and remove. Disconnect transmission oil line clamps. Remove oil pan bolts and place oil pan on axle carrier. Remove sprocket and chain from oil pump. Disconnect oil pump and place in oil pan.

3) Pull out oil pan with oil pump at an angle in forward direction, while pulling downward on torsion bar. To install, reverse removal procedures. Use sealing compound on oil pan.

FITTING PISTONS

Measure pistons and cylinder diameters to determine if pistons or cylinders are worn. Pistons are available in two standard and three oversizes. From engine .006336 (300 SEL/8) and 002135 (600) a new crankshaft with larger counterweights at three and four positions requires pistons with small cut-aways on the sides (see illustration). New style pistons may be installed in early engines, but early style pistons can not be installed in late engines.

1964-72 MERCEDES-BENZ 6.3 LITER V8 (Cont.)



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LATE STYLE PISTON

Replacement Pistons (In.)

Application	①Piston Dia.
Standard	4.054-4.055
Intermediate	4.064-4.065
1st. O.S.	4.074-4.075
2nd. O.S.	4.093-4.094
3rd O.S.	4.113-4.114

① – Weight difference of pistons is four grams maximum.

CONNECTING ROD ASSEMBLY

From 1968 onward, connecting rod bolts are stretch bolts. Measure smallest diameter of stretch bolt with a pair of sharp edge calipers. Replace bolt if a minimum diameter of .334" has been reached. Install connecting rod cap and torque to 36 ft. lbs. Further tighten an additional 100° of wrench rotation. Use a stiff handle wrench for final tightening.

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

	MAIN BEARINGS				CONNECTING ROD BEARINGS		
Engine	Journal Diam.	Clearance	Thrust Bearing	Crankshaft Endplay	Journal Diam.	Clearance	Sideplay
All Models	2.7541-2.7545"	.0017-.0025"	Center	.004-.009"	2.1629-2.1637"	.0017-.0025"	.008-.014"

MAIN BEARING SERVICE

Inspect main and connecting rod journals for wear or damage. Maximum wear limit is .00078". Regrind crankshaft and install new undersize bearings if necessary.

Crankshaft Journal Diameters (In.)

Application	Main Bearing	Rod Bearing
Std.	2.7541-2.7545	2.1629-2.1637
1st. U.S.	2.7442-2.7446	2.1531-2.1539
2nd. U.S.	2.7344-2.7348	2.1433-2.1440
3rd. U.S.	2.7246-2.7249	2.1334-2.1342
4th. U.S.	2.7147-2.7151	2.1236-2.1244

REAR MAIN BEARING OIL SEAL SERVICE

Removal – 1) Remove engine and transmission. See *Engine Removal*. Drain engine oil. Separate automatic transmission and clutch from engine. Loosen and remove all drive belts. Remove ignition coil and mount on left-hand camshaft cover. Remove chain tensioner and tube for oil dipstick. Remove both camshaft covers. Mark sprockets and chain and remove camshaft sprockets.

2) Turn engine over and remove drive plate, intermediate flange and oil pan. Mark crankshaft sprocket and chain for reassembly. Remove oil pump and oil pump sprocket. Loosen clamping lever on alternator. Remove nut on crankshaft and pull off pulley and vibration damper with suitable puller (100 587 07 33 00) after removing two bolts in vibration damper.

3) Remove front crankcase seal holder. Remove main and connecting rod bearing caps. Mark caps for proper reassembly. Remove rear bearing seal holder by prying out of crankcase with a suitable lever.

4) Remove locating pins. Pull double roller chain upward and lift crankshaft. Remove old seal ring and clean all parts.

Installation – 1) Insert rubber strip in seal groove and press down until cone tips protrude through rubber. Press fiber seal down firmly on cone tips with a hammer handle.

2) Cut seal so ends protrude .059-.070" above parting surface on crankcase and rear bearing seal holder. Clean and lightly coat crankshaft bearing journals with oil. Install crankshaft and tighten main bearings from inside out.

3) Place locating pins in grooves in seal holder. Coat bottom parting surfaces with sealing compound. Inspect seal holder in crankcase and tighten. Lightly tap sealing pins to ensure they are fully seated.

4) Check seat of seal, rotate crankshaft to see if seal is too tight on crankshaft or produces pressure marks. To install remaining components, reverse removal procedures.

ENGINE FRONT COVER & OIL SEAL

Removal – 1) Remove crankshaft pulley and vibration damper. Remove Allen bolts from seal holder and withdraw seal holder.

2) Remove lock washers on both threaded studs and remove side rail from studs. Support seal holder and drive out seal with suitable tool.

Installation – 1) Heat seal holder and place on suitable support. Press seal in cover. Install side rail over threaded bolts and install lock washers. Fill groove between seal lips with hot bearing grease.

2) Coat edges of front cover with sealing compound. Using a wire hook, pull side rail outward from seal. Place cover in position on crankcase and remove hook. Install Allen screws and tighten to specifications.

1964-72 MERCEDES-BENZ 6.3 LITER V8 (Cont.)

CAMSHAFT			
Engine	Journal Diam.	Clearance ①	Lobe Lift
All Models			
No. 1	1.3763-1.3769"	.002-.005"	-----
No. 2 & 3	1.8881-1.8887"	-----	-----
No. 4 & 5	1.9275-1.9281"	-----	-----

① – End play is .003-.009".

CAMSHAFT REMOVAL

Removal – 1) Remove battery and spark plugs. Drain cooling system. Remove ignition coil and disconnect lines from brake assembly. Loosen venting line and remove cover from power steering reservoir. Use care to prevent dirt from falling into reservoir. Remove camshaft covers.

2) Remove oil pipes for camshaft lubrication and camshaft cover mounting brackets. Remove rocker arms and set aside in proper order for assembly to original locations. See *Rocker Arm Assembly*.

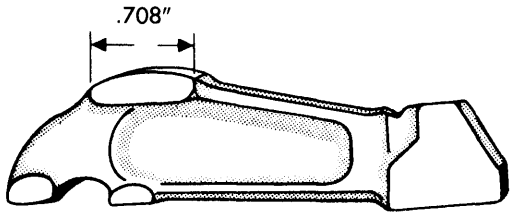
3) Rotate engine by crankshaft until number one piston is at TDC with pointer on vibration damper aligned with TDC mark. Marks on both camshafts must be aligned with marks on front camshaft bearing support.

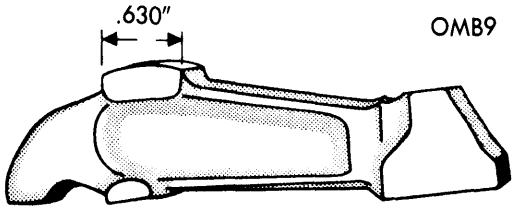
NOTE – Do not rotate engine by camshaft sprockets nuts. Use crankshaft to rotate engine.

4) Remove nut attaching camshaft sprocket. Wire camshaft sprocket to chain so they will not become separated. Remove sprocket from camshaft. Chain tensioner need not be removed. Unscrew Allen bolts and remove camshaft with bearing supports.

NOTE – Left rear bearing support can not be removed because of brake assembly.

Installation – 1) Inspect camshaft and bearings, replace as necessary. Slide bearing supports on camshaft. Install bearing supports and camshaft on cylinder head and tighten to specifications. Check that camshaft turns freely.





ROCKER ARMS

2) Install compensating washer, spacer and disc spring on camshaft. Press chain tensioner downward and install sprocket. Install camshaft sprocket nut after checking that timing is correct.

NOTE – Spacer on right-hand camshaft is .905" long.

3) Install rocker arms and camshaft cover brackets. When installing camshaft with code numbers 18 or 19, rocker arms with .708" cam path must be installed (see illustration).

4) Adjust tappet clearance and check camshaft timing. Install camshaft covers, spark plugs, vacuum line from brake assembly and vent line. Replace power steering reservoir cover.

NOTE – When checking timing of left-hand camshaft, number five cylinder is at TDC when pointed on vibration damper points to 90°.

5) Check when throttle valve is fully open, that regulating linkage does not touch vent pipe. Fill radiator and install battery. Check timing angle and firing point of number one and five cylinders. Warm-up engine and torque outer cylinder head bolts bearing brackets (exhaust side) to 65 ft. lbs.

VALVE TIMING ①				
	INTAKE		EXHAUST	
Engine	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
600 (100)	2.5°	52.5°	37.5°	18°
300SEL/8 6.3	6°	50°	40°	16°

① – Valve clearance set to .016".

TIMING CHAIN REPLACEMENT

Removal – 1) Remove camshaft covers and spark plugs. Partially drain cooling system and remove thermostat housing. Remove regulating shaft between venturi control unit and injection pump. Remove chain tensioner.

2) Brake endless chain and attach new chain with a master link. Install master link spring lock facing direction of rotation. Use care not to drop chain down into engine.

Installation – 1) Slowly turn engine in direction of rotation, drawing new chain over sprockets and pulling old chain from engine. Connect ends of new chain with master link facing inward toward camshaft and spring lock facing direction of rotation (see illustration).

2) Install "O" ring behind chain tensioner. Install chain tensioner without oil and tighten attaching nuts. Fill oil pocket in

1964-72 MERCEDES-BENZ 6.3 LITER V8 (Cont.)

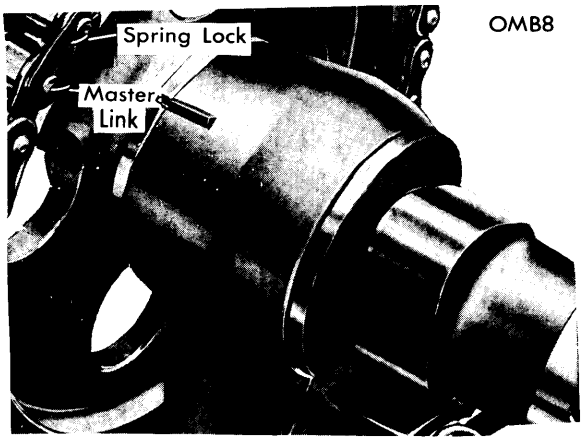
cylinder head with engine oil. Using suitable venting lever (187 589 02 63 00), push tension sprocket bearing against stop. Move sprocket back slowly, keeping oil pocket filled. Repeat until no more air bubbles appear.

3) Check crankshaft in relation to camshaft to find if valve timing is correct. See *Valve Timing*. Install camshaft covers and spark plugs.

VALVE TIMING

Rotate crankshaft until number one piston is at TDC. Both right and left camshaft timing marks must align with mark on front bearing support (see illustration).

NOTE — Rotate engine by crankshaft, never use camshaft sprocket nuts.



CAMSHAFT TIMING MARK & MASTER LINK

ENGINE OILING

Crankcase Capacity — 7.4 qts. with filter.

Oil Filter — Replace 6,000 miles.

Normal Oil Pressure — 73.5 psi.

Pressure Regulator Valve — Non-adjustable.

OIL PUMP

1) Remove sprocket screw and pull sprocket from oil pump drive shaft. Remove two attaching screws and lift out oil pump.

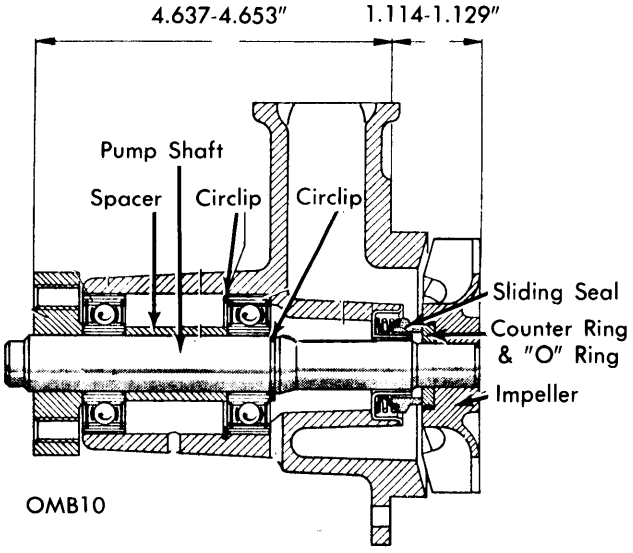
NOTE — If oil pump is replaced, drill pump shaft and sprocket together and insert a dowel pin.

2) Oil relief valve is located behind water pump in early models. Starting with engine number 006241 (300 SEL/8) and 002092 (600), oil relief valve is incorporated in oil pump. If new type oil pump is installed on early engines, remove oil relief valve from crankcase and plug crankcase opening.

ENGINE COOLING

WATER PUMP

Remove bolts and Allen screws attaching bearing housing and water pump housing. With a suitable puller, pull impeller off of pump shaft. Unscrew screw bolts from cover. Use a long punch inserted in water exhaust bore to release cover (tap lightly with a hammer). Using circlip pliers, take off cover. To reassemble, reverse disassembly procedure.



WATER PUMP

Thermostat — Opens at 172-176°F (std.), 186-190°F (winter).

Cooling System Capacity — 19 qts. (300 SEL/8) and 24.3 qts. (600).

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Cylinder Head	①58
Camshaft Cover	7
Camshaft Bearing Supports	32
Tappet Adjusting Screw	18 min.
Rocker Arm Bearing Bracket	16-18
Connecting Rod Cap (1964-67)	43
Main Bearing Cap	58
Crankshaft Front Bolt	290
Vibration Damper	25
Flywheel (1964-67)	33-36
Intermediate	36
Sprocket Wheel	25-32

① — Tighten cylinder head bolts in three stages; 29, 43 and 58 Ft. Lbs. Warm up engine and tighten to 65 ft. lbs. After 185-620 miles loosen each head bolt one at a time and retorque to 65 ft. lbs.