1963-73 JAGUAR 4.2 LITER 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
1965-67 XK-E	258.4	4235	3x1-Bbl.	265@5400	.....	①	3.625	92.97	4.173	106
1968-71 XK-E	258.4	4235	3x1-Bbl.	245@5500	.....	9.0-1	3.625	92.97	4.173	106
1963-64 Mark X	258.4	4235	3x1-Bbl.	265@5400	.....	②	3.625	92.97	4.173	106
1967 420 & 420G	258.4	4235	2x1-Bbl.	265@5400	.....	②	3.625	92.97	4.173	106
1969-73 XJ 6	258.4	4235	2x1-Bbl.	245@5500	.....	9.0-1	3.625	92.97	4.173	106

① — 8.0-1 or 9.0-1 compression ratio.
② — 7.0-1, 8.0-1 or 9.0-1 compression ratio.

ENGINE IDENTIFICATION

Engine may be identified by engine number stamped on right side of engine above oil filter and at front of cylinder head. Prefix of number will identify model as follows:

Model	Prefix
XK-E & 2+2	7E
Mark X	7D
420 & 420G Sedan	7F
XJ 6	7L

Compression ratio of engine may be determined by suffix of engine number as follows:

Suffix	Compression Ratio
/7	7.0-1
/8	8.0-1
/9	9.0-1

ENGINE REMOVAL

1965-71 XK-E — 1) Remove hood. Disconnect battery and drain cooling system. Disconnect clamp on breather pipe. Remove top of air cleaner. Disconnect fuel line below center carburetor.

2) Loosen clamps attaching water hoses to cylinder head and radiator. Disconnect clamp attaching heater hoses to manifold. Disconnect brake vacuum line and electrical connections from fan control thermostat.

3) Remove nuts and bolts attaching header tank mounting bracket to front crossmember. Disconnect header tank overflow hose and remove header tank with mounting bracket.

4) Disconnect throttle linkage at rear carburetor. Remove wires from water temperature transmitter and from coil. Disconnect battery cable and solenoid switch wire from starter.

5) Remove oil filter and crankshaft pulley, complete with damper and drive belt. Remove timing pointer and mark pulley and pointer for reassembly.

6) Remove tachometer generator complete with leads. Disconnect heater pipes from exhaust manifold and remove, save all sealing rings.

7) On Man. Trans. models, remove seats. Unscrew knob and lock nut from gear shift lever. Remove ash tray and radio console (if fitted) from transmission tunnel. Disconnect all electrical cables from console.

8) On 2+2 models, raise center arm rest, lift out bottom panel and remove attaching metal screws. Remove center arm rest and trimmed cover panel from transmission tunnel.

9) On Man. Trans. models, remove screws attaching two seat belt brackets and lift off trimmed cover. Remove transmission cover. Disconnect reverse light wires from switch on transmission top cover and speedometer drive cable. Remove clutch slave cylinder and disconnect propeller shaft.

10) On Auto. Trans. models, remove dipstick and tube from transmission oil pan. Place selector lever in "L", and from underneath vehicle, unscrew nut attaching selector cable adjustable ball joint to transmission lever. Loosen outer cable clamp at transmission bracket.

11) Remove speedometer drive cable from transmission. Disconnect transmission oil cooler pipes from right side of radiator and transmission, remove pipes and clamps. Disconnect kickdown cable at rear of cylinder head.

12) Remove center arm rest and trimmed cover panel from transmission tunnel. Remove transmission cover plate and disconnect propeller shaft.

13) On all models, remove two lower nuts attaching torsion bar reaction plate on each side and tap bolts back flush with face of plate. With the aid of a helper, place a lever between head of bolt just released and torsion bar. Exert pressure on bolt head to relieve tension on upper bolt. Remove nut and tap upper bolt back flush with face of plate. Repeat for other side and tap plate off bolts.

NOTE — Failure to relieve tension of upper bolts when tapping them will result in stripping threads. If this occurs new bolts must be installed and torsion bars reset.

14) Support engine by means of a hoist. Install a jack under transmission. Remove self locking nut and stepped washer from engine stabilizer. Remove bolts from rear engine mounting plate and front engine mounts.

1963-73 JAGUAR 4.2 LITER 6 CYLINDER (Cont.)

15) With engine level, slide engine forward until water pump clears sub-frame top crossmember and bell housing clears anchor brackets at rear of torsion bars. Gradually lifting front of engine and lowering rear, withdraw engine from vehicle. To install, reverse removal procedures.

All Models Except XK-E – **1)** Disconnect battery and remove hood. Drain engine oil and cooling system. Remove air cleaner and radiator.

2) Disconnect starter cables. Remove high tension lead from coil. Disconnect engine harness line plug and socket. Remove leads from tachometer generator. Disconnect main throttle shaft.

3) Remove hoses from heater. Disconnect fuel feed line at fuel filter bowl. Remove vacuum line from check valve and brake vacuum reservoir line.

NOTE – If equipped with air conditioning, remove compressor and mounting bracket. Attach compressor to inner fender panel. Do Not disconnect hose connections from compressor.

4) Disconnect power assist steering pump and position aside to prevent damage. Disconnect exhaust pipes and remove sealing rings. Disconnect ground strap and alternator cable.

5) On Auto. Trans. models, remove nut attaching selector cable pivot pin to selector lever and disconnect cable. Disconnect speedometer cable and oil cooler pipes.

6) On Man. Trans. & overdrive models, remove console and gear shift lever grommet. Remove gear shift lever knob. Disconnect solenoid wires at snap connectors. Disconnect speedometer drive cable and clutch slave cylinder from clutch housing.

7) On all models, jack up rear engine mount and remove four screws and washers. Lower jack slowly to relieve tension on mounting spring and remove spring, mounting pan and four packing pieces. Unscrew mounting pin and remove upper spring seat.

8) Remove four propeller shaft attaching nuts and disconnect universal joint.

9) Support engine with suitable hoist. Remove two front engine mount bolts. Remove nut and washers from stabilizer between rear of cylinder head and firewall.

10) Lower rear of engine and support on jack. Carefully slide engine forward and remove from vehicle. To install, reverse removal procedures.

INTAKE MANIFOLD REMOVAL

On XK-E & Mark X, intake manifold is in three separate aluminum castings each feeding two cylinders. Manifolds are heated by water coming from passages in cylinder head. A water outlet pipe attached to intake manifold houses the thermostat.

XK-E & Mark X – **1)** Drain cooling system, disconnect battery and disconnect top water hose and by-pass hose from intake manifold water jacket. Remove air hose from air cleaner.

2) Disconnect engine breather pipe from below air intake elbow and remove elbow noting gaskets between elbow and manifold. Disconnect leads from the following: water temperature transmitter, thermostat switch, auxiliary starting carburetor, and "anti-creep" switch (if equipped).

3) Disconnect flexible fuel feed line at joint below front carburetor and remove vacuum advance line from front carburetor. Disconnect accelerator linkage at rear of engine.

4) Remove two vacuum lines at rear of air balance tube. Remove vacuum line from below heater water valve and Auto. Trans. dipstick tube (if fitted) to mounting bracket.

5) Remove hoses and valve. Remove bolt attaching carburetor overflow pipe clamp to oil filter head. Remove manifold attaching nuts and lock washers and associated clamps and brackets, lift off intake manifold complete with carburetors. To install, reverse removal procedures.

NOTE – On 420, 420G, and XJ 6 models, intake manifold is a one piece aluminum casting. It is similar in all other respects to the three piece manifold.

420, 420G & XJ 6 – **1)** Remove carburetors, top water hose and by-pass hoses from intake manifold. Disconnect leads from water temperature gauge indicator and auxiliary starting carburetor switch. Disconnect vacuum hose from beneath intake manifold, located next to distributor vacuum unit. Remove distributor cap and high tension lead.

2) Disconnect heater hose at rear of manifold. On 420 & 420G, remove cotter pin from accelerator linkage at pin in manifold and remove linkage. On XJ 6, disconnect throttle cable from accelerator cable and withdraw cable through firewall. Remove nuts and lock washers, loosen heater hose clamps from lower studs and lift off intake manifold. To install, reverse removal procedures.

CYLINDER HEAD REMOVAL & INSTALLATION

CAUTION – Do not rotate engine or camshafts with camshaft sprockets disconnected. If a camshaft must be rotated with cylinder head removed, other camshaft must be removed or camshaft bearing caps loosened to allow valves to close.

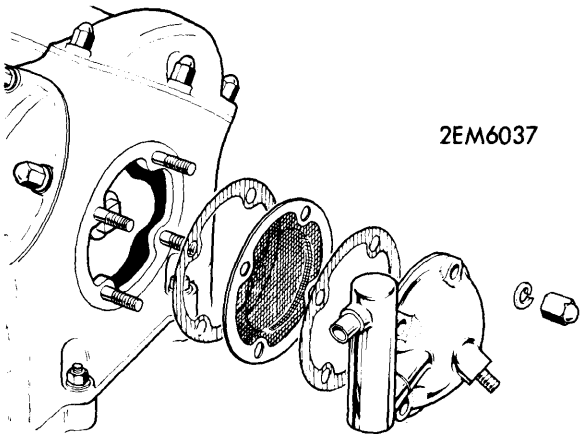
NOTE – When installing camshafts in cylinder head, be sure that keyway in front bearing flange of each camshaft is 90° to adjacent camshaft cover face (see illustration in Valve Clearance Adjustment) before tightening camshaft bearing caps. If this operation is being carried out with cylinder head on engine, rotate engine until No. 6 (front) piston is at TDC of firing stroke before fitting camshafts.

NOTE – As valves in fully open position protrude below cylinder head face, cylinder head must be supported with blocks on each end to prevent valve damage.

1963-73 JAGUAR 4.2 LITER 6 CYLINDER (Cont.)

Removal – 1) Remove hood, battery and battery platform. Drain cooling system. Remove air cleaner and air intake pipe. Disconnect accelerator linkage at throttle shaft and attachment at intake manifold. Disconnect vacuum line from front carburetor. Disconnect fuel lines at float chamber unions. On XJ 6, remove two firewall-to-fender tie rods.

2) Disconnect leads from auxiliary starting carburetor solenoid. Remove pipe between starting carburetor and intake manifold. Disconnect leads from tachometer generator. Disconnect top water hose and by-pass from front of intake manifold. Remove spark plug wires and carrier. Remove clutch line bracket from rear of cylinder head.



ENGINE BREATHER

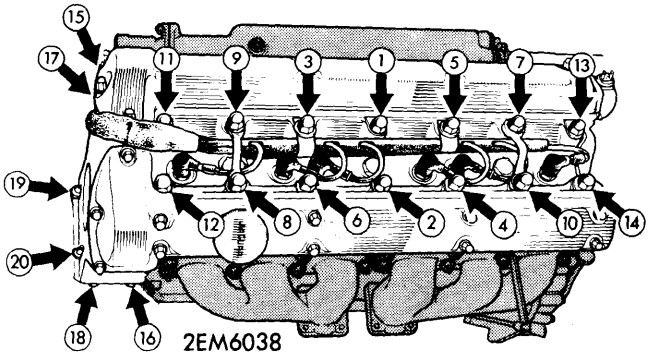
3) Disconnect wires and remove coil. Disconnect engine breather hose from front of cylinder head. Remove exhaust manifolds and spark plugs. Disconnect two camshaft oil lines unions from rear of head. Remove heater hose and clamps from rear of intake manifold. Disconnect leads from water temperature transmitter. Loosen clamp and disconnect vacuum servo line from hose connection on intake manifold.

4) Remove domed nuts and countersunk screw (XJ 6 only) from each camshaft cover and lift off covers. Remove breather housing from cylinder head, note position of baffle plate with two holes vertical for reassembly reference (see illustration).

5) Release tension on top timing chain by loosening nut on eccentric idler sprocket shaft, depressing spring-loaded stop peg and rotating serrated adjuster plate clockwise.

6) Remove lock wire and one camshaft sprocket screw from each camshaft. Rotate engine until other two screws are accessible and remove screws. Camshaft sprockets may be slid up support brackets.

NOTE – Do not rotate camshafts or engine after sprockets are disconnected.



CYLINDER HEAD TIGHTENING SEQUENCE

7) Loosen cylinder head domed nuts part of a turn at a time in order shown in illustration until nuts are free. Remove six nuts attaching front of cylinder head. Lift off head complete with carburetors.

Installation – 1) Read *CAUTION* and *NOTES* before starting installation. Turn No. 6 (front) piston to TDC position. Install cylinder head gasket with marking "TOP" facing upward. Place cylinder head, complete with manifolds on engine block. The second cylinder head stud from front on left side is a dowel stud.

2) Install spark plug lead carrier on third and sixth stud from front on right side using plain washers. Use plain washers on two front studs. Place clutch hose bracket on two rear studs. Install "D" washers on remaining studs. Tighten domed head nuts in sequence shown in illustration. Finally tighten six nuts attaching front of head.

3) Install camshaft sprockets. See *Valve Timing*. Install camshaft oil feed line at rear of head, using all new copper washers. Install camshaft covers and gasket, do not fully tighten cover nuts. Install tachometer generator and flange plug to rear of left and right camshaft covers respectively with "O" rings seated in recesses. Now fully tighten camshaft cover nuts. To install remaining components, reverse removal procedures.

VALVES

Engine & Valve	Head Diam. In. (mm)	Face Angle In. (mm)	Seat Angle In. (mm)	Seat Width In. (mm)	Stem Diameter In. (mm)	Stem Clearance In. (mm)	Valve Lift In. (mm)
1963-73							
Intake	1.75 (44.5)	45°	45°	....	.3122-.3123 (7.930-7.932)	.0015 (.04)	.375 (9.53)
Exhaust	1.625 (41.3)	45°	45°	....	.3122-.3123 (7.930-7.932)	.002 (.05)	.375 (9.53)

VALVE ARRANGEMENT

Left Side – All exhaust.

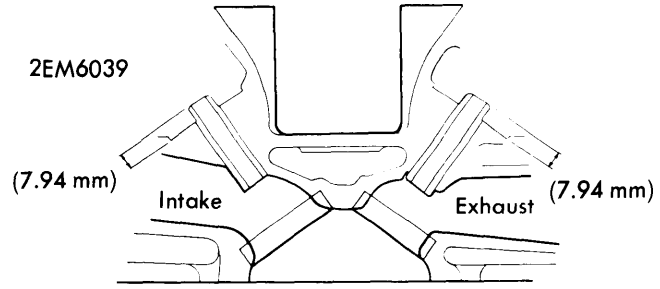
Right Side – All intake.

VALVE GUIDE SERVICING

Examine valve guide for wear. To replace, drift out guide from top of head. If guide bore exceeds standard diameter in head, ream bore to selected oversize and install oversize guide. To

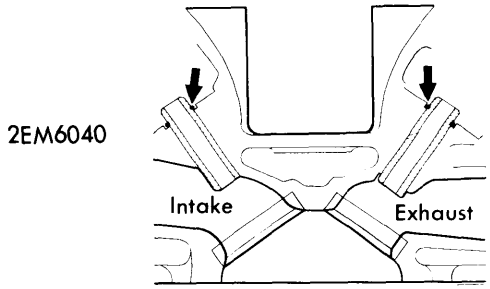
1963-73 JAGUAR 4.2 LITER 6 CYLINDER (Cont.)

install guides in models with no snap ring proceed as follows: Heat head in boiling water for 30 minutes. Coat valve guide with graphite grease and press in with drift until 5/16" (7.94 mm) of guide protrudes above valve spring seat. To install guides with snap rings, press guide into head until snap ring touches head.



EARLY STYLE VALVE GUIDE

NOTE — On XJ 6, intake valves are fitted with oil seals which must be removed before valve spring seat.



LATE STYLE VALVE GUIDE

XJ 6 & XKE Oversize Valve Guides

Application	Guide Diameter Inches (mm)
1st OS (1 Groove)	.503-.504 (12.78-12.80)
2nd OS (2 Grooves)	.506-.507 (12.85-12.88)
3rd OS (3 Grooves)	.511-.512 (12.98-13.00)

Application	Head Bore Diameter Inches (mm)
1st Oversize	Do Not Ream
2nd Oversize	.5048-.5055 (12.822-12.840)
3rd Oversize	.5098-.5105 (12.949-12.967)

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE (LBS.) Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
1963-73			
Inner	1.656 (42.14)	30.33@1.22 (13.76@30.95)	①
Outer	1.938 (49.21)	48.37@1.31 (21.94@33.34)	①

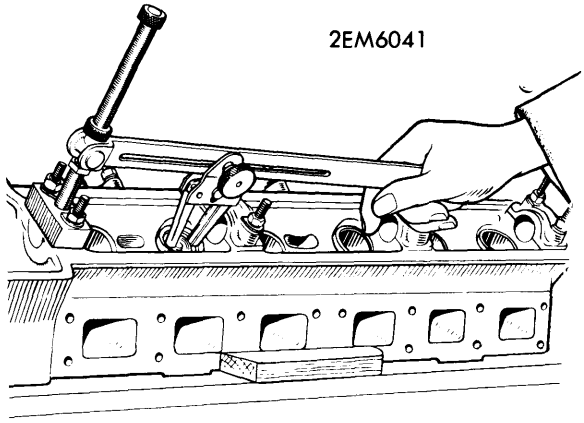
① — Information not available

VALVE SPRING REMOVAL

NOTE — Valve springs are made of two different types of steel: intake springs are silicon steel and exhaust springs are austenitic steel.

CAUTION — Support ends of cylinder head with wooden blocks to prevent damage to valves. Opened valves protrude below face of cylinder head.

1) Remove camshaft bearing caps, note markings for reassembly. Remove camshaft, tappets and adjusting pads. Retain tappets and pads in proper order for reassembly.



VALVE SPRING COMPRESSOR (CHURCHILL No. J.6118)

2) Install suitable spring compressor (Churchill No. J.6118) and a block of wood between valve and work table. Compress springs and remove valve keepers. Compare old spring with new spring or specifications, replace as necessary. To install, reverse removal procedures.

VALVE TAPPET SERVICE

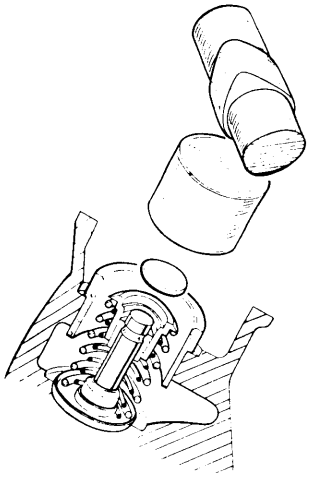
1) Remove camshaft, tappet and adjusting pads and retain in proper order. Remove valves and springs. See *Valve Spring Removal*.

NOTE — Valves are numbered and must be replaced in order. No. 1 cylinder is at rear of engine (flywheel end).

2) Inspect tappet and tappet guide for wear or damage. Remove old tappet guide by boring out until guide collapses. Take care not to damage head. At 68°F (20°C) measure guide bore in cylinder head.

3) Grind down the 1.643" (41.73 mm) of new tappet guide until a .003" (.08 mm) interference fit is obtained with cylinder head. Grind down lead-in until it is .003-.006" (.08-.15) smaller than guide size.

1963-73 JAGUAR 4.2 LITER 6 CYLINDER (Cont.)



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VALVE & TAPPET ASSEMBLIES

4) Heat cylinder head in a 300°F (150°C) oven for half an hour. Press in tappet guide until it bottoms. Ream tappet guide bore to a diameter of 1.3750-1.3757" (34.925-34.943 mm).

NOTE — It is essential that tappet guide bore is concentric with valve guide bore.

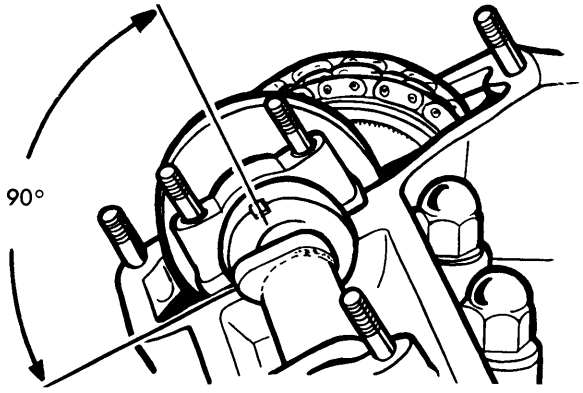
VALVE CLEARANCE ADJUSTMENT

NOTE — One camshaft must be removed when checking valve clearances on the other.

1) Measure clearance between heel of cam and tappet on all cylinders. Write down clearances. Remove camshaft and tappets. Check adjusting pad letter, and select a pad which will give the proper clearance. Before engine numbers 7R-8688 XK-E coupe and convertible, 7R-38855 2+2, 7L-8345 XJ 6, 420, 420G, and Mark X clearances are intake .004" (.10 mm) and exhaust .006" (.15 mm). After above engine numbers, clearances are intake .012" (.30 mm) and exhaust .014" (.36 mm). Camshafts requiring the larger clearances have an indentation on camshaft sprocket flange.

2) Adjusting pads come in sizes from .085-.110" (2.16-2.80 mm) thick in .001" (.03 mm) increments, letters A to Z respectively. Reinstall pads, tappets and camshaft and repeat process on other camshaft.

NOTE — Position keyway in front bearing flange of each camshaft at 90° to camshaft cover flange before tightening camshaft bearing caps.



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CAMSHAFT LOCATING FLANGE

PISTONS, PINS, RINGS

Engine	PISTONS	PINS		RINGS		
	Clearance In. (mm)	Piston Fit In. (mm)	Rod Fit In. (mm)	Rings In. (mm)	End Gap In. (mm)	Side Clearance In. (mm)
1963-73	.0011-.0017 ① (.028-.043)	.0001 ② (.003)	.0002 (.005)	Comp.	.015-.020 (.38-.50)	.001-.003 ④ (.03-.08)
				Oil	.011-.016 ③ (.28-.41)	.001-.003 ④ (.03-.08)

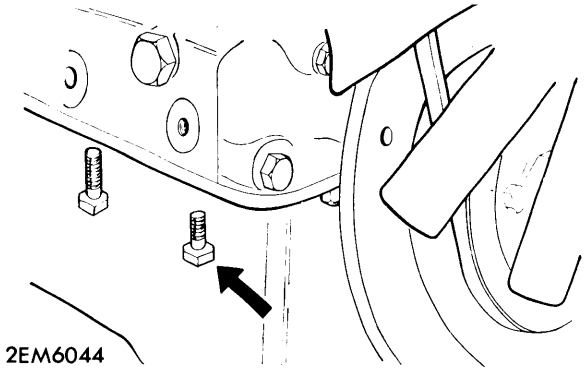
① — Measured at bottom of skirt, 90° to piston pin bore.
② — Interference fit.
③ — 1963-64 Mark X, 1967 420 and 420G, and 1969-73 XJ6, clearance is .015-.033" (.38-.84 mm).
④ — 1969-73 XJ 6: compression is .0025" (.064 mm), and oil is .004" (.10 mm).

OIL PAN REMOVAL

Remove 26 screws attaching oil pan to crankcase and four nuts to timing cover. Use care when handling aluminium oil pan.

When installing oil pan make sure short screw is located in front right hand corner (see illustration).

1963-73 JAGUAR 4.2 LITER 6 CYLINDER (Cont.)

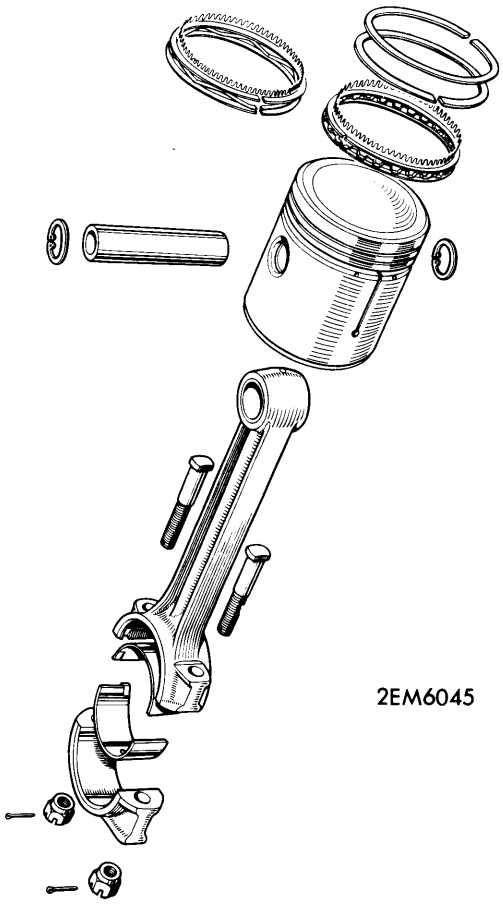


OIL PAN SHORT SCREW LOCATION

PISTON & ROD ASSEMBLY

Removal – With cylinder head and oil pan removed, remove cotter pins, nuts and rod caps. Withdraw piston and rod assembly from top of cylinder block.

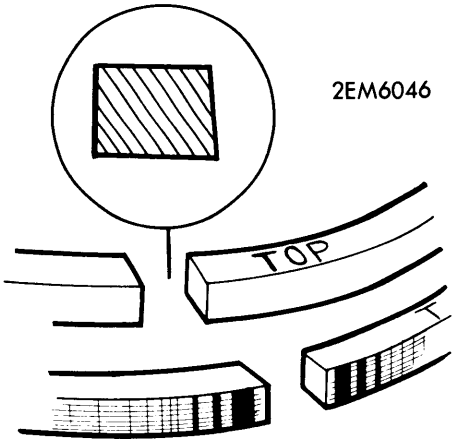
Installation – Install piston with split skirt facing exhaust side of engine (left side) and marking "FRONT" facing forward. Connecting rod, cap and cylinder numbers must all match. Install rod caps and torque nuts to specifications. Install new cotter pins.



PISTON & ROD ASSEMBLY

PISTON RING INSTALLATION

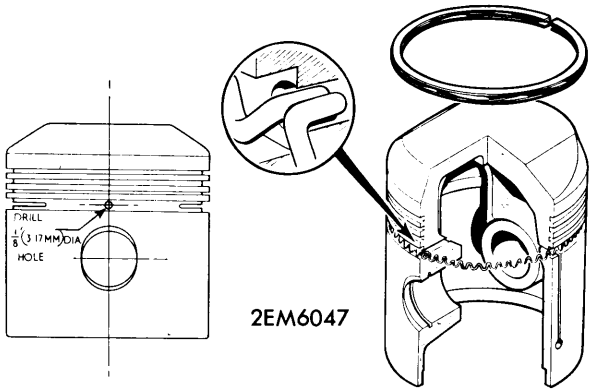
1) After checking end gap and sideplay of rings, install on piston with chrome plated ring in top groove. Install tapered ring in groove with narrowest part of ring or marking "T" or "TOP" facing upward (see illustration).



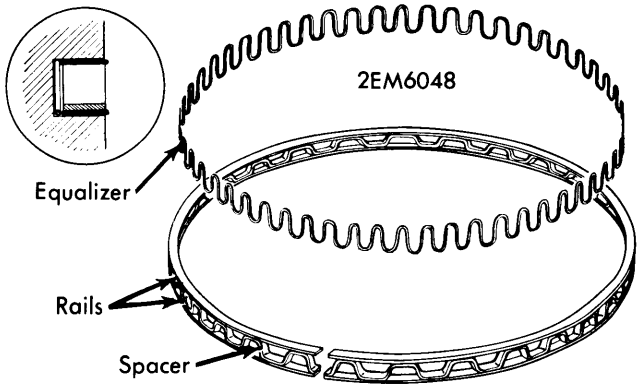
PISTON RING MARKS

2) Oil ring is made up of two side rails and a spacer glued together as an assembly.

NOTE – Not all pistons have an expander, but may be modified to accept one (see illustration).



OIL RING INSTALLATION



MAGIFLEX OIL RING

1963-73 JAGUAR 4.2 LITER 6 CYLINDER (Cont.)

Install expander in groove with ends inserted in hole above wrist pin. Place oil ring assembly over expander. Use a ring compressor to hold oil ring in position.

PISTON PIN REPLACEMENT

Piston pins are a finger push fit. When replacing piston pins, always use new circlips.

FITTING PISTONS

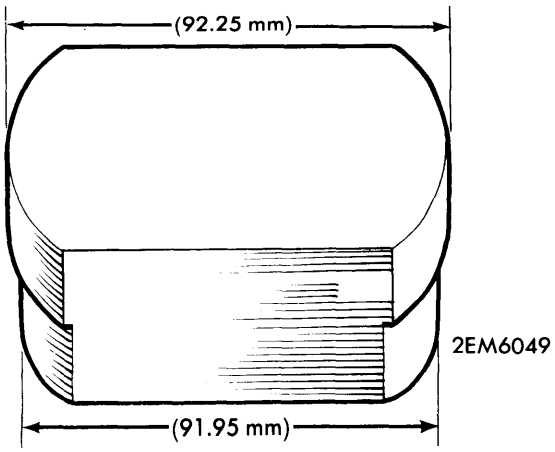
Measure piston and cylinder bore to determine clearance. Replace piston or bore cylinder to next oversize if necessary. Pistons come in .010", .020", and .030" (.25 mm, .51 mm, and .76 mm) oversizes and the following graded standard sizes. Grade letter is stamped on piston crown and cylinder block.

Graded Standard Pistons

Grade Letter	Cylinder Diameter Inches (mm)
F	3.6250-3.6253 (92.075-92.083)
G	3.6254-3.6257 (92.085-92.093)
H	3.6258-3.6261 (92.095-92.103)
J	3.6262-3.6265 (92.105-92.113)
K	3.6266-3.6269 (92.115-92.123)

CYLINDER LINERS

1) If cylinder wear limit exceeds clearance of .030" (.76 mm) oversize piston, replace liners and bore to fit standard pistons.



CYLINDER LINER INSTALLING BLOCK

2) Prepare a stepped block to press liners out of block (see illustration). Press liners out through top of cylinder block. Coat cylinder bore half way down and top outer edge of liner with sealing compound.

3) Press in liner from the top of block and grind off liner flush with top of block. Following reboring, remove blanking plugs in main oil gallery. Paint oilways and crankcase interior with heat and oil resistant paint.

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)
1963-73	2.7500-2.7505 ① (69.85-69.86)	.0025-.0042 (.064-.107)	Center	.004-.006 (.10-.15)	2.0866 (53.000)	.0015-.0033 (.038-.084)	.0058-.0078 (.147-.198)

① — On XKE and 2+2, journals 2, 3, 5, and 6 are 2.7495-2.7500" (69.84-69.85 mm).

MAIN BEARING SERVICE

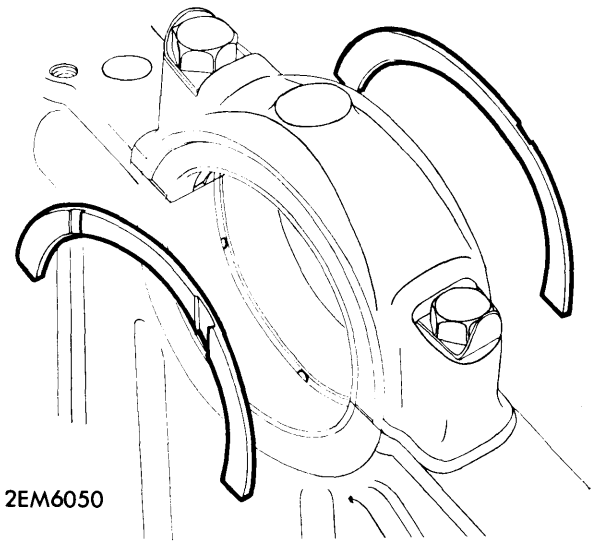
Remove connecting rod and main bearing caps and retain in proper order for reassembly. All caps are numbered and must be replaced in their original positions. When wear or out-of-round exceeds .003" (.08 mm), grind crankshaft and fit undersize bearings. Bearings are available in .010", .020", .030", and .040" (.25 mm, .51 mm, .76 mm, and 1.02 mm) undersizes. Replace crankshaft if wear exceeds .040" (1.02 mm) undersize.

THRUST BEARING ALIGNMENT

Thrust bearing washers are used on center main bearing caps. Install thrust washers with white metal side outwards (see illustration). Check crankshaft endplay, install thrust washers giving proper clearance. Thrust washers come in standard and .004" (.10 mm) oversize.

REAR MAIN BEARING OIL SEAL SERVICE

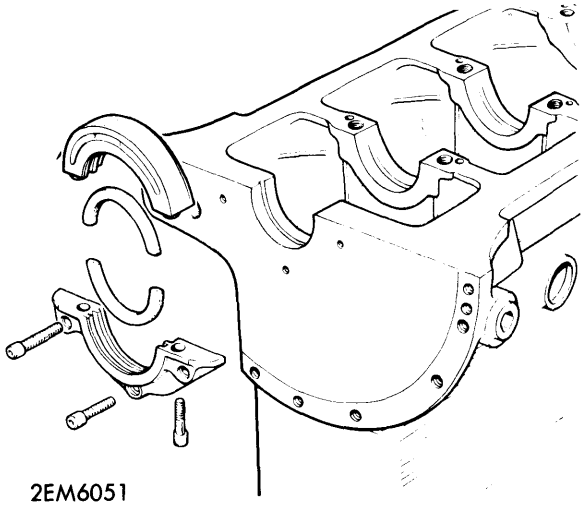
1) With lower half of seal and crankshaft removed, pull out seal from seal holders. Take new asbestos seals and tap them on their side to narrow cross section of seal.



THRUST WASHERS

1963-73 JAGUAR 4.2 LITER 6 CYLINDER (Cont.)

2) Install seal in seal housing grooves. Press seals in groove with a hammer handle until ends of seals are flush with housing ends. **Do Not** cut off ends of seals if they protrude past ends of housing, but continue pressing with hammer handle until they are flush.



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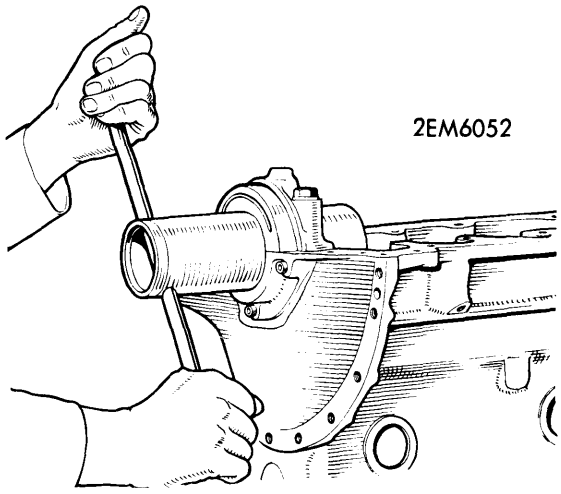
CRANKSHAFT REAR OIL SEAL

3) Assemble two seal halves and secure with Allen screws. Install rear main cap to block without bearings. Torque cap to specifications. Attach seal and housing to cylinder block with the three Allen screws.

4) Smear a small amount of colloidal graphite around inner face of seal. Insert a suitable sizing bar (Churchill No. J.17). See that pilot end of bar enters rear main bearing. Pushing and rotating sizing bar until it is fully home, then pull and rotate and withdraw bar.

5) Remove seal housing from cylinder block and split seal halves by removing Allen screws. Remove rear main bearing cap. Crankshaft may now be installed.



2EM6052

SIZING REAR OIL SEAL

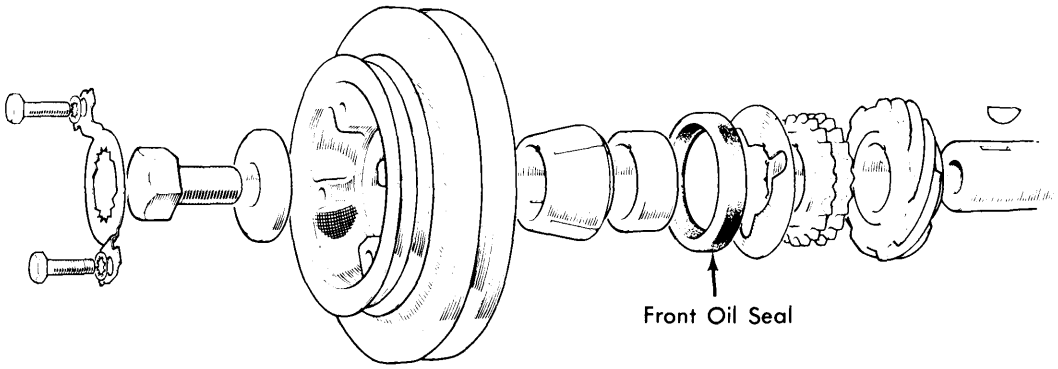
ENGINE FRONT COVER & OIL SEAL

Removal – 1) Remove radiator and fan belt. Mark position of vibration damper for reassembly. Remove pulley. Using a pair of levers, pry damper off of split cone. Remove split cone.

2) Remove oil pan and water pump. Unscrew screws attaching timing cover and slide timing cover and oil seal off of crankshaft.

Installation – 1) Place new seal in groove in timing cover. Using a new gasket and sealing compound, intall timing cover and seal. Reinstall oil pan with a new gasket. Install short screw in front right hand corner of oil pan.

2) Reinstall split cone on crankshaft. Position crankshaft damper to mark, install pulley and torque attaching bolts to specifications. Reinstall remaining components in reverse of removal procedures.



2EM6053

CRANKSHAFT DAMPER

1963-73 JAGUAR 4.2 LITER 6 CYLINDER (Cont.)

CAMSHAFT			
Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
1963-73	.9990-.9994 (25.375-25.385)	.0005-.0020 (.013-.051)	.375 (9.53)

CAMSHAFT REMOVAL & BEARING REPLACEMENT

Removal – 1) Remove camshaft covers. Unscrew Allen screws attaching tachometer counter generator on right side of head and sealing plug on left side. Note position of copper washers and half gaskets. Remove "O" rings.

2) Break wire locking camshaft adjuster plate screws. Rotate engine until No. 6 piston is at TDC on compression stroke, that is when keyway in front bearing flange of each camshaft is at 90° to adjacent cover face.

3) Rotate engine until inaccessible adjuster plate screws can be removed. Rotate engine back to the TDC position of No. 6 cylinder and remove two remaining screws.

4) Tap sprockets off their respective camshaft flanges. Release the eight nuts attaching bearing caps a turn at a time. Remove nuts, lock washers and "D" washers from bearing studs.

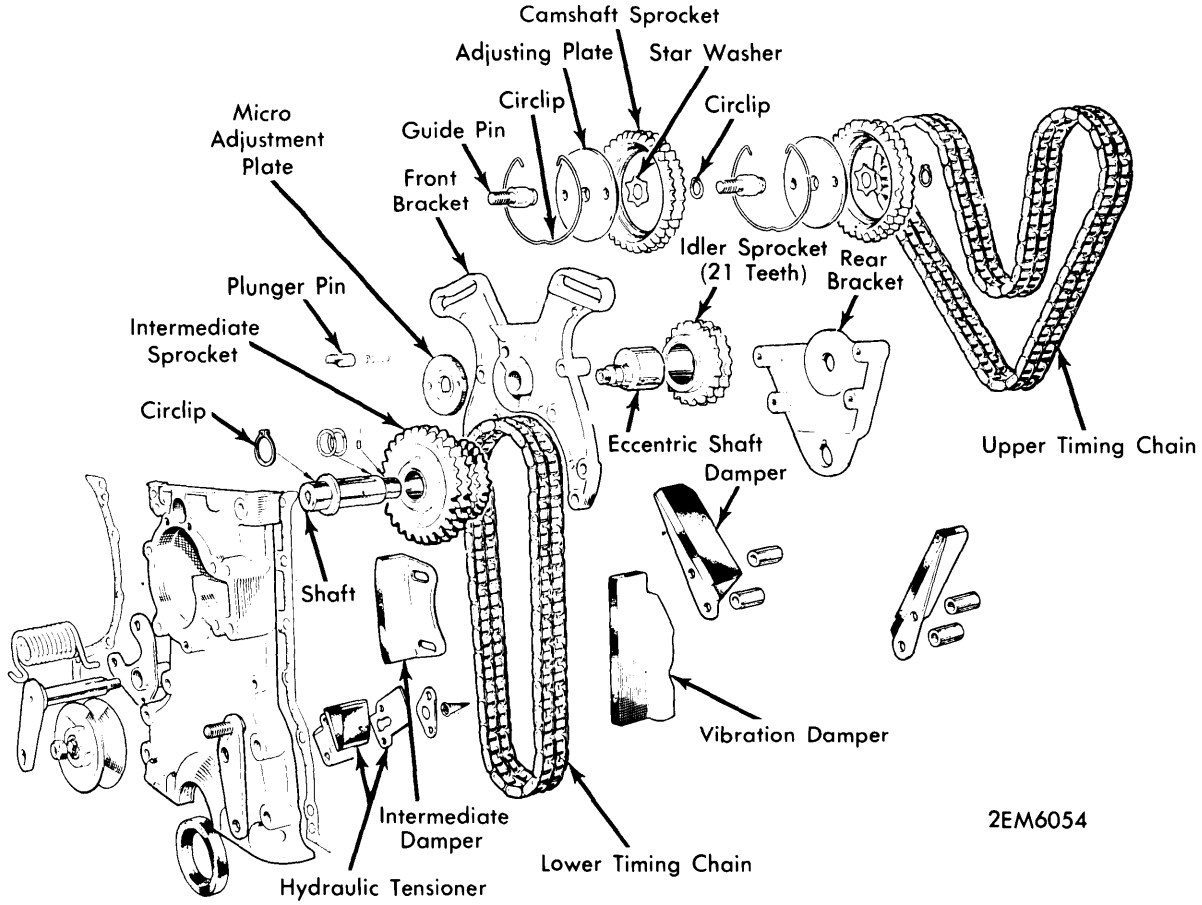
5) Remove bearing caps, noting bearing cap numbers for reassembly. Lift out camshaft, inspect camshaft and bearings for wear or damage. No undersize bearings are available, replace bearings or camshaft if necessary.

Installation – 1) Check that No. 6 piston is still on TDC of firing stroke. Replace bearings in their proper locations. Replace camshafts with their keyways in front bearing flange at 90° to adjacent cover face.

2) Install bearing caps to their proper numbered locations. Install nuts, lock washers and "D" washers and tighten nuts down evenly a turn at a time until torque specifications are reached. To set timing See *Valve Timing*. To install remaining components, reverse removal procedures.

VALVE TIMING ①				
	INTAKE		EXHAUST	
Engine	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
1963-73	15°	57°	57°	15°

① – With tappets set at .010" (.25 mm).



TIMING GEAR ASSEMBLY

1963-73 JAGUAR 4.2 LITER 6 CYLINDER (Cont.)

TIMING CHAIN REPLACEMENT

Removal – 1) With cylinder head, timing cover and oil pan removed as previously described. Remove plug from bottom chain tensioner. Insert Allen wrench and rotate clockwise until slipper head remains in a retracted position. Remove attaching bolts and lift off tensioner, remove and clean filter screen (if fitted).

2) Remove front mounting bracket. Remove two screwdriver slotted screws from rear mounting bracket. Timing gear assembly can now be removed.

3) Remove nut and serrated washer from front end of idler shaft, and withdraw plunger and spring. Remove nuts attaching front mounting bracket to rear bracket and slide front bracket off studs.

4) Remove bottom chain from large intermediate sprocket. Remove circlip from end of shaft in mounting bracket. Press shaft out of bracket and withdraw sprockets from shaft. Inspect and replace any parts showing signs of wear.

Assembly – 1) Install eccentric shaft in front mounting bracket. Insert spring and locking plunger for serrated plate in front mounting bracket. Install serrated plate with lock washer and nut. Slide idler sprocket (21 teeth) on eccentric shaft.

2) Slide intermediate sprocket (20 & 28 teeth) on shaft with larger sprocket facing forward. Press shaft through lower central hole in rear mounting bracket. Secure shaft with circlip at rear of bracket.

3) Place top timing chain (longer chain) on small intermediate sprocket and bottom timing chain (shorter chain) to large intermediate sprocket. Loop upper timing chain under idler sprocket and between front and rear mounting brackets, while resting on right and left dampers.

4) Pass the four attaching bolts through holes in brackets, chain dampers and spacers with lock washers under head of bolts. Secure two mounting brackets together with four stud nuts and lock washers.

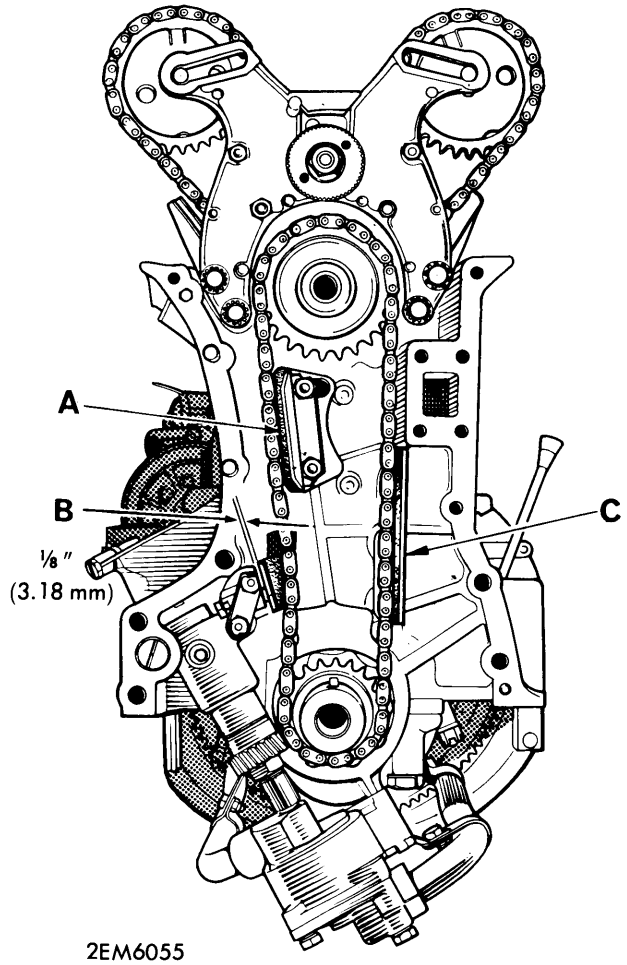
Installation – 1) Install timing gear assembly on cylinder block. Place chain tensioner filter screen in cylinder block (if fitted). Use shims as necessary, between backing plate and cylinder block so that timing chain runs centrally along rubber slipper of chain tensioner. Tighten attaching bolts securely.

NOTE – Do not release chain tensioner until it is securely mounted with timing chain in position.

2) Insert Allen wrench in tensioner. Turn Allen wrench clockwise until tensioner head moves forward under spring pressure against chain. Install plug and bend up tab of lock washer.

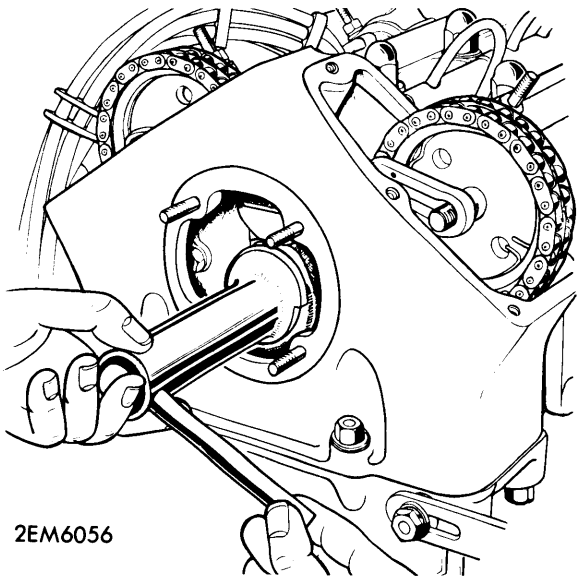
NOTE – Do not attempt to turn Allen wrench counterclockwise or force tensioner head into chain by external pressure.

3) Looking at *Adjusting Lower Timing Chain* illustration; set intermediate damper (A) in light contact with chain when there is ⅛" (3.18 mm) gap between rubber slipper and tensioner body (B). If chain is worn or stretched, gap at (B) may have to be increased slightly to prevent chain from hitting cylinder block. Position lower damper (C) in light contact with chain.



ADJUSTING LOWER TIMING CHAIN

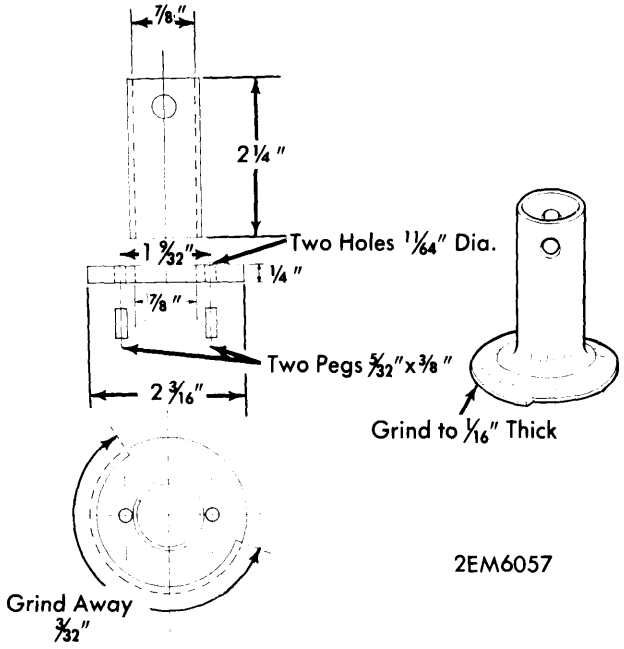
4) Through breather opening in front of cylinder head, loosen lock nut securing serrated plate. Push locking plunger in-



ADJUSTING UPPER TIMING CHAIN

1963-73 JAGUAR 4.2 LITER 6 CYLINDER (Cont.)

ward, using suitable tool (Churchill No. J.2) (see illustration) rotate serrated plate counterclockwise until chain is correctly tensioned. Chain should have slight flexibility on both outer sides below camshaft sprockets, chain must not be dead tight. Release locking plunger and tighten lock nut.

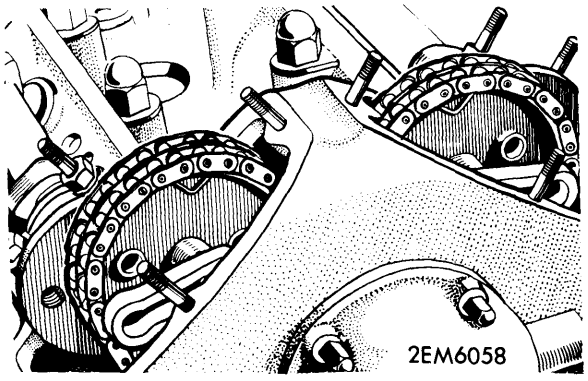


UPPER TIMING CHAIN TOOL (CHURCHILL No. J.2)

VALVE TIMING

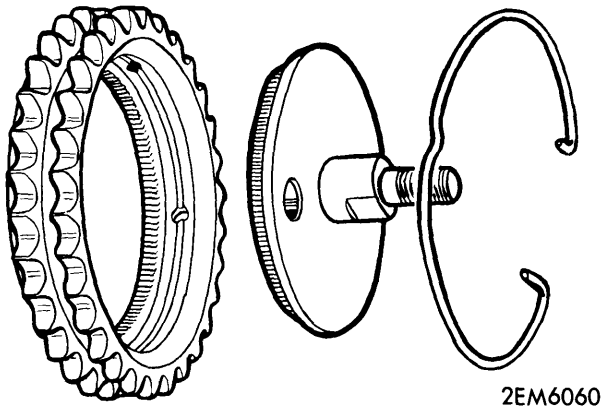
1) Rotate engine so that No. 6 (front) piston is at TDC on compression stroke, and distributor rotor arm points at No. 6 segment. Check that timing chains are properly adjusted. See *Timing Chain Replacement.*

2) Remove lock wire from camshaft sprocket screws. Rotate engine until inaccessible screws can be removed. Return engine to TDC of No. 6 piston and remove remaining screws. Tap camshaft sprockets off camshaft flanges.



CAMSHAFT SPROCKETS DISCONNECTED

3) Accurately position camshafts with valve timing gauge (see illustration), and check that TDC marks are in exact alignment. Withdraw circlips from camshaft sprocket assembly and press adjusting plates forward until serrations disengage (see illustration).

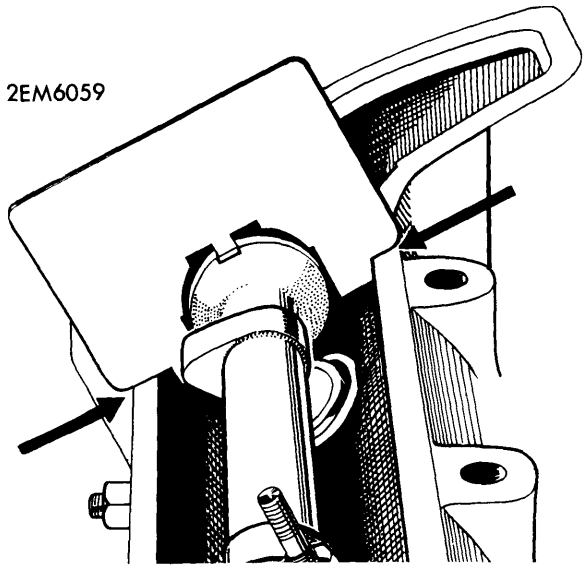


CAMSHAFT SPROCKET ASSEMBLY

4) Replace sprockets on flanges of camshaft and align two holes in adjuster plate with holes in flanges. Engage serrations of adjuster plates with serrations in sprocket.

NOTE — Screw holes must be in exact alignment. If difficulty is experienced in aligning holes turn adjuster plates 180° and realign holes.

5) Replace circlips in camshaft sprockets. Replace camshaft sprocket screws and lock wire. Recheck valve timing.



VALVE TIMING GAUGE

1963-73 JAGUAR 4.2 LITER 6 CYLINDER (Cont.)

ENGINE OILING

ENGINE OILING SYSTEM

Lubrication is provided by a gear driven eccentric rotor type pump. Oil from pump goes through a full-flow oil filter to all moving engine components.

Crankcase Capacity – XKE, 9 qts. (8.6 ltr); All others, 7.2 qts. (6.5 ltr).

Oil Filter – Mark X without emission control, replace 6,000 miles (10,000 km); All others, replace 3,000 miles (5,000 km).

Normal Oil Pressure (Hot) – 40 psi (2.8 kg/cm²) @ 3,000 RPM.

OIL PUMP

Removal – Remove oil pan, suction and delivery pipes. Remove bolts attaching oil pump to front main bearing cap. Withdraw pump and coupling sleeve at top of drive shaft.

Disassembly – 1) Remove bolts and take off bottom cover. Remove inner and outer rotors. Inner rotor is pinned to drive shaft and cannot be disassembled.

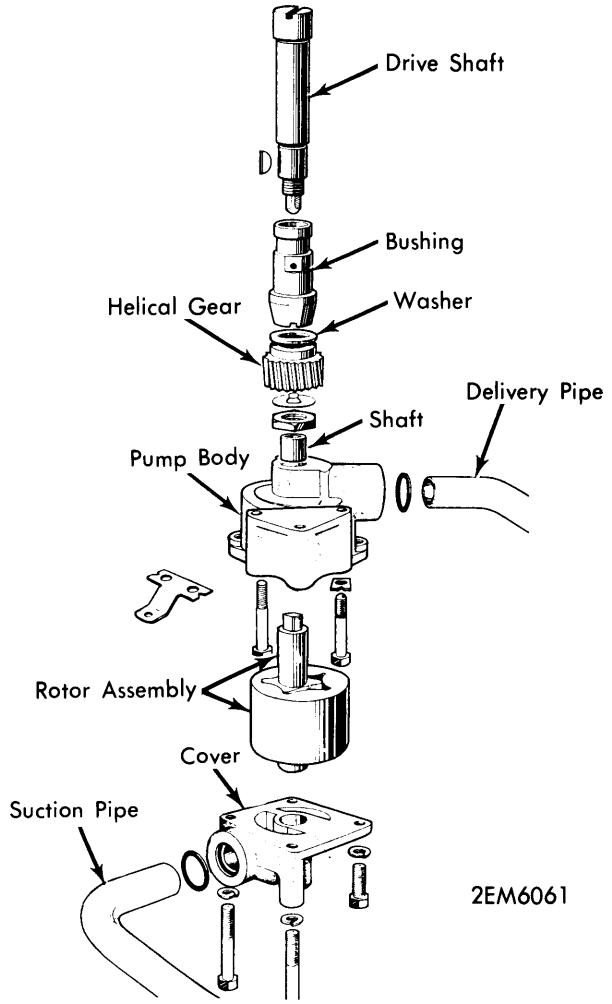
2) Check clearances of inner and outer rotor lobes, outer rotor-to-body and rotor-to-cover plate. Place drive shaft in a soft jawed vice and check that rotor is tight on pin.

NOTE – Drive shaft, inner and outer rotors are supplied as an assembly only.

Assembly – Reassemble in reverse order of disassembly. Install outer rotor to pump body with chamfered end forward. Use new "O" rings on suction and delivery pipes. To install, reverse removal procedures.

Oil Pump Specifications

Application	Maximum Clearance Inches (mm)
Rotor-to-Rotor Lobes	.010 (.25)
Rotor-to-Cover	.004 (.10)
Outer Rotor-to-Body	.010 (.25)



OIL PUMP

ENGINE COOLING

WATER PUMP

Disassembly – 1) Remove water pump and gasket from timing cover. Pull fan hub from shaft with a puller. Loosen lock nut and remove Allen locating screw.

2) Using an arbor press and a tube measuring 1 3/32" (27.76 mm) O.D. and 3/32"(24.60 mm) I.D., press shaft and impeller assembly out of pump body. Do not press on shaft or bearing will be damaged.

1963-73 JAGUAR 4.2 LITER 6 CYLINDER (Cont.)

ENGINE COOLING (Cont.)

3) Press shaft from impeller and remove seal and rubber thrower. Spindle and bearing assembly cannot be further disassembled.

4) Clean and inspect all parts for wear or damage. Bearing is sealed and lubricated, therefore do not wash in solvents.

Assembly – 1) Install shaft and bearing assembly into pump body from rear. Align and install locating screw and lock nut. Place rubber thrower in its groove on shaft in front of seal.

2) Coat outside of brass seal housing with suitable water resistant sealer and install into recess in pump housing. Push seal into its housing with carbon face towards rear of pump.

3) Press impeller onto shaft until rear face of impeller is flush with end of shaft. Press fan hub onto shaft until it is flush with end of shaft.

THERMOSTAT

Normal Thermostat

Application	Full Open @ °F (°C)
XKE	185 (85)
XJ 6	165 (74)
420, 420G, & Mark X	168 (76)

Winter Thermostat

Application	Full Open @ °F (°C)
XKE	199 (93)
XJ 6	179 (82)
420, 420G, & Mark X	183 (84)

Cooling System Capacity (With Heater)

Application	Capacity In Quarts (ltr)
XKE	13.25 (12.5)
Mark X	14.75 (14.0)
420, 420G & XJ 6	15.25 (14.4)

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Camshaft Bearing Cap	15 (2.1)
Connecting Rod Cap	37 (5.1)
Main Bearing Cap	83 (11.5)
Cylinder Head Nuts	54 (7.5)
Flywheel Bolts	67 (9.3)