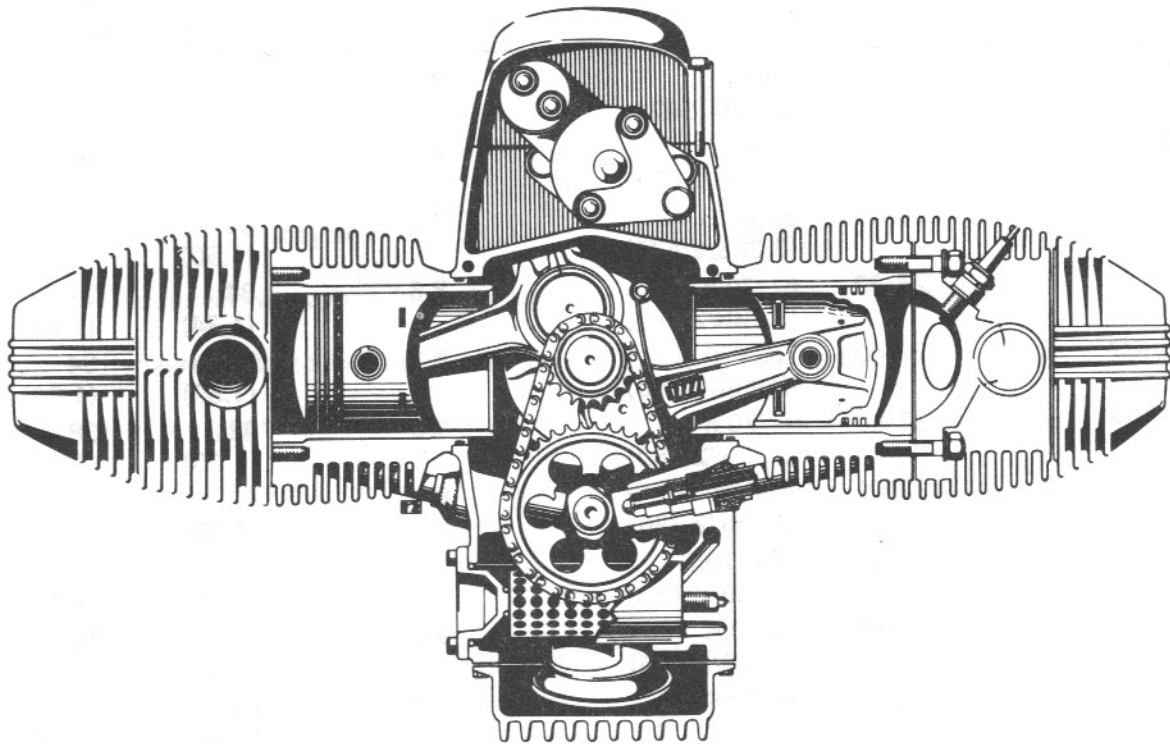


The BMW Motorcycle Engine

Documentation for the BMW Service Training School

BMW Motorrad GmbH + Co.
Service Promotion





- BMW MOTORCYCLE ENGINE: AIRCOOLED, HORIZONTALLY OPPOSED TWIN CYLINDER FOUR-STROKE
- CRANKCASE: ONE-PIECE TUNNEL CASTING
- CRANKSHAFT: STEEL DROP FORGING
- MAIN AND BIG END BEARING JOURNALS: 'TENIFER' TREATED
- CAMSHAFT: CLEAR CHILL CASTING, SLIP PHOSPHATIZED
- PISTONS: LIGHT ALLOY, PINS OFFSET
- CYLINDER BARRELS: COMPOSITE ALUMINUM, WITH 'NIKASIL' OR 'GALNIKAL' BORE SURFACES
- CYLINDER HEADS: LIGHT ALLOY WITH SHRINK-FIT VALVE SEAT RINGS
- VALVE GEAR: OPERATED FROM CAMSHAFT BY CHILL CAST TAPPETS, ALUMINUM PUSHRODS AND ROCKERS
- LUBRICATING SYSTEM: EATON TYPE PUMP WITH FULL-FLOW OIL FILTER

SPECIFICATIONS

MODEL *	CYL. CODE	KW/HP	BORE/STROKE mm (in)	COMPR. RATIO (: 1)	VALVE DIAM. INL. EXH. mm (in)
R N	45	20/27	70/61.5 (2.756/2.421)	8.2	34 32 (1.34) (1.26)
R 45 S	45	26/35	70/61.5 (2.756/2.421)	9.2	34 32 (1.34) (1.26)
R 65	65	33/45	82/61.5 (3.228/2.421)	9.2	38 34 (1.50) (1.34)
R 50/5	5	24/32	67/70.6 (2.638/2.780)	8.6	34 32 (1.34) (1.26)
R 60/5/6/7	6	29/40	73.5/70.6 (2.894/2.780)	9.2	38 34 (1.50) (1.34)
R 75/5/6/7	7	37/50	82/70.6 (3.228/2.780)	9.0	42 38 (1.65) (1.50)
R 80/7 N	8	37/50	84.8/70.6 (3.339/2.780)	8.0	42 38 (1.65) (1.50)
R 80/7 S	8	40/55	84.8/70.6 (3.339/2.780)	9.2	42 38 (1.65) (1.50)
R 90/6	9	44/60	90/70.6 (3.543/2.780)	9.0	42 40 (1.65) (1.57)
R 90 S	9	49/67	90/70.6 (3.543/2.780)	9.5	42 40 (1.65) (1.57)
R 100/7	1	44/60	94/70.6 (3.701/2.780)	9.0	42 40 (1.65) (1.57)
R 100 T	1	48/65	94/70.6 (3.701/2.780)	9.5	44 40 (1.73) (1.57)
R 100 S	1	48/65	94/70.6 (3.701/2.780)	9.5	44 40 (1.73) (1.57)
R 100 S '79	1	51/70	94/70.6 (3.701/2.780)	9.5	44 40 (1.73) (1.57)
R 100 RS	1	51/70	94/70.6 (3.701/2.780)	9.5	44 40 (1.73) (1.57)
R 100 RT	1	51/70	94/70.6 (3.701/2.780)	9.5	44 40 (1.73) (1.57)

* up to 1980 models

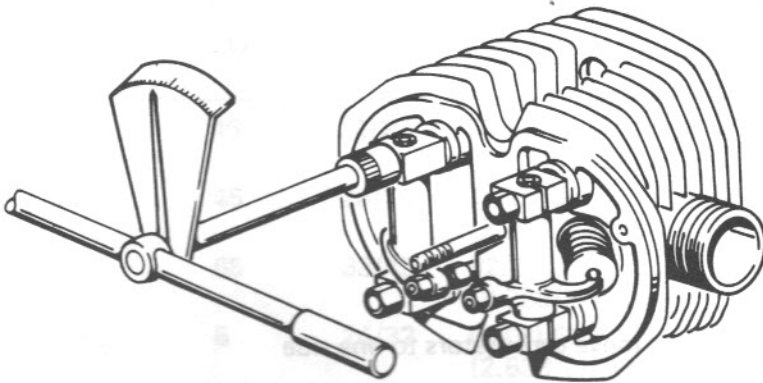
From 1981 models on:

R 65	37/50	82/61.5 (3.228/2.421)	9.2	40 36 (1.57) (1.42)
R 100	49/67	94/70.6 (3.701/2.780)	8.2	44 40 (1.73) (1.57)
R 100 CS	51/70	94/70.6 (3.701/2.780)	9.5	44 40 (1.73) (1.57)
R 80 G/S	37/50	84.8/70.6 (3.339/2.780)	8.2	42 38 (1.65) (1.50)

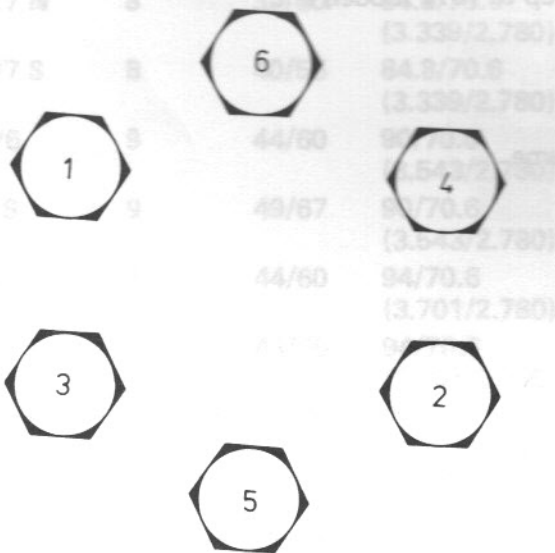
- 
- ectors and move carburetors to one side
- and pull swinging fork back

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

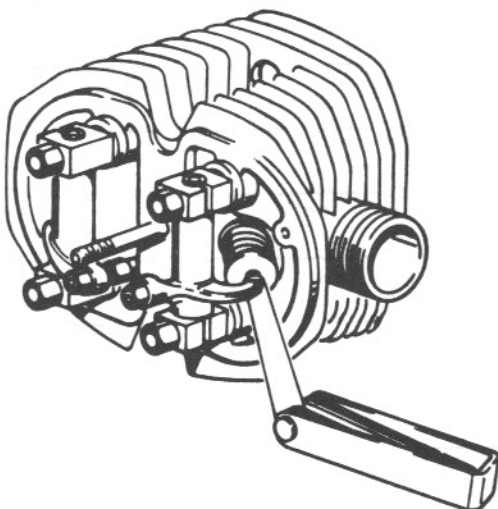
VALVE CLEARANCES – ROCKERS – CYLINDER HEAD



Tighten the cylinder head retaining nuts with the engine cold, in three torque stages

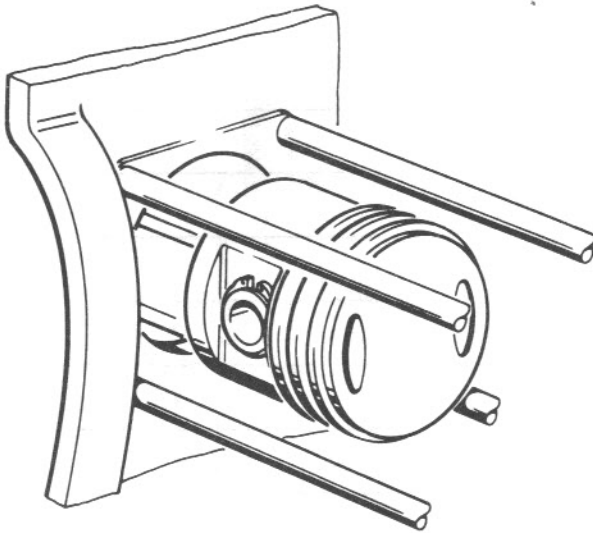


Tightening sequence

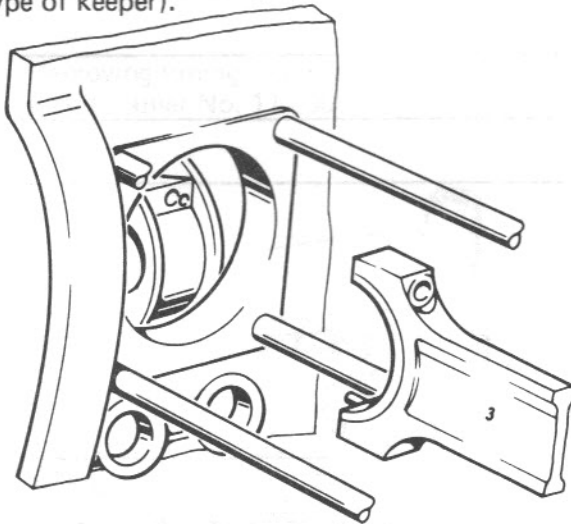


Adjust valve clearances with engine cold

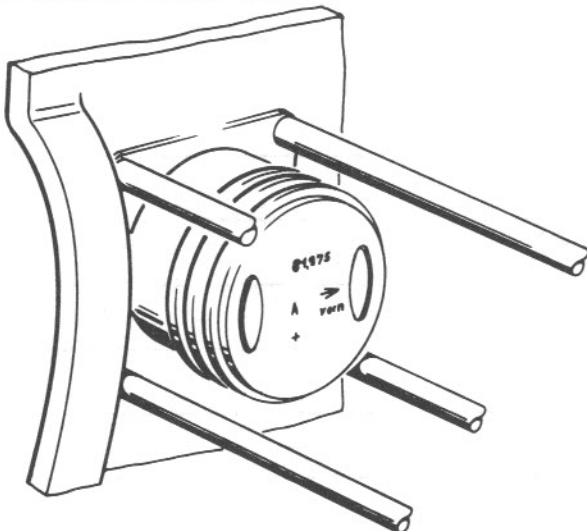
PISTONS AND CONNECTING RODS



Remove the piston pin keeper with Seeger circlip pliers or a scriber needle (according to type of keeper).



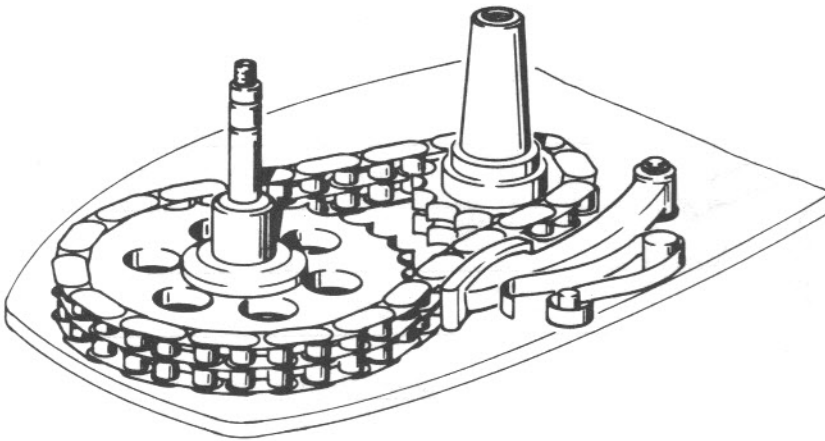
Install the connecting rod with the retaining pins at the front (direction of travel of motorcycle).



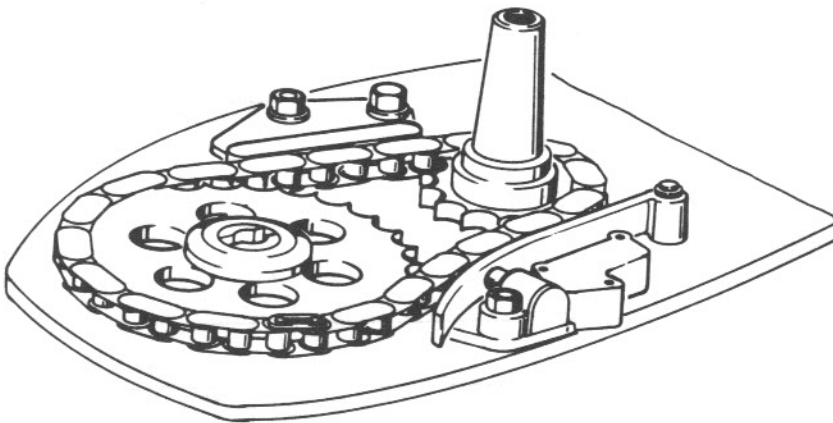
Install the pistons with the 'vorn' (front) mark facing forwards.

CRANKSHAFT DRIVE
TIMING CASE COVER

**CAMSHAFT DRIVE
TIMING CASE COVER**

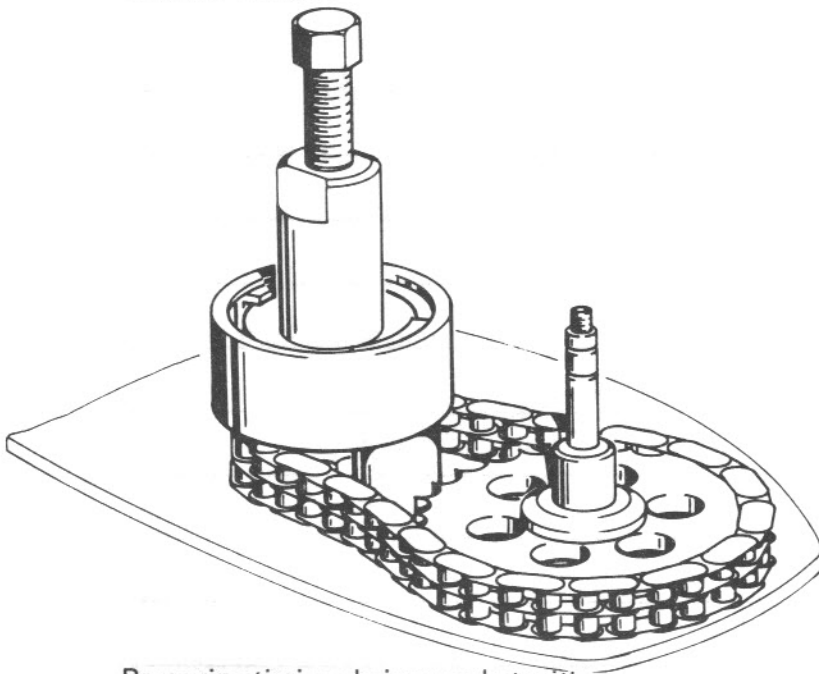


Duplex timing chain with tensioner

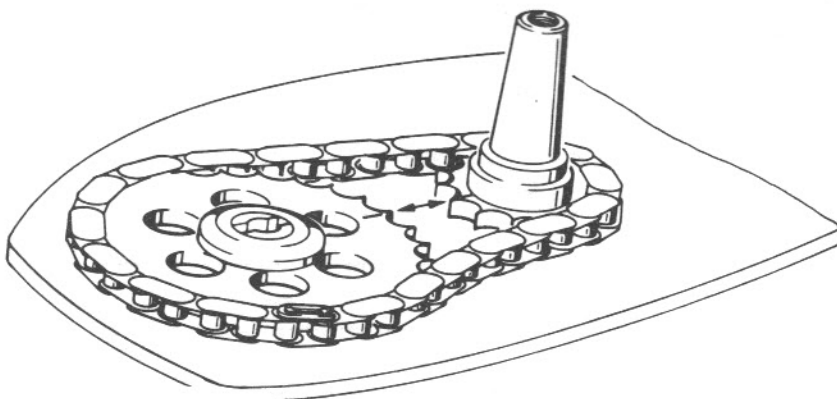


Single timing chain with hydraulically
damped chain tensioner and slide rail

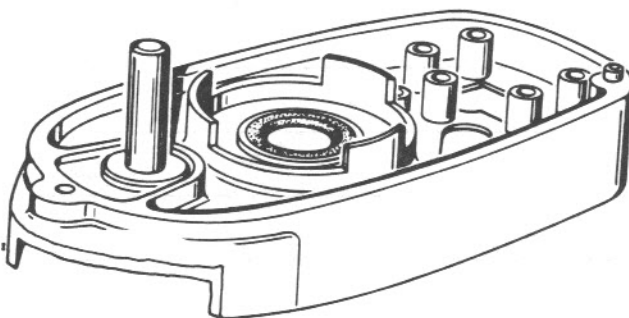
TIMING CHAIN SPROCKET PULLER
TIMING MARKS



Removing timing chain sprocket with
special puller No. 112600

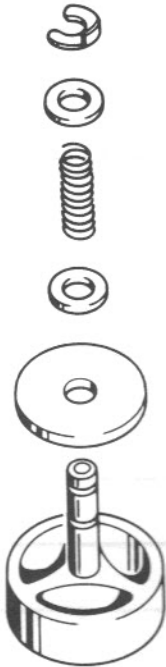


Timing marks on chain sprockets

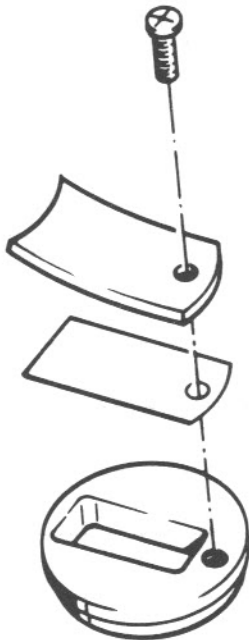


Cover assembly (up to 1978 model,
with assembly arbor No. 111820/830)

ENGINE BREATHER

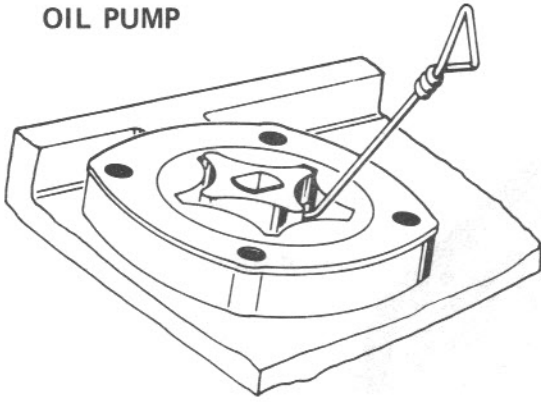


Non-return valve with spring-loaded
fiber plate

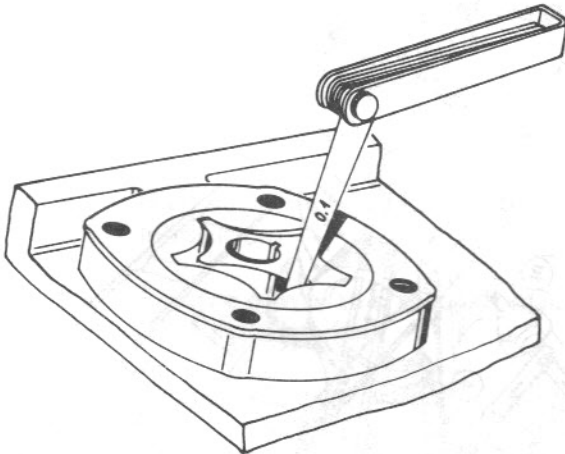


Diaphragm valve with metal tongue

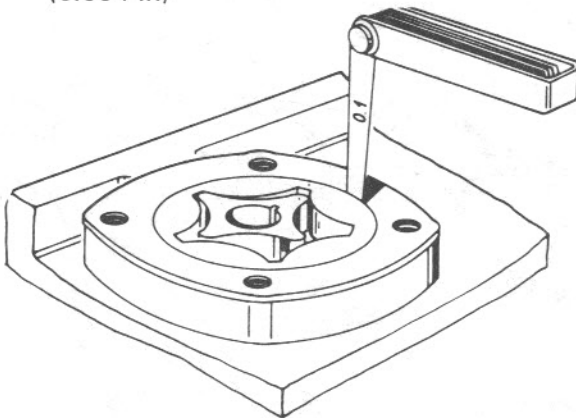
OIL PUMP



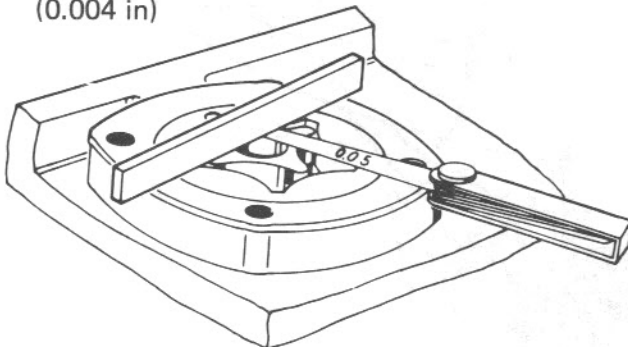
Disassembly of inner and outer rotor



Max. inner rotor test clearance 0.1 mm
(0.004 in)

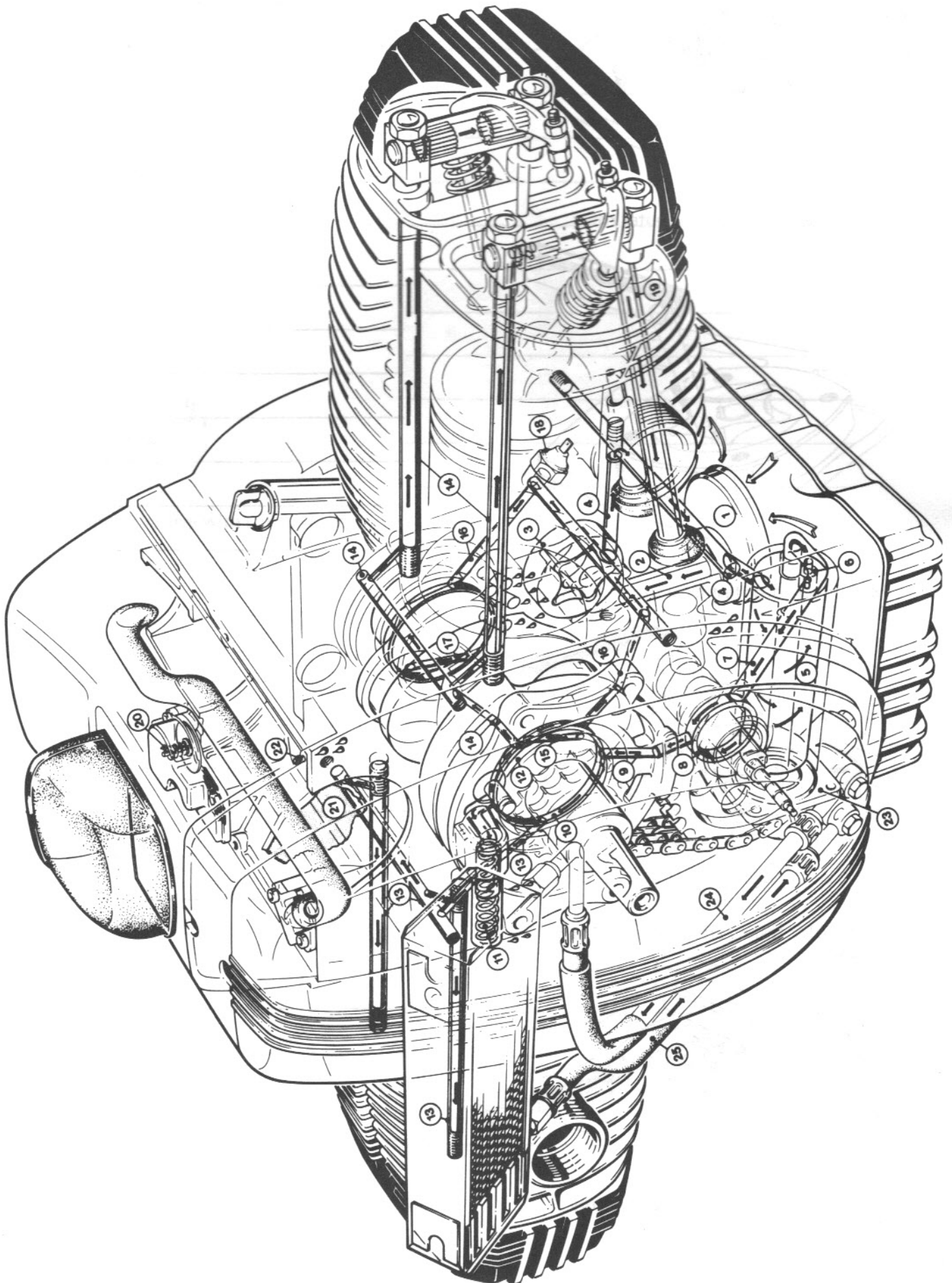


Outer rotor test clearance max. 0.1 mm
(0.004 in)



Side clearance, inner and outer rotors
max. 0.05 mm (0.002 in)

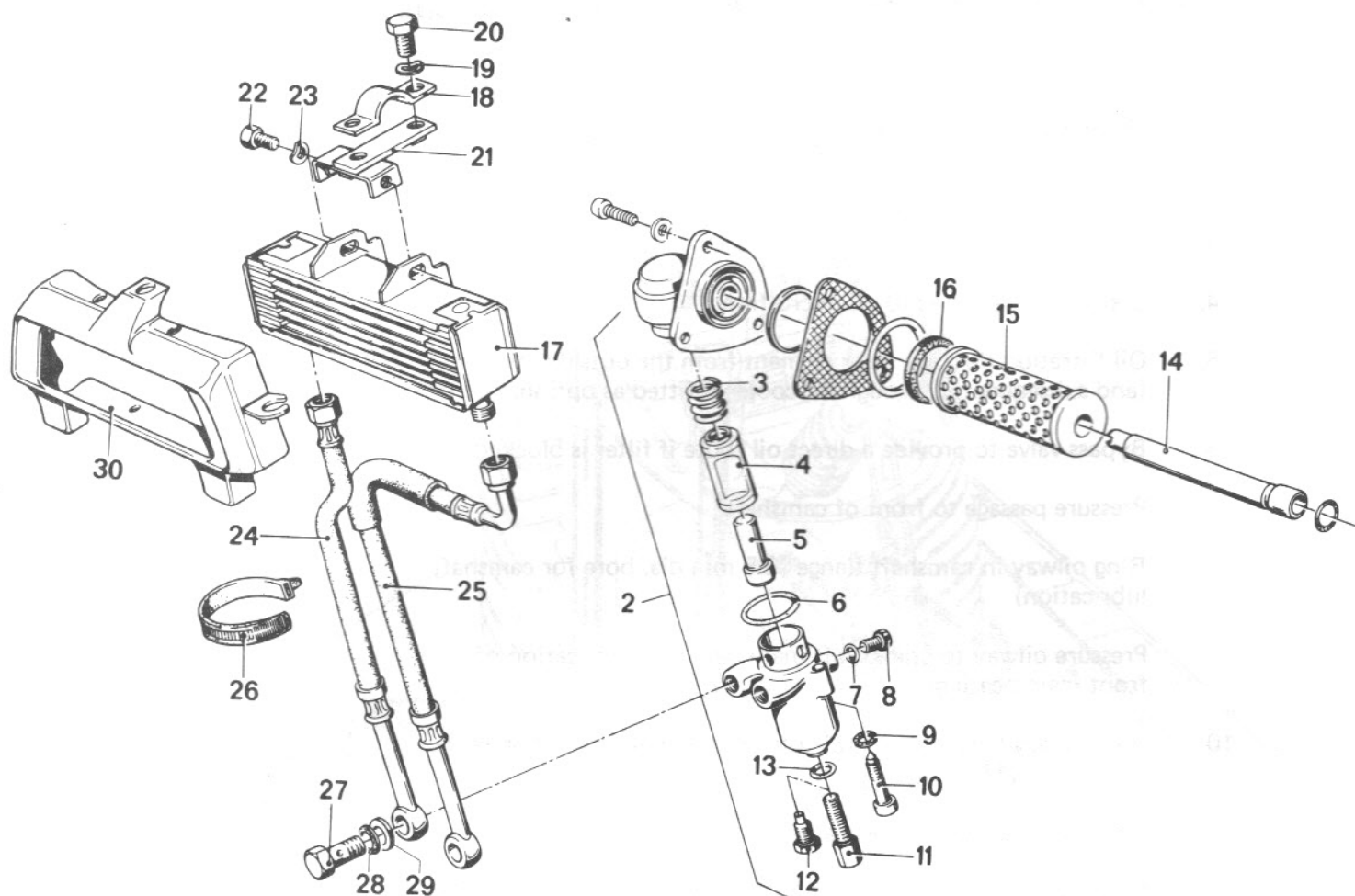
ENGINE LUBRICATING OIL CIRCUIT



KEY TO ENGINE LUBRICATING OIL CIRCUIT — UP TO 1980 MODELS

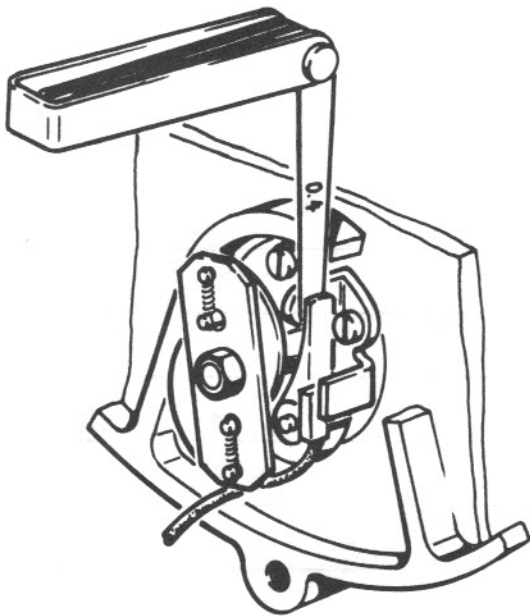
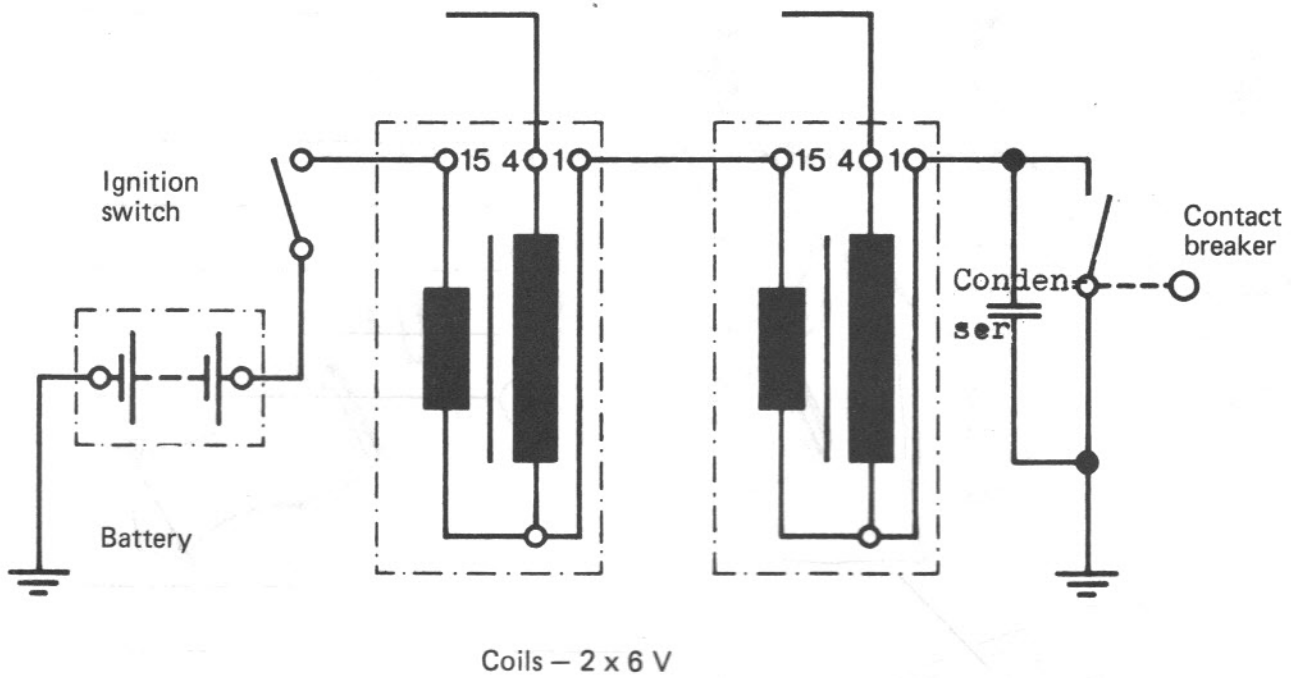
1. Oil pickup head in oil sump
2. Riser pipe to oil pump
3. Eaton oil pump
4. Distribution passage to oil micro-filter
5. Oil filtration through filter element from the outside inwards (and subsequently through oil cooler if fitted as optional extra)
6. Bypass valve to provide a direct oil route if filter is blocked
7. Pressure passage to front of camshaft
8. Ring oilway in camshaft flange (2.5 mm dia. bore for camshaft lubrication)
9. Pressure oilway to crankshaft main bearings (lubrication of front main bearing)
10. Ring oilway with outlet (16) to rear main bearing and pressure relief valve (11)
11. Pressure relief valve (opens above 5 bars pressure)
12. Front main bearing shell with outlets to right (13) and left (14) cylinder heads
13. Oilway to right cylinder head (to lubricate rocker shafts and valve stems)
14. Oilway to left cylinder head (to lubricate rocker shafts and valve stems)
15. Drillway in crankshaft leading to right big end bearing
16. Oil passage to oil pressure sensing switch and rear main bearing
17. Drillway in crankshaft leading to right big end bearing
18. Oil pressure sensing switch
19. Return oil flow through pushrod tubes to oil sump
20. Crankcase breather valve
21. Settling chamber for crankcase breather
22. Return bore, 1.5 mm dia., in settling chamber
23. Oil filter head (option: oil cooler with thermostat control valve)
24. Oil feed line (with optional oil cooler)
25. Oil return line (with optional oil cooler)

OIL COOLER — COMPONENTS /7

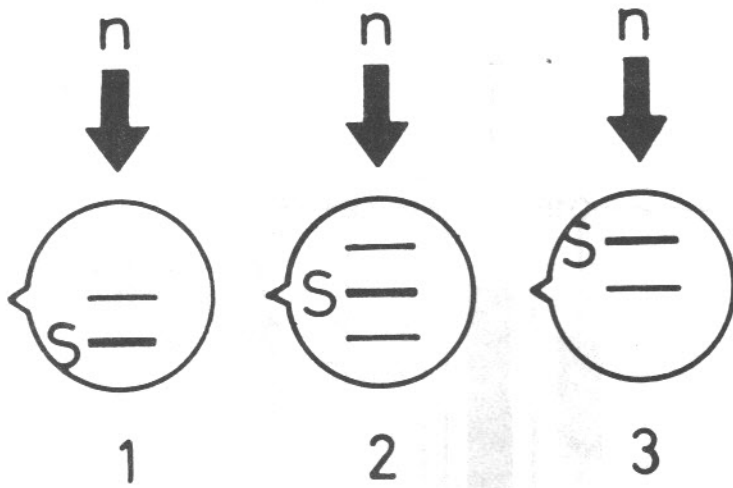


Item No.	Designation (with parts list number)
2	Oil filter head, complete
3	Coil spring
4	Control piston
5	Actuating element (thermostat)
11	Screw plug (oil change)
12	End plug
14	Oil pipe (11 42 1 335 387)
15	Oil filter (11 42 1 335 385)
25	Return line
26	Feed line

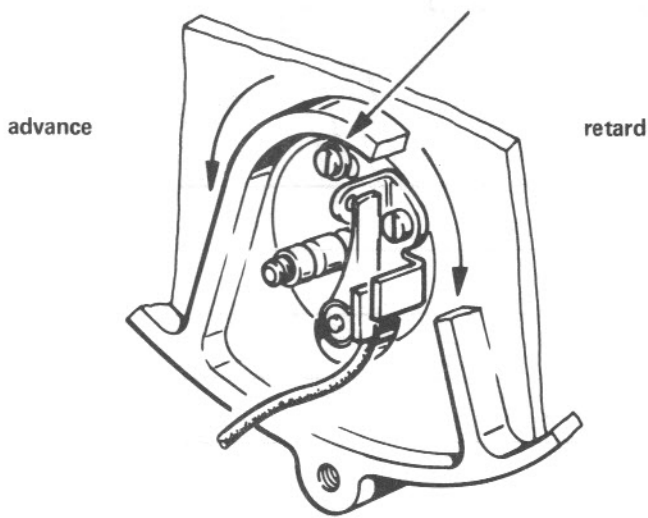
IGNITION — CIRCUIT DIAGRAM FOR ALL MODELS FROM 1969 — 1980



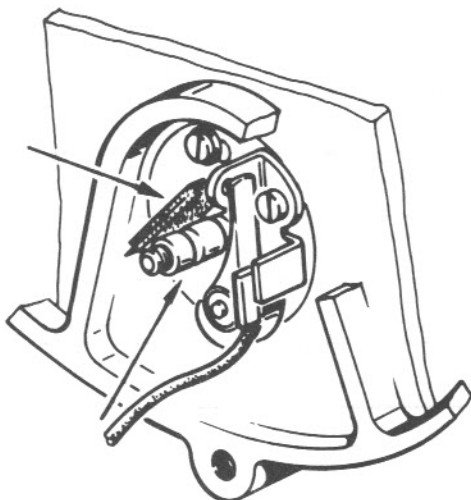
Adjusting breaker points gap — models up to 1978



Ignition timing marks

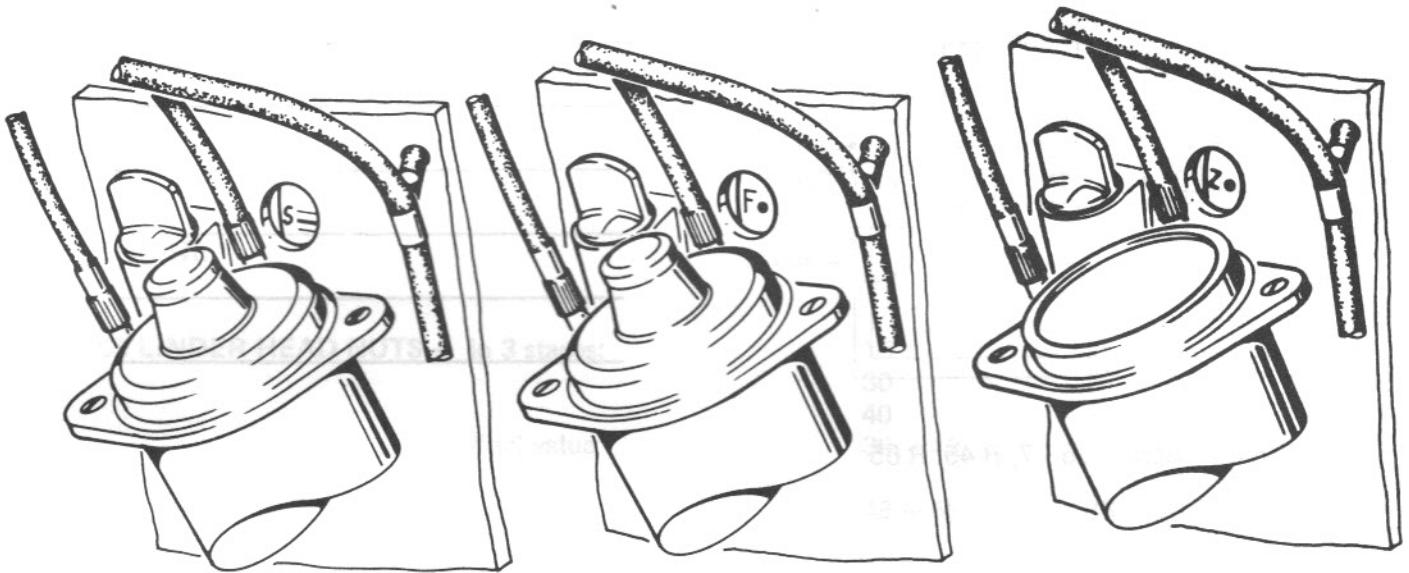


Timing the ignition

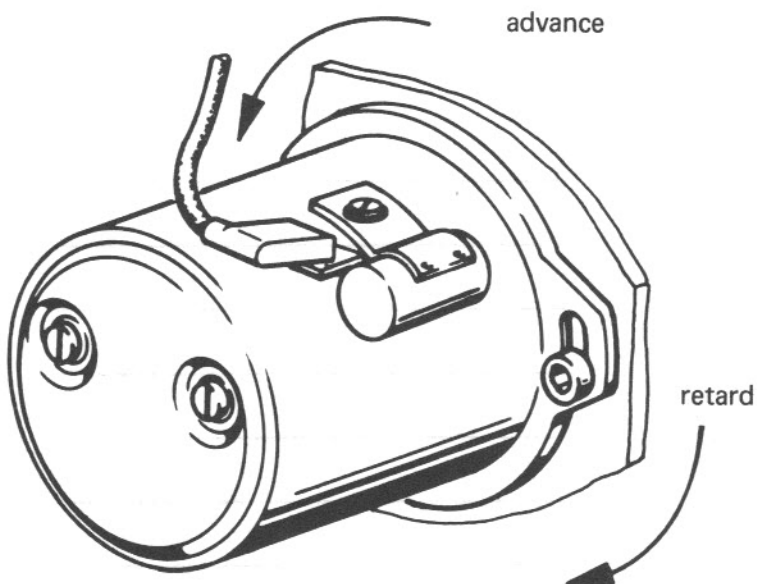


Greasing points

IGNITION SYSTEM — R 45, R 65, /7 until 1980

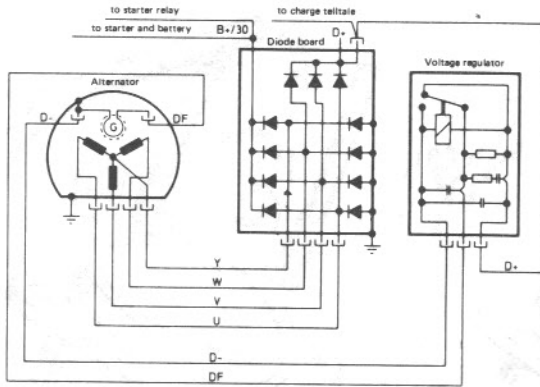


Checking ignition timing

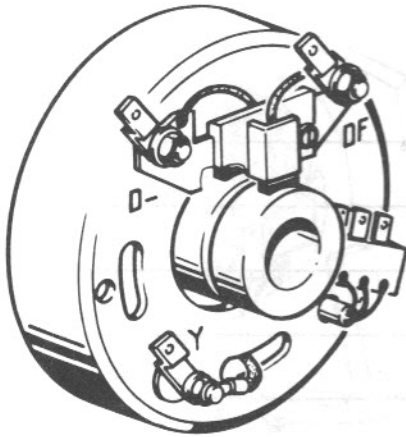


Adjusting ignition timing

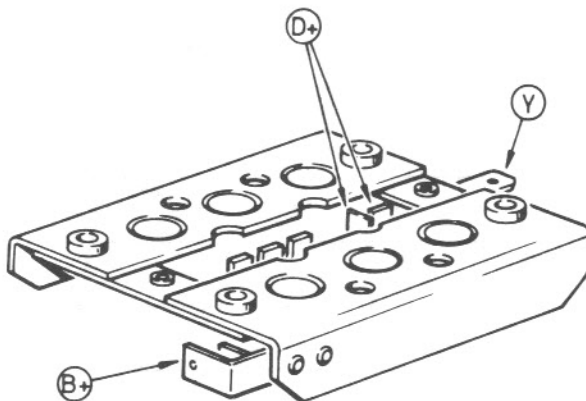
ALTERNATOR, DIODE BOARD



Circuit diagram /6, /7, R 45, R 65



Checking the armature



Measuring voltage between B+ and D+

SUMMARY OF TIGHTENING TORQUES IN NM

(10 Newton-meters (Nm) = app. 1 mkgp)

ENGINE

	Nm	(lb.ft)
CYLINDER HEAD NUTS — in 3 stages:	15	11
	30	22
	40	29
— final value	38 — 42	28 — 31
BIG END BOLTS	48 — 52	35 — 38
OIL SUMP TO CRANKCASE	9 — 11	6.6 — 8.1
VALVE ADJUSTING SCREW LOCKNUT	18 — 21	13.2 — 15.5
CARBURETOR CONNECTING STUB PIPES	120 — 140	88 — 103
FLYWHEEL — R 50/5 — R 75/5		
M 10 bolts, 26 mm (1.02 in) long	60 — 65	44 — 48
R 60/6 — R 90 S		
M 10 bolts, 32 mm (1.26 in) long	65 — 70	48 — 52
/6 and /7, 1976 models		
M 11 bolts, 32 mm (1.26 in) long	100 — 105	74 — 77
R 45 and R 65 models as /7		