
Workshop Manual

BMW R 50/5
R 60/5
R 75/5

Bayerische Motoren Werke AG München



Workshop Manual **BMW R 50/5**
 R 60/5
 R 75/5

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Bayerische Motoren Werke AG München

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INTRODUCTION

The purpose of this repair manual is to provide the necessary information to perform the required maintenance and repairs. It is most useful to a trained BMW specialist and supplements the knowledge he acquired during the training sessions in a BMW Service School.

Each main section is preceded by the corresponding specifications. The various groups are, according to the system, established in the flat rate manual.

Example:

33-10/2 in the index means:

33 Main section

-10 Sub section

/ 2 Page number of the sub section.

The special tools that are available are listed in the Tool catalog, Part No. 01 99 099 420. The method with which these tools are used is illustrated in the appropriate section of this repair manual.

As a rule, the sequence of removal is explained. If the reassembly is not possible in reverse order of the removal, it is explained accordingly.

For any subsequent changes and additions, new sheets will be issued. They either replace existing sheets or they are added.

Additional information can be derived from Service Bulletins, and the illustrations in the parts catalog.

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Specifications

Type	R 50/5	R 60/5	R 75/5	Engine
Engine type	Horizontally opposed with overhead valves			
Engine number location	On the left side of engine housing near the dip stick			
Stroke mm	67 (2.68")	73.5 (3.07")	82 (3.2")	Bore mm
Number of cylinders	2			
Arrangement of cylinders	Horizontally-opposed			
Squareness ratio	1.05	0.96	0.86	
Displacement cm ³	498	599	745	
Compression ratio	8.6 : 1	9.2 : 1	9.0 : 1	
Horse Power HP at RPM	36/6600	46/6600	57/6400	
Maximum permitted RPM	6500	6500	6200	
Idle speed RPM	7000			
Maximum permitted break-in	800 ÷ 1000			
Direction of rotation	Clockwise (as viewed from the front)			
HP cu. inch	1.14	1.25	1.24	
Maximum torque lb-ft at RPM	28.2 / 5000	35.5 / 5000	43.4 / 5000	

Type	R 50/5	R 60/5	R 75/5	Engine
Specifications				
Instructions for compression check	1. Remove spark plugs.	2. Using a calibrated compressor, check compression whether battery fully charged, engine at normal operating temperature and wide open throttle. Turn engine over at starting speed, using electric starter for this check. Remove vacuum type carburetor prior to checking.	(With carburetor and oil, without ignition coils and intake system) "With carburetor and oil, without ignition coils and intake system"	Curb weight lbs
Recommended Fuel	129	139	143	Fuel consumption Miles/gallon
Recommended Fuel	Regular	Premium	54.2	Fuel consumption Miles/gallon
Engine lubrication system:	High pressure wet sump system	Full flow	49	45.2
Oil pump type	Rotary full pressure	Oil pressure warning light	0.2÷0.5	Oil consumption (miles/quarts)
Oil filter	Without filter change Lit. (quarts)	With filter change Lit. (quarts)	2.25 (2.11 US quarts / 1.76 Imp quarts)	Oil consumption (miles/quarts)
Oil pump type	Full flow	Oil pressure warning light	0.1 (0.106 US quarts / 0.088 Imp quarts)	Oil recommendation
Oil filter	Oil pressure below 32° Fahrerheizung bei 38° Fahreranheizung	Oil pressure below 32° Fahreranheizung bei 38° Fahrerheizung	Single grade HD oil SAE 30	Oil grade HD oil SAE 40
Oil pump type	Brand name engine oil SAE 10W30	Brand name engine oil SAE 10W30	over 86° F. and for high speed requirements	over 86° F. and for high speed requirements
Oil pump type	Single grade HD oil SAE 30	Single grade HD oil SAE 30	32° Fahreranheizung bei 38° Fahrerheizung	32° Fahreranheizung bei 38° Fahrerheizung
Oil pump type	5.0 (71 psi)	6000	0.1÷0.7 (0.004"÷0.0068")	Outer rotor clearance mm
Oil pump type	1400 (1480 US quarts / 1230 Imp quarts)	0.1÷0.7 (0.004"÷0.0068")	0.1 (0.025"÷0.001")	Outer rotor diameter mm
Oil pump type	57.1, 0	57.2, 0	+0.046 (2.15"÷0.00184")	Housing diameter mm

Type	R 50/5	R 60/5	R 75/5	Engine
Specifications				
Instructions for compression check	1. Remove spark plugs.	2. Using a calibrated compressor, check compression whether battery fully charged, engine at normal operating temperature and wide open throttle. Turn engine over at starting speed, using electric starter for this check. Remove vacuum type carburetor prior to checking.	(With carburetor and oil, without ignition coils and intake system) "With carburetor and oil, without ignition coils and intake system"	Curb weight lbs
Recommended Fuel	Regular	Premium	54.2	Fuel consumption Miles/gallon
Recommended Fuel	129	139	49	Fuel consumption Miles/gallon
Fuel consumption Miles/gallon	49	49	45.2	Fuel consumption Miles/gallon
Compressor lbs/inch² above average	128÷142.2	128÷142.2	below 128	Compressor lbs/inch² above average
Piston speed ft/sec.	49.5	49.5	64.00	Piston speed ft/sec.
Piston speed ft/sec.	64.00	64.00	62.00	Piston speed ft/sec.
Instructions for compression check	1. Remove spark plugs.	2. Using a calibrated compressor, check compression whether battery fully charged, engine at normal operating temperature and wide open throttle. Turn engine over at starting speed, using electric starter for this check. Remove vacuum type carburetor prior to checking.	(With carburetor and oil, without ignition coils and intake system) "With carburetor and oil, without ignition coils and intake system"	Curb weight lbs

Type	R 50/5	R 60/5	R 75/5	Engine
Valve Seats:				Specifications
Valve Seats:	103.0-0.4 (4.05"-0.016")	98.5-0.3 (3.88"-0.012")	97.5-0.3 (3.84"-0.012")	Intake mm
Valve Seats:	102.5-0.4 (4.04"-0.016")	98.8-0.4 (3.89"-0.016")	98.8-0.4 (3.89"-0.016")	Exhaust mm
Valves:				Specifications
Intake opens	OT TDC 6° before TDC 6° V OT	40° n UT 40° after BDC 47° n UT	40° v UT 40° before BDC 47° v UT	Exhaust opens
Intake closes	6° before TDC 6° before TDC 6° before TDC	47° after BDC 47° before BDC 47° after BDC	52° before TDC 52° before TDC 52° before TDC	Exhaust closes
Valve timing	With valve clearance of 2 mm			Valves
Exhaust valve	0.20 (0.08")	0.15 (0.06")	0.15 (0.06")	Length (overall)
Adjusted with cold engine				Intake mm
Valve Clearance:	Free length of relieve valve spring mm			Exhaust mm
Housing depth mm	Maximum allowable wear in cover mm			Clearance between rotor mm
Rotor width mm	Clearance between journal surface (pump body) and sealing surface (rotor) mm			Clearance between journal surface (pump body) and sealing surface (rotor) mm
Rotor width mm	14+0.010 (0.55"+0.0004")	14+0.010 (0.55"+0.0004")	0.12-0.23 (0.048-0.012")	Housing depth mm
	+0.025	+0.025	0.12-0.23 (0.048-0.012")	Clearance between rotors mm
	14-0.034 (0.55"-0.00136)	14-0.034 (0.55"-0.00136)	0.050-0.091 (0.022"-0.004")	Clearance between journal surface (pump body) and sealing surface (rotor) mm
	-0.016	-0.016	0.05 (0.02")	Maximum allowable wear in cover mm
			Free length of relieve valve spring mm	Valve Clearance:
				Adjusted with cold engine
				Intake valve
				Exhaust valve
				Valve timing

Type	R 50/5	R 60/5	R 75/5	Engine
				Specifications
Valve clearance:	Free length of relieve valve spring mm			Valve Clearance:
Housing depth mm	Maximum allowable wear in cover mm			Adjusted with cold engine
Rotor width mm	Clearance between journal surface (pump body) and sealing surface (rotor) mm			Intake valve
Rotor width mm	14+0.010 (0.55"+0.0004")	14+0.010 (0.55"+0.0004")	0.12-0.23 (0.048-0.012")	Exhaust valve
	+0.025	+0.025	0.12-0.23 (0.048-0.012")	Valve timing
	14-0.034 (0.55"-0.00136)	14-0.034 (0.55"-0.00136)	0.050-0.091 (0.022"-0.004")	Adjusted with cold engine
	-0.016	-0.016	0.05 (0.02")	Intake valve
			Free length of relieve valve spring mm	Valve Clearance:
				Adjusted with cold engine
				Intake valve
				Exhaust valve
				Valve timing

Specifications

Engine

Type	R 50/5	R 60/5	R 75/5
Valve Spindles:			
Wire diameter mm	4,25 (0,167")		
Outer diameter mm	31,9 (1,255")		
Free length mm	42,5 (1,67")		
Spring load at length mm	29 kp/37,6 mm (64 lbs/1,48") 70 kp/28,5 mm (54,5 lbs/1,125")		
lbs./inches	cc. 43,5 (1,71")		
Direction of winding	right		
Number of windings	6		
Installed position	Crank pin fitted winding toward cylinder head		
Rocker arm:			
Rocker arm bore diameter mm	18 + 0,032 (0,708" + 0,00128)		
Outer diameter of rocker arm bushing mm	18 + 0,012 (0,708" + 0,00048)		
Inner diameter of rocker arm bushing mm	14,5 + 0,030 (0,57" + 0,0012)		
Rocker arm shaft diameter mm	14,5 + 0,012 (0,57" + 0,00048)		
Clearance of rocker arm shaft mm	0,002 + 0,047 (0,00008" + 0,00188")		
Rocker arm clearance mm	0,002 + 0,047 (0,00008" + 0,00188")		
Rocker arm side play	No clearance (spring pre-load)		

Specifications

Engine

Type	R 50/5	R 60/5	R 75/5
Valve clearances:			
Full height mm	54 (2,13")		
Outer diameter mm	14 + 0,061 (0,551" + 0,00244)		
Inner diameter mm	8 + 0,015 (0,315" + 0,0006)		
Bore in cylinder head mm	14 + 0,018 (0,551" + 0,00072)		
Cylinder head Fehnheit	240 + 260 (460 + 500°F)		
Repetier temperatur mm	14,1 + 0,050 (0,551" + 0,00244)		
Valve guide oversizes	0,032 + 0,061 (0,0128" + 0,00244)		
Intake mm	0,050 + 0,080 (0,0016" + 0,0028")		
Exhaust mm	0,040 + 0,070 (0,0016" + 0,0028")		
Value seat clearance:	0,050 + 0,080 (0,0016" + 0,0028")		
Or through tappets push rods and rocker arms	0,15 (0,006")		
Cam shaft/drive	Duplex chain with chain tensioner		
Cam chain	3/8 X 7/32		
Roller diameter mm	6,35 (0,25")		
Number of links	50		

Specifications

Type	R 50/5	R 60/5	R 75/5	Engine
Bore diameter for front main bearing	$65_0^{+0.19}$ ($2.56^{+0.00076}$)	$65_0^{+0.19}$ ($2.56^{+0.00076}$)	$65_0^{+0.19}$ ($2.56^{+0.00076}$)	
Connecting rod journal diameter ϕ mm	$48_0^{-0.09}$ ($1.89^{+0.00036}$)	$48_0^{-0.09}$ ($1.89^{+0.00036}$)	$48_0^{-0.09}$ ($1.89^{+0.00036}$)	
Connecting rod journal diameter ϕ mm	$48_0^{-0.04}$ ($1.89^{+0.00036}$)	$48_0^{-0.04}$ ($1.89^{+0.00036}$)	$48_0^{-0.04}$ ($1.89^{+0.00036}$)	
First fit oversize mm	$47.75_0^{-0.025}$ ($1.88^{+0.00036}$)	$47.75_0^{-0.025}$ ($1.88^{+0.00036}$)	$47.75_0^{-0.025}$ ($1.88^{+0.00036}$)	
Second undersize mm	$47.50_0^{-0.025}$ ($1.87^{+0.00036}$)	$47.50_0^{-0.025}$ ($1.87^{+0.00036}$)	$47.50_0^{-0.025}$ ($1.87^{+0.00036}$)	
Connecting rod journal width mm	$22_0^{+0.149}$ ($0.866^{+0.0595}$)	$22_0^{+0.149}$ ($0.866^{+0.0595}$)	$22_0^{+0.149}$ ($0.866^{+0.0595}$)	
Maximum allowable wear mm	0.02 ($0.0008^{+0.00036}$)	0.02 ($0.0008^{+0.00036}$)	0.02 ($0.0008^{+0.00036}$)	
Front shaft end play mm	$0.08 \div 0.15$ ($0.0032^{+0.06^{+0.00036}}$)	$0.08 \div 0.15$ ($0.0032^{+0.06^{+0.00036}}$)	$0.08 \div 0.15$ ($0.0032^{+0.06^{+0.00036}}$)	
Maximum allowable runout of front crank-shaft mm	$0.08 \div 0.15$ ($0.0032^{+0.06^{+0.00036}}$)	$0.08 \div 0.15$ ($0.0032^{+0.06^{+0.00036}}$)	$0.08 \div 0.15$ ($0.0032^{+0.06^{+0.00036}}$)	
Shaft sleeve measured from center big end to center small end mm	135 ($5.314^{+0.00036}$)	135 ($5.314^{+0.00036}$)	135 ($5.314^{+0.00036}$)	
Hrusti woscher blue mm	$2.483 \div 2.530$ ($0.095^{+0.0955}$)	$2.530 \div 2.578$ ($0.095^{+0.105}$)	$2.575 \div 2.626$ ($0.1015 \div 0.103^{+0.00036}$)	
Hrusti woscher green mm	$2.530 \div 2.578$ ($0.095^{+0.105}$)	$2.575 \div 2.626$ ($0.1015 \div 0.103^{+0.00036}$)	$2.626 \div 2.673$ ($0.103 \div 0.105^{+0.00036}$)	
Maximum flywheel clutch full runout mm	0.10 ($0.004^{+0.00036}$)	0.10 ($0.004^{+0.00036}$)	0.10 ($0.004^{+0.00036}$)	
Connecting rod:				
Center distance between big and small ends mm	135 ($5.314^{+0.00036}$)	135 ($5.314^{+0.00036}$)	135 ($5.314^{+0.00036}$)	
Connecting rod diameter of wrist pin mm	$24_0^{+0.021}$ ($0.945^{+0.00084}$)	$24_0^{+0.021}$ ($0.945^{+0.00084}$)	$24_0^{+0.021}$ ($0.945^{+0.00084}$)	
Connecting rod bushing bore ϕ mm	$22_0^{+0.020}$ ($0.866^{+0.0008}$)	$22_0^{+0.020}$ ($0.866^{+0.0008}$)	$22_0^{+0.020}$ ($0.866^{+0.0008}$)	
Connecting rod bushing bore ϕ mm	$22_0^{+0.040}$ ($0.866^{+0.0115}$)	$22_0^{+0.040}$ ($0.866^{+0.0115}$)	$22_0^{+0.040}$ ($0.866^{+0.0115}$)	
Wrist pin bushing outer diameter mm	$24.060 \div 24.100$	$24.060 \div 24.100$	$24.060 \div 24.100$	
Wrist pin bushing inner thickness mm	$(0.946^{+0.048})$	$(0.946^{+0.048})$	$(0.946^{+0.048})$	
Engine				

Type	R 50/5	R 60/5	R 75/5	Engine
Bore diameter for front main bearing	$65_0^{+0.19}$ ($2.56^{+0.00076}$)	$65_0^{+0.19}$ ($2.56^{+0.00076}$)	$65_0^{+0.19}$ ($2.56^{+0.00076}$)	
Connecting rod journal diameter ϕ mm	$48_0^{-0.050}$ ($1.89^{+0.00025}$)	$48_0^{-0.050}$ ($1.89^{+0.00025}$)	$48_0^{-0.050}$ ($1.89^{+0.00025}$)	
Connecting rod journal diameter ϕ mm	$48_0^{-0.04}$ ($1.89^{+0.00025}$)	$48_0^{-0.04}$ ($1.89^{+0.00025}$)	$48_0^{-0.04}$ ($1.89^{+0.00025}$)	
First fit oversize mm	$47.75_0^{-0.025}$ ($1.88^{+0.00036}$)	$47.75_0^{-0.025}$ ($1.88^{+0.00036}$)	$47.75_0^{-0.025}$ ($1.88^{+0.00036}$)	
Second undersize mm	$47.50_0^{-0.025}$ ($1.87^{+0.00036}$)	$47.50_0^{-0.025}$ ($1.87^{+0.00036}$)	$47.50_0^{-0.025}$ ($1.87^{+0.00036}$)	
Connecting rod journal width mm	$22_0^{+0.149}$ ($0.866^{+0.0595}$)	$22_0^{+0.149}$ ($0.866^{+0.0595}$)	$22_0^{+0.149}$ ($0.866^{+0.0595}$)	
Maximum allowable wear mm	0.02 ($0.0008^{+0.00036}$)	0.02 ($0.0008^{+0.00036}$)	0.02 ($0.0008^{+0.00036}$)	
Front shaft end play mm	$0.08 \div 0.15$ ($0.0032^{+0.06^{+0.00036}}$)	$0.08 \div 0.15$ ($0.0032^{+0.06^{+0.00036}}$)	$0.08 \div 0.15$ ($0.0032^{+0.06^{+0.00036}}$)	
Maximum runout of front crank-shaft mm	$0.08 \div 0.15$ ($0.0032^{+0.06^{+0.00036}}$)	$0.08 \div 0.15$ ($0.0032^{+0.06^{+0.00036}}$)	$0.08 \div 0.15$ ($0.0032^{+0.06^{+0.00036}}$)	
Hrusti woscher red mm	$2.483 \div 2.530$ ($0.095^{+0.0955}$)	$2.530 \div 2.578$ ($0.095^{+0.105}$)	$2.575 \div 2.626$ ($0.1015 \div 0.103^{+0.00036}$)	
Hrusti woscher green mm	$2.530 \div 2.578$ ($0.095^{+0.105}$)	$2.575 \div 2.626$ ($0.1015 \div 0.103^{+0.00036}$)	$2.626 \div 2.673$ ($0.103 \div 0.105^{+0.00036}$)	
Maximum flywheel clutch full runout mm	0.10 ($0.004^{+0.00036}$)	0.10 ($0.004^{+0.00036}$)	0.10 ($0.004^{+0.00036}$)	
Connecting rod:				
Wrist pin bushing outer diameter mm	$24.060 \div 24.100$	$24.060 \div 24.100$	$24.060 \div 24.100$	
Wrist pin bushing inner thickness mm	$(0.946^{+0.048})$	$(0.946^{+0.048})$	$(0.946^{+0.048})$	
Engine				

Specifications

Type	R 50/5	R 60/5	R 75/5	Engine
Piston rings:				
1st groove (Top ring) height mm	$0.25 \div 0.40$ ($0.01'' \div 0.016''$)	$0.25 \div 0.40$ (d_{lo})	$0.30 \div 0.45$ ($0.012'' \div 0.018''$)	
2 nd GROOVE (nose ring) height mm	$0.25 \div 0.40$ ($0.01'' \div 0.016''$)	$0.25 \div 0.40$ (d_{lo})	$0.30 \div 0.45$ ($0.012'' \div 0.018''$)	
Side clearance mm	$0.25 \div 0.40$ ($0.01'' \div 0.016''$)	$0.25 \div 0.40$ (d_{lo})	$0.30 \div 0.45$ ($0.012'' \div 0.018''$)	
Ring gap mm	$0.25 \div 0.40$ ($0.01'' \div 0.016''$)	$0.25 \div 0.40$ (d_{lo})	$0.30 \div 0.45$ ($0.012'' \div 0.018''$)	
Ring groove (oil scraper ring) height mm	$1.75 \div 0.040$ ($0.0689'' \div 0.0024''$)	$1.75 \div 0.040$ ($0.0689'' \div 0.0016''$)	$1.75 \div 0.040$ ($0.0689'' \div 0.0024''$)	
Slide clearance mm	$0.25 \div 0.40$ ($0.01'' \div 0.016''$)	$0.25 \div 0.40$ (d_{lo})	$0.30 \div 0.45$ ($0.012'' \div 0.018''$)	
Slide gap mm	$0.25 \div 0.40$ ($0.01'' \div 0.016''$)	$0.25 \div 0.40$ (d_{lo})	$0.30 \div 0.45$ ($0.012'' \div 0.018''$)	
Ring gap mm	$0.25 \div 0.40$ ($0.01'' \div 0.016''$)	$0.25 \div 0.40$ (d_{lo})	$0.30 \div 0.45$ ($0.012'' \div 0.018''$)	
Slide clearance mm	$0.25 \div 0.40$ ($0.01'' \div 0.016''$)	$0.25 \div 0.40$ (d_{lo})	$0.30 \div 0.45$ ($0.012'' \div 0.018''$)	
2 nd GROOVE (nose ring) height mm	$2.00 \div 0.030$ ($0.08'' \div 0.0021''$)	$2.00 \div 0.030$ ($0.08'' \div 0.0012''$)	$2.00 \div 0.030$ ($0.08'' \div 0.0021''$)	
Slide play mm	$0.05 \div 0.06$ ($0.002'' \div 0.0024''$)	$0.05 \div 0.06$ ($0.002'' \div 0.0024''$)	$0.05 \div 0.06$ ($0.002'' \div 0.0024''$)	
Ring gap mm	$0.25 \div 0.40$ ($0.01'' \div 0.016''$)	$0.25 \div 0.40$ (d_{lo})	$0.30 \div 0.45$ ($0.012'' \div 0.018''$)	
Slide clearance mm	$0.25 \div 0.40$ ($0.01'' \div 0.016''$)	$0.25 \div 0.40$ (d_{lo})	$0.30 \div 0.45$ ($0.012'' \div 0.018''$)	
3rd groove (oil scraper ring) height mm	$4.00 \div 0.010$ ($0.16'' \div 0.0012''$)	$4.00 \div 0.010$ ($0.16'' \div 0.0004''$)	$4.00 \div 0.010$ ($0.16'' \div 0.0004''$)	
Slide play mm	$0.03 \div 0.04$ ($0.0012'' \div 0.0016''$)	$0.03 \div 0.04$ ($0.0012'' \div 0.0016''$)	$0.03 \div 0.04$ ($0.0012'' \div 0.0016''$)	
Direction of installation mm				Wrist pin towards top
Wrist pins DIN				BMW's own design
Wrist pin offset mm				Not according to German industrial standards (DIN)

Type	R 50/5	R 60/5	R 75/5	Engine
Piston diameter ϕ mm	66.960 (2.63")	73.460 (2.89")	73.460 (2.91")	73.460 (2.63")
1st oversize + 0.50 mm (0.02")	A 66.960 (2.63")	B 67.460 (2.65")	C 67.960 (2.67")	A 66.960 (2.63")
2nd oversize + 1.0 mm (0.04")	A 67.960 (2.67")	B 69.470 (2.70")	C 71.470 (2.73")	A 67.960 (2.67")
3rd oversize + 1.5 mm (0.06")	A 69.470 (2.70")	B 71.470 (2.73")	C 74.480 (2.76")	A 69.470 (2.70")
4th oversize + 2.0 mm (0.08")	A 71.470 (2.73")	B 73.480 (2.76")	C 76.480 (2.79")	A 71.470 (2.73")
5th oversize + 2.5 mm (0.10")	A 73.480 (2.76")	B 76.480 (2.79")	C 79.480 (2.82")	A 73.480 (2.76")
Standard piston diameter ϕ mm	A 66.970	B 69.470	C 71.470	A 66.970
Wrist pin selection	+ or S indicated	+ or — indicated	W or S indicated	Wrist pin selection
Weight selection	Concave — oval — pitched	Concave — oval — pitched	Concave — oval — pitched	Weight selection
Piston: Pin lip shape	0.12 (0.0048")	0.12 (0.0048")	0.12 (0.0048")	Piston: Pin lip shape
Wrist pin diameter ϕ mm	0.01 (0.0004")	0.01 (0.0004")	0.01 (0.0004")	Wrist pin diameter ϕ mm
Maximum allowable taper of cylinder bore	0.01 (0.0004")	0.01 (0.0004")	0.01 (0.0004")	Maximum allowable taper of cylinder bore
Minimum allowable wear of cylinder	0.01 (0.0004")	0.01 (0.0004")	0.01 (0.0004")	Minimum allowable wear of cylinder
Maximum allowable cylinder bore out-of-round mm	0.12 (0.0048")	0.12 (0.0048")	0.12 (0.0048")	Maximum allowable cylinder bore out-of-round mm

Specifications

Cylinder head nuts	1.2 (87)	lock nut on valve adjustment	1.8-2.2 (13.0-15.9)
Flywheel bolts	5.8-6.2 (41.9-44.8)	Oil pan	3.5-3.9 (25.3-28.2)
Connecting rod bolts	4.0-5.2 (34.7-37.6)	All other nuts	1.5-3.5 (10.8-25.3)
Flywheel bolts	128 (76.8)	All other screws	All other screws of the screw firms or in the new BMW standards sheet 600021.

Torque specifications mlp (ft/lbs)

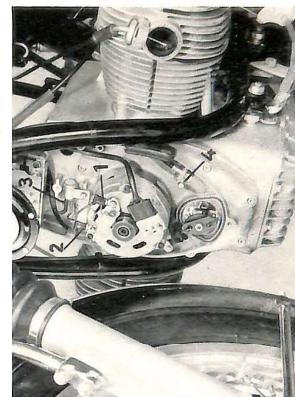
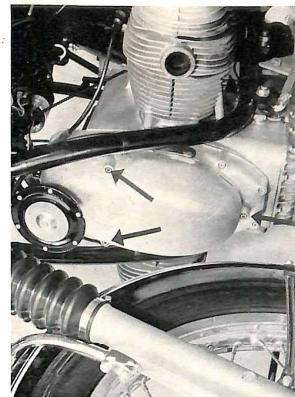
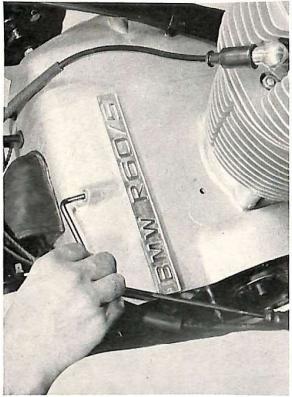
Type	R 50/5	R 60/5	R 75/5
Engine			
Wrist pin bore diameter white mm	22 0 .0003 (0.866" - 0.00012")	22 0 .0006 (0.866" + 0.00012")	Wrist pin bore diameter white mm
Wrist pin bore diameter black mm	22 0 .0003 (0.866" + 0.00012")	22 0 .0003 (0.866" + 0.00012")	Wrist pin bore diameter black mm
Point identification black mm	22 0 .0006 (0.866" - 0.00024")	22 0 .0003 (0.866" - 0.00012")	Point identification black mm
Wrist pin diameter Ø	22 0 .0003 (0.866" 0.00012")	22 0 .0003 (0.866" 0.00012")	Wrist pin bore diameter in piston Ø
Point identification white mm	22 0 .0003 (0.866" 0.00012")	22 0 .0003 (0.866" 0.00012")	When piston is identified "S" (schwarz-black)
Wrist pin bore diameter when Ø	22 0 .0003 (0.866" + 0.00012")	22 0 .0003 (0.866" + 0.00012")	Wrist pin bore diameter when Ø
Wrist pin clearance L. in piston mm	0.000-0.006 (- 0.00024")	0.000-0.006 (- 0.00024")	Clearance of wrist pin
In wrist pin bushing	0.015-0.023 (0.0006" - 0.00092")	0.018-0.026 (0.00072" - 0.00104")	In wrist pin bushing
Top speed	R 50/5	R 60/5	R 75/5
Engine			
Shifting upshift km/h (mph)	ca. 145 (92)	ca. 155 (98)	ca. 165 (108)
Chroughed km/h (mph)	ca. 157 (100)	ca. 157 (105)	ca. 175 (115)
Acceleration from 0 to 30 mph in seconds	3.0	2.6	2.2
from 0 to 60 mph in seconds	6.6	5.5	4.8
from 0 to 50 mph in seconds	10.2	8.2	7.0
from 0 to 40 mph in seconds	14.8	11.3	10.0
from 0 to 30 mph in seconds	19.2	14.1	12.7
from 0 to 20 mph in seconds	22.7	17.0	15.8
from 0 to 10 mph in seconds	22.7	20.0	19.8
from 0 to 90 mph in seconds	22.7	28.0	32.3
Average optimum speed km/h (mph)	111 (66.6)	111 (66.6)	111 (66.6)
Shifting kilometer in seconds	17.2	15.8	14.6
1/4 mile in seconds	32.3	30.4	28.2

Specifications

Type	R 50/5	R 60/5	R 75/5
Engine			
Wrist pin bore diameter Ø	22 0 .0003 (0.866" 0.00012")	22 0 .0006 (0.866" + 0.00012")	On piston head
Wrist pin bore diameter white Ø	22 0 .0003 (0.866" + 0.00012")	22 0 .0006 (0.866" - 0.00024")	With a "W" (white)
Point identification black mm	22 0 .0003 (0.866" 0.00012")	22 0 .0006 (0.866" - 0.00024")	When piston is identified
Wrist pin bore diameter in piston Ø	22 0 .0003 (0.866" + 0.00012")	22 0 .0006 (0.866" - 0.00024")	Wrist pin bore diameter in piston Ø
Wrist pin bore diameter white Ø	22 0 .0003 (0.866" 0.00012")	22 0 .0006 (0.866" - 0.00024")	When piston is identified
Piston is identified "S" (schwarz-black)	22 0 .0003 (0.866" + 0.00012")	22 0 .0006 (0.866" - 0.00024")	Piston is identified "S" (schwarz-black)
Wrist pin clearance L. in piston mm	0.000-0.006 (- 0.00024")	0.000-0.006 (- 0.00024")	Wrist pin clearance L. in piston mm
In wrist pin bushing	0.015-0.023 (0.0006" - 0.00092")	0.018-0.026 (0.00072" - 0.00104")	In wrist pin bushing
Top speed	R 50/5	R 60/5	R 75/5
Engine			
Shifting upshift km/h (mph)	ca. 145 (92)	ca. 155 (98)	ca. 165 (108)
Chroughed km/h (mph)	ca. 157 (100)	ca. 157 (105)	ca. 175 (115)
Acceleration from 0 to 30 mph in seconds	3.0	2.6	2.2
from 0 to 60 mph in seconds	6.6	5.5	4.8
from 0 to 50 mph in seconds	10.2	8.2	7.0
from 0 to 40 mph in seconds	14.8	11.3	10.0
from 0 to 30 mph in seconds	19.2	14.1	12.7
from 0 to 20 mph in seconds	22.7	17.0	15.8
from 0 to 10 mph in seconds	22.7	20.0	19.8
from 0 to 90 mph in seconds	22.7	28.0	32.3
Average optimum speed km/h (mph)	111 (66.6)	111 (66.6)	111 (66.6)
Shifting kilometer in seconds	17.2	15.8	14.6
1/4 mile in seconds	32.3	30.4	28.2

Specifications

All other screws	All other screws of the screw firms or in the new BMW standards sheet 600021.
Flywheel bolts	5.8-6.2 (41.9-44.8)
Connecting rod bolts	4.0-5.2 (34.7-37.6)
Flywheel bolts	128 (76.8)
Cylinder head nuts	1.2 (87)



11 00 050 Engine removal and installation

Remove transmission 2300/020

Remove fuel tank 16 11 030

Remove left ignition coil 12 13 010

Remove exhaust system 18 00/020

Remove right carburetor
Unscrew two allen head bolts and remove upper engine cover (starter cover)

Disconnect starter cable

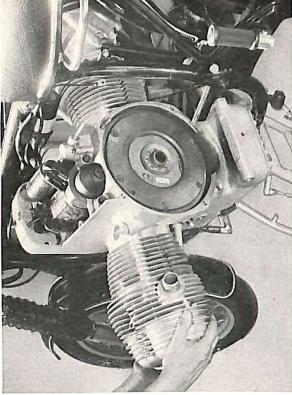
Loosen upper horn mounting bolt. Unscrew the three allen head bolts and remove front engine cover

Fitting instruction:

When installing, be sure that the ventilating hose is firstly installed into the engine protection cover.

Unclip cable from alternator
(1 = DF, 2 = D-top)
Unplug wire from condensor
Unscrew hex. head bolt with lock nut (4) and pull out tachometer cable

Unplug the two wires from the diode chassis (arrow)

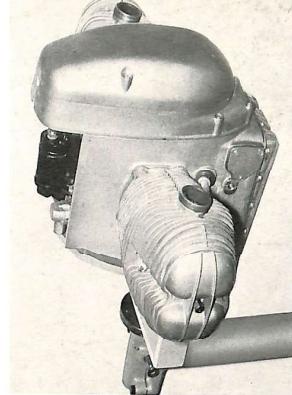


Remove engine to the left, tilt engine slightly to the left and downward to facilitate removal.

Unplug the wire on the left side of the diode chassis (arrow)



Install the engine on work stand BMW No. 6000 in device BMW No. 6005/1 and fasten by screws. Prior to disassembling the engine, it's good practice to check ignition timing 12 11 00, contact breaker points gap 12 11 141 as well as the valve clearances 11 34 504 in order to localize previously existing faults and to hold them in mind on further checks.



Remove left and right ignition wires and unplug wire from the oil pressure sensing switch (5)

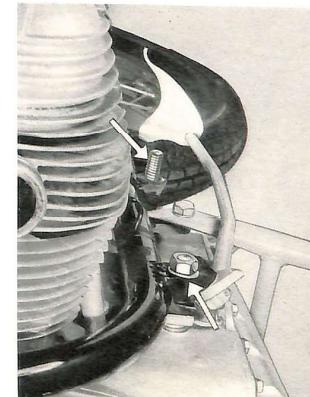
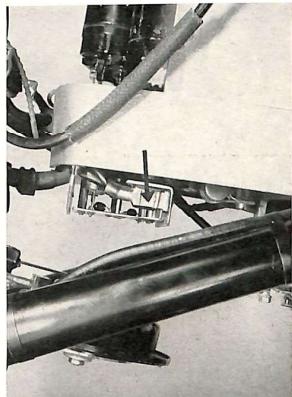
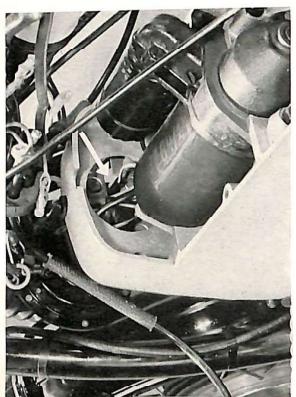


Withdraw front and rear engine through bolts



Assembly instructions: before inserting the front engine through bolt, place the center stand brackets between the engine housing and the frame on both sides. In addition the side stand bracket is placed between engine and frame on the left side.

The rear engine through-bolt holds the foot rests and the exhaust pipe clamps. **Attention,** a spacer is required between the engine housing and the frame at the rear through-bolt.



11 11 527 Cylinder boring and honing

11 12 100 Cylinder head removal and installation
11 25 500 Piston removal and installation

The preparatory steps explained hereofore should be accomplished only if necessary.

The cylinders can be bored to two oversizes 0.020" (0.5 mm) and 0.040" (1.0 mm). Boring to a 3rd oversize is not allowed.

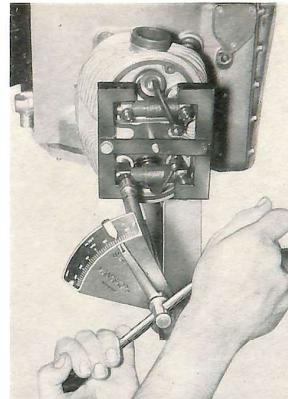
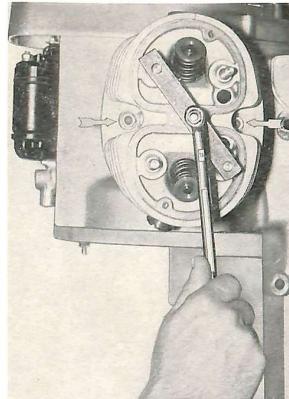
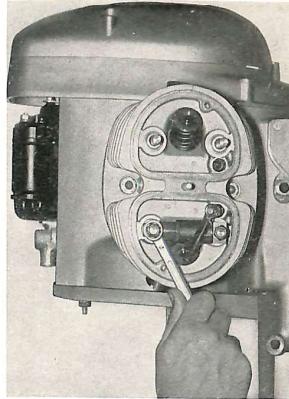
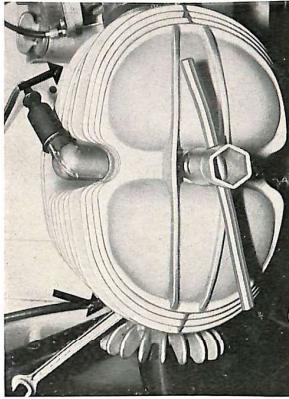
Measure bored and honed cylinder and select the proper size piston. For correct clearance see "Specifications".

Install new cylinder; measure cylinder; select correct piston for proper clearance.

Leaking of the pushrod seals can be eliminated by driving the pushrod tubes inward. BMW tool No. 221

11 12 100 Cylinder head removal and installation

Remove cap nut and the two nuts on each end of the valve cover.
Remove rocker box cover and gasket.



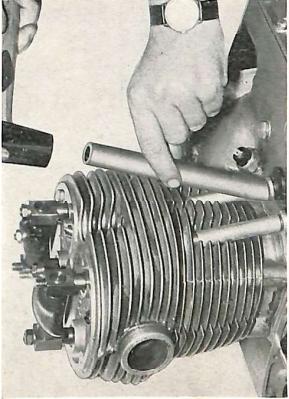
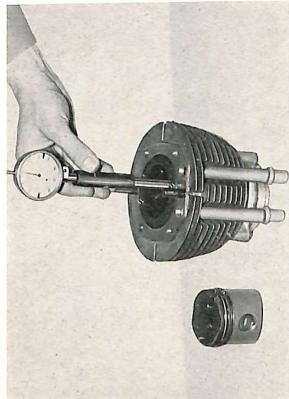
11 12 100 Cylinder head removal and installation

Remove cap nut and the two nuts on each end of the valve cover.
Remove rocker box cover and gasket.

Remove the four (4) shoulder nuts and withdraw the rocker arms and push rods.

Install two shoulder nuts diagonally across on two cylinder through bolts. Install bracket BMW tool No. 209. Withdraw cylinder and cylinder head by tightening cap nut (hex. size 14 mm) on rocker box cover center bolt. As soon as the cylinder is free of the engine housing, remove the two nuts (hex. size 14 mm-see arrow) and separate cylinder from cylinder head with a light mallet blow. Withdraw cylinder head and cylinder from through bolts.

Assembly instructions: First place rocker arm alignment tool, BMW tool No. 200, on rocker arms. Tighten the six cylinder head nuts in the following sequence.
1st to 11 ft/lbs
2nd to 18 ft/lbs
3rd to 25 ft/lbs

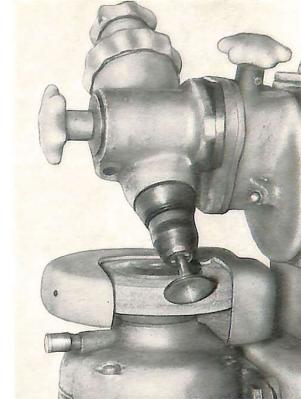
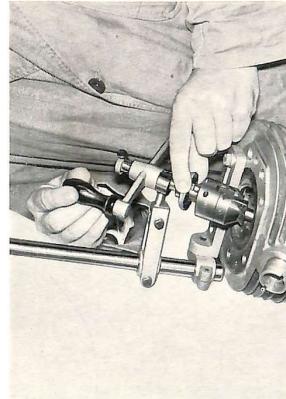
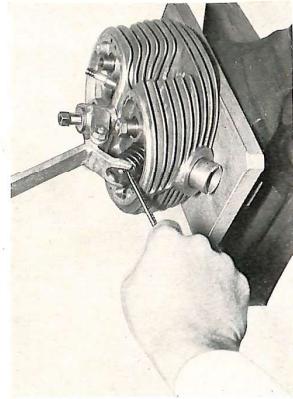


See chart

11 12 503 Cylinder head disassembly and reassembly and valve grinding

Cylinder head removed according to 11 12 100

Mount cylinder head on fixture, BMW tool No. 5034, clamp the fixture into a vise. Compress the valve springs with the compressor lever of tool 5034. Remove the valve keepers, spring retainers, and valve springs. Remove cylinder head from holder and remove both valves.



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Inspection of cylinder head:

- a) for cracks and good gasket surfaces.
- b) tightness of valve guides and valve seats.
- c) valve guide wear.
- d) valve stem and rocker arm pads for wear.
- e) rocker arm clearance.
- f) valve springs for specified length and tension
(see 'Specifications')

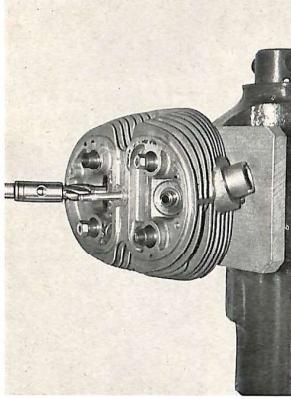
Refacing valve seats: Reface the valve seats in the cylinder head with the "Hunger" or another suitable seat refacer. The valve seat face has an angle of 45° 20'. The seat width is 1.5 mm (0.060") for the intake valve and 2.0 mm (0.08") for the exhaust valve, measured at a 45° angle. Chamfering toward the combustion chamber should be 15°, chamfering toward intake or exhaust port should be 75°. The seat at the valve should be positioned near the outer diameter.

Refacing valves: Reface the valve seats in the cylinder head with the "Hunger" or another suitable seat refacer. Inspect the margin (edge) after the valves are refaced. Valves with less than 1 mm (0.040") margin should be replaced. Refaced valves and recut valve seats using the "Hunger" valve seat cutter do not have to be lapped. Check tight seating of valves by filling the intake (exhaust) port with gasoline. Check for leaking gasoline.

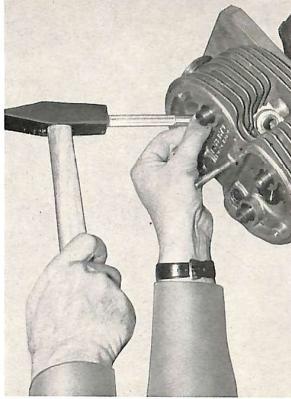
If necessary lap in valves using holder, BMW tool No. 540.

1112 561 Valve guide replacement

Cylinder head removed according to 1112 100.
Cylinder head disassembled, reassembled, and valves
ground according to 1112 303.
The preparatory steps explained heretofore should be
performed only if necessary.
Machine valve guides down to the snap ring.



Remove snap ring, heat cylinder head to 360° F and drive
valve guides toward combustion damper using drift,
BMW tool No. 5128.

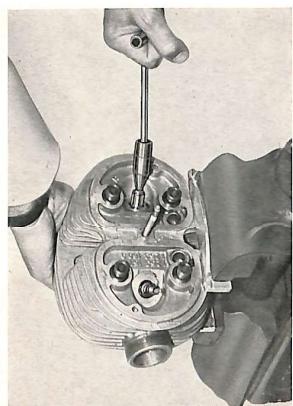


Install snap rings on new valve guides and press valve
guides into heated cylinder head. [For fit see "Specifica-
tions"]. Let cylinder heads cool down and ream valve
guides with reamer 8H7.



1112 521 Valve Seat Replacement

Valve seats have to be replaced after several refacings.
Machine off valve seat without damaging the seat bore.
Use a "Hunger" valve seat cutter or other suitable tool.
Heat the cylinder head to 450°-500° F and install new
valve seats. [For fit see "Specifications"].

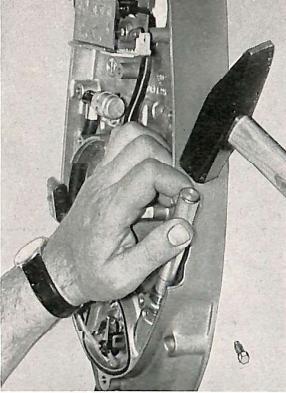


11 14 830 Timing case cover removal and installation

Engine is removed according to 11 00 050.

Alternator removed and installed according to 12 31 212
Automatic timing advance removed and installed according to 12 11 141.

Remove the nine allenhead bolts and three allen nuts with an allen wrench.



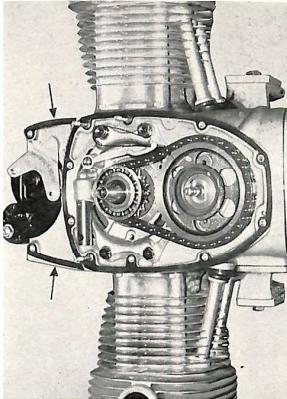
Install the puller, BMW tool No. 214, into the alternator mounting holes. **Caution:** install the insert into the crankshaft.

Replace defective seals. To install crankshaft seal use drift, BMW tool No. 224.

■

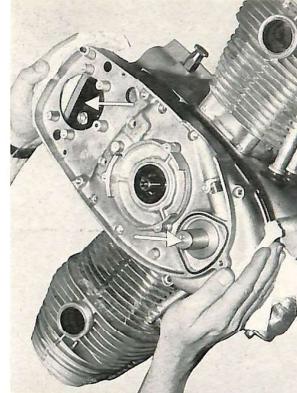
Install the puller, BMW tool No. 214, into the alternator mounting holes. **Caution:** install the insert into the crankcase. Before installing cover remove diode chassis and seal for advance unit shaft. Heat cover to 180°.

■



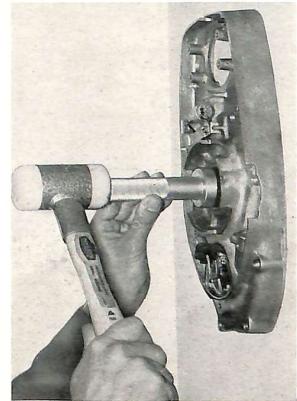
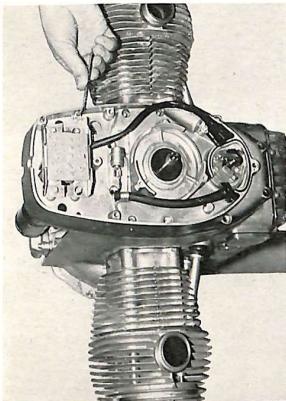
Replace defective seals. To install crankshaft seal use drift, BMW tool No. 224.

■



If the seal of the tachometer pinion has to be replaced proceed as follows: Remove clamp bolt, withdraw bushing, drive tachometer pinion out using a soft metal drift. The seal will come out with the pinion.

■



Install tachometer pinion, seal and bushing, top in with suitable drift.

■

Installing timing case cover. Place crankcase in horizontal position. Lay gasket, and two sealwashers (arrow) on crankcase. Before installing cover remove diode chassis and seal for advance unit shaft. Heat cover to 180°.

■

Install guide bushing, BMW tool Nr. 225, into seal bore for advance unit shaft. Install timing case cover. Install advance unit shaft. Tighten all head bolts and nuts and tighten starting from the center to both sides.

11 21 501 Crankshaft replacement

Engine removed according to 11 00 050.

Cylinder head removed and installed according to 11 12 100

Connecting rod removed and installed according to 11 24 500

Piston removed and installed according to 11 25 500

Timing sprockets replaced according to 11 31 001

Oil pump removed and installed according to 11 41 500

Alternator removed and installed according to 12 31 212

Clutch removed and installed according to 21 21 500

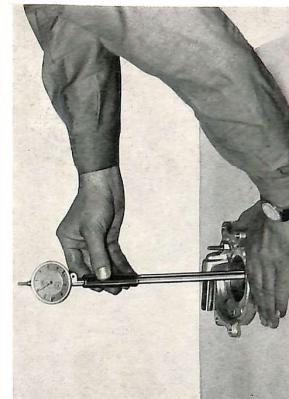
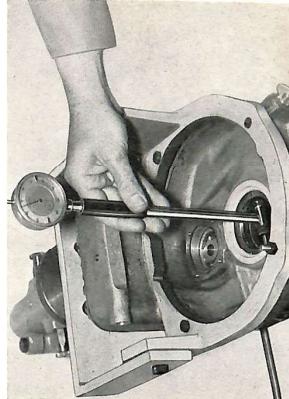
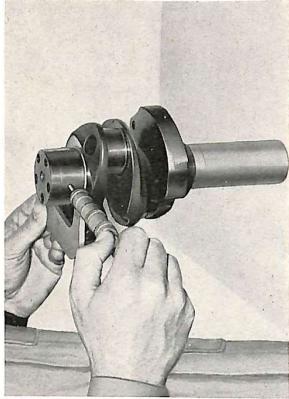
The preparatory steps explained herebefore should be performed only if necessary.

Remove remaining three hex. nuts and one shoulder nut (hex. size 14 mm), and two nuts (hex. size 13 mm) from main bearing retainer.

Install two bolts from puller BMW tool No. 216, into the holes provided in the bearing retainer. Put insert into crankshaft and place puller (same as Kukko puller No. 6026 M8) parallel to the bearing retainer. Pull bearing retainer off.

Measure crankshaft and insert bearings.

Remove housing from repair stand.
Measure main and connecting rod journals with a micrometer horizontally and vertically.



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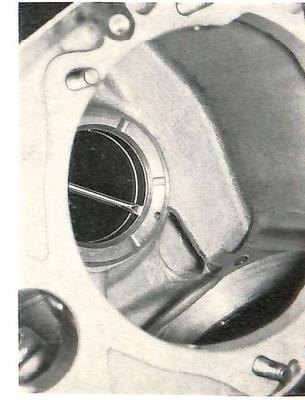
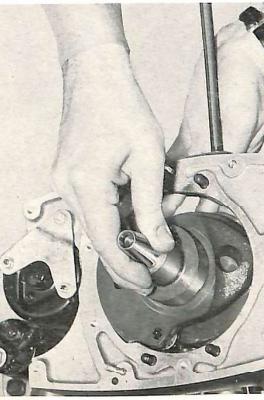
31

Insert in crank case.

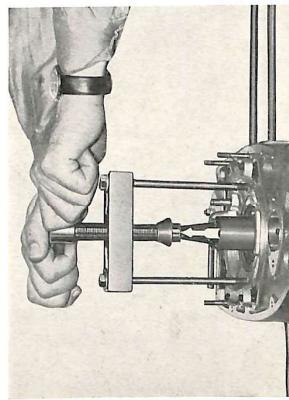
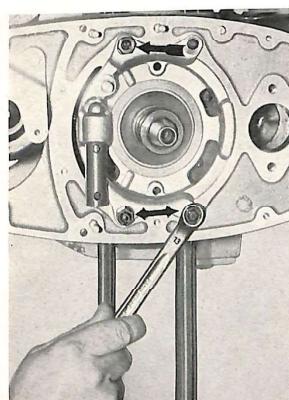
Turn crankshaft until front counter weight is even with the upper recess. Remove crankshaft.

Front main bearing retainer.

Remove both thrust rings from the two locating pins using drift, BMW tool No. 219.



Bolt connecting rod caps and connecting rods together and measure in two positions using an inside micrometer.
(For data see 'Specifications')



11 21 531 Main bearing insert replacement

Engine removed according to 11 00 050

Cylinder head removed and installed according to 11 12 100

Connecting rod removed and installed according to 11 24 500

Piston removed and installed according to 11 25 500

Timing sprockets replaced according to 11 31 061

Oil pump removed and installed according to 11 41 500

Alternator removed and installed according to 12 31 212

Clutch removed and installed according to 21 21 500

The preparatory steps explained heretofore should be performed only if necessary.

Heat engine housing to 180–200° F. BMW tool No. 205. The pins of the inner thrust washer have to fit into the holes provided in the sleeve. Press bearing insert out using the removal mandrel of BMW tool No. 205.

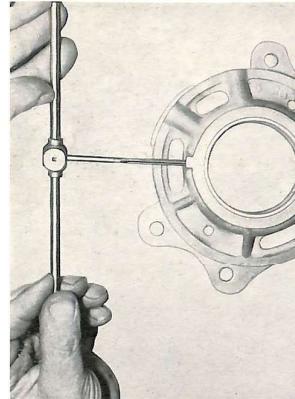
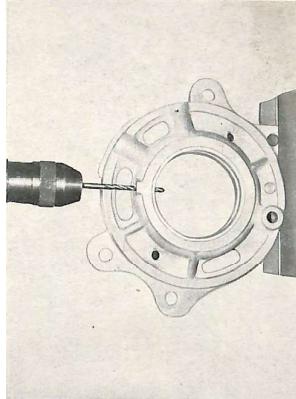
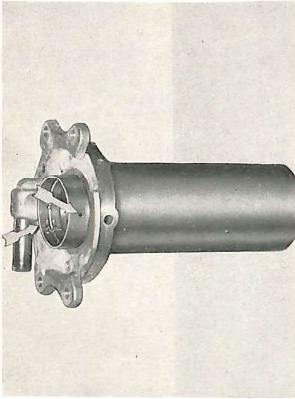
Installation of the 1st or 2nd oversize bearing inserts.

Heat engine housing to 180–200° F. Place aluminum block of fixture BMW tool No. 205 on the removal sleeve. Place engine housing on fixture so that both pins fit into the holes provided in the aluminum block. Insert bearing, position the bearing joint 26° to the right of top center as viewed from the rear, with the oil holes being exactly vertical.

Put installation mandrel with fiber bushing into bearing insert and press bearing insert into housing.
Caution: the mandrel is provided with two cutouts which fit over the locating pins. The width of the bearing insert provides for a slight recess on both sides.

Replacing bearing insert in main bearing retainer.

Drive location pin out from the inside with a drift. Heat cover to 180–200° F. Place it on the cylinder of fixture, BMW tool No. 205. Press it out with removal mandrel of fixture, BMW tool No. 205.



Heat bearing retainer to 180–200° F. Place new bearing insert into retainer. The bearing joint should be positioned 26° left of top center as viewed from the front with the oil holes exactly vertical.

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Clamp bearing retainer into vise (use jaw protectors). Drill two (0.126") holes into the bearing insert through the existing passages in the retainer. Carefully deburr holes in the insert.

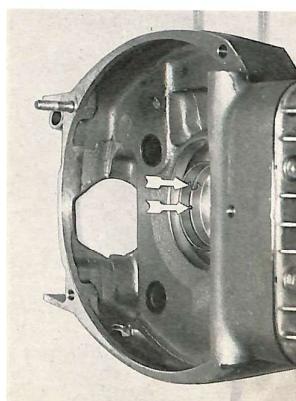
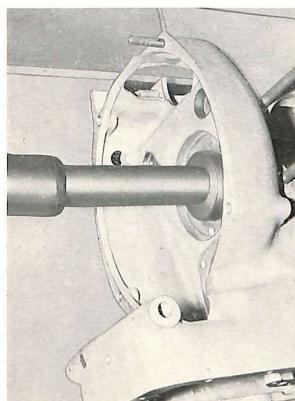
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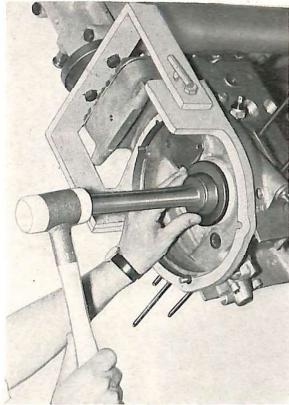
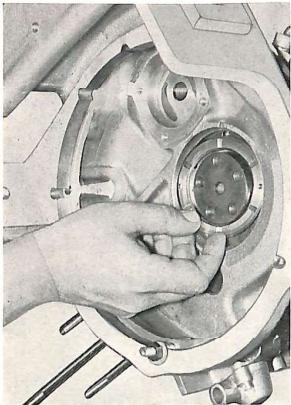
Locking bearing insert.
 Start a hole in the bearing insert using a drill 0.153" (exact size of locating pin hole) through the locating pin hole (position 3). Finish the hole with a 0.150" drill. Ream the hole with a hand reamer 4/8. Do not ream completely through. This provides a blind hole and prevents the locating pin from passing through the bearing.

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Clamp installation mandrel with fiber sleeve into vise. Put cover over mandrel and tap in locating pin far enough that it recedes 0.02–0.04" from the inner bearing surface. Centerpunch pin in place and carefully deburr hole.

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Select a blue thrust washer which is as close to the desired thickness as possible. The thickness should not be more than plus 0.03 mm (0.0012") or minus 0.04 mm (0.0016") of the desired thickness. Install chosen thrust washer on the locating pins.

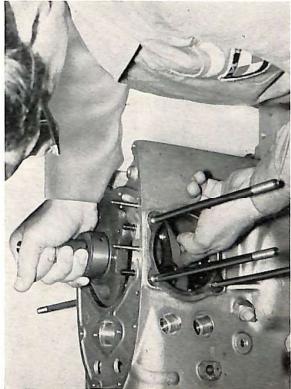
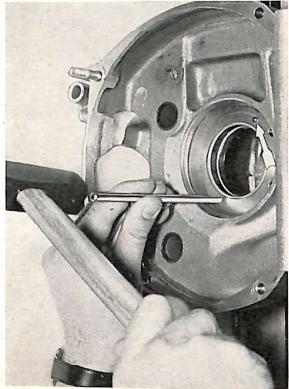
Adjusting end-play of the crankshaft:

Size chart of thrust washers:

Color	Max. thickness mm	Min. thickness mm
red	2.483 \div 2.530	0.098 \div 0.095"
blue	2.530 \div 2.578	0.0995 \div 0.105"
green	2.578 \div 2.626	0.1015 \div 0.103"
yellow	2.626 \div 2.673	0.103 \div 0.105"

To adjust end-play of crankshaft, install two thrust washers on the locating pins; a green marked washer inside, and a red marked one outside. Both locating pins should provide the same distance on both sides: Heat the engine housing for installation and possible correction of location of the pins.

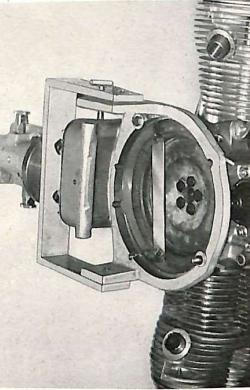
Heat engine housing to 180° F. Mount the housing in the repair stand and place it vertically. Carefully insert crankshaft. Turn housing horizontal and install front main bearing retainer and tighten it. Turn engine 180° and install flywheel according to 1122510.



Example

Actual end play	0.18 mm	0.00709"
desired end play	0.12 mm	0.00472"
difference	0.06 mm	0.00237"
Thickness of washer removed	2.48 mm	0.09753"
add	0.06 mm	0.00237"
Thrust washer should be	2.54 mm	0.1"

11 22 510 Flywheel removal and installation



First method

With engine removed; engine removed according to 11 00 050. The pictures and text explain the procedure to follow with the engine removed.

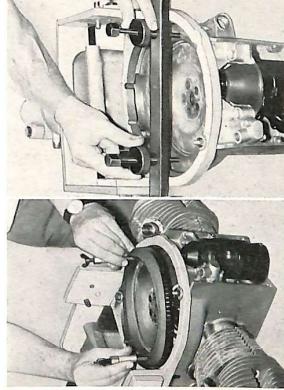
Second method

With transmission removed. Transmission removed according to 23 00 020
(Engine remains in frame)
Clutch removal and installation 21 21 500

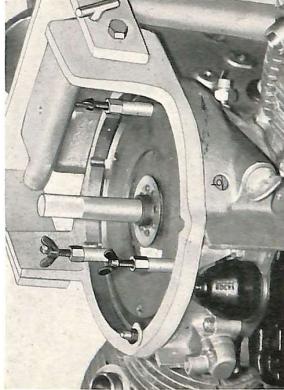
Install holder, BMW tool No. 292, on the flywheel. Holder lays against gussets in clutch housing.



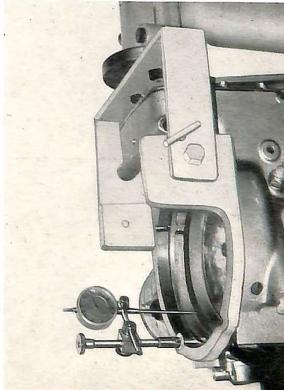
Remove the five flywheel bolts. Screw two clutch compression bolts, BMW tool No. 534, into flywheel and carefully lift flywheel out without cocking it.



To reassemble, set piston to top dead center, line up the OT mark of the flywheel in the inspection hole. Install the five flywheel bolts, mount the flywheel holder, BMW tool No. 292, (for torque see "specifications"). The flywheel bolts are expansion head bolts and have to be installed dry.



Check clutch face runout of the flywheel with dial indicator using holder, BMW tool No. 5104.
Place the engine vertical for checking of the runout. (To check runout with engine installed push against center of crankshaft to prevent it from moving back.)



11 24 500 Connecting rod removal and installation

First method

engine removed
cylinder head removed
piston removed and installed

The preparatory steps explained herebefore should be performed only if necessary.

To remove and install the connecting rod, turn the crankshaft to top dead center. Remove connecting rod bolts with a serrated socket, insert M10. Withdraw connecting rod and rod cap with bearings.



Assembly instructions: When installing the connecting rods place the locating pins on both rods forward.



according to 11 00 050
according to 11 12 100
according to 11 25 500

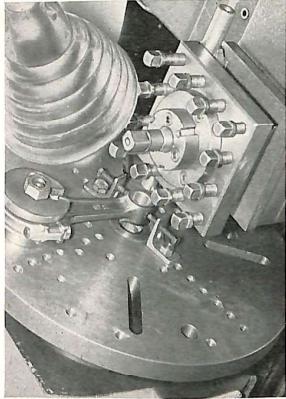
according to 11 00 050
according to 11 12 100
according to 11 25 500



Inspection and repair. Measure connecting rod big end with a micrometer.

Check wrist pin bushing for tightness in the connecting rod, and check wrist pin for proper fit in the bushing. If the wrist pin has too much play in the bushing, replace the bushing.

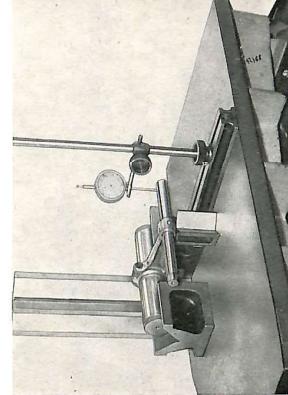
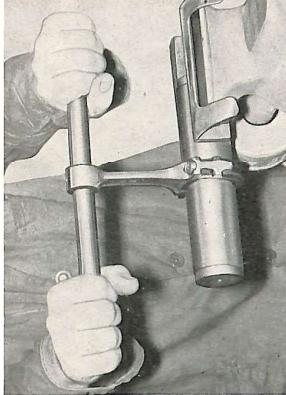
Press new wrist pin bushing in. Mount connecting rod in a lathe and turn bushing to a high finish to the proper size. (See Specifications)



A correctly fitting wrist pin can be pushed through the bushing with light thumb pressure.

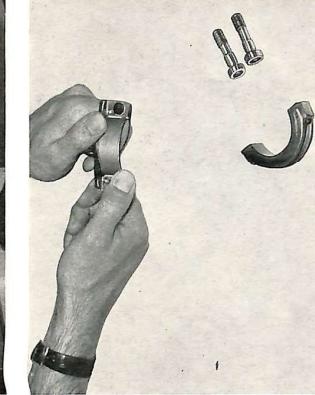


Clamp connecting rod into vise for straightening. (Use jaw protectors). (For allowable deviation with the use of a 150 mm (5.91") pin see Specifications).



Check connecting rod for twist.

Place two prisms on the surface plate support wrist pin eye on the surface plates that the distance from the side to the centerline of the connecting rod and wrist pin eye is approx. the same. Check with dial indicator on the big end mandrel and wrist pin to check for twist. If necessary straighten (for allowable deviation see Specifications).



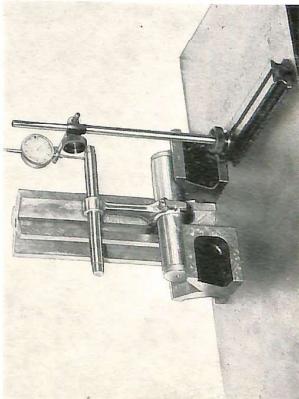
11 24 551 Replacing connecting rod inserts

Push inserts into clean connecting rod.

Measuring and straightening of connecting rods; install a set of inserts into the big end (a set of inserts should be kept on hand to be used for this check whenever it is done) and mount the rod on a hardened ground mandrel. The rod should have no clearance on the mandrel. Insert a pin 150 mm (5.91") long, which fits without play, through the wrist pin eye.



Lay two exactly alike prisms on a surface plate, place connecting rod vertical and measure the distance from the plate to the top of the pin of the wrist pin eye, to see if big end bore and wrist pin eye are parallel.



Before installation of the crankshaft, coat main and rod inserts with Molykote Paste "G".

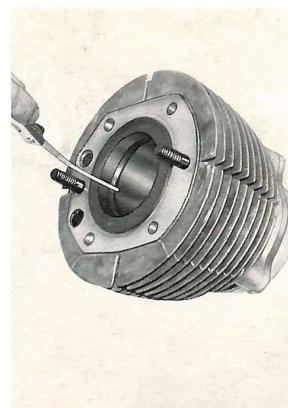
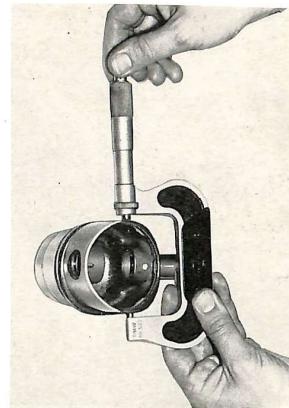
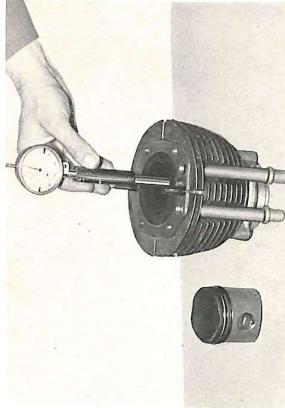


1125500 Piston removal and installation

Cylinder head removed and installed according to
1112100

Withdraw cylinder and base gasket from through bolts.
Caution: insert wooden protection fixture under piston
skirts before withdrawing the cylinder completely to pre-
vent damage to the pistons.

Inspection and repair; measure cylinders horizontally and
vertically approximately 10 mm (0.4") from the top, in
the middle and near the bottom with an inside micro-
meter at an ambient temperature of approx. 68° F.



Remove wrist pin lock ring with an awl or a small screw
driver, remove wristpin with drift, BMW tool No. 210.

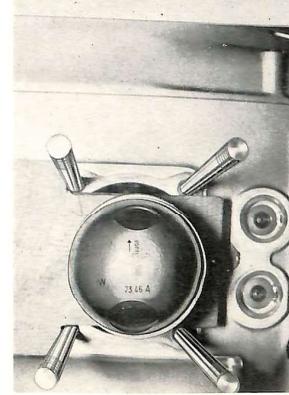
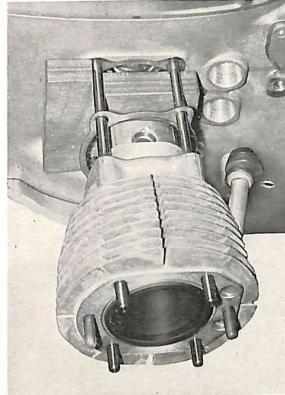
Assembly instruction:

The marking "vorn—" should point forward, this is im-
portant since the wrist pin is off center.
The piston does not have to be heated for wrist pin in-
stallation.

Measure piston at the piston skirt crosswise to the wrist
pin bore.

Measure piston ring clearance and end gap with a feeler
gauge.
(For cylinder wear data, piston size and ring clearance
and gap see "Specifications".)

Position the circlip in the groove so that one end over-
laps the opening. Press on center of circlip using dr ft,
BMW tool No. 210.

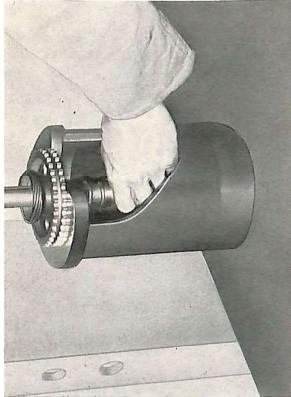


1131 061 Timing sprockets replacement

Engine removed according to 1100050

Alternator removed and installed according to 1231 212

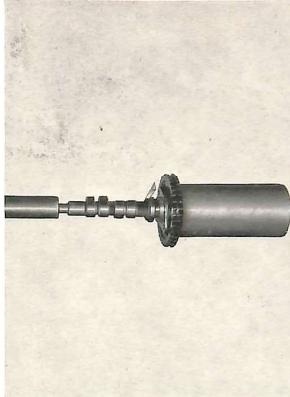
Place crankcase horizontal, install puller insert into crankshaft and install puller BMW tool No. 217 and remove ball bearing.



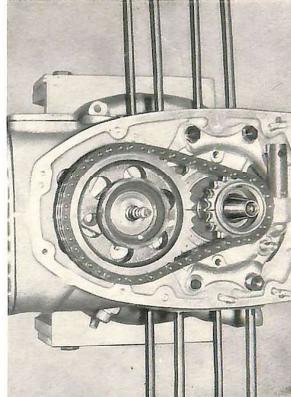
Place camshaft on an anvil tube [approximate tube dimensions: inside diameter 90 mm [3.54"], outside diameter 106 mm [4.17"], length 225 mm [8.86"]], so that sprocket lies flat, place sleeve BMW tool No. 212 on camshaft and press off sprocket together with tachometer drive gear.



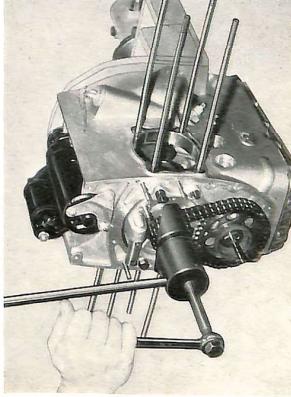
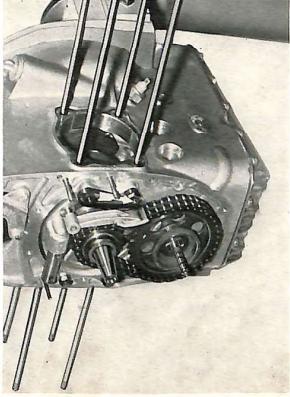
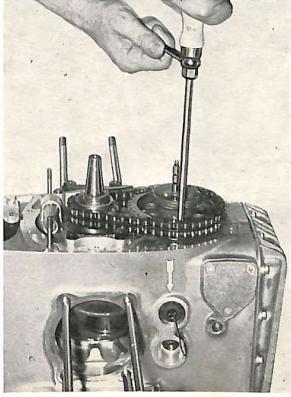
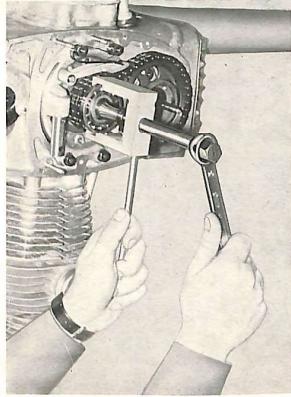
Before reinstalling the sprockets, coat the inside bore lightly with oil. If the chain has stretched and has to be replaced, it is good practice to also replace the camshaft and crankshaft sprockets.

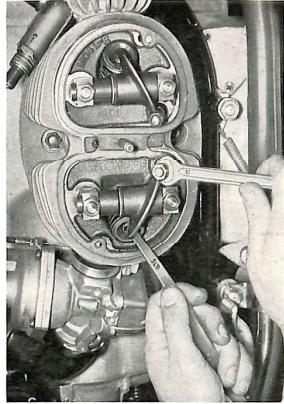
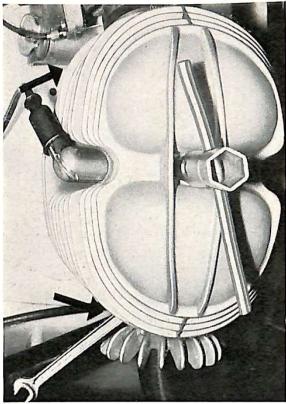


Checking end-play of camshaft. The assembly of the camshaft is in reverse order of the disassembly. Insert front camshaft bearing on camshaft, press on camshaft sprocket first and then press on tachometer drive gear; check end-play between camshaft bearing and camshaft with a feeler gauge. [For clearance see "Specifications".]

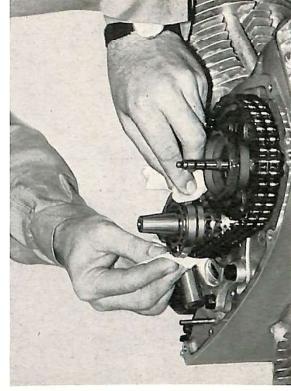
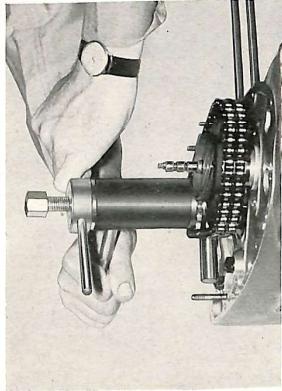


To install the camshaft, place engine housing vertical. Insert camshaft and crankshaft sprocket into chain, line up markings in the center.





Insert camshaft into engine housing — push crankshaft sprocket on crankshaft carefully so that key and key groove mate. Install fixture sleeve, BMW tool No. 216, and puller bolt, BMW tool No. 535, over sprocket into the end of the crankshaft and pull the sprocket on. Caution — guide camshaft into its rear bearing bore.



11 34 504 Adjusting Valve Clearance

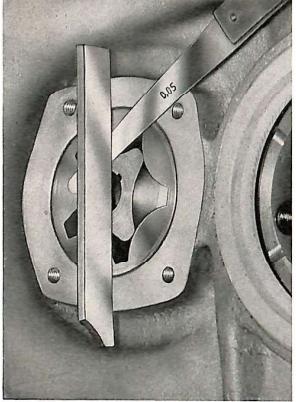
Loosen ocam nut and the two nuts (arrow), remove rocker cover and gasket.

Adjust valve clearance with feeler gage between valve stem and rocker arm when engine is stopped and cold. To do this, unscrew spark plugs and turn engine over with cranked screw driver at the alternator rotor bolt until the cylinder to be adjusted is at compression top dead center. Both valves are closed. If necessary, readjust the clearance at the adjuster screw after loosening the lock nut; secure with lock nut. Redcheck valve clearance. Valve clearance see specifications.

8.69

8.65

44



11 41 500 Oilpump removal and installation

First method
With engine removed; engine removed according to 11 00 050.

The pictures and text explain the procedure to be followed with the engine removed.

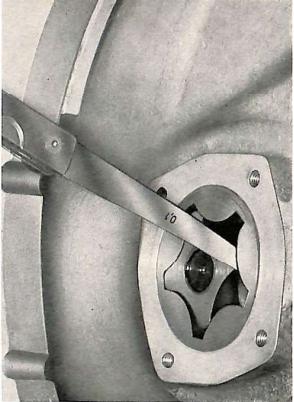
Second method
With transmission removed; transmission removal according to 23 00 020.

Engine remains in frame.

Clutch removed and installed according to 21 21 500.

Flywheel removed and installed according to 11 12 510.

Remove the 4 countersunk screws and remove oil pump cover.



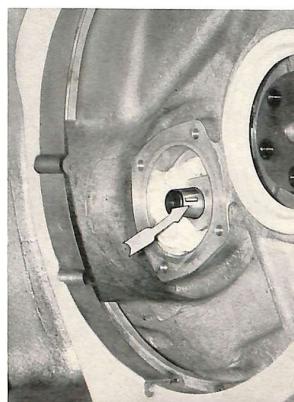
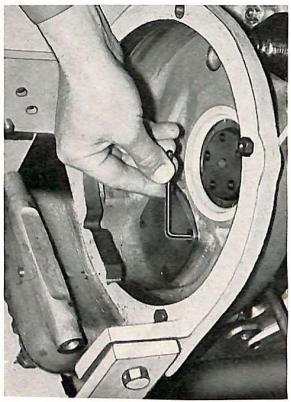
Pull out inner and outer pump rotor.

Check clearance between inner and outer rotor.
(for clearances see „Specifications“)

To reassemble, install woodruff key and push on rotor, with the chamfer of the inner rotor toward the engine. Caution, it is good practice to always replace O-ring in cover.

Remove woodruff key. Stuff a rag into the openings to prevent the key from falling in before attempting the key removal.

Inspection. Check clearance between housing and outer pump rotor.



12 Engine electrical system

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12 11 141 Breaker points replacement	10
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12 31 212 Alternator removal and installation	12
12 32 000 Regulator removal and installation	14
12 41 020 Starter removal and installation	15
12 41 170 Starter protection relay removal and installation	17

Type (Bosch)	DF 12 V 0.5 PS	Amperage draw maximum Amp.	Power output HP	Torque mfp (lb-ft.)	Protection relay	Alternator:	Type (Bosch)	Drive of alternator	Maximum output W/V	Maximum current output	Charging begins at RPM	Max. allowable oval-of-round on the slip rings mm	Max. diameter of the slip rings mm	Regulator:	Type (Bosch)	Without load Volt	With load Volt	
Starter:	R 50/5	R 60/5	R 75/5	0.5	0.885 (6.4)	SRibbel SR 9570	180/14	Bosch G 14 V 13 A 19	180/14	13	980	10 000	0.06 (0.0024")	0.06 (0.0024")	13.5±14.2	13.8±14.8	13.5±14.2	13.8±14.8
Type (Bosch)	R 50/5	R 60/5	R 75/5	290	0.885 (6.4)	SRibbel SR 9570	180/14	Bosch G 14 V 13 A 19	180/14	13	980	10 000	0.06 (0.0024")	0.06 (0.0024")	13.5±14.2	13.8±14.8	13.5±14.2	13.8±14.8
Type (Bosch)	R 50/5	R 60/5	R 75/5	290	0.885 (6.4)	SRibbel SR 9570	180/14	Bosch G 14 V 13 A 19	180/14	13	980	10 000	0.06 (0.0024")	0.06 (0.0024")	13.5±14.2	13.8±14.8	13.5±14.2	13.8±14.8
Type (Bosch)	R 50/5	R 60/5	R 75/5	290	0.885 (6.4)	SRibbel SR 9570	180/14	Bosch G 14 V 13 A 19	180/14	13	980	10 000	0.06 (0.0024")	0.06 (0.0024")	13.5±14.2	13.8±14.8	13.5±14.2	13.8±14.8

Specifications

Engine electrical system

Engine electrical system

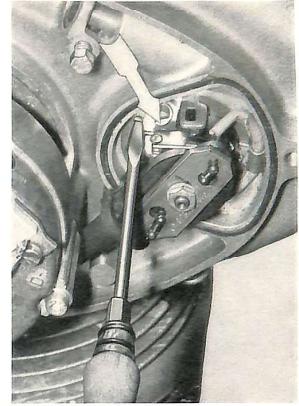
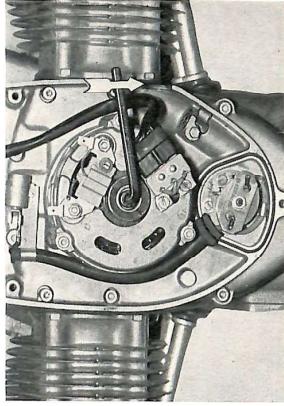
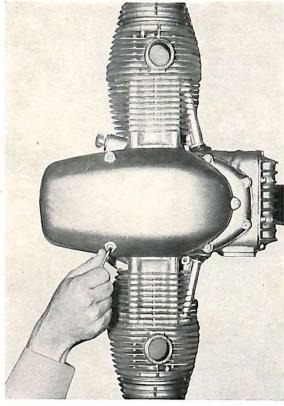
Type	R 50/5	R 60/5	R 75/5
Double contact (Bosch)	0 197 002 001 RS 20/1 A 1 A		
Ignition coil:	E 6 V		
Starting spark length	8 (0.32")		
With 300 sparks/min. and 3 V, mm	13.5 (0.54")		
Operating spark length	With 3,600 sparks/min. mm		
Spark plugs:	M 14 × 1.25		
Bosch	W 200 T 30	W 230 T 30	W 230 T 30
Bosch	200/13/3 A	230/14/3 A	230/14/3 A
Bosch	N 7 Y		
Champion	0.7 (0.028")		
Spark plug gap mm	Sparks per min.		
Type (Bosch):	Automatic ignition advance mounted on camshaft		
Ignition breaker:	Advance beginning		
Maximum advance at	2500		
Grease for advance unit and breaker cam	Grease F 1 V 4		
Grease for breaker cam shaft	Dosch grease F 1 V 22 or F 1 V 26		
Grease for breaker point gap	0.35-0.40 (0.014"-0.016")		
Breaker arm spring tension	450		

Engine electrical system

Type	R 50/5	R 60/5	R 75/5
Dwell angle	110°±1°		
Condenser capacitance	0.2 μF — 25%		
Starter motor assembly (for engine assembly)	90° OT		
Timing range	310° ± 20°		

Torque specifications Nm (ft/lbs)

Armadure mounting bolt	2,3-2,7 (16.6-21.7)	Spark plugs	4,75 (34.3)	Starter motor mounting bolts	2,3-2,7 (16.6-21.7)
All other screws and nuts should be tightened following the usual normal values quoted in the tables of the screw firms or in the new BMW standards sheet 600021.					



1211004 Ignition timing

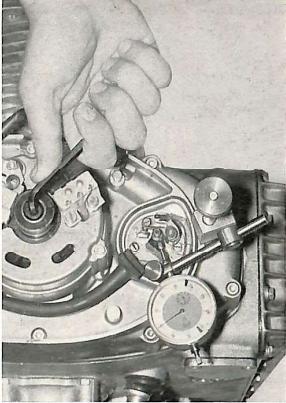
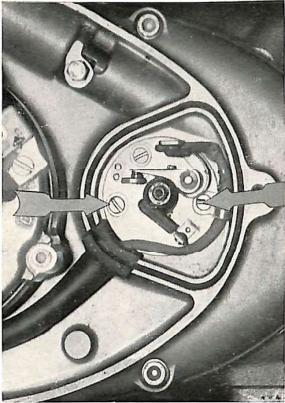
Loosen three allenhead bolts and remove front engine cover

Fitting instruction: When installing, be sure that the ventilating hose is firstly installed into front engine cover.

If no dwell meter is available proceed as follows:
Remove spark plugs, insert an allen wrench into the armature mount bolt (allen wrench size 6 mm). Turn crankshaft clockwise (as seen viewed from the front).

The breaker lever has to lift off fully. Check gap with feeler gauge. If necessary replace the breaker points.
1211141

Adjusting the breaker point gap. Loosen locking screw (arrow), insert screw driver between the two pins and into the slot of the contact and adjust gaps as required. Tighten the locking screw. Recheck dwell angle and recheck point gap.
(for dwell angle and point gap see "Specifications")

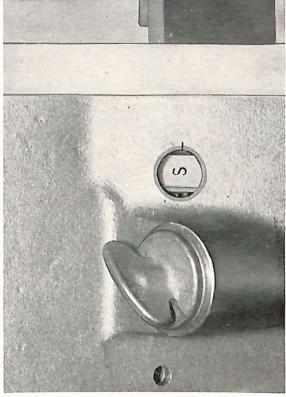
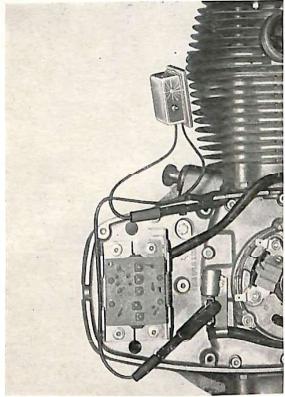


Adjusting the timing: Loosen the two screws that hold the point plate. Turning the plate in direction of rotation refords the timing, turning it against the direction of rotation advances the timing. (Crankshaft and camshaft turn in the same direction). After completing timing adjustment tighten the two screws.

Ignition timing check

Engine removed or installed
Engine removed according to 11 00 050

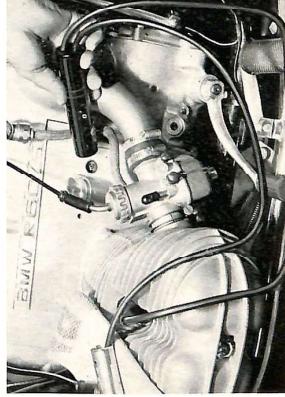
- c) with continuity light
- b) with neon type timing light
- c) Connect continuity light between condensor (1) and ground (2), ignition turned on.



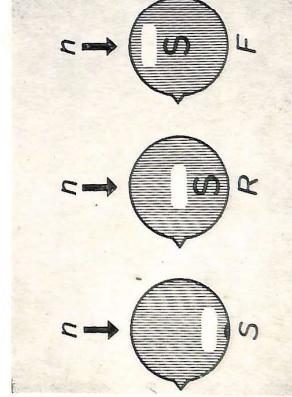
To adjust the timing with a continuity light, first turn the crankshaft 45° against the direction of rotation (light goes out), to take up any possible slack in the engine components. Now turn engine in the direction of rotation until light lights up. Adjust as necessary.

Recheck timing with a timing light. If the timing is incorrect check runout of shaft on camshaft, and check advance unit for ease of movement. Maximum allowable runout of shaft 0.02 mm (0.0008").

- b) When checking the timing with a timing light connect the timing light to spark plug wire. Observe the position in the inspection hole with the engine running.



With the engine running at idle (800–1000 RPM) the 'S' mark (retarded or Slow) must appear as the white line in the inspection hole. If the line is above the center the ignition is too advanced. If the line is below the center the ignition is too far retarded. As the RPM is increased the 'S' mark will disappear to the top (beginning of advance approximately 800 RPM) and the 'F' mark will appear from below (F=advanced or Fast) at approximately 2500 RPM. This signifies full advance.



12 11 141 Replacing the breaker points

Loosen the three allenhead bolts and remove the front engine cover. Remove the hex. nut holding the advance unit and withdraw the advance unit. When reinstalling the advance unit align the locating mass.

12 13 010 Ignition coil removal and installation

Remove fuel tank according to 16 11 030

Disconnect negative cable from battery

Disconnect wires from terminals '1' and '15' of the coil and disconnect high tension cable

Remove coil allen mounting bolts and remove coil

Assembly instruction: The front mounting bolt of the left coil is also used to hold a ground wire.

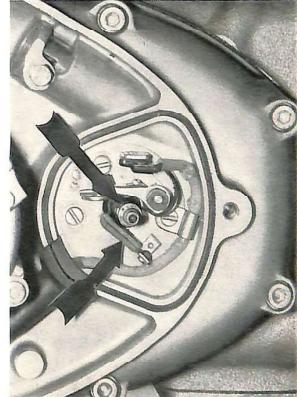
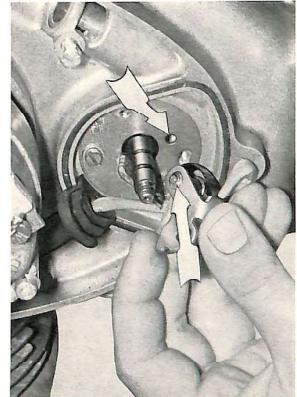
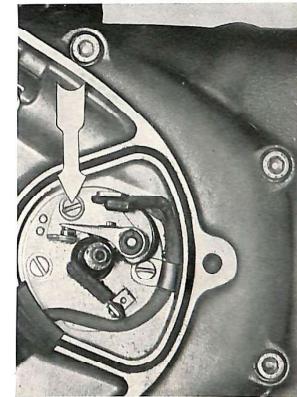
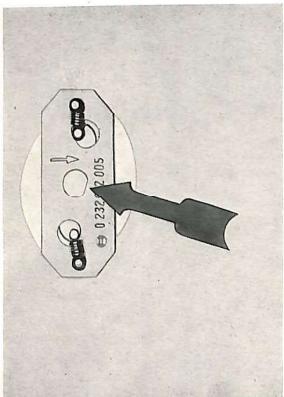


Check contacts for wear, in an emergency they can be cleaned but they should always be replaced. To remove the points remove the filister head screw (arrow), withdraw the wire from the condensor and remove the point plate.

During reassembly make certain that the brass axle for the breaker arm is inserted through the proper hole.



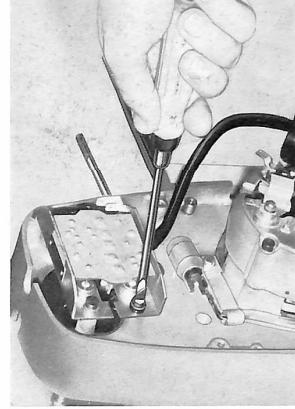
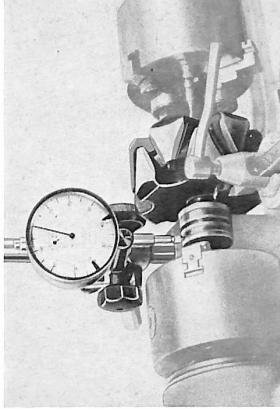
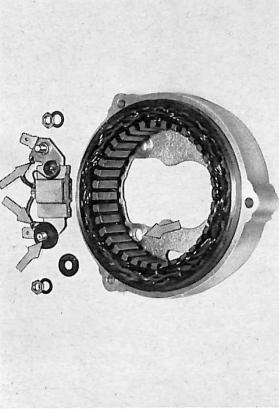
Before installation of the advance unit examine the felt for the breaker cam, if necessary apply a small amount of Bosch grease F 1 1/4 to it. Apply a small amount of grease F 1 1/22 on the advance unit axle. Check timing advance weights for ease of operation after installation.



12.31.2 Alternator removal and installation

Engine removed according to 11.00.050
Remove the three allenhead bolts and remove the front engine cover.

Fitting instruction: When installing, be sure that the ventiling hose is firmly installed into front engine cover.



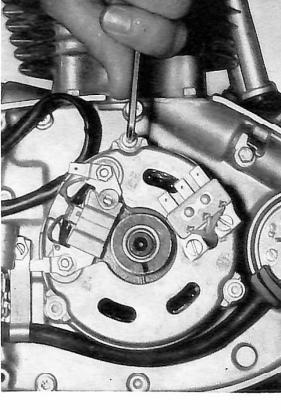
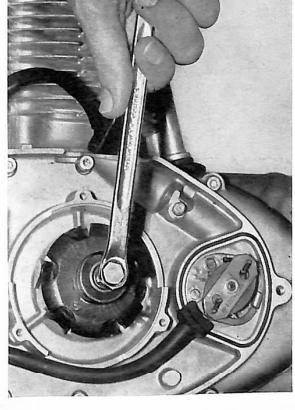
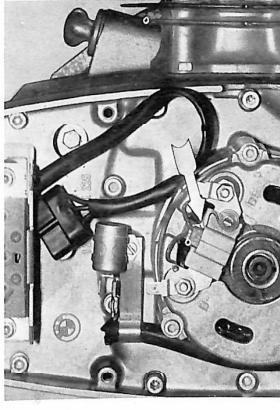
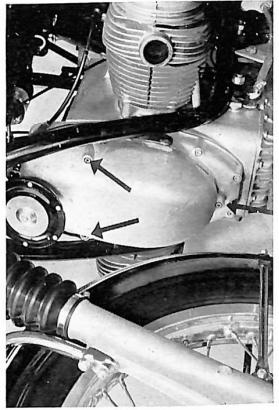
Repairing the alternator.

Remove the two nuts (hex. size 8 mm) from the inside of the stator housing. Withdraw brushholder with brushes. If the brushes have to be replaced, be careful during soldering so that no solder runs down into the brush wires. Install insulator bushing on the stud of the brush holder, install insulating washers and install brush holder into stator housing.

Unplug the three-prong plug from the alternator stator. Lift the brushes and clamp them in by placing the brush springs on the side of the brushes

Remove the three allenhead bolts from the stator housing

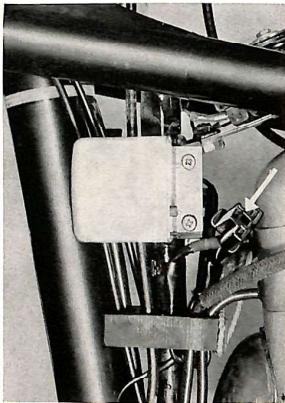
Remove the armature mounting bolt and press armature off with a puller bolt, BMW tool No. 5030.



12 32 000 Regulator removal and installation

Fuel tank removal and installation 16 11 030

Disconnect negative battery cable. Withdraw connector (arrow). Remove the two Phillips-head screws and remove the regulator.



12 41 020 Electric starter removal and installation

Remove micronic filter insert 13 72 000

Remove fuel tank 16 11 030

Loosen the three hose clamps of the right air tube, withdraw the rubber sleeve and remove the air tube.



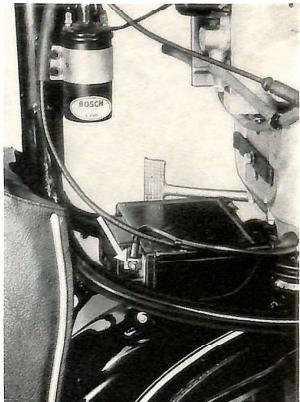
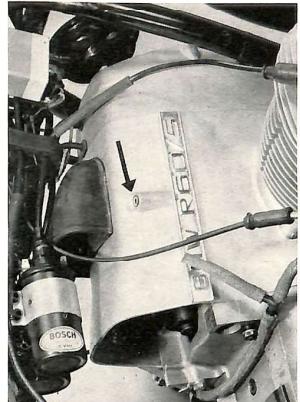
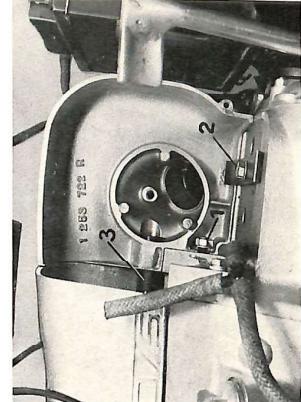
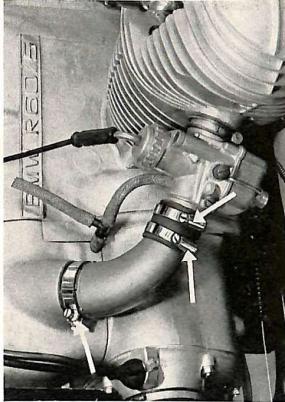
Loosen hex-nut (1) and hex-head bolt (2) of the right air filter housing. Remove filter housing, withdraw breather hose to the rear.



Remove the two allenhead bolts on the left and right and remove upper engine (starter) cover.

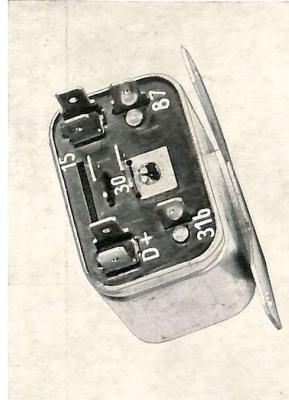


Unhook the battery straps, remove battery cover and disconnect negative battery cable.



Disconnect starter cables.

Remove starter by withdrawing it rearward.



12 41 170 Starter protection relay removal and installation

Remove fuel tank 16 11 030

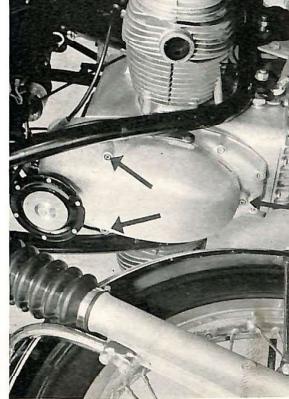
Disconnect the negative cable at the battery, remove the two bolts and lock washers, unplug the five wire plugs.

Loosen upper horn mounting bolt.

Remove the three allenhead bolts and remove the front engine cover.

Fitting instruction: When installing, be sure that the ventilating hose is firstly installed into front engine cover.

Remove hex head bolt (arrow) with a socket wrench.



Starting Motor Service Diagnosis

Condition	Possible Cause	Correction
Starter fails to operate when starter button is depressed.	Headlight turned on: a) Lights are dim. Weak battery or dead cell in the battery. b) Light is on, but dims upon actuation of starter. Dead battery. c) Light is on, but dims as soon as the starter button is depressed. Loose or corroded battery cable terminals. d) Light is normal. Bridge terminals 50 and 30 on the starter. Starter turns. Starter button defect or faulty wiring. e) Light is normal. Starter solenoid is actuated but starter does not turn. Use auxiliary cable to connect battery positive to terminal 30 on the starter. Starter turns. Solenoid switch contact corroded.	a) Test for specific gravity. Recharge or replace battery as required. b) Charge battery. c) Clean the terminals, apply a light film of petroleum to the terminals after tightening. d) Replace starter button, repair open circuit. e) Replace solenoid.
Starter does not turn while a cable is connected directly from battery positive to terminal No. 30.	c) Worn brushes. b) Brushes binding. c) Brush spring pressure insufficient.	a) Replace brushes. b) Loosen brushes. c) Replace brush springs.
Starter runs at high RPM but does not turn engine, or turns engine intermittently.	c) Defective starter pinion. b) Broken teeth on flywheel drive gear. c) Starter pinion does not engage.	a) Replace pinion. b) Replace flywheel. c) Repair starter.

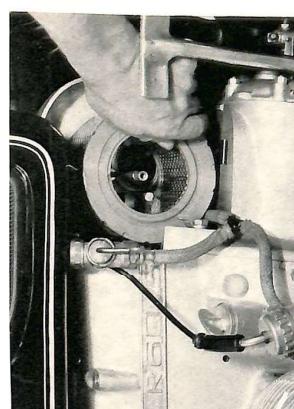
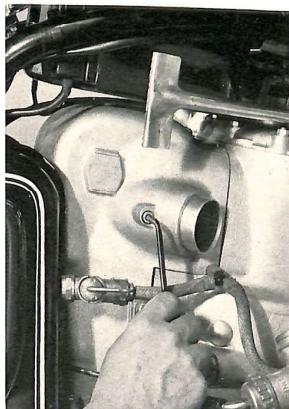
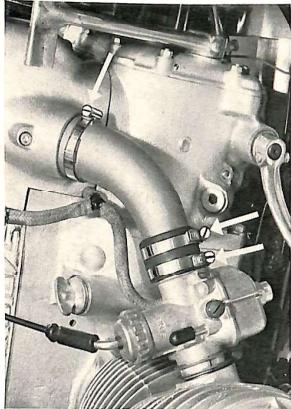
13 Carburation

Specifications
13 72 000 Air filter insert removal and installation
Page 3
5

Type	Carburetor	Specifications
Left carburetor	Riggit carburetor	Two inclined Bing slide carburetors with needle jet and concentric float
Right carburetor	Trocal diaphragm	Two inclined Bing slide carburetors with needle jet and concentric float
Main jet	26	26
Slide needle Nr.	2.68	2.68
Slide needle left	130	130
Slide needle right	140	140
Slide needle position	2	2
Cold start jet	—	—
Mixture bore in rotaray valve	—	—
Idle jet	35	35
Idle air jet	—	—
Idle mixture screw position (turn opened)	0.5	0.5-1
By-pass passage	—	—
Float needle	2.2 φ	2.2 φ

13 72 000 Air filter insert removal and installation

Loosen the three hose clamps of the left air intake tube. Pull the rubber hose off and remove the air intake tube.



Remove the allenhead bolt in the center of the left air filter housing. Depress kick starter lever and remove filter housing.

Remove filter insert.

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Carburetion	Type	Specifications
Throttle slide	R 50/5	R 60/5
Foilt weight	22-570	20-570
Vacuum slide weight	10 (0.35 oz.)	10 (0.35 oz.)
Idle passage bore	0.8 Ø	0.8 Ø
Diaphragm	—	—
Air filter	—	—
Fuel system:	One common 'Micro-Starter' filter element	6 gallon of which one gallon reserve
Fuel recommendation	Regular	Premium
Minimum octane (RON)	92	99
Fuel tank capacity	99	99

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16 Fuel tank and fuel lines

Specifications
16 11 030 Fuel tank removal and installation
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Fuel tank and fuel lines

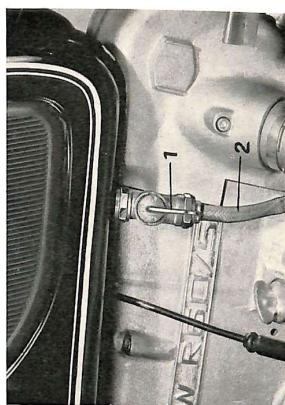
Specifications

Type	R 50/5	R 60/5	R 75/5	Fuel tank capacity Ltr.	Reserve Ltr.
				24 (6 gallons)	3.5 (1 gallon)



1611030 Fuel tank removal and installation

Disconnect negative cable from battery.
Remove steering damper rod, be sure to first remove
circlip.



Close fuel pet cocks (1) remove fuel lines (2).



Flip up dual seat, remove wing nuts. Pull fuel tank to the
rear then lift up at the front and remove.

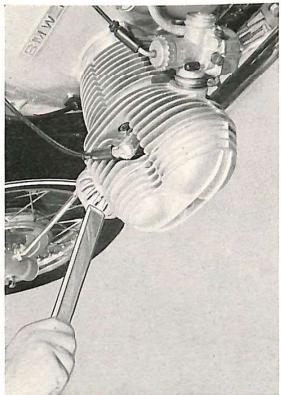
18 Exhaust system

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Finned exhaust pipe nut ft/lbs $20 \div 22 \text{ (} 144.7 \div 146 \text{)}$	
All other screws and nuts should be tightened following the usual normal values quoted in the tables of the screw firms or in the new BMW standards sheet 600021.	

Torque specifications mkg (ft/lbs)

Type	Exhaust system	Specifications
Muffler diameter ϕ mm	R 50/5	100 (3.94")
	R 60/5	38x1 (1.496" \times 0.04")
	R 75/5	



18 00 020 Exhaust system removal and installation

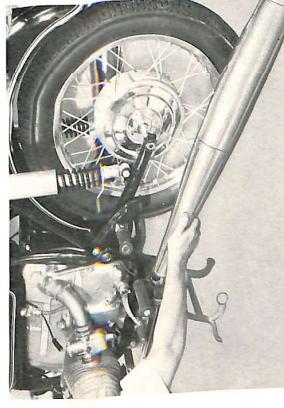
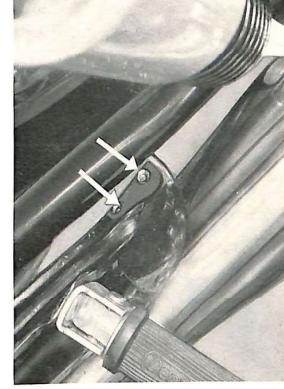
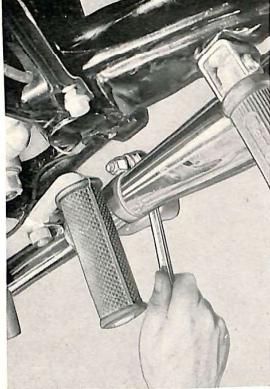
Remove both exhaust pipe nuts, use wrench BMW No. 338/2.

Remove the hex. nuts on the footrests and the hex. head-bolts on the frame.

Loosen the allenhead bolts on the cross-over pipe and remove exhaust system.

18 12 000 Muffler removal and installation

Loosen hex. head bolt of exhaust pipe clamp, slide clamp off muffler.



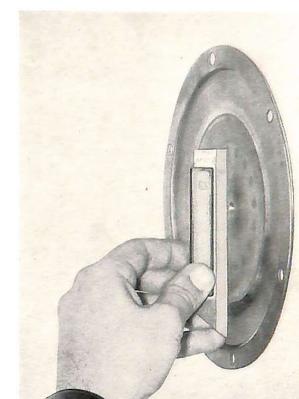
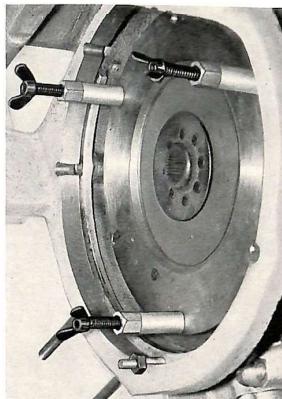
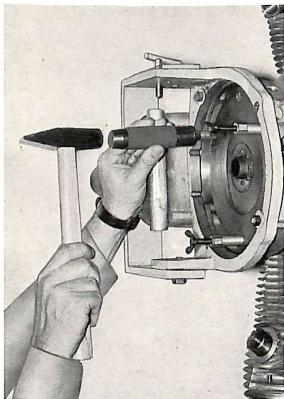
21 Clutch

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Remove hex. head bolt on the frame.

Pull muffler off to the rear.

Clutch	Specifications
Type	R 50/5 R 60/5 R 75/5
Marking (diaphragm spring)	"—" "—" without marking
Diaphragm spring pressure, installed kp	150÷165 (330.75÷363.83 lbs) 166÷180 (366.03÷396.9 lbs) 180÷220 (396.9÷485.1 lbs)
Height of diaphragm spring, free mm	17,5±0,5 (0,7"±0,02")
Testing instruction of diaphragm spring	When placing the diaphragm border upon the measuring plate, the vertical runout of the diaphragm border max. 0,8 mm (0,032"). the spring tongues max. 0,3 mm (0,012") or when placing the spring tongue upon the measuring plate, the height difference of the spring tongues max. 0,3 mm (0,012") or when placing the diaphragm border max. 0,8 mm (0,032").
Total thickness of the clutch plate (lamele and lining) mm	6±0,25 (0,24"±0,01")
Min. thickness of the clutch plate mm	4,5 (0,18")
Max. lateral runout of the clutch disc at idle diameter mm	0,15 (0,006")
Max. allowable runout of the clutch plate mm	0,3 (0,012")
Max. allowable runout of the clutch plate mm	0,1 (0,004")
Max. clutch plate cam	6 (0,00834 oz)
Clutch lever play (cable) mm	2 (0,08")



21 21 500 Clutch removal and installation

First method

With engine removed: Engine removal according to 11 00 150. The pictures and text explain the procedure to be followed with the engine removed.

Second method

With transmission removed: Transmission removal according to 23 00 020. Engine remains in frame.

Loosen the 6 countersunk screws with an impact screw driver. Remove every alternate screw and install in their place a clutch clamp bolt; BMW tool No. 534. Tighten the clamp bolt and steved nut.

Remove the remaining three countersunk screws. Unscrew the three steved nuts of the clamp bolts evenly until the diaphragm spring is fully relaxed.

Remove Clutch end-plate, six spacers, clutch plate, pressure plate and diaphragm spring.

Inspection and repair:

In the lobes of the screw firms or in the new BMW standards sheet 6002/1, All other screws and nuts should be tightened following the usual normal values quoted

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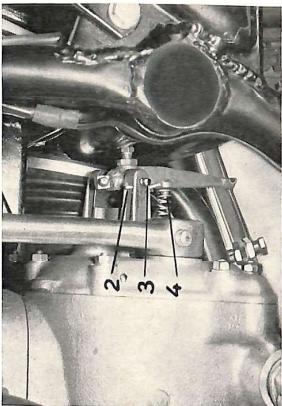
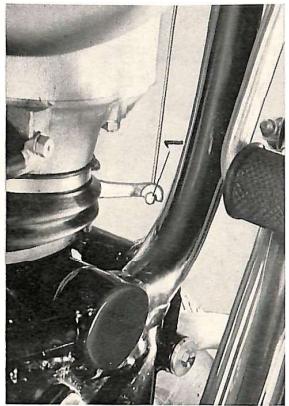
All the lobes of the screw firms or in the new BMW standards sheet 6002/1, All other screws and nuts should be tightened following the usual normal values quoted

Clutch to flywheel 1.5÷2.0 (10.8÷14.5)

Lock nut for check lever adjusting screw 2.0÷2.3 (14.5÷16.6)

Torque specifications Nm (ft/lbs)

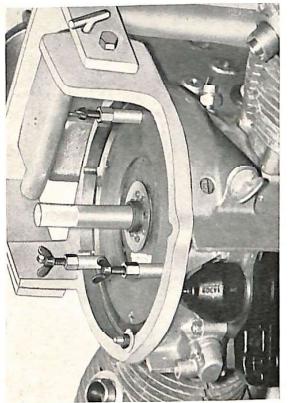
Clutch	Type
R 75/5	
R 60/5	
R 50/5	



During reassembly use centering arbor, BMW tool No. 529,
to properly position the clutch plates.

21 51 000 Clutch lever removal and installation
Unhook clutch cable (1).

Remove cotter pin (2), withdraw pin (3) remove clutch
lever and spring (4).



23 Transmission

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23 21 500 Input shaft and output shaft removal and installation	9
23 31 501 Shift fork replacement	13
23 31 851 Shift spring replacement	15
23 31 901 Neutral indicator replacement	17
23 51 501 Kick starter removal and replacement	18