
DUCATI



4

OVER HEAD CAMSHAFT MOTORCYCLES



SUPPLEMENT TO

WORK SHOP MANUAL

Issued in January 1966 - Mod. 4106/E

PRINTED IN ITALY

5



**5 - Speed
Ducati
Single
Overhead
Camshaft
Motor Cycles**

**Editions 1967
1968
1969
1970**

**250 Monza
250 Mark 3
250 Mark 3 desmo
250 Scrambler

350 Mark 3
350 Mark 3 desmo
350 Scrambler

450 Mark 3
450 Mark 3 desmo
450 Scrambler**

**INSTRUCTIONS FOR SERVICE STATIONS
AND DUCATI REPAIR SHOPS**

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MAIN SPECIFICATIONS

The main specifications of each single O.H.C. SHAFT DUCATI MOTOR CYCLE are found in the « USE and MAINTENANCE » Instruction Book.

CARBURETOR (Page 34)

For the 250 and 350 cc motorcycles it is advisable to refer to the corresponding Instruction Books and Spare Parts Catalogues, while for the 450 cc motorcycles (being the carburetor apparently the same when it is seen from outside, whereas in reality the carburation differs according to the type of the machine and also if it is with or without filter), the carburetor specifications are found in the following schedule):

CARBURETOR		Distinct. Mark	Valve	Needle	Atomiser	Idler jet	Mixture screw	Horn or Filter	Main jet	Exhaust	Fit for 450
DELLORTO	DUCATI										
1	VHB 29 AD adjustment 3521	Yellow securing screw for Pipe	60	V 7/H	265 T	50	1 1/4	H-7688	135	Italia U.S.A. SCR Sample for Berl.	Mark 3 SCR
2	VHB 29 AD with sole horn adjustment 3513	—	60	V 7/H	265 T	50	1 1/4	H-7688 F	130	Italia U.S.A. SCR Sample for Berl.	Mark 3 SCR
1	VHB 29 AD adjustment 3521	Yellow securing screw for Pipe	60	V 7/H	265 T	50	1 1/4	H-7688	135	U.S.A. SCR Sample for Berl.	Mark 3D
2	VHB 29 AD with sole horn adjustment 3513	—	60	V 7/H	265 T	50	1 1/4	H-7688 F	130	U.S.A. SCR Sample for Berl.	Mark 3D
3	VHB 29 AD adjustment 3522	Yellow securing screw for valve cover	60	V 8/H	265 T	45	2 3/4	H-7688	135	Italia	Mark 3D
4	VHB 29 AD with sole horn adjustment	—	60	V 8/H	265 T	45	2 3/4	H-7688 F	130	Italia	Mark 3D
5	VHB 29 AD adjustment	—	60 with hole \varnothing 1.75	V 7/H	265 T	45	—	H-7688	135 140 145	SCR	Upated Mark 3 SCR
5	VHB 29 AD with sole horn adjustment	—	60 with hole \varnothing 1.75	V 7/H	265 T	45	—	H-7688 F	135 140 145	SCR	Upated Mark 3 SCR

ALL FOR 450's.

ELECTRICAL SYSTEM (Page 35)

For the description, advantages, specifications, diagram and inconveniences, refer to the corresponding instruction manuals, while hereinafter we describe the:

CHECK OF THE RECHARGE INSTALLATION WITH ELECTRONIC REGULATOR

The battery recharge installation consists of a flywheel alternator which produces single-phase alternate current which is rectified and voltage-regulated by an electronic regulator with controlled diodes.

The voltage regulation let arrive to the battery only the current quantity required by its charge situation; consequently a quick recharge is obtained without any overcharge, resulting in an extended life of the battery itself.

The controlled diodes allow the direct and regulated flow of the rectified current from the alternator to the battery without having to pass through limiting impedances, resulting in a better output of the installation itself.

The current arrives to the utilizers (lamps, horn etc.) directly from the battery without passing through current coils and the utilizers can therefore be more efficient.

CHECK OF THE CHARGE CURRENT AND REGULATION

- a) Make sure that the wiring harness be efficient, particularly the part regarding the alternator, the regulator and the battery, and that the employed lamps be those requested.

- b) Disconnect from the battery positive (+) clip the pertaining red cable and insert between the disconnected cable or the free clip, an ammeter for direct current, ammeter in which the zero is in its center, having a current carrying capacity of 15 Amp. approximately.
- c) Possibly connect between the battery (+) and (-) clips, a direct current Voltmeter having a current carrying capacity of 8 to 10 Volts approximately, and make sure that the battery voltage be at least of 4 V; if it were not so, the regulator will not be excited and consequently there will be no current output.
- d) Insert the contact key, let run the engine and gradually accelerate till the flywheel alternator attains approximately 6,000 r.p.m.
- e) **Check of the maximum output** - Switch on the main vehicle lights with a battery voltage (showed by the voltmeter) being lower than that of 7 V rated for the regulator; the charge current (showed by the ammeter) should be 5 Amp. approximately.
- f) **Check of the minimum output** - Switch off the main vehicle lights and let the engine running at the said number of revolutions. The battery voltage should progressively increase till it attains the regulator rating value (7.5 Volt approximately), while the charge current should progressively decrease till arriving near 1 Amp. approximately (when the battery is entirely charged).

If there is no current output or if the maximum current is found, the regulator can be defective and therefore it must be replaced. Repeat the tests. If on the contrary are found figures lower than those mentioned in parag. « e », check the alternator separately.

CHECK OF THE FLYWHEEL ALTERNATOR (see fig. 1 and fig. 2).

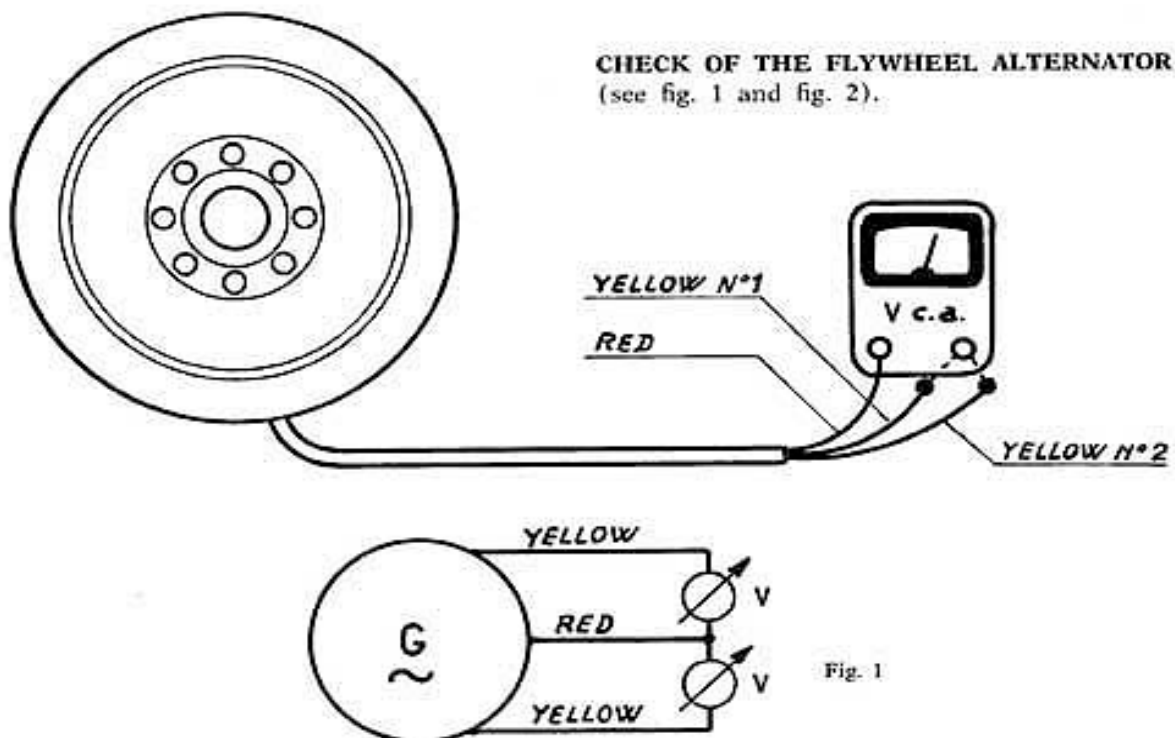


Fig. 1

**INSTRUCTIONS FOR CHECKING
THE ADVANCE ON DUCATI MOTORCYCLES**
(Page 45)

For all models, the ignition advance check can be carried out according to the traditional system (see instruction books for 250-350-450 cc), or according to the check by stroboscopic light (illustrated in detail in the instruction book for

the 450 cc), bearing in mind that the round reference mark (.) appearing on the cover, clutch side, refers to the total advance in the models 250 and 350 cc; on the contrary, the linear reference mark (I) refers to the total advance in the 450 cc models.

The figures in the following table have been taken with an opening between the contact-breaker contacts of .3 to .4 mm (.012 to .015 inch).

Models	Strokes	Advance with still engine	Extent of automatic advance	Total advance with engine running at 3.000 r.p.m.	Flywheel position α°
250 MONZA	4	5° + 8°	28°	33° + 36°	0°
250 MARK 3	4	5° + 8°	28°	33° + 36°	0°
250 MARK 3 D	4	5° + 8°	28°	33° + 36°	0°
250 SCRAMBLER	4	5° + 8°	28°	33° + 36°	0°
350 MARK 3	4	5° + 8°	28°	33° + 36°	0°
350 MARK 3 D	4	5° + 8°	28°	33° + 36°	0°
350 SCRAMBLER	4	5° + 8°	28°	33° + 36°	0°
450 MARK 3	4	0°	28°	28°	0°
450 MARK 3 D	4	0°	28°	28°	0°
450 SCRAMBLER	4	0°	28°	28°	0°

MOTORCYCLE DISMANTLING (page 51)
ENGINE DISMANTLING (page 54)

As a whole, follow the description in the Work Shop Manual from page 51 to page 58.

OVERHAUL AND LIMITS OF WEAR (page 59)

Follow the check described from page 59 and up bearing in mind that for the:

Clutch springs (page 61)

the speech is current for the motorcycles till 350 cc, while for those of 450 cc it should be read:

The springs are 6. When checking their efficiency, bear in mind what follows:

- the initial length of each new spring is about 27.5 mm (1.083"), and it takes a 21 kilogram approx. (approx. 46.3 lbs) weight to compress the spring down to 20 mm (25/32"). Springs may be checked by measuring them free;
- if the length is equal to, or less than 5% of the initial measurement, then the spring is still efficient; otherwise it is not and must be replaced.

STARTER (page 62)

Check the spindle-to-bush fit. Initially the diameter of the bush in the crank-
case (clutch side) is $\varnothing 22H8+0.033$, and that of

the cover (clutch side) is $\varnothing 18H7+0.018$. When wear exceeds 0.10 mm (.004") the bushes must be replaced. They can be extracted with a press and a mandrel. The same means can be used to assemble the bushes.

After having assembled the new bushes, ream to the above mentioned diameters.

STARTER GEAR (page 62)

Inspect the teeth. If they are excessively worn, change the gear with a new one.

NOTE! - If the engagement teeth are very much out of shape, then also inspect the 1st-speed driven gear, with which the starter gear meshes and, if necessary, change also the first speed driven gear.

Initially the diameter of the gear is

$\varnothing 22H7+0.021$.

When wear exceeds 0.10 mm (.004"), the gear must be replaced.

SLIDING COUPLING

Operate as for the starter gear.

CLUTCH PRESSURE SPRING

There is no fixed charge, so if there are no inconveniences in its work, it is still fit.

TABLES OF WEAR (page 67)

Motorcycles 250 MARK 3 - 250 MARK 3 D

Table N. 1 - Clearance between cylinder and piston.

The same table for 250 MARK 3 - MACH 1 of page 69 goes for these motorcycles too.

Motorcycles 250 MONZA - 250 SCRAMBLER

The same table of page 68 goes for these motorcycles too.

350 MARK 3 - MARK 3 D - SCR MOTORCYCLES

ASSEMBLY	CYLINDER C = mm.		PISTON D = mm.		Max. clearance E = mm.	Min. clearance E = mm.	Limits of wear mm.
	A	B	A	B			
Standard	A	76.00 ÷ 76.01	B	75.885 ÷ 75.865	0.145	0.115	0.19
	B	76.01 ÷ 76.02	A	75.895 ÷ 75.875	0.145	0.115	
1st rebore + 0.4	A	76.40 ÷ 76.41	B	76.285 ÷ 76.265	0.145	0.115	
	B	76.41 ÷ 76.42	A	76.295 ÷ 76.275	0.145	0.115	
2nd rebore + 0.6	A	76.60 ÷ 76.61	B	76.485 ÷ 76.465	0.145	0.115	
	B	76.61 ÷ 76.62	A	76.495 ÷ 76.475	0.145	0.115	
3rd rebore + 0.8	A	76.80 ÷ 76.81	B	76.685 ÷ 76.665	0.145	0.115	
	B	76.81 ÷ 76.82	A	76.695 ÷ 76.675	0.145	0.115	
4th rebore + 1	A	77.00 ÷ 77.01	B	76.885 ÷ 76.865	0.145	0.115	
	B	77.01 ÷ 77.02	A	76.895 ÷ 76.875	0.145	0.115	

450 cc MOTORCYCLE

ASSEMBLY	CYLINDER C = mm.		PISTON D = mm.		Max. clearance E = mm.	Min. clearance E = mm.	Limits of wear mm.
	A	B	A	B			
Standard	A	86.00 ÷ 86.01	B	85.86 ÷ 85.85	0.16	0.14	0.21
	B	86.01 ÷ 86.02	A	85.87 ÷ 85.86	0.16	0.14	
1st rebore + 0.4	A	86.40 ÷ 86.41	B	86.26 ÷ 86.25	0.16	0.14	
	B	86.41 ÷ 86.42	A	86.27 ÷ 86.26	0.16	0.14	
2nd rebore + 0.6	A	86.60 ÷ 86.61	B	86.46 ÷ 86.45	0.16	0.14	
	B	86.61 ÷ 86.62	A	86.47 ÷ 86.46	0.16	0.14	
3rd rebore + 0.8	A	86.80 ÷ 86.81	B	86.66 ÷ 86.65	0.16	0.14	
	B	86.81 ÷ 86.82	A	86.67 ÷ 86.66	0.16	0.14	
4th rebore + 1	A	87.00 ÷ 87.01	B	86.86 ÷ 86.85	0.16	0.14	
	B	87.01 ÷ 87.02	A	86.87 ÷ 86.86	0.16	0.14	

Table N. 9 - Minimum and maximum clearance between rocker pin and rocker bush. - Limits of wear. (page 77)

MOTOR CYCLE MODEL	BUSH BORE ∅ - mm.	ROCKER PIN ∅ - mm.	Min. & max. clearance mm.	Limits of wear mm.
450 MARK 3 - SCR	8.013	8.010	0.003	0.05
	8.028	8.001	0.027	
250 MONZA 250 - 350 MARK 3 250 - 350 SCR	10.013	10.010	0.003	0.05
	10.028	10.001	0.027	
250 - 350 - 450 MARK 3 D	8.040	8.030	0.010	0.07
	8.062	8.015	0.047	

Table N. 10 - Maximum interference and maximum clearance between bush and rocker (page 77) - Limits of wear.

MOTOR CYCLE MODEL	ROCKER BORE ∅ - mm.	BUSH OUTSIDE ∅ - mm.	Max. interference - Max. clearance + mm.	Limits of wear mm.
250 - 350 - 450 MARK 3 D	10.000	9.995	+ 0.005	0.07
	10.022	9.973	+ 0.049	
250 MONZA 250 - 350 - 450 MARK 3 250 - 350 - 450 SCR	13.000	13.012	- 0.012	0.04
	13.018	13.001	- 0.017	

Table N. 11 - Needle valve springs (page 77).

MOTOR CYCLE MODEL	SPRING INLET OR EXHAUST	P		L = mm.	Limits of wear mm.
		Kg.	lb		
250 - 350 - 450 MARK 3 D	I	16 + 0.800	35.3	Parallel arms	Arms converging
	E	16 - 0.800	35.3		
250 MONZA 250 SCR	I	27 ± 0.650	59.5	* *	
	E	22 + 1	48.5		
250 - 350 - 450 MARK 3 350 - 450 SCR	I	27 ± 0.650	59.5	* *	
	E	27 ± 0.650	59.5		

REASSEMBLING OF THE ENGINE (page 78).

As a whole, follow the description of the Work Shop Manual from page 78 to 93; bear in mind however the following variations:

FITTING BEARING, ROLLERS BOX AND BUSHES etc. (page 78)

The rollers box has been eliminated and replaced by a bearing.

ASSEMBLING THE TIMING BEVEL GEAR, ON HALF-CRANKCASE CHAIN SIDE.

Assembling in half-crankcase (page 78). Besides the thrust washer ∅_i = 29.2, fit the distance piece ∅_e = 35 - thickness 10 mm.

ASSEMBLING THE GEAR BOX (page 79).

Step No. 1. - The 1st-speed driven gear (kick-starter gear is not put in the clutch side half-crankcase together with the rollers and grease, but on the gear layshaft, together with the thrust washers.

Steps No. 2, 3, 4 and 5, as page 79.

CLOSING THE CRANKCASE (page 80).

Before closing the crankcase, fit on half-crankcase clutch side, the starter pin complete with pedal release spring, with the thrust washer shim 1 mm., and from the opposite side, the thrust washer shim 0.5 mm., the starter gear, the

MOTOR CYCLE	INTAKE		EXHAUST	
	Opens $\pm 5^\circ$	Closes $\pm 5^\circ$	Opens $\pm 5^\circ$	Closes $\pm 5^\circ$
250 - 350 - 450 DESMO	70°	82°	80°	65°
250 MARK 3	62°	76°	70°	48°
250 - 450 SCR - 450 MARK 3	27°	75°	60°	32°
350 MARK 3 - SCR	70°	84°	80°	64°

Setting the Ignition Advance (page 90)

See pages 90, 91 and 92 of the Work Shop Manual and the Schedule at page 8 of the supplement.

Fitting the Spark Plug (page 92)

Check the spark plug gap which should be approximately 0.6 to 0.8 mm (.026" to .028") for the 250 and 350 cc and 0.8 mm (.028") for the 450 cc.

REASSEMBLING OF THE MOTORCYCLE (page 94)

As a whole, follow the description of the Work Shop Manual at page 94 and following ones. For the electrical connections, follow the electrical diagrams, in colors and with numbers, of the instruction book.

For the batteries having outer electrical clamping screws, bear in mind that they must always be installed with the positive pole (+) with red clamp on the righthand side of the rider, and the negative pole (-) with blue clamp on the lefthand side of the rider.

TROUBLES, THEIR ORIGIN AND REPAIR (page 111)

The remedies therein described go for the new models too, while for the battery which discharges quickly, refer yourself to the instructions book. The same it is said for the check of the electric balances.

TOOLS (page 115)

To the normal set of tools listed at pages 115, 116 and 117 should be added the following ones:

Illustration N°	Page	Reference N°	Tool
1	115	88713.0411	Flywheel magneto extractor for 250 - 350 - 450 cc.
2	115	88700.0459	Tool to grasp piston, 450 cc.
6	115	88713.0462	Z = 12 wrench, to hold sprocket, to lock nut for 450 cc.
11	115	88713.0435	Extractor for rocker pin, 250 - 350 - 450 D.
14	115	88713.0434	Pin for orienting washers and bushes when fitting rocker pins, 250 - 350 - 450 D.
15	115	88713.0433	Spanner to hold timing shaft (to lock Z = 28 bevel gear), 250 - 350 - 450 D.
16-17	115	88713.0460/0461	Pins to fit and re-fit gudgeon pin, 450 cc.
34	45	98112.0002	Degree wheel mounting device, 250 - 350 - 450 cc.
—	—	88713.0441	Warning stroboscopic light to check the ignition advance with screw and oil protector, for 250 - 350 - 450 cc.

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	Opens $\pm 5^\circ$	Closes $\pm 5^\circ$	Opens $\pm 5^\circ$	Closes $\pm 5^\circ$
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	Opens ± 5°	Closes ± 5°	Opens ± 5°	Closes ± 5°
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ENCLOSURE TO WORKSHOP MANUAL

Enclosure to Supplement MOD. 4125/E of December 1969 to WORKSHOP MANUAL
MOD. 4106/E of January 1966.

1st EDITION - REF. - DM - MOD. 4127/E PRINTED JANUARY 1971 - 1,000

Every DUCATI REPAIR SHOP is supplied with a copy of this enclosure

450 cc Over Head Camshaft Motorcycle 197 450 R/T

The main specifications of this Motorcycle can be found in the « INSTRUCTION AND MAINTENANCE MANUAL » for the 450 cc. DESMO-CROSS-SPECIAL.

As a whole, this motorcycle is an arrangement obtained with the engine of the 450 DESMO and the frame of the 450 SCRAMBLER, together with the addition of some variations.

ENGINE

For the carburetor, the instructions for checking the ignition advance, and for the electrical equipment, can be found on pages 6, 19 and following ones, as well as on pages 29 and 30 of the Instruction Manual.

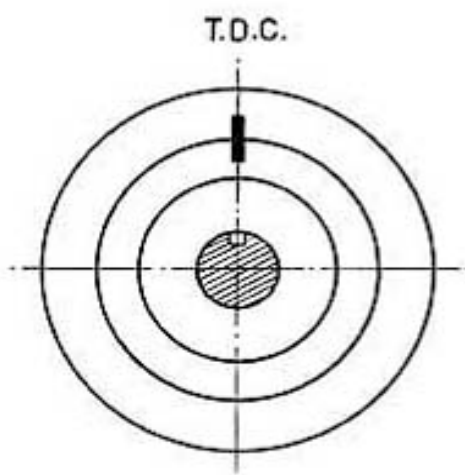
Take particular note of the electrical equipment in case of

FLYWHEEL REFIRING

Displace the piston until the TDC (top dead center) is in firing phase; the flywheel line must be placed on the upper side, on the same axis of the key for the driving shaft gear.

For the wear limits, employ the same tables for the 450 cc Motorcycle in the Supplement to WORKSHOP MANUAL, pages 9, 10, 11 and 12.

To reassemble the engine, follow the same Supplement, on page 12 and following ones, referring particularly to the 450 DESMO.



FRAME

If the frame has to be reassembled, remember that the sole important variation has been brought to the steering, where at the steering ball races and balls we fitted two conical roller bearings ($\varnothing 26 \times \varnothing 52 \times 15$); smear them with bearing grease before fitting them.

After fitting the front fork, check its smoothness, as it must be uniform and without play.

DUCATI MECCANICA S.p.A. - BOLOGNA
(BORGO PANIGALE) CASELLA POSTALE 313
TELEPH. 40.02.50 (four lines) TELEGRAMS: "DUCATIMEC." - BOLOGNA (ITALY)

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DUCATI MECCANICA S.p.A. - BOLOGNA
(BORGO PANIGALE) CASELLA POSTALE 313
TELEPH. 40.02.50 (four lines) TELEGRAMS: "DUCATIMEC." - BOLOGNA (ITALY)

MAIN SPECIFICATIONS

The main specifications of each single O.H.C. SHAFT DUCATI MOTOR CYCLE are found in the « USE and MAINTENANCE » Instruction Book.

CARBURETOR (Page 34)

For the 250 and 350 cc motorcycles it is advisable to refer to the corresponding Instruction Books and Spare Parts Catalogues, while for the 450 cc motorcycles (being the carburetor apparently the same when it is seen from outside, whereas in reality the carburation differs according to the type of the machine and also if it is with or without filter), the carburetor specifications are found in the following schedule):

CARBURETOR		Distinct. Mark	Valve	Needle	Atomiser	Idler jet	Mixture screw	Horn or Filter	Main jet	Exhaust	Fit for 450
DELLORTO	DUCATI										
1	VHB 29 AD adjustment 3521	Yellow securing screw for Pipe	60	V 7/II	265 T	50	1 3/4	H-7688	135	Italia U.S.A. SCR Sample for Berl.	Mark 3 SCR
2	VHB 29 AD with sole horn adjustment 3513	—	60	V 7/II	265 T	50	1 3/4	H-7688 F	130	Italia U.S.A. SCR Sample for Berl.	Mark 3 SCR
1	VHB 29 AD adjustment 3521	Yellow securing screw for Pipe	60	V 7/II	265 T	50	1 3/4	H-7688	135	U.S.A. SCR Sample for Berl.	Mark 3D
2	VHB 29 AD with sole horn adjustment 3513	—	60	V 7/II	265 T	50	1 3/4	H-7688 F	130	U.S.A. SCR Sample for Berl.	Mark 3D
3	VHB 29 AD adjustment 3522	Yellow securing screw for valve cover	60	V 8/II	265 T	45	2 3/4	H-7688	135	Italia	Mark 3D
4	VHB 29 AD with sole horn adjustment	—	60	V 8/II	265 T	45	2 3/4	H-7688 F	130	Italia	Mark 3D
5	VHB 29 AD adjustment	—	60 with hole \varnothing 1.75	V 7/II	265 T	45	—	H-7688	135 140 145	SCR	Upated Mark 3 SCR
5	VHB 29 AD with sole horn adjustment	—	60 with hole \varnothing 1.75	V 7/II	265 T	45	—	H-7688 F	135 140 145	SCR	Upated Mark 3 SCR

ALL FOR 450's.

ELECTRICAL SYSTEM (Page 35)

For the description, advantages, specifications, diagram and inconveniences, refer to the corresponding instruction manuals, while hereinafter we describe the:

CHECK OF THE RECHARGE INSTALLATION WITH ELECTRONIC REGULATOR

The battery recharge installation consists of a flywheel alternator which produces single-phase alternate current which is rectified and voltage-regulated by an electronic regulator with controlled diodes.

The voltage regulation let arrive to the battery only the current quantity required by its charge situation; consequently a quick recharge is obtained without any overcharge, resulting in an extended life of the battery itself.

The controlled diodes allow the direct and regulated flow of the rectified current from the alternator to the battery without having to pass through limiting impedances, resulting in a better output of the installation itself.

The current arrives to the utilizers (lamps, horn etc.) directly from the battery without passing through current coils and the utilizers can therefore be more efficient.

CHECK OF THE CHARGE CURRENT AND REGULATION

- a) Make sure that the wiring harness be efficient, particularly the part regarding the alternator, the regulator and the battery, and that the employed lamps be those requested.

- b) Disconnect from the battery positive (+) clip the pertaining red cable and insert between the disconnected cable or the free clip, an ammeter for direct current, ammeter in which the zero is in its center, having a current carrying capacity of 15 Amp. approximately.
- c) Possibly connect between the battery (+) and (-) clips, a direct current Voltmeter having a current carrying capacity of 8 to 10 Volts approximately, and make sure that the battery voltage be at least of 4 V; if it were not so, the regulator will not be excited and consequently there will be no current output.
- d) Insert the contact key, let run the engine and gradually accelerate till the flywheel alternator attains approximately 6,000 r.p.m.
- e) **Check of the maximum output** - Switch on the main vehicle lights with a battery voltage (showed by the voltmeter) being lower than that of 7 V rated for the regulator; the charge current (showed by the ammeter) should be 5 Amp. approximately.
- f) **Check of the minimum output** - Switch off the main vehicle lights and let the engine running at the said number of revolutions. The battery voltage should progressively increase till it attains the regulator rating value (7.5 Volt approximately), while the charge current should progressively decrease till arriving near 1 Amp. approximately (when the battery is entirely charged).

If there is no current output or if the maximum current is found, the regulator can be defective and therefore it must be replaced. Repeat the tests. If on the contrary are found figures lower than those mentioned in parag. « e », check the alternator separately.

CHECK OF THE FLYWHEEL ALTERNATOR (see fig. 1 and fig. 2).

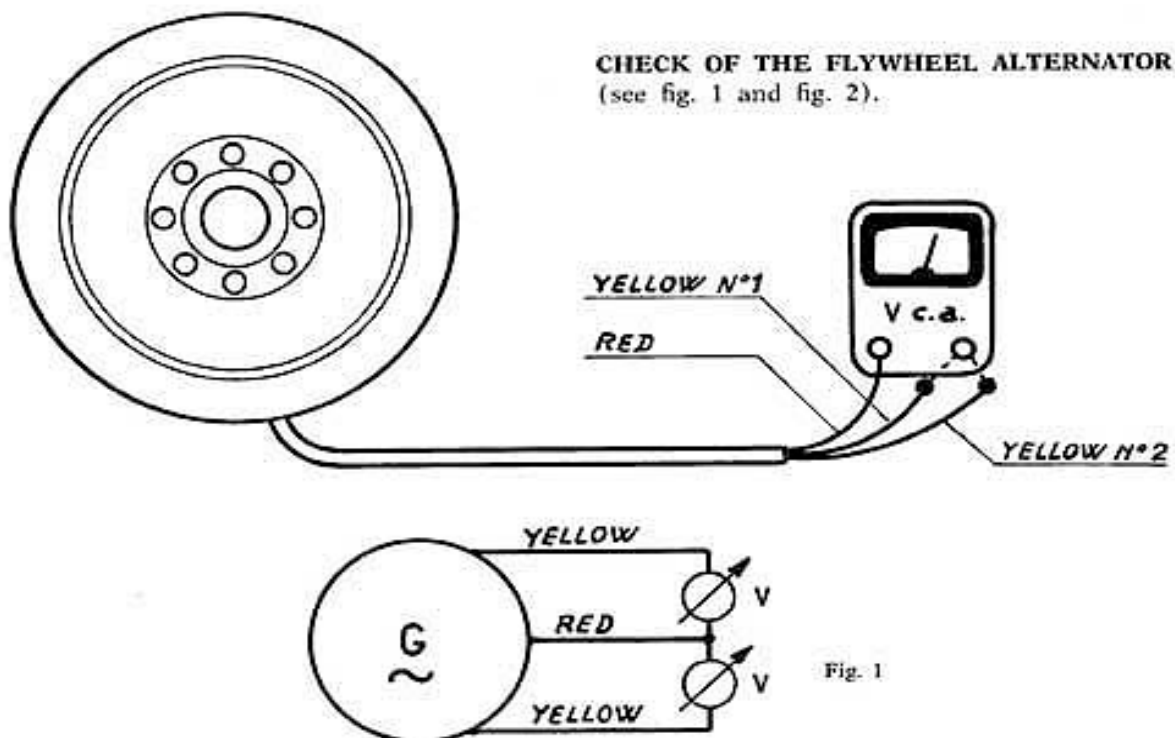


Fig. 1

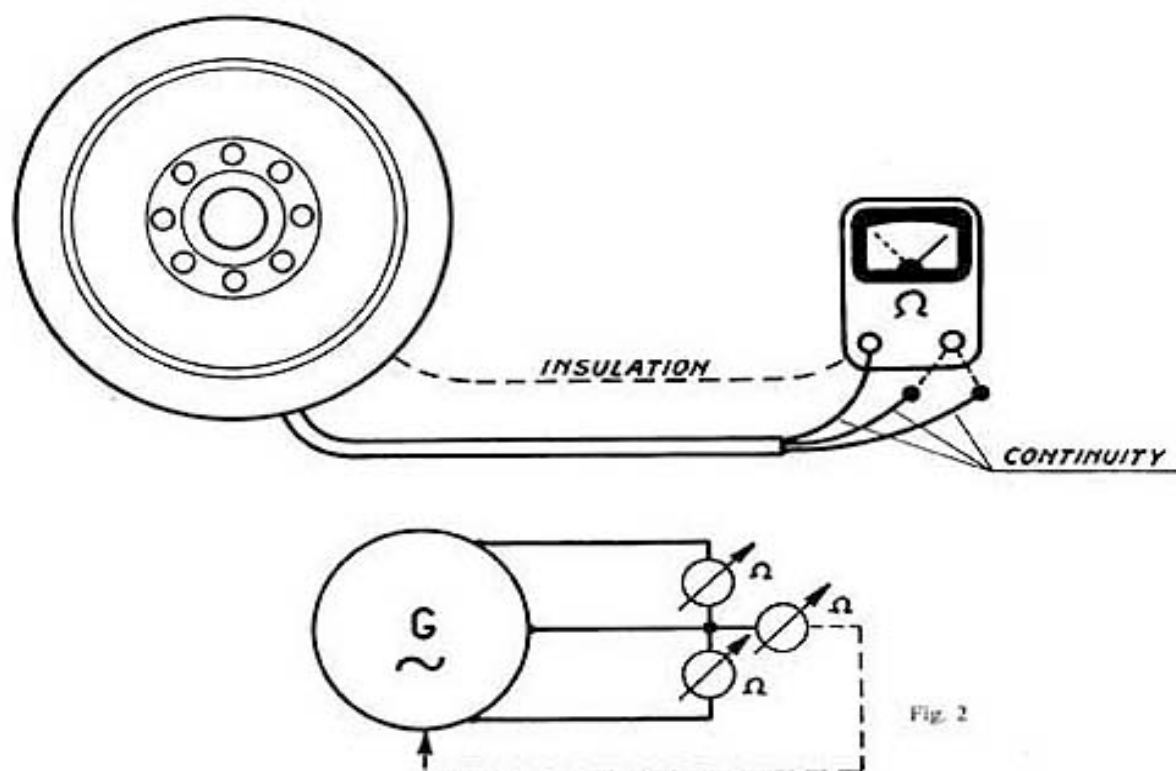


Fig. 2

Disconnect from the regulator the 2 yellow cables and the red one coming from the alternator, taking care to place them without they touch each other.

Then insert the contact key, let the engine run, progressively accelerating till attaining 6,000 r.p.m. in the flywheel alternator and measure the voltage between each yellow cable and the red cable, with a voltmeter for alternate current (having a rectifier).

The voltage so found should approximately correspond to 38 to 40 V; if they are lower, for the same amount, than the specified one, the

rotor could be partially demagnetized and therefore it should be remagnetized, employing the adequate magnetizer.

If the two voltages are not equilibrated between them, the stator can be defective and therefore it must be checked, measuring with an Ohmmeter the continuity among the disconnected cables and the insulation towards earth, making sure, in case, that the stator coils do not show any apparent sign of burn.

If one or both the windings result cut off or at the earth, replace the stator and repeat the voltage tests.

CHECK OF THE ELECTRONIC REGULATOR
(see fig. 3)

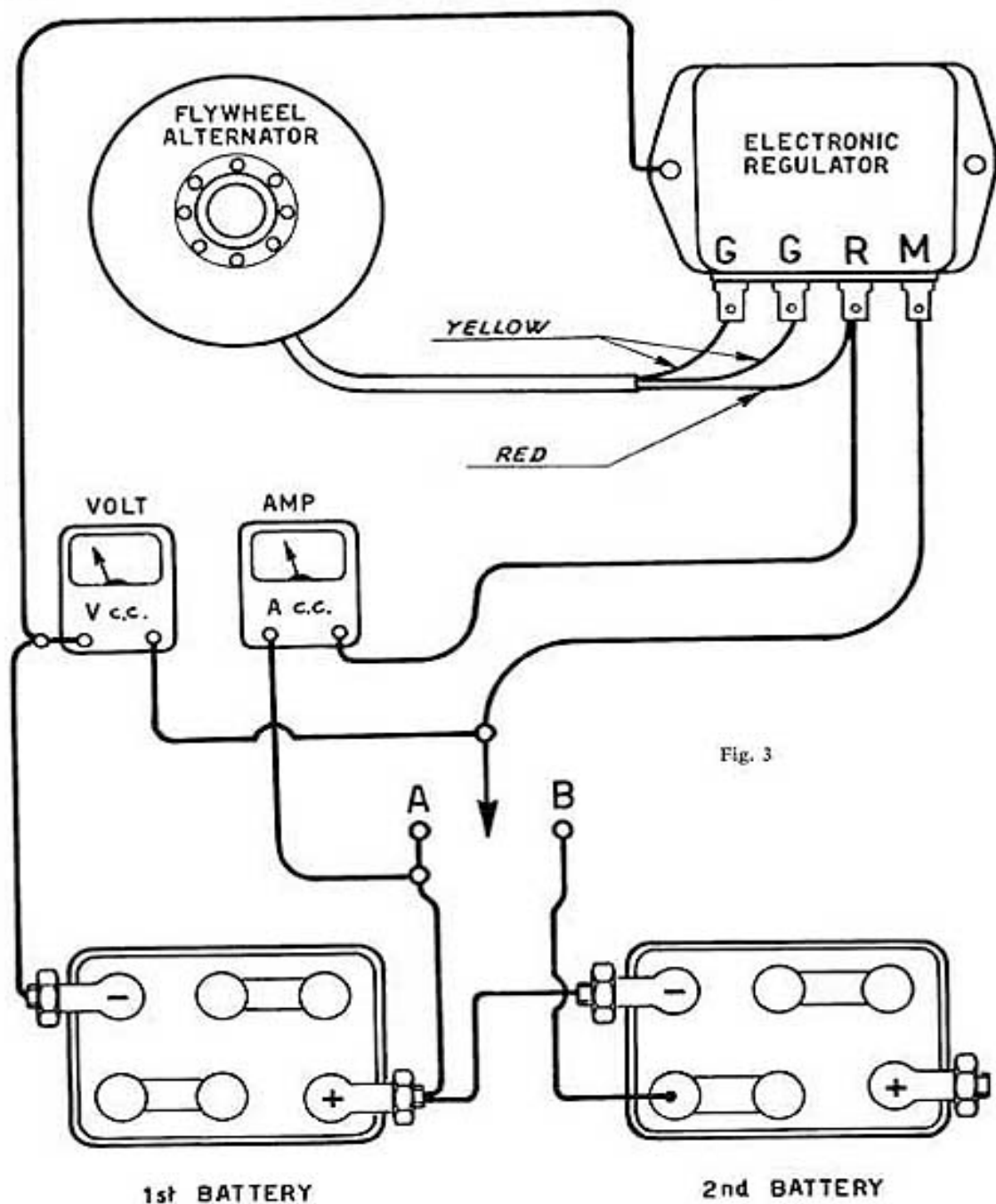


Fig. 3

Check how works the tension regulation: install on the test bench the regulator, the pertinent alternator, the battery, the ammeter and the voltmeter, following the proper scheme.

Put the bench in working condition letting the alternator turn at 6,000 r.p.m. approximately:

a) With deviator in position « A » (6 to 7): the ammeter will show the charge current which

can be from 1 to 10 Amp. according to the battery charge condition;

b) With deviator in position « B » (8 V. approx.): the ammeter must show 0 Amp. (closed regulator).

N.B. - If the regulator does not follow these rules, it is defective and therefore it must be replaced. Repeat the said tests.

**INSTRUCTIONS FOR CHECKING
THE ADVANCE ON DUCATI MOTORCYCLES**
(Page 45)

For all models, the ignition advance check can be carried out according to the traditional system (see instruction books for 250-350-450 cc), or according to the check by stroboscopic light (illustrated in detail in the instruction book for

the 450 cc), bearing in mind that the round reference mark (.) appearing on the cover, clutch side, refers to the total advance in the models 250 and 350 cc; on the contrary, the linear reference mark (I) refers to the total advance in the 450 cc models.

The figures in the following table have been taken with an opening between the contact-breaker contacts of .3 to .4 mm (.012 to .015 inch).

Models	Strokes	Advance with still engine	Extent of automatic advance	Total advance with engine running at 3,000 r.p.m.	Flywheel position α°
250 MONZA	4	5° + 8°	28°	33° + 36°	0°
250 MARK 3	4	5° + 8°	28°	33° + 36°	0°
250 MARK 3 D	4	5° + 8°	28°	33° + 36°	0°
250 SCRAMBLER	4	5° + 8°	28°	33° + 36°	0°
350 MARK 3	4	5° + 8°	28°	33° + 36°	0°
350 MARK 3 D	4	5° + 8°	28°	33° + 36°	0°
350 SCRAMBLER	4	5° + 8°	28°	33° + 36°	0°
450 MARK 3	4	0°	28°	28°	0°
450 MARK 3 D	4	0°	28°	28°	0°
450 SCRAMBLER	4	0°	28°	28°	0°

MOTORCYCLE DISMANTLING (page 51)
ENGINE DISMANTLING (page 54)

As a whole, follow the description in the Work Shop Manual from page 51 to page 58.

OVERHAUL AND LIMITS OF WEAR (page 59)

Follow the check described from page 59 and up bearing in mind that for the:

Clutch springs (page 61)

the speech is current for the motorcycles till 350 cc, while for those of 450 cc it should be read:

The springs are 6. When checking their efficiency, bear in mind what follows:

- the initial length of each new spring is about 27.5 mm (1.083"), and it takes a 21 kilogram approx. (approx. 46.3 lbs) weight to compress the spring down to 20 mm (25/32"). Springs may be checked by measuring them free;
- if the length is equal to, or less than 5% of the initial measurement, then the spring is still efficient; otherwise it is not and must be replaced.

STARTER (page 62)

Check the spindle-to-bush fit. Initially the diameter of the bush in the crankcase (clutch side) is $\varnothing 22H8+0.033$, and that of

the cover (clutch side) is $\varnothing 18H7+0.018$. When wear exceeds 0.10 mm (.004") the bushes must be replaced. They can be extracted with a press and a mandrel. The same means can be used to assemble the bushes. After having assembled the new bushes, ream to the above mentioned diameters.

STARTER GEAR (page 62)

Inspect the teeth. If they are excessively worn, change the gear with a new one.

NOTE! - If the engagement teeth are very much out of shape, then also inspect the 1st-speed driven gear, with which the starter gear meshes and, if necessary, change also the first speed driven gear.

Initially the diameter of the gear is

$\varnothing 22H7+0.021$.

When wear exceeds 0.10 mm (.004"), the gear must be replaced.

SLIDING COUPLING

Operate as for the starter gear.

CLUTCH PRESSURE SPRING

There is no fixed charge, so if there are no inconveniences in its work, it is still fit.

**INSTRUCTIONS FOR CHECKING
THE ADVANCE ON DUCATI MOTORCYCLES**
(Page 45)

For all models, the ignition advance check can be carried out according to the traditional system (see instruction books for 250-350-450 cc), or according to the check by stroboscopic light (illustrated in detail in the instruction book for

the 450 cc), bearing in mind that the round reference mark (.) appearing on the cover, clutch side, refers to the total advance in the models 250 and 350 cc; on the contrary, the linear reference mark (I) refers to the total advance in the 450 cc models.

The figures in the following table have been taken with an opening between the contact-breaker contacts of .3 to .4 mm (.012 to .015 inch).

Models	Strokes	Advance with still engine	Extent of automatic advance	Total advance with engine running at 3,000 r.p.m.	Flywheel position α°
250 MONZA	4	5° ± 8°	28°	33° ± 36°	0°
250 MARK 3	4	5° ± 8°	28°	33° ± 36°	0°
250 MARK 3 D	4	5° ± 8°	28°	33° ± 36°	0°
250 SCRAMBLER	4	5° ± 8°	28°	33° ± 36°	0°
350 MARK 3	4	5° ± 8°	28°	33° ± 36°	0°
350 MARK 3 D	4	5° ± 8°	28°	33° ± 36°	0°
350 SCRAMBLER	4	5° ± 8°	28°	33° ± 36°	0°
450 MARK 3	4	0°	28°	28°	0°
450 MARK 3 D	4	0°	28°	28°	0°
450 SCRAMBLER	4	0°	28°	28°	0°

MOTORCYCLE DISMANTLING (page 51)
ENGINE DISMANTLING (page 54)

As a whole, follow the description in the Work Shop Manual from page 51 to page 58.

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- if the length is equal to, or less than 5% of the initial measurement, then the spring is still efficient; otherwise it is not and must be replaced.

STARTER (page 62)

Check the spindle-to-bush fit. Initially the diameter of the bush in the crank-case (clutch side) is $\varnothing 22H8+0.033$, and that of

the cover (clutch side) is $\varnothing 18H7+0.018$. When wear exceeds 0.10 mm (.004") the bushes must be replaced. They can be extracted with a press and a mandrel. The same means can be used to assemble the bushes.

After having assembled the new bushes, ream to the above mentioned diameters.

STARTER GEAR (page 62)

Inspect the teeth. If they are excessively worn, change the gear with a new one.

NOTE! - If the engagement teeth are very much out of shape, then also inspect the 1st-speed driven gear, with which the starter gear meshes and, if necessary, change also the first speed driven gear.

Initially the diameter of the gear is

$\varnothing 22H7+0.021$.

When wear exceeds 0.10 mm (.004"), the gear must be replaced.

SLIDING COUPLING

Operate as for the starter gear.

CLUTCH PRESSURE SPRING

There is no fixed charge, so if there are no inconveniences in its work, it is still fit.

TABLES OF WEAR (page 67)

Table N. 1 - Clearance between cylinder and piston.

Motorcycles 250 MARK 3 - 250 MARK 3 D

The same table for 250 MARK 3 - MACH 1 of page 69 goes for these motorcycles too.

Motorcycles 250 MONZA - 250 SCRAMBLER

The same table of page 68 goes for these motorcycles too.

350 MARK 3 - MARK 3 D - SCR MOTORCYCLES

ASSEMBLY	CYLINDER C = mm.		PISTON D = mm.		Max. clearance E = mm.	Min. clearance E = mm.	Limits of wear mm.
	A	B	A	B			
Standard	A	76.00 ÷ 76.01	B	75.885 ÷ 75.865	0.145	0.115	0.19
	B	76.01 ÷ 76.02	A	75.895 ÷ 75.875	0.145	0.115	
1st rebore + 0.4	A	76.40 ÷ 76.41	B	76.285 ÷ 76.265	0.145	0.115	
	B	76.41 ÷ 76.42	A	76.295 ÷ 76.275	0.145	0.115	
2nd rebore + 0.6	A	76.60 ÷ 76.61	B	76.485 ÷ 76.465	0.145	0.115	
	B	76.61 ÷ 76.62	A	76.495 ÷ 76.475	0.145	0.115	
3rd rebore + 0.8	A	76.80 ÷ 76.81	B	76.685 ÷ 76.665	0.145	0.115	
	B	76.81 ÷ 76.82	A	76.695 ÷ 76.675	0.145	0.115	
4th rebore + 1	A	77.00 ÷ 77.01	B	76.885 ÷ 76.865	0.145	0.115	
	B	77.01 ÷ 77.02	A	76.895 ÷ 76.875	0.145	0.115	

450 cc MOTORCYCLE

ASSEMBLY	CYLINDER C = mm.		PISTON D = mm.		Max. clearance E = mm.	Min. clearance E = mm.	Limits of wear mm.
	A	B	A	B			
Standard	A	86.00 ÷ 86.01	B	85.86 ÷ 85.85	0.16	0.14	0.21
	B	86.01 ÷ 86.02	A	85.87 ÷ 85.86	0.16	0.14	
1st rebore + 0.4	A	86.40 ÷ 86.41	B	86.26 ÷ 86.25	0.16	0.14	
	B	86.41 ÷ 86.42	A	86.27 ÷ 86.26	0.16	0.14	
2nd rebore + 0.6	A	86.60 ÷ 86.61	B	86.46 ÷ 86.45	0.16	0.14	
	B	86.61 ÷ 86.62	A	86.47 ÷ 86.46	0.16	0.14	
3rd rebore + 0.8	A	86.80 ÷ 86.81	B	86.66 ÷ 86.65	0.16	0.14	
	B	86.81 ÷ 86.82	A	86.67 ÷ 86.66	0.16	0.14	
4th rebore + 1	A	87.00 ÷ 87.01	B	86.86 ÷ 86.85	0.16	0.14	
	B	87.01 ÷ 87.02	A	86.87 ÷ 86.86	0.16	0.14	

Table N. 2 - Assembly interference and clearance between piston and gudgeon pin. - Limits of wear. 250 - 350 cc MOTORCYCLES

The same table for the 250 cc and 350 SEBRING goes for these motorcycles too (see page 72 - fig. 63).

450 cc MOTORCYCLE

ASSEMBLY	PISTON ∅ A=mm.	GUDGEON PIN ∅ B=mm.	Clearance + Interference - C = mm. max.	Limits of wear mm.
Standard	22.003	21.995	+ 0.008	0.05
	21.997	22.000	- 0.003	
1st gudgeon pin oversize - 0.010	22.013	22.005	+ 0.008	
	22.007	22.010	- 0.003	
2nd gudgeon pin oversize - 0.015	22.018	22.010	+ 0.008	
	22.012	22.015	- 0.003	
3rd gudgeon pin oversize - 0.020	22.023	22.015	+ 0.008	
	22.017	22.020	- 0.003	

Table N. 3 - Minimum and maximum axial clearance on assembly for compression rings and oil-scrappers (page 72) - fig. 64). - Limits of wear.

MOTOR CYCLE MODEL	1st & 2nd Piston Rings E=mm.	Oil-scraper Piston E=mm.	Piston seat D=mm.	Min. & Max. allowance F=mm.	Limits of wear mm.
250 MONZA	1.990	—	2.010	0.020	0.10
	1.978	—	2.030	0.052	
250 SCRAMBLER	—	2.490	2.510	0.020	
	—	2.478	2.530	0.052	
250 MARK 3	1.490	—	1.510	0.020	0.10
	1.478	—	1.530	0.052	
250 MARK 3 D	—	2.990	3.010	0.020	
	—	2.978	3.030	0.052	
350 MARK 3	1.490	—	1.510	0.020	0.10
	1.478	—	1.530	0.052	
350 MARK 3 D	—	3.990	4.010	0.020	
	—	3.978	4.030	0.052	
450 cc	1.490	—	1.510	0.020	0.10
	1.478	—	1.530	0.052	
	—	4.490	4.510	0.020	
	—	4.478	4.530	0.052	

Table N. 2 - Assembly interference and clearance between piston and gudgeon pin. - Limits of wear. 250 - 350 cc MOTORCYCLES

The same table for the 250 cc and 350 SEBRING goes for these motorcycles too (see page 72 - fig. 63).

450 cc MOTORCYCLE

ASSEMBLY	PISTON ∅ A=mm.	GUDGEON PIN ∅ B=mm.	Clearance + Interference - C = mm. max.	Limits of wear mm.
Standard	22.003	21.995	+ 0.008	0.05
	21.997	22.000	- 0.003	
1st gudgeon pin oversize - 0.010	22.013	22.005	+ 0.008	
	22.007	22.010	- 0.003	
2nd gudgeon pin oversize - 0.015	22.018	22.010	+ 0.008	
	22.012	22.015	- 0.003	
3rd gudgeon pin oversize - 0.020	22.023	22.015	+ 0.008	
	22.017	22.020	- 0.003	

Table N. 3 - Minimum and maximum axial clearance on assembly for compression rings and oil-scrappers (page 72) - fig. 64). - Limits of wear.

MOTOR CYCLE MODEL	1st & 2nd Piston Rings E=mm.	Oil-scraper Piston E=mm.	Piston seat D=mm.	Min. & Max. allowance F=mm.	Limits of wear mm.
250 MONZA	1.990	—	2.010	0.020	0.10
	1.978	—	2.030	0.052	
250 SCRAMBLER	—	2.490	2.510	0.020	
	—	2.478	2.530	0.052	
250 MARK 3	1.490	—	1.510	0.020	0.10
	1.478	—	1.530	0.052	
250 MARK 3 D	—	2.990	3.010	0.020	
	—	2.978	3.030	0.052	
350 MARK 3	1.490	—	1.510	0.020	0.10
	1.478	—	1.530	0.052	
350 MARK 3 D	—	3.990	4.010	0.020	
	—	3.978	4.030	0.052	
450 cc	1.490	—	1.510	0.020	0.10
	1.478	—	1.530	0.052	
	—	4.490	4.510	0.020	
	—	4.478	4.530	0.052	

Table N. 4 - Assembly tolerance for piston ring and oil-scraper end gap (see page 73 - fig. 65). - Limits of wear.

MOTOR CYCLE MODEL	O.D. of piston ring or oil-scraper in working position L = mm.	Gap G = mm.			Limits of wear mm.
		1st Ring	2nd Ring	Oil-scraper	
250 MONZA - 250 SCR	74.00 ÷ 74.02	0.25 ÷ 0.40	0.30 ÷ 0.45	0.30 ÷ 0.45	1.00
250 MARK 3 - 250 MARK 3 D	74.00 ÷ 74.02	0.25 ÷ 0.40	0.25 ÷ 0.40	0.20 ÷ 0.35	1.00
350 MARK 3 - 350 SCR - 350 MARK 3 D	76.00 ÷ 76.02	0.30 ÷ 0.45	0.30 ÷ 0.45	0.25 ÷ 0.40	1.00
450 cc.	86.00 ÷ 86.02	0.30 ÷ 0.45	0.30 ÷ 0.45	0.25 ÷ 0.40	1.00

Table N. 5 - Minimum and maximum assembly clearance between gudgeon pin and connecting rod small end bush. - Limits of wear.

250 - 350 cc Motorcycles

The table for the 250 cc and 350 Sebring goes for these motorcycles too (see page 74 - fig. 66).

450 cc MOTORCYCLES

ASSEMBLY	Connecting rod small end bush $\varnothing A = \text{mm.}$	Gudgeon pin $\varnothing B = \text{mm.}$	Clearance min. & max. C = mm.	Limits of wear mm.
Standard	22.000	22.000	0.000	0.04
	22.021	21.995	0.026	
1st gudgeon pin oversize + 0.010	22.010	22.010	0.000	
	22.031	22.005	0.026	
2nd gudgeon pin oversize - 0.015	22.015	22.015	0.000	
	22.036	22.010	0.026	
3rd gudgeon pin oversize - 0.020	22.020	22.020	0.000	
	22.041	22.015	0.026	

Table N. 6 - Radial tolerance on assembly between connecting rod big end and crank pin (see page 75 - fig. 67). - Limits of wear.

250 - 350 - 450 cc Motorcycles

The same table for the 250 cc and 350 Sebring - Page 75 - goes for these motorcycles too.

Table N. 7 - Axial tolerance on assembly between connecting rod big end and crank pin (see page 76 - fig. 68). - Limits of wear.

0
E = 75 - 0.05 for the 250 - 350 - 450 cc motorcycles
Measures A - B - C - D as for the 250 cc and 350 SEBRING (page 76).

Table N. 8 - Minimum and maximum clearance between valve-stem and valve-guide. - Limits of wear.

250 - 350 - 450 cc Motorcycles

The same table for the 250 cc and 350 SEBRING (page 76) goes for these motorcycles too.

Table N. 4 - Assembly tolerance for piston ring and oil-scraper end gap (see page 73 - fig. 65). - Limits of wear.

MOTOR CYCLE MODEL	O.D. of piston ring or oil-scraper in working position L = mm.	Gap G = mm.			Limits of wear mm.
		1st Ring	2nd Ring	Oil-scraper	
250 MONZA - 250 SCR	74.00 ÷ 74.02	0.25 ÷ 0.40	0.30 ÷ 0.45	0.30 ÷ 0.45	1.00
250 MARK 3 - 250 MARK 3 D	74.00 ÷ 74.02	0.25 ÷ 0.40	0.25 ÷ 0.40	0.20 ÷ 0.35	1.00
350 MARK 3 - 350 SCR - 350 MARK 3 D	76.00 ÷ 76.02	0.30 ÷ 0.45	0.30 ÷ 0.45	0.25 ÷ 0.40	1.00
450 cc.	86.00 ÷ 86.02	0.30 ÷ 0.45	0.30 ÷ 0.45	0.25 ÷ 0.40	1.00

Table N. 5 - Minimum and maximum assembly clearance between gudgeon pin and connecting rod small end bush. - Limits of wear.

250 - 350 cc Motorcycles

The table for the 250 cc and 350 Sebring goes for these motorcycles too (see page 74 - fig. 66).

450 cc MOTORCYCLES

ASSEMBLY	Connecting rod small end bush $\varnothing A = \text{mm.}$	Gudgeon pin $\varnothing B = \text{mm.}$	Clearance min. & max. C = mm.	Limits of wear mm.
Standard	22.000	22.000	0.000	0.04
	22.021	21.995	0.026	
1st gudgeon pin oversize + 0.010	22.010	22.010	0.000	
	22.031	22.005	0.026	
2nd gudgeon pin oversize - 0.015	22.015	22.015	0.000	
	22.036	22.010	0.026	
3rd gudgeon pin oversize - 0.020	22.020	22.020	0.000	
	22.041	22.015	0.026	

Table N. 6 - Radial tolerance on assembly between connecting rod big end and crank pin (see page 75 - fig. 67). - Limits of wear.

250 - 350 - 450 cc Motorcycles

The same table for the 250 cc and 350 Sebring - Page 75 - goes for these motorcycles too.

Table N. 7 - Axial tolerance on assembly between connecting rod big end and crank pin (see page 76 - fig. 68). - Limits of wear.

0
E = 75 - 0.05 for the 250 - 350 - 450 cc motorcycles
Measures A - B - C - D as for the 250 cc and 350 SEBRING (page 76).

Table N. 8 - Minimum and maximum clearance between valve-stem and valve-guide. - Limits of wear.

250 - 350 - 450 cc Motorcycles

The same table for the 250 cc and 350 SEBRING (page 76) goes for these motorcycles too.

Table N. 4 - Assembly tolerance for piston ring and oil-scraper end gap (see page 73 - fig. 65). - Limits of wear.

MOTOR CYCLE MODEL	O.D. of piston ring or oil-scraper in working position L = mm.	Gap G = mm.			Limits of wear mm.
		1st Ring	2nd Ring	Oil-scraper	
250 MONZA - 250 SCR	74.00 ÷ 74.02	0.25 ÷ 0.40	0.30 ÷ 0.45	0.30 ÷ 0.45	1.00
250 MARK 3 - 250 MARK 3 D	74.00 ÷ 74.02	0.25 ÷ 0.40	0.25 ÷ 0.40	0.20 ÷ 0.35	1.00
350 MARK 3 - 350 SCR - 350 MARK 3 D	76.00 ÷ 76.02	0.30 ÷ 0.45	0.30 ÷ 0.45	0.25 ÷ 0.40	1.00
450 cc.	86.00 ÷ 86.02	0.30 ÷ 0.45	0.30 ÷ 0.45	0.25 ÷ 0.40	1.00

Table N. 5 - Minimum and maximum assembly clearance between gudgeon pin and connecting rod small end bush. - Limits of wear.

250 - 350 cc Motorcycles

The table for the 250 cc and 350 Sebring goes for these motorcycles too (see page 74 - fig. 66).

450 cc MOTORCYCLES

ASSEMBLY	Connecting rod small end bush $\varnothing A = \text{mm.}$	Gudgeon pin $\varnothing B = \text{mm.}$	Clearance min. & max. C = mm.	Limits of wear mm.
Standard	22.000	22.000	0.000	0.04
	22.021	21.995	0.026	
1st gudgeon pin oversize + 0.010	22.010	22.010	0.000	
	22.031	22.005	0.026	
2nd gudgeon pin oversize - 0.015	22.015	22.015	0.000	
	22.036	22.010	0.026	
3rd gudgeon pin oversize - 0.020	22.020	22.020	0.000	
	22.041	22.015	0.026	

Table N. 6 - Radial tolerance on assembly between connecting rod big end and crank pin (see page 75 - fig. 67). - Limits of wear.

250 - 350 - 450 cc Motorcycles

The same table for the 250 cc and 350 Sebring - Page 75 - goes for these motorcycles too.

Table N. 7 - Axial tolerance on assembly between connecting rod big end and crank pin (see page 76 - fig. 68). - Limits of wear.

0
E = 75 - 0.05 for the 250 - 350 - 450 cc motorcycles
Measures A - B - C - D as for the 250 cc and 350 SEBRING (page 76).

Table N. 8 - Minimum and maximum clearance between valve-stem and valve-guide. - Limits of wear.

250 - 350 - 450 cc Motorcycles

The same table for the 250 cc and 350 SEBRING (page 76) goes for these motorcycles too.

Table N. 4 - Assembly tolerance for piston ring and oil-scraper end gap (see page 73 - fig. 65). - Limits of wear.

MOTOR CYCLE MODEL	O.D. of piston ring or oil-scraper in working position L = mm.	Gap G = mm.			Limits of wear mm.
		1st Ring	2nd Ring	Oil-scraper	
250 MONZA - 250 SCR	74.00 ÷ 74.02	0.25 ÷ 0.40	0.30 ÷ 0.45	0.30 ÷ 0.45	1.00
250 MARK 3 - 250 MARK 3 D	74.00 ÷ 74.02	0.25 ÷ 0.40	0.25 ÷ 0.40	0.20 ÷ 0.35	1.00
350 MARK 3 - 350 SCR - 350 MARK 3 D	76.00 ÷ 76.02	0.30 ÷ 0.45	0.30 ÷ 0.45	0.25 ÷ 0.40	1.00
450 cc.	86.00 ÷ 86.02	0.30 ÷ 0.45	0.30 ÷ 0.45	0.25 ÷ 0.40	1.00

Table N. 5 - Minimum and maximum assembly clearance between gudgeon pin and connecting rod small end bush. - Limits of wear.

250 - 350 cc Motorcycles

The table for the 250 cc and 350 Sebring goes for these motorcycles too (see page 74 - fig. 66).

450 cc MOTORCYCLES

ASSEMBLY	Connecting rod small end bush $\varnothing A = \text{mm.}$	Gudgeon pin $\varnothing B = \text{mm.}$	Clearance min. & max. C = mm.	Limits of wear mm.
Standard	22.000	22.000	0.000	0.04
	22.021	21.995	0.026	
1st gudgeon pin oversize + 0.010	22.010	22.010	0.000	
	22.031	22.005	0.026	
2nd gudgeon pin oversize - 0.015	22.015	22.015	0.000	
	22.036	22.010	0.026	
3rd gudgeon pin oversize - 0.020	22.020	22.020	0.000	
	22.041	22.015	0.026	

Table N. 6 - Radial tolerance on assembly between connecting rod big end and crank pin (see page 75 - fig. 67). - Limits of wear.

250 - 350 - 450 cc Motorcycles

The same table for the 250 cc and 350 Sebring - Page 75 - goes for these motorcycles too.

Table N. 7 - Axial tolerance on assembly between connecting rod big end and crank pin (see page 76 - fig. 68). - Limits of wear.

0
E = 75 - 0.05 for the 250 - 350 - 450 cc motorcycles
Measures A - B - C - D as for the 250 cc and 350 SEBRING (page 76).

Table N. 8 - Minimum and maximum clearance between valve-stem and valve-guide. - Limits of wear.

250 - 350 - 450 cc Motorcycles

The same table for the 250 cc and 350 SEBRING (page 76) goes for these motorcycles too.

Table N. 9 - Minimum and maximum clearance between rocker pin and rocker bush. - Limits of wear. (page 77)

MOTOR CYCLE MODEL	BUSH BORE ∅ - mm.	ROCKER PIN ∅ - mm.	Min. & max. clearance mm.	Limits of wear mm.
450 MARK 3 - SCR	8.013	8.010	0.003	0.05
	8.028	8.001	0.027	
250 MONZA 250 - 350 MARK 3 250 - 350 SCR	10.013	10.010	0.003	0.05
	10.028	10.001	0.027	
250 - 350 - 450 MARK 3 D	8.040	8.030	0.010	0.07
	8.062	8.015	0.047	

Table N. 10 - Maximum interference and maximum clearance between bush and rocker (page 77) - Limits of wear.

MOTOR CYCLE MODEL	ROCKER BORE ∅ - mm.	BUSH OUTSIDE ∅ - mm.	Max. interference - Max. clearance + mm.	Limits of wear mm.
250 - 350 - 450 MARK 3 D	10.000	9.995	+ 0.005	0.07
	10.022	9.973	+ 0.049	
250 MONZA 250 - 350 - 450 MARK 3 250 - 350 - 450 SCR	13.000	13.012	- 0.012	0.04
	13.018	13.001	- 0.017	

Table N. 11 - Needle valve springs (page 77).

MOTOR CYCLE MODEL	SPRING INLET OR EXHAUST	P		L = mm.	Limits of wear mm.
		Kg.	lb		
250 - 350 - 450 MARK 3 D	I	16 + 0.800	35.3	Parallel arms	Arms converging
	E	16 - 0.800	35.3		
250 MONZA 250 SCR	I	27 ± 0.650	59.5	* *	
	E	22 + 1	48.5		
250 - 350 - 450 MARK 3 350 - 450 SCR	I	27 ± 0.650	59.5	* *	
	E	27 ± 0.650	59.5		

REASSEMBLING OF THE ENGINE (page 78).

As a whole, follow the description of the Work Shop Manual from page 78 to 93; bear in mind however the following variations:

FITTING BEARING, ROLLERS BOX AND BUSHES etc. (page 78)

The rollers box has been eliminated and replaced by a bearing.

ASSEMBLING THE TIMING BEVEL GEAR, ON HALF-CRANKCASE CHAIN SIDE.

Assembling in half-crankcase (page 78). Besides the thrust washer ∅_i = 29.2, fit the distance piece ∅_e = 35 - thickness 10 mm.

ASSEMBLING THE GEAR BOX (page 79).

Step No. 1. - The 1st-speed driven gear (kick-starter gear is not put in the clutch side half-crankcase together with the rollers and grease, but on the gear layshaft, together with the thrust washers.

Steps No. 2, 3, 4 and 5, as page 79.

CLOSING THE CRANKCASE (page 80).

Before closing the crankcase, fit on half-crankcase clutch side, the starter pin complete with pedal release spring, with the thrust washer shim 1 mm., and from the opposite side, the thrust washer shim 0.5 mm., the starter gear, the

Table N. 9 - Minimum and maximum clearance between rocker pin and rocker bush. - Limits of wear. (page 77)

MOTOR CYCLE MODEL	BUSH BORE ∅ - mm.	ROCKER PIN ∅ - mm.	Min. & max. clearance mm.	Limits of wear mm.
450 MARK 3 - SCR	8.013	8.010	0.003	0.05
	8.028	8.001	0.027	
250 MONZA 250 - 350 MARK 3 250 - 350 SCR	10.013	10.010	0.003	0.05
	10.028	10.001	0.027	
250 - 350 - 450 MARK 3 D	8.040	8.030	0.010	0.07
	8.062	8.015	0.047	

Table N. 10 - Maximum interference and maximum clearance between bush and rocker (page 77) - Limits of wear.

MOTOR CYCLE MODEL	ROCKER BORE ∅ - mm.	BUSH OUTSIDE ∅ - mm.	Max. interference - Max. clearance + mm.	Limits of wear mm.
250 - 350 - 450 MARK 3 D	10.000	9.995	+ 0.005	0.07
	10.022	9.973	+ 0.049	
250 MONZA 250 - 350 - 450 MARK 3 250 - 350 - 450 SCR	13.000	13.012	- 0.012	0.04
	13.018	13.001	- 0.017	

Table N. 11 - Needle valve springs (page 77).

MOTOR CYCLE MODEL	SPRING INLET OR EXHAUST	P		L = mm.	Limits of wear mm.
		Kg.	lb		
250 - 350 - 450 MARK 3 D	I	16 ± 0.800	35.3	Parallel arms	Arms converging
	E	16 - 0.800	35.3		
250 MONZA 250 SCR	I	27 ± 0.650	59.5	* *	
	E	22 + 1	48.5	* *	
250 - 350 - 450 MARK 3 350 - 450 SCR	I	27 ± 0.650	59.5	* *	
	E	27 ± 0.650	59.5	* *	

REASSEMBLING OF THE ENGINE (page 78).

As a whole, follow the description of the Work Shop Manual from page 78 to 93; bear in mind however the following variations:

FITTING BEARING, ROLLERS BOX AND BUSHES etc. (page 78)

The rollers box has been eliminated and replaced by a bearing.

ASSEMBLING THE TIMING BEVEL GEAR, ON HALF-CRANKCASE CHAIN SIDE.

Assembling in half-crankcase (page 78). Besides the thrust washer ∅i = 29.2, fit the distance piece ∅e = 35 - thickness 10 mm.

ASSEMBLING THE GEAR BOX (page 79).

Step No. 1. - The 1st-speed driven gear (kick-starter gear is not put in the clutch side half-crankcase together with the rollers and grease, but on the gear layshaft, together with the thrust washers.

Steps No. 2, 3, 4 and 5, as page 79.

CLOSING THE CRANKCASE (page 80).

Before closing the crankcase, fit on half-crankcase clutch side, the starter pin complete with pedal release spring, with the thrust washer shim 1 mm., and from the opposite side, the thrust washer shim 0.5 mm., the starter gear, the

Table N. 9 - Minimum and maximum clearance between rocker pin and rocker bush. - Limits of wear. (page 77)

MOTOR CYCLE MODEL	BUSH BORE ∅ - mm.	ROCKER PIN ∅ - mm.	Min. & max. clearance mm.	Limits of wear mm.
450 MARK 3 - SCR	8.013	8.010	0.003	0.05
	8.028	8.001	0.027	
250 MONZA 250 - 350 MARK 3 250 - 350 SCR	10.013	10.010	0.003	0.05
	10.028	10.001	0.027	
250 - 350 - 450 MARK 3 D	8.040	8.030	0.010	0.07
	8.062	8.015	0.047	

Table N. 10 - Maximum interference and maximum clearance between bush and rocker (page 77) - Limits of wear.

MOTOR CYCLE MODEL	ROCKER BORE ∅ - mm.	BUSH OUTSIDE ∅ - mm.	Max. interference - Max. clearance + mm.	Limits of wear mm.
250 - 350 - 450 MARK 3 D	10.000	9.995	+ 0.005	0.07
	10.022	9.973	+ 0.049	
250 MONZA 250 - 350 - 450 MARK 3 250 - 350 - 450 SCR	13.000	13.012	- 0.012	0.04
	13.018	13.001	- 0.017	

Table N. 11 - Needle valve springs (page 77).

MOTOR CYCLE MODEL	SPRING INLET OR EXHAUST	P		L = mm.	Limits of wear mm.
		Kg.	lb		
250 - 350 - 450 MARK 3 D	I	16 ± 0.800	35.3	Parallel arms	Arms converging
	E	16 ± 0.800	35.3		
250 MONZA 250 SCR	I	27 ± 0.650	59.5	* *	
	E	22 ± 1	48.5		
250 - 350 - 450 MARK 3 350 - 450 SCR	I	27 ± 0.650	59.5	* *	
	E	27 ± 0.650	59.5		

REASSEMBLING OF THE ENGINE (page 78).

As a whole, follow the description of the Work Shop Manual from page 78 to 93; bear in mind however the following variations:

FITTING BEARING, ROLLERS BOX AND BUSHES etc. (page 78)

The rollers box has been eliminated and replaced by a bearing.

ASSEMBLING THE TIMING BEVEL GEAR, ON HALF-CRANKCASE CHAIN SIDE.

Assembling in half-crankcase (page 78). Besides the thrust washer ∅_i = 29.2, fit the distance piece ∅_e = 35 - thickness 10 mm.

ASSEMBLING THE GEAR BOX (page 79).

Step No. 1. - The 1st-speed driven gear (kick-starter gear is not put in the clutch side half-crankcase together with the rollers and grease, but on the gear layshaft, together with the thrust washers.

Steps No. 2, 3, 4 and 5, as page 79.

CLOSING THE CRANKCASE (page 80).

Before closing the crankcase, fit on half-crankcase clutch side, the starter pin complete with pedal release spring, with the thrust washer shim 1 mm., and from the opposite side, the thrust washer shim 0.5 mm., the starter gear, the

Table N. 9 - Minimum and maximum clearance between rocker pin and rocker bush. - Limits of wear. (page 77)

MOTOR CYCLE MODEL	BUSH BORE ∅ - mm.	ROCKER PIN ∅ - mm.	Min. & max. clearance mm.	Limits of wear mm.
450 MARK 3 - SCR	8.013	8.010	0.003	0.05
	8.028	8.001	0.027	
250 MONZA 250 - 350 MARK 3 250 - 350 SCR	10.013	10.010	0.003	0.05
	10.028	10.001	0.027	
250 - 350 - 450 MARK 3 D	8.040	8.030	0.010	0.07
	8.062	8.015	0.047	

Table N. 10 - Maximum interference and maximum clearance between bush and rocker (page 77) - Limits of wear.

MOTOR CYCLE MODEL	ROCKER BORE ∅ - mm.	BUSH OUTSIDE ∅ - mm.	Max. interference - Max. clearance + mm.	Limits of wear mm.
250 - 350 - 450 MARK 3 D	10.000	9.995	+ 0.005	0.07
	10.022	9.973	+ 0.049	
250 MONZA 250 - 350 - 450 MARK 3 250 - 350 - 450 SCR	13.000	13.012	- 0.012	0.04
	13.018	13.001	- 0.017	

Table N. 11 - Needle valve springs (page 77).

MOTOR CYCLE MODEL	SPRING INLET OR EXHAUST	P		L = mm.	Limits of wear mm.
		Kg.	lb		
250 - 350 - 450 MARK 3 D	I	16 ± 0.800	35.3	Parallel arms	Arms converging
	E	16 - 0.800	35.3		
250 MONZA 250 SCR	I	27 ± 0.650	59.5	* *	
	E	22 + 1	48.5	* *	
250 - 350 - 450 MARK 3 350 - 450 SCR	I	27 ± 0.650	59.5	* *	
	E	27 ± 0.650	59.5	* *	

REASSEMBLING OF THE ENGINE (page 78).

As a whole, follow the description of the Work Shop Manual from page 78 to 93; bear in mind however the following variations:

FITTING BEARING, ROLLERS BOX AND BUSHES etc. (page 78)

The rollers box has been eliminated and replaced by a bearing.

ASSEMBLING THE TIMING BEVEL GEAR, ON HALF-CRANKCASE CHAIN SIDE.

Assembling in half-crankcase (page 78). Besides the thrust washer ∅i = 29.2, fit the distance piece ∅e = 35 - thickness 10 mm.

ASSEMBLING THE GEAR BOX (page 79).

Step No. 1. - The 1st-speed driven gear (kick-starter gear is not put in the clutch side half-crankcase together with the rollers and grease, but on the gear layshaft, together with the thrust washers.

Steps No. 2, 3, 4 and 5, as page 79.

CLOSING THE CRANKCASE (page 80).

Before closing the crankcase, fit on half-crankcase clutch side, the starter pin complete with pedal release spring, with the thrust washer shim 1 mm., and from the opposite side, the thrust washer shim 0.5 mm., the starter gear, the

grooved thrust washer, spring ring, slide coupling, clutch pressure spring, spring retainer and lastly the spring ring.

At the side of the half-crankcase, fit the 1 mm shim washer and screw the sliding coupling stop

pin; then turn up one edge of the under placed washer at the level of the pin head face. Close both halves following the procedure explained at page 80 of the Work Shop Manual.

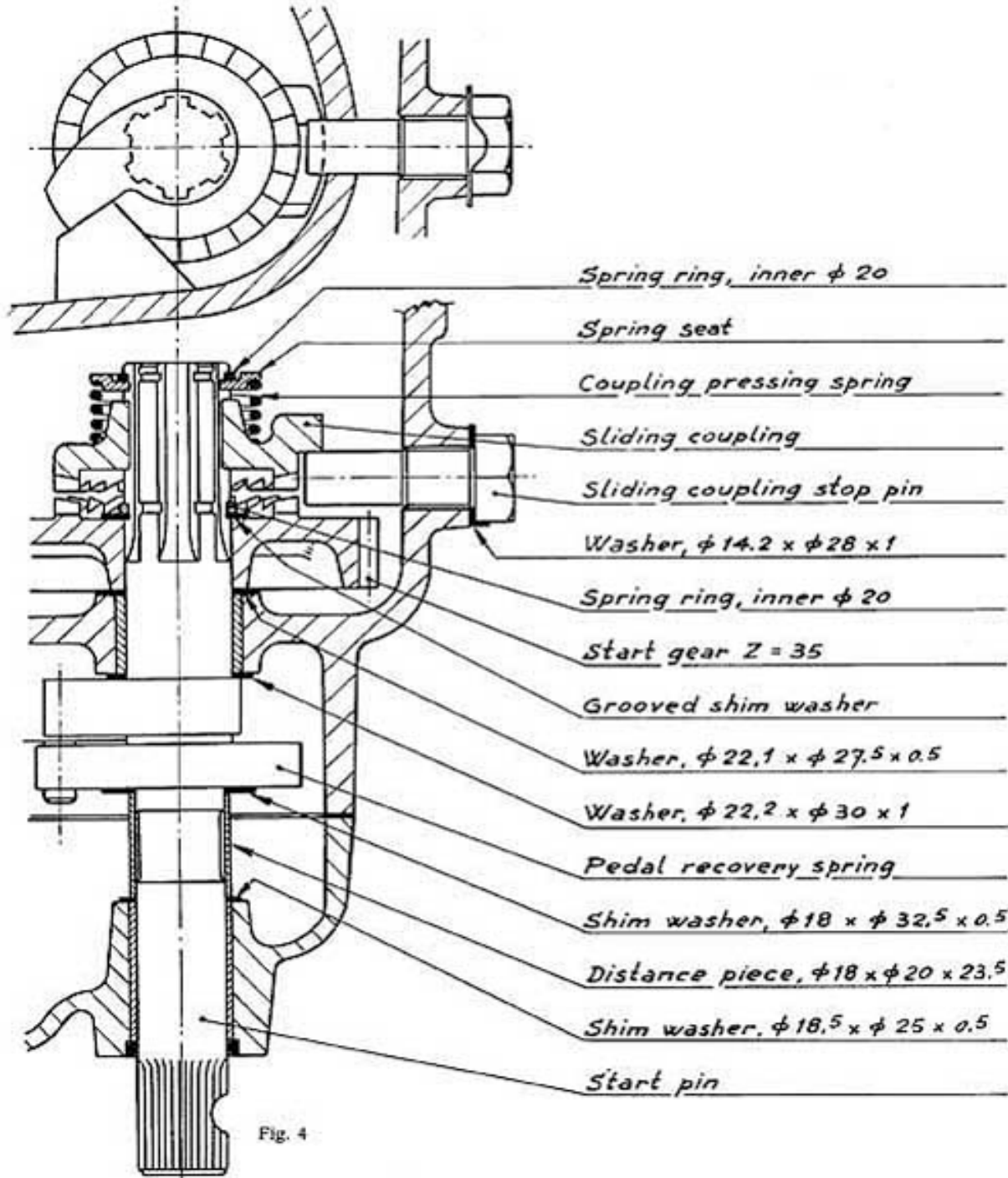


Fig. 4

Assembly of the Flywheel-magneto, Kick-Starter and Clutch Housing (page 81)

Follow as explained at page 81, figures 77 and 33

of the Work Shop Manual, and in Schedule at page 8 of the supplement for what regards the position of the flywheel.

Assembling the Kick-Starter gear (page 81)

The Kick-starter gear and pin with spring have been fitted before closing both halves (fig. 4). Wind the pedal release spring till it fits the anchorage pin. Fit the thrust washer $\varnothing e = 32.5$, the spacer $L = 23.5$ and the thrust washer $\varnothing e = 25$ (see fig. 4). The leaf spring with plate, safety washer and screw T.E. have been eliminated.

Assembling the cover on the « Timing System side » (page 83)

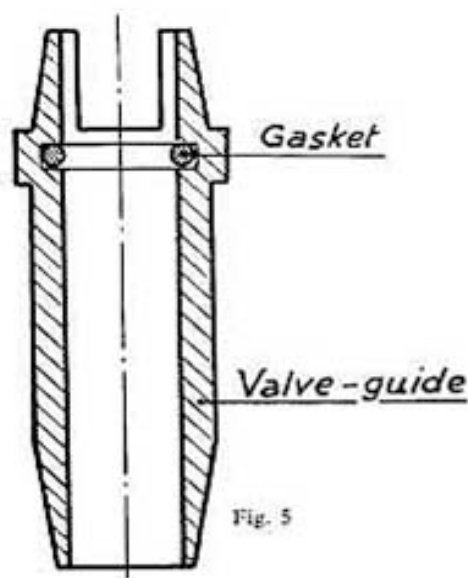
Everything as at page 83, except the timing of the advance gear with the pump gear which has to be expressed as follows: Time the advance gear with the pump gear, the two reference marks must coincide in the models 250 and 350 cc., while in the 450 cc model the point of the pump gear must coincide with the advance gear reference dash.

ASSEMBLING THE CYLINDER HEAD (page 85)

For the models MARK 3 and SCRAMBLER follow the procedure explained at page 85 and the following ones, of the Work Shop Manual.

For the 250 and 350 DESMO models, operate as follows:

- Take the cylinder head 0609.92.350 and lap the valve-seats, following the instructions of page 85 of the Work Shop Manual.
- Fit the gasket Gaco OR 107 HR 0400.17.030 in the seats of both the intake valve-guide 0727.92.380 and exhaust valve-guide 0727.92.390.



- Fit the ring Gaco OR 2018 HR - 0609.92.225 on the pin for the closing (or lower) rocker 0727.92.233.

- Insert the rubber plug 0609.92.235 in the seat existing in the desmo head for the closing (or lower) rocker pin, after you introduced in the corresponding holes, 2 bolts securing the cylinder-head, in order to avoid the rubber coming out during the introduction.

- Fit the closing (or lower) rockers 0609.92.180 with their respective pins and thrust washers helping to center the rocker cover. There are in the following sizes:

- thickness 0.1 mm - 0609.92.185
- thickness 0.2 mm - 0609.92.195
- thickness 0.3 mm - 0609.92.205
- thickness 0.5 mm - 0400.09.090
- thickness 1 mm - 0509.92.210
- thickness 2 mm - 0609.92.190

- Fit the timing shaft 0609.29.010, the cap with bearing 0609.92.640 and the timing gears, following the instructions at page 86 of the Work Shop Manual.

- Assemble the anchorage-springs unit 0609.92.160, the adjustment washer (there are of various thicknesses:

- thickness 0.2 mm - 0609.92.082
- thickness 0.3 mm - 0609.92.083
- thickness 0.4 mm - 0609.92.084
- thickness 0.5 mm - 0609.92.085
- thickness 0.6 mm - 0609.92.086
- thickness 1 mm - 0609.92.080),

the adjustment shim thickness 2 mm. 0609.92.070 (on request we supply also that of 3 mm thickness 0609.92.074) and the half rings 0727.92.260.

With the adjustment washers, adjust the closing (or lower) rocker on 0 mm.; rotate the anchorage forward and backward: it must move freely without backlash or friction.

- Remove the half-rings, the shim, the washers and anchorage to allow the tie and springs fitment.
- Press the valve downwards and fit the spring anchorage 0609.92.130, the 2 spring drifts 0400.92.420 and the 2 valve springs 0251.92.140.
- Fit again the anchorage, the adjustment washers, the shim and half-rings previously removed, and insert the springs under the anchorage.
- Fit the opening (or upper) rocker pin 0727.92.220 with the pertinent opening (or upper) rocker 0609.92.170 in order to check the thickness of the upper rocker shim. The normal set of the employed rocker shims is the following:

- thickness 2 mm - 0723.92.500
- thickness 2.1 mm - 0723.92.501
- thickness 2.3 mm - 0723.92.503
- thickness 2.5 mm - 0723.92.505
- thickness 2.7 mm - 0723.92.507
- thickness 2.9 mm - 0723.92.509
- thickness 3.1 mm - 0723.92.511

After you checked the shim with a gauge or a feeler, taking into account a backlash of 0.10 mm (0.0039"), remove the rocker pin.

- Carry out the side thickening of the rocker in the same manner of the thickening of the closing (or lower) rockers and fit on the

valve end, the rocker thickness previously established.

- Fit again the rocker pin and check again if the backlash is really 0.10 mm (0.0039"); if it were not so, remove again the parts and effect the operation again till you obtain the prescribed backlash.

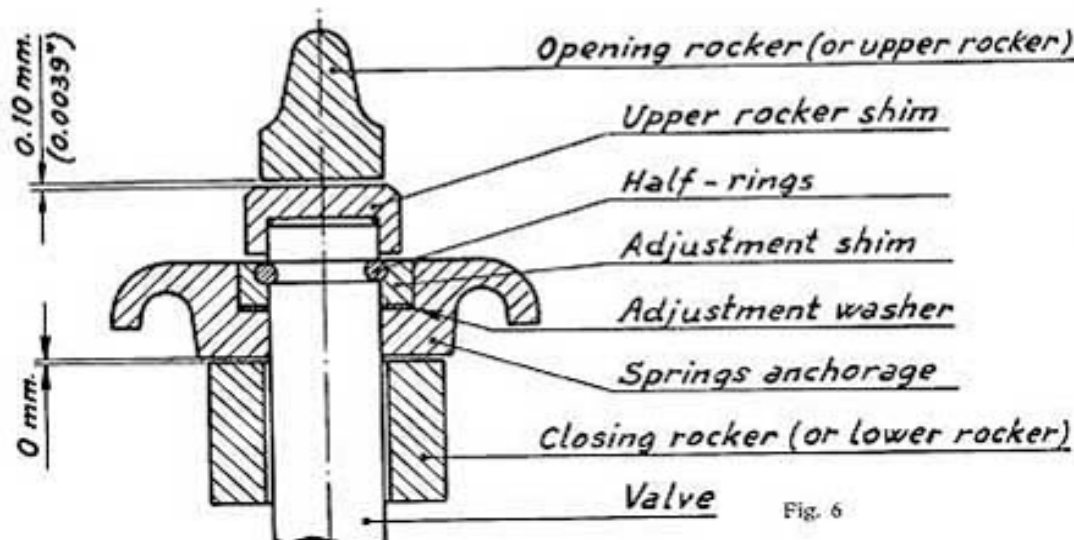


Fig. 6

ASSEMBLING THE CYLINDER DESMO HEAD IN THE 450 DESMO ENGINE

— Follow the same system adopted of the 250 and 350 Desmo, with the sole difference that the following parts are not the same:

- Opening rocker pin - 0616.92.220
- Closing rocker pin - 0616.92.230
- Head with seats and valveguides - 0616.92.350
- Cap with bearing - 0616.92.640

Checking the timing Adjustment - Clearance - Pages 89 and 90

For the model 250 Monza (in which the tappets are adjusted by means of a screw), follow the procedure described at pages 89 and 90 of the WORK SHOP MANUAL.

The values are those appearing on the schedule of page 89.

On the contrary, for the models:
250 - 350 - 450 MARK 3
250 - 350 - 450 DESMO
250 - 350 - 450 SCRAMBLER

(in which the tappets are adjusted by fitting appropriate winkel caps), act as follows:

- 1) Remove the threaded plug in front of the crankshaft and fit the appropriate degree wheel with tool N. 100 - see Fig. 100, page 91.
- 2) Fit an indicator on one of the cover clamping screws.

- 3) Bring the engine to the TDC (Top Dead Center) compression phase (valves closed) and set the indicator to the zero point of the degree wheel.

- 4) By means of a feeler gauge, adjust the intake valve tappet to its recommended gap (0.05 to 0.10 mm = .002" to .004" for the models 250 - 350 - 450 MARK 3 and 250 - 350 - 450 SCR; 0.10 to 0.15 mm = .004" to .006" for the upper opening rocker in the models 250 - 350 - 450 DESMO; in the Desmo models the gap of the lower closing rocker is 0 mm).

- 5) Slowly rotate the crankshaft, clockwise, till the tappet begins to lock the winkel cap.

- 6) Read the degree wheel. The value should correspond to the opening of the intake valve.

- 7) Continue rotating slowly the crankshaft, always in the same direction, till the winkel cap is free.

- 8) Read again the degree wheel. The value indicated should correspond to the closing of the intake valve.

- 9) Repeat these operations, for the same gaps, with the exhaust valve too.

NOTE! - In the said models, the control clearance is also the working clearance.

The values — in degrees — obtained on the degree wheel should correspond with those mentioned in the table below (approximation $\pm 5'$).

MOTOR CYCLE	INTAKE		EXHAUST	
	Opens $\pm 5^\circ$	Closes $\pm 5^\circ$	Opens $\pm 5^\circ$	Closes $\pm 5^\circ$
250 - 350 - 450 DESMO	70°	82°	80°	65°
250 MARK 3	62°	76°	70°	48°
250 - 450 SCR - 450 MARK 3	27°	75°	60°	32°
350 MARK 3 - SCR	70°	84°	80°	64°

Setting the Ignition Advance (page 90)

See pages 90, 91 and 92 of the Work Shop Manual and the Schedule at page 8 of the supplement.

Fitting the Spark Plug (page 92)

Check the spark plug gap which should be approximately 0.6 to 0.8 mm (.026" to .028") for the 250 and 350 cc and 0.8 mm (.028") for the 450 cc.

REASSEMBLING OF THE MOTORCYCLE (page 94)

As a whole, follow the description of the Work Shop Manual at page 94 and following ones. For the electrical connections, follow the electrical diagrams, in colors and with numbers, of the instruction book.

For the batteries having outer electrical clamping screws, bear in mind that they must always be installed with the positive pole (+) with red clamp on the righthand side of the rider, and the negative pole (-) with blue clamp on the lefthand side of the rider.

TROUBLES, THEIR ORIGIN AND REPAIR (page 111)

The remedies therein described go for the new models too, while for the battery which discharges quickly, refer yourself to the instructions book. The same it is said for the check of the electric balances.

TOOLS (page 115)

To the normal set of tools listed at pages 115, 116 and 117 should be added the following ones:

Illustration N°	Page	Reference N°	Tool
1	115	88713.0411	Flywheel magneto extractor for 250 - 350 - 450 cc.
2	115	88700.0459	Tool to grasp piston, 450 cc.
6	115	88713.0462	Z = 12 wrench, to hold sprocket, to lock nut for 450 cc.
11	115	88713.0435	Extractor for rocker pin, 250 - 350 - 450 D.
14	115	88713.0434	Pin for orienting washers and bushes when fitting rocker pins, 250 - 350 - 450 D.
15	115	88713.0433	Spanner to hold timing shaft (to lock Z = 28 bevel gear), 250 - 350 - 450 D.
16-17	115	88713.0460/0461	Pins to fit and re-fit gudgeon pin, 450 cc.
34	45	98112.0002	Degree wheel mounting device, 250 - 350 - 450 cc.
—	—	88713.0441	Warning stroboscopic light to check the ignition advance with screw and oil protector, for 250 - 350 - 450 cc.