

# DUCATI



## OVER HEAD CAMSHAFT MOTORCYCLES



## WORK SHOP MANUAL

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## WORK SHOP MANUAL



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

**160 Monza Junior**

**250 Monza**

**250 GT**

**250 Mark 3**

**250 Mach 1**

**250 SCR**

**350 Sebring**

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

## FOREWORD

The purpose of this **Workshop Manual** is to provide **Motorcycle Repair Shops** with the basic information to accurately dismantle, overhaul, reassemble, repair and tune any of the single cylinder overhead camshaft DUCATI models, in the most efficient manner possible.

A detailed description of all the required operations is supported with a series of photographs, drawings, diagrams and tables, all of which have been designed to help the mechanic in the repair shop.

All authorized DUCATI Repair Shops are staffed by skillful and trained mechanics who are equipped with all the necessary tools, which guarantee satisfactory repairs. Defective or worn-out parts will be replaced by Original Factory spare parts supplied by DUCATI MECCANICA... Only Genuine DUCATI replacement parts should be used; these are manufactured to close tolerances and can be used with confidence as they are entirely inter-changeable with the parts used in the assembly and construction of all standard DUCATI motorcycles.

Some of the fundamentally important information in this Shop Manual can also be found in the Rider's Manual which is given to all those who purchase a DUCATI motorcycle.

NOTE: Measurements shown in the Shop Manual are in Decimal Metric System, except where noted, and marked in inches.



Fig. 1



## **SUMMARY**

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## MAIN SPECIFICATIONS

The main specifications of each single O.H.C. SHAFT DUCATI MOTOR CYCLE are given here after. For more details see the « Use and Maintenance » Instruction Book.

Model: 160 MONZA JUNIOR - 1st Edition

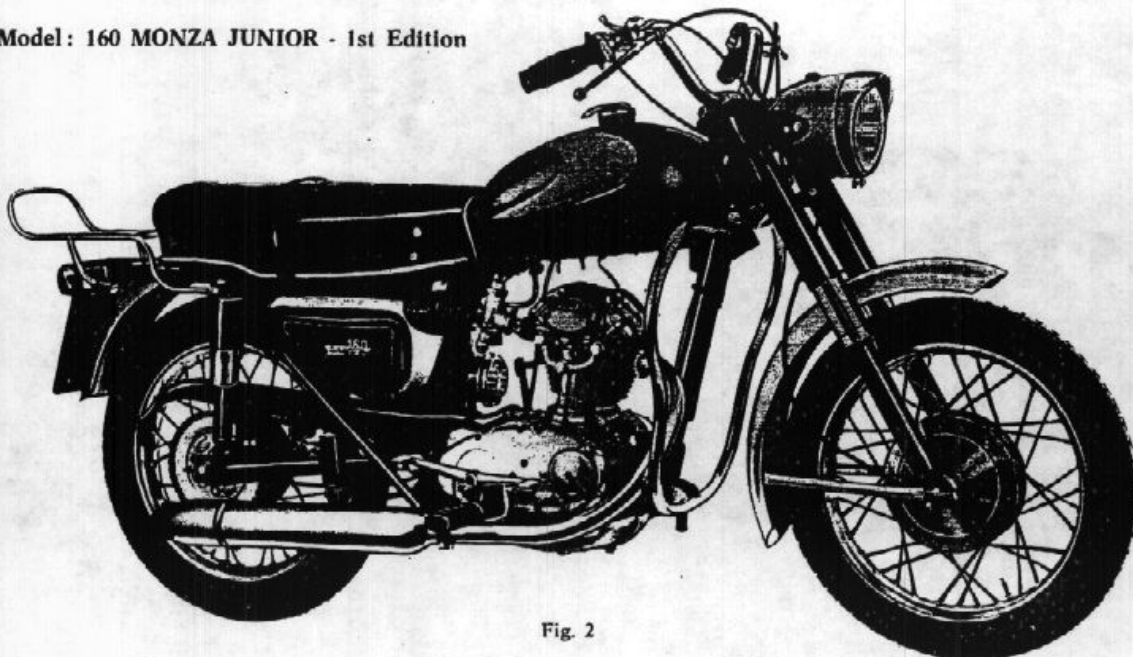


Fig. 2

### ENGINE

4 stroke.

Single cylinder, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

Cylinder head, made of light alloy; hemispherical combustion chamber; inserted valve seats.

Bore: 61 mm.

Stroke: 52 mm.

Cubic capacity: 156 c.c.

Compression ratio: 8.2 : 1.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 8000.

Carburetor: Dell'Orto UB 22 BS with quiet air inlet in the toolbox.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor).

Spark plug: Marelli CW 260 N, Beru 260 - KLG F-100.

Electrical equipment: Lighting by alternator fly-wheel: 6V - 28W three-light headlamp, tail light with Stop, horn - Parking lights, stop and horn fed by battery 6V-7Ah.

Transmission: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

Gearbox: in unit with engine; 4 speeds; constant mesh gears; pedal control with preselector.

Clutch: multi-plate type running in oil bath.

### FRAME

High tensile steel tubing. Very sturdy.

Tubular safety-bar; 2 center stands; rear parcel holder.

Front suspension: telehydraulic fork with steering dampers.

Rear suspension: swinging fork with hydraulic shock-absorbers.

Wheels: spoke type; chromium-plated steel rims with normal profile; front one: 16"×2.1/4"; rear one: 16"×1.85"; front, with removable axle.

Brakes: expanding; front one, hand operated; rear, foot operated.

Drum diameter: front, 158 mm., rear, 136 mm.

Tires: 2.75"×16", the front one; 3.25"×16" the rear one.

Inflating pressure: 2.25 kg./cm<sup>2</sup> for both wheels: (30-32 lbs. front and rear).

### DIMENSIONS:

Wheel base	1.330 metres (52.3621")
Max. length	1.980 metres (77.9526")
Max. height	0.930 metres (36.6151")
Max. width	0.735 metres (28.9369")
Height at saddle	0.760 metres (29.9212")
Weight (unladen)	106 kgs. (lbs. 233.69)
Oil sump capacity, approx.	1.750 kgs. (lbs. 3.858)
Fuel tank capacity	13 lts. (3.4342 US. gal. - 2.8597 Imp. gal.)

### PERFORMANCE:

Max. speed approx.	102 km/h (63 m.p.h.)
	In lowered position, race type.
Fuel consumption	2.8 lts. (84 M/US. gal. - 101 M/Imp. gal.)

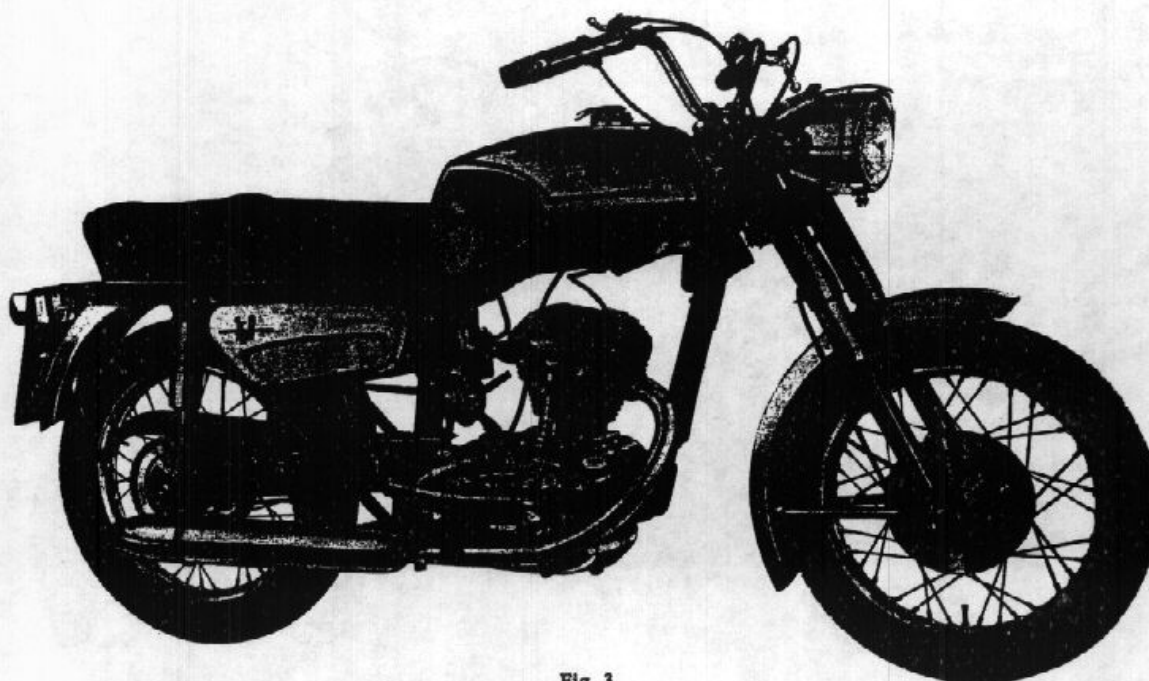


Fig. 3

## ENGINE

4 stroke.

Single cylinder, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

Cylinder head, made of light alloy; hemispherical combustion chamber; inserted valve seats.

Bore: 61 mm.

Stroke: 52 mm.

Cubic capacity: 156 c.c.

Compression ratio: 8.2 : 1.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 8000.

Carburetor: Dell'Orto UB 22 BS with quiet air inlet in the toolbox.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor).

Spark plug: Marelli CW 260 N, Beru 260 - KLG F-100.

Electrical equipment: Lighting by alternator fly-wheel: 6V-28W three-light headlamp, tail light with Stop, horn - Parking lights, stop and horn fed by battery 6V-7Ah.

Transmission: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

Gearbox: in unit with engine; 4 speeds; constant mesh gears; pedal control with preselector.

Clutch: multi-plate type running in oil bath.

## FRAME

High tensile steel tubing. Very sturdy.

Tubular safety-bar; 2 center stands; rear parcel holder.

Front suspension: telehydraulic fork with steering dampers.

Rear suspension: swinging fork with hydraulic shock-absorbers.

Wheels: spoke type; chromium-plated steel rims with normal profile; front one: 16"×2¼"; rear one: 16"×1.85"; front, with removable axle.

Brakes: expanding; front one, hand operated; rear, foot operated.

Drum diameter: front, 158 mm., rear, 136 mm.

Tires: 2.75"×16", the front one; 3.25"×16" the rear one.

Inflating pressure: 2.25 kg./cm<sup>2</sup> for both wheels: (30-32 lbs. front and rear).

## DIMENSIONS:

Wheel base	1.330 metres (52.3621")
Max. length	1.980 metres (77.9526")
Max. height	0.930 metres (36.6151")
Max. width	0.735 metres (28.9369")
Height at saddle	0.760 metres (29.9212")
Weight (unladen)	108 kgs. (lbs. 238.100)
Oil sump capacity, approx.	1.750 kgs. (lbs. 3.858)
Fuel tank capacity	13 lts. (3.4342 US gal. - 2.8597 Imp. gal.)

## PERFORMANCE:

Max. speed approx.	102 km.p.h. (63 m.p.h.)
	In lowered position, race type
Fuel consumption	2.8 litres (84 M/US gal. - 101 M/Imp. gal.)



Model: 160 MONZA JUNIOR - 3rd Edition (1966)

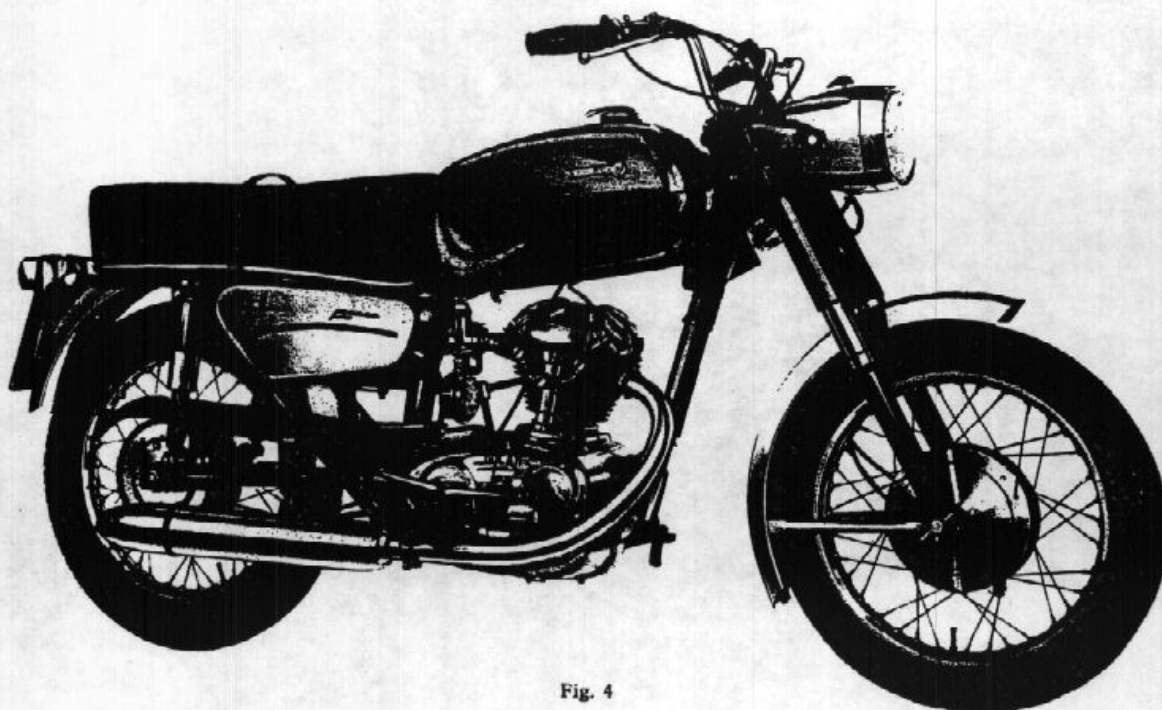


Fig. 4

#### ENGINE

4 stroke.

Single cylinder, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

Cylinder head, made of light alloy; hemispherical combustion chamber; inserted valve seats.

Bore: 61 mm.

Stroke: 52 mm.

Cubic capacity: 156 c.c.

Compression ratio: 8.2 : 1.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 8000.

Carburetor: Dell'Orto UB 22 BS with quiet air inlet in the toolbox.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor).

Spark plug: Marelli CW 260 N, Beru 260 - KLG F-100.

Electrical equipment: Lighting by alternator fly-wheel: 6V - 28W three-light headlamp, tail light with Stop, horn - Parking lights, stop and horn fed by battery 6V-7Ah.

Transmission: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

Gearbox: in unit with engine; 4 speeds; constant mesh gears; pedal control with preselector.

Clutch: multi-plate type running in oil bath.

#### FRAME

High tensile steel tubing. Very sturdy.

Tubular safety-bar; 2 center stands; rear parcel holder.

Front suspension: telehydraulic fork with steering dampers.

Rear suspension: swinging fork with hydraulic shock-absorbers.

Wheels: spoke type; chromium-plated steel rims with normal profile; front one: 16"×2.1/4"; rear one: 16"×1.85"; front, with removable axle.

Brakes: expanding; front one, hand operated; rear, foot operated.

Drum diameter: front, 158 mm., rear, 136 mm.

Tires: 2.75"×16", the front one; 3.25"×16" the rear one.

Inflating pressure: 2.25 kg./cm<sup>2</sup> for both wheels: (30-32 lbs. front and rear).

#### DIMENSIONS:

Wheel base	1.330 metres (52.3621")
Max. length	1.980 metres (77.9526")
Max. height	0.930 metres (36.6151")
Max. width	0.735 metres (28.9369")
Height at saddle	0.760 metres (29.9212")
Weight (unladen)	108 kgs. (lbs. 238.100)
Oil sump capacity, approx.	1.750 kgs. (lbs. 3.858)
Fuel tank capacity	13 lts. (3.4342 US gal. - 2.8597 Imp. gal.)

#### PERFORMANCE:

Max. speed approx.	113 km.p.h. (70 m.p.h.)
	In lowered position, race type
Fuel consumption	2.8 litres (84 M/US gal. - 101 M/Imp. gal.)

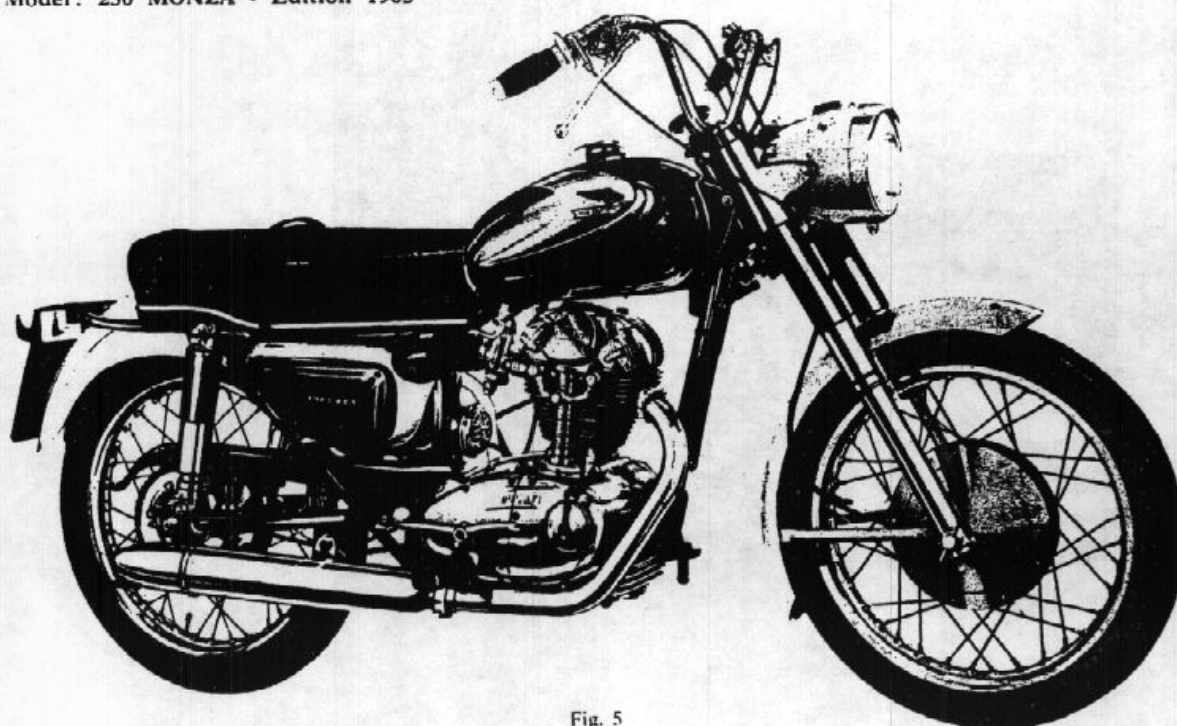


Fig. 5

## ENGINE

### 4-stroke.

Single-cylinder, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

Cylinder head, made of light alloy; hemispherical combustion chamber; inserted valve seats.

Bore: 74 mm.

Stroke: 57.8 mm.

Cubic capacity: 248.589 c.c.

Compression ratio: 8 : 1.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 7200.

Carburetor: Dell'Orto UBF 24 BS with quiet air inlet in the toolbox.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor).

Spark plug: Marelli CW 260 N, Beru 260, KLG F-100.

Electrical equipment: Battery fed. Battery recharged by an alternator-flywheel 6 Volt, 60 Watt and static regulator. Three-bulb headlamp, tail light, stop light, and horn.

Transmission: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

Gearbox: in unit with engine; 5 speeds; constant mesh gears; pedal control with preselector.

Clutch: multi-plate type running in oil bath.

## FRAME

High tensile steel tubing. Very sturdy.

Tubular swinging arm and 2 stands.

Front suspension: telehydraulic fork complete with steering damper.

Rear suspension: swinging fork with adjustable hydraulic shock absorbers.

Wheels: spoke type; normal profile, steel rims; 18" x 2 1/2".

Front wheel with removable axle.

Brakes: expanding; front, hand operated; rear, foot operated. Drum diameter: front, 180 mm.; rear, 160 mm.

Tires: front, 2.75" x 18", ribbed; rear, 3.00" x 18", with road tread.

Inflating pressure: 2.25 kg./cm² for both wheels: (30-32 lbs. front and rear).

## DIMENSIONS:

Wheel base	1.320 metres (51.968")
Max. length	2.000 metres (78.740")
Max. height	1.070 metres (42.1260")
Max. width	0.800 metres (31.4961")
Height at saddle	0.800 metres (31.4961")
Weight (unladen)	125 kgs. (lbs. 275.580)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
	2.400 lt. approx. (0.634 US gal. 0.5279 Imp. gal.)
Fuel tank capacity	13 litres (3.4342 US gal. - 2.8597 Imp. gal.)

## PERFORMANCE:

Max. speed (in lowered racing position)	128 km.p.h. (80 m.p.h.)
Fuel consumption per 100 kms.	3.2 litres (73 MI. per US gal. - 85 MI. per Imp. gal.)



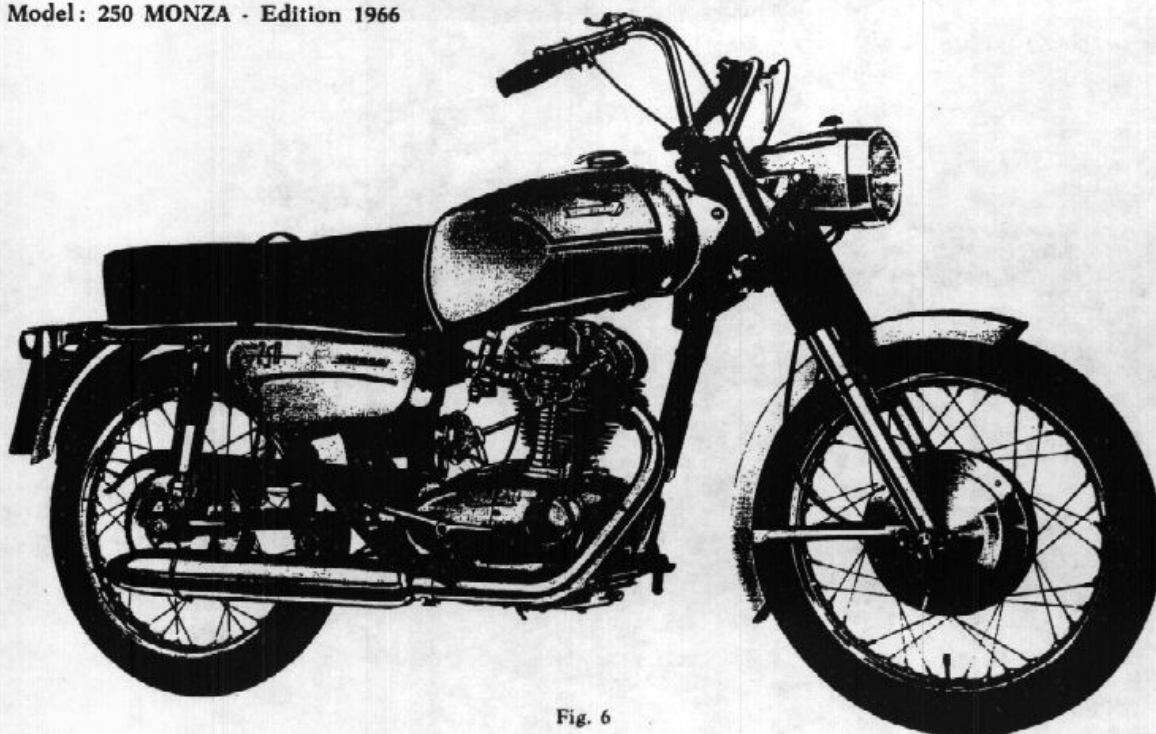


Fig. 6

## ENGINE

### 4-stroke.

Single-cylinder, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

Cylinder head, made of light alloy; hemispherical combustion chamber; inserted valve seats.

Bore: 74 mm.

Stroke: 57.8 mm.

Cubic capacity: 248.589 c.c.

Compression ratio: 8 : 1.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 7200.

Carburetor: Dell'Orto UBF 24 BS with quiet air inlet in the toolbox.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor).

Spark plug: Marelli CW 260 N, Beru 260, KLG F-100.

Electrical equipment: Battery fed. Battery recharged by an alternator-flywheel 6 Volt, 60 Watt and static regulator. Three-bulb headlamp, tail light, stop light, and horn.

Transmission: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

Gearbox: in unit with engine; 5 speeds; constant mesh gears; pedal control with preselector.

Clutch: multi-plate type running in oil bath.

## FRAME

High tensile steel tubing. Very sturdy.

Tubular swinging arm and 2 stands.

Front suspension: telehydraulic fork complete with steering damper.

Rear suspension: swinging fork with adjustable hydraulic shock absorbers.

Wheels: spoke type; normal profile, steel rims: 18" x 2 1/2".

Front wheel with removable axle.

Brakes: expanding; front, hand operated; rear, foot operated. Drum diameter: front, 180 mm.; rear, 160 mm.

Tires: front, 2.75" x 18", ribbed; rear, 3.00" x 18", with road tread.

Inflating pressure: 2.25 kg./cm<sup>2</sup> for both wheels: (30-32 lbs. front and rear).

## DIMENSIONS:

Wheel base	1.320 metres (51.968")
Max. length	2.000 metres (78.740")
Max. height	1.070 metres (42.1260")
Max. width	0.800 metres (31.4961")
Height at saddle	0.800 metres (31.4961")
Weight (unladen)	125 kgs. (lbs. 275.580)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
	2.400 lt. approx. (0.634 US gal. - 0.5279 Imp. gal.)
Fuel tank capacity	13 litres (3.4342 US gal. - 2.8597 Imp. gal.)

## PERFORMANCE:

Max. speed (in lowered racing position)	128 km.p.m. (over 80 m.p.h.)
Fuel consumption per 100 kms.	3.2 litres (73 MI. per US gal. - 85 MI. per Imp. gal.)

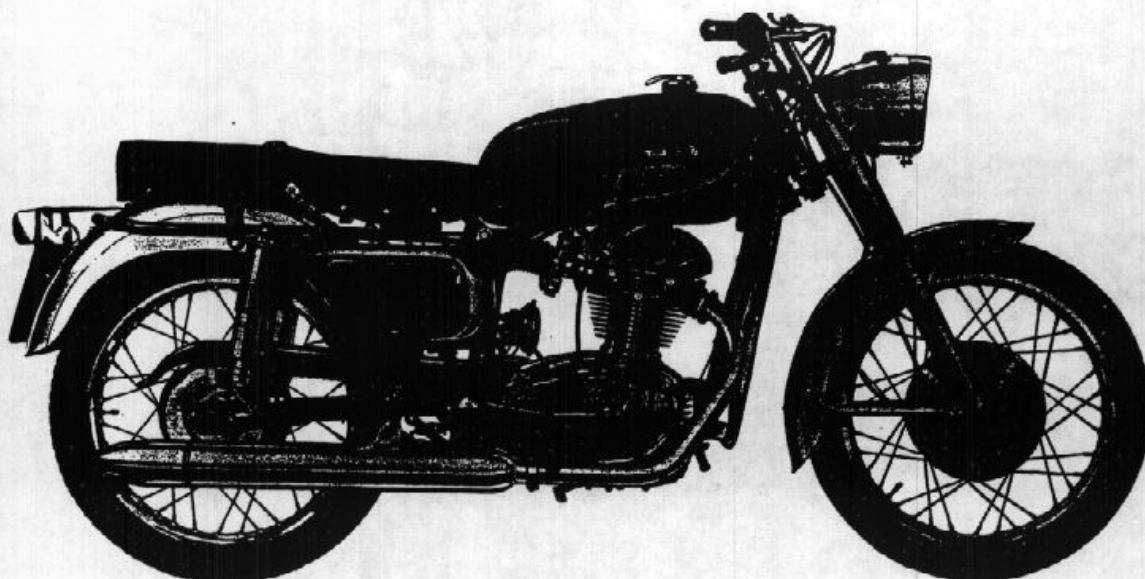


Fig. 7

## ENGINE

4-stroke.

Single-cylinder, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

Cylinder head, made of light alloy; hemispherical combustion chamber; inserted valve seats.

Bore: 74 mm.

Stroke: 57.8 mm.

Cubic capacity: 248.589 c.c.

Compression ratio: 8 : 1.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 7200.

Carburetor: Dell'Orto UBF 24 BS with quiet air inlet in the toolbox.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor).

Spark plug: Marelli CW 260 N, Beru 260, KLG F-100.

Electrical equipment: Battery fed. Battery re-charged by an alternator-flywheel 6 Volt, 60 Watt and static regulator. Three-bulb head-lamp, tail light, stop light, and horn.

Transmission: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

Gearbox: in unit with engine; 5 speeds; constant mesh gears; pedal control with preselector.

Clutch: multi-plate type running in oil bath.

## FRAME

High tensile steel tubing, of sturdy construction.

Tubular safety bars: Center stand and Jiffy stand.

Front suspension: telehydraulic fork complete with steering damper.

Rear suspension: swinging fork with adjustable hydraulic shock absorbers.

Wheels: spoke type; chromium-plated steel rims with normal profile; 18" x 2 1/2". Front wheel with removable axle.

Brakes: expanding; front, hand operated; rear, foot operated. Drum diameter: front, 180 mm.; rear, 160 mm.

Tires: front, 2.75" x 18", ribbed; rear, 3.00" x 18", with road tread.

Inflating pressure: both wheels 2.25 kg./cm<sup>2</sup> (front and rear, 30-32 lbs.).

## DIMENSIONS:

Wheel base	1.320 metres (51.968")
Max. length	2.000 metres (78.740")
Max. height	1.070 metres (42.1260")
Max. width	0.800 metres (31.4961")
Height at saddle	0.800 metres (31.4961")
Weight (unladen)	125 kgs. (lbs. 275.580)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409) 2.400 lt. approx. (0.634 US gal. - 0.5279 Imp. gal.)
Fuel tank capacity	17 litres (4.4909 US gal. - 3.7396 Imp. gal.)

## PERFORMANCE:

Fuel consumption per 100 kms.	3.2 litres (72 MI. per US gal. - 85 MI. per Imp. gal.)
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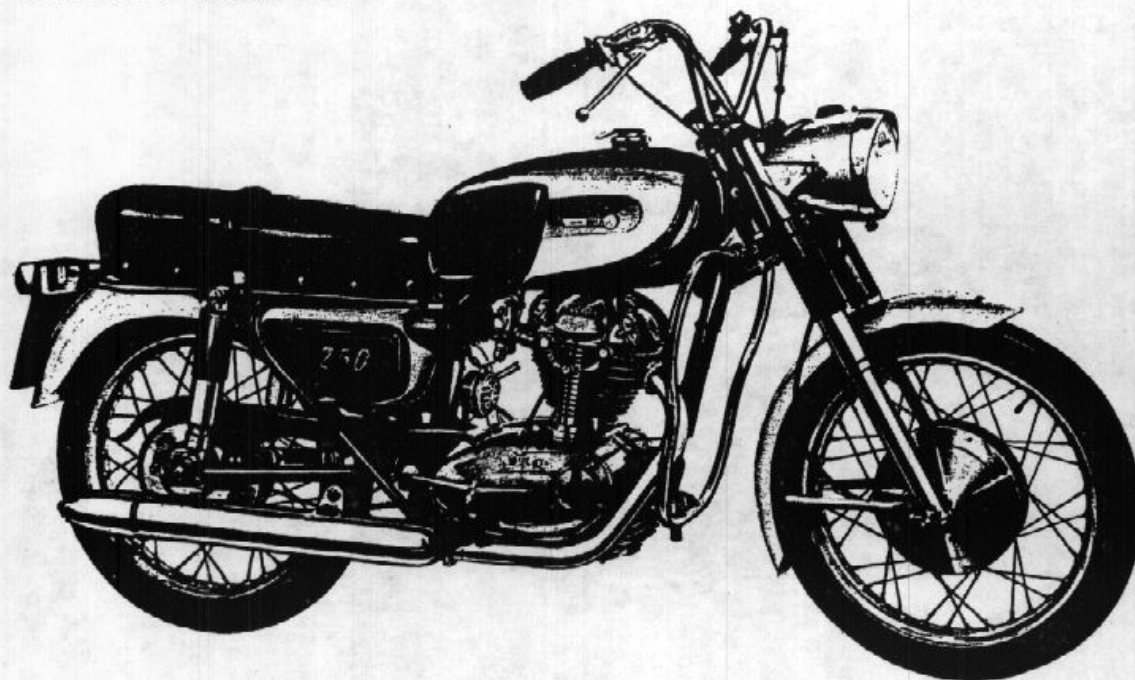


Fig. 8

## ENGINE

4-stroke.

Single-cylinder, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

Cylinder head, made of light alloy; hemispherical combustion chamber; inserted valve seats.

Bore: 74 mm.

Stroke: 57.8 mm.

Cubic capacity: 248.589 c.c.

Compression ratio: 8 : 1.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 7200.

Carburetor: Dell'Orto UBF 24 BS with quiet air inlet in the toolbox.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor).

Spark plug: Marelli CW 260 N, Beru 260, KLG F-100.

Electrical equipment: Battery fed. Battery recharged by an alternator-flywheel 6 Volt, 60 Watt and static regulator. Three-bulb headlamp, tail light with stop, horn.

Transmission: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

Gearbox in unit with engine; 5 speeds; constant mesh gears; pedal control with preselector.

Clutch: multi-plate type running in oil bath.

## FRAME

High tensile steel tubing, of sturdy construction.

Tubular safety bars: Center stand and Jiffy stand.

Front suspension: telehydraulic fork complete with steering damper.

Rear suspension: swinging fork with adjustable hydraulic shock absorbers.

Wheels: spoke type; chromium-plated steel rim with normal profile; 18" x 2 1/2". Front wheel with removable axle.

Brakes: expanding; front, hand operated; rear foot operated. Drum diameter: front, 18 mm.; rear, 160 mm.

Tires: front, 2.75" x 18", ribbed; rear, 3.00" x 18" with road tread.

Inflating pressure: both wheels 2.25 Kg./cm<sup>2</sup> (front and rear, 30-32 lbs.).

## DIMENSIONS:

Wheel base	1.320 metres (51.968")
Max. length	2.000 metres (78.740")
Max. height	1.070 metres (42.1260")
Max. width	0.800 metres (31.4961")
Height at saddle	0.800 metres (31.4961")
Weight (unladen)	125 kgs. (lbs. 275.580)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
	2.400 lt. approx. (0.634 US gal. 0.5279 Imp. gal.)
Fuel tank capacity	17 litres (4.4909 US gal. - 3.7396 Imp. gal.)

## PERFORMANCE:

Fuel consumption per 100 kms.	3.2 litres (73 MI. per US gal. - 85 MI. per Imp. gal.)
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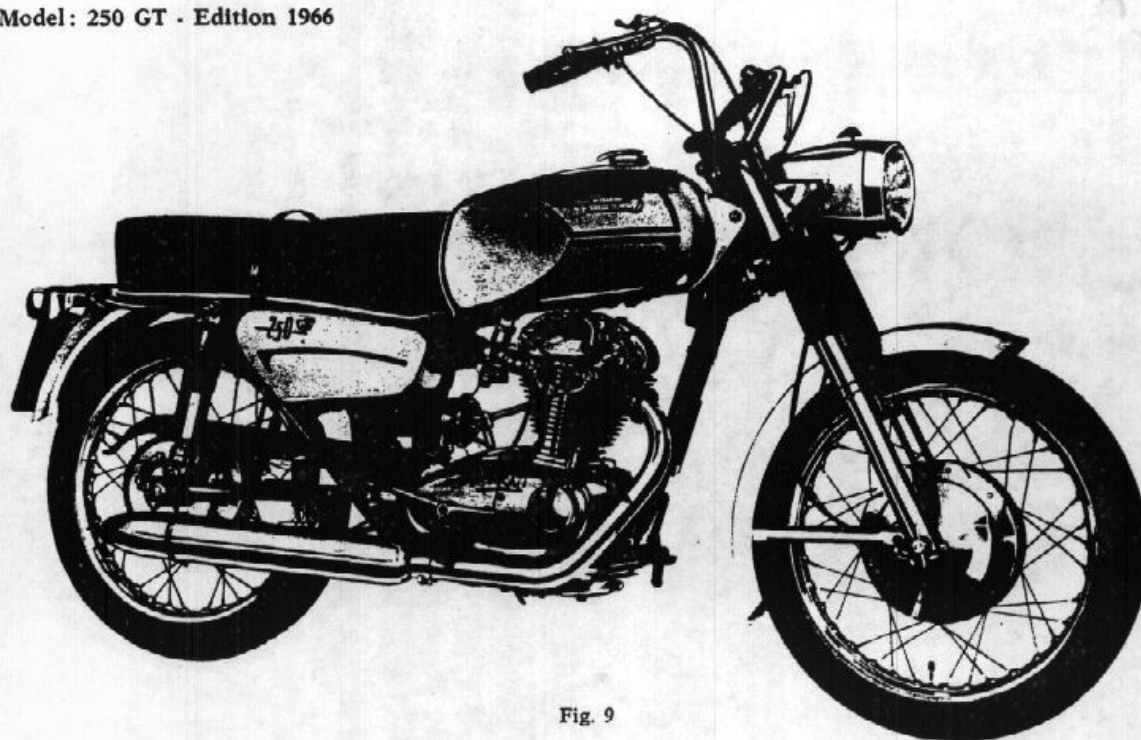


Fig. 9

## ENGINE

4-stroke.

Single-cylinder, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

Cylinder head, made of light alloy; hemispherical combustion chamber; inserted valve seats.

Bore: 74 mm.

Stroke: 57.8 mm.

Cubic capacity: 248.589 c.c.

Compression ratio: 8 : 1.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 7200.

Carburetor: Dell'Orto UBF 24 BS with quiet air inlet in the toolbox.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor).

Spark plug: Marelli CW 260 N, Beru 260, KLG F-100.

Electrical equipment: Battery fed. Battery re-charged by an alternator-flywheel 6 Volt, 60 Watt and static regulator. Three-bulb head-lamp, tail light with stop, horn.

Transmission: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

Gearbox in unit with engine; 5 speeds; constant mesh gears; pedal control with preselector.

Clutch: multi-plate type running in oil bath.

## FRAME

High tensile steel tubing, of sturdy construction.

Tubular safety bars: Center stand and Jiffy stand.

Front suspension: telehydraulic fork complete with steering damper.

Rear suspension: swinging fork with adjustable hydraulic shock absorbers.

Wheels: spoke type; chromium-plated steel rims with normal profile; 18" x 2 1/2". Front wheel with removable axle.

Brakes: expanding; front, hand operated; rear, foot operated. Drum diameter: front, 180 mm.; rear, 160 mm.

Tires: front, 2.75" x 18", ribbed; rear, 3.00" x 18", with road tread.

Inflating pressure: both wheels 2.25 Kg./cm<sup>2</sup> (front and rear, 30-32 lbs.).

## DIMENSIONS:

Wheel base	1.320 metres (51.968")
Max. length	2.000 metres (78.740")
Max. height	1.070 metres (42.1260")
Max. width	0.800 metres (31.4961")
Height at saddle	0.800 metres (31.4961")
Weight (unladen)	125 kgs. (lbs. 275.580)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
	2.400 lt. approx. (0.634 US gal. - 0.5279 Imp. gal.)
Fuel tank capacity	13 litres (3.4342 US gal. - 2.8597 Imp. gal.)

## PERFORMANCE:

Fuel consumption per 100 kms.	3.2 litres (73 MI. per US gal. - 85 MI. per Imp. gal.)
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Model: 250 MARK 3 - Edition 1964

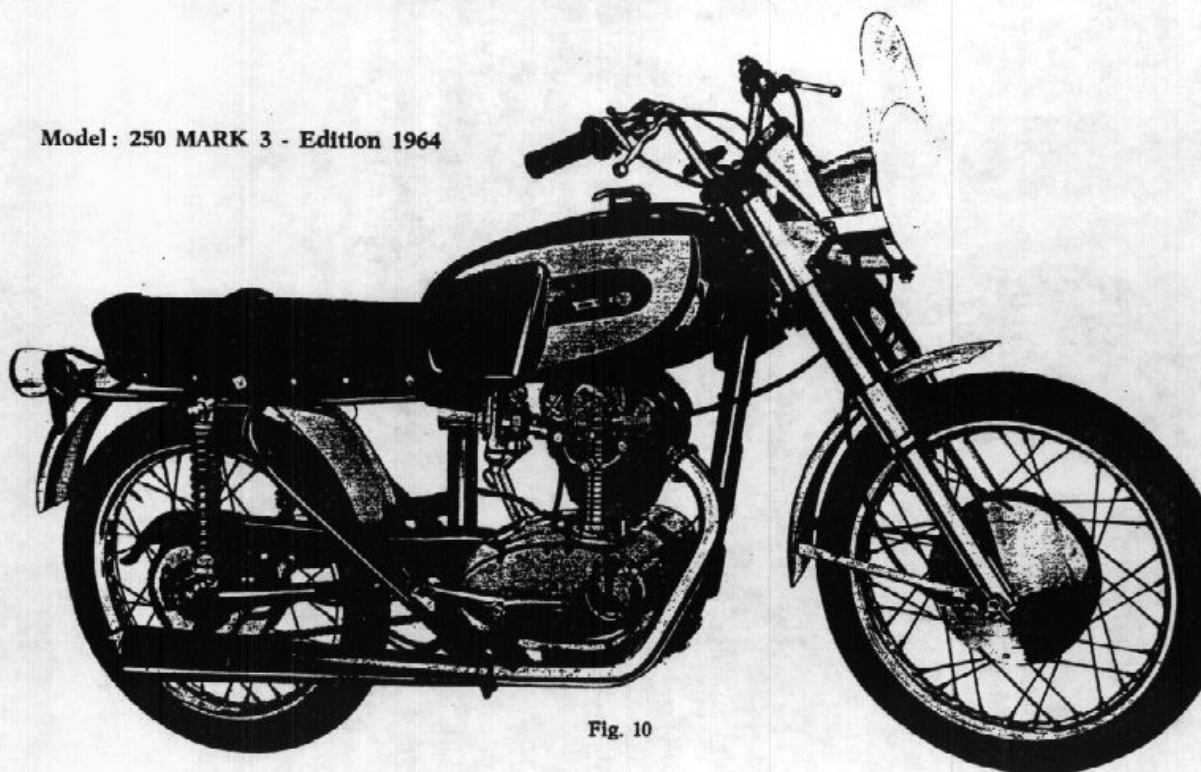


Fig. 10

#### ENGINE

4-stroke.

Single-cylinder, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

Cylinder head, made of light alloy; hemispherical combustion chamber; inserted valve seats.

Bore: 74 mm.

Stroke: 57.8 mm.

Cubic capacity: 248.589 c.c.

Compression ratio: 10 : 1 approximately.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 8000.

Carburetor: Dell'Orto SSI 27 A with air horn.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor) in alternate current.

Spark plug: Marelli CW 260 N, Beru 260, KLG F-100.

Electrical equipment: by an alternator-flywheel 6 Volt, 40 Watt magnet. Two-bulb headlamp, tail light with stop, H.T. outer coil.

Transmission: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

Gearbox: in unit with engine; 5 speeds; constant mesh gears; pedal control with preselector.

Clutch: multi-plate type running in oil bath.

#### FRAME

High tensile steel tubing of sturdy construction and design.

Front suspension: telehydraulic fork complete with steering damper.

Rear suspension: swinging fork with adjustable hydraulic shock absorbers, with exposed spring.

Wheels: spoke type; normal section, chromium-plated steel rims; 18" x 2 1/4". Front wheel with removable axle.

Brakes: expanding; front, hand operated; rear foot operated. Drum diameter: front, 180 mm.; rear, 160 mm.

Tires: front, 2.50" x 18", ribbed; rear, 2.75" x 18", with road tread and reinforced.

Inflating pressure: 2.25 kg./cm² for both wheels (front and rear: 30-32 lbs.).

#### DIMENSIONS:

Wheel base	1.320 metres (51.968")
Max. length	2.000 metres (78.740")
Max. height	1.090 metres (42.9133")
Max. width	0.580 metres (22.8346")
Height at saddle	0.750 metres (29.5275")
Weight (unladen)	110 kgs. (lbs. 242.500)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
Fuel tank capacity	2.400 lt. approx. (0.634 US gal. - 0.5279 Imp. gal.)
	17 litres (4.4909 US gal. - 3.7396 Imp. gal.)

#### PERFORMANCE:

Max. speed	177 km.p.h. (110 m.p.h.)
Fuel consumption per 100 kms.	3.5 litres (68 MI. per US gal.) 80 MI. per Imp. gal.)



Model: 250 MARK 3 - Edition 1965

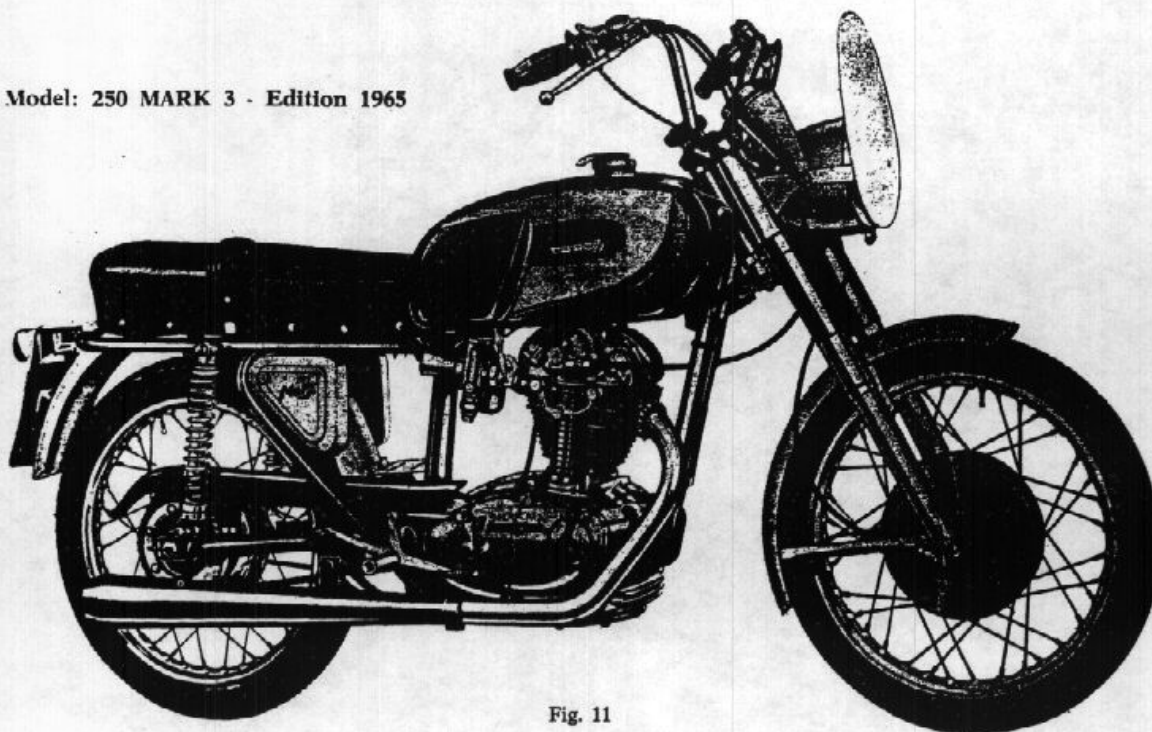


Fig. 11

## ENGINE

### 4-stroke.

Single-cylinder, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

Cylinder head, made of light alloy; hemispherical combustion chamber; inserted valve seats.

Bore: 74 mm.

Stroke: 57.8 mm.

Cubic capacity: 248.589 c.c.

Compression ratio: 10 : 1 approximately.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 8000.

Carburetor: Dell'Orto SSI 29 D with air horn.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor) in alternate current.

Spark plug: Marelli CW 260 N, Beru 260, KLG F-100.

Electrical equipment: by an alternator-flywheel 6 Volt, 40 Watt magnet. Two-bulb headlamp, tail light with stop, H.T. outer coil.

Transmission: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

Gearbox: in unit with engine; 5 speeds; constant mesh gears; pedal control with preselector.

Clutch: multi-plate type running in oil bath.

## FRAME

High tensile steel tubing of sturdy construction and design.

Front suspension: telehydraulic fork complete with steering damper.

Rear suspension: swinging fork with adjustable hydraulic shock absorbers, with exposed spring.

Wheels: spoke type; normal profile, chromium-plated steel rims; 18" x 2 1/4". Front wheel with removable axle.

Brakes: expanding; front, hand operated; rear, foot operated. Drum diameter: front, 180 mm.; rear 160 mm.

Tires: front 2.50" x 18", ribbed; rear, 2.75" x 18", with road tread and reinforced.

Inflating pressure: 2.25 kg./cm<sup>2</sup> for both wheels (front and rear: 30-32 lbs.).

## DIMENSIONS

Wheel base	1.350 metres (53.1495")
Max. length	2.000 metres (78.740")
Max. height	1.070 metres (42.1260")
Max. width	0.800 metres (31.4961")
Height at saddle	0.800 metres (31.4961")
Weight (unladen)	112 kgs. (lbs. 246.918)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
	2.400 lt. approx. (0.634 US gal. - 0.5279 Imp. gal.)
Fuel tank capacity	16 litres (4.227 US gal. - 3.5196 Imp. gal.)

## PERFORMANCE:

Max. speed	177 km.p.h. (110 m.p.h.)
Fuel consumption per 100 kms.	4 litres (60 MI. per US gal. - 70 MI. per Imp. gal.)

Model: 250 MARK 3 - Edition 1966

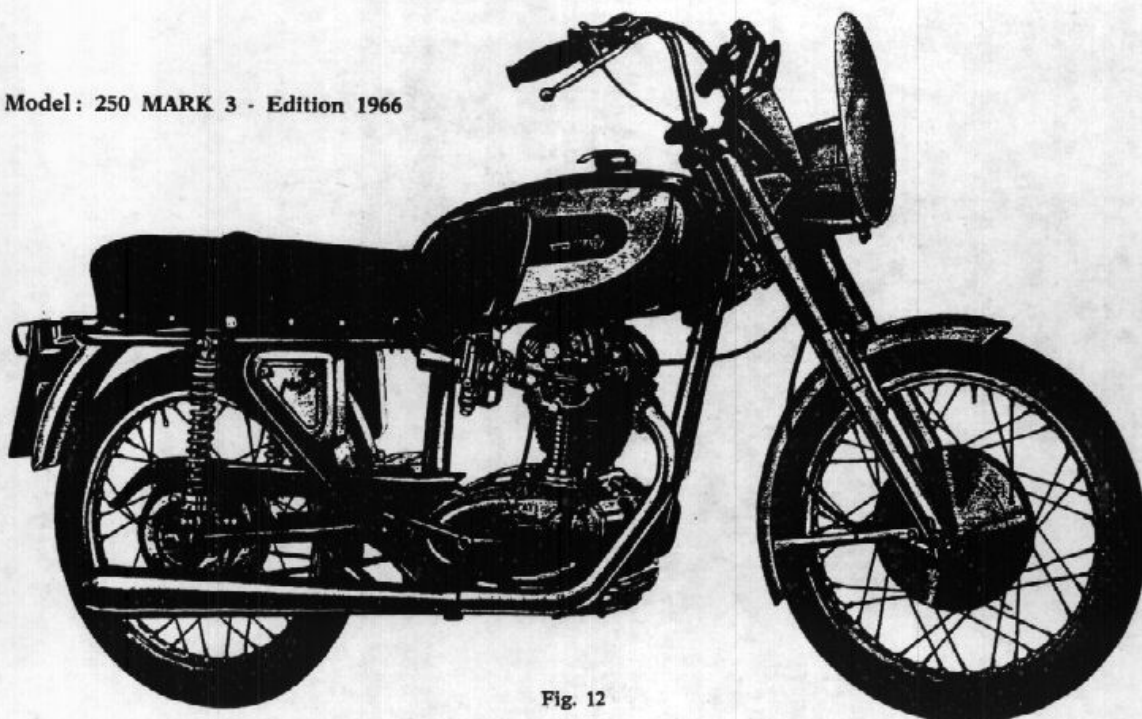


Fig. 12

## ENGINE

4 stroke.

Single-cylinder, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

Cylinder head, made of light alloy; hemispherical combustion chamber; inserted valve seats.

Bore: 74 mm.

Stroke: 57,8 mm.

Cubic capacity: 248.589 c.c.

Compression ratio: 10 : 1 approximately.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 8000.

Carburetor: Dell'Orto SSI 29 D with air horn.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor) in alternate current.

Spark plug: Marelli CW 260 N, Beru 260, KLG F-100.

Electrical equipment: by an alternator-flywheel 6 Volt, 40 Watt magnet. Two-bulb headlamp, tail light with stop, H.T. outer coil.

Transmission: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

Gearbox: in unit with engine; 5 speeds; constant mesh gears; pedal control with preselector.

Clutch: multi-plate type running in oil bath.

## FRAME

High tensile steel tubing of sturdy construction and design.

Front suspension: telehydraulic fork complete with steering damper.

Rear suspension: swinging fork with adjustable hydraulic shock absorbers, with exposed spring.

Wheels: spoke type; normal profile, chromium-plated steel rims; 18" x 2 1/4". Front wheel with removable axle.

Brakes: expanding; front, hand operated; rear, foot operated. Drum diameter: front, 180 mm.; rear 160 mm.

Tires: front 2.50" x 18", ribbed; rear, 2.75" x 18", with road tread and reinforced.

Inflating pressure: 2.25 kg./cm<sup>2</sup> for both wheels (front and rear: 30-32 lbs.).

## DIMENSIONS:

Wheel base	1.350 metres (53.1495")
Max. length	2.000 metres (78.740")
Max. height	1.070 metres (42.1260")
Max. width	0.800 metres (31.4961")
Height at saddle	0.800 metres (31.4961")
Weight (unladen)	112 kgs. (lbs. 246.918)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
Fuel tank capacity	2.400 lt. approx. (0.634 US gal. - 0.5279 Imp. gal.)
	16 litres (4.227 US gal. - 3.5196 Imp. gal.)

## PERFORMANCE:

Max. speed	177 km.p.h. (110 m.p.h.)
Fuel consumption per 100 kms.	4 litres (60 MI. per US gal. - 70 MI. per Imp. gal.)

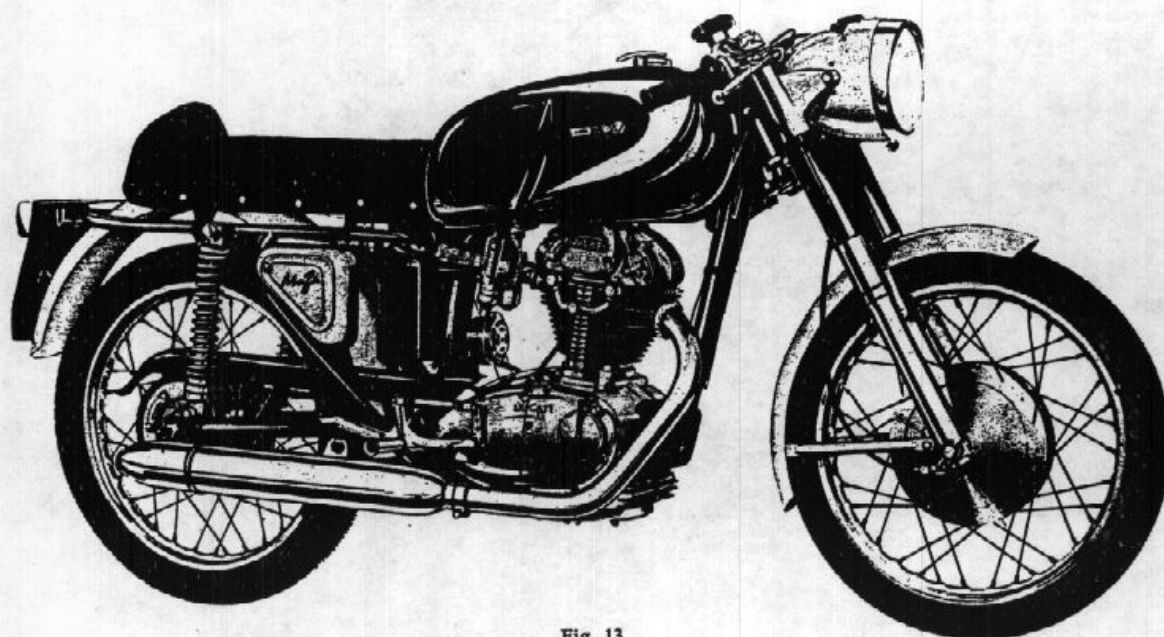


Fig. 13

## ENGINE

**4-stroke.**

**Single-cylinder**, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

**Cylinder head**, made of light alloy; polyspherical combustion chamber; inserted valve seats.

**Bore**: 74 mm.

**Stroke**: 57.8 mm.

**Cubic capacity**: 246.589 c.c.

**Compression ratio**: 10 : 1.

**Timing** by O.H.C., valves inclined 80°.

**Max. output** r.p.m.: 8500.

**Carburetor**: Dell'Orto SSI 29 D with air horn.

**Cooling** by air.

**Lubrication**: forced - by gear pump. Oil sump in crankcase.

**Ignition** by coil (distributor).

**Spark plug**: Marelli CW 260 N, Beru 260, KLG F-100.

**Electrical equipment**: Battery fed. Battery recharged by an alternator-flywheel 6 Volt, 60 Watt and static regulator. Three-bulb headlamp, tail light with stop, horn.

**Transmission**: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

**Gearbox**: in unit with engine; 5 speeds; constant mesh gears; pedal control with preselector.

**Clutch**: multi-plate type running in oil bath.

## FRAME

**High tensile steel tubing**, of sturdy construction and design.

**Front suspension**: telehydraulic fork complete with steering damper.

**Rear suspension**: swinging fork with adjustable hydraulic shock absorbers, with exposed spring.

**Wheels**: spoke type; chromium-plated steel rims with normal profile; 18" x 2 1/4". Front wheels with removable axle.

**Brakes**: expanding; front, hand operated; rear, foot operated. Drum diameter: front, 180 mm.; rear, 160 mm.

**Tires**: front: 2.50" x 18" ribbed; rear: 2.75" x 18"; with road tread.

**Inflating pressure**: 2.25 Kg./cm<sup>2</sup> for both wheels (30-32 lbs. front and rear).

## DIMENSIONS:

Wheel base	1.350 metres (53.1495")
Max. length	2.000 metres (78.740")
Max. height	0.920 metres (36.2204")
Max. width	0.590 metres (23.2283")
Height at saddle	0.760 metres (29.9212")
Weight (unladen)	116 kgs. (lbs. 255.735)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
	2.400 lt. approx. (0.634 US gal. - 0.5279 Imp. gal.)
Fuel tank capacity	16 litres (4.227 US gal. - 3.5196 Imp. gal.)

## PERFORMANCE:

Max. speed	150 kms. (94 m.p.h.) in normal position and 170 kms. (106 m.p.h.) in lowered position
Fuel consumption per 100 kms.	4 litres (60 Mi. per US gal.) 70 Mi. per Imp. gal.)





Fig. 14

## ENGINE

**4-stroke.**

**Single-cylinder**, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

**Cylinder head**, made of light alloy; hemispherical combustion chamber; inserted valve seats.

**Bore**: 74 mm.

**Stroke**: 57.8 mm.

**Cubic capacity**: 248.589 c.c.

**Compression ratio**: 9.2 : 1.

**Timing** by O.H.C., valves inclined 80°.

**Max. output** r.p.m.: 8000.

**Carburetor**: Dell'Orto SSI 27 A with F 20 efficient air cleaner.

**Cooling** by air.

**Lubrication**: forced - by gear pump. Oil sump in crankcase.

**Ignition** by coil (distributor) in alternate current.

**Spark plug**: Marelli CW 260 N, Beru 260, KLG F-100.

**Electrical equipment**: by an alternator-flywheel 6 Volt, 40 Watt magnet. Two-bulb headlamp, tail light with stop, outer H.T. coil.

**Transmission**: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

**Gearbox**: in unit with engine; 5 speeds; constant mesh gears; pedal control with preselector.

**Clutch**: multiplate type running in oil bath.

## FRAME

**High tensile steel tubing**, of sturdy construction (with side stand).

**Front suspension**: telehydraulic fork complete with steering damper.

**Rear suspension**: swinging fork with adjustable hydraulic shock absorbers.

**Wheels**: spoke type; with chromium-plated steel rims; with normal profile; 19" x 2 1/2". Front wheel with removable axle.

**Brakes**: expanding; front, hand operated; rear, foot operated. Drums diameter: front: 180 mm.; rear: 160 mm.

**Tires**: front: 3.00" x 19"; rear: 3.50" x 19"; both having knobby tread. Inflating pressure: 2.25 kg./cm<sup>2</sup> for both wheels (30-32 lbs. front and rear).

## DIMENSIONS:

Wheel base	1.350 metres (53.1495")
Max. length	2.020 metres (79.5274")
Max. height	1.050 metres (41.3385")
Max. width	0.820 metres (32.2834")
Height at saddle	0.750 metres (29.5275")
Weight (unladen)	109 kgs. (lbs. 240.304)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
	2.400 lt. approx. (0.634 US gal. - 0.5279 Imp. gal.)
Fuel tank capacity	11 litres (2.9059 US gal. - 2.4197 Imp. gal.)

## PERFORMANCE:

Fuel consumption per 100 kms.	3.5 litres (68 MI. per US gal. - 80 MI. per Imp. gal.)
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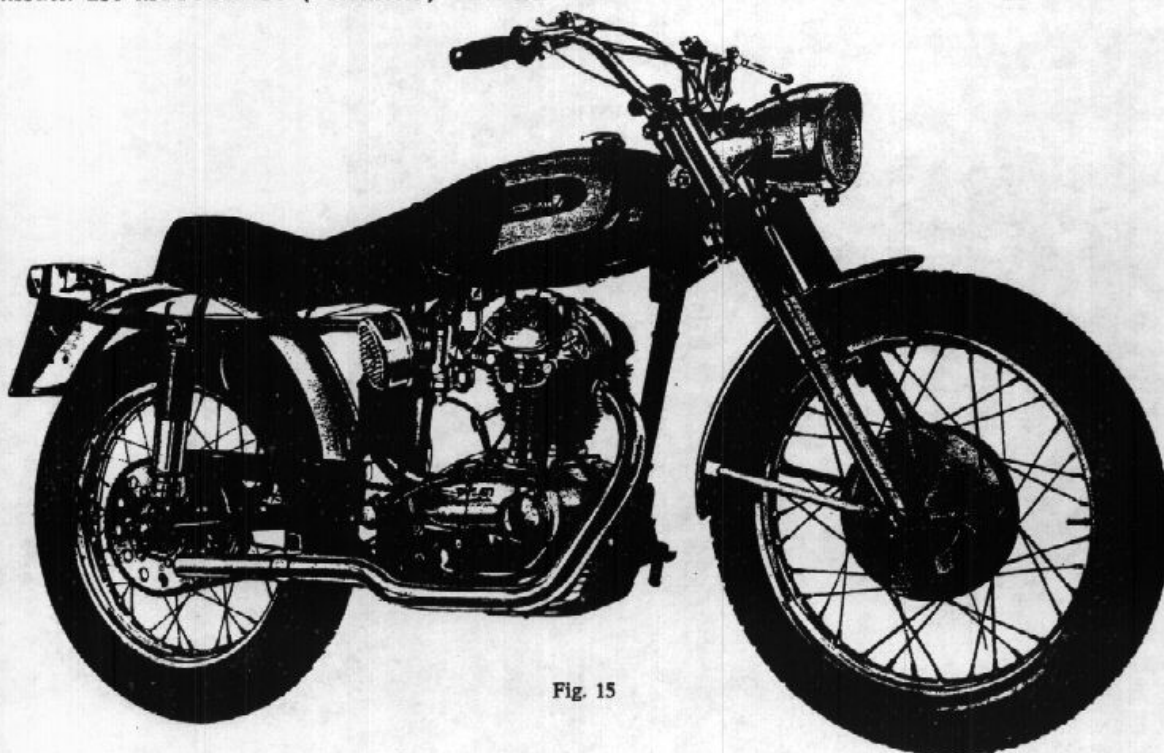


Fig. 15

## ENGINE

4-stroke.

Single-cylinder, inclined 10°, made of light alloy, deeply finned; special cast-iron inserted liner.

Cylinder head, made of light alloy; hemispherical combustion chamber; inserted valve seats.

Bore: 74 mm.

Stroke: 57.8 mm.

Cubic capacity: 248.589 c.c.

Compression ratio: 9.2 : 1.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 8000.

Carburetor: Dell'Orto SSI 27 A with F 20 efficient air cleaner.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor) in alternate current.

Spark plug: Marelli CW 260 N, Beru 260, KLG F-100.

Electrical equipment: by an alternator-flywheel 6 Volt, 28 Watt magnet. Two-bulb headlamp, tail light with stop, outer H.T. coil.

Parking lights and stop fed by battery 6V-7Ah.

Transmission: from engine to gearbox, by gears; from gearbox to wheel, by chain with special cushion drive.

Gearbox: in unit with engine; 5 speeds; constant mesh gears; pedal control with preselector.

Clutch: multiplate type running in oil bath.

## FRAME

High tensile steel tubing, of sturdy design and construction, (with side stand).

Front suspension: telehydraulic fork complete with steering damper.

Rear suspension: swinging fork with adjustable hydraulic shock absorbers.

Wheels: spoke type; with chromium plated steel rims; with normal profile; 19" x 2 1/2" the front, and 18" x 3" the rear. Wheels with removable axle.

Brakes: expanding; front, hand operated; rear, foot operated. Drums diameter: front: 180 mm.; rear: 160 mm.

Tires: front: 3.50" x 19"; rear: 4.00" x 18"; both having knobby tread. Inflating pressure: 2.25 kg./cm<sup>2</sup> for both wheels (30-32 lbs. front and rear).

## DIMENSIONS:

Wheel base	1.350 metres (53.1495")
Max. length	2.020 metres (79.5274")
Max. height	1.050 metres (41.3385")
Max. width	0.820 metres (32.2834")
Height at saddle	0.750 metres (29.5275")
Weight (unladen)	120 kgs. (lbs. 264.555)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
	2.400 lt. approx. (0.634 US gal. - 0.5279 Imp. gal.)
Fuel tank capacity	11 litres (2.9059 US gal. - 2.4197 Imp. gal.)

## PERFORMANCE:

Fuel consumption per 100 kms.	3.5 litres (68 MI. per US gal. - 80 MI. per Imp. gal)
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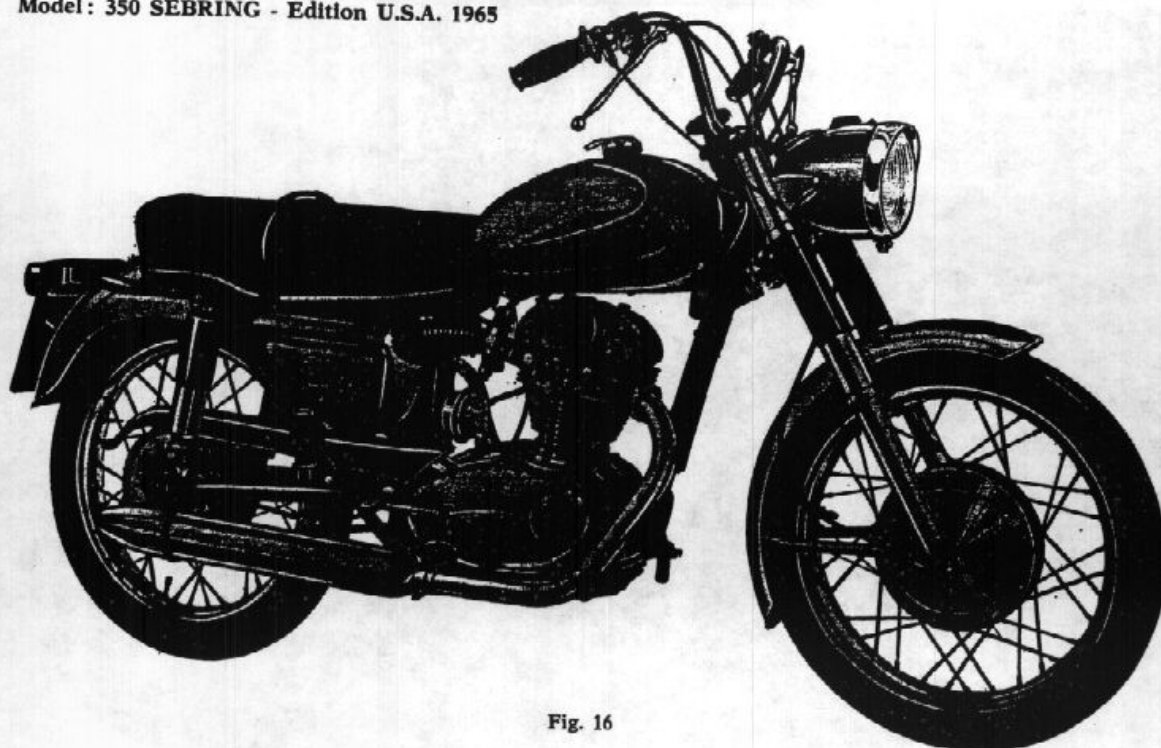


Fig. 16

## ENGINE

4 stroke.

Single-cylinder, inclined 10°, made of light alloy, deeply finned, special cast-iron inserted liner.

Cylinder head, made of light alloy, with hemispherical combustion chamber; inserted valve seats.

Bore: 76 mm.

Stroke: 75 mm.

Cubic capacity: 340.237 c.c.

Compression ratio: 8.5 to 1.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 6250.

Carburetor: Dell'Orto UBF 24 BS with quiet air inlet in the toolbox.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor).

Spark plug: Marelli CW 260 N - BERU 260, KLG F-100.

Electrical equipment: Lighting by battery recharged by 6V-60W alternator flywheel and current static rectifier, 3-light headlamp, tail light with stop light, horn.

Transmission: by gears between the engine and the gearbox; by chain between the gearbox and the rear wheel with special cushion drive.

Gearbox in unit with the engine, 5 gears; constant mesh gears. Control by pedal with gear shift.

Clutch: multi-plate type running in an oil bath.

## FRAME

High tensile steel tubing, very sturdy.

Tubular legbar: 2 center stands.

Front suspension: telchydraulic fork with steering damper.

Rear suspension: swinging fork with hydraulic adjustable shock-absorbers.

Wheels: spoke type; with chromium-plated steel rims, normal profile 18"×2½". Front wheel with removable axle.

Brakes: expanding; front, hand operated; rear foot operated. Drums diameter: front, 180 mm.; rear, 160 mm.

Tires: front, 2.75"×18" ribbed; rear, 3.00"×18" knobby.

Inflating pressure: 2.25 kg./cm² for both wheels: (30-32 lbs. front and rear).

## DIMENSIONS:

Wheel base	1.330 metres (52.3621")
Max. length	2.000 metres (78.740")
Max. height	1.070 metres (42.1260")
Max. width	0.850 metres (33.4645")
Height at saddle	0.800 metres (31.4961")
Weight (unladen)	123 kgs. (lbs. 271.168)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
Fuel tank capacity	13 litres (3.4342 US gal. - 2.8597 Imp. gal.)

## PERFORMANCE:

Max. speed	125 km/h approx. (78 m.p.h.)
Fuel consumption per 100 kms.	4.5 litres (52 M/US gal. - 63 M/Imp. gal.)

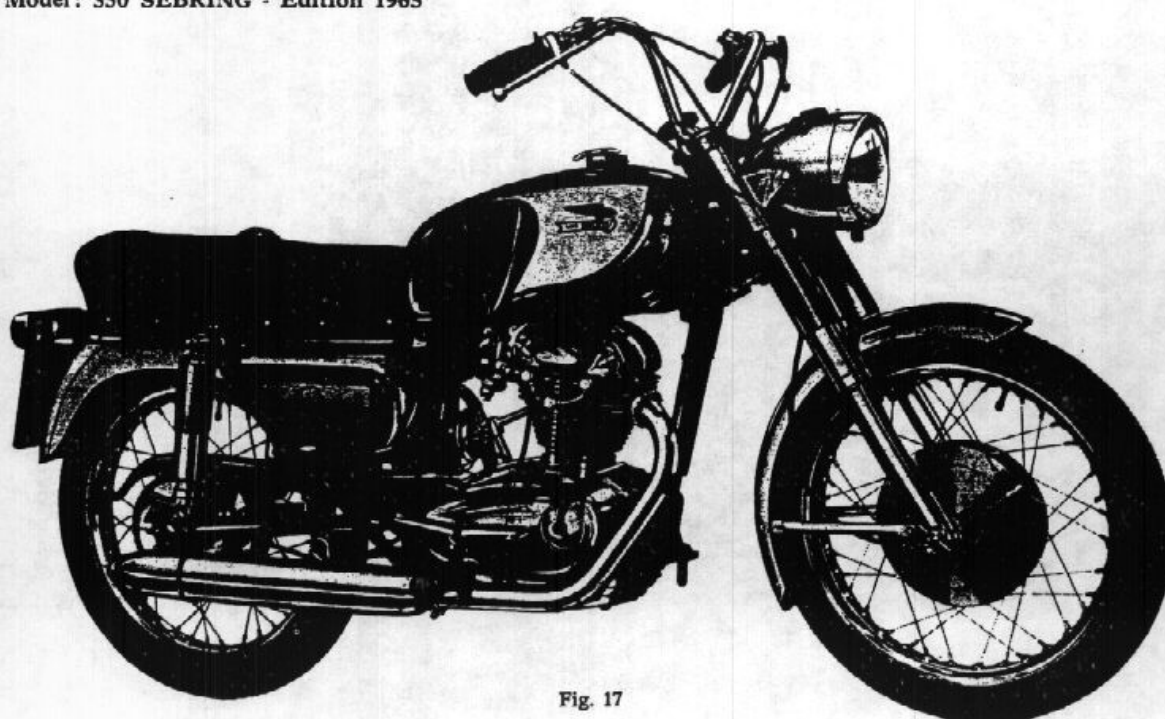


Fig. 17

## ENGINE

4 stroke.

Single-cylinder, inclined 10°, made of light alloy, deeply finned, special cast-iron inserted liner.

Cylinder head, made of light alloy, with hemispherical combustion chamber; inserted valve seats.

Bore: 76 mm.

Stroke: 75 mm.

Cubic capacity: 340.237 c.c.

Compression ratio: 8.5 to 1.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 6250.

Carburetor: Dell'Orto UBF 24 BS with quiet air inlet in the toolbox.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor).

Spark plug: Marelli CW 260 N - BERU 260, KLG F-100.

**Electrical equipment:** Lighting by battery recharged by 6V-60W alternator flywheel and current static rectifier, 3-light headlamp, tail light with stop light, horn.

**Transmission:** by gears between the engine and the gearbox; by chain between the gearbox and the rear wheel with special cushion drive.

**Gearbox** in unit with the engine, 5 gears; constant mesh gears. Control by pedal with gear shift.

**Clutch:** multi-plate type running in an oil bath.

## FRAME

High tensile steel tubing, very sturdy.

Tubular legbar: 2 center stands.

**Front suspension:** telehydraulic fork with steering damper.

**Rear suspension:** swinging fork with hydraulic adjustable shock-absorbers.

**Wheels:** spoke type; with chromium-plated steel rims, normal profile 18"×2½". Front wheel with removable axle.

**Brakes:** expanding; front, hand operated; rear foot operated. Drums diameter: front, 180 mm.; rear, 160 mm.

**Tires:** front, 2.75"×18" ribbed; rear, 3.00"×18" knobby.

Inflating pressure: 2.25 kg./cm² for both wheels: (30-32 lbs. front and rear).

## DIMENSIONS:

Wheel base	1.330 metres (52.3621")
Max. length	2.000 metres (78.740")
Max. height	1.070 metres (42.1260")
Max. width	0.850 metres (33.4645")
Height at saddle	0.800 metres (31.4961")
Weight (unladen)	123 kgs. (lbs. 271.168)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
Fuel tank capacity	17 litres (4.4909 US gal. - 3.7396 Imp. gal.)

## PERFORMANCE:

Max. speed	125 km/h approx. (78 m.p.h.)
Fuel consumption per 100 kms.	4.5 litres (52 M/US gal. - 63 M/Imp. gal.)

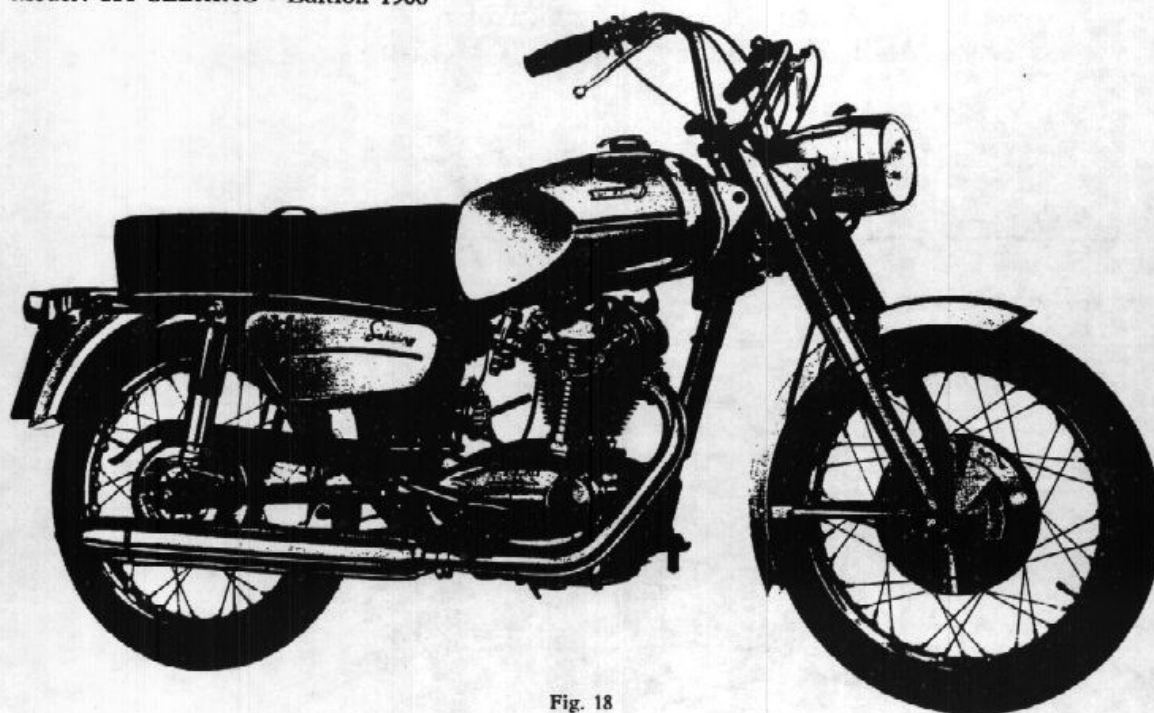


Fig. 18

## ENGINE

4 stroke.

Single-cylinder, inclined 10°, made of light alloy, deeply finned, special cast-iron inserted liner.

Cylinder head, made of light alloy, with hemispherical combustion chamber; inserted valve seats.

Bore: 76 mm.

Stroke: 75 mm.

Cubic capacity: 340.237 c.c.

Compression ratio: 8.5 to 1.

Timing by O.H.C., valves inclined 80°.

Max. output r.p.m.: 6250.

Carburetor: Dell'Orto UBF 24 BS with quiet air inlet in the toolbox.

Cooling by air.

Lubrication: forced - by gear pump. Oil sump in crankcase.

Ignition by coil (distributor).

Spark plug: Marelli CW 260 N - BERU 260, KLG F-100.

Electrical equipment: Lighting by battery recharged by 6V-60W alternator flywheel and current static rectifier, 3-light headlamp, tail light with stop light, horn.

Transmission: by gears between the engine and the gearbox; by chain between the gearbox and the rear wheel with special cushion drive.

Gearbox in unit with the engine, 5 gears; constant mesh gears. Control by pedal with gear shift.

Clutch: multi-plate type running in an oil bath.

## FRAME

High tensile steel tubing, very sturdy.

Tubular legbar: 2 center stands.

Front suspension: telehydraulic fork with steering damper.

Rear suspension: swinging fork with hydraulic adjustable shock-absorbers.

Wheels: spoke type; with chromium-plated steel rims, normal profile 18" x 2 1/2". Front wheel with removable axle.

Brakes: expanding; front, hand operated; rear foot operated. Drums diameter: front, 180 mm.; rear, 160 mm.

Tires: front, 2.75" x 18" ribbed; rear, 3.00" x 18" knobby.

Inflating pressure: 2.25 kg./cm<sup>2</sup> for both wheels: (30-32 lbs. front and rear).

## DIMENSIONS:

Wheel base	1.330 metres (52.3621")
Max. length	2.000 metres (78.740")
Max. height	1.070 metres (42.1260")
Max. width	0.850 metres (33.4645")
Height at saddle	0.800 metres (31.4961")
Weight (unladen)	123 kgs. (lbs. 271.168)
Oil sump capacity, approx.	2 kgs. (lbs. 4.409)
Fuel tank capacity	13 litres (3.4342 US gal. - 2.8597 Imp. gal.)

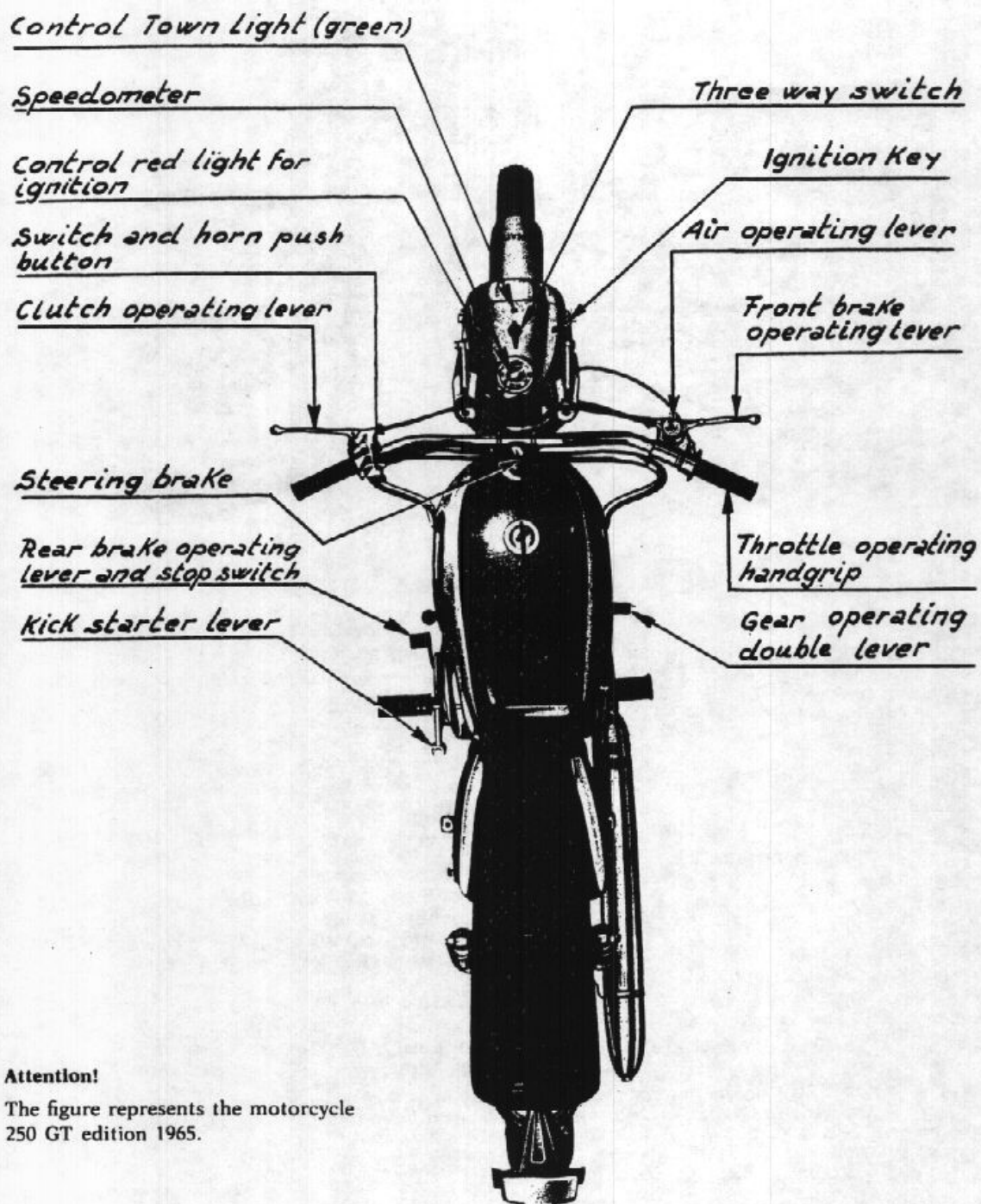
## PERFORMANCE:

Max. speed	142 km/h approx. (85-88 m.p.h.)
Fuel consumption per 100 kms.	4.5 litres (52 M/US gal. - 63 M/Imp. gal.)



## CONTROLS AND INDICATORS

(Motor cycle supplied with DUCATI-APRILIA Electrical Equipment).



### Attention!

The figure represents the motorcycle 250 GT edition 1965.



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# LUBRICATION TABLE

The DUCATI MECCANICA S.p.A. RECOMMEND  
for their Single O.H.C. shaft motor cycles the  
following AGIP products



Parts to be lubricated or refilled	Operation	Interval	Lubricant or fuel
Petrol tank	Refill	When the tank is going to run short of fuel	AGIP SUPERCORTE-MAGGIORE
Engine	Fully replace the oil in the engine sump, when the engine is hot.	After the first 500 kms. (300 miles)	AGIP F.1 MULTIGRADE or RACING SAE 40
	Fully replace the oil in the engine sump, when the engine is hot.	After the first 1000 kms. (600 miles)	AGIP F.1 MULTIGRADE or RACING SAE 40
	Attain again the oil level	Every 500 kms. (300 miles)	AGIP F.1 MULTIGRADE or RACING SAE 40
	Fully replace the oil, when the engine is hot, and clean filter	Every 2,000 kms. (1200 miles)	AGIP F.1 MULTIGRADE or RACING SAE 40
Lobes of camshaft, gears and bearings	Grease	During assembling operation	AGIP F.1 GREASE 30
Cables for: throttle, air regulation, front brake, clutch, rear brake & speedometer	Grease	During assembling operation	AGIP F.1 GREASE 30
Speedometer drive	Grease	During assembling operation and every 1,500 kms. (1000 miles)	AGIP F.1 GREASE 30
Lever controls on the handlebar and throttle twist grip control	Grease	During assembling operation and every 3,000 kms. (2000 miles)	AGIP F.1 GREASE 30
Steering boxes	Grease by pressure pump		AGIP F.1 GREASE 30
Front fork tubes	Drain fully and fill in new oil, in the quantity recommended at page 27	During assembling operation or when the fork plugs or when the fork tubes are of different length	HYDRAULIC BRAKE FLUID or AGIP F.1 SHOCK ABSORBER
Outer side of front fork sliding column, and front suspension spring.	Cover with grease	During assembling operation	AGIP F.1 GREASE 30
Brake cams and barrels of brake hubs levers	Grease	During assembling operation and every 2,000 kms. (1200 miles)	AGIP F.1 GREASE 30
Joint of starter lever	Grease	During assembling operation and every 3,000 kms. (2000 miles)	AGIP F.1 GREASE 30
Joint of rear suspension (fork)	Grease	During assembling operation	AGIP F.1 GREASE 30
	Lubricate by pressure pump	Every 2,000 kms. (1200 miles)	AGIP F.1 MULTIGRADE
Central stand spindle and pedal spindle of rear brake	Grease	During assembling operation and every 2,000 kms. (1200 miles)	AGIP F.1 GREASE 30
Chain	Grease	Every 2,000 kms. (1200 miles)	AGIP F.1 GREASE 30

## DESCRIPTION

### FRAME

The frames of DUCATI SINGLE-CYLINDER O.H.C. MOTOR CYCLES are of the single-girder tubular type. These are made of high tensile and are of exceptionally sturdy design.

### SUSPENSIONS

**Front:** telehydraulic, long-stroke fork.

Each fork tube contains 100 to 110 cm<sup>3</sup> (3 1/4 ounces) of HYDRAULIC BRAKE FLUID, or AGIP F.1 SHOCK ABSORBER for the 250 and 350 cc. motorcycles while, for the 160 Monza Jr. each fork tube contains 150 cc. (5 1/4 ounces) of AGIP F.1 MOTOR HD SAE 20.

**Rear:** swinging fork with double acting hydraulic shock absorbers.

Adjustable to three load values - Minimum-Medium-Maximum, in the 250 and 350 cc. motorcycles.

### WHEELS

The wheels are of the spoke type and their rims are:

Model	Material	Profile	RIM SIZE	
			Front	Rear
160 M. Jr.	Steel	Normal	16 x 2 1/4"	16 x 1.85"
250 Mz	Steel	Normal	18 x 2 1/4"	18 x 2 1/4"
250 GT	Steel	Normal	18 x 2 1/4"	18 x 2 1/4"
250 M 3	Steel	Normal	18 x 2 1/4"	18 x 2 1/4"
250 M 1	Steel	Normal	18 x 2 1/4"	18 x 2 1/4"
250 SCR	Steel	Normal	19 x 2 1/4"	19 x 2 1/4"
edit. 1966	Steel	Normal	19 x 2 1/4"	18 x 3"
350 S	Steel	Normal	18 x 2 1/4"	18 x 2 1/4"

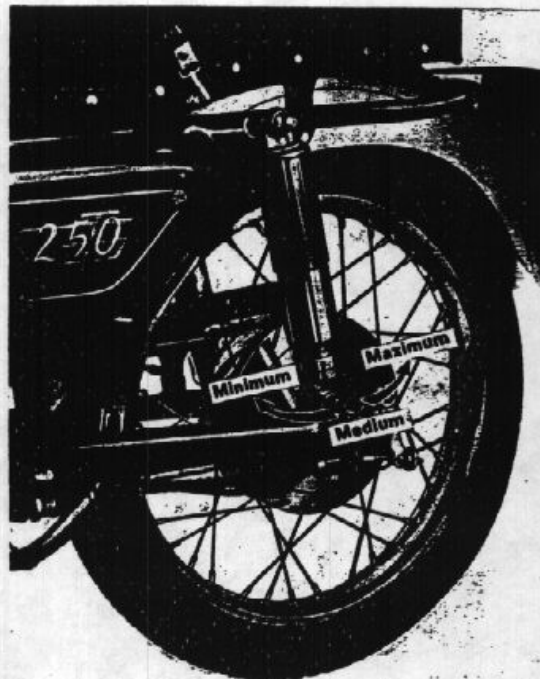


Fig. 21

The wheels have removable axles.

Rear wheel is provided with a special cushion drive.

Tires and tire inflating pressures are as under:

Model	FRONT WHEEL				REAR WHEEL			
	Tire	Infl. pres.		Tire	Infl. pres.			
		kg./cm. <sup>2</sup>	lbs./sq.in.		kg./cm. <sup>2</sup>	lbs./sq.in.		
160 M. Jr.	2.75-16R road tread	2,25	30-32	3.25-16R road tread	2,25	30-32		
250 Monza	2.75-18 ribbed	2,25	30-32	3.00-18 road tread	2,25	30-32		
250 GT	2.75-18 ribbed	2,25	30-32	3.00-18 road tread	2,25	30-32		
250 Mark 3	2.50-18 ribbed	2,25	30-32	2.75-18R road tread	2,25	30-32		
250 Mach 1	2.50-18 ribbed	2,25	30-32	2.75-18R road tread	2,25	30-32		
250 SCR	3.00-19 motocross	2,25	30-32	3.50-19 motocross	2,25	30-32		
edit. 1966	3.50-19 road tread	2,25	30-32	4.00-18 road tread	2,25	30-32		
350 S	2.75-18 ribbed	2,25	30-32	3.00-18 road tread	2,25	30-32		

### BRAKES

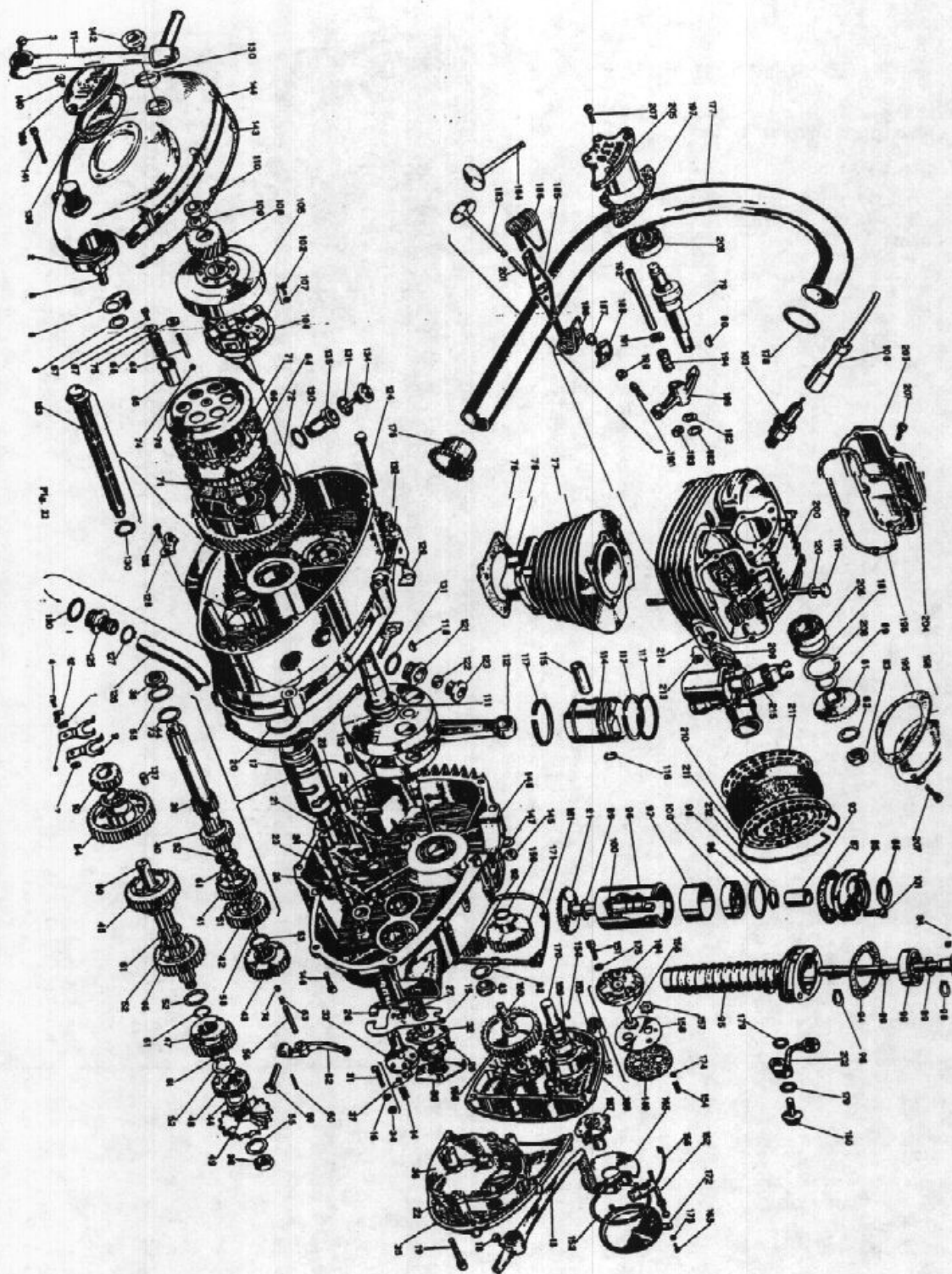
Expanding; double brake-shoe; front brake, hand operated; rear brake, foot operated; large diameter brake-blocks; wear resistant brake-lining and finned drums.

Drum diameters are:

Front drum: 180 mm; rear drum: 160 mm, for the 250 and 350 cc., while for the 160 Monza Jr. they are respectively of mm 158 and 136.

### ENGINE

Before starting the description, we suggest that the mechanic, planning to work on the engine, first familiarize himself with the various components of the Ducati single-cylinder overhead cam engine.





### STARTER Assembly

- 1 Plate
- 2 Pedal return spring
- 3 Screw TE 8MB×28 UNI 184
- 4 Screw TE 6MA×12 UNI 187
- 5 Starter pin Z=20
- 6 Thrust washer Ø 15.5×Ø 23×0.5
- 7 Washer Ø 6.5×Ø 13×2.5
- 8 Segment locking plate
- 9 Leaf spring
- 10 Starter gear Z=22
- 11 Complete starter lever
- 12 Safety washer Øi=6.4

### GEARBOX CONTROL Assembly

- 13 Gear operating lever
- 14 Ball spring
- 15 Washer Ø 7.4×Ø 13×0.5
- 16 Bent washer Ø 6.4×Ø 11×0.5
- 17 Speed gear selector
- 18 Screw TE 6MA×25
- 19 Screw TCEI 6MA×30
- 19 Screw TCEI 6MA×35
- 19 Screw TCEI 6MA×45
- 20 Thrust washer Ø 36.5×Ø 42×0.2
- 20 Thrust washer Ø 36.5×Ø 42×0.5
- 21 Thrust washer Ø 16.5×Ø 22×0.2
- 21 Thrust washer Ø 16.5×Ø 22×0.5
- 22 Screw TSC 6MA×30
- 23 Fork pin Ø 12×106
- 24 1st and 3rd speed engaging fork
- 25 2nd and 4th speed engaging fork
- 26 Top speed engaging fork
- 27 Fork pressure spring
- 28 Selector operating fork
- 29 Pedal return spring
- 30 Adjustment plate
- 31 Eccentric 6MA
- 32 Fork operating spindle
- 33 5th speed selector
- 34 Hex. nut 6MA×6
- 35 Cover chain side
- 36 Cover for speed selector
- 37 Ball 11/32" (Ø 8.731) RIV 90142011

### GEARSHIFT & CLUTCH Assembly

- 38 Hex. nut (16×1M)×6
- 39 Gear change main shaft Z=17
- 40 2nd speed driving gear Z=22
- 41 3rd speed driving gear Z=26
- 42 4th speed driving gear Z=29
- 43 5th speed driving gear Z=31
- 44 Washer Ø 20.2×Ø 28.2×2
- 45 2nd speed driven gear Z=38
- 46 3rd speed driven gear Z=35
- 47 4th speed driven gear Z=32
- 48 5th speed driven gear Z=30
- 49 Chain sprocket
- 50 Gearbox layshaft
- 51 Grooved thrust washer
- 52 Grooved thrust washer Ø 18×Ø 26×0.5
- 53 Spring ring Ø 18×Ø 22×2.5
- 54 1st speed driven gear Z=43
- 55 Safety washer tab Øi=16.3

- 56 Clutch peg
- 57 Screw TC 5MA×12
- 58 Clutch operating rod
- 59 Clutch lever pin
- 60 Split drift pin Ø 2.8×25
- 61 Spring ring Øi=20
- 62 Clutch operating lever
- 63 Roller Ø 5×5 - RIV 91131051
- 64 Inner driven disc
- 65 Spring retainer
- 66 Clutch spring
- 67 Washer Ø 5.2×Ø 14×1
- 68 Clutch adjustment screw 8MA
- 69 Clutch drum
- 70 Pressure disc
- 71 Driving disc
- 72 Clutch housing Z=60 (see couple of gears)
- 73 Outer distance piece Ø 20.3×Ø 25×5
- 74 Ball 3/16" (Ø 4.76) RIV 90152006
- 75 Hex. nut 8MA×5

### CYLINDER Assembly

- 76 Gasket between cylinder and head
- 77 Cylinder Øi=74
- 78 Cylinder liner

### TIMING Assembly

- 79 Timing shaft
- 80 Special Woodruff key 3×5
- 81 Bevel gear Z=28
- 82 Safety washer with Øi=14.5 tab.
- 83 Hex. nut (14×1M sin.)×6
- 84 Screw TCEI 6MA×30
- 85 Flange
- 86 Thrust washer Ø 29.2×Ø 35×0.1
- 86 Thrust washer Ø 29.2×Ø 35×0.2
- 86 Thrust washer Ø 29.2×Ø 35×0.5
- 87 Gasket between flange and crankcase
- 88 Gasket GACO OR 138
- 89 Normal thrust washer Ø 15.5×Ø 22 - thckn. 0.05 - 0.1 - 0.2 - 0.5 - 1
- 90 Transmission with bevel gear Z=20
- 91 Bevel gear Z=30
- 92 Bevel gear Z=21
- 93 Normal sleeve Ø 15×Ø 20×34
- 94 Gasket for head protection
- 95 Timing protection
- 96 Bush
- 97 Distance piece Ø 31×Ø 35×19.6
- 98 Ring Seeger 15 E
- 99 Bearing RIV 02 AJ Ø 15×Ø 35×11
- 100 Bearing RIV 3 AOn Ø 15×Ø 35×11
- 101 Screw TCEI 6MA×16 UNI 2383

### ELECTRIC SYSTEM Assembly

- 102 Screw TCC 5MA×15
- 103 Sparking plug thermic degree 260 with gasket, Marelli CW 260 N, BERU 260, KLG F-100
- 104 Complete stator plate 31.95.409
- 105 Flywheel Ø 126 31.95.415
- 106 Ignition cable - 31.95.113

107 Spring washer A 5.3 UNI 1751

#### CRANKSHAFT Assembly

- 108 Crankshaft gear Z=24
- 109 Safety washer with tab  $\varnothing i=20.2$
- 110 Hex. nut (20x1M)x7
- 111 Thrust washer  $\varnothing 30.5 \times \varnothing 37$  (thickness 1 - 1.1 - 1.2 - 1.3)
- 112 Crankshaft
- 113 Threaded dowel 18x1M
- 114 Complete normal Borgo piston  $\varnothing 74$
- 115 Normal piston gudgeon pin
- 116 Spring ring  $\varnothing i=17.5$
- 117 Piston rings set
- 118 Woodruff key 4x5 UNI 99

#### CRANKCASE Assembly

- 119 Tie rod TE 10MAx253
- 120 Bent washer  $\varnothing 10.5 \times \varnothing 18 \times 0.8$
- 121 Cable gland nut
- 122 Rubber for flywheel cable
- 123 Ring plug
- 124 Screw TE 8MAx85
- 124 Screw TE 8MAx120
- 125 Breather air nozzle 22MB
- 126 Breather tube
- 127 Breather tube locking ring
- 128 Plate
- 129 Gasket
- 130 Gasket  $\varnothing 22.5 \times \varnothing 28 \times 1$
- 131 Gasket  $\varnothing 22 \times \varnothing 28 \times 1.5$
- 132 Crankcase clutch side
- 133 Filter
- 134 Oil plug with level stick
- 135 Oil filler
- 136 Screw TS 6MAx15 UNI 262
- 137 Roller  $\varnothing 7 \times 7$  RIV 91131071
- 138 Cover for clutch adjustment hole
- 139 Cover gasket
- 140 Screw TSC 6MAx14
- 141 Screw TCEI 6MAx40
- 141 Screw TCEI 6MAx50
- 142 Plug 22 MB
- 143 Gasket for clutch side cover
- 144 Cover clutch side with bush
- 145 Hex. nut 8MAx8 UNI 205
- 145 Hex. nut Elastic-Stop 8MAx10.5
- 146 Screw TCEI 6MAx25
- 146 Screw TCEI 6MAx40
- 147 Bent washer  $\varnothing 8.4 \times \varnothing 15 \times 0.5$
- 148 Crankcase chain side

#### PUMP - ELECTRICAL SYSTEM Assembly

- 149 Pump gasket
- 150 Special Woodruff key 3x5
- 151 Screw with hole TC 6MAx30
- 152 Gasket
- 153 Rubber tube
- 154 Pressure valve spring
- 155 Threaded bush 10 MB
- 156 Driving gear Z=7
- 157 Driven gear Z=7
- 158 Pump cover
- 159 Thrust washer  $\varnothing 15.5 \times \varnothing 22 \times 1$

- 160 Thrust washer  $\varnothing 10.5 \times \varnothing 18 \times 1$
- 161 Timing cover gasket
- 162 Column 6MA - L=61.5
- 162 Column 6MA - L=70.5
- 163 Screw TCC 4MAx7
- 164 Pump body
- 165 Complete distributor
- 166 Condenser 0.3  $\mu$ F
- 167 Automatic advance
- 168 Pump operating gear with pin
- 169 Timing cover
- 170 Distributor operating spindle
- 171 Driving gear of the distributor Z=30
- 172 Distributor cover with 2 springs
- 173 Spring washer A4.3 UNI 1751
- 174 Ball  $\frac{1}{4}$ " ( $\varnothing 6.35$ ) RIV 90152008
- 175 Spring washer A6.4 UNI 1751

#### EXHAUST Assembly

- 176 Hold ring 48x1.5M
- 177 Exhaust pipe
- 178 Gasket  $\varnothing i=36$

#### HEAD Assembly

- 179 Gasket  $\varnothing 12.2 \times \varnothing 20 \times 1$
- 180 Union screw (12x1.25M)x24
- 181 Thrust washer  $\varnothing 29.2 \times \varnothing 35 \times 0.2$
- 182 Thrust washer  $\varnothing 10.5 \times \varnothing 18 \times 1$
- 183 Inlet valve
- 184 Exhaust valve
- 185 Spring attachment cross-bar
- 186 Valve spring
- 187 Valve rubber
- 188 Spring attachment, tie h=12
- 189 Rocker with chromed shoe
- 190 Adjustment screw 8MB
- 191 Spring washer
- 192 Rocker pin
- 193 Hex. nut 8MBx4
- 194 Rocker normal bush
- 195 Timing cover gasket
- 196 Valve cover gasket
- 197 Cap gasket
- 198 Timing cover
- 199 Cotter  $\varnothing 11.9 \times 8$
- 200 Head
- 201 Split spring drift  $\varnothing 5.4 \times 12$
- 202 Oil union
- 203 Valve cover
- 204 Rubber 50x17x4
- 205 Cap bearing holder
- 206 Bearing RIV 02 A or FAG 6202  $\varnothing 15 \times \varnothing 35 \times 11$
- 207 Screw TCEI 6MAx16 - UNI 2383
- 208 Ring Seeger 35 I - UNI 3654

#### CARBURETOR

- 209 Rubber distance piece
- 210 Filtering body 2166
- 211 Drilled disc 2167
- 212 Filtering body retain ring 2168
- 213 Hex. nut Elastic-Stop 8MAx9
- 214 Stud 8MAx37
- 215 Carburetor Dell'Orto type UBF 24 BS

# DESCRIPTION OF THE 250 c.c. SINGLE-CYLINDER O.H.C. ENGINE

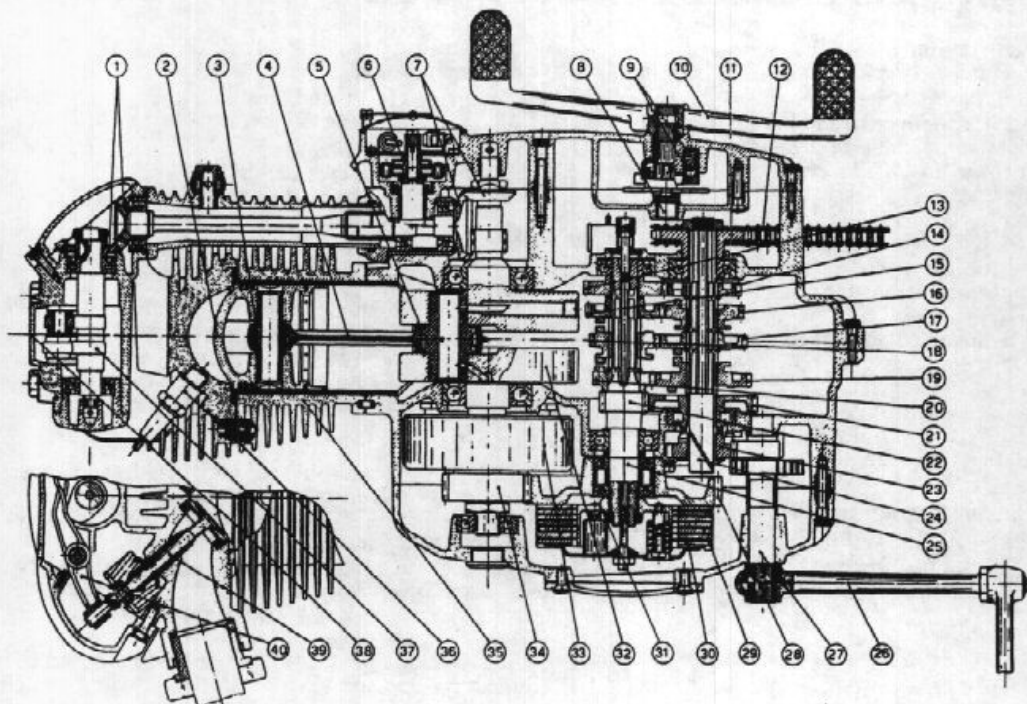


Fig. 23

## KEY TO THE ENGINE PARTS

- |   |                                  |                                     |                                   |
|---|----------------------------------|-------------------------------------|-----------------------------------|
| 1 Matched pair of spiral bevel gears.   | 11 Power exit shaft gear.        | 21 1st speed driven gear.           | 31 Clutch drum (clutch hub)       |
| 2 Piston.                               | 12 Driving chain.                | 22 1st speed (bottom) driving gear. | 32 Crankshaft.                    |
| 3 Connecting rod bush.                  | 13 5th speed (top) driving gear. | 23 Starter gear.                    | 33 Alternator magnet and flywheel |
| 4 Connecting rod.                       | 14 5th speed driven gear.        | 24 Change layshaft.                 | 34 Crankshaft gear.               |
| 5 Roller cage.                          | 15 4th speed driving gear.       | 25 Change mainshaft.                | 35 Engine cylinder.               |
| 6 Coil ignition with automatic advance. | 16 4th speed driven gear.        | 26 Starter lever.                   | 36 Sparking plug.                 |
| 7 Matched pair of spiral bevel gears.   | 17 3rd speed driven gear.        | 27 Starting shaft.                  | 37 Camshaft.                      |
| 8 Gear change selector.                 | 18 3rd speed driving gear.       | 28 Clutch housing.                  | 38 Engine head.                   |
| 9 Compression spring and ball.          | 19 2nd speed driven gear.        | 29 Driving clutch plates.           | 39 Valve.                         |
| 10 Gear change lever.                   | 20 2nd speed driving gear.       | 30 Driven clutch plates.            | 40 Rocker.                        |



## DESCRIPTION AND OPERATION OF AN OVERHEAD CAMSHAFT ENGINE

The basic construction of all the overhead camshaft single-cylinder Ducati engines is similar. The dimensions vary; otherwise, the differences lie chiefly on those measurements and specification that determine the compression ratio output or engine piston displacement, number of the speeds etc.

The basic engine described below is that of the « 250 G.T. » Motor Cycle (fig. 23).

The parts mentioned therein, but which do not appear on the illustration, may be found on the detailed fig. 22.

The engine is firmly secured to the frame by means of four bolts and 4 nuts of  $\varnothing$  8 mm so as to form solid unit.

The two crankcase sections and their covers, of die-cast, specially treated aluminium alloy, house the main parts of the engine.

On the left side of the crankcase are:

- The alternator magnet and flywheel (33) the alternating current of which is converted into direct current by a selenium rectifier contained in the current static regulator;
- the crankshaft gear (34), which drives the clutch housing (28);
- the clutch;
- the starter.

On the right of the crankcase are:

- the gear selector (8);
- two spiral bevel gears (7) which drive the cam shaft (37) through another pair of spiral gears (1) fitted inside the head (38);
- the gear-driven oil pump;
- the ignition distribution (breaker points) (6) which transfers the high tension current from the H.T. coil.

In the middle are:

- the engine assembly;
- the gearbox.

The main parts of the engine are:

- the crankshaft (32) - supported centrally by two ball bearings chosen for their durability and ability to sustain high rpm; on the extreme left by another ball bearing, and on the extreme right by a special bronze bushing;
- the connecting-rod (4) is fabricated of special steel and heat treated for maximum strength. Big-end has caged (5) roller bearings and the small-end a special-bronze bushing (3);
- the convex domed piston (2) made in one piece of cast light alloy; having an elliptical skirt and 4 rings two of which are slotted scrapers;
- the cylinder (35) made of light alloy and deeply finned has an inserted liner of special cast iron;
- the cylinder head (38) of cast light alloy features fins for adequate cooling. The combustion chamber is of modern hemispherical design and has inserted valve seats and guides;
- the timing system (39) is provided with overhead valves inclined at  $80^\circ$  with rocker (40) and an overhead camshaft (37);

- the ignition sparking plug (36);
- the carburetor.

The main parts of the gearbox are:

- the mainshaft (25);
- the layshaft (24);
- driving gear cluster (15-18-20);
- driving gear cluster (14-16-17-19-21).

### STARTING

As can be seen in fig. 23, the starter consists of a sector gear shaft (27) that meshes with the starting gear (23) which, in turn - through the face teeth - engages the bottom gear (21).

The starter lever (26), the thrust leaf springs for the spiral lever-return spring and other parts of less importance complete the assembly.

### CLUTCH

The clutch operates in oil and consists of steel plates (30) (driven plates) which are fitted alternately with (29) - driving plates - made of steel and having a phenolic resin lining.

While the former (30) slide along the twelve semi-circular grooves of the clutch hub (31), the latter (29) move along the eight clutch housing slots (28).

The crankshaft gear (34), on the left side of the connecting rod, drives the clutch housing which in turn drives, through the plates, the clutch hub which is attached to the mainshaft (25).

The clutch assembly revolves on two adequately spaced internal bearings.

### GEARBOX

The gearbox consists of the control assembly and the gear assembly.

The control assembly consists of a foot operated lever (10) on the right side of the engine, which, by means of the selector fork, actuates the rotation of the cam (drum not seen in the illustration) whose helical grooves move the pins of the three forks (not seen in the illustration) which in turn engage the chosen gear.

Engagement of the gear is ensured by a device consisting of a compression spring and a ball (9).

### GEAR SHIFTING

The mainshaft (25) rotates on two ball bearings fitted in the two parts of the crankcase. It carries:

- 1) The bottom driving gear (22) which turns with the mainshaft.
- 2) The 2nd speed driving gear (20) which idles on the shaft but cannot move axially.
- 3) The 3rd speed driving gear (18) which rotates with the shaft but is free to slide backward and forward longitudinally.
- 4) The 4th speed driving gear (15) which idles on the shaft does not move axially.
- 5) The top speed driving gear (13) which turns with the mainshaft.

The layshaft (24), like the mainshaft, rotates on one ball bearing housed in the half-crankcase chain side and on a shell and rollers fitted in the half-crankcase clutch side. It carries:

- 1) The bottom driven gear (21) which idles on the shaft but does not move axially;

- 2) The 2nd speed driven gear (19) which rotates with the shaft but is free to slide backward and forward longitudinally.
- 3) The 3rd speed driven gear (17) which idles on the shaft but does not move axially.
- 4) The 4th speed driven gear (16) which rotates with the lay shaft, in the rotary sense, but freely sliding in a longitudinal sense only.
- 5) The top driven gear (14) which idles on the shaft and does not move axially.
- 6) The output sprocket (11) which rotates with the shaft.

#### BOTTOM GEAR

By virtue of gear (22), the mainshaft (25) is in constant mesh with gear (21) idling on the layshaft.

The 2nd driven gear (19) slides along to mesh its face teeth with the bottom driven gear (21), locking it on the layshaft and compelling the layshaft to rotate and drive the output sprocket (11) which, in turn - through chain (12) - drives the wheel sprocket.

#### 2ND GEAR

As it rotates, the mainshaft (25) drags with it the gear (18) which slides along, meshes its face-teeth with gear (20) and compels it to move with the mainshaft; motion is thus transmitted to 2nd driven gear (19) which, being fixed to the layshaft causes it to rotate too.

The drive then passes on to the output sprocket, the chain and the wheel sprocket.

#### 3RD GEAR

The mainshaft (25) rotates and drags with it the gear (18) which drives gear (17) idling on the layshaft.

Gear (19) slides along the layshaft (24) and, by means of its face-teeth, compels the 3rd driven gear (17) and the layshaft (24) to move in unison, thus driving the output sprocket, the chain, and the wheel sprocket.

#### 4TH GEAR

The mainshaft (25) drags with it gear (18) which slides along the shaft and meshes its face-teeth with gear (15) idling on the mainshaft so that they all move together.

From gear (15) the drive passes on to the 4th driven gear (16) which, being united to the layshaft, drives it and, of course, the output sprocket, the chain and then the wheel sprocket.

#### 5TH GEAR (TOP)

The mainshaft (25) drags with it gear (13) which transmits the movement to the neutral gear (14) on the layshaft.

The gear (16) sliding on the layshaft (24) by

means of its front teeth, unites the (14) with the (24) and realises in this manner the movement of the 5th speed driven gear (14), driving the layshaft - output sprocket - chain and wheel sprocket.

Fig. 23 of the General Operation picture shows the gearbox in neutral position.

#### PRESSURE LUBRICATING OIL PUMP

It is a gear pump (it can not be seen in the illustration). The pump body of treated aluminium alloy enclosed the treated and ground steel gears.

The pump is driven by the crankshaft (32).

The pump draws the oil through the filter from the base of the crankcase, which acts as an oil sump, and circulates oil through the ducts to all parts of the engine. The oil is returned by gravity.

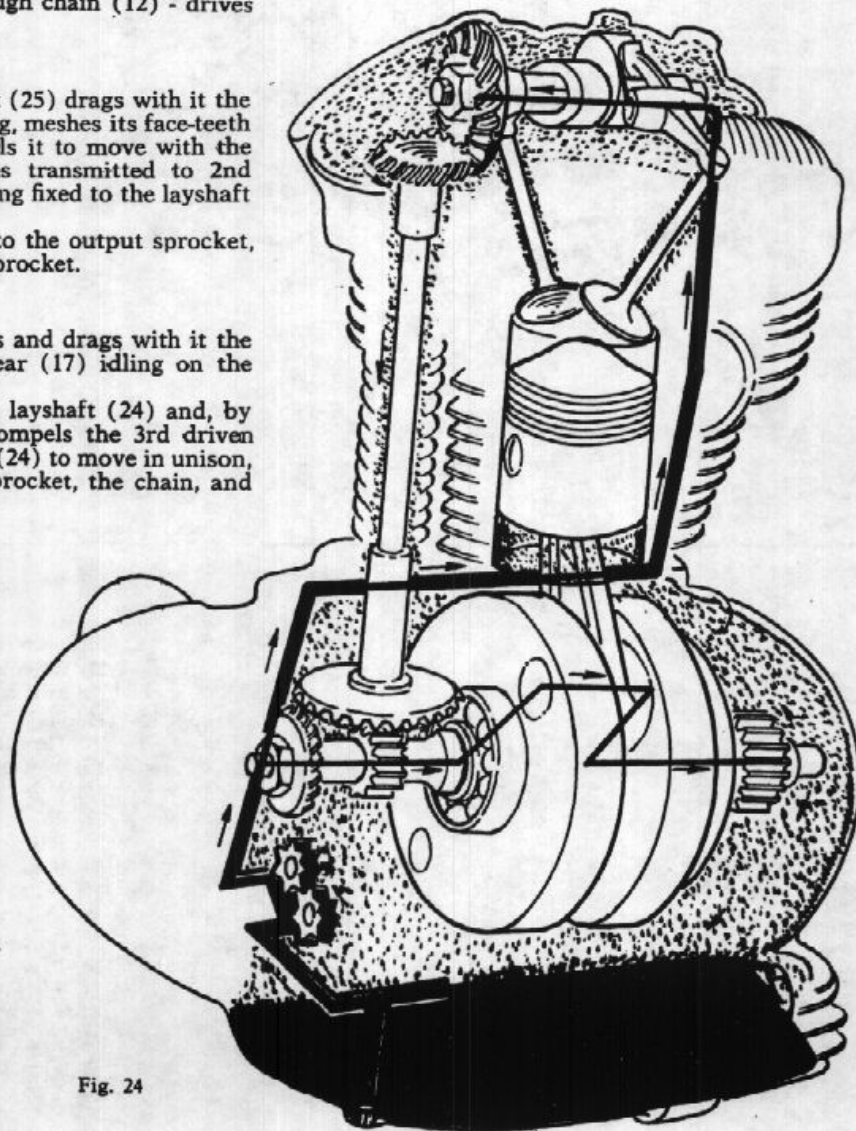


Fig. 24

## CARBURETOR

It mixes air and petrol vapour in a proportion suitable for combustion.

Hereunder is a list of the parts that go to make up a Dell'Orto Carburetor for overhead camshaft motor cycles.

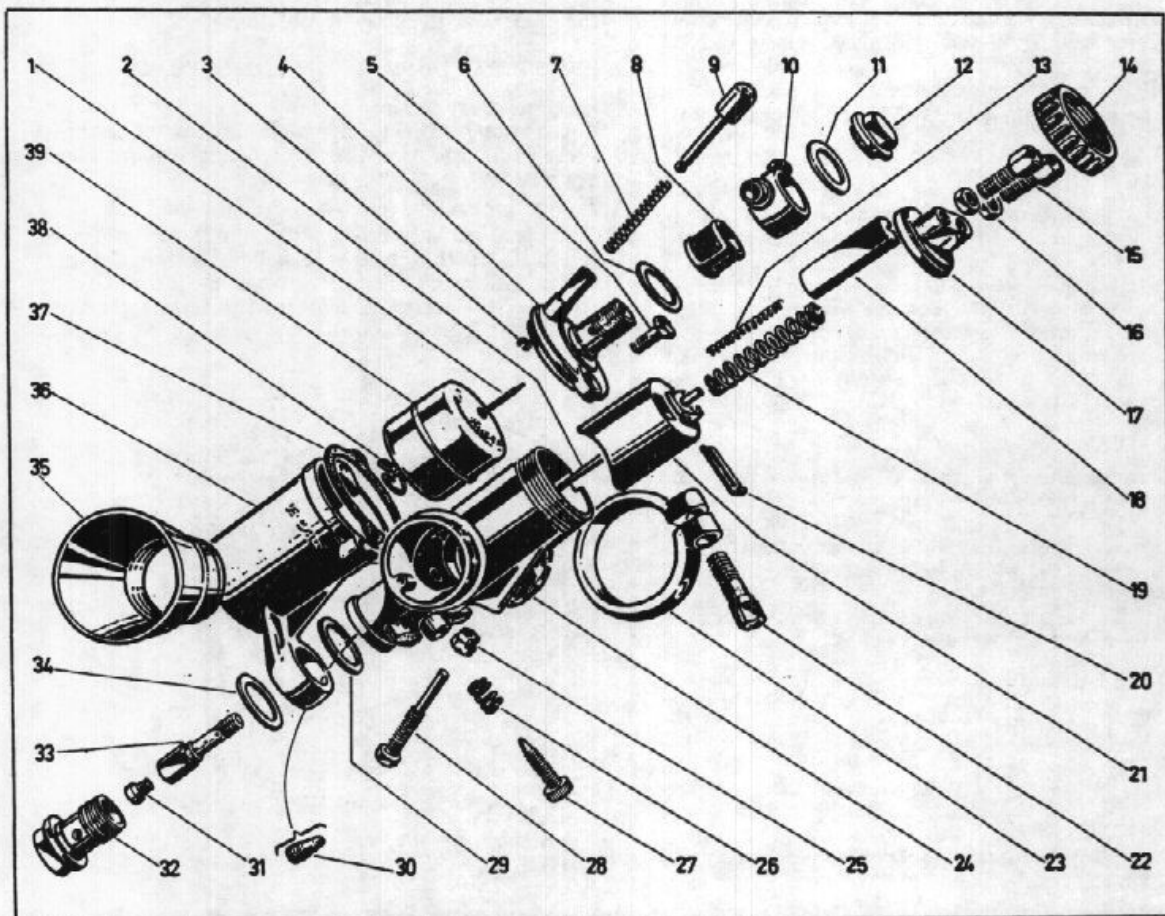


Fig. 25

- 1 Tapered float-needle.
- 2 Tapered needle.
- 3 Tickler retaining ring.
- 4 Float chamber cover.
- 5 Float chamber cover screw.
- 6 Pipe union washer.
- 7 Tickler spring.
- 8 Petrol filter.
- 9 Tickler.
- 10 Petrol pipe union.
- 11 Pipe union washer.
- 12 Pipe union plug.
- 13 Air slide spring.
- 14 Cover ring for mixture chamber.
- 15 Cable adjusting screw.
- 16 Cable adjusting screw lock-nut.
- 17 Throttle slide cover.
- 18 Air Control slide, with cable.
- 19 Throttle spring.
- 20 Tapered needle anchoring clip.

- 21 Throttle slide.
- 22 Ring clamp screw.
- 23 Ring clamp.
- 24 Carburetor body, left side.
- 25 Throttle stop screw nut.
- 26 Pilot air screw spring.
- 27 Pilot air screw.
- 28 Throttle stop screw.
- 29 Float chamber union plug washer.
- 30 Slow running jet.
- 31 Main jet.
- 32 Float chamber union plug.
- 33 Jet holding atomiser.
- 34 Float chamber union plug washer.
- 35 Air inlet.
- 36 L.H. float chamber.
- 37 Float chamber cover washer.
- 38 Float needle retaining ring.
- 39 Float.



## ELECTRICAL SYSTEM

### ELECTRIC SYSTEMS FOR MOTOR CYCLES

Most motor cycles manufacturers adopt either the dynamo system or the flywheel-magneto system. As it is known, the efficiency of the dynamo system depends on the perfect operation of such easily damageable parts as the commutator, the brushes and the regulator.

Though very simple and robust, the flywheel-magneto system has the disadvantage of varying the intensity of the light according to the engines revolutions (160 Monza Junior, Mark 3 and 250 Scrambler).

### ELECTRIC SYSTEM USED ON DUCATI SINGLE O.H.C. SHAFT 250 MONZA, 250 G.T., 250 MACH 1 AND 350 SEBRING.

The completely rectified system described hereunder brings together only the advantages of the two above mentioned systems.

It consists of the following parts:

- 1) A flywheel magneto alternator generating the alternating current required by the system's equipment. There are three types: one type for the motorcycles 160 Monza Jr. and the 250 Scrambler from engine number 92172 (6 V - 28 W); one type for the 250 Mark 3 and Scrambler till engine number 92171 (6 V - 40 W), and one type for the 250 Monza, 250 G.T., 250 Mach 1 and 350 Sebring (6 V - 60 W).

The picture below shows a «DUCATI ELETRO» flywheel magneto alternator, for the 250 Mark 3 and Scrambler till e.n. 92171.

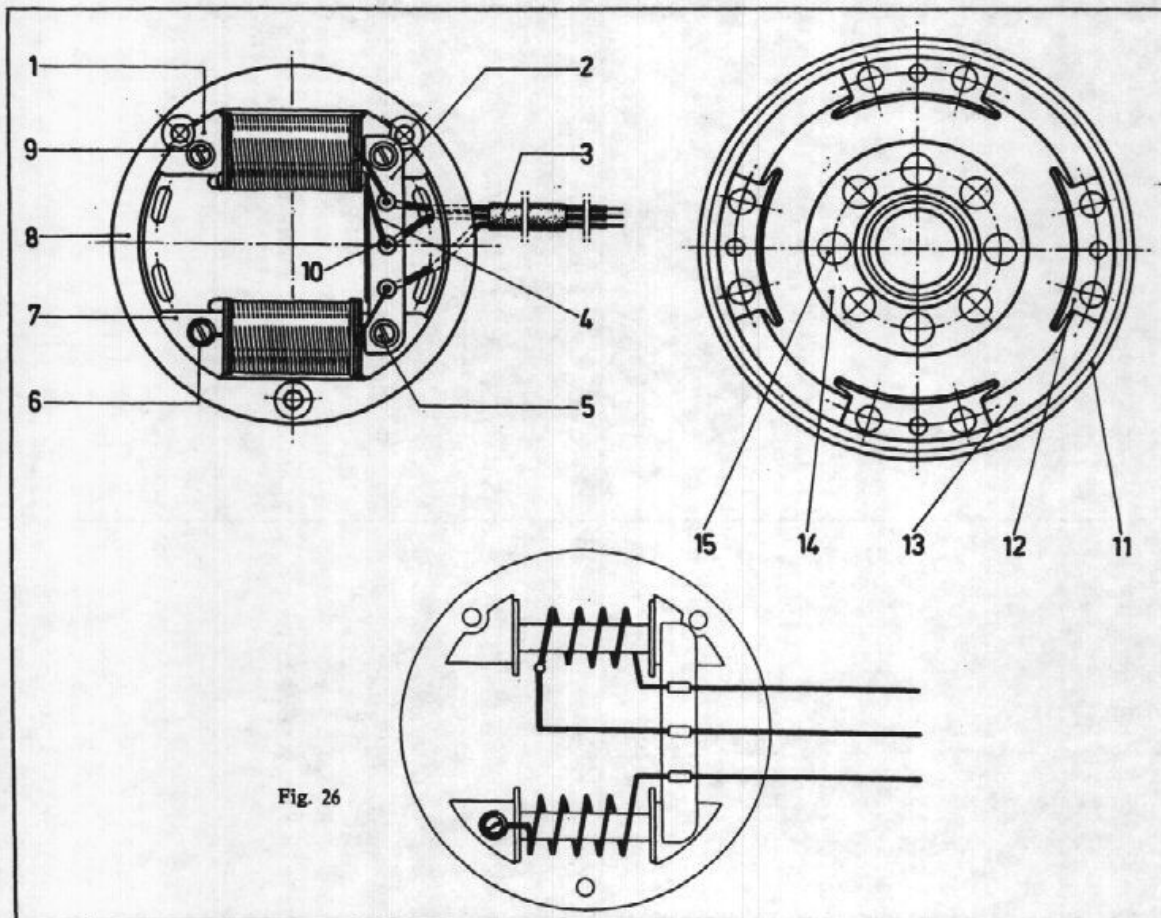


Fig. 26

#### PARTS STATOR

- 1 Lighting coil.
- 2 Terminal block.

- 3 Feed three-pole cable.
- 4 Insulating tube.
- 5 Coil & block fixing screw.
- 6 Spring washer.

- 7 Feed coil.
- 8 Stator plate.
- 9 Lighting coil fixing screw.
- 10 Tin-plated copper wire.

#### ROTOR

- 11 Casing.
- 12 Pole pieces.
- 13 Magnet.
- 14 Hub.
- 15 Rivet.

The following figure shows the « Ducati Elettro ». Flywheel magnet alternator for the 250 Monza, 250 G.T., 250 Mach 1 and 350 Sebring.

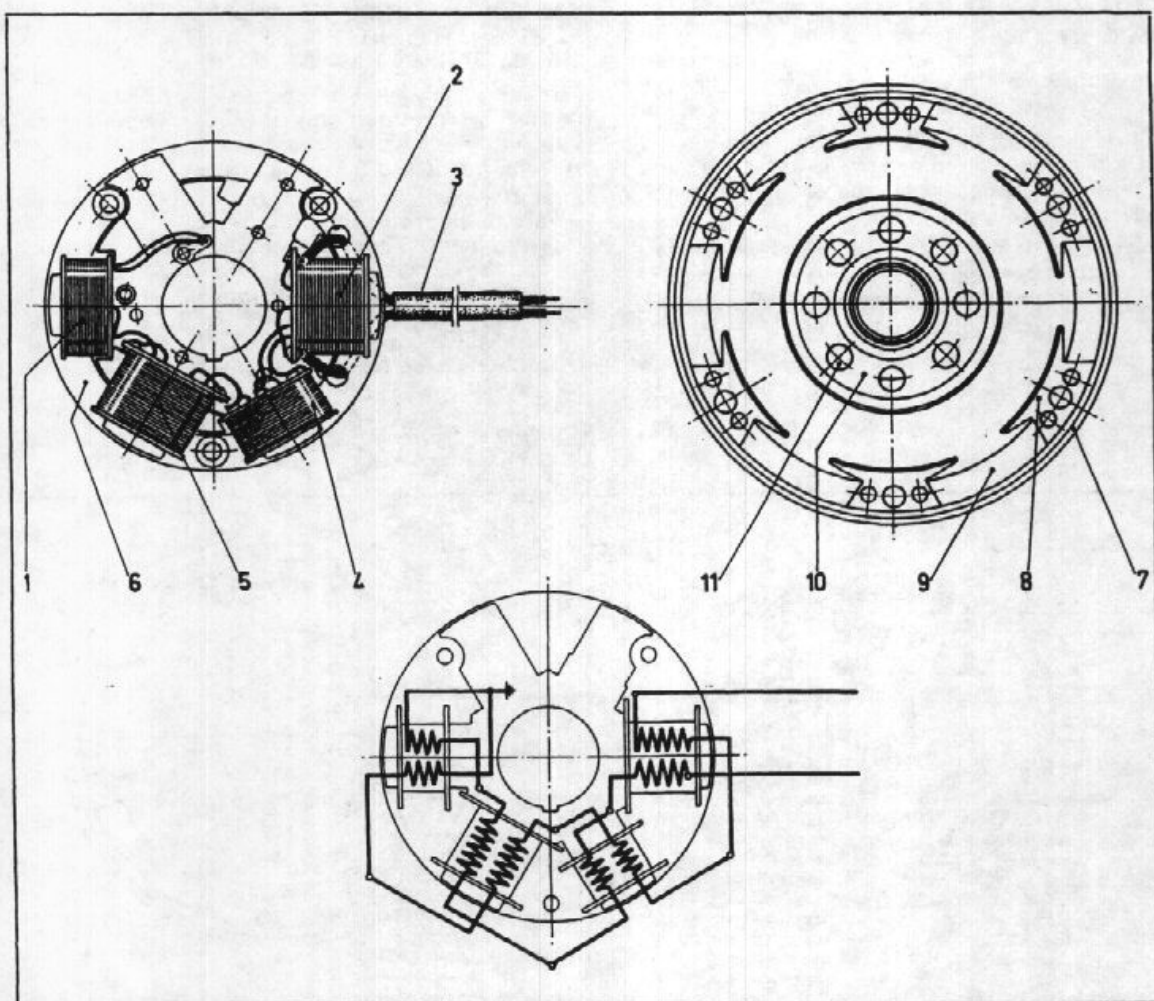


Fig. 27

#### PARTS

##### STATOR

- |                       |                      |
|-----------------------|----------------------|
| 1 1st charging coil.  | 4 3rd charging coil. |
| 2 4th charging coil.  | 5 2nd charging coil. |
| 3 Bi-pole feed cable. | 6 Stator plate.      |

##### ROTOR

- |                |
|----------------|
| 7 Casing.      |
| 8 Pole pieces. |
| 9 Magnet.      |
| 10 Hub.        |
| 11 Rivet.      |

NOTE! - We omit to show the flywheel magnet of the Monza Jr. and 250 Scrambler, as it is similar to that of the Mark 3 and 250 Scrambler till c.n. 92171.

- 2) **Battery** (SAFA 3L3 - 13.5 Ah. - 6V.), constantly charged by the flywheel magnet alternator. It feeds the lighting equipment (250 Monza, 250 G.T., 250 Mach 1 and 350 Sebring). Battery (SAFA 3IL3 - 7 Ah. - 6V.), for 160 Monza Jr. and 250 Scrambler from c.n. 92172.
- 3) **Rectifier** - current static regulator unit 6V. - 10A. It converts the flywheel magnet alternate current into direct current before feeding it to the battery, by automatically regulating the charge (250 Monza, 250 G.T., 250 Mach 1 and 350 Sebring).

- 4) **High tension coil.** - It converts the battery low tension current into high tension current and supplies, through the sparking plug points, the spark required at every 2 revolutions of the engine. For the 250 Monza, 250 G.T., 250 Mach 1 and 350 Sebring the H.T. coil is in direct current, while for the 160 Monza Jr., 250 Mark 3 and the 250 Scrambler, the H.T. coil is in a.c.

The following picture shows the H.T. «DUCATI ELETTRO» Coil, in direct current.

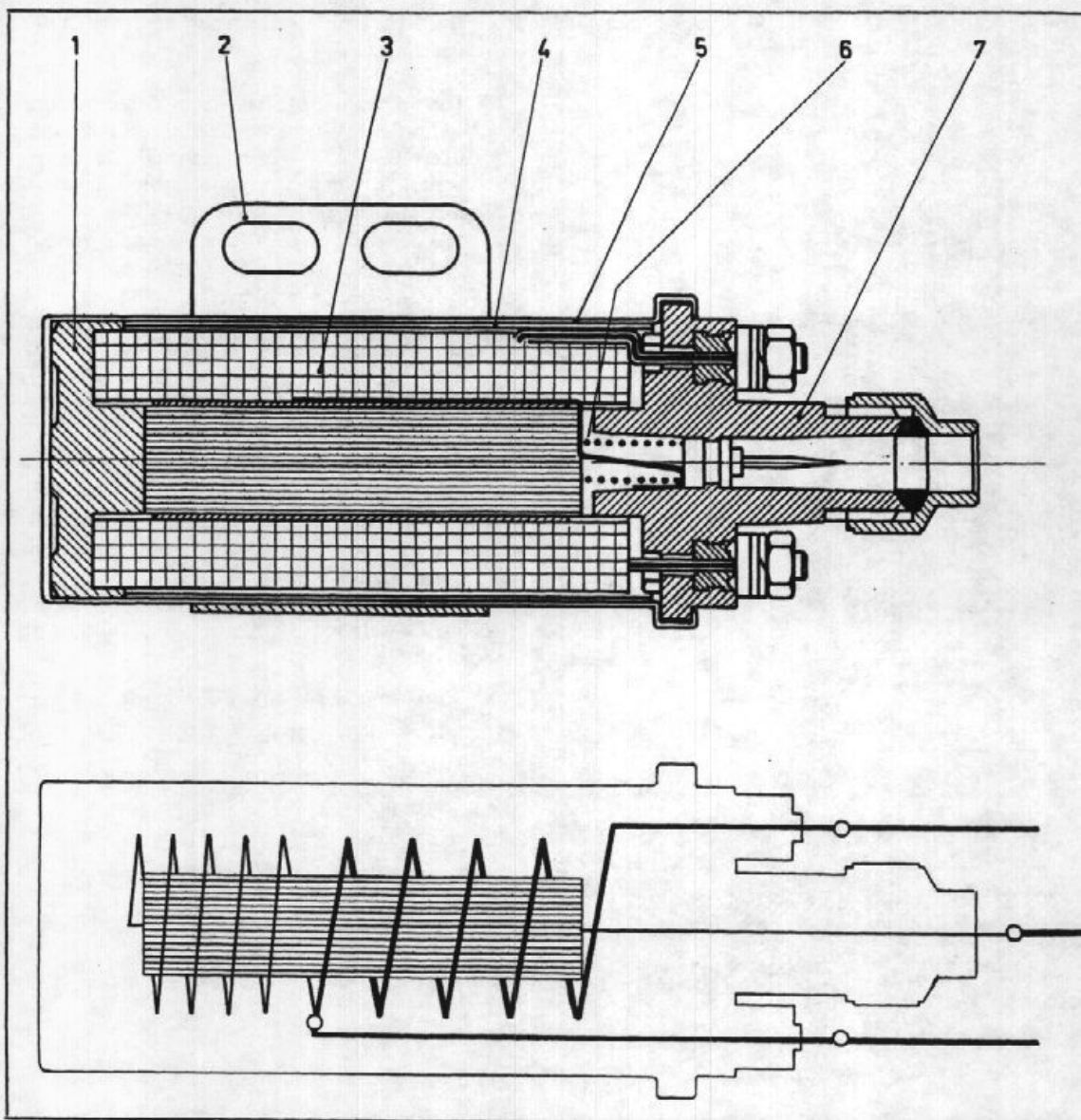


Fig. 28

**PARTS OF OPEN-CIRCUIT, HIGH TENSION SEPARATE COIL FOR THE «DUCATI-APRILIA» SYSTEM**

- |                   |                    |            |          |
|-------------------|--------------------|------------|----------|
| 1 Insulated base. | 3 Winding.         | 5 Housing. | 7 Cover. |
| 2 Mounting.       | 4 Magnetic screen. | 6 Spring.  |          |



5) **Distributor with automatic advance** - It opens the primary circuit the very instant the plug is to spark.

6) **Spark plug** - This is one of the most important parts of the engine and is largely responsible for the operation.

The spark plug is screwed into the cylinder head and is connected to the source of electric power by means of an insulated cable.

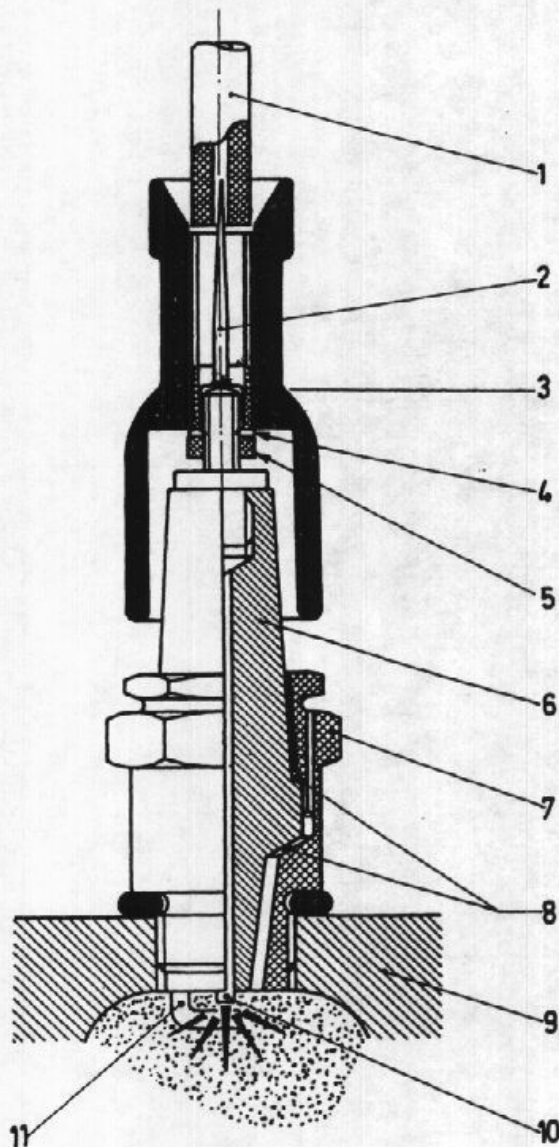


Fig. 29

The spark of the plug ignites the previously compressed mixture of fuel and air.

The spark plug consists of two main parts:

a) **The body (7)**, provided with a threaded stem,  $14 \times 1.5$  M, which is screwed (first loosely and then tightly) on the cylinder head (9). Between the cylinder head and the sparking plug is a gasket. An extension (11) welded to the lower end forms one of the electrodes (the ground electrode). The sparking occurs between the two electrodes.

b) **The insulator (6)** which is fitted to the body (7). In the center is encased a second electrode (10) which, through the terminal, is connected to a cable (1) that carries the current.

The copper gaskets (8) guarantee a perfect seal between body and insulator.

A faulty seal can cause trouble.

The efficiency of the insulator is of primary importance because the insulator has to bear high temperatures (up to  $2000^{\circ}\text{C}.$ ), high voltages (about 10,000 V.), and pressures (about 30 atmospheres).

Items (2), (3), (4) and (5) are part of the ignition cable and serve to insure a perfect contact between cable and spark plug. In addition, these parts guarantee proper insulation and protect both ends.

7) **Electrical sets for lighting and indicating purposes:**

- a) Headlamp light - 6V - 25/25W;
- b) rear parking light, number plate light, stop light 6V - 3/15W;
- c) front parking light 6V - 3W;
- d) Horn 6V in c.c.;
- e) charge red warning light 6V - 1.5W.

ELECTRICAL SCHEME (250 GT - MONZA - MACH 1 - 350 SEBRING)

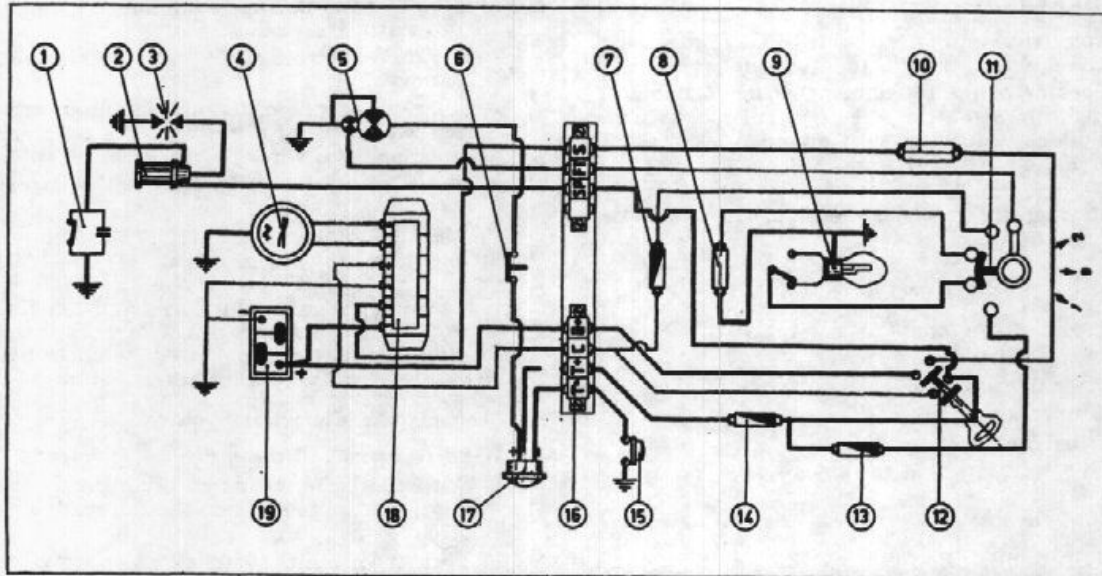


Fig. 30

KEY TO PARTS OF THE ELECTRICAL SCHEME

- 1 Contact breaker-condenser.
- 2 Ignition coil in c.c. 6 V.
- 3 Sparking plug.
- 4 Generator 6 V - 60 W.
- 5 Plate carrier and Stop Light 6 V - 3/15 W.
- 6 Stop light switch.
- 7 Fuse protecting the system of the front and the rear parking lights - 15 A.

- 8 Bulb for front parking light 6 V - 3 W - warning green light.
- 9 Bulb of the headlamp 6 V - 25/25 W.
- 10 Bulb for the charge warning red light 6 V - 1.5 W.
- 11 Three position commutator.
- 12 Extractable 4 contact-key.
- 13 Fuse protecting the projector light equipment (dazzling and anti-dazzling) - 15 A.

- 14 Fuse protecting the horn and the Stop indicator - 15 A.
- 15 The horn push button.
- 16 Terminal block for headlamp.
- 17 Horn 6 V c.c.
- 18 Static regulator of current and rectifier 6 V - 10 A.
- 19 Battery SAFA 3L3 - 13.5 Ah - 6 V.

## A FOREWORD

The electrical equipment with DUCATI regulator is an equipment with the following features:

- 1) Feeding of the instruments as the Traffic and Lighting Signals and the ignition sets by continuous (direct) current, supplied by an accumulator (battery).
- 2) Feeding the current to recharge the battery through the flywheel alternator and the static regulator-rectifier.

## UTILISED INSTRUMENTS

- 1) Lighting sets and Traffic signals.
- 2) Headlight 6 V - 25/25 W.
- 3) Rear light, plate light, Stop light 6 V - 3/15 W.
- 4) Front light 6 V - 3 W.
- 5) Horn 6 V c.c.
- 6) Red warning light for charge 6 V - 1,5 W.

## IGNITION SETS

- 1) H.T. Coil in c.c. 6 V.
- 2) Sparking plug.

## WORKING

The current produced by the flywheel alternator through the regulator static-rectifier, is properly rectified and made suitable to the charge of the battery and conveniently regulated. The regulator of DUCATI special static type which is constituted by a core of iron material in closed circuit on which are the inducted and inductive windings which act as equilibrators in force of special conditions of magnetic and electric in advance-regulated equilibrium, provides to the last features mentioned in the previous paragraph, in such a way that the charging current of the battery is variable, as the utilization load connected with the use of the various utilised instruments is also changeable.

## FEATURES REGARDING THE HEADLIGHT

In the cap of the headlight are seated the following devices:

- 1) Ignition and commutation of lights (main commutator).
- 2) Connection and disconnection of the H.T. (extractable lock switch).
- 3) Pilot lamps.
- 4) Fuses.
- 5) Parts for current connection and derivation.

## MAINTENANCE

### A) Regarding the battery:

- 1) Periodical overhaul of the effective condition of the components with addition of distilled water for the normal level of the electrolyte.
- 2) Periodical overhaul of the parts for current connection, especially those regarding the battery. Make sure of the good working of the terminal block B+.
- 3) If the battery should quickly be discharged

for a fault or an interruption in the recharging circuit, manage as follows:

Disjoin the wire from the + terminal block of the battery.

— Insert an amperemeter in continuous current with central 0 between the terminal block and the wire.

— Insert the ignition key and let the engine turn.

The headlamp warning red light should be cut out when the engine runs at 1,000 ÷ 1,500 r.p.m.

If the said light goes out only when the engine is running at a higher number of revs., or it does not go out at all, you must take corrective measures as mentioned in parag. c) at page 41.

## B) Checking the Electrical System:

Make sure that all the bulbs are efficient.

- 1) With the lights switched out (during the day), the amperemeter should read 0 at 1,200 r.p.m. approx.
- 2) With town lights switched on (during the night), the amperemeter should read 0 at 1,400 r.p.m. approx.
- 3) With the antidazzle lights switched on (during the night), the amperemeter should read 0 at 2,200 r.p.m. approx.

If such balances are attained at high number of revolutions or if they are not attained, operate in the following manner:

## 1) CHECK THE ALTERNATOR

### a) Stator:

disjoin the yellow cables of the alternator from the regulator and check with an Ohmmeter, or with a circuit tester (consisting of a 6V/2W lamp fed in series by a 6V battery) if between each cable and earth there is continuity (lamp lit with the circuit tester); in the contrary case disassemble the stator and check the connections and the inside weldings.

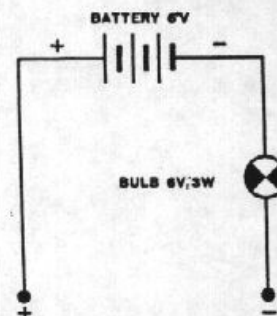


Fig. 31

### b) Rotor:

if the balance is attained at a number of revs. beyond the prescribed one, the rotor can be partially demagnetized; consequently replace it.



## 2) CHECK THE REGULATOR

### a) Fuse (15A)

Take out the cover and get sure that it is efficient.

### b) Diodes rectifying the power

Insert an Ohmmeter stylus terminals (or of a circuit tester), respectively between the red and yellow take-off n. 1: you should have continuity (lighted lamp) or insulation (lamp switched out). Inverting the stylus terminals you should obtain the opposite. If you have continuity in both the cases, the diode n. 1 is short-circuit; if you have insulation in both the cases, the diode is cut-out.

Repeat again the tests between the red and yellow take-off n. 2 for the diode n. 2.

### c) Diodes rectifying the warning light circuit

Insert an Ohmmeter stylus terminals (or of a circuit tester), respectively for the brown take-off and yellow n. 1, and the yellow n. 2: you should obtain continuity (lighted lamp) or insulation (lamp switched out). Inverting the stylus terminals you should obtain the opposite.

Inserting an ohmmeter between the brown and green take-off, you should read a resistance of  $\sim 28$  ohm.

### d) Ammeter check coil

Inserting an Ohmmeter stylus terminals (or of a circuit tester), between the red and grey take-off, you should read continuity (lighted lamp).

### e) Insulation towards earth

Inserting an Ohmmeter stylus terminals (or of a circuit tester) between the regulator support plate and the take-offs yellow 1, yellow 2, grey, green, brown and red: you should obtain insulation (lamp switched out).

N.B. If during this check you should find one or many differences with what explained at points b, c, d, e, replace the static regulator.

## C) Regarding the electrical equipment:

- 1) For overhauling or repair cases, it is extremely important to get a clear idea of how the electrical equipment operates and to follow the diagram. Never send opposite currents (continuous or alternating) to the generator in order to avoid it becomes demagnetized.
- 2) Every overhauling should be carried out with appropriate Ohmmeters and Voltmeters.
- 3) In order not to damage the good operation of the static regulator-rectifier current, you should not drive without a battery.

- 4) If the static regulator-rectifier will not work, never try to open it, for no reason, but send it back to DUCATI MECCANICA S.p.A. for its replacement.

## ADVANTAGES OF DUCATI STATIC REGULATOR

The electrical system with static regulator of current offers real advantages.

The advantages can be summarized as follows:

- 1) Regulation of the automatic charge.
- 2) There are no electrical contacts with the regulator and therefore there is a greater degree of efficiency.
- 3) Simplified electrical headlamp switch which is limited to the lights only.
- 4) Possibility of determining, by the red indicating light, whether the battery is charging or not.
- 5) There are three fuses to protect the wiring system; one fuse (7) is for the front and rear parking lights, the second fuse (13) protects the headlight (high and low beam), the third fuse (14) protects the horn and stoplight (see electric diagram at page 39).  
The advantage of the 3-fuse system guarantees the proper operation of some of the electrical system should one of the fuses blow out. This, in turn, helps to determine which portion of the electrical system is not functioning properly.

## OPERATION OF THE HEADLIGHT SWITCH

- 1) Insert key: the engine may be started. The red indicating light indicates that the battery is discharged and only when the engine runs at above idling speed will the light go out indicating that the battery is charging.  
Switch:  
Position 0 - lights are switched off.  
Position 1 - switch is on, the rear and the front parking lights and the green indicating light.  
Position 2 - Switch is on, the headlight, and allows operator the use of both the high and low beam.  
The electric horn is in operation.  
The rear stop light is in operation.
- 2) Key is not inserted: the engine will not start and the red indicating light does not function.  
Switch:  
Position 0 - lights switched off.  
Position 1 - switch is on, rear and front parking lights and green indicating light.  
Position 2 - headlight does not function.

The connection between the static regulator and the rectifier-battery is cut out.

The horn will not operate and the stoplight will not operate.

Important rules to be followed in order to have a regular operation.

- 1) Never add, modify or replace the electrical parts of this system with any other than original factory replacement parts.
- 2) Always replace the bulbs with others of the same type and power.
- 3) When the electrical equipment is checked or is to be replaced, disconnect the battery in order to avoid an accidental short-circuit which would demagnetize the flywheel magneto.
- 4) Under no circumstances use your motor cycle without a battery or with a discharged battery, as this would damage the regulator.
- 5) Never leave the ignition key switched on when the engine is not running. Otherwise, the current circulating in the H.T. coil would overheat the coil. It may even melt it, causing the molten wax to trickle on the engine head, and the battery would lose its charge rapidly.
- 6) Keep the battery in perfect condition by following the instructions given hereunder.

#### INSTRUCTIONS ON USE AND MAINTENANCE OF BATTERY

##### HOW TO CHARGE IT THE FIRST TIME

Type of battery: SAFA 3L3, free acid, dry charge.

- Voltage: 6.
- Capacity in 20 hours: 13.5 Ah.
- Capacity in 10 hours: 12 Ah.
- Normal charging current: 1.2 Amp.
- Maximum charging current: 2 Amp.
- Outside dimensions: 120×90×165 mm.

#### WARNING

Keep the battery, always in a cool, dry place. Check the electrolyte regularly, at least once every two weeks.

Never let the battery become completely discharged or allow the battery to remain discharged for any length of time.

Keep the vent plugs well screwed in. Clean the terminals and connections by removing oxide and protect them with a thin coating of pure vaseline. **DO NOT USE GREASE.**

Batteries should be kept clean and dry all over, but especially the upper part.

#### Electrolyte

It must be sulphuric acid having the degree of purity prescribed for accumulators, diluted with

distilled water so that the density at 15°C. (59°F.) is as follows:

AMBIENT CONDITIONS	ELECTROLYTE DENSITY when battery is:		Electrolyte max. temperature during charge
	dry	charged	
Temperate climate	1.28+1.29	1.27+1.28	122° C 50° C
Tropical climate	1.21+1.22	1.20+1.21	140° F 60° C

Level of electrolyte in the cells must be at the same level of the antislash gauze (0 mm.). After having filled all the cells with electrolyte, let the battery rest for about 2 hours so that the plates can cool down.

Part of the electrolyte is absorbed by the separators and plates. The right level will have to be restored by adding more sulphuric acid.

To measure the electrolyte level use only glass or ebonite sticks.

#### First charge

Remove the vent plugs and charge the batteries with direct current at an intensity equal to 1/10th, of the nominal capacity in 10 hours, for a maximum period of ten consecutive hours.

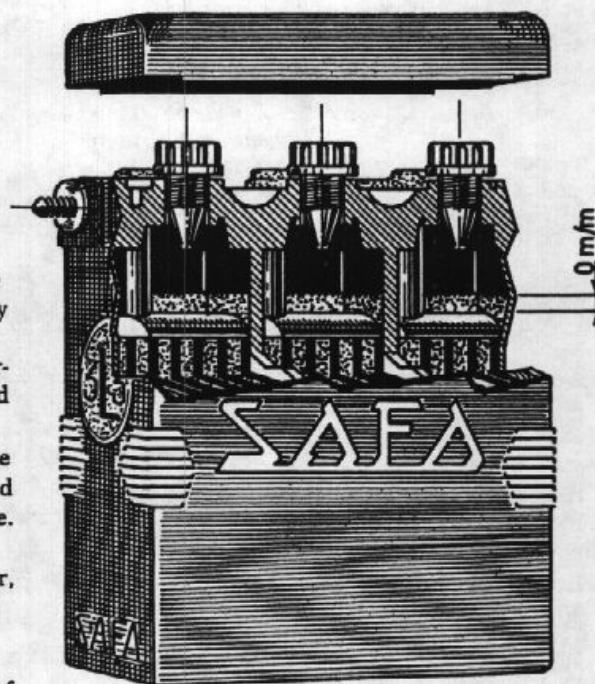


Fig. 32

While charging be careful the electrolyte temperature does not exceed 50°C. (122°F.).

Charging must stop when:

- a) the above mentioned charging time is up. (Time lost due to interruptions that may occur, must be taken into account);
- b) there is intense ebullition in all the cells;
- c) the density of the electrolyte and the reading of each battery cell remain unchanged for at least three consecutive readings made at one-hour intervals.

When charging is over, the electrolyte density should have recovered its initial value and the reading of each cell should have reached a minimum of 2.7 Volts under charge; in other words, 8.1 Volts for a 3-cell battery and 16.2 Volts for a 6-cell battery.

The batteries are now ready to be used.

#### Recharging

It is preferable to charge at an intensity in Amperes equal to and not exceeding 1/10th of the nominal capacity in 10 hours. If, while charging, the temperature (measured with a suitable thermometer dipped in the electrolyte) reaches 50°C. (122°F.), the charge must be either reduced or interrupted until the temperature has gone down to at least under 40°C. (104°F.). Charging must continue until the electrolyte density is constant for 3 consecutive readings made at one-hour intervals, or until tension has reached the value of 2.7 Volts per cell.

**NEVER** - no matter for what reason - use any density sulphuric acid to restore the right level.

Use chemically pure distilled water **ONLY**. - Make sure the vessel used is always scrupulously clean; foreign substances would spoil the liquid and definitely compromise the efficiency of the battery. If the accumulators are to remain temporarily inactive they must be given a short charge at least once a month or every time they are to be used.

#### IN CASE THE ELECTRICAL EQUIPMENT DOES NOT WORK, CHECK THE FOLLOWING PARTS:

The efficiency of the charge circuit, constituted by the alternator and the regulator, is checked in the manner described in the parag. MAINTENANCE at pages 40 and 41. Checking the electric balances, make sure that all the bulbs and the fuses are of the correct type and in working condition.

In the following schedule, are mentioned the recharging values in Amperes, in the working conditions.

Three position commutator	40 Watt		60 Watt	
	3000 RPM	4000 RPM	3000 RPM	4000 RPM
1. Daylight Run	+ 1.25	+ 2.0	+ 1.2	+ 1.4
2. Town Run	+ 1.40	+ 1.7	+ 1.7	+ 1.75
3. Country Run	- 0.2	+ 0.8	+ 0.9	+ 1.5
	250 c.c. 4-Speed		250 c.c. 5-Speed	

**NOTE!** - For checking the rotor, — see parag. b) at page 40 — follow this manner:

Connect the two alternator yellow cables to an anti-inductive pattern resistance for a value of 2.35 Ohms 100 Watts. The voltage measured at the ends of the said resistance with a H.F. thermocouple voltmeter should be  $\geq$  for 15 V. at 3,000 revs. If the voltage is less, re-magnetize the rotor.

**ABSOLUTELY AVOID TO CARRY OUT TESTS PUTTING CONTINUOUS OR ALTERNATE CURRENT ON THE GENERATOR TO AVOID THE FLYWHEEL BEING DEMAGNETIZED.**

#### The headlamp and cables

If no faults are found, attach the cables again in their correct positions and check the inner and outer cables of the headlight. The cables should be securely in position in their sockets without any looseness, breakage or possibility of vibration. Check the 4-way Key Switch which should not be grounded within the headlamp. (Make sure switch is insulated against headlamp shell).

Note that an **insulating diaphragm** should be found in dismantling the 4 way switch, between the inner plate supporting the key and the mobile part of the switch.

#### The H. T. coil for continuous current

When there are signs of molten wax or excessive overheating of the coil, this can be due to faulty insulation or a short-circuit. In either case, the coil should be replaced.

High-tension coils having metal casing should be examined for faulty insulation between the main and secondary cables as well as the ground: it is sufficient to connect a test lamp fed by a battery with one end of the cable and try to close the circuit on the high-tension cable or on the metal casing of the coil. If the lamp lights up, the coil is defective and must be replaced.



#### The condenser insulation

Connect a lamp fed by a battery with the condenser casing and try to close the circuit on the condenser headwire. If the lamp lights, replace the condenser.

#### ELECTRICAL SYSTEM OF DUCATI SINGLE-CYLINDER O.H.C. 250 MARK 3 AND 250 MOTOCROSS (SCRAMBLER) TILL ENGINE NUMBER 92171.

As it has been explained on Page 35, the electrical system of the Ducati models is a type of magneto incorporating the use of alternate currents of an alternator flywheel, the magneto portion of which feeds the high-tension coil and supplies the current for the headlight and tail-light bulbs. This is a more simple system than that which involves the use of a battery. If it does not function properly, check in the following manner:

#### Supply of current and ignition

First of all, make sure that the stop-light bulb and the stop-light switch are functioning properly. The stop-light bulb is fed through the ground of the high-tension feeding coil: when the bulb of the stop-light blows out, due to a malfunction of the stop-light switch, the engine will not start because of a deficiency in the ignition system.

Make certain that the rotor marks correspond to those recommended in the Ducati ignition and Flywheel Specifications booklet (see table at page 45).

#### LOCATION OF MAGNETO FLYWHEEL POSITION OF ALL MODELS

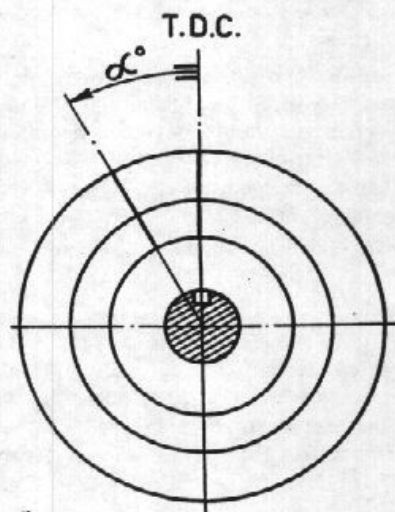


Fig. 33

# INSTRUCTIONS FOR CHECKING THE ADVANCE ON THE DUCATI MOTORCYCLES WITH D. C. IGNITION.

On the Ducati motorcycle the ignition advance is partially automatic and its angularities correspond to the following table.

Models	Strokes	from engine number	till engine number	Advance with engine still	extent of autom. advance	Total advance with engine running at 3,000 r.p.m.	Flywheel position $\alpha^\circ$
160 Monza Jr.	4	—	—	$21^\circ \div 23^\circ$	$18^\circ$	$39^\circ \div 41^\circ$	$32^\circ \div 36^\circ$
250 GT	4	—	—	$5^\circ \div 8^\circ$	$28^\circ$	$33^\circ \div 36^\circ$	$0^\circ$
250 Monza	4	—	85.486	$5^\circ \div 8^\circ$	$28^\circ$	$33^\circ \div 36^\circ$	$6^\circ \div 8^\circ$
	4	85.487	—	$5^\circ \div 8^\circ$	$28^\circ$	$33^\circ \div 36^\circ$	$0^\circ$
250 Mach 1	4	—	—	$5^\circ \div 8^\circ$	$28^\circ$	$33^\circ \div 36^\circ$	$0^\circ$
250 Mark 3 1963-64	4	—	87.921	$38^\circ \div 41^\circ$	—	$38^\circ \div 41^\circ$	$0^\circ$
	4	87.922	88.295	$38^\circ \div 41^\circ$	—	$38^\circ \div 41^\circ$	$19^\circ \div 21^\circ$
250 Mark 3 1965-66	4	88.296	—	$38^\circ \div 41^\circ$	—	$38^\circ \div 41^\circ$	$32^\circ \div 36^\circ$
	4	—	—	$21^\circ \div 23^\circ$	$18^\circ$	$39^\circ \div 41^\circ$	$32^\circ \div 36^\circ$
250 Motocross	4	—	87.421	$38^\circ \div 41^\circ$	—	$38^\circ \div 41^\circ$	$0^\circ$
	4	87.422	87.902	$38^\circ \div 41^\circ$	—	$38^\circ \div 41^\circ$	$19^\circ \div 21^\circ$
350 Sebring	4	87.903	—	$21^\circ \div 23^\circ$	$18^\circ$	$39^\circ \div 41^\circ$	$32^\circ \div 36^\circ$
	4	—	—	$5^\circ \div 8^\circ$	$28^\circ$	$33^\circ \div 36^\circ$	$0^\circ$

The figures in the table are taken with an opening between the contact-breaker contacts of  $0,3 \div 0,4$  mm. ( $.012 \div .015$  inch).

Before periodically checking the advance (after the first 1000 km and subsequently every 2000 km) it is necessary to make sure that the automatic device is in perfect order, that it is well lubricated and that the springs are not TWISTED or SHIFTED from their proper seating.

The amount of advance will be  $14^\circ$ , equal to  $28^\circ$  on the engine shaft in the models GT, Monza 250, Mach 1 and Sebring or  $9^\circ$  equal to  $18^\circ$  in the mo-

dels 160 Monza Jr., 250 Mark 3 edit. 1965 and 250 Motocross from e.n. 87903. If there is any doubt about this, have the angularity checked by special Works and for your ordinary checking please proceed as follows:

- 1) Remove the threaded plug opposite the engine shaft and mount the special protractor (fig. 34).

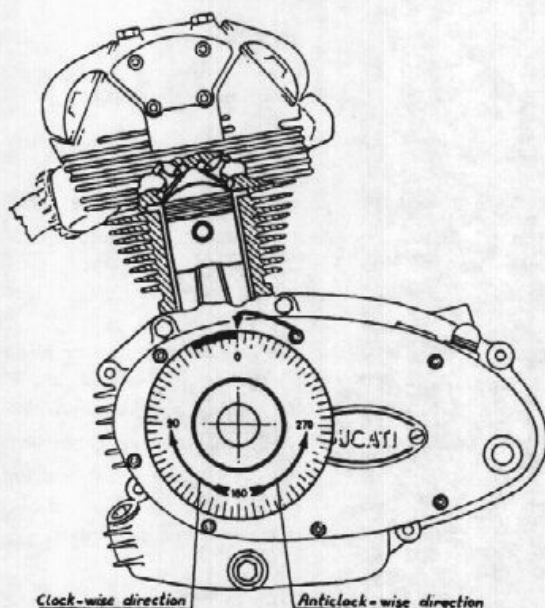


Fig. 34

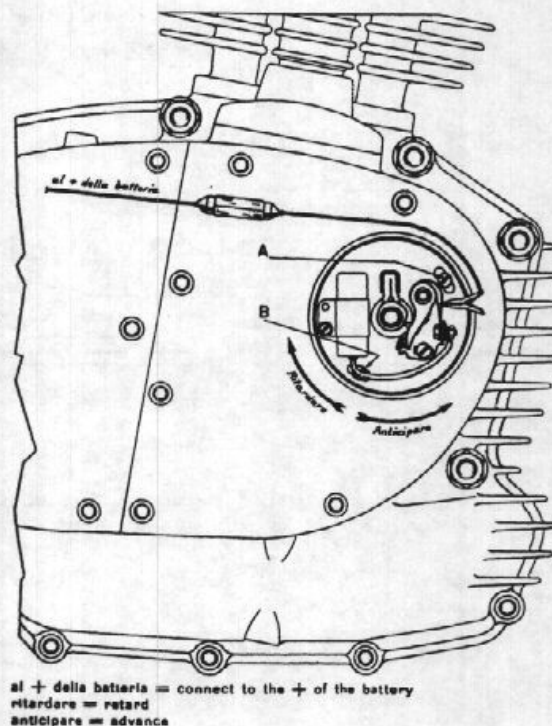


Fig. 35

- 2) Fix an indicator on a cover tightening screw (fig. 34).
- 3) Place the engine at top dead centre (TDC) in the compression phase and make the protractor coincide with the indicator at the zero (fig. 34).
- 4) Turn the engine shaft clockwise by about one quarter of a turn.
- 5) Adjust the contact-breaker opening to  $0,3 \pm 0,4$  mm ( $.012 \div .015$  in.) and then connect up the spring of the moving part of the contact-breaker to a 6 V - 3 W lamp in series with the positive terminal of the battery (fig. 35). This lamp should light up.
- 6) Turn the engine shaft slowly in the anti-clockwise direction until the lamp goes out. At that moment the indicator should show on the protractor the degrees of advance contained in the corresponding table of page 45.
- 7) This test should be repeated for confirmation.
- 8) If the results do not correspond to the data in the table, loosen the two screws A and B holding the contactbreaker plate and turn this plate to advance or retard the ignition until the figures shown in the table are obtained.
- 9) It should be remembered that if the felt lubricating the cam becomes dry, the fibre block actuating the opening of the movable contact will become worn and thus reduce the amount of the opening between the contacts.

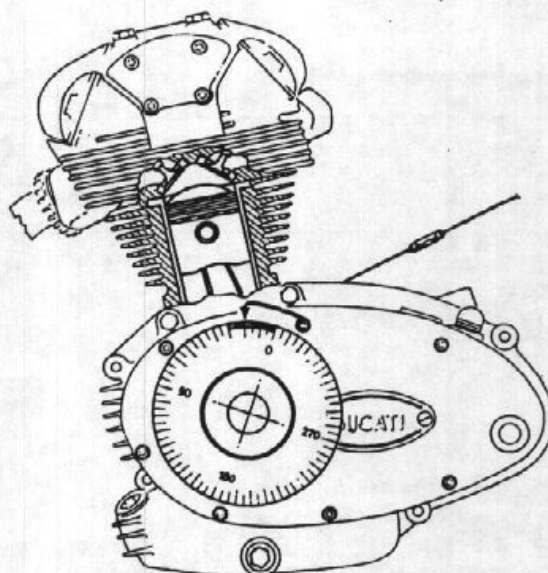


Fig. 36

#### ELECTRICAL SYSTEM (250 Scrambler & Mark 3)

The engine of the Mark 3 & Scrambler is provided with an alternator-flywheel magnet of the outer H.T. coil type.

The coil supplies the lighting plant with 40 W.

#### ELECTRICAL SCHEME (250 Scrambler till e.n. 92171 & Mark 3)

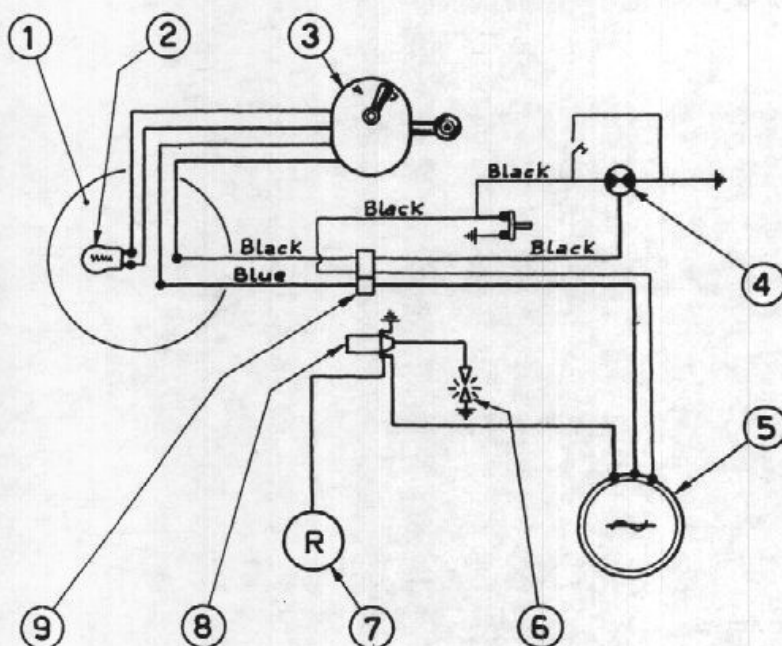


Fig. 37

#### KEY TO PARTS OF THE ELECTRICAL SCHEME

1. Headlamp Aprilia mod. 130 ASN.
2. Filament bulb 6 V-25/25W.
3. Switch and deviator Aprilia 59/N.
4. Tail light mod. Aprilia 4521 - 6V - 5/20W.
5. Flywheel alternator 6V-40 W.
6. Ignition sparking plug.
7. Contact breaker-condenser.
8. Alternated current ignition coil 6V.
9. 3-way terminal block.



The components of this generator are:

- 1) the rotating flywheel, comprising the magnets with their polar expansion, the drum sustaining the magnets and the hub.
- 2) the stator plate comprising the 3 inductors with their corresponding magnet cores.

#### NOTE!

When the flywheel is to be fitted on the driving shaft, in these models and the previous ones, be careful it is in perfect phase. To carry it out, proceed as follows:

Having the piston at the Top Dead Center (T.D.C.) and the driving shaft key and flywheel mark (dashed) in the position shown in the figure, let the flywheel rotate anticlockwise, for the angle  $\alpha'$  till it attains the new position (see fig. 33 at page 44).

The headlamp carries 2 lights: the high beam (6 V. - 25 W.) and the low beam (6 V. - 25 W.).

On the handlebar, near the left handgrip, is fitted the 2-way light switch (in-out) with the deviator for the high and low lights.

On the rear mudguard, the tail light and stop light is fitted with a 6 V. 5/20 W bulb also an emergency toggle switch.

Therefore, when a stop light burns out, you change the position of this switch and in turn, you ground the ignition until you can repair or replace the bulb.

#### CHECK THE 40 WATT ALTERNATOR

##### Stator

Disconnect the 3 cables of the alternator from the terminal block and check:

- 1) the red cable (headlight lamp) and ground are in circuit.
- 2) the white cable (stop-light) and yellow cable feeding the high-tension coil are in circuit.

If the circuit in one or both of the above cases is not complete, remove the alternator, check the

connections and inner solderings of the stator. An Ohm-meter (scale, 1,000 ohms) should be employed to check the circuit.

##### Rotor

To check the rotor magnet efficiency, carry out the following operations:

- 1) Between the cable supplying current to the bulb (with the bulb burning) and the ground, insert a high-frequency thermocouple voltmeter with the engine running at 3,000 r.p.m. You should obtain a reading of  $\approx 5.5$  Volts.
- 2) Repeat the same operation between the stop-light bulb (with the bulb burning) and ground. You should have the same reading of 5.5 Volts at 3,000 r.p.m.

If the results you obtain do not conform to those given, the rotor must be re-magnetized.

##### Check of the cables and the headlamp

Arrange as for the electrical system having a regulator (see page 44) except for the 4-way switch that is not included in this system.

##### Check the insulation of the alternate current H.T. coil

Arrange as for the H.T. coil in continuous current (see page 44).

#### ELECTRICAL SYSTEM

(250 Scrambler from e.n. 92172 & 160 Monza Jr.)

This electrical system differs from the 2 previous ones for:

- 1) the rotating flywheel which feeds the headlight lamp (high and low beams), the tail light and the ignition;
- 2) the battery which feeds the horn (only in the 160 Monza Jr. model), the stop light and the parking lights.

**ELECTRICAL SCHEME**  
(250 Scrambler from e.n. 92172)

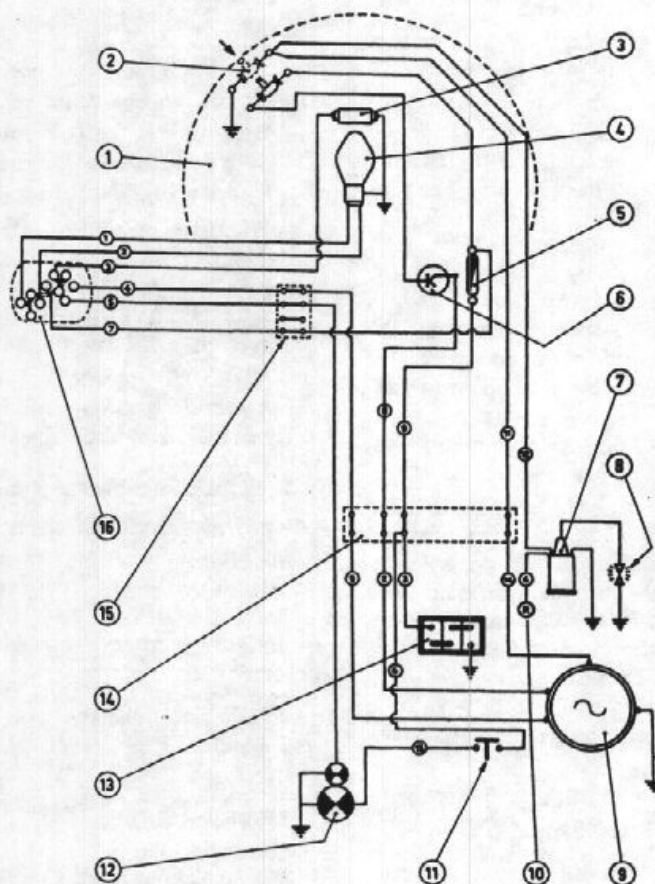


Fig. 38

**KEY TO PARTS OF THE ELECTRICAL SCHEME**

- 1 Headlamp APRILIA 130
- 2 4-contact key
- 3 Parking light 6V-3W
- 4 Headlamp bulb 6V-25/25W
- 5 Fuse 15A
- 6 Diode
- 7 H.T. coil in a.c. 6V
- 8 Ignition spark plug
- 9 Generator 6V - 28W
- 10 Contact breaker - Condenser
- 11 Stop switch
- 12 Number plate bulb and stop light 6V-3/15W
- 13 Battery 7Ah - 6V - SAFA 3 IL 3
- 14 Frame terminal block
- 15 Derivation terminal block
- 16 Lights control device

**COLOUR OF THE CABLES**

- 1-2 White
- 3-8 Blue
- 4 Brown
- 5 Black with yellow collar
- 6-13 Black
- 7-11-12 Green
- 9 Red
- 10 Black with blue collar
- 14 Yellow

# **ELECTRICAL SCHEME** (160 Monza Jr.)

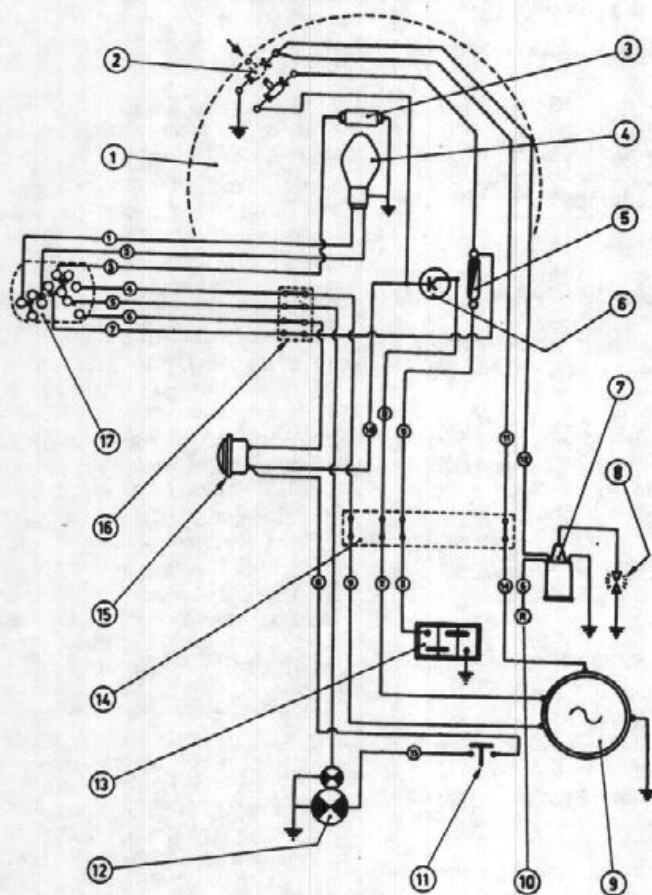


Fig. 39

## **KEY TO PARTS OF THE ELECTRICAL SCHEME**

- 1 Headlamp APRILIA 130 RCGN/t (App. I.G.M. 1408 PMx)
- 2 4-contact key
- 3 Parking light 6V.3W
- 4 Headlamp bulb 6V-25/25W
- 5 Fuse 15A
- 6 Diode
- 7 H.T. coll in a.c. 6V
- 8 Ignition spark plug
- 9 Generator 6V - 28W
- 10 Contact breaker - Condenser
- 11 Stop switch
- 12 Number plate bulb and stop light 6V-3/15W
- 13 Battery 7Ah - 6V - SAFA 3 IL 3
- 14 Frame terminal block
- 15 Horn 6V
- 16 Derivation terminal block
- 17 Lights control device LD 57/8SM.

## **COLOUR OF THE CABLES**

- 1-2 White
- 3-8 Blue
- 4 Brown
- 5 Black with yellow collar
- 6-13 Black
- 7-11-12 Green
- 9 Red
- 10 Black with blue collar
- 14 Yellow



## INSTRUCTIONS ON USE AND MAINTENANCE OF BATTERY HOW TO CHARGE IT THE FIRST TIME

Battery Type 3IL3 - Capacity: 7 Ah in 20 hrs.

- 1) Fill each cell with sulphuric acid (specific weight 1280) till level is 1 cm. (0.3937 in.) above top edge of the plates.
- 2) Let battery rest for about 6 hours, to allow plates to soak and cool down; then re-establish the right level by adding more sulphuric acid.
- 3) Charge battery for at least 48 hours running, at an intensity equal to 1/10th its capacity, until electrolyte thickness has recovered its initial value.

(While charging the battery be careful electrolyte temperature does not exceed 50°C. (122°F.).)

At this stage there will be an intense ebullition in all the cells. Voltage of each cell must reach at least 2.7 volts while charge is being made; that is, 8.1 volts for a 3-cell battery, and 16.2 volts for a 6-cell battery.

If necessary, restore right level by adding distilled water. The battery is now ready for use.

## INSTRUCTIONS ON MAINTENANCE OF BATTERY.

During idle periods, and before using battery, make sure electrolyte level is at least 6 mm. above top edge of plates if battery is for a car, and 2 mm. if battery is for a motor cycle.

See that the above mentioned level is always maintained. Add distilled water only; NEVER sulphuric acid.

If the battery is not used at once, it must be charged for a short time at least once a month, or every time it has to be used. Take great care that especially the upper part of the battery is kept clean and dry. Make sure the vent plugs are well screwed down; if they are damaged, change them. Protect terminals and connections from possible oxidation by coating with pure vaseline.

The characteristics of the battery should correspond perfectly to those of the electric equipment assembled on the motor cycle.

## RECHARGING

Before recharging the battery, which has been removed from the machine, make sure it is quite clean.

Put into circuit and recharge preferably at a normal intensity in amperes equal to and not exceeding 1/10th of the battery capacity rating in 10 hours (see tables and other data in SAFA Catalogue).

If, while recharging, the temperature (measured by means of an appropriate thermometer dipped in the electrolyte) reaches 50°C. (122°F.) reduce or stop the charge till the temperature has gone down to at least less than 40°C. (104°F.). Charging must continue until reading of the electrolyte density is the same 3 times running and is equal to 31° Bè (specific weight 1275) or until voltage

has reached the value of 2.7V. per cell.

NEVER add sulphuric acid. Maintain level by adding chemically pure distilled water ONLY.

## MAINTENANCE

If the battery should quickly be discharged for a fault or an interruption in the recharging circuit, manage as follows:

Disjoin the wire from the + terminal post of the battery and insert the ammeter in continuous current between the terminal post and the wire. Insert the ignition key and let the engine turn.

### Checking the electrical balance

Make sure that all the bulbs and fuses are efficient.

- 1) With the lights switched out (during the day) the ammeter should mark the flowing of the current at about 1,500 revs. per minute.
- 2) With town lights switched on (during the night) the ammeter should read 0 at about 3,800 revs. per minute.
- 3) The country lights are fed in a.c. directly by the flywheel so they do not interest the circuit Diode-rectifier-battery.

If these balances are reached with a superior number of revs. or if they are not reached, and if the country light does not light up, operate in the following manner:

### Checking the alternator

- a) **Stator:** Disjoin the wires from the terminal post of the frame and check by the ohmmeter or by the circuit tester (composed of a bulb of 6 V/3 W fed in series by a battery of 6 V) so that between each cable and earth there is continuity (for a lighted lamp), in the opposite case remove the stator and check the connection and the weldings (see fig. 31).
- b) **Rotor:** If the balance reaches a higher number of revs. the rotor may be partially demagnetized; replace it.

### Checking the diode-rectifier

Having the ignition key inserted, connect the stylus terminals of the ohmmeter (or of a circuit tester) with the blue and red cables which arrive at the terminal post of the frame as follows:

The + of the ohmmeter (or of the circuit tester) with the red and the — with the blue. Continuity (bulb switched on) should be read, inverting the stylus terminals there should be no continuity (bulb switched out).

If this occurs, replace the Diode-rectifier.

### Horn at earth (only for 160 Monza Jr.)

If the horn is not working and is earthed, the battery is automatically in short circuit. Arrange for the replacement.

### Check of the cables and the headlamp.

Check the insulation of the H.T. alternate current coil.

Check the insulation of the condenser.

Manage as for the described previous electrical systems.

# MOTORCYCLE DISMANTLING

## REMOVING ENGINE FROM FRAME

We shall describe the method of removing the 250 cc O.H.C. Ducati engine with battery and current static regulator from the frame. For other models, a similar procedure can be followed.

Before starting to remove the engine from the frame, the mechanic should make certain that the necessary malfunction exists. This can be done by running the engine. The engine should be carefully washed and cleaned with Gunk or Kerosene, being careful not to use a too concentrated solution on painted surfaces. Wipe dry and use compressed air if available. By following these instructions, the work is made easier.

Place a container or basin under the engine from the left side. Drain the oil from the crankcase by removing the drain plug and filter. Turn off the gas tank petcocks. Remove the plastic fuel line and then remove the saddle. Now remove gas tank. It is advisable to place a piece of rubber between the tank and the upper part of the fork to avoid damaging the finish of the tank. Next, disconnect the two yellow wires (leading to the flywheel magneto) from the static regulator. Take them off the frame, roll up the ends and lay them on the engine.

## REMOVAL OF MUFFLER AND EXHAUST PIPE

With a hexagonal wrench, loosen the screw which attaches the muffler to the frame. Using the left hand, swing the muffler and with the right hand, using Wrench # 23, unscrew the clamping ring at the exhaust opening at the cylinder head. You can now remove the muffler and exhaust pipe. Lay it down carefully in order to protect the chrome finish. With a pair of pliers, remove the clamping ring and take off the plastic breather tube from the engine.

### Footrest

With a T-Box wrench, loosen the footrest clamping bolt and rotate the right footrest until it is in a downward position.

### Chain guard

With a 10 mm box wrench, remove the chain guard.

### Chain

Turn the rear wheel until the chain connecting link is visible. Remove connecting link and remove chain. Replace connecting link so it will not be lost and set chain aside.

### Carburetor

Remove the flexible rubber hose connecting the carburetor with the intake silencer. Remove the carburetor by loosening the ring clamp screw

and lay it on the central bar of the frame. Do not disconnect the control cables.

## Shifting mechanism assembly

Using a T-Wrench, unscrew the 6 screws of the Shifting Mechanism Assembly and remove it completely. Next disconnect the clutch control cable and with the outer cable, place it across the frame. Next disconnect the distributor cable from the high-tension coil. Using a T-Wrench, unscrew the 6 nuts that secure the engine to the frame, starting with the top screws on the rear. Remove this bolt and replace it with a supporting pin. Now remove the remaining bolts which will permit the front plates to drop and partially free the engine.

## Engine removal from the frame

Using your right hand, lift the engine at the front and with the left hand, remove the pin (27). Then holding the engine from underneath at the rear, swing the engine slightly towards the right and remove it. Extreme care should be taken not to damage the ignition coil which is fitted to the frame member, especially the Bakelite connecting nut. Carry the engine to the bench and place it on the proper aluminium base (42).

## DISMANTLING THE FRAME

In dismantling the frame parts avoid the use of adjustable wrenches, which often spoil the edges of nuts and hexagonal screws.

Avoid the use of iron hammers, use only leather, wooden or plastic mallets, otherwise insert a lead packing between the part and the tool.

In the process of dismantling the frame, make sure that the individual pieces are marked so that each piece will be in the original position when reassembled. The disassembly operation of the frame can be followed by reversing the procedure shown on pages in this manual which indicate the method of assembling the frame.

A good rule is to use a number of small boxes, in which screws, and small parts may be placed, while the larger parts can be kept in a proper order to avoid mixing them with parts belonging to other motor cycles.

The small boxes may be of the same number as the groups of the spare parts catalogue, and bear the same initials:

Boxes for	Initials
— Accessories - Chain - Chain Cover	AC-CC
— Central stand-Rear brake-Foot rests	CS-RB-FR
— Front fork	FF
— Lamp and Horn	LH
— Rear suspension	RS
— Handlebars and Controls	HC

- Mudguard
- Number Plate carrier
- Front Wheel
- Rear wheel
- Frame - Tank - Saddle

MG  
NPC  
FW  
RW  
FR-TA-SA

After this premise, in our particular case, the frame dismantling does not require special equipment, but we can follow the usual practice of a repair shop.

#### Removal of Outer Race from Frame

Although the removal of these parts does not require special tools, as does their refitting, certain precautions should however be taken.

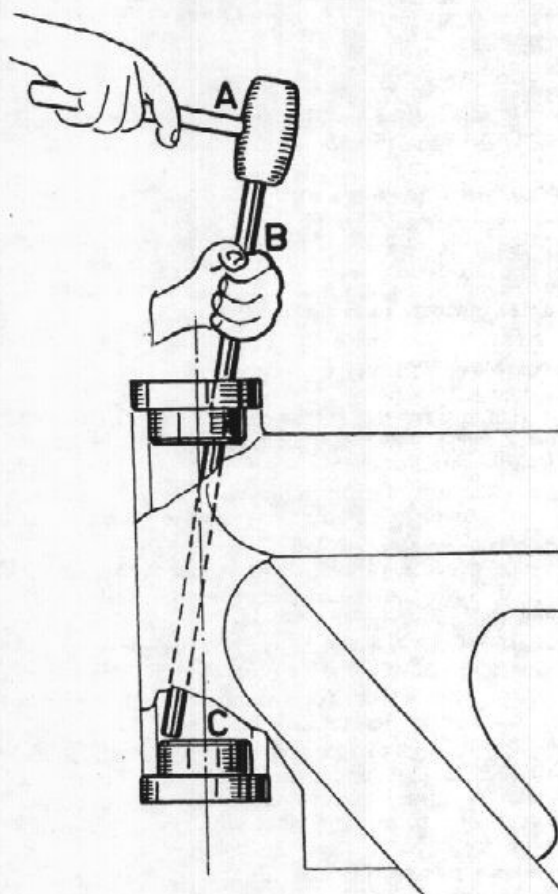


Fig. 40

These consist in giving light blows with hammer A on a steel bar B of about 10 mm. diameter around the lower cage C, in order not to distort the frame housing, and to ensure a free assembly of new outer race.

The upper cage may be dismantled in the same manner.

This operation is to be carried out only if races are worn.

#### Rear suspension dismantling

The rear suspension should not be tampered with by dismantling.

In case the rear springs or dampers of the shock absorbers collapse or become ineffective, the complete shock absorber should be replaced.

For information purposes, the detail of a shock-absorber, type Marzocchi, is shown with its related key to the parts (fig. 41).



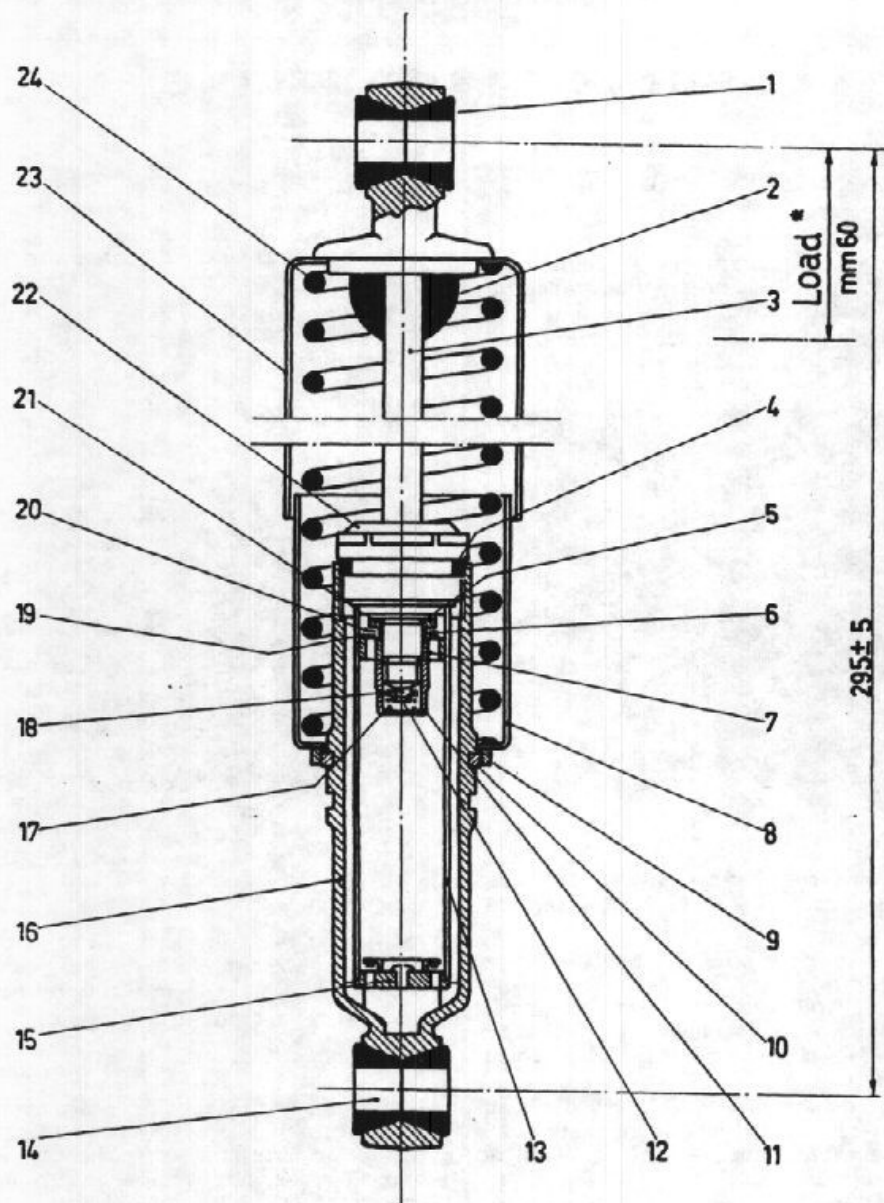


Fig. 41

#### KEY TO DIAGRAM

- |                                |                                 |                              |
|--------------------------------|---------------------------------|------------------------------|
| 1 Conical silentblock rubbers. | 8 Chrome plated sleeve.         | 16 Main body.                |
| 2 Bump stop rubber.            | 9 Collar for half rings.        | 17 Hydraulic shock spring.   |
| 3 Piston rod.                  | 10 Half rings.                  | 18 Ball.                     |
| 4 External oil ring.           | 11 Piston retaining cap nut.    | 19 Disk valve.               |
| 5 Spring ring for piston rod.  | 12 Ball cup.                    | 20 Disked washer.            |
| 6 Piston spacer.               | 13 Pressure tube.               | 21 Shroud for spring ring 5. |
| 7 Piston.                      | 14 Conical silentblock rubbers. | 22 Bush with oil seal.       |
|                                | 15 Complete bottom valve.       | 23 Painted sleeve.           |
|                                |                                 | 24 Suspension.               |

Load	Kg.
Max.	170 ÷ 173
Medium	155 ÷ 157
Min.	140 ÷ 145

#### DISMANTLING THE FRONT FORK

Particular attention is required to dismantle the front fork and it is advised to carefully follow

the assembly operations on Page 94, noting that the dismantling is done in reverse order of that indicated on Page 94.

## ENGINE DISMANTLING

### DISMANTLING CYLINDER HEAD AND CYLINDER

With the piston at top dead center, remove the plug 22 MB and fit the piston position indicator (10), see fig. 10 and « TOOLS », Page 115. Simultaneously, unscrew the four cylinder head bolts using box wrench ch. 17.

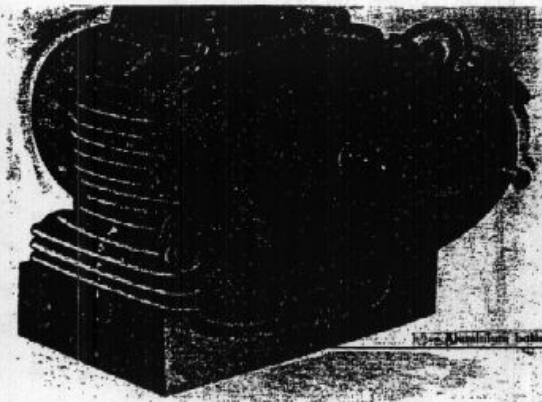


Fig. 42

With a socket screw spanner, loosen the two screws securing the timing drive cover flange to the crankcase.

Free the cylinder head by twisting slightly and lift off.

If difficulty is encountered in freeing the head, tap lightly with a mallet under the inlet or exhaust pipe flanges - never on the fins which are easily broken.

After removing the cylinder head, check the head gasket No. 0400.17.030, to make sure that it can be used again as an effective seal. If doubtful of condition, replace.

Remove the cylinder, rocking it slightly and lifting it from its seat.

With an appropriate set of needle-nose pliers, remove the circlips which hold the gudgeon pin

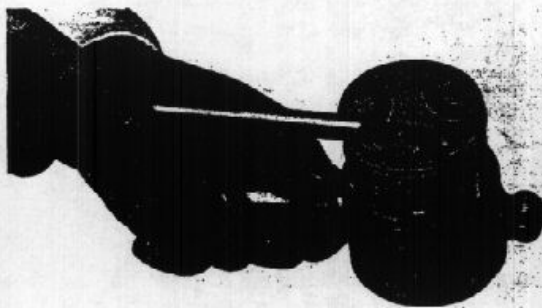


Fig. 43

in place. Use a drift or pin and drive out the gudgeon pin making sure that you support the piston in your hand so as to avoid damaging the connecting rod. Clean the piston in the normal manner with tool no. 2 and scrape off carbon deposits.

Remove the right-side crankcase cover, (camshaft drive side-timing side). Insert tool 18-a to lock the main shaft gear. Straighten out the locking tab washer and loosen the nut that secures the timing gear.

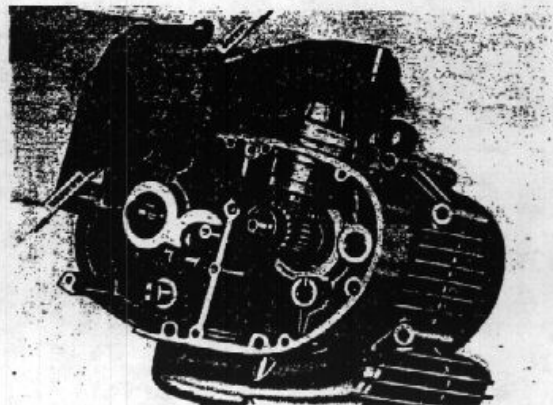


Fig. 44

(Note that this nut has a left-hand thread). Tie the thrust washers with the gear that has been removed and place them in the proper box. Remove the oil pump drive gear.

### Removal of the counter shaft sprocket

Now remove the counter shaft sprocket using Wrench # 6, hold the sprocket and lift the tab of the lock washer. Unscrew the nut with a T-24 mm. Wrench and remove the counter shaft sprocket.

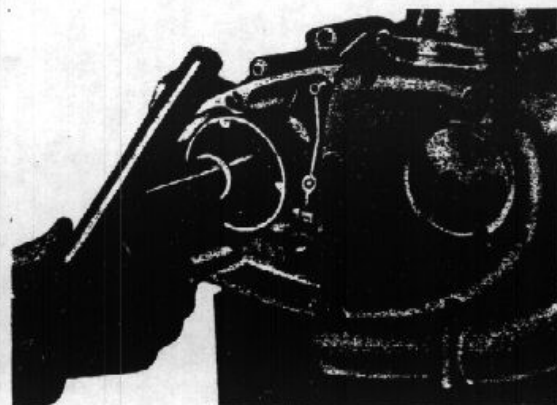


Fig. 45

Remove the kick-starter lever.

Next remove left-side crankcase cover with an Allenhead Wrench # 88713.0256 (7), taking out the 8 screws holding the cover. Five of these screws are short, three are long - **make note of their location.** In removing the cover, use puller tool # 88713.0258 (9).

To amplify further on the above: With the puller screwed on the cover, apply several light blows with a plastic mallet or piece of wood, directing the force to the starter spindle. Keep turning the puller and hitting the spindle. This will release the cover. **Never use a screw driver or similar sharp instrument to pry the cover from the case.** The use of the extractor will eliminate possible damage, to the matching surfaces.

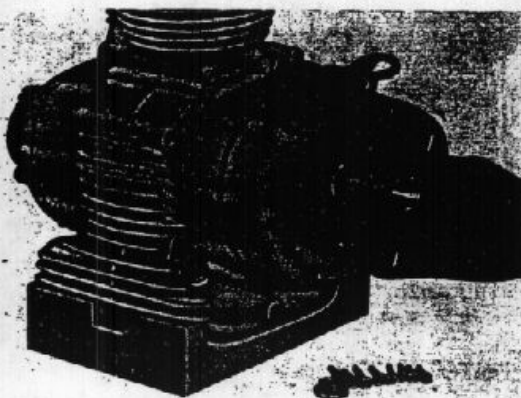


Fig. 46

Remove the shim washer of the starter spindle which many times sticks to the cover. Using a screw driver, remove the clutch screws and the springs. Place all the clutch parts which are removed in one box.

Using a screw driver, remove the clutch spring cups.

Next remove the pressure plate and clutch disks. Open the tab washer under the securing nut on the crankshaft gear. With clutch tool # 4, hold the clutch housing, and with a 30 mm. wrench, unscrew the nut and take off the washer (Figure 47).

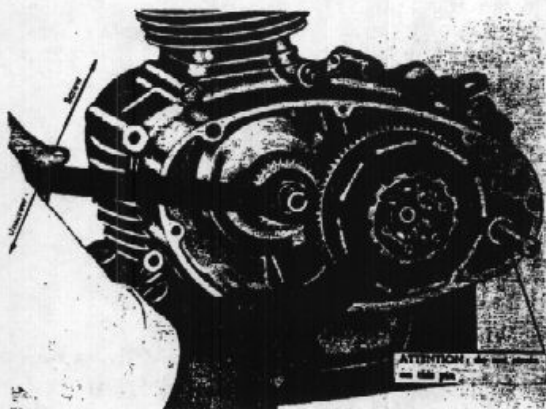


Fig. 47

To remove the crankshaft gear, tap the end of the crankshaft lightly with a plastic mallet. Extract the gear by hand and remove the key.

#### Method of Removing the Clutch Housing

Insert Tool No. 5 into the clutch hub. Hold steady by hand or place it on the bench. **Never allow the tool to touch or come in contact with the starter spindle in this operation, as well as in the operations that call for tool no. 4.**

Open the tab washer and remove hub nut with a 24 mm. T-Wrench.

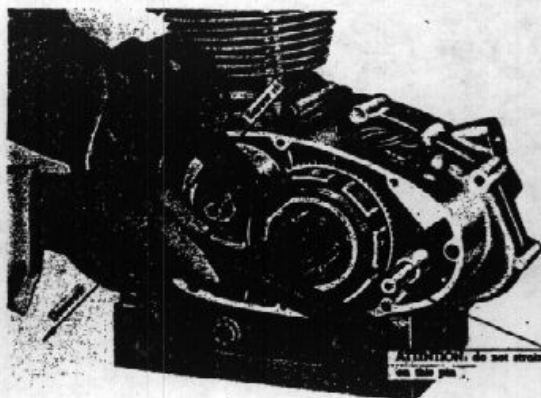


Fig. 48

Remove the clutch hub with tool # 49, and by hand the housing.

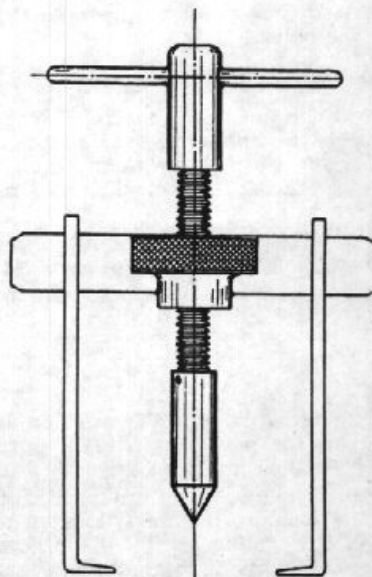


Fig. 49

**Remove the complete starter spindle assembly.** Push back the tab on the locking washer. Use a 10 mm. wrench to remove the screw that holds two (2) leaf springs to the crank-case. Now remove the starter gear.



### Method of pulling flywheel

Use Ducati extractor tool. No. 1 to remove the flywheel.

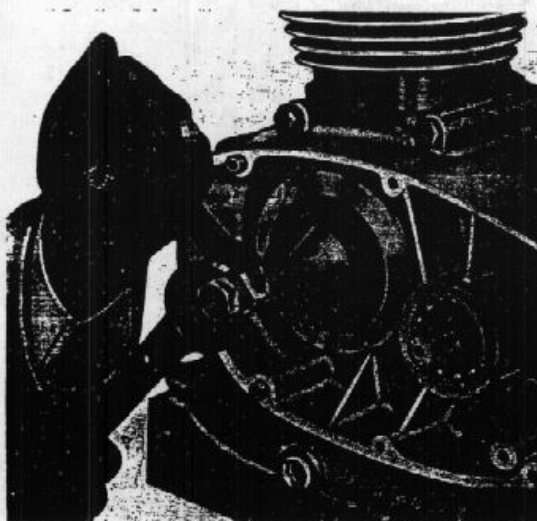


Fig. 50

### Removing stator

Remove the bakelite cable plug. Using a C-wrench, remove the cable gland nut. Now loosen the screws that secure the stator.

When both stator and flywheel are stored, place the rotor on the stator to protect the windings from possible damage and to preserve the magnetism of the poles.

### Dismantling of the parts:

Remove the clutch push rod, control spindle, and the two (2) 3/16" diameter balls and one (1) roller, 5 x 5 mm., by pushing them through the main shaft with a long 4 mm. diameter rod.

### Method of splitting the crankcase

Remove two (2) 8 mm. bolts using a 14 mm. T-Wrench. Then remove the five (5) Allen head screws. Now place all the washers and screws in a box.

The two crankcase halves are now ready to be taken apart.

With the engine in an upright position, gently tap the end of the main shaft. Make sure that the two halves come apart evenly.

When the clutch side of the crankcase is almost free from the locating bushings, located on the other half of the crankcase, it will be necessary to turn the engine over so that the chain side rests on the bench. In this manner, the clutch half can be lifted and removed from the half that is resting on the bench.

Note that this operation may require the help of an assistant. Again we advise not to use a screw driver or any other similar tool to pry the cases so as to avoid damaging the crankcase matching surfaces.

With the two crankcase halves apart, the gear-box and crank assemblies will be on the chain half of the crank case.

In the 5-speed model, the same gear rotates on a roller bearing instead of a ball bearing and will drop out rather than have to be taken out when the crankcase is lifted.

The opening of the crankcase halves can be easier, employing the plate 88713.0330 showed in fig. 51 and which is supplied on request.

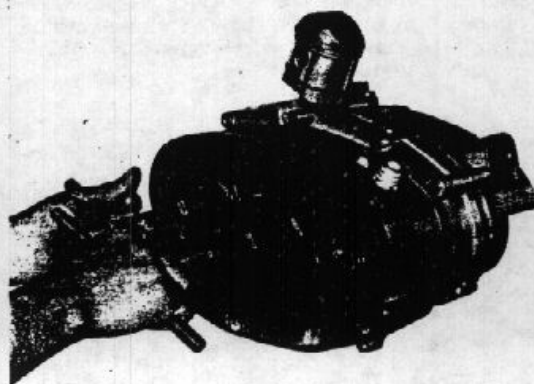


Fig. 51

### Crankcase Clutch side

Using an aluminium drift, applied on the hub side, tap off the 1st speed driven gear (only in the 4-speed engines; in the other engines the drift is not necessary).

Before putting away the half crankcase, ensure, by visual inspection, that the starting plate 0600.49.153 is in good condition and also that the clamping screws are still tight.

### Chain Side of the Crankcase

Remove the crank assembly by hand, taking care that the shim washers are collected and tied to the small end. (The removal may require the use of some light blows with a plastic mallet).

In removing the other parts of the gear change group, be very careful with the spacing washers, tie each to the dismantled part. The other parts dismantled at this stage are:

- 1) Gearshifting forks and guide rods.
- 2) Cam drum with related washers on each end.
- 3) Gear change main shaft and layshaft with related washers.

### Dismantling bevel gear Z-30

- 1) With pointed pliers remove the Seeger ring.
- 2) Take off the spacing washers.
- 3) With a mallet and an aluminium drift, tap on the stem of the gear until it drops out.
- 4) With a tool (3) extract the bushing with the bearings.

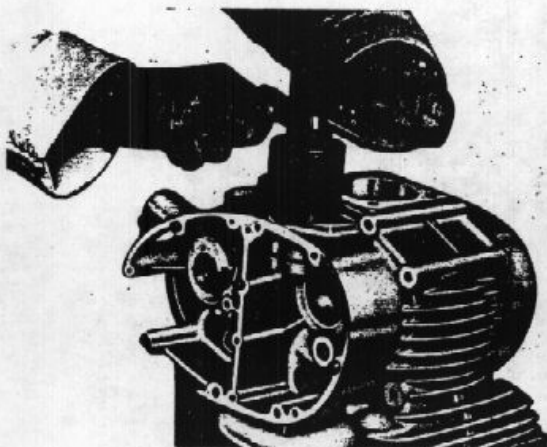


Fig. 52

#### **Dismantling bearings and bushings from crankcases**

This operation is to be carried out only if the replacement of bearings or shell and bushes is really necessary.

Wash the two halves carefully with Diesel oil or kerosene, then dry.

On a proper electric hot plate heat the two pieces until they reach a temperature of about 80°-100°C. (180°-210°F.).

Tap out the bearings with a hammer and aluminium drift taking care not to tilt the bearings, in order to avoid distorting the housing.

The same method may be used to extract the bushes and the shell.

**NOTE!** - Never heat the parts with an open flame to avoid distorting the crankcase and therefore make it unusable.

The extraction of the old bearings, the shell and the fitting of the new ones, should be done in the same operation to avoid heating the crankcase twice.

When inserting the bearings into their seats, make certain that the lettering on the bearing faces outwards.



Fig. 53

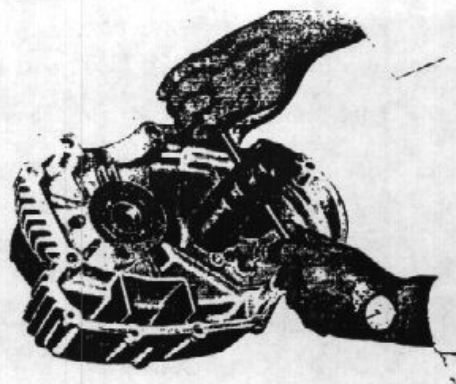


Fig. 54

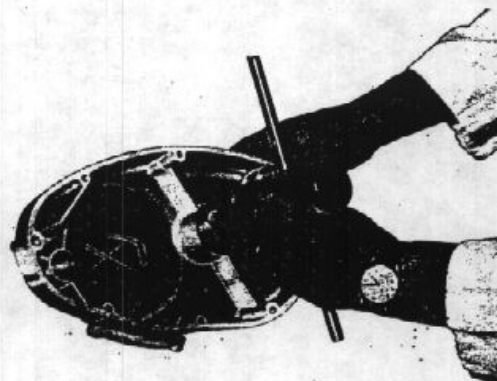


Fig. 55

When the crankcase is cold check that each bearing, shell or bush is well nipped in its housing.

In the contrary case, see the chapter « Overhaul and limits of wear ». Remember that when the engine is assembled, it is impossible to heat the part and the use of a bearing extractor is strongly recommended (tool 24).

#### **Dismantling the parts from the timing cover**

Using a screwdriver, remove the screw that holds the automatic advance and the two (2) screws that hold the ignition plate. Place all these parts in a box.

To dismantle the pump, break the lead seals, loosen the four screws, free the pump body by hand and hence the two inside gears, as well as the pump cover, pump gasket, ball and spring.

#### **Dismantling Parts of the Shifting Mechanism Assembly.**

Remove shift lever with a 10 mm. wrench.

Remove the three (3) screws that secure the shift selector cover.

Remove the cover by tapping with a plastic hammer on the shaft of the selector.

Remove the spring and spacing washers.

The other parts are removed by hand and require no special equipment. Place everything into proper boxes for efficient re-assembly.

#### **Dismantling the cylinder head.**

Remove the camshaft cover by unscrewing the three (3) securing screws.

Remove both valve covers.

Remove the four (4) screws that hold the bearing carrier and cover plate.

From the opposite side, insert a pin or rod about 7" long and about 1/8" in diameter into the cavity of the camshaft and tap out the cap gently.

Remove the camshaft carrier cover and gasket. In order to remove the rocker shaft, use extractor (11).

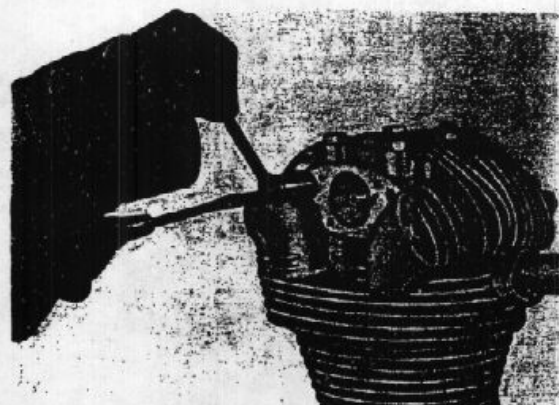


Fig. 56

**NOTE!** - When reassembling the rocker shafts, make sure that they are assembled with the threaded holes on the outside on the camshaft carrier cap side. The removal of the rocker shafts will free the rockers which should be taken out by hand.

Make sure that the spring and spacing washers of each side are collected and tied to the respective rockers as they were in their assembled position.

Identify to avoid transposition during re-assembly and place in box.

#### **To dismantle the camshaft gear.**

Straighten the tab washer, insert the tool (15) from the cap end in order to hold the camshaft. With a 22 mm. wrench, unscrew the camshaft nut. Now remove tool (15) and with an aluminum drift and hammer, push out the camshaft until it comes out of the cap side.

Remove the gear, taking care not to lose the Woodruff key and the spacing washers. Tie the washers to the gear, tape on the Woodruff key and place in box.

**To remove the valves** - use Tool (21), bringing pressure on the valve springs in the customary manner to free the semicones and spring saddles. Neither the valves nor the springs are interchangeable so keep them separate with their respective semicone and spring saddles - and indicate in the box, in which they're placed, whether they

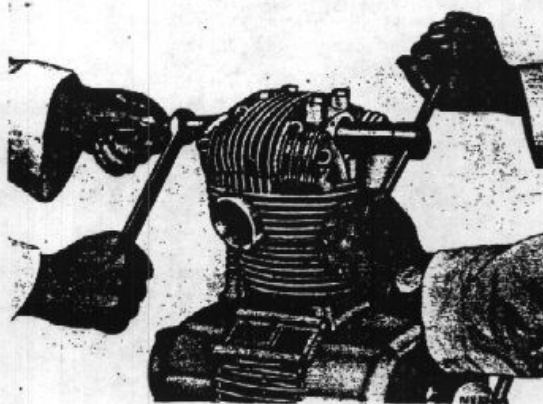


Fig. 57

are intake or exhaust.

**To dismantle the camshaft drive cover**, proceed as follows:

Remove the screws which secure the oil return lines, with a 17 mm. wrench.

Pull out the cover with drive, bearing and bearing carrier.

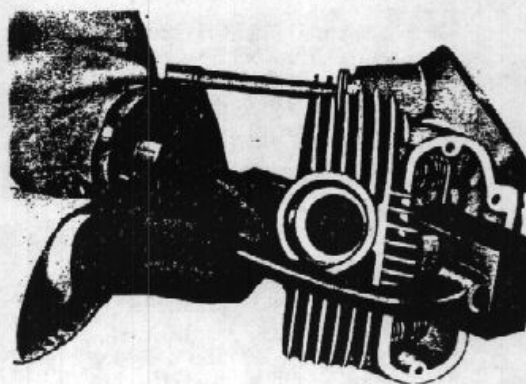


Fig. 58

To dismantle this assembly, remove the Seeger rings, making certain to keep the shims on each side of the bearing separate.

These shims, locate the bevel gear to the proper mesh and adjustment and for that reason, the shims should be tied and a note made of which one should go on each side at re-assembly.

**To remove the intake flange:** (On models in which it is fitted). Using a wrench, remove the flange and the rubber spacer.

**To remove the studs:** Secure a nut and a lock nut on the projecting studs and clamping them firmly, remove from the head.

**To remove the camshaft bearing** (if necessary), proceed in the following manner:

Remove the Seeger ring from the grooved seat. Heat the cylinder head on an electric hot plate to a temperature of 80°-100°C (180° to 210° F), placing the specific part to be heated in direct contact with the plate.

**To remove the bearing from the camshaft** (if necessary), heat this part in the same way as above.



# MOTORCYCLE DISMANTLING

## REMOVING ENGINE FROM FRAME

We shall describe the method of removing the 250 cc O.H.C. Ducati engine with battery and current static regulator from the frame. For other models, a similar procedure can be followed.

Before starting to remove the engine from the frame, the mechanic should make certain that the necessary malfunction exists. This can be done by running the engine. The engine should be carefully washed and cleaned with Gunk or Kerosene, being careful not to use a too concentrated solution on painted surfaces. Wipe dry and use compressed air if available. By following these instructions, the work is made easier.

Place a container or basin under the engine from the left side. Drain the oil from the crankcase by removing the drain plug and filter. Turn off the gas tank petcocks. Remove the plastic fuel line and then remove the saddle. Now remove gas tank. It is advisable to place a piece of rubber between the tank and the upper part of the fork to avoid damaging the finish of the tank. Next, disconnect the two yellow wires (leading to the flywheel magneto) from the static regulator. Take them off the frame, roll up the ends and lay them on the engine.

## REMOVAL OF MUFFLER AND EXHAUST PIPE

With a hexagonal wrench, loosen the screw which attaches the muffler to the frame. Using the left hand, swing the muffler and with the right hand, using Wrench # 23, unscrew the clamping ring at the exhaust opening at the cylinder head. You can now remove the muffler and exhaust pipe. Lay it down carefully in order to protect the chrome finish. With a pair of pliers, remove the clamping ring and take off the plastic breather tube from the engine.

### Footrest

With a T-Box wrench, loosen the footrest clamping bolt and rotate the right footrest until it is in a downward position.

### Chain guard

With a 10 mm box wrench, remove the chain guard.

### Chain

Turn the rear wheel until the chain connecting link is visible. Remove connecting link and remove chain. Replace connecting link so it will not be lost and set chain aside.

### Carburetor

Remove the flexible rubber hose connecting the carburetor with the intake silencer. Remove the carburetor by loosening the ring clamp screw

and lay it on the central bar of the frame. Do not disconnect the control cables.

## Shifting mechanism assembly

Using a T-Wrench, unscrew the 6 screws of the Shifting Mechanism Assembly and remove it completely. Next disconnect the clutch control cable and with the outer cable, place it across the frame. Next disconnect the distributor cable from the high-tension coil. Using a T-Wrench, unscrew the 6 nuts that secure the engine to the frame, starting with the top screws on the rear. Remove this bolt and replace it with a supporting pin. Now remove the remaining bolts which will permit the front plates to drop and partially free the engine.

## Engine removal from the frame

Using your right hand, lift the engine at the front and with the left hand, remove the pin (27). Then holding the engine from underneath at the rear, swing the engine slightly towards the right and remove it. Extreme care should be taken not to damage the ignition coil which is fitted to the frame member, especially the Bakelite connecting nut. Carry the engine to the bench and place it on the proper aluminium base (42).

## DISMANTLING THE FRAME

In dismantling the frame parts avoid the use of adjustable wrenches, which often spoil the edges of nuts and hexagonal screws.

Avoid the use of iron hammers, use only leather, wooden or plastic mallets, otherwise insert a lead packing between the part and the tool.

In the process of dismantling the frame, make sure that the individual pieces are marked so that each piece will be in the original position when reassembled. The disassembly operation of the frame can be followed by reversing the procedure shown on pages in this manual which indicate the method of assembling the frame.

A good rule is to use a number of small boxes, in which screws, and small parts may be placed, while the larger parts can be kept in a proper order to avoid mixing them with parts belonging to other motor cycles.

The small boxes may be of the same number as the groups of the spare parts catalogue, and bear the same initials:

Boxes for	Initials
— Accessories - Chain - Chain Cover	AC-CC
— Central stand-Rear brake-Foot rests	CS-RB-FR
— Front fork	FF
— Lamp and Horn	LH
— Rear suspension	RS
— Handlebars and Controls	HC

Check the spherical surface and make sure that the ball fits well in its seat. For the adjustment cups check the contact surface with the rocker.

#### Camshaft

Check the cam lobes for score marks and undulation which may be due to the hardened skin being worn away; it is advisable in such cases to renew the part; if wear is slight, polish. Check that the lubrication holes are not blocked.

#### Camshaft support bearings

To check bearings see « overhauling the bearings » on page 67.

#### Spiral bevel gears

Check:

- 1) Profile and wear of the gear teeth, and for cracked or broken teeth.
- 2) The flats on the drive shafts and if they are distorted or worn badly, replace.
- 3) Outer diameter of gear shaft and sleeve hole; this coupling must be exact and without play; if the gear teeth are still in good condition but the drive is poor, replace the old sleeve with a new one having an undersize internal diameter ( $-0.01$ ,  $-0.015$ ,  $-0.02$ ), otherwise replace the whole gear.

### OVERHAULING CYLINDER AND PISTON

#### Cylinder

Check the cylinder liner bore surface; it must be smooth and without scores, ridges and steps; rebore if necessary (see table in page 68 and 69). If liner is damaged, replace the cylinder liner.

#### Procedure for Removing Cylinder Liner:

Heat cylinder on hot plate  $80^{\circ} + 100^{\circ}\text{C}$ . ( $180^{\circ} - 210^{\circ}\text{F}$ ) and then, by lifting the cylinder, the liner will drop out. The same procedure is used, in reverse, when fitting a new cylinder liner.

Care should be taken to line up the four (4) cut-aways in the cylinder liner upper flange to clear the cylinder holes for the bolts.

Check the condition of the top and bottom cylinder surfaces. Make sure that the lubrication hole is perfectly clean.

#### Piston

Carefully check the piston crown and skirt. After removing the carbon depots (see fig. N.o 43 on page 54) **make certain that surface is smooth.** If deep scores or seizure marks are found it is advisable to replace the piston.

Check the condition of the piston ring grooves in the piston; see also that the holes under the scraper ring grooves are clear.

**NOTE!** - If the piston rings are worn (see tables on pages 72 and 73) fit an oversize set.

As already mentioned in the section headed **Cylinder**, when reboring, it is essential to adhere to the tables on pages 68 and 69 so as to ensure the correct fit of factory recommended DUCATI pistons.

#### Gudgeon pin

The piston pin must be a « snug » fit in the small end bushing of the connecting rod and a « push »

fit in the piston.

When the piston is changed it is advisable to change also the gudgeon pin which is supplied as a replacement in the following oversize:  $0.01 - 0.015 - 0.02$  mm. (see table 2 on page 72).

### OVERHAULING CRANKSHAFT AND CONNECTING ROD

#### Rod Small end bush

The bushing must be a « press » fit in the connecting rod.

It must be free of nicks and score marks.

The lubricating holes must be clean.

When renewing the bushing, be sure to use one that has a slightly larger outside diameter ( $+0.05$  mm =  $.002''$ ). This must be forced into position with a press.

It is necessary to ream the bore to give the recommended fit as indicated in Table 5 on Page 74.

Now check to make sure that the bushing and crankshaft are parallel.

#### Crankshaft

Check:

- 1) All the working surfaces of the shaft.
- 2) The condition of the threads.
- 3) The key ways.
- 4) The lubrication holes.
- 5) The end play and side clearance between rod and crank pin (see table on pages 75 and 76).
- 6) The hollow of the crank pins by removing the end covers, and clean. **Make sure to replace all the covering discs.**

If crankshaft is found to be defective, replace.

**NOTE!** - Check condition and size of the shaft bush in the timing cover; the original

size is  $12\text{H}8 + 0.027^*$ . The maximum allowable wear is  $0.10$  mm =  $.004''$ . **This fit is very important and if not held to close tolerances, will restrict the proper functioning of the oil circulatory system to the cylinder head.**

To remove the bushing, the oil pump cover must be placed on an electric hot plate at a temperature of  $120^{\circ} - 150^{\circ}\text{C}$ . ( $248^{\circ}$  to  $302^{\circ}\text{F}$ ). Everything in the cover assembly must be removed, including Stefa oil seal.

The bushing should be removed and replaced at the same time.

\* These sizes have been supplied on the basis of the ISA Tolerance System (International Tolerance System).

In the size  $12\text{H}8$ , with the system ISA, it is understood:

- 12 - the nominal diameter of the hole;
- H - the tolerance position which corresponds to  $0$  mm;
- 8 - the working quality which corresponds to  $+ 0.027$  mm.

Therefore:

$0$   
—  $12\text{H}8 + 0.027$  corresponds to a tolerance of the hole of  $12.000$  to  $12.027$  mm, which on the basis of the conversion tables of our manual, pages 70 and 71, corresponds in inches, to:

$0''$   
—  $0.4724'' + 0.00106'' = 0.4724''$  to  $0.4735''$ .

For the other sizes that will be met, base yourself on this same instance to obtain the sizes in inches.

## OVERHAULING CRANKCASE AND COVERS

Check:

- 1) The crankcase for cracks. If any are discovered replace.
- 2) The condition of the joint faces.
- 3) The bearings (see page 67) and the box, and see that they are seated.
- 4) The internal surfaces of bushes, which must be smooth.
- 5) That the bushes are secure in their housing.
- 6) The oil seals; if they are not in good condition, replace them.
- 7) All the oil pipes.
- 8) The oil sump and filter assembly. Make certain that these are properly cleaned.

### NOTE!

If bushes and box are found loose in their housing, they should be replaced with oversized ones. In the case of bearings being found loose, change the half crankcase or cover in question.

## OVERHAULING CLUTCH

### Clutch housing

Check:

- 1) Profile and wear of teeth (this operation should be carried out with the crankshaft gear - see « Reassembling of the engine », page 82).
- 2) The clutch driving plate slots.
- 3) The bearings (see page 82) should be firm in their housing.

Should either or all be faulty, then replace the clutch housing-driving gear unit.

### Clutch plates

They must be neither scored, distorted nor excessively worn.

If any of these defects are discovered, replace the faulty part(s).

The initial thickness of the clutch plate pack is 27 mm = 1.0630". Owing to wear, the said thickness may go down to 25 mm = .9842" but no more. If it does, change the plates with new ones.

As uncoated steel clutch plates are not likely to wear much, they should be replaced only if the plates are out of shape or scored.

### Pressure plate

By means of a metal ruler check the surface in contact with the plates; it must be flat. If it is not, replace the pressure plate.

### Clutch springs

There are 6 clutch springs. When checking their efficiency remember that:

- the initial length of each new spring is 30.4 mm (1.183"), and that it takes a 17 kilogram (approx. 37 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.

### Clutch operating inner lever

Check the lever insert for wear. If it is worn replace it with an oversized one.

## OVERHAULING OIL PUMP

### Gears

Check condition of teeth.

### Pump body

(Made of light, treated-aluminium, alloy. Inserted bush and pin).

After having carefully cleaned the pump body with petrol (gasoline), and dried it with a blast of air, check the following:

- 1) **Diameter of the 2 gear recesses.** - When the part is new, diameter is  $19H8+0.033$ . - When the diameter reaches about 19.15, the pump body must be replaced.
- 2) **Depth of gear recesses.** - Initially:  $9H8+0.022$ . When it reaches 9.12, replace the housing.
- 3) If pump body is damaged, shows signs of wear or score marks, it must be replaced.

### Fit between driven gear and pin.

Pin diameter:  $6h7 - 0.012$

Gear diameter:  $6F7 \begin{cases} +0.010 \\ +0.022 \end{cases}$

When clearance between pin and gear exceeds 0.05 mm = .002", replace both pin and gear.

### Fit between driving gear and pump body bush.

This fit must be perfect. - Max. clearance: 0.04 mm (.0016").

Beyond this value the pump may draw in air and, when the engine is warm, the oil pumped may not be adequate for engine lubrication.

If needed, replace bush with another having a larger outside diameter.

### Pump drive gear

Check:

- 1) Gear teeth and spindle coupling.
- 2) Whether shaft and corresponding bush are worn. If the bush is worn, it must be replaced, otherwise it will damage the corresponding pump body bush.

### Pump cover

Surface in contact with gears must be perfectly smooth. If scored, replace.

## OVERHAULING OF STARTER AND GEARBOX

### Bearings

Check them as directed on page 67.

### Fit between shafts and bushes

Check clearance between shafts and corresponding bushes. It must not exceed 0.10 mm (.004").

### Fork control spindle

Check condition of the pin. If it is chipped or worn, replace it.



### Selector control fork

Check whether there are signs of breakage or wear. If there are, replace.

### Gearbox selector

Check very carefully for wear of pins and general condition of selector. Replace if scored or chipped.

### Gearbox cam drum

Check the cam drum to make sure the fork control guides are not worn.

When new, the guides are  $8H11+0.090$  wide; they may not wear more than  $0.10\text{ mm } (.004")$ .

### Fork guides and gear-engaging forks.

Inspect the two fork guides. Make sure they are straight. If they are not replace, or straighten under a press.

Inspect the fork arms and related control pins. Make sure they are not appreciably worn.

**Warning!** - The wear on the gear-engaging forks depends solely on the way they have been assembled. If the assembly is carried out as it should, there will be no wear.

### Gearbox mainshaft and driving gears

Check the following:

- 1) Threads at end of mainshaft: see whether they are damaged (if damaged replace).
- 2) Condition of the 6 splines on which the mobile gears slide.
- 3) Teeth of the fixed gears.
- 4) Grooves of the Seeger rings.
- 5) Straightness of shaft. This is done by placing it between two centers and using a dial indicator. If there is a deviation exceeding  $0.05\text{ mm } (.002")$  the shaft must be replaced, or straightened under a press.
- 6) Front driving dogs of 2nd-speed free gear and gear teeth.
- 7) Engaging dogs and teeth of the 3rd-speed splined gear.
- 8) Engaging dogs and teeth of the 4th-speed free gear.
- 9) The splined gear of the 5th-speed in its teeth.

### Gearbox layshaft and driven gears

Check the gearbox layshaft and driven gears. Any part showing a defect which prevents its perfect operation must be replaced.

**NOTE!** - In order to check these parts, follow same procedure as outlined in the previous 9 points.

### Starter

Check the spindle-to-bush fit.

Initially the diameter of the bush in the crankcase (clutch side) is  $15H8+0.027$  and that of the cover (clutch side) is  $18H7+0.018$ .

When wear exceeds  $0.10\text{ mm } (.004")$  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 spindle

Inspect teeth of sector and lever engagement. There must be no cracks or signs of breakage. If there are, replace.

### Starter gear

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 both the starter gear and first-speed driven gear.

Initially the diameter of the bush embodied in the gear is  $17F7+0.016$ . When wear exceeds  $0.10\text{ mm } (.004")$  the bush must be replaced. It can be extracted with a press and a mandrel. The same means can be used to assemble the bush. After having assembled the new bush, ream to the above mentioned diameter.

### Pedal return spring

There are no prescribed specifications pertaining to tension; if the return spring does not work properly, it is recommended that it be replaced.

## OVERHAULING OF THE DISTRIBUTOR

Check the following:

- 1) Condition of gear.
- 2) Fit between spindle and bushes. Initial diameter of bushes is:  $15H8+0.027$ . Maximum wear allowed:  $0.10\text{ mm } (.004")$ .
- 3) Perfect tightness of Stefa Seal embodied in cover.

There must be absolutely no oil seepage. If there is, replace with new Stefa Oil Seal.

### Overhauling of carburetor

Disassemble the carburetor completely. Wash all parts carefully with carbon tetrachloride. Using air pressure, clean all the channels and holes. If compressed air is not available, use a short length of copper or brass wire which can be passed through the channels and holes. This procedure is required to make absolutely certain that the parts are all thoroughly cleaned. When re-assembling, make certain that each part is in its correct place.

While the various carburetor parts are in their disassembled state, it is recommended that all the parts listed under figure 25, page 34 be carefully inspected.

## ADJUSTMENT OF THE DELL'ORTO CARBURETOR

### Regulation of the idle jet:

Regulation of the idle jet should always be done on a warm engine. Open throttle no more than

1/8 the distance of the bore, then adjust the air screw to the proper position according to the sound of the engine. It should be between 1/2 to 2 turns open. **In is rich; out is lean.** On larger than 30 mm carbs it is just the opposite. If it runs better more turns in either direction, the idle jet should be changed respectively. On larger than 30 mm carbs, the idle Jet is not changeable.

#### Regulation of the slide:

Open throttle between 1/8 to 1/4 distance of

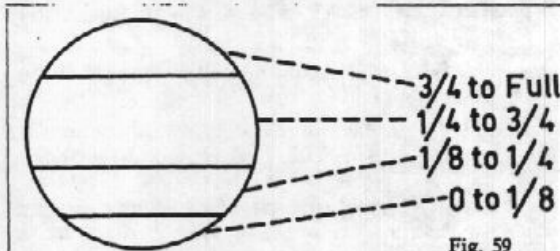


Fig. 59

bore. If carburetor spits back flames, cutaway is too high. If engine loads up, cutaway is too small.

#### Regulation of the needle & needle jet:

Open throttle while riding, to between 1/4 to 3/4 distance of bore. If it spits back, needle is too low. If it loads up, needle is too high. A finer adjustment can be made by changing the Needle Jet.

#### Regulation of the main jet:

This can only be done by a plug check at full bore of one mile or more.

#### Fuel level:

The correct fuel level should be up to the center of the little round plug which is in the side of the little air slide housing.

#### Throttle slide:

Observe whether it slides properly in the mixing chamber. If, owing to wear, (slide must operate smoothly - not loosely), it does not slide properly, a new throttle must be fitted. Also, if mixing chamber shows signs of excessive wear or score marks which are likely to prevent proper operation or free movement of the throttle valves, this should be replaced.

#### Tapered needle:

Inspect to see whether there are evident signs of wear along the tapered part or on the fixing notches. Wear may be due either to long service or to hard treatment. No matter what the reason, if worn, replace with a new one of the same type.

#### Needle Jet:

When engine is overhauled and the carburetor is disassembled, replace needle jet, making certain that it is replaced with original factory recommended jet.

**NOTE!** - Remember that consumption depends directly on the state of preservation of the needle and the needle jet. Unless these two parts are in perfect condition, consumption will not be correct.

#### Main jet:

Make sure that the jet orifice has never been tampered with, for the purpose of altering its calibration. Clean by passing through the softest and smallest wire possible to avoid inadvertently increasing the size of the orifice and thereby increasing fuel consumption and causing carburation trouble.

If in doubt, don't hesitate to change the jet with a new one, which must be original and have the same identification number.

Throttle controlled by Main Jet

Throttle controlled by Needle & Needle Jet

Throttle controlled by Valve Cutaway

Throttle controlled by Idle Jet & Air Screw

#### Idling Jet:

The foregoing recommendations apply also to this jet.

#### Constant level float chamber:

It is essential that this part of the carburetor should work properly, otherwise carburation will not be satisfactory.

Therefore, inspect the following:

- 1) **Needle valve:** Look and see whether the tapered part is in good condition. If damaged or showing evident signs of wear, replace.
- 2) **Needle valve seat:** Make sure the edge where the needle valve seals is neither damaged nor worn. If it is, replace.
- 3) **Float:** Make sure it is not weighed down by petrol (gasoline) due to a puncture caused by careless handling. Also, see that means by which float is secured to the valve is in good order. If there are any signs of defects, replace with a new, original float.

#### Air cleaner and petrol filter:

When the carburetor has these accessories, inspect them and clean them. **Remember that a dust-clogged air cleaner increases fuel consumption and decreases power.**

#### INSPECTION OF SEALS

When the engine has been dismantled, it is advisable to replace all the seals with new ones when re-assembling.

#### FRAME

#### OVERHAULING OF « DUCATI » FRONT FORK (250 and 350 cc.).

#### Lower sliding tube

#### Check:

- 1) To see whether there are signs of cracks or damage.
- 2) Whether bore for central column shows signs of scoring, notches, etc. If there are any

defects of the kind, replace.

- 3) Assembly clearance between central column and lower sliding tube; initially it is:  $0.009 \div 0.081$  millimetres (.0003543 to .003189"). Max. clearance - due to wear allowed: 0.20 mm. (.008").
- 4) Condition of mudguard-fixing studs. Broken studs cannot be replaced.

#### Central column

Check:

- 1) Straightness of tube. If tube is not perfectly straight, replace.
- 2) Outer surface. It must be smooth. If slightly scored, smooth with emery cloth. If deeply scored, replace.

#### Suspension spring

First of all, check whether the two springs, when free, are of the same length.

Length tolerance between the two springs: 5 mm. (.2").

Initial length of springs is: 240 mm. (approx. 9½").

Under a 65 Kg. (approx. 145 lbs.) load, a spring should not be compressed more than 100 mm. (approx. 4"). If it is, replace it with a new one. When freed again, it must be less than 4% shorter than before the test.

#### Washers, gaskets, grommets and other sealing rings

Check with the greatest care to make absolutely sure they are not faulty.

#### Hydraulic stem assembly

- 1) Check each part to see whether there are signs of excessive wear or breakage.
- 2) Make sure the little holes through which the oil should pass are not clogged.

#### Lower yoke and steering column

Inspect:

- 1) the lower bearing for faults;
- 2) the tube; make sure it is not out of shape or cracked; check condition of threads;
- 3) the steering cup; it must neither be scored nor worn.

#### Other Parts of the Fork (Ball Race)

Carefully inspect all the other parts of the fork assembly to make certain that when reassembled, the fork functions properly.

#### OVERHAULING OF « MARZOCCHI » FRONT FORK (160 Monza Jr.).

It differs from the other fork because it is lighter in weight and cheaper, in view of its particular application.

To dismantle, overhaul and re-assemble it, as a general rule, follow the instructions given for the 250 and 350 c.c. at pages 94 to 97.

We remind you that each tube of the fork contains 150 c.c. (5.1¼ ounces) of AGIP F.1 MOTOR HD SAE 20 oil.

#### OVERHAULING THE FRAME

- 1) Make certain that the ball bearing, including upper and lower race, is in perfect condition. If not, replace.
- 2) Inspect all the frame members. Make sure that there are no cracks or fractures. Inspect also for any distortion or fractured welds. (If frame welds are cracked, repair. Mild distortions can be straightened).

#### OVERHAULING REAR FORK (Swinging Arm)

Make certain that there are no signs of cracks, broken or fractured welds or distortions. If there are, replace, or weld.

- 1) Rear fork joint bushes. Their initial measure: diameter 29 mm.  $\left\{ \begin{array}{l} + 0.02 \\ + 0.04 \end{array} \right.$  diam. 1.1417"  $\left\{ \begin{array}{l} + .0008" \\ + .0016" \end{array} \right.$

The bushes-to swivel tube fit, of the swinging arm must be very exact. Max. clearance allowed is 0.08 mm. (.0032"). If more, then it is advisable to replace the bushes or the pin to ensure good road holding qualities.

The bushes can be taken out cold by using a drift and a hammer.

After you have installed the new bushes, bore to:  $\varnothing 29 \text{ mm} \left\{ \begin{array}{l} + 0.02 \\ + 0.04 \end{array} \right.$  diam. 1.1417"  $\left\{ \begin{array}{l} + .0008" \\ + .0016" \end{array} \right.$

- 2) The swivel tube journal diameters should be: 29h6—0.013. In case of excessive wear, replace.

#### CHECK THE GAS TANK

Inspect for leaks.

When the point of defect is discovered, empty the tank of all gas and make sure that the inside is absolutely dry. In repairing the tank, the welding or brazing operation should take place, if possible, with the tank open and, if possible, full of water.

After the repair has been made, empty the water and clean with gas (petrol).

To remove any scales or residue on the inside of the tank, drop in a length of chain, shake tank, and empty. This procedure will loosen any deposits that may have gathered on the inside of the tank.

#### GAS TANK PETCOCK

Remove petcock; some models may have two (2).

Using compressed air, clean out the filters. When replacing the petcocks, make certain that you have a tight seal and that no gasoline leaks. If you do not have a good seal, replace washer inside the petcock.

Also check the proper sealing qualities of the washer between the petcock and the gas tank. Change if any signs of moisture appear.

#### Fuel lines

Inspect the fuel lines and clean with compressed air.

#### Gas cap

Make sure hole in cap is not clogged and the washer is not missing.



## OVERHAULING OF WHEELS

Before proceeding with this subject, a key to the parts is given hereunder.

Key to parts of the front wheel hub with built-in speedometer drive

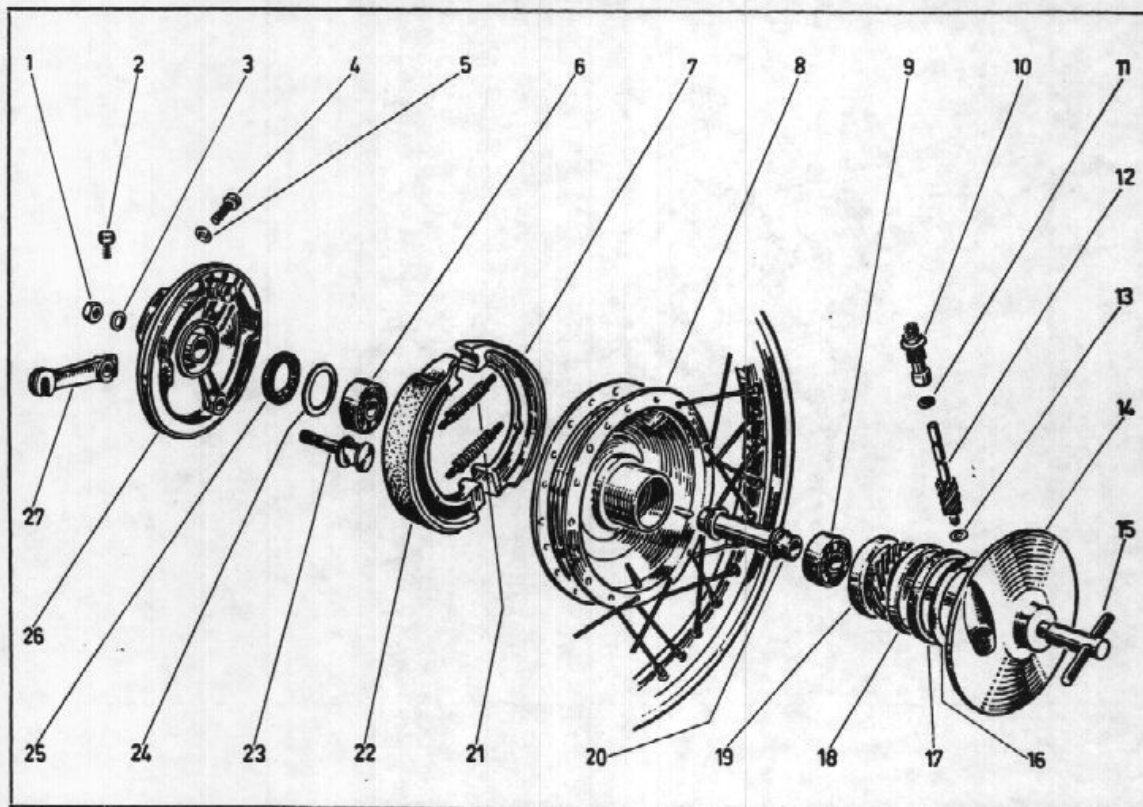


Fig. 60

- |   |  |  |
|---|--|--|
| 1 Special hex. nut<br>(12×1.25M)×11.                      | 10 Connection, 12 MC -<br>16 MB, for speedometer<br>drive.<br>VEGLIA RV454-M2. | 19 Crown gear for<br>VEGLIA speedometer<br>drive RV-454-002. |
| 2 Lever clamping screw.                                   | 11 Thrust washer,<br>Ø 6.1 × Ø 12 × 1.   | 20 Tubular distance piece<br>with collars L=51.              |
| 3 Washer Ø12.2×Ø 22×2.                                    | 12 Speedometer gear<br>VEGLIA.   | 21 Shoe spring.  |
| 4 Adjusting screw.  | 13 Thrust washer,<br>Ø 6.1 × Ø 12 × 1.   | 22 Lower shoe complete<br>with lining.                       |
| 5 Threaded ring.  | 14 Right-side cover.   | 23 Brake Cam.  |
| 6 Bearing RIV 02 A or<br>FAG 6202 - C3 -<br>Ø 15×Ø 35×11. | 15 Hub spindle.  | 24 Bearing protecting<br>washer.                             |
| 7 Upper shoe complete<br>with lining.                     | 16 Felt backing disk<br>Ø 56.5×Ø 65×0.8.                                       | 25 Felt cover washer<br>Ø 23×Ø 42×4.                         |
| 8 Front hub.  | 17 Felt Ø 55×Ø 63.5×2.   | 26 Left-side cover.  |
| 9 Bearing RIV 02 A or<br>FAG 6202 - C3 -<br>Ø 15×Ø 35×11. | 18 Cup Ø 56.5×Ø 65×2.8.  | 27 Front brake lever.  |

# Key to parts of rear wheel hub

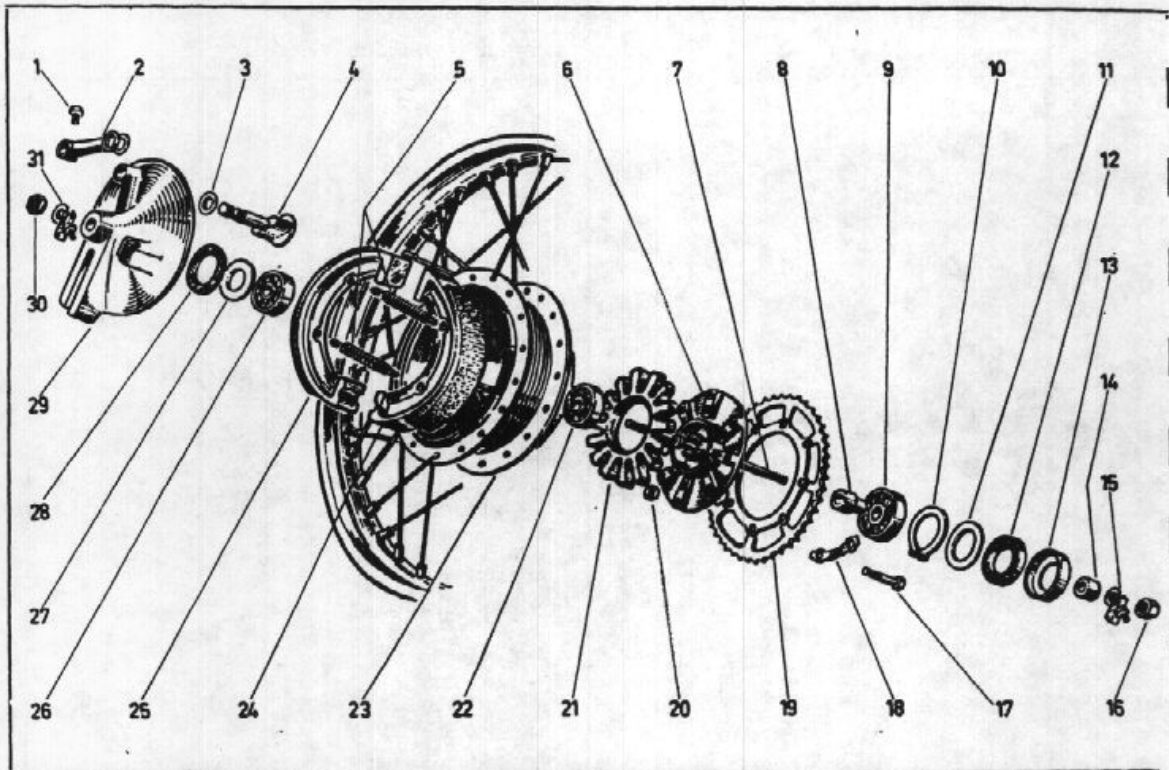


Fig. 61

- |   |   |   |
|---|---|---|
| 1 Lever clamping screw.                     | 12 Felt washer<br>Ø 24 × Ø 41 × 3.5.                        | 23 Rear hub (flange diameter 225 mm.).                      |
| 2 Rear brake lever.                         | 13 Cup Ø 25 × Ø 42 × 4.                                     | 24 Lower shoe complete with lining.                         |
| 3 Thrust washer for brake cam.              | 14 Distance piece (spacer)<br>Ø 15 × Ø 25 × 13.5.           | 25 Upper shoe complete with lining.                         |
| 4 Brake cam.                                | 15 Chain tensioner 7 MA.                                    | 26 Bearing RIV 02 A or FAG 6202 - C3 -<br>Ø 15 × Ø 35 × 11. |
| 5 Shoe spring.                              | 16 Hex. nut<br>(15 × 1.25M) × 10.5.                         | 27 Bearing protecting washer.                               |
| 6 Flange.                                   | 17 Screw TE 7MA × 29.                                       | 28 Felt cover washer,<br>Ø 25 × Ø 44 × 6.                   |
| 7 Hub spindle.                              | 18 Safety plate.  | 29 Cover.   |
| 8 Bush.                                     | 19 Sprocket Z=45.   | 30 Hex. Nut,<br>(15 × 1.25M) × 10.5.                        |
| 9 Bearing RIV ELL 20 -<br>Ø 20 × Ø 42 × 12. | 20 Hex. nut 7MA × 7.  | 31 Chain tensioner.   |
| 10 Seeger ring 42 I.                        | 21 Cushion drive rubber.                                    |   |
| 11 Disk for felt<br>Ø 25 × Ø 41.8 × 0.5     | 22 Bearing RIV 02 A or FAG 6202 - C3 -<br>Ø 15 × Ø 35 × 11. |   |

## OVERHAULING THE WHEEL

Check:

- 1) Wheel-rim. Make sure there are no deep dents, no cracks, and that the spoke nipples are tightened equally.
- 2) Surface of brake-drum. Make sure it is not scored and that it is centered with respect to the axis of rotation.
- 3) Tightness of bearings in their housing.
- 4) Condition of bearings. (See farther on, « Overhauling the Bearings »).
- 5) Condition of thread of spindle and nuts.
- 6) Brake-linings. Thickness should be constant. If excessively or unevenly worn, replace the shoe-lining unit. Replace also if soaked with grease.
- 7) When testing brake, whether the shoe spring returns quickly. If it doesn't, replace the spring.
- 8) Where the felt dust-retaining ring is efficient.
- 9) Whether there are cracks in the hub bodies and in the covers; if there are, replace.
- 10) In checking the rear wheel, attention should be paid to the condition of the cushion drive rubber. If torn or defective, replace.

## OVERHAULING THE REAR SUSPENSION

If stuck or working badly (see loads and deflections in figure 41 on page 53) all that can be done is to replace the suspension.

## OVERHAULING THE ELECTRIC SYSTEM

See page 35 and those following.

See page 113 and those following.

## OVERHAULING THE BEARINGS

Inspect the race surfaces carefully. (The outer surface of the inside ring, and the inner surface of the outside ring).

They must be smooth. If they are not, replace. The ball surfaces must be extremely smooth and even.

If defects are found, replace the bearing.

It is strongly recommended that no attempt is made to repair a bearing.

**NOTE!** - When fitting bearings in their seats, remember to apply pressure only on the ring which is being forced and take care that the bearing trademark or manufacturer's name is always outside the seat.

Before being forced in their housing, the bearings have a small amount of radial clearance which is reduced when they are fitted. This clearance must not, however, disappear completely, otherwise the bearing becomes overloaded and will wear quickly.

## LIST OF TABLES OF WEAR WEAR LIMITS

Table N. 1 - Clearance between cylinder and piston.

Table N. 2 - Clearance and interference between piston and gudgeon pin.

Table N. 3 - Min. and max. axial clearance on assembly for compression rings and oil-scrappers.

Table N. 4 - Assembly clearance for ring end gap (compression rings and oil-scrappers).

Table N. 5 - Min. and max. assembly clearance between gudgeon pin and connecting-rod small-end bush.

Table N. 6 - Radial tolerance on assembly between connecting-rod big-end and crank-pin.

Table N. 7 - Axial tolerance on assembly between connecting-rod big-end crank-pin.

Table N. 8 - Min. and max. clearance between valve stem and valve guide.

Table N. 9 - Min. and max. clearance between rocker pin and bush.

Table N. 10 - Clearance and max. interference between bush and rocker.

Table N. 11 - Hair pin-valve springs.

## TABLES OF WEAR

Table N. 1 - Clearance between cylinder and piston. Limits of wear.

The fit of the piston is very important. The measurements are critical and the tolerances indicated on the following pages should be adhered to.

Original factory pistons and cylinders fall into categories A and B. Refer to chart.

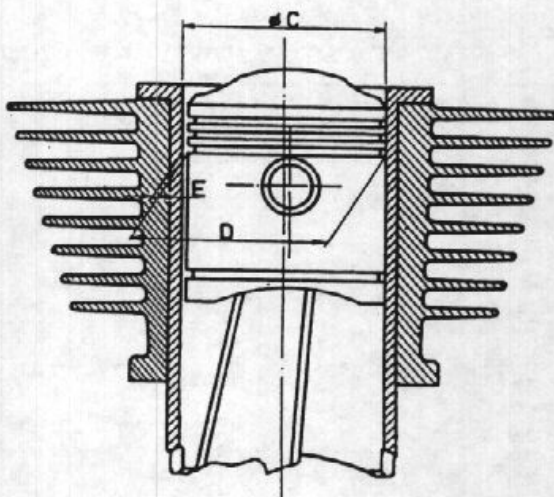


Fig. 62

## LEGEND

A = Class to which cylinder and piston belong.

B = Class to which cylinder and piston belong.

C = Cylinder inside diameter or bore.

D = Piston outside diameter measured under the groove of the first oil-scraper.

E = Assembly clearance.



**NOTE**

Standard and oversized pistons, as well as standard cylinders, are supplied by DUCATI MECCA-

NICA S.p.A. The Reboring of cylinders must be done by Servicing and Repair Shops in accordance with data given in these tables.

**160 MONZA JUNIOR MOTOR CYCLE**

ASSEMBLY	CYLINDER C = mm.		PISTON D = mm.		Max. clearance E = mm.	Min. clearance E = mm.	Limits of wear mm.
Standard	A	61.00 ÷ 61.01	B	60.92 ÷ 60.91	0.10	0.08	0.15
	B	61.01 ÷ 61.02	A	60.93 ÷ 60.92	0.10	0.08	
1st rebore + 0.4	A	61.40 ÷ 61.41	B	61.32 ÷ 61.31	0.10	0.08	
	B	61.41 ÷ 61.42	A	61.33 ÷ 61.32	0.10	0.08	
2nd rebore + 0.6	A	61.60 ÷ 61.61	B	61.52 ÷ 61.51	0.10	0.08	
	B	61.61 ÷ 61.62	A	61.53 ÷ 61.52	0.10	0.08	
3rd rebore + 0.8	A	61.80 ÷ 61.81	B	61.72 ÷ 61.71	0.10	0.08	
	B	61.81 ÷ 61.82	A	61.73 ÷ 61.72	0.10	0.08	
4th rebore + 1	A	62.00 ÷ 62.01	B	61.92 ÷ 61.91	0.10	0.08	
	B	62.01 ÷ 62.02	A	61.93 ÷ 61.92	0.10	0.08	

**250 MONZA - G.T. - SCRAMBLER MOTOR CYCLES**

ASSEMBLY	CYLINDER C = mm.		PISTON D = mm.		Max. clearance E = mm.	Min. clearance E = mm.	Limits of wear mm.
Standard	A	74.00 ÷ 74.01	B	73.905 ÷ 73.895	0.115	0.095	0.16
	B	74.01 ÷ 74.02	A	73.915 ÷ 73.905	0.115	0.095	
1st rebore + 0.4	A	74.40 ÷ 74.41	B	74.305 ÷ 74.295	0.115	0.095	
	B	74.41 ÷ 74.42	A	74.315 ÷ 74.305	0.115	0.095	
2nd rebore + 0.6	A	74.60 ÷ 74.61	B	74.505 ÷ 74.495	0.115	0.095	
	B	74.61 ÷ 74.62	A	74.515 ÷ 74.505	0.115	0.095	
3rd rebore + 0.8	A	74.80 ÷ 74.81	B	74.705 ÷ 74.695	0.115	0.095	
	B	74.81 ÷ 74.82	A	74.715 ÷ 74.705	0.115	0.095	
4th rebore + 1	A	75.00 ÷ 75.01	B	74.905 ÷ 74.895	0.115	0.095	
	B	75.01 ÷ 75.02	A	74.915 ÷ 74.905	0.115	0.095	

# 250 MARK 3 - MACH 1 MOTOR CYCLES

ASSEMBLY	CYLINDER C = mm.		PISTON D = mm.		Max. clearance E = mm.	Min. clearance E = mm.	Limits of wear mm.
Standard	A	74.00 ÷ 74.01	B	73.87 ÷ 73.88	0.14	0.12	0.19
	B	74.01 ÷ 74.02	A	73.88 ÷ 73.89	0.14	0.12	
1st rebore + 0.4	A	74.40 ÷ 74.41	B	74.27 ÷ 74.28	0.14	0.12	
	B	74.41 ÷ 74.42	A	74.28 ÷ 74.29	0.14	0.12	
2nd rebore + 0.6	A	74.60 ÷ 74.61	B	74.47 ÷ 74.48	0.14	0.12	
	B	74.61 ÷ 74.62	A	74.48 ÷ 74.49	0.14	0.12	
3rd rebore + 0.8	A	74.80 ÷ 74.81	B	74.67 ÷ 74.68	0.14	0.12	
	B	74.81 ÷ 74.82	A	74.68 ÷ 74.69	0.14	0.12	
4th rebore + 1	A	75.00 ÷ 75.01	B	74.87 ÷ 74.88	0.14	0.12	
	B	75.01 ÷ 75.02	A	74.88 ÷ 74.89	0.14	0.12	

# 350 SEBRING MOTOR CYCLE

ASSEMBLY	CYLINDER C = mm.		PISTON D = mm.		Max. clearance E = mm.	Min. clearance E = mm.	Limits of wear mm.
Standard	A	76.00 ÷ 76.01	B	75.93 ÷ 75.92	0.09	0.07	0.14
	B	76.01 ÷ 76.02	A	75.94 ÷ 75.93	0.09	0.07	
1st rebore + 0.4	A	76.40 ÷ 76.41	B	76.33 ÷ 76.32	0.09	0.07	
	B	76.41 ÷ 76.42	A	76.34 ÷ 76.33	0.09	0.07	
2nd rebore + 0.6	A	76.60 ÷ 76.61	B	76.53 ÷ 76.52	0.09	0.07	
	B	76.61 ÷ 76.62	A	76.54 ÷ 76.53	0.09	0.07	
3rd rebore + 0.8	A	76.80 ÷ 76.81	B	76.73 ÷ 76.72	0.09	0.07	
	B	76.81 ÷ 76.82	A	76.74 ÷ 76.73	0.09	0.07	
4th rebore + 1	A	77.00 ÷ 77.01	B	76.93 ÷ 76.92	0.09	0.07	
	B	77.01 ÷ 77.02	A	76.94 ÷ 76.93	0.09	0.07	

**CONVERSION TABLE**  
**DECIMAL EQUIVALENTS OF MILLIMETERS**

mm	inches	mm	inches	mm	inches	mm	inches	mm	inches
.01	.00039	.26	.01024	.51	.02008	.76	.02992	2	.07874
.02	.00079	.27	.01063	.52	.02047	.77	.03032	3	.11811
.03	.00118	.28	.01102	.53	.02087	.78	.03071	4	.15748
.04	.00157	.29	.01142	.54	.02126	.79	.03110	5	.19685
.05	.00197	.30	.01181	.55	.02165	.80	.03150	6	.23622
.06	.00236	.31	.01220	.56	.02205	.81	.03189	7	.27559
.07	.00276	.32	.01260	.57	.02244	.82	.03228	8	.31496
.08	.00315	.33	.01299	.58	.02283	.83	.03268	9	.35433
.09	.00354	.34	.01339	.59	.02323	.84	.03307	10	.39370
.10	.00394	.35	.01378	.60	.02362	.85	.03346	11	.43307
.11	.00433	.36	.01417	.61	.02402	.86	.03386	12	.47244
.12	.00472	.37	.01457	.62	.02441	.87	.03425	13	.51181
.13	.00512	.38	.01496	.63	.02480	.88	.03465	14	.55118
.14	.00551	.39	.01535	.64	.02520	.89	.03504	15	.59055
.15	.00591	.40	.01575	.65	.02559	.90	.03543	16	.62992
.16	.00630	.41	.01614	.66	.02598	.91	.03583	17	.66929
.17	.00669	.42	.01654	.67	.02638	.92	.03622	18	.70866
.18	.00709	.43	.01693	.68	.02677	.93	.03661	19	.74803
.19	.00748	.44	.01732	.69	.02717	.94	.03701	20	.78740
.20	.00787	.45	.01772	.70	.02756	.95	.03740	21	.82677
.21	.00827	.46	.01811	.71	.02795	.96	.03780	22	.86614
.22	.00866	.47	.01850	.72	.02835	.97	.03819	23	.90551
.23	.00906	.48	.01890	.73	.02874	.98	.03858	24	.94488
.24	.00945	.49	.01929	.74	.02913	.99	.03898	25	.98425
.25	.00984	.50	.01969	.75	.02953	1.00	.03937	26	1.02362



# **CONVERSION TABLE** **MILLIMETERS TO INCHES IN DECIMALS**

1 mm. = 0.03937 inches.

1 inch = 25.4005 mms.

mm	decimal	mm	decimal	mm	decimal	mm	decimal
1	0.0394	39	1.5354	77	3.0315	240	9.4488
2	0.0787	40	1.5748	78	3.0709	250	9.8425
3	0.1181	41	1.6142	79	3.1102	260	10.2362
4	0.1575	42	1.6535	80	3.1496	270	10.6299
5	0.1968	43	1.6929	81	3.1890	280	11.0236
6	0.2362	44	1.7323	82	3.2283	290	11.4173
7	0.2756	45	1.7716	83	3.2677	300	11.8110
8	0.3150	46	1.8110	84	3.3071	310	12.2047
9	0.3543	47	1.8504	85	3.3464	320	12.5984
10	0.3937	48	1.8898	86	3.3858	330	12.9921
11	0.4331	49	1.9291	87	3.4252	340	13.3858
12	0.4724	50	1.9685	88	3.4646	350	13.7795
13	0.5118	51	2.0079	89	3.5039	360	14.1732
14	0.5512	52	2.0472	90	3.5433	370	14.5669
15	0.5906	53	2.0866	91	3.5828	380	14.9606
16	0.6299	54	2.1260	92	3.6220	390	15.3543
17	0.6693	55	2.1654	93	3.6614	400	15.7480
18	0.7087	56	2.2047	94	3.7008	410	16.142
19	0.7480	57	2.2441	95	3.7402	420	16.535
20	0.7874	58	2.2835	96	3.7795	430	16.929
21	0.8268	59	2.3228	97	3.8189	440	17.323
22	0.8661	60	2.3622	98	3.8583	450	17.717
23	0.9055	61	2.4016	99	3.8976	460	18.110
24	0.9449	62	2.4409	100	3.9370	470	18.504
25	0.9842	63	2.4803	110	4.3307	480	18.898
26	1.0236	64	2.5197	120	4.7244	490	19.291
27	1.0630	65	2.5590	130	5.1181	500	19.685
28	1.1024	66	2.5984	140	5.5118	510	20.079
29	1.1417	67	2.6378	150	5.9055	520	20.472
30	1.1811	68	2.6772	160	6.2992	530	20.866
31	1.2205	69	2.7165	170	6.6929	540	21.260
32	1.2598	70	2.7559	180	7.0866	550	21.654
33	1.2992	71	2.7953	190	7.4803	560	22.047
34	1.3386	72	2.8346	200	7.8740	570	22.441
35	1.3780	73	2.8740	210	8.2677	580	22.835
36	1.4173	74	2.9134	220	8.6614	590	23.228
37	1.4567	75	2.9528	230	9.0551	600	23.622
38	1.4961	76	2.9921				

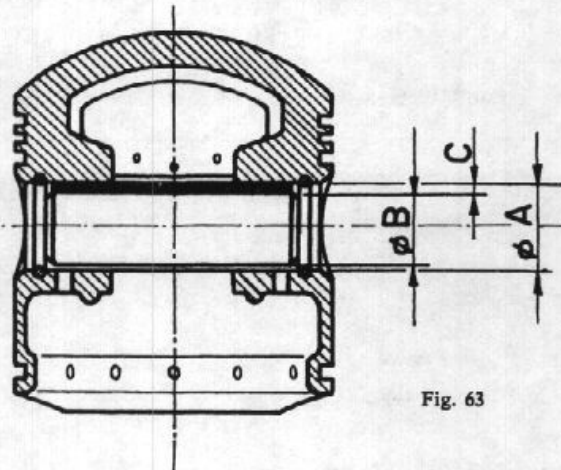
For intermediate values not shown on table, it is necessary to combine several values from table. Example: To convert 168 mms. to inches, take from table:

$$\begin{array}{r}
 160 \text{ mms.} = 6.2992 + \\
 8 \text{ mms.} = 0.3150 = \\
 \hline
 168 \text{ mms.} = 6.6142
 \end{array}$$

**Table N. 2 - Assembly interference and clearance between piston and gudgeon pin. - Limits of wear.**

**NOTE**

Standard and oversize gudgeon pins, as well as pistons with standard gudgeon pin holes, are supplied by DUCATI MECCANICA S.p.A.. The oversizing of gudgeon pin holes in pistons must be done by servicing and repair shops in accordance with the following tables.



**Fig. 63**

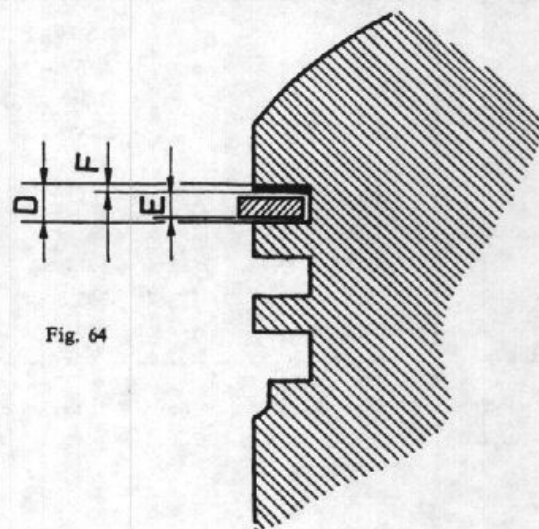
**160 MONZA JUNIOR MOTOR CYCLE**

ASSEMBLY	PISTON $\varnothing A = \text{mm.}$	GUDGEON PIN $\varnothing B = \text{mm.}$	Clearance Interference $C = \text{mm. max.}$	Limits of wear mm.
Standard	16.003	15.995	+ 0.008	0.05
	15.997	16.000	- 0.003	
1st gudgeon pin oversize + 0.010	16.013	16.005	+ 0.008	
	16.007	16.010	- 0.003	
2nd gudgeon pin oversize + 0.015	16.018	16.010	+ 0.008	
	16.012	16.015	- 0.003	
3rd gudgeon pin oversize + 0.020	16.023	16.015	+ 0.008	
	16.017	16.020	- 0.003	

**250 cc and 350 SEBRING MOTOR CYCLES**

ASSEMBLY	PISTON $\varnothing A = \text{mm.}$	GUDGEON PIN $\varnothing B = \text{mm.}$	Clearance Interference $C = \text{mm. max.}$	Limits of wear mm.
Standard	18.003	17.995	+ 0.008	0.05
	17.997	18.000	- 0.003	
1st gudgeon pin oversize + 0.010	18.013	18.005	+ 0.008	
	18.007	18.010	- 0.003	
2nd gudgeon pin oversize + 0.015	18.018	18.010	+ 0.008	
	18.012	18.015	- 0.003	
3rd gudgeon pin oversize + 0.020	18.023	18.015	+ 0.008	
	18.017	18.020	- 0.003	

**Table N. 3 - Minimum and maximum axial clearance on assembly for compression rings and oil-scrappers. Limits of wear.**



**Fig. 64**

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.
160 MONZA JUNIOR	1.500	—	1.520	0.020	0.10
	1.488	—	1.540	0.052	
	—	2.500	3.520	0.020	
	—	2.488	3.540	0.052	
250 MONZA	1.990	—	2.000	0.010	0.10
250 GT	1.978	—	2.020	0.042	
250 MOTOCROSS	—	2.490	2.500	0.010	
	—	2.478	2.520	0.042	
250 MARK 3 edit. 64	1.490	—	1.500	0.010	0.10
	1.478	—	1.520	0.042	
	—	2.990	3.000	0.010	
	—	2.978	3.020	0.042	
250 MARK 3 edit. 65-66 250 MACH 1	1.490	—	1.510	0.020	0.10
	1.478	—	1.530	0.052	
	—	2.990	3.010	0.020	
	—	2.978	3.030	0.052	
350 SEBRING	1.490	—	1.510	0.020	0.10
	1.478	—	1.530	0.052	
	—	3.990	4.010	0.020	
	—	3.978	4.030	0.052	

Table N. 4 - Assembly tolerance for piston ring and oil-scraper end gap. - Limits of wear.

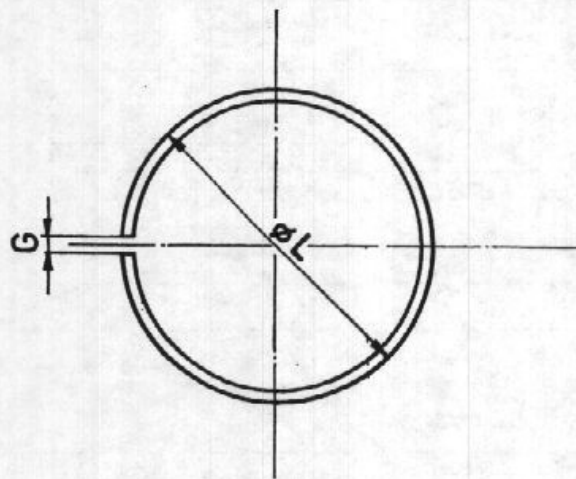


Fig. 65

MOTOR CYCLE MODEL	O.D. of piston ring or oil-scraper in working position L = mm.	Gap G = mm	Limits of wear mm.
160 MONZA JUNIOR	61.00 ÷ 61.02	0.15 ÷ 0.30	0.80
250 MONZA - GT - SCR	74.00 ÷ 74.02	0.30 ÷ 0.45	1.00
250 MARK 3 - MACH 1	74.00 ÷ 74.02	0.25 ÷ 0.40	1.00
350 SEBRING	76.00 ÷ 76.02	0.30 ÷ 0.45	1.00



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

**NOTE**

Standard and oversize gudgeon pins are supplied by DUCATI MECCANICA S.p.A.. Boring for oversizing connecting rod bush must be done by servicing and repair shops.

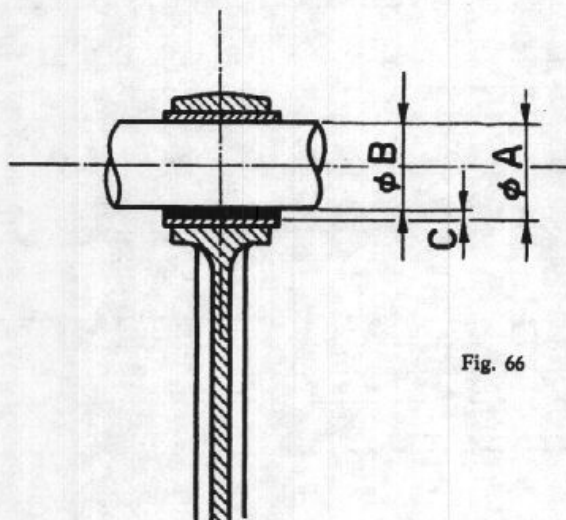


Fig. 66

**MOTOR CYCLE 160 MONZA JUNIOR**

ASSEMBLY	Connecting rod small end bush ØA = mm.	Gudgeon pin ØB = mm.	Clearance min. & max. C = mm.	Limits of wear mm.
Standard	16.005	16.000	0.005	0.05
	16.023	15.995	0.028	
1st gudgeon pin oversize + 0.010	16.015	16.010	0.005	
	16.033	16.005	0.028	
2nd gudgeon pin oversize + 0.015	16.020	16.015	0.005	
	16.038	16.010	0.028	
3rd gudgeon pin oversize + 0.020	16.025	16.020	0.005	
	16.043	16.015	0.028	

**250 cc and 350 SEBRING MOTOR CYCLES**

ASSEMBLY	Connecting rod small end bush ØA = mm.	Gudgeon pin ØB = mm.	Clearance min. & max. C = mm.	Limits of wear mm.
Standard	18.000	18.000	0.000	0.03
	18.018	17.995	0.023	
1st gudgeon pin oversize + 0.010	18.010	18.010	0.000	
	18.028	18.005	0.023	
2nd gudgeon pin oversize + 0.015	18.015	18.015	0.000	
	18.033	18.010	0.023	
3rd gudgeon pin oversize + 0.020	18.020	18.020	0.000	
	18.038	18.015	0.023	

Table N. 6 - Radial tolerance on assembly between connecting rod big end and crank pin.  
Limits of wear.

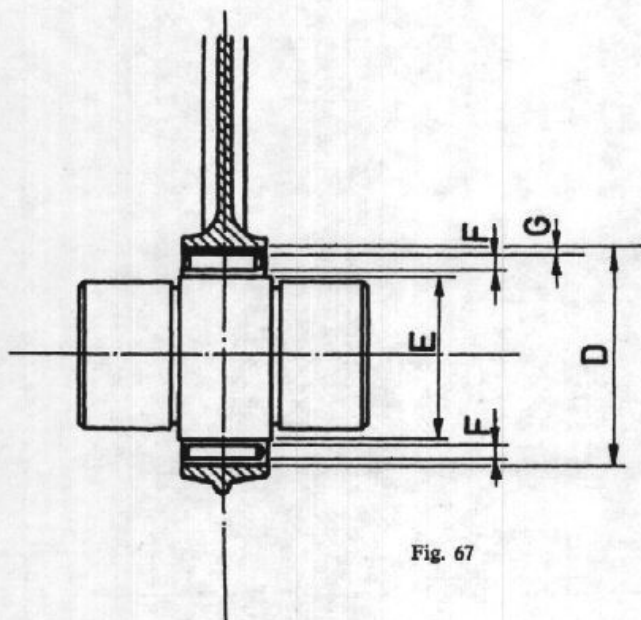


Fig. 67

#### MOTOR CYCLE 160 MONZA JUNIOR

CONNECTING ROD BIG END D = mm.	CRANK PIN E = mm.	ROLLER F = mm.	Clearance min. and max. G = mm.	Limits of wear mm.
34.000	27.995	3.000	0.005	0.03
34.002	27.993	2.998	0.013	

#### 250 cc and 350 SEBRING MOTOR CYCLES

CLASS	CONNECTING ROD BIG END D = mm.	CRANK PIN E = mm.	ROLLER F = mm.	Interference — Clearance + G = mm. max.	Limits of wear mm.
A	39.000	32.006	3.500	— 0.006	0.03
A	39.010	32.000	3.498	+ 0.014	
B	38.994	32.000	3.500	— 0.006	0.03
B	39.000	31.990	3.498	+ 0.014	

Table N. 7 - Axial tolerance on assembly between connecting rod big end and crank pin.  
Limits of wear.

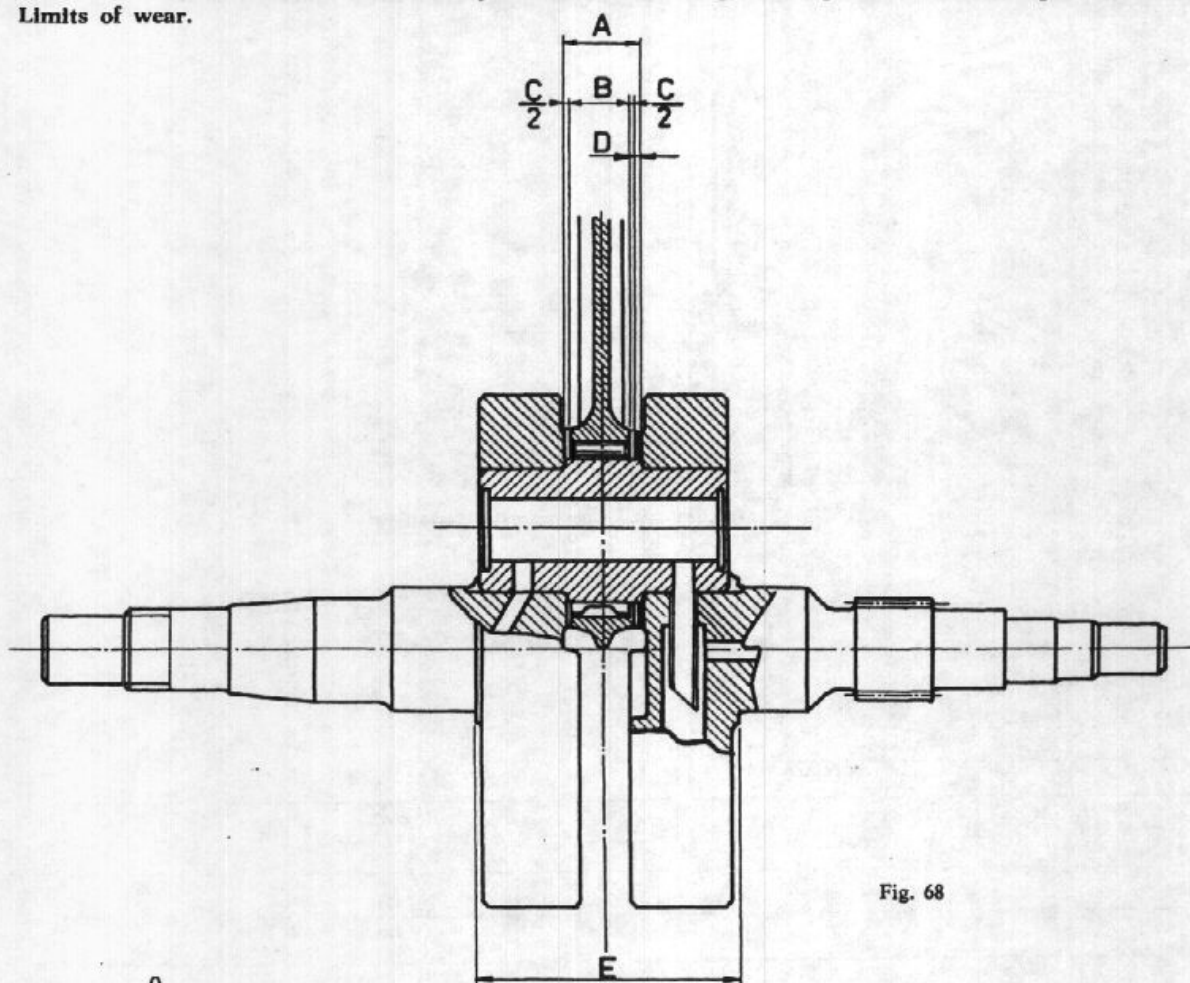


Fig. 68

$E = 63 - 0.05$  for 160 Monza Junior.

$E = 65.5 - 0.05$  for 250 cc motor cycles and 350 Sebring.

MOTOR CYCLE MODEL	CRANK PIN A = mm.	CONNECTING ROD BIG END B = mm.	THRUST WASHERS C = mm.	Clearance min. & max. D = mm.	Limits of wear mm.
160 MONZA JR.	19.100	16.950	2.000	0.150	0.60
	19.150	16.907	1.820	0.423	
250 cc and 350 SEBRING	20.100	17.950	2.000	0.150	0.60
	20.150	17.907	1.820	0.423	

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

MOTOR CYCLE MODEL	VALVE-GUIDE BORE Ø = mm.	VALVE STEM Ø = mm.	Clearance min. & max. mm.	Limits of wear mm.
160 MONZA JR.	7.000	6.987	0.013	0.08
	7.022	6.965	0.057	
250 cc and 350 SEBRING	8.000	7.987	0.013	0.08
	8.022	7.965	0.057	



**Table - N. 9 - Minimum and maximum clearance between rocker pin and rocker bush. - Limits of wear.**

MOTOR CYCLE MODEL	BUSH BORE Ø = mm.	ROCKER PIN Ø = mm.	Min. & max. clearance mm.	Limits of wear mm.
160 MONZA JUNIOR	8.013	8.010	0.003	0.05
	8.028	8.001	0.027	
250 cc and 350 SEBRING	10.013	10.010	0.003	0.05
	10.028	10.001	0.027	

**Table N. 10 - Maximum interference and maximum clearance between bush and rocker.  
Limits of wear.**

MOTOR CYCLE MODEL	ROCKER BORE Ø = mm.	BUSH OUTSIDE Ø = mm.	Max. interference — Max. clearance + mm.	Limits of wear mm.
160 MONZA JUNIOR	11.000	11.012	— 0.012	0.04
	11.018	11.001	+ 0.017	
250 cc and 350 SEBRING	13.000	13.012	— 0.012	0.04
	13.018	13.001	+ 0.017	

**Table N. 11 - Needle valve springs.**

MOTOR CYCLE MODEL	SPRING INLET OR EXHAUST	P		L = mm.	Limits of wear mm.
		Kg.	lb		
160 MONZA JUNIOR	I	16 ± 0.800	35.3	Parallel arms	Arms converging
	E	16 ± 0.800	35.3	" "	
250 MONZA 250 MARK 3 edit. 64 250 SCR - GT f. e.n. 87422	I	27 ± 0.650	59.5	" "	
	E	22 ± 1	48.5	" "	
250 GT till e.n. 87421	I	22 ± 1	48.5	" "	
	E	22 ± 1	48.5	" "	
250 MARK 3 edit. 65 - 66 250 MACH 1	I	27 ± 0.650	59.5	" "	
	E	27 ± 0.650	59.5	" "	

## REASSEMBLING OF THE ENGINE

We shall now deal with those assembly jobs which, besides extra care on the part of the operator, require special tools. To assemble the engine's less important parts, follow the usual repair shop practice.

### FITTING BEARINGS, ROLLERS BOX AND BUSHES IN THE CRANKCASE AND COVERS (IF THEY HAVE HAD TO BE REMOVED FOR REPLACEMENT).

Take the cleaned crankcase parts and place them on the electric plate-oven. Heat to  $100^{\circ} \pm 110^{\circ}\text{C}$ . ( $212^{\circ} \div 230^{\circ}\text{F}$ .).

Remove the parts from the plate and place them on a level surface. The bearing, the box and bushes may now be dropped in their respective housings.

If the crankcase parts are not hot enough, drive the bearing, or bush home with the aid of an aluminium drift and a mallet.

**NOTE!** - When fitting bearings, take care that the trademark or name of the bearing is readable when bearing is in place.

In the « chain-side » half of the crankcase fit the oil-seal washer under the layshaft bearing so that the lip formed, is turned towards the bearing. The shielded bearing should be fitted on the main-shaft seat with the shielding up against the seat. Wash with gas or kerosene and dry using air. On the outside of the half crankcase being worked on, the opposite position from where the shielded bearing is being fitted, fit the rubber washer and the retaining washer, and then press both into the seat and secure by swedging 3 or 4 places with a blunt instrument or small chisel. Fit the GACO seal ring in the cam-drum seat. Assemble the clutch lever with related pins.

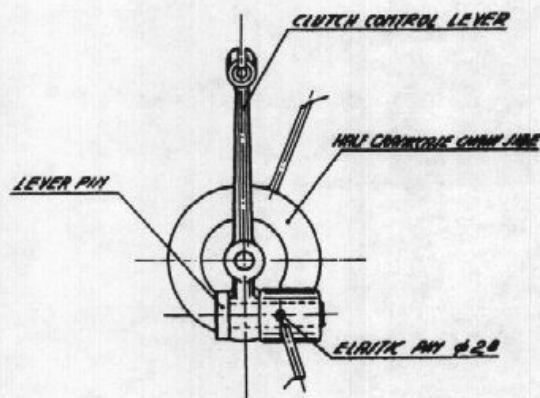


Fig. 69

When the above operations have been completed, make sure that each bearing is seated properly by tapping slightly on an aluminium drift with a hammer.

### ASSEMBLING THE TIMING BEVEL GEAR

#### Fitting bearings in the bearing-housing

In the well-cleaned housing place the 1st bearing, then the spacer, and then the 2nd bearing.

Make sure they are resting properly in their seat.

#### Assembling bearing-housing in crankcase

Take bevel gear  $Z=30$  with its shim washer,  $\varnothing i=15.5$  already in place.

Fit bevel gear into the crankcase from the bottom, threading it into the housing which is pushed in from the top of the crankcase.

Add another  $\varnothing 15.5$  thrust washer and lock the assembly by means of a Seeger ring.

Make sure there is no end play.

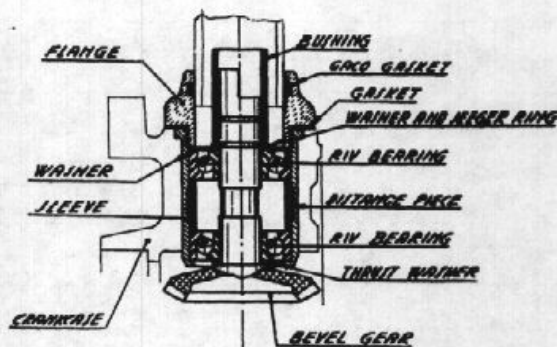


Fig. 70

Should there be end play, add more shim washers or replace them with thicker ones (replacement washers are supplied 0.05, 0.1, 0.2, 0.5 thick). Place the  $\varnothing i=29.2$  thrust washer, on top of the bearing and then assemble the flange-crankcase gasket.

Fit the flange with relative GACO seal.

Secure the latter with two TCEI 6 MA screw using a hexagon « T » wrench.

With the aid of a feeler gauge make sure the gasket is well seated; if it isn't, put in a thinner  $\varnothing i=29.2$  washer in place of the other (washer: 0.1, 0.2 and 0.5 thick are obtainable).

Install the  $\varnothing i=15$  coupling sleeve over the gear shaft.

## SHIMMING THE CRANKSHAFT

Place the « chain-side » half of the crankcase on two pieces of wood.

Insert the crankshaft (driving gear end) in its bearing and seat it properly by tapping it with a mallet.

Make sure the crankshaft is resting properly against the bearing.

Should the shaft fit, in the bearing, be so tight as to make assembly difficult, reduce the collar O.D. by polishing with very fine emery cloth. Repeat the assembly operation.

At the free end insert the shim washer or washers - the very same which the engine had when dismantled and which were tied to the connecting-rod small-end.

Fit in position the « clutch-side » half of the crankcase; secure by putting in all the screws and test by hand how smoothly the shaft revolves. The end play must not exceed 0.03 to 0.05 mm. (.0012" ÷ .0020"). If clearance is greater, add the necessary shim washers of the proper thickness. If clearance is not sufficient, replace washers with others that are adequate.

**NOTE!** - It is a good policy in the assembly operation of the above to start off with a tight fit, gradually replacing shim washers to a point where the required clearances will afford free movement and a minimum of end-play.

Remove the screws, split the crankcase, leaving the crankshaft in the left-half side of the crankcase.

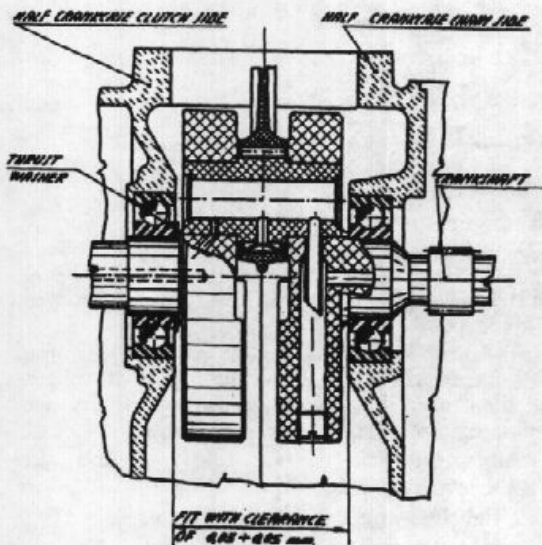


Fig. 71

## ASSEMBLING THE GEAR BOX

**Step No. 1.** - The first step in the assembly of the gear box is to put the 1st-speed driven gear (kick-starter gear) in the leftside crankcase, together with the rollers and grease.

**Step No. 2.** - Take the layshaft, complete with its previously checked gears, and make certain that the gear-engaging dogs mesh properly and that the gears slide freely (see Fig. 72).

**Step No. 3.** - Now take the main shaft, complete with its previously checked gears, making sure that the gear-engaging dogs mesh properly and that the gears slide freely. Assemble into its bearing, working with the small end first. Tap lightly into place with a plastic mallet (see Fig. 73).

**Step No. 4.** - (Assembly of Cam Drum and Gear-Engaging Forks). Take the cam drum with two (2) shim washers ( $\phi i=16.5$  and  $\phi i=36.5$  respectively). Insert drum into its place, checking to make sure that it rotates.

Now insert the three gear-engaging forks into the appropriate gears then engage the forks into the drum.

Lastly, insert the fork guides through the forks and into the crankcase bosses (see Fig. 74).

**Step No. 5.** - Checking the Gear Box Assembly. At this point, rotate the drum engaging 1st, 2nd, 3rd, 4th and 5th gear; in every gear the shafts must rotate freely.

**NOTE!** - If something binds, gears do not mesh freely or gear box doesn't function smoothly, check for error in assembly.

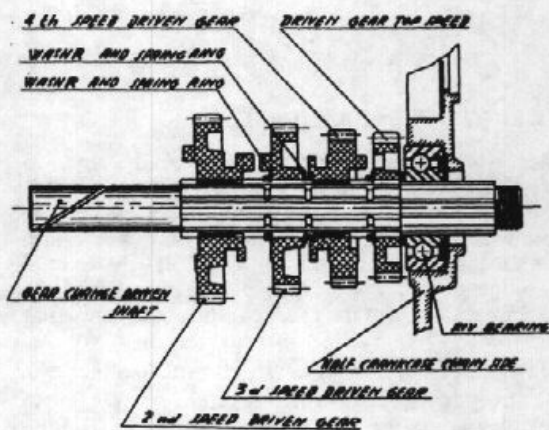


Fig. 72



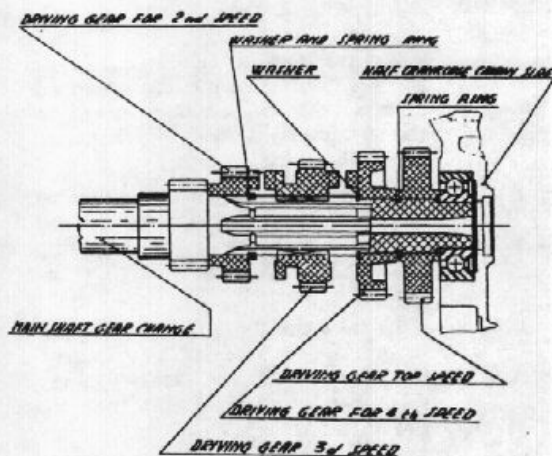


Fig. 73

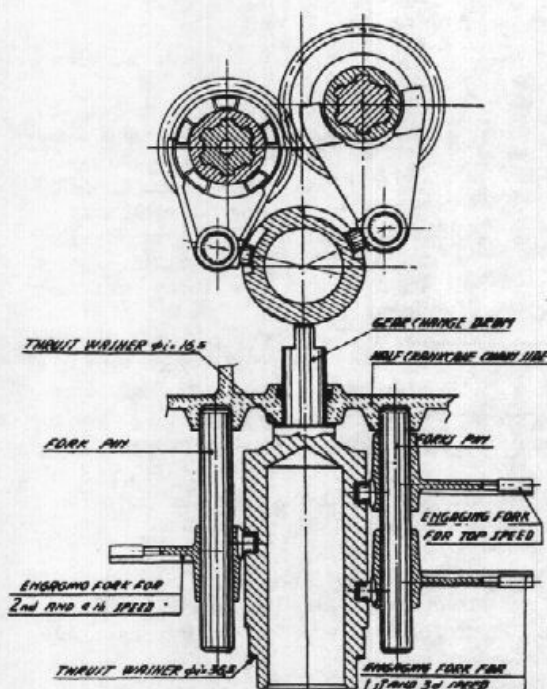


Fig. 74

### CLOSING THE CRANKCASE

Place the gasket in position and make certain that the hole for the oil passage is exposed. Fit other half of crankcase on top of it. With the clutch side resting on the bench and the chain side on top, and using a mallet, tap lightly around the edge of the upper half of the crankcase. At the same time, rotate the gear box shaft so that both halves will settle for a perfect fit.

Now secure both halves with the proper screws. The proper procedure to tighten screws is to first draw up all the screws and then tighten one and tighten the second, opposite the first.

Tighten another at one end and the next, opposite that and so on, so that all portions of the crankcase have an equal amount of pressure.

**NOTE!** - A good practice after assembling both crankcase is to take a small aluminum rod, and using a small hammer, tap around the inner race of the crankshaft bearing to release tension that may have built up in assembly.

### ASSEMBLING THE OIL FILTER

From the clutch side half of the crankcase, insert and screw in the oil filter, making sure that the washer is in place and in good condition on the filter. (Be careful when threading in the filter that the end of the filter is properly situated in the seal, which is cast on the inside of the crankcase).

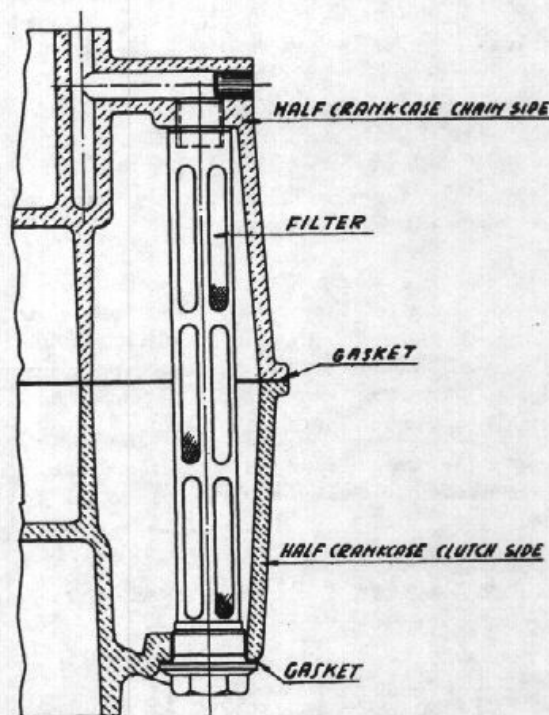


Fig. 75

Take pump-gear 0600-70.300 with its washer 0400.70.120 and assemble it in its place. This auxiliary assembly is needed so that the bevel gears can be shimmed, the timing of which will be done later.

Insert shim washer  $\varnothing i=15.5$  on the driving shaft, insert the 4x5 Woodruff key in its place, and then insert bevel gear  $Z=21$ , so that the two timing marks of both gears combine.

Assemble the tab washer  $\varnothing i=14.5$  and the 14x1M lefthanded hexagon nut.

Lock tightly using the following tools:

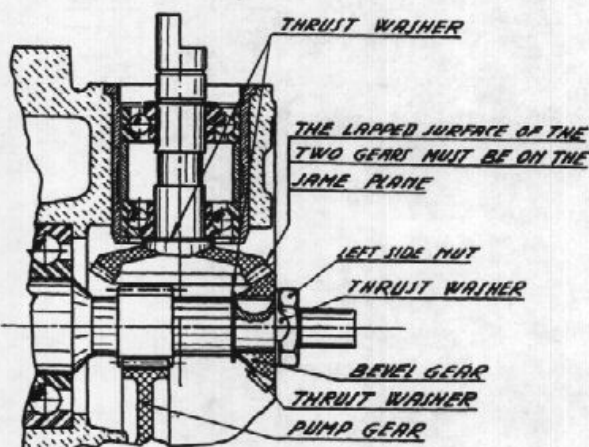
- (18a) - Driving shaft holding tool;
- - 22 mm. hexagon wrench.

**NOTE!** - Left handed thread (see Fig. 44 on page 54). It is very important that the washer mentioned in the above assembly be fitted. The omission of this small part will cause excessive engine damage.

Rotate the gears by hand until both ground surfaces of the two (2) gears are in view.

If the shimming is correct, these two ground surfaces will present an even surface and the teeth of each of the gears will be in mesh 100%. At this point, the gears should rotate freely without backlash.

If shimming is not correct, adjust the shim washers on either or both of the gears until the desired precision is attained.



**ATTENTION:** WHEN ASSEMBLING THE ABOVE PARTS PAY ATTENTION THAT THE LOCATING SPOTS OF THE TWO GEAR COINCIDE EXACTLY. AFTER PLEASE FIND THE TWO LAPPED SURFACES OF THE TWO GEARS AND CONTROL THAT THESE ARE ON THE SAME PLANE.

Fig. 76

To re-shim the gears, proceed as follows:

- Remove the 14×1M left handed nut using the same tools as before.
- Unscrew the flange securing screws.
- Remove the Seeger ring.
- Screw extractor (3) in the housing and take the housing out of the crankcase (see Fig. 52 on page 57).
- Add or remove shims as required.
- When this operation is completed, lock the nut by bending the tab over the flat of the nut nearest to the timing spot.

**Assembly of the clutch-side cover, including Magneto, Kick-Starter and Clutch Assembly.**

To do this, the engine should be placed on two blocks of wood. Assemble the stator of the flywheel magneto with three (3) fixing screws and washers to the left-hand half of the crankcase. When fitting the flywheel, remember that the flywheel reference line must coincide with the DUCATI « Flywheel and Ignition Specifications »

(fig. 77 and fig. 33 and table a pag. 45).

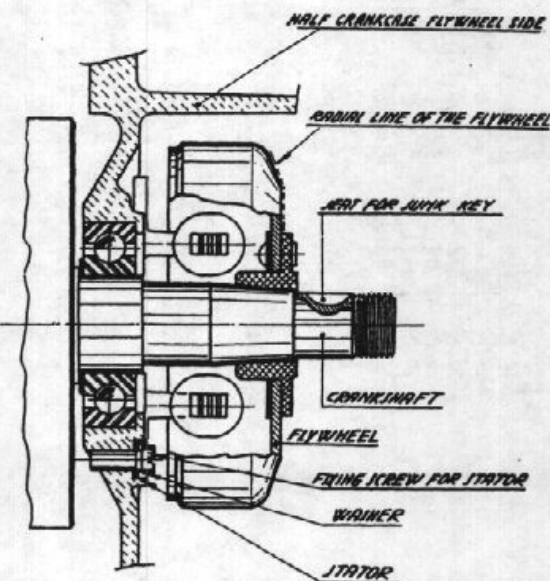


Fig. 77

#### Assembling the Kick-Starter gear

Fit the kick-starter gear and the starter spindle assembly complete with spring, spacer, and thrust washer and sector lock plate, as showed in the figure 78.

Wind the spring until it fits the anchorage pin.

Install the leaf spring that presses the starting gear and secure with the plate 0400.88.010 which is not seen in fig. 78, the lock washer and TE screw.

Care must be taken when tightening the bolt that the fingers of the spring are equidistant from the center of the shaft.

Lock the bolt by lifting a tab over its head and lowering the other tab onto the crankcase.

Fit the 4 x 5 Woodruff key and the driving gear to the crankshaft.

#### Assembling the clutch housing

Fit the housing with the bearings on the mainshaft, after the installation of the spacer 0258.16.840 on the shaft.

Assemble the clutch drum, the Øi=16.3 safety washer, and the 16×1M hexagon nut.

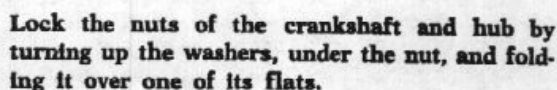
Fit the Øi=20.2 tab washer with related 20×1M nut on the crankshaft.

Holding the housing firm by means of the special tool (4), use spanner ch. 30 to tighten the driving shaft nut (see Fig. 47, page 55), with a load of 8.3 to 9.7 Kgm. (=lbs/inch 700/850), in all models.

Hold the clutch drum firm with tool (5) and, using spanner ch. 24, tighten the hub nut (see Fig. 48, page 55).



**NOTE!** - If the driving gear and clutch housing mesh too tightly, the engine will whine; therefore an undersize driving gear must be fitted.



First of all assemble one driving plate; then, alternately, six driven plates and six driving plates.



16 Clutch drum.  
17 Clutch housing.  
18 Clutch peg.  
19 Ball (2).  
20 Clutch operating rod.



Into the mainshaft cavity insert the clutch peg, the ball, the clutch rod, the other ball and the roller.

Fit the pressure plate with the adjustment screw and nut.

Into the pressure plate holes, insert the spring-retainer cups together with their springs, and lock by means of screws and washers. Tighten well and completely.

Adjust the pressure plate leaving the screw protruding about 5 mm. from the nut surface and draw up the nut very tightly.

#### Assembling the « clutch-side » cover

Fit the cover gasket on the half-crankcase.

Fit the « clutch-side » cover, tapping lightly with a mallet all around it.

Secure with screws and remember that the 3 longer ones go in the dowel positions.

Insert the oil-seal rubber in the starter spindle.

Fit the starter lever so that it is at 45° in relation to the cylinder axis. Tighten the lever locking-screw.

#### FITTING THE PUMP ON THE TIMING COVER

Take the pump body with bush and pin already assembled.

Insert the pressure valve spring in the seat of the timing cover and introduce the ball.

Insert the gears in their place in the pump body and make sure they run properly.

Check the clearance between the end faces of the gear and the pump cover.

Lubricate the gears.

Assemble on the « timing side » cover, the pump gasket, the pump cover and, finally, the pump body.

Secure by means of four 6 MA screws and related spring washers.

Check operation. It satisfactory, then safety wire.

**NOTE!** - Only authorized DUCATI dealer is permitted to remove the seal, dismantle the pump, overhaul it, and assemble and seal it again.

Failure to observe the foregoing con-

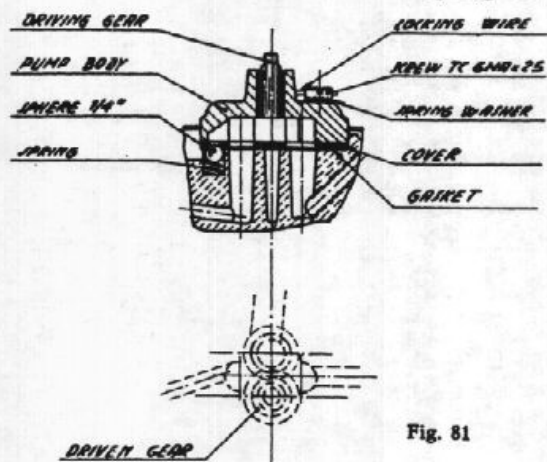


Fig. 81

dition, releases DUCATI MECCANICA S.p.A. from all responsibility should trouble arise after unauthorized persons having tampered with the pump.

#### ASSEMBLING THE COVER ON THE « TIMING SYSTEM SIDE »

Time the pump gear with the drive shaft gear (the two reference « Marks » must coincide).

In the appropriate place on the crankshaft, fit the advance spindle with the two (2) thrust washers.

Time the advance gear with the pump gear, (the two reference marks must coincide).

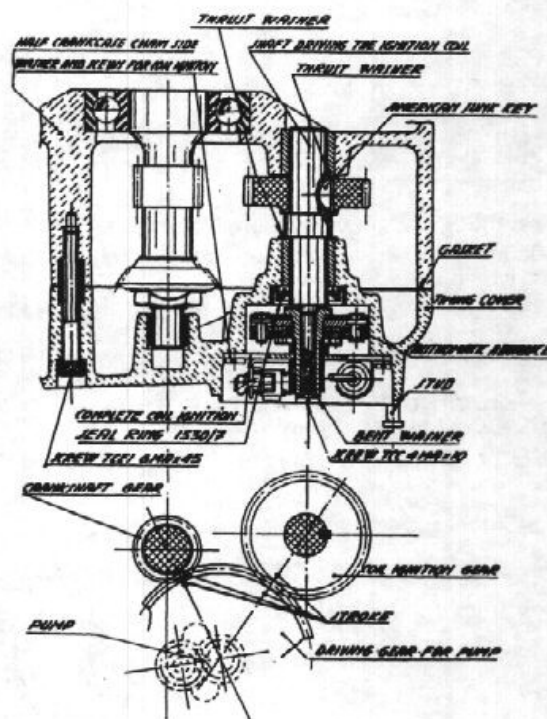


Fig. 82

Lubricate the gears.

Fit the cover seal gasket.

Fit the timing cover complete with pump.

Take great care that the slot in the shaft of the pump driving gear will accept the mating shaft of the pump gear.

Use tool (26) to protect the Stefa sealing ring of the cover while inserting the advance spindle.

Secure the cover by means of screws and studs (the latter will serve also to fit the ignition distributor cover). Tighten well. In this case, too, the two longer screws should be fitted in the position of the locating dowels (see Fig. 83).

#### Assembling of the Automatic Advance and the Ignition Distributor.

Insert the automatic advance in the spindle.

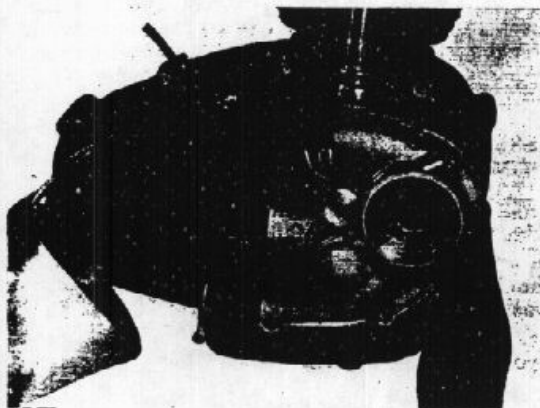


Fig. 83

**NOTE!** - The cam lobe must be up and towards the right.

Install the ignition distributor and secure it as well as the automatic advance with 3 screws and 3 washers.

#### Assembling the Counter-Shaft Sprocket

Assemble the driving pinion, the  $\varnothing i=16.3$  tab washer and the  $16 \times 1M$  nut.

Hold the sprocket by means of tool (6) and tighten the nut with a standard ch. 24 spanner. Lock the washer on the nut (see Fig. 45, page 54).

#### ASSEMBLING THE PISTON ON THE CONNECTING ROD

First of all, starting from the top, fit the upper

##### II° COMPRESSION RING

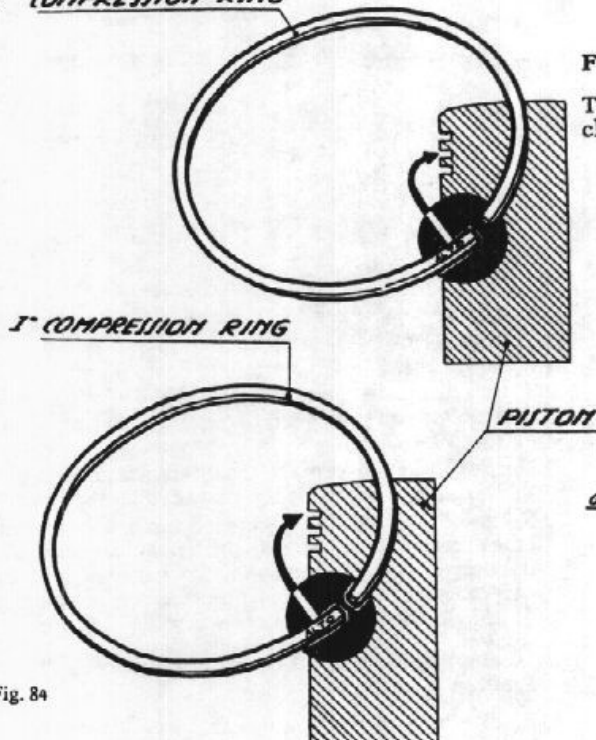


Fig. 84

oil-scraper into the 3rd groove of the piston; then the 2nd ring into the 2nd groove, and the 1st ring into the 1st groove.

On the opposite end fit the 2nd oil-scraper:

**NOTE!** - The word « ALTO » must be at the top, otherwise the piston-to-cylinder seal will not be effective.

Heat the piston to  $60^{\circ} \div 80^{\circ}C.$  ( $140^{\circ} \div 176^{\circ}F.$ ) by dipping it in hot oil, or by resting its base on an electric heater, or by applying an acetylene flame to the piston crown.

Place the piston on the connecting rod in such a position that the smaller impression of the two valves is turned towards the front of the engine. Insert the gudgeon-pin in its place by means of a drift (16-17).

Retain by means of 2 circlips.

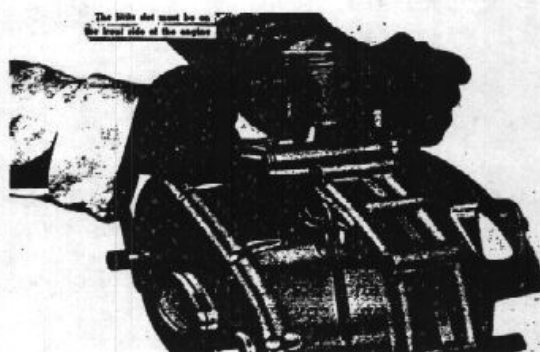


Fig. 85

#### FITTING THE CYLINDER

Take the cylinder; make sure it is thoroughly clean; then fit the cylinder-to-crankcase gasket.

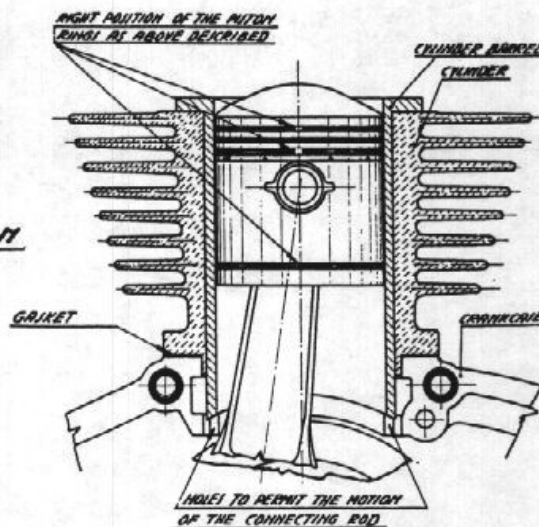


Fig. 86

Offset the piston ring gaps 180° taking care that they are not in line with the connecting rod cut-out in the barrel.

Lubricate the piston and insert the cylinder.

Make sure that the little GACO rubber ring is fitted in place on the hollow stud through which oil circulates.

### ASSEMBLING THE CYLINDER HEAD

Take the cylinder head and make sure the valve-seats and valve-guides are still in good condition (see pages 59 and 76).

Lap the valve-seats.

#### Lapping the valve-seats

Smear the tapered part of the valve head with oil and very fine abrasive. Valve grinding compound. Insert the valve in its seat and grip the end of the stem with tool (8). This tool is provided with clamps for the 160 - 250 - 350 cc. engines.

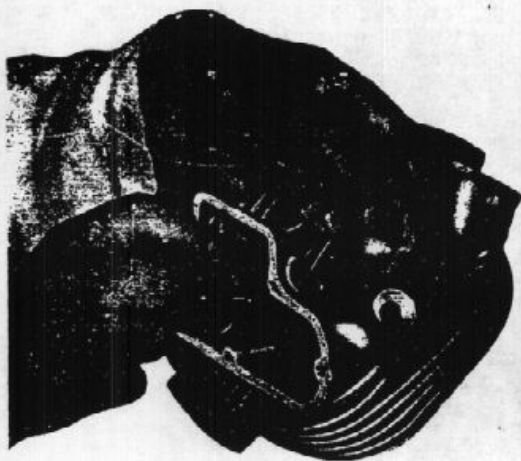


Fig. 87

To properly lap in the valve, use the special tool provided, pulling upward and rotating alternately clockwise and counter-clockwise.

Change the position every now and then.

Clean the valve and the valve seat; assemble as before by means of tool (8) and pull the valve shut.

Fill the combustion chamber with petrol or Kerosene and then blow with compressed air - from the exhaust pipe connection, in the case of exhaust valve; from the intake duct in the case of the intake valve.

This operation must, of course, be carried out on one valve at a time; in the meanwhile, the other valve must either be properly fitted in its place or resting on its seat (even in the latter case the liquid will not flow through the valve head).

If bubbles do not appear on the surface of the free liquid, then the operation has been successful. If bubbles do appear, then the lapping must be repeated.

It is good policy to repeat the seal test even after the valves have been definitely installed,

because foreign matter may have gotten between the valve and the valve seat while the valve was being installed.

If lapping does not bring the desired effect, then the valve-seat will have to be re-cut.

#### Recutting the valve-seats.

This operation is carried out using tool (22) as shown in the illustration below.

Repeat the lapping operation and the seal test, afterwards.

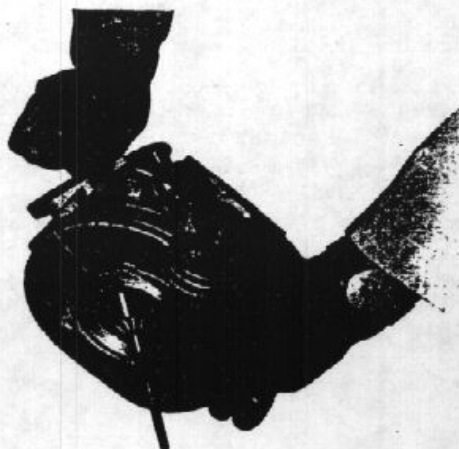


Fig. 88

#### Assembling the anchorage and springs (already fitted together) on the head

Fit the rubber oil seal on the valve guide.

Assemble the anchorage-springs unit on the head by inserting the anchorage in the valve-guide and fit the anchorage dowels in the head by tapping lightly with a pin punch and a hammer

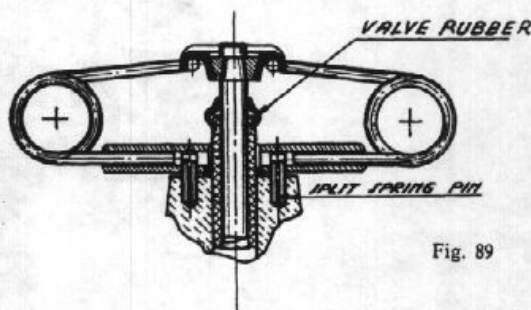


Fig. 89

**NOTE!** - Wire thickness and tension of the intake and exhaust valve springs differ. Make sure to match the heavier intake valve springs with the intake valve, especially in the models: Monza - Mark 3 edit. 64 - SCR - GT from e.n. 87422.

#### Loading the valve-springs

Using tool (21), pull the springs until you can insert the spring-saddle on the valve stem (see Fig. 57, page 58).

Insert the cotters.



Settle the valves properly by tapping lightly on the top of the stem with a plastic mallet.

#### Fitting the bearing

Fit the RIV 02 A bearing (that is, if it was previously taken out) using an aluminium drift and a mallet. Be very careful the bearing goes in parallel into its housing in the head, otherwise both housing and bearing will go out of shape. Fit the existing  $\varnothing i=29.2$  shim washer and lock with a Seeger 35 I ring.

#### Assembling the timing shaft

Lubricate the cam lobes and insert the shaft in the head bearing (put in existing shims, if any). Fit the  $3 \times 5$  Woodruff key. Insert bevel gear  $Z=28$ . Fit the  $\varnothing i=14.5$  tab washer. Screw in the  $14 \times 1M$  left-hand threaded nut. Lock the cam with tool (15) and tighten the nut with hexagon wrench 22 (see Fig. 58, page 58). On the opposite side assemble the cap with the bearing.

#### Assembling bevel gear drive and bevel gear cover

Insert into the drive cover the previously assembled drive, bearing and bearing housing.

**NOTE!** - Fit the drive cover gasket in its proper position, in order not to obstruct the lubrication ducts.

When attaching the drive cover to the head, mesh the two gears so that the timing marks coincide. Having secured the drive cover completely, and after tapping the two gears with a plastic mallet - to make them settle properly - check whether the ground surfaces of the two gears form an even plane perfect mesh.

**NOTE!** - The two gears should rotate freely and there must be no backlash.

If the surfaces are not in line, reshim both gears until the ideal condition has been reached.

The foregoing operation must be carried out with the head resting on a raised surface and by inserting tool (91), shown in the picture, into the free end of the drive cover, to ensure the centering of the drive with the upper bearing (see Fig. 91).

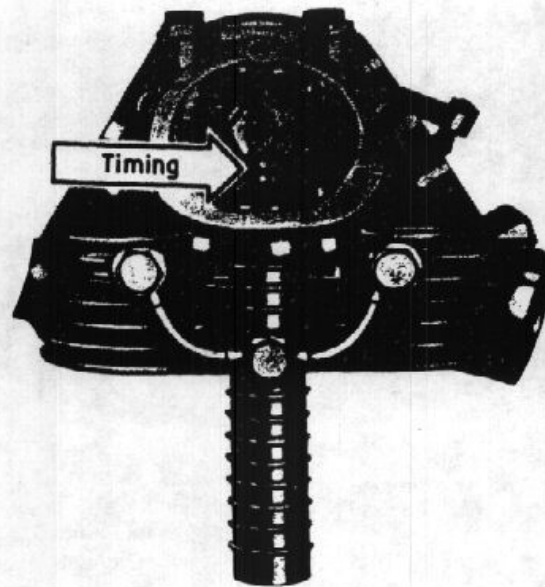


Fig. 90

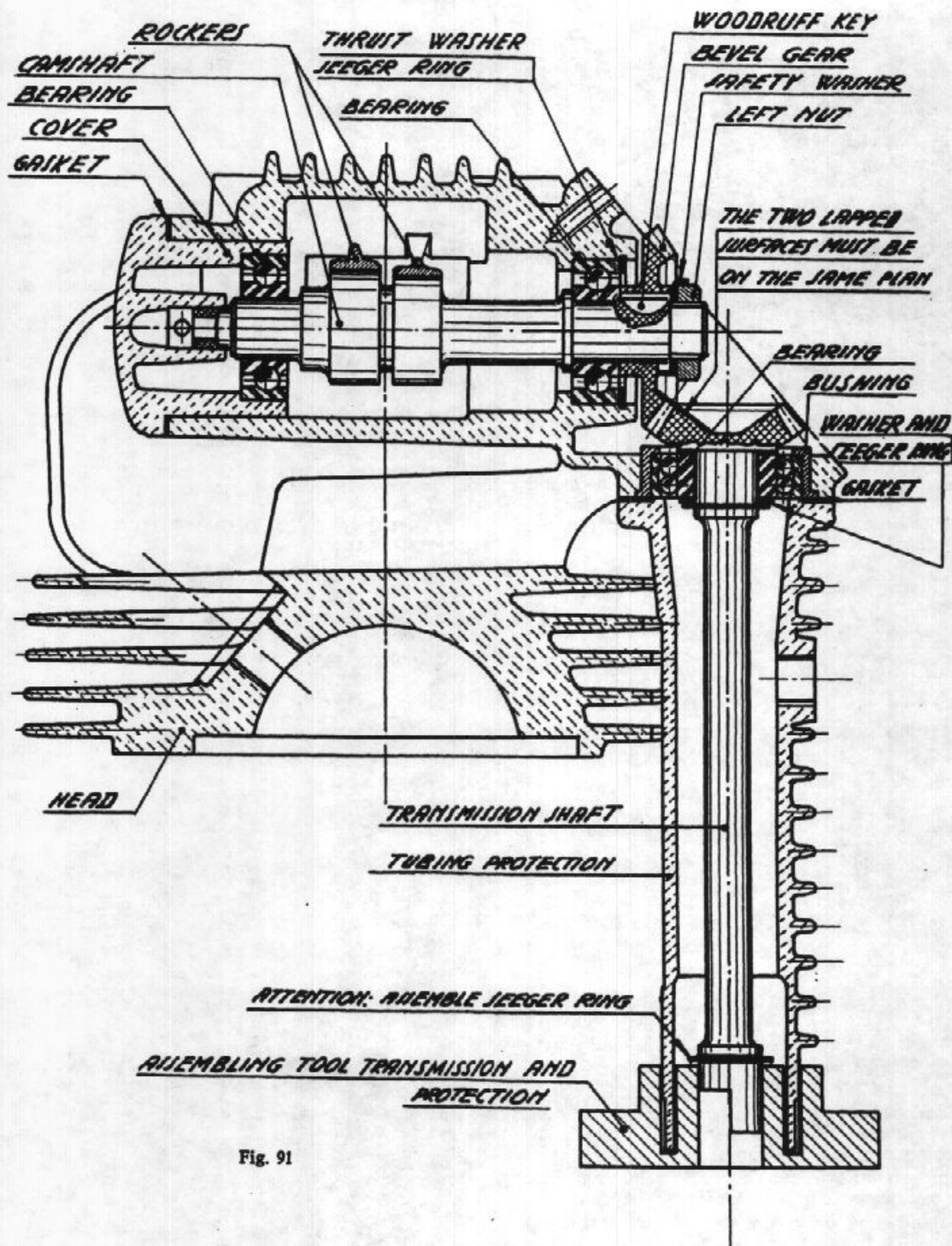


Fig. 91

#### Assembling the rockers

Using a  $\varnothing 2.5$  pin (which can be made out of a discarded spoke) and a hammer, knock out the bearing-housing.

Fit the bush in the rocker and place in position the shim washers; then insert the whole unit

into its place. Align the hole with the bush and washer centralizing mandrel (14).

Extract the pin partially, to insert the spring washer.

NOTE! - The shim washers and the spring washer should be arranged so that the

rocker adjusting screw will remain centered on the end of the valve stem.

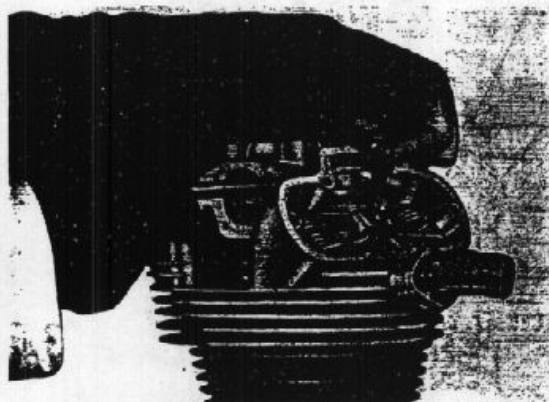


Fig. 92

Remove the pin and insert the rocker-pin taking care that its threaded cavity remains outside, so that it will be possible to pull the rocker-pin out if required.

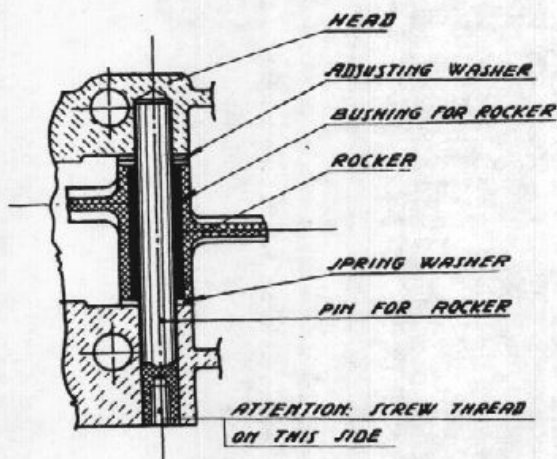


Fig. 93

**NOTE!** - When fitting the rocker take care the adjusting screw touches the end of the valve with the flat and not the rounded part.

In the models 250 Mark 3 - Mach 1 and Scrambler, insert between the valve and the rocker, the adjusting cap (winkel cap).

Fit the cap with the bearings and related gasket; lock by means of four TCEI 6MA screws.

Tap lightly on the cap with a mallet and check the bevel drive.

Lock the camshaft securing nut by turning part of the washer under the nut, onto one of its flats.

Fit the Seeger ring on the end of bevel gear shaft at the lower end of the drive cover. (See Fig. 91, page 87. The Seeger ring can be fitted before the drive assembly is attached to the head. However, it is most important not to forget this ring, otherwise the consequences may be serious).

RR

**ATTENTION: THE PLANE SURFACE OF THE SPHERE MUST BE IN CONTACT AND TRUE WITH THE VALVE**

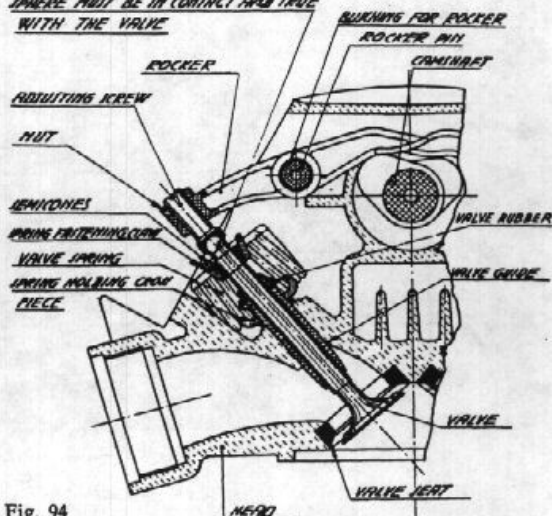


Fig. 94

#### FITTING THE CYLINDER HEAD ON THE BARREL

At this point, if the previous instructions have been followed and the moving parts of the engine were not disturbed by rotation in either direction, all the gears are in proper position and the engine is correctly timed. At this point, the cylinder head can be fitted.

The system is timed when these marks are arranged as shown by the arrows in the following illustration.

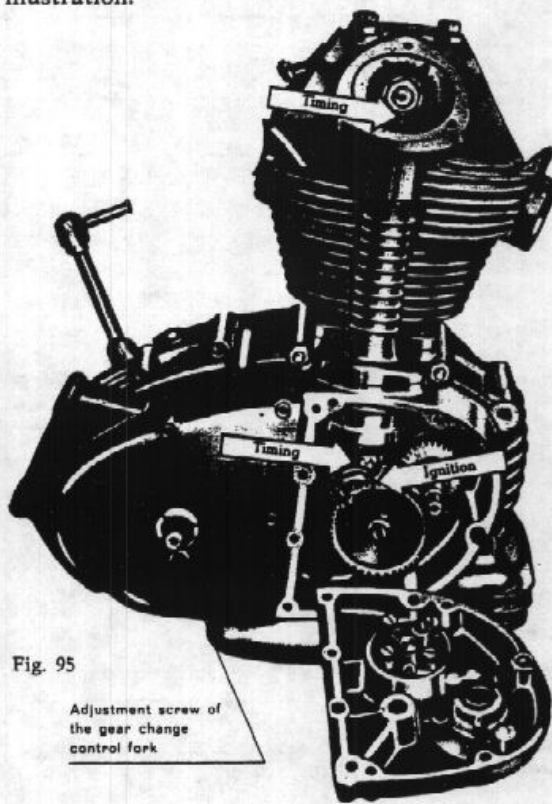


Fig. 95

Adjustment screw of the gear change control fork



## ASSEMBLING THE HEAD

When fitting the head, care must be taken not to damage the machined surfaces of either the cylinder head or the cylinder barrel. Position the cylinder head so that the hole meets the dowel. Four (4) bolts and four (4) washers are employed to secure the head.

Care must be taken to tighten the head with an

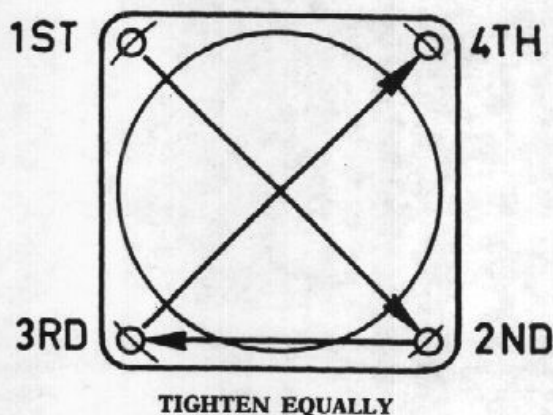


Fig. 96

equal amount of pressure on all four (4) studs. The attached sketch indicates the procedure for tightening, with a load of 3.4 to 4.0 Kgm. corresponding to 300 to 350 lbs/inch, for the 250 and 350 cc motorcycles, with a load of 2.8 to 3.4 Kgm, corresponding to 250 to 300 lbs/inch, for the 160 Monza Junior.

When fitting the head care must be taken not to dent the cylinder locating dowel. Secure by means of the 4 bolts and the 4 washers.

### Checking the timing

To carry out this check-up, proceed 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) Adjust the tappets with a 0.3 mm (.012") feeler gauge (for the models 160 Monza Junior, 250 Monza, GT, and 350 Sebring)\*.
- 5) Put a 0.1 mm (.004") feeler gauge between the intake valve and the adjuster.
- 6) Slowly rotate the crankshaft, clockwise, till the tappets begin to lock the 0.1 mm (.004") feeler gauge.
- 7) Read the degree wheel. The value should correspond to the opening of the intake valve.
- 8) Continue rotating slowly the crankshaft always in the same direction, till the feeler is slightly free from the grasp of the valve and the adjuster.
- 9) Read the degree wheel. The value indicated should correspond to the closing of the intake valve.
- 10) Repeat these operations with the exhaust valve in the models 160 Monza Jr., 250 Monza, GT and 350 Sebring.

**\* NOTE!** - Use a 0.25 mm (.0098") feeler gauge for intake valves for the models 250 Mach 1 - Mark 3 edit. 1965 and 250 Scrambler; a 0.3 mm (.012") feeler gauge for the intake valve of the Mark 3, edit. 1964 and for the exhaust valve of the 250 Scrambler; a 0.4 mm (.016") feeler gauge for the exhaust valves of the 250 Mark 3 and 250 Mach 1.

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

If the values do not correspond, check as follows:

- 1) The gears are not timed (see Fig. 95, page 88).
- 2) There is too much clearance between the Woodruff key and the timing shaft gear or between the Woodruff key and the timing shaft groove.
- 3) There is too much clearance between the Woodruff key and the crankshaft bevel gear or the Woodruff key and the crankshaft groove.
- 4) The rocker slipper is excessively worn.
- 5) The cam lobe is excessively worn.

To eliminate above troubles, reinspect the parts and replace if necessary.

MOTOR CYCLE	INTAKE		EXHAUST	
	Opens $\pm 5^\circ$	Closes $\pm 5^\circ$	Opens $\pm 5^\circ$	Closes $\pm 5^\circ$
160 MONZA JUNIOR	24°	40°	51°	30°
250 MONZA and GT from e.n. 87422	20°	70°	50°	30°
250 GT till e.n. 87421	52°	52°	75°	27°
250 MARK 3 edit. 64	62°	68°	75°	55°
250 MACH 1 & MARK 3 - edit. 65-66	62°	76°	70°	48°
250 SCRAMBLER	32°	75°	55°	44°
350 SEBRING	20°	70°	50°	30°

### TAPPET ADJUSTMENT

The tappets are adjusted by means of the screws of the rockers (in the models 160 Monza Junior,

250 Monza, GT and 350 Sebring) or by fitting the appropriate winkel caps (in the models 250 Mark 3, Mach 1 and Scrambler).

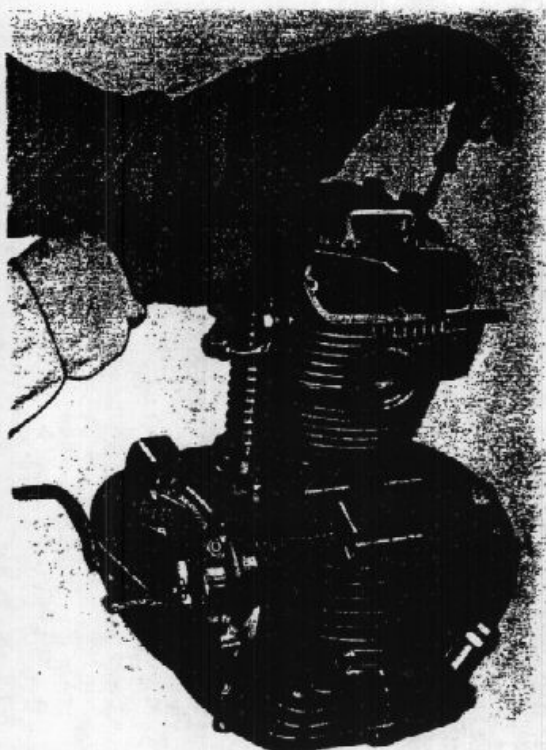


Fig. 97

#### Clearance

The working clearance between valves and rockers, when the engine is cold and piston is at T.D.C.  $0.05 \div 0.07$  mm (160 Monza Junior, 250 Monza, GT and 350 Sebring);  $0.15$  and  $0.20$  respectively for the intake and exhaust (250 Scrambler);  $0.20$  and  $0.30$  as above (Mark 3 edit. 64);  $0.15$  and  $0.30$  as above (Mach 1 and Mark 3 edit. 65).

This clearance must be adjusted and checked with a feeler gauge after engine is timed (see Fig. 95 at page 88).

#### Setting the Ignition Advance

All new DUCATI 250 cc models are fitted with

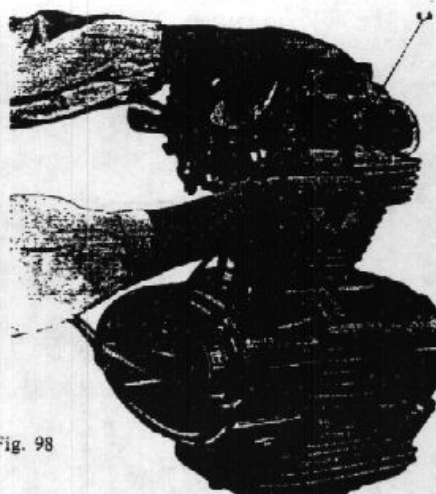


Fig. 98

automatic advance and should be set according to the various readings listed in the table below. (Models prior to 1965 are almost fitted with fixed ignition advance).

The values mentioned in the above table, were read when there was a  $0.3 \div 0.4$  mm. ( $.012 \div .016$ ") gap between the breaker contacts; to check them use a feeler gauge as shown in the following picture.

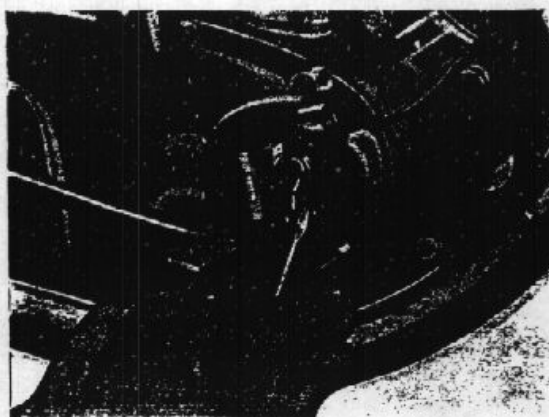


Fig. 99

Models	Strokes	from engine number	till engine number	Advance with engine still	extent of autom. advance	Total advance with engine running at 3,000 r.p.m.	Flywheel position °
160 Monza Junior	4	—	—	$21^{\circ} \div 23^{\circ}$	$18^{\circ}$	$39^{\circ} \div 41^{\circ}$	$32^{\circ} \div 36^{\circ}$
250 GT	4	—	—	$5^{\circ} \div 8^{\circ}$	$23^{\circ}$	$33^{\circ} \div 36^{\circ}$	$0^{\circ}$
250 Monza	4	—	85.486	$5^{\circ} \div 8^{\circ}$	$23^{\circ}$	$33^{\circ} \div 36^{\circ}$	$6^{\circ} \div 8^{\circ}$
250 Mach 1	4	85.487	—	$5^{\circ} \div 8^{\circ}$	$23^{\circ}$	$33^{\circ} \div 36^{\circ}$	$0^{\circ}$
	4	—	—	$5^{\circ} \div 8^{\circ}$	$28^{\circ}$	$33^{\circ} \div 36^{\circ}$	$0^{\circ}$
250 Mark 3 1963-64	4	—	87.921	$38^{\circ} \div 41^{\circ}$	—	$38^{\circ} \div 41^{\circ}$	$0^{\circ}$
	4	87.922	88.295	$38^{\circ} \div 41^{\circ}$	—	$38^{\circ} \div 41^{\circ}$	$19^{\circ} \div 21^{\circ}$
	4	88.296	—	$38^{\circ} \div 41^{\circ}$	—	$38^{\circ} \div 41^{\circ}$	$32^{\circ} \div 36^{\circ}$
250 Mark 3 - 1965-66	4	—	—	$21^{\circ} \div 23^{\circ}$	$18^{\circ}$	$39^{\circ} \div 41^{\circ}$	$32^{\circ} \div 36^{\circ}$
	4	—	87.421	$38^{\circ} \div 41^{\circ}$	—	$38^{\circ} \div 41^{\circ}$	$0^{\circ}$
250 Motocross	4	87.422	87.902	$38^{\circ} \div 41^{\circ}$	—	$38^{\circ} \div 41^{\circ}$	$19^{\circ} \div 21^{\circ}$
	4	87.903	—	$21^{\circ} \div 23^{\circ}$	$18^{\circ}$	$39^{\circ} \div 41^{\circ}$	$32^{\circ} \div 36^{\circ}$
350 Sebring	4	—	—	$5^{\circ} \div 8^{\circ}$	$28^{\circ}$	$33^{\circ} \div 36^{\circ}$	$0^{\circ}$

Before adjusting the breaker points check the contact surfaces very carefully. They must be smooth and clean.

If surfaces are not, file them carefully with a smooth file and be sure to remove all the metal dust.

Make sure that the automatic advance is in perfect order, that it is well lubricated and that the springs are not **TWISTED** or **SHIFTED** from their proper seating.

The rotary amplitude of the automatic advance will be equal to  $14^\circ$  ( $9^\circ$ ) corresponding to  $28^\circ$  ( $18^\circ$ ) on the crankshaft.

To check-up proceed as follows:

- 1) Remove the threaded plug in front of the crankshaft and fit the wheel.
- 2) Fit an indicator on one of the cover clamping screws. Adjust breaker points to 0.3 mm.  $\pm$  0.4 mm. (.012" - .016") gap.
- 3) Bring the engine to T.D.C. of the compression stroke and set the degree wheel so that the indicator is at zero. (These three operations were carried out when checking the timing phase. We are now repeating them for the benefit of anyone who needs to check the ignition advance only).
- 4) Rotate the crankshaft clockwise for about one quarter of a turn.

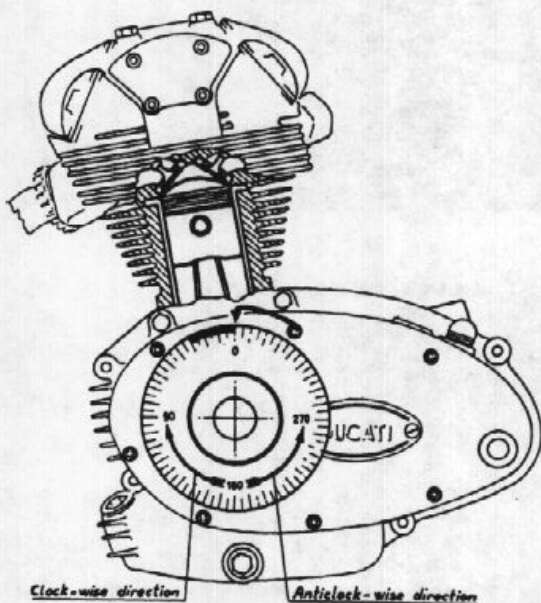
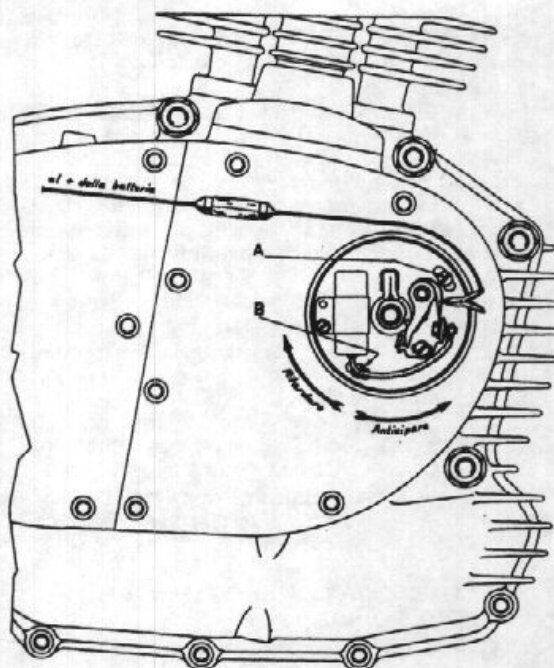


Fig. 100

- 5) To the spring of the moving part of the breaker contact connect a 6V - 3W lamp in series with the battery positive pole (+). The lamp should light up.



al + della batteria = connect to the + of the battery  
ritardare = retard  
anticipare = advance

Fig. 101

- 6) Rotate the crankshaft slowly anticlockwise till the light goes out, or it loses its light intensity. At the moment at which the light goes out or loses its intensity, the indicator should reveal the degree of advance on the degree wheel and should correspond with those given in the table (page 90).

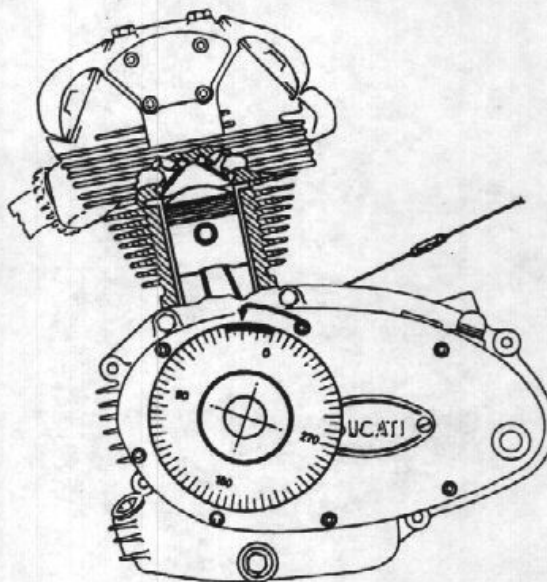


Fig. 102



- 7) We suggest that you repeat the test to be absolutely sure there is no mistake.
- 8) If the values you obtain do not conform with those in the table, loosen the two plate-fixing screws «A» and «B» and rotate the plate, advancing or retarding ignition till the values obtained are those given in the table.  
In the fixed advances, bear in mind that the elongated holes of the moving plate are based on the flywheel tuning up amplitude degree. In case the prescribed advance cannot be obtained, do not elongate the holes, but replace the contact breakers.
- 9) One should bear in mind that if the cam lubricating felt is allowed to go dry, the fibrous slipping block (that operates the opening of the moving part of the contact breaker arm) tends to wear out and thus the gap value decreases (gap closes).
- 10) Fit the gasket, the ignition distributor cover, the two A 4.3 spring washers, and fix with two TCC 4 MA screws.

#### FITTING THE VALVE AND CAMSHAFT COVERS AND OIL LINES

Assemble:

- The valve covers with related gaskets. Lock with TCEI 6MA screws.
- The timing system cover with related gasket. Lock with TCEI 6MA screws.
- The oil return line with related gaskets on and under the sealing surfaces. Lock with a 12×1.25M screw.

#### INSTALLING THE CARBURETOR

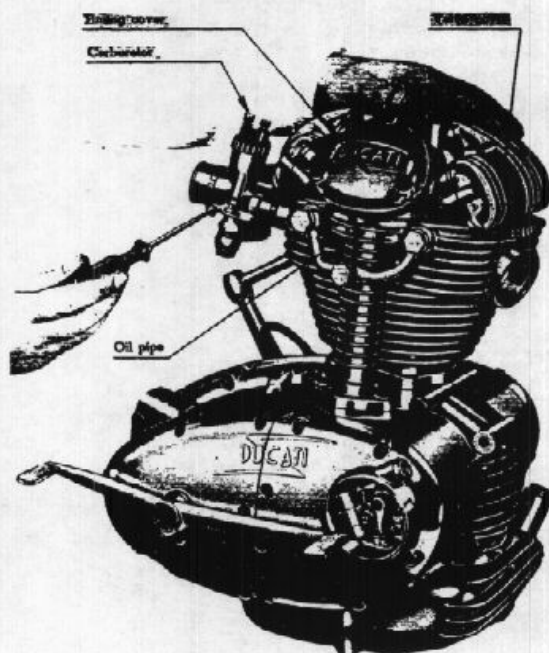


Fig. 103

Assemble:

- The intake flange gasket (160 Monza Jr., 250 Mark 3, Mach 1, Scrambler).
- The spacer (250 Monza, GT and 350 Sebring).
- The intake flange (160 Monza Jr., 250 Mark 3, Mach 1, Scrambler).
- The two Elastic-stop 8 MA×9 hexagon nuts. Tighten them securely.
- The carburetor. Tighten the sleeve locking screw (160 Monza Jr., 250 Mark 3, Mach 1, Scrambler).

#### FITTING THE SPARK PLUG

Be careful not to cross the threads.

Lightly screw in by hand, and then tighten with spark plug wrench.

Make sure that you have a gasket between the spark plug and the cylinder head.

Check the spark plug gap, which for normal use, should be approximately .026" to .028" (0.6 to 0.8 mm.).

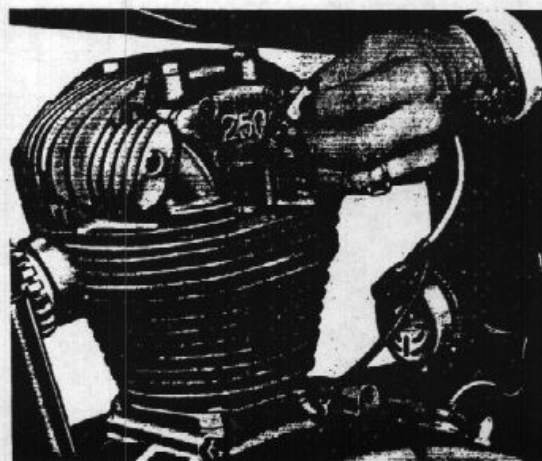


Fig. 104

#### ASSEMBLING THE «CHAIN AND GEARBOX SIDE» COVER

Inspect the cover bushes to see whether they need replacing.

If they do, this operation may be performed without heating.

Lubricate all the parts with oil or grease.

Fit the eccentric with its washer and nut.

On the fork-control spindle assemble the pedal return spring and the adjusting plate, and insert the unit in its housing in the cover.

Lock the spindle on the shift lever; hold it tight using leaded jaws.

Fit the Øi=7 locating dowels.

Fit the spring and the ball.

Install the gear selector and related Øi=15.5 washers.

Insert the selector control fork in the selector collar and, at the same time, fit the fork in the cover, in such a manner that the fork opening

takes the first two selector pins (counting from left to right).

Assemble the fork thrust-spring and the  $\varnothing i=12.5$  thrust washer on the fork control spindle.

Fit the selector cover and, using a screwdriver lock the three TSC 6MA screws.

Rotate the cover to and fro, to see how the gearbox works. If the gearbox does not work per-

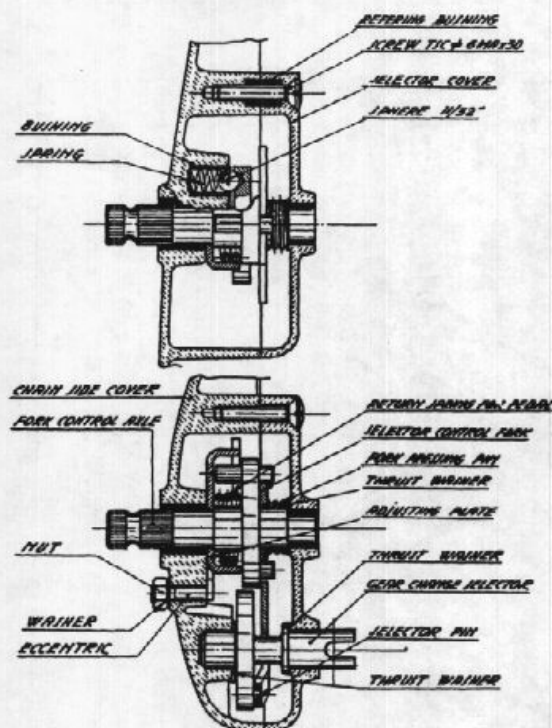


Fig. 105

fectly, adjust the 6 MA eccentric and its locknut. For the adjustment of the shifting gear, put the shift in 1st, 2nd, 3rd or 4th gear. Turn adjusting screw until the pins on the shift drum are EQUAL distance apart from the selector fork.

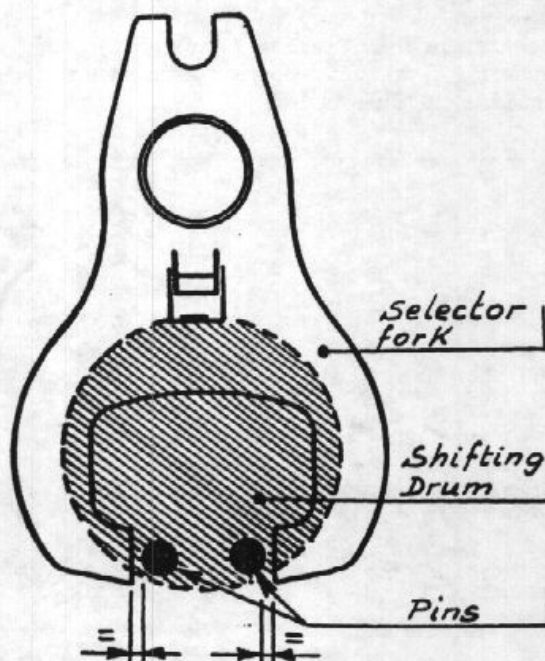


Fig. 106

The « chain and gearbox side » cover is fitted on the engine only when the engine has been fitted to the frame, otherwise the cover will have to be removed again when the chain is put in.

## 94



### Fitting the valve in the central column

Insert the nine balls in the valve seat (40); hold them in position with a little soft grease; close with washer, and then fit on support (see Fig. 108): « Tool » at page 115.

Take the central column, wash it with naphtha and a small brush, dry with compressed air, and fit it into place by tapping on the end of the tube with a wooden or leather mallet.

Lock by means of ring (41).

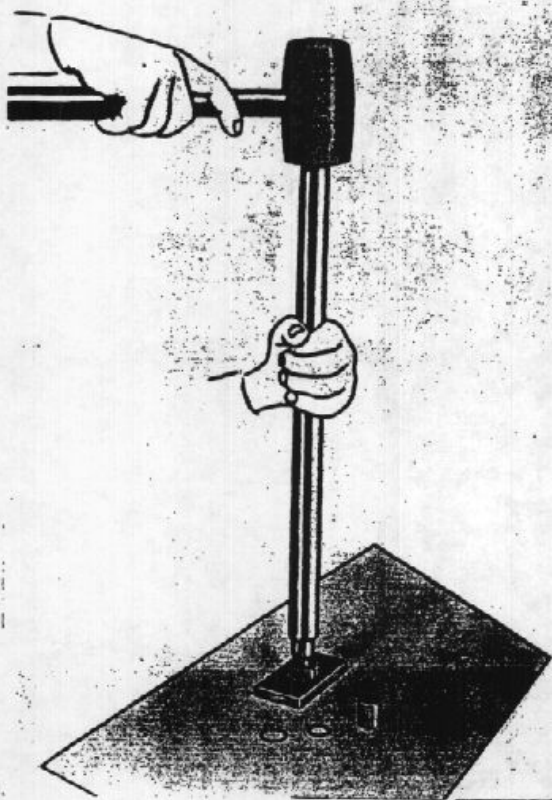


Fig. 108

### Assembling the lower sliding tube

Take washer (42), insert in the threaded plug (28) and smear the thread with jointing compound.

Screw it inside the lower sliding tube by means of the proper wrench (see Fig. 109), turning anti-clockwise.

Secure down the screw (20) in its hole together with gasket (21).

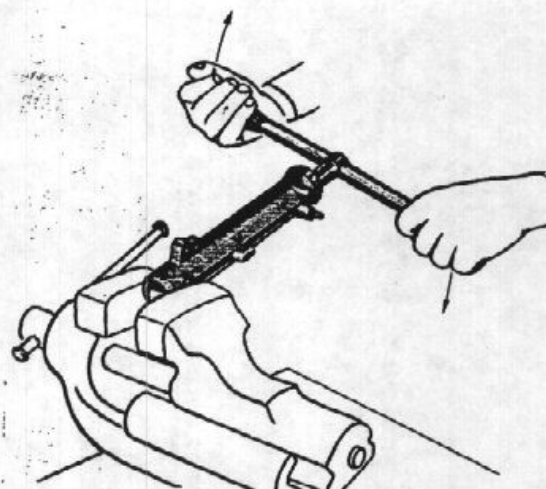


Fig. 109

Fit the sealing ring (31) using a punch (as shown in Fig. 110), tapping the end of the punch with a wooden mallet.

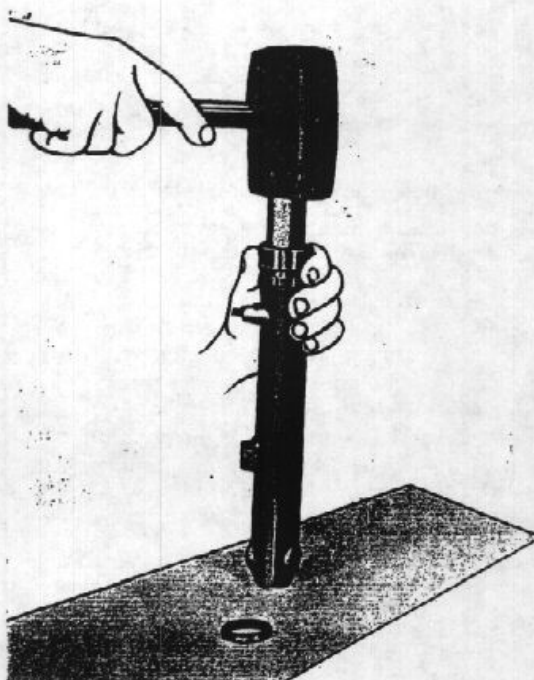


Fig. 110

Insert the central column (37) and the gasket (32) into the lower sliding tube.

Then fit the dust-cover (33) and its washer, after having lubricated the thread.

At the end of the dust-cover insert the guiding bush (see Fig. 111); then screw in with a standard hook wrench (111).

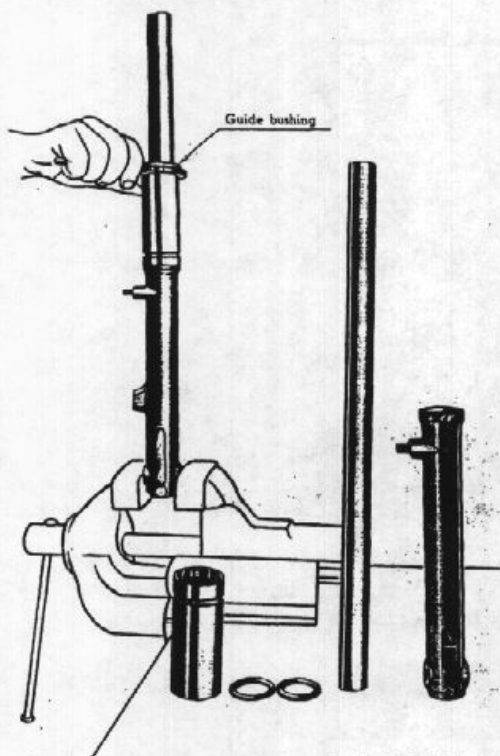


Fig. 111

#### Assembling the lower yoke and steering column

Fit on the lower yoke and steering column (16) the lower steering cone (15), tapping with a mallet on the flat end of a tube inserted in the column. The tube is about 300 mm. long. (12"). Fit screw (38) in the yoke, with washer (17) and nut (18). Do not tighten completely.

Grip the yoke (column side) into a bench vice having lead covered jaws.

Fit the 2 tubes (5) into their right position.

To put in the screws (34) use a long, magnetized screwdriver; then, tighten completely with a stronger screwdriver (see Fig. 112).

#### Securing the central column in the lower sliding tube.

Insert the spring (30) inside the tube, and on the spring, the damper stem (39).

Using a suitable T wrench (see Fig. 113), that locks the damper stem, push the stem forward in order to have the necessary stress while securing the screw (26) with a T wrench for inside hexagons.

In a previous operation, gasket (27) was to be fitted on screw (26) and the screw stem smeared with jointing compound.

After screwing, extract the tube towards you, lubricate it with AGP F.I GREASE 33 FD. and then insert suspension spring (4). Fit the lower connecting yoke (16).

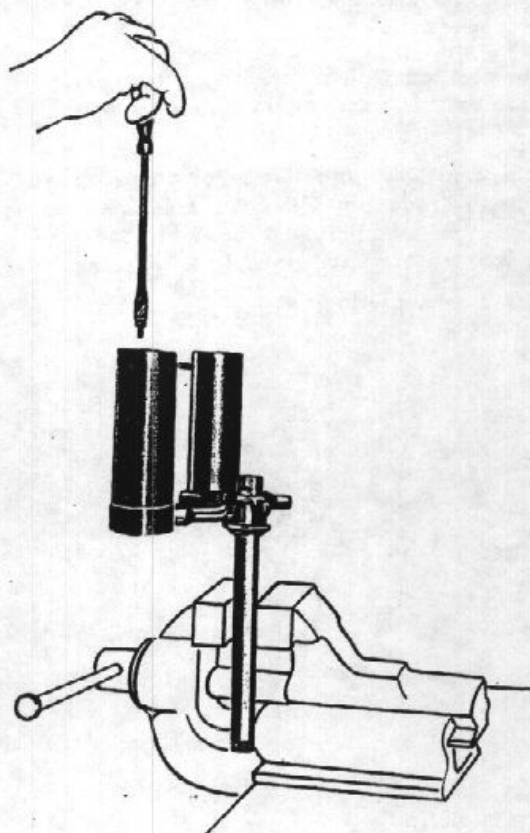


Fig. 112

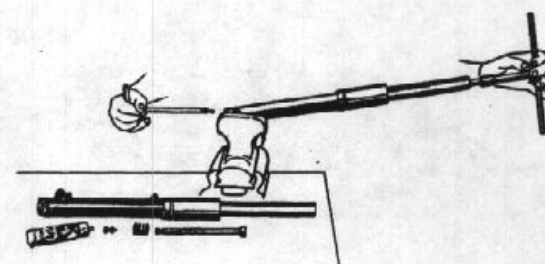


Fig. 113

Grip the central fork column in the vice and pull the shaft plate until is reached a length of 157 mm. (approx. 6") which is limited by a rod, as shown in the figure 115.

Hold nut (18) firm and tighten screw (38) completely.

Repeat the above operation with the other central column.

The job is to be carried out by two operators. One pulls the plate and screws the bolt; the other does the measuring and tightens the nut.

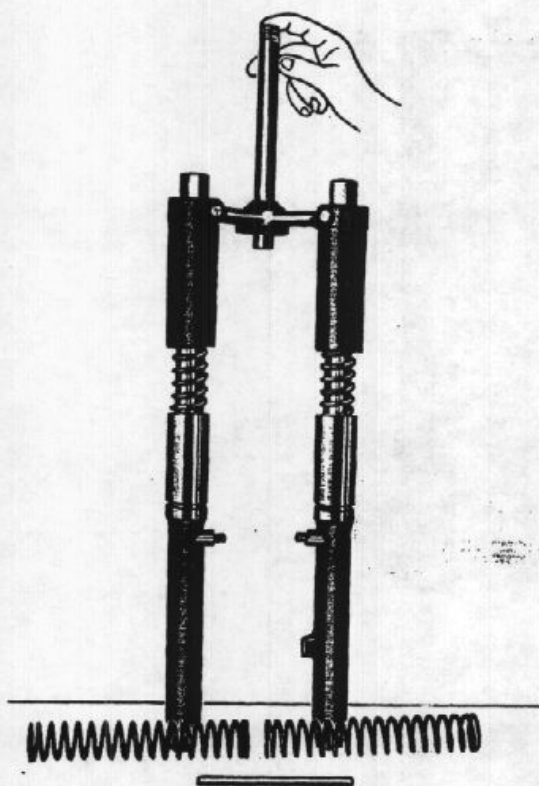


Fig. 114

#### Filling in the oil

Insert the righthand headlight bracket (1), the lefthand headlight bracket (2) and the two rubber spacers (36).

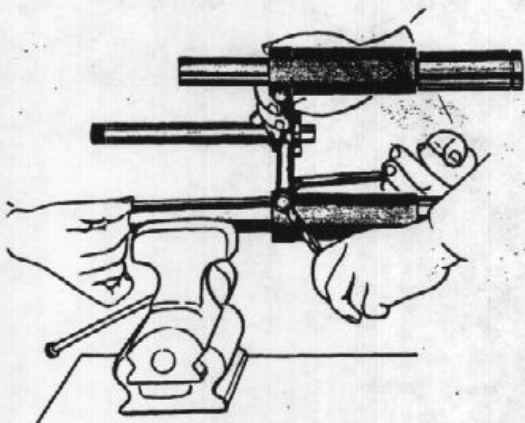


Fig. 115

Into each tube fill 100 ÷ 110 cc, about 3.½ ounces, (« coke » bottle holds 7 ounces) of AGIP F.1 SHOCK ABSORBER oil (Hydraulic Brake Fluid)

or equivalent.

Upper yoke (35), balls (14), box (13), plug (6), and the parts of the steering damper are fitted when the fork is being assembled in the motor cycle frame. This applies also to screw (24), washer (23), and nut (22), which are secured when the front wheel is mounted.

The following picture shows in detail the inserting of the upper plug (6) with the sealing ring. (This operation, as stated above, is carried out when the fork is secured to the frame).

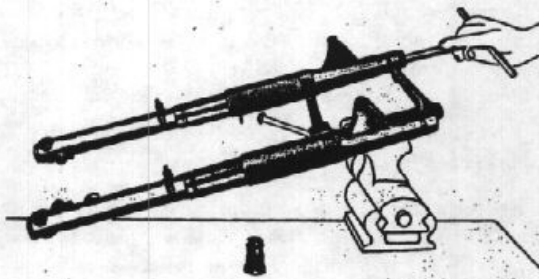


Fig. 116

#### FITTING THE TIRES ON THE RIMS

Fit:

- the inner tube protecting band;
- the inner tube;
- the tire.

Use standard Tire tools. Carry out the works sprinkling talcum powder round the tire edges. Be very careful not to damage inner tube while using the wrenches.

Slightly inflate the innertube, then check alignment of tire when put in its place.

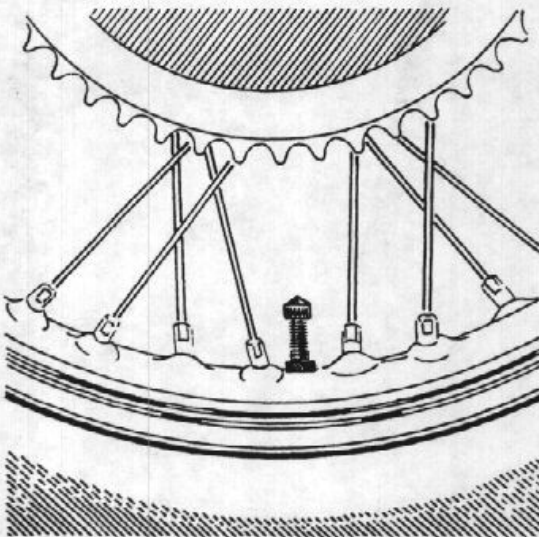


Fig. 117



Make sure that the valve stem is in the **proper position**, pointing to the center of the wheel. Inflate tire to the recommended pressure. Refer to page 27.

#### REASSEMBLING OF THE MOTOR CYCLE

(250 Monza - G.T. Mach 1)

The procedure for the other models with battery (160 Monza Jr., 250 Scrambler from e.n. 92172 and 350 Sebring) is almost equal to the above mentioned models. On the contrary, the procedure for the models without battery (250 Mark 3 and 250 Scrambler till e.n. 92171), is not described because it is simpler.

Using tool (118) secure the 2 ball races on the frame (see fig. 118 and 119).

The figures refer to the assembling of the motor cycle 250 G.T. edition 1965. The edition 1966 differs only for the form of some parts, as headlight, mudguards (fenders), tank, saddle, tool-

box, etc. but the procedure is always the same.

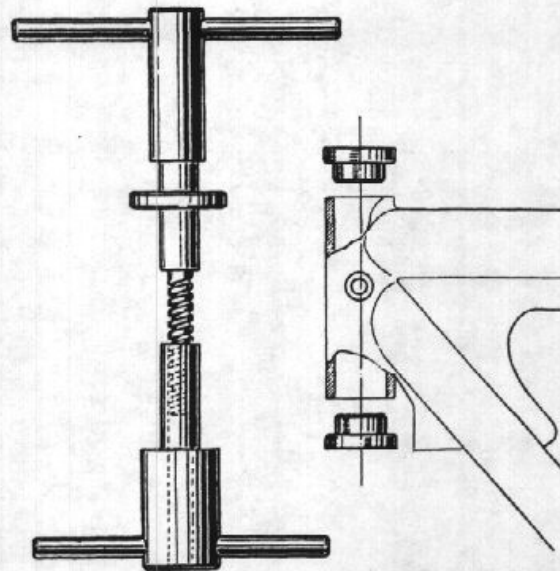


Fig. 118

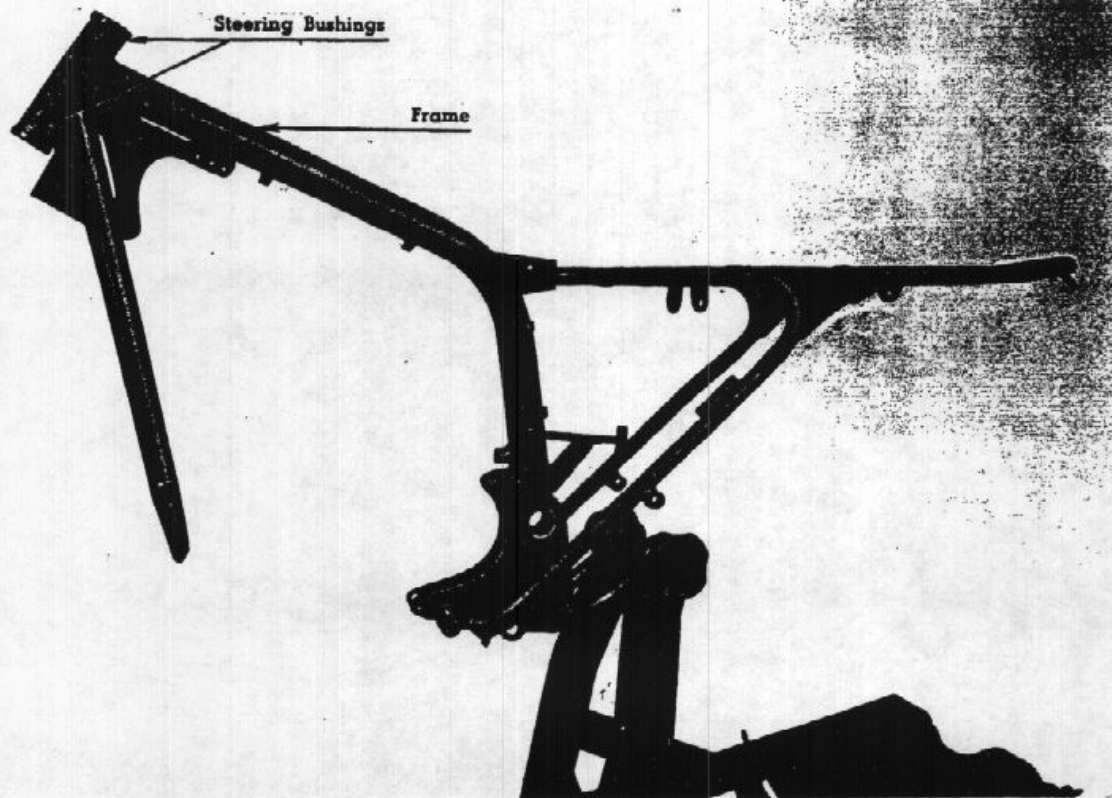


Fig. 119

- the stand, after having lubricated the pin;
- the rear fork, after having lubricated pin and bushes with grease; between the fork and the frame insert the thrust and shim washers until there is no play or movement; (the above mentioned washers can be obtained in three thicknesses 0.1, 0.2 and 0.5 mm.);
- and block the fork pin fixing screws;
- the oiler;
- the shock absorbers, bearing in mind that the letters « MIN » should be in front of the operator (see Fig. 21, page 27);
- R.H. toolbox with filter and breather tube;
- the rear mudguard: be extremely careful about centering;
- the guiding rubbers and the wire insulation on the mudguard holes;
- the stop switch plate is fixed with 2 wires, one for the stop-light and one for the horn;
- the current static regulator and rectifier;
- the center stand stop;
- the 48 size  $\frac{3}{16}$ " balls in the steering ball races (24 each) after they have been lubricated with AGIP F.1 GREASE 30 or equivalent.

- the horn;
- the number-plate holder.

Assemble: (see fig. 122):

- the front fork, the steering damper and the handlebar with the controls.
- and block the upper linking plate.

**NOTE!** - The upper portion of the two (2) fork tubes must be equal. To equalize length of these tubes, tighten bolt No. 6 at the top of the fork and loosen bolts no. 38 at the lower yoke. After this operation has been carried out, re-tighten bolts No. 38. (see fig. 107).

(Check front fork to make sure it works smoothly; there must be no clearance).

Assemble: (see fig. 123):

- Fit the km. - or mile - speedometer on the headlight.
- Fit the headlight.
- Let the speedometer cable pass in the fork eyelet.
- Fit the H.T. coil with its cable.

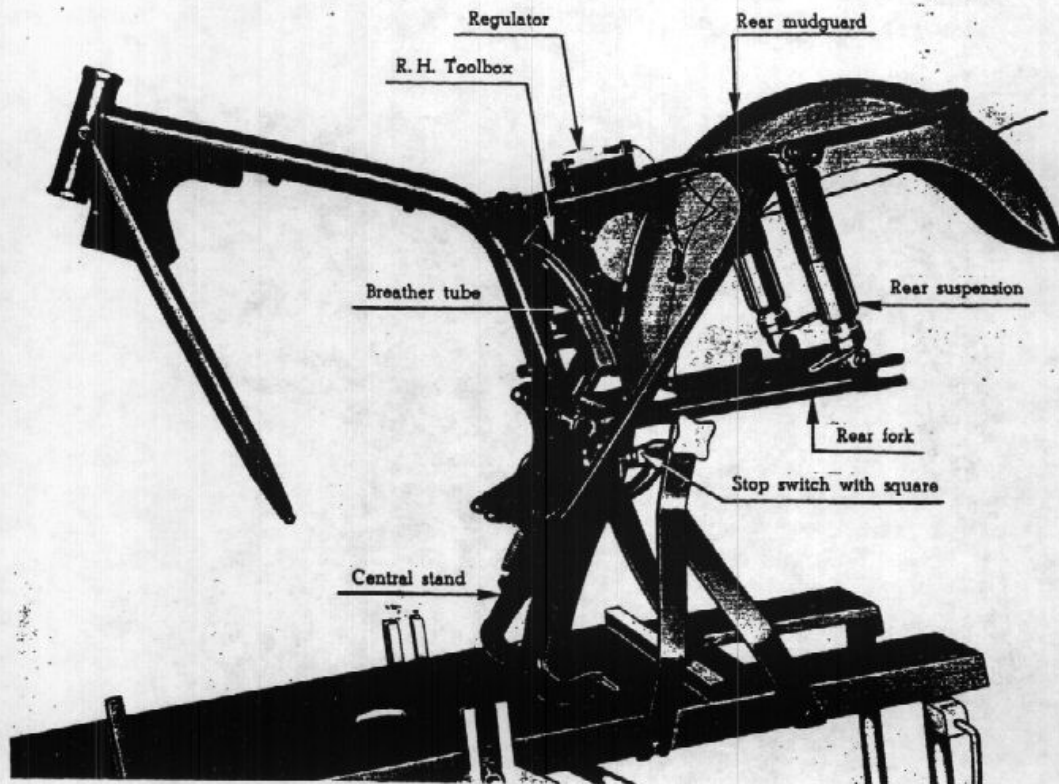


Fig. 120

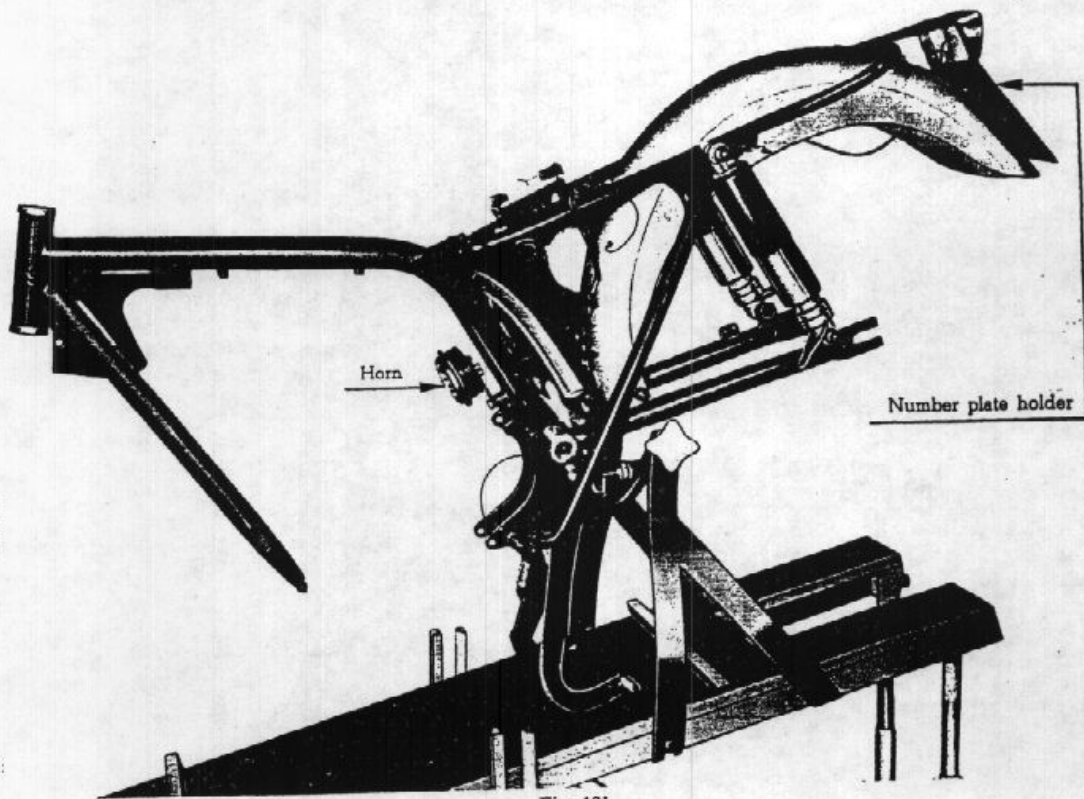


Fig. 121

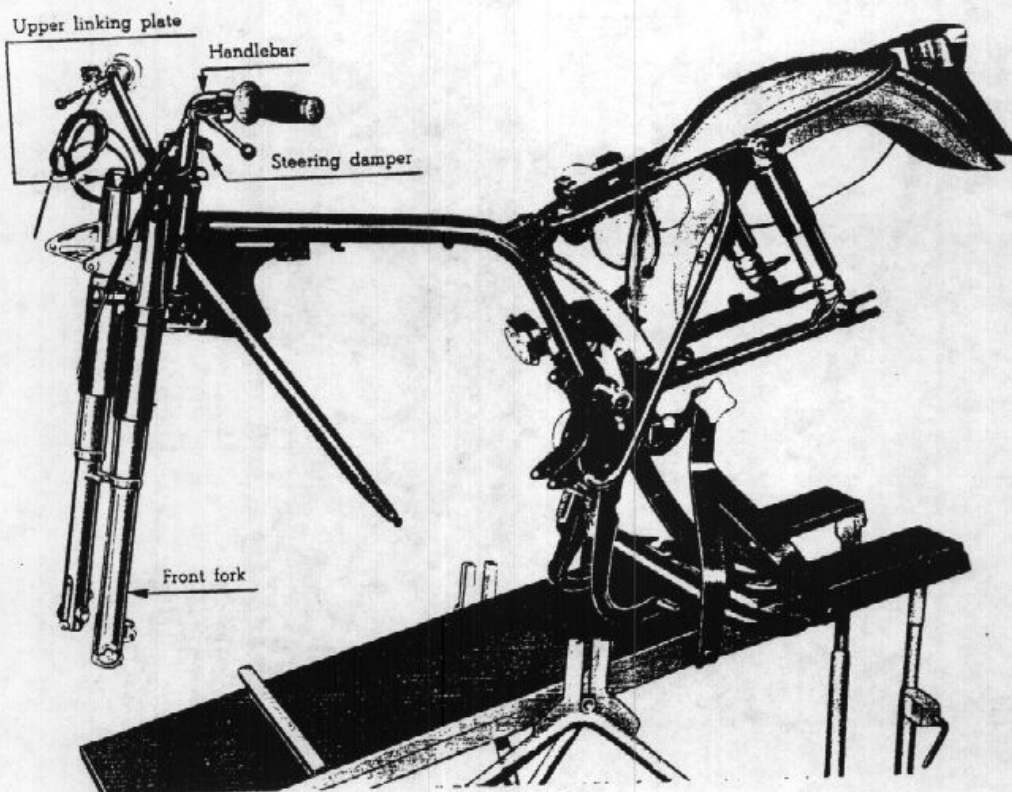


Fig. 122



- Fit the rear brake lever and return spring (before inserting, lubricate the lever pin with the usual AGIP F.1 GREASE 30).
- Fit the footrests and rod, washers and nuts. (Screw loosely and keep the footrests down).

Assemble: (see fig. 124):

- Thread the cable that goes to the terminal board and feeds the numberplate light, and the cable that from the brake « stop » switch goes to the « stop » light, through the hole in the rear mudguard; turn both cables under the mudguard, secure them with the tabs, then thread them through the rear hole and tie them to the number plate holder.
- Fix the push-button light switch on the handlebar.

- Lay the main cable of the headlight along the frame central tube and fix it in the bands welded to the frame for that purpose.
- Connect the headlight cables to the static regulator (see the electric diagram in Fig. 30, page 39).
- Connect the cables issuing from the headlight and from the brake servo switch for stop, to the horn.
- Connect the H.T. coil to the cable issuing from the headlight.
- The cable which will successively be connected to the coil ignition is already fixed to the other clamping screw. Fix that cable to the front tube of the frame with 2 rubber bands (rubber straps).

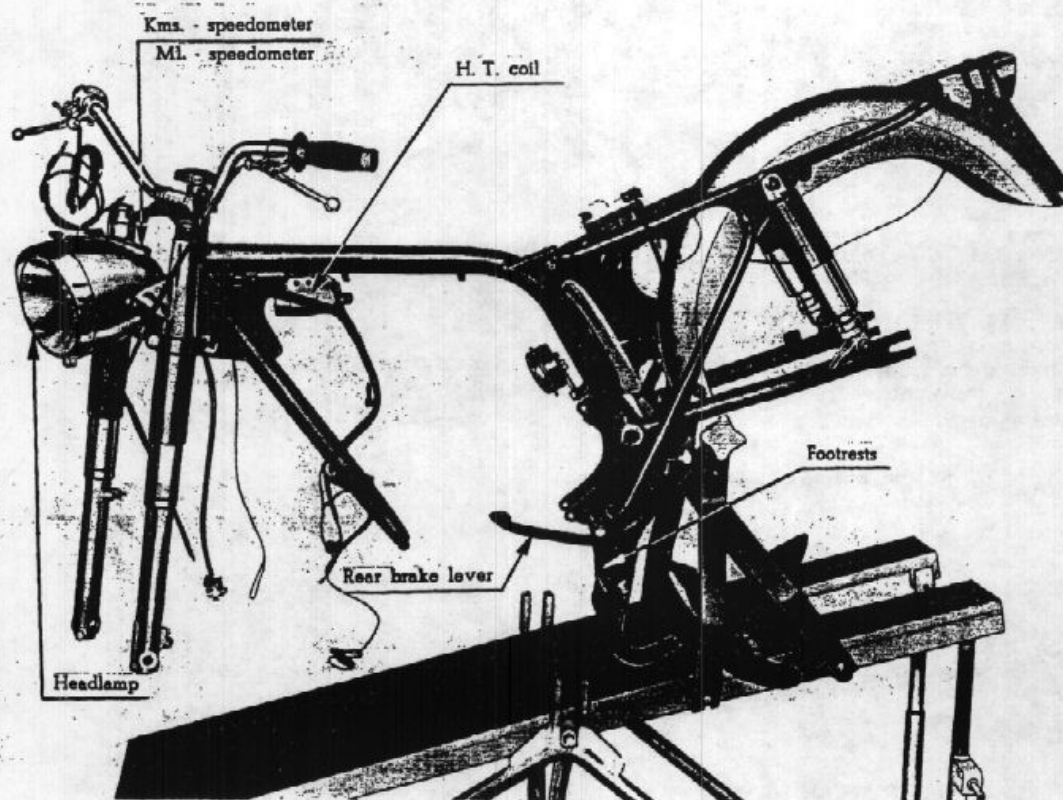


Fig. 123

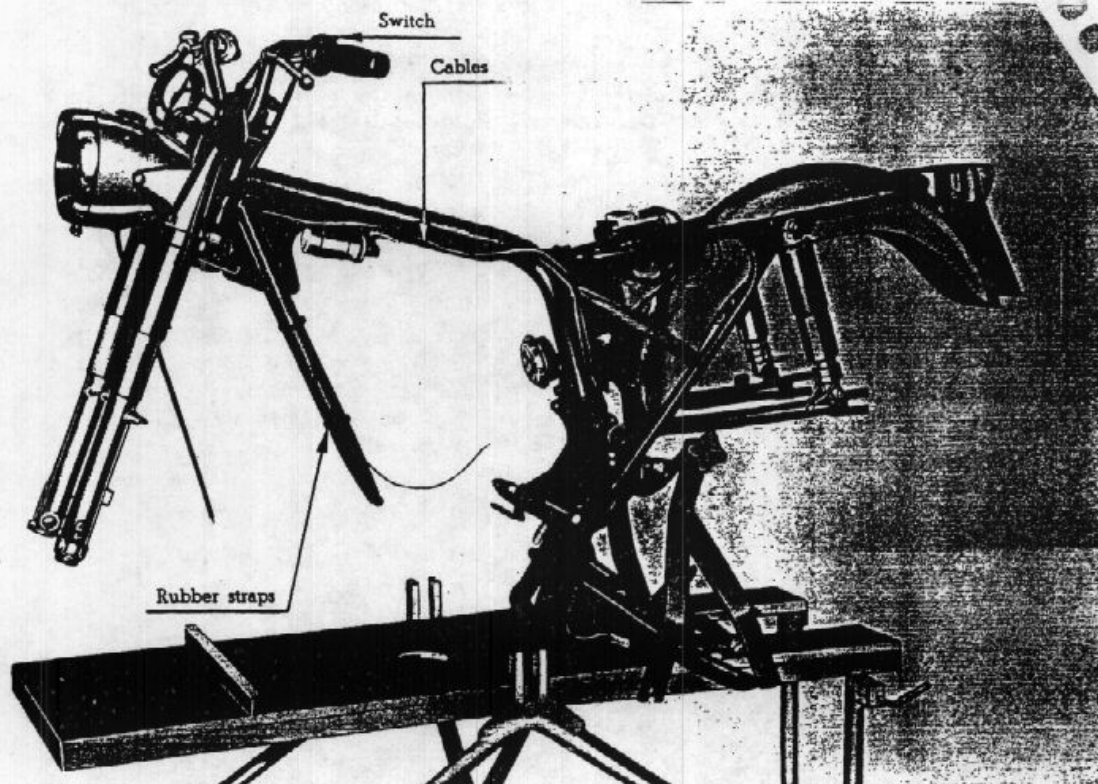


Fig. 124

#### FITTING THE CONTROL CABLES ON THE HANDLEBAR

Fit the wires and sheathes in their right place on the handlebar. Inside the sheathes put the wires after having smeared them with AGIP F.1 GREASE 30 or equivalent.

Use the same grease to lubricate the clutch and the front brake levers.

Adjust the screw and nut which secure the lever.

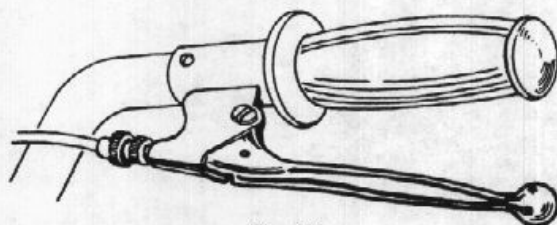


Fig. 125

#### FITTING THE THROTTLE SET

If while dismantling and overhauling the motor cycle it was found necessary to dismantle the throttle set, to find out why it did not work properly, and if some parts had to be either repaired or replaced, refer to the picture below to get assured in which order the parts are to be re-assembled, as well as to the list of the parts which constitute the throttle set.

#### Parts of the throttle - Super Practic B type

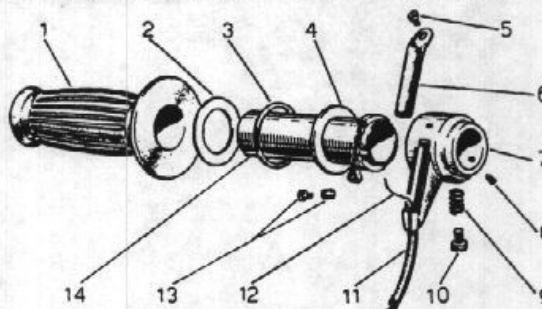


Fig. 126

- |  |   |
|--|---|
| 1 Rubber handgrip.   | 9 Spring for the screw adjusting the bush.              |
| 2 Outer washer - 0.5 thick.                                    | 10 Screw 5MA for adjusting the bush.                    |
| 3 Stop ring.   | 11 Throttle wire sheath and sheath terminals.           |
| 4 Inner washer - 1.8 thick.                                    | 12 Throttle wire.                                       |
| 5 Screw TCC 3MA x 3 securing cover.                            | 13 Terminal of the throttle control wire.               |
| 6 Cover.   | 14 Tube of the throttle complete with chain and spring. |
| 7 Bush with plate and rubber.                                  |   |
| 8 Screw ST 5MA x 7 securing the throttle set to the handlebar. |   |

**NOTE!** - Before assembling the parts, lubricate them all with AGIP F.1 GREASE 30 or equivalent.

Connect the cables to the headlight.

Lay the control cables of the handlebars along the fork legs, except the air and throttle controls which must be laid along the central tube of the frame.

Fit the front mudguard.

Fit the front wheel — complete with tire — proceeding as follows (see fig. 127):

- Take out the pin from the wheel and fit the wheel in its place in the fork.

- Insert the pin, put in the washer and nut, and screw loosely.

- Check whether the wheel turns freely.

See that the clutch and brake adjustment screws are turned all the way in.

- Screw tightly on the handlebar the adjustable sheathterminal bush of the front brake lever.

Fit the brake adjuster and the threaded counter ring on the hub; insert the brake cable.

- Secure the brake wire to the hub lever.

- Check wheel and braking, loosening the wheel axle nut and tightening the brake lever on the handlebar in order to center, the shoe-and-drum assembly. Maintaining this position, tighten the axle nut securely.

- Secure the end of the speedometer cable to the wheel drive.

- Secure the lower free end of the brake wire with a small band, often bending upward.

Straddling the machine, securely grip the handlebars, pushing down vigorously on the telescopic fork four or five times, in order to make certain fork tubes are parallel and lined up.

Then lock the axle by tightening the lower clamping bolt.

Now tighten the front mudguard.

Fit the rear wheel - complete with tire - proceeding as follows:

- Place wheel and axle in the slots of the swinging arm.

- Fit the chain adjusters.

- Screw on axle nuts, finger-tight.

With the front fork, the handlebar and both wheels in place, and the assembly now on the center stand, we can proceed with the installation of the engine.

Carefully manipulate the engine from the right side in such a manner that the rear brackets line up with the hole provided in the crankcase. Then swing over to line up the front mounting with the two (2) brackets provided. Fit the side stand (see fig. 128).

#### Inserting Engine Mounting Studs

1. From the left side, insert the upper rear bolt. Put nut on finger-tight.

2. Fit the four (4) front mounting studs through the plates to the frame and the engine.

3. Insert the lower rear bolt.

Prior to tightening the engine mounting studs, make certain that engine itself is pushed towards the rear of the frame to avoid having the chain pull it towards the back.

Connect the stoplight switch spring to the rear brake lever. Connect the two (2) engine wires to the static regulator, (see electric diagram Fig. 30, page 39).

On Scrambler till e.n. 92171 and Mark 3, connect three (3) wires, one to the H.T. coil, one to the stop switch and one to the lighting system, (see electric diagram, Fig. 37, page 46).



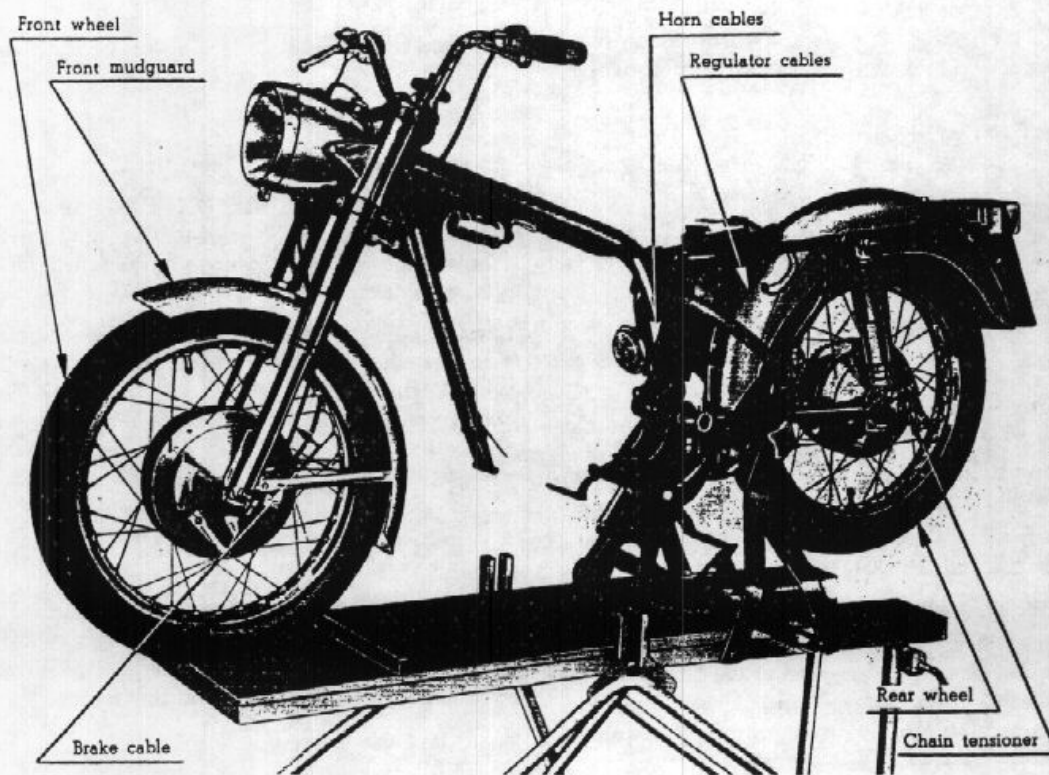


Fig. 127

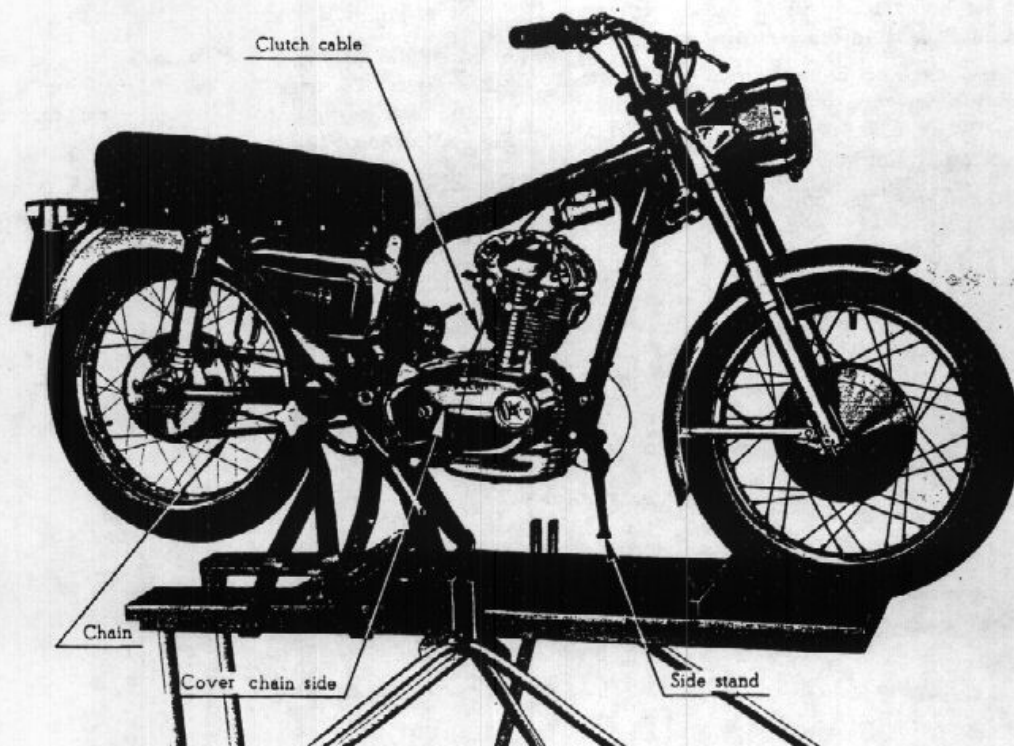


Fig. 128

Connect the clutch wire to the clutch operating lever inside the engine. Remember, first, to tighten completely the adjusting screw of the clutch wire on the handlebar. Also, make sure the clutch push rod has already been fitted. Fit the chain.

Keeping the wheel centered, adjust it by means of the chain-adjusters.

**NOTE!** - When the machine is on the ground and one person is sitting on the rear portion of the saddle (or the rear shocks are halfway depressed), the chain should be 15 to 20 mm. ( $\frac{1}{4}$ " -  $\frac{3}{4}$ ") loose to allow swinging arm movement. (See Figure 129).

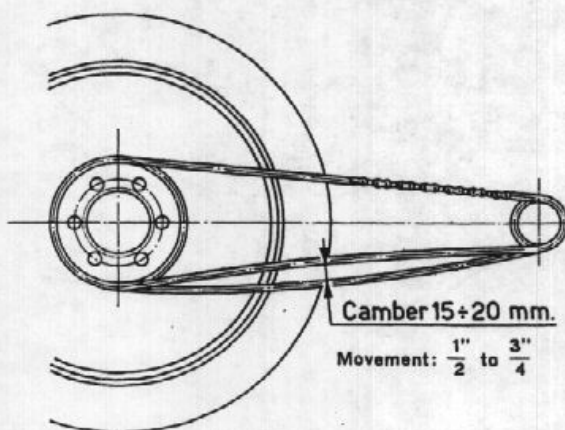


Fig. 129

Securely tighten completely the left and right axle nuts.

Fit the rear brake cable and adjust.

Mount shifting mechanism to engine (see fig. 128) « chain and gearbox side cover ».

Secure the breather tube, on the engine by means of the appropriate ring and fastening it to the upper fork of the frame with a rubber band (250 Mark 3 and Scrambler) or insert it in the toolbox (when it is fitted) for 250 Monza, G.T. and 350 Sebring or directing it through the saddle towards the rear (250 Mach 1).

Fit the saddle.

Rotate the two footrests to their right position and tighten completely the clamping nut.

Fit the oil filler with pertaining gaskets and stick-provided filler plug (see Fig. 130).

Connect the spark plug to the plug terminal (see Fig. 131).

Fit the gearbox lever and lock it with a washer and a screw (see Fig. 131).

Put on the chain-guard (see Fig. 131).

Fit the lamp and the reflex glass on the number plate holder.

#### Fitting the battery

Fit the battery and connect it with the positive (+) pole of the regulator and with the head-lamp (red cables) and with the negative (—) pole of the regulator and with the ground (green cables).

**NOTE!** - The battery 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 (see Fig. 132).

#### FITTING THE CARBURETOR GASKETS

Connect the throttle and air control cables to the carburetor.

Before doing so, make certain that both the air and gas are completely shut off. Make sure that the carburetor is securely mounted to the engine.

Fit the carburetor rubber joint on the toolbox.

Connect the H.T. coil-contact breaker wire to the breaker arm and soft-solder (see Fig. 133).

Fit the gasket, the distributor cover, the 2 spring washers A 4.3 and tighten with the 2 screws TCC 4 MA.

Fit the L.H. toolbox.

Fit the exhaust tube on the engine, inserting the sealing gasket, and screwing the lock-ring by hand.

Fit the muffler, locking its rear side and tighten the clamping-ring completely using a spanner (23) (see Fig. 133).

Fit the footrest rubbers.

Fit the footrest for the pillion rider.

Put the tool-bag in the tool-box.

Attach the tire inflator to the frame front tube.

Using insulating tape, fix the tank packing to the frame and at the same time, also electric equipment and clutch cables.

Fit the legbar (see Fig. 134).

Fit the petrol tank, remembering to overlay a piece of rubber in the front of it to avoid scratching the paint.

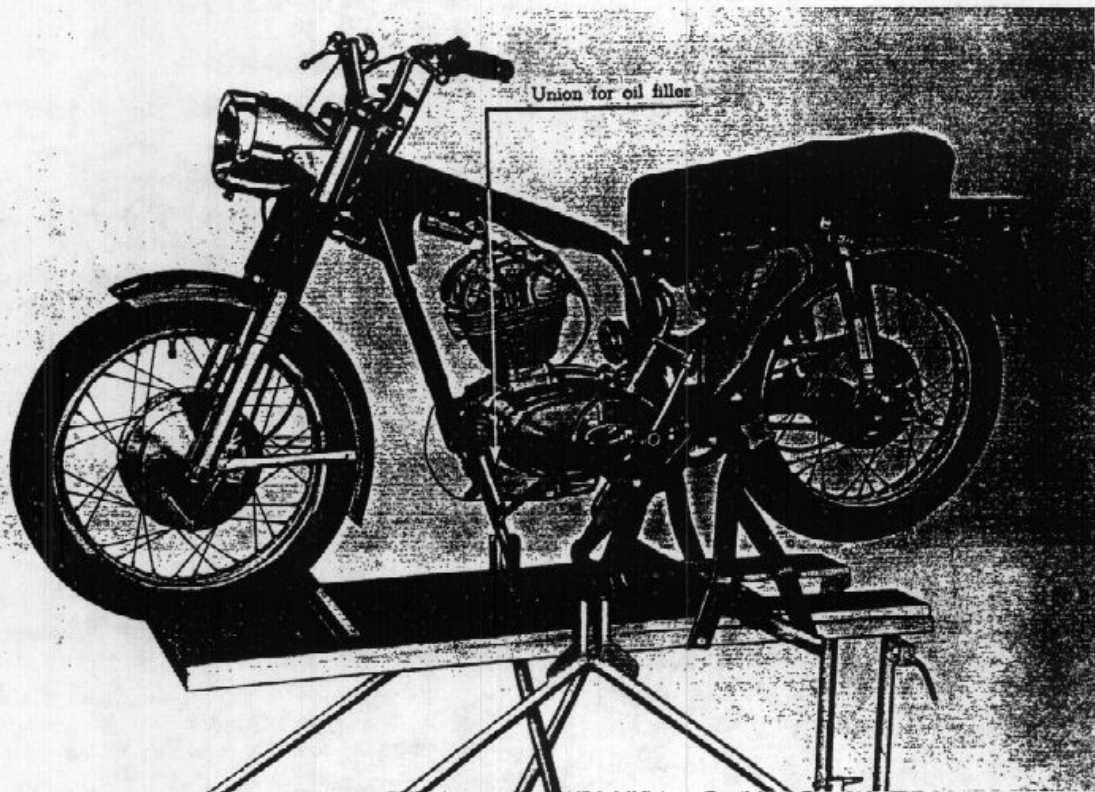


Fig. 130

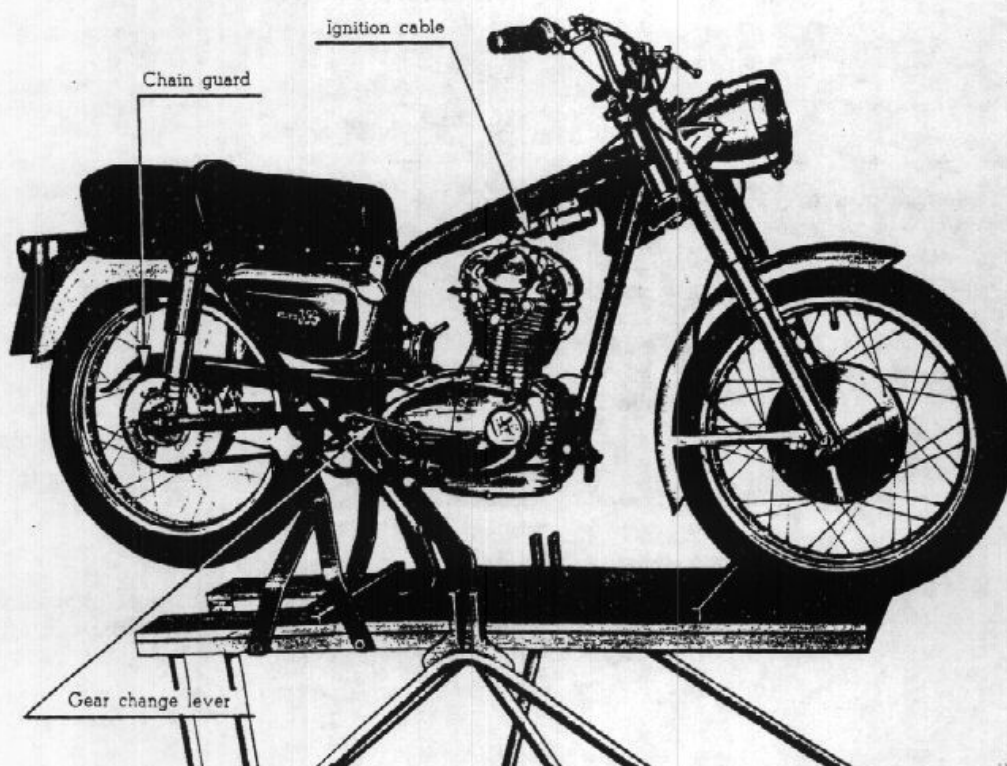


Fig. 131



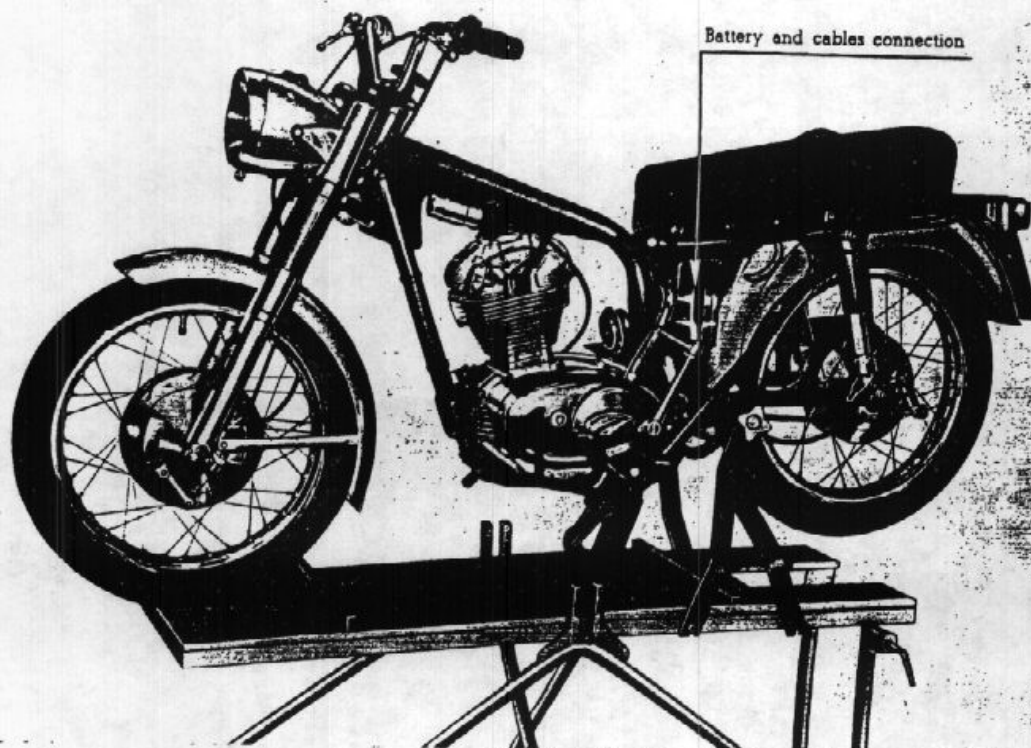


Fig. 132

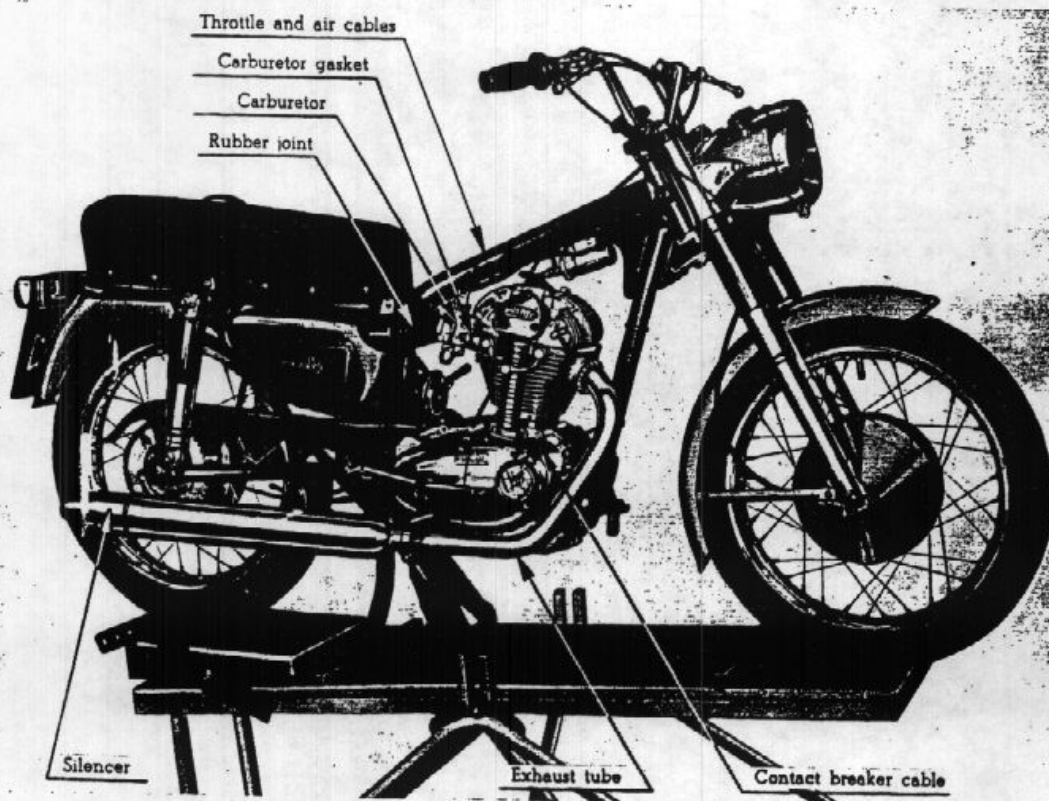


Fig. 133

Fix the front part of the tank with two anti-vibrators, and two  $\varnothing i=8.5$  washers; then lock with TEC 8 MB screws.

Hitch the rear part of the tank using a spanner (30).

Fit the petrol pipe.

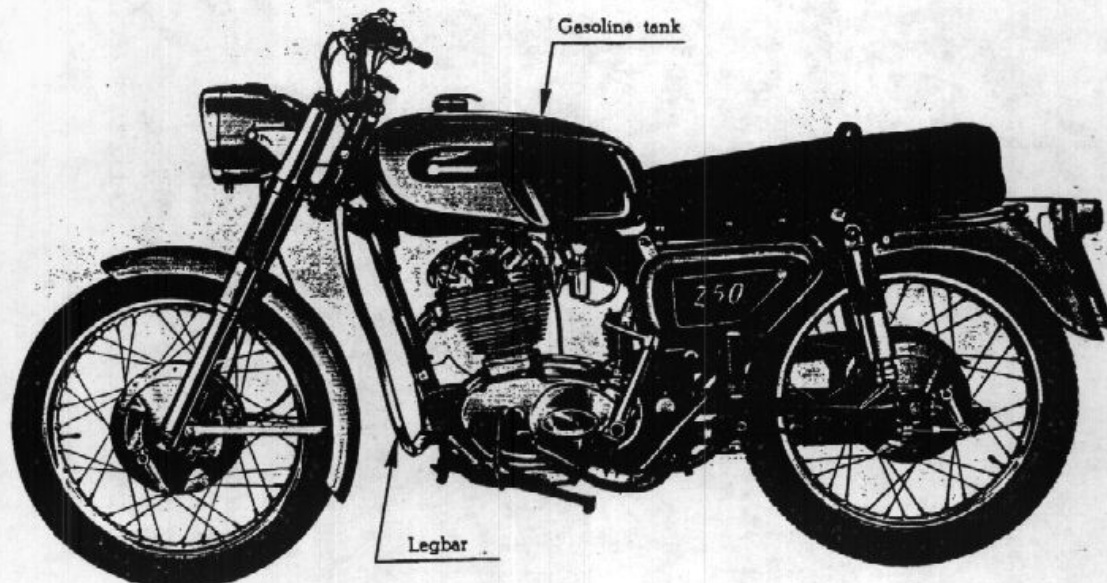


Fig. 134

#### Filling the engine oil sump

The oil sump of the engine holds about 2 kilogrammes = lbs 4.409 (lt. 2.400 = 0.634 US gal. = 0.5279 Imp. gal. = 2 1/4 Quarts) for the 250 cc and 350 cc, while for the 160 Monza Jr. the sump holds 1.750 kg. = lbs 3.858 (lt. 2.100 = 0.5548 US gal. = 0.4620 Imp. gal. = 2 1/4 Quarts).

The filler plug stick is marked «MIN» and «MAX» in the spots where the oil level is respectively at its lowest and at its highest point.

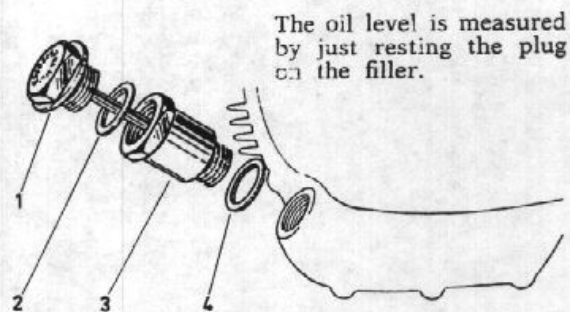


Fig. 135

- 1) Stick provided filler plug;
- 2) Sealing gasket;
- 3) Filler;
- 4) Sealing gasket.

## ALIGNMENT OF HEADLIGHT

Proceed as follows:

- 1) Place the machine 5 metres approximately 6 yards from a white or light-colored wall.
- 2) Make certain that the ground is level and that the machine is facing head-on towards the wall.
- 3) The machine, with the weight of one person only and resting on both wheels, (not on the center stand) is now ready for headlight adjustment.
- 4) Draw a cross on the wall on the spot where the optical axis of the projector intersects with the wall, 0.815 mt. (32") from the ground, for the models 250 Monza, G.T., Mark 3, Mach 1 and 350 Sebring (see Fig. 136), 0.835 mt. (32.5") for Monza Jr. (see Fig. 137) and 0.845 mt. (33") for the 250 Scrambler (see Fig. 138).

- 5) Switch on the high beam and the cross on the wall should be in the center of the circle of concentrated light projected on the wall. (We suggest that you repeat the test to be absolutely sure that no mistakes have been made).
- 6) If the alignment of the headlight requires correction, loosen the two (2) screws, one on each side of the headlight, and adjust to the desired angle.
- 7) Make sure all lights are functioning properly, including stop-light.

## Conclusion

At this stage, if the motor cycle has been carefully assembled, in accordance with the foregoing instructions, it should work properly and give no trouble whatsoever. (For information on refilling, starting the engine, riding away, and stopping the machine, refer, if it is necessary, to the

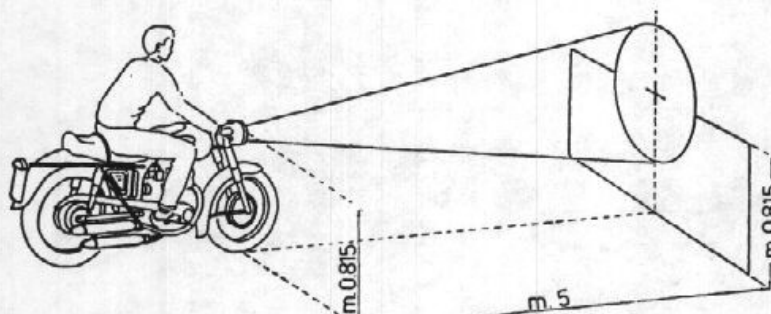


Fig. 136

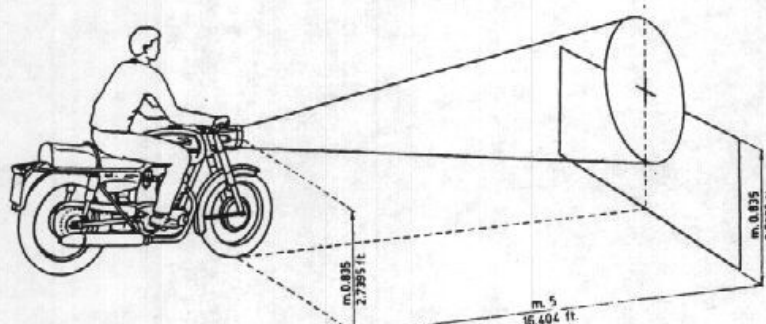


Fig. 137

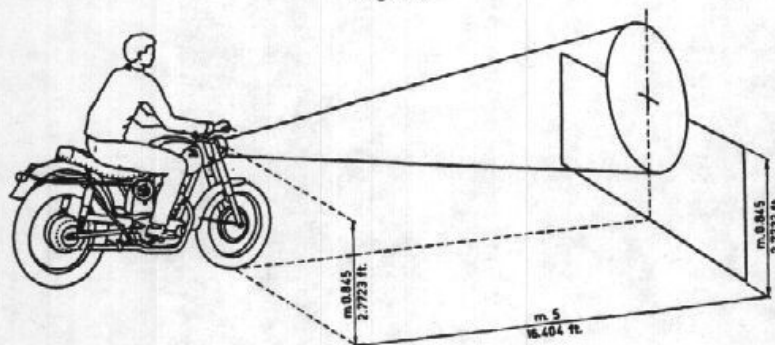


Fig. 138



DUCATI OVER- HEAD-CAM SINGLE CYLINDER MOTORCYCLE, Manual, pages 40, 41 and 42) for the 160 Monza Jr. and 49, 50 and 51 for the other models.

If you notice something wrong, refer to chapter on « Faults - Causes - Remedies ».

After that, give the machine a general clean-up.

#### **General cleaning**

Proceed as follows:

- 1) Clean the engine with gunk and dry it with clean rags.
- 2) Wash the painted parts of the frame with water. Use a sponge to wash and chamois to dry.
- 3) Never use harsh solvents on the painted surface.

#### **MISCELLANEOUS ASSEMBLY**

Before closing this chapter, let us tell you again some operations which, in our opinion, are indispensable.

Connect electrical wires to the stop-light and tail-light.

Fit the exhaust pipe to the engine.

Insert the asbestos gasket and tighten the locking ring by hand.

Fit the muffler, secure the rear portion first, and then tighten the exhaust tube clamping ring with a special tool.

Where the muffler slides over the exhaust tube, there is a clamp that must be secured after the exhaust pipe and muffler have been tightened. Using tape, secure the tank packing to the frame and also put the electric harness and clutch cable in place.

Now fit the gas tank, making certain not to damage the front portion of the tank when assembling.

Between the tank mounting ears and the frame, fit one rubber washer on each side of the frame. Then fit the two (2) screws, finger-tight.

Now fit the saddle, mounting it in the appropriate position.

Next place the hook between the saddle and the tank.

Using the spring-hook, secure the tank and tighten all the tank and saddle bolts.

Now hook up the gas lines.

## TROUBLES, THEIR ORIGIN AND REPAIR

Faults	Probable cause	Remedy
Abnormal starting due to: 1) Feeding.	<p>Petrol does not reach carburetor owing to:</p> <ul style="list-style-type: none"> <li>a) Lack of petrol in tank</li> <li>b) Cock left inadvertently shut.</li> <li>c) Need for reserve supply (petrol tank nearly empty).</li> <li>d) Pet cock filter clogged.</li> <li>e) Hole clogged in petrol inlet plug.</li> <li>f) Petrol pipe either clogged or broken.</li> </ul> <p>The carburetor petrol inlet filter is dirty.</p> <p>The jet is clogged.</p> <p>Carburetor body with clogged channels.</p> <p>Excessive flow due to:</p> <ul style="list-style-type: none"> <li>a) Foreign matter in rod seat.</li> <li>b) Float is cracked.</li> </ul> <p>Air infiltrates through carburetor base joint.</p> <p>Air filter is dirty.</p>	<p>Fill up.</p> <p>Turn the petcock lever to position «A» (open).</p> <p>Turn the petcock lever to position «R» (reserve).</p> <p>Take out the filter and clean it with gasoline and air pressure.</p> <p>Let air pass freely again.</p> <p>If clogged, free by sending blows of compressed air through it. If broken, replace.</p> <p>Remove filter and clean gauze with gasoline (petrol) and a blow of air.</p> <p>Dismantle and clean with air pressure.</p> <p>Dismantle the carburetor and clean it carefully with petrol and compressed air.</p> <p>Shut the cock and let the engine take the excess mixture. If the engine does not start, maybe the sparking plug is damp with petrol. In this case take out the plug and dry it.</p> <p>Remove the rod and clean the seat by means of compressed air.</p> <p>Replace.</p> <p>Check carburetor-to-suction pipe seal and suction pipe-to-cylinder head seal.</p> <p>Clean it.</p>
2) Ignition.	<p>Sparking plug does not spark, because:</p> <ul style="list-style-type: none"> <li>a) it is dirty.</li> <li>b) It is damp.</li> <li>c) Insulation is cracked.</li> <li>d) Spark plug is not correctly gapped.</li> </ul> <p>There is an interruption in the ignition coil-to-sparking plug cable or it discharges externally.</p> <p>The H.T. coil does not work.</p> <p>Battery is discharged.</p> <p>The breaker contacts do not open.</p> <p>The breaker arm is stuck on pin.</p> <p>The breaker contacts are dirty.</p> <p>The breaker arm is grounded.</p> <p>Condenser interrupted or short-circuited.</p> <p>Condenser or coil wire grounded.</p> <p>Ignition is either excessively advanced or delayed.</p>	<p>To check whether sparking plug sparks or not, remove it from its seat, rest the uninsulated part of the sparking plug against the cylinder after you have re-attached the cable; then rotate the engine several times and check sparking.</p> <p>If there is no spark, insert a new plug, otherwise check electric wiring.</p> <p>Clean with petrol and a small brush.</p> <p>Dry it.</p> <p>Replace sparking plug.</p> <p>Restore prescribed gap distance; it should be about .026"-.028" (0.6 to 0.8 mm.).</p> <p>Inspect cable insulation and, if necessary, replace cable. Also, make sure the cable is well inserted in the coil seat.</p> <p>Replace.</p> <p>Recharge it according to instructions on pages 42 and 50.</p> <p>Check position of fixed contact.</p> <p>Check breaker arm movement and lubricate pin.</p> <p>Clean them with a rag soaked with petrol.</p> <p>Insulate it.</p> <p>Replace.</p> <p>Either insulate or replace.</p> <p>Check engine timing.</p>

Faults	Probable cause	Remedy
Starting.	Engine does not work after the starting lever has been operated: the clutch plates are slipping, don't adhere.	See «Clutch does not work» farther down.
Clutch does not work.	They slip because: a) There is lack of clearance in the operating lever, on handlebar. b) The springs have lost tension. c) The clutch-plates are either worn or out of shape. Owing to excessive clearance the operating lever on handlebar does not disengage clutch completely. The engine is still cold. Max. jet is dirty.	Adjust the bush at the sheath-end, in order to have a clearance of about 4 mm. (.16") at the end of the operating lever, on handlebar. Replace them. Replace them. Adjust the sheath-terminal bush so that clearance at the end of the control lever on handlebar is about 4 mm. (.16"). Let it warm up. Free passage by means of a blow of air.
Engine stops when throttle is opened. Output is low.	Mixture is too rich. Mixture is too poor. Exhaust pipe and silencer are dirty. Engine head and piston are incrustated with carbon. Valves do not close properly. Excessive clearance between rockers and valves. Inefficient sealing between cylinder and cylinder head. The sparking plug: a) is loosely screwed in. b) has no gasket. c) is dirty. d) is unsuitable. e) electrodes are at wrong distance or worn. Rods securing head - cylinder - crankcase are loose. The piston rings are stuck, worn out, or broken. Cylinder is worn.	Adjust the carburetor. Adjust the carburetor. Clean them. Remove carbon deposits very carefully. Grind the valve seat and replace the valves when bent or burnt. Adjust clearance locking the screw by means of the proper check nut in the 160 Monza Jr., 250 Monza, G.T. and 350 Sebring. In the other models fit the appropriate shim. Check sealing faces. Tighten it completely. Put one in. Clean it. Replace it. Restore correct gap distance; it should be 0.6 to 0.8 mm. .026" to .028" maximum. Screw them tightly when engine is cold. Replace and clean carefully their seats in the piston. Rebore cylinder. Oversize +0.4 mm. (.16") or +0.6 mm. (.024") or +0.8 mm. (.032") or +1 mm. (.040") and fit a corresponding oversized piston.
High fuel consumption.	Float has a hole. Bad sealing owing to unevenness of float rod or foreign bodies in rod seat. Air filter is dirty. Jet has altered hole. Delayed ignition.	Replace float. Replace rod or clean rod seat with blows of compressed air. Dismantle, wash with gasoline, then dip in very light oil. Drain before reassembling. Replace the jet. Restore the ignition timing (see assembly), and correct the advance. Replace and clean carefully the ring seats in the piston.
Backfire.	The piston rings are stuck, worn out, or broken. The sparking plug, for: a) Wrong distance between the electrodes. b) Incrustation. c) Pre-ignition. The exhaust tube gasket may have become loose. Condenser interrupted or short-circuited.	Restore right distance. It should be 0.6 to 0.8 mm. (.026" to .028") maximum. Clean with petrol and a small brush. Replace spark plug with another having a higher thermal degree, (one range colder). Tighten the lock-ring. Replace.
Engine is noisy.	Excessive clearance between cylinder and piston. Excessive clearance between gudgeon pin and little-end bush.	Re-bore the cylinder to the very next oversize: 0.4 mm. (.016"), 0.6 mm. (.024"), 0.8 mm. (.032"), 1 mm. (.040"). Replace gudgeon pin or - better - the bush and the gudgeon pin (Bushes with oversized outside diameter and oversized gudgeon pins are available).



Faults	Probable cause	Remedy
Unefficient Electrical equipment	Excessive clearance between connecting rod big-end and crank pin. Excessive clearance between valves and rockers. Flywheel is loose on the driving shaft. The gearshift gears have too much clearance; their teeth are cracked or broken. The 2 conic timing gears knock because they are too loosely meshed. The 2 conic timing gears hiss because they are too tightly meshed. The double bevel gear transmission is noisy.	Replace connecting rod assembly.  Adjust.  Replace the Woodruff key, the safety washer and tighten the nut completely. Replace.  Replace the driving gear with an oversized one.  Replace the driving gear with an undersized one.  Adjust clearance and alignment of gears by shimming (see assembling operation). If teeth are cracked or broken it is advisable to replace the couple. Repair or replace.
	The wires are disconnected or uncovered. Wire terminals loose, unsoldered or broken. Horn: a) Wires detached from their clamps. b) Sound is uneven.  c) Horn button and depth and anti-dazzling light switch are inefficient. Headlamp reflector has gone dull or yellow. Four-way key-switch: a) The inside diaphragm, of insulating material, is unserviceable. b) The switch key does not turn on the current because it is too short. c) Faulty connection of wires. d) Contacts engaged.  e) Contacts disengaged. The town light will not turn on, because: a) The bulb is burnt-out. b) The fuse is blown. c) The number-plate wire is grounded. d) The ground wire is detached from the light bracket. e) The main switch brushes contact badly. The two-light bulb does not turn on, because: a) The filaments are burnt-out. b) The fuse is burnt-out. c) The number-plate wire is grounded. d) The main switch brushes contact badly. e) Light switch broken down or wire disconnected. Headlamp light is either intermittent or it does not turn on at all, because ground is lacking, either partially or completely, between headlamp and frame.	Tighten screws completely, resolder, or replace.  Connect again and tighten screws completely.  Adjust by means of appropriate screw which is located at the back of the horn. Inspect contacts and closure of tiny screws for fixing the wires. If broken, replace.  Replace.  Replace, otherwise the lack of insulation may damage the whole electrical system. Use the right key or else one that is as long as the original key.  Restore connection. Check whether the four plates contact evenly. Restore evenness. Check insulation between plates and restore if lacking.  Replace with one of same type and voltage. Replace. Replace.  Reconnect it.  Charge the plates or replace.  Replace with a bulb of same type and voltage. Replace. Replace.  Charge plates or replace.  Replace switch or re-connect wire.  Restore metal contact between headlight body, lamp-holder and fork plate.

Faults	Probable cause	Remedy
Irregular steering.	No charge from battery, because: a) Alternator-regulator cables are disconnected.	Lift the saddle and connect the cables.
	b) Switch contacts are inefficient.	Inspect inside headlamp and restore contacts.
	c) Four-way key switch is inefficient.	See « Four-way key switch » on page 113.
	d) Static regulator is inefficient.	Replace.
Wheel hubs give trouble.	General inspection of electrical equipment.	See « Checks » on page 40 and following.
	Battery is discharged.	Recharge it according to instructions on pages 42 and 50.
	Battery discharges quickly owing to breakdown or to break in recharging circuit.	Check electrical equipment according to instructions on pages 40 and 50.
	Steering assembly is either excessively hardened, or has excessive clearance.	Adjust by means of the upper knurled cap, after loosening the column securing nut and the fork plate side screw.
Bad braking.	The ball races are damaged.	Replace the caps or the races or both.
	The balls are damaged (worn, scored, or flattened).	Replace.
	The hubs have too much clearance.	Replace either the spindle or the bearings.
	Front brake operating lever on handlebar has too much play or excessive travel.	Adjust by making clearance at end of lever 2+5 mm. (.08" to .20") before brake operates.
Spring suspensions are inefficient.	Rear brake operating footlever runs exceedingly long working distance.	Adjust by making clearance at end of lever 25+30 mm. (.98" to 1.18") before brake operates.
	Brake linings are: a) Worn.	Replace complete brake shoe.
	b) Dirty with grease.	If soaked with grease, replace. If only greasy, wash with gasoline and restore the braking surface by rubbing lightly with emery cloth.
	Drums are scored.	If grooves are superficial, remove them with emery cloth or on a lathe. If the grooves are deep, replace.
Machine does not hold the road.	Front fork springs are stiff.	Drain oil completely and replace with fresh oil. (see fork assembly on page 97 and 27).
	Fork may not be properly assembled.	Assemble it properly.
	Rear suspension in-operative.	Replace.
	The wheels are not aligned.	Center the rear wheel with the front one.
	One of the adjustable shock absorbers is loaded differently from the other.	Adjust.
	Rear fork has too much end clearance.	Shim.
	Rear fork bushes have too much clearance (see page 64).	Replace.
	Quantity of oil in each front fork leg is not equal.	Drain oil completely and refill in right quantity (see fork assembly, pages 97 and 27).
	Front fork legs due to unequal length of faulty assembly.	Equalise them (see fork assembly, page 96).
	Tires insufficiently inflated.	Inflate them in accordance with Pressure Table on page 27.
	Tire tread is worn.	Replace tire.

## TOOLS

The following is a list of the SPECIAL tools with which every Ducati Repair Shop must be equipped.

No list of STANDARD tools is given because Repair Shops should already be equipped with such tools; if they are not, they can get what they need in any hardware shop.

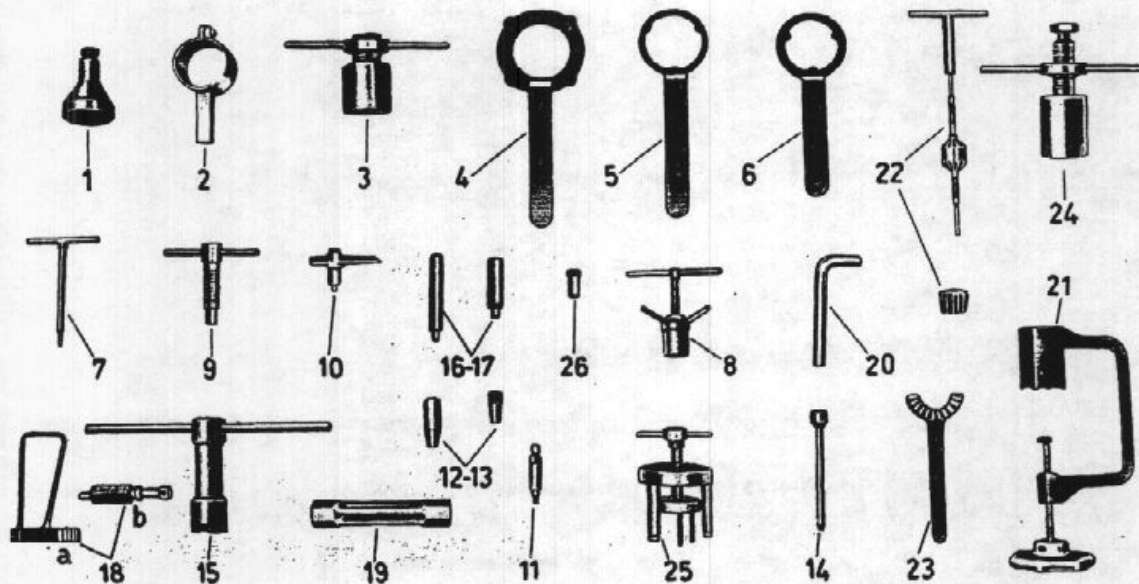


Fig. 139

Illustration N°	Page	Reference N°	Tool
1	115	88713.0250	Flywheel magneto extractor.
2	115	88713.0242	Tool to grasp piston 160 Monza Jr.
2	115	88713.0310	Tool to grasp piston 250 cc.
2	115	88713.0379	Tool to grasp piston 350 Sebring.
3	115	88713.0252	Extractor for timing bearing holder bush.
4	115	88713.0253	Spanner to secure the clutch housing (to lock crank shaft gear).
5	115	88713.0254	Spanner to secure the clutch drum (to lock drum nut).
6	115	88713.0311	Z = 14 wrench, to hold the counter-shaft sprockets (to lock nut).
6	115	88713.0255	Z = 15 wrench, to hold the counter-shaft sprockets (to lock nut).
6	115	88713.0274	Z = 16 wrench, to hold the counter-shaft sprockets (to lock nut).
6	115	88713.0026	Z = 17 wrench, to hold the counter-shaft sprockets (to lock nut).
6	115	88713.0313	Z = 18 wrench, to hold the counter-shaft sprockets (to lock nut).
7	115	88713.0256	5 mm. « T » socket wrench for inside hexagons. (Allenhead wrench).
7	115	88713.0314	6 mm. « T » socket wrench for inside hexagons.
8	115	88713.0257	Clamps for the lapping of the valve seats.
9	115	88713.0258	Cover extractor on clutch-side.
10	115	88713.0259	Piston position indicator.
11	115	88713.0260	Extractor for rocker pin.



Illustration N°	Page	Reference N°	Tool
12	115	88713.0272	Cone for fitting round or square sectioned spring rings, in the models 160 Monza Jr. and 250 cc in 4 speeds.
13	115	88713.0261	Cone for fitting Seeger ring on gearshift mainshaft in the models 160 Monza Jr. and 250 cc in 4 speeds.
14	115	88713.0262	Pin for orienting washers and bushes when fitting rocker pins.
15	115	88713.0263	Spanner to hold timing shaft (to lock Z=28 bevel gear).
16 - 17	115	88713.0277/0278	Pins to fit and re-fit gudgeon pin in the 160 Monza Jr.
16 - 17	115	88713.0264/0265	Pins to fit and re-fit gudgeon pin for 250 and 350 cc models.
18a	115	88713.0266	To lock the main shaft tapered Z=21 gear (with cylinder and head assembled).
18b	115	88713.0369	To lock the main shaft tapered Z=21 gear (with cylinder and head dismantled).
19	115	0400.93.330	Box wrench, double - ch. 21-22 - to lock Z=28 bevel gear (see illustration N° 15).
20	115	0440.03.060	Wrench for inside hexagons - ch. 12 - to lock DUCATI front fork upper plugs (for 250 and 350 cc models).
20	115	0440.03.340	Wrench for inside hexagons - ch. 14 - to lock engine plugs.
21	115	88713.0267	Device for assembling and dismantling valves with needle springs.
22	115	88713.0315	Dragging, wrench.
22	115	88715.0149	Cutter-holder pin for valve seats 250 and 350 cc.
22	115	88715.0150	Cutter-holder pin for valve seats for 160 Monza Jr.
22	115	88743.0008	Milling cutter for « 250 Monza, G.T., Mark 3 edit. 1964, Scrambler and 350 Sebring » exhaust valve seat and « 250 G.T. » till e.n. 87421 intake valve seat.
22	115	88743.0014	Milling cutter for « 250 Monza, G.T. from e.n. 87422, Mark 3 edit. 1964 and Scrambler, 350 Sebring » intake valve seat and « 250 Mach 1 and Mark 3 edit. 1965 » exhaust valve seat.
22	115	88743.0015	Coned cutter for touching up 250 Monza, G.T., Mark 3 edit. 1964, Scrambler and 350 Sebring exhaust valve seat, and « 250 G.T. » till e.n. 87421 intake valve seat.
22	115	88743.0016	Coned milling cutter for touching up 160 Monza Jr. intake valve seat.
22	115	88743.0018	Milling cutter for intake valve seat of Monza Jr.
22	115	88743.0020	Coned milling cutter for touching up 160 Monza Jr. exhaust valve seat.
22	115	88743.0021	Cutter for 160 Monza Jr. exhaust valve seat.
22	115	88743.0093	Cone milling cutter for touching the intake valve seat of 250 Mach 1 and Mark 3 1965.
22	115	88743.0094	Cone milling cutter for touching the exhaust valve seat of 250 Mach 1 and Mark 3 1965.
22	115	88743.0104	Milling cutter for « 250 Mach 1 and Mark 3 edit. 1965 » intake valve seat.
23	115	88713.0268	Spanner for securing the exhaust pipe clamping-ring.
24	115	88713.0269	75120.3075 bearing extractor in the 250 and 350 cc models.
24	115	88713.0270	75110.2566 - 75120.2054 - 75120.2566 - 75155.2054 bearings extractor, for 160, 250 and 350 cc.
24	115	88713.0271	75120.1747 - 75155.1747 bearings extractor, for 160 - 250 and 350 cc.
25	115	—	Cancelled.
26	115	88713.0276	Bush for fitting advance cover.
27 (i. m.)	51	88713.0316	Pin for removing engine from frame and securing it on frame.
34	45	88713.0285	Degree wheel-mounting device for checking the timing and ignition advance.
35	45	88713.0343	Warning light for checking the advance.

Note: i.m.=illustration missing.

Illustration N°	Page	Reference N°	Tool
(i.m.)	51	88713.0318	« T » spanner for removing the tank rear anchorage.
42	54	88713.0317	Aluminium base for engine support.
49	55	88713.0319	Puller, clutch drum.
72	79	88713.0377	Cone for fitting spring rings $\varnothing 20 \times \varnothing 24 \times 1.9$ on the gear change layshaft of the 250 cc, 5 speeds and 350 cc.
72	79	88713.0378	Cone for fitting spring rings $\varnothing 20 \times \varnothing 24 \times 1.9$ on the gear change layshaft of the 250 cc, 5 speeds and 350 cc.
73	80	88713.0375	Cone for fitting spring rings $\varnothing 18 \times \varnothing 22 \times 2.5$ on the gear change main shaft of the 250 cc, 4 and 5 speeds and, 350 cc.
73	80	88713.0376	Cone for fitting spring rings $\varnothing 20 \times \varnothing 24 \times 1.9$ on the gear change main shaft of the 250 cc, 5 speeds and 350 cc.
91	87	88713.0025	Device for fitting transmission and protector on engine head.
108	95	88713.0012	Small support to be used when fitting valve in DUCATI front fork central column.
109	95	88713.0010	« T » wrench for fitting left threaded plug in DUCATI fork lower sliding tube.
110	95	88713.0009	Punch to fit sealing ring in DUCATI front fork lower sliding tube.
111	96	88713.0013	Guiding bush for fitting dust-cover on lower sliding tube.
111	96	88713.0322	Spanner for fixing the fork dust cover.
113	96	88713.0008	« T » wrench to lock the damper stem (to lock lower screw 8 MA).
118	98	88713.0323	To secure the steering boxes on the frame.
i.m.	—	88713.0070	Spanner for fixing threaded upper bush 0278.37.470 on front fork of the 160 Monza Jr.

Note: i.m. = illustration missing.

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ELECTRICAL SCHEME (250 GT - MONZA - MACH 1 - 350 SEBRING)

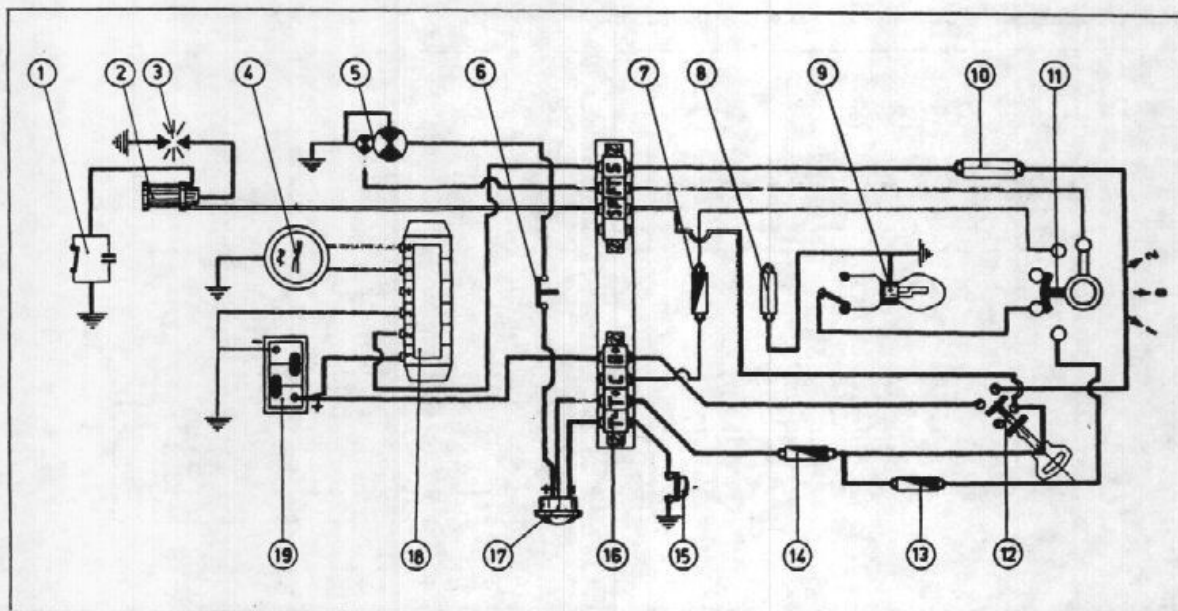


Fig. 30

KEY TO PARTS OF THE ELECTRICAL SCHEME

- |   |   |  |
|---|---|--|
| 1 Contact breaker-condenser.  | 8 Bulb for front parking light 6 V - 3 W - warning green light.                       | 14 Fuse protecting the horn and the Stop indicator - 15 A. |
| 2 Ignition coil in c.c. 6 V.  | 9 Bulb of the headlamp 6 V - 25/25 W.   | 15 The horn push button.                                   |
| 3 Sparking plug.  | 10 Bulb for the charge warning red light 6 V - 1.5 W.                                 | 16 Terminal block for headlamp.                            |
| 4 Generator 6 V - 60 W.   | 11 Three position combinator.   | 17 Horn 6 V c.c.   |
| 5 Plate carrier and Stop Light 6 V - 3/15 W.                                  | 12 Extractable 4 contact-key.   | 18 Static regulator of current and rectifier 6 V - 10 A.   |
| 6 Stop light switch.  | 13 Fuse protecting the projector light equipment (dazzling and anti-dazzling) - 15 A. | 19 Battery SAFA 3L3 - 13.5 Ah - 6 V.                       |
| 7 Fuse protecting the system of the front and the rear parking lights - 15 A. |   |  |

ELECTRICAL SCHEME (250 GT - MONZA - MACH 1 - 350 SEBRING)

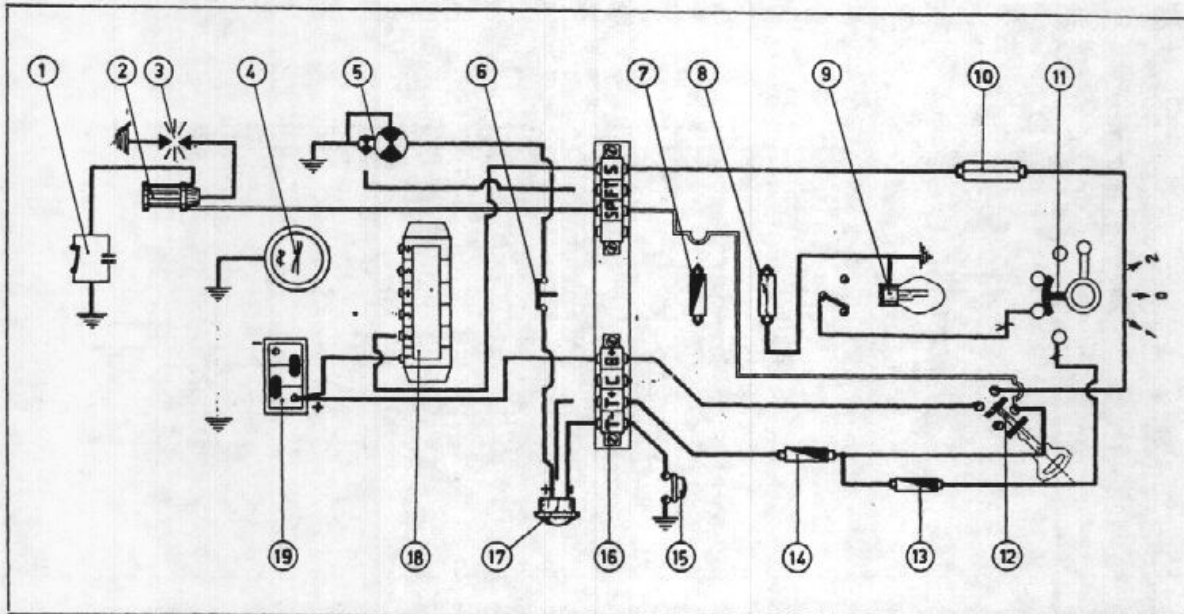


Fig. 30

KEY TO PARTS OF THE ELECTRICAL SCHEME

- |  |   |  |
|--|---|--|
| 1 Contact breaker-condenser.                 | 8 Bulb for front parking light 6 V - 3 W - warning green light.                       | 14 Fuse protecting the horn and the Stop indicator - 15 A. |
| 2 Ignition coil in c.c. 6 V.                 | 9 Bulb of the headlamp 6 V - 25/25 W.   | 15 The horn push button.                                   |
| 3 Sparking plug.                             | 10 Bulb for the charge warning red light 6 V - 1.5 W.                                 | 16 Terminal block for headlamp.                            |
| 4 Generator 6 V - 60 W.                      | 11 Three position commutator.   | 17 Horn 6 V c.c.   |
| 5 Plate carrier and Stop Light 6 V - 3/15 W. | 12 Extractable 4 contact-key.   | 18 Static regulator of current and rectifier 6 V - 10 A.   |
| 6 Stop light switch.                         | 13 Fuse protecting the projector light equipment (dazzling and anti-dazzling) - 15 A. | 19 Battery SAFA 3L3 - 13.5 Ah - 6 V.                       |



# ELECTRICAL SCHEME (250 GT - MONZA - MACH 1 - 350 SEBRING)

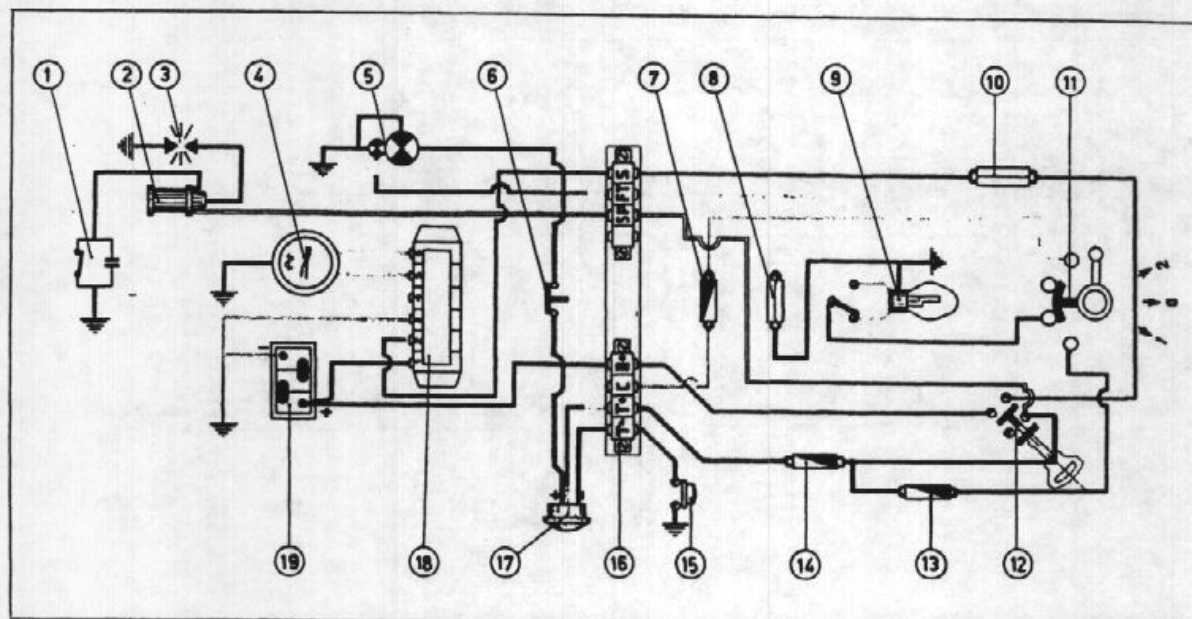


Fig. 30

## KEY TO PARTS OF THE ELECTRICAL SCHEME

- |  |   |  |
|--|---|--|
| 1 Contact breaker-condenser.                 | 8 Bulb for front parking light 6 V - 3 W - warning green light.                       | 14 Fuse protecting the horn and the Stop indicator - 15 A. |
| 2 Ignition coil in c.c. 6 V.                 | 9 Bulb of the headlamp 6 V - 25/25 W.   | 15 The horn push button.                                   |
| 3 Sparking plug.                             | 10 Bulb for the charge warning red light 6 V - 1.5 W.                                 | 16 Terminal block for headlamp.                            |
| 4 Generator 6 V - 60 W.                      | 11 Three position commutator.   | 17 Horn 6 V c.c.   |
| 5 Plate carrier and Stop Light 6 V - 3/15 W. | 12 Extractable 4 contact-key.   | 18 Static regulator of current and rectifier 6 V - 10 A.   |
| 6 Stop light switch.                         | 13 Fuse protecting the projector light equipment (dazzling and anti-dazzling) - 15 A. | 19 Battery SAFA 3L3 - 12.5 Ah - 6 V.                       |

ELECTRICAL SCHEME (250 GT - MONZA - MACH 1 - 350 SEBRING)

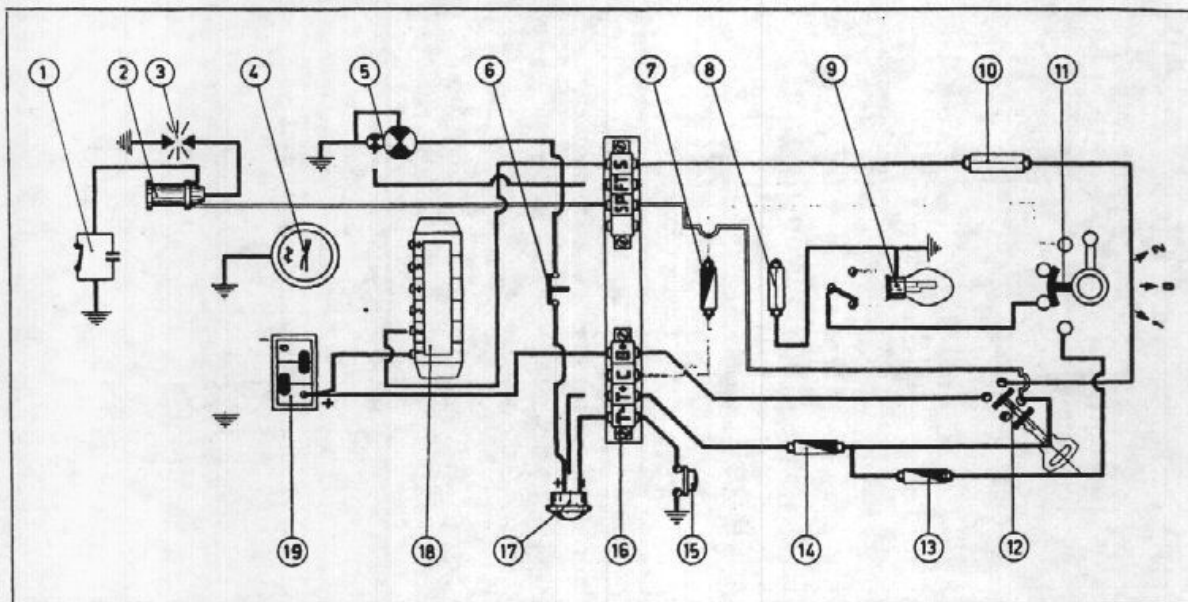


Fig. 30

KEY TO PARTS OF THE ELECTRICAL SCHEME

- |   |   |  |
|---|---|--|
| 1 Contact breaker-condenser.  | 8 Bulb for front parking light 6 V - 3 W - warning green light.                       | 14 Fuse protecting the horn and the Stop indicator - 15 A. |
| 2 Ignition coil in c.c. 6 V.  | 9 Bulb of the headlamp 6 V - 25/25 W.   | 15 The horn push button.                                   |
| 3 Sparking plug.  | 10 Bulb for the charge warning red light 6 V - 1.5 W.                                 | 16 Terminal block for headlamp.                            |
| 4 Generator 6 V - 60 W.   | 11 Three position commutator.   | 17 Horn 6 V c.c.   |
| 5 Plate carrier and Stop Light 6 V - 3.15 W.                                  | 12 Extractable 4 contact-key.   | 18 Static regulator of current and rectifier 6 V - 10 A.   |
| 6 Stop light switch.  | 13 Fuse protecting the projector light equipment (dazzling and anti-dazzling) - 15 A. | 19 Battery SAFA 3L3 - 13.5 Ah - 6 V.                       |
| 7 Fuse protecting the system of the front and the rear parking lights - 15 A. |   |  |

**ELECTRICAL SCHEME**  
(250 Scrambler till e.n. 92171 & Mark 3)

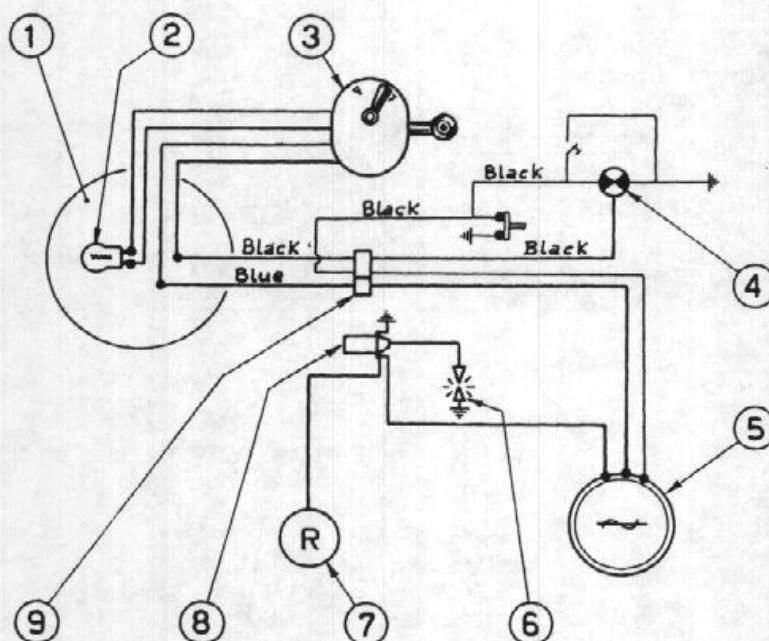


Fig. 37

**KEY TO PARTS OF THE ELECTRICAL SCHEME**

1. Headlamp Aprilia mod. 130 ASN.
2. Filament bulb 6 V-25/25W.
3. Switch and deviator Aprilia 59/N.
4. Tail light mod. Aprilia 4521 - 6V - 5/20W.
5. Flywheel alternator 6V-40 W.
6. Ignition sparking. plug.
7. Contact breaker-condenser.
8. Alternated current ignition coil 6V.
9. 3-way terminal block.



**ELECTRICAL SCHEME**  
(250 Scrambler till e.n. 92171 & Mark 3)

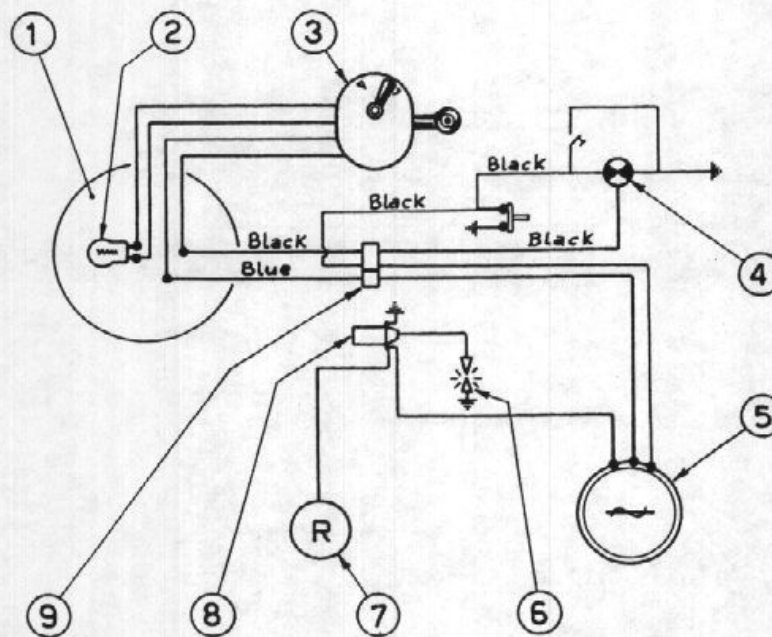


Fig. 37

**KEY TO PARTS OF THE ELECTRICAL SCHEME**

1. Headlamp Aprilia mod. 130 ASN.
2. 2-Filament bulb 6 V-25/25W.
3. Switch and deviator Aprilia 59/N.
4. Tail light mod. Aprilia 4521 - 6V - 5/20W.
5. Flywheel alternator 6V-40 W.
6. Ignition sparking. plug.
7. Contact breaker-condenser.
8. Alternated current ignition coil 6V.
9. 3-way terminal block.

# **ELECTRICAL SCHEME** (250 Scrambler from e.n. 92172)

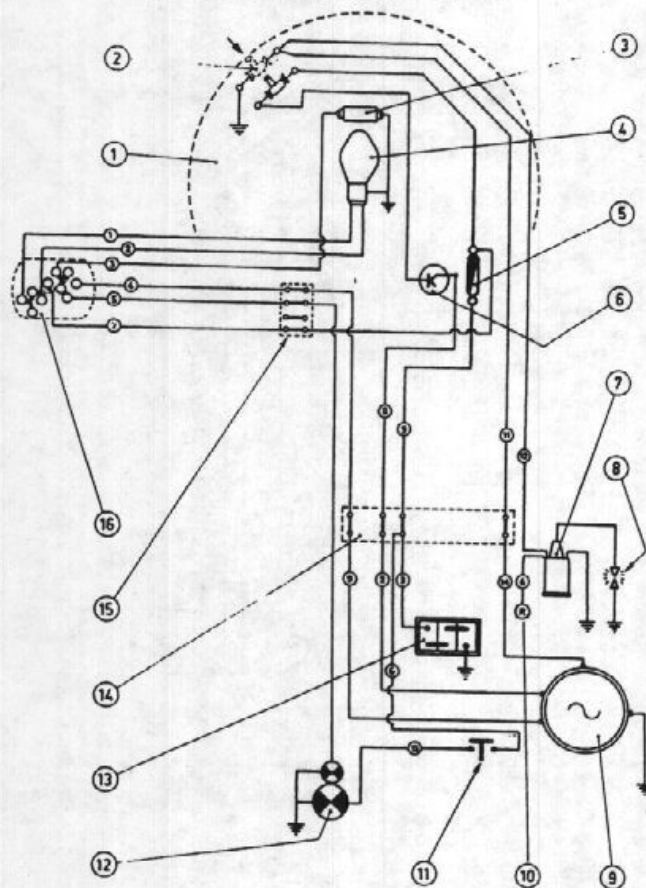


Fig. 38

## **KEY TO PARTS OF THE ELECTRICAL SCHEME**

- 1 Headlamp APRILIA 130
- 2 4-contact key
- 3 Parking light 6V-3W
- 4 Headlamp bulb 6V-25/25W
- 5 Fuse 15A
- 6 Diode
- 7 H.T. coil in a.c. 6V
- 8 Ignition spark plug
- 9 Generator 6V - 28W
- 10 Contact breaker - Condenser
- 11 Stop switch
- 12 Number plate bulb and stop light 6V-3/15W
- 13 Battery 7Ah - 6V - SAFA 3 IL 3
- 14 Frame terminal block
- 15 Derivation terminal block
- 16 Lights control device

## **COLOUR OF THE CABLES**

- 1-2 White
- 3-8 Blue
- 4 Brown
- 5 Black with yellow collar
- 6-13 Black
- 7-11-12 Green
- 9 Red
- 10 Black with blue collar
- 14 Yellow

# **ELECTRICAL SCHEME** (160 Monza Jr.)

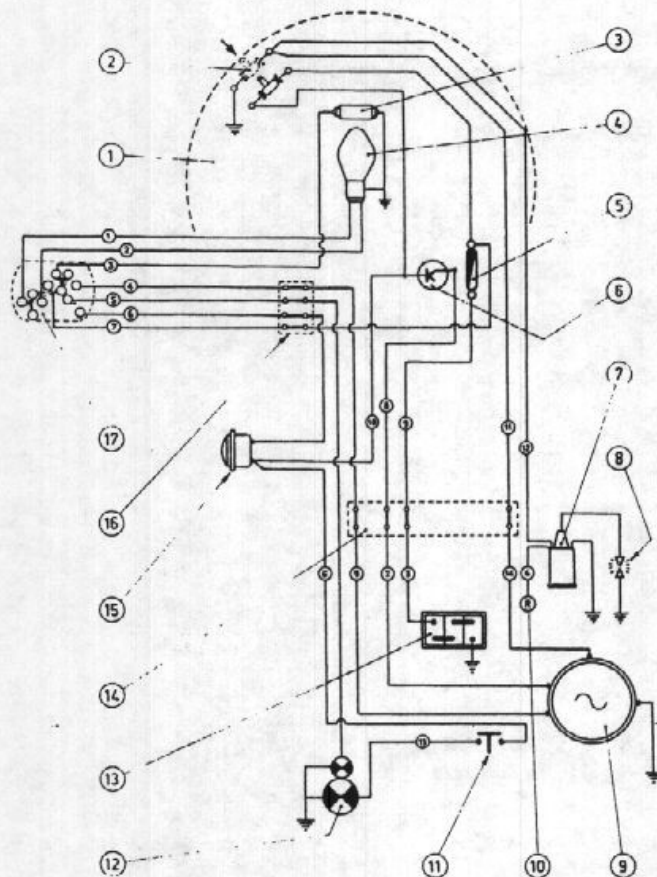


Fig. 39

## **KEY TO PARTS OF THE ELECTRICAL SCHEME**

- 1 Headlamp APRILIA 130 RCGN/t (Apr).  
I.G.M. 1408 PMx)
- 2 4 contact key
- 3 Parking light 6V-3W
- 4 Headlamp bulb 6V-25/25W
- 5 Fuse 15A
- 6 Diode
- 7 H.T. coil in a.c. 6V
- 8 Ignition spark plug
- 9 Generator 6V - 28W
- 10 Contact breaker - Condenser
- 11 Stop switch
- 12 Number plate bulb and stop light  
6V-3/15W
- 13 Battery 7Ah - 6V - SAFA 3 IL 3
- 14 Frame terminal block
- 15 Horn 6V
- 16 Derivation terminal block
- 17 Lights control device LD 57/8SM.

## **COLOUR OF THE CABLES**

- 1-2 White
- 3-8 Blue
- 4 Brown
- 5 Black with yellow collar
- 6-13 Black
- 7-11-12 Green
- 9 Red
- 10 Black with blue collar
- 14 Yellow



# **ELECTRICAL SCHEME**

(160 Monza Jr.)

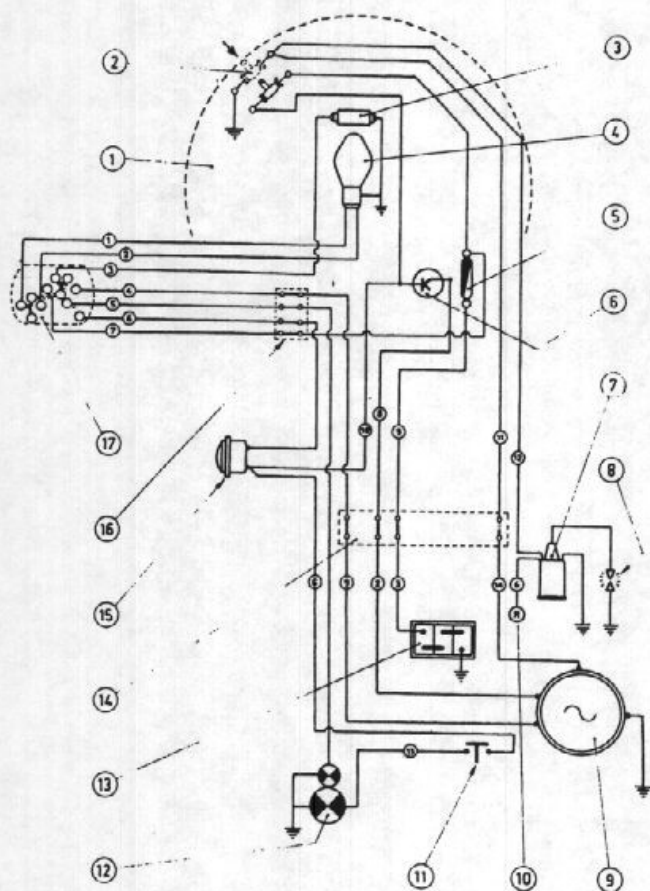


Fig. 39

## **KEY TO PARTS OF THE ELECTRICAL SCHEME**

- 1 Headlamp APRILIA 130 RCGN/t (App. I.G.M. 1408 PMx)
- 2 4-contact key
- 3 Parking light 6V-3W
- 4 Headlamp bulb 6V-25/25W
- 5 Fuse 15A
- 6 Diode
- 7 H.T. coil in a.c. 6V
- 8 Ignition spark plug
- 9 Generator 6V - 28W
- 10 Contact breaker - Condenser
- 11 Stop switch
- 12 Number plate bulb and stop light 6V-3/15W
- 13 Battery 7Ah - 6V - SAFA 3 IL 3
- 14 Frame terminal block
- 15 Horn 6V
- 16 Derivation terminal block
- 17 Lights control device LD 57/8SM.

## **COLOUR OF THE CABLES**

- 1-2 White
- 3-3 Blue
- 4 Brown
- 5 Black with yellow collar
- 6-13 Black
- 7-11-12 Green
- 9 Red
- 10 Black with blue collar
- 14 Yellow

# DUCATI



## OVER HEAD CAMSHAFT MOTORCYCLES



SUPPLEMENT TO

## WORK SHOP MANUAL

Issued in January 1966 - Mod. 4106/E

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**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**

1st EDITION - REF. DM - MOD. 4125/E - PRINTED DECEMBER 1969 - 2.000

Every DUCATI REPAIR SHOP is supplied with a copy of this manual.

The contents of this handbook are not binding and DUCATI MECCANICA S.p.A. reserve to themselves the right of altering any of the constructional details, accessories, tools, etc., which, in their opinion, are necessary for the improvement of the book itself or of any technical-economical need, but this cannot be considered a bound for the partnership to bring it up-to-date.

## **S U M M A R Y**

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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	0615.92.700	Yellow securing screw for Pipe	60	V 7/11	265 T	50	1 3/4	H-7688	135	Italia U.S.A. SCR Sample for Berl.	Mark 3 SCR
2 VHB 29 AD adjustment 3513	0615.92.705 with sole horn	—	60	V 7/11	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	0615.92.700	Yellow securing screw for Pipe	60	V 7/11	265 T	50	1 3/4	H-7688	135	U.S.A. SCR Sample for Berl.	Mark 3D
2 VHB 29 AD adjustment 3513	0615.92.705 with sole horn	—	60	V 7/11	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	0616.92.700	Yellow securing screw for valve cover	60	V 8/11	265 T	45	2 3/4	H-7688	135	Italia	Mark 3D
4 VHB 29 AD adjustment	0616.92.705 with sole horn	—	60	V 8/11	265 T	45	2 3/4	H-7688 F	130	Italia	Mark 3D
5 VHB 29 AD adjustment	0615.92.710	—	60 with hole Ø 1.75	V 7/11	265 T	45		H-7688	135 140 145	SCR	Up-rated Mark 3 SCR
5 VHB 29 AD adjustment	0615.92.710 with sole horn	—	60 with hole Ø 1.75	V 7/11	265 T	45		H-7688 F	135 140 145	SCR	Up-rated Mark 3 SCR

## 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).

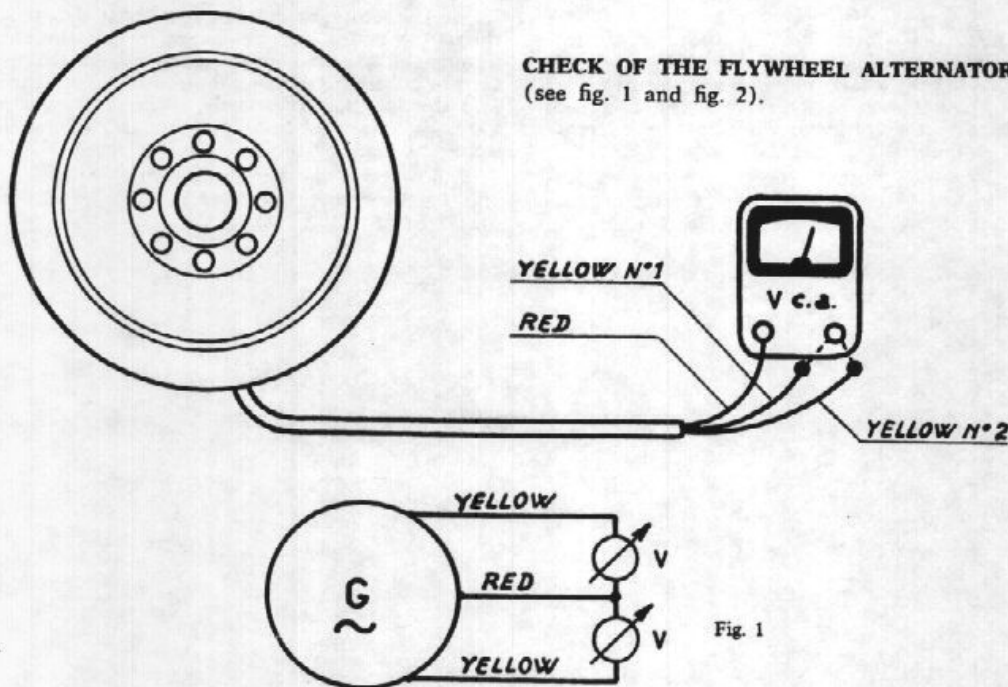


Fig. 1

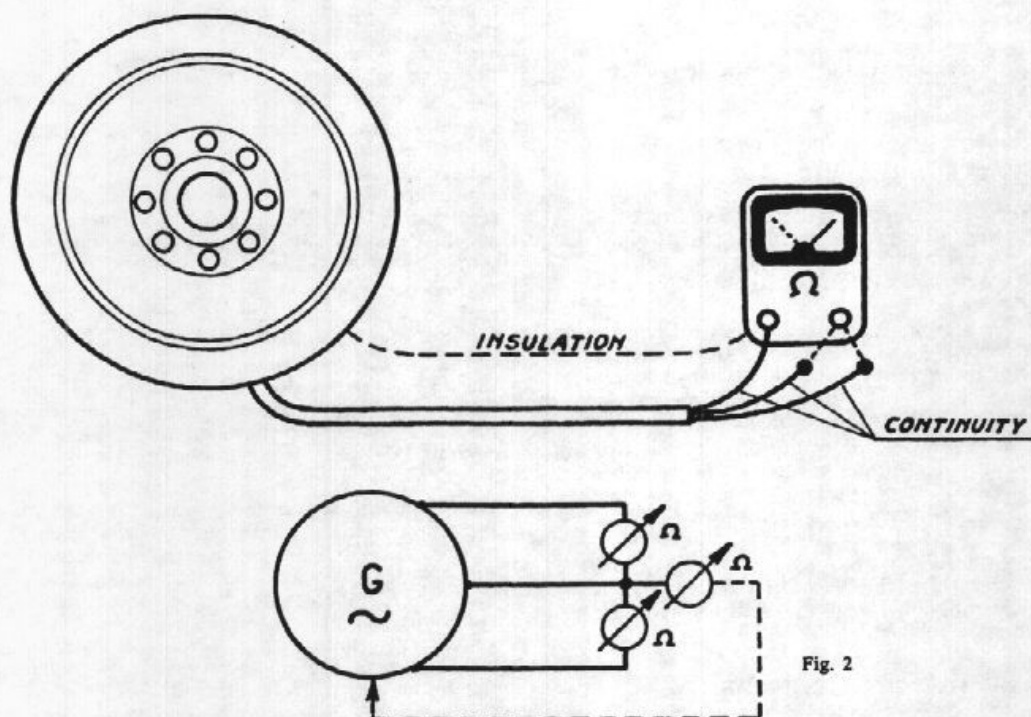


Fig. 2

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)

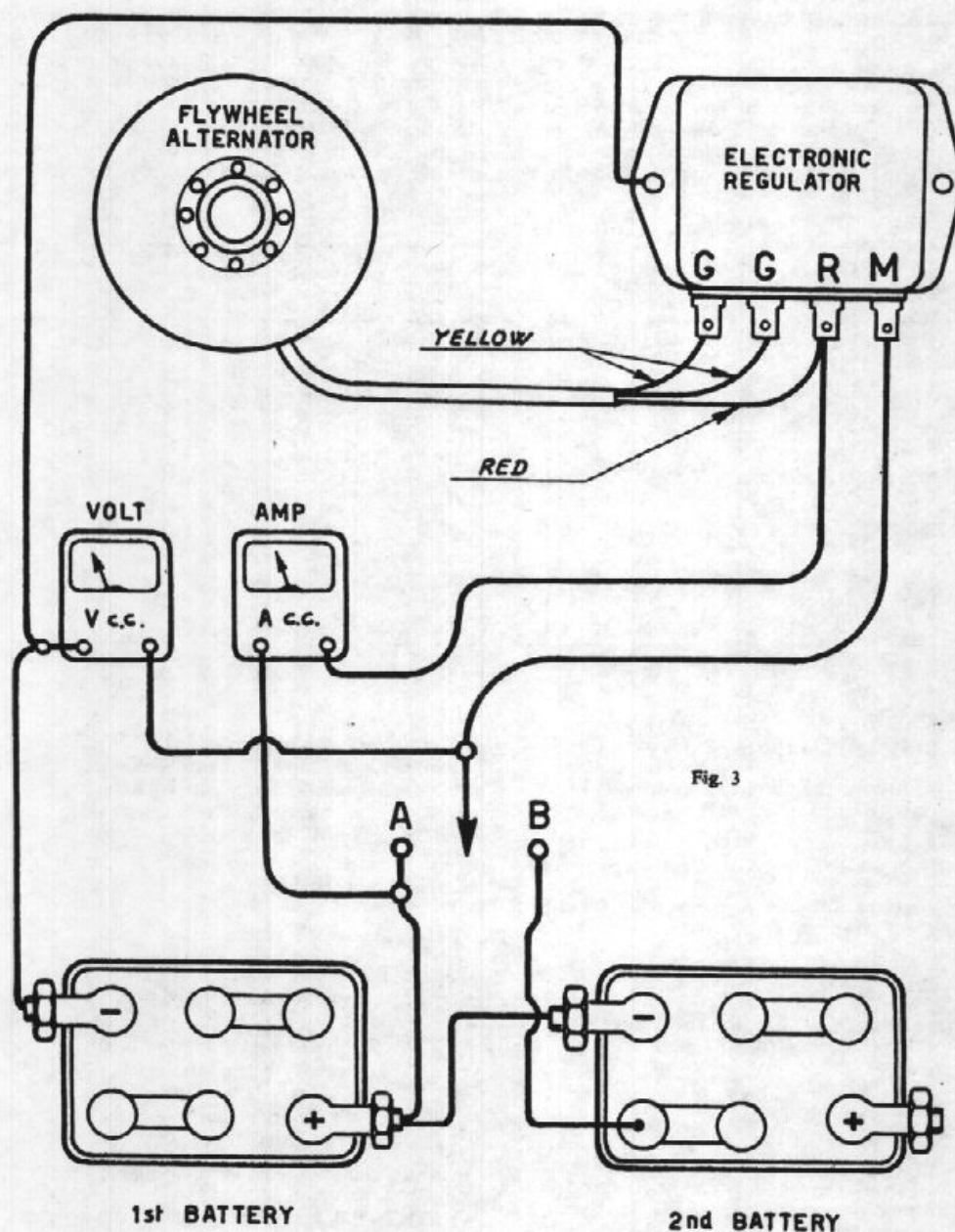


Fig. 3

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 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.
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.
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 Ø A=mm.	GUDGEON PIN Ø 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-scrapers (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 250 SCRAMBLER	1.990	—	2.010	0.020	0.10
	1.978	—	2.030	0.052	
	—	2.490	2.510	0.020	
	—	2.478	2.530	0.052	
250 MARK 3 250 MARK 3 D	1.490	—	1.510	0.020	0.10
	1.478	—	1.530	0.052	
	—	2.990	3.010	0.020	
	—	2.978	3.030	0.052	
350 MARK 3 350 MARK 3 D 350 SCRAMBLER	1.490	—	1.510	0.020	0.10
	1.478	—	1.530	0.052	
	—	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 ØA = mm.	Gudgeon pin ØB = 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 SEBRIN (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 Ø = mm.	ROCKER PIN Ø = 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 Ø = mm.	BUSH OUTSIDE Ø = 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 Øi = 29.2, fit the distance piece Øe = 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.

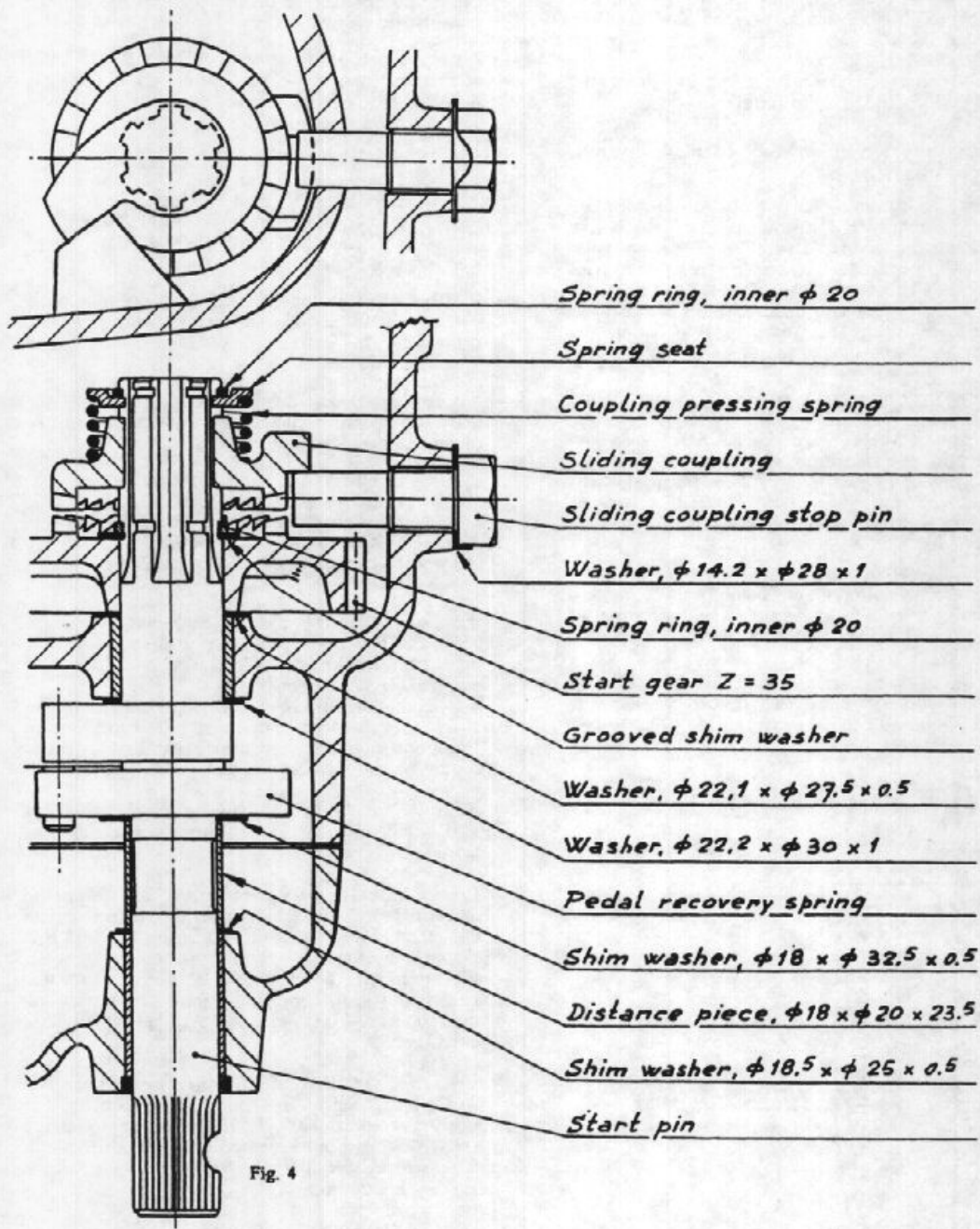


Fig. 4

**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)

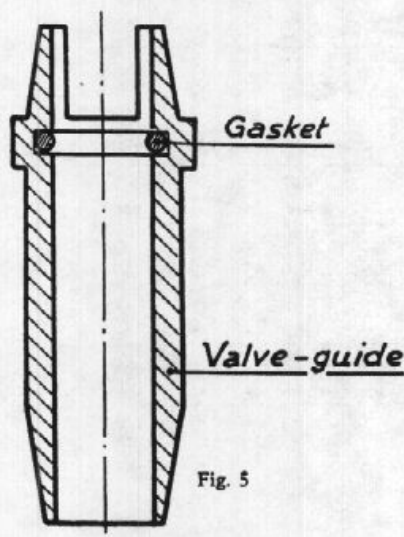
Everything as at page 83, except the timing of the advance gear with the pump gear which has to be expressed as follows: Time the advance gear with the pump gear, the two reference marks must coincide in the models 250 and 350 cc., while in the 450 cc model the point of the pump gear must coincide with 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 - 0609.92.210
- 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.

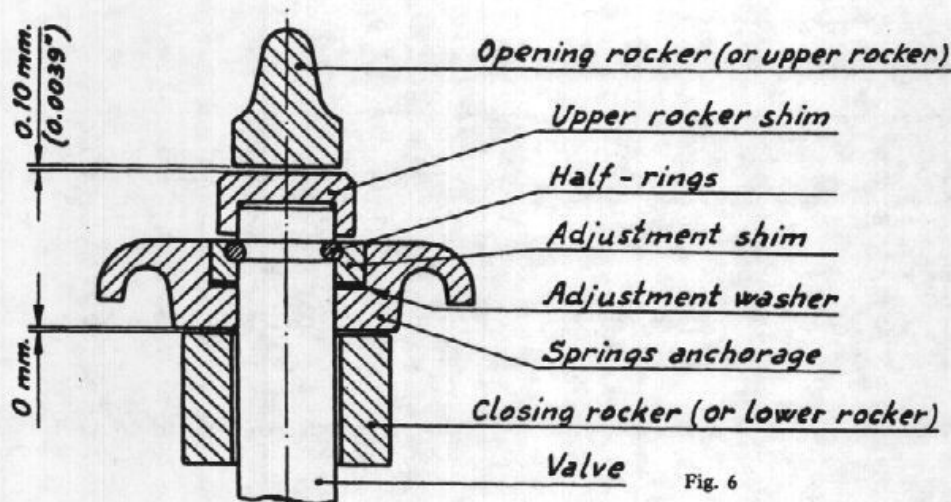


Fig. 6

#### 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  $\pm 5^\circ$ ).



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.