NORTON

INTERPOL 2

POLICE OPERATORS

WORKSHOP MANUAL

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Norton Interpol 2

Twin Rotor Idling Supplement to Workshop Manual 00-4228

REPLACEMENT OF THE ORIGINAL PAGES (AS NUMBERED) BY THOSE WITH IDENTICAL NUMBERS FROM THE SUPPLEMENT CONVERTS THE ORIGINAL WORKSHOP MANUAL FOR BOTH SINGLE AND TWIN ROTOR IDLE USE.

Part No. 00-4229

MAIN BEARINGS

Roller Main Bearings	FAG RNU 2206E 30x62x20
Ball Axial Bearing	16005 C3 25x47x8

ROTOR HOUSINGS:

Material	LM9 Aluminium alloy
Housing width – max	68.20
min	68.19
Rotor end float (without seals fitted)	0.40/0.43
Trochoid surface plating	Galnisic Elnisil. Plate

Stationary Gear

Number of teeth	30
Main bearing housing diameter	61.97/61.98

END & INTERMEDIATE PLATE

Left End Plate

Material	LM13 Aluminium alloy
Maximum regrind	0.20–0.25
*Minimum allowable plate thickness	27.20
Parallel tolerance	0.025
Permissible unevenness	0.02
Surface finish	0.4 μmm.

Intermediate Plate

Material	LM13 Aluminium alloy
Maximum regrind	0.20–0.25 per side
*Minimum allowable plate thickness	45.40
Parallel tolerance	0.02
Permissible unevenness	0.02
Surface finish	0.4 μmm.

Right End Plate (Primary Chaincase)

Material	LM13 Aluminium alloy
Maximum regrind	0.20–0.25
*Minimum allowable plate thickness	27.20
Parallel tolerance	0.025
Permissible unevenness	0.02
Surface finish	0.4 μmm.

*Plate material thickness on both end plates measured from rotor running surface to base of stationary gear flange counterbore. Intermediate plate thickness measured between running surfaces.

LOCATING DOWELS (ROTOR HOUSINGS)

Diameter	15.59/15.60
Length	80.80/81.20
End clearance (fitted between end plate and intermediate plate)	0.99/1.40

CARBURETTORS:

Make	S.U.
Type	H.I.F.4 Constant depression
Choke size	1 1/12" (38 mm)
Main jet (left and right handed)	0.090 in.
Needle	ADR
Spring	RED
Damper	AUG 8103

TRANSMISSION

Primary Chain	Duplex 92x3/8 pitch 30 tooth engine sprocket. 57 tooth clutch sprocket
Rear Chain	Single row 112x5/8in x 3/8in. Grand Prix chain.

CLUTCH

Type	Eighteen plate diaphragm spring type cable operated.
Material	Sintered bronze engaging with steel intermediate plates.

CLUTCH DETAILS:

Type	Multi-plate all metal with integral shock absorber
Number of plates:	
Driving (Steel)	9
Driven (Sintered bronze)	9
Driving plate thickness	1.17–1.27 mm
Driven plate thickness	2.15–2.25 mm
Diaphragm spring diameter (Laycock 83466/70)	159.86–159.76
Free depth	10.71–11.21
Clutch sprocket bearing	6007 C2 35x62x14 Single row ball.
Clutch pressure plate bearing	7200 10x30x9 Angular contact

CUTCH OPERATING MECHANISM

Clutch lift	2.25 mm
Ball diameter	10 mm
Ball recess depth	2.0

CHAIN TENSIONER

Slipper – foot radius	50.80
– leading/trailing edge radius	6.35
– shaft diameter	14.732–14.744
– housing bore	14.738–14.757

GEARBOX

Type	5–speed constant mesh

GEARBOX RATIOS

1st (bottom)	1:2.54
2nd	1: 1.84
3rd	1: 1.4
4th	1: 1.19
5th (top)	1: 1.0

OVERALL RATIOS	Single Rotor Idling	Twin Rotor Idling
1st (bottom)	11.25	12.22
2nd	8.15	8.85
3rd	6.20	6.73
4th	5.27	5.72
5th (top)	4.43	4.81
Road speed at 1000 engine r.p.m. in top gear	16.49	15.19

SPROCKET DETAILS

Engine – Number of teeth	30	30
Clutch – Number of teeth	57	57
Gearbox – Number of teeth	18	17
Rear Wheel – Number of teeth	42	43

BRAKES (rear)	
Type	Hydraulically operated single disc.
Discs	Stainless with integral alloy carriers
Disc diameter	280 mm (11 in.)
Pad type	Textar 290–Sintered Metal–"All Weather"
Minimum lining thickness	4.5 mm. – not beyond groove
Hydraulic Fluid	Lockheed Super D.O.T.4 or Equivalent
Calipers	Twin piston
TYRES	
Sizes – Front	4.10 V18 (WM 2 rim) or 100/90V18
Rear	4.25/85 V18 (WM 3 rim) or 120/80V18
	V rated (over 130 mph)
	Pirelli Phantom
	MT 29 Front ribbed (tubed)
	MT 28 Rear block (tubed)
Inner tube	Type 14A 18SS Front and rear
Pressures	Front (solo) 32 p.s.i. (2.25 Kg/cm²)
	Rear (solo) 36 p.s.i. (2.53 Kg/cm²)
SPEEDOMETER DRIVE	
Drive gearbox ratio	17/14
Drive cable length – outer	880
Drive cable length – inner	912
ELECTRICAL SYSTEM	
Ignition timing (rotor shaft position)	18° B.T.D.C. fixed
Voltage	12 volt
Polarity	Negative earth/ground
Battery	14 amp/hr
Alternator	Kokusan 220w 3 phase
Voltage regulator	Sparkrite Electronic Unit
Flasher unit	Lucas 8FL 35048 12 volt
Horns	Fiamm 12 volt
Horn relay	Lucas 26RA 54038118
IGNITION	
Plugs	10 mm surface gap non-adjustable type with long life platinum centre electrode.
Type	CHAMPION U.G. 80 P.V. or U.G. 501. P.V.
Plug gap	Fixed non-adjustable
Coils	Two Hitachi 12 volt – CM11 – 54
Ignition Unit	Sparkrite Capacitor Discharge Unit (C.D.U.) with internal distributor switching.
Ignition Trigger Unit	Sparkrite Variable Reluctance electromagnetic pulse generator.
	Air gap 0.3 mm ± 0.05 (0.010 – 0.014 in.).
Electronic Retard Unit	Gunton MK8/50
Ignition Relay Unit	Lucas 12 volt –28 PA
Temperature Sensor	RS 151-243 (100K at 25°RC)
STARTER SYSTEM	
Type	Electric
Make	Lucas M3
Reduction ratio:-	
Starter Motor	Number of teeth 10
Starter Gears	Number of teeth 145
Clutch Housing	Number of teeth 57
Engine Sprocket	Number of teeth 30

Reduction ratio – starter motor to engine shaft – 7.63:1

BULBS

Headlight	472	H4	12V 55/60 watt (QH)
Parking light	254	Festoon 57	12V 5W
Daylight running	254	Festoon 57	12V 5W
Pilot bulb (where fitted)	233	SCC BA9s	12V 4W
Direction indicator			
Fairing	382	SCC BA15s	12V 21 Watt
Pannier	382	SCC BA15s	12V 21 Watt
Stop/Tail	380	SBC BAY15d	12V 5/21 Watt
Fog Lamp	382	SCC BA15s	12V 21 Watt
Rear No Plate	233	SCC BA9s	12V 4 Watt
Blue Lamp		GE4416B Sealed Beam	12V Blue 30w
Binnacle warning	286	W2x4.6d Capless	12V 1.2 Watt
Instrument Illumination	286	W2x4.6d Capless	12V 1.2 Watt
Speedo/Tacho Illumination	286	W2x4.6d Capless	12V 1.2 Watt

FUSES

Main	25 Amp (Blue) }
Ignition Circuit	8 Amp (White) } Automotive Continental
Flasher Circuit	8 Amp (White) }
Lights Circuit	8 Amp (White) }
Ignition Relay Unit	5 Amp (Lucas) "In-Line"

CAPACITIES

Fuel Tank	5 Imp Gal (22.5 Litres)
Oil Reservoir	7 Imp pints (4 Litres)
Gearbox	1 Litre
Primary Transmission	250 cc.
Final Drive	Initial Fill 175cc – Refill 75cc.
Front Forks (each leg)	250 cc.

KERBSIDE

Kerb Weight	260 KG (570 lbs) with fairing and Police Eqpt.
Length	1805 mm (86 in.)
Wheelbase	1486 mm (58 1/2 in)
Handlebar Width	710 mm (28 in.)
Static Laden Height	762 mm (30 in. measured at the seat)
Ground Clearance	165 mm (6 1/2 in.)

ROUTINE MAINTENANCE

ROUTINE SERVICING CHART

OPERATION	FREQUENCY (Whichever occurs First)	SPEEDOMETER READING (Miles & Kilometers) 1000 MILES (1600 Kms) A SERVICE	6000 MILES (10000 Kms) B SERVICE	1200 MILES (20000 Kms) C SERVICE	SECTION
AIR FILTER ELEMENTS CLEAN	MONTHLY IN DUSTY CONDITIONS		√	√	E5
BATTERY TERMINALS AND ELECTROLYTE LEVELS		√	√	√	H1
BRAKE FLUID LEVEL	MONTHLY	√	√	√	F1
BRAKE FLUID CHANGE	ANNUALLY				F4
BRAKE & CLUTCH LEVERS LUBRICATE	MONTHLY	√	√	√	A14
BRAKE PAD WEAR EXAMINE	MONTHLY or every 3000 miles		√	√	F2
BRAKE PEDAL PIVOT GREASE	3 MONTHS	√	√	√	A15
BRAKE CALIPER (rear) MOUNTING PLATE LUBRICATE	3 MONTHS	√	√	√	A13
CARBURETTOR DAMPER PISTON OIL LEVEL EXAMINE	MONTHLY		√	√	B7
CARBURETTOR SUCTION CHAMBERS & DAMPER PISTONS CLEAN	AS REQUIRED		√	√	B5
CARBURATION EXAMINE	AS REQUIRED	√			B7
CLUTCH CABLE EXAMINE		√	√	√	G4
FRONT FORK OIL CHANGE				√	A12
GEARBOX OIL LEVEL EXAMINE (Single Rotor Idling Models)	3 MONTHS	√			A7
GEARBOX OIL CHANGE			√	√	A7
MICROSWITCH ADJUSTMENT EXAMINE			√	√	B11
PRIMARY DRIVE OIL LEVEL EXAMINE	3 MONTHS	√			A8
PRIMARY DRIVE OIL CHANGE			√	√	A8
OIL METERING UNIT ADJUSTMENT EXAMINE		√	√	√	A6
REAR DRIVE CHAIN ADJUSTMENT EXAMINE	AS REQUIRED	√			D10
REAR DRIVE CHAIN OIL CHANGE			√	√	A9
STEERING HEAD BEARING ADJUSTMENT EXAMINE		√	√	√	G13
SPARK PLUGS EXAMINE & CLEAN			√	√	H4
SPARK PLUGS CHANGE	AS REQUIRED				H4
THROTTLE CABLE EXAMINE		√	√	√	G3
WHEEL ALIGNMENT		√	√	√	F19

DAILY ROUTINE CHECKS

TYRES, LIGHTS, ENGINE OIL LEVEL, BRAKE OPERATION, HORN, REAR VIEW MIRROR ADJUSTMENT

ROUTINE MAINTENANCE

Refer to Sections A1 & A2 for Lubrication Chart and Recommended Lubricants

FIRST 1000 MILE SERVICE (1600 km)

		Section
Examine and adjust	Oil metering pump unit	A6
	Steering head bearings	G13
	Throttle cable	G3
	Clutch cable	G4
	Rear chain	D10
	Wheel alignment	F19
Examine and adjust oil levels	Oil tank	A1
	Carburettor damper piston	B7
	Primary chaincase	A8
	Gearbox	A7
	Rear chaincase	A9
	Brake master cylinder reservoirs	F1
Lubricate	Brake & clutch lever pivots (handlebar)	A14
	Rear brake pedal pivot	A15
Grease	Rear brake caliper mounting plate pivot	A13
Check	Battery terminal and electrolyte level	H1
	Lights	H11 to H18
	Tyres	F15
	Wheel alignment	F19
	Security of: All fairing brackets and mounting points	
	Screen mounting screws	

EVERY 6000 (10,000 km) AND 12,000 MILES (20,000 km)

Examine and replace where necessary	Brake pads	F2
Drain and refill to correct level	Primary chaincase	A8
	Gearbox	A7
	Rear chaincase	A9
Check and Re-adjust where necessary	Oil metering pump unit	A6
	Steering head bearings	G13
	Micro-switch (Single Rotor Idling Models)	B11
	Throttle cable	G3
	Clutch cable	G4
	Rear drive chain	D10
	Wheel alignment	F19
Remove, clean and re-fit	Spark plug	H4
	Air filter element	E5
	Carburettor suction chambers	B5
Lubricate with oil	Carburettor damper piston	B7
	Rear brake pedal	A15
Lubricate with grease	Rear brake caliper mounting plate pivot	A13
Check	Battery terminals & electrolyte level	H1
	Lights	H11 to H18
	Tyres	F15

ADDITIONAL AT 12000 MILES (20,000 km)

Drain and refill to correct level	Front forks	A12
Monthly	Check brake pads	F2
	Oil level – carburetter damper piston	B7
Annually	Drain and refill brake hydraulic system	F4

FOREWORD

The Norton Interpol 2 Workshop Manual has been compiled to assist workshop staff to service the motorcycle in accordance with the manufacturers recommendations, and to carry out all envisaged routine maintenance, running repairs and major overhaul operations.

The Manual is divided into sections dealing with major assemblies throughout the machine, covering strip-down, examination, reconditioning and re-assembly procedures. Where appropriate, cross references are provided to assist in locating the sections included within a particular operation, each section containing line drawings to provide useful and clear indication in support of the text.

Special tools are illustrated in the tools section at the end of the manual, and where used in strip and rebuild operations, are included in the illustrations and text. To assist in identification, rectification and repair, a series of conversion tables have been added to the manual as a ready reference, particularly as, with only few exceptions, the Norton Interpol 2 Motorcycle is constructed to I.S.O. metric dimensional standards throughout.

A fully illustrated replacement parts catalogue for this machine is available under part number 00-4227, and together with the Police Operators Manual (part number 92-1140) will further assist in the service of the machine.

It must be emphasised that to obtain the full performance and life potential of this machine, it is essential that only genuine Norton replacement spare parts are utilised.

CONTENTS

GENERAL DATA

GENERAL DATA

All dimensions are in mm except where stated otherwise.

Recommended wear limitations are given in the appropriate sections.

ENGINE:

Type	Twin Chamber air cooled rotary.
Chamber Capacity	588 cc.
Power Output KW.	63 (85 b.h.p.) at 9000 r.p.m.
Compression Ratio	9.0 to 1.
Fuel	97 octane (4 star petrol.)

ROTORS

Material	High grade S.G. Iron
Width	67.77/67.79
Diameter (Effective O.D. at Apex seal groove shoulders)	71 mm
Bearing bore size	63.050/63.065
Type of bearing	Needle roller
Diametral clearance on shaft	0.025/0.040
Seal groove dimensions:	
Apex .... width	3.05/3.08
depth	8.5/9.0 nominal
Side ....width	1.53/1.56
depth	3.00/3.10
Corner .... Diameter	8.00/8.015
depth	6.20/6.30

ROTOR SEALS

Apex seals –	Material	IKA3/S14
	Length (including corner piece)	68.13/68.19
	Width	2.99/3.00
	Depth (not including end sections)	7.35/7.50
	Tip Radius	2.0
Side seals –	Material	IKA
	Length	102 nominal
	Width	1.45–1.47
	Depth	2.3–2.4
Seal Pin –	Material	IKA 59
	Length	5.50/5.60
	Diameter	7.97/7.98
	Groove Width	3.10/3.12
	Groove Depth	1.90/2.05

ROTOR SHAFT

Material	EN 36B
Overall length max	354.50
min	353.50
Main bearing journal diameter	
max	37.46
min	37.47
Rotor bearing journal diameter	
max	55.040
min	55.027

MAIN BEARINGS

Roller Main Bearings	FAG RNU 2206E 30x62x20
Ball Axial Bearing	16005 C3 25x47x8

ROTOR HOUSINGS:

Material	LM9 Aluminium alloy
Housing width – max	68.20
min	68.19
Rotor end float (without seals fitted)	0.40/0.43
Trochoid surface plating	Galnisic Elnisil. Plate

Stationary Gear

Number of teeth	30
Main bearing housing diameter	61.97/61.98

END & INTERMEDIATE PLATE

Left End Plate

Material	LM13 Aluminium alloy
Maximum regrind	0.20–0.25
*Minimum allowable plate thickness	27.20
Parallel tolerance	0.025
Permissible unevenness	0.02
Surface finish	0.4 μmm.

Intermediate Plate

Material	LM13 Aluminium alloy
Maximum regrind	0.20–0.25 per side
*Minimum allowable plate thickness	45.40
Parallel tolerance	0.02
Permissible unevenness	0.02
Surface finish	0.4 μmm.

Right End Plate (Primary Chaincase)

Material	LM13 Aluminium alloy
Maximum regrind	0.20–0.25
*Minimum allowable plate thickness	27.20
Parallel tolerance	0.025
Permissible unevenness	0.02
Surface finish	0.4 μmm.

*Plate material thickness on both end plates measured from rotor running surface to base of stationary gear flange counterbore. Intermediate plate thickness measured between running surfaces.

LOCATING DOWELS (ROTOR HOUSINGS)

Diameter	15.59/15.60
Length	80.80/81.20
End clearance (fitted between end plate and intermediate plate)	0.99/1.40

CARBURETTORS:

Make	S.U.
Type	H.I.F.4 Constant depression
Choke size	1 1/12" (38 mm)
Main jet (left and right handed)	0.090 in.
Needle	ADR
Spring	RED
Damper	AUG 8103

TRANSMISSION

Primary Chain	Duplex 92x3/8 pitch 30 tooth engine sprocket. 57 tooth clutch sprocket
Rear Chain	Single row 112x5/8in x 3/8in. Grand Prix chain 18 tooth gearbox sprocket. 42 tooth rear wheel sprocket
Overall Gear Ratio	(Using 18/42 final drive) 16.0 m.p.h. at 1000 r.p.m. in 5th gear.

CLUTCH

Type	Eighteen plate diaphragm spring type cable operated.
Material	Sintered bronze engaging with steel intermediate plates.

CLUTCH DETAILS:

Type	Multi-plate all metal with integral shock absorber
Number of plates:	
Driving (Steel)	9
Driven (Sintered bronze)	9
Driving plate thickness	1.17–1.27 mm
Driven plate thickness	2.15–2.25 mm
Diaphragm spring diameter (Laycock 83466/70)	159.86–159.76
Free depth	10.71–11.21
Clutch sprocket bearing	6007 C2 35x62x14 Single row ball.
Clutch pressure plate bearing	7200 10x30x9 Angular contact

CUTCH OPERATING MECHANISM

Clutch lift	2.25 mm
Ball diameter	10 mm
Ball recess depth	2.0

CHAIN TENSIONER

Slipper – foot radius	50.80
– leading/trailing edge radius	6.35
– shaft diameter	14.732–14.744
– housing bore	14.738–14.757

GEARBOX

Type	5–speed constant mesh

GEARBOX RATIOS

1st (bottom)	1: 2.59
2nd	1: 1.84
3rd	1: 1.4
4th	1: 1.19
5th (top)	1: 1.0

OVERALL RATIOS

1st (bottom)	11.78
2nd	8.37
3rd	6.37
4th	5.41
5th (top)	4.55
Engine r.p.m. at 16.0 m.p.h. in top gear	1000 R.P.M.

SPROCKET DETAILS

Engine – Number of teeth	30
Clutch – Number of teeth	57
Gearbox – Number of teeth	18
Rear Wheel – Number of teeth	42

GEARBOX SHAFTS

Mainshaft:

Left end diameter (plain dia)	20.57/20.58
Right end diameter (spline o/d)	19.97/19.99
Length	255.8/256.2

Layshaft:

Left end diameter	19.51/19.63
Right end diameter	17.01/17.02
Length	159.8/160.0

BEARINGS

Mainshaft bearing (left) – High gear	RJ009 special purpose roller
Mainshaft bearing (right)	6304 20x52x15 Single row ball
Layshaft bearing (left	M13141 Needle roller
Layshaft bearing (right)	M11121 Needle roller

Mainshaft 3rd gear bush:	
Bore diameter	23.81/23.84
Shaft diameter	23.76/23.77
Layshaft 1st gear bush:	
Bore diameter	20.55/20.57
Shaft diameter	20.50/20.52
Layshaft 2nd gear bush:	
Bore diameter	20.55/20.57
Shaft diameter	20.50/20.52

NO. OF TEETH ON GEARBOX PINIONS.

LAYSHAFT		MAINSHAFT	
1st	24	1st	13
2nd	21	2nd	16
3rd	18	3rd	18
4th	17	4th	20
5th	15	5th	21

GEARCHANGE MECHANISM

Plungers:	
Outer diameter	10.96/10.97
Working clearance in bore	0.012 min – 0.051 max.
Plunger springs:	
No. of working coils	12
Free length	31.75

QUADRANT RETURN SPRINGS

Total number of coils	11
Free length	47 mm (approx overall)
Rate	2.9/3.2 Kg/cm.

CAMPLATE PLUNGER

Plunger diameter	11.06/11.08
Plunger length	43.66
Plunger spring length	54.4
No. of coils	19
Loading	1.8 kg at 44 mm.

OIL METERING UNIT

Output at 1500 RPM Pump Shaft (pro-rata for other R.P.M.)
Position 'C' ..... 10 ± 4.5cc per hour – (each of two outlets)
Position 'F' ..... 225 ± 10cc per hour – (each of two outlets)

CHAIN DETAILS

Primary chain	Duplex endless 114038 7/16" x 3/8" x 92 links
Final drive chain	Simplex Single row 119059 5/8" x 3/8" x 112 links.

FRAME

STEERING HEAD RACE BEARINGS

Type	30205A 25x52x15 Taper roller

SWINGING FORK BEARINGS

Type	Timken L.M. 11901 (Cup) LM11949L (Cone) LM11900 E (Seal) – Taper roller bearing.
Size	Cup O.D. 1.7810 in. Cone bore 0.7500 in.
Spacer sizes:	
Right Hand	28x19.5x2.7
Left Hand	28x14.5x2.7
Shim size:	
26.6/26.8 O.D. x 19.1/19.2 I.D. x thickness	A – 3.07/3.12 B – 3.17/3.22 C – 3.27/3.32 D – 3.37/3.42 E – 3.47/3.52
Spindle diameter	19.035/19.045
Spindle length (U/H)	202

REAR SUSPENSION UNITS

Type – 3 Position adjustable	70056663 Girling gas assisted
Extended length between centres	341
Bump stop contact	261
Total movement	89
Spring type	Red/Yellow/Red 9054-63 single rate
Free length	8.8 inches
Rate	126 lb/in
Load at fitted length (8.4 ins)	50 lbs

TELESCOPIC FRONT FORKS

Total travel	130 (5 1/8 in)
Fork tube diameter	37.97–37.95
Slider bore diameter	38.00–37.97
Spring free length	460
Coil diameter	23
No. of coils	65
Oil capacity (each leg)	250 cc

WHEEL (Front)

Rim size	WM 2 (1.85) x 18
Original equipment	Cast aluminium alloy.
Bearing	6203EE 17x40x12 double lip sealed ball bearing.

WHEEL (rear)

Rim size	WM 3 (2.15) x 18
Original equipment	Quickly Detachable Cast Aluminium.
Wheel bearing	6303EE 17x47x14 double lip sealed ball bearing.
Hub bearing (wheel side)	6005–2RS 25x47x12 ball bearing
Hub bearing (sprocket side)	7205B 25x52x15 angular contact ball bearing.

BRAKES (Front)

Type	Hydraulically operated twin disc.
Discs	Stainless with integral alloy carriers.
Disc diameter	280 mm (11 in.)
Pad type	Textar 290–Sintered Metal–"All Weather"
Minimum lining thickness	4.5 mm – not beyond groove
Hyd. Fluid	Lockheed Super D.O.T.4 or Equivalent.
Calipers	Twin piston

BRAKES (rear)	
Type	Hydraulically operated single disc.
Discs	Stainless with integral alloy carriers
Disc diameter	280 mm (11 in.)
Pad type	Textar 290–Sintered Metal–"All Weather"
Minimum lining thickness	4.5 mm. – not beyond groove
Hydraulic Fluid	Lockheed Super D.O.T.4 or Equivalent
Calipers	Twin piston
TYRES	
Sizes – Front	4.10 V18 (WM 2 rim) } or 100/90V18
Rear	4.25/85 V18 (WM 3 rim) } or 120/80V18
	V rated (over 130 mph)
	Pirelli Phantom
	MT 29 Front ribbed (tubed)
	MT 28 Rear block (tubed)
Inner tube	Type 14A 18SS Front and rear
Pressures	Front (solo) 32 p.s.i. (2.25 Kg/cm²)
	Rear (solo) 36 p.s.i. (2.53 Kg/cm²)
SPEEDOMETER DRIVE	
Drive gearbox ratio	17/14
Drive cable length – outer	880
Drive cable length – inner	912
ELECTRICAL SYSTEM	
Ignition timing (rotor shaft position)	18° B.T.D.C. fixed
Voltage	12 volt
Polarity	Negative earth/ground
Battery	14 amp/hr
Alternator	Kokusan 220w 3 phase
Voltage regulator	Sparkrite Electronic Unit
Flasher unit	Lucas 8FL 35048 12 volt
Horns	Fiamm 12 volt
Horn relay	Lucas 26RA 54038118
IGNITION	
Plugs	10 mm surface gap non-adjustable type with long life platinum centre electrode.
Type	CHAMPION U.G. 80 P.V. or U.G. 501. P.V.
Plug gap	Fixed non-adjustable
Coils	Two Hitachi 12 volt – CM11 – 54
Ignition Unit	Sparkrite Capacitor Discharge Unit (C.D.U.) with internal distributor switching.
Ignition Trigger Unit	Sparkrite Variable Reluctance electromagnetic pulse generator. Air gap 0.3 mm ± 0.05 (0.010 – 0.014 in.).
STARTER SYSTEM	
Type	Electric
Make	Lucas M3
Reduction ratio:-	
Starter Motor	Number of teeth 10
Starter Gears	Number of teeth 145
Clutch Housing	Number of teeth 57
Engine Sprocket	Number of teeth 30

Reduction ratio – starter motor to engine shaft – 7.63:1

GD

BULBS

Headlight	472	H4	12V 55/60 watt (QH)
Parking light	254	Festoon 57	12V 5W
Daylight running	254	Festoon 57	12V 5W
Pilot bulb (where fitted)	233	SCC BA9s	12V 4W
Direction indicator Fairing	382	SCC BA15s	12V 21 Watt
Pannier	382	SCC BA15s	12V 21 Watt
Stop/Tail	380	SBC BAY15d	12V 5/21 Watt
Fog Lamp	382	SCC BA15s	12V 21 Watt
Rear No Plate	233	SCC BA9s	12V 4 Watt
Blue Lamp		GE4416B	12V Blue
Binnacle warning	286	W2x4.6d Capless	12V 1.2 Watt
Instrument Illumination	286	W2x4.6d Capless	12V 1.2 Watt
Speedo/Tacho Illumination	286	W2x4.6d Capless	12V 1.2 Watt

FUSES

Type – Automotive Continental.

Main	25 Amp (Blue)
Ignition Circuit	8 Amp (White)
Flasher Circuit	8 Amp (White)
Lights Circuit	8 Amp (White)

CAPACITIES

Fuel Tank	5 Imp Gal (22.5 Litres)
Oil Reservoir	7 Imp pints (4 Litres)
Gearbox	1 Litre
Primary Transmission	250 cc.
Final Drive	175 cc.
Front Forks (each leg)	250 cc.

KERBSIDE

Kerb Weight	260 KG (570 lbs) with fairing and Police Eqpt.
Length	1805 mm (86 in.)
Wheelbase	1486 mm (58 1/2 in)
Handlebar Width	710 mm (28 in.)
Static Laden Height	762 mm (30 in. measured at the seat)
Ground Clearance	165 mm (6 1/2 in.)

RECOMMENDED TORQUE SETTINGS

Engine Unit:	LBs/ft	KGs/m
*Stationary gear retaining bolts	5	0.7
Engine through studs	10	1.4
*Flywheel/Generator rotor nut	150	21
*Counter balance/sprocket nut	150	21
*Generator to flywheel bolts	5	0.7
Spark plugs	7-8	1.0
Primary Transmission.		
*Primary chain tensioner bolts	15-18	2.1-2.5
Clutch hub nut	100	13.8
Gearbox		
*Gearbox quadrant pivot bolt	18	2.5
Gearbox to frame mounting bolts	100	13.8
Gearbox final drive sprocket nut	80	11
Gearbox to primary inner cover bolts	16-18	2.1-2.5
*Gearbox drain plug	15	2
Frame		
Rear suspension unit mounting bolts	30	4.2
Footrest mounting screws	30	4.2
Swinging Arm		
Swinging arm spindle	10	1.4
Rear brake torque arm bolts	30-35	4.2-4.8
Rear caliper mounting bolts	30	4.2
*Rear drive sprocket retaining bolts	40	5.5
Forks		
Tube pinch bolts	22-24	3.0-3.3
Top lug/stem pinch bolts	18	2.5
RH leg spindle clamp bolt	18-20	2.5-2.8
Handlebar clamp screws	18	2.5
Front caliper mounting bolts	30	4.2
Stem top cap nut	65	9
Wheels		
Front and rear wheel spindle nuts	100	13.8
Front and rear disc mounting bolts	12	1.7

* ADDITIONAL LOCTITE APPLICATION (See Loctite Section)

GD

LOCTITE SECTION

Location:	Type:
Engine:	
Through studs in RH end plate	270
Stationary gear screws and dowel pins	270
Throttle disc screws & micro-switch adjuster screw	648
Eccentric shaft nuts	270
Generator holding bolts to flywheel	270
Generator lead clamp screw to body	270
Air filter attachment screws	270
Primary Transmission	
Primary chain tensioner bolts	270
One-way valve insert into chain tensioner body	270
Primary chaincase drain plug	504
Clutch & Starter Components:	
Flywheel sleeve in clutch sprocket	648
Bearing in clutch sprocket	648
Clutch hub nut	270
Gearbox:	
Gearbox sealing studs (LH footrest mounting plate attachment)	270
Gearbox quadrant pivot bolt	270
Gearbox filler and drain plugs	504
Frame:	
Oil drain plugs	504
Seat lock security screw to housing	270
Centre stand stop locknuts	270
Side stand buffer retaining nut	648
Rear Chain Drive:	
Rear chain enclosure gaiters	RTV 4 (Black)
Rear chain drive drain plug	648
Wheels & Brakes:	
Rear sprocket screws	648
Rear brake torque rod stud	648
Fairing:	
Steering head bracket fixing screws	241
Fairing lower bracket fixing screws	241
Recommentations:	
Bolt/nut locking	Loctite 241 Nutlock
Thread locking	Loctite 270 Studlock
Retention	Loctite 628 High Temperature Retention
Gasketing	Loctite 504 Liquid Gasket
Joint Faces (General)	Loctite RTV 4 'Superflex'.

SPECIAL SEALANTS, GREASES AND INSULATING MATERIALS

Rotor Gas Seals ..... Petroleum Jelly (Vaseline)
Idle Adjustment Screw 'O' Ring ..... Petroleum Jelly (Vaseline)
Rotor Housings – Intermediate Plate – Engine End Plate and oil pump joint faces ..... Wellseal
Rotor Shaft Main Bearing Oil Seal Housings – Oil Pipe Unions – Threads & Olives ..... Wellseal
Joint Faces – General ..... Loctite Sealant RTV4 (Clear)
Wiring Harness Electrical Junctions ..... Wynn's Viscotene
H.T. Cable to Coil Grommet ..... Hellerine Grade 'M'
Air Filter Elements ..... Putoline Action Fluid (or similar)

ROUTINE MAINTENANCE

RM

ROUTINE SERVICING CHART

OPERATION	FREQUENCY (Whichever occurs First)	SPEEDOMETER READING (Miles & Kilometers) 1000 MILES (1600 Kms) A SERVICE	6000 MILES (10000 Kms) B SERVICE	1200 MILES (20000 Kms) C SERVICE	SECTION
AIR FILTER ELEMENTS CLEAN	MONTHLY IN DUSTY CONDITIONS		√	√	E5
BATTERY TERMINALS AND ELECTROLYTE LEVELS		√	√	√	H1
BRAKE FLUID LEVEL	MONTHLY	√	√	√	F1
BRAKE FLUID CHANGE	ANNUALLY				F4
BRAKE & CLUTCH LEVERS LUBRICATE	MONTHLY	√	√	√	A14
BRAKE PAD WEAR EXAMINE	MONTHLY or every 3000 miles		√	√	F2
BRAKE PEDAL PIVOT GREASE	3 MONTHS	√	√	√	A15
BRAKE CALIPER (rear) MOUNTING PLATE LUBRICATE	3 MONTHS	√	√	√	A13
CARBURETTOR DAMPER PISTON OIL LEVEL EXAMINE	MONTHLY		√	√	B7
CARBURETTOR SUCTION CHAMBERS & DAMPER PISTONS CLEAN	AS REQUIRED		√	√	B5
CARBURATION EXAMINE	AS REQUIRED	√			B7
CLUTCH CABLE EXAMINE		√	√	√	G4
FRONT FORK OIL CHANGE				√	A12
GEARBOX OIL LEVEL EXAMINE	3 MONTHS	√			A7
GEARBOX OIL CHANGE			√	√	A7
MICROSWITCH ADJUSTMENT EXAMINE			√	√	B11
PRIMARY DRIVE OIL LEVEL EXAMINE	3 MONTHS	√			A8
PRIMARY DRIVE OIL CHANGE			√	√	A8
OIL METERING UNIT ADJUSTMENT EXAMINE		√	√	√	A6
REAR DRIVE CHAIN ADJUSTMENT EXAMINE	AS REQUIRED	√			D10
REAR DRIVE CHAIN OIL LEVEL EXAMINE		√			A9
REAR DRIVE CHAIN OIL CHANGE			√	√	D10
STEERING HEAD BEARING ADJUSTMENT EXAMINE		√	√	√	G13
SPARK PLUGS EXAMINE & CLEAN			√	√	H4
SPARK PLUGS CHANGE	AS REQUIRED				H4
THROTTLE CABLE EXAMINE		√	√	√	G3
WHEEL ALIGNMENT		√	√	√	F19

DAILY ROUTINE CHECKS

TYRES, LIGHTS, ENGINE OIL LEVEL, BRAKE OPERATION, HORN, REAR VIEW MIRROR ADJUSTMENT

ROUTINE MAINTENANCE

Refer to Sections A1 & A2 for Lubrication Chart and Recommended Lubricants

FIRST 1000 MILE SERVICE (1600 km)

		Section
Examine and adjust	Oil metering pump unit	A6
	Steering head bearings	G13
	Throttle cable	G3
	Clutch cable	G4
	Rear chain	D10
	Wheel alignment	F19
Examine and adjust oil levels	Oil tank	A1
	Carburettor damper piston	B7
	Primary chaincase	A8
	Gearbox	A7
	Rear chaincase	A9
	Brake master cylinder reservoirs	F1
Lubricate	Brake & clutch lever pivots (handlebar)	A14
	Rear brake pedal pivot	A15
Grease	Rear brake caliper mounting plate pivot	A13
Check	Battery terminal and electrolyte level	H1
	Lights	H11 to H18
	Tyres	F15
	Wheel alignment	F19
	Security of: All fairing brackets and mounting points	
	Screen mounting screws	

EVERY 6000 (10,000 km) AND 12,000 MILES (20,000 km)

Examine and replace where necessary	Brake pads	F2
Drain and refill to correct level	Primary chaincase	A8
	Gearbox	A7
	Rear chaincase	A9
Check and Re-adjust where necessary	Oil metering pump unit	A6
	Steering head bearings	G13
	Micro-switch	B11
	Throttle cable	G3
	Clutch cable	G4
	Rear drive chain	D10
	Wheel alignment	F19
Remove, clean and re-fit	Spark plug	H4
	Air filter element	E5
	Carburettor suction chambers	B5
Lubricate with oil	Carburettor damper piston	B7
	Rear brake pedal	A15
Lubricate with grease	Rear brake caliper mounting plate pivot	A13
Check	Battery terminals & electrolyte level	H1
	Lights	H11 to H18
	Tyres	F15

ADDITIONAL AT 12000 MILES (20,000 km)

Drain and refill to correct level	Front forks	A12
Monthly	Check brake pads	F2
	Oil level – carburetter damper piston	B7
Annually	Drain and refill brake hydraulic system	F4

SECTION A

LUBRICATION SYSTEM

SECTION A1

LUBRICATION CHART

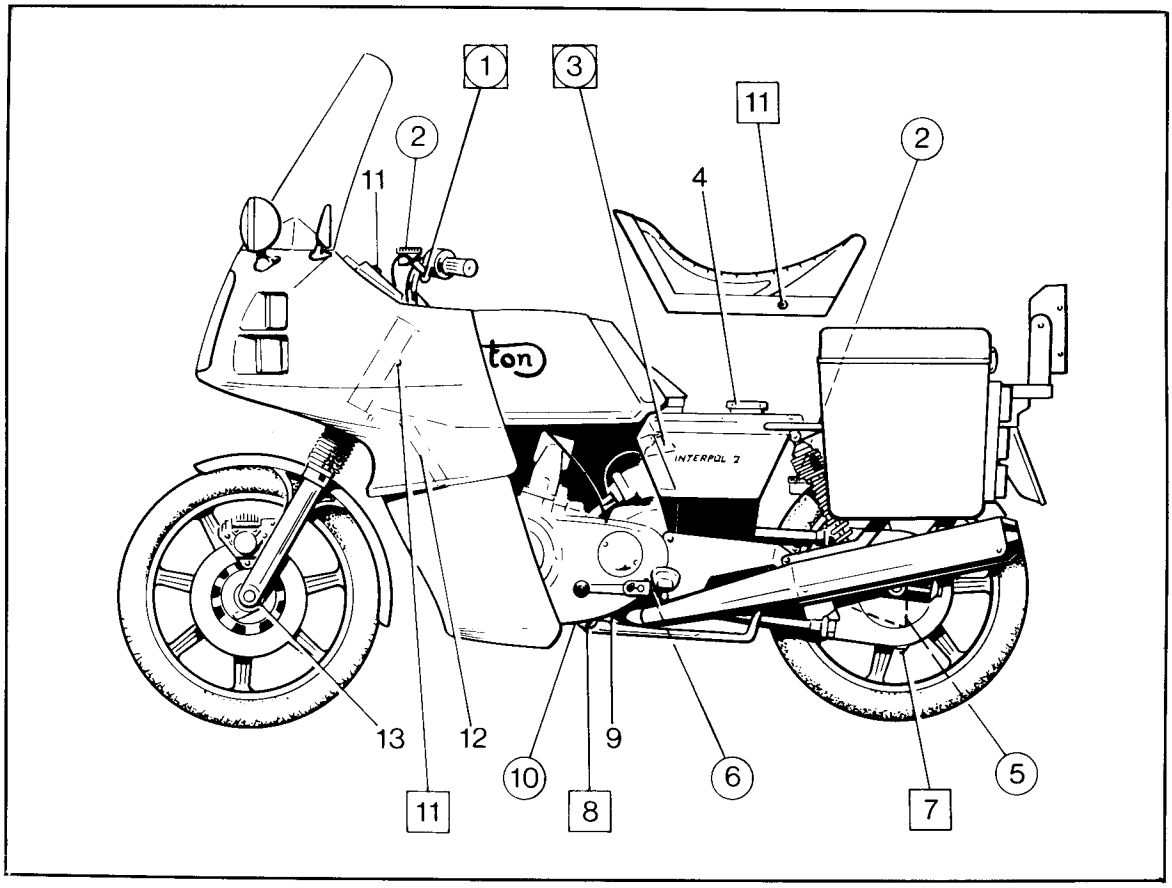


Fig. A1. Motorcycle Lubrication Chart
Figures within squares refer to left side of machine.
Figures within circles to the right side of the machine.

KEY	ITEM	LUBRICANT	SECTION
1	BRAKE & CLUTCH LEVERS	OIL	A14
2	BRAKE & FLUID RESERVOIRS	BRAKE FLUID	F1
3	CARBURETTOR DAMPER PISTONS	OIL	B7
4	ENGINE OIL TANK	OIL	E6
5	REAR BRAKE CALIPER MOUNTING PLATE	GREASE	A13
6	BRAKE PEDAL PIVOT	GREASE	A15
7	FINAL DRIVE CHAIN	OIL	A9
8	SIDE STAND PIVOT	OIL	E17
9	GEARBOX	OIL	A7
10	PRIMARY DRIVE CHAINCASE	OIL	A8
11	LOCK MECHANISMS	OIL	–
12	AIR FILTER ELEMENTS	ACTION FLUID	E4
13	TELESCOPIC FORKS	FORK OIL	A12

REFER TO LUBRICATION SPECIFICATION CHART FOR CORRECT LUBRICANTS A2

SECTION A2

APPROVED LUBRICANTS

DO NOT USE MULTIGRADE OILS AS ENGINE LUBRICANTS

Monograde oils meeting the minimum Service Classification CC or CD (Milspec MIL-L-2104B) are the only oils recommended for use in this engine – Preferred SAE rating – 40

	ENGINE	PRIMARY DRIVE & CARBURETTER DASHPOTS	GEARBOX	FINAL DRIVE & GENERAL LUBRICATION POINTS	FRONT FORKS	GREASE &
SHELL	Rotella 40 or 30	All seasons Motor Oil	Spirax HD HD85W/140	All seasons Motor Oil	Donax TF or Dexron 2	HMP Grease
B.P.	Vanellus M40 or M30	Super Visco 2000 or Visco-Static	Motorcycle Oil 80/140	Super Visco 2000 or Visco-Static	Motorcycle Fork Oil	B.P. Eng. Grease L2
ESSO	HDX 30 or 40	Plus 20w/50	GP 85w/140 GX 85w/140	Plus 20w/50	Glide G Nuto H 32 Univis J 32	Beacon 2 or 3
FILTRATE	HD 111 30 or 40	Super 20w/50	Hypoid EP 80w/140	Super 20w/50	Filtrate fork oil	Super lithium grease
CASTROL	Deusol 30 or 40	GTX 20w/50 or 15w/50	Castrol Gear Oil EP85/140	GTX 20w/50 15w/50	Castrol Fork oil	Castrol LM Grease
CHEVRON	Delo 100 SAE 30 or 40	Supreme 20w/50	Universal Gear Lubricant SAE 80w/140	Supreme 20w/50	EP Hydraulic oil 32	Duralith grease EP 2
TEXACO	Ursatex SAE 30 or 40	Eurotex HD motor oil 15w/50	Fleetgear oil SAE 80w/140	Eurotex HD Motor oil 15w/50	Rando HD 32	Marfak all purpose grease
DUCKHAMS	Fleetol HDX 30 or 40	Duckhams 15w/50 Hypergrade		Duckhams 15w/50 Hypergrade	Duckhams Fork oil	Duckhams LB10 Grease
CONOCO	HD30 or HD40	20w/50		20w/50	Hyd SP 32	HMP Grease
GULF	XHD 40	Multi G	Multipurpose Gear Lube 85W/140	Multi G	Hydrasil 32	Gulf Crown No. 2 E.P.

Products are not Listed in Order of Preference

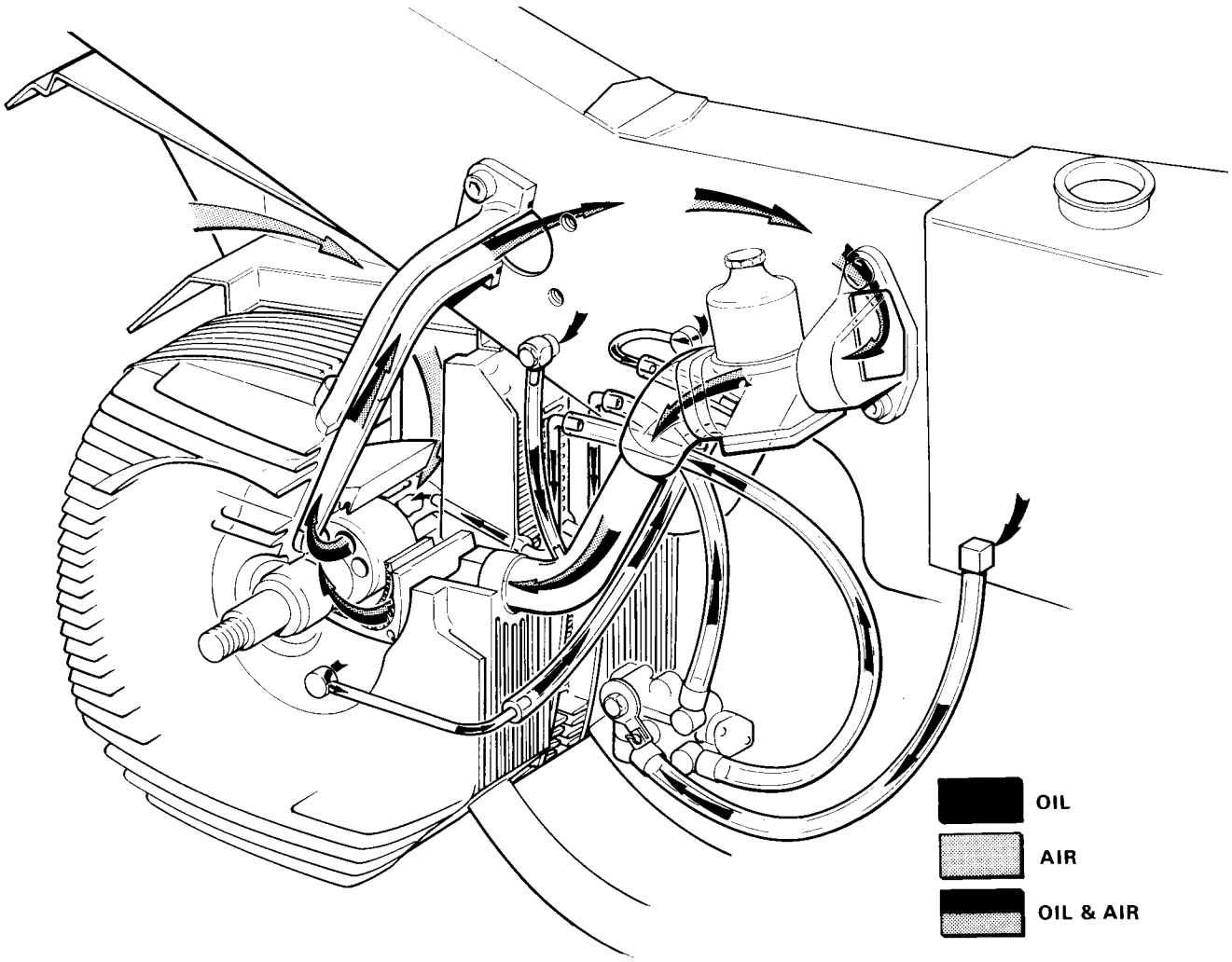


Fig. A2. Engine Lubrication System

SECTION A3

ENGINE LUBRICATION SYSTEM

INTRODUCTION

This engine has been designed to utilise a 'total loss' lubrication system, completely eliminating the need for oil changing, full flow filters, oil return pumps etc., whilst at the same time providing a continually metered supply of clean oil to lubricate the moving parts of the engine.

Oil is taken from an oil tank formed within the frame of the motor cycle which is fed directly to a metering unit, located on the drive sprocket end of the gearbox mainshaft and driven by the mainshaft. Oil flow at any engine speed is controlled by the oil metering pump output regulating lever which is directly connected to the throttle control cable. Oil supply to the engine therefore is governed by a combination of engine speed and throttle opening.

Should the oil metering unit prove to be suspect at any time (see Section A5) complete replacement of the unit is recommended as no servicing is possible. On no account should any attempt be made to overhaul a metering unit as serious damage can be caused to the complete power unit if a defective component is re-fitted.

Oil is distributed from the metering unit via two feed pipes to each side of the aluminium alloy intermediate plate where it meets incoming cooling air and forms an air/oil mist. The mist lubricates the rotor shaft, rotors, gears and bearings within the rotor housing and is subsequently burnt off during the process of combustion. Slight smoking from the exhaust is normal and to be anticipated after or during tickover but excessive smoking is abnormal and immediately indicates re-adjustment of the metering unit has become necessary. (Section A6).

SECTION A4

REMOVAL AND REPLACEMENT OF OIL METERING UNIT

REMOVING THE OIL METERING UNIT

Drain the gearbox oil and remove the left gearbox end cover. Disconnect both oil feed and supply pipes from the metering unit at the three banjo union bolts being careful to block the oil tank to metering unit pipe to prevent loss of oil. This can easily be achieved by clamping two sealing washers either side of the feed pipe banjo union using a bolt and nut. Release the two bolts securing the metering unit to the gearbox end cover.

Disconnect the operating cable and detach the oil metering unit.

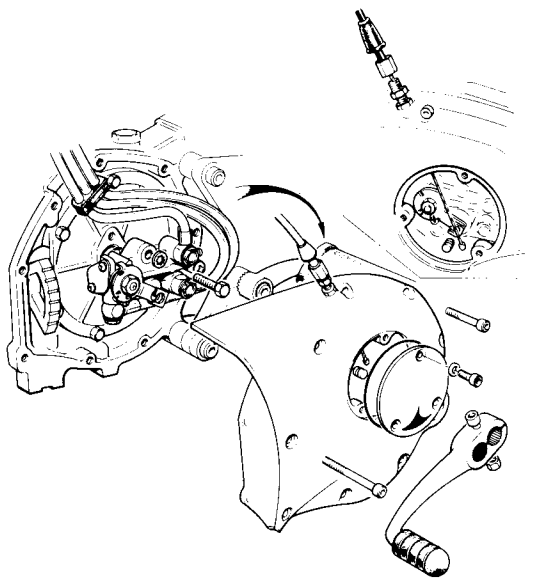


Fig. A3. Removal and replacement of the oil metering unit

REFITTING THE OIL METERING UNIT

Clean the mating surfaces on the gearbox end plate and oil metering unit and coat lightly with the recommended sealing compound. (General Data). Inspect the 'O' ring and replace if necessary. Refit the metering unit ensuring the oil feed pipes to the engine are primed and the oil feed pipe from the oil tank to the metering unit has flow. Refit the gearchange/cover assembly using the recommended sealer. Refill the gearbox with the recommended lubricant. (Section A2). Adjust the metering unit as described in Section A6 and replace the access cover.

WARNING: Great care must be taken when priming the oil feed pipes not to overload the one way valves with excess pressure.

SECTION A5

TESTING THE OIL METERING UNIT

If the machine has shown a tendency to 'smoke' heavily from the exhaust, the oil metering unit may be

a) not adjusted correctly or

b) not delivering oil at the specified rate (see General data section).

Adjust the metering unit as described in Section A6 and, if smoking persists, remove the metering unit and test in the following manner:–

Drive the pump at 1500 rpm with a supply of clean engine oil to the bottom union. (See Fig. A3). Take the two outlet pipes to measuring flasks and run the metering unit in the 'F' position until all of the air bubbles have been displaced from the pipes by oil. Once a flow of oil has been established, reduce the flow rate by moving the operating lever to the 'C' position (wire in this position). Allow the pump to run for exactly 15 minutes and measure the amount of oil in the measuring flasks and multiply this figure by 4. This will give the amount of oil per outlet/hour in cc. Repeat the test with the operating lever in the 'F' position, and check the delivery figures with those given in General Data. If the oil metering unit is delivering oil outside the specified limits, it must be replaced, as attempting to overhaul the unit could ultimately result in serious damage to the engine.

SECTION A6

ADJUSTING THE OIL METERING UNIT

Run the engine until normal running temperature is reached. Remove the oil metering unit inspection cover on the left gearbox cover. To set the adjustment of the metering unit, run the engine at 2000 rpm.

Adjust the oil metering unit operating cable until 'C' mark on the operating lever lines up with the line on the metering unit casting, with engine speed at a steady 2000 rpm.

Lock the operating cable in this position. Run the engine at constant 2000 rpm and re-check setting marks and if necessary re-set. Replace the cover. If smoke is still apparent from the exhaust, investigate further.

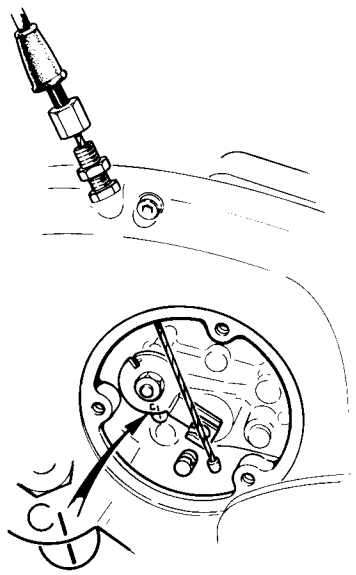


Fig. A4. Adjusting the oil metering unit

SECTION A7

GEARBOX LUBRICATION

The gearbox is lubricated by means of its own internal oil bath, splash oil being fed to all the gearbox components including the enclosed gearchange mechanism.

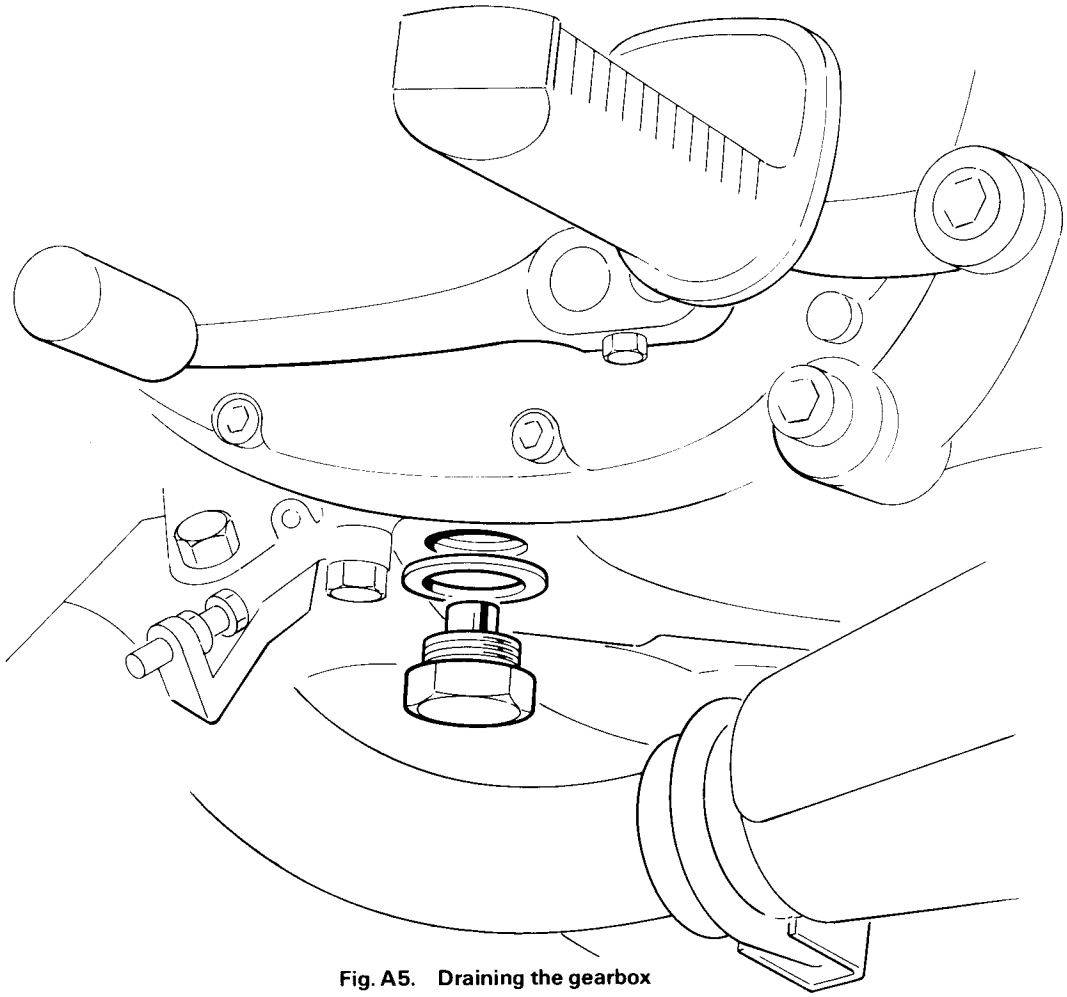


Fig. A5. Draining the gearbox

Drain and Refill.

1. Stand the machine on firm level ground.

2. The oil can now be drained by removing a magnetic drain plug in the base of the gearbox. This plug should be inspected for any signs of debris or metallic particles adhering to it. (see Fig.A5).

3. When the oil has drained thoroughly, clean the drain plug, drain plug aperture and refit drain plug using 'Loctite 648' to secure.

4. Remove the gearbox inspection cover plate (three screws) and refill with one litre of the recommended lubricant (Section A2) up to approximately 3mm ($\frac{1}{8}$) below edge of cover aperture.

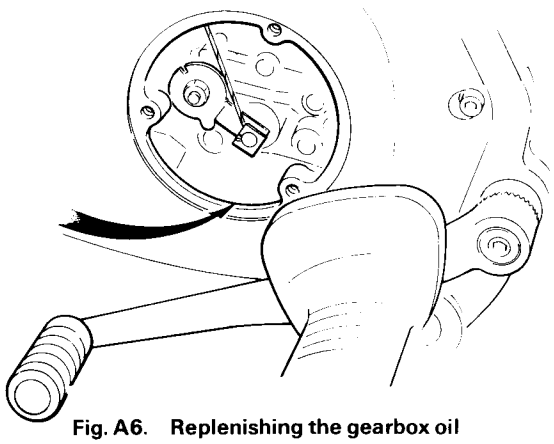


Fig. A6. Replenishing the gearbox oil

5. Recheck level after allowing oil to settle.

6. Refit gearbox inspection cover plate (See Fig.A).

Note: Ensure only recommended lubricants are used.

SECTION A8

PRIMARY CHAINCASE LUBRICATION

The primary chain and clutch are lubricated by the oil contained within the chaincase which also functions as the damping medium for the primary chain tensioner mechanism. It is therefore essential that the chaincase oil level is maintained correctly at all times.

Excessive noise or rattling from this area may indicate that either the primary drive chain is prematurely worn or the tensioner is unable to function correctly, due to low oil level, broken spring etc. The cause must be identified and rectified immediately.

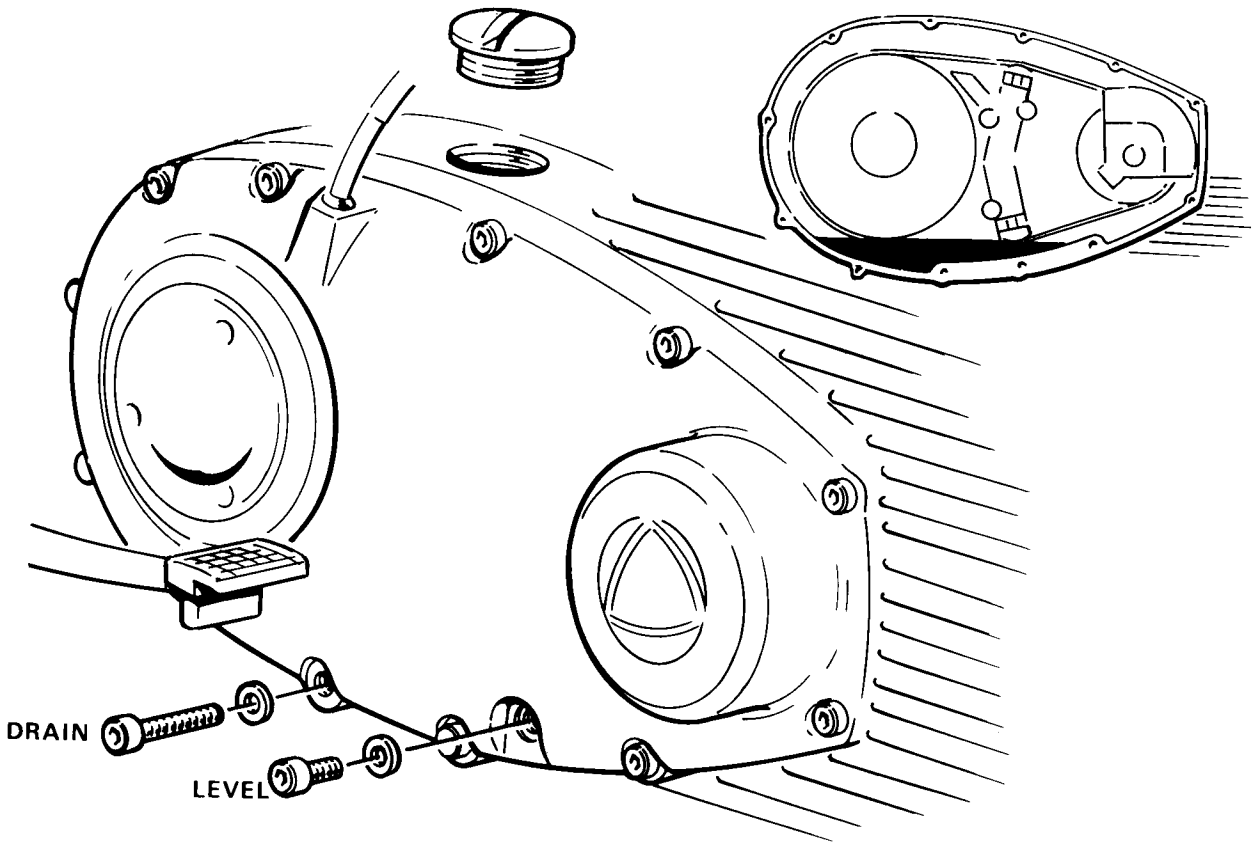


Fig. A7. Replenish oil in the primary chaincase

DRAIN AND REFILL

The oil can be drained from the primary chaincase by removing the lowest hexagon headed socket screw at the bottom of the outer primary drive cover which also acts as the primary chaincase oil drain plug. When the oil has drained, clean and replace the drain plug. Next remove the primary chaincase polished alloy filler plug on the top of the chaincase, and unscrew and remove the level plug taking care not to lose the sealing washer. Using a plastic container and tube, squeeze in 250cc of the recommended lubricating oil (Section A2) and allow to settle. Re-check oil level and replace filler plug. Run the engine to normal operating temperature, stop engine, remove level plug and allow excess oil to drain off. Replace drain plug, using Loctite 648'.

SECTION A9

REAR CHAIN LUBRICATION

The rear chain is lubricated by continued immersion within its own sealed oil bath, the chain being protected from damage by road dirt ingress by fully sealed rubber gaiters. The rear wheel drive sprocket is also fully enclosed within a cast aluminium housing incorporating the rear chaincase drain plug.

To drain and refill the rear chaincase proceed as follows:-

1. Remove drain plug at the lowest point of the rear sprocket housing and allow the oil to drain. Clean the drain plug and aperture, replace the drain plug securing with 'Loctite 648'.

2. Remove the black plastic filler plug and washer situated on top of the gearbox sprocket housing and replenish with 175 cc clean fresh oil to the recommended specification (see Section A2).

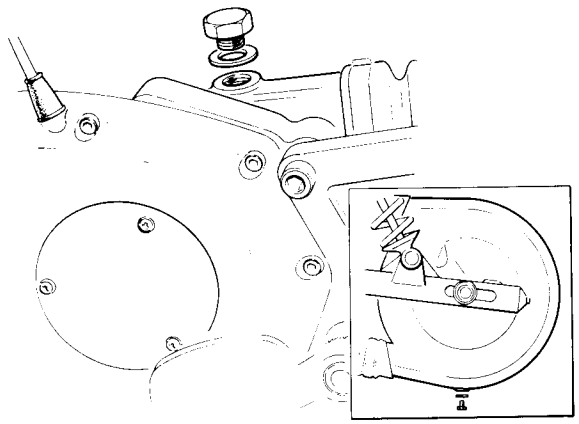


Fig. A8. Drain and refill the rear chaincase

Refit filler plug.

SECTION A10

STEERING HEAD BEARINGS

The steering head bearings are of the taper roller type and are greased on original assembly. As the steering head bearings are sealed units no further lubrication is necessary except during:–

a. Removal for replacement.

b. Removal for any other reason, ie. fork replacement, re-painting the frame etc. (eg. total strip down operation)

Although the steering head bearings do not normally require lubrication, they should be checked for adjustment at every 6000 and 12,000 mile service. (See section G13).

SECTION A11

WHEEL BEARING LUBRICATION

The wheel ball bearing races are sealed for life. No adjustment or lubrication is necessary. If any play or rough running becomes evident, the bearings will need replacing. Removal and replacement of front and rear wheel bearings is fully dealt with in sections F2 and F4.

SECTION A12

TELESCOPIC FORK LUBRICATION

The oil contained in the front fork legs not only lubricates bearing surfaces, but also acts as the damping medium. Because of the latter function it is essential that the amount of oil in each leg is of exactly equal quantities and viscosity. Check at the recommended maintenance periods as any variation due to loss or unequal filling will adversely affect the handling qualities of the machine.

Oil leakage from the fork leg gaiter indicates oil seal failure and replacement is dealt with in Section G7. The correct period for changing the fork oil is every 12,000 miles or every twelve months, whichever is the sooner.

To change the oil remove the drain screws at the rear of each fork slider leg and drain. When oil flow stops, sit astride the machine and with the machine off the centre stand apply the front brake lever and push the fork up and down three or four times to release any trapped oil. Replace both drain plugs and sealing washers.

With the machine replaced on the centre stand, support the weight of the machine under the engine (or alternatively operate on one fork leg at a time). Remove the fork stem top nuts and refill with the recommended quantity of the specified lubricant. (Section A2). Replace stem cap nuts being careful whilst applying pressure to pre-tension the coiled fork springs, not to cross thread the cap nuts into the fork tubes. Tighten the cap nuts. Finally standing astride machine, engage the front brake and pump the forks up and down to prime the damper units.

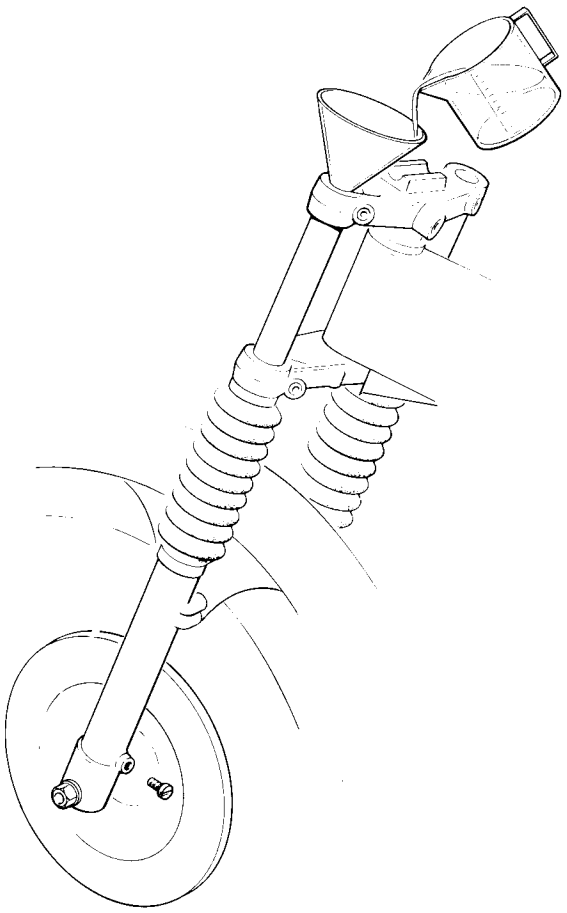


Fig. A9. Draining and replenishing the front forks

SECTION A13

LUBRICATION NIPPLES

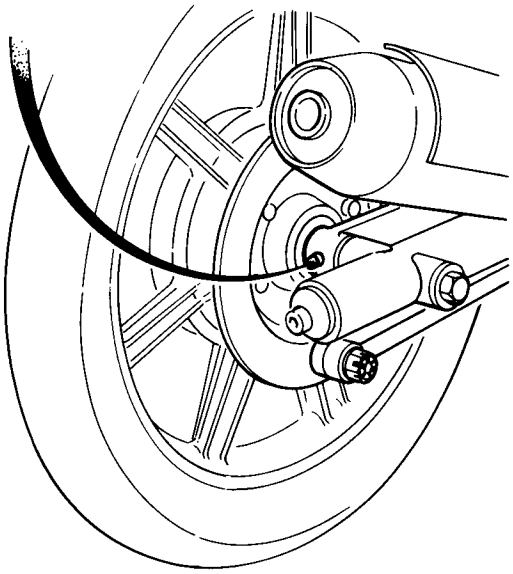


Fig. A10. Rear brake caliper grease nipple

The machine has only one grease nipple. This is located at the rear disc brake caliper mounting plate, and should be given two or three pumps of the recommended grease (Section A2) at the 6000 mile and 12000 mile services (or at 3 month intervals - whichever is most appropriate, and the excess grease wiped clean.

SECTION A14

CONTROL CABLES

All control cables are nylon lined and do not require lubrication. However, the front brake lever and clutch lever pivots require lubricating every month or at the 6000 and 12000 mile service whichever is the soonest, with the recommended lubricant. (Section A2).

SECTION A15

REAR BRAKE PEDAL SPINDLE LUBRICATION

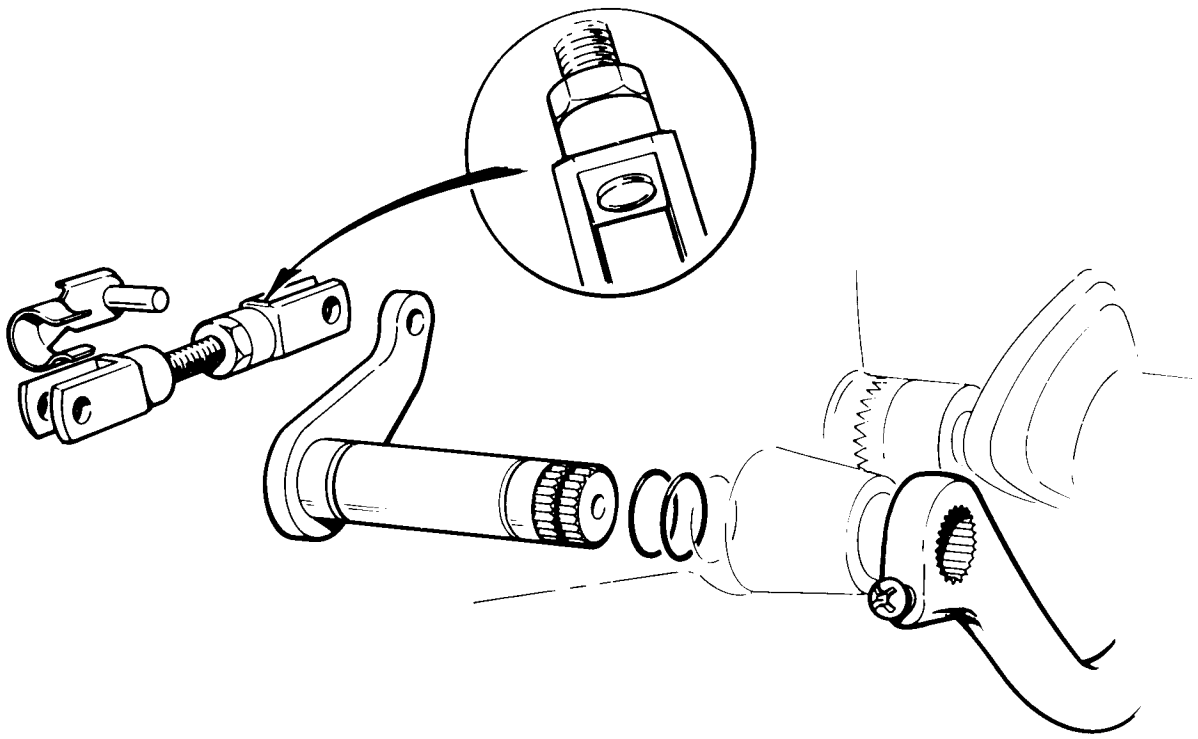


Fig. A11. Rear brake pedal spindle lubrication

Should the brake pedal feel stiff in operation or be reluctant to return to the 'off' position, the spindle may need cleaning and re-greasing. To do this, remove the brake pedal and spindle as described in Section E20. Clean out the spindle bearing, examine and replace, if necessary the sealing 'O' rings, lubricate with grease (Section A2) and re-assemble applying grease to the brake rod pivot clip pins. Check operation of brake pedal.

Freedom of operation can be maintained subsequently by simple regular application of the oil can to the pedal pivot spindle joint.

SECTION A16

SPEEDOMETER CABLE

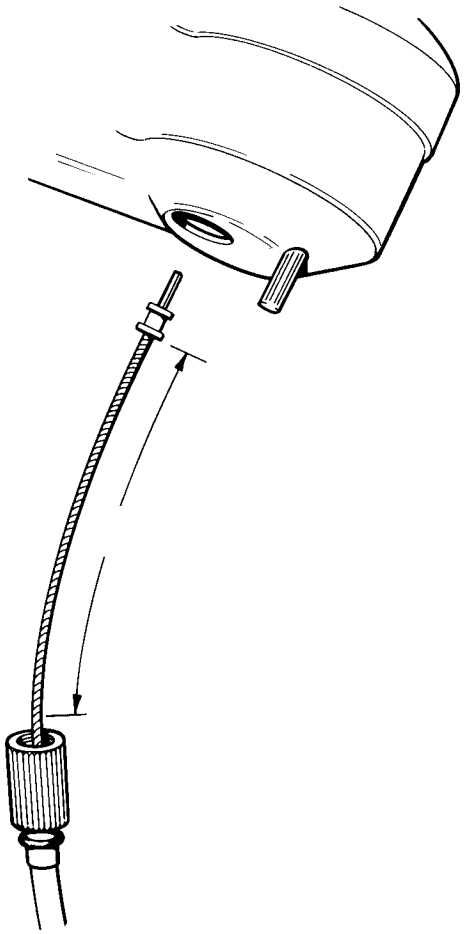


Fig.A12. Speedometer cable lubrication

Lubricate every 12,000 miles. Disconnect the outer cable at the drive housing and withdraw the inner cable. Clean and inspect. Lightly grease the inner cable with high melting point grease, (see Section A2 - Recommended Lubricants) leaving the top 6" free of grease. Re-insert the inner cable into the outer and re-connect to the drive housing.

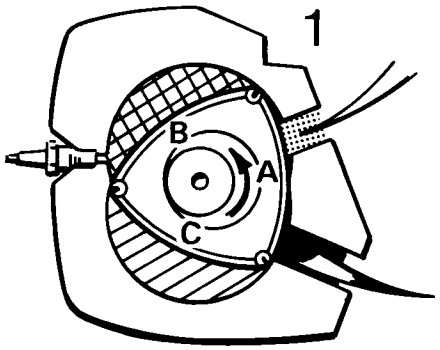
SECTION B

ENGINE

INTRODUCTION

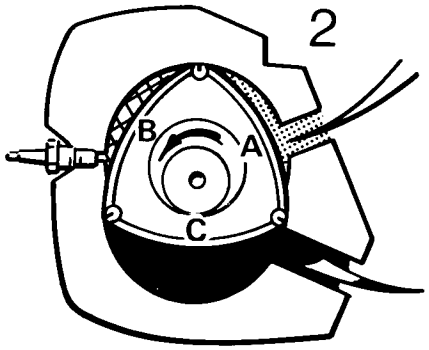
THE ROTARY ENGINE

The Rotary Engine utilises the rotating combustion chamber principle originally conceived by Felix Wankel in the mid 1950's and has been the subject of constant progressive development since that time. The first rotary engine powered motor car ran as long ago as 1960, and the first production car was produced soon afterwards in 1964. Norton have been actively involved in this development since 1969 and have now become established as one of the leading authorities on the rotary engine.



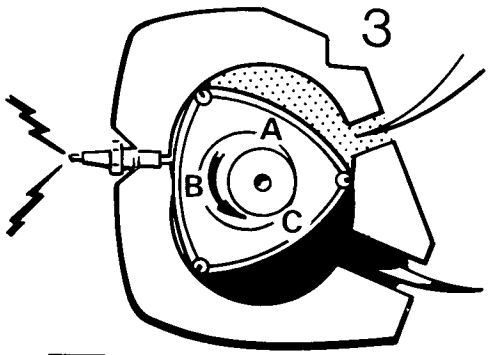
A INDUCTION
B COMPRESSION
C POWER PHASE

Induction of fuel/air mixture commences when the rotor achieves position A.



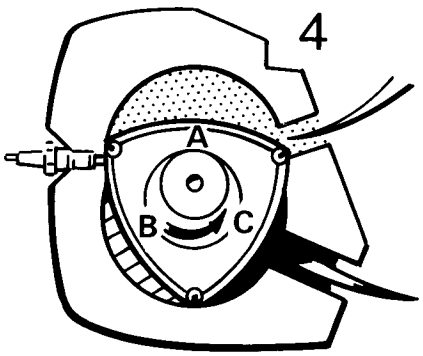
A INDUCTION
B COMPRESSION
C EXHAUST

With continued rotation, the fuel/air mixture is compressed at positionB.



A INDUCTION
B IGNITION
C EXHAUST

When the rotor attains position B, the compressed fuel/air mixture is ignited.



A INDUCTION
B POWER PHASE
C EXHAUST

The gas expands providing the power, until exhaust occurs on reaching position C.

Fig. B1. Operating sequence of the Wankel Engine illustrating the four phases of the combustion principle completed within one single rotation of the rotor.

PRINCIPAL OF OPERATION

The Wankel rotary combustion engine works according to the Otto-cycle principle, with four distincly separate individual phases – induction, compression, expansion (the actual working phase) and exhaust. From Fig. B1 "Operating Sequence of the Wankel Engine" it will be seen that a change from maximum chamber volume can only take place when the rotor has travelled through 90°, that is whilst a rotor flank moves from 1, through 2 and 3, the contained volume increases gradually. and induction occurs. During succeeding 90° movements, the compression, expansion and exhaust phases take place in strict sequence. In addition, one complete thermodynamic cycle will currently be taking place in each of the three chambers, whilst the rotor turns through 360°.

The drive shaft makes three complete revolutions for each turn of the rotor, which determines that every thermodynamic phase extends over 270° of shaft rotation. The relative movement is controlled by an internal ring gear incorporated within the rotor, meshing with a stationary pinion fixed to the outer end cover.

THE NORTON ROTARY ENGINE

The Norton rotary engine comprises only three basic moving parts; an eccentric shaft and twin rotors mounted by means of needle roller bearings and displaced at 180° to each other on the shaft. The three corners and side flanks of each rotor incorporate spring loaded gas seals within the trochoid shaped combustion chamber housings thereby ensuring the efficiency of induction, compression, expansion and exhaust phases of the operating cycle.

The eccentric rotor shaft is forged in EN36 steel and is supported at either end by substantial roller main bearings located in each stationary gear housing mounted within the aluminium end plates. Air cooling passages are drilled axially through the shaft below the rotor needle roller bearing journal surfaces, and the rotors themselves are cast with internal integral cooling fins in axial passages at each of the three corners of the triangular rotor.

Filtered cold air is drawn into the aluminium alloy centre plate of the engine where lubricating oil from the metering pump is injected prior to the air stream being divided to pass through holes in either side of the centre plate. The induction air is then drawn through the rotor and shaft cooling passages to openings in the left and right end plates respectively, and thence up through the hollow forward engine mounts into the frame plenum chamber (See Fig. A2 – "Engine Lubrication System"). In passing through the centre of the engine, the air not only cools the internal surfaces, but distibutes the oil mist to all the moving parts of the engine before passing into the working chambers of the engine and being burnt.

Fuel/air mixture is provided by two S.U. H.I.F. 4 constant depression carburettors, drawing air from the frame plenum chamber. The throttle butterflies are fitted directly in the combustion housing inlet port entries, providing the necessary degree of fuel /air mixture control. The right inlet port incorporates an auxiliary feed by-passing the throttle butterfly and fed directly from the right carburettor inlet housing via an adjuster – thereby providing a metered engine idle control. The left inlet port is additionally arranged to be fed by means of a throttle operated, solenoid controlled valve allowing unfuelled air direct from the frame plenum chamber when the throttle is in the closed position. This action termed 'single rotor idling' causes the left rotor to cease giving power, provides an additional frictional load for the right rotor to carry, and therefore allows the provision of a more stable idle quality.

Drive is taken from the right end of the eccentric shaft by an hydraulically-damped enclosed duplex primary chain, transmitting the power through an all metal multi-plate clutch to a five speed constant mesh gearbox. The left end of the eccentric shaft carries the engine flywheel and generator. A capacitor discharge electronic ignition unit is triggered by an inductive pick-up mounted adjacent to the periphery of the flywheel.

SECTION B1

ENGINE REMOVAL

NOTE:

Mating surfaces on the engine, gearbox and primary drive casings and mating surfaces within the engine unit do not, unless otherwise stated, use gaskets. All jointing surfaces on this engine unit are machined to close tolerances and care must be taken when stripping and re-assembling to avoid damage.

CAUTION:

AS COMPONENTS ARE REMOVED, ALL EXPOSED AIR PASSAGES IN THE ROTOR HOUSINGS MUST BE SEALED WITH MASKING TAPE AS ENTRY OF FOREIGN BODIES, SWARF ETC MAY RESULT IN EXTENSIVE DAMAGE TO THE ENGINE.

REMOVING THE ENGINE UNIT

Where a fairing is fitted, remove both bottom panels to allow access to the power unit. Where fitted, remove the lower fairing mounting frames. Lift the seat and remove the side covers by releasing the 'Dzus' fastener at the top forward corner of the panel. Lift upwards to remove, Remove the fuel tank as described in Section E2. Disconnect the positive and negative battery leads and remove the battery (Section H1). Drain the gearbox lubricant by removing the magnetic drain plug situated in the base of the gearbox casting. When the lubricant has drained, clean the drain plug and drain plug aperture. Replace drain plug using 'Loctite 648'. (Section A7). Drain primary chaincase lubricant by removing the socket headed bolt in the primary chaincase cover (Section A8).

Remove the exhaust system as described in Section E10.

Remove the left and right carburetters as described in Section B6 and place upright in a secure position away from any potential source of ignition or contamination.

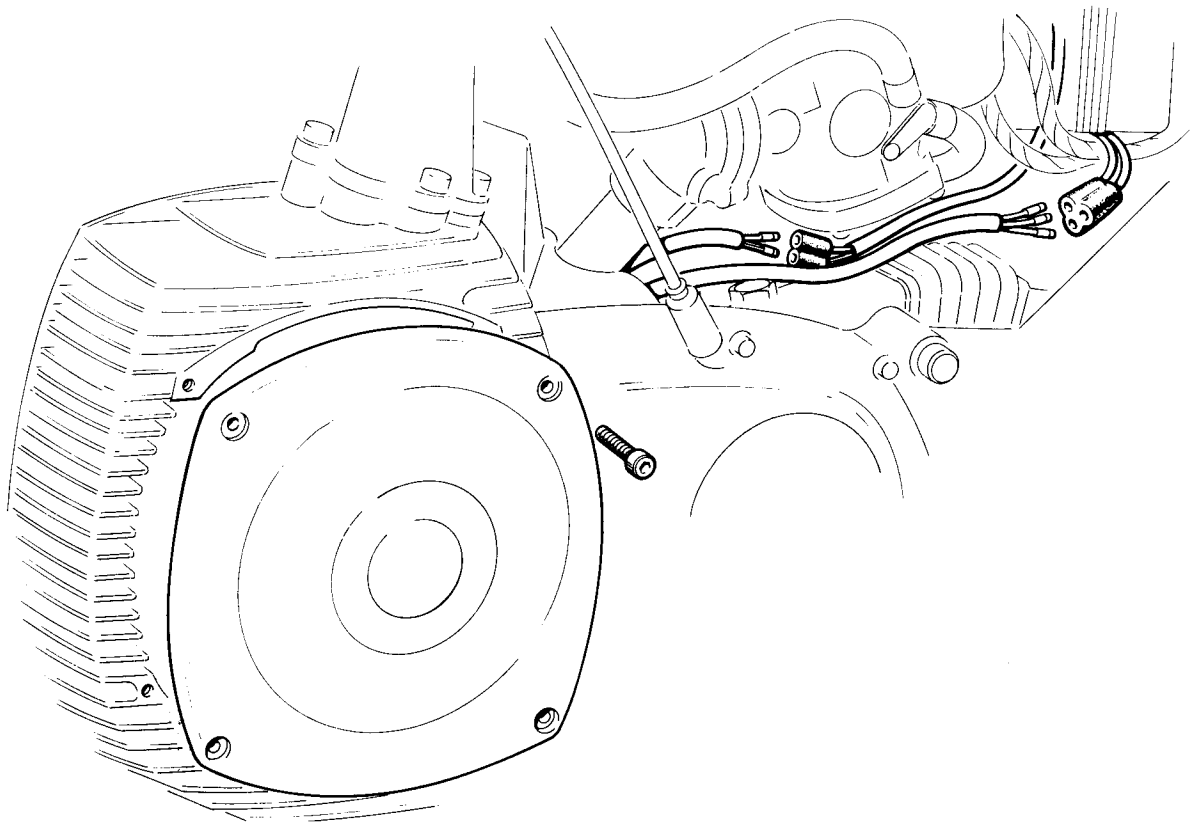


Fig. B2. Disconnecting voltage regulator, ignition wires and generator cover

Remove the clutch adjustment access cover, the clutch lift plate and primary chaincase cover as described in Section C1 "Removing the Primary Chaincase Cover", with the addition that, if the engine is to be removed from the frame, it is now advisable to remove the two front, and one rear socket headed bolts securing the right footrest mounting plate to the machine, and tie back to clear the primary chaincase being careful to avoid damaging any hydraulic pipes.

Moving to the left side of the machine, disconnect the two ignition trigger unit leads (slate grey and slate grey/black) and the three generator leads at the in-line connector (there is no need to remember which way round the generator leads are connected or to refer to the wiring diagram as these leads can be re-connected in any order). Release four socket headed bolts securing the generator cover to the left engine end plate and remove the cover gently pulling through the generator leads.

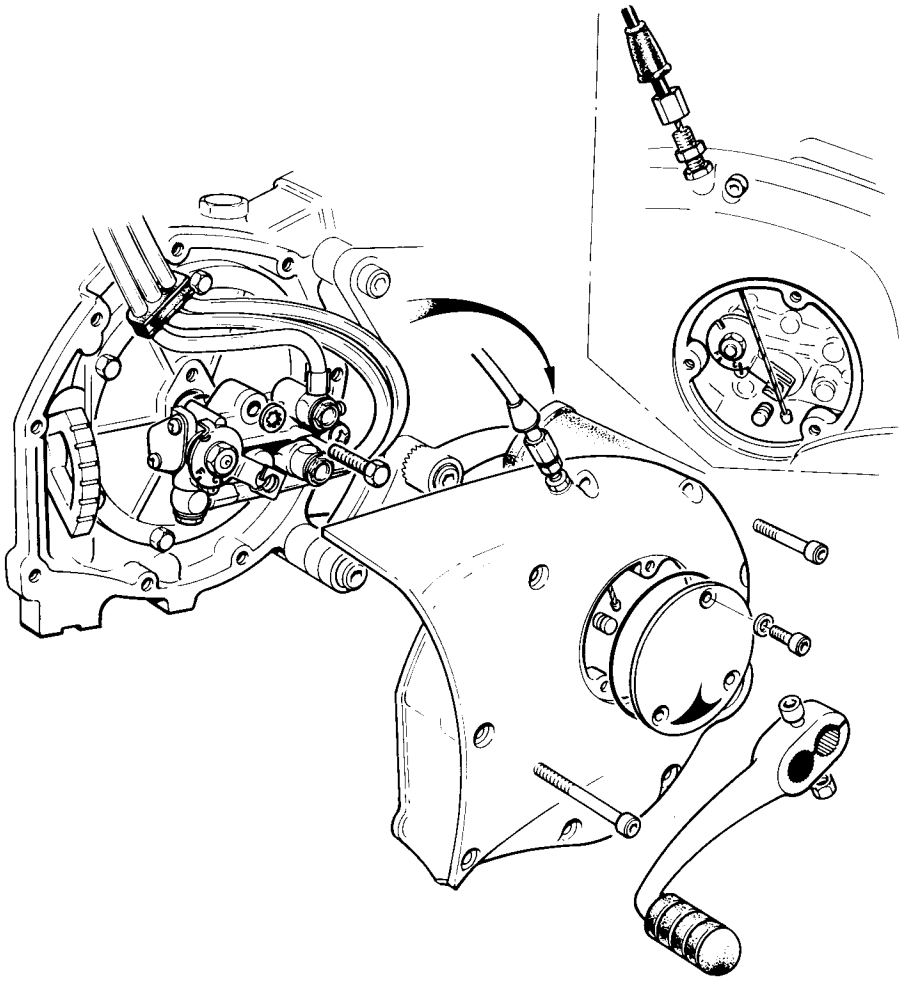


Fig. B3. Removing the gearchange cover and oil metering unit

Slacken the socket headed bolt securing the left riders footrest and rotate through 180 deg to clear the gearchange cover. Remove the access cover to the oil metering unit by removing three socket headed bolts. Disconnect the operating cable by pushing the lever arm upwards and releasing the cable being sure to retain the nylon trunnion. Release nine bolts securing the gearchange cover in place and gently tap free. Before removing the supply pipe from the engine oil tank to the oil metering unit, obtain a 2" to 3" piece of pipe similar to the supply pipe and block one end (or alternatively, one of the gearbox cover bolts inserted into the piece of pipe will do). This is used to block the oil feed at the oil tank adaptor to prevent excess spillage of lubricant. Remove two bolts securing the oil metering unit to the gearbox end cover and remove the oil metering unit. Tie to the engine to avoid damage whilst the engine is being removed.

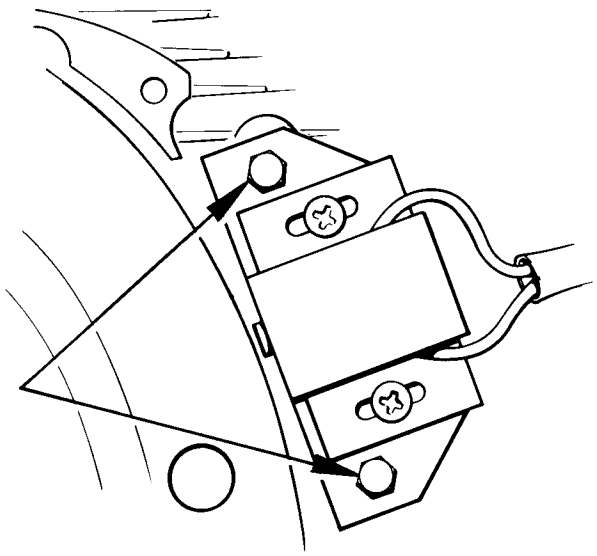


Fig. B4. Ignition pick-up trigger unit (Release two screws)

Disconnect the two in-line connectors from the ignition trigger unit leads and the leads to the single rotor idling valve at the valve. Remove the ignition trigger unit and micro-switch by releasing two bolts (Fig B4-arrowed) in the ignition trigger unit fibre mounting pad. To remove the micro-switch it will be necessary to open the throttle wide in order to clear the throttle stop lever. Disconnect the throttle butterfly cable (Fig B5) by holding open the butterfly levers with a screw-driver or similar tool, lift the outer cable from the cast bracket on the idling valve body (A) and hook the cable clear of the operating lever (B). Refer to Section G3 for full details of complete throttle cable removal and replacement.

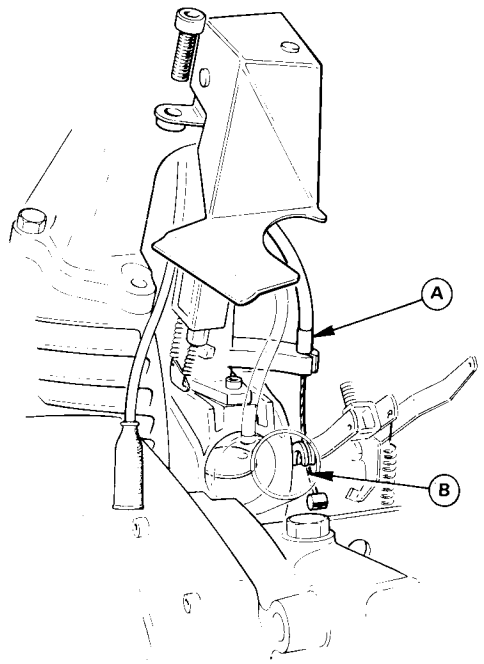


Fig. B5. Disconnecting the throttle butterfly cable

Release three socket headed bolts securing the idling valve elbow to the frame and remove one socket headed bolt securing the idling valve to the left rotor housing, the elbow and single rotor idling valve assembly. Remove the inlet pipes, idle pipe and oil drain pipes as shown in Fig. B6.

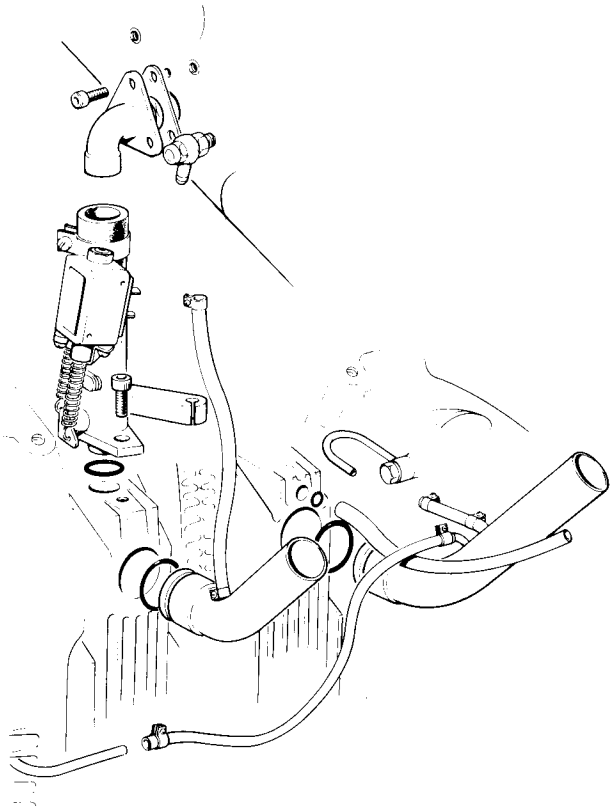


Fig. B6. Removing the single rotor idling valve assembly, inlet, idle and oil drain pipes

Remove the air box front panel/coil assembly and disconnect the coil leads - Section E3 and remove the two air box support screws.

Disconnect and remove the left horn and the left air transfer port by releasing three screws at the left engine plate and four screws at the frame end of the transfer port. BLOCK ALL ACCESS PORTS TO THE ENGINE AND FRAME WITH MASKING TAPE TO PREVENT DAMAGE BY THE INGRESS OF FOREIGN BODIES.

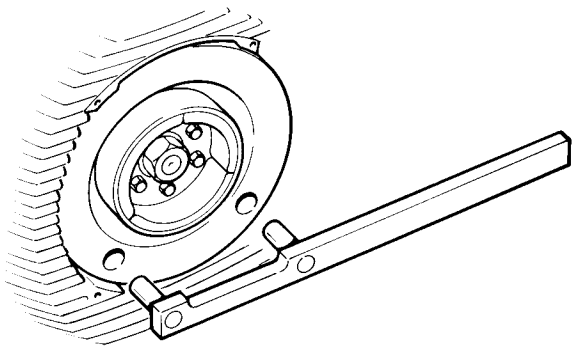


Fig. B7. Using the flywheel restrainer bar

Fit the flywheel restrainer bar Part No 50-0231 to the flywheel (Fig B7). Fit two strong elastic bands around the primary chain tensioner slippers (Fig B8) to secure them in the correct position for re-assembly and remove the tensioner by releasing three bolts securing the tensioner to the right engine and plate/inner chaincase. Remove tensioner back plate. Release the trapped oil within the tensioner body by applying a thin bladed screwdriver to the ball release valve as shown below

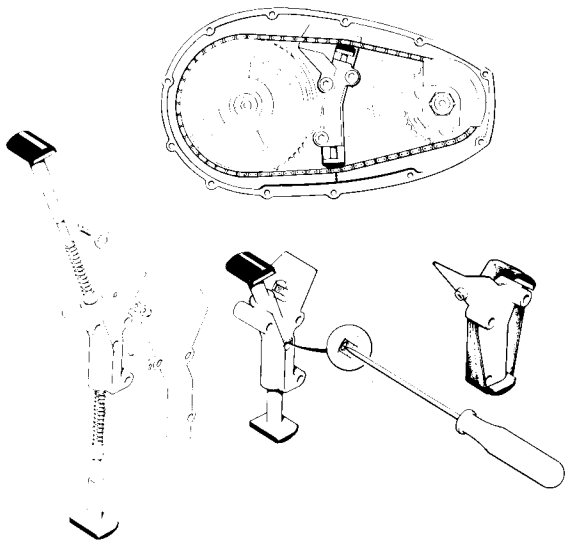


Fig B8 Removing the chain tensioners–illustrating
a) exploded view of the tensioner assembly
b) releasing the oil pressure
c) use of restraining rubber bands

Fit the clutch spring compressor tool Part No 69-0614. Tension, and remove the clutch pressure plate by releasing the large circlip located in the lip of the clutch drum. Remove six or more clutch plates and fit the clutch hub locking tool Part No 50-0140 into the clutch drum. Remove the clutch hub nut and then the engine sprocket securing nut, washer and balance weight. If the flywheel is to be removed from the engine unit it is advisable to slacken the securing nut at this stage. Fit extractor tool Part No 50-0408 to the engine sprocket (Fig B9) using the two M8 x 1.25 x 60 bolts supplied. Draw the sprocket along the shaft until the primary chain just starts to tighten. Remove the extractor from the engine sprocket and fit it to the clutch hub using the M8 x 1.25 x 40 bolts provided and draw the clutch hub/drum/ starter gear unit along the gearbox mainshaft until free movement is felt. Remove the extractor. It should now be possible to remove the clutch hub assembly and engine drive sprocket simultaneously with the primary chain in position around the clutch hub and engine sprocket. Unless work is to be carried out on the clutch hub/starter gear assembly, do not remove the primary chain but leave it in place to assist re-assembly.

Note: It is important to refit the primary chain the same way round as previously fitted.

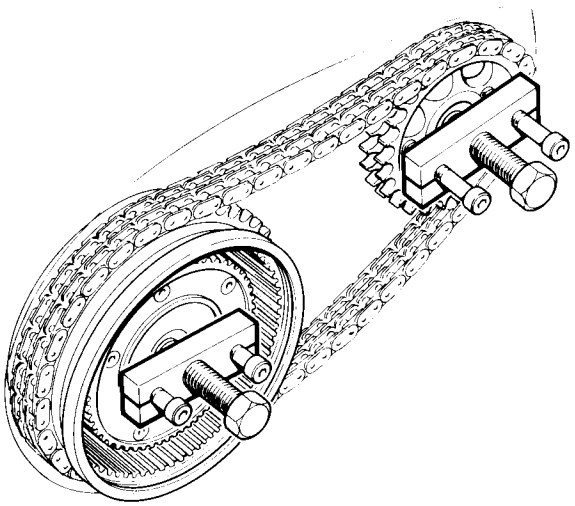


Fig. B9. Removing clutch and engine sprockets using the extractor tool

CAUTION:

DO NOT BE TEMPTED TO STRIKE THE ROTOR SHAFT ENDS TO REMOVE A STUBBORN ENGINE SPROCKET, COUNTERBALANCE WEIGHT OR FLYWHEEL. SUCH ACTION WILL INEVITABLY RESULT IN INTERNAL DAMAGE.

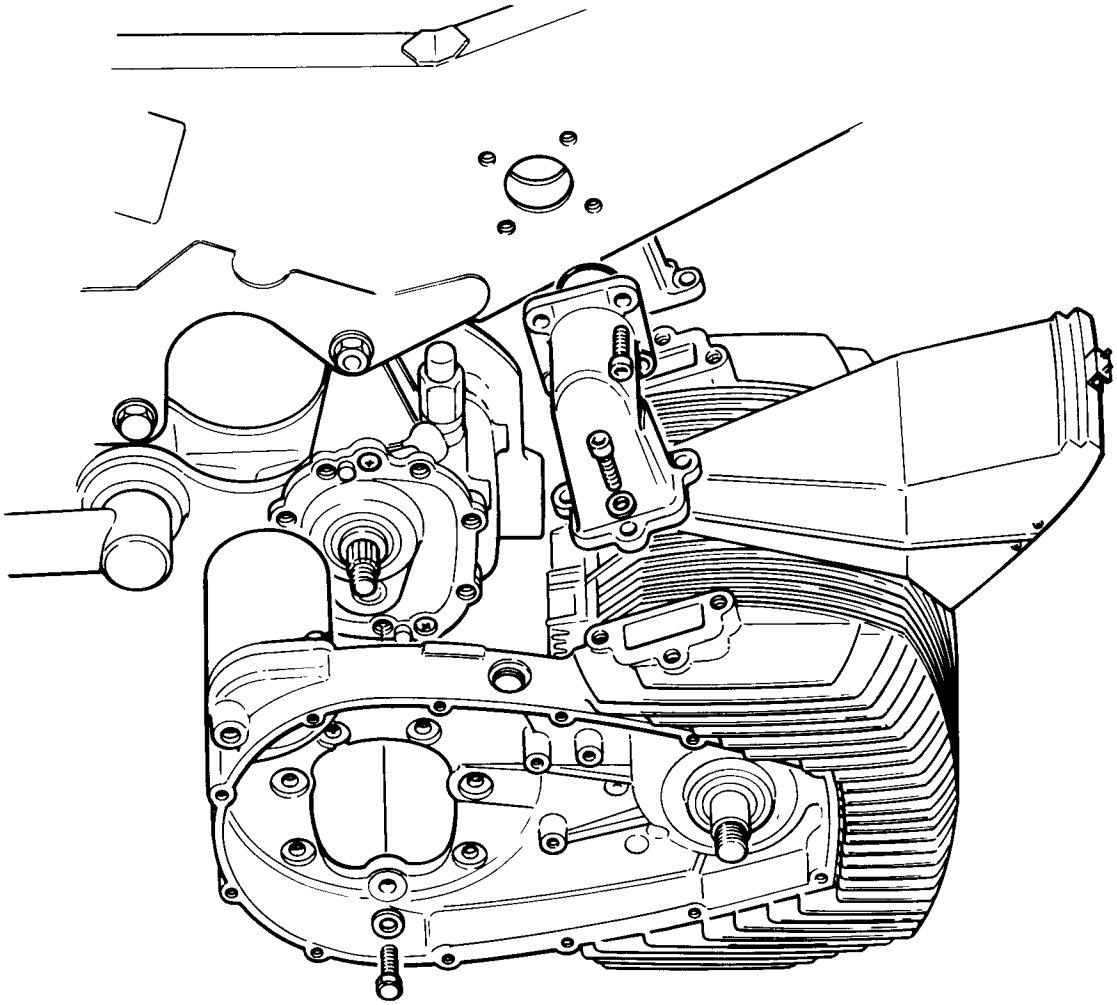


Fig. B10. Removing the engine from the frame

Disconnect the thermocouple lead from the white multi-pin plug at the instrument binnacle. Free the cable and secure to the engine to enable the engine to be removed
Disconnect the right horn and remove. Remove the right transfer port by releasing three socket headed bolts at the right engine plate and four socket headed bolts at the frame.

Disconnect the starter motor to starter solenoid lead at the solenoid and tuck the engine to battery earth lead in towards the power unit to avoid snagging when removing the engine from the frame. Remove all but two of the engine right end plate/primary drive inner cover to gearbox mounting bolts. Support the power unit under the rotor housings, release the remaining two bolts, and being careful to avoid damaging the locating dowels remove the power unit turning slightly to the right to clear the starter motor and gearbox.

Place a support under the engine and obtain assistance to remove the power unit (Fig.B10). Whilst it is possible for the individual to lift the engine unassisted, it is necessary to turn it to the right whilst removing from the frame. We therefore advise against attempting to remove the engine without assistance.

SECTION B2

DISMANTLING THE ENGINE UNIT

Before commencing the dismantling of the power unit, ensure a clean area is prepared to place the internal engine components in strict order of dis-assembly. As the majority of these parts will be capable of further service, it is absolutely essential that the order and sequence of dis-assembly is exactly repeated during re-assembly.

Careful layout during dismantling for inspection prior to re-build must therefore be planned at this point.

As it is necessary to protect the rotor shaft ends against sideways impact a design for a straight forward engine stand is shown at Fig B13. **DO NOT ATTEMPT TO DISMANTLE THE POWER UNIT WITHOUT THE USE OF SUCH A STAND,** as the stand protects the rotor shaft end clear of all working surfaces.

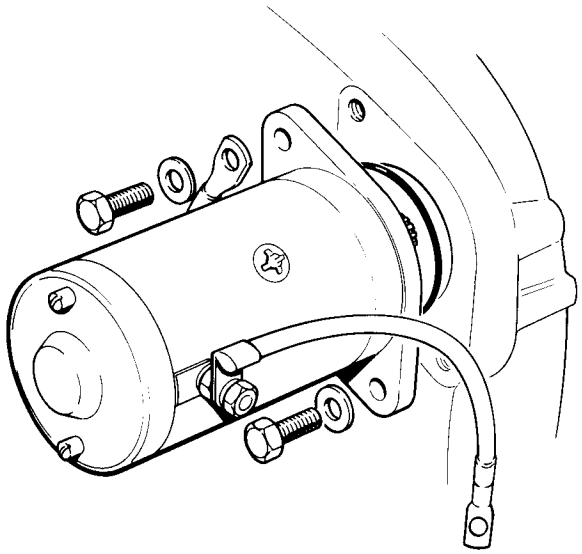


Fig. B12. Removing the starter motor

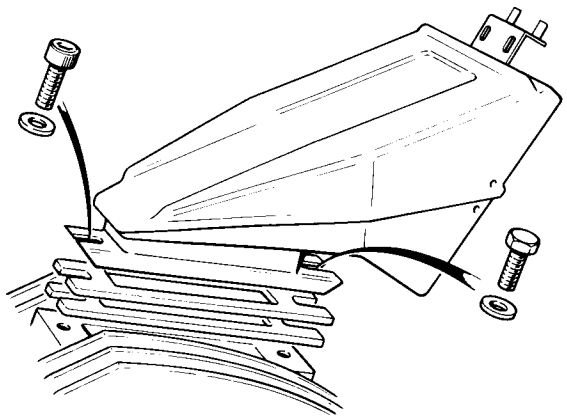


Fig. B11. Removing the air filter box

Ensure the rotor shaft woodruff key and drive sprocket shims are removed from the right end of the rotor shaft and retained in a secure place. Remove the air filter box by releasing the bolts situated to the front and rear of the air filter box base. Remove the starter motor noting the position of the live and earth leads Fig. B12.

The power unit can now be turned onto its right side with the rotor shaft end positioned in the support stand recess. All further dismantling will be carried out in this position.

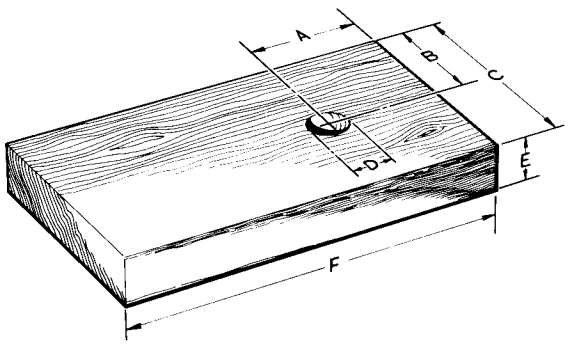


Fig. B13. Suggested engine support stand
Dimensions A 107 mm
B 90 mm
C 240 mm
D 60 mm
E 50 mm
F 360 mm

Remove the stainless steel exhaust manifold by releasing six socket headed bolts securing the manifold to the rotor housings. Withdraw the stainless steel liner tubes from the exhaust ports (Be sure to re-fit liner tubes when re-assembling the power unit). Remove the two oil feed pipes from the intermediate plate and remove the throttle butterfly return springs.

Fig B15 shows a design for laying out the seals and springs removed from the rotors. It is important to keep them in strict order for re-assembly. Carefully remove the rotor side seals, springs and apex seal corner pieces and store in their appropriate positions. It is essential that the two pieces of each apex seal remain identified and re-used as a pair.

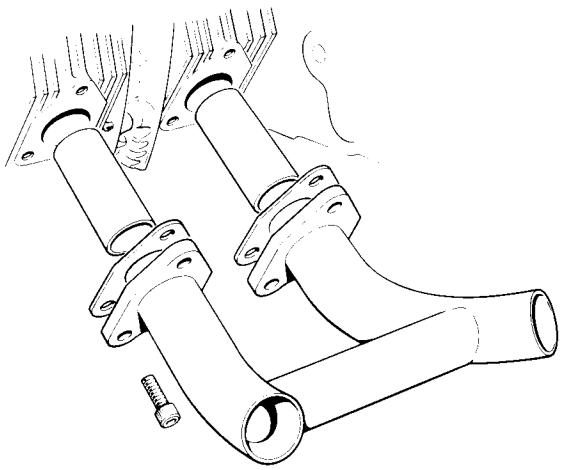


Fig. B14. Removal of exhaust manifold and stainless steel liners

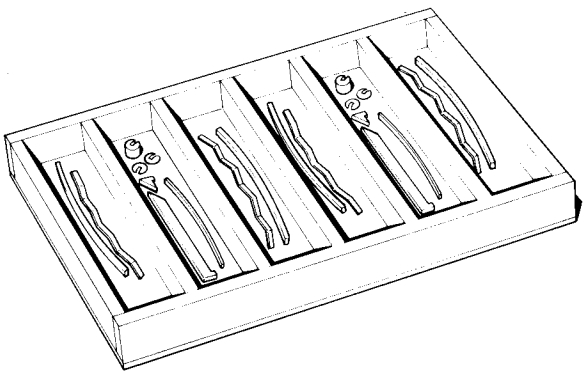


Fig. B15. Suggested rotor seal identification layout

Remove the flywheel retaining nut and washer and two of the six flywheel/generator bolts (opposing two bolts). Using the extractor - Part No 50-0408 with M6 x 1.0 x 45 bolts provided, draw the flywheel/generator rotor assembly from the rotor shaft. A ring of 11 nuts will now be visible on the left engine end plate. Remove these noting the position of spacers and washers. Very gently lever the left end plate and rotor housing apart (this will probably be necessary due to jointing compound used on mating surfaces), and lift the end plate off the studs, being careful to retain any rotor side seals and springs which may adhere to the end plate running surface due to surface tension of the lubricant. It is not necessary to remove the woodruff key.

Gently lever the left rotor housing clear of the intermediate plate and lift off the studs. Remove the apex seals and springs and lift the rotor and rotor bearing off the rotor shaft. Remove the side seals and springs and store in their correct order.

Remove the intermediate plate and right rotor housings as described for the left end plate and rotor housing, carefully storing the side and apex seals and springs.

Carefully lift the rotor shaft and the right rotor assembly out of the right main bearings being careful to retain the side seals and springs.

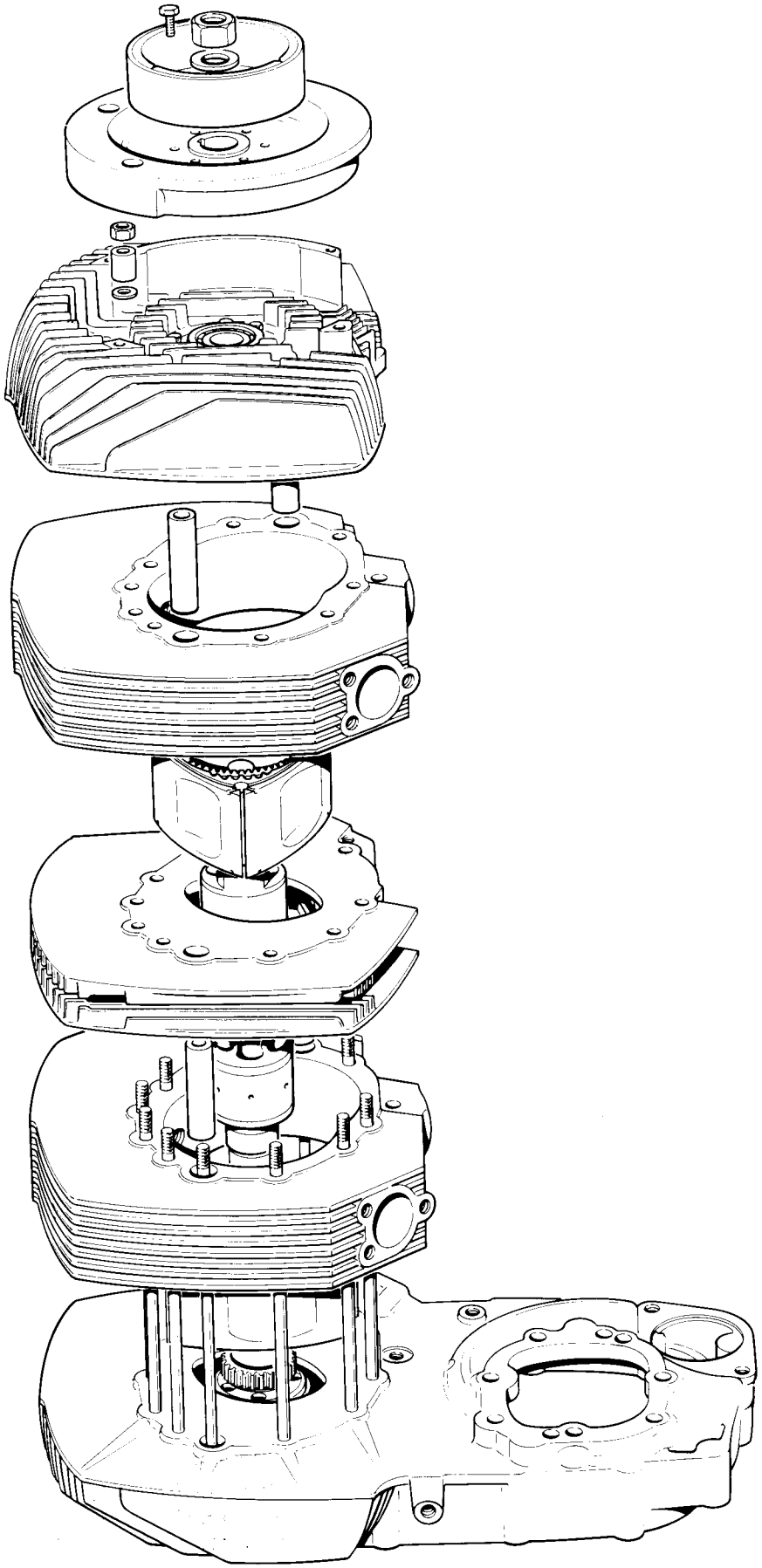


Fig. B16. Exploded view of the engine components

SECTION B3

REMOVING AND REPLACING MAIN BEARINGS AND OIL SEALS

The rotor shaft main bearings should not need replacement during the normal life of the machine. If however, the main bearings and oil seals should need to be replaced, always replace **all** main bearings. It is false economy to attempt to run with one new and two old main bearings.

Remove the nine bolts securing the left main bearing oil seal housing and stationary gear to the left engine end plate. This will allow the oil seal housing and 'O' ring to be removed. The main bearing oil seal may be pressed out of its housing for replacement. Gently heat the left engine alloy end plate to 150° C and carefully press the stationary gear/main bearing assembly out of the alloy end plate.

To remove the main bearing from the stationary gear use the Service Tool Part Number 00-5901 as shown in Fig. B17 (a). The main bearing must be PRESSED out as illustrated with the flange of the stationary gear well supported in a receiving cup. Any damage to the flange may result in the misalignment of the main bearing and the meshing of the rotor gear.

This will provide clearance for removal of the bearing. The replacement bearing should be pressed back into place, ensuring it is fully home in the housing.

When pressing the replacement oil seal into the left side oil seal housing, ensure the seal garter spring is towards the bearing. ie. solid face outboard.

Removal of the right main bearing is accomplished in a similar manner to that of the left described above, the right side housing an addition ball bearing fitted within the oil seal housing, utilised to control the available end float and positive location of the rotor shaft. Removal of the axial bearing (as it is called) is achieved by first removing the oil seal

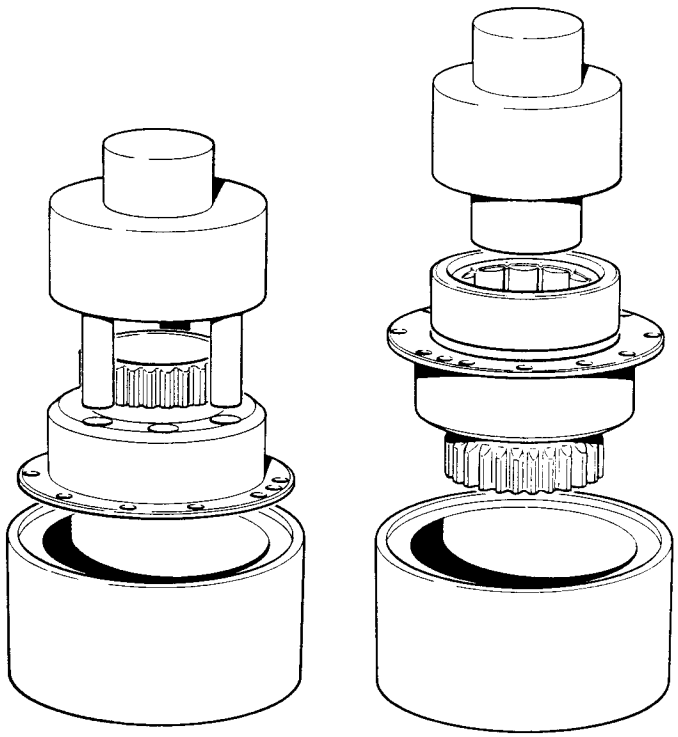


Fig. B17. (a) Removing the rotorshaft main bearings (b) Replacing the main bearings into the stationary gear.

followed by removal of the bearing location circlip. The bearing can then be lifted free.

Place the new axial bearing in position and locate with the circlip. Fit the new oil seal with garter facing the axial bearing. ie the solid seal face towards the stationary gear.

After removal of the stationary gear and main roller bearing as described for the left side assembly, replacement of the stationary gear assembly for both left and right side is as follows.

To refit stationary gear/main bearing assemblies screw two M5 studs into two of the nine bolt holes in the end plate, this will help the alignment of the stationary gear to the dowel and the bore (Fig B18)

Gently heat the end plate to 150°C and press the stationary gear/main bearing assembly fully home.

Taking care not to restrict the two oil holes (Fig B18) thinly apply the recommended sealing compound (See General Data) to the axial bearing/oil seal housing and refit using the correct grade of 'Loctite' on the securing bolts.

CAUTION

The flange at the stationary gear and its mating face on the End Plate must be scrupulously clean to avoid any possibility of misalignment of the main bearing and rotor gear mesh.

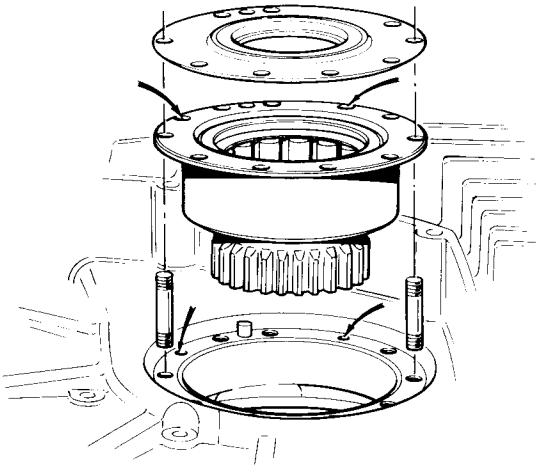


Fig. B18. Aligning the stationary gear during assembly into the housing, illustrating the use of guide studs, and the importance of keeping clean the oil supply holes (arrowed).

SECTION B4

INSPECTION

Basic component dimensions are given in the GENERAL DATA section at the beginning of this manual. Maximum permissable wear measurements are detailed in this section under the appropriate headings.

Rotors

The rotors should be inspected for any obvious signs of damage:

1. Examine the drive gear teeth for wear. (there should be little or no sign of wear. Any wear that has taken place will be immediately noticeable). The rotor must be replaced if the ring gear is damaged in any way.

2. Examine the bearing surface for deterioration or wear. Examine also for signs of ovality using an internal micrometer.

   Maximum allowable ovality 0.015 mm.

3. Examine the side, apex and corner seal slots for undue wear.

   See 'General Data' for seal groove dimensions.

4. Examine the rotor casting for any signs of deterioration and wear.

Using a wire brush,clean the combustion faces and using a fine stone ease the edges of the rotor to clean off any metal 'burring' which may have taken place during cleaning. Wash the rotors thoroughly and keep very clean for re-assembly.

Re-mark each rotor 'right' or 'left' for re-assembly.

Rotor Seals

Whilst the engine is dismantled it is advisable to inspect the apex side and corner seals and springs as these must be removed from the rotors during the normal course of inspection. If however, the seals are found to be in good condition then there is no reason why they should not give many more miles of useful service, **provided they are re-fitted in their original position on the rotors.** It is advisable to fit new replacement seal springs whenever an engine is stripped and rebuilt for examination or overhaul.

B

Strip Examination and Replacement

1. **Apex seals** Examine for end wear and signs of the top surface wearing. Check also for signs of wear caused by the seal chattering (moving backwards and forwards within its locating groove).

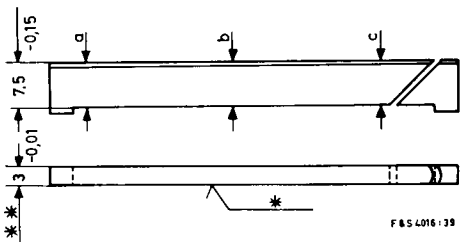


Fig. B19. Apex seal
Max. permissible wear depth.–1.5 mm (0,060 in) at a, b & c. Max allowable difference between a & c – 0.2 mm (0.008 in).
* Width – 0.02 mm (0.008 in).
** Max. allowable unevenness 0.02 mm (0.008 in).

2. **Side Seals** Check to ensure the seals have not become jammed in their grooves and that the specified end float exists between the side seal and the corner seal. (See Fig. B33).

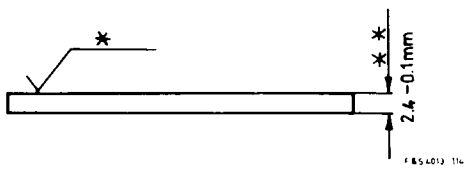


Fig. B20. Side Seal
Max permissible wear:
** Depth – 0.2 mm (0.008).
* Permissible unevenness 0.1 mm (0.004 in).

3. **Corner seal pins** Examine for signs of wear. Check also that the apex seal end pieces have not jammed in their seal pins, and that the seal pins are free to operate in the rotor. (Fig. B33).

The sealing pins must be evenly worn. Check with a micrometer.
Max. permissible unevenness:
* 0.05 mm (0.002 in)).
Max permissible wear:
** 0.3 mm (0.012 in)

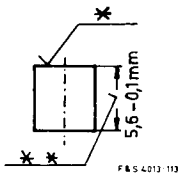


Fig. B21. Corner seal pin

4. **Springs** Examine and replace. It is always advisable to renew the springs at every engine strip down and repair even if found to be in good condition during strip examination.

NOTE:

Jammed side, apex and corner seals may occur and usually result from the use of an incorrect grade of engine oil. The correct grade oils recommended for use with this engine can be found in Section A2 "Recommended Lubricants". **Do not under any circumstances use a multi-grade type of oil. Use only the Recommended Lubricants to the specifications listed in Section A2.**

Rotor Shaft

Examine the rotor shaft for signs of any evident main and rotor journal wear. Examine also the overall dimensions of the rotor shaft. Wash the rotor shaft thoroughly and keep very clean for re-assembly. Check dimensions with those given in General Data - Engine Section.

ROTOR SHAFT RECONDITIONING

Reconditioned rotor shaft assemblies are available on an exchange basis through the Factory Service Department.
These assemblies comprise the rotor shaft, rotors,rotor Bearings, flywheel and balance weight.
It is not possible to re-grind the rotor shaft using normal machine shop facilities. The bearings are carefully matched with the rotor shaft at the factory and are machined to very close tolerances in order to maintain accurate rotor needle roller bearing clearances and alignment. We strongly advise that full use be made of the factory reconditioning service as only parts reconditioned and supplied by Norton Motors carry the Norton warranty.

Rotor Bearings

In order to examine the rotor bearings, it is necessary to remove them from the rotors. To ensure the bearings are refitted the original way round and to their appropriate rotor, it is advisable to mark the end of the rotor and bearing cage with paint.
If replacement of the rotor bearings proves to be necessary, carefully label the bearings L.H. and R.H., and return them to the Factory Service Department where it can be determined which size of bearing is required to maintain the specified running clearances.

Note:
Always replace rotor bearings in pairs. Never attempt to run one old and one new bearing together.

Main Bearings

Clean & examine for any signs of wear. Check the bearing tracks for pitting and replace if necessary.

Note:
Always replace main bearings in pairs, never attempt to run one old and one new bearing together.

Main Bearing Oil Seals

Clean thoroughly. Examine for signs of wear, rupture or deterioration of the oil seal material. Replace as necessary.

Rotor Housings

Carefully examine the trochoid track for any signs of damage to the plated surface. Any carbon deposits can be removed with a petrol (gasoline) soaked cloth. The housing will require replacement if the Elnisil plating of the sliding surface has become damaged due to dirt or foreign matter. If the housing is to be replaced, new apex seals must be used in the rotor.

Clean the carbon deposits from the exhaust ports.

Examine the condition of the throttle butterflies, spindles and bushes and replace if worn beyond the limits given in the General Data. Examine the throttle levers for wear and replace as necessary.

End & Intermediate Plates

Carefully remove any carbon deposits on the wearing surfaces, wash thoroughly and blow dry. Note that the original rotor side bearing faces in the alloy were originally subject to an 'etching' process to produce oil retaining pores and pockets in the surface. (See below)

Examine the machined wearing surfaces for any signs of 'picking up' and scoring.

Examine the oil passages to ensure they are clean and not blocked.

The end and intermediate plates do not normally wear appreciably during service but nevertheless should be checked. Limitations can be found in the 'General Data' section.

Re-Finishing the End and Intermediate Plates

Should any deep scores (over 0.25 mm deep) be found on the wearing surfaces then the affected end or intermediate plate should be replaced. If suitable equipment is available the working surfaces can be reground. (See General Data – End and Intermediate Plates). Reconditioned end and intermediate plates are available on an exchange basis at reasonable cost and can be obtained from the factory.

Should it be found necessary to refinish the wearing surfaces use the following procedure:-

The left end plate and the intermediate plate can be surface ground to the limitations given in 'Important Note'. The right end plate which is also the primary chaincase can be ground to within the limits given but extreme care must be taken to position the end plate on the machine finished side of the primary chaincase in order that the end plate can be ground parallel.

IMPORTANT NOTE:

Surface finishing of the end and intermediate plates should never require the removal of more metal than 0.013 mm (0.005 in) per plate surface.

In extreme circumstances where damage has occurred, the total surface metal removed from one plate running surface should not exceed 0.25 mm (0.010 in) and from the total of all plate running surfaces must never exceed 1.0 mm (0.04 in) otherwise internal running clearances will be reduced below designed safe limits.

When material has been removed from the end and intermediate plates, the end clearance of the locating dowels must also be checked and material removed from the dowel ends if necessary to clear the plates and allow complete tightening down of the end and intermediate plates against the rotor housings.

The effective stud (11) length is also affected by material removal from the end and intermediate plates. The total stud protrusion through the left end plate must never exceed 222/223 mm, and must be assembled accordingly.

Etching the Wearing Surfaces

When the wearing surfaces of the end and intermediate plates have been surface ground, the ground finish must be chemically etched. The chemical etching process is used to provide an oil retaining finish to the wearing surface.

Procedure

Prepare a paste by dissolving approximately one teaspoonful of sodium hydroxide crystals in 500 cc of hot water, into which has been gradually stirred sufficient "Ronstrip" or similar caustic powder until a medium consistency paste is achieved. Heat the end or intermediate plate to the point when the component can still be handled without gloves and place the end or intermediate plate wearing surface uppermost. Carefully spread the paste evenly on to the working surface (taking care not to apply to the housing joint faces). Leave to act for 15 mins. Wash the plate thoroughly in hot clean water. When using this process do not allow any of the solution to touch the paint finish on the component as the chemical reaction will bleach the paint finish leading to discolouration.

WARNING

Caustic Soda (Sodium Hydroxide) is a dangerous chemical which gives off poisonous gases when being used and is highly corrosive. Wear protective clothing and work in a well ventilated area when handling this chemical.

SECTION B5

SU CARBURETTER – DESCRIPTION

How the SU Carburetter applies the Variable Choke System.

A variable choke orifice is obtained in the SU carburetter by the vertical movement of a close fitting piston positioned above the fuel jet in the middle of the body casting. A suction disc integral with the piston works in a concentric chamber bolted to the body casting. Drillings in the piston transmit any depression existing within the choke area to the chamber above the suction disc. The underside of this disc is vented to atmosphere. As the choke orifice size is varied over wide limits by the movement of the piston, so must the fuel orifice size be varied. This is achieved by means of a profiled needle attached to the piston and projecting into the jet. Correct discharge areas are obtained by accurate dimensioning of this needle.

Opening the throttle allows manifold depression to be communicated to the choke area of the carburetter and also to the chamber above the suction disc. The piston will rise, allowing a mixture of air and fuel to pass underneath it to relieve the depression, and will continue to rise until the depression has reached a value which is just sufficient to balance the weight of the piston. It will be appreciated that approximately the same depression will be obtained whatever the demand and that the piston height will be governed by the mass of mixture flowing beneath it. This depression is arranged to be of sufficient value to ensure that good atomization is obtained, but small enough to ensure adequate engine filling at high engine speeds.

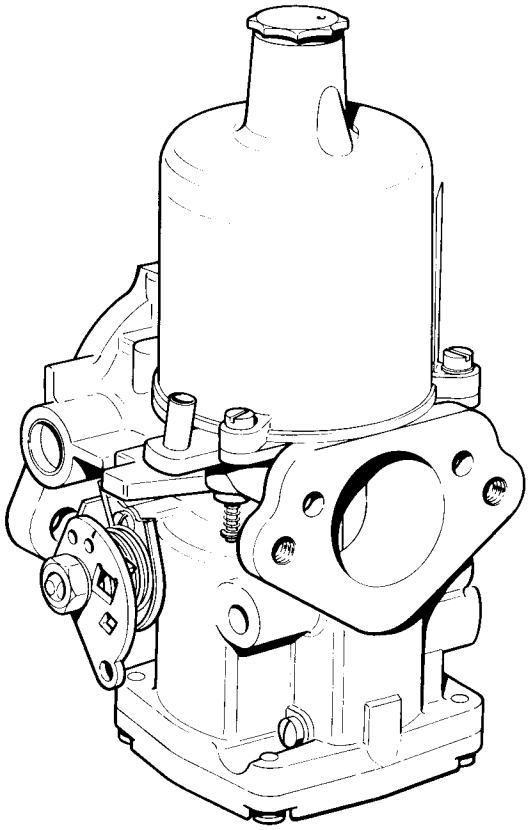


Fig. B22. The S.U. HIF carburetter

Enrichment necessary during rapid opening of the throttle is provided by means of hydraulic damper.

This restricts the rate of piston lift, thereby increasing the depression acting over the jet.

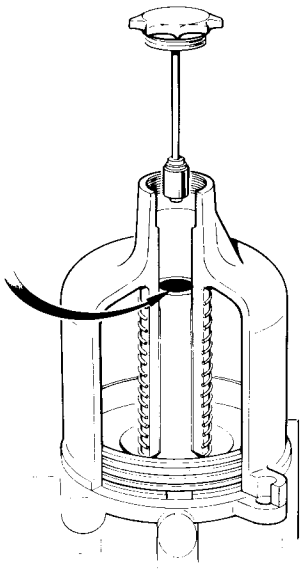


Fig. B23. Removal of the carburetter damper piston

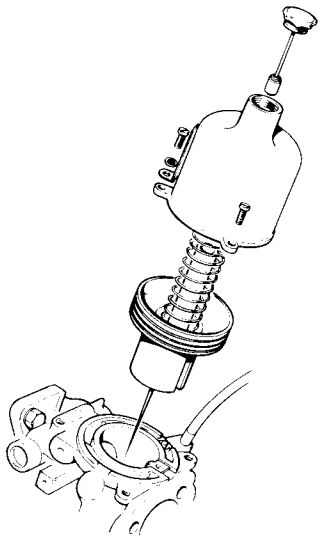


Fig. B24. Removal of the suction chamber

NOTE
A general fall off in performance for no immediately apparent reason could indicate the need for the suction chamber (Fig B24) and suction chamber pistons to be thoroughly cleaned (Section B7, para 27) due to becoming coated in engine oil and lacquer from the frame plenum chamber, finding its way to the carburetter inlets, thereby restricting the freedom of the piston to provide a positive response to throttle variations. Servicing procedures are described in section B7.

SECTION B6

REMOVING AND REFITTING THE CARBURETTERS

REMOVAL

1. Lift the seat and remove the side panels (Sections E1 and E2).

2. Turn the left and right fuel supply tap to the 'off' position, and the right vacuum operated tap to the 'on' position.

3. Disconnect the fuel pipe from the right carburetter to the left carburetter and disconnect the fuel feed pipes at the fuel taps. Disconnect the vacuum feed pipe to the right fuel tap and remove the fuel tank. (See Section E2).

4. Remove the left engine cover by removing the socket headed screw in the left engine mounting/air transfer port. Remove the two socket headed screws securing the left intake manifold to the frame and, holding the inlet pipe in place carefully pull the carburetter away from the frame approx 3 ins. (7.5cm), and then from the inlet pipe. Disconnect the choke cable from the quadrant on the frame side of the carburetter. Place the complete assembly upright in a safe place.

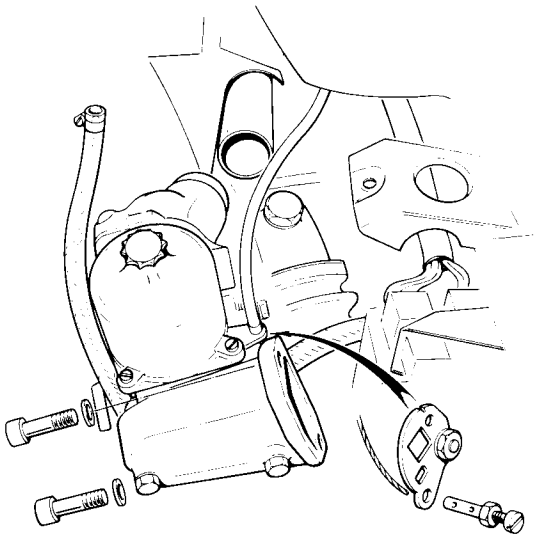


Fig. B25. Removal of the left carburetter

5. Remove the right carburetter in the same way following removal of the right hand engine cover and battery, being careful to disconnect the fast idle operating rod from the throttle fast idle lever clip before removing the two socket headed bolts which secure the right intake manifold to the frame. Caution: Do not disturb the adjustment of the fast idle operating rod length. This is factory set and should not be altered.

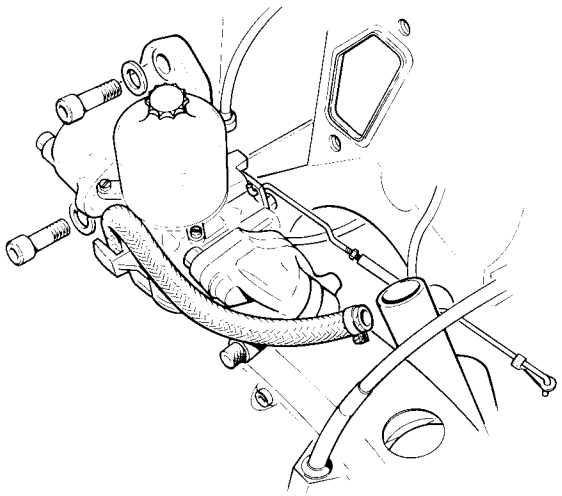


Fig. B26. Removal of the right carburetter

REFITTING

1. Refit the left carburetter. Lubricate the manifold end of the inlet pipe to ease fitting of the carburettor/manifold assembly. The choke cable is then fitted to the choke quadrant situated on the inner most side of the carburetter, and the carburetter and manifold assembly fitted in place, ensuring the manifold is seated correctly on the frame.(See para 6).

2. Fitting the right carburetter is similar, but there are however two important differences:
   Idle Pipe Assembly
   Fast Idle Rod

3. Lubricate the seal end of the right hand inlet pipe with engine oil and push into place in the engine right hand inlet port. Similarly lubricate the idle pipe (engine end) and push into place positioning the pipe so that it runs from above the inlet pipe (engine end), to below the inlet pipe (carburetter end).

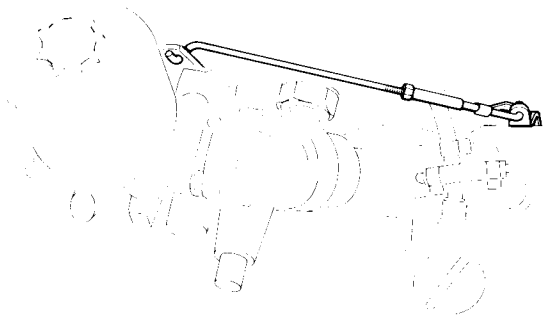


Fig. B27. Re-fitting the fast idle rod

4. Now fit the choke cable as described previously and fit the fast idle rod (long end to the choke bell crank) in position. Lubricate the inlet and idle pipe ends and push the right hand carburetter inlet manifold assembly onto the pipes, being careful to avoid bending the fast idle rod.

5. The right side carburetter can now be bolted into position and the fast idle rod clipped in place on the butterfly fast idle lever. (Fig B23).

6. When refitting the choke cable ends through the abutments in the left and right carburetter bodies, engage the inner cables through the solderless nipples entered through the choke lever quadrant. When refitting the inner cables, allow 2.5mm (0.10 in) free movement of the inner cables before the choke begins to function.

NOTE:

The fast idle lever should not normally need adjustment. If however the rod has been replaced refer to section B12 "Setting and Adjusting the Fast Idle Rod".

7. Re-fit the fuel tank (Section E2) and reconnect the fuel pipes to the left and right carburetter and to the fuel taps. Refit the fuel tap vacuum feed pipe.

8. Re-fit the side panels and replace the seat into position.

SECTION B7

CARBURETTER SERVICING

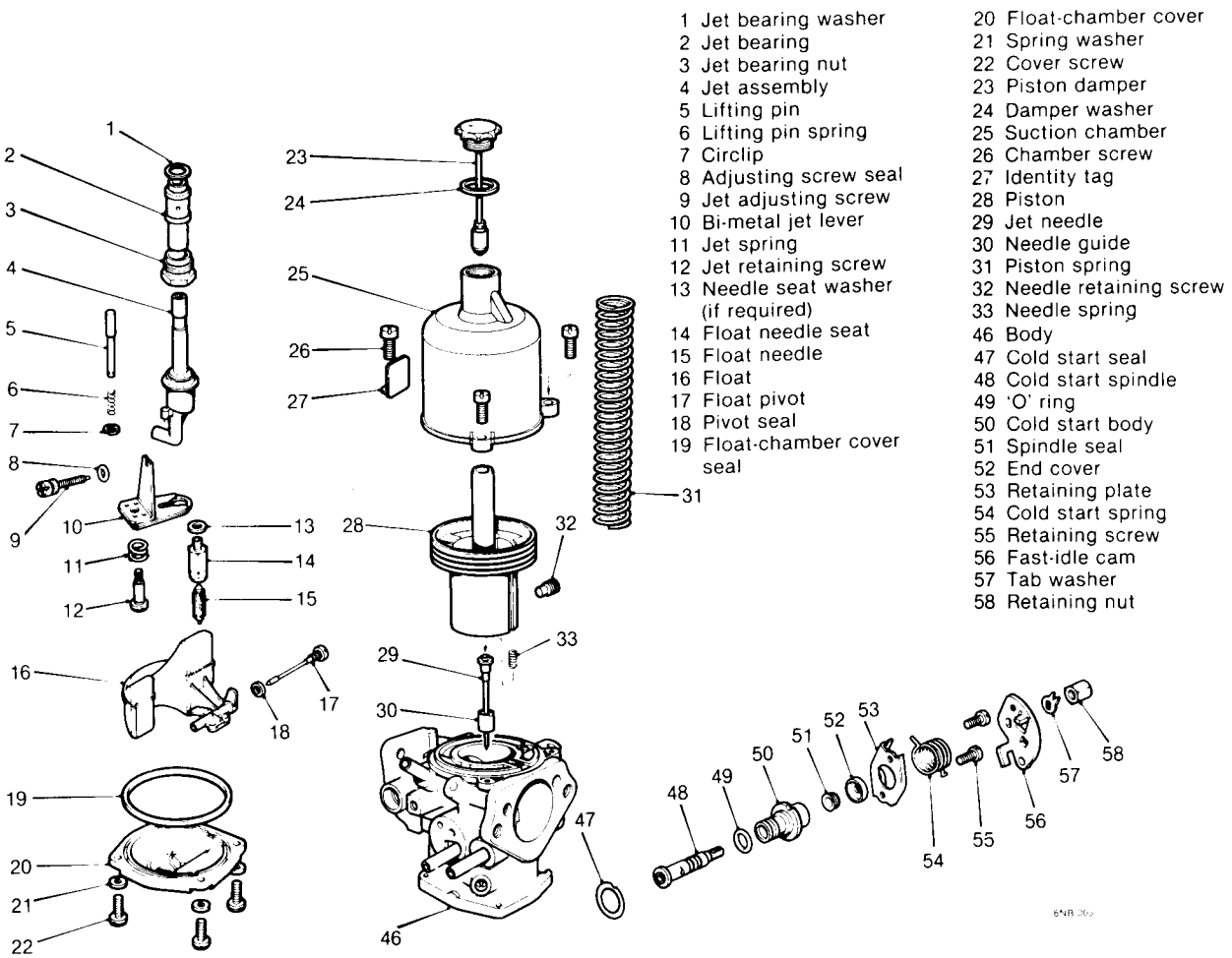


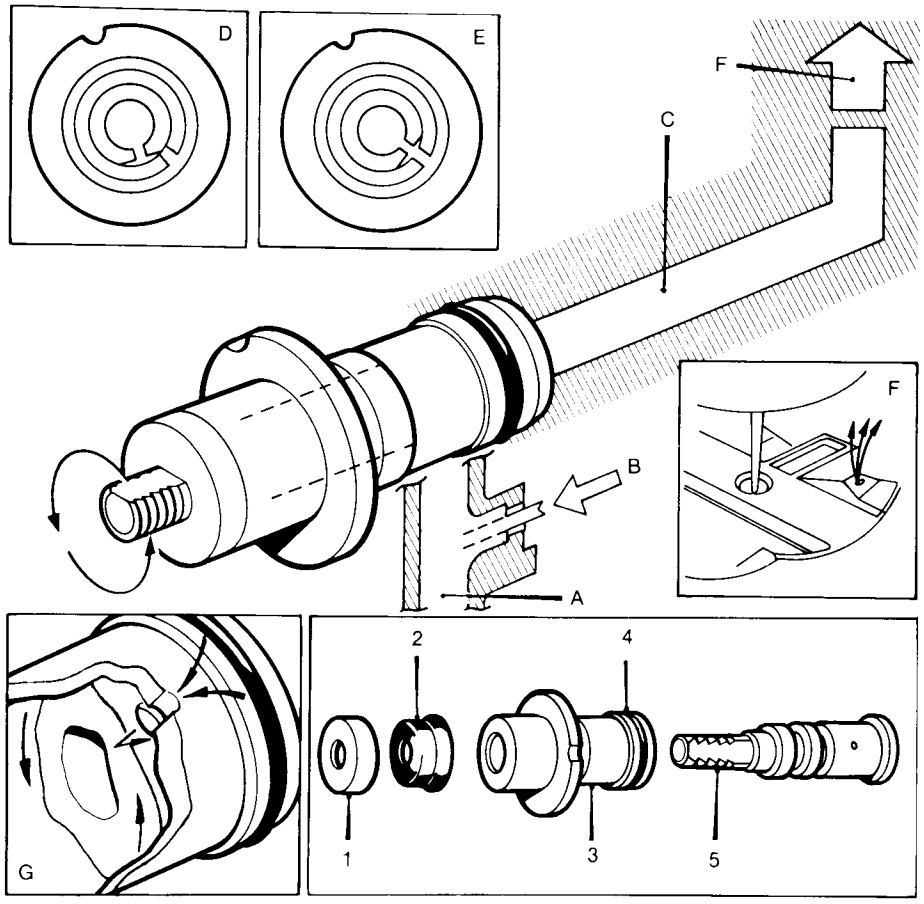
Fig. B28. Carburetter components

SERVICING - TYPE HIF CARBURETTERS

DISMANTLING

1. Thoroughly clean the outside of the carburetter.
2. Remove the piston damper with its washer.
3. Unscrew the suction chamber retaining screws.
4. Lift the chamber assembly vertically from the body without tilting it.
5. Lift out the piston assembly.
6. Empty the oil from the piston rod.
7. Note the position of the needle guide etch mark in relation to the piston transfer holes for correct re-assembly and unscrew the needle guide locking screw.
8. Withdraw the needle, guide and spring.
9. Mark the bottom cover-plate and body to ensure correct re-assembly, unscrew the retaining screws and remove the cover complete with sealing ring.
10. Remove the jet adjusting screw complete with 'O' ring.
11. Remove the jet adjusting lever retaining screw and spring.

Cold Start Enrichment Device



Cold start enrichment device

1 End seal cover
2 End seal
3 Starter valve body
4 'O' ring
5 Valve spindle

A Fuel supply
B Air bleed
C Fuel delivery to jet bridge
D Commencement of enrichment
E Maximum enrichment
F Enrichment outlet
G Fuel flow through valve

Fig. B29. Cold start unit assembly

12. Withdraw the jet complete with bi-metal adjusting lever and disengage the lever.

13. Remove the float pivot spindle and aluminium washer.

14. Withdraw the float.

15. Remove the needle valve and unscrew the valve seat.

16. Unscrew the jet bearing locking nut and withdraw the bearing complete with fibre washer.

17. Note the location of the ends of the fast idle cam lever return spring.

18. Unlock and remove the cam lever retaining nut and locking washer.

19. With the return spring held towards the carburetter body, prise off the cam lever and remove the return spring.

20. Unscrew the starter unit retaining screws and remove the cover plates.

21. Withdraw the starter unit assembly and remove its gasket (Fig B29).

22. Withdraw the valve spindle and remove the 'O' ring, seal and dust cap.

INSPECTION

23. Examine the float needle and seating for damage and excessive wear; renew if necessary.

24. Examine all rubber seals and 'O' rings for damage or deterioration, renew as necessary. **THE COVER PLATE SEALING RING MUST BE RENEWED.**

25. Check condition of all fibre washers and gaskets; renew as necessary.

26. Examine the carburetter body for cracks and damage and for security of the brass connections and the piston key.

27. Clean the inside of the suction chamber and piston rod guide with fuel or methylated spirit (denatured alcohol) and wipe dry. **ABRASIVES MUST NOT BE USED.**

28. Examine the suction chamber and piston for damage and signs of scoring.

NOTE:

The following timing check need only be carried out if the cause of the carburetter malfunction which necessitated the dismantling has not been located.

29. Temporarily plug the piston transfer holes.

30. Fit the piston into the chamber without spring.

31. Fit a nut and screw, with a large flat washer under the nut, into one of the suction chamber fixing holes, positioning the washer so that it overlaps the chamber bore.

32. Fit the damper and washer.

33. Check that the piston is fully home in the chamber, invert the assembly to allow the chamber to fall away until the piston contacts the washer. Check the time taken for the chamber to fall the full extent of the piston travel. For carburetters of $1\frac{1}{8}$" (38mm) to $1\frac{1}{8}$" (47.6mm) bore the time taken should be 5 to 7 seconds.

34. If the times are exceeded check the piston and chamber for presence of oil, foreign matter and damage. If after rechecking the time is still not within these limits, renew the suction chamber assembly.

REASSEMBLING

35. Reverse the procedure in 1 to 22 noting the following

a) Starter unit valve is fitted with the cut-out towards the top retaining screw hole and its retaining plate is positioned with the slotted flange towards the front of the machine. Apply a smear of oil to the starter 'O' ring prior to assembly, as this will obviate force being applied with consequent damage to the 'O' ring.

b. When fitting the jet assembly to the adjusting lever ensure that the jet head moves freely in the bi-metal cut-out.

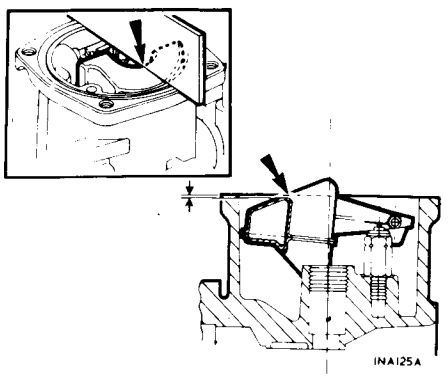


Fig. B30. Setting the Float level

c. After fitting the float and valve, invert the carburetter so that the needle valve is held in the shut position by the weight of the float only. Check that the point indicated on the float (see illustration Fig B30) is 0.04/0.02 in (1.0/0.5 mm) below the level of the float chamber face. Adjust the float position by carefully bending the brass pad. Check that the float pivots correctly about the spindle.

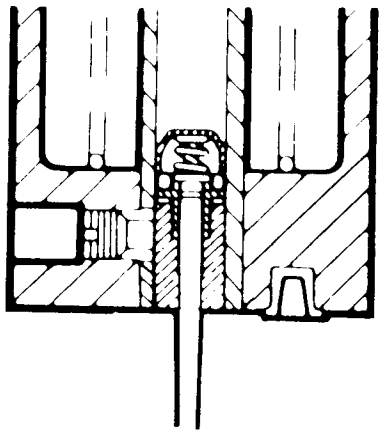


Fig. B31. Needle guide setting to be flush with piston lower face

d. Use a new retaining screw and new needle guide ensuring that the needle guide gives the needle bias in the direction of the rear of the machine. Before tightening the retaining screw, check that the level of the top of the guide is correct relative to the piston face - ie. flush with the face of the piston. Fig. B31.

c. Unscrew the cap and withdraw the damper. Top up with lubricating oil (see Section A2 – Recommended Lubricants) until the level is 13.0 mm ($\frac{1}{2}$ in) above the top of the hollow piston rod, refit the damper and screw the cap firmly into the suction chamber.

SECTION B8

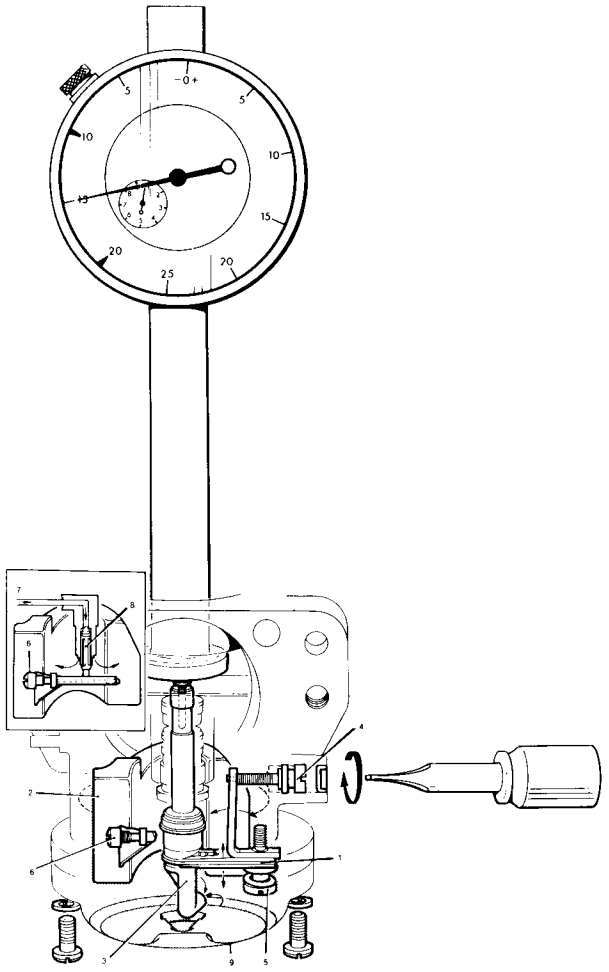
SETTING THE MIXTURE STRENGTH

The mixture strength is set at the factory and will not, in the normal course of events require adjustment, as the carburetters incorporate a built in fuel temperature compensation device. Should the mixture at any time need to be re-set, the following procedure should be followed.

1. Remove the damper piston, suction chamber piston and spring, as described in the previous section B7 items 1-6.

2. Ensure that the mixture needle shoulder is level with the base of the suction piston. (Section B7, item 35d).

3(a). Initial jet setting without jet height gauge. Position the end of a steel rule above the main jet orifice, screw the mixture control **out** until the main jet block just contacts the steel rule. At this point the main jet block will be level with the carburetter venturi base. Screw the adjuster in $3\frac{1}{4}$ turns. This will give the required 0.110 in. (2.79 mm) for the left carburetter, and approximately the 0.120in (3.05mm) specified for the right main jet height below the venturi base. (This measurement can be achieved more accurately using a height gauge fitted with dial indicator).



A diagrammatic enlargement of the float-chamber layout

1 Bi-metal assembly
2 Concentric float
3 Jet head
4 Jet adjusting screw
5 Bi-metal pivot screw
6 Float fulcrum screw
7 Fuel inlet
8 Needle valve
9 Bottom cover-plate

Fig. B32. Setting the main jet

3(b) Main Jet Setting - using a height setting gauge as shown in Fig B32.

Adjust the main jet setting using the recommended height setting gauge as shown in Fig B32, turning the adjuster to provide the specified settings (below) with the main jet rising to the required setting
Left carburetter 0.110in (2.79mm)
Right carburetter 0.120in (3.05mm)
The difference in settings between the carburetters results from the auxiliary feed to the idle speed control being fed from the right hand carburetter.

4. Replace the suction chamber and pistons, top up the damper pistons with the recommended lubricant and run the engine until normal running temperature is reached.

5. Disconnect the right hand spark plug lead and set the engine to run at 2,000 r.p.m. This is best acheived by using the throttle cable adjustment.

6. Turn the mixture control screw **in** $\frac{1}{4}$ turn and then slowly screw **out** until the engine speed just starts to fall, then screw back **in** $\frac{1}{4}$ turn.

7. Refit the right spark plug lead and remove the left spark plug lead. Repeat the above procedure with the right carburetter.

8. Refit the left spark plug lead and re-set the idling speed by turning the adjusting screw on the right inlet manifold in or out to lower or raise the engine speed, after returning the throttle cable adjuster to its original setting.

SECTION B9

REASSEMBLING THE ENGINE UNIT

MOST IMPORTANT

Ensure that the area you are using to assemble the engine is cleared and thoroughly cleaned and that all tools and equipment to be used are ready and clean. The slightest ingress of dust or foreign bodies to this engine could initiate extensive damage. Remember a little care now may save a lot of work later.

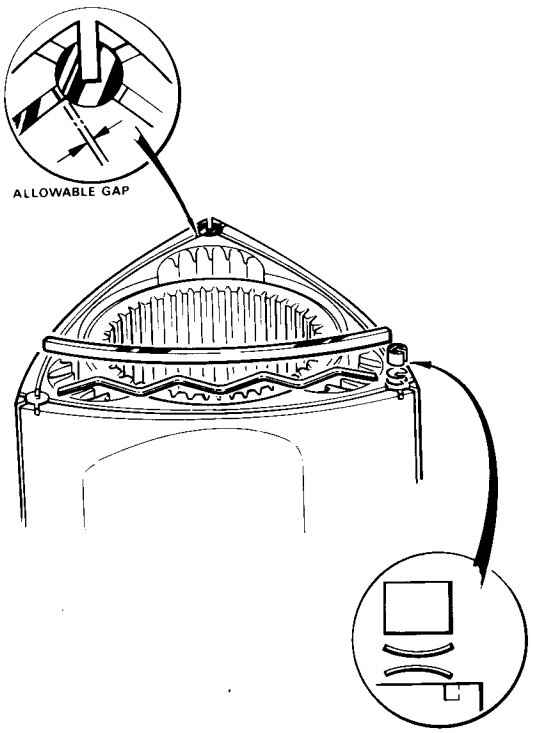


Fig. B33. Refitting the rotor side seals

Refit the needle roller bearings to each rotor ensuring they are replaced in the positions from which they were removed by reference to the recommended paint identification marks placed on the bearings during dismantling. It is essential that the bearings are fitted to the correct rotors and that the bearings are installed into the rotors facing the right direction.

Take both rotors and place them gearside up on a clean surface. Smear the side seal, apex seal pin and apex seal slots with petroleum jelly (vaseline). Fit the apex seal pin springs either 'wish bone' or twin concave discs fitted back to back (with the convex faces towards each other) into the seal pin recesses. Fit the apex seal pins being careful to align the slot in the seal pin with the apex seal slot in the rotor (See Fig B33). This can be achieved by using the apex seal to locate the seal pin slot.

Fit the side seal springs into their seats with the end of the spring facing in towards the rotor. Fit the side seals to the slots with the polished surface uppermost. Check the specified allowable gap between the corner seal pin and its end of the side seal. With the side seal pushed fully against one corner seal pin, the measured allowable gap must not exceed 0.127 – 0.178 mm (0.005 – 0.007 in). See Fig. B33.

Carefully turn the rotors over and repeat the above operation. There should be a clearance between the side seal and the apex seal pins. The seals should move slightly in their slots without binding.

Check that all side seals and apex seal pins can be depressed below the level of the rotor face to ensure full and free movement of the seals.

Ensure the seals now in the lower grooves **do not drop out.**

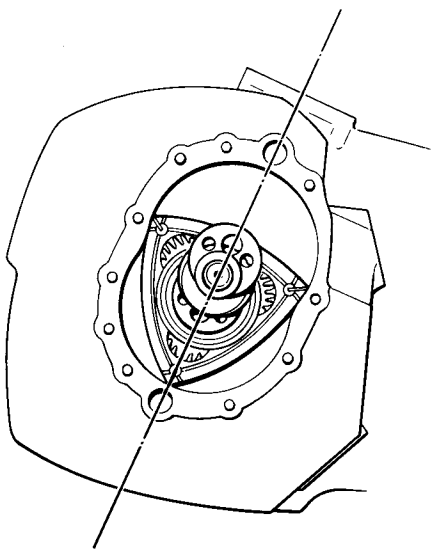


Fig. B34. Positioning the first rotor and eccentric shaft.

Lubricate the rotor bearings with engine lubricant. Fit the right rotor to the drive side of the rotor shaft.

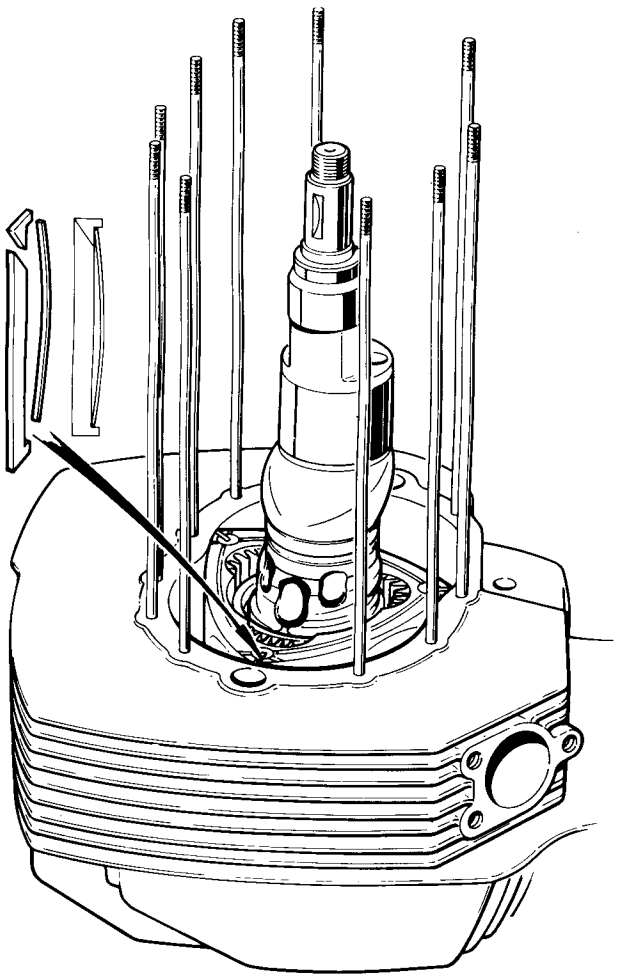


Fig. B35. Fitting the apex seals, seal springs and apex seal corner pieces

Lubricate the right end plate running surface with engine oil. The rotor shaft and rotor should now be inserted (gear side down) through the roller bearing to engage the stationery gear, with the shaft centre cooling holes aligned with the rotor apex and the top dowel hole as shown in Fig B34

AT THIS POINT CHECK TO ENSURE THAT NO SEALS HAVE BEEN DISLODGED.

Smear the mating surfaces of the right end plate and right rotor housing with the recommended jointing compound and fit the housing in place on the studs. Re-fit the top and bottom locating dowels in the rotor housing (if removed). Turn the rotor shaft through 90° to facilitate the subsequent assembly of the intermediate plate and fit the apex seals and seal springs with the convex face towards the centre of the rotor (ie. the ends of the spring should contact the ends of the apex seal – see Fig B35), and slide into position between the rotor slot and the apex seals. Finally position the apex seal corner pieces. Push the apex seal corner pieces home, as these will be held in place by apex seal spring pressure. Smear jointing compound onto the intermediate plate joint face, lubricate the intermediate plate running surface with engine oil and set the throttle levers pointing to the top of the engine (to clear the oil pipes). Assemble the plate over the studs, ensuring the two location dowels are fully engaged, checking all seals are in position before finally pushing home the intermediate plate. Rotate the rotor shaft through a further 90° to align the centre air passage with the bottom dowel. Carefully offer up and assemble the second rotor (LH) gear side uppermost to the eccentric shaft, with one of the apex slots aligned to the lower dowel centre line, in a similar manner to that indicated in Fig B34.

Smear the left rotor housing joint faces with jointing compound and assemble over the studs ensuring the throttle levers are engaged as shown in Fig B36.

Check the rotor side seals are still located correctly in the grooves, and assemble the apex seals (again as shown in Fig B35). Slide the seal springs into position with the convex side towards the rotor. Fit the seal corner pieces, pushing them home and closing the assembly by pressing the seal pins against their seal springs. Apply jointing compound to the mating surfaces and having lubricated the intermediate and end plate running surfaces, refit the LH end plate. Fit the spacers over the end plate studs (all but top two). Fit the nuts and torque load to 10lbs/ft. (1.4 KgM).

REFITTING THE FLYWHEEL ALTERNATOR AND STARTER MOTOR

Refit flywheel and alternator assembly and torque load nut to 150 lbs/ft. Pump engine oil through the oil pipes to the intermediate plate and position the engine the right way up. It should be possible to rotate the flywheel by hand without the spark plugs fitted with minimal resistance. Any unusual resistance to movement probably indicates an incorrectly fitted rotor seal and warrants immediate investigation. Refit the throttle butterfly return springs and set the throttle lever gap at 0.060" (1.5mm) (Fig B36). Refit the exhaust liner tubes (Fig B37) and, using new manifold gaskets, refit the exhaust manifold. Refit the air box assembly using the recommended Silicone Sealant. Do not overtighten the securing screws.

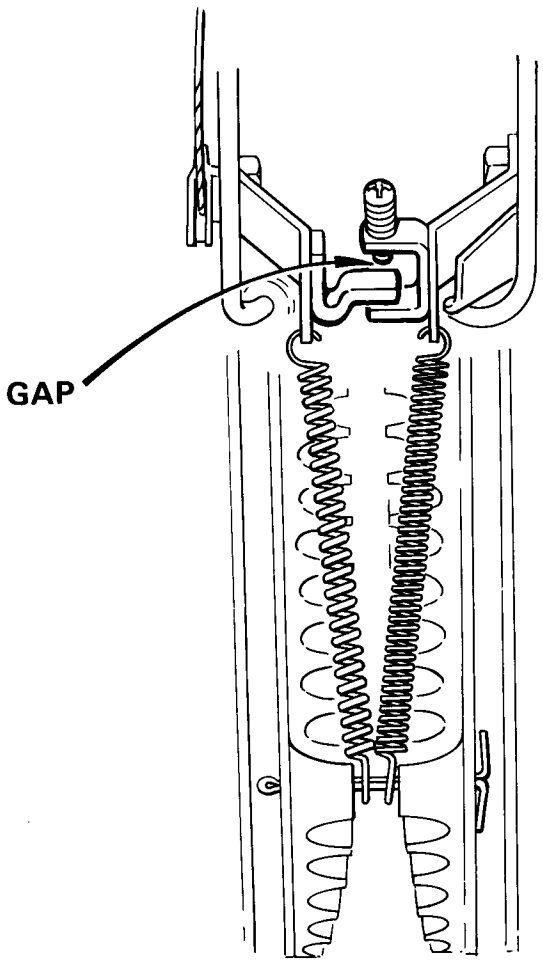


Fig. B36. Throttle butterfly gap and return springs

Refit the starter motor (Fig B38) to the power unit using the recommended sealant and ensuring the live and earth cable are secure and routed correctly as these cables are inaccesible once the engine is in place.

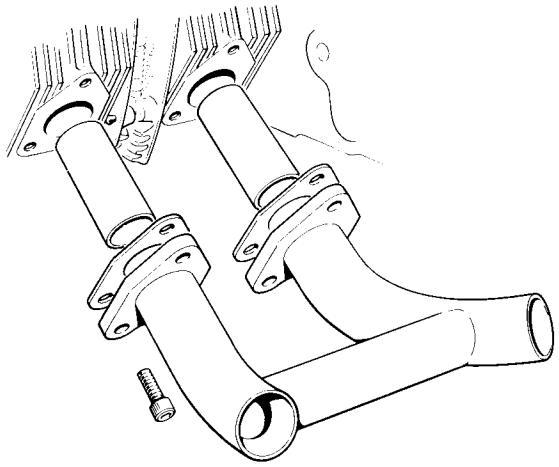


Fig. B37. Refitting exhaust liner tubes and manifold

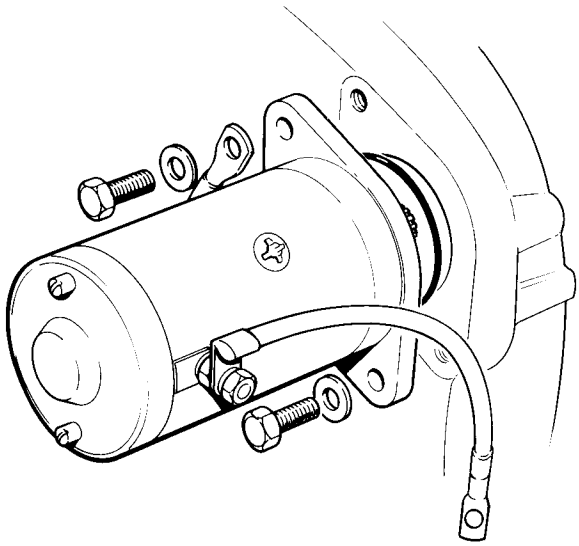


Fig. B38. Refitting starter motor

OIL METERING UNIT

Do not fit the single rotor idling valve, hose and adaptor in place until the power unit is fitted as these items can foul the frame during installation of the power unit. Fit the metering unit flexible pipes, connect and clip to their respective engine oil feed pipes, priming the clear plastic feed pipe with the recommended engine lubricant prior to assembling the metering unit to ensure a supply of lubricant to the engine on initial start up.The metering unit can be held in place in the generator magnetic rotor whilst re-fitting the power unit to avoid accidently trapping any feed pipes between the engine and gearbox.

CAUTION

Do not excessively pressurise the oil pipes when priming as this can result in damage to the one-way valves.

SECTION B10

REFITTING THE ENGINE UNIT

Clean the gearbox end plate and apply the recommended sealant to the mating surfaces, ensuring that sealant is prevented from entering the mounting bolt holes. Offer up and refit the power unit to the gearbox from the right hand side of the machine locating the primary drive case on the two locating dowel pegs, in the gearbox end plate (Fig B39). Using the recommended liquid locking agent on the gearbox bolts, torque load to the figure given in the 'General Data' -Torque Wrench Setting.

Ensure when fitting the engine in place, that the side stand wiring harness is positioned between the left rotor housing and the gearbox casting.

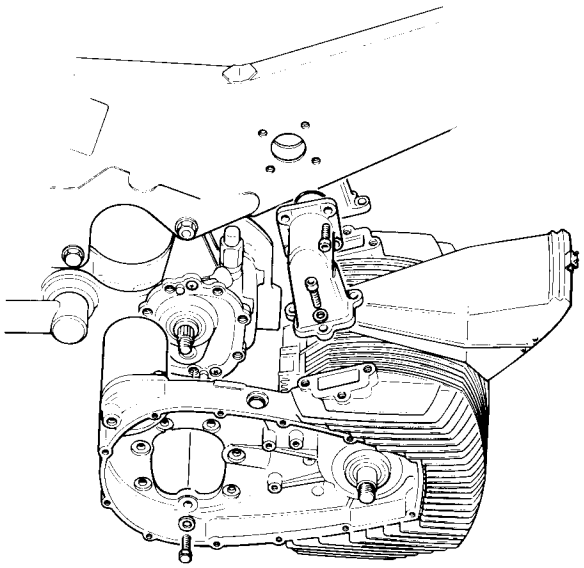


Fig. B39. Replacing the engine unit

Fit the single rotor idling valve micro-switch and ignition trigger unit (Fig B40), setting the air gap to the recommended clearance as given in 'General Data'. Refer to Section B11 for adjusting micro-switch.

Refit the single rotor idling valve assembly to the left rotor housing.

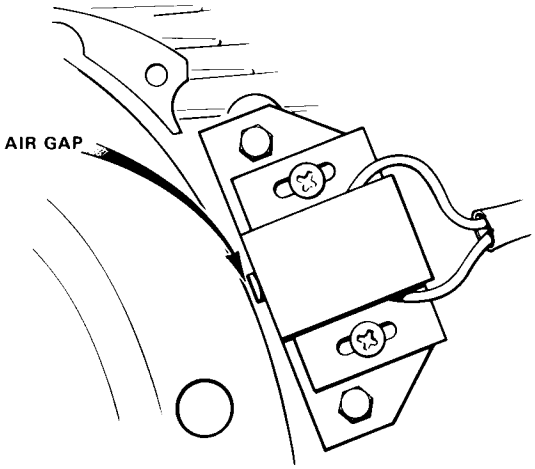


Fig. B40. Replacement of the ignition trigger unit and by-pass micro switch.

Refit the throttle butterfly cable (Fig B41) by positioning the inner cable roller nipple end (B) in the throttle butterfly operating lever to allow the outer cable to be positioned in the by-pass valve cast bracket (A).

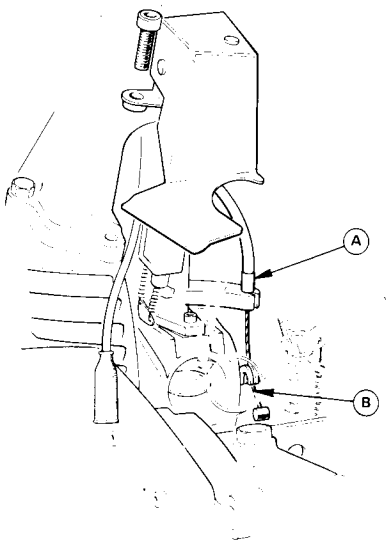


Fig. B41. Replacing the throttle butterfly cable

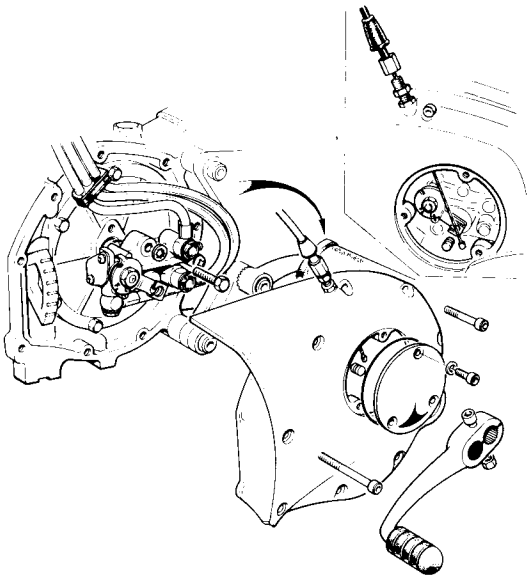


Fig. B42. Replacing the oil metering unit

Refitting the Carburetters

Refer to Section B6 - Removing and Refitting the Carburetters

Final Assembly

Fit the idle valve hose to the valve and fit the elbow to the hose. Fit the gasket and fasten to the port in the frame, using the three M5 stainless head screws. Fit the aluminium alloy air transfer ports ensuring all masking has been removed and fit the engine covers and horns. Re-fit the air box support screws and the air box cover/coils into place. Re-connect thermocouple lead to the white multi pin plug at the instrument binnacle.Raise the choke lever knob fully, to pre-tension the cable and refit the fuel tank (E2)ensuringthat no cables are trapped between the tank and the frame, and that the vacuum pipe is securely connected from the right hand port to the right hand fuel tap.
Refit the clutch and primary transmission (Section C2) ensuring that the shallow hexagon socket-headed clutch cover bolt is fitted adjacent to the left hand footrest position. Refit clutch cable and adjust (refer to section C5).

NOTE:
It is important to assemble the clutch to the gearbox mainshaft and fully tighten in position prior to refitting the oil metering pump unit to obviate any possibility of damage to the metering unit. Do not forget to torque load the engine sprocket nut and clutch centre nut to the recommended figure. (See General data -Torque Wrench Settings).
Refit the oil metering unit to the left gearbox end plate (Fig B42) as described in Section A5, ensuring the drive spigot is aligned with the slot positioned in the end of the gearbox mainshaft. Fit the oil supply pipe to the oil tank outlet. Slacken the posidriv headed bleed screw at the metering unit and allow the lubricant to bleed through to fill the tube to the metering unit. Re-tighten the posidriv headed bleed screw.
Refit the oil metering unit operating cable and refit the gearchange cover assembly using the recommended sealer. Refit the alternator cover being careful not to trap the alternator leads (the leads can be connected in any order at the plug) and replenish the gearbox and primary drive oil levels with the recommended quantity and type of lubricant (recommended lubricants Section A2). Re-position the footrests (Section E19), fit the exhaust silencers (Section E10) and right foot brake pedal mounting plate (Section E20). Replenish the engine oil tank with the recommended lubricant. (Recommended lubricants - Section A2).

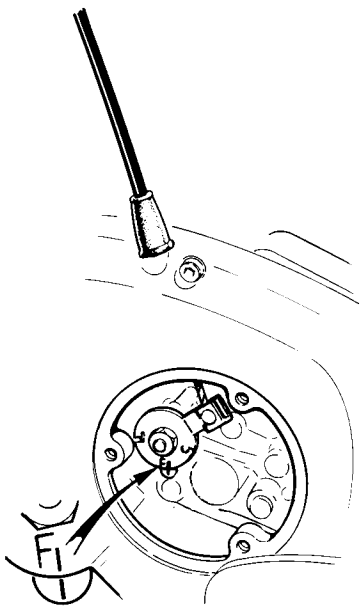


Fig. B43. Oil metering unit - initial setting at first start up following engine rebuild

Initial Starting Up

Apply the choke and with the oil metering access cover removed, hold the operating lever in the 'F' position (Fig B43) with the engine running at no more than 2000rpm. This will allow the engine lubrication system to prime itself and provide ample lubricant allowing the engine to be run until warmed up sufficiently to enable resetting of the oil metering unit. Continue to run the engine with the oil pump operating lever in the 'F' position until normal running temperature is reached

(100-150° C) when the engine should idle. During warm up try not to let the engine revs exceed 2000rpm. If new running components have been used within the engine the oil pump should be set 2 mm 'rich" – beyond the 'C' mark at 2000 r.p.m., and re-set back to the recommended normal after a further 1000 miles. The oil metering unit should then be adjusted and set in accordance with the instructions contained in Section A6 'Adjusting the oil metering unit'. Blue smoke from the exhaust on initial start up is normal but should clear once the oil metering unit has been correctly set and the machine has been ridden a couple of miles.

EXCESSIVE SMOKING

If after normal running, excessive smoking persists, then examination of the frame oil scavenge suction pipe is recommended. Remove the oil scavenge pipe from the frame (immediately above the single rotor idling valve assembly) and from the left inlet pipe. Using an air line or similar equipment, blow the pipe clear. This action should clear any temporary blockage that may have existed in the scavenge pipe causing a build up of engine oil in the frame being drawn intermittently through in larger quantities, causing excessive smoking from the exhaust.

SECTION B11

SINGLE ROTOR IDLING SYSTEM

DESCRIPTION

The Norton Rotary engine is generally free from the normal frictional loads imposed on a reciprocating engine and, because of this, the idling speed naturally tends to be high. To combat this high idling speed, the fuel/air supply to the left rotor is designed to be cut off at idling speed initiating parasitic drag produced by the left rotor thereby lowering the overall idling speed of the engine. When the throttle is in the closed position a lever attached to the throttle butterfly valve spindle operates a micro switch which in turn opens a solenoid operated air by-pass valve in the inlet port of the left rotor housing thereby preventing combustion in the left rotor chambers. This has the effect of consequently lowering the idle speed. Adjustment of this micro switch is described below and any maladjustment will affect throttle response. The original factory adjustment is retained by Loctite application.

Access to the micro switch is shown in Fig B44.

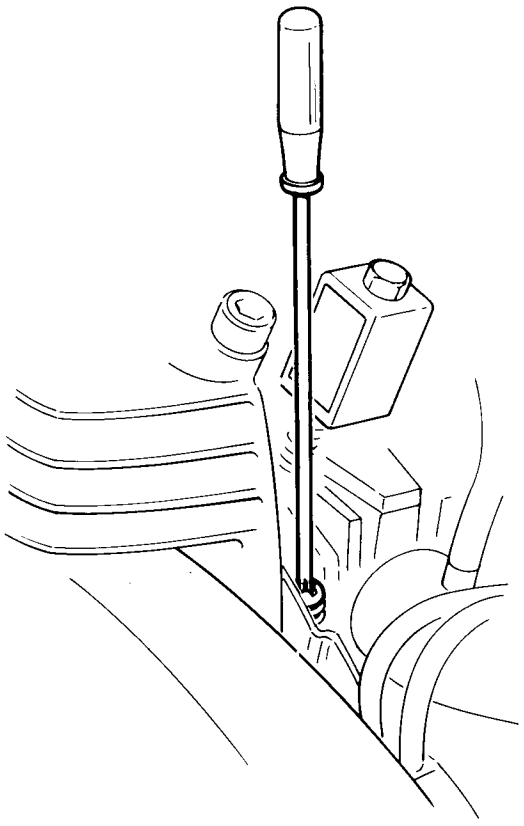


Fig. B44. Micro-switch adjustment

ADJUSTING THE MICRO-SWITCH

Switch on the ignition and unscrew the micro switch adjustment as far as possible without screwing it out of the lever. Re-apply a small drop of Loctite to the adjuster and screw back in with the throttle closed until the single rotor idling valve is seen (and heard - a pronounced 'click' - to operate (Fig B44)). Screw the adjuster in a further quarter of a turn only and very gently open and close the throttle. The idling valve should operate the instant the throttle lever moves off its stop, but just before the right throttle butterfly lever actuates. It is stressed that exact adjustment of this switch is essential to smooth engine pick-up from closed throttle and hence great care must be taken when carrying out the final adjustment.

SECTION B12

FAST IDLE ADJUSTMENT

The idle speed control is positioned so that the rider may adjust the idle speed to his requirements whilst astride the machine. The idle should be set to the lowest speed at which the engine will run stably without stalling, with all lights and direction indicators on, and the clutch lever pulled in.

With the choke pressed fully home, and the engine at normal working temperature, with headlamp switched 'on', idle speed should be between 1000 and 1100 R.P.M.

Should the idling become erratic or unreliable at any time, the idle screw should be removed and the rubber sealing 'O' ring replaced. Lubricate the seal with high melting point grease prior to refitting the screw.

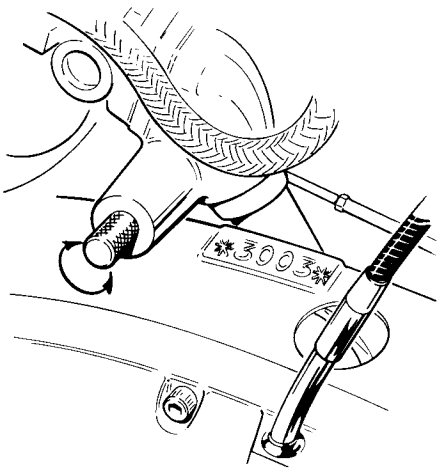


Fig. B45. Fast idle adjustment

SETTING AND ADJUSTING THE FAST IDLE ROD

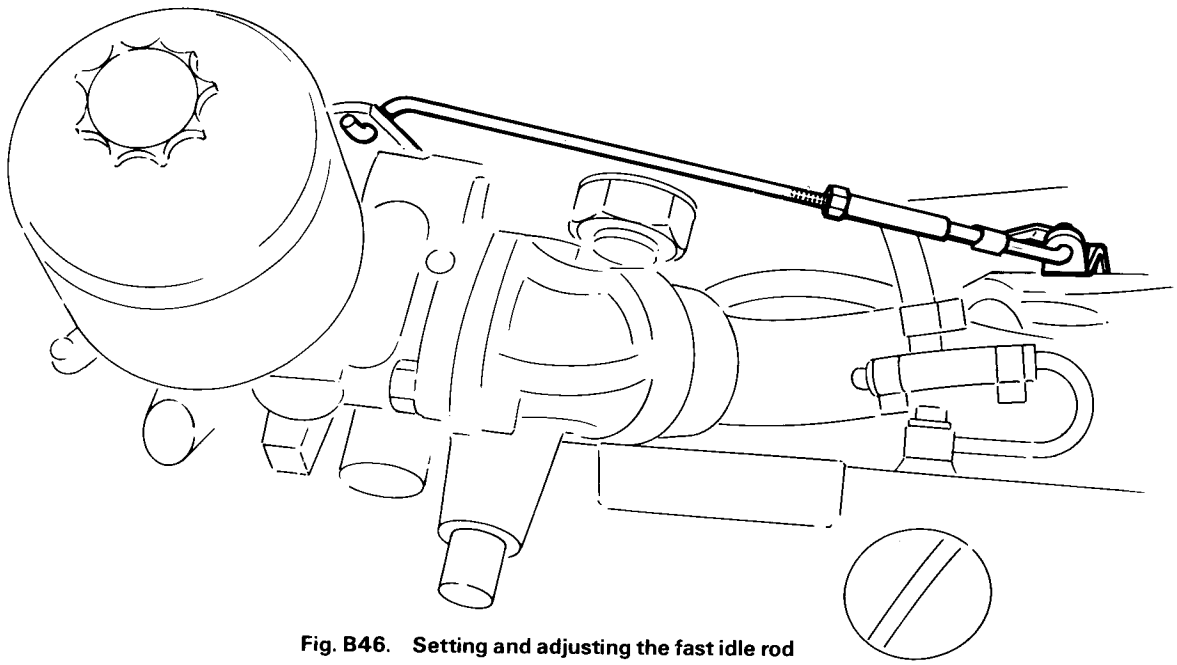


Fig. B46. Setting and adjusting the fast idle rod

The choke cable divides along its length and connects to the fast idle cam on both carburettors. Operation of the choke cable rotates the carburettor idle cam to which is additionally attached (on the right side carburettor) the fast idle rod, which connects directly to the right side throttle spindle fast idle lever. Forward movement of this lever under the influence of choke cable operation and consequent idle cam rotation lifts the right housing throttle lever assembly, and partially opens the throttle valve.

When replacing an idle rod, the effective length and therefore setting, is extremely important. The length of the rod assembly must be adjusted and firmly secured by means of the locknut provided to ensure the throttle linkage is operated to just initiate the audible "click" from the left hand idle by-pass micro-switch when the choke cable has reached the full-out position.

Operation of the micro-switch as described assumes the correct linkage gap (Section B9 – Fig. B36) has already been made.

Final rod length may require slight adjustment to ensure maximum engine rpm does not exceed 2500 with choke full out, when starting a COLD ENGINE.

Once correctly adjusted, there should be no further need to alter the final setting.

SECTION C

PRIMARY TRANSMISSION

TRANSMISSION

DESCRIPTION

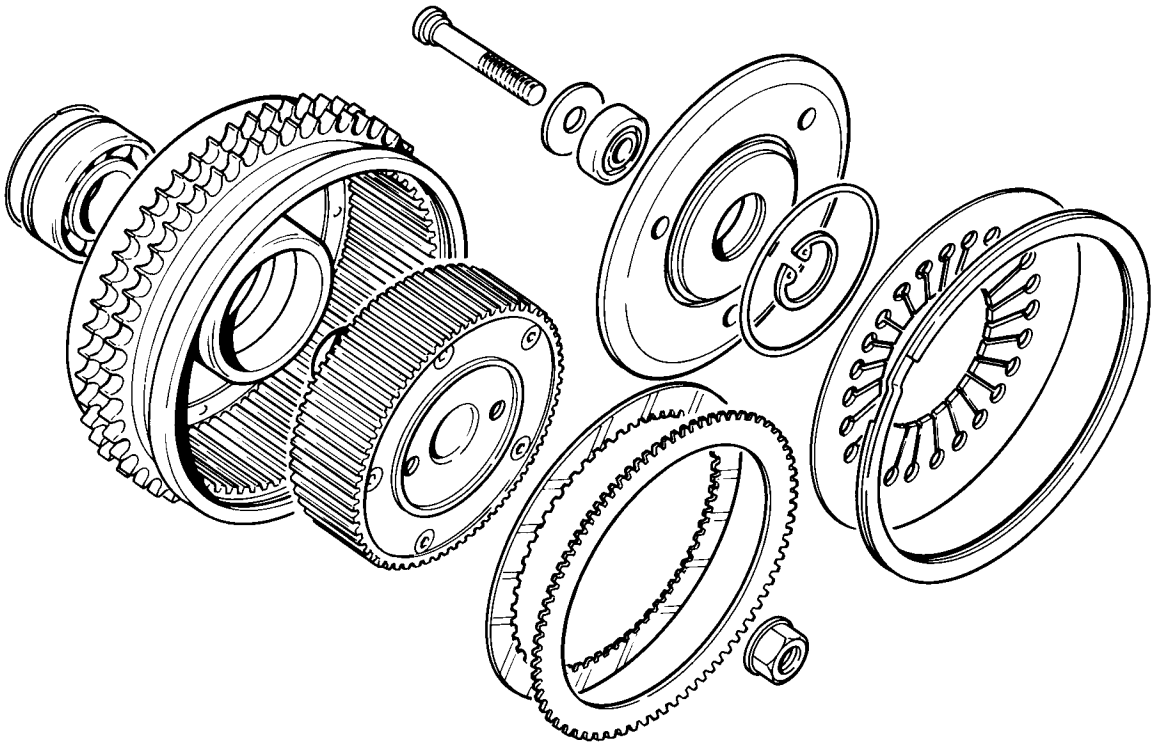


Fig. C1 The Clutch Components

The engine unit transmits its power by sprocket and duplex primary chain to the clutch chainwheel containing a multi-plate all metal diaphragm spring clutch, and through to the gearbox by means of rubber vane type shock absorber contained within the clutch hub.

The clutch drum houses a large circlip retaining a diaphragm spring, pressure plate, nine bronze driven plates and nine steel driving plates. The diaphragm spring applies the clamping pressure through the pressure plate to the clutch plates. The clutch drive is released by a pull rod acting on a ball bearing situated in the pressure plate which allows the driven and driving plates to separate, causing the drive from the engine to be disengaged from the gearbox. There is no need to 'free' the clutch before starting the engine.

From the clutch, power is transmitted through the gearbox to the high gear and gearbox final drive sprocket and, in turn, by the heavy duty rear chain, which is totally enclosed and running within an oil bath, to the rear wheel sprocket located in an aluminium housing and then via a second rubber 'cush drive' to the rear wheel. It is not necessary to remove the engine unit to carry out work on the primary transmission.

MAINTENANCE

The only maintenance necessary is adjustment of the clutch pull rod (Section C8). Should clutch slip or clutch drag occur, first check that the clutch pull rod is not binding. If no fault is found it will be necessary to strip the clutch and make replacements. Should the motorcycle continue to be driven under conditions of clutch slip, the heat generated may cause considerable damage to the clutch unit.

Primary chain tension is maintained by the automatic tensioner comprising two spring loaded pistons using the chaincase oil as a damping medium. Should the slippers become worn or cease to function the tensioner should be replaced as a complete unit.

When undertaking this operation, or whenever the primary chain is removed it would at the same time be advantageous to examine the clutch driven and driving plates for wear thereby eliminating the work involved in gaining subsequent access to these parts.

SECTION C1

REMOVAL & REPLACEMENT OF PRIMARY CHAINCASE COVER

REMOVING THE PRIMARY CHAINCASE COVER

Position a suitable receptacle below the primary chaincase. Remove the bottom-most socket headed bolt and drain the oil. Slacken the right footrest securing bolt and swing footrest clear of the primary chaincase.

Extract and remove the clutch access cover by inserting one of the 8 mm. screws from the air transfer ports into one of the three cover fixing screw holes. (Early machines not providing this facility in the access cover can be converted by removing the cover using an 11 mm. (7/16 in.) diameter bar inserted into the screw hole counterbore, and levering to break the seal joint. Tap each hole 8 mm. (fine) prior to refitting). Remove the two locknuts on the clutch pull rod and, being careful to collect three 10 mm. ball bearings, remove the clutch lift plate (Fig. C3).

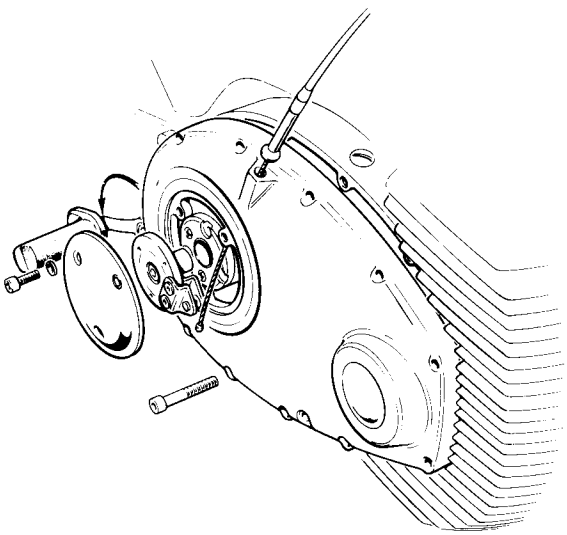


Fig. C2 Removing the Primary Chaincase Cover

Disconnect the clutch cable and remove (Fig. C2). Remove the remaining socket headed screws noting that the location of the one shallow headed screw is the closest to the footrest mounting. Avoid damaging the highly polished surface finish of the covers by inserting an 8 mm. diameter bar down the clutch cable hole to assist in cover removal.

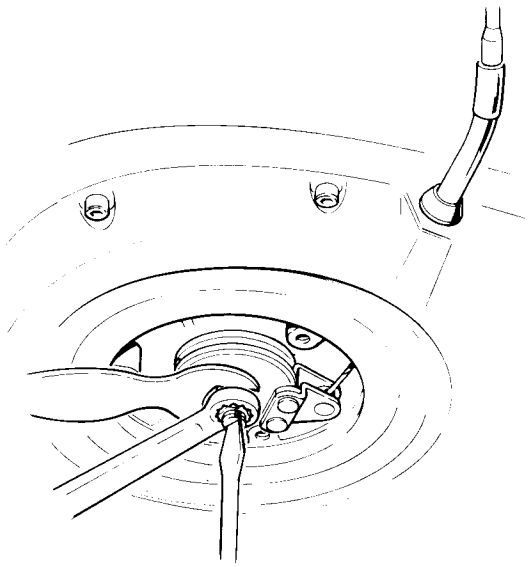


Fig. C3 Removing the Clutch Adjuster and Locknuts

REPLACING THE PRIMARY CHAINCASE COVER

Refitting is the reverse of removal but care must be taken to clean any silicone jointing compound from mating surfaces and re-apply the recommended type. Before re-assembling, examine the clutch lift mechanism for any signs of wear or damage. Apply grease to the working faces of the clutch lift mechanism back and lift plates, and position the three ball bearings into the grease to assist in re-assembly. Do not forget to refill the chaincase with the correct quantity of the recommended oil.

SECTION C2

REMOVING AND REPLACING THE CHAIN TENSIONER

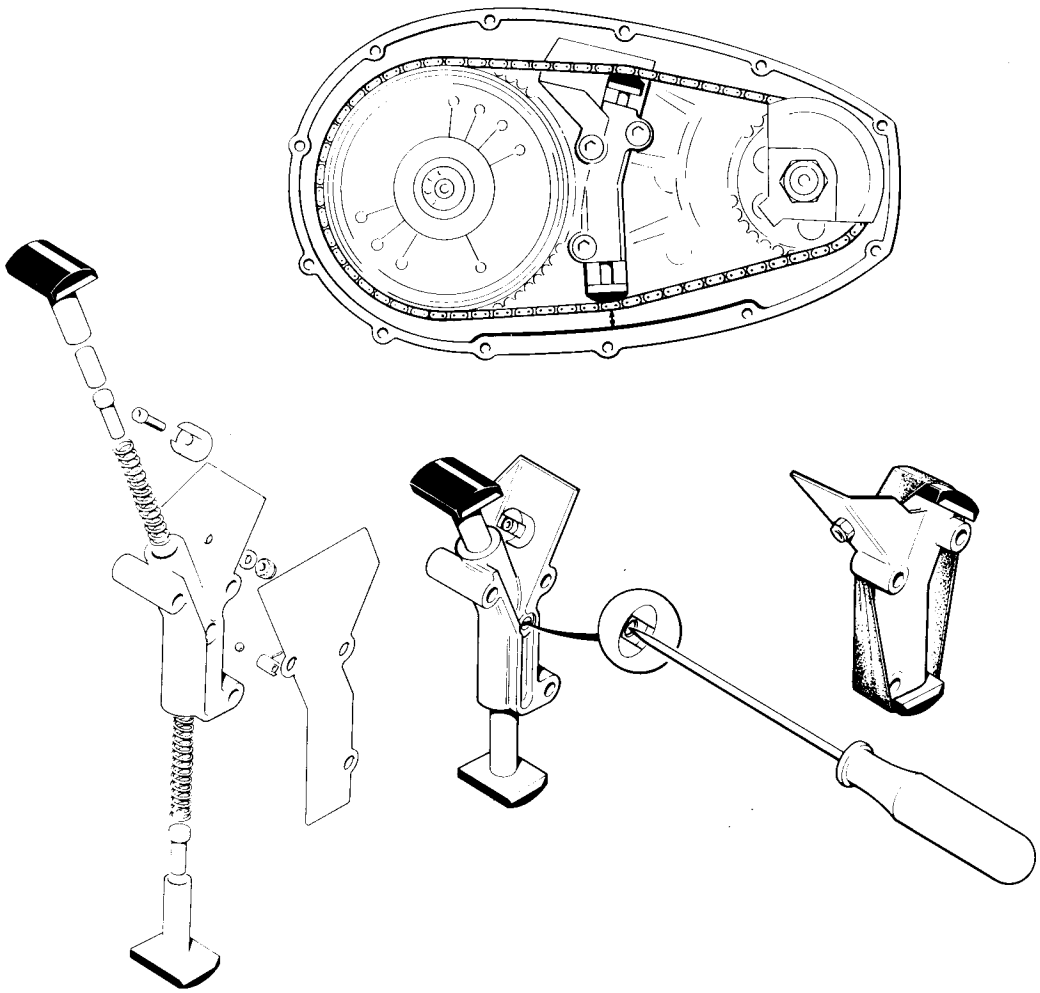


Fig. C4 Removing and Replacing the Primary Chain Tensioner

Remove the primary chaincase cover (see previous section C1) and place a strong elastic band around the chain slippers. This is to prevent the spring loaded slippers 'flying out' when removed (Fig. C4).

Remove the three bolts securing the unit to the right end plate. The unit can now be withdrawn. Replacement is the reverse of dismantling. However, care should be taken to ensure the backing plate is assembled behind the primary chain, silicone jointing compound being applied to the rear face of the tensioner avoiding ingress of the sealant into the one-way valve mechanism, and the tensioner carefully offered into position and located by the three bolts which are locked in position with 'Loctite 270'. Replace primary chaincase cover, re-sealing with the recommended silicone sealer and re-fill with the recommended oil to correct level. See Fig. C5

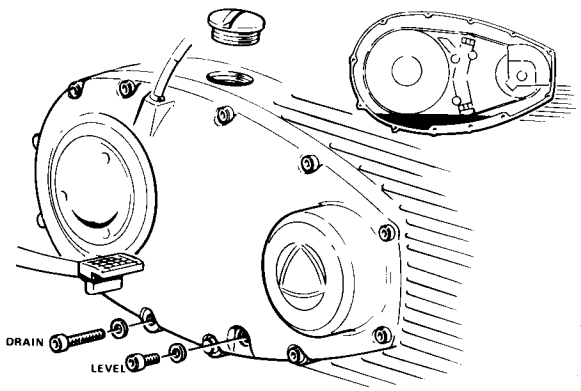


Fig. C5 Replenishing the Oil in the Primary Chaincase

NOTE:

The primary chain tensioner must be re-assembled in the correct sequence in order to operate normally. See inset in Fig. C4

SECTION C3

REMOVAL OF THE PRIMARY TRANSMISSION AND CLUTCH

PRIMARY TRANSMISSION AND CLUTCH

Remove the primary chaincase cover as described in Section C1. Remove the chain tensioner as described in Section C2. Remove the generator cover situated on the left end plate. Fit flywheel restrainer. Fig. C6 (Part No 50-0231).

Fit clutch diaphragm spring compressor Part No 69-0614 to the clutch pull rod and tension the diaphragm spring. Release the large circlip located in the clutch drum and remove the diaphragm spring and clutch pressure plates. (See Fig C1).

The clutch driving and driven plates can now be removed. Fit the clutch locking tool, (Part No 50-0410), and release the clutch hub nut, and then remove nut on right end of the rotor shaft and remove the balance weight.

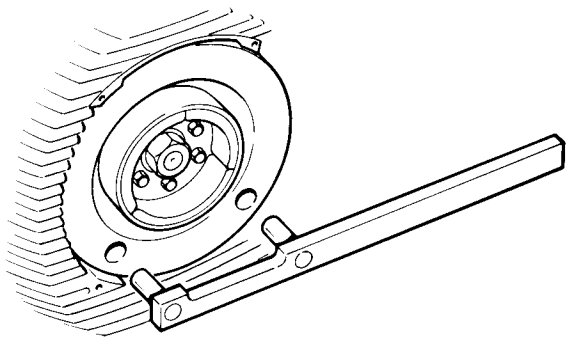


Fig. C6 Using Flywheel Restrainer Part No 50-0231

Fit the hub puller Part No 50-0408, and pull off clutch hub and engine sprocket together to avoid damage to primary chain.

SECTION C4

INSPECTION OF COMPONENTS

CLUTCH DIAPHRAGM SPRING

The diaphragm spring should be inspected for signs of wear, obvious damage, distortion and discolouration due to excessive heat. Check for distortion by placing on a flat surface table and inspecting for flatness at the outer rim, and the parallel height of the inner spring 'fingers'. Any distortion may be the cause of clutch 'judder' or snatch. The plate must be replaced if any distortion is evident.

CLUTCH PLATES

The clutch driven and driving plates should be checked for flatness on a surface plate and any damaged plates should be replaced.

CLUTCH PRESSURE PLATE

Check for distortion. Examine the clutch pull rod and pull rod bearing for signs of heat, roughness or mis-alignment. Replace as necessary.

STARTER GEAR & FREEWHEEL BEARING

Examine the starter free wheel sprag unit by removing the retaining circlip and easing the bearing out of its housing. Check for obvious

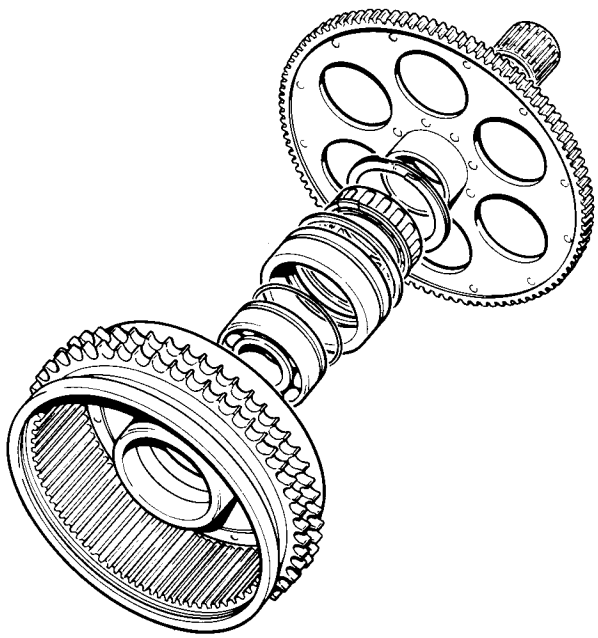


Fig. C7 Starter Gear and Freewheel Bearing

signs of wear, discolouration, chipped bearing and, where necessary, replace. Examine the other bearings for sign of damage, wear and overheating, and replace as necessary. Check the starting ring gear and starter motor gear for wear.

PRIMARY CHAIN

Inspect the primary drive chain for excessive wear of the rollers and pivot pins and check that the elongation is less than 1¼%.The extent of wear is most conveniently checked against a new chain, but if a new chain is not available, lay the chain out on a flat surface, compress the chain ends inwards to take up the play and mark the ends of the chain. Pull the chain out to its fullest extent and again mark the position. The difference in lengths obtained should not be more than 1¼% of the total length of the chain. (ie 1.3 cm/0.5 in. max). As the chain is "endless", the measurement in looped condition will exhibit half the overall dimension. A further indication the chain requires replacement will be given when wear marks are exhibited on the inner chaincase lower wear pad coupled with associated chain noise.

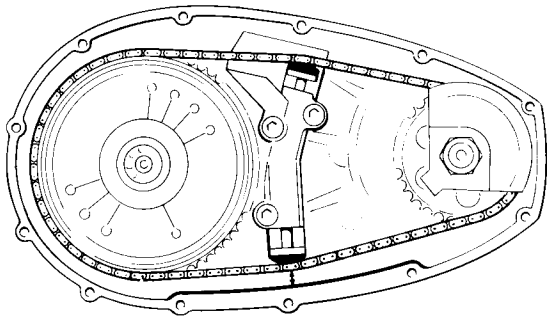


Fig. C8 Primary Chain Wear Limitations

SECTION C5

REPLACING THE CLUTCH SHOCK ABSORBER RUBBERS

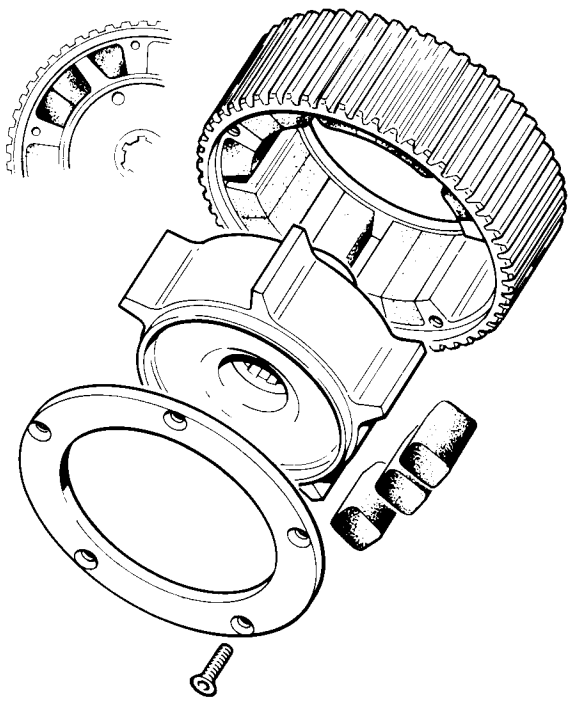


Fig. C9 The Clutch Shock Absorber Unit

Replacement of the rubber segments requires speciallised equipment, and for this reason it is advisable to return the shock absorber unit to the Factory Service department for service unit exchange.

If there is no alternative but to recondition locally, some improvisation in the manufacture of a simple fixture and wrench will be required, drawings for which will be supplied on application to the Service Department. Place the clutch hub on a dummy mainshaft gripped in a vice. Using a suitable strap wrench, compress the shock absorber rubbers and remove them from the hub. When refitting, please note thet there are 15 rubber segments and these should be fitted as indicated in Fig. C9.

Refit the clutch shock absorber assembly cover plate and secure with five screws. Use 'Loctite' to secure the screws.

SECTION C6

PRIMARY CHAIN ALIGNMENT

The primary chain alignment is set at the factory and during the normal life of the machine should not need re-setting. If, however, the rotor shaft is replaced for any reason or the primary side main bearings are replaced, then adjustment could be called for. Adjustment is achieved using shims between the engine sprocket and right rotor shaft ball bearing Fig. C10. The primary chain alignment can be examined by installing the engine sprocket and clutch drum/chain wheel in place, prior to final assembly without the primary chain and chain tensioner being fitted. Before screwing the Primary Chain Alignment Gauge to the tensioner upper mounting, ensure the boss is clean and free from burrs or damage. Once in position the gauge should be zeroed on the face of the teeth of the clutch sprocket. The gauge should then be rotated to the face of the teeth on the engine sprocket.

Any misalignment can be adjusted out by the use of spacer shims between the engine drive sprocket and rotor shaft. When making this adjustment due regard must be taken of the residual mainshaft end float, final alignment being set to within 0.25 mm (0.010 in.) of mean shaft location.

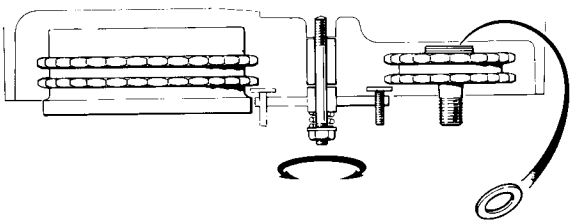


Fig. C10 Checking Primary Chain Alignment

SECTION C7

RE-ASSEMBLY OF CLUTCH AND PRIMARY TRANSMISSION

If not already replaced, refit the clutch bearing, the starter freewheel sprag unit and circlips into the clutch sprocket assembly (Fig C7). If the freewheel unit outer spool is being replaced, it must be retained by using Loctite 270 during re-assembly, and circlips (where fitted) refitted.

Refit the needle roller bearing assembly and gently rotate and push the starter gear into the clutch housing and test for the sprag clutch operation. Fit the primary chain to the clutch and engine sprockets and offer this assembly onto the gearbox mainshaft and rotor shaft simultaneously. Fit the rotor shaft counter balance weight and fit nut – torque load to the recommended setting (General Data) using Loctite 270 on the nut.

Position the clutch locking tool (Part Number 50-0410) and tighten the mainshaft nut to the recommended figure. Fit clutch plates, and refit pressure plate and diaphragm spring unit.

Before releasing the clutch spring compressor, ensure that the circlip is properly located in the groove in the clutch drive housing – FAILURE TO DO THIS COULD RESULT IN INJURY – the circlip could spring out, due to incorrect location of the circlip in its groove.

Refit chain tensioner and refit the primary chaincase cover. (Section C2).

SECTION C8

ADJUSTING THE CLUTCH OPERATING MECHANISM

Before adjusting the clutch operating mechanism.

1. Slacken the adjustment at the handlebar clutch lever cable adjuster.
2. Remove the inspection cover from the primary case (transmission cover not previously having been removed).
3. Check the slotted pull rod for correct adjustment. The lift bearing at the inner end of the pull rod should be lightly pre-loaded. The pre-loading is correct when there is no end float on the pull rod, but it can still just be rotated by gripping the adjusting nuts with the fingers, with no slackness being felt.
4. If there is end-float, slacken the lock nut and screw out the stud until the end-float just disappears.
5. Tighten the inner ring nut whilst holding the stud, then tighten the lock nut whilst holding the inner nut.
6. Recheck for end-float after tightening lock nut.
7. Readjust at the clutch lever to just 1/8 in. (3.2 mm) free play in the cable.
8. Replace the inspection cover, ensuring the sealing 'O' ring is in place, and the plastic washers are located under the heads of the three fixing screws.

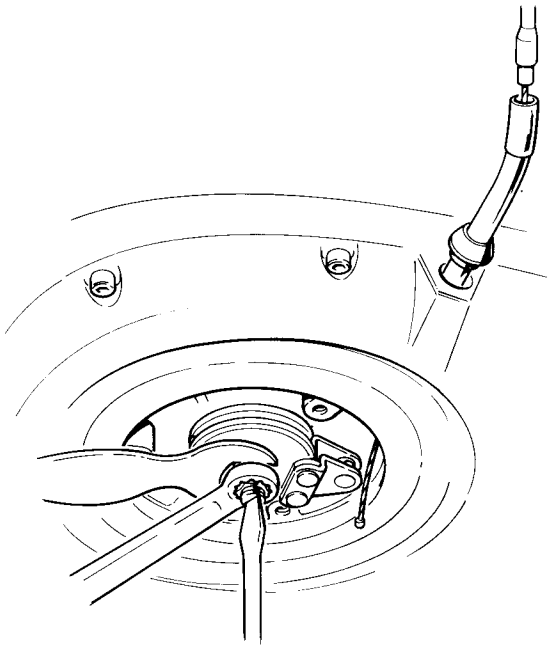


Fig C11 Adjusting the Clutch Operating Mechanism

NOTE

If the clutch has any tendency to slip when the clutch lever is fully released, it is a sign that the clutch pull rod (or the cable) is pre-loaded excessively. If the clutch fails to free completely when the clutch lever is fully compressed, it is a sign that too much end-float (or free play) exists in the cable or pull rod.

SECTION D

GEARBOX

SECTION D1

DESCRIPTION

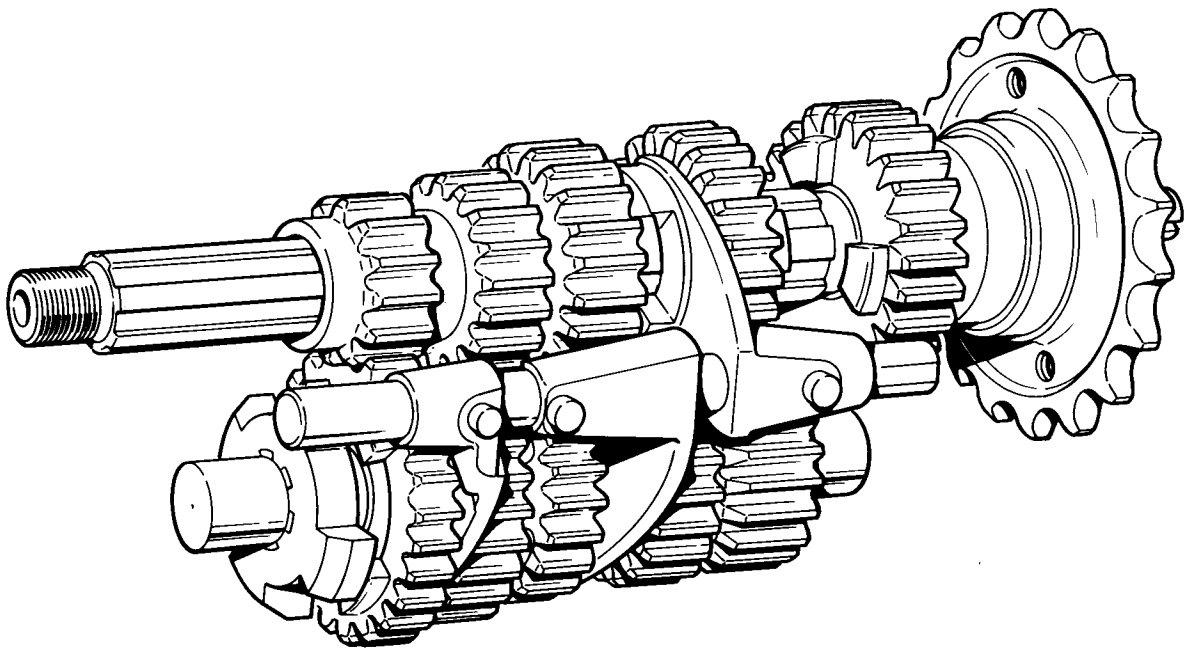


Fig. D1. The five speed gear cluster

SEQUENCE OF GEARCHANGING

The gearbox is operated by the pedal on the left side of the machine splined to the gear-change spindle and engaging with the plunger quadrant. Two chamfered plungers with springs fit into the housing in such a way that as the gear pedal is moved up and down the plungers locate in the teeth at the outboard end of the camplate quadrant. The quadrant is pivoted in the centre and the inboard end formed to mate with the captive pinion of the camplate. See Figs. D3 and D5

Figs. D2(i) to D2(vi) illustrate the camplate with its plunger and the engaging pins of the selector forks which can be seen in the cam-plate track. The three sliding pinions are moved along the mainshaft and layshaft by the selector forks. The neutral position of the cam-plate and gears are shown in Fig. D2(i).

When the pedal is depressed to engage low gear (first) the camplate is turned anti-clockwise moving the layshaft selector fork to mesh the sliding first gear with the dog-lock on the end of the layshaft. As second gear is selected by lifting the pedal, the second lay-shaft selector fork brings the sliding third gear into mesh with the layshaft second gear, while the previous selector fork disengages first gear from the dog-lock. Continued action of

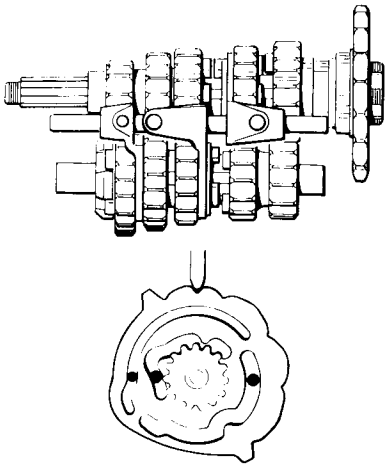


Fig. D2(i) Gears in Neutral position

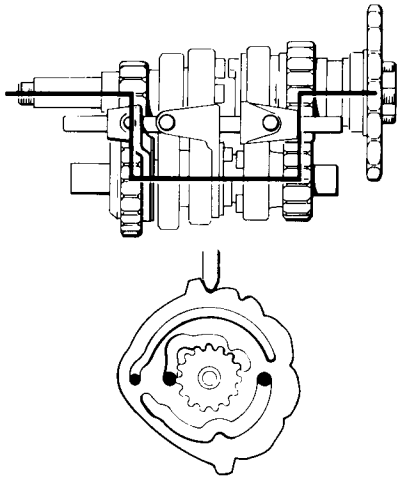


Fig. D2(ii) First gear engagement

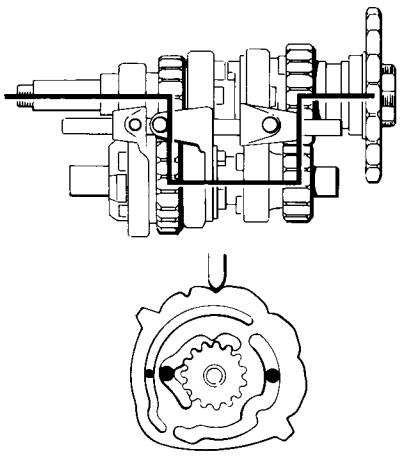


Fig. D2(iii) Second gear

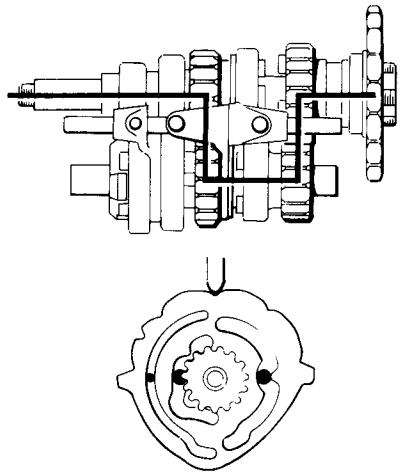


Fig. D2(iv) Third gear

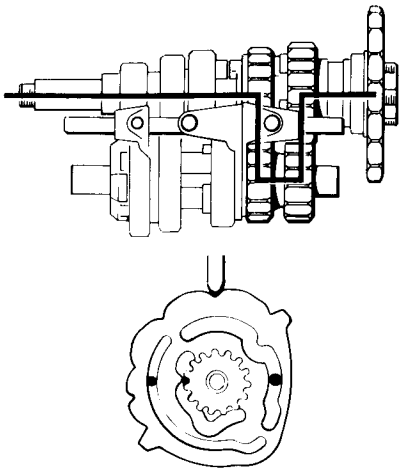


Fig. D2(v) Fourth gear engagement

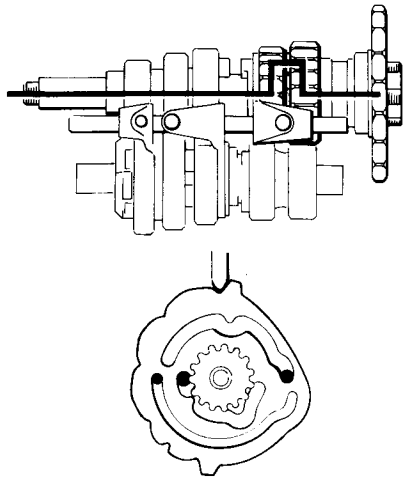


Fig. D2(vi) Fifth (top) gear

Fig. D2. The gearchange sequence

the gear lever in the same direction will select third gear by moving the mainshaft sliding gear into mesh with the mainshaft third gear. At the same time the second layshaft selector disengages second gear.

Further movement of the gear lever will select fourth gear by moving the sliding layshaft third gear into mesh with the layshaft fourth gear while the mainshaft fourth gear is moved into neutral position.

Finally, fifth gear is obtained by a final movement of the lever in the same direction. The mainshaft selector fork will bring the mainshaft sliding gear (fourth gear) into mesh with the mainshaft fifth gear. At the same time the second layshaft sliding gear (third gear) is moved into neutral position. It should be noted that throughout the range of gear pedal movements the gear pedal spindle and plunger housing return to the original position ready for the next selection.

SECTION D2

REMOVING AND REPLACING THE GEAR BOX OUTER COVER ASSEMBLY

Place a suitable receptacle under the gearbox drain plug and drain the gearbox oil (Fig. A5). Remove the generator cover and oil metering unit inspection cover (Fig. A3), disconnect and remove oil metering unit operating cable. Slacken LH footrest mounting bolt and swing footrest clear of the gearbox outer cover, release the nine socket headed screws holding the outer cover in place and gently tap the cover free (Fig. B3).

WARNING
DO NOT OPERATE THE GEAR CHANGE LEVER ONCE THE OUTER COVER HAS BEEN REMOVED. Operation of this lever will allow the spring loaded selector plungers to jump out of their housings and this could cause injury. (See Fig. D3).

Once the outer cover has been removed, access is gained to the gear selector quadrant and the engine oil metering unit. (Refer to section A4 Removal & Replacement of oil metering unit).

Replacement is the reverse of removal. It is, however, important to remember to adjust the oil metering unit (See Section A6) and to refill with the recommended lubricant (Section A2) through the metering unit access cover to a level corresponding with the bottom of the access aperture.

SECTION D3

DISMANTLING & REASSEMBLING THE GEARCHANGE MECHANISM

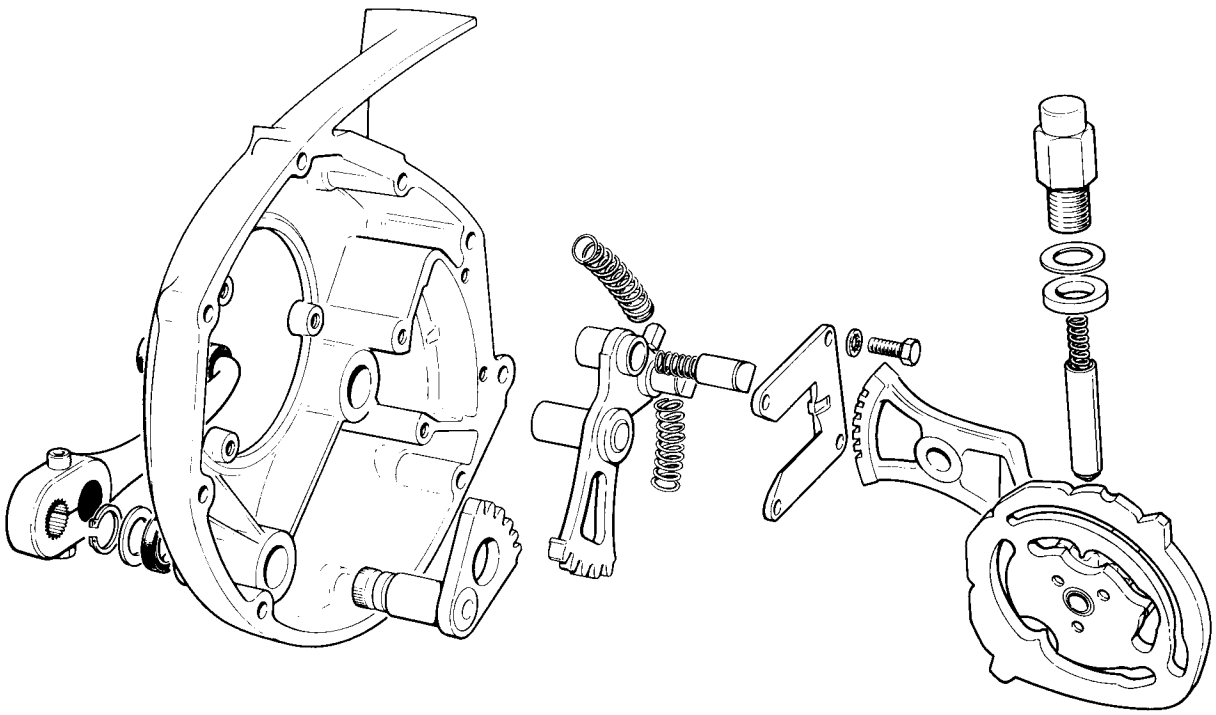


Fig. D3. The Gearchange Mechanism-Exploded view

Slacken off the gear change pedal locking bolt and withdraw the pedal from the splined shaft. A little leverage between the pedal and the cover may be necessary. For this, choose a suitable tool and protective pad to avoid damage to the cover.

Remove the four screws and locking washers securing the guide plate. Withdraw the guide plate, plunger quadrant and curved return springs. Thoroughly clean the parts in Paraffin (kerosene) and inspect them for wear etc., as detailed in Section D4.

To reassemble the mechanism offer the spindle to the outer cover bush using a smear of oil to assist assembly, then refit the two quadrant return springs and ensure that they locate correctly over the step in the cover. To facilitate assembly of the springs, first fit the gearchange pedal and clamp it in position, thus enabling the quadrant to be rotated and the springs compressed (See Fig. D3).

Refit the retainer plate, not forgetting the locking washers which fit one under each of the four screws. Finally, refit the springs and plungers, taking care that they are not suddenly ejected from their seats during assembly.

SECTION D4

INSPECTING THE GEARCHANGE MECHANISM

1. Inspect the gearchange plungers for wear and ensure that they are a clearance fit in the quadrant. Check the plunger springs by comparing their lengths with the figures given in 'General Data'.

2. Examine the plunger guide plate for wear and grooving on the taper guide surfaces. Renew the plate if grooving has occurred.

3. Inspect the footchange pedal return springs for fatigue and if they show signs of corrosion due to condensation, they should be renewed.

4. Examine the gearchange quadrant bore for wear and possible ovality by inserting the quadrant into the bore and feeling the amount of play.

5. Check the tips of the plungers and the teeth of the camplate operating quadrant for chipping and wear. To remove the camplate quadrant it is first necessary to remove the engine as detailed in Section D5 then remove the two split pins and withdraw the spindle.

6. Check the fit of the gearchange pedal spindle in the cover bore, by first removing the spindle oil seal. Insert the spindle and check the amount of play. Replace spindle or cover as necessary. Refit a new spindle oil seal, with the garter side facing inwards.

SECTION D5

DISMANTLING THE GEARBOX

Remove the engine unit (see section B1), drain the gearbox oil (A7) and remove the two pan headed slotted screws recessed in the RH gearbox end cover. Gently tap the cover loose and withdraw it from the gearbox mainshaft. Withdraw the layshaft 1st gear driving dog from the layshaft and remove the circlip behind. Gently stone away any burrs that may have been thrown up on the edges of the circlip groove to prevent subsequent damage to the bore of the first gear bush. Carefully pull out the selector shaft and, raising the selector fork slightly, remove the selector fork and layshaft 1st gear. Remove the layshaft 2nd

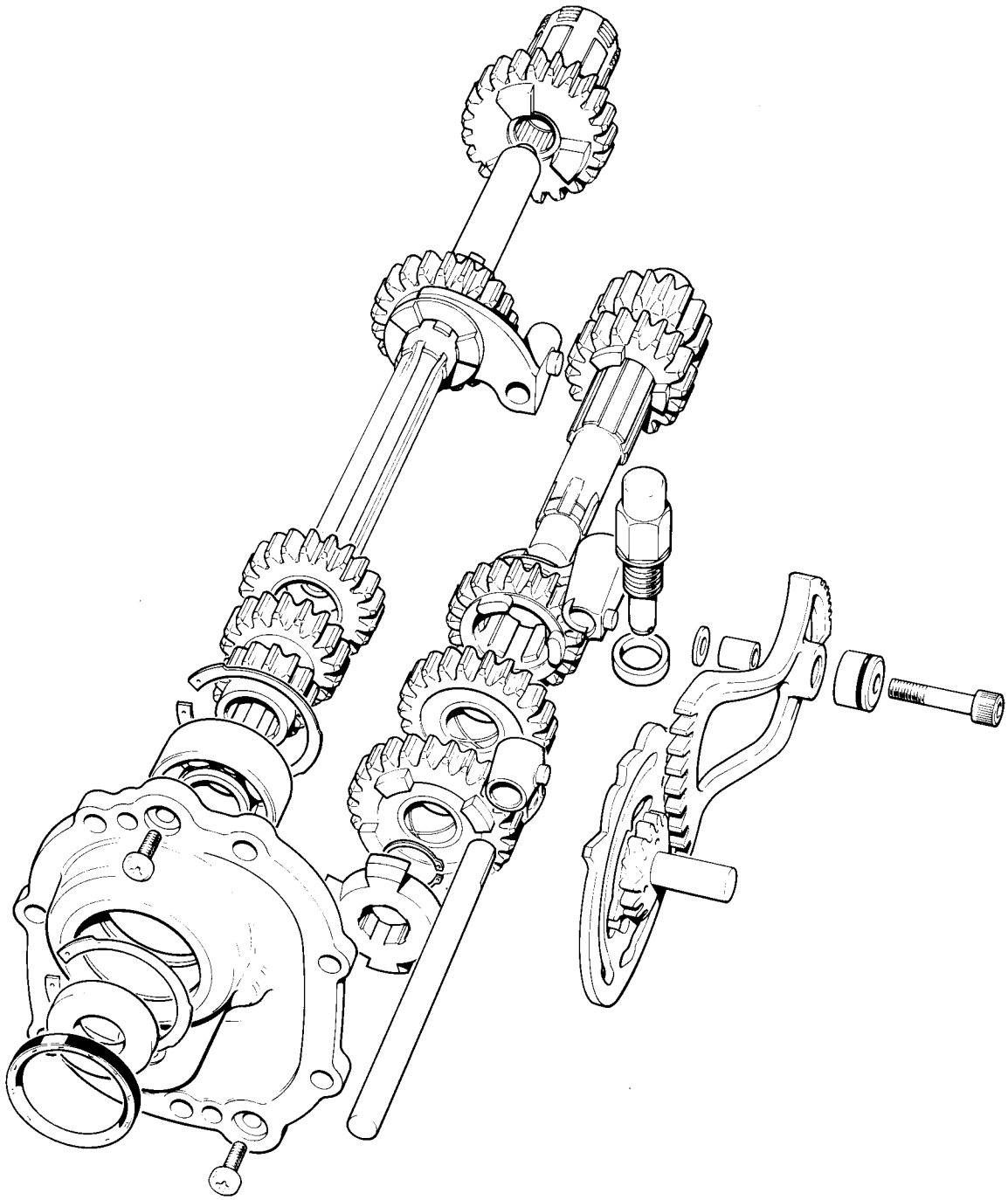


Fig. D4 Exploded view of the gearbox components.

gear mainshaft 1st and 2nd gear cluster, and mainshaft 3rd gear. Raise the selector fork and withdraw the selector and layshaft 3rd gear simultaneously. Pull out the mainshaft and 4th gear and the layshaft with its 4th and 5th gears. Take out the mainshaft 5th gear assembly by releasing the drive sprocker tab washer and removing the drive sprocket retaining nut. This will require the use of a suitable chain strap wrench and 1." A/F spanner. (See also Section D8).

Between the tab washer and drive sprocket is located an 'O' ring. This must be removed to allow the mainshaft 5th gear assembly to be pushed into the gearbox. **The 5th gear assembly will not move if the 'O' ring is left in place.** Move to the left side of the machine and remove the camplate quadrant pivot bolt and quadrant assembly.

SECTION D6

INSPECTION OF THE GEARBOX COMPONENTS

Examine all gears for signs of wear, pitting, cracks and obvious damage, i.e. fractured teeth. Examine all bearings for damage, wear, fatigue and discolouration. If bearings do need to be replaced, heat the gearbox housing gently to 150° C to remove and replace.

Check the mainshaft high gear assembly to ensure the needle roller bearings which are a press fit into the bore of the gear have remained in their correct location. Any movement towards fourth gear can result in reduced mainshaft end float, and create gear changing difficulties. The bearings can be positioned correctly (1.52 mm/0.060 in) below the lip of the inner bore at the toothed end of the gear (using a 26.7/26.9 mm (1.05/1.06 in.) diameter shouldered gauge incorporating a 20.5/20.6 mm. (0.809/0.810 in.) spigot.

Later machines have the needle bearings located by the circlip and a spacing bush.

Examine the driving dogs for wear and damage, the selectors and camplate for wear. Ensure that the mainshaft and layshaft splines are not 'burred' or worn i.e. that the spline edges and faces are undamaged. Any lack of smoothness between the shaft and gear seriously affects gear changing and selection

THE LAYSHAFT 4TH AND 5TH GEAR ASSEMBLY IS A FACTORY REPLACEMENT UNIT. DO NOT TRY TO DISMANTLE. This is because this unit is selectively assembled from carefully matched components.

Examine all oil seals and 'O' rings for wear and damage and replace as necessary.

SECTION D7

REASSEMBLY OF THE GEARBOX COMPONENTS

Refit the camplate quadrant into the gearbox taking care when re-assembling the quadrant pivot bolt, bush, pivot sleeve and thrust washer that the pivot bolt is not tightened beyond the recommended torque setting. Always check the freedom of movement of the quadrant prior to continuing assembly. Refit the camplate after ensuring there is no damage to the spindle. Before pushing the camplate fully home it is essential that the camplate quadrant and the camplate gear are timed in their correct positions.
The camplate should be positioned as if in 5th gear (fig D5) and the quadrant positioned so that the top tooth aligns with the cover plate securing screw hole centre at 8 o'clock (see insert – Fig D5) then the camplate can be pushed fully home. To check the timing is correct, spin the camplate, checking that all the detents in the periphery align with the plunger before the quadrant prevents further rotation of the camplate.
Fit the mainshaft 5th gear assembly into the bearing. Fit the mainshaft selector fork onto the mainshaft 4th gear, insert the mainshaft, 4th gear, and selector fork into the gearbox with the mainshaft passing through the mainshaft 5th gear assembly and locating the selector fork driving pin in the camplate.
When assembling the mainshaft through 5th gear, rotate the mainshaft to prevent damage or accidental displacement of the oil seal.

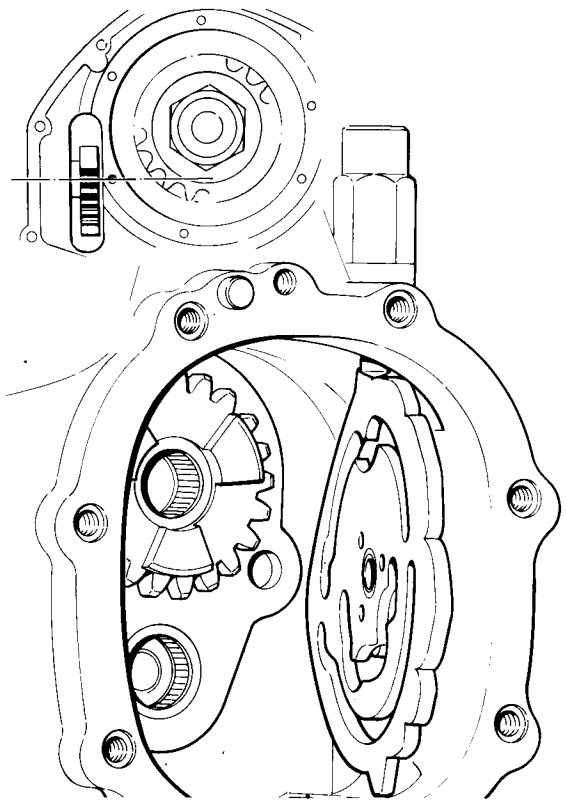


Fig. D5. Gearbox re-assembly showing initial camplate location when engaging with the gearchange quadrant.

NOTE. IT MAY BE NECESSARY TO MOVE THE CAMPLATE SLIGHTLY TO ACCOMMODATE THE SELECTOR FORK DRIVING PIN. Fit the layshaft assembly into the gearbox housing. Fit the layshaft 3rd gear and selector fork onto the layshaft locating the selector drive pin in the inner of the two drive slots. Fit mainshaft 3rd gear, layshaft 2nd gear, mainshaft 1st and 2nd gears onto their shafts. Fit the layshaft 1st gear and selector with the selector drive pin in the nearest slot. Refit the circlip onto the layshaft and re-position the layshaft 1st gear driving dog with rounded face outwards. Refit the gearbox end plate using clear silicone sealer.

At this point a check should be made for adequate mainshaft end float (approx 3mm or 1/8in). If not present, re-check the sequence of assembly. Should the problem persist, the mainshaft high gear needle roller bearing cage location must be checked as detailed in section D6.

Before replacing the engine ensure that all gears can be selected. If all five gears cannot be selected, it is likely the camplate timing is at fault.

WARNING

UNDER NO CIRCUMSTANCES WHATSOEVER MUST THE END OF THE MAINSHAFT BE STRUCK TO LOCATE THE NEEDLE ROLLERS. SUCH ACTION WOULD FRACTURE A ROLLER NEEDLE RESULTING IN ULTIMATE LOCK UP OF THE GEARBOX WHEN IN USE AND POSSIBLE INJURY TO THE RIDER.

Refit the engine unit, primary drive etc as described in Section B10 and refill gearbox with recommended lubricant (Section A2).

SECTION D8

CHANGING THE GEARBOX DRIVE SPROCKET

To gain access to the gearbox sprocket, first drain gearbox (Section A7) and rear chain oil, (A9) then remove the LH gearbox outer cover assembly. (See Section D5). Remove the oil metering unit and the oil metering unit mounting plate (Fig. B3 and D6). This will give access to the gearbox sprocket. Detach the rear drive chain rubber gaiters from their gearbox end mountings and withdraw from the chain apertures (See Fig. D8).

Disconnect split link and pull chain from gearbox sprocket, wire ends of chain together to prevent the chain being pulled through the rear sprocket housing. After releasing the gearbox sprocket nut lock washer apply a chain wrench and remove the gearbox sprocket nut. After removing the 'O' ring the gearbox sprocket can be pulled off. If the service tool (Part No. 50-0408) is required to remove the sprocket, it is advisable to protect the bifurcated end of the gearbox mainshaft.

Inspect the mainshaft oil seal whilst the sprocket is removed and if necessary, replace. When fitting a new sprocket fit a new 'O' ring between the tab washer and the sprocket. Reassembly is the reverse of dismantling. However, care must be taken to clean and seal all mating surfaces with clear silicone sealer and to pre-load the sprocket nut to the correct figure. Do not forget to refill gearbox and rear chain oils (See recommended lubricants – Section A2).

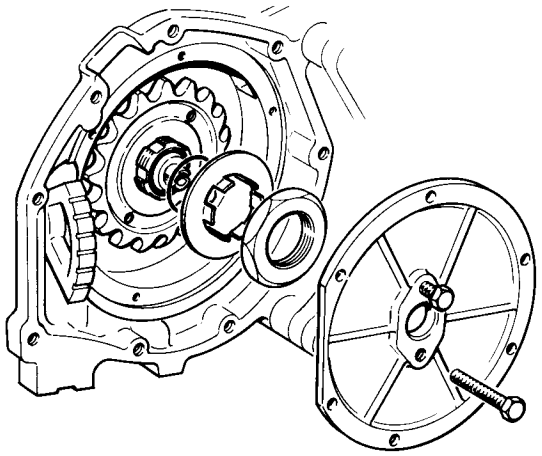


Fig. D6. Changing the gearbox sprocket.

NOTE:

1. If the gearbox sprocket is worn, there is a possibility that the chain and rear drive sprocket will also be worn. Examination is recommended and replacements should be made if any worn parts are found.

2. When refitting the gearbox cover plate ensure the locating dowel holes and all bolt holes are clear and not blocked by sealing compound, grease or oil. Tightening a bolt in a thread, filled or partially filled with any of the above could cause a hydraulic lock with subsequent damage to the gearbox casing.

SECTION D9

REAR DRIVE CHAIN

The rear chain specified for this machine is a single row 5/8in x 3/8in x 112 links 'Renold Grand Prix' totally enclosed and running in an oil bath.

This system of complete enclosure and constant lubrication ensures maximum chain life and reduces the need for frequent chain adjustment. The rear chain is considered to have reached the end of its useful life when the difference between its compressed and extended length, when laid in a straight line on a flat surface (112 links) exceeds 22 mm (7/8 in.). Continued running with any further stretch will inevitably initiate premature sprocket wear.

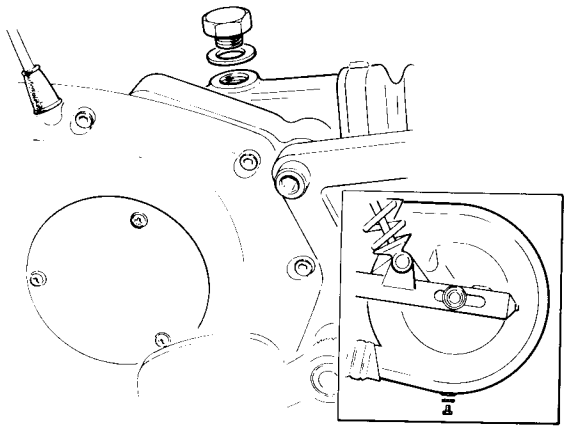


Fig. D7. Drain and refill the rear chaincase

Removing & Replacing the Rear Chain

Removal and replacement of the rear chain is a straight forward operation.

Place a suitable receptacle under the rear wheel sprocket outer cover, remove the drain plug and drain the oil. Remove the clip securing the bottom chain gaiter to the rear sprocket housing and push the gaiter forward. Rotate the rear wheel until the spring link comes into view. Slacken off the rear chain adjusters to allow for fitting of new chain. Remove spring link and connect new chain to

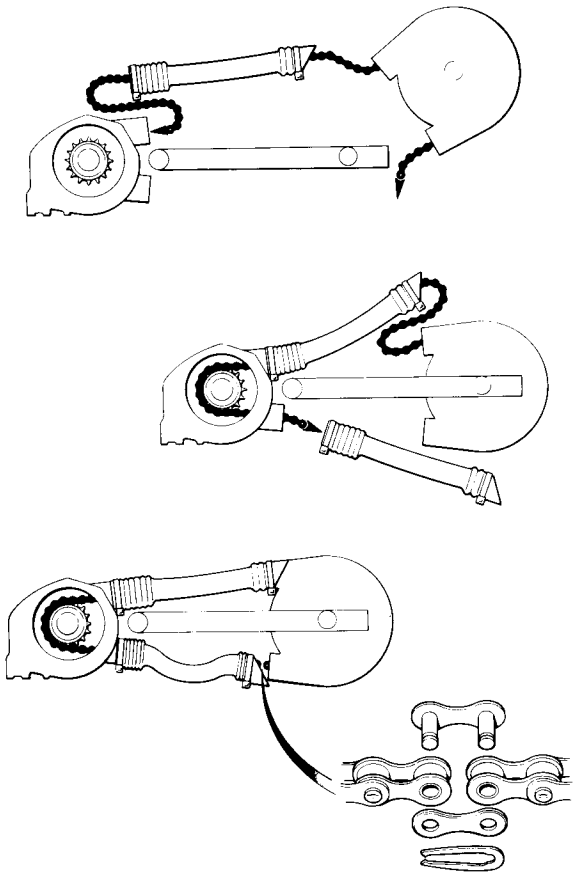


Fig. D8. Replacing the rear chain and gaiters.

old and pull through. When new chain appears, disconnect old chain and connect new one using new spring link fitted with CLOSED END IN THE DIRECTION OF TRAVEL. Clean any old sealing compound from joint faces, wash with petrol to remove all traces of lubricant and apply a good coating of clear silicone sealing compound. Refit lower chain gaiter and clip. Replace drain plug. Wipe off excess sealing compound refill with 175 cc of the recommended oil through plastic filler plug in the top of the gearbox casting and adjust the chain to give 1½"(40 mm) total free play with the machine on the centre stand. Adjust in accordance with the following Section D10. Adjusting the rear chain tension.

NOTE: If at any time the rear chain has been withdrawn from around the rear wheel drive sprocket, the housing will have to be removed from the swinging arm to allow the chain to be re-engaged. See Fig. D8.

SECTION D10

ADJUSTING THE REAR CHAIN TENSION

The rear chain tension should be checked at the first 1000 mile service, and the subsequent 6000 mile intervals.

Whenever a new chain or replacement gaiters have been fitted, the chain must be adjusted in accordance with the following instructions.

To check whether adjustment is necessary, apply a force of approx. 4 kg (8 lb.) in the centre of the top run of the synthetic rubber chain gaiter (with machine on the centre stand on firm level ground). If the total up and down movement is less than 40 mm (1¼") re-adjustment is necessary.

Adjust as follows:

1. Slacken the RH rear wheel spindle bolt, then the LH spindle nut. (Prevent the LH spindle turning with the nut by using the appropriate socket wrench).

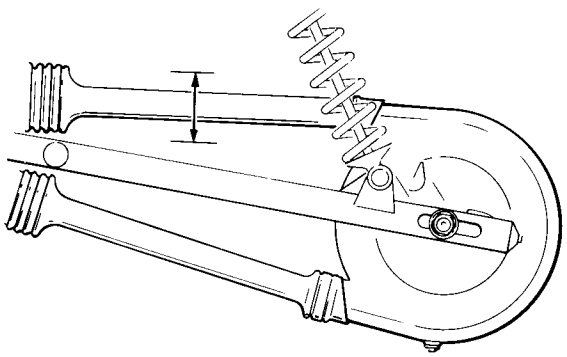


Fig. D9. Rear chain tension adjustment

2. Using the socket wrench, turn the adjusters in the rear ends of the fork tubes clockwise to tighten. Turn each adjuster 1/4 turn at a time correspondingly. Take great care to avoid LH & RH adjusters moving by different amounts as this will put the rear wheel out of line.

3. When the total up and down chain movement is reduced to 40 mm (1¼") the chain tension is correct. Do not overtighten the chain. It will cause rough running and damage the gearbox sprocket bearings.

4. Check that the spindle marks on each side line up with the corresponding marks on the respective scales.

   IT IS IMPORTANT THAT THEY DO SO.

   The markers also act as chain wear indicators.

   Silver Area - Normal
   Red Area – Replace Chain

5. Apply a downward pressure on the top run of the chain whilst nipping up the LH spindle nut and RH bolt to ensure the wheel does not move during tightening.

6. Tighten the RH spindle bolt and LH nut to a torque of 13.8 Kg.M (100 lb. ft.).

WARNING
Operating the machine with pointer adjustment beyond the red sector is DANGEROUS. The chain could break.

If one or more decals have become detached from the swinging arm, the only reliable way to re-affix replacement decals (Following chemically cleaning down the decal contact area to be totally free of oil, grease or dirt), is to correctly adjust the rear chain (Section D10), accurately align the front and rear wheels (Section G14) and replace the decals exactly in line with the marks on the spindle abutments. The original production location was determined in conjunction with a brand new chain, but due allowance for mileage can be given when replacing both decals (eg following re-painting). Obviously, when replacing only one decal, it must align exactly with the existing decal.

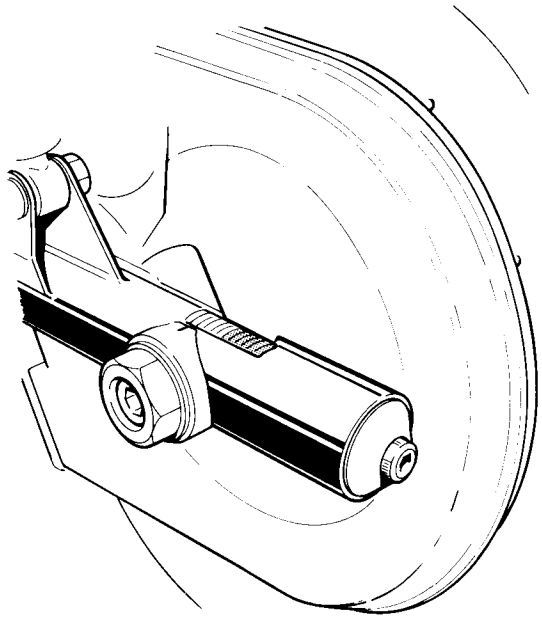


Fig. D10 Rear wheel alignment decal

SECTION D11

REAR CHAIN GAITERS

If, at any time, a split is found in the rear chain gaiter (s), they must be replaced as any ingress of dirt will drastically shorten the life of the chain. See Section D9.

Proceed as described for replacing the chain, but slacken the gaiter clips and remove both gaiters and the chain from around the rear wheel drive sprocket as shown in Fig. D8. It is advisable to restrain the chain from disengaging from the gearbox drive sprocket if the original drive chain is not being replaced. Clean any old sealing compound from the gaiter joint faces, wash with petrol to remove all traces of lubricant, and apply a good coating of new clear silicone sealing compound. Pass the chain top run through the top gaiter as shown in Fig. D8. Thread the lower chain run through the lower gaiter. Pass the top chain run round the rear sprocket and replace the drive housing. Assemble the gaiters in the sequence shown in Fig'D8 and fit the chain spring link with the closed end in the direction of travel. Close the lower gaiter joint. Fit and lock-up the gaiter clips. Check wheel alignment and chain adjustment as directed in Section D10.

SECTION E

FRAME

SECTION E1

REMOVAL AND REPLACEMENT OF THE SIDE COVERS

The right side cover protects the electrical equipment, including the battery and starter relay unit, and the left side cover houses the electronic ignition and voltage control units, fuse box, direction indicator flasher unit and horn relay. Removal of both side covers is first achieved by releasing the seat and gaining access to the DZUS fastner at the forward end of each cover immediately beneath the rear of the fuel tank. Turn the slotted fastner stud 90° anti-clockwise, disengage the stud and lift the cover, at the same time guiding the rear location grommet up over the rear fixing peg.

Replacement is the reverse procedure, but care must be taken when positioning the panels prior to fitting to ensure the lower rear moulding sits snugly inboard of the rear footrest and silencer mounting plates. Draw the rear top grommet over the locating peg, pressing down the panel until the nose of the DZUS fastner stud can be engaged in the fastner body. Turn the slotted stud through 90° clockwise to fix the cover in position.

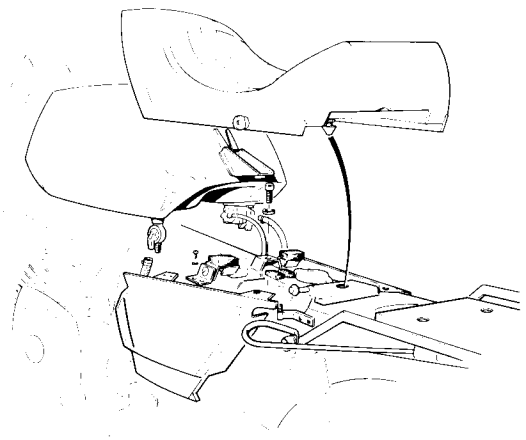


Fig. E1. Removing and Replacing the Fuel Tank and Side Covers

SECTION E2

REMOVING AND REPLACING THE FUEL TANK

Remove the seat and turn the LH fuel tap to the "OFF" position. Turn the RH vacuum operated tap to the "ON" position. Disconnect the fuel feed pipes from the taps (both sides), release the bolt at the rear of the tank and centralise the handlebars. Pull the tank to the rear, lifting and supporting the back of the tank. It should then be possible to work the tank rearwards and off the front mounting rubber buffers.

Before attempting to replace the fuel tank, check that the wiring harness cables lie neatly in the support bracket located under the steering head, and that the clutch and choke cables are held in the support bracket on the opposite side. Ensure the throttle cable is routed above the tank front mounts and is not trapped or displaced.
Pull the choke knob – this tensions the cable and prevents it from becoming trapped or mislocated during fuel tank re-assembly. Lightly vaseline the two forward tank mounting rubbers and offer the forward end of the tank over them, ensuring clean engagement of the forward integral tank guides. The forward tank rubbers have eccentric mountings and thus provide a tank nose height adjustment facility. Each rubber must be set to maintain a level and horizontal tank. Care must be taken at this point to avoid damage to the paint finish on the tank. Push the tank forward, lower the rear end and engage the rear fixing bolt through the plain washer, tank rear lug, rubber mounting bush and spacer sleeve. Tighten down. Refit fuel lines and seat. Reconnect the vacuum pipe from the right hand inlet port to the right hand fuel tap.
Check for a trapped throttle cable by turning the forks from lock to lock with the engine running.
WARNING.
If the engine races, the motorcycle must not be ridden until the fault has been rectified.

SECTION E3

REMOVING AND REPLACING THE AIRBOX COVERS AND SIDE PANELS

To remove the front airbox covers, release the two black plastic hexagon headed screws in the bottom edge of the forward facing cover panel. Detach both the H.T. and L.T. leads from the ignition coils, and lift the panel clear of the two location pegs.

To remove the airbox side panels (where fitted) remove the front panel as described and then release the socket head bolt securing the rear of each side panel to the engine air transfer port. The panel can now be lifted clear. Replacing the covers is the reverse of removal.

SECTION E4

THE AIR FILTER

The air filter is of the fluid wetted reticulated foam type housed in a plastic 'Airbox' at the front of the engine immediately below the fuel tank. To gain access to the air filter elements it is necessary to remove the airbox front cover, (described in Section E3 above). As the air passages from the air filter assembly do not supply air directly to the carburettors, it is of the utmost importance to understand that before reaching the carburettors, the air flow acts as a coolant through the rotors and shaft, within the centre of the engine and because of this, UNDER NO CIRCUMSTANCES WHATEVER SHOULD THE ENGINE BE RUN WITHOUT THE COMPLETE AIR FILTER ASSEMBLY FITTED IN PLACE. Any foreign body allowed in such a way to enter the engine air passages whilst running could cause disaster from extensive damage to the engine components.

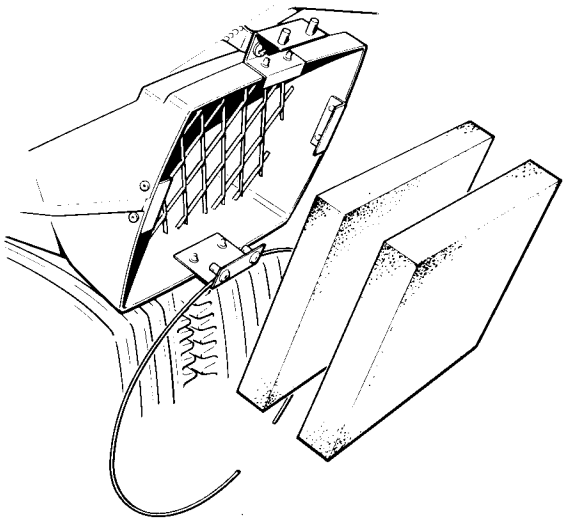


Fig. E2. The Air Filter

SECTION E5

CLEANING THE AIR FILTER ELEMENTS

Remove the front air box cover panel (Section E3). Release the large circular clip situated in the front of the airbox. Remove the filter elements and wire mesh. Clean the foam filter elements in petrol, dry and immerse in clean filter fluid. (Section GD). Squeeze out any excess and re-fit to the air box. Any damaged filter elements should be replaced. This service need only be carried out at regular 6000 miles intervals. If, however, the machine is operated in extremely dry and dusty conditions, this service should then be repeated on a monthly basis. Adhere strictly to the Filter Fluid manufacturers instructions.

SECTION E6

THE OIL TANK

The oil tank is an integral part of the frame. Access to the filler cap is by lifting the seat. The filler cap has a built in graduated oil dipstick. Forward of the oil filler cap is the oil level warning unit. This unit can be tested for operation by switching on the ignition and pushing the oil level warning unit float to the bottom extent of its travel with the dipstick. This should illuminate the oil warning light Fig. H9. Engine oil is drawn off at the bottom LH side of the tank through a filter and via a clear plastic pipe to the oil metering unit situated on the LH end of the gearbox mainshaft. The oil metering unit is a pump combined with a metering system which supplies fresh engine oil to the power unit in quantities governed by the engine load and rpm. Removal and replacement of this unit is described in Section A4. Adjustment is critical and is described in Section A6.

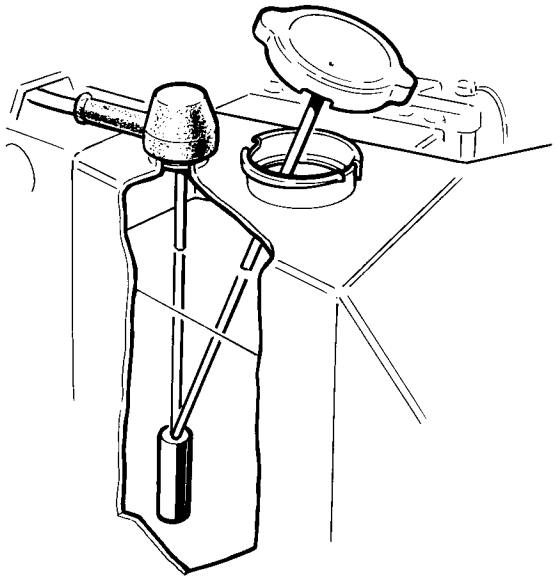


Fig. E3. Checking the Oil Level Switch Float Action

SECTION E7

ADJUSTING THE REAR SUSPENSION

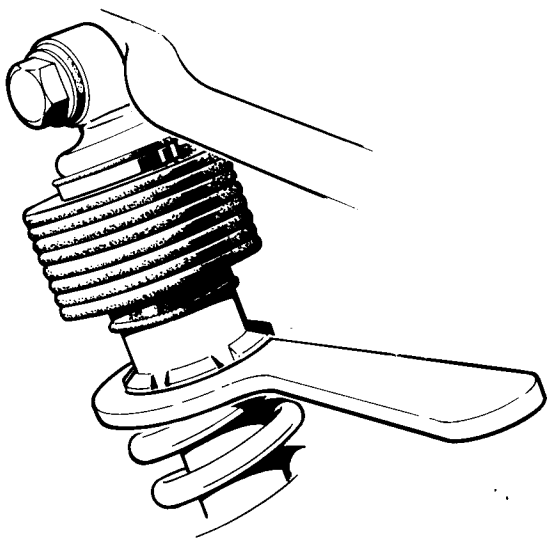


Fig. E4. Adjusting the Rear Suspension Units.

NOTE: When replacing units always replace in pairs.

The rear swinging arm movement is controlled by two matched Girling gas assisted spring and hydraulic damper units. Constant rate damping is provided, whilst the suspension spring pre-load is adjustable using a three position cam ring located immediately below rubber bellows at the top of the suspension unit. By using a 'c' spanner located in the notches and rotating the cam ring in the direction shown, the pre-loading of the spring can be decreased and rotation in the opposite direction will increase the pre-load to the spring. Both units must be adjusted equally to maintain even spring loading. See Fig. E4.

SECTION E8

REMOVING & REFITTING THE REAR SUSPENSION UNITS

Place the machine on the centre stand in order to lift the rear wheel clear of the ground. To remove the suspension units release the top mounting bolt and remove the bottom mounting nut and bolt. The unit can now be removed. Replacement is the reverse procedure. Ensure the units are fitted correctly, e.g. adjusters to the top, and at the top location are the correctly specified high tensile bolts. Check to ensure the cam adjusters are in the correct position, as incorrectly adjusted suspension units could adversely affect the handling of the machine. The correct sequence of spacer washers at the top suspension unit bolt fixing is two plain washers inboard (i.e. between the top fixing damper bush and the frame) and one plain washer outboard. Tighten the top bolts to 30 lb. ft. 4.2 Kg/m torque.

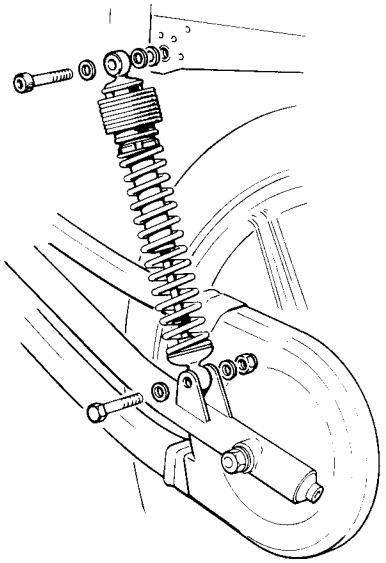


Fig. E5. Removing and Replacing the Rear Suspension Units.

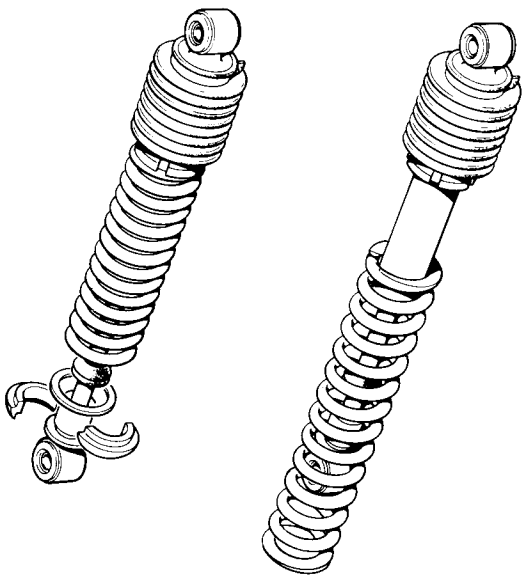
SECTION E9

STRIPPING AND RE-ASSEMBLY – REAR SUSPENSION UNITS

The suspension unit consists of a sealed gas hydraulic damper unit and outer coiled spring. The static load on the spring is adjustable and should be set according to the type of conditions under which the machine is to be used (see Section E7).

To dismantle the suspension unit and remove the spring, it is required to remove the rubber gaiter and to compress the spring whilst the two semi-circular spring retainer plates are removed. To do this first turn the cam until it is in the LIGHT LOAD position, then carefully grip the top lug in a vice. Take firm hold of the spring and compress it until sufficiently shortened to allow the spring retainers to be removed.

The damper unit should be checked for leakage, bending of the plunger rod, and damping action. Check the bonded pivot bushes for wear and ensure that the sleeve is not loose in the rubber bush.



Fig, E6. Dismantling the Rear Suspension Units

Reassembly is reversal of dismantling. Check that the cam is in the light load position before compressing the spring.

NOTE: For information concerning suspension units or spare parts the local Girling agent should be consulted.

SECTION E10

REMOVING AND REPLACING THE EXHAUST SYSTEM

Remove two clamps which secure the silencers to the exhaust manifold. Approximately 1/3 way back from the front of the silencers will be found a mounting bracket secured to the silencers by two bolts.
Removal of these bolts will allow the silencers to be drawn off the exhaust manifold. Should the silencers prove difficult to remove, grasping the front end of the silencer and pulling whilst gently rotating the other end of the silencer in a circular movement will release the silencer from the exhaust manifold (See Fig. E7)
DO NOT UNDER ANY CIRCUMSTANCE attempt to bend the exhaust system, as the exhaust manifold could then be damaged.
If required at this stage remove the six hexagonal headed socket screws retaining the exhaust manifold in place onto the engine. Withdraw the manifold, gaskets and stainless steel liners from the exhaust ports. Clean and inspect the components and replace as necessary. Refit the stainless steel exhaust inner tubes into the engine exhaust ports. Under no circumstances whatsoever should any attempt be made to re-assemble the exhaust system without these sleeves in position, as irreparable damage will inevitably be caused to the engine housings. Do not attempt to substitute the original stainless steel tube with mild steel components as these will deteriorate rapidly in the extremely high exhaust gas temperatures encountered in this engine. Fit two new exhaust manifold gaskets. Refit the manifold.
Before fitting the silencers it is advisable to lightly grease the nose bore of the silencers and the manifold pipes to assist in re-assembly. 'Rotate' the silencers in position on the pipes, bolt into position on the mounting plates, and re-tighten the 'U' bolt clamps.

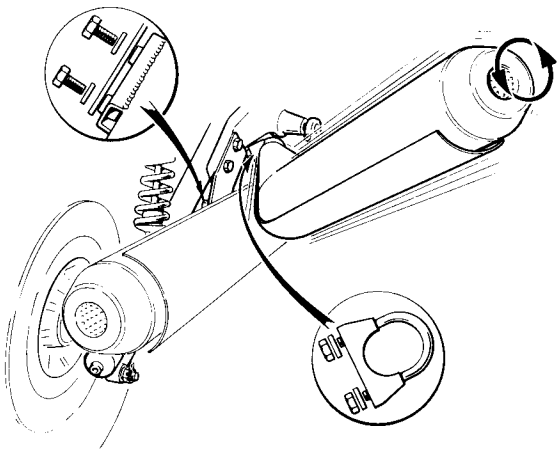


Fig. E7. Removing the Silencers

SECTION E11

REMOVING THE SWINGING ARM

Place the machine on the centre stand and remove the rear wheel (Section F12) and the exhaust silencers (Section E10). Disconnect the leads from the stop light switch which is attached to the R.H. foot rest mounting plate. After detaching the rear brake fluid reservoir, remove the footrest plate as a complete assembly together with the fluid reservoir and rear caliper plate from the machine. Remove the L.H. footrest mounting plate and detach the rear suspension units at their lower fixings. Remove the nut, washer and abutment from the fixed spindle of the rear sprocket/cush drive assembly.

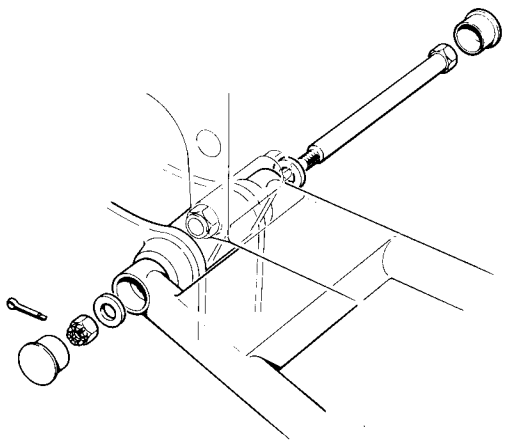


Fig. E8. Removing the Swinging Arm

Remove the plastic dust caps at both ends of the swinging arm spindle. Ensure that the split pin is removed before attempting to release the castellated nut. Using a soft metal drift, gently tap the spindle out of the swinging arm from left to right.

The swinging arm can now be lifted clear and removed. All components from the swinging arm pivot assembly should be cleaned and examined for wear or damage and, if necessary replaced.

SECTION E12

EXAMINATION OF THE SWINGING ARM

A possible cause of poor handling could be due to severe shock that has been applied to the swinging arm, which in consequence has become twisted away from the original design dimensions. The most accurate way to check for truth is to remove the swinging arm, refit the the spindle and support on a pair of 'v' blocks at both ends. Then support one end of the swinging arm on a 'v' block and, using a dial test indicator, measure the difference in height between the fork ends. If the difference between the two measurements is 6.5 mm (1/4 in.) or more, the swinging arm cannot be straightened. This also applies if the rear swinging arm is found to be tracking out of line.

If the swinging arm is found to be out of true further examination of allied components for damage must be made, with special attention given to the rear suspension units and the rear wheel.

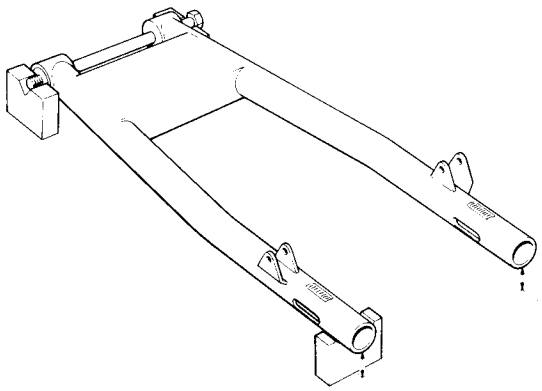


Fig. E9. Examination of the Swinging Arm.

SECTION E13

TRUING THE SWINGING ARM

Before making any attempt to rectify any mis-alignment in the swinging arm, examine the tubes and welding critically to ascertain the cause of deterioration. If the assembly is sound, and it is found necessary to re-straighten the swinging arm, the procedure is straight forward:-

Insert a stout steel bar through the pivot eyes at the forward end of the swinging arm and clamp the bar securely in a vice. Insert by at least 150 mm (6in.) down both tubes of the swinging arm two snugly fitting bars of approx. 750 mm (2.5 ft.) and lever against these until the truth of the swinging arm has been restored, using the above checking procedure to examine the swinging arm at each stage of straightening. Do not apply heat to the swinging arm as this will weaken it. Move the swinging arm as little as possible to reduce the risk of damage to the leg. Finally, examine carefully for any signs of weld deterioration and restore any surface finish which may have been damaged.

SECTION E14

RENEWING THE SWINGING ARM PIVOT BEARINGS

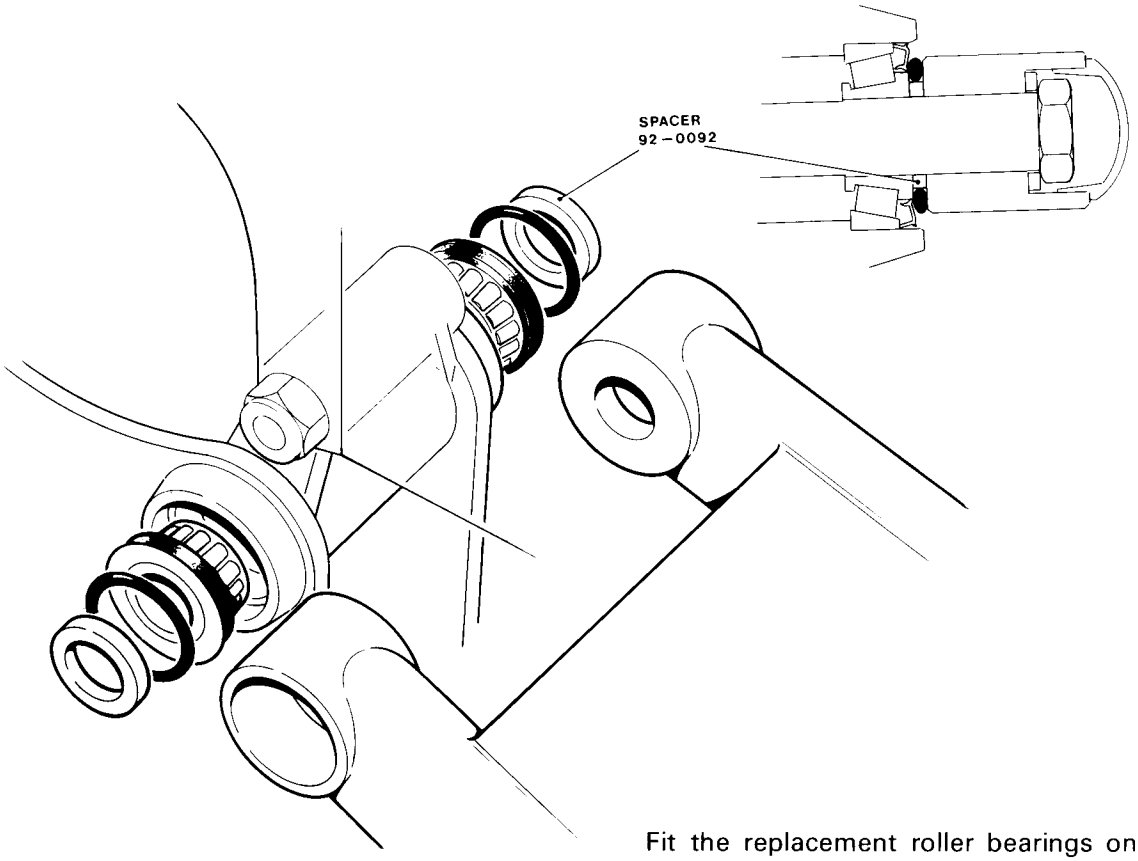


Fig. E10. Shimming the Swinging Arm Pivot Bearings

If, after examination, the spindle or bearings are found to be worn or damaged, they must be replaced. Always replace the swinging arm bearings in pairs. The bearing outer races should be removed from a heated case (85°C) using an external claw extractor to withdraw the outer race to ensure even removal from the housing. Similarly refit the new race outers until fully home whilst the case is still warm.

Fit the replacement roller bearings onto the spindle and offer into the bearing housing. Using an outside caliper measure the overall distance from the end faces of the bearings and then measure the distance between the inside faces of the swinging arm pivot and compare the two measurements. Shim the pivot equally both sides of the bearing housing to remove any play. To accommodate any variations the spacer 92-0092 is available in five different widths (See General Data).

SECTION E15

REPLACING THE SWINGING ARM

Using pivot sleeve tool Part Number 92-0572 to locate the spindle re-assemble ensuring the 'o' ring is fitted over the spacer and that the bearings are packed with a lithium based grease prior to assembly. Refer to Section A2–Lubrication System "Recommended Lubricants". After the spindle has been re-fitted from the R.H. side, check to ensure the 'O' ring is squarely in position on top of the spacer. Torque load the spindle to the figure stated in the table and refit the following:
Cotter pin, dust caps, rear chain enclosure, suspension units, L.H. footrest mounting plate, R.H. footrest mounting plate and brake fluid reservoir, rear wheel and exhaust silencers. Readjust the rear drive chain (Section D10) and check the front and rear wheel alignment (Section F19).

SECTION E16

FRAME

Description
The frame is of 16 SWG sheet steel box section forming an extremely rigid basic spine, and therefore unlikely to be distorted in anything but a major accident. Should this occur the most convenient method to check for frame twist is to examine the frame for mis-alignment as indicated in Fig. E11. If a twist or bend is evident within these points, it would indicate the need for replacement as it is impractical to attempt to straighten the frame.

Initial Examination
The first check should be used to determine whether or not there is a possibility of misalignment. This is straight forward procedure which is not time consuming and requires the minimum of equipment. Whilst this check is fairly accurate, it should be remembered that it will only show that there is a descrepancy between the front and rear wheel alignment, i.e. a twist in the frame, forks, or swinging arm and if misalignment is found then the front forks, rear swinging arm and frame should be examined further.

Procedure
Position the machine on the centre stand on firm level ground. Using trammels, align the front and rear wheel and viewing the machine from the riding position examine carefully the handlebar alignment. The handlebars should be 90° to the front wheel. If they are not then if the handlebars themselves are not distorted, the front forks will need to be inspected. See Section G8. Having lined up the front and rear wheel, place an engineers vertical spirit level on the rear brake disc and pack the feet of the centre stand to obtain an exact vertical reading on the spirit level. Re-check the wheel alignment and place the spirit level on the front brake disc. This should also read exactly vertical. Any major difference in readings between the front the rear brake discs will need further investigation.

Further Examination of the Frame
If the procedure for initial frame examination indicates the machine has been involved in some form of accident, or that there may be damage to the frame, then further examination will be necessary.

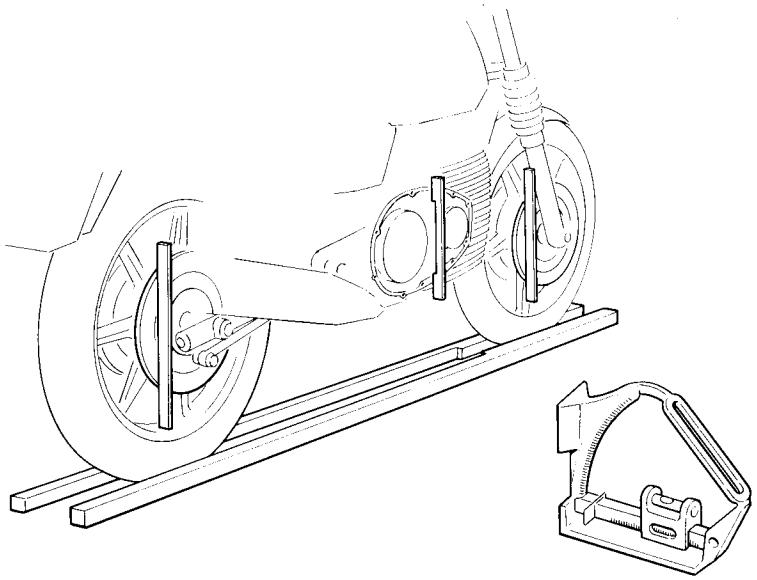


Fig. E11. Initial Examination of the Frame for Possible Misalignment

As the engine is bolted directly to the gearbox, which itself is bolted rigidly into the frame, a very convenient and accurate vertical datum line is provided by the primary chaincase joint line for alignment assessment, without need to strip the machine out for investigation.

Remove the primary chaincase cover as described in Section C1, and using suitable blocks or spacers, apply the engineers spirit level to the top and bottom edges of the chaincase joint. Adjust the setting to absolute vertical, suitably packing the centre stand, and then recheck the front and rear discs – following a re-check on wheel alignment with the trammels (See Section F19).

If the above checks indicate a mis-alignment between the primary chaincase vertical face and the rear disc, the swinging arm will require attention. If however the alignment is unsatisfactory between the chaincase face and the front disc, the cause may be within the front fork or wheel assembly, and not the frame.

Check the front fork alignment as detailed in Section G8. If the forks are found to be satisfactory, the frame will require stripping out for complete examination. If the measurements are outside the limits in drawing (Fig. E12), the frame must be replaced as no repairs or straightening are possible with this frame.

As this procedure is not straightforward without the use of speciallised equipment, it is recommended the frame be returned to the Factory Service Department, where it can be re-checked on the original manufacturing jigs.

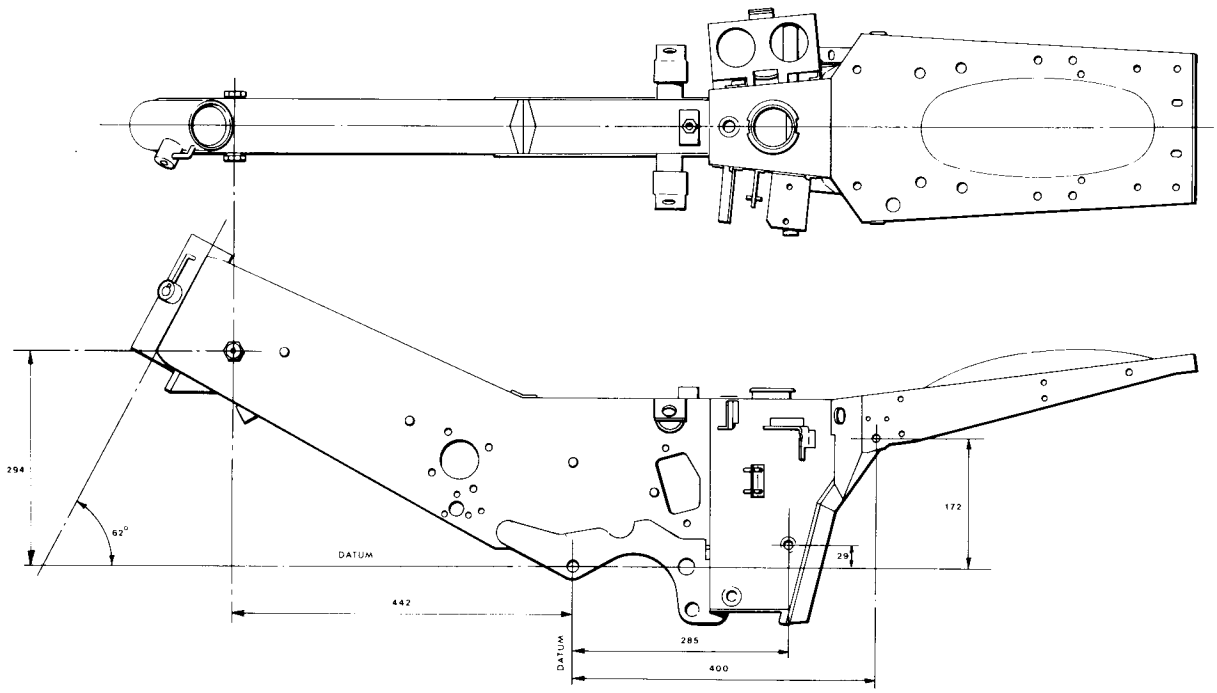


Fig. E12. Frame Dimensions

SECTION E17

REMOVING & REPLACING THE SIDE STAND

Removing and Replacing the Side Stand

The side stand pivot lug is secured to the gear-box casting by three socketed headed bolts and is removable as a complete unit. To remove the side stand assembly, disconnect the side stand warning light switch and remove the three socket headed bolts. The side stand assembly will now come away from the gearbox casing. Should excessive play develop in the side stand pivot, the pivot bush can be replaced by removing the two tension springs and withdrawing the pivot bolt. This will give access to the pivot bush. Reassembly and refitting the side stand assembly is the reverse of the above procedure. Re-set the final position of the side stand switch in accordance with the instructions given in Section H15. "WARNING LAMP SWITCHES"

SECTION E18

REMOVING & REPLACING THE CENTRE STAND

The centre stand is secured in position by a stud, threaded at both ends, passing through the gearbox casing and supporting the stand by means of pivot spacers about which the centre stand pivots.

To remove the centre stand, support the machine securely and remove the exhaust silencers (Section E10) and L.H. exhaust silencer bracket, which encompasses the stop for the centre stand. The removal of this bracket will enable the stand to retract further than normal thereby decreasing the tension on the centre stand return springs.

Protect the paint finish on the underside of the swinging arm from damage that may have been caused by the feet of the centre stand.

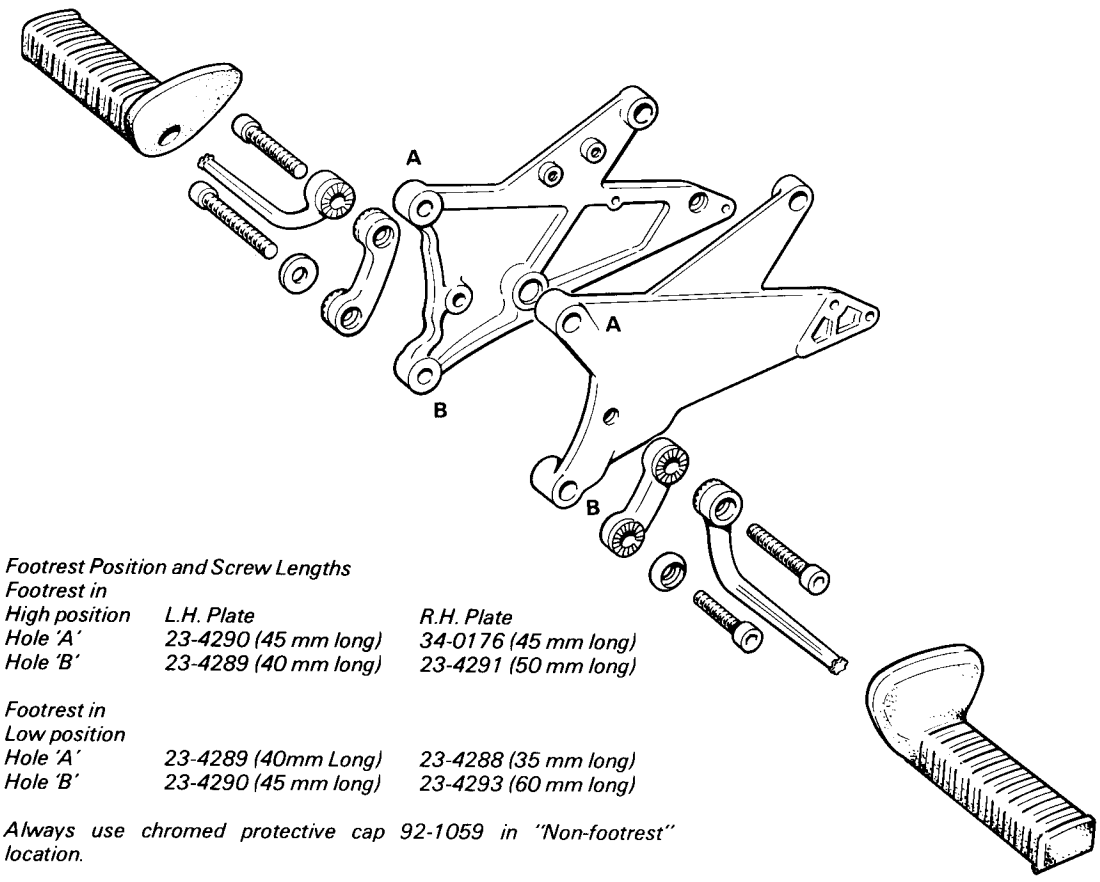
Remove the nut and washers from one end of the through stud and remove the bifurcated rivets that secure the 'C' hooks to the centre stand. The through stud can then be removed.

Examine the pivot spacers and bushes and replace as necessary.

Reassembly and refitting of the centre stand is the reverse of the above procedure, but be sure to grease the spindle prior to inserting into the gearbox casting bore to discourage water ingress and corrosion. Also be sure to test the centre stand for satisfactory operation before riding the machine.

SECTION E19

POSITIONING THE RIDERS FOOTRESTS



Footrest Position and Screw Lengths

Footrest in High position	*L.H. Plate*	*R.H. Plate*
Hole 'A'	*23-4290 (45 mm long)*	*34-0176 (45 mm long)*
Hole 'B'	*23-4289 (40 mm long)*	*23-4291 (50 mm long)*
Footrest in Low position		
Hole 'A'	*23-4289 (40mm Long)*	*23-4288 (35 mm long)*
Hole 'B'	*23-4290 (45 mm long)*	*23-4293 (60 mm long)*

Always use chromed protective cap 92-1059 in "Non-footrest" location.

Fig. E13. Footrest Mountings

The riders footrests are adjustable for height throughout a usefully large range of movement and are interchangeable between upper and lower mounting points.

To change the footrests from the lower to upper mounting points proceed as follows:-

Left Footrest
Remove the upper mounting point bolt and chrome protecting collar from the footrest mounting plate. Remove the footrest with its mounting bolt and fit to upper mounting point. Refit upper mounting point bolt and chrome protecting collar to bottom mounting point.

Right Footrest
Remove footrest and mounting bolt, remove upper mounting point bolt and chrome protecting collar, fit the footrest to the upper mounting point using bolt Part No. 34-0176 (length 45 mm).

Fit bolt Part No. 23-4291 (length 50 mm) with the chrome protecting collar to the lower mounting point.

WARNING

1. Always use the recommended alternative bolts on the right footrest when moving to the upper position. Use of the existing bolts could result in insufficient thread being engaged with resulting weakening of the footrest mounting. Always ensure a minimum of six threads of screw engagement. Torque to 4.2 Kg.M (30lb.ft).

2. Check rear brake pedal for full operational movement when footrests have been fitted.

SECTION E20

REMOVING AND REPLACING THE REAR BRAKE PEDAL

Should the rear brake pedal operation become stiff at any time it will be necessary to remove the brake pedal spindle in order to clean the affected parts.

To remove the brake pedal spindle, detach the brake pedal by releasing the clamp screw at the rear of the brake pedal and withdraw it from the splined shaft. Remove the two silencer mounting bolts being careful to support the silencer to avoid applying unnecessary strain on the exhaust manifold. Remove the three socket headed bolts securing the right footrest mounting plate to the frame and gearbox noting their individual lengths and locations and carefully pull the mounting plate clear of the machine.

Unclip and remove the two brake actuating rod pivot pins and remove the actuating rod. The rear brake pedal pivot can now be removed.

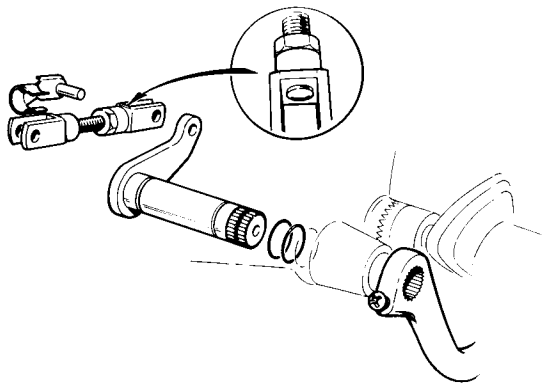


Fig. E14. Rear Brake Pedal Spindle

Clean the brake pedal pivot and pivot bore and inspect the sealing 'O' rings, replace if necessary. Lubricate the pivot with the recommended grease (Section A2) and reassemble in the reverse order to that given above making sure that the brake rod pivots are lubricated and firmly secured in place.

SECTION F

BRAKES, WHEELS AND TYRES

BRAKING SYSTEM

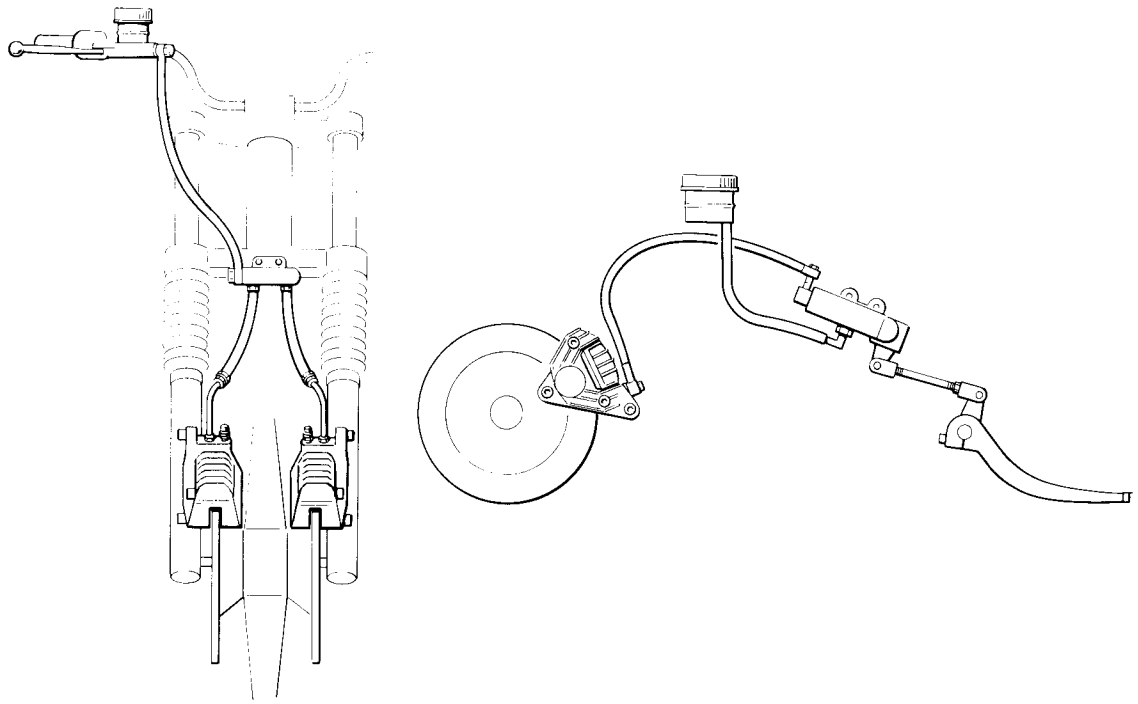


Fig. F1. The Braking System

DESCRIPTION

All machines are fitted with Brembo disc brakes on the front and rear wheels. The disc brake assembly comprises high quality stainless steel discs attached to both sides of the front wheel hub and to the right hand side of the rear wheel hub, with cast alloy brake calipers attached at the front to the fork sliders, and at the rear to a fully floating brake mounting plate. The calipers each house a pair of pistons with 'Textar' all weather sintered bronze brake pads fitted for maximum all weather efficiency.

SECTION F1

BRAKE FLUID LEVEL

BRAKE FLUID LEVEL

A brake fluid reservoir is fitted directly onto the front brake master cylinder whereas on the footbrake operated rear master cylinder the reservoir is remotely located below the seat.

The brake fluid level should be as shown in Figs. F2(a) & 2(b). There is a mark running around the outside of each of the reservoirs approximately 12 mm from the top (upper level) and one approximately 22 mm from the

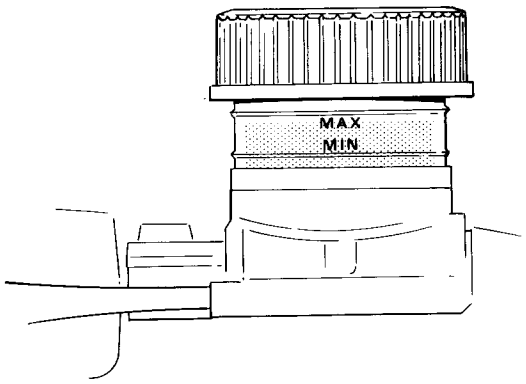


Fig. F2(a). Brake Fluid Level – Front Master Cylinder

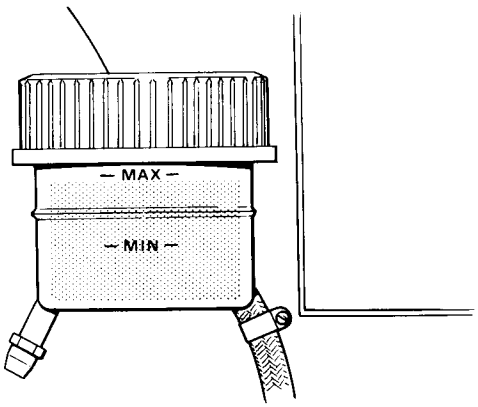


Fig. F2(b). Brake Fluid Level – Rear Master Cylinder

top of the reservoir (bottom level). The level will drop slightly as the pads wear and when new pads are fitted the level will return to the original position, providing no leakage has occured. Provided the fluid level does not drop below the lower mark very little attention will be needed (See lubrication chart Section A1) other than the specified monthly level checks, and the recommended annual fluid change, (See Section F4).

WARNING

FRONT BRAKE LEVER BACKLASH ADJUSTMENT

Under no circumstances should the clearance between the front brake lever and the master cylinder operating piston be altered. The clearance has been set during manufacture and any attempt to adjust the clearance could result in loss of braking operation and possible accident to the rider.

SECTION F2

BRAKE PADS

The front and rear brake pads should be examined regularly (monthly – see Section RM Routine Servicing chart) for wear. The pads will require replacement when the lining thickness is 4.5 mm (3/16 in).

New pad thickness 9.0 mm.
Minimum thickness 4.5 mm.

To examine the depth of lining material it is necessary to remove the pads from the brake calipers. To remove the front or rear brake pads, remove the plastic cover over the top of the caliper (Fig. F3) and, pressing down on the hooked end of the spring clip, withdraw the locating pin. Remove the central spring pivot pin and the other locating pin with the spring clip. The pads can now be removed.

When cleaning the brake caliper with the pads removed, be careful to avoid damaging or dislodging any dust seals. Keep a close watch on the brake hydraulic fluid master cylinder level. Do not allow fluid to overflow when depressing the pistons as brake fluid is highly corrosive, can strip paint and will cause permanent damage to tyres.

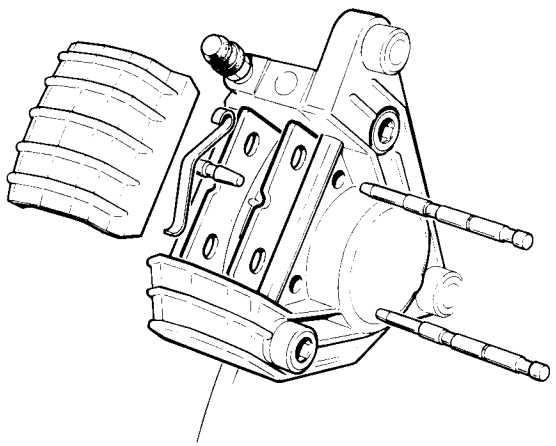


Fig. F3 Brake pad replacement

Replacement of the brake pads is the reverse of removal. When the pads have been changed, apply the brakes five or six times to ensure correct operation.

Care should be taken for the next 50 miles (approx) allowing the friction material to bed in satisfactorily.

SECTION F3

BLEEDING THE HYDRAULIC SYSTEM

If at any time it has been found necessary to remove part of the hydraulic system or slacken a pipe junction (for repairs etc), it will be necessary to top-up the hydraulic reservoir and 'bleed' any remaining air from the system. The following procedures apply to both front and rear brakes of the machine.

WARNING
PARTICULAR ATTENTION MUST BE PAID TO SERVICING PROCEDURES INVOLVING BRAKE SYSTEMS. This section, 'Bleeding the Hydraulic System' is of vital importance and great care must be taken to ensure that correct procedures are followed. Failure to follow the prescribed procedure could lead to an accident.

When bleeding the system at all times keep the reservoir well topped-up to ensure no air is allowed into the system from the reservoir.

Fluid drained from the system must not be used again as it may be 'aerated' or contaminated with other chemicals or moisture. Use only the fluid specified in 'General Data' for topping up.

All brake fluid is 'hygroscopic', ie naturally absorbs moisture, and therefore should never be re-used. The caps on both the new fluid container and the master cylinder reservoir must be kept firmly sealed. Open only as the fluid is being used.

Connect a suitable pipe to the caliper bleed nipple and immerse the other end under at least 1" of brake fluid in a clear container (bottle etc). Remove the reservoir filler cap and take out the rubber diaphragm. Now slacken the bleed nipple 1/2 to 3/4 of a turn with bleed pipe attached.

Ensure that the master cylinder reservoir is topped-up to the upper level mark and pull in the front brake lever or push down on the rear brake pedal as far as it will go and hold in that position for a couple of seconds whilst the bleed nipple is released. Any air in the system will have been expelled through the rubber tube and will have been seen to bubble into the container. After closing the nipple, release the brake lever which 're-charges' the system and repeat the operation until no air bubbles

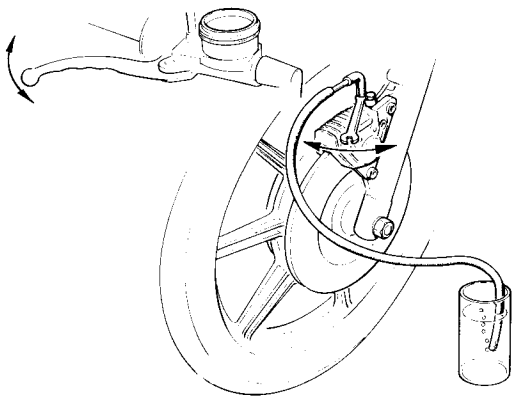


Fig. F4. Bleeding the Front Brake

are seen to escape into the container. When the flow of air bubbles cease, hold the brake lever full on and retighten the bleed nipple (with the bleed pipe still connected). After the nipple has been finally tightened, the bleed pipe can be removed. Repeat the procedure for the second caliper (front brake). If 'sponginess' still exists at the brake lever, repeat the procedure until eliminated. When satisfactory operation has been achieved, top up the master cylinder reservoir to the upper level.

REAR BRAKE ONLY

Disconnect the brake torque arm at the brake caliper mounting plate and rotate the caliper upwards sufficiently to raise the bleed nipple above the level of the pistons before commencing bleeding operations exactly as described above. When operation is complete, refit the brake torque arm, and top up the reservoir to the upper level.

The recommended torque setting for 6 mm caliper bleed nipples is 0.25/0.50 KgM (2.2/3.6 ft lbs) and 0.83/1.24 KgM (6/9 ft lbs) for 10 mm bleed nipples.

Check 'General Data' – Torque Settings for brake torque arm bolt setting.

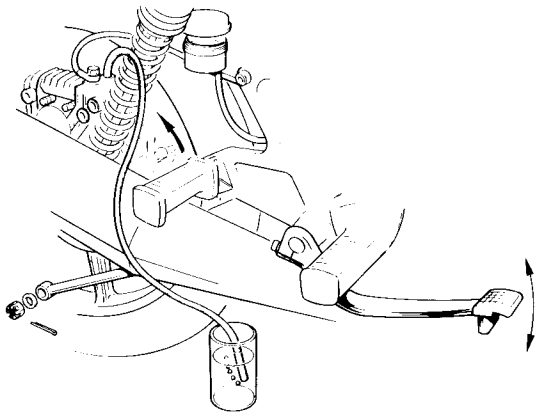


Fig. F5. Bleeding the Rear Brake

SECTION F4

FLUSHING THE HYDRAULIC SYSTEM

If the hydraulic system has been contaminated by foreign matter or other fluids it should be flushed out and refilled with new fluid as decribed below. The system should be flushed out in any case, at the interval stated in 'routine servicing' (Section A1) ie every 12,000 miles or every year, whichever occurs first.

Firstly, pump all the fluid out of the system by opening the bleed nipples connect a pipe to the bleed nipple and safely collect in a container whilst operating the brake level. Fill the master cylinder reservoir with new hydraulic fluid taken from a new container and pump out through the bleed nipple in a manner similar to that described in Section F3 Bleeding the Hydraulic System. Having ensured that all the new clean fluid has passed through the bleed nipple, replenish the master cylinder reservoir (see Section F1) with the specified grade of brake fluid (See General Data Section) 'Bleed' the brakes as described in Section F3.

IMPORTANT NOTE:
If the system has been contaminated by a mineral oil, all rubber parts including seals and flexible hoses must be replaced.

SECTION F5

FLEXIBLE HOSES

REMOVAL

The removal and replacement of both front and rear brake pressure hoses is a straightforward operation. However, there are some safety points to remember.

1. Examine all flexible pipes for signs of rubbing, deterioration, bulging etc, at regular intervals. IF IN DOUBT REPLACE THE PIPE. Wherever possible renew copper sealing washers.

NOTE:
If sealing washers are to be used again, they can be 'annealed' by heating to a cherry red colour and plunging into cold water. All flexible brake pipes have a marker line running their length, this is to facilitate correct alignment of the pipe which must not be twisted.

WARNING

FLEXIBLE BRAKES HOSES

Ensure that the flexible brake hoses are not twisted and do not stretch or kink during operation of the front forks at the extreme limits of movement.

2. Bleed the system thoroughly with the correct grade of hydraulic fluid. Exercise extreme care when tightening banjo bolts, unions etc as they are hollow and are easily sheared.
3. Examine pipes very carefully for leaks, bulges etc under maximum braking effort.
4. Check there is no fluid loss at any of the joints. To rectify any leak, close off the joint and replace the affected pipe or copper washer. Bleed the system as detailed in Section F3.

SECTION F6

BRAKE ADJUSTMENTS

Hydraulically operated disc brakes are fitted to the front and rear wheels of this machine and, as they are self compensating for wear, no adjustment of the brake systems is possible. However, adjustment of the rear brake pedal position is possible. There are two means of adjustment for the rear brake pedal.

1. The pedal can be removed from the splines of the pivot shaft and moved one spline at a time to the required position.

2. The brake master cylinder actuating rod (situated behind the right footrest mounting plate) can be screwed in or out to provide brake pedal height adjustment.

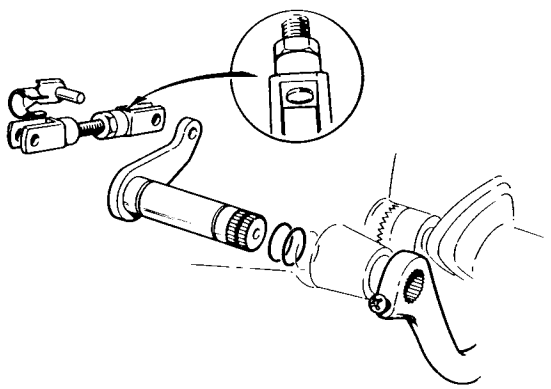


Fig. F6. Rear Brake and Pedal Adjustment

To adjust the rear brake actuating rod remove the right footrest mounting plate as described in Section E20, slacken the locknut on the actuating rod, detach the pivot pin clip at the forward end and withdraw the pivot pin. Rotate the fork end to move it along the actuating rod. The normally assembled position of the actuating rod is with the rod end flush with the fork end tapped holes, and allowable adjustment is plus or minus two threads. When the required adjustment has been achieved, refit the pivot pin and clip, and re-tighten the locknut. Continue re-assembly of the footrest plates.

WARNING
ADJUSTMENT OF THE REAR BRAKE MASTER CYLINDER ACTUATING ROD. The normal position of this rod is flush with the fork end tapped holes and adjustment is plus or minus two threads at each end. Over adjustment could result in either the actuating rod threaded ends protruding too far into the fork ends bringing them into contact with the brake pedal lever and causing the mechanism to lock, or the rod could be adjusted too far back leaving insufficient threads engaged in the fork ends. These could strip and cause the rear brake not to function during braking. Following any brake adjustment ensure that the rear brake operates normally and that the brake pedal does not foul the silencer heat shield.

BRAKE PEDAL PAD ADJUSTMENT
The aluminium footbrake pedal pad is detachable, being fixed to the pedal arm by two stainless steel cap headed screws. The pedal pad incorporates three threaded fixing holes, and being offset to the centreline of the pad, allows fitment in four alternative positions to suit the riders convenience.

SECTION F7

FRONT BRAKE MASTER CYLINDER

Master Cylinder – Description

The master cylinder body is cast in light alloy, comprising a cylindrical body and a piston fitted with seals ensuring oil tightness. The piston incorporates an extension against which the operating lever thrusts, return being controlled by a spring and buffer. A retaining ring, scraper seal and lock-ring prevent ingress of water and foreign matter into the body of the master cylinder.

The operating lever pivots on the master cylinder casting, incorporating an adjuster screw controlling the relative location of the piston and lever. The clearance should be set between 0.05 and 0.15 mm. Clearances greater will allow lever rattle, less will prevent hydraulic fluid transfer from the master cylinder itself.

The transparent reservoir is fixed to the body casting by means of a clamping plate and lock screw compressing a sealing 'O' ring into position. A bellows type seal fits in the reservoir top, preventing escape of fluid and entry of dirt, damp etc. and is held in place by the plastic cap.

General Maintenance – Checking and Testing

Check the level of the fluid in the reservoir frequently. Never allow the level to fall below the minimum indicated. Top up as required from a clean new can of the specified fluid – replace the caps on both the can and the master cylinder reservoir as soon as practicable, as brake fluid is hygroscopic.

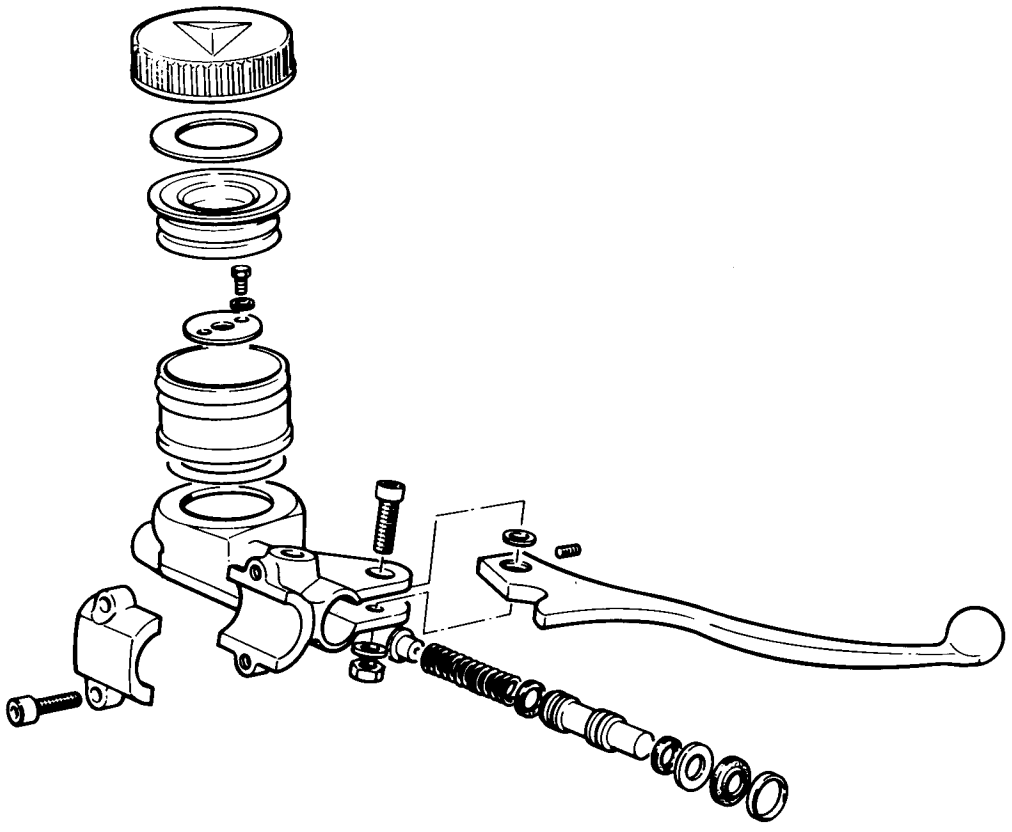


Fig. F7. The Front Brake Master Cylinder

Change the fluid every 12,000 miles (20,000 km) or every year whichever occurs first. The volume of fluid required fro the front brake system is 150cc.

Check the prescribed lever gap (see above – "Description") is between 0.05 and 0.15 mm. Always flush out the system using the actual specified fluid.

Not alcohol or other fluid.

Never dry out the system using compressed air.

Periodically lubricate the sealing ring seal by applying Castrol BNG grease to the piston thrust abutment. Under no circumstance whatsoever should oil or mineral grease be used for this application.

Periodically also lubricate the contact zone between the piston and the lever with molybdenum disulphide grease.

General Rules for Stripping Brake Parts

Prior to dismantling and stripping the brake system, completely clean all the external parts. Seal the ends of the pipework to prevent entry of foreign bodies. Following dismantling, clean all items in trichlorethelene, and rubber items in ethyl alcohol. Note that 'trike' must never come into contact with rubber seals.

Precision components must be handled with care to avoid damage. After cleaning, dry carefully with fluff free cloth, and moisten cylinder walls and piston surfaces with brake fluid to protect from corrosion.

Overhauling and Replacement of Components

In cases where master cylinder faults have occured (e.g. loss of fluid or reduction in braking efficiency) the seals should be replaced as follows:

i Syphon the fluid from the reservoir with a syringe.
ii Detach and seal fluid feed pipe.
iii Remove pivot and lever.
iv Insert flat ended drift into the fluid exit hole and gently tap the piston out of the cylinder being careful not to damage the internal walls of the master cylinder.
v Collect from the piston the scraper seal ring, lock washer and lock ring.
vi Remove the spring and guide buffer.
vii Clean carefully the piston and master cylinder, ensuring the components are not damaged.
viii Check the seals, and where necessary using a suitable tool remove from the piston the old seals without damaging the piston grooves. Note the seal lip location and direction prior to removal.
ix Fit the replacement seals ensuring the pressure lips are facing in the correct direction (i.e. seal lips towards fluid exit hole).
x Assemble onto the piston rear extension, the lockwasher, the scraper seal ring (checking it is not damaged and the lip is in good condition) and the locking ring in that order.
xi Thread onto the piston the return spring and its guide buffer. Slightly smear the master cylinder bore and the piston and seals with CASTROL BNG grease and offer into the master cylinder bore. Re-set the lock ring using a hollow drift until the lockwasher is felt to be fully home.
xii Change as necessary any copper washers, re-fit the hose to the master cylinder (recommended torque 13/16 lb.ft (1.80 KG.M). Re-assemble the lever and pivot and reset the adjuster screw to the dimensions given above in 'General Maintenance'.
xiii Refit reservoir with the recommended fluid (DOT4) and bleed the system as necessary (Section F3).

SECTION F8

REAR BRAKE MASTER CYLINDER

Master Cylinder – Description

The master cylinder body is cast in light alloy, comprising a cylindrical body and a piston fitted with seals ensuring oil tightness. The piston incorporates a rear extension against which the brake cylinder lever thrusts, return being controlled by an internal spring and buffer. A retaining ring, scraper seal and lock ring prevent ingress of water into the body of the master cylinder.

The operating lever pivots within integral lugs on the master cylinder casting actuated by the footbrake lever to which it is connected by means of an adjustable brake rod. (See Section F6).

The transparent fluid reservoir is remotely mounted on the right side of the machine beneath the seat, and connected by feed pipe to an elbow union located within the master cylinder body by a retaining grommet. The reservoir incorporates a bellows type seal which fits in the reservoir top preventing escape of fluid and entry of dirt, damp etc. . and is held in place by the plastic cap.

General Maintenance – Checking and Testing

Check the level of the fluid in the reservoir frequently. Never allow the level to fall below the minimum indicated. Top up as required from a clean new can of the specified fluid – replacing the caps on both the can and reservoir as soon as possible as brake fluid is hygroscopic.

Change the fluid every 12,000 miles (20,000 km) or every year, whichever occurs first. The volume of fluid required for the rear brake system is 100 cc approximately.

When flushing out the system, use only the specified brake fluid. Do not use alcohol or other fluids, and never attempt to purge or dry out the system using compressed air.

Periodically lubricate the rear brake lever pivots with engine oil, ensuring no traces are transferred to the rear piston scraper seal assembly. Anti-friction molybdenum disulphide grease should be used to lubricate the contact zone between the piston extension thrust rod and the lever when circumstances permit.

General Rules for Stripping Brake Parts

Exactly the same rules apply when stripping the rear master cylinder as detailed in Section 7 for the front master cylinder.

Additional attention must be paid to protecting the cleanliness of the remote reservoir feed pipe and caliper hose connections in view of their close proximity to the rear wheel and tyre.

Overhauling the Rear Master Cylinder

Remove the right footrest mounting plate and brake actuating rod as described in Section E20. Remove the master cylinder from the mounting plate as follows:

i Syphon the fluid from the reservoir with a syringe.
ii Detach and seal the fluid feed pipe at the master cylinder end.
iii Disconnect the brake light leads.
iv Disconnect rear brake hose banjo bolt and seal off caliper feed hose.
v Remove the brake light switch and banjo union.
vi Undo two M6 x 25 bolts and detach rear master clinder.
vii Remove one circlip, remove the brake lever.
viii Insert a round flat ended drift into the fluid exit hole and gently tap the piston out of the cylinder, being careful not to damage the internal walls of the master cylinder.
ix Collect from the piston the scraper seal ring, lock washer and lock ring.
x Remove the spring and guide buffer.
xi Clean carefully the piston and master cylinder ensuring the components are not damaged.

xii Check the seals, and where necessary using a suitable tool remove from the piston the old seals, noting the location of each seal and its direction. Do not damage the oil seal grooves.

xiii Fit the replacement seals ensuring the pressure lips are facing in the correct direction (i.e. seal lips towards fluid exit hole).

xiv Assemble on to the piston rear extension the lock washer, scraper seal ring (checking it is not damaged and the lip is in good condition) and the lock – ring – in that order.

xv Thread onto the piston the return spring and its guide buffer. Lubricate the master cylinder bore and piston seals with a slight smear of Castrol BNG grease and offer into the master cylinder bore. Re-seat the lock ring using a hollow drift until the lock washer is felt to be fully home.

xvi Re-assemble the lever, pivot and circlip, applying a smear of molybdenum disuphide grease to the piston and lever thrust faces and pivot pin.

xvii Refit the master cylinder to the right footrest mounting plate. Reconnect the brake rod, greasing well the pivots and pivots pins.

xviii Replace the reservoir feed and caliper hose pipes, fitting new copper washers as required.

xiv Replace the right foot rest mounting plate as detailed in Section E20.

xv Refill the reservoir to the recommended level with the specified DOT 4 brake fluid. Proceed to bleed the rear brake system as described in Section F3 (Fig. F5).

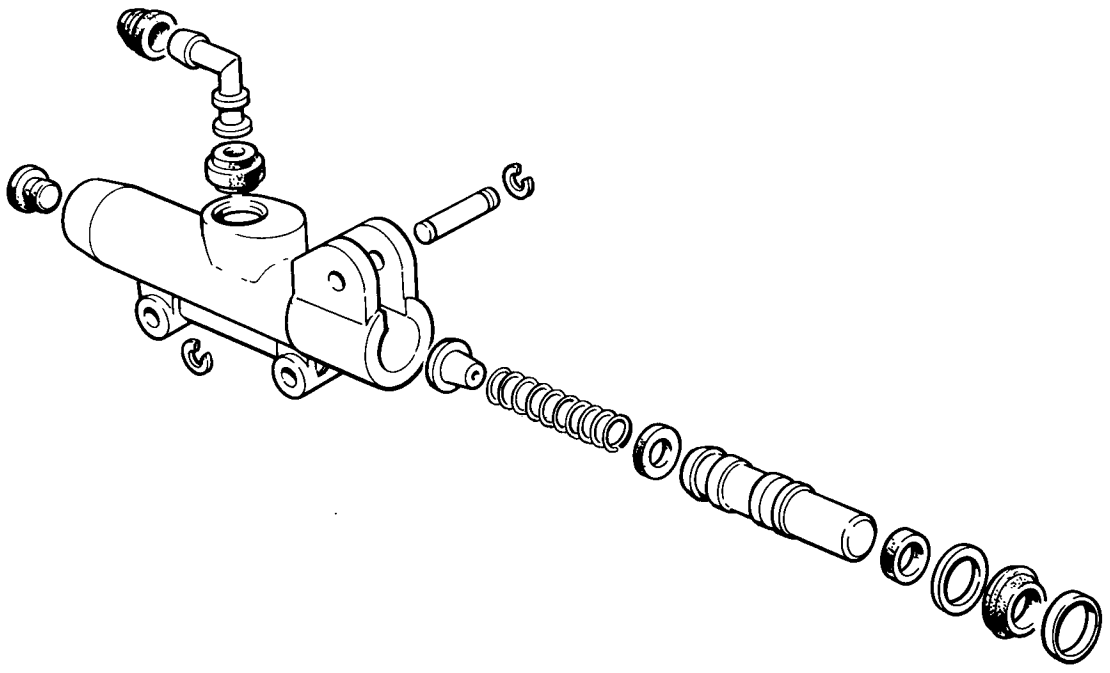


Fig. F8. Rear Brake Master Cylinder

SECTION F9

STRIPPING AND RE-ASSEMBLING THE BRAKE CALIPER

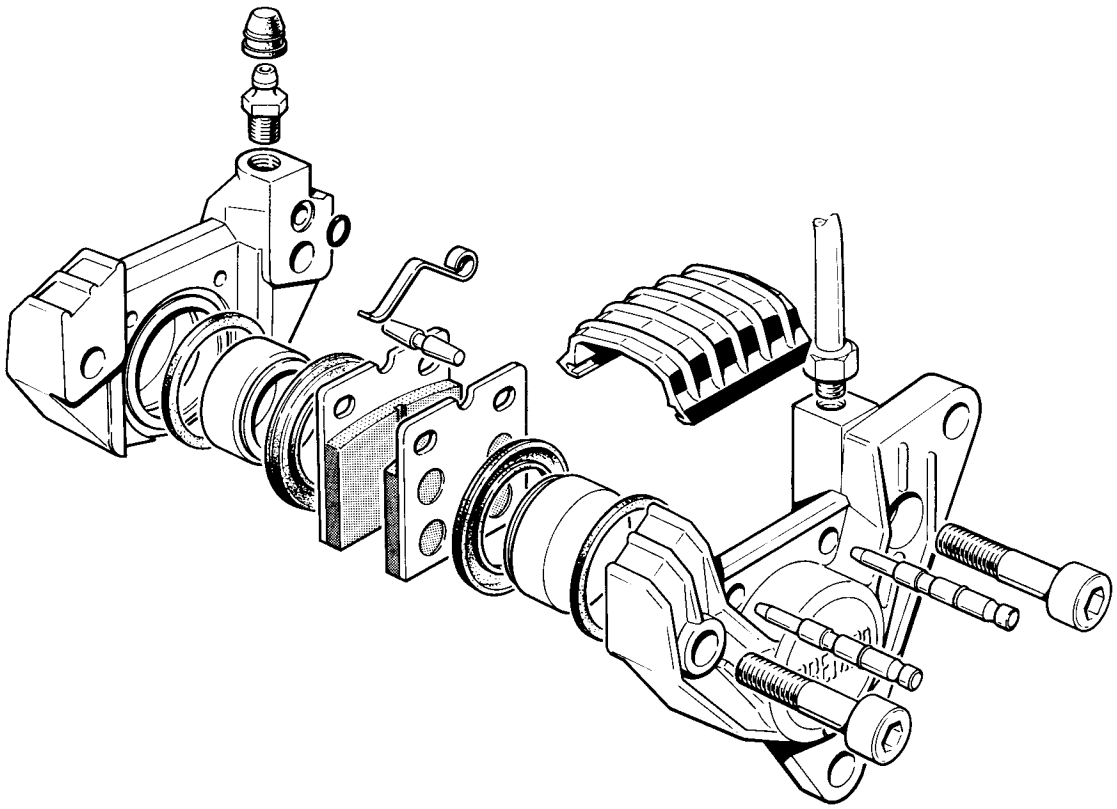


Fig. F9. Exploded View – Brake Caliper Assembly

Description

The caliper comprises two halves cast in light alloy and bolted together with two screws. In each half caliper is a cylindrically bored housing machined as a guide for the piston. Sealing between the piston and caliper is made by a rubber seal housed in a groove machined into the cylinder bore. Adjustment for pad wear occurs automatically, since with gradual wear on the pads the pistons continue to emerge from the cylinders.

A dust seal fixed to annular shoulders on the piston and cylinder bore prevent ingress of damp and foreign matter. The pistons work directly on the two brake pads which are held in position by two locating pins and shorter pin complete with an anti-rattle spring to prevent relative movement.

An inspection cover which clips in position prevents water and dirt entering the caliper and pad enclosure.

Supply of brake fluid is achieved via the threaded hole machined in the caliper body at the mounting lugs, the two caliper halves being connected by internal holes, with 'O' ring oil sealing between. One half caliper is provided with a bleed nipple to assist in the elimination of air bubbles.

Replacement of Components

Component replacement will prove to be necessary if fluid is visible around the caliper pistons or disc, with accompanying fluid loss from the reservoir. To change the seals proceed as follows:

Drain the system by opening the caliper bleed nipple (having connected a pipe from the nipple to a fluid container) and operating the brake lever until no further fluid flows. Repeat for the second caliper in the case of the front brake. Care must be taken during the following sequence to prevent any residual fluid falling onto paintwork, tyres or other parts of the

machine. If this does unfortunately occur, the affected parts must immediately be washed thoroughly in copious supplies of hot soapy water.

a Remove and seal the brake pipes.
b Remove the caliper.
c Prise the cover out of position.
d Remove the pin and spring locating the pads.
e Remove the locking pins and pads.
f Strip the caliper into two halves (Fig. F9).
g Remove the dust seal from the half caliper which exhibits the leak.
h Remove the piston from the half caliper using compressed air, taking great care to do this gradually. Do not scratch the piston or bore surfaces when withdrawing the piston.
i Remove the defective seal from its groove using a sharpened rod or pin, being careful not to damage the shoulders of the groove.
j Clean the piston.
k Fit a new replacement seal – finger pressure only.
l Lightly smear Castrol BNG grease over the seal and piston sides prior to assembly.
m Refit the piston and relocate the dust excluder (replace if torn or damaged) locating properly in both piston and cylinder.
n Bolt up the two halves of the caliper, checking the joint 'O' ring seal is securely located on its seat.
o The two large screws should be replaced by new screws prior to torquing up to 30/33 lb ft (4.15/4.56 Kg m).
p Re-fit the caliper. The mounting screws should be torqued up to 30/33 lb ft (4.15/4.56 Kg m).
q Re-fit the brake pads, retaining pins and the short spindle with the pad locating spring clip. Replace any pin exhibiting any signs of rust or corrosion.
r Re-connect the brake pipe (10/12 lb ft – 1.38/1.70 Kg m).
s Bleed the system as described in Section F3 "Bleeding the Hydraulic System".

WARNING
The only satisfactory remedy for a siezed piston is renewal of the affected caliper assembly.

SECTION F10

REMOVING AND REFITTING THE FRONT WHEEL

REMOVAL

Place the machine on its centre stand and placing a stout support under the engine, disconnect the speedometer drive cable from the drive gearbox. Remove both front brake calipers and support them as shown in Fig. F10 – do not allow any strain to be put on the brake pipes. Place a piece of wood or similar packing between the brake pads and remember not to operate the front brake lever whilst the front wheel is removed. Release the spindle clamp bolt, undo the spindle nut and draw the spindle out of the wheel and forks. Remove the wheel.

REFITTING

Refitting is the reverse of removal but there are a couple of points to watch. Ensure that the wheel spindle is clean and that the speedometer cable is fitted correctly. Grease the spindle lightly before fitting. Before tightening the spindle nut and clamp bolt, take the machine off the centre stand and push the machine forward, apply the brakes to centralise the forks and tighten the spindle nut and clamp bolts. Torque load the spindle nut to 80/100 lbs. ft. (13.8 kg M).

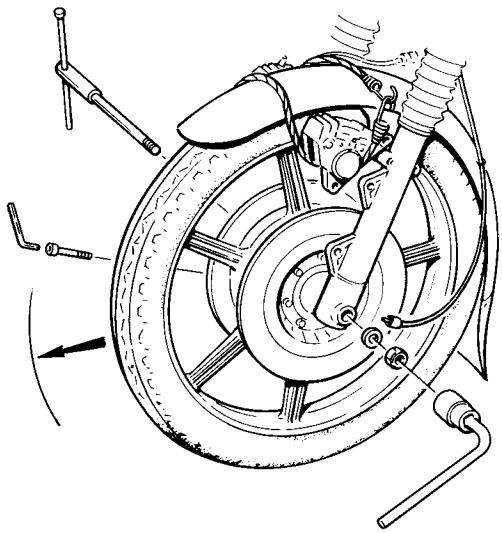


Fig. F10. Removing the Front Wheel

NOTE:
The speedometer cable must be routed inside the left side front brake pipe, to avoid any possiblity of subsequent contact or abrasion.

SECTION F11

REMOVAL AND REPLACEMENT OF THE FRONT WHEEL BEARINGS

REMOVAL

Remove the front wheel as described in Section F10 and remove the speedometer drive gearbox body and seal. Extract the speedometer drive gear and withdraw spacer. Remove the discs by releasing the six bolts on either side of the wheel. Move the internal spacer to one side, and very carefully drift out the bearing from the left side. Turn the wheel over and repeat for the RH bearing.
Inspect for any damage and replace where necessary. Examine the hub casting for cracks and the speedometer gearbox body for similar signs.

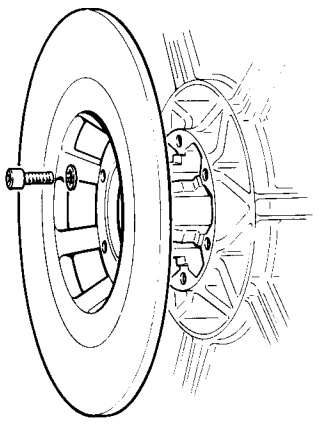


Fig. F11. Removing the Front Wheel Brake Discs

DISCS
The discs must be free of all surface imperfections, and if scored must be replaced to maintain braking efficiency. Max. allowable disc run out is0.15 mm (0.006 in.).

REASSEMBLY
Fit the RH bearing and locating circlip. Turn the wheel onto its right side and fit the bearing spacer tube. Fit the LH bearing and the spindle to locate the spacer tube before pressing home the bearing. Fit the seal into the speedometer drive gearbox. Fit the washer next to the bearing, grease the speedometer gearbox and refit.

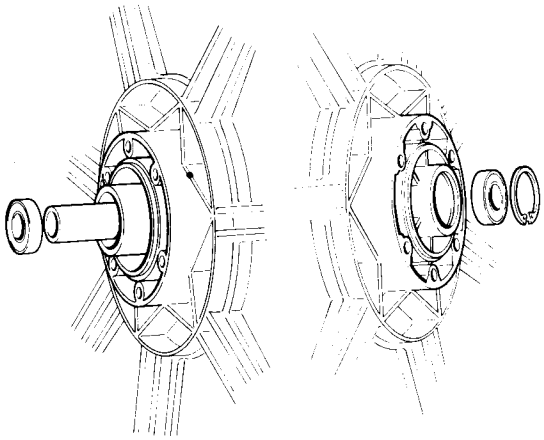


Fig. F12. Removing and Replacing the Front Wheel Bearings

SECTION F12

REAR WHEEL REMOVAL AND REPLACEMENT

REMOVAL
With the machine on the centre stand unscrew the rear mudguard 'camloc' fasteners ('Push turn' – anti-clockwise) and lift the rear mudguard. There is a stainless steel clip to retain it in the 'up' position. Remove the rear brake torque arm from the rear brake caliper mounting plate. Remove the wheel spindle from the right side and suspend the brake caliper from the grab rail with the caliper service hook. (As shown in Fig. F13). Note how the distance pieces are removed (for refitting). Pull the wheel to the right to clear the cush drive rubbers and roll the wheel out from the swinging fork.

REPLACEMENT
Refitting is the reverse, Ensure, however, that the wheel spindle is clean and lightly greased. To assist fitting the vanes in the rear wheel into the driver rubbers, apply silicone grease (or if not available apply liquid soap to the rubbers prior to assembly).

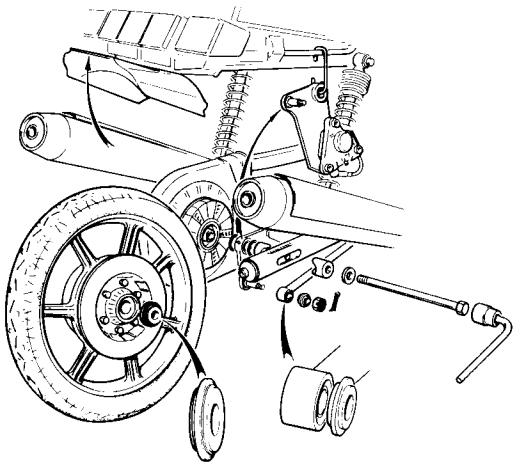


Fig. F13. Rear Wheel Removal and Replacement

Locate the drive vanes in the cush drive and fit the spacers in the correct order. See Fig. F13. Torque load spindle to 80/100 lb. ft. (13.8 kg M).

SECTION F13

REMOVING AND REPLACING THE REAR WHEEL BEARINGS

Remove rear wheel as described in Section F12. On the disc brake side of the wheel (RH) remove the internal circlip and remove the six bolts securing the brake disc. Remove the brake disc. Move the internal spacer to one side and very carefully drift out the bearing from the left side. Turn the wheel over and repeat the operation on the RH bearing. Wash the components and carefully examine the bearings for wear, damage, discolouration etc and replace where necessary. Always replace wheel bearings in pairs. Assembly is the reverse of dismantling.

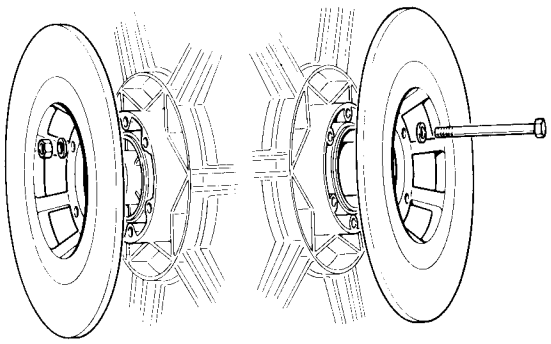


Fig. F14. Removing and Replacing the Rear Wheel Brake Discs

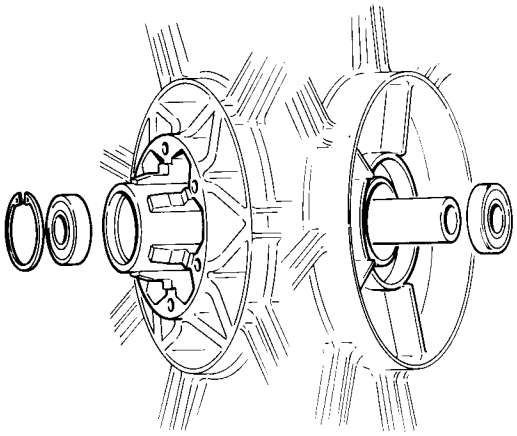


Fig. F15. Removal and Refitting the Rear Wheel Bearings.

SECTION F14

REMOVING & REPLACING THE REAR DRIVE SPROCKET ASSEMBLY

Remove the rear wheel complete as described in Section F12. Drain the lubricating oil from the rear drive chaincase by removing the drain plug in the bottom of the sprocket housing (section A9). Remove the top and bottom chain gaiter clips and push forward the top gaiter to give access to the driving chain split link. (Fig. D9) Remove the spring link and pull the chain up through the bottom of the rear sprocket housing. Wire the ends of the chain together to retain the chain around the gear-box sprocket and to prevent accidental removal. Now is a good opportunity to examine the chain gaiters for splits or cracks and leaks.

Replace both gaiters if one is worn or damaged as, if one is worn then the other will very probably be equally worn. Remove the spindle nut and withdraw the hub unit complete with rubber cush drive from the swinging arm assembly.

DISMANTLING

Remove the rubber cush drive from the hub assembly and, removing the ten screws, take off the outer hub cover. Remove the 'O' ring and washer from the spindle. Unscrew the five bolts securing the sprocket to the hub and remove the sprocket. Remove the inner

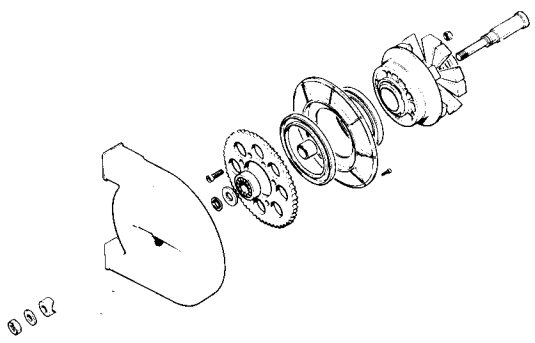


Fig. F16. Replacing the Rear Wheel Drive Sprocket.

sprocket cover and oil seal, but do not attempt to remove the pressed metal cover from the hub. Draw the inner bearing, spindle and spacer tube from the hub, and noting the position of the outer thrust bearing, draw it out of the hub. Wash carefully in de-greasing solution and examine all bearings and oil seals for damage, wear etc, and replace where necessary. Examine the cush drive rubber for wear and deterioration, and replace if necessary.

NOTE
Pay particular attention to the condition of the large oil seal. This should be replaced if the slightest sign of oil leakage is found. When fitting a new seal, run a narrow bead of clear silicone sealer around the base of the oil seal housing to prevent oil leakage past the outside of the seal.

REASSEMBLY
Gently heat the hub to approximately 85°C and place the shock absorber vane face on a firm flat surface.

Press the angular contact thrust bearing fully home to the shoulder within the pre-warmed hub ensuring the thicker end of the outer race is assembled inwards towards the centre of the hub. Turn the hub over and support it on the inner race of the angular contact bearing and enter the spacer tube prior to pressing the double sealed face ball bearing into the housing until the spacer tube prevents further movement. Smear a film of chaincase oil (Section A2) round the hub spigot and fit the inner sprocket cover and oil seal assembly over the spigot. Fit the sprocket to the hub and torque load bolts to the recommended setting. After assembling the spindle through the bearings fit the abutment washer and sealing 'O' ring onto the spindle. Smear clear silicone sealer onto the sprocket inner and outer cover faces and assemble to cover. Pull up the ten screws evenly and tightly. Thinly coat the cush drive rubber with silicone grease and refit it to the hub. Slacken off the chain tensioner and feed the chain through the hub assembly, turning the cush drive to pull the chain through. Refit the spring link with the closed end in the direction of travel. Refit the hub unit to the swinging arm. Seal the chain gaiter ends with clear silicone sealer and new gaiter clips. Refit the rear wheel (Section F12). Replenish the rear chain oil bath with correct amount of the recommended lubricant (Section A2). Adjust the final drive chain (Section D10) and align the wheels (Section F19).

SECTION F15

TYRE MAINTENANCE

CHECKS DURING USE.
Check the tyre pressure daily and examine for cuts etc. over the whole of the tyre surface. Misalignment of the wheels, a twist in the frame or forks and worn wheel bearings or steering head bearings can all affect the wear characteristics of the tyres, it is therefore important to maintain the cycle parts in good working order.

When new tyres are to be fitted the wheels should be balanced after fitting the tyres as an out of balance tyre can adversely affect the handling qualities of the machine.

Have the tyres inspected by an expert if, at any time they have been subjected to any form of violent impact (e.g. hitting kerb), as although

the tyre may appear undamaged on the outside, it may have received internal damage not immediately noticeable to the untrained eye.

When checking tyres remove any small stones and foreign objects that may have become embeded in the tyre. IT IS BETTER TO LOCATE A PUNCTURE WHILST REMOVING SHARP OBJECTS FROM THE TYRE PRIOR TO RIDING THE MACHINE THAN TO HAVE THE SAME OBJECT CAUSE A HIGH SPEED 'BLOW' OUT.

Should the tyres become contaminated at any time with oil, grease or especially brake fluid, the contaminant should be scrubbed off **immediately** with hot, soapy water. If in doubt as to the serviceability of the tyre after contamination consult a tyre expert.

TYRE PRESSURES

The Technical Specification lists the recommended tyre pressures for use on this machine and great importance is attached to the advice given. Failure to follow the advice given on tyre pressure could result in an adverse effect on the grip, wear and handling qualities of the tyres and may result in deterioration of the machine's handling characteristics, to the extent that an accident may result. Always check pressures when the tyres are cold as road usage raises the tyre temperature and, consequently tyre pressures. When undertaking a long high speed journey raise the tyre pressures by 4 p.s.i. (0.3 bar) front and rear (cold). NEVER ON ANY OCCASION EXCEED 50 p.s.i. (COLD) IN ANY TYRE.

WEAR INDICATORS

These are narrow lateral 'bumps' at the base of the tread grooves which appear at the surface when the groove depth is reduced to 0.8 mm (approx). The wear indicators are spaced evenly around the circumference of the tyre in at least three places. The tyre should be replaced before the tread wear reaches this point.

SECTION F16

SELECTION OF REPLACEMENT TYRES

When selecting replacement tyres for this machine it is important to remember the performance capabilities inherent in the design. This machine is a high performance vehicle and it is essential to use 'V' rated tyres as only tyres of this speed rating or higher will withstand the stresses encountered in high speed motoring. 'V' rate is for speeds above 130 mph (210 KM/H).

Load capacity is another important consideration and the tyres being selected must have a greater load capacity than will ever be encountered on the machine fully loaded with luggage and all accessories. Ensure that the tyre cross section will not contact any cycle part during use. Checks must be made when fitting a tyre of differing make to the original equipment to ensure that, with the suspension fully compressed front and rear, there are no contact areas with cycle parts. Remember also that a tyre will tend to 'grow' (that is, the tyre diameter will become larger due to rotational forces and an increase in temperature) at speed on the road, and this could result in the incorrect tyre contacting the cycle parts.

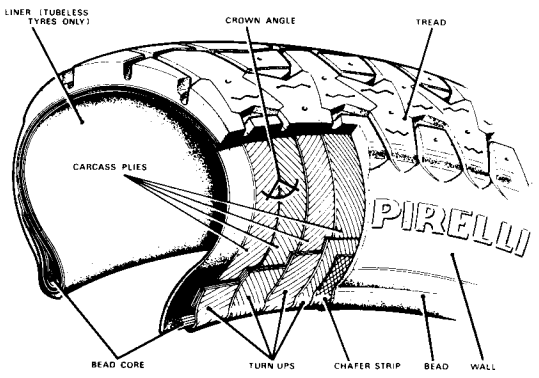


Fig. F17. Cross Section of 'V' Rated Tyre

In view of the performance capabilities of this machine we recommend that only matched pairs of tyres be fitted. Some high speed tyres, although of good quality and performance may not give their best when fitted to a machine

which does not have matching tyres. This 'mis-matching' of tyres can result in instability at high speeds and a general loss in handling performance.

WARNING
IF YOUR MACHINE HAS TUBED TYPE TYRES SPECIFIED AS ORIGINAL EQUIPMENT DO NOT ATTEMPT TO FIT TUBELESS TYRES AS THE WHEELS MAY BE UNSUITABLE.

SECTION F17

REMOVING AND REFITTING TYRES

To remove the tyre first remove the valve cap and valve core, using the valve cap itself to unscrew the core. Unscrew the knurled valve securing nut and then place all parts where they will be free from dirt and grit. It is recommended that the cover beads are lubricated with a little soapy water before attempting to remove the tyre. The tyre lever should be dipped in this solution before each application. First insert a lever at the valve position and whilst carefully pulling on this lever, press the tyre bead into the well of the rim diametrally opposite the valve position (see Fig. F18). Insert a second lever close to the first and prise the bead over the rim flange (Fig. F19). Remove the first lever and reinsert a little further round the rim from the second lever. Continue round the bead in steps of two or three inches until the bead is completely away from the rim. Push the valve out of the rim and then withdraw the inner tube. To completely remove the tyre first stand the wheel upright and then insert a lever between the remaining bead and the rim. The tyre should be easily removed from the rim.

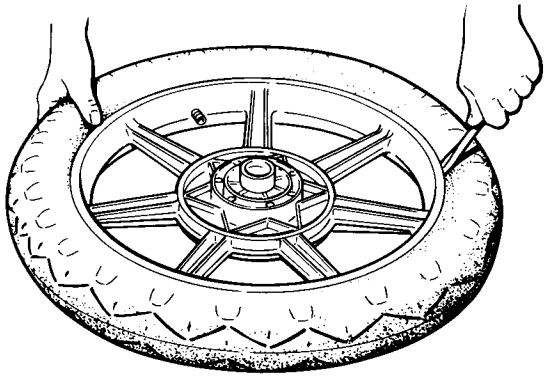


Fig. 18. Inserting the First Tyre Lever

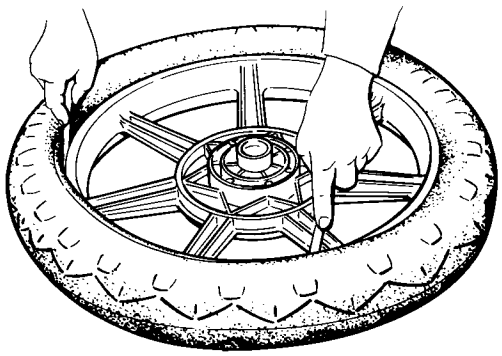


Fig. 19. Inserting the Second Tyre Lever

REFITTING THE TYRE

Replace the inner tube valve core and inflate the tube sufficiently to round it out without stretch, dust it with french chalk and insert in into the cover with the valve located at 180° opposite the cover 'balancing spot' leaving it protruding outside the beads for about four inches either side of the valve.

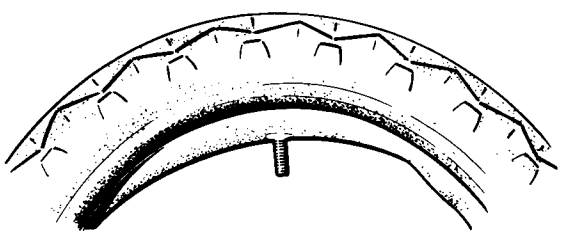


Fig. 20. Cover and Tube Assembled Ready for Fitting

NOTE
The instruction applies to the Pirelli Phantom tyres fitted as original equipment. For alternative manufacture replacement tyres, always read and comply with the manufacturers fitting instructions.

At this stage it is advisable to lubricate the beads and levers with soapy water.

Squeeze the beads together at the valve position to prevent the tube slipping back inside the tyre and offer the cover to the rim, as shown in Fig. F21. At the same time threading the valve through the valve hole in the rim.

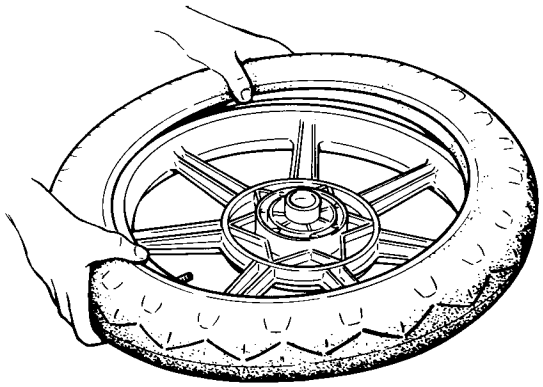


Fig. 21. Refitting the Tyre to the Wheel.

Particular attention must now be given to the direction of travel arrows moulded into side of the tyre indicating the direction of rotation of the tyre when fitted, according to whether fitted to front or rear wheel.

Allow the first bead to go into the well of the rim and the other bead to lie above the level of the rim flange.

Working from the valve, press the first bead over the rim flange by hand, moving forward in small steps and making sure that the parts of the bead already dealt with, lies in the well of the rim. If necessary use a tyre lever for the last few inches, as shown in Fig. F22. During this operation continually check that the inner tube is not trapped by the cover bead.

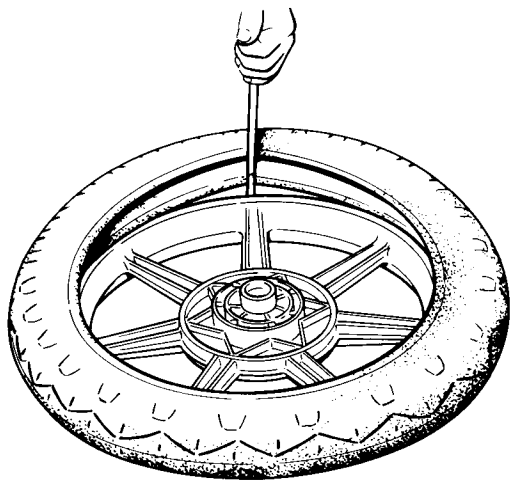


Fig. F22. Levering on the First Bead

Press the second bead into the well of the rim diametrally opposite the valve. Insert a lever as close as possible to the point where the bead passes over the flange and lever the bead into the flange, at the same time pressing the fitted part of the bead into the well of the rim. Repeat until the bead is completely over the flange, finishing at the valve position (see Fig. F23).

Push the valve inwards to ensure that the tube near the valve is not trapped under the bead. Pull the valve back and inflate the tyre. Check that the fitting line on the cover is concentric with the top of the rim flange and that the valve protrudes squarely through the valve hole. Fit the knurled rim nut and valve cap. The tyre pressure should then be set to the figure given in General Data. Before refitting either wheel to the machine it must be checked for balance (Section F20).

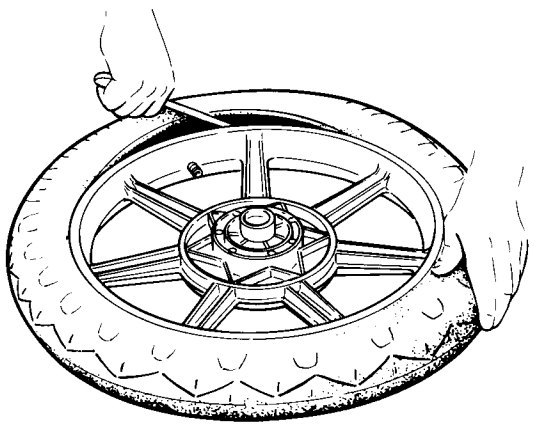


Fig. F23. Levering on the Second Bead

SECTION F18

TYRE REPAIRS

As this machine has very high performance capabilities we do not recommend repairs to the tyres or inner tubes. In the event of damage to the tyre the affected tyre and inner tube should be replaced, repairs to the tyre or inner tubes should be carried out only as an emergency 'get you home' measure. When riding on a repaired tyre keep the speed down and replace the affected tyre as soon as is practicable.

SECTION F19

FRONT AND REAR WHEEL ALIGNMENT

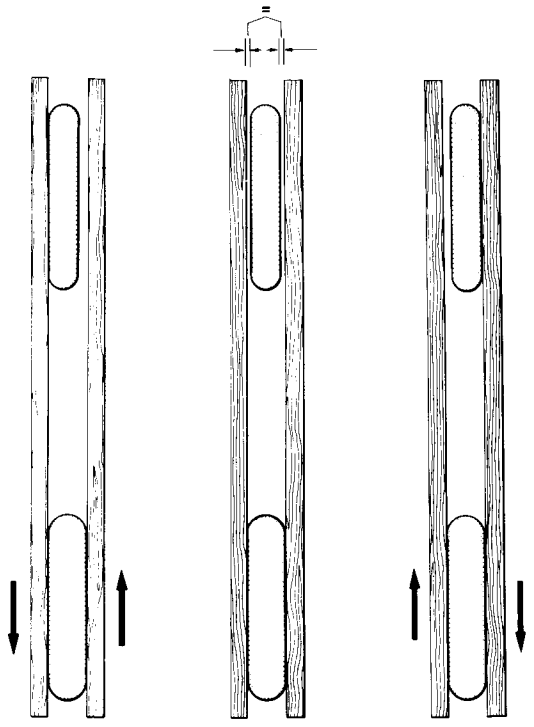


Fig. F24. Front and Rear Wheel Alignment

When the rear wheel has been fitted into the frame it should be aligned correctly by using two straight edges or 'battens' about 7 feet (2 M.) long. With the machine off the stand the battens should be placed along-side the wheel, one either side of the machine and each about four inches above the ground. When both are touching the rear tyre on both sides of the wheel the front wheel should be midway between the parallel with both battens. (allowing for the difference of width of front and rear tyres). Position the front wheel so that this can be seen. Any necessary adjustment must be made by first slackening the rear wheel spindle nuts, then turning the spindle adjuster screws (Fig. F25) to achieve front and rear wheel alignment ensuring that the correct rear chain adjustment is maintained See Section D10 "Adjusting the Rear Chain".

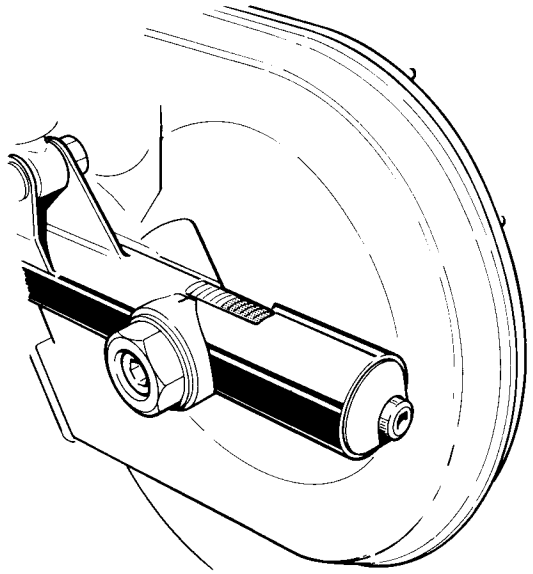


Fig. F25. Maintaining the Rear Wheel Spindle Adjustment

SECTION F20

WHEEL BALANCING

Following renewal or refitting of a tyre to a wheel, the overall balance of the wheel and tyre must be checked and corrected where necessary.

Mount the wheel on a horizontal spindle allowing it to rotate freely on its own bearings. Gently spin the wheel and allow it to stop, marking with chalk the highest point at which the spinning stopped. Repeat the procedure and if the wheel constantly returns to the same position, it will require balancing.

Remove any existing weights and repeat the above procedure, fit to the rim of the wheel at the lightest (highest) point a weight restraining clip, and fit a weight. Repeat the test procedure and should the wheel return to the original position more weight at the top is required. If it swings to the bottom, less weight is needed. When the wheel is in balance it will stop in any position.

If more than 20 grms. are required to balance the wheel it is recommended that two smaller weights are used in preference to one large one.

SECTION G

TELESCOPIC FRONT FORK

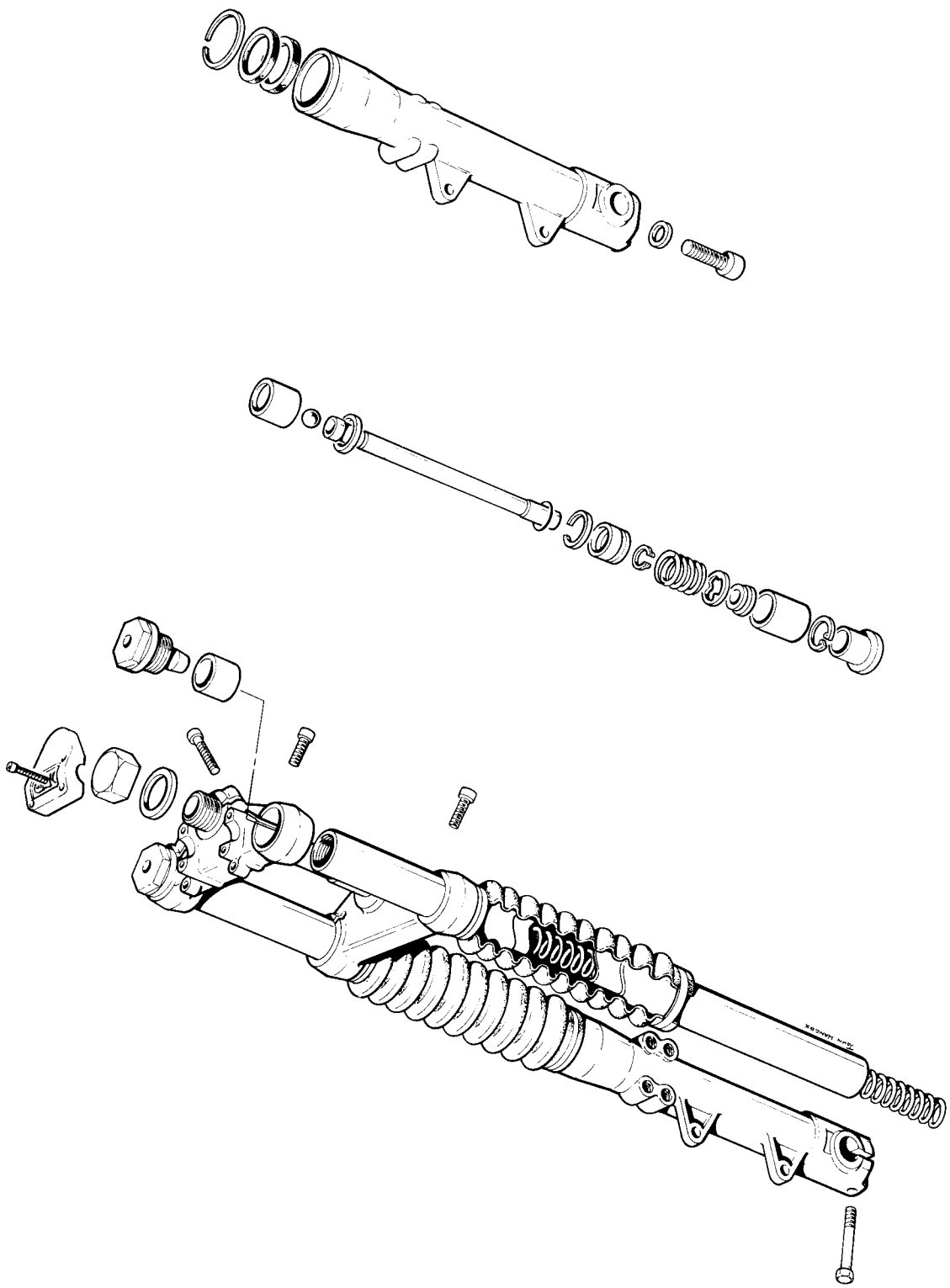


Fig. G1. Sectioned View of the Front Fork

DESCRIPTION

The front fork is telescopic, the lower sliders being manufactured in aluminium alloy, fine bored to act as close fitting bearings, and sliding on the chrome plated high grade steel stanchion tubes supported by internal coiled suspension springs. Each leg contains 250 cc of hydraulic fluid controlling both the fork thrust and rebound damping characteristics provided by the internal damper tube, piston and ball check valve assembly. The forks can be drained at specified intervals by means of a plug provided in each sliding member and replenished by removing the large fork tube top plug assembly.

Each leg is rigidly clamped into an aluminium alloy lower fork yoke in which the steering stem is located and fitted, taper roller races being used to mount the forks into the frame steering head. The top yoke onto which the handlebars are mounted and clamped is also manufactured from aluminium alloy, being retained to the top of the stanchion tubes by M10 pinch bolts, making an extremely rigid structure. The front wheel spindle is clamped into the right hand fork slider, the left positively locating the front wheel alignment, and retained in position by means of a locknut.

SECTION G1

REMOVING AND REPLACING THE FRONT MUDGUARD

To remove the front mudguard first remove the front wheel (Section F10). Release the speedometer cable restraining clip and remove the two bolts securing each mounting bracket to the fork slider legs. Ease each brake pipe rearwards through its support bracket on the mudguard until the grommet can be removed and the brake pipe is free to be lifted clear of the bracket. The mudguard can then be removed. Refitting the front mudguard is the reverse of the above procedure.

CAUTION
Great care must be exercised when removing and refitting the front mudguard assembly in order that damage to the front brake pipes should be avoided.

SECTION G2

REMOVING AND REPLACING THE HANDLEBARS

The handlebars can be removed from the front fork top yoke clamp assembly (eg when refilling the fork legs with damping fluid) without need to detach the hydraulic pipe or the electrical or control cables. Place a protective cover over the fuel tank and remove the four handlebar clamp retaining socket headed screws, carefully holding the handlebars in position until detached and free to lower them carefully onto protective cover over the fuel tank. Replacement is the exact reverse procedure. (See overleaf).

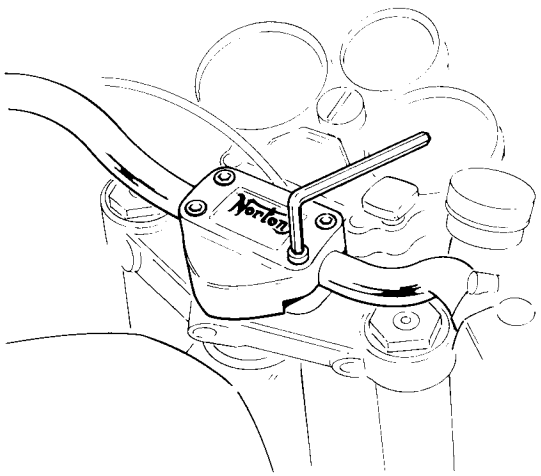


Fig. G2. Handlebar Removal or Adjustment

To detach the handlebars completely from the machine (eg for replacement purposes) it will first be necessary to remove the front brake master cylinder (Section F7)., throttle/twist grip assembly (Section G3), clutch lever assembly, left handlebar switch (Section H11) and handlebar grip.

The clutch cable can normally be removed by slackening off the cable adjuster at the abutment to allow disengagement of the cable nipple from the lever slot. As an aid to easy handlebar grip removal, slide a thin blade or screwdriver between the grip and the handlebar, and squirt a small amount of petrol (gasolene) into the gap. Twist off the grip.

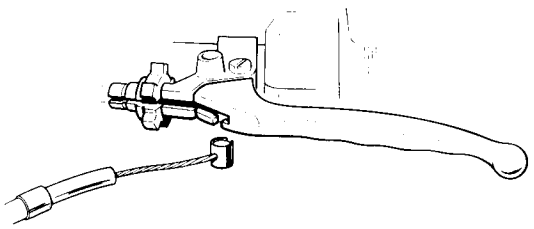


Fig. G3. Removal of the Clutch Cable at the Handlebar.

After replacing the handlebars a check must always be made to ensure that complete freedom is available for full fork and handlebar movement, and that all the controls and cables remain totally unobstructed.

SECTION G3

REMOVING AND REPLACING THE THROTTLE CABLE

HANDLEBAR END

1. Remove the fuel tank (Section E2).
2. Remove left hand side cover and engine cover. (Section E1)
3. Remove the two screws from the base of the right hand switch cluster. Separate the two halves and unhook the upper cable nipple from the twist grip drum.

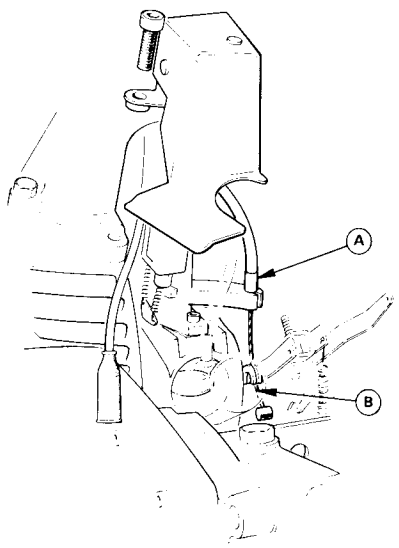


Fig. G5. Removal of the Butterfly Cable.

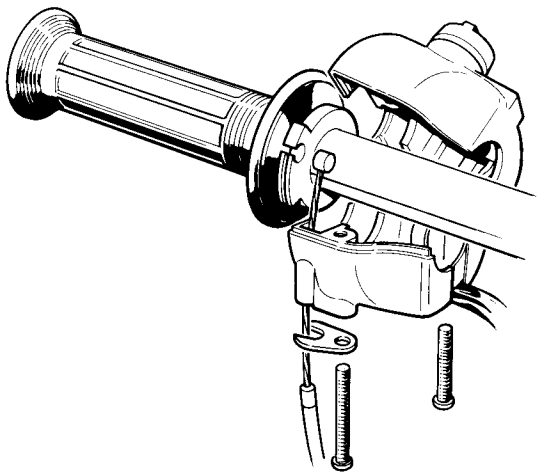


Fig. G4. Right Handlebar Twistgrip

REMOVING THE BUTTERFLY CABLE

1. Lift the butterfly cable outer ferrule from the cast bracket on the back of the air by-pass body (A) Fig. G5.
2. Allow cable outer to drop down cable inner.
3. This will allow the end nipple to be removed from the throttle linkage on the back of the rotor housing (B).

REMOVING OIL METERING UNIT CABLE

1. Remove the inspection cover from the left hand gearbox end cover casting by undoing the three socqket headed screws. Be careful not to lose the nylon sealing washers under the screw heads.

2. Unhook the cable from the oil metering unit operating lever (Fig. G6), being careful not to lose the nylon roller on the nipple. Remove this and keep in a safe place until required for assembly.

3. Remove the upper hexagon nut from adjuster assembly being careful not to disturb adjustment. The cable may now be removed from the gearbox end cover casting.

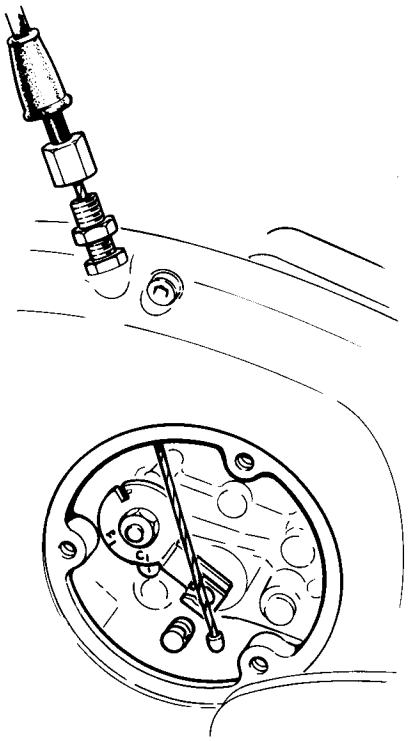


Fig. G6. The Oil Metering Unit Cable.

THROTTLE CABLE – REPLACEMENT AND ADJUSTMENT

Replacement of complete throttle cable assembly.

1. At this stage, the complete throttle cable assembly may be removed from the machine and replaced.

2. The procedure for replacement is exactly the reverse of the various operations described.

3. If required, the assembly may be divided at the junction block under the tank. The two halves of the block can be separated and the outer sleeve pulled back from the upper cable to reveal the nylon block which carried the upper nipples of the butterfly cable and the oil metering unit cable. These can be unhooked as required.

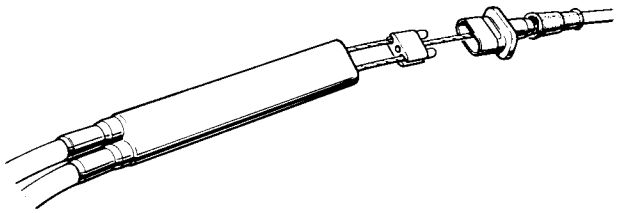


Fig. G7. The Throttle Cable Junction Box

WARNING
Ensure the oil metering unit outer cable is firmly held in the lower adjuster ferrule. If the outer cable has become detatched in service, the cable must be replaced

Adjustment of throttle cable after refitting.

1. The cable should be adjusted to leave 2.5 mm (0.100") free play at the handlebar end.
2. Check adjustment after refitting the fuel tank (Section E2) when the motor is running and warm, by turning handle-bars slowly from lock to lock to discover whether the idling speed is affected.
3. Correct as required.

Adjustment of oil metering unit cable after refitting (Fig. G6)

1. Final adjustment of the oil metering unit setting should be done with the engine running and warm. (See Section A6)
2. When replacing inspection cover and socket screws, remember to refit the 'O' rings and nylon washers. Do not over tighten the socket screws.

WARNING
Adjustment of the engine oil metering unit is critical. Maladjustment could cause excessive oil feed to the engine or alternatively eventual seizure. Follow strictly the instructions given in Lubrication Section A6. "Adjusting the oil metering unit".

SECTION G4

REMOVING AND REPLACING THE CLUTCH CABLE

Removing the Cable

1. Pull out the choke knob to pre-tension the choke cable assembly.
2. Remove the petrol tank. (Section E2)
3. Slacken the clutch cable adjuster at the handlebar end and remove the cable from the lever assembly (Fig. G3).
4. Remove the inspection cover from the primary chain case by undoing the three socket headed screws and removing the nylon washers from the counterbores. Screw an M8 bolt into the cover which will jack the cover from its location.
5. Unhook the cable end from the operating lever with long nosed pliers. (Fig. G8).
6. Remove the cable from the machine.

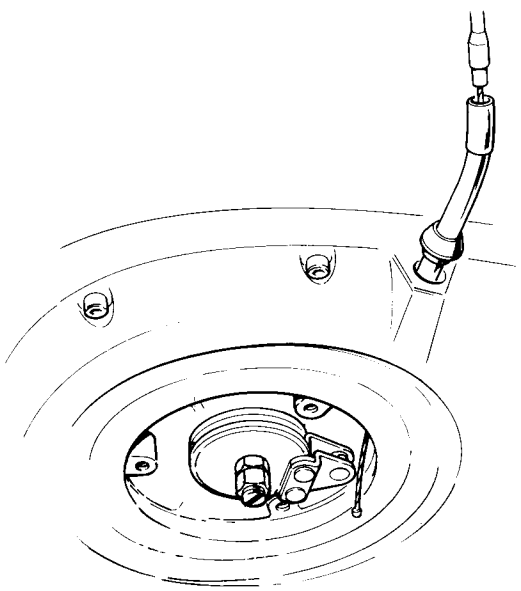


Fig. G8. Clutch Cable Removal at the Primary Chaincase

Fitting the Cable

Fitting the cable is the reverse of the procedure described above. Take care to ensure that the cable end is seating correctly in the operating lever.

NOTE:
Check that choke control knob is fully lifted before replacing tank. This will prevent the cable junction box from snagging on the inside of the tank tunnel. Check also the plastic anti-chafe guard is correctly positioned between the fork top yoke and the instrument binnacle mounting points.

When refitting a clutch cable, always ensure the cable slot in the lower clutch operating lever trunnion is facing inwards (towards the clutch adjuster pull rod). Insert the end of the cable through the ears of the lever before engaging the cable and entering the cable nipple into the trunnion slot.

Check the operation of the clutch, and if necessary re-adjust the mechanism in accordance with the instructions given in Section C8 "Adjusting the Clutch Operating Mechanism"

If the clutch has any tendency to slip when the clutch lever is fully released, it is a sign that the clutch pull rod (or the cable) is pre-loaded excessively. If the clutch fails to free completely when the clutch lever is fully compressed, it is a sign that too much backlash (or free play) exists in the cable or pull rod.

When adjustment and operation is satisfactory, check its seating of of the sealing 'O' ring is correct, that the three plastic sealing washers are in place under the heads of the three socket head screws, and replace the inspection cover.

Finally, re-adjust the cable at the handlebar clutch lever cable adjuster, until all the free play in the outer cable has been eliminated.

SECTION G5

CHOKE CABLE – REPLACEMENT AND ADJUSTMENT

1. Remove the fuel tank, side panels and battery (Sections E1, E2 and H1)
2. Detach left and right hand carburettors as described in Section B6 "Removing and Refitting the carburettors"
3. The choke cable may now be removed by slackening the lock ring on the choke knob assembly and sliding the choke knob and cable assembly off the machine.

Fitting and Adjustment of the Cable

1. Fitting is the reverse of the procedure described above.
2. When refitting the solderless nipples at the end of the choke cables, allow 2.5 mm (0.100") free movement of the inner cables before the choke begins to function.
3. Do not forget to raise the choke lever knob fully before replacing the petrol tank.

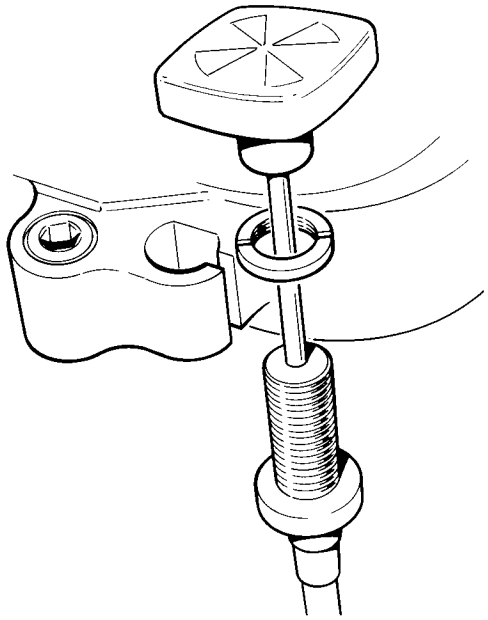


Fig. G9. Choke Cable Location at Binnacle

SECTION G6

THE INSTRUMENT BINNACLE

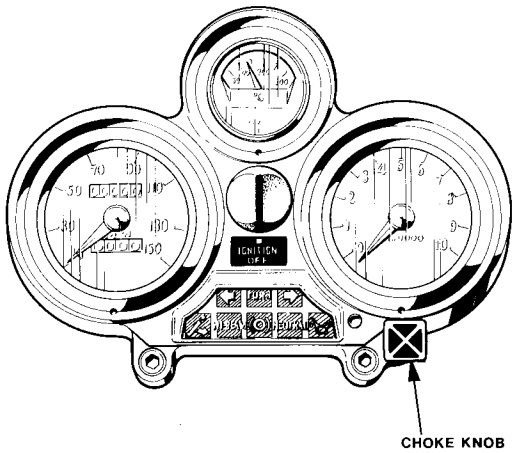


Fig. G10. The Instrument Binnacle – Showing Location of the Choke Knob and the Mounting Screws

To gain access to the instruments, ignition switch, illumination or warning lights, it is necessary to remove the binnacle from the fork top yoke.

Remove the two socket headed screws which attach the complete binnacle assembly to the top fork yoke. Slacken the lockring which retains the choke knob assembly in its locating slot in the binnacle casing. Slide the choke assembly clear. (See Section G5 above).

Disconnect the speedometer drive cable at the drive gearbox connection.

Raise the binnacle slightly. Next, remove both electrical plugs (one red, one white) from beneath the binnacle lower half and lift clear of the forks.

Replacement of the binnacle assembly is a direct reverse of the above. Colour match the red and white plugs and sockets, re-connect the speedometer cable and replace the completed assembly onto the top fork yoke, tightening the two socket headed screws into position. Replace the choke cable into the binnacle slot, and tighten the lock ring.

For details of the electrical equipment and wiring connections within the binnacle, refer to Section H8 – "Binnacle Warning and Illumination Lights".

SECTION G7

FRONT FORK REMOVAL

The front forks may be removed from the machine either as an assembly complete with front wheel and mudguard, or as forks complete following wheel and mudguard removal. Alternatively the fork legs may be removed and replaced one leg at a time, leaving the top and bottom yokes in position. The sequence of operation depends solely on the requirements and facilities for fork overhaul available to the fitter.

If, however, the forks are to be stripped, then it is advisable to remove the brake calipers and hydraulic system, handlebars, front wheel, and mudguard prior to removing the front forks as the front wheel spindle is heavily torque loaded and may be difficult to remove if left in place whilst removing the forks.

Drain the fork legs by removing the drain screw at the base of the legs and when the flow of oil has ceased, pump the forks up and down to pump out any remaining oil. Disconnect the speedometer drive cable at both ends and remove. Release the red and white multi-pin connectors from the instrument binnacle, remove the two socket headed screws securing the binnacle to the fork top yoke, and remove. Disconnect the clutch cable and the handlebar control switch electrical connectors. Remove the front brake lever and master cylinder and tie to the top of the fork tube. Release the four socket headed bolts securing the handlebars to the fork top yoke, and remove the handlebars. If the fork legs are to be stripped it is advisable at this stage to slacken the fork top nuts and also the damper rod screws. Slacken the top yoke clamp screws and remove the top yoke. Remove the steering stem adjusting and locking nuts and supporting the forks gently tap downwards to remove from the frame.

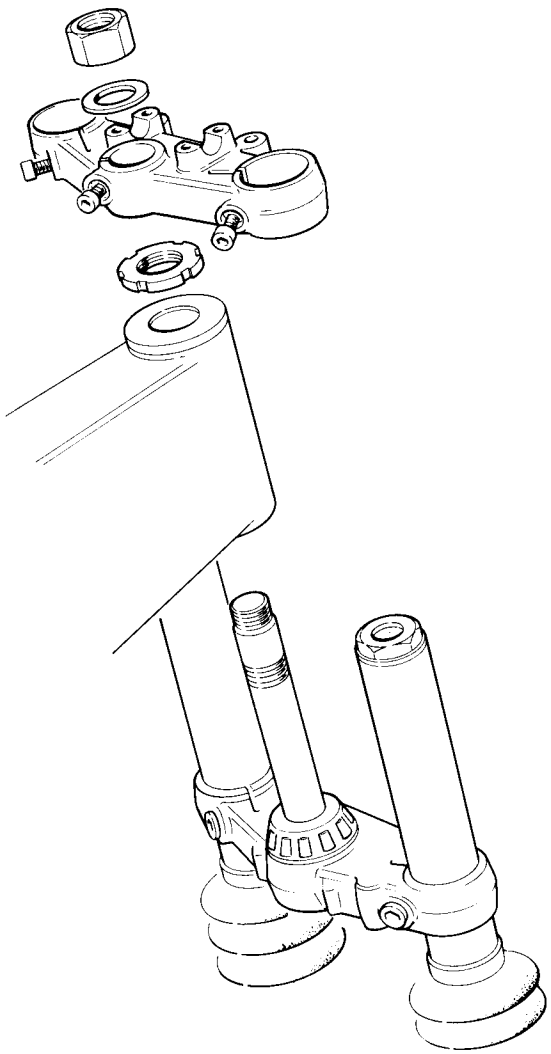


Fig. G11. Removingthe Front Forks

SECTION G8

STRIPPING AND INSPECTING THE FORK LEGS

STRIPPING THE FORK LEGS

1. Remove the fork legs from the yokes as described in Section G7.
2. Release the fork tube cap
3. Remove the spring guide sleeve. Remove the spring (twisting it round to allow the oil to drain back into the fork leg).
4. Empty the oil out of the fork leg by pumping the fork slider up and down until all the oil has drained.

5. Locate the fork leg upside down in a vice (using soft fibre jaws to protect the finish) and remove the damper rod bottom screw. During this operation it may be necessary to prevent the damper rod turning in the slider by inserting a guide into the top of the damper rod.

6. Remove the fork dust seal bellows by releasing the clip at the top of the slider and pulling the bellows clear.

7. Remove the fork tube very gently from the slider.

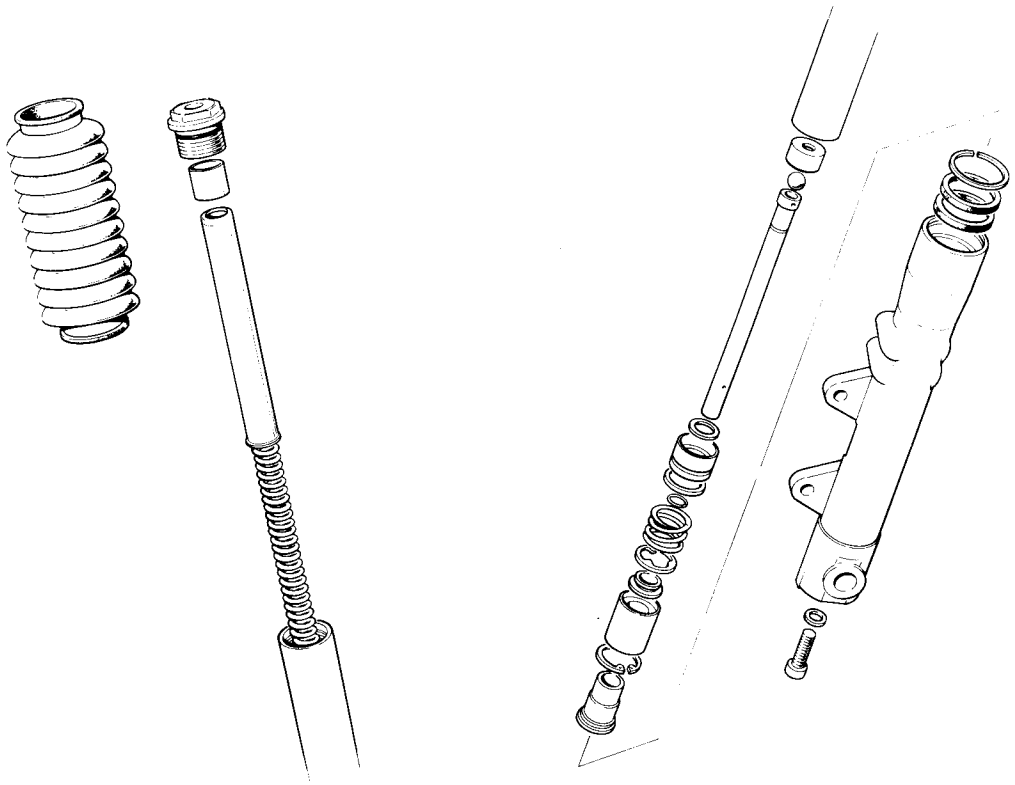


Fig. G12. Stripping the Fork Legs

8. Remove the circlip located at the top of the slider by positioning a screwdriver beneath the circlip and levering gently upwards.

9. Exercising great care, lever out the oil seal. Ensure that the top lip of the fork slider is protected and not damaged and that the oil seal seat is not damaged in any way as this may cause leakage of oil on re-assembly.

10. Remove the damper rod from the fork (it may be necessary to tap the rod out gently if it has jammed).

11. Remove the valve assembly by withdrawing the circlip located in the end of the fork tube and lay out the components as they were dismantled (for ease of re-assembly).

INSPECTION

Whilst the forks are dismantled we recommend that the oil seals be replaced as these are relatively inexpensive items and, if possible the valve assembly should be replaced as a worn valve assembly will greatly affect the handling characteristics of the machine.

Inspect the springs for any signs of cracking or collapsed coils and measure the overall length of the springs. If not within the dimensions given in 'General Data' replace them.

The springs should always be replaced in pairs as springs of unequal length with adversely affect the handling.

SECTION G9

ACCIDENT DAMAGE

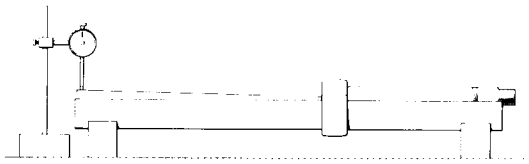


Fig. G13. Front Fork Alignment

When the forks have been stripped, the fork tubes and yokes can be examined for damage.

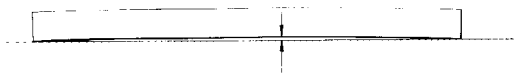


Fig. G14. Checking the Fork Tubes for Distortion

If the machine has been involved in an accident, there is a possibility that the fork tubes or fork yokes, or both, may have been distorted. Examining the tubes for distortion is a simple procedure. Remove the tubes from the fork and yokes and roll them on a surface table (Fig. G14), any distrotion will show up clearly. Fork tubes that are damaged in any way should be replaced. We do not recommend attempting to straighten fork tubes as they may be weakened in the process of straightening and are not an expensive item to replace. If after the above test, the tubes are found to be straight, then the yokes may be checked using the following methods.

To examine the bottom yoke requires the use of a surface table, three 'V' blocks, and a dial test indicator. With the fork tubes in the yokes, position the assembly as shown in the illustrations (Fig. G13), that is with the tubes supported at the top end on one block per tube and at the bottom end on one block. The difference in height should now be measured between the left and right fork tubes. Any difference will be attributable to a distorted bottom yoke. When tubes and/or yokes have been replaced always try to set the tubes up parallel on the 'V' blocks and surface table. This will ensure freedom of fork action and correct wheel alignment when the forks are refitted to the machine.

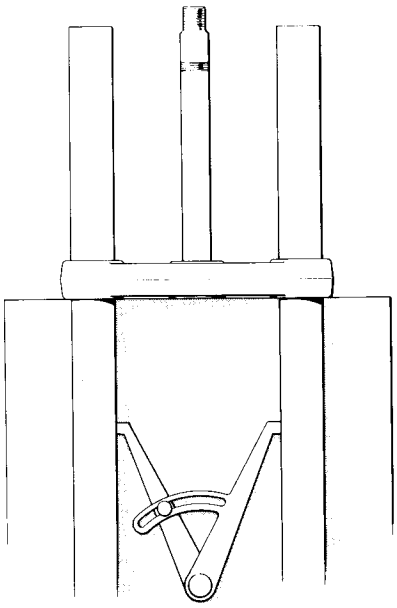


Fig. G15. Checking the Bottom Yoke

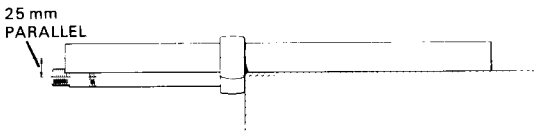


Fig. G16. Checking the Stem Angle

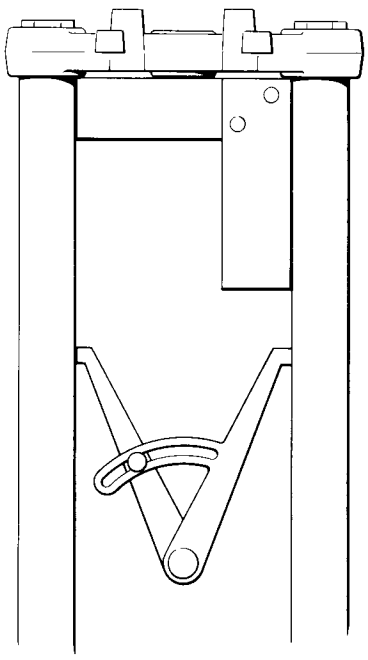


Fig. G17. Checking the Top Yoke

SECTION G10

REASSEMBLING AND REFITTING THE FORK LEGS

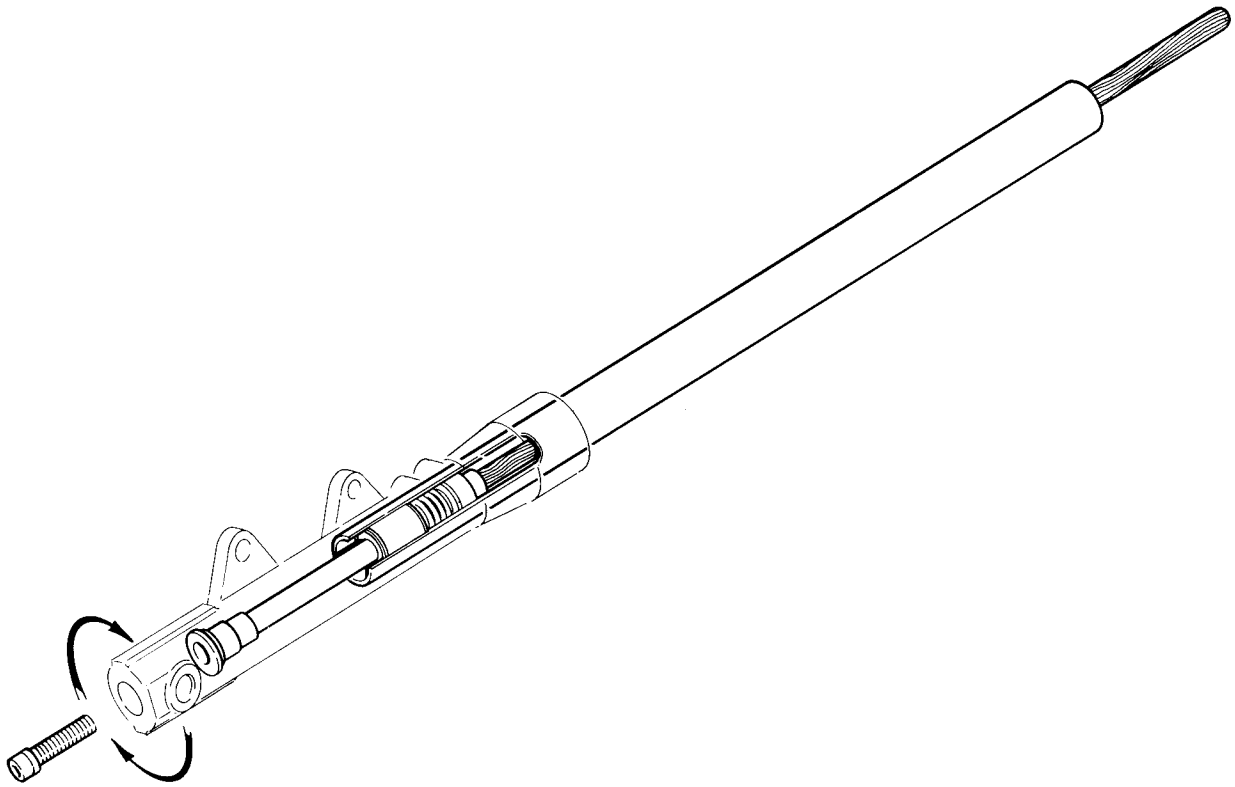


Fig. 18. Reassembling the Front Forks

1. Reassemble the valve unit and refit it to the fork leg.

2. Refit the damper rod assembly into the fork tube moving the damper rod from side to side to locate the end in the counterbore.

3. Refit the oil seals into the fork slider and fit the fork tube and damper assembly into the fork slider pushing it firmly into the counterbore.

4. Using the same guide as used during dismantling refit the bottom screw, rotating the fork tube to ensure correct location. If the fork does not move freely in the slider when the bottom screw has been tightened repeat the assembly operation more carefully.

5. Refill the fork tubes with the recommended quantity and type of oil (Section A2) and pump up and down whilst holding the slider stationary.

6. Insert the spring and spring guide sleeve. If the spring has variably spaced coils fit the tighter coils at the top.

7. Refit the top caps.

8. Refit the fork dust seal bellows aligning the lower edge of the bellows with the bottom of the parallel section of the fork slider casting.

9. Reassemble the fork legs into the yokes and complete the re-assembly of the complete forks.

10. Leaving the axle and bottom yoke bolts slightly slack take the machine off the stand and, applying the front brake pump the front forks up and down at least six times to line up the fork legs.

11. Tighten all bolts and nuts to the recommended figures given in Technical Data.

SECTION G11

REPLACING THE FRONT FORKS

As discussed in Section G7, (Front Fork Removal), the front forks may be removed complete for dismantling, or if preferred dismantled stage by stage from the machine itself.

Replacement of the forks, which ever method is adopted is the reverse of the dismantling procedure, care being taken to ensure attention is given to the adjustment of the steering head bearings as early as possible, preferably before the weight of the wheel, mudguard, calipers, handlebars etc are added. The ideal is when building has commenced with the assembly of the top and bottom yokes to the frame headstock prior to offering up the leg assemblies.

The headraces should be adjusted and locked into position with the stem bearing adjusting the top nut to provide minimum clearance as described in Section G1.

SECTION G12

RENEWING THE STEERING HEAD BEARINGS

Remove the forks complete as detailed in Section G7.

Remove the bearings, dust shields and shims, remove the bearing outer races by gently tapping out of the frame with a soft metal drift. Replace the bearing races in the frame and grease the replacement bearing with the recommended lubricant (Section A2). Clean any burrs from the fork stem and reassemble the forks onto the machine. Adjust the bearings correctly (Section G13) and, leaving the fork top yoke clamp bolts looses, push the machine foward and apply the front brake.

This will align the fork tubes.

SECTION G13

STEERING HEAD BEARING ADJUSTMENT

It is important that the steering head bearings are kept in correct adjustment. Worn or mal-adjusted bearing will have a detrimental affect on the handling qualities of the machine.

The steering head bearings are of the taper roller type and are greased on original assembly. As the steering head bearings are sealed units no lubrication is necessary except during:-

a. Removal for replacement.

b. Removal for any other reason, i.e. fork replacement, re-painting the frame etc.

Place a support under the front of the engine so that the front wheel is raised off the ground, stand in front of the machine, grasp the base of the fork legs in each hand and attempt to move them backwards and forwards. Should any play be detected, the steering head must be adjusted.

If excessive movement is present, it is advisable first to check that this is not due to wear in the forks themselves between the stanchion tubes and outer sliding members. If no play exists there, then the correct procedure is to re-adjust the steering head taper roller bearings such that all fore and aft movement is eliminated, yet no pre-loading applied between the two roller bearings.

Running the machine with over-tightened head bearings inevitably results in bearing track indentation causing serious deterioration in handling characteristics. Turn the handlebars from left to right and right to left a few times holding the handlebars very lightly. No roughness or 'lumpy' movement should be felt. If the head race bearings feel rough or 'lumpy' the bearing races are either too tightly adjusted or are indented or the rollers damaged. In the latter cases they must be replaced.

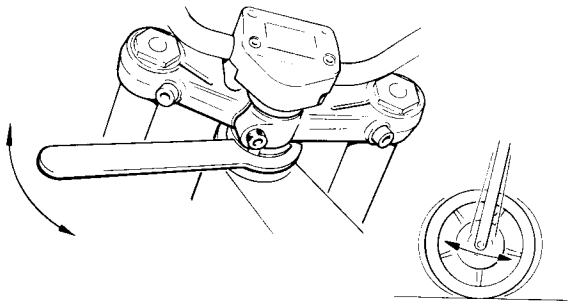


Fig. G19. Steering Head Bearing Adjustment

TO ADJUST THE STEERING HEAD BEARINGS

With the support firmly placed under the front of the engine unit to maintain the front wheel off the ground, remove the handlebars and handlebar clamp as described in Section G2. Slacken the steering stem top locknut from the top yoke. Release and slacken off the top yoke stem pinch bolt beneath the locknut. Next slacken the two fork legs pinch bolts in the lower yoke. Using a suitable 'C' spanner gradually screw down the adjuster ring nut until all the play has been adjusted out. Great care must be taken to avoid overtightening the adjuster ring nut, as this could damage the bearings and seriously affect the handling of the machine.

Retighten the steering stem top locknut, the top yoke stem clamp bolt to a torque of 2.5 kg M (18 lb ft) and the fork leg pinch bolts in the lower yoke to a torque of 5.0 kg M (22 lb ft)

Recheck the fork for minimal play and for freedom of movement of the bearings.

SECTION H

ELECTRICAL SYSTEM

ELECTRICAL SYSTEM

INTRODUCTION

The electrical system is supplied from a 220 w alternating current generator situated on the left hand engine end plate and is driven directly from the end of the rotor shaft. The current is converted to DC power by an electronic voltage regulator, with direct current being supplied to a 12 v 14 amp/hr battery.

Power is supplied to an electronic ignition unit with internal distributor switching controlled by a variable reluctance electro-magnetic pulse generator, which senses a change in magnetic field strength caused by a recess in the flywheel providing a signal for the ignition system to operate. The battery supplies current for the lights, ignition system, single rotor idle system and twin horns operated by a relay unit.

The routine maintenance required by the various components is set out in the following sections. All electrical components and connections, including the earthing points to the frame of the machine must be clean.

No emergency start facility is incorporated. There is, however, sufficient voltage available to start the machine by pushing if the engine will not turn over on the starter motor.

NOTE:
Great care must be taken when push starting this machine. The machine is light, the engine starts easily, and throttle response is rapid. When attempting a push-start, keep one hand on the clutch lever and the throttle twist grip ready for immediate closure at first sign of engine response.

1. Before commencing any inspection or fault rectification on the electrical circuits, check fuse box for any defective fuses and check the battery connections are clean and secure.

2. When working on electrical plugs and connectors we advise the use of Wynns 'Viscotene' on all plugs and connectors prior to re-assembly in order to reduce the chance of corrosion.

3. The voltage generated by capacitor discharge ignition systems (particularly primary circuits) can be dangerous. Investigatory work should only be undertaken by trained personnel. Ensure the ignition switch is 'off' before working on any part of the ignition system.

SECTION H1

BATTERY PREPARATION AND INSTALLATION

BATTERY – INITIAL FILL AND MAINTENANCE

The battery containers are moulded in a translucent plastic material through which the acid level can be seen. Screwed filler plugs seal the top against accidental spillage with gases being vented through a single pipe at the side of the battery which is long enough to carry any potentially corrosive fumes well clear of the parts which may be affected.

WARNING

1. DO NOT ALLOW NAKED LIGHTS OR SPARKS NEAR THE BATTERY AS IT GIVES OFF HYDROGEN & OXYGEN GASES WHICH CAN BE EXPLOSIVE.

2. DO NOT CONNECT THE BATTERY TERMINALS 'BACK TO FRONT'. NEGATIVE IS EARTH ON THIS MACHINE.

TABLE A

SPECIFIC GRAVITY OF ELECTROLYTE FOR FILLING THE BATTERY

UK & CLIMATES NORMALLY BELOW 77° F (25° C)		CLIMATES BETWEEN 77–100° (25–38° C)		TROPICAL CLIMATES OVER 100° F (38° C)	
FILLING	FULLY CHARGED	FILLING	FULLY CHARGED	FILLING	FULLY CHARGED
1.260	1.280/1.300	1.240	1.260	1.210	1.220/1.240
The electrolyte should be cooled below 30° C (86° F) before filling.					

To prepare a dry-charged battery for service first remove the short blanking pipe seal attached to the vent and fit the long vent pipe. Remove the filler caps and fill each cell with dilute sulphuric acid (Electrolyte–S.G. 1.260 at 60° F) to the UPPER LEVEL indicator line. Allow the battery to stand for at least one hour, and then top up to the UPPER LEVEL with dilute sulphuric acid. The battery should then receive a charge of 1.4 amperes for fifteen to twenty hours before being allowed to stand for at least one hour. If the electrolyte level has fallen during charging, top up with distilled water to the UPPER LEVEL. Do not install the battery into the machine until charging and filling is complete and the battery cleaned of any acid spillage and wiped clean. The specific gravity of the electrolyte should now have reached 1.280/1.300.

NOTE:
In tropical climates (over 100° F), initial fill specific gravity should be 1.210 and fully charged become 1.220/1.240.

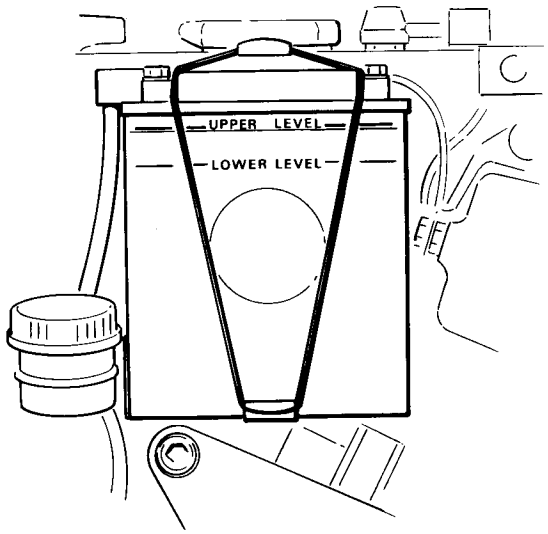


Fig. H1. Battery Location and Installation

TABLE B

MAXIMUM PERMISSIBLE ELECTROLYTE TEMPERATURE DURING CHARGING

Climates Below	Climates Between	Climates Above
77° F (25° C)	77–100° F (27–38° C)	100° F (38° C)
100° F (38° C)	110° F (43° C)	120° F (49° C)

NOTE:
The specific gravity of the electrolyte varies with the temperature. For convenience in comparing specific gravities, they are always corrected to 60° F, which is adopted as a reference temperature. The method of correction is as follows:

For every 5° F below 60° F deduct 0.020 from the observed reading to obtain the true specific gravity at 60° F. For every 5° F above 60° F add 0.020 to the observed reading to obtain the true specific gravity at 60° F.

The temperature must be indicated by a thermometer having its bulb actually immersed in the electrolyte and not the ambient temperature.

INITIAL INSTALLATION OF THE BATTERY

When charging and filling of the battery has been completed, and the case, filler plugs and terminals dried and wiped clean, grease (or use petroleum jelly-vaselene) liberally applied to the two terminals prior to offering the battery on to the machine, place the battery on the tray (upon the rubber mat) with the terminals outboard, POSITIVE terminal forward. Connect the RED lead to the positive (+ve) terminal, and the black earth (ground) lead to the rearmost negative (–ve) terminal. Ensure the plastic vent pipe is threaded downward and rearward, and that the exit lies below the effective lowest point of the frame to ensure acid fumes escaping from the battery do not initiate corrosion anywhere on the machine itself. Clip the end of the pipe in this position.

ROUTINE MAINTENANCE

Every month or weekly in hot climates, the battery should be cleaned as follows:-

Remove the battery from the machine, examine the terminals. If they are corroded, scrape them clean. Remove the vent pipe and ensure it is not blocked. Check the vent hole is free, wash the battery with warm water and grease the terminals with petroleum jelly. Replace the vent pipe securely and replace the battery on the machine negative terminal to earth (ground).

Every month preferably whilst the battery has been removed for examination and cleaning, examine the level of electrolyte in each cell, add DISTILLED WATER until the electrolyte level is between the two lines. In very hot climates examine electrolyte level weekly.

WARNING
Do not allow the electrolyte level to go above the top level indicator line.

With this type of battery the acid can only be reached using a small hydrometer which indicates the level of charge. Great care should be exercised when carrying out these operations not to spill any acid or to allow a naked flame near the electrolyte. The mixture of hydrogen gas given off during charging and, to a lesser extent when standing, can be dangerously explosive.

The reading obtained from the battery electrolyte should be compared with those given in Table A. If a battery is suspected of being faulty it is advisable to have it examined by a Yuasa service centre or agent.

Storing the Machine for Long Periods
Should the machine be left for any length of time (e.g. over two weeks at a time) the battery should be disconnected, as there is a continual small current drain imposed on the battery by the voltage regulator. (And clock – Police Machines). If the vehicle is to be left for more than two weeks, remove the battery and trickle charge every two weeks to keep the battery in peak condition.

When re-fitting the battery clean the terminals and lead ends to ensure a good contact.

SECTION H2

THE ELECTRONIC COIL IGNITION SYSTEM

The electronic capacitor discharge coil ignition system comprises a variable reluctance electromagnetic pulse generator (Fig. H3) which is usually referred to as an 'ignition trigger unit', and electronic ignition unit and two 12 volt ignition coils. The ignition trigger unit and electronic ignition unit are designed specifically for this machine and are not replaceable with components from other sources, the specified system incorporating an engine revolution limited designated to operate at 9250 ± 150 r.p.m.

The ignition trigger unit initiates the required pulse when a step in the flywheel traverses the pole piece of the trigger unit. At this moment, the magnetic flux density is changing rapidly, and this generates a voltage in the trigger unit windings. The polarity of this voltage is reversed when the opposite step in the flywheel traverses the pole piece; it is the polarity of the trigger signal which determines which of the ignition coils is fired by the electronic ignition unit

The trigger unit is located between the flywheel and the left engine end plate, behind the generator/flywheel cover. Two small bolts secure both the trigger unit and air by-pass microswitch to each side of the left end plate.

The electronic ignition unit, is of the capacitor discharge type. High voltage pulses are distributed to the low-tension windings of each coil alternately. It is for this reason that care should be taken when dealing with the ignition system. Fault diagnosis is best performed by substituting with units known to function correctly, after checking that correct supply voltage exists between the white/yellow (positive) and black (negative) leads when the ignition is switched on. (See Section H3 Part A).

The electronic ignition unit is situated behind the left electrical side cover which is removed by releasing the 'Dzus' fastener at the forward end of the panel (Section E1). The ignition unit is fastened in place to the frame by two clips at the top and bottom of the unit which secure both the ignition unit and the voltage regulator to the frame. Withdrawing the clips respectively upwards or downwards will release both the ignition unit and voltage regulator unit (Fig. H16).

The best method of locating a low tension circuit fault is dealt with in the next section. Failure to locate a fault in the low tension circuit would indicate that the spark plugs are faulty or a fault in the high tension side of the system, and the procedures given in Section H3 should be followed.. However, before commencing any of the following procedures the air gap setting between the ignition trigger unit and the flywheel (Fig. H3), should be checked.

SECTION H3 PART A

CHECKING THE LOW TENSION CIRCUIT FOR CONTINUITY

A standard 'AVO' meter or 'multimeter' should be sufficient to test the circuits on this machine and the tests described have been compiled with this in mind.

NOTE:
Before commencing with ignition circuit fault finding, it is advisable to first examine the single rotor idle valve and micro switch for correct operation. Section B11.

Refer to the electrical circuit wiring diagram (Figs. H19 & 20). The following details the continuity of the low tension ignition circuit working back from Electronic Ignition Unit, through the fuse box, ignition switch, binnacle plugs etc to the source of power supply, in order to establish a point of failure or breakdown.

1. Disconnect the Electronic Ignition Unit feed plug.

2. Switch on the ignition, and check the 12 volt (white/yellow) pin at the plug.

3. Switch off ignition.

4. Check continuity between the slate and slate/black leads at the feed plug from the Electronic Ignition Unit to the trigger unit (See Section H3 Part B).

5. Check earth (Black) continuity at connector pin to main frame earth (ground). If a 12 volt supply is not available at the White/Yellow lead feeding the ignition unit trace back to source as follows, using the multi-tester.

6. Again switch on ignition.

7. Follow White/Yellow lead to right handlebar switch (ENGINE STOP SWITCH).

8. Ensure switch is in 'Run' position.

9. Trace wire continuity back to White/Black lead at fuse box (Fig. H20) (8 amp fuse).

10. Check fuse and fuse box terminal connections for continuity.

11. Follow back through white lead from fuse box (12 volt secondary supply) to the white binnacle plug (terminal 2). This is fed from the ignition switch on the 'ON' position.

12. The ignition switch is fed from the red binnacle socket through the brown/blue lead, which continues back to the main 25 amp fuse in the fuse box. Check fuse and terminal connections.

13. This fuse is fed by the brown/white wire from the start relay battery connection. The start relay is fed direct from the battery positive terminal by the heavy duty red wire.

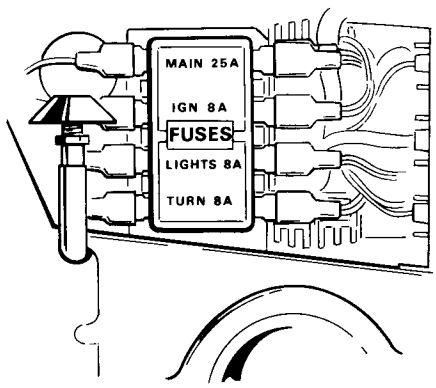


Fig. H2. The Fuse Box

Main fuse 25A (Blue)
Ignition Circuit 8A (White)
Flasher Circuit 8A (White)
Lights Circuit 8A (White)

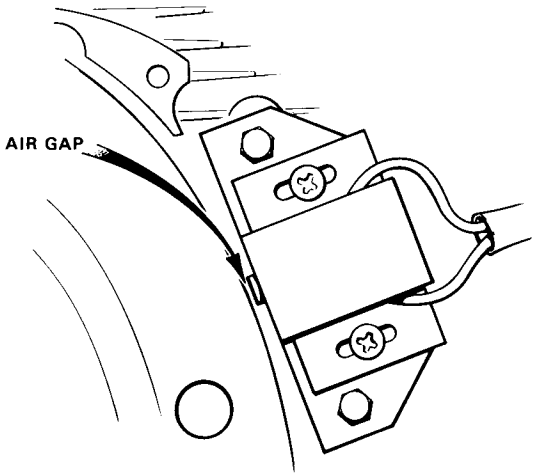
NOTE:
In the wiring harness, all colour coded wires entering the harness leave identically coded.

SECTION H3 PART B

TESTING THE IGNITION TRIGGER UNIT

First check the air gap (Fig. H3). Having ascertained the air gap is correct, check the continuity by removing the leads at the two in-line connectors and connecting the tester across the slate and slate/black leads.

Having checked for continuity, the next stage is to measure the resistance across the same



slate and slate/black leads. A reading of between 150-210 Ohms is normal. Any reading outside these limits indicates a faulty trigger unit and replacement will be necessary. Finally check the trigger unit slate and slate/black leads for short to earth. A short to earth would indicate an insulation fault in the trigger unit and replacement being necessary.

Other than the above, no other checks are possible on the trigger unit without access to the manufacturer's test equipment.

Fig. H3. Ignition Pick-Up Trigger Unit – Location and Air Gap.

SECTION H3 PART C

TESTING THE ELECTRONIC IGNITION UNIT

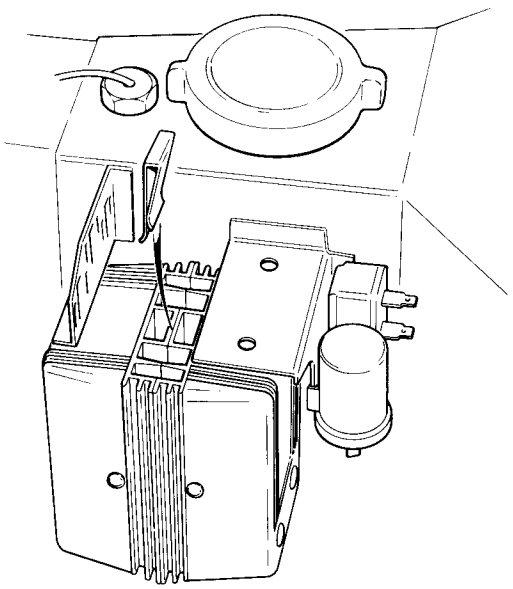


Fig. H4. Electronic Ignition and Voltage Regulator Units

WARNING
Electronic ignition units can be dangerous. Great care must be taken when handling this equipment. Wherever possible when working on the ignition system, disconnect the battery at the negative and positive terminals.

Due to the design of the electronic capacitor discharge ignition unit the only tests possible are:-

a. Check 12 volt supply to the ignition unit at the multi pin connector white/yellow lead.

b. Assuming there is a 12 volt supply at the white/yellow lead with the ignition 'on', and that the ignition trigger unit has been checked as detailed in H3 Part B, the only other test is to substitute the ignition unit assembly for a known serviceable replacement. Should the ignition unit require replacement, a Factory Exchange replacement unit can be obtained at minimal cost.

SECTION H3 PART D

TESTING THE IGNITION COIL LOW TENSION CIRCUIT

Disconnect the red multi pin plug at the ignition unit and check for continuity along the black/white lead to the right coil, and along the black/yellow lead to the left coil. To gain access to the coils, refer to Section E3. Check both the black/white leads and black/yellow leads for shorting to earth. If the above test does not uncover a fault check the coils for resistance. A normal reading of 2.8 Ohms should be obtained. Any reading outside these limits would indicate a faulty coil and necessary replacement. Check the coil earth lead (Black) for continuity to earth. (See below).

No further testing of the low tension side of the ignition circuity is possible without access to manufacturers test equipment.

SECTION H3 PART E

TESTING THE IGNITION COIL HT OUTPUT

i) Testing the ignition coil

Low tension winding resistance	2.8 ohms (nominal)
High tension winding resistance	10K ohms (max.)

ii) Testing the ignition coil H.T. Output

A spark gap of 10mm. should be arranged. Each ignition coil should be capable of producing a spark sufficient to jump this gap. Observe the H.T. "chimney" of the cable while the engine is rotated using the starter motor and check that there is no sparking or "tracking" to the L.T. terminals. If the coil cannot produce a 10mm. long spark, or if it is tracking,then it must be replaced.

iii) Testing the ignition H.T. Leads

The designed internal resistance of each lead is 600 ohms to 1.2K ohms maximum. Readings outside this range affect the legal radio suppression Type Approval performance, and readings above 1.2K towards open circuit values can create internal sparking within the leads resulting in ultimate lead and coil breakdown.

SECTION H4

THE SPARK PLUGS

The spark plugs are Champion 10 mm surface discharge type. We recommend the plugs be removed and inspected at every service (every 6000 miles) when the outer or earth ring of the spark plug should be scraped clear of carbon nodules.

DO NOT ATTEMPT TO CLEAN THE SPARK PLUGS IN A CONVENTIONAL GRIT OR SAND BLASTING MACHINE. GRIT PARTICLES COULD LODGE INSIDE THE PLUG AND BE RELEASED LATER WHEN THE ENGINE IS RUNNING POSSIBLY CAUSING RESULTANT DAMAGE TO THE ENGINE.

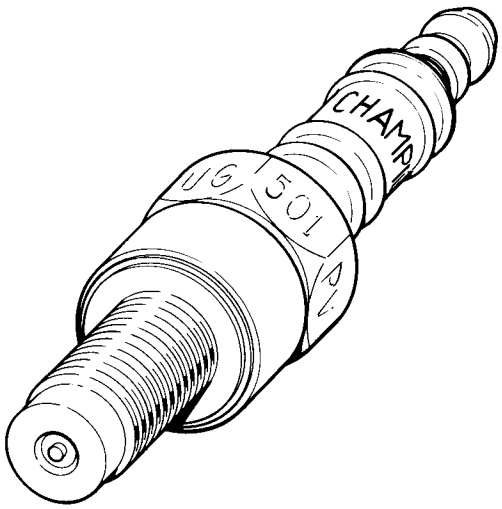


Fig. H.5. Surface Discharge Type Spark Plug
Under no circumstances should this type of spark plug be cleaned using a sand or grit blasting process.

The spark plugs are designed to be partially self cleaning in use and, with the platinum centre electrode, long lived. Normal life expectancy should be in the region of 15000+ miles, the only servicing necessary being as described above.

As the spark plugs are of the surface discharge type, adjustment of the spark gap is neither possible nor necessary.

In contrast to normally accepted practice, the mixture strength cannot be judged by the appearance of the spark plugs as this design provide no positive indication and should not be used as a mixture indicator. We stress the necessity of cleaning the outer ring of the spark plugs as failure to clean the carbon nodules from the surface can lead to a build up of carbon deposit initiating incandescence at high engine r.p.m. thereby causing pre-ignition and consequent high running temperatures. A deposit of white particles on the spark plug outer ring indicates pre-ignition has taken place and the plugs should be scraped clean or replaced immediately.

SECTION H5

THE CHARGING SYSTEM

The charging system consists of a 220 watt Kokusan alternator feeding a 12 volt 14 amp/hour battery via an electronically controlled voltage regulator.

The voltage regulator has been designed specifically for this machine and, like the ignition unit, no replacement is available from alternative sources. A Factory Exchange replacement service is available at minimal cost.

BEFORE COMMENCING ANY TEST PROCEDURES ENSURE THE BATTERY IS IN GOOD CONDITION AND FULLY CHARGED.

To locate a fault in the charging system, first test the alternator as described in Section H5 Part B. If the alternator is satisfactory the fault must lie in the charging circuit and the electronic voltage regulator. However, it is advisable to check the continuity of the wiring and connectors prior to testing individual units.

SECTION H5 PART A

ALTERNATOR

The alternator fitted to this machine is a KOKUSAN GP 9121 three phase unit.

Speed range	300 to 10,000 rpm
Direction of rotation ..	Anticlockwise (from stator side)
Static balance	2 grammes max' on external circumference
Flywheel inertia	26.6 Kg/cm2
Weight	1.8 Kg

FLYWHEEL

The flywheel is an iron sheet pressing with three ferrite permanent magnets fixed to the inner face by means of a powerful adhesive. As adhesive is used to locate the magnets in place it is important to avoid damage to the unit. Do not strike the flywheel in order to remove it from the rotor shaft. Always use the extractor part No 50-0408. Should the alternator flywheel be dropped onto a hard surface it must be replaced as the permanent magnets may become detached from their adhesive fixing and cause considerable mechanical damage should they come adrift when the engine is running.

STATOR

The stator is fabricated from iron laminations, rivetted to form 18 poles with each pole being wired as a charging coil. The coils are in three phase 'star' wiring to supply a three phase output.

NOTE:

Never carry or lift the stator by the leads as this may damage the unit.

INSPECTION & MAINTENANCE

As there are no wearing parts the alternator should require no attention during normal use.

SECTION H5 PART B

CHECKING THE ALTERNATOR OUTPUT

FAULT FINDING

Should the machine show signs of low charging, flat battery etc., the following tests should be carried out after first checking the battery, earth (negative) and positive leads to the battery and the fuses.

TESTING THE STATOR

Disconnect the three alternator leads at the in-line connectors and connect a rectified type A.C. voltmeter between the white/green and white/blue alternator leads.

In normal ambient temperatures the voltmeter should read as follows:-

R.P.M.	1000	1500	2000
VOLTAGE (A.C.)	14.4	21.6	28.8

Having examined the A.C. voltage output, the stator coil resistance should be examined with a resistance meter (Wheatstone Bridge). The meter should be connected to the white/green and white/blue leads, at normal ambient temperatures a reading of 0.48 Ohms to 0.72 Ohms should be obtained.

The insulation should now be examined by connecting a 500 volt insulation tester ('Megger') between the bare metal parts of the stator and any of the alternator leads. A figure of 5 megohms or greater should be obtained.

SECTION H5 PART C

CHECKING THE ELECTRONIC VOLTAGE REGULATOR

As the voltage regulator is of the sealed type, extensive testing of this component is not possible. There are however sufficient 'on the machine' tests possible to arrive at a conclusion whether or not the voltage regulator is faulty.

1. Run the engine at 3000 rpm with only ignition on. Connect a D.C. volt meter across the battery positive and negative terminals and measure the reading. A reading of 14-15 volts should be obtained.

2. Increase engine revs to 4000 rpm and switch on all electrical services. At full load a reading of 14-15 volts should be maintained.

3. Switch off all services including the ignition (Disconnect the clock on Police machines).

Finally disconnect the battery positive lead and connect an 'AVO' meter or 'multimeter' in series with the battery. A current drain of not more than 12 milliamps should be indicated. A higher reading than this indicates either a faulty voltage regulator unit or an unauthorised service is operating eg. faulty switch etc, causing unwanted current drain on the system.

CAUTION
DO NOT RUN THE ENGINE WITH THE BATTERY DISCONNECTED OR SHORT CIRCUIT THE BROWN/BLUE REGULATOR FEED LINE TO EARTH AS BOTH OR EITHER ACTION WOULD CAUSE DAMAGE TO THE REGULATOR UNIT.

SECTION H6

THE STARTER MOTOR

The Lucas M3 starter is fitted to the right side engine end plate, above and to the rear to the gearbox. Removal can only be achieved with the engine unit removed from the frame/gearbox assembly.

Remove the engine unit as described in Section B1, and when access to the starter motor is gained, unscrew the hexagon headed screws and washers from the mounting flange, and lift clear the starter motor assembly. Retain the sealing 'O' ring for further use.

Holding the motor body firmly in a vice, unscrew the two long screws retaining the alloy end cap and the mounting flange in position, effectively holding the complete motor assembly together.

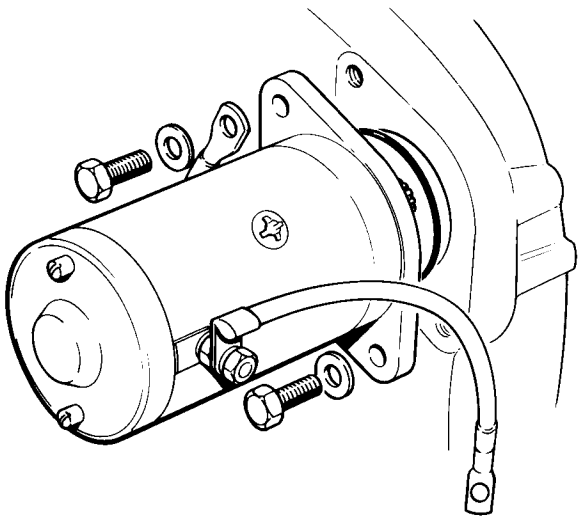


Fig. H6. The Starter Motor – Installation

At this point the operator should be warned that although replacement brushes are available, suitable equipment is needed to spot weld the brush tail to the field windings and outer shell. Replacement bearing bushes are also available for both end plates complete with thrust pad (commutator end) and oil seal for the mounting flange end. Fit the seal 'open' end inwards towards the starter motor.

Replacement is the reverse. Examine the 'O' ring, and if satisfactory, apply the recommended sealant (General Data) to the 'O' ring and its seating, and replace the motor using the two hexagon headed screws and plain washers. Continue rebuild as detailed in Section B10 (Refitting the engine unit).

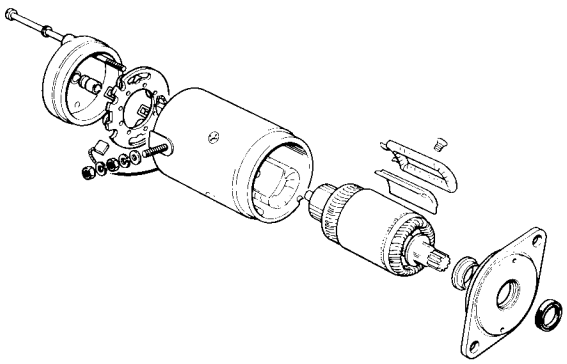


Fig. H.7. Exploded View of the Starter Motor

SECTION H7

STARTER RELAY

The starter relay is located immediately below the battery tray, in a sealed unit and if found to be faulty must be replaced. Before assuming the starter relay is at fault, first ensure the battery is in charged condition and that the start button is functioning correctly. To check this, short the white/red lead connection on the relay to earth, using a jumper lead. Provided voltage/current is available at the white/yellow lead from the engine, the 'stop' lever on the right handlebar is operating correctly (ie. That it is not in either 'off' position, and that the ign. fuse has not blown) then the relay is at fault, and if not operative, must be replaced.

SECTION H8

BINNACLE WARNING AND ILLUMINATION LIGHTS

Remove the binnacle as described in the Telescopic front fork Section G6. To gain access to the instruments, ignition switch and bulbs, remove the four nuts and the small 'posidriv' headed screw visible beneath the lower housing. The lower section of the binnacle can now be detached from the fascia section.

The instruments and, or bulbs may now be removed and replaced as required. All the bulbs are 1.2 watt wedge base (capless) and can be changed after pulling the bulb holder from its location and drawing out the chosen bulb. Replacement is the reverse procedure. Continue reassembly of the binnacle in reverse order from that

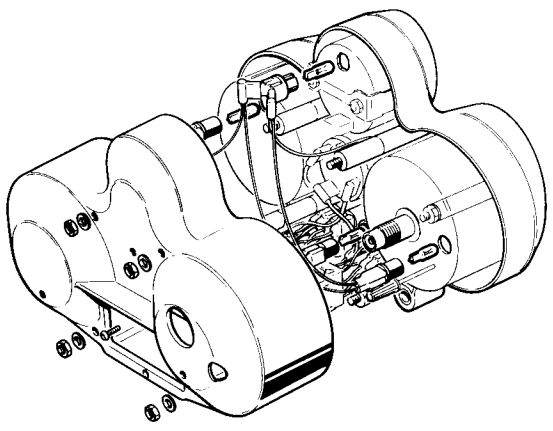


Fig. H8. Access to the Binnacle

of dismantling, but ensure the spacers between the two halves of the binnacle casing are properly located. (Long-upper, short-lower), and that the internal connections and fasteners are tight. Give a light application of silicone anti-corrosion spray, and replace the lower casing. Re-fit the four nuts and washers, and replace the small 'posidriv' screw.

The binnacle is now ready for re-assembly onto the front forks as described in Section G6 in Fig. H11. The wiring diagrams (Figs. H19 & 20) clearly indicate the colour coded wire connections and individual switch functions. The switch assembly is supplied complete with lead and junction.

SECTION H9

OIL LEVEL TEST BUTTON

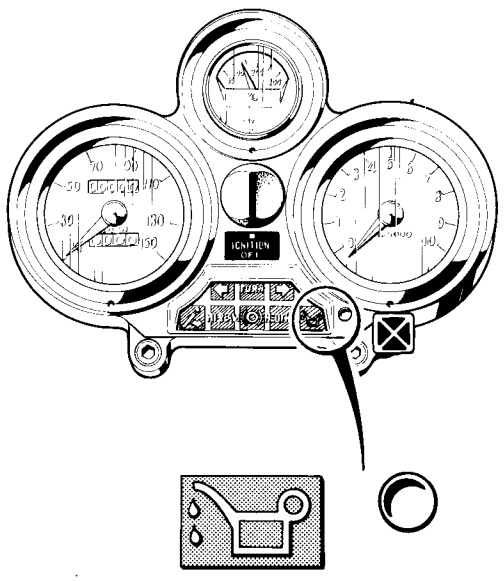


Fig. H9. Oil Level Warning Light – Test Button

The test button is part of the binnacle wiring harness and is fitted to provide an oil warning light bulb facility. Bulb illumination when testing with the ignition switched 'ON'. and pressing the oil level test button does not indicate correct functioning of the oil level warning switch incorporated within the oil reservoir. A separate test procedure for this equipment is described in Section H15 'warning switches'.

The test button body is assembled from beneath the instrument panel fascia, and retained in position with a hexagon nut. The operating knob is finally pressed into position onto the button stem. Replacement requires gaining access to the binnacle as described in Section H8 cutting the existing red and black feed wires, re-soldering the new connections into the circuit and re-insulating. Re-assemble the binnacle and replace in position on the top yoke as described in section H8 and G6.

SECTION H10

BY-PASS MICRO-SWITCH

The fitting and setting of the by-pass micro-switch is quite critical to the function and response of the complete motorcycle. Located on a mounting plate fixed in-board of the left side engine end plate, the switch is positioned so that a lever fitted to the left rotor housing throttle spindle bears onto the micro-switch operating arm via a spring retained adjusting screw. Replacement is achieved following removal of the generator cover (4 screws), and the two screws holding the ignition trigger unit and mounting pad in position. The two screws are extended through the left side engine plate, the two associated captive nuts retaining the micro-switch mounting plate.

Replace the micro' switch onto the mounting plate, re-locate the trigger unit and placing the micro-switch mounting plate in its proper position, tighten up the two screws.

Before replacing the generator cover, re-adjust and set the ignition trigger unit air gap as shown (Fig. H3) to 0.3 mm – 0.05 (0.010" – 0.014") Re-set the by-pass micro-switch adjustment in accordance with the instructions given in engine Section B11 'Adjusting the micro-switch'.

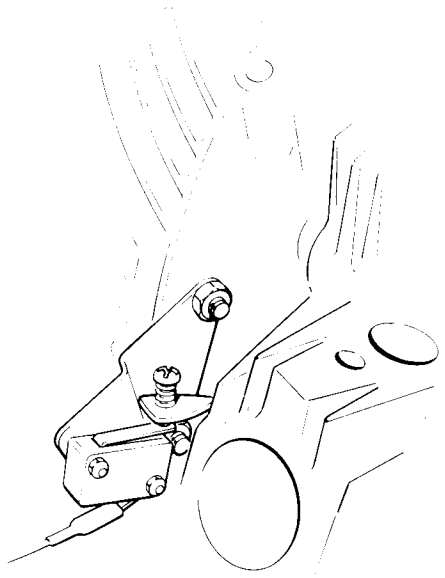


Fig. H10. By-Pass Micro-Switch

SECTION H11

LEFT HANDLEBAR SWITCH

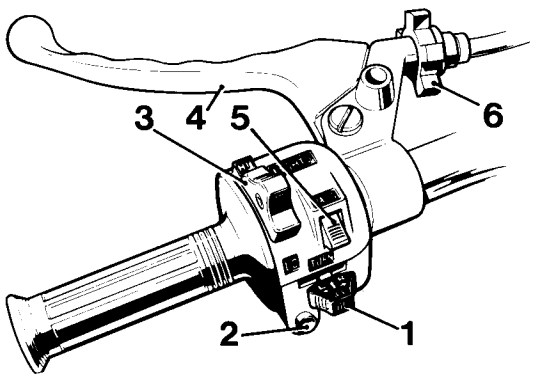


Fig. H.11. Left Handlebar Switch

1 Direction Indicator Switch
2 Horn
3 Hi-Lo Main Beam Switch
4 Clutch Operating Lever
5 Headlamp Flasher Switch
6 Clutch Lever Cable Adjuster

Functions controlled by the left handlebar switch are as shown in Fig. H11. The wiring diagram (Figs. H19 & 20) clearly indicates the colour coded wire connections and individual switch functions. The switch assembly is supplied complete with lead and junction terminal block, and is detached from the handlebar by removal two pan head 'posidriv' screws on the underside of the lower switch half.

Care should be taken during replacement to protect the switch internal functions from damage during re-assembly, and care exercised to allow the cable to exit cleanly from the switch without being trapped as the switch halves are finally tightened together.

SECTION H12

RIGHT HANDLEBAR SWITCH

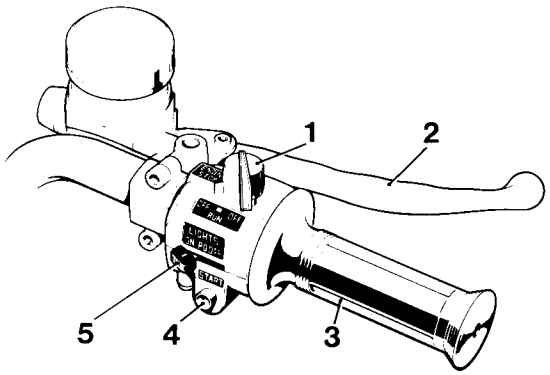


Fig. H12. Right Handlebar Switch
1 Engine Kill Switch (showing 'Run' and 'Stop' positions).
2 Front Brake Lever
3 Throttle Twist Grip
4 Start Push button
5 Lights on/off Selector Switch

Fig. H12 illustrates the right handlebar switch controls which also incorporate the throttle twist-grip assembly. To dismantle and remove the switch section, slacken and remove the two 'posidriv' pan head screws from the underside of the switch lower half, taking note that the forward of the two screws also functions as the throttle cable retaining clamp screw. Collect the two screws, clamp, spacer washer and lift the two switch halves apart, at the same time disengaging the throttle cable from twist-grip drum abutment. Replacement is the reverse of removal, but care must be taken during re-assembly to protect from damage the upper switch half internal functions, and to ensure the electric cable exit is unobstructed, and the cable is not trapped as the fixing screws are tightened. Whilst re-assembling the switch halves, ensure the throttle cable is snugly seated into the twist grip drum abutment (after having greased the handlebar end and drum internal bore), and that the throttle cable retaining clamp and spacing washers have located the throttle cable abutment securely in position. (See Fig. G4).

SECTION H13

DIRECTION INDICATORS

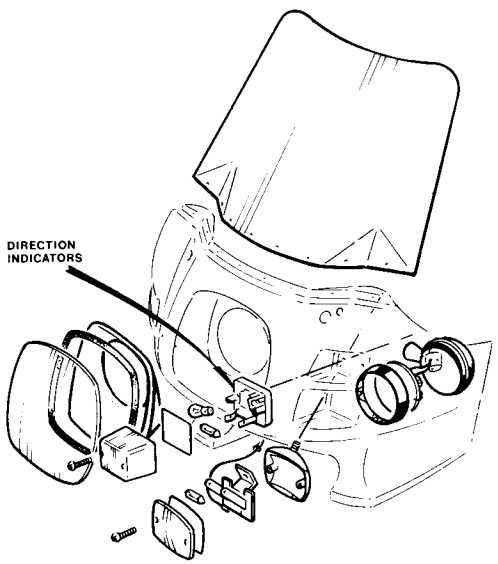


Fig. H14. Front Direction Indicators
– illustrates also the foward parking, driving and optional Police type flashing blue lights

Machines with fairing and pannier equipment specify direction indicator and parking lights to the front (Fig. H14). To obtain access to the direction indicator and parking light bulbs, remove the two lens screws carefully retaining the gasket. Check the tension of the pilot festoon bulb mounting arms is adequate, and then carefully replace the lens, ensuring correct seating of the sealing gasket.

Three light units are mounted onto a single plinth on rear pannier equipped machines (Fig. H15). Access to the bulbs is removal of the two screws in each lens. Note that there are three rubber 'O' rings gaskets under the head of each screw, and one fibre washer between the lens and the lamp body mounting point on each lens screw. Carefully replace the lens ensuring the sealing gasket is seating correctly, and providing a perfectly water tight seal.

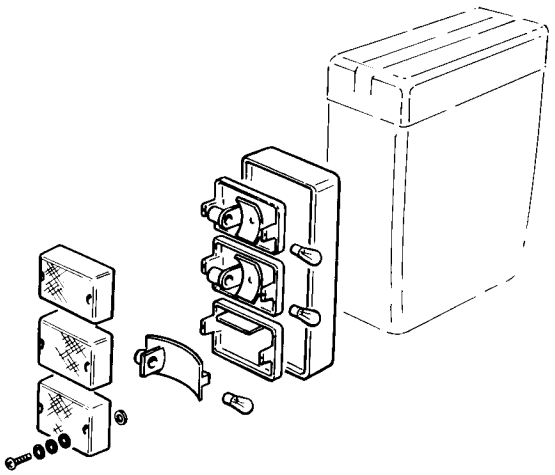


Fig. H15. Rear Direction Indicator. Stop/Tail and Fog Lights fitted on Pannier Equipped Machines

SECTION H14

DIRECTION INDICATOR FLASHER UNIT

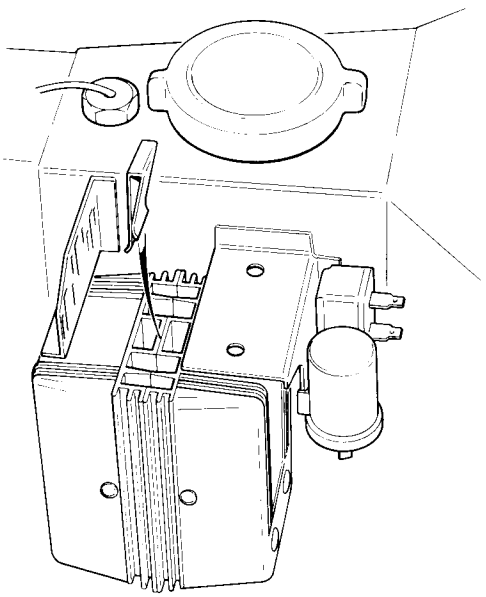


Fig. H16. Location of Direction Indicator Flasher Unit and horn relay to the rear of the Electronic Ignition units

The flasher unit is contained behind the left side panel. To replace the unit, lift the seat and remove the side cover. This will give access to the electrical units. The flasher unit is positioned to the rear and below the fuse box behind the horn relay unit. To replace, unclip the flasher unit from its mounting and disconnect the two electrical leads. Refitting is the reverse of the above procedure.

SECTION H15

WARNING LAMP SWITCHES

SIDE STAND SWITCH

The side stand switch is of the press-'off' type, and therefore functions when the side stand is not secured in the fully retracted position.

To remove the side stand switch, pull off the two wires from the connector spades at the rear of the switch, and unscrew the switch from the side stand support bracket, carefully retaining the spacer washer. On later models the switch is part of a sub-harness.

Replace the new switch, assembling the spacer washer over the threaded portion and between the switch body and the side stand support bracket. Tighten into position and re-connect the feed wires. (Wires to either terminal).

To adjust the operating screw, slacken off the locknut and enter the operating screw further into the side stand bracket. This will ensure that the first time the side stand is released against its spring tension, it will not flip back and crush the switch plunger.

Slowly swing the stand back into the retracted position, and gradually screw out the operating screw until the point where with the ignition switched 'ON', the warning light just operates. Pull out the side stand to the fully extended position, unscrew one further half turn, and apply the locknut. Check the operation and re-adjust if necessary.

NEUTRAL INDICATOR SWITCH

Identifiable as a black plastic hexagonal headed bolt, with a single wire exit from the centre, located at the top of the gearbox casing, on the right side. The switch is a 'Press-for-on' type.

Access is gained for replacement in service by first removing the right carburettor complete with its inlet and outlet manifold (See Section B6 'Removal'Item 5'). Remove the inlet pipe from the right rotor housing, followed by the idle pipe.

Using a box spanner, having disconnected the switch lead at the snap connector junction, unscrew and remove the neutral indicator switch.

To replace, first engage neutral (ensuring this is neutral between first and second gear – not a false neutral between another combinations of gears). Engage and screw in neutral indicator switch, having temporarily reconnected the lead at the snap connector (or even more easily using a 'jump' lead through a hollow box spanner).

Switch on the ignition and continue to screw in the neutral indicator switch until the warning light just comes 'on'. Screw in the switch one further 1/4 turn.

Check the operation of the switch by changing gear. If satisfactory, and the neutral location is positive, switch off the ignition, replace the idle pipe, inlet pipe and right carburettor complete with inlet and outlet manifolds in accordance with the instructions given in Section B6 'Refitting'.

OIL LEVEL SWITCH

As described Section H9, the oil level test button on the instrument binnacle only checks that the oil level warning light bulb functions satisfactorily. The actual operation of the warning light function is controlled by a float within the reservoir which operates an internal reed switch causing the oil level warning light to illuminate when the oil level falls below the recommended minimum.

The approved test for this function (following having checked the warning light bulb function with the ignition 'on', by depressing the test button) is to continue with ignition 'on'. and using the oil reservoir filler cap dipstick, press the switch float down to the limit of its travel (Fig. H17). The instrument panel oil warning light should have illuminated just before this point is reached.

If not, the fault must be located and corrected. It is vital to the correct functioning of this machine that the rider is provided with the designed oil level safety warning system. If the bulb test is satisfactory, and the 'dip-stick' test not positive, disconnect the float switch lead at the snap connector, and earth (ground) the red/white wiring harness end of the lead. If the float switch is faulty, the warning light will now illuminate. Replace the switch. (See below).

If the warning light does not illuminate, trace the red/white lead back to red plug terminal 3 on the underside of the binnacle. The remainder of this circuit within the binnacle follows from terminal 3 in the binnacle socket via a red wire to the red wire from the test button at the warning light bulb holder. (Section H8 and Fig. H20).

REPLACING THE OIL LEVEL FLOAT SWITCH

Disconnect the switch lead at the snap connector. Unscrew the hexagon top nut from the frame threaded boss. Fit the replacement switch, taking care not to damage or bend the thin shaft, and ensuring the float action is perfectly free.

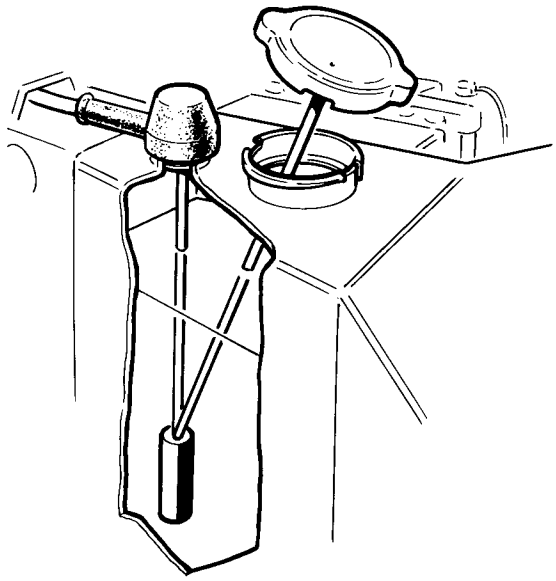


Fig. H17. Oil Level Switch – Location and Test Procedure

Tighten up, re-connect the snap connector, and test the switch function (with the ignition switched 'on').

SECTION H16

HEADLAMP

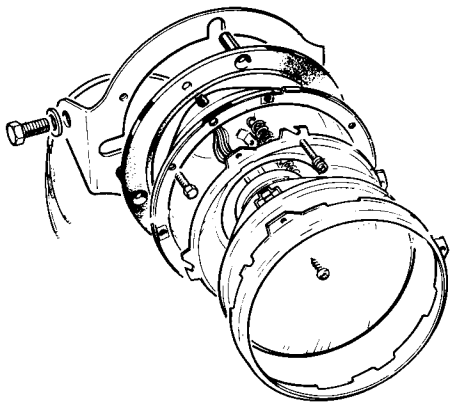


Fig. H18. The Headlamp Unit – illustrating the method of mounting the light unit

Where a fairing is used, the headlight is fixed to the fairing upper mounting bracket using an alternative headlamp cowl mounting. The light unit is recessed within the fairing front, and is enclosed by a forward shroud and protective sealed window.

TO CHANGE A LIGHT UNIT OR BULB

Prise back the sealing rubber gasket flange and remove the headlight window. Unscrew the four black plastic pan headed screws and withdraw the black plastic shroud. This allows access to the light unit.

REMOVING THE LIGHT UNIT

Remove the three 'posidriv' pan headed screws from the flanged retainer rim and remove it. Pull the glass light unit forward and detach the wiring harness plug connector from the main/dip and pilot bulbs. Withdraw the light unit.

Replace the bulbs as necessary, taking particular care not to handle the glass in the case of the quartz halogen headlamp/dip beam bulb. (If inadvertantly smeared with oil or grease, the bulb should be cleaned with methylated spirit and allowed to dry prior to fitting).

Refit the harness connector, ensuring the pilot (parking) bulb is correctly located. Replace the Light Unit to fit correctly locating the fitting lugs into the associated shouldered recesses in the housing. Clamp the light unit firmly in place with flanged retainer rim held in position with the three 'posidriv' pan headed screws.

Completion is the reverse of the dismantling procedure although in the case of the models with front fairing it is advisable to check and adjust the main beam setting prior to refitting the headlamp shroud, seal and window.

SECTION H17

REMOVING & REPLACING THE REAR LIGHT UNIT

For machines fitted with pannier equipment, refer to Section H13 (Fig. H15) for details of pannier mounted warning and tail lights.

SECTION H18

REMOVING AND REPLACING THE FRONT & REAR STOP LIGHT SWITCHES

FRONT STOP LIGHT SWITCH

The front stop light switch is a pressure sensitive unit situated in the front brake hydraulic circuit four way junction block below the front fork bottom yoke. To remove, disconnect the two electrical leads at the connectors on the switch and unscrew the switch. When refitting the switch use a new copper sealing washer and 'bleed' the system as described in section F3.

NOTE:

When replacing the stop light switch it is advisable first to drain the system (as described in Section F4) and to protect the tyres and cycle parts from contamination by brake fluid.

REAR STOP LIGHT SWITCH

The rear brake light operating switch is located in the rear of the master cylinder assembly behind the right footrest mounting plate and is visible between the mouting plate and the rear brake fluid reservoir with the right side cover removed. To replace the switch disconnect the two electrical leads at the switch and remove the protective rubber boot. This will allow the switch to be unscrewed. When refitting the switch it is important to replace the copper sealing washer. Replacement is the reverse of the above procedure and the previous note applies recommending prior draining of the hydraulic system. When the switch has been replaced it will be necessary to bleed the system as described in Section F3 "Bleeding the Hydraulic System"

SECTION H19

REMOVING & REPLACING THE HORNS

Twin driving horns
The horns, which are non adjustable are located below the fuel tank on the left and right sides of the frame. To remove and replace the horns it is necessary to remove the fuel tank (Section E2). Once the fuel tank has been removed the horns can be detached from their mounting brackets by releasing the nut at the back of the horns and disconnecting the two electrical leads.

Replacement is the reverse of the above procedure.

Two tone Police Air Horns
The two tone Police air horn is mounted within the fairing, attached by a bracket clamped to the R.H. side of the headlamp mounting.

The Fiamm "GEMINI" trumpet outlet aligns with a aperture formed within the right side of the fairing shell.

Located within the right side stowage compartment is the air horn compressor, the only maintenance required being the occasional application of light lubricating oil provided with the equipment in accordance with the manufacturers instructions (e.g. two drops of oil every 3 months applied through the oil nipple (red plastic cup) in the upper end of the compressor motor.

SECTION H20
WIRING DIAGRAMS

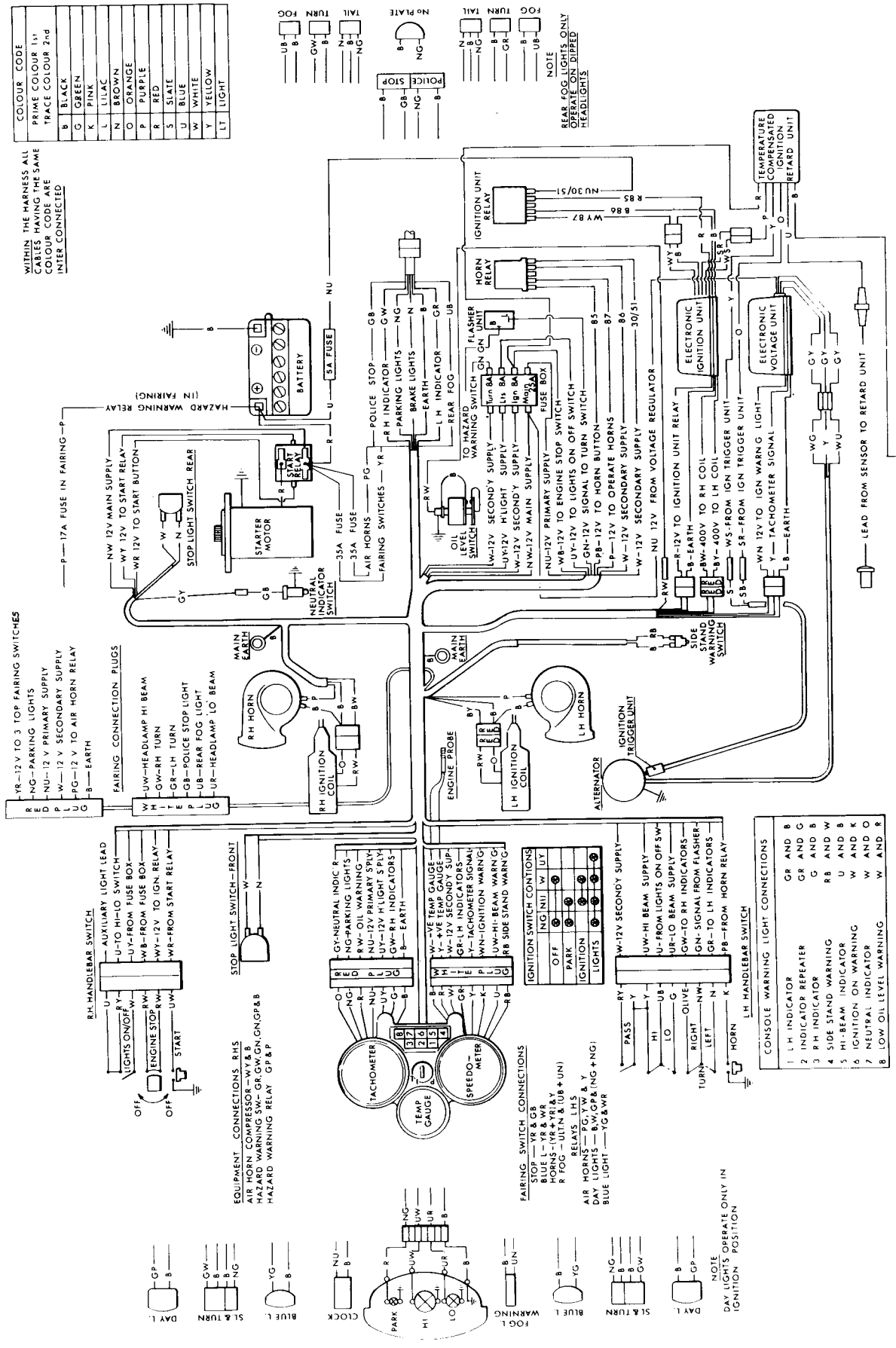


Fig. H21. Main Wiring Harness – Twin Rotor Idle

SECTION H20

WIRING DIAGRAMS

Fig. H19. On later machines, the Electronic Ignition Unit cable to the Ignition Trigger Unit has a revised colour coding.
Slate/Red (SR) now becomes Slate/Black (SB).
White/Slate (WS) now becomes Slate (S).

Fig. H20. Thermocouple connections
Thermocouple Brown to White plug centre terminal (15)
Thermocouple Blue to White plug outer terminal (18)

Temperature Gauge +ve (Red) to White socket centre terminal (15)
Temperature Gauge +ve (Black) to White socket outer terminal (18)

Red socket – terminals 1–9
White Socket – terminals 11–19

SECTION J

SPECIAL TOOLS

SPECIAL TOOLS

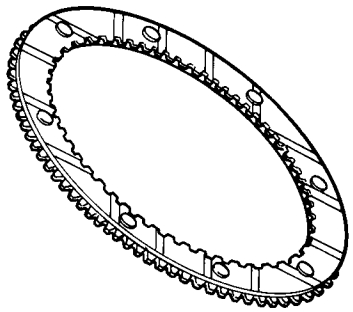


Fig. J1. Clutch Hub Locking Tool
Part Number 50-0140

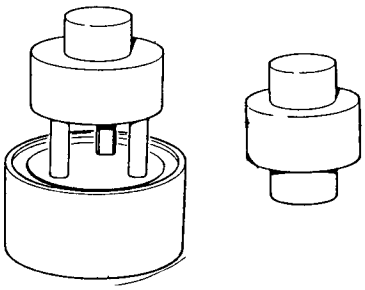


Fig. J6
Main Bearing Press Tool
Part Number 00-5901

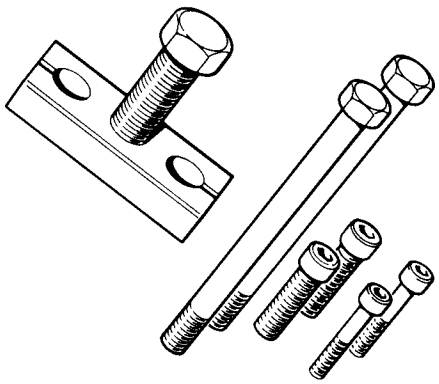
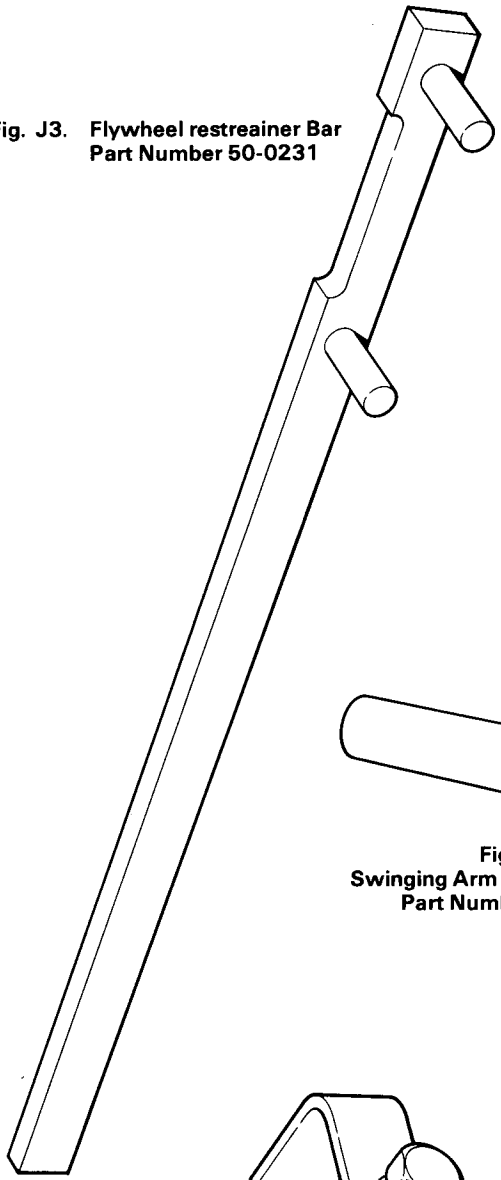


Fig. J4
Extractor Tool
Part Number 50-0408

Fig. J3. Flywheel restreainer Bar
Part Number 50-0231



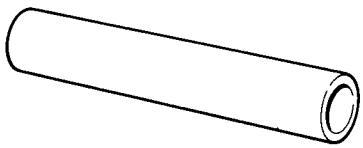


Fig. J2
Swinging Arm Pivot Sleeve Tool
Part Number 92-0572

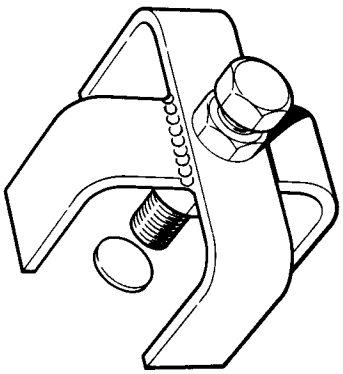


Fig. J5
Clutch Spring Compressor
Tool Part Number 69-0614

L1.82

Conversion Tables

Conversion Tables

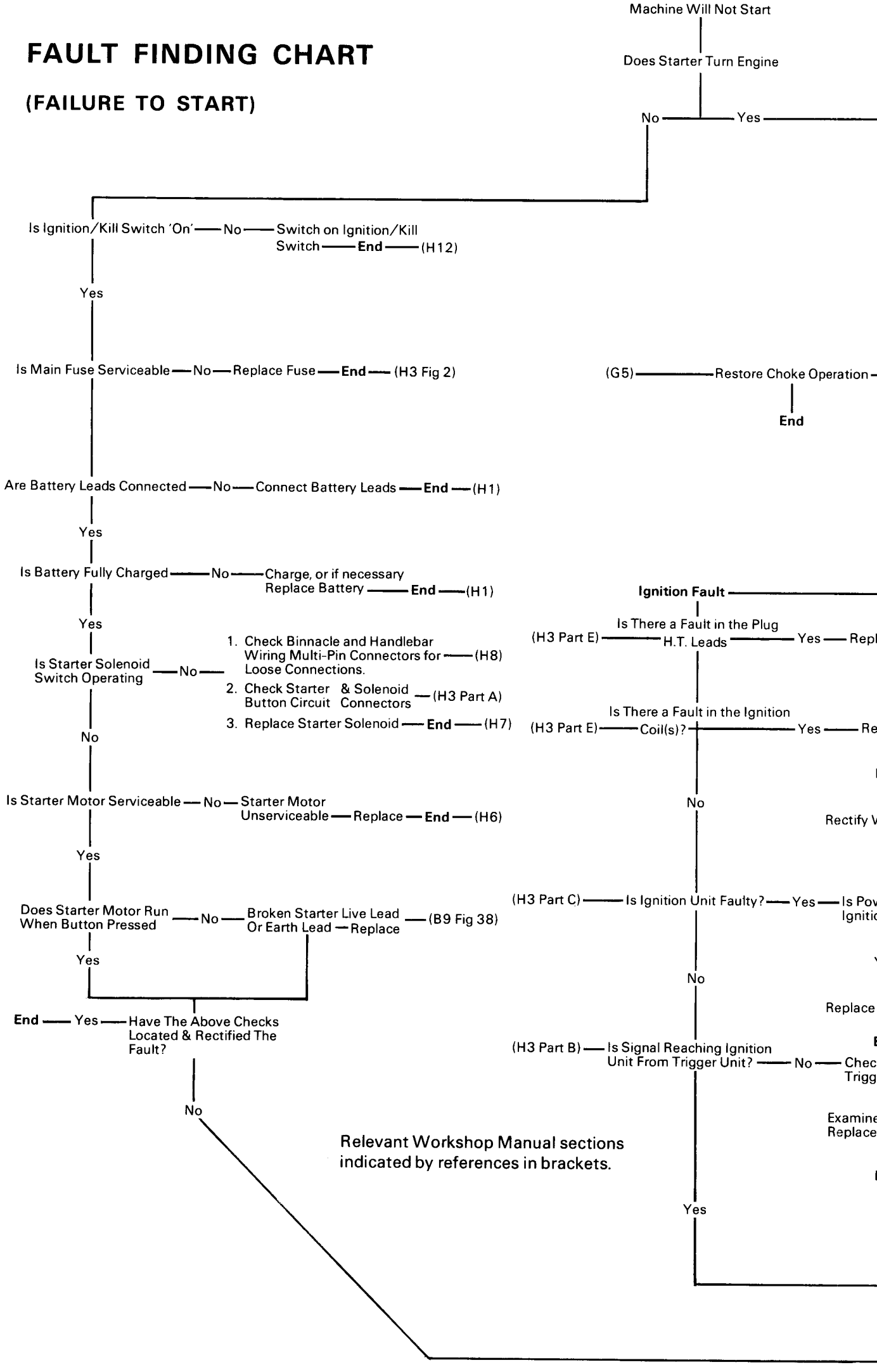
FRACTIONS TO DECIMALS — DECIMALS OF INCH TO MILLIMETRE

Fractions			Decimals	mm.
		1/64	·015625	·3969
	1/32		·03125	·7937
		3/64	·046875	1·1906
1/16			·0625	1·5875
		5/64	·078125	1·9844
	3/32		·09375	2·3812
		7/64	·109375	2·7781
1/8			·125	3·1750
		9/64	·140625	3·5719
	5/32		·15625	3·9687
		11/64	·171875	4·3656
3/16			·1875	4·7625
		13/64	·203125	5·1594
	7/32		·21875	5·5562
		15/64	·234375	5·9531
1/4			·25	6·3500
		17/64	·265625	6·7469
	9/32		·28125	7·1437
		19/64	·296875	7·5406
5/16			·3125	7·9375
		21/64	·328125	8·3344
	11/32		·34375	8·7312
		23/64	·359375	9·1281
3/8			·375	9·5250
		25/64	·390625	9·9219
	13/32		·40625	10·3187
		27/64	·421875	10·7156
7/16			·4375	11·1125
		29/64	·453125	11·5094
	15/32		·46875	11·9062
		31/64	·484375	12·3031
1/2			·5	12·700

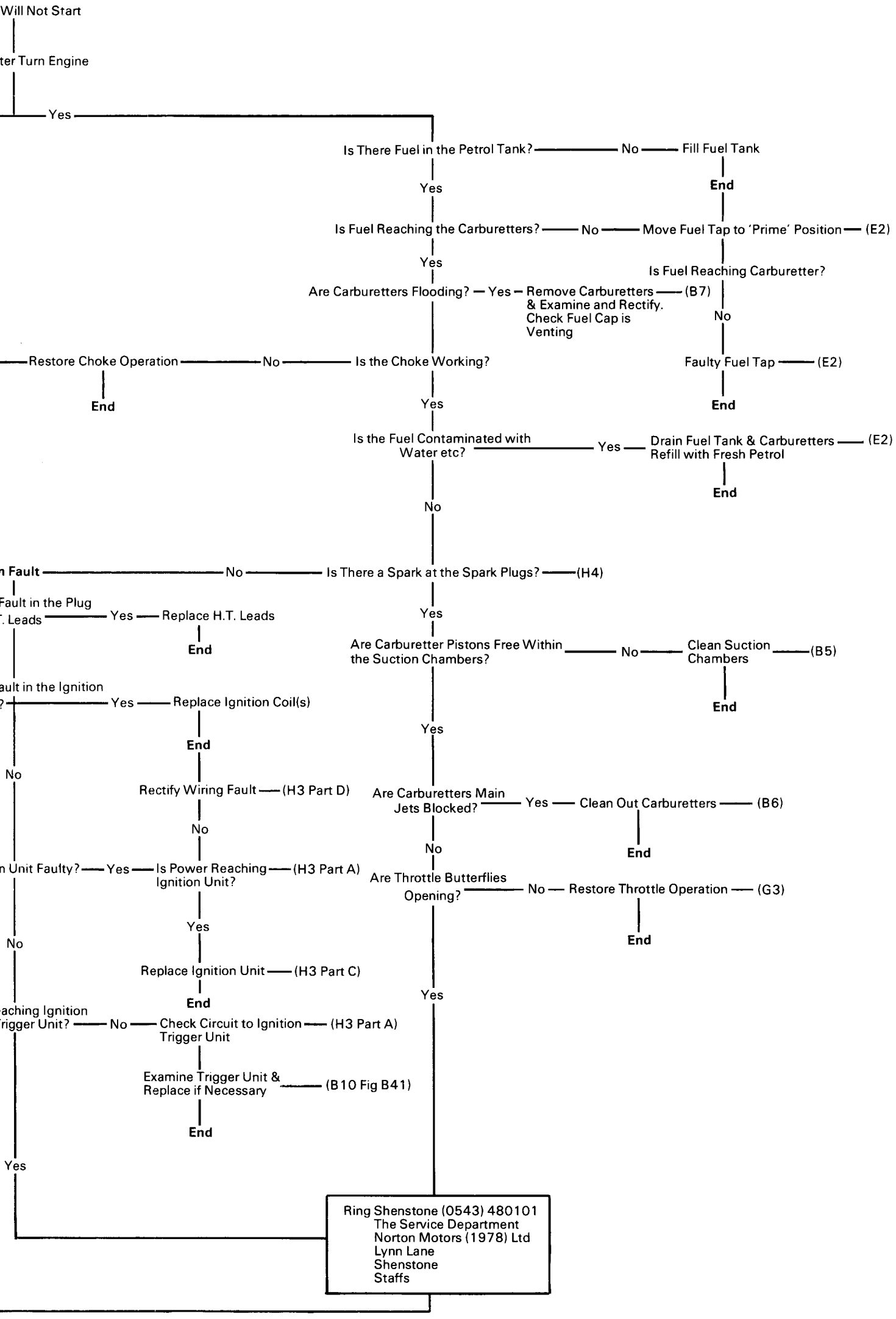
Fractions			Decimals	mm.
		33/64	·515625	13·0969
	17/32		·53125	13·4937
		35/64	·546675	13·8906
9/16			·5625	14·2875
		37/64	·578125	14·6844
	19/32		·59375	15·0812
		39/64	·609375	15·4781
5/8			·625	15·875
		41/64	·640625	16·2719
	21/32		·65685	16·6687
		43/64	·671875	17·0656
11/16			·6375	17·4625
		45/64	·703125	17·8594
	23/32		·71875	18·2562
		47/64	·734375	18·6531
3/4			·75	19·05
		49/64	·765625	19·4469
	25/32		·78125	19·8437
		51/64	·796875	20·2406
13/16			·8125	20·6375
		53/64	·828125	21·0344
	27/32		·84375	21·4312
		55/64	·859375	21·8281
7/8			·875	22·225
		57/64	·890625	22·6219
	29·32		·90625	23·0187
		59/64	·921875	23·4156
15/16			·9375	23·8125
		61/64	·953125	24·2094
	31/32		·96875	24·6062
		63/64	·984375	25·0031
1				25·4

FAULT FINDING CHART

(FAILURE TO START)



Relevant Workshop Manual sections indicated by references in brackets.


Will Not Start
ter Turn Engine
Yes
Is There Fuel in the Petrol Tank?
No
Fill Fuel Tank
End
Yes
Is Fuel Reaching the Carburetters?
No
Move Fuel Tap to 'Prime' Position
(E2)
Yes
Is Fuel Reaching Carburetter?
Are Carburetters Flooding?
Yes
Remove Carburetters & Examine and Rectify. Check Fuel Cap is Venting
(B7)
No
Restore Choke Operation
No
Is the Choke Working?
Faulty Fuel Tap
(E2)
End
Yes
End
Is the Fuel Contaminated with Water etc?
Yes
Drain Fuel Tank & Carburetters Refill with Fresh Petrol
(E2)
End
No
n Fault
No
Is There a Spark at the Spark Plugs?
(H4)
Fault in the Plug
. Leads
Yes
Replace H.T. Leads
End
Yes
Are Carburetter Pistons Free Within the Suction Chambers?
No
Clean Suction Chambers
(B5)
End
ault in the Ignition
?
Yes
Replace Ignition Coil(s)
End
Yes
No
Rectify Wiring Fault
(H3 Part D)
Are Carburetters Main Jets Blocked?
Yes
Clean Out Carburetters
(B6)
End
No
n Unit Faulty?
Yes
Is Power Reaching Ignition Unit?
(H3 Part A)
No
Are Throttle Butterflies Opening?
No
Restore Throttle Operation
(G3)
End
Yes
No
Replace Ignition Unit
(H3 Part C)
End
Yes
aching Ignition
rigger Unit?
No
Check Circuit to Ignition Trigger Unit
(H3 Part A)
Examine Trigger Unit & Replace if Necessary
(B10 Fig B41)
End
Yes
Ring Shenstone (0543) 480101
The Service Department
Norton Motors (1978) Ltd
Lynn Lane
Shenstone
Staffs

Conversion Tables

INCHES TO MILLIMETRES (DECIMALS OF)

Inches	0	10	20	30	40
0		254·0	508·0	762·0	1016·0
1	25·4	279·4	533·4	787·4	1041·4
2	50·8	304·8	558·8	812·8	1066·8
3	76·2	330·2	584·2	838·2	1092·2
4	101·6	355·6	609·6	863·6	1117·6
5	127·0	381·0	635·0	889·0	1143·0
6	152·4	406·4	660·4	914·4	1168·4
7	177·3	431·8	685·8	939·8	1193·8
8	203·2	457·2	711·2	965·2	1219·2
9	228·6	482·6	736·6	990·6	1244·6

1/1000	
inches	mm.
·001	·0254
·002	·0508
·003	·0762
·004	·1016
·005	·1270
·006	·1524
·007	·1778
·008	·2032
·009	·2286

1/100	
inches	mm.
·01	·254
·02	·508
·03	·762
·04	1·016
·05	1·270
·06	1·524
·07	1·778
·08	2·032
·09	2·286

1/10	
inches	mm.
·1	2·54
·2	5·08
·3	7·62
·4	10·16
·5	12·70
·6	15·24
·7	17·79
·8	20·32
·9	22·86

MILLIMETRES TO INCHES

mm.	0	10	20	30	40	50	60	70	80	90
0		·39370	·78740	1·18110	1·57480	1·96851	2·36221	2·75591	3·14961	3·5433
1	·03937	·43307	·82677	1·22047	1·61417	2·00788	2·40158	2·79528	3·18891	3·5826
2	·07874	·47244	·86614	1·25984	1·65354	2·04725	2·44095	2·83465	3·22835	3·6220
3	·11811	·51181	·90551	1·29921	1·69291	2·08662	2·48032	2·87402	3·26772	3·6614
4	·15748	·55118	·94488	1·33858	1·73228	2·12599	2·51969	2·91339	3·30709	3·7007
5	·19685	·59055	·98425	1·37795	1·77165	2·16536	2·55906	2·95276	3·34646	3·7401
6	·23622	·62992	1·02362	1·41732	1·81103	2·20473	2·59843	2·99213	3·38583	3·7795
7	·27559	·66929	1·06299	1·45669	1·85040	2·24410	2·63780	3·03150	3·42520	3·8189
8	·31496	·70866	1·10236	1·49606	1·88977	2·28347	2·67717	3·07087	3·46457	3·8582
9	·35433	·74803	1·14173	1·53543	1·92914	2·32284	2·71654	3·11024	3·50394	3·8976

MILLIMETRES TO INCHES (DECIMALS OF)

1/1000	
mm.	inches
0·001	·000039
0·002	·000079
0·003	·000118
0·004	·000157
0·005	·000197
0·006	·000236
0·007	·000276
0·008	·000315
0·009	·000354

1/100	
mm.	inches
0·01	·00039
0·02	·00079
0·03	·00118
0·04	·00157
0·05	·00197
0·06	·00236
0·07	·00276
0·08	·00315
0·09	·00354

1/10	
mm.	inches
0·1	·00394
0·2	·00787
0·3	·01181
0·4	·01575
0·5	·01969
0·6	·02362
0·7	·02756
0·8	·03150
0·9	·03543

Conversion Tables

POUNDS PER SQUARE INCH TO KILOGRAMS PER SQUARE CENTIMETRE

	0	1	2	3	4	5	6	7	8	9	
—		0·070	0·141	0·211	0·281	0·352	0·422	0·492	0·562	0·633	—
10	0·703	0·773	0·844	0·914	0·984	1·055	1·125	1·195	1·266	1·336	10
20	1·406	1·476	1·547	1·617	1·687	1·758	1·828	1·898	1·969	2·039	20
30	2·109	2·179	2·250	2·320	2·390	2·461	2·531	2·601	2·672	2·742	30
40	2·812	2·883	2·953	3·023	3·093	3·164	3·234	3·304	3·375	3·445	40
50	3·515	3·586	3·656	3·726	3·797	3·867	3·937	4·007	4·078	4·148	50
60	4·218	4·289	4·359	4·429	4·500	4·570	4·640	4·711	4·781	4·851	60
70	4·921	4·992	5·062	5·132	5·203	5·273	5·343	5·414	5·484	5·554	70
80	5·624	5·695	5·765	5·835	5·906	5·976	6·046	6·117	6·187	6·257	80
90	6·328	6·398	6·468	6·538	6·609	6·679	6·749	6·820	6·890	6·960	90

POUNDS TO KILOGRAMS

	0	1	2	3	4	5	6	7	8	9	
—		0·454	0·907	1·361	1·814	2·268	2·722	3·175	3·629	4·082	—
10	4·536	4·990	5·443	5·987	6·350	6·804	7·257	7·711	8·165	8·618	10
20	9·072	9·525	9·079	10·433	10·886	11·340	11·793	12·247	12·701	13·154	20
30	13·608	14·061	14·515	14·968	15·422	15·876	16·329	16·783	17·237	17·690	30
40	18·144	18·597	19·051	19·504	19·953	20·412	20·865	21·319	21·772	22·226	40
50	22·680	23·133	23·587	24·040	24·494	24·948	25·401	25·855	26·308	26·762	50
60	27·216	27·669	28·123	28·576	29·030	29·484	29·937	30·391	30·844	31·298	60
70	31·751	32·205	32·659	33·112	33·566	34·019	34·473	34·927	35·380	35·834	70
80	36·287	36·741	37·195	37·648	38·102	38·855	39·009	39·463	39·916	40·370	80
90	40·823	41·277	41·731	42·184	42·638	43·091	43·545	43·998	44·452	44·906	90

FOOT POUNDS TO KILOGRAM METRES

	0	1	2	3	4	5	6	7	8	9	
—		0·138	0·277	0·415	0·553	0·691	0·830	0·968	1·106	1·244	—
10	1·383	1·521	1·659	1·797	1·936	2·074	2·212	2·350	2·489	2·627	10
20	2·765	2·903	3·042	3·180	3·318	3·456	3·595	3·733	3·871	4·009	20
30	4·148	4·286	4·424	4·562	4·701	4·839	4·977	5·116	5·254	5·392	30
40	5·530	5·668	5·807	5·945	6·083	6·221	6·360	6·498	6·636	6·774	40
50	6·913	7·051	7·189	7·328	7·466	7·604	7·742	7·881	8·019	8·157	50
60	8·295	8·434	8·572	8·710	8·848	8·987	9·125	9·263	9·401	9·540	60
70	9·678	9·816	9·954	10·093	10·231	10·369	10·507	10·646	10·784	10·922	70
80	11·060	11·199	11·337	11·475	11·613	11·752	11·890	12·028	12·166	12·305	80
90	12·443	12·581	12·719	12·858	12·996	13·134	13·272	13·411	13·549	13·687	90

Conversion Tables

PINTS (IMPERIAL) TO LITRES

	0	1	2	3	4	5	6	7	8
—	—	·568	1·136	1·705	2·273	2·841	3·841	3·978	4·546
¼	·142	·710	1·279	1·846	2·415	2·983	3·552	4·120	4·688
½	·284	·852	1·420	1·989	2·557	3·125	3·125	4·262	4·830
¾	·426	·994	1·563	2·131	2·699	3·267	3·836	4·404	4·972

GALLONS (IMPERIAL) TO LITRES

	0	1	2	3	4	5	6	7	8	9	
—		4·546	9·092	13·638	18·184	22·730	27·276	31·822	36·368	40·914	—
10	45·460	50·005	54·551	59·097	63·643	63·189	72·735	77·281	81·827	86·373	10
20	90·919	95·465	100·011	104·557	109·103	113·649	118·195	122·741	127·287	131·833	20
30	136·379	140·924	145·470	150·016	154·562	159·108	163·645	168·200	172·746	177·292	30
40	181·838	186·384	190·930	195·476	200·022	204·568	209·114	213·660	218·206	222·752	40
50	227·298	231·843	236·389	240·935	245·481	250·027	254·473	259·119	263·605	268·211	50
60	272·757	277·303	281·849	286·395	290·941	295·487	300·033	304·579	309·125	313·671	60
70	318·217	322·762	327·308	331·854	336·400	340·946	345·492	350·038	354·584	359·130	70
80	363·676	368·222	372·768	377·314	381·860	386·406	390·952	395·498	400·044	404·590	80
90	409·136	413·681	418·227	422·773	427·319	431·865	436·411	440·957	445·503	450·049	90

MILES TO KILOMETRES

	0	1	2	3	4	5	6	7	8	9	
—		1·609	3·219	4·828	6·437	8·047	9·656	11·265	12·875	14·484	—
10	16·093	17·703	19·312	20·922	22·531	24·140	25·750	27·359	28·968	30·578	10
20	32·187	33·796	35·406	37·015	38·624	40·234	41·843	43·452	45·062	46·671	20
30	48·280	49·890	51·499	53·108	54·718	56·327	57·936	59·546	61·155	62·765	30
40	64·374	65·983	67·593	69·202	70·811	72·421	74·030	75·639	77·249	78·858	40
50	80·467	82·077	83·686	85·295	86·905	88·514	90·123	91·733	93·342	94·951	50
60	96·561	98·170	99·780	101·389	102·998	104·608	106·217	107·826	109·436	111·045	60
70	112·654	114·264	115·873	117·482	119·092	120·701	122·310	123·920	125·529	127·138	70
80	128·748	130·357	131·967	133·576	135·185	136·795	138·404	140·013	141·623	143·232	80
90	144·841	146·451	148·060	149·669	151·279	152·888	154·497	156·107	157·716	159·325	90

MILES PER GALLON (IMPERIAL) TO LITRES PER 100 KILOMETRES

10	28·25	15	18·83	20	14·12	25	11·30	30	9·42	35	8·07	40	7·06	50	5·65	60	4·71	70	4·04
10½	26·90	15½	18·22	20½	13·78	25½	11·08	30½	9·26	35½	7·96	41	6·89	51	5·54	61	4·63	71	3·98
11	25·68	16	17·66	21	13·45	26	10·87	31	9·11	36	7·85	42	6·73	52	5·43	62	4·55	72	3·92
11½	24·56	16½	17·12	21½	13·14	26½	10·66	31½	8·97	36½	7·74	43	6·57	53	5·33	63	4·48	73	3·87
12	23·54	17	16·61	22	12·84	27	10·46	32	8·83	37	7·63	44	6·42	54	5·23	64	4·41	74	3·82
12½	22·60	17½	16·14	22½	12·55	27½	10·27	32½	8·69	37½	7·53	45	6·28	55	5·13	65	4·35	75	3·77
13	21·73	18	15·69	23	12·28	28	10·09	33	8·56	38	7·43	46	6·14	56	5·04	66	4·28	76	3·72
13½	20·92	18½	15·27	23½	12·02	28½	9·91	33½	8·43	38½	7·34	47	6·01	57	4·96	67	4·22	77	3·67
14	20·18	19	14·87	24	11·77	29	9·74	34	8·31	39	7·24	48	5·89	58	4·87	68	4·16	78	3·62
14½	19·48	19½	14·49	24½	11·53	29½	9·58	34½	8·19	39½	7·15	49	5·77	59	4·79	69	4·10	79	3·57

Conversion Tables

METRIC I.S.O. THREAD – FINE PITCH

Nom. Tap. Dia. × Pitch mm	Nom. Tap. Dia. × Pitch mm	Nom. Tap. Dia. × Pitch mm
M3 ×0.35	M14 × 1.25	M28 × 1.50
M3.5 × 0.35	M14 × 1.50	M30 × 1.50
M4 ×0.50	M16 × 1.50	M30 × 2.00
M4.5 × 0.50	M18 × 1.50	M32 × 1.50
M5 ×0.50	M20 × 1.50	M33 × 2.00
M6 ×0.75	M22 × 1.50	M40 × 1.50
M8 ×1.00	M24 × 1.50	M50 × 1.50
M10 × 1.00	M25 × 1.50	M63 × 1.50
M10 × 1.25	M27 × 1.50	
M12 × 1.25	M27 × 2.00	

L.I. 110(a)

METRIC I.S.O. THREAD – COARSE PITCH

Nom. Tap Dia. × Pitch mm	Nom. Tap Dia. × Pitch mm	Nom. Tap Dia. × Pitch mm
M2 ×0.40	M10 × 1.50	
M2.2 × 0.45	M11 × 1.50	M36 × 4.00
M2.5 × 0.45	M12 × 1.75	M39 × 4.00
M3 ×0.50	M14 × 2.00	M42 × 4.50
M3.5 × 0.60	M16 × 2.00	M45 × 4.50
M4 ×0.70	M18 × 2.50	M48 × 5.00
M4.5 × 0.75	M20 × 2.50	M52 × 5.00
M5 ×0.80	M22 × 2.50	M56 × 5.50
M6 ×1.00	M24 × 3.00	M60 × 5.50
M7 ×1.00	M27 × 3.00	
M8 ×1.25	M30 × 3.50	
M9 ×1.25	M33 × 3.50	

L.I. 110(b)

Conversion Tables

I.S.O. METRIC THREADS

Nom. Dia. Tap mm	Pitch mm	Tapping Drill mm	Nom. Dia. Tap mm	Pitch mm	Tapping Drill mm
1.0	0.25	0.75	11.0	1.50	9.50
1.1	0.25	0.85	12.0	1.75	10.20
1.2	0.25	0.95	14.0	2.00	12.00
1.4	0.30	1.10	16.0	2.00	14.00
1.6	0.35	1.25	18.0	2.50	15.50
1.8	0.35	1.45	20.0	2.50	17.50
2.0	0.40	1.60	22.0	2.50	19.50
2.2	0.45	1.75	24.0	3.00	21.00
2.5	0.45	2.05	27.0	3.00	24.00
3.0	0.50	2.50	30.0	3.50	26.50
3.5	0.60	2.90	33.0	3.50	29.50
4.0	0.70	3.30	36.0	4.00	32.00
4.5	0.75	3.70	39.0	4.00	35.00
5.0	0.80	4.20	42.0	4.50	37.50
6.0	1.00	5.00	45.0	4.50	40.50
7.0	1.00	6.00	48.0	5.00	43.00
8.0	1.25	6.80	52.0	5.00	47.00
9.0	1.25	7.80	56.0	5.50	50.50
10.0	1.50	8.50			

L.I. 109

GALLONS

Gallons (Imperial) — Gallons (U.S.)

Imperial Gallons	U.S. Gallons		U.S. Gallons	Imperial Gallons
1	1·2		1	0·83
2	2·4		2	1·66
3	3·6		3	2·50
4	4·8		4	3·33
5	6·0		5	4·16
6	7·2		6	5·00
7	8·4		7	5·83
8	9·6		8	6·66
9	10·8		9	7·49
10	12·0		10	8·30

50 miles per U.S. gallon
is equivalent to
60 miles per Imperial gallon.