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## 1. GENERAL SAFETY:

### **WARNING**

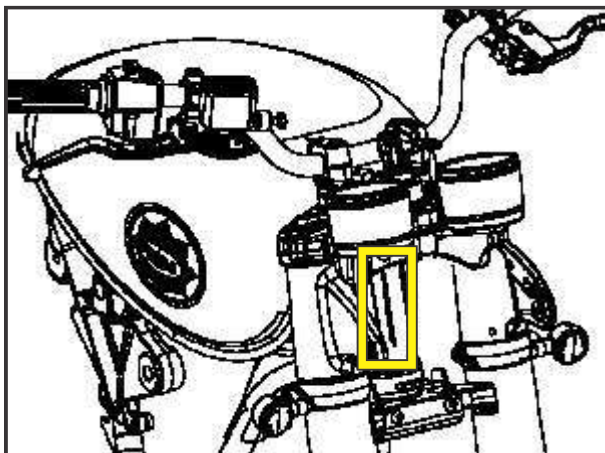
The engine must be running to do some work, make sure the area is well ventilated. Never run the engine in closed area. The exhaust gas contains poisonous carbon monoxide that may cause loss of consciousness and may lead to death.

## GENERAL SERVICE PRECAUTIONS:

- 1) Diagnose the problem thoroughly before dismantling the Motorcycle.
- 2) Use Special Tools, designed for this product.
- 3) Use only Metric Tools when servicing this Motorcycle. Metric bolts, Nuts and Screws are not interchangeable with English Fasteners. The use of incorrect Tools and Fasteners may damage the motorcycle.
- 4) Install new Gaskets, O-rings, Oil Seals, Dowel Pins, Cotter pins etc., while reassembling.
- 5) When tightening bolts or Nuts, begin with larger diameter or inner bolts first, and tighten to the specified torque diagonally in 2-3 steps, unless a particular sequence is specified.
- 6) Clean the parts in non-flammable or high flash point solvent upon disassembly. Lubricate all sliding surface before reassembly.
- 7) After reassembly check all parts for proper installation & install new gaskets, O-rings, cotter pins, and lock plates when reassembling.
- 8) Route all electrical wires always away from sharp edges and areas where they might be pinched between moving parts.
- 9) Do not run the motorcycle without / with weak battery which may damage other electrical components.
- 10) Always use Genuine parts and Engine oil MOTUL H-TECH1004T10W50 / CASTROL 10W504TJASO MA-2 [SAE 10W50 fully synthetic motorcycle engine oil that meets JASO-MA2 and API-SL (or Higher) specification]
- 11) Always refer Workshop manual and follow the procedures & instructions provided in the manual.
- 12) Refer the product specific Spare Parts Catalogue to find the correct spare parts and their part numbers.
- 13) Use Genuine or recommended parts and lubricants or their equivalents. Parts that don't meet specifications may cause damage to the motorcycle.
- 14) Use the special tools designed for this product to avoid damage and incorrect assembly.

2. VEHICLE IDENTIFICATION

Frame No. (Alpha Numeric 17 digit)

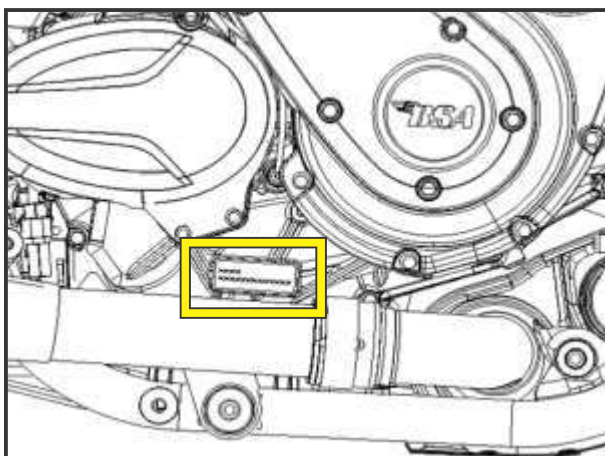


Frame Number is stamped on the right side of the steering stem of the chassis. VIN NUMBER- 17 Digit.

VIN - Vehicle Identification Number

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
M	Z	D	B	1	1	C	1	5	M	1	A	0	0	0	0	1
WMI Code			Model Code		Drive	Engine		Transmission		Year Code	Plant Code	Month Code		Production Serial No.		

Engine No. (Alpha Numeric 11 digit)



Engine Number is stamped on the lower side of crankcase at right hand side.

1	2	3	4	5	6	7	8	9	10	11
X	A	E	M	A	0	0	0	0	0	1
Model Code		Engine	Year Code	Month Code	Serial No.					

## 3. SPECIFICATIONS

Parameters	Description	Specification
Dimensions	Overall Length	2,206 mm
	Overall width	817 mm
	Overall height	1,093 mm
	Wheelbase	1,425 mm
	Seat height	782 mm
	Ground clearance	150 mm
	Kerb weight (With 90% Fuel, Tools)	213.5kg

Parameters	Description	Specification
Frame	Frame type	Tubular
	Front suspension	Telescopic hydraulic fork with cover tubes
	Front suspension travel	120 mm
	Rear suspension	Twin shock absorber, 5 step adjustable
	Rear axle travel	108 mm
	Front tire size	Pirelli 100/90-18 Tubeless with tube
	Rear tire size	Pirelli 150/70-17 Tubeless with tube
	Front brake	Disc brake 320 mm dia., Floating type caliper
	Rear brake	Disc brake 255 mm dia.
	Caster angle	26.5°
	Trail length	97 mm
	Fuel tank capacity	12.0 liter
	Dead volume	0.5 liter
	Reserve	3.0 liter

Parameters	Description	Specification	
Engine	Cylinder Arrangement	Single Cylinder, 4 Valves, Inclined 4° From Vertical	
	Bore and stroke	100 x 83 mm	
	Displacement	652 cc	
	Compression ratio	11.5 : 1	
	Valve train	Chain driven, DOHC, 4 Valves	
	Intake Valve	Opens :	1 mm (0.04 in) lift 4° BTDC lift
		Closes :	1 mm (0.04 in) lift 40° ABDC
	Exhaust Valve	Opens :	1 mm (0.04 in) lift 40° BBDC
		Closes :	1 mm (0.04 in) lift 4° ATDC
Lubrication system	Forced Lubrication (Crankshaft, Valve Train, Transmission, Piston), Dry sump		

## SPECIFICATIONS

Parameters	Description	Specification
Engine	Oil pump type	Trochoid
	Cooling system	Liquid cooled
	Air filtration	Paper element
	Engine dry weight	55 Kg

Parameters	Description	Specification
Fuel System	Type	Electronic Fuel Injection
	Throttle bore	46 mm

Parameters	Description	Specification	
Drive Train	Clutch System	Multi-plate, Wet Clutch A & S Type	
	Clutch operation system	Pull Type	
	Transmission	Constant mesh, 5-speed (Manual)	
	Primary reduction	1:1.946	
	Final reduction	1:2.938	
	Gear ratio	1st	1:2.75
		2nd	1:1.75
		3rd	1:1.313
4th		1:1.045	
5th		1:0.875	
	Gear shift pattern	1 - N - 2 - 3 - 4 - 5 (Left foot operated)	

Parameters	Description	Specification
Electricals	Ignition System	Electronic Fuel Injection
	Starting system	Electric Starter Motor
	Charging system	Three Phase Alternator (350w)
	Regulator / rectifier	3 Phase Regulator Rectifier (DC Type)
	Head Lamp	12V, (60/55W)
	Battery	12V, 11.2AH
	Idle rpm	1500 ± 100 RPM
	Throttle grip free play	3~5 degree
	EWT sensor resistance (at 20°C)	11.401-14.33kΩ
	TPS (Resistance)	2kΩ ± 30%
	Fuel injector resistance (at 25°C)	12Ω
	Inlet Air Control valve (IACV) resistance	(at 25°C) 51Ω ± 10%

## SPECIFICATIONS

Parameters	Description	Specification
Electricals	Heater Cold Resistance (Lambda sensor)	(at 25°C) $14 \pm 2.2\Omega$
	Fuel pressure at idle	$250 \pm 10\text{kPa}$
	Fuel pump flow (at 12 V)	15 Lt / Hr Min

Parameters	Description	Specification	
Cooling System	Coolant Capacity (Radiator And Engine)	1760 MI	
	Radiator cap relief pressure	$1.4\text{ bar} \pm 0.5\text{ bar}$	
	Thermostat	Begin to open	$88 \pm 2\text{ }^\circ\text{C}$
		Fully open	$98\text{ }^\circ\text{C}$
		Valve lift	6 mm minimum

Parameters	Description	Specification
Battery	Capacity Current leakage	12 V- 11.2 AH
	Voltage (20°C/68°F) Fully charged	3.0 mA max.
	Needs to charge	13.0 - 13.2 V
	Charging Voltage	Below 12.4 V
	Charging current	$14.4 \pm 0.2\text{V}$
	Normal	1.1AX5 - 10 hr
	Quick	5.5AX1 hr

Parameters	Description	Specification
Alternator	Capacity	0.350 k W@5,000 RPM
	Charging coil resistance(20°C/68°F)	$0.35 - 0.55\ \Omega$

Parameters	Description	Specification
Spark plug	Champion	RA7YC
	Spark plug gap	0.8 - 0.9 mm
	Ignition timing ("F"mark)	$10^\circ$ BTDC at idle

## SPECIFICATIONS

Parameters	Description	Specification
<b>Bulbs</b>	Headlight	12 V, (60/55 W)
	Position light	Bulb - 5W, 2V (5W)
	Brake / tail light	20W LED (5 nos.)
	License light	12 V - 5 W (2 LED)
	Turn signal light	12 V - 10 W x 4
	Instrument light	LED
	Horn	12V DC
	Turn signal indicator	LED
	High beam indicator	LED
	Neutral indicator	LED
	MIL	LED
	Engine coolant temperature indicator	LED
	Low Battery	LED
	Low fuel	LED

Parameters	Description	Specification
<b>Fuse Numbers</b>	F1-Charging fuse (Green)	30A
	F2-Ignition, Radiator fan (Green)	10A
	F3-HECU (Yellow) ABS	20A
	F4-Lamps (Blue)	15A
	F5-Ignition coil [Coil 1 & 2] (Blue)	15A
	F6-Speedo, ECU, Immobiliser (Red)	10A
	F7-EFI loads (Red)	10A
	F8-Accessories (Red)	10A
	F9-Ignition 2 (Orange)	5A

Parameters	Description	Specification
<b>Engine oil capacity</b>	After draining	2.3 liters
	After oil filter change	2.35 liters
	After disassembly	2.5 liters

Parameters	Description	Specification
<b>Engine oil</b>	Recommended Engine Oil	MOTUL H-TECH 100 4T 10W 50 CASTROL 10W50 4T JASO MA-2 [SAE 10W50 fully synthetic motorcycle engine oil that meets JASO-MA2 and API-SL (or Higher) specification].

## LUBRICATION SYSTEM SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After Draining	2.3 liters	First oil change at 1st Servicing (500 Miles)
	After oil filter change	2.35 liters	Sub sequent Oil Change interval is at every 3500 miles
	After disassembly	2.5 liters	Subsequent Oil Change Interval is at every 3500 Miles
Engine oil		Recommended Engine Oil :- <b>MOTUL H-TECH 100 4T 10W 50</b> <b>CASTROL 10W50 4T JASO MA-2</b> [SAE 10W50 fully synthetic motorcycle engine oil that meets JASO-MA2 and API-SL (or Higher) specification].	
Radiator coolant		MOTUL EXPERT REDICOOOL (PREMIX)      INUGEL CASTROL HD	
Oil pump	Tip clearance (mm)	0.05 - 0.150	0.18
	Body clearance (mm)	0.085 - 0.180	0.25
	Side clearance (mm)	0.04 - 0.15	0.17

## CYLINDER HEAD / VALVES SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Cylinder Compression Pressure		5 - 7 bar	-
Valve clearance		IN	0.1~0.15 mm
		EX	0.25~0.30 mm
Camshaft	Cam lobe height (mm)	IN	40.38-40.44
		EX	40.39-40.45
Valve lifter	Oil clearance (d22 journal)	IN/EX	0.02-0.054
Valve, Valve guide	Valve stem O.D.	IN	4.967-4.981
		EX	4.956-4.970
	Valve guide I. D.	IN/EX	5.006-5.018
	Stem-to-guide clearance	IN	0.025-0.051
		EX	0.036-0.062
	Valve seat width	IN	1.05-1.35
		EX	1.25-1.55
Valve guide projection	IN/EX	10.6-11.0	

## VALVE SPRING

ITEM		STANDARD	SERVICE LIMIT
Valve spring - free length	IN	46.25	44.45
	EX	46.25	44.45
Cylinder head warpage			

## CLUTCH / STARTER CLUTCH SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Clutch Lever Free Play	-	10~12.5 mm	-
Main shaft OD - At Clutch Bush	O.D.	24.988-24.975	24.968
Primary driven gear (GPDN)	I.D.	28.993-29.009	29.029
Starter driven gear (11/52T)	I.D.	10.05-10.08	10.1

## TRANSMISSION / GEAR SHIFT / LINKAGE SPECIFICATIONS

ITEM			STANDARD	SERVICE LIMIT
Shift Forks	I.D.	4th & 5th Input	8.013-8.049	8.08
	Claw thickness		3.5-3.6	3.4
	I.D.	1st & 3rd Output	8.013-8.049	8.08
	Claw thickness		3.5-3.6	3.4
	I.D.	2nd Output	8.013-8.049	8.08
	Claw thickness		3.5-3.6	3.4
Shift fork shaft	OD		7.991-8.00	7.984
Transmission M - Main / Input Shaft C - Counter / Output shaft Number denotes, respective Gear no. / Location (eg. C1 means First Gear of Counter / Output Shaft)	Gear ID	C1	25.007-25.020	25.04
		M5		
		C2	26.007-26.020	26.04
		C3		
		M4		

## CRANKCASE / CRANKSHAFT / BALANCER / PISTON / CYLINDER

ITEM			STANDARD	SERVICE LIMIT	
Crankshaft	Connecting rod side clearance		0.15 - 0.40	0.5	
	Main journal bearing oil clearance	RH & LH	0.034 - 0.065	0.085	
	Run out	RH & LH	0.03	0.04	
Piston, piston rings	Piston O.D. at 13 from bottom	A	99.945 - 99.955	99.885	
		B	99.955 - 99.965	99.895	
	Piston pin Bore I.D.	RH & LH	22.005 - 22.010	22.02	
	Piston pin O.D.	Top, mid, bottom	21.994 - 22.0	21.979	
	Piston-to-piston pin clearance		0.005 - 0.016	NA	
	Piston ring end gap	Top		0.2 - 0.4	0.4
		Second		0.2 - 0.4	0.6
		Oil (Side rail)		0.2 - 0.7	1
Piston ring-to-ring groove clearance	Top		0.030 - 0.070	0.09	
	Second		0.020 - 0.060	0.09	
Cylinder	I.D. (DN)	A - Group	100 - 100.12	100.052	
		B - Group	100.012-100.025	100.065	
	Out of round		0.006	0.01	
	Taper		0.05	0.06	
Warpage		0.008	0.01		
Cylinder-to-piston clearance			0.045-0.070	NA	
Connecting rod small end I.D.			22.015 - 22.025	22.04	
Connecting rod-to-piston pin clearance			0.015 - 0.031	NA	

## FRONT WHEEL / SUSPENSION / STEERING SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		3.6 mm	1 mm
Cold tire pressure	Driver only	Front 28 (psi)	
	Driver and passenger	Front 28 (psi)	
Wheel rim run out	Radial		1.8 mm
	Axial		1.8 mm
Fork	Spring free length	303.8 mm	300 mm
	Fork tube run out	-	
	Recommended fork fluid	Gabriel Front Fork oil (2W35)	
	Fluid level	-	
	Fluid capacity	400 ml / Leg	

## REAR WHEEL / SUSPENSION SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		7 mm	1 mm
Cold tire pressure	Driver only	30 psi	
	Driver and passenger	34 psi	
Wheel rim run out	Radial		1.8 mm
	Axial		1.8 mm
Drive chain	Size / link	106 Links	
	Slack	25 - 30 mm	
Shock absorber	Spring pre-load adjuster standard position	2nd position	
	Rebound adjuster initial setting	NA	

ITEM		STANDARD	SERVICE LIMIT
Front	Specified brake fluid	DOT4	
	Brake disc thickness	5 mm	4.5 mm
	Brake disc run out	0.25 mm	0.30 mm
Rear	Specified brake fluid	DOT4	
	Brake disc thickness	5 mm	4.5 mm
	Brake disc run out	0.25 mm	0.30 mm

## 4. TORQUE VALUES STANDARD

FASTENER TYPE	TORQUE (kgf.m)	FASTENER TYPE	TORQUE (kgf.m)
5mm hex bolt and nut	0.45-0.60	3mm screw	0.05-0.08
6mm hex bolt and nut	0.80-1.20	4mm screw	0.10-0.15
8mm hex bolt and nut	1.80-2.50	5mm flange bolt	0.35-0.50
10mm hex bolt and nut	3.00-4.00	6mm flange bolt and nut	0.70-1.10
12mm hex bolt and nut	5.00-6.00	Plastic Parts	0.6-0.8

## FRAME

ITEM	QTY	THREAD Dia. mm	TORQUE kgf.m	REMARK
Spark plug	1		1.9-2.1	
Engine oil drain bolt	1		4.0-4.8	
<b>LUBRICATION SYSTEM</b>				
Oil pump assembly bolt			Refer Torque chart	
<b>FUEL SYSTEM (EFI)</b>				
Fuel pump	6	M6	1.0	Screw
Fuel Gauge	5	M5	0.7	Flange bolt
Injector Cap	1	M5X0.8X12	0.3	Screw
TMAP	1	M6X0.8X12	0.4	Screw
<b>COOLING SYSTEM</b>				
Coolant pump assembly bolt				
Refer Torque chart				
<b>ENGINE REMOVAL / INSTALLATION</b>				
Drive sprocket bolt			Refer Torque chart	
Driven sprocket bolt 6		M8X1.25X2 8	3.5-4	
Driven sprocket nut 6		M8X1.25		
Front sprocket cover	2	M6X1X20	1.2	
		M6X1X65		
GSL	1	M6X1X20	1.2	Flange bolt
<b>FRAME / BODY PANEL / EXHAUST SYSTEM</b>				
Exhaust pipe (Muffler to engine mounting)	2	M8X1.25X1 7	2.5	Nut special
Exhaust pipe mounting bolt	1	M8	2.5	Steel Insert Nut
"Muffler front / rear mounting bolt / nut"	2	M8	2.5	
"Exhaust pipe / muffler protect or socket bolt"	2	M6	1.2	
Front fender mounting bolt	8	M6	0.8-1.2	
Rear fender mounting bolt	4	M6	0.8-1.2	

## FRAME

ITEM	QTY	THREAD Dia. mm	TORQUE kgf.m	REMARK
Sub frame	2	M10	3-4	
Silencer Mounting Bolt	2	M10	3.5-5.0	
Silencer Heat Shield 4		M5	0.5	
Front fender mounting bolt LH & RH	4	M6	0.8-1.2	
<b>MAINTENANCE</b>				
Air cleaner duct mounting screw	6	M5	0.3	
<b>FUEL SYSTEM (PGM-FI)</b>				
Fuel tank rear mounting nut	1	M6X20	1.2	
Fuel pump mounting nut	4	M5X12	0.8	
O2 sensor	1	M12	2.0	
Air cleaner housing mounting bolt	4	M5X12	1.2	
<b>COOLING SYSTEM</b>				
Radiator mounting bolt	1	M6X18	0.8-1.2	
Fan motor mounting bolt	3	M6X12	0.8	
<b>ENGINE REMOVAL / INSTALLATION</b>				
Front engine hanger nut	3	M10x90	5.5	
Front engine hanger bolt	4	M10X125	5.5	
Rear engine mounting	1	M10X90	5.5	
Top engine hanger M10	1	M10X50	5.5	
<b>CLUTCH / STARTER CLUTCH</b>				
Clutch lever pivot bolt			Refer Torque chart	
<b>FRONT WHEEL / SUSPENSION / STEERING</b>				
Handle bar holder bolt	4	M8	2.0-2.5	
Right handle bar switch screw	2	M5	0.4	
Left handle bar switch screw	2	M5	0.4	
Steering stem adjusting lock nut	1	M30	3.3-3.5	Second Locknut
Steering stem adjusting nut	1	M30	1.0-1.2	First Locknut
Steering cap nut	1	M16	7.1-7.5	
Bottom bridge pinch bolt	2	M10	3.0-4.0	
Top bridge pinch bolt 2	M10	3.0-4.0		
Front axle pinch bolt	1	M8	2.3-2.5	
Front axle nut	1	M16	7.5-8.0	
Front brake disc mounting bolt	5	M8	2.7-3.0	
<b>REAR WHEEL / SUSPENSION</b>				
Rear axle nut	1	M16	7.5-8.0	

## FRAME

ITEM	QTY	THREAD Dia. mm	TORQUE kgf.m	REMARK
Sprocket cover mounting	1	M6	0.8-1.2	
Driven sprocket nut	5	M8	3.5-4	
Shock absorber mounting nut	2	M12	3.5-4.5	
Swing arm pivot nut	1	M16	7.5-8.0	
Chain cover mounting	1	M6	0.8-1.2	
Foot rest holder mounting bolt	4	M8	1.8-2.5	
Drive chain slider socket bolt	2	M5	0.5-0.7	
<b>HYDRAULIC BRAKE - FRONT</b>				
Front brake caliper mounting bolt	2	M8X33	2.7-3.0	
Front caliper bleed valve	1	M5	0.7-1.1	
Front master cylinder holder bolt	2	M6	0.5-0.6	
Brake lever pivot nut	1	M5	0.7	
Front master cylinder reservoir cap screw	2	M4	0.08-0.15	
Front brake hose clamp bolt / nut	1	M6	2.1-2.7	
<b>LIGHTS / METERS / SWITCHES</b>				
Ignition switch mounting bolt	2	M6	0.8-1.2	
License light mounting nut	2	M6	0.8-1.2	
Side stand switch bolt	1	M6	0.4-0.6	
Clutch switch mounting screw	2	M6	0.3	
Side indicator blinker	4	M6	0.8-1.2	
<b>OTHERS</b>				
Side stand pivot bolt	1	M10	1.5-1.8	
Side stand pivot nut	1	M10	1.5-1.8	
Gear shift pedal pivot bolt	1	M6	1.2	
Ignition coil stay mounting bolt	1	M6	1.2	
Horn mounting bolt	1	M8	1.0-1.4	
Battery holding bracket bolts	3	M6	0.8-1.2	
Front license plate mounting bolts	2	M5	0.8-1.2	
Rear license plate mounting bolts	2	M6		
Reflector mounting bracket bolts	2	M6		

## ENGINE

PARAMETERS	ITEM	Qty.	TORQUE kgf.m	REMARK
<b>ASSEMBLY, CYLINDER HEAD</b>				
Bolt M6 x 1-45l (head To Block Chain Side)	Cylinder Head Mounting	3	1.1(0.9-1.2)	Pre-Coating
Bolt, M8 x 1.25-50l (head To Block LH Side)	Cylinder Head Mounting	4	3.3(3.1-3.5)	Pre-Coating
Screw Socket M8x1.25x48x10.9	Bush Riffle Logo/Cyl Head Mounting	1	3.3(3.1-3.5)	Pre-Coating
Hex Nut M10x1.5 (Main Stud)	Cylinder Head Mounting	4	6 (5.7-6.3)	Pre-Coating
Flanged Bolt M6x1 - 45l	Cam Shaft Holder Mounting	8	1.1(0.9-1.2)	NA
Bolt Step M6x1 - 37l	Cylinder head cover Mounting	7	1.1(0.9-1.2)	Loctite 243
Bolt M6x1 - 16l	Cap Water Connector Mounting	3	1.1(0.9-1.2)	Loctite 243
Stud Muffler M8x41 (exhaust)	Silencer Mounting	2	2(1.9-2.1)	Loctite 638
Flange Head Bolt - Sh M6x12	Coolant Drain Hole	1	1.1(0.9-1.2)	Loctite 243
Spark Plug	Spark Plug Mounting	2	2 (1.9-2.1)	NA
Bolt Chain Guide Upper (ScrewM6)	Top Chain Guide Mtg on Camshaft Hdl	2	1.1(0.9-1.2)	Loctite 638
Screw Camshaft M10x30	Chain Sprocket Mtg On Camshaft	2	6(5.7-6.3)	Loctite 243
Hex Bolt M6x1_I30	Cylinder Block To CCLH	2	1.1(0.9-1.2)	Loctite 243
M20x1.5	Silent Chain Hyd Chain Tensioner	1	4.4(4-4.8)	Loctite 243
M10x1.5	Coolant Temp Sensor	1	1.4(1.2-1.4)	NA
<b>ASSEMBLY, CRANKCASE LH</b>				
Bolt, Drain Magnetic	CCLH	1	4.4 (4-4.8)	NA
Counter Sunk Screw M5x16	Oil Pump Cover Mounting	6	0.6(0.55-0.65)	Loctite 243
Screw Hex M5x0.8x16x8.8	Oil Strainer Mounting	2	0.6(0.5-0.7)	Loctite 243
Stud Mx10x223 (Tower Stud)	Block Mounting	2	6 (5.7-6.3)	Loctite 638
Bolt, M8x20 (TDC Positioning)	CCLH	1	1.5(1.4-1.6)	Loctite 243
Banjo Bolt 16mm	CCLH	2	2.7(2.4-3.0)	Loctite 243
Silent Chain Guide Pivot Bolt	Slack Side Chain Guide To CCLH	1	0.9(0.9-1.0)	Loctite 243
Flange Bolt M6X12	Drain Oil Hose Inlet Mounting	2	1.0(0.8-1.2)	Loctite 243
<b>ASSEMBLY, CRANKCASE RH</b>				
Hex Flanged Bolt M6x45	CCRH on CCLH	11	1.1(0.9-1.2)	Loctite 243
Hex Flanged Bolt M6x75	CCRH on CCLH	3	1.1(0.9-1.2)	Loctite 243
Neutral Switch M10x1.25	Neutral Switch On CCRH	1	2 (1.9-2.1)	NA
Oil Pressure Switch M10x1	Oil Pressure Switch	1	1.22 (1-1.4)	Loctite 243
Sealing Washer M12x1	Pressure Retaining Valve	1	1.5(1.4-1.6)	Loctite 243
Valve Pin Screw M10x1.25	Valve Pin Screw	1	1.5(1.4-1.6)	Loctite 243
Stud-M10	Block Mounting	2	6.0(5.7-6.3)	Loctite 638

## ENGINE

PARAMETERS	ITEM	Qty.	TORQUE kgf.m	REMARK
<b>ASSEMBLY CLUTCH ADAPTOR PLATE, CLUTCH COVER, CLUTCH, STARTER MOTOR</b>				
Bolt M6x1_35l	Adapter Plate To CCASE	6	1.1(0.9-1.2)	Loctite 243
Bolt M6x1_25l	Adapter plate to Pipe Coolant Conn.	2	1.1(0.9-1.2)	Loctite 243
Bolt M6x1_25l	Water Pump Housing To Adaptor Plate	5	1.1(0.9-1.2)	Loctite 243
Bolt M6x1_55l	Water Pump HSG To Adp Plate To CCLH	2	1.1(0.9-1.2)	Loctite 243
Bolt M6x1_55l	Clutch cover to Adapter plate	5	1.1(0.9-1.2)	Loctite 243
Bolt M6x1_85l	Clutch cover to Adapter plate to CC	3	1.1(0.9-1.2)	Loctite 243
Bolt M6x1_80l	Clutch cover to Adapter plate to CC	2	1.1(0.9-1.2)	Loctite 243
Bolt M6x1_65l	Clutch cover to Clutch Adapter plate	1	1.1(0.9-1.2)	Loctite 243
Hex Screw M6x35	Clutch Assembly springs	3	1.1(0.9-1.2)	Loctite 243
Hex Nut M18x1.5	Clutch Main Nut	1	15.5(14-17)	Pre-Coating
Hex Nut M20x1.5	Output Sprocket Mounting	1	15.5(14-17)	Pre-Coating
Bolt Hex Flange M6x1x35	Starter Motor Mounting	2	1.1(0.9-1.2)	Loctite 243
Hex Nut M6x6l	Starter Motor Cable Tightening	3	(0.39-0.55)	NA
Bolt M5X0.8X10L	Holding Bracket starter harness mounting	2	(0.45-0.6)	Loctite 243
<b>ASSEMBLY, MAGNETO ADAPTER PLATE, CAP MAGNETO, MAGNETO</b>				
Screw M5x0.8_15l	Pulsar Coil Mounting	2	1.1(0.9-1.2)	Loctite 243
Bolt, M6x1_35l	Magneto Coil (stator) Mounting	3	1.1(0.9-1.2)	Loctite 243
Bolt M5x0.8_10l	Inner Cable Bracket Mounting	2	0.6(0.5-0.7)	Loctite 243
Hex Nut M22x1.5	Magneto Mounting Nut On Crksft	2	22	Pre-coating
Bolt M6x1x_35l	GPD Magneto Adapter Plate To CCRH	9	1.1(0.9-1.2)	Loctite 243
Bolt, M6x1x_105l (108L)	Cap To Adaptor Plate To CC RH_oil Filter	3	1.0(0.9-1.1)	Loctite243
Bolt, M6x1x_12l	CC RH Cap To Adaptor Plate To CCRH	4	1.0(0.9-1.1)	Loctite 243
Screw Socket M8x1.25_25l	Stator rubber grommet & Cover LH	6	3.3(3.1-3.5)	NA
3 Bond Sealant #Tb1217g	Stator Rubber Grommet And Cover LH	Apr	NA	NA
Grease,Castrol Nlgi 3	All O-ring And Oil Seals	Apr	NA	NA
Petamo Ghy 441 (Kluber Make)	Water Pump Oil Seals	3-5 gm	NA	NA

Apr - AS PER REQUIREMENT

NA - Not Applicable

## 5. LUBRICANTS &amp; CONSUMABLES

Lubricant Name	Specification	Qty.	Application	Remark
Engine Oil	10W50 JASO MA-2	During overhaul - 2.5L During Service - 2.3L	Engine Oil Tank	
Engine Coolant	Engine Premix	1.76 L	Radiator + Reservoir Tank	Reservoir Tank - 150ml Hoses + Radiator - 1610 ml
Fevicol for KemaHandle		0.015 ltr	Handle Bar	Refer in Handlebar Installation
Loctite 243 or Equivalent		0.003ltr	Bolts	Refer WBS systems with Loctite details at all the required.
3 Bond 1104 ECO	1217G	As required	Engine Gasket	Stator rubber Grommet, Crankcase Gasket, Cylinder Head Cover Seal
Loctite 638		As required	Bolts	Head pipe, Engine head stub.
Grease CastrolNLG13		As required	Engine Oil seal / ring	Engine oil seal / O-ring / Water transfer Bush / Oil filter holder O-ring
Loctite 415 Sealant		0.001ltr	Rubber Bead near battery Box	Refer in Frame & Mountings Installation for Loctite application on Rubber bead near Battery box (Loctite for Style part LH / RH Updated)
Petroleum jelly		As required	Battery Terminal	Check in every service and apply if required.
Conducting Grease	Multi temp Grease	As required	RR unit Connector / Earthing terminal	
Drive chain cleaner	Motul chain cleaner - C1	As required	Drive Chain	
Drive chain Lube	Motul chain Lube - C2	As required	Drive Chain	
Front Fork Oil	HPCL : 2W35	400 ± 3 CC/Leg	Front Fork	
Brake oil	Dot 4	~145ml	Front/Rear mastercylinder.	

## LUBRICANTS &amp; CONSUMABLES

Lubricant Name	Specification	Qty.	Application	Remark
Grease LimaplexHTX3		0.020Kg	Steering	
Grease LimaplexHTX3		As required	Front / Rear Wheel Axle, Swing Arm.	
Multi Purpose Grease		As required	Side Stand	
Throttle body cleaner		As required	Throttle body	Check in every service and clean if required.

## 6. SPECIAL TOOL LIST

SR. NO.	DESCRIPTION	TOOL PHOTO	PART NO.
1	Magneto Holder		T14010VF0010N
2	Clutch Center Holder		T14010VF0020N
3	Magneto Puller		T14010VF0030N
4	Piston Pin Remover		T14010VF0040N
5	Stem Seal Insert Tool		T14010VF0290N
6	Connecting Rod Holder		T14010VF0070N
7	Cyl Block & Crank Case Face Closing Plates		T14010VF0080N
8	Output Shaft Oil Seal Pressing Tool		T14010VF0090N

## SPECIAL TOOL LIST

SR. NO.	DESCRIPTION	TOOL PHOTO	PART NO.
9	Gear Shifting Shaft Oil Seal Pressing		T14010VF0100N
10	Output Shaft RH Brg Pressing Tool		T14010VF0170N
11	Bearing Pressing handle Compression		T14010VE0320N
12	LH Input Shaft Brg (6202) Removal Cap		T14010VE0330N
13	LH Input Shaft Brg Puller		T14010VF0210N
14	Balancer LH - RH Ball Brg (6202) Puller		T14010VF0200N
15	Adaptor Compression Gauge		T14010VF0250N
16	Valve Pressing Tool		T14010VE0110N

## SPECIAL TOOL LIST

SR. NO.	DESCRIPTION	TOOL PHOTO	PART NO.
17	GPD & GDPN Locking Tool		T14010VF0310N
18	Water Pump Gear Pressing Tool		T14010VF0280N
19	Water Pump Shaft 2nd Oil Seal Pressing Tool		T14010VF0240N
20	Engine Mounting Fixture		T14010VF0300N
21	Value Pressing Tool Socket		T14010VF0260N
22	Clutch Release Shaft Oil Seal Pressing Tool		T14010VF0130N
23	Water Pump Shaft Double Lip Oil Seal Pressing Tool		T14010VF0390N
24	Balancer Shaft Oil Seal Pressing Tool		T14010VF0150N

## SPECIAL TOOL LIST

SR. NO.	DESCRIPTION	TOOL PHOTO	PART NO.
25	Balancer Shaft LH-RH Bearing Pressing Tool		T14010VF0160N
26	Output CC LH - Input CC RH Bearing Pressing Tool		T14010VF0190N
27	Input Shaft LH Bearing Pressing Tool		T14010VF0180N
28	Output RH Ball Bearing Puller Tool		T14010VF0230N
29	Output LH - Input RH Ball Bearing Puller		T14010VF0220N
30	Piston Ring Compression Tool		T14010VF0060N
31	Rear Shock Absorber Adjuster Tool		T14000J30010N
32	Bottom Outer Race Pressing Tool Top Outer Race Pressing Tool		T14000Y50570N T14000Y50580N

## SPECIAL TOOL LIST

SR. NO.	DESCRIPTION	TOOL PHOTO	PART NO.
33	Wheel Bearing Pressing Tool		T14000Y50540N
34	Steering Nut Tightning		T14010Y40010N
35	Swing Arm Ball Bearing Pressing Tool		T14000Y50550N
36	Swing Arm Needle Bearing Pressing Tool		T14000Y50560N
37	Rear Axle Nut Torque Extension		T14000B10190N
38	Socket Adjuster Tool		T1100B10020N
39	Fuel Pump Pressure Gauge		T15010Y50020N
40	Paddock Stand		T14000B10570N

## SPECIAL TOOL LIST

SR. NO.	DESCRIPTION	TOOL PHOTO	PART NO.
41	Diagnostic Tool Assy		T1501RKW0010N
42	Wiring Diagnostic Cable		T1501RKW0040N
43	Wiring Tool Diagnostic - 2		T1501RKW0060N

## 7. TECHNICAL FEATURES

### TELESCOPIC HYDRAULIC SUSPENSION

- Ø41mm Telescopic front suspension with 120mm travel.
- Best in Class High speed Vehicle Stability.
- Excellent Ride comfort in bumpy roads.
- Lower customer fatigue during long rides.



### FRONT DISC

- 320 mm dia front disc with 5mm thickness.
- Axial mounted, Monoblock – 2 piston, floating caliper.
- No skidding on slippery road conditions.
- Stable braking on all road surfaces.



### REAR DISC

- 255mm dia rear disc with 5mm thickness.
- Axial mounted, Monoblock – single piston, floating caliper.
- Shorter stopping distance with less pedal efforts.
- Excellent braking at high speeds.



### LIQUID COOLED 650 CC FUEL INJECTED ENGINE WITH CO-AXIAL FRAME AND SWINGARM :

- 650cc Liquid cooled, 4Valve - DOHC 55Nm @ 4000rpm.
- Closed loop EFI system with Idle speed controller.
- High performance spark plugs.
- Excellent initial pickup.
- Excellent throttle response in all gears.
- Smooth engine noise and better mileage.



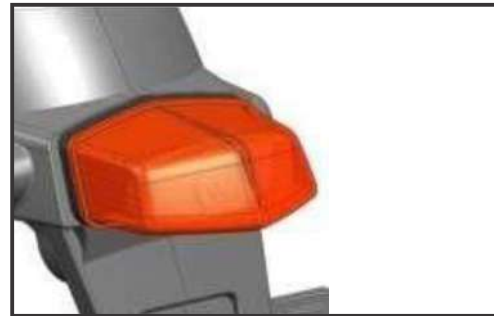
### HEADLIGHT

- Attractive round headlamp
- 60/55W H4 halogen headlamp
- Better and clear visibility in night
- Powerful focus of light
- Lower maintenance cost



### STYLISH LED TAIL LIGHT DESIGN

- LED tail lamp and number plate lamp
- Superior visibility in the night
- Low power consumption lighting system



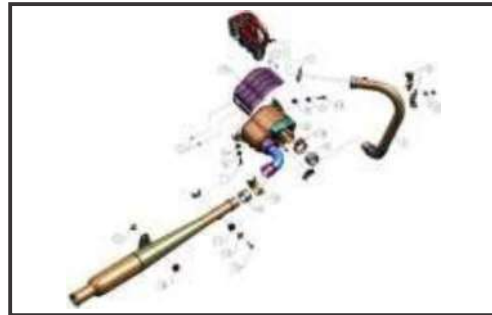
### SPEEDOMETER, RPM METER & TELL TALES POD

- Analog Speed & RPM indicator
- Digital ODO meter / Tripmeter
- Digital Side stand ON indication text on Tell tale POD
- Display Trip A & Trip B
- Low fuel indicator
- Digital Fuel level indication
- ABS-MIL Indicator
- Neutral Indicator
- Immobilizer, High beam, Engine Coolant Temperature
- Turn Signal Indicator, ECU-MIL, Low Engine Oil Indicator



### SINGLE EXHAUST PORT

- Unique exhaust beat having BSADNA.
- Increases the torque.
- Feeling of riding a powerful vehicle.
- Aesthetic appeal and retains BSADNA.



### REAR SHOCK ABSORBER

- Twin shock absorber.
- 5 step adjustable.
- 108mm wheel travel.



### FUEL TANK

- Fuel tank of 12.0 ltr capacity (Including reserve volume) Reserve Volume:-3.0 Ltr (Including dead volume)
- Classic style design
- Rich look chrome plated fuel tank
- Embossed BSA logo on the fuel tank



### HIGH PERFORMANCE DRIVE CHAIN

- High Strength 520 NASR (106 Links) Drive Chain.
- High in performance.
- **Stronger in durability.**
- **Made up of Special Grade Material.**
- **Silent in Operation.**



## 8. MAINTENANCE SERVICE INFORMATION

- Place the motorcycle on level surface before starting any work.

### MAINTENANCE SCHEDULE :

- Perform the Pre-ride inspection in the Owner's Manual at each scheduled maintenance period.

I: Inspect, C: Clean, R: Replace, L: Lubricate, D: Drain, A: Adjust, T: Tighten

Frequency	Which ever comes first	Service schedule						
		1st	2nd	3rd	4th	5th	6th	7th
Item	Service	1st	2nd	3rd	4th	5th	6th	7th
	Months	1	12	24	36	48	60	72
	Miles	500	3500	7500	11000	14500	18000	22500
	Kms	1000	6000	12000	18000	24000	30000	36000
**	Fuel Line							
**	Throttle Operation							
***	Throttle Body Cleaning	I,C	I,C	I,C	I,C	I,C	I,C	I,C
**	Air Cleaner	C	C	R	C	R	C	R
**	Spark Plug	-	I,C	I,C	I,C	I,C	I,C	I,C
##	Valve Clearance							
**	Engine Oil	R	R	R	R	R	R	R
***	Engine Oil Filter & O-Ring Oil FilterHolder	R	R	R	R	R	R	R
**	Magnetic Drain Bolt Washer	R	R	R	R	R	R	R
***	Fuel Pump Filter			I/R*				
**	Fuel Filter Secondary	-	-			R	-	
**	Radiator Coolant Level							R
**	Cooling System (Hose) / Radiator Fan							
**	Drive Chain Slackness / Wear	EVERY 500 MILES / 1000 KMS I, L (Adjust if Required)						
***	Drive Chain Slider Condition							
**	Brake Fluid Level / Leakage				R			R
**	Front / Rear Brake Pad Wear			I/R	I/R	I/R	I/R	I/R
**	Brake Light Switch Working							
***	Front & Rear Disk Mtg. Bolts	I,T	I,T	I,T	I,T	I,T	I,T	I,T

### NOTE

- As & when crankcase is opened, check the engine oil strainer & replace it if clogged.
- If any abnormal noise is observed before the specified maintenance schedule in that case cylinder head cover can be opened to inspect valve clearance else to be checked on at specified maintains schedule.

Frequency	Which ever comes first	Service schedule						
		Service	1st	2nd	3rd	4th	5th	6th
Item	Months	6	12	24	36	48	60	72
	Miles	500	3500	7500	11000	14500	18000	22500
	Kms	1000	6000	12000	18000	24000	30000	36000
**	Clutch System / free Play	I,A	I,A	I,A	I,A	I,A	I,A	I,A
**	Suspension Operation							
**	Nuts, Bolts, Fasteners							
***	Wheels / tires							
***	Cush Drive	I,R	I,R	I,R	I,R	I,R	I,R	I,R
***	Steering Head Bearings				R			R
**	Check All the Cables For Damage / Routed Without Sharp Bends And Set Correctly							
*	Check Battery Voltage / terminals (Apply Petroleum Jelly)							
**	Front Fork Oil Leak	Inspect at every service and replace after 22,500 miles / 36000 Kms.						
**	Side Stand Operation	i	i					
***	Swing Arm Bearing							
**	Side Stand Pivot And Rider Foot Rest	L	L	L	L	L	L	L
***	EFI (electronic Fuel Injection)	I/R	I/R	I/R	I/R	I/R	I/R	I/R
***	Check The Wheel Bearing For Play							
***	Spoke Tightness And Rim Run Out	I,T	I,T	I,T	I,T	I,T	I,T	I,T
**	In case of mil indication read out the fault memory using diagnostics tool	As & when mil flashes						
**	Exhaust guard bolt tightening	i						

 **NOTE**

I/R\* : First check the fuel flow rate as per the SOP, If the flow rate is not, As per specification then you need to check the fuel pump filter and if required, Replace it.

- 1) Service more frequently when riding in dusty area
- 2) For higher odometer reading, repeat at the frequency.
- 3) The vehicle must be serviced at every 3500 mile/6000 km or within 12 months (whichever is earlier) from the date of previous service. Engine oil drain period 3500 Mil / 6000 KMS applicable only on : MOTUL H-TECH 100 4T 10W 50 / CASTROL - 10W50 JASO MA-2 (SAE low 50 fully synthetic motorcycle engine oil that meets JASO-MA2 and API-SL or higher specification)

# If any abnormal noise is observed from tappets before the specified maintenance scheduled in that case cylinder head cover can be opened to inspect valve clearance else to be checked only at specified maintenance scheduled.

\* Can be done by the customer himself.

\*\* We recommend that these items are to be attended by an authorized Service Centre.

\*\*\* These items must be attended only by Authorized Service Centre as they require special tools/Expertise/Lubricants.

### **SAFETY PRECAUTION:**

Make sure the engine is off before you begin any maintenance or repairs. This will help eliminate several potential hazards.

### **Carbon monoxide poisoning from engine exhaust:**

Be sure there is adequate ventilation available whenever you operate the engine.

### **Burns from hot parts:**

Let the engine and exhaust system cool before touching.

### **Injury from moving parts:**

- Do not run the engine unless instructed to do so.
- Read the instructions before you begin, and make sure that the tools and skills required.
- To prevent the motorcycle from falling over, park it on a firm and level surface.
- To reduce the possibility of a fire or explosion, be careful when working around fuel or batteries. Use only non-flammable solvent, not petrol, to clean parts. Keep cigarettes, sparks and flames away from the battery and all fuel-related parts.
- To ensure the best quality and reliability, use only Genuine Parts for repair and replacement.

### **Safety precaution during battery voltage electrical inspection:**

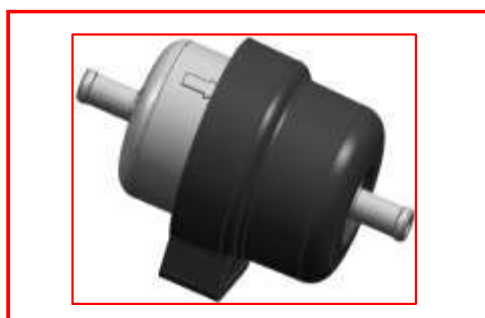
- Always remove metal objects from hands, wrists & neck E.g. rings, bracelet watches & necklaces.
- Always when working on vehicle electrical system disconnect the battery but before disconnection:
  - i) Switch off all electrical loads.
  - ii) Always take great care to avoid shorting the line terminal to earth.
- Never place tools or metal objects near to or on top of a battery.

## FUEL LINES

- Remove fuel tank from vehicle.
- Check the fuel filter line for any leakages or bent.
- Replace fuel pipe when found damage or cut.



- Replace primary filter when fuel flow is low or 7500 Miles (if required)
- **Secondary filter replace at every 14500 Miles.**

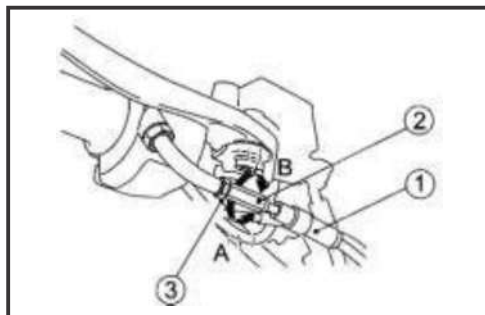


### NOTE

If vehicle is running in area, where quality of fuel is not good then replace the fuel filter before recommended Miles.

## THROTTLE OPERATION

- Check for smooth rotation of the throttle grip from the fully open to the fully closed position at both full steering positions.
- Measure the throttle grip free play at the throttle grip angle, The Standard free play should be approximately: 3~5 degree.



To adjust the free play, slide the throttle body boot (1), then loosen the lock nut (2) and turn the adjuster (3).

After adjustment, tighten the lock nut and return the throttle cable boot securely.

(1) Throttle cable boot

(2) Adjuster.

(3) Lock nut

(A) Increase

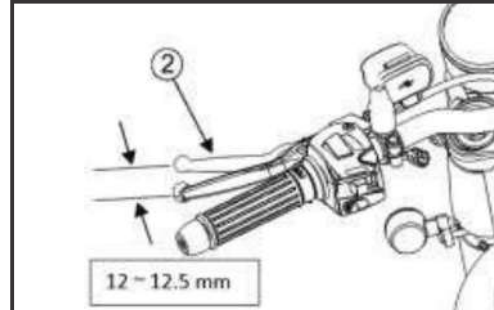
(B) Decrease

**NOTE**

Check for any damage or cut in throttle cable.  
Avoid full throttle operation with engine running.

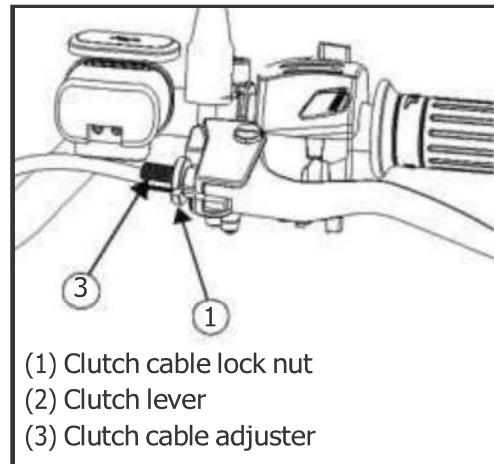
**CLUTCH**

Clutch adjustment may be required if the vehicle stall when shifting into gear or tends to creep or if the clutch slips, causing acceleration to lag behind engine speed. Minor adjustments can be made with the clutch cable adjuster nut (1) at the clutch lever (2).



Normal clutch lever free play is:  
(12 ~ 12.5 mm) (2.5 ~ 3 mm at pivot end)

- Avoid half clutch operation.
- Check for any damage or cut in clutch cable.
- Loosen the lock nut (1) and turn the clutch cable adjuster (3).
- Tighten the lock nut and check the adjustment.
- If the adjuster is threaded out near its limit or if the correct free play cannot be obtained, using the clutch cable adjuster, loosen the lock nut and turn the clutch cable adjuster completely and tighten the lock nut.
- 
- Lubricate the locknut after use in rains, wash. Dusty condition.


**NOTE**

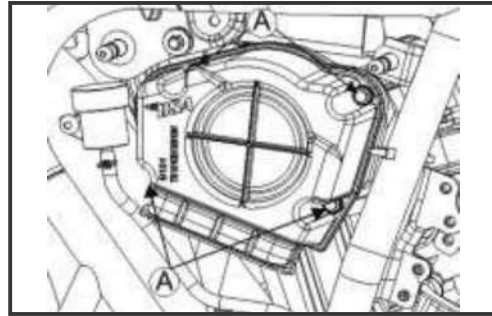
This motorcycle is equipped with a paper type air cleaner element. Do not apply any type of oil on it.

BSA is fitted with dry paper filter. The air filter should be serviced at regular interval as per maintenance schedule. Service more frequently when riding in unusually wet or dusty areas.

The air filter element is located inside the right-hand side box. To access the filter element proceed as follows:

### AIR CLEANER Filter Servicing

- Remove the RH side box cover by pulling it outwards gently from its three locks.
- Unscrew the four screws (A) using 8 mm socket and remove the air filter cover.
- Remove the gasket located on the air filter cover.
- Takeout the filter element from the air filter box.
- Tap the air filter & clean it by dry air, so that dust comes out. if required install the filter element.
- Ensure that the filter is installed properly. Use the Genuine air cleaner element specified for your model. Using the non-genuine air cleaner element which is not of equivalent quality may cause premature engine wear or performance variations.
- Install the removed parts in reverse order of removal.



### SPARK PLUG

Your BSA is designed with twin spark plugs.

1. Primary Spark Plug
2. Secondary Spark Plug

#### **NOTE**

Clean around the spark plug base with compressed air before removing the spark plug and be sure that no debris is allowed to enter the combustion chamber.

## REMOVAL/INSTALLATION

- Initially, Remove the spark plug caps (1) by hand.
- Use Special tool to remove spark plug (2), After loosening use spark plug suppressor cap to take it out from cylinder head.
- Ensure that spark plug grade is as per given specification i.e. RA7YC (Champion)
- Follow the same process for secondary spark plug.
- Clean the insulator tip and electrodes of the plug, carefully using pointed scraper or spark plug cleaner.
- Check the gap between the center and side electrodes with a wire type feeler gauge.
- Set the gap 0.8 - 0.9 mm.

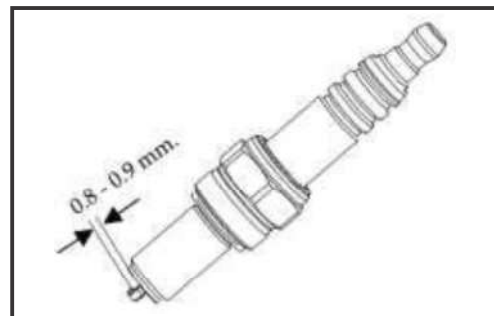


1) Spark Plug Removal Tool

### **WARNING**

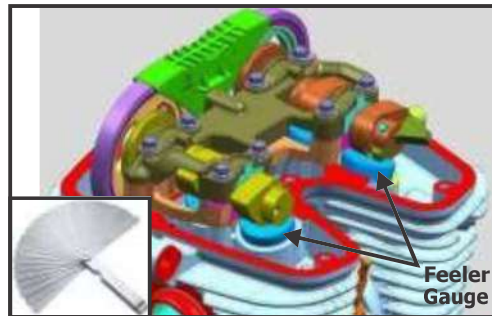
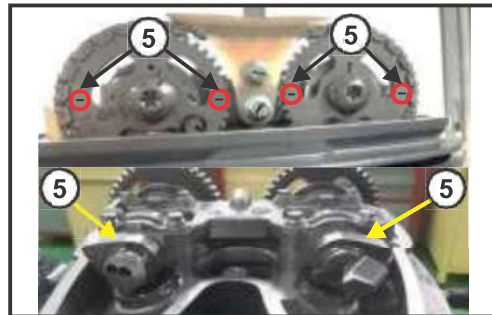
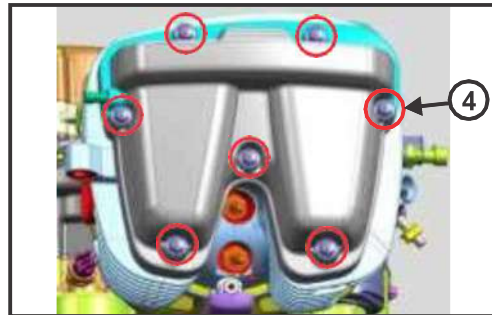
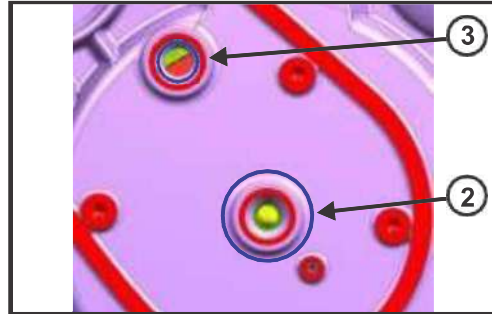
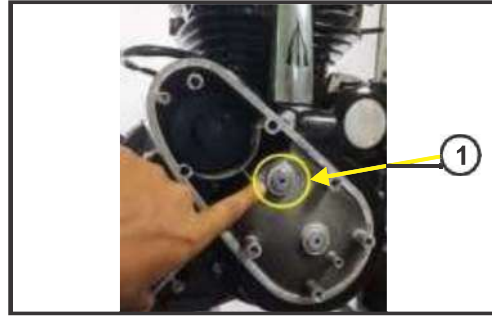
Do not adjust the spark plug gap. if the gap is out of specification, Replace it with a new one.

- Refit the spark plugs primary & secondary connections are fitted properly.
- While replacing hand tight the spark plug first & tighten it with torque 20(19-21) Nm.
- Do not overtight the Spark plug.
- Ensure spark plug suppressor cap gets locked properly.



## VALVE CLEARANCE

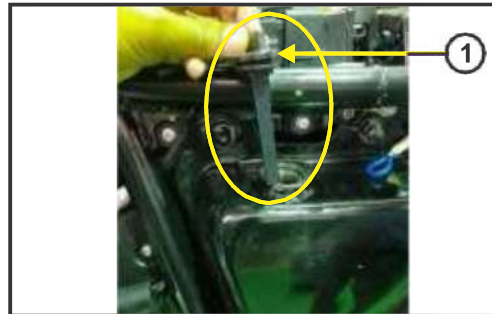
- Remove cap magneto cover by removing bolt.
- Remove both gauge (1) inspection cover with the help of 4 mm Allen key.
- Use an Allen key of 8mm to turn the crankshaft clockwise to set the TDC position. Rotate crankshaft (2) till the punch mark on Magneto cover (3) & magneto get aligned as shown.
- Remove 7 bolts (4). Lift the cover up and remove cylinder head cover with gasket.
- Ensure the mark on both the cam sprocket & 4 cam lobe (5) is aligned properly as shown in images.
- Ensure the TDC mark on the magneto cover & magneto is also aligned.
- Insert the feeler gauge in between the camshaft & valve lifter bucket as shown in picture & 5 measure the clearance for all the four valves.
- Ensure all the valves clearance within the specification. (Specification - IN SIDE 0.1 - 0.150 mm & EX SIDE 0.250 – 0.3 mm).
- If clearances are not as per the specification, note down the clearance & set it accordingly as shown in subsequent slides.



## ENGINE OIL

### OIL LEVEL INSPECTION

- Place the vehicle on paddock rmly on level surface.
- Start the engine and let it idle for 3 - 5 Minutes.
- Stop the engine & wait 2 - 3 minutes.
- Remove the dipstick (1) and wipe it clean.
- Insert the dipstick until its tights, but do not screw it in. Check that the oil level is between the upper and lower-level lines.
- If the level is below the lower-level line (2), remove the dipstick (4) and ll the recommended oil up to the upper-level line (3)



### RECOMMENDED ENGINE OIL:

MOTUL H-TECH 100 4T 10W 50 / CASTROL - 10W50 JASO MA-2

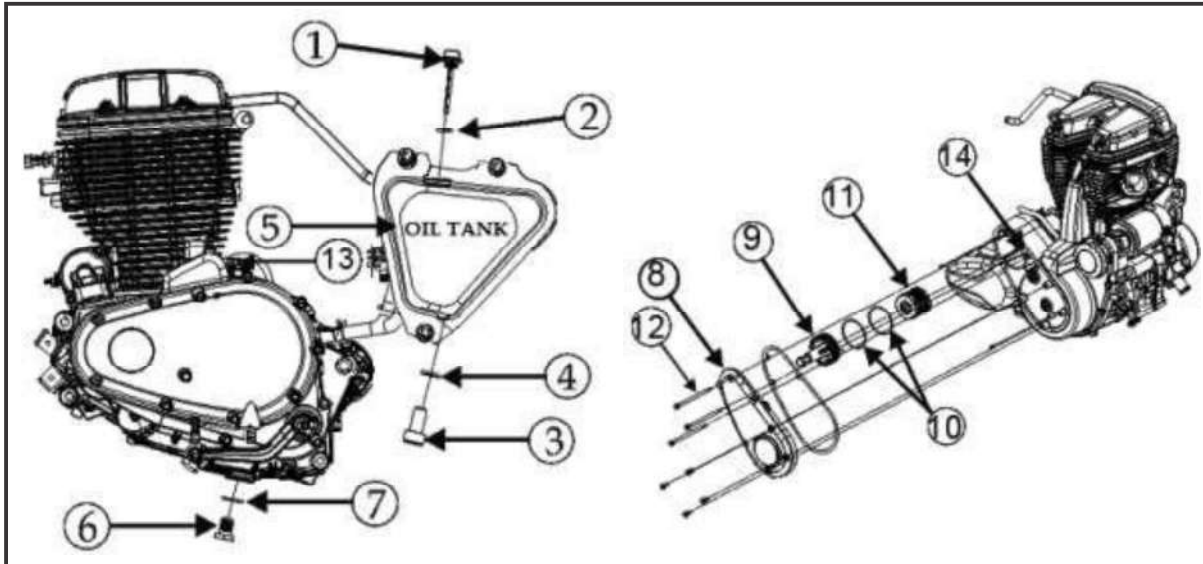
[SAE 10W50 fully synthetic motorcycle engine oil that meets JASO- MA2 and API-SL (or Higher) specification]

### ENGINE OIL CAPACITY

- Engine oil replacement (during Overhaul): 2500 ml
- Engine oil replacement (During Service W/O lter) : 2300 ml
- Engine oil replacement (During Service with oil lter): 2350 ml
- Check that the O-rings of the oil lter cap & dipstick are in good condition, replace them if necessary.
- Apply engine oil to the O-rings.

## ENGINE OIL AND FILTER REPLACEMENT

Engine oil needs to be drain from two different location One is from the engine oil reservoir tank and another from the engine sump as shown in the □g.



- |                       |                       |                      |
|-----------------------|-----------------------|----------------------|
| (1) Oil dip stick     | (2) O-ring            | (3) Drain bolt       |
| (4) Sealing washer    | (5) Oil tank          | (6) Drain Plug       |
| (7) Sealing Washer    | (8) Cap Magneto Cover | (9) Oil □lter holder |
| (10) O-ring oil □lter | (11) Oil □lter        | (12) Bolts           |
| (13) Banjo bolt       | (14) Oil □lter holder |                      |

- Place the vehicle on paddock □rmly on level surface.
- Start the engine and idle for 2-3 minutes.
- Stop the engine, wait for 2 - 3 min for oil to settle down and then drain oil
- Use a clean tray / jar to collect the used oil.
- To Drain the oil from the oil reservoir tank, remove the Oil dip stick (1) & drain bolt (3) along with the sealing washer (4).

### NOTE

Use a funnel to remove Oil.

- To drain the oil from the engine sump, remove the drain plug (6) along with the sealing washer (7).
- Remove the cap magneto cover (8), by unscrewing the cover bolts(12)
- Pull and take out the Oil □lter holder assembly (9) with the oil □lter element (11).
- Remove the used oil □lter element from the oil □lter holder lock. Install the new O-ring oil □lter (10) and new oil □lter (11) into the oil □lter holder (9). Installation of oil □lter needs to be done after oil bleeding procedure as mentioned in the below points of oil bleeding. Ensure the oil □lter rubber side face must be installed facing towards the engine side.

- Ensure the assembly of oil filter holder and oil filter (Arrow mark) vertically up.
- Use only Genuine oil filter as recommended. Using the non-genuine filter which is not equivalent quality may cause engine damage.
- Ensure the cap magneto cover bolts (12) are tighten securely to the specified torque. Cap magneto cover bolts torque : 9-11 Nm
- Check that the sealing washer (As per recommended maintenance schedule) on the drain bolt is in good condition and install the bolt. Replace the sealing washer every other time the oil is changed, or each time if necessary. Engine oil drain bolt torque 40-48 Nm.
- Initially fill the oil in the oil reservoir tank with recommended grade oil. Approximately - 1700 ml and install the oil dip stick / oil filler cap.
- After filling the oil, Bleeding needs to be carried out from banjo bolt (13). Once the oil is coming out from the banjo bolt, tighten the banjo bolt with specified torque.
- Do cranking (remove the ignition cable from both spark plugs) and check oil from oil filter holder location (14). Once oil starts coming out, assemble oil filter holder and other parts in reverse order.
- Start the engine and let it idle for 3-5 minutes.
- Shut off the engine and refill the oil reservoir tank again with 600 ml and install the oil dip stick /oil filler cap, (Total Engine oil capacity for service fill- 2300 ml)
- Check the engine oil level, it must be below min & max dip stick.
- Make sure there is no oil leakage.
- Check the O-ring of oil dip stick for any damage and install the dip stick / oil filler cap

#### RECOMMENDED OIL:

MOTUL H-TECH 100 4T 10W 50 / CASTROL - 10W50 JASO MA-2

[SAE 10W50 fully synthetic motorcycle engine oil that meets JASO- MA2 and API-SL (or Higher) specification]

#### NOTE

Improper installation of the oil filter can cause serious engine damage.

## DRIVE CHAIN

### WARNING

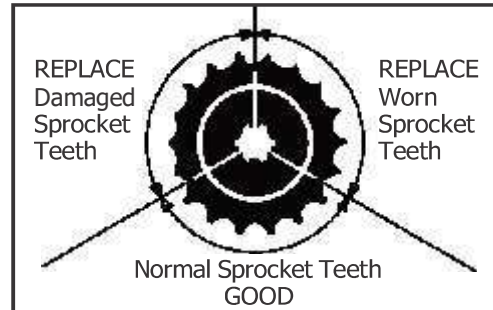
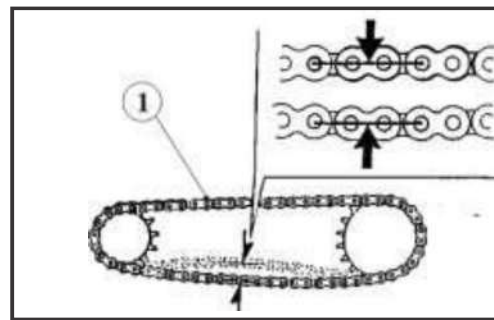
- Amputation hazard. Never inspect or adjust the drive chain while the engine is running.

The service life of the drive chain (1) is dependent upon proper lubrication and adjustment. poor maintenance can cause premature wear or damage to the drive chain and sprockets. The drive chain should be checked, adjusted, and lubricated as part of the periodic inspection.

Under severe usage, or when the vehicle is used in unusually dusty or muddy areas, more frequent maintenance will be necessary.

## INSPECTION

- Turn the engine off, place the vehicle on paddock & shift the transmission to neutral.
- Check slack in the lower drive chain run between the sprockets. Drive chain slack should be adjusted to allow the following vertical movement by hand.
- Move the motorcycle forward, stop. Check the drive chain slack. Repeat this procedure several times. Drive chain slack should remain certain constant.
- If the chain is slack only in certain sections, some link are kinked and binding. Binding & kinking can frequently be eliminated by lubrication.



**Required Drive Chain slackness: 25-30 mm**

## WHY NEED TO CHECK DRIVE CHAIN

- Damaged Rollers
- Loose Pins
- Dry or Rusted Links
- Improper Adjustment

## DRIVE CHAIN ADJUSTMENT

### **WARNING**

Drive chain with damaged rollers, loose pins, or missing O-rings must be replaced.  
A chain which appears dry or shows sign of rust, requires supplementary lubrication.  
Kinked or binding links should be thoroughly lubricated and worked free. If links cannot be freed, the chain must be replaced.

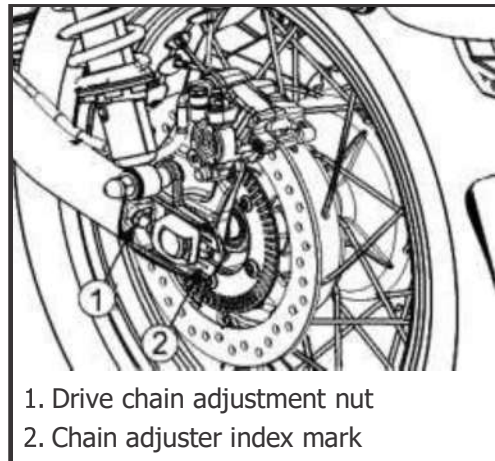
The Drive Chain slack should be checked and adjusted, if necessary, every 500mile/1000 km. when operated at sustained high speeds or under conditions of frequent rapid acceleration, the chain may require more frequent adjustment.

If the drive chain requires any adjustment, the procedure is as follow :



### INSPECTION

- Place the vehicle on paddock on a firm, level surface with the transmission in neutral and the ignition switch OFF.
- Loosen the rear axle nut from RH side using special tool.
- Turn both drive chain adjustment nuts (1) an equal number of turns until the correct drive chain slack is obtained.
- Turn the drive chain adjusting screws clockwise to tighten the chain, or counterclockwise to provide more slack. Adjust the chain slack at a point midway between the drive sprocket and the rear wheel sprocket.
- Roll the rear wheel in forward direction and check the slackness.
- Check near axle alignment by making sure the chain adjuster index marks (2) align with the rear edge of the adjuster.



1. Drive chain adjustment nut  
2. Chain adjuster index mark

### **NOTE**

- Both left and right marks should be corresponded. If the axle is misaligned, turn the left or right adjusting screws until the marks correspond on the rear edge of the adjuster and recheck chain slack.

- Tighten the rear axle nut to the specified torque Rear axle torque: 75~80 Nm.
- Tighten the drive chain adjusting screws slightly, then tighten the drive chain lock nuts by holding the drive chain adjusting screws with a spanner.
- Recheck drive chain slack (Slackness should be 25~30 Nm) Damage to the bottom part of the frame may be caused by excessive drive chain slack of more than: 50 mm (2.0 inch)

**Chain : 520NASR (106 links)**

### NOTE

If necessary, replace the drive chain at your nearest authorized dealer.

### CLEANING AND LUBRICATION

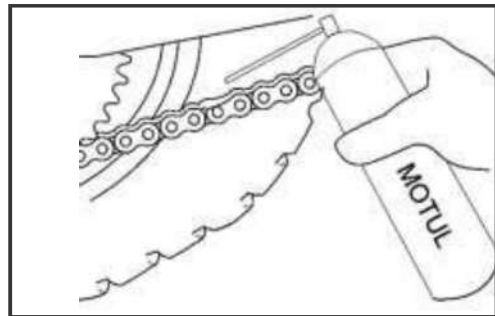
Lubricate the drive chain every 1000 miles or sooner if chain appears to dry. After inspecting the slack, Clean the chain and sprockets while rotating the rear wheel. Use dry cloth with chain cleaner designed specially for O-ring chain or neutral detergent. Use a soft brush if the chain is dirty. After cleaning, wipe dry and lubricate with drive chain.



Lubricant: Motul Chain Clean & Motul Chain Lube.

Do not use a steam cleaner, a high-pressure cleaner wire brush, lubricant not designed specially for O- ring chains as these can damage the rubber O-ring seals.

Avoid getting lubricant on the brakes or tyres. Avoid applying excess chain lubricant to prevent spray onto your clothes and the Vehicle.



### NOTE

Be sure the drive chain has dried completely before lubricating.

## BRAKE FLUID

### CAUTION

- Do not allow foreign material to enter the system when filling the reservoir.
- Avoid spilling fluid on painted, plastic or rubber parts. place a shop cloth over these parts whenever the system is serviced.

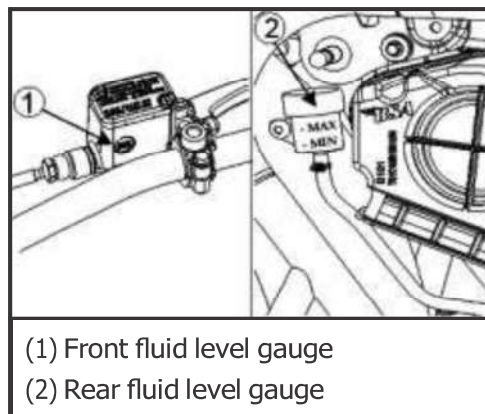
Both the front and rear brake is hydraulic disc type. As the brake pads wear, the brake fluid level drops. There are no adjustments to perform, but fluid level and pad wear must be inspected periodically.

The system must be inspected frequently to ensure there is no fluid leakage.

If the brake lever / pedal free travel becomes excessive and the brake pads are not worn beyond the recommended limit, there is probably air in the brake system and it must be bled.

### FRONT & REAR BRAKE FLUID LEVEL:

- With the vehicle in an upright position (using paddock), check the fluid level (1). It should be above the MIN level mark. If the level is at or below the MIN level. check the brake pads for wear.
- Check the rear brake fluid level (2). It should be between MIN & MAX. If the level is on or below the MIN level mark, check the brake pads for wear.
- Worn pads should be replaced. If the pads are not worn, have your brake system inspected for leaks.
- Use recommended brake fluid - DOT 4 (from a sealed container)
- Do brake bleeding process if necessary.
- Check brake fluid level at every service.



### NOTE

Do not mix different types of fluid, as they are not compatible with each other.

## **2 FRAME**

### **2.1 FRAME/BODY PANELS**

- 2.1.1 SIDE PANEL RH/LH**
- 2.1.2 SEAT**
- 2.1.3 FUEL TANK**
- 2.1.4 BATTERY BOX**
- 2.1.5 EVAPORATIVE SYSTEM**

### **2.2 FRONT WHEEL / SUSPENSION / STEERING**

- 2.2.1 FRONT WHEEL & TYRE PRESSURE**
- 2.2.2 FRONT FENDER ASSEMBLY**
- 2.2.3 STEERING**
- 2.2.4 CLUTCH SETTING**
- 2.2.5 FRONT FORK ASSEMBLY**

### **2.3 REAR WHEEL/SUSPENSION**

- 2.3.1 REAR FENDER ASSEMBLY**
- 2.3.2 FRAME AND SUB FRAME**
- 2.3.3 FOOT REST RH/LH**
- 2.3.4 SIDE STAND**
- 2.3.5 REAR WHEEL & TYRE PRESSURE CHECKING**
- 2.3.6 DRIVE CHAIN**
- 2.3.7 REAR SHOCK ABSORBER**
- 2.3.8 SWING ARM**

### **2.4 INDUCTION**

- 2.4.1 FUEL LINE / PUMP / FUEL FILTER**
- 2.4.2 THROTTLE BODY AND CABLE**
- 2.4.3 AIR CLEANER AND DUCT**

### **2.5 BRAKE**

- 2.5.1 BRAKE FLUID**
- 2.5.2 BRAKE BLEEDING FRONT/REAR**
- 2.5.3 BRAKE PADS FRONT/REAR**
- 2.5.4 BRAKE CALIPER & PISTON**

### **2.6 EXHAUST**

- 2.6.1 HEADER PIPE**

- 2.6.2      CAT CONVERTOR**
- 2.6.3      GASKET AND STYLE SHIELD**
- 2.6.4      MUFFLER**

**2.7      COOLING SYSTEM**

- 2.7.1      RADIATOR**
- 2.7.2      HOSE PIPE**
- 2.7.3      THERMOSTAT VALVE**
- 2.7.4      EXPANSION TANK AND LEVEL**

1. **LH & RH SIDE PANELS**
2. **TROUBLESHOOTING**

### 1. LH & RH Side Panels Removal Procedure

- Place the vehicle on Paddock on a firmly level ground / Ramp.
- Remove the LH side panel by holding the panel firmly in both hands.



- Remove the RH side panel by holding the panel firmly in both hands.



- Pull the panel away from the vehicle until it clears the three retaining grommets (leaving the grommets in place)
- Follow the Reverse procedure to install the side panels.



#### **WARNING**

- Be cautious not to force them or apply excessive pressure, as you do not want to damage the panels or the mounting points.
- **Set aside the side panels:** Place the removed side panels in a safe and clean location to avoid any scratches or damage.

## 2. Troubleshooting

Troubleshooting issues with BSA motorcycle side panels can help you identify and address problems that may arise during the removal, installation, or everyday use of these panels. Here are some troubleshooting points to consider:

- Alignment Issues:
  - **Problem:** Side panels don't align properly with the frame or other body parts.
  - **Solution:** Check the alignment of the mounting points and ensure they match up with the frame and other components. Adjust or realign as necessary. Damaged or bent mounting points may require replacement.
  - **Solution:** Check the wiring connections and ensure they are properly connected and not damaged. Test the electrical components for functionality. Replace any faulty components or wiring.
  
- Scratches or Damage:
  - **Problem:** Side panels have scratches, dents, or other damage.
  - **Solution:** Repair minor scratches or dents using appropriate methods (e.g., polishing, touch-up paint). If damage is severe, consider replacing the side panels.
  
- Difficulty Removing or Installing Side Panels:
  - **Problem:** Side panels are hard to remove or install.
  - **Solution:** Check for any obstructions or misaligned mounting points. Lubricate mounting points if necessary. Ensure you are following the proper procedure for removal and installation.
  
- Rattling or Vibration:
  - **Problem:** Side panels rattle or vibrate while riding.
  - **Solution:** Inspect the mounting points for tightness. Consider adding foam or rubber grommets to reduce vibration and noise. Ensure the panels are securely attached.
  
- Cracks or Breakage:
  - **Problem:** Side panels are cracked or broken.
  - **Solution:** If the panels are structurally compromised, it's best to replace them.

1. **INTRODUCTION**
2. **REMOVAL OF SEAT**
3. **RE-ASSEMBLE OF SEAT ASSEMBLY.**

## 1. INTRODUCTION

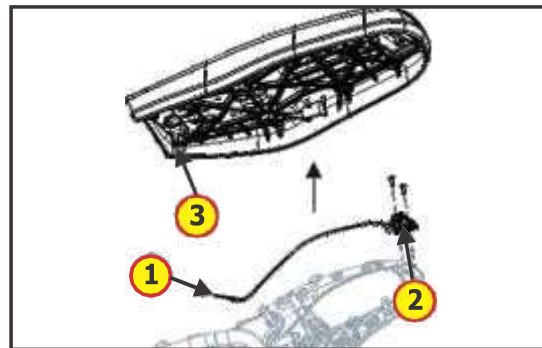
### SEAT

#### FEATURES:

- Rider & Co-Rider comfort
- Seat height - 782 mm
- Best in Class ergonomics

## 2. REMOVAL OF SEAT ASSEMBLY

- Remove the LH side panel by holding the panel firmly in both hand & pull the panel away from the vehicle until it clears the three retaining grommets (leaving the grommets in place)
- Pull the seat latch unlock cable (1) located under the LH side panel, so it can unlock the seat from its lock (2).
- Hold the seat assembly & lift from its position then pull it out from tongue latch (3) and take it out from the vehicle.



## 3. RE-ASSEMBLE OF SEAT ASSEMBLY

- Place the seat assembly in its position.
- Ensure the seat is locked in tongue (3) from front side.
- Press the seat assembly from the rear side to lock in its position, positive click sound will indicate the seat is locked in their position.
- Refit the LH side panel by positioning the three locating bullets to the grommets, then press firmly to secure the panel in its position.
- Finally, grasp the panel and make sure that it is fully retained.



1. **REMOVAL OF FUEL TANK**
2. **ASSEMBLE OF FUEL TANK ASSEMBLY**

## 1. REMOVAL OF FUEL TANK FROM VEHICLE

**Safety Precautions:** Before you begin, make sure you have the necessary safety equipment, and take precautions to avoid sparks or open flames since you'll be working with gasoline. Work in a well-ventilated area and disconnect the vehicle's battery to prevent any electrical accidents.

### A. Process:

a. **Relieve Fuel Pressure:** Before you can safely work on the fuel system, you need to relieve the fuel pressure. Locate the fuel pump relay or fuse in your vehicle's fuse box and remove it. Start the engine and let it run until it stalls. This will depressurize the fuel system.



b. **Disconnect the Battery:** Disconnect the negative terminal of the vehicle's battery to prevent any electrical hazards.



c. **Access the Fuel Pump:** Remove the rear seat, access panel & Fuel Tank to reach the fuel pump. (Fig1~fig3)



d. Lift the fuel tank & disconnect the electrical & fuel line connections. (Fig -4)



- e. **Disconnect Fuel Lines:** Use a fuel line disconnect tool to disconnect the fuel lines attached to the fuel pump. Be prepared for some fuel to spill, so have a container ready to catch it. (Fig-4 & Fig-5)



- f. **Ensure the Electrical Connections:** Disconnect any electrical connectors attached to the fuel pump. (fig-5)

### 2. Reassemble to the Motorcycle:

1. Follow the reverse steps to reassemble the motorcycle, ensuring all wiring is properly connected.



#### **NOTE**

Before starting the engine, turn the key to the "On" position (but do not start the engine) to allow the fuel system to pressurize. Check for any fuel leaks.

1. **INTRODUCTION**
2. **LOCATION**
3. **DISASSEMBLY & ASSEMBLY**

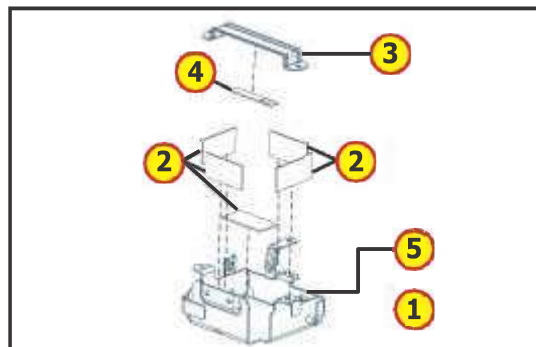
### 1. INTRODUCTION

It is located on the motorcycle's frame, beneath the seat.

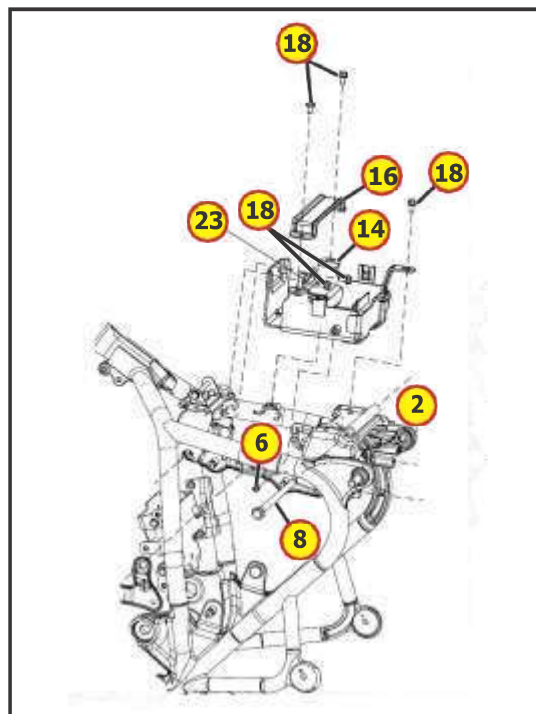
The battery box serves several purposes:

- **Battery Securement:**  
It holds the battery securely in place, preventing it from moving or shifting during the bike's operation, which can help extend the battery's lifespan.
- **Protection:**  
The box protects the battery from external elements, such as moisture, dust, and debris, which can otherwise damage the battery and its connections.
- **Aesthetic Considerations:**  
In some cases, the battery box's design is integrated into the overall look of the motorcycle, contributing to its aesthetics.

### 2. LOCATION :



- 1) Battery Box
- 2) Pad Battery Box
- 3) Battery Clamp
- 4) Foam Battery Clamp
- 5) Loose Bracket Battery Mounting



### 3. DISASSEMBLY & ASSEMBLY

#### NOTE

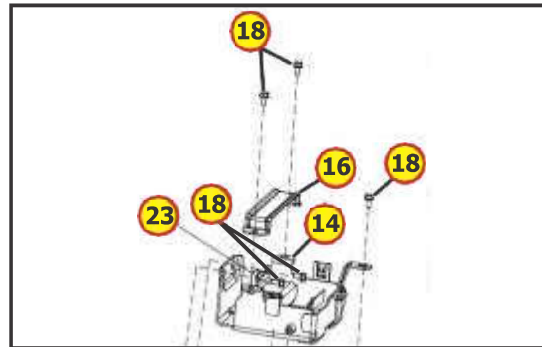
- Ensure that battery is disconnected before initiating this process.
- Take out the battery & place it securely outside.
- Ensure to disconnect the negative terminal first & then positive.

1. Remove the M6 X 12 screw for battery box removal.



2. Use box spanner of 12 to remove the FLANGE BOLT M6X12 (18).

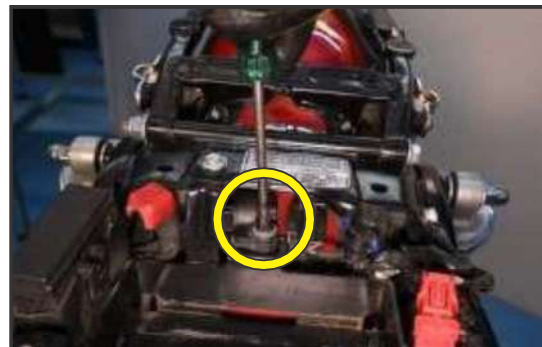
3. Remove the battery clamp (16).



4. Disconnect the Roll over sensor assembly (Optional)



5. Remove the rollover mounting screw by screw (Optional)



6. Lift the Battery box from its mounting.



 **NOTE**

Follow the reverse sequence to assemble the battery box to vehicle.

- Important Points to considered while assembly of the box.
  - Harness routing to be ensure in proper way. There should not be any pinching.
  - Connect the Positive terminal first then negative terminal.

1. **INTRODUCTION**
2. **LOCATION OF PARTS**
3. **DISASSEMBLY OF EVAPORATIVE FUEL SYSTEM**
4. **ASSEMBLY OF EVAPORATIVE FUEL SYSTEM**

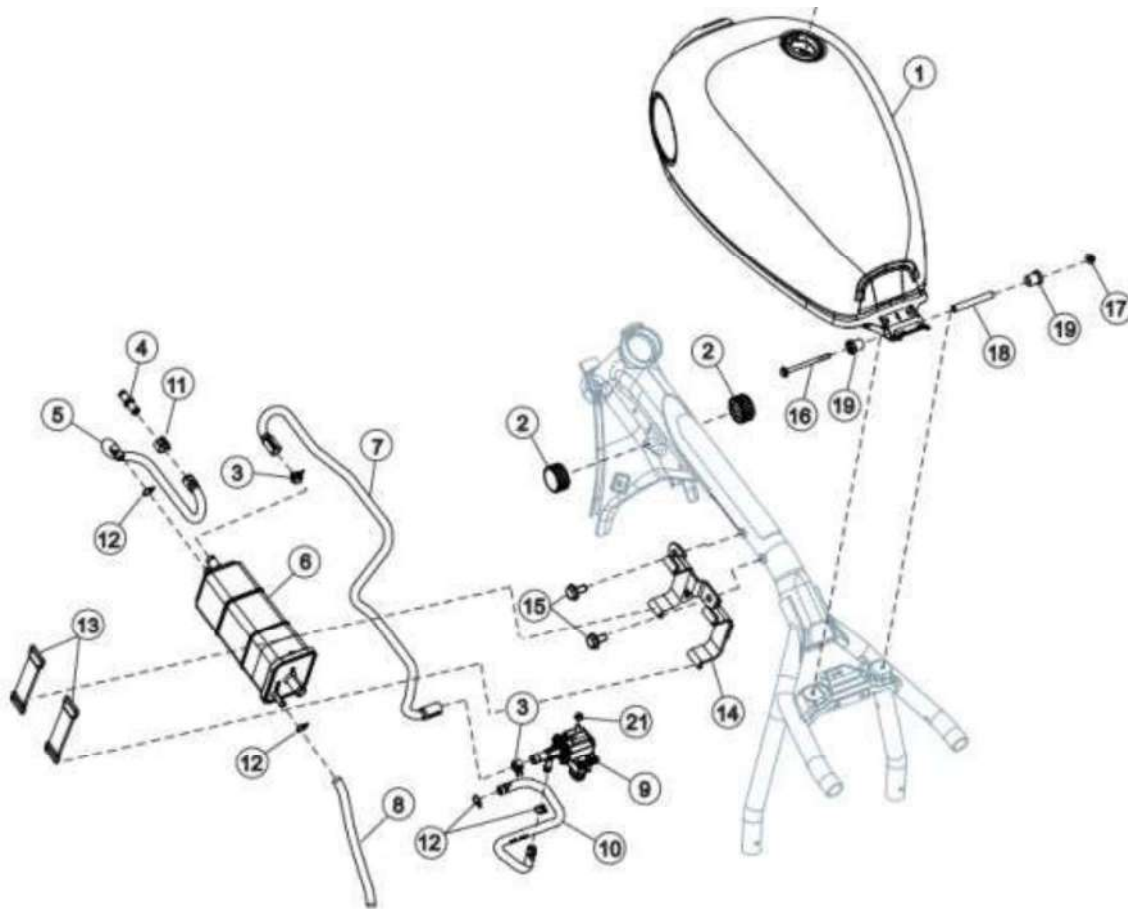
## 1. INTRODUCTION

An activated carbon canister is used to capture hydrocarbon vapor emissions from the fuel tank as part of an evaporative emission control system (EVAP).

This charcoal-filled canister's job is to absorb fuel vapor that would otherwise vent out to the atmosphere, causing pollution. Vapors trapped by the charcoal are released back into the engine through the purge valve and then burned.

## 2. LOCATION OF PARTS

An evaporative system (Carbon canister) is located beneath the fuel tank assembly. Evaporative system is mounted on the frame assembly with the holding bracket.



### NOTE

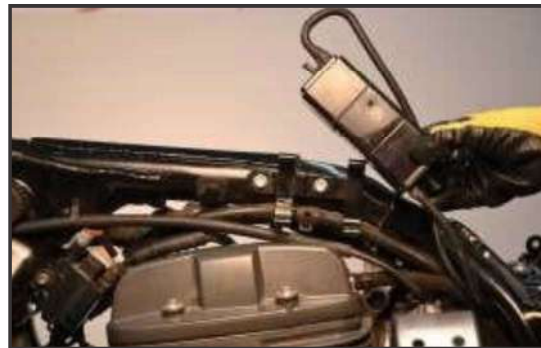
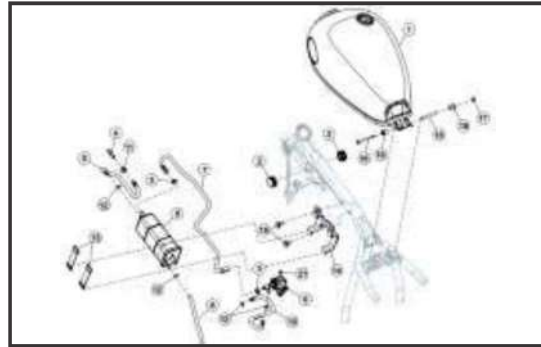
Before working on the evaporative fuel system, fuel pump and fuel filter all the lines must be empty. No fuel supply should be there to these lines.

For dismantling of evaporative fuel system (Carbon Canister). Primarily the fuel tank assembly should be removed from the vehicle by disconnecting the fuel line supply.

For removal of fuel tank assembly follow the procedure mentioned in fuel tank topic of this manual.

### 3. DISASSEMBLY OF EVAPORATIVE FUEL SYSTEM

- i. Remove the two tool kit bands (13) that holds the carbon canister box.
- ii. Hold the carbon canister box assembly (6) and take it out from the canister mounting bracket (14).
- iii. Dislocate the clip tube (12) using a nose plier and remove the hose evaporative connector to canister (5).
- iv. Remove the spring band clamp (3) using a plier and remove the hose (7) connecting canister to purge control valve (9).
- v. Dislocate the clip tube (12) using a nose plier and remove the drain tube (8).
- vi. Disconnect both the hoses (7) & (10) connected to purge valve (9) by removing the holding clamp (3) & (12).
- vii. By removing hex nut (21) takeout the purge control valve (9).



#### NOTE

Carbon canister assembly is not a repairable part. Hence, if required need to replace it with a new one.

### 4. DISASSEMBLY OF EVAPORATIVE FUEL SYSTEM

1. Before assembly check the hoses for any cracks/ damage. Replace with the new if required.
2. Check the clamps and clip tube for proper holding tension.
3. Assembly the Evaporative fuel system parts in the reverse order of removal.

- 1. SERVICE INFORMATION**
- 2. TROUBLESHOOTING**
- 3. FRONT FENDER**
- 4. REAR FENDER**
- 5. FRONT WHEEL**
- 6. FRONT FORK**
- 7. REAR WHEEL**
- 8. SHOCK ABSORBER**

### 1. Service Information : Tire

#### Inspection and Maintenance :

- Check tire pressure regularly and maintain it within the recommended range.
- Inspect the tires for cuts, punctures, and uneven wear. Replace tires that are damaged or excessively worn.
- Ensure the wheel rims are in good condition without dents or cracks.

#### Wheel Alignment :

- Periodically check and adjust the front wheel alignment to ensure it is parallel with the rear wheel. Misalignment can affect handling.

#### Wheel Bearings :

- Inspect and lubricate the front wheel bearings according to the maintenance schedule in your service manual.
- If there is any play or roughness in the wheel bearings, replace them.

#### Front Suspension :

##### Fork Inspection :

- Regularly inspect the front forks for oil leaks and damage.
- Check the fork seals for signs of leakage. If there is any leakage, replace the fork seals.

##### Fork Oil Change:

- Follow the recommended fork oil change interval in your service manual. (Need Interval)
- Use the specified fork oil and fill to the correct level as per the manual. (Need Oil Specs)

##### Fork Alignment and Settings:

- Check and adjust the fork alignment if necessary.
- Adjust the fork compression and rebound settings to suit your riding preferences.

##### Steering:

##### Steering Head Bearings:

- Inspect the steering head bearings for play or roughness when turning the handlebars.
- Adjust or replace the steering head bearings as needed.

##### Handlebars and Controls:

- Ensure that the handlebars and controls are securely fastened and aligned correctly.
- Steering Damper (if equipped):
- Check the steering damper's operation and adjust it according to your riding preferences.

### **Brake Inspection :**

- Inspect the front brake system, including the caliper, pads, and brake lines.
- Replace brake pads if they are worn, and bleed the brake system if necessary.

### **GENERAL**

- This section covers removal and installation of the Frame, exhaust system & Side panel.
- Always replace the exhaust pipe gaskets after removing the exhaust pipes from the engine.
- When installing the exhaust system, loosely install all the exhaust pipe fasteners.
- Always tighten the exhaust clamps first, then tighten the mounting fasteners.
- Always inspect the exhaust system for leaks after installation.

### **Tools and Materials Needed :**

- Motorcycle stands
- Paddock stand
- Appropriate size wrenches or socket set
- Screwdriver
- Allen keys
- Block of wood (for supporting the engine, if needed)

## **2. Troubleshooting**

### **Visual Inspection**

- Start by examining the front wheel, suspension, and steering components for any visible damage, loose parts, or signs of wear.

### **Tire Inspection :**

- Check the tire for cuts, punctures, or uneven wear. Ensure that the tire pressure is within the recommended range.
- If the tire is damaged or worn unevenly, replace it.

### **Suspension Check:**

- Inspect the fork tubes, fork seals, and fork oil levels. Leaking fork seals can affect suspension performance.
- If you find any issues with the forks, consider rebuilding or replacing them.

### **Wheel Bearings:**

- Check the front wheel bearings for play or roughness. If you notice any issues, replace the bearings.

### **Hard steering**

- Steering head bearing adjustment nut too tight.

- Worn or damaged steering head bearings
- Bent steering stem
- Insufficient tire pressure
- Faulty tire

### **Steers to one side or does not track straight**

- Damaged or loose steering head bearings
- Loose steering stem adjusting nut
- Bent forks / Bent frame / Bent axle
- Unevenly adjusted right and left forks
- Worn or damaged wheel bearings
- Incorrect Handlebar routing in stem

### **Front wheel wobbling**

- Bent rim
- Bent spoke
- Worn or damaged front wheel bearings
- Insufficient tire pressure
- Faulty tire
- Unbalanced front tire and wheel

### **Front wheel hard to turn**

- Faulty front wheel bearing
- Bent front axle
- Front brake drags

### **Soft suspension**

- Insufficient fluid in fork
- Incorrect fork fluid weight
- Weak fork springs
- Insufficient tire pressure

### **Stiff suspension**

- Bent fork pipes
- Too much fluid in fork
- Incorrect fork fluid weight
- Clogged fork fluid passage

### **Front suspension noise**

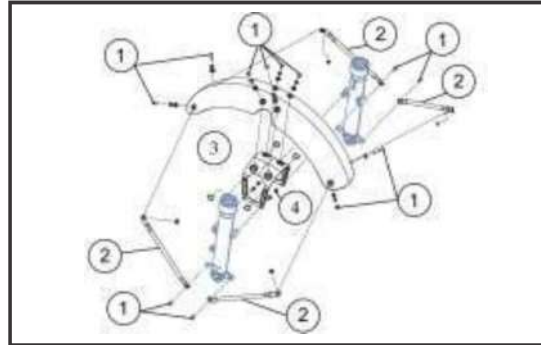
- Insufficient fluid in fork
- Loose fork fasteners

**Test Ride:-** After performing the above checks and adjustments, take the motorcycle for a test ride at a safe and controlled location. - Pay attention to how the motorcycle handles, steers, and absorbs bumps. - If you still experience problems with the front wheel, suspension, or steering, consult for a more in-depth diagnosis and repair.

### 3. FRONT FENDER

#### i. DISMANTLING OF FRONT FENDER ASSEMBLY

- Place the vehicle on paddock on a firmly level ground.
- Remove the front fender round head socket screw (1) using 5 mm allen key.
- Take out the front fender stay support (2) from front fender & fork assembly.
- To remove the front fender bracket (3), need to remove the flange bolt (4) with help of 4 mm T spanner.
- After removing all the screw from front fender it will free from mountings.
- Firmly hold the front fender in both hands.
- Slightly tilt the front fender either side and slowly take it out.
- Ensure there is no damage/scratches done while removal of front fender.
- Follow the reverse process to assemble front fender assembly.



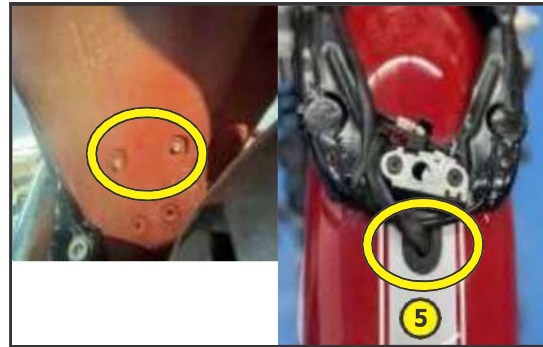
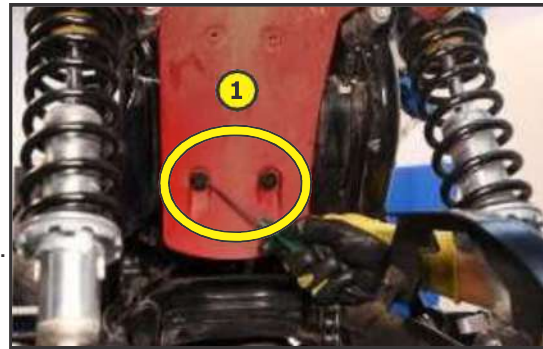
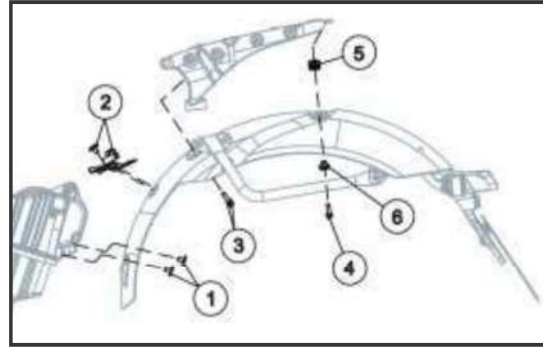
#### **NOTE**

Ensure during assembly, arrow mark on fender towards vehicle front.

#### 4. REAR FENDER

##### i. DISMANTLING OF REAR FENDER ASSEMBLY

- Place the vehicle on paddock on a firmly level ground/Ramp.
- Remove the Plastic rivet (1) which hold the rear fender assembly to air filter assembly.
- Remove plastic rivet from bracket relay mounting (2), Use 10 No socket to remove flange bolts (3) from sub-frame assembly.
- Loosen the sub frame rear side hex bolt. (4) using 8 No socket & take it out along with rubber grommet (5) & washer (6).
- Remove the Rear fender stay using 5 mm allen key.
- Disconnect the tail lamp coupler & take out the rear fender assembly.
- Follow reverse process to assembly.



#### NOTE

It is mandatory to replace the plastic rivet with the new while assembling.

### 5. FRONT & REAR WHEEL

#### A. SPECIFICATIONS

##### i. TYRE PRESSURE

Front	Solo: 1.9 kgf/cm (28 psi) With pillion: 1.9 kgf/cm (28 psi)
Rear	Solo: 2.1 kgf/cm (30 psi) With pillion: 2.39 kgf/cm (34 psi)

##### ii. TYRE SIZE

Front	100/90-18, Tubeless with tube, Pirelli phantom sports comp
Rear	150/90-17, Tubeless with tube, Pirelli phantom sports comp

##### iii. TYRE TORQUE

Axle Nut	75-80 Nm.
Pinch Bolt	23 - 25 Nm.

##### iv. THREAD DEPTH (SERVICE LIMIT)

Front Tyre	Minimum 1.0 mm
Rear Tyre	Minimum 1.0 mm

#### B. REMOVAL OF FRONT WHEEL ASSEMBLY

- Park the Vehicle on a firm & Level ground.
- Place the jack below the bash plate.
- Lift the vehicle until front wheel is free from ground & rotate freely.
- Loosen the pinch Bolt (A) from the front LH fork.
- Remove the axle nut (B) along with spacer using No.22 Socket.



- Tap & remove the axle bolt (C) using 10 mm allen key.
- Tilt the vehicle slightly on either side & take out the front wheel assembly.



### **NOTE**

Place a 4 mm thick wooden / plastic piece in between brake pads to avoid getting in touch with each other.

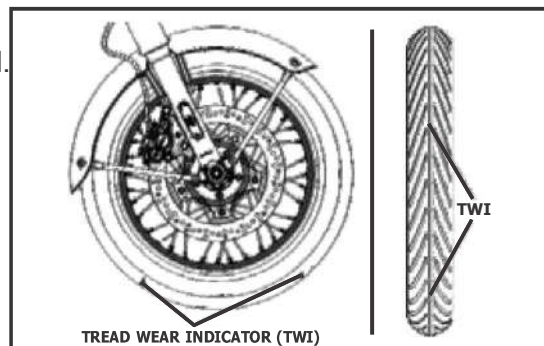


### **CAUTION**

- Do not press the front brake lever when the wheel is removed as this will result in brake pads getting locked.
- Always protect the disc, after removing wheel assembly from vehicle. Do not support wheel on disc while working on wheel. it may cause wheel rim out.
- Protect disc from oil & grease. oil/grease on disc may reduce braking. Panic braking can cause accident & result in personal injury.

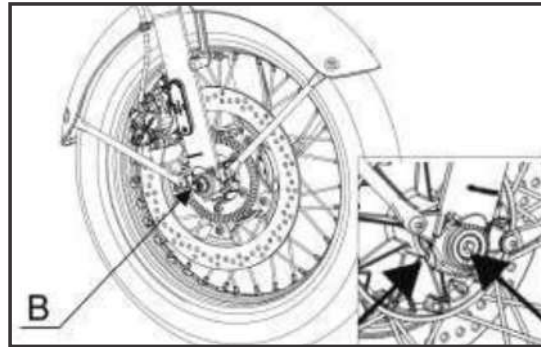
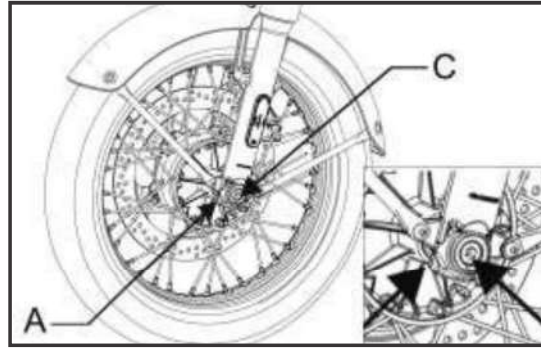
### **POINT TO BE CHECKED BEFORE RE-FITMENT**

- Tread wears out should be with in service limit.
- Bearing smoothness & apply grease if required.
- No Broken spokes / damage
- No wheel rim run out.
- Recommended tyre pressure.
- No Cut / Cracks in tires



### C. FRONT WHEEL RE-ASSEMBLE

- Remove the placed wooden piece in between front brake pads.
- Install the wheel assembly along with spacer between front fork end, also ensure that the brake disc is fixed between brake pads.
- Insert & tap the front wheel axle bolt (C) gently through the front fork.
- Place the washer & nut
- Take down the vehicle from jack/ramp & tighten the nut with 75-80 Nm torque.
- Tighten the pinch bolt (A) on LH fork with tightening torque of 23-25 Nm.
- Rotate & check the wheel for free & Smooth rotation.



## 6. FRONT FORK

### i. DISASSEMBLY

- This tool is used to guide Oil seal on the Inner tube without damaging Oil seal lip.
- Clamp the Inner tube Clamping Jaws onto the Fork Inner tube using 6mm Allen Key.
- Then Clamp this assembly in a Bench vise.



### CAUTION

Inner tube Clamping jaws are made of Brass to avoid any damage to inner tube during clamping.

- Loosen the Bolt cap with 22 mm Socket and Torque Wrench/Ratchet.



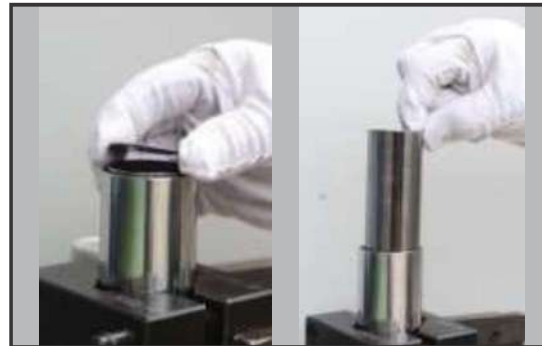
**! WARNING**

Make sure to press down during the last few threads to prevent sudden release of Bolt cap due to Spring reload.

- Remove the Boltcap from the Inner tube



- Take out the washer-2 and spacer from the fork inner tube.



- Tilt the Fork by keeping finger at the opening of inner tube to hold the Spring seat washer & Fork Spring. Take out both the parts.



- Pour out the Front Fork oil to a bin. In order to take out all the oil, hold the outer tube stationary and stroke the Inner tube by other hand. Make sure to dispose the used Front fork oil properly.



- Remove the Dust seal using Flat Screw driver.

**! CAUTION**

Should be done carefully without damaging the Dust seal.



- Remove the Circlip with Flat small screw driver.

**! CAUTION**

Make sure not to damage Oil seal garter spring and Inner tube.



- Slide and locate the Front Fork onto the Piston Locator.
- Then loosen the M10 fork bolt with 8mm Allen key and Torque wrench / Ratchet.

**! CAUTION**

- Make sure not damage inner tube ID while sliding Fork onto the Piston locator.
- Before loosening M10 bolt please ensure proper location of Piston by checking; - No rotation of Outer.



- Take out the Fork from the Piston locator.
- Make sure to hold both the Outer tube & inner tube.
- Once the Fork is removed, Piston will be on the Locator.



- Take out the M10 Fork bolt and Copper Gasket by tilting the Outer tube.
- If Gasket has not come out, try to remove it using a small flat screw driver.
- Slide hammer out the Front Fork seals and bushings by vigorously extending the Inner tube.



### CAUTION

- If the seals and bushing are not coming out then, clamp the outer tube in vise.
- Make sure it is clamped on the Strong part of the Outer tube.
- Not to clamp on Outer tube OD, as it may lead to ID deformation. So, clamp it on any rib without damaging the working area.
- Slide out the Seals and Guide Bush from the other side of the Inner tube.
- Tilt the outer tube to remove the Spindle taper from the Outer tube.



- Remove the Slide Bush from the Inner tube by opening the Slide bush and then push it.



- Opening of Slide bush can be done either by hand or by using thin end screwdriver.



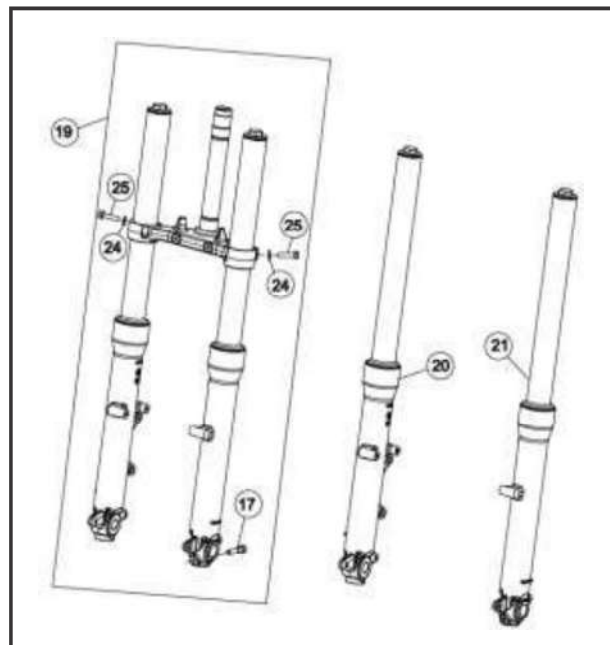
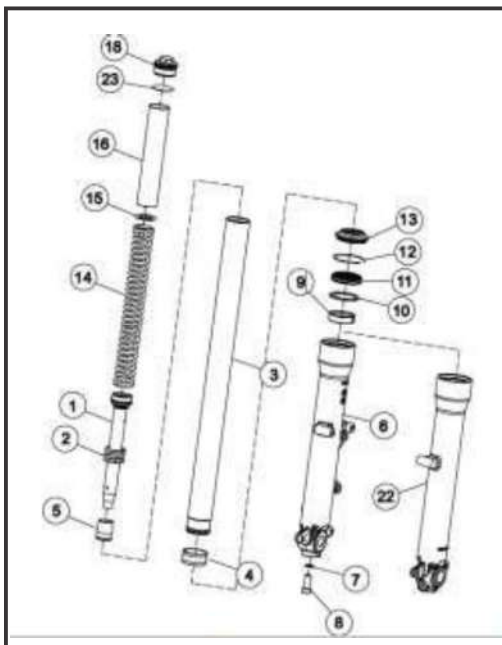
### **! CAUTION**

- Make sure not to damage or open too much during use of Screwdriver.

### **! WARNING**

- Protect your fingers from sharp edges.

### ii. FRONT FORK ASSEMBLY



- 1) Piston (Piston+Piston Ring)
- 2) Rebound Spring
- 3) Inner Tube Assembly
- 4) Slide Bush
- 5) Spindle Taper
- 6) Outer Tube RH
- 7) Gasket
- 8) Bolt M10X1
- 9) Guide Bush
- 10) DU Bush Washer
- 11) Oil Seal
- 12) Circlip
- 13) Dust Seal

- 14) Spring
- 15) Washer Spacer
- 16) Spacer
- 17) Socket hex head bolt
- 18) Bolt cap with O-ring Sub-Assembly
- 19) Front Fork Assembly
- 20) Fork leg Assy. RH
- 21) Fork leg Assy. LH
- 22) Outer Tube LH
- 23) Washer
- 24) Spring washer
- 25) Screw Socket

### iii. FRONT FORK ASSEMBLY

- Insert the new Slide Bush onto the groove
- provided on the Inner tube.

#### **WARNING**

- Protect your fingers from sharp edges.



- Locate the Piston + Piston Ring + Rebound Spring onto the Piston Locator.



- Put the Piston thimble on the Piston.



- Slide the Inner tube assembly (with Slide bush) over the Piston Assembly.
- Make sure the Inner tube assembly is below the Piston Thimble.



- Remove the Piston Thimble and install the Spindle taper on the Piston.



- Install the Outer tube on the Inner tube assembly & Piston till it rests on the Spindle taper.



- Install the M10 Bolt + Gasket in the Outer tube

 **CAUTION**

During Reassembly do not use the old Gasket, always use new Gasket.



- Tighten the M10 fork bolt with 8mm Allen key and Torque wrench/Ratchet.
- Torque: 25~35N.m



- Take out Front Fork from the Piston locator fixture. While taking out hold Inner tube with one hand and outer tube with other hand.



- Slide the Guide bush into the Outer tube.



- Slide the Guide Bush Washer into the Outer tube.



- Press the Guide Bush & Guide Bush washer by slide hammering using Guide bush pressing tool.

 **CAUTION**

Make sure Guide Bush is seated properly.



- Grease the Oil seal in the ID.



- Locate the Seal thimble on the Inner tube.
- Insert the Oil seal onto the Oil Seal thimble.
- Then slide the Oil seal down using the oil seal pressing tool and take out the oil seal thimble.



- Install the Oil seal into the Outer tube by slide hammering the oil seal using Oil seal pressing tool.



- Insert the circlip into the outer tube groove.



- Press the circlip into the groove using Oil seal pressing tool.
- Make sure the Circlip seated properly into the groove.



- Locate the Seal thimble on the Inner tube.
- Insert the Dust seal onto the Seal thimble.
- Then slide the Dust seal down using the Dust seal pressing tool and take out the Seal thimble.



- Install the Dust seal into the Outer tube by slide hammering the Dust seal using Dust seal pressing tool.



- Pour the Oil into the Fork.
- Oil quantity: 400 ml (Per Leg)
- After pouring the oil, Stroke the inner tube slowly to bleed the fork.



- Install the Spring into the Fork.

**CAUTION**

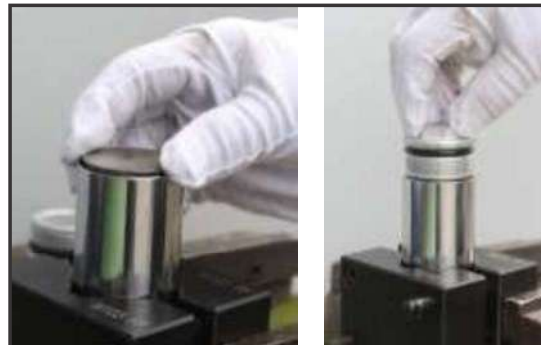
Install the Spring with closed coil down.



- Insert the Spring seat washer then spacer and then place the washer 2.



- Clamp the Fork Inner tube in a Bench vise with Inner tube clamping Jaws which are specifically designed to hold Inner tube.
- Place the Washer-2 on the spacer and then place the Bolt cap on it.



**CAUTION**

Inner tube Clamping jaws are made of Brass to avoid any damage to inner tube during clamping.

- Tighten the Boltcap with 22mm Socket and Torque Wrench / Ratchet. Torque: 15~30 N.m

**NOTE**

Make sure to press down during initial tightening.



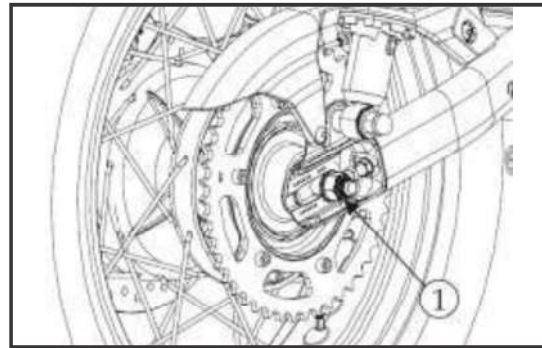
#### iv. Maintenance check points – Front fork

- Check the front fork condition by operating the handlebar up and down.
- Check the entire assembly for any leakages.
- Check the torque of mounting bolts as per specification.
- Replace front fork oil, if required.
- Check front fork condition at every service.
- Ensure no accidental damage on front fork.
- Per Leg Fork oil capacity- 400 ml.
- Recommended replacement at 22500 Miles.

### 7. REAR WHEEL

#### i. REMOVAL OF REAR WHEEL ASSEMBLY

- Park the Vehicle on a firm & Level ground.
- Note and mark the position of the chain adjuster.
- Remove the lock nut (1) of the axle bolt from RH side



- Tap and remove the axle bolt (2) from LH side.
- Push the wheel forward and remove the chain from wheel sprocket.
- Pull the rear caliper bracket assembly (3) outward.



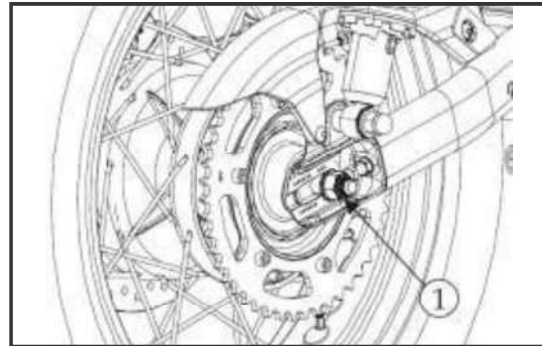
- Tilt the vehicle slightly on either side & take out the rear wheel assembly.
- Place a 4 mm wooden piece or plastic sheet between the brake pads to avoid brake pads getting in touch with each other.

### ii. REAR WHEEL RE-ASSEMBLY

- Tilt the vehicle slightly on either side & take out the rear wheel assembly.
- Remove the wooden piece / cardboard sheet placed between the brake pads.
- Put the axle bolt (2), LH outer spacer & Caliper Assy (3) from LH side it forward along the stopper lug on swing arm to align with hole on caliper bracket.



- Push axle bolt (2) completely, along with chain adjuster tighten the lock nut (1) with tightening torque of 75-80Nm.
- Reassemble the chain with sprocket and ensure the free rotation of the wheel.



- Check the chain slackness is between (25-30 mm), adjust if required.
- Ensure Index molarity is aligned from both sides.



## 8. REAR SHOCK ABSORBER

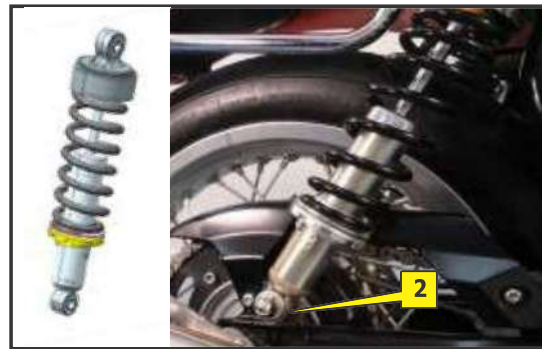
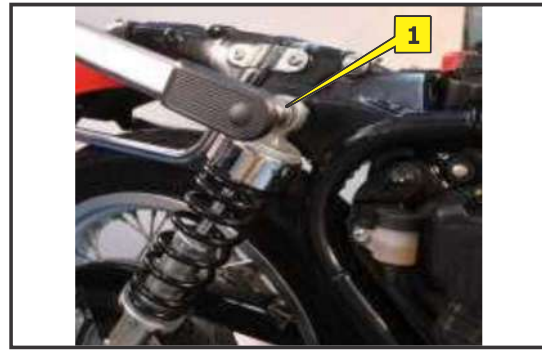
### i. FEATURES :

- Progressive rear shock absorbers with 108 mm wheel travel.
- 5 step adjustable progressive rear shock absorber that absorbs all the road shocks and provides good comfort.



### ii. DISASSEMBLY OF REAR SHOCK ABSORBER

- Remove the lock nut (1 & 2) of from RH side & LH side.
- Remove the bolts.
- Pull the shock absorber assembly to remove from vehicle.



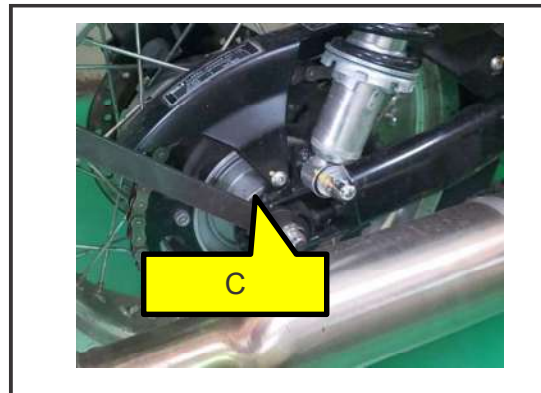
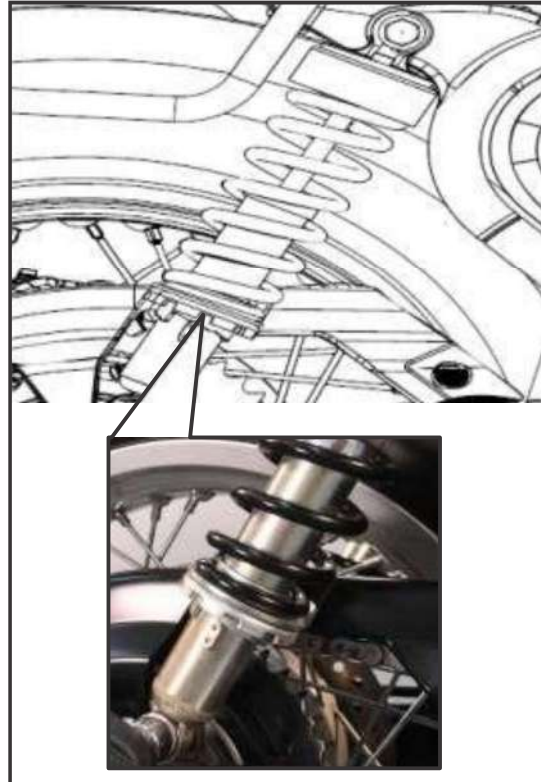
### iii. ASSEMBLY OF REAR SHOCK ABSORBER

- Reverse the process to assemble the shock absorber to vehicle.
- Follow the torque value to tightening of shock absorber.



### iii. ADJUSTMENT OF REAR SHOCK ABSORBER

- The rear shock absorbers are of adjustable type i . e., the spring compression can be increased or decreased.
- Increase the spring compression for high load operation.
- Decrease the spring compression for low load operation.
- The adjuster provided on the bottom of the spring has five notches.
  - Insert Special 'C' Spanner on the bottom adjuster and rotate to change notch position.
  - Turn the adjuster such that the adjuster moves up to increase the spring compression and vice versa to reduce the spring compression.
- Adjust both the left hand and right-hand shock absorbers to same position.
- Standard position is at second notch.



#### **WARNING**

Riding the motorcycle with the notches adjusted in different positions on LH and RH shock absorber can cause loss of control and may hamper the riding performance.

1. TECHNICAL SPECIFICATION
2. DISASSEMBLY & ASSEMBLY OF HANDLEBAR & MOUNTINGS
3. STEERING
4. TROUBLESHOOTING

**1. TECHNICAL SPECIFICATION**

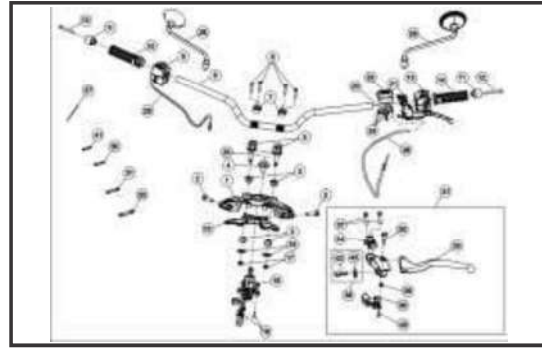
Width	817 mm
Height	1093 mm
Handle Type	Single piece made up of round tube

**2. DISASSEMBLY OF HANDLEBAR & MOUNTINGS**

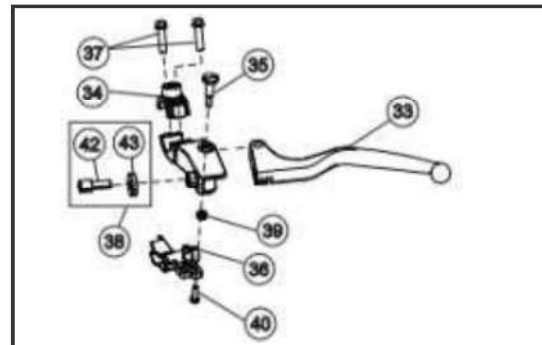
- Park the vehicle on the firm level ground/surface using paddock stand.
- Remove the key from the ignition switch.
- Remove both LH & RH side mirrors. Rotate RH mirror in anti-clockwise direction & LH mirror in clockwise direction.
- Remove the two bolts of master cylinder that hold the master cylinder upper holder & front master cylinder.
- Before complete unscrewing hold the front master cylinder lever assembly with hand at the lower end & take away the front master cylinder upper holder & cylinder lever assembly.



- Remove the flange bolt 2 no's (37) & take out the holder upper (34) & clutch lever assembly (21)



- Remove the socket bolt 2 no's (12) from LH & RH side each & take out the counterweight mounted on handlebar end



- Pull & remove the throttle tube (10) & LH handle grip (14)

- Loosen the screws of both the RH switch assembly & LH switch assembly located beneath & take out the RH & LH switch assembly.

- Now the handlebar is free from all its mountings.

- Remove the 4-socket screw (8) & take out the handlebar holder upper (7) & handlebar tube (6)

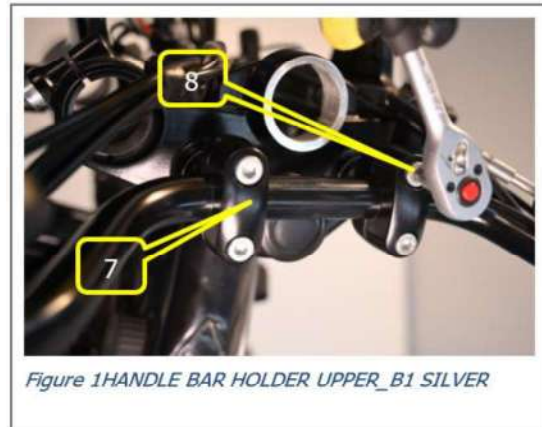


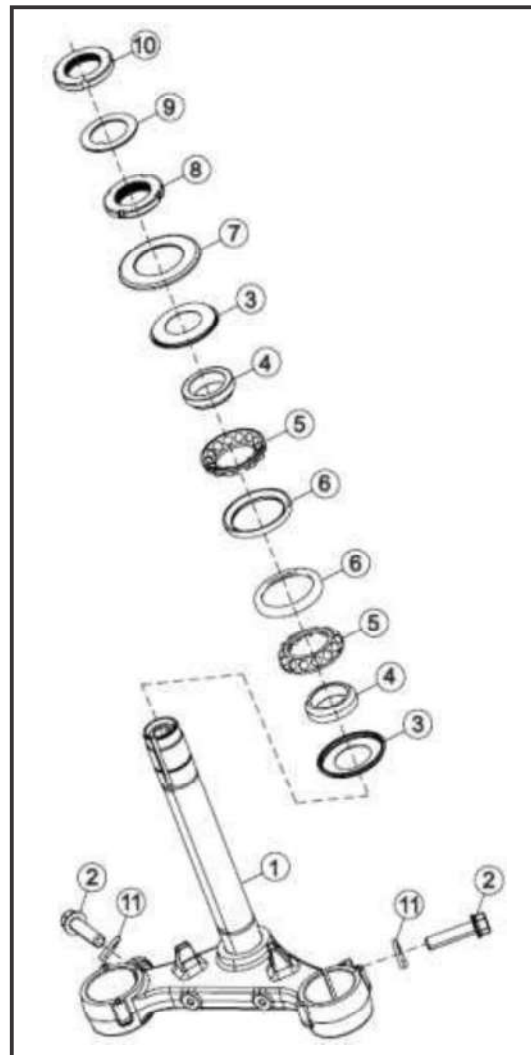
Figure 1 HANDLE BAR HOLDER UPPER\_B1 SILVER

### 2.1 ASSEMBLY OF HANDLEBAR & MOUNTINGS

- Inspect the handlebar for bend/damage replace with the new one if required.
- Inspect the RH & LH switch assembly for proper functioning.
- Check the throttle cable & clutch cable for any cracks/cuts. Replace with the new one if required.
- Check the electrical wiring connectors for proper locking in its mating parts.
- Assembly the mounting parts of handlebar & handle bar in the reverse order of removal.
- Tighten the handlebar holding nuts to the specified torque.

### 3. STEERING STEM

1. UNDER BRACKET- STEM ASSY\_
2. SCREW SOCKET M10X1.25X40X8.8
3. STEERING DUST SEAL
4. INNER BALL RACE
5. STEERING BALL (DIA 7.9375) WITH CAGE
6. OUTER BALL RACE
7. DUST CAP, STEERING
8. STEERING NUT
9. WASHER, STEERING LOCKNUT
10. STEERING LOCK NUT
11. WASHER SPRING



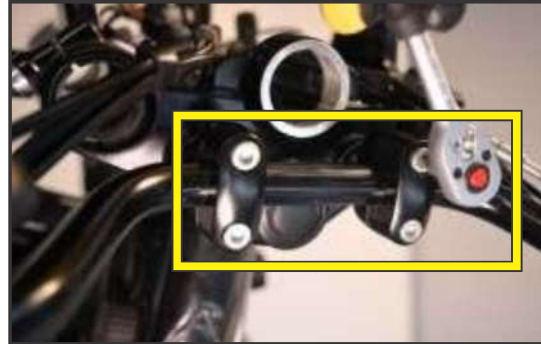
### 3.1 Steering Stem removal

#### a. Remove the Front Wheel:

- Loosen and remove the axle nut and axle.
- Carefully slide the front wheel out of the forks

#### b. Remove the Handlebars

- Loosen & remove the screw socket (M8X1.25X33X10.9) to remove Handlebar holder upper.
- Carefully slide the handlebars out of the upper triple tree. (Follow the Handlebar removal process)



#### c. Remove the Fork Tubes:

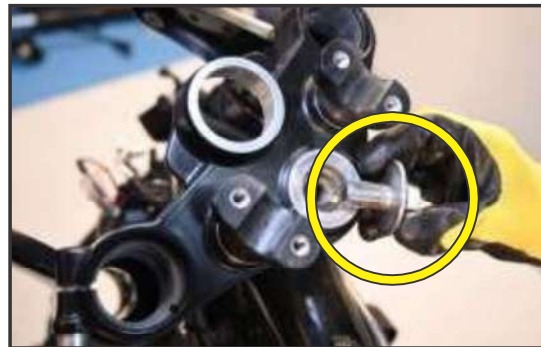
- Loosen and remove the fork tube caps or bolts from the upper triple tree.
- Slide the fork tubes out of the triple tree.

#### d. Access the Steering Stem:

- With the upper triple tree removed, you should now have access to the steering stem.

#### e. Remove the Steering Stem bolt :

- Locate the steering stem nut, usually located at the top of the stem.
- ( SCREW SPECIAL M16X1.25X25X8.8)
- Use the M16 wrench to loosen and remove the nut.
- Remove the allen bolt (3) M10X1.25X35



- Remove the upper bracket by lifting from assembly.



- Remove the damper headlamp stay
- Remove the Headlamp Stay LH and RH

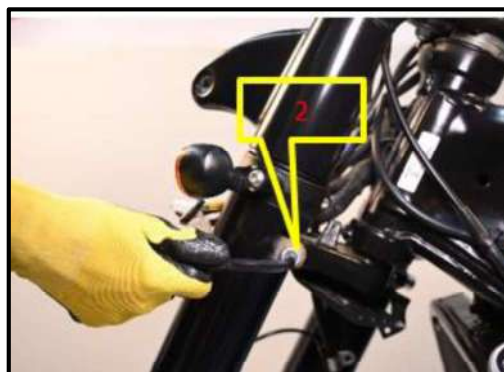


- Remove the Blinker assembly.



**f. Remove the fork tubes:**

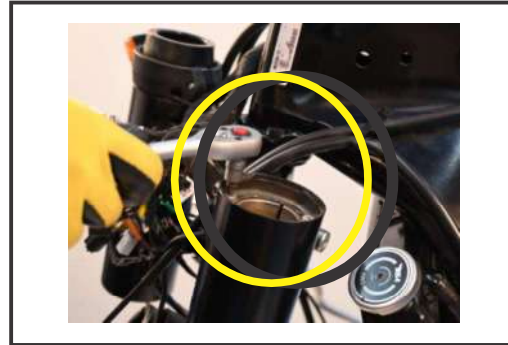
- Remove the M10 allen Bolt (2) (screw socket M10x1.25x40x8.8)
- Remove the allen bolt (3) M10x1.25x35
- Loosen and remove the fork tube caps or bolts from the upper holder.
- Slide the fork tubes out of the upper & lower holder.



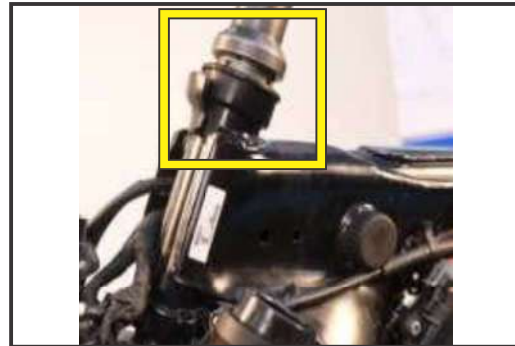
**g. Remove the Steering Stem:**

- The steering stem should now be free to slide out of the frame. If it is stuck, use a rubber mallet to gently tap it to help loosen it.

- Remove the screws of both LH and RH front fork cover tube assembly and take away both the tubes from fork as shown in the fig.



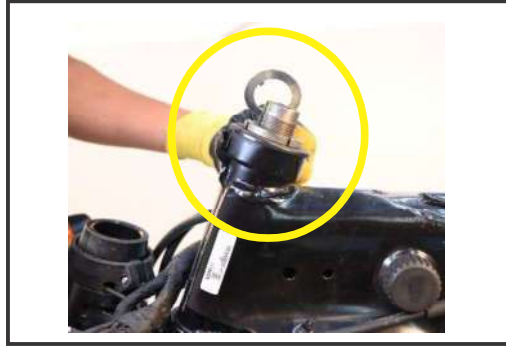
- **Using Special tool – Steering nut tightening**  
(T14010Y40010N) loosen the steering lock nut as shown in the fig.



- Take out the steering lock nut from steering stem threading.



- Take out the washer (9) from steering stem

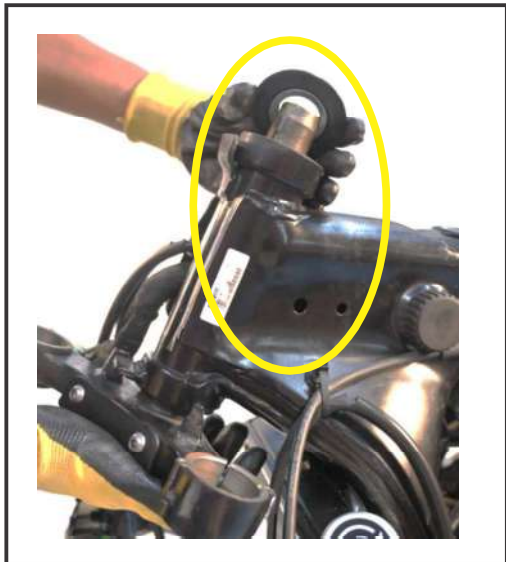


- Use special tool to remove steering nut (8)



- NOTE: When lesser threading of steering stem is left, hold the under-bracket assembly from the lower end and take out the under-bracket assembly from the steering cage as shown in the fig.

- Hold the steering stem at its lower end and remove the dust cap from the top surface of the steering stem as shown in the fig.



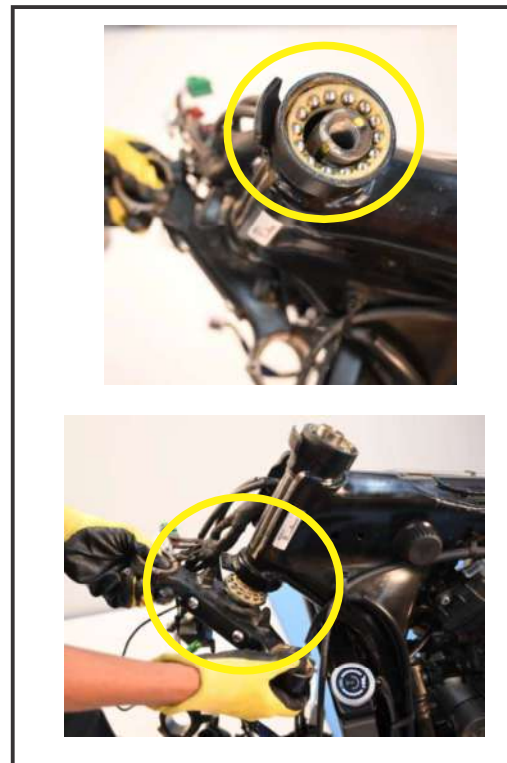
- Remove the dust seal.



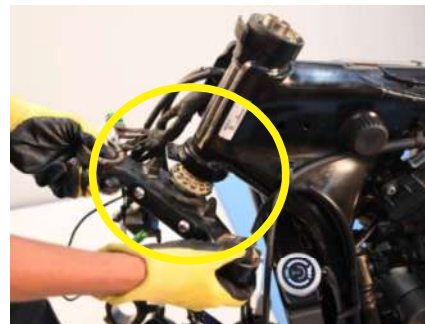
- Remove the inner ball race by lifting it upward.



- Remove the dust seal (5) steering ball (dia 7.9375) with cage.



- When lesser threading of steering stem are left, hold the under bracket assembly from the lower end and take out the under bracket assembly from the steering cage as shown in the fig.



- Clean the under-bracket assembly



thoroughly using a clean cotton cloth. Insert the dust seal, inner ball race & steering ball with adequate amount of recommended grease applied as shown in the fig.

- Insert the dust seal, inner ball race and steering ball with adequate amount of recommended grease at the top of steering cage cup as shown in the fig.



- Before assembly, apply adequate amount of recommended grease (molybdenum) to the steering ball bearing using soft brush as shown in the fig.



- Before inserting steering stem in the steering cage. Apply adequate amount of molybdenum grease on the lower and upper surface of the steering cage cups using soft brush as shown in the fig.



- Remove the bearing race with the help of screwdriver and hammer- Ensure no scratches/damages on frame.



- Inspect and Replace Bearings and Seals:
- Once the steering stem is removed, inspect the bearings and seals for wear and damage. If necessary, replace them with new ones.



### 3.2 Steering Stem Reassembly:

- To reassemble, reverse the above steps, making sure to torque all bolts and nuts as per specifications.

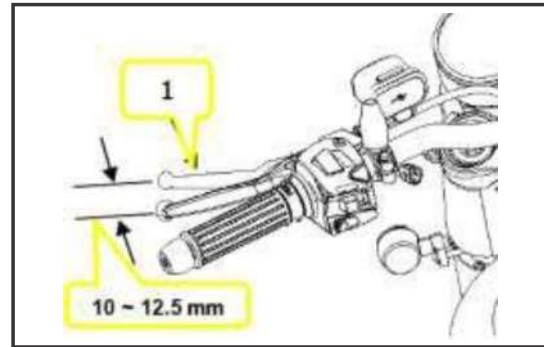


### NOTE

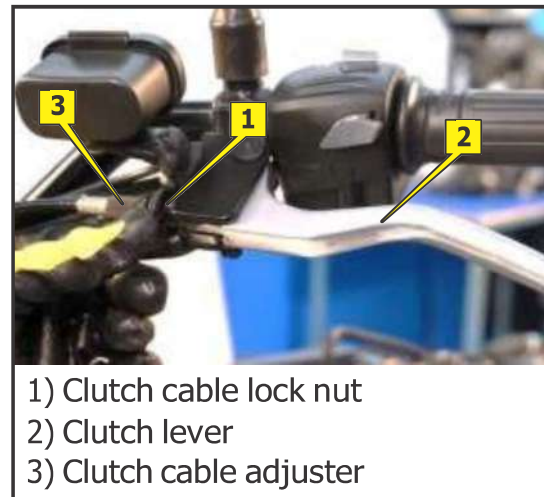
- Double-check all connections, cables, and wiring.
- Make sure the front wheel is properly aligned.

### 1. CLUTCH SETTING

- Clutch adjustment may be required if the vehicle stall when shifting into gear or tends to creep or if the clutch slips, causing acceleration to lag behind engine speed.
- Minor adjustments can be made with the clutch cable adjuster nut (1) at the clutch lever (2).
- Normal clutch lever free play is : (10 ~ 12.5 mm) & (2.5 ~ 3 mm at pivot end)



- Loosen the lock nut (1) and turn the clutch cable adjuster (3).
- Tighten the lock nut and check the adjustment.
- If the adjuster is threaded out near its limit or if the correct free play cannot be obtained, using the clutch cable adjuster, loosen the lock nut and turn the clutch cable adjuster completely and tighten the lock nut.



#### NOTE

Lubricate the locknut after use in rains, wash. Dusty condition.

- Avoid half clutch operation.
- Check for any damage or cut in clutch cable
- Locate the Clutch cable free play adjustment nuts below engine cover.



- Adjust the free play by using open end spanners as shown in photo.



### **NOTE**

Adjust & inspect the clutch free play in every service of vehicle.

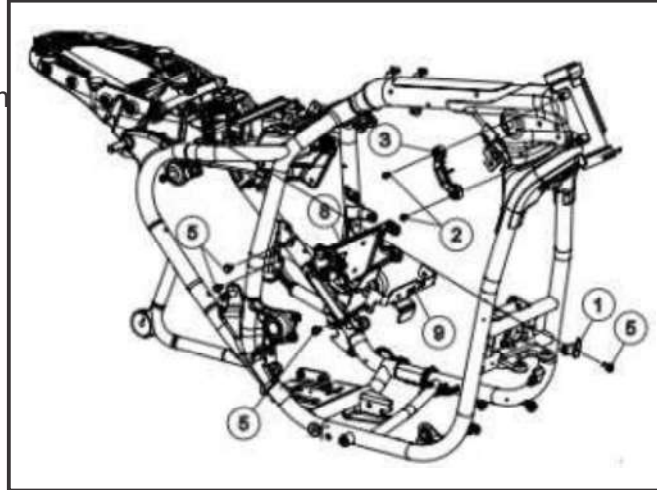
1. **INTRODUCTION**
2. **TECHNICAL SPECIFICATION**
3. **DISASSEMBLY-ASSEMBLY OF FRAME**
4. **SUB FRAME**
5. **TROUBLESHOOTING**

## 1. INTRODUCTION

Frame assembly is one of the major components of the vehicle. All the assembly / sub-assemblies that form a complete vehicle are mounted on the frame assembly.

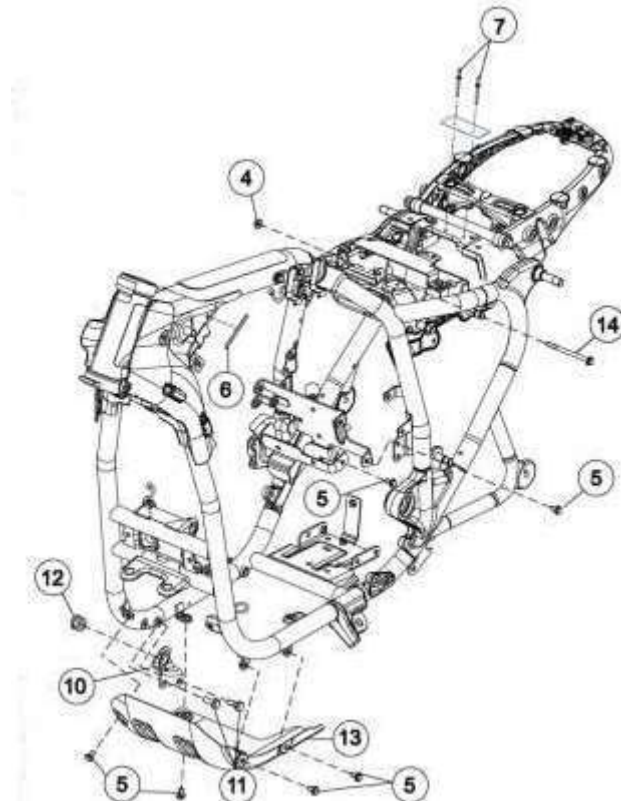
**Assembly / sub-assemblies mounted on the frame are :-**

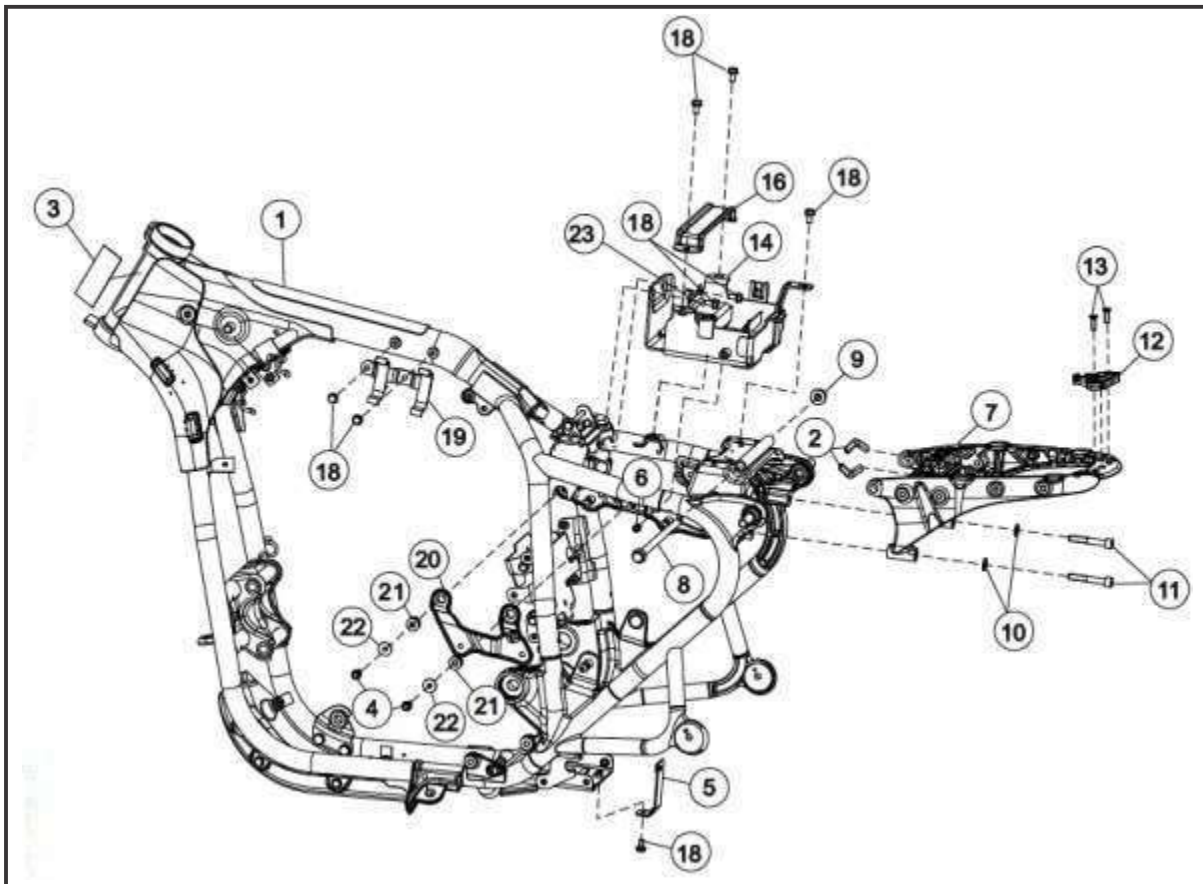
- Engine assembly
- Wheels and tires
- Front and Rear suspension system
- Front and Rear fender assembly
- Swing arm
- Fuel tank assembly
- Induction system
- Brake system
- Exhaust system
- Cooling system
- Electrical system
- Handle bar system
- Seat assembly
- Sub frame assembly
- Front and rear tool rear assembly
- Side stand assembly



## 2. TECHNICAL SPECIFICATION

- Chassis type :-Round Tubular
- Cradle type :- Double Cradle





Sr. No.	Part No.	Part Description
1	T08000B10470N	Frame Assembly Kit
2	T08000B10340N	Beading Frame
3	T08000KE0020N	Anti Abrasive Tape Head Pipe
4	TSF0102271	Flange Bolt M6 X 18
5	T08000B10250N	Starter Relay Mounting Braket
6	SP0306006	2W_Socket Head Screw M6 X 12
7	T08000B10070W	Sub Frame Complete Welded Gloss Black
8	SF0102617	Bolt Hex FL M10 X 1.50 X 200 X 10.9
9	SF0315017	Nut HX NYL FL M10 X 1.50 X 13.5 X 10
10	TSF0401129	Washer M8 (8.4 X 17 X 1.6)
11	SF0224075	Screw Socket M8 X 1.25 X 55 X 10.9
12	MF01450000400	Seat Latch Assembly
13	SF0211010	Screw FTCS CR M6 X 1 X 20 X 6.6
14	T08000B10150N	Battery Box
15	T1503DKE0250N	Pad Battery Box
16	T08000B10160N	Battery Clamp
17	T15010KE0840N	Foam Battery Clamp
18	95701-06012-00	Flange Bolt M6 X 12
19	T08010B10520N	Bracket BS-IV Canister Mounting Loose
20	T08000B10200N	Bracket Air Filter Mounting Loose LH
21	T13160KG0150N	Grommet SAI Mtg.
22	T13160KG0210N	Collor Fairing Mounting
23	T08000B10460N	Loose Bracket Battery Mounting

### 3. DISASSEMBLY OF FRAME

1. To access frame assembly all the above-mentioned assemblies/sub-assemblies mounted on the frame assembly needs to be made down primarily.
2. For removal of the assemblies/ Sub-assemblies refer the respective section covered under this manual.
3. Once all the assemblies are down. Frame assembly is free from all mountings.



#### NOTE

Frame assembly is accessed rarely, only in the case of frame bend and accidental cases or when the cracks are observed in welding joints of frame assembly.



#### CAUTION

If the frame assembly is observed with any welding defect/cracks it's recommended to replace the complete frame assembly with new frame assembly.

### 4. ASSEMBLY OF FRAME

1. Before assembly inspect the frame assembly for any type of bends/cracks and improper weld joints
2. Mount all the assemblies and sub-assemblies on frame assembly in the reversal order of removal.



#### NOTE

- Assemblies and sub-assemblies mounted on the frame assembly should be tighten to the specified torque using torque wrench.
- Also ensure that Electrical Battery is disconnected before initiating this process.
- Ensure that all electrical connectors are disconnected before dismantling of frame & subframe.

### 3. SUB FRAME

#### INTRODUCTION :-

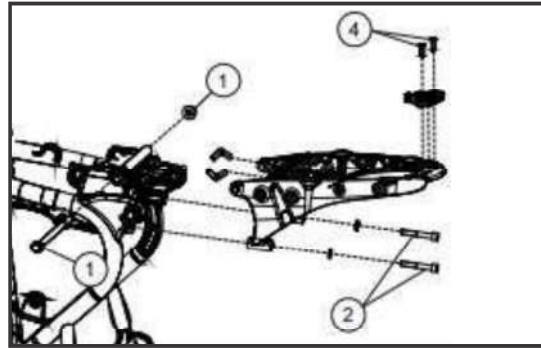
Sub frame is the extension given to the main frame assembly. Sub frame in this vehicle is mounted on the rear side of the frame assembly.

Sub frame support the seat assembly mounting. Sub frame is made from forging & forming.

Main frame assembly and sub frame are joined by the means of fasteners.

### 5.1. DISASSEMBLY AND ASSEMBLY OF SUB FRAME

1. Place the vehicle on paddock on a firmly level ground.
2. Remove the sub frame mounting hex bolt (1) & Nut (3) from main frame using 12 no socket and 17 no spanner.
3. Use 6 mm allen key to remove the socket screw (2) from frame along with washer.
4. Use 10 no socket to remove flange bolts from sub-frame assembly.
5. Loosen the sub frame rear side hex bolt using 8 no socket.
6. Remove the sub frame stay using 5 mm allen key.
7. Disconnect the Tail lamp coupler, Cut the cable tie & take out the Sub frame assembly.
8. Follow the reverse process to assemble front fender.



## 5. TROUBLESHOOTING

### i. Visual Inspection :

Start with a thorough visual inspection of the frame and subframe. Look for signs of damage, rust, cracks, or other abnormalities.

### ii. Alignment :

Check the alignment of the frame and subframe. If the frame is not straight, it can lead to handling problems. Ensure that all parts are properly aligned and secured.

### iii. Rust and Corrosion :

Rust and corrosion can weaken the frame over time. If you find any areas with rust, sand it down, apply an anti-rust treatment, and repaint the affected area.

### iv. Cracks and Welds :

Examine all welds for cracks or signs of failure. If you find any, they should be repaired by a professional welder or replaced.

### v. Subframe Mounting :

Ensure that the subframe is securely attached to the main frame. Loose or damaged subframe mounts can affect the stability of the motorcycle.

**vi. Subframe Material:**

In older BSA motorcycles, subframes were often made of mild steel, which is prone to rust. Consider replacing the subframe with a stainless steel or other rust-resistant material if necessary.

**vii. Suspension Mounts :**

Check the suspension mounting points on both the frame and subframe. Loose or damaged suspension mounts can lead to handling issues.

**viii. Aftermarket Accessories:**

If anyone has added aftermarket accessories, like luggage racks or panniers, make sure they are securely attached to the subframe. Poorly attached accessories can strain the subframe and lead to structural issues.

**ix. Replacement:**

In some cases, if the frame or subframe is severely damaged or compromised, it may be necessary to replace these components. This is a complex and expensive process that is best left to experienced professionals.



**NOTE**

Always prioritize safety when dealing with frame and subframe issues on a motorcycle.



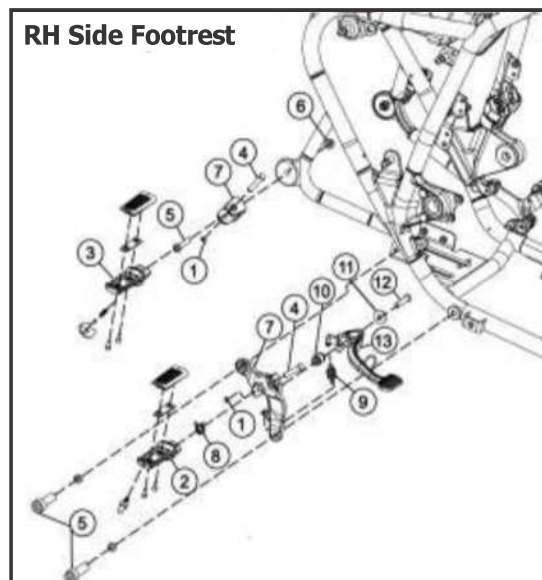
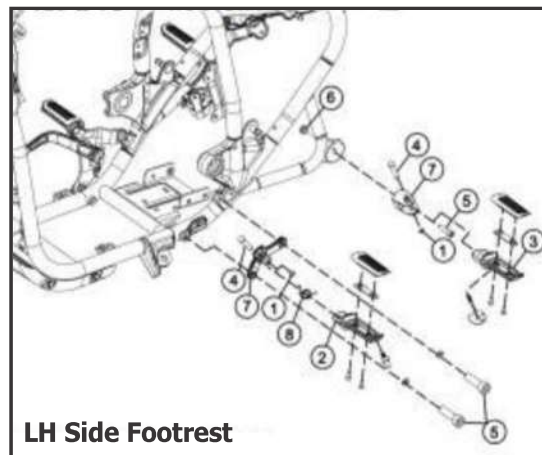
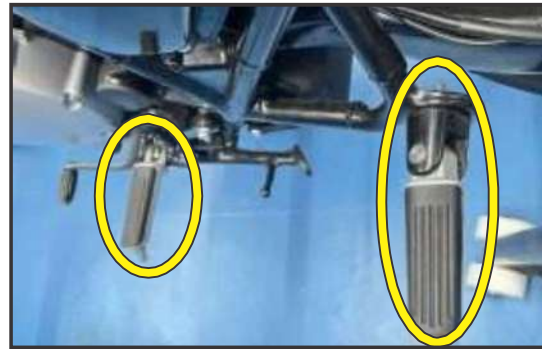
**WARNING**

A compromised frame can result in a serious accident.

1. FOOTREST
2. TROUBLESHOOTING

### 1. LH & RH Footrest Removal Procedure

- Place the vehicle on Paddock on a firmly level ground / Ramp.
- The footrest is attached to a bracket, which is secured to the frame of the motorcycle.
- Remove the footrest circlip / Seeger (1) from RH & LH side of both rider footrest (2) and pillion footrest (3) using multi-functional screwdriver.
- Tap driver pedal pin (4) by Rubber or wooden mallet.
- Remove the pin driver pedal (4) from RH & LH side of both rider footrest and pillion footrest which hold the footrest to clevis.
- Remove steel ball, detent plate & rotating spring for removing pillion footrest LH/RH.(3)
- Loosen the Head screw socket (5) along with washers & nut (6) using 6 mm allen key to remove Clevis (7).
- To remove the clevis from RH & LH side Rider footrest, with loosen torsion spring (8).
- Loosen the Rear brake pedal return spring (9), remove Bush (10), washer (11), bolt (12) & Rear brake pressure hose.
- Take out the Rear brake pedal (13) & clevis from frame.
- Follow the reverse procedure to install the footrest.



#### Point To be checked before Installation.

- Torsion Spring Tension
- Wear Out Circlip
- Check marking for “L” & “R” below rider & pillion footrest for correct assembly.



**NOTE**

- Keep these fasteners in a safe place, as you'll need them for reinstallation.
- Ensure the click sound while folding the footrest.
- Inspect and Clean: Take this opportunity to inspect the footrest and bracket for any signs of wear, damage, or corrosion. Clean them if necessary.

### 2. Troubleshooting

#### 1. Footrest Won't Fold or Extend:

- Check for Obstructions: Inspect the footrest for any obstructions, such as debris or foreign objects that may be preventing it from folding or extending.
- Lubrication: Apply lubricant to the hinge or pivot points of the footrest to ensure smooth movement. Rust or corrosion can sometimes cause stiffness.

#### 2. Footrest is Loose or Wobbly:

- Tighten Fasteners: Check and tighten all bolts, nuts, and screws that secure the footrest and its bracket to the motorcycle frame. Loose fasteners can lead to instability.
- Inspect Bracket: Examine the footrest bracket for any cracks or damage. Replace the bracket if it is compromised.

#### 3. Footrests are Uneven:

- Inspect for Damage: Check the footrests for any signs of damage or wear, such as bent brackets or misaligned pegs.

#### 4. Footrests are Slippery:

- Check Surface: If the footrests are too smooth or worn, replace if required.
- Clean: Remove any grease, oil, or debris from the footrests. A clean, dry surface provides better grip.

#### 5. Footrest Rust or Corrosion:

- Clean and Protect: Remove rust or corrosion with a wire brush or sandpaper.
- Apply rust-resistant paint or a protective coating to prevent further corrosion.

#### 6. Excessive Vibration:

- Inspect Engine and Suspension: Excessive vibration can affect the footrests. Check the motorcycle's engine mounts and suspension components for wear or damage.

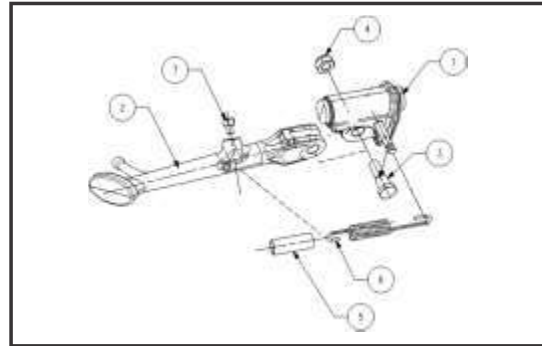
1. **INTRODUCTION**
2. **REMOVAL OF SIDE STAND**
3. **INSPECTION OF SIDE STAND**

## 1. INTRODUCTION

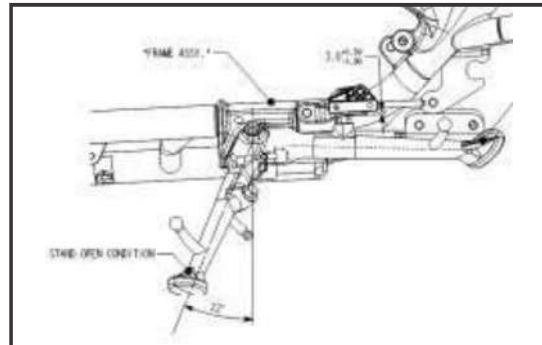
- A side stand is a device mounted on the side of a motorcycle that allows the rider to prop the motorcycle upright when it is parked. This helps keep the motorcycle stable and prevents it from tipping over when it's not in motion. Side stands are a standard feature on most modern motorcycles.

## 2. REMOVAL OF SEAT ASSEMBLY

Sr. No.	Part No.	Part Description
1	T1501MB10061N	Magnet Holder_B101
2	T2302BKW0010N	Spring Side Stand Jawa
3	T20000KW0140N	Rubber Sleeve, Return Spring
4	MF01690000400	Nyloc Nut 10 MM
5	T2302BKW0020N	Step Bolt Side Stand Jawa
6	T2301AB10010N	Side Stand
7	T08010B10010N	Frame Complete Welded



- Place the vehicle on paddock stand firmly on level ground.
- Remove the side stand switch (not necessary to disconnect the connector).
- Remove the side stand return spring along with rubber sleeve (5).
- Remove the side stand pivot nut (3) and bolt (4) using 17 no spanner.
- Apply molybdenum disulfide grease to the side stand pivot bolt sliding surface and frame bracket hole.
- Locate & install the side stand on frame bracket and collar.
- Install and tighten the pivot bolt to the specific torque.



### Torque: 1.5 ~ 1.8 Kgf.m

- Install and tighten the side stand pivot nut to the specified torque while holding the side stand pivot bolt.
- Install the side stand and return springs in the direction as shown.
- Install the side stand switch.



### 3. INSPECTION OF SIDE STAND

- Check the side stand spring for any damage and loss of tension, and the side stand assembly for free movement.



- If the side stand is squeaky or stiff, clean the pivot area and lubricate the pivot bolt with clean engine oil.



1. GENERAL INFORMATION
2. TECHNICAL SPECIFICATION
3. INSPECTION & MAINTENANCE
4. SERVICE INFORMATION
5. TROUBLESHOOTING

### 1. GENERAL INFORMATION :

- Drive chain is the medium through which power is transferred from engine sprocket to the rear wheel of the vehicle. The service life of the drive chain is dependent upon proper lubrication and adjustment. Poor maintenance can cause premature wear or damage to the drive chain and sprockets. The drive chain should be checked, adjusted, and lubricated as part of the periodic inspection.
- When the vehicle is used in unusually dusty or muddy areas, more frequent maintenance will be necessary.

### 2. TECHNICAL SPECIFICATIONS

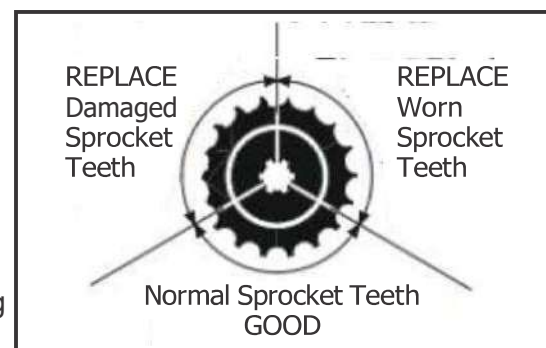
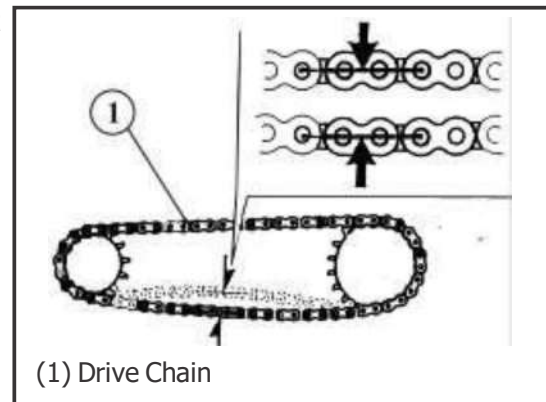
- Chain : 520NASR (106 links)

### 3. INSPECTION AND MAINTENANCE

#### 3.1. INSPECTION OF DRIVE CHAIN

#### WARNING

- Amputation hazard. Never inspect or adjust the drive chain while the engine is in running condition / rear wheel rotating.
- Turn the engine off, place the vehicle on paddock & shift the transmission to neutral.
- Check slack in the lower drive chain run between the sprockets. Drive chain slack should be adjusted to allow the following vertical movement by hand.
- Rotate the rear wheel by quarter turn / 90 degree. Check the drive chain slack. Repeat this procedure again by rotating the wheel further by 90 degrees. Do this for least 2 full wheel rotations. Drive chain slack should remain certain constant.
- If the chain is slack only in certain sections, some links are kinked and blinding. Blinding & kinking can frequently be eliminated by means of lubrication.



**Drive Chain Slackness: 25-30 mm**

#### DRIVE CHAIN NEEDS TO BE INSPECTED FOR :

- Damaged Rollers
- Loose Pins
- Dry or Rusted Links
- Improper Adjustment

#### 3.2. Maintenance of Drive Chain

- The Drive Chain slack should be checked and adjusted, if necessary, every 1000 km. when operated at sustained high speeds or under conditions of frequent rapid acceleration, the chain may require more frequent adjustment.

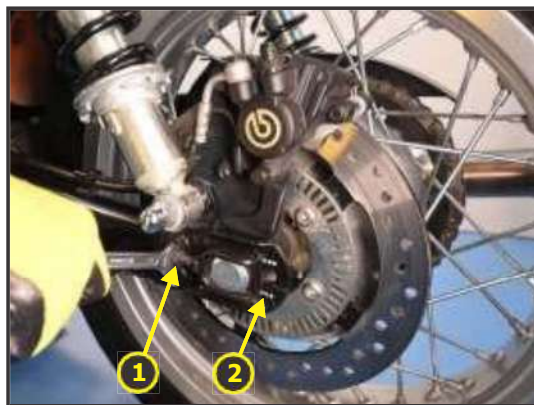


#### CAUTION

- Drive chain with damaged rollers, loose pins, or missing O-rings must be replaced or uneven elongation of links must be replaced. A chain which appears dry or shows sign of rust requires supplementary lubrication. Kinked or binding links should be thoroughly lubricated and worked free. If links cannot be freed, the chain must be replaced.

#### If the drive chain requires any adjustment, the procedure is as follows :

- Place the vehicle on paddock on a firm, level surface with the transmission in neutral and the ignition switch OFF.
- Loosen the rear axle nut from RH side.
- Loosen the adjustment Nuts on both sides then turn both drive chain adjustment screws (1) an equal number of turns until the correct drive chain slack is obtained.



- Turn the drive chain adjusting screws clockwise to tighten the chain, or counterclockwise to provide slacker. Check the chain slack at a point midway between the drive sprocket and the rear wheel sprocket.
- Roll the rear wheel in forward direction and ensure consistency of slackness at every quarter turn and repeat for at least 2 complete wheel rotations.

- Check rear axle alignment by making sure the chain adjuster index marks (2) align with the rear edge of adjuster.
- 1) Drive chain adjustment screw.
- 2) Chain adjuster index mark.

 **NOTE**

- Both left and right marks should be corresponded. If the axle is misaligned, turn the left or right adjusting screws until the marks correspond on the rear edge of the adjuster and recheck chain slack.
- Tighten the rear axle nut to the specified Rear axle torque: 75~80 Nm.
- Tighten the drive chain adjusting screws slightly, then tighten the drive chain lock nuts by holding the drive chain adjusting screws with a spanner.
- Recheck drive chain slack (Slackness should be 25~30 Nm).


 **WARNING**

Damage to the bottom part of the frame may be caused by excessive drive chain slack of more than: 50 mm (2.0 inch)

 **NOTE**

If necessary, replace the drive chain with the Genuine brand and specification.  
Chain: 520NASR (106 links)

#### 4. SERVICE INFORMATION

Lubricate the drive chain at every 1000 km or sooner if chain appears to dry. After inspecting the slack, clean the chain and sprockets by rotating the rear wheel. Use dry cloth with chain cleaner designed specifically for O-ring chain or neutral detergent. Use a soft brush if the chain is dirty. After cleaning, wipe it and dry and then apply lubricant.

### Recommended Lubricant: Motul Chain Clean & Motul Chain Lube

- Do not use a steam cleaner, a high-pressure cleaner wire brush, lubricant not designed specifically for O-ring chains as these can damage the rubber O-ring seals.



- Avoid getting lubricant on the brakes or tires. Avoid applying excess chain lubricant to prevent spray onto your clothes and the Vehicle.



### NOTE

- Ensure that the drive chain has dried completely before lubricating.

## 5. TROUBLESHOOTING

The drive chain in a BSA motorcycle is a critical component that directly affects the bike's performance and safety. Proper maintenance and regular inspections are necessary to ensure a smooth and trouble-free ride. Here is how you can troubleshoot common drive chain issues:

- **Inspect Chain Tension:**
  - Ensure that the chain has the correct tension. An overly tight or too loose chain can lead to problems.
- **Cleaning & Lubrication :**
  - Keep the chain clean by regularly removing dirt and debris. A dirty chain can accelerate wear and reduce efficiency.
  - Check the chain's lubrication. It should be well-oiled but not excessively greasy. Lubricate the chain regularly to reduce wear and improve its lifespan.

- **Alignment:**
  - Examine the alignment of the chain. It should be in a straight line from the front sprocket to the rear sprocket. Misalignment can lead to rapid wear and poor performance.
- **Sprocket Condition:**
  - Inspect the condition of the front and rear sprockets. They should be free from excessive wear, damage, or missing teeth. Replace sprockets if necessary.
- **Chain Wear:**
  - Check for signs of chain wear, such as elongation or tight spots. If the chain is too worn, it should be replaced to prevent potential accidents.
- **Tight Spots or Binding:**
  - Rotate the rear wheel and check for tight spots or binding in the chain. These issues can lead to uneven wear and reduced performance.
- **Chain Noise :**
  - Unusual noises coming from the chain, such as clicking or grinding, can indicate problems. Investigate and address the source of the noise promptly.
- **Fastener Check :**
  - Regularly inspect and tighten the chain's adjusting and connecting bolts. Loose fasteners can affect the chain's tension.
- **Replacement Interval :**
  - Chains have a specified lifespan. If your chain is old and has been used for many miles, consider replacing it, even if there are no visible signs of wear.
  - It is recommended to replace the chain, drive & driven sprocket as a set at the same time.

1. **INFORMATION**
2. **TROUBLESHOOTING**
3. **SWING ARM**
4. **GENERAL**

### 1. Information:

The swing arm is an essential component of a BSA motorcycle's suspension system. It is a pivoting rear suspension linkage that connects the rear wheel to the motorcycle's frame. The primary function of the swing arm is to allow the rear wheel to move up and down in response to bumps and irregularities in the road while keeping it in alignment with the motorcycle's frame.

### 2. Troubleshooting

#### • **Visual Inspection :**

Start by visually inspecting the swing arm and its components. Look for any obvious signs of damage, such as cracks, bends, or missing parts. Ensure that all bolts and fasteners are properly tightened.

#### • **Lubrication :**

Check the swing arm pivot bearings and bushings for proper lubrication. Lack of lubrication can lead to excessive wear and play in the swing arm, affecting the bike's handling. If necessary, apply the recommended lubricant.

#### • **Alignment:**

Inspect the alignment of the rear wheel. An improperly aligned rear wheel can be a sign of swing arm misalignment. Use appropriate tools to measure and adjust the alignment if necessary.

#### • **Swing Arm Bushings and Bearings:**

If you suspect problems with the swing arm bushings or bearings, you may need to disassemble the swing arm. Inspect these components for wear, damage, or excessive play. Replace any worn or damaged parts with new ones.

#### • **Tighten Fasteners:**

Check and tighten all swing arm-related fasteners, including the pivot bolt and axle nut. Loose fasteners can lead to instability and handling issues.

#### • **Shock Absorbers:**

Ensure that the shock absorbers (dampers) connected to the swing arm are in good condition. If they are leaking oil or not functioning correctly, they may need to be serviced or replaced.

### 3. Preventive Maintenance:

Regularly inspect and maintain your motorcycle to prevent swing arm and suspension issues from occurring in the first place. This includes routine lubrication, alignment checks, and following the BSA recommended maintenance schedule.

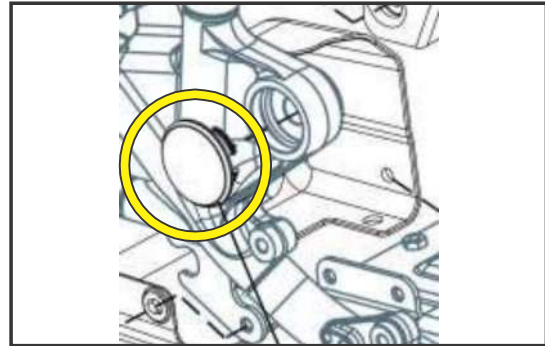
#### 4. Swing Arm

##### i. Swing Arm Removal Procedure

### NOTE

5. Before removing Swing arm ensure that Rear wheel, shock absorber & panels are removed from vehicle.

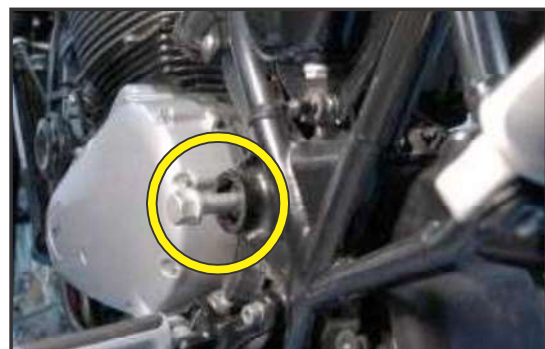
- Remove the cap of swing arm pivot as shown in photograph.



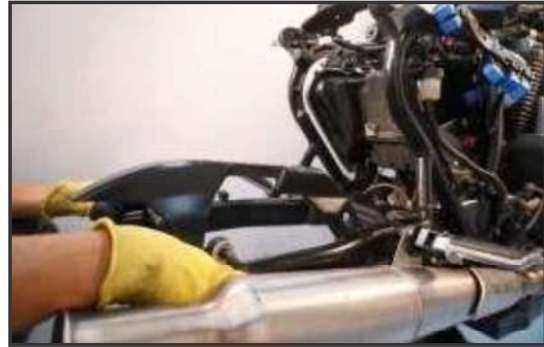
- Loosen the socket nut using 15 No. socket as shown in photograph.



- Remove the hex bolt as shown in photograph.



- Hold the Swing arm by both Hands.



- Lift the Swing arm slowly for removal.



- Take out Swing arm from vehicle.



### ii. Swing Arm Installation Procedure

- a. Follow the reverse process for assembly.
- b. Apply a thin coat of grease to the swingarm pivot bolt sliding surface. (Grease Lima plex HTX3)
- c. **Pivot Nut Torque : 7.5 ~ 8.0 Kgf.m (M16 Thread Dia)**

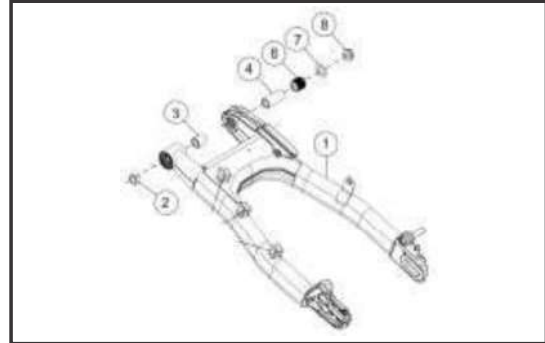
### iii. Safety Measures during Assembly process

- Torque Specifications: Follow the recommended torque specifications provided in the manual when tightening bolts and fasteners. Over-tightening or under-tightening can lead to issues with the swing arm's performance and safety.

- Alignment: Pay close attention to the alignment of the swing arm. It must be properly aligned with the frame and wheel to ensure stability and safe handling. Use any alignment marks or references provided in the manual.
- Secure Bolts: Double-check that all bolts and fasteners are securely tightened. Use a torque wrench to ensure proper torque levels. Loose bolts can lead to serious accidents.
- Check the tightening torque of pivot adjuster, it should be in specified range.

## 6. IMPORTANT POINTS DURING BEARING CHECKING & REPLACEMENT PROCESS

1. Swingarm subassembly
2. Bush Outer LH
3. Bush Inner LH
4. Bush RH
5. Swing arm pivot adjuster
6. Washer
7. Flange U Nut



- Check the swing arm visually before assembling it for any cracks / damages.



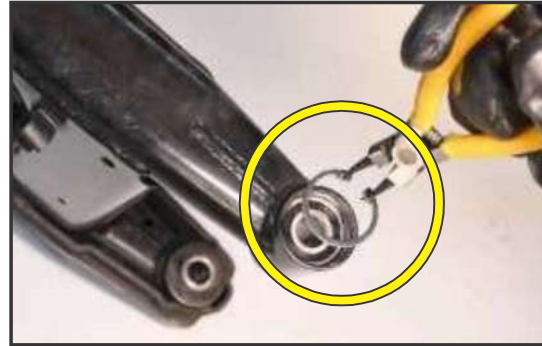
- Remove the RH Bush from Swingarm.



- Remove the LH Bush from Swingarm.
- Remove the Dust Seal from swingarm
- DUST SEAL (22x35x7) - outer

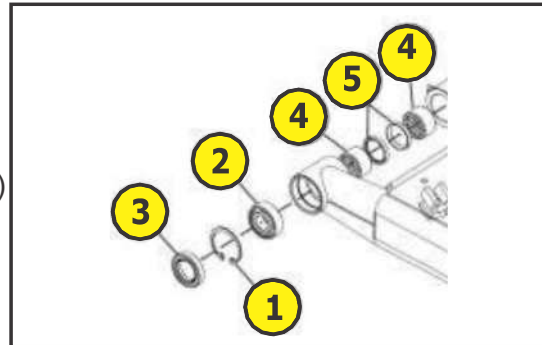


- Remove the internal CIRCLIP 35X1.5N I from swingarm



- **Sub parts in Swing Arm**

1. Internal Circlip 35X1.5N (TSF0602039)
2. Bearing 15X35X11 (62022RS1) (MH01850001000)
3. Dust Seal (22x35x7) (T18020UF0080N)
4. Shell Needle 2X28X16 (MH01850001300)
5. Dust Seal (CR20X28X4 HMSA10 V) (MH01620003400)



- **Special Tools for Swing Arm Bearing Assemblies :**

- a. Ball bearing pressing tool T14000Y50550N



- b. Needle bearing pressing T14000Y50560N



- Always use special tools for bearing fitment & use soft mallet.



### **Safety Measures during Assembly process**

- **Torque Specifications:** Follow the recommended torque specifications provided in the manual when tightening bolts and fasteners. Over-tightening or under-tightening can lead to issues with the swing arm's performance and safety.
- **Alignment:** Pay close attention to the alignment of the swing arm. It must be properly aligned with the frame and wheel to ensure stability and safe handling. Use any alignment marks or references provided in the manual.
- **Secure Bolts:** Double-check that all bolts and fasteners are securely tightened. Use a torque wrench to ensure proper torque levels. Loose bolts can lead to serious accidents.
- Check the tightening torque of pivot adjuster, it should be in specified range.

- 1. INTRODUCTION**
- 2. LOCATION OF PARTS**
- 3. DISASSEMBLY & ASSEMBLY OF FUEL FILTER**
- 4. DISASSEMBLY & ASSEMBLY OF FUEL PUMP**
- 5. DISASSEMBLY & ASSEMBLY OF FUEL GAUGE**
- 6. TROUBLESHOOTING**

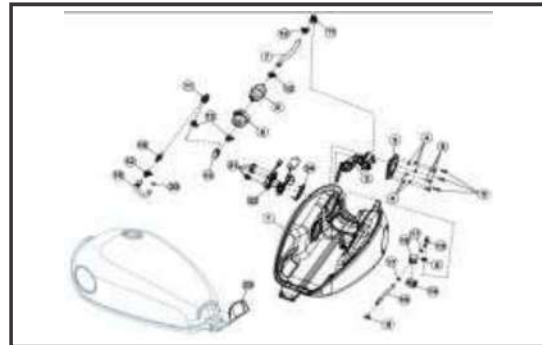
### 1. INTRODUCTION

The major components of fuel system are :

1. Fuel Tank & Fuel lines.
2. Fuel filter.
3. Fuel pump.
4. Fuel sensor / Fuel gauge.

### 2. LOCATION OF PARTS

- Fuel pump and Fuel gauge are located beneath the fuel tank assembly.
- Fuel Filter is located outside of the fuel tank assembly.



### NOTE

Before working on the fuel lines, fuel pump and fuel filter all the lines must be empty. No fuel supply should be there to these lines.

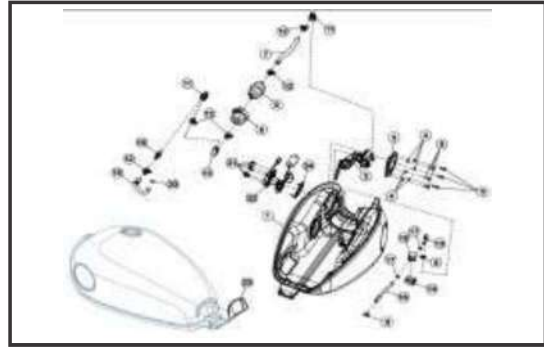
For removal of fuel tank assembly follow the procedure mentioned in fuel tank topic of this manual.

### 3. DISASSEMBLY OF FUEL FILTER

- For dismantling of fuel lines/fuel pump and fuel filter.
- Primarily the fuel tank assembly should be removed from the vehicle by disconnecting the fuel line supply, canister routing to fuel tank & fuel pump connector, Empty the fuel tank.
- Place the fuel tank sideways on thick cloth to avoid scratches.
  1. Disconnect the Elbow (Quick fuel Connector) 11 connected to the fuel pump (2).
  2. Disconnect the fuel hose connected to the fuel injector, by dislocating the spring clamp.
  3. Now the fuel filter assembly is independent from the fuel tank assembly (1).
  4. Separate the fuel filter (9) and elbow connector (11) from the fuel hose connected to pump and filter by removing both the spring band clamps (12).



5. Disconnect the hose (10) connected to filter by dislocating the spring band clamp (12).
6. Remove the support filter (8) mounted over the fuel filter (9).
7. Disconnect the elbow (11) by dislocating the clamp (12).
8. Remove the fuel hose connect (18) from elbow (11).
9. Disconnect the fuel hose (19) from fuel hose connector (18) by removing the clamp (12).



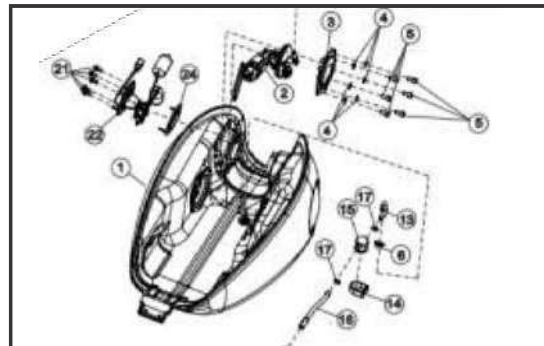
### 3.1 ASSEMBLY OF FUEL FILTER

1. Before assembly check the fuel hoses, filter and fuel filter of any damage and cracks. Replace if required.
2. Clean the fuel filter.
3. Check the entire spring band clamp for proper tension. Replace if required.
4. Assemble the fuel filter in the reverse order of removal.



### 4. DISASSEMBLY OF FUEL PUMP

- Remove the socket head screw (6 no's) (5) and washer (4) mounted on the inner wall of fuel tank that holds fuel pump.
- Remove the fuel pump mounting bracket. (3) and take out the fuel pump assembly (2) from the fuel tank assembly.

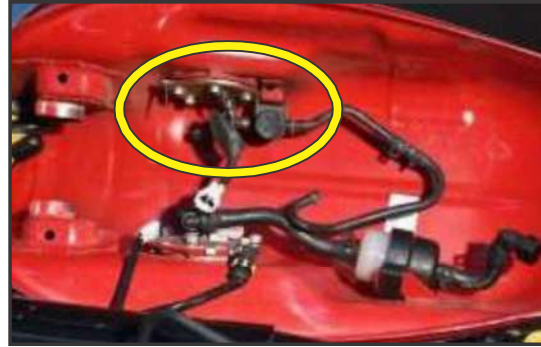


#### A. ASSEMBLY OF FUEL PUMP

- Clean the filter of the fuel pump thoroughly using petroleum.
- Assemble the fuel pump in the reverse order of removal.
- Tighten all the fasteners holding the fuel pump with the specified torque.

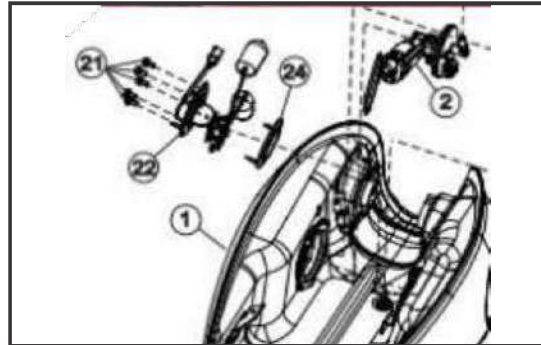
## 5. DISASSEMBLY OF FUEL GAUGE

- Remove the fuel gauge mounting bolts (21).
- Take out fuel gauge (22) slowly from the fuel tank assembly. Ensure that while removal of fuel gauges the level gauge wire does not get bend. Any deviation in the fuel gauge will shows the improper fuel level in the tank
- Remove the fuel gauge gasket (24) mounted on the inner wall of fuel tank assembly.



## B. ASSEMBLY OF FUEL GAUGE

- Check that fuel gauge is proper in function and wire is not bending.
- Fuel gauge is calibrated hence any modification is not recommended.
- Check the fuel gauge gasket for any cracks. Whenever opened always replace with new one.
- Assembly the fuel gauge in the reverse order of removal with specified tightening torque.
- Tightening torque to be applied crisscross pattern in two halves.



## 6. TROUBLESHOOTING

### i. Fuel Pump Troubleshooting:

#### A. Symptoms of a faulty fuel pump:

- Engine sputtering or stalling.
- Difficulty starting the motorcycle.
- Loss of power while riding.
- Unusual noises coming from the fuel pump.

#### B. Steps to troubleshoot the fuel pump:

##### a) Check the Fuel Pump Fuse:

Ensure the fuel pump fuse is intact. If it's blown, replace it with the correct amperage fuse.

**b) Listen for Fuel Pump Noise:**

Turn the ignition to the ON position without starting the engine. Listen for a buzzing or whirring noise from the fuel pump. If you don't hear anything, the fuel pump might be faulty.

**c) Check Fuel Pump Wiring:**

Inspect the wiring connections to the fuel pump. Ensure they are secure and free from damage.

**d) Fuel Pump Pressure Test:**

Perform a fuel pressure test to determine if the pump is delivering the correct fuel pressure to the engine. If the pressure is too low, the fuel pump may need replacement.

**e) Fuel Pump Replacement:**

If the fuel pump is determined to be faulty, you'll need to replace it. This typically involves removing the fuel tank and accessing the pump.

**ii. Fuel Filter Troubleshooting :**

**A. Symptoms of a clogged or faulty fuel filter :**

- Poor engine performance.
- Stalling or hesitation during acceleration.
- Difficulty starting the motorcycle.
- Reduced fuel efficiency.

**B. Steps to troubleshoot the fuel filter:**

**a) Inspect for Blockages :**

If the fuel filter is visible, inspect it for signs of clogs or blockages. A clogged filter can restrict fuel flow.

**b) Replace the Fuel Filter :**

If the fuel filter is clogged or dirty, replace it with a new one. It's a relatively simple procedure that involves removing the old filter and installing the new one.

**c) Check for Fuel Pressure:**

After replacing the filter, check for proper fuel pressure to ensure the issue has been resolved.

- 1. INTRODUCTION**
- 2. LOCATION**
- 3. TECHNICAL SPECIFICATION**
- 4. REMOVAL & ASSEMBLY**

## 1. INTRODUCTION

In fuel injected engines, the throttle body is the part of the air intake system that controls the amount of air flowing into the engine, in response to driver accelerator pedal input in the main.

### Throttle Body Location :

Throttle body is located in between the Air filter housing and inlet manifold. One end of the throttle body is connected to the Air filter housing box with the means of holding clamp and the other is connected to the inlet manifold.

### Maintenance :

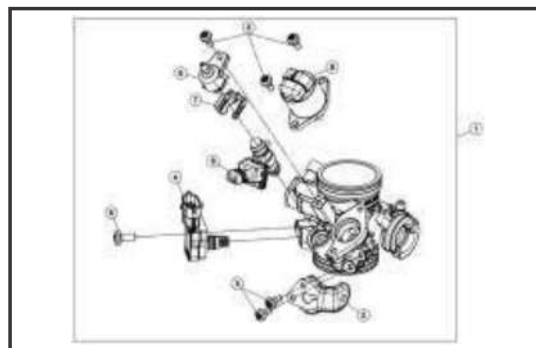
Regular maintenance of throttle body is crucial for the optimal performance of a BSA motorcycle. This includes regularly checking cleaning that removes the carbon suit deposited on the valve surface. Cleaning of throttle body must be done by recommended Throttle body cleaning agents and with any other non- genuine cleaners.

## 2. TECHNICAL SPECIFICATIONS

BSA is fitted with the throttle body diameter – 38 mm

### 2.1 PART IDENTIFICATION OF THROTTLE BODY

1. THROTTLE BODY ASSEMBLY
2. CABLE BRACKET
3. FASTNER-MTB
4. TMAP\_ECU\_C
5. FASTNER-TMAP
6. FUEL INJECTOR\_ECU C
7. FIXING INJECTOR CLIP
8. FUEL INJECTOR CAP
9. IACV ECU



## 3. DISMANTLING OF THROTTLE BODY ASSEMBLY

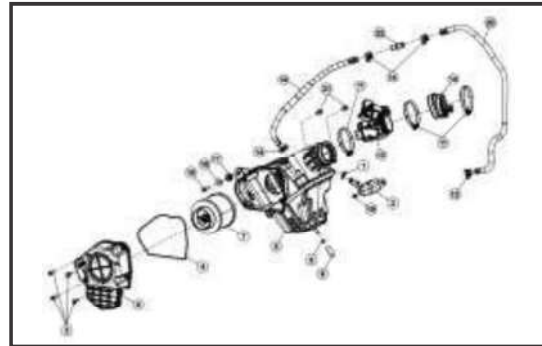
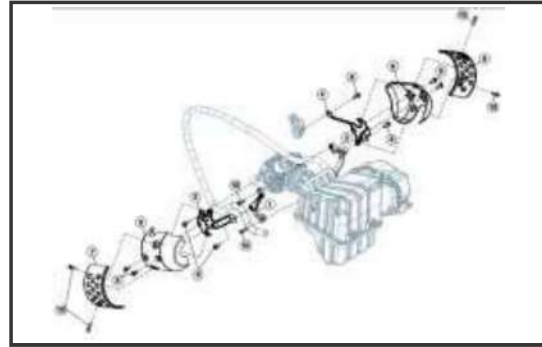


### NOTE

Throttle body assembly is calibrated with throttle body position sensor. Any type of adjustment in the position sensor is not recommended. Extra care needs to be taken while assembly and removal of throttle body assembly from vehicle.

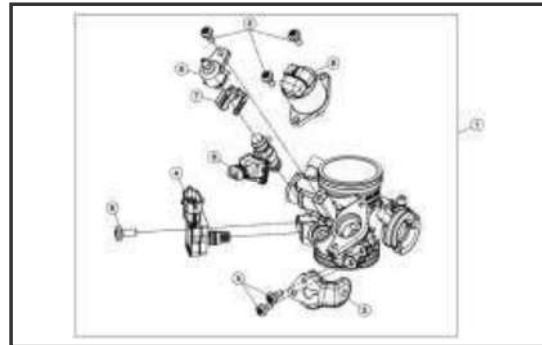
Before proceeding with the dismantling of throttle body assembly. Ensure that there is no supply of fuel in the fuel lines connected to the throttle body.

- Remove the socket screws (10) from both RH and LH side of the throttle cover. Take out the throttle body cover LH (7) and throttle body cover RH (8).
- Remove the flange bolts (9) from both RH and LH side of the throttle body cover. Take out the inner throttle body cover LH (5) and inner throttle body covers RH (6).
- Remove the flange bolts (9) from both RH and LH side of the throttle body cover bracket LH (3) and RH (4)
- Remove the holder throttle cover mounting LH and RH by unscrewing two socket screws (10).
- Loosen the special clamp screw (11) that hold the throttle body into air filter housing (5)
- Loosen the special clamp screw (11) that holds the throttle body into the inlet manifold (10).
- Disconnect the throttle cable from the cable notch of throttle body assembly.
- Take out the throttle body assembly (12)
- For child parts and its location of throttle body assembly refer the details mentioned in 2.1 section of this topic



### 3.1 ASSEMBLY OF THROTTLE BODY

- Clean the throttle body with the recommended throttle body cleaner
- Check the manifold for any holes/cracks. Replace if required.
- Check the holding clamps for proper tension and grip. Replace if required.
- Assemble the throttle body in the reverse order of removal.
- Connect the fuel lines supply.



- 1. GENERAL INFORMATION**
- 2. AIR CLEANER (FILTER ELEMENT)**
- 3. AIR CLEANER HOUSING AND DUCT**
- 4. TROUBLESHOOTING**

### 1. GENERAL INFORMATION:

BSA vehicle is fitted with dry paper filter. The air filter element should be serviced at regular intervals as per the maintenance schedule. Air filter element should be cleaned more often when riding in unusually wet or dusty areas.

Air induction system is located on the Right side of vehicle and is accessed by opening the RH side panel cover.

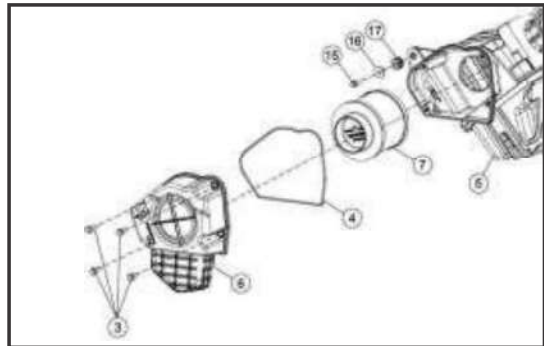
#### **NOTE**

BSA vehicle is equipped with a paper type air filter element. Do not apply any type of oil on it.

### 2. AIR CLEANER (FILTER ELEMENT)

#### 2.1 Removal and cleaning Air Cleaner.

- Place the vehicle on a firm level ground. / Ramp using a paddock stand.
- Remove the RH side box cover by pulling it outwards gently from its locks.
- Unscrew the 4 screws (3) using 8 mm socket and remove the air filter cover.
- Remove the gasket (4) located on the air filter cover.
- Takeout the filter element (7) from the air filter box.
- Tap the air filter and clean it by the means of compressed dry air, so that the dust comes out. If required install new air filter element.
- While installation, ensure the air filter element is installed properly in its location.



#### **NOTE**

If the air filter element needs to be replaced. Always use Genuine air filter element as per the specification.

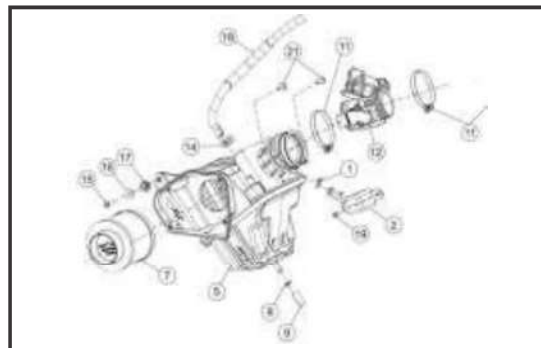
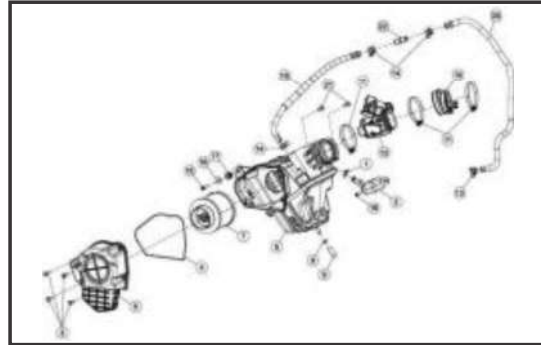
#### 2.2 Fitment of Air Cleaner.

- Install the air cleaner (7) and its associated parts in the reverse order of removal.

### 3. Air Cleaner Housing and Duct

#### 3.1 Dismantling of Air Cleaner Housing and Duct.

- Remove the air filter element from the induction box by following the steps given in section 2.
- Disconnect the air filter box assembly (5) from throttle body assembly (12) by losing the screw of the special clamp (11).
- Disconnect the air filter breather tube (18) by removing the spring band clamp (14) using pliers.
- Disconnect the air filter box assembly (5) from the resonator (2) located at the LH side of the vehicle by dislocating the tube clip (1) by the means of the pliers.
- For removal of filter box; unscrew hex bolt (15) from the RH side and two flange bolts (21) from the LH side.
- Remove the seat assembly from the vehicle.
- Take out the air filter box assembly (5) from its location.



#### 3.2 Fitment of Air Cleaner Housing and Duct.

- Inspect the air filter box assembly for any damage. Replace it if required.
- Inspect the inlet ducts, breather tubes for any damage. Replace them if required
- Inspect the holding clamps and tube clips for proper tension. Replace them if required.
- Install the air filter box assembly in the reverse order of removal.

### 4. TROUBLESHOOTING

Troubleshooting the air cleaner and duct system in a BSA motorcycle is important for maintaining proper engine performance and fuel efficiency. Here are some steps to help you diagnose and address common issues related to the air cleaner and ducts:

#### • Check for Air Filter Blockages :

- Remove the air cleaner cover and inspect the air filter element. If it's clogged with dirt or debris, clean or replace it as needed. A dirty air filter can restrict airflow to the engine, leading to decreased performance.

- **Examine the Air Cleaner Housing:**
  - Inspect the air cleaner housing for damage or cracks. Ensure that the housing is securely fastened and properly sealed to prevent unfiltered air from entering the engine.
  
- **Check for Duct Cracks or Leaks :**
  - Examine the air ducts and connections for any cracks or leaks. These can allow unfiltered air to enter the engine, potentially causing poor performance or damage.
  
- **Verify Proper Duct Connections :**
  - Ensure that all air ducts are properly connected and secure. Loose or disconnected ducts can lead to a loss of air pressure and decreased engine performance.
  
- **Inspect the Intake Manifold :**
  - Check the intake manifold for any damage or loose connections. The manifold connects the throttle body to the engine and plays a crucial role in delivering the air- fuel mixture.
  
- **Lubricate Duct Seals:**
  - Apply a thin layer of rubber-safe lubricant or silicone grease to the seals and connections to ensure proper sealing and to prevent air leaks.
  
- **Replace Damaged Components :**
  - If you find any damaged or worn-out air cleaner elements, ducts, or connections, replace them with OEM or high-quality aftermarket parts.
  
- **Inspect for Debris in the Ducts :**
  - Check for any foreign objects or debris inside the air ducts. Remove any obstructions to ensure a clear and unobstructed airflow path.

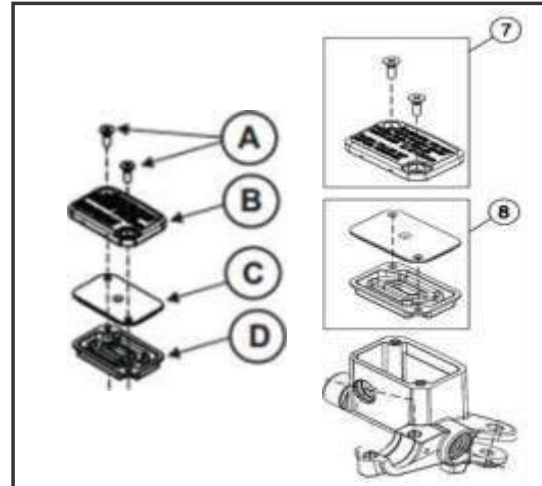
1. **FRONT DISC BRAKE BLEEDING**
2. **REAR DISC BRAKE BLEEDING**
3. **TROUBLESHOOTING**

### 1. GENERAL Tools and materials Needed :

- I. Brake fluid (recommended DOT 4)
- II. Brake bleeding kit (or a clean plastic hose)
- III. A small container to collect old brake fluid
- IV. Wrenches

### 2. FRONT DISC BRAKE BLEEDING

- Remove the screw to open reservoir cap (B)
- Remove the screws (A), reservoir cap (B), diaphragm plate (C) and diaphragm (D).

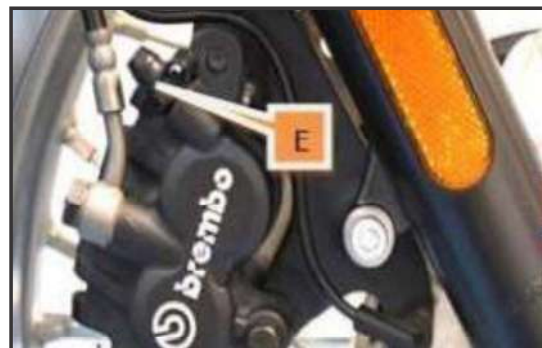


### NOTE

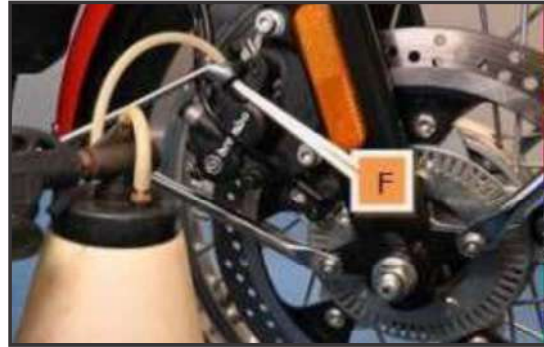
- Do not mix different types of fluid. Which are not compatible.
- Perform the bleeding procedure until the system is completely bleed.
- For the last refill fill the reservoir to the MAX level (NOT to the edge)
- Fill the reservoir with new brake fluid from a sealed container up to the edge.



- Remove the rubber cap (E) from the bleeder screw of the caliper,



- Insert the bleeder transparent hose (F) after the wrench.



- Loosen the bleeder screw (E) and keep it open, Press the front brake lever repeatedly until all the air from brake system comes out. Tighten the bleeder screw.



- Fill the reservoir with new brake fluid from a sealed container up to the edge. Press the front brake lever repeatedly again until all the air from brake system comes out.



- Move the front brake lever to half stroke and lock it in position using a cable tie.

- Loosen the bleeder screw and keep it open, Push the caliper against the disc until the pistons are completely inside the caliper.



- Press the front brake lever completely, close the bleeder screw and repeatedly press the front brake lever several times until pressure is recovered.
- Fill the master cylinder reservoir with DOT 4 brake fluid from a sealed container up to the edge.



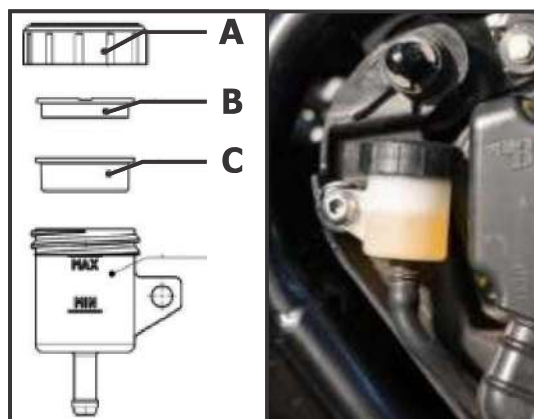
- Close the bleed valve and operate the brake lever. If it still feels spongy, bleed the system again. After tightening the system completely, tighten the bleed valve to the specified torque.
- Torque: 12 ~ 16 Nm.



- Wash reservoir cap, plastic diaphragm and rubber membrane with water and dry it completely with compressed air. Install the diaphragm, diaphragm plate and reservoir cap.
- Tighten the screws of reservoir cap with torque of 0.8 ~ 1.5 Nm

### 3. REAR DISC BRAKE BLEEDING

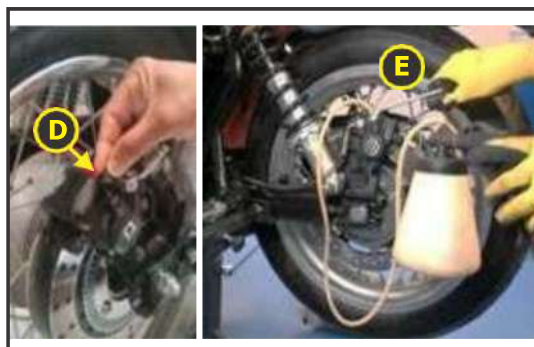
- Remove reservoir filler cap (A), plastic diaphragm (B) and rubber membrane (C)



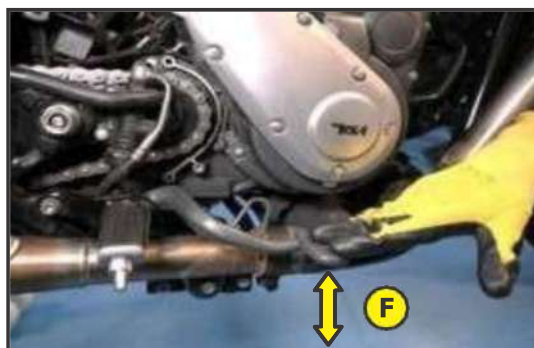
- Fill the reservoir with new brake fluid from a sealed container up to the edge.



- Remove the rubber cap (D) from the bleeder screw of the caliper, insert the bleeder transparent hose (E) after the wrench.



- Loosen the bleeder screw and keep it open, Pump the rear brake pedal (F) several times until all the air from brake system comes out.



- Fill the reservoir with new brake fluid from a sealed container up to the edge.
- Perform the bleeding procedure until the system is completely flushed/bleed. Tighten the bleeding screw.
- Torque: 12 ~ 16 Nm
- Loosen the bleeder screw and keep it open, Push the caliper against the disc until the pistons are completely inside the caliper.



- Press the pedal, Close the bleeder screw, and apply the pedal several times until pressure is recovered.
- Refill fill the reservoir to the MAX level (NOT to the edge)
- Wash filler cap, plastic diaphragm and rubber membrane with water and dry it



completely with compressed air. Close the reservoir. Secure the bleeder screw with the specified tightening torque, remove bleeder hose and wrench and clean the bleeder screw with water and compressed air. Set the rubber cap back to the bleeder screw.

#### 4. TROUBLESHOOTING

##### i. Spongy Brake Lever or Pedal:

- a. Issue:
  - If the brake lever or pedal feels spongy or has excessive travel, it indicates air in the brake system.
- b. Solution:
  - Re-bleed the brake system to remove all air bubbles. Follow the proper bleeding procedure carefully.
  - Check for leaks in the brake lines or caliper seals and repair or replace any damaged components.

##### ii. No Fluid Flow from Bleeder Valve:

- a. Issue:
  - When you open the bleeder valve, no brake fluid flows out.
- b. Solution:
  - Check the master cylinder reservoir to ensure it is properly filled with brake fluid. The reservoir should not run dry during the bleeding process.
  - Make sure the bleeder valve is fully open.
  - Verify that there are no blockages in the brake line or bleeder valve.

##### iii. Bleeder Valve Stripped or Damaged:

- a. Issue:
  - If the bleeder valve is stripped or damaged, it can be challenging to open or close.
- b. Solution:
  - Carefully remove the damaged bleeder valve and replace it with a new one. Ensure the replacement is of the correct size and type.
  - Use the appropriate tools and take care not to over-tighten the bleeder valve when installing it to prevent damage.

### **iv. Contaminated Brake Fluid :**

- a. Issue:
  - If the brake fluid appears dirty or contaminated, it can affect brake performance.
- b. Solution:
  - Perform a complete brake fluid flush by bleeding the entire system with fresh brake fluid.
  - Ensure that you use the correct type of brake fluid as specified in your motorcycle's owner's manual (usually DOT 4 for most motorcycles).

### **v. Inadequate Bleeding Sequence:**

- a. Issue:
  - If you don't follow the correct bleeding sequence, air may remain trapped in the system.
- b. Solution:
  - Follow the sequence precisely to ensure all calipers are bled properly.

### **vi. Leaking Brake Lines or Fittings:**

- a. Issue:
  - Leaks in the brake lines or at the connections can introduce air into the system.
- b. Solution:
  - Inspect all brake lines and fittings for signs of leaks. Tighten or replace any leaking components.

- 1. BRAKE PAD INSPECTION**
- 2. CHECKING**

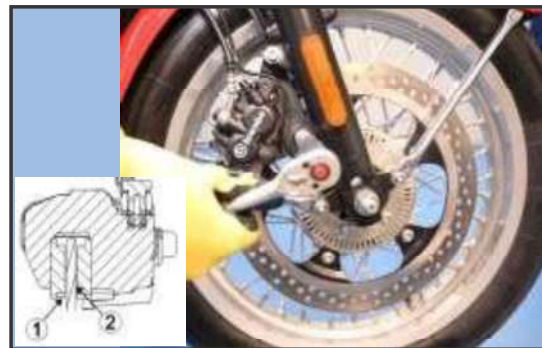
### 1. BRAKE PAD INSPECTION

- Check the brake pads for wear.
- Replace the brake pads if either pad is worn to the bottom of wear limit groove (1).
- Check the wear indicator grooves (1) in each pad.
- If the pad is worn to the bottom of the grooves, replace both pads as a set.



### 2. CHECKING AND MONITORING OF PAD & DISC WEAR

- The extent of brake pad wear can be checked by observing the groove limit on the pad.
- When wear exceeds the groove limit, replace it with new ones.
- Thickness should be more than 4.5 mm. Always replace the brake pad as a set, otherwise braking performance will be adversely affected.
- If disc thickness is less than above values, change the disc. Also check disc (2) for any damage, cracking, and deformation. If it shows the above defects, change the Disc.
- Check and clean brake pad at every service.
- Avoid the brake pad from oil contact.



- 1. DISASSEMBLY OF FRONT BRAKE CALIPER & PISTON**
- 2. DISASSEMBLY OF REAR BRAKE CALIPER & PISTON**

### 1. DISASSEMBLY OF FRONT BRAKE CALIPER & PISTON Removal of Front Brake pads from caliper

- Remove the 2 grub screws on the caliper body.
- Loosen and remove 2 socket headed pin screws from the caliper body.
- Remove the brake pad from Caliper Assembly.
- Remove Mounting Bracket from the Caliper Assembly.
- Remove the Pad tensioner spring plate from caliper.



### Removal of Piston & seals from caliper

- Remove the bellow & boot from the caliper assembly.
- Hold the caliper body with the pistons facing downwards.
- Blow low pressure compressed air with a nozzle into the oil passage hole on the caliper, to drive out the pistons from the caliper bores.
- Gently remove the seals from caliper using a blunt and soft tool.



### 2. DISASSEMBLY OF REAR BRAKE CALIPER & PISTON Removal of Rear Brake pads from wheel caliper

- Pull out the pivot pin from the inside of the caliper.
- Remove the brake pads from the caliper.
- Loosen and remove rear wheel axle nut.
- Pull out the pivot pin from the inside of the caliper.
- Separate the Mounting Bracket from the Caliper Assembly by gently pulling them apart.
- Remove the Pad tensioner spring plate from caliper and mounting bracket.



### **Removal of Piston & seals from caliper**

- Hold the caliper body with the piston facing downwards.
- Blow low pressure compressed air with a nozzle into the oil passage hole on the caliper, to drive out the piston from the caliper bore.
- Gently remove the piston with seal from caliper using a blunt and soft tool.

1. **General information**
2. **Header pipe & style shield**
3. **Muffler assembly**
4. **Catalytic converter**
5. **Troubleshooting**

### 1. General Information:

BSA vehicle is designed with single exhaust on RH side. The Exhaust system has a unique design and exhaust beat that carry the DNA of BSA motorcycles in it.

#### a. Features & Advantages:

- Unique exhaust beat that maintains DNA of BSA motorcycles.
- Increases the torque that improves the performance and ride quality.
- Enhances the rider feel to ride for a longer period without fatigue.
- Aesthetic appeal and rich look of the muffler



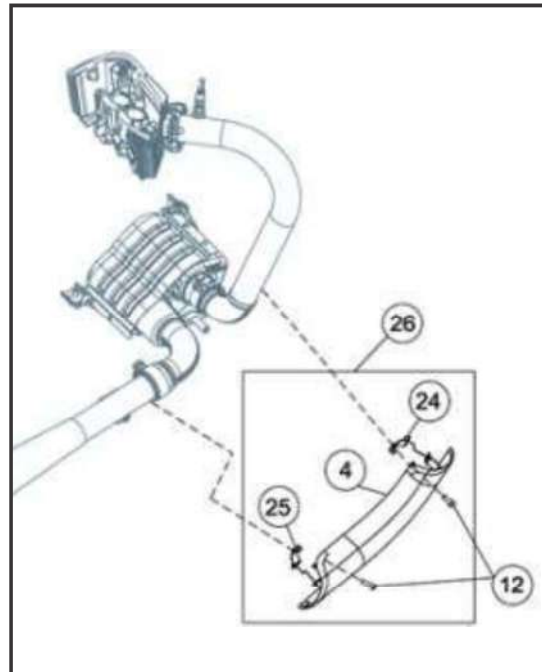
### 2. Header pipe and Style Shield

#### A. Dismantling of Style shield

- Place the vehicle on a firm level ground/ramp using a paddock stand.

#### **WARNING**

- Before dismantling any part of the exhaust system. Allow the vehicle to cool completely and settle it down. Working on the exhaust system when the vehicle is in extremely hot condition may cause burns and life-threatening incidents to operator.
- Remove two socket head screws (12)
- Unlock the top clamp (24) and bottom clamp (25) from their locking notch from the rear end of the style shield. Take out the style shield (4) and its mounting clamps.



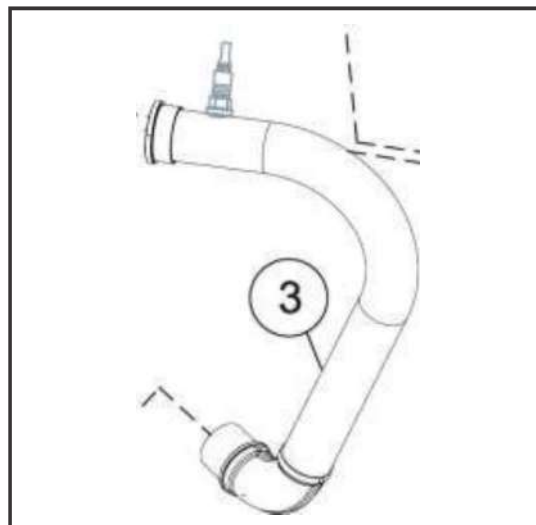
#### B. Assembling of Style shield – Follow the reverse procedure of dismantling.

#### C. Dismantling of Header pipe.

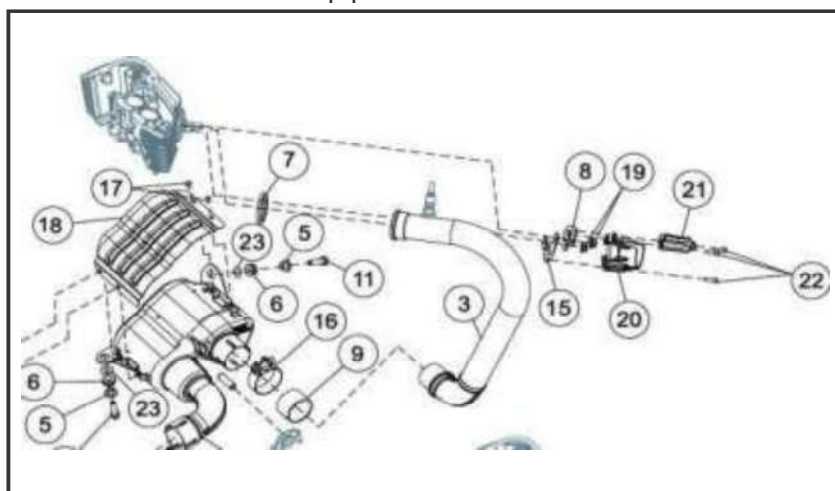
- Place the vehicle on a firm level ground / ramp using a paddock stand.

**! WARNING**

- Before dismantling any part of the exhaust system. Allow the vehicle to cool completely and settle it down. Working on the exhaust system when the vehicle is in extremely hot condition may cause burns and life- threatening incidents to operator.
- Remove the style shield by following the steps mentioned under section A
- Before dismantling header pipe, ensure the ignition key is in the off position in ignition switch.



- Disconnect the wiring harness connector of lambda sensor and remove the lambda sensor mounted on the header pipe.



**NOTE**

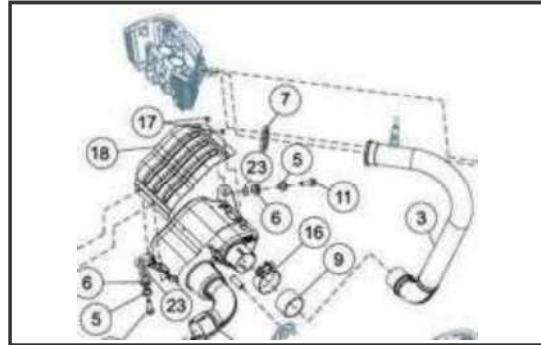
- While dismantling the lambda sensor ensure the tip of the lambda sensor doesn't get damage. As the sensor is the most sensitive part of the exhaust system.
- Unscrew the 3 head screws (22), take out the style cover bigger (20) and style cover smaller (21) from its location.
- Remove the 2 nuts M8 (19) and take out the exhaust flange top (8) and exhaust flange bottom (15).
- Loosen the screw of exhaust clamp (16) and gently pull the header pipe away from the vehicle.
- Take the header pipe from its mountings along with the exhaust gasket (7) and graphite gasket (9).

#### D. Assembling of Header pipe

- While assembling the header pipe. It is mandatory to replace the exhaust gasket (7) and graphite gasket (9) with the new ones.

#### NOTE

- While dismantling the header pipe both the gaskets; exhaust gasket and graphite gasket gets damage. As these gaskets are exposed to extremely high temp of exhaust gas. Ensure to use genuine gasket.
- Inspect the header pipe for any damage and rust formation of the outer surface. If required replace the header pipe with new one.
- Inspect the lambda sensor for any damage and carbon deposition on the tip of the sensor. If required clean the lambda sensor before assembling.
- Inspect the style shield covers for any cracks/damage. Replace if required.
- Inspect the wiring connector of lambda sensor for any damage and proper locking in its mating part.



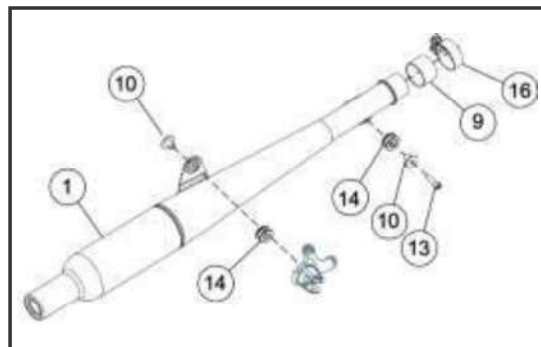
### 3. Muffler assembly

#### A. Dismantling of Muffler assembly

Place the vehicle on a firm level ground / ramp using a paddock stand.

#### WARNING

- Before dismantling any part of the exhaust system. Allow the vehicle to cool completely and settle it down. Working on the exhaust system when the vehicle is in extremely hot condition may cause burns and life-threatening incidents to operator.
- Remove the style shield mounted on the muffler. For removal follow the
- dismantling step mentioned in specified topic.



- Loosen the screw of exhaust clamp (16) and gently pull the header pipe away from the vehicle.
- Unscrew the socket head screw (13). Remove the sleeve (10) inserted in support grommet (14).
- Remove the RH side pillion footrest assembly. For removal follow the steps given in topic (--).
- Unscrew the socket head screw (-- ) from the footrest holder bracket.
- Firmly hold the muffler assembly (1) by the means of any support or hold it by hand and remove the sleeve and grommet mounted in the muffler bracket.
- Pull the muffler assembly (1) backwards and take it out carefully and place it in the clean and safe place.

 **NOTE**

While removal of muffler assembly ensures that there are no damage/scratches caused. After removal cover the muffler assembly with cloth / corrugated box to avoid damage/scratches.

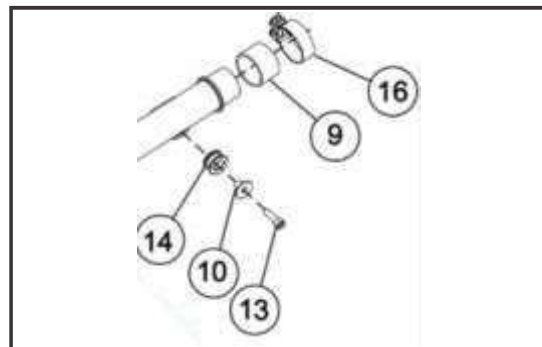
**B. Assembling of Muffler assembly**

While assembling the muffler assembly. It is mandatory to replace graphite gasket (9) with the new ones.

 **NOTE**

While dismantling the muffler assembly the graphite gasket gets damage. As this gasket is exposed to extremely high temp of exhaust gas. Ensure to use new genuine gasket.

- Inspect the exhaust clamp for any crack and rust formation. If required replace the clamp pipe with new one.
- Inspect the sleeve and grommet for any damage/crack. If required replace with the new one.
- Once all the inspection is done follow the reverse procedure of dismantling to assembly of muffler assembly.



#### 4. Catalytic Converter

##### A. Dismantling of Catalytic Converter assembly.

- For removal of catalytic converter assembly. First remove the style shield, header pipe assembly and muffler assembly by following the steps mentioned under section 2 & 3 of this topic.
- Remove the 2 hex bolt (11), Collar (5),
- grommet (6) and special washer (23) mounted on the frame assembly that holds the cat con box assembly (2).
- Firmly hold and take out the cat con assembly (2) away from the vehicle.
- Remove 4 screws (17) and take out heat protection shield (18) mounted on the cat con assembly.
- Loosen the screw of exhaust clamp (16) and gently pull the header pipe away from the vehicle.

##### **NOTE**

Catalytic converter is one of the major and critical components of the exhaust system. Extreme care needs to be taken while dismantling it. Ensure that there is no any damage occurred. Catalytic converter is non repairable part. If required needs to replace by a complete new genuine assembly.

##### B. Assembling of Catalytic Converter assembly.

- Inspect the Catalytic Converter assembly for any damage. If required with new one.
- Once all the inspection is done follow the reverse procedure of dismantling to assembly of Catalytic Converter assembly.

#### 5. TROUBLESHOOTING

Troubleshooting the exhaust system in a BSA motorcycle is important for ensuring proper performance and compliance with emissions regulations. Here's a step-by- step guide to help you identify and address common exhaust system issues:

##### i. **Listen for Unusual Sounds :**

Start your motorcycle and listen for any unusual noises coming from the exhaust system. This could include hissing, popping, or rattling sounds.

##### ii. **Check for Leaks :**

Leaks in the exhaust system can cause poor performance and noise. Look for visible cracks, holes, or loose connections in the pipes, mufflers, and joints.

##### iii. **Inspect the Exhaust Gaskets :**

Exhaust gaskets at the cylinder head and where the pipes connect to the mufflers can deteriorate over time. Check for signs of wear or leaks at these gasket locations.

**iv. Examine the Exhaust Pipes :**

Inspect the exhaust pipes for rust and corrosion. Surface rust can be normal, but deep corrosion can weaken the pipes and lead to leaks.

**v. Muffler Check :**

Check the muffler for damage, rust, or holes. Make sure it's securely mounted and hasn't come loose from its hangers.

**vi. Examine the Header and Collector Pipes:**

Inspect the header pipes that connect to the engine cylinders and the collector pipe that joins the header pipes. Make sure they are properly connected and undamaged.

**vii. Check for Loose or Missing Fasteners :**

Ensure that all nuts, bolts, and clamps in the exhaust system are properly tightened and in good condition. Loose fasteners can lead to leaks and rattling.

**viii. Address Exhaust Smoke :**

Excessive exhaust smoke (blue, white, or black) can be a sign of engine issues. If the smoke is not due to a simple cold start, it may require further investigation to determine the cause.

**ix. Exhaust Odor :**

If you notice a strong smell of exhaust fumes, it can be a sign of a leak or an overly rich fuel-air mixture. Address this issue promptly to avoid health and safety concerns.

1. **GENERAL GUIDELINES**
2. **RADIATOR**
3. **RADIATOR FLUSHING**
4. **TROUBLESHOOTING**

## 1. GENERAL GUIDELINES

### A. Introduction

When it comes to choosing the right coolant for your BSA motorcycle, like any other vehicle, it's essential to follow the recommendations and guidelines.

However, we will provide you some general guidelines for using MOTUL INUGEL EXPERT and CASTROL REDICOOOL HD (PREMIX) coolants in your BSA motorcycle.

**Coolant Change Interval:** Follow the recommended coolant change interval. Regularly check the coolant level and condition in the reservoir.

**Flush the Cooling System:** Before adding a new coolant, it's a good practice to flush the cooling system to remove any old coolant, debris, or contaminants. Flushing should be done following the recommended instructions.

**Bleeding the Cooling System:** After changing the coolant, ensure that you properly bleed the cooling system to remove any air bubbles. Air pockets can reduce cooling efficiency and lead to overheating.

**Maintenance Checks:** Periodically inspect the cooling system components, including hoses, radiator, and thermostat, for any signs of damage or wear. Replace any damaged parts promptly.

**Coolant Level:** Keep the coolant level within the recommended range. Avoid overfilling, as excessive coolant can lead to system pressure issues.

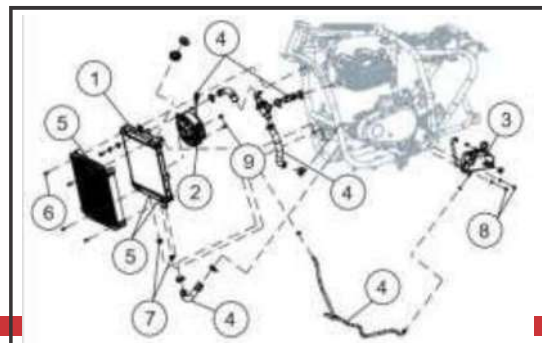
**Avoid Mixing Coolants:** It is generally not recommended to mix different types or brands of coolant. Stick with one type and brand to maintain consistency and effectiveness.

### NOTE

**Dispose of Old Coolant Properly:** When disposing of old coolant, follow local environmental regulations. Coolant is considered hazardous waste and should not be poured down drains or onto the ground.

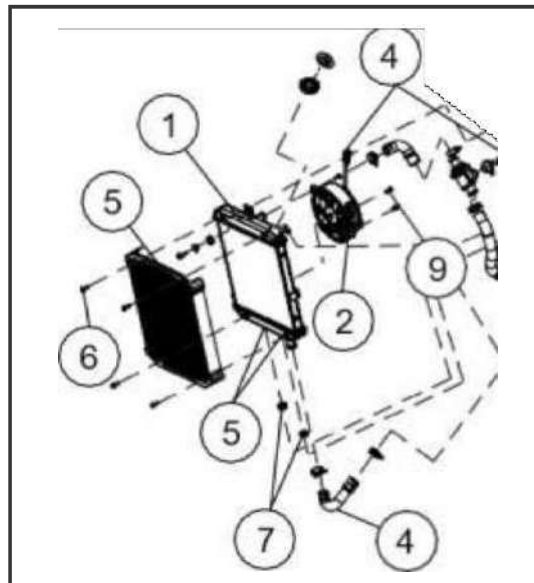
## 2. RADIATOR

- Basically, cooling system consist of three components, (1) Radiator, (2) Radiator Fan, (3) Reservoir tank / Expansion tank and Hoses.
- Remove the Hoses connected to the



Radiator to cooling tank, Radiator to Engine, Radiator to Thermostat hose, Bypass hose & Fan coupler (4).

- Loose the socket head screw of radiator grill (5) using 4 mm Allen key & take it out.
- Use 10 mm socket to remove grill mounting bolt (6) which fix the radiator to the frame.
- Firmly hold the radiator assembly, free it from grommet (7) which is placed on Frame bracket.
- Take out the radiator assembly.
- Remove radiator fan with removing flanged head bolt (9).
- Loose the collar & bolt (8) of expansion tank and remove it from frame.
- To install cooling system again, follow the reverse process.



#### NOTE

- Do not work on vehicle when the engine is hot condition, allow it cool down & settle. While reassembling ensures to check all the hose/clamps are not damage or cut. And are fitted properly in their position.

#### WARNING

- Never remove the radiator cap when engine is hot.
- Serious burns could occur from high pressure engine coolant escaping from the radiator.
- High Testing Pressure than specified values may damage radiator.
- In case of any damage, replace damaged parts.
- Be careful not to allow engine Coolant to contact peripheral parts.

### 3. COOLANT FLUSHING

- Flushing a radiator basically means taking the radiator outside and giving it a good clean by Flushing fresh water through it to get rid of any Junk.

#### NOTE

##### a. Flushing radiator is strongly recommended for the following reasons :

- It removes scale deposits and rust.
- Scale deposits and rust build up in a radiator overtime.
- Flushing helps to take out these deposits, which get washed out with the antifreeze.

##### b. BENEFITS OF RADIATOR FLUSH

- It removes all scale build-up and contaminants.
- It lubricates the water pump.
- It protects against future rust formation.
- It opens the opportunity to inspect the cooling system.
- Improve engine performance.

#### 4. TROUBLESHOOTING

i. Symptom 1: Overheating

Solution : Overheating can result from various issues. Start by checking the coolant level, radiator cap, and coolant mixture. Ensure the cooling system is properly bled of air. Inspect the radiator for blockages, clean the fins, and check the fan's operation. If the problem persists, it may be a faulty thermostat or radiator, which should be inspected and replaced as needed.

ii. Symptom 2 : Coolant Leak

Solution : A coolant leak can be caused by damaged hoses, loose connections, or a faulty radiator. Inspect all hoses and connections for leaks or damage. Tighten hose clamps as needed. If the radiator is leaking, it may require repair or replacement.

iii. Symptom 3 : Low Coolant Level

Solution : If the coolant level is consistently low, it's important to identify and fix the source of the leak. Thoroughly inspect the radiator, hoses, water pump, and connections for leaks. Replace any damaged components and top up the coolant with the appropriate mixture.

iv. Symptom 4 : Radiator Fan Not Working

Solution : A malfunctioning radiator fan can lead to overheating. Check the fan's electrical connections and fuses. Test the fan motor by applying direct voltage to it. If the fan still doesn't work, consider replacing the fan motor or the temperature sensor responsible for fan activation.

v. Symptom 5: Coolant Discoloration or Contamination

Solution: If the coolant appears discolored or contaminated, it may be time for a radiator flush and coolant replacement. Drain the old coolant, flush the radiator with water, and refill it with the recommended coolant mixture according to BSA specifications.

vi. Symptom 7: Persistent Air Bubbles in Cooling System

Solution: If you frequently notice air bubbles in the cooling system, it may indicate an issue with the cooling system's sealing or bleeding. Check for any loose or damaged gaskets, hoses, or connections. Properly bleed the cooling system to remove air pockets.

vii. Symptom 8 : Corroded or Damaged Radiator

Solution : If the radiator is visibly corroded or damaged, it may need to be replaced. Consult your BSA motorcycle's manual for the recommended radiator replacement procedure.

viii. Symptom 9: Rising Temperature During Idle

Solution: If the temperature rises significantly when the motorcycle is idling, it could indicate a weak or failing water pump. Have the water pump inspected and replaced if necessary.

ix. Symptom 10: Engine Misfiring or Poor Performance

Solution: In extreme cases, radiator issues can lead to engine overheating, causing performance problems or even engine damage. If you experience engine misfires or poor performance along with cooling system issues, it's crucial to address the cooling problem promptly to prevent engine damage.

 **NOTE**

**Regular Interval Checkpoints :**

**A. Visual Inspection :**

Start by visually inspecting the radiator for any obvious signs of damage, such as leaks, cracks, or bent fins. Look for coolant stains or puddles under the bike, which can indicate a leak.

**B. Check Coolant Level :**

Ensure that the coolant level in the radiator is at the appropriate level. Low coolant levels can lead to overheating. Top it off with the correct coolant if necessary.

**C. Inspect Hoses and Connections:**

Inspect the radiator hoses and their connections for any signs of damage, cracks, or leaks. Tighten hose clamps as needed.

1. **GENERAL INFORMATION**
2. **LOCATION OF THERMOSTAT VALVE**
3. **DISMANTLING & ASSEMBLY OF THERMOSTAT VALVE**

### 1. General Information:

Thermostat valve is the important part of the cooling system and play a vital role in the coolant circulation from engine to radiator.

The role of the thermostat is to control the flow of hot coolant through the radiator. The thermostat is integrated and mounted in between the engine and radiator.

#### Function of Thermostat Valve:

- Removes excess heat from the engine.
- Maintains a constant engine temperature.
- Regulates the flow of coolant from engine to radiator.

### 1. Location of Thermostat Valve

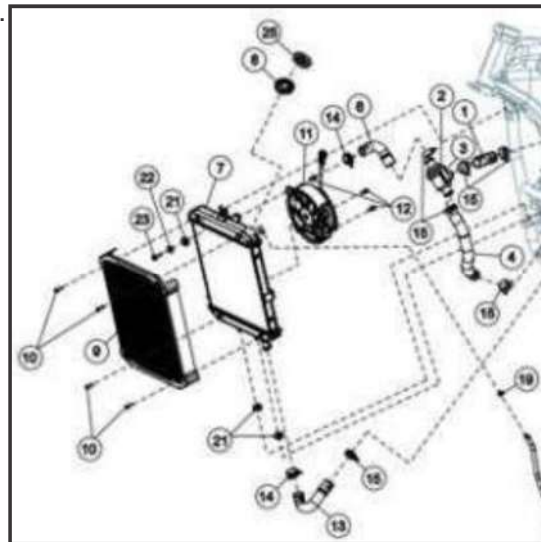
Thermostat valve is located in between the engine and radiator. One end of the thermostat is connected to the bypass hose (4) of the coolant. Where in the hot coolant is enters the thermostat valve and the other end is connected to the hose thermostat (6) from where the hot coolant enters the radiator for cooling.

### 2. Dismantling of Thermostat Valve

#### WARNING

Before dismantling any part of the cooling system. Allow the vehicle radiator to cool completely and settle it down. Working on the cooling system when the coolant is extremely hot condition may cause burns and life-threatening incidents to operator.

- Place the vehicle on a firm level ground.  
/ Ramp using a paddock stand.
- Allow the vehicle radiator to cool down completely.
- Drain the coolant lines completely before dismantling thermostat valve.
- For draining the coolant from hoses / coolant lines refer the topic
- Dislocate the spring band clamps (15) from both the ends of thermostat valve.



(2) using pliers.

- Remove the hoses; entry hose (1), bypass hose (4) and thermostat hose (6) from the thermostat.
- Take away the thermostat.

### 3.1 Assembling of thermostat Valve Before assembling

following point needs to be inspected:

- Check the functioning of the thermostat valve. If necessary, replace with the new one.
- Clean the thermostat thoroughly with coolant or water. Ensure that are no burse and dust particles accumulated in the valve body and spring.
- Check the hoses for any cuts/ damage. If required replace with the new one.
- Check the coolant leakage from coolant lines/ hoses
- Check the tension of spring band clamps. If required replace with the new one.
- For assembling follow the reversal procedure of dismantling.

#### **NOTE**

- Check the coolant level after the assembly of thermostat valve. Top up the coolant if required to the specified level. Coolant level must be maintained between MIN & MAX level in the coolant recovery tank. Low coolant level may cause engine heating issue and leads to engine seizure.
- After thermostat dismantling need to put coolant in radiator up to filler neck area.

### **3 Engine**

- 3.1 Engine removing**
  - 3.1.1 Engine compressor pressure checking**
  - 3.1.2 Spark plug**
  - 3.1.3 Shim setting**
  - 3.1.4 Engine oil draining**
  - 3.1.5 Oil filter replacement**
  - 3.1.6 Electrical coupler and sensor**
  - 3.1.7 Mounting bolts**
  
- 3.2 Cylinder head/valve/camshaft**
  - 3.2.1 Cylinder head cover & gasket**
  - 3.2.2 Oil filter cover & ignition timing**
  - 3.2.3 Camshaft & silent timing chain**
  - 3.2.4 Head assembly**
  - 3.2.5 Inlet & exhaust valve**
  
- 3.3 Block piston assembly**
  - 3.3.1 Block and piston assembly**
  - 3.3.2 Piston and rings**
  
- 3.4 Rotor assembly / starter clutch**
  - 3.4.1 Magneto cover**
  - 3.4.2 Stator plate and crank sensor**
  - 3.4.3 Starter motor and free wheel**
  - 3.4.4 Rotor assembly**
  
- 3.5 Clutch**
  - 3.5.1 Clutch cover**
  - 3.5.2 Oil pump**
  - 3.5.3 A & s clutch**
  - 3.5.4 Primary gear**
  
- 3.6 Crankcase / transmission / balancer**
  - 3.6.1 Crank case rh / lh**
  - 3.6.2 Crank shaft and balance**
  - 3.6.3 Transmission assembly**
  
- 3.7 Engine installation**
  - 3.7.1 Engine oil refilling & oil filter**

**3.7.2**      **Coolant refilling**

**3.7.3**      **Engine mounting**

1. **INTRODUCTION**
2. **PRESSURE CHECKING**
3. **TROUBLESHOOTING**

### 1. INTRODUCTION

Compression pressure is essential in BSA motorcycle engine, for several critical reasons :

**Engine Efficiency** : Compression pressure plays a vital role in the combustion process. It determines how effectively the air-fuel mixture is compressed within the engine's cylinders before ignition. Proper compression ensures efficient combustion, which is essential for generating power and torque.

**Power Output** : Adequate compression pressure is necessary to produce the required power output. Low compression can lead to reduced engine performance, resulting in sluggish acceleration and reduced top speed.

**Fuel Efficiency** : Engines with correct compression ratios tend to be more fuel- efficient. Proper compression ensures that the air-fuel mixture is burned efficiently, which can lead to better fuel economy.

**Emissions** : A well-compressed air-fuel mixture burns more cleanly, leading to lower emissions of harmful pollutants. This is important for both environmental reasons and to meet emissions regulations.

**Engine Longevity** : Maintaining the correct compression pressure is crucial for the longevity of the engine. Low compression can cause overheating, increased wear and tear, and potential damage to engine components.

**Diagnostic Tool** : Compression pressure testing is a valuable diagnostic tool. It can help identify various engine issues, such as worn piston rings, cylinder head gasket leaks, valve problems, or cylinder wear. Detecting these issues early can prevent more significant problems and costly repairs in the future.

**Performance Assessment** : Periodically checking compression pressure allows you to assess the overall health of the engine. If the compression pressure is within the specified range, it indicates that the engine is in good condition. If it falls outside of that range, it signals potential problems that need to be addressed.

### 2. PRESSURE CHECKING

To check the compression pressure in a BSA motorcycle you'll need a compression tester tool.

### i. Gather Necessary Tools and Materials :

- Compression tester kit
- Wrenches and sockets

### ii. Prepare the Motorcycle :

- Ensure the motorcycle is on a level surface and the engine is at operating temperature.
- Remove the spark plug(s) from the cylinder head(s).



### iii. Connect the Compression Tester :

- Screw the compression tester into the spark plug hole of the cylinder you want to test. Hand tighten it securely.



### iv. Disable Ignition :

- Disable the ignition system to prevent the engine from starting while testing. You can do this by disconnecting the ignition coil.

### v. Crank the Engine :

- Crank the engine several times using the electric starter. This will build up compression in the cylinder.

### vi. Read the Gauge:

- Observe the compression tester gauge. It should show the compression pressure in PSI (pounds per square inch) or kPa (kilopascals). Note the reading.  
Specification: Upto 6~7 Bar



### vii. Reassemble:

- After completing the compression test, reattach the spark plug(s) and ignition components if disconnected.

### 3. TROUBLESHOOTING

#### i. Analyze the Results :

- If the compression pressure falls within the specified range for your motorcycle, it indicates that the engine compression is healthy.
- If the compression pressure is significantly lower than the specified range, it may indicate engine problems such as worn piston rings, cylinder walls, or valves.

#### ii. Check Spark Plug Condition :

- Inspect the spark plug(s) you removed during the test. If the spark plug is fouled or damaged, it can affect compression readings. Replace any worn or damaged spark plugs with the correct type and gap.

#### iii. Wet Compression Test :

- If you suspect an issue with piston rings, you can perform a wet compression test. This involves adding a small amount of oil (about a teaspoon) into the cylinder through the spark plug hole and retesting the compression. If the compression significantly improves after the wet test, it suggests that the issue may be related to worn piston rings.

#### iv. Inspect Valves and Valve Seals:

- Compression problems can also be caused by issues with the valves or valve seals. Check for proper valve clearance and make sure the valves are sealing correctly. Replace worn valve seals if necessary.

#### v. Check for Leaks:

- Inspect the engine for any visible signs of oil or coolant leaks. Leaks in the cylinder head gasket or other areas can result in reduced compression.

#### vi. Inspect Timing and Camshaft:

- Timing issues or a malfunctioning camshaft can affect compression. Ensure that the timing marks are aligned correctly, and that the camshaft is in good condition.

#### vii. Cylinder Bore and Piston Condition:

- If none of the above steps resolve the compression issue, it may be necessary to inspect the cylinder bore and piston. If there is significant wear or damage to these components, they may need to be replaced.



#### NOTE

Remember that compression testing is just one aspect of diagnosing engine problems. If you are experiencing performance issues or suspect engine problems, it's best to practice performing a more comprehensive assessment and address any issues that may be present.

1. **INTRODUCTION**
2. **LOCATION**
3. **REMOVAL & ASSEMBLY**
4. **TROUBLESHOOTING**

## 1. INTRODUCTION

Spark plugs are a critical component in the ignition system of any internal combustion engine. BSA is designed with twin spark plugs.

1. Primary Spark Plug
2. Secondary Spark Plug

Here's an introduction to spark plugs in BSA motorcycles:

### **Purpose of Spark Plugs :**

Spark plugs are essential for the ignition process in an internal combustion engine. They create the spark needed to ignite the air-fuel mixture in the engine's combustion chamber, initiating the power stroke that drives the motorcycle forward.

### **Spark Plug Location :**

In BSA motorcycles, the spark plug is typically located at the top of the engine's cylinder head.

### **Maintenance :**

Proper maintenance of spark plugs is crucial for the optimal performance of a BSA motorcycle. This includes regularly checking and adjusting the spark plug gap, cleaning, or replacing them as needed, and ensuring they are properly torqued when installed.

### **Gap Adjustment :**

The spark plug gap, which is the distance between the center and ground electrode, needs to be checked correctly according to the manufacturer's specifications. This gap affects the spark's intensity and timing, which, in turn, influences the engine's performance and efficiency.

## 2. LOCATION IN VEHICLE

BSA is designed with twin spark plugs.

1. Primary Spark Plug
2. Secondary Spark Plug



## 3. REMOVAL & ASSEMBLY

### **NOTE**

Clean around the spark plug base with compressed air before removing the spark plug and be sure that no debris is allowed to enter the combustion chamber.

- Initially, Remove the spark plug cap (1) by hand.

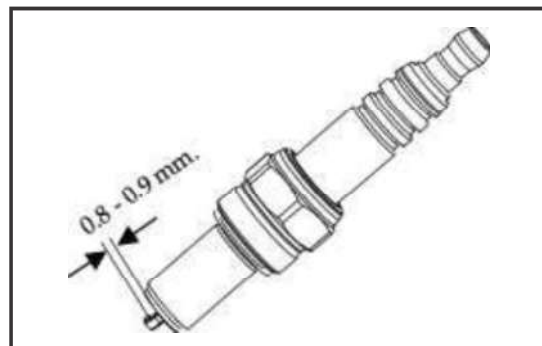


- Use Special tool to remove spark plug (2), After loosening use spark plug suppressor cap to take it out from cylinder head.



- Ensure that spark plug grade is as per given specifications i.e. RA7YC
- Follow the same process for secondary spark plug.

- Clean the insulator tip and electrodes of the plug, carefully using pointed scraper or spark plug cleaner.



- Check the gap between the center and side electrodes with a wire type feeler gauge.

**Check the gap 0.8 - 0.9 mm.**

**! WARNING**

Do not adjust the spark plug gap. if the gap is out of specifications, Replace it with a new one.

- Refit the spark plugs primary & secondary connections are fitted properly.
- While replacing hand tight the sparkplug first & tighten it with **torque 20(19-21) Nm.**
- Do not overtight the Spark plug.
- Ensure spark plug suppressor cap gets locked properly.



#### 4. TROUBLESHOOTING

##### Symptoms of Spark Plug :

- Engine misfires or hesitation during acceleration.
- Rough idling or poor engine performance.
- Reduced fuel efficiency.
- Difficulty starting the motorcycle.
- Unusual engine noise, such as knocking or pinging.

##### Action :

Inspect Spark Plug Condition : Visually inspect the spark plugs regularly to check for signs of wear, fouling, or damage. Look for the following:

**Fouling** : If the spark plug's electrodes are covered in black soot or oil deposits, it may indicate a rich fuel mixture or an oil leak. Clean or replace fouled plugs as needed.

**Wear and Tear** : Check for signs of erosion or damage to the spark plug's electrodes. Damaged or excessively worn plugs should be replaced.

**Gap** : Ensure that the spark plug gap (the distance between the center and ground electrode) is within the manufacturer's specified range.



##### **NOTE**

Spark plugs have a finite lifespan and should be replaced at the intervals specified in BSA maintenance schedule or the spark plug manufacturer's recommendations. Even if they appear visually fine, they can degrade over time and affect engine performance.

1. GENERAL INFORMATION
2. SHIM SETTING PROCESS
3. VALVE CLEARANCE SETTING
4. REASSEMBLY PROCESS
5. TROUBLESHOOTING

## 1. GENERAL INFORMATION

### A. Introduction

A "shim setting" typically refers to the adjustment of the valve clearances using shims or tappet shims. Valve clearances are the small gaps between the camshaft lobes and the valve lifters (tappets) in the engine. It's important to maintain the correct valve clearances to ensure the engine runs smoothly and efficiently.

Here's how it generally works:

1. **Valve Clearances:** Over time, the valve clearances can change due to wear and tear. This can result in poor engine performance and increased valve noise.
2. **Shims:** Shims are thin, precisely machined pieces of metal that come in various thicknesses. They are placed between the camshaft and the valve lifter (tappet) to adjust the valve clearance.
3. **Adjustment:** To adjust the valve clearance, measure the current clearance using a feeler gauge.
4. **Replacement:** If necessary, the shims may need to be replaced with new ones of the appropriate thickness to achieve the correct valve clearance.
5. **Reassembly:** Once the correct valve clearances are achieved, the engine components are reassembled, and the motorcycle is ready to run smoothly.

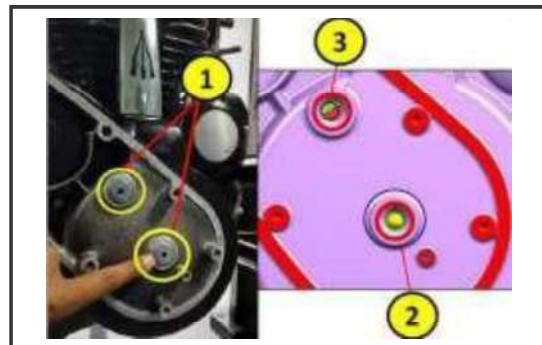
### NOTE

It is essential to follow the BSA guidelines and specifications when adjusting valve clearances. Incorrect valve clearance can lead to poor engine performance, excessive valve wear, and other problems.

## 2. Shim setting process

### STEP 1

- Remove both gauge inspection cover.
- (1) with the help of 4 mm Allen key.
- Use an Allen key of 8mm to turn the crankshaft clockwise to set the TDC position (2).
- Rotate crankshaft (3) till the punch mark on Magneto cover & magneto get aligned as shown.



**STEP 2**

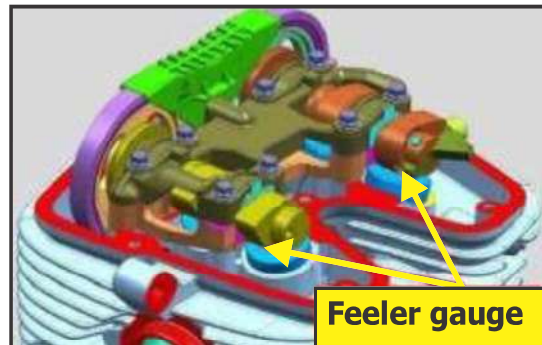
- Remove 7 bolts (4). Lift the cover up and remove cylinder head cover with gasket.

**STEP 3**

- Ensure the mark on both the cam sprocket & cam lobe (5) is aligned properly as shown in images.
- Ensure the TDC mark on the magneto cover & magneto is also aligned.

**STEP 4**

- Insert the feeler gauge in between the camshaft & valve lifter bucket as shown in picture & measure the clearance for all the four valves.
- Ensure all the valves clearance within the specification.



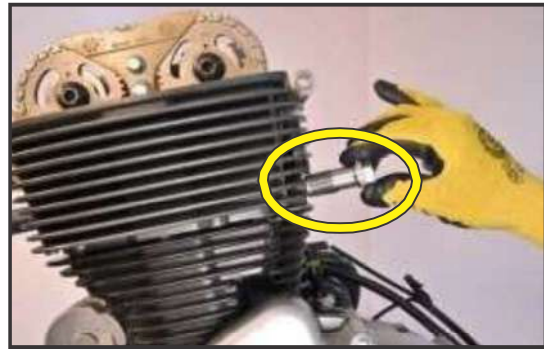
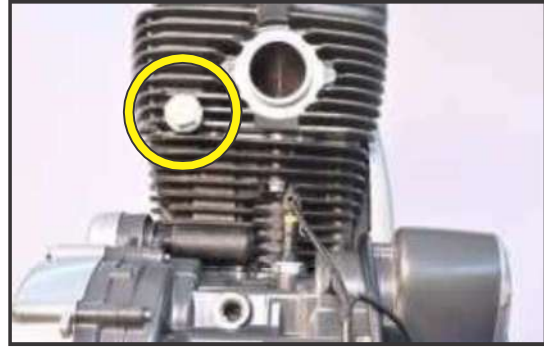
**Specification - IN SIDE 0.1 -0.150 mm & EX SIDE 0.250 – 0.3 mm**

**NOTE**

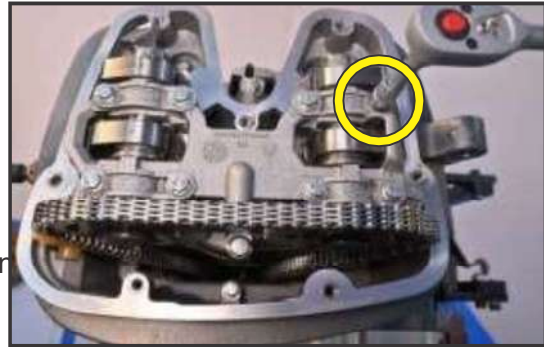
- If clearances are not as per the specification, note down the clearance & set it accordingly as shown in subsequent slides.
- Shim setting & Valve clearance checking should be done in engine cold condition.

#### STEP 5

- Loose the Hydraulic chain tensioner.



- Put the camshaft holder assembly aside by removing all the 8 bolts. Need to remove upper chain guide & bolts.



**NOTE**

Follow the camshaft holder bolt opening sequence from camshaft topic.

- Remove valve lifter bucket and measure thickness of shims with micrometer and note down dimension.
- Replace the shim in each valve to bring the clearance within specification with the help of filler gauge thickness measured earlier.



### 3. VALVE CLEARANCE SETTING:

- Follow the same process for all valves.
- Put the cam in its position & check the TDC mark alignment on sprocket (As shared in earlier slide).
- Put the cam holder, tight all the bolts with 11(9-12) Nm torque & assemble the chain tensioner. Check TDC mark.
- Check the valve clearance again.
- If valve clearance is not set properly repeat the same process to adjust the clearance.

### 4. REASSEMBLY PROCESS:

- After tightening the cam holder with 11(9-12) Nm torque put the cylinder head top cover.
- Ensure the cover is fitted properly in the cylinder head cover rubber gasket.
- Clean rubber gasket sealing surface & apply specified sealant on rubber gasket.
- Tight the cylinder head cover special bolt with 11(9-12) Nm torque.
- Tight the tensioner screw with 44(40 -48) Nm torque.
- Assemble all the vehicle parts & refer the vehicle torque table as per given specification for tightening the bolts.
- After starting the vehicle ensure there is no abnormal noise or leakages from the engine.



### NOTE

- If clearances are not as per the specification, note down the clearance & set it accordingly as shown in subsequent slides.
- Shim setting & Valve clearance checking should be done in engine cold condition.

### 5. TROUBLESHOOTING

Troubleshooting during shim setting, specifically for adjusting valve clearances in a motorcycle engine, can help ensure that the process is done correctly. Here are some common issues and troubleshooting steps for shim setting:

#### i. Inaccurate Valve Clearance Measurement:

- a. Issue: If the initial valve clearance measurement is inaccurate, it can lead to incorrect adjustments.
- b. Troubleshooting: Double-check your feeler gauge measurements for accuracy.

#### ii. Incorrect Shims Installed:

- a. Issue: Using the wrong thickness of shims can result in incorrect valve clearances.
- b. Troubleshooting: Confirm that you have the correct shims for your motorcycle's engine. Double-check the shim thickness by measuring it with a micrometer.

**iii. Difficulty in Removing or Installing Shims :**

- a. Issue: Shims can sometimes be difficult to remove or install due to tight clearances or other factors.
- b. Troubleshooting: Lubricate the shims and the tappet surfaces with engine oil to ease installation and removal. Use a magnetic tool to handle and position shims if available.

**iv. Valve Noise or Poor Engine Performance After Adjustment :**

- a. Issue: If the valve clearances are still not correct after adjustment, you may experience valve noise or poor engine performance.
- b. Troubleshooting: Recheck the valve clearances to ensure they are within the BSA's specifications. Make sure all components are properly reassembled and torqued to the correct values.

**NOTE**

It's possible that further inspection of the valve train, camshaft, or tappets may be needed if issues persist.

**v. Uneven Valve Clearances:**

- a. Issue: Valve clearances on one side of the engine are different from the other.
- b. Troubleshooting: Check for any discrepancies in the camshaft or tappet installation. Make sure you are adjusting the correct valves, as some engines have different intake and exhaust valve clearances. Verify that the engine is at the top dead center (TDC) for the cylinder you are working on.

**vi. Damaged Shims or Components:**

- a. Issue: Shims or other engine components are damaged during the adjustment process.
- b. Troubleshooting: Inspect shims and components for any signs of damage. Replace damaged shims or parts as needed.

**vii. Valve Clearances Drifting Out of Spec Over Time:**

- a. Issue: The valve clearances may drift out of spec after a period of use.
- b. Troubleshooting: Regularly monitor and maintain valve clearances as part of routine maintenance. If the clearances keep changing rapidly, there may be underlying issues with the valve train, such as worn cam lobes, tappets, or valve seats. In such cases, a more comprehensive inspection may be necessary.

**WARNING**

Shim setting is a critical engine adjustment, and precision is essential to ensure the engine runs smoothly and efficiently.

- 1. GENERAL GUIDELINES**
- 2. ENGINE OIL LEVEL**
- 3. ENGINE OIL REPLACEMENT**
- 4. ENGINE OIL FILTER REPLACEMENT**
- 5. TROUBLESHOOTING**

#### 1. General Guidelines:

- **Viscosity Rating (SAE Grade) :**

The first thing to consider is the viscosity of the oil, typically represented by the SAE (Society of Automotive Engineers) grade. Common SAE grades for motorcycle engines include 10W-40, 15W-50, and 20W-50.

The "W" stands for winter, and it indicates the oil's flow characteristics at colder temperatures. The lower the W number, the better the oil flows in cold weather.

The second number represents the oil's viscosity at operating temperature. Higher numbers indicate thicker oil, which is better for high-temperature conditions.

- **Oil Type & Specifications :**

- i. MOTUL H-TECH 100 4T 10W 50 / CASTROL - 10W50 JASO MA-2

- ii. SAE 10W50 fully synthetic motorcycle engine oil that meets JASO- MA2 and API-SL (or Higher) specification

- **Oil Capacity :** Be sure to use the correct oil capacity specified in your owner's manual. Overfilling or underfilling can lead to engine problems.

- **Oil Change Interval :** Follow the recommended oil change interval in your owner's & Workshop manual.

- **Oil Filter :** Make sure to change it at the same time you change the oil. Refer to BSA part Catalogue for the correct filter type.

- **Environmental Considerations :** Dispose of used oil responsibly by taking it to a recycling center or an auto parts store that accepts used oil. Do not dump used oil into the environment.

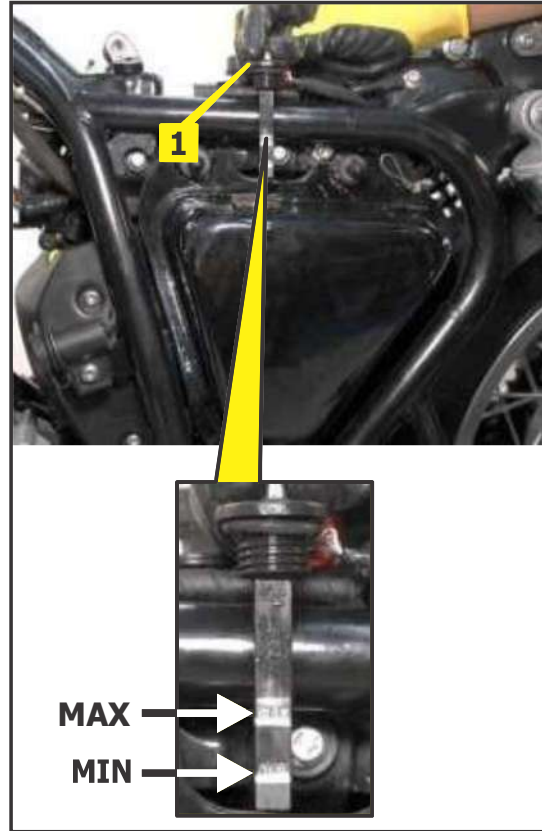
#### Tools and Materials Needed :

- Oil filter (if applicable) & Oil Drain pan
- Funnel
- Paper Towel
- Paddock stand
- Appropriate size wrenches or socket set

## 2. Engine Oil Level

### i. Engine Oil Level Inspection

- Place the vehicle on paddock firmly on level surface.
- Start the engine and let it idle for 3 - 5 Minutes.
- Stop the engine & wait for 2 - 3 minutes.
- Remove the dipstick (1) and wipe it clean.
- Insert the dipstick until it seats, but do not screw it in. Check the oil levels between the upper and lower-level lines.
- If the level is below the lower-level line (2), remove the oil filler cap (4) and fill the recommended oil up to the upper-level line (3)
- Check that the O-rings of the oil filler cap & dipstick are in good condition, replace them if necessary.
- Apply engine oil to the O-rings.
- Install the oil filler cap & dipstick.



### • RECOMMENDED ENGINE OIL:

- MOTUL H-TECH 100 4T 10W 50 / CASTROL - 10W50 JASO MA-2
- SAE 10W50 fully synthetic motorcycle engine oil that meets JASO- MA2 and API-SL (or Higher) specification.

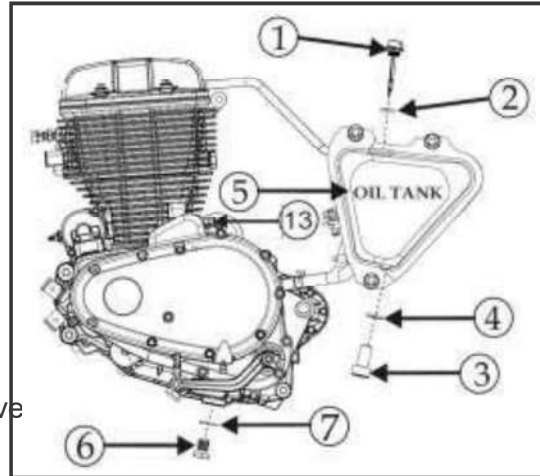


ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After Draining	2.3 liters	First oil change at 1st Servicing (500 Miles)
	After oil filter change	2.35 liters	Subsequent Oil Change interval is at every 3500 miles
	After disassembly	2.5 liters	Subsequent Oil Change Interval is at every 3500 Miles
Recommended Engine Oil :-	MOTUL H-TECH 100 4T 10W 50 CASTROL 10W50 4T JASO MA-2 [SAE 10W50 fully synthetic motorcycle engine oil that meets JASO-MA2 and API-SL (or Higher) specification]		

#### 3. ENGINE OIL REPLACEMENT

Engine oil needs to be drain from two different location

- One is from the engine oil reservoir tank and another from the engine sump as shown in the figure.
- (3 - Drain Bolt & 6 – Drain Plug as shown in figure)



- |                       |                        |
|-----------------------|------------------------|
| (1) Oil Dip Stick     | (2) O-ring             |
| (3) Drain bolt        | (4) Sealing washer     |
| (5) Oil tank          | (6) Drain Plug         |
| (7) Sealing Washer    | (8) Cap Magneto Cover  |
| (9) Oil filter holder | (10) O-ring oil filter |
| (11) Oil filter       | (12) Bolts             |
| (13) Banjo bolt       | (14) Oil filter holder |

- Place the vehicle on paddock firmly on level surface.
- Start the engine and warm up for 2 minutes.
- Stop the engine, wait for 2 - 3 min for oil to settle down and then drain oil.
- Use a clean tray / jar to collect the used oil.
- To Drain the oil from the oil reservoir tank, remove the oil filler cap / Oil dip stick (1) & drain bolt (3) along with the sealing washer (4).



- To drain the oil from the engine sump, remove the drain plug (6) along with the sealing washer (7).



- Check that the sealing washer (7) is in good condition.
- Check & change the washer (7) if it is necessary during the oil change process.



- Initially take the Approximately - 1700 ml oil



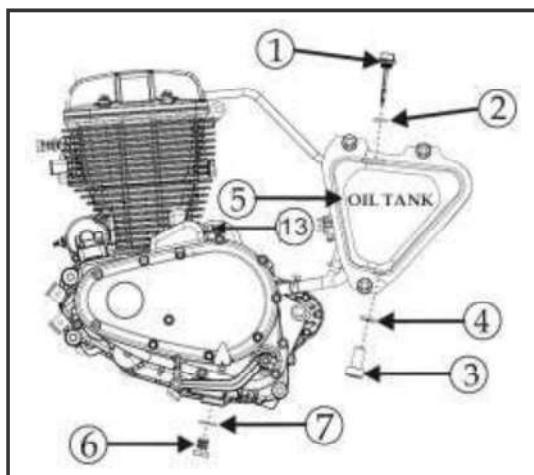
- Fill the oil in the oil reservoir tank with and install the oil dip stick / oil filler cap.



- Do cranking (remove the ignition cable from both spark plugs) and check oil from oil filter holder location (14). Once oil starts coming out, assemble oil filter holder and other parts in reverse order.



- If the oil doesn't come out from oil filter area after filling the oil, Bleeding needs to be carried out from banjo bolt (13). Once the oil is coming out from the banjo bolt, tighten the banjo bolt with specified torque.



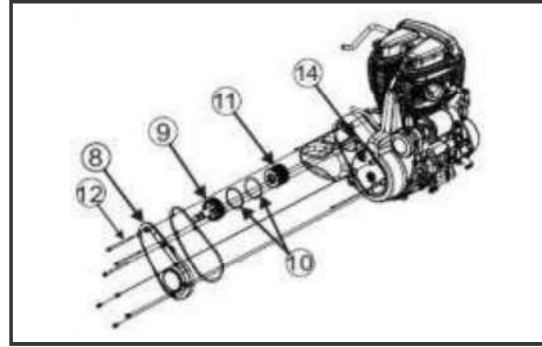
- Start the engine and let it run for a 3 to 5 minutes to circulate the oil
- Turn off the engine and allow it to sit for a minute.
- Shut off the engine and refill the oil reservoir tank again with 600 ml and install the oil dip stick/oil filler cap, (Total Engine oil capacity for service fill- 2300 ml)



- Check the oil level using the dipstick, it must be between max & min level mark of dipstick. Adjust the oil level as needed.
- Make sure there is no oil leakage.
- Check the O-ring of the oil dip stick for any damage and install the dip stick / oil filler cap.

#### 4. ENGINE OIL FILTER REPLACEMENT

- Remove the cap magneto cover (8), by unscrewing the cover bolts (12)
- Pull and take out the Oil filter holder assembly (9) with the oil filter element (11).



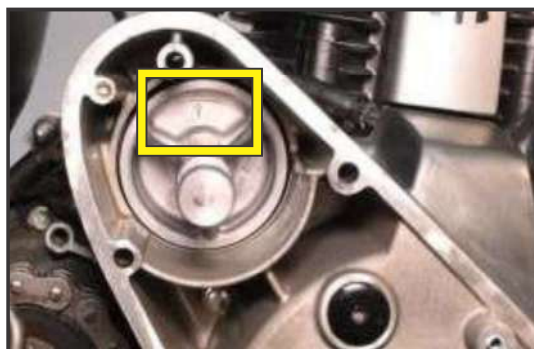
- Remove the used oil filter element from the oil filter holder lock. Install the new O-ring oil filter (10) and new oil filter (11) into the oil filter holder (9). Installation of oil filter needs to be done after oil bleeding procedure as mentioned in the below points of oil bleeding.



- Ensure the oil filter rubber side face must be installed facing towards the engine side.



- Ensure the assembly of oil filter holder and oil filter (Arrow mark) vertically up.
- Use only genuine oil filter as recommended. Using the non-genuine filter which is not equivalent quality may cause engine damage.



- Ensure the cap magneto cover bolts (12) are tightened securely to the specified torque. Cap magneto cover bolts torque: 9-11 Nm
- Check that the sealing washer (As per recommended maintenance schedule) on the drain bolt is in good condition and install the bolt. Replace the sealing washer every time the oil is changed, or whenever necessary.



- Engine oil drain bolt torque 40-48 Nm. (4.0 - 4.8 kgf.m)

## 5. Troubleshooting

### a) Low Oil Level:

#### Symptoms:

Low oil pressure warning light, engine knocking or tapping noises, poor engine performance.

#### Troubleshooting:

Check the oil level using the motorcycle's dipstick or sight glass. If it is low, top up with the recommended oil type and quantity as specified in the owner's manual.

### b) Oil Leaks:

#### Symptoms:

Visible oil puddles under the motorcycle, oil-soaked parts or components, low oil level.

#### Troubleshooting:

Identify the source of the leak, which can be from gaskets, seals, or loose fittings.

Tighten or replace the faulty component. It is important to fix oil leaks promptly to

prevent oil loss and potential engine damage.

**c) Excessive Oil Consumption:**

**Symptoms:**

Frequent need to top up oil, excessive smoke from the exhaust, fouled spark plugs.

**Troubleshooting:**

Check for oil leaks, as mentioned above. If there are no visible leaks, the engine may be burning oil. This could be due to worn piston rings or valve seals. Consult a mechanic for a comprehensive inspection and repair.

**d) Oil Contamination:**

**Symptoms:**

Discolored or milky oil, coolant loss, overheating, or poor engine performance.

**Troubleshooting:**

If you notice coolant mixing with the oil (resulting in a milky appearance), it could indicate a blown head gasket or cracked engine block. Address these issues promptly to prevent further damage.

**e) Oil Pressure Problems:**

**Symptoms:**

Low oil pressure warning light, abnormal engine noises, poor performance.

**Troubleshooting:**

Use a mechanical oil pressure gauge to measure the actual oil pressure. If it is below the specified range, this could indicate a worn oil pump, clogged oil passages, or low oil level. Address these issues as needed to restore proper oil pressure.

**f) Oil Viscosity Issues:**

**Symptoms:**

Difficulty starting the engine in cold weather, excessive engine noise, reduced fuel efficiency.

**Troubleshooting:**

Ensure you are using the correct oil viscosity grade recommended for your motorcycle. Changing to the appropriate oil grade can often resolve these issues.

**g) Dirty or Contaminated Oil:**

**Symptoms:**

Reduced engine performance, increased engine wear, poor fuel efficiency.

**Troubleshooting:**

Regularly change the engine oil and filter at the recommended intervals. Ensure that you use the recommended oil and filters. Contaminated oil can cause serious damage, so it is crucial to maintain clean oil.

**h) Oil Foaming:**

**Symptoms:**

Increased engine noise, poor lubrication, overheating.

**Troubleshooting:**

Foaming can occur due to improper oil levels or aeration of the oil. Check the oil level and ensure it is within the recommended range. If the problem persists, inspect the oil pump for any issues.

- 1. SERVICE INFORMATION**
- 2. ENGINE REMOVAL**
- 3. ENGINE ASSEMBLY**
- 4. TROUBLESHOOTING**

## 1. Service Information:

### i. GENERAL

- When removing/installing the engine, tape the frame around the engine beforehand for frame protection.
- When installing the engine, be sure to tighten the engine mounting fasteners to the specified torque in the specified sequence. If you mistake the torque or sequence, loosen all mounting fasteners, then tighten them again to the specified torque in the correct sequence.

The following components can be serviced with the engine installed in the frame.

- Starter motor
- Throttle body
- Oil pump
- Rocker arm
- Camshaft
- Clutch
- Dual clutch
- Drive gear
- Gearshift linkage
- Flywheel
- Stator
- Balancer

•The following components require engine removal for service.

- Cylinder head/valves
- Transmission
- Crankshaft
- Piston/cylinder

### **Tools and Materials Needed:**

- Motorcycle stands
- Paddock stand
- Appropriate size wrenches or socket set

- Screwdriver
- Allen keys
- Block of wood (for supporting the engine, if needed)

## 2. Engine Removal from Vehicle

- **Disconnect the Battery:**

Disconnect the motorcycle's battery to prevent any electrical hazards during the engine removal process.



- **Drain Fluids:**

Drain the engine oil and, if applicable, the coolant from the motorcycle. Make sure to properly dispose of these fluids in accordance with local regulations.



- **Remove Exhaust System:**

Loosen and remove the exhaust headers or pipes connected to the engine



### 3.1.5 ENGINE MOUNTING & BOLTS



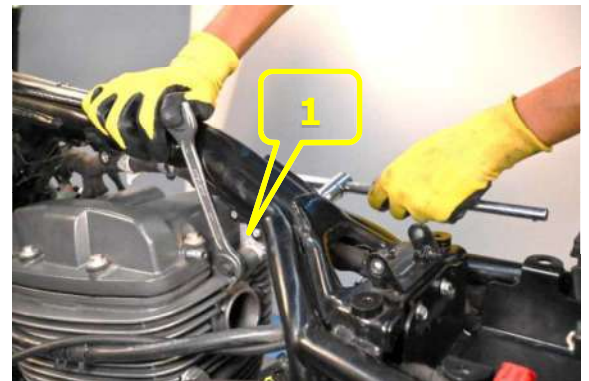
- **Remove radiator pipe:**
- Remove any hoses that connect to the radiator tank. These hoses are secured with hose clamps.
- Use pliers to loosen and remove hose clamps.



- **Disconnect Wiring and Cables:**
- Label and disconnect all electrical connections and cables that are attached to the engine, including the spark plug wires, ignition system, and any sensors.

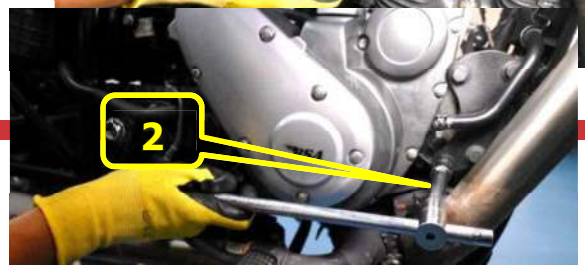


- **Remove Fuel System:**
- Turn off the fuel supply and disconnect the fuel lines.
- Disconnect the throttle body from the engine.



- **Support the Engine:**
- Before lifting the engine out, ensure it is properly supported. You can use an engine hoist or lift to support the engine's weight. Attach suitable straps or chains to the engine to lift it evenly.

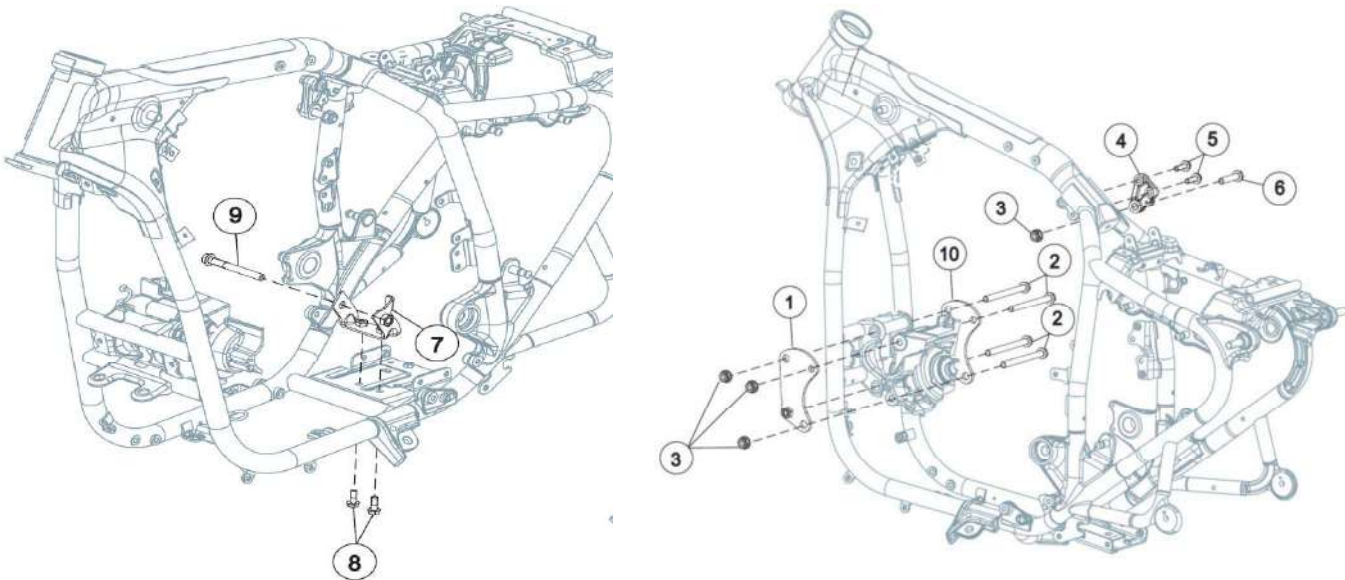
- **Locate all Engine Mountings:**
- Locate and remove all the mounting bolts (1) M10 X 1.25 & (2) M10 X 90 Flanged bolt that secure the engine to the frame. Refer the images for



specific locations.

#### NOTE

- It is essential to support the motorcycle on a lift or jack to ensure stability during this process.
- **Lift the Engine:**
- Carefully lift the engine out of the frame using the engine hoist. Make sure the engine clears all surrounding components and the frame without causing any damage.



1	T08000B10010N	BRACKET LOOSE ENGINE MOUNTING FRONT LH
2	SF0102620	BOLT HEX FL M10X1.25X120X10.9
3	TSF0318009	FLANGE U NUT M10x1.25
4	T08000B10030N	BRACKET LOOSE ENGINE MOUNTING TOP
5	SF0102572	BOLT HEX FL M8X1.25X28X8.8
6	TSF0102302	FLANGED BOLT M10 X 50
7	T08000B10040N	BRACKET LOOSE ENGINE MOUNTING REAR
8	SI0202054	SCREW HEX FL SL M8X1.25X20X8.8
9	TSF0102299	FLANGED BOLT M10 x 90
10	T08010B10550N	BRACKET LOOSE ENGINE MOUNTING FRONT RH

## 3. Engine Reinstallation to Vehicle

- To reinstall the engine, reverse the steps above, ensuring that all bolts are tightened as per specifications.
- Reconnect all electrical connections, fuel lines, and other components.
- Fill the engine with oil and coolant

## 4. Troubleshooting

### i. Start with Basic Inspection:

- Ensure there is enough fuel in the tank.
- Check the oil level and quality. Old or contaminated oil can affect engine performance.

### ii. Check for Fuel Issues:

- Inspect the fuel lines for leaks or blockages.
- Clean or replace the fuel filter.
- Check the throttle body for clogs, and ensure the float level is correct.
- Verify that the choke is functioning correctly.

### iii. Ignition System:

- Check the spark plug wires for damage or loose connections.
- Examine the spark plugs for fouling or wear, and replace if necessary.
- Verify the timing is set correctly according to your vehicle's specifications.

### iv. Air Intake and Exhaust:

- Make sure the air filter is clean and not clogged.
- Check the exhaust system for leaks or obstructions that could affect engine performance.

### v. Compression:

- Conduct a compression test to ensure the engine is building the correct level of compression. Low compression can indicate worn piston rings or cylinder damage.

vi. **Valve Adjustment:**

- Check and adjust the valve clearance to ensure proper valve operation.

vii. **Electrical System:**

- Inspect the battery for a proper charge and clean, tight connections.
- Check the wiring harness for damaged or corroded wires.
- Ensure the charging system (Alternator) is working correctly.

viii. **Fuel System:**

- Clean and rebuild the Throttle body if needed.
- Check the fuel pump pressure or any other fault.

ix. **Exhaust Smoke Analysis:**

- **Black smoke:** Indicates a rich fuel mixture.
- **White smoke:** Indicates coolant entering the combustion chamber, potentially due to a blown head gasket.
- **Blue smoke:** Indicates burning oil, which could be due to worn piston rings or valve seals.

- 1. SERVICE INFORMATION**
- 2. CYLINDER HEAD DISMANTLING**
- 3. TROUBLESHOOTING**
- 4. CYLINDER HEAD INSTALLATION**
- 5. COMPONENT LOCATION**

## SERVICE INFORMATION

### General

- This section covers service of the valves, and camshaft. These services can be done with the engine installed in the frame.
- When disassembling, mark and store the disassembled parts to ensure that they are reinstalled in their original locations.
- Clean all disassembled parts with cleaning solvent and dry them by blowing them off with compressed air before inspection.
- Valve and camshaft lubricating oil is fed through oil passage in the cylinder head. Clean the oil passages before assembling cylinder head.
- Be careful not to damage the mating surfaces when removing the cylinder head cover and cylinder head.

## TROUBLESHOOTING

- Engine top-end problems usually affect engine performance. These can be diagnosed by a compression test, or by tracing noises to the top-end with a sounding rod or stethoscope.
- If the performance is poor at low speeds, check for a white smoke in the crankcase breather hose. If the hose is smoky, check for seized piston ring.

Compression too low, hard starting or poor performance at low speed.

- **Valves:**

- Incorrect valve clearance
- Burned or bent valve
- Incorrect valve timing
- Broken valve spring
- Uneven valve seating
- Valve stuck open

- **Cylinder head:**

- Leaking or damaged cylinder head gasket.
- Loose spark plug.
- Warped or cracked cylinder head.

- **Cylinder / piston problem**

- Compression too high, overheating or knocking
- Excessive carbon build-up on piston head or combustion chamber.

### Excessive smoke

- Worn valve stem or valve guide
- Damaged stem seal
- Cylinder / piston problem

### Excessive noise

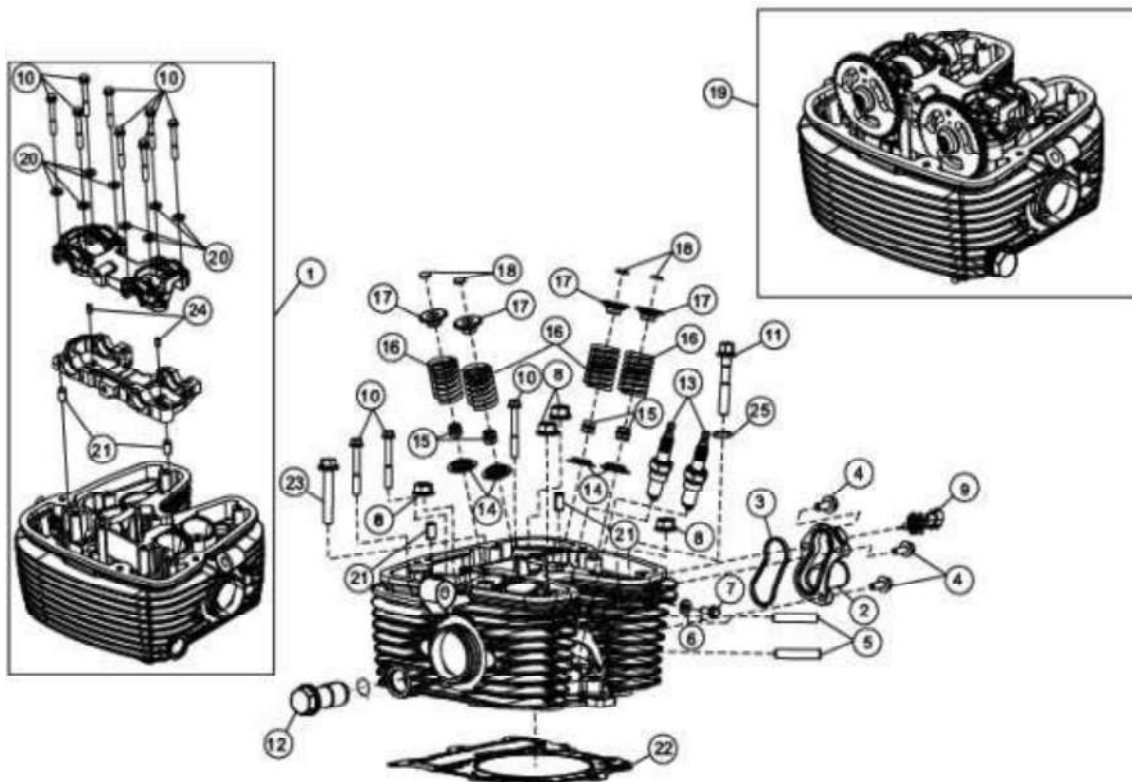
- Incorrect valve clearance
- Sticking valve or broken valve spring
- Excessively worn valve seat
- Worn or damaged camshaft
- Worn shaft

### Worn valve stem end

- Loose or worn cam chain
- Worn or damaged cam chain tensioner
- Worn cam sprocket teeth
- Cylinder / piston problem

### Rough idle

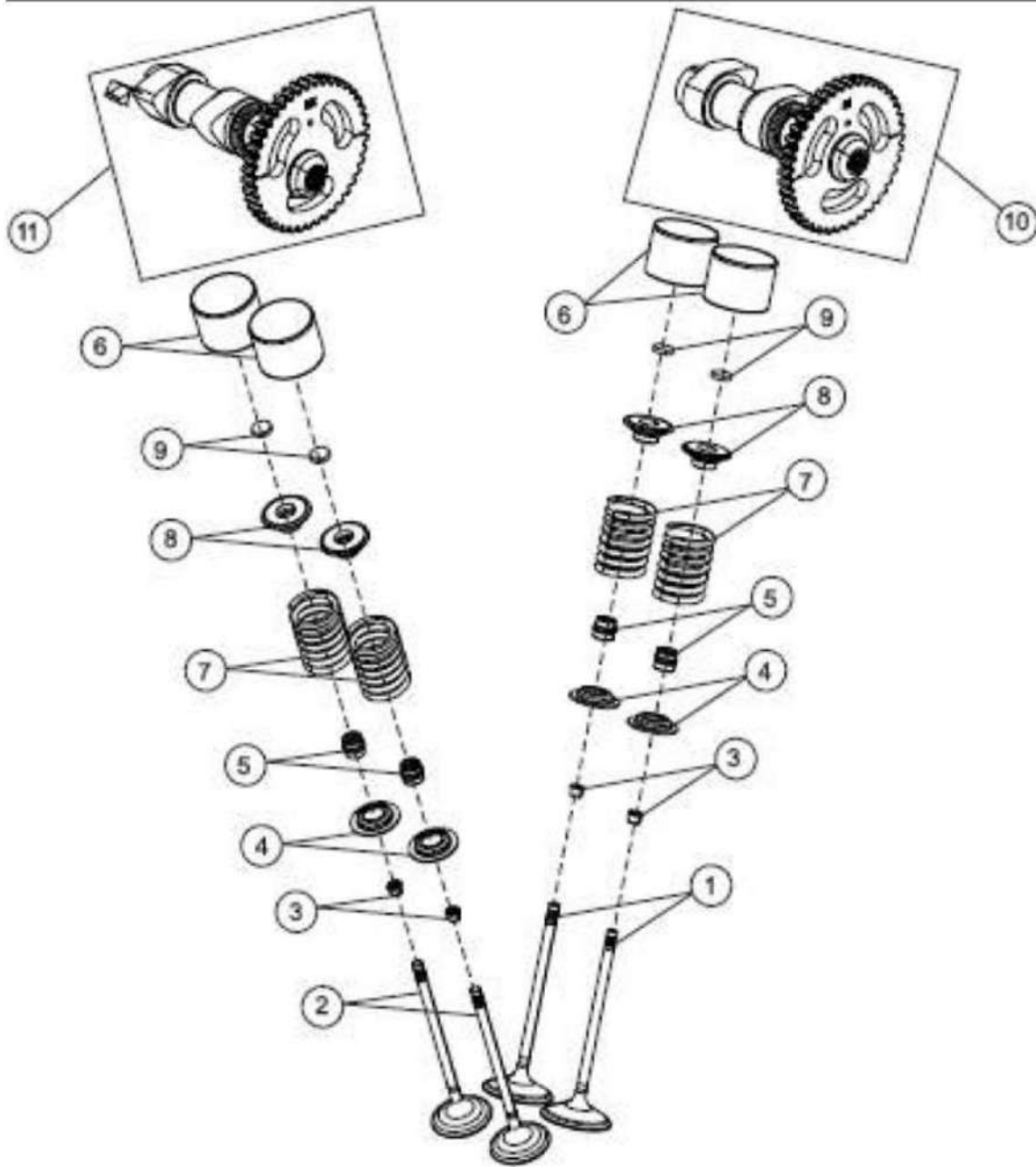
- Low cylinder compression



**CYLINDER HEAD - EXPLODED VIEW**

Sr. No.	Part No.	Part Description	Fr.	Qty.
1	T0208AVF0100N	ASM Cam Shaft Holder Machining B1 Engine	5.5	1
2	T0202BVF0110N	CAP WATER CONNECTOR HEAD	0.6	1
3	T0209BVF0010N	GASKET CAP COOLANT	0.6	1
4	SF0202313	BOLT M6X1-16L	0.6	3
5	T0202BUF0830 N	STUD MUFFLER (M8X41)	1.6	2
6	MJ01700005400	ALUMINIUM WASHER (Ø6.2*012*2)	0.6	1
7	T0202DVF0230 N	FLANGED HEAD BOLT-SH M6X12	0.6	1
8	SF0303051	NUT HEX FL M10X1.5X9X10	0.5	4
9	T1502HUF0060 N	SENSOR COOLANT TEMP	0.5	1
10	SP0102001	BOLT M6X1-45L (HEAD TO BLOCK CHAIN POCKET SIDE)	0.3	11
11	SF0224171	SCREW SOCKET M8X1.25X48X10.9 (BLOCK TO HEAD RH)	0.3	1
12	T0208AVF0211N	SILENT CHAIN HYDRAULIC CHAIN TENSIONER ASSEMBLY	0.5	1
13	T1502DVF0020 N	SPARK PLUG	0.4	2
14	T0208BVF0010N	VALVE SPRING SUPPORT (SPRING SEAT)	5.5	4
15	T0208BVF0070N	VALVE STEAM SEAL	5.5	4
16	T0208BVF0030N	VALVE SPRING	5.5	4
17	T0208BVF0040N	VALVE SPRING RETAINER	5.5	1
18	T0208BVF0060N	ADJUSTMENT SHIM (2.3 to 3 mm)	5.5	4
19	T0202BVF0020N	ASSEMBLY, CYLINDER HEAD	5.5	1
20	SF0401213	WASHER PLAIN M6X13X1	5.5	8
21	MJ01760000700	DOWEL (HOLDER TO HEAD) 8X14	5.5	2
22	T02090VF0040N	GASKET CYLINDER HEAD	5.5	1
23	SF0202231	SCREW HEX FL SL M8X1.25X50X10	5.5	1
24	T0202CVF0470 N	HOLLOW DRIVE PIN (DOWEL) DIA. 5XL10 (HOLDER TO HOLDER)	5.5	2
25	T0210DVF0010 N	WASHER COVER RIFLE LOGO	0.3	1

## VALVE TRAIN AND CAMSHAFT- EXPLODED VIEW



Sr. No.	Part No.	Part Description	Frts.	Qty.
1	T0208DVF0020 N	INTAKE VALVE 36MM	5.2	2
2	T0208DVF0030 N	VALVE EXHAUST 31MM	5.2	2
3	T0208BVF0050N	VALVE COTTER	5.2	8
4	T0208BVF0010N	VALVE SPRING SUPPORT (SPRING SEAT)	5.2	4
5	T0208B VF0070N	VALVE STEM SEAL	5.2	4
6	T0208BVF0020N	VALVE LIFTER BUCKET	0.8	4

Sr. No.	Part No.	Part Description	Fr.	Qty.
7	T0208BVF0030N	VALVE SPRING	5.2	4
8	T0208BVF0040N	VALVE SPRING RETAINER	5.2	4
9	T0208BVF0060N	ADJUSTMENT SHIM (2.3 to 3mm)	5.2	4
9	T0208BVF0080N	ADJUSTMENT SHIM 2.300	5.2	4
9	T0208BVF0090N	ADJUSTMENT SHIM 2.325	5.2	4
9	T0208BVF0100N	ADJUSTMENT SHIM 2.350	5.2	4
9	T0208BVF0110N	ADJUSTMENT SHIM 2.375	5.2	4
9	T0208BVF0120N	ADJUSTMENT SHIM 2.400	5.2	4
9	T0208BVF0130N	ADJUSTMENT SHIM 2.425	5.2	4
9	T0208BVF0140N	ADJUSTMENT SHIM 2.450	5.2	4
9	T0208BVF0150N	ADJUSTMENT SHIM 2.475	5.2	4
9	T0208BVF0160N	ADJUSTMENT SHIM 2.500	5.2	4
9	T0208BVF0170N	ADJUSTMENT SHIM 2.525	5.2	4
9	T0208BVF0180N	ADJUSTMENT SHIM 2.550	5.2	4
9	T0208BVF0190N	ADJUSTMENT SHIM 2.575	5.2	4
9	T0208BVF0200N	ADJUSTMENT SHIM 2.600	5.2	4
9	T0208BVF0210N	ADJUSTMENT SHIM 2.625	5.2	4
9	T0208BVF0220N	ADJUSTMENT SHIM 2.650	5.2	4
9	T0208BVF0230N	ADJUSTMENT SHIM 2.675	5.2	4
9	T0208BVF0240N	ADJUSTMENT SHIM 2.700	5.2	4
9	T0208BVF0250N	ADJUSTMENT SHIM 2.725	5.2	4
9	T0208BVF0260N	ADJUSTMENT SHIM 2.750	5.2	4
9	T0208BVF0270N	ADJUSTMENT SHIM 2.775	5.2	4
9	T0208BVF0280N	ADJUSTMENT SHIM 2.800	5.2	4
9	T0208BVF0290N	ADJUSTMENT SHIM 2.825	5.2	4
9	T0208BVF0300N	ADJUSTMENT SHIM 2.850	5.2	4
9	T0208BVF0310N	ADJUSTMENT SHIM 2.875	5.2	4
9	T0208BVF0320N	ADJUSTMENT SHIM 2.900	5.2	4
9	T0208BVF0330N	ADJUSTMENT SHIM 2.925	5.2	4
9	T0208BVF0340N	ADJUSTMENT SHIM 2.950	5.2	4
9	T0208BVF0350N	ADJUSTMENT SHIM 2.975	5.2	4
9	T0208BVF0380N	ADJUSTMENT SHIM 3.000	5.2	4
10	T0208AVF0260N	ASSEMBLY CAMSHAFT INLET COMPLETE	5.2	1
11	T0208AVF0240N	ASSEMBLY CAMSHAFT EXHAUST COMPLETE	5.2	4

### CYLINDER HEAD DISMANTLING

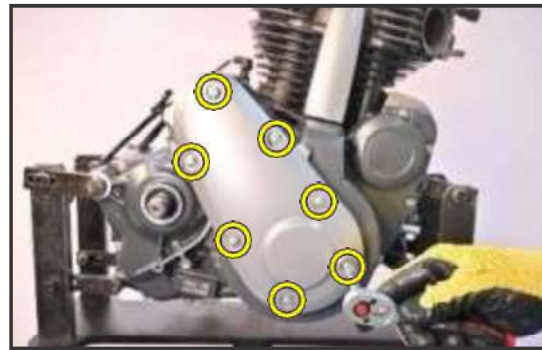
- Stop the engine, disconnect the spark plug caps and remove the spark plugs.
- Disconnect the fuel pump unit.
- After the engine has cooled, remove the cylinder head cover assembly as shown.  
**Hex Flange Bolt Step : 7 Nos. - M6x1-37L Socket Spanner size : 10 mm**



- Remove the cylinder head cover with gasket.



- Remove the cap cover magneto bolts. Remove the bolts in criss-cross direction.  
**Step Bolt : 7 Nos. – M6 x 108 mm = 3 nos. & M6x 12 mm = 4 nos. Socket Spanner size : 8mm.**



- Remove the Cap Cover Magneto with Gasket.



- Remove the Timing window 4 mm Allen cap.



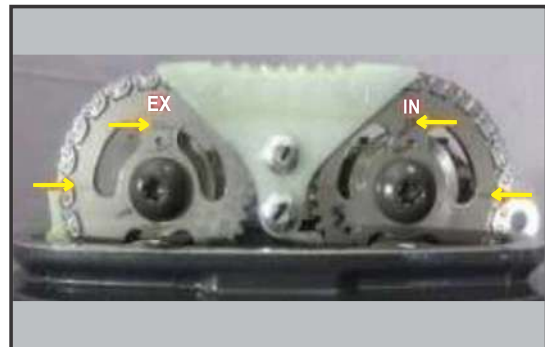
- With the help of 8mm Allen key rotate the crank shaft to match the TDC marking.



- Through the inspection gauge window ensure rotor marking is aligned.



- Ensure the cam shaft TDC marking are aligned.



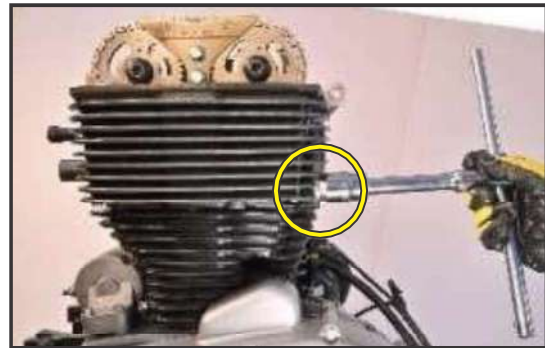
- Ensure the chain guide top 2 bolts and remove the top chain guide. **Hex Bolt** : 2 Nos. - M6 x 16 mm **Socket Spanner size** : 10mm



- Take out top chain guide.



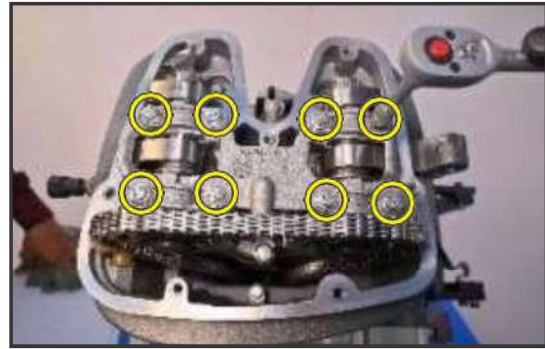
- Remove the hydraulic chain tensioner. **Hex Bolt** : 1 No. - M20 x 1.5 mm **Socket Spanner size** : 22mm



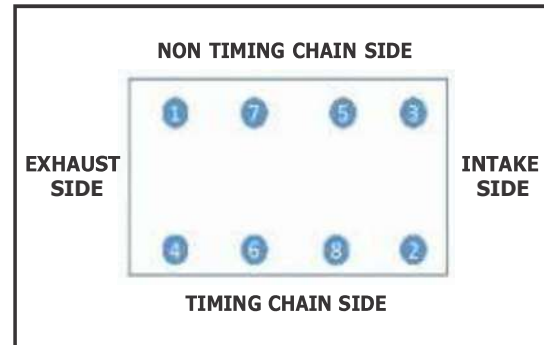
- Take out hydraulic chain tensioner.



- Remove the camshaft holder 8 bolts.  
**Flanged Hex Bolt** : 8 Nos. - M6 x 45 mm  
**Socket Spanner size** : 8mm



- Follow the bolt removing sequence.



- Remove the camshaft holder upper.



### CAUTION

Never use a lever to remove the camshaft holder from the cylinder head. Using a lever will cause damage to the head and camshaft holder.



- Take out camshaft holder upper.



- Remove the camshaft holder dowel.  
Do not forcibly remove the dowel pins from the camshaft holders.



- Remove the Exhaust & Intake Camshaft assembly.



- Take out Exhaust & Intake Camshaft assembly.



- Remove the camshaft holder Lower & Dowel.  
Do not forcibly remove the dowel pins from the camshaft holders.



- Take out camshaft holder Lower & Dowel.



- Remove the tight side chain guide.



- Remove the horn bracket 2 bolts with earthing cable.  
**Flanged Hex Bolt: 2 Nos. - M6x35 mm**  
**Socket Spanner size : 8 mm**



- Remove the starter motor assembly.



- Take out starter motor assembly.



- Remove the Cylinder block to head side bolts from intake side.

**Hex Bolt** : 1 No. - M8 x 50 mm **Ring**

**Spanner size** : 12mm



- Remove the Cylinder block to head side bolts from the exhaust side. **Hex Bolt** : 2 Nos. - M8 x 50 mm **Ring**

**Hex Bolt** : 2 Nos. - M8 x 50 mm **Ring**

**Spanner size** : 12mm



- Remove the Cylinder head inside bolt. **Hex Bolt** : 1 No. - M8 x 50 mm

**Socket Spanner size** : 12mm



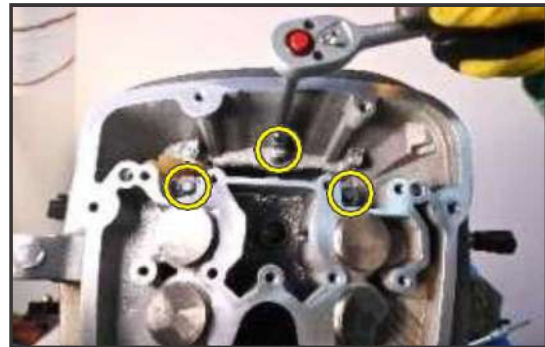
- Remove the Cylinder head outside bolts  
Allen bolt (Rifle logo plate). **Allen Bolt** : 1 No. - M8 x 48 mm **Allen Key**  
size : 6mm



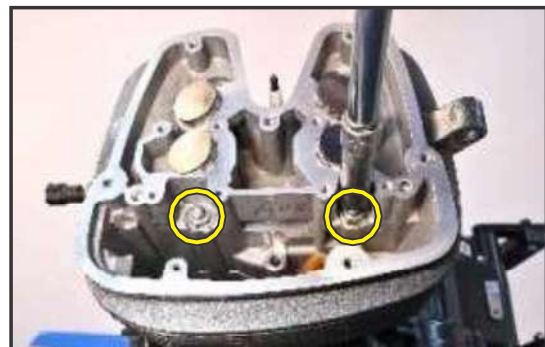
- Take out the Rifle logo plate.



- Remove the Cylinder head inside 3 bolts. **Hex Bolt** : 3 Nos. - M6 x 45 mm  
**Socket Spanner** size : 8mm



- Remove the Cylinder head inside 4 hex nuts (Main Studs).  
**Hex Nut** : 4 Nos. - M10 x 1.5 mm  
**Socket Spanner** size : 14 mm  
Criss cross pattern



- Remove the hex nuts in crisscross pattern as shown in photograph.



- Remove the Cylinder Head sub-assembly.



### CAUTION

Do not tap the cylinder head too hard and do not damage the mating surface with a screwdriver.



- Remove the Valve lifter buckets & shim.



- Check and note the shim size



- Remove the valve cotter by using special tool

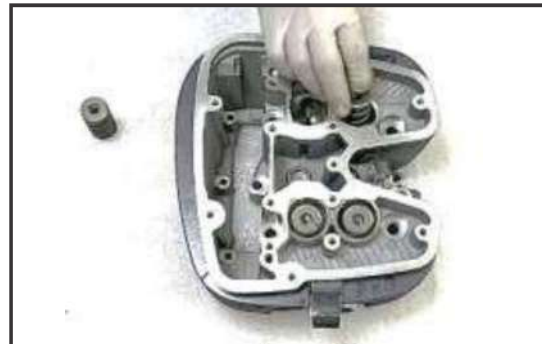


### CAUTION

To prevent loss of tension, do not compress the valve springs more than necessary.



- Remove the valve retainer and spring.



- Remove the Valves.



- Confirm new shim size from existing Shim size and valve clearance.



### CYLINDER HEAD INSTALLATION

- Rotate the crank shaft (in Magneto Assembly) to match the TDC marking.  
**Allen Key size : 8mm**



- Through the inspection gauge window ensure rotor marking is aligned.



- Install the Cylinder Head sub-assembly.  
Wipe-off any oil from the journals of the cylinder head, camshaft and camshaft holder.



Inspect the following parts for damage, abnormal wear, deformation, burning or clogs in oil passages.

- Cylinder head
- Valve springs
- Valves
- Valve guides
- Dowel Pins
  
- Replace any part if it is out of service limit.



### CAUTION

Ensure to use new Cylinder Head Gasket while assembling Cylinder Head

- Fit the Cylinder head inside 4 hex nuts (Main Studs)

Apply a thin coat of thread-locking adhesive (Loctite 243) to the threads of each hex nut before fixing

**Hex Nut** : 4 Nos. - M10 x 1.5 mm

**Socket Spanner size** : 17 mm

**Torque** : 6 Kgfm



- Fit the head side bolts from exhaust side (bottom to head) to the Cylinder block.

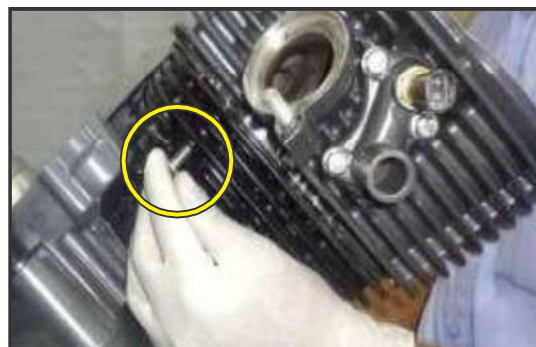
Apply a thin coat of thread-locking adhesive (Loctite 243) to the threads of bolt before fixing.

**Hex Bolt** : 2 Nos. - M8 x 50 mm

**Ring Spanner size** : 12mm

Tighten until finger tight and then by spanner

**Torque** : 3.3 Kgfm



- Fit the head side bolts from intake side to the Cylinder block

Apply a thin coat of thread-locking adhesive (Loctite 243) to the threads of bolt before fixing.

**Hex Bolt** : 1 No. - M8 x 50 mm

**Ring Spanner size** : 12 mm

Tighten until finger tight and then by spanner

**Torque** : 3.3 Kgfm



- Fit the Cylinder head inside 3 bolts. Ensure carbon deposits are removed from the combustion chamber.

**Hex Bolt** : 3 Nos. - M6 x 45 mm

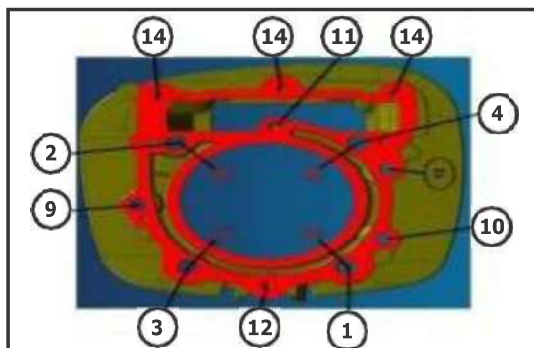
**Socket Spanner size** : 8 mm

Tighten until finger tight, and then by socket-spanner

**Torque** :1.1 Kgfm



- Initially tighten the collar nuts of the Cylinder Head to 20 NM (1-4) and then tighten to 60 NM (5-8).
- Tighten the fasteners of the Cylinder Head to Cylinder in the sequence as shown (9-14) to specified torque.
- For (9-13) tighten to 33 NM & for (14) tighten to 11 NM.



- Insert dowel pin and refit the head bracket. Inspect the dowel pin for damage, abnormal wear, deformation or burning. Replace if it is out of the service limit.



- Insert and fit the timing chain guide.



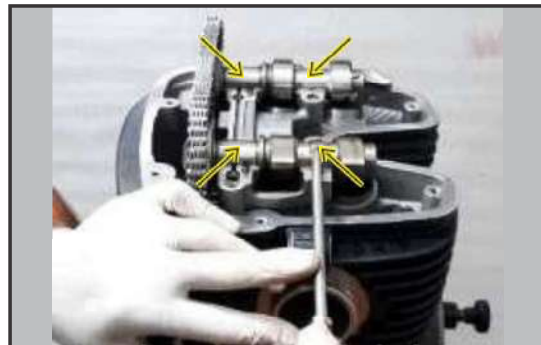
- Refit the Exhaust Camshaft assembly. Inspect the camshaft sprockets for damaged and worn teeth. Replace if necessary.



- Refit the Intake Camshaft assembly. Inspect the camshaft sprockets for damaged and worn teeth. Replace if necessary.



- Lubricate both the camshaft lobes properly.



- Fit the upper camshaft holder along with its bolts.

**Flanged Hex Bolt** : 8 Nos. - M6 x 45 mm

**Socket Spanner size** : 8 mm

Tighten until finger tight, and then by socket-spanner in crisscross direction

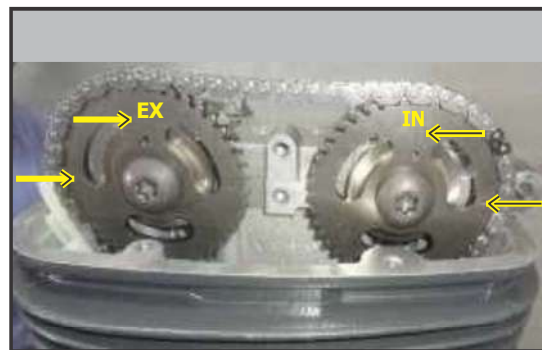
**Torque** : 1.1 Kgfm



### CAUTION

Never fit a camshaft sprocket to a camshaft using incorrectly identified bolt holes. Severe engine damage will result from incorrect attachment.

- Ensure marking on both the cam sprockets are aligned properly as shown in the photograph.



- Fix the top chain guide.  
Check that the chain is correctly located around the crankshaft, and both camshaft sprockets.



- Fit 2 bolts to the top chain guide.

Apply a thin coat of thread-locking adhesive (Loctite 638) to the threads of bolts before fixing.



**Hex Bolt** : 2 Nos. –M6 x 15 mm

**Socket Spanner size** : 10mm

Tighten until finger tight, and then by socket-spanner.

**Torque** : 1.1 Kgfm



- Fit the hydraulic timing chain tensioner. Apply a thin coat of thread-locking adhesive (Loctite 243) to the threads of bolt before fixing.

**Hex Bolt** : 1 No. - M20 x 1.5 mm

**Socket Spanner size** : 22mm

Tighten until finger tight, and then by socket-spanner.

**Torque** : 4.4 Kgfm



### CAUTION

Never fit the camshaft sprockets without correctly setting the camshaft timing using the service tools and timing procedure. Severe engine damage will result from incorrect valve timing adjustment.



- Check valve clearance when the engine is cold.

If the measurement does not fall within the specified range, adjustments must be made.

Inspect the valves for damage, abnormal wear, deformation or burning.

Replace them if found out of the service limit.

**Inlet Valve** : 0.1 to 0.15 mm

**Exhaust Valve** : 0.25 to 0.30 mm

Tool- Feeler Gauges



### CAUTION

If the valve clearances are not checked and corrected, wear could cause the valves to remain partly open, which lowers performance, burns the valves and valve seats and may cause serious engine damage.

- Fix the Timing window 4 mm Allen cap.  
**Allen Cap** : 4 mm



- Fix the Cap Cover Magneto with new Gasket.



- install the cap cover magneto.



- Fit the bolts to the Cap Cover Magneto. Apply a thin coat of thread-locking adhesive (Loctite 243) to the threads of bolt before fixing

**Step Bolt :** 7 Nos. M6 x 108 mm= 3 nos. & M6x 12 mm = 4 nos.

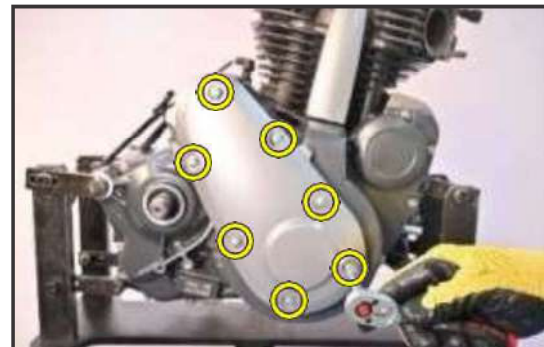
**Socket Spanner size : 8 mm**

Tighten until finger tight, and then by socket-spanner

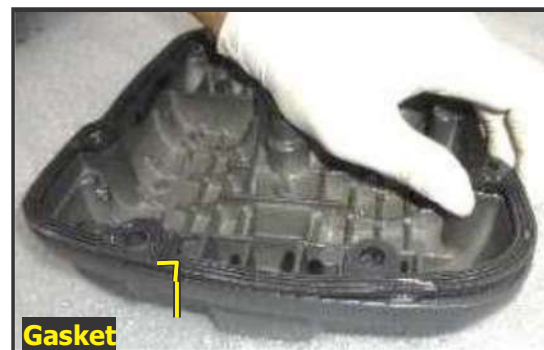
**Torque : 1.0Kgf.m**



- Tighten all the bolts in crisscross direction.



- Fit the cylinder head cover along with new gasket



- Install the cylinder head cover.



- Fit the bolts to the cylinder head cover. Apply a thin coat of thread-locking adhesive (Loctite 243) to the threads of bolt before fixing. Sleeve Bolt: 7 Nos. –M6 x 37l mm
- **Socket Spanner size: 10 mm**  
Tighten until finger tight, and then by socket-spanner.  
**Torque : 1.1Kgfm**



**3.3 BLOCK PISTON ASSEMBLY**

**3.3.1 Block Piston**

**3.3.2 Piston Rings**

**3.4 ROTOR ASSEMBLY & STARTER CLUTCH**

**3.4.1 MAGNETO COVER**

**3.4.2 STARTER PLATE & CRANK SENSOR**

**3.4.3 STARTER MOTOR & FREE WHEEL**

**3.4.4 ROTOR ASSEMBLY**

**3.5 CLUTCH**

**3.6 CRANKCASE / TRANSMISSION / BALANCER**

**3.7 ENGINE INSTALLATION**

## 5. TECHNICAL SPECIFICATION

## SERVICE INFORMATION

### General

- The crankcase must be separated to service the crankshaft assy and pistons and connecting rods.
- Mark and store the connecting rods, bearing caps, and bearing inserts to be sure of their correct locations for reassembly.
- The crankpin and connecting rod bearing inserts are select fit and are identified by color codes. Select replacement bearings from the code tables. After selecting new bearings, recheck the oil clearance & axial play with gauge. Incorrect clearances can cause major engine damage.
- Clean the oil passages in the upper crankcase with compressed air before installing the pistons.

## TROUBLESHOOTING

- Engine top-end problems usually affect engine performance. These can be diagnosed by a compression test, or by tracing noises to the top-end with a sounding rod or stethoscope.
- If the performance is poor at low speeds, check for a white smoke in the crankcase breather hose. If the hose is smoky, check for seized piston ring.

### **Cylinder compression is too low, hard to starting, or poor performance at low speed**

- Leaking cylinder head gasket:
- Loose spark plug:
- Worn, stuck or broken piston ring
- Worn or damaged cylinder and piston

### **Compression too high, overheating or knocking**

- Excessive carbon built-up on piston head or combustion chamber

### **Excessive smoke**

- Worn cylinder, piston, or piston ring
- Improper installation of piston rings
- Scored or scratched piston or cylinder wall

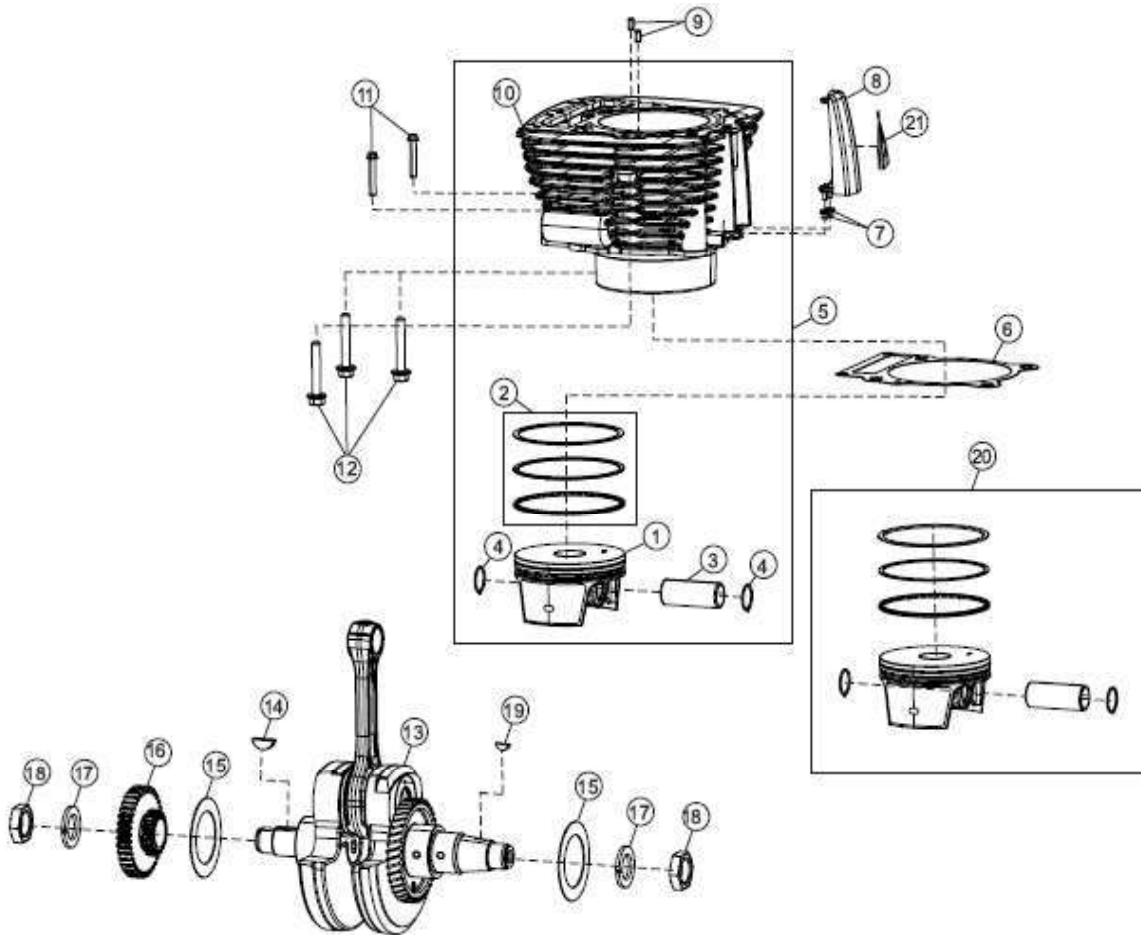
#### Abnormal noise

- Worn piston pin or piston pin hole
- Worn connecting rod small end
- Bent connecting rod
- Worn cylinder, piston, or piston rings
- Worn main journal bearings
- Worn crankpin bearings

#### Engine vibration

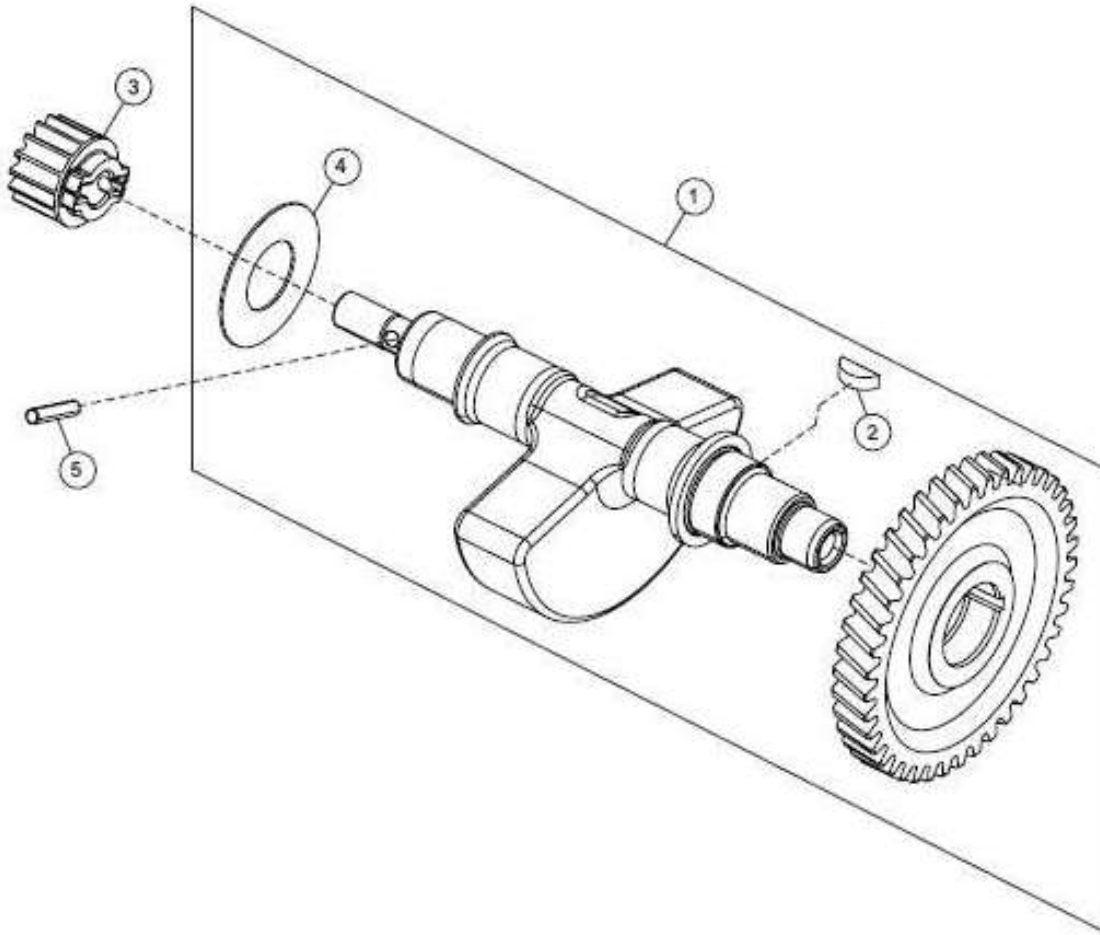
- Excessive crankshaft runout

### • CRANKSHAFT AND PISTON – EXPLODED VIEW



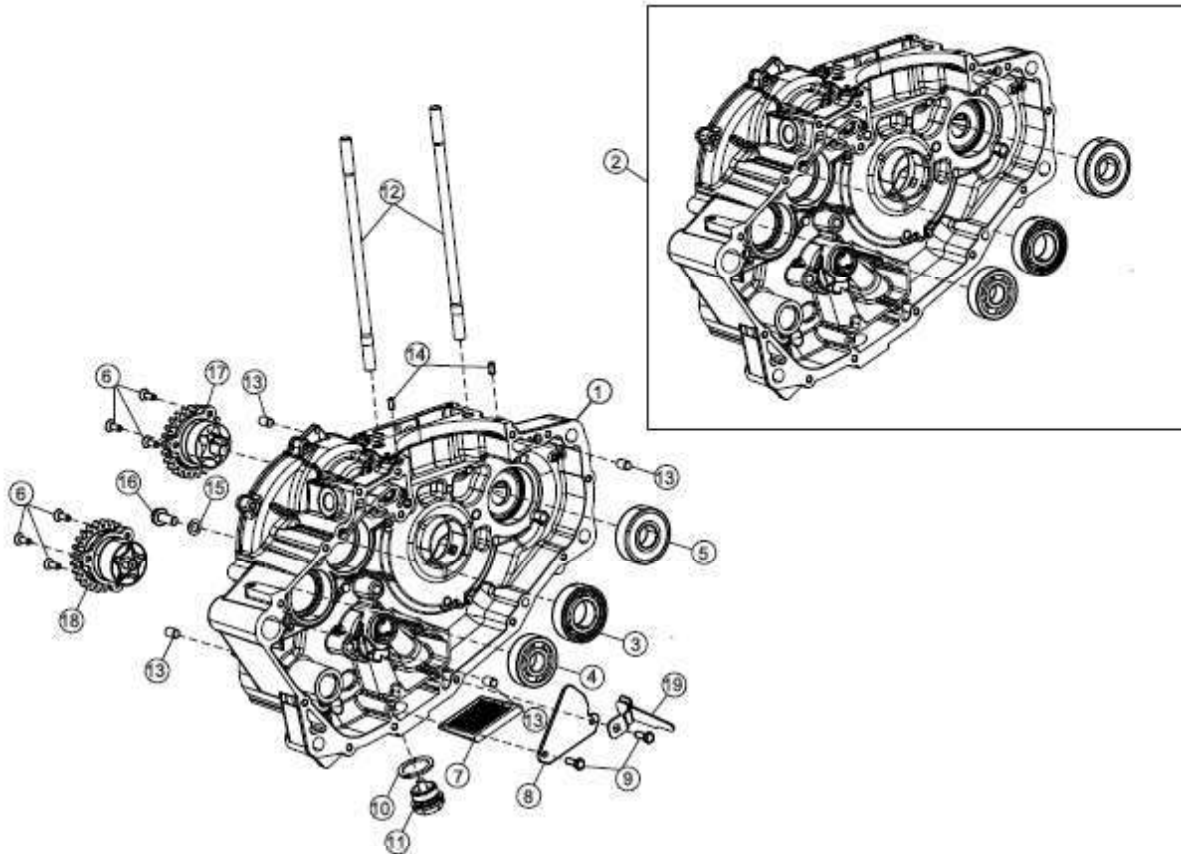
SR. NO.	PART NO.	PART DESCRIPTION	FRT	QTY
1	T0210BVF0020N	PISTON	5.5	1
2	T0210BVF0100N	KIT PISTON RINGS B1	5.5	1
3	T0210BVF0060N	PIN PISTON B101	5.5	1
4	T0210BVF0070N	RING SNAP	5.5	2
5	T0202AVF0160N	BLOCK PISTON KIT FOR B1 ENGINE	5.5	1
6	T0202AVF0070N	GASKET CYLINDER BLOCK	5.5	1
7	T0202AVF0050N	BUSH RIFFLE LOGO	0.2	2
8	T0202AVF0030N	COVER RIFFLE LOGO	0.2	1
8.1	T0202AVF0140F	COVER RIFFLE LOGO DULL SILVER	0.2	1
8.2	T0202AVF0150N	BUFFED RIFFLE LOGO	0.2	1
9	T0202CVF0470N	HOLLOW DRIVE PIN (DOWEL) DIA. 5XL10	5.5	1
10	T0202AVF0090N	CYLINDER BLOCK	5.5	1
11	TSF0102296	HEX BOLT (BLOCK TO CCASE) M6X1_L30	0.5	1
12	SF0202231	BOLT M8X1.25 - 50L (HEAD TO BLOCK LH SIDE)	0.8	3
13	T0210AVF0030N	ASSEMBLY CRANKSHAFT	8.5	1
14	SF0801001	WOODRUF KEY 6X9 DIN 6888	8.5	1
15	T0210AVF0230N	SPACER FOR CRANKSHAFT 650	8.5	2
15.1	T0210AVF0110N	SPACER 46X89X1 ( 4 THK VER)	8.5	APR
15.2	T0210AVF0190N	SPACER 46X89X1.2 ( 4 THK VER)	8.5	APR
15.3	T0210AVF0200N	SPACER 46X69X1.4 ( 4 THK VER)	8.5	APR
15.4	T0210AVF0210N	SPACER 46X89X1.6 ( 4 THK VER)	8.5	APR
16	T0210AVF0180N	SILENT CHAIN DRIVE WHEEL 37/21	8.5	1
17	SF0402150	WASHER SPRING L M22X36X3.2	8.5	2
18	SF0301265	HEX NUT M22X1.5	8.5	2
19	SF0801013	WOODRUF KEY 4X5 DIN 6888	1.5	1
20	T0210BVF0010N	ASSEMBLY, PISTON	5.5	1
21	T13200B10030N	DECAL ENGINE CAP RH	0.2	1

• **BALANCER SHAFT ASSEMBLY – EXPLODED VIEW**



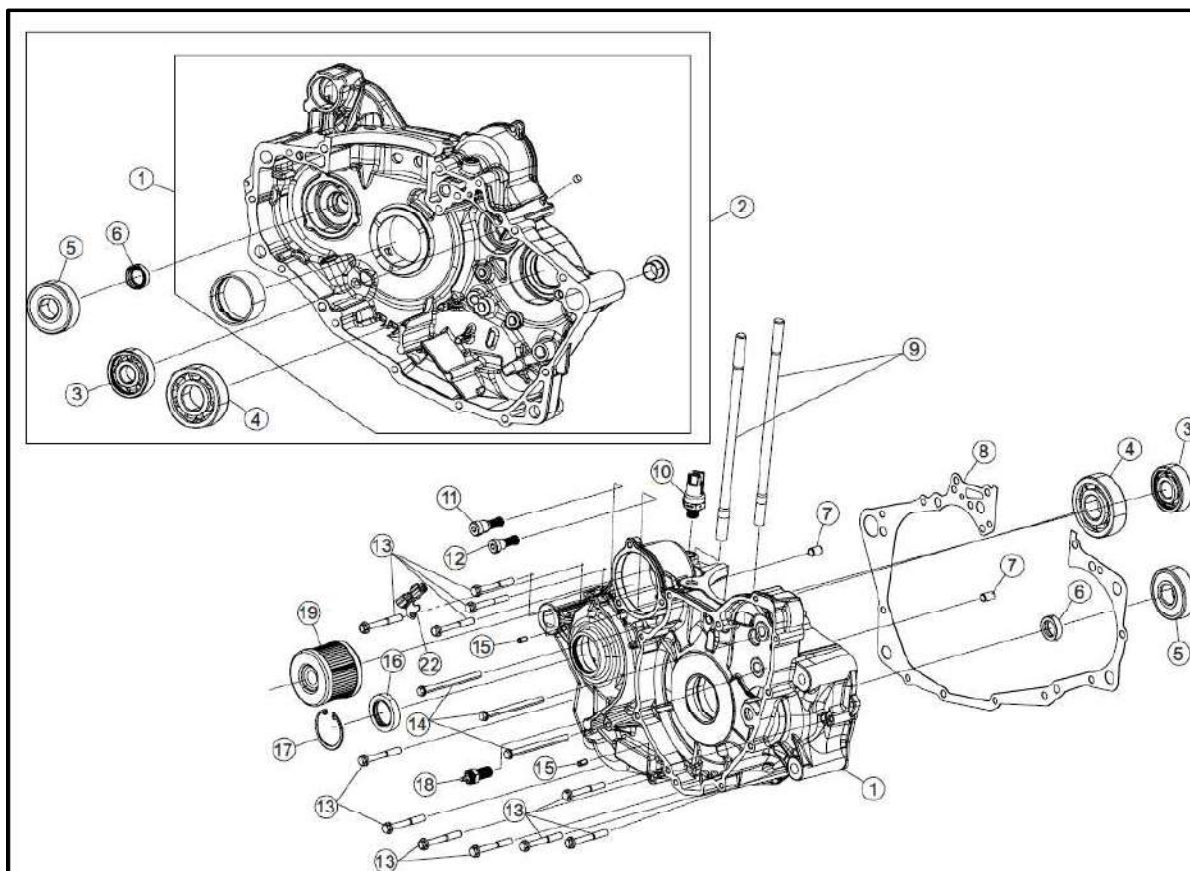
SR. NO.	PART NO.	PART DESCRIPTION	FRT	QTY
1	T0210DVF0020N	ASSEMBLY, BALANCER SHAFT	8.5	1
2	SF0801013	WOODROF KEY 4X5 DIN 6888	8.5	1
3	T0401EVF0010N	GEAR WATER PUMP DRIVE 15T	8.5	1
4	T0210DVF0110N	SPACER BALANCER SHAFT	8.5	1
4.1	T0210DVF0050N	SPACER BALANCER 20 X41X0.8 thk	8.5	1
4.2	T0210DVF0080N	SPACER BALANCER 20 X41X1 thk	8.5	1
4.3	T0210DVF0090N	SPACER BALANCER 20 X41X1.2 thk	8.5	1
4.4	T0210DVF0100N	SPACER BALANCER 20 X41X1.4 thk	8.5	1
5	T0401EVF0020N	PIN NEEDLE WATER PUMP DRIVE GEAR B 4X19.8	8.5	1

#### • CRANKCASE LH – EXPLODED VIEW







SR NO.	PART NO.	PART DESCRIPTION	FRT	QTY
1	T0202CVF0610N	KIT CRANKCASE LH WITH BUSHING AND SLEEVE	8.2	1
2	T0202CVF0620N	KIT CRANKCASE LH WITH BUSHING AND BEARINGS	8.5	1
3	SP0101Q2901	BEARING BALL I/P SHAFT 25x52x15 (6205)	8.5	1
4	T18050LUF0320N	BEARING BALL O/P SHAFT 17x47x14 (6303)	8.5	1
5	B101-SP010100800	BALL BEARING (20x52x15) (C3) BALANCER GEAR	8.5	1
6	SF0209017	SCREW FLCS SK SL M5X0.8X16X8.8	8.5	6
7	T0202CVF0120N	OIL STRAINER (SIEVE)	8.5	1
8	T0202CVF0130N	STRAINER GUIDE (OIL GUIDE)	8.5	1
9	SF0201050	SCREW HEX M5X.8X16X8.8XZN	8.5	2
10	T0202CVF0140N	WASHER DRAIN PLUG	0.2	1
11	T0202CVF0240N	MAGNETIC DRAIN PLUG M24X2_L8	0.2	1
12	T0202CVF0150N	STUD M10X2.23 (Tower Stud)	5.5	2
13	MJ01780000500	DOWEL PIN, HOLLOW (Ø8*12)	5.5	4
14	T0202CVF0470N	HOLLOW DRIVE PIN (DOWEL) DIA. 5XL10	5.5	2
15	MJ01700005800	AL WASHER SEALING (8.2X14X1.25)	5.5	1
16	95701-08020-07	BOLT M8 X 20 (TDC POSITIONING)	5.5	1
17	T0203AVF0110N	ASSEMBLY PRESSURE SIDE OIL PUMP	6.0	1
18	T0203AVF0030N	ASSEMBLY SUCTION SIDE OIL PUMP	6.0	1
19	T0202CVF0720N	OIL RETAINING PLATE	8.5	1

## • CRANKCASE RH – EXPLODED VIEW



SR. NO.	PART NO.	PART DESCRIPTION	FRT	QTY
1	T0202CVF0630N	KIT CRANKCASE RH WITH BUSHING AND SLEEVE	8.5	1
2	T0202CVF0640N	KIT CRANKCASE RH WITH BUSHING, BEARING & OIL SEAL	8.5	1
3	SP010103001	BEARING INPUT SHAFT 17x47x14(6303) ONE SIDE SEALED	8.5	1
4	B101-SP010100900	BEARING OUTPUT SHAFT 25x62x17 (6305)	8.5	1
5	B101-SP010100800	BALL BEARING (20x52x15) (C3)	8.5	1
6	T0202CVF0190N	OIL SEAL A 15X24X5 NBR1 (BALANCER SHAFT FOR BREATHER OUT)	8.5	1
7	MJ01760000500	DOWEL PIN, HOLLOW (Ø8*12)	8.5	2
8	T0202CVF0200N	GASKET CRANKCASE TO CRANKCASE	8.5	1
9	T0202CVF0150N	STUD M10X223 (TOWER STUD)	5.5	2
10	T0202CVF0250N	OIL PRESSURE SWITCH M10X1	4.5	1
11	T0202CVF0410N	ASSY OIL PRESSURE RETAINING VALVE	2.5	1
12	T0202CVF0650N	KIT ASSEMBLY OIL STOPPER	2.5	1
13	SP0102001	HEX.FLANGED BOLT M6X45 (CCASE TO CCASE)	0.5	11
14	TSF0102291	HEX.FLANGED BOLT M6X75 (CCASE TO CASE STARTER AREA)	0.5	3
15	T0202CVF0470N	HOLLOW DRIVE PIN (DOWEL) DIA 5XL 10	0.8	2
16	T0202CVF0180N	OIL SEAL 24X38X6	8.5	1
17	T0202CVF0680N	INTERNAL CIRCLIP OUTPUT SHAFT OIL SEAL (DIA 38X1.5	8.5	1
18	T02170VF0010N	NEUTRAL SWITCH	8.5	1
19	T0203BVF0010N	OIL FILTER ELEMENT	0.3	1
20	T0203BVF0030N	O RING OIL FILTER	0.3	2
21	T0203BVF0050N	OIL FILTER HOLDER AL	0.3	1
22	T1502AB10020N	HOLDING BKT_MAGNETO WIRE	0.3	1

- LIST OF SPECIAL TOOLS

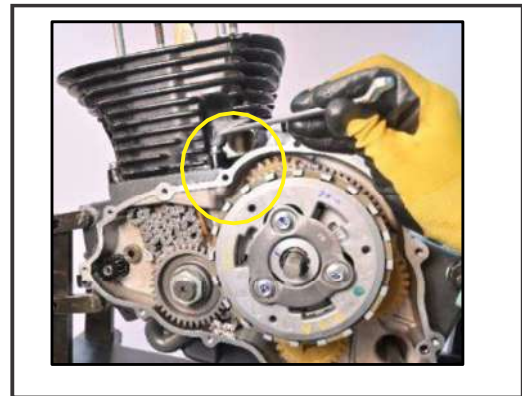
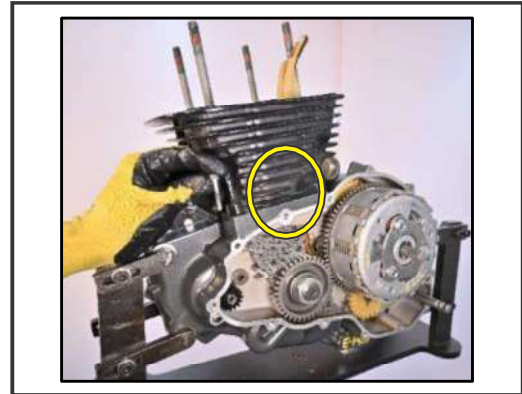
SR. NO.	DESCRIPTION	TOOL	PART NO.
1	Engine Mounting Fixture		T14010VF0300N
2	Piston Pin Remover		T14010VF0040N
3	Magneto Puller		T14010VF0030N
4	Clutch Center Holder		T14010VF0020N

## CYLINDER BLOCK DISMANTLING

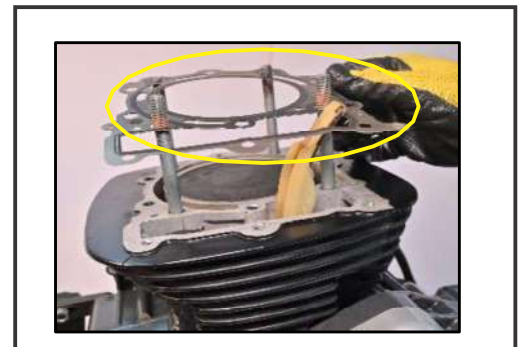
- Remove the cylinder block 2 bolts from clutch side.

Hex Bolt: 2 Nos. - M6x30 mm

Socket Spanner size: 8 mm



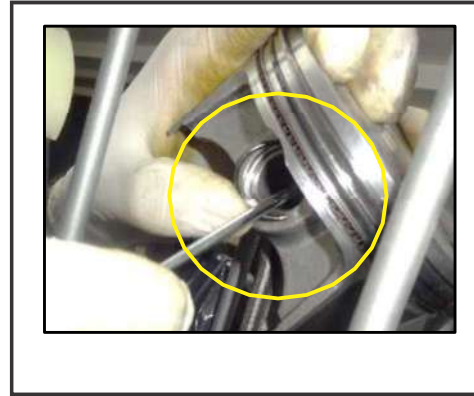
- Remove the cylinder head gasket.



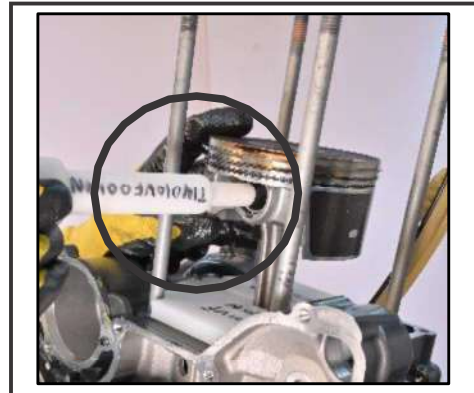
- Remove the cylinder block & cylinder block gasket.



- Remove the Piston Circlip by using special tool



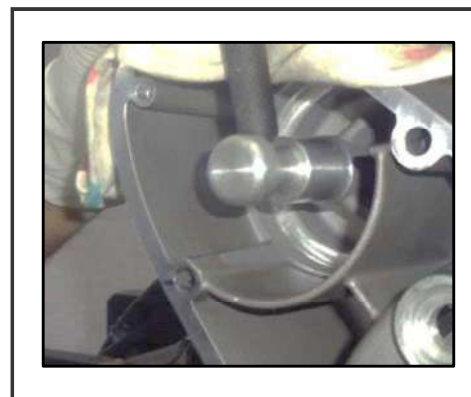
- Remove the Piston Pin by using special tool



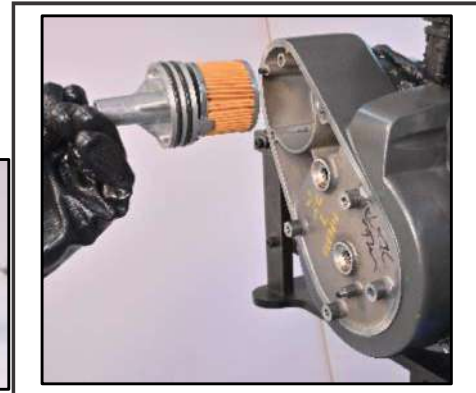
- Remove the Piston assembly.



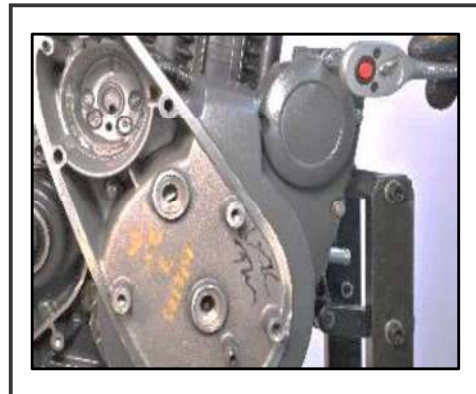
- Remove the oil filter holder by using plastic rod/handle & ensure no damages to magneto side adapter plate gasket surface.



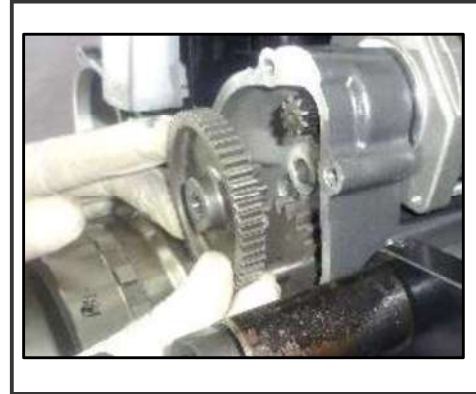
- Remove the oil filter holder by using plastic rod/handle & ensure no damages to magneto side adaptor plate gasket surface.



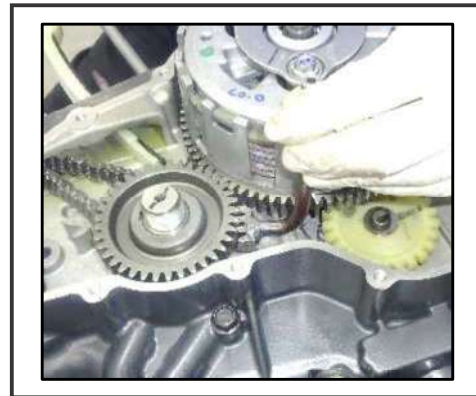
- Remove the magneto side adaptor plate
  - **Hex Bolt: 9 Nos. - M6 x 35 mm**
  - **Socket Spanner size: 8 mm**



- Remove the starter motor idler gear



- Fix the primary gear holder tool on clutch housing.

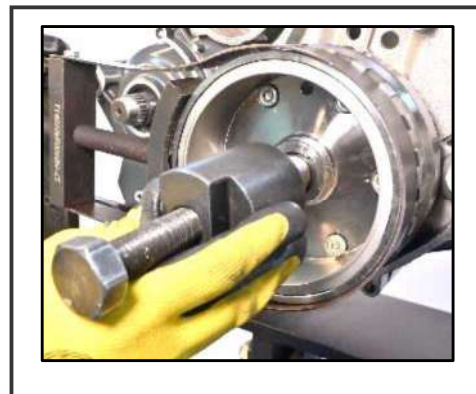


- With the help of long torque wrench loosen the magneto nut

- **Hex Bolt: 1 No. - M22 x 1.5 mm**
- **Socket Spanner size: 32 mm**



- Extract the rotor by using a special tool.



### 3.3.1 BLOCK PISTON

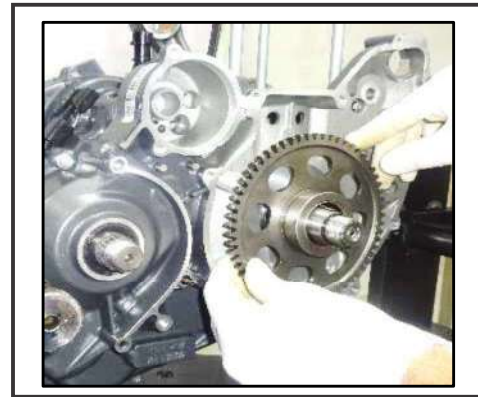
- Change the primary gear holder position.



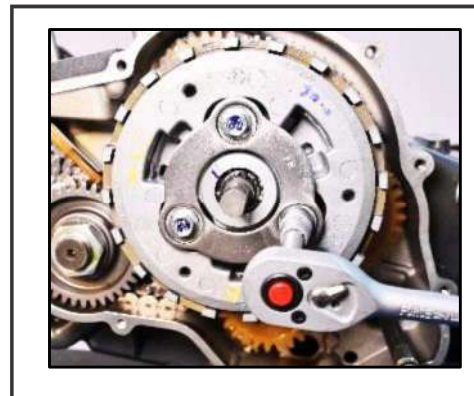
- Remove the rotor assembly.



- Remove the free wheel gear and washer.



- Loosen the clutch housing 3 bolts simultaneously.
  - **Hex Bolt: 3 Nos. – M6 x 35 mm**
  - **Socket Spanner size: 10 mm**



### 3.3.1 BLOCK PISTON

- Remove the clutch spring and clutch center



- With the help of clutch holder tool loosen the clutch nut
- **Hex Nut: 1 No. – M18 x 1.50 mm**
- **Washer – 1Nos**
- **Socket Spanner size: 27 mm**



- Remove the clutch nut and washer

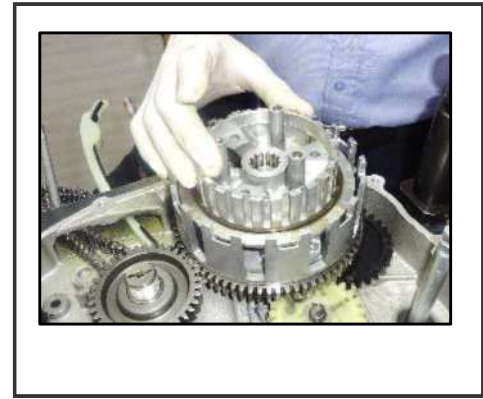


- Remove the primary gear nut and spring washer
- **Hex Nut: 1 No. – M22 x 1.5 mm**
- **Spring Washer: 1 No.**
- **Socket Spanner size: 32 mm**



### 3.3.1 BLOCK PISTON

- Remove the clutch stack, Spline washer and housing



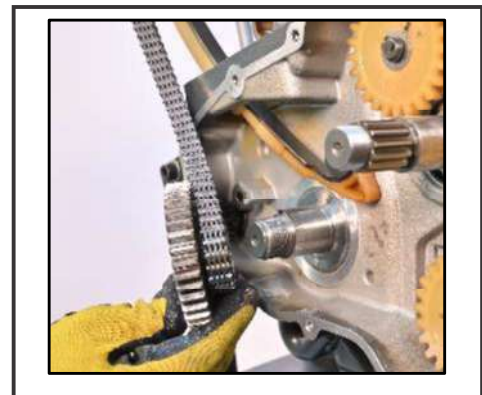
- Remove the clutch needle bearing 2 nos. and washer.



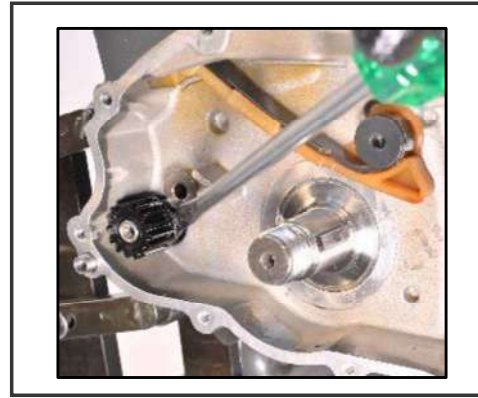
- Remove the primary gear and silent timing chain

#### CAUTION

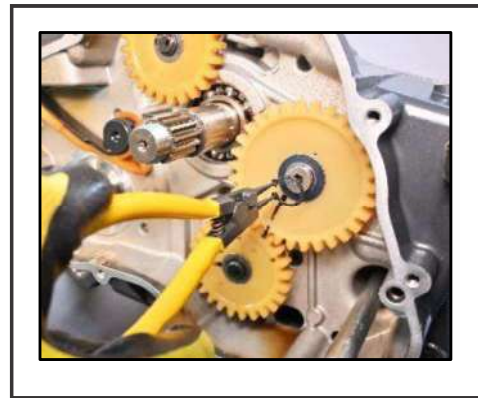
- If While removing gear cloth to be used to avoid scratch due to screw driver
- Ensure no damages to the crank case matching surface while removing coolant gear.



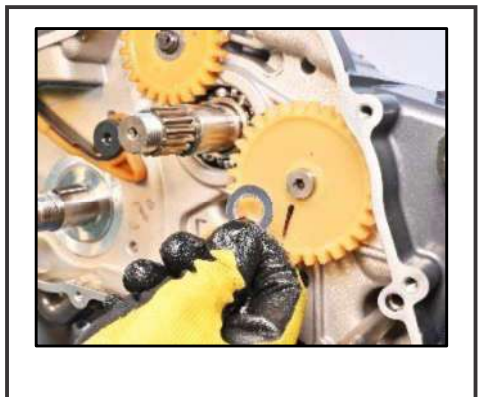
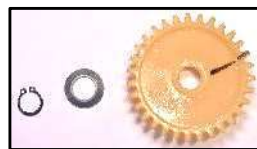
- Remove the coolant gear and pin



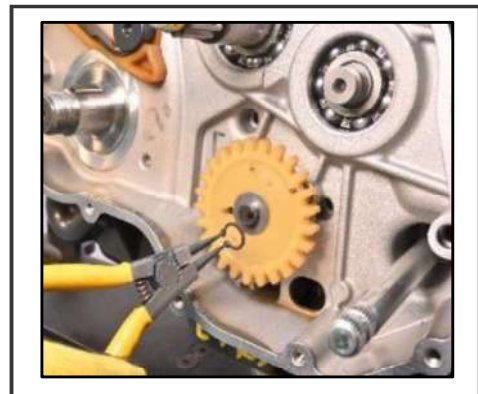
- Remove the oil pump intermediate gear circlip



- Remove the oil pump intermediate gear & washer

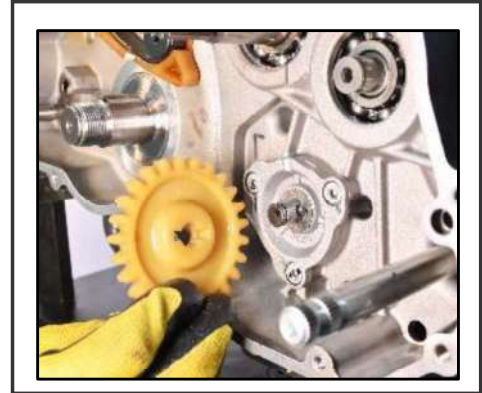


- Remove the delivery pump gear circlip and front washer.





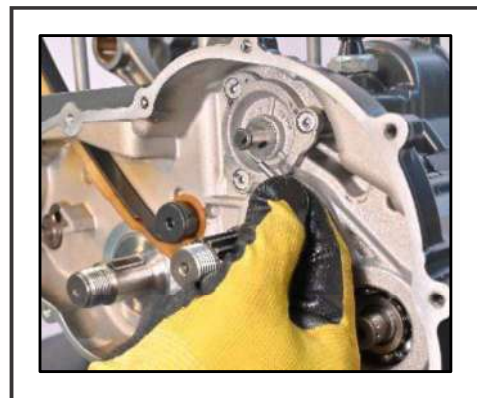
- Remove the delivery pump gear, pin and rear washer.



- Remove the suction pump gear circlip and front washer.



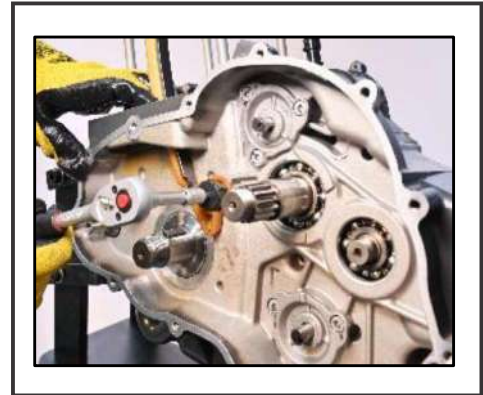
- Remove the Suction pump gear with pin and rear washer



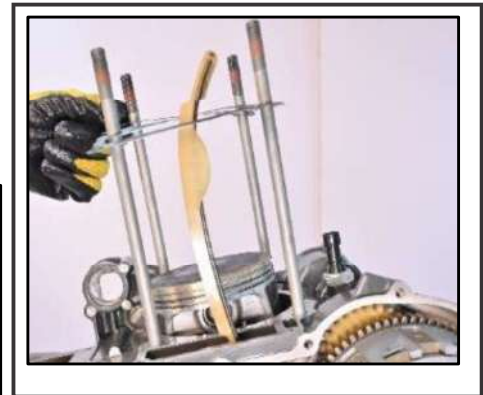


- Remove the slack side chain guide Allen bolt

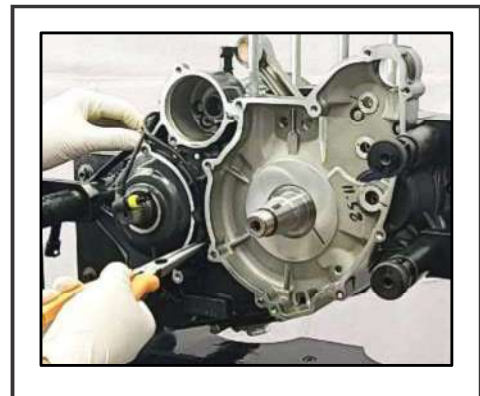
**Allen Bolt: 1 No. – M6**



- Ensure that cylinder block gasket has already removed during block removal process.

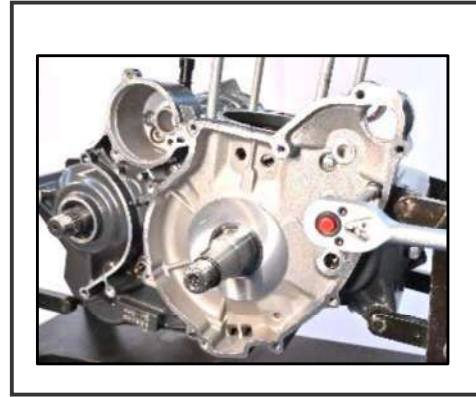


- Remove the Neutral Switch Connector



### 3.3.1 BLOCK PISTON

- Loosen the bolts of RHS crank case

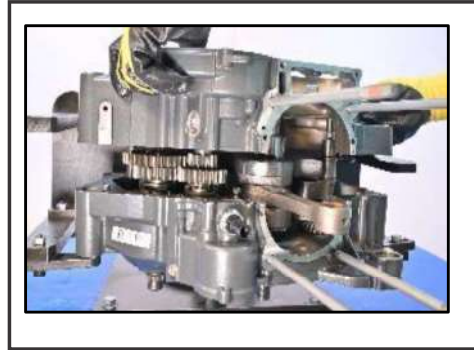


Hex Flanged Bolt: 11 Nos. - M6 x 45 mm

Hex Flanged Bolt: 3 Nos. - M6 x 75 mm

Socket Spanner size: 8 mm

- Remove the LHS crank case

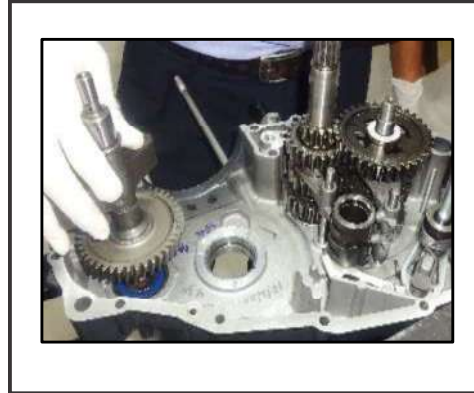


- Remove Crank shaft and Balancer shaft



### CYLINDER BLOCK INSTALLATION

- Fit the Balancer shaft assembly in RHS Crankcase



- Insert oil in crankshaft oil gallery and ensure lubrication of big-end bearing.



- Insert crankshaft thrust washer at Magneto side (1.2mm washer)
- Thrust Washer: 1 No. – 1.2 mm



- Insert crankshaft thrust washer at GPD side
- Thrust Washer: 1 No. – 1.0 mm



- Ensure that the crankshaft is clean, and the oil ways within the crankshaft are clean and free from blockages and debris.

#### Instructions

- Fit the Crankshaft and match the Balancer and Crankshaft's gear dot mark.



- Insert Balancer shaft thrust washer.



- Insert dowel pins at shown locations.
- Inspect the dowel pins for any damages, abnormal wear, deformation or burning.
- Replace if they are out of the service limit.

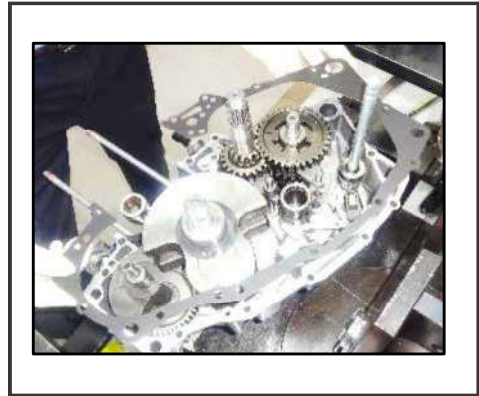


**Dowel Pins: 2 Nos. - Ø8x12 mm**



### Insert Crankcase Gasket

- Ensure that the Gasket is new



### Insert NRV valve

- Ensure NRV valve sits in the slot vertically straight.
- For NRV assy, first spring to be installed along with valve pin screw and then pin to be assembled from top side



- Fit the LHS crank case



- Fit the RHS crank case along with its bolts
- Apply a thin coat of thread-locking adhesive (Loctite 243) to the threads of bolt before fixing
- Ensure free movement of the crankshaft



### 3.3.1 BLOCK PISTON

- Fix the slack side chain guide Allen bolt

- Fit the oil pump intermediate gear on the output shaft & washer



- Inspect the gear for any scratches, damages, abnormal wear and deformation. Replace if necessary.



- Fit the oil pump intermediate gear circlip



- Fit the primary gear and silent timing chain



### 3.3.1 BLOCK PISTON

on crankshaft.

- Fit the timing chain on the gear pinion teeth before fitting the primary gear.
- Inspect the gear for any scratches, damages, abnormal wear and deformation. Replace if necessary.
- Install washer & clutch needle bearing 2 nos.

- Lubricate the clutch needle bearings



- Fit the clutch stack housing and washer

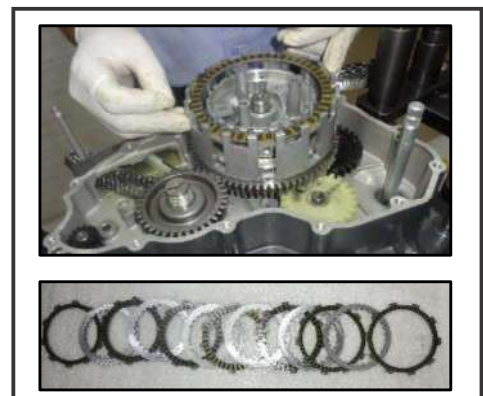


- Fit the clutch hub

- Insert the Judder plain ring with its taper face in downward direction.
- Then insert thin frictional plates and pressure plates one after another. On the top two thin frictional plates and one pressure plate between them should be present

#### CAUTION

- Ensure the clutch plates are all installed in the correct locations. Failure to do so will adversely affect the operation of the clutch.
- Inspect the plates for scratches, damages, abnormal wear and deformation. Replace if necessary.



- Insert new washer and new nut on clutch hub



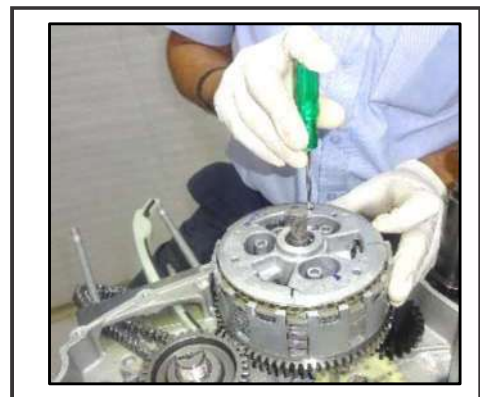
### 3.3.1 BLOCK PISTON



- Apply a thin coat of thread-locking adhesive (Loctite 638) to the threads of bolt before fixing
- With help of clutch holder tool tighten the clutch nut
  - **Hex Nut: 1 No. – M18 x 1.50 mm**
  - **Washer: 1 No.**
  - **Socket Spanner size: 27 mm**
  - **Tighten until finger tight, and then by socket-spanner.**
  - **Torque –16 Kgfm**



- Insert the clutch wheel on top and match the pressure plate with the help of small screw driver



- Fit clutch springs and clutch center

 **CAUTION**



### 3.3.1 BLOCK PISTON



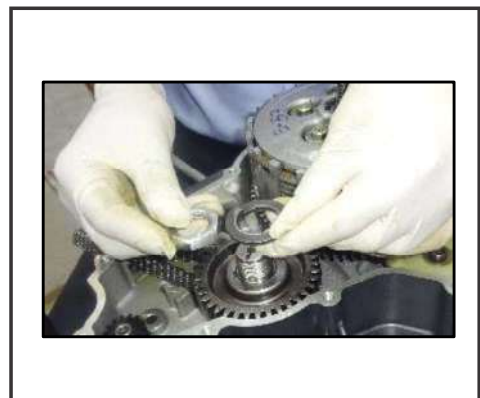
Ensure the clutch springs are all installed correctly under the release plate. Failure to do so will adversely affect the operation of the clutch.



- Tighten the clutch housing bolts simultaneously and level them at the same time
  - **Hex Bolt: 3 Nos. – M6 x 35 mm**
  - **Socket Spanner size: 10 mm**
  - **Tighten until finger tight, and then by socket-spanner.**
  - **Torque –1.1 Kgfm**



- Fit the crankshaft spring washer and nut
- Apply a thin coat of thread-locking adhesive (Loctite 638) to the threads of nut before fixing
  - **Spring Washer: 1 No.**
  - **Hex Bolt: 1 No.**
  - **Socket Spanner size: 8 mm**
  - **Tighten until finger tight, and then by socket-spanner.**
  - **Torque –22 Kgfm**



- Insert washer on crankshaft from magneto side



- Lubricate the crankshaft properly
- Wipe-off any excess oil from the crankshaft

- Fix the free wheel gear.
- Lubricate the free wheel gear bore before fixing.
- Wipe-off any excess oil from the bore
- Fit the rotor assembly (magneto with woodruff key)



- LOCTITE 638 application on taper face – Care to be taken before assembly. Also ensure no oil on taper face.



- Fix the washer and nut on the shaft
- Apply a thin coat of thread-locking adhesive



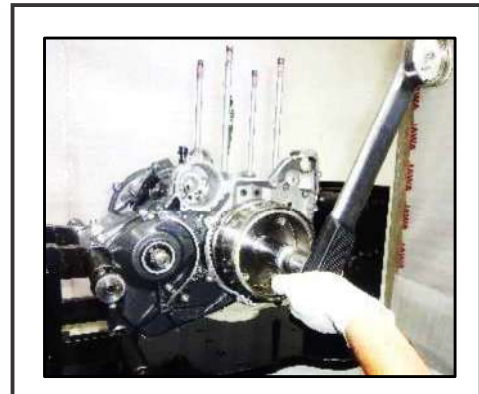
### 3.3.1 BLOCK PISTON

(Loctite 638) to the threads of nut before fixing

- **Hex Bolt: 1 No. - M22 x 1.5 mm**
- **Socket Spanner size: 32 mm**
- **Tighten until finger tight, and then by socket-spanner.**
- **Torque – 22 Kgf**



- Tighten the rotor by using long torque wrench.
- Check the free rotation of Magneto and free wheel.



- Fit the cylinder block gasket
- Ensure that the Gasket is new



- Fit the Piston assembly on the conrod
- Lubricate the piston with clean engine oil before assembling

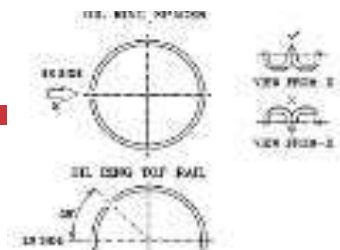
#### **CAUTION**

Failure to use new circlips could allow the circlips to detach from the piston. This could seize the engine and lead to an accident.

- Match the Piston and insert the Piston Pin by using special tool.
- Ensure that one new circlip of piston is already in place.
- Lubricate the piston pin with clean engine oil before inserting.
- Keep the Piston ring end gap as below –
  - Top 1 Intake side
  - Top 2 exhaust side
  - Oil expander towards intake “W” shape
  - Both oil rail towards intake 45/45 degrees



- Refer this orientation for Piston ring assembly. Refer Piston ring chapter for more



### 3.3.1 BLOCK PISTON

information.

- Insert new 2nd outer Piston Circlip by using special tool
- Ensure that the circlip is fixed properly.



- Compress the piston ring with the help of special tool until the tool rests on the crankcase



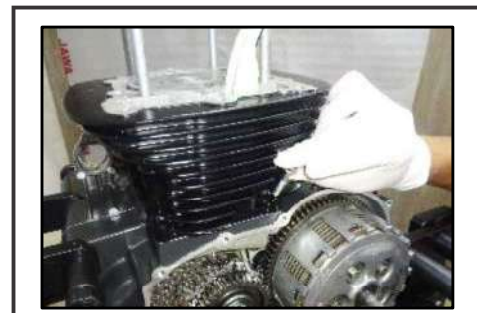
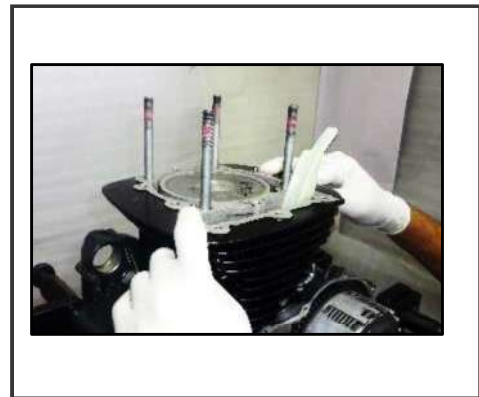
- Lubricate the cylinder block bore before fixing



- Fit the cylinder block
- Wipe-off any excess oil from the bore
- Insert the cylinder block by holding the piston ring compressor in place
- Remove the ring compressor once the rings are entered inside the block

**Dowel Pins: 2 Nos.**

- Insert the dowel pins and push the cylinder block down.
- Inspect the pins for damage, abnormal wear, deformation or burning. Replace them if they are out of the service limit.



- **Hex Bolt: 2 Nos. - M6x30 mm**
- **Socket Spanner size: 8 mm**
- **Tighten until finger tight, and then by socket-**

### 3.3.1 BLOCK PISTON

spanner

- Torque – 1.1 Kgfm

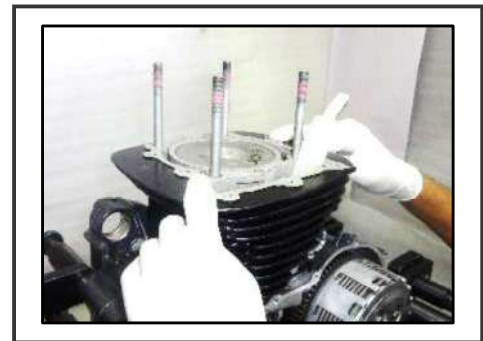
Fix the cylinder block bolts from the clutch side



- Insert the dowel pins and the cylinder head gasket.



- Inspect the pins for damage, abnormal wear, deformation or burning.
- Replace if they are out of the service limit.



- Ensure that the Gasket is new.



- Install the Cylinder Head sub-assembly.



1. **TECHNICAL SPECIFICATION**
2. **DISASSEMBLY OF PISTON & PISTON RINGS**
3. **ASSEMBLY OF PISTON & PISTON RINGS**
4. **TROUBLESHOOTING**

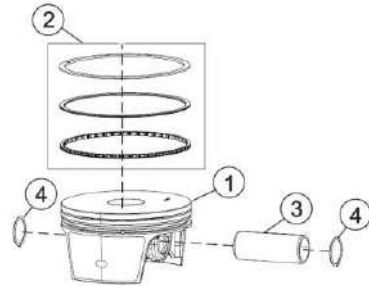
ITEM			STANDARD	SERVICE LIMIT
Piston, piston rings	Piston O.D. at 13 from bottom	A	99.945 - 99.955	99.885
		B	99.955 - 99.965	99.895
	Piston pin Bore I.D.	RH & LH	22.005 - 22.010	22.02
	Piston pin O.D.	Top, mid, bottom	21.994 - 22.0	21.979
	Piston-to-piston pin clearance		0.005 - 0.016	NA
	Piston ring end gap	Top	0.2 - 0.4	0.4
		Second	0.2 - 0.4	0.6
		Oil (Side rail)	0.2 - 0.7	1
	Piston ring-to-ring groove clearance	Top	0.030 - 0.070	0.09
		Second	0.020 - 0.060	0.09
Cylinder-to-piston clearance			0.045-0.070	NA
Connecting rod small end I.D.			22.015 - 22.025	22.04
Connecting rod-to-piston pin clearance			0.015 - 0.031	NA

- Photograph



## 2 DISASSEMBLY OF PISTON & PISTON RINGS

- i. Remove the snap rings (4) from both the sides of piston grove.



- ii. Using special tool piston pin remover "T14010VF0040N" remove the piston pin that connects piston & connecting tool.



- iii. Carefully take out the piston rings & oil retainer ring from the piston grooves.



### 3 ASSEMBLY OF PISTON & PISTON RINGS

- i. Before assembling piston rings in piston check the piston ring gap. Insert the piston ring in block & then insert the piston from the head side.



- ii. After insertion piston into the block rotate the piston to check the freeness  
Piston Ring end cap-  
**Top – Std – 0.2 to 0.4 mm**  
**Second – Std – 0.2 to 0.4 mm**  
**Oil Ring (side rail) – 0.2 to 0.7 mm**



- iv. Check the piston ring end gap with filler gauge.



- v. Install the oil expander ring "W" towards Exhaust



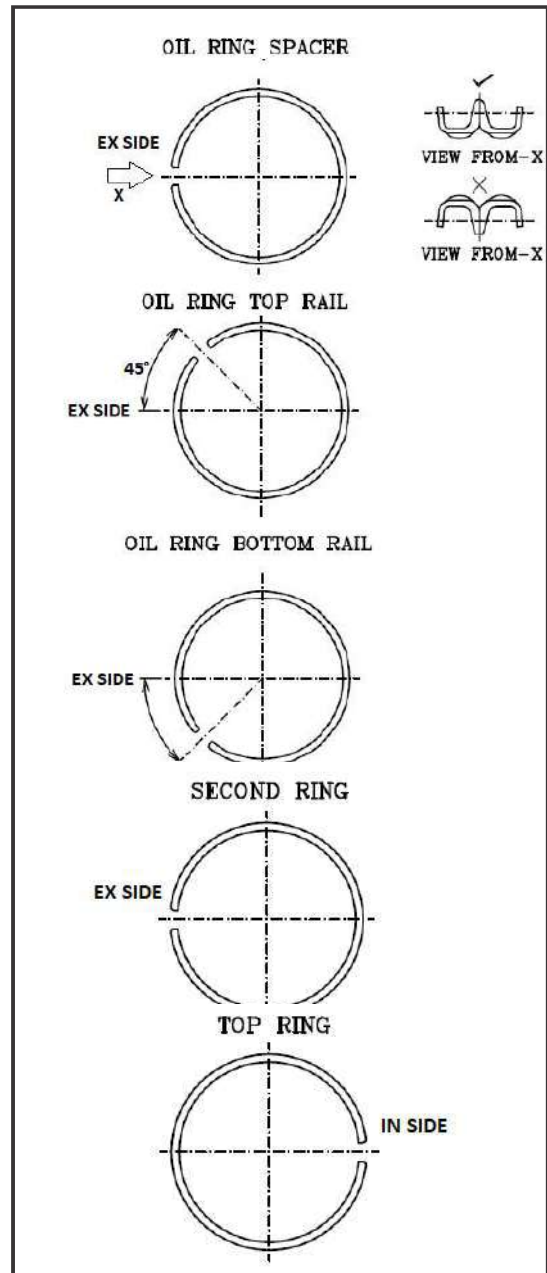
### 3.3.2 PISTON AND RINGS

& Install two oil rail 45/45 degree toward Exhaust.



REFER SHOWN  
ORIENTATION

- vi. install top 1 ring gap towards inlet & top 2nd ring gap towards exhaust.



- iii. Check the piston pin OD. The OD should be between 21.994 to & 22.0 mm.
- iv. Install the piston on the connecting rod small end. Insert the piston pin & lock the piston pin with snap ring on both the sides of piston.



## 4 TROUBLESHOOTING

Here are common piston ring problems and how to troubleshoot them:

### i. **Loss of Compression:**

#### a. Symptoms:

- Reduced engine power, excessive exhaust smoke, poor performance.

#### b. Troubleshooting:

- Perform a compression test to determine if there is a loss of compression in cylinders.
- If compression is low, inspect the piston rings for damage, wear, or improper installation.
- Replace worn or damaged rings with the appropriate size and type.

### ii. **Excessive Blow-By:**

#### a. Symptoms:

- Oil or exhaust gas escaping past the piston rings into the crankcase.

#### b. Troubleshooting:

- Inspect the piston rings for damage, wear, or improper seating.

- Replace worn or damaged rings and ensure they are correctly installed.

#### iii. Excessive Oil Consumption:

##### a. Symptoms:

- Frequent need to top up engine oil, blue smoke from the exhaust.

##### b. Troubleshooting:

- Check for leaks or external oil sources.
- Perform a wet and dry compression test to determine if the oil is being burned due to worn rings.
- If the wet compression test shows a significant increase in pressure, it indicates worn piston rings.

#### iv. Ring Sticking or Carbon Buildup:

##### a. Symptoms:

- Loss of power, poor fuel economy, smoking exhaust.

##### b. Troubleshooting:

- Remove the cylinder head and piston to inspect the rings.
- Examine the rings for carbon buildup or sticking to the piston groove.
- Clean the rings and grooves using an appropriate cleaner and a ring groove cleaning tool.
- Replace any damaged or excessively worn rings.

#### v. Ring End Gap Issues:

##### a. Symptoms:

- Uneven compression, poor performance, engine knocking.

##### b. Troubleshooting:

- Measure the end gap of the piston rings with a feeler gauge to ensure they are within the specifications.
- If the end gap is too small, the rings may expand and seize. If it's too large, it can lead to poor compression.
- Replace rings with the correct end gap specifications as specified in the service manual.

#### vi. Incorrect Ring Installation:

##### a. Symptoms:

- Poor compression, loss of power, engine noise.

##### b. Troubleshooting:

- Ensure the piston rings are correctly installed with the proper orientation and gaps.
- Disassemble and reassemble the rings correctly if they were installed improperly.

- 1. INTRODUCTION**
- 2. TECHNICAL SPECIFICATION**
- 3. LOCATION**
- 4. STARTER MOTOR & FREE WHEEL COMPONENTS**
- 5. DISASSEMBLY OF STARTER MOTOR**
- 6. ASSEMBLY OF STARTER MOTOR**
- 7. TROUBLESHOOTING**

### 1. INTRODUCTION

Here's a general overview of how an electric starter motor works in a motorcycle:

i. Starter Motor:

The electric starter motor is typically located on the side of the engine. It is a small electric motor powered by the motorcycle's battery.

ii. Battery:

The motorcycle's battery supplies the electrical power needed to turn the starter motor. It must be in good condition to provide sufficient power.

iii. Starter Button:

To start the motorcycle, the rider usually pushes a starter button on the handlebars, which sends an electrical signal to the starter motor.

iv. Solenoid:

In many motorcycles, a solenoid is used to engage the starter motor with the engine's flywheel. When the starter button is pressed, the solenoid creates a magnetic field that moves a plunger, connecting the starter motor to the engine.

v. Starter Motor Operation:

Once engaged, the starter motor spins a gear, which meshes with the motorcycle's engine's flywheel or starter clutch. This rotation turns the engine over, initiating the internal combustion process.

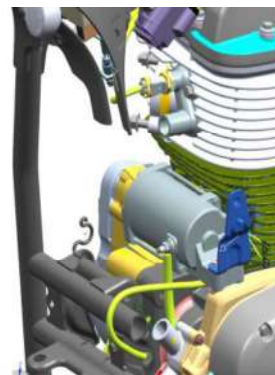
vi. Engine Starting:

As the starter motor turns the engine, the spark plug ignites the fuel-air mixture, and the engine comes to life. Once the engine is running, the rider can release the starter button.

### 2. TECHNICAL SPECIFICATION

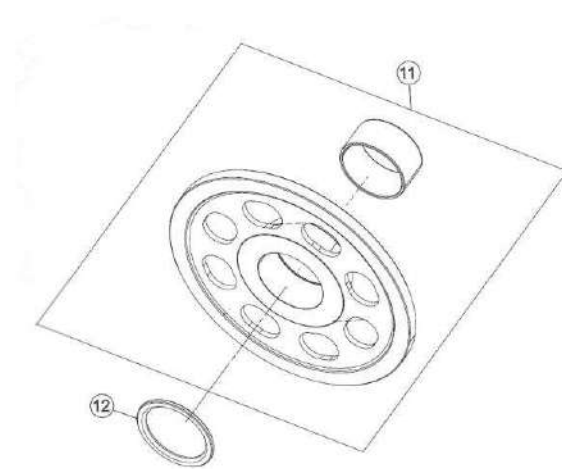
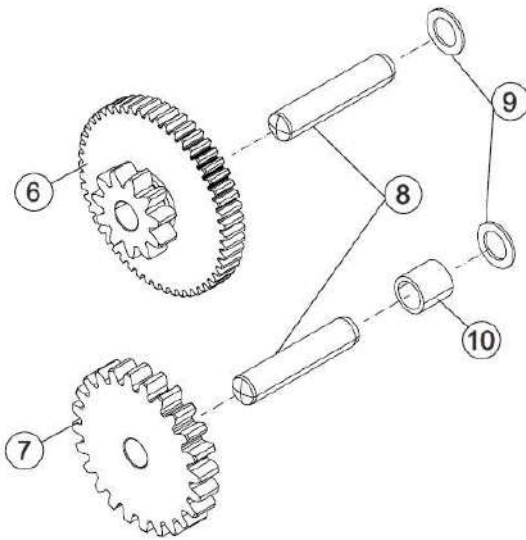
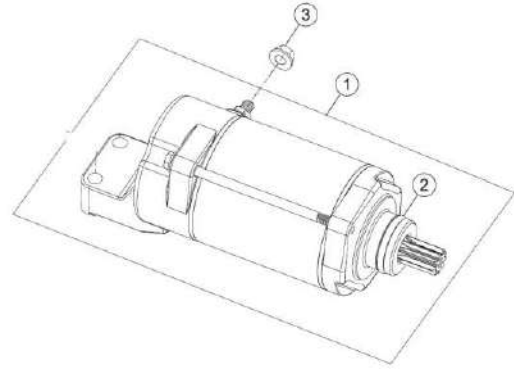
- Starter driven gear - (11/52T)
- Driven type – Electric driven

### 3. LOCATION IN VEHICLE



## 4. STARTER MOTOR & FREE WHEEL COMPONENTS

- 1 T1503BVF0010N - STARTER MOTOR ASLY
- 2 T1503BVF0020NO - RING (SPIGOT STARTER MOTOR)
- 3 65538380 - NUT FLANGE 6MM
- 6 T0205BVF0010N IDLER GEAR 11/52
- 7 T0205BVF0020N IDLER GEAR 24T
- 8 T0205BVF0030N SHAFT IDLE GEAR STARTER
- 9 T0205BVF0050N WASHER STARTER GEAR
- 10 T0205BVF0040N SPACER
- 11 T1502AVF0100N ASSEMBLY FREEWHEEL GEAR AND BUSH
- 12 T1502AVF0150N WASHER FREEWHEEL GEAR



### NOTE

Before working on Starting system allow the vehicle to cool down if it is in hot condition. Ensure the ignition switch is in OFF position. Disconnect the wiring harness connector connected to starter motor before carrying out any work on starter motor.

## 5. DISASSEMBLY OF STARTER MOTOR

1. Put the ignition key in OFF position.
2. Disconnect the starter motor wiring harness connector connected to starter motor.

### 3.4 STARTER MOTOR & FREE WHEEL

3. Remove the two hex bolts holding the starter motor as shown in the below figure and take out the starter motor from its mountings.



## 6. ASSEMBLY OF STARTER MOTOR

1. Check the starter motor for proper functioning.
2. Check the starter motor gear teeth's for worn out. Replace the starter gear with new one, if required.
3. Check the mounting bolts for proper threading.
4. Check the wiring harness connectors for any damage. Replace with the new one if required.
5. Assembly the starter motor in the reverse order of removal.



## 7. TROUBLESHOOTING

Here are some general troubleshooting steps for an starter motor:

- i. Check the Battery:
  - a. Ensure the motorcycle's battery is charged and in good condition. A weak or dead battery can prevent the starter motor from working correctly. Charge or replace the battery if necessary.
- ii. Ignition Switch and Kill Switch:

- a. Verify that the ignition switch is in the "on" position, and the kill switch (if equipped) is set to "run."
- iii. Fuse Inspection:
  - a. Inspect the motorcycle's fuses to ensure none are blown. Replace any blown fuses with the correct type and rating.
- iv. Starter Button:
  - a. Check the starter button on the handlebars. Make sure it's functioning correctly. Sometimes, it can get dirty or damaged, leading to connectivity issues.
- v. Wiring and Connections:
  - a. Inspect all wiring connections for loose or corroded terminals. Clean and tighten them as necessary.
- vi. Grounding:
  - a. Verify that the motorcycle's electrical system has a good ground connection. A poor ground can prevent the starter motor from working.
- vii. Starter Motor Condition:
  - a. If all the above checks out and the starter motor is still not working, it may be a problem with the starter motor itself. You may need to remove and test the starter motor to ensure it's functioning correctly. If it's faulty, it may need to be replaced or rebuilt.
- viii. Safety Switches:
  - a. Some motorcycles have safety interlock switches, such as the clutch switch or neutral safety switch, which prevent the starter from engaging unless certain conditions are met. Ensure these switches are functioning properly.
- ix. Starter Relay:
  - a. Check the starter relay for proper operation. If it's not working, it may need to be replaced.

- 1. INTRODUCTION**
- 2. TECHNICAL SPECIFICATION**
- 3. PART IDENTIFICATION OF I/P & O/P SHAFT**
- 4. DISASSEMBLY & ASSEMBLY OF I/P & O/P SHAFT**
- 5. TROUBLESHOOTING**

The transmission assembly in a BSA motorcycle, is a critical component responsible for transmitting power from the engine to the rear wheel. It plays a key role in controlling the speed and direction of the motorcycle. The transmission assembly typically includes several important parts and mechanisms:

**1. Gearbox:** The gearbox is the primary component of the transmission assembly. It contains a series of gears that can be engaged or disengaged to change the speed and power output of the motorcycle.

**2. Clutch:** The clutch is used to temporarily disconnect the engine's power from the gearbox. It allows the rider to change gears and come to a stop without turning off the engine. BSA motorcycles typically have a manual clutch lever that the rider operates to engage or disengage the clutch.

**3. Chain:** BSA motorcycles use a chain system to transfer power from the transmission to the rear wheel.

**4. Transmission Case:** The transmission components are housed within a protective case, which also contains the necessary lubricants to ensure smooth operation.

### 2. TECHNICAL SPECIFICATION

Clutch System	A&S Type Clutch
Clutch operation system	Pull Type
Transmission	Constant mesh, 5-speed (Manual)
Primary reduction	1:1.946
Final reduction	1:2.938
Gear ratio 1 <sup>st</sup>	1:2.75
2nd	1:1.75
3rd	1:1.313
4th	1:1.045
5th	1:0.875
Gearshift pattern	1 - N - 2 - 3 - 4 - 5 (Left foot operated)

Transmission assembly consists of the input shaft and output shaft assembly.

### 3.PART IDENTIFICATION OF INPUT & OUTPUT SHAFT ASSEMBLY

#### 3.1 Parts of Input shaft /Drive shaft Assembly.

1. Input Shaft, T/M
2. Gear 4<sup>th</sup> Drive
3. Thrust Washer Plain 25.6X28.5X1.5
4. Snap ring 25
5. Gear 3<sup>rd</sup> Drive
6. Thrust Washer\_21.2X27.5X1
7. Needle Bearing 21X25X13
8. Gear 5<sup>th</sup> Drive
9. Gear 2<sup>nd</sup> Drive



#### 3.2 Parts of Output Shaft/Driven Shaft

1. Output Shaft, T/M (Drive Shaft)
2. Needle Bearing 22X26X10
3. Needle Bearing 22X26X13
4. Gear 2<sup>nd</sup> Driven
5. Thrust washer spline 22.35X31.4X2
6. Gear 5<sup>th</sup> Drive
7. Gear 3<sup>rd</sup> Driven
8. Step Thrust / Spline Washer 22.35X25.5X2.9
9. Gear 4<sup>th</sup> Driven
10. Thrust Washer\_21.2X30X1
11. Needle Bearing 21X25X10
12. Gear, 1<sup>st</sup> Driven
13. Thrust Washer 17.2X30X(1/1.5/2)

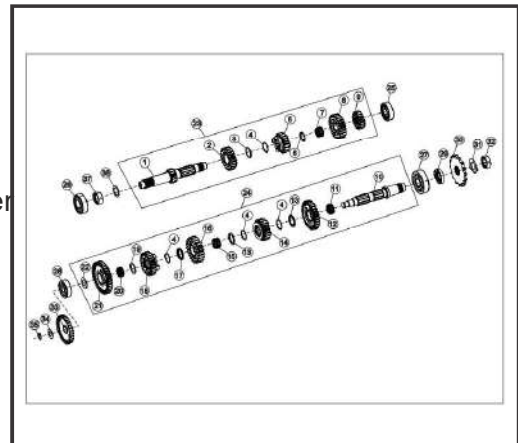


#### NOTE

Input assembly shaft and output assembly shaft forms a Complete Transmission system. Hence both the assemblies must be taken out completely in pair while repairing.

### 4.DISASSEMBLY OF INPUT SHAFT/DRIVE SHAFT ASSEMBLY

1. Take out the Gear 5<sup>th</sup> Drive (8) and Gear 2<sup>nd</sup> Drive (9) Mounted on the splines of Input Shaft
2. Take out the Needle Bearing (7) and Thrust Washer (6)
3. Take out the Gear 3<sup>rd</sup> Drive (5), Snap ring (4), Thrust washer (3) and Gear 4<sup>th</sup> Drive (2) Mounted on the Center of the Input Shaft

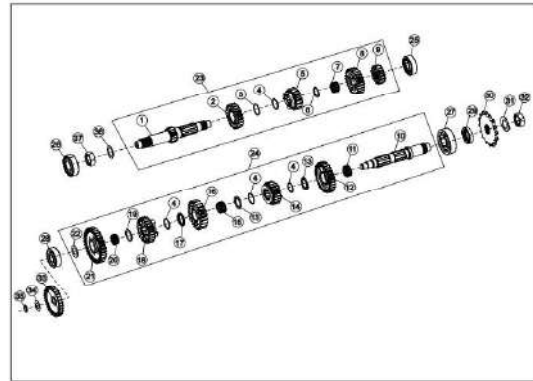


- Now the Input Shaft is free all its Mountings.



### 4.1 ASSEMBLY OF INPUT SHAFT

- Before assembling its mandatory to clean all the Gears and Input Shaft with clean petroleum. Use soft brush to clean Gears
- Ensure that there are no burrs and sludge found on Gear and Input Shaft Before assembly
- Inspect the Gears and Input Shaft for any damage/Broken teeth's and splines
- Assembly the Input Shaft assembly in the reverse order of removal



#### NOTE

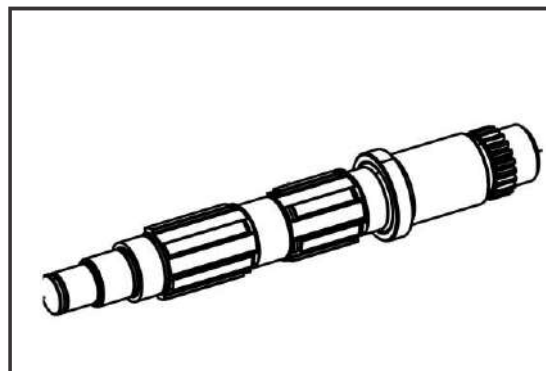
- While removal of Bearing mounted on the Input Shaft always use the bearing removal tool.

### 4.2 DISASSEMBLING OF OUTPUT SHAFT/DRIVEN SHAFT

- Remove the gear 1<sup>st</sup> driven and needle bearing (20)
- Remove the Thrust washer (19) and gear 4<sup>th</sup> driven (18) from the splines of Output shaft.
- Remove the snap ring (4) using nose plier and take out the spline washer (17)
- Remove the gear 3<sup>rd</sup> driven (10) and need bearing (15) using a bearing removal tool.



5. Remove thrust washer (13) and snap ring (4) and out the gear 5<sup>th</sup> driven from the splines of output shaft
6. Remove the snap ring (4) and thrust washer (13) and take out the gear 2nd drive (12) and need bearing (11) from Output shaft



### 4.3 ASSEMBLY OF OUTPUT SHAFT

1. Before assembly its mandatory to clean all the gear, bearings, washer and circlips and Output Shaft with clean petroleum. Use soft brush to clean Gears and splines of shaft
2. Ensure that there are No burs and sludge found on gear and Output Shaft before assembly
3. Inspect the gears and Input Shaft for any damage/broken teeth's and splines
4. Assembly the output shaft assembly in the reverse order of removal



#### NOTE

Paring of Input shaft Assembly and output shaft assembly must be done properly. Proper pairing ensures the proper meshing of the Gears with their mating parts. Improper pairing leads to gear tooth break and rattling sound in the transmission.

## 5. TROUBLESHOOTING



#### NOTE

Gather Information:

Start by gathering as much information as possible. Talk to the owner or rider to get details about the symptoms they're experiencing. Common transmission problems include difficulty shifting, slipping gears, grinding noises, and more. Note any recent maintenance or repairs.

#### i. Visual Inspection:

Perform a visual inspection of the motorcycle's transmission. Look for loose or damaged components, leaks, and any obvious signs of wear and tear. Check the condition of the transmission oil and look for any metal shavings or debris in it.

#### ii. Check the Clutch:

Often, clutch-related issues can mimic transmission problems. Ensure the clutch is adjusted correctly and

functions properly. Inspect the clutch plates, springs, and release mechanism for any signs of wear or damage.

iii. **Shifting Problems:**

If there are issues with shifting, check the gear shift lever, linkage, and related components for misalignment or damage. Adjust the shift lever and linkage if necessary.

iv. **Transmission Oil:**

Drain and inspect the transmission oil. If it's dirty or contains metal particles, it could indicate internal transmission problems. Replace the oil with the recommended type and quantity.

v. **Internal Transmission Inspection:**

If the external inspection and oil change don't resolve the issue, you may need to disassemble the transmission for an internal inspection. This is a complex task and should be performed by a skilled mechanic & as per specifications.

vi. **Gears and Bearings:**

Inspect the condition of gears, shafts, and bearings within the transmission. Worn or damaged components should be replaced.

vii. **Synchronizers:**

Transmission synchronizers ensure smooth gear engagement. If there are issues with gears grinding, inspect and replace worn synchronizers if needed.

viii. **Seals and Gaskets:**

Check for leaks from the transmission. Replace any damaged seals or gaskets, which can cause oil leakage and damage.

ix. **Reassembly and Adjustment:**

Reassemble the transmission carefully, ensuring all parts are properly aligned and torqued to the specifications. Adjust the clutch and shift linkage to ensure smooth operation.



**NOTE**

If you're not comfortable with the complexity of transmission assembly and diagnosis, it's advisable to consult a manufacturer's support for assistance. They have the experience, tools, and expertise to handle transmission issues effectively.

1. **GENERAL GUIDELINES**
2. **COOLANT RECOMMENDATION**
3. **SPECIFICATION**
4. **COOLANT INSPECTION**
5. **COOLANT REPLACEMENT**
6. **TROUBLESHOOTING**

## 1. GENERAL GUIDELINES

### A. Introduction

When it comes to choosing the right coolant for your BSA motorcycle, like any other vehicle, it's essential to follow the recommendations and guidelines. However, we will provide you some general guidelines for using MOTUL INUGEL EXPERT and CASTROL REDICOOL HD (PREMIX) coolants in your BSA motorcycle.

**Coolant Change Interval:** Follow the recommended coolant change interval. Regularly check the coolant level and condition in the reservoir.

**Flush the Cooling System:** Before adding a new coolant, it's a good practice to flush the cooling system to remove any old coolant, debris, or contaminants. Flushing should be done following the recommended instructions.

**Bleeding the Cooling System:** After changing the coolant, ensure that you properly bleed the cooling system to remove any air bubbles. Air pockets can reduce cooling efficiency and lead to overheating.

**Maintenance Checks:** Periodically inspect the cooling system components, including hoses, radiator, and thermostat, for any signs of damage or wear. Replace any damaged parts promptly.

**Coolant Level:** Keep the coolant level within the recommended range. Avoid overfilling, as excessive coolant can lead to system pressure issues.

**Avoid Mixing Coolants:** It is generally not recommended to mix different types or brands of coolant. Stick with one type and brand to maintain consistency and effectiveness.

### NOTE

**Dispose of Old Coolant Properly:** When disposing of old coolant, follow local environmental regulations. Coolant is considered hazardous waste and should not be poured down drains or onto the ground.

## 2. COOLANT RECOMMENDATION

Recommended Radiator coolant –  
**MOTUL INUGEL EXPERT CASTROL REDICOOL HD (PREMIX)**



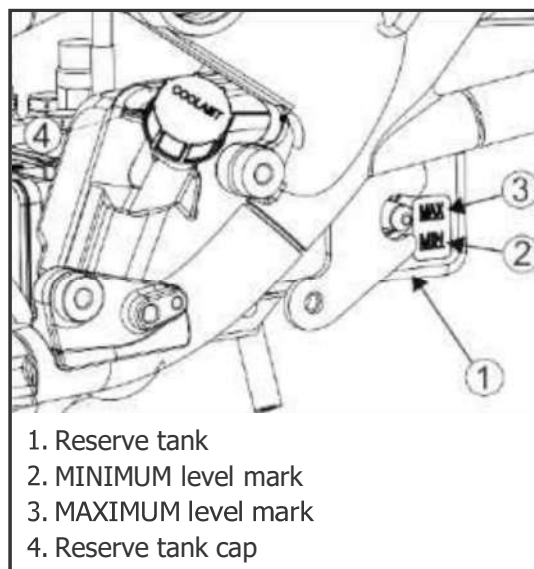
### 3. COOLANT SPECIFICATIONS

#### Coolant Capacity

Radiator and Engine	:	1760 ml (Radiator + Reservoir Tank)
		Reservoir Tank - 150 ml Hoses +
		Radiator - 1610 ml
Radiator cap relief pressure :	1.4 Bar +/- 0.5	
Bar Thermostat Begin to open :	88 +/- 2°C	
Fully open :	98°C	
Valve Lift :	6mm Minimum	

### 4. COOLANT INSPECTION

- Place the vehicle on the paddock.
- The reserve tank is located below the swing arm in front of the rear tyre. Check the coolant level in the reserve tank (1).
- Ensure that the engine is at the normal operating temperature and motorcycle is in an upright position.
- If the coolant level is below the Min level mark (2).
- Add coolant mixture until it reaches the MAX level mark (3).
- Always add coolant to the reserve tank, open the reserve tank cap (4) to add the coolant.
- Do not attempt to add coolant by removing the radiator cap.
- If the reserve tank is empty, or if coolant loss is excessive, check for leaks and visit dealer for repair.



#### NOTE

Removing the radiator cap while the engine is hot can cause the coolant to spray out and seriously injuring you.

Always let the engine & radiator cool down before removing the coolant.

### 5. COOLANT REPLACEMENT

- Place the vehicle on the paddock.
- Position a drip tray beneath the engine.
- Remove adaptor plate bolt to drain coolant (1).



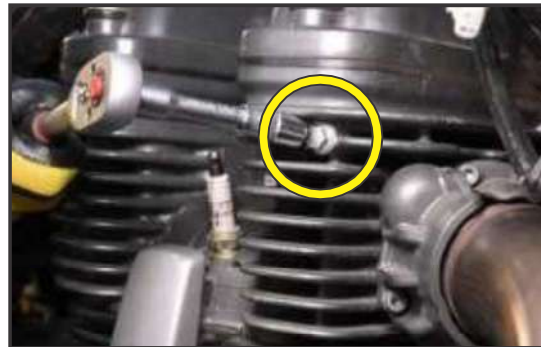
- Hold a funnel below the drain and open the radiator cap.
- Drain off all the coolant.



- Remove fastener (2), lift out the expansion tank and drain off all coolant.
- Install the expansion tank.
- Tighten the adaptor bolt (1) along with washer and put vehicle on center stand.



- Slacken bleed screw in cylinder head (3).



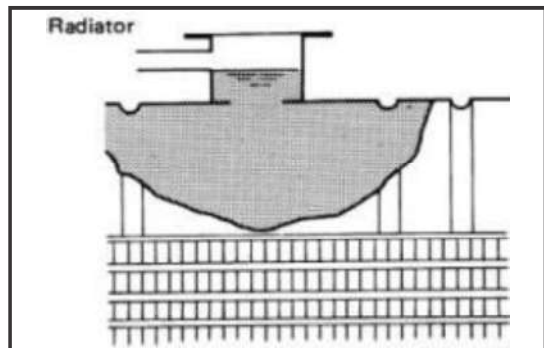
- Fill the radiator until coolant escapes at the bleedscrew.
- Repeatedly squeeze the coolant hoses to expel the air.
- Tighten bleed screw.
- Top up coolant until the level reaches the top of the filler neck (4).



- Top up expansion tank to the MAX mark.
- Engine Coolant Capacity (with reservoir Tank at "Max" Level) – Approximately 1.76 litre
- Install Radiator Cap.



- Warm up until opening the thermostat. (Standard for warming-up time is appx. 3 min at 4000 rpm.) make sure the thermostat opening condition by touching radiator hose to see a flow of warm coolant. Please avoid overheating the engine.



- Stop the engine and cool down to less than approximately 50°C
- Cool down using external blower to reduce the time.
- Refill Reservoir Tank to "max" level line with engine coolant.
- Check cooling system for leaks with engine running.

**NOTE**

- Do not use non-ethylene glycol coolant, tap water, nor mineral water while adding or replacing the coolant.
- Use of improper coolant may cause damage, such as corrosion in the engine, blockage of the cooling passage or radiator and premature wear of the water pump seal.
- Use any genuine COOLANT without diluting with water.

**CAUTION**

- Never remove the radiator cap when the engine is hot.
- Serious burns could occur from high pressure engine coolant escaping from the radiator.
- High Testing Pressure than specified values may damage radiator.
- If Coolant Level decreases below 'MIN' Mark of Coolant Tank, refill the coolant of recommended brand.
- In case of any damage, replace damaged parts.
- To avoid being scalded, never change engine coolant when the engine is hot.
- Wrap a thick cloth around the radiator cap and carefully remove radiator cap.
- First, turn radiator cap a quarter of a turn to release build-up pressure. Then turn radiator cap all the way.
- Be careful not to allow engine coolant to contact peripheral parts.

**6. TROUBLESHOOTING****i. Coolant Leaks:**

- Symptoms: Puddles of coolant under the bike, low coolant levels, overheating.
- Solution: Inspect the entire cooling system for leaks. Check hoses, connections, and the radiator for any visible damage or loose fittings. Replace or repair damaged components. Ensure the radiator cap is sealing properly.

**ii. Overheating:**

- Symptoms: Rising engine temperature, engine running hot.
- Solution: Check the coolant level when the engine is cold. If it's low, top it up with the recommended coolant. Ensure there are no obstructions in the radiator or cooling fins. Check the thermostat for proper operation and replace it if necessary. Also, verify that the cooling fan is functioning correctly.

**iii. Rust or Corrosion:**

- Symptoms: Rust-colored coolant, engine overheating, reduced cooling efficiency.
- Solution: Drain the old coolant and flush the system with a radiator flush solution as per the procedure. After flushing, fill the system with fresh coolant according to the recommendations. Regularly changing the coolant will help prevent rust and corrosion.

### **iv. Coolant Contamination:**

- Symptoms: Milky or oil-like substance in the coolant, overheating, poor engine performance.
- Solution: If you suspect coolant contamination with engine oil, it could indicate a leaking head gasket or a cracked engine block. Inspect the head gasket and engine block for signs of damage and repair or replace as needed.

### **v. Clogged Radiator:**

- Symptoms: Reduced cooling efficiency, overheating.
- Solution: Inspect the radiator for debris, dirt, or bugs that may be blocking airflow. Clean the radiator using a soft brush or compressed air. If the radiator is severely clogged, consider removing it for a more thorough cleaning or repair.

### **vi. Air in the Cooling System:**

- Symptoms: Gurgling or bubbling sounds in the coolant system, erratic temperature readings.
- Solution: Bleed the cooling system to remove any trapped air. Refer to the motorcycle's service manual for the correct procedure, as it can vary between models.

### **vii. Thermostat Issues:**

- Symptoms: Engine temperature fluctuations, slow warm-up.
- Solution: Test the thermostat by placing it in hot water and checking if it opens at the specified temperature. If it doesn't, replace it with a new one.

### **3 ELECTRICAL**

#### **3.3 SENSOR AND ACTUATOR**

#### **3.4 BATTERY**

#### **3.5 ELECTRICAL CIRCUIT**

##### **3.5.1 COMPLETE CIRCUIT DIAGRAM**

##### **3.5.2 FUSE DISTRIBUTION**

##### **3.5.3 LIGHTING SYSTEM**

##### **3.5.4 STARTING CIRCUIT**

##### **3.5.5 CHARGING SYSTEM**

##### **3.5.6 IMMOBILIZER CIRCUIT**

##### **3.5.7 ABS CIRCUIT**

#### **3.6 Other Electrical Components**

##### **3.6.1 RR UNIT**

##### **3.6.2 LH & RH HANDLE BAR SWITCH**

##### **3.6.3 HEADLAMAP ASSY**

##### **3.6.4 FRONT & REAR INDICATOR**

##### **3.6.5 HORN**

#### **3.7 BCM**

#### **3.8 IMMOBILIZER**

#### **3.9 FUEL PUMP**

#### **3.10 ABS SYSYTEM**

#### **3.11 RELAY AND FUSES**

#### **3.12 SPEEDOMETER**

#### **3.13 WIRING HARNESS ROUTING**

#### **3.14 DTC**

#### **3.15 TROUBLESHOOTING**

- 1. ELECTRONIC FUEL INJECTION (EFI)**
- 2. COOLANT TEMPERATURE SENSOR**
- 3. THROTTLE BODY – ELECTRONIC COMPONENTS**
  - a. IACV - IACV–IDLE AIR CONTROL VALVE**
  - b. TPS – THROTTLE POSITION SENSOR**
  - c. TMAP – TEMPERATURE AND MANIFOLD ABSOLUTE PRESSURE**
  - d. FUEL INJECTOR**
- 4. LAMBDA SENSOR / O<sub>2</sub> (OXYGEN) SENSOR**
- 5. ECU – ELECTRONIC CONTROL UNIT**
- 6. ROLL OVER SENSOR**
- 7. IGNITION COIL**
- 8. FUEL PUMP**
- 9. CRANK SENSOR**
- 10. SIDE STAND SWITCH**

## 1. EFI - Electronic Fuel Injection

**Fuel Injection System:** EFI is a modern fuel delivery system that has largely replaced traditional carburetors in motorcycles and other vehicles. It precisely manages the delivery of fuel to the engine's cylinders for combustion.

**Components:** A typical EFI system for a motorcycle includes several key components:

- **Fuel Injectors:** These are small nozzles that spray fuel into the intake manifold or directly into the combustion chamber.
- **ECU (Engine Control Unit):** The ECU is the brain of the EFI system. It collects data from various sensors and calculates the optimal amount of fuel to inject into the engine for efficient combustion.
- **Sensors:** Various sensors monitor the engine's condition and provide data to the ECU. Common sensors include the throttle position sensor, oxygen sensor, air temperature sensor, and engine temperature sensor.
- **Fuel Pump:** The fuel pump delivers fuel from the tank to the injectors.
- **Intake Air Temperature Sensor:** Measures the temperature of incoming air.
- **Throttle Position Sensor (TPS):** Monitors the position of the throttle and how much it's open.
- **Oxygen Sensor (O2 Sensor):** Measures the amount of oxygen in the exhaust gases, helping the ECU adjust the air-fuel mixture in real-time.
- **Roll over Sensor:** Senses the vehicle inclination angle to turn off the engine in case of accident/fallen condition for rider safety.

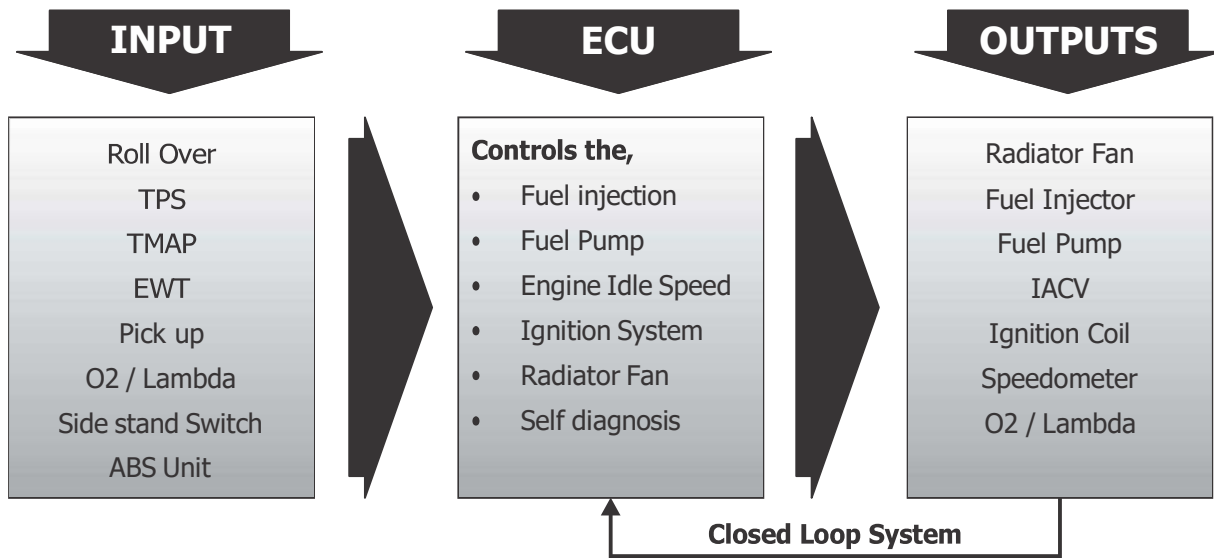
**Operation:** The EFI system constantly collects data from sensors and adjusts the air-fuel mixture to optimize combustion and fuel efficiency. When you twist the throttle, the TPS sends a signal to the ECU, which then calculates how much fuel to inject. The oxygen sensor provides feedback on the exhaust gases, allowing the ECU to fine-tune the mixture.

**Advantages of EFI:**

- Improved fuel efficiency.
- Better throttle response.
- Reduced emissions.
- Precise control of the air-fuel mixture under varying conditions.

**Maintenance:** EFI systems require less frequent maintenance compared to carburetors, which often need tuning. However, when maintenance is required, it typically involves diagnosing and replacing faulty sensors or components.

**Tuning:** Modern EFI systems can be tuned electronically using specialized software and equipment.



## 2. Coolant Temperature Sensor

Type	NTC
Operation	<ul style="list-style-type: none"> <li>• Change in resistance = Change in temp = Change in voltage</li> <li>• As the temperature increases resistance will decrease</li> </ul>
Technical Specifications	<ul style="list-style-type: none"> <li>• Type of Sensor – NTC (Resistance decreases with increasing temperature)</li> <li>• Resistance range : 11.4 kΩ to 14.33 kΩ at 20°C</li> <li>• Working temp range : -40 to 140°C</li> </ul>



### i. LOCATION ON VEHICLE

- Coolant temperature sensor is typically located on the cylinder Head.

### ii. REMOVAL & ASSEMBLY PROCEDURE

- Unthread the sensor from housing to remove
- Assemble the new sensor to its position & tighten it to the recommended torque specification.
- Do not overtighten, as it can damage the sensor or the housing.



### 3. Throttle Body – Electronic Components

#### a. IACV – Idle Air Control Valve

Type	Stepper Motor
Operation	The IACV is a stepper motor that allow varying amounts of air into the engine to keep the idle stable.
Technical Specifications	12VDC



#### i. LOCATION ON VEHICLE

- IACV is typically located on the THROTTLE BODY TOP SIDE.

#### b. Throttle Position Sensor

Type	Sensor
Operation	It indicates the amount of throttle has been opened. <ul style="list-style-type: none"> <li>• The TPS sensor is a simple potentiometer that provides a 0.45 ~ 4.5 V signal to the ECU (Electronic Control Unit).</li> <li>• Higher voltages indicating more throttle.</li> </ul>
Technical Specifications	<ul style="list-style-type: none"> <li>• Working voltage – 5V</li> <li>• Resistance range – 710 ~ 1380Ω</li> <li>• Voltage on vehicle – 0.45 ~ 4.5 V</li> </ul>



#### i. LOCATION ON VEHICLE

- TPS is typically located on the THROTTLE BODY.

#### c. TMAP – Temperature and Manifold Absolute Pressure

Type	Sensor
Operation	<ul style="list-style-type: none"> <li>• It provides the information about the amount of vacuum &amp; temperature is in the intake manifold.</li> </ul>
Technical Specifications	<ul style="list-style-type: none"> <li>• Resistance decreases with increasing temperature.</li> </ul>

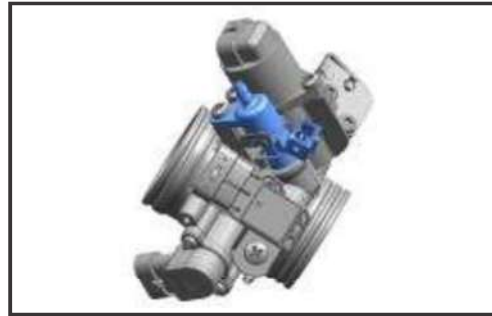


#### i. LOCATION ON VEHICLE

- TMAP is typically located on the THROTTLE BODY.

#### d. Fuel Injector

Type	Sensor
Operation	Used to spray the fuel in internal combustion as per the timing decided by ECU (Electronic Control Unit)
Technical Specifications	<ul style="list-style-type: none"> <li>• Resistance value : 12Ω</li> <li>• Pressure: 270 kPa</li> </ul>



#### i. LOCATION ON VEHICLE

- Fuel injector is typically located on the THROTTLE BODY.

#### A) Throttle Body Removal Procedure

Here is a general guide on how to remove a throttle body from a motorcycle:

##### a) Necessary Tools and Supplies :

- Socket set
- Screwdrivers
- Allen wrenches
- Fuel line disconnect tool
- Safety goggles
- Work gloves

##### b) Safety Precautions :

- Ensure that the motorcycle is turned off and cool to the touch before starting any work.
- Disconnect the battery to prevent any electrical issues.

##### c) Disconnect the Air Intake :

- Remove the air filter cover and filter to access the throttle body.
- Carefully disconnect any hoses or clamps connecting the air intake system to the throttle body.

##### d) Remove the Throttle body cover RH & LH (Fig. 1 & 2)



Fig. 1 Body Cover RH

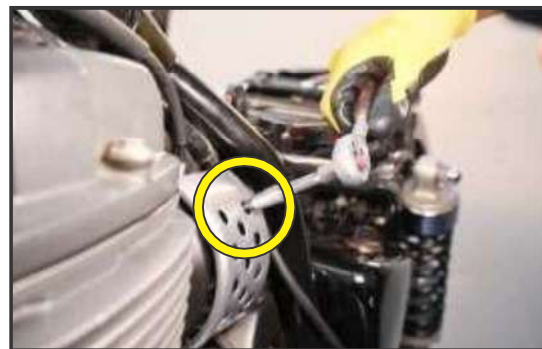


Fig. 2 Body Cover LH

e) **Remove the Cover RH & LH (Fig. 1 & 2)**

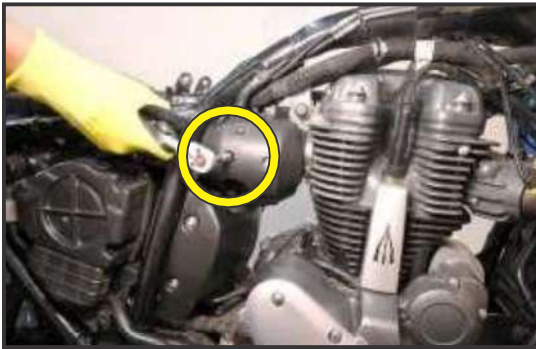


Fig. 1 Cover RH



Fig. 2 Cover LH

f) **Carefully Remove the Throttle Body cover brackets RH & LH (Fig 1 & 2)**



Fig. 1 Bracket RH



Fig. 2 Bracket LH

g) **Disconnect the Electrical Connections:**

- Disconnect any electrical connectors leading to the throttle body, including the throttle position sensor (TPS) and idle air control valve (if applicable).

h) **Loosen the throttle cable mounting nuts (Fig 1)**

i) **Take out the throttle cable from the body.**

j) **Remove throttle clamp by using screwdriver (Fig 2)**



Fig. 1 Cable Mtg. Nuts



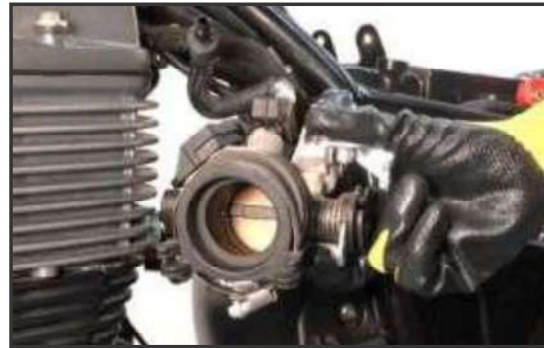
Fig. 2 Throttle Clamp Mtg.

- k) Use a socket set or appropriate tools to remove the bolts securing the throttle body to the intake manifold as shown in figure.

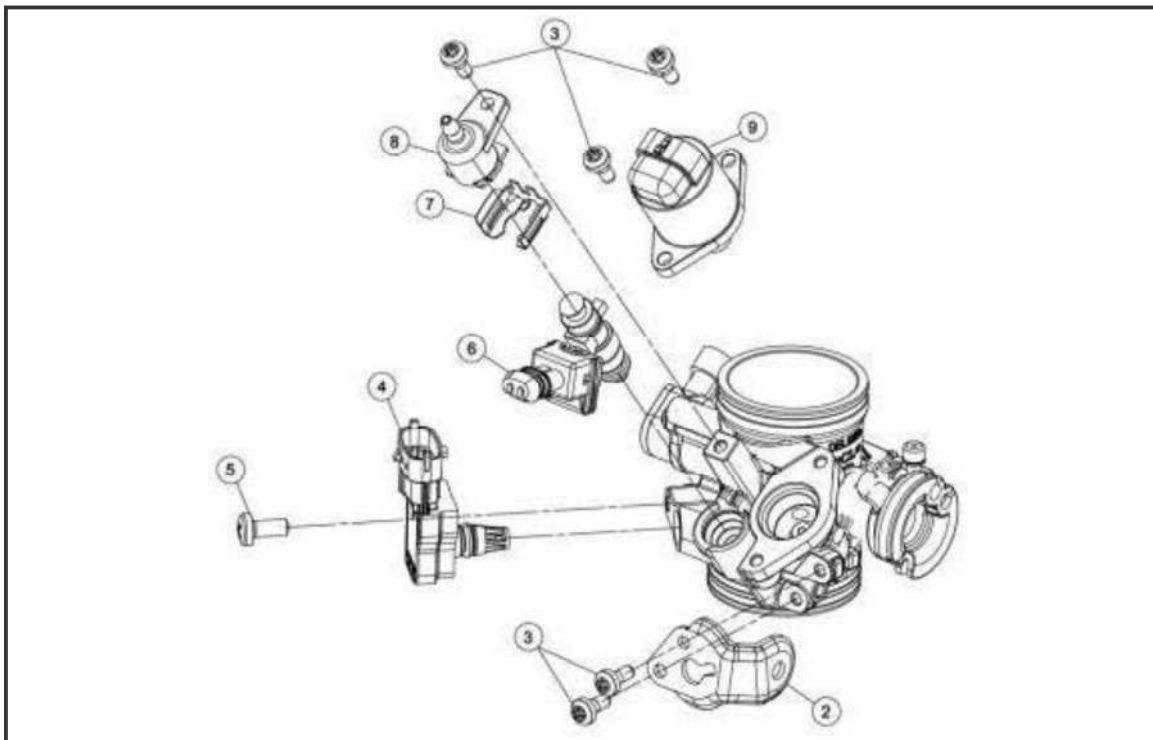


- l) **Carefully take out the Throttle Body.**

- Gently pull the throttle body away from the intake manifold while being mindful of any attached hoses or cables. If necessary, use a flathead screwdriver to help loosen the throttle body.



- m) **Remove respective sensor from Throttle Body**



## B) Inspect and Clean:

- Inspect the throttle body for any signs of damage, wear, or carbon buildup. Clean it thoroughly using a recommended throttle body cleaner and a clean rag if needed.



Fig. 1 Cable Mtg. Nuts



Fig. 2 Throttle Body Mtg. Bolt

## C) THROTTLE BODY INSTALLATION PROCEDURE

- Reverse the removal procedure for installation.

### NOTE

- **Make sure** all Cables, and electrical connections are properly reattached.
- Torque the throttle body mounting bolts to the specifications.

### ➤ NOTE: Test and Calibration :

Start the motorcycle and check for any abnormal idle or throttle response. You may need to recalibrate the TPS or perform other adjustments as specified in manual.

## 4. Lambda Sensor / O<sub>2</sub> (Oxygen) Sensor

Type	Sensor
Operation	<ul style="list-style-type: none"> <li>• Monitor &amp; compare the oxygen content of the exhaust gas with actual oxygen in atmosphere.</li> <li>• Controls the Emissions</li> </ul>
Technical Specifications	<ul style="list-style-type: none"> <li>• Operating voltage; 10V - 14V</li> <li>• Output Voltage : &gt; 0.6V (Rich mixture), &lt; 0.3V (lean mixture)</li> <li>• Heater Resistance—14 + 2 Ohm</li> </ul>



- **LOCATION ON VEHICLE**
- Location on silencer assembly.

### WARNING

- Ensure the motorcycle is cool and not running to avoid burns from hot exhaust components.

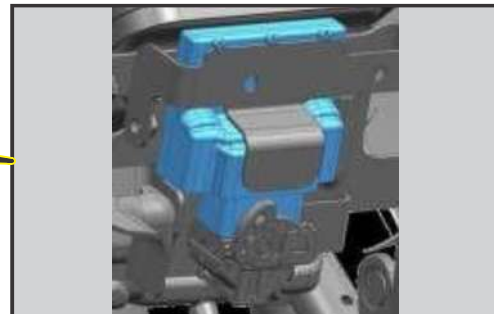
- Make sure you have the necessary tools and safety gear, including gloves and eye protection.

## 5. ECU – Electronic Control Unit

Type	Controller
Operation	<ul style="list-style-type: none"> <li>• Monitor &amp; Control the parameters essential for fuel combustion for best optimum out put</li> <li>• Controls the safety of rider.</li> <li>• Controls the other miscellaneous features.</li> </ul>
Technical Specifications	Operating voltage - 6V ~ 16V

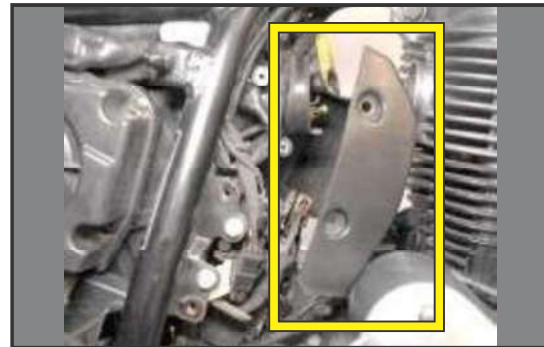


### i. LOCATION ON VEHICLE

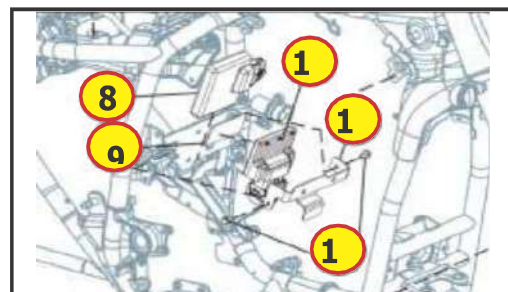


### ii. ECU REMOVAL PROCEDURE

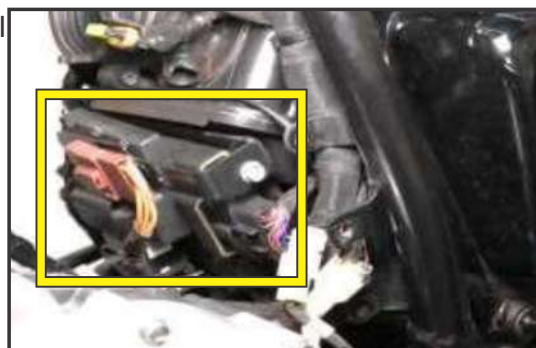
- Remove the ECU Cover.



- Remove the Flange Bolt (12) from ECU clamp (11)
- Disconnect the Wiring from ECU (10).
- Take out the ECU & BCM from vehicle.



- Take out the ECU & BCM from vehicle

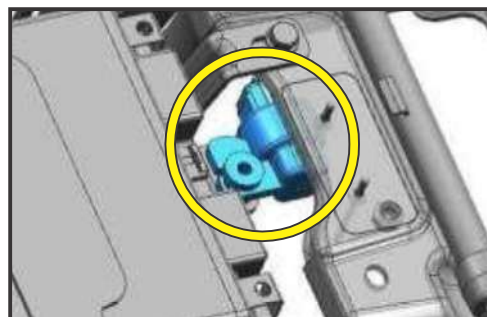


### iii. ECU INSTALLATION PROCEDURE

- Reverse the removal procedure for installation.

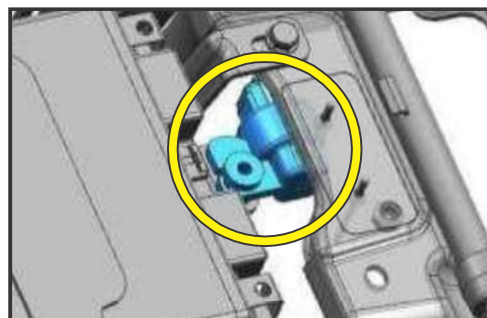
## 6. Roll Over Sensor

Type	Hall Sensor
Operation	<ul style="list-style-type: none"> <li>• Safety for vehicle to off the Engine incase of fallen / accidents</li> </ul>
Technical Specifications	<ul style="list-style-type: none"> <li>• Operating voltage – 7V ~ 17V</li> <li>• Operating angle - 60° + 10° to RH &amp; LH side</li> </ul>



### i. LOCATION ON VEHICLE

- Roll-over sensors in motorcycles are typically located in the vicinity of the bike's main control unit, often under the seat.
- These sensors are part of the motorcycle's safety systems and are designed to detect when the bike has experienced a significant impact or has fallen over. When a roll-over sensor detects such an event, it can trigger safety features like cutting off the fuel supply



### ii. ROLL OVER SENSOR REMOVAL PROCEDURE

#### **WARNING**

- Ensure the motorcycle is on a stable and level surface.
- Disconnect the motorcycle's battery to prevent electrical accidents.
- Allow the motorcycle to cool down if it has been running.

- Remove Seat: You may need to remove seat to access Roll Over Sensor.
- Remove Battery: Follow the Battery removal process from battery Section.

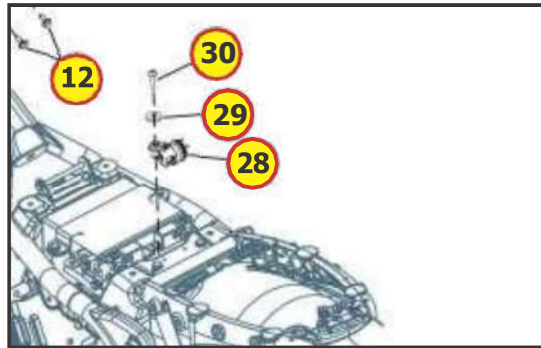


### iii. Disconnect Wiring:

- a) Identify the wiring harness connected to the roll-over sensor.
- b) Carefully disconnect the wiring harness connectors.
- c) Use caution and avoid damaging the connectors or wires.



- d) Remove the screw & Washer (Number 29 & 30)



### iv. ROLL OVER SENSOR INSTALLATION PROCEDURE

- If you replaced the roll-over sensor, follow the reverse steps to reassemble the motorcycle, ensuring all wiring is properly connected.
- Secure the sensor in its original mounting location.

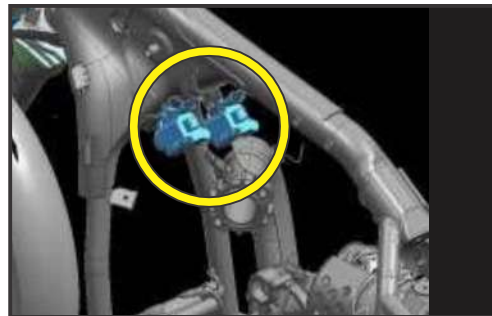
## 7. Ignition Coil

Type	Coil
Operation	<ul style="list-style-type: none"> <li>Used to generate the spark</li> <li>Firing Timing is defined by ECU</li> </ul>
Technical Specifications	<ul style="list-style-type: none"> <li>Primary coil resistance- <math>1 + 0.15\Omega</math></li> <li>Secondary coil resistance- <math>9 + 2K\Omega</math></li> </ul>



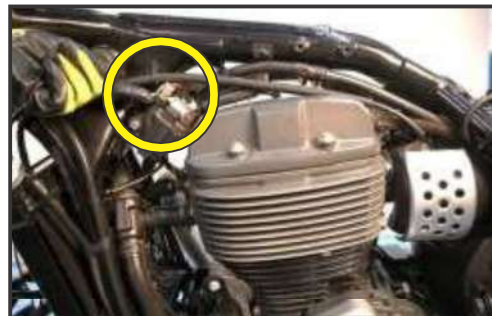
### i. LOCATION ON VEHICLE

- Ignition coil is fitted on frame on LH & RH Side.



### ii. IGNITION COIL REPLACEMENT PROCEDURE

- Disconnect any wires connected to the coil, noting their positions.



- Loosen and remove bolt securing the coil to the frame.
- Take out the ignition coil.
- Replace the Ignition coil with new one & reverse the process for assembly.

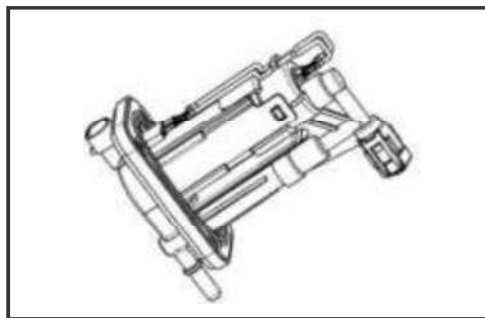


### NOTE

Ensure the Proper connections from HT coil to Spark plug cable. Properly rotate the cable to guide firmly in HT coil output.

## 8. Fuel Pump

Type	Pump
Operation	<ul style="list-style-type: none"> <li>Fuel must be pumped from the fuel tank to the engine with required pressure.</li> </ul>
Technical Specifications	<ul style="list-style-type: none"> <li>Operating voltage – 7V ~ 17V</li> <li>Rated voltage: 13.5 ± 0.5V</li> <li>Operating voltage : 8-16V</li> <li>Gasoline compatibility : Up to E22</li> <li>Input current : 2.5A max at 12 ± 0.2V</li> <li>Pressure : 3.5 bar</li> </ul>



### i. LOCATION ON VEHICLE

- Fuel pump is fitted on fuel tank.



### ii. FUEL PUMP REMOVAL PROCEDURE

#### **WARNING**

- Before you begin, make sure you have the necessary safety equipment, and take precautions to avoid sparks or open flames since you'll be working with gasoline.
- Work in a well-ventilated area, and disconnect the vehicle's battery to prevent any electrical accidents.

#### A. Process:

- Relieve Fuel Pressure :** Before you can safely work on the fuel system, you need to relieve the fuel pressure. Locate the fuel pump relay or fuse in your vehicle's fuse box and remove it. Start the engine and let it run until it stalls. This will depressurize the fuel system.
- Disconnect the Battery :** Disconnect the negative terminal of the vehicle's battery to prevent any electrical hazards.

c. Remove seat.



d. Remove side panel



e. Remove fuel tank to reach fuel pump.

f. Disconnect Fuel Lines: Use a fuel line disconnect tool to disconnect the fuel lines attached to the fuel pump. Be prepared for some fuel to spill, so have a container ready to catch it. (Fig-5)

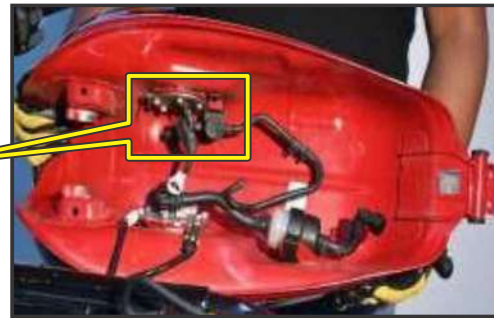


g. Disconnect Electrical Connections: Disconnect any electrical connectors attached to the fuel pump.

h. Remove the Fuel Pump: If the fuel pump is inside the fuel tank, you will need to lower or remove the fuel tank to access it.



c. Remove fuel pump mounting bolts



iii. Reassemble to the Motorcycle:

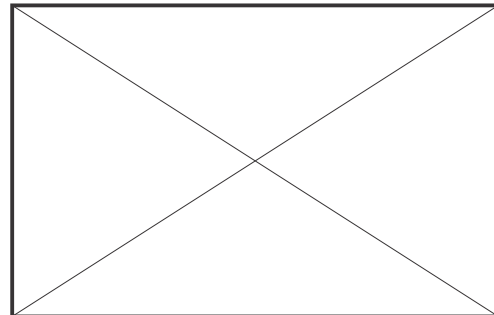
- If you Checked / replaced the Fuel Pump, follow the reverse steps to reassemble to the motorcycle, ensuring all wiring is properly connected.
- Secure the sensor in its original mounting location.

**! WARNING**

Before starting the engine, turn the key to the "On" position (but do not start the engine) to allow the fuel system to pressurize. Check for any fuel leaks.

9. Crank Sensor

Type	Sensor
Operation	<ul style="list-style-type: none"> <li>• Used to sense the engine RPM &amp; Crank position to determine the ignition timing &amp; other parameters. It is a part of Stator Assembly.</li> </ul>
Technical Specifications	<ul style="list-style-type: none"> <li>• Resistance : <math>130 \pm 20\% \Omega</math></li> <li>• Air gap: <math>0.7 \pm 0.1 \text{ mm}</math></li> </ul>

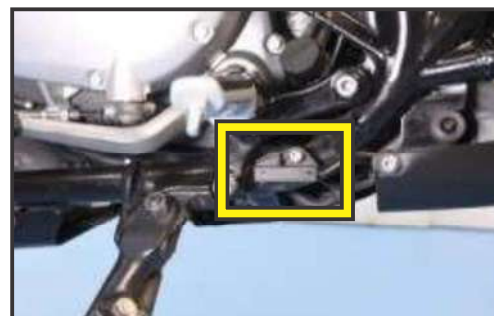


**NOTE**

Hall effect sensors to detect the rotational position of the crankshaft.

10. Side Stand Switch

Type	Contact less switch
Operation	<ul style="list-style-type: none"> <li>• Used to sense the position of side stand switch.</li> </ul>
Technical Specifications	<ul style="list-style-type: none"> <li>• 12VDC</li> </ul>

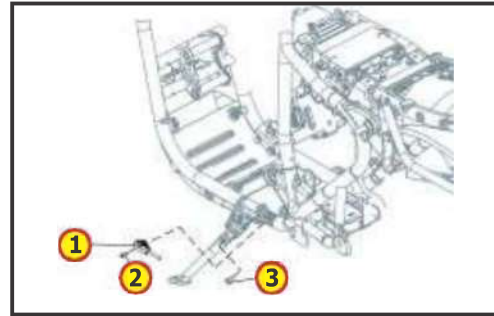


 **NOTE**

A side stand switch is a safety device designed to prevent the engine from running when the side stand (kickstand) is down. The purpose of this switch is to ensure that the rider does not accidentally ride off with the side stand down, which can be dangerous.

**i. SIDE STAND SWITCH REMOVAL PROCEDURE**

- Unscrew the side stand switch screw (2) using 4 mm allen key.
- Remove the ECU cover screws using 5 mm allen key.
- Remove the Jacket heating socket using 5 mm allen key.
- Disconnect the side stand switch cable from wiring Harness coupler.



(1) Side Stand Switch    (2) Screw  
(3) Magnet holder

**ii. SIDE STAND SWITCH INSTALLATION PROCEDURE**

- Reverse the removal procedure for installation.

 **NOTE**

Align the side stand switch with the frame hole.

- 1. BATTERY INTRODUCTION**
- 2. MAINTENANCE AND CARE**
- 3. TECHNICAL SPECIFICATIONS OF BATTERY**
- 4. LOCATION OF BATTERY**
- 5. REMOVAL OF BATTERY FROM VEHICLE**
- 6. ASSEMBLY OF BATTERY ON VEHICLE**
- 7. BATTERY CHARGING**
- 8. BATTERY HANDLING & PRECAUTIONS**

## 1. Battery Introduction

A motorcycle battery is an essential component of a motorcycle's electrical system, providing the electrical energy required to start the engine, power the motorcycle's lights, accessories, and maintain various electrical functions while the engine is running. BSA Vehicle is equipped with MF Lead Acid Battery.

### **Maintenance-Free (Sealed) Lead-Acid Batteries:**

These batteries are sealed and do not require maintenance. They are often considered more convenient and are commonly used in modern motorcycles.

### **Functions of a Motorcycle Battery:**

- **Starting the Engine:** The primary function of a motorcycle battery is to provide the electrical power required to start the engine. When you turn the ignition key or press the starter button, the battery sends a surge of electricity to the starter motor, which then cranks the engine.
- **Powering Lights and Accessories:** Motorcycle batteries also supply power to the motorcycle's lights (headlights, taillights, turn signals), horn, and various electrical accessories like heated grips and USB chargers.
- **Stabilizing Electrical Voltage:** The battery helps stabilize the electrical voltage in the motorcycle's electrical system. It acts as a buffer, ensuring that electrical components receive a consistent voltage even when the engine is running at varying RPMs.

## 2. Maintenance and Care:

Proper maintenance and care are essential to ensure the longevity and reliability of your motorcycle battery:

- **Charging:** Regularly charge your motorcycle battery, especially if you don't ride frequently. Use a quality battery charger designed for motorcycle batteries and avoid overcharging.
- **Cleanliness:** Keep the battery and its terminals clean and free from corrosion. Corrosion can interfere with electrical connections and reduce battery performance.
- **Storage:** If you plan to store your motorcycle for an extended period, remove the battery and store it in a cool, dry place. You can also use a battery maintainer to keep it charged.
- **Replacement:** Motorcycle batteries have a limited lifespan, typically ranging from 2 to 5 years, depending on the type and usage. When your battery no longer holds a charge or struggles to start the engine, it's time to replace it.
- **Safety:** When working with motorcycle batteries, always wear safety goggles and gloves, and follow proper safety precautions to prevent acid exposure and electrical hazards.

**NOTE**

In summary, a motorcycle battery is a critical component that provides electrical power to start the engine and operate various electrical systems on a motorcycle. Regular maintenance and care are essential to ensure it functions properly and has a longer lifespan.

For checking the battery voltage and electrolyte specific gravity, contact authorized battery service center.

**3. Battery Specification**

Capacity - 12V / 11.2Ah

Leakage Current - 3.0 mA

CCA Rating - 230 CCA

Dimension in mm - 150X110X87


**4. Location in Vehicle**

On BSA motorcycles, Battery is located below seat.


**5. REMOVAL OF BATTERY FROM THE VEHICLE**

The battery is located below the seat. To remove the battery, follow the below instruction.

**WARNING**

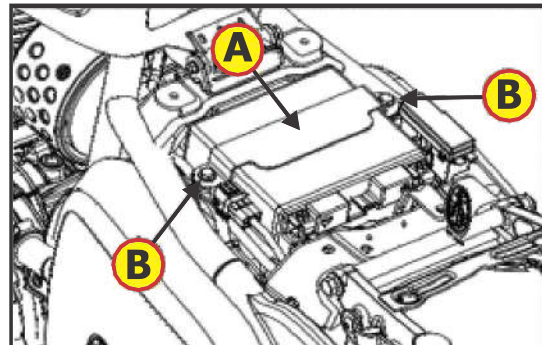
Always disconnect the Battery Negative terminal first for Battery removal. (As shown in photograph)



- Remove the LH side panel by grasping the panel firmly in both hands and pull the panel away from the vehicle until it clears the three retaining grommets (leaving the grommets in place).
- Pull the seat unlock cable and release it once the seat is unlocked from its position.
- Take out the seat assembly away from the vehicle.
- Disconnect both the +Ve & -Ve terminal wires of battery (-Ve first and then +Ve).



- Remove the battery holding clamp (A), by unscrewing two screws (B).
- Carefully take out the battery from battery carrier by holding the rubber straps.



## 6. BATTERY INSTALLATION PROCEDURE

- Place the battery in the battery carrier by means of rubber strap.
- Connect the Positive terminal (Red wire).
- Connect the Negative terminal (Black wire).
- Smear the terminals with petroleum jelly. (Do not use grease).
- Rest the battery clamp (A) to hold the battery in its position by tightening two screws (B).
- Place the seat assembly on vehicle in its position and gently press the seat at rear side a click sound will give a positive indication of seat is locked.
- Rest the LH side panel by positioning the three locating dowels to the grommets, then press firmly to secure the panel in its position.
- Now grasp the panel and make sure that it is fully retained.

## 7. BATTERY CHARGING :

- Set Multi meter on DCV Mode & check battery OCV 12.5V.
- Start the Vehicle.
- After Vehicle starts, wait for 2 minutes till engine speed stabilizes to 1500 +/- 100 rpm.
- Check voltage at battery terminals by connecting DMM.
- Voltage across battery should be between 13.5 V DC to 14.7 V DC.



- If specified Voltage is not measured, then check for the charging fuse (30A (Green fuse). Refer the sticker inside fuse box to identify it).
- If fuse is blown, check for any cut in wires on the respective charging system line in wiring harness (Magneto output to RR & RR to battery)
- If Fuse is not blown and specified voltage is not measured, check for coupler of RR unit, if it is loosely fitted or else connect a spare working RR externally and check for battery voltage.

## 8. BATTERY HANDLING PRECAUTIONS:

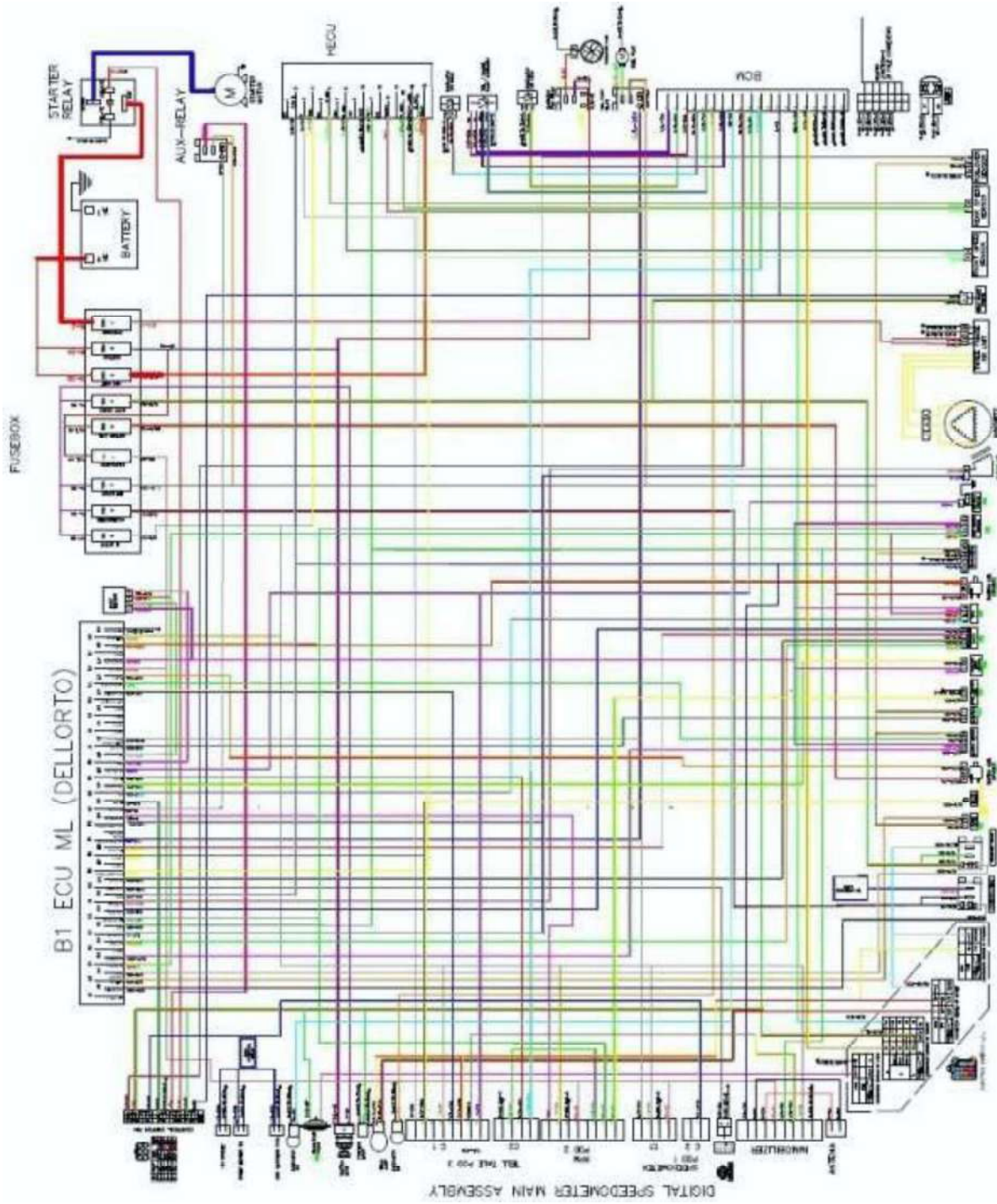
- **Secure Mounting:** Ensure the battery is securely mounted in its designated location to prevent vibrations and movement that could lead to damage or leaks.
- **Check Battery Terminals:** Periodically inspect the battery terminals for corrosion or loose connections. Clean the terminals with a wire brush and a mixture of baking soda and water if corrosion is present. Ensure that the terminals are securely tightened.
- Never place the battery near fire.
- Never hammer the battery heavily by mallet or any heavy component.
- Never short the battery terminals.

- If the battery cracks due to mishandling and sulphuric acid paste contacts the skin or clothes, wash it off immediately with water. When sulphuric acid paste contacts ones' eyes, wash them with a plenty of water and visit a doctor.
- If the vehicle is kept idle for more than 30 days, please check battery voltage. Recharge if required.
- When the battery is not to be used for a long time, store it in a cool and dry area.
- Do not dispose dead batteries directly. Submit it to the dealer for proper disposal. It causes environmental hazards.

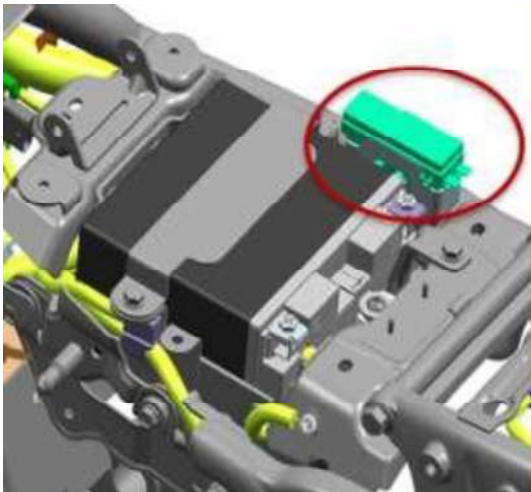
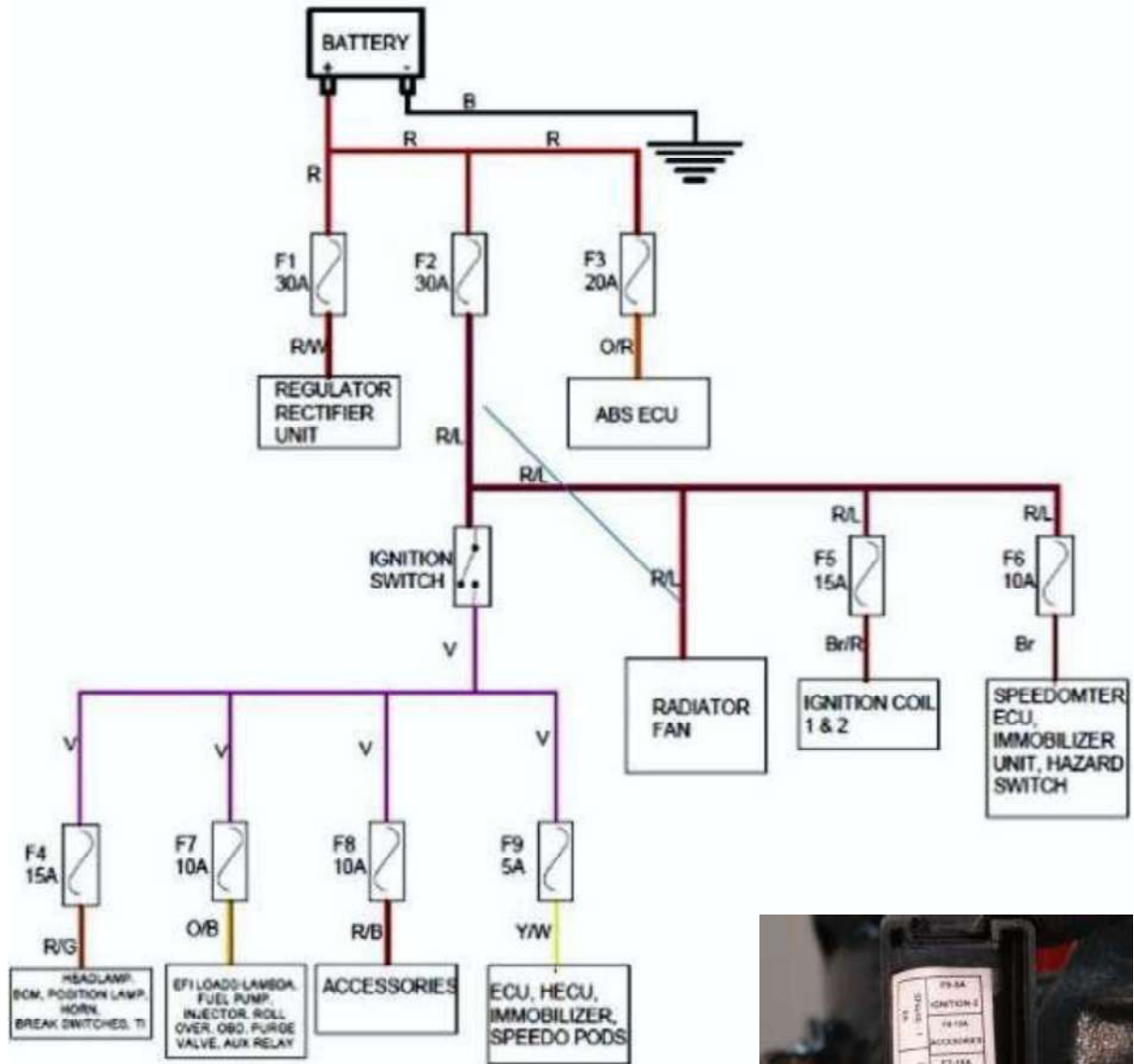
**Manufacturer's Recommendations:**

Always follow the manufacturer's guidelines and recommendations for handling and maintaining the specific maintenance-free battery.

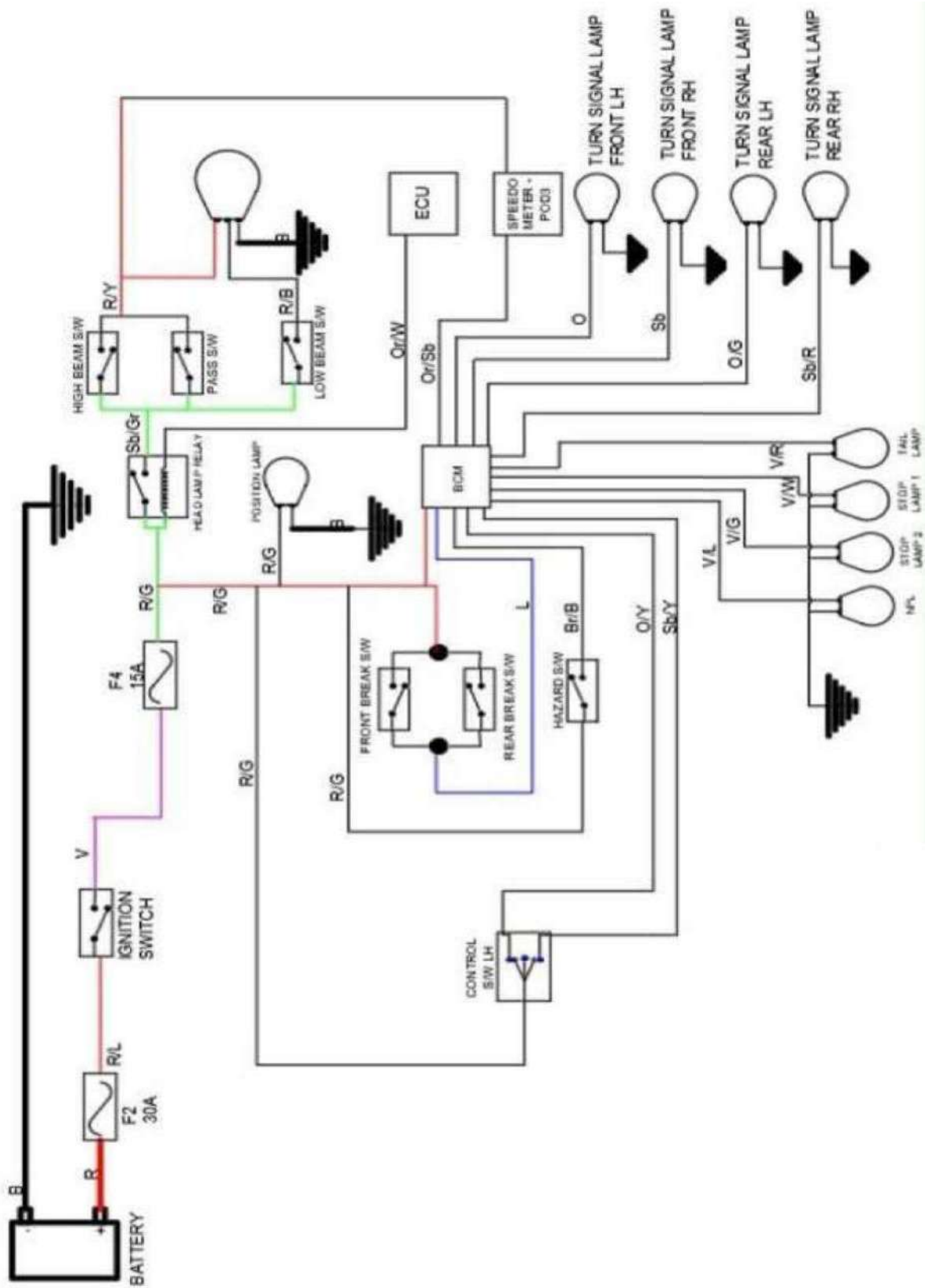
- 1. COMPLETE VEHICLE SCHEMATIC**
- 2. FUSE DISTRIBUTION**
- 3. LIGHTING SYSTEM**
- 4. STARTING CIRCUIT**
- 5. CHARGING SYSTEM**



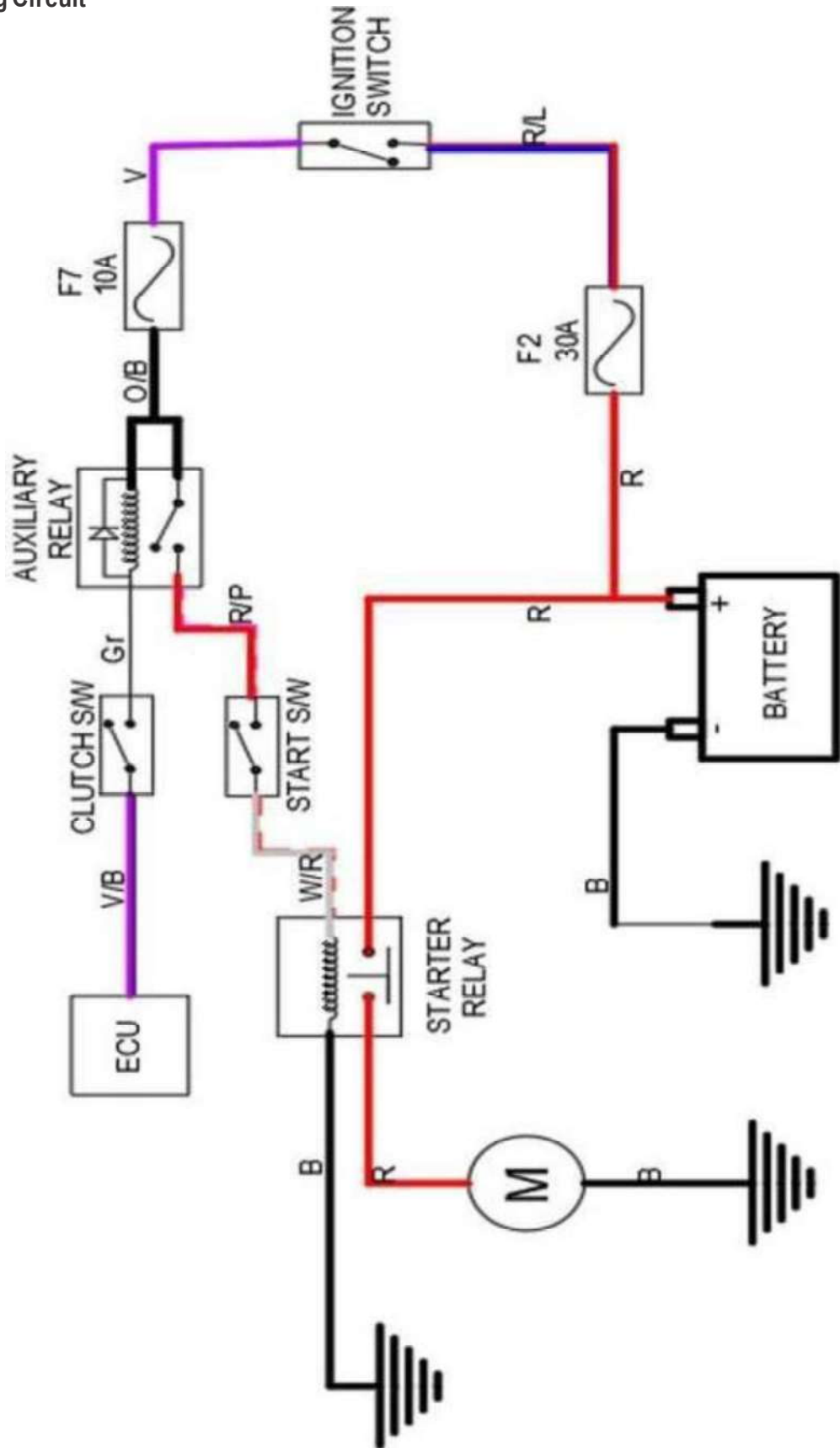
## Fuse Distribution



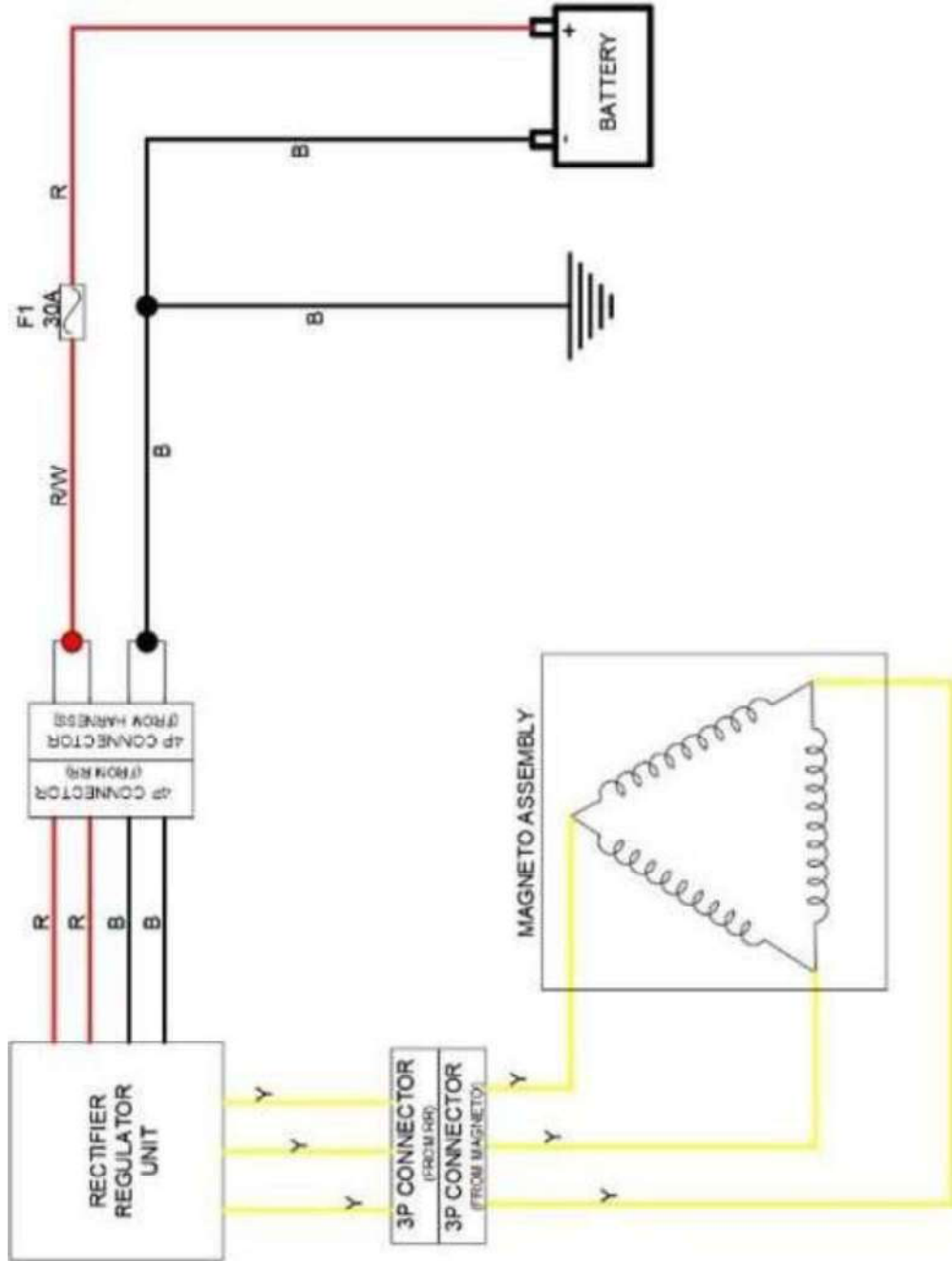
Lighting System



Starting Circuit



Charging System



- 1. RR UNIT**
- 2. RH HANDLEBAR CONTROL SWITCH**
- 3. LH HANDLEBAR CONTROL SWITCH**
- 4. USB PORT**
- 5. HEADLAMP ASSEMBLY**
- 6. FRONT INDICATOR**
- 7. REAR INDICATOR**
- 8. HORN**

## 1. RRUNIT

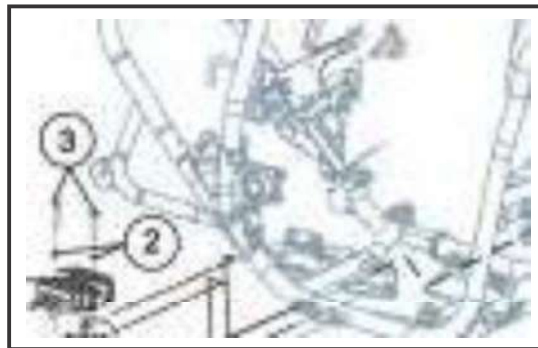
### A. Introduction

The "RR Unit" in a BSA motorcycle likely refers to the "Regulator Rectifier Unit." This is an essential component in the electrical system of a motorcycle. The regulator rectifier unit performs two main functions:

**Rectification:** It converts the alternating current (AC) generated by the motorcycle's alternator into direct current (DC). This DC is required to charge the **motorcycle's battery and** power the various electrical components.

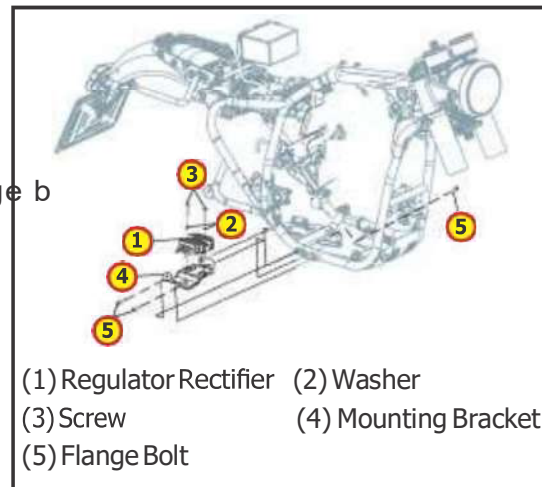
**Regulation:** It regulates the voltage output to ensure that it stays within the specified range. This is crucial to prevent overcharging of the battery, which can damage it, or undercharging, which can lead to a flat battery and electrical system issues.

### B. Location on Vehicle



### C. REMOVAL / INSTALLATION UNIT

- Unscrew the RR unit mounting bracket (4) screws Using 6 mm allen key.
- (RH side - 2 screw, LH side - 1 Flange b
- Remove the ECU cover (electronic control unit) Using 5 mm allen key.
- Remove the RR Unit holding screw (3) from bracket using 10 no. socket.
- Remove the ECU cover (electronic control unit) Using 5 mm allen key.
- Unplug the RR unit three coupler from ECU.
- Take out the RR unit.
- Follow the reverse process to install RR Unit.



### D. Troubleshooting

- Troubleshooting issues with the regulator-rectifier (RR unit) in a BSA motorcycle involves identifying and addressing problems related to the

charging system, battery, and electrical components. Here are some steps to help you troubleshoot RR unit problems on your BSA motorcycle:

### i. Check Charging Voltage

- First check battery open circuit voltage.
- After that start the motorcycle and let it run at idle.
- Use a Multimeter to measure the voltage across the battery terminals. It should read around 12.6-13.0 volts for a fully charged battery.
- Increase the RPMs, and the voltage should rise to around 13.5-14.7 volts. This indicates that the charging system is working correctly.



### ii. Low Charging Voltage

- If the charging voltage is consistently low (below 13.5 volts while revving the engine), it could indicate a problem with the RR unit or the alternator.
- Check the connections to the RR unit for loose or damaged wires.
- Inspect the RR unit for physical damage or signs of overheating.

### iii. Overcharging

- If the charging voltage is consistently high (above 14.5 volts while revving the engine), it could indicate an issue with the RR unit.
- Check for loose connections or damaged wires.
- Inspect the RR unit for any signs of overheating, such as discoloration or a burnt smell.
- Overcharging can damage the battery and other electrical components, so it should be addressed promptly.

### iv. Battery Inspection

- Ensure the battery is in good condition. If the battery is weak or faulty, it can affect the charging system's performance.
- Check the battery's terminals for corrosion and ensure they are clean and tight.

### v. Stator and Alternator Testing

- If you suspect a problem with the alternator or stator, you may need to perform additional tests using a Multimeter to measure AC voltage output from the stator coils.
- Consult your motorcycle's service manual for specific testing procedures and values.

### vi. Replace or Repair RR Unit

- If you have confirmed that the RR unit is faulty, it may need to be replaced or repaired.
- Replace the genuine RR unit of your BSA motorcycle.

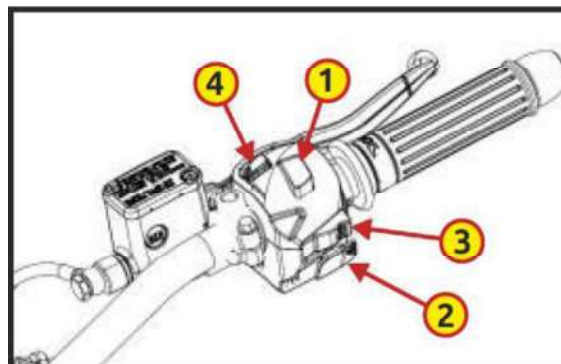
### 2. RH HANDLEBAR CONTROL SWITCH

Here are some common features and functions you might find on a BSA handlebar switch:

#### A. Introduction

- **Engine Kill Switch:**

The engine kill switch (1) is next to the throttle grip. When the switch is in the ( ) position, the engine will operate. When the switch is in the ( ) position the engine will not operate. This switch is intended primarily as an emergency switch and should normally remain in position.



**NOTE:**

If the vehicle is stopped with the ignition switch ON and the engine kill ( ) switch position, the position lights, tail light, license light and speedometer will still be on, resulting in battery discharge.

**Start Button :**

The start button (2) is located on the lower side of the engine kill switch. The start button is used for starting the engine. pressing the button starts the engine. When the start button is pressed, the starter motor will crank the engine and headlight will turn ON above 1000 rpm.



**NOTE**

Clutch lever operation is required to start the engine expect in neutral condition

**Hazard Button :**

To turn the hazard warning lights ON/OFF. Slide the hazard warning light button (3). The ignition must be switched ON for the hazard warning lights to function.

**Information Button (i) ODO, Trip A/ Trip B (mile) :**

Simply press the “i” button to change the mode in a sequence of ODO - Trip A - Trip B - ODO.



### B. Location



## 3. LH HANDLEBAR CONTROL SWITCH

### A. Introduction Headlight



#### Dipper Switch : (2)

Push the headlight Dipper switch to (  ) position to select high beam or to (  ) select low beam.

#### Passing Light Control Switch : (2)

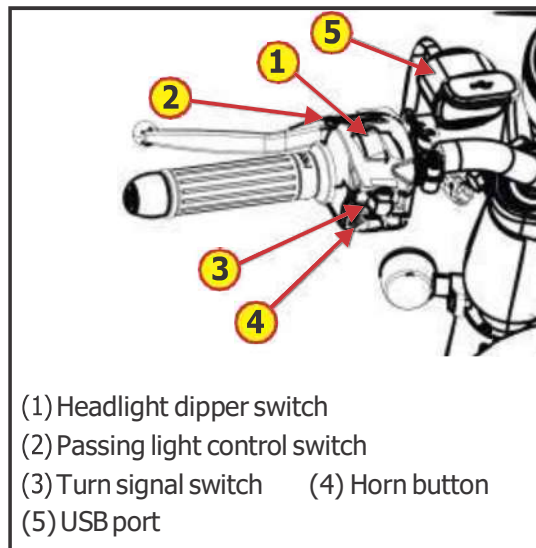
When this switch is pressed, the headlight flashes on to signal approaching cars or when passing.

#### Turn Signal Switch : (3)

Move to (  ) the signal to left turn comes on, shifting to (  ) the signal to right turn comes on. press the switch to turn signal off.

#### Horn Button : (4)

Press the (  ) button to sound the horn.



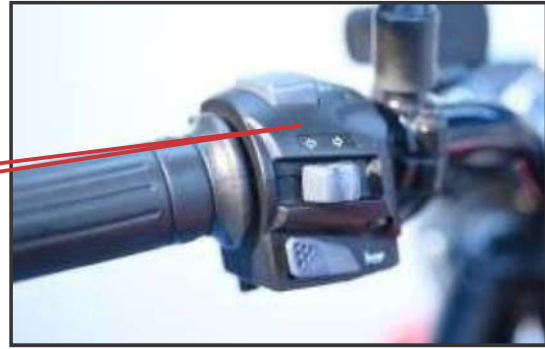
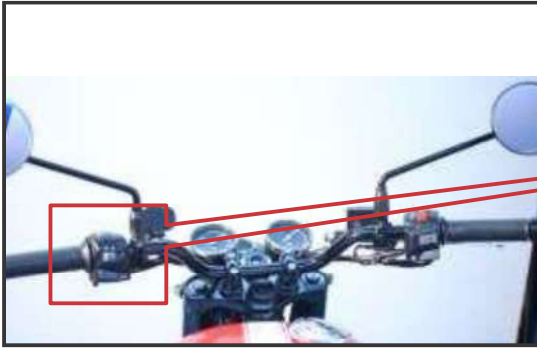
## 4. USB Port :

Your vehicle is provided with USB port on the left side of the handlebar near LH switch.

- USB port will function only when the battery voltage in more than 13V & engine is in running condition.
- Same will be stop functioning, if the battery voltage is less than 12V or Engine OFF.



### B. location



### C. TROUBLESHOOTING FOR RH HANDLEBAR & LH HANDLEBAR SWITCH

#### I. Visual Inspection :

- Examine the handlebar switch and its wiring for any visible damage, loose connections, or exposed wires.
- Look for any signs of corrosion or rust, which can hinder electrical connections.

#### D. Test the Switch Functions :

- Start by testing each function of the switch (e.g., lights, horn, turn signals) one at a time to determine which, if any, functions are not working.
- If none of the functions work, it could be a power supply or wiring issue.

#### E. Check Fuses and Relays :

- Inspect the fuses related to the handlebar switch functions. Replace any blown fuses with the correct amperage.
- Ensure the relevant relays (if present) are functioning correctly.

#### iii. Test the Components :

- If a specific function is not working, like the turn signals or horn, test the corresponding components (e.g., bulbs, horn unit) to ensure they are functional.
- Check for continuity in the wiring between the handlebar switch and the affected component.

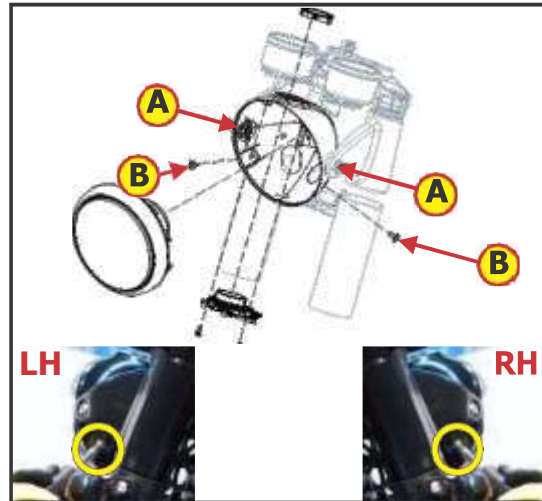
#### F. Inspect the Wiring :

- Trace the wiring harness from the handlebar switch to the electrical components it controls. Look for damaged or disconnected wires.
- Pay close attention to any connectors and junctions along the wiring.

## 5. HEADLAMP ASSEMBLY

### A. REMOVAL PROCEUDRE

- Use 5 mm allen key to remove screw from headlamp stay (A)
- Loosen the headlamp cowl bolt from headlamp housing.
- Unscrew the two screws mounted on the headlamp housing (B).



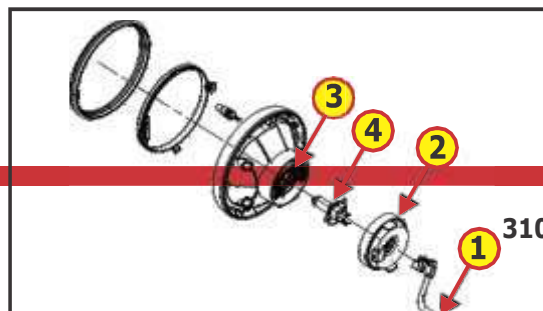
- Tilt the headlamp assembly outwards from the bottom and then lift the assembly upwards to unlock from the notch.



- Carefully take out the headlamp assembly from headlamp Stay.
- Unplug all the coupler of headlamp wiring harness (1) from main wiring harness.
- Remove the rubber cap (2) from the housing end.



- Press the bulb holding clamp (3) downwards and take out the bulb (4) from its position.
- Follow the Reverse procedure to install



the headlamp assembly.

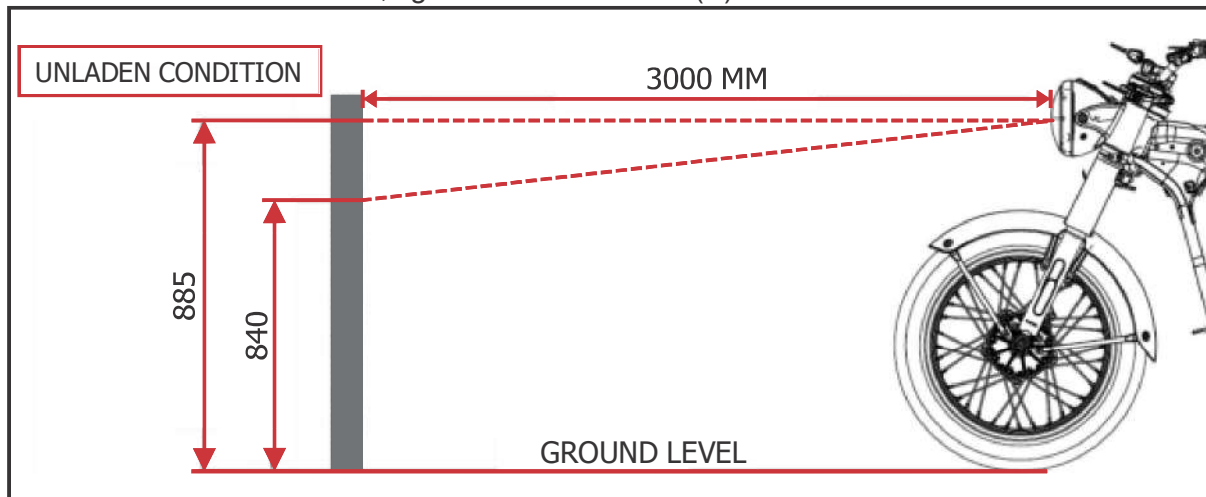
### CAUTION

Never touch the bulb with your finger. Fingerprints will etch the glass and decrease bulb life. Hence, it is recommended to grab the bulb with paper or clean dry cloth during handling.

### B. HEADLAMP FOCUS ADJUSTMENT

The AIS-009 (2011) standard, which is part of the Automotive Industry Standards in India, provides guidelines for headlamp alignment for motor vehicles, including motorcycles. To adjust the headlamp on a BSA motorcycle in compliance with this standard, follow these steps:

- Park your BSA motorcycle on a level surface facing a wall
- The headlamp focus can be adjusted by loosening the two screws (A).
- Adjust the headlamp focus if required. (Head lamp focus is pre adjusted as per the standards)
- Setting the headlamp assembly at the required angle will set the head lamp focus.
- Once the focus is set, tighten the two screws (A).



### NOTE

- Park your BSA motorcycle on a level surface facing
- Check Tire Pressure: Ensure that your tires are properly inflated to the recommended pressure. Incorrect tire pressure can affect the headlight beam height.

### TEST CONDITIONS AS PER AIS-009 (2011) STD

- Both the wheels touching ground - off stand and rider seated (approximate weight of rider - 75 kg).
- Measure low beam cut-off line height at 3 meter distance from head lamp lens.
- low beam cut off shall be at 840 mm height from ground using adjustment bolt in

headlamp assembly.

- Adjustment of low beam cut-off pattern will automatically adjust the high beam
- Focus adjustment of high beam focus is not required.
- If head lamp low beam cut-off line falls within above specification in given test conditions (Vehicle off stand and rider seating condition), no need to adjust the low beam cut-off pattern.

### C. TROUBLESHOOTING FOR HEADLAMP

Troubleshooting the headlamp on a BSA motorcycle involves diagnosing and fixing various electrical and mechanical issues. Here are some common troubleshooting steps to help you identify and resolve headlamp problems:

#### i. Check the Bulb

- Start with the simplest step. Ensure that the headlamp bulb is not burnt out or damaged. If it is, replace it with a new one.

#### ii. Inspect the Wiring

- Check the wiring leading to the headlamp for any visible damage, loose connections, or frayed wires. Replace any damaged wires or connectors.

#### iii. Fuse Inspection

- Locate the fuse box on your BSA motorcycle and check the headlamp fuse. If the fuse is blown, replace it with a new one of the same rating. If it blows again immediately, there may be a short circuit that needs to be investigated.

#### iv. Battery Voltage

- Ensure that your motorcycle's battery is in good condition and has minimum 12.2 voltage to power the headlamp. Low battery voltage can lead to dim or flickering headlamp performance.

#### v. Switch Check

- Test the headlamp switch for proper functionality. Make sure it's making good contact and not stuck in between positions. If the switch is faulty, replace it.

#### vi. Ground Connection

- The headlamp needs a good ground connection to work correctly. Ensure that the ground wire is securely connected to the frame of the motorcycle.

#### vii. Voltage Regulator / Rectifier

- Check the voltage regulator or rectifier to make sure it's functioning correctly. If it's not regulating voltage properly, it can affect the headlamp's brightness and stability.

#### viii. Headlamp Housing and Reflectors

- Inspect the headlamp housing and reflectors for damage or corrosion. Damaged or corroded reflectors can reduce the effectiveness of your headlamp.

### ix. Alternator and Stator

- Ensure that the alternator and stator are working correctly, as they generate the electrical power for your motorcycle's system. A malfunction in these components can lead to insufficient power for the headlamp.

### x. Voltage Drop Test

- Use a Multimeter to perform a voltage drop test along the headlamp circuit. This can help identify any high-resistance connections or components that are causing a voltage drop.

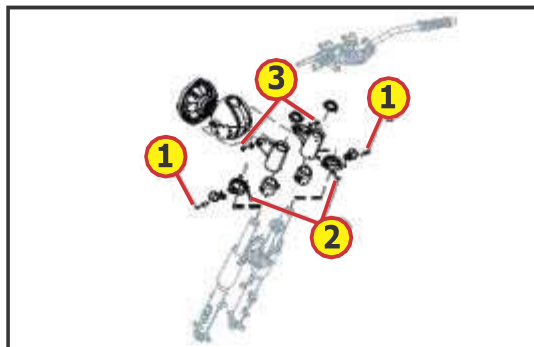
## WARNING

- Remember to follow safety precautions when working with electrical systems on your motorcycle, including disconnecting the battery and wearing appropriate protective gear. Always refer to your BSA motorcycle's service manual for specific troubleshooting procedures and wiring diagrams.

## 6. FRONT INDICATOR

### A. REPLACEMENT PROCEDURE

- Use 5 mm allen key to remove bolt from RH & LH side indicator (1) (each side having 2 bolts)
- Loosen the RH & LH front indicator mounting spacer hex soc head bolt (2) using 4 mm allen key.
- Remove the screws mounted on the headlamp stay (3) using 5 mm allen key.
- Tilt the headlamp assembly outwards from the bottom and then lift the assembly upwards to unlock from the notch.
- Carefully take out the headlamp assembly from headlamp Stay.
- Unplug the RH & LH side Indicator coupler from headlamp main wiring harness & take out the indicator.
- Follow the Reverse process to install the front indicator.



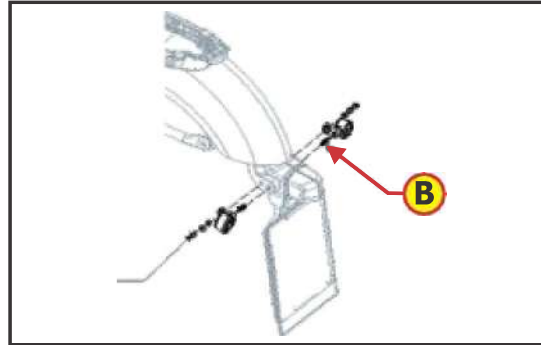
## 7. REAR INDICATOR

### A. REPLACEMENT PROCEDURE

- Place the vehicle on paddock on a firmly levelground.



- Unscrew the 4 screws using 5 mm allen key from support plate which is installed on inner side the rearfender assembly.
- Remove the remaining screw using multi-functional screwdriver.
- Take out the support plate and remove the rear LH & RH indicator (A) using 5 mm allen key.
- Unplug the indicator coupler (B) of both RH & LH side Indicator & take out the indicator.
- Follow the Reverse procedure to install the rear indicator assembly.



## B. TROUBLESHOOTING

Troubleshooting front and rear indicator issues on a BSA motorcycle, or any motorcycle for that matter, involves a systematic approach to identify and resolve the problem. Here's a step-by-step guide to help you troubleshoot indicator problems on your BSA motorcycle in 2023:

### i. Check the LED's

- Start by inspecting the indicator LED's. Make sure they are not burnt out or damaged. If you find any faulty, replace with new ones.

### ii. Inspect the Wiring

- Examine the wiring connecting the indicators. Look for any loose or disconnected wires, damaged insulation, or frayed wires. If you find any issues, replace the affected wiring.

### iii. Fuse Inspection

- Locate the fuse box in your motorcycle's electrical system. Check the indicator fuse to ensure it is intact. If the fuse is blown, replace it with a new one of the same rating.

### iv. Switch Functionality:

- Test the indicator switch or button on the handlebars. Ensure it is functioning correctly. If the switch is faulty, you may need to replace it.

### v. Flasher Check

- Flasher relays that control the flashing of the indicators. Test the flasher to ensure it is functioning properly. If it's not, replace it with a new one.

#### vi. Ground Connections

- Make sure the indicator bulbs and wiring have proper ground connections. Poor grounding can lead to indicator issues. Clean and secure any ground connections as needed.

#### vii. Battery Voltage

- Check the battery voltage with a Multimeter. Low battery voltage is less than 12.6 volt can affect the performance of electrical components. Charge the battery if it's low or replace it if it's old and not holding a charge.

#### viii. Indicator Housing and Lens:

- Inspect the indicator housings and lenses for any cracks or damage that may allow moisture to enter. Moisture can damage bulbs and wiring. Replace any damaged components.

#### ix. Test the Indicators

- Turn on the ignition and test the indicators. Check both the front and rear indicators to see if they are working correctly. If one set is working, but the other isn't, it can help narrow down the issue.

#### x. Check for Flasher Speed:

- If the indicators are flashing too quickly or not at all, this can be an indication of a problem. **Flashing Rate** : When you activate the indicators, they should flash at a consistent rate, typically around 80-90 times per minute. The flashing rate is controlled by a flasher relay, which is part of the motorcycle's electrical system.



#### NOTE

Ignition key should be off position.



#### WARNING

Can cause personnel injury or even spark generation.

### 8. HORN

The horn on a BSA motorcycle, like any motorcycle, is a critical safety feature that alerts other road users to your presence and can help prevent accidents.

Here's an overview of the horn on a BSA motorcycle:

**Horn Location** : The horn is located on the left side of motorcycle.

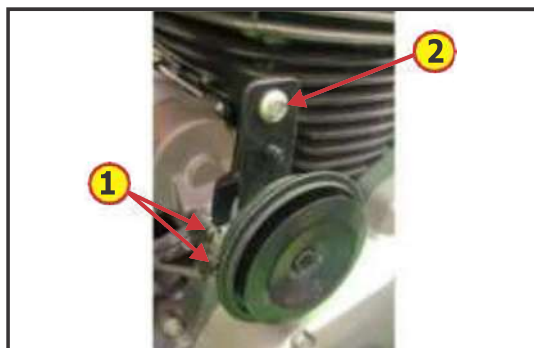


**Horn Button** : To activate the horn, you will find a horn button on the handlebars. When you press this button, it completes an electrical circuit, causing the horn to emit a loud sound.

**Horn Sound** : BSA motorcycles come equipped with a horn that produces a distinctive sound.

#### A. REPLACEMENT PROCEDURE :

- If your horn fails or produces a weak or distorted sound, it may be necessary to replace it. When replacing the horn, ensure it has the correct electrical specifications and mounting options. There may other horns with similar specification and mounting option in after market.
- Always use BSA genuine spare parts for replacement of any faulty parts.
- Turn the ignition switch OFF.
- Disconnect the wire connectors (1) from the horn.
- Remove the screw (2) using 5 mm allen key.
- Take out the horn assembly.



#### B. TROUBLESHOOTING

If you encounter issues with your BSA motorcycle's horn, such as it not producing any sound or sounding weak, here are some troubleshooting steps to consider:

##### i. Check Wiring:

- Inspect the horn's wiring for loose connections, corrosion, or damage. Ensure the connections are secure.

##### ii. Test the Horn Button:

- Press the horn button on the handlebars to see if you can hear a sound from the horn when the button is pressed. If you don't hear a click, the button or the horn may be faulty.

##### iii. Test the Horn:

- Disconnect the wiring from the horn and directly apply 12V power to the horn. If it still doesn't produce sound, the horn itself may be defective and should be replaced.

##### iv. Check the Fuse:

- Ensure that the fuse related to the horn in the motorcycle's electrical system is intact. Replace it with similar specification if it's blown.

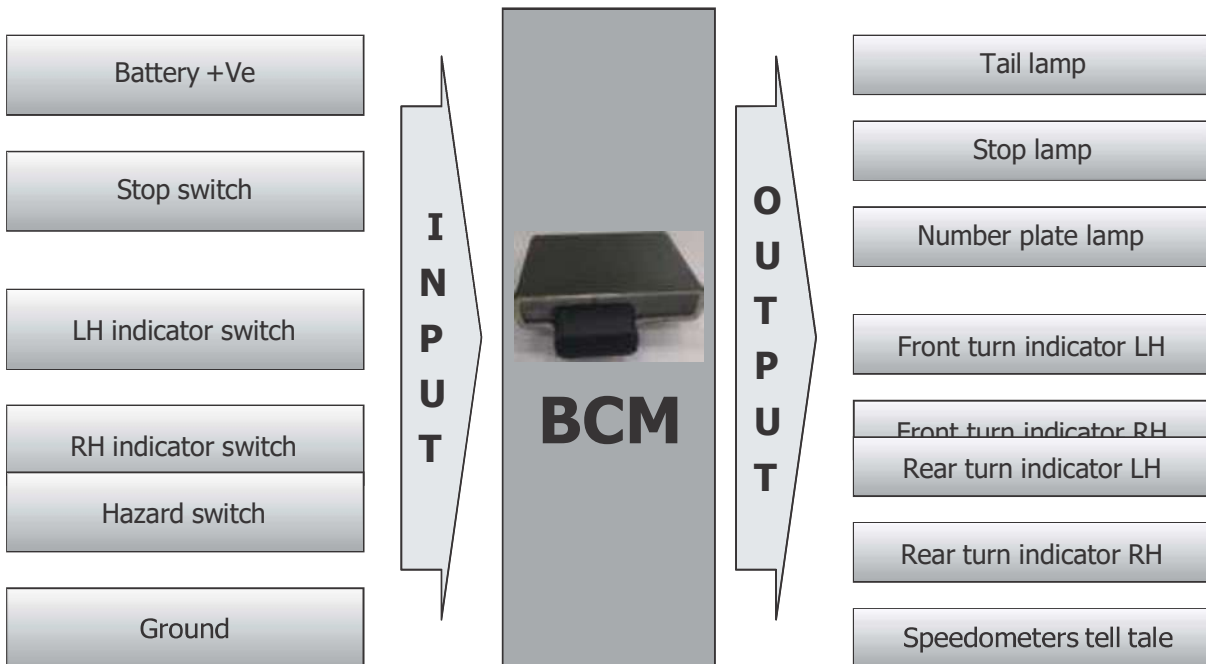
- 1. BCM INTRODUCTION**
- 2. FUNCTIONS**
- 3. REMOVAL & INSTALLATION OF BCM FROM THE VEHICLE**
- 4. TROUBLESHOOTING**

## 1. Body Control Module (BCM) Introduction

A Body Control Module (BCM) is a critical component in modern motorcycles, responsible for managing various electrical and electronic functions.

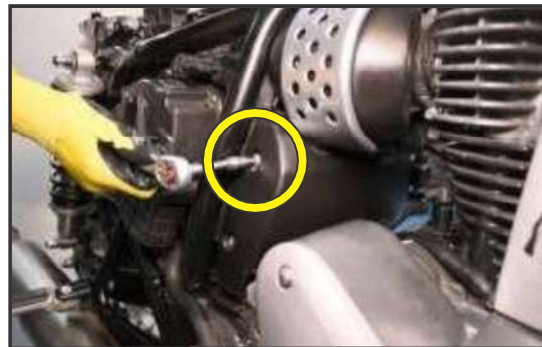
## 2. Functions of a BCM:

- Lighting Control: The BCM manages various lighting systems, including taillights, turn signals, brake lights. It controls lighting modes, such as high beam, low beam.
- This also maintains the blinking rate of turn indicators upon receiving signal from turn indicator switches and hazard switch.

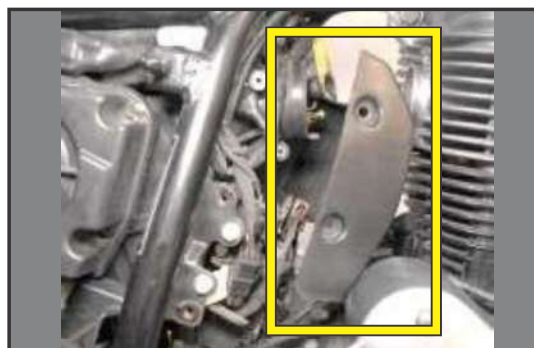


## 3. REMOVAL OF BCM FROM THE VEHICLE

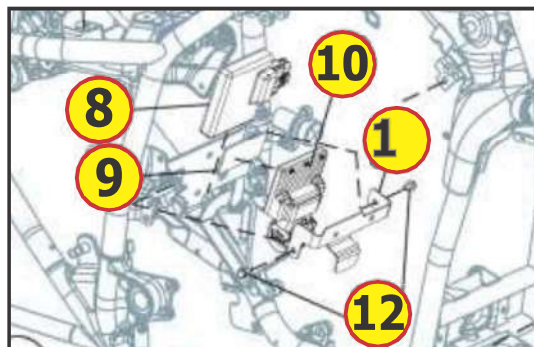
- Remove ECU cover assembly using 5mm allen key. (2 Bolt at LH side & 2 Bolt at RH side)



- Take ECU cover assembly as shown in photograph.



- Remove the Bolt (12) from spanner
- Remove the bracket (11) from vehicle to access the BCM Unit
- Disconnect the Electrical Connections.
- Follow the reverse steps to assemble the BCM unit to Vehicle.



### NOTE

- Disconnect the Battery before starting this activity
- Follow Wiring Diagram
- Handle the BCM Carefully
- Avoid short circuit

## 4. TROUBLESHOOTING OF BCM

- i. Visual Inspection:  
Inspect the BCM and its wiring for any obvious physical damage, loose connectors, or corroded terminals. Address any visible issues.
- ii. Battery Voltage Check:  
Ensure the motorcycle's battery is fully charged and in good condition. Measure the battery voltage with a Multimeter. Low or insufficient voltage can lead to BCM issues. (Voltage below 10V)
- iii. Check Fuse: Inspect the fuses Related to the BCM circuit. Replace any blown fuses or faulty relays.
- iv. BCM Wiring Harness Inspection:  
Inspect the wiring harness that connects to the BCM. Look for damaged or frayed wires, loose connections, or corrosion. Repair or replace any damaged wires or connectors.

v. Test Input Sensors and Switches:

Test various sensors and switches connected to the BCM (e.g., ignition switch, brake light switch, turn signals). Ensure they are functioning correctly and sending the expected signals to the BCM.

vi. Test Outputs:

Check the outputs from the BCM to various components such as lights, indicators. Use a Multimeter to verify that the BCM is sending the correct signals to these components.

1. **INTRODUCTION**
2. **BSA TRANSPONDER KEY REPLACEMENT SOP -  
TO BE FINALIZED FROM R & D**
3. **TROUBLESHOOTING**

## 1. Introduction

An immobilizer in a BSA motorcycle, is a security feature designed to prevent unauthorized use or theft of the motorcycle.

Immobilizers are commonly found in modern motorcycles to enhance security. Here's how an immobilizer typically works:

**Key or Fob:** The immobilizer system is often linked to the motorcycle's ignition system and is controlled by a key or electronic fob provided to the owner.

**RFID or Transponder Technology:** Most motorcycle immobilizers use Radio-Frequency Identification (RFID) or transponder technology. The key or fob contains a small chip or transponder that emits a unique code when brought into proximity with the motorcycle's ignition system.

**Code Verification:** When you insert the key or bring the fob near the motorcycle's ignition, the immobilizer system verifies the transmitted code. If the code matches the one stored in the motorcycle's system, the immobilizer disengages, allowing the motorcycle to start.

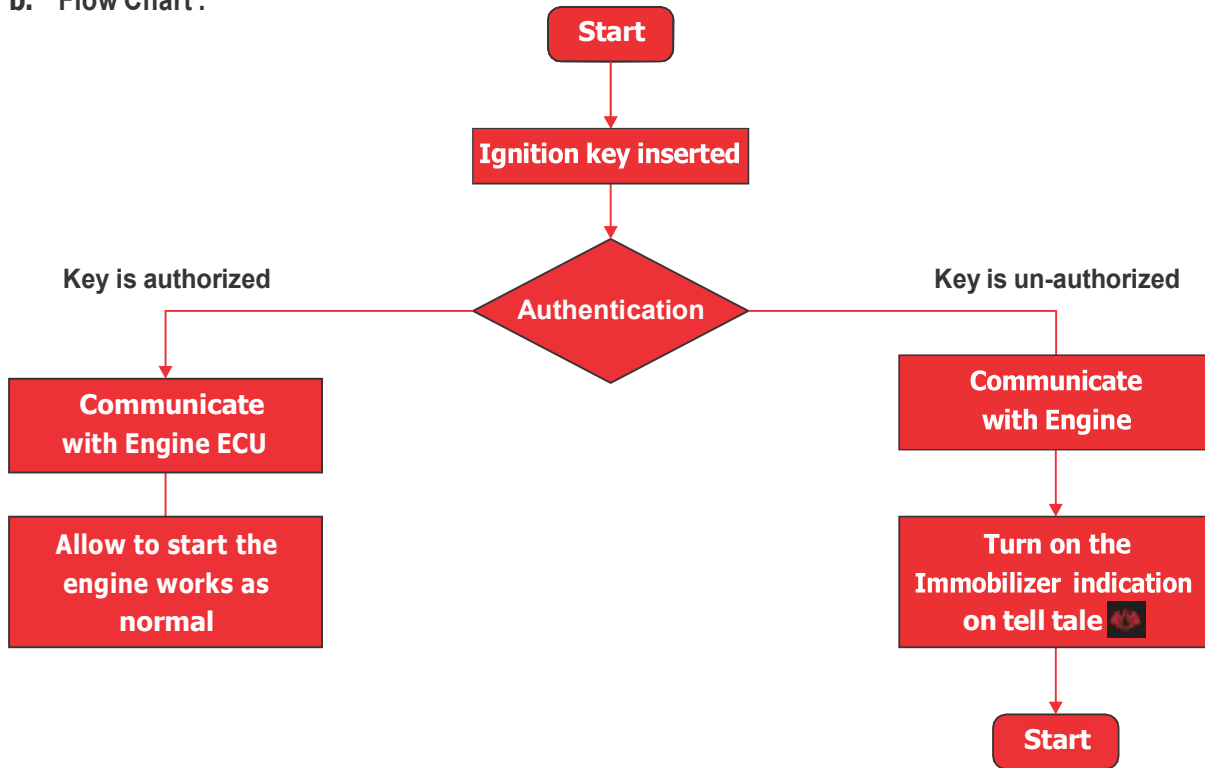
**Engine Start:** Once the immobilizer system confirms the correct code, it allows you to start the motorcycle's engine. Without the correct key or fob, engine will not start.

The primary purpose of an immobilizer is to prevent hot-wiring of the motorcycle or using a copied key to start it. It adds an extra layer of security to your motorcycle, making it more challenging for thieves to steal.

### a. Functions:

- The immobilizer is based on LF signal wherein an antenna is a part of ignition lock, and a transponder chip is present in the key corresponding to the lock.
- If the wrong key is detected, it disabled the communication with Engine ECU and turns the immobilizer indicators.
- Since the transponder chip is embedded in the key or Smart Key fob, it cannot be easily duplicated. In case of loss of the key or Smart Key fob, only the authorized dealers can deactivate the lost key. They can arrange for a new key from the manufacturer after verifying the customer's credentials.

## b. Flow Chart :



## 1. BSA TRANSPONDER KEY REPLACEMENT SOP

## :PROCESS:

- Readiness of Diagnostic tool, Key pairing pigtail, Blank key with Virgin transponder & Key Biting machine.
- Key Biting/ Duplication through Key biting machine
- Connections
- Key pairing through diagnostic tool.
- Key verification.



Key Pairing Pigtail



Key Biting Machine



Diagnostic Tool



BSA Blank keyset

### Key Duplication through key biting machine

- Keys will be supplied without Biting with a virgin transponder.  
NOTE: (Dealers need to manage inventory for this part)
- Key biting needs to be done at the center location / Dealer end where key biting machine will be kept.
- Vehicle users need to provide the Key code engraved on the key to BSA dealer.
- BSA Dealer will feed that key code in the machine and place the key without biting at specified location.
- Machine will bite the key as per the key code entered. Now the duplicate key is prepared.

#### Virgin Transponder



Four-digit key code written on key tag & immo ECU sticker

### CONNECTIONS: DIAGNOSTIC TOOL & PIGTAIL

- Open LH side pane.
- After open panel pull wire for seat open.



- After open seat connect diagnostic tool with OBD Connector



- Remove Fuse-2 (30A) Fuse-7 (10A)



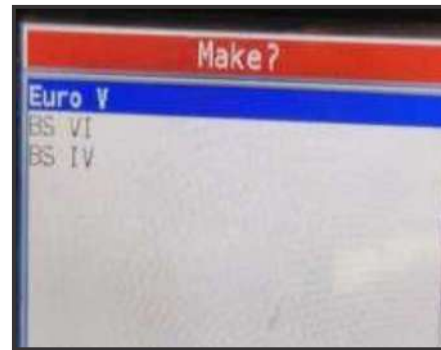
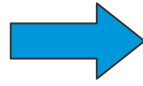
- Pigtail F-2 in 30A fuse-2 & F-7 in 10A Fuse.



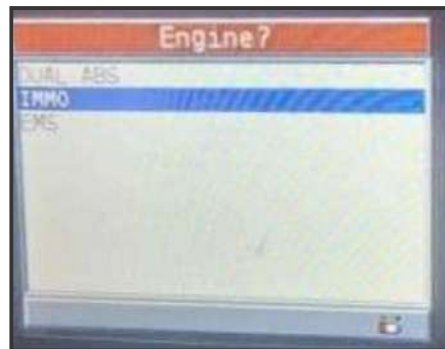
- Connect the Diagnostic tool to vehicle OBD Connector
- Keep vehicle IGNITION ON after key pairing pigtail & Bosch Diagnostic tool connections done and follow below steps.



Select vehicle diagnostic



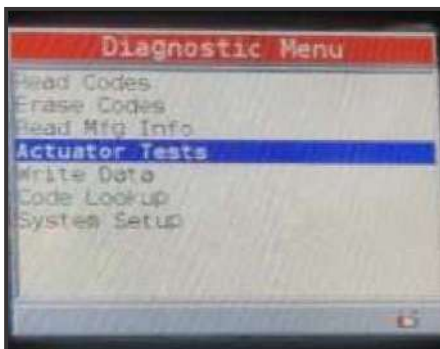
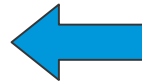
Select Euro 5



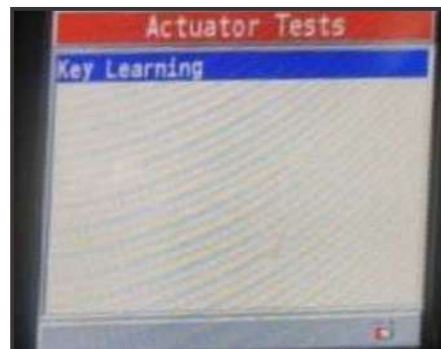
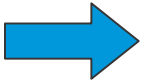
Select IMMO



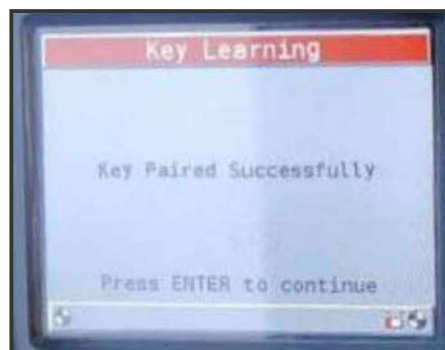
Select model BSA



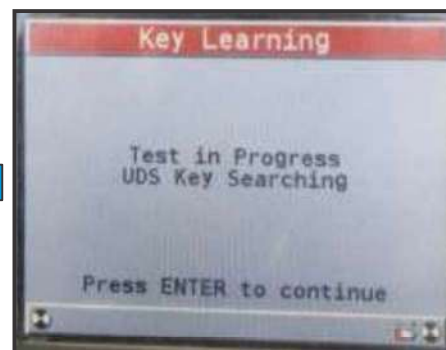
Select Actuator Test



Select key learning for test start



Now both key paired successfully

Swap the 2nd key within 5 sec.  
after getting

**NOTE**

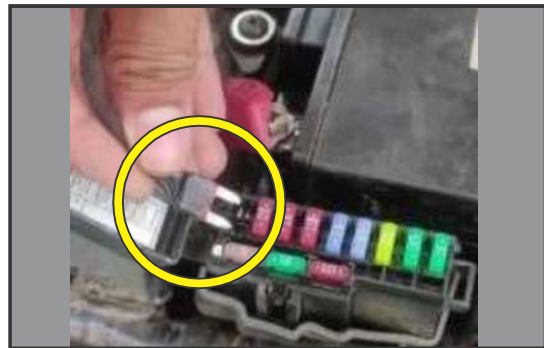
With the help of Bosch tool, we can pair a maximum of 2 no's of keys.

**KEY VERIFICATION**

- After successfully pairing OFF the Ignition switch.



- Disconnect the pigtail from fuse box and replace the relevant fuses.



- Again, start the ignition and check the immobilizer symbol on TT pod. If it's not available, then key pairing successful.



- When it appears the key not paired then repeat the process for pairing.



 **NOTE**

- If you own a BSA motorcycle with an immobilizer, it's essential to follow the manufacturer's instructions regarding key or fob management.
- Losing your key or fob can be problematic, as getting a replacement typically requires reprogramming the immobilizer system, which can be costly and inconvenient.

**3. TROUBLESHOOTING****i. Check the Key or Fob:**

- Ensure that you're using the correct key or electronic fob that is programmed to work with your Motorcycle's immobilizer system.
- Verify that the key or fob is not damaged or low on battery power. Replace the battery if necessary.

**ii. Attempt Multiple Starts:**

- If the immobilizer appears to be preventing the motorcycle from starting, try multiple start attempts with brief pauses in between. Sometimes, there may be a delay in the immobilizer recognizing the key or fob.

**iii. Inspect Wiring and Connections:**

- Examine the wiring and connections related to the immobilizer system for any visible damage, loose connections, or corrosion. Ensure all wires are securely connected.

 **NOTE**


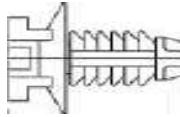




Remember that tampering with the immobilizer system or attempting to bypass it without proper authorization can lead to unintended consequences and may void your warranty. It's best to follow the manufacturer's recommended troubleshooting steps or seek professional assistance if needed to ensure the system is properly repaired and functional.

- 1. WIRING HARNESS PARTS**
- 2. PARTS USED IN WIRING HARNESS**
- 3. WIRING HARNESS ROUTING**

**1 WIRING HARNESS PARTS**

<b>Part No.</b>	<b>Part Name</b>
<b>T1501AB10010N</b>	<b>WIRING HARNESS B1</b>
T1501AB10020N	WIRING REAR LAMPS
T1503AB10020N	WIRING -BATTERY POSITIVE
T1503AB10030N	WIRING-BATTERY NEGATIVE
T1503BB10020N	WIRING -STARTER MOTOR POSITIVE
T1503BB10030N	WIRING -STARTER MOTOR GROUND

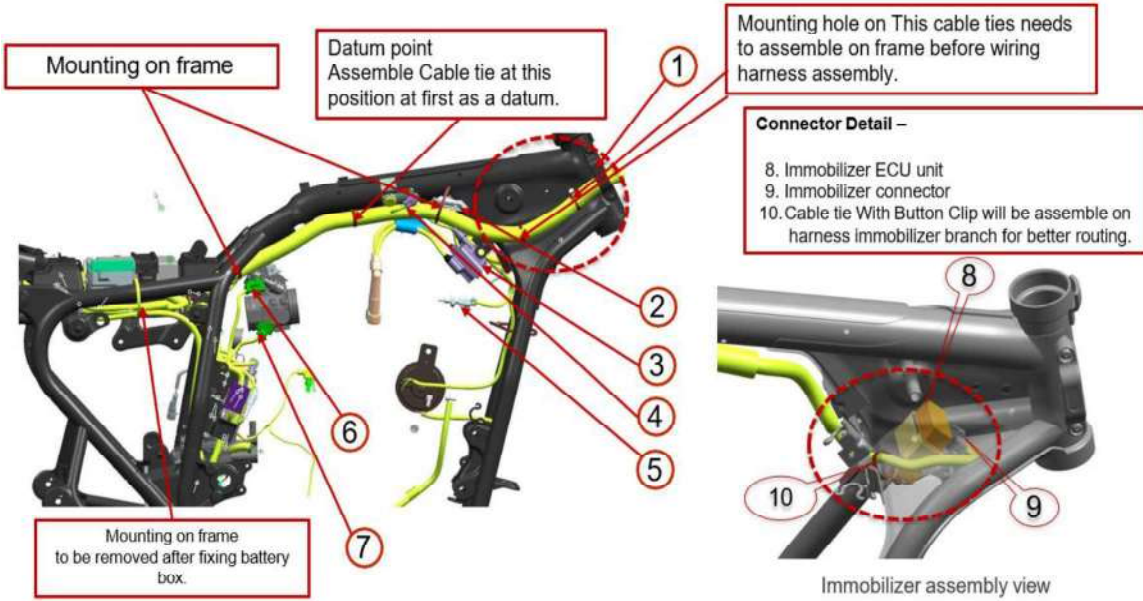
2 WIRING HARNESS PARTS

Description	image
Cable tie	
Cable tie clamp -Brake hose	
Double cable clip	
Rubber strap 50 mm	
Rubber strap 60 mm	
Rubber strap 140 mm	

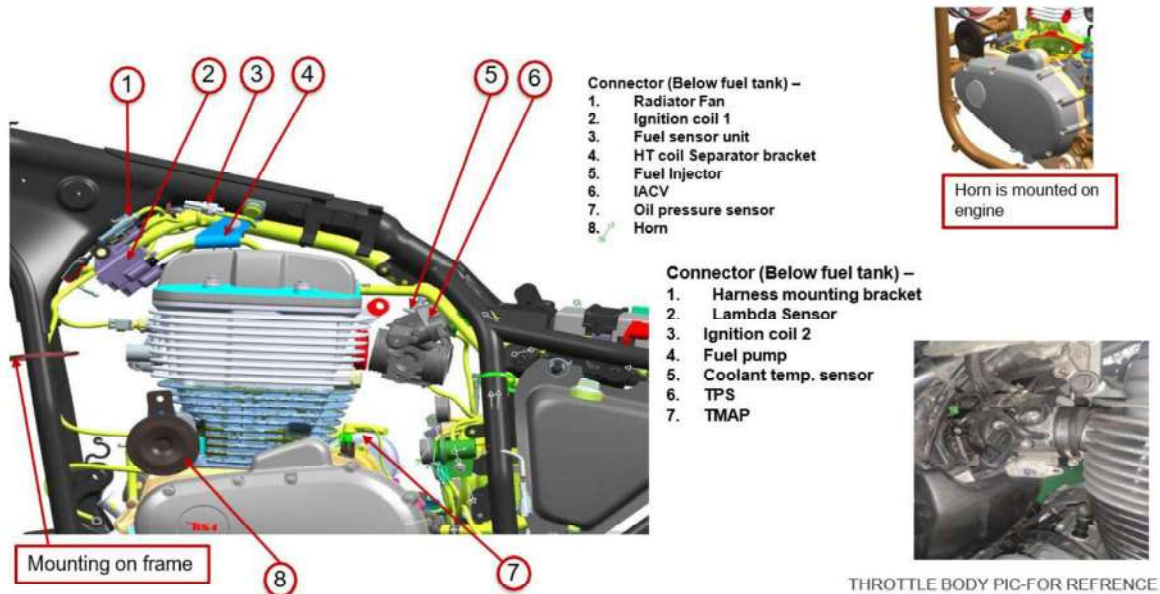
3 WIRING HARNESS ROUTING

## 3.1 Main Wiring Harness - T1501AB10010N

### a. Wiring harness – Main (Center pipe routing – RH side)

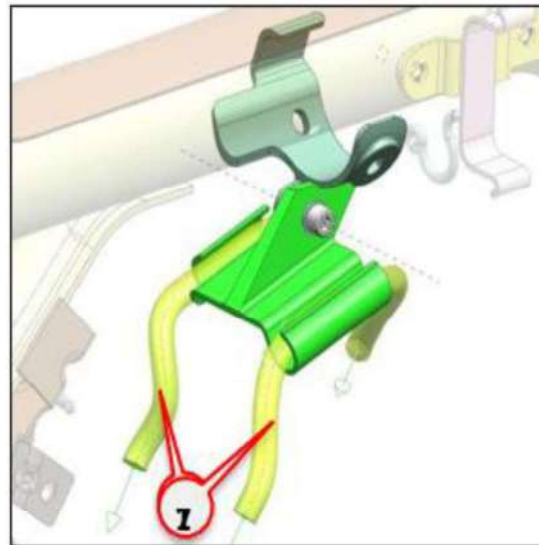
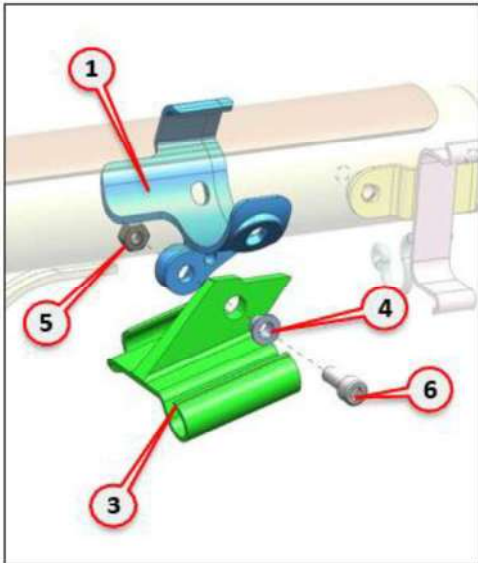


### b. Wiring harness – Main (Center pipe routing – LH side)



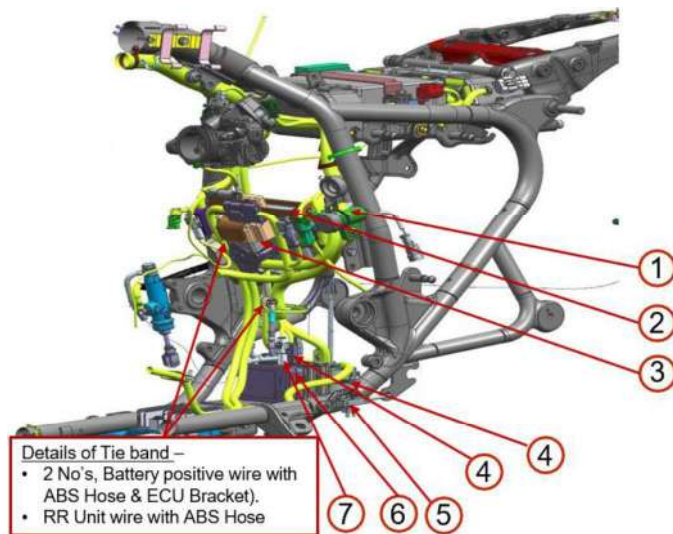
### c. B101\_SEPARATOR BRKT - HT COIL

1. Separator C bracket mounted on frame tube.
  2. Plastic rivet diameter 7.0 mm To be used to clamp separator C bracket on frame tube.
  3. Separator bracket is clamped with C bracket by using 4 no. Collar and no. 5 & no. 6 socket head screw & nut.
  4. Collar
  5. Nut
  6. Socket head Screw.
  7. HT coil cables are separated with separator bracket .
- Separator bracket HT coil mounts on frame tube above the cylinder head to separate HT coil cables.



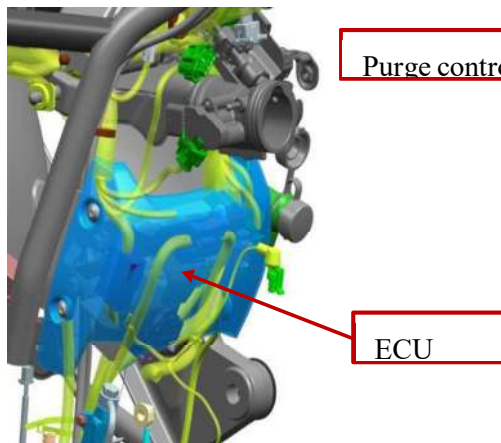
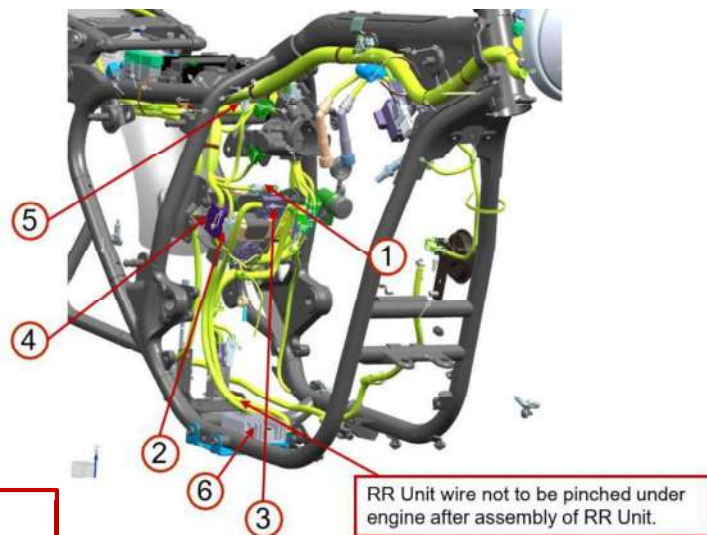
## d. Wiring harness – Main (Near air filter LH side)

1. 12 V socket
2. BCM
3. ECU
4. Starter Relay
5. Side stand switch
6. HECU
7. Rear brake switch
8. Starter relay coil



## e. Wiring harness – Main (Near air filter RH side)

1. Rear Speed sensor
2. Wiring Engine sensor
3. Magneto (I/P)
4. Magneto (O/P)
5. Purge valve
6. RR Unit



### f. Wiring harness – Main (Vehicle top side)

1. Fuse box

2. Radiator fan relay

3. Fuel pump relay

4. Roll over

5. Wiring rear lamp

6. Auxiliary relay

7. Headlamp relay

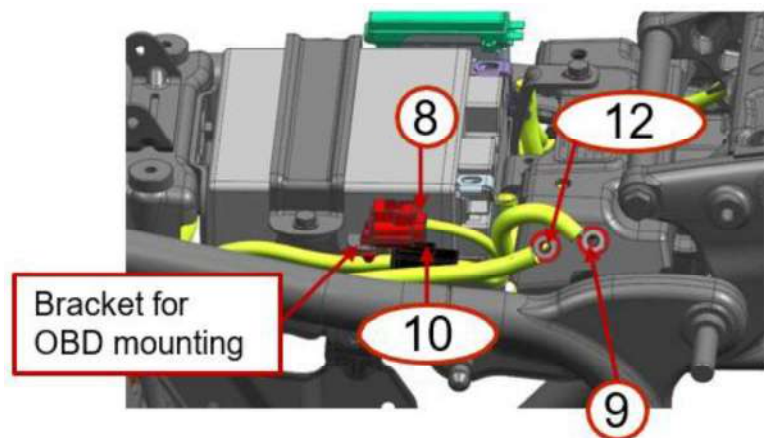
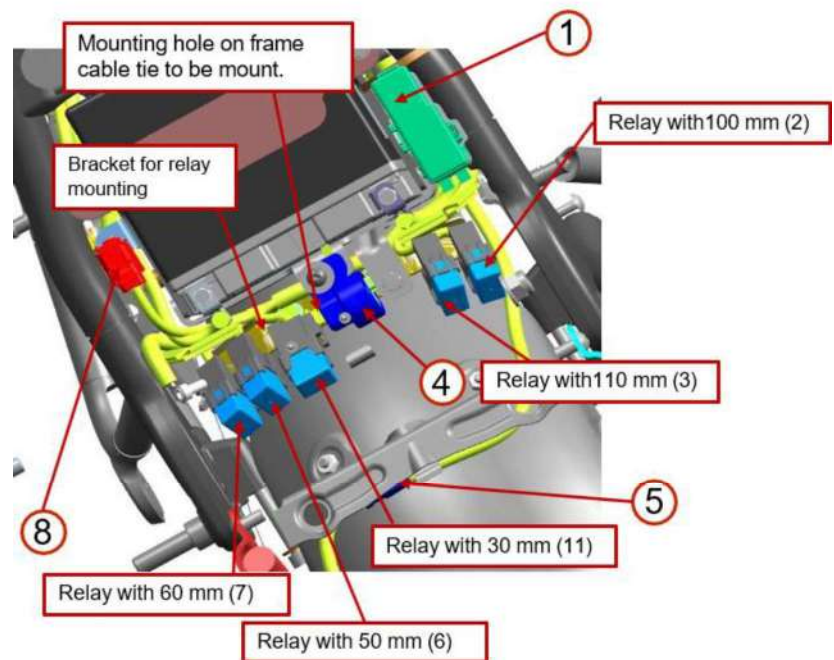
8. Diagnostic connector (OBD)

9. Battery cable Earth junction

10. Earth junction (connector) 2

11. Accessories relay.

12. Wiring harness earth point



- Relays are mount on brackets before fender assembly.

### g. Wiring harness – Main (Headlamp area –LH-RH side connector)



Wiring harness near head lamp area ( Before condition).



Wiring harness near head lamp area sort LH & RH side harness branches.



Wiring harness near head lamp area ( After condition). Assemble Rubber strap 60mm on LH as well as RH side.

### h. Wiring harness –Main (Handler Bar Assembly) – Rubber Strap Locations



**Control Sw. LH –** Rubber strap to be used for wires excluding clutch cable.



**Control Sw. RH –**

- Brake sw. & control sw. cable to be strap with handlebar.
- Wires to be strap together excluding throttle cable.

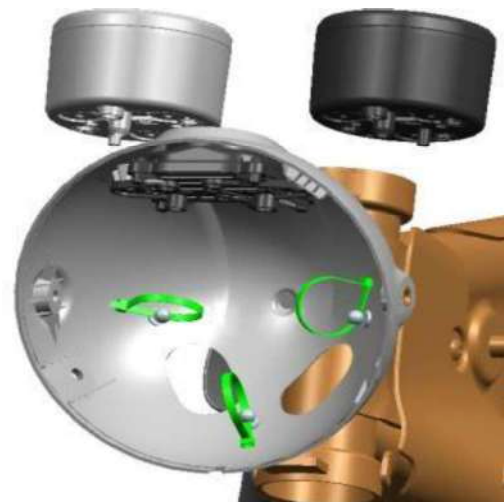
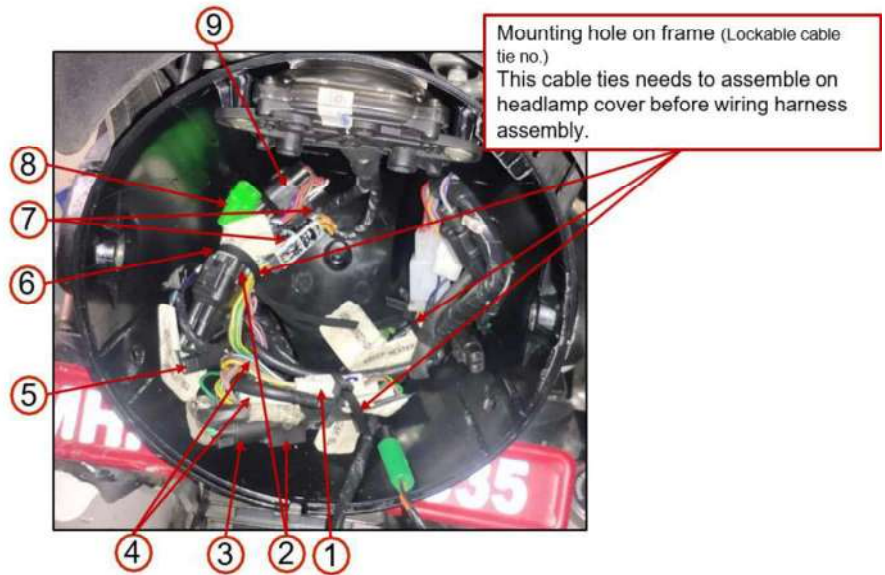


RUBBER STRAP 60 MM TO BE ADDED-FOR USB CHARGER IN HANDEL BAR AREA.

### i. Wiring harness – Main (Headlamp area –RH side connector)

Connector –

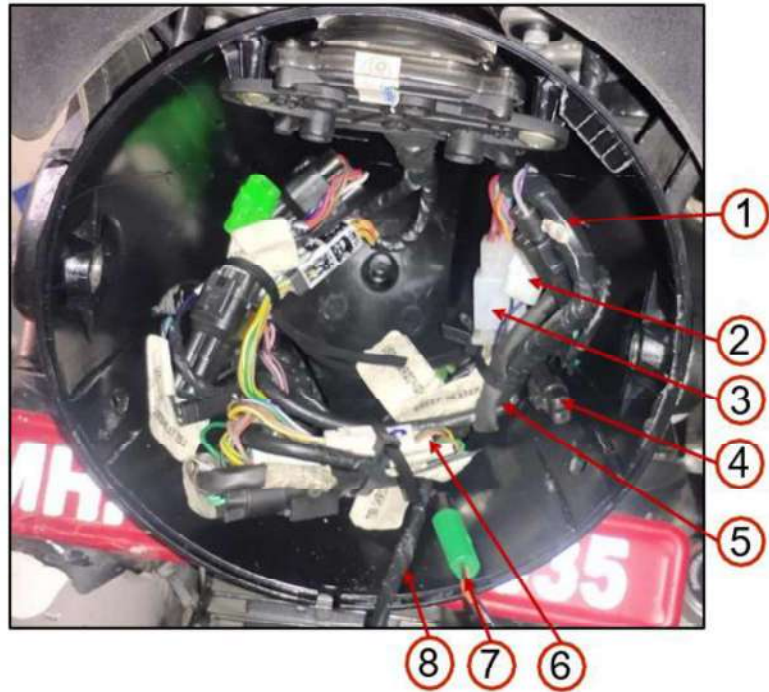
1. RPM pod
2. Control Switch RH C1 & C2
3. Front speed sensor
4. Speedo pod C1 & C2
5. Front Indicator RH
6. Ignition lock
7. Tell tail pod C1 & C2
8. Grip heater
9. Antenna



### j. Wiring harness – Main (Headlamp area –LH side connector)

Connector –

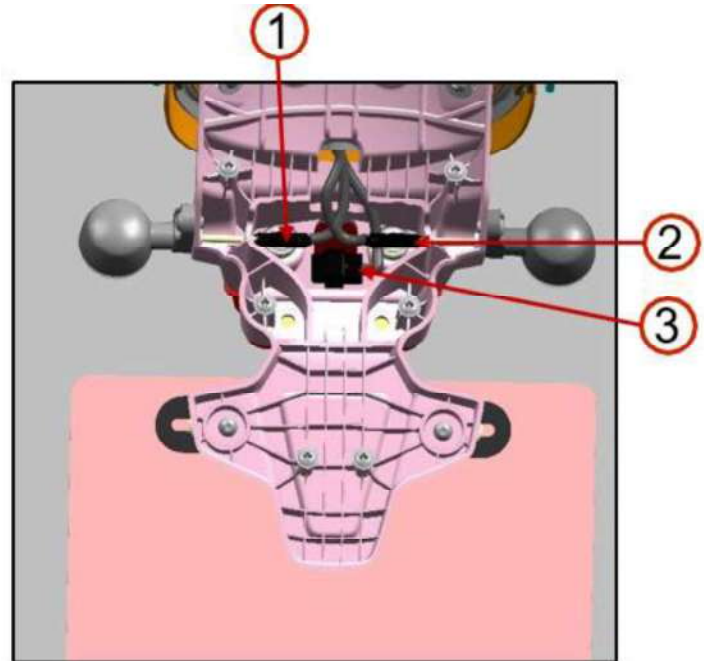
1. Regulator rectifier output
2. Front Indicator LH
3. Control Switch LH
4. Clutch Switch
5. Regulator rectifier input
6. USB charging port
7. Position Lamp
8. Headlamp



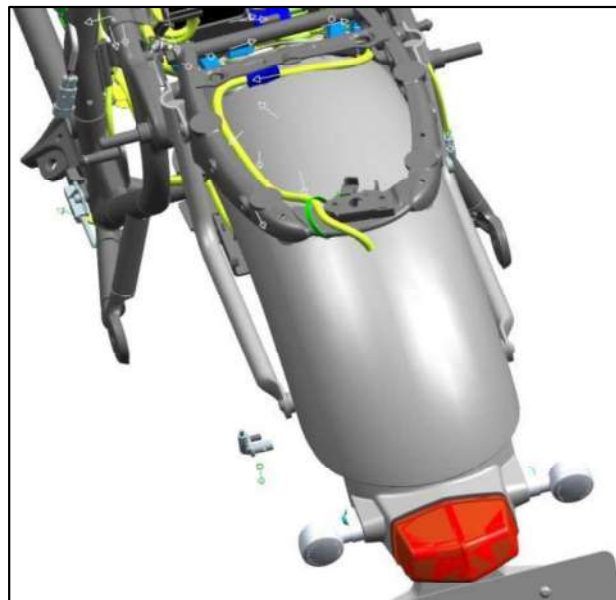
### Colour Code for Indicator

#### Assembly :

1. Wire with orange coloured tape to be assembled with LH Side Indicator.
2. Wire with blue coloured tape to be assembled with RH Side Indicator.



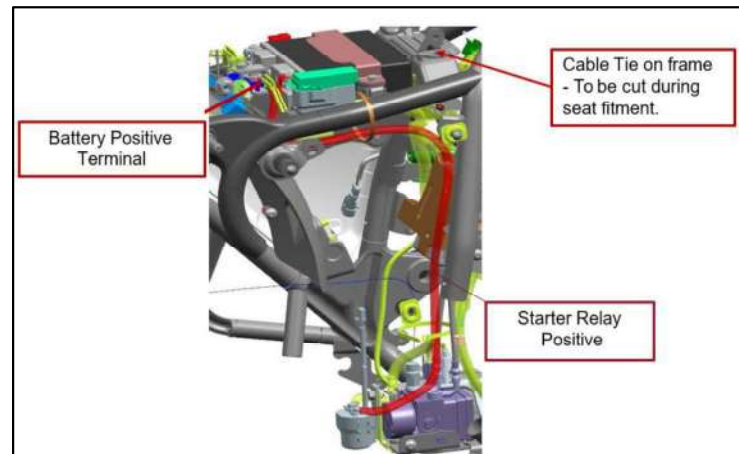
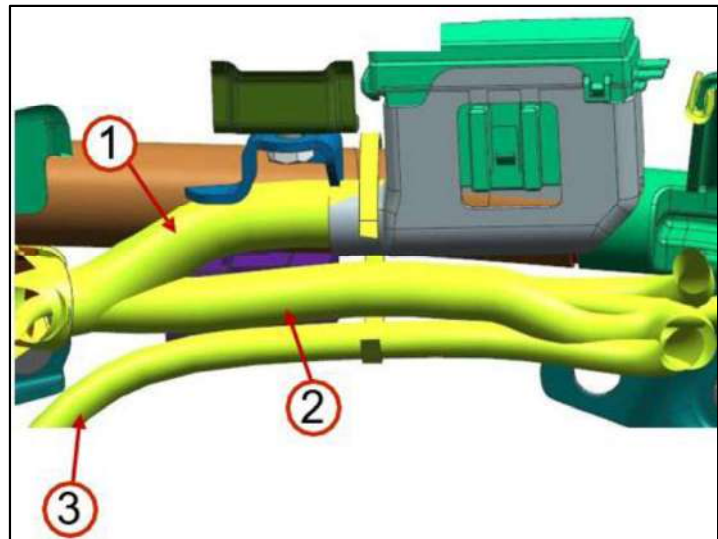
- Wiring rear lights connector from wiring harness -main
- Routing over the mudguard
- Harness must be route as shown in highlighted area. it will pass from above sub frame. to avoid seat resting circular area on subframe.



NOTE :

- Routine sequence to be follow RH side of vehicle in battery box.
- Fuse branch tube to be route first.
- Relay to be route below the fuse box branch.
- Battery cable should be route below the relay branch.

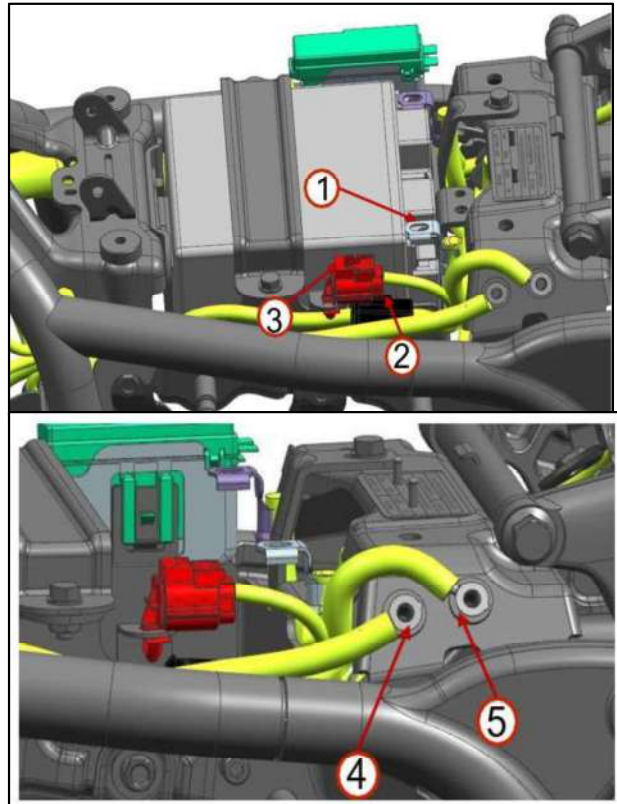
1. Fuse box Branch.
2. Relay branch.
3. Battery positive branch



### 3.4 WIRING - BATTERY NEGATIVE - T1503AB10030N

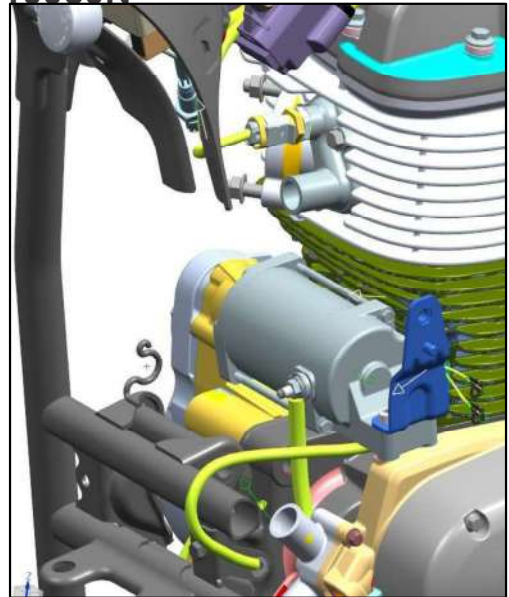
1. Battery negative terminal (Battery Side)
2. Harness earth connector.
3. Diagnostic connector
4. Wiring harness Earth point
5. Battery negative earth point

- At Earth point for main harness after fixing wires-Petroleum Jelly (OKS-1104)-PART No-72-00-16-2275 to applied over it.
- **Tightening torque should be 1 to 1.2 kg.m**



### 3.5 WIRING - STARTER MOTOR POSITIVE & GROUD - T1503BB10020N & T1503BB10030N

- Starter positive wire should be inside, and coolant tube should be outside while routing through holding bracket starter harness.
- Wiring Starter motor ground. Cable Barcode position should be in invisible area.



Starter motor positive

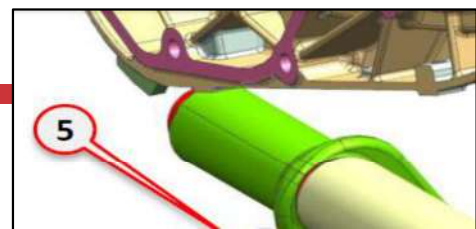
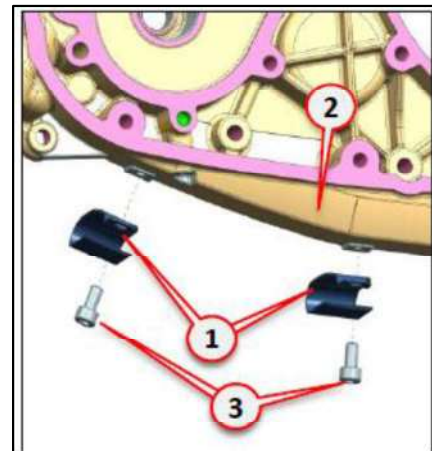
Starter motor negative

### 3.6 HOLDING BKT\_STARTER HARNESS

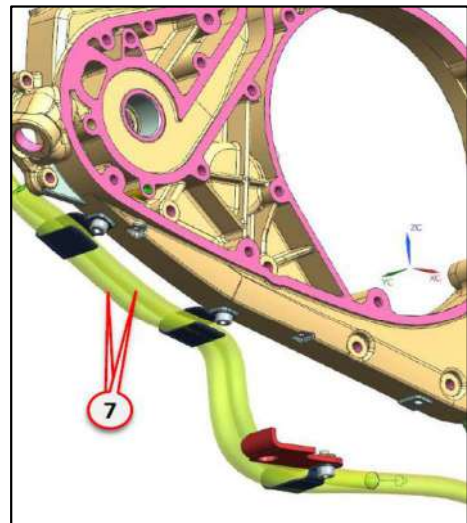
1. T1503BB10040n - HOLDING BKT\_STARTER HARNESS – Qty 3 nos
2. TSF0224077 - BOLT SOCKET HEAD CAP SCREW (M5X10) – Qty 3 Nos
  - a. Torque - 0.45-0.60



- 2 no's mounted on clutch cover adopter plate and one on cat box mounting bracket.
- Insert sequence – first insert the starter wiring harness and secondly coolant hose insert in the bracket.

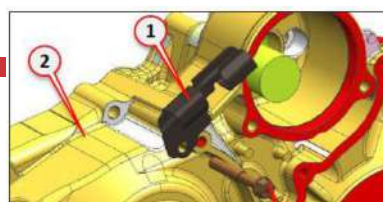


1. Holding bracket starter harness 2 quantities are mounted below the clutch cover adopter plate.
2. Clutch cover adopter plate.
3. Bolt is used to clamp the bracket on clutch cover adopter plate.
4. Remaining one is to be clamped on cat box mounting bracket.
5. Cat box mtg bracket.
6. Bolt is used to clamp the bracket with cat box mounting bracket.
7. Starter harness & cooling hose inserted in the bracket so as bracket should hold these two cables.



### 3.7 B101-HOLDING BKT\_MAGNETO HARNESS

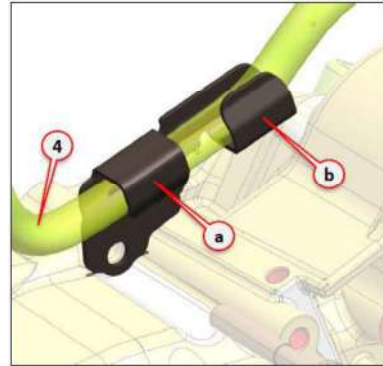
1. Holding bracket starter harness 2 quantities are mounted below the clutch cover adopter plate.



## 4.7 WIRING HARNESS ROUTING

1. Holding bracket magneto harness to be mounted on crankcase RH side
2. Crankcase RH.
3. Flanged bolt is to be used clamp the holding bracket magneto wire.
4. Magneto wire.

- Holding bracket magneto wire mounted on engine crankcase RH to hold the magneto cable.



**4 INTRODUCTION**

**5 FEATURES**

**6 TROUBLESHOOTING**

## 1. INTRODUCTION

Typically, a motorcycle speedometer provides information about the current speed of the motorcycle in kilometers per hour (km/h). Some modern motorcycles may have additional features integrated into the speedometer or displayed on a digital instrument cluster, such as

**Odometer:** Tracks the total distance the motorcycle has traveled.

**Trip Meter:** Allows you to measure the distance for a specific trip.

**Tachometer:** Indicates the engine's revolutions per minute (RPM), providing information about the engine's performance.

**Fuel Gauge:** Displays the amount of fuel remaining in the fuel tank.

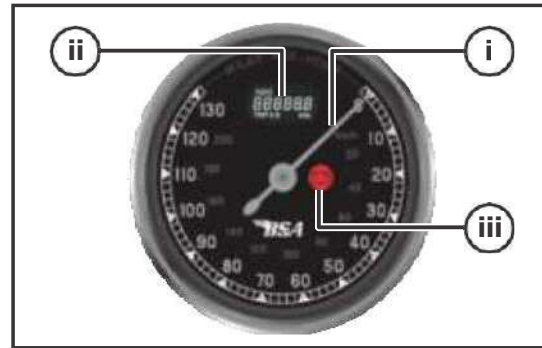
## 2. FEATURES

- i. 9 Tell Tales INDICATIONS.
- ii. Illuminated speedo needle.
- iii. LED backlit digital speedometer dial.
- iv. Retro design like the smith's speedometer.
- v. Digitally controlled speedometer and fuel gauge.



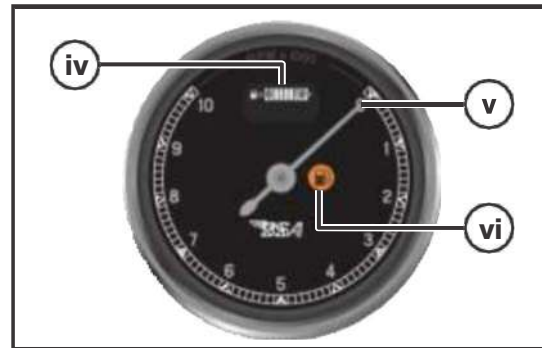
### A. POD 1 Features

- i. Speedometer – shows the riding speed.
- ii. Odometer- shows the cumulative distance covered.
- iii. Low Battery Indicator (Red Light ON) - Turns ON when battery voltage drops to 11.8V.



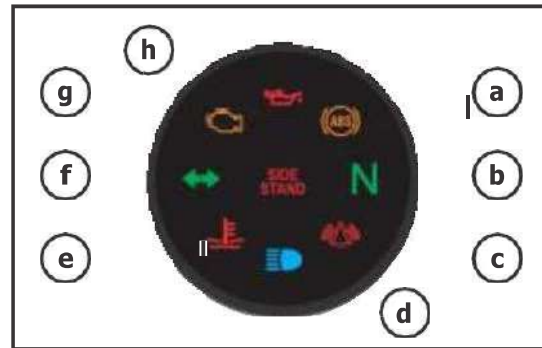
### B. POD 2 Features

- iv. Fuel meter: shows the amount of fuel available in the tank
- v. Tachometer/ Engine RPM meter- Shows the RPM of engine
- vi. Low fuel indicator (Orange light Blinking) :



### C. POD 3 Features

- a. ABS fault light (Amber light ON) - Turns ON in case of any abnormality in the ABS system
- b. Neutral indicator (Green light ON) - Turns ON when transmission is in neutral
- c. Immobilizer (Red light ON): Turns ON when unauthorized key is inserted in ignition lock.
- d. High beam indicator (Blue light ON): Turns ON when headlamp is on High beam
- e. Coolant temperature indicator (Red Light ON): turns ON when coolant temperature is  $\geq 120$ deg C.
- f. Side indicator (Green light Blinking): turns ON when left/right turn switch operates.
- g. MIL (Amber light ON): Turns ON when any abnormality in the system
- h. Oil pressure indication (Red Light ON): If Engine oil pressure is below specified pressure level
- i. Side stand warning indicator (Red light ON): Turns on when side stand is in ON state.

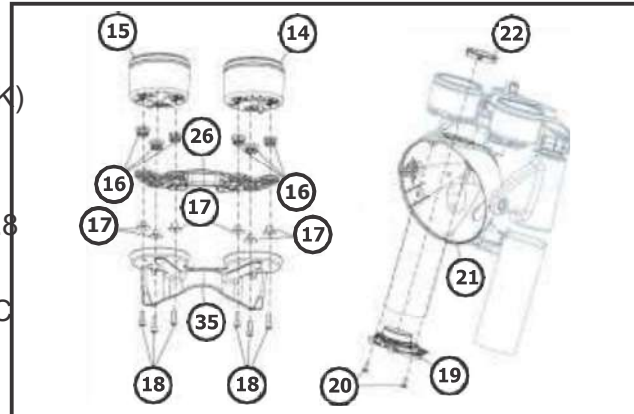


### A. POD 1 Features

- i. Speedometer – shows the riding speed
- ii. Odometer- shows the cumulative distance covered
- iii. Low Battery Indicator (Red Light ON) - Turns ON when battery voltage drops to 11.8V.

### D. Subpart & Assembly

14. POD-1-SPEEDOMETER
15. POD 2-RPM METER (SATIN BLACK)
16. GROMMET FOR M6
17. COLLAR M5X8L
18. SCREW RDHDCRC M5X0.8X20X6.8
19. POD 3-TELL-TALE INDICATION
20. SCREW TPRF CR ST 4.8X1.6X13 C
22. BEZEL TALE TALE POD CHROME
35. SPEEDO BRACKET COVER



## 3. TROUBLESHOOTING

- i. **Check the Connections:** Ensure that all the electrical connections to the speedometer are secure and free from corrosion. Loose or damaged connections can lead to malfunctions.
- ii. **Inspect the Wiring:** Examine the wiring leading to and from the speedometer for any visible damage, such as frayed wires or breaks. Replace any damaged wiring.
- iii. **Fuse Inspection:** Check the fuse related to the speedometer in the motorcycle's fuse box. If the fuse is blown, replace it with a new one of the same rating.
- iv. **Speed Sensor Check:** The speedometer often relies on a speed sensor. Make sure the speed sensor is properly connected and functioning. In some cases, the sensor may need replacement.

1. **DTC CODE INTRODUCTION**
2. **GENERAL TROUBLESHOOTING STEPS**
3. **DTC CODE SUMMARY**
4. **ABS READ DIAGNOSTIC TROUBLE CODE (DTC)**
5. **DIAGNOSTIC TROUBLE CODE (DTC)**

## 1. DTC Code Introduction

DTC stands for Diagnostic Trouble Code. It is a standardized system used in the automotive industry to identify and communicate problems or issues within a vehicle's engine or other essential systems. DTCs are primarily associated with the On-Board Diagnostics (OBD) system, which is present in most modern vehicles.

Here's an introduction to DTC codes and how they work:

**1. Purpose:** DTC codes are used to pinpoint specific issues or malfunctions in a vehicle's various systems. These codes help mechanics and technicians quickly identify problems, making diagnosis and repair more efficient.

**2. OBD System:** The OBD system continuously monitors various sensors and components in the vehicle, such as the engine, transmission, emissions, and more. When it detects an abnormality or malfunction, it generates a DTC code.

**3. DTC Format:** DTCs typically consist of a letter followed by a series of numbers. The format can vary slightly, but a common example is P0300. In this example:

- The "P" indicates it's a powertrain issue (related to the engine or transmission).
- The "03" specifies the subsystem or component (e.g., cylinder misfire).
- The "00" represents a general fault within that subsystem or component.

**4. Types of DTCs:** There are several categories of DTCs, including:

- Generic DTCs: These are standardized codes used across all vehicle makes and models.
- Manufacturer-Specific DTCs: Some codes are specific to certain car manufacturers, providing more detailed information about the issue.
- Pending DTCs: These are potential trouble codes that have not triggered the check engine light yet but may indicate an emerging issue.
- Permanent DTCs: These are more severe issues that have caused the check engine light to illuminate and are stored in the vehicle's memory until cleared.

**5. Scanning and Interpretation:** To retrieve DTCs, a Bosch diagnostic scanner is connected to the vehicle's OBD connector. Once connected, the scanner reads the codes, which can then be interpreted using a database. This helps determine the nature of the problem.

**6. Repair and Maintenance:** After identifying the DTC, mechanics or vehicle owners can take appropriate action to address the issue. This may involve replacing a faulty component, repairing wiring, or performing maintenance tasks.

**7. Clearing DTCs:** After the problem has been resolved, DTCs can be cleared from the vehicle's memory using the diagnostic scanner. This turns off the check engine light, indicating that the issue has been addressed.

## 2. Troubleshooting Diagnostic Trouble Codes (DTCs)

When troubleshooting Diagnostic Trouble Codes (DTCs) in a modern vehicle, follow these general steps:

- i. **Retrieve the DTC:** Use an OBD-II scanner or a manufacturer-specific diagnostic tool to retrieve the DTC(s) stored in your vehicle's computer. These codes provide information about the specific issue that triggered the check engine light.
- ii. **Record the DTC(s):** Write down the DTC(s) and their descriptions. These alphanumeric codes will help you pinpoint the problem.
- iii. **Research the DTC:** Look up the DTC(s) in a repair manual, online database, or the manufacturer's documentation to understand what they mean. The code will often provide a starting point for diagnosis.
- iv. **Check for Other Codes:** Sometimes, multiple codes may be stored, and they could be related. Check for any additional DTCs that may provide more context about the issue.
- v. **Visual Inspection:** Inspect the engine bay and related components for obvious issues such as disconnected hoses, loose wires, damaged connectors, or worn-out components. Address any visible problems.
- vi. **Check Fluid Levels:** Low engine oil, coolant, or other vital fluids can trigger DTCs. Ensure all fluid levels are at the recommended levels.
- vii. **Inspect Vacuum Hoses:** Vacuum leaks can lead to various DTCs. Inspect the vacuum hoses for cracks or disconnected sections.
- viii. **Wiring Inspection:** Examine the wiring harness for damage, especially if the DTC relates to a sensor or component. Damaged wiring can cause erroneous DTCs.
- ix. **Sensor Testing:** Test sensors related to the DTC. Use a multimeter or a scan tool to check sensor resistance, voltage, or output signals as per manufacturer specifications.
- x. **Clear DTCs:** After recording and addressing the issues, use the diagnostic tool to clear the DTCs from the vehicle's memory.
- xi. **Intermittent Issues:** If the DTC relates to an intermittent issue, it may not appear during your initial diagnostic session. Consider driving the vehicle under different conditions to recreate the problem.

### **NOTE**

Remember that some DTCs may be straightforward to diagnose and fix, while others may require more advanced diagnostic tools and expertise. Additionally, always prioritize safety when working on your vehicle.

Component	Fault code	Monitoring Strategy	Fault decision criteria	MI activation criteria	Secondary parameters	Demonstration test
Oxygen sensor	P0031	<ol style="list-style-type: none"> <li>Oxygen sensor heater control output - short to ground</li> <li>Comparison of heater control circuit feedback voltage with threshold value</li> </ol>	When voltage level of Feedback pin of heater circuit reads STG condition for 5s, then the fault code is set.	1st Cycle	Engine RPM & Oxygen sensor signal	Type A
Oxygen sensor	P0032	<ol style="list-style-type: none"> <li>Oxygen sensor heater control output - short to Battery</li> <li>Comparison of heater control circuit feedback voltage with threshold value</li> </ol>	When voltage level of Feedback pin of heater circuit reads STB condition for 5s after heater ON, then the fault code is set.	1st Cycle	Engine RPM & Oxygen sensor signal	Type B
Manifold air pressure sensor	P0107	<ol style="list-style-type: none"> <li>Manifold air pressure sensor input - low reading (STG)</li> <li>Compare Intake air pressure value with threshold value</li> </ol>	MAP < 6.25 kPa for >3 seconds	1st Cycle	Engine RPM & TPS sensor signal	Type A
Manifold air pressure sensor	P0108	<ol style="list-style-type: none"> <li>Manifold air pressure sensor input - high reading (connector Open)</li> <li>Compare Intake air pressure value with threshold value</li> </ol>	MAP > 117.5 kPa for 3 seconds	1st Cycle	Engine RPM & TPS sensor signal	Type B
Engine Coolant temp. sensor	P0117	<ol style="list-style-type: none"> <li>Engine Coolant temperature sensor input - low reading (Connector open)</li> <li>Compare coolant temperature with threshold temperature value</li> </ol>	EWT < -38degC for 3 sec	1st Cycle	Engine RPM & coolant temp. sensor signal	Type A
Engine Coolant temp. sensor	P0118	<ol style="list-style-type: none"> <li>Engine Coolant temp. sensor input - high reading (STG)</li> <li>Compare coolant temp. with threshold temp. value</li> </ol>	EWT > 130degC for 3 sec	1st Cycle	Engine RPM & coolant temp. sensor signal	Type A
Oxygen sensor	P0132	<ol style="list-style-type: none"> <li>Oxygen sensor 1 input-high reading Compare oxygen sensor</li> <li>voltage with threshold value</li> </ol>	LAMBD A V1 > 1.5 V for 5sec	1st Cycle	Engine RPM & Oxygen sensor signal	Type A

Component	Fault code	Monitoring Strategy	Fault decision criteria	MI activation criteria	Secondary parameters	Demonstration test
Oxygen sensor	P0134	1. Oxygen sensor 1 input - no activity detected 2. Compare oxygen sensor voltage with threshold value	Oxygen sensor is not warmed up even after elapsing 300 seconds since heater is ON	1st Cycle	Engine RPM & Oxygen sensor signal	Type B
Engine over temperature	P0217	Compare coolant temperature during vehicle running with threshold value of coolant over temp.	EWT > 120 deg for 5s	1st Cycle	Engine RPM & coolant temp. sensor signal	Type C
Engine overspeed	P0219	Compare engine RPM with threshold engine cutoff RPM	RPM > 9500 RPM for 5s	1st Cycle	Engine RPM & TPS sensor signal	Type C
Fuel pump Relay	P0231	1. Fuel pump Relay control output - short to ground 2. Comparison of Fuel pump Relay control circuit feedback voltage with threshold value	When fuel pump is OFF, if Fuel Pump Output feedback Pin of driver < STG load for the time of 3s	1st Cycle	Engine RPM & TPS sensor signal	Type A
Fuel pump Relay	P0232	1. Fuel pump Relay control output - short to battery 2. Comparison of Fuel pump Relay control circuit feedback voltage with threshold value	When fuel pump is ON, if Fuel Pump Output feedback Pin of driver is > pump over current threshold for the time threshold of 3s	1st Cycle	Engine RPM & TPS sensor signal	Type B
Injector	P0261	2. Injector output - STG (Connector Open) 3. Comparison of Injector control circuit feedback voltage with threshold value	When injector is OFF, If Injector Output Feedback Pin of driver STG for >20 Sec	1st Cycle	Engine RPM, Oxygen & TPS sensor signal	Type A
Injector	P0262	1. Injector output - short to battery 2. Comparison of Injector control circuit feedback voltage with threshold value	When injector is ON, If Injector Output Feedback Pin of driver > over current threshold for 5s	1st Cycle	Engine RPM & Oxygen sensor signal	Type B
Crank sensor	P0335	Comparison of crank sensor conditioning circuit feedback voltage with threshold value	If the CRANK sensor input circuit feedback pin of the ASIC monitors no crank signal input during Key ON	1st Cycle	Engine RPM & TPS sensor signal	Type A
IACV	P0505	1. IACV control output - short to battery 2. Comparison of IACV control circuit feedback voltage with threshold value	When Feedback pins of Stepper Bridge #1 & #2 reads STB, then the fault code is set	1st Cycle	Engine RPM & TPS sensor signal	Type A

Component	Fault code	Monitoring Strategy	Fault decision criteria	MI activation criteria	Secondary parameters	Demonstration test
IACV	P0508	1. IACV control output - short to ground 2. Comparison of IACV control circuit feedback voltage with threshold value	When Feedback pins of Stepper Bridge #1 & #2 reads STG, then the fault code is set;	1st Cycle	Engine RPM & TPS sensor signal	Type A
IACV	P0509	1. IACV control output – Connector Open 2. Comparison of IACV control circuit feedback voltage with threshold value	When Feedback pins of Stepper Bridge #1 & #2 reads OPEN, then the fault code is set;	1st Cycle	Engine RPM & TPS sensor signal	Type A
Sensor supply voltage	P0608	1. Sensor supply voltage -out of range 2. Comparison of Sensorsupply circuit feedback voltage with threshold value	When sensor supply voltage feedback pin monitors the feedback value outside its operating range of 4.5 to 5.5V for 10 secs	1st Cycle	Manifold air pressure, TPS sensor signal	Type A
Coolant fan relay	P0691	1. Coolant fan relay control - short to ground 2. Comparison of Injector control circuit feedback voltage with threshold value	When Coolant fan relay is OFF, If fan relay Output feedback Pin of driver < STG for 5s	1st Cycle	Engine RPM & coolant temp. sensor signal	Type A
Coolant fan relay	P0692	1. Coolant fan relay control - short to battery 2. Comparison of Coolantfan Relay control circuit feedback voltage with threshold value	When coolant fan relay is ON, If fan relay Output feedback Pin of driver > over current threshold for 5s	1st Cycle	Engine RPM & coolant temp. sensor signal	Type B
Roll sensor	P1507	1. Roll sensor voltage out of range 2. Comparison with Roll over signal voltage with threshold value	ROLLV < 0.098V or ROLLV > 4.9V for 3sec	1st Cycle	Engine RPM & TPS sensor signal	Type A
Roll Over Event	P0508	Comparison of vehicle tilt angle with defined tilt angle	ROLLV > 1V for 10sec	1st Cycle	Engine RPM & TPS sensor signal	Type B
Ignition coil	P0351	1. Ignition coil – short to Battery or connector open	When Engine is turning, if Coil Output feedback Pin of driver COILFB1_OC < 0.2V or COILFB1_SC > 0.278V	1st Cycle	Engine RPM & TPS sensor signal	Type B
	P0352	2. Comparison with ignition coil control circuit feedback after Engine crank				

Component	Fault code	Monitoring Strategy	Fault decision criteria	MI activation criteria	Secondary parameters	Demonstration test
Manifold air temperature sensor	P0112	1. Manifold air temp. sensor input - low reading (Connector Open) 2. Comparison intake airtemp. with predefined temperature value	MAT < -35 deg C for 3 sec	1st Cycle	Engine RPM & Manifold air temp. sensor signal	Type A
Manifold air temperature sensor	P0113	1. Manifold air temp. sensor input - high reading (STG) 2. Comparison intake airtemp. with predefined temperature value	MAT > 110 deg C for 3 sec	1st Cycle	Engine RPM & Manifold air temperature sensor signal	Type A
Throttle position sensor	P0122	1. Throttle position sensor input - low reading (STG) 2. Comparison with throttle opening percentage during Key ON	TPSV < 0.2V for 5s	1st Cycle	Engine RPM, Key ON status & TPS sensor signal	Type A
Throttle position sensor	P0123	1. Throttle position sensor input - high reading (connector open) 2. Comparison with throttle opening percentage during Key ON	TPSV > 4.8V for 5s	1st Cycle	Engine RPM, Key ON status & TPS sensor signal	Type A
Loss of cranksync at speed	P0339	Comparison with Engine speed & vehicle speed	Loss of synchronization of 360deg CA/720deg CA is detected above calibration threshold value of 2000 rpm	1st Cycle	Engine RPM & TPS sensor signal	Type B
Engine coolant temperature sensor	P1517	1. Engine coolant temp. - implausible 2. Comparison of rise of current EWT value to a minimum calibratable temperature threshold value within a defined number of engine cycles after engine start	EWT connector Open before Key ON & connect again after Key ON	1st Cycle	Engine RPM & coolant temp. sensor signal	Type A
Throttle position sensor	P1522	1. Throttle position sensor - no activity detected 2. Comparison with throttle opening percentage during Key ON	CLTPSV = 0.762V for 30s	1st Cycle	Engine RPM, Key ON status & TPS sensor signal	Type A
Fuel system - running too lean	P0171	Compare close loop fuel correction	CLC = -25% for 60s	1st Cycle	Engine RPM, Oxygen, Engine load & TPS sensor signal	Type B

Component	Fault code	Monitoring Strategy	Fault decision criteria	MI activation criteria	Secondary parameters	Demonstration test
Fuel system - running too rich	P0172	Compare close loop fuel correction	CLC = 25% for 60s	1st Cycle	Engine RPM, Oxygen, Engine load & TPS sensor signal	Type B
Idle control system - RPM lower than expected	P0506	Comparison of actual Engine speed with desireengine speed	RPM < DESIREDIDLE - 500 rpm at zero throttle	1st Cycle	Engine RPM &TPS sensor signal	Type B
Idle control system - RPM higher than expected	P0507	Comparison of actual Engine speed with desireengine speed	RPM > DESIREDIDLE + 500 rpm at zero throttle	1st Cycle	Engine RPM &TPS sensor signal	Type B
Battery voltage low	P0562	Comparison of Battery voltage with threshold value	VBATT < 10.5V for 100 sec.	1st Cycle	Engine RPM	Type A
Battery voltage High	P0563	Comparison of Battery voltage with threshold value	VBATT > 16V for 100 sec.	1st Cycle	Engine RPM	Type A
Vehicle Speed CAN Bus fault	P0501	Receive input from ABS for fault condition	Speed Sensor Disconnect	MIL Not activated	MIL Distance	Type A
Oil pressure sw fault	P0521	Oil pressures switch OPEN /Not connected	Check connectivity	1st Cycle		Type A
Oil pressure sw fault	P0524	Oil pressure Low detected	Replace sensor	1st Cycle		Type B
E-purge	P0443	E-Purge	Check connectivity	1st Cycle		Type B
Starter relay	P0616	Starter relay control STG	Check connectivity	1st Cycle		Type A
Starter relay	P0617	Starter relay control STB	Check connectivity	1st Cycle		Type A
Immobilizer	P1578	Number of retries exceeded for Random Number transmission to Immo ECU	Check immo ECU connectivity Antenna connection	1st Cycle		Type A
Immobilizer	P1580	Number of retries exceeded for Response (R7ECM) transmission to Immo ECU	Check immo ECU connectivity Antenna connection	1st Cycle		Type A
Immobilizer	P1582	Incorrect response received from Immo ECU	Check VIN number	1st Cycle		Type A
Immobilizer	P1584	Negative response received after Random Number transmission from ECU	Check immo ECU connectivity Antenna connection	1st Cycle		Type A
Immobilizer	P1586	Negative response received after Response transmission from Mahindra ECU	Antenna connection Check immo ECU connectivity	1st Cycle		Type A

**ABBREVIATION :**

STG - Short to ground STB - Short to Battery

**1. Demonstration test details –Cycle Description**

- Type A– Ignition Key ON for 2 Min & Off for 10 Sec.
- Type B – WMTC Cycle.
- Type C – Full throttle Condition min 30 Min.

**2. MIL Deactivate criteria**

- Restore the fault for which MIL is ON.
- Drive The vehicle in WMTC cycle for 35 Sec
- Turn Off the vehicle & wait for 10 Sec.
- Again, start the vehicle & drive in WMTC cycle for 35 sec
- Repeat WMTC drive cycle for 4 times
- During 4th cycle after completion of 35 second MIL will deactivate. (Only if fault is restored & no new error code occurred).


**4. ABS READ DIAGNOSTIC TROUBLE CODE (DTC) ( DTC LOGGED- MIL ON CONDITION)**

LIST FOR SINGLE CHANNEL ABS		LIST FOR DUAL CHANNEL ABS	
DTC	DESCRIPTION	DTC	DESCRIPTION
C1D90	Wheel speed sensor – el. Fault front	C0807-03	Valve Failures
C1D91	Wheel speed sensor – Extrapolation Fault front	C0807-04	Internal Fault
C1D92	Wheel speed sensor – Periodic Fault front	C0807-05	Main Driver Leakage
C1D93	Wheel speed sensor – Start Recognition Fault front	C0807-06	Hardware Fault
C1D94	Wheel speed sensor – Phase-Length-Supervision Fault front	C0807-07	MCU Failures
C1DD 3	OSEK Fatal Error	C0807-08	CAN_RAM_Check
C1DF0	Pump defective	C0807-0A	EEPROM anomaly Suspicion
C1DF1	Pump-connection	C0807-0E	Valve Activation invalid
C1DF2	Hardware Fault	C0807-0F	Valve Activation invalid

LIST FOR SINGLE CHANNEL ABS		LIST FOR DUAL CHANNEL ABS	
DTC	DESCRIPTION	DTC	DESCRIPTION
C1DF5	Internal Hardware Fault (main driver, valves,	C0807-1A	Pump blocked
C1DF3	Voltage low – long term detection	C0807-1B	Pump connection
C1DF4	Voltage low	C0807-1C	Pump supply
C1DF7	Voltage high	C0807-1D	Pump short circuit
C1DF8	Kl30 disconnection	C0808-60	Voltage low
		C0808-63	Voltage high
		C080B-2F	Coding Error
		C0809-01	Sensor Periodic Fault front
		C0809-02	Sensor Double Frequency Checkfront
		C0809-03	Sensor Phase-Length-SupervisionFault front
		C0809-04	Sensor El. Fault front
		C0809-05	Sensor Extrapolation Fault front
		C0809-06	Sensor Start Recognition Fault front
		C0809-11	Sensor Periodic Fault rear
		C0809-12	Sensor Double Frequency Check rear
		C0809-13	Sensor Phase-Length-SupervisionFault rear
		C0809-14	Sensor El. Fault rear
		C0809-15	Sensor Extrapolation Fault rear
		C0809-16	Sensor Start Recognition Fault rear
		D0344-5F	CAN Bus Off

## 5. DIAGNOSTIC TROUBLE CODE (DTC)

### Lambda Sensor / O2 (Oxygen) Sensor

DTC Code	P0031, P0032
Components	Lambda Sensor / O2 Sensor
Photograph	
Basics / Operation / Working	<p>Oxygen Sensor generate the signal voltage range from 0.2 to 0.9V depend on air fuel ratio.</p> <p>Heater circuit is required to generate heat in O2 sensor to activate the functionality of O2 sensor. If heater control feedback circuit voltage is 0V for min 5Sec then ECU set DTC code P0031 &amp; MIL is ON. After activation of heater, If Heater driver current value is &gt; Over current threshold value for Min 5 Sec then ECU set DTC code P0032 &amp; MIL is ON</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine ON.
Reaction after fault	Engine run in open loop mode. Emission & Fuel economy will be affected.

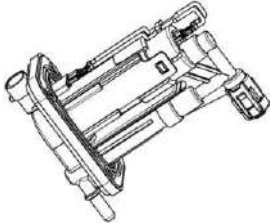
### Lambda Sensor / O2 (Oxygen) Sensor - DTC Code : P0130

Basics / Operation / Working	If oxygen sensor signal voltage is >1.5V for min 5Sec, then ECU set DTC code P0130 & MIL is ON.
Other Conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine ON.
Reaction after fault	Emission & Fuel economy will be affected.


### Lambda Sensor / O2 (Oxygen) Sensor - DTC Code : P0134

Basics / Operation / Working	If oxygen sensor not giving any signal voltage even after heater is ON elapsing 150 Sec, then ECU set DTC code P0134 & MIL is ON.
Other Conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine ON.
Reaction after fault	Emission & Fuel economy will be affected.


### Fuel System

DTC Code	P0171, P0172
Components	Fuel pump
Photograph	
Basics / Operation / Working	<p>Oxygen Sensor generate the signal voltage range from 0.2 to 0.9V depend on air fuel ratio ECU work in close loop to correct lean &amp; rich mixture into Stoichiometric mixture.</p> <p>After detection of lean air fuel mixture to ECU, it will start correction in fuel to make it 14.7:1 (Stoichiometric).</p> <p>If the fuel value correction is 20% of base fuel value for 60 Sec &amp; still system run in lean, then ECU set DTC code P0171 &amp; MIL is ON. After detection of rich air fuel mixture to ECU, it will start correction in fuel to make it stoichiometric.</p> <p>If the fuel value correction is -20% of base fuel value for 60 sec &amp; still system run in rich, then ECU set DTC code P0172 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine ON.
Reaction after fault	Emission & Fuel Economy will be affected.


### Manifold Air Pressure sensor

DTC Code	P0107, P0108
Components	Temperature and Manifold absolute pressure sensor
Photograph	
Basics / Operation / Working	<p>MAP Sensor is used to measure the Air pressure in inlet manifold. The MAP Sensor measures the pressure value from 10Kpa to 100Kpa If Inlet pressure value detect &lt; 6Kpa min 3Sec then ECU set DTC code P0107 &amp; MIL is ON. If Inlet pressure value detect &gt; 117Kpa min 3Sec then ECU set DTC code P0108 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V
Reaction after fault	Engine RPM will be unstable, Emission & Fuel economy will be affected.

### Manifold Air Pressure sensor

DTC Code	P0112, P0113
Components	Temperature and Manifold absolute pressure sensor
Photograph	
Basics / Operation / Working	<p>MAT Sensor is used to measure the Air pressure in inlet manifold. The MAT Sensor measures the Air Temperature value from -35 to 110°C</p> <p>If Inlet air temperature value detect &lt; -35°C min 3Sec then ECU set DTC code P0112 &amp; MIL is ON. If Inlet air temperature value detect &gt; 110°C min 3Sec then ECU set DTC code P0113 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V
Reaction after fault	Engine RPM will be unstable, Emission, Fuel economy & Drivability will be affected


### Engine Coolant temperature sensor

DTC Code	P0117, P0118, P1517
Components	Engine coolant temperature Sensor
Photograph	
Basics / Operation / Working	<p>Engine coolant temperature Sensor is used to measure the coolant temperature in engine.</p> <p>The coolant Sensor measures the coolant Temperature value from - 38 to 130°C.</p> <p>If coolant temperature value is &lt; -38°C min 3Sec then ECU set DTC code P0117 &amp; MIL is ON. If coolant temperature value is &gt; 130°C min 3Sec then ECU set DTC code P0118 &amp; MIL is ON. After Engine ON if coolant temperature &lt; 40°C for 40000 revolutions, then ECU set DTC code P1517 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine ON
Reaction after fault	Engine will be run in limp home mode; drivability will be affected.


### Engine Over temperature

DTC Code	P0217
Components	Engine coolant temperature Sensor
Photograph	
Basics / Operation / Working	<p>Engine coolant temperature Sensor is used to measure the coolant Temperature in engine.</p> <p>The coolant Sensor measures the coolant Temperature value from -38 to 130°C If coolant temperature value is &gt; 120°C for 5Sec then ECU set DTC code P0217 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine ON.
Reaction after fault	Engine will be run in limp home mode, Drivability & Fuel economy will be affected.


### TPS Sensor

DTC Code	P0122, P0123
Components	TPS Sensor
Photograph	
Basics / Operation / Working	<p>TPS Sensor is used to detect Throttle opening percentage. TPS Sensor measure voltage range from 0.2 to 4.8V depend throttle opening percentage.</p> <p>If TPS sensor voltage is &lt; 0.2V for min 5Sec then ECU set DTC code P0112 &amp; MIL is ON.</p> <p>If TPS sensor voltage is &gt; 4.8V for min 5Sec then ECU set DTC code P0113 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V.
Reaction after fault	Emission, drivability & Fuel economy will be affected.

### TPS - Throttle pedal Mechanical Failure

DTC Code	P1522
Components	TPS Sensor
Photograph	
Basics / Operation / Working	<p>TPS Sensor is used to detect Throttle opening percentage. TPS Sensor measure voltage range from 0.2 to 4.8V depend throttle opening percentage.</p> <p>If TPS sensor voltage is = 0.76V for min 30 Sec then ECU set DTC code P1522 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V.
Reaction after fault	Emission & Fuel economy will be affected.

### Fuel Pump

DTC Code	P0232, P0231
Components	Fuel Pump
Photograph	
Basics / Operation / Working	<p>Fuel Pump Control relay is used to provide the fuel to injector with constant pressure</p> <p>If Fuel Pump control relay driver feedback circuit detect the 0V for 3sec then ECU set DTC code P0231 &amp; MIL is ON.</p> <p>If Fuel Pump control relay driver overcurrent feedback circuit detect the current &gt; threshold current value for 3 sec, then ECU set DTC code P0232 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V.
Reaction after fault	Vehicle will not start.

### Engine Over speed

DTC Code	P0219
Components	Crank Sensor
Basics / Operation / Working	<p>Crank Sensor is used to generate the signal of engine revolution. The crank Sensor generate the signal for engine revolution from 100 to 9500.</p> <p>ECU Calculate the Engine RPM from the signal received from crank sensor.</p> <p>If engine RPM is &gt; 9500 for 5Sec then ECU set DTC code P0219 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine ON.
Reaction after fault	Safety indication for rider.

### Crank Sensor


DTC Code	P0335
Components	Crank Sensor
Basics / Operation / Working	<p>The crank Sensor generates the signal for engine revolution from 100 to 9500. ECU Calculate the Engine RPM from the signal received from crank sensor.</p> <p>If MAP Value is changed &amp; ECU not get the crank sensor signal, then ECU set DTC code P0335 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine crank.
Reaction after fault	Engine will not crank.

### Loss of crank sync at speed

DTC Code	P0339
Components	Crank Sensor
Basics / Operation / Working	<p>The crank Sensor generate the signal for engine revolution from 100 to 9500.</p> <p>ECU Calculate the Engine RPM from the signal received from crank sensor.</p> <p>If calculated rotation angle is different than 360° &amp; 720° sensor then ECU set DTC code P0339 &amp; MIL is ON</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine ON.

Reaction after fault	Engine will not Start or vehicle will hesitate.
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### Injector

DTC Code	P0261, P0262
Components	Fuel Injector
Photograph	
Basics / Operation / Working	<p>Injector is used to Inject the fuel in inlet manifold.</p> <p>ECU Control the quantity of fuel based on the input parameter like, Engine RPM, MAP value, TPS value, Vehicle speed etc.</p> <p>In injector off condition if feedback voltage is 0V for 5 Sec then ECU set the DTC code P0261 &amp; MIL is ON.</p> <p>After Injector Turn ON, if injector driver current value is &gt; Overcurrent threshold value for Min 5 Sec then ECU set DTC code P0262 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V.
Reaction after fault	Engine will not crank.


### IACV

DTC Code	P0505, P0508, P0509
Components	IACV
Photograph	
Basics / Operation / Working	<p>IACV is used to control the air flow in vehicle idle condition of engine.</p> <p>ECU Control the ON/OFF condition based on Engine RPM feedback to run engine in stable condition at idle RPM.</p> <p>In Engine Idle RPM condition If Stepper feedback voltage is 0V then ECU set DTC code P0505 &amp; MIL is ON.</p> <p>In Engine Idle RPM condition If Stepper feedback voltage is equal to battery voltage then ECU set DTC code P0508 &amp; MIL is ON.</p> <p>In Engine Idle RPM condition If Stepper bridge is open then ECU set DTC code P0509 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine run at idle RPM
Reaction after fault	Engine idle RPM will not stable, Drivability & fuel Economy will be affected.


### Idle Control System

DTC Code	P0506, P0507
Components	IACV
Photograph	
Basics / Operation / Working	<p>IACV is used to control the air flow in vehicle idle condition of engine.</p> <p>ECU Control the ON/OFF condition based on Engine RPM feedback to run engine in stable condition at idle RPM.</p> <p>In Idle Condition If engine RPM &lt; 1000 then ECU set DTC code P0506 &amp; MIL is ON.</p> <p>In Idle Condition If engine RPM &gt; 2000 then ECU set DTC code P0507 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine run at idle RPM.
Reaction after fault	Engine idle RPM will not stable, Emission & fuel Economy will be affected.


### Battery

DTC Code	P0562, P0563
Components	Battery
Photograph	
Basics / Operation / Working	<p>Battery is used to crank the vehicle &amp; provide backup to all electrical system.</p> <p>Regulator rectifier is used to convert AC voltage of alternator into DC to charge the battery &amp; run another electrical &amp; electronics load.</p> <p>If the battery voltage is &lt;10.5V for 10 Sec, then ECU set DTC code P0562 &amp; MIL is ON.</p> <p>If the battery voltage is &gt;16.0V for 10 Sec, then ECU set DTC code P0563 &amp; MIL is ON</p>
Other conditions	Ignition Key ON.
Reaction after fault	For Low battery vehicle will not start.

### Sensor Supply

DTC Code	P0608
Components	TPS and MAP Sensors
Photograph	
Basics / Operation / Working	<p>Sensor Supply gives 5V to all sensor like TPS, MAP etc.</p> <p>If the sensor supply voltage is &gt;5.5V for 5Sec, then ECU set DTC code P0608 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON
Reaction after fault	TPS & MAP signal gives wrong data, Emission & fuel economy will be affected.


### Roll Over Sensor

DTC Code	P1507
Components	Roll Over Sensor
Photograph	
Basics / Operation / Working	<p>Roll Over Sensor is used to measure the vehicle tilt angle.</p> <p>Roll over Sensor measure the vehicle tilt angle <math>60 \pm 10^\circ</math> it gives voltage signal 0.5V to 1.3V</p> <p>If Voltage is &lt; 0.098V or &gt; 4.9V for 3 sec, then ECU set DTC code P1507 &amp; MIL is ON</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V
Reaction after fault	Safety indication for rider.


### Roll Over Sensor

DTC Code	P1508
Components	Roll Over Sensor
Basics / Operation / Working	If Voltage is > 1V for 10 sec, then ECU set DTC code P1508 & MIL is ON
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine ON
Reaction after fault	Fuel supply to Engine will cut off after 10 Sec.


### Coolant Fan

DTC Code	P0691, P0692
Components	Coolant Fan
Photograph	
Basics / Operation / Working	<p>Coolant Fan Control relay is used to provide the cooling to radiator.</p> <p>If Coolant fan control relay driver feedback circuit detect the 0V for 3sec then ECU set DTC code P0691 &amp; MIL is ON.</p> <p>If Coolant fan control relay driver overcurrent feedback circuit detect the current &gt; threshold current value for 3 sec, then ECU set DTC code P0232 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V.
Reaction after fault	Engine will overheat, Emission, Drivability & Fuel economy will be affected.

### Vehicle Speed Sensor No Signal

DTC Code	P0501
Components	Speed Sensor
Photograph	
Basics / Operation / Working	<p>Speed sensor is used to give speed signal to ABS Unit.</p> <p>ABS Unit calculate the speed based on speed sensor input &amp; give speed signal to Engine ECU. Speed signal is 5 Pulses /revolution.</p> <p>If engine is running at 3500 rpm &amp; above in geared condition for 20 sec &amp; still ECU is not receiving speed signal from ABS, then ECU set DTC code P0501 &amp; MIL is OFF.</p> <p>If there is fault in Speed sensor then ABS ECU will detect the fault &amp; ABS MIL will turn ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V & Engine ON.
Reaction after fault	Speedometer will not work; ABS ECU will not work.

### Ignition Coil

DTC Code	P0350
Components	Ignition Coil
Photograph	
Basics / Operation / Working	<p>Ignition Coil is used to generate spark to ignite the fuel.</p> <p>If Ignition coil driver feedback circuit detect the voltage &lt; 0.2V then ECU set DTC code P0350 &amp; MIL is ON.</p>
Other conditions	Ignition Key ON, Battery Voltage shall be within 11 to 15V.
Reaction after fault	Vehicle will not start.

## **1. TROUBLESHOOTING BASICS**

## **2. TROUBLESHOOTING TABLES**

## 1. Troubleshooting Basics

Troubleshooting a BSA motorcycle involves identifying and addressing common issues that can affect its performance.

Electrical troubleshooting on a BSA motorcycle, especially a 2023 model, can be quite specific and may involve modern electronic components.

Here are steps you can take to diagnose and address electrical issues on your BSA motorcycle.

### i. Check the Battery:

- Start by ensuring that the battery is in good condition and fully charged. Test the battery voltage with a multimeter. A healthy battery should read around 12.6 volts or higher when the bike is not running.

### ii. Inspect Wiring and Connections:

- Examine the wiring harness for any visible damage, such as frayed wires, loose connections, or corrosion.
- Check all electrical connectors, including those for the lights, ignition system, and sensors. Ensure they are clean and securely connected.

### iii. Fuse Inspection:

- Locate the motorcycle's fuse box and inspect the fuses. Replace any blown fuses with ones of the same rating.
- If a fuse keeps blowing, it is a sign of an electrical fault that needs further investigation.

### iv. Starter Motor and Relay:

- If the motorcycle won't start, check the starter motor and Relay. Listen for any clicking sounds when you press the starter button.
- Ensure that the starter relay is functioning properly.

### v. Check the Charging System:

- Test the alternator or stator to ensure it is producing the correct voltage. Consult service manual for specific testing procedures.
- Verify that the voltage regulator/rectifier is functioning correctly.

### vi. Ignition System:

- Inspect the ignition system, including the ignition coil, spark plug wires, and spark plugs. Make sure everything is in good condition.
- Test the ignition switch to ensure it making proper contact when turned.

**vii. Lights and Signals:**

- If you have issues with lights or turn signals not working, inspect the bulbs, sockets, and wiring.
- Test the switches for the lights and turn signals.

**viii. Testing Sensors and Sensors Wiring:**

- Modern motorcycles often have various sensors (e.g., TMAP, TPS, O2 Sensor) .If you suspect a sensor issue, consult a service manual for testing procedures and use a multimeter to check sensor output.

**ix. Grounds:**

- Ensure that all electrical components have proper grounding. Bad ground can cause various electrical problems.

**x. ECU (Electronic Control Unit) Diagnostics:**

- Use Bosch Diagnostic tools to check for error codes and system diagnostics. Check the service manual for information on accessing and interpreting these codes.

**NOTE**

Remember to prioritize safety while working on electrical systems. Disconnect the battery before working on any electrical components and take precautions to prevent short circuits or accidental electrical shocks.

## 2. Troubleshooting table

### A. Vehicle not starting (does not crank)

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Vehicle not starting (does not crank)	Ignition switch in "OFF" position	Switch on ignition
	Engine kill switch in "OFF" position	Push stop switch to "ON" position
	Clogged fuel line/pipe	Clean the fuel line/pipe
	Vent hole clogged in fuel tank cap	Clean vent hole
	Auto decompression not working	Ensure free motion of flyweight in exhaust cam assembly
	Loose spark plug	Tighten spark plug
	Clutch slipping	Adjust clutch cable free play
	Starter motor not working	Check and replace if faulty
	Failure of spark plug	Check and replace, if necessary
	Starter Motor not working & Battery not fully charged	Check and replace, if necessary
	Loose connection and /or Starter relay not working	Check and replace, if necessary
	Malfunctioning of clutch/starter switch & battery discharge	Check and replace, if necessary
	If vehicle is in gear engaged position	Press the clutch lever and start switch together
	Side stand in "ON" position & vehicle in gear engaged condition	Ensure side stand in "OFF" position
Immobilizer Tell-tale continuous ON / Blinking. Cause - Immobilizer ECU / Antenna coupler connection faulty.	Check Immobilizer ECU/antenna wiring / connection. Check/replace the transponder key.	

### B. Vehicle cranks but does not start (Engine Misfiring)

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Vehicle cranks but does not start (Engine Misfiring)	Fuel Filter Clog / Empty Tank	Check Fuel filter blockage & replace / clean if necessary
	ECU	Check for any stored DTC
	Loose spark plug	Fix cap/lead firmly
	Spark plug fouled/insulation broken	Clean/reset gap or replace
	Poor compression	Auto decompression sticky / not working
	White / Black smoke due to excess oil in sump above max level	Check and drain excess oil

### C. High oil consumption

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
High oil consumption	Oil leakage	Check and rectify
	Oil level incorrect	Check and top-up, if required
	Breather system leakage	Check and rectify
	Worn out Cyl-Piston parts	Change service limit exceeded parts

### D. Vehicle cranks but does not start (Engine Misfiring)

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Vehicle cranks but does not start (Engine Misfiring)	Water in petrol tank / Fuel Line	Clean throttle body / petrol tank. Fill tank with fresh petrol
	Loose / Leak through intake hose / line	Tighten rubber hose / line suitably, Replace if necessary

**E. Engine lacks power**

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Vehicle cranks but does not start (Engine Misfiring)	Faulty fuel supply	Clean the fuel line/pipes/vent hole
	Clutch Cable free play excessive and clutch slipping	Adjust cable free play
	Choked airfilter	Clean/Replace airfilter
	Loose / Leak in Intake line / Throttle body mounting	Tighten rubber hose / Intake Suitably, Replace if necessary
	Rear chain adjusted too tight	Re-adjust properly
	Under inflated tyres	Maintain recommended tyre pressure
	Vehicle running in LIMP home mode	Side stand in OFF position/ In case MIL is glowing or side stand ON text is displayed in place of ODO meter. Need to be check cooling system
	ECU (Electronic Control Unit)	Check and replace, if necessary

**F. Engine Overheating**

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Engine Overheating	Clutch slipping	Check and correct
	Suction / Intake System / Coolant leakage	Check and correct
	Improper Fueling	Use good quality of fuel
	Radiator fan not working	Check and correct
	Silencer and Exhaust System	Check and correct

**G. Vehicle getting off in running (Engine Starts, But Runs Irregularly & stop/stall)**

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Vehicle getting off in running (Engine Starts, But Runs Irregularly & Stop/stall)	Faulty fuel supply	Clean the fuel line/tap/vent hole
	Very low idling speed	Check and correct
	Transmission Clutch slipping	Check and correct
	Suction/Intake System/Parts leakage	Check and correct
	Incorrect Fueling & Valve Timing	Check and correct
	TPS setting (Too Lean or Rich)	Adjust Throttle Play as per specification
	Silencer and Exhaust System	Check and correct
	Cooling System / Parts leakage / blockage	Check and correct

### H. Excessive Fuel Consumption

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Excessive Fuel Consumption	Fuel leakage	Check and correct
	Malfunction in EFI system	Check and correct
	Chocked airfilter	Check and correct
	Poor compression	Auto decompressor sticky or not working properly
	Under inflated tyre	Inflate to recommended pressure
	TPS setting (Too Lean or Rich)	Adjust Throttle Play as per specification

### I. Ignition knock

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Ignition Knock	Malfunction in EFI system	Check and correct
	Suction leakage	Check and correct
	ECU (Electronic Control Unit)	Check and replace, if necessary

### J. Brakes Ineffective

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Brakes Ineffective	Brake sponginess	Proper brake system bleeding
	Brake oil leakage	Check and correct/replace faulty component

### K. Starter motor operates but engine does not start

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Starter motor operates but engine does not start	Check engine slipper gear	Replace slipper gear
	Ignition system defective	Check spark by removing spark plug, If no spark then check electrical system
	Spark plug gap adjustment	Ensure the proper gap in spark plug
	Fuel pump not working or Low fuel pressure	Check fuel pump and measure the fuel volume by using diagnostic tool
	DTC showing on speedometer	Check the error code on Diagnostic tool

#### L. Lights are not illuminating

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Lights are not illuminating	Ignition Key is OFF	Keep Ignition Key in ON condition
	Battery discharge	It should be more than 12.4 V, Charge if required.
	Fuse Blown / Relay malfunction	Replace if found blown / faulty
	Control switch not working	Check the Continuity
	Bulb/ LED has fused	Replace if fused
	Loose connection	Ensure the all the connectors are firmly connected with wiring
	Wiring harness defective	Check the continuity of lighting circuit in wiring harness
	ECU malfunction	Check and correct

#### M. Head Lamp illumination not proper

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Head Lamp illumination not proper	Headlight Setting disturbed	Follow the SOP for Head lamp setting
	Reflector dirty / damage	Check for any damage or dark spots inside headlamp reflector area, Replace if required.
	Battery discharge	It should be more than 12.4 V, Charge if required.
	Regulator output voltage is low for charging battery	Check the RR unit output voltage. i.e. >13.5 V. Replace if found faulty

#### N. Unable to switch HI/LOW beams

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Unable to switch HI/LOW beams	Hi/Lo switch faulty	Check the Continuity
	Headlamp relay faulty	Replace if found defective
	Wiring harness defective	Check the Continuity of wiring harness

#### O. Not showing proper vehicle speed

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Not showing proper vehicle speed	Gap between disc and sensor is more	Ensure the gap between disc and sensor, adjust if required.
	Loose connection	Ensure the all the connectors are firmly connected with wiring
	Speed sensor defective	Replace if found defective
	Speedometer malfunction	Replace if found defective

**P. Speedometer tell-tales Not visible/ not working**

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Speedometer tell-tales Not visible / not working	Ignition Key is OFF	Keep Ignition Key in ON condition
	Loose connection	Ensure the all the connectors are firmly connected with wiring
	Speedometer Defective	Replaced if found defective
	Battery discharge	It should be more than 12.4V, Charge if required.
	Sensor malfunction	Check and replace

**Q. Side stand Indication Not working or continuous ON**

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Side stand Indication Not working or continuous ON	Ignition Key is OFF	Keep Ignition Key in ON condition
	Battery discharge	It should be more than 12.4 V, Charge if required
	Loose connection	Ensure the all the connectors are firmly connected with wiring
	Magnet missing	Installed new magnet if required
	More gap between switch and magnet	Maintain the proper gap between switch and magnet
	Switch defective	Replaced if found defective

**R. Horn not working**

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Horn not working	Ignition Key is OFF	Keep Ignition Key in ON condition
	Battery discharge	It should be more than 12.4V, CC
	Loose connection	Ensure the all the connectors are firmly connected with wiring
	Fuse Blown	Replace if found blown
	Control switch not working	Check the Continuity

**S. Horn Sound not proper**

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Horn Sound not proper	Ignition Key is OFF	Keep Ignition Key in ON condition
	Battery discharge	It should be more than 12.4 V, Charge if required.
	Loose connection	Ensure the all the connectors are firmly connected with wiring
	Incorrect screw adjustment	Set the horn by adjusting screw

#### T. No Fuel Indication/ Improper fuel Indication

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
No Fuel Indication/ Improper fuel Indication	Ignition Key is OFF	Keep Ignition Key in ON condition
	Battery discharge	It should be more than 12.4 V, Charge if required.
	Loose connection	Ensure the all the connectors are firmly connected with wiring
	Fuel sensor defective / Speedometer malfunction	Check the resistance of Fuel level sensor, replaced if found faulty

#### U. Engine is running, but Idling is not proper

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Engine is running, but Idling is not proper	IACV defective	Check IACV valve for its operation, replace if required
	Incorrect fitment of IACV	Ensure the proper fitment of IACV
	Battery discharge	It should be more than 12.4 V, Charge if required.
	MIL indication on speedometer	Use the diagnostic tool to rectify the Error code
	Reverse polarity of Pulsar coil	Ensure the correct polarity of wires for Pulsar coil

#### V. Engine Cranks but doesn't start/ Engine misfire / Engine power Loss

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Engine Cranks but doesn't start/Engine misfire/Engine power Loss	MIL indication on speedometer	Use the diagnostic tool to rectify the Error code
	Loose connection in Ignition coil & suppressor cap	Ensure the connections

#### W. Battery is not getting charged

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Battery is not getting charged	Fuse Blown	Replace if found blown
	Loose connection / dust accumulation on negative terminal	Remove, clean and then connect Negative / Earth terminal again.
	Battery defective	Check the VRLA battery separately using a VRLA battery charger
	Regulator unit defective / low output voltage	Crank the engine and check for regular output : >14V @200 RPM
	Magneto coil defective	Confirm the magneto all coil resistances are within specifications, Relace If Required
	Magneto coil short with ground	Confirm that there is no short circuit between ground and phases of coil

### X. Engine Overheat

FAULTS/CONCERNS	POSSIBLE CAUSES	ACTION TO BE TAKEN
Engine Overheat	MIL indication on speedometer	Use the diagnostic tool to rectify the error code
	Temperature sensor failure/High temperature	Check the Temperature indication on speedometer
	Radiator Fan faulty	Check for Fan operation through diagnostic tool
	Reverse direction of fan	Check Fan air flow direction
	Low coolant	Check the coolant level
	Coolant pump not working	Ensure the operation of coolant pump
	Thermostat not working	Ensure the thermostat operation