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BOXER 150

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1

I Read I Learn

Identification

Salient Features

Technical Specifications

Periodic Maintenance & Lubrication



The Frame and Engine serial numbers are used to register the motorcycle. They are the unique alpha-numeric codes to identify your particular vehicle from others of the same model and type.

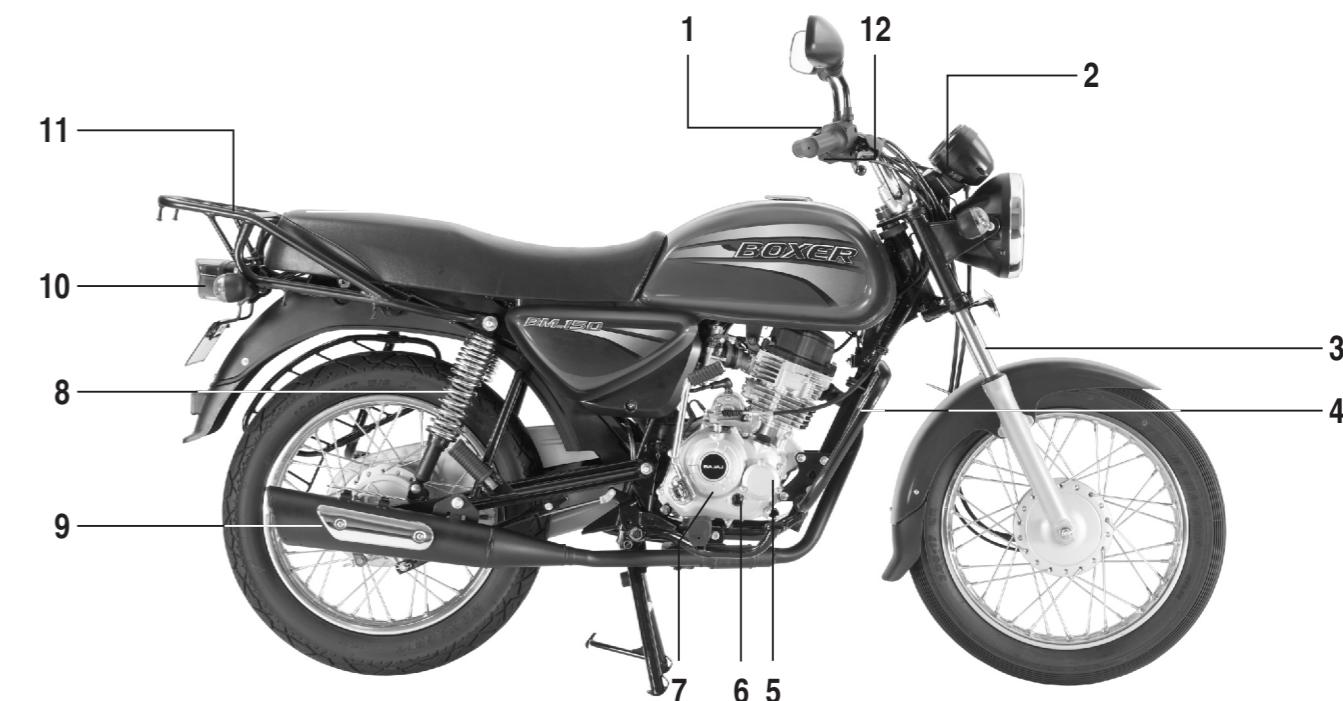


Frame Number Location
On LH Side of Steering Tube
(Alpha-Numeric - 17 Digits)



Engine Number Location
On LH Side Crankcase Near Gear Change Lever
(Alpha-Numeric - 11 Digits)

1. RH Control Switch	7. 4 Speed Transmission
2. Speedo Console	8. Spring-N-Spring Rear Suspension
3. Front Fork	9. Silencer
4. Single Down Tube Frame	10. Tail Lamp
5. Paper Oil Filter	11. Grip Frame
6. Engine Oil Level Window	12. LH Control Switch



PERFORMANCE

SAFETY


Features	Advantage	Benefits
<ul style="list-style-type: none"> Engine 144.8 cc Engine Power: 8.83 kW at 7500 RPM Engine torque: 12.26 Nm at 5000 RPM 	<ul style="list-style-type: none"> New generation technology engineered for best mileage and performance as well. 	<ul style="list-style-type: none"> Better combination of mileage & power.
<ul style="list-style-type: none"> Positive crankcase ventilation 	<ul style="list-style-type: none"> Prevents venting of hazardous engine oil fumes. 	<ul style="list-style-type: none"> Prevents dust entry inside the engine.
<ul style="list-style-type: none"> Paper type oil filtration system. 	<ul style="list-style-type: none"> Paper type oil filtration system filters out micro level dirt/dust particles from engine oil. 	<ul style="list-style-type: none"> Increased life of engine components.
<ul style="list-style-type: none"> ExhausTEC. 	<ul style="list-style-type: none"> Improves engine torque at low rpms and is optimized to get maximum performance from engine. 	<ul style="list-style-type: none"> No frequent gear change needed.
<ul style="list-style-type: none"> Digital CDI Throttle position sensor (TPS) 	<ul style="list-style-type: none"> Optimized ignition timing for better throttle response at various engine rpms. 	<ul style="list-style-type: none"> Refined engine that gives best performance combination of mileage and power.

Features	Advantage	Benefits
<ul style="list-style-type: none"> Powerful 12V 35/35W round headlight. 	<ul style="list-style-type: none"> Wide spread bright illumination of head light. 	<ul style="list-style-type: none"> Safe night driving.
<ul style="list-style-type: none"> Robust tubular semi double cradle type. 	<ul style="list-style-type: none"> Excellent ride, handling and stability. 	<ul style="list-style-type: none"> Safe to drive on any road condition.
<ul style="list-style-type: none"> Bigger brake drum Front & Rear 130 mm diameter. 	<ul style="list-style-type: none"> Larger contact area between brake drum & brake shoes enhances braking efficiency. 	<ul style="list-style-type: none"> Effective braking.

STYLE



COMFORT AND CONVENIENCE



Features	Advantage	Benefits
<ul style="list-style-type: none"> Unique shaped petrol tank with radiant decals. Round headlight. Twin pod instrument cluster. Crome plated front fender. Silver coloured engine. Long & wide seat. Sturdy grab rail. 	<ul style="list-style-type: none"> Stylish and eye catching looks. 	<ul style="list-style-type: none"> Robust & unmatchable bike in its class.

Features	Advantage	Benefits
<ul style="list-style-type: none"> Large display fuel meter. 	<ul style="list-style-type: none"> Ease in understanding about the fuel quantity that is available inside the petrol tank. 	<ul style="list-style-type: none"> Easy to read fuel level, even in vehicle running condition.
<ul style="list-style-type: none"> Long & wide seat. 	<ul style="list-style-type: none"> High density foam, long/wide seat & optimized saddle position gives a very ergonomic seating posture which aids riding comfort. 	<ul style="list-style-type: none"> Comfortable & pleasant journey for all.
<ul style="list-style-type: none"> Rear : SNS type rear adjustable hydraulic shock absorber. Front : Ceriani type telescopic front suspension. MF battery. 	<ul style="list-style-type: none"> Worlds 1st SNS suspension with longest travel in its class supported with Ceriani type telescopic front suspension. Low maintenance and no spillage of electrolyte. 	<ul style="list-style-type: none"> Very absorptive and supple suspension for an enhanced riding experience. No frequent topping up.



Engine & Transmission

Type	: Four stroke, Natural air cooled, SI Engine
No. of cylinders	: One
Bore	: 56.00 mm
Stroke	: 58.08 mm
Engine displacement	: 144.8 cc
Compression ratio	: 9.5 ± 0.5 : 1
Idling Speed	: 1400 ± 50 rpm in warm condition
Max. net power	: 8.83 kw @ 7500 rpm
Max. net torque	: 12.26 Nm @ 5000 rpm
Ignition System	: AC
Ignition Timing	: Variable as per maps in CDI
Fuel	: Unleaded Petrol, 87 RON Minimum
Carburettor	: UCAL UVD20
Spark Plug	: Champion PRZ9HC & BOSCH UR4AC
Spark Plug Gap	: 0.7 to 0.8 mm
Lubrication	: Positive Displacement
Starting	: Kick & Electric Start
Clutch	: Wet, Multi Disc Type
Transmission	: 4 Speed Constant Mesh
Primary reduction	: 3.571 : 1 (75/21)
Gear Ratios	1st Gear : 2.833 : 1 (34/12) 2nd Gear : 1.733 : 1 (26/15) 3rd Gear : 1.227 : 1 (27/22) 4th Gear : 0.958 : 1 (23/24)
Final Drive Ratio	: 3.071 : 1 (43/14)

Chassis & Body

Frame Type	: Tubular
Suspension	Front : 125 mm Fork travel, Telescopic Rear : 100 mm Rear Wheel travel, SNS
Brakes	Front : Mechanically expanding shoe type Rear : Mechanically expanding shoe type
Brake Size	Front : 130 mm Drum brake Rear : 130 mm Drum brake
Tyres	Front : 3.00 x 17, 45 P Rear : 100/90 x 17, 55 P
Tyre Pressure	Front : 1.75 Kg / Cm ² (25.0 PSI) Rear (Solo) : 2.00 Kg / Cm ² (28.0 PSI) Rear (with Pillion) : 2.25 Kg / Cm ² (32.0 PSI)
Rims	Front : 1.6" x 17" Spoke Wheel Rear : 2.15 x 17" Spoke Wheel
Fuel Tank Capacity	: 11.0 Liters
Usable Reserve	: 2.5 Liters
Unusable Reserve	: 1.0 Liter

Controls

Steering	: Handlebar
Accelerator	: On handle bar, RH grip
Gears	: Left foot pedal operated, Step shift
Brakes	Front : Lever operated, RH hand. Rear : Pedal operated by RH foot

Electricals

System	: 12 V (AC / DC)
Battery	: 12V 5Ah MF
Head Lamp	: 12 V 35/35 W, HS-1, without pilot lamp
Tail / Stop Lamp	: 12V, 5/21W
Side Indicator Lamp	: 12V, 10 W (4 Nos. - Clear Bulbs)
Speedometer Lamp	: 12V 2W
Neutral Indicator	: 12V, 2W
Turn Signal Indicator	: 12V, 2W
Hi-beam Indicator	: 12V, 2W
Fuel Meter Lamp	: 12V, 2W
Horn	: 12 V DC, 70 mm dia.

Dimensions

Length	: 2016 mm
Width	: 740 mm
Height	: 1055 mm
Wheel Base	: 1285 mm
Saddle Height	: 808 mm
Ground Clearance	: 190 mm

Weights

Vehicle Kerb Weight	: 123 kg
Gross Vehicle Weight	: 253 kg

Performance

Maximum speed	: 100 km/h (with single rider 68 Kg)
Climbing ability	: 25% (14° max)

Notes :

- Values given above are nominal & for guidance only, 15% variation is allowed to cater for production & measurement.
- All dimensions are under un-laden conditions.
- Definitions of terminologies wherever applicable are as per Relevant IS/ISO standards.
- Specifications are subject to change without notice.

Sr. No.	Operation		RECOMMENDED FREQUENCY							
			Servicing	1st	2nd	3rd	4th	5th	6th	
		Kms	750	5000	10000	15000	20000	25000	30000	
1.	Servicing		✓	✓	✓	✓	✓	✓	✓	1st - 750 Kms / 30 Days 2nd onward @5000 Kms
2.	Engine idling speed / CO%	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	
3.	Valve tappet clearance	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	
4.	Engine oil	R	R	Top-up	R	Top-up	R	Top-up	R	Replace at 10000 Kms
5.	Oil strainer	CL	CL		CL		CL		CL	Clean at 10000 Kms
6.	Paper oil filter	R	R		R		R		R	Replace at every oil change
7.	Spark plug functioning / Gap	C, A, R	C, A	C, A	C, A	R	C, A	C, A	R	Replace at every 15000Kms
8.	Air cleaner element Clean* / Replace	CL, R	CL	CL	CL	R	CL	CL	R	Clean at every 5000Kms Replace at every 15000Kms
9.	Air filter cover 'O' Ring	C, R	C	C	C	C	R	C	C	Replace at every 20000Kms
10.	Fuel cock sediment bowl cleaning	CL		CL	CL	CL	CL	CL	CL	Clean at every 5000 kms
11.	Carburettor float bowl cleaning	CL			CL		CL		CL	Clean at every 10000Kms
12.	Carburettor rubber duct	C, R	C	C	C	C	R	C	C	Replace at every 20000kms
13.	Fuel pipes	C, R	C	C	C	C	R	C	C	Replace at every 20000kms
14.	Battery electrolyte level	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	
15.	Clutch lever free play	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	
16.	Throttle grip play	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	
17.	Rear brake pedal free play	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	
18.	Brake lining or pad wear	CL, R		CL	CL	CL, R	CL	CL	CL, R	Replace at every 15000kms
19.	Brake fluid level / Top up / Replace**	C, A, R	C, A	C, A	C, A	C, A	C, A	C, A	R	Replace at every 30000kms
20.	Master cylinder cup and dust seal**	R							R	Replace at every 30000kms
21.	Caliper piston seal and dust seal**	R							R	Replace at every 30000kms
22.	Brake hose pipe**	C, R							C, R	Replace at every 30000kms
23.	Brake cam & pedal pivot pin	L			L				L	
24.	Steering play	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	
25.	Steering stem bearing	C, L, R			C,L,R		C,L,R		C,L,R	
26.	All fasteners tightness	C, T	C, T	C, T	C, T	C, T	C, T	C, T	C, T	
27.	Rear sprocket fasteners	C, T	C, T	C, T	C, T	C, T	C, T	C, T	C, T	
28.	Rear wheel rubber shock damper	C, R			C, R		C, R		C, R	Replace at every 10000kms
29.	Silencer drain hole cleaning	CL	CL	CL	CL	CL	CL	CL	CL	Clean at every 5000Kms
30.	Cylinder head de-carbonising, valve lapping & Replace valve oil seals	CL			CL				CL	Clean at every 15000Kms
31.	Engine air breather tube	C, R	C	C	C	C	R	C	C	Replace at every 20000Kms
32.	Drive chain Adjustment, Cleaning and Lubrication	C, A CL, L	C, A, L	CL, A, L	CL, A, L	A- slackness whenever required				
33.	Drive chain 'O' ring type lubrication and cleaning **	L, CL	L= at every 500 Kms. CL & L = at every service					At every 5000Kms		
34.	Drive chain link lock	R		R	R	R	R	R	R	Whenever drive chain opened
35.	Wheel bearing (for non sealed bearings)**	C, L				C, L				At every 20000Kms
36.	Front & Rear wheel spoke tightening**	C, T	C, T	C, T	C, T	C, T	C, T	C, T	C, T	At every service

Sr. No.	Operation		RECOMMENDED FREQUENCY								
			Servicing	1st	2nd	3rd	4th	5th	6th		
		Kms	750	5000	10000	15000	20000	25000	30000		
37.	Tyre tread wear	C, R			C, R	At every ser. after 2nd ser.					
38.	Front fork oil	R						R		Replace at every 20000Kms	
39.	Auto choke, Thermal sensor**	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	At every 5000Kms	
40.	TPS**	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	At every 5000Kms	
41.	RSA - Check gas pressure**	C, A					C, A			C, A	At every 20000Kms.
42.	Starter clutch bush kit for dry type**	CL, R					CL, R			CL, R	
43.	Clutch switch cleaning**	CL			CL		CL		CL		
44.	General lubrication	L	L	L	L	L	L	L	L		
45.	Swing arm pivot pin lubrication	L					L				Lubricate at every 20000Kms
46.	Swing arm bush grease nipples lubrication	L	L	L	L	L	L	L	L	Lubricate at every 5000Kms	
47.	Engine foundation silent bush**	R					R			R	Replace at every 15000Kms

● : Indicates operation to be performed.

★ : More frequent cleaning may be required when driving in dusty condition.

★★: As applicable

A - Adjust • C - Check • CL - Clean • L - Lubricate • T - Tighten • R - Replace

Note :

Parts / Lubricants to be replaced as per Periodic Maintenance & Lubrication Chart are mandatory and the same are chargeable to customer.

Recommended Oil	SAE 20W50 of API 'SL', JASO MA Grade.
Replacement Frequency*	1st replacement at 500-750 Kms. / 1st service. Thereafter at every 2500 Kms.
Recommended Quantity	Drain & Refill 1000 ml., Engine Overhaul 1100 ml.

⚠ CAUTION :

- It is most important to adhere to recommended grade & frequency of oil change for the purpose of long life of critical engine components.
- Do not reuse drained oil.

2

Fuel System

Carburettor Specifications

CO Checking & Setting

Tune up for Optimum Mileage



UCAL



Item	Specification
Make	UCAL
Type	UV20SS
Idling Speed	1400 ± 100 rpm
VC Screw Setting	Adjust VC screw to get CO% - 1.5 to 2.5%
Main Jet	102.5
Jet Needle Mark	U-5HPF1
Needle Jet Marking	O-1M
Jet Needle 'e' Clip Position	Single Groove with 2.5 shim
Pilot Jet	12.5
Throttle Valve Mark	2.5 (W-1.5x0.4)
Float Height	14.4 mm
Choke	Manual Choke
Starter Jet	30

Readiness of CO Gas Analyser

Warm up the CO Gas Analyzer for 10~15 minutes before proceeding further. Warming up is essential every time machine is put on to purge out any gases left in side.



Carry out Span Check as per manufacturer's Recommendation to confirm the OK condition of the Equipment (If Span Check does not confirm the reading, then carry out Gas Calibration as per mfgrs. recommendation). Set the Equipment display to Zero before taking the reading.

Readiness of the Vehicle

Before checking CO emission, prepare the vehicle for checking the CO.



- Warm up the engine to its normal operating temp. by riding 5~6 Kms. The case cover should be warm enough by feel. (Engine Oil Temp. = 60°C).

Caution: In choke 'ON' condition CO % is high : 9~10%. Hence warming up of engine is a must.

- Set CO to 1.5 ~ 2.5 %.

Note: If engine does not go off, then attend to the additional air supply problem in the carburetor circuit & intake system. After solving the problem once again confirm that engine should die down on closing the V.C. Screw.

- Set CO to 1.5 ~ 2.5 %.
- Set Idling speed to specified Idling 1400 ± 100 rpm. Raise the engine to moderate speed at no load condition for about 15 seconds. Then bring back to specified idling RPM.

Taking the Reading

- Remove M-5 bolt and aluminum washer fitted to the nozzle (12mm OD) shown in figure, of the connecting tube welded to silencer pipe before CAT converter.
- Use a Silicon Rubber tube of approximately 300 mm to fit onto the nozzle. Only a Silicon rubber tube should be used, as it has better high temp. resistance & will not deform / melt due to high temp. at the nozzle.
- Connect the other end of the Silicon Rubber tube to the flexible probe pipe of machine. Ensure that the inner diameter of Silicon tube perfectly matches with outer diameter of flexible probe pipe of Gas Analyzer.
- The Silicon rubber tube must fit snugly onto the nozzle to prevent any air / exhaust gas leakage.
- Note the CO / HC readings when the reading display stabilizes.
- As per Emission Norms the recommended CO% for 2 Wheelers is 3.5% at idling RPM. But CO% for Bajaj Vehicles, for best results in terms of fuel efficiency are different for different models. **The ideal CO% is between 1.5 to 2.5% at idling RPM = 1400 ± 100.**
- If the reading is shown excess or less than BAL specifications, try to achieve by adjusting V.C. Screw.
- Turning in V.C. Screw will lead to less CO% and turning out will lead to more CO%.

Note: Remember the V.C. Screw should not be taken out more than the recommended position. Every time V.C. Screw setting is changed specified Idling RPM must be restored and then reading should be considered.

- If the CO% is not falling within recommended % in spite of adjusting the V.C. Screw then find out the cause & rectify. After rectifying the problem confirm the CO% in the same way as mentioned above.

Important: For Better Mileage and Performance, achieve CO% as recommended.

In **Boxer 150** motorcycle for better mileage & performance achieve values given below.

Recommended CO% value w.r.t. V.C. Screw and Idling RPM for Better Fuel Efficiency		
Model	Recommended CO%	Recommended Idling RPM
Boxer 150	1.5% ~ 2.5%	1400 ± 100 rpm

TPS - Hall Sensor : Checking



Continuity check in coupler disconnected condition :

SOP :

- Disconnect TPS coupler
- Check Continuity between Blue & Black / Yellow wire
- There should **NOT BE** any continuity.



Input supply voltage check :



SOP :

- Connect TPS coupler
- Switch 'ON' ignition key.
- Check voltage between Brown and Black / Yellow wires of TPS Hall Sensor.
- Standard value : 12.5 ± 0.4 volts (Battery voltage).



Voltage check in POT condition:



SOP :

- TPS coupler is in connected condition.
- Ensure engine is running in POT mode.
- Check voltage between Blue & Black / Yellow wire in Partial Open Throttle (POT) condition.
- Standard value : < 1 volt in Partial Open Throttle position.

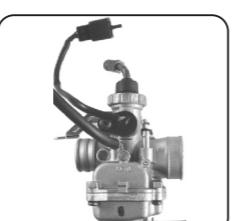


Voltage check in WOT condition:

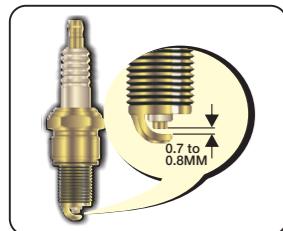


SOP :

- TPS coupler is in connected condition.
- Ensure engine is running in WOT mode.
- Check voltage between Blue & Black / Yellow wire in Wide Open Throttle (WOT) condition.
- Standard value : 3.0 to 5.0 volts in Wide Open Throttle position.



Engine Tune-up



SPARK PLUG :
BOSCH UR4AC, Champion PRZ9HC

- Spark Plug Gap : 0.7 ~ 0.8 mm.
- Replace at Every : 15000 Kms

AIR FILTER:

- Clean at Every : 5000 Kms.
- Replace at Every : 15,000 Kms.



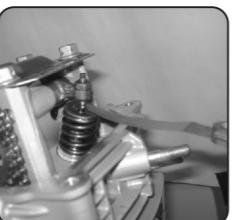
COMPRESSION PRESSURE

- Standard : 11 to 13 Kg/cm²
- Service Limit : 9.5 Kg/cm²



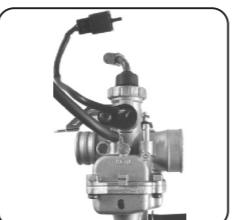
TAPPET CLEARANCE

- Inlet Valve : 0.05 mm
- Exhaust Valve : 0.1 mm



CARBURATOR

- Idling : 1400 ± 100 rpm.
- Jet Needle Clip Position : Fixed
- CO % : $1.5 \sim 2.5$ %.
- V.C. Screw Setting : To achieve CO% between $1.5 \sim 2.5$



Other Mandatory Checks

- Ensure no fuel leakage through fuel cock, fuel lines.
- Ensure free rotation of both wheels.
- Ensure correct tyre pressure -
 - Front wheel : 25 PSI
 - Rear (Solo) : 28 PSI
 - Rear (Pillion) : 32 PSI
- Set control cable free play:
 - Clutch lever 2~3 mm.
 - Front brake lever 2~3 mm.
 - Rear brake pedal 15~20 mm.
- Chain slackness : 25~30 mm.
- Check & confirm proper functioning of spark plug.

3

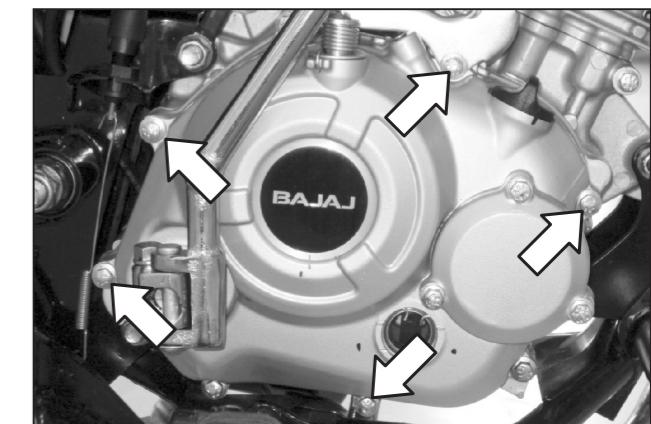
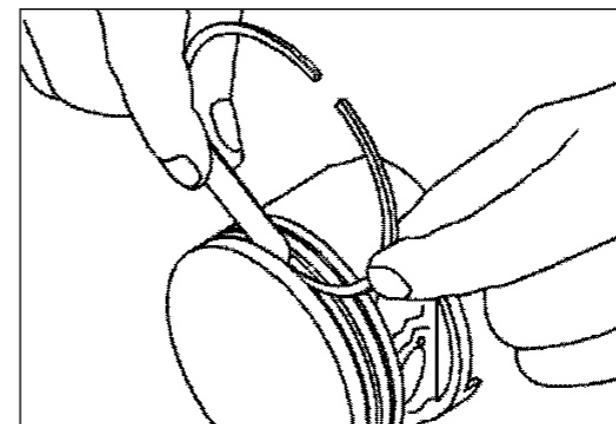
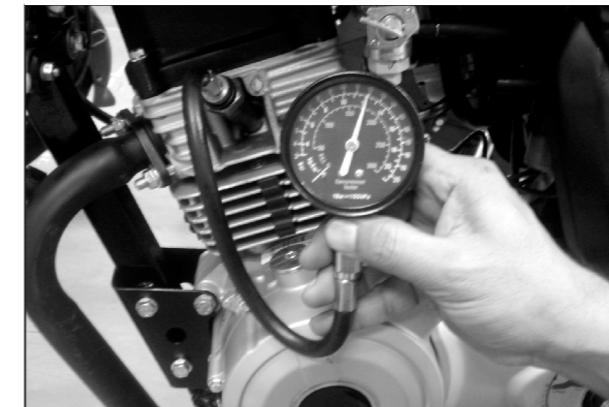
Engine & Transmission

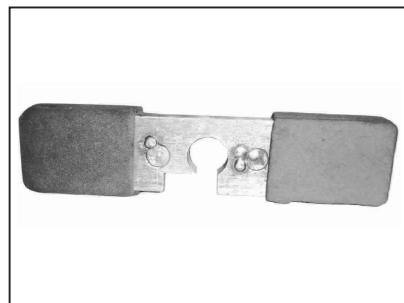
Special Tools

Service Limits

Tightening Torques

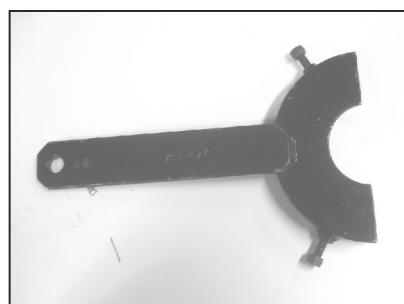
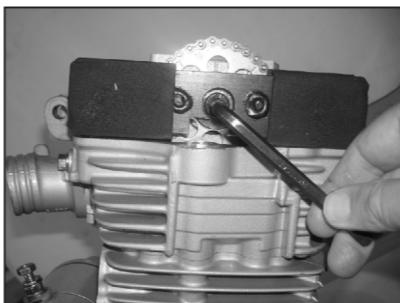
Skill Tips



Special Tools

Cam Sprocket Holder

Part No. : F4 1ZJZ 47

Application : For holding sprocket during removal / refitting of Cam sprocket allen bolt.


Magneto Rotor Holder

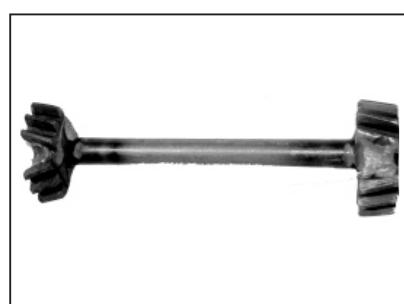
Part No. : F4 1ZJZ 44

Application : To hold rotor while loosening / tightening its nut.


Magneto Rotor Puller

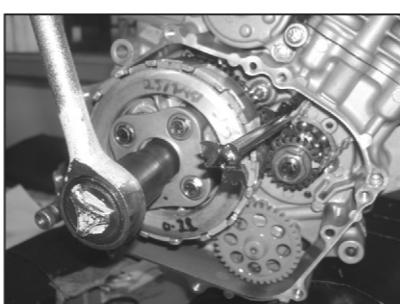
Part No. : F4 1ZJZ 46

Application : To pull out the rotor from crankshaft assembly.


Primary Gear Holder

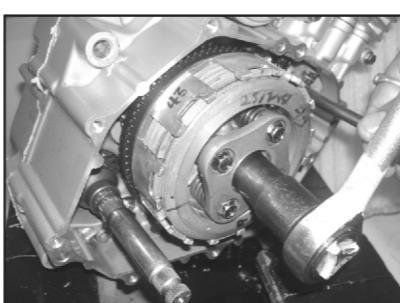
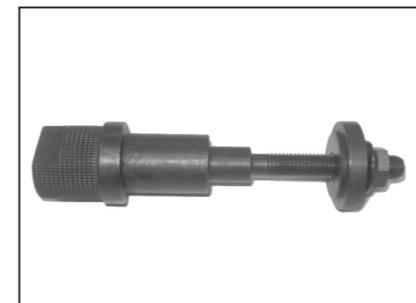
Part No. : F4 1AJA 11

Application : To hold primary and secondary gear while loosening/tightening the primary gear nut & special nut securing clutch.


Socket for Clutch Nut

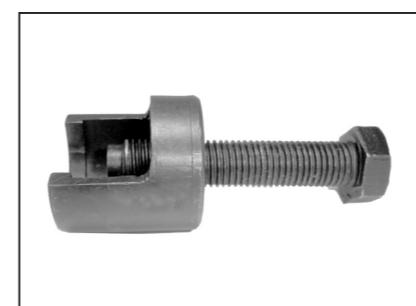
Part No. : 37 10DJ 43

Application : To loosen / tighten special nut securing clutch.


Special Tools

Clutch Dismantling Tool

Part No. : F4 1AJA 58

Application : To dismantle & assemble clutch assembly.


Camshaft Big Bearing Puller

Part No. : 37 10DH 32

Application : To remove big bearing from camshaft.


Camshaft Small Bearing Puller

Part No. : 37 10DH 31

Application : To remove small bearing of camshaft.


Spark Plug Spanner

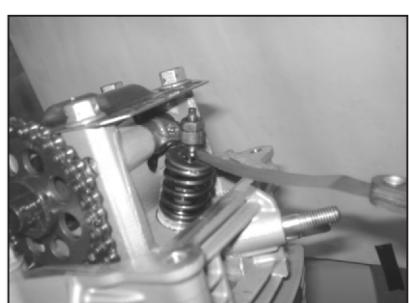
Part No. : 37 1040 51

Application : For removing and refitting spark plug.


Valve Tappet Adjuster

Part No. : F4 1ZJW 33

Application : To hold the Valve Tappet screw while adjusting tappet clearance.

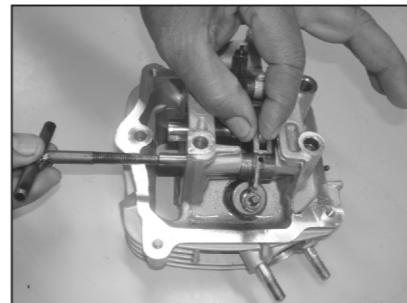


Special Tools

**Rocker Shaft Remover**

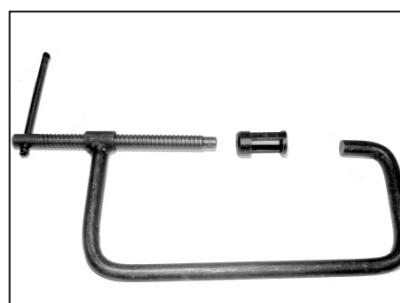
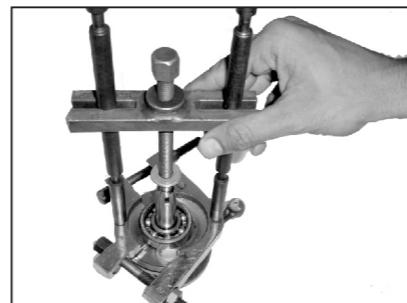
Part No. : 37 10CS 22

Application : To remove Rocker Shaft from cylinder head.

**Bearing Extractor**

Part No. : 37 1030 48

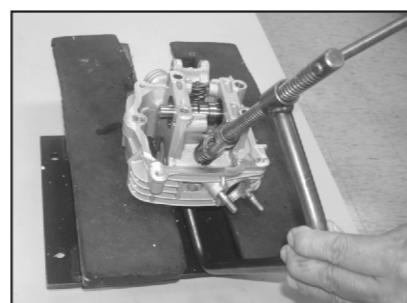
Application : To Pull out main ball bearing from crankshaft

**Adaptor & Valve Spring Compressor**

Adaptor Part No. : 37 1031 08

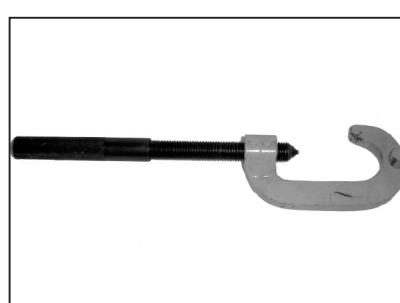
Valve Spring Compressor : 37 1031 07

Application : To assemble / dismantle intake, exhaust valve by compressing spring in cylinder head.

**Drift Piston Pin**

Part No. : 37 1010 06

Application : To remove refit piston pin.

**Output Sprocket Holder**

Part No. : 37 1030 53

Application : To hold the output sprocket while removing sprocket allen bolts.

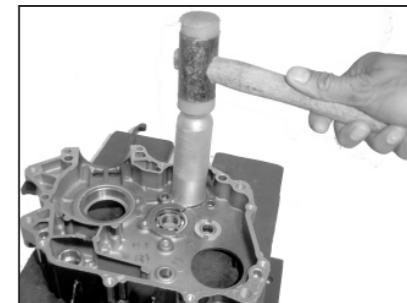


Special Tools

**Driver for Fitting Bushing Gear Shift Drum**

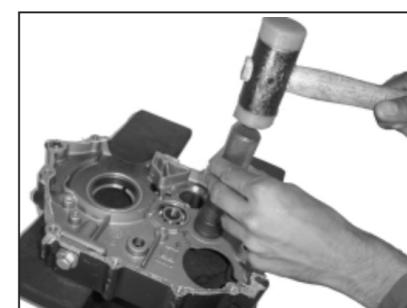
Part No. : E6 1011 00

Application : To assemble "Bushing with PTFE Lining" at parent hole of crankcase RH for "Gear Shift Drum" mounting.

**Bearing Driver Set**

Part No. : 37 1030 61

Application : Common bearing driver set for fitting & removing bearings from crankcase.



NOTES

Compression Pressure

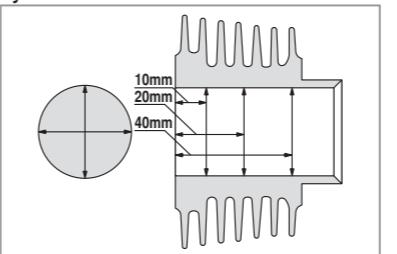

Std. Limit	11.0 ~ 13.0 kg/cm ²
Ser. Limit	Min 9.5 kg/cm ²

Valve Clearance


	Intake	Exhaust
Std. Limit	In 0.05	Ex 0.1
Ser. Limit	—	—

Rocker Arm Shaft Diameter

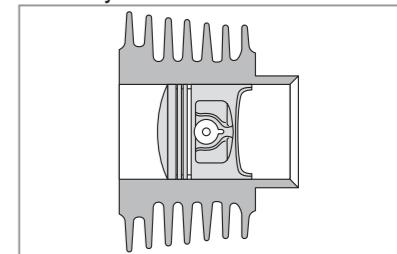

Std. Limit	7.994 ~ 8
Ser. Limit	7.98

SERVICE LIMIT - ENGINE
Cylinder Inside Diameter


Group A	56.008 ~ 56.018
Group B	56.018 ~ 52.028

Piston Diameter

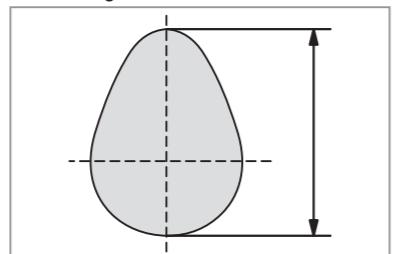

Group A	55.968 ~ 55.978
Group B	55.978 ~ 55.988

Piston Cylinder Clearance


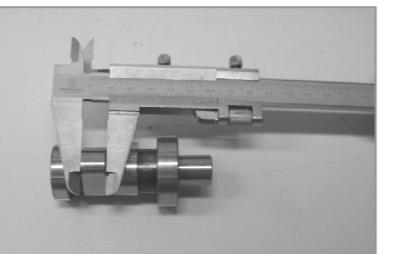
Std. Limit	0.03 ~ 0.05
Ser. Limit	Max 0.06

Cam Sprocket Diameter

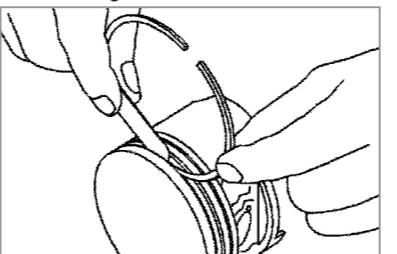

Std. Limit	61.165 ~ 61.285
Ser. Limit	60.865 ~ 61.285

Cam Height


	Intake	Exhaust
Std. Limit	30.084	30.122
Ser. Limit	30.009	30.047

Cam Lobe Width


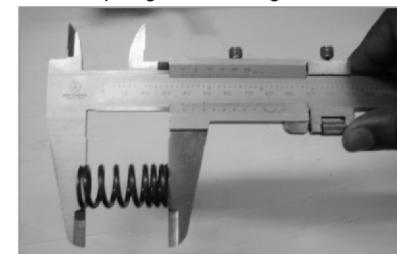
Std. Limit	7 mm
Ser. Limit	—

Piston Ring Groove Clearance


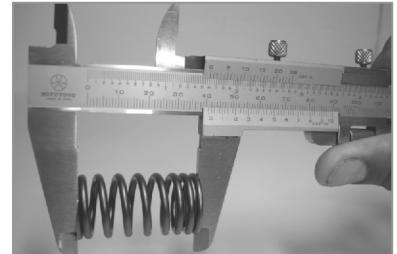
	Top	Second	Oil Ring
Std. Limit	0.03~0.07	0.02~0.06	0.03~0.11
Ser. Limit	0.15	0.15	—

Piston Ring End Gap

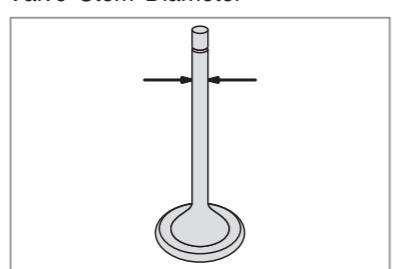

	Top	Second	Oil Ring
Std. Limit	0.1~0.25	0.3~0.45	0.2~0.7
Ser. Limit	0.4	0.6	—

Clutch Spring Free Length


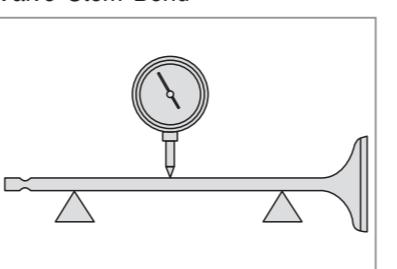
Std. Limit	35.0
Ser. Limit	32.6

Valve Spring Free Length


Std. Limit	38.74
Ser. Limit	35.29

Valve Stem Diameter


	Intake	Exhaust
Std. Limit	4.475~4.49	4.455~4.47
Ser. Limit	4.46	4.45

Valve Stem Bend


Std. Limit	0.01
Ser. Limit	> 0.01 Replace

Friction Plate Thickness


Std. Limit	3.0
Ser. Limit	2.8

Steel Plate Thickness

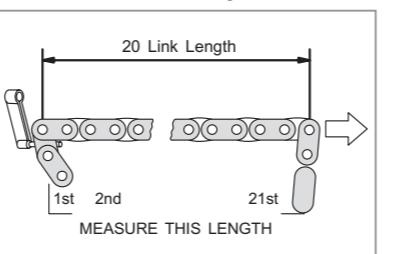

Std. Limit	1.6
Ser. Limit	---

Valve Stem to Guide Clearance

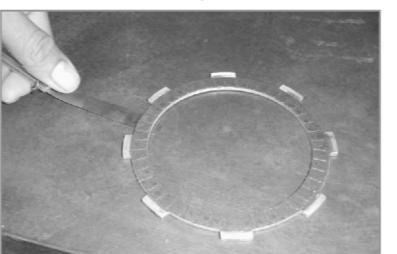

	Intake	Exhaust
Std. Limit	0.01 ~ 0.037	0.025 ~ 0.052
Ser. Limit	Max 0.07	Max 0.07

Cylinder Head Warp

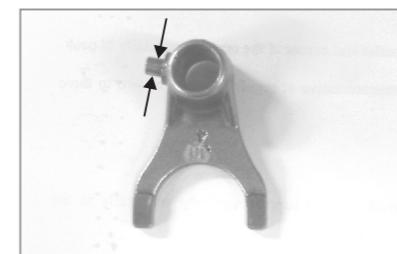

Std. Limit	0.03 mm
Ser. Limit	0.05 mm

Camshaft Chain Length


Std. Limit	127.00 ~ 127.48 mm
Ser. Limit	128.9 mm

Friction Plate Warp


Std. Limit	0.1
Ser. Limit	—

Gear Shift Fork Guide Pin Dia


Std. Limit	4.45 ~ 4.49
Ser. Limit	4.4

Shaft Fork Shift O.D.


Std. Limit	9.972 ~ 9.987
Ser. Limit	9.96

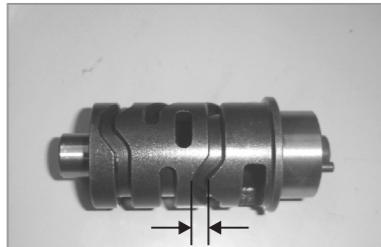
ALL DIMENSIONS ARE IN MM

Fork Shift I.D.



Std. Limit	10.0 ~ 10.022
Ser. Limit	10.03

Shift Drum Groove Width



Std. Limit	4.55 ~ 4.70
Ser. Limit	4.75

Crankshaft Run Out



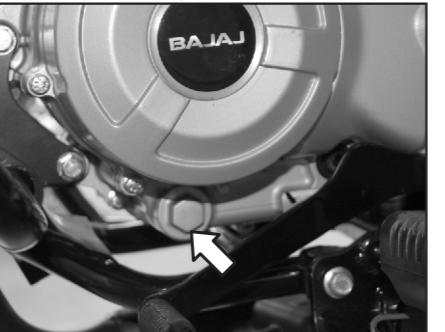
Std. Limit	0.02
Ser. Limit	0.05

Spark Plug



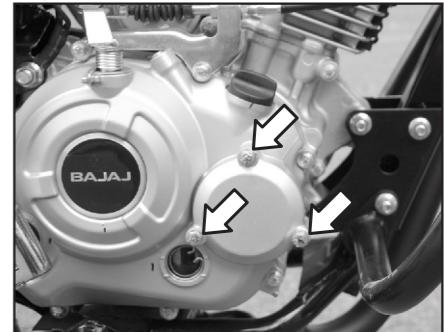
1.3 ~ 1.5 Kgm

Cap Strainer (18 mm A/F Bolt)



0.9 ~ 1.1 Kgm

Cap Oil Filter



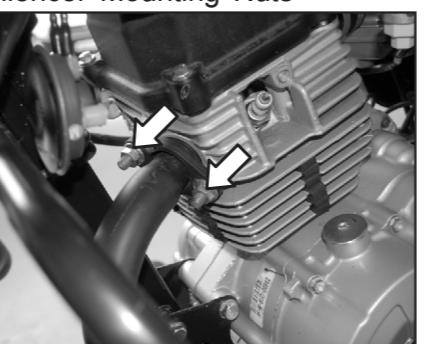
0.9 ~ 1.1 Kgm

Con Rod Side Clearance



Std. Limit	0.1 ~ 0.35
Ser. Limit	0.7

Silencer Mounting Nuts



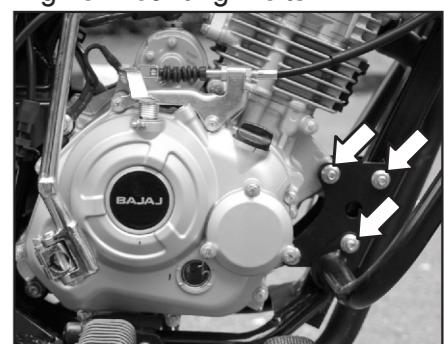
2.0 ~ 2.2 Kgm

Silencer Bracket Bolt



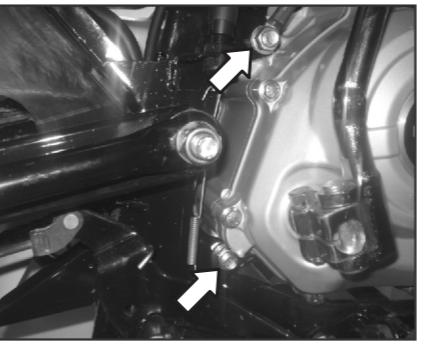
3.5 Kgm

Engine Mounting Bolts



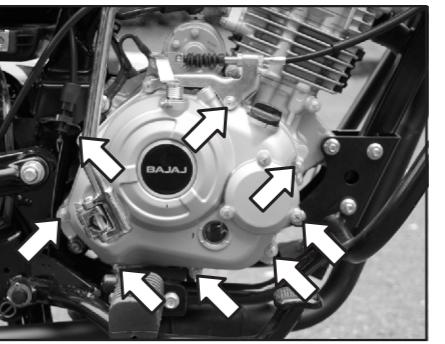
2.0 ~ 2.2 Kgm M8 : 12 MM

Engine Mounting Bolts



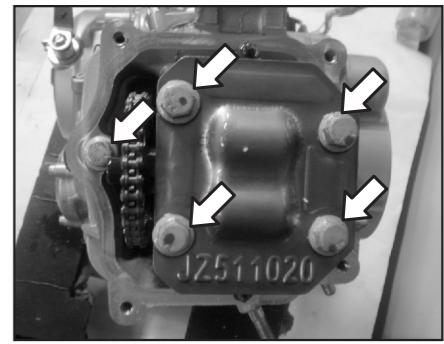
3.0 ~ 3.2 Kgm M10 : 14 MM

Clutch Cover Bolts



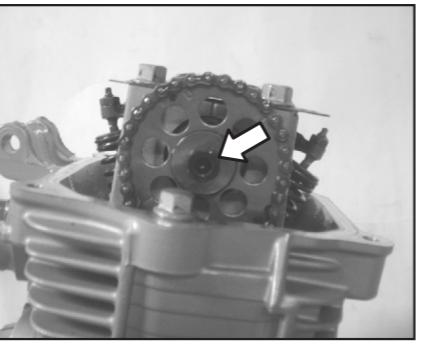
0.9 ~ 1.1 Kgm

Cylinder Head Bolts (12 mm)



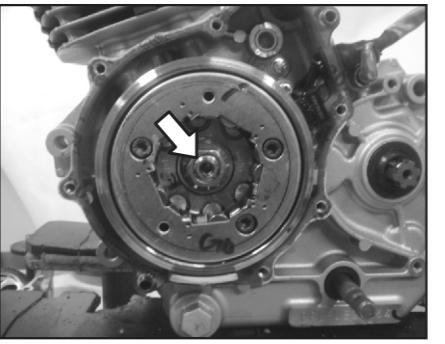
2.2 ~ 2.5 Kgm

Cam Sprocket Allen Bolt



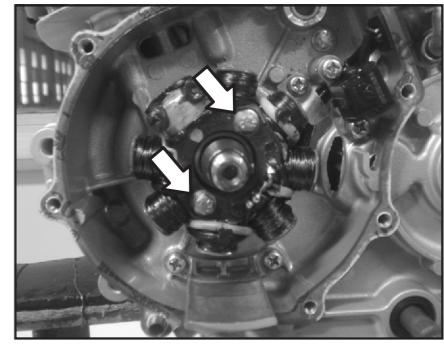
1.6 ~ 1.8 Kgm

Rotor Mounting Nut



5.0 ~ 5.5 Kgm

Stator Plate Bolts

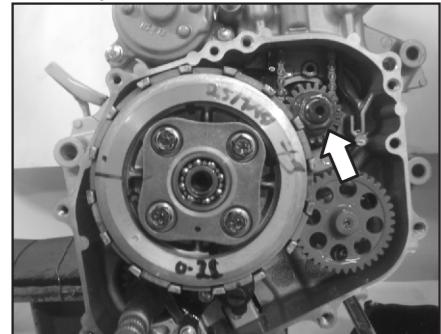


0.9 ~ 1.1 Kgm

ALL DIMENSIONS ARE IN MM

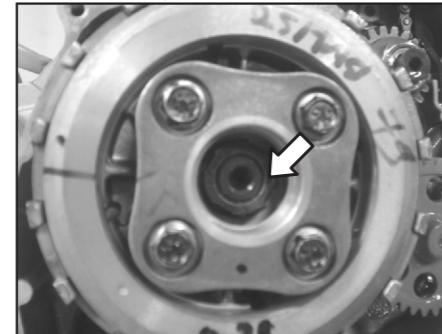
NOTES

Primary Gear Nut



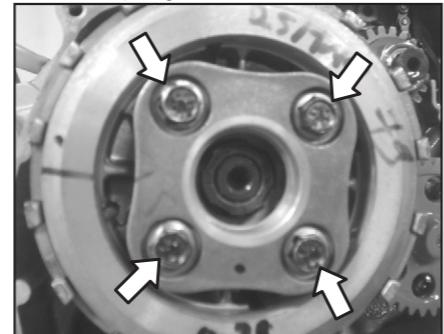
5.0 ~ 5.5 Kgm

Clutch Nut (L.H. Thread)



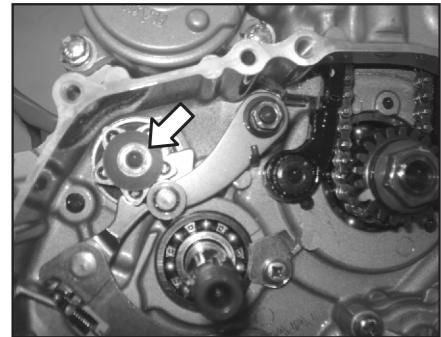
6.0 ~ 6.5 Kgm

Clutch Spring Bolts



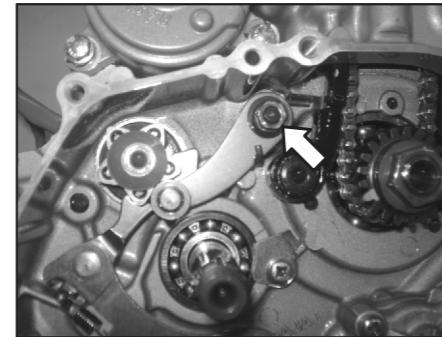
1.1 ~ 1.0 Kgm

Drum / Cam Allen Bolt



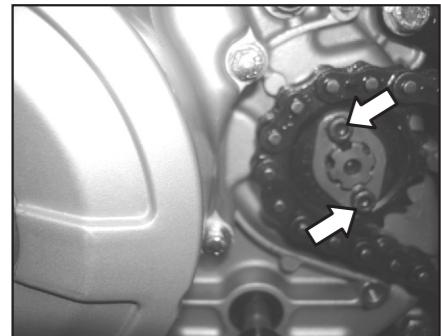
0.9 ~ 1.1 Kgm

Stud Inhibitor Nut



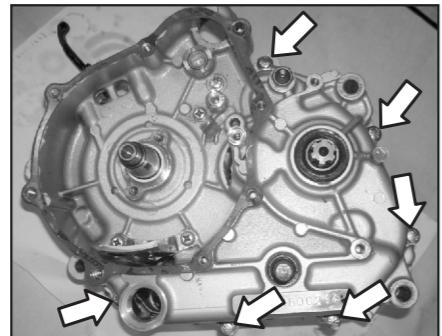
0.9 ~ 1.1 Kgm

Output Sprocket Bolts



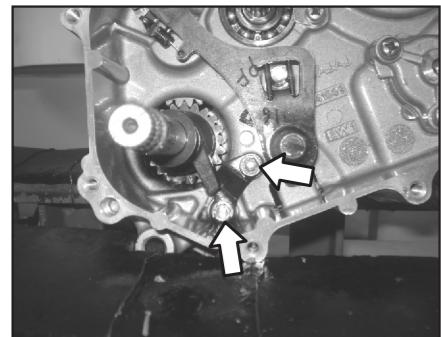
0.8 Kgm

Crankcase Joining Bolts



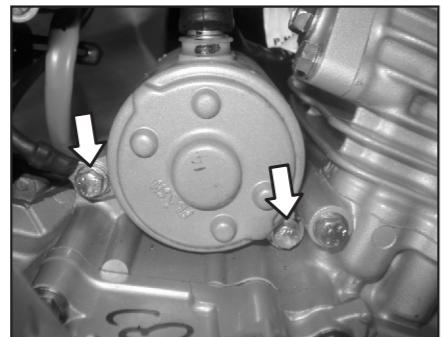
0.9 ~ 1.1 Kgm

Kick Guide Bolts



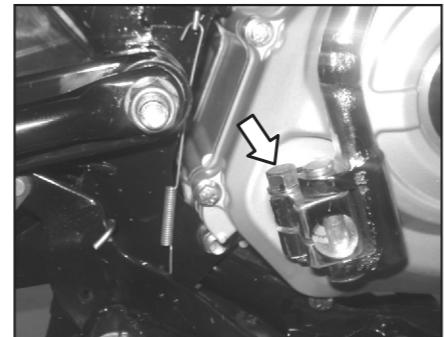
0.9 ~ 1.1 Kgm

Starter Motor Mounting Bolts



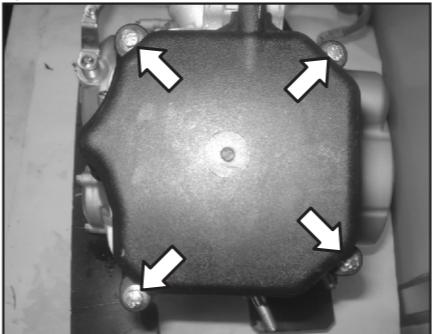
0.9 ~ 1.1 Kgm

Bolt Kick Lever



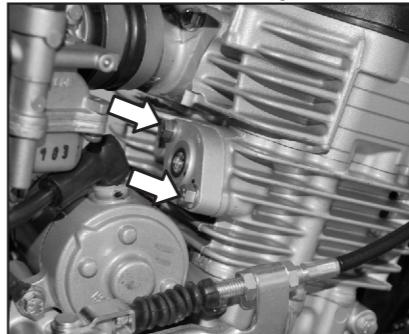
2.0 ~ 2.2 Kgm

Cylinder Head Cover Bolts



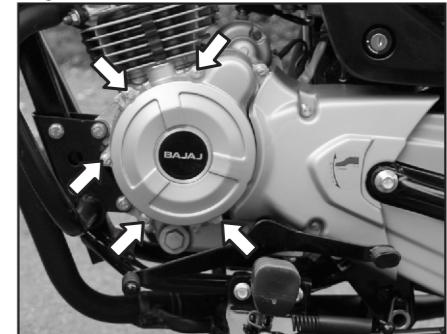
0.9 ~ 1.1 Kgm

Chain Tensioner Mounting Bolts



0.9 ~ 1.1 Kgm

Magneto Cover Bolts

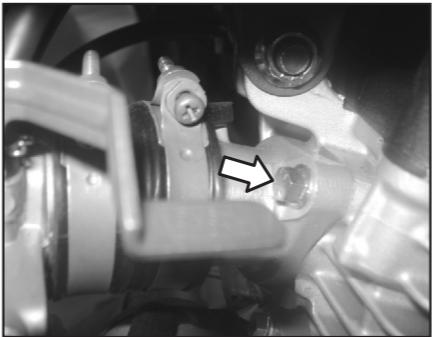


0.9 ~ 1.1 Kgm

Oil Pump Mounting Screws

0.5 ~ 0.7 Kgm

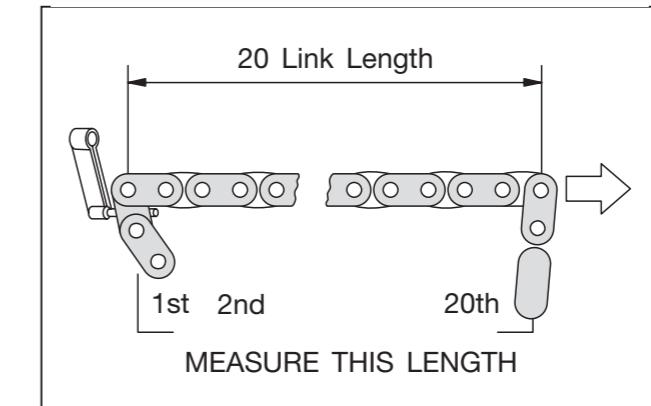
Manifold Mounting Bolts



0.9 ~ 1.1 Kgm

NOTES

4

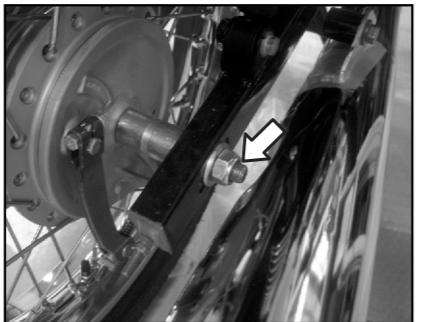
Vehicle (Frame)**Tightening Torques****Service Limits****Special Tools**

Front Axle Nut



4.5 ~ 5.5 Kgm

Rear Axle Nut



8.0 ~ 10.0 Kgm

Tie Rod Nut



3.0 ~ 3.2 Kgm

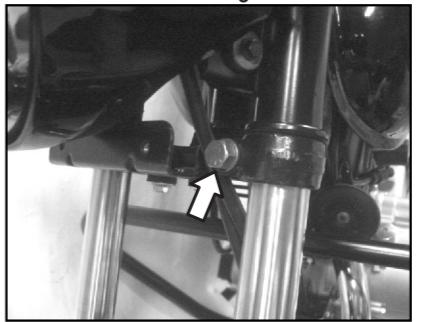
TIGHTENING TORQUES

RSA Lower Bolt



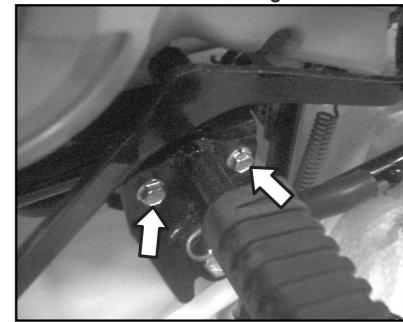
2.3 ~ 2.7 Kgm

Front Fender Mounting Bolts



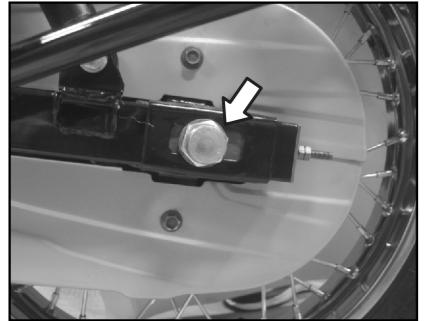
2.0 ~ 2.2 Kgm

Rider Foot rest Mounting



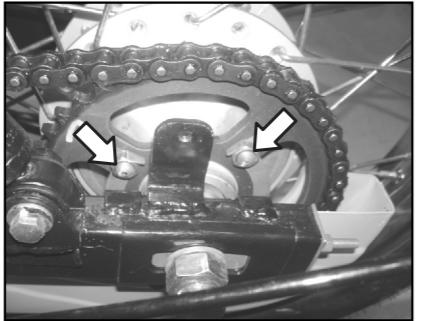
2.0 ~ 2.2 Kgm

Rear Sleeve Nut



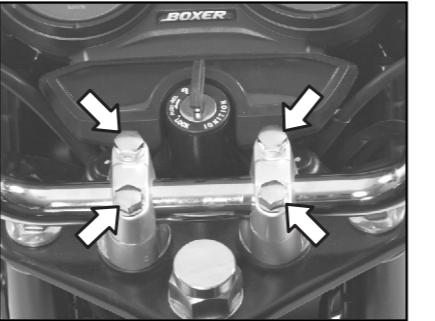
7.0 ~ 8.0 Kgm

Rear Sprocket Mounting Nut



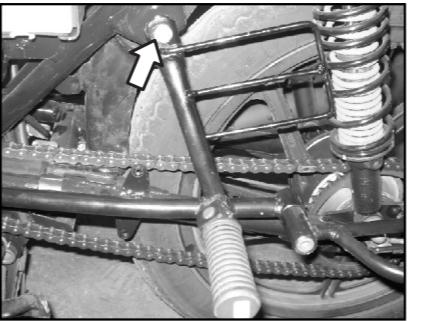
3.0 ~ 3.2 Kgm

Handle Bar Holder Bolts



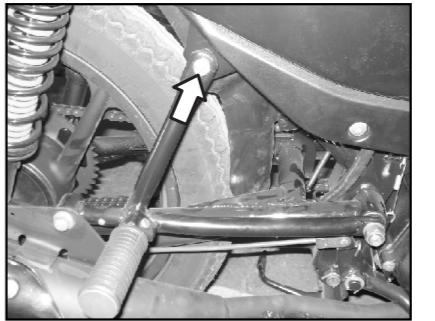
1.0 ~ 1.4 Kgm

LH Stay Bolt



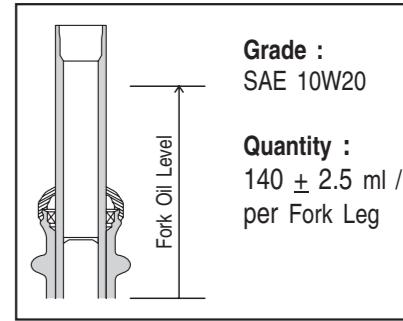
2.0 ~ 2.2 Kgm

RH Stay Bolt



2.0 ~ 2.2 Kgm

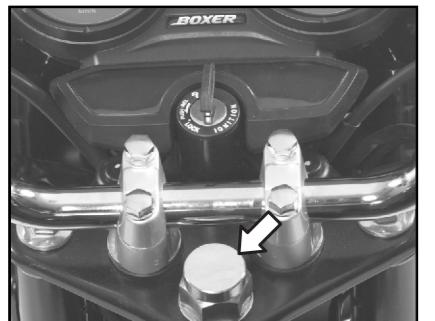
Front Fork Oil Grade & Capacity



Grade :
SAE 10W20

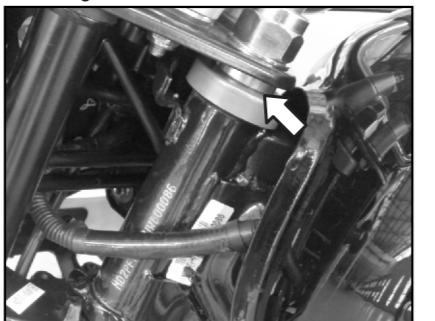
Quantity :
140 ± 2.5 ml /
per Fork Leg

Fork Center Nut



4.5 ~ 5.0 Kgm

Steering Stem Nut Slotted



0.4 ~ 0.6 Kgm

Fork Pipe Top Bolts

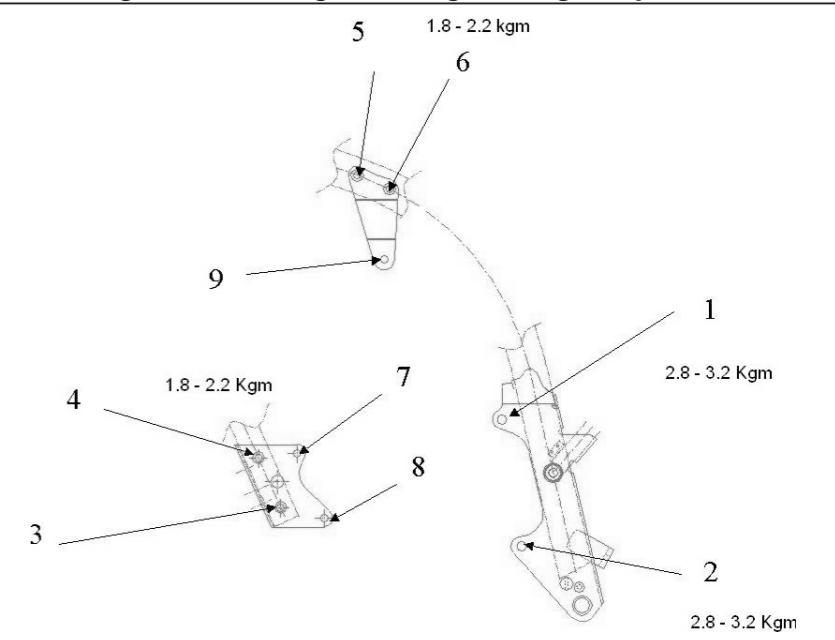


3.0 ~ 3.5 Kgm

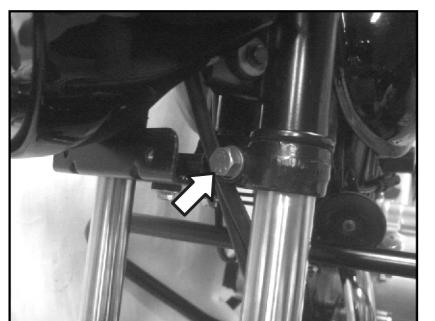
Grease Application Points

S.N.	Vehicle Component	Type of Grease
1.	Bearing balls of steering	HP Lithon RR3 grease
2.	Swing arm shaft	
3.	Front wheel axle	
4.	Rear wheel axle	
5.	Brake pedal pivot	
6.	Center stand shaft	
7.	Side stand 'U' bracket	
8.	Gear shifter lever pivot	

Engine Mounting Bolt Tightening Sequence

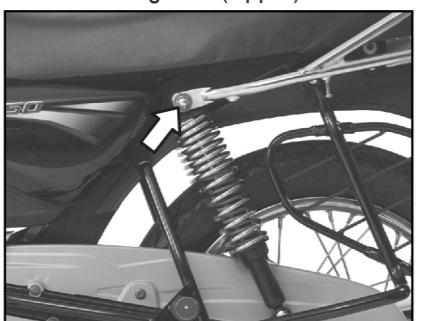


Fork Under Bracket Bolts



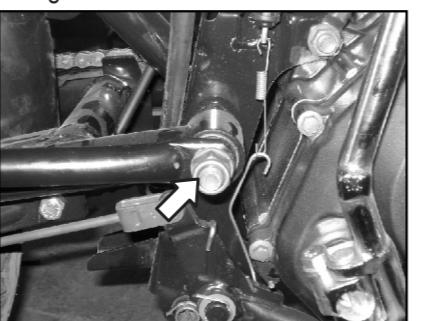
3.0 ~ 3.2 Kgm

RSA Mounting Nut (Upper)



3.0 ~ 3.2 Kgm

Swing Arm Shaft

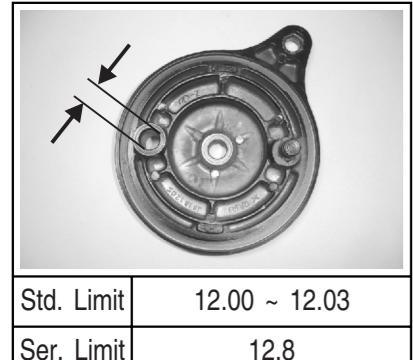


4.5 ~ 5.5 Kgm

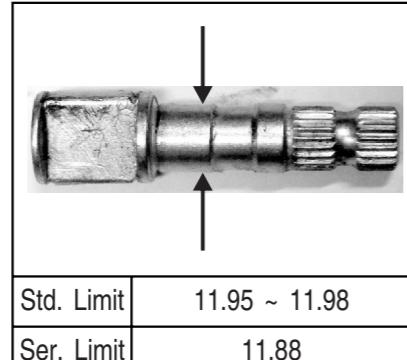
Loctite Applications

S.N.	Vehicle Fastener	Type of Loctite & Loctite Colour
1.	Rider step mtg. bolts	Thread Locker 243
2.	RSA lower bolt	Dark Blue Colour

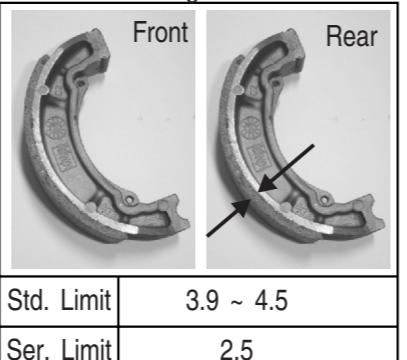
Brake Panel Cam Hole Dia.



Brake Cam Diameter



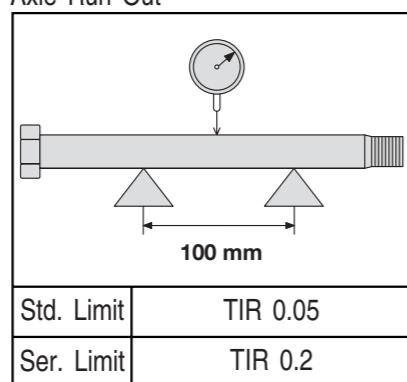
Brake Shoe Lining Thickness



Brake Drum Inside Dia. Front



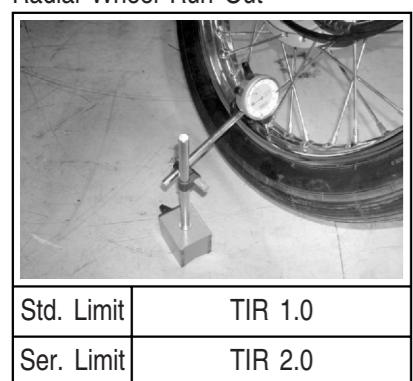
Axe Run Out



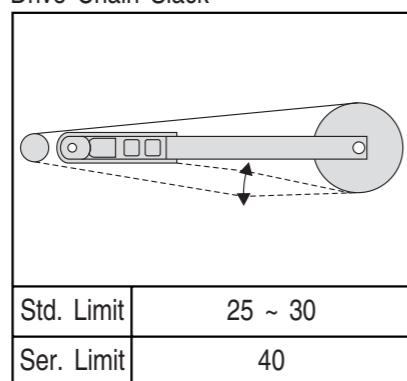
Axial Wheel Run Out



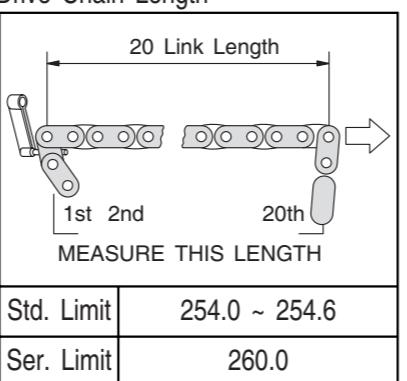
Radial Wheel Run Out



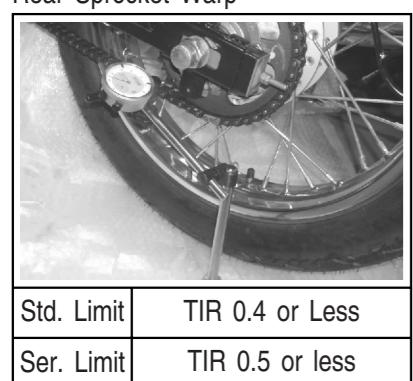
Drive Chain Slack



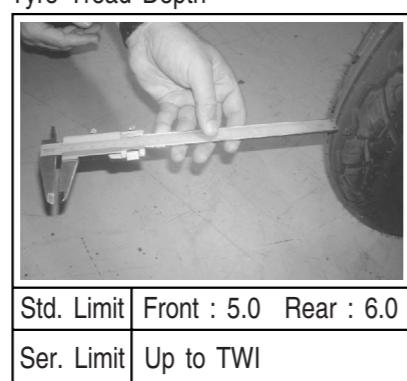
Drive Chain Length



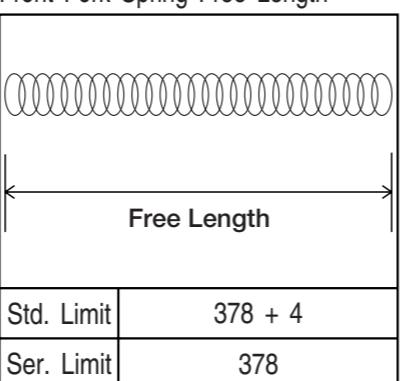
Rear Sprocket Warp



Tyre Tread Depth



Front Fork Spring Free Length



Special Tools



Fork Oil Seal Driver

Part No. : 37 1830 07

Application :

To fit fork oil seal in its seat provided at outer pipe ID.



Stem Bearing Driver

Part No. : 37 1830 05

Application :

To fit bearing race on fork under holder bracket

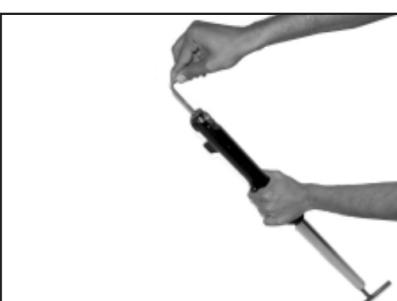


Front fork cylinder holder handle with adaptor

Part No. : 37 1830 06

Application :

To hold fork cylinder while loosening / tightening fork allen head bolt at bottom.



Installer Upper & Lower Bearing Race Frame

Part No. : 37 1801 06

Application :

To install upper & lower steering races / cones into their seats inside frame.

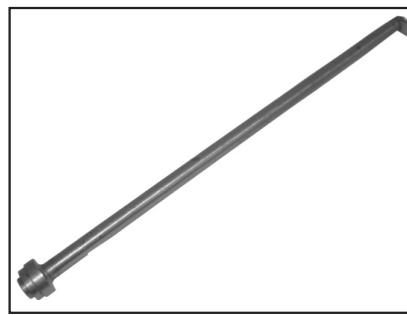


**Bearing Race Extractor**

Part No. : 37 1030 48

Application :

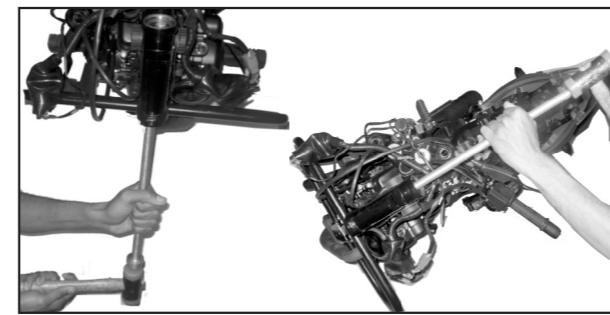
To Pull out steering race from ' Fork Under Holder bracket'

**Steering Cone Remover**

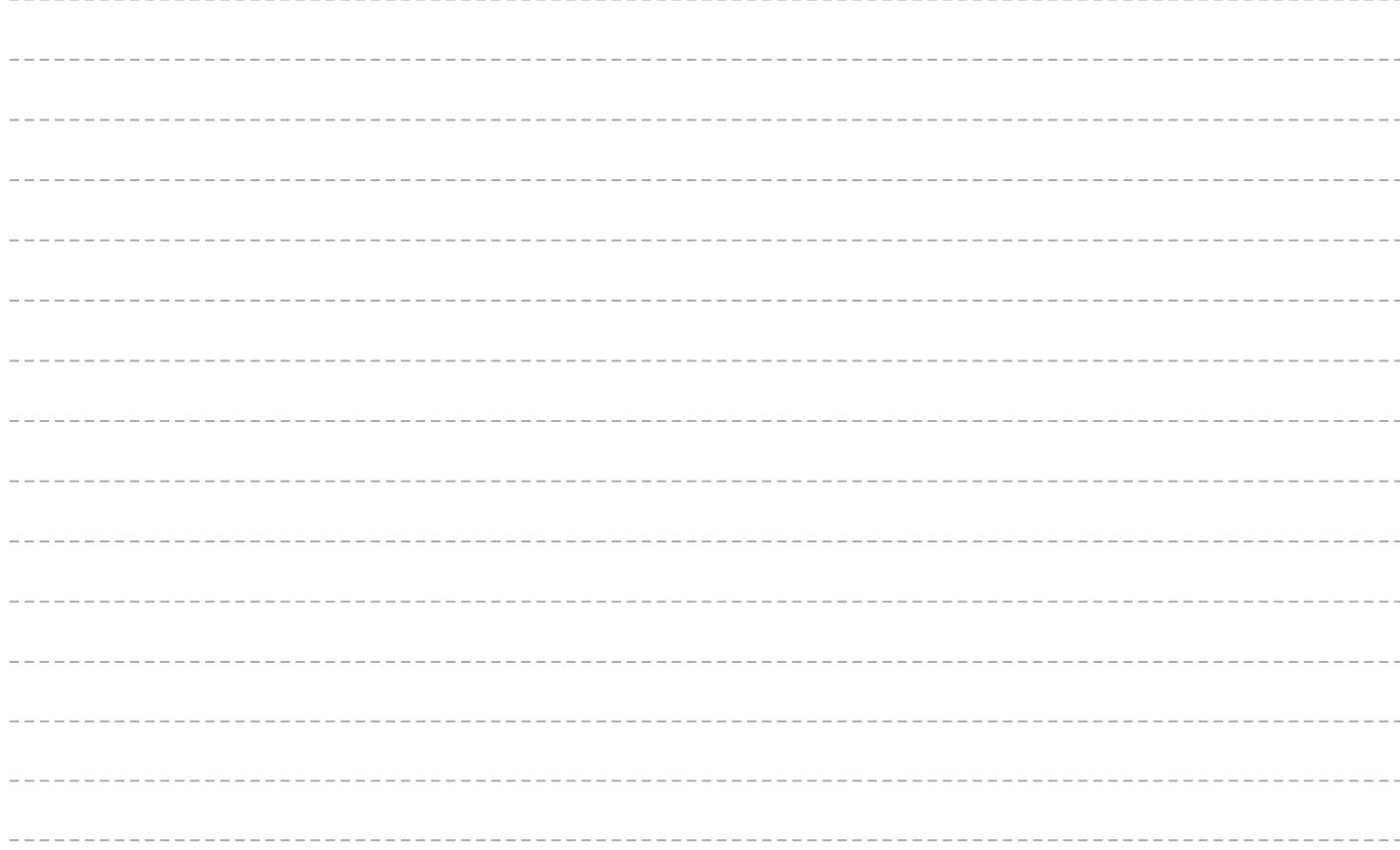
Part No. : 37 1805 06

Application :

To remove steering cones from frame.



NOTES



5

Electricals**Battery****Electrical Checking Procedure****Electrical Diagrams**

Battery Technical Specification


For Self Start	
• Make	Exide / Amco / Minda
• Voltage	12 Volt
• Type	MF Battery
• Capacity	5 Ah
• Specific gravity of electrolyte for initial filling of new battery	1.24 for use above 10°C, 1.28 for use below 10°C
• Initial charging duration	10 ~15 hrs (depending upon the condition of the battery)
• Charging current specification	0.5 Amp

Initial Charging Procedure for dry charged Battery

- Fill each cell with battery grade sulfuric acid of the correct sp. gravity (1.24 at room temp. for use above 10°C & 1.28 at room temp. for use below 10°C)
- Allow the battery to stand for 30 min. after filling.
- Keep vent plugs open. Connect battery to charger & charge at 0.5 Amp. Charging voltage of charger should be 14.5 volt min. without connecting the battery.
- Charge continuously for 10 to 15 hours (charging duration will depend upon the condition of the battery) Specific gravity of fully charge battery after rest period of 1 hour will be 1.24 & battery voltage will be 12.5.
- After charging push vent plugs strip firmly into place & wash off acid spillage with water & dry the battery.
- Using the battery load tester confirm for good indication of state of charge of battery.

Battery Charging Procedure

In case battery is discharged follow the procedure given below by using constant current. "Battery Charger" of 0.5 Amp. charging current specification for 5 Ah battery

- Remove battery from vehicle
- Clean battery thoroughly
- Remove vent / filler plug strip
- Top up level with distilled water in between Min and Max. level
- Connect to battery charger & ensure respective terminal are connected properly
- Set charging current at 0.5 A DC for 5 Ah Battery. Charging voltage of charger should be more than 14.5 volt without connecting the battery .
- Charge battery (battery charging time depends upon the charging condition of the battery)
- Check specific gravity of each cell & voltage after 1 hour it should be 12.5 volt & specific gravity 1.24 for the fully charged battery.
- Disconnect the battery from the charger.
- Fit vent / filler plug strip firmly.
- Reconnect battery terminals
- Apply petroleum jelly to the battery terminals.


Fuse

- Inspect the fuse element.
- Check continuity of fuse.
- If it is blown out, replace.
- If a fuse fails repeatedly, check the electrical system to determine the cause. Replace it with a new fuse of proper amperage capacity.
- If fuse is replaced by lower capacity fuse, it may lead to repetitive fuse blowing problem.

Note : Never use higher capacity fuse.

Caution : When replacing a fuse be sure the new fuse matches the specified fuse rating for that circuit. Installing that a fuse with a higher rating may cause damage to wiring & components.


Front Brake Light Switch

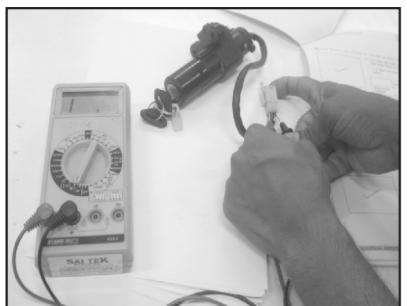
- Turn 'ON' the ignition switch.
- The brake light should glow brightly when the front brake lever is pressed.
- If it does not, check the front brake switch.

	Brown	Blue	Continuity check by multimeter
Lever Pressed	●	●	Continuity is shown
Lever Released	●	●	No Continuity


Rear Brake Light Switch

- Turn 'ON' the ignition switch.
- Check the operation of the rear brake light switch by depressing the brake pedal
- If it does not operate check continuity of rear brake switch.

	Brown	Blue	Continuity check by multimeter
Brake Pedal Pressed	●	●	Continuity is shown
Brake Pedal Released	●	●	No Continuity



Ignition Switch

Measuring & Testing Equipment : Multimeter

	Brown	White	Black-White	Black-Yellow
OFF	•	•	•	•
ON	•	•	•	•

SOP :

- Switch OFF Ignition key.
- Disconnect Ignition switch's coupler.
- Remove Ignition Switch from vehicle .
- Check continuity between wires in 'ON' & 'OFF' position.

Standard Value :

- Beep Sound & Continuity in 'ON' position. No continuity in 'OFF' position.

Note: • Don't use duplicate or non-OE Ignition key.
• Never lubricate Ignition switch by oil / grease.



Standard Value :-

Fuel Level	Fuel Quantity Liter	Standard value Ohm
Empty Tank	1.3 liters	100 ± 5
Half	5.9 liters	46 ± 4
Full Tank	9.0 liters	9 ± 15



Starter Relay

Measuring & Testing Equipment : Test Jig or Multimeter

Connection : Test Jig - Connect starter relay coupler to Test Jig & it show result as OK / Defective

Meter Range	Connections		Standard Value
200 Ohms	Meter +ve	Meter -ve	3.5~4.3 Ohms
	Starter Relay Coil Red - Yellow Wire	Starter Relay Coil Black Wire	

SOP :

- Switch OFF engine.
- Disconnect coupler from Relay.
- Connect multimeter to Starter Relay coil terminals.
- Check resistance.

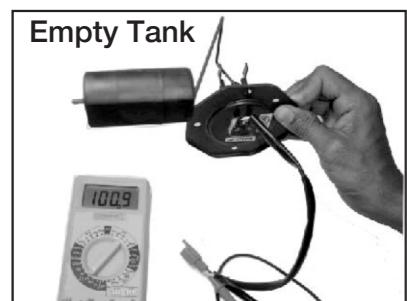


Capacitor

Checking Method :

Touch +ve wire of capacitor to earth. Spark will occur.
This Indicates capacitor is OK.

Note: Capacitor is very important for Battery charging function, so ensure capacitor coupler is always firmly connected.



Fuel Gauge - Tank Unit

Measuring & Testing Equipment : Multimeter

Meter Range	Connections		Standard Value
200 Ohms	Meter +ve White / Yellow	Meter -ve Black / Yellow	As per chart given below



Lighting Coil

Measuring & Testing Equipment : Multimeter

Meter Range	Connections		Standard Value
200 Ohms	Meter +ve	Meter -ve	0.9~1.3 Ohms
	Yellow	Black	

SOP :

- Switch OFF engine.
- Disconnect stator plate coupler
- Connect multimeter between Yellow & Black wires.
- Check resistance value between Yellow & Black wires.



Excitor Coil

Measuring & Testing Equipment : Multimeter

Meter Range	Connections		Standard Value
200 Ohms	Meter +ve	Meter -ve	13.23~16.17 Ohms
	Red	Black	

SOP :

- Switch OFF engine.
- Disconnect stator plate coupler
- Connect multimeter between Red & Black wires.
- Check resistance value between Blue / White & Blue / White.



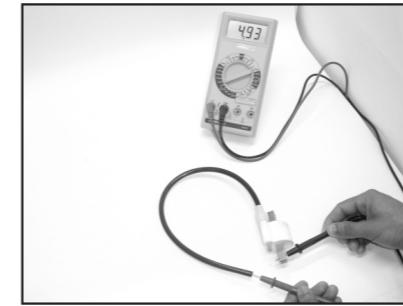
Battery Charging Coil

Measuring & Testing Equipment : Multimeter

Meter Range	Connections		Standard Value
200 Ohms	Meter +ve	Meter -ve	1.8 ~ 2.20 Ohms
	Blue / White	Blue / White	

SOP :

- Switch Off Ignition Key.
- Disconnect Stator Plate Coupler
- Connect multimeter between 2 Blue / White wires.
- Measure resistance between 2 Blue / White wires.



H. T. Coil Inspection

H.T. Coil : (Inspection Using Multimeter)

- Measure the primary winding resistance as follows
- Connect the multimeter between input terminal & GND plate on the core.
- Measure the secondary winding resistance as follows
- Remove the plug cap by turning it counter clockwise.
- Connect the multimeter between H.T. cable end & GND plate on the core.
- Measure primary winding & secondary winding resistance.
- If the value does not match as per, specifications replace the coil.
- If the meter reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked test replace the coil with one OK coil.
- Visually inspect the secondary winding lead.
- If it shows any damage, replace the coil.



Pick-up Coil

Measuring & Testing Equipment : Multimeter

Meter Range	Connections		Standard Value
2 K Ohms	Meter +ve	Meter -ve	193.5~236.5 Ohms
	White / Red	Black / Yellow	

SOP :

- Switch Off Ignition Key.
- Disconnect Stator Plate Coupler
- Connect multimeter between White / Red & Black / Yellow wires.
- Measure resistance between White / Red & Black / Yellow wires.

Note: Ensure gap 0.5~0.7 mm between pole of pick-up coil & rotor peep.

Primary Winding	0.3 Ω to 0.5 Ω at 25°C
Secondary Winding	4.5 kΩ to 6.5 kΩ at 25°C

TPS Checking

Continuity Check



Continuity Check

- Disconnect TPS coupler
- Check Continuity between Blue & Black / Yellow wire
- There should not be any continuity.

Meter Range	Connections		Standard Value
Continuity Mode	Meter +ve	Meter -ve	No continuity must be shown.
	Blue	Black / Yellow	

Input Voltage Check



- Connect TPS coupler.
- Switch 'ON' Ignition Key.
- Check voltage between Brown & Black/Yellow wires of TPS Hall Sensor.

Meter Range	Connections		Standard Value
20V DC	Meter +ve	Meter -ve	12.4 Volts (Battery Voltage)
	Brown	Black / Yellow	

POT Voltage Check



Voltage Check in POT Condition

- TPS coupler is in connected condition.
- Switch 'ON' Ignition key.
- Check voltage between Blue & 'Black / Yellow' wire in POT condition.

Meter Range	Connections		Standard Value
20V DC	Meter +ve	Meter -ve	Less than 1 Volt.
	Blue	Black / Yellow	

WOT Voltage Check



Voltage Check in WOT Condition

- TPS coupler is in connected condition.
- Switch 'ON' Ignition key.
- Check voltage between Blue & 'Black / Yellow' wire in WOT condition.

Meter Range	Connections		Standard Value
20V DC	Meter +ve	Meter -ve	3 ~ 5 VDC
	Blue	Black / Yellow	

Horn

Measuring & Testing Equipment : DC Clamp Meter

Meter Range	Connections	Standard Value
200 DC A	Encircle clamp meter jaws around Brown wire of horn	2 Amps Max.

SOP :

- Encircle clamp meter jaws around Brown wire of Horn.
- Press horn switch & check instantaneous current drawn by horn.



Starter Motor - Current Drawn

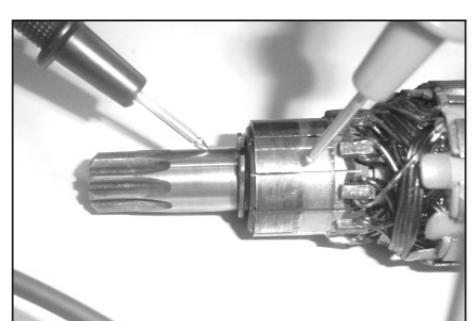


Starter Motor - Current Drawn

- Switch 'ON' Ignition Key & disconnect both spark plug caps (care to be taken so that spark does not jump to metal part)
- Select range & set clamp meter Zero reading.
- Encircle red input wire of starter motor by clamp meter jaws.
- Ensure battery is fully charged. Confirm the charged condition using battery load tester.
- Crank engine by pressing self starter button.
- Press self starter button 3 seconds & check cranking current displayed on clamp meter LCD display.

Meter Range	Connections	Standard Value
200 DC A	Encircle clamp meter jaws around thick red wire of starter motor.	30 ~ 38 Amps

Starter Motor Armature



Starter Motor Armature

- Dismantle starter motor & take out Armature.
- Remove dust by air blow.
- Check continuity between starter motor shaft & each segment on commutator.
- Replace armature if continuity is shown.

Meter Range	Connections	Standard Value
Continuity Mode	Meter +ve	Meter -ve
	Commutator Segment	Shaft



- Replace armature if continuity is observed
- Check continuity between each pair of adjacent segments on commutator.

Meter Range	Connections		Standard Value
Continuity Mode	Meter +ve	Meter -ve	Continuity is shown.
	Any segment on commutator	Adjacent segment on commutator	

- Replace armature if continuity is not shown between any two adjacent pair of commutator segments.

AC Lighting Voltage Measurement



- Open head light housing.
- Start engine & set it at 4500 rpm ensure headlight, tail light & speedometer lights are 'ON'.
- Ensure Hi/Lo beam switch at 'Hi' beam mode. Set multimeter at 20VAC.
- Connect multimeter as per chart given below.
- Voltage should be 12 to 13.5 V AC. This indicates RR unit is functioning perfectly & giving regulated ACV output for lighting circuit.

	Connections		Standard Value
Empire rpm 4500 rpm with H/L, T/C speedo light 'ON' + Hi beam 'ON'	Meter +ve	Meter -ve	13.2 to 13.8 V AC
	Red-Black wire at H/L socket	Earth wire at H/L socket	
Multimeter set at 20V AC			



Battery Charging Voltage Measurement

Use fully charged battery while measuring

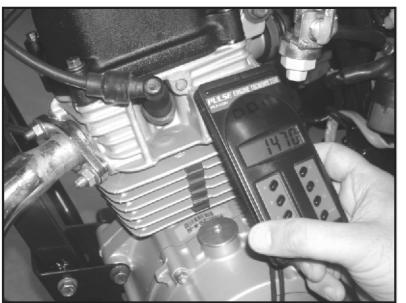
Ensure $V_B = 12.5 \pm 0.3$ V before checking

V_B = Battery open circuit terminal voltage with Battery terminals in disconnected condition.

To measure the DC voltage; set the meter at 20V DC range. Connect the meter +ve lead to Battery +ve terminal & meter -ve lead to battery -ve terminal without disconnecting battery wires. Start the engine & set it at 1500 RPM. Measure the voltage with headlight switch in 'ON' position. Switch OFF Ignition key & disconnect the meter leads.

Meter Range	Meter Connections	Specified at 1500 RPM
20 V DC	+ve lead Battery +ve terminal -ve lead Battery -ve terminal	14.4 ± 0.3 Volts

Note : For DC voltage measurement connect multimeter in parallel circuit.



Battery DC Charging current Measurement

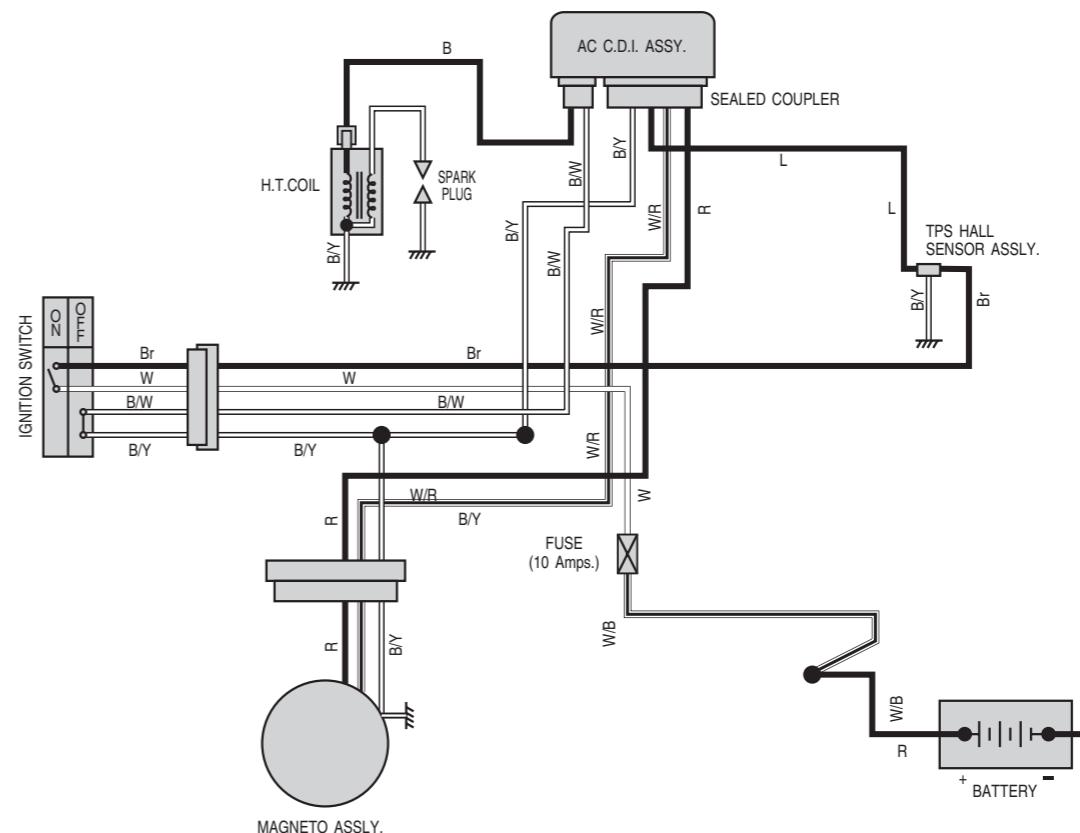
Use fully charged battery while measuring.

Ensure $V_B = 12.5 \pm 0.3$ V before checking.

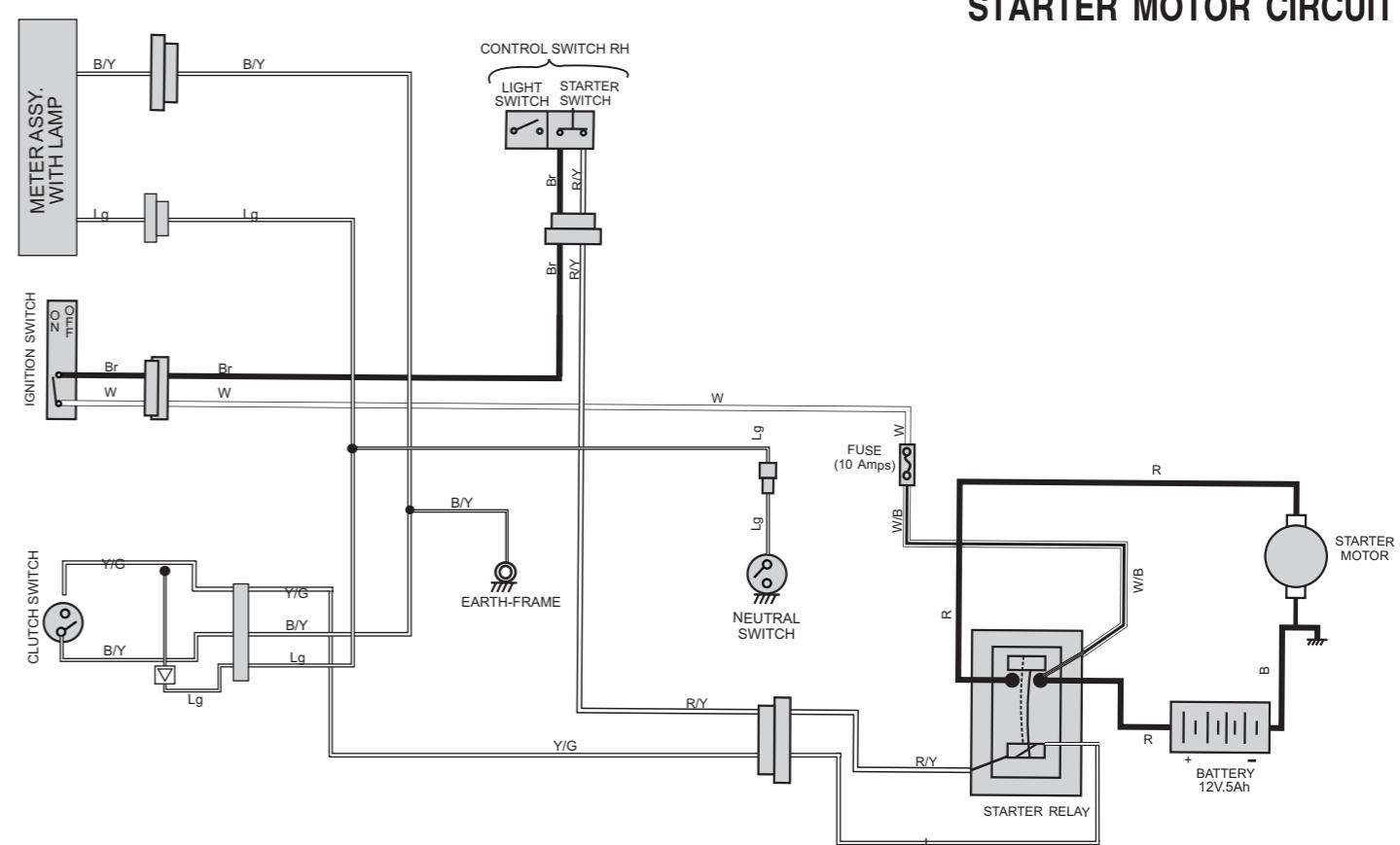
To measure the DC charging current, set the meter to 10A DC range. Disconnect Red wire from Battery +ve terminal connect meter +ve lead to Red wire of wiring of wiring harness & -ve lead to +ve terminal of battery. Start the engine & set it at 4000 RPM. Put ON the headlight & measure the DC charging current. The DC charging current should be 0.7 A max. Switch OFF Ignition key & disconnect the meter leads. Connect the RR unit & battery.

Meter Range	Meter Connections	Specification
DC 10 Amp	Meter +ve Red wire of Harness Meter -ve Battery +ve Terminal	0.7 A Max. @ 4000 RPM with fully charged battery

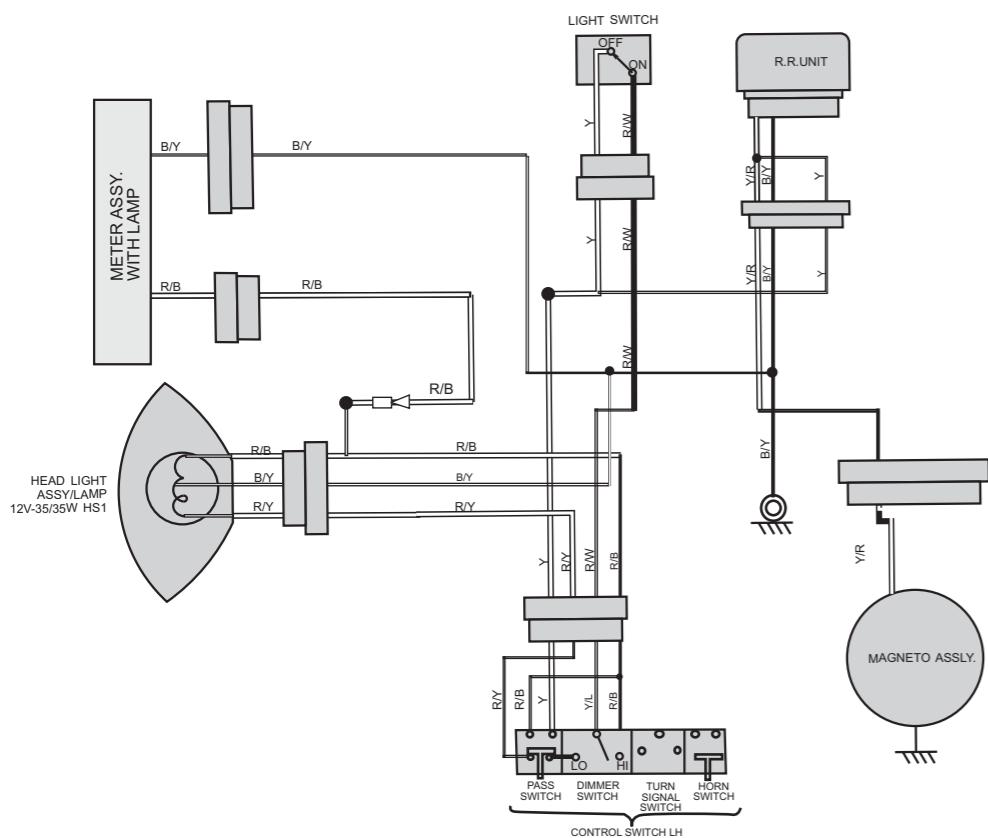
Note : For DC current measurement connect multimeter in series circuit.



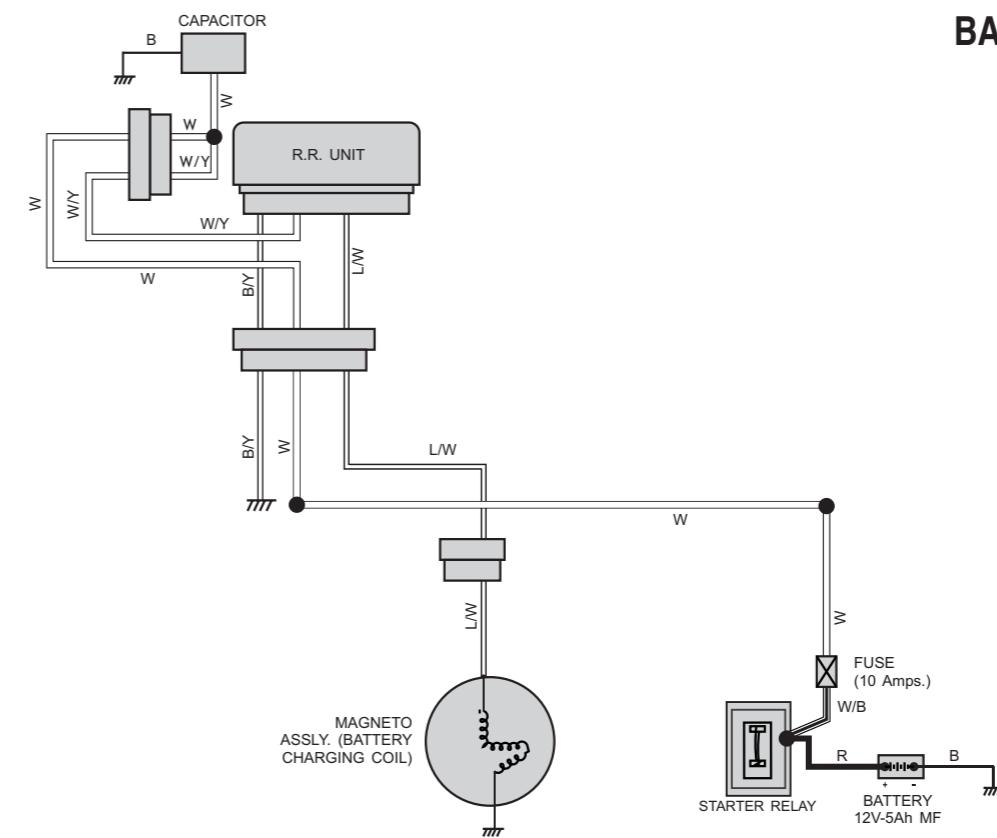
IGNITION CIRCUIT



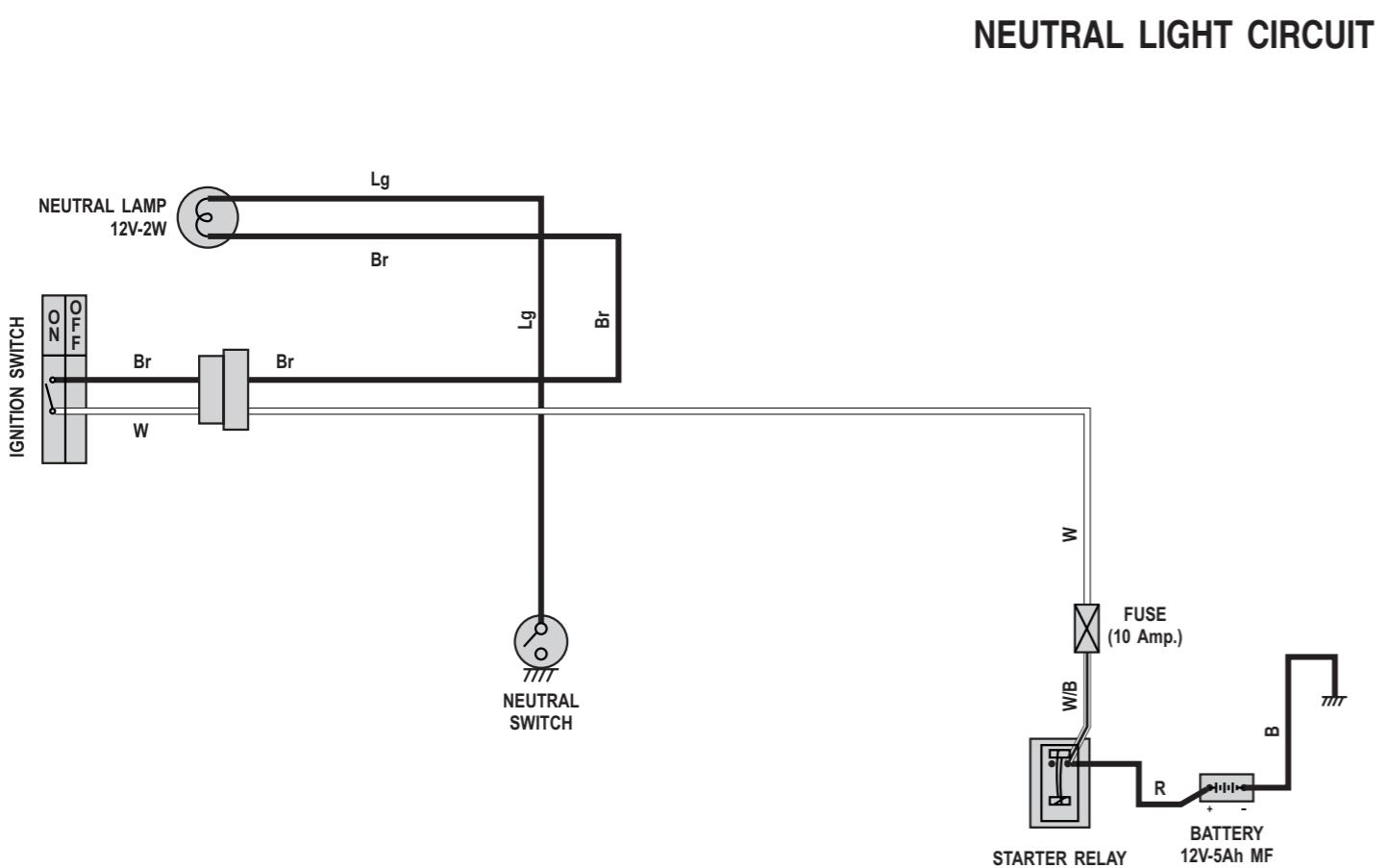
STARTER MOTOR CIRCUIT



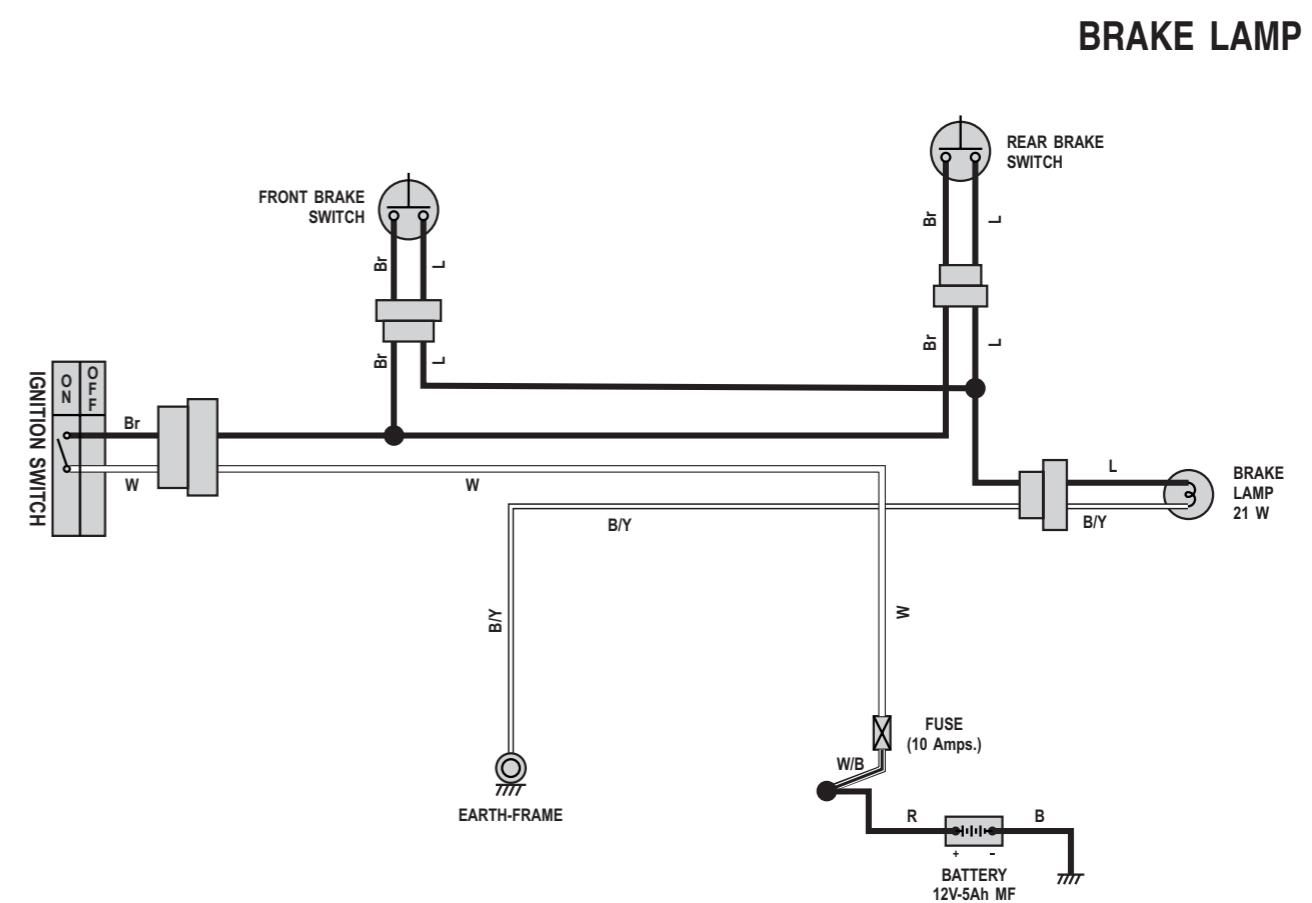
LIGHT SYSTEM CIRCUIT



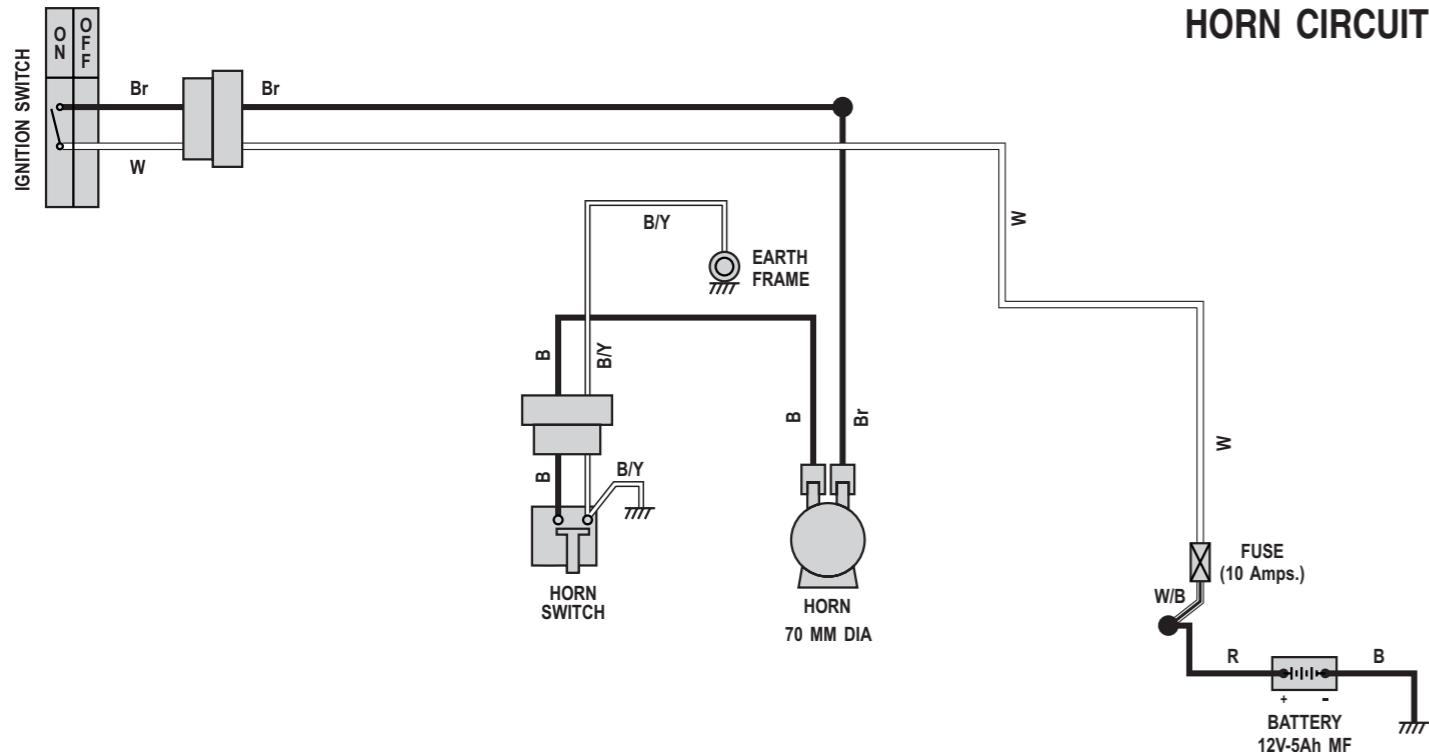
BATTERY CHARGING CIRCUIT



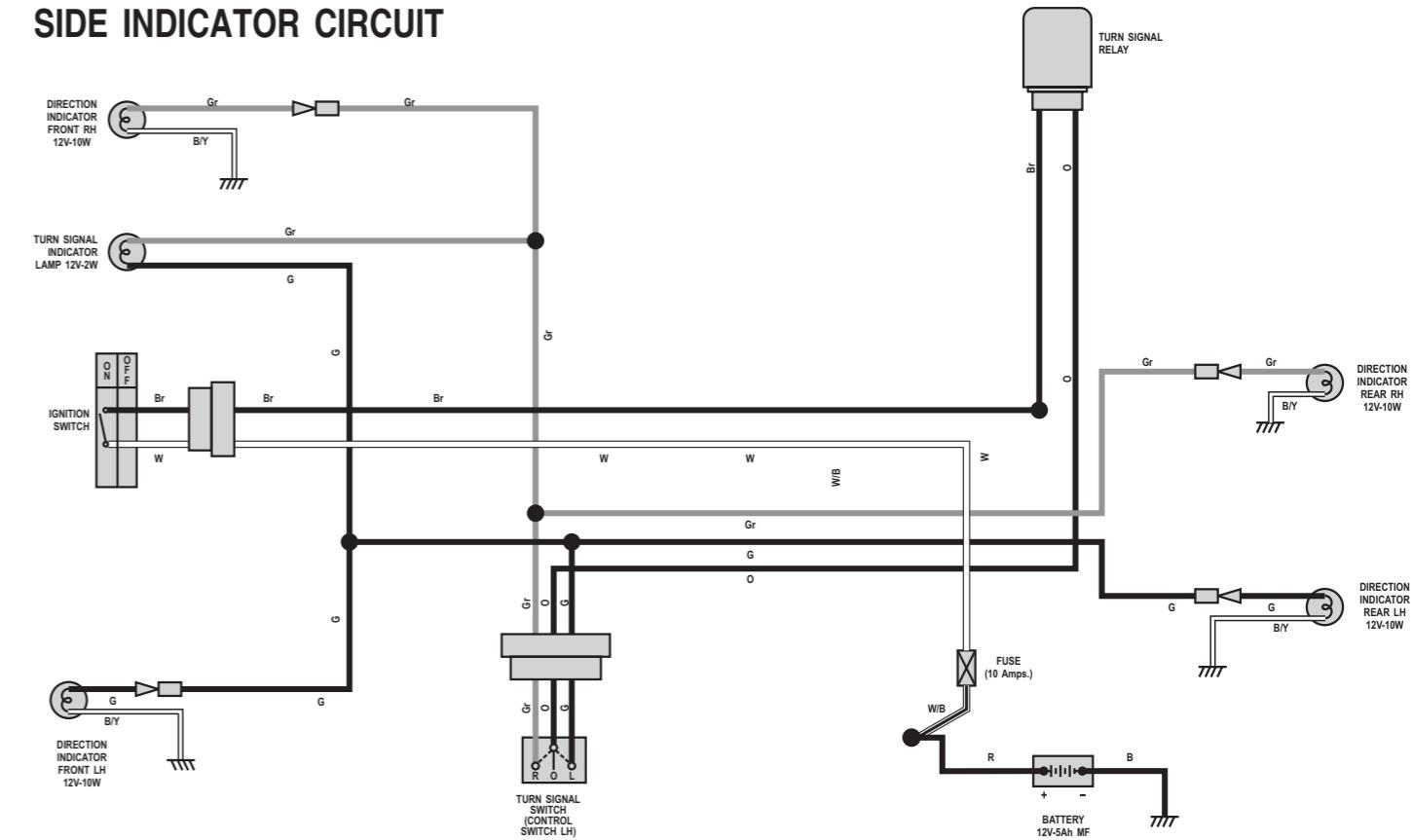
NEUTRAL LIGHT CIRCUIT



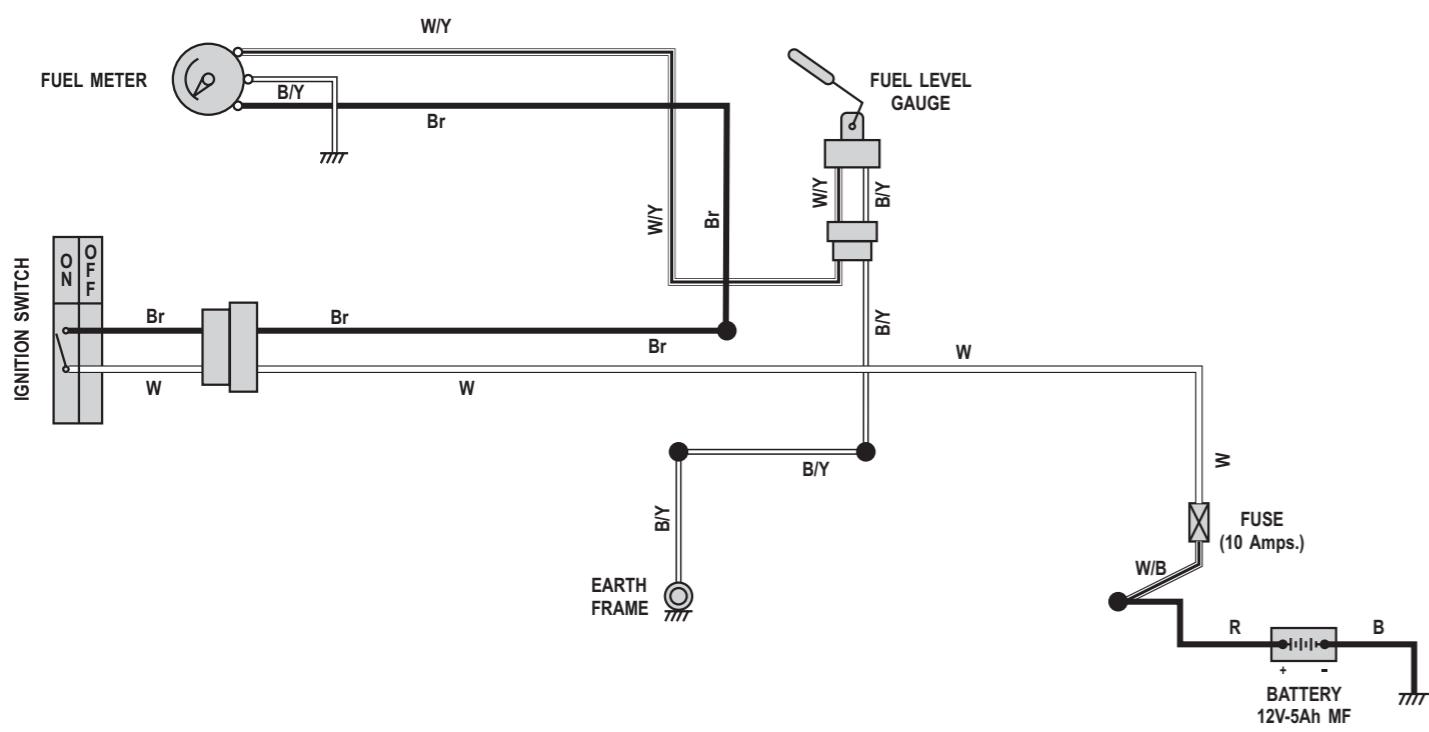
NEUTRAL LIGHT CIRCUIT



HORN CIRCUIT



FUEL GAUGE CIRCUIT



IGNITION CIRCUIT

