TVS

Apache

RTR 200 4V

DFiLOGIC

SERVICE MANUAL

NOTICE

All information included in this publication is based on the latest product information available at the time of approval for printing.

All the illustrations given in this manual may vary from the actual vehicles.

TVS MOTOR COMPANY LIMITED reserves the right to make changes at any time without prior notice and without incurring any obligation whatsoever.

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FOREWORD

We are happy to provide you the first edition of new **TVS APACHE RTR 200 4V DFiLOGIC** motorcycle's service manual.

This manual is prepared to provide the assistance during the process of servicing the new **TVS APACHE RTR 200 4V DFiLOGIC** motorcycle. This manual describes about the basic operations of this new product, do's and don't's, service limits of individual components and sub systems while servicing the **TVS APACHE RTR 200 4V DFiLOGIC** motorcycle. We request you to carefully go through this manual and follow the instructions given.

All the instructions and illustrations of this manual is prepared based on the recent information available during the preparation of manual. Modifications or any improvements on product will be communicated through '**SERVICE INFORMATION BULLETINS**' from time to time.

This manual will help to the technicians who already have technical knowledge about motorcycles.

While servicing, certain parts may require replacement. For ordering spares please refer **Parts catalogue of TVS APACHE RTR 200 4V DFiLOGIC** motorcycle. The illustrations in this manual may not give you the exact name, part number and quantities.

Incase, you face any critical problems during the course of servicing and if you need any further clarifications or technical assistance you may contact our area service personal.

You may also contact us at

TVS Motor Company Limited,
International Business (Service) Department,
Post box No.4, Harita, Hosur - 635 109,
Tamilnadu, India.

HOW TO READ THIS MANUAL

This service manual is split into seven chapters as "General information", "Periodic maintenance", "Servicing of engine", "Fuel, Lubrication and Exhaust system", "Electrical system", "Chassis" and "Service information".

Mostly the pages run through two columns in the inside pages with instructions on left side and the illustrations on the right side. Some of the exploded views occupy full pages. In between the running instructions we have used the notations as per the examples given below:

Heading:- **CHAIN ASSEMBLY DRIVE**

Sub heading:- **Chain slackness**

Note :- This provides further clarification for clear understanding of any particular information/operation/data**.**

Note:
Inspect and set the idling speed after completing all other maintenance actions.

Caution / warning :- This indicates special procedures of precautions to be followed by the mechanics during the service. Avoiding these messages may cause injury to them as well as damage to the components.

Caution:
Check that the gasket inlet is intact and in good condition.

Hand tools :-

17 mm spanner

Part number	Description

Special tools :-

N231 002 0	Clutch nut tightening tool

Service limits :-

Service limit	0.05 mm

Chapter 1

GENERAL INFORMATION

TVS APACHE RTR 200 4V

Fig. 1.1 RIGHT SIDE

Fig. 1.2 LEFT SIDE

VEHICLE IDENTIFICATION NUMBERS

LOCATIONS

FRAME NUMBER

- The frame serial number is stamped on the right side of the steering head tube. (Fig. 1.3)

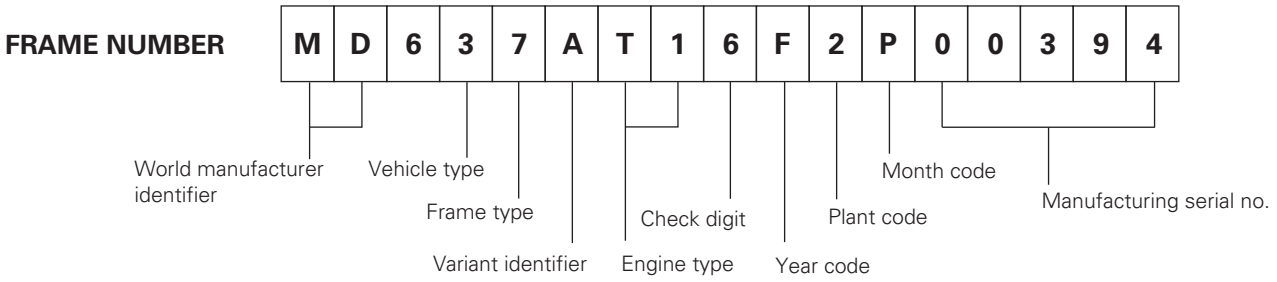
Fig. 1.3

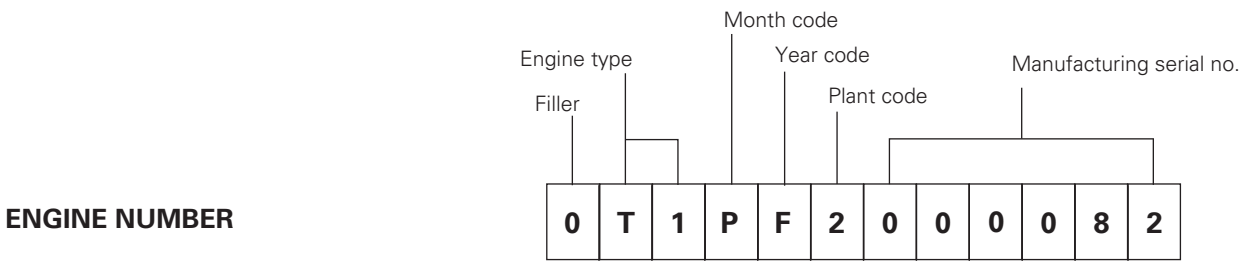
ENGINE NUMBER

- The engine serial number is stamped on the left side crankcase assembly near cylinder block. (Fig. 1.4)

Fig. 1.4

FRAME AND ENGINE NUMBER CODES





YEAR AND MONTH CODES

CODE FOR THE PRODUCTION YEAR

CODE	YEAR
1	2001
2	2002
3	2003
4	2004
5	2005
6	2006
7	2007
8	2008
9	2009
A	2010
B	2011
C	2012
D	2013
E	2014
F	2015
G	2016
H	2017
J	2018
K	2019
L	2020
M	2021
N	2022
P	2023
R	2024
S	2025
T	2026
V	2027
W	2028
X	2029
Y	2030

CODE FOR THE PRODUCTION MONTH

CODE	MONTH
A	JANUARY
B	FEBRUARY
C	MARCH
D	APRIL
E	MAY
F	JUNE
G	JULY
H	AUGUST
K	SEPTEMBER
L	OCTOBER
N	NOVEMBER
P	DECEMBER

TECHNICAL SPECIFICATIONS

DIMENSIONS AND WEIGHT	
Overall length	2050 mm
Overall width	790 mm
Overall height	1105 mm
Seat height	800 mm
Ground clearance	180 mm
Wheel base	1353 mm
Kerb weight (with toolkit and 90% of fuel)	148.5 kg
Pay load	130 kg
Maximum laden weight	278.5 kg

ENGINE	
Type	4 stroke, Oil cooled, Single cylinder OHC, EFI
Bore	66 mm
Stroke	57.8 mm
Piston displacement	197.75 cc
Compression ratio	9.7 : 1
No. of valves	4
Throttle body	BOSCH
Air filter	Viscous Paper filter
Oil filter	Wire mesh and micronic paper filter
Lubrication system	Forced wet sump
Maximum power in kW	15.46 kW (21 PS) @ 8500 rpm
Maximum torque in Nm	18.1 Nm @ 7000 rpm
Maximum speed	Around 129 km / h
Engine idling rpm (under warm condition)	1400 ± 200 rpm
Starting system	Electric starter

TRANSMISSION	
Clutch	Wet - multiplate type
Gear shift pattern	1 down and 4 up
Primary transmission	Helical gears
Secondary transmission	Chain and sprockets

TECHNICAL SPECIFICATIONS

GEAR RATIO

First gear	2.917
Second gear	1.857
Third gear	1.333
Fourth gear	1.050
Fifth gear	0.880
Primary reduction	2.818
Secondary reduction	3.461

CHASSIS

Frame			Double Cradle Split Synchro STIFF (DCSSS)
Front suspension			Telescopic oil damped
Rear suspension			Gas charged Mono shock absorber, 7 step adjustable with rectangular swing arm
Steering angle			34°
Caster angle			25.5°
Trail length			95.5 mm
Brakes	Front		Hand operated, 270 mm petal disc
	Rear		Foot operated, 240 mm petal disc
Tyre*	Front		90/90 x 17 Tubeless
	Rear		130/70 x 17 Tubeless
Tyre pressure	Front		1.75 kg/cm^2 (25 PSI)
	Rear	Solo	2.00 kg/cm^2 (28 PSI)
		Dual	2.25 kg/cm^2 (32 PSI)

ELECTRICAL

Type	AC generator
Ignition system	ECU - 3D Ignition timing map
Spark plug	BOSCH UR4KE
Battery type	12V, 9 Ah
Body earthing	Negative terminal
Generator	Fly wheel magneto 12V, 260W
Head lamp	12V, 60/55W H4 x 1
Position lamp	LED lamp (2W) x 2
Tail / brake lamp	LED indicator (1W max. / 2.5W max.)
Turn signal lamp	12V, 10W x 4
Number plate lamp	12V, 5W x 1
Instrument panel	LCD / LED indicators
Horn	12V, DC x 2
Fuse	12V 20Ax1, 12V 15Ax1 and 12V 10Ax2 blade type

*** The pneumatic tyres fitted in this vehicle meet the requirements specified by BIS and comply with the requirements under Central Motor Vehicles Rules (CMVR), 1989.**

TECHNICAL SPECIFICATIONS

CAPACITIES

Fuel type	Unleaded petrol
Fuel tank capacity*	12 litres (including reserve)
Reserve	2.5 litres
Engine cum transmission oil grade	TVS TRU4 FULLY SYNTHETIC oil (SAE 10W30 API-SL, JASO MA2)
Engine cum transmission oil capacity	1200 ml (after draining) 1400 ml (incase of disassembly)
Front fork oil grade	TRU FORK oil
Front fork oil quantity	325 ± 2 cc
Brake fluid	TVS Griling DOT 3 / DOT 4

Note:
Specification are subject to change on account of continuous improvements in the product.

*** The fuel tank is not a measuring instrument and the capacity of the fuel tank may vary from the indicated capacity.**

ADVANTAGES AND SPECIAL FEATURES OF TVS APACHE RTR 200 4V

- 200 CC, 4 valve, learn burn engine with the peak power of 21 PS @ 8500 rpm and peak torque of 18.1 Nm @ 7000 rpm helps to achieve 0 to 60 kmph speed in 3.9 secs.
- ECU - 3D Ignition timing map, tuned for smooth power delivery
- High combustion nanofriks-coated piston
- 6 plate clutch for racing launch
- 5 speed gear box for high speed
- Large intake resonator - boosts low-end torque
- Paper filter in air cleaner for increased durability
- Oil cooled along with ram air assisted cooling for optimum engine performance
- Stainless steel exhaust pipe exhaust system
- Double barrel exhaust engineered with European sound design techniques
- Race origin double cradle split syncro stiff frame
- Double check valve bush front fork for excellent and smooth front suspension
- KYB mono tube suspension for aggressive racing
- Roto petal disc brakes
- Race grip Remora tyres (Pirelli tyres optional)
- Aluminium forged handle bars
- Interactive racing display
- All new - Day LED lamp
- Aggressive tank cowl
- Racing ergo split seat assembly
- Longer wheel base for better stability

RUNNING - IN PERIOD

The first 1000 km is a crucial part. Proper running-in operation during this period helps in ensuring a longer life and smooth performance of **TVS APACHE RTR 200 4V DFiLOGIC.**

The reliability and performance of **TVS APACHE RTR 200 4V DFiLOGIC** depends on special care and restrain exercised during running-in period. It is especially important that you avoid operating the engine in a manner, which could expose the engine parts to excessive heat. Maximum recommended speed upto 750 km is 50 km/h.

Do not ride at constant low speed for a longer time during any portion of the running-in period. Keep varying the engine speed for better mating of parts.

FUEL AND OIL RECOMMENDATIONS

TVS APACHE RTR 200 4V has a four stroke engine. Do not mix oil with petrol. Be sure to use the following specified fuel and oil.

Fuel:

- Unleaded petrol with octane number between 85 to 95 by research method.
- Use fuel additives **IFTEX** in petrol as recommended by the manufacturer for low carbon deposition.

Oils:

Application	Qty	Manufacturer	Brand
Engine cum transmission oil	1200 ml (during regular service) 1400 ml (incase of disassembly)	TVS-M	TVS TRU4 FULLY SYNTHETIC oil (SAE 10W30 API-SL, JASO Ma2)
Front fork oil	325 ± 2 cc	TVS-M	TRU FORK oil
Disc brake oil	–	TVS Girling	DOT 3 / DOT 4

Other lubricant:

Application	Qty	Manufacturer	Brand
Grease	–	Bharat petroleum IOC Bechem Kluber Lubrication	MP Grease no. 3 Servo Gem no. 3 Bechem premium grade 3 Kluber Centoplex 2
Chain lubricant	–	TVS Motor Company	TRU SPRAY

PRECAUTIONS AND GENERAL INSTRUCTIONS

Observe the following precautions without fail when dismantling and reassembling.

- Do not run the engine indoors with little or no ventilation.
- Be sure to replace gaskets, O-rings, circlips and cotter pins with new ones, for safety.
- When tightening nuts and bolts, start first with the larger or centre ones. Tighten these to the specified torque using a crisscross pattern.
- Use specified special and common tools only.
- When engine and final drive components are disassembled and inspected, coat the mating surfaces with a lubricant to prevent corrosion.
- When assembling components, use recommended lubricants.
- After assembling, check every part for proper installation, movement and operation.
- Always ensure mutual safety when working with the partners.
- Use only genuine **TVS Motor Company** parts and recommended lubricants.

LIST OF HAND TOOLS REQUIRED

1. Flat head spanners:

7 mm, 8 mm, 10 mm, 12 mm, 14 mm and 21 mm

2. Ring spanners:

8 mm, 9 mm, 10 mm, 11 mm, 12 mm, 13 mm, 14 mm, 16 mm , 17 mm, 22 mm, 24 mm, 27 mm and 32 mm

3. Tubular spanners:

8 mm, 10 mm, 12 mm, 14 mm, 16 mm and 17 mm

4. Socket spanners:

12 mm, 14 mm, 17 mm, 22 mm, 27 mm and 32 mm

5. Allen keys:

3 mm, 4 mm, 6 mm, 8 mm, 10 mm and 12 mm

6. Screw drivers:

Flat screw driver-small, flat screw driver, phillips head screw driver no.1, phillips head screw driver no. 2 and phillips head screw driver no. 3

7. Hammers:

Nylon hammer, rubber mallet and metal hammer

8. Pliers:

Straight nose plier, combination plier, water pump plier, external circlip plier-6 inch and snap ring circlip plier-7 inch

9. Others:

Drift, chisel, plug spanner, compression gauge, special adopter, micrometer, vernier calliper, dial gauge, surface plate and hot plate

LIST OF SPECIAL TOOLS REQUIRED

Sl. no.	Part no.	Description
1	M131 002 0	Magneto puller
2	M131 007 0	Tappet adjuster
3	M131 011 0	Puller assembly - crankcase
4	N231 001 0	Clutch holder tool
5	N231 002 0	Clutch nut tightening tool
6	N931 009 0	Tool fork oil seal
7	N931 011 0	Tool fork cylinder holder
8	N931 012 0	Tool pre-load adjuster
9	N931 013 0	Tool cone bottom installer
10	N931 014 0	Tool steering nut
11	N931 015 0	Tool swing arm service
12	N931 016 0	Tool steering cup remover
13	N931 017 0	Magneto tool assembly
14	NB31 004 0	Assembly tools steering cups
15	S131 002 0	Extractor inlet and exhaust valve
16	S131 050 0	Bearing installer set
17	S131 111 0	Main bearing extractor
18	031 180 0	Front fork oil level gauge
19	031 240 1	Universal oil seal remover

SPECIAL TOOLS & ITS APPLICATION

1. Magneto puller - M131 002 0 (Fig. 1.5A)

- Used to remove the magneto rotor from the crankshaft assembly. (Fig.1.5B)

Fig. 1.5A

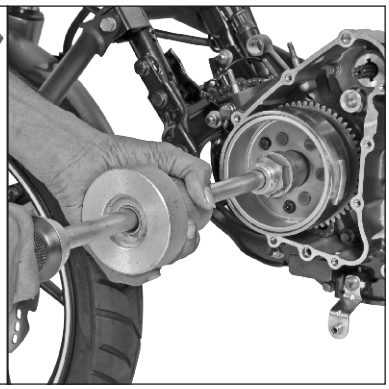


Fig. 1.5B

2. Tappet adjuster - M131 007 0 (Fig.1 .6A)

- Used to adjust the valve tappet clearance. (Fig. 1.6B)

Fig. 1.6A

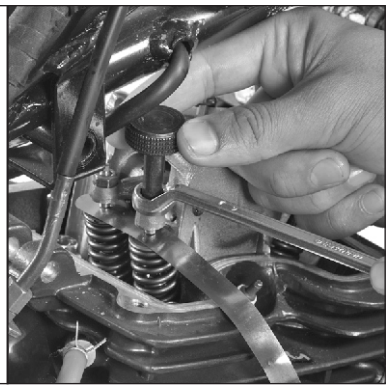


Fig. 1.6B

3. Puller assembly crankcase - M131 011 0 (Fig. 1.7A)

- Used to separate the LH and RH side crankcases. (Fig. 1.7B)

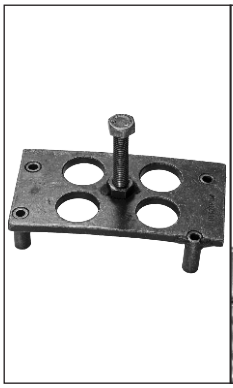


Fig. 1.7A

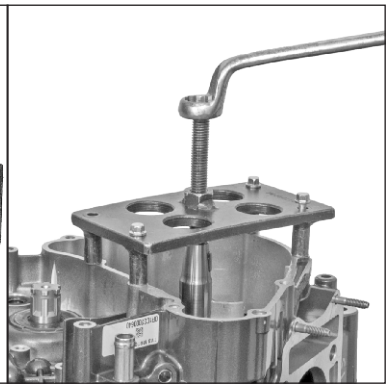


Fig. 1.7B

4. Clutch holder tool - N231 001 0 (Fig.1.8A)

- Used to hold the clutch assembly during clutch assembly mounting nut removal. (Fig. 1.8B)

Fig. 1.8A

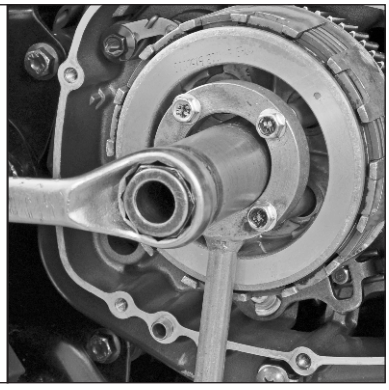


Fig. 1.8B

5. Clutch nut tightening tool - N231 002 0 (Fig.1.9A)

- Used to remove / reassemble the clutch nut during clutch servicing. (Fig. 1.9B)

Fig. 1.9A

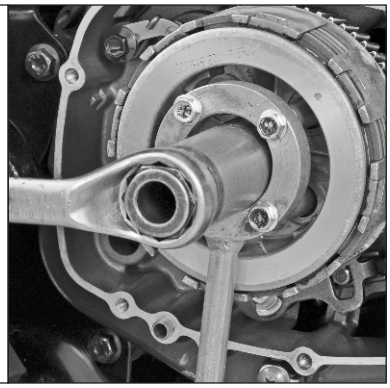


Fig. 1.9B

6. Tool fork oil seal - N931 009 0 (Fig. 1.10A)

- Used to assemble the front fork oil seal and dust cap. (Fig. 1.10B)

Fig. 1.10A

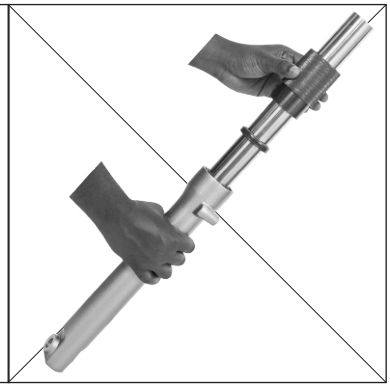


Fig. 1.10B

7. Tool fork cylinder holder - N931 011 0 (Fig. 1.11A)

- Used to hold the front fork cylinder during fork leg assembly dismantling. (Fig. 1.11B)

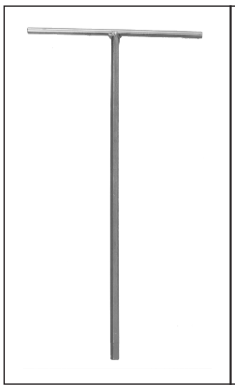


Fig. 1.11A

Fig. 1.11B

8. Tool pre-load adjuster - N931 012 0 (Fig. 1.12A)

- Used to adjust the rear mono-shock spring pre-load. (Fig. 1.12B)

Fig. 1.12A

Fig. 1.12B

9. Tool cone bottom installer - N931 013 0 (Fig. 1.13A)

- Used to assemble the cone bottom to the steering stem. (Fig. 1.13B)

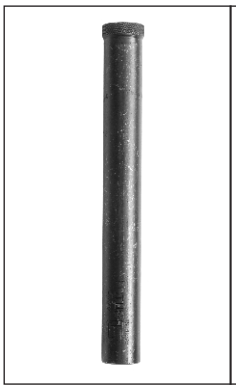


Fig. 1.13A

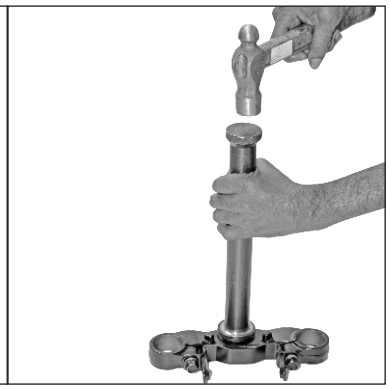


Fig. 1.13B

10.Tool steering nut - N931 014 0 (Fig. 1.14A)

- Used to remove / assemble the steering lock nut and arrester steering stem. (Fig. 1.14B)

Fig. 1.14A

Fig. 1.14B

11.Tool swing arm service - N931 015 0 (Fig. 1.15A)

- Used to remove and reassemble the swing arm needle bearings. (Fig. 1.15B)

Fig. 1.15A

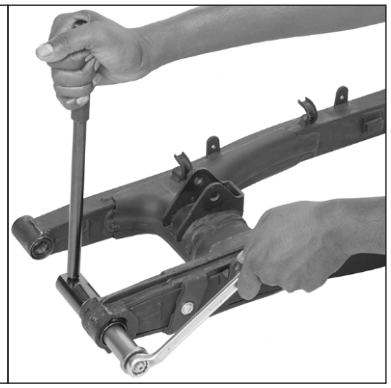


Fig. 1.15B

12.Tool steering cup remover - N931 016 0 (Fig. 1.16A)

- Used to remove the top and bottom steering cups. (Fig. 1.16B)

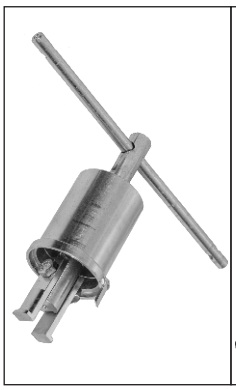


Fig. 1.16A

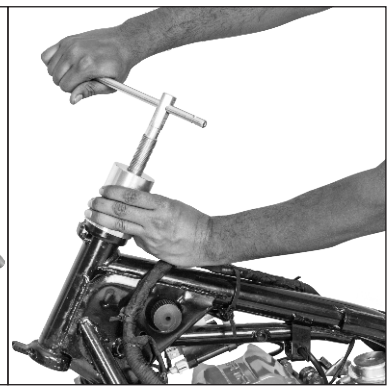


Fig. 1.16B

13.Magneto tool assembly - N931 017 0 (Fig. 1.17A)

- Used to hold the magneto rotor while removing/assembling the primary drive gear and magneto rotor nuts. (Fig. 1.17B)

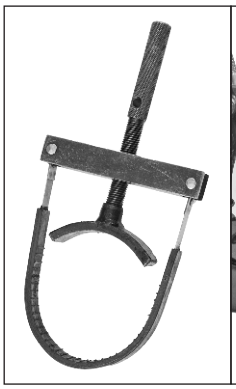


Fig. 1.17A

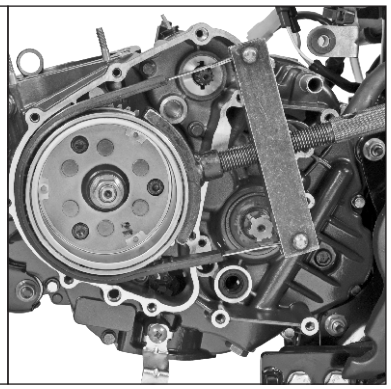


Fig. 1.17B

14.Assembly tool steering cups - NB31 004 0 (Fig. 1.18A)

- Used to assemble the cup bottom and race steering inner during servicing of steering. (Fig. 1.18B)

Fig. 1.18A

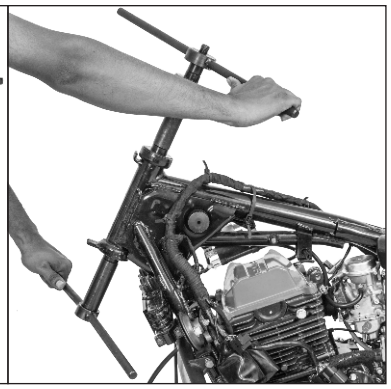


Fig. 1.18B

15.Extractor inlet and exhaust valve - S131 002 0 (Fig. 1.19A)

- Used to hold the compress the inlet and exhaust value spring during removal of valves. (Fig. 1.19B)

Fig. 1.19A

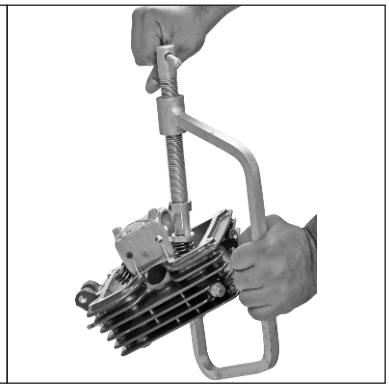


Fig. 1.19B

16.Bearing installer set - S131 050 0 (Fig. 1.20A)

- Used to remove / assemble the bearings, oil seals and bushes. (Fig. 1.20B)

Fig. 1.20A

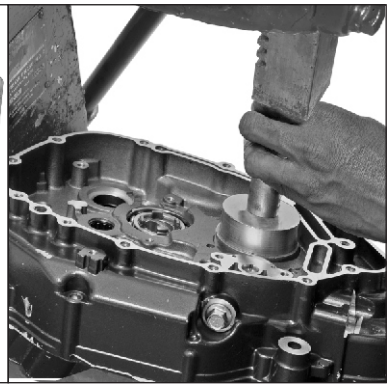


Fig. 1.20B

17.Main bearing extractor - S131 111 0 (Fig. 1.21A)

- Used to remove the main bearing from the crankshaft. (Fig. 1.21B)

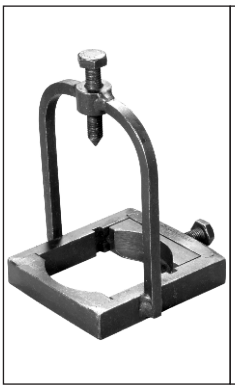


Fig. 1.21A

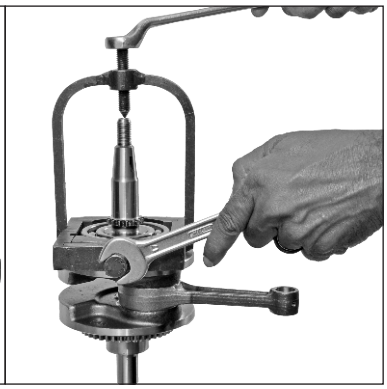


Fig. 1.21B

18.Front fork oil level gauge - 031 180 0 (Fig. 1.22A)

- Used to maintain the front fork oil level at the specified height. (Fig. 1.22B)

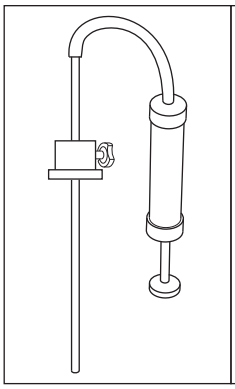


Fig. 1.22A

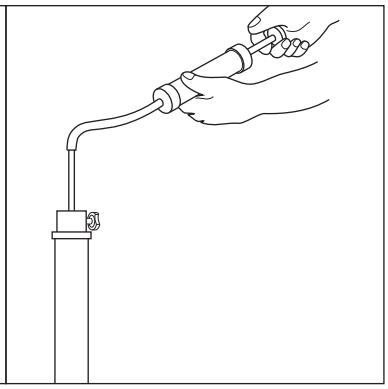


Fig. 1.22B

19.Universal oil seal remover - 031 240 1 (Fig. 1.23A)

- Used to remove the installed oil seals. (Fig. 1.23B)

Fig. 1.23A

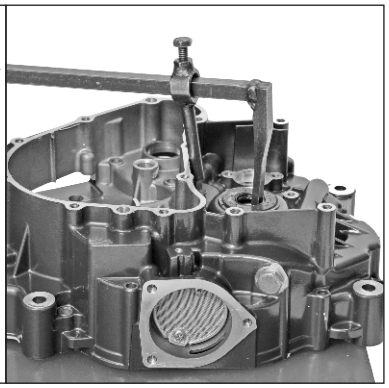


Fig. 1.23B

Chapter 2

PERIODIC MAINTENANCE

PERIODIC MAINTENANCE

For a trouble free performance of the vehicle and its longer life, the vehicle should be periodically inspected for wear of components, carbon deposits, stretched cables, etc. The worn-out components to be replaced or repaired and necessary adjustment to be made for certain items for better performance of the vehicle as indicated in the table.

Note:
More frequent maintenance checks may be performed on vehicles that are used in severe conditions like dusty environment, dense traffic conditions, sustained full throttle operation and un-metalled roads.

PERIODIC MAINTENANCE SCHEDULE - FREE SERVICES

Item	In free service					After free service		Remarks
Service km Period from the date of sale	1st 500-750 1 month	2nd 2500-3000 3 months	3rd 5000-6000 6 months	4th 8500-9000 9 months	5th 11500-12000 12 months	Every 3000 km	Every 6000 km	
Engine cum transmission oil	R	I&T	R	I&T	R	I&T	R	
Oil filter (strainer)	C	–	C	–	C	–	C	
Oil filter (paper filter)	R	–	R	–	R	–	R	
Spark plug	I & C	–	–	–	R	–	–	Replace every 12000 km
Air cleaner element	I	–	–	–	R	–	–	Replace every 12000 km
Tappet clearance	I & A	–	I & A	–	I & A	–	I & A	
Oil cooler fins	–	–	I & C	I & C	I & C	I & C	–	
Oil cooler pipes	–	I	I	I	I	I	–	Inspect & replace if required every 15000 km
Clutch plates	–	–	–	–	–	–	–	Inspect & replace if required every 21000 km
Engine breather hose	I	I	I	I	I	I	–	Replace every 21000 km if required
Fuel filter	–	–	–	–	–	–	–	Replace every 25000 km
Hose fuel	I	I	I	I	I	I	–	Replace every two years or 20000 km
Clutch and throttle cable play[1]	I, A & L	I, A & L	I, A & L	I, A & L	I, A & L	I, A & L	–	
Throttle grip	–	–	L	–	L	–	L	Lubricate using grease
Steering smooth operation / play[2]	I & A	–	–	–	C, L & A	–	–	C & L with fresh Bechem premium grade 3 grease every 12000 km
Front fork oil	–	–	–	–	–	–	–	Replace every 18000 km
Front and rear suspension[3]	I	I	I	I	I	I	–	
All fasteners	I & TI	I & TI	I & TI	I & TI	I & TI	I & TI	–	Tighten if necessary
Drive chain*	C, L & A	C, L & A	C, L & A	C, L & A	C, L & A	C, L & A	–	Adjust if necessary

R - Replace; I - Inspect; T - Top up; C - Clean; A - Adjust; TI - Tighten; L - Lubricate; S - Set

1 Inspect for proper operation and adjust play. Lubricate ends using grease.

2 Inspect for smooth steering rotation, steering shake / noise. Adjust the steering if necessary.

3 Inspect for smooth and proper function of front and rear suspension. Also inspect for any visual damage and oil leakage.

* Clean the drive chain with dry cloth and apply TRU SPRAY / TRU 4 oil as frequently as every 500 km for better chain life and smooth vehicle running.

Item	In free service					After free service		Remarks
Service km Period from the date of sale	1st 500-750 1 month	2nd 2500-3000 3 months	3rd 5000-6000 6 months	4th 8500-9000 9 months	5th 11500-12000 12 months	Every 3000 km	Every 6000 km	
Retainer oil seal[4]	I	I	I	R	I	I	–	Replace every 9000 km
Chain guide bottom[5]	I	I	I	R	I	I	–	Replace every 9000 km
All bulbs, horn and switches	I	I	I	I	I	I	–	Inspect for proper functioning
Head lamp beam	I & A	I & A	I & A	I & A	I & A	I & A	–	
Battery electrolyte level	I & T	I & T	I & T	I & T	I & T	I & T	–	
Specific gravity and voltage[6]	I	I	I	I	I	I	–	
Brake effectiveness	I	I	I	I	I	I	–	
Brake pedal shaft	L	L	L	L	L	L	–	Lubricate using TRU4 oil
Brake pad wear	I	I	I	I	I	I	–	Replace if necessary
Brake fluid	I & T	I & T	I & T	I & T	I & T	I & T	–	Replace every 21000 km
Brake hose	I	I	I	I	I	I	–	Replace every three years
Master cylinder cups	–	–	–	–	–	–	–	Replace every 21000 km
Wheel freeness	I	I	I	I	I	I	–	
Tyre pressure at cold condition	I & S	I & S	I & S	I & S	I & S	I & S	–	
Engine idling RPM	I & S	I & S	I & S	I & S	I & S	I & S	–	
Idling CO%[7]	I	–	–	–	–	–	–	
Ball joint gear shift lever	–	–	L	–	L	–	L	Lubricate using grease
Centre / side stand pivot	L	L	L	L	L	L	–	Lubricate using grease
Swing arm bearings	–	–	–	–	–	–	–	C & L with fresh Bechem premium grade 3 grease every two years or 12000 km whichever is earlier
Wheel balancing[7]	–	–	–	–	I	–	–	

R - Replace; I - Inspect; T - Top up; C - Clean; A - Adjust; TI - Tighten; L - Lubricate; S - Set

[4&5] Inspect at every service. Replace if found damaged. However the retainer oil seal and the chain guide bottom need to be replaced every 9000 km.

[6] Recharge if necessary.

[7] Wheel balancing to be done every 1 year or every 12000 km. In addition, after every tyre puncture repair or tyre replacement, wheel balancing to be done.

SEAT ASSEMBLIES

REMOVAL

Rear seat (passenger seat) removal

- Insert the ignition key into the seat lock (A).
- Turn it in clockwise, then pull and release the front section of the seat (1) first, followed by the rear section as shown in the figure. (Fig. 2.1)
- To reassemble the rear seat, reverse the removal procedure.

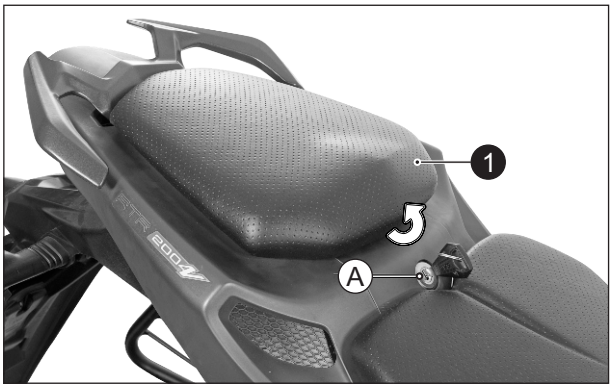


Fig. 2.1

Utility box removal

- To remove the utility box (A), remove the rear seat. (refer Fig. 2.1)
- Take out the utility box by dislocating it from the seat release cable (B). (Fig. 2.2)
- To reassemble the utility box, reverse the removal procedure.

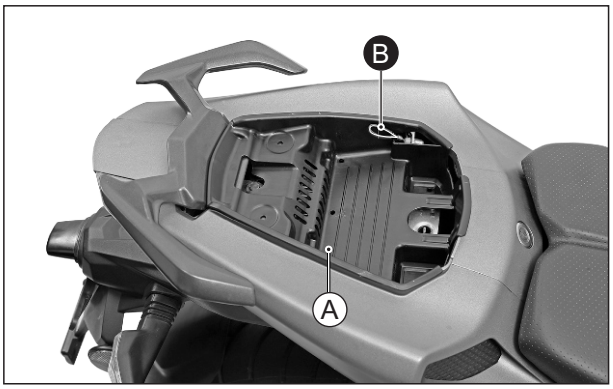


Fig. 2.2

Front seat (rider seat) removal

- To remove the front seat (2), remove the rear seat (refer Fig. 2.1) and take out the key from the lock.
- Pull the seat release cable (A) to release seat lock. Keeping the seat release cable pulled, lift the seat from rear end and slide it backward to remove. (Fig. 2.3)
- To reassemble the front seat, reverse the removal procedure.

Caution:
Make sure that the seat is locked securely in position after installation.

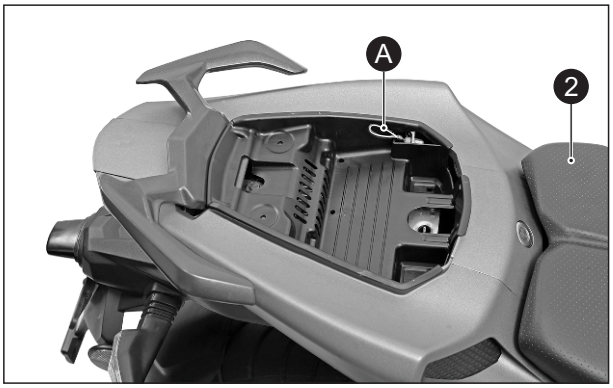


Fig. 2.3

COVER FRAME R & L

REMOVAL

- Remove the seats as explained earlier.
- Remove the CRR pan head screw (A) (M6x16 - 2 nos.) and CRR pan head screw (B) (M6x20 - 1 no.) from the cover frame R. (Fig. 2.4)

Phillips head screw driver

- Take out the cover frame R by carefully dislocating it from the lugs.
- Remove the CRR pan head screw (A) (M6x16 - 2 nos.) and CRR pan head screw (B) (M6x20 - 1 no.) from the cover frame L. (Fig. 2.5)

Phillips head screw driver

- Take out the cover frame L by carefully dislocating it from the lugs.
- To reassemble the cover frame R & L, locate the lugs of the cover frame at the holes provided on the fuel tank and install the CRR pan head screw (M6x16 - 3 nos. each side).

Phillips head screw driver

Tightening torque	3 ± 1 Nm

Caution:
Make sure that the cover frame is locked securely in position after installation.

Note:
Ensure the availability of cushions in the cover frame front lug mounting area (at fuel tank).

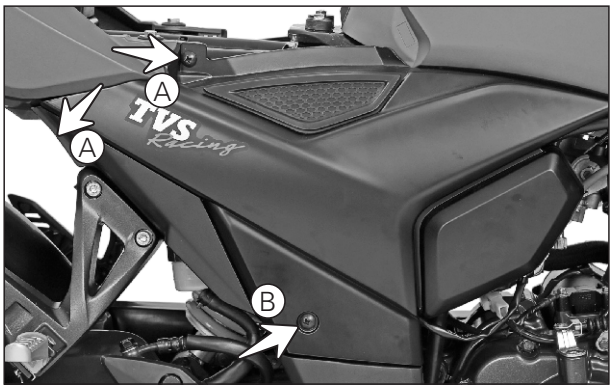


Fig. 2.4

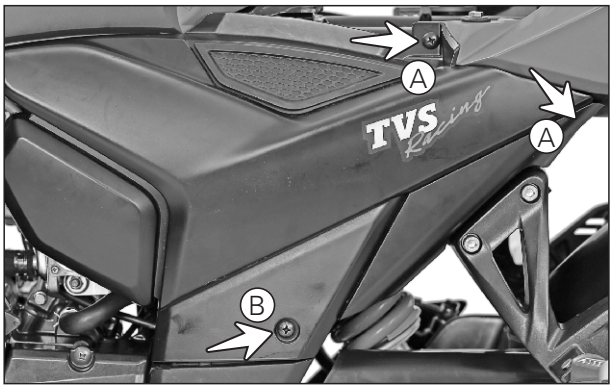


Fig. 2.5

FUEL TANK COMPLETE

REMOVAL

- Remove the seats and cover frame assembly as explained earlier.
- Press and pull the fuel hose quick coupler (Fig. 2.6A) and disconnect the fuel hose from the fuel filter. (Fig. 2.6B)

Small screw driver

- Disconnect the fuel pump module sensor coupler. (Fig. 2.7A)
- Remove the hexagonal screw (M6x30 - 2 nos.) along with plain washers from the fuel tank rear mounting. (Fig. 2.7B)

10 mm spanner

Tightening torque	7 ± 1 Nm

- Remove the cushion fuel tank rear upper (2 nos.)
- Carefully lift the rear portion of fuel tank and take out the cushion fuel tank rear lower (2 nos) from the fuel tank mounting.
- Remove fuel tank complete along with fuel pump assy and drain hose by sliding it out from both the cushion fuel tank front.

Note:
While reassembling fuel tank complete, ensure that fuel tank drain hose is routed properly as per the fitment in OE vehicle (refer fig. 2.8 & fig. 2.9).

Ensure the fitment of both lower and upper fuel tank cushions rear and proper seating of the fuel tank at cushion fuel tank front during reassembly.

While connecting the fuel module sensor, ensure the availability of water boot.

Caution:
If the drain hose is not routed properly, it will lead to water entry in the tank.

Fig. 2.6A

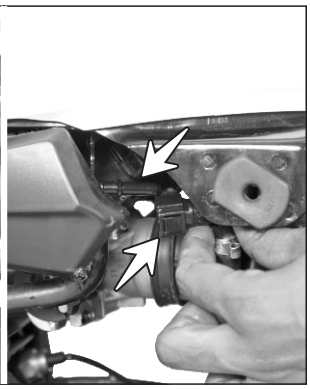


Fig. 2.6B

Fig. 2.7A

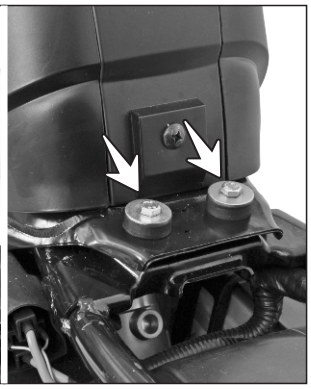


Fig. 2.7B

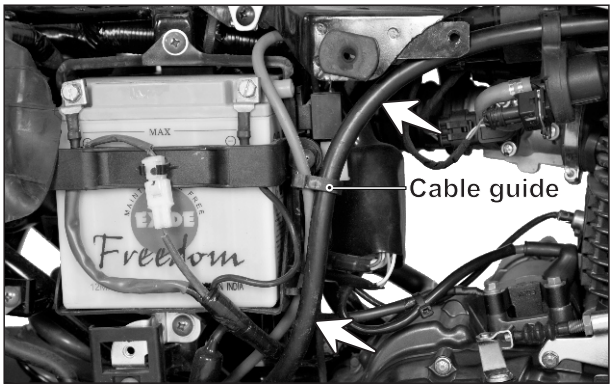


Fig. 2.8

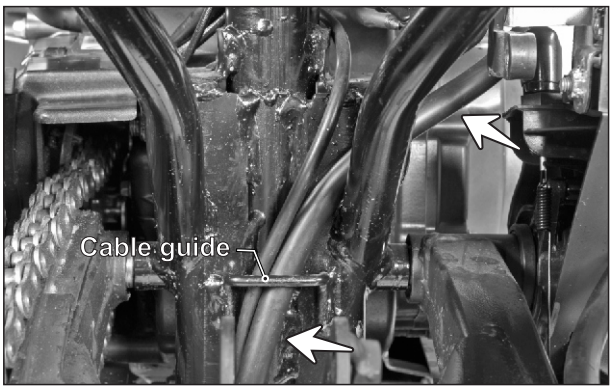


Fig. 2.9

COVER FUEL TANK ASSEMBLY

REMOVAL

- Remove the fuel tank as explained earlier.
- Remove the CRR flanged pan head tap screw (A) (ST4.2x13 - 2 nos.) from the mounting of deflector. (Fig. 2.10)

Phillips head screw driver	
Tightening torque	1.5 ± 0.5 Nm

- Similarly, remove the CRR pan head screw (B) (M6x12 - 1 no.) from the mounting of deflector with cover fuel tank. (Fig. 2.10)

Tightening torque	3 ± 1 Nm

- Take out the deflector by carefully dislocating it from the lugs.
- Remove the CRR pan head screw (M6x12 - 1 no.) from the mounting of cover fuel tank inner L with the fuel tank. (Fig. 2.11)

Phillips head screw driver	
Tightening torque	3 ± 1 Nm

- Remove the CRR pan head screw (M6x12 - 2 nos.) from the cover fuel tank front mounting. (Fig. 2.12A)
- Similarly, remove the CRR pan head screw (M6x12 - 1 no.) from the cover fuel tank rear mounting. (Fig. 2.12B)

Phillips head screw driver	
Tightening torque	3 ± 1 Nm

- Remove the CRR pan head screw (M6x12 - 2 nos.) from the cover fuel tank rear mounting. (Fig. 2.13)

Phillips head screw driver	
Tightening torque	3 ± 1 Nm

Note:
Ensure the presence of retainer clips before installing the screws during re-assembly.

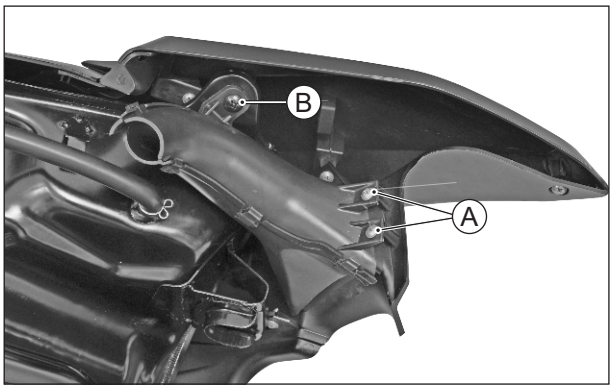


Fig. 2.10

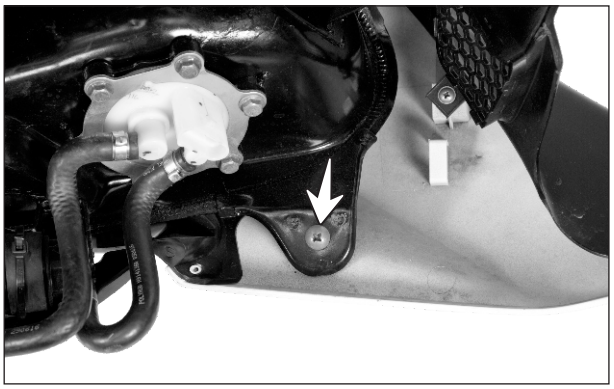


Fig. 2.11


Fig. 2.12A


Fig. 2.12B

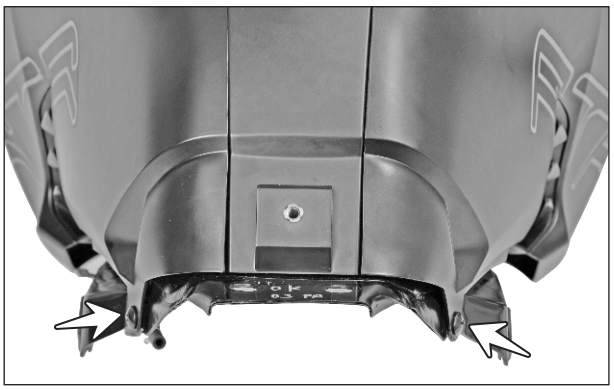


Fig. 2.13

- Remove hexagonal socket cap screw (M5x30 - 3 nos.) from the mounting of fuel tank cap assembly. (Fig. 2.14)

4 mm allen key

Tightening torque	5 ± 1 Nm

Note:
Remove only the marked screws (refer Fig. 2.14). Do not disturb the other screws as they are for aesthetic purpose only and do not require any removal.

Caution:
Do not use the screws having more than 30 mm length as it may puncture the tank and lead to fuel leakage.

- Open the fuel tank cap by using the control key. (Fig. 2.15)

- Remove the CRR pan head screw (M5x12) from the fuel tank cap inner mounting. (Fig. 2.16)

Phillips head screw driver

Tightening torque	3 ± 1 Nm

- Take out the fuel tank cap assembly along with seal fuel tank cap.

Note:
Ensure the presence of seal in the fuel cap assembly before re-installing the cap.

- Carefully dislocate and remove the cover fuel tank assembly from the fuel tank.

- Remove the CRR flanged pan head tap screw (ST4.2x13 - 3 nos.) from the mounting of cover fuel tank inner R. (Fig. 2.17)

Tightening torque	1.5 ± 0.5 Nm

- Dislocate the cover fuel tank inner R from the cover fuel tank assembly. In similar manner, remove the cover fuel tank inner L from the cover fuel tank assembly.

Note:
During reassembly, ensure the presence of clips (clip nut ST4) before installing the screws.

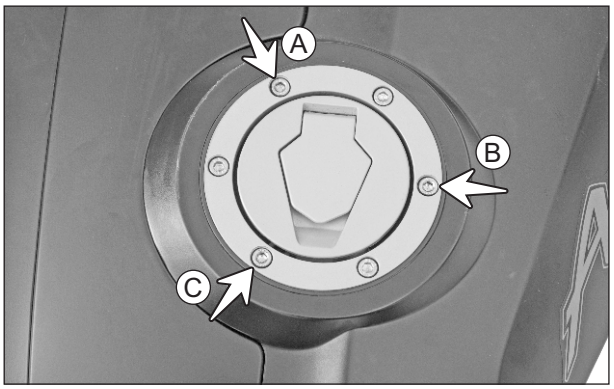


Fig. 2.14

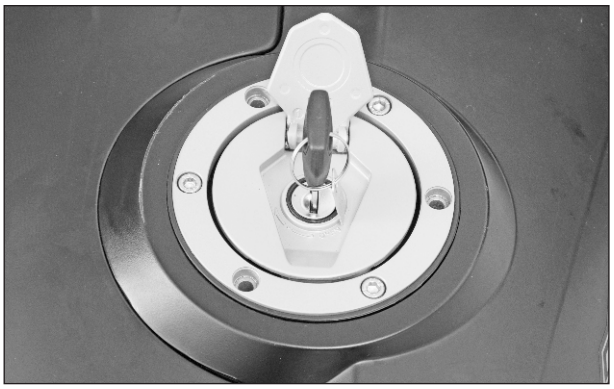


Fig. 2.15

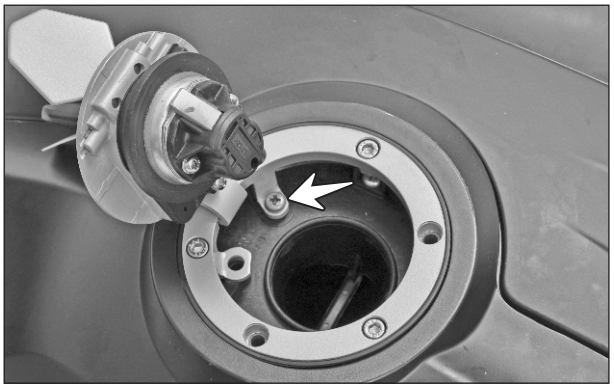


Fig. 2.16

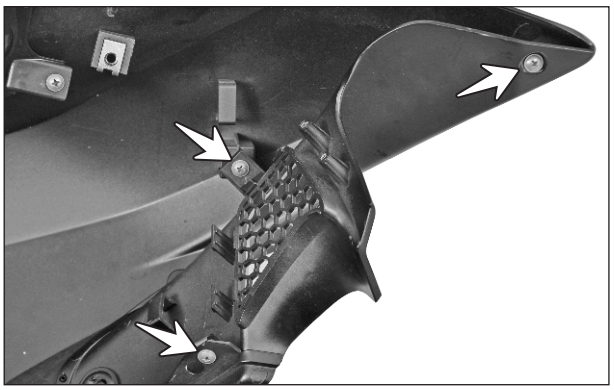


Fig. 2.17

- Remove the CRR flanged pan head tap screw (ST4.2x13 - 3 nos.) from the mounting of cover fuel tank outer R. (Fig. 2.18)

Phillips head screw driver

Tightening torque	1 ± 0.5 Nm

- Carefully dislocate and take out the cover fuel tank outer R from the cover fuel tank top.

- Remove the CRR flanged pan head tap screw (ST4.2x13 - 4 nos.) from the mounting of cover fuel tank outer L. (Fig. 2.19)

Tightening torque	1 ± 0.5 Nm

- Carefully dislocate the cover fuel tank outer L from the cover fuel tank top.

- Remove the CRR flanged pan head tap screw (ST4.2x13 - 2 nos.) from the mounting of grill cover fuel tank R. (Fig. 2.20)

Tightening torque	1 ± 0.5 Nm

- Dislocate and take out the grill cover fuel tank from the cover fuel tank outer R.

- In similar manner, remove the grill cover fuel tank L from the cover fuel tank outer L.

FUEL TANK CAP ASSEMBLY - REMOVAL

- Remove the fuel tank complete and cover fuel tank assembly from the tank as explained earlier.

- Remove the CRR pan head screw (M5x12 - 3 nos.) from the mounting of inlet fuel tank complete and take out the inlet along with the 'O' ring. (Fig. 2.21)

Phillips head screw driver

Tightening torque	4.5 ± 0.5 Nm

Caution:
Do not use the screws having more than 12 mm length as it may puncture the tank and lead to fuel leakage. Also, ensure to fix a new 'O' ring while reassembling the inlet to avoid leakages.

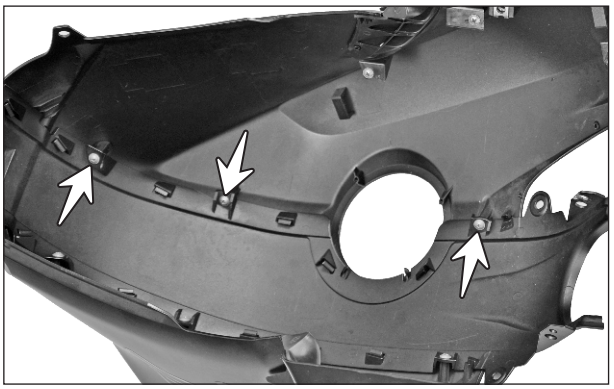


Fig. 2.18

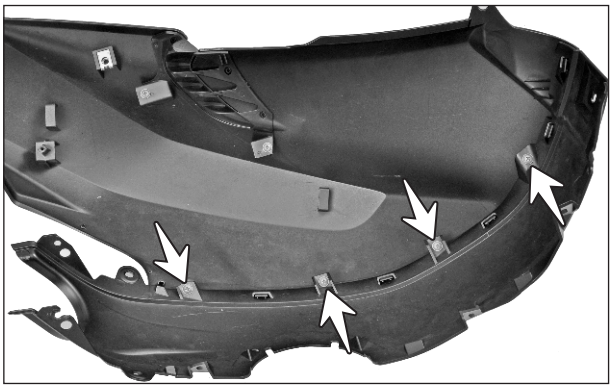


Fig. 2.19

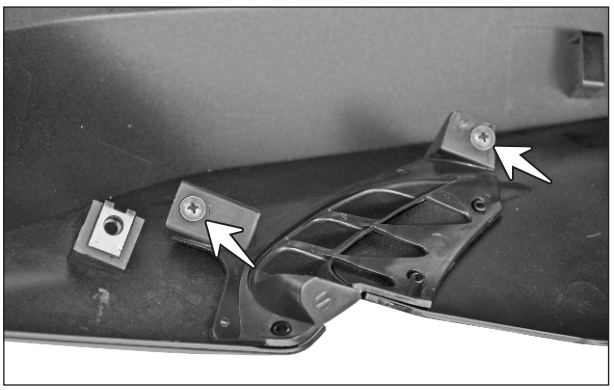


Fig. 2.20

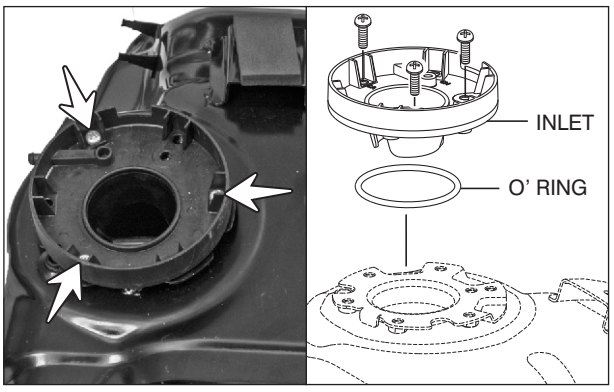


Fig. 2.21

REASSEMBLY

- For re-assembly, reverse the procedure removal. Assemble the covers separately and then assemble them as a set into the fuel tank.
- Refer exploded view for assembly details. (Fig. 2.22)

Note:
Before assembling the cover fuel tank assembly into the fuel tank. Ensure the availability of cushions at the respective places. Else it may create rattling noise.

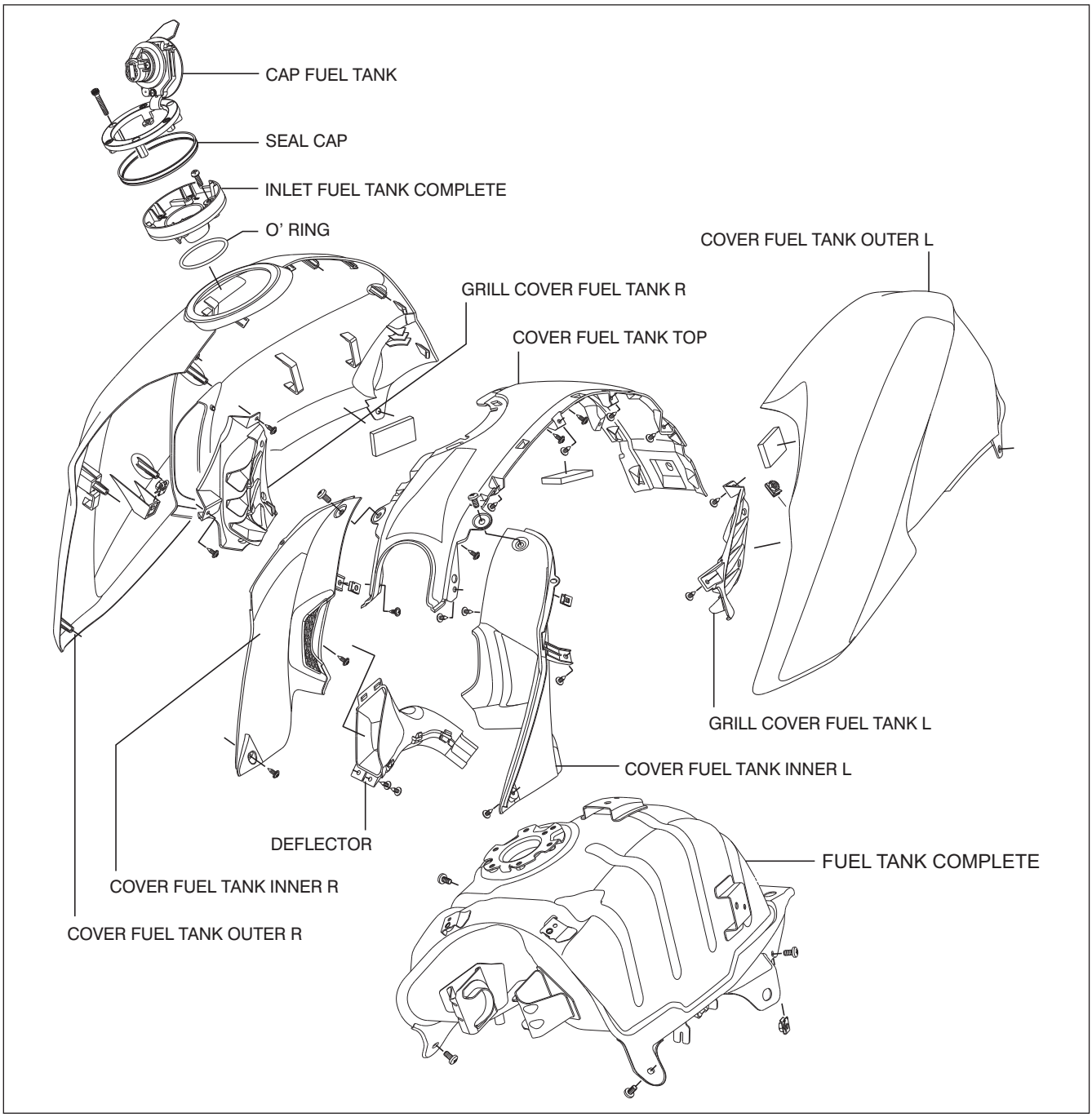


Fig. 2.22

TAIL COVER ASSEMBLY

REMOVAL

- Remove the seats and cover frame L & R as explained earlier (refer page nos. 2-3 & 2-4).
- Remove the hexagonal socket cap screw (M8x25 - 4 nos.) from the mounting of pillion handle and take out the pillion handle. (Fig. 2.23)

6 mm allen key	
Tightening torque	22 ± 2 Nm

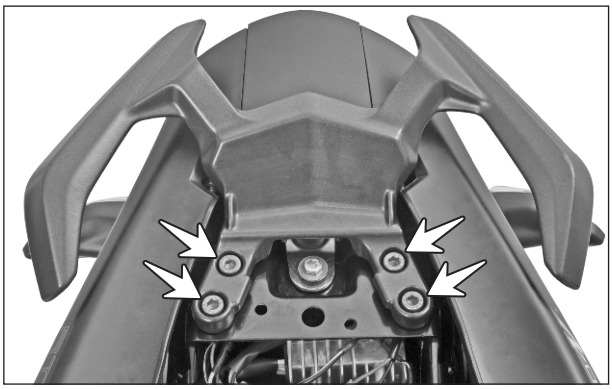


Fig. 2.23

- Disconnect the tail lamp coupler (A) from the wiring harness. (Fig. 2.24)
- Disconnect the rear seat lock cable (B) from the seat latch and release it from its locating bracket. (Fig. 2.24)
- Similarly, release the seat release cable (C) of front seat from its locating bracket. (Fig. 2.24)

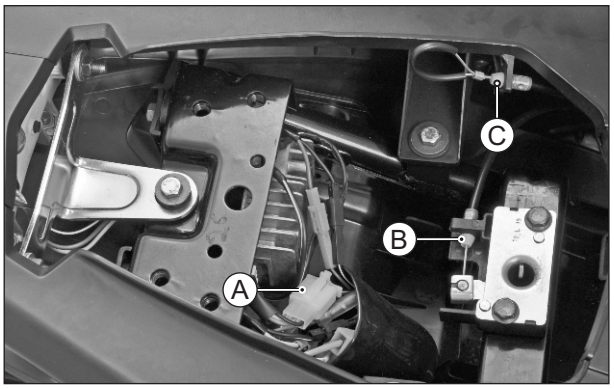


Fig. 2.24

- Remove hexagonal bolt (M6x20 - 4 nos.) along with punched washers from the mounting the tail cover assembly with the chassis. (Fig. 2.25)

10 mm spanner	
Tightening torque	6 ± 2 Nm

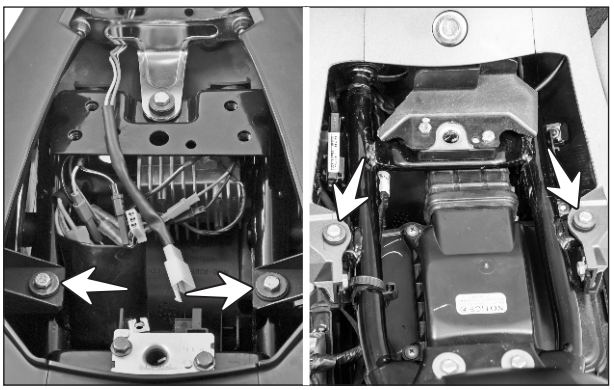


Fig. 2.25

- Remove hexagonal bolt (M6x20 - 1 no.) along with the cup washer from the mounting of tail cover assembly with the chassis. (Fig. 2.26)

10 mm spanner	
Tightening torque	6 ± 2 Nm

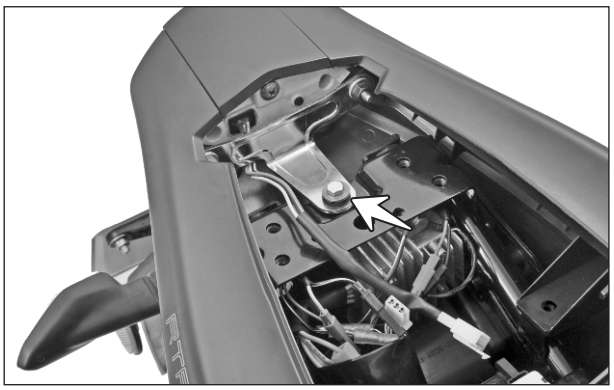


Fig. 2.26

- Remove the CRR pan head screw (M6x16) from the tail cover centre rear. (Fig. 2.27)

Phillips head screw driver

Tightening torque	3 ± 1 Nm

- Dislocate the tail cover centre rear from tail cover assembly.

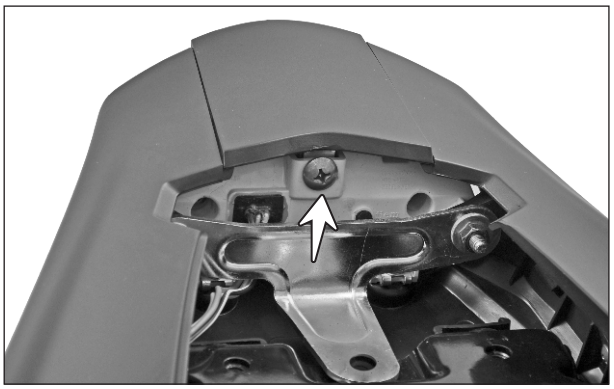


Fig. 2.27

Incase fitted with screws:

- Remove the CRR pan head screw (M6x16 - 4 nos.) from the mounting of tail cover assembly bottom. (Fig. 2.28)

Phillips head screw driver

Tightening torque	3 ± 1 Nm

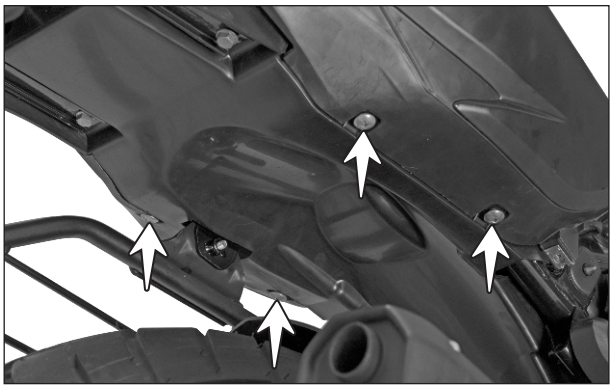


Fig. 2.28

Else:

- Loosen the screws of snap rivets and pull out all the four snap rivets from the tail cover mounting. (Fig. 2.29)
- Gently dislocate and take out the tail cover assembly from the vehicle.
- Reassemble the parts in the reverse order of removal.

Note:
Ensure the availability of cushions at the top mounting of tail cover assembly.

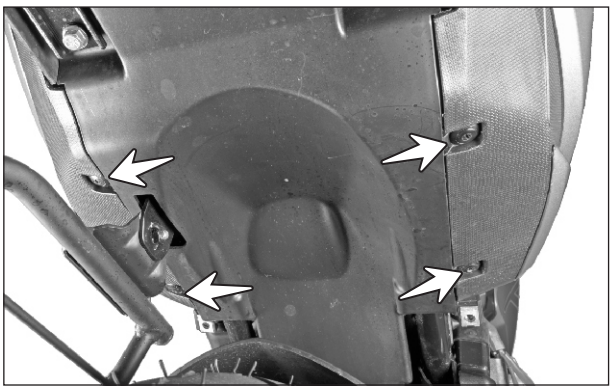


Fig. 2.29

PERIODIC MAINTENANCE AND TUNE-UP PROCEDURE

ENGINE CUM TRANSMISSION OIL

Replacement

Replace at initial 500 - 750 km and every 6000 km there after. Inspect and top-up every 3000 km.

After long period of use, the engine cum transmission oil will get contaminated and accelerates the wear of sliding and interlocking surface. Replace the engine cum transmission oil periodically by following the procedure given below:

- Place the vehicle on center stand. Using a clean cloth clean the surrounding surfaces of gauge oil level and plug complete oil drain. Start the engine and warm to normal operating temperature (oil temperature to 80° C) and switch 'OFF'.
- Remove the gauge oil level to facilitate easy draining of oil. (Fig. 2.30)
- Loosen and remove the hexagonal flange head bolts (M6x20 - 3 nos.). (Fig. 2.31)

8mm spanner	
Tightening torque	10 ± 2 Nm

- Remove the cap oil strainer along with 'O' ring and drain the engine cum transmission oil.

Oil filter (Strainer)

- Loosen the CRR pan head screw (M5x12 - 2 nos.) and remove the strainer complete engine oil along with a 'O' ring. Inspect the strainer for any damage. Replace if necessary. Otherwise clean and reassemble the parts in the revers order of removal. (Fig. 2.32)

Phillips head screw driver	
Tightening torque	8 ± 2 Nm

Note:
Check the condition of the 'O' ring and replace if required. Ensure the availability of 'O' ring in the cap during reassembly.

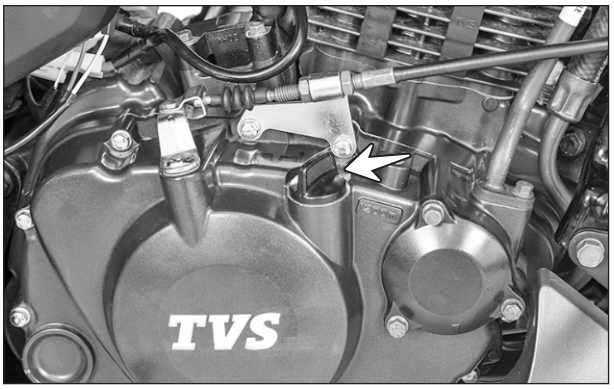


Fig. 2.30

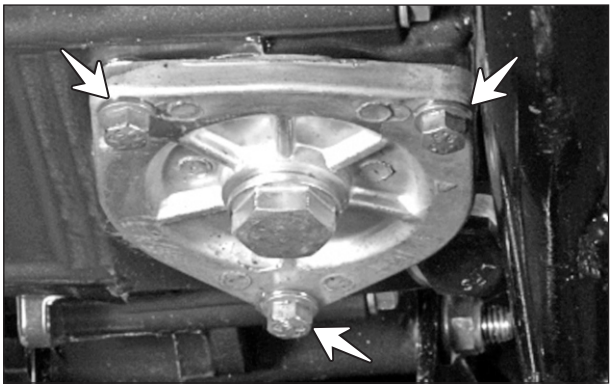


Fig. 2.31

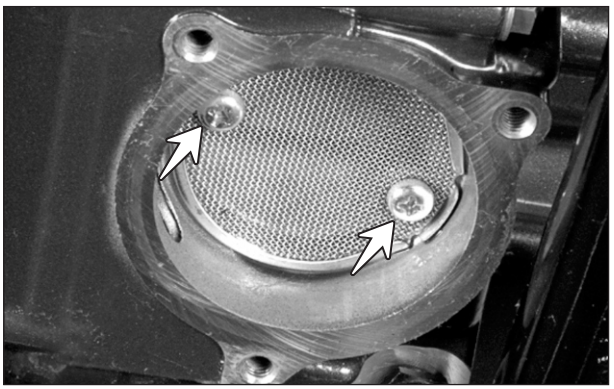


Fig. 2.32

- Fill TVS TRU4 FULLY SYNTHETIC oil (SAE 10W30 API-SL, JASO Ma2).

Capacity	1200 ml (after draining)
	1400 ml (after disassembly)

Note:
Before adding the fresh oil, replace the filter complete engine oil without fail.

- Refit gauge oil level.

Oil level check

- Ensure that the engine is in cold condition. Place the vehicle on center stand on a flat surface with front wheel touching the ground.
- Unscrew the gauge oil level and wipe it clean. Insert the gauge in its hole by threading it in completely.
- Check the oil level. The oil level should be between minimum and maximum levels. (Fig. 2.33)
- If the oil level is below the minimum level, top-up with the TVS TRU4 FULLY SYNTHETIC oil (SAE 10W30 API-SL, JASO MA2) upto the maximum level.

Note:
Check the condition of the 'O' ring (A) and replace if required. Ensure the availability of 'O' ring in the gauge during reassembly.

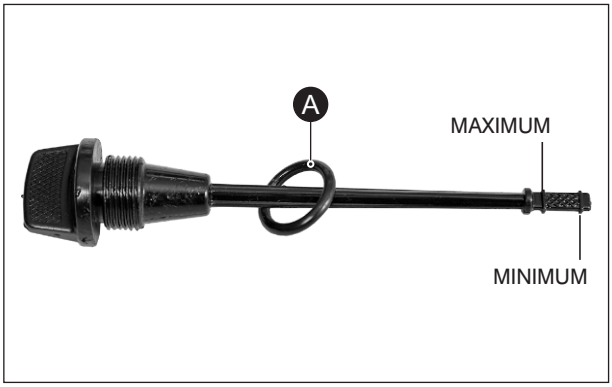


Fig. 2.33

FILTER COMPLETE ENGINE OIL

Replace at initial 500 - 750 km and every 6000 km there after.

- Before removing the filter complete engine oil, drain the engine cum transmission oil as per the guidelines mentioned above.
- Loosen and remove the hexagonal flange bolts (M6x16 - 2 nos. and M6x75 - 1 no.). (Fig. 2.34)

8 mm spanner

Tightening torque	10 ± 2 Nm

- Remove the cap oil filter along with the 'O' ring and spring oil filter cap.

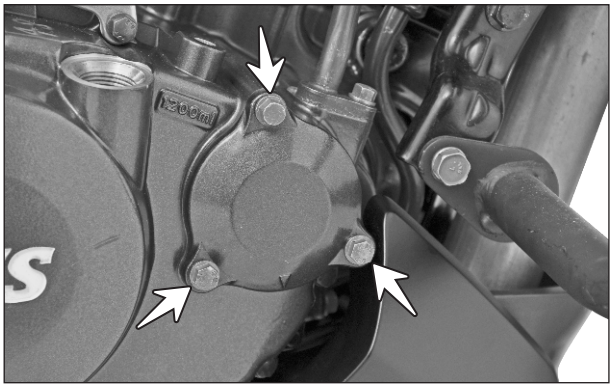


Fig. 2.34

- Remove the filter complete engine oil and 'O' ring (A). (Fig. 2.35)

Note:
Keep an oil bowl while opening the cap oil filter to collect the left over oil.

While reassembling, ensure to assemble the 'O' rings (A & C) and spring oil filter (B). (Fig. 2.36)

Locate the seal end (1) of the filter towards crankshaft. (Fig. 2.36)

Whenever the filter complete engine oil is replaced, it is recommended to replace the engine cum transmission oil along with it.

- Reassemble the parts in the reverse order of dismantling.

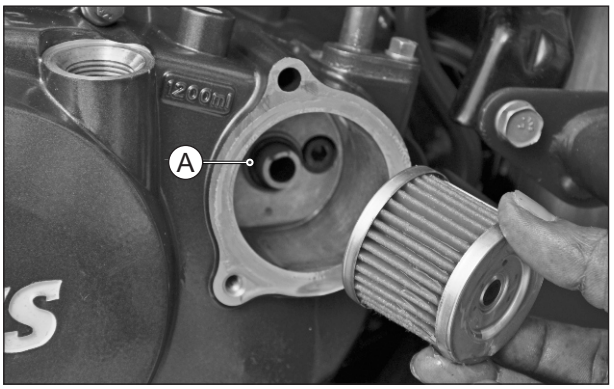


Fig. 2.35

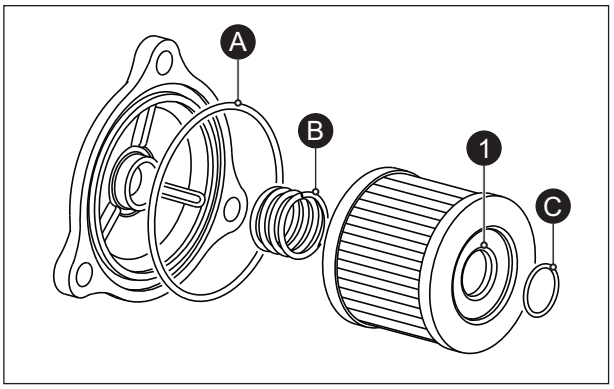


Fig. 2.36

SPARK PLUG

- Check the type of the spark plug.

Inspect and clean at initial 500 - 750 km. Replace spark plug every 12000 km.

- Neglecting the spark plug leads to difficulty in starting and poor performance.
- Before removing the spark plug, clean the spark plug surroundings to prevent any foreign materials from falling inside the cylinder bore.
- Disconnect the sparkplug cap and remove the spark plug. (Fig. 2.37)

Plug spanner

- Carbon deposits on the spark plug electrodes prevents good sparking and causes misfiring. Clean the deposits by blasting sand and compressed air using a spark plug cleaning machine as explained below:
- Ensure the air and power supply to the spark plug machine is on.

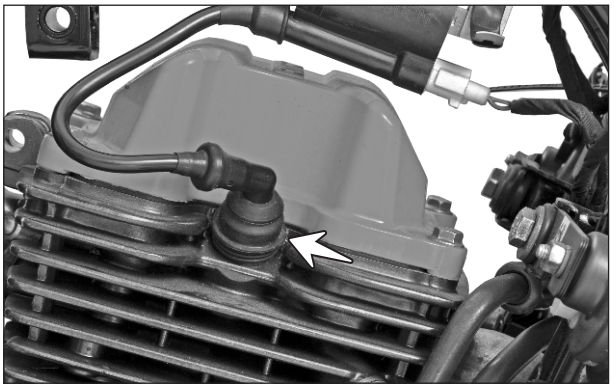


Fig. 2.37

- Fix the spark plug into the machine as shown in the figure. (Fig. 2.38)
- Blast the sand (abrasive) by pulling the lever (A) towards sand blasting mode while rotating the spark plug. (Fig. 2.38)
- Now, blow the air by pushing the lever (A) towards air blasting mode. This will remove any sand material stuck into the plug. (Fig. 2.38)
- Remove the plug from the machine and once again confirm cleanliness of the plug.

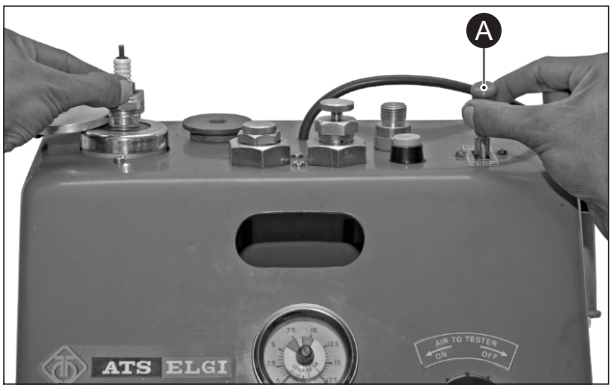


Fig. 2.38

Caution:
Do not use flared steel cables to clean the spark plug as it may spoil the spark plug's electrodes.

- Check the spark plug for wear of central (A) and ground electrode (B). If either of them are worn-out replace the spark plug with a new one. (Fig. 2.39)

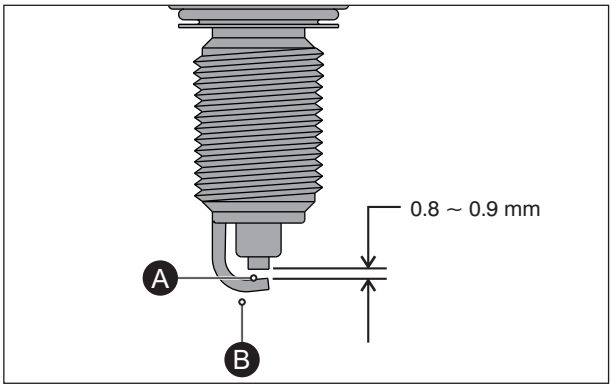


Fig. 2.39

Caution:
Use only the recommended make and type of spark plug for the good performance of the engine. Do not use spark plug that fallen from the hand/carton box (internally they may have crack and the profile may change).

Sparkplug	BOSCH UR4KE

- Visually inspect the spark plug gap. If the gap is found more, replace the plug with a new.

Spark plug gap	0.8 ~ 0.9 mm

Caution:
Since hook profile spark plug is used, do not try to adjust the gap as it may affects the profile.

- Check the spark plug for correct spark performance in the spark plug tester as instructed below:
- Rotate the plug gap setting knob (A) and match the plug gap reading (0.7 mm) with the red line (B) marked in the pressure gauge. (Fig. 2.40A)
- Fix the spark plug in the machine as shown(at plug testing socket) and connect the HT card of the machine to the plug. (Fig. 2.40B)

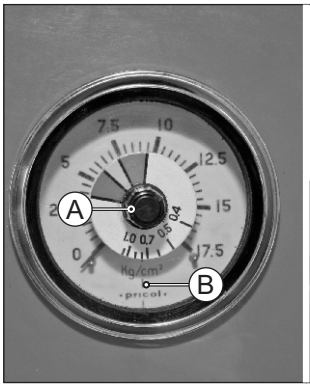


Fig. 2.40A

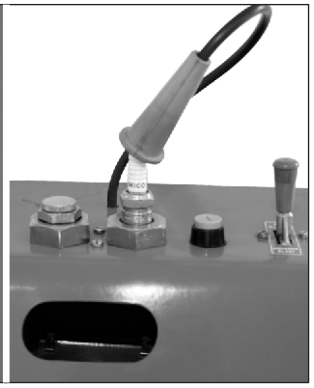


Fig. 2.40B

- Open the air control knob (A) and adjust the air pressure of the tester in such way that the pressure gauge needle is lying either in yellow band or in green band. (Fig. 2.41)

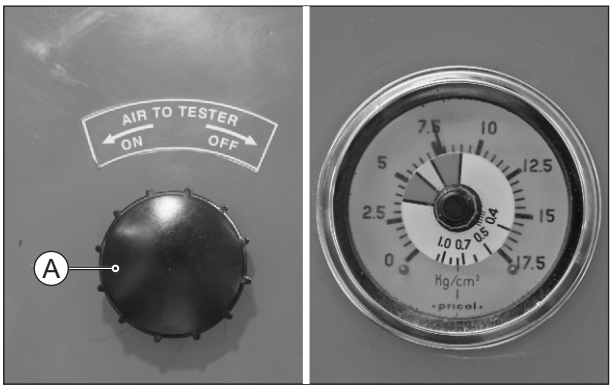


Fig. 2.41

- Now, press the spark testing button of the machine and look for strong, blue continuous spark through the window (A) of the machine. (Fig. 2.42)

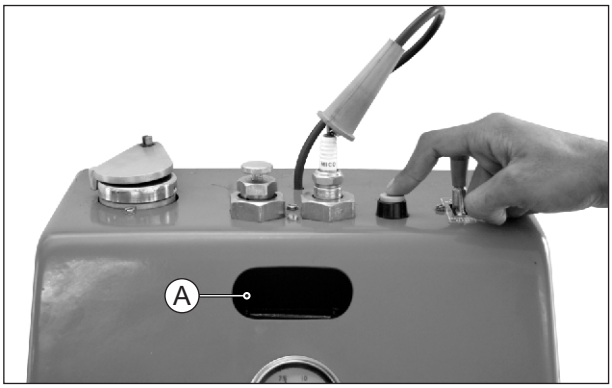


Fig. 2.42

- After confirming the performance, fix the spark plug back and connect the HT card.

Caution:
Do not over tighten or cross thread the spark plug to avoid the cylinder head threads damage.

It is advised to tighten the spark plug by hand till the end and then tighten using the right sized spark plug spanner. (Tightening torque : 10 ~ 15 Nm)

AIR CLEANER ELEMENT

Replace cleaner element every 12000 km.

Note:
Replace the air cleaner element (filter holder complete) early if it is clogged with excessive dirt (based on the usage and environment) or found with any damage. Cleaning the air cleaner element with solvent / other chemicals can damage the element and consequently reduces the life of engine parts.

- Check and replace the air cleaner element in the following manner:
- Remove the seats as explained earlier.
- Disconnect the tube inlet from the cover filter element. (Fig. 2.43)

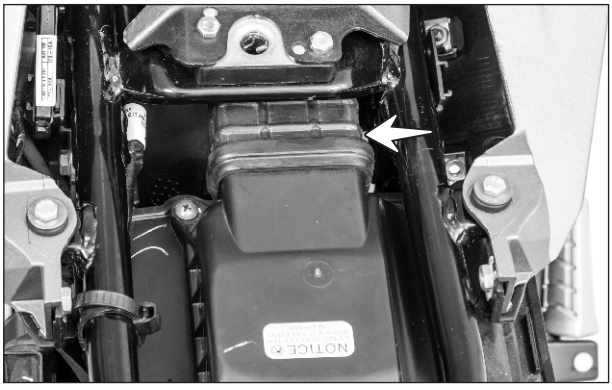


Fig. 2.43

- Remove the CRR pan head screw (M5x16 - 4 nos.) from the cover filter element. (Fig. 2.44)

Phillips head screw driver

Tightening torque	2 ± 0.2 Nm

- Take out the cover filter element from the case air cleaner complete.

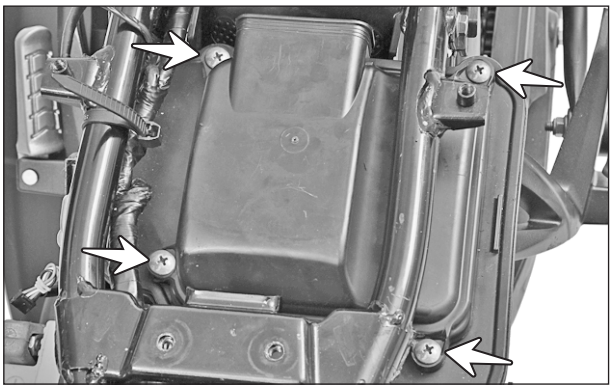


Fig. 2.44

- Remove and inspect the air cleaner element for any blockage / abnormality. Replace the element if any block or damage is found. (Fig. 2.45)

Caution:
Do not wash or clean the air cleaner element. It needs only replacement. However the air cleaner element must be replaced at every 12000 km.

Note:
While removing / reassembling the air cleaner element do not hold the paper element portion. Hold only at the sides.

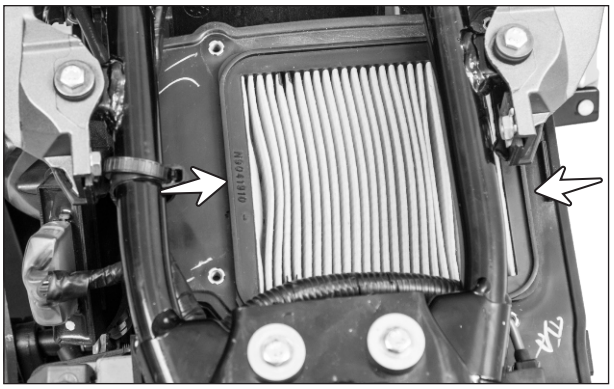


Fig. 2.45

- Inspect and ensure that the cover air cleaner and case air cleaner assembly is clear from any dust, dirt and foreign particles. (Fig. 2.46)

- Before reassembling the air cleaner element, clean the case air cleaner and cover air cleaner using a cloth and cleaning solvent.

Note:
Before reassembling the cover, ensure the availability and the intactness of seal cleaner (A & B) in both cover and the case.

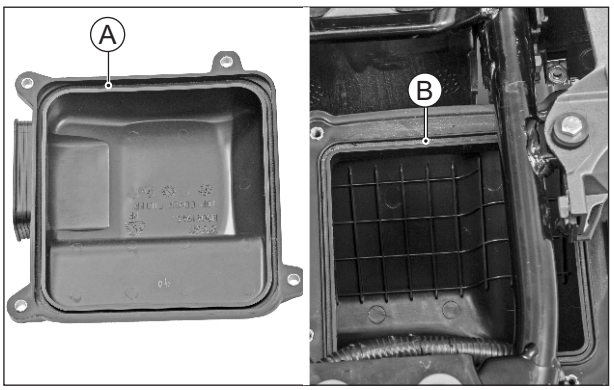


Fig. 2.46

- Reassemble the parts in the reverse order of removal while ensuring the following:

  - Use only hands to assemble paper filter. Do not use any tool. Ensure that the hands are free from oil and dust.

  - Position the air filter snugly and correctly in the case air cleaner so that no incoming air will by pass it. Remember rapid wear of valves guide valves valve oil seals piston, piston rings and cylinder is often caused by a defective or incorrectly fitted air filter.

- Assemble the tube inlet snugly and correctly.

FUEL FILTER

Replace every 20000 km or two years.

- Cut all the fuel hose clips(4nos.). (Fig. 2.47)

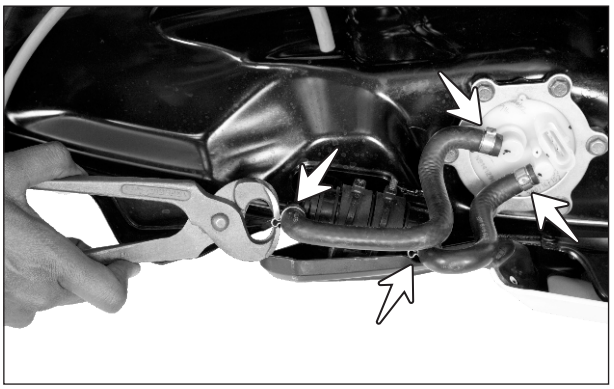


Fig. 2.47

- Disconnect all the fuel hoses(2nos.). (Fig. 2.48)

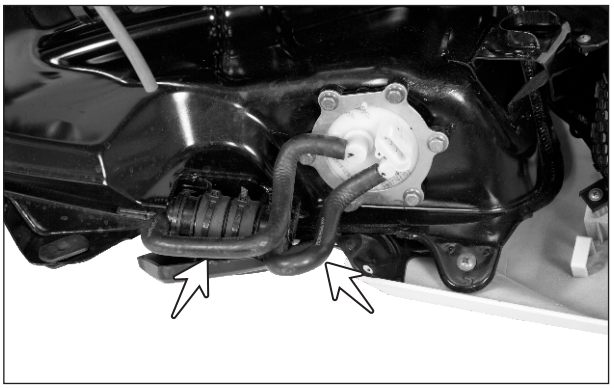


Fig. 2.48

- Cut the fuel filter strap(2nos.) from the fuel filter mounting. (Fig. 2.49)

Note:
While reassembling the fuel filter, use new cable straps and reconnecting the new fuel hose, use new hose clip.

Fig. 2.49

TAPPET CLEARANCE

Inspect and adjust at initial 500 - 750 km and every 6000 km there after.

- For inspecting and adjusting the tappet clearance, fuel tank assembly need to be removed. Refer page no. 2-5 for fuel tank removal procedure.

- Disconnect HT card and remove the sparkplug. (Fig. 2.50)

Plug spanner

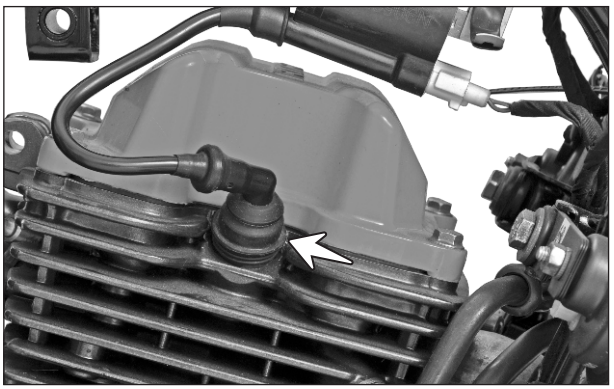


Fig. 2.50

- Remove the hexagonal flange bolt (M6x20 - 2 nos.) mounting the ignition coil assembly with the frame. (Fig. 2.51)

10 mm spanner	
Tightening torque	5.5 ± 1 Nm

- Dislocate and take out the ignition coil assembly from the frame.

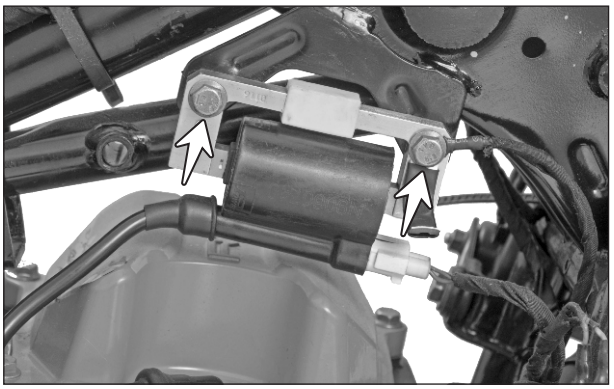


Fig. 2.51

- Remove the hexagonal bolt (M6x25 - 4 nos.) from the mounting of cover cylinder head. (Fig. 2.52)

10 mm spanner	
Tightening torque	10 ± 2 Nm

- Dislocate the cover cylinder from the left hand side of the vehicle as shown in the figure.

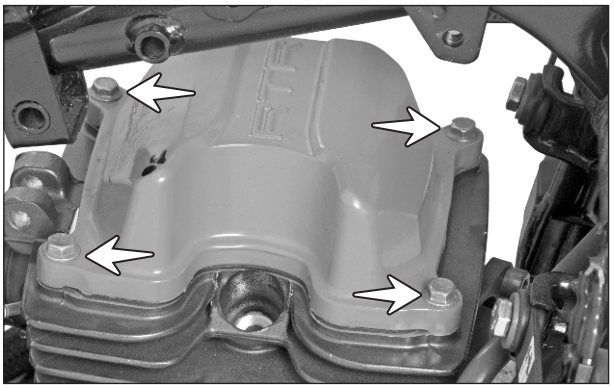


Fig. 2.52

- Remove plug TDC (A) along with the gasket. (Fig. 2.53)

17 mm spanner	
Tightening torque	27.5 ± 2.5 Nm

- Remove plug crankshaft hole (B). (Fig. 2.50)

10 mm allen key	
Tightening torque	10 ± 2 Nm

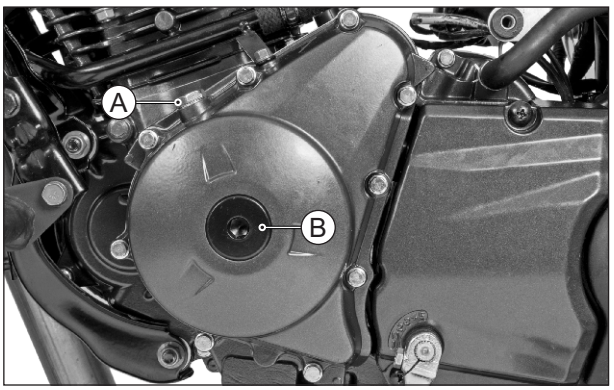


Fig. 2.53

- Align the TDC mark (A) on rotor assembly with centre of the inspection hole provided in the cover magneto by rotating the rotor assembly. (Fig. 2.54)

17 mm tubular spanner

Note:
At this point both the rocker arm should have free play. Otherwise rotate the rotor assembly one more complete round and align the mark again.

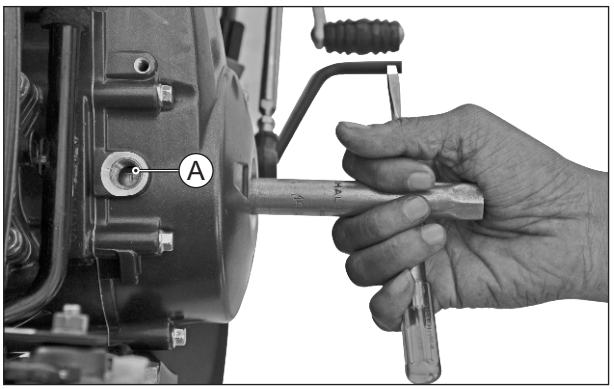


Fig. 2.54

- Check the valve clearance when the engine is in cold condition. (Fig. 2.55)

Feeler gauge

Valve	Standard
Inlet valve	0.06 mm
Exhaust	0.06 mm

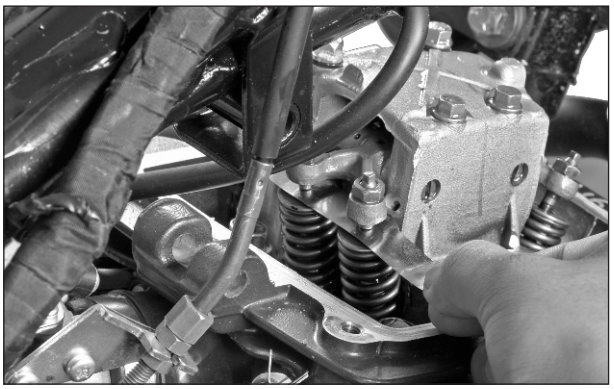


Fig. 2.55

- If the clearance measured is not within the specified limit, loosen the nut tappet adjusting. (Fig. 2.56)

9 mm spanner

- Adjust valve clearance using a special tool.

M13 100 70	Tool, tappet adjuster

Feeler gauge

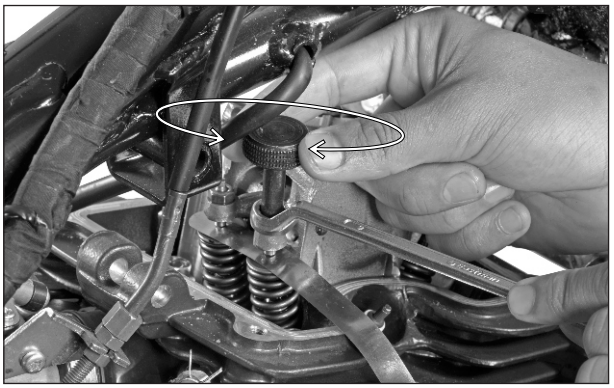


Fig. 2.56

- After adjusting to the specified clearance, tighten the nut tappet adjusting, while holding the screw tappet adjusting in the same position using special tool. (Fig. 2.57)

M13 100 70	Tool, tappet adjuster

Feeler gauge

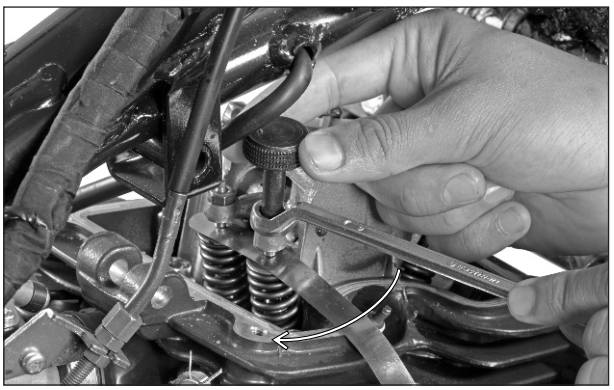


Fig. 2.57

- Reassemble the parts in the reverse order of removal.

ENGINE OIL COOLER ASSEMBLY

Removal

- Remove the hexagonal flange bolt (M6x20 - 1 no.) mounting the pipe complete outlet with the cover clutch assembly. (Fig. 2.58A)

- Remove the hexagonal flange bolts (M6x16 - 2 nos.) mounting the pipe complete outlet with the oil cooler assembly. Dislocate and take out the pipe complete outlet. (Fig. 2.58B)

8 mm spanner

Tightening torque	10 ± 2 Nm

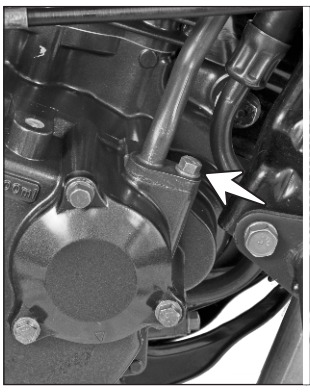


Fig. 2.58A

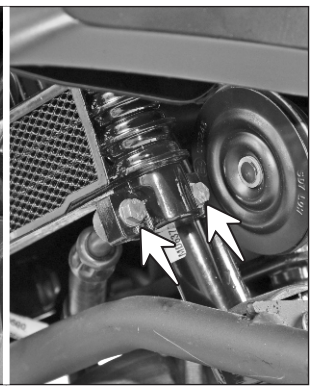


Fig. 2.58B

- Remove the hexagonal flange bolt (M6x20 - 1 no.) mounting the pipe complete inlet with the crankcase assembly R. (Fig. 2.59A)

- Remove the hexagonal flange bolts (M6x16 - 2 nos.) mounting the pipe complete inlet with the oil cooler assembly. Dislocate and take out the pipe complete inlet. (Fig. 2.59B)

8 mm spanner	
Tightening torque	10 ± 2 Nm

Fig. 2.59A Fig. 2.59B

- Remove the hexagonal flange bolts (M6x25 - 2 nos.) from the oil cooler assembly mounting and take out the oil cooler assembly. (Fig. 2.60)

10 mm spanner	
Tightening torque	10 ± 2 Nm

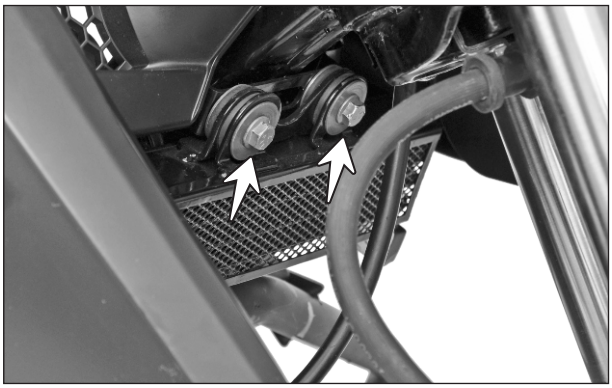


Fig. 2.60

Oil cooler assembly fins

Inspect and clean at 6000 km first and every 3000 km thereafter.

- Gently dislocate the guard oil cooler along with cup washers from the oil cooler assembly. (Fig. 2.61)

- Visually inspect the oil cooler fins for any blockage.

- If found any, clean them using a small blend tool and compressed air.

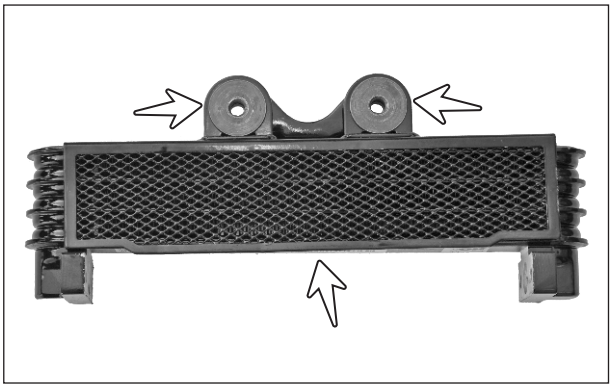


Fig. 2.61

Caution:
Care should be taken not to damage the fins while cleaning with the tool and compressed air.

- Inspect the oil cooler fins (A) for any deformation. If it so, straighten them with a thin, flat head screw driver. (Fig. 2.62)

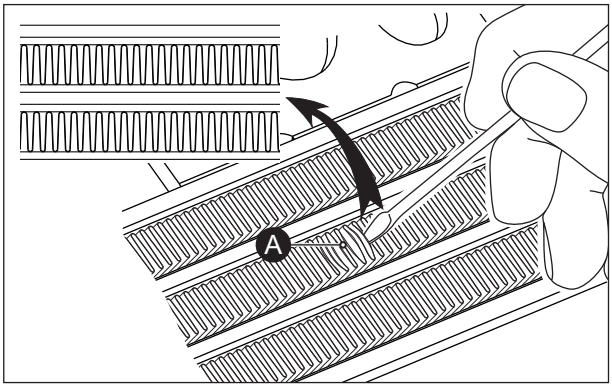


Fig. 2.62

Note:
If the air passages of the cooler assembly are blocked more than 20% by unremovable objects or if the fins of the cooler are un-repairable, replace the cooler assembly with a new one.

Oil cooler assembly pipes

Inspect at every 3000 km. Replace every 15000 km if required.

- Visually inspect the cooler assembly inlet and outlet pipes for any crack, leakage, damage or deformation. (Fig. 2.63)
- If found any replace the oil cooler pipes with a new one.

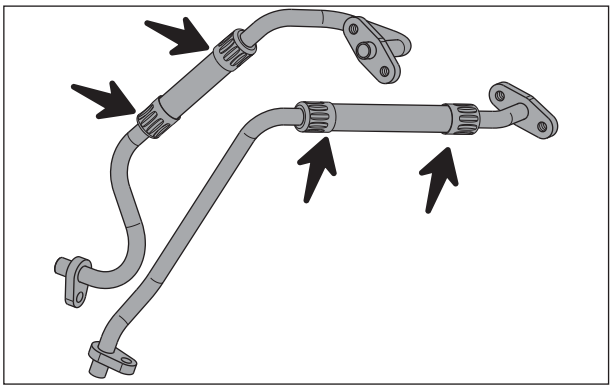


Fig. 2.63

Re-assembly

- Reassemble the parts in the reverse order of removal. Refer exploded view for details. (Fig. 2.64)

Note:
Ensure to assemble the 'O' rings at both inlet and outlet pipes ends.

Ensure the availability of grommet and cup washers at the mounting area of oil cooler assembly.

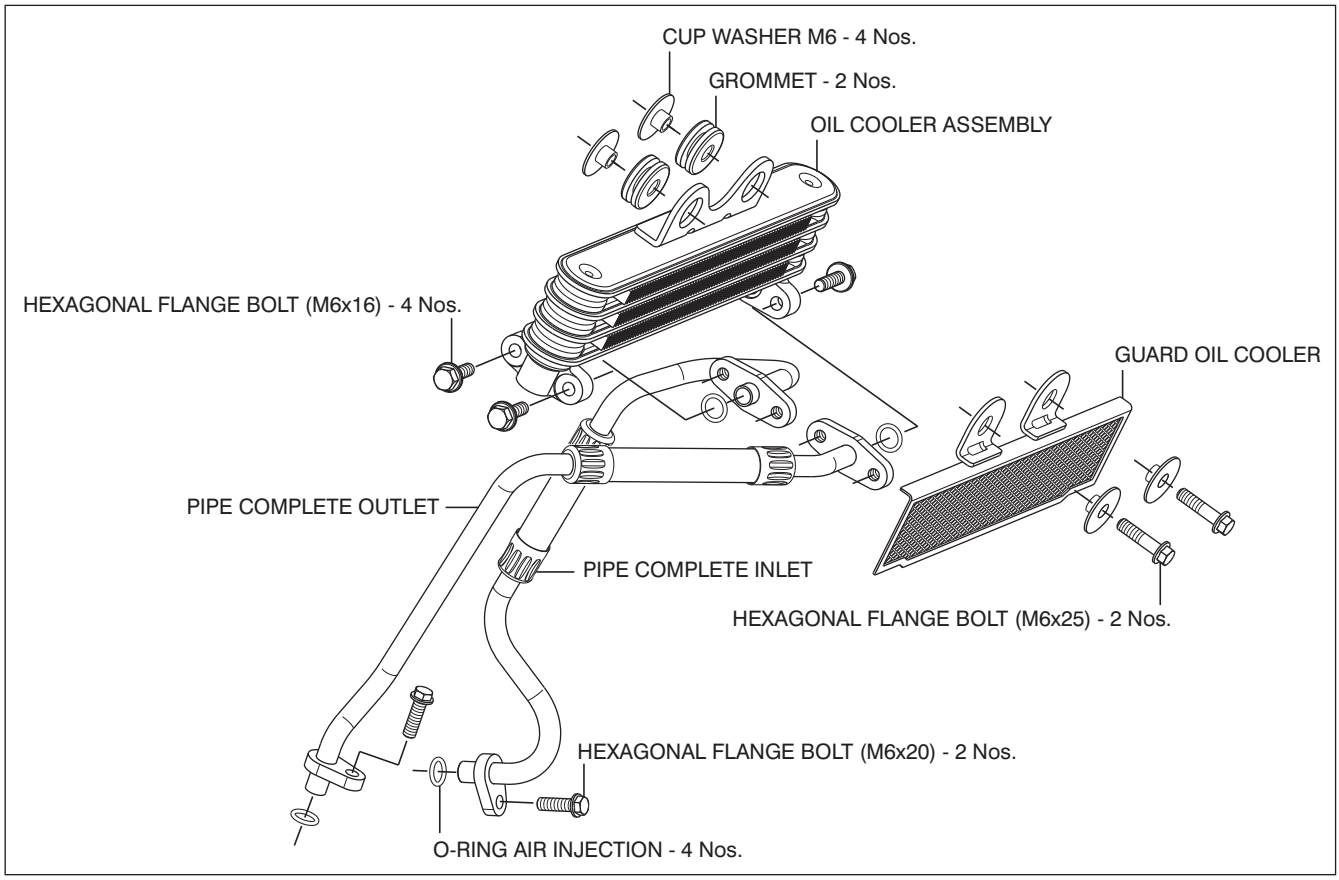


Fig. 2.64

CLUTCH PLATES (Plate clutch drive & driven)

Inspect the plate clutch drive and driven at every 21000 km. Replace if required.

- Normally clutch is serviced for:
  - Loss of power / low pick-up
  - Jerking of vehicle
  - Any abnormal noise from clutch

- But as a precaution measure the clutch drive and driven plates must be inspected and if required replaced at every 21000 km for the better performance of the vehicle. (Fig. 2.65)

- Refer chapter "Servicing of engine" page no. 3-2 for clutch removal and servicing procedure.

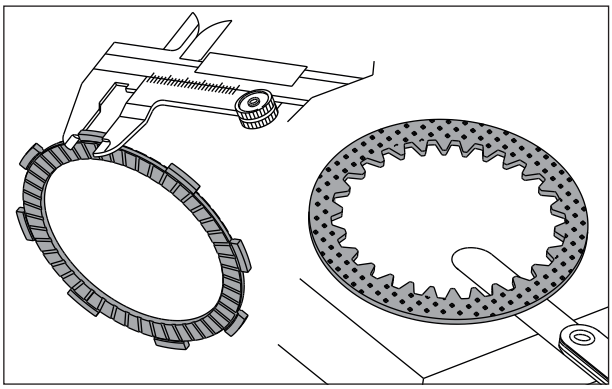


Fig. 2.65

ENGINE BREATHER HOSE

Inspect at every service. Replace every 21000 km if required.

- Visually inspect the engine breather hose for any crack, leakage, damage or deformation. If found any, replace the engine breather hose. (Fig. 2.66)

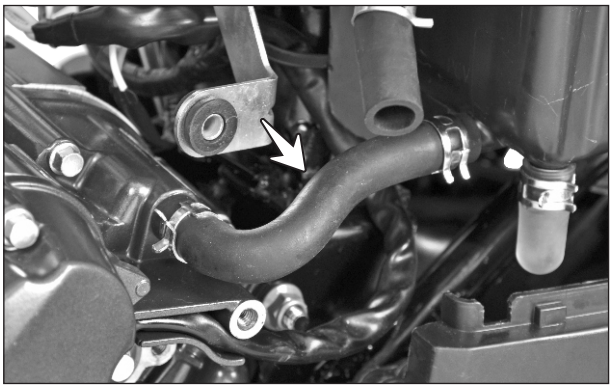


Fig. 2.66

THROTTLE BODY RUBBER DUCTS (Pipe intake complete and Tube outlet)

Inspect at every 3000 km. Replace every 21000 km if required.

- Visually inspect the pipe intake complete and air cleaner tube outlet for any crack, leakage, damage or deformation. (Fig. 2.67)

- If found any, replace the pipe intake complete and air cleaner tube outlet.

Note:
Tube outlet cannot be replaced separately. If any damage is found, replace the air cleaner assembly as a whole.

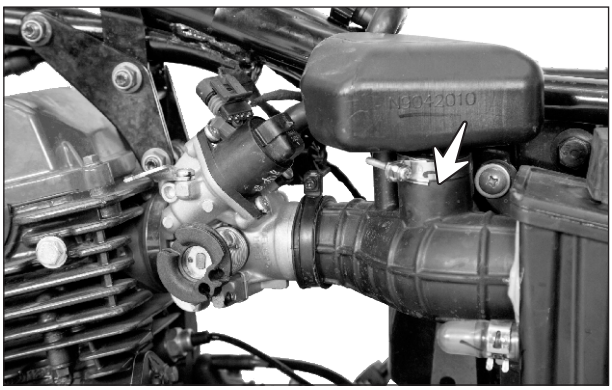


Fig. 2.67

HOSE FUEL

Replace every 20000 km.

- Inspect the fuel hoses and connections for damage and leakage. (Fig. 2.68)

- If any abnormality is found replace the hose fuel. However fuel hose must be replaced every 20000 km.

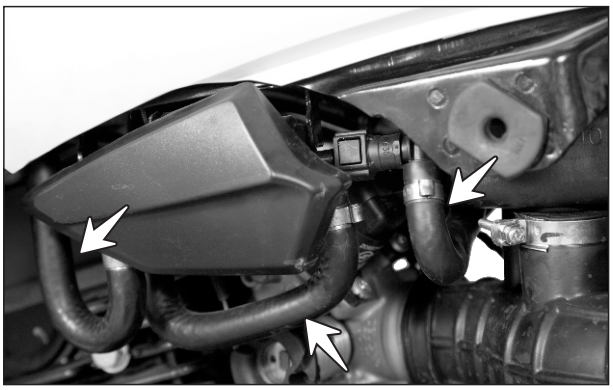


Fig. 2.68

CABLE ASSEMBLY CLUTCH - FREE PLAY

Inspect, adjust and lubricate ends with grease at initial 500 - 750 km and every 3000 km there after

- Cable assembly clutch free play is one of the most important adjustments, which may need to check regularly for better life of the clutch plates.

- Measure the free play at the lever assembly clutch end as shown in the figure, before the clutch begins to disengage. (Fig. 2.69)

Free play	8 ~ 13 mm

- If the play is more or less, loosen the lock nut (A) and turn the adjusting nut (B) 'in' or 'out' until the specified play is obtained. And then tighten the lock nut (A), while holding the adjusting nut (B) in the same position. (Fig. 2.70)

12 mm spanner

Note:
Adjust the clutch play when the engine is in cold condition

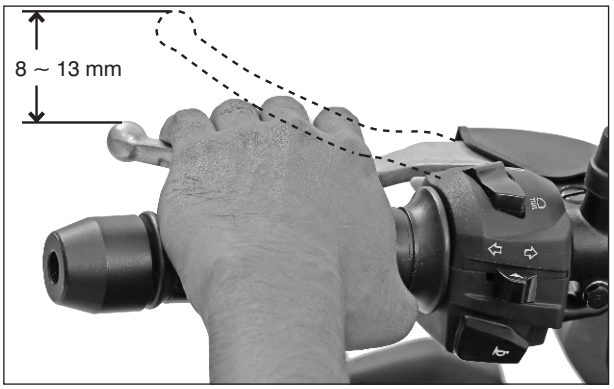


Fig. 2.69

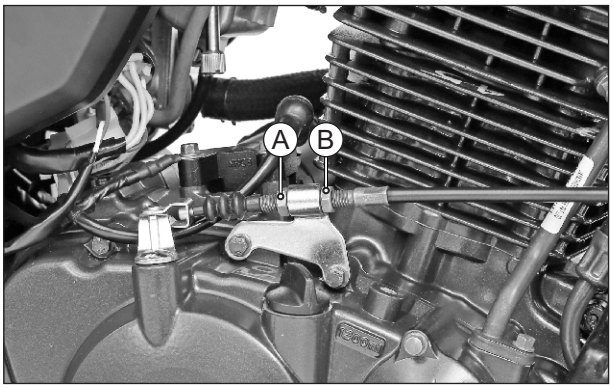


Fig. 2.70

CABLE ASSEMBLY THROTTLE - FREE PLAY

Inspect, adjust and lubricate ends with grease at initial 500 - 750 km and every 3000 km there after

- For checking the cable assembly throttle (throttle cable) free play, first dislocate the boot throttle (A) from its position. (Fig. 2.71)

- Gently pull the throttle cable while holding the adjuster (A) to check the free play. (Fig. 2.72) If the free play is more or less adjust as follow:

Free play	1 ~ 2 mm

- Loosen the lock nut (B) and turn the adjuster (A) 'in' or 'out' until the specified play is obtained.

10 mm / 8 mm spanner

- Tighten the lock nut (B) while holding the adjuster (A) in place.

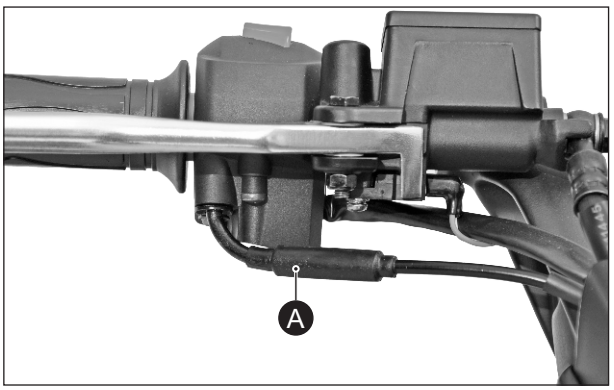


Fig. 2.71

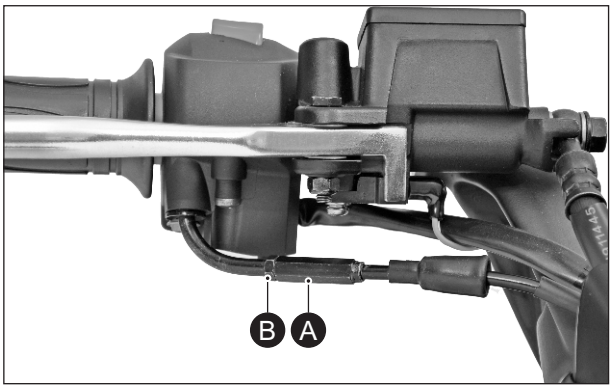


Fig. 2.72

- After adjusting, start the vehicle, let the engine run in idle, turn the handle bar to extreme right, left and check whether idling rpm varies. If it varies check the routing of throttle cable and if required correct it. Readjust the free play once again.

- The throttle cable also can be adjusted at the throttle body end. Follow the procedure to adjust the play.

- Measure the throttle cable free play as explained earlier.

- If the measured free play is more or less, loosen the lock nut (A) and turn the adjuster nut (B) 'in' or 'out' until the specified play is obtained. And then tighten the lock nut (A), while holding the cable adjuster (C). (Fig. 2.73)

10 mm spanner

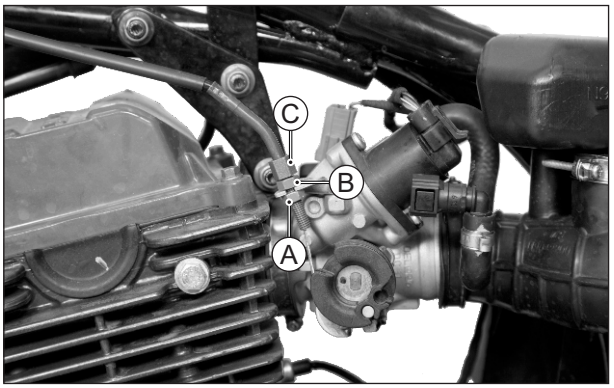


Fig. 2.73

THROTTLE GRIP

Lubricate with grease every 6000 km.

- Inspect throttle grip for smooth rotation. If found hard remove and lubricate as explained below:

- Remove the throttle cable locking screw from throttle case lower. (Fig. 2.74)

Phillips head screw driver

Tightening torque	2.25 ± 0.25 Nm

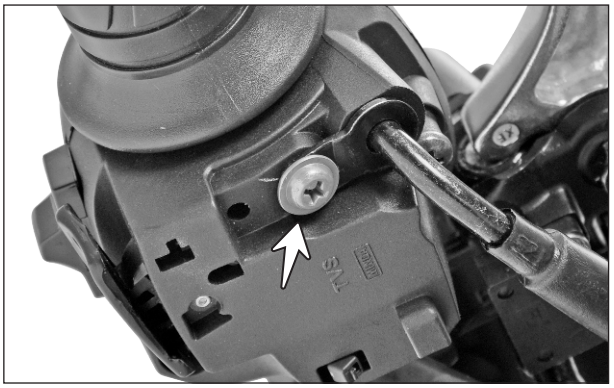


Fig. 2.74

- Remove the CRR pan head screws (M5x30 2 nos.) from the throttle case upper and lower mounting. (Fig. 2.75)

Phillips head screw driver

Tightening torque	1.75 ± 0.25 Nm

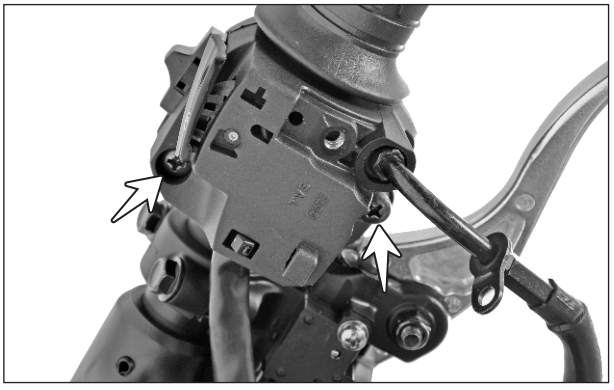


Fig. 2.75

- Gently dislocate the throttle case upper and lower. Disconnect the throttle cable from grip complete throttle.

- Clean the dust and grease from both the cases and grip. Apply fresh grease.

- Reconnect the throttle cable to the grip and reassemble the parts in the reverse order of removal.

Note:
After assembling the cases, ensure the proper locking of throttle cable with throttle case lower. Also check the free play of throttle cable. If found more, adjust as explained in page no. 2-26.

STEERING PLAY AND FREENESS

Inspect at initial 500 - 750 km. Adjust if necessary. Clean and lubricate the steering with Bechem premium grade 3 grease every 12000 km.

- Steering should be adjust correctly for smooth movement of handle bar and safe riding. Stiff steering prevents smooth movement of handle bar resulting in poor directional stability. Too loose steering will cause vibration and damage to the steering bearings.

- Check to see that there is no play in the steering bearings. (Fig. 2.76)

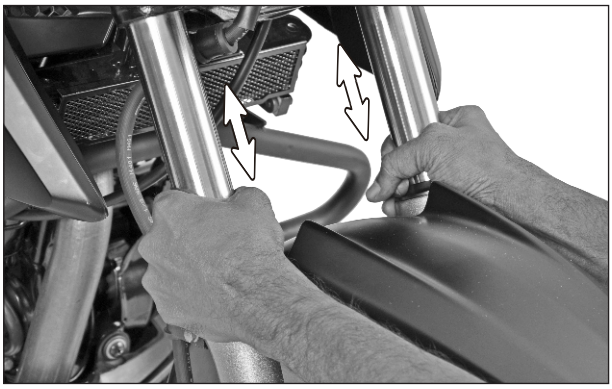


Fig. 2.76

Warning:
Bottom steering adjuster must be tightened with the handle bar assembly removed condition only.

Do not use C-clamps for tightening the arrester steering because it leads to clearance between arrester system and upper bracket followed by steering shake / noise and durability complaint.

- If any play is found, remove the CRR pan head screw (M6x20 - 2 nos.) housing head lamp front top mounting. (Fig. 2.77)

Phillips head screw driver	
Tightening torque	3 ± 1 Nm

Fig. 2.77

- Loosen both side bottom mounting hexagonal flange bolt of housing head lamp and tilt the housing head lamp forward. (Fig. 2.78)

10 mm spanner	
Tightening torque	4.5 ± 1.5 Nm

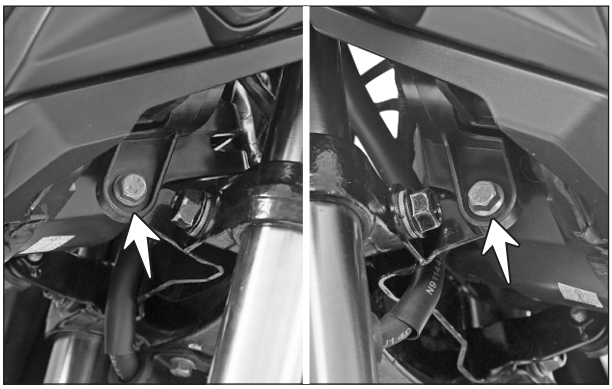


Fig. 2.78

- Take out the cap lock nut (A) and remove the lock nut steering along with a special washer. (Fig. 2.79)

32 mm spanner	
Tightening torque	80 ± 20 Nm

Fig. 2.79

- Loosen hexagonal socket head cap screws (A) (M8x30 - 2 nos.) from the mounting of handle bar assembly with the front fork. (Fig. 2.80)

6 mm allen key	
Tightening torque	16 ± 2 Nm

- Similarly, loosen hexagonal socket head cap screws (B) (M8x45 - 2 nos.) from the mounting of lower bracket complete (fork upper mounting). (Fig. 2.80)

Tightening torque	19 ± 2 Nm

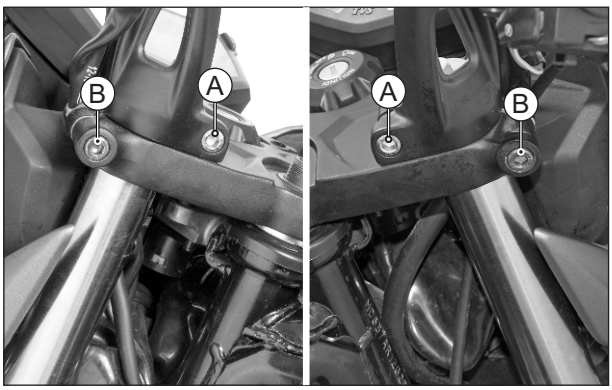


Fig. 2.80

- Gently lift the handle bar assembly. Support and hang the handle bar assembly on the vehicle itself.

Note:
Ensure that the cables are not too much stretched or bent and the surfaces of fuel tank assembly and head lamp assembly not got damaged.

- Using a blunt tool, unlock the lock washer locking arrester steering stem top and bottom. (Fig. 2.81)

Small flat screw driver

- Using a special tool loosen and remove the arrester steering stem and take out the lock washer. (Fig. 2.82)

N931 014 0	Tool steering nut

32 mm spanner

- Using the special tool turn the arrester steering stem bottom either clockwise or anti-clockwise to reduce or to increase steering play respectively. (Fig. 2.83)

N931 014 0	Tool steering nut

32 mm spanner

- After ensuring there is no play in the steering, assemble the lock washer and arrester steering stem top.

- Locate the lock washer properly and tighten the steering stem top. Finally lock the lock washer and then assemble the other parts in the reverse order of removal.

- Finally, tighten the steering lock nut to the specified torque.

Note:
After adjustment the steering, ensure the handle bar moves smoothly without any jerk or sticky. When slowly moved by hand the handle bar moves freely from center position to either left or right with its own weight.

Check the head lamp beam position and adjust if required after reassembling.

- If any play is still found, inspect the following items and replace the affected parts, if necessary (refer chapter "Chassis" page no. 6-23 for removal, checking and reassembly procedures)

  - Wear of the race steering inner and outer.
  - Wear of cup bottom and cone bottom.

Fig. 2.81

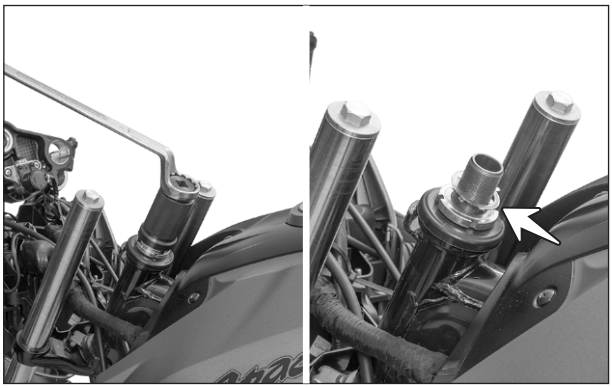


Fig. 2.82

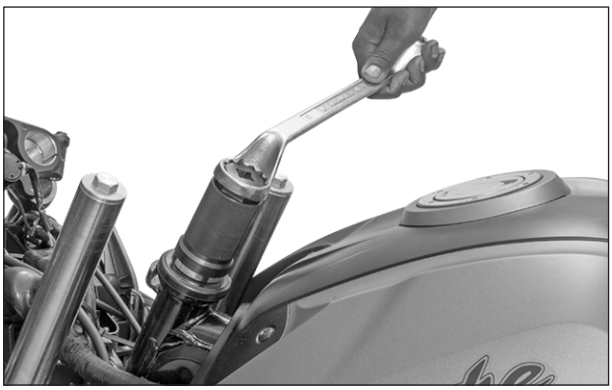


Fig. 2.83

- Wear or damage of steering balls.
- Number of balls in cage.
- Distortion of lower bracket complete.
- Rusting of races and balls
- Grease washout

Note:
However, the steering need to be cleaned and lubricated with fresh grease every 12000 km.

FRONT FORK OIL

Replace every 18000 km.

- Inspect both the leg assemblies of front fork for any oil leak / abnormality. (Fig. 2.84) If found any, front fork leg assemblies need to be serviced.

- However, the front fork oil need to be replaced every 18000 km. Refer chapter "Chassis" page no. 6-17 for service and oil replacement procedure of front fork.

Fig. 2.84

FRONT AND REAR SUSPENSION

Inspect for proper function at initial 500 - 750 km and every 3000 km thereafter.

- Inspect the front fork (both the legs) for smooth operation / proper action. If found any abnormality service the leg assemblies as explained in chapter "Chassis" page no. 6-17. (Fig. 2.85)

- Similarly, inspect the rear shock absorber for smooth operation / proper action. If found any abnormality replace the shock absorber. Check the shock absorber for any mud / dirt accumulation. If found with mud or dirt, clean them thoroughly. (Fig. 2.85)

- Inspect for any oil leak in shock absorber. Replace the shock absorber if found leaking.

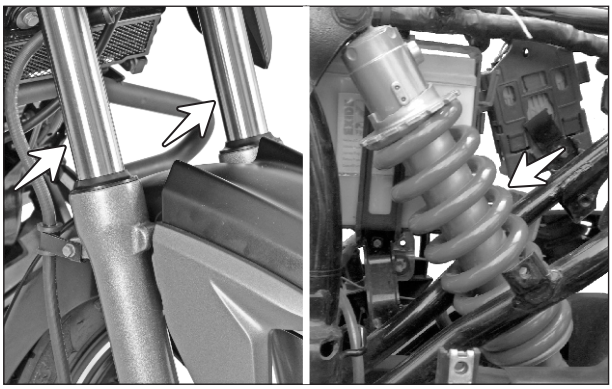


Fig. 2.85

ALL FASTENERS (Bolts and nuts)

Inspect and tighten at initial 500 - 750 km and every 3000 km there after.

- All the bolts and nuts must be in good condition, for safety. They must be checked and re-tightened, as necessary to the specified torque (refer chapter "Service information" page no. 7-8 & 7-10 for torque details).

CHAIN ASSEMBLY DRIVE (Drive chain)

Clean, lubricate and adjust at 500 - 750 km and every 3000 km thereafter.

Note:
However, the drive chain must be cleaned (on the vehicle) with dry cloth and lubricated with TRU SPRAY / TRU 4 oil as frequently as every 500 km for better chain life and smooth vehicle running.

- If dirt / dust particles deposition on the drive chain is found less, the drive chain can be cleaned and lubricated on the vehicle itself.
- Place the vehicle on the center stand.
- Clean the drive chain thoroughly using a cloth wet with kerosene while rotating the wheel assembly.
- Allow 3 minutes for the drive chain surface to dry and wipe the surface with dry cloth.
- After cleaning the drive chain, check the slackness of drive chain as shown. (Fig. 2.86)

Slackness	20 ~ 25 mm

- If slackness if found more or less, adjust the slackness as follows:

Note:
Excess chain slackness consumes more fuel.

- Slightly loosen the hexagonal flanged U-nut (M14x1.5) of axle rear. (Fig. 2.87)

22 mm spanner

Tightening torque	78 ± 18 Nm

Fig. 2.86

Fig. 2.87

- Loosen and adjust the chain adjusting bolts (A and B) 'in' or 'out' equally by looking at the line mark (C and D) on chain adjusters until the specified play (slackness) is obtained. (Fig. 2.88 A & B)

12 mm spanner

Caution:
Adjust both the chain adjuster exactly the same amount to maintain correct wheel alignment

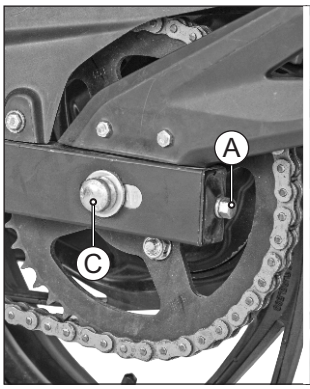


Fig. 2.88A

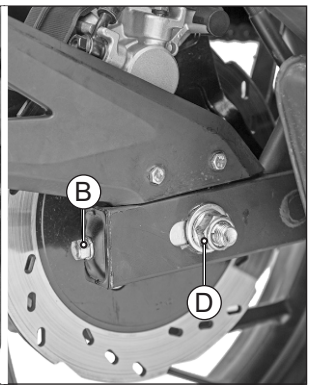


Fig. 2.88B

- After obtaining the specified play, rotate the rear wheel by hand and apply rear brake.
- Hold the brake pedal in applied condition and tighten the rear axle nut to the specified torque.
- Now, tighten the chain adjusting bolts (A and B). (Fig. 2.88 A & B)
- Using TRU SPRAY lubricate the chain while rotating the wheel slowly. (Fig. 2.89)

Note:
Shake TRU SPRAY container well before use. Attach the extension tube to the TRU SPRAY container for pin point application. Hold the container upright and spray from a distance of 4-6 inches as shown in the figure.

Fig. 2.89

- If dirt / dust particles deposition on the drive chain is found more, it is recommended for the first time alone to follow the procedure given below:
- Remove the seats and cover frame assembly as explained earlier.
- Remove the hexagonal bolt (M6x20) from the gear shift linkage assembly and dislocate the gear shift linkage from the shaft gear shift. (Fig. 2.90)

10 mm spanner

Tightening torque	10 ± 2 Nm

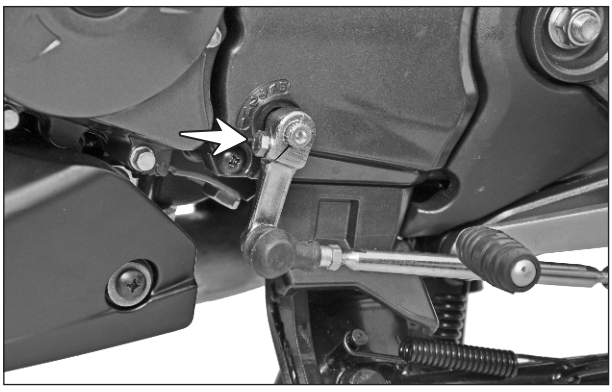


Fig. 2.90

- Remove the CRR pan head screws (M6x20 - 2 nos.) from the cover engine sprocket mounting and take out the cover. (Fig. 2.91)

Phillips head screw driver	
Tightening torque	10 ± 2 Nm

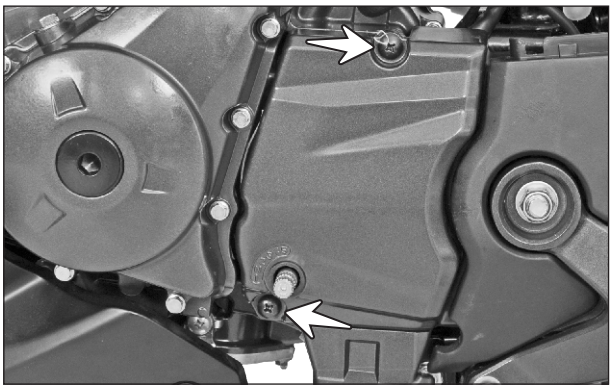


Fig. 2.91

- Remove the hexagonal flange bolt (M6x16 - 1 no.) from speed sensor cable guide mounting and dislocate the cable guide to enable easy removal of drive sprocket. (Fig. 2.92)

8 mm spanner	
Tightening torque	10 ± 2 Nm

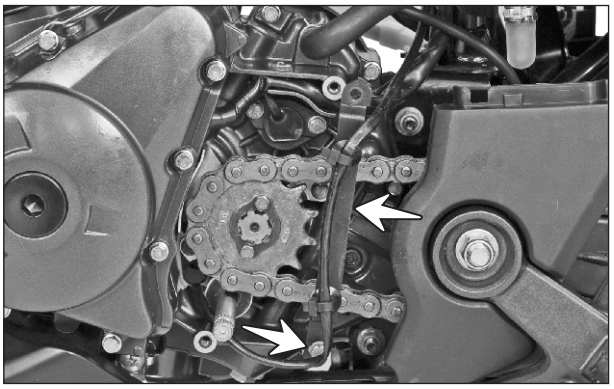


Fig. 2.92

- In-order to remove the foot rest assembly, remove the swing arm axle nut (A) along with punched washer. (Fig. 2.93)

17 mm spanner	
Tightening torque	40 ± 4 Nm

- Also, remove the hexagonal socket head cap screw (B) (M10x25 - 1 no.) along with punched washer from the rider foot rest assembly and take out the rider foot rest assembly. (Fig. 2.93)

8 mm allen key	
Tightening torque	18 ± 3 Nm

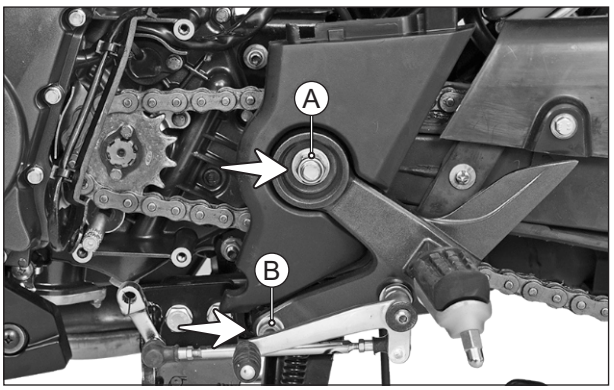


Fig. 2.93

- Remove the hexagonal bolts (2 nos.) and take out the lock washer by rotating it either clockwise or anti-clockwise from the sprocket engine. (Fig. 2.94A & B)

8 mm spanner	
Tightening torque	8 ± 1 Nm

- Dislocate the sprocket engine along with the chain from the drive shaft.

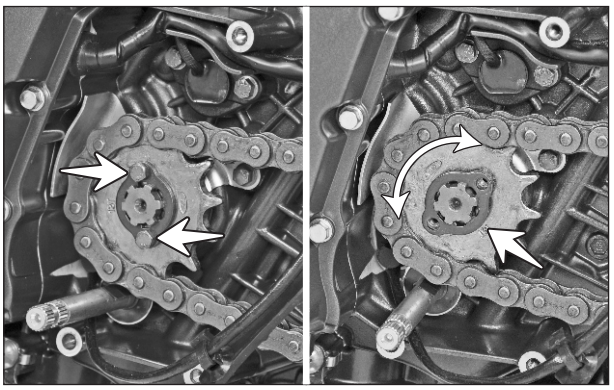


Fig. 2.94A Fig. 2.94B

- Remove the hexagonal bolts (M6x16 - 4 nos.) from both LH & RH mounting wheel hugger rear mounting. (Fig. 2.95A & B)

10 mm spanner	
Tightening torque	8 ± 2 Nm

Fig. 2.95A

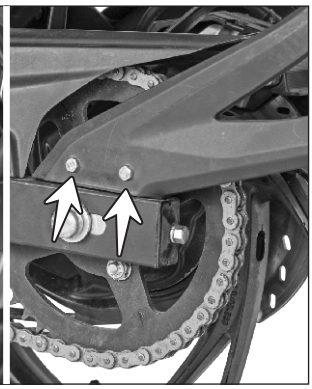


Fig. 2.95B

- Loosen the hexagonal flanged U-nut (M14x1.5) of axle rear. (Fig. 2.96A)

22 mm spanner	
Tightening torque	78 ± 18 Nm

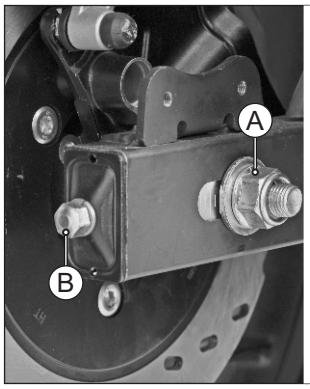


Fig. 2.96A

- Similarly, loosen the chain adjuster bolts (A and B) to some extended in order to remove the chain. (Fig. 2.96B)

12 mm spanner

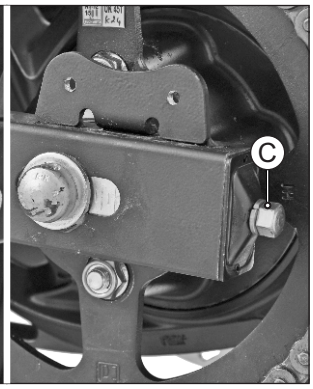


Fig. 2.96B

- Remove the hexagonal bolts (M6x12 - 2 nos.) along with the washers from the chain guard. (Fig. 2.97)

10 mm spanner	
Tightening torque	8 ± 2 Nm

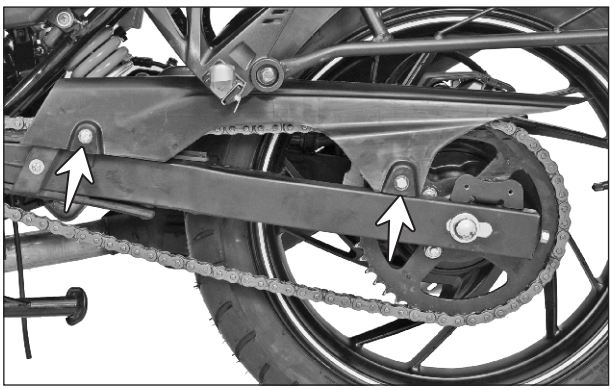


Fig. 2.97

- Push the rear wheel from the back towards front so that the drive chain loosens and hangs as shown. (Fig. 2.98)

- Now, lift the chain guard upward. Gently take out the drive chain by dislocating it from the rear sprocket and swing arm assembly.

- Clean the drive chain by dipping it in kerosene. Brush off any dirt / dust sticking to it.

Caution:
A brush with steel wires should not be used for cleaning the drive chain as it will damage the 'O' ring in the drive chain.

- Drain / dry the kerosene by hanging the chain for 5 minutes.

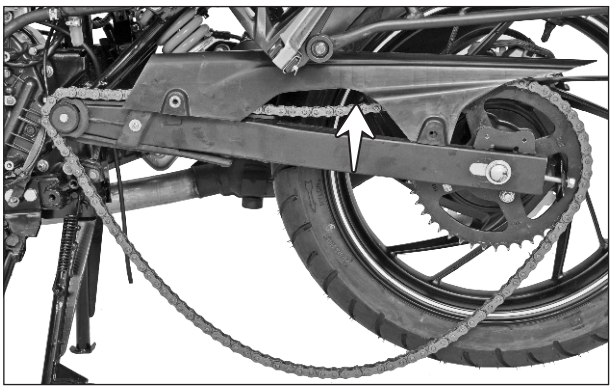


Fig. 2.98

- Visually inspect the chain assembly drive for the below listed possible malfunctions.
  - Loose pins
  - Damaged rollers
  - Excessive wear
- If found any defects, the chain assembly drive must be replaced with a new one.
- Similarly, to check the drive chain elongation, count 21 pins on the drive chain and measure the distance between 20 pitch. (Fig. 2.99)

Vernier caliper	
Service limit	323 mm

- If the measured distance exceeds the service limits, replace the drive chain with a new one.
- If the drive chain is found OK, assemble back to the vehicle. Adjust the drive chain slackness and lubricate.

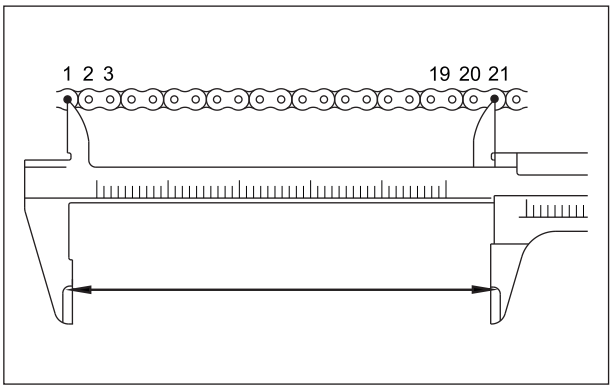


Fig. 2.99

RETAINER OIL SEAL (Drive shaft oil seal)

Inspect at initial 500 - 750 km and every 3000 km thereafter. Replace the retainer every 9000 km.

- Remove the sprocket engine along with drive chain as explained in page no. 2-31. Inspect the retainer oil seal for any physical damage. If found any,
- Remove the hexagonal flange bolt (M6x16 - 2 nos.) from the mounting of retainer oil seal and take out. (Fig. 2.100)

8 mm spanner	
Tightening torque	10 ± 2 Nm

- Replace the retainer with a new one.

Note:
Please remember the retainer oil seal must be replaced at every 9000 km irrespective its condition.

- Reassemble the parts in the reverse order of dismantling. Check the drive chain play and if required readjust as explained earlier.

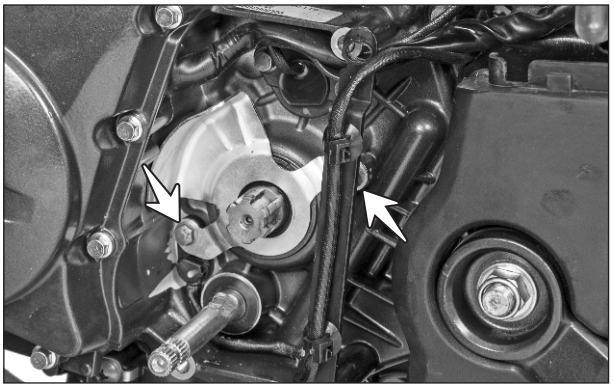


Fig. 2.100

CHAIN GUIDE BOTTOM (Drive chain guide)

Inspect at initial 500 - 750 km and every 3000 km thereafter. Replace the chain guide bottom at every 9000 km.

- Remove the hexagonal bolt (M6x20) from the gear shift linkage assembly and dislocate the gear shift linkage from the shaft gear shift. (Fig. 2.101)

10 mm spanner	
Tightening torque	12 ± 2 Nm

- In-order to remove the foot rest assembly, remove the swing arm axle nut along with punched washer. (Fig. 2.102)

17 mm spanner	
Tightening torque	40 ± 4 Nm

- Also, remove the hexagonal socket head cap screw (M10x25 - 1 no.) along with punched washer from the rider foot rest assembly and take out the rider foot rest assembly. (Fig. 2.102)

8 mm allen key	
Tightening torque	18 ± 3 Nm

- Remove the hexagonal flange bolt (M6x16 - 2 nos.) from the mounting of chain guide bottom and take out the chain guide. (Fig. 2.103)

10 mm spanner	
Tightening torque	8 ± 1 Nm

- Inspect the chain guide bottom and its bushes for any damage / deformation. If found any replace the guide / bushes with a new one. (Fig. 2.104)

Note:
Please remember the chain guide bottom must be replaced at every 9000 km irrespective its condition.

- Reassemble the parts in the reverse order of dismantling.

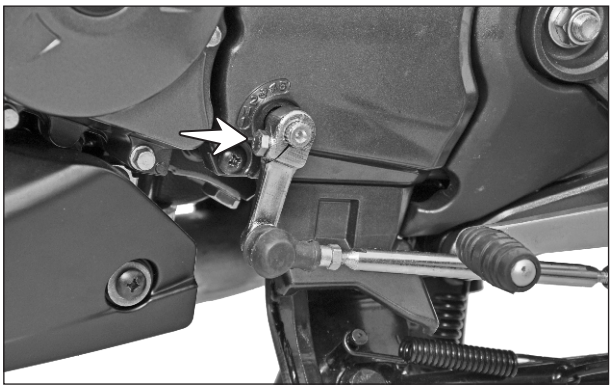


Fig. 2.101

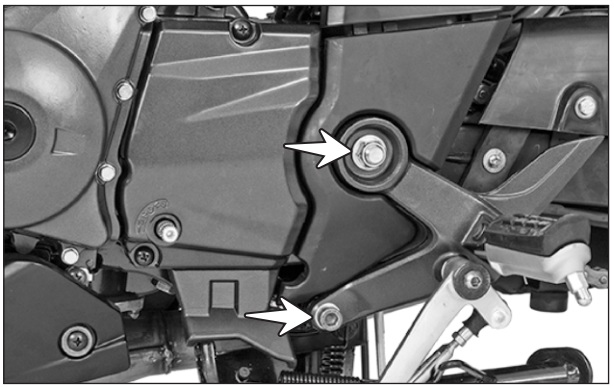


Fig. 2.102

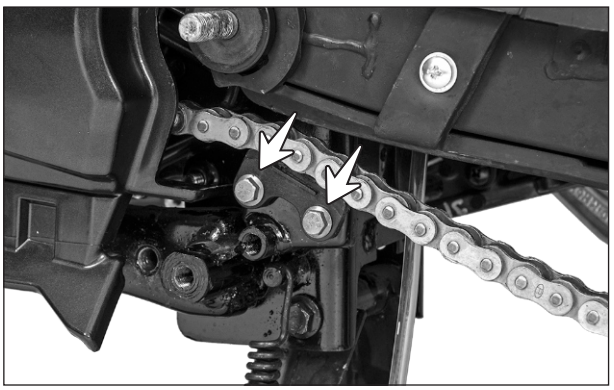


Fig. 2.103

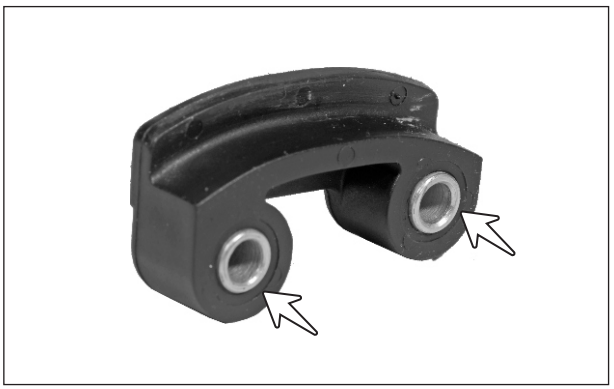


Fig. 2.104

ALL BULBS, HORN AND SWITCHES

Inspect at initial 500 - 750 km and every 3000 km thereafter.

- Inspect for the proper functioning of all bulbs, horn and switches.
- Incase found any abnormality, replace them. Refer chapter "Electrical system" page no. 5-19 for checking and replacement procedure.

HEAD LAMP BEAM ADJUSTMENT

Inspect and adjust at initial 500 - 750 km and every 3000 km there after.

- Keeping the bike in a straight line, sit on the bike to aim the head lamp beam vertically. Focus head lamp high beam on a vertical screen, which is at a distance of 10 meter from the head lamp bulb's center point. Adjust head lamp assembly such that the focal point of high beam on the screen is 100 mm lower than the head lamp bulb's center. (Fig. 2.105)

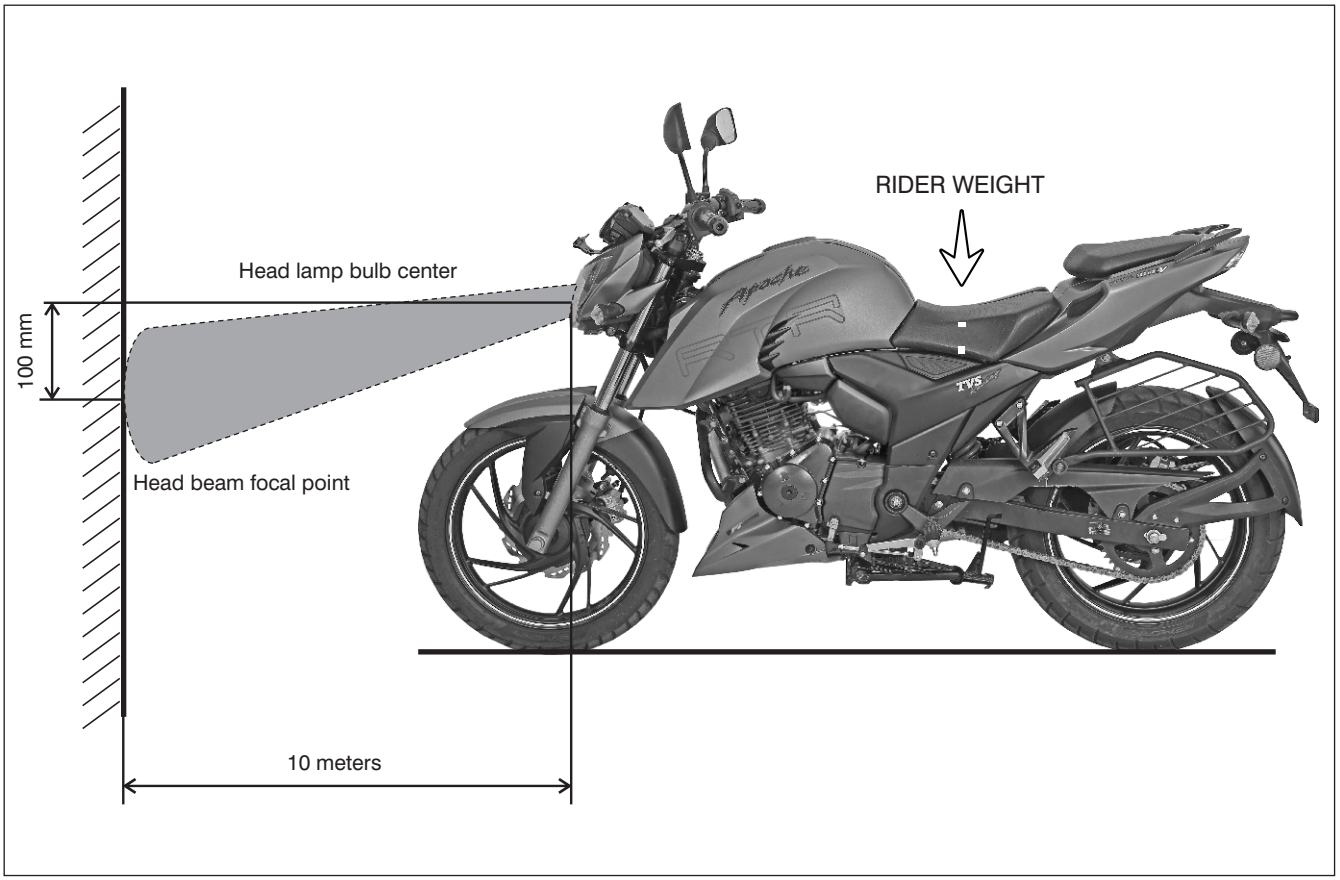


Fig. 2.105

Note:
Head lamp focus should be adjusted only when the head lamp in high beam.

- To adjust the head lamp focus, insert a small phillips head screw driver into the slot provided on the left side the head lamp and rotate the head lamp adjuster till the focus is adjusted to specification described earlier. (Fig. 2.106)

Small phillips head screw driver

Fig. 2.106

BATTERY ASSEMBLY

Inspect and top-up electrolyte level / Inspect the electrolyte specific gravity and battery voltage at initial 500 - 750 km and every 3000 km thereafter. Recharge if necessary.

- Remove the battery from the vehicle as explained in the chapter "Electrical system" page no. 5-24.

Note:
While removing the battery terminals, remove the '- ve' terminal first. While reconnecting, connect the'+ ve' terminal at last.

- Visually inspect the surface of the battery container. If any sign of cracking or electrolyte leakage from the sides of battery is noticed, replace the battery with a new.

- Measure the open circuit voltage of battery using pocket tester. (Fig. 2.107)

Pocket tester	
Open circuit voltage	12.9 Volts

- If the voltage measure is less than 12 Volts, then charge the battery using constant current battery charger by referring the procedure mentioned in chapter "Electrical system" page no. 5-24.

- If the battery lead terminals are found rusty with acidic white powdery substance, then clean them with sandpaper / warm water.

Fig. 2.107

- Add distilled water as necessary, to ensure the electrolyte is above the minimum level line but not above the maximum level line. (Fig. 2.108)

Caution:
Do not add tap water or acid for topping up the battery. Use only distilled water.

Electrolyte specific gravity at 20°C

Battery type	Normal	Under charged
12V, 9.0 Ah	1.28	1.25

- If the specific gravity reading is not in normal condition the battery needs charging. (Fig. 2.109) Recharge the battery with constant current battery charger (refer chapter "Electrical system" page no. 5-26 for charging procedure).

- After doing the necessary check and charging, re-fit the battery in the reverse order of removal and reconnect the terminals. Apply petroleum gelly in the terminals to avoid corrosion.

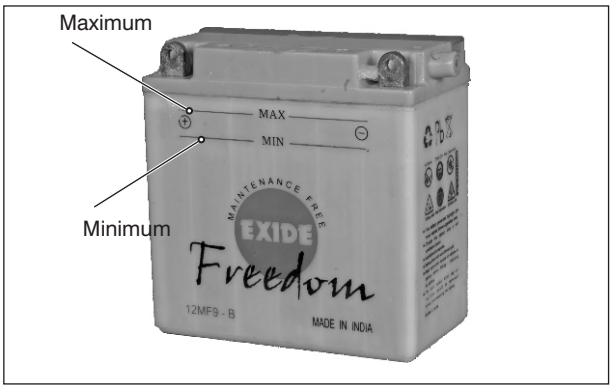


Fig. 2.108

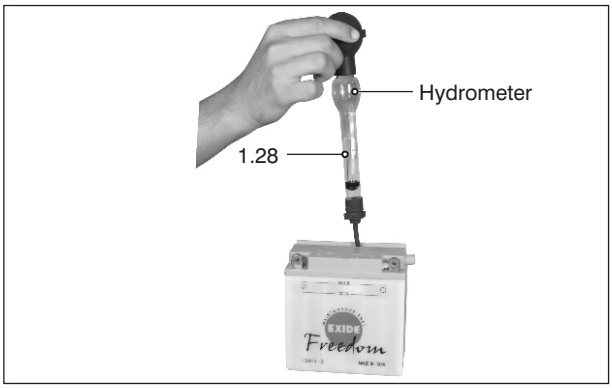


Fig. 2.109

BRAKES

Inspect the front brake and rear brake effectiveness at initial 500 - 750 km and every 3000 km thereafter.

Inspect front and rear brake fluid level and top-up at initial 500 - 750 km and every 3000 km thereafter. Replace brake fluid every 21000 km.

Inspect front and rear brake pad wear at initial 500 - 750 km and every 3000 km thereafter. Replace if necessary.

Inspect brake hose at initial 500 - 750 km and every 3000 km thereafter. Replace brake hose and master cylinder cups every 21000 km.

Brake effectiveness

- Inspect the front and rear brake for its effectiveness. If the brakes are more spongy or ineffective, it may be because of air entry in the brake system which needs bleeding. Refer chapter "Chassis" page no. 6-7 for the procedure of brake bleeding.

Brake fluid level - front brake

- Place the vehicle on center stand. Keep the handle bar straight. Ensure that the master cylinder is parallel to the ground.
- Inspect the brake fluid level in master cylinder through the inspection window. The level should be above the lower mark (A) provided on the reservoir body. (Fig. 2.110)
- If the level is found below the lower level mark on the cylinder, then replenish the level up to the top by following the procedure given below:
- Remove the mounting screw of reservoir cap. (Fig. 2.111)
- Remove the reservoir cap and take out the plate diaphragm and diaphragm.
- Fill fresh brake fluid of recommended grade

Brake fluid	TVS Griling DOT3 / DOT4

- Reassemble the parts and apply the front brake to check the effectiveness.
- If the lever travel is more or the lever feels soft or spongy, air bleeding from the system to be carried out. Refer chapter "Chassis" page no. 6-7 for bleeding procedure.

Brake fluid level - Rear brake

- Remove cover frame R. (refer page 2-4 for removal procedure) Place the vehicle in center stand. Inspect the brake fluid level in the reservoir.
- The brake fluid level in the reservoir should be at the maximum mark provided in the reservoir. (Fig. 2.112)
- If the level is found the lower level mark on the reservoir, then replenish the level up to the maximum level.
- Remove the cap and take out the diaphragm. (Fig. 2.113)
- Fill fresh brake fluid of recommended grade.

Brake fluid	TVS Griling DOT3 / DOT4

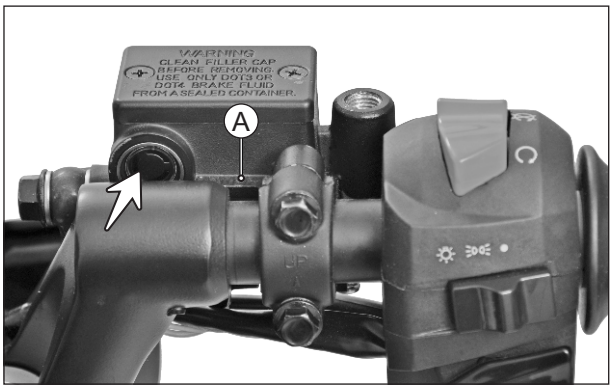


Fig. 2.110

Fig. 2.111

Fig. 2.112

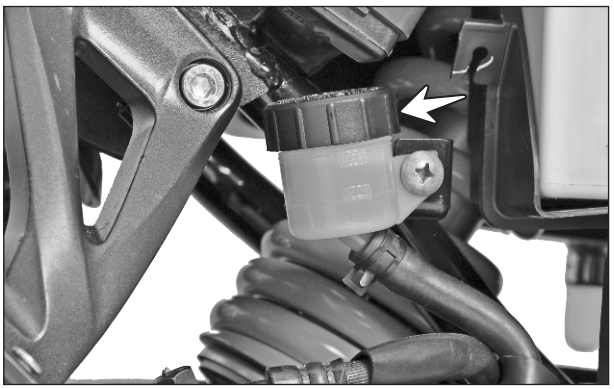


Fig. 2.113

- Reassemble the parts and apply the rear brake to check the effectiveness.

- If the brake pedal travel is more or the pedal feels soft or spongy, air bleeding from the brake system to be carried out. Refer chapter "Chassis" page no. 6-7 for bleeding procedure.

Caution:
Please remember to be replace the brake fluid every 21000 km without fail for the better performance of the brake system.

Disc pad wear - Front & Rear

- Observe the wear limit line marked on the pad and check wear condition of brake pads. (Fig. 2.114)

- When the wear exceeds the limit line replace the pad as a set. Refer chapter "Chassis" page no. 6-5 & page no. 6-36 for the front and rear pads replacement procedure.

Note:
Brake pad wear can be checked without removing the caliper assembly from the fork and rear wheel.

Caution:
Replace the brake pad with set, otherwise braking performance will be adversely affected.

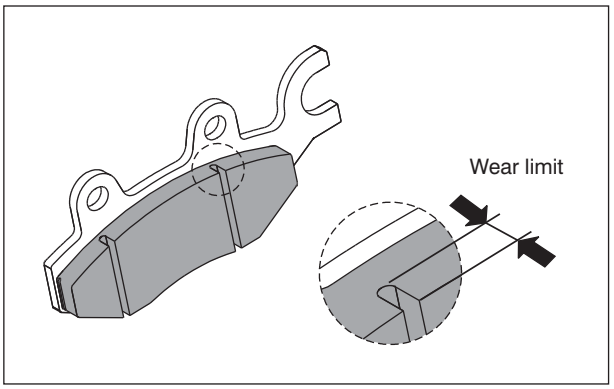


Fig. 2.114

Front & rear brake hoses

- Inspect the front and rear brake hoses for any visual damage / crack and oil leak. If found any, replace the respective hose. However the brake hoses must be replace every three years without fail for the safety. (Fig. 2.115)

- Refer chapter "Chassis" page no. 6-8 and 6-37 for the brake hoses front and rear replacement procedures.

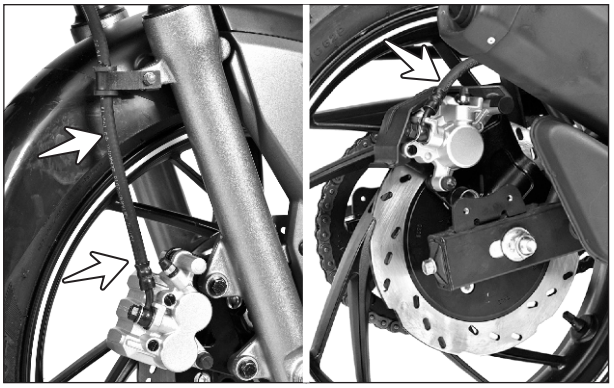


Fig. 2.115

WHEEL FREENESS

Inspect at initial 500 - 750 km and every 3000 km thereafter.

- Slowly rotate both the wheels by hand and observe for any abnormal noise / tightness. (Fig. 2.116)

- If found any, inspect for the proper functioning of brakes. If found OK then, inspect for the proper play in the drive chain (refer page no. 2-30). Also inspect for correctness of wheel bearing, alloy wheel etc., (refer chapter "Chassis" page no. 6-1 & 6-28 for removal and inspection procedure).

Note:
Tight wheel rotation increases fuel consumption.

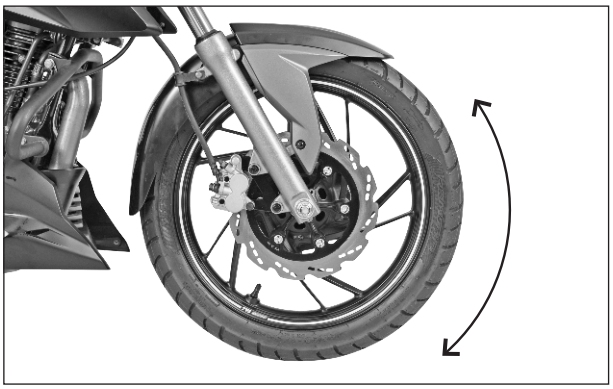


Fig. 2.116

TYRES

Inspect at initial 500 - 750 km and at every 3000 km thereafter.

Tyre tread condition:

- Using the vehicle with excessively worn tyres will decrease riding stability and consequently invite a dangerous situation due to loss of control. It is highly recommended to replace the tyre with a new one when the groove depth of tyre from tread surface reaches the following specifications: (Fig. 2.117)

Service limit	
Front	1 mm
Rear	1 mm

Tyre depth gauge

Note:
Tyre depth also can be checked by tyre wear indicator. (Fig. 2.118)

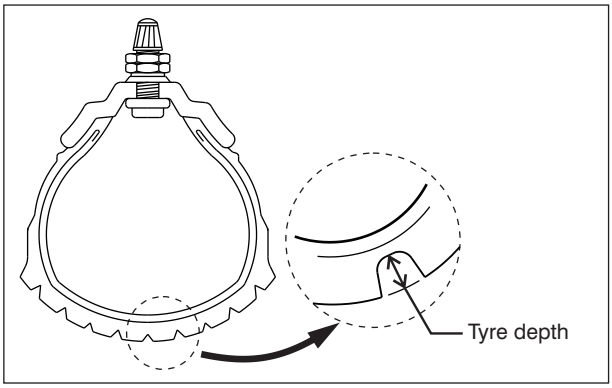


Fig. 2.117

Fig. 2.118

Tyre rotation direction

- While reassembling the tyre, after removing from the wheel rim, ensure that the arrow mark (A) provided on the tyre facing the direction of wheel rotation. (Fig. 2.119)

Note :
Wheel balancing to be done whenever tyre is removed from the wheel rim and refitted.

Fig. 2.119

Tyre pressure:

- Under inflated tyres wear faster, affect stability and smooth cornering. Over inflated tyres decrease area of tyre contact with ground causing skid or loss of control. (Fig. 2.120)

- Maintain proper tyre pressure for good road stability and longer tyre life. Inflate tyres in cold condition to the pressure as given below:

Fig. 2.120

Tyre pressure gauge

Tyre pressure	**Front** Kg/cm² (psi)	**Rear** Kg/cm² (psi)
Solo riding	1.75 (25)	2.00 (28)
Dual riding	1.75 (25)	2.25 (32)

Note:
Low tyre pressure consumes more fuel.

BALL JOINT GEAR SHIFT LEVER

Lubricate every 6000 km using grease

- Lubricate the ball joint gear shift lever using grease every 6000 km for easy operation of lever and smooth gear shifting. (Fig. 2.121)

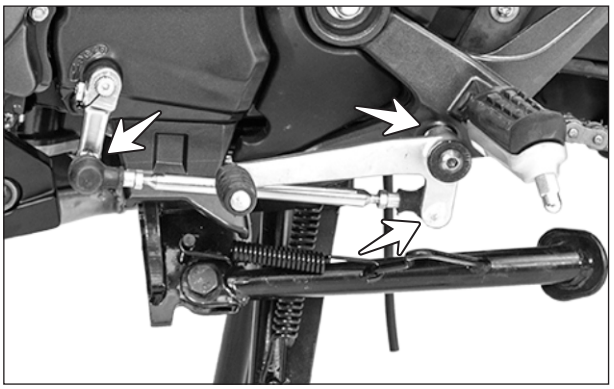


Fig. 2.121

CENTER AND SIDE STAND PIVOT

Lubricate at initial 500 - 750 km and every 3000 km thereafter.

- Lubricate the pivots of center stand and side stand using grease for smooth operation. (Fig. 2.122)

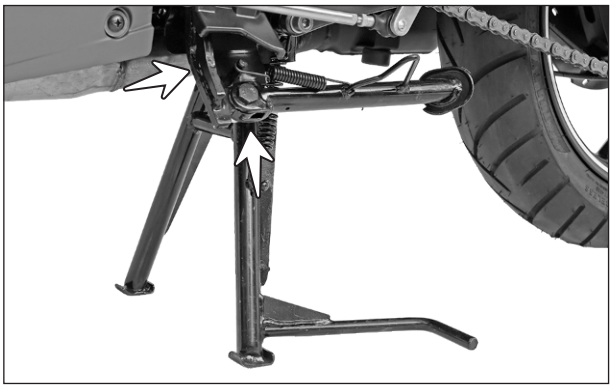


Fig. 2.122

SWING ARM BEARINGS

Lubricate using grease every 2 years or 12000 km.

- Loosen hexagonal screw (M6x20 - 1 no) from the arm gear shifter lever mounting and dislocate the gear shift lever from the shaft assembly gear shift. (Fig. 2.123)

10 mm spanner	
Tightening torque	10 ± 2 Nm

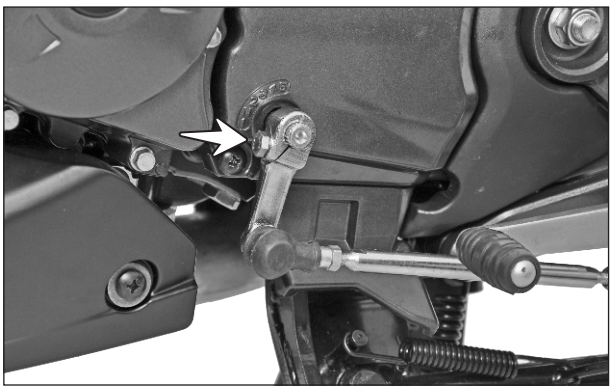


Fig. 2.123

- Remove the swing arm axle 'U' nut (M12) along with punched washer. (Fig. 2.124)

17 mm spanner	
Tightening torque	40 ± 4 Nm

- Also, remove the hexagonal socket head cap screw (M10x25 - 1 no.) along with punched washer from the rider foot rest assembly LH and take out the foot rest assembly. (Fig. 2.124)

8 mm allen key	
Tightening torque	18 ± 3 Nm

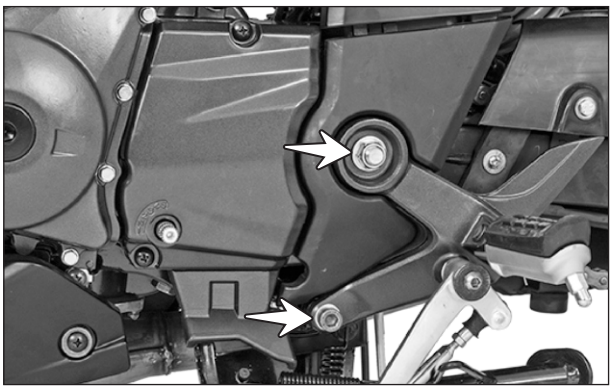


Fig. 2.124

- Disconnect the spring of stop lamp switch from the rear brake pedal. (Fig. 2.125)

Nose plier

Note:
Ensure to reconnect the spring during reassembly for proper working of brake lamp.

Fig. 2.125

- Remove the hexagonal socket head cap screw (M10x25 - 1 no.) along with punched washer from the rider foot rest assembly RH. (Fig. 2.126)

8 mm allen key

Tightening torque	18 ± 3 Nm

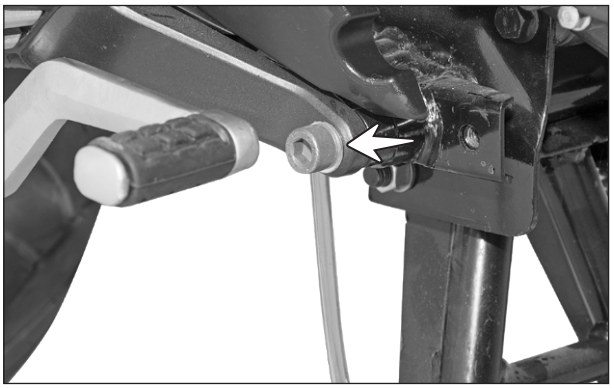


Fig. 2.126

- Remove the CRR pan head screw (M6x16 - 1 no.) from the rider foot rest assembly RH top mounting. (Fig. 2.127)

Phillips head screw driver

Tightening torque	10 ± 2 Nm

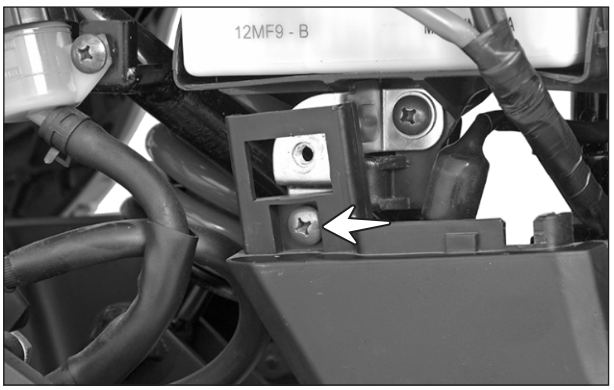


Fig. 2.127

- Draw out shaft complete swing arm by gently tapping at the other side. (Fig. 2.128)

Nylon hammer

Note:
Use a suitable guide in place of shaft complete swing arm to prevent the swing arm declining from its position.

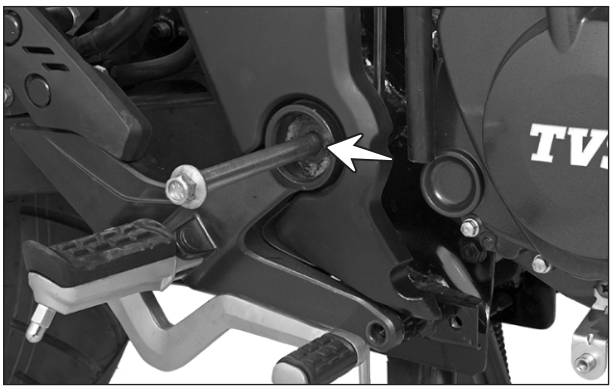


Fig. 2.128

- Take out the foot rest assembly RH along with rear master cylinder assembly and brake pedal assembly and hang it carefully.

Caution:
Care should be taken not to stretch / damage brake hose during the removal foot rest assembly.

- Take out the dust seal swinging arm and sleeve swing arm from the RH side of the swing arm assembly. (Fig. 2.129)

Combination plier

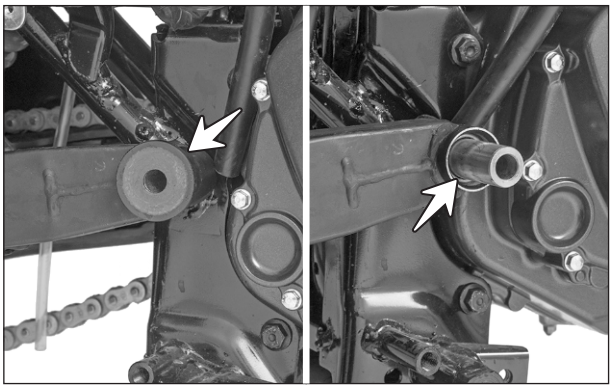


Fig. 2.129

- Clean the sleeve, dust seal, swing arm needle bearing and the swing arm shaft using a clean cloth. Replace the seal and bearing incase of any damage. Else lubricate all parts with **Bechem premium grade 3 grease**.

- Assemble back the foot rest assembly RH while ensuring the proper routing of brake hoses and tighten the mounting bolts.

- Insert the shaft complete swing arm from the RH side while carefully removing the guide (inserted earlier) from the other side.

Note:
Insert the swing arm shaft in such a way that the LH side dust seal and sleeve can be removed easily and the needle bearing can be accessed for lubrication.

- Now, take out the dust seal swinging arm and sleeve swing arm from the LH side of the swing arm assembly. (Fig. 2.130)

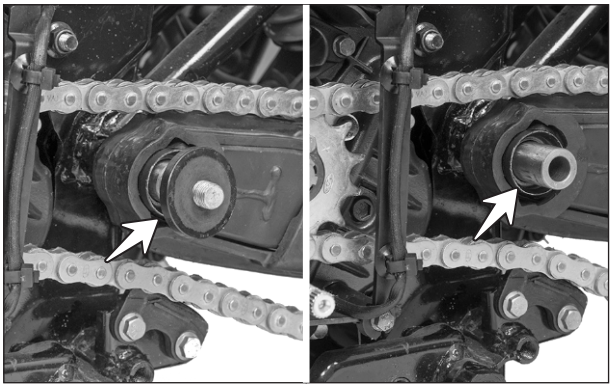


Fig. 2.130

- Clean the sleeve, dust seal and swing arm needle bearing using a clean cloth. Replace the seal and bearing incase of any damage. Else lubricate all parts with **Bechem premium grade 3 grease**.

- Reassemble the foot rest assembly LH and tighten the mounting bolts. Assemble the shaft swing arm's 'U' nut and tighten it to the specified torque.

- Re-fix the gear shift lever and tighten the mounting bolt. Reconnect the spring stop lamp switch and ensure the proper working of brake lamp while applying the rear brake.

WHEEL BALANCING

Wheel balancing to be done every 1 year or every 12000 km. In addition, after every tyre puncture repair or tyre replacement, wheel balancing to be done.

The Inspection of wheel balance and balancing of unbalanced wheels may be done by the manual procedure or by using an automatic wheel balancing machine as detailed below.

Inspection of wheel balance and balancing the wheel (manual method)

- Remove front or rear wheel assembly which needs to be checked for unbalance from the vehicle.
- Support the wheel as shown in figure using a fixture (A) and an axle. (Fig. 2.130)

Note:
Ensure that the wheel is rotating freely on the fixture without any obstruction.

Ensure the axle is in horizontal position and the wheel is not having any axial movement on the fixture.

- Rotate the wheel by hand and mark (Q) at the top as shown in the figure when the wheel stops rotating (comes to a halt). (Fig. 2.131)
- Rotate the wheel five times.
- If the 'Q' marked on the wheel stops randomly at different positions on each of the five rotations, then the wheel is considered as balanced sufficiently.
- Else, if the 'Q' marked on the wheel stops at one position on each of the five rotation, then the wheel is unbalanced and it need to be balanced again.

Follow the procedure given below for balancing the wheel manually.

1. Clean the exposed surface (A) of the wheel rim with IP 80% solution (cleaning agent) near the position 'Q' marked. (Fig. 2.131 & Fig. 2.132)

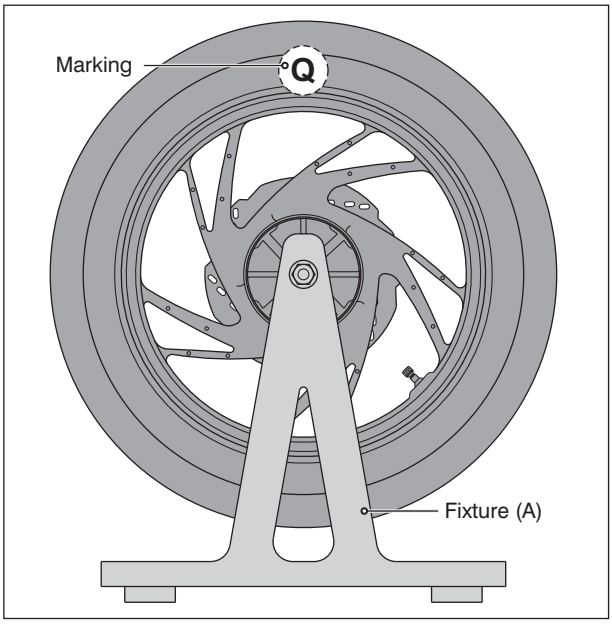
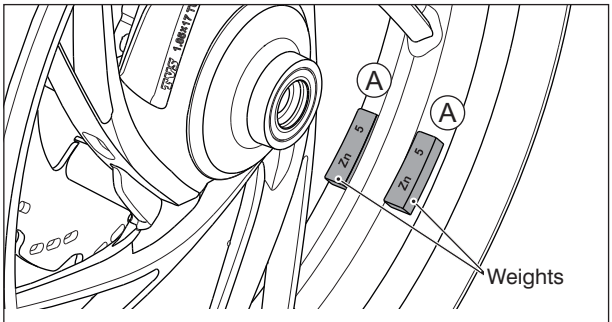


Fig. 2.131



Equal amount of balancing weights to be pasted on both the surfaces of the wheel rim

Fig. 2.132

2. Temporarily fix a 10 gram (5 gram each on both the side) balancing weight on the wheel rim near the 'Q' marked area, using a temporary adhesive tape (without removing the protective cover on the balancing weight).

3. Hold the wheel by hand and rotate it ¼ turn downwards (angle 'L' indicated in the figure) and leave. (Fig. 2.133) When the wheel is left, if the wheel does not rotate further ('up' or 'down'), it may be concluded that the wheel is balanced. If the wheel rotates 'up' or 'down', then the wheel needs to be balanced further.

4. If the wheel rotates and the weight goes up, replace the weight with next heavier size by referring Table 1. Further, if the wheel rotates and the weight goes down, replace the weight with the next lighter size from the Table 1.

5. Repeat the steps 3 & 4 till the wheel remains at rest after being rotated ¼ turn.

6. For final confirmation, rotate the wheel further ¼ turn (by hand) and yet again another ¼ turn. In both the cases, if the wheel comes to a rest after ¼ turn rotation, it may be concluded that the wheel is balanced.

After final confirmation, the balancing weight must be fixed permanently at the locations decided earlier. Follow the procedure given below for fixing the weight permanently.

1. Remove the temporarily fixed balancing weights and clean the wheel rim surface with IP 80% solution (cleaning agent) at the designated location where the balancing weight needs to be fixed again.

2. Remove (peel off) the protective cover on the back side of the balancing weight as shown. (Fig. 2.134)

3. Stick the balancing weight at the cleaned location on the wheel rim with a minimum pressure of 1 kg/cm^2 and hold for 3 Sec (min).

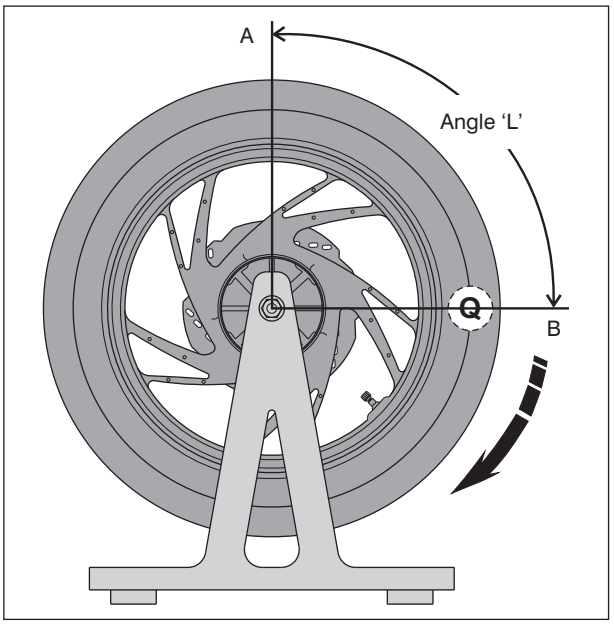


Fig. 2.133

Table 1		
SL.No.	**Part No.**	**Weight**
1	N932 590 0	5 g
2	N932 587 0	10 g
3	N932 588 0	15 g
4	N932 589 0	20 g

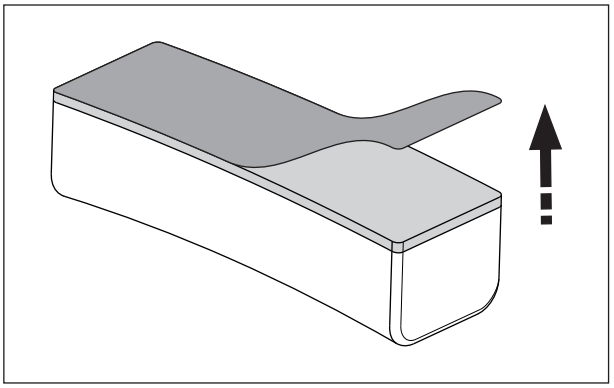


Fig. 2.134

Inspection of wheel balance and balancing the wheel (using automatic wheel balancing machine)

- Alternatively, in lieu of the manual procedure, the unbalance in the wheel may be checked and balancing of the wheel may be done using an automatic wheel balancing machine. For instructions, please refer to the User's manual of the automatic wheel balancing machine.

- After checking, fix the balancing weights permanently to the wheel rim by referring the procedure given in the previous page.

- After the balancing procedure is completed using an automatic wheel balancing machine, the wheel may be deemed to be balanced if the permissible residual unbalance (Uper) in the wheel assembly is less than 2122 g-mm (in front wheel) and 2117 g-mm (in rear wheel), for balance quality grade G40 as per the method of unbalance measurement specified in ISO 1940-1:2003.

Note:
The sum total of all balancing weights fixed on a single wheel rim shall not exceed 60 g in front wheel and 70 g in rear wheel, irrespective of the procedure used for balancing (manual or automatic).

Use genuine TVS-M approved Balancing weights only (refer Table 1).

Removal (uninstallation) of balancing weight from wheel rim:

- As the balancing weight is of "Stick-on" type, it may be removed from the wheel rim by application of sufficient force by hand. Do not use sharp objects to remove the balancing weight, as it may damage the wheel rim surface. After removal, clean the location on the wheel rim from where the balancing weight was removed, with IP 80% solution (cleaning agent) before fixing any more balancing weights.

Caution:
Vehicle with unbalanced wheels are unsafe to ride. Ensure that the balancing weights are not loosely fixed on the wheels.

LUBRICATION POINTS

Note:
Lubricate the exposed parts which are subject to rust, with either engine oil or grease as mentioned in the schedule or whenever the vehicle has been operated under wet or rainy conditions.

Before lubricating each part, clean off any rusty spots and wipe off any grease, oil, dirt or grime.

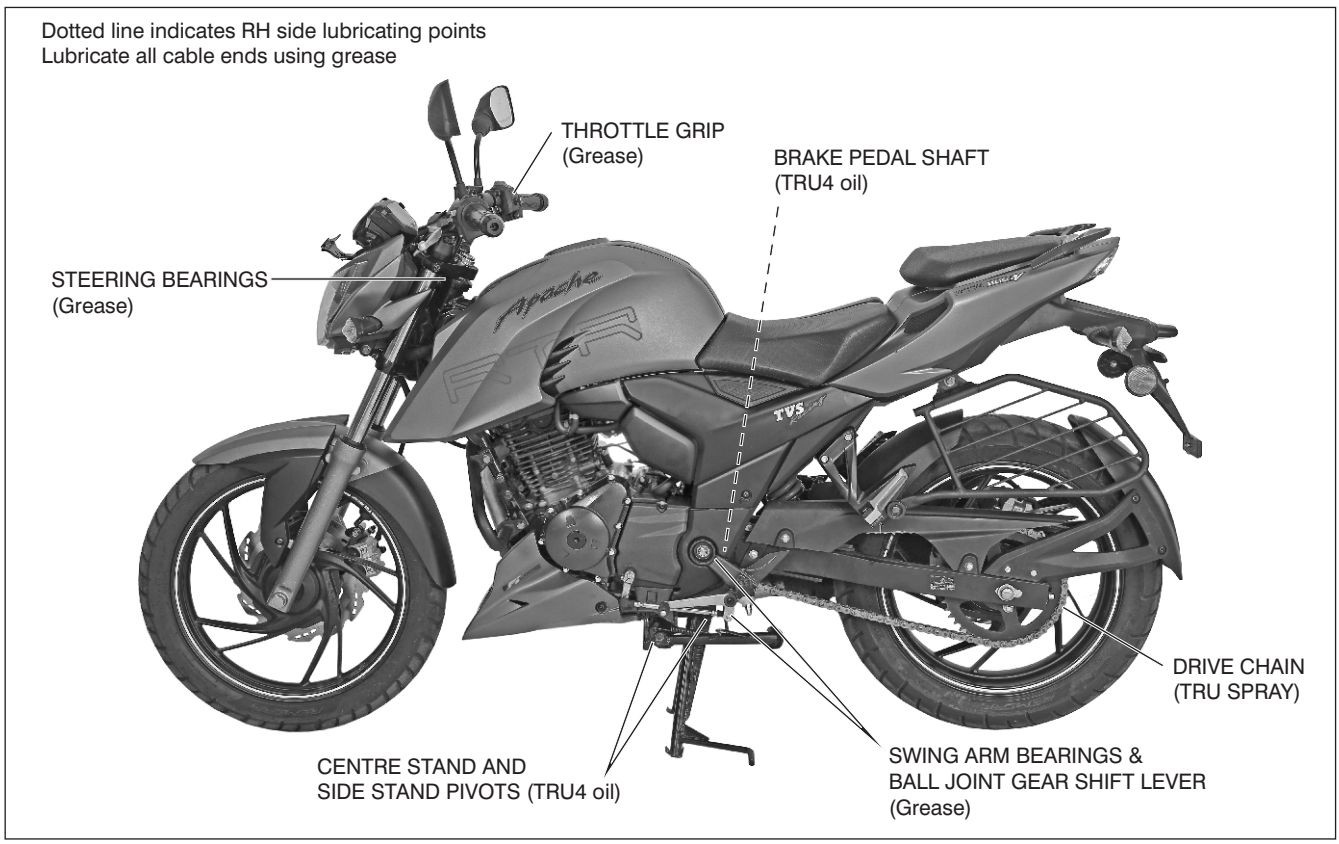


Fig. 2.135

DIGITAL SPEEDOMETER FUNCTIONS AND ITS SETTING

FUNCTIONS

(A) Digital clock
- Indicates the time in 12 hour time format.

> ***Note:***
> ***If the vehicle battery is disconnected and reconnected again during service, you may need to reset the clock time as explained in page no. 2-59.***

(B) Turn signal indicator left (⬅)
- Flashes when the 'left' side turn signal indication is activated.

(C) High beam indicator lamp (≡D)
- Glows when the head lamp is activated in high beam.

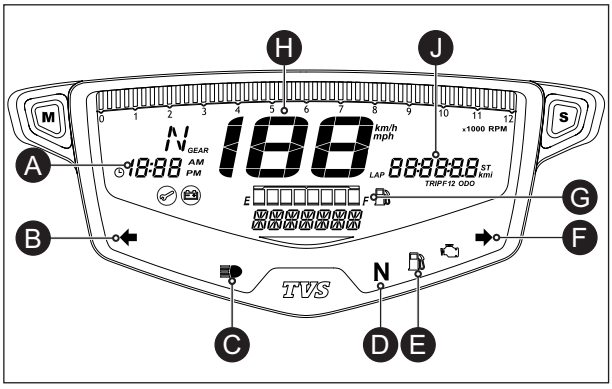
(D) Neutral indicator lamp (**N**)
- Glows when the vehicle is in neutral and goes 'OFF' if the gear is shifted from neutral.

(E) Low fuel indication ( )
- Blinks when the fuel level reaches to minimum safe level and glows continuously when the fuel comes below minimum safe level.

(F) Turn signal indicator right (➡)
- Flashes when the 'right' side turn signal indication is activated.

(G) Fuel gauge
- Digital bars of fuel gauge indicates the approximate quantity of fuel available in the fuel tank. There are eight bars to indicate the quantity of fuel available in the fuel tank.

- All the eight bars will be displayed when the fuel in the tank reaches above 10.5 liters approximately (full tank). When the fuel reaches half tank (6.5 liters approx.) the fuel gauge displays only four bars as shown.

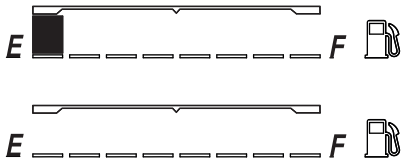


- The fuel gauge shows only single bar when the fuel reaches minimum safe fuel level (3.5 liters approx.)

- Low fuel indication ( ) starts blinking and one bar will be visible when the fuel reaches below minimum safe level (2.5 liters approx). Fuel need to be refilled immediately. Once the fuel level reaches 1.8 liters approx., no bar will be visible and low fuel indication glows continuously.

Caution:
Before turning IGNITION key to ON position, ensure availability of adequate fuel in tank. That is LOW FUEL INDICATION shall not come ON, before vehicle starting.

To avoid dry run of fuel pump, never run vehicle beyond 5 kms, after LOW FUEL INDICATION.

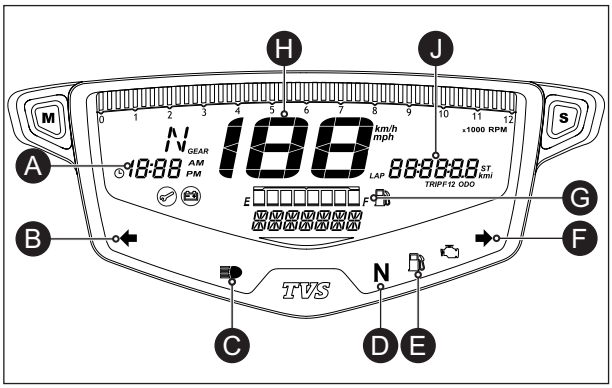


Note:
If all the fuel level bars in the speedometer are blinking and an error message 'CHECK FUEL SENSOR' scrolls at bottom, inspect the fuel module sensor, wiring harness couplers and the speedometer assembly.

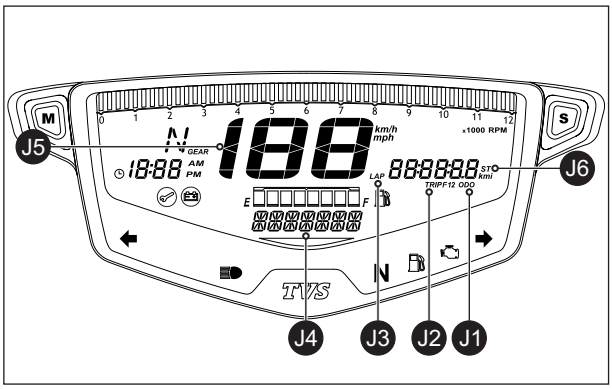
(H) Speedometer

- Speedometer indicates the vehicle speed in kilometer per hour by default when turning the ignition to ON position. This can be changed to mile per hour. The mode can be changed between kilometer per hour 'KMPH' and mile per hour 'MPH' using mode and set switch buttons (refer page no. 2-59).

Note:
If the ignition key is left in 'ON' condition and vehicle is kept without moving in geared condition(except Neutral) for more than 3 minutes, an error message 'CHECK SPEED SENSOR' will scroll at the bottom which is normal.



(J) Odometer / Trip meter 1 & 2 / Lap indicator / High speed indicator / Shortest time indicator



J1. Odometer

- Odometer registers the total distance covered by the vehicle in kilometer or mile as set by the user.

- The digit after the dot mark denotes one tenth of a kilometer or mile. Set the meter in 'ODO' mode to know the odometer reading.

J2. Trip meter

- In ODO mode, press the mode button once and twice to enter 'TRIP 1' and 'TRIP 2' meters respectively.

- Trip meter indicates the trip distance traveled in kilometer or mile (as set by the user). The digit after the dot mark denotes one tenth of a kilometer or mile.

- Provision to measure two different distance 'TRIP 1' or 'TRIP 2' is provided for the users to use as per their convenience.

J3. Lap timer

- Lap timer indicates the time taken to complete the lap.

- In 'TRIP 2' meter mode, press the mode button once to enter lap timer mode. After speedometer enters the lap timer mode, press SET button for more than 1 sec. After set button input, lap timer indicating digit blinks at a rate of 2 Hz.

- Lap timer will start counting when the vehicle speed is more than 3 km/h and stops blinking once it starts counting.

- Lap timer will stop counting and starts blinking once the vehicle speed reduces below 3 km/h. Blinking will stop once the vehicle comes to neutral.

- New lap can be started once the data is cleared manually (refer page 2-58 for resetting the lap timer data).

Note:
Lap timer works only when the lap timer mode is active.

J4. Alpha numeric display

- The self diagnostic alpha numeric display indicates the information about the current mode and error messages when the ignition key is turned ON.

J5. High speed indicator

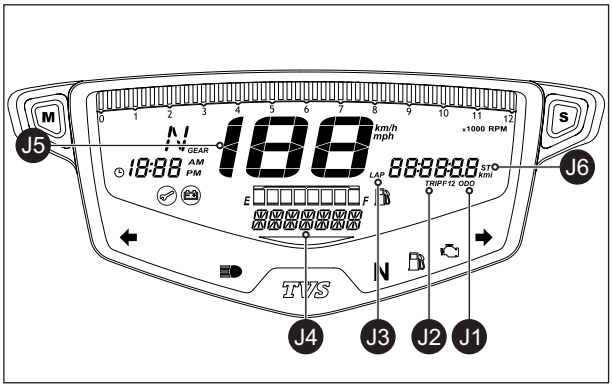
- High speed indicator records the maximum speed (top speed) achieved by the rider so far either in km/h or mph as set by the user. It can be reset and new speed can be recorded if required. Refer page no. 2-58 for resetting the high speed data.

- Set the meter in 'HIGH SPEED' mode to know the maximum speed achieved by any user so far.

- Whenever the vehicle speed crosses the previous achieved high speed then speedometer will scroll 'ACHIEVED HIGH SPEED' in display and flash the high speed data at the rate of 2 Hz till the scrolling completes when speed comes less than 3 km/h. This will happen in all modes except shortest time mode.

Note:
Maximum speed recorded so far will be displayed whenever the meter is set in 'HIGH SPEED' mode.

This display will off automatically once the vehicle starts moving (> 1 km/h) and it will continue the normal operation. Max speed recorded will be stored until manual reset. If the high speed is reset, the speed value will be shown as '0'.



J6. Shortest time indicator

- Shortest time indicator records the minimum time taken so far to reach 60 km/h or 40 mph speed (as set by the user).

- The recorded time can be reset and new time can be recorded if required. Set the meter in 'SHORTEST TIME' mode to know the time taken by a rider to reach the specific speed from starting.

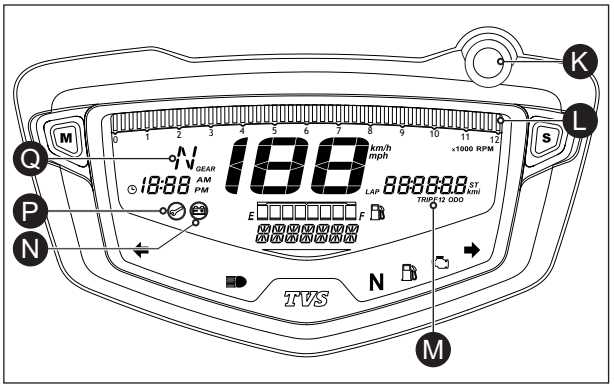
Note:
Minimum time taken recorded so far to reach 60 km/h or 40 mph speed will be displayed when the ignition is turned 'ON' and the meter is set in ' SHORTEST TIME' mode. Once the speed reached 60 km/h or 40 mph, then the time will stop at the exact point.

The best time achieved by any user and the last time taken to reach 60 km/h or 40 mph speed will be displayed in 'SHORTEST TIME' mode as shown in the previous page. Only the recorded last time taken can be reset the and new time can be recorded. The 'best record' time will be automatically replaced by next best time and the new best time recorded will be flashed and 'BEST SHORTEST TIME' scrolls in running display when the vehicle comes less than 3 km/h.

(K) Shift RPM indicator

- Shift RPM indicator alerts the user to shift the gears when engine reaches the specified RPM. Users can set the RPM indication levels as per their riding convenient in multiples of 1000 up to 12000 RPM.

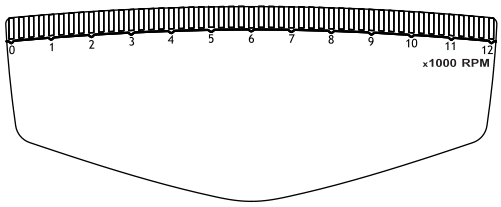
- When the engine reaches the set RPM, red indicator in the digital speedometer glows and indicates the user to shift to next higher gear.



Note:
Shift RPM indicator does not work when the vehicle is in neutral or when the fifth gear is engaged.

(L) Tachometer

- Tachometer indicates the engine speed in multiples of 1000 RPM (Revolutions Per Minute).



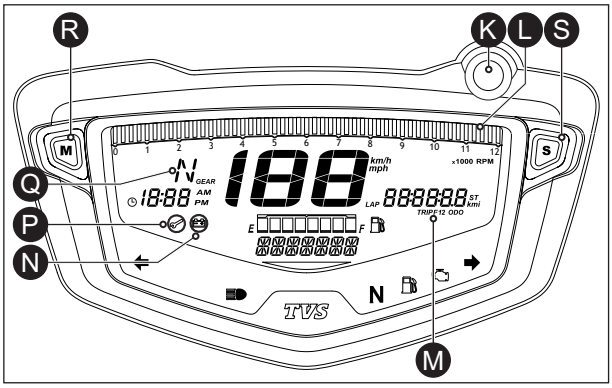
(M) Trip F

- This function shows the distance traveled when the low fuel indication symbol ( ) starts blinking and fuel gauge shows only one bar or glows continuously with fuel gauge showing no segment, the display automatically switches to the 'TRIP F' indicator after 1km or 0.6 miles as set by the user and 'TRIP F' meter starts counting from 1 km in km/h mode and 0.6 miles in mph mode.

- If the fuel level remains in minimum safe level, the reading is saved even after the ignition key is turned 'OFF'.

- The count stops and clears automatically after 5km is covered when the fuel level rises above minimum safe level. 'TRIP F' meter cannot be activated or deactivated manually.

- At every ignition ON, 'TRIP F' meter will get enabled automatically until fuel level is reached above minimum safe level (2.5 L).



(N) Low battery indicator

- An icon with battery symbol ' ' glows when the battery charge is too low. Check and charge the battery.

(P) Service reminder

- If the service is due, whenever the ignition lock is turned 'ON', an icon with spanner symbol ' ' blinks for 10 seconds after the speedometer's self diagnostic cycle and continues to glow till the vehicle is serviced and reset.

Note:
The service reminder indicator lamp works only based on the distance (km/miles) covered by the vehicle. This is only a reminder indicator. Advise customers to keep track and follow the service schedule.

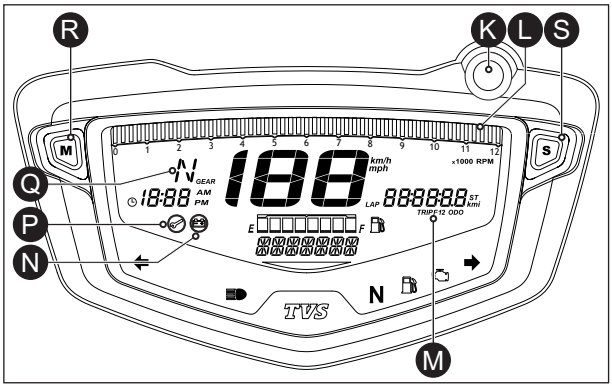
(Q) Gear shift indicator

- The gear shift indicator in the digital display indicates the position of the gears.

(R & S) MODE and SET buttons

- Sequence of mode is as follows:
  1. ODO
  2. Trip 1
  3. Trip 2
  4. Lap timer
  5. High Speed
  6. Shortest time mode

- The mode (R) and set (S) buttons are provided to change the mode between 'ODO', 'TRIP 1', 'TRIP 2', 'LAP timer', 'HIGH SPEED', 'SHORTEST TIME' and to set the MPH, CLOCK, SHIFT RPM etc.



Note:
Mode and Set switch buttons will not work when the vehicle exceeds above 10 km/h or 6 mph in the respective modes.

SETTING THE DIGITAL DISPLAY

- Every press of the mode button changes the display to other mode. Follow the below procedures to set the display in desired mode.

- If ignition is turned OFF when the meter is in ODO or TRIP meters, then the respective meters will be displayed in the next ignition ON. If any other modes other than these were set during ignition OFF, then ODO meter will be displayed in the next ignition ON.

1. Press the mode button twice or thrice to change display to '0.0 km TRIP1' or '0.0 km TRIP2' mode.

   - To reset any of the trip meter while ensuring the display is in 'TRIP 1' or 'TRIP 2', press and hold the SET button for a few seconds

2. Press the 'Mode' button till the ' LAP 000000 ' timer display appears to set 'LAP' timer mode.

   - To reset the Lap timer mode, keep the display in 'LAP' timer mode and press and hold SET button for few seconds.

3. Press the 'Mode' button till the ' HIGH SPEED MODE ' display appears to set the 'HIGH SPEED' indicator mode.

   - To reset the high speed recorded, keep the display in 'HIGH SPEED' mode and press the 'Set' button for a few seconds.

4. Press the 'Mode' button till the display changes to 'BEST RECORD 99 LAST RECORD 00' to set 'SHORTEST TIME' indicator.

   - To reset the 'LAST RECORD' of the shortest time, press and hold the 'Set' button for few a seconds. Please remember only current record will be reset and best time display will remain same.

5. Press the 'Mode' button once to change the display to ODO mode again.

KMPH and MPH setting

- Ensure the display is in 'ODO' mode. Press and hold the 'Mode' button till 'MPH' blinks in display. Press 'Set' button to select the 'MPH' mode, the 'MPH mode' icon scrolls in running display for one full cycle.

- To change the display to 'KMPH' mode again, press and hold the 'Mode' button till 'KMPH' blinks in display. Press 'Set' button to select the 'KMPH' mode, the 'KMPH' icon scrolls in running display for one full cycle.

Digital clock setting

- Press and hold the 'Mode' button till 'MPH' icon blinks in display.

- Release and press the 'Mode' button once again so that the 'Clock' icon blinks.

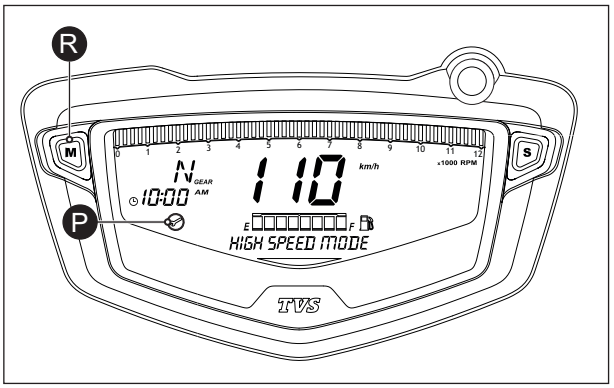
- On pressing the 'Set' button, 'CLOCK MODE' scrolls in running display and the hour digit of the clock blinks.

- Now, press the 'Mode' button to increase the hours while hour digits are blinking.

- On pressing the 'Set' button again the hours of the clock is set and the minute digit blinks.
- Now, press the 'Mode' button to increase the minutes while minute digits are blinking.
- Else, on pressing the 'Set' button again the minutes of the clock is set and the hour format 'AM' or 'PM' blinks.
- Press the 'Mode' button to change the hour format 'AM' or 'PM'. Press the 'Set' button once again to set hour format and to come out from clock setting.

Setting the Shift RPM

- Press and hold the 'Mode' button till 'MPH' icon blinks in display.
- Release and press the 'Mode' button twice so that the 'RPM' icon blinks.
- Press the 'Set' button to reach shift RPM setting mode the 'SHIFT RPM' icon scrolls in running display for one cycle. Previous RPM setting value is displayed in the bar display and LED will glow.
- Now, press the 'Mode' button to increase the RPM (multiples of 1000) in cyclic fashion. Once the user starts updating, the LED stops glowing.
- Pressing the 'Set' button to exit the setting. Once the shift RPM is set, the LED again glows till this mode is exit.



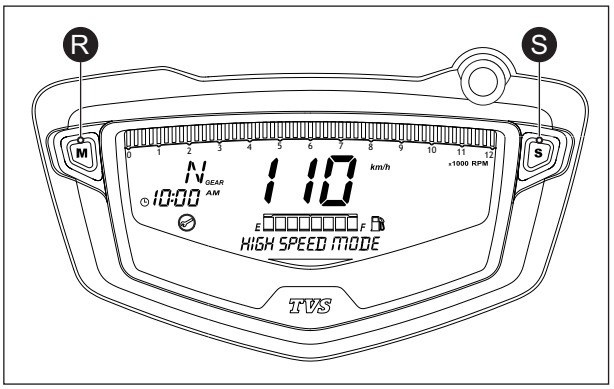
SERVICE REMINDER RESETTING PROCEDURE

- If the service reminder (P) is glowing, reset it after carrying out periodic services.
- Turn 'ON' the ignition and wait till the completion of speedometer's self test cycle (till the 'RACE ON' message appears on the speedometer dial).
- Press the 'Mode' button (R) till the display changes to 'HIGH SPEED' mode (HIGH SPEED MODE).

Note:
Please remember that the service reminder indicator of speedometer can be reset only in 'HIGH SPEED' mode.

- Now, press and hold both 'Mode' and 'Set' buttons (R & S) till the service reminder indicator disappears.

- Turn 'OFF' and turn 'ON' the ignition and once again confirm that the indicator is reset (not appearing again).

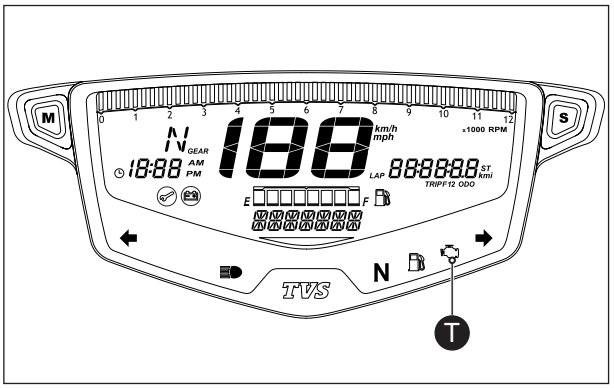


Malfunction

(T) Malfunction indicator lamp

- MIL is turned ON when the ECU detects a fault in the system.

Ignition	Engine	Malfunction indicator	Status
On	On	Off	Ok
On	On	On	Fault



Chapter 3

SERVICING OF ENGINE

ENGINE OVERHAUL

Before beginning engine overhaul, observe engine conditions for the following:

- Cleanliness
- Compression pressure
- Any abnormal noise
- Oil leak, seepage if any

To overhaul the gears, balancer shaft, shaft complete counter, shaft complete drive and crankshaft assembly, the crank cases need to be separated.

COMPRESSION PRESSURE

- Warm-up the engine to normal operating temperature before checking the compression pressure.
- Stop the engine and remove the spark plug.

Plug spanner

- Mount the compression gauge adaptor to the plug hole, taking care to make the connection leak proof. (Fig. 3.1)

Compression gauge and special adopter

Caution :
Before mounting the gauge, enure that the gauge is calibrated. Similarly, after mounting the gauge ensure that there is no leakage in the line.

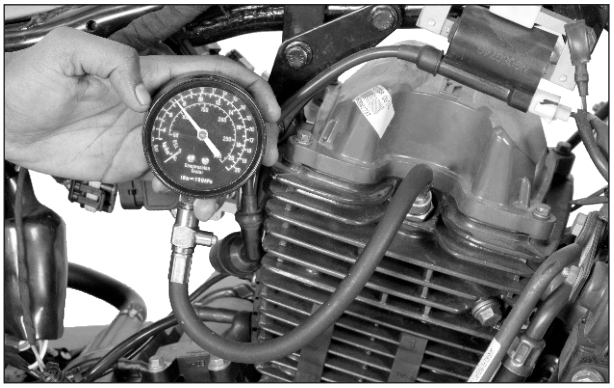


Fig. 3.1

- With the fuel cock knob in 'OFF' position, switch 'OFF' the ignition, open the throttle fully and crank the engine five to six times with the electric starter, until the maximum reading achieved in the compression gauge.

Standard	6.3 ~ 8.4 kg/cm^2 (90 ~ 120 psi)
Service limit	< 6.3 kg/cm^2 (< 90 psi)

- If the compression pressure is high, it indicates that high carbon deposit on the combustion chamber and the piston crown.

- If the compression pressure is low, pour 3 to 5 cc of clean engine oil into the cylinder through the sparkplug hole and re-check the compression pressure. If the compression pressure increases from the previous value, then check the following.
  - Leaking cylinder head gasket.
  - Worn piston rings.
  - Worn cylinder and piston.
  - Piston ring stuck in the grooves.
- If the compression pressure is almost same as the previous value, check the valves for leakage and throttle body butterfly valve opening.

CLUTCH - SERVICING

REMOVAL

Clutch assembly can be serviced with the engine mounted on the vehicle itself. Normally clutch is serviced for:

- Loss of power / pickup
- Jerking of vehicle
- Any abnormal noise from clutch

- Drain engine cum transmission oil as explained in chapter "Periodic maintenance" page no. 2-12.
- After draining always measure the oil quantity using a measuring jar.
- Remove filter complete engine oil as explained in chapter "Periodic maintenance" page no. 2-13.
- Loosen lock nut (A) and adjusting nut (B) from the cable assembly clutch mounting. (Fig. 3.2)

12 mm spanner

- Using 20 mm open end spanner rotate the arm clutch release towards front, in such a way that cable assembly clutch can be dislocated from the arm clutch release. (Fig. 3.3)

20 mm spanner

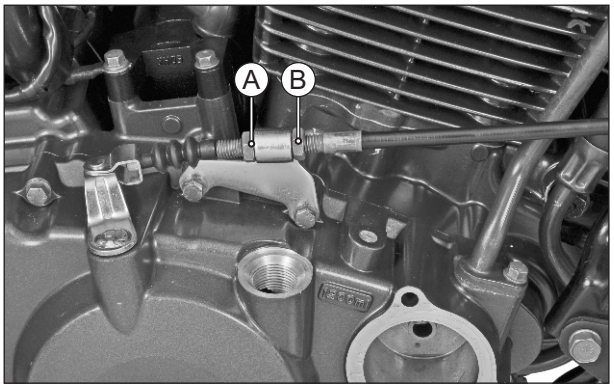


Fig. 3.2

Fig. 3.3

- Dislocate the cable assembly clutch from the bracket clutch cable. (Fig. 3.4)

- Place a plastic tray under the engine to collect the remaining oil in the engine while removing the cover clutch.

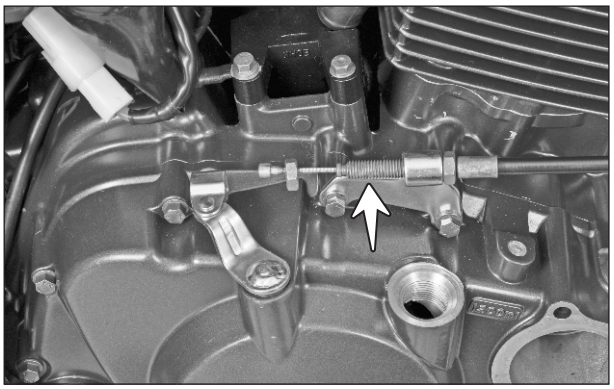


Fig. 3.4

- Remove the hexagonal flange bolt (M6x25 - 1 no.) from the pipe complete outlet of engine oil cooler and dislocate the pipe from the cover clutch. (Fig. 3.5)

8 mm spanner	
Tightening torque	10 ± 2 Nm

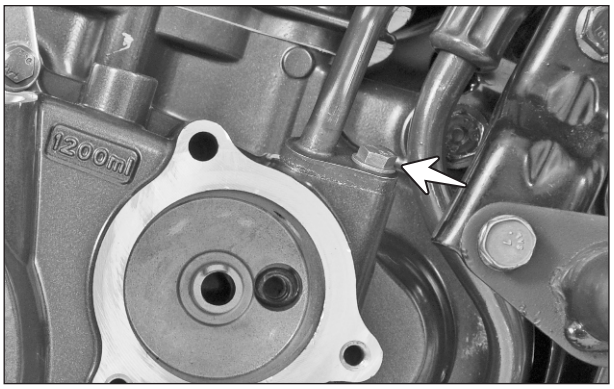


Fig. 3.5

- Remove the hexagonal socket head cap screw (M6x16 - 1 no.) from the cover clutch mounting. (Fig. 3.6)

4 mm allen key	
Tightening torque	10 ± 2 Nm

Caution:
While reassembling, ensure to assemble the hexagonal socket head cap screw without fail to avoid leakage of oil.

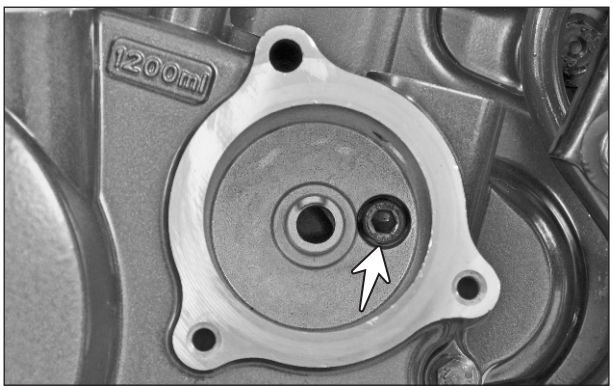


Fig. 3.6

- Remove the hexagonal flange bolts (M6x35 - 11 nos.) from the cover clutch mounting. (Fig. 3.7)

8 mm spanner	
Tightening torque	10 ± 2 Nm

- Take out cover clutch by gently tapping at the ends using nylon hammer.

Nylon hammer

- Take out gasket cover clutch and dowel pin clutch cover (2 nos.).

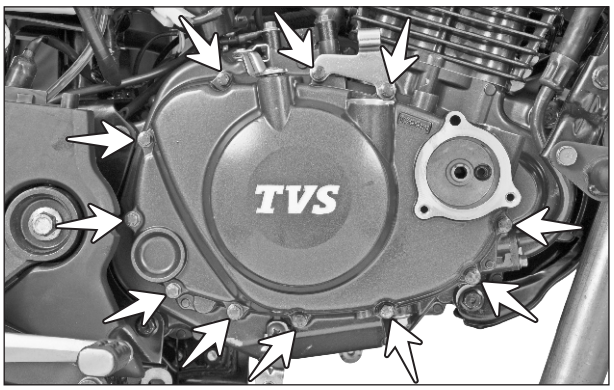


Fig. 3.7

- Take out adopter pin clutch release from the clutch assembly along with a ball (dia. 3/16). (Fig. 3.8)

Caution:
While reassembling ensure to assemble the ball without fail.

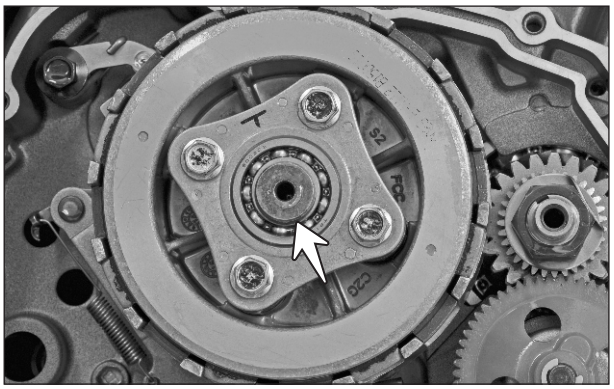


Fig. 3.8

- Remove the hexagonal flange head bolts (M6x25 - 4 nos.) from the plate clutch release mounting. (Fig. 3.9)

10 mm spanner	
Tightening torque	10 ± 2 Nm

Note:
Please follow the uniform loosening and tightening of plate clutch release bolts to avoid uneven loading of plate.

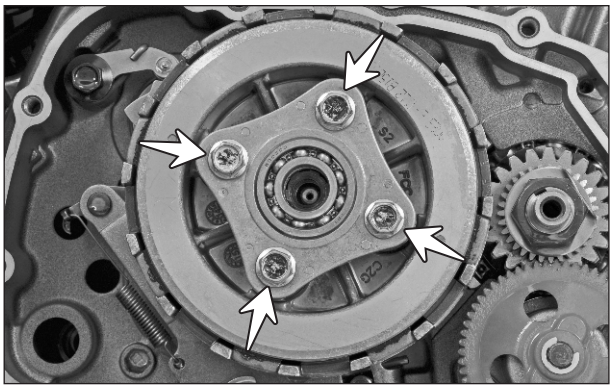


Fig. 3.9

- Take out plate clutch release.
- Take out the spring clutch (4 nos.). (Fig. 3.10)

Caution:
While reassembling, ensure all the four clutch springs are having same colour grade.

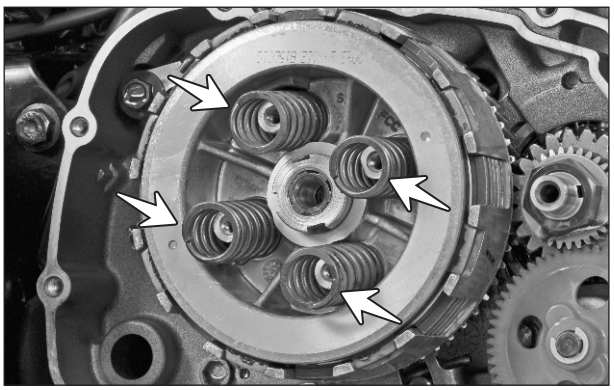


Fig. 3.10

- Using special tool hold the disc clutch pressure and remove nut clutch shaft (slotted nut). (Fig. 3.11)

N231 001 0	Clutch holding tool
N231 002 0	Clutch nut tightening tool
27 mm spanner	
Tightening torque	75 ± 5 Nm

Caution:
Assemble all the four bolts of plate clutch release with the clutch holding special tool. Do not experiment with two bolts mounted diagonally as it may damage the disc clutch pressure.

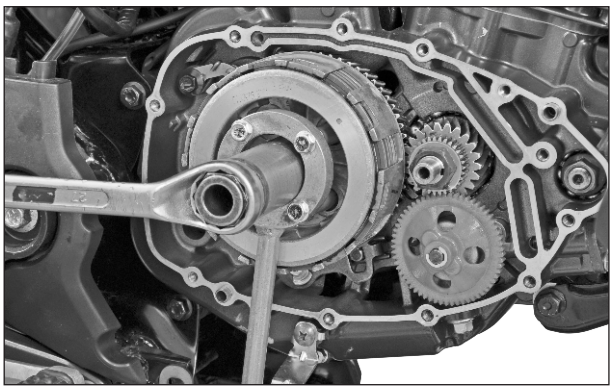


Fig. 3.11

- Take out the spring disc from clutch shaft. (Fig. 3.12)

Note:
While reassembling, locate the spring disc in such a way that the convex face diameter of washer faces towards outside.

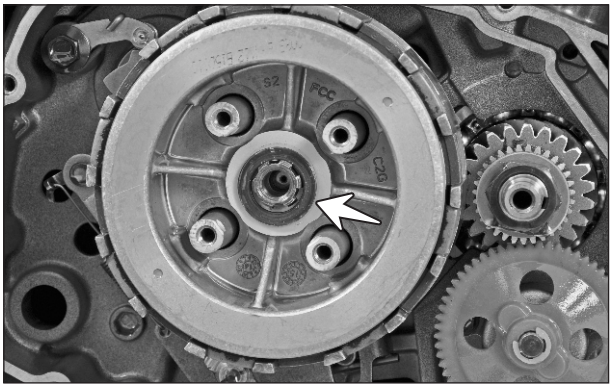


Fig. 3.12

- Pull out disc clutch pressure along with the hub clutch, plate clutch driven (5 nos.) and plate clutch drive (4 nos.) as a set. (Fig. 3.13)

Caution:
Please note that, one plate clutch drive (the top one) is seated in smaller slotted groove of the clutch housing as shown. Care should be taken to reassemble the top drive plate in the same position.

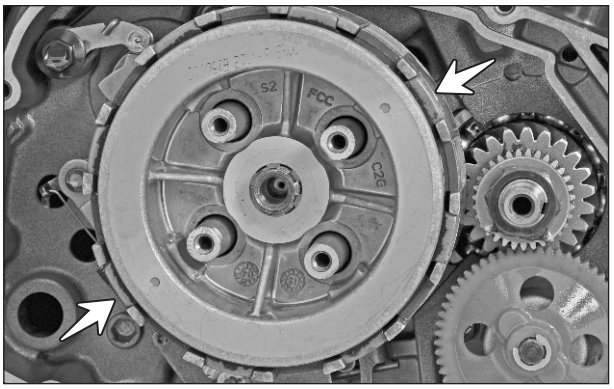


Fig. 3.13

- Separate the hub clutch, plate clutch driven (5 nos.), plate clutch drive (4 nos.) and disc clutch pressure. (Fig. 3.14)

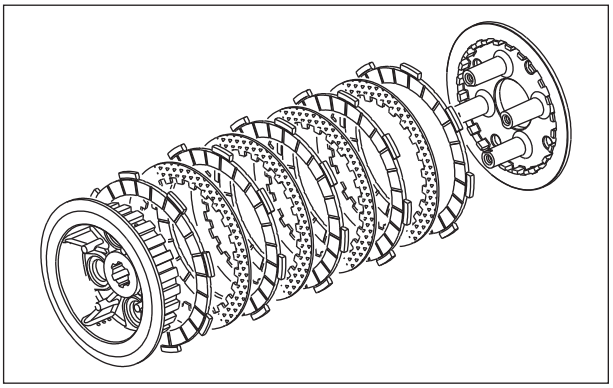


Fig. 3.14

- Remove thrust washer clutch hub from the shaft complete counter. (Fig. 3.15A)

- Pull out gear assembly primary driven along with a clip primary driven gear from gear complete kick starter. (Fig. 3.15B)

Note:
While reassembling, ensure the clip in the gear assembly primary driven.

Also ensure to locate and lock the gear assembly primary driven with gear complete kick starter driven.

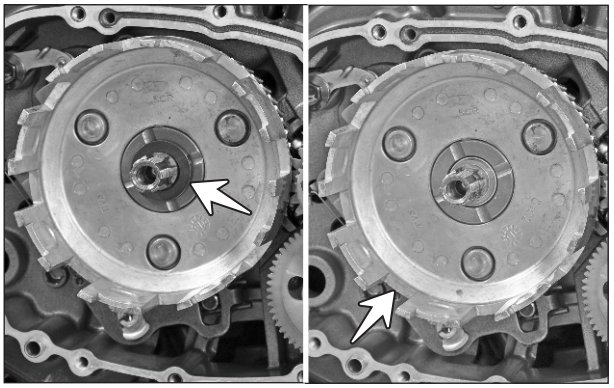


Fig. 3.15A Fig. 3.15B

INSPECTION

Plate clutch drive

- Inspect the thickness of plate clutch drive using a vernier caliper. If the thickness is less than the service limit, change the plate clutch drive as a set. (Fig. 3.16)

Vernier caliper	
Service limit	2.600 mm (min)

- Similarly, inspect the claw width of plate clutch drive using a vernier caliper. (Fig. 3.17). If the claw width is less than the service limit, change the plate clutch drive as a set.

Vernier caliper	
Service limit	15.300 mm (min)

- Check the plates for burning due to excessive friction / contaminated or low oil level. Inspect plate clutch drive claws for indents (cut marks) due to regular thrust from the housing clutch. Found if any, replace the plates as a set.

Plate clutch driven

- Inspect the plates clutch driven for distortion using a feeler gauge as shown. (Fig. 3.18)

- Check every individual plates. Hold the plates with three fingers and insert the feeler gauge between the surface plate and driven plate at 3 to 4 locations to determine the distortion. If the distortion is more than the service limit, change the plate clutch driven as a set.

Service limit	0.100 mm (max)

Spring clutch

- Check the free length of springs clutch using a vernier caliper. If the springs reaches service limit, replace all the spring as a set. (Fig. 3.19)

Service limit	38.57 mm (min)

Caution:
Clutch springs are graded and identified with different colour codes. While reassembling, ensure the springs of same colour codes are assembled.

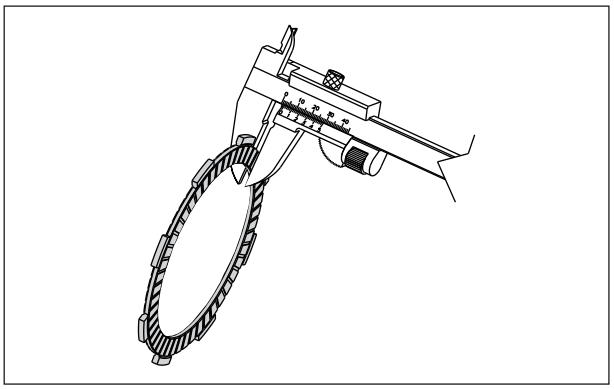


Fig. 3.16

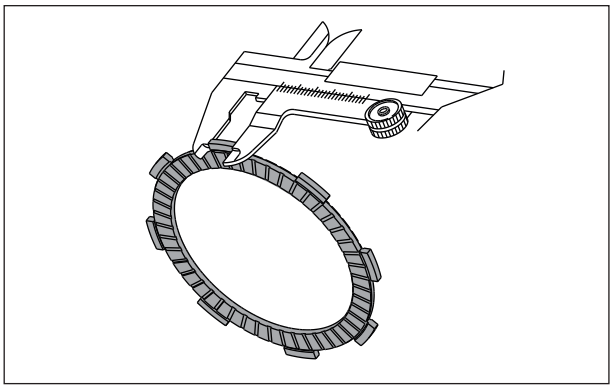


Fig. 3.17

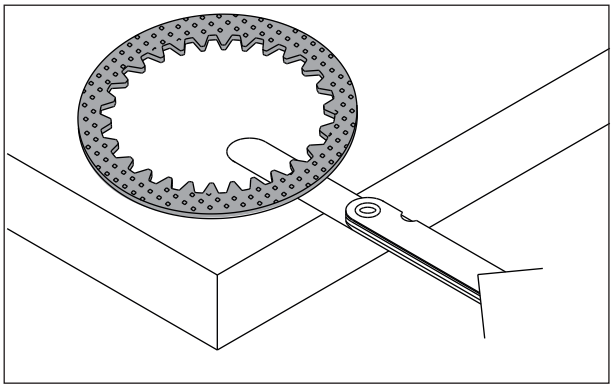


Fig. 3.18

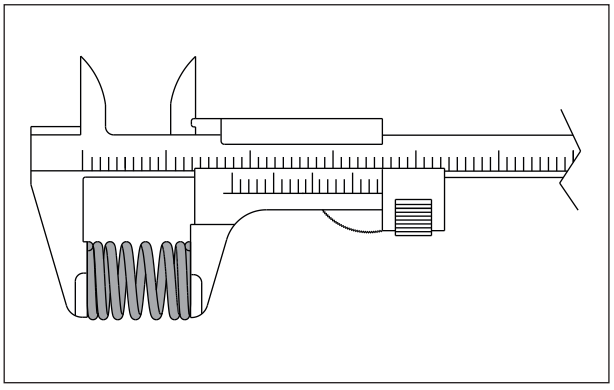


Fig. 3.19

Gear assembly primary driven (housing clutch)

- Inspect housing clutch for the indents / cuts created by the plate clutch drive. (Fig. 3.20)

> ***Note :***
> ***Check the primary drive gear play by rotating the gear portion. The play should be lesser than 6° with respect to the housing clutch (aluminum body). If it is found more, replace the primary driven gear assembly with a new one.***

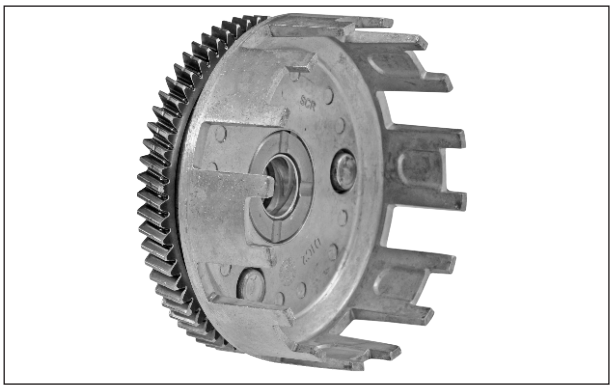


Fig. 3.20

Hub clutch

- Inspect the hub clutch for wear. If any ridges or cuts formed on the hub clutch by the clutch plates, replace with a new one. Also check the lubrication holes for any blockage. (Fig. 3.21)

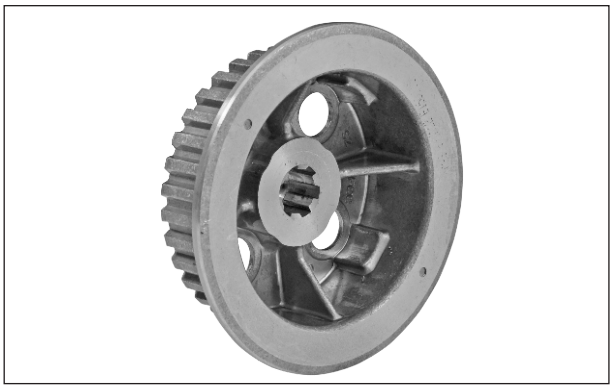


Fig. 3.21

REASSEMBLY

- Reassemble parts in the reverse order of disassembly.
- Before reassembling, inspect the bearing clutch release plate for any abnormal noise and smooth rotation. Replace bearing with a new one if found defective.
- Ensure the clutch plates are held firmly together by checking the play between the drive plates after tightening the plate clutch release bolts. (Fig. 3.22)
- Before reassembling cover clutch, ensure the assembly of a ball and pin clutch release inside the adopter clutch release.
- Replace the gasket cover clutch with a new one.
- Reconnect the clutch cable and adjust clutch play. Refer chapter "Periodic maintenance" page no. 2-25 for clutch adjustment procedure.
- Refill the engine cum transmission oil. Refer chapter "Periodic maintenance" page no. 2-12 for oil filling procedure.

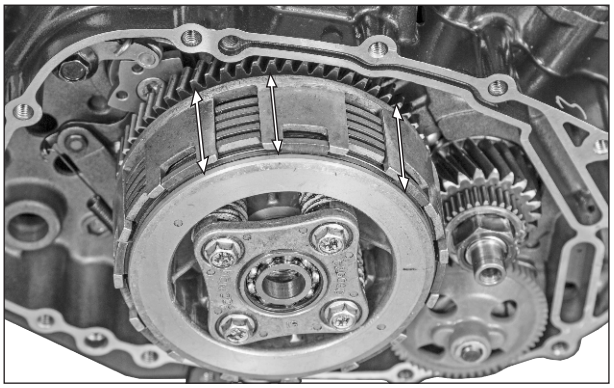


Fig. 3.22

CYLINDER HEAD ASSEMBLY - SERVICING

REMOVAL

- Remove the cover frame R and L as explained in the chapter "Periodic maintenance" page no. 2-4.
- Remove the fuel tank complete as explained in the chapter "Periodical maintenance" page no. 2-5.
- Disconnect the HT card from the spark plug and remove the spark plug. (Fig. 3.23)

Plug spanner

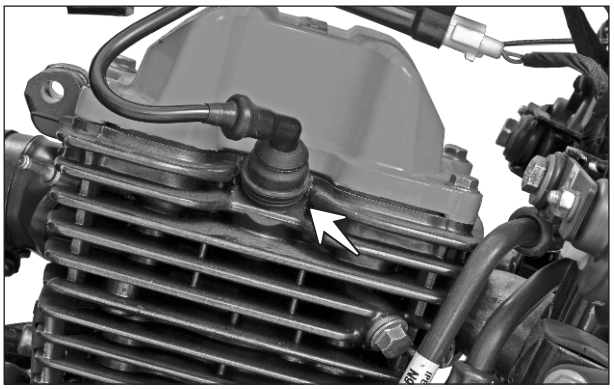


Fig. 3.23

- Disconnect the all sensors (4 nos.) from throttle body assembly. (Fig. 3.24)

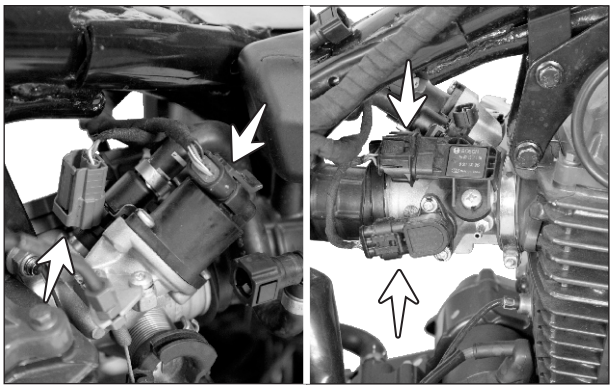


Fig. 3.24

- Loosen the hose clip (A) of tube air cleaner outlet and hose clip (B) of pipe intake complete. (Fig. 3.25)

Phillips head screw driver

- Gently pull out the throttle body assembly and carefully hang it on the frame itself.

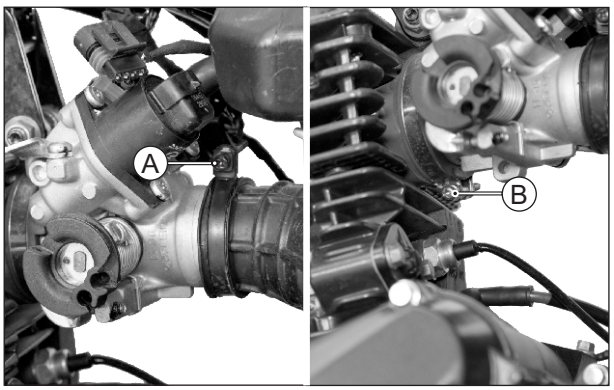


Fig. 3.25

- Remove the plug (A) using small flat screw driver from the adjuster assembly. (Fig. 3.26A)
- Using a small flat screw driver, lock the adjuster plunger by rotating it in clockwise direction. (Fig. 3.26B)

Small flat screw driver

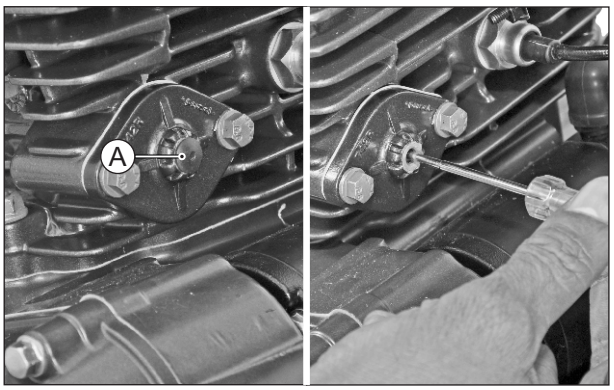


Fig. 3.26A Fig. 3.26B

- Remove the hexagonal flange bolts (M6x16 - 2 nos.) from the adjuster assembly mounting and take out the adjuster assembly along with a gasket. (Fig. 3.27)

8 mm spanner	
Tightening torque	10 ± 2 Nm

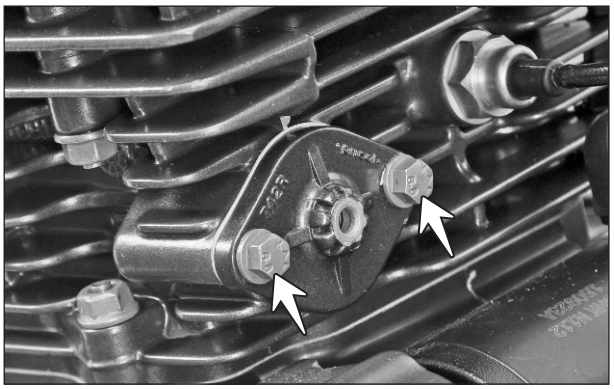


Fig. 3.27

- Disconnect the wiring socket (A) of ignition coil from the wiring harness. (Fig . 3.28)
- Remove the hexagonal flange bolt (M6x20 - 2 nos.) from the mounting of ignition coil assembly and take out the ignition coil. (Fig. 3.29)

10 mm spanner	
Tightening torque	5.5 ± 1 Nm

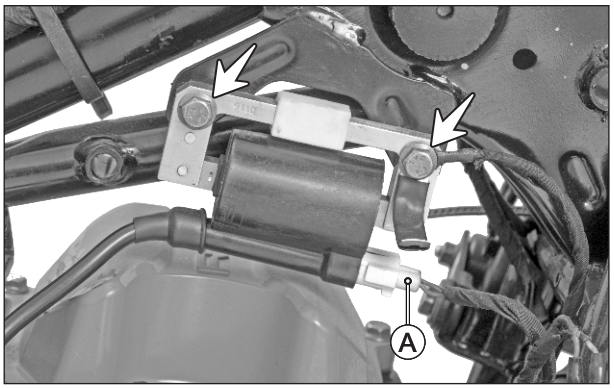


Fig. 3.28

- In-order to remove the muffler assembly, the engine guard needs to be removed.
- Remove the CRR pan head screw (M6x20 - 1 no.) along with plain washer from the top mounting of engine guard. (Fig. 3.29)

Phillips head screw driver	
Tightening torque	4.5 ± 1.5 Nm

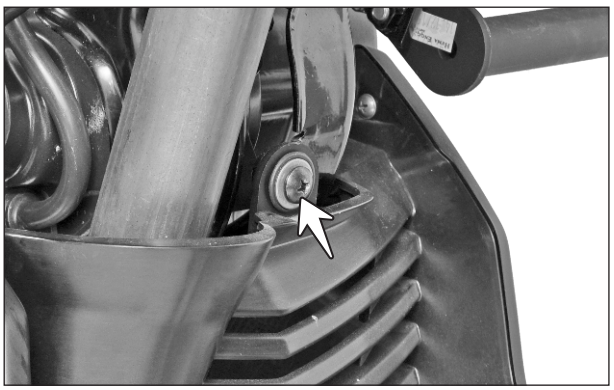


Fig. 3.29

- Remove the CRR pan head screw (M6x20 - 2 nos.) along with plain washers from the LH and RH mounting of engine guard. (Fig. 3.30)

Phillips head screw driver	
Tightening torque	4.5 ± 1.5 Nm

- Gently takeout the engine guard as an assembly.

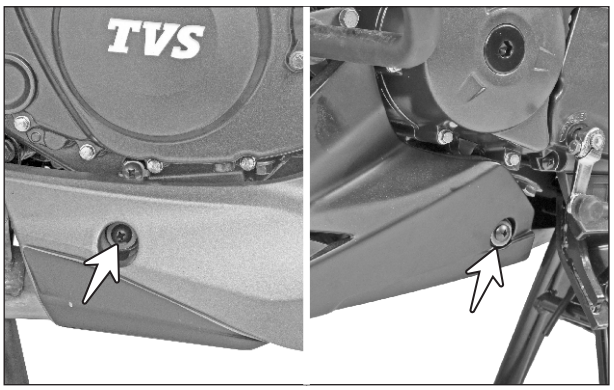


Fig. 3.30

- Pull the red color clip from the coupler and disconnect the O_2 sensor coupler from the wiring harness. (Fig. 3.31)

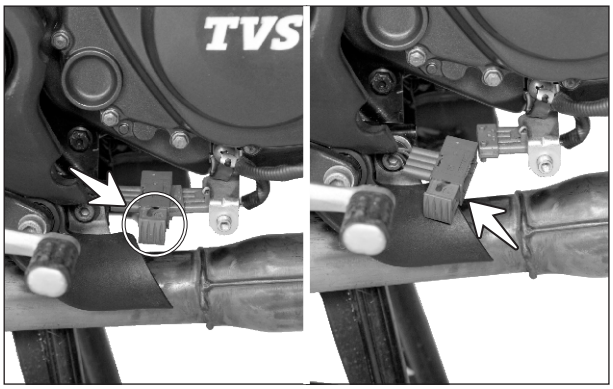


Fig. 3.31

- Remove the hexagonal socket head cap screw (M8x30 - 2 nos.) from the muffler assembly front mounting. (Fig. 3.32A)
- Remove the hexagonal socket head cap screw (M8x25 - 1 no.) from the center mounting of muffler assembly with punched washer. (Fig. 3.32B)

6 mm allen key	
Tightening torque	18.1 ± 1.3 Nm

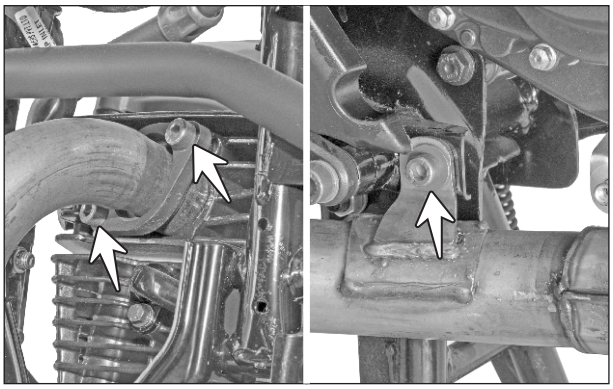


Fig. 3.32A Fig. 3.32B

- Remove the hexagonal bolt (M8x60 - 1 no.) from the muffler assembly rear mounting along with punched washer and 'U' nut. (Fig. 3.33)

12 mm spanner	
Tightening torque	19.6 ± 2 Nm

- Take out muffler assembly by dislocating from the cylinder head assembly.

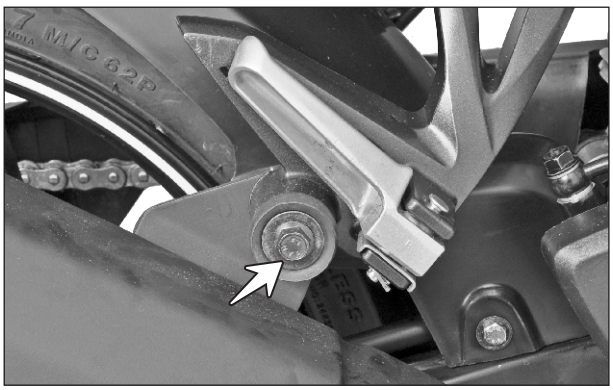


Fig. 3.33

- Remove the hexagonal flange nuts (2 nos.) fastening the cylinder head assembly with the cylinder block. (Fig. 3. 34)

10 mm spanner	
Tightening torque	7 ± 1 Nm

Note:
Ensure to loosen the hexagonal flange nuts (2 nos.) fastening the cylinder block with the crankcase to avoid warpage of cylinder before removing the nuts fastening the cylinder head and cylinder.

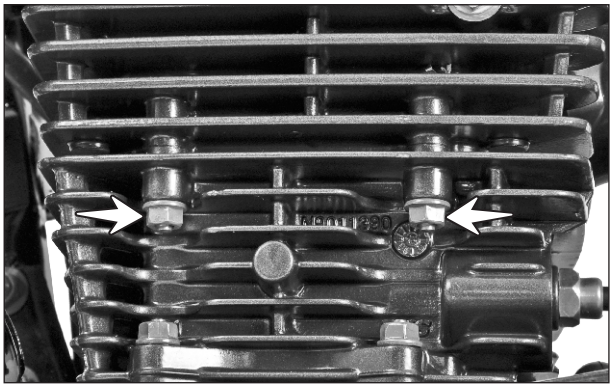


Fig. 3.34

- Remove the hexagonal flange bolt (M16x25 - 4 nos.) from the cover cylinder head mounting. (Fig. 3.35)

10 mm spanner	
Tightening torque	10 ± 2 Nm

- Dislocate the cover cylinder from the left hand side and take out.

- Take out the packing seal cover cylinder head. (Fig. 3.36)

Note:
While reassembling inspect the condition of the packing seal. If any distortion / damage is found, replace the packing with a new one.

- Slowly rotate the rear wheel and engage first gear.

- Now, remove the hexagonal flange bolt (M8x1.25 LH) from the cam shaft assembly. (Fig. 3.37)

10 mm spanner	
Tightening torque	18 ± 2 Nm

Caution:
Since left hand type thread is used in the bolt, it should be loosened in the opposite direction.

Note:
Apply ANABOND 112 thread locker during reassembly of the bolt.

- Gently pull out the sprocket cam shaft using nose plier and dislocate the cam chain from cam sprocket. (Fig. 3.38)

Caution:
Care should be taken not to drop the cam chain inside the crankcase assembly while dislocating.

- Hold the cam chain using a good quality copper wire to prevent the chain from falling into the crankcase assembly and hang it on the head assembly itself.

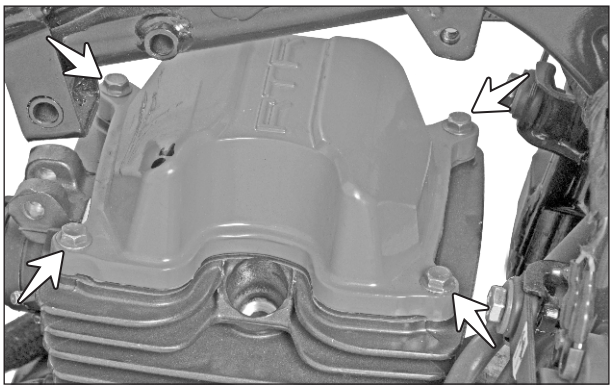


Fig. 3.35

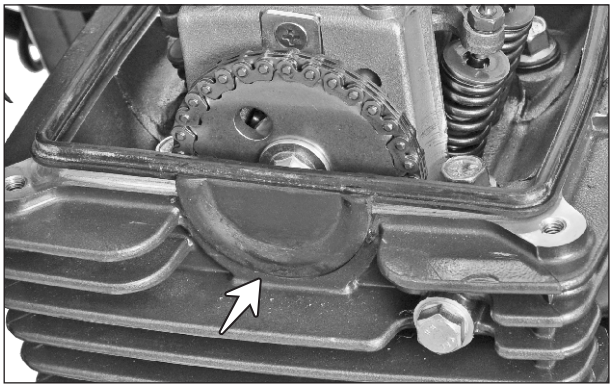


Fig. 3.36

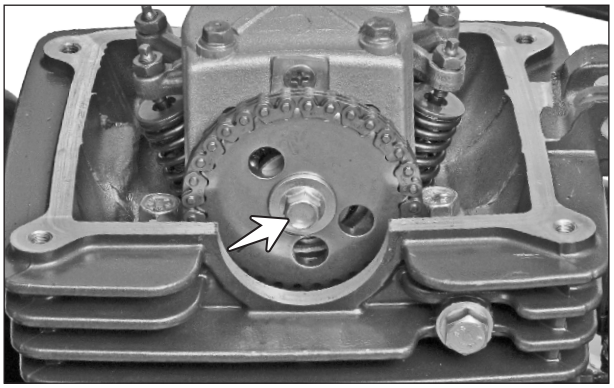


Fig. 3.37

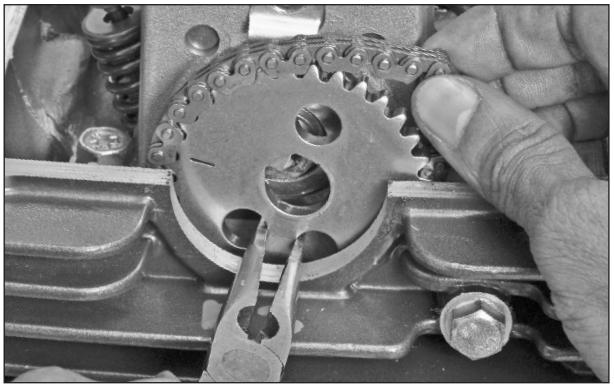


Fig. 3.38

- Take out the washer camshaft sprocket from the camshaft. (Fig. 3.39)

Nose plier

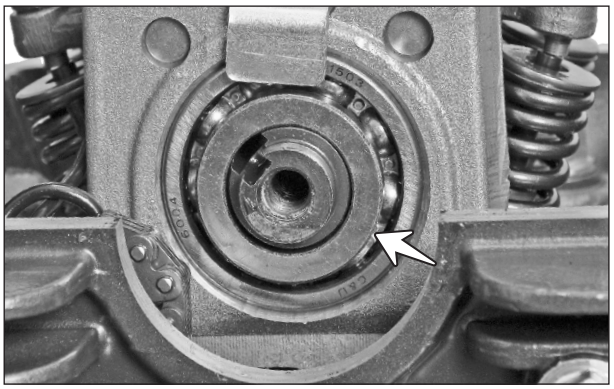


Fig. 3.39

- Take out the cam chain tensioner by removing the bolt cam chain tensioner along with washer cam chain tensioner. (Fig. 3.40)

12 mm spanner	
Tightening torque	12 ± 2 Nm

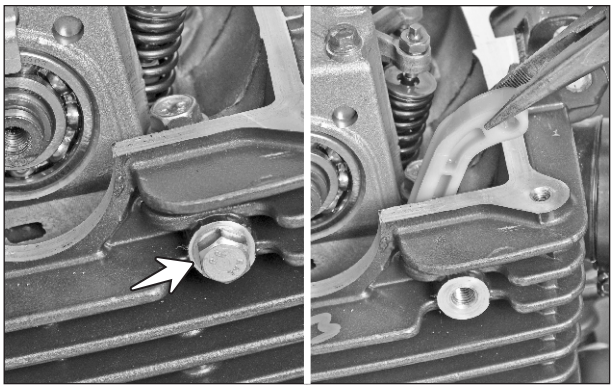


Fig. 3.40

- Remove the bolt cylinder head (4 nos.) from the mounting of cylinder head complete. (Fig. 3.41)

12 mm spanner	
Tightening torque	24.5 ± 2.5 Nm

Note:
While reassembling, always tighten the cylinder head assembly bolts in criss-cross pattern to have uniform seating.

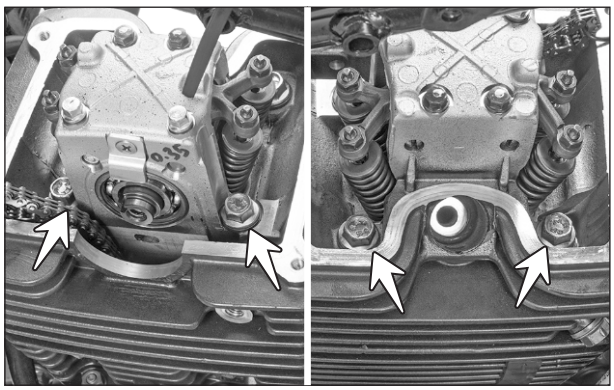


Fig. 3.41

- Remove punched washers (3 nos.) and a copper washer (A) from the mounting surface of bolt cylinder head. (Fig. 3.42)

Caution:
While reassembling the bolt cylinder head at the right hand front side of the cylinder head assembly, always use copper washer to avoid oil leak.

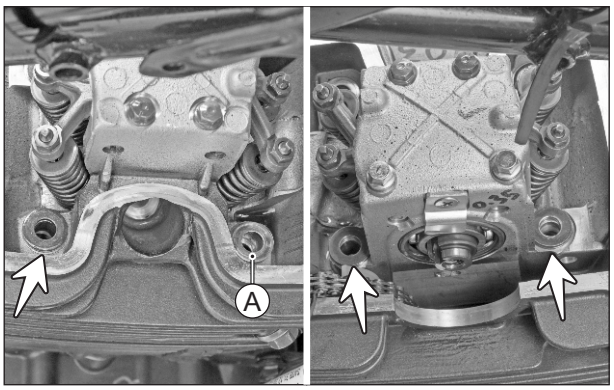


Fig. 3.42

- Holding the cam chain, gently lift and take out the cylinder head as an assembly. (Fig. 3.43)

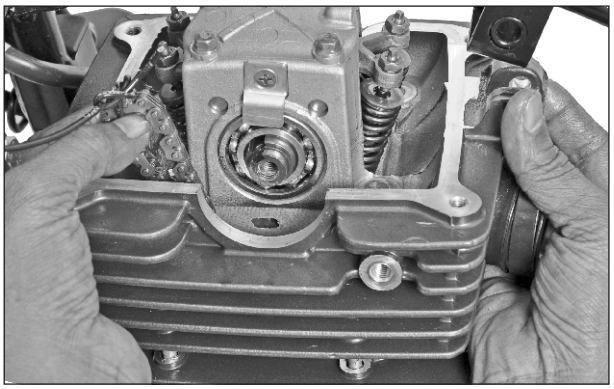


Fig. 3.43

- Take out the tubular dowels (A) either from cylinder head assembly or from cylinder block. (Fig. 3.44)
- Take out the gasket cylinder head (B). (Fig. 3.44)

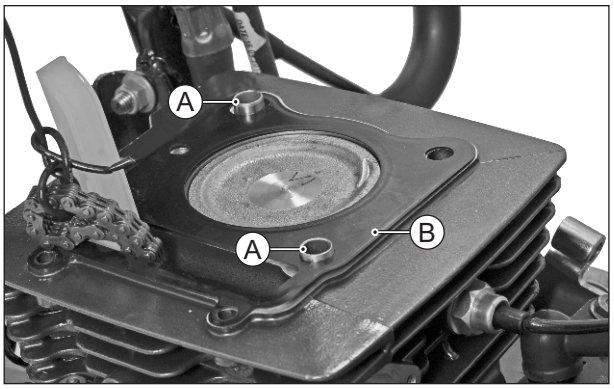


Fig. 3.44

Note:
While reassembling, check the gasket for any damage, scoring, deformation or leakage marks. If found replace the gasket with a new one.

CYLINDER HEAD ASSEMBLY

DISASSEMBLY

- Remove the REC CSK head screw (M6x16 - 2 nos.) from the pipe intake complete mounting and take out the pipe intake along with a 'O' ring. (Fig. 3.45)

Phillips head screw driver	
Tightening torque	10 ± 2 Nm

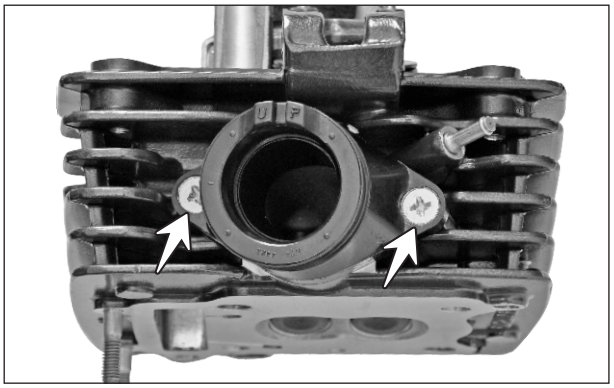


Fig. 3.45

Note:
While reassembling replace the 'O' ring with new one.

- Remove hexagonal flange bolt (M6x25 - 4 nos.) from the mounting of cylinder head assembly. (Fig.3.46)

8 mm spanner	
Tightening torque	7 ± 1 Nm

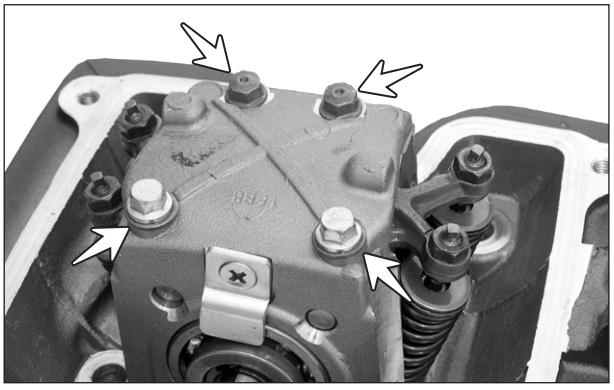


Fig. 3.46

- Remove the REC CSK head screw (M5x15 - 1 no.) from the stopper camshaft and dislocate and take out the stopper camshaft. (Fig. 3.47)

Phillips head screw driver

Tightening torque	4 ± 1 Nm

- Take out the camshaft complete from the cylinder head complete.

- Using a flat screw driver, gently push out both the shaft rocker arms. (Fig. 3.48)

Caution :
While removing the shaft rocker arm, the needle bearing pins assembled inside the rocker arm may fall inside the cylinder head. Ensure to re-collect all the pins and fix it into the rocker arm without fail.

- Take out both intake and exhaust rocker arm assemblies from the cylinder head assembly.

- Locate the special tool to remove the inlet valve as the movable jaw of the tool rests on the retainer valve spring (Fig. 3.49A) and the other end (fixed jaw) to rest at the center of the valve face. (Fig. 3.49B)

- Slowly tighten the special tool to compress the valve springs.

S131 002 0	Extractor assembly, inlet and exhaust valve

Caution:
Do not compress the spring more than required to prevent the spring from loss of tension.

- Remove the cotter valves (2 nos.) from the valve stem. (Fig. 3.50)

Nose plier

- Loosen and take out the special tool.

- Remove the cotters of other inlet valve in similar manner.

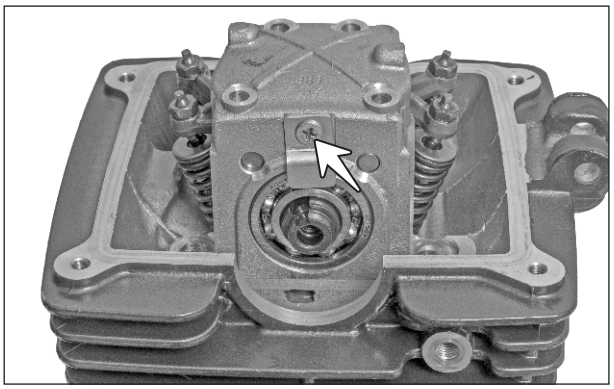


Fig. 3.47

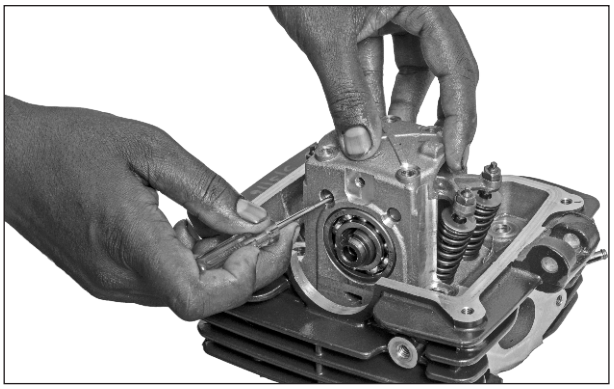


Fig. 3.48

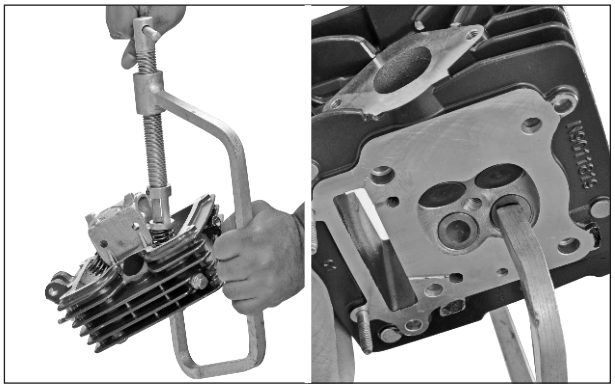


Fig. 3.49A Fig. 3.49B

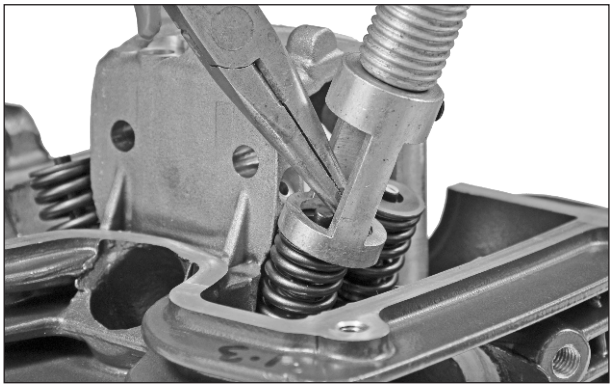


Fig. 3.50

- Remove the retainer valve springs and spring valves. (Fig. 3.51)

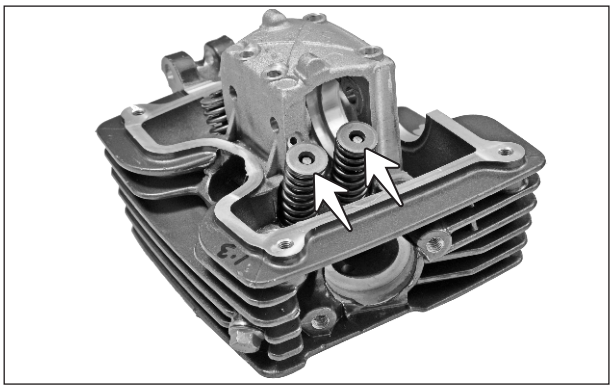


Fig. 3.51

- Gently push down the valves from the top and remove them from the combustion chamber side. (Fig. 3.52)

Note:
While removing the valves, check for the free movement of the valves. If there is no free movement, check the valves for bend and runout. Replace the valves incase of bend or runout.

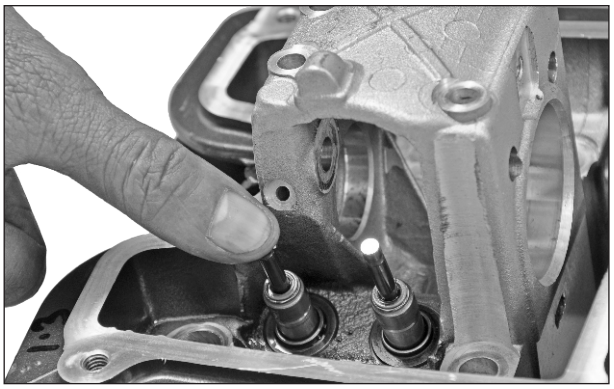


Fig. 3.52

- Remove the seal valve stem oil from the valve guides. (Fig. 3.53)

Nose plier

Note:
While reassembling, replace the valve stem oil seals with a new ones.

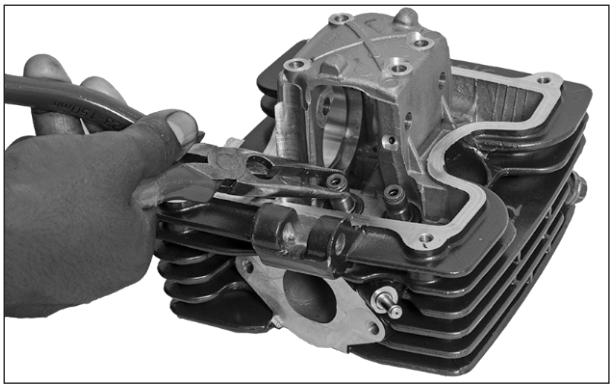


Fig. 3.53

- Remove seat valve spring. (Fig. 3.54)

Nose plier

- Repeat the same procedure for removing the other side valves.

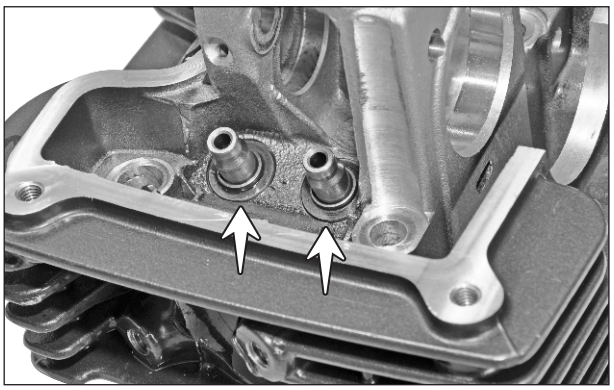


Fig. 3.54

- Using M6 nuts, remove stud bolt cylinder head (2 nos.) from cylinder head complete. (Fig. 3.55)

10 mm spanner

Tightening torque	7 ± 1 Nm

Note:
Remove the stud bolts only if necessary. Else it may get spoiled.

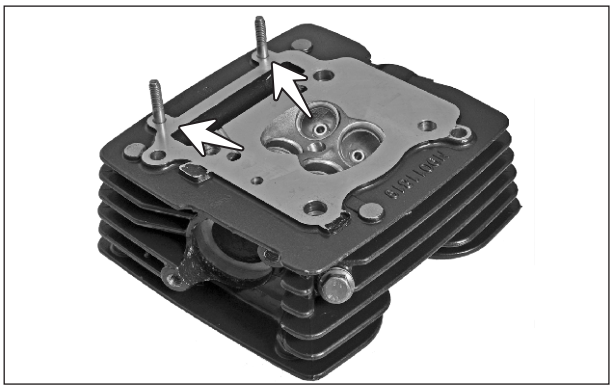


Fig. 3.55

DECARBONISING

Cylinder head complete

- Carbon deposits on the combustion chamber of the cylinder head complete will increase the compression ratio which will result in pre-ignition and overheating. Carbon deposited at the exhaust manifold will prevent smooth flow of exhaust, thereby reducing the engine power output.

- Decarbonise the combustion chamber of cylinder head complete using suitable decarbonising spray. (Fig. 3.56)

Note:
Decarbonise the head complete cylinder combustion chamber after removing both the valves. Use suitable cleaning solvent.

Caution:
Care should be taken not to damage the surface of the combustion chamber while DECARBONISING.

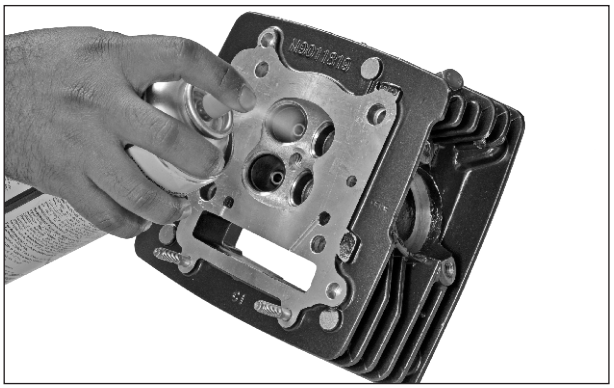


Fig. 3.56

Seat valve

- Carbon deposition on valve seating will cause valves not to seat properly thereby causing leakage and affects idling, pickup and mileage. Also leads to erratic running and starting trouble.

Valve and valve guide

- Carbon deposits on the valve stem rubs continuously on guide valve and results in increased clearance between the stem and guide valve. Clean the valve stem with suitable cleaning solvent. (Fig. 3.57) Repeat with other valves.

- Clean the guide valve to remove any carbon buildup by using carbon removers. Clean other parts of head complete cylinder thoroughly with suitable cleaning solvent. Repeat with other valves.

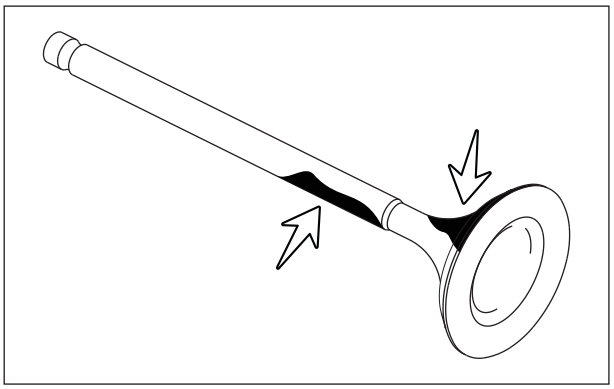


Fig. 3.57

INSPECTION

Head complete cylinder

- After cleaning the liquid gasket from the surface of the cylinder head complete, inspect the surface for any scratches, high and low spots. If noticed, remove them using a fine emery paper (400 grade) placed over the surface plate. (Fig. 3.58)

Surface plate

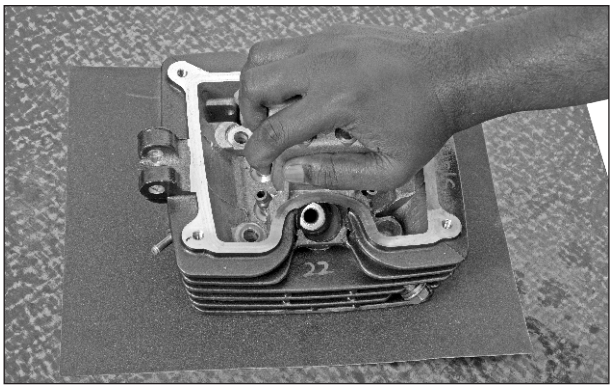


Fig. 3.58

- Using a feeler gauge, check for the distortion of surfaces of the cylinder head complete. If the reading exceeds the limit, replace the head complete cylinder with a new one. (Fig. 3.59)

Feeler gauge

Surface plate

Service limit	0.050 mm (max)

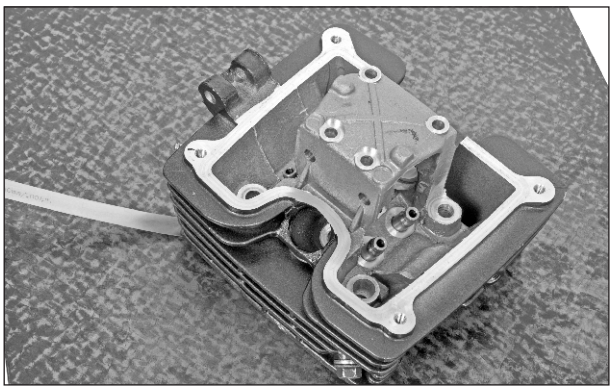


Fig. 3.59

Shaft valve rocker arm

- Inspect the shaft valve rocker arm for any damage. Measure the outer diameter (OD) of shaft valve rocker arm. If the OD is less than the service limit, replace the shaft. (Fig. 3.60) Repeat with other rocker arm shafts.

Outside micrometer

Service limit	8.000 ~ 7.991

Note:
The OD should be checked at the arm complete valve rocker seating area.

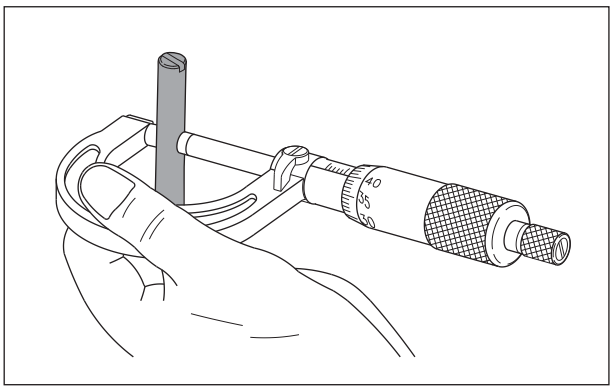


Fig. 3.60

Arm complete valve rocker

- The arm complete valve rocker has a roller follower. The roller follower is a steel roller housed with a needle bearing. This has been provided to decrease the load exerted by the valve train on engine by reducing the friction. (Fig. 3.61)

- Inspect this roller for its free rotation and for any physical damage on its surface. Found if any replace the arm.

- There are needle bearings assembled on both the side of the arm at shaft seating area. Inspect these bearings for any abnormality. Replace the arm if found any abnormality.

Caution:
Each needle bearing of arm complete valve rocker has 20 needles in it. Ensure the availability of all the 20 needles before reassembling the arm as the needles may fall during removal of the arm from the cylinder head assembly.

Additional care should be taken during reassembly of the arm in the cylinder head because the rollers may fall during reassembly also.

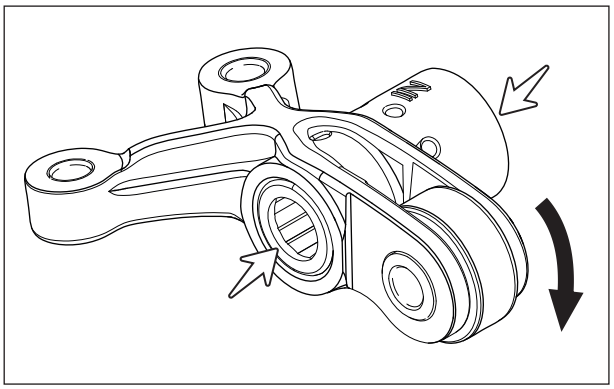


Fig. 3.61

Camshaft assembly

- Check the camshaft assembly for runout, wear of cam lobes and journals. Any of these could cause the engine to produce abnormal noise, vibration or lack of power output.

- Measure the cam lobe height. If the lobe height is less than the service limit, replace the camshaft complete with a new one. (Fig. 3.62)

Outside micrometer

Service limit	
Inlet	33.35 mm (min)
Exhaust	33.20 mm (min)

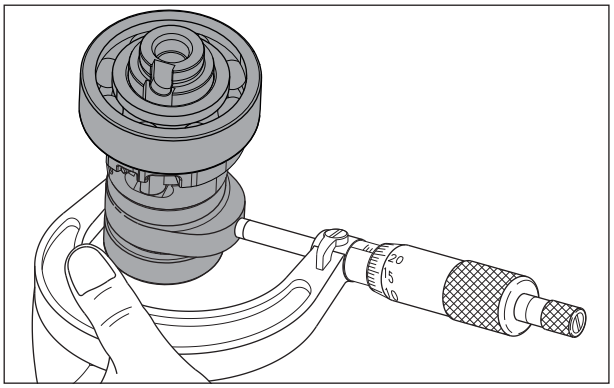


Fig. 3.62

- Inspect the ball bearings of camshaft for abnormal play, shake or pitting.

- Measure the runout of the camshaft with a dial gauge. Replace the camshaft with a new one if the runout exceeds the service limit. (Fig. 3.63)

V-block set (4"x3"x3")

Dial gauge (1/100 mm) / Magnetic stand

Service limit	0.080 mm (max)

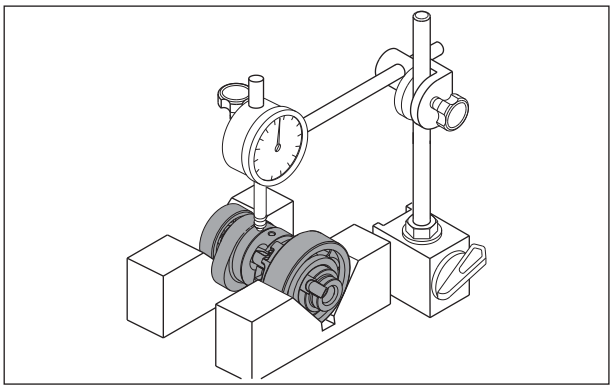


Fig. 3.63

Valve intake and valve exhaust

- Inspect each valve for trueness, burning, scratches, abnormal wear or bend. Measure the outside diameter of valve stem on the operational area. (Fig. 3.64)

Outside micrometer

Service limit	
Inlet	4.470 ~ 4.455 mm (min)
Exhaust	4.485 ~ 4.470 mm (min)

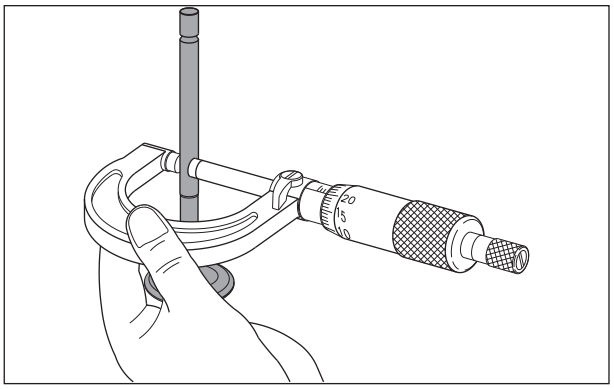


Fig. 3.64

- Using the special tools, measure the runout on valve stem and valve head. Replace the valve with new one if runout exceeds the service limit. (Fig. 3.65)

V-Block set (4"x3"x3")

Dial gauge (1/100 mm) / Magnetic stand

Service limit	
Runout on stem	0.050 mm (max)
Runout on head	0.075 mm (max)

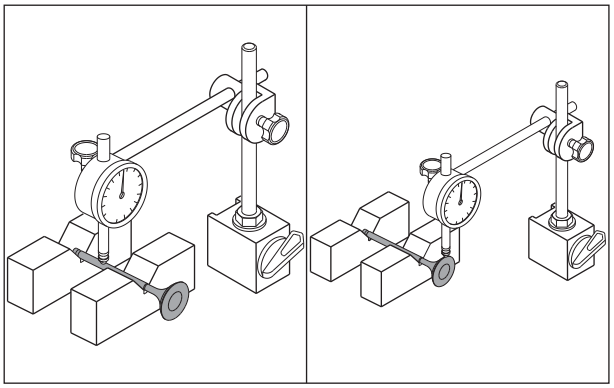


Fig. 3.65

- Check the valve for smooth movement in the guide valve.

- Measure the thickness of valve head. If the thickness is less than the service limit, replace the valve with a new one. (Fig. 3.66)

Vernier caliper

Service limit	
Inlet and exhaust	0.500 mm (min)

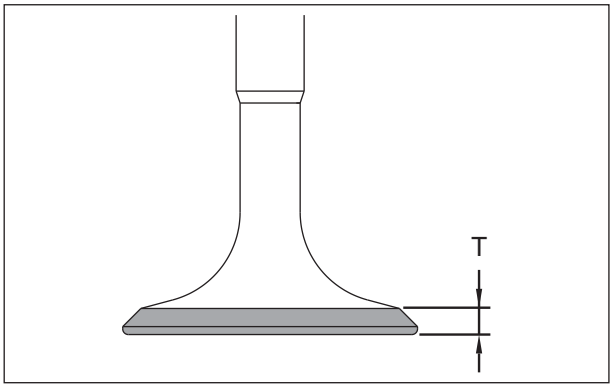


Fig. 3.66

Valve stem condition

- Inspect the valve stem end face (A) for pitting and wear. If pitting or wear noticed, replace the valve with a new one. (Fig. 3.67)

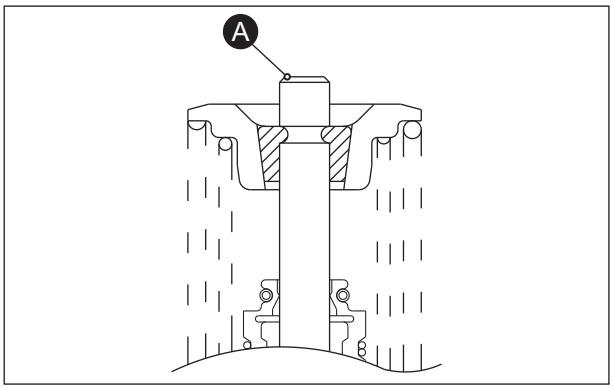


Fig. 3.67

Spring valve

- Measure the free length of the valve springs. If the length is smaller than the service limit, replace the springs. (Fig. 3.68)

Vernier caliper

Service limit	
Spring length (inner)	38.75 mm (min)
Spring length (outer)	38.75 mm (min)

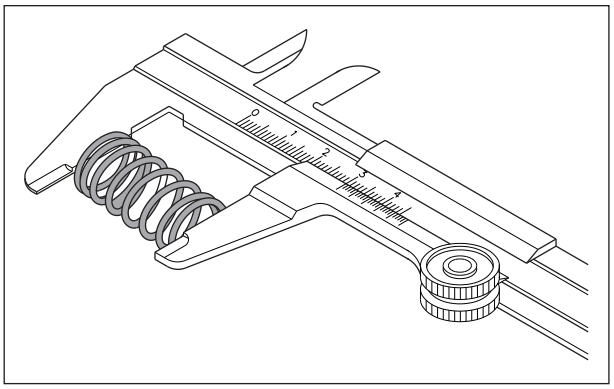


Fig. 3.68

Tensioner cam chain

- Inspect the tensioner cam chain for any distortion / damage, cuts or crack. If found any, replace the tensioner with new one. (Fig. 3.69)
- After assembling the tensioner cam chain, make sure it moves freely in the cylinder head assembly.

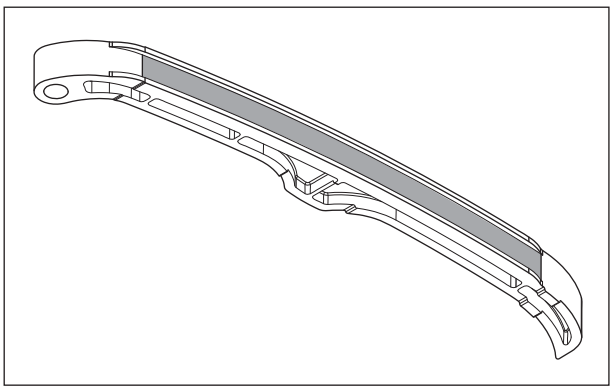


Fig. 3.69

Cam chain

- Visually inspect the cam chain for loose pins, twist / seized links etc. If found any replace the cam chain with a new one. (Fig. 3.70)

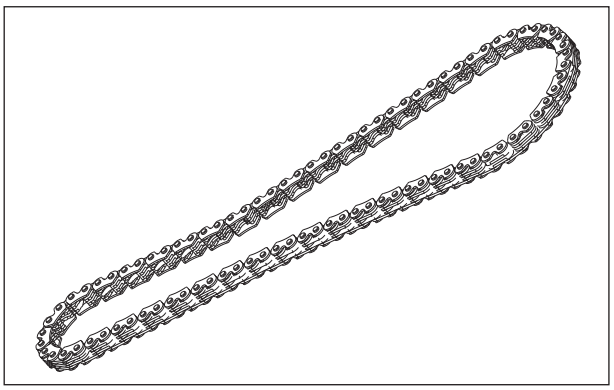


Fig. 3.70

REASSEMBLY

Head complete cylinder

- For reassembly, reverse the disassembly procedure while taking care of the following instructions. Refer exploded view of cylinder head assembly for assembly details. (Fig. 3.71)

Note:
Use only new 'O' rings and oil seals. Do not use old ones.

- Assemble the seat valve spring and a new seal valve stem oil.

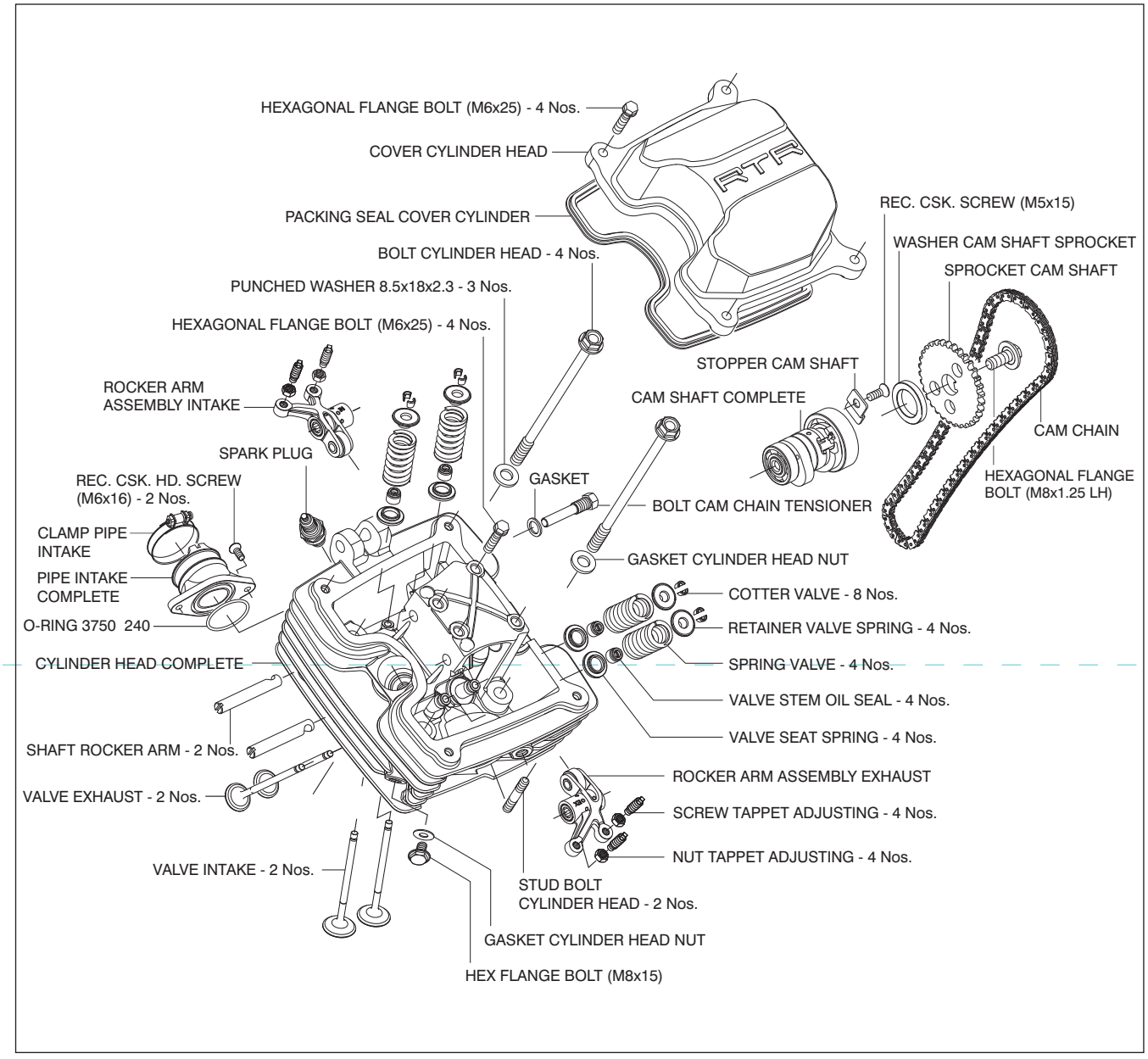


Fig. 3.71

- While assembling the valves, insert smoothly into the guide to avoid any damage to the seal valve stem oil.
- Assemble the valve spring and retainer valve spring.
- Using the special tool compress the spring and assemble the cotter valves.

Note:
The diameter of intake valves are larger than the diameter of exhaust valves. Lubricate the valve stems before installing.

Ensure proper seating of the cotter valves in its groove by gently tapping on retainer valve spring. (Fig. 3.72)

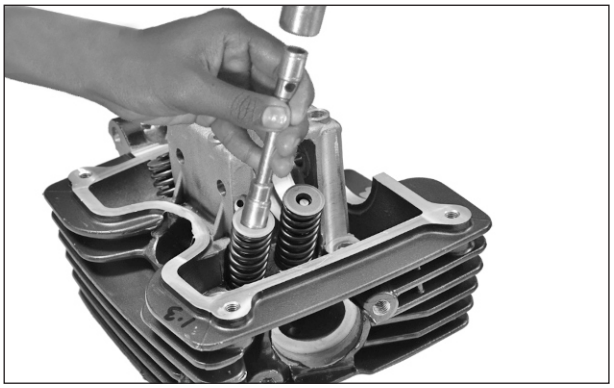


Fig. 3.72

- After assembling the valves, pour petrol into the intake port and look for leakage of the petrol around valve intake seating. (Fig. 3.73)
- Similarly check the exhaust valves also.
- If any leakage noticed, replace the defective parts (valves or cylinder head assembly).

Note:
While checking the exhaust valves, close the secondary air injection port opening to avoid petrol leakage.

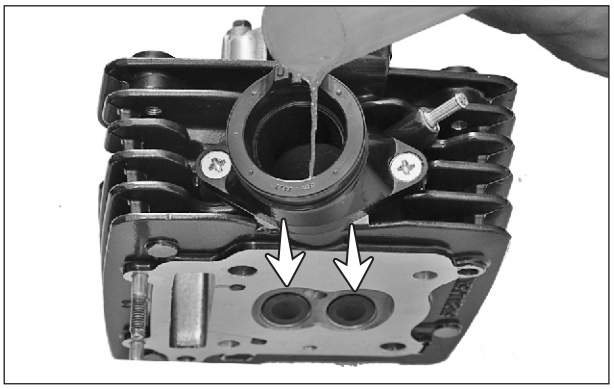


Fig. 3.73

CYLINDER HEAD ASSEMBLY - RE-FIXING

- Reassemble the parts carefully in the reverse order of removal.
- Remove plug TDC (A) along with the gasket. (Fig. 3.74)

17 mm spanner	
Tightening torque	27.5 ± 2.5 Nm

- Remove plug crankshaft hole (B). (Fig. 3.74)

10 mm allen key	
Tightening torque	10 ± 2 Nm

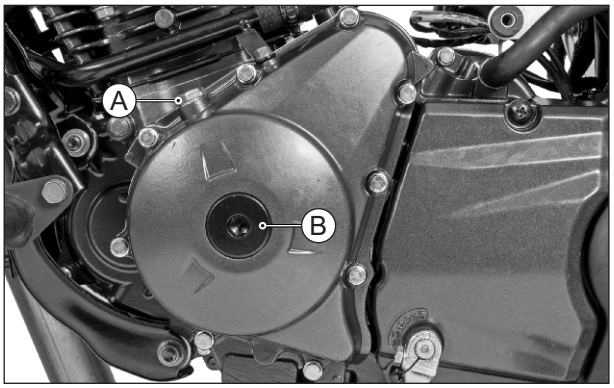


Fig. 3.74

- Ensure that the transmission is in neutral and align the TDC mark (A) on rotor assembly with center of the inspection hole provided in the cover magneto by rotating the rotor assembly. (Fig. 3.75)

17 mm tubular spanner

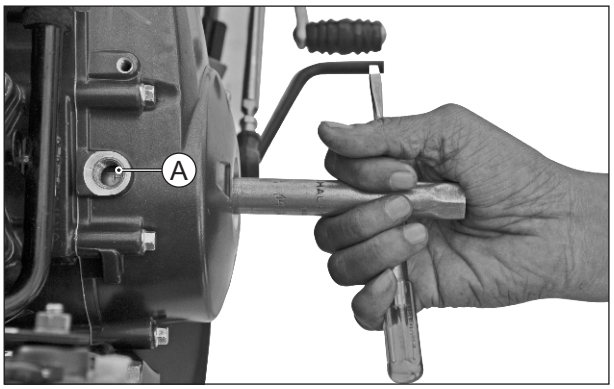


Fig. 3.75

- Assemble the sprocket camshaft along with the cam chain in the camshaft complete while aligning the sprocket camshaft mark (A) with the cylinder head surface (B) towards exhaust side. (Fig. 3.76)

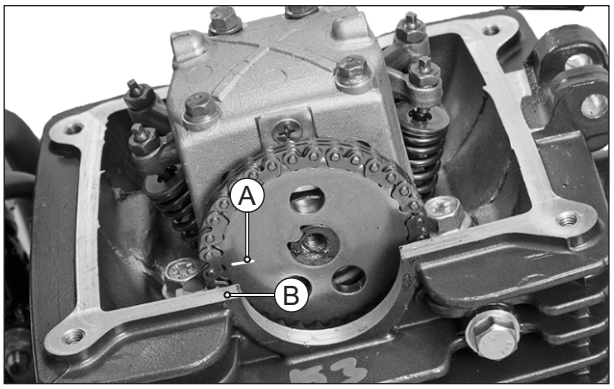


Fig. 3.76

- Apply Anabond 112 thread locker to the sprocket cam shaft mounting bolt and then assemble and tighten the mounting bolt.

10 mm spanner

Tightening torque	18 ± 2 Nm

Caution:
Since left hand thread is used in the bolt, it should be tightened in the opposite direction.

- Set the tappet clearance as explained in chapter "Periodic maintenance" page no. 2-20.
- Reassemble the cover cylinder head, muffler assembly, ignition coil assembly and throttle body assembly.
- Assemble the spark plug and connect the suppressor cap.
- Refill the engine cum transmission oil as explained in chapter "Periodic maintenance" page no. 2-12 and ensure its level.

CYLINDER BLOCK, PISTON AND RINGS PISTON - SERVICING

REMOVAL

- Remove the cylinder head assembly as explained earlier.
- Disconnect the thermal sensor wiring socket from the main wiring harness. (Fig. 3.77)

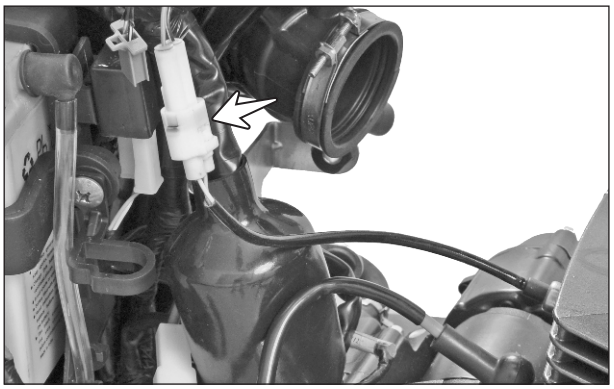


Fig. 3.77

- Pull out the guide cam chain (A) from the cylinder block. (Fig. 3.78)

Fig. 3.78

- Remove the hexagonal flange nut (M6 - 2 nos.) from the mounting cylinder block with the crankcase. (Fig. 3.79)

10 mm spanner

Tightening torque	7 ± 1 Nm

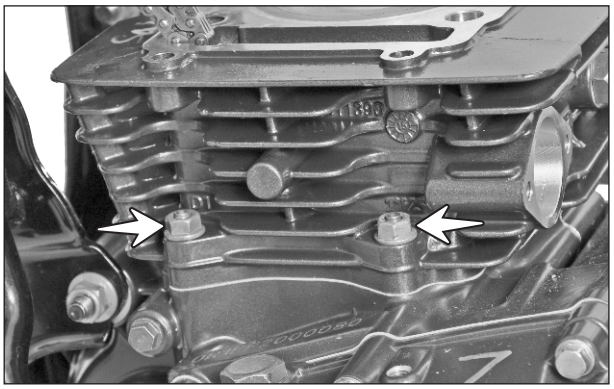


Fig. 3.79

- Gently pull out the cylinder block holding the connecting rod by hand to avoid any damage to the piston assembly and crankcase. (Fig. 3.80)

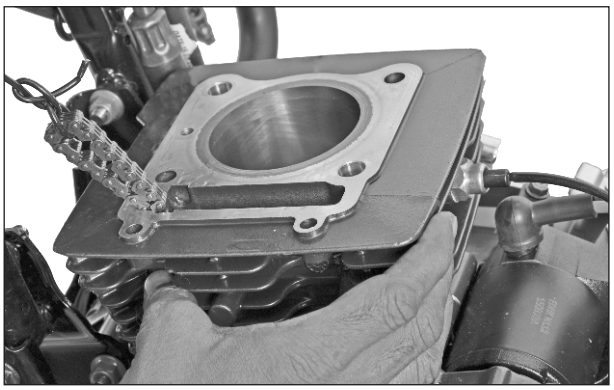


Fig. 3.80

- Remove the gasket cylinder (A) and tubular dowel (B) (2 nos). (Fig. 3.81)

Nose plier

- Place a clean cloth in the crankcase assembly bore to prevent the circlip pin piston from falling inside the crankcase while removing.

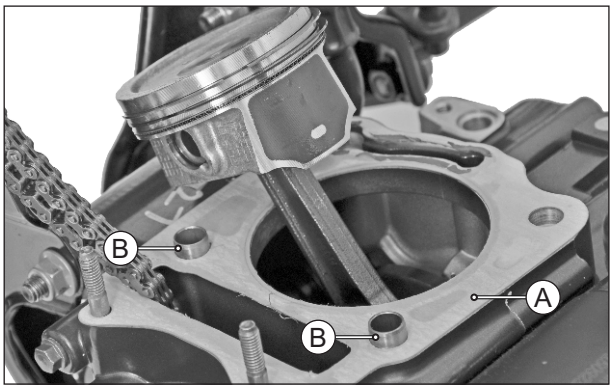


Fig. 3.81

- Remove the circlip pin piston from any one side of the piston. (Fig. 3.82)

Nose plier

Fig. 3.82

- Gently push and take out the piston pin from the piston and then take out the piston along with the rings. (Fig. 3.83)

Fig. 3.83

INSPECTION

Guide cam chain

- Inspect the guide cam chain for any distortion / damage, cuts or crack. If found any, replace the guide with new one. (Fig. 3.84)

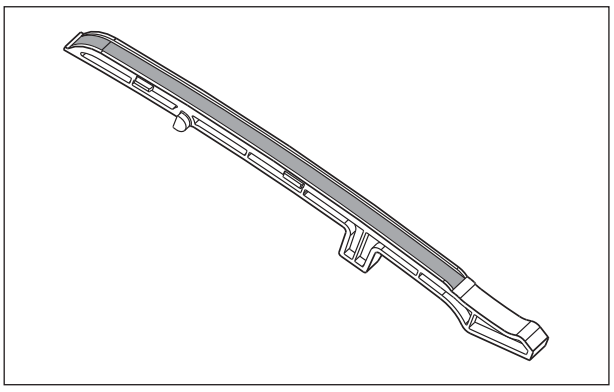


Fig. 3.84

Cylinder block

- Clean the gasket cylinder and adjuster tensioner gasket seating areas if any gasket material is stuck. Do not scrape the surfaces.

- Measure the cylinder block ID (bore) using the bore gauge. Cylinder bore should be checked in two axis with reference to the cylinder axis at three locations as shown in the figure. (Fig. 3.85 & Fig. 3.86)

Bore gauge

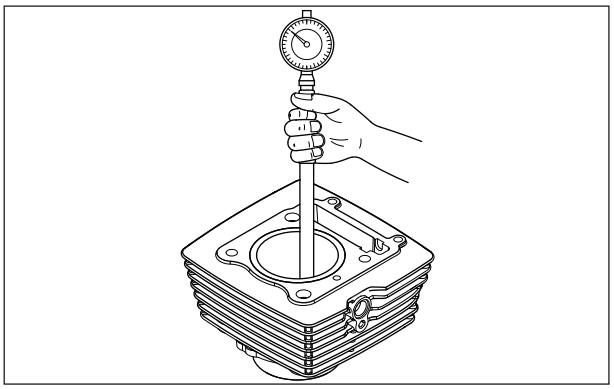


Fig. 3.85

- If the wear exceeds the service limit, replace the cylinder block or rework the cylinder to next oversize by using a boring machine. The cylinder must be honed after boring.

- The cylinder blocks are manufactured with slightly increasing diameters which are all identified with their respective colour and codes as below:

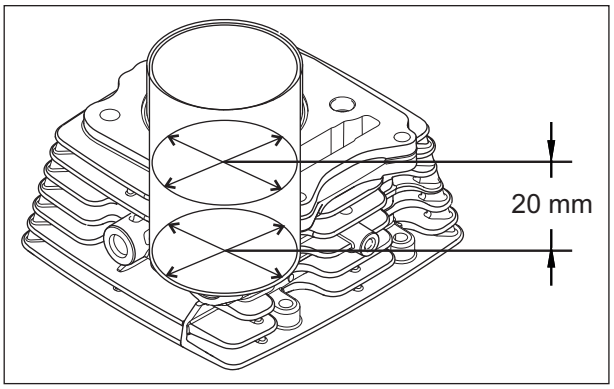


Fig. 3.86

Size	Grade	Standard (in mm)	Service Limit (in mm)
–	A	66.000 ~ 66.005	66.115
–	B	66.005 ~ 66.010	
–	C	66.010 ~ 66.015	
1st OS	PINK	66.256	–
2nd OS	WHITE	66.506	–

Note:
Minor surface flaws on the cylinder wall due to seizure or similar abnormalities may be corrected by using fine emery paper (400 grade). If the flaws are deep grooves, the cylinder must be reworked to the next oversize or replaced.

Piston

- Remove the ring piston top (1st) (A), piston ring 2nd (B) and oil rails (C) along with spacer (D). (Fig. 3.87)

Caution:
Do not expand the rings more, it may lose it's mechanical properties.

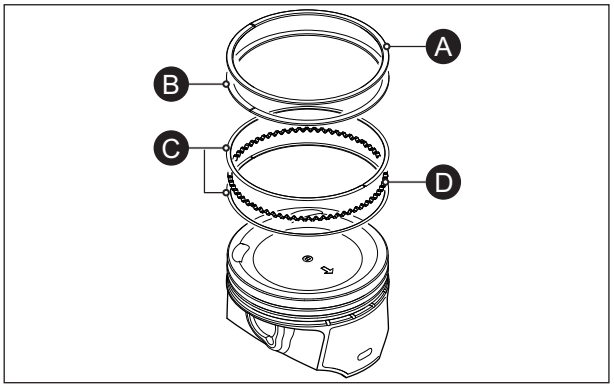


Fig. 3.87

- Decarbonise the piston and piston ring grooves. After cleaning the grooves, fit the rings and rotate them in their respective grooves to make sure that they rotate freely. (Fig. 3.88)

- Carbon in the grooves is liable to cause the rings piston to stuck in the grooves, and this will lead to reduced engine power output.

Note:
While cleaning the ring grooves of the piston, take care not to damage the grooves. Use an old broken ring to clean the grooves.

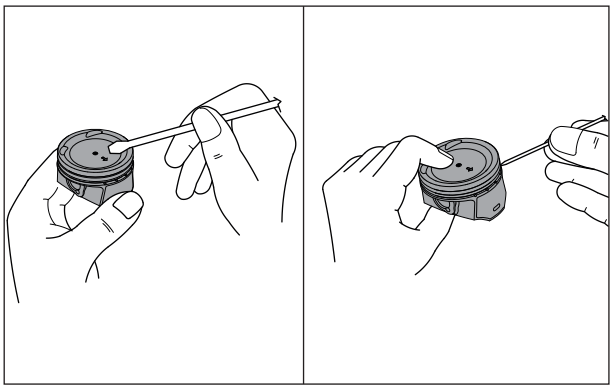


Fig. 3.88

- If a piston sliding surface is badly scored or scuffed due to overheating, it must be replaced. Shallow grooves or minor scuff can be removed by smoothening with a fine emery paper (400 grade). (Fig. 3.89) Inspect the piston for damage or crack. Replace if required.

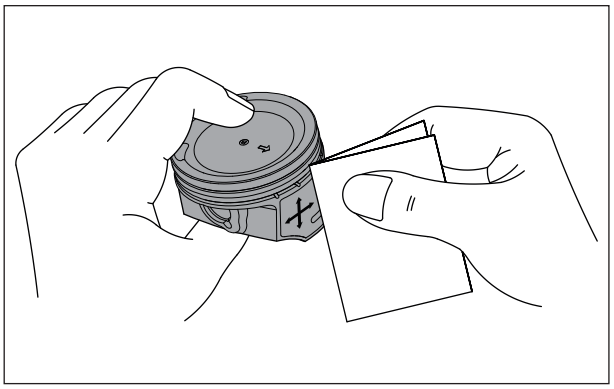


Fig. 3.89

- Measure the diameter at the right angle to the pin piston and at a point which is 10 mm from the bottom to check wear. If the diameter is lower than the service limit, replace the piston. (Fig. 3.90)

Outside micrometer

Size	Grade	Standard (in mm)	Service Limit (in mm)
–	A	65.960 ~ 65.965	65.875
–	B	65.965 ~ 65.970	
–	C	65.970 ~ 65.975	
1st OS	PINK	66.215 ~ 66.220	–
2nd OS	WHITE	66.465 ~ 66.470	–

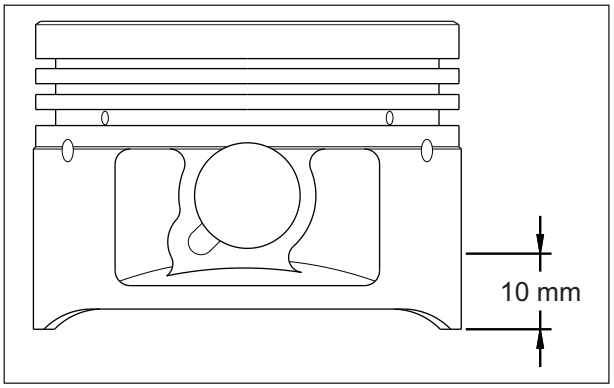


Fig. 3.90

- Cylinder to piston clearance is the difference between piston diameter and bore diameter.

- Check the pin piston bore ID of piston for wear. (Fig. 3.91)

Inside micrometer

Service limit	15.030 mm (max)

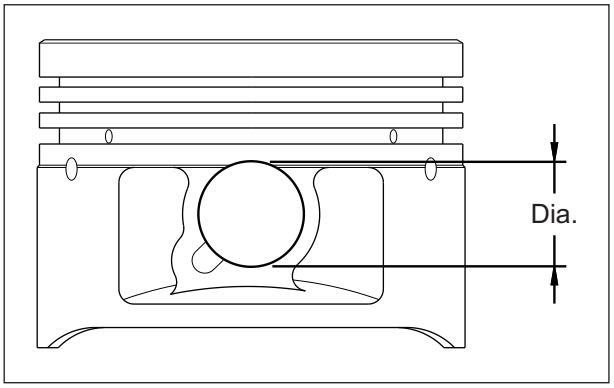


Fig. 3.91

- If the ID is more than the service limit, replace the piston with a new.

Piston pin

- Check the piston pin OD using a micrometer. (Fig. 3.92) If the reading less than the service limit replace the pin piston. Other wise the pin may create unwanted noise.

Outside micrometer	
Service limit	14.992 mm (min)

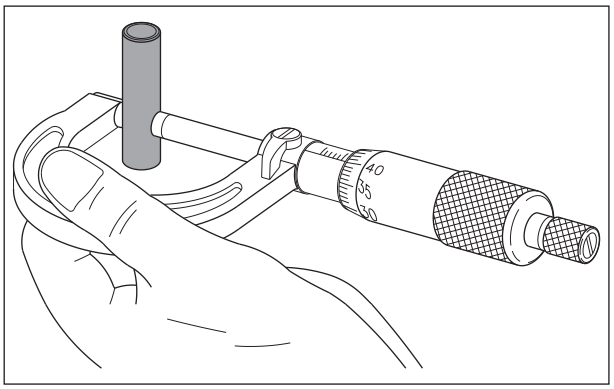


Fig. 3.92

Rings piston

- Inspect the piston rings for distortion, it will cause the rings to stick or roll in the grooves. Replace the distorted rings.
- As the rings wear out, its end gap increases resulting in reduced engine power output.
- The rings (Top and 2nd) closed end gap should be checked to assess the serviceability of the ring piston.
- Install the ring in the cylinder block, using the piston, push the ring into the cylinder block bore at 20 mm from the bottom. This will make the ring to seat squarely in the cylinder block. Using a feeler gauge measure the close end gap. (Fig. 3.93)
- If the gap exceeds the limit, replace rings with new ones.

Feeler gauge	
Service limit	0.700 mm (max)

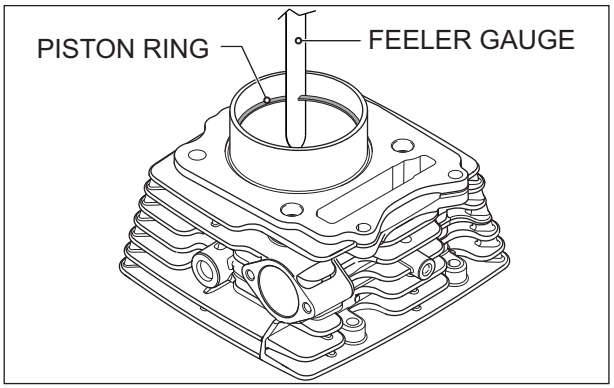


Fig. 3.93

REASSEMBLY

- Assemble back and align the piston rings in the following manner while taking care of the points given below:

Note:
Avoid damage to the piston skirt surface and rings piston during installation.

- Assemble the 4th ring (spacer) in the third groove of piston in such away that its triangle shaped end (butt end) facing upwards (triangle facing towards piston top). (Fig. 3.94)

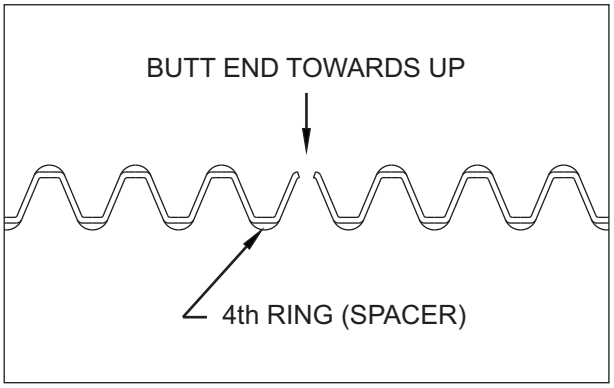


Fig. 3.94

Caution:
Always assemble the 4th ring (spacer) first. Because this will accommodate the oil rails top and bottom.

- Assemble the 5th ring (oil rail bottom) and ensure it is seated properly in the groove (at spacer). (Fig. 3.95)
- Now, assemble the 3rd ring (oil rail top) and ensure it is seated properly in the groove (at spacer). (Fig. 3.95)
- Install the ring piston 1st and ring piston 2nd with the marking on the ring 'TOP1' and 'TOP2' (Fig. 3.95 & Fig. 3.96) facing up (mark facing towards piston top).

Note:
Before aligning the piston rings, ensure the rings are rotating freely in its grooves without any obstruction.

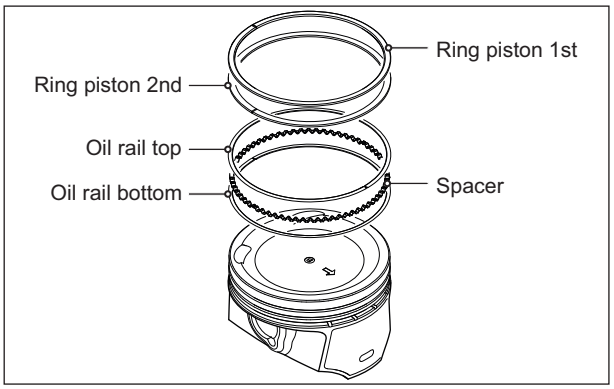


Fig. 3.95

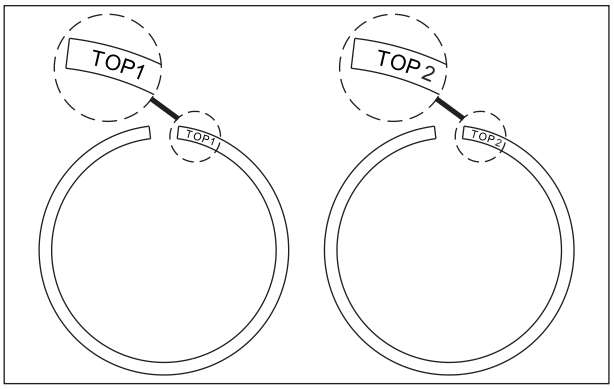


Fig. 3.96

- Align the ring piston 1st in such a way that the end gap of the ring is located at the inlet side of the piston (opposite to exhaust mark) as shown. (Fig. 3.97)
- In similar manner, align the ring piston 2nd in such a way that the end gap of the ring is located at 120 degree from the first ring end gap as shown. (Fig. 3.97)

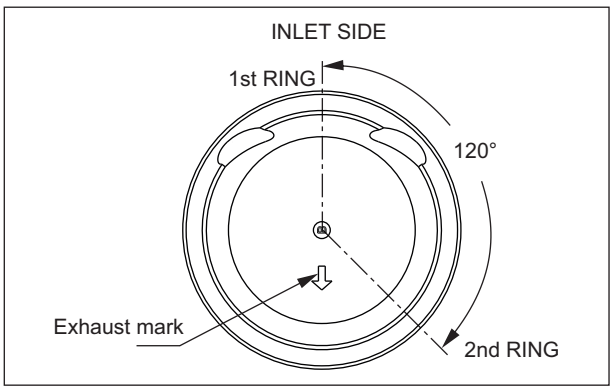


Fig. 3.97

- Align the end gap of 3rd ring (oil rail top) at 90 degree from the end gap of the second ring as shown. (Fig. 3.98)
- Similarly, align the end gap of 4th ring (spacer) at 90 degree from the end gap of the third ring as shown. (Fig. 3.98)

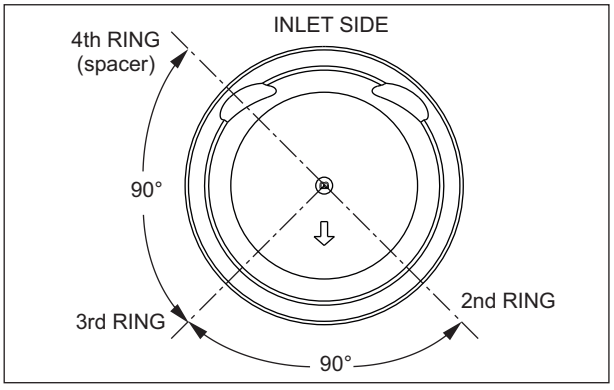


Fig. 3.98

- Align the end gap of 5th ring (oil rail bottom) at 90 degree from the end gap of the fourth ring (spacer) as shown. (Fig. 3.99)

- Assemble the piston into the crankshaft in such a way that the arrow mark indicated in the piston crown should face towards the exhaust port of the cylinder. (Fig. 3.100)

Note:
Carefully install the circlip pin piston in its groove. Else it may come out from piston during engine running and damage the cylinder block and piston assembly.

- While installing the cylinder block slightly lubricate inner wall of the cylinder with fresh 4T oil.

- Reassemble the parts carefully in the reverse order of removal.

- Align the TDC mark on the rotor assembly with the crankcase mark by rotating the rotor assembly (refer page no. 3-23).

- Set the tappet clearance as explained in chapter "Periodic maintenance" page no. 2-20.

- Reassemble the cover cylinder head, muffler assembly, ignition coil assembly and throttle body assembly. Assemble the spark plug and connect the suppressor cap.

- Refill the engine cum transmission oil as explained in chapter "Periodic maintenance" page no. 2-12 and ensure its level.

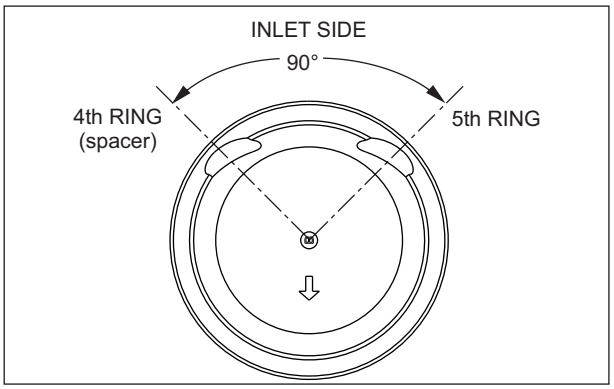


Fig. 3.99

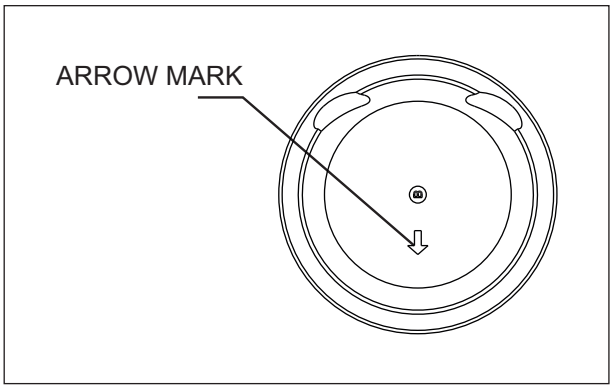


Fig. 3.100

GEAR BOX ASSEMBLY, CRANK SHAFT ASSEMBLY AND BALANCER SHAFT ASSEMBLY- SERVICING

- Only to repair or replace gears, clutch shaft assembly, drive shaft assembly, crankshaft assembly and the balancer shaft assembly, the crankcases needs to be separated.
- Remove the clutch assembly as explained earlier (refer page no. 3-2 for removal procedure).
- Remove the cylinder head assembly, cylinder block and piston as explained earlier (refer page. 3-8 & 3-24 for removal procedure).

REMOVAL OF ENGINE ASSEMBLY FROM THE VEHICLE

- Remove hexagonal screw (M6x20 - 1 no.) from the arm gear shifter lever mounting. (Fig. 3.101)

10 mm spanner	
Tightening torque	10 ± 2 Nm

- Gently pull out the gear shift lever from the shaft assembly gear shift.
- Remove CRR pan head screw (M6x20 - 2 nos.) from the cover engine sprocket and take out cover engine sprocket. (Fig. 3.102)

Philips head screw driver	
Tightening torque	10 ± 2 Nm

- Remove hexagonal screw (M5x10 - 2 nos.) from the lock plate engine sprocket mounting. (Fig. 3.103)

8 mm spanner	
Tightening torque	8 ± 1 Nm

- Take out the lock plate sprocket by rotating and dislocating it from the shaft complete drive grooves.

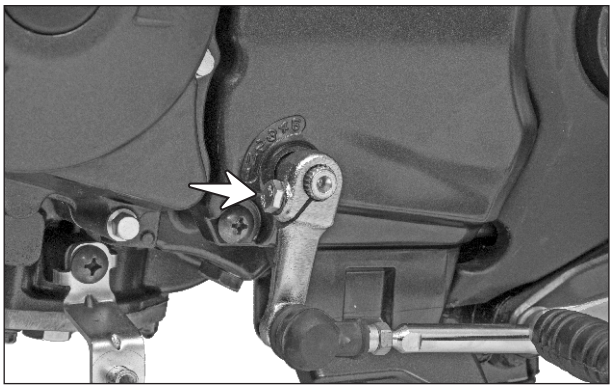


Fig. 3.101

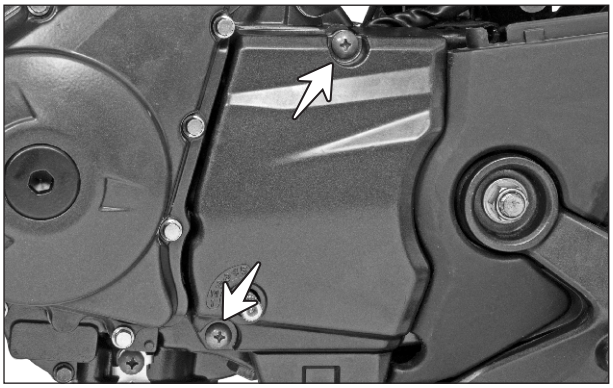


Fig. 3.102

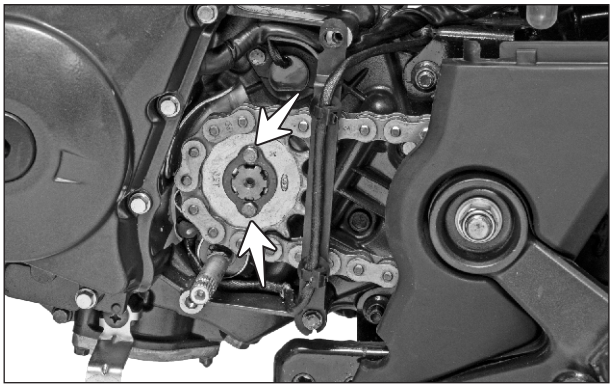


Fig. 3.103

- Pull out the sprocket engine along with drive chain assembly from shaft drive. (Fig. 3.104)
- Dislocate sprocket from the drive chain. Hang the drive chain in the frame itself.

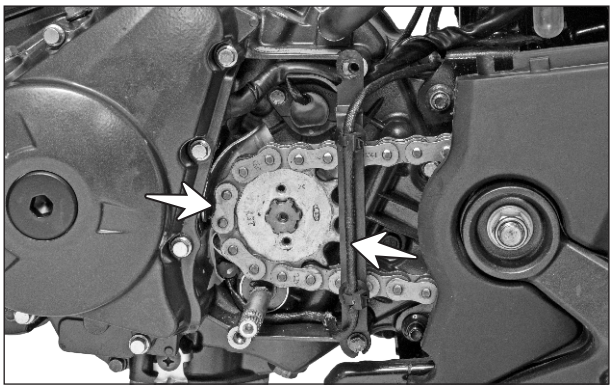


Fig. 3.104

- Disconnect the speed sensor wiring socket from the main wiring harness. (Fig. 3.105)

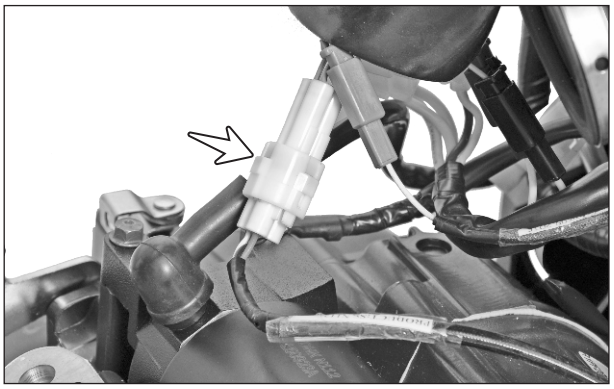


Fig. 3.105

- Remove hexagonal bolt (A) (M6x16 - 1 no.) and dislocate the guide speed sensor (B). (Fig. 3.106A)
- Remove the hexagonal bolt (C) (M6x16 - 2 nos.) from the retainer oil seal drive shaft and take out the retainer (D). (Fig. 3.106B)

8 mm spanner	
Tightening torque	10 ± 2 Nm

- Gently pull out the speed sensor (E) along with guide speed sensor. (Fig. 3.106B)

Nose plier

- Remove the hexagonal flange bolt (M6x16 - 2 nos.) and take out the switch gear position (A). (Fig. 3.107)

8 mm spanner	
Tightening torque	10 ± 2 Nm

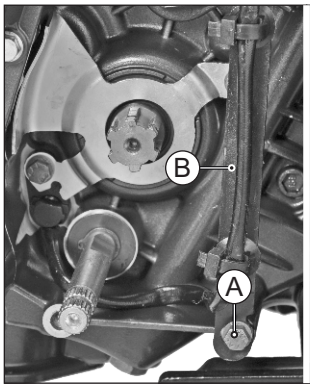


Fig. 3106A

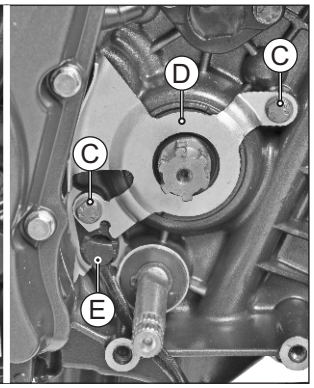


Fig. 3106B

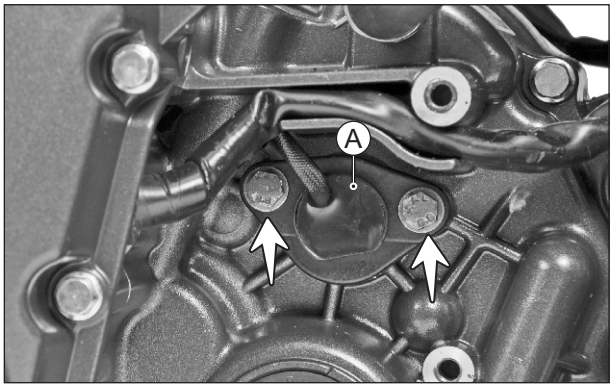


Fig. 3.107

- Remove the hexagonal bolt (M6x16 - 1 no.) (A) and take out contact complete gear shift switch (B). (Fig. 3.108)

8 mm spanner

Tightening torque	4 ± 1 Nm

Note:
While reassembling contact complete gear shift, locate the projection of contact into the groove on shaft for proper indication of gear positions.

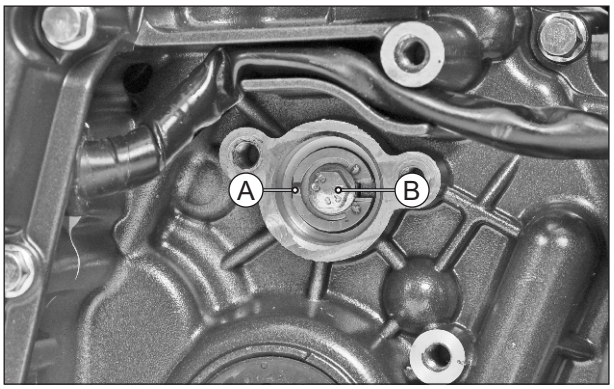


Fig. 3.108

- Remove the circlip (12x1) from shaft complete gear shift and take out the shim (12x26x1). (Fig. 3.109)

Snap ring plier - external

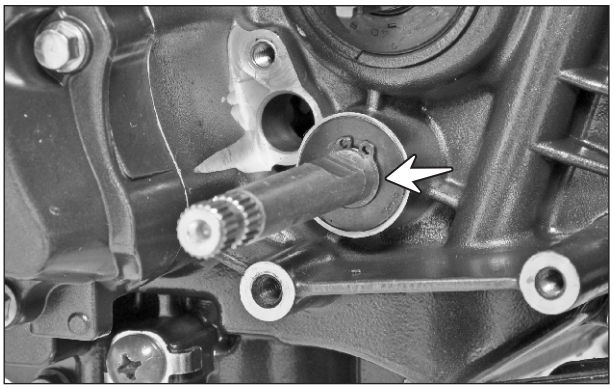


Fig. 3.109

- Disconnect all the couplers from magneto assembly connected to wiring harness. (Fig. 3.110)

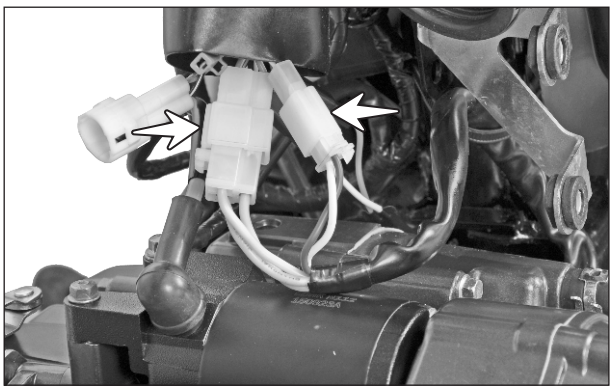


Fig. 3.110

- Remove the hexagonal flange bolts (M6x40 - 9 nos.) from the cover magneto mounting. (Fig. 3.111)

8 mm spanner

Tightening torque	10 ± 2 Nm

- Take out the cover magneto by gently tapping with the nylon hammer along with starter assembly.

Nylon hammer

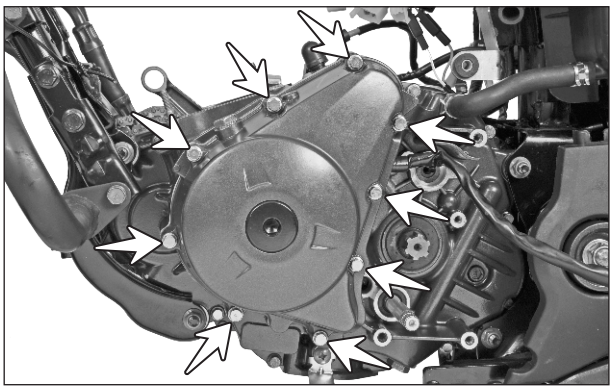


Fig. 3.111

- Take out gasket magneto cover and dowel pin (A) (2 nos.). (Fig. 3.112)

Nose plier

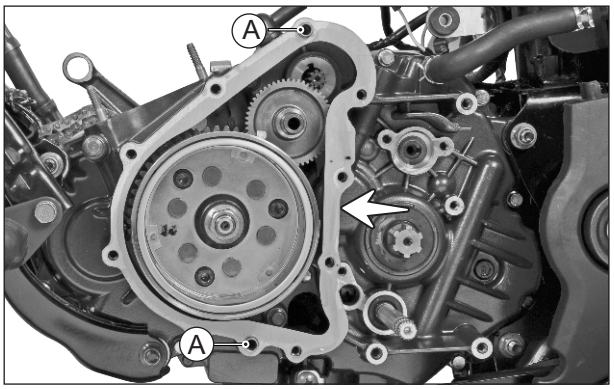


Fig. 3.112

- Take out the spacer starter idle gear (A), pin magneto cover (B) and gear starter idle (C) either from the crankcase or from the cover magneto. (Fig. 3.113A)

Nose plier

- Remove the stopper starter gear (D). (Fig. 3.113B)

Note:
While reassembling the gear starter idle ensure to assemble the stopper starter gear (D). (Fig. 3.113B)

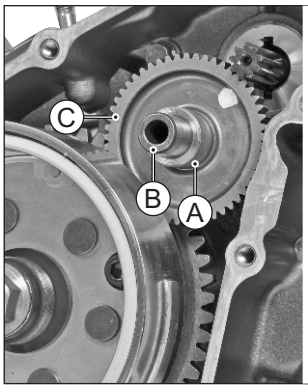


Fig. 3.113A

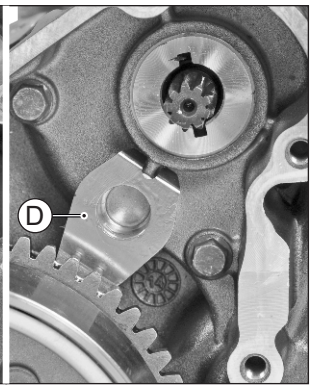


Fig. 3.113B

- Remove bolt gear shift cam stopper and take out stopper complete gear shift along with spring gear shift cam stopper and shim. (Fig. 3.114)

10 mm spanner	
Tightening torque	10 ± 2 Nm

Note:
While reassembling, ensure that shim is located properly under the stopper complete gear shift, before tightening the bolt gear shift cam stopper. After tightening check cam stopper for free movement.

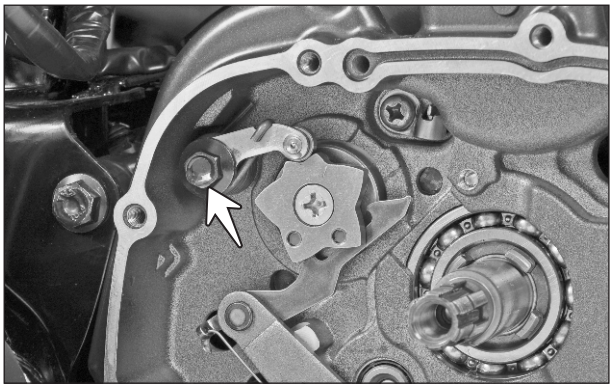


Fig. 3114

- Remove recessed CSK head screw (M6x20 - 1 no.) from the index star mounting and take out the index star. (Fig. 3.115)

Philips head screw driver	
Tightening torque	8 ± 2 Nm

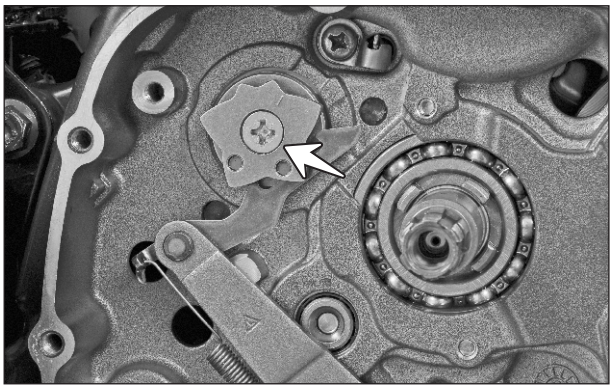


Fig. 3.115

- Carefully pull out the shaft complete gear shift. (Fig. 3.116)

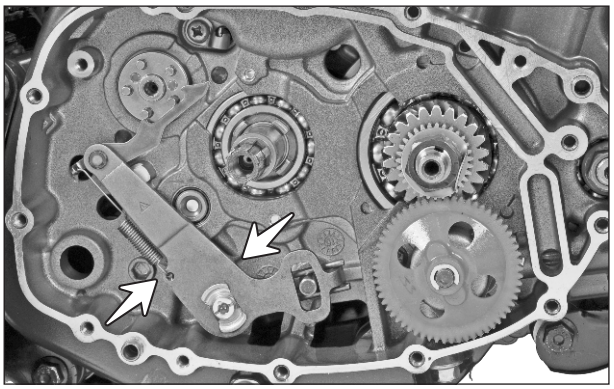


Fig. 3.116

- Take out the pin holder complete from the cam gear shift. (Fig. 3.117)

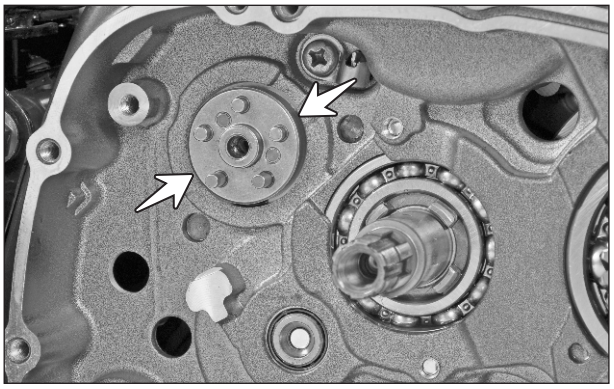


Fig. 3.117

- Remove the E-ring from the oil pump shaft and take out gear oil pump driven. (Fig. 3.118)

Small flat screw driver

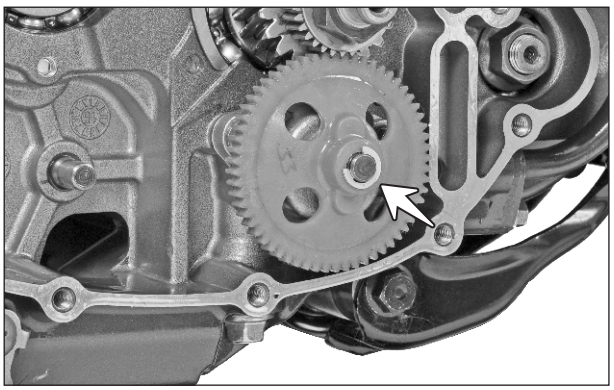


Fig. 3.118

- Remove the pin oil pump driven gear (A). (Fig. 3.119)

Nose plier

- Remove hexagonal flange bolt (3 nos.) from the pump assembly oil and pull out pump assembly. (Fig. 3.119)

8 mm spanner

Tightening torque	8 ± 2 Nm

Note:
While reassembling the oil pump ensure the presence of pin oil pump.

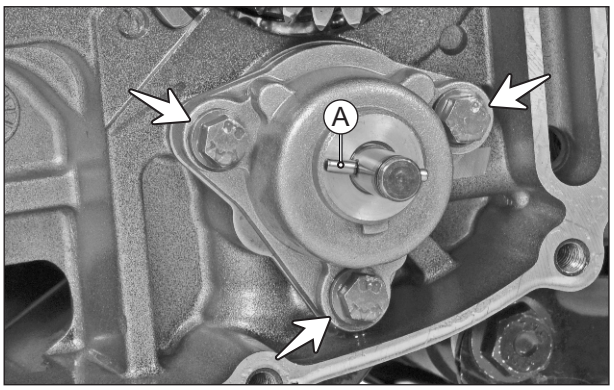


Fig. 3.119

- Disconnect the negative terminal first followed by the positive terminal from the battery assembly. (Fig. 3.120)

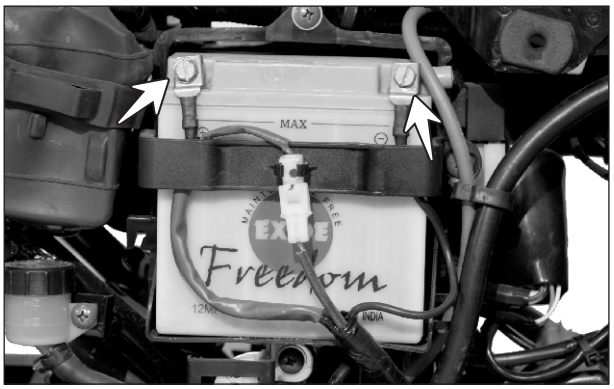


Fig. 3.120

- Dislocate the boot (A) from the starter motor terminal. (Fig. 3.121A)
- Remove the special screw (B) along with washer from the starter motor positive terminal and disconnect positive terminal. (Fig. 3.121B)

8 mm spanner	
Tightening torque	10 ± 2 Nm

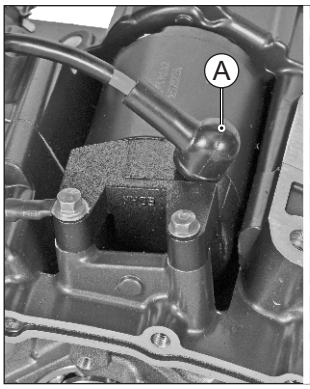


Fig. 3.121A

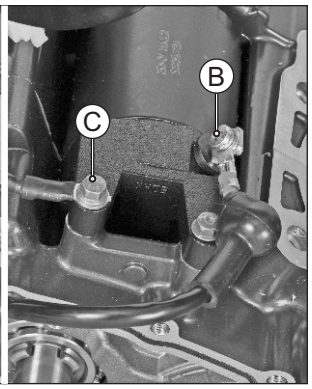


Fig. 3.121B

- Remove the hexagonal flange bolt (M6x25 - 1 no.) (C) from the starter motor mounting and remove the negative terminal from the starter motor. (Fig. 3.121B)

8 mm spanner	
Tightening torque	10 ± 2 Nm

- Dislocate the hose clip (A) and disconnect the hose breather PCV (B) from the engine assembly. (Fig. 3.122)

Nose plier

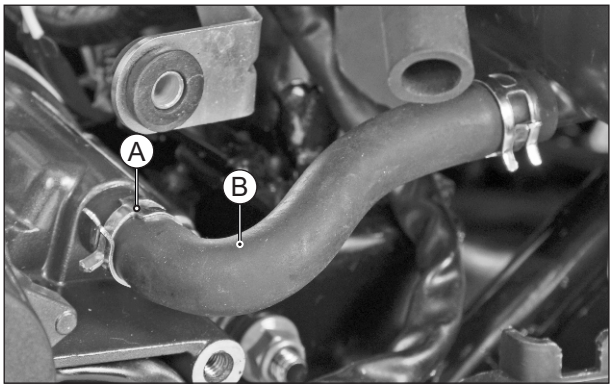


Fig. 3.122

- Remove the hexagonal flange bolt (M6x25 - 1 no.) from pipe complete inlet of engine oil cooler and dislocate the pipe complete inlet from the crank case assembly R. (Fig. 3.123)

8 mm spanner	
Tightening torque	10 ± 2 Nm

Note:
An 'O' ring is fitted on the pipe complete inlet end. Ensure the condition and availability of 'O' ring during reassembly.

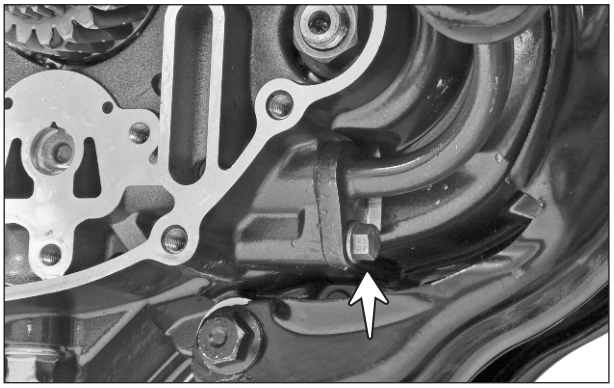


Fig. 3.123

- Remove the hexagonal flange bolt (M6x25 - 1 no.) from the starter motor and remove the motor assembly starter along with a 'O' ring. (Fig. 3.124)

8 mm spanner	
Tightening torque	10 ± 2 Nm

Note:
While reassembling the motor assembly starter, make sure the presence of 'O' ring.

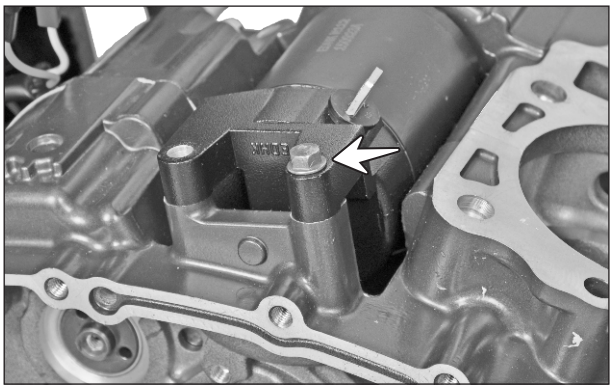


Fig. 3.124

- Unfold washer primary driven gear. (Fig. 3.125)

Chisel / metal hammer

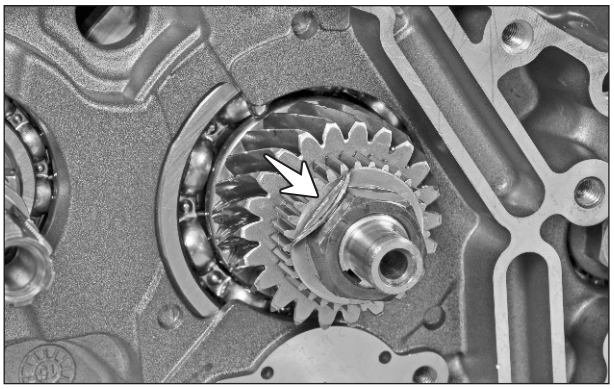


Fig. 3.125

- Using the special tool, hold the rotor assembly and remove hexagonal nut (M16 LH). (Fig. 3.126A & B)

N931 017 0	Magneto tool assembly
22 mm spanner	
Tightening torque	60 ± 5 Nm

- Take out washer primary drive gear.

Note:
While reassembling, replace the washer with a new one.

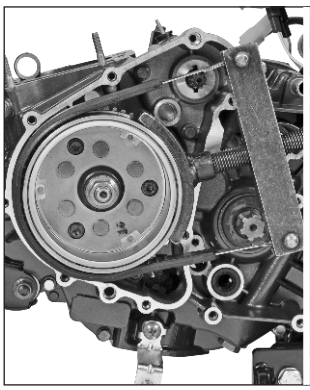


Fig. 3.126A

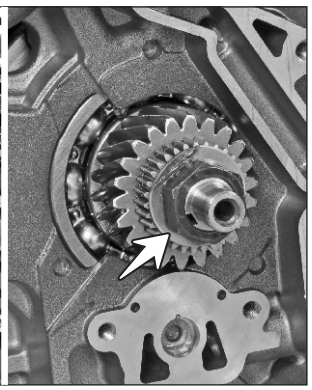


Fig. 3.126B

- Remove gear oil pump drive (A). (Fig. 3.127)
- Remove gear primary drive (B). (Fig. 3.127)

Note:
While reassembling the primary drive gear, assemble the primary gear in such a way that its stepped side is facing towards crankshaft bearing.

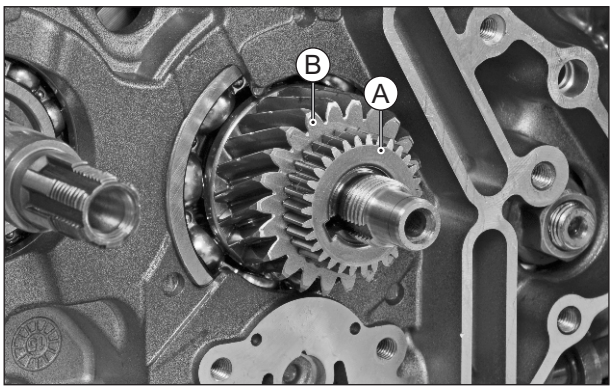


Fig. 3.127

- Take out key (4x4x15) from the crankshaft assembly. (Fig. 3.128)

Nose plier

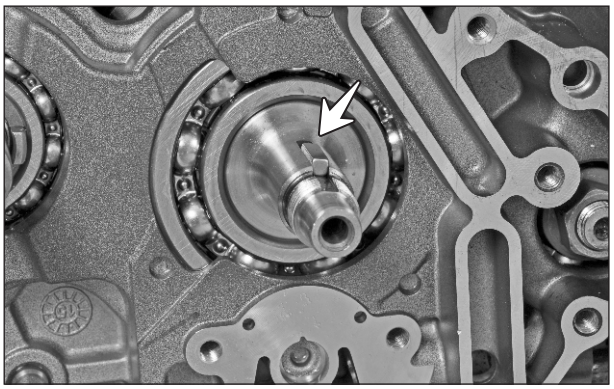


Fig. 3.128

- Using the special tool, hold the rotor assembly as explained earlier and remove the hexagonal flange nut (M12x1.25) from the balancer shaft assembly. (Fig. 3.129)

17 mm spanner	
Tightening torque	55 ± 5 Nm

Note:
Apply ANABOND 112 thread locker during reassembly of the nut.

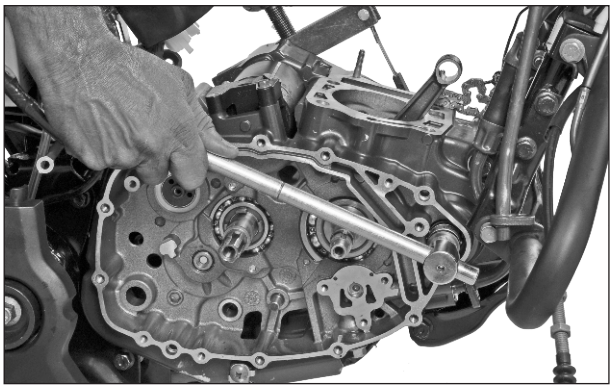


Fig. 3.129

- Using the special tool, hold the rotor assembly and remove the rotor assembly mounting hexagonal flange nut (M12x1.25). (Fig. 3.130)

N931 017 0	Magneto tool assembly
17 mm spanner	
Tightening torque	80 ± 5 Nm

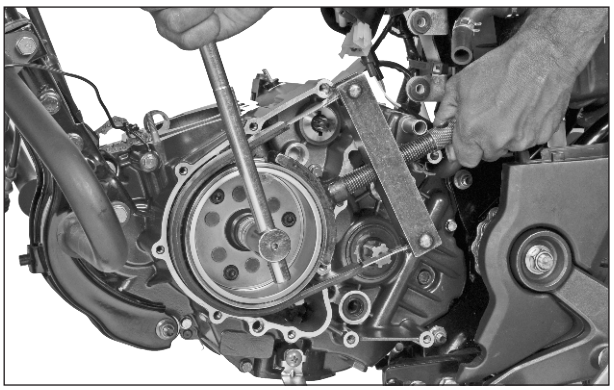


Fig. 3.130

- Using the special tool, remove the rotor assembly along with gear complete starter clutch. (Fig. 3.131)

M131 002 0	Puller assembly rotor

Note:
Always keep rotor assembly on a non metallic surface with open side facing upwards.

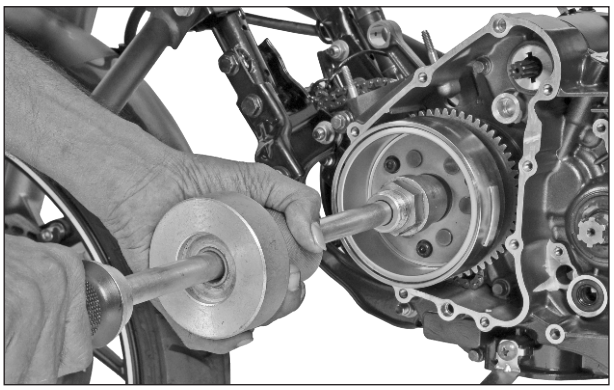


Fig. 3.131

- If required, separate the gear complete starter clutch and remove the one way clutch from rotor assembly by removing the hexagonal socket head cap screw (M6x16 - 3 nos.) along with punched washers. (Fig. 3.132)

5 mm allen key

Tightening torque	12 ± 1 Nm

Note:
Do not separate the gear complete starter clutch from one way clutch until it is necessary, to avoid falling of rollers from one way clutch. Always keep them in assembled condition.

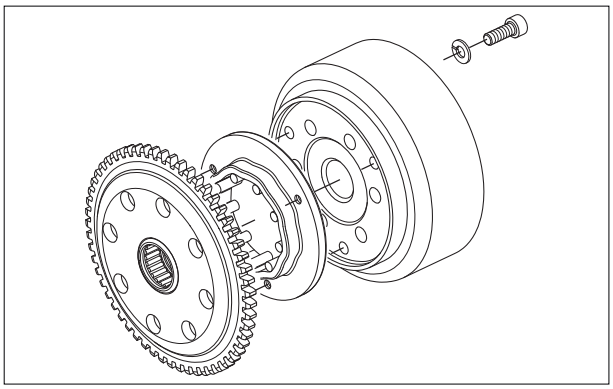


Fig. 3.132

- Take out the cam chain (A) and woodruff key (B) from the crankshaft complete. (Fig. 3.133)

Nose plier

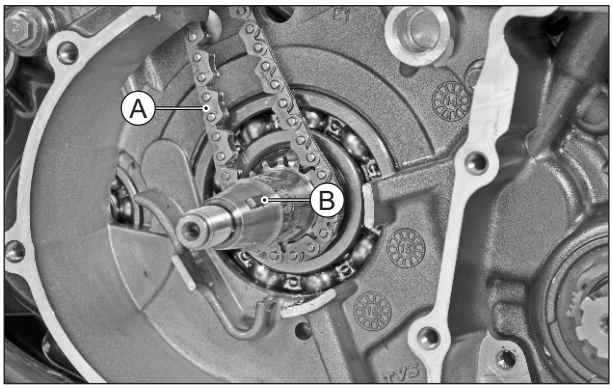


Fig. 3.133

- Remove the hexagonal flange bolt (A) (M8x25 - 2 nos.) along with spring washer from LH side top and bottom mounting of crash guard. (Fig. 3.134)

- Remove the hexagonal flange bolt (B) (M8x25 - 1 no.) along with spring washer from RH side top mounting of crash guard and dislocate the cable guide (C). (Fig. 3.134)

- Remove the hexagonal flange bolt (D) (M8x25 - 1 no.) along with spring washer from RH side bottom mounting of crash guard and take out the crash guard. (Fig. 3.134)

12 mm spanner

Tightening torque	27 ± 3 Nm

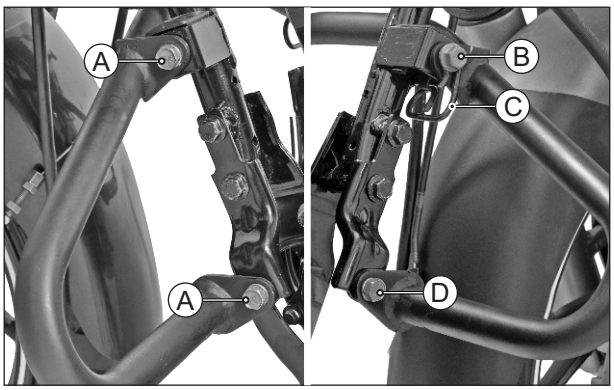


Fig. 3.134

- Remove the hexagonal flange bolt (M8x55 - 2 nos.) from the mounting of bracket crash guard RH and take out the bracket. (Fig. 3.135)

12 mm spanner

Tightening torque	27 ± 3 Nm

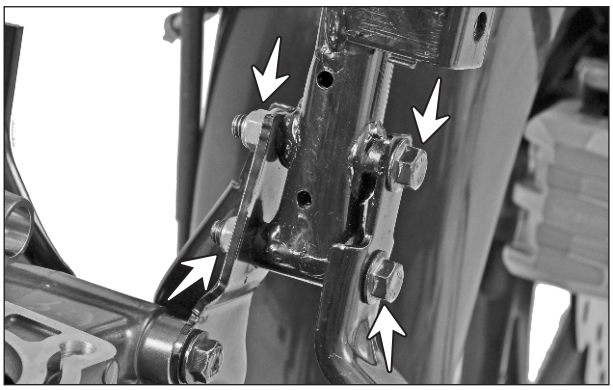


Fig. 3.135

- Remove the hexagonal flange bolt (M8x100 - 1 no.) and (M8x120 - 1 no.) from the mounting of bracket engine mounting RH and take out the bracket. (Fig. 3.136)

12 mm spanner	
Tightening torque	32.5 ± 2.5 Nm

- Remove the hexagonal flange bolt (M18x100 - 1 no.) and (M8x120 - 1 no.) from the rear mounting of the engine assembly. (Fig. 3.137)

12 mm spanner	
Tightening torque	32.5 ± 2.5 Nm

Note:
While removing mounting bolts, always remove the bottom bolt first.

Once the 'U' nuts are removed from their mounting, they should be replaced with new ones.

- Gently lift the engine assembly with both the hands and take out from the right hand side of the vehicle. Place the engine assembly on a engine rest.

ENGINE - DISASSEMBLY

- Remove the CRR pan head screw (M6x12 - 1 no.) from the retainer guide T/M oil and remove the guide T/M oil. (Fig. 3.138)

Phillip head screw driver	
Tightening torque	8 ± 2 Nm

- Remove the hexagonal flange bolt (M6x55 - 1 no.) from the crankcase assembly mounting (RH side). (Fig. 3.139)

8 mm spanner	
Tightening torque	10 ± 2 Nm

- Turn the engine to the other side (magneto side).

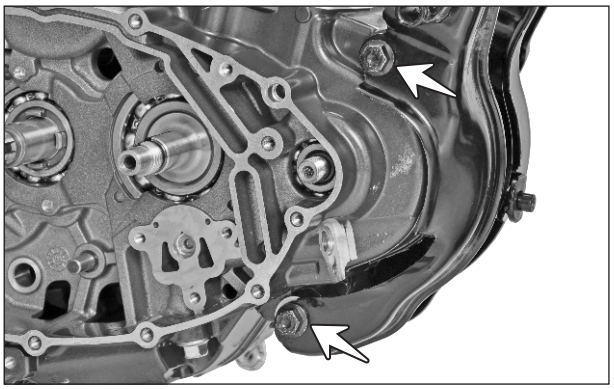


Fig. 3.136

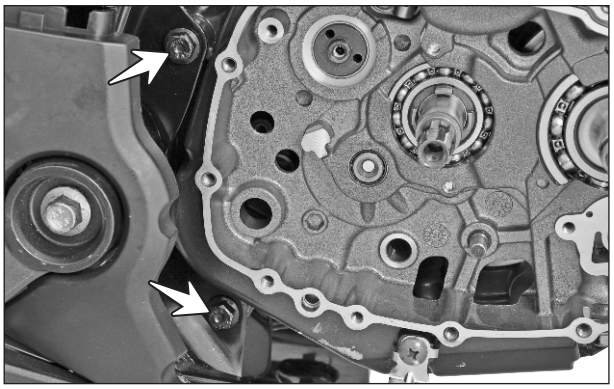


Fig. 3.137

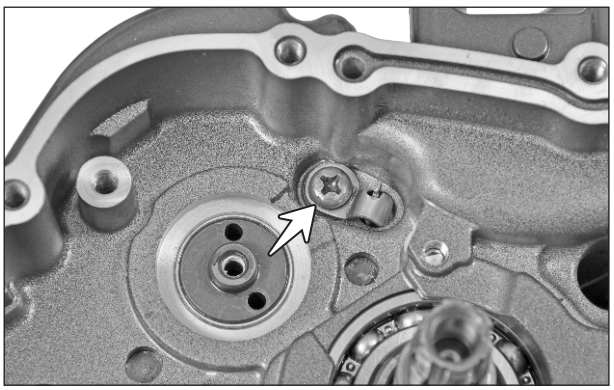


Fig. 3.138

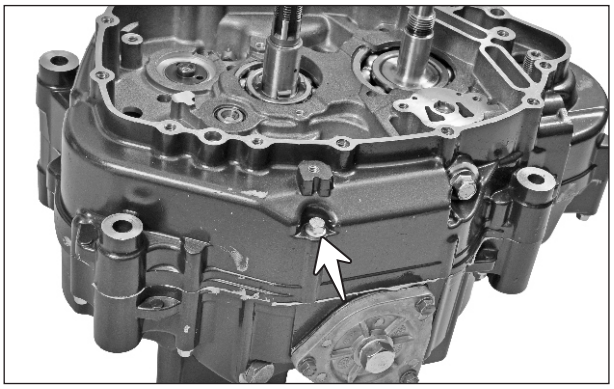


Fig. 3.139

- Remove hexagonal flange bolts (M6x55 - 5 nos. (A), M6x40 - 4 nos. (B), M6x75 - 4 nos (C) and M6x95 - 1 no. (D) from the crankcase mounting. (Fig. 3.140)

8 mm spanner	
Tightening torque	10 ± 2 Nm

Note:
While reassembling, insert all the bolts first and check equal height of bolts from their respective seating surfaces.

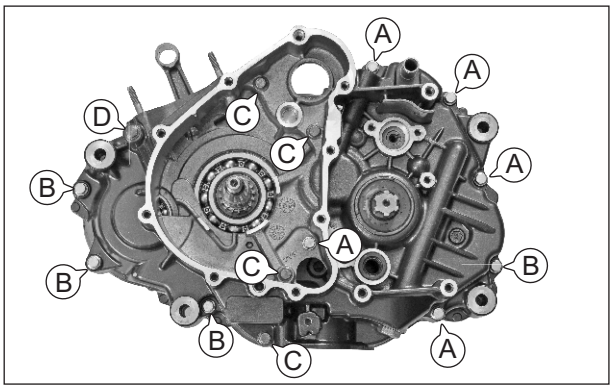


Fig. 3.140

- Using special tool, separate the crankcase assemblies by pulling the crankcase complete L. (Fig. 3.141)

M131 011 0	Puller assembly
17 mm spanner	
8 mm spanner	

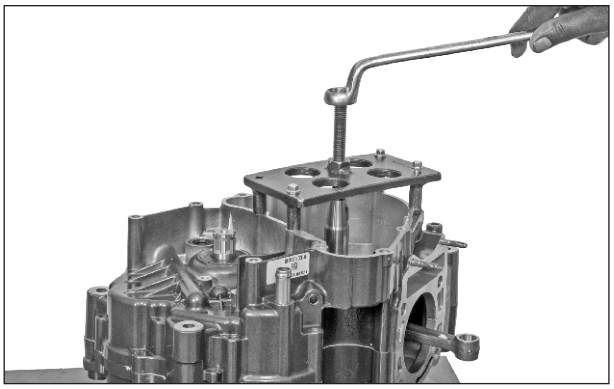


Fig. 3.141

- Take out the tubular dowel (2 nos.).

- Take out shim (15x27x0.5) (A) and retainer spring (B) from the balancer shaft. (Fig. 3.142)

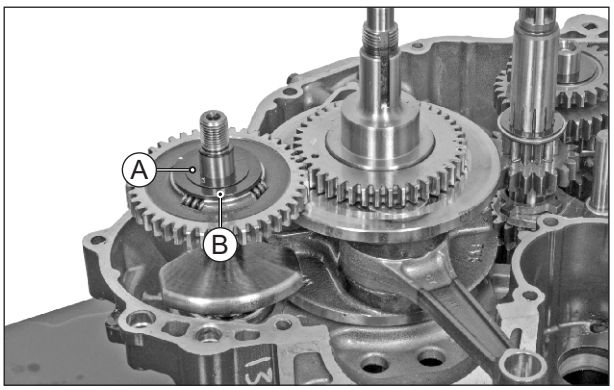


Fig. 3.142

- Take out the thrust washer (A) from the drive shaft assembly. (Fig. 3.143)

- Take out the bearing kick starter driven gear (B) along with thrust washer and shim from the counter (clutch) shaft assembly. (Fig. 3.143)

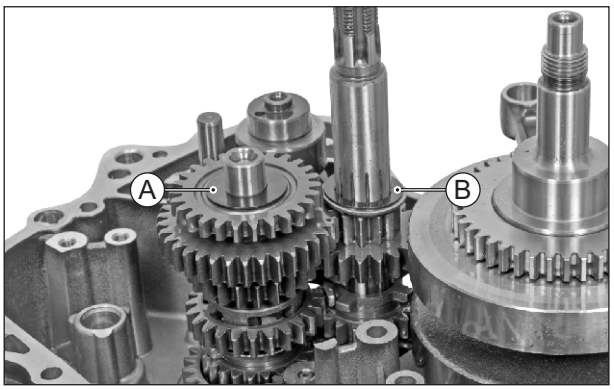


Fig. 3.143

- Take out gear assembly balancer shaft driven from the balancer shaft. (Fig. 3.144)

Caution:
While reassembling the gear assembly balancer shaft driven, align the balancer drive and driven gears to match the dot / punch marks in one line as shown in the illustration without fail to avoid costly damages to the engine. (Fig. 3.145)

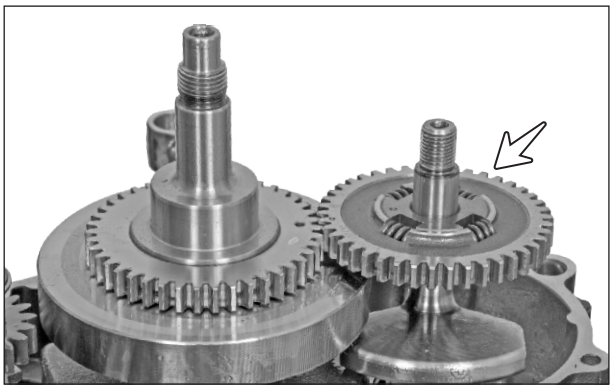


Fig. 3.144

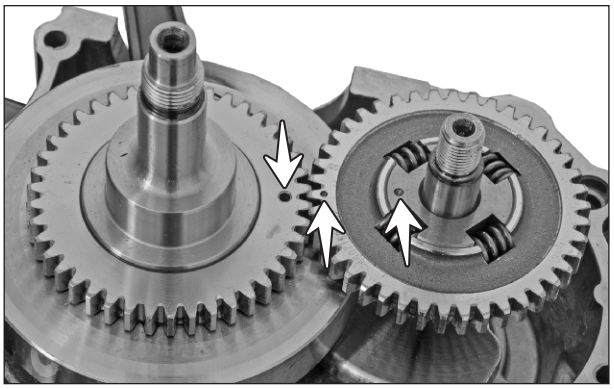


Fig. 3.145

- Remove the wood ruff key (A) from the balancer shaft assembly. (Fig. 3.146)

Nose plier

- Take out the retainer spring (B) from the balancer shaft assembly. (Fig. 3.146)

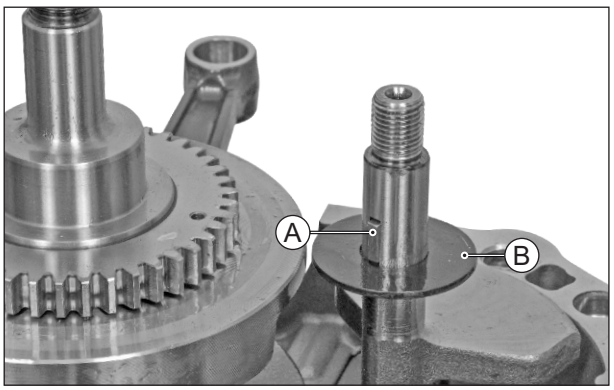


Fig. 3.146

- Pull out both the shaft shift forks from the fork gear shifts. (Fig. 3.147)

Nose plier

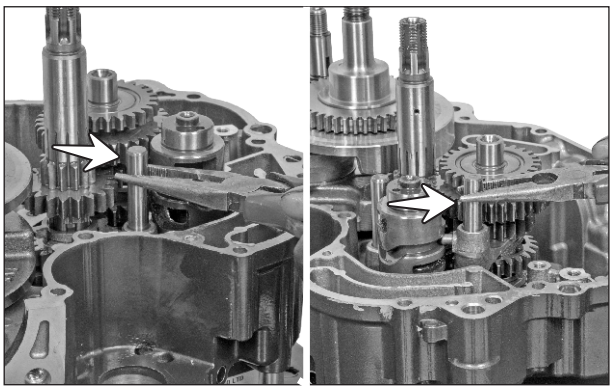


Fig. 3.147

- Dislocate the fork gear shift no.1, fork gear shift no. 2 and fork gear shift high speed from cam gear shift and take out the cam gear shift (A). (Fig. 3.148)

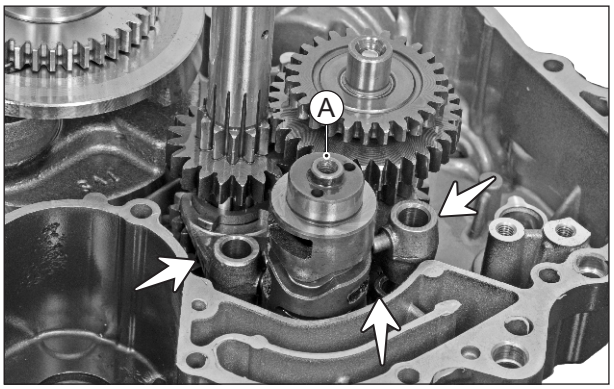


Fig. 3.148

- Take out fork gear shift no.1, fork gear shift no. 2 and fork gear shift high speed from gears. (Fig. 3.149)

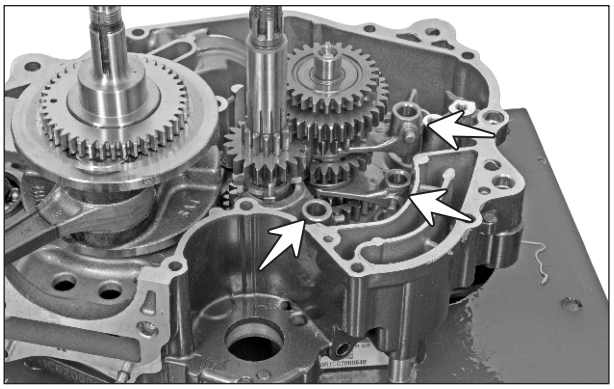


Fig. 3.149

- Take out drive shaft assembly and the counter (clutch) shaft assembly along with the gears as a set. (Fig. 3.150)

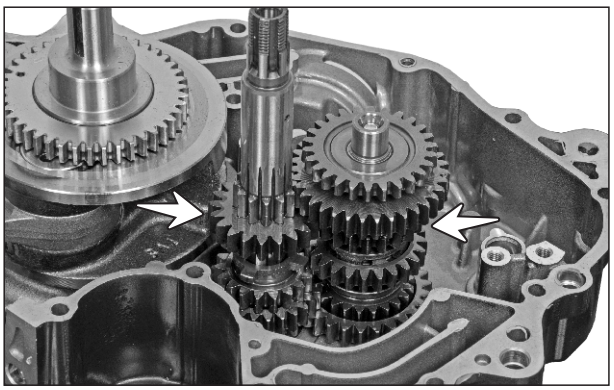


Fig. 3.150

- Take out the gear 2nd driven. (Fig. 3.151)

Note:
Since the gear idler (speed sensor gear) locks the 2nd driven gear, it will not come along with the drive shaft assembly during the shaft removal. Hence the gear has to be taken separately.

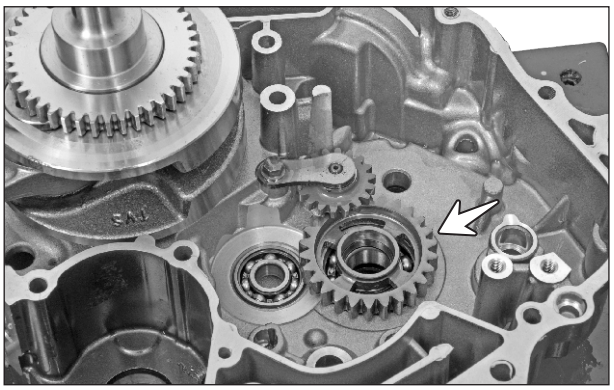


Fig. 3.151

- Take out thrust washer from the drive shaft assembly gear 2nd driven seating area. (Fig. 3.152)

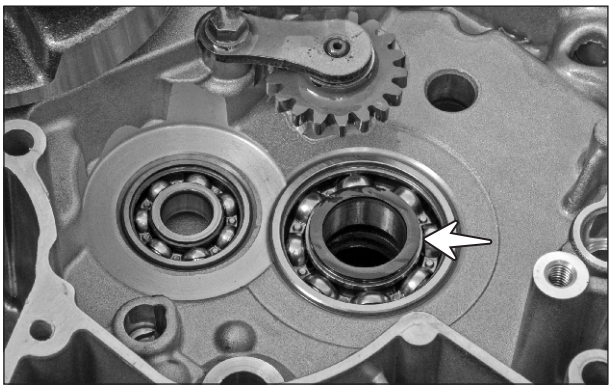


Fig. 3.152

- Pull out crankshaft assembly from the crankcase assembly LH by gently tapping it from the other side. (Fig. 3.153)

Note:
While removing the crankshaft assembly, ensure that the balancer shaft is rotated to the other side and not obstructing the crankshaft.

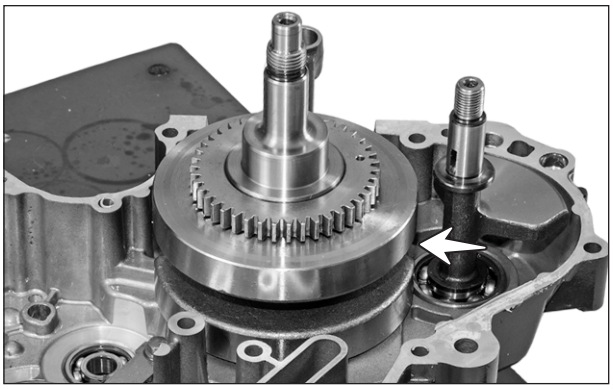


Fig. 3.153

- Take out the balancer shaft complete as an assembly. (Fig. 3.154)

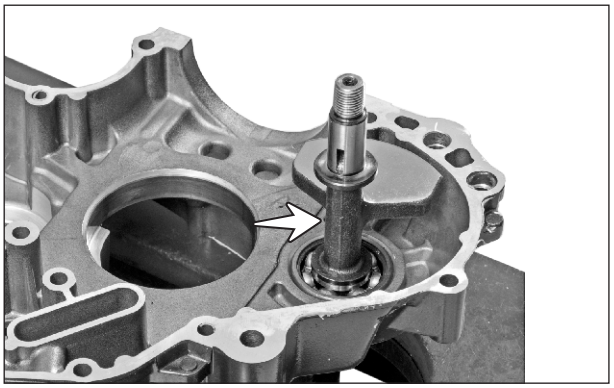


Fig. 3.154

- Remove hexagonal bolt (M6x16 - 1 no.) from the bracket idler gear mounting and dislocate the bracket idle gear. (Fig. 3.155)

8 mm spanner	
Tightening torque	10 ± 2 Nm

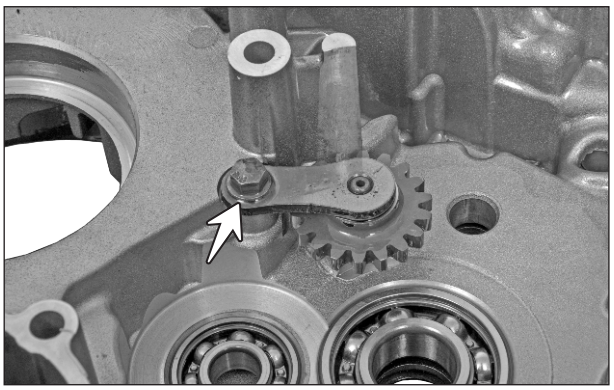


Fig. 3.155

- Take out the idler gear along with shims (11.2x18.5x1 - 2 nos.). (Fig. 3.156)

Note:
While reassembling the idler gear ensure the presence of shims on both side.

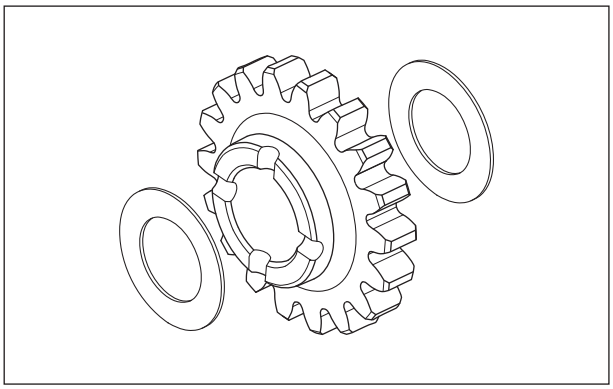


Fig. 3.156

- Using the special tool, remove the ball bearing (6207) from the crankshaft assembly (in case if the bearing comes with crankshaft). (Fig. 3.157)

S131 111 0	Extractor main bearing
17 mm spanner	

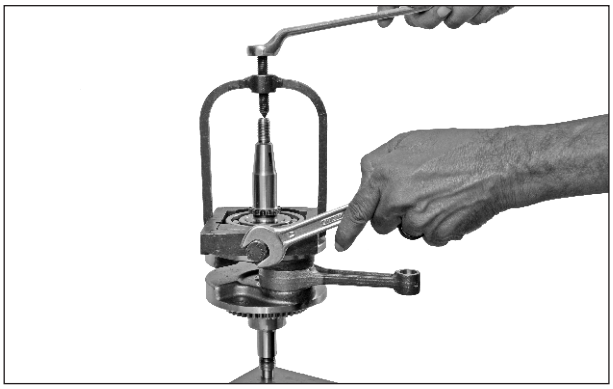


Fig. 3.157

- Using the special tool (bearings installer set), bearings and oil seals can be removed and reassembled. (Fig. 3.158)

S131 050 0	Bearing installer set
Metal hammer	

Note:
Remove the bearings, only if they need to be replaced. Unnecessary removal of bearings should be avoided, otherwise can damage the bearings and can cause deterioration to the interference fit. It is sufficient to clean and lubricate the bearings in assembled condition.

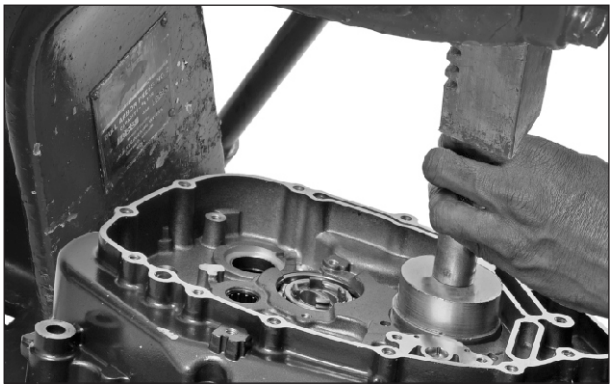


Fig. 3.158

- Using the special tool (universal oil seal remover), the oil seals can be removed. (Fig. 3.159)

031 240 1	Universal oil seal remover

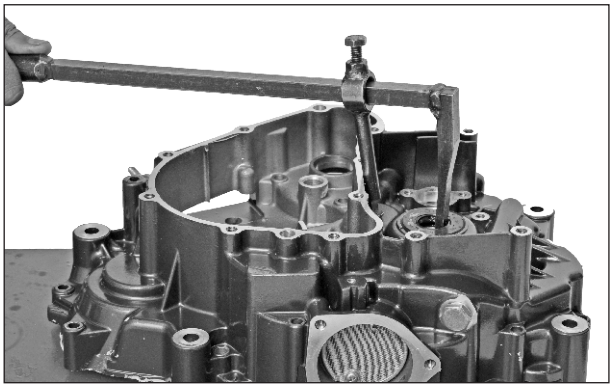


Fig. 3.159

GEAR ASSEMBLY BALANCER SHAFT DRIVEN

- Gear balancer shaft driven can be separated from the race balancer gear driven by pressing it out.

Note:
While reassembling the gear balancer shaft ensure that the dots (A) on the race balancer gear driven and gear balancer driven should be aligned and the pin balancer shaft driven (B) should be placed opposite to each other. (Fig. 3.160)

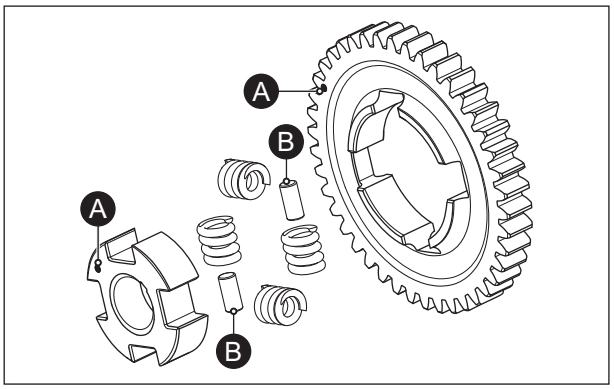


Fig. 3.160

SHAFT COMPLETE DRIVE - DISASSEMBLY

- Take out the gear 4th driven. (Fig. 3.161)

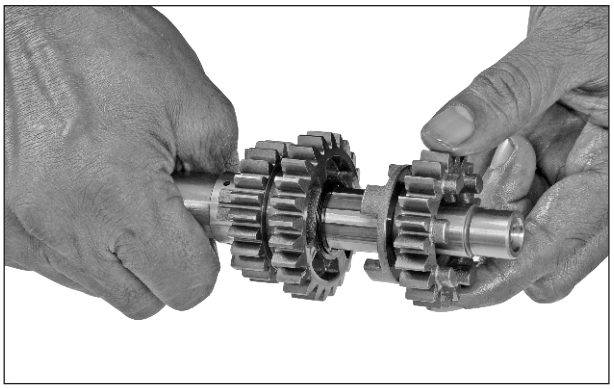


Fig. 3.161

- Remove the circlip (20x1.2). (Fig. 3.162)

Snap ring plier - External

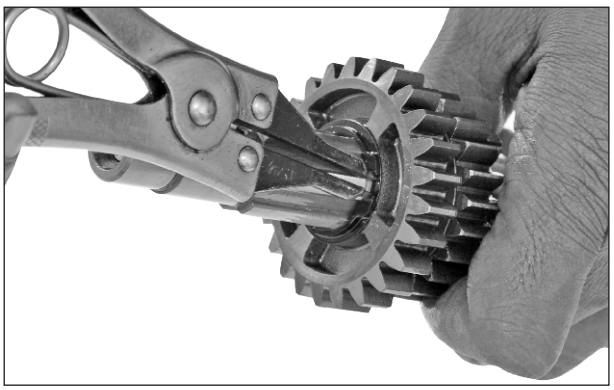


Fig. 3.162

- Take out the shim (A). (Fig. 3.163)
- Take out the gear 3rd driven (B). (Fig. 3.163)

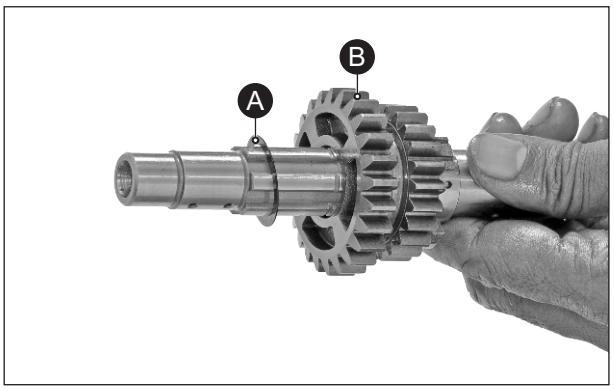


Fig. 3.163

- Take out the star bush. (Fig. 3.164)

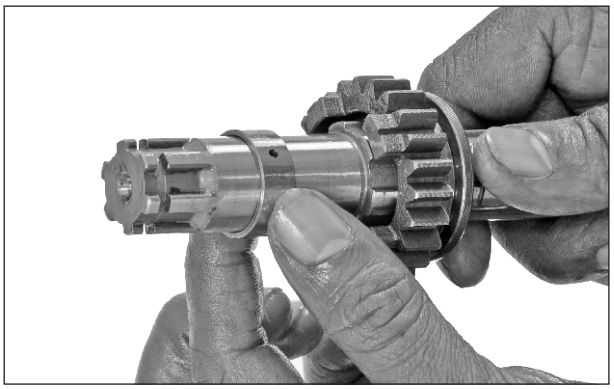


Fig. 3.164

- Take out the gear 5th driven. (Fig. 3.165)

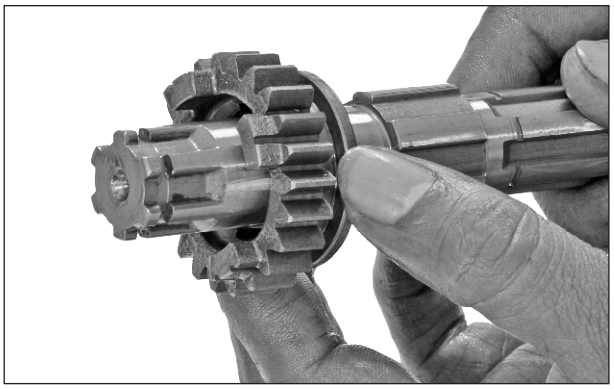


Fig. 3.165

INSPECTION

- Shaft complete drive / shaft complete counter (assembly) / cam gear shift / drive gears and driven gears.
- Before inspection, clean all the components thoroughly with cleaning solvent.
- Carefully inspect all the parts for any scoring marks, breakage, wear of splined surfaces of shafts / gear teeth. Replace damaged parts with the new ones.
- Using a feeler gauge, check the clearance between fork gear shift and its seating groove on the gear. (Fig. 3.166)
- If the measured clearance exceeds the service limit, determine whether the gear or the fork gear shift should be replaced with a new one.

Feeler gauge

Description	Service limit
Fork gear shift to groove clearance	0.300 mm (max)

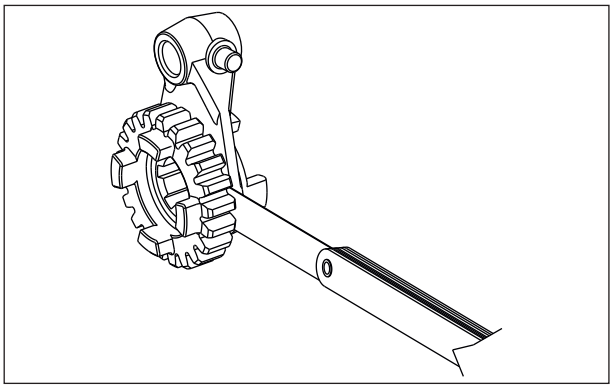


Fig. 3.166

REASSEMBLY

- Reverse the removal procedure of gears for re-assembly.
- While reassembling the gears, attention must be given to the locations and positions of washers and circlips.

Caution:
Never reuse circlips after removing from the shaft.

While installing a new circlip, care should be taken not to expand the end gap larger than the required to slip over the shaft.

After installing a new circlip, always ensure that it is completely seated in its groove and securely being locked. The flat surface of the circlip should always face towards the component being locked.

- The exploded view will serve as a reference for correct mounting of the gears, washers and circlips. (Fig. 3.167)

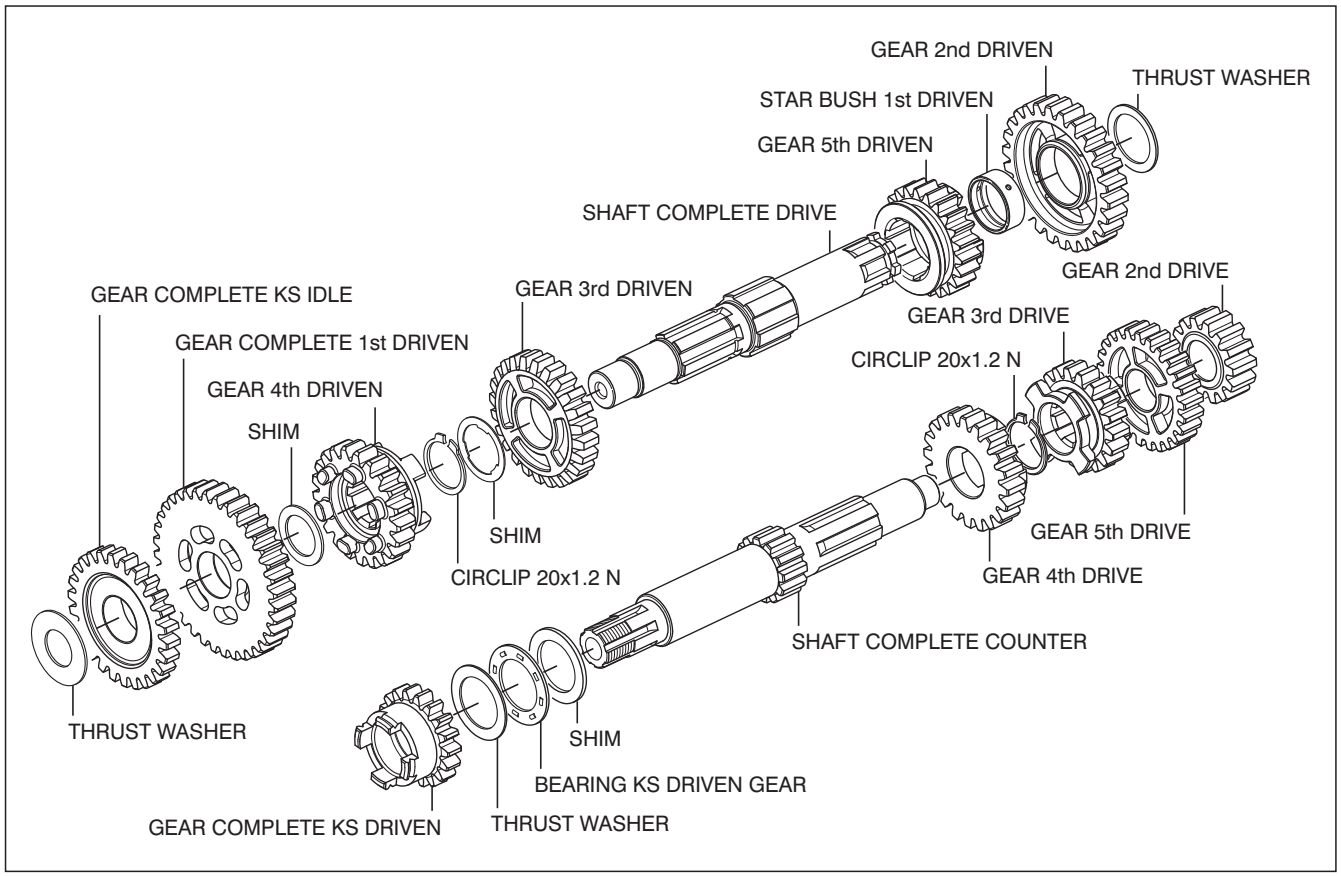


Fig. 3.167

ENGINE COMPONENTS - INSPECTION

Bearings

- Wash bearings with a cleaning solvent and lubricate them with engine oil before inspecting.
- Inspect the play of each bearing before fixing it. Hold inner race and rotate the outer race by hand and observe for any abnormal noise and smooth rotation. Replace bearing with a new one if found defective. (Fig. 3.168)

Note:
Do not use compressed air to clean the bearings.

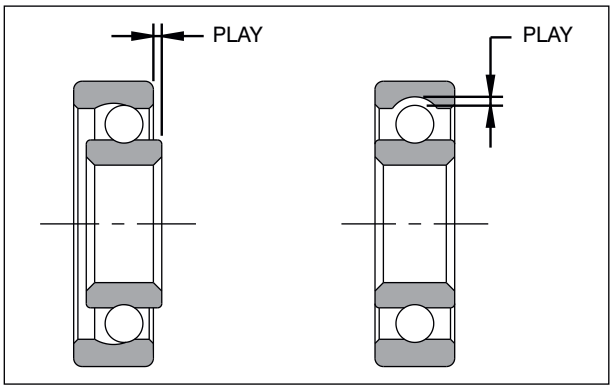


Fig. 3.168

Oilseal

- Damage to the oil seal lip (A) may result in leakage of oil. Inspect the oilseals for the damage of lip and always replace oilseals with the new ones during reassembly. (Fig. 3.169)

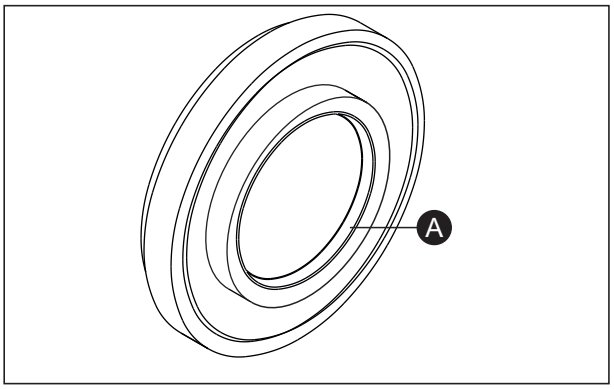


Fig. 3.169

Crankshaft assembly - runout

- Support crankshaft assembly with 'V' blocks or anvil.
- Mount the dial indicator at positions shown to read the runout. Runout should be within the service limit. (Fig. 3.170)
- Excessive runout of crankshaft assembly causes abnormal engine vibration and bearing noises. Such vibration shortens the engine life.

V - block set (4"x3"x3")
Dial gauge (1/100 mm)
Magnetic stand

Service limit	0.100 mm (max)

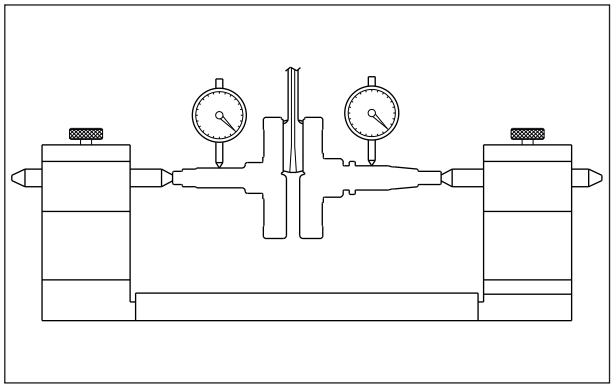


Fig. 3.170

Condition of the big end bearing - crankshaft assembly

- Hold the crankshaft assembly in hand, shake the connecting rod to find out the radial play. If any play is noticed, then replace the crankshaft assembly with a new one. (Fig. 3.171)

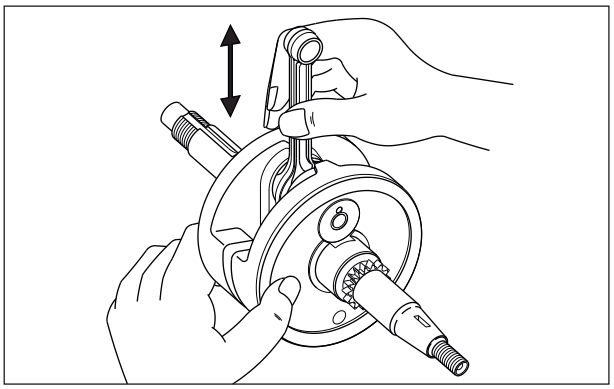


Fig. 3.171

- Measure connecting rod big end side clearance with a feeler gauge. If the clearance exceeds the service limit, replace the crankshaft assembly with a new one. (Fig. 3.172)

Feeler gauge	
Service limit	0.650 mm (max)

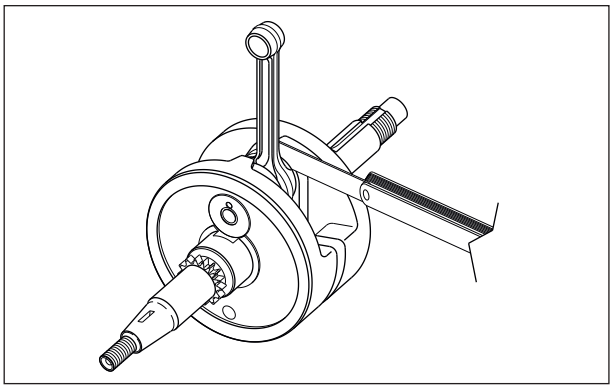


Fig. 3.172

Connecting rod small end diameter

- Measure internal diameter (ID) of the connecting rod small end. If ID is more than the service limit, replace the crankshaft assembly with a new one. (Fig. 3.173)

Service limit	15.040 mm (max)

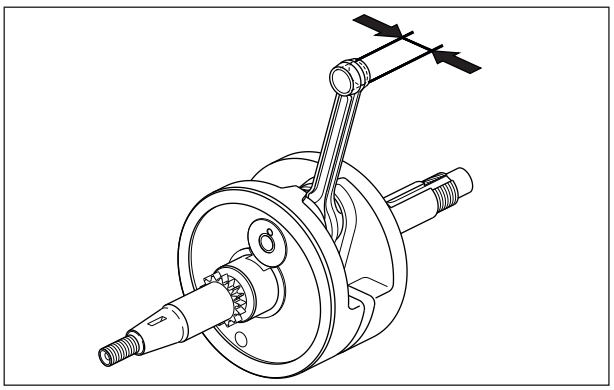


Fig. 3.173

Balancer shaft - Inspection

- Inspect the balancer shaft for any twist or bend. If found any replace the balancer shaft assembly.
- Inspect the balancer shaft bearing for free rotation and any abnormal noise. If found any replace the bearing. (Fig. 3.174)

Note:
Replace both LH & RH bearings together (one bearing is assembled on the shaft and the other one is on the RH side crankcase).

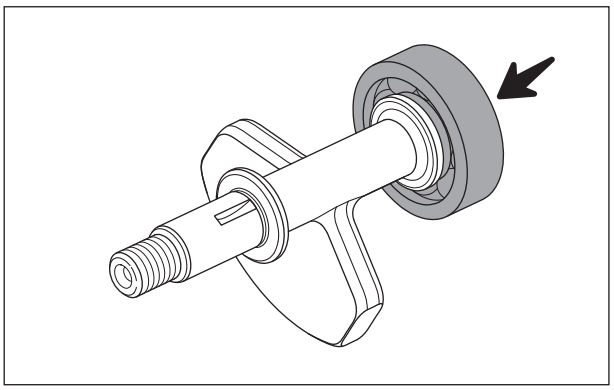


Fig. 3.174

ENGINE ASSEMBLY - REASSEMBLY

- Refer engine exploded view for assembly details. (Fig. 3.175)
- Reassemble parts carefully in the reverse order of disassembly.
- Never reuse gaskets, circlips, 'O' rings and oilseals when the engine is overhauled.
- After installing a circlip, ensure that it is seated properly in its groove by rotating it.
- Always use recommended special tools.

Bearings

For reassembling bearings use a special tool.

Note:
Whenever bearings are replaced it is recommended that both LH & RH bearings are replaced as a set to have better results. Make sure that the bearings are not misaligned with the fitting.

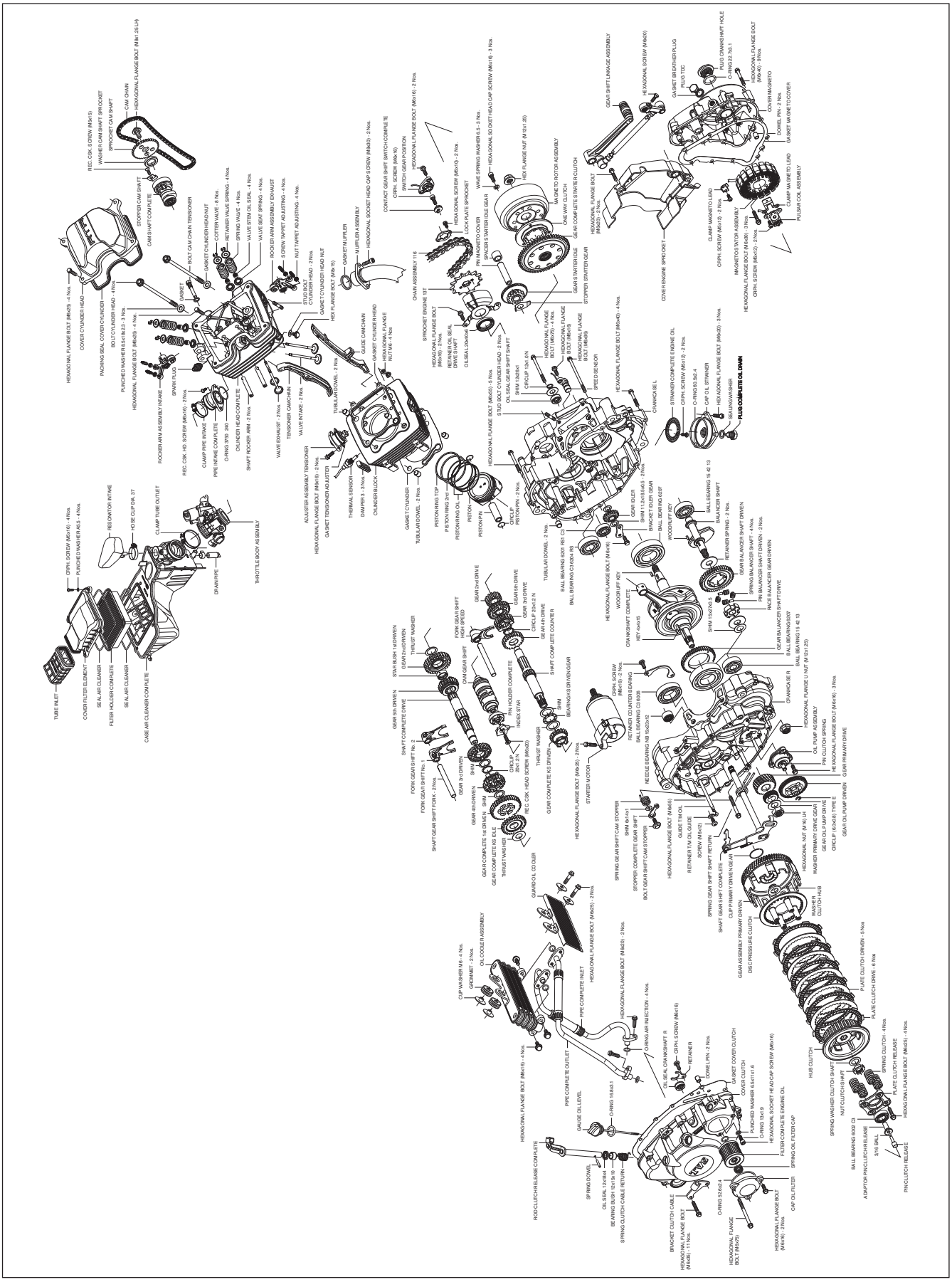
Oil seals

While assembling the oilseals to the crankcase follow the procedure given below:

- Apply grease to the lip of oilseal.
- Use only specified special tool for assembling the oilseals.
- When fixing the oilseal over the shaft check that the lip seats over the shaft perfectly all around the circumference without any distortion.
- Apply engine oil on each running and sliding part before installing them during reassembly.

Fasteners

- Tighten all fasteners to the specified torque using torque wrench (refer torque chart in page no. 7-8 & 7-9 for torque specification).



CRANKCASE ASSEMBLY LH & RH - REASSEMBLY

- Remove the gasket material on the mating surfaces of crankcase assembly L & R and thoroughly remove oil stains.

- Assemble the idle gear on the crankcase assembly LH and secure it with the bracket idle gear using hexagonal flange bolt (M6x16) and tighten it to the specified torque. (Fig. 3.176)

8 mm spanner	
Tightening torque	10 ± 2 Nm

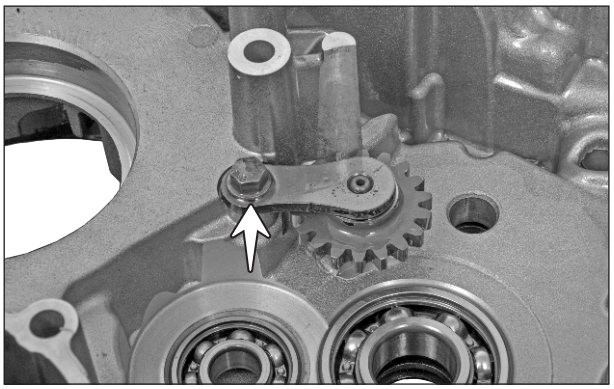


Fig. 3.176

- Assemble the balancer shaft complete as an assembly in the crankcase assembly LH. (Fig. 3.177)

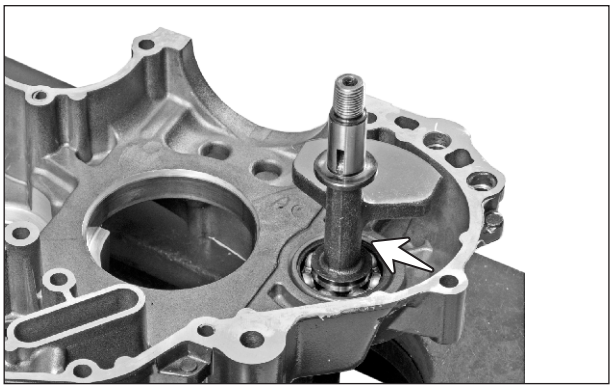


Fig. 3.177

- Rotate the balancer shaft to other side as shown and assemble the crankshaft assembly in the crankcase assembly LH. (Fig. 3.178)

Note:
While assembling the crankshaft take extra care not to cause any dent, damage and scratches to the machined surfaces.

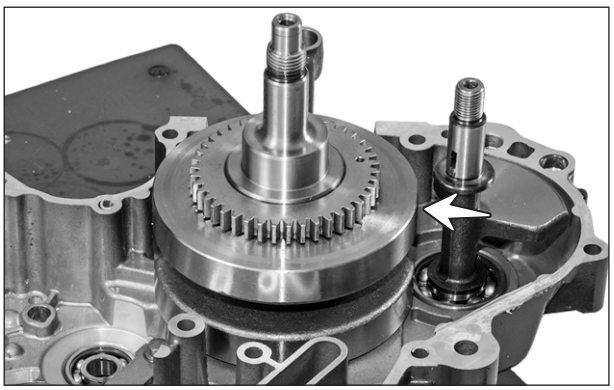


Fig. 3.178

- Assemble the retainer spring on the balancer shaft and secure it with the wood ruff key (A). (Fig. 3.179)

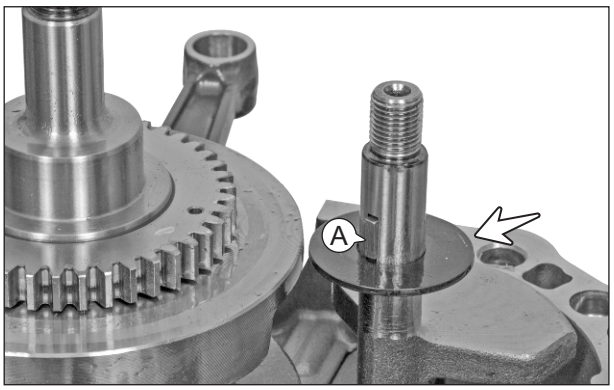


Fig. 3.179

- Assemble the gear balancer shaft driven assembly on the balancer shaft. (Fig. 3.180)

Caution:
While reassembling, align balancer drive and driven gears to match dot/punch marks (A) in one line as shown in the figure.

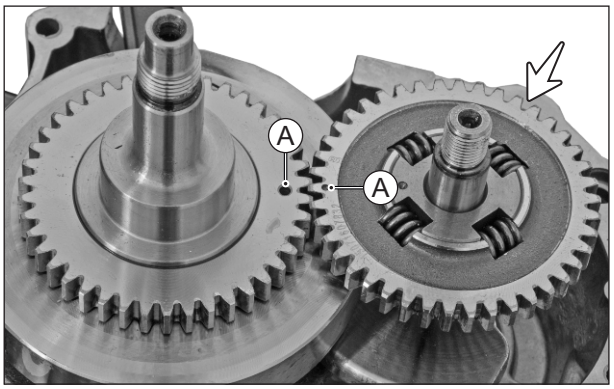


Fig. 3.180

- Assemble the retainer spring (A) and the shim (B) on the balancer shaft. (Fig. 3.181)

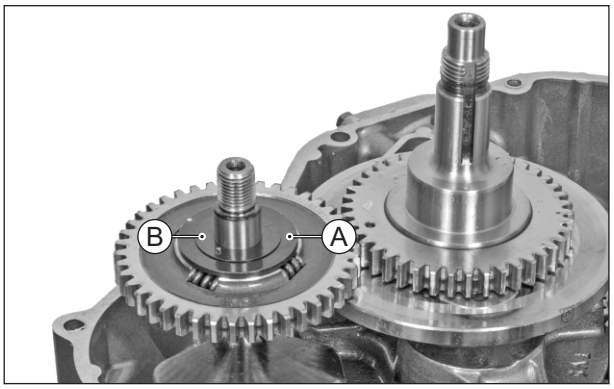


Fig. 3.181

- Place a thrust washer on the crankcase assembly LH at shaft complete drive seating area (above the ball bearing). (Fig. 3.182A)
- Place the gear 2nd driven on the crankcase assembly LH at shaft complete drive seating area (above the thrust washer). (Fig. 3.182B)

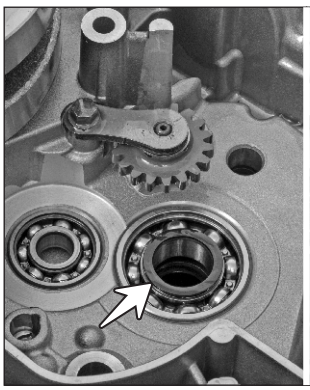


Fig. 3.182A

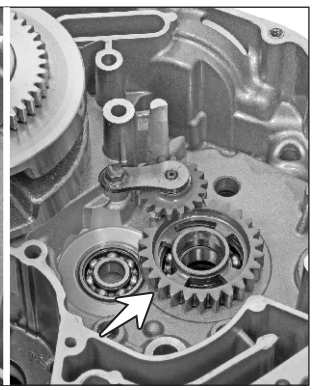


Fig. 3.182B

- Assemble the counter shaft assembly (clutch shaft) and drive shaft assembly as set in crankcase assembly LH. (Fig. 3.183)

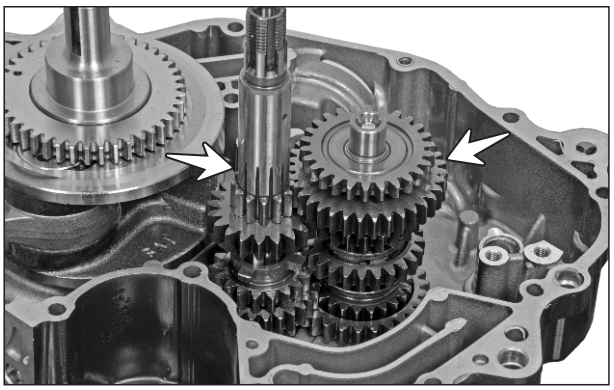


Fig. 3.183

- Assemble the fork gear shift no.1, fork gear shift no. 2 and fork gear shift high speed on their respective position. (Fig. 3.184)

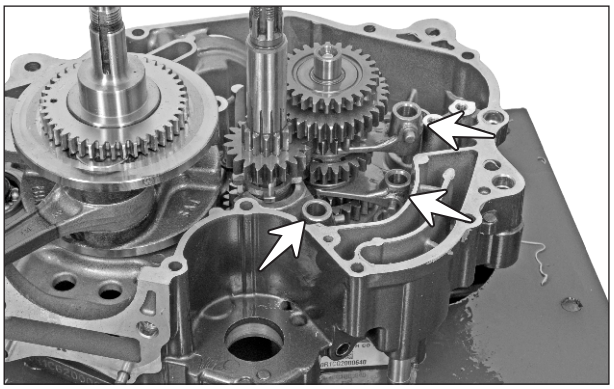


Fig. 3.184

- Assemble cam gear shift (A) in the crankcase assembly. (Fig. 3.185) and locate both the fork gear shifts in their respective grooves on the cam complete gear shift.

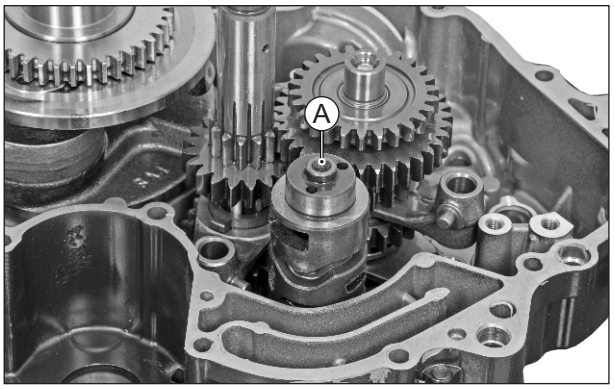


Fig. 3.185

- Assemble both the shaft shift forks in the crankcase assembly LH through fork gear shifts. (Fig. 3.186)

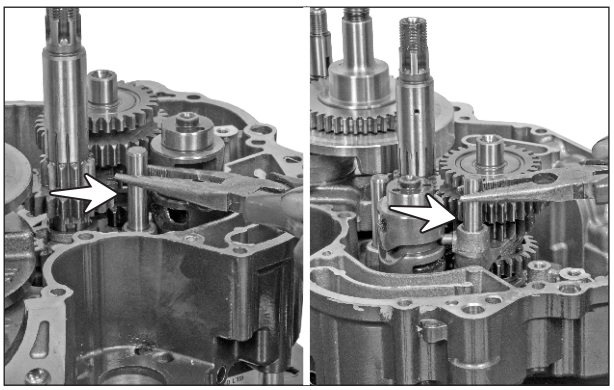


Fig. 3.186

- Assemble the shim (A) on the shaft complete drive. (Fig. 3.187)
- Assemble bearing kick starter driven gear along with shim and thrust washer (B) on the shaft complete counter. (Fig. 3.187)

Note:
While assembling the shim and thrust washer, assemble the shim below the bearing kick starter driven gear and thrust washer on the top.

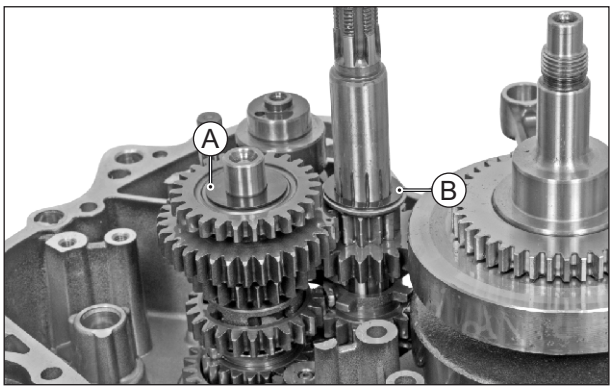


Fig. 3.187

- Assemble tubular dowel (2 nos.) in the crankcase assembly LH and fix gasket crankcase.

Note:
Apply little grease on the gasket crankcase for better seating.

- Assemble the crankcase assembly RH to the crankcase assembly LH by gently tapping. (Fig. 3.188)

Nylon hammer

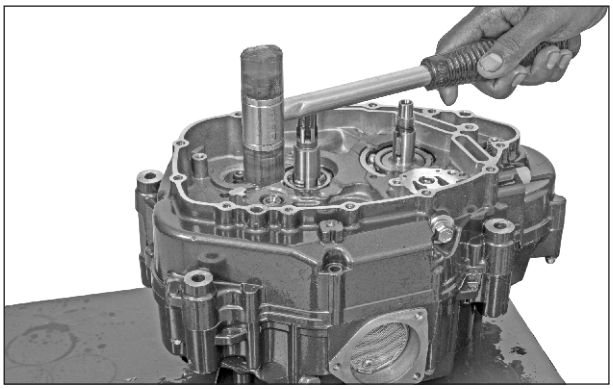


Fig. 3.188

- Assemble and tighten hexagonal flange bolts (M6x55 - 5 nos., M6x40 - 4 nos., M6x75 - 4 nos. and M6x95 - 1 no.) on the crankcase complete LH. (Fig. 3.189)

8 mm spanner	
Tightening torque	10 ± 2 Nm

Note:
Tighten the screws in crisscross pattern.

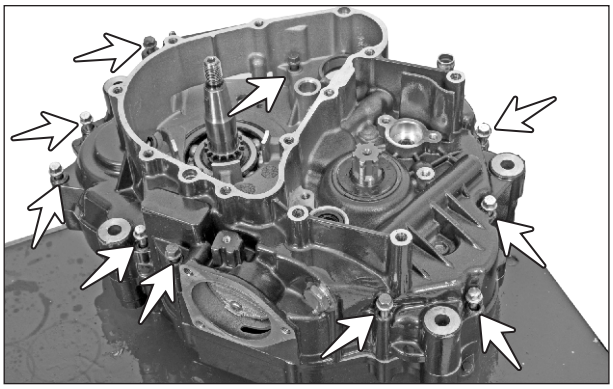


Fig. 3.189

- Assemble and tighten hexagonal flange bolt (M6x55 - 1 no.) on the crankcase complete RH. (Fig. 3.190)

8 mm spanner	
Tightening torque	10 ± 2 Nm

Note:
After tightening crankcase bolts, check for the free rotation of shaft complete drive, and shaft complete counter and crankshaft assembly.

If large resistance is felt, gently tap on the shaft complete drive and shaft complete counter assemblies with nylon hammer.

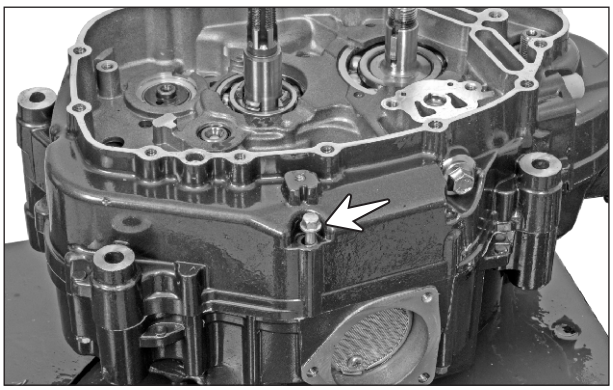


Fig. 3.190

CLUTCH

- Before assembling the cover clutch, ensure that adopter clutch release and ball are assembled on the clutch assembly. (Fig. 3.191A)

- Also ensure that pin clutch release is assembled on the cover clutch. (Fig. 3.191B)

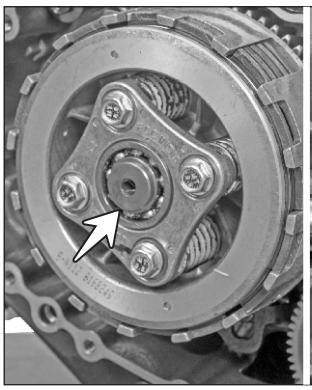


Fig. 3.191A

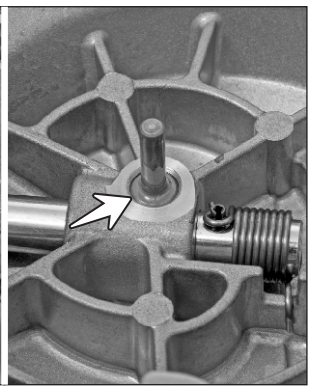


Fig. 3.191B

VALVE TIMING AND VALVE CLEARANCE

Valve timing

- While reassembling sprocket cam shaft, follow the below given procedures:
- Rotate rotor assembly and match the TDC mark (A) on rotor assembly and the mark (B) on crankcase assembly LH. (Fig. 3.192A)
- At this position, ensure that the mark (C) on sprocket cam shaft matches with the surface edge of head complete cylinder (D). (Fig. 3.192B)

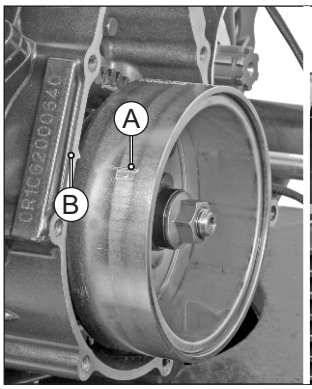


Fig. 3.192A

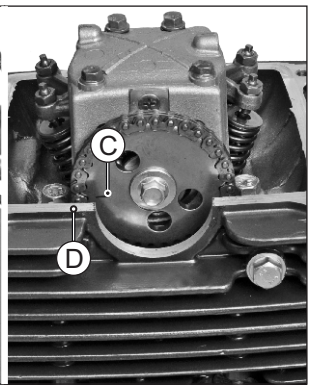


Fig. 3.192B

Valve clearance

- Adjust valve clearance to the specified limit (refer chapter "Periodic maintenance" page no. 2-19 for procedure and specification)
- Before starting the vehicle, fill up engine cum transmission oil and carry out all the other adjustments. Tune the engine as prescribed in chapter "Periodic maintenance" page no. 2-18.

RUNNING-IN AFTER OVERHAUL

- The rebuilt / overhauled engine should undergo running-in.
- Do not overload the engine immediately after overhaul as it may result in rapid wear of components due to overstrain, overheat and overload.
- This will have a impact through out the life of the rebuilt components resulting in under performance of vehicle.

Chapter 4

FUEL, LUBRICATION AND EXHAUST SYSTEM

FUEL SYSTEM

FUEL TANK COMPLETE

- The fuel tank complete is located on frame tube near the steering pivot with a lockable cap assembly fuel tank (A) and fuel filter with hose injector (B) at the bottom left side of the tank. (Fig. 4.1)
- The cap assembly fuel tank can be opened with the ignition key.
- A fuel pump module is mounted at the bottom side of the fuel tank. (Fig. 4.2)

Tank capacity	
Main	12 liters
Reserve	2.5 liters

- Clean the fuel tank complete periodically. Inspect the tank for any leakage. If any leakage is noticed, replace the fuel tank with a new one.

REMOVAL

- Drain the petrol completely.
- Remove the fuel tank assembly as explained in chapter "Periodic maintenance" page no. 2-5.
- Remove fuel filter assembly as explained in chapter "Periodic maintenance" page no. 2-5.
- Remove the hexagonal flanged bolt (M6 x 10 - 6 nos.) along with the gasket from the fuel pump module. (Fig. 4.3)

10 mm spanner	
Tightening torque	8 ± 1 Nm

- Take out the plate carefully. (Fig. 4.4)

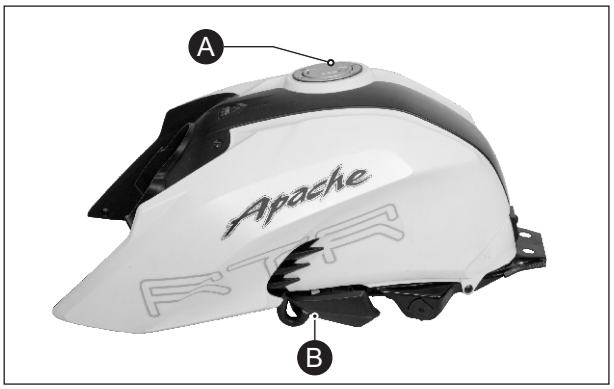


Fig. 4.1

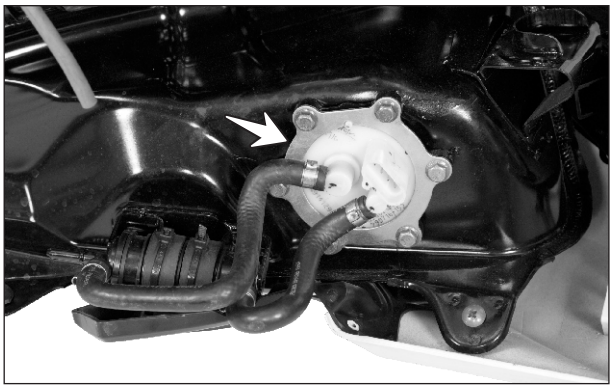


Fig. 4.2

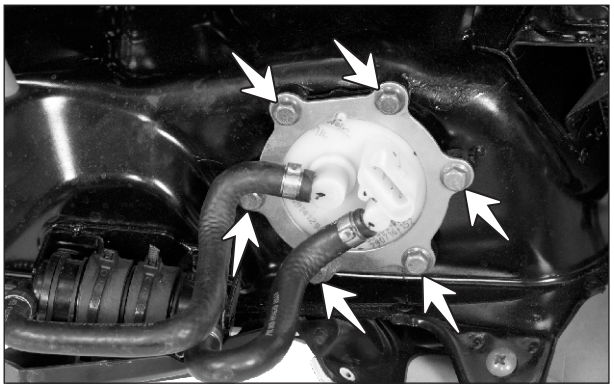


Fig. 4.3

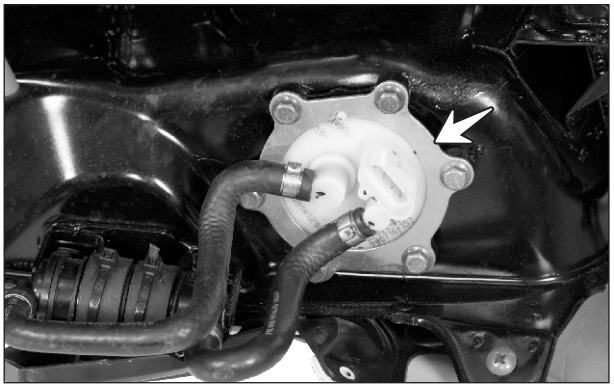


Fig. 4.4

- Take out the fuel pump module along with the two o-ring. (Fig. 4.5)

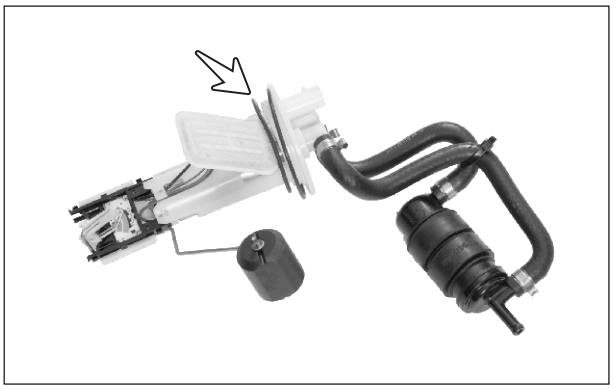


Fig. 4.5

Note:
While reassembling the fuel pump module, ensure the both the o-ring are new & assembled.

Ensure the slot A, B, C in same line. (Fig. 4.6)

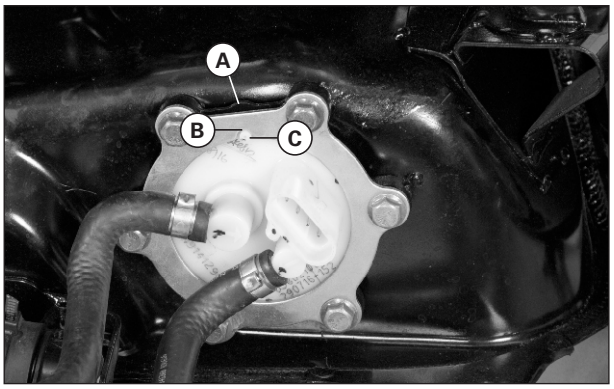


Fig. 4.6

- Dislocate the hose clamp and disconnect the hose drain from the fuel tank assembly. (Fig. 4.7)

Nose plier

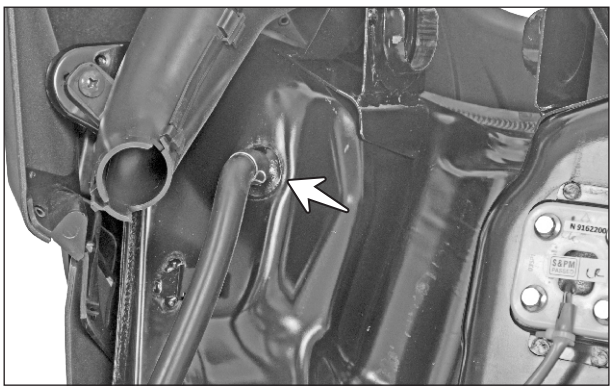


Fig. 4.7

HOSE FUEL

- Visually inspect the hose fuel for crack or leakage at its mounting points. If any crack or leakage noticed replace hose fuel with a new one.

THROTTLE BOBY ASSEMBLY

Removal from the vehicle

- Replacing of throttle body assemble or replacing the child part of throttle body assy, if required.

> ***Note:***
> ***Before removing the throttle body assembly, disconnect the hose injector from fuel filter.***

- Remove the seats and cover frame L & R by referring the chapter "Periodic maintenance" page no. 2-3 & 2-4.

- Disconnect all the sensors in throttle body (A)fuel injector sensor, (B)T-map sensor, (C)throttle position sensor, (D)idle air control valve. (Fig. 4.8)

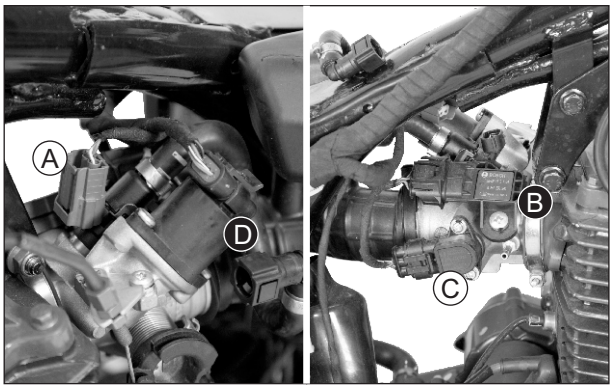


Fig. 4.8

- Fully loosen the throttle cable lock nut (A) while holding the adjuster (B). (Fig. 4.9)

10 mm spanner

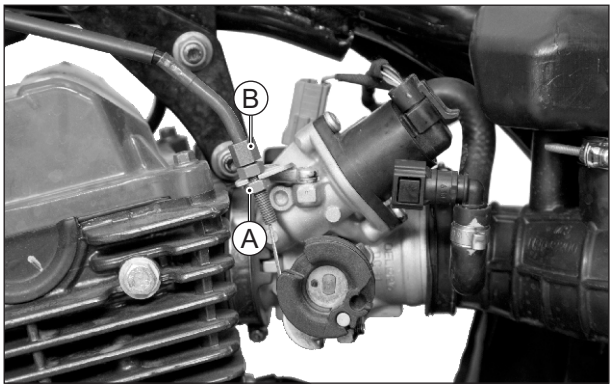


Fig. 4.9

- Loosen the clamp intake pipe and gently pull out the throttle body assembly from the intake pipe. (Fig. 4.10A)

Phillips head screw driver

Tightening torque	2.25 ± 0.25 Nm

- Similarly, loosen the clamp outlet pipe and dislocate the tube outlet pipe of air cleaner from the throttle body assembly. (Fig. 4.10B)

Tightening torque	1.75 ± 0.25 Nm

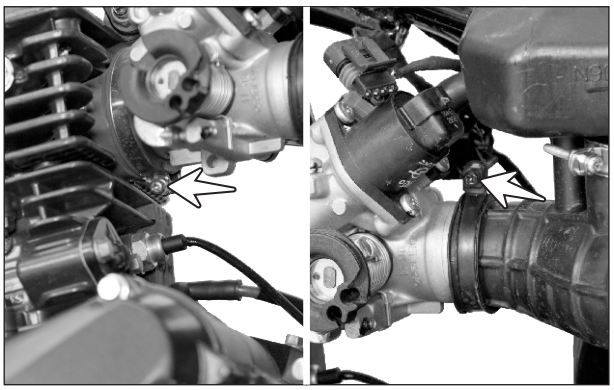


Fig. 4.10A Fig. 4.10B

- Remove the screw throttle body (M5x12 - 2nos.) from the throttle position sensor and gently pull out the throttle position sensor along with a 'O' ring. (Fig. 4.11)

Phillips head screw driver	
Tightening torque	2.25 ± 0.25 Nm

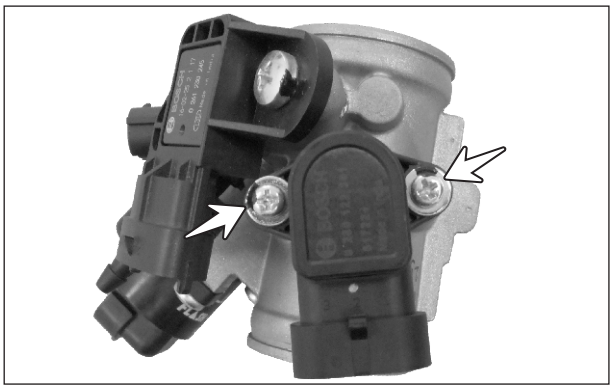


Fig. 4.11

- Remove the screw (1no.) from the T-map sensor and gently pull out the T-map sensor along with a 'O' ring. (Fig. 4.12)

Phillips head screw driver	
Tightening torque	4.5 ± 0.5 Nm

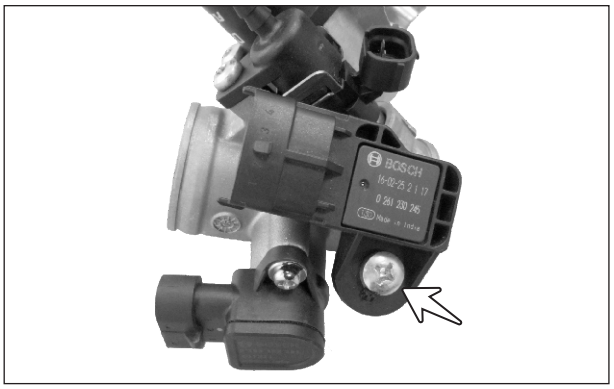


Fig. 4.12

- Remove the torsional screw (1no.) from the fuel injector and take out the cap injector, holder injector and injector with a 'O' ring. (Fig. 4.13)

Torsional screw driver	
Tightening torque	4.5 ± 0.5 Nm

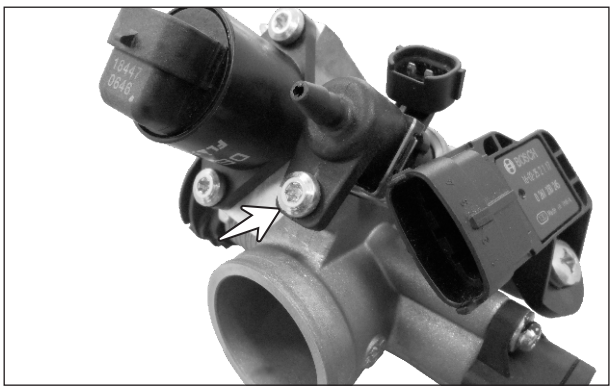


Fig. 4.13

- Remove the torsional screw (2nos.) from the idle stopper unit and gently pull out the idle stopper unit along with a 'O' ring. (Fig. 4.14)

Torsional screw driver	
Tightening torque	4.5 ± 0.5 Nm

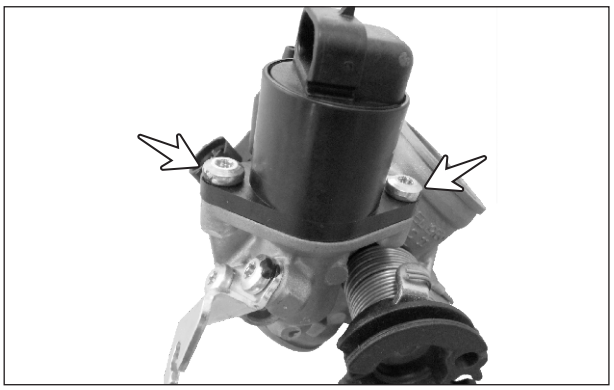


Fig. 4.14

- Remove the torsional screw (2nos.) from the bracket throttle holder and take out the bracket throttle holder. (Fig. 4.15)

Torsional screw driver

Tightening torque	4.5 ± 0.5 Nm

Note:
While reassembling the sensors, ensure the 'O' ring availability.

Caution:
During reassembly of the sensors do not tighten more than required as it may damage the seating surface.

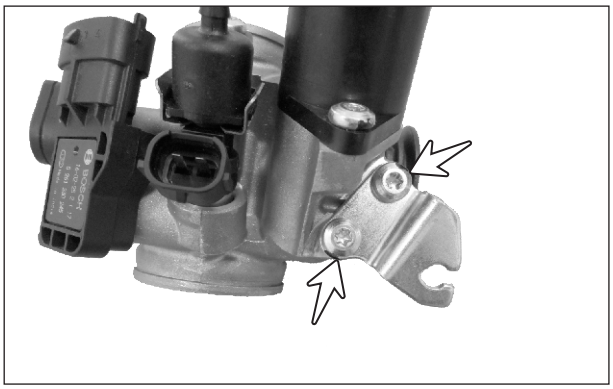


Fig. 4.15

LUBRICATION SYSTEM

- Lubrication system is very important to any engine which helps the engine to perform well even at higher speeds and temperature. So maintaining the lubrication system is essential to safeguard the engine.
- In this bike, the lubrication system is called as positive lubrication system. It contains a trochoid oil pump which delivers oil to the lubrication circuit from the sump.
- It has an oil filter in the inlet side of the pump. Also it has paper filter at the outlet of the oil pump. The oil travels through various systems of the engine to cool.
- The oil circuit is shown in the figure.(Fig. 4.16)
- Always clean the oil passages whenever service or opening the crankcase.
- Replace or replenish the lubricating oil as per the periodical maintenance schedule.

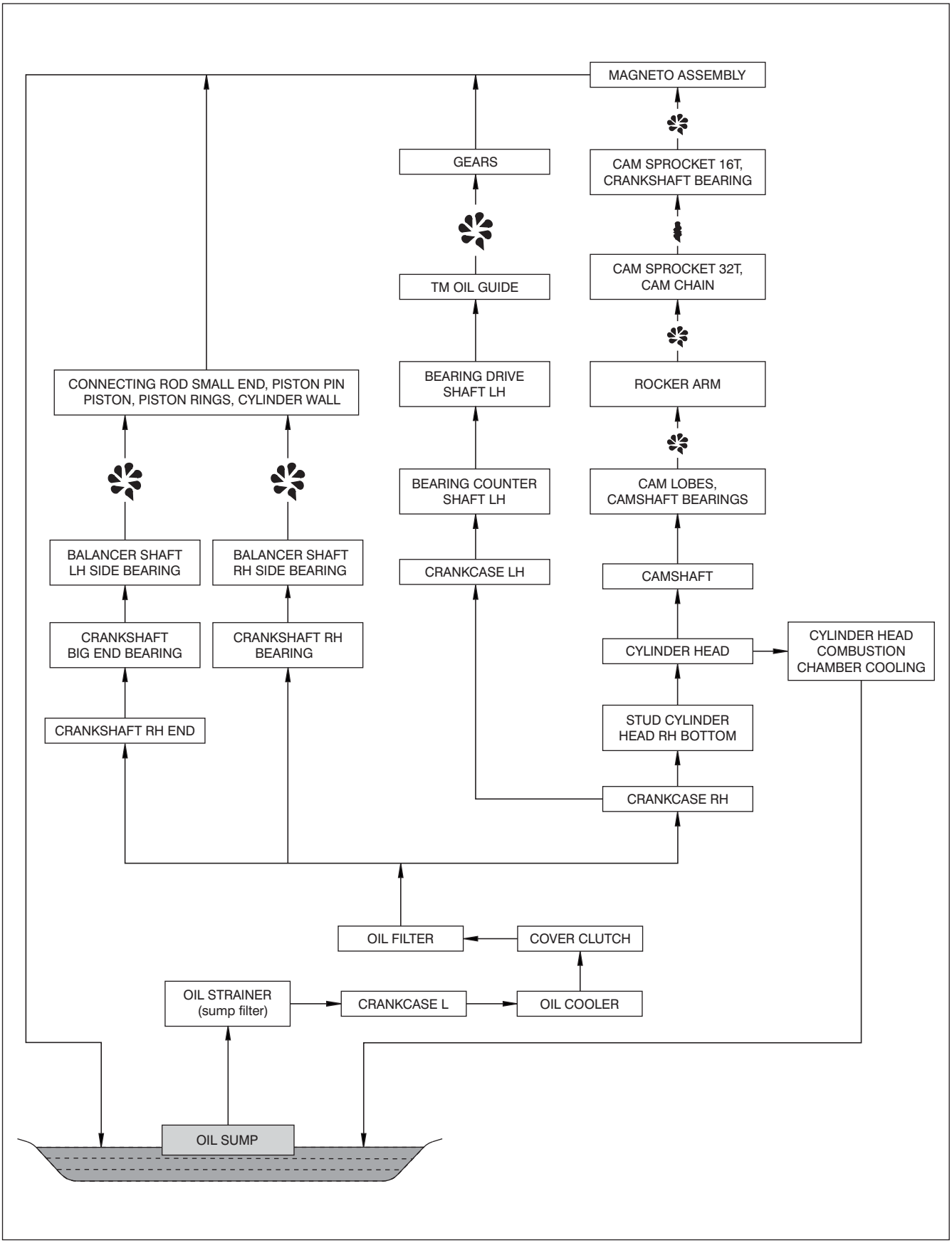

MAGNETO ASSEMBLY
GEARS
CAM SPROCKET 16T, CRANKSHAFT BEARING
TM OIL GUIDE
CAM SPROCKET 32T, CAM CHAIN
BEARING DRIVE SHAFT LH
ROCKER ARM
CONNECTING ROD SMALL END, PISTON PIN PISTON, PISTON RINGS, CYLINDER WALL
BEARING COUNTER SHAFT LH
CAM LOBES, CAMSHAFT BEARINGS
BALANCER SHAFT LH SIDE BEARING
BALANCER SHAFT RH SIDE BEARING
CRANKCASE LH
CAMSHAFT
CRANKSHAFT BIG END BEARING
CRANKSHAFT RH BEARING
CYLINDER HEAD
CYLINDER HEAD COMBUSTION CHAMBER COOLING
CRANKSHAFT RH END
STUD CYLINDER HEAD RH BOTTOM
CRANKCASE RH
OIL FILTER
COVER CLUTCH
OIL STRAINER (sump filter)
CRANKCASE L
OIL COOLER
OIL SUMP

Fig. 4.16

OIL FILTER (STRAINER)

- Oil filter is provided on the right side crankcase at the bottom, inside the cap oil strainer. (Fig. 4.17)
- Clean the oil filter as specified in the periodic maintenance schedule (refer chapter "Periodic maintenance" page no. 2-12 for removal and cleaning procedure).

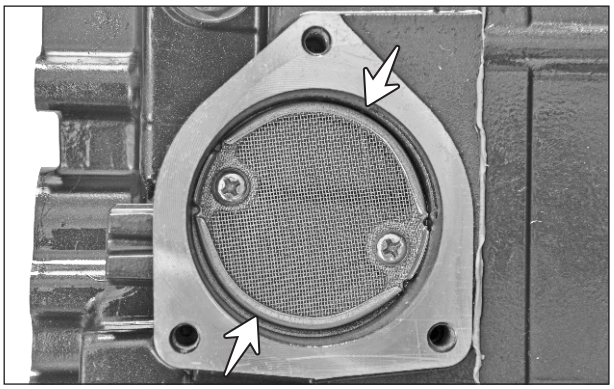


Fig. 4.17

OIL PUMP ASSEMBLY

- The pump assembly oil is mounted on the right side crankcase, just below the gear primary drive. (Fig. 4.18)
- Oil pump is the prime member which delivers oil to the lubrication system from the sump. It is driven by a separate gear (gear oil pump drive) through a plastic gear. Inspect the oil pump driven gear and the oil pump surface for any damage. Tighten the oil pump mounting screws to the specified torque while reassembling.

Tightening torque	8 ± 2 Nm

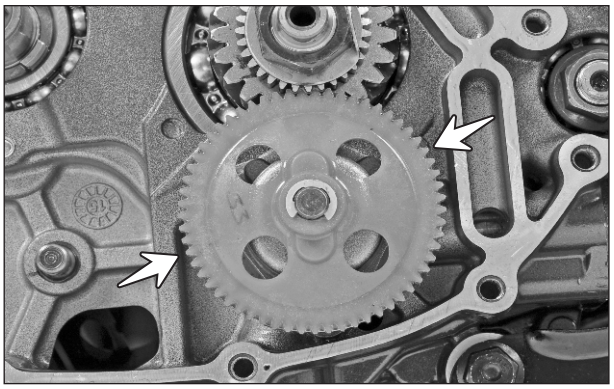


Fig. 4.18

- To ensure supply of oil to cylinder head components, the oil flow can be checked at the cylinder head by following the procedure given below:
- Start the engine and run for a few seconds.
- Slowly loosen the hexagonal flange bolt (M8x15 - 1 no.) along with the copper gasket and look for the flow of oil. (Fig. 4.19)

14 mm spanner

Tightening torque	12 ± 2 Nm

Note:
Do not open the bolt suddenly as the oil may splash out through the hole.

Do not the keep the oil inspection hole open for longer period as it may lead to more amount of oil drain.

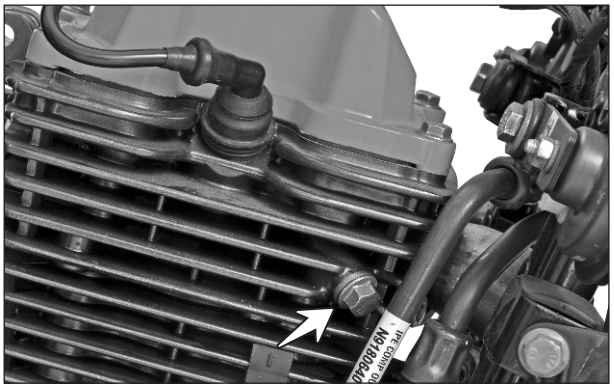


Fig. 4.19

- If there is no oil flow through the inspection hole, check for proper working of oil pump, clogged oil filter and for any block in the oil flow passages.

OIL COOLER ASSEMBLY

- The oil cooler assembly is mounted on the frame below the fuel tank near the steering head column. (Fig. 4.20)
- The oil from the engine is pumped through the oil cooler assembly, cooled down and sent back to the engine.
- Visually inspect the oil cooler fins for any blockage. If found any, clean them using a small blunt tool and compressed air.
- Inspect the oil cooler fins for any deformations, straighten them with a thin, flat head screw driver.
- Visually inspect the cooler assembly inlet and outlet pipes for any crack, leakage, damage or deformation. If found any, replace them with new ones.
- Refer chapter "Periodic maintenance" page no. 2-21 for removal, inspection and rectification procedure of oil cooler assembly.

Fig. 4.20

FILTER COMPLETE ENGINE OIL

- The filter complete engine oil should be periodically inspected and changed if necessary with a new one. (Fig 4.21)

Note:
Whenever the filter complete engine oil is replaced, it is recommended that engine oil is also to be replaced.

- The procedure for changing oil and filter complete engine oil is explained in detail in chapter "Periodic maintenance" page no. 2-12 & 2-13.

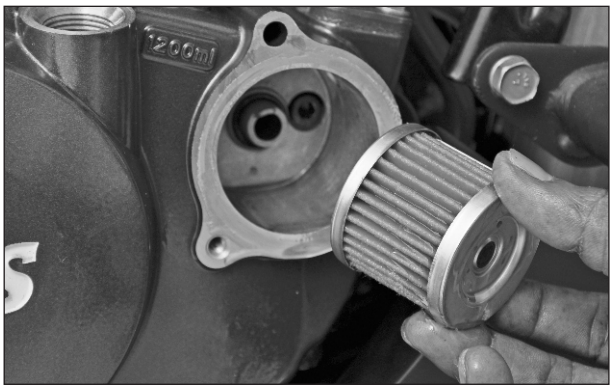


Fig. 4.21

EXHAUST EMISSION CONTROL

- The pollutants emitted from the exhaust system are harmful to environment. If combustion is absolutely complete, there would not be any atmospheric pollution from the exhaust system. Water and carbon dioxide are the products of perfect and complete combustion. However, complete combustion is difficult to achieve in internal combustion engines.

- There are three major pollutants in the exhaust emission. They are:-

  1. Unburnt hydrocarbons (HC)
  2. Carbon monoxide (CO)
  3. Nitrogen oxides (NO_x)

WHY DOES THE GASOLINE FAIL TO BURN COMPLETELY?

There are several reasons for incomplete combustion. Some of them are:-

1. Weak spark
2. Improper air-fuel mixture ratio
3. Adulterated petrol
4. Wrong ignition timing
5. Low compression
6. Excessive valve over lap
7. Improper idle speed
8. Incorrect exhaust system

EXHAUST SYSTEM

- The exhaust system consist of parts right from the exhaust valve to muffler assembly through which the exhaust gasses passes through.

- Normally in four stroke vehicle, the muffler will not be as dirty as two stroke vehicles unless the system is corrupted because of oil or other thing mixing with petrol unknowingly. But whenever the muffler is removed from the engine, the exhaust gasket should be replaced to avoid leakage.

PREVENTIVE MAINTENANCE (EMISSION)

- While every new vehicle leaving the factory is certified and is meeting the exhaust emission standards, the CO level in the exhaust gases may get altered depending upon altitude and also over a period of time depending upon usage or lack of maintenance. It is therefore necessary whenever the vehicle is serviced, inspect the CO level and tune up the engine to maintain the emission standards.

Caution:
Increased CO level in exhaust gases not only pollutes the air badly but also affects the engine performance.

MEASURING CO LEVEL IN EXHAUST EMISSION

- No need to set the idling CO & rpm. Before measuring the emissions it is important to understand the measuring procedure, controls & maintenance aspects of that equipment by referring to the individual manufacurer's manual.

TO CHECK AND SET THE CO:-

Guidelines:

1. Warm up the vehicle by running the engine on road for 3 to 4kms at 50kmph or on the chassis dynamometer with the applicable emission driving cycle.

2. Check for MIL status, if it is ON need to rectify the problem as discussed in the service manual.

3. Check vehicle for other abnormalities, engine noise, induction leak, erratic idling, etc.

4. Check and record the idling rpm with the help of tachometer or diagnostic tool.

Chapter 5

ELECTRICAL SYSTEM

WIRE COLOUR CODE INDEX

S.NO.	CODE	WIRE COLOUR
01	B	BLACK
02	BBr	BLACK WITH BROWN TRACER
03	BG	BLACK WITH GREEN TRACER
04	Bl	BLUE
05	BlB	BLUE WITH BLACK TRACER
06	BlW	BLUE WITH WHITE TRACER
07	BOr	BLACK WITH ORANGE TRACER
08	BR	BLACK WITH RED TRACER
09	Br	BROWN
10	BrBl	BROWN WITH BLUE TRACER
11	BrG	BROWN WITH GREEN TRACER
12	BrR	BROWN WITH RED TRACER
13	BrW	BROWN WITH WHITE TRACER
14	BW	BLACK WITH WHITE TRACER
15	BY	BLACK WITH YELLOW TRACER
16	G	GREEN
17	GR	GREEN WITH RED TRACER
18	Gr	GREY
19	GrB	GREY WITH BLACK TRACER
20	GW	GREEN WITH WHITE TRACER
21	GY	GREEN WITH YELLOW TRACER
22	Lbl	LIGHT BLUE
23	Lg	LIGHT GREEN
24	Or	ORANGE
25	OrB	ORANGE WITH BLACK TRACER
26	OrBl	ORANGE WITH BLUE TRACER
27	OrBr	ORANGE WITH BROWN TRACER
28	OrG	ORANGE WITH GREEN TRACER
29	OrW	ORANGE WITH WHITE TRACE
30	P	PINK
31	PBl	PINK WITH BLUE TRACER
32	PG	PINK WITH GREEN TRACER
33	R	RED
34	RB	RED WITH BLACK TRACER
35	RW	RED WITH WHITE TRACER
36	RY	RED WITH YELLOW TRACER
37	V	VIOLET
38	VB	VIOLET WITH BLACK TRACER
39	VW	VIOLET WITH WHITE TRACER
40	W	WHITE
41	WB	WHITE WITH BLACK TRACER
42	WG	WHITE WITH GREEN TRACER
43	WGr	WHITE WITH GREY TRACER
44	WR	WHITE WITH RED TRACER
45	Y	YELLOW
46	YB	YELLOW WITH BLACK TRACER
47	YBl	YELLOW WITH BLUE TRACER
48	YOr	YELLOW WITH ORANGE TRACER
49	YR	YELLOW WITH RED TRACER
50	YW	YELLOW WITH WHITE TRACER

CAUTION

CONNECTOR

- When connecting a connector, be sure to push it in until a click sound is felt. (Fig. 5.1)
- Inspect connector for corrosion, contamination and breakage on its cover.

COUPLER

- With a lock type coupler, be sure to release the lock before disconnecting it and push it in fully till it gets lock with click feel. (Fig 5.2A)
- When disconnecting a coupler, be sure to hold the coupler itself and do not pull the lead wires.
- Inspect each terminal on the coupler for being loose or bent. Inspect each terminal for corrosion and contamination.
- Water proof couplers are provided at the important connections. (Fig. 5.2B) Ensure the presence of water proof seals in the couplers before reconnecting them.

FUSE

- When a fuse blows, always investigate the cause, correct it and then replace the fuse. (Fig 5.3)
- Do not use a fuse of a different capacity. Do not use wire or any other substitute for the fuse or it may cause melting / burning of wires.

SEMICONDUCTOR EQUIPPED PART

- Be careful not to drop the parts with a semiconductor built in such as TCI unit, regulator cum rectifier and others. (Fig. 5.4)
- When inspecting these parts, follow the inspection instruction strictly. Neglecting proper procedure may cause damage to these parts.

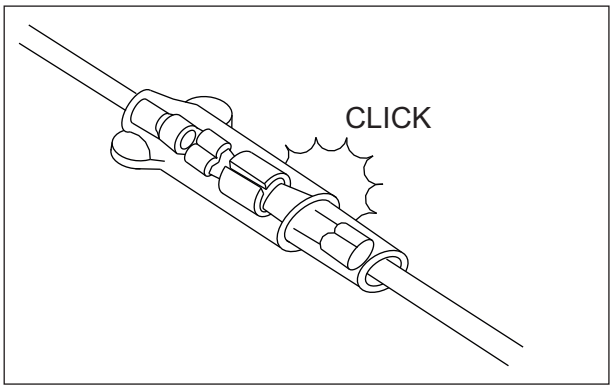


Fig. 5.1

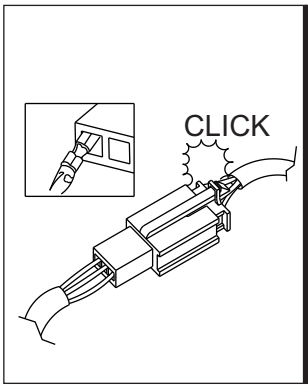


Fig. 5.2A

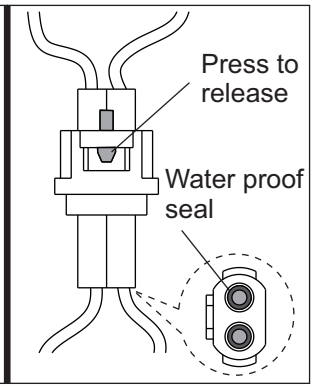


Fig. 5.2B

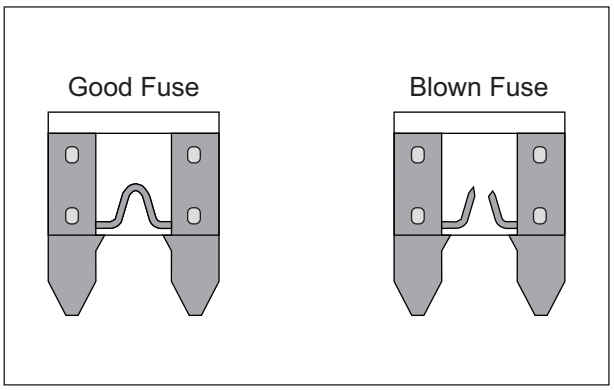


Fig. 5.3

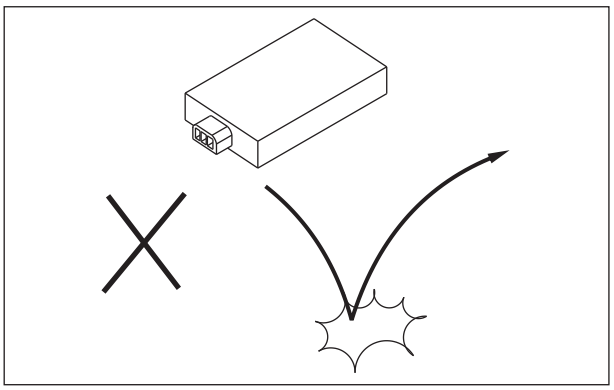


Fig. 5.4

CONNECTING BATTERY

- For battery disassembly or servicing, be sure to disconnect the negative terminal first. When connecting the terminals to the battery, connect the negative terminal last.
- If any terminal of the battery is found corroded, remove the battery, pour warm water over it and clean with wire brush.
- Apply petroleum jelly on the terminals after completion of connection and cover the positive terminal with the boot. (Fig. 5.5)

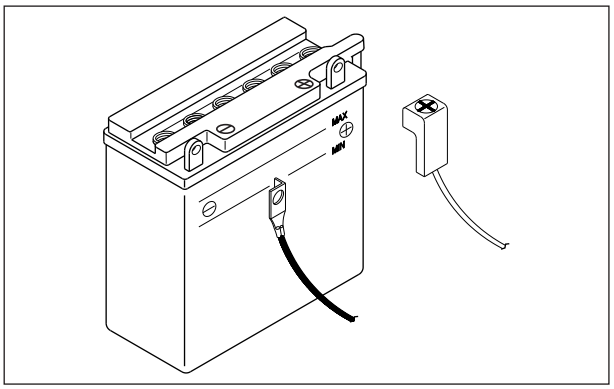


Fig. 5.5

TVS Apache RTR 200 electrical system is divided in to four basic systems (circuits) named:

1. EMS circuit
2. Lighting circuit
3. Charging circuit
4. Electric starter circuit

EMS SYSTEM

The ECU system of the new TVS Apache RTR 200 EFI consists of engine control unit (ECU), battery, fuse, ignition lock, main relay, fuel pump relay, fuel pump module, ignition coil, fuel injector, Oxygen sensor (O2), inlet air control valve (IACV), manifold absolute pressure and manifold air temperature sensor (MAP and MAT sensor), throttle position sensor (TPS), thermal sensor (ETS), suppressor cap and spark plug. (Fig. 5.6)

The output 12 V DC power supply from the battery passes through DC Fuse 20 Amps and supplied to the ignition switch, speedometer and EMS Fuse 10 Amps, from the EMS Fuse the 12 V DC power is supplied to main relay.

Turn ON the ignition switch.

When the ignition switch is turned ON, the DC output from the battery is supplied to the fuse lighting load then to the engine kill switch from the engine kill switch to the ECU unit.

Once the ECU unit gets the DC supply, the ECU supplies negative to the main relay trough a red black wire and also the to the fuel pump relay.

Now both positive and negative is available at the main relay so the relay activates the output of the relay which is supplied to the Fuel pump relay, O2 sensor, Fuel injector, ignition coil, purge valve and ECU Unit.

Now both positive and negative is also available at the fuel pump relay. The relay is activated and the output of the fuel pump relay is supplied fuel pump module.

A negative is already available at the fuel pump module. So the fuel pump starts to run.

Start the vehicle using the self-starter switch. This causes the rotation of crankshaft and the magneto rotor connected with it. When the magneto rotor rotates, the Pip in the magneto rotor periphery passes the pulsar coil of the magneto assembly.

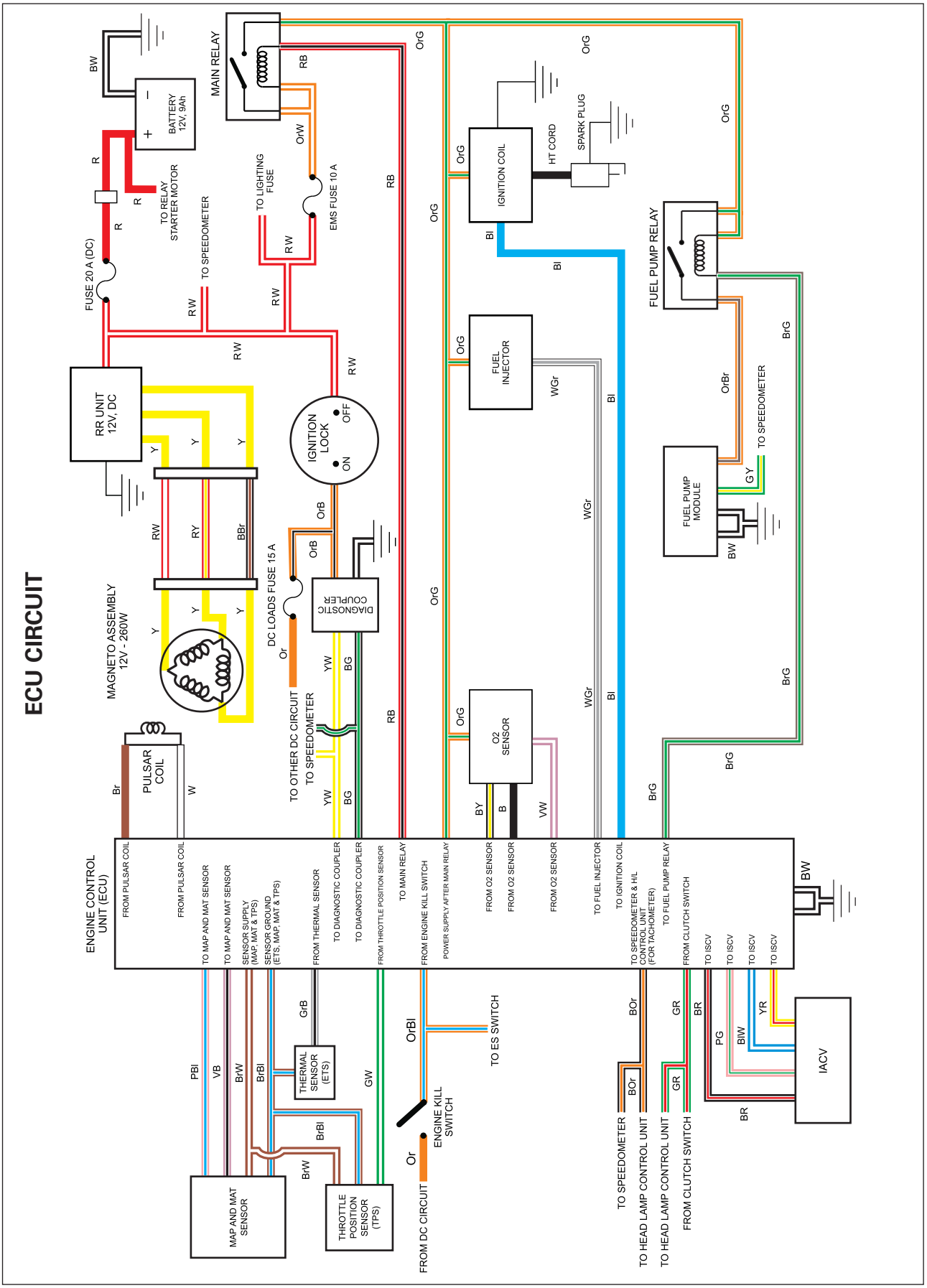

ECU CIRCUIT
BATTERY 12V, 9Ah
MAIN RELAY
FUSE 20 A (DC)
TO RELAY STARTER MOTOR
TO SPEEDOMETER
TO LIGHTING FUSE
EMS FUSE 10 A
IGNITION COIL
HT CORD
SPARK PLUG
FUEL PUMP RELAY
RR UNIT 12V, DC
IGNITION LOCK
ON
OFF
FUEL INJECTOR
FUEL PUMP MODULE
MAGNETO ASSEMBLY 12V - 260W
DC LOADS FUSE 15 A
DIAGNOSTIC COUPLER
TO OTHER DC CIRCUIT
TO SPEEDOMETER
O2 SENSOR
PULSAR COIL
ENGINE CONTROL UNIT (ECU)
FROM PULSAR COIL
TO MAP AND MAT SENSOR
SENSOR SUPPLY (MAP, MAT & TPS)
SENSOR GROUND (ETS, MAP, MAT & TPS)
FROM THERMAL SENSOR
TO DIAGNOSTIC COUPLER
FROM THROTTLE POSITION SENSOR
TO MAIN RELAY
FROM ENGINE KILL SWITCH
POWER SUPPLY AFTER MAIN RELAY
FROM O2 SENSOR
TO FUEL INJECTOR
TO IGNITION COIL
TO SPEEDOMETER & H/L CONTROL UNIT (FOR TACHOMETER)
TO FUEL PUMP RELAY
FROM CLUTCH SWITCH
TO ISCV
THERMAL SENSOR (ETS)
MAP AND MAT SENSOR
THROTTLE POSITION SENSOR (TPS)
ENGINE KILL SWITCH
FROM DC CIRCUIT
TO ES SWITCH
TO SPEEDOMETER
TO HEAD LAMP CONTROL UNIT
TO HEAD LAMP CONTROL UNIT
FROM CLUTCH SWITCH
IACV

Fig. 5.6

The pulsar coil produces voltage signals whenever the pip of the magneto rotor passes it and supplies these signals to the ECU unit through brown and white wires. A negative connection is given to the ECU unit from a common earth junction through a black white wire for its working.

The manifold absolute pressure and manifold temperature sensor (MAP and MAT senor) is used to find the inlet air temperature and manifold pressure. These readings are given the ECU unit.

The engine temperature is calculated trough a thermal senor which is available at the cylinder block of the engine and given to the ECU unit.

The throttle position is calculated trough a through a throttle position sensor (TPS). These readings are given the ECU unit.

On receipt of these signals the fuel injector is operated by the ECU unit. And also the ECU unit collapses the ignition coil primary winding voltage for a fraction of a second. This in-turn develops a high voltage across the secondary winding of ignition coil due to mutual induction.

This high voltage is given to the spark plug through the HT cord and the spark plug produces the spark. This spark is produced just before the Top Dead Center of the piston.

Now the engine starts running and the ECU operates the inlet air control valve (IACV) which is fitted on the throttle body to maintain a stable idling RPM by controlling the inlet air through the throttle body.

The oxygen sensor (O2 sensor) fitted in muffler calculates the volume unburnt fuel coming out from the combustion chamber and these reading are given to the ECU unit. Based on the O2 sensor inputs the ECU unit changes the timing of the ignition coil and the fuel flow to the combustion chamber through the fuel injector.

When the ignition lock is in 'OFF' condition or the engine kill switch is in 'OFF' condition, the DC output from the battery to the ECU unit and the other sensors is disconnected, thus the vehicle will not start.

IGNITION LOCK

- The ignition lock is located on the handle bar assembly. (Fig. 5.7)
- Disconnect the coupler of ignition lock from the main wiring harness and inspect lock for continuity with the pocket tester (multimeter).

Pocket tester

LOCK POSITION	R	Or
OFF		
ON	O———	———O

- Replace the ignition lock if there is no continuity found.

Fig. 5.7

ENGINE KILL SWITCH

- Engine kill switch is located at the right side handle bar assembly on the switch assembly handle RH. (Fig. 5.8)
- Disconnect the switch assembly handle RH coupler from main wiring harness and inspect the switch for continuity with pocket tester.

Pocket tester

LOCK POSITION	Or	OrB
PRESS UP (⊗)		
PRESS DOWN (◯)	O	O

Fig. 5.8

CHECKING THE PULSAR COIL WITH POCKET TESTER (MULTIMETER)

Pocket tester

- Set pocket tester at 2000 ohms position.
- Disconnect the pulsar coil socket from wiring harness.
- Connect pocket tester '+ve' lead to the brown wire (Br) of pulsar coil and '–ve' lead to white wire (W) of pulsar coil. (Fig. 5.9)
- Measure the resistance. If resistance measured is not within the specified limit, replace pulsar coil with a new one.

Pulsar coil (Br - W)	360 ~ 440 ohms

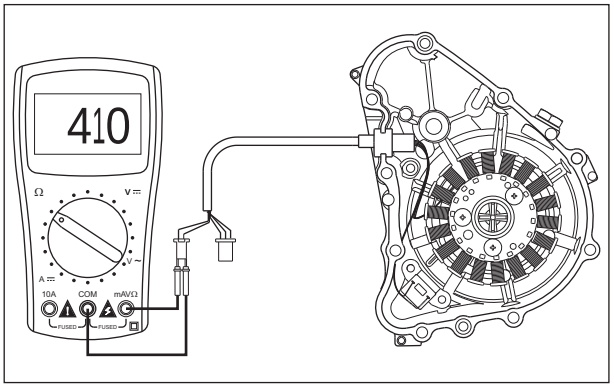


Fig. 5.9

CHECKING THE STATOR ASSEMBLY WITH POCKET TESTER

- Since there is a 3 phase magneto assembly used in this vehicle, the stator assembly checking procedure is entirely different from other vehicles. (Fig. 5.10) The resistance of the stator assembly is to be checked between all the three faces. Follow the procedure given bellow:
- Disconnect the stator assembly coupler from the main wiring harness.

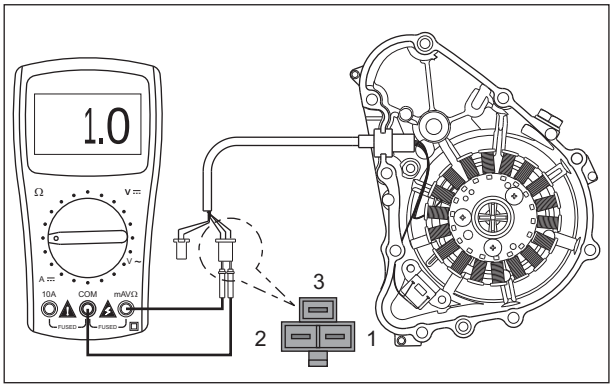


Fig. 5.10

- Set the pocket tester knob at 200 ohms position.

Pocket tester

- There are three yellow wires (Y) coming out of the stator assembly. Connect the pocket tester (+ve) lead to the first yellow wire (Y) and (-ve) lead to second yellow wire (Y) and measure the resistance. (Fig. 5.10)

- Similarly, check the resistance between second and third yellow wires. Also the third and first yellow wires. If any one phase resistance is not within the limit, replace the magneto stator assembly with a new one.

Resistance across any two phase	0.2 ~ 1.2 ohms

CHECKING THE IGNITION COIL ASSEMBLY WITH POCKET TESTER

- The ignition coil is mounted on the right side of the frame below the fuel tank assembly, near the cylinder head assembly. (Fig. 5.11)

- Disconnect the wiring socket connecting TCI unit and the ignition coil. Also disconnect the HT cord from the spark plug.

Pocket tester

- Set Pocket tester at 200 ohms position.

- Connect the pocket tester's '+ve' and '–ve' lead to the terminals of the ignition coil coupler as shown to measure the primary winding resistance. (Fig. 5.12) If the resistance is not within the specified limit, replace the ignition coil assembly with a new one.

Primary resistance	4.05 ~ 4.95 ohms

- If primary winding resistance is OK, then check the secondary winding resistance.

- Set pocket tester at 20k ohms position.

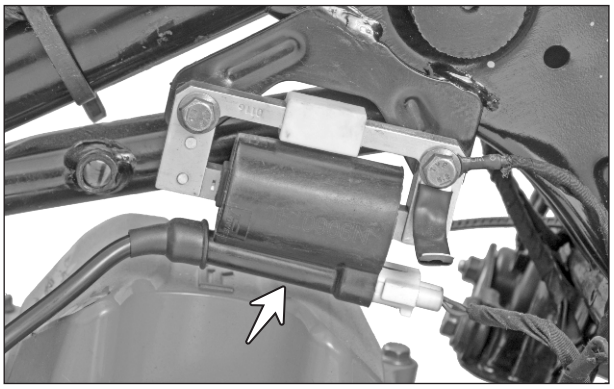


Fig. 5.11

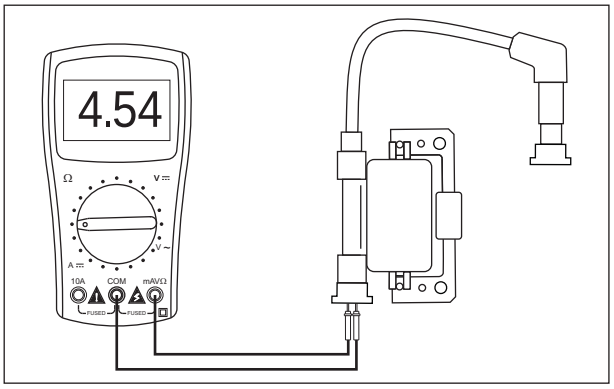


Fig. 5.12

- Remove the suppressor cap from the HT cord. Connect the pocket tester's '+ve' lead to the HT cord and '–ve' lead to any terminal of the ignition coil coupler and measure the resistance. (Fig. 5.13)

Secondary resistance	8.96 ~ 13.44 k ohms

- If resistance of the windings are not within the limit, replace ignition coil with a new one.

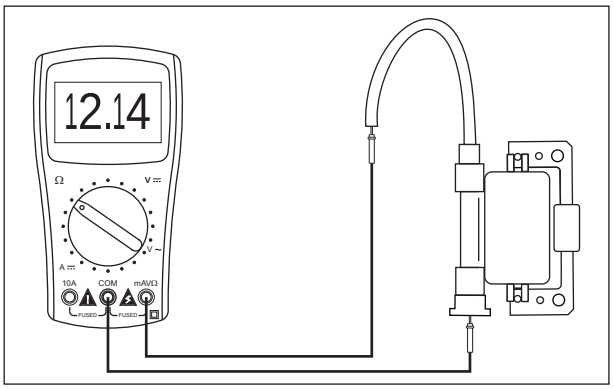


Fig. 5.13

SPARK PLUG

- Neglecting the sparkplug leads to poor performance of engine. If the sparkplug is used for a longer period, the electrodes gradually burn away and carbon builds up along the inside part (refer chapter "Periodic maintenance" page no. 2-14 for cleaning and maintenance of spark plug).

Caution:
Always use recommended make and type of sparkplug only.

Spark plug	BOSCH UR4KE

ENGINE CONTROL UNIT (ECU)

- ECU (engine control unit) is placed below the rider seat assembly near the battery. ECU unit can be checked by diagnostic tool. (Fig.5.14)

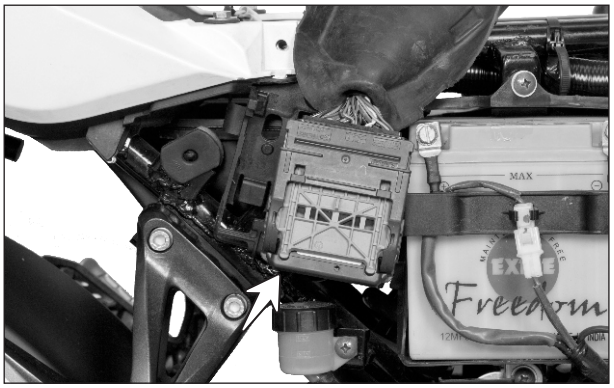


Fig. 5.14

THERMAL SENSOR

- A thermal sensor is fixed on the cylinder block to sense the engine temperature and give input to the ECU in the form of resistance. (Fig. 5.15) Check the resistance of the thermal sensor in the following manner:

- Set the pocket tester at 20k ohms position.

Pocket tester

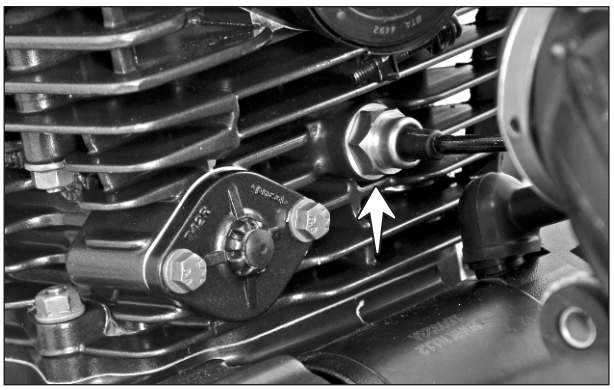


Fig. 5.15

- Disconnect the thermal sensor coupler from main wiring harness. Connect the pocket tester's '+ve' lead to the yellow red (YR) wire and '–ve' lead to the white red (WR) of the thermal sensor coupler and measure the resistance when engine is in cold condition. (Fig. 5.16)

Resistance	0.3 ~ 14k ohms

- If the resistance measured is not within the specified limit, replace the thermal sensor with a new one.

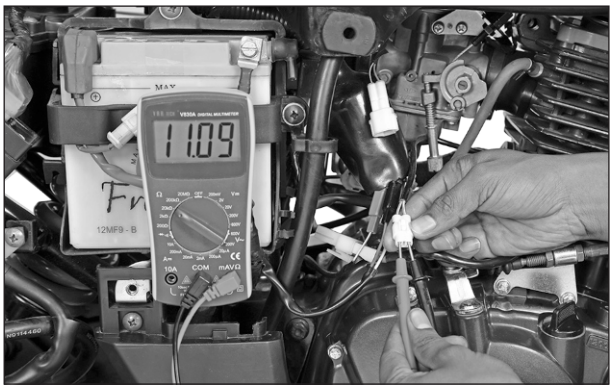


Fig. 5.16

LIGHTING SYSTEM

The lighting system consists of magneto assembly, regulator cum rectifier unit (RR unit), battery, ignition lock, fuse 10A (lighting), fuse 15A (DC load), ECU and control switches. The working of lighting system of the TVS Apache RTR 200 4V are as follows. (Fig. 5.17)

A DC output from the battery is connected to the head lamp control unit through a10A fuse (lighting). And one more DC output from the battery is connected to a 15A fuse (DC load) through the ignition lock. When the ignition lock is turned 'ON', DC output from the lock is supplied to head lamp control unit, switch lighting, switch beam control and the pass-by switch.

When the switch lighting knob is slid to the 'PO' position, the output DC current from the switch is supplied to the position lamps and the tail lamp.
Similarly, when the switch lighting knob is slid to the 'HL' (head lamp 'ON') position, the output DC current from the switch is supplied to the head lamp control unit along with the position lamps and the tail lamp. Upon receiving the input from the switch lighting the head lamp control unit checks for the input from the pulsar coil to determine the engine running condition (head lamp works only for 10 seconds when the engine is in 'OFF' condition) and the switch beam control to determine the head lamp beam ('High' or 'Low').

If the beam control switch is in 'High' position, the head lamp control unit will not get any input signal from switch beam control and supplies the power to the head lamp 'High beam' and the head lamp high beam glows. If the beam control switch is in 'Low' position, the head lamp control gets an input signal from the switch and supplies power to the head lamp 'Low beam' and the head lamp low beam glows.

When the pass-by switch is pressed, a DC signal is sent to the head lamp control unit. Now, the head lamp control unit checks for the input from the switch lighting to determine the head lamp condition ('ON' or 'OFF'). If the head lamp is in 'OFF' condition the head lamp control unit supplies the power to the head lamp 'high beam' and makes it to glow. If the head lamp is in 'ON' and glowing in 'low beam', the head lamp control unit cuts 'OFF' the power supply to the 'low beam' and supplies to the 'high beam' (toggles). If the head lamp is glowing in 'high beam' the head lamp control unit does it in vice-versa. If the pass-by switch is pressed when the engine is not running, the head lamp glows only with 50% illumination.

If the head lamp is turned 'ON, when the engine is not running, the head lamp control unit checks for the input from switch beam control to determine the head lamp beam ('High' or 'Low'). Based on the switch beam controls position the head lamp glows for 10 seconds with only 50% intensity. If the self start switch is pressed within this 10 seconds the head lamp goes 'OFF' and gets 'ON' after the engine starting with 100% intensity. If the vehicle is kept in engine idling condition for more than 20 seconds with the head lamp 'ON', the head lamp reduces the illumination by 50% and gains it back to 100% once the vehicle is moved or the throttle is opened.

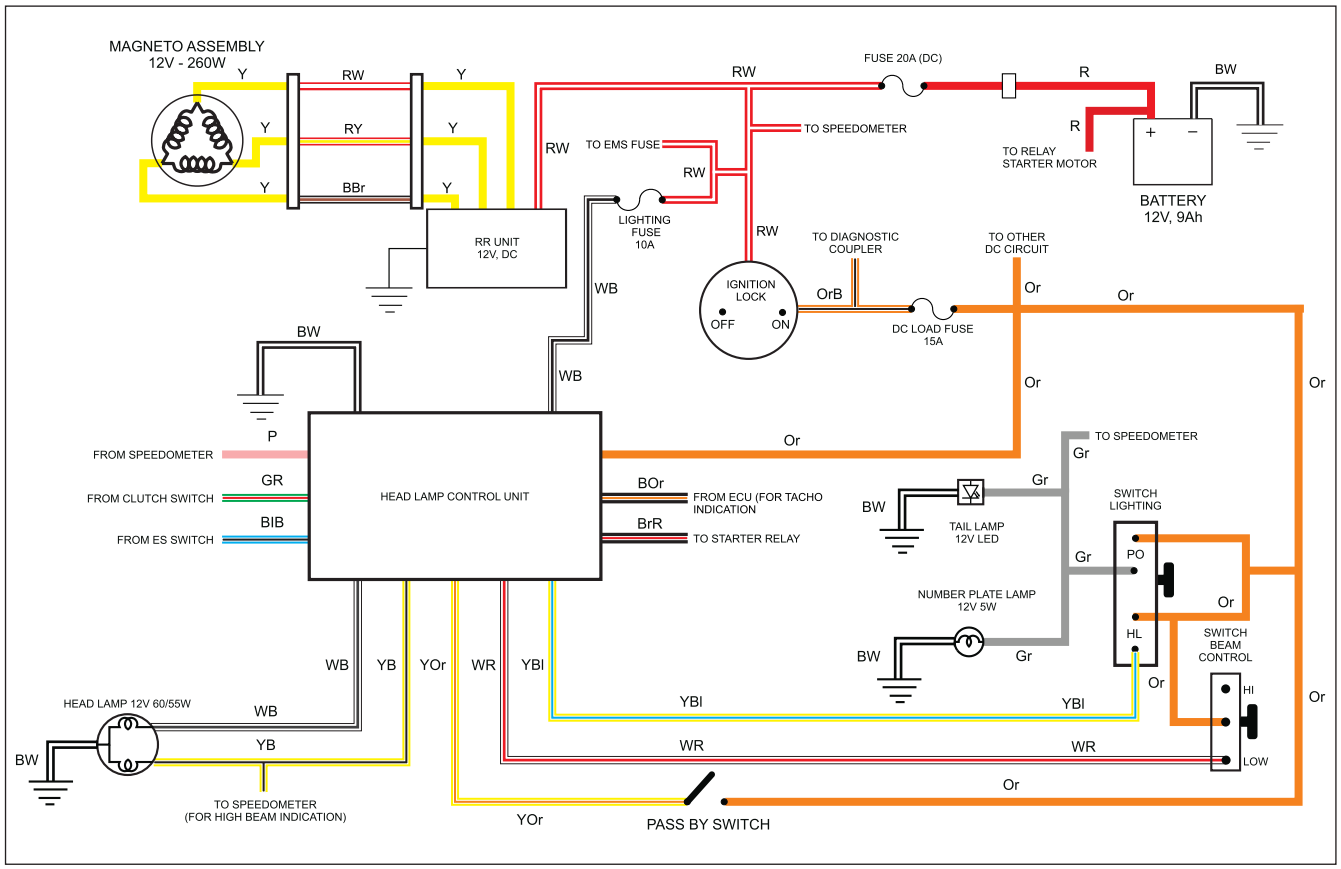


Fig. 5.17

SWITCH LIGHTING

- Switch lighting is provided on the switch assembly RH on the right hand side of the handle bar. (Fig. 5.18)
- Check the switch for continuity with the pocket tester.

Fig. 5.18

Pocket tester

SWITCH POSITION	Or	Gr
OFF (●)		
PO	O——	——O

SWITCH POSITION	Or	YBl
OFF (●)		
ON	O——	——O

SWITCH BEAM CONTROL

- Switch beam control is provided on the switch assembly LH on the left hand side of the handle bar. (Fig. 5.19)

- Check the switch for continuity with the pocket tester.

Pocket tester

SWITCH POSITION	Or	WR
PRESS UP ( ) - HIGH		
PRESS DOWN ( ) - LOW	O——O	

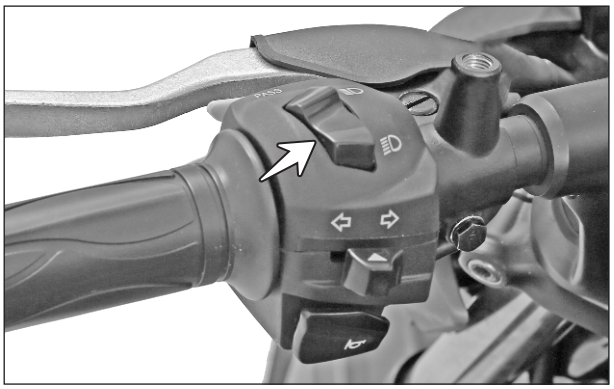


Fig. 5.19

PASS-BY SWITCH

- Pass-by switch is provided on the switch assembly handle LH on the left side of the handle bar. (Fig. 5.20)

- Check the switch for continuity with the pocket tester.

Pocket tester

SWITCH POSITION	Or	YOr
PRESS - ON	O——O	
RELEASE - OFF		

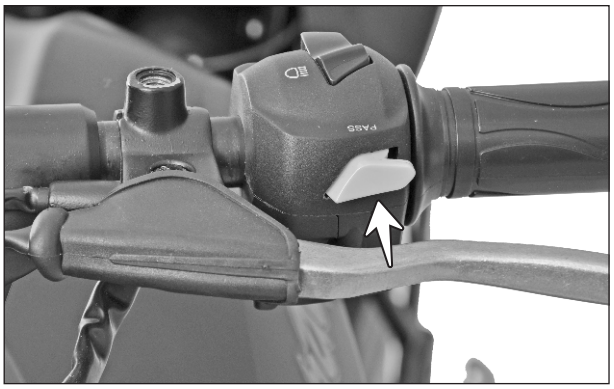


Fig. 5.20

12V REGULATION SYSTEM

REGULATOR CUM RECTIFIER (RR UNIT)

- The RR unit (regulator cum rectifier) is fitted below the rear seat assembly near the tail lamp assembly. (Fig. 5.21)

- The RR unit consists as the name implies, regulator which regulates the voltage between 12V to 14V constantly, and rectifier used for converting AC current to DC for charging and other purpose.

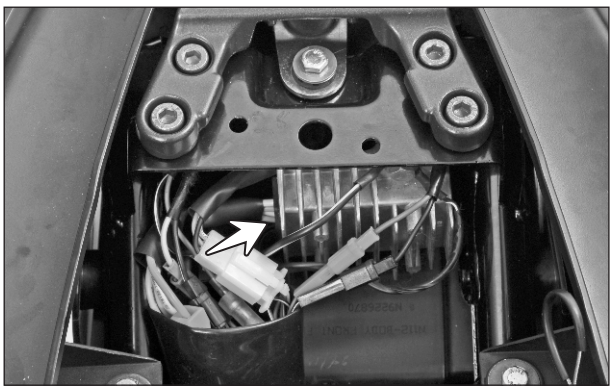


Fig. 5.21

HEAD LAMP CONTROL UNIT

- Head lamp control unit is placed below the pillion seat assembly near fuse holder. Head lamp control unit can be checked by doing a good (or) bad analysis (replacing existing with a new one). (Fig.5.22)

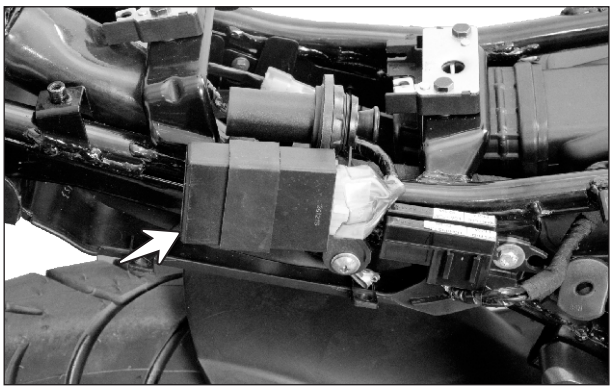


Fig. 5.22

CHARGING AND DC SYSTEM

The DC system consists of magneto assembly, regulator cum rectifier unit (RR unit), battery, ignition lock, fuse 20A (main fuse), fuse15A (DC load) and the control switches. A DC output from the battery is directly connected to the speedometer through a 20A fuse for the memory and other functions of speedometer. Another DC output from the battery is connected to the ignition lock through the same 20A fuse. When the ignition lock is turned 'ON' the DC output from the ignition lock is supplied to the position lamps, smart phone charger, brake lamp switches front and rear, horns, speedometer assembly and other DC operated components through a 15A fuse (DC load). (Fig. 5.23)

A negative input from the common earth junction is directly connected to the position lamps. By switching 'ON' the ignition lock, the lamps glow directly. Similarly, the smart phone charger also gets the negative input from the common earth junction and it will be ready for charging the smart phones.

When the brake lamp switch front or rear is operated (brake applied), the DC current from either of the switch is supplied to the brake lamp. A negative earth connection from the common earth junction is connected to the lamp and hence the lamp glows. Similarly, when the horn button is pressed, the negative input from the common junction is connected to the horns. Since the horns are connected to the ignition lock's DC output directly, on pressing the switch, the horns blow.

A DC output from the ignition lock is connected to the speedometer assembly for its operation. A input signal from the gear position sensor is connected to the speedometer and the ECU for gear position sensing. A neutral indication signal is connected to the ECU from the speedometer for electric start operation. The fuel level indicator in the speedometer gets an input signal in the from of variable resistance from the fuel pump sensor. Based on these signals the fuel level indicator shows the fuel level indication.

An input voltage and a negative supply are given to the speed sensor from the speedometer. The output signal from the speed sensor is connected to the speedometer. Based on these signals the speed indication is shown. Speedometer shows engine rpm based on the engine speed signal received from the ECU.

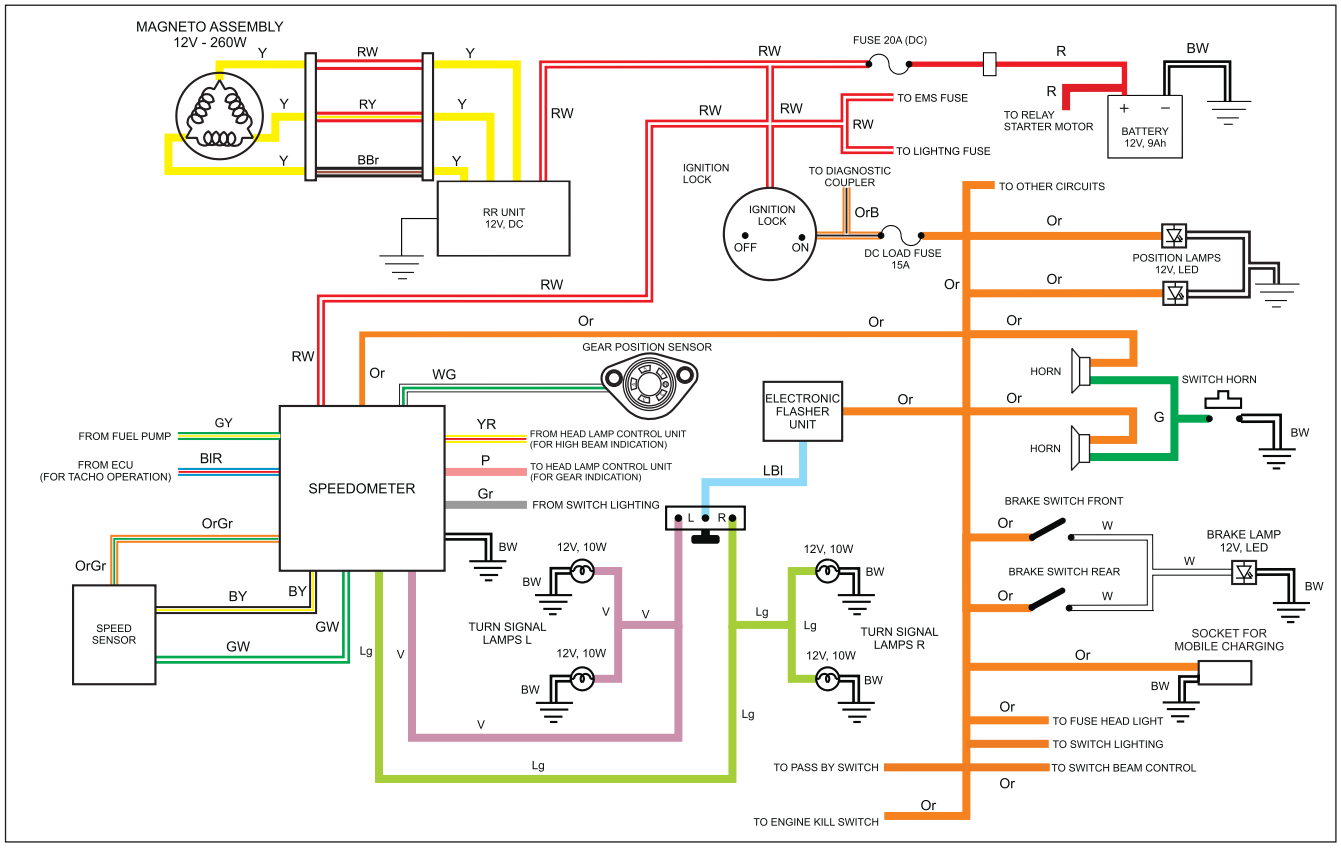


Fig. 5.23

A DC output from the ignition lock is connected to the electronic flasher unit. The output from the flasher unit is connected to the switch turn signal. When the switch is slid to the 'right' or 'left' the respective front and rear turn signal lamps glow along with the turn signal indicator on the speedometer .

HORNS (12V DC)

- The horns are mounted on the frame at the front side of the vehicle below the fuel tank. (Fig. 5.24)
- The DC output orange wire (Or) from the ignition lock is connected to the horns directly and the negative green wire (G) from the horns is connected to earth through the horn switch.

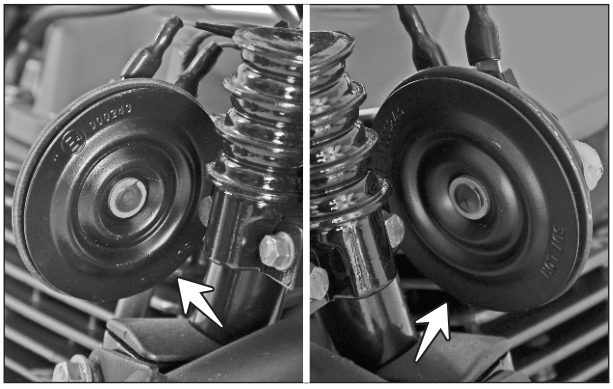


Fig. 5.24

- The horn switch is located on the switch assembly handle LH. (Fig. 5.25)
- Check the switch for continuity with the pocket tester.

Pocket tester		
SWITCH POSITION	**G**	**BW**
PRESS - ON	O———	———O
RELEASE - OFF		

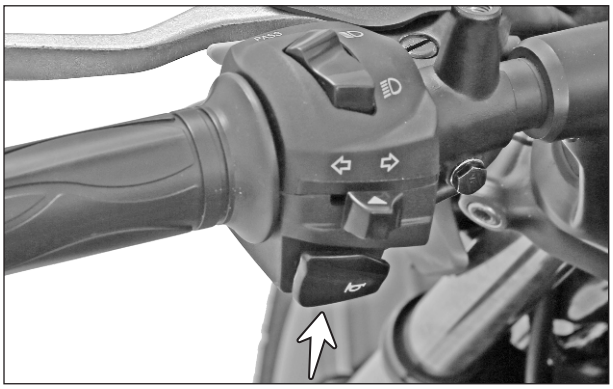


Fig. 5.25

TURN SIGNAL LAMPS FRONT AND REAR

- The DC output from the ignition lock is connected to the switch turn signal through a electronic flasher unit mounted below the seat assembly near the battery. (Fig. 5.26)
- The DC output wire orange (Or) from the ignition lock is connected to the flasher unit and the output from the flasher unit is connected to the switch turn signal through a light blue wire (Lbl).

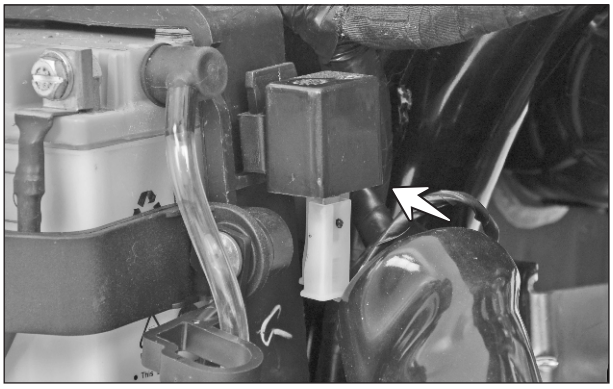


Fig. 5.26

- The switch turn signal is located on the switch assembly handle LH. (Fig. 5.27)
- Inspect the switch for continuity with the pocket tester.

Pocket tester

SWITCH POSITION	V	Lbl	Lg
TO LEFT (◄)	O——O		
PRESS RELEASE		O	
TO RIGHT(►)		O——O	

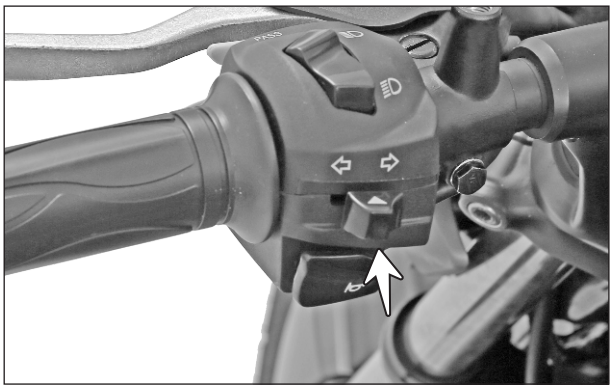


Fig. 5.27

GEAR POSITION SENSOR

- The gear position sensor is mounted on the crankcase assembly LH below the cover engine sprocket. (Fig. 5.28)
- Gear position sensor senses the exact position of the gear and generates the resistance accordingly. These resistances are sent to the digital speedometer and the TCI unit through a white green wire (WG). To measure the resistance level of gear position sensor at various position follow the procedure given below:
- Set the pocket tester at 20k ohms position.

Pocket tester

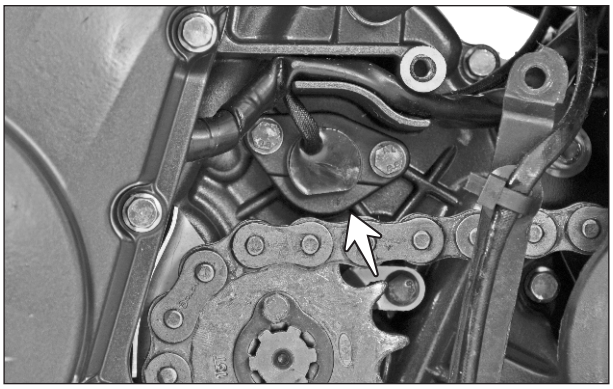


Fig. 5.28

- Disconnect the gear position sensor's socket from wiring harness.
- Connect pocket tester's '+ve' lead to the green white wire (GW) of gear position sensor and '–ve' lead to body earth. (Fig. 5.29)
- The resistance of gear position sensor at various position are as follows:

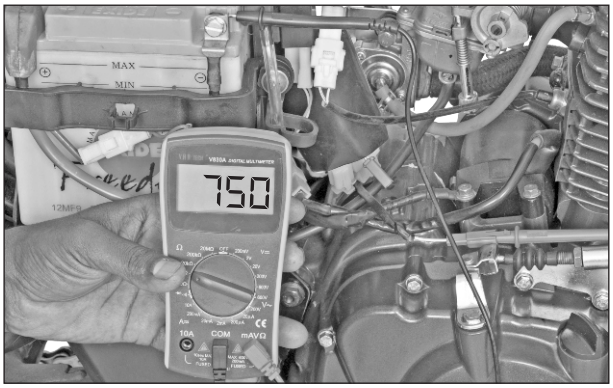


Fig. 5.29

GEAR POSITION	RESISTANCE
First gear	0.075 kilo ohms
Neutral	0.75 kilo ohms
Second gear	1.5 kilo ohms
Third gear	2.7 kilo ohms
Fourth gear	5.6 kilo ohms
Fifth gear	15 kilo ohms

SWITCH ASSEMBLY STOP LAMP FRONT AND REAR (BRAKE SWITCHES)

- The DC output from ignition lock is connected to the stop lamp through switch assembly stop lamp front and rear. Stop lamp switch front is fitted on the lever bracket assembly RH. (Fig. 5.30)
- Switch assembly stop lamp rear is fitted on the frame below the battery assembly near the mounting of the swing arm complete and operated by the brake pedal. (Fig. 5.31)
- Inspect the switch for continuity with the pocket tester.

Pocket tester

SWITCH POSITION	Or	W
APPLY BRAKE - ON	O———	———O
RELEASE - OFF		

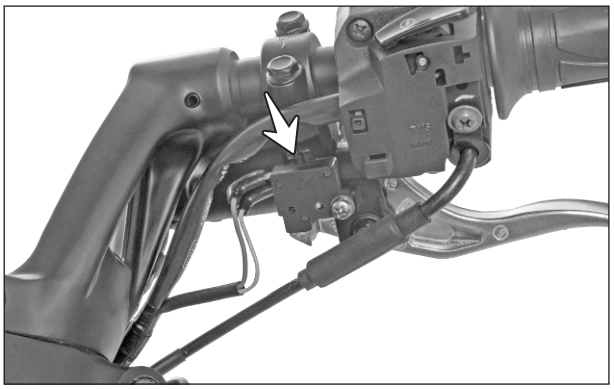


Fig. 5.30

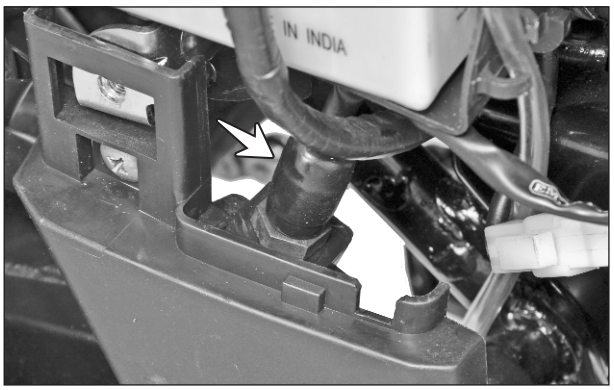


Fig. 5.31

FUEL LEVEL SENSOR

- Fuel level indicator and fuel warning lamp are provided in the digital speedometer.
- Fuel level indicator and the warning lamp works based on the variable resistance signal received from the fuel level sensor. Fuel level sensor resistance alters the resistance in accordance with the amount of fuel available in the fuel tank.
- The fuel level sensor is in fuel pump module, it is fitted at the bottom of the fuel tank. (Fig. 5.32)

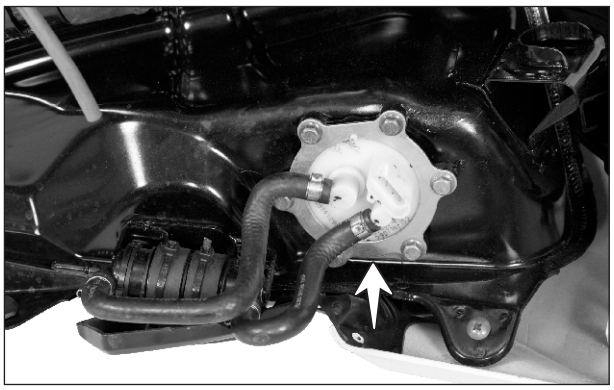


Fig. 5.32

SPEED SENSOR

- Speed sensor is mounted on the crank case LH near engine sprocket. (Fig. 5.33)

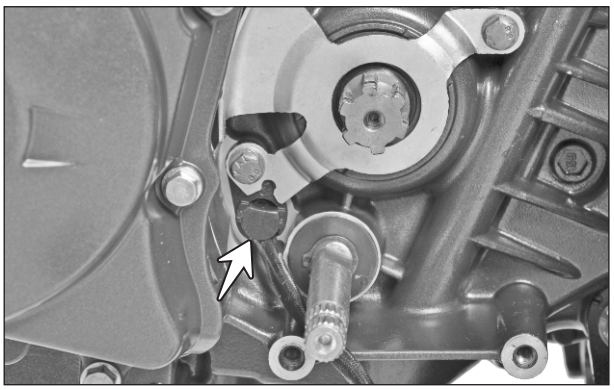


Fig. 5.33

To check the speed sensor:

- Set pocket tester at DC 20 V range.

Pocket tester

- Check and ensure the battery voltage is within the specifications.

Battery voltage	12.9 volts

- If the battery voltage is found less than the specified voltage, recharge the battery as explained in page no. 5-26.

- Disconnect the speed sensor coupler from the main wiring harness. (Fig. 5.34)

- Turn 'ON' the ignition.

- Connect the pocket tester's '+ve' lead to the orange grey wire (OrGr) of speed sensor coupler at the wiring harness side and '–ve' lead to the black yellow wire (BY) of speed sensor coupler at the wiring harness side and measure the voltage. (Fig. 5.35)

The voltage should be:

Voltage	9 ± 1 Volt

- Then connect the pocket tester's '+ve' lead to the white green wire (WG) of speed sensor coupler at the wiring harness side and '–ve' lead to the black yellow wire (BY) of speed sensor coupler at the wiring harness side and measure the voltage. (Fig. 5.36)

The voltage should be:

Voltage	5 ± 1 Volt

- If there is no voltage output found in the speed sensor coupler. Then check the continuity of wiring harness between speed sensor coupler and speedometer coupler.

WIRE COLOUR	SPEEDO COUPLER	SPEED SENSOR COUPLER
OrGr	O———	———O
BY	O———	———O
GW	O———	———O

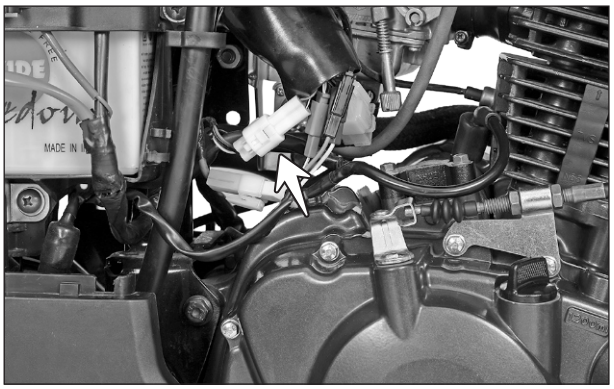


Fig. 5.34

Fig. 5.35

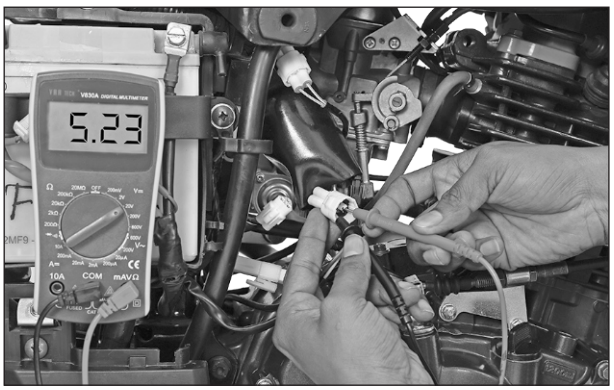


Fig. 5.36

- If there is no continuity in the wiring harness, replace the wiring harness and check for speed indication in the speedometer.
- If the continuity is found OK, replace the speedometer and check for speed indication in the speedometer.
- If the voltage is found OK while checking with the pocket tester, then check speed senor in the following manner:
- Reconnect the speed sensor coupler.
- Set pocket tester knob at DC 20 V range.
- Connect the pocket tester's '+ve' lead to the orange grey wire (OrGr) and '–ve' lead to the black yellow wire (BY) of speed sensor coupler and measure the voltage. (Fig. 5.37)

Fig. 5.37

The voltage should be:

Voltage	9 ± 1 Volt

- Then connect pocket tester's '+ve' lead to the white green wire (WG) and '–ve' lead to the black yellow wire (BY) of speed sensor coupler and measure the voltage. (Fig. 5.38)

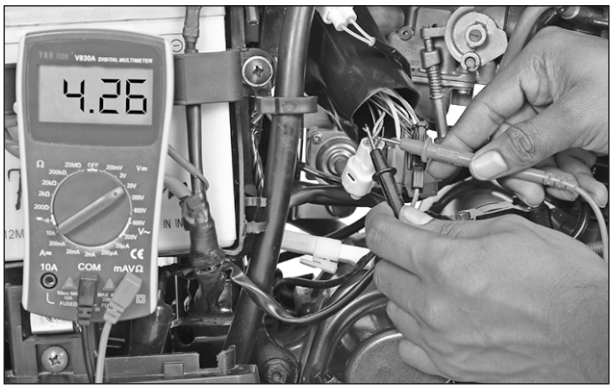


Fig. 5.38

The voltage should be either level A or level B.

LEVEL	VOLTAGE LEVEL
A	5 ± 0.5 Volt
B	0.1 ± 0.5 Volt

- Now slowly rotate the rear wheel. If the voltage indicated in the pocket tester is at **level A** then it should change to **level B** or vice versa.
- Now rotate the rear wheel little faster. If the voltage indicated in the pocket tester is not as per the specification. Then replace the speed sensor and check the speedometer for proper speed indication.

Voltage	2.5 ± 0.5 Volt

CHARGING PERFORMANCE CHECK

- Set the pocket tester at DC 200 V range.
- Remove the cover frame RH (refer chapter "Periodic maintenance" page no. 2.4 for removal procedure).
- Connect the pocket tester's '+ve' lead of to positive terminal of the battery and '–ve' lead of pocket tester to the negative terminal of the battery. (Fig. 5.39)
- Start and warm up the engine. Switch on the head lamp high beam.
- Gradually increase the throttle while observing the rpm indicator of speedometer. Once the rpm reaches 4000, check the pocket tester reading. The reading should be

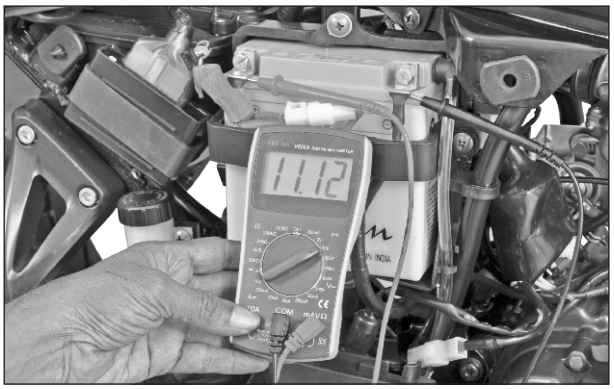


Fig. 5.39

Charging performance	14.5 ± 0.3V at 2500 rpm and above

Note:
While checking the charging current, switch on the head lamp high beam to know the correct reading.

- If the reading measured is not within the limit, check the stator coil resistance as explained in page no. 5-5 .
- If the stator coil resistance found OK, then replace the RR unit with a new one and re-check.
- Reassemble the cover frame RH.

ELECTRIC STARTER SYSTEM

Electric starter system consists of battery, ignition lock, engine kill switch, electric starter switch, neutral switch, clutch switch, head lamp control unit, relay starter motor and the starter motor assembly. (Fig. 5.40)

A DC output from the battery is connected to the ignition lock through a 20A fuse. When the ignition lock is turned 'ON', this DC output is connected to the head lamp control unit, engine kill switch, electric starter switch and relay starter motor through a 15A fuse (DC load).

A DC output from the battery is directly connected to the relay starter motor and the output of the relay is connected to the starter motor through thick wires. A negative is connected to the starter motor from the common earth junction. When the relay energises, the battery output is supplied to the starter motor and the motor works.

Based on the resistance input from the gear position sensor, the neutral position is sensed by the speedometer and the speedometer supplies a negative input to the head lamp control unit for activating the electric start circuit. A negative output from the clutch switch is supplied to the head lamp control unit when the switch is operated. In the absence of neutral indication from the speedometer, this negative input is taken by the head lamp control unit for activating the self start circuit in geared condition.

While pressing the electric starter switch, the DC supply from the electric starter switch flows to the head lamp control unit. On receipt of this DC input signal, the head lamp control unit checks the availability of negative input either from the speedometer or from the clutch switch. If any one of these input is available, the head lamp control unit connects a negative supply to the relay starter motor and energises the relay. Even though all the above conditions are met by the head lamp control unit, if the engine is in running condition (if there is a pulsar coil input to the ECU), the ECU unit cuts 'OFF' the negative supply to the starter relay to avoid the cranking of motor during engine running condition and protects the motor from damage.

If the electric start switch is pressed continuously either in neutral or in clutch applied condition, the head lamp control unit energies the starter relay for 3 seconds and switches 'OFF' automatically and energises again after 3 seconds for battery saving.

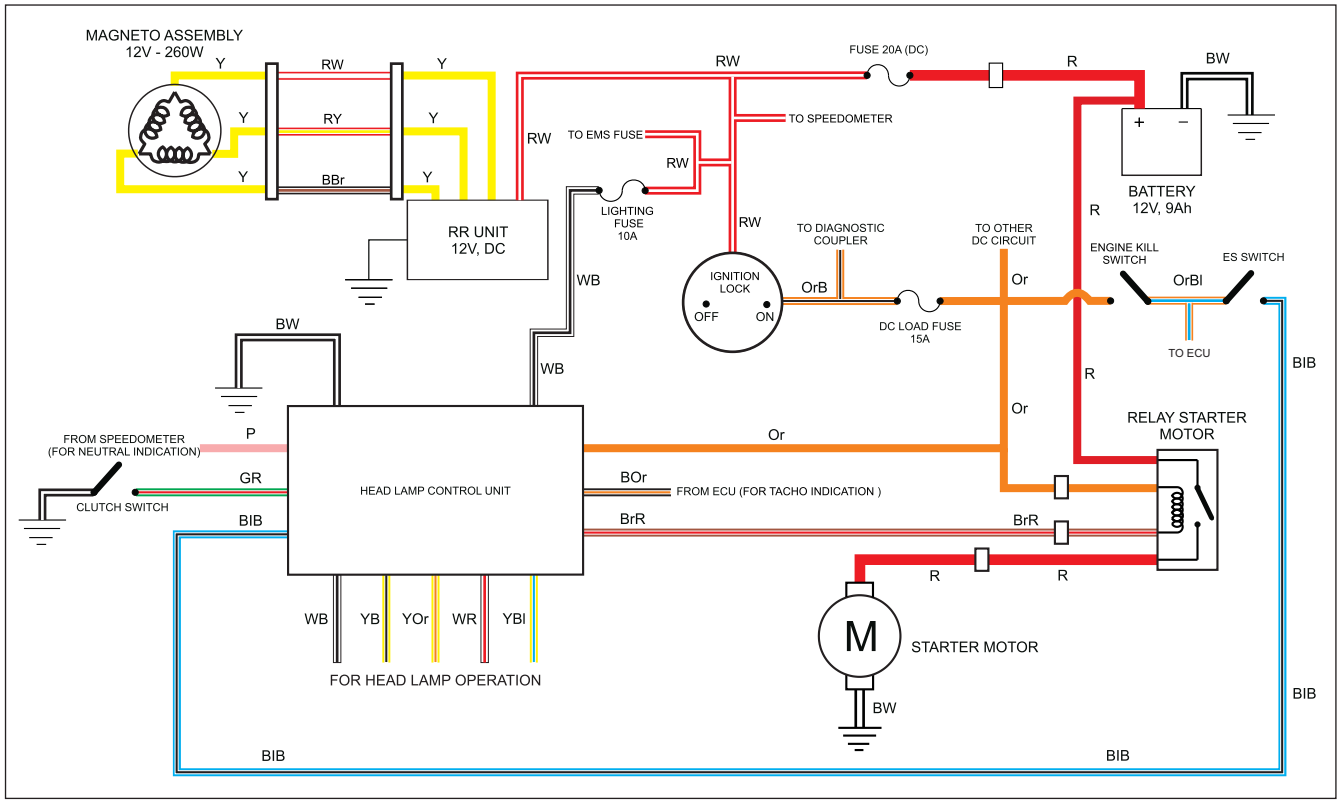


Fig. 5.40

ELECTRIC STARTER SWITCH

- Electric starter switch is located at the bottom side of switch assembly RH on the right hand side of the handle bar. (Fig. 5.41)
- Inspect switch for continuity using pocket tester with the engine kill switch is in 'ON'.

SWITCH POSITION	OrB	BIB
PRESS - ON	O——O	
RELEASE - OFF		

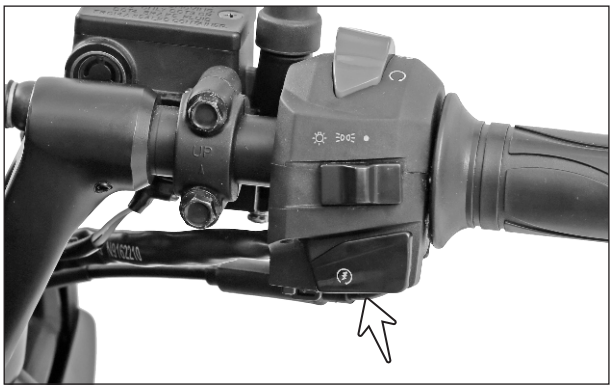


Fig. 5.41

SWITCH ASSEMBLY CLUTCH

- Switch assembly clutch is located in the bracket clutch lever which is mounted on handle bar LH. (Fig. 5.42)
- Inspect the switch for continuity with the pocket tester.

SWITCH POSITION	GR	BIB
PRESS - ON	O——O	
RELEASE - OFF		

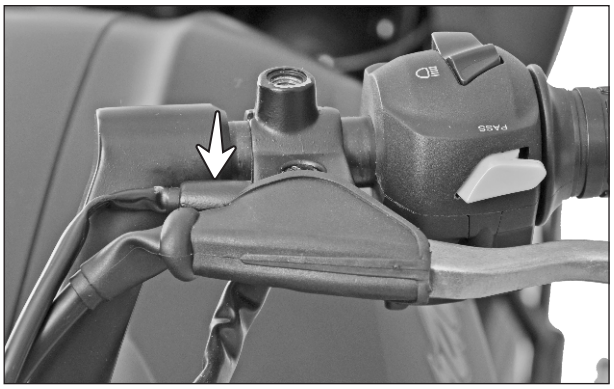


Fig. 5.42

RELAY SELF STARTER (STARTER RELAY)

- Relay self starter is located on the left side of the vehicle on top of the air cleaner assembly. (Fig. 5.43)
- Inspect relay by checking the continuity using pocket tester.

RELAY CONDITION	R	R
NOT ENERGIZED		
ENERGIZED	O——O	

(To energise the starter relay keep the vehicle in neutral condition, press and hold the starter switch with the ignition lock and engine kill switch in 'ON' condition.)

- If there is no continuity found, replace the starter relay and once again check for continuity. Again, if problem persists, then replace the head lamp control unit and check.

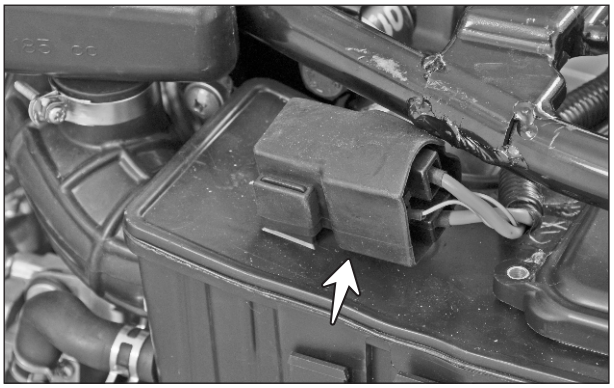


Fig. 5.43

BULBS REPLACEMENT

LAMP ASSEMBLY TURN SIGNAL - BULB

- Remove the self tapping screw from turn signal lamp housing and take off lens along with the holder assembly and bulb. (Fig. 5.44)

Phillips head screw driver

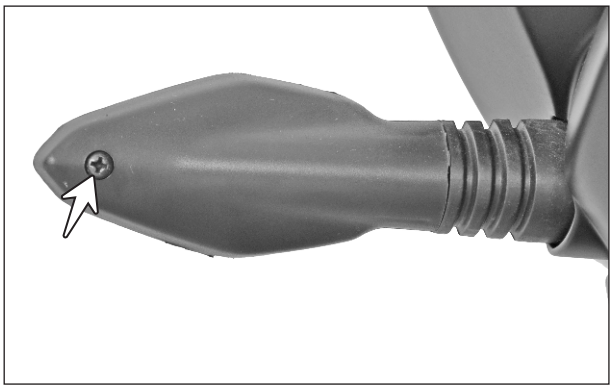


Fig. 5.44

- Rotate and pullout the bulb holder from the housing and replace the bulb with a new one. (Fig. 5.45)

Turn signal lamp	12V, 10W

Fig. 5.45

- Reassemble the parts and tighten the self tapping screw.
- Same procedure can be followed for replacing the turn signal lamp's bulbs.

HEAD LAMP ASSEMBLY - BULB

- Remove the CRR pan head screw (M6x25 - 2 nos.) housing head lamp front top mounting. (Fig. 5.46)

Phillips head screw driver

Tightening torque	3 ± 1 Nm

Fig. 5.46

- Loosen the hexagonal flange bolt (M6x16 - 2 nos.) from the bottom mounting housing head lamp (both LH and RH) and tilt the housing head lamp forward. (Fig. 5.47)

10 mm spanner

Tightening torque	4.5 ± 1.5 Nm

Fig. 5.47

- Pullout the socket head lamp (A) from head lamp bulb and dislocate the dust cap (B) of head lamp assembly. (Fig. 5.48)

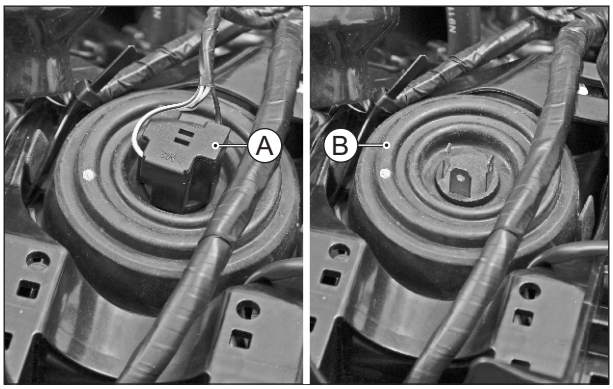


Fig. 5.48

- Take out head lamp bulb by snapping out the clip (A) and replace with a new one. (Fig 5.49)

Head lamp bulb	12V, 60/55W H4

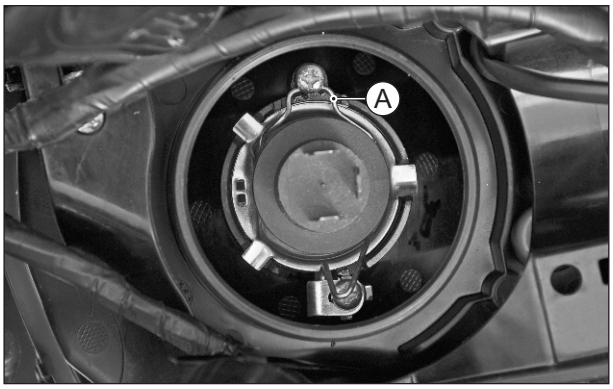


Fig. 5.49

- Reassemble the parts in the reverse order of removal.

Note:
After reassembling head lamp, readjust the head lamp beam as explained in chapter "Periodic maintenance" page 2-38)

Do not touch the halogen bulb as it will reduce its life and performance.

POSITION LAMPS - REPLACEMENT

- Remove the CRR pan head screw (M5x16 - 2 nos.) from the housing speedometer rear mounting and remove the housing speedometer rear. (Fig. 5.50)

Phillips head screw driver

Tightening torque	3 ± 1 Nm

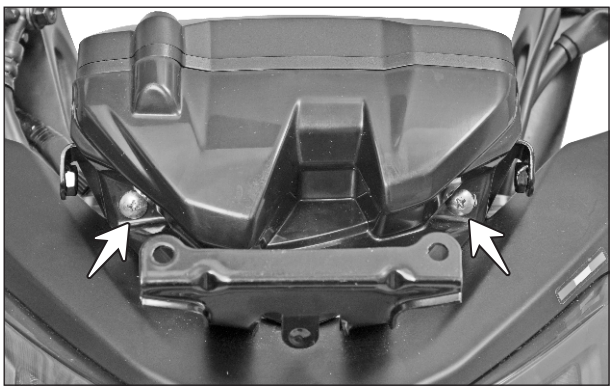


Fig. 5.50

- Remove the housing head lamp front top and bottom mounting bolts and tilt the housing head lamp as explained in the pervious page.

- Remove the hexagonal nuts (M6 - 4 nos.) from the bracket housing head lamp along with the punched washer. (Fig. 5.51)

10 mm spanner

Tightening torque	3 ± 1 Nm

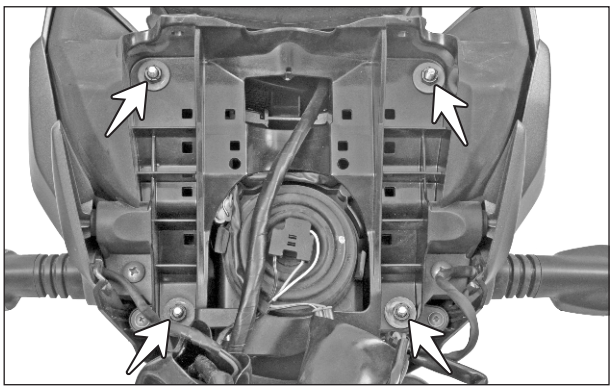


Fig. 5.51

- Remove the CRR pan head tap screw (M6x16 - 2 nos.) from the bracket housing head lamp. (Fig. 5.52)

Phillips head screw driver

Tightening torque	1.5 ± 0.5 Nm

- Gently pull out the turn signal lamp by dislocating it from the lugs and separate the housing head lamp front and rear.

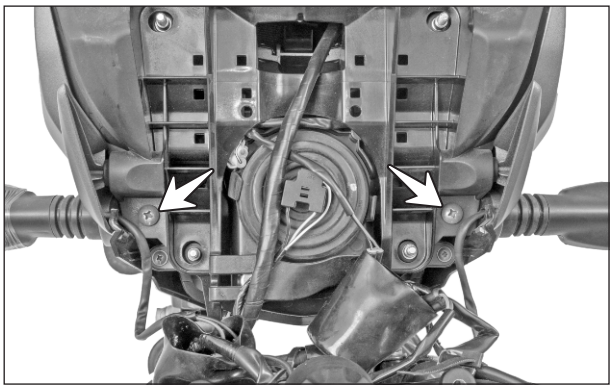


Fig. 5.52

- Disconnect the position lamp assembly connector. (Fig. 5.53)

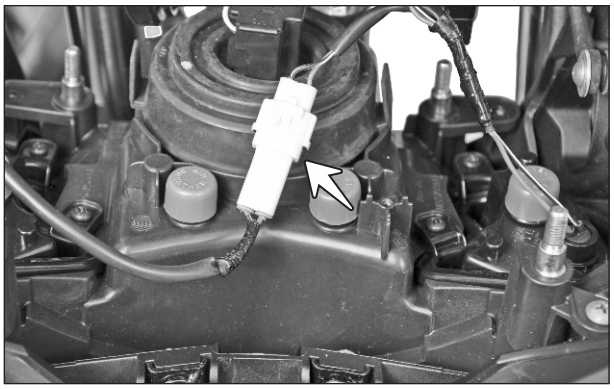


Fig. 5.53

- Remove the CRR flanged pan head tap screw (ST4.2x13 - 3 nos.) and takeout the position lamp assembly LH. (Fig. 5.54)

Phillips head screw driver

Tightening torque	1 ± 0.2 Nm

Position lamp	LED lamp (2W)

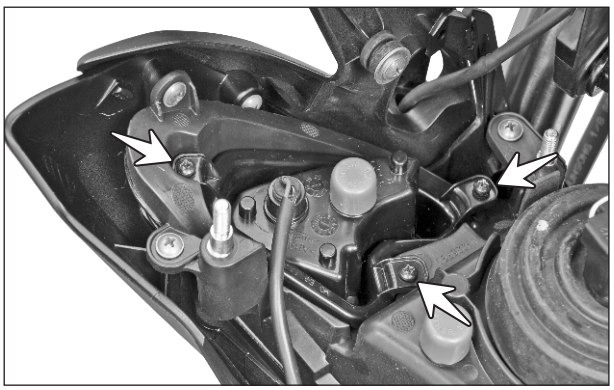


Fig. 5.54

- Replace the position lamp with a new one and reassemble housing head lamp front.
- In similar manner the position lamp RH can be removed and replaced.
- Reassemble the parts in the reverse order of removal.

Note:
After reassembling head lamp assembly, readjust the head lamp beam as explained in chapter "Periodic maintenance" page 2-38).

DIGITAL SPEEDOMETER ASSEMBLY

Since the digital speedometer is provided with LED indicators, it is not possible to replace t h e m individually. Recommended to replace the entire speedometer assembly, incase of any failure.

REMOVAL

- Remove the CRR pan head screw (M5x16 - 2 nos.) from the mounting of housing speedometer rear and take out the housing speedometer. (Fig. 5.55)

Phillips head screw driver

Tightening torque	3 ± 1 Nm

- Remove the hexagonal nut (M6 - 3 nos.) along with plain washers from the mounting of speedometer assembly. (Fig. 5.56)

10 mm spanner

Tightening torque	3 ± 1 Nm

- Disconnect coupler from the speedometer assembly by gently pressing the lock and take out the digital speedometer. (Fig. 5.57)
- Replace the new speedometer.
- Reassemble the parts in the reverse order of removal procedure.

Note:
After reassembling the head lamp, readjust the head lamp beam as explained in chapter "Periodic maintenance" page 2-38).

TAIL LAMP ASSEMBLY

- Refer the chapter "Periodic maintenance" page 2-10 for tail cover assembly removal procedure.
- Remove the hexagonal flange nut (M6 - 2 nos.). (Fig. 5.58)

10 mm spanner

Tightening torque	2.5 ± 0.5 Nm

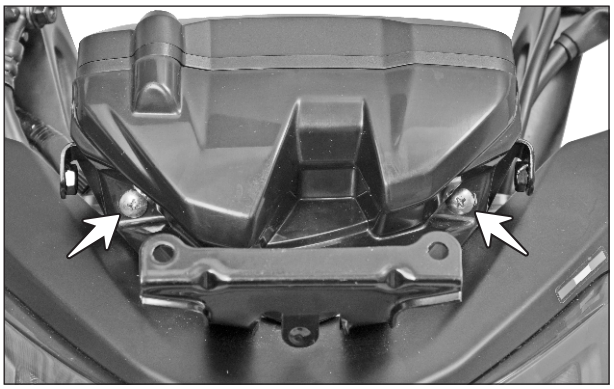


Fig. 5.55

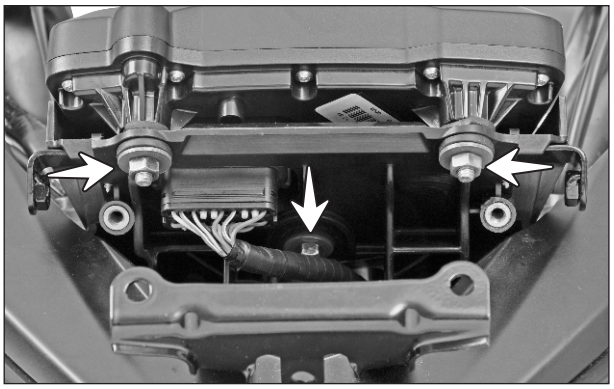


Fig. 5.56

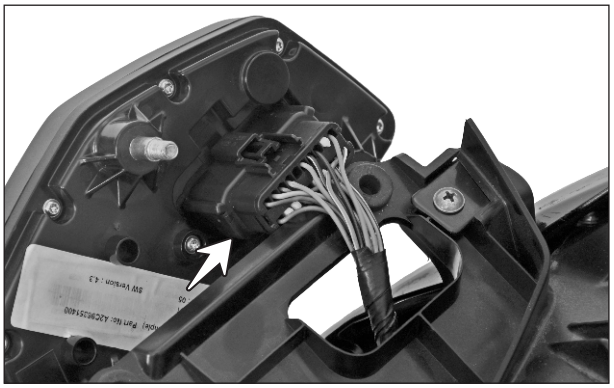


Fig. 5.57

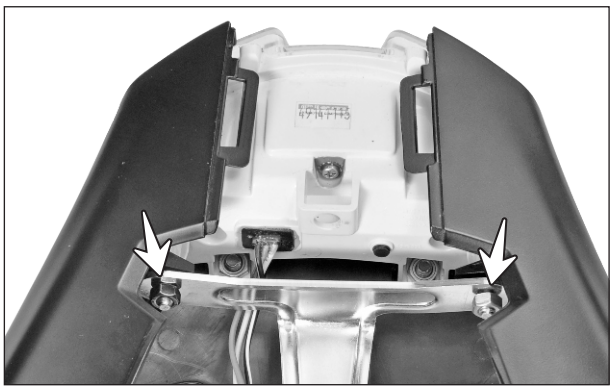


Fig. 5.58

- Remove the CRR pan head screw (M6x16 - 2 nos.) from the tail assembly mounting. (Fig. 5.59)

Phillips head screw driver

Tightening torque	3 ± 1 Nm

- Replace lamp assembly with new one.
- Reassemble the parts in the reverse order of dismantling.

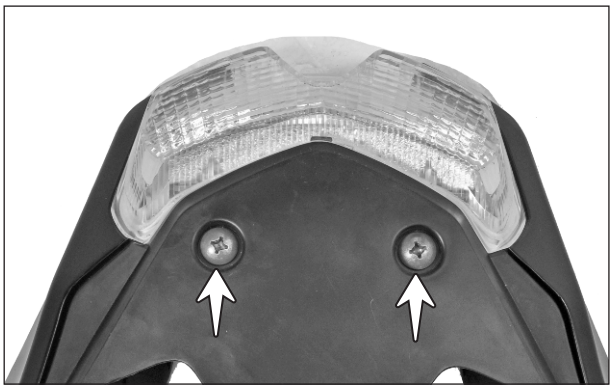


Fig. 5.59

NUMBER PLATE ILLUMINATOR - BULB

- Remove the rear seat assembly.
- Disconnect the number plate lamp couplers from the main wiring harness. (Fig. 5.60)

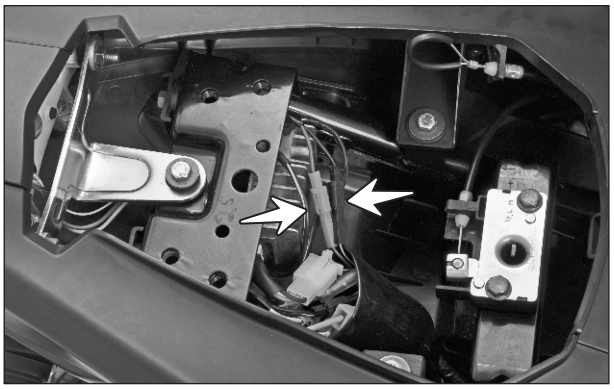


Fig. 5.60

- Remove mounting nuts (M6 - 2 nos.) and take out the number plate illuminator as an assembly and pull out the rubber grommet. (Fig. 5.61A)

10 mm spanner

Tightening torque	3 ± 1 Nm

- Pull out bulb holder along with the bulb. (Fig. 5.61B)
- Remove bulb from the holder and replace with a new one (12V, 5W).

Note:
While reassembling ensure that the presence of the grommet in the tail cover.

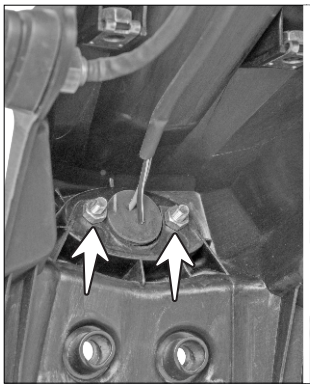


Fig. 5.61A

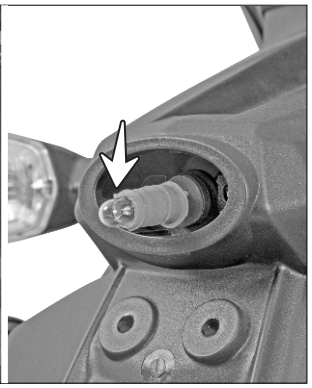


Fig. 5.61B

ADJUSTMENTS

HEAD LAMP BEAM ADJUSTMENT

- Adjust the head lamp beam as per the specification by referring procedure given in chapter "Periodic maintenance" page no. 2-38 for the adjustment procedures.

SWITCH ASSEMBLY STOP LAMP - REAR

- The switch assembly stop lamp rear can be adjusted by turning the adjuster nut (A) in or out, so that the brake lamp glows when the rear brake is applied. (Fig. 5.62)

Note :
While adjusting the switch assembly, do not turn the body switch assembly (B) holding the adjuster nut (A).

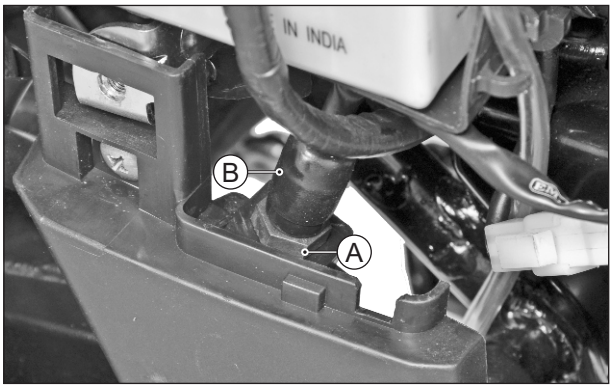


Fig. 5.62

BATTERY

- Remove the cover frame RH (refer chapter "Periodic maintenance" page no. 2-4)
- Disconnect the battery's negative terminal (A) first and then positive terminal (B). (Fig. 5.63)

10 mm spanner	
Tightening torque	3 ± 1 Nm

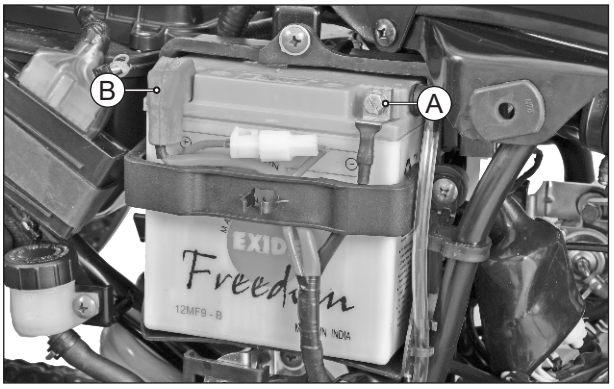


Fig. 5.63

- Remove the clamp by removal of the CRR pan head screw (M6x16 - 1 no.) (A) and take out the battery assembly. (Fig. 5.64)

Phillips head screw driver	
Tightening torque	3 ± 1 Nm

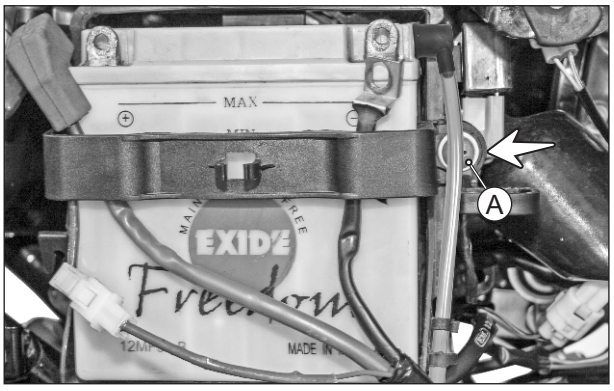


Fig. 5.64

- Remove the battery from the vehicle and clean it thoroughly.
- Visually inspect the surface of the battery assembly for any sign of cracking or electrolyte leakage. If any sign of cracking or electrolyte leakage from side walls of the battery is noticed, replace the battery with a new one.

- Measure the open circuit voltage of battery using pocket tester. (Fig. 5.65)

Open circuit voltage	12.9 Volts

- If the voltage measured is less than 12 volts, then charge the battery using constant current battery charger as explained below:
- If the battery lead terminals are rusty or covered with an acidic white powdery substance, then clean them with sand paper / warm water.
- The electrolyte level must be between the minium level and maximum level mark provided on the battery case. (Fig. 5.66)
- Add distilled water as necessary, to ensure the electrolyte is above the minimum level line but not above the maximum level line. (Fig. 5.66)

Caution:
Add only distilled water for topping up the electrolyte level.

Fig. 5.65

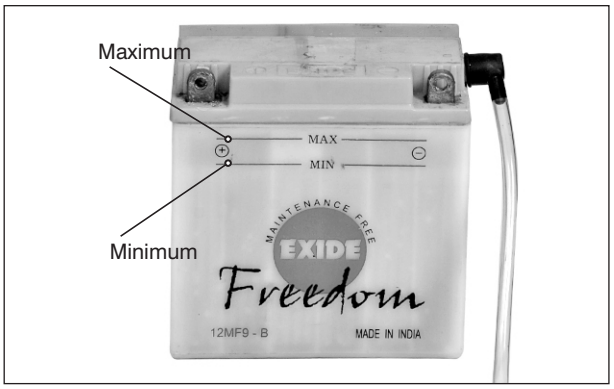


Fig. 5.66

- Check the electrolyte specific gravity reading using the hydrometer. (Fig. 5.67) If the reading is not within the specified limit, it indicates that the battery needs charging.

Hydrometer

Electrolyte specific gravity at 20°C

Battery type	Normal	Under charged
12V, 9.0 Ah	1.28	1.25

Note:
To read the specific gravity on the hydrometer, bring the electrolyte in the hydrometer to eye level (Fig. 5.68) and read the graduations on the float scale bordering on the lower meniscus.

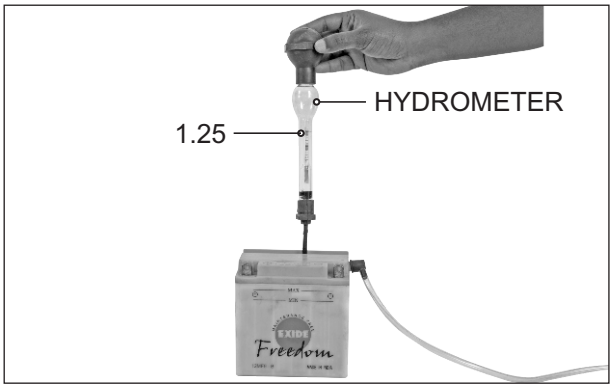


Fig. 5.67

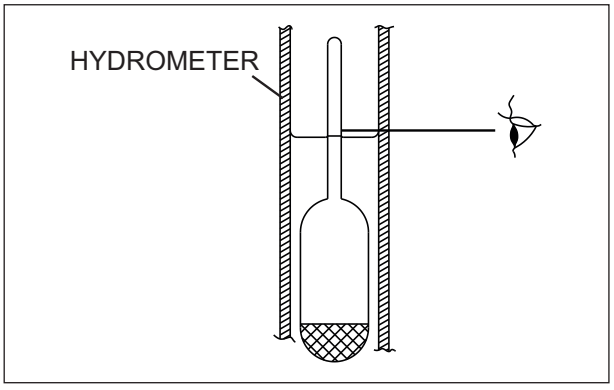


Fig. 5.68

BATTERY CHARGING

- Constant current battery charger having the current output of 0.9 amps must be used for charging the 12V, 9 AH battery.

Caution:
Use only constant current battery charger. Do not use constant voltage battery charger.

- If the battery charger has multiple battery charging facility (0.25A/0.5A/0.9A), then select the output current according to the battery connected for charging at each bay.

Charging procedure

- Remove the filler cover strip of battery and connect the positive lead of the battery charger (red colour) to the positive terminal (+) of the battery and the negative lead of the charger (black colour) to the negative terminal (-) of the battery as shown in the figure. (Fig. 5.69)

Fig. 5.69

Caution:
Care should be taken not to connect the battery charger in reverse order ie. positive lead to negative terminal and vice versa.

Incase, if the battery is connected in the reverse order, the reverse polarity indicator of the charger (if available in the charger) glows and the protection fuse (if available in the charger) blows.

Correct the connection and replace the fuse before charging. Otherwise the battery may not get charged.

- Turn the selector knob (A) of the charger to the 0.9 amps position incase of multiple battery charger. (Fig. 5.70)

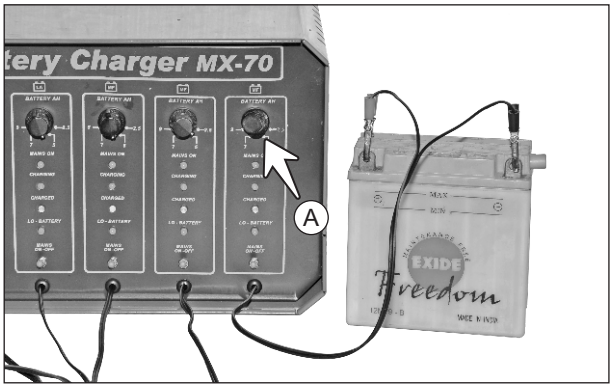


Fig. 5.70

Caution:
Ensure to select the charging current based the battery amphere only. If more or less current is selected the battery may get damaged.

- Connect the battery charger to the power supply and switch on the power.

- Switch on the 'MAINS ON-OFF' switch (A) and ensure that the 'MAINS-ON' LED indicator (B) is glowing. (Fig. 5.71) If this indicator is not glowing, then check the main fuse of the charger and replace the fuse if required.

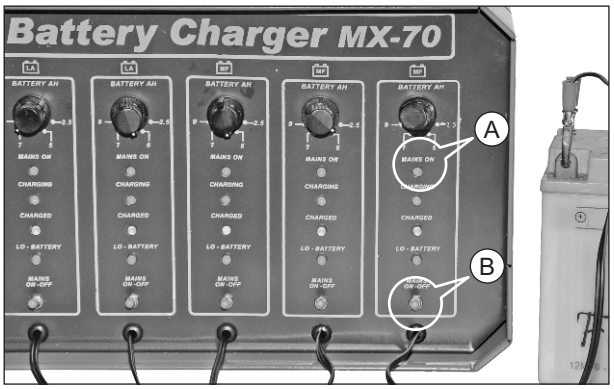


Fig. 5.71

- Now, the 'CHARGING' LED indicator (A) glows and indicates the battery is getting charged. If this indicator is not glowing, check whether 'LO-BATTERY' LED indicator (B) is glowing. (Fig. 5.72)

- If the 'LO-BATTERY' LED indicator is glowing, it indicates that the battery voltage is very less and it can't be charged further. Replace the battery with a new one.

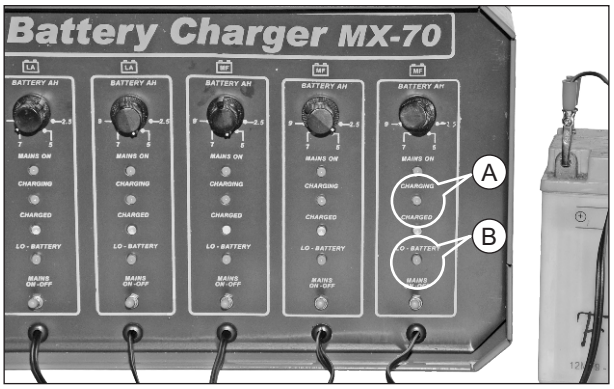


Fig. 5.72

- After charging the battery for few hours (time may vary based on the battery voltage and capacity) 'CHARGED' LED indicator (A) of charger glows and indicates that the battery is charged. (Fig. 5.73)

Indication of full charge

- The following are the indication of full charge.

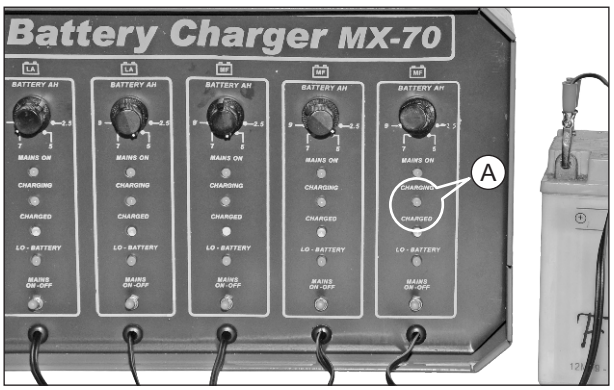


Fig. 5.73

- Battery can be considered to be fully charged when three consecutive specific gravity (SG) readings taken at intervals of 30 minutes each, indicating a reading of 1.28. (Fig. 5.74)

- Free gassing of electrolyte.

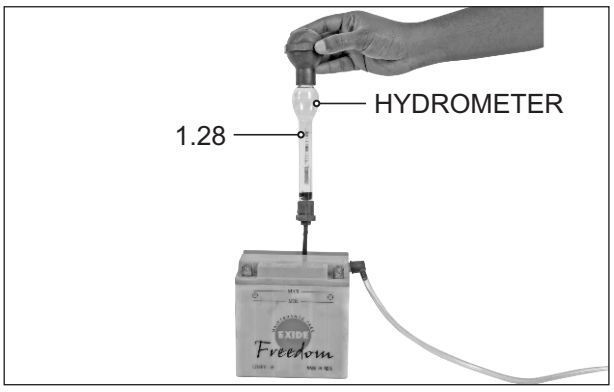


Fig. 5.74

- The stable consecutive readings showing 12.8 volt or more with 30 minutes of interval. (Fig. 5.75)

Note:
If the battery voltage is less than 11 volt, irrespective of correct specific gravity reading, then the battery needs to be replaced with a new one.

- After charging re-fix the battery assembly and connect the positive terminal first followed by the negative terminal.
- Apply petroleum jelly to the terminals to avoid corrosion.
- Reassemble the parts in the reverse order of removal.

Fig. 5.75

WHEEL ASSEMBLY FRONT

REMOVAL

- Support the motorcycle by center stand and place a jack or block to keep the front wheel off the ground.
- Remove the front wheel axle nut along with punched washer. (Fig. 6.1)

22 mm spanner

Tightening torque	78 ± 18 Nm

- Draw out the axle front. (Fig. 6.2)
- Take out the wheel assembly front along with disc plate and spacer complete LH.

Note:
While taking out the front wheel keep some cushion in between the brake pads, to avoid binding.

Disc replacement

- Remove special screw (M8 - 6 nos.) from the disc plate mounting and take out disc plate from the alloy wheel front. (Fig. 6.3)

6 mm allen key

Tightening torque	31 ± 3 Nm

- Remove oil seal (A) using the special tool.

031 240 1	Universal oil seal remover

Note:
While reassembling the mounting bolts apply thread locker without fail.

Removal of bearings

Warning:
Bearings should be removed only in case of replacement.

- Heat the wheel assembly front upto 125° C by placing the wheel on a hot plate. (Fig. 6.4)

Hot plate

Fig. 6.1

Fig. 6.2

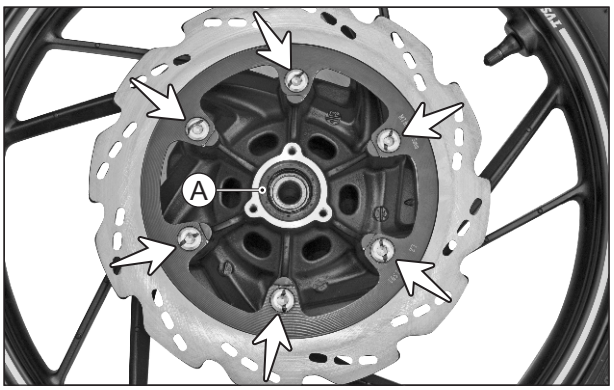


Fig. 6.3

Fig. 6.4

- Gently tap out bearing left and right and spacer complete front hub with a suitable mandrel. (Fig. 6.5)

Nylon hammer
Drift

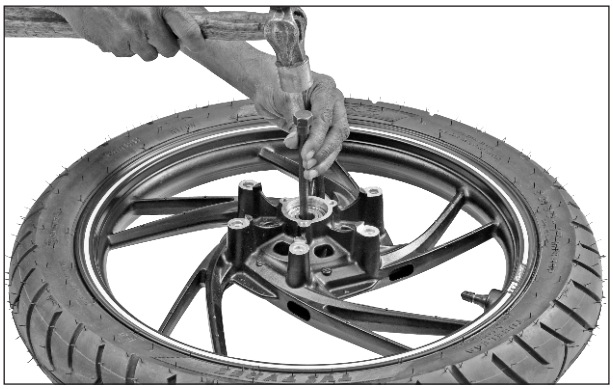


Fig. 6.5

INSPECTION

Before inspection, clean all necessary components with suitable cleaning solvent and lubricate them.

Wheel bearings

- Inspect the wheel bearings inner race for play by hand while fixing it in the hub complete front wheel. (Fig. 6.6)
- Rotate the inner race by hand to inspect whether abnormal noise occurs or rotating smoothly. Replace bearing if found defective.

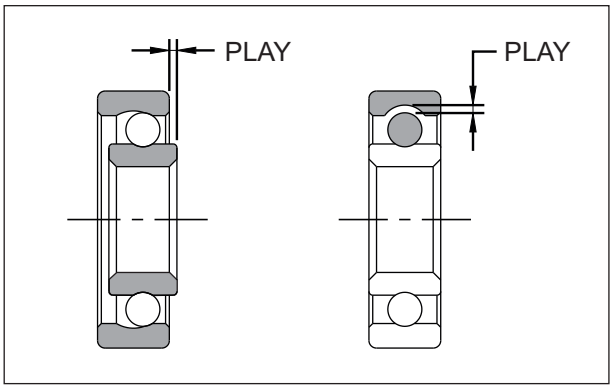


Fig. 6.6

Axle front

- Using the special tools, check the axle front for run out (straightness) and replace the axle with a new one if run out exceeds the limit. (Fig. 6.7)

Dial gauge (0.01mm)
Magnetic stand
V - block - 4"x3"x3"

Service limit	0.25 / 100 mm

Warning:
Do not attempt to straighten a bent axle.

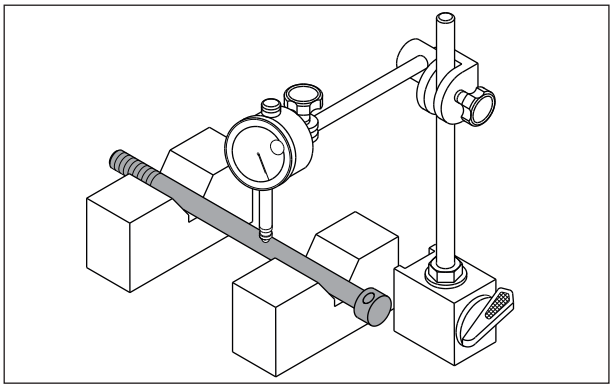


Fig. 6.7

Alloy wheel front

- Using the special tools, measure the run-out of alloy wheel front. Excessive run-out is usually due to a bent alloy wheel. (Fig. 6.8)

Dial gauge (0.01mm)
Magnetic stand

Service limit	1 mm

- Replace the alloy wheel if found defective.

Fig. 6.8

Tyre front

- Using the vehicle with excessively worn-out tyres will decrease riding stability and consequently invite a dangerous situation due to loss of control. It is highly recommended to replace the tyre with a new one when the groove depth of tyre from tread surface reaches the following specifications: (Fig. 6.9)

Tyre depth gauge / Vernier caliper	
Service limit	1 mm

Note:
Tyre depth can also be checked by tyre wear indicator (TWI). (Fig. 6.10)

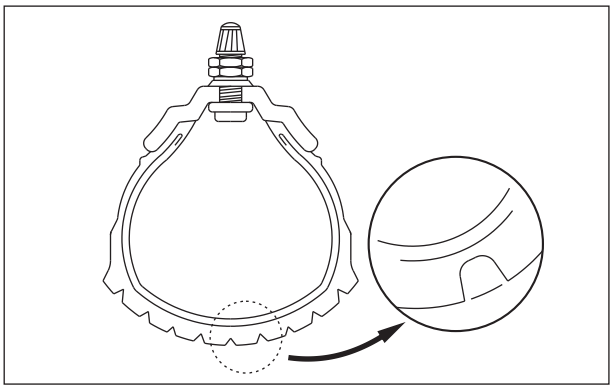


Fig. 6.9

Fig. 6.10

Tyre inflation pressure

- Inflation pressure affects the tyre life to a greater extent. So it is necessary to maintain proper inflation pressure. (Fig. 6.11)

Tyre pressure gauge

Pressure:

Single and dual	1.75 kg/cm² (25 PSI)

Note:
Tyre pressure should be checked only when the tyre is cold.

Fig. 6.11

Tubeless tyre

- Refer page no 6-33 & 6-34 for puncture repairing procedure and replacement of valve tubeless tyre.

REASSEMBLY

- Reassemble the wheel assembly front in the reverse order of disassembly and removal. Before assembling front wheel assembly, lubricate the axle front and bearings.

- Before tightening axle nut, stroke the fork assembly front several times to check for proper fork action. Tighten the axle nut only after ensuring the fork action.

Note:
While remounting front wheel assembly locate the disc in between the brake pads after removing cushion.

Wheel balancing to be done whenever the tyre is removed and reassembled from the wheel rim (alloy wheel).

- Refer the exploded view for details. (Fig. 6.12)

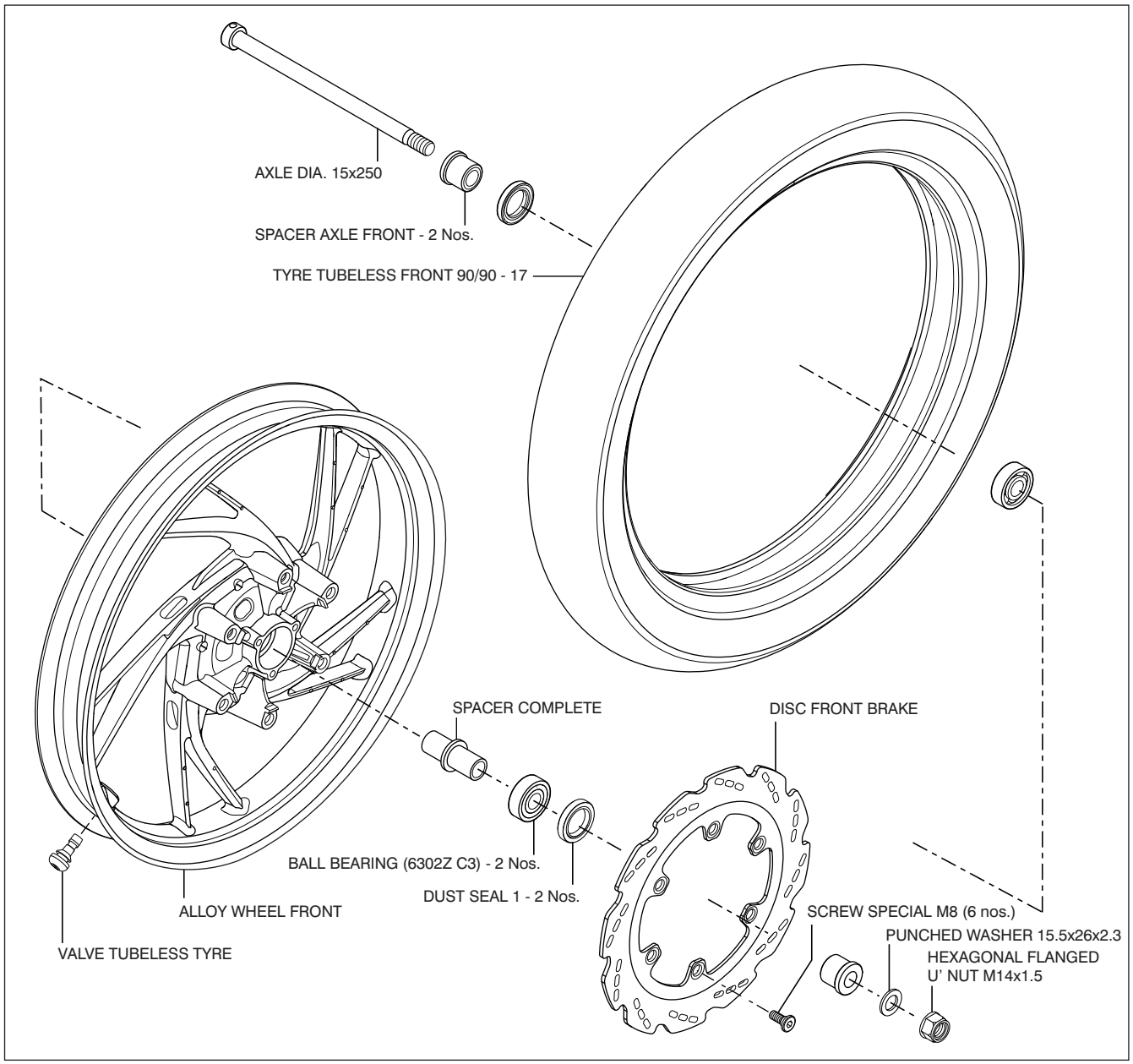


Fig. 6.12

DISC BRAKE SYSTEM - FRONT

BRAKE PADS

- Take out lever RH (front brake lever) by removing the mounting bolt and flange nut. (Fig. 6.13)

10 mm spanner	
Tightening torque	11 ± 0.5 Nm

Fig. 6.13

- Remove the caliper assembly mounting bolts (M8x27 - 2 nos.) and take off the caliper assembly. (Fig. 6.14)

12 mm spanner	
Tightening torque	23 ± 5 Nm

Note:
Wash mud and dust off around the front wheel assembly and caliper assembly before dismantling them.

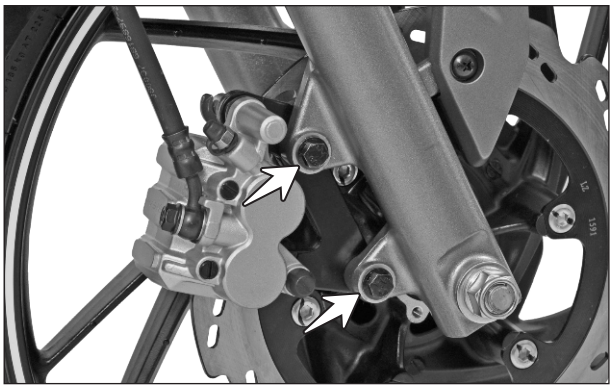


Fig. 6.14

- Remove the plug pin (2 nos.) from the caliper body. (Fig. 6.15)

Flat head screw driver	
Tightening torque	2.5 ± 0.5 Nm

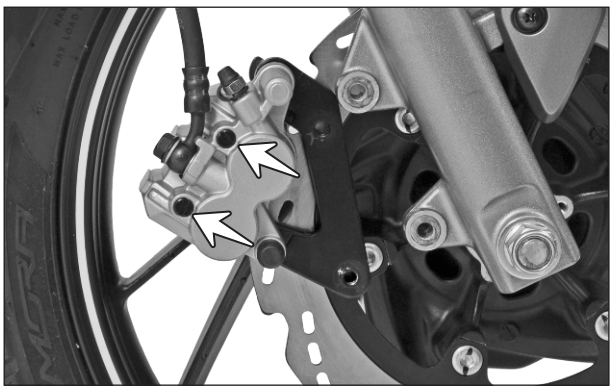


Fig. 6.15

- Remove pin hanger (2 nos.). (Fig. 6.16)

5 mm allen key	
Tightening torque	17.5 ± 2.5 Nm

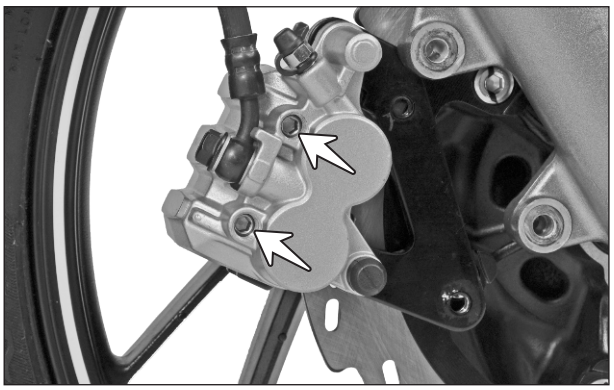


Fig. 6.16

- Pull out the pad complete inner and pad complete outer by hand. (Fig. 6.17)

Fig. 6.17

Inspection of brake pads

- Observe the wear limit line marked on the pad and check the wear condition of brake pads. (Fig. 6.18) When the wear exceeds the limit line, replace the pads with new ones.

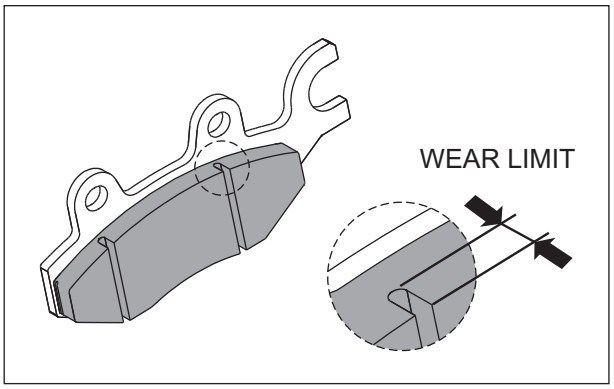


Fig. 6.18

BRAKE FLUID AND ITS HANDLING

Inspecting brake fluid level

- Before inspecting the brake fluid level, place your motorcycle firmly on the centre stand with the handlebar kept straight.

- Inspect the brake fluid level in the reservoir, If the oil level is found to be lower than the 'Lower level' mark provided on the reservoir, replenish the reservoir with the brake fluid graded below. (Fig. 6.19)

TVS Grilling DOT 3 or DOT 4

Caution:
Since the brake system of this motorcycle has glycol based brake fluid, do not use or mix different types of brake fluid such as silicon based and petroleum-based fluid for refilling the system, otherwise damage sustained will be serious.

Do not use any brake fluid taken from old or used or unsealed containers.

Do not squeeze the brake lever while the reservoir cap is removed. Otherwise brake fluid will sometimes spout out.

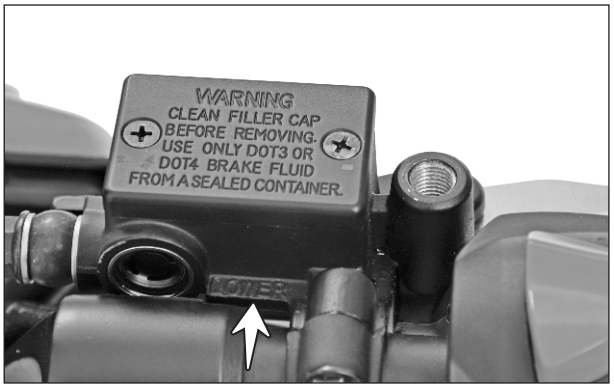


Fig. 6.19

Caution:
Do not place the removed reservoir cap on the speedometer or on any other painted surfaces. Brake fluid will damage the instrument cluster lenses and painted parts.

Ensure no water enters the brake fluid container. Because brake fluid has hygroscopic property, and its boiling point falls excessively if water is mixed with it.

Check the brake hose for cracks and hose joints for leakage. If found any, replace the hose.

Air bleeding from the brake system

- If the front brake lever travel becomes more or if any soft or spongy feel is observed in the lever, you must carry out the air bleeding from the brake system. Follow the procedure given below for bleeding the air:

Note:
It is best, if two persons perform air bleeding. Keep the fluid level in the reservoir just above the 'Lower level' mark during the bleeding procedure.

1. Dislocate the bleeder cap and attach a bleeder tube to the bleeder screw as shown in figure (Fig. 6.20). A transparent tube is useful in finding air bubble expelled from the system. The tube must be submerged in a clean container partially filled with brake fluid.

2. Fill the reservoir with the brake fluid. Fix back the reservoir cap to prevent spout of brake fluid and entry of dust.

3. Allow the pressure in the hydraulic system by stroking the brake lever rapidly several times and then hold the lever tight.

4. Unscrew (open) the bleeder by half a turn and depress the lever all the way down. Do not release the lever until the bleeder valve is screwed in (tighten) again. (Fig. 6.21)

10 mm spanner

5. Repeat steps 3 and 4 until air bubbles disappear from the bleeder tube or container. Tighten the bleeder securely.

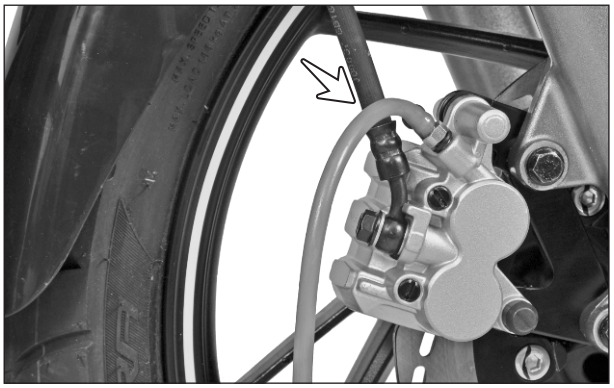


Fig. 6.20

Fig. 6.21

6. Remove the bleeder tube and install the cap bleeder.

7. After completing the bleeding operation, check the fluid level in the reservoir and replenish if necessary.

Caution:
Do not reuse the brake fluid drained from the system.

Brake fluid replacement

- Boiling point of brake fluid falls considerably with absorption of moisture which may take place during a long period of use. Therefore, it is recommended to replace old brake fluid with new one periodically.

Replace brake fluid every 21000 km

- On changing brake fluid, extreme attention should be paid so as not to mix any foreign materials because they would block the return port of the master cylinder resulting in the brake dragging or squeaking.

Perform the following procedure to change the brake fluid:

1. Attach a bleeder tube to the bleeder. Drain out the old brake fluid by squeezing the brake lever with bleeder opened until the brake fluid disappears in the bleeder tube.

2. After old brake fluid is drained out from the system completely, carry out the same procedure as described in 'air bleeding' from the brake system.

HOSE COMPLETE BRAKE (BRAKE HOSE)

- Inspect the hose complete brake for any crack or leakage. If leakages found, replace the hose as below:

- Flush the brake fluid out by opening the bleeder at caliper assembly with a tube on the bleeder head to a clean container (refer brake bleeding).

- Remove the banjo bolt (2 nos.) along with gaskets (2 nos. on each side) from both the ends of the hose complete brake. (Fig. 6.22)

12 mm spanner

Tightening torque	30 ± 2 Nm

Note:
Ensure the reassembly of new gaskets while reconnecting the hose without fail to avoid leakage.

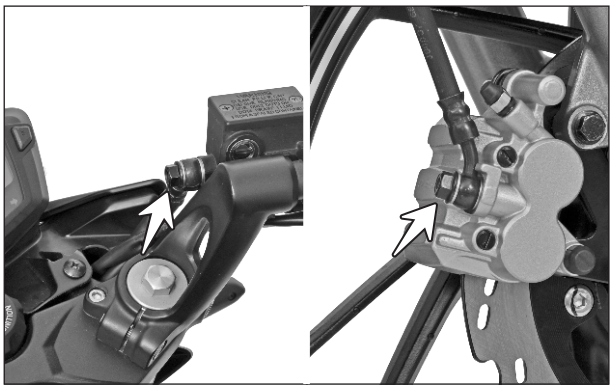


Fig. 6.22

- Dislocate the hose complete brake from the clamp hose under bracket (Fig. 6.23A) and clamp brake hose. (Fig. 6.23B)

- Dislocate and take out the brake hose from the vehicle.

Caution:
Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The fluid reacts chemically with paint, plastics, rubber materials etc., and will damage them severely.

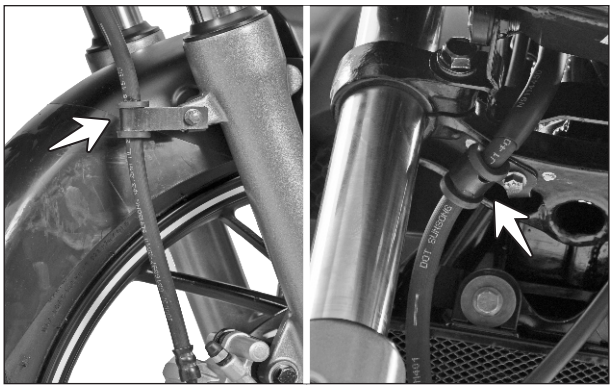


Fig. 6.23A Fig. 6.23B

- Reassemble the new brake hose in the reverse order of dismantling.

- Assemble and tighten the banjo bolts at both the ends of the hose along with gaskets.

Caution:
Assemble only new gaskets with the banjo bolts during reassembly. Do not use old ones.

- Bleed the air from the brake circuit after reassembly of brake hose (refer air bleeding procedure on page no. 6-7).

Replace brake hose every 3 year

CALIPER ASSEMBLY - REMOVAL AND DISASSEMBLY

- Remove the banjo bolt along with gaskets and take off the hose from the caliper assembly. (Fig. 6.24)

12 mm spanner

Tightening torque	30 ± 2 Nm

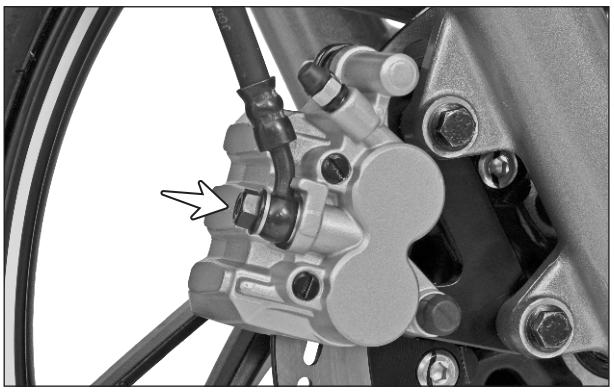


Fig. 6.24

- Remove caliper assembly mounting bolts and brake pads as explained in page no. 6-5.
- Remove the spring pad from the caliper housing. (Fig. 6.25)

Nose plier

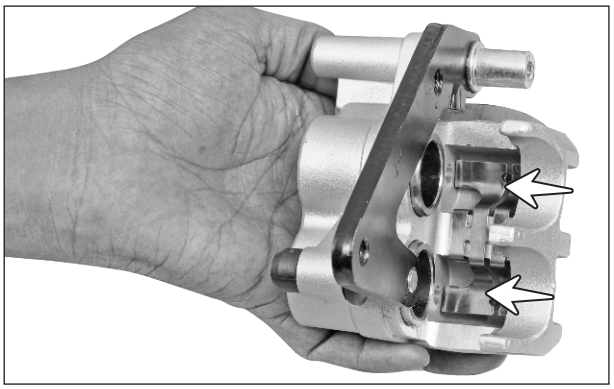


Fig. 6.25

- Dislocate the boot-B and bush boot pin from the pin grooves and slide out the bracket complete front. (Fig. 6.26)

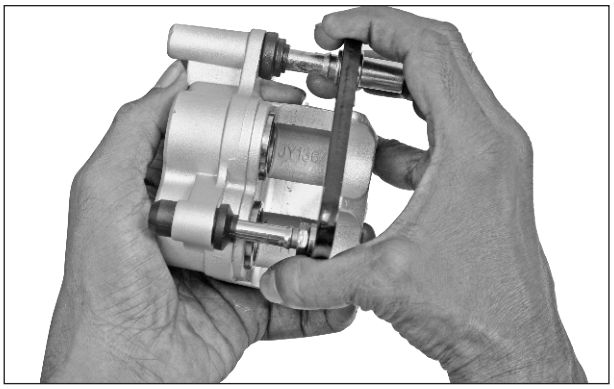


Fig. 6.26

- Carefully pull out the boots from the caliper assembly housing. (Fig. 6.27)

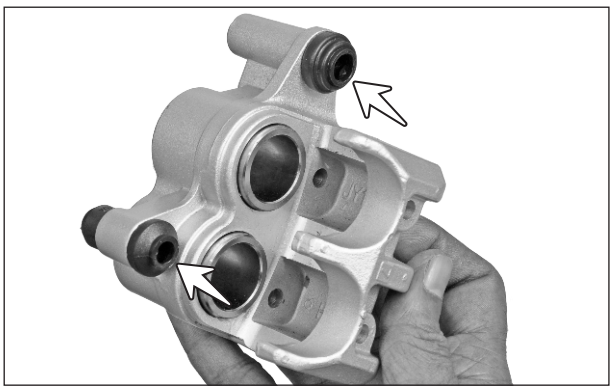


Fig. 6.27

- Insert a spacer in between the piston caliper and the caliper body (at pad position) and then apply compressed air through inlet port of the caliper to slide both the pistons out. (Fig. 6.28)

Caution:
Be careful while applying compressed air as it pushes the pistons forcefully. Do not use high pressure air which may damage to pistons.

Note:
Do not try to pull out single piston as the compressed air cannot push the second piston.

Do not use nose plier to pull out the pistons as it damages the piston.

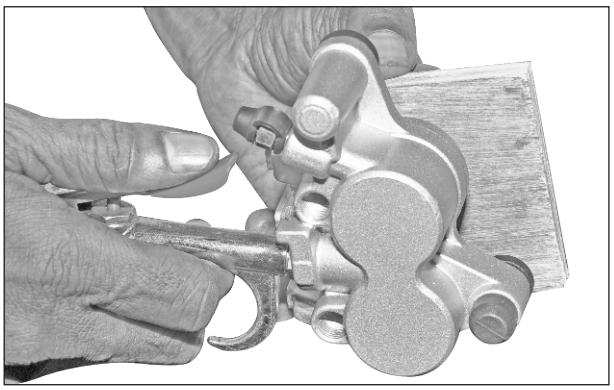


Fig. 6.28

- Remove the dust seals 1 and 2 with a bent plastic / brass tool to avoid scratches in the caliper bore. (Fig. 6.29)

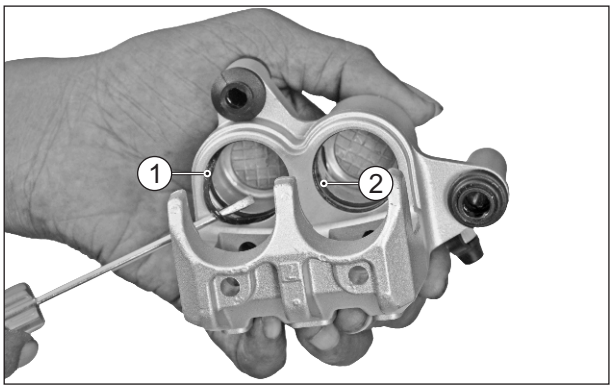


Fig. 6.29

- Remove the bleeder screw. (Fig. 6.30)

10 mm spanner	
Tightening torque	5.5 ± 1.5 Nm

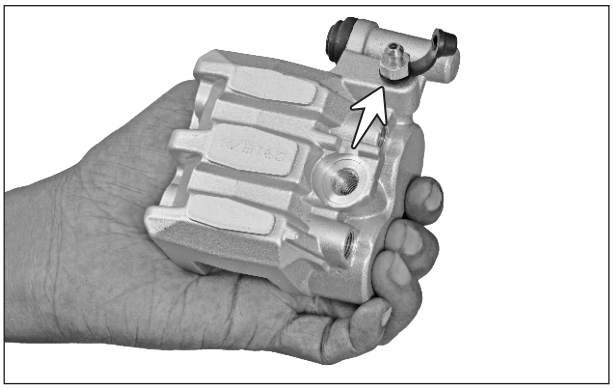


Fig. 6.30

- Clean parts thoroughly with the fresh brake fluid.

Caution:
Never use kerosene, petrol or other solvents for cleaning the brake system. Otherwise rubber parts will be damaged. Do not wash the pads and also take care that brake fluid is not splashed on pads.

Caliper assembly inspection

Inspect the following parts:

- Pin hangers for any bend.
- Bracket complete front for loose lugs.
- Piston and caliper bore for any scratches.
- Piston and dust seals for any damage.

- Replace the defective parts after necessary inspection.

Caliper assembly - reassembly

- Insert the dust seal - 1 and dust seal - 2 into the caliper body seal grooves and ensure perfect seating without any twist (refer exploded view on page no. 6-16 for assembly details).

- Smear the piston with fresh TVS Girling DOT 3 or DOT 4 brake fluid and slowly insert into the bore of caliper body without tapering. Ensure the piston is sliding easily into the bore.

- Assemble the spring pad in the caliper body and fix back the boot-B and bush boot pin.
- Apply little grease on the pin bolts and assemble the bracket complete front into the caliper body while ensuring the proper seating of both the boots in the pin bolt grooves.
- Assemble the pad inner and pad outer. Locate the pin hangers properly into the holes of pad inner and pad outer and assemble it. Fix back plug pins and bleeder screw.
- Remount the caliper assembly into the fork leg and reconnect the brake hose along with gaskets. Bleed the system thoroughly.

DISC PLATE SERVICING

Inspection (with disc mounted on wheels)

- Face out of the disc plate should not be more than the limit specified below. Measure the disc plate face out on the largest periphery of the disc plate with a dial indicator. (Fig. 6.31)
- If the face out exceeds the limits, check whether the cause lies in the front wheel bearing or the disc plate itself. Replace defective parts.

Magnetic stand

Dial gauge (0.01)

Standard	0.2 mm
Service limit	0.3 mm

Note:
Wipe out the disc plate surface with a dry soft cloth before inspection.

Fig. 6.31

- Measure the thickness of disc plate at the worn-out portion as shown. (Fig. 6.32)
- If the thickness measured is less than the limits, replace the disc plate (refer page no. 6-1 for disc plate removal procedure).

Micrometer

Standard	Front - 4 mm & Rear - 4.5 mm
Service limit	Front - 3.5 mm & Rear - 4 mm

Fig. 6.32

MASTER CYLINDER - REMOVAL AND DISASSEMBLY

- Dislocate the dust cap (A) and loosen the lock nut of rear view mirror. Now, remove the rear view mirror gently. (Fig. 6.33)

14 mm spanner	
Tightening torque	28.5 ± 6.5 Nm

Caution:
While reassembling the mirror care should be taken not to damage the mounting threads of the master cylinder.

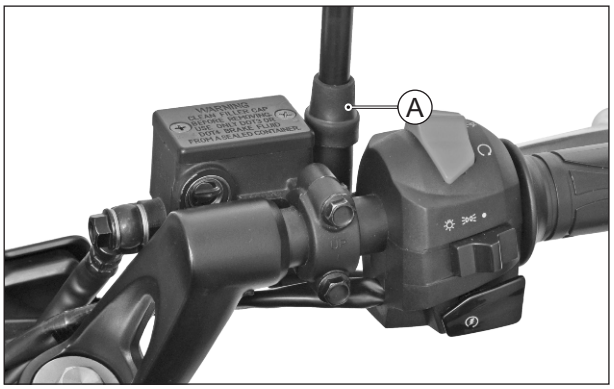


Fig. 6.33

- Bleed out the brake system completely as explained earlier.

- Remove the banjo bolt and brake hose from the master cylinder assembly along with the gaskets (2 nos.). (Fig. 6.34)

12 mm spanner	
Tightening torque	30 ± 2 Nm

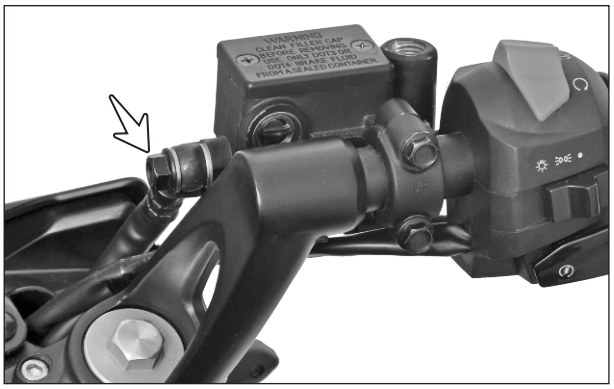


Fig. 6.34

- Disconnect the wiring harness of the stop lamp switch from the switch terminal. (Fig. 6.35)

Fig. 6.35

- Take out the lever RH (front brake lever) by removing the mounting bolt and flange nut. (Fig. 6.36)

10 mm spanner	
Tightening torque	11 ± 0.5 Nm

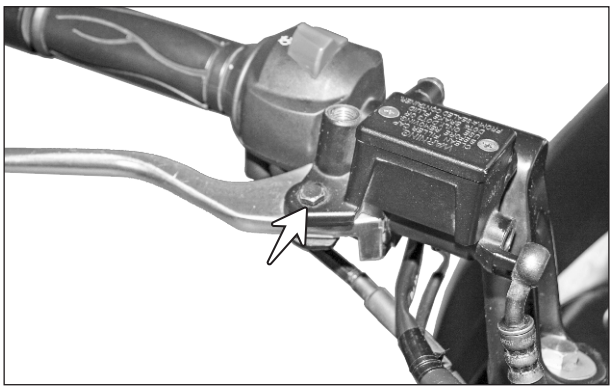


Fig. 6.36

- Remove the master cylinder fluid reservoir cap by unscrewing screws (2 nos.). (Fig. 6.37)

Phillips head screw driver

Tightening torque	1.5 ± 0.5 Nm

- Take out the plate diaphragm and diaphragm from the reservoir.

Fig. 6.37

- Take out the master cylinder by unscrewing the mounting bolts (2 nos.) of holder master cylinder. (Fig. 6.38)

10 mm spanner

Tightening torque	10 ± 2 Nm

Note:
Hold the master cylinder while removing the holder mounting bolts in-order to avoid falling.

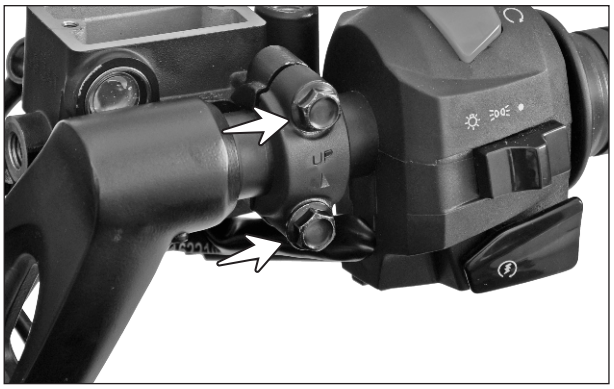


Fig. 6.38

- Remove the mounting screw of stop lamp switch and take out the stop lamp switch. (Fig. 6.39)

Phillips screw driver

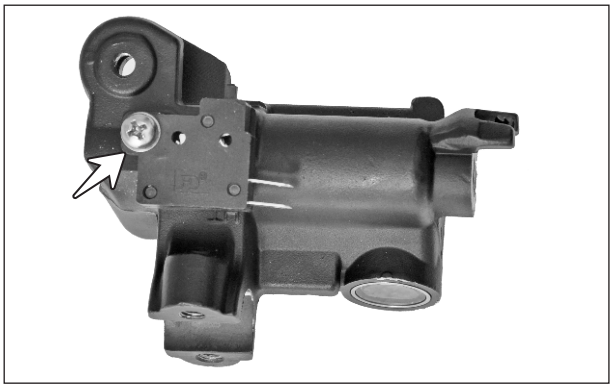


Fig. 6.39

- Remove the dust boot from the master cylinder using a blunt tool. (Fig. 6.40)

Note:
While removing boot, care must be taken not to damage it.

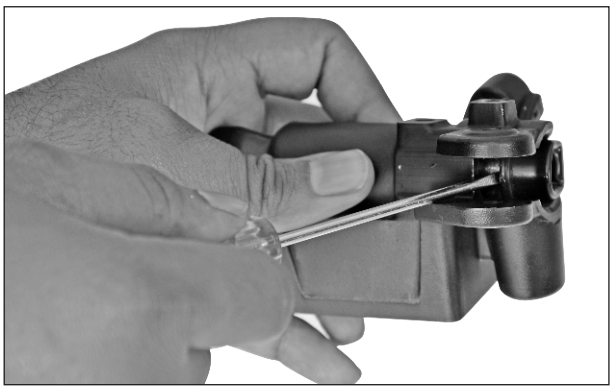


Fig. 6.40

- Holding the master cylinder by hand slightly press the piston with thumb finger and remove the circlip from the master cylinder using a circlip plier without damaging the piston and the cylinder. (Fig. 6.41)

Circlip plier

Note:
Ensure that the circlip is seated properly in its position after installation.

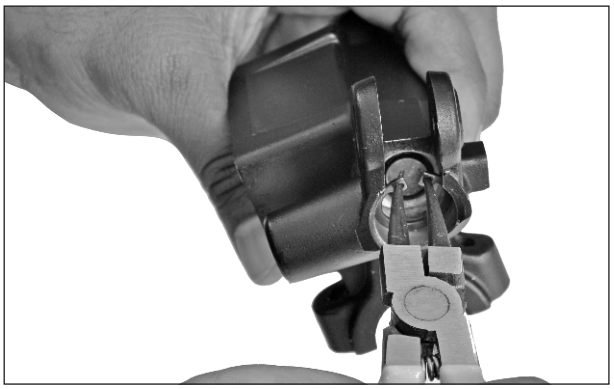


Fig. 6.41

- Slowly pull out the piston along with the P - cup, S - cup and spring. (Fig. 6.42) Clean the system thoroughly using fresh brake fluid.

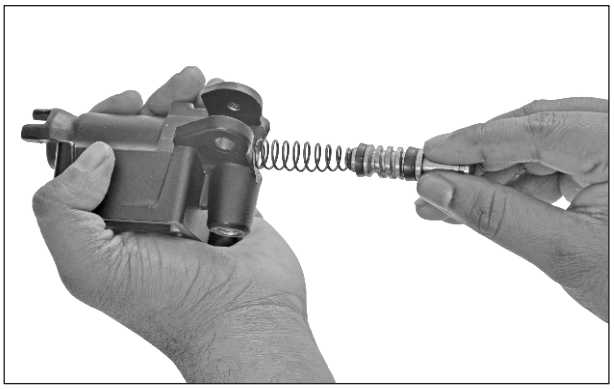


Fig. 6.42

Caution:
Never use kerosene, petrol or other solvents for cleaning the brake system. Otherwise rubber parts will get damaged.

Do not wash the brake pads. Ensure that the brake fluid is not in contact with the pads surface.

Inspection of master cylinder

Inspect the following parts:

- Master cylinder for any scratches or any other damages.
- Piston and cup surface for scratches or other damages.
- Piston boot and other components for wear and damages.
- Master cylinder recuperation and feed port for any blockage, if so clear the block using compressed air.

- After the above inspection, if found any defect, replace the respective parts.

REASSEMBLY

- Reassemble the master cylinder in the reverse order of dismantling. Refer (Fig. 6.43) for assembly details.

Caution:
Apply the brake fluid to the cylinder bore and all internal parts before inserting piston assembly into the bore.

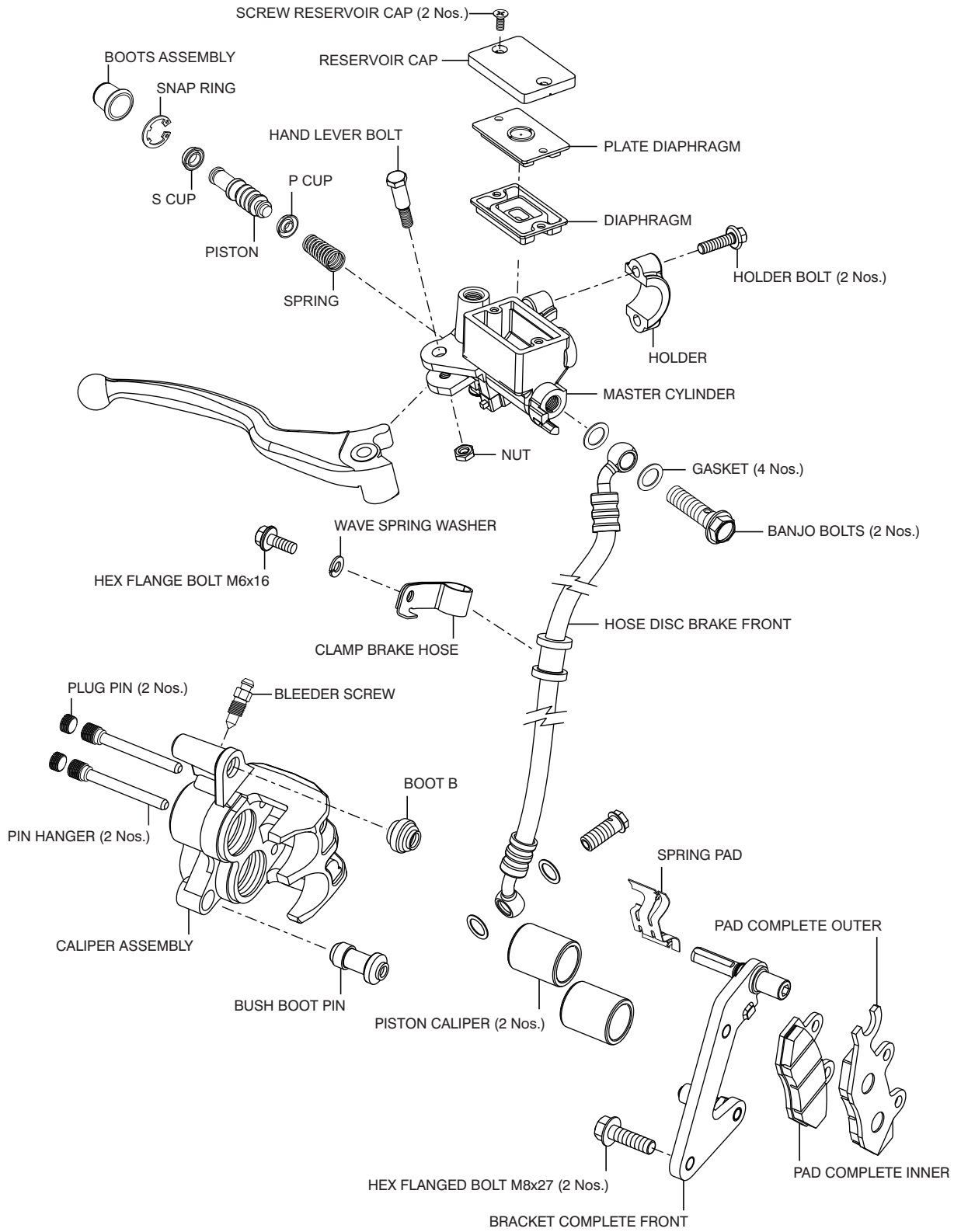

SCREW RESERVOIR CAP (2 Nos.)
BOOTS ASSEMBLY
RESERVOIR CAP
SNAP RING
HAND LEVER BOLT
PLATE DIAPHRAGM
S CUP
P CUP
DIAPHRAGM
PISTON
HOLDER BOLT (2 Nos.)
SPRING
HOLDER
MASTER CYLINDER
NUT
GASKET (4 Nos.)
WAVE SPRING WASHER
BANJO BOLTS (2 Nos.)
HEX FLANGE BOLT M6x16
HOSE DISC BRAKE FRONT
CLAMP BRAKE HOSE
PLUG PIN (2 Nos.)
BLEEDER SCREW
BOOT B
PIN HANGER (2 Nos.)
SPRING PAD
PAD COMPLETE OUTER
CALIPER ASSEMBLY
BUSH BOOT PIN
PISTON CALIPER (2 Nos.)
HEX FLANGED BOLT M8x27 (2 Nos.)
PAD COMPLETE INNER
BRACKET COMPLETE FRONT

Fig. 6.43

- Remount the master cylinder to the handle bar and fix the holder in 'UP' direction. (Fig. 6.44)

10 mm spanner

Tightening torque	10 ± 2 Nm

Note:
Always tighten the top bolt first and then the bottom one.

Mount master cylinder to the handle bar such that reservoir becomes horizontal when the bike is placed on centre stand and steering is kept straight.

Fig. 6.44

- Fix the brake hose to the master cylinder outlet port along with the banjo bolt and gaskets.
- Fill the reservoir with fresh TVS Girling DOT3 or DOT4 brake fluid above the level 'LOWER' mark on the reservoir and bleed the system thoroughly. (Fig. 6.45)
- Fix the reservoir cap along with diaphragm and plate diaphragm and tighten screws. Connect the wiring harness to the brake light switch.
- Replace the following parts every 21,000 km
  - Piston along with P-cup, S-cup, spring and boot.
  - Reservoir cap and diaphragm.
  - Caliper dust seal - 1 and dust seal - 2.

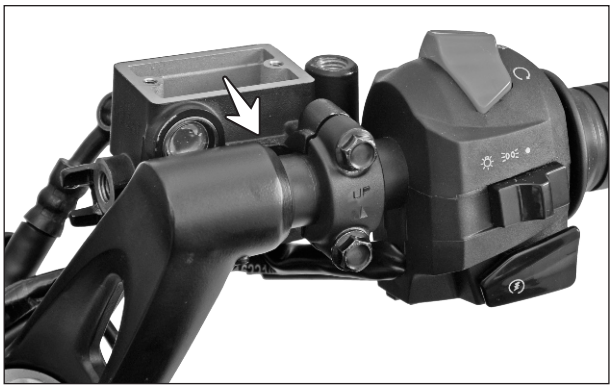


Fig. 6.45

FORK ASSEMBLY FRONT

OIL CHANGE

- Dismantle the wheel assembly front (refer page no 6-1 for dismantling procedure).
- Remove caliper assembly along with hose complete brake. Keep some cushion in between the brake pads to avoid binding.
- Remove the CRR pan head screws (M6x16 - 2 nos.) from the fender front L & R.(Fig. 6.46)

Phillips screw driver

Tightening torque	3 ± 1 Nm

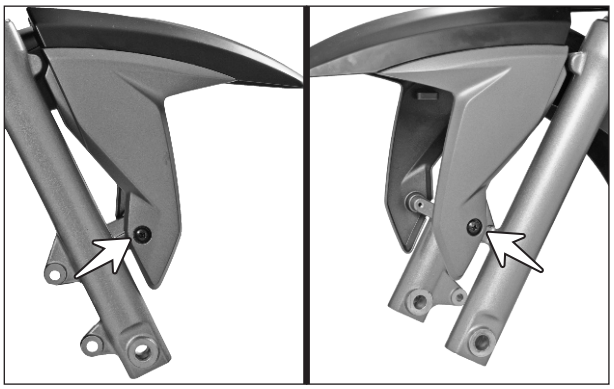


Fig. 6.46

- Remove hexagonal screws (M8x20 - 4 nos.) along with wave spring washer (4 nos.) from the fender front mounting. (Fig. 6.47)

13 mm spanner	
Tightening torque	18 ± 3 Nm

- Take out THE brace front fender along with spacer front fender (4 nos.).

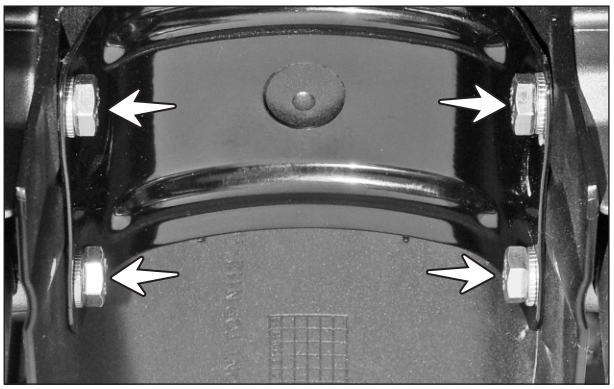


Fig. 6.47

- Loosen hexagonal socket head screws (A) (M8x30 - 2 nos.) from the handle bar assembly mounting. (Fig. 6.48)

6 mm allen key	
Tightening torque	16 ± 2 Nm

- Loosen hexagonal socket head screws (B) (M8x45 - 2 nos.) from the upper bracket complete mounting (fork upper mounting). (Fig. 6.48)

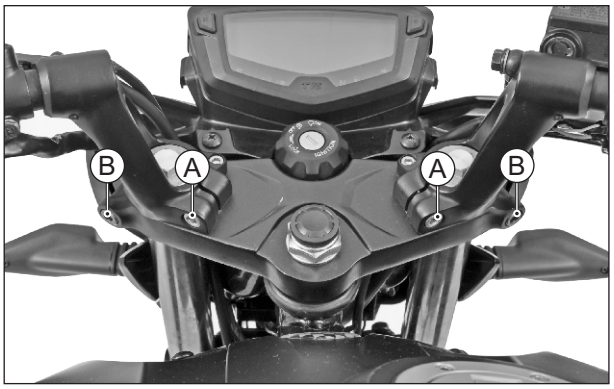


Fig. 6.48

6 mm allen key	
Tightening torque	19 ± 2 Nm

- Loosen the hexagonal screws (M10x40 - 2 nos.) of lower bracket complete (fork lower mounting). (Fig. 6.49)

14 mm spanner	
Tightening torque	36 ± 4 Nm

Note:
Hold the fork leg assembly while loosening the bottom mounting bolts. Else it may fall.

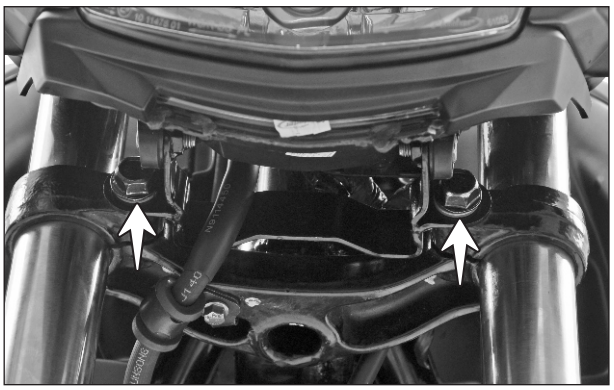


Fig. 6.49

- Slightly pull out the fork leg assembly RH from the under bracket till the top nut is accessible and tighten the lower bracket hexagonal bolt again. (Fig. 6.50A)

Caution:
Do not over tight the lower mounting bolt, as it may damage the inner tube assembly of fork leg.

Do not damage working zone of front fork inner tube while removing and assembly as it may cause oil leak.

- Using an 17 mm spanner, loosen the cap nut of front fork leg assembly to facilitate easy dismantling of fork leg. (Fig. 6.50B)

17 mm spanner	
Tightening torque	23 ± 3 Nm

- Now, once again loosen the lower mounting screw and pull out the fork leg assembly RH.
- Remove the fork cap nut along with 'O' ring from the leg assembly front fork. (Fig. 6.51)

Caution:
Remove the cap nut with constant handgrip on nut. The nut is subject to spring load and may jump out incase of loose handling.

Use Nylon coated spanner to prevent damage of nut.

- In similar manner, remove and dismantle the fork leg assembly LH.
- Take out the washer, spacer front fork, washer spring seat and spring front fork. (Fig. 6.52)
- Turn the leg assembly front fork upside down. Holding the outer tube by hand, pump inner tube 'in' and 'out' to drain the oil completely. (Fig. 6.53)

Note:
Hold the leg assembly front fork inverted for few minutes to drain the oil completely.

- Clean the leg assembly front fork with kerosene and drain completely.

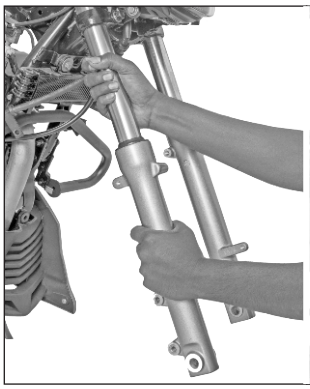


Fig. 6.50A

Fig. 6.50B

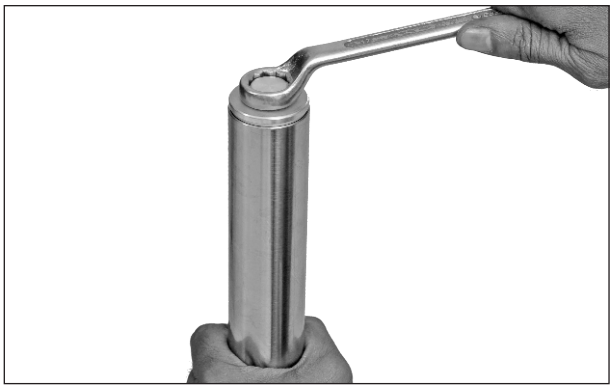


Fig. 6.51

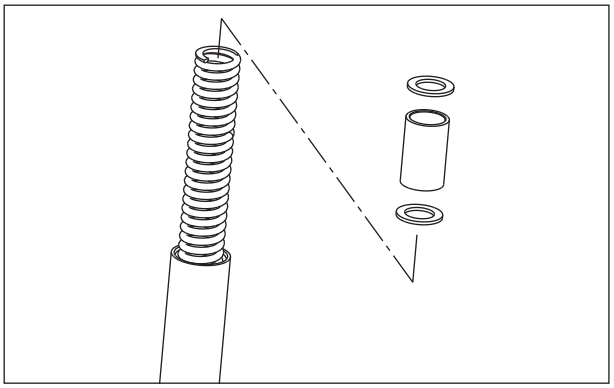


Fig. 6.52

Fig. 6.53

- Fill 325 ± 2 cc amount of fresh fork oil in fork leg assembly. (Fig. 6.54)

Oil specification	TRU FORK oil

- Now, stroke the inner tube up and down 10 times to remove the air bubble.

Fig. 6.54

- Adjust the special tool (oil level gauge) to the specified height. Hold the front fork vertically and take out the excess oil from the front fork using the special tool as shown. (Fig. 6.55)

Note :
When adjusting the oil level, compress the inner tube fully.

031 180 0	Fork oil level gauge

Oil level	114 mm

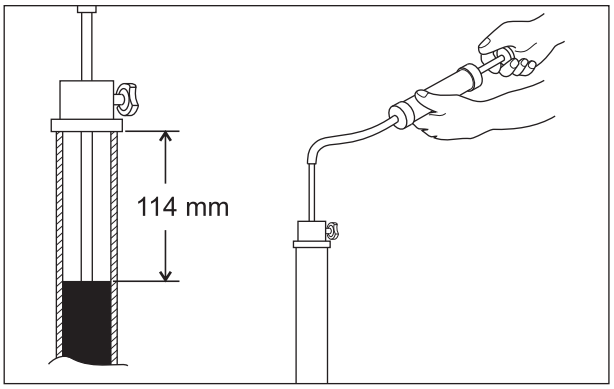


Fig. 6.55

- Check spring front fork length (refer page no. 6-22 for checking procedure).
- Install spring front fork with its smaller pitch end facing upward. (Fig. 6.56)
- Assemble washer spring seat, spacer front fork and washer.
- Before installing cap nut front fork, lightly apply grease to the 'O' ring. Remount for leg assembly LH & RH.
- Tighten top mounting screws (fork upper mounting) to the specified torque (refer chapter "Service information page no. 7-10 for torque sheet).
- Tighten hexagonal bolts of lower bracket (fork bottom mounting) to the specified torque (refer chapter "Service information page no. 7-10 for torque sheet)..
- Reassemble the front fender and front wheel assembly in the reverse order of removal.
- Re-fix the caliper assembly front fork and ensure the proper working of brake.

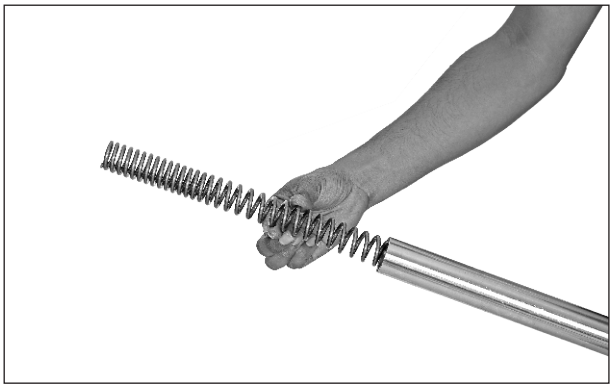


Fig. 6.56

LEG ASSEMBLY FRONT FORK- DISASSEMBLY

- Remove both the LH and RH leg assembly front (refer page no. 6-17).
- Drain out the front fork oil as explained earlier.
- Remove the seal dust front fork (dust seal) from the outer tube while ensuring no damage to the dust seal, inner surface of outer tube and outer surface of inner tube. (Fig. 6.57A)
- Remove the snap ring from the outer tube while ensuring no damage to the inner surface of outer tube and outer surface of inner tube. (Fig. 6.57B)

Flat screw driver

Caution:
While reassembling, replace the dust seal if any damage is found.

Do not damage working zone of front fork inner tube while removing and assembly as it may cause oil leak.

- Using the special tool, hold the piston and remove the hexagonal allen screw connecting fork outer tube and inner tube. (Fig. 6.58)

N931 011 0	Tool front cylinder holder

8mm allen key

Tightening torque	23 ± 3 Nm

Note:
Please remember to replace the gasket with a new one while reassembling.

- Hold the inner and outer tube using both the hands. Pull out the tube inner (inner tube) from the tube outer (outer tube) along with cylinder front fork (piston front fork), DU bush and oil seal.
- Remove the spindle tapper from the bottom of the piston front fork. If it does not come out with piston, remove it from the fork outer tube. (Fig. 6.59)
- Remove the piston front fork and spring front fork from the inner tube assembly. (Fig. 6.60)

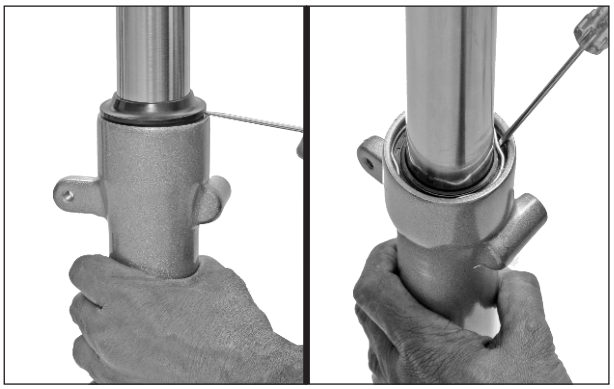


Fig. 6.57A Fig. 6.57B

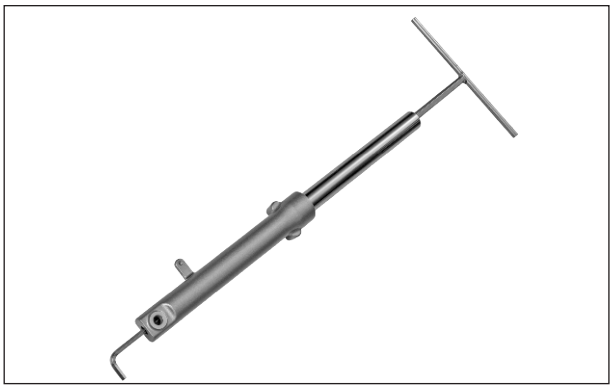


Fig. 6.58

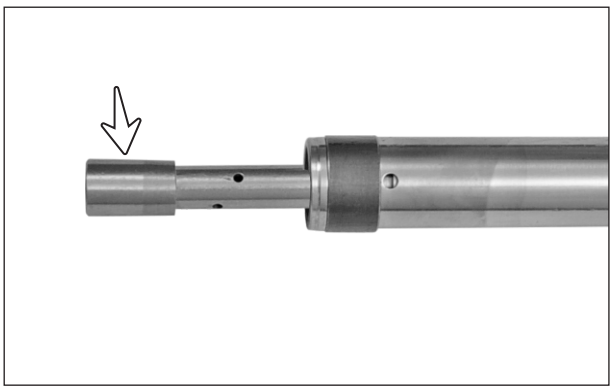


Fig. 6.59

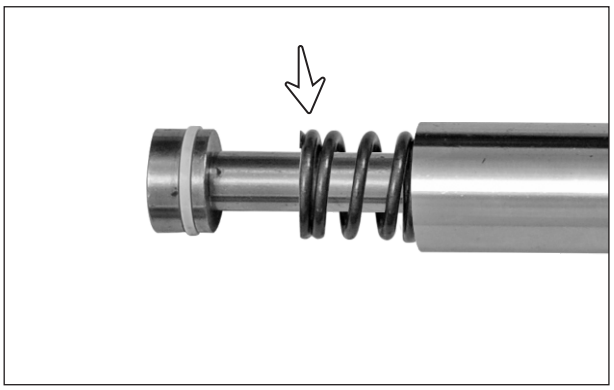


Fig. 6.60

INSPECTION

- Before inspection, clean all the components with a cleaning solvent (kerosene).
- Inspect the piston front fork and ring damper piston for wear and any damage. (Fig.6.61) Replace with new ones if any damage is noticed.
- Inspect the outer surface of inner tube and sliding surface (inner surface) of outer tube for any scuffing, scratches, dents, plating peel off etc.. Replace the inner tube or outer tube if it has surface defects / flaws. If the inner tube has damage / dent on surface, replace the oil seal and inner tube together.
- Similarly, inspect the DU bush for any damage or wear. Replace if found any.

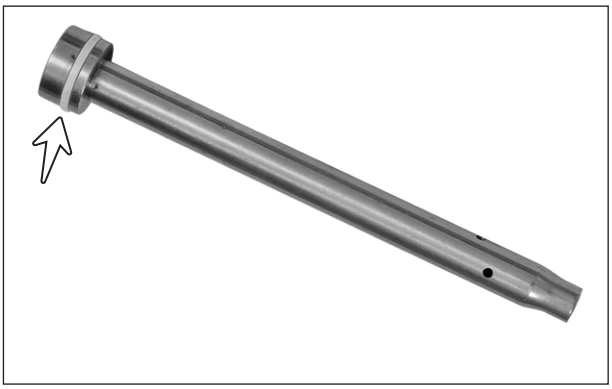


Fig. 6.61

Spring front fork

- Measure the free length (A) of the spring front fork. If the length is shorter than service limit or deformation of spring, replace it with a new one. (Fig. 6.62)

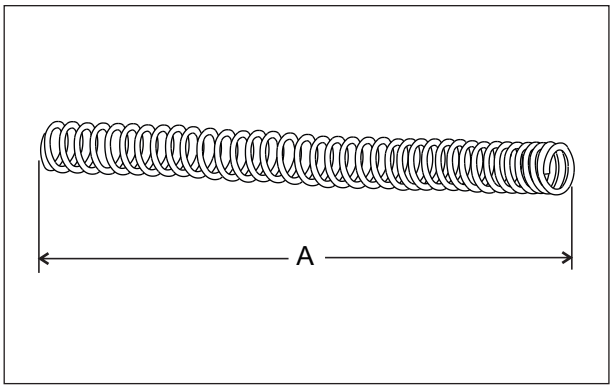


Fig. 6.62

Service limit length (A)	428 mm

REASSEMBLY

Reassemble and remount the leg assemblies front fork in the reverse order of disassembly while carrying out the following steps.

- Refer leg assembly front fork exploded view (Fig. 6.63) for assembly details.
- Make sure all the components are clean. Lubricate the inner surface of the outer tube and outer surface of the inner tube.
- Insert the fork piston along with the rebound spring slowly, so that it slides down into the tube inner and protrudes from the bottom.
- Assemble the spindle tapper in the piston. now insert the outer tube in the inner tube along with DU bush.
- **Fix a new copper washer** and apply thread lock to the allen screw of the piston before assembling it.

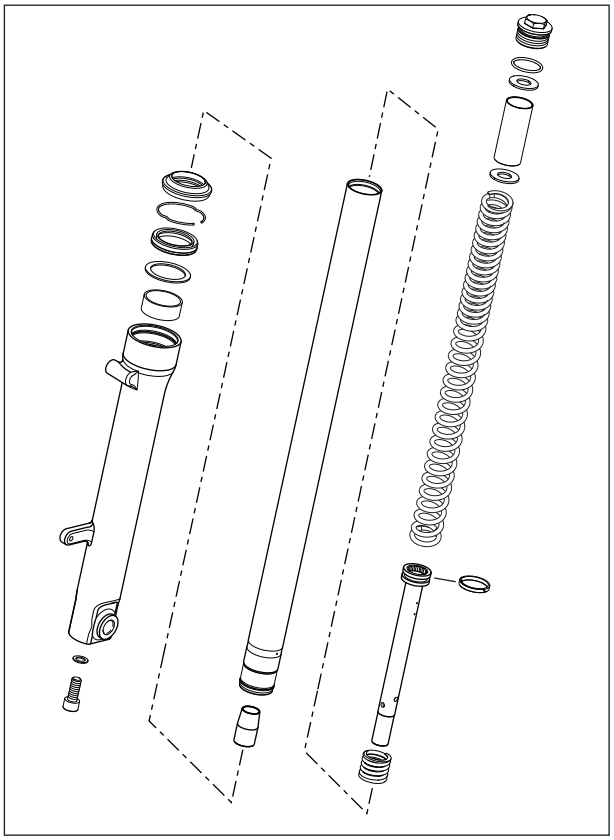


Fig. 6.63

- Assemble the washer spring seat, spacer front fork and washer.
- Install the new oil seal using the special tool. (Fig. 6.64A)

N931 009 0	Tool fork oil seal

Note:
Before installing the oil seal, apply little grease (MOS_2) on the lip of oil seal.

- Reassemble the snap ring.
- Reassemble the dust seal using special tool. (Fig. 6.64B)

N931 009 0	Tool fork oil seal

- Fill up the fork oil as per specification.

Note:
After filling up, slowly pump the leg assembly front fork up and down 10 times to remove air lock / gaps. Install the spring with its smaller pitch up-ward. Before installing the lock nut, apply grease to the 'O' ring.

- Remount the front fork assembly.

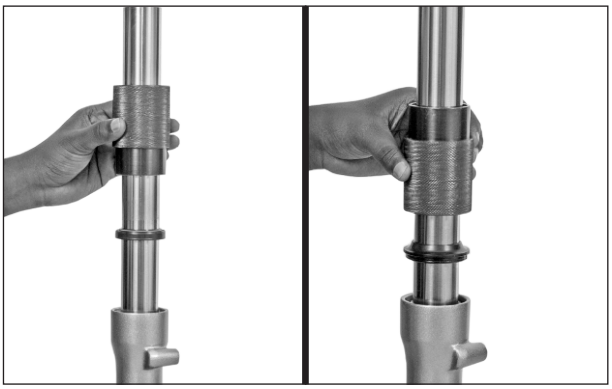


Fig. 6.64A Fig. 6.64B

LOWER BRACKET COMPLETE (STEERING STEM) - DISASSEMBLY

- Remove the CRR pan head screw (M5x16 - 2 nos.) from the housing speedometer rear mounting and remove the housing speedometer rear. (Fig. 6.65)

Phillips head screw driver

Tightening torque	3 ± 1 Nm

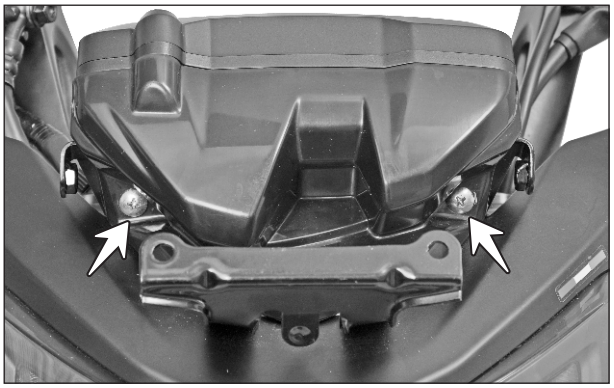


Fig. 6.65

- Disconnect wiring socket from the speedometer assembly.
- Remove the CRR pan head screw (M6x25 - 2 nos.) housing head lamp front top mounting. (Fig. 6.66)

Phillips head screw driver

Tightening torque	3 ± 1 Nm

Fig. 6.66

- Remove the hexagonal flange bolt (M6x16 - 2 nos.) from the bottom mounting of housing head lamp (both LH and RH) while holding the housing by one hand. (Fig. 6.67)

10 mm spanner	
Tightening torque	4.5 ± 1.5 Nm

- Take out the housing head lamp by gently disconnecting and dislocating the wiring sockets of main wiring harness.
- Remove both the leg assembly front fork (refer page no. 6-17).
- Take out cap lock nut (A) and remove lock nut steering along with the special washer. (Fig. 6.68)

32 mm spanner	
Tightening torque	80 ± 20 Nm

- Gently lift the handle bar assembly, support and hang it at the side of the fuel tank complete while taking care of painted surface of the tank.

Note:
Ensure that the control cables are not stretched too much or bent.

- Unlock the lock washer arrester steering using a blunt tool. (Fig. 6.69A)
- Remove the arrester steering stem top using a special tool. (Fig. 6.69B)

N931 014 0	Tool steering nut

- Take out the lock washer arrester steering. (Fig. 6.70A)
- Remove the arrester steering stem using the special tool while holding the lower bracket complete and draw out bracket. (Fig. 6.70B)

N931 014 0	Tool steering nut

Note:
Steering balls tend to fall during bracket removal, hence they should be collected carefully.

Fig. 6.67

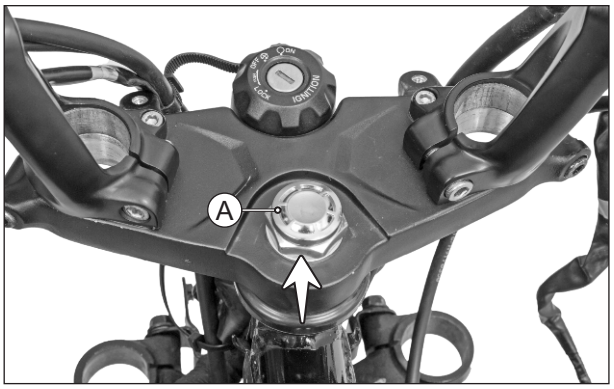


Fig. 6.68

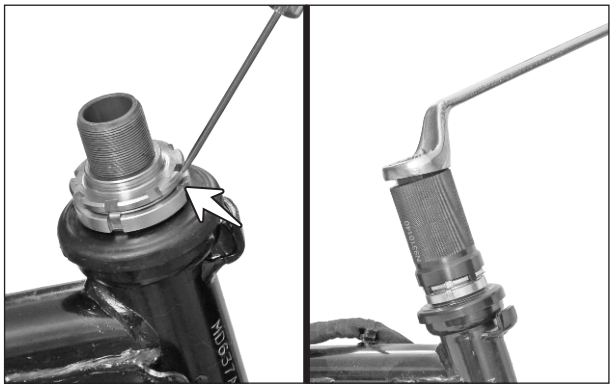


Fig. 6.69A

Fig. 6.69B

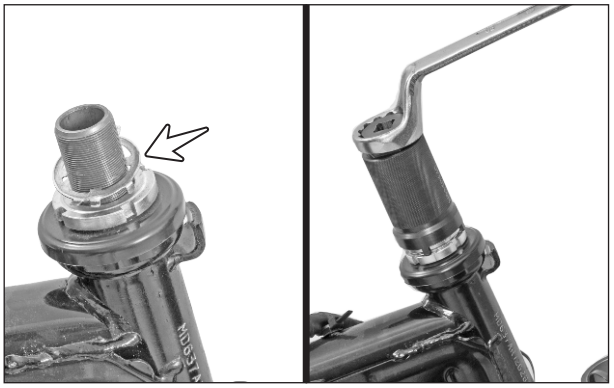


Fig. 6.70A

Fig. 6.70B

- Remove the dust seal steering upper. (Fig. 6.71A)
- Remove cone top. (Fig. 6.71B)
- Remove the upper and lower steering balls.

Position	Qty	Size
Upper	18 nos	6.35 mm
Lower	18 nos	6.35 mm

Fig. 6.71A

Fig. 6.71B

- Assembly the special tool on the frame and slowly draw out the cup top from the steering pivot pipe (frame). (Fig. 6.72)

M931 016 0	Remover steering cup

Note:
While fixing the special tool, ensure that the tool is seated properly on the steering pivot tube and the lock plate of the tool is locked with the steering stopper properly.

Fig. 6.72

- In similar manner, remove the cup bottom from the frame.
- Remove the cone bottom and dust seal steering lower fitted on the lower bracket complete. (Fig. 6.73)

Chisel / metal hammer

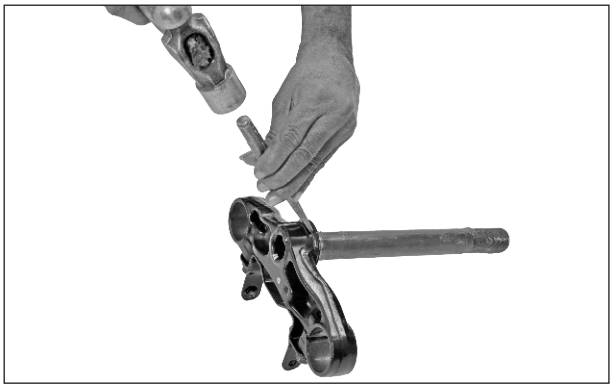


Fig. 6.73

INSPECTION

Before inspection clean all the components with kerosene. Inspect the removed parts for the following abnormalities and replace the defective with new ones.

- Handle bar distortion.
- Races and cones for wear, pitting, rusting and indentation. (Fig. 6.74)
- Worn or damaged steel balls / ball cage and rusting. (Fig. 6.74)

Note:
Always replace the cup, cone and races as a set only.

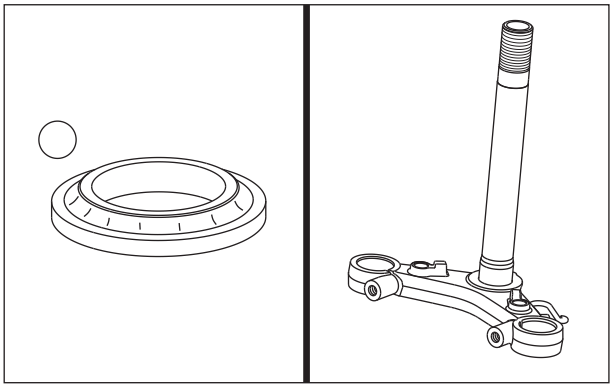


Fig. 6.74

REASSEMBLY

- Reassemble the lower bracket complete, leg assembly front fork LH & RH, handle bar assembly and wheel assembly front in the reverse order of disassembly while carrying out the following steps:

- Refer lower bracket complete exploded view (Fig. 6.75) for assembly details.

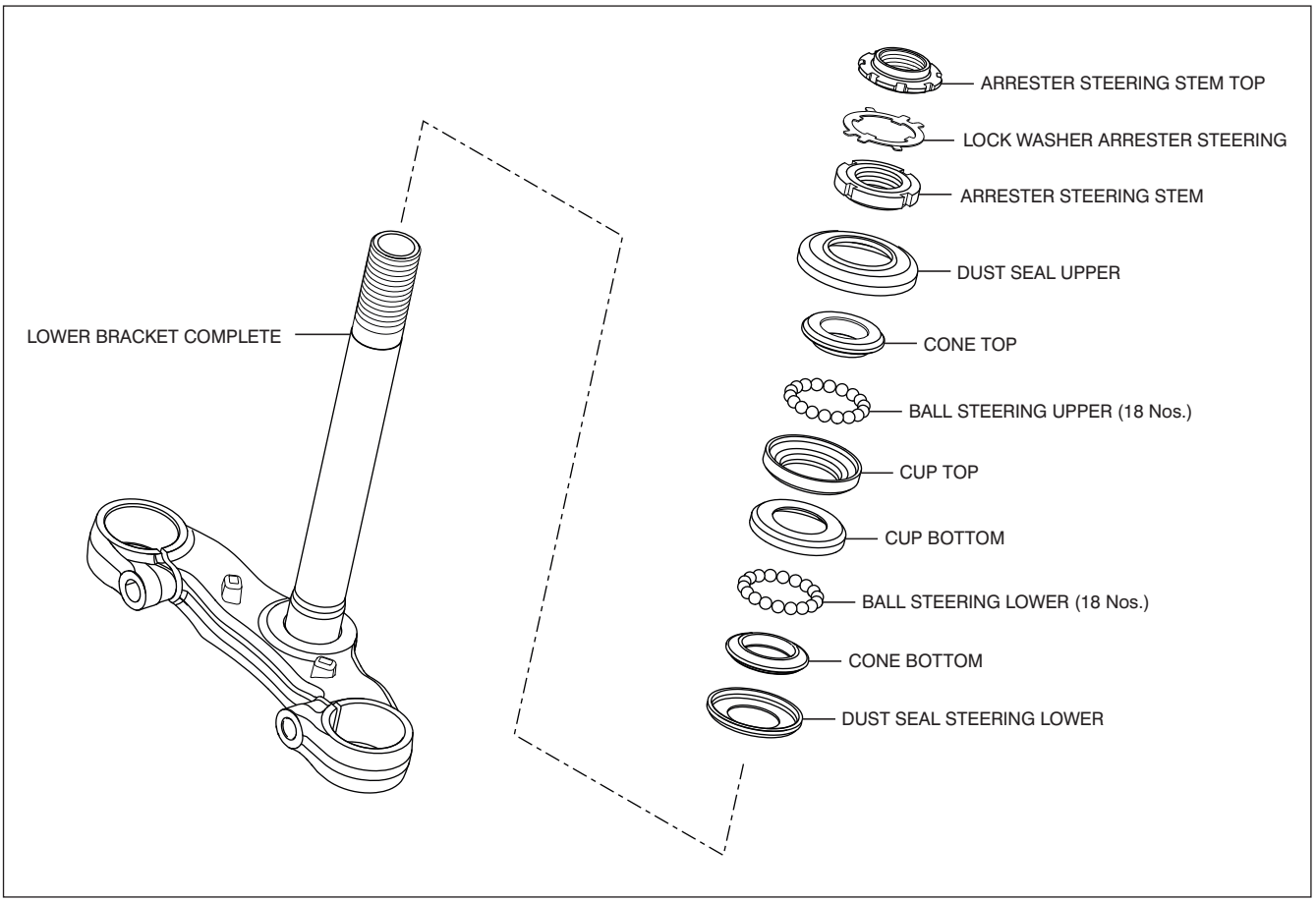


Fig. 6.75

Cup bottom and cup top

- Assemble the cup bottom and cup top by using a special tool. (Fig. 6.76)

NB31 004 0	Assembly tool steering cups

Note:
Always replace the cup, cone and races as a set.

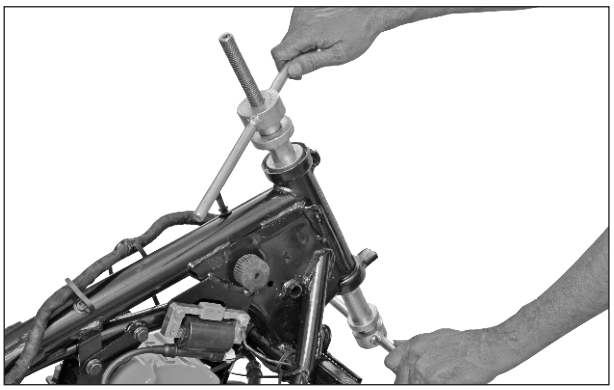


Fig. 6.76

Steering balls

- Apply grease to the cup top and cup bottom. (Fig. 6.77)

Bechem premium grade 3

- Install specified quantity of steering balls at cup top and cup bottom (refer page no. 6-25 for the specified quantity).

Cone bottom

- Install cone bottom to the lower bracket complete (steering stem) by using the special tool and apply grease. (Fig. 6.78)

N931 013 0	Tool cone bottom installer

- Reassemble the lower bracket complete along with cone top and dust seal upper in the reverse order of disassembly. Assemble and tighten the arrester steering stem to 30 ~ 40 Nm.

N931 014 0	Tool steering nut

- Loosen the arrester steering to 0 Nm (fully loosen) and re-tight it to 6 ~ 8 Nm.
- Turn the lower bracket complete to the right and left, five or six times for proper seating of steering ball (Fig. 6.79) and re-tight the arrester to 6 ~ 8 Nm torque again.
- Now, assemble the lock washer arrester steering and assemble the steering arrester top and tighten it till it touches lock washer.
- Now loosen steering arrester top and align the grooves till it matches with the next tab in the lock washer.
- Fold the lock washer tabs upside and match with the grooves in the arrester steering top.
- Assemble the upper bracket along with handle bar assembly. Finally tighten the locknut steering to the specified torque (60 ~ 100 Nm).

Warning:
Bottom steering adjuster must be tightened with the handle bar assembly removed condition only.

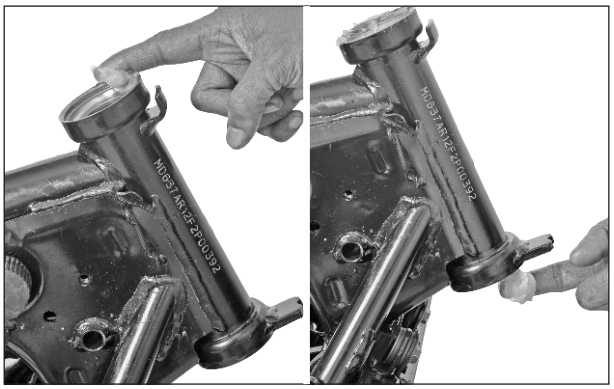


Fig. 6.77 A Fig. 6.77 B

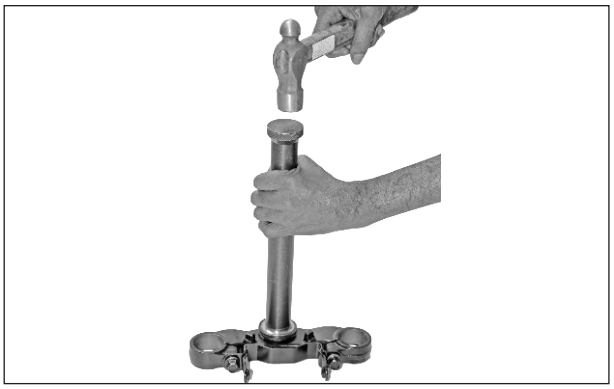


Fig. 6.78

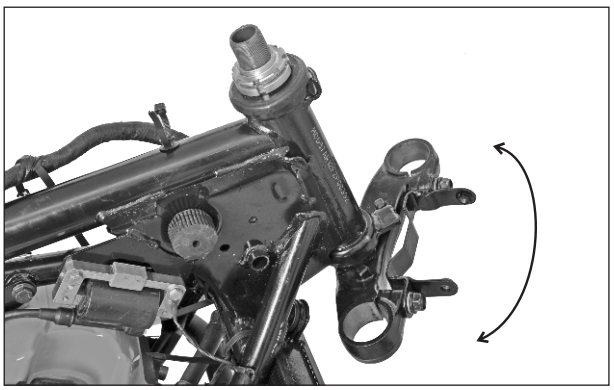


Fig. 6.79

Warning:
Do not use C-clamps for tightening the arrester steering because it leads to clearance between arrester system and upper bracket followed by steering shake / noise and durability complaint.

Steering should be adjusted correctly for smooth movement of handlebar and safe riding. Stiff steering prevents smooth movement of handlebar resulting in poor directional stability and too loose steering will cause vibration and damage to the steering races .

Note:
After adjustment, ensure the handlebar moves smoothly without any jerk or sticky. When slowly moved by hand it moves freely from center position to either left or right with its own weight.

WHEEL ASSEMBLY REAR - REMOVAL

- Remove the chain (refer chapter "Periodic maintenance" page no. 2-32 for chain removal procedure).
- Loosen the chain adjusting screw from chain adjuster complete LH and RH. (Fig. 6.80)

12 mm spanner

- Remove 'U' nut (M14x1.50) from the axle complete rear along with washer. (Fig. 6.81A)

22 mm spanner

Tightening torque	78 ± 18 Nm

- Pull out the axle complete rear by gently tapping at other end. (Fig. 6.81B)
- Dislocate the caliper assembly from the slot provided on swing arm by pulling it towards rear side. Take out the wheel assembly rear.
- Remove the sprocket drum assembly from the wheel along with spacer rear axle LH.

DISC REPLACEMENT

- Remove spacer rear axle R (A). (Fig. 6.82)

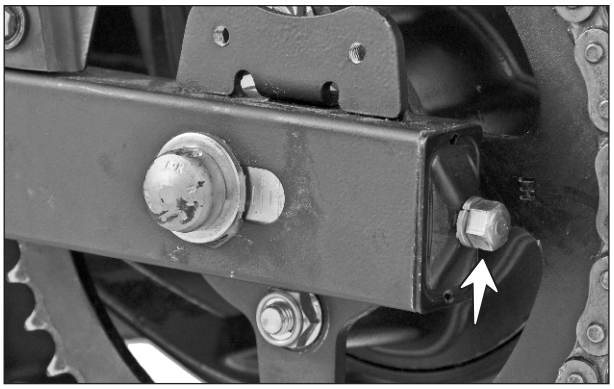


Fig. 6.80

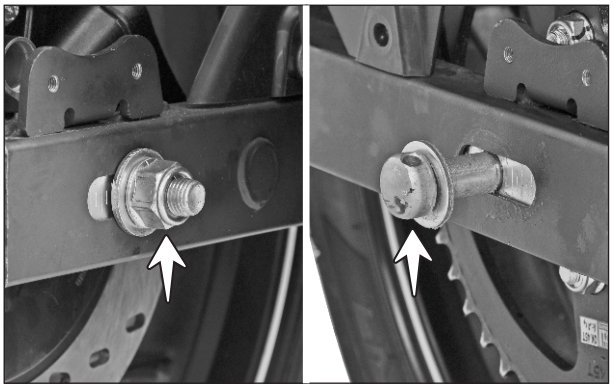


Fig. 6.81A Fig. 6.81B

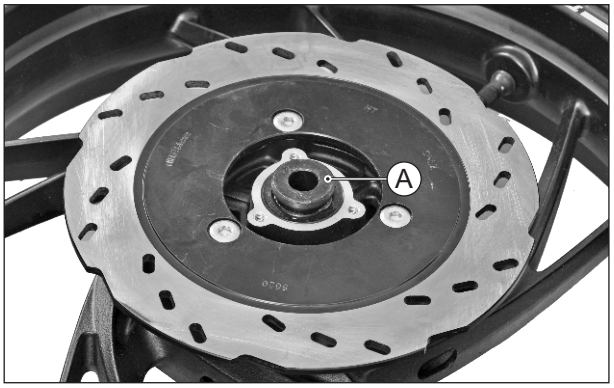


Fig. 6.82

- Remove the screw special (M8 - 3 nos.) from the disc plate mounting and take out disc plate from the alloy wheel rear. (Fig. 6.83)

6 mm allen key

Tightening torque	31 ± 3 Nm

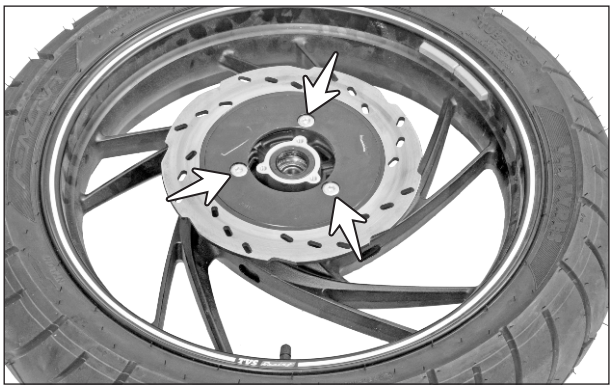


Fig. 6.83

Wheel bearing removal

Warning:
It is recommended to remove the bearings only in case of replacement.

Note:
Before heating the wheel assembly rear, it is recommended to remove the absorber rear wheel hub shock. (Fig. 6.84)

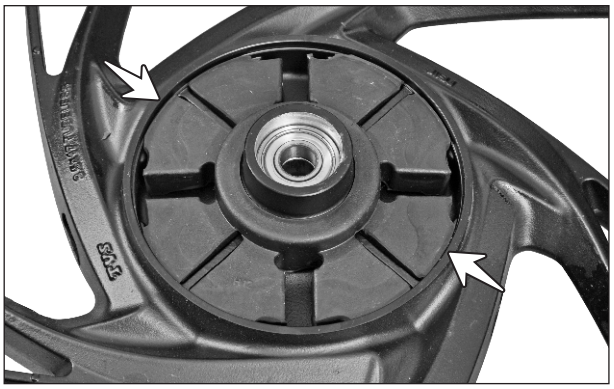


Fig. 6.84

- Remove the oil seal using special tool. (Fig. 6.85)

031 240 1	Universal oil seal remover

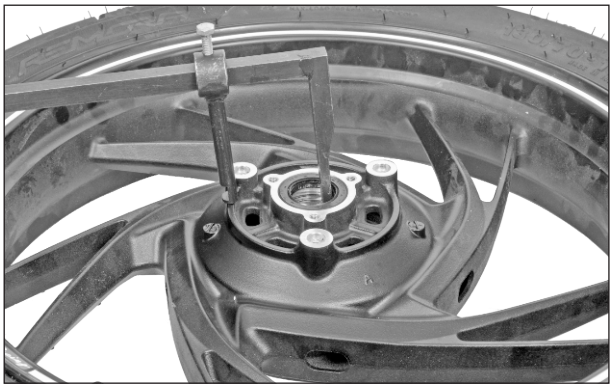


Fig. 6.85

- Place the wheel assembly rear (brake drum) on a hot plate and heat to approximately 125°C. (Fig. 6.86)

Hot plate

Fig. 6.86

- Draw out the bearing from the wheel assembly rear. (Fig. 6.87)

Drift

Nylon hammer

Fig. 6.87

SPROCKET DRUM ASSEMBLY - DISASSEMBLY

- Take out the spacer rear axle LH from the sprocket drum assembly. (Fig. 6.88)

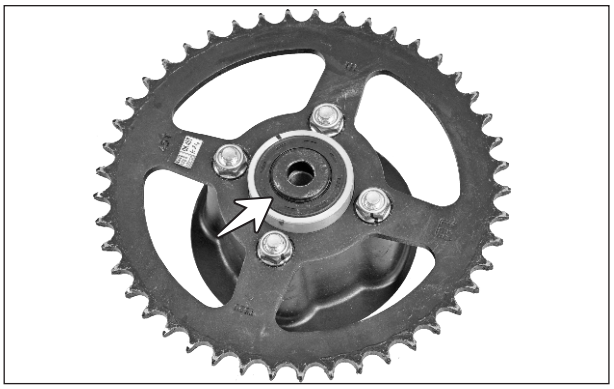


Fig. 6.88

- Remove the dust seal using special tool. (Fig. 6.89)

031 240 1	Universal oil seal remover

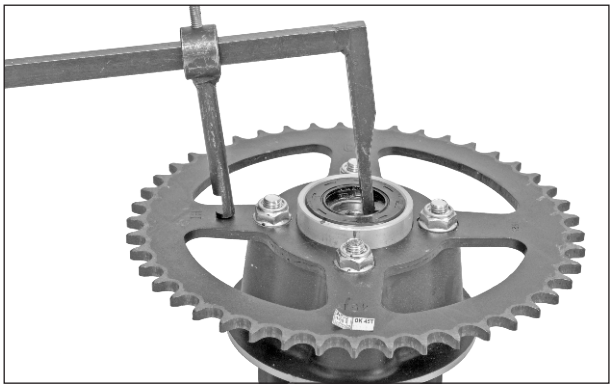


Fig. 6.89

- Remove the flanged 'U' nut (M10 - 4 nos.). (Fig. 6.90)

12 mm spanner

Tightening torque	48 ± 2 Nm

- Take out the sprocket rear and bolt rear sprocket (4 nos.).

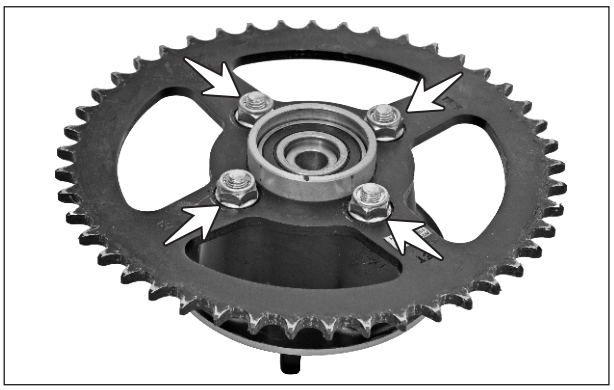


Fig. 6.90

- Heat the drum rear sprocket on a hot plate to approximately 125° C. (Fig. 6.91A)

Hot plate

- Draw out the ball bearing along with shaft rear sprocket from drum rear sprocket. (Fig. 6.91B)

Drift

Nylon hammer

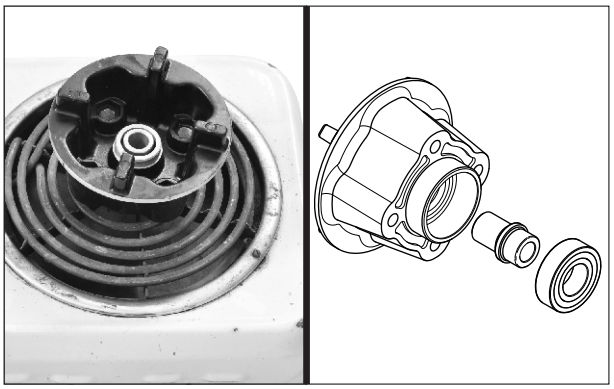


Fig. 6.91A Fig. 6.91B

INSPECTION

Before inspection, clean all the components with kerosene and lubricate the bearings immediately after cleaning.

- Inspect wheel bearings, axle complete rear and alloy wheel rear (refer page no. 6-2 for checking procedure).

- Clean and inspect the drive chain as explained in chapter "Periodic maintenance" page 2-32.

Sprocket rear

- Inspect sprocket rear teeth for wear. If they are worn-out as illustrated (Fig. 6.92), replace the sprocket with a new one.

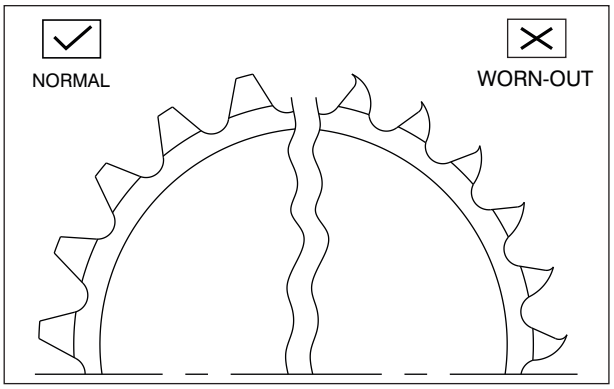


Fig. 6.92

Absorber rear wheel hub shock

- Inspect the absorber rear wheel hub shock for wear, deformation or damage. Replace with new one if required. (Fig. 6.93)

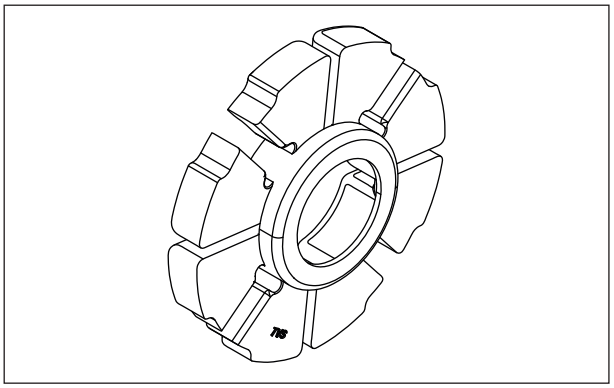


Fig. 6.93

Tyre inflation pressure

- Tyre inflation pressure affects the tyre life to a great extent. So it is necessary to maintain the proper tyre pressure. (Fig. 6.94)

Tyre pressure gauge

Tyre pressure	
Solo riding	2.00 kg/cm^2 (28 PSI)
Dual riding	2.25 kg/cm^2 (32 PSI)

Note:
Tyre pressure should be checked when the tyre is cold. Low tyre pressure consumes more fuel.

Fig. 6.94

REASSEMBLY

- Reassemble and remount the wheel assembly rear in the reverse order of disassembly. Refer wheel assembly exploded view (Fig. 6.95) for assembly details.
- Before assembling rear wheel assembly, lubricate the axle rear and bearings.

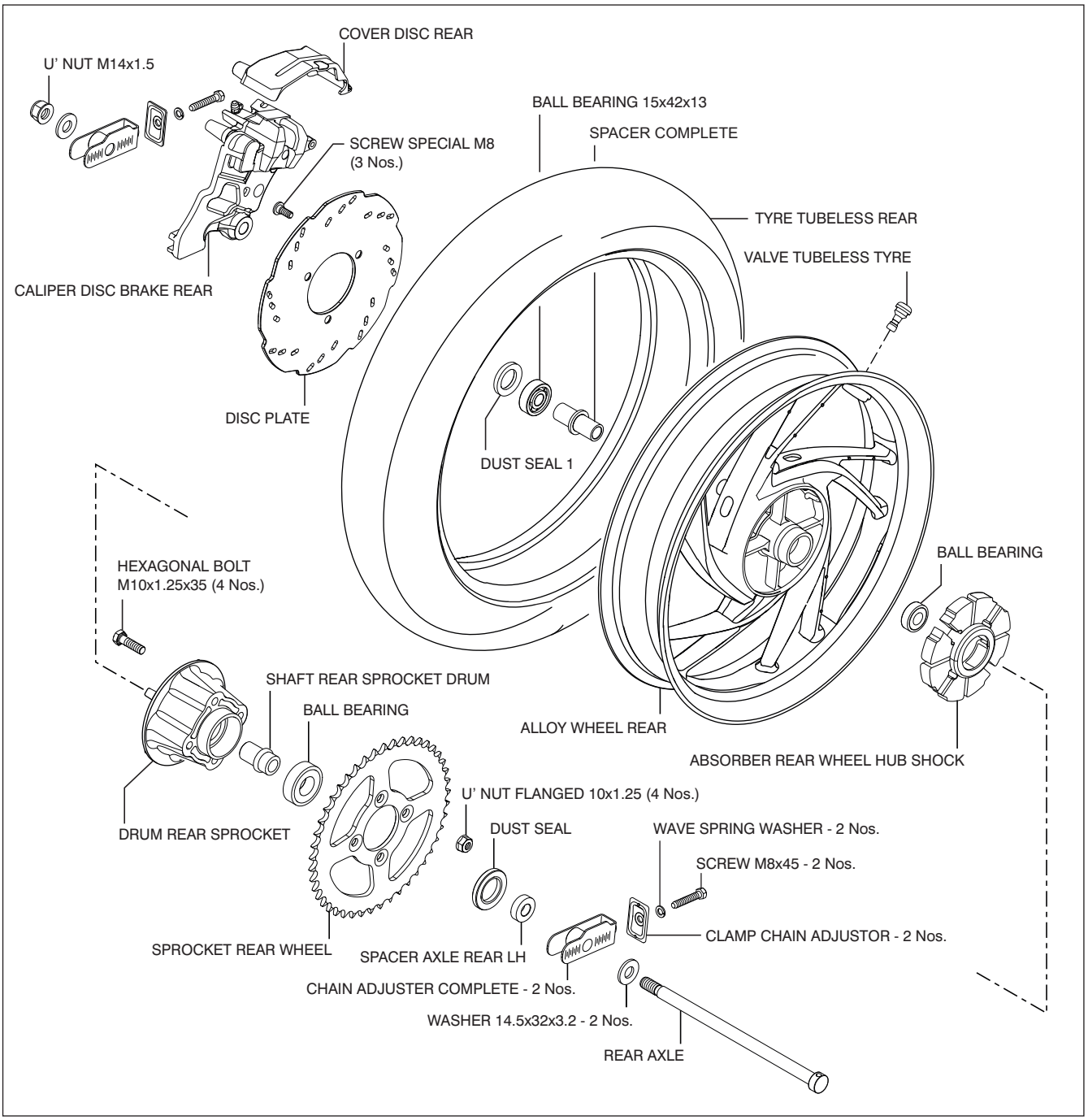


Fig. 6.95

- Make sure that the slot (A) in the bracket complete caliper assembly fits over the stopper (B) on the swing arm assembly. (Fig. 6.96)

Note:
While reassembling the disc plate apply specified thread lock to the disc plate mounting bolts.

After remounting the wheel assembly rear, readjust the chain slackness (refer chapter "Periodic maintenance" page no. 2-32).

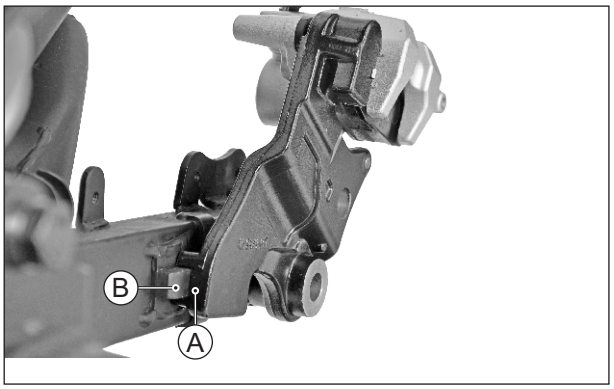


Fig. 6.96

TUBELESS TYRE

PUNCTURE REPAIR

Tubeless tyre provides the benefit of easy repairing the punctured tyre without removing the wheel assembly. Hence repairing can be performed with the vehicle stand still condition and repairing procedure is as follows:

- Keep the bike firmly on center stand.
- Identify the punctured location and make a visible mark. (Fig. 6.97A)
- Pull out nail or puncture causing object from the tyre using a combination plier. (Fig. 6.97B)

Combination plier

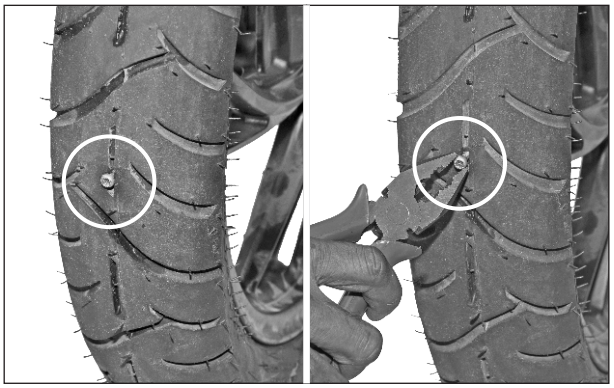


Fig. 6.97A Fig. 6.97B

- Insert the reaming tool exactly into the punctured point and carefully ream the punctured hole. (Fig. 6.98)

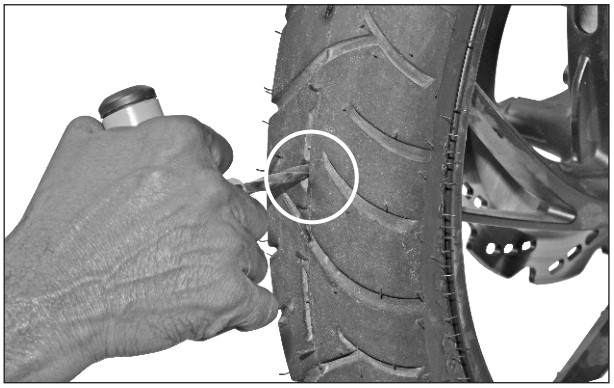


Fig. 6.98

- Take a cold mending strip and insert it between the strip holding jaws of strip inserting tool. (Fig. 6.99)

Note:
After inserting the strip, ensure that strip is held at the middle point of strip length. (Fig. 6.99)

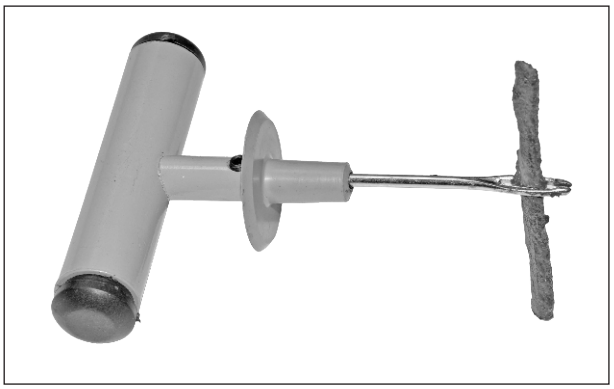


Fig. 6.99

- Insert the strip inserting tool along with strip into the reamed hole till the strip goes inside at least more than half of its folded length. (Fig. 6.100)

- Leaving the strip in that position, gently pull out the strip inserting tool.

Note:
While pulling out the strip inserting tool, ensure that the strip does not come out along with the tool.

Fig. 6.100

- Take out the tool completely and cut remaining strip leaving 5 mm from surface of tyre. (Fig. 6.101)

- Fill air to the specified limit and checkout for any leakage.

Caution:
Ensure, the wheel assembly is checked for proper balancing after every tyre puncture repair or tyre replacement for better vehicle stability (refer chapter "Periodic maintenance" page no. 2-48 for detailed procedure of wheel balancing).

Fig. 6.101

REPLACEMENT OF VALVE TUBELESS TYRE

Valve tubeless tyre in RTR 200 alloy wheel can be replaced by following below given procedure:

- Remove wheel assembly from the vehicle (refer page no. 6-1 & 6-28 for wheel assembly removal procedure)

- Remove the tyre from the alloy wheel.

Caution:
Use of normal tyre levers for removal of tubeless tyre by any puncture repair shop may cause severe damage to the tyre seating area of alloy wheel, which leads to improper sealing and loss of air. Hence it is recommended that removal of tubeless tyre is performed by using a tyre removal machine.

- Keep the alloy wheel on a level surface.
- Applying gentle load on valve tail, cut the valve tubeless tyre at the alloy wheel neck area and take out separated piece . (Fig. 6.102A)

Hand knife

- Push out remaining part of valve from the alloy wheel using a suitable tool. (Fig. 6.102B)

Fig. 6.102A

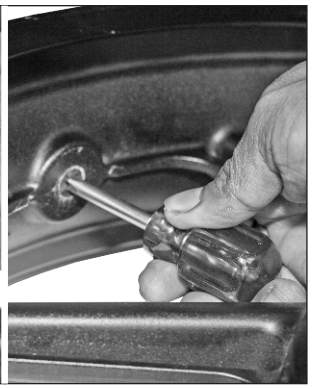


Fig. 6.102B

- Locate and seat new valve tubeless tyre to the valve mounting hole from outer periphery of alloy wheel. (Fig. 6.103A)
- Using a suitable mandrel, gently tap the valve head and ensure that valve is seated properly. (Fig.6.103B)
- Reassemble parts in reverse order of disassembly.

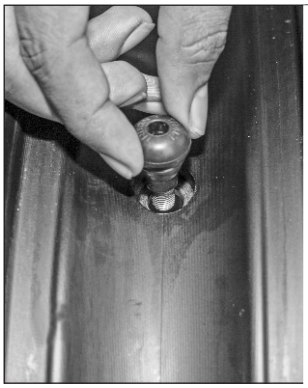


Fig. 6.103A

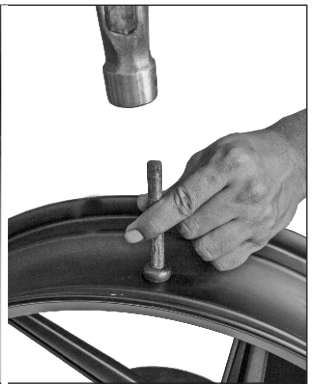


Fig. 6.103B

Note:
While reassembling the tyre, ensure that the arrow mark (A) on the tyre faces the direction of wheel rotation. (Fig. 6.104)

It is recommended to apply a little amount of soap solution over the alloy wheel at the tyre seating area for ease of tyre assembly.

Caution:
Ensure, the wheel assembly is checked for proper balancing after every tyre puncture repair or tyre replacement for better vehicle stability (refer chapter "Periodic maintenance" page no. 2-48 for detailed procedure of wheel balancing).

Fig. 6.104

DISC BRAKE SYSTEM REAR

BRAKE PADS

- Remove wheel assy rear along with the disc plate (refer page no. 6-28 for wheel assy rear removal procedure).
- Take out the bracket complete along with the caliper assembly and take out the caliper cover.
- Remove the plug pin from the caliper housing. (Fig. 6.105)

Flat head screw driver	
Tightening torque	2.5 ± 0.5 Nm

- Remove the pin hanger. (Fig.6.106)

5 mm spanner	
Tightening torque	17.5 ± 2.5 Nm

- Take out the pad complete inner and pad complete outer. (Fig. 6.107)

Fig. 6.105

Fig. 6.106

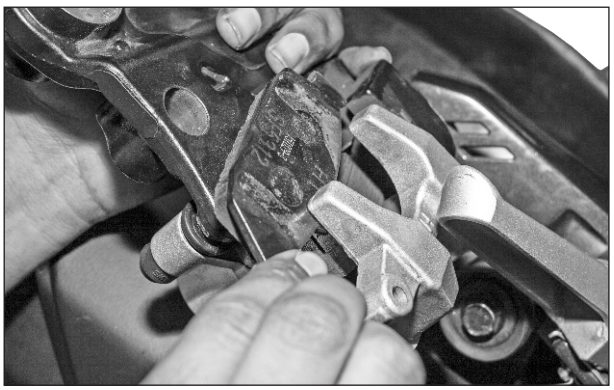


Fig. 6.107

Inspection of brake pads

- Observe the wear limit line marked on the pad and check the wear condition of brake pads. (Fig. 6.108) When the wear exceeds the limit line, replace the pad with new ones.

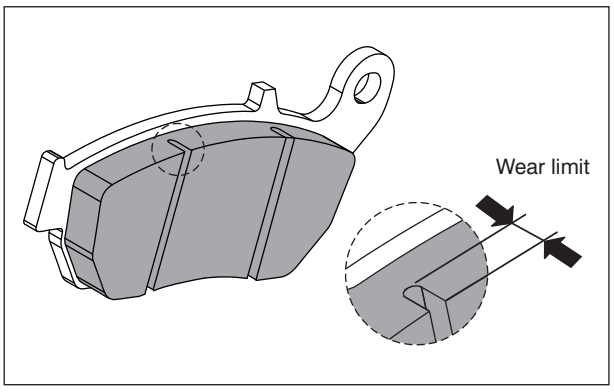


Fig. 6.108

BRAKE FLUID

Inspection of brake fluid level

- Remove the cover frame R (refer chapter "Periodic maintenance" page 2-4 for removal procedure). Place the vehicle in center stand. Inspect the brake fluid level in thereservoir.
- The brake fluid level in the reservoir should be at the maximum mark provided in the reservoir. (Fig. 6.109)
- If the level is below lower level mark, replenish the level up to the maximum level.
- Remove the cap and take out the diaphragm and fill fresh brake fluid of recommended grade. (Fig. 6.110)

Brake fluid	TVS Griling DOT3 / DOT4

Fig. 6.109

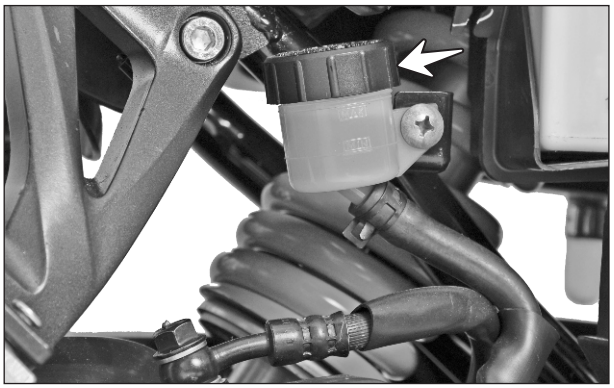


Fig. 6.110

Air bleeding

- If the rear brake pedal travel becomes more or if any soft or spongy feel is observed in the lever, you must carry out the air bleeding from the brake system.

Brake fluid replacement

- Boiling point of brake fluid falls considerably with absorption of moisture which may take place during a long period of use. Therefore, it is recommended to replace the old brake fluid with new periodically.

Replace brake fluid every 21000 km

- Refer page 6-6, 6-7 & 6-8 for brake fluid handling, air bleeding from the brake system and brake fluid replacement procedure.

HOSE COMPLETE BRAKE REAR

- Inspect the hose complete brake for any crack or leakage. If leakages found, replace the hose as described below:
- Flush the brake fluid out by opening the bleeder at caliper assembly with a tube on the bleeder head to a clean container (refer brake bleeding).

- Remove the banjo bolt (2 nos.) along with gaskets (2 nos. on each side) from both the ends of the hose complete brake. (Fig. 6.111)

12 mm spanner

Tightening torque	30 ± 2 Nm

Note:
Ensure the reassembly of new gaskets while reconnecting the hose without fail to avoid leakage.

- Dislocate the hose complete brake rear from the clamps of swing arm assembly and care fully take out.

Caution:
Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The fluid reacts chemically with paint, plastics, rubber materials etc., and will damage them severely.

- Reassemble the new brake hose in the reverse order of dismantling.

- Assemble and tighten the banjo bolts at both the ends of the hose along with new gaskets.

Caution:
Assemble only new gaskets with the banjo bolts during reassembly. Do not use old ones.

- Bleed the air from the brake circuit after reassembly of brake hose (refer air bleeding procedure on page no. 6-7).

Replace brake hose every 3 year

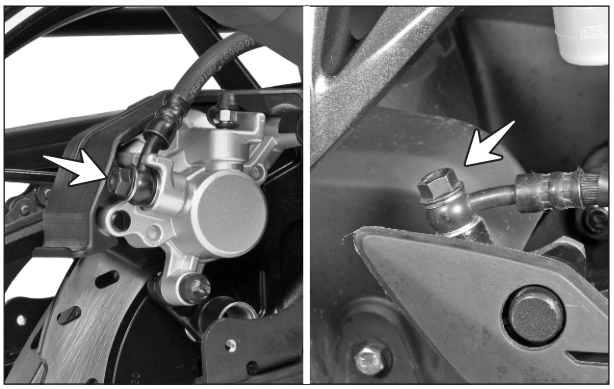


Fig. 6.111

CALIPER ASSEMBLY - REMOVAL AND DISASSEMBLY

- Bleed out brake fluid from the brake system.

- Remove the banjo bolt and take out the gaskets. (Fig. 6.112)

12 mm spanner

Tightening torque	30 ± 2 Nm

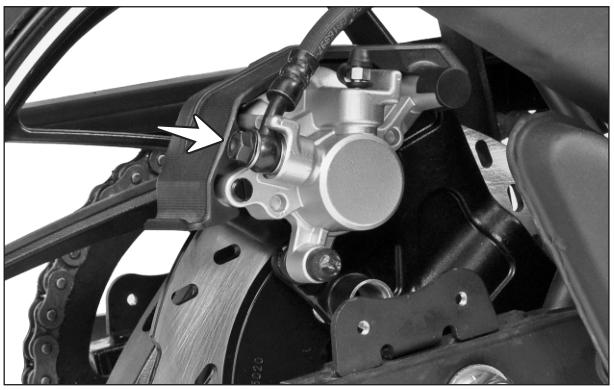


Fig. 6.112

- Remove the wheel assembly rear along with the disc plate (refer page no. 6-28 for wheel assy rear removal).
- Take out the bracket complete along with the caliper assembly.
- Remove the plug pin from the caliper housing. (Fig. 6.113)

Flat head screw driver	
Tightening torque	2.5 ± 0.5 Nm

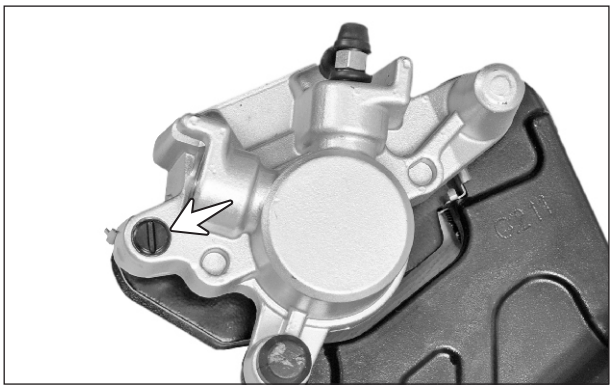


Fig. 6.113

- Remove the pin hanger. (Fig.6.114)

5 mm spanner	
Tightening torque	17.5 ± 2.5 Nm

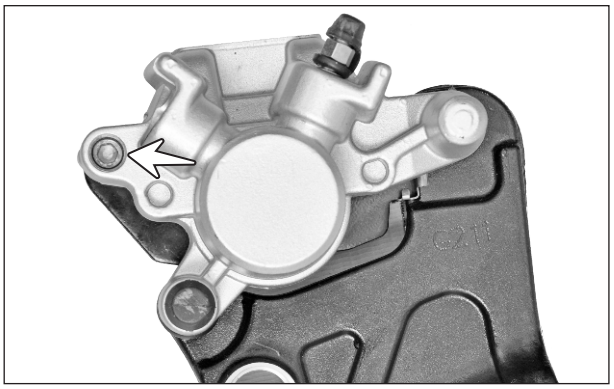


Fig. 6.114

- Take out the pad complete inner and pad complete outer. (Fig. 6.115)

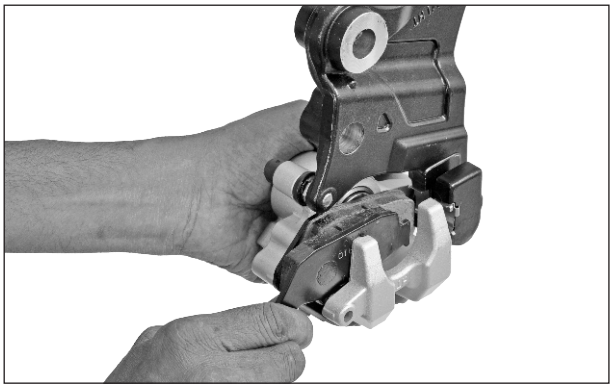


Fig. 6.115

- Remove the spring pad from the caliper housing. (Fig. 6.116)

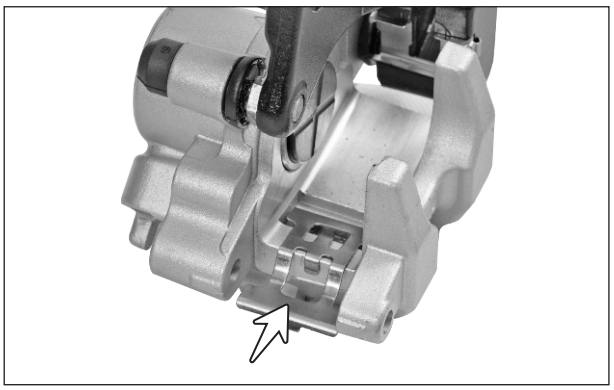


Fig. 6.116

- Remove the bracket complete rear caliper by sliding out after dislocating boot-B and bush boot pin from the pin grooves. (Fig. 6.117)

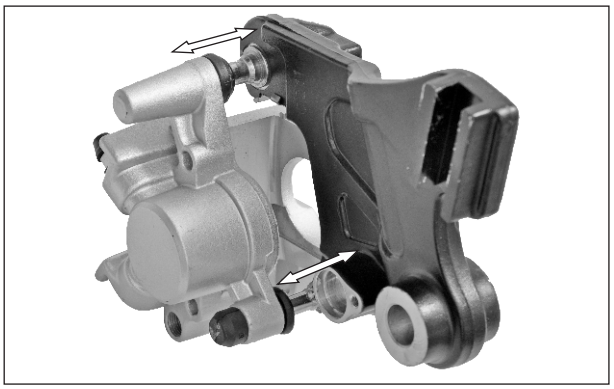


Fig. 6.117

- Carefully pull out the cap piston (A) and boots (B)from the caliper assembly housing. (Fig. 6.118)

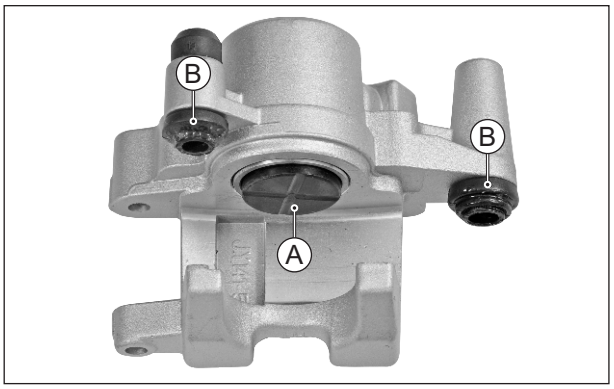


Fig. 6.118

- Insert a spacer between piston caliper and the caliper housing (at pad position) and then apply compressed air through the inlet port of the caliper to slide pistons out. (Fig. 6.119)

Caution:
Be careful while applying compressed air as it will shoot the piston forcefully. Do not use high pressure air to prevent damage to the piston.

Do not use nose plier to pull out the piston as it may cause scratches.

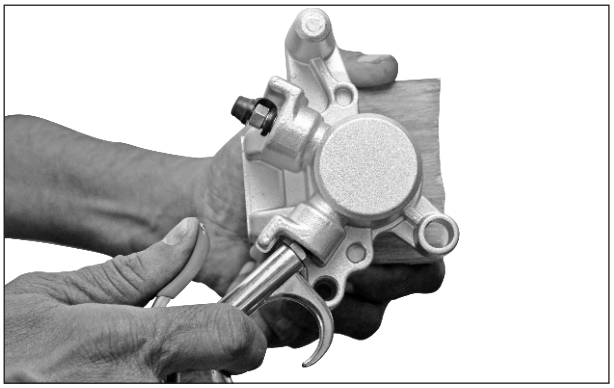


Fig. 6.119

- Remove the dust seals with a bent plastic / brass tool to avoid scratches on the caliper bore. (Fig. 6.120)

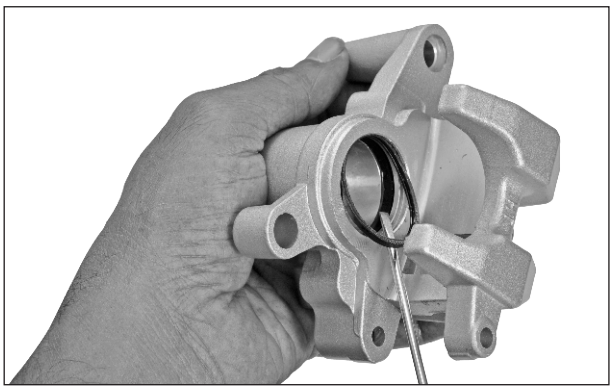


Fig. 6.120

- Unplug cap bleeder and remove bleeder screw. (Fig. 6.121)

8 mm spanner	
Tightening torque	5.5 ± 1.5 Nm

- Clean the parts thoroughly with fresh brake fluid.

Caution:
Never use kerosene, petrol or other solvents for cleaning the brake system. Otherwise rubber parts will be damaged. Do not wash the pads and also take care that the brake fluid is not splashed on the pads.

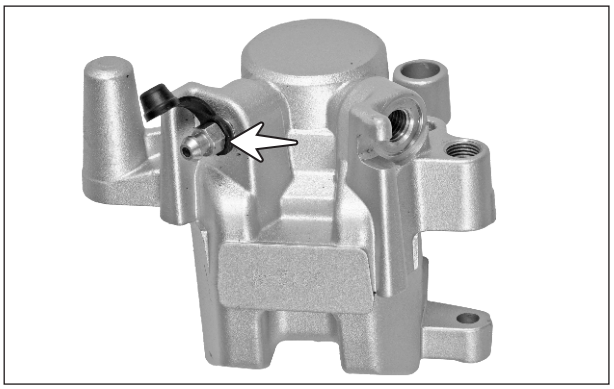


Fig. 6.121

Caliper assembly inspection

Inspect the following parts:

- Pin hangers for any bend.
- Bracket complete front for loose lugs.
- Piston and caliper bore for any scratches.
- Piston and dust seals for any damage.

- After completion of above inspection, replace the defective parts as required.

Caliper assembly - reassembly

- Insert the dust seals in the caliper housing grooves and ensure perfect seating without any twist of the seals (refer exploded view on page no. 6-45 for details).

- Smear the piston with fresh TVS Girling DOT 3 or DOT 4 brake fluid and slowly insert into the bore of caliper body without tapering. Ensure the piston is sliding easily into the bore.

- Assemble the spring pad in the caliper housing. Assemble boot-B and bush boot pin in the caliper housing.

- Apply little grease to the pin bolts of bracket complete caliper and assemble the bracket by ensuring proper seating of both the boots in their respective grooves.

- Assemble the pad inner and pad outer.

- Assemble the pin hangers by locating it properly in the holes of the pad inner and outer.
- Fix the plug pins, bleeder screw and cap bleeder.
- Remount wheel assembly rear along with spacer RH.
- Remount caliper assembly rear by locating the slot provided on bracket comp caliper with the stopper provided on swing arm complete. Assemble the axle and tighten the 'U' nut of rear axle.
- Remount brake hose along with the gaskets and bleed the system by referring the procedure explained on page no. 6-7.

DISC PLATE - SERVICING

Inspection (with disc mounted on wheels)

- Inspect the disc plate as explained in front disc plate servicing (refer page 6-12 for disc plate inspection).

Disc plate replacement

- Replace the disc plate if found to be defective (refer page no. 6-28 for removal procedure).

MASTER CYLINDER REAR (REAR DISC BRAKE) - REMOVAL AND DISASSEMBLY

- Remove the cover frame RH (refer chapter "Periodic maintenance" page no 2-4 for cover frame R removal procedure).
- Bleed the brake system completely.
- Remove the banjo bolt along with gasket (2 nos. on each side) from the master cylinder rear. (Fig. 6.122)

12 mm spanner	
Tightening torque	30 ± 2 Nm

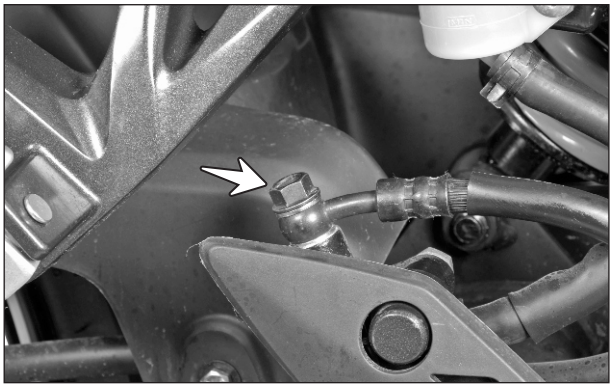


Fig. 6.112

- Remove the split pin and take out cotter pin from the rear master cylinder. (Fig. 6.123)

Nose plier

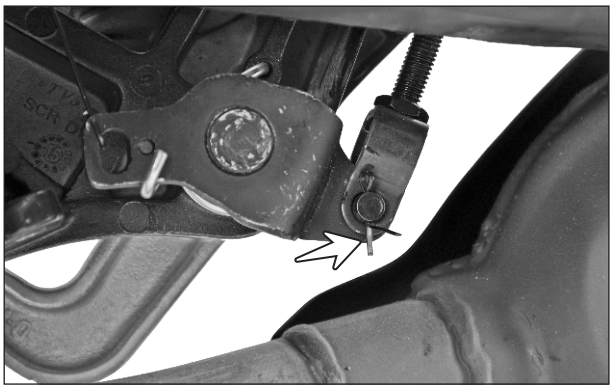


Fig. 6.123

- Remove the clip hose (A) and take out hose oil (B). (Fig. 6. 124)

Nose plier

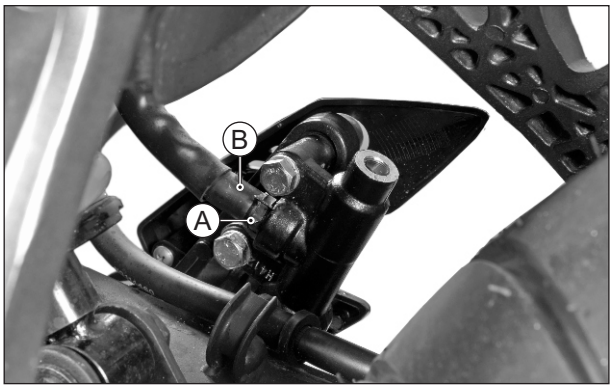


Fig. 6.124

- Remove the hexagonal screws (M6x40 - 2 nos.) along with punched washers. (Fig. 6.125)

13 mm spanner	
Tightening torque	30 ± 2 Nm

- Take out master cylinder assembly from the pillion footrest assembly RH.

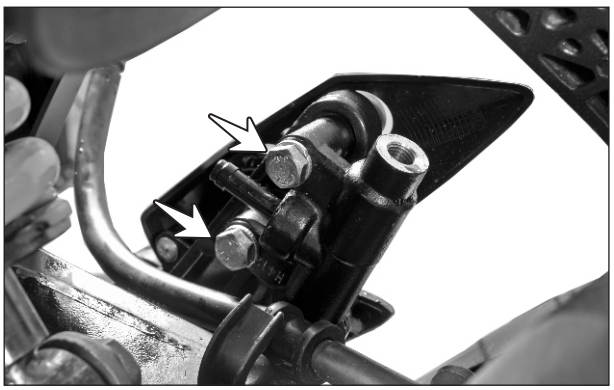


Fig. 6.125

- By firmly holding master cylinder housing, remove the circlip (A) by using circlip plier. (Fig. 6.126)

Circlip plier

- Take out the insert (B) from the master cylinder assembly. (Fig. 6.126)

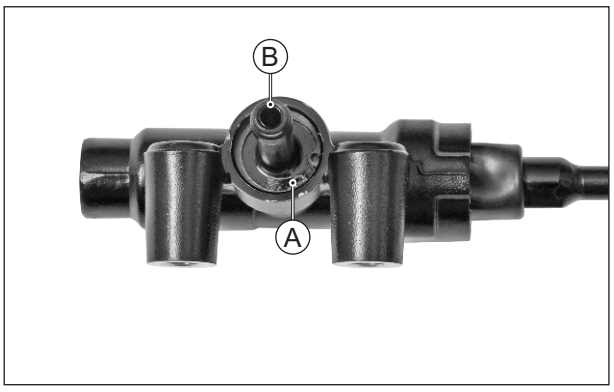


Fig. 6.126

- Take out the 'O' ring from the master cylinder assembly. (Fig. 6.127)

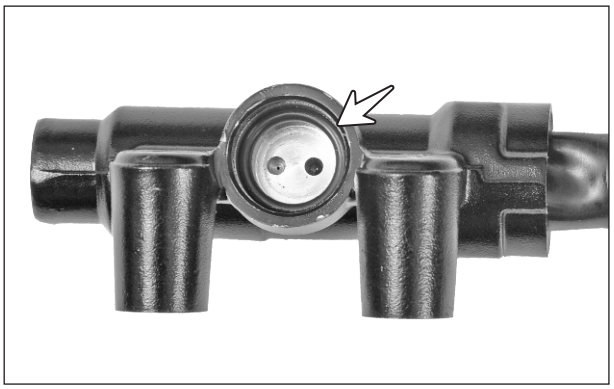


Fig. 6.127

- Carefully lift the boot from the cylinder by using a blunt tool. (Fig. 6.128A)

Note:
While removing the boot care should be taken not to damage it.

- While firmly holding the master cylinder by hand, slightly press the push rod and remove circlip by using a circlip plier without damaging the cylinder. (Fig. 6.128B)

Circlip plier

Fig. 6.128A

Fig. 6.128B

- Slowly pull out the piston along with P - cup, S - cup and spring. (Fig. 6.129)

- Clean the system thoroughly using fresh brake fluid.

Caution:
Never use kerosene, petrol or other solvents for cleaning the brake system. Otherwise rubber parts get damaged.

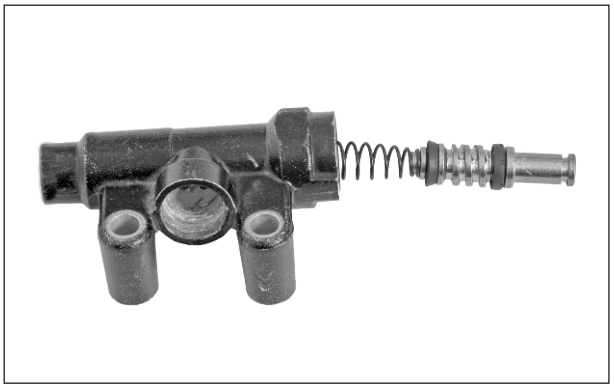


Fig. 6.129

INSPECTION

Inspect the following parts:

- Master cylinder for any scratches or other damage.
- Piston and cup surface for scratches or other damage.
- Piston boot and other components for wear and damage.
- Master cylinder recuperation and feed port for any blockage, if so clear the blockage using compressed air.

- After completion of above inspection, replace defective parts as required.

REASSEMBLY

- Reassemble master cylinder in the reverse order of dismantling. Refer exploded view for assembly details. (Fig. 6.130)

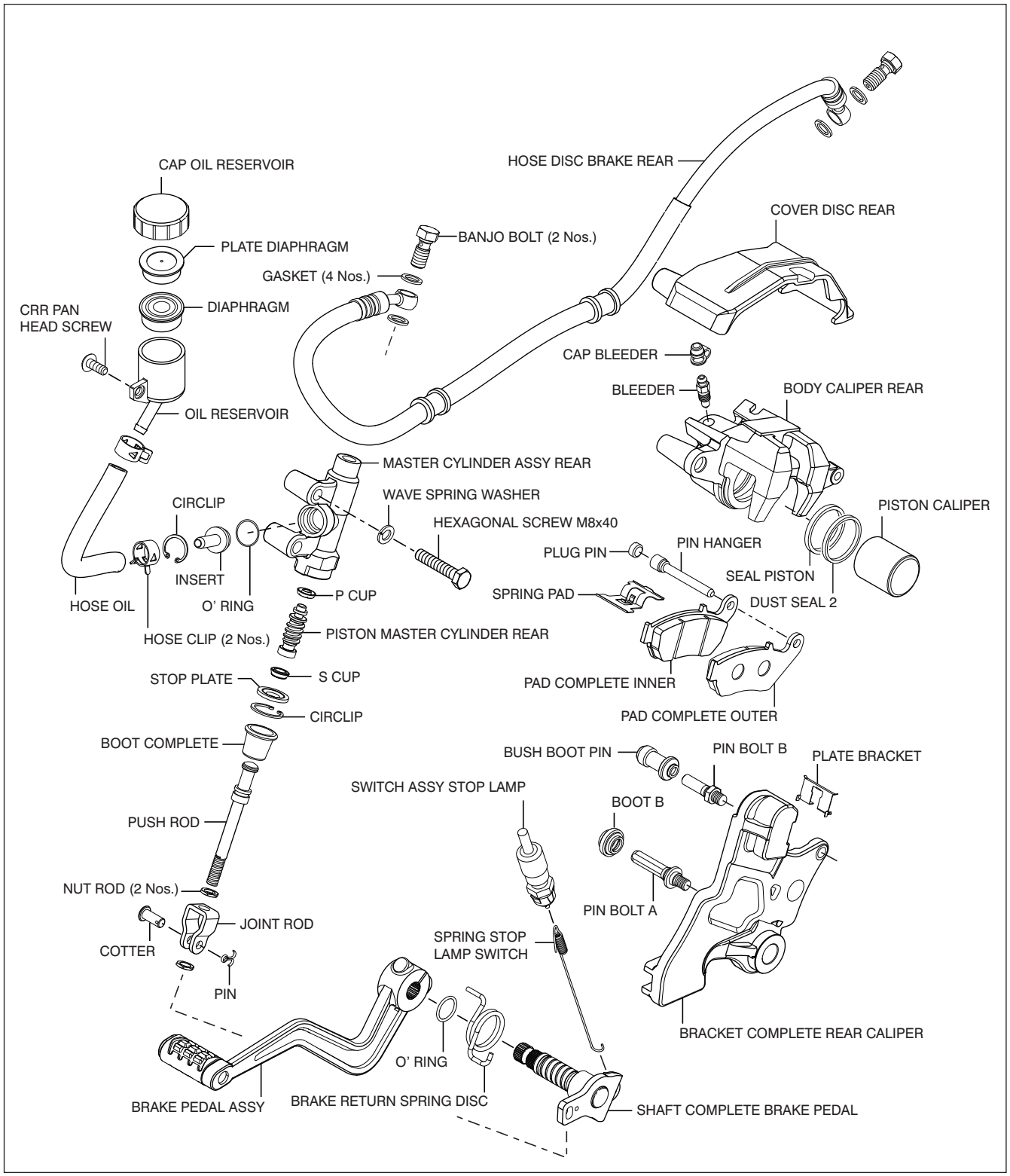


Fig. 6.130

Caution:
Apply brake fluid to the cylinder bore and all internal parts before inserting the piston into the bore.

- Fix the hose complete brake rear to the master cylinder outlet port along with the banjo bolt and new gaskets.
- Fill the reservoir with DOT3 or DOT4 brake fluid upto the level 'MAXIMUM' marked on the reservoir.
- Fix the reservoir cap along with plate diaphragm and diaphragm.
- Bleed the system thoroughly by referring the bleeding procedure on page no. 6-7.
- Once again inspect and if required top-up the brake fluid and tighten reservoir mounting screw.

Replace following parts at every 21,000 km.

- Piston along with P-cup, S-cup, spring and boot assembly.
- Diaphragm plate and diaphragm.
- Caliper seal piston and dust seal-2.

REAR SHOCK ABSORBER - REMOVAL

- Remove the rear wheel assembly as explained in page no. 6-28.
- Dislocate the starter relays from the air filter assembly. (Fig. 6.131)
- Loosen the clamp tube outlet screw and dislocate the tube outlet from the throttle body assembly. (Fig. 6.132)

Philips head screw driver

- Remove hose clip (A) from hose engine breather and pull out the hose from air filter cleaner assembly. (Fig. 6.132)

Nose plier

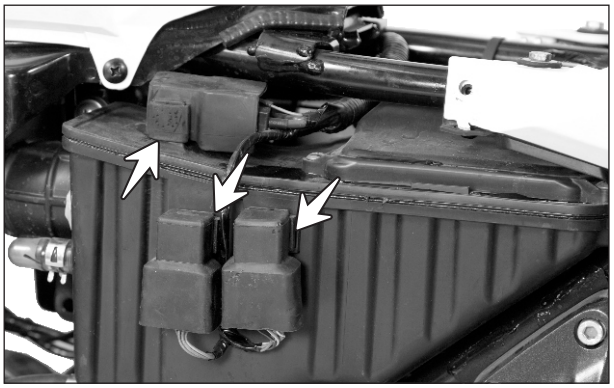


Fig. 6.131

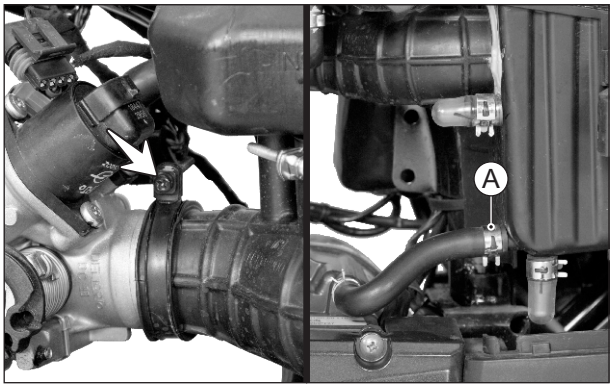


Fig. 6.132

- Remove the CRR pan head screw (M6x16 - 2 nos.) along with the punched washers and take out the air cleaner assembly. (Fig. 6.133)

Philips head screw driver	
Tightening torque	5 ± 1 Nm

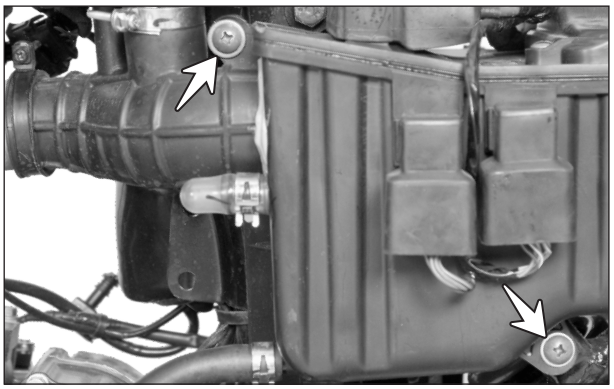


Fig. 6.133

- Remove the hexagonal bolts (M6x20 - 4 nos.) along with the washers from the chain guard assembly and gently dislocate the chain guard. (Fig. 6.134 & 6.135)

10 mm spanner	
Tightening torque	8 ± 2 Nm

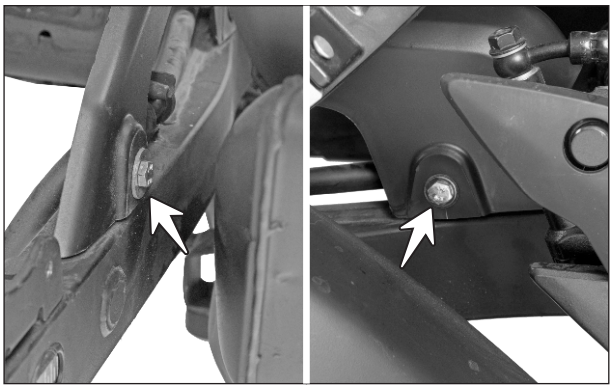


Fig. 6.134

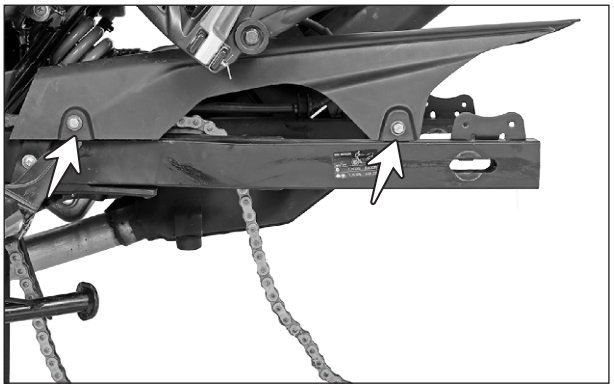


Fig. 6.135

- Remove the hexagonal flange bolt (M12x52) from the shockabsorber mounting top. (Fig. 6.136)

15 mm spanner	
Tightening torque	60 ± 4 Nm

Fig. 6.136

- Remove the hexagonal flange bolt (M12x52) from the bottom mounting of shockabsorber rear shock absorber. (Fig. 6.137)
- Dislocate and take out the rear shock absorber.

15 mm spanner	
Tightening torque	60 ± 4 Nm

- Reassemble the rear shock absorber and other parts in the reverse order of removal.

Fig. 6.137

SWING ARM COMPLETE

REMOVAL

- Remove the rear wheel assembly along with the disc plate and dislocate the caliper assembly rear. Refer page no. 6-28.
- Remove the CRR pan head screw from the reservoir mounting and take out the reservoir. (Fig. 6.138)

Phillips head screw driver	
Tightening torque	3 ± 1 Nm

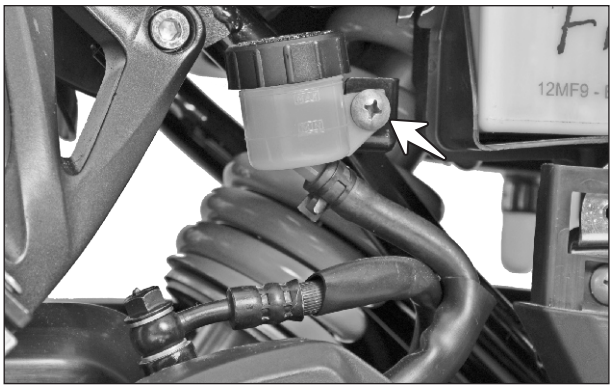


Fig. 6.138

- Remove CRR pan head screw from the rider foot rest assembly RH and dislocate the rider foot rest assembly RH. (Fig. 6.139)

Phillips head screw driver	
Tightening torque	3 ± 1 Nm

Fig. 6.139

- Loosen the shock absorber rear top mounting flange hexagonal bolt (M12x52). (Fig. 6.140)

15 mm spanner	
Tightening torque	60 ± 4 Nm

Fig. 6.140

- Remove hexagonal flange bolt (M12x52 - 1 no.) of shockabsorber rear lower mounting from swing arm complete. (Fig. 6.141)

15 mm spanner	
Tightening torque	60 ± 4 Nm

Fig. 6.141

- Remove 'U' nut (M12) rear swing arm pivot mounting. (Fig. 6.142)

17 mm spanner	
Tightening torque	40 ± 4 Nm

- Take out nut and the punched washer.

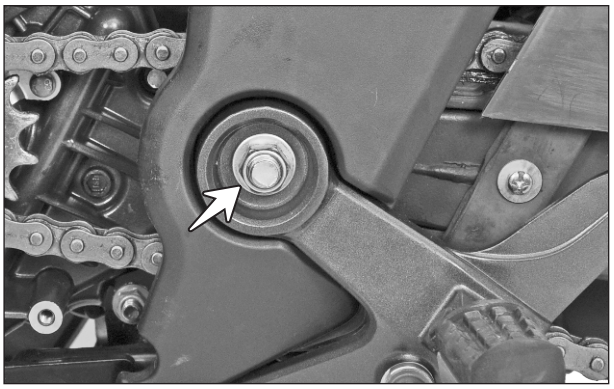


Fig. 6.142

- Draw out the shaft complete swing arm along with punched washer by gently tapping at the other side. (Fig. 6.143)

Nylon hammer

- Dislocate the brake hose from the swing arm complete.
- Take out swing arm complete from the frame assembly.

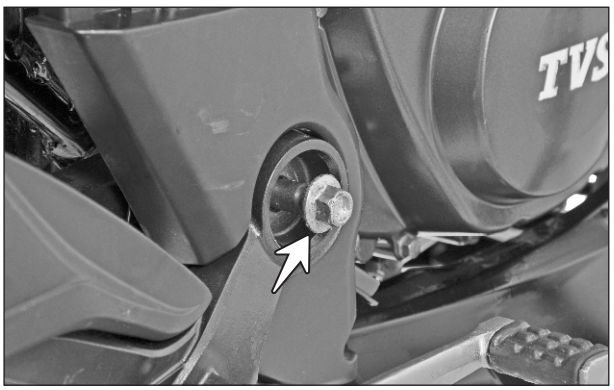


Fig. 6.143

- Remove CRR pan head screw (M6x16 - 1 no.) (A) along with the punched washer and take out buffer chain (B) from the swing arm assembly. (Fig . 6.144)
- Draw out both the bush swinging arm (Fig. 6.144) and check the needle bearing for any damage or abnormality. If found any replace the needle bearing as set. Follow the below procedure described below:

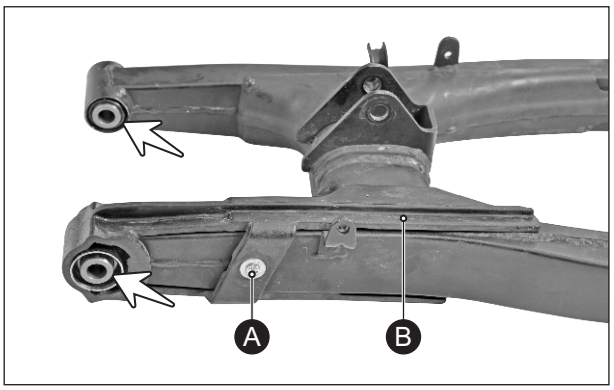


Fig. 6.144

- Remove the dust seal (2 nos.) from swing arm assembly. (Fig. 6.145)

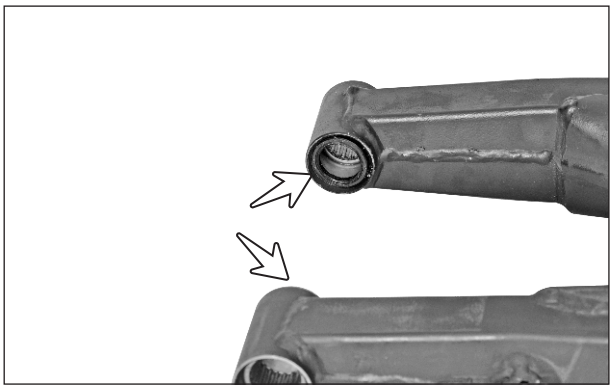


Fig. 6.145

- Using the special tool remove the needle bearing (2 nos.) from the swing arm assembly. (Fig. 6.146)

N931 015 0	Tool swing arm service

Note:
Swing arm needle bearing should be removed only in case of replacement.

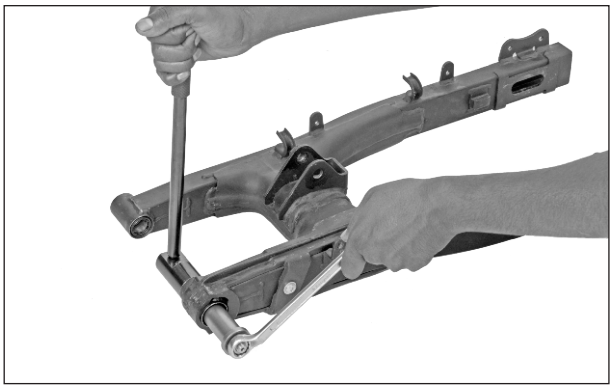


Fig. 6.146

- Reassemble the needle bearing using the special tool. (Fig. 6.147)

N931 015 0	Tool swing arm service

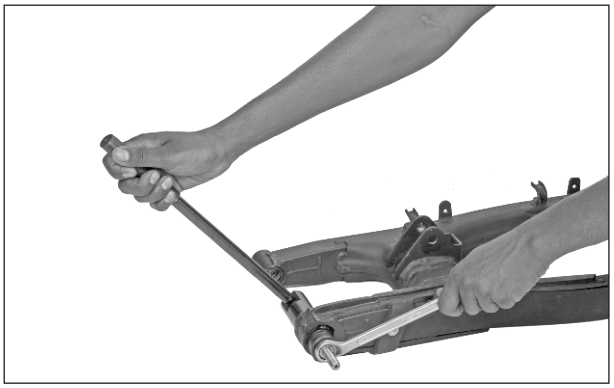


Fig. 6.147

INSPECTION

Shaft complete swing arm

- Using the special tools, check shaft complete swing arm for run-out and replace it with a new one if run-out exceeds the limit. (Fig. 6.148)

Dial gauge (0.01mm)
Magnetic stand
V - block

Service limit	0.6 mm

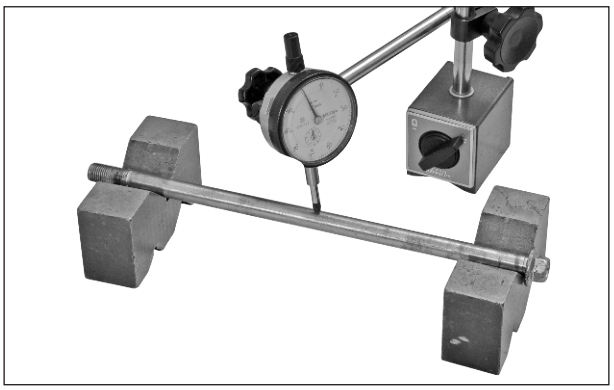


Fig. 6.148

REASSEMBLY

- Reassemble and remount the swing arm complete in the reverse order of removal. Refer exploded view for assembly details. (Fig. 6.149)

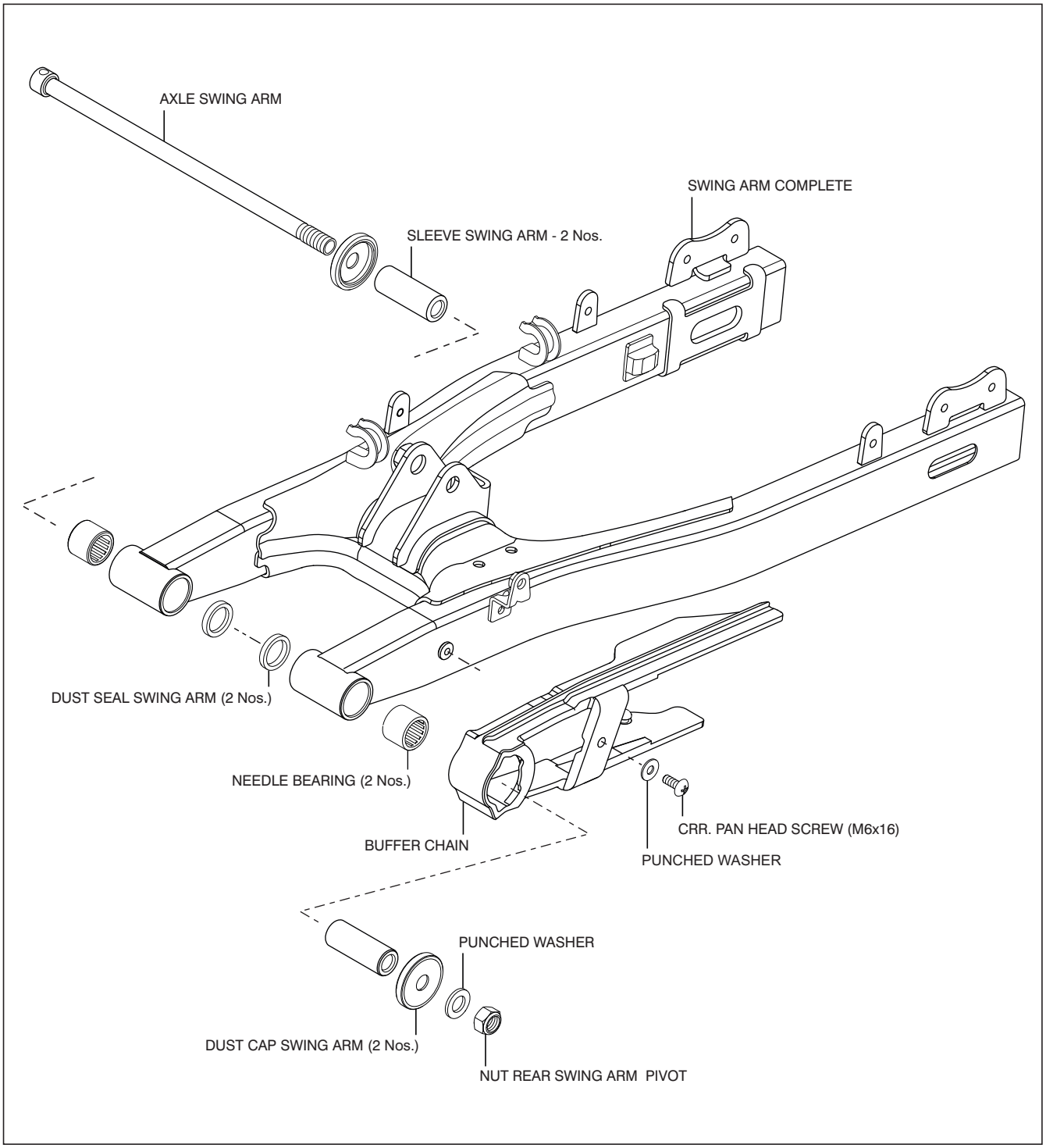


Fig. 6.149

REAR SHOCKABSORBER ADJUSTMENT

- Insert the ignition key into the seat lock (A).
- Turn it in clockwise, then pull and release the front section of the seat (1) first, followed by the rear section as shown in the figure. (Fig. 6.150)

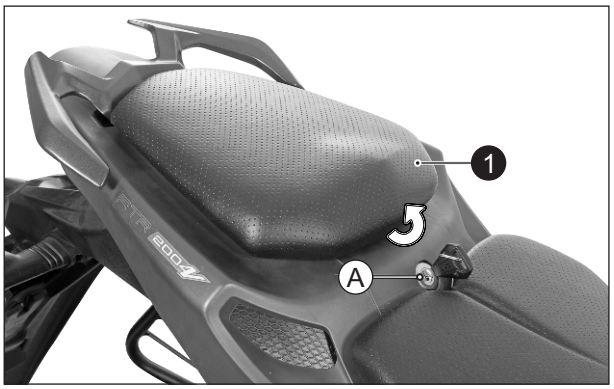


Fig. 6.150

- Pull the seat release cable (A) to release seat lock. Keeping the seat release cable pulled, lift the seat from rear end and slide it backward to remove. (Fig. 6.151)

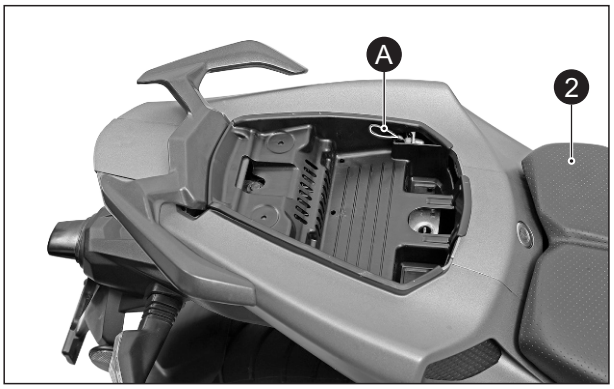


Fig. 6.151

- Insert the pre-load adjuster service tool's protrusion to the lug on the rear shockabsorber as shown. (Fig. 6.152)

N931 012 0	Tool pre-load adjuster

- Attach the service tool with a teeth to the left or right of the one available directly below. (Fig. 6.152)
- Apply torque to rotate the adjuster plate for adjustment until the desired pre-load is obtained. (Fig. 6.153)

Fig. 6.152

Caution:
Adjust step by step. Do not go at a stretch as it will damage the cam.

- To reassemble the front seat, reverse the removal procedure.

Caution:
Make sure that the seat is locked securely in position after installation.

Fig. 6.153

Chapter 7

DIAGNOSTIC TOOL

DIAGNOSTIC TOOL)

CONNECTING DIAGNOSTIC TOOL SEQUENCE

Diagnostic tool → Main cable → Diagnostic cable → Vehicle diagnostic coupler → Vehicle ON (Fig. 7.1)

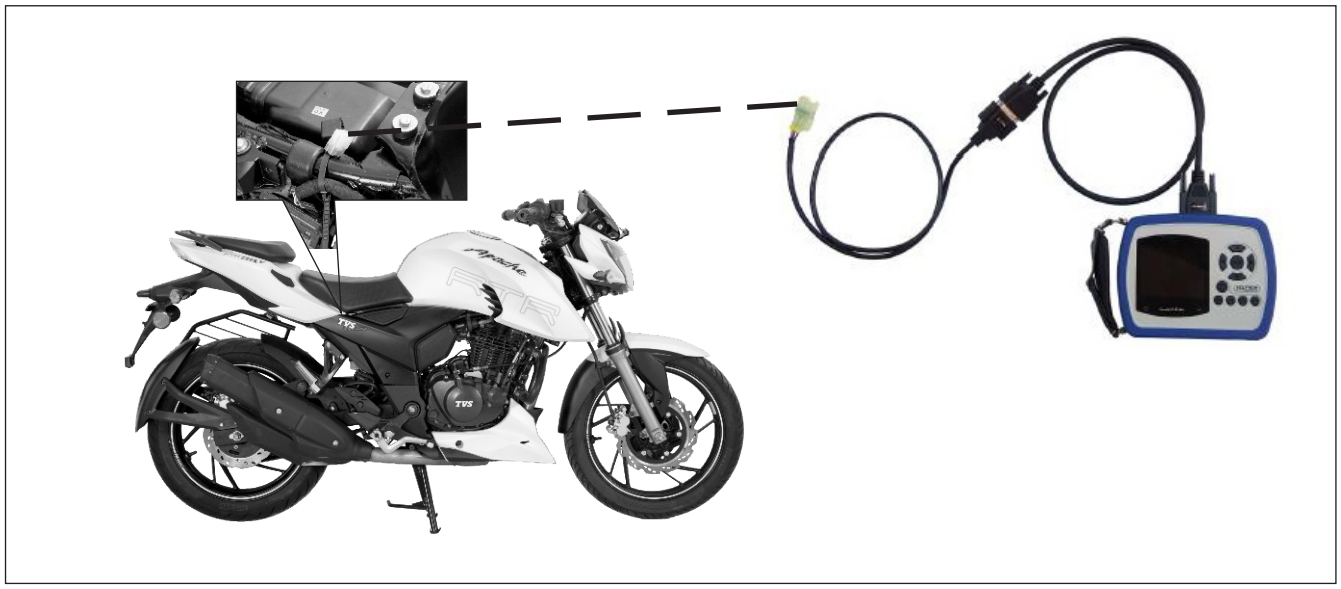


Fig. 7.1

TOOL PAGE

- Tool entry display page after switching ON the vehicle. (Fig. 7.2)

Fig. 7.2

TOOL HOME PAGE

After the display page the tool will display two options.

- **Diagnosis(F1)** - Used to check the vehicle for errors and functionality. (Fig. 7.3)
- **Setup(F2)** - Change language and settings of the diagnostic tool. (Fig. 7.3)

Fig. 7.3

SELECTING DIAGNOSIS(F1)

- After entering Diagnosis(F1) mode, the vehicle to be diagnosed is selected. (Fig. 7.4)

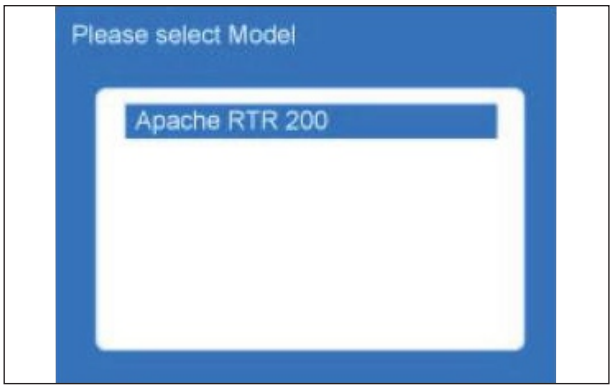


Fig. 7.4

- After selecting the vehicle model the respective ECU is selected. In this case EMS ECU. (Fig. 7.5)

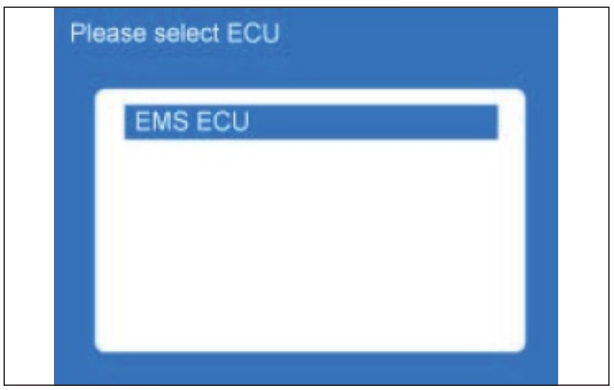


Fig. 7.5

EMS ECU

Once the ECU is selected the diagnosis menu of the ECU will be displayed which has the following option (Fig. 7.6)

- Vehicle Info
- DTC
- Live data
- Actuator

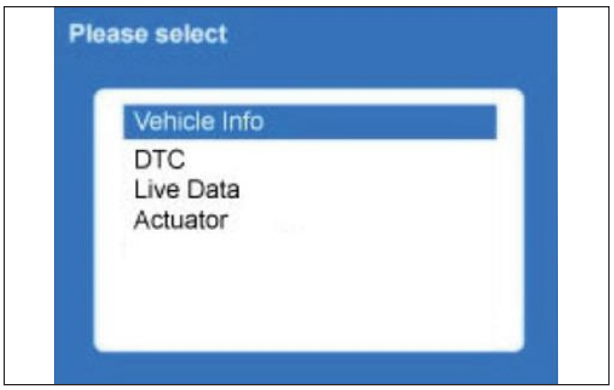


Fig. 7.6

VEHICLE INFO

- Displays vehicle information like VIN, date of programming, etc,. (Fig. 7.7)

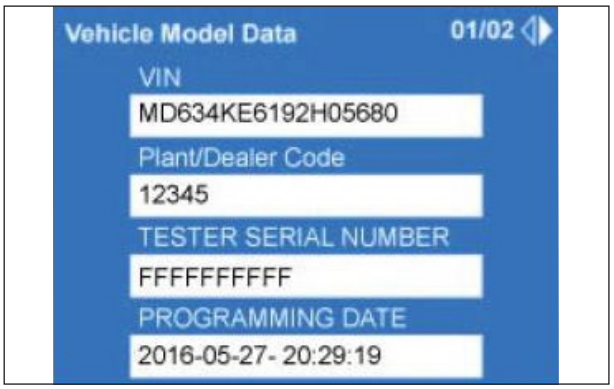


Fig. 7.7

DIAGNOSTIC TROUBLE CODE (DTC) MENU

- Display error code if any error is present in the vehicle. It has two pages (Fig. 7.8)

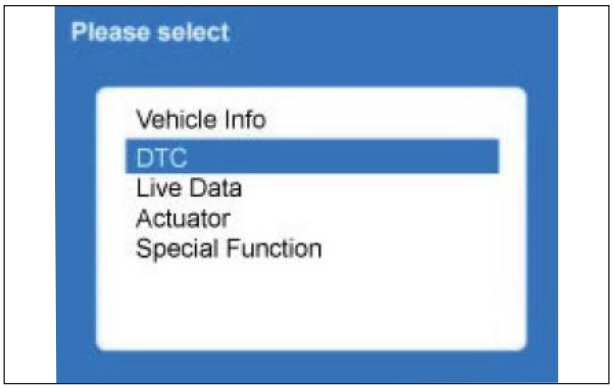


Fig. 7.8

1. **Current** (Fig. 7.9A)
2. **History** (Fig. 7.9B)

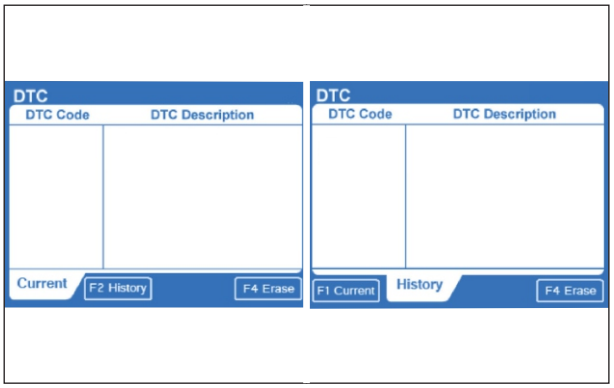


Fig. 7.9A Fig. 7.9B

- DTC error code (A) (Fig. 7.10)
- DTC discription (B) (Fig. 7.10)

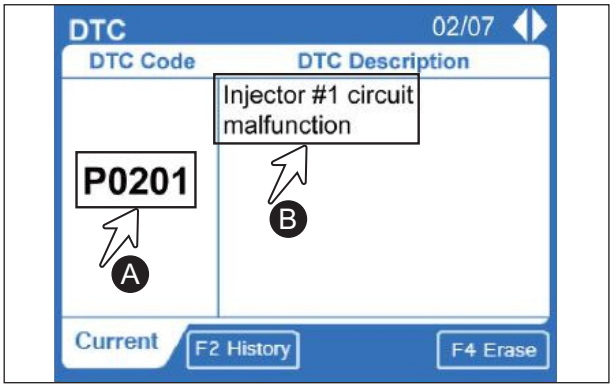


Fig. 7.10

1. CURRENT PAGE

- It displays the errors currently present in the vehicle. It can be both confirmed error as well as non confirmed error (error is created in the vehicle but is not confirmed). (Fig. 7.11)

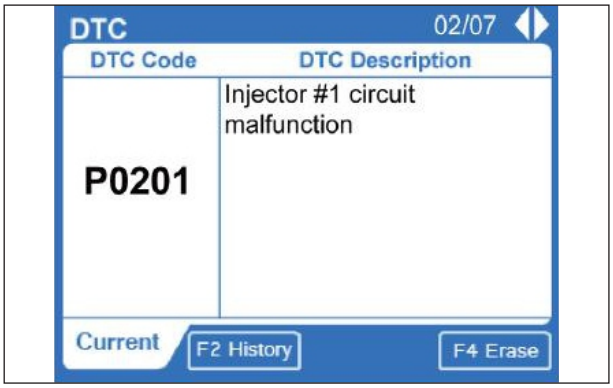


Fig. 7.11

2. HISTORY

- Once the error is confirmed it will appear in history. Once error has moved to history it means that the error has been confirmed. It will have both confirmed errors as well as cleared errors (error is cleared from vehicle but not erased from memory). (Fig. 7.12)

- Once the error is confirmed the MIL lamp will glow in the speedometer.

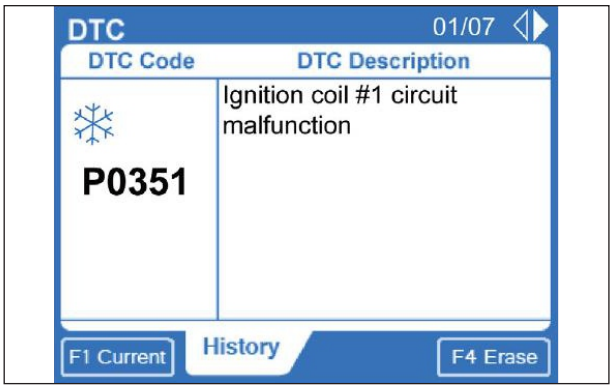


Fig. 7.12

- Both the current as well as the history page may have more than one error. This can be viewed using the arrow keys ' ◄ ', ' ► 'on the tool. (Fig. 7.13)

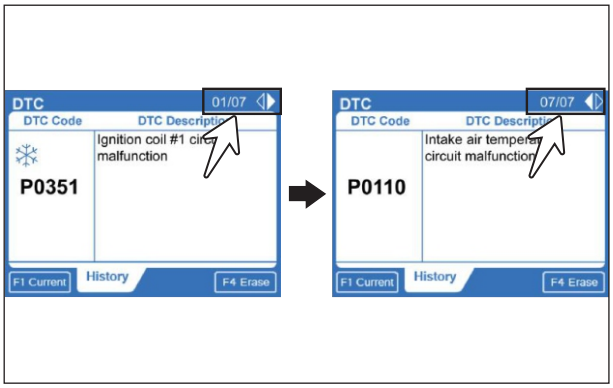


Fig. 7.13

FREEZE FRAME DATA

- The symbol (highlighted) near a DTC code represents that this particular error has freeze frame data.
  The freeze frame data contains all the system level data during the occurrence of that particular error. This occurs only for the error created first. (Fig. 7.14)

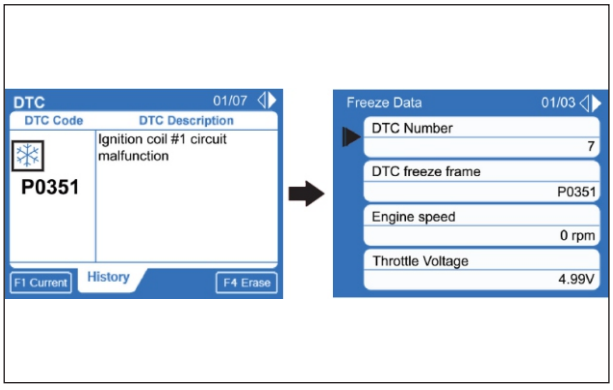


Fig. 7.14

ERASING FUNCTION

- Once the error in the vehicle has been rectified, the error will be automatically removed from current page, but it will be present in the history page. This can be removed by using the erase function.

  If erase is performed on an non rectified error, it will not be erased. (Fig. 7.15)

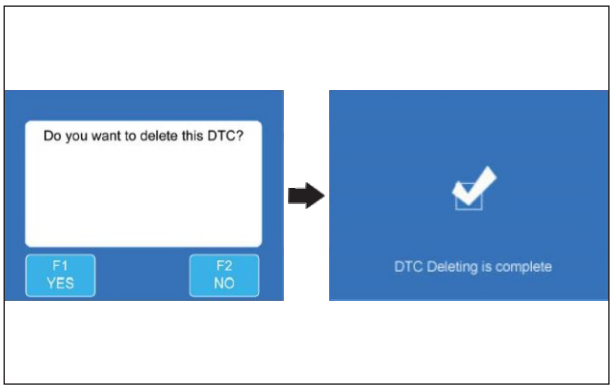


Fig. 7.15

AFTER ERASING FUNCTION

- Current and History page after erasing the rectified errors. (Fig. 7.16)

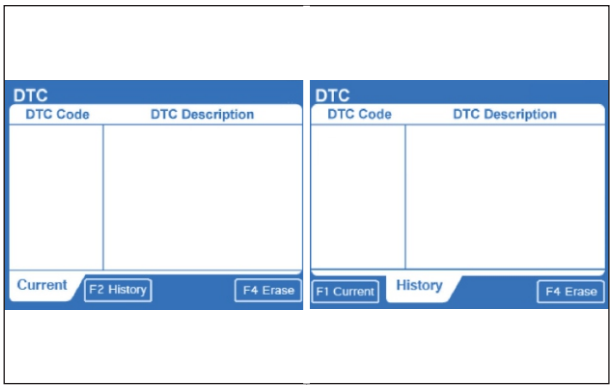


Fig. 7.16

LIVE DATA MENU

- This menu has the values of all the vehicle parameters available to be read by the tool. This menu will display the running parametric value when the vehicle is started. (Fig. 7.17)

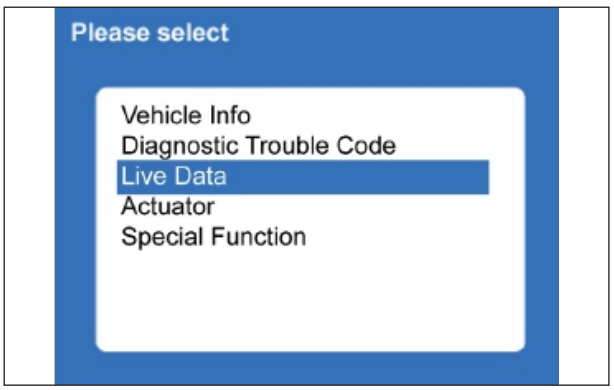


Fig. 7.17

- It usually have parameters like Engine speed, Vehicle speed, Engaged gear, Battery voltage, Injection time, Ignition time, Throttle value, Atmospheric pressure, Inlet pressure, State of system, Fuel pump status, O2 heater status. etc,. (Fig. 7.18)

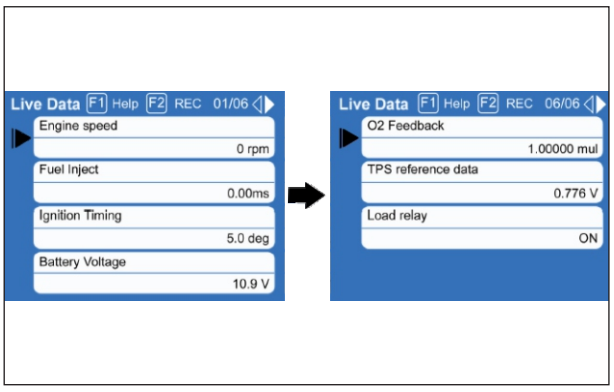


Fig. 7.18

ACTUATOR MENU

- This menu displays all the actuators in the vehicle. (Fig. 7.19)
- This is used to test the individual actuators. (Fig. 7.20)
- The actuator to be tested is selected and the test is run by selecting ON(F3) on physical inspection of the actuator it can be verified for its nominal operation. (Fig. 7.20)
- The test will run for 3sec and will end automatically at the end of the 3rd second.

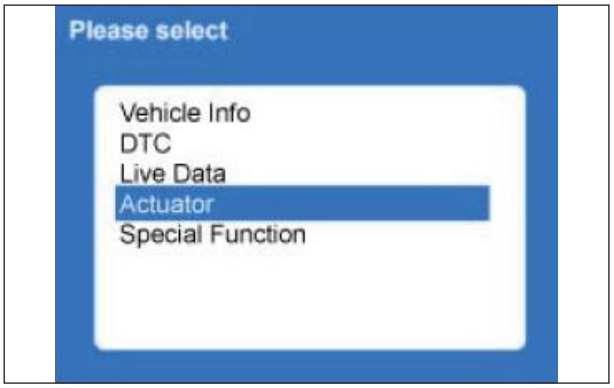


Fig. 7.19

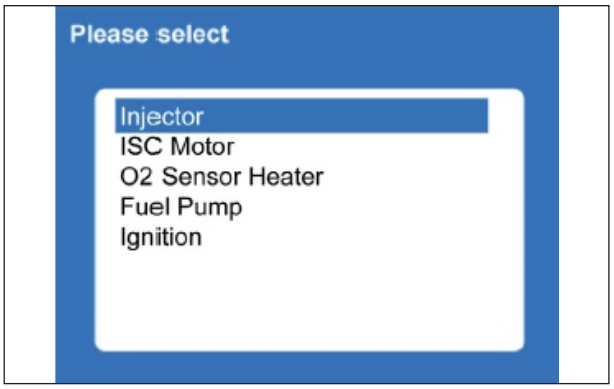


Fig. 7.20

ACTUATOR TEST

- When F3 is pressed the Actuator test will commence (**Test is Progress**) and at the end of 3 seconds it will display **Test completed**. (Fig. 7.21)

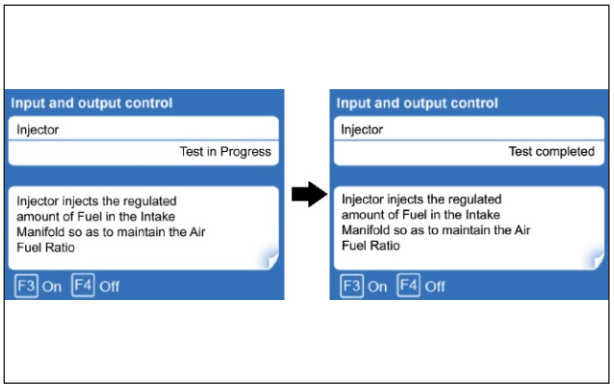


Fig. 7.21

SETUP MENU

- In the Setup menu, Language system info and Data and time can be set and read. (Fig. 7.22)

Fig. 7.22

LANGUAGE MENU

- This will have English, Indonesia and Persian. (Fig. 7.23)

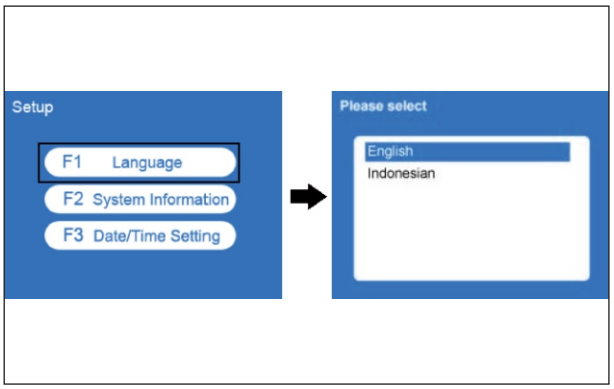


Fig. 7.23

SYSTEM INFORMATION MENU

- This menu will have information about the diagnostic tool like Interface number, Hardware version and Software version. (Fig. 7.24)

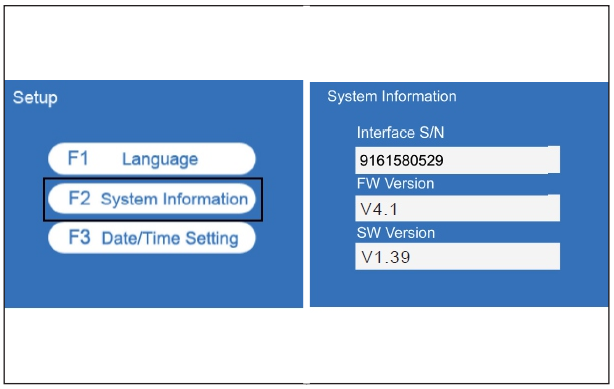


Fig. 7.24

DATE AND TIME SETTING

- This menu allows the user to set date and time in the Diagnostic tool. (Fig. 7.25 & 7.26)

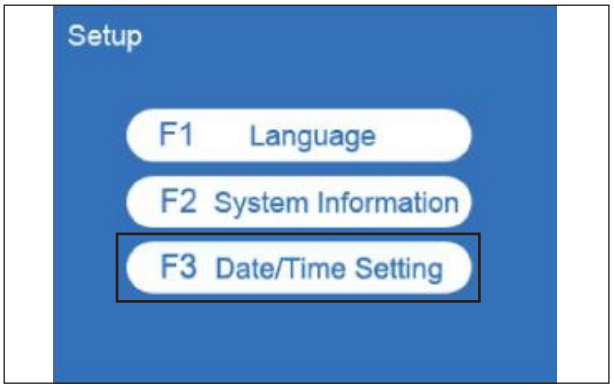


Fig. 7.25

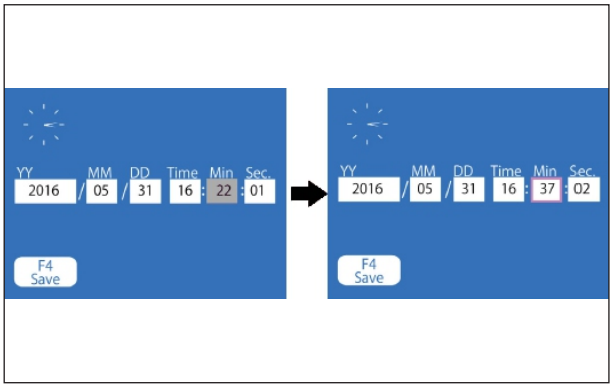


Fig. 7.26

MALFUNCTION INDICATOR

- The malfunction(blinking) code flash on and off pattern. (Fig. 7.27)

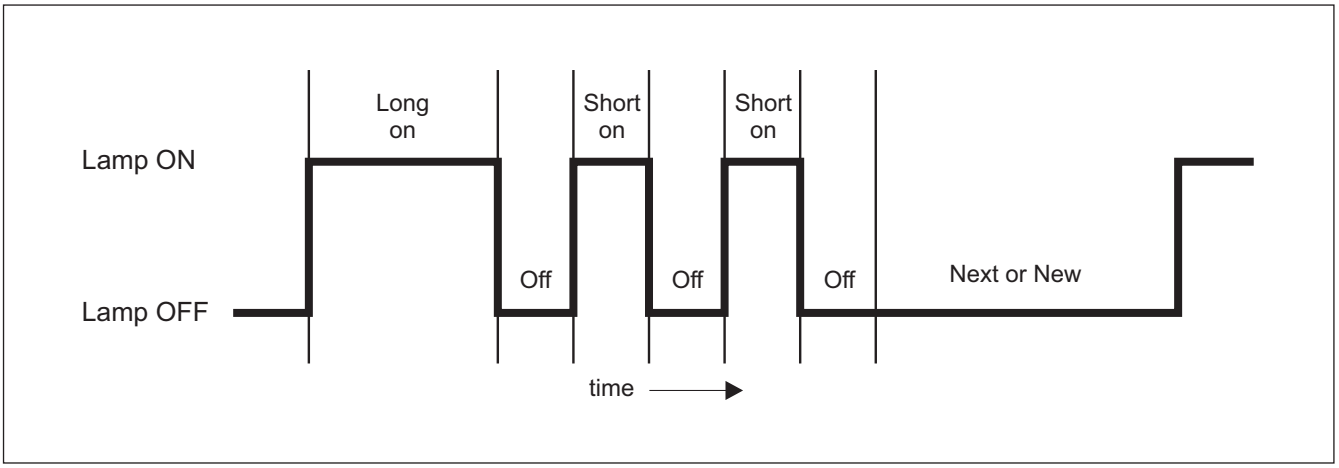


Fig. 7.27

Note:
Long on : Long lights time (1.0sec)
Short on : Short lights time (0.4sec)
Off : Short lights-out time (0.4sec)
Next or New : Every time code lights-out interval (3.0sec)

ERROR CODE TABLE

Sl. No	DTC Description	MIL	Blink code
1	CHECK IACV	ON	49
2	CHECK ETS	ON	12
3	CHECK TPS	ON	06
4	CHECK TMAP	ON	09
5	CHECK FUEL PUMP RELAY	ON	41
6	CHECK INJECTOR	ON	33
7	CHECK OXYGEN SENSOR HEATER	ON	45
8	CHECK IGNITION COIL	ON	37
9	CHECK OXYGEN SENSOR	ON	17
10	CHECK TMAP	ON	13
11	CHECK CRANK SENSOR	ON	66
12	CHECK SENSOR SUPPLY	ON	21
13	CHECK IACV SPEED	ON	29

DIAGNOSTIC TROUBLE CODES

P - Code	Description
P0642	Sensor supply short to Ground
P1643	Sensor supply short to Battery
P0201	Injector Open circuit
P0261	Injector short to Ground
P0262	Injector short to Battery
P0627	Fuel Pump relay Open circuit
P0628	Fuel Pump relay short to Ground
P0629	Fuel Pump relay short to Battery
P0113	Intake Air temperature sensor Open circuit / Short to Battery
P0112	Intake Air temperature sensor short to Ground
P0134	O2 sensor Open circuit
P0131	O2 sensor short to Ground
P0132	O2 sensor short to Battery
P0130	O2 sensor signal error
P0123	TPS Open circuit / Short to Battery
P0122	TPS short to Ground
P1238	Engine Temperature Sensor Open circuit / Short to Battery
P1239	Engine Temperature Sensor short to Ground
P2300	Ignition coil short to Ground
P0030	O2 heater Open circuit
P0031	O2 heater short to Ground
P0032	O2 heater short to Battery
P0511	IACV Open circuit
P0508	IACV short to Ground
P0509	IACV short to Battery
P0108	MAP sensor Open circuit / Short to Battery
P0107	MAP sensor short to Ground
P1336	Crank sensor error

DIAGNOSTIC TROUBLE CODES (DTC) FAULT ANALYSIS

Fault analysis method for common faults are given below

OPEN CIRCUIT

Step 1: Check if the Coupler of the respective sensor / actuator is correctly connected. If the coupler is not connected properly then the error was caused due coupler loose connection. If coupler is connected properly move to Step 2.

Step 2: If Step 1 is OK then remove the coupler from the sensor and check the continuity between the respective ECU pin corresponding to that particular sensor / Actuator and the coupler end of the sensor. If continuity is not there, then the error was caused due to Non continuity in the wiring harness.

SHORT TO BATTERY

Step 1: Remove the coupler from the sensor under fault. Now check the continuity between the ECU pin no 3 and the output pin of the sensor / actuator in the coupler end of wiring harness. If continuity is there, then the error was caused due to ECU failure. If there is no continuity, then the error was caused due to sensor failure.

SHORT TO GROUND

Step 1: Remove the coupler from the sensor / actuator under fault. Now check the continuity between the ECU pin no 1 and the output pin of the sensor / actuator in the coupler end of wiring harness. If continuity is there, then the error was caused due to ECU failure. If there is no continuity, then the error was caused due to sensor failure.

Chapter 8

SERVICE INFORMATION

SERVICE DATA

VALVE AND VALVE GUIDE

Unit : mm

S.No.	DESCRIPTION		STANDARD	SERVICE LIMIT
1	Valve diameter	Inlet Exhaust	22.500 19.300	–
2	Valve clearance	Inlet Exhaust	0.06 0.06	–
3	Valve stem (OD)	Inlet Exhaust	4.470 ~ 4.455 4.485 ~ 4.470	–
4	Guide valve (ID)	Inlet Exhaust	4.500 ~ 4.512	–
5	Guide valve to valve stem clearance	Inlet Exhaust	0.045 ~ 0.057 0.027 ~ 0.042	0.086 0.080
6	Valve stem runout	Inlet Exhaust	–	0.050
7	Valve head thickness	Inlet Exhaust	–	0.500 (min)
8	Valve head radial runout	Inlet Exhaust	0.030	0.075
9	Spring valve free length	Inner Outer	39.75	< 38.75

CAM SHAFT COMPLETE & HEAD COMPLETE CYLINDER (CYLINDER HEAD)

Unit : mm

S.No.	DESCRIPTION		STANDARD	SERVICE LIMIT
1	Cam lobe height	Inlet Exhaust	33.402 ~ 33.422 33.251 ~ 33.271	33.35 33.20
2	Cam shaft complete runout	–	–	0.080
3	Shaft valve rocker arm (OD)	Inlet Exhaust	8.000 ~ 7.991	–
4	Cam chain elongation (20 pitch)	–	–	128.20
5	Head complete cylinder distortion	–	–	0.050

CYLINDER, PISTON AND RINGS PISTON **Unit : mm**

S.No.	DESCRIPTION		STANDARD	SERVICE LIMIT
1	Compression pressure	–	90 ~ 120 psi @ 640 RPM (6.3 ~ 8.4 kg/cm²)	<90 psi (6.3 kg/cm²)
2	Cylinder to piston clearance	–	0.040 ~ 0.045	0.120
3	Cylinder bore diameter	–	66.000 ~ 66.015	66.115
4	Piston dia. (measure 10 mm from skirt end)	–	65.960 ~ 65.975	65.875
5	Cylinder complete distortion	–	–	0.050
6	Ring piston closed end gap	Top 2nd	0.150 ~ 0.300 0.350 ~ 0.500	0.700 0.700
7	Ring to groove clearance	Top 2nd	0.025 ~ 0.065 0.015 ~ 0.055	0.120 0.100
8	Ring piston groove width	Top 2nd Oil Ring	0.8005 ~ 0.8025 0.8005 ~ 0.8025 1.5050 ~ 1.5200	–
9	Ring piston thickness	Top & 2nd	0.760 ~ 0.780 0.770 ~ 0.790	–
10	Piston pin hole (ID)	–	15.002 ~ 15.008	15.030
11	Pin piston (OD)	–	14.996 ~ 15.000	14.992

CRANKSHAFT COMPLETE AND BALANCER SHAFT **Unit : mm**

S.No.	DESCRIPTION	STANDARD	SERVICE LIMIT
1	Connecting rod small end (ID)	15.003 ~ 15.009	15.040
2	Connecting rod big end side clearance	0.150 ~ 0.400	0.650
3	Connecting rod big end width	17.950 ~ 18.000	–
4	Crank web to web width	53 ± 0.1	–
5	Crankshaft complete runout	0.040	0.100

CLUTCH

Unit : mm

S.No.	DESCRIPTION	STANDARD	SERVICE LIMIT
1	Cable clutch free play at lever end (in engin cold condition)	8 ~ 13	–
2	Plate clutch drive thickness	2.920 ~ 3.080	2.600
3	Plate clutch drive claw width	15.750 ~ 15.850	15.300
4	Plate clutch driven distortion	0.05	0.100
5	Spring clutch free length	39.17	38.57

TRANSMISSION SPECIFICATION

S.No.	DESCRIPTION	SPECIFICATION
1	Primary reduction ratio	2.818 (62/22)
2	Final reduction ratio	3.461 (45/13)
3	Gear ratio	
	First gear	2.917 (35/12)
	Second gear	1.857 (26/14)
	Third gear	1.333 (24/18)
	Fourth gear	1.050 (21/20)
	Fifth gear	0.880 (22/25)

TRANSMISSION

Unit : mm

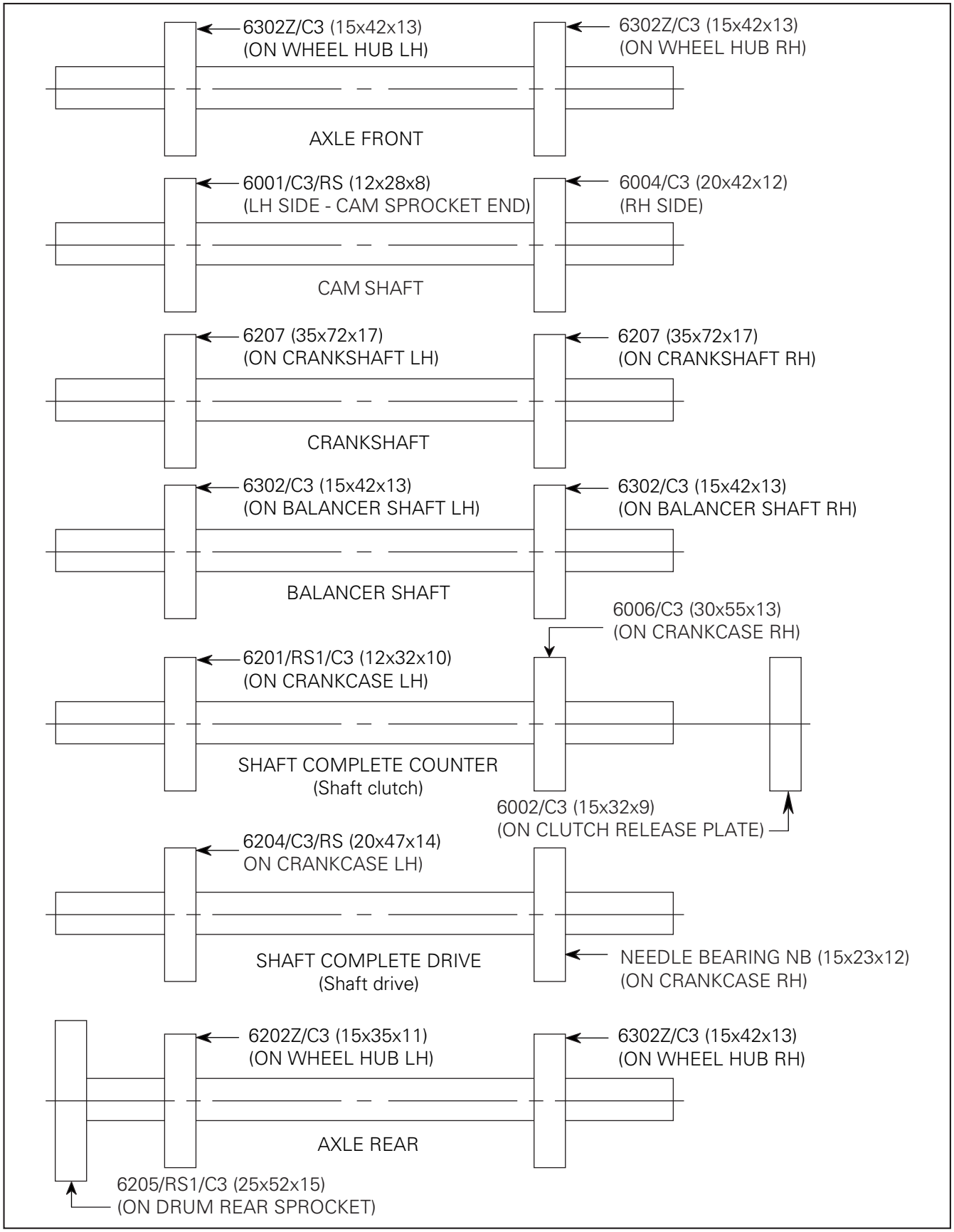
S.No.	DESCRIPTION		STANDARD	SERVICE LIMIT
1	Shift fork to groove clearance	Fork No. 1 & 2 Fork high speed	–	0.300
2	Drive chain - 20 pitch length		317.5	323
3	Drive chain slack		20 ~ 25	–

SUSPENSION

Unit : mm

S.No.	DESCRIPTION	STANDARD	SERVICE LIMIT
1	Front fork stroke length	130	–
2	Front fork spring length	438	428
3	Front fork oil grade	TRU FORK oil	
4	Front fork oil capacity (each leg)	325 ± 2 cc	

BEARING SPECIFICATION



ELECTRICAL

S.No.	DESCRIPTION		SPECIFICATION
1	Spark plug type		BOSCH UR4KE
2	Spark plug gap		0.8 ~ 0.9 mm
3	Pulsar coil resistance		360 ~ 440 ohms
4	Ignition coil resistance	Primary winding Secondary winding	4.05 ~ 4.95 ohms 8.96 ~ 13.44 k ohms
5	Stator coil resistance		0.2 ~1.2 ohms
6	Thermal sensor		0.3 ~ 14 k ohms
7	Gear Position sensor	Neutral First gear Second gear Third gear Fourth gear Fifth gear	0.75 kilo ohms 0.075 kilo ohms 1.5 kilo ohms 2.7 kilo ohms 5.6 kilo ohms 15 kilo ohms
8	Charging performance		14.5 ± 0.3V @ 2500 rpm and above
9	Battery (Type / Amp.)		12V, 9 Ah
10	Battery open circuit voltage	Full charge Needs charging	12.9 Volts 12 Volts
11	Battery electrolyte specific gravity	Full charge Needs charging	1.28 1.25
12	Generator		12V, 260 W
13	Head lamp - high / low beam		12V, 60/55W H4
14	Position lamps		LED lamp (2W), 2 nos.
15	Tail lamp / brake lamp		LED indicator (1W max. each / 2.5W max. each)
16	Turn signal lamp		12V, 10W x 4 nos
17	Number plate lamp		12V, 5W x 1
18	Instrument panel		LCD / LED indicators
19	Horn		12V, DC x 2
20	Fuse		12V, 20A x 1, 15A x 1 and 10A x2 (blade type)

BRAKE AND WHEEL ASSEMBLY **Unit : mm**

S.No.	DESCRIPTION		STANDARD	SERVICE LIMIT
1	Disc plate face out		0.2	0.3
2	Disc plate thickness	Front Rear	4.0 4.5	3.5 4.0
3	Disc pad thickness	Front Rear	6.2 7.3	1.4 1.4
4	Alloy wheel runout (front and rear)	Axial Radial	0.8 0.8	1.0 1.0
5	Axle runout	Front Rear	0.15 / 100 mm	0.25 / 100
6	Tyre size	Front Rear	90/90 x 17" 130/70 x 17"	– –
7	Tyre tread depth	Front Rear	4.5 6.2	1.0 1.0
8	Tyre pressure - Front	Solo Dual	1.75 kg/cm² (25 psi)	–
9	Tyre pressure - Rear	Solo Dual	2.00 kg/cm² (28 psi) 2.25 kg/cm² (32 psi)	– –
10	Swing arm axle runout		0.6	–
11	Front fork oil level (height)		114 mm	–

Note:
Any part in use is subject to wear and tear. The maximum amount of acceptable wear is called "Service Limit". Any part which is within the service limit is expected to provide a satisfactory period of service life.

TIGHTENING TORQUE

ENGINE

S.No.	DESCRIPTION	QUANTITY	TORQUE IN Nm
1	Spark plug	1	12.5 ± 2.5
2	Plug complete oil drain	1	22.5 ± 2.5
3	Bolt, cap oil strainer	3	10 ± 2
4	CRR pan head screw, oil strainer	2	8 ± 2
5	Bolt, oil flow inspection	1	12 ± 2
6	Bolt, adjuster assembly tensioner	2	10 ± 2
7	Nut, cylinder head mounting (at side)	2	7 ± 1
8	Bolt, cover cylinder head mounting	4	10 ± 2
9	Bolt, camshaft sprocket mounting	1	18 ± 2
10	Bolt, cylinder head mounting	4	24.5 ± 2.5
11	Bolt, cam chain tensioner	1	12 ± 2
12	Bolt, rocker arm shaft	4	7 ± 1
13	CRR csk head screw, camshaft holder	1	4 ± 1
14	CRR csk head screw, pipe intake	2	10 ± 2
15	Stud, cylinder head	4	7 ± 1
16	Nut, cylinder mounting (at side)	2	7 ± 1
17	Bolt, oil cooler outlet and inlet pipe mounting (at clutch cover)	2	10 ± 2
18	Bolt , cover oil filter	3	10 ± 2
19	Bolt, cover clutch mounting	11	10 ± 2
20	Hexagonal socket head cap screw, cover clutch mounting	1	10 ± 2
21	Bolt, plate clutch release	4	10 ± 2
22	Nut, clutch assembly mounting	1	75 ± 5
23	Bolt, oil pump mounting	3	8 ± 2
24	Bolt, gear shit cam stopper mounting	1	10 ± 2
25	CRR csk head screw, index star mounting	1	8 ± 2
26	Nut, gear primary drive mounting	1	60 ± 5
27	Nut, balancer shaft mounting	1	55 ± 5
28	Bolt, lever assembly gear shift	1	10 ± 2
29	CRR pan head screw, cover engine sprocket	2	10 ± 2
30	Hexagonal screw, sprocket engine mounting	2	8 ± 1
31	Bolt, retainer oil seal drive shaft	2	10 ± 2
32	Bolt, switch gear position	2	10 ± 2
33	Bolt, guide speed sensor	1	10 ± 2
34	Bolt, speed sensor	2	10 ± 2
35	Bolt, contact complete gear shift	1	4 ± 1
36	Bolt, cover magneto mounting	9	10 ± 2

TIGHTENING TORQUE

ENGINE

S.No.	DESCRIPTION	QUANTITY	TORQUE IN Nm
37	Hexagonal flange nut, magneto rotor mounting	1	80 ± 5
38	Bolt, one way clutch	3	12 ± 1
39	Bolt, stator coil mounting	3	10 ± 2
40	Plug TDC	1	27.5 ± 2.5
41	Plug crankshaft hole	1	10 ± 2
43	U nut, engine mounting	4	32.5 ± 2.5
44	Bolt, starter motor assembly	2	10 ± 2
45	Hexagonal flange bolt, crankcase mounting	15	10 ± 2
46	Bolt, bracket idler gear	1	10 ± 2
47	Bolt, pipe complete inlet and outlet (mounting at oil cooler)	4	10 ± 2
48	Bolt, oil cooler mounting	2	10 ± 2

TIGHTENING TORQUE

CHASSIS

S.No.	DESCRIPTION	QUANTITY	TORQUE IN Nm
1	U nut, axle front	1	78 ± 18
2	Special screw, disc plate mounting (front wheel)	6	31 ± 3
3	Special screw, disc plate mounting (rear wheel)	3	31 ± 3
4	Hex. socket head cap screw, front fork upper mounting (upper bracket)	2	19 ± 2
5	Bolt, front fork lower mounting (lower bracket)	2	36 ± 4
6	Lock nut, steering	1	80 ± 20
7	Hex. socket head cap screw, handle bar assembly mounting	2	16 ± 2
8	Bolt, caliper assembly mounting (front)	2	23 ± 5
9	Cap nut, front fork	1	23 ± 3
10	Allen bolt, fork leg assembly (cylinder mounting)	1	23 ± 3
11	Lock nut, rear view mirror	2	28.5 ± 6.5
12	Bolt, brake / clutch lever mounting	1	11 ± 0.5
13	Bolt, master cylinder mounting (front)	2	10 ± 2
14	CRR pan head screw, housing head lamp top mounting	2	3 ± 1
15	Bolt, housing head lamp bottom mounting	2	4.5 ± 1.5
16	CRR screw, front fender mounting	2	3 ± 1
17	Bolt, front fender mounting	4	18 ± 3
18	Bolt, fuel tank mounting	2	7 ± 1
19	Screw, fuel tank cap mounting	3	4.5 ± 0.5
20	Screw, inlet fuel tank mounting	3	4.5 ± 0.5
21	Bolt, fuel pump module mounting	6	
22	Bolt, ignition coil mounting	2	5.5 ± 1
23	Nut, side stand mounting	1	37 ± 3
24	Bolt, center stand mounting	2	37 ± 3
25	CRR screw, reservoir rear	1	3 ± 1
26	Bolt, hugger rear mounting	4	8 ± 2
27	Bolt, chain guide mounting	2	8 ± 2
28	Bolt, master cylinder mounting (rear)	2	30 ± 2
29	Banjo bolt, master cylinder and caliper mounting (front & rear)	4	30 ± 2
30	Nut, swing arm assembly mounting	1	40 ± 4
31	Hexagonal socket head cap screw, front foot rest mounting	2	18 ± 3
32	Bolt, shock absorber mounting	2	60 ± 4
33	Bolt, saree guard mounting (at frame)	4	27 ± 3

TIGHTENING TORQUE

CHASSIS

S.No.	DESCRIPTION	QUANTITY	TORQUE IN Nm
36	Hexagonal socket head cap screw, pillion handle mounting	4	22 ± 2
37	Nut, axle complete rear	1	78 ± 18
38	Bolt, chain case complete mounting	4	8 ± 2
39	Nut, muffler assembly mounting (at rear)	1	19.6 ± 2
40	Hexagonal socket head cap screw, muffler mounting (at front)	2	18.1 ± 1.3
41	Hexagonal socket head cap screw, muffler mounting (at frame)	1	18.1 ± 1.3
42	Bolt, bracket crash guard	4	27 ± 3

SPECIAL MATERIAL REQUIRED FOR MAINTENANCE

The following recommended materials are required for maintenance work on the TVS Apache RTR 200 4V and should be kept in hand for ready use.

S.No.	APPLICATION	MATERIAL
LUBRICANTS		
1	Front fork oil seal lip	Kluber Centoplex 2 or equivalent
2	Swingarm assembly pivot, throttle grip, speedo cable, brake cams and control levers	BP MP Grease No.3, Servo Gem (IOC) No.3 and Bechem premium grade 3
3	Steering races, steering cup and steering cone	Bechem premium grade 3
4	Centre stand / side stand pivot and kick starter pedal pivot	TVS TRU4 FULLY SYNTHETIC oil
5	Engine cum transmission oil	TVS TRU4 FULLY SYNTHETIC oil (SAE10W30 SL-JASO MA2)
6	Front fork oil	TRU FORK oil
7	Drive chain lubricant	TVS TRU SPRAY
ADHESIVES		
1	Liquid gasket	Threebond TB1104
2	Packing seal cover cylinder head	Locktite 5205
3	Fastening nuts adhesion	Anabond thread locker
4	Fastening rubber, plastics and ceramic	Anabond (Eng) Cyanoacrylate adhesive 202 and 201 Dendrite adhesive
5	Bearing fitment adhesive	Specfit
CLEANING SOLVENTS		
1	Crankcase, shafts, gears and filter air cleaner	Inflammable solvent like kerosene
2	Piston and rings	Carbon tetra chloride and Acetone carbon chloride
3	Throttle body	Carbon tetra chloride
BRAKE FLUID		
1	TVS Girling	DOT 3 / DOT 4

USE OF GENUINE TVS MOTOR COMPANY PARTS

When replacing any part of the machine, always use TVS-M genuine parts only. Non genuine parts will reduce the performance of TVS Apache RTR 200 4V and cause failures.

FUEL

ITEM	SPECIFICATION
Fuel type	Unleaded Petrol
Fuel tank capacity including reserve	12 litres
Reserve	2.5 litres

TROUBLE SHOOTING

A. STARTING TROUBLE

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
A1	Self starter not working	Battery voltage is less	Charge the battery / replace
		Loose connection	Tighten
		Defective starter motor	Replace
		Defective starter relay	Replace
		Defective starter switch	Replace
		Defective gear position sensor	Replace
		Defective TCI	Replace
		Defective speedometer	Replace
		No continuity of wiring in harness	Replace
A2	No fuel flow to Injector	No fuel in fuel tank	Fill petrol
		Clogged fuel filter	Replace fuel filter
		Blockage of vent hole in cap fuel tank	Clear vent hole
		Fuel pump not working	MIL error status
A3	No spark / weak spark / intermittent spark	Battery dead	Replace
		Incorrect spark plug gap	Replace
		Dirty spark plug	Clean
		Bridging of electrodes	Replace
		Loose suppressor cap	Correct / fix properly
		Water entry between suppressor cap and spark plug	Clean
		Oily sparkplug	Check oil leakages through rings, valves into combustion chamber and correct
		Defective engine kill switch	Correct / Replace
		Defective ignition coil	Replace
		Defective ignition switch	Replace
		Defective ECU	Replace
		Defective pulsar coil	Replace
A4	Incorrect valve timing	Valve timing marks not matching	Correct valve timing
		Improper valve tappet clearance	Adjust tappets
A5	Induction leakage	Loose throttle body mounting	Tighten
		Damaged intake pipe and gasket	Replace

TROUBLE SHOOTING

A. STARTING TROUBLE (Contd.)

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
A6	Poor compression	Leakage through head gasket	Tighten nuts / replace gasket
		Incorrect valve clearances	Adjust to specification
		Worn out piston rings	Replace
		Worn out cylinder and piston	Replace
		Leakage through valve	Do lapping and correct

B. POOR PICK-UP

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
B1	No free movement of vehicle	Brake binding	Adjust both brakes
		Low tyre pressure	Inflate to specification
		Jammed wheel bearings	Replace / lubricate
		Tight chain	Adjust free play
		Tight drive shaft	Check and correct circlip seating
B2	Improper ignition	Refer complaint No. A3	
		Refer complaint No. A4	
B3	Improper carburation	Refer complaint No. A6	
B4	Clutch slippage	Incorrect free play	Adjust as per specification
		Burnt drive, driven plates	Check and replace
B5	Poor compression	Refer complaint No. A7	
B6	Poor engine response on acceleration	Block at air cleaner inlet below the cover frame	Remove blockage
B7	Jerking at particular RPM	Malfunction in FI system	Check MIL
		Leak in induction system	Refer complaint no. A5
		Fuel filter clogging	Replace filter
		Spark plu gap is more than spec	Replace spark plug
		Improper spark plug cap	Press & correct spark plug cap

TROUBLE SHOOTING

C. GEAR SHIFTING RELATED

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
C1	Gear shifting hard	Improper free play in clutch lever	Adjust free play to specification
		Gear shift lever fouling with foot rest	Inspect and correct
		Poor engine oil quality	Replace
		Improper drive chain slackness	Inspect and adjust
C2	Neutral lamp not working	Contact gear shift switch defective	Correct / Replace
		Gear position sensor defective	Replace
		Loose connection	Correct
		No continuity in wiring harness	Replace
		Neutral lamp LED not working	Replace speedometer

D. SMOKY EXHAUST (WHITE SMOKE)

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
D1	Burning of oil in combustion chamber	Oil mixed in fuel	Replace fuel in tank and clean
		Adulterated fuel	Replace fuel in tank and clean
		Improper routing / clogged breather pipe	Correct routing / clean
		Damaged seal valve stem oil / valve stem	Replace
		Incorrect fitment of 2nd and Oil rings	Fit properly
		Worn out piston rings	Replace Rings
		Worn out cylinder and piston	Replace cylinder and piston
		Engine oil level exceeded maximum limit	Fill to the specified level

E. SMOKY EXHAUST (BLACK SMOKE)

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
E1	Very rich mixture	Sticky / worn out float needle	Correct / replace
		Worn out jets	Replace
		Clogged air filter	Clean / replace
		Punctured float	Replace
		Choke plunger stuck	Correct

TROUBLE SHOOTING

F. ENGINE OVER HEATING

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
F1	Poor cooling	Cooling fins covered with mud	Clean
F2	No free movement of vehicle	Refer complaint No. B1	
F3	Incorrect ignition	Refer complaint No. A3	
F4	Poor lubrication	Incorrect type of oil	Use recommended oil
		Low quantity / poor quality	Top up / replace as specified
		Oil filter clogged	Clean / replace
		Defective oil pump	Replace
		Blocked oil passages	Clean / Correct
F5	Clutch slippage	Refer complaint No. B4	
F6	High compression pressure	Excessive carbon deposition	Decarbonise engine & muffler
F7	Incorrect valve timing	Improper valve clearance	Check and adjust
F8	Incorrect sparkplug	Wrong heat range of sparkplug	Replace

G. HIGH FUEL CONSUMPTION

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
G1		Refer complaint Nos. B1, 2, 3, 4, 5, 6 & 7	
G2	Fuel leakages	Leakage through fuel tank, fuel hose, injector and throttle body	Correct leakages

H. EXCESSIVE CO

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
H1	Malfunctioning of exhaust gas analyser	Wrongly selected settings / accessories	Correct
H2	Rich mixture	Refer complaint No. E1	

TROUBLE SHOOTING

I. JERKY MOVEMENT / ABNORMALITY OF ENGINE RPM

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
I1	Excessive CO	Improper idling rpm	Adjust idling

J. HEAD LAMP NOT WORKING

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
J1	Bulb fused	Defective bulb	Replace
J2	No power supply to bulb	Loose contact in bulb holder/switch	Correct contacts
		Loose contact in wiring couplers	Correct contacts
		Defective TCI	Replace TCI
		Wiring cut	Replace wiring harness
		No power supply from stator coil	Check stator coil resistence
		Defective RR unit	Replace

K. HORN NOT WORKING

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
K1	No sound	Blown fuse	Replace
		No / discharged battery	Fix / recharge
		Defective horn	Replace
		Defective horn button	Correct / replace
		Wiring cut / disconnected terminal	Replace / connect
K2	Weak / irregular sound	Loose connection	Correct
		Discharged battery	Recharge
		Incorrect tuning of horn	Tune properly (lock the nut after tuning)
K3	Rippling noise	Defective connections	Check each terminal
		Defective horn	Replace
		Loose clamp	Correct