## GENERAL INFORMATION



## GENERAL PROCEDURES



## PERIODIC MAINTENANCE

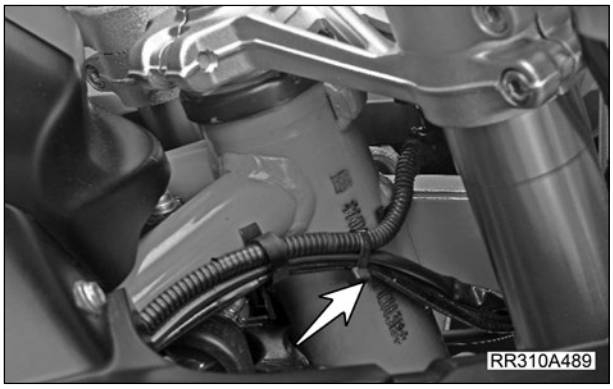

RIGHT SIDE VIEW


LEFT SIDE VIEW

# VEHICLE IDENTIFICATION NUMBERS

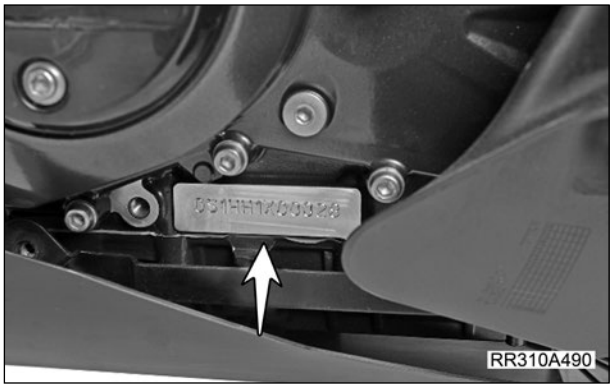
## Frame Number

The frame serial number is stamped on the RHS of the steering head tube.

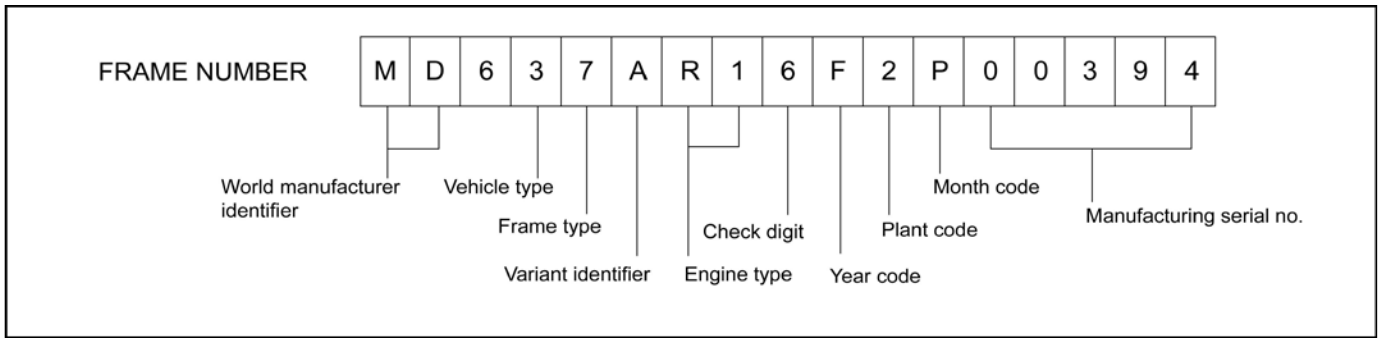



## Engine Number

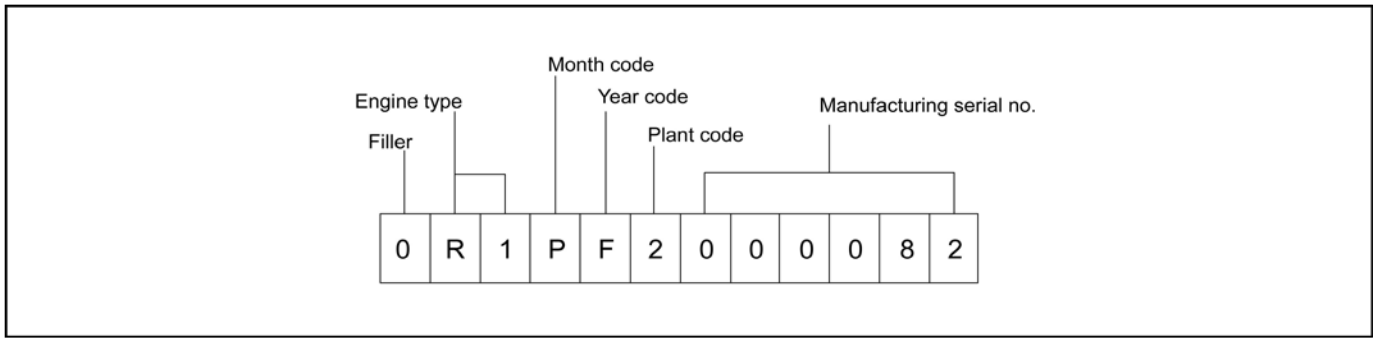
The engine serial number is stamped on the LHS crankcase assembly near cylinder block.




## Frame Number Codes




## Engine Number Codes



**Year and Month Codes**

| 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 |

| Code | Year |
|---|---|
| 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 | 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 |

## Introduction to Antilock Braking System (ABS)

Apache RR310 is the bike with an Antilock Braking System. The ABS is an Electronically controlled Hydraulic device designed to prevent skidding and help riders to maintain steering control during an emergency-stopping situation. ABS prevents locking of wheels thereby preventing skidding and loss of steering control of the bike. The ABS provides complete control of the bike when brakes are applied hard in dry or wet road, at any speed. The rider can be assured that the vehicle is stopped and it is in his control even in emergency braking situation. The ABS uses continuous wheel speed monitoring system ie. wheel speed sensors & toner rings and a Hydraulic Electronic Control Unit (HECU) to control the vehicle at limits. During normal operation ABS works similar to a normal brake, but functions only when the wheel tends to lock up. The speed sensors fitted on both the wheel measures the rotational speed of the wheel, when the wheel rotation reduces rapidly, the HECU modulates the pressure in the brake circuit and there by preventing the wheel from locking.

During hard stop the brake pedal / brake lever feels different, i.e., a rapid pulsation in the brake pedal / brake lever; This is absolutely normal. It is not mandatory to have this pulsation feel every time the brake is applied. This pulsation feel also depends on the road condition (dry / wet / slippery / mud). The ABS can apply and release the pressure in the brake line much faster than that the rider can do with brake pedal / brake lever to avoid wheel locking, so, there is no need to pump the brake, it requires only continuous application.

## TECHNICAL SPECIFICATIONS

### Dimensions and Weight

| | |
|---|---|
| Overall length | 2001 ± 20 mm |
| Overall width | 786 ± 5 mm |
| Overall height | 1135 ± 10 mm |
| Seat height | 811 ± 10 mm |
| Ground clearance | 180 ± 5 mm |
| Wheel base | 1365 ± 12 mm |
| Kerb weight | 169.5 kg |
| Pay load | 130 kg |
| Max. laden weight | 299.5 kg |

### Engine

| | |
|---|---|
| Bore | 80 mm |
| Stroke | 62.1 mm |
| Piston displacement | 312.2 cc |
| Compression ratio | 10.9 ± 0.5 : 1 |
| No. of valves | 4 |
| Air filter | Dry paper type |
| Oil filter | Wire mesh and Micronic paper filter |
| Lubrication system | Wet sump lubrication |
| Maximum power in kW | 33.5 bhp (25 kW) @ 9700 rpm |
| Maximum torque in Nm | 27.5 ± 1.1 Nm @ 7700 ± 200 rpm |
| Maximum speed | 160 km/hr |
| Engine idling rpm (warm) | 1700 ± 200 rpm |
| Starting system | Electric starter |
| Camshaft | Dual camshaft |
| Fuel feed | Closed loop EFI system |
| Cooling system | Liquid cooling |
| Air filter | Dry paper type |
| Oil filter | Wire mesh and Micronic paper filter |
| Lubrication system | Wet sump lubrication |
| Starting system | Electric starter |

### Transmission

| | |
|---|---|
| Clutch type | Wet multiplate type |
| Gear shift pattern | One down five up |
| Primary transmission | Spur gears |
| Secondary transmission | Chain and sprockets |

### Gear ratio

| | |
|---|---|
| First gear | 3.000 |
| Second gear | 2.060 |
| Third gear | 1.590 |
| Forth gear | 1.290 |
| Fifth gear | 1.100 |
| Sixth gear ratio | 0.950 |
| Primary reduction | 3.080 |
| Secondary reduction | 2.470 |

### Chassis

| | | |
|---|---|---|
| Frame | Trellis type frame | |
| Front suspension | USD fork 41 mm diameter | |
| Rear suspension<br>Steering angle | Solid Die cast Aluminium swing arm directly hinged monoshox, pre-load adjustable. | |
| Caster angle | 25° ± 1° | |
| Tail length | 136 mm | |
| Front brake | Hand operated 300 mm disc | |
| Rear brake | Foot operated 240 mm disc | |
| Front tyre | Michelin - Pilot street radial | |
| Rear tyre | Michelin - Pilot street radial | |
| Front tyre pressure | 2.25 kg (32 PSI) for both solo and dual | |
| Rear tyre pressure | Solo | 2.25 kg (32 PSI) |
| | Dual | 2.25 kg (32 PSI) |

### Electrical

| | |
|---|---|
| Type | AC generator |
| Ignition system | Closed loop EFI system |
| Spark plug | NGK (LMAR9D - J) |
| Battery type | 12V / 8 Ah MF lead acid battery |
| Body earthing | Two grounds are mounted on engine body (1. Engine ground and 2. Ignition ground) |
| Generator | 12V, 290W @ 6000 rpm |
| Head lamp | 12V, LED |
| Position lamp | 12V, LED |
| Tail / brake lamp | 12V, LED (2W / 2W approx.) |
| Turn signal lamp | 12V, LED (2W each) |
| Number plate lamp | 12V LED |
| Instrument panel | LCD / LED indicators |
| Horn | 12V DC two numbers |
| Fuse | Mini fuse - 7.5A x 2, 10A x 2, 20A x 1 and 30A x 1 |

### Capacities

| | |
|---|---|
| Fuel type | BSIV / Unleaded petrol (91% octane rating by research method) |
| Fuel tank capacity | Approx. 11 ± 0.5 liters (including reserve) |
| Reserve | 2 liters |
| Engine & transmission oil grade | TVS TRU4 / MOTUL 3000 4T plus (SAE 15W50 API SJ / JASO MA2) |
| Engine & transmission oil capacity | 1700 ml (fresh assembly / full drain along with filter change) |
| Front fork oil grade | KWT KHL 15-10 |
| Front fork oil capacity | 440 ml per leg |
| Brake fluid | DOT 4 |

### Recommended Fuel and Lubricants

| | |
|---|---|
| Chain cleaner | MOTUL |
| Chain lubricant | MOTUL |
| **Coolant** | |
| Recommended manufacturer | Glysantin |
| Recommended grade | G48 |
| Recommended quantity | 1 liter (coolant and distilled water ratio 50:50) |
| **Cone set grease** | |
| Recommended manufacturer | Klueberplex |
| Recommended grade | BEM 34-132 |
| Recommended quantity | 15 gm (in sachet) |

### Free plays

| | |
|---|---|
| Clutch free play | 8 - 12 mm |
| Throttle free play | 5 ± 2 mm |
| Drive chain free play | 40 - 50 mm |

## RUNNING-IN RECOMMENDATIONS

Running-in is essential to preserve engine life and performance over time. Twisty roads and gradients are ideal to run in the engine, brakes and suspension effectively. The first 1000 km is a running-in period for your motorcycle.
Maximum engine speed during running-in 0 to 1000 km - below 7000 rpm
During the first 1000 km, avoid the full throttle starts and rapid acceleration, which could expose the engine parts to excessive stress. It is advisable to run the engine at varying load and rpm, though still within recommended rpm limit. Avoid riding at constant engine rpm for prolonged periods.
During initial running, use brakes gently. Do not brake hard or keep brake applied for too long to enable a correct break-in of brake pad friction material against the brake discs.
To allow all the mechanical parts of motorcycle to adapt each another, and to avoid reduction of engine components life, it is advisable to avoid sudden acceleration and running the engine at high rpm for too long, especially uphill.
Check the drive chain frequently and if required adjust it. Also ensure that the chain is lubricated as required to increase its service life.

**CAUTION**

On completion of running -in period, scheduled maintenance service should be observed carefully without fail.
Failure to comply with this will result in damage to the engine or shorter engine life.

Keeping to the running-in recommendations will ensures longer engine life and reduce the need for overhauls and re-tuning.

## SAFETY AND REGULATIONS

Soil, air, and water quality is important for all industries and life in general. When legislation does not yet rule the treatment of some of the substances that advanced technology requires, sound judgment should govern the use and disposal of products of a chemical and petrochemical nature.

Familiarize yourself with the local legislation and make sure that you understand this legislation. Where no legislation exists, obtain information from suppliers of oils, filters, batteries, fuels, anti-freeze, cleaning agents, etc., with regard to the effect of these substances on man and nature and how to safely store, use, and dispose of these substances.

**Helpful hints**

- Avoid the use of cans or other inappropriate pressurized fuel delivery systems to fill tanks. Such delivery systems may cause considerable spillage.
- In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of these products contain substances that may be harmful to your health.
- Modern oils contain additives. Do not burn contaminated fuels and or waste oils in ordinary heating systems.
- Avoid spillage when you drain fluids such as used engine coolant mixtures, engine oil, hydraulic fluid, brake fluid, etc. Do not mix drained brake fluids or fuels with lubricants. Store all drained fluids safely until you can dispose of the fluids in a proper way that complies with all local legislation and available resources.
- Do not allow coolant mixtures to get into the soil. Collect and dispose of coolant mixtures properly.
- Repair any leaks or defects in the engine cooling system immediately.
- Do not increase the pressure in a pressurized circuit as this may lead to a component failure.
- Protect hoses during welding. Penetrating weld splatter may burn a hole or weaken hoses, allowing the loss of oils, coolant, etc.

**Mandatory battery recycling**

Batteries and electric accumulators contain several substances that can have a harmful effect on the environment if the batteries are not properly recycled after use. Improper disposal of batteries can contaminate the soil, groundwater, and waterways. TVS strongly recommends that you return all used batteries to a TVS dealer, who will dispose of the used batteries or recycle the used batteries properly.

Do not dispose of batteries in your household garbage.
Points of sale are obliged to:

- Accept the return of your used batteries
- Store the returned batteries in a suitable location
- Send the returned batteries to the battery manufacturer for recycling

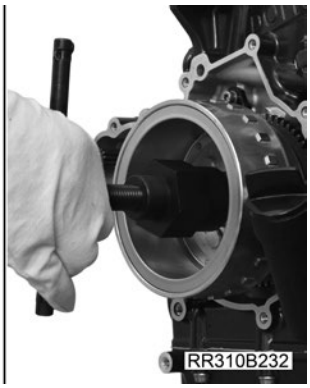
**Spare parts**

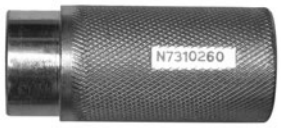
Only use TVS Original Parts. Only genuine spare parts guarantee the same quality, duration, and safety as original parts, as they are the same parts that are assembled during standard production. Only TVS Original Parts can offer this guarantee.

## WORKSHOP TOOLS AND EQUIPMENTS

### Special tools

| Part Number | Description of tools | Image |
|---|---|---|
| NB310090 | U69 ENGINE HOLDER AND ROTARY STAND |  RR310A309 |
| N7310140 | TOOL TDC LOCK |  RR310A564 |
| NB310100 | TOOL PISTON RING ASSY |   RR310B209 |
| N7310110 | TOOL ONEWAY CLUTCH ASSY |  RR310A560 |

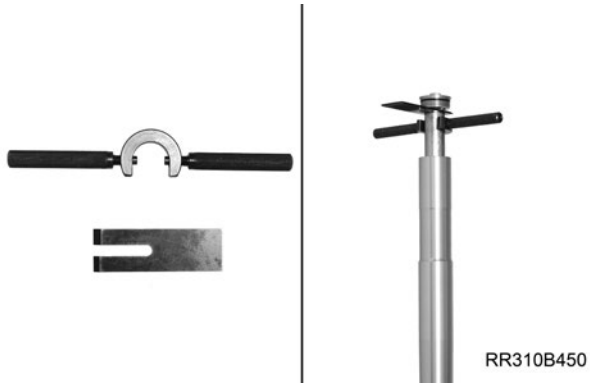
| Part Number | Description of tools | Image |
|---|---|---|
| N7310170 | ADAPTER COMPRESSION GAUGE |  RR310A565 |
| N7310150 | ADAPTER MAGNETO PULLER |   RR310B232 |
| N7310090 | TOOL IG INDEX - TOOL IGNITION COIL |   RR310B442 |
| NB310080 | TOOL PISTON CIRCLIP ASSY. |  RR310A559 |

| Part Number | Description of tools | Image |
|---|---|---|
| N7310160 | SERVICE TOOL CLUTCH NUT |  RR310A446 |
| N7310280 | MANDREL COOLANT SEAL 35 27 |  RR310A573 |
| N7310240 | MANDREL BALL BEARING 26 10 |  RR310A570 |
| N7310230 | MANDREL NEEDLE BEARING 12 8 |  RR310A569 |

| Part Number | Description of tools | Image |
|---|---|---|
| N7310220 | MANDREL NEEDLE BEARING 20 14 |  RR310A568 |
| N7310190 | MANDREL OIL SEAL 24 15 |  RR310A566 |
| N7310070 | PISTON ROD HOLDER |  RR310A449 |
| N7310210 | MANDREL NEEDLE BEARING 32 25 |  RR310A567 |

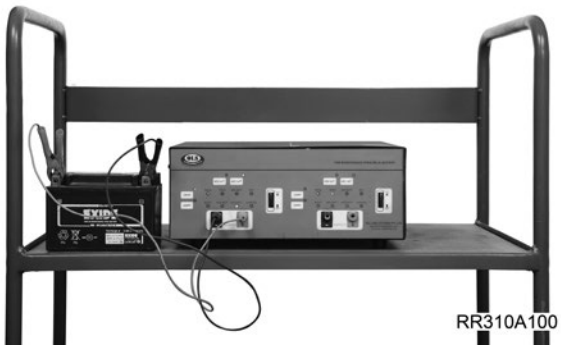
| Part Number | Description of tools | Image |
|---|---|---|
| N7310100 | PLATE ENGINE SUPPORT |    |
| N7310130 | STEM OIL HOLDER |  RR310A563 |
| S1310020 | EXTRACTOR ASSY INLET & EXH VAL |  RR310A580 |
| N7310120 | TOOL ONEWAY CLUTCH RE-MOVER |  RR310A562 |

| Part Number | Description of tools | Image |
|---|---|---|
| N7310250 | MANDREL BALL BEARING 40 17 |  RR310A571 |
| N7310020 | TOOL - DAMPER ROD |  RR310A448 |
| N7310010 | TOOL CARTRIDGE HOLDER |  RR310A449 |
| ME-99050515 | ENGINE OIL FILTER TOOL |   RR310B021 |

| Part Number | Description of tools | Image |
|---|---|---|
| N7310050 | TOOL SPACE HOLDER |  RR310B450 |
| N7310060 | INSTALLER FRONT FORK OIL SEAL |  RR310A557 |
| NB310050 | SLIT INSERT |  RR310A578 |
| N7210010 | ADJUSTER SHOCK ABSORBER REAR |  RR310A556 |

| Part Number | Description of tools | Image |
|---|---|---|
| N7310080 | TOOL SWINGARM SERVICE |  RR310A558 |
| NB310020 | STEERING CONE REMOVER |  RR310A575 |
| NB310030 | REMOVER STEERING CUP |  RR310A576 |
| NB310010 | MANDREL STEERING CONE |  RR310A574 |

| Part Number | Description of tools | Image |
|---|---|---|
| NB310040 | ASSY TOOL STEERING CUPS |  RR310A577 |
| N7310260 | MANDREL BALL BEARING |  RR310A572 |
| ME-311800 | FORK OIL LEVEL |  RR310A553 |
| ME-99010595 | CALIPER PIN REMOVER TOOL |  RR310A555 |

| Part Number | Description of tools | Image |
|---|---|---|
| ME-98200080 | PORTABLE BATTERY CHARGER - MXS 3.8 (Part No. Pending) |  RR310A100 |
| ME-99010551 | CHAIN REMOVING & INSTALLT-ING TOOL |  RR310A554 |

## PARKING THE VEHICLE ON PADDOCK STAND

Component : Parking the vehicle
Objective : To install and remove the paddock stand
Repair cycle : Whenever required

**CAUTION**

Ensure the ramp is free from oil and other slippery materials.
Do not sit on the vehicle when parked with paddock stand.

**Rear Wheel Paddock**

- Park the vehicle on the ramp using side stand.
- Make sure the vehicle is parked in the center of the ramp and there is enough space on all sides of the vehicle.
- Turn OFF the engine and ignition.

**WARNING**

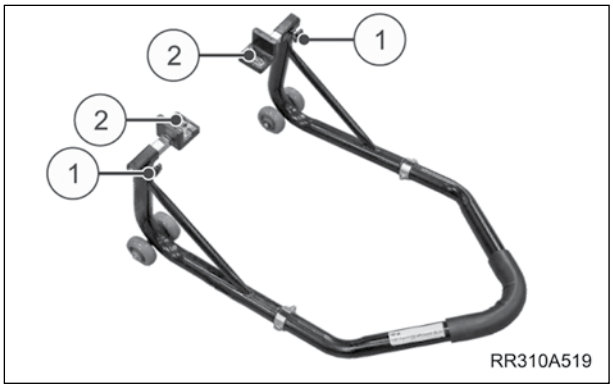
Parked vehicle may roll over or fall over. Always place the vehicle in the middle of the ramp. This may result in serious injury or death.

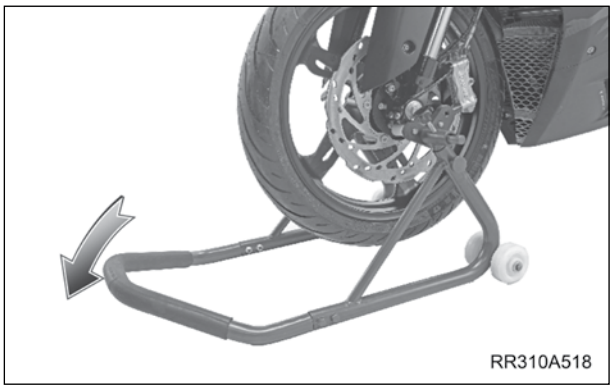
**NOTE**

Ask a helper to hold the vehicle firmly on the ramp, till the Paddock stand is applied completely.

(Refer image RR310A519)

- Loosen the clamping screws (1) of the stand adopters.
- Move away the adapters (2) in such way that the swing arm fits between them.
- Ensure that the axle is not covered.
- Position the stand.
- Make sure that the vehicle is secured so that it cannot topple sideways.
- Push the stand down until the motorcycle is standing upright and the handle of auxiliary stand is resting on the floor properly.

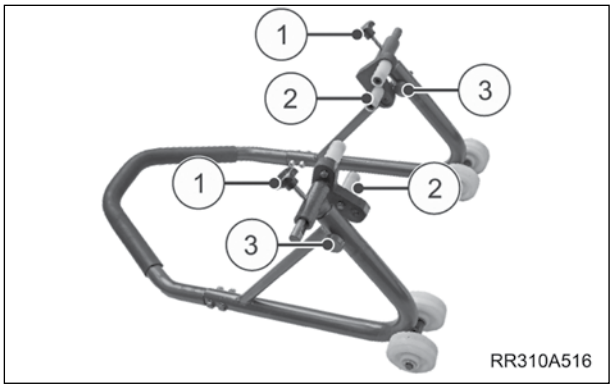


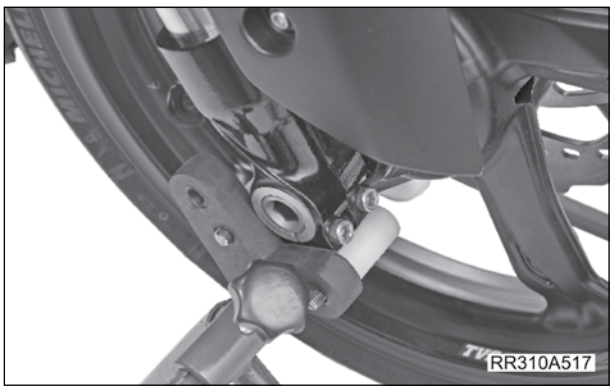




**Front Wheel Paddock**

(Refer image RR310A516)

- Loosen the clamping screws (1) of the stand adopters.
- w Move away the adopters (2 & 3) in such way that the front forks fit between them.
- Centre the stand relative to the front wheel and push it against the front axle.
- Align the two adapters (2 & 3) so that the front forks are securely seated.
- Apply uniform pressure to push the stand down and raise the motorcycle.
- Tighten the clamping screws (1).



## OPERATING THE RAMP

Component : Ramp lift / lower
Objective : To raise or lower the ramp

**CAUTION**

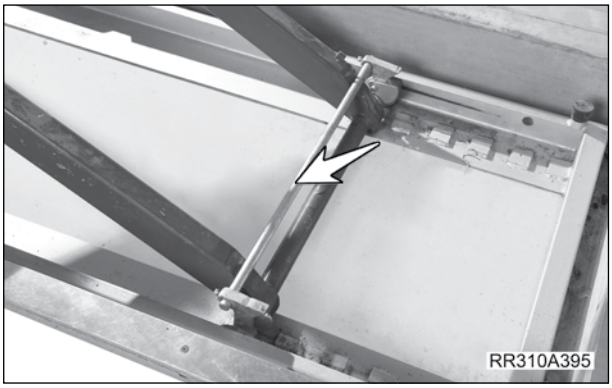
Ensure the ramp is free from oil and other slippery materials.


**Raise**

- Park the vehicle on the ramp using side stand.
- Lift the ramp to the desired height using the UP button.
- Push the locking bar into the locking blocks.
- Slightly lower the ramp and ensure the ramp is safely locked.

**WARNING**

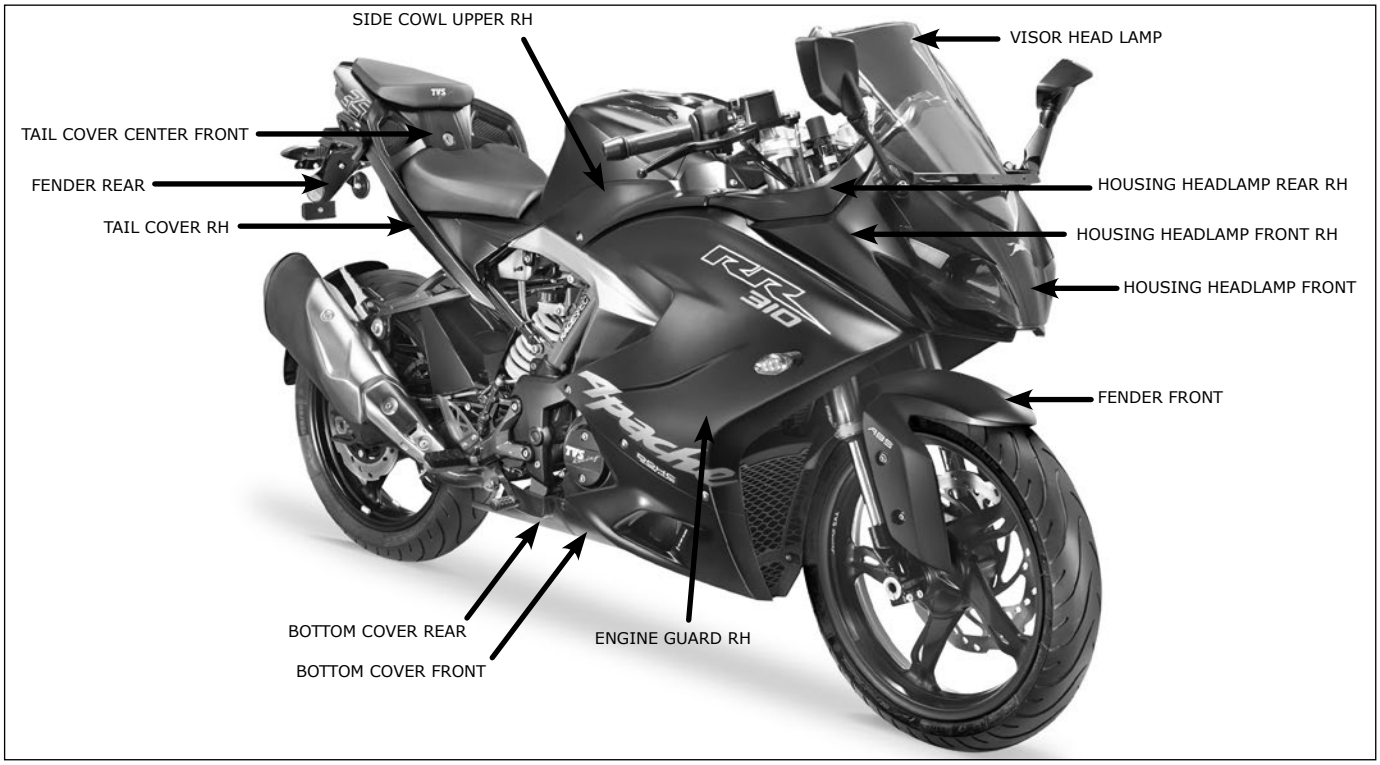
Never get below the ramp which is in raised condition.




**Lower**

- Lift the locking bar from the locking blocks.
- Press the DOWN button and lower the ramp until it completely touches the bottom end.

# COWLS IDENTIFICATION




RIGHT HAND SIDE


LEFT HAND SIDE

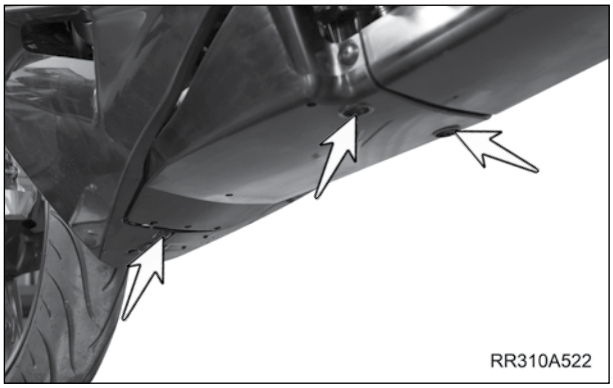
# BOTTOM COVER FRONT AND REAR

Component : Bottom cover front and rear
Component condition : Vehicle on ramp and component accessible
Objective : Bottom cover front and rear removal
Repair cycle : As required

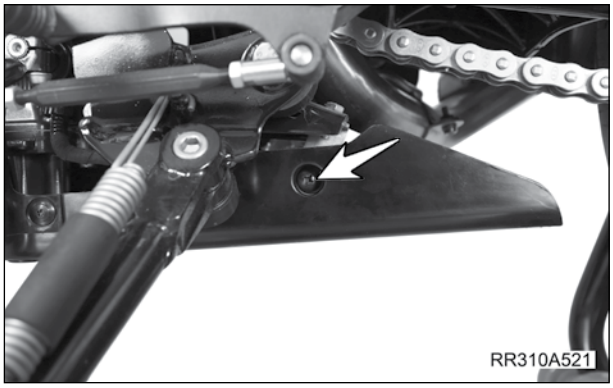
**Removal**

- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the plastic snap rivet at the front.
- Remove the mounting bolts.

| | |
|---|---|
| Tool | 10 mm socket |
| Tightening torque | 5 Nm |




- Remove pan head screws on both the sides.




**Install**

- Installation is the reverse of removal.

## ENGINE GUARD CENTER

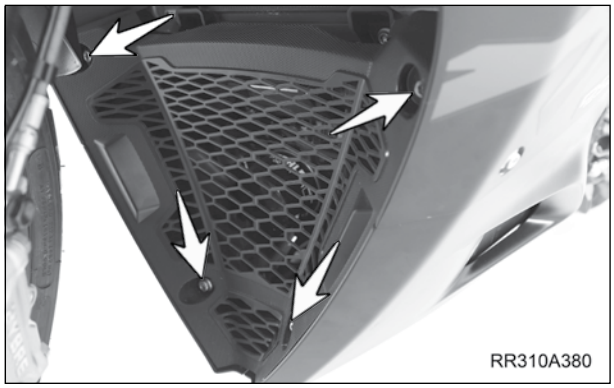
Component : Engine guard center
Component condition : Vehicle on ramp and component accessible
Objective : Engine guard center removal
Repair cycle : As required

**Removal**

- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the cover bolts.

| | |
|---|---|
| Tool | 5 mm Allen Key bit |
| Tightening torque | 5 Nm |

- Lift up and remove the engine guard center.




**Installation**

- Installation is the reverse of removal.

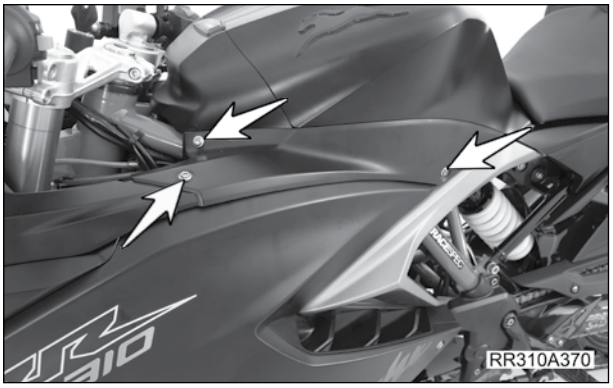
# SIDE COWL UPPER LH AND RH

Component : Side cowl upper LH and RH
Component condition : Vehicle on ramp and component accessible
Objective : Side cowl upper LH and RH removal
Repair cycle : As required.

**Removal**

- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the three allen screws.
- Slide the cowl front and pull the side cowl upper LH out.
- Repeat the same procedure for removing the cowl on the RH side.

| | |
|---|---|
| Tool | 5 mm Allen Key bit |
| Tightening torque | 5 Nm |




**Installation**

- Installation is the reverse of removal.

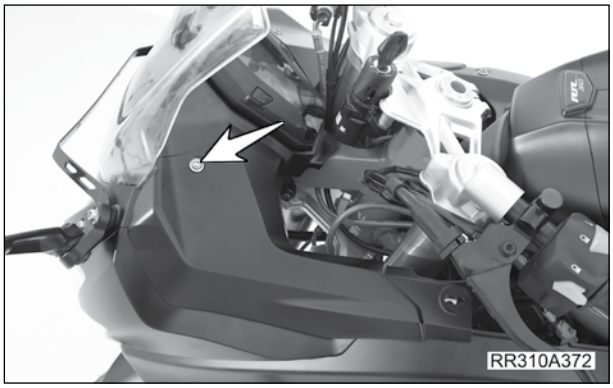
## HOUSING HEADLAMP REAR LH AND RH

Component : Housing headlamp rear LH and RH
Component condition : Vehicle on ramp and component accessible
Objective : Housing headlamp rear LH and RH removal
Repair cycle : As required

**Removal**

- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove side cowl upper LH. Refer ***Side cowl upper removal*** for procedure.
- Remove the allen screw.

| | |
|---|---|
| Tool | 5 mm Allen Key bit |
| Tightening torque | 5 Nm |




- Pull the cowl gently in outer direction till the lugs pop out.
- Remove the cowl clear off the vehicle.
- Repeat the same procedure for removing the cowl on the RH side.

**Installation**

- Installation is the reverse of removal.

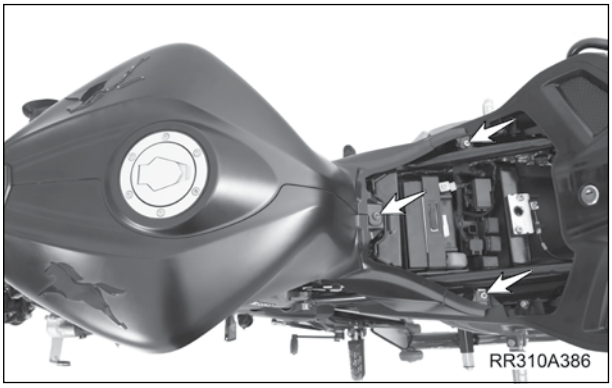
# FUEL TANK COVER ASSEMBLY

Component : Fuel tank cover assembly
Component condition : Vehicle on ramp and component accessible
Objective : Fuel tank cover assembly removal
Repair cycle : As required

**Removal**

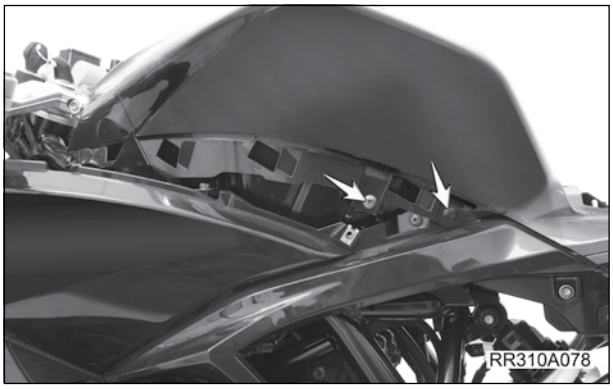
- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the seats. Refer ***Seat removal*** for procedure.
- Remove side cowl upper LH. Refer ***Side cowl upper removal*** for procedure.
- Remove side cowl upper RH. Refer ***Side cowl upper removal*** for procedure.
- Remove the tank cover mounting bolts below the seats.

| | |
|---|---|
| Tool | 5 mm Allen Key bit |
| Tightening torque | 5 Nm |




- Remove the side mountings on the LH side.
- Remove the side mountings on the RH side.

| | |
|---|---|
| Tool | 10 mm socket bit |
| Tightening torque | 5 Nm |




- Lift the tank cover at the front first and clear off the vehicle.


**Installation**

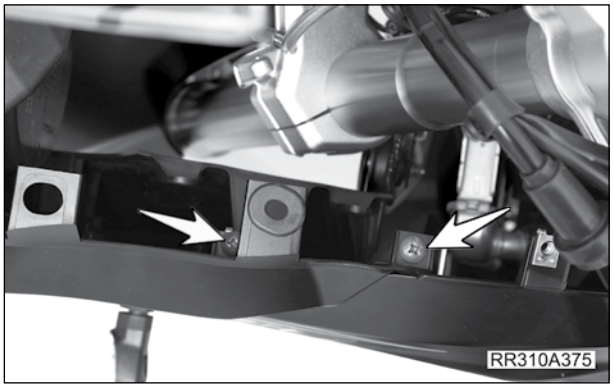
- Installation is the reverse of removal.

# ENGINE GUARD

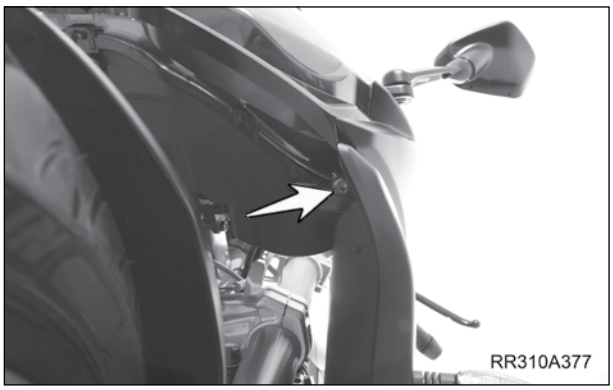
Component : Engine guard
Component condition : Vehicle on ramp and component accessible
Objective : Engine guard removal
Repair cycle : As required

**Removal**

- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove bottom cover. Refer ***Bottom cover removal*** for procedure.
- Remove engine guard center. Refer ***Engine guard center removal*** for procedure
- Remove side cowl upper LH. Refer ***Side cowl upper removal*** for procedure.
- Remove the mounting screws on the inside from the top.

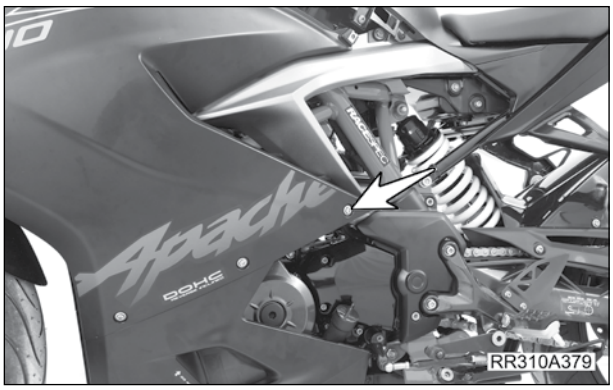



- Remove the mounting screws on the inside from the bottom.

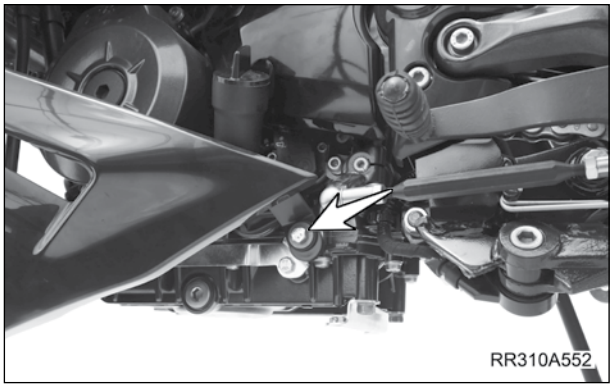



- Remove the mounting screw on the outside.

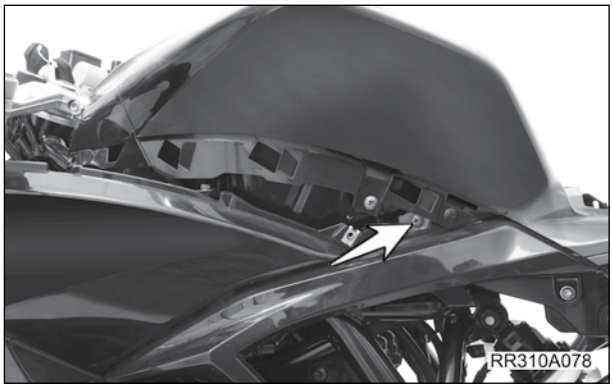
| | |
|---|---|
| Tool | 5 mm Allen Key bit |
| Tightening torque | 5 Nm |



- Remove the bottom mounting bolt.




- Remove the mounting bolt at the top below the fuel tank cover.




- Remove the snap rivet at the bottom.

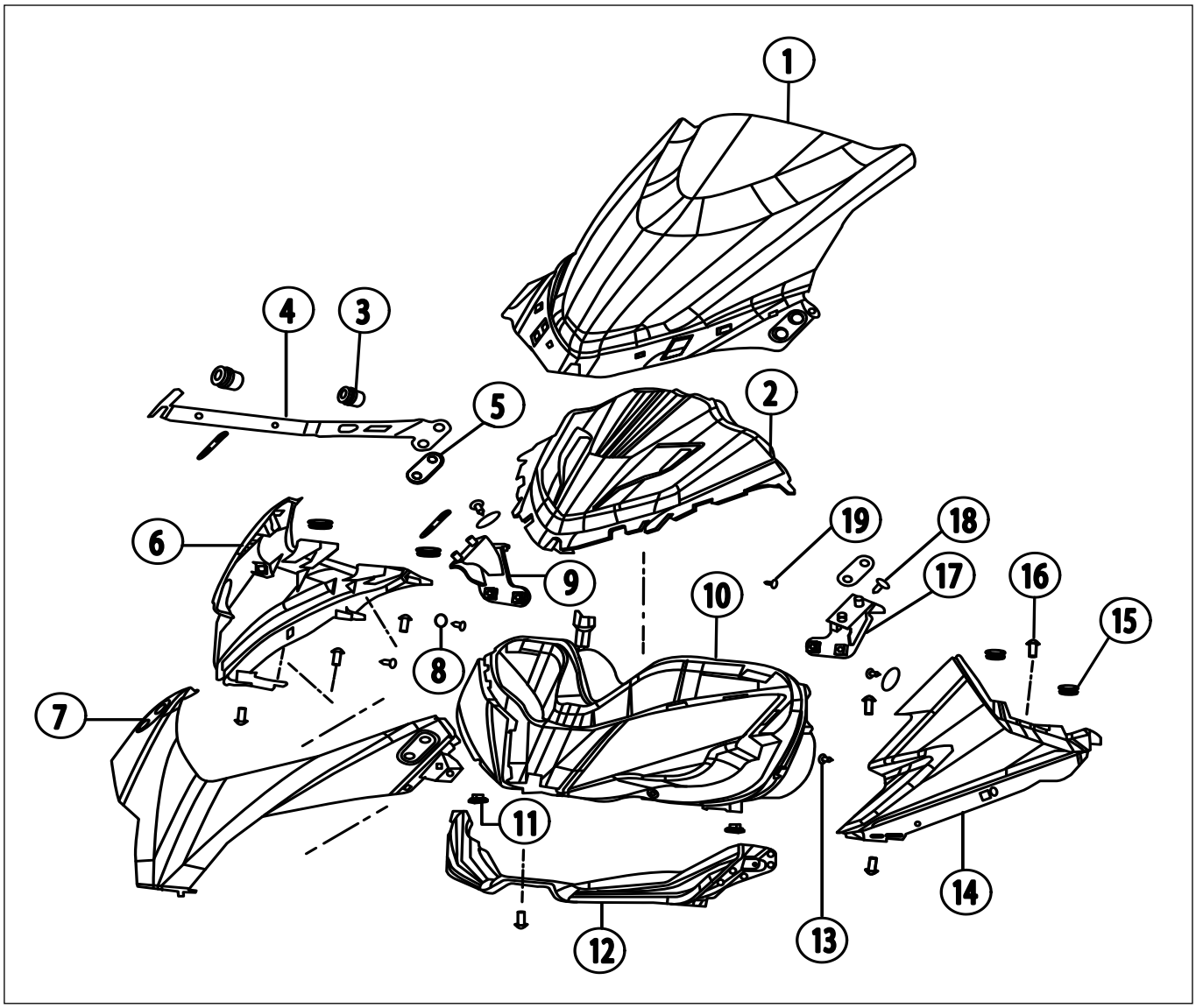

- Gently pull the cowl out and disconnect the indicator connector.
- Remove the engine guard.
- Repeat the procedure to remove the engine guard on the RH side.

**Installation**

- Installation is the reverse of removal.
- Connect ***TVS Ride Scan Tool*** and run diagnostics.

## HEADLAMP HOUSING COMPONENTS

Component : Headlamp housing components
Component condition : Headlamp assembly on workbench
Objective : Headlamp housing components replace
Repair cycle : As required




| Item No. | Description | Item No. | Description |
|---|---|---|---|
| 1 | Visor headlamp | 11 | Retainer clip M6 |
| 2 | Visor headlamp bottom | 12 | Housing headlamp bottom |
| 3 | Visor grommet MTG | 13 | CRR flanged pan head tap screw |
| 4 | Licence plate bracket | 14 | Housing headlamp front LH |
| 5 | Mirror grommet | 15 | Cushion fuel tank |
| 6 | Housing headlamp front RH | 16 | CRR pan head screw M6X16 |
| 7 | Housing headlamp front | 17 | Mirror bracket MTG LH |
| 8 | Plastic Spacer | 18 | Snap rivet plastic |
| 9 | Mirror bracket MTG RH | 19 | Socket screw 3.5X16 |
| 10 | Headlamp assembly | | |

**Removal**

- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove side cowl upper LH. Refer ***Side cowl upper removal*** for procedure.
- Remove side cowl upper RH. Refer ***Side cowl upper removal*** for procedure.
- Remove Housing head lamp rear LH and RH. Refer ***Housing headlamp rear*** for procedure.
- Remove bottom cover. Refer ***Bottom cover*** for procedure.
- Remove Engine guard LH and RH. Refer ***Engine guard removal*** for procedure.
- Remove Instrument cluster. Refer ***Instrument cluster removal*** for procedure.
- Remove headlamp assembly. Refer ***Head lamp removal*** for procedure.
- Place the headlamp assembly on workbench.
- Replace the headlamp housing components as required. Refer the exploded view for mounting fasteners.

**Installation**

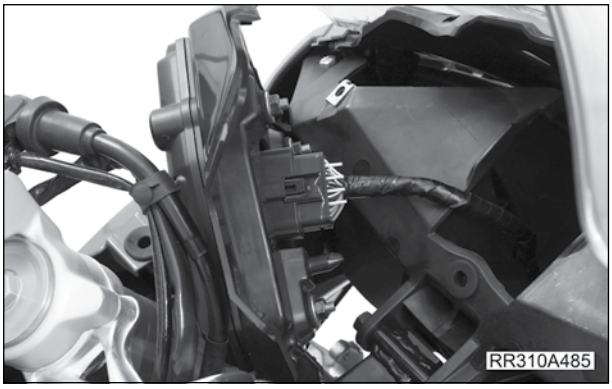
- Installation is the reverse of removal.
- Connect ***TVS Ride Scan Tool*** and run diagnostics.

# HOUSING INSTRUMENT CLUSTER

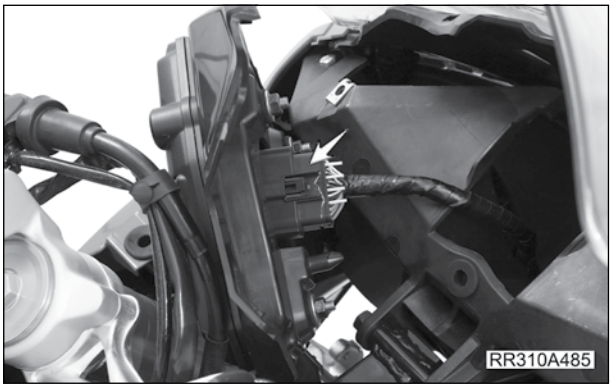
Component : Housing Instrument cluster
Component condition : Vehicle on ramp and component accessible
Objective : Housing Instrument cluster removal
Repair cycle : As required

**Removal**

- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove side cowl upper LH. Refer ***Side cowl upper removal*** for procedure.
- Remove side cowl upper RH. Refer ***Side cowl upper removal*** for procedure.
- Remove Housing head lamp rear LH and RH. Refer ***Housing headlamp rear*** for procedure.
- Pull the instrument cluster with housing out of the headlamp assembly.




- Cut the wire tag and disconnect the instrument cluster connector.
- Remove the mounting nuts(X3) and separate the cluster from the housing.




**Install**

- Installation is the reverse of removal.
- Connect ***TVS Ride Scan Tool*** and run diagnostics.

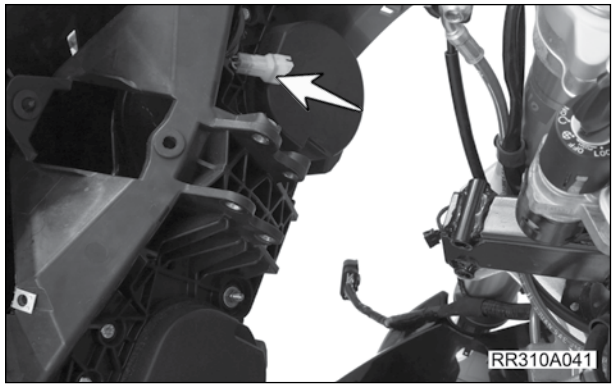
# HEADLAMP ASSEMBLY

Component : Headlamp assembly
Component condition : Vehicle on ramp and component accessible
Objective : Headlamp assembly removal
Repair cycle : As required

**Removal**

- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove side cowl upper LH. Refer ***Side cowl upper removal*** for procedure.
- Remove side cowl upper RH. Refer ***Side cowl upper removal*** for procedure.
- Remove Housing head lamp rear LH and RH. Refer ***Housing headlamp rear*** for procedure.
- Remove bottom cover. Refer ***Bottom cover*** for procedure.
- Remove the Engine center guard. Refer ***Engine center guard removal*** procedure.
- Remove Engine guard LH and RH. Refer ***Engine guard removal*** for procedure.
- Remove Instrument cluster. Refer ***Instrument cluster removal*** for procedure.
- Disconnect the headlamp connector and cut the wire tag.
- Remove the headlamp assembly.

| | |
|---|---|
| Tool | 12 mm socket bit |
| Torque | 15 Nm |


**Installation**

- Installation is the reverse of removal.
- Connect ***TVS Ride Scan Tool*** and run diagnostics.

# FENDER REAR ASSEMBLY

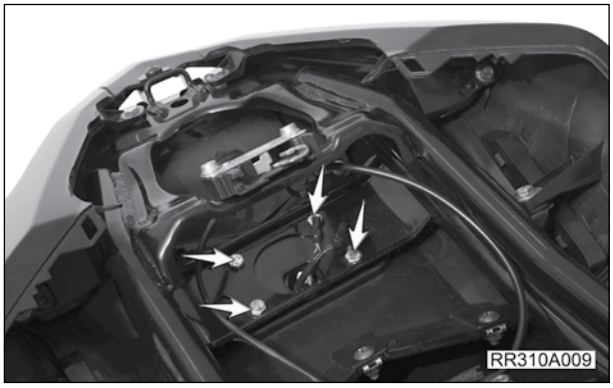
Component : Fender rear assembly
Component condition : Vehicle on ramp and component accessible
Objective : Fender rear assembly removal
Repair cycle : As required

**Removal**

- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove both the seats. Refer ***Seat removal*** procedure.
- Remove the tail cover center front. Refer ***Tail cover center front*** for procedure.
- Disconnect indicator connectors LH and RH, Tail lamp connector, license plate light connector.
- Cut the wire tags.
- Remove the fender assembly.


- Remove fender mounting bolts.

| | |
|---|---|
| Tool | 10 mm Socket bit |
| Torque | 5 Nm |




- Gently pull the fender assembly out.

**Installation**

- Installation is the reverse of removal.
- Connect ***TVS Ride Scan Tool*** and run diagnostics.

# TAIL COVER ASSEMBLY

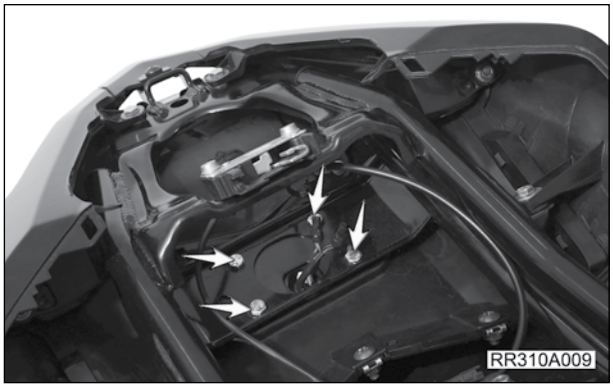
Component : Tail cover assembly
Component condition : Vehicle on ramp and component accessible
Objective : Tail cover assembly removal
Repair cycle : As required

**Removal**

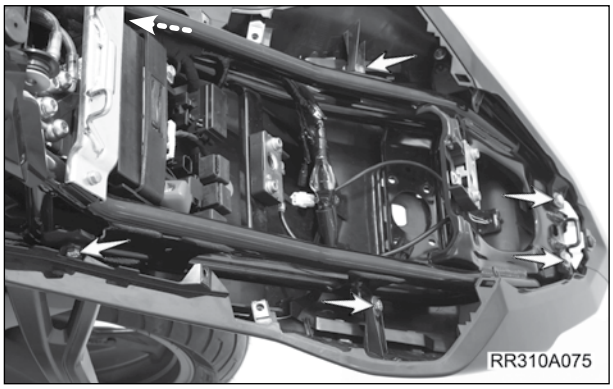
- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove both the seats. Refer ***Seat removal*** procedure.
- Remove the tail cover center front. Refer ***Tail cover center front*** for procedure.
- Disconnect indicator connectors LH and RH, Tail lamp connector, license plate light connector.
- Cut the wire tags.
- Remove the fender assembly.


- Remove fender mounting bolts.

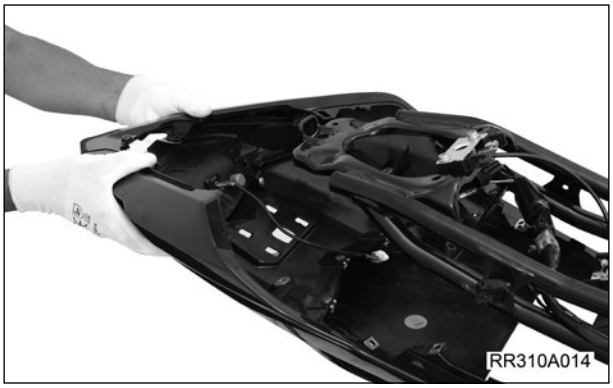
| | |
|---|---|
| Tool | 10 mm Socket bit |
| Torque | 5 Nm |




- Remove the mounting bolts as shown.



- Remove the Tail cover assembly.
- Separate the LH, RH and bottom cover as required.




**Installation**

- Installation is the reverse of removal.
- Connect ***TVS Ride Scan Tool*** and run diagnostics.

# TAIL COVER CENTER FRONT

Component : Tail cover center front
Component condition : Vehicle on ramp and component accessible
Objective : Tail cover center front removal
Repair cycle : As required

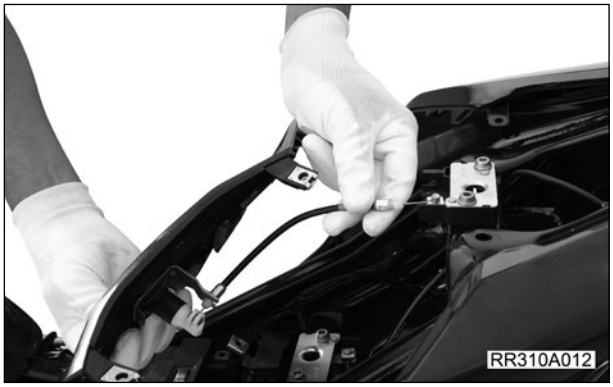
**Removal**

- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove both seats. Refer ***Seat removal*** procedure.
- Remove the upper mounting rivets and bottom mounting bolts.

| | |
|---|---|
| Tool | 10 mm socket bit |
| Torque | 5 Nm |

- Pull the cover gently till the lock assembly snaps out.


- Disconnect seat bowden cable. Slide upwards and remove the tail cover center front.




**Installation**

- Installation is the reverse of removal.

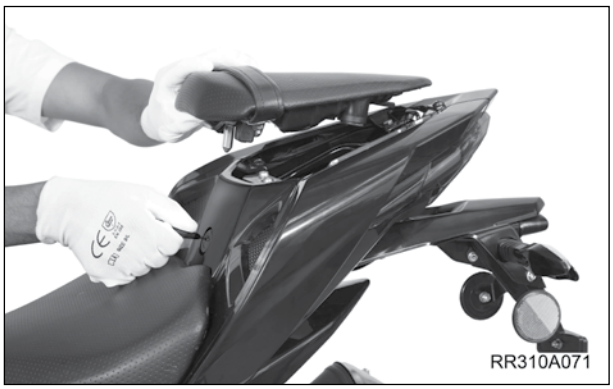
## SEAT ASSEMBLY REMOVAL

Component : Seat
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : As required

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.

**Rear seat (Pillion seat) removal**

- Insert the ignition key into the seat lock.
- Turn it clockwise, release and lift the rear seat.
- Installation procedure is reverse the removal process.
- Reverse the slide process done while removal of the rear seat and press the front end of the seat.




**CAUTION**

Ensure the seat is locked securely in position after installation.

**Front seat (Rider Seat) removal**

- To remove the front seat, remove the rear seat first and take out the key from the lock.
- Pull the seat release cable to release the seat lock. Keeping the seat release cable pulled, lift the seat from the rear end and slide it backwards to remove.
- Installation procedure is reverse the removal process.


**CAUTION**

Ensure the seat is locked securely in position after installation. Reverse the slide process done while removal of the front seat and press the front end of the seat at the seat pin area.

## PERIODIC MAINTENANCE TABLE

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

| Description | Service | 1st | 2nd | 3rd | 4th | 5th |
|---|---|---|---|---|---|---|
| | km x 1000 | 1 | 5 | 10 | 15 | 20 |
| | Months | 2 | 6 | 12 | 18 | 24 |
| Engine oil filter along with drain bolt washer | | R | - | R | - | R |
| Engine oil | | R | T | R | T | R |
| Air cleaner element | | - | - | R | - | R |
| Spark plug | | - | - | - | - | R |
| Tappet clearance (valve clearance)* | | - | - | I & A | - | I & A |
| Clutch operations (adjust if required) | | I & A | I & A | I & A | I & A | I & A |
| Throttle cable / grip / system (replace parts if required) | | - | - | I | - | I |
| Steering play | | I & A | - | I & A | - | I & A |
| Front and rear suspension | | - | - | I | - | I |
| Wheel bearing freeness (replace if required) | | - | - | I | - | I |
| Air suction system / engine breather | | - | - | I | - | I |
| Front fork oil replacement | | - | - | - | - | R |
| All fasteners | | I & TI | - | I & TI | - | I & TI |
| Drive chain slackness / lubrication | | Inspect, adjust and lubricate every 1000 km | | | | |
| Drive chain wear (replace if required) | | - | - | I | - | I |
| All lamps and horn | | - | I | I | I | I |
| Head lamp beam (focus) | | I & A | I & A | I & A | I & A | I & A |
| Battery voltage (recharge if required) | | I | I | I | I | I |
| Brake light switch operation | | I | I | I | I | I |
| Front and rear brake fluid level** | | I | I | R | I | R |
| Front and rear brake pad wear (replace if required) | | - | I | I | I | I |
| Disc plates (replace if required) | | - | - | I | - | I |
| Brake hose / rubber parts of master cylinder and Caliper front and rear (replace if required) | | - | - | I | - | I |
| Master cylinder cups | | - | - | - | - | I & R |
| Tyre air pressure (at cold condition) | | I & A | I & A | I & A | I & A | I & A |
| Steering stem bearing (Inspect & lubricate with Grease if required) | | I & L | - | I & L | - | I & L |
| Speed sensor (free from any mud / clogging with dirt) | | I | I | I | I | I |
| Coolant level, water hoses and O-rings (replace if required)*** | | I | I | I | I | I |
| Fuel hose / system | | I | - | I | - | I |
| Fuel filter | | - | - | - | - | R |
| Swing arm bearing (replace if required) | | I | I | I | I | I |

| Description | Service | 1st | 2nd | 3rd | 4th | 5th |
|---|---|---|---|---|---|---|
| | km x 1000 | 1 | 5 | 10 | 15 | 20 |
| | Months | 2 | 6 | 12 | 18 | 24 |
| Side stand | | C, I & L | C, I & L | C, I & L | C, I & L | C, I & L |
| Side stand switch function and physical damage | | I | I | I | I | I |
| Drive chain guide wear (replace if required) | | - | - | I | - | I |
| Instrument cluster MIL lamp function | | I | I | I | I | I |
| Radiator fan / fins and deflector (clean if required) | | I | I | I | I | I |
| Reading fault codes using diagnostic tool | | I | I | I | I | I |
| Availability of fuse puller and fuse condition | | I | I | I | I | I |
| Brake pedal / gear shift lever mounting pin (lubricate using grease) | | I | I | I | I | I |
| Ignition cum steering lock (lubricate) | | C & L | C & L | C & L | C & L | C & L |

* Adjust if necessary.
** Replace brake fluid first at 10000 kms and every 20000 kms or 2 years thereafter.
*** Coolant, hoses and O-rings must be replaced every 30000 kms or every 3 years.
At higher odometer readings, the above service intervals to be followed.

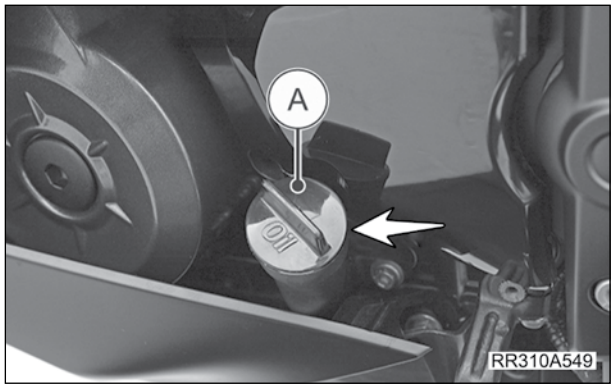
## ENGINE OIL LEVEL CHECK

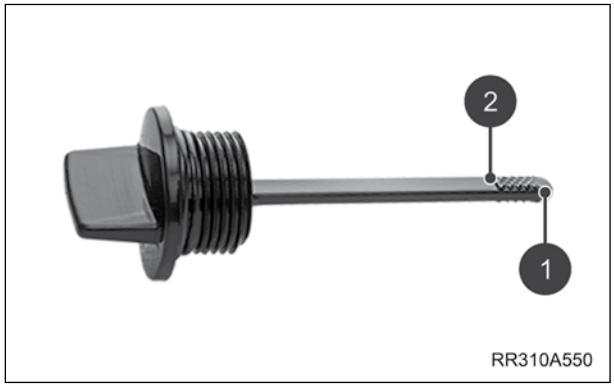
Component : Engine oil dipstick
Objective : To check the level of engine oil
Repair cycle : As required

**CAUTION**

Check the engine oil level before the riding the motorcycle. Insufficient engine oil or too much engine oil affects the engine adversely.

- Hold the vehicle in upright condition with both wheels on ground, on a flat and firm surface while checking the oil level to avoid wrong indication.
- Wipe off the surroundings of the gauge oil level. Start the engine and let it idle for 3 to 5 minutes.
- Switch OFF of the ignition. Hold the vehicle in upright condition with both wheels on ground, on a flat and firm surface.
- After 2 to 3 minutes, remove the gauge oil level (A) and wipe it cleanly.
- Re-fix the gauge again. Slowly and steadily remove the gauge and inspect the oil level.
- The level should be between minimum (1) and maximum level (2) mark on the gauge.
- If the level is below the minimum level (1), slowly add recommended engine oil till the level reaches to maximum level (2).
- Re-fix gauge after ensuring correct oil level.
- Wipe out the oil traces with a clean cloth to prevent dust accumulation.
- Re-fix gauge after ensuring correct oil level.
- Wipe out the oil traces with a clean cloth to prevent dust accumulation.




**CAUTION**

Running the engine with insufficient or excess engine oil may cause serious damage to the engine.

## ENGINE OIL AND OIL FILTER REPLACEMENT

Component : Engine oil and engine oil filter
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : Engine oil and Filter has to be replaced first at 1000 kms and then every 10000 kms or 1 year whichever is earlier

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the bottom cover. Refer to ***Bottom cover*** procedure.
- Remove the center engine guard. Refer to ***center engine guard*** procedure.
- Start the engine and run in idle rpm for 60 seconds or till oil reaches 65° to 70°C temperature.

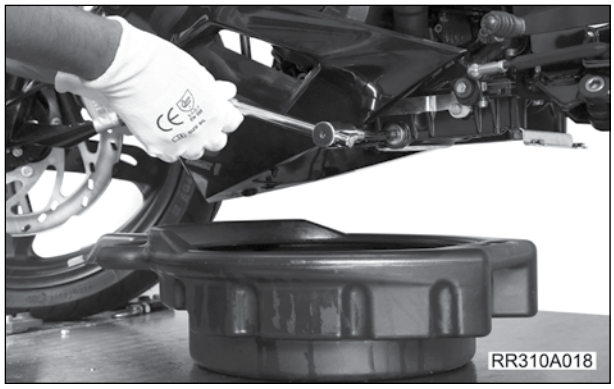
**⚠ WARNING**

Hot engine oil may cause burns, always wear gloves when handling engine oil and/or touching hot surfaces.

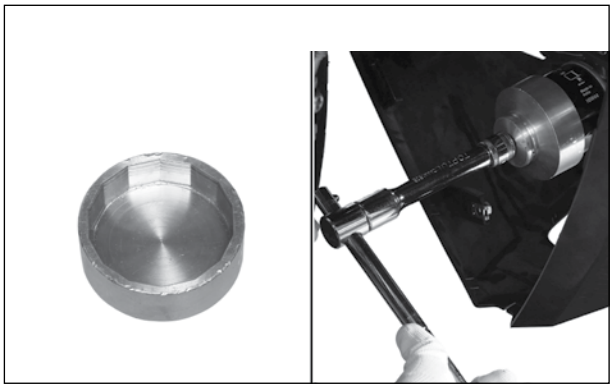
Do not come in direct contact with Engine oil. Always wear suitable protective equipment when working with hazardous chemicals like oil, coolant etc.

- Clean the surfaces around the dipstick and drain nut.
- Place a clean tray to collect the drained oil below the drain plug.
- Remove the drain plug and ensure the oil drains into the tray only and does not spill out.
- Loosen and remove the dipstick to make sure the oil will be drained easily.

| | |
|---|---|
| Tool | 8 mm Allen Key Long-bit |




- Using the oil filter wrench remove the oil filter from the vehicle and discard it.



**CAUTION**

Spilled oil must be cleaned immediately. Always keep the work area clear of any spills to avoid any injuries.

**NOTE**

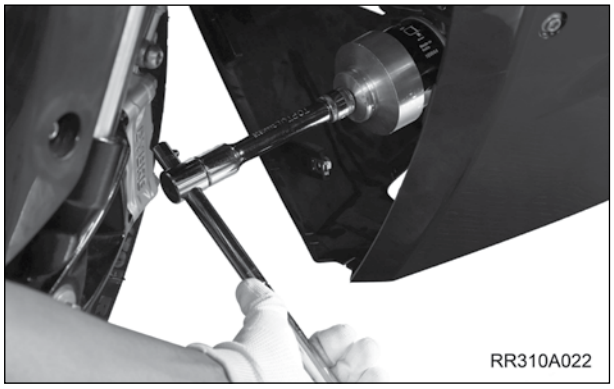
Ensure oil is drained completely.

**CAUTION**

Dispose used oil and oil filter in accordance with local environmental regulations.

**NOTE**

Do not reuse the oil and oil filter, always replace with new.

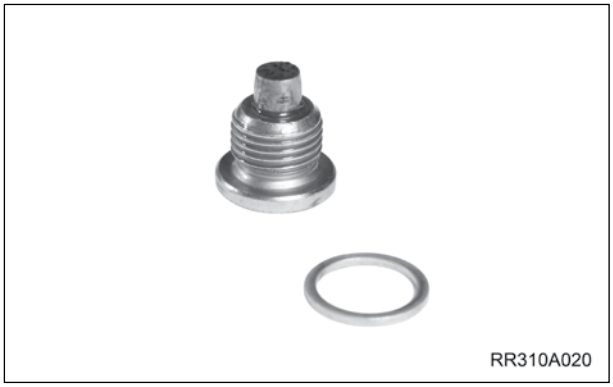



- Apply a thin film of oil to the O-ring of the new oil filter.
- Install the new oil filter on the slot.

| | |
|---|---|
| Tightening torque | 19 Nm |

- Replace the drain plug washer with new.
- Tighten the drain plug using a torque wrench.

| | |
|---|---|
| Tool | 8mm bit |
| Tightening torque | 20 Nm |




- Fill the TVSM TRU4 synthetic oil/MOTUL 3000 4T Plus MA2 oil of 1700 ml.
- Tighten the dipstick while ensuring the condition of the O-ring.
- Start the engine.
- Run the engine in idle and ensure there are no oil leaks from the oil filter and drain plug.
- Check the engine oil level and top up if required. Refer ***Engine oil level check*** procedure for checking engine oil level.

## AIR CLEANER ELEMENT REPLACEMENT

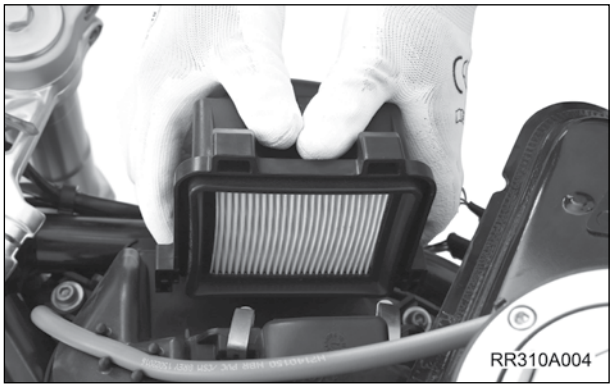
Component : Air cleaner element replace
Component condition : Vehicle on ramp and component accessible
Objective : General / periodic service
Repair cycle : Air filter element has to be replaced every 10,000 kms or 1 year, whichever is earlier.

**CAUTION**

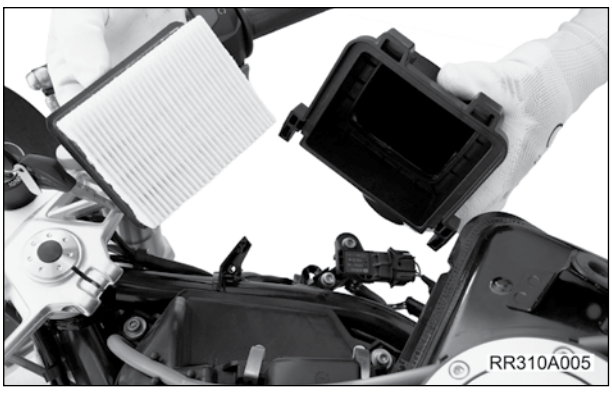
Replace the air filter more frequently if the vehicle is being used in a dusty environment.

- Remove the fuel tank cover. Refer to ***Fuel tank cover*** procedure
- Remove the two air filter housing clips.


- Gently lift and pull out the air filter duct.




- Remove the air filter element from the air filter housing.
- Wipe the air filter housing with a clean tissue.
- Install a new filter element.
- Installation is reverse the removal procedure.




**CAUTION**

Do not blow air or use cloth to clean the air filter housing. Blowing air could force the dust into the intake and by using cloth there are chances of lint or threads being left behind. Either way there are chances of engine damage.

Cleaning and reusing the element is not recommended and should always be replaced with new.

**WARNING**

Always use a recommended mask to clean the air filter and its housing.

## SPARK PLUG REPLACEMENT

Component : Spark plug
Component condition : Vehicle on ramp and component accessible
Objective : General / periodic service
Repair cycle : Spark plug has to be replaced every 20,000 kms or 2 year, whichever is earlier

**CAUTION**

Use the recommended **NGK Make Spark Plug (LMAR9D - J)** only

**WARNING**

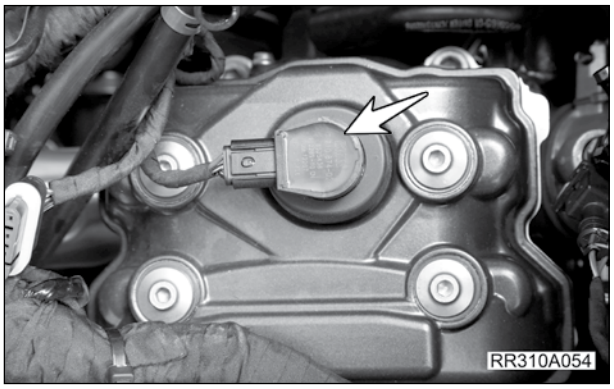
Do not clean or adjust the gap of spark plug. If any malfunction is observed in spark plug replace it.

Neglecting the replacement of spark plug will lead to difficulty in starting and poor performance.

Before removing the spark plug clean the surroundings of spark plug to prevent any foreign materials falling inside the cylinder bore.

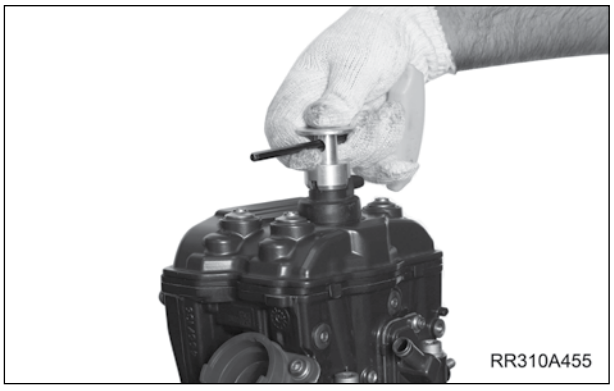
**Removal**

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove both seats. Refer ***Seat removal*** for procedure.
- Remove the fuel tank cover. Refer to ***Fuel tank cover*** procedure.
- Remove fuel tank assembly. Refer to ***Fuel tank assembly*** for procedure.
- Disconnect the electrical connection to ignition coil.



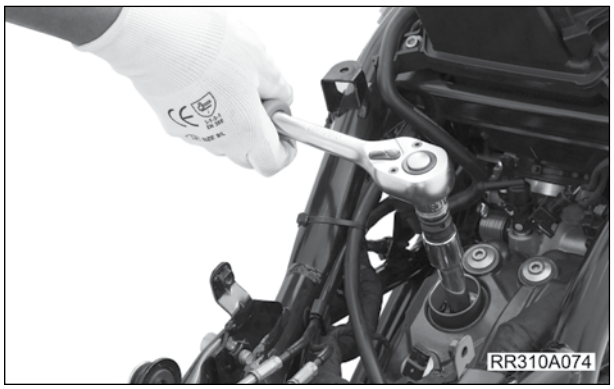

- Pull the ignition coil from the engine.

| Tool | N7310090 |
|---|---|



- Rotate and remove the spark plug.

| | |
|---|---|
| Tool | 14 mm special bit |




**Installation**

- Insert the spark plug vertically into the spark plug hole.
- Hand tighten the spark plug and later using the special tool.

| | |
|---|---|
| Tool | 14 mm special bit |
| Torque - used plug | 12 Nm |
| Torque - new plug | pre tightening 15 Nm |
| | loosen and final 12 Nm |

**CAUTION**

The insulator of the spark plug will break if the wrench is inclined during tightening.

- Hand press the ignition coil into the coil slot.
- Connect the ignition coil electrical connection.

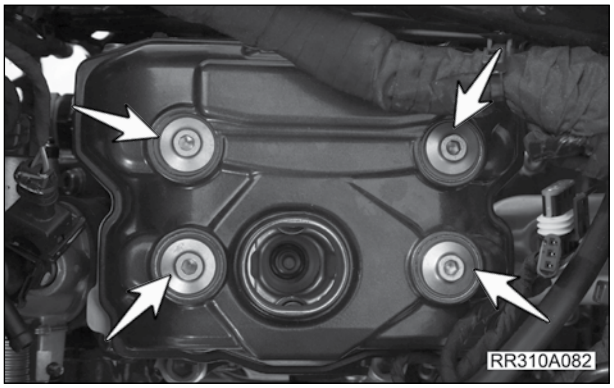
**NOTE**

Ensure spark plug does not fall down. This will damage the tip of the plug.

## TAPPET VALVE CLEARANCE ADJUST

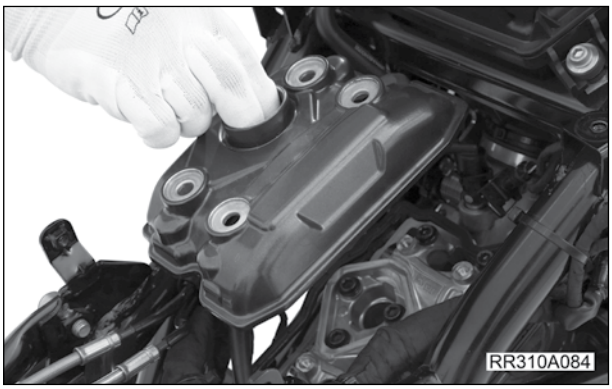
Component : Tappet valve
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : Tappet has to be checked and adjusted every 10,000kms or 1 year, whichever is earlier

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the fuel tank cover. Refer to ***Fuel tank cover*** procedure.
- Remove fuel tank assembly. Refer to ***Fuel tank assembly*** for procedure.
- Remove Engine bottom cover. Refer to ***Engine bottom cover*** for procedure.
- Remove center engine guard. Refer ***center engine guard*** for procedure.
- Remove engine guards LH and RH. Refer ***Engine guards LH and RH*** for procedure.
- Remove Ignition coil. Refer ***Ignition coil removal*** for procedure.
- Remove the spark plug. Refer to ***Spark plug*** procedure.
- Remove bolts (X4) on the cylinder head cover.




| | |
|---|---|
| Tool | 6 mm Allen key |
| Tightening torque | 10 Nm |

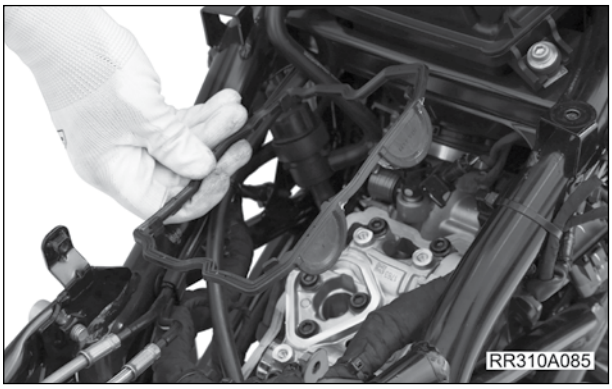
- Lift the cylinder head cover.




- Lift and remove the gasket.

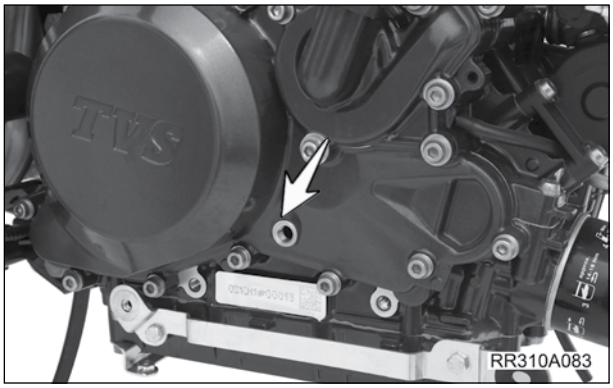
**NOTE**

Keep the gasket safe. Check for damage. Replace, if found damaged.



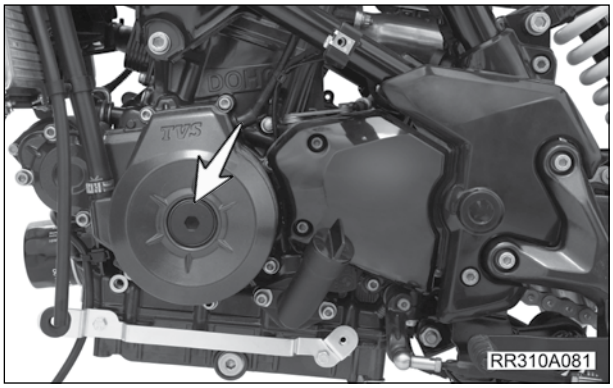
- Remove the TDC plug.

| | |
|---|---|
| Tool | 5 mm Allen key |



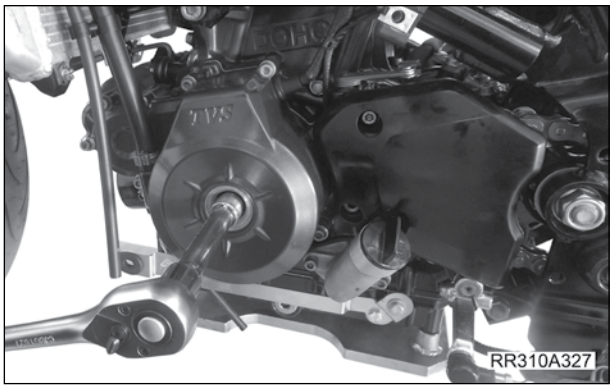

- Remove the plug from crankshaft hole.

| | |
|---|---|
| Tool | 10 mm Allen key |

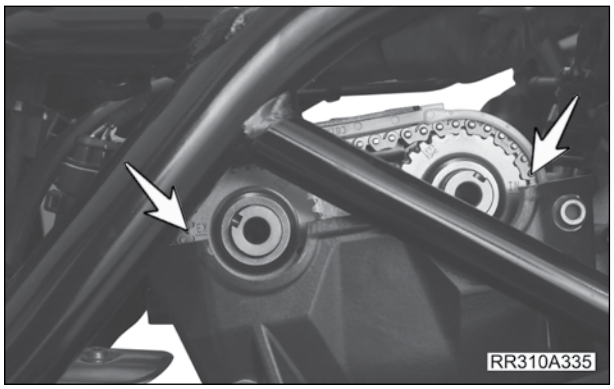


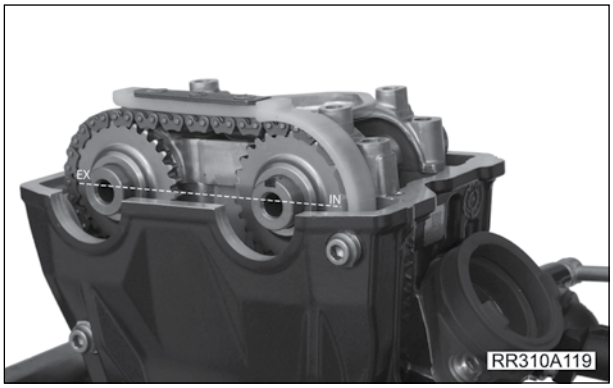

- Rotate the bolt in the crankshaft hole. This will rotate the crankshaft.

| | |
|---|---|
| Tool | 12 mm extendable wrench |




- Rotate the crankshaft until the EX mark on exhaust side 1 and IN mark on the intake side 2 align with the edge of housing.





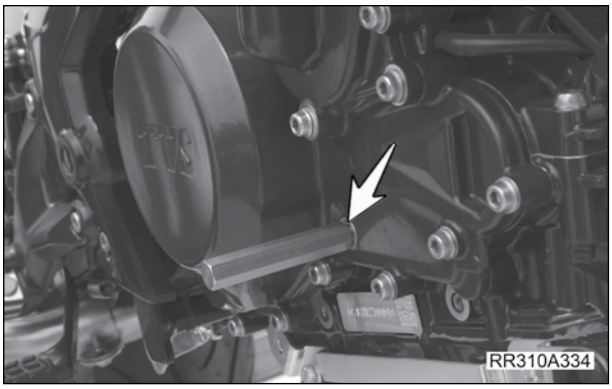

- Lock the crankshaft using special tool.

| | |
|---|---|
| Tool | N7310140 |

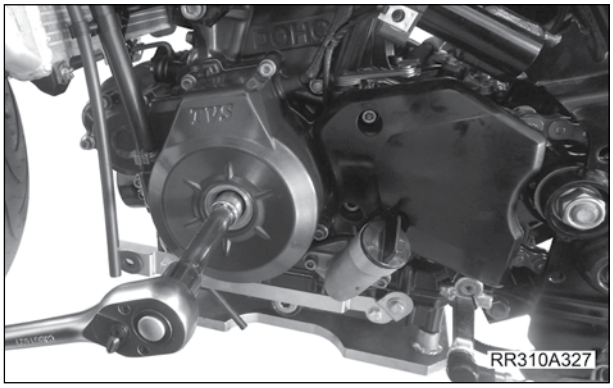
**NOTE**

There should not be any gap between the tool shank and the vehicle body. If gap exist, crankshaft is not in TDC.

If there is gap, rotate crankshaft again and lock it.

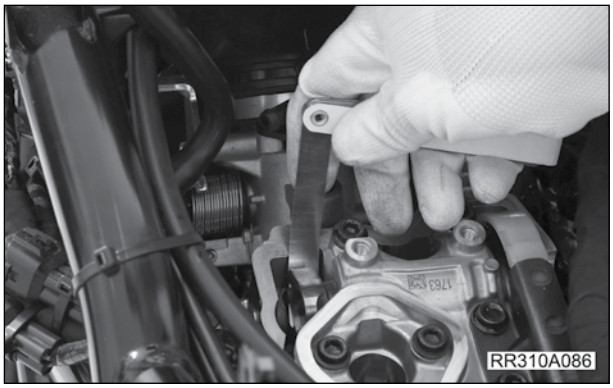



- Reconfirm to set the crankshaft in TDC. When the crankshaft is locked in TDC the nut will not rotate.




- Check valve clearance using feeler guage. Check the valve clearance between cams and rocker arms. Record the measured values in the chart provided in ***Engine service data***.

| | |
|---|---|
| Inlet valve clearance | 0.11 to 0.2 mm |
| Exhaust valve clearance | 0.26 to 0.35 mm |




- Refer the ***Engine section*** for adjustment procedure.

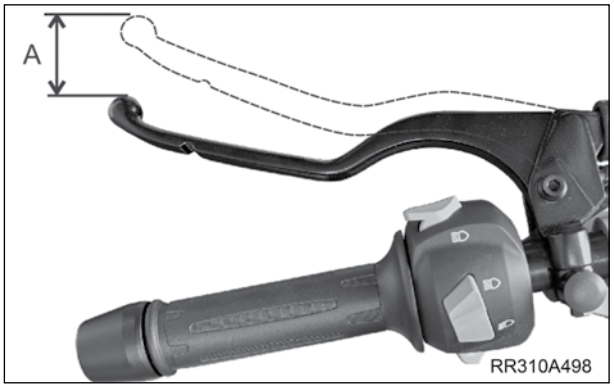
## CLUTCH PLAY ADJUSTMENT

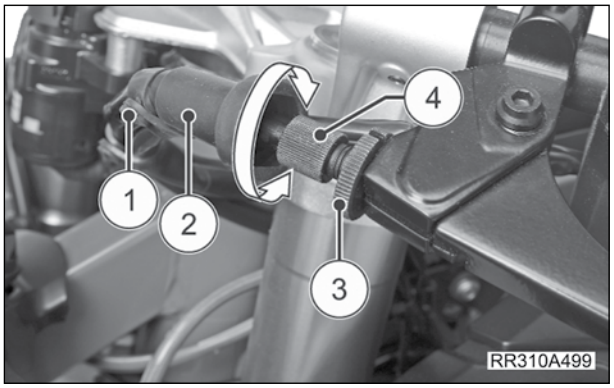
Component : Clutch lever
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : Adjust the clutch to permissible level on initial 1,000 kms and for every 5,000 kms

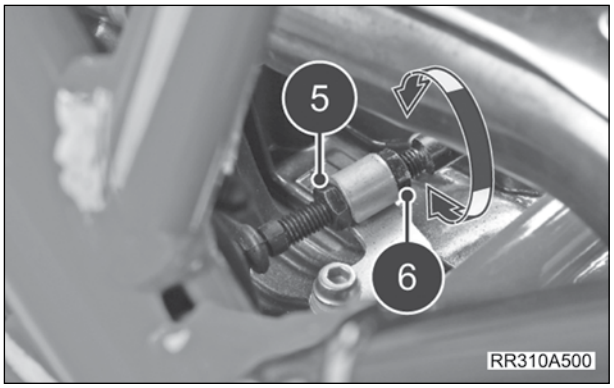
- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Park the vehicle on level surface and keep the handlebar in straight position.
- Measure the clutch free play (A) at the lever end as shown.
- If the measured free play is 'more' or 'less' than the standard limit given below:

| | |
|---|---|
| Recommended play | 8 to 12 mm |

  ◦*Remove the cable clamp (1). Pull back the dust cover (2) of clutch lever.*
  ◦*Loosen the lock nut (3) and turn the adjuster (4) 'in' or 'out' till the specified play is obtained.*
- After the adjustment, once again check the free play and confirm.
- Lock the lock nut (3) again.
- If the adjuster is threaded out to its maximum limit or if the correct free play cannot be obtained using the cable adjuster, loosen the lock nut and completely turn-in the clutch cable adjuster.
- *Re-fix the dust cover (2) and cable clamp (1).*
- *If clutch play is still exceeding the limit then, remove the exhaust system. Refer* ***Exhaust system removal procedure****.*
- *Loosen the lock nut (5) at the bottom end of the clutch cable.*
- *Turn the adjuster in (6) 'in' or 'out' until the specified play is obtained and then tighten the lock nut and check the adjustment once again.*
- After adjusting the clutch play, start the engine and engage the gear. Ensure that the engine is not stalling and not creeping.
- Once the adjustments are completed,turn the handle end to end(RH to LH) for cable flexibility.




**CAUTION**

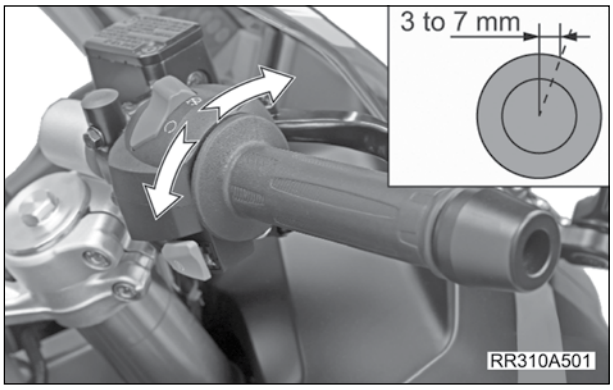
Clutch play free play should be checked and adjusted only when the engine is cold.

During clutch play checking and adjustment, check the clutch cable for kinks or sign of wear that could cause sticking or failure.

## THROTTLE CABLE PLAY ADJUSTMENT

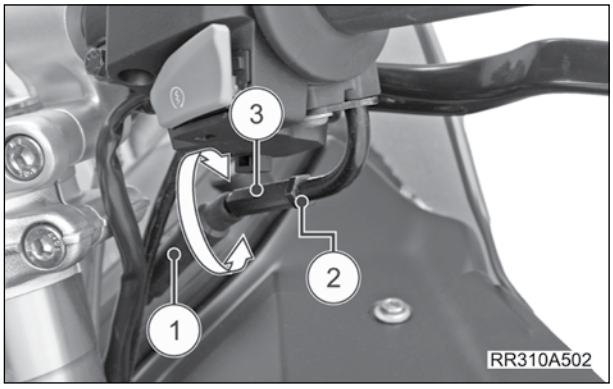
Component : Accelerator cable
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : Clean and lubricate the accelerator cable for every 10,000kms

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Park the vehicle on level surface and keep the handlebar in straight position.
- Check and ensure the smooth rotation of throttle grip from fully open to fully closed condition at both extreme steering positions (left and right).
- Turn the handle end to end (LH to RH) and ensure proper routing of cable and it is not fouling with any part during steering operation.
- Ensure that the engine is in cold condition.
- Measure the throttle cable play at the throttle grip end as shown in the figure at various position of the steering.




| | |
|---|---|
| Free play | 3 mm to 7 mm |

- If the play is not within the specification,
- Slide the boot throttle adjuster (1) and then loosen the lock nut (2).
- Turn the throttle cable adjuster (3) 'in' or 'out' until the specified play is obtained.
- After the adjustment, once again re-check and ensure the right play.
- Tighten the locknut and re-locate the throttle adjuster boot carefully.




| | |
|---|---|
| Tool | 8mm / 10mm spanner |

**WARNING**

Do not lubricate the throttle cable, replace if found sticky or damaged.

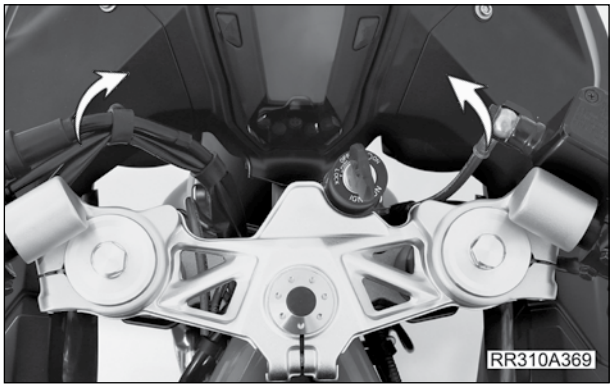
**NOTE**

Replace the throttle cable if the adjuster has reached its limit or if you observe any sticky operation or damage.

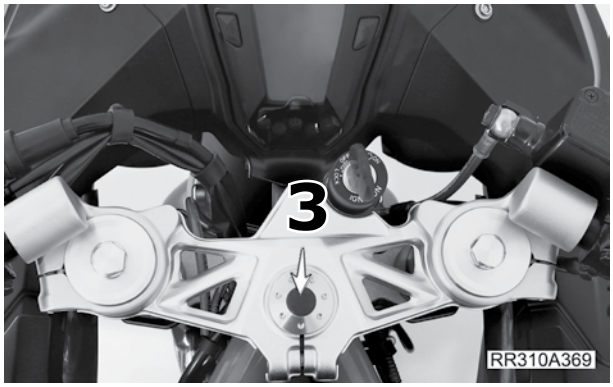
## STEERING PLAY ADJUSTMENT PROCEDURE

Component : Steering handle
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : Steering play has to be checked first at 1000 kms and then every 10,000 kms

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Shake the handle forward and backward holding the front brake. If play is noticed, follow the below procedure.
- Loosen the clamping screws (2nos) on the fork bridge(1).
- Loosen the clamping screw of the steering tube(2).
- Remove the grommet and loosen the adjusting screw(3).
- Tighten it to the below specification.

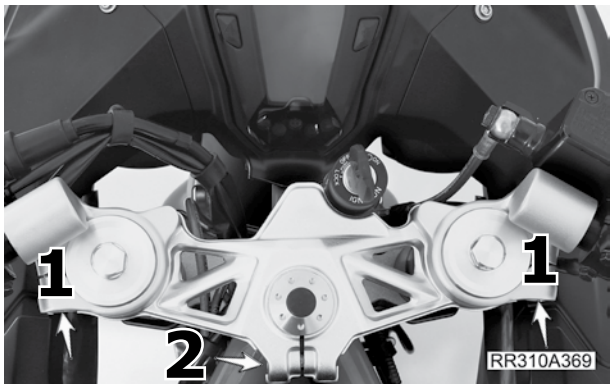



| Tighten torques | |
|---|---|
| Adjustment specification for steering bearing | |
| M20 | Tightening torque (forks turned fully to right) - 15 Nm |
| | Swing the forks 3x to left/ right through full arc of travel |
| | Back off (forks turned fully to the left) - 60° |
| | Tightening torque (forks fully turned to the right) - 11 Nm |




- Tighten clamping screws (1) and (2).

| Tighten torques | |
|---|---|
| Fork bridge , Top, to fork fixed tube | |
| M8 x 30 | 19 Nm |
| Fork bridge , Top, to steering tube | |
| M8 x 30 | 19 Nm |




- Tighten clamping screws (3).

| Tighten torques | |
|---|---|
| Adjusting screw to fixed fork tube | |
| M20 | 38 Nm |

- Replace the steering bearing in case the play exceeds specifications. Refer ***Handle bearing replacement*** procedure.

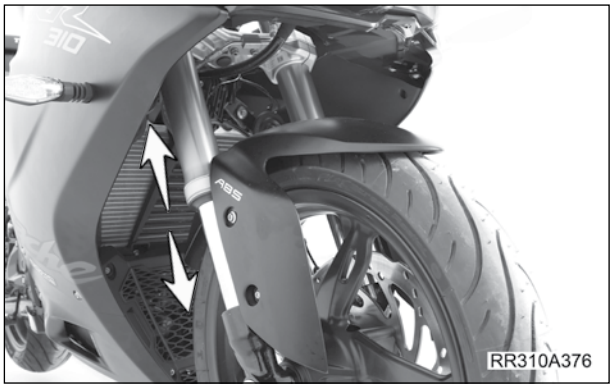
## SUSPENSION SYSTEM - CHECK

| | |
|---|---|
| Component | : Front fork and rear suspension |
| Component condition | : Vehicle on ramp and component accessible |
| Objective | : General service |
| Repair cycle | : Check the smooth function of front fork and rear suspension every 10,000 kms |

- Park the vehicle on the Ramp with side stand.

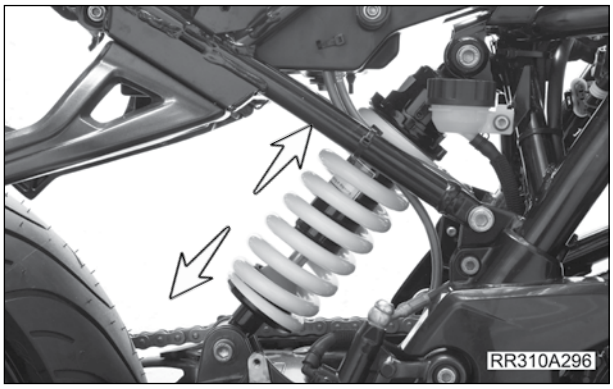
**Front fork**

- Inspect both the legs of front fork for smooth operation / proper action.
- If any abnormality is found, service the front forks. Refer to ***Front fork oil replacement*** procedure.




**Rear suspension**

- Pump the rear seat up and down 4-5 times and check for smooth stroke.
- If the suspension does not move smoothly or makes noise, replace the rear suspension. Refer ***Rear suspension replace*** for procedure.



## WHEEL BEARING - CHECK

Component : Wheel bearings
Objective : General service
Repair cycle : Check the wheel bearing condition every service.

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Rotate the wheels freely. Check the uneven bearing noise or any obstructions in free rotation due to damaged wheel bearings.
- Replace the wheel bearings if required. Refer to ***Wheel bearings replacement*** procedure.

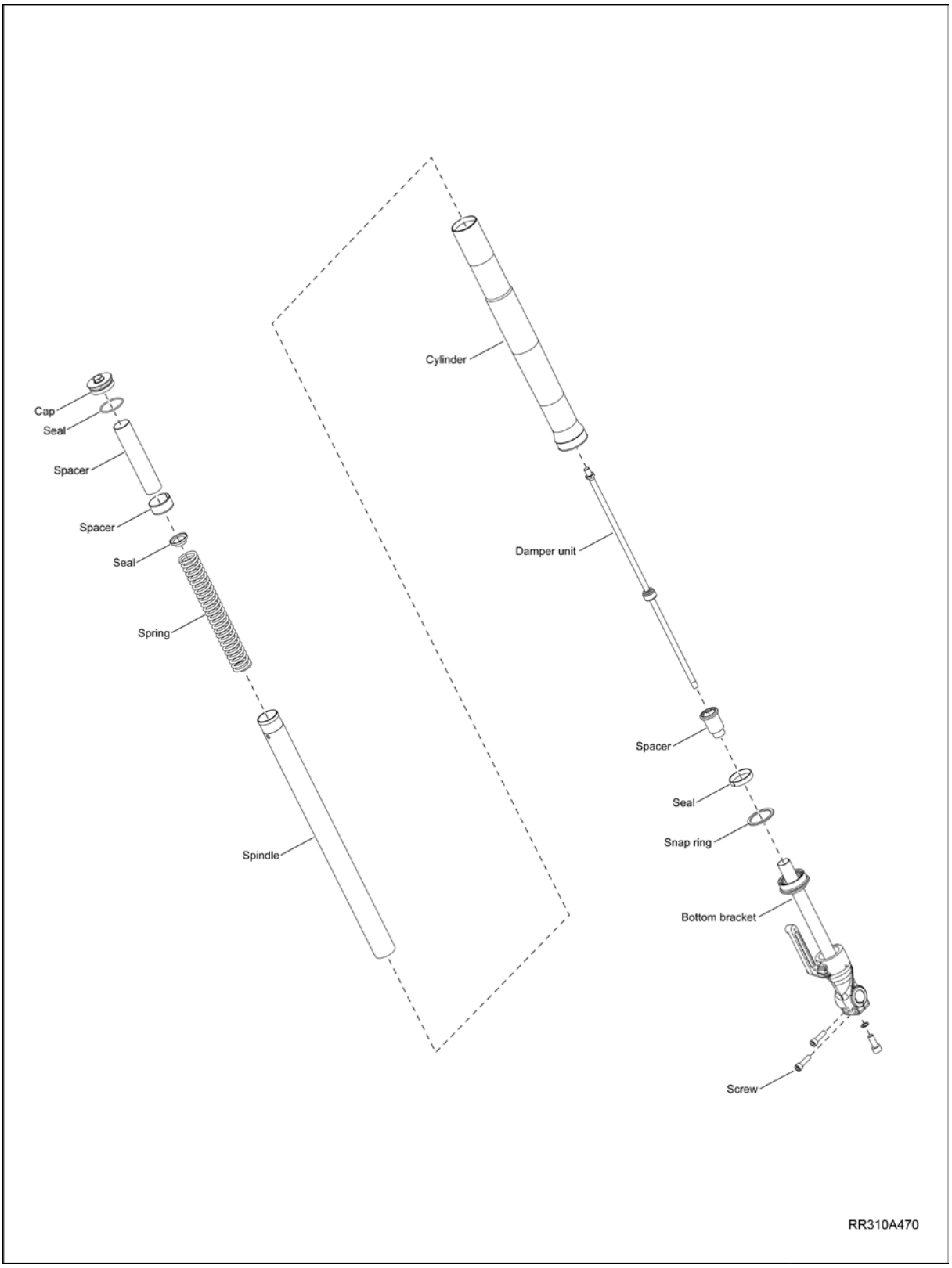
## AIR SUCTION BREATHER - CHECK

| | |
|---|---|
| Component | : Air duct |
| Component condition | : Vehicle on ramp and component accessible |
| Objective | : General service |
| Repair cycle | : As required |

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove Air filter element. Refer to ***Air cleaner element replacement*** procedure.
- Visually inspect the air inlet duct and its surrounding for any obstructions for the free flow of air into the filter.

## FORK OIL AND OIL SEAL

Component : Fork oil and oil seal
Component condition : Mounted on Engine stand
Objective : Fork oil and oil seal replace
Repair cycle : Overhaul the fork every 20,000 kms and replace the fork oil

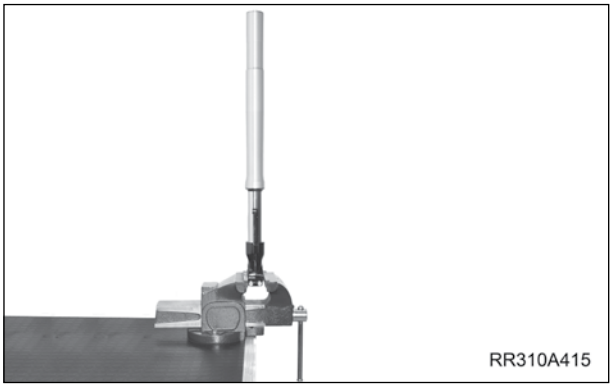


**Removal**

- Remove the front fork. Refer to ***front fork removal*** procedure.
- Fix the fork assembly firmly on a bench vice.

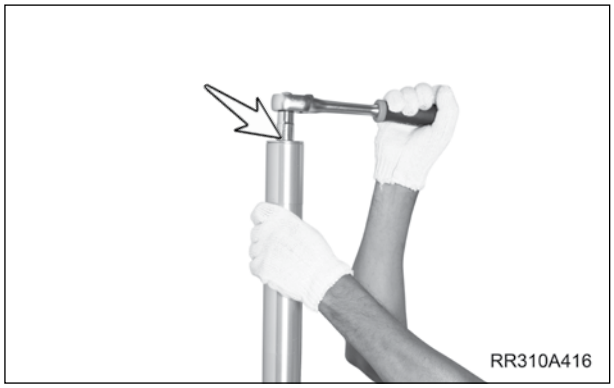
**NOTE**

Use cloth piece at the clamping end so that vice jaws will not damage the fork.




- Loosen the bolt on the top of the fork cap.
- Lift the cap from the lower fixed fork tube.

| | |
|---|---|
| Tool | 17 mm wrench |



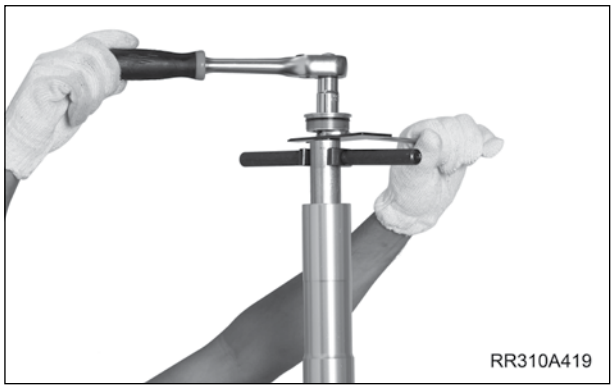

- Install the pre-tensioning tool on the fork spindle and press it down with force.

**WARNING**

The tensioner tool will be having compressed potential energy. Take utmost care while performing this operation, failure of which will cause severe injury or death.


- Press the pre-tensioning tool and using the help from a second person, insert a spacer between the cap and the fork tube.
- Press the pre-tensioner tool further tool and insert a 14mm open spanner below the cap, above the spacer, to hold the nut.
- Loosen the bolt and remove the cap from the fork.
- Press the pre-tensioner tool and remove the spacer inserted.

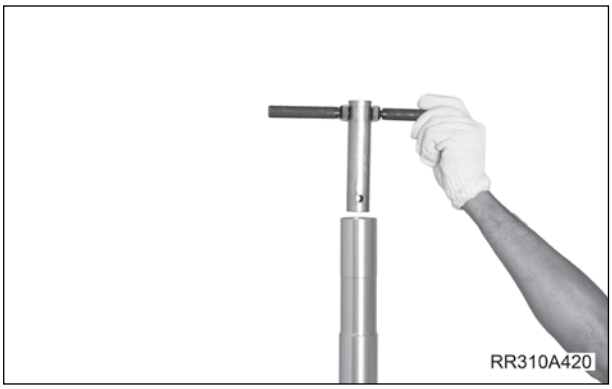
| | |
|---|---|
| Tool | N7310050 |



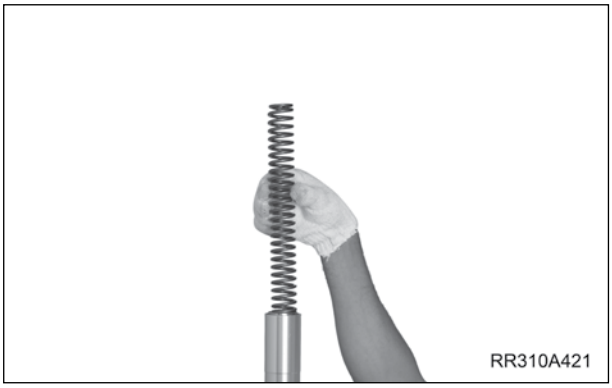
- Lift and remove the fork spindle.

**WARNING**

The tensioner tool will be having compressed potential energy. Take utmost care while performing this operation, failure of which will cause severe injury or death.




- Remove spacer and compression ring from front fork leg.



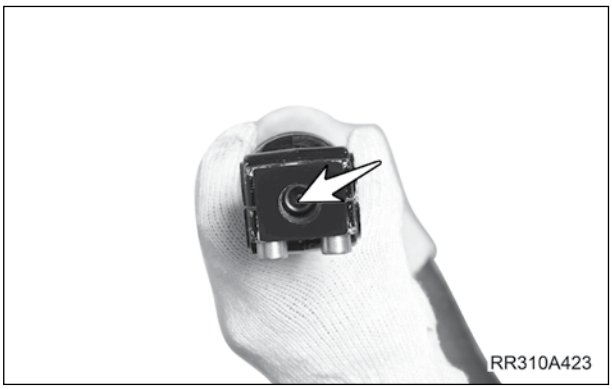

- Drain the fork oil into a measuring jar.

**NOTE**

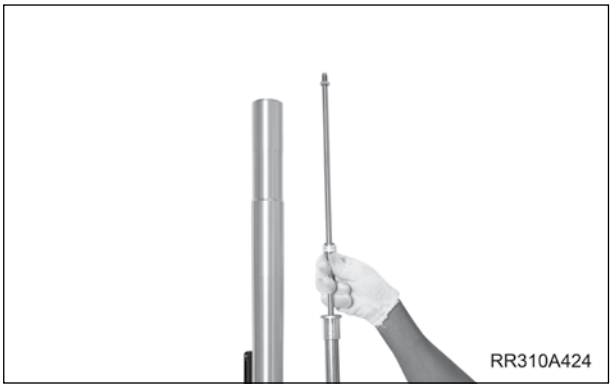
Make sure all the components are clean. Lubricate the inner surface of the outer.


- Fix a damper locking tool on the damper and lock it.
- Lock the damper lifting tool and using allen bit, remove the bolt with sealing ring.

| | |
|---|---|
| Tool | 8 mm Allen long bit |



- Pump the damper unit to drain the fully.
- Lift and remove the damper unit.




- Using a flat head screwdriver, lift and release the seal dust cap from the fork assembly.
- Using a flat head screwdriver, lift the snap ring from the fork assembly.

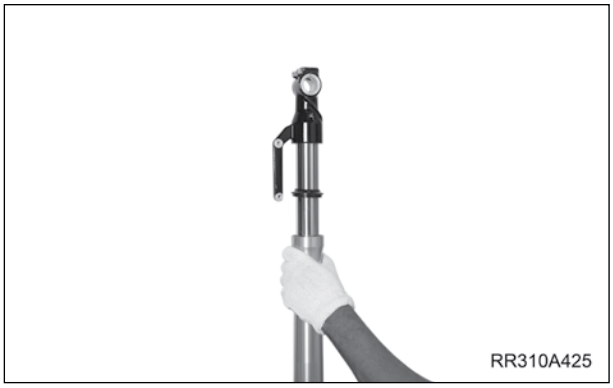
**NOTE**

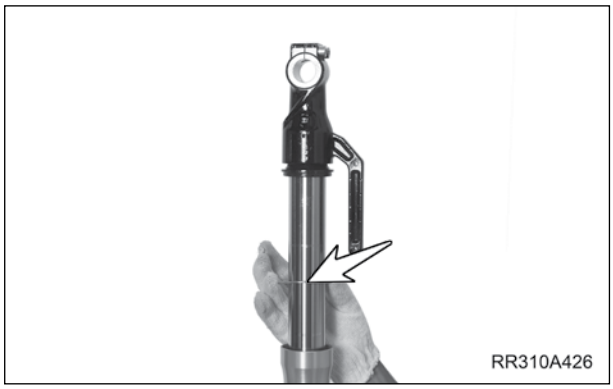
Replace the metal washer.

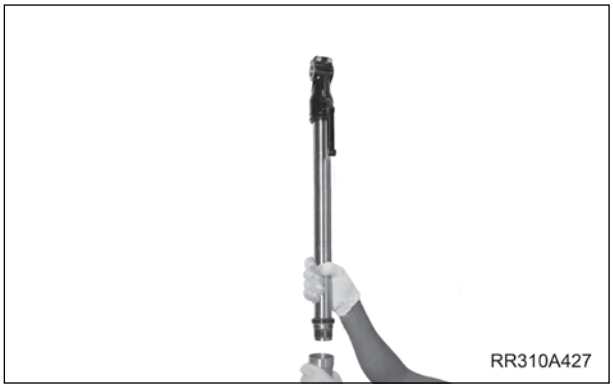
- Lift and remove the fork tube from the assembly.
- Remove the metal washer and discard it.
- Remove the copper washer and discard it.
- Remove the snap ring and discard it.
- Lift and remove the rubber washer and discard it.

**WARNING**

The spring will have two ends with dissimilar diameter. While inserting always make sure the smaller diameter end of the spring is facing up.

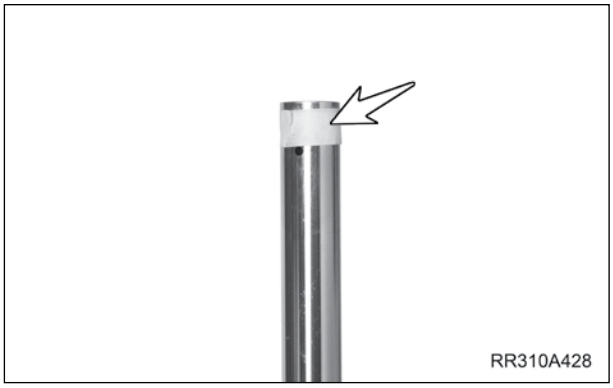


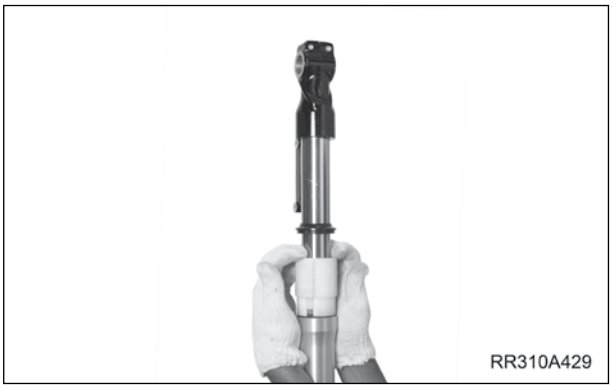
**Install**

- Cover the fork tube end with a plastic wrapper, which prevents the washers from getting damaged.
- Install the new rubber washer.
- Install new snap ring.
- Install new copper washer.
- Install new metal washer.

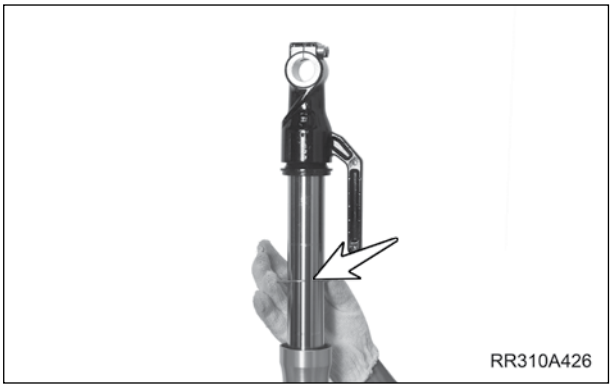



- Install the new oil seal using the special tool. Press the special tool and lock the oil seal in its position.
- Before installing the oil seal, apply little grease on the inner lip of the oil seal.

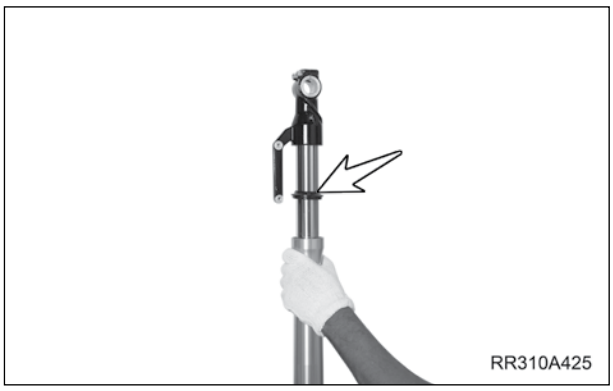
| | |
|---|---|
| Tool | N7310060 |




- Using a flat head screwdriver, install the snap ring into the fork assembly.




- Using a flat head screwdriver, install the seal dust cap into the fork assembly.
- Insert the damper unit into the fork tube.

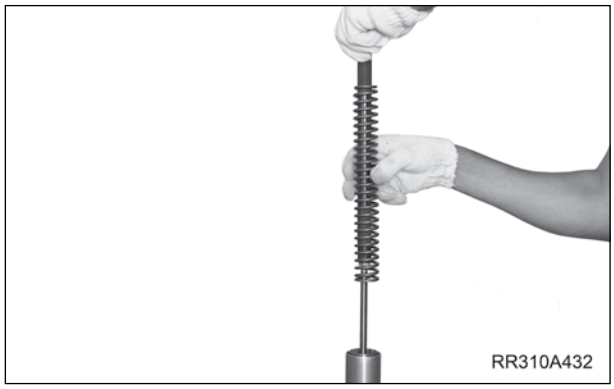


- Lock the damper using the damper locking tool.
- Apply Anabond on the threads of the bolt.
- Install the bolt with new washer and tighten.

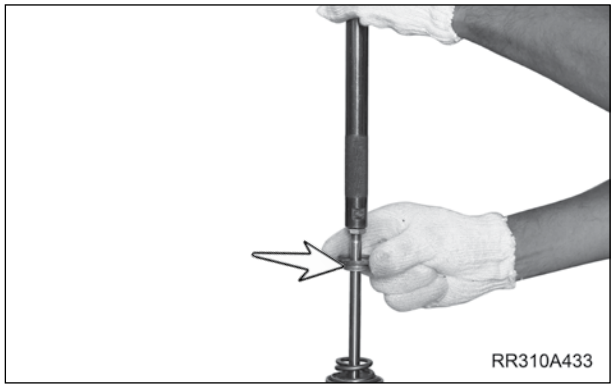
| | |
|---|---|
| Tighten torque | Nm |


- Install the damper lifter special tool to the damper.
- Lift the damper from the fork tube using the damper lifting tool.
- Holding the damper in lifted position, fill 445 ml per leg / level 78 mm of KHL (15-10) grade of fork oil into the fork tube.
- Using the special tool suck out the extra amount of oil from the fork leg.

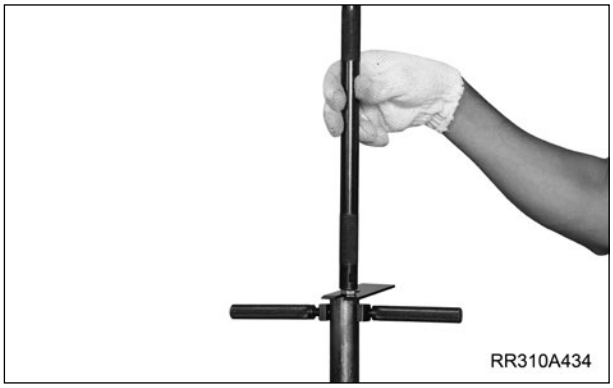

- Insert the spring into the damper.

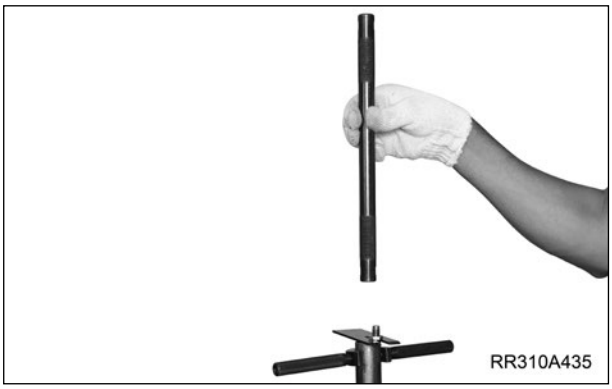



- Install the spacer on the damper.



- Install the fork spindle with the pre-tensioner tool.
- Taking the help of second person, press the spindle into the fork tube, compressing the spring.
- Taking the help of second person to press the pre-tensioner tool and insert the spacer, as shown.
- Replace the O-ring on the fork leg cap.




- Hold the nut, using an open spanner.
- Using the help of second person, tighten the bolt on the cap.
- Press the pre-tensioner tool and remove the spacer.
- Detach the pre-tensioner tool from the fork assembly.
- Tighten the fork cap completely.

| | |
|---|---|
| Tighten torque | 20 Nm |

## NUT, BOLT AND WASHERS CONDITION

Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : Check all the nuts, bolts and fasteners of the vehicle initially for 1,000 kms and every 5,000 kms

- Park the vehicle on level surface and keep the handlebar in straight position.
- Check and tighten all nuts and bolts to the specified torque.

## DRIVE CHAIN SLACKNESS - CHECK

Component : Drive chain
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : Inspect and adjust the drive chain slackness every 1,000 kms

**NOTE**

The chain should be adjusted in no load condition and in the location as shown.

**CAUTION**

Do not use any petrol,diesel, kerosene, or thinner to clean the chain, since the O-rings will get damaged, use only recommended cleaning solvent.

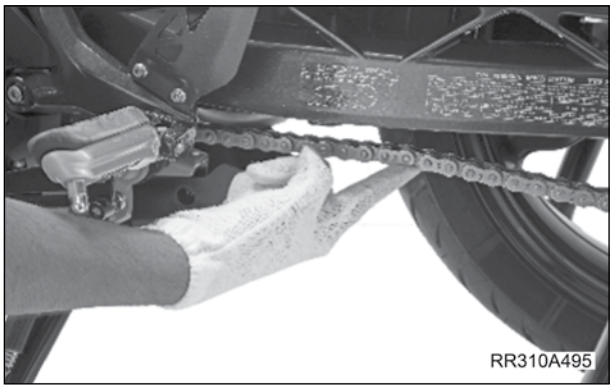
- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Rotate the rear wheel and spray the cleaning solvent **Motul** to the drive chain.
- Leave the cleaning solvent to soak for 5 minutes.
- Wipe off the cleaning solvent on the chain with a waste cloth thoroughly.
- Pull the chain fully down midway between chain sprocket and pinion and take it as initial reference on the metal scale.
- Pull the chain up fully. Take this point as a final reference.
- Measure the vertical movement of the chain midway between the sprockets.

**NOTE**

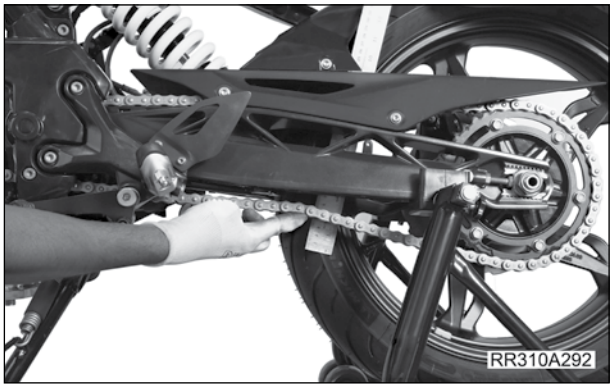
Adjust the chain at the point of least deflection

| | |
|---|---|
| Tool | Metal scale |
| Permissible slackness | 30 to 40 mm |

- If the slackness exceeds the permissible value, Refer to ***Drive chain adjustment*** procedure.







## DRIVE CHAIN LUBRICATION

Component : Drive chain
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : Drive chain must be lubricated every 1,000 kms

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- *Rotate the rear wheel by hand and apply the Motul- liberally as shown to the drive chain inner lower runs.*
- *Ensure that both row of links are lubricated.*


**CAUTION**

Use only Motul to lubricate the chain.

Usage of other oils will hamper safety, performance and shorten the service life of the chain.

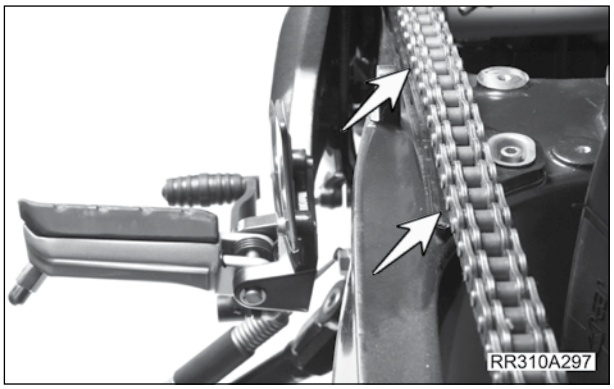
**NOTE**

Ensure that the chain is thoroughly cleaned and the solvent is wiped off.
Shake Motul container well before use. Attach the extension tube to the Motul container for pin point application. Hold the container upright and spray from a distance of 1 to 2 inches.

## DRIVE CHAIN AND GUIDE WEAR

Component : Drive chain and guide
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : Inspect the drive chain guide in every service and replace if necessary

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Visually inspect the drive chain and guide for any damages. Replace if found damaged.
- Refer ***Drive chain replace*** for procedure.
- Refer ***Drive chain guide replace*** for procedure.




**NOTE**

Check if the chain is not adjusting properly. Replace chain and both the sprockets. Check for chain and sprocket teeth for damage or wear.

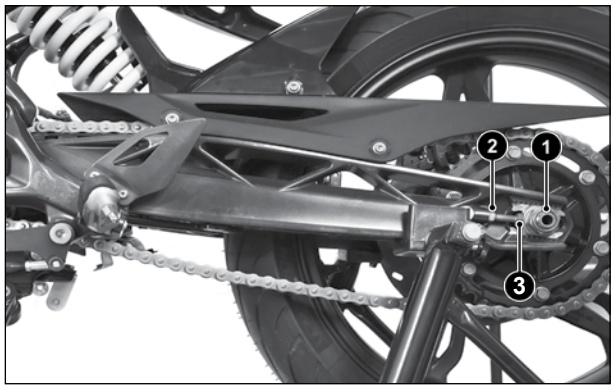
**NOTE**

Replace chain and both the sprockets as a set always.

## DRIVE CHAIN ADJUSTMENT

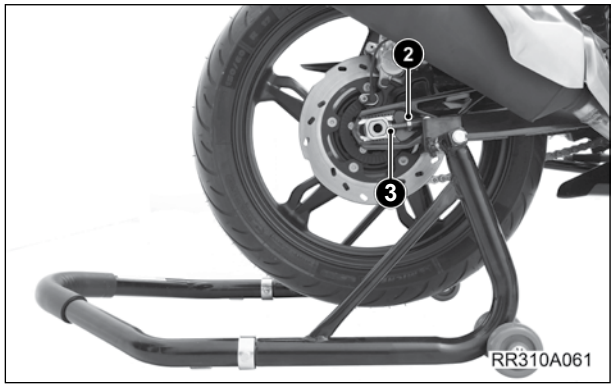
Component : Drive chain
Component condition : Vehicle on ramp and component accessible
Objective : Drive chain adjustment
Repair cycle : As required

- Park the vehicle on the front and rear paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Loosen the rear axle nut (1) by few turns on LH side of the vehicle.




| | |
|---|---|
| Tool | 27 mm bit with wrench |
| Torque | 100 Nm |

- Loosen the adjuster lock nut (2) on both the sides of the swing arm.
- Loosening the bolt (3) equally on both sides to decrease the play.




| | |
|---|---|
| Tool | 13 mm open spanner |
| Torque | 19 Nm |

- Measure the chain slackness at regular intervals and maintain it around 30mm to 40mm.
- Match the graduations on both sides of the swing arm uniformly.
- Tighten the adjuster lock nut to the specified value.
- Tighten the rear axle nut to the specified value.
- Turn the wheel, measure the chain slack again at the tightest position and readjust if necessary.

**CAUTION**

Misalignment of the wheel will result in abnormal tyre wear.

**WARNING**

Misalignment of the wheel will cause vehicle imbalance and may cause injury or death.

## LIGHTS AND HORN - CHECK

Component : Lights and horn
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : All lights and horn must be checked every 5,000 kms and replaced if necessary

- Inspect for proper functioning of all lights and horns.
- Replace if abnormality is found.
- Refer respective procedure in ***Electrical system*** for replacement.
- Diagonise lights and horn with TVS Ride Scan Tool . Refer ***TVS Ride Scan Tool*** for procedure.

**NOTE**

Do not tune the horn. Replace if necessary.

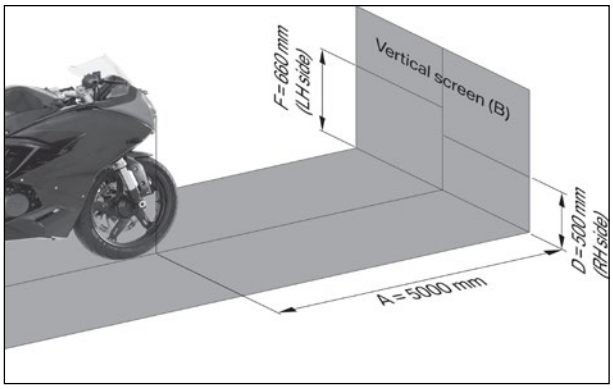
## HEAD LAMP BEAM ADJUSTMENT

Component : Head lamp
Component condition : Vehicle on floor and rider seated on the vehicle
Objective : General service
Repair cycle : Adjust the head lamp beam every 5,000 kms

**CAUTION**

Inspect the functioning of all the lights before starting every ride. Replace the lights, if found faulty.

- Sit on the bike and aim the beam vertically.
- Focus the head lamp beam on a vertical screen which is at a distance of 5 meter from the head lamps' center point.
- Adjust the head lamp high beam so that the focal point of high beam on the screen is 100 mm lower than the head lamps' center.

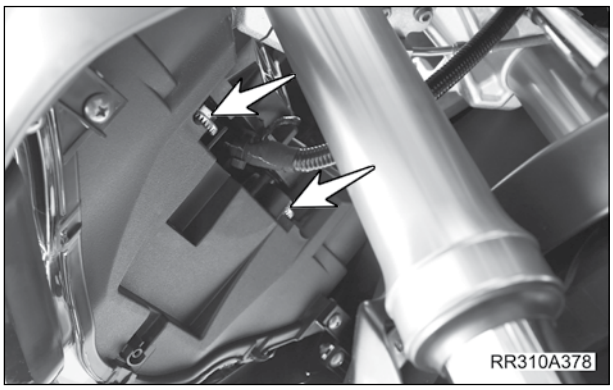



**NOTE**

The head lamp must be adjusted only in the high beam

- Rotate the head lamp beam adjuster to adjust the beam to required height.

| | |
|---|---|
| Tool | Philips head screwdriver |




**NOTE**

There are two adjuster screws separately for two individual lamps

## BATTERY VOLTAGE - CHECK

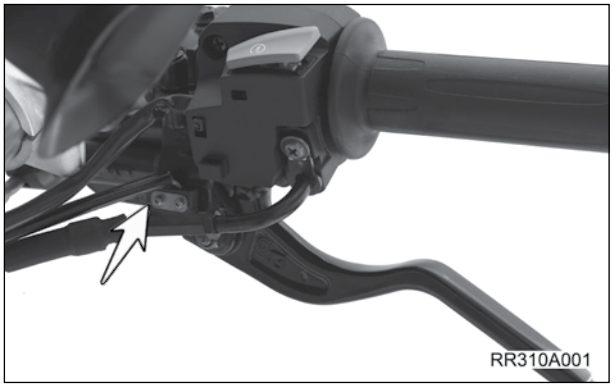
| | |
|---|---|
| Component | : Battery voltage |
| Component condition | : Component accessible |
| Objective | : General / periodic service |
| Repair cycle | : Check the battery voltage every 5,000 kms |

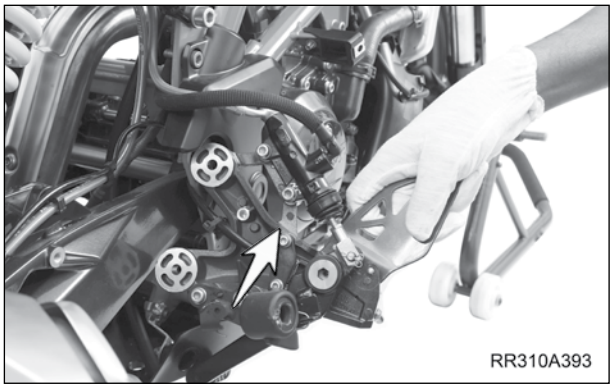
- Remove both seats. Refer to ***Seats removal*** procedure.
- Check the voltage of the battery and recharge it if required. Refer ***Battery voltage*** procedure.
- Check battery charging voltage using TVS Ride Scan Tool. Refer ***TVS Ride Scan Tool*** for procedure.

## BRAKE LIGHT SWITCH OPERATION

Component : Brake light switch
Component condition : Vehicle on ramp and paddock applied
Objective : General service
Repair cycle : Check the brake light operation first on 1,000 kms and every 5,000 kms

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Turn 'ON' the ignition.
- Apply front brake and check if brake light glows.
- If light does not glow check and rectify the proper contact between brake lever and switch.
- If contact is ok check the brake light switch operation using TVS Ride Scan tool.
- If switch is ok, replace tail lamp assembly else, replace the brake switch.
- Repeat the above procedure for rear brake light switch.
- Refer ***Electrical section*** for replacement procedure.



## BRAKE FLUID LEVELS CHECK

Component : Front and rear brake fluid
Component condition : Vehicle on flat floor
Objective : General service
Repair cycle : Check the front and rear brake fluid levels at initial 1,000 kms and every 5,000 kms
Replace the brake fluids every 10,000 kms

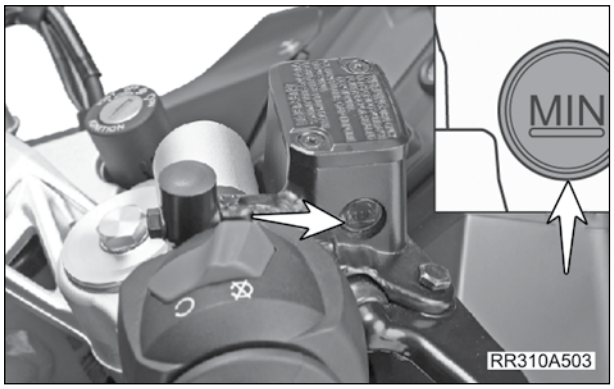
**CAUTION**

Cover the vehicle with suitable cover when handling brake fluid. Brake fluid may cause damage to paint work. Do not keep brake fluid containers exposed longer than necessary.

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- *Place the vehicle straight and ensure the master cylinder is parallel to the ground.*

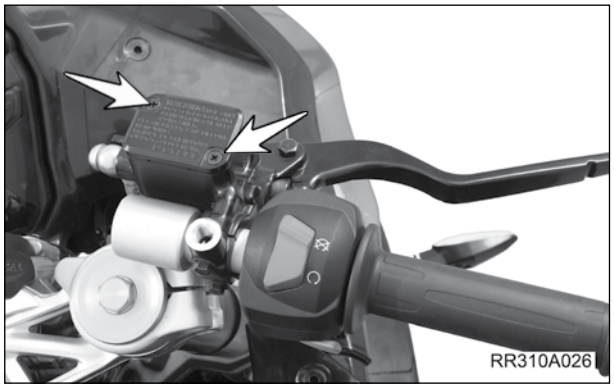
**Front brake fluid level**

- 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.

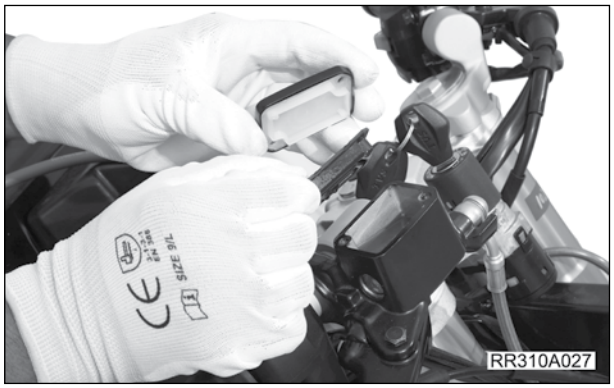



- *If the brake fluid level is below the mark on the cylinder, then top up the level. Refer the procedure below.*
  - *Remove the mounting screws on the reservoir cap.*

| | |
|---|---|
| Tool | Philips screwdriver |
| Tightening torque | 5 Nm |




  - *Remove the reservoir cap and take out the plate diaphragm.*
  - *Fill the recommended brake oil BASE – Dot 4 Grade Brake Fluid above the mark (A)*
  - *Assemble the parts and apply the front brake to check the effectiveness.*

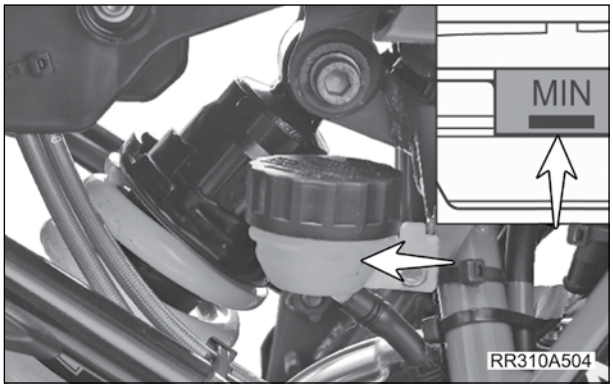



**NOTE**

If the lever travel is more or the lever feels soft or spongy, air bleeding from the system to be carried out. Refer ***Air Bleeding procedure***.

**Rear brake fluid level**

- The brake fluid level in the reservoir must be at the maximum mark provided in the reservoir.
- If the level is found less than the mark, then remove the cap and top up the level up to the maximum level.




**NOTE**

The recommended brake oil BASE – Dot 4 Grade Brake Fluid

If the pedal travel is more or the pedal feels soft or spongy, air bleeding from the system to be carried out. Refer ***Brake Bleeding*** procedure.

## BRAKE PAD WEAR CHECK

Component : Front and rear brake pads
Component condition : Vehicle on flat floor
Objective : General service
Repair cycle : Check the front and rear brake pad conditions every 5,000 kms and replace if required

**CAUTION**

Do not blow air to clean the pads. Brake pads contain harmful substances if inhaled. Always use a suitable mask before opening the pads.

Replace the brake pad as a set. Braking performance will be adversely affected if brake pad is not replaced as a set. Always use TVS Genuine Parts for optimal performance.

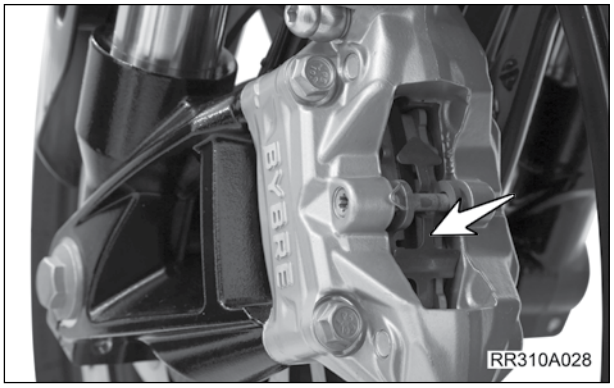
**NOTE**

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

- Park the vehicle on the Ramp.

**Front brake pad wear check**

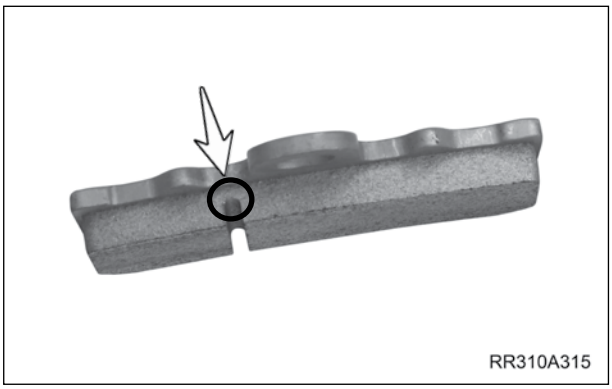
- *Observe the wear limit line marked on the pad and check the wear condition of the brake pads.*
- *When the wear exceeds the limit line, replace the pad as a set. Refer* ***Brake pads replacement*** *procedure.*




- *If the brake fluid level is below the mark on the reservoir, then top up the level. Refer the* ***Brake fluid levels*** *procedure.*

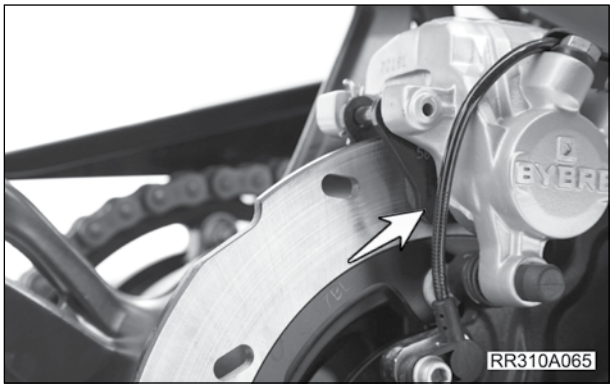
**Rear brake pad wear check**

- Check the rear brake pad wear. The tapering in the corner of rear pads will indicate the amount of

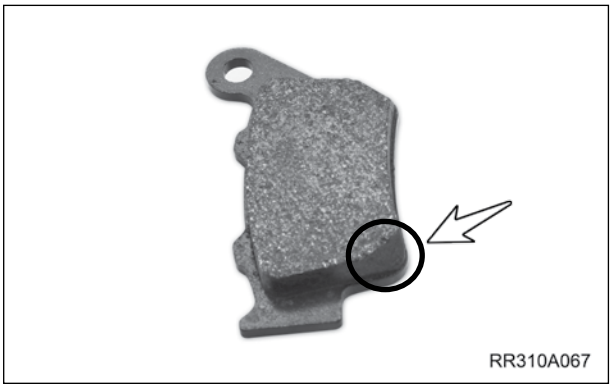


wear.

- When the wear exceeds the limit line, replace the brake pads as a set. Refer ***Brake pads replacement*** procedure.




- *If the brake fluid level is below the mark on the reservoir, then top up the level. Refer the* ***Brake fluid levels*** *procedure.*



## BRAKE DISC THICKNESS CHECK

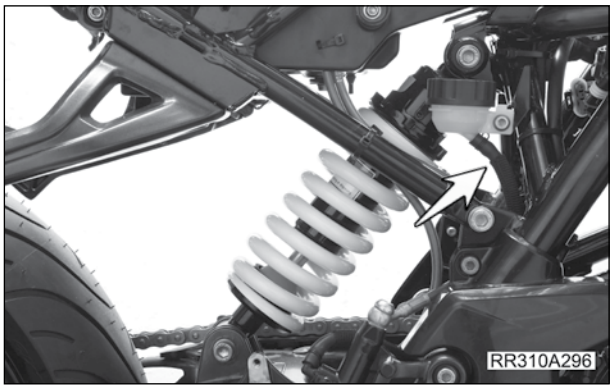
Component : Front and rear brake discs
Component condition : Vehicle on flat floor
Objective : General service
Repair cycle : Check the front and rear brake discs conditions every 10,000 kms and replace if required

- Park the vehicle on the Front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Measure the thickness of the disc plate using micrometer in atleast 4 different locations.
- Compare the measured value with the value punched on the brake disc.
- If the measured thickness is less than the recommended value on the brake disc, then replace the front brake disc.
- Repeat the above procedure for rear brake disc as well.
- Refer ***Front brake disc replacement*** and ***Rear brake disc replacement*** procedure.

## BRAKE HOSE / RUBBER PARTS

Component : Brake Hose / Rubber Parts
Component condition : Vehicle on flat floor
Objective : General service
Repair cycle : Check every service and replace if required. Mandatory replacement at 40,000 kms or 4 years whichever is earlier.

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Check the brake hose for damages, deterioration and crimping etc.
- Replace hose if required.
- Perform brake bleeding (both front and rear). Refer ***Brake bleeding*** procedure.



## MASTER CYLINDER

Component : Brake master cylinder
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : As required.

- Inspect for any leakage in master cylinder or brake fluid reservoir.
- Replace if abnormality or leakage is found.
- Refer ***Brake master cylinder replacement*** for procedure.

## TYRE AIR PRESSURE - CHECK

Component : Tyres
Component condition : Vehicle on flat floor and tyre nozzles accessible
Objective : General service
Repair cycle : Check the tyre pressure whenever possible.

**CAUTION**

Over inflated tyres will decrease the area of tyre contact with ground resulting in skid and loss of control.

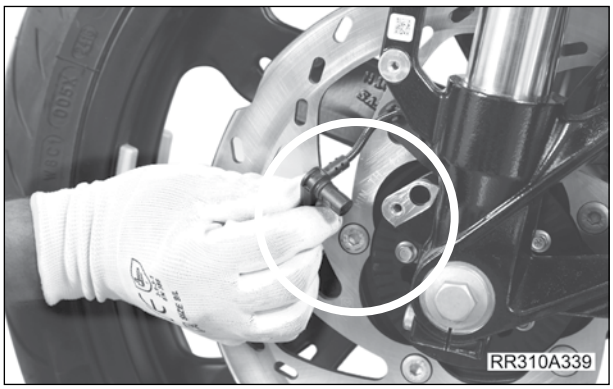
- Maintain proper tyre pressure for good road stability. Refer the below chart for recommended tyre pressures.

| | |
|---|---|
| Front kg/psi (Psi) | Solo and Dual 2.25 (32) |
| Rear kg/psi (Psi) | Solo and Dual 2.25 (32) |

## WHEEL SPEED SENSOR

Component : Wheel speed sensor
Objective : General service
Repair cycle : As required.

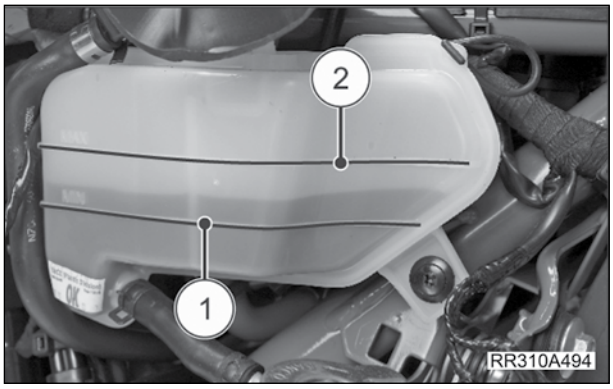
- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Ensure the gap between the wheel speed sensor and the toner ring is free of dust, debris etc.
- Clean using plain water only. Do not use any solvents, oil etc.
- After cleaning check for any trouble codes using ***TVS Ride Scan Tool***.




## COOLANT LEVEL AND WATER HOSES

Component : Coolant Level and water hoses
Objective : General service
Repair cycle : Check the cooling components every 5,000 kms and topup if required

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the cover frame. Refer ***Cover frame removal*** procedure.
- Turn ON the engine.
- Visually inspect the coolant level in the coolant reservoir (use a torch if required).
- Visually check all rubber hoses, pipes, joints and O rings for any cracks, leakage, damage or deformation.
- The coolant level should be between minimum and maximum level (1 & 2) on the coolant reservoir.
- Perform Coolant leakage test to determine coolant leakage in the system.




**NOTE**

The cooling fan may switch ON after the ignition is turned OFF to reduce the heat and to protect the engine which is normal.
Do not top-up the coolant when the engine is hot. Top-up the coolant only in the reservoir tank.

**WARNING**

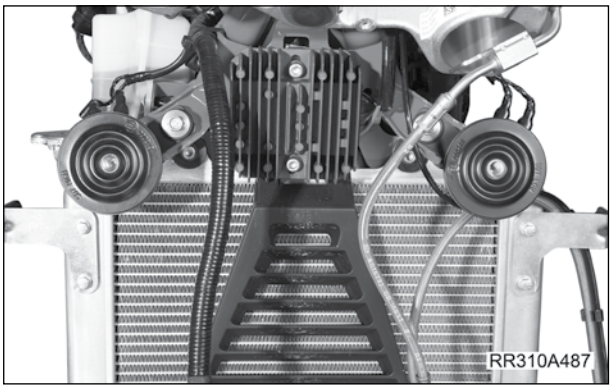
Do not open the radiator cap when engine is hot. Hot coolant may cause serious burns/injury. Always wear protective equipment while handling hot coolant.

- Based on the coolant leakage test results, replace components as required.

## RADIATOR FINS AND FAN OPERATION - CHECK

Component : Radiator fins and fan operation check
Objective : General service
Repair cycle : Check the radiator fins condition every 5,000 kms

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Visually inspect any damage in the radiator fins.
- If leakage is found, Perform Coolant leakage test procedure.
- Clean the dust and debris on the radiator with water jet at recommended pressure.
- If damaged, replace the radiator. Refer ***Radiator removal*** procedure.
- Check radiator fan cut in and cut off temperature as below.
  - *Cut in at 105° C*
  - *Cut off at 95° C*
- The temperature readings can be viewed in instrument cluster.
- Check radiator fan operation using the TVS Ride Scan Tool.




**NOTE**

Engine will switch off if the coolant temperature exceeds 112° C. If this is observed do not switch ON the engine even for testing purposes till the coolant temperature returns to normal.

## FUEL HOSE AND SYSTEM

Component : Fuel hose and system
Objective : General service
Repair cycle : Check the fuel system components initially at 1,000 kms and every 10,000 kms

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Visually inspect the fuel hoses for any leakage or bulging. Replace the fuel hoses immediately if found leaky.
- Use ***TVS Ride Scan Tool*** to check fuel pump and fuel injector actuation.

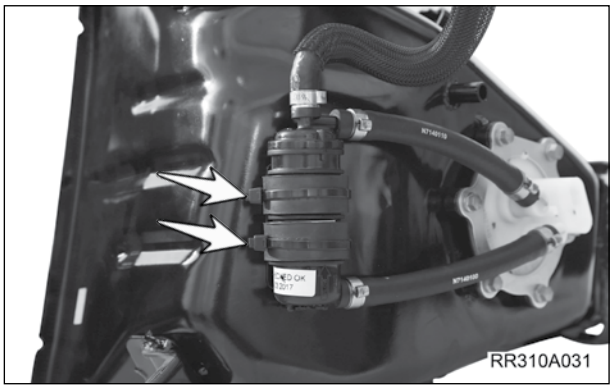
## FUEL FILTER AND HOSES

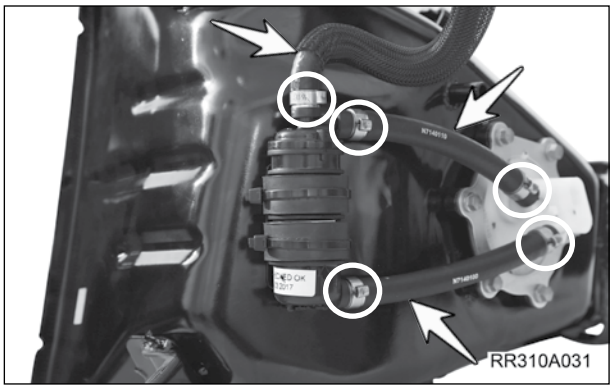
Component : Fuel filter and hoses
Objective : General service
Repair cycle : Replace the fuel filter every 20,000 kms or 2 years, whichever is earlier.

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove fuel tank cover. Refer ***Fuel tank cover removal*** for procedure.
- Remove fuel tank assembly. Refer ***Fuel tank assembly removal*** for procedure.
- Disconnect all the three hoses and dispose the clamps.
- Cut the wire tags.
- Install new filter and secure with new wire tags.
- Inspect and replace fuel hoses if required with new clamps.

**NOTE**

Always replace the clamps if removed. Do not reuse.



## SWING ARM BEARING - CHECK

Component : Swing arm bearing
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : Inspect swing arm bearing every service.

- Park the vehicle on the ramp.
- Pump the rear seat up and down.
- Check for any abnormal noise or grease leakage in the swing arm area.
- Replace swing arm bearing if required. Refer ***Swing arm bearing replace*** procedure.

## SIDE STAND OPERATION - CHECK

Component : Side stand
Objective : General service
Repair cycle : Check the operation of side stand every 5,000 kms

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Open the side stand and check for the damage in rubber boot on the spring.
- If found damaged, replace the spring.
- Lubricate the contact point on the chassis and stand.

## READING OUT FAULTY MEMORY FROM DIAGNOSTIC TOOL

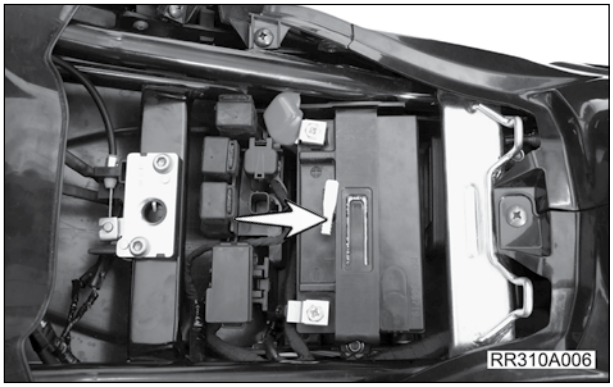
| | |
|---|---|
| Component | : Reading out Faulty Memory from Diagnostic Tool |
| Component condition | : Vehicle on ramp and component accessible |
| Objective | : General / periodic service |
| Repair cycle | : Check the error diagnostic codes every service. |

- Park the vehicle on the ramp.
- Connect the TVS Ride Scan Tool. Refer ***TVS Ride Scan Tool*** for procedure.
- Check for any diagnostic error codes on the tool.
- Proceed as per the guidelines in the tool.

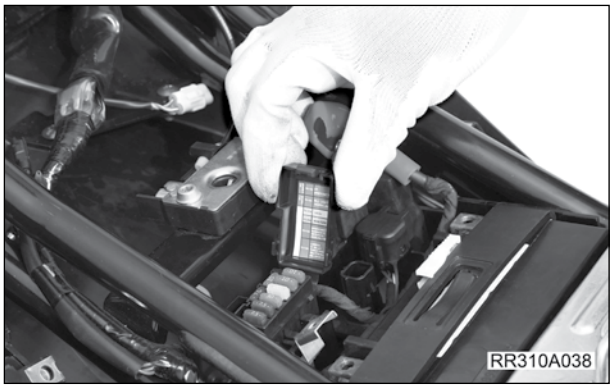
## FUSE BOX AND FUSE PULLER

Component : Fuse box and fuse puller
Component condition : Component accessible
Objective : General service
Repair cycle : Check every service

- Remove both seats. Refer ***Seat removal*** procedure.
- Check the availability of fuse puller on the battery clamp.
- If misplaced, get a new fuse puller.




- Open the fuse box cover.

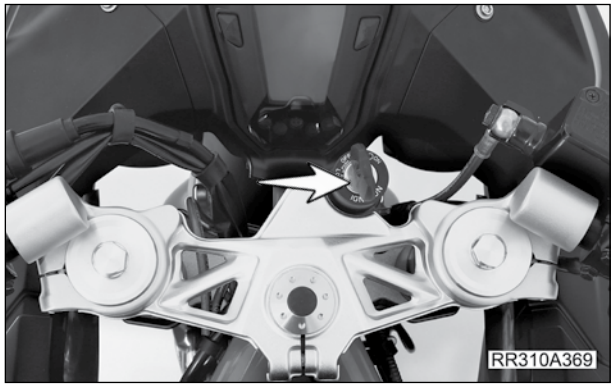



- Using the fuse puller, pull out the fuses and check fuse condition. Replace as required.

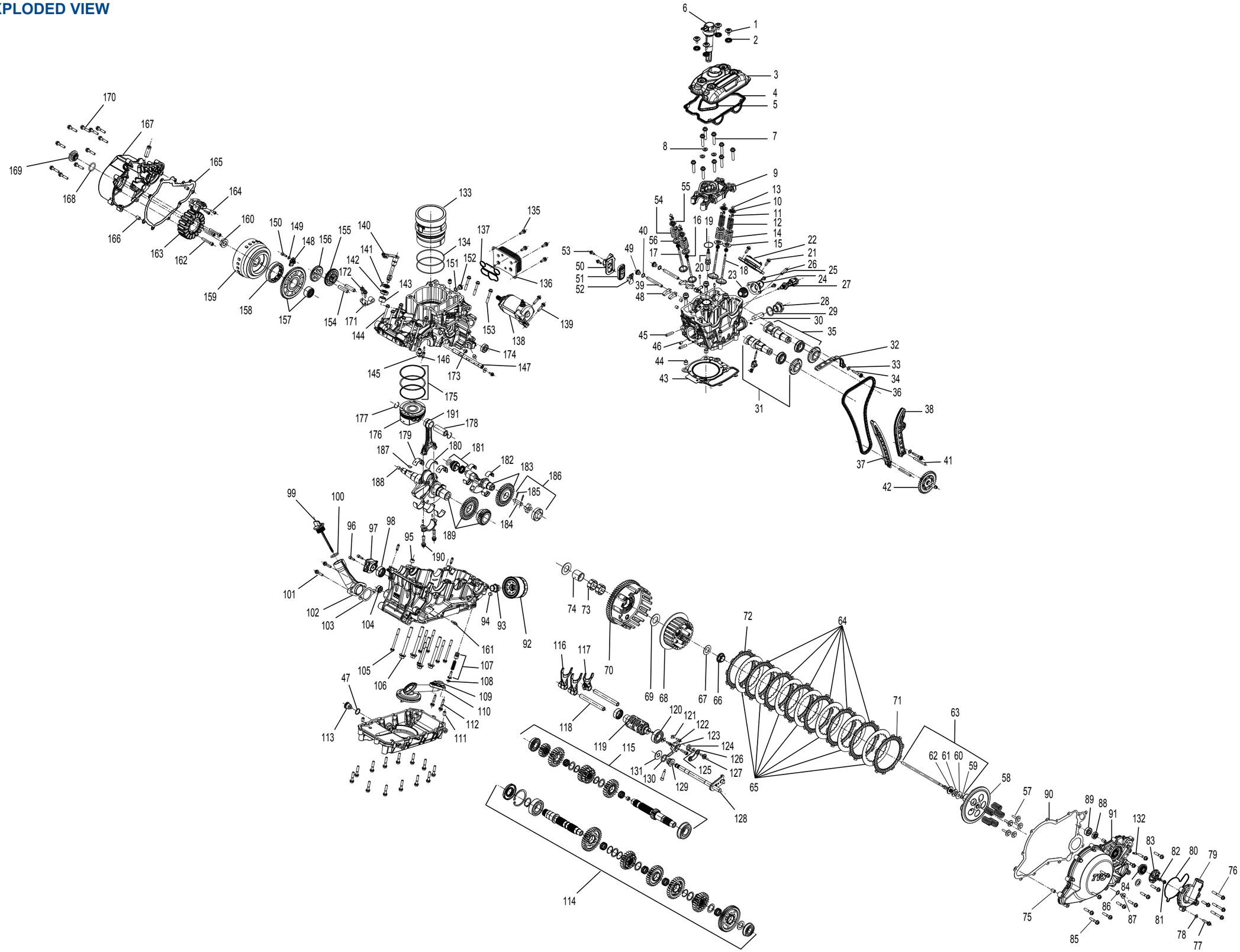
## IGNITION CUM STEERING LOCK

Component : Ignition cum Steering lock
Component condition : Component accessible
Objective : General service
Repair cycle : Lubricate the lock every service.

- Lubricate the ignition key slot with recommended spray regularly.
- Keep the key slot free from dust.



## ENGINE EXPLODED VIEW



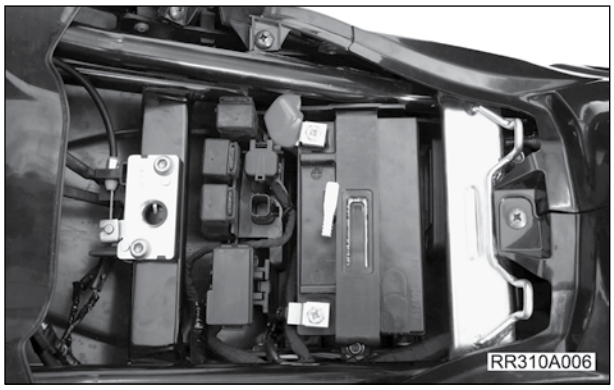
| Item No. | Description | Item No. | Description | Item No. | Description | Item No. | Description |
|---|---|---|---|---|---|---|---|
| 1 | BOLT CYLINDER HEAD COVER | 49 | PLUG CAP | 97 | SWITCH GEAR POSITION WITH O RING | 145 | JET OIL SPRAY |
| 2 | GROMMET | 50 | COVER SAIVALVE | 98 | NEEDLE BEARING 25x32x12 | 146 | DOWEL PIN 6x17.8 |
| 3 | COVER CYLINDER HEAD | 51 | SEC AIR INJECTION VALVE COMP | 99 | PLUG OIL FILLER M24 | 147 | OIL MANIFOLD ASSY. |
| 4 | PACKING SEAL COVER CYLINDER 1 | 52 | ARRESTOR PLATE | 100 | O RING 24.7x2.3 | 148 | STOPPER COMP. STARTER GEAR |
| 5 | PACKING SEAL COVER CYLINDER 2 | 53 | HEX SPOCKET CAP FLANGE BOLT M5x12 | 101 | HEX SOCKET CAP FLANGE BOLT M6x30 | 149 | PUNCHED WASHER A5.5 |
| 6 | IGNITION COIL ASSY. | 54 | SPRING VALVE EXHAUST | 102 | ADAPTOR OIL FILL | 150 | HEX SOCKET CAP SCREW M5x16 |
| 7 | HEX SOCKET CAPS FLANGE BOLT M7x38 | 55 | RETAINER VALVE SPRING 5.0 EXH | 103 | GASKET OIL LEVEL PLUG | 151 | GASKET OIL GALLERY PLUG |
| 8 | SPECIAL WASHER 7.2x15x2 | 56 | VALVE SEAT SPRING EXHAUST | 104 | OIL SEAL 12x22x9 | 152 | PLUG CAP M10x1 |
| 9 | HOUSING CAMSHAFT | 57 | HEX BOLT M6x25 | 105 | HEX SOCKET CAP FLANGE BOLT M6x70 | 153 | HEX SOCKET CAP FLANGE BOLT M6x40 |
| 10 | RETAINER VALVE SPRING INTAKE 500 | 58 | DISC PRESSURE CLUTCH | 106 | BOLT M9  95 | 154 | PIN MAGNETO |
| 11 | COTTER VALVE 500 | 59 | CIRCLIP 9 08 | 107 | KIT PRESSURE RELIEF VALVE | 155 | GEAR INTERMEDIATE ASSY |
| 12 | SPRING VALVE INTAKE INNER | 60 | SPECIAL WASHER | 108 | CIRCLIP 12x1 | 156 | GEAR STARTER IDLE |
| 13 | BUTTON TAPPET (GRADING) | 61 | THRUST BEARING 10x24x2 | 109 | O RING 17x2 | 157 | GEAR STARTER CLUTCH ASSY. |
| 14 | SPRING VALVE INTAKE OUTER | 62 | PLUNGER | 110 | SUCTION TUBE COMP. | 158 | ONEWAY CLUTCH |
| 15 | VALVE SEAT SPRING INTAKE | 63 | KIT CLUTCH ACTUATOR | 111 | PIN CYLINDER HEAD COVER KNOCK | 159 | ROTOR ASSY. |
| 16 | OIL SEAL VALVE STEM 500 | 64 | PLATE CLUTCH DRIVE | 112 | HEX SOCKET CAP FLANGE BOLT M6x25 | 160 | HEX FLANGE NUT M16x1.5 |
| 17 | VALVE EXHAUST 500 | 65 | PLATE CLUTCH DRIVEN | 113 | PLUG OIL DRAIN | 161 | STOPPER GEARSHIFT SPRING |
| 18 | VALVE INTAKE 500 | 66 | HEX FLANGE NUT | 114 | DRIVE SHAFT ASSY | 162 | HEX SOC CAP SCREW M6x40 |
| 19 | O RING 26x1.5 | 67 | WASHER CLUTCH HUB | 115 | COUNTER SHAFT ASSY | 163 | STATOR ASSY |
| 20 | SPARK PLUG | 68 | HUB CLUTCH | 116 | FORK GEARSHIFT NO.1 | 164 | HEX SOC CAP SCREW M5x16 |
| 21 | HEX SOCKET CAP FLANGE BOLT M6x16 | 69 | SHIM 22x40x2 | 117 | FORK GEARSHIFT NO.2 | 165 | GASKET MAGNETO COVER |
| 22 | PIPE INTAKE COMP. | 70 | GEAR ASSY. PRIMARY DRIVEN | 118 | SHAFT GEARSHIFT FORK | 166 | DOWEL PIN |
| 23 | THERMOSTAT | 71 | PLATE CLUTCH DRIVE JUDDER TYPE-B | 119 | CAM GEARSHIFT | 167 | COVER MAGNETO ASSY. (WITH BREATHER) |
| 24 | HOUSING THERMOSTAT | 72 | PLATE CLUTCH DRIVE TYPE 2 | 120 | BALL BEARING 20x42x12 | 168 | O RING 22.7x3.1 |
| 25 | HEX SOCKET CAP FLANGE BOLT M5x12 | 73 | NEEDLE BEARING 28x33x13 | 121 | CIRCLIP 25x1.2 | 169 | PLUG CRANKSHAFT HOLE |
| 26 | INSERT INTAKE | 74 | SPACER CLUTCH | 122 | HEX SOCKET CAP SCREW M5x12 | 170 | HEX SOC CAP FLANGE BOLT M6x30 |
| 27 | TEMPERATURE SENSOR ENGINE | 75 | DOWEL PIN | 123 | INDEX STAR ASSY | 171 | BRKT CLUTCH CABLE |
| 28 | SCREW TAPET ADJUSTING | 76 | HEX SOCKET CAP FLANGE BOLT M6x45 | 124 | SPRING GEARSHIFT CAM STOPPER | 172 | HEX SOCKET CAP FLANGE BOLT M6x16 |
| 29 | GASKET TENSIONER ADJ HYDL | 77 | HEX SOCKET CAP FLANGE BOLT M6x25 | 125 | SHIM 6x14x1 | 173 | BUSH |
| 30 | TENSIONER CAMCHAIN HYDL | 78 | ALUMINIUM WASHER 6.2x12x1 | 126 | STOPPER COMP. GEAR SHIFT | 174 | OIL SEAL 22 10 6 |
| 31 | CAMSHAFT EXHAUST ASSY. | 79 | WATER PUMP COVER | 127 | BOLT GEAR SHIFT CAM STOPPER | 175 | RING SET PISTON 8000 |
| 32 | GUIDE CAMCHAIN PLAS COMP. UPPER | 80 | PACKING WATER PUMP | 128 | SHAFT COMP GEARSHIFT ASSY | 176 | PISTON DIA80 |
| 33 | COPPER WASHER 8x13x1 | 81 | HEX SOCKET CAP FLANGE BOLT M5x12 | 129 | SPACER GEARSHIFT ARM | 177 | CIRCLIP PISTON PIN |
| 34 | BOLT CAMCHAIN TENSIONER | 82 | COPPER WASHER 5.2x9.9x1.5 | 130 | RETURN SPRING GEARSHIFT SHAFT | 178 | PISTON PIN |
| 35 | CAMSHAFT INTAKE ASSY | 83 | IMPELLER | 131 | PUNCHED WASHER 30x125x15 | 179 | GROOVE SHELL BEARING CRANKSHAFT |
| 36 | CAM CHAIN | 84 | FACE SEAL | 132 | INSERT | 180 | SHELL BEARING CONNECTING ROD |
| 37 | GUIDE CAMCHAIN | 85 | HEX SOCKET CAP FLANGE BOLT M6x30 | 133 | SLEEVE CYLINDER | 181 | KIT BREATHER |
| 38 | TENSIONER CAMCHAIN PLAS | 86 | GASKET OIL GALLERY PLUG | 134 | O RING 8600 20 | 182 | SHELL BEARING BALANCER SHAFT |
| 39 | SHAFT FINGER FOLLOWER | 87 | PLUG CAP | 135 | HEX SOCKET CAP FLANGE BOLT M6x16 | 183 | BALANCER SHAFT ASSY. |
| 40 | GASKET OIL GALLERY PLUG | 88 | OIL SEAL 22x10x6 | 136 | HEAT EXCHANGER WATER AND OIL | 184 | SHAFT OIL PUMP |
| 41 | DOWEL PIN 6x51 | 89 | BALL BEARING 10x26x8 | 137 | SEAL HEAT EXCHANGER | 185 | PIN 3.5x15.8 |
| 42 | COUNTER SHAFT CAM CHAIN DRIVE | 90 | GASKET CLUTCH COVER | 138 | STARTER MOTOR WITH O RING | 186 | ROTOR WITH OIL PUMP SHAFT |
| 43 | GASKET CYL HEAD | 91 | COVER CLUTCH | 139 | HEX SOCKET CAP FLANGE BOLT M6 25 | 187 | WOODRUFF KEY 4x5 |
| 44 | TUBULAR DOWEL | 92 | FILTER COMP ENGINE OIL WITH PACKING | 140 | ROD CLUTCH RELEASE COMP. | 188 | HEX SOC. GRUB SCREW M8 |
| 45 | SET SCREW M7X30 | 93 | ADAPTOR SCREW OIL FILTER | 141 | SPRING CLUTCH CABLE | 189 | CRANKSHAFT ASSY |
| 46 | HEX SOCKET GRUB SCREW M8 | 94 | HEX SOC GRUB SCREW M10x1 | 142 | OIL SEAL 15x24x7 | 190 | SPECIAL BOLT CON. ROD |
| 47 | ALUMINIUM WASHER 16x20x1.5 | 95 | NEEDLE BEARING 8x12x8 | 143 | NEEDLE BEARING 14x20x12 | 191 | CONNECTING ROD ASSY. |
| 48 | FINGER FOLLOWER | 96 | HEX SOCKET CAP SCREW M5x16 | 144 | HEX SOCKET CAP FLANGE BOLT M6x70 | | |

# ENGINE REMOVAL

Component : Engine
Component condition : Mounted on Engine stand
Objective : Engine Removal
Repair cycle : As required

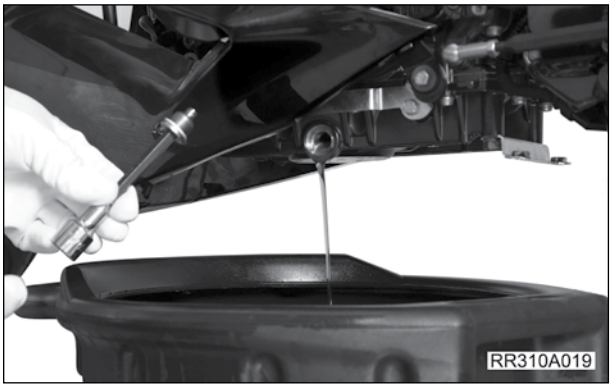
**Removal**

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the front and rear seat assembly. Refer ***Seat assembly remove*** for procedure.
- Remove the following cowls:
  - *Refer **Bottom cover Rear** for procedure.*
  - *Refer **Bottom cover Front** for procedure.*
  - *Refer **Side cowl upper LH** for procedure.*
  - *Refer **Side cowl upper RH** for procedure.*
  - *Refer **Fuel tank cover** for procedure.*
  - *Refer **Side cowl LH** for procedure.*
  - *Refer **Side cowl RH** for procedure.*
  - *Refer **Engine guard Center** for procedure.*
  - *Refer **Engine guard LH** for procedure.*
  - *Refer **Engine guard RH** for procedure.*
  - *Refer **Housing headlamp rear LH and RH** for procedure.*
  - *Refer **Headlamp housing components** for procedure.*
- Remove the fuel tank assembly. Refer ***Fuel tank – Removal*** for procedure.
- Remove the radiator assy. Refer ***Radiator – Remove and Installation*** for procedure.
- Remove Air filter housing and ducts. Refer ***Air filter housing and ducts*** removal for procedure.
- Remove the Exhaust system. Refer ***Exhaust system – Removal*** for procedure.
- Remove the front sprocket. Refer ***Front Sprocket – Remove and Installation*** for procedure.




- Remove the drain plug and ensure the oil drains into the tray only and does not spill out.

| | |
|---|---|
| Tool | 8 mm Allen Key bit |

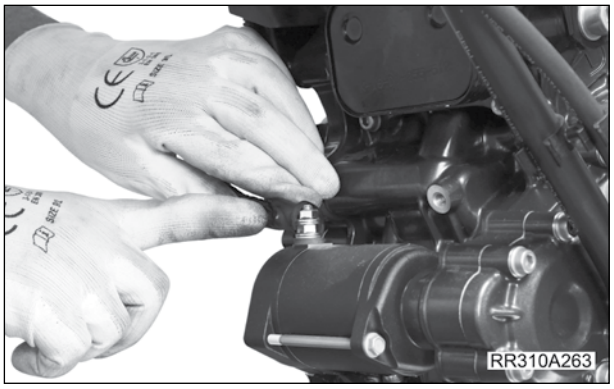



**CAUTION**

Spilled oil must be cleaned immediately. Always keep the work area clear of any spills to avoid any injuries.

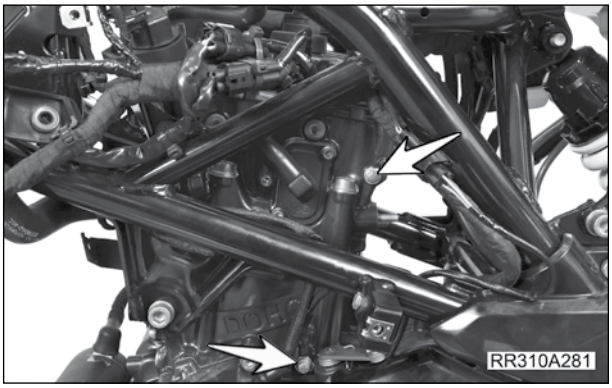
- Disconnect the electric connection from self-starter.

| | |
|---|---|
| Tool | 10 mm Open End Spanner |

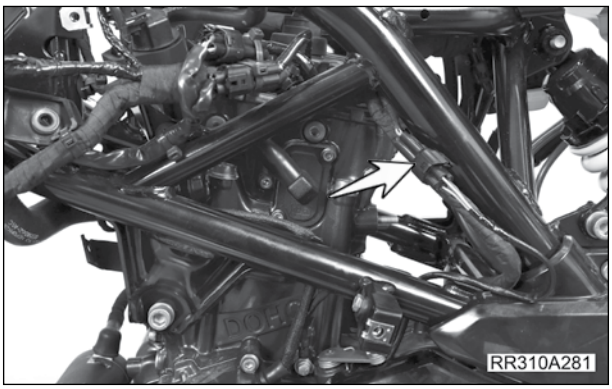



- Remove the coolant temperature sensor connector.


- Disconnect grounding points.
- Location - One on the LH rear cylinder head, the other on LH upper crankcase.

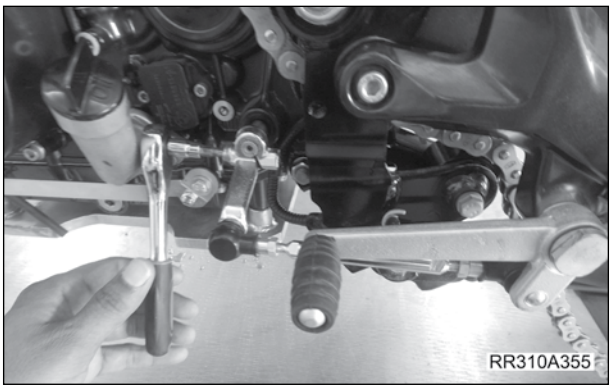



- Disengage gear position sensor connector.

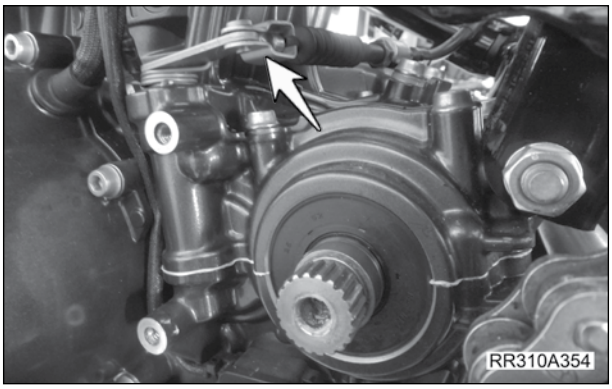


- Disconnect the gear shifting lever linkage.

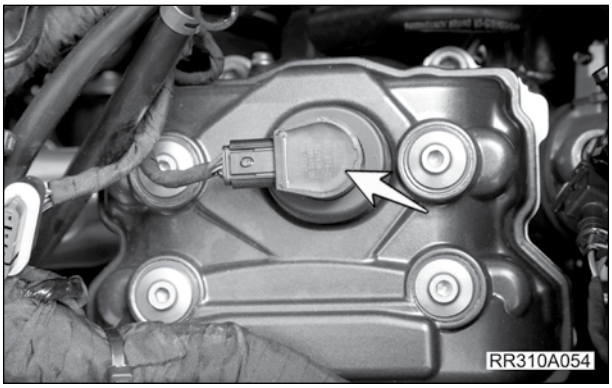
| Tool | 6 mm Allen Key Socket |
|---|---|




- Loosen the clutch cable and disconnect the clutch link.




- Disconnect the Ignition coil connector.

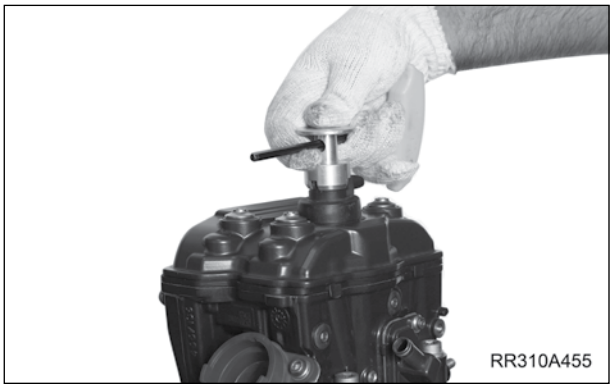



- Remove the ignition coil.

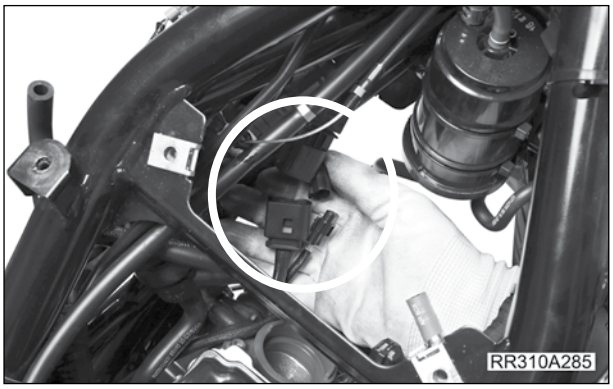
| Tool | N7310090 |
|---|---|

**NOTE**

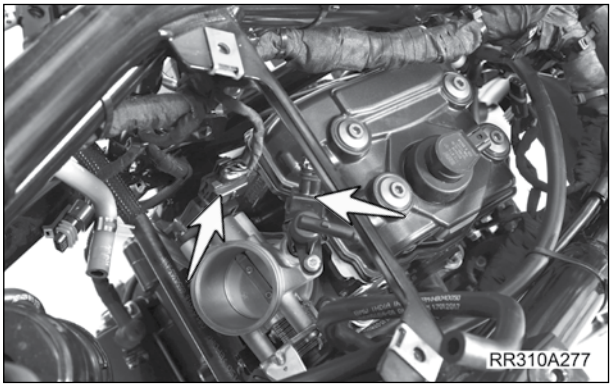
It is not required to remove the ignition coil. However, it is recommended to remove the ignition coil to avoid breakage.



- Remove the Magneto connector.
- Remove the Ignition coil (Crank position sensor) connector.
- Remove the regulator rectifier connector.



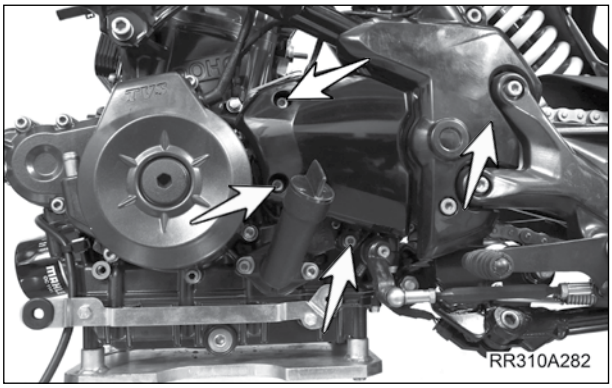

- Disconnect the throttle cable connection.
- Disconnect the throttle position connector.
- Disconnect the Injector connector.
- Re-check the all electrical connection are disconnected from engine area.
- Re-check all the air hoses are disconnected.




- Remove the front sprocket cover.

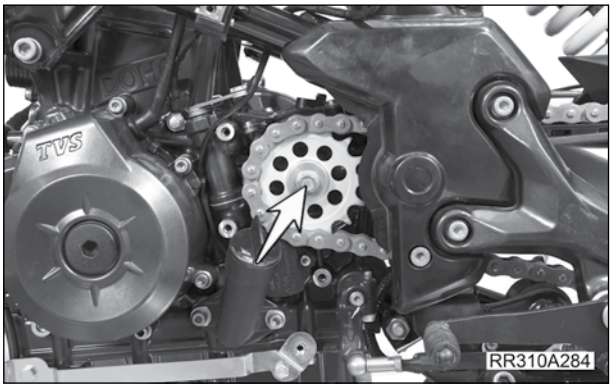
| Tool | 5 mm Allen Key Screwdriver |
|---|---|

- Remove the Sprocket cover frame.
- Remove the bottom frame cover RH and LH.



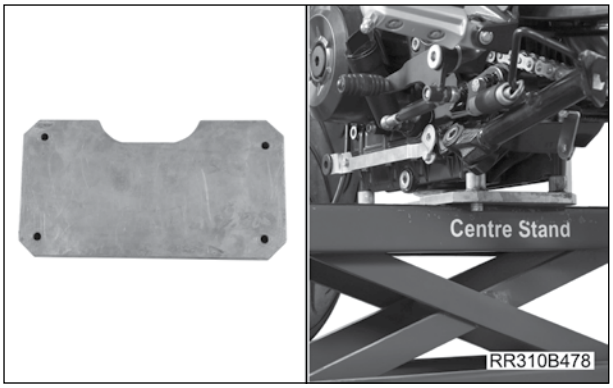

- Remove the front sprocket.

| Tool | 12 mm bit |
|---|---|

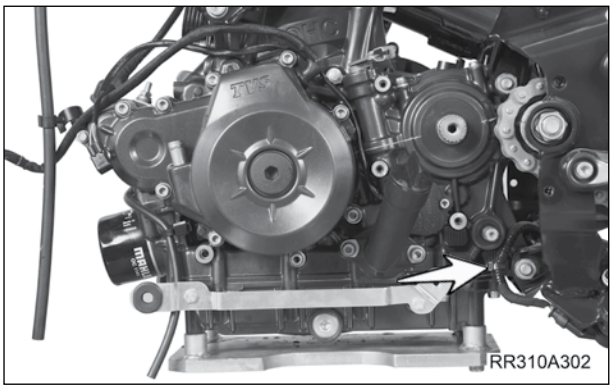


- Install the engine support plate below the engine.
- Align the scissor lift below the engine.
- Support the engine on the scissor lift.

| Tool | N7310100 |
|---|---|

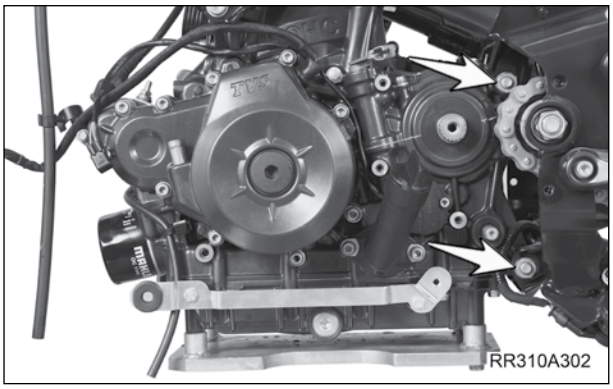



- Disconnect the engine wiring clip.




- Remove the engine mounting nuts at the rear LH side first.

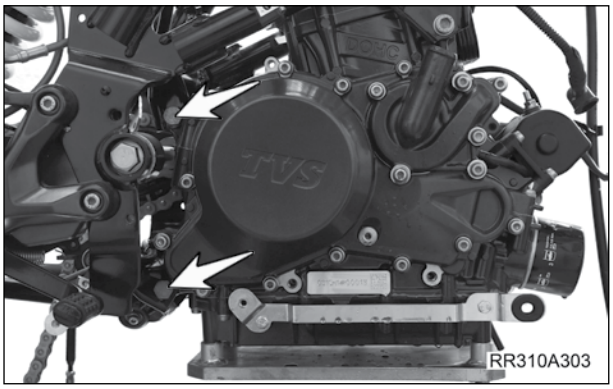
| Tool | 10 mm socket |
|---|---|




- Slide the mounting bolts out.

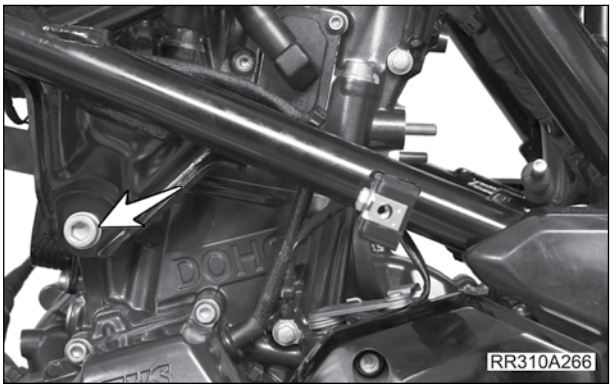
**NOTE**

The bolts should not be hammered or tapped out. Adjust the scissor lift such that the bolts slide out by hand.

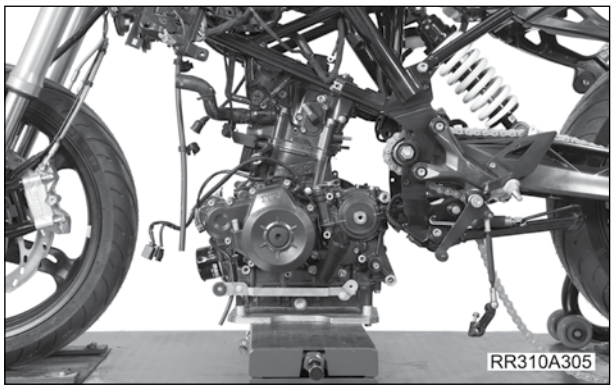


- Remove the engine mounting screws on either side at the front.

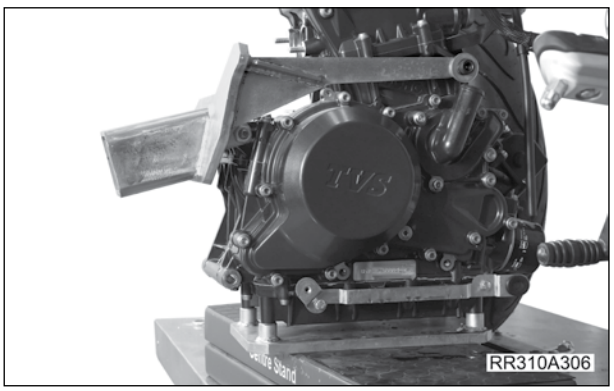
| | |
|---|---|
| Tool | 8 mm Allen Socket |



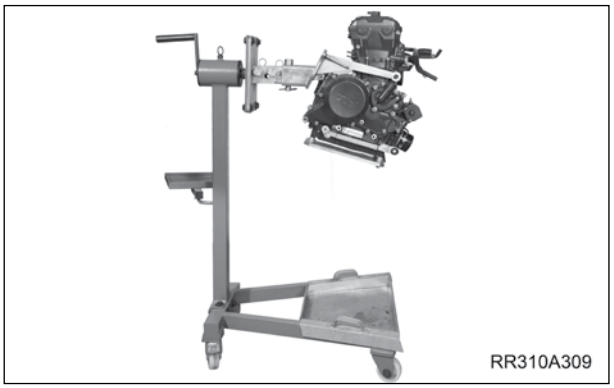

- Move away the all wiring harness away from the engine.




- Slowly lower the scissor lift and dismount the engine from the chassis.



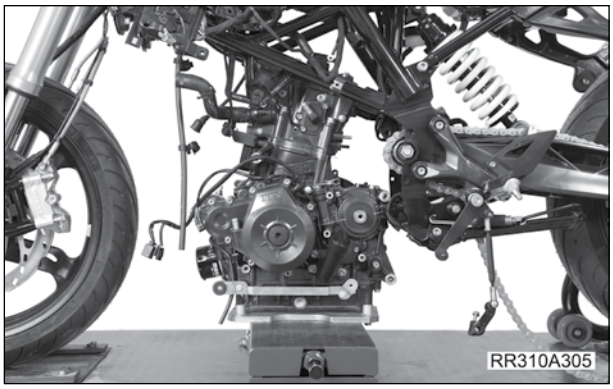

- Using a workshop crane, lift the engine clear off the ramp and mount it on the engine stand.



## ENGINE INSTALLATION

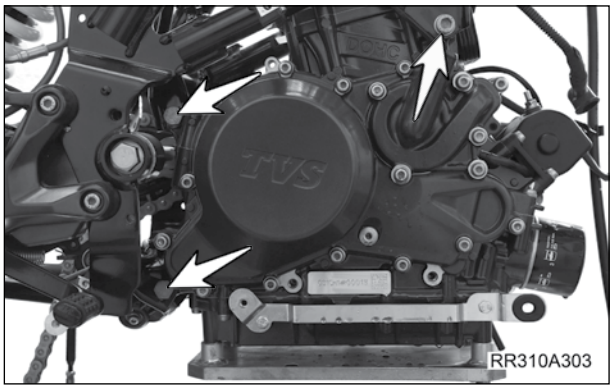
Component : Engine
Component condition : Mounted on Engine stand
Objective : Engine Installation
Repair cycle : As required

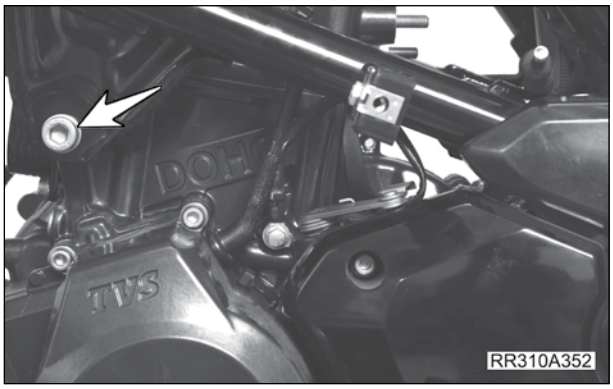
- Place the engine on scissor cross lift.
- Slowly raise the lift to align the engine mountings holes.




- Align the mounting holes so that the mounting screws should go freely inserted into the holes.
- Install the engine mounting screws at the front first.
- Torque the mounting bolts as per below sequence.

| Sequence | Position | Torque |
|---|---|---|
| Step-1 | Attach the screw locking agent loosely, turn the screw with washers. | Loctite 270, high strength |
| Step-2 | Front left | 45 Nm |
| Step-3 | Top rear | 45 Nm |
| Step-4 | Bottom rear | 45 Nm |
| Step-5 | Front right | 45 Nm |

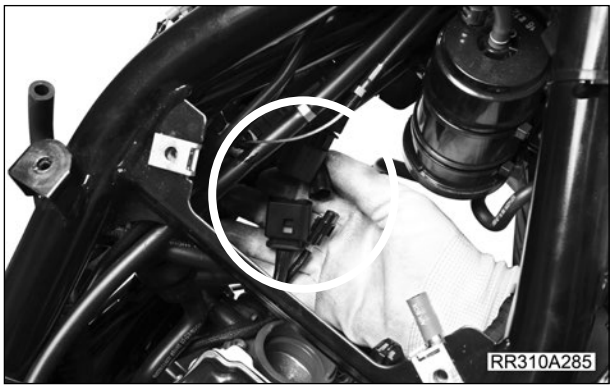


- Connect the self starter electrical connection.

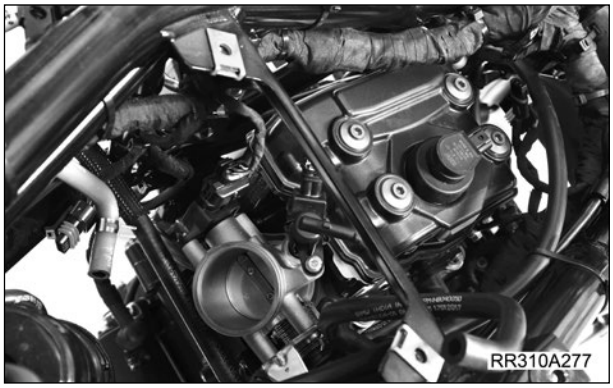
| | |
|---|---|
| Tool | 10 mm open end Spanner |
| Tightening torque | 4.5 Nm |


- Connect the Magneto and Crank position sensor connectors.
- Fix the wire with wire tag.
- Connect the ground wire to cylinder block and near cylinder head.

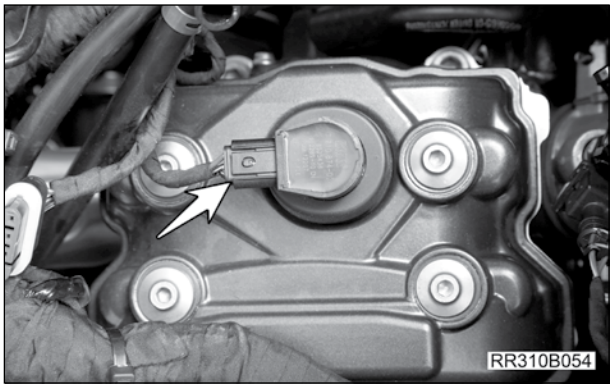



- Connect the coolant temperature sensor connector.

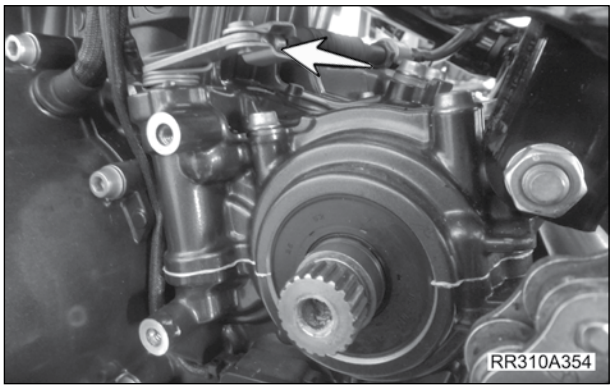

- Connect the Injector connector.
- Connect the trottle position sensor connector.
- Connect the throttle cable connection.



- Install the Ignition coil and connector.

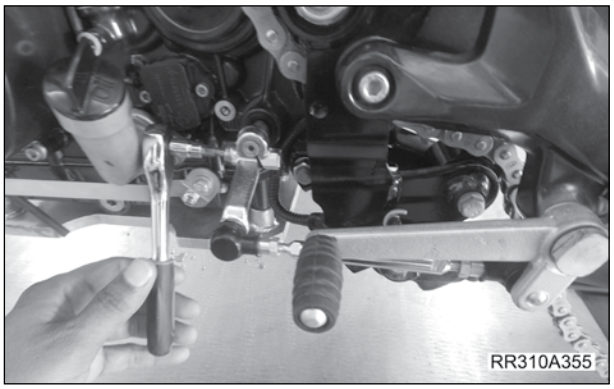



- Fix the clutch cable to the clutch link.




- Install the gear shifter linkage lever.

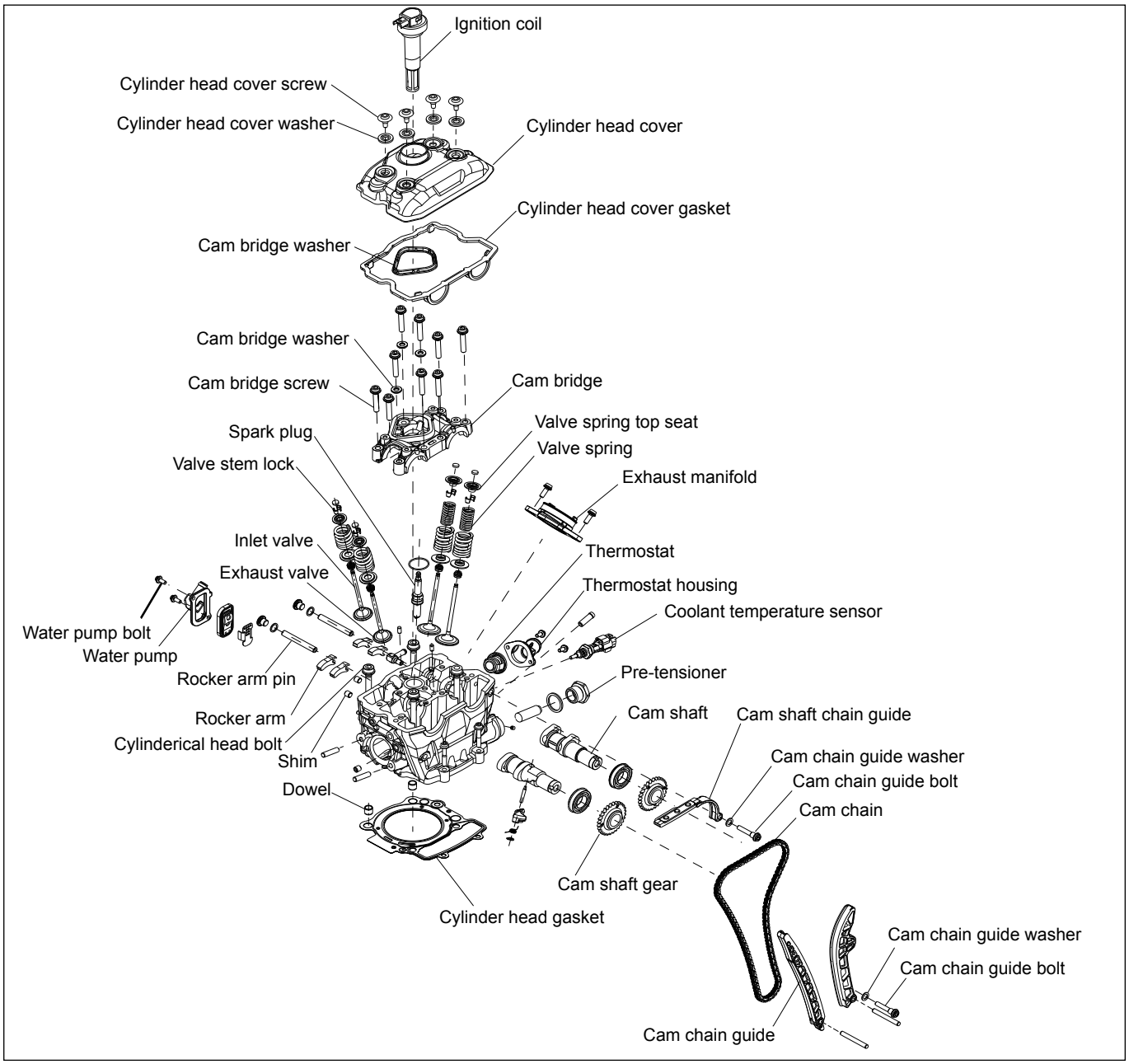
| | |
|---|---|
| Tool | 5 mm Allen Key Socket |
| Tightening torque | 8 Nm |




- Install the front sprocket. Refer ***Front Sprocket – Remove and Installation*** for procedure.
- Install the Exhaust system. Refer ***Exhaust system – Removal and Installation*** for procedure.
- Install Air filter housing and ducts. Refer ***Air filter housing and ducts*** installation for procedure.
- Install the radiator assy. Refer ***Radiator – Remove and Installation*** for procedure.
- Install the fuel tank assembly. Refer ***Fuel tank – Install*** for procedure.
- Refill the engine oil. ***Refer Engine oil – Replace-*** for procedure.
- Refill coolant. Refer ***Coolant pump removal and installation*** for quantity.

- Check no wires are in contact with hot surfaces.
- Check all electrical cable routings and fasten with wire tags as required.
- Adjust drive chain slackness. Refer ***Drive chain slackness*** for procedure.
- Adjust clutch and throttle play.
- Connect the battery and terminals.
- Connect ***TVS Ride Scan Tool*** and perform diagnostics.
- Install the following cowls in the below order:
  - *Refer **Housing headlamp rear LH and RH** for procedure.*
  - *Refer **Headlamp housing components** for procedure.*
  - *Refer **Engine guard RH** for procedure.*
  - *Refer **Engine guard LH** for procedure.*
  - *Refer **Engine guard Center** for procedure.*
  - *Refer **Side cowl RH** for procedure.*
  - *Refer **Side cowl LH** for procedure.*
  - *Refer **Fuel tank cover** for procedure.*
  - *Refer **Side cowl upper RH** for procedure.*
  - *Refer **Side cowl upper LH** for procedure.*
  - *Refer **Bottom cover Front** for procedure.*
  - *Refer **Bottom cover Rear** for procedure.*
- Install the front and rear seat assembly. Refer ***Seat assembly install*** for procedure.

## EXPLODED VIEW - CYLINDER HEAD



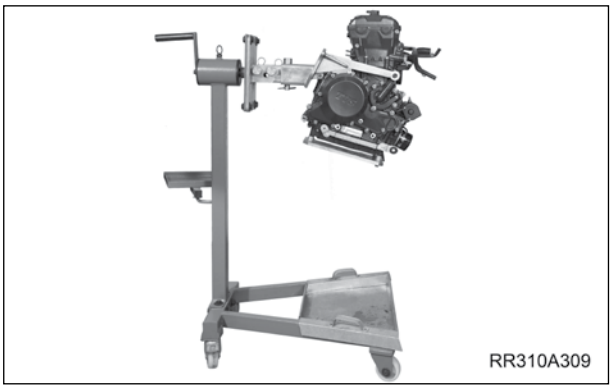
# CYLINDER HEAD - REMOVAL AND INSTALLATION

Component : Cylinder head
Component condition : Mounted on Engine stand
Objective : Cylinder Head Removal
Repair cycle : As required

**Removal**

- Remove engine and mount it on the stand. Refer ***Engine removal*** for procedure.

| | |
|---|---|
| Tool | NB310090 |

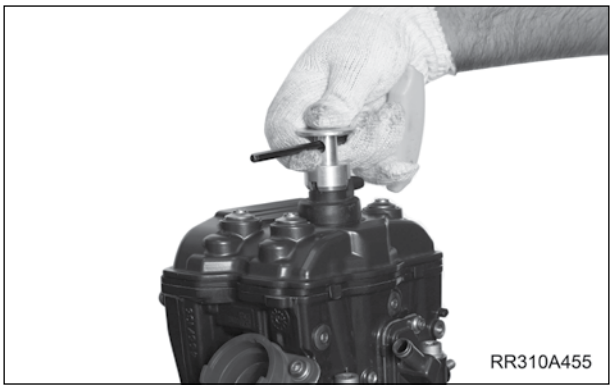



- Remove ignition coil.

| | |
|---|---|
| Tool | N7310090 |

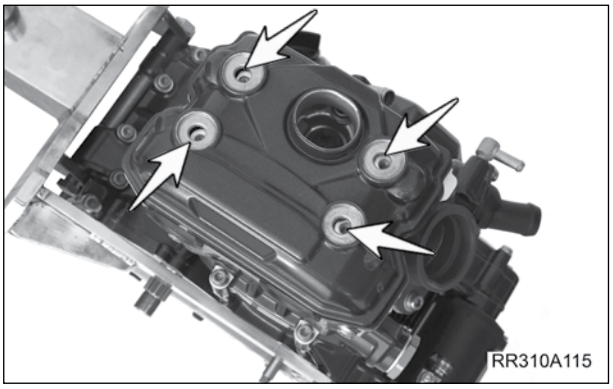
- Remove spark plug.

| | |
|---|---|
| Tool | Plug bit with socket |
| Torque | 12 Nm |

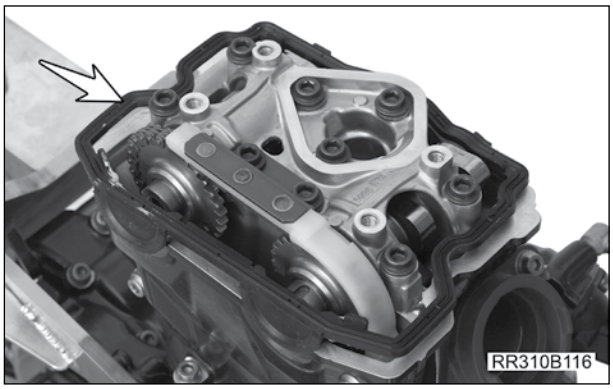



- Remove cylinder head cover.

| | |
|---|---|
| Tool | 6 mm Allen Key |
| Torque | 10 Nm (diagonal sequence) |

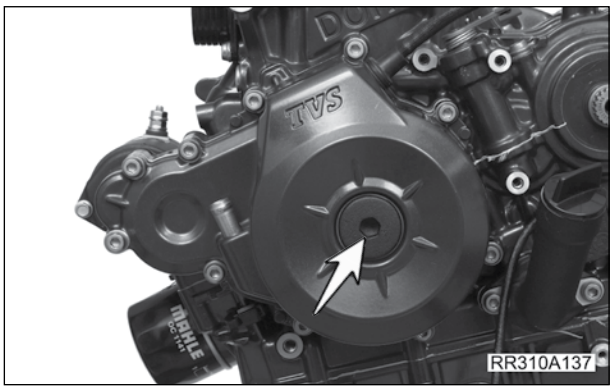



- Remove cylinder head cover packing.



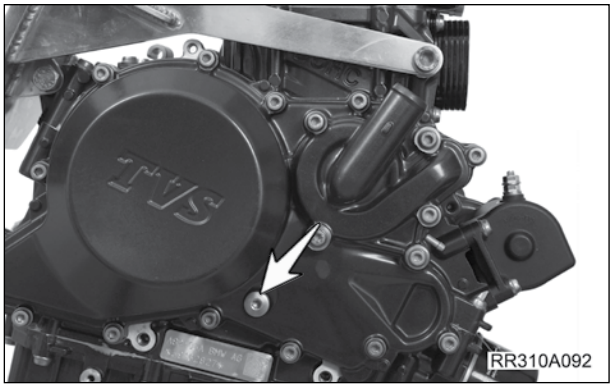
- Remove the crankshaft hole plug.

| | |
|---|---|
| Tool | 10 mm Allen Key |
| Torque | 10 Nm |

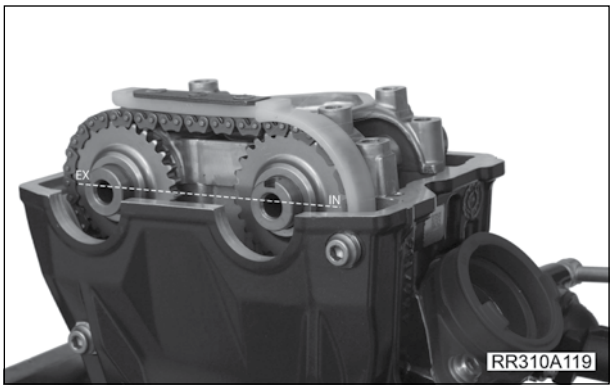



- Remove the TDC locking tool plug cap.

| | |
|---|---|
| Tool | 10 mm Allen Key |
| Torque | 10 Nm |

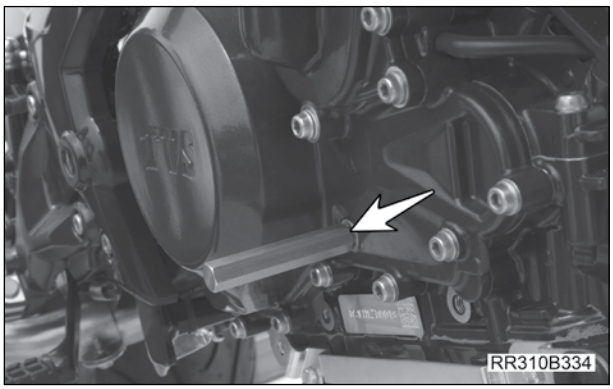



- Rotate camshaft till the exhaust and inlet markings are alligned with the block as shown.




- Lock piston in TDC with the special tool.

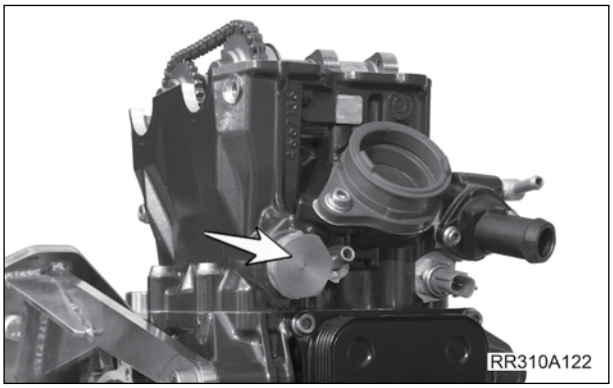
| | |
|---|---|
| Tool | N7310140 |



- Record the measured values in the chart provided in ***Engine service data***.

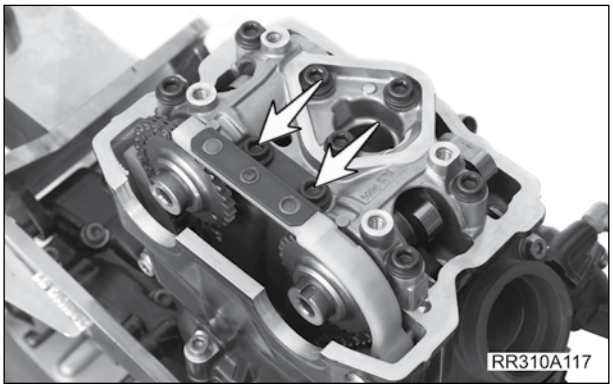
- Remove the timing chain tensioner.

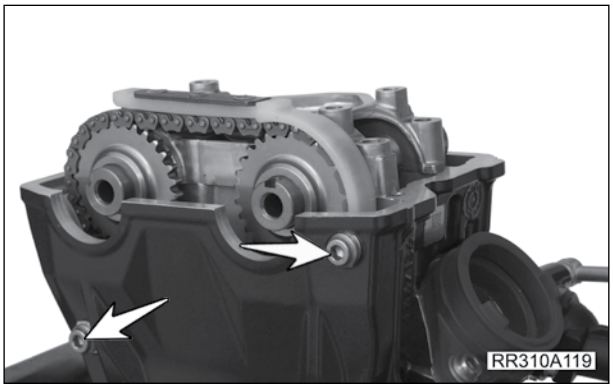
| | |
|---|---|
| Tool | 24 mm open end |
| Torque | 30 Nm |




- Remove the chain guide.

| | |
|---|---|
| Tool | 8 mm Allen Key |
| Torque | 12 Nm |
| Loctite | Loctite 243 |



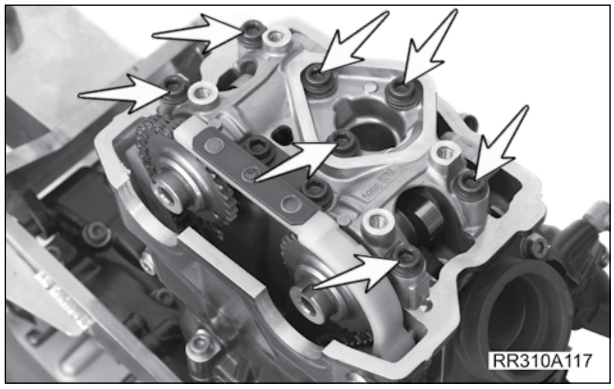

**NOTE**

Refer the installation procedure for bolt tightening sequence during assembly.

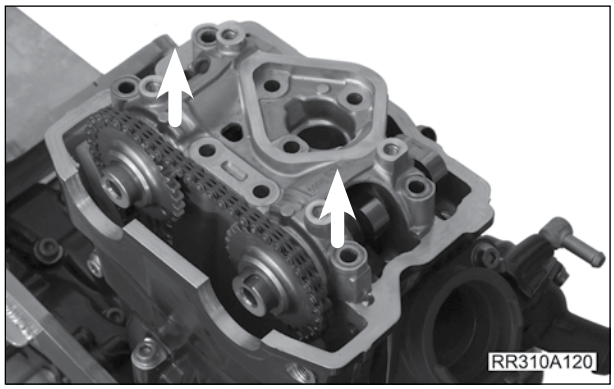
- Remove the camshaft housing bolts in sequence from outside to inside.
- Retain copper washers from the inner bolts.

**NOTE**

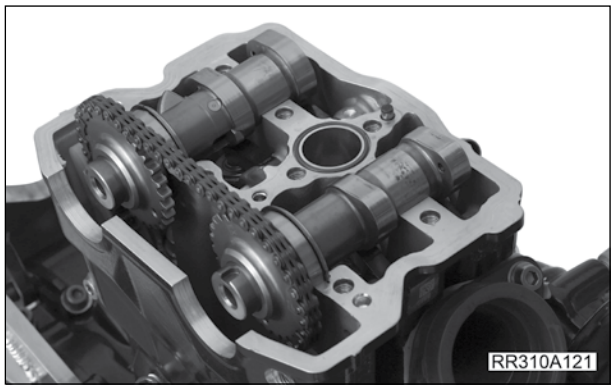
Loosen all bolts first before removing them.



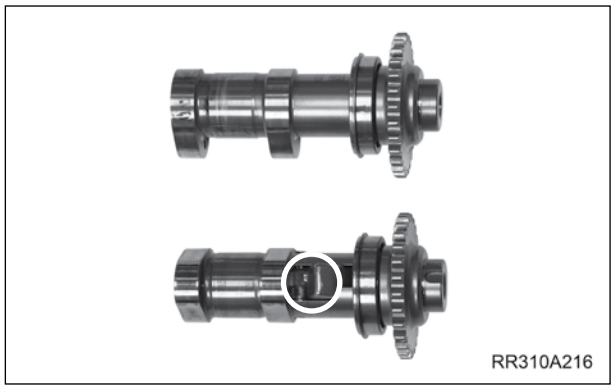

- Lift the camshaft housing clear off the head.



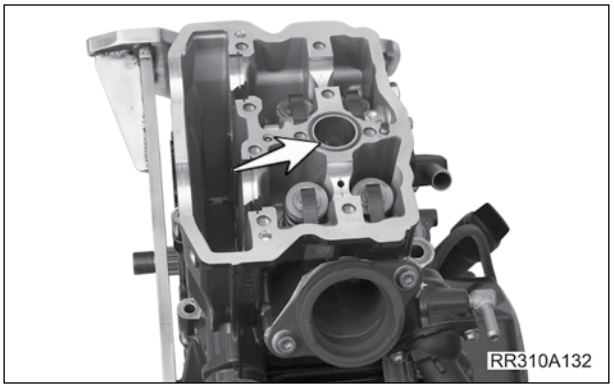

- Remove the camshaft. Let the timing chain fall into the crankcase.




- Exhaust camshaft can be identified by the presence of de-compressing mechanism.



- Remove and discard the ignition coil o-ring.



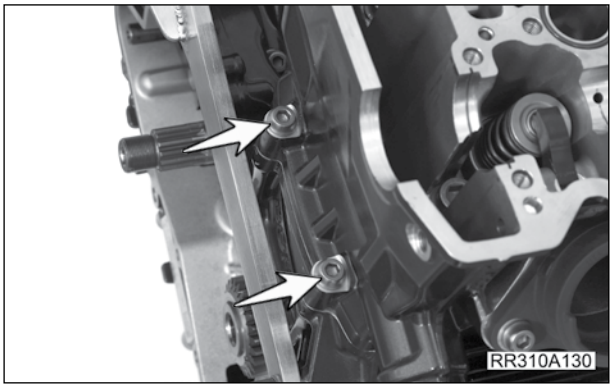

- Remove the tappet shims and measure the thickness along with the valve clearance data.

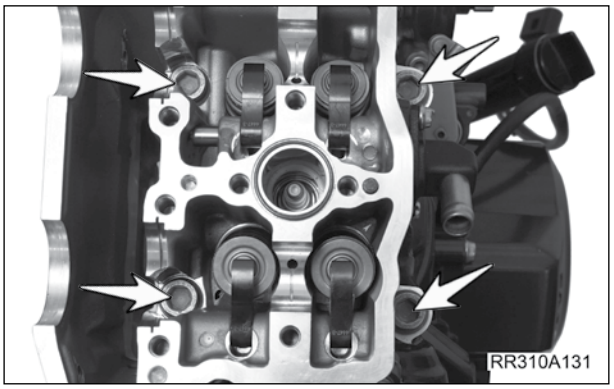
**NOTE**

Shims should be used on respective valves only during assembly. Place the shims in clean, marked container or tray.

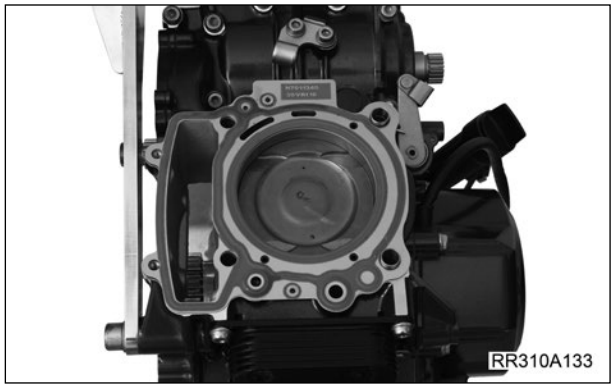
- Remove the head bolts from outside to inside and discard.

| | |
|---|---|
| Tool | 12 mm Allen Key |



- Lift the cylinder head gently off the block. Tap with a rubber mallet, if required.
- Remove and discard cylinder head gasket.

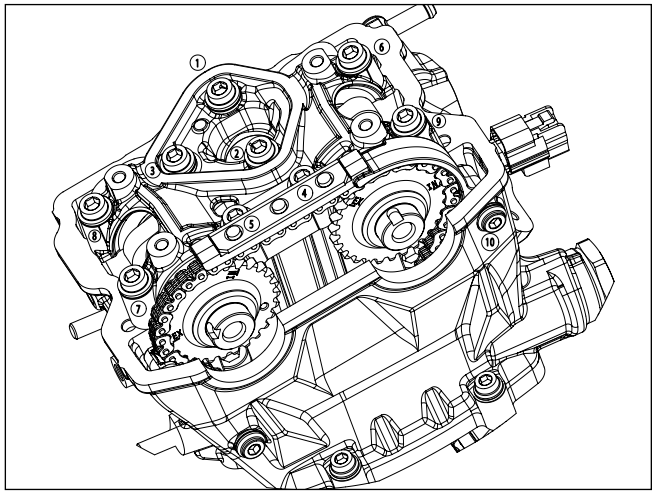



**Installation**

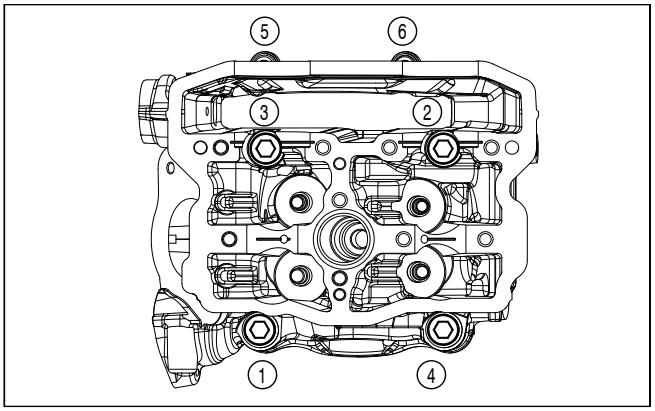
- Installation is the reverse of the removal procedure.
- The following items must be replaced and not reused.
  - Head gasket
  - Head bolts
  - Ignition coil o-ring.

- Camshaft housing and guide cam chain tightening sequence as shown:

| Tightening torques | |
|---|---|
| Camshaft housing and guide cam chain | |
| Pretightening | 5 Nm |
| Final tightening | 15 Nm |



- Install and tighten cylinder head bolts
  - *Lubricate thread and contact surfaces of the bolts (1) up to (6) with engine oil.*
  - *Install bolts (1) to (6) and hand-tight.*
  - *Tighten bolts (1) up to (6) with 1st tightening torque.*
  - *Tighten bolts (1) up to (4) with additional angle of rotation.*
  - *Tighten bolts (5) and (6) with 2nd tightening torque.*



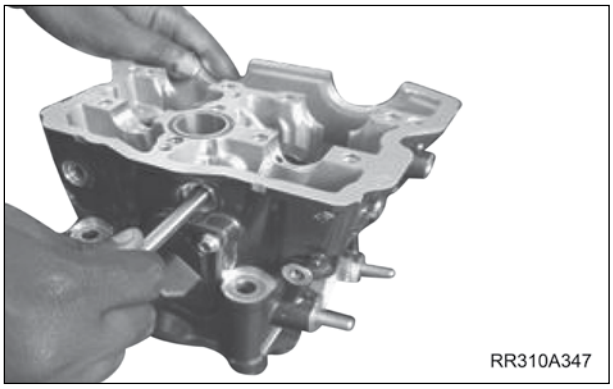

| Tightening torques | |
|---|---|
| Cylinder head to engine block | |
| M9x1.25, Threads and contact surface of the screw head are oiled | Tightening sequence: As per bolt numbering |
| | Hand tight |
| M6x35, Threads and contact surface of screw head are oiled | 1st tightening torque, 5 Nm |
| M9x1.25, Bolt (1) to (4) | 2nd tightening torque, 20 Nm |
| | Additional angle of rotation, 90° |
| M6x35, Bolt (5) and (6) | 2nd tightening torque, 10 Nm |

## CYLINDER HEAD

Component : Cylinder head
Component condition : Component on workbench
Objective : Cylinder head Disassembly
Repair cycle : As required

**Disassembly**

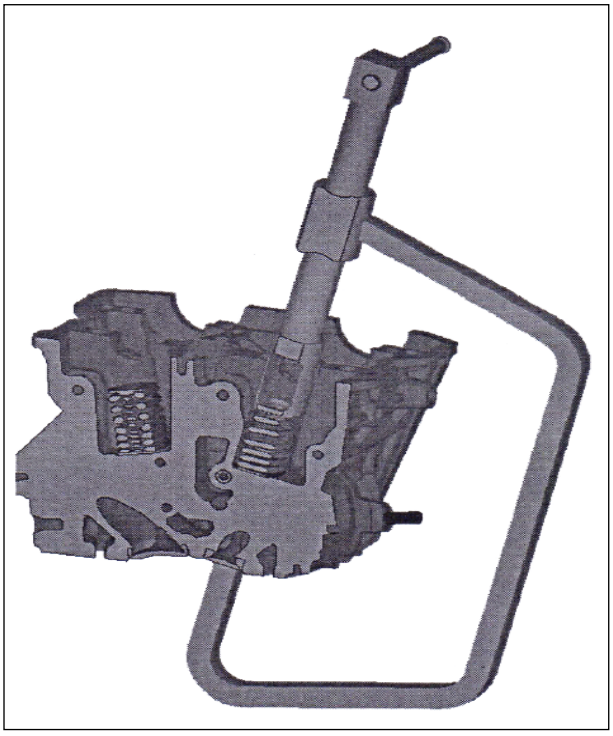
- Remove cylinder head assembly from engine. Refer ***Cylinder head – Removal*** for procedure.
- Remove rocker pin locking screw along with copper washer (X2).
- Remove the rocker pin (2 nos).




- Remove the rocker (X4).
- Using a magnetic stick remove shims from the valve tops.
- Align and install the valve compressor tool.

| Tool | S1310020 |
|---|---|

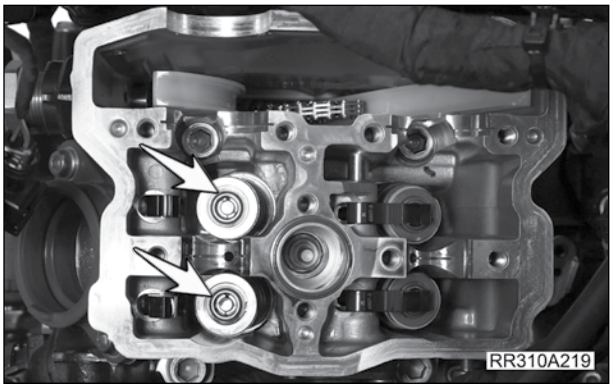
- Install the tool on the valve head to arrest the movement of valve.
- Press valve compressor tool to release the valve spring tension. Remove the valve stem lock.
- Remove the tool from the valve. Remove valve spring seat and valve spring.
- Remove the tool from the valve head surface.
- Remove the valve from the cylinder head.
- Repeat the above sequence for removing other valves.



**NOTE**

Only the Inlet valve will have inner and outer spring.

- Remove the valve stem seal with the help of plier.
- Remove the spring retainer.
- Repeat the same procedure for removing other valve stem seal and spring retainer.



## CYLINDER HEAD

| | |
|---|---|
| Component | : Cylinder head |
| Component condition | : Component on workbench |
| Objective | : Cylinder Head Assembly |
| Repair cycle | : As required |

**Assembly**

- Install valve seats .
- Insert valve.
- Insert new valve sleeve and tap the old valve sleeve out.

| | |
|---|---|
| Tool | S1310020 |

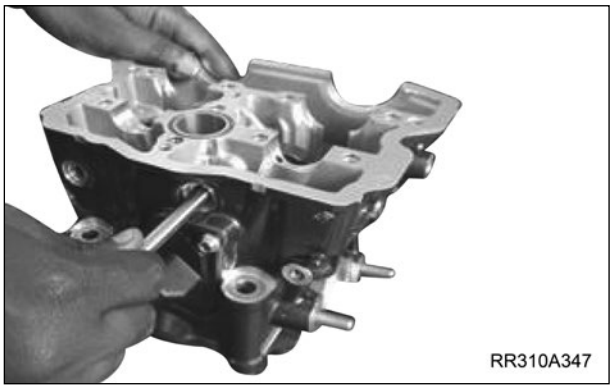
- Discard the old valve sleeve.
- Insert the valve again.
- Install the stem oil seal.

| | |
|---|---|
| Tool | N7310130 |

- Insert the valve spring (2 nos. for intake and 1 nos. for exhaust) and spring seat.
- Compress the valve spring and install the valve stem lock.

| | |
|---|---|
| Tool | S1310020 |

- Release the tool slowly ensuring proper seating of the lock on the valve seat.
- Repeat the procedure for all the valves.

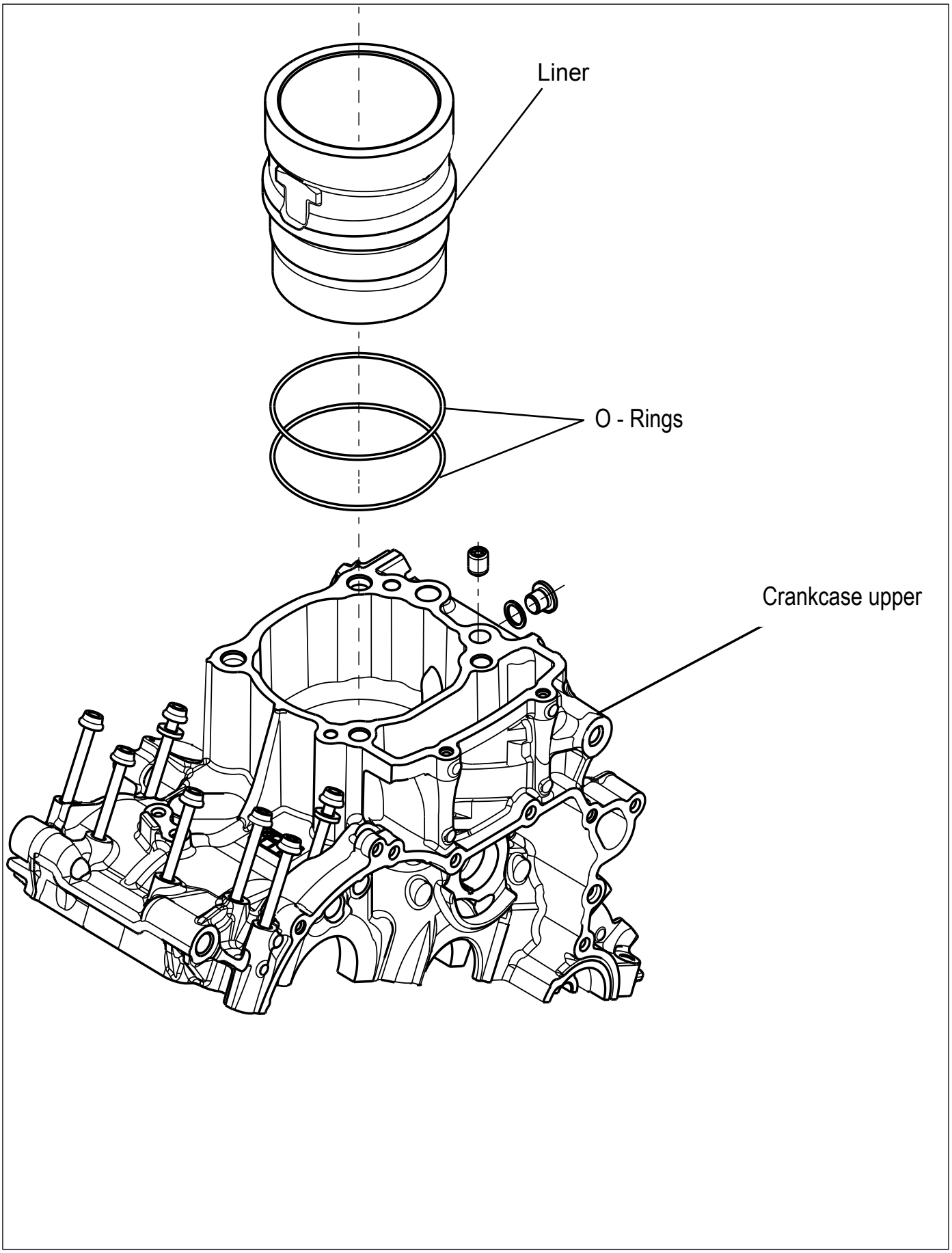

RR310A347

- Install the rockers (X4)
- Install the rocker pin (X2).
- Install the rocker pin locking screw along with copper washer (X2).

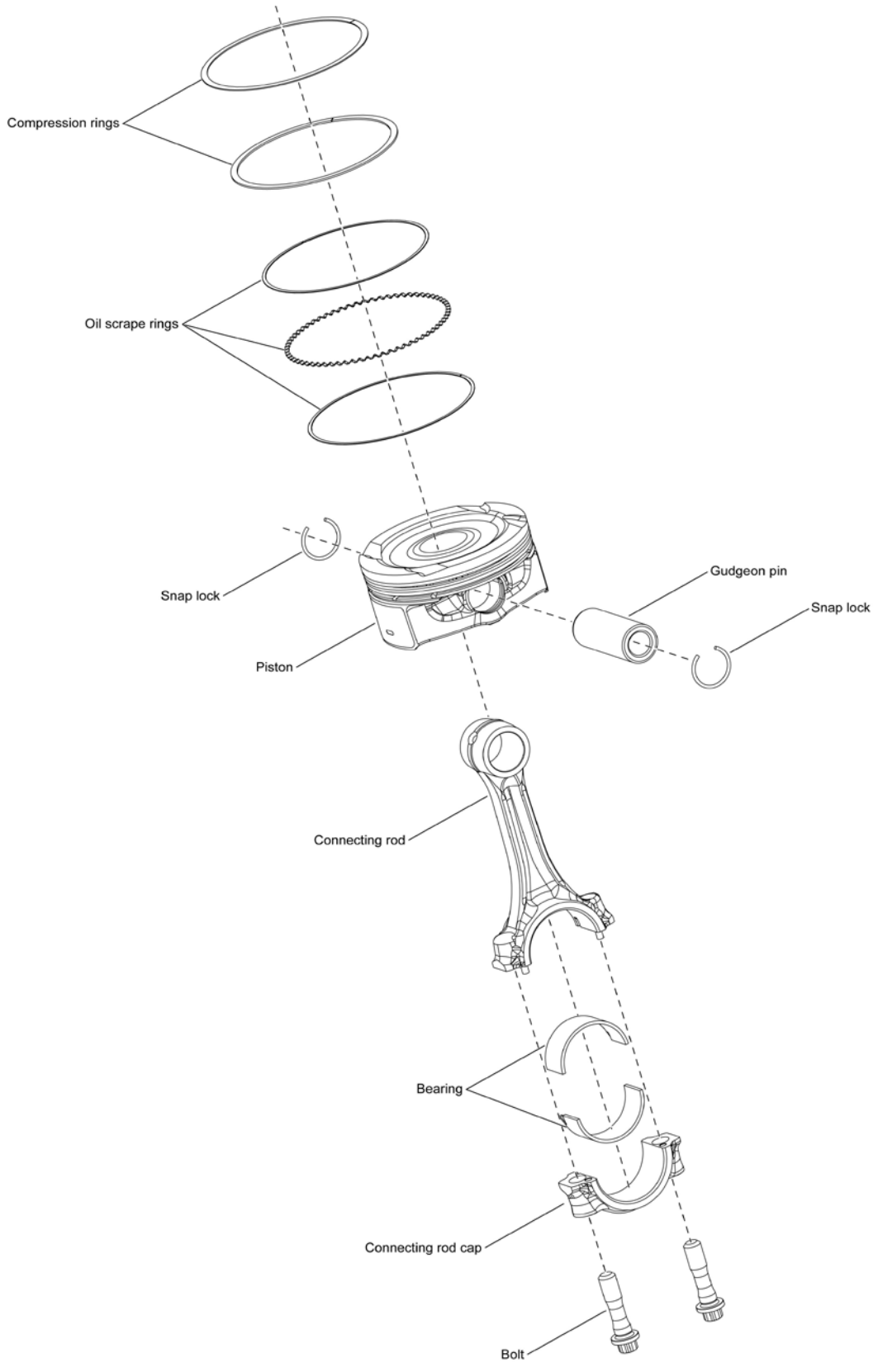
| | |
|---|---|
| Tool | 10 mm Allen Key |


RR310A348

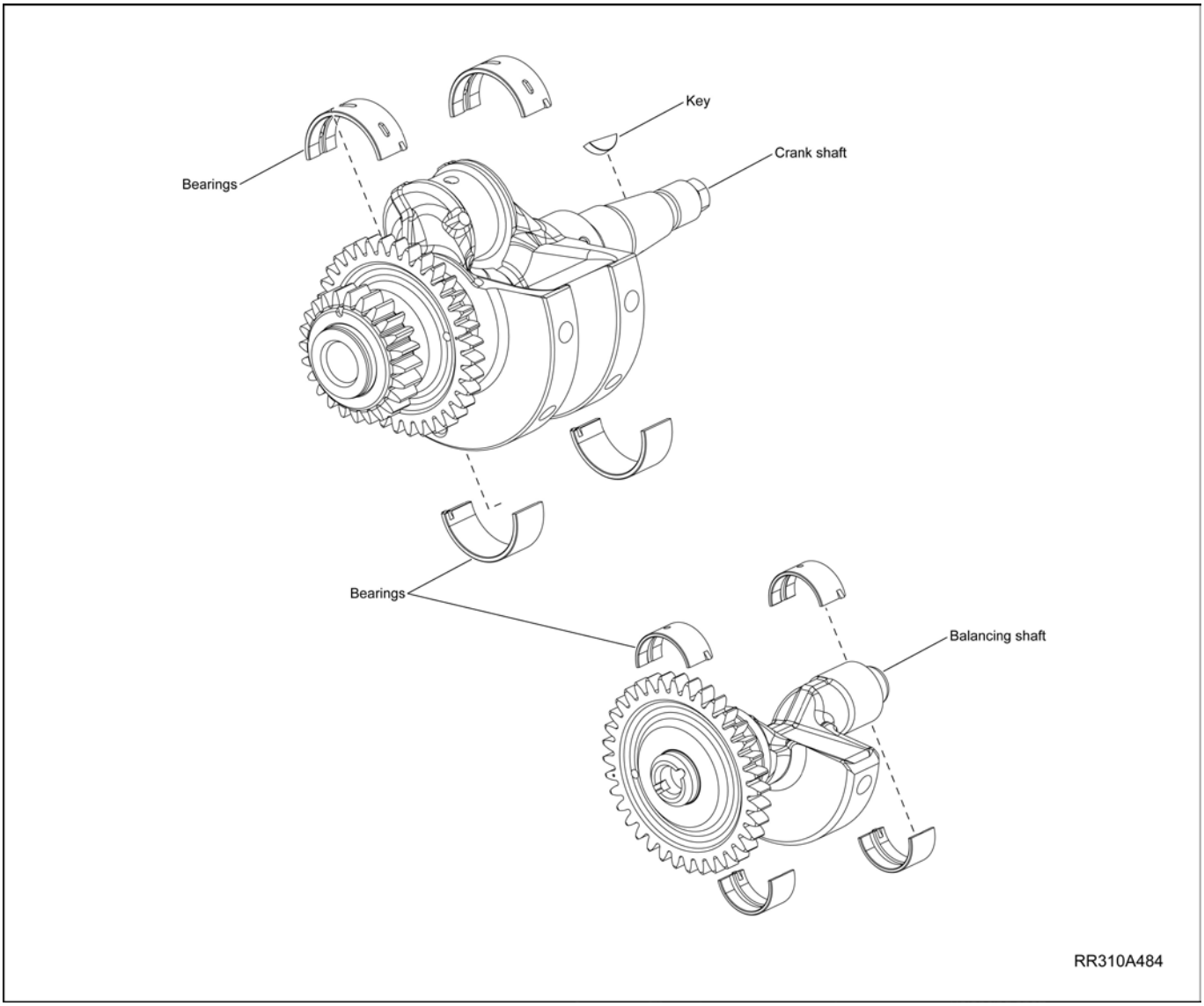
## EXPLODED VIEW - CRANKCASE UPPER



## EXPLODED VIEW - PISTON AND CONNECTING ROD



## EXPLODED VIEW - CRANKSHAFT AND BALANCING SHAFTS



## ENGINE AND GEARBOX

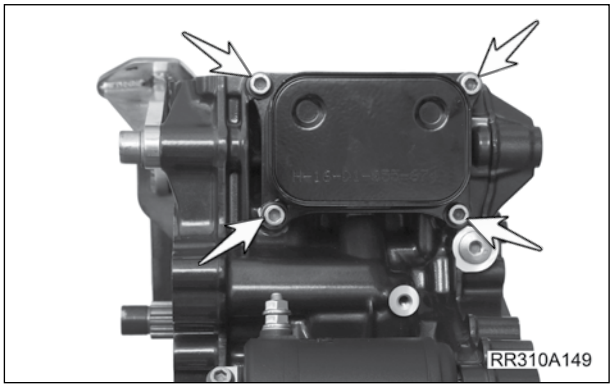
Component : Engine and Gear Box
Component condition : Mounted on Engine stand
Objective : Engine Disassembly
Repair cycle : As required

**Disassembly**

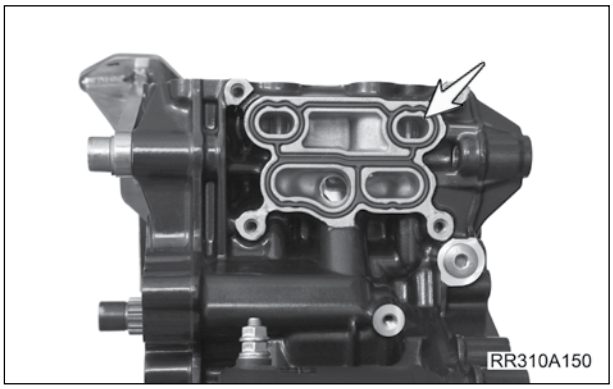
- Remove engine from vehicle. Refer ***Engine Removal*** for procedure.
- Remove cylinder head. Refer ***Cylinder Head – Removal*** for procedure.
- Remove clutch assembly. Refer ***Clutch – Removal*** for procedure.
- Remove oil pump. Refer ***Oil pump – Removal*** for procedure.
- Remove magneto. Refer ***Magneto - Removal*** for procedure.

- Remove the heat exhanger screws (4.nos) and remove the heat exchanger.

| Tool | 6 mm Allen Key |
|---|---|

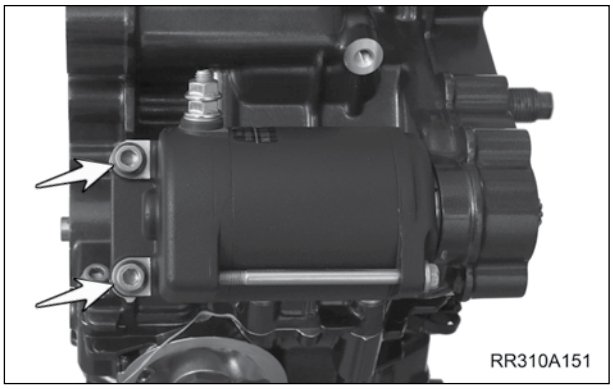



- Remove gasket and discard.



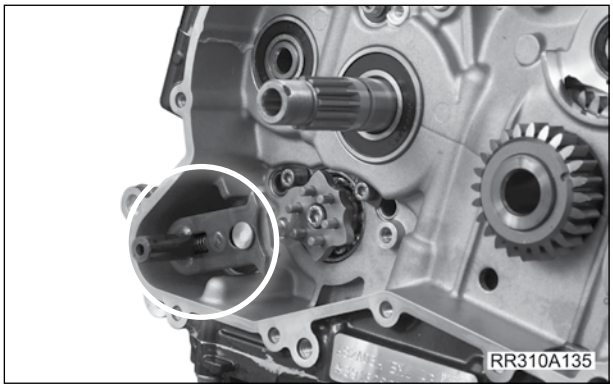

- Remove starter.

| Tool | 6 mm Allen Key |
|---|---|



- Remove the gear shifter rod assembly.
- Remove the Spacer.
- Remove Gear selector holder.

| Tool | Allen screwdriver |
|---|---|

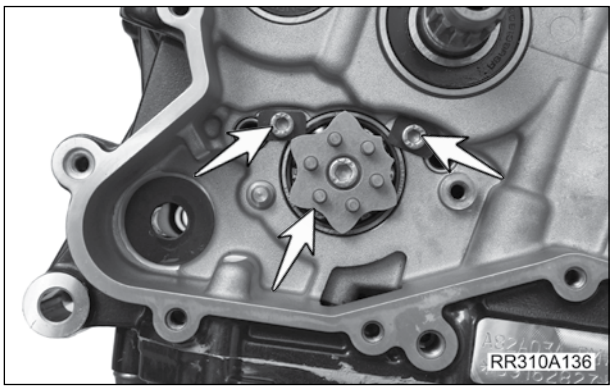



- Remove the star index.

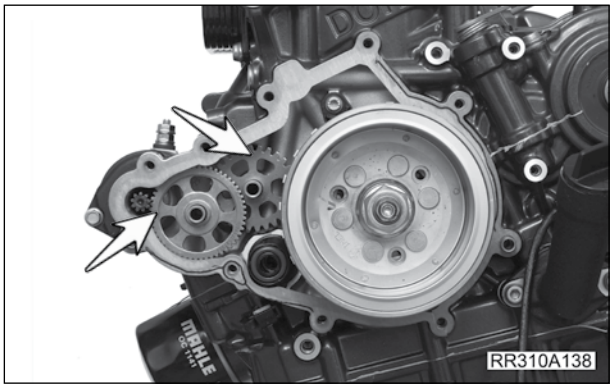
| Tool | 6 mm Allen Key |
|---|---|

- Remove bearing stopper locks (2 nos).

| Tool | 5 mm Allen Key |
|---|---|

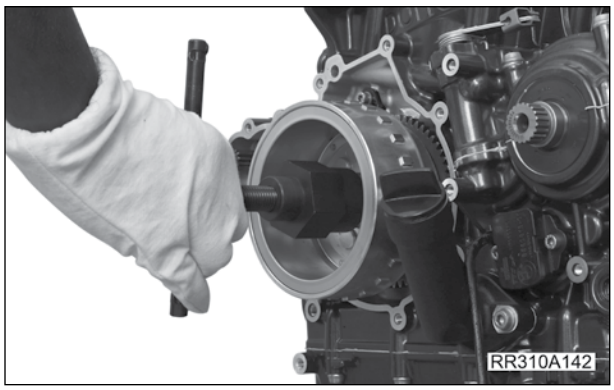



- Remove the Idlers and pins (2 Nos).



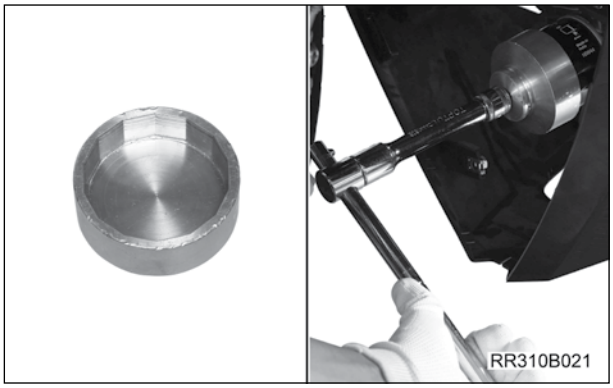

- Install puller and remove magneto rotor.

| Tool | N7310150 |
|---|---|



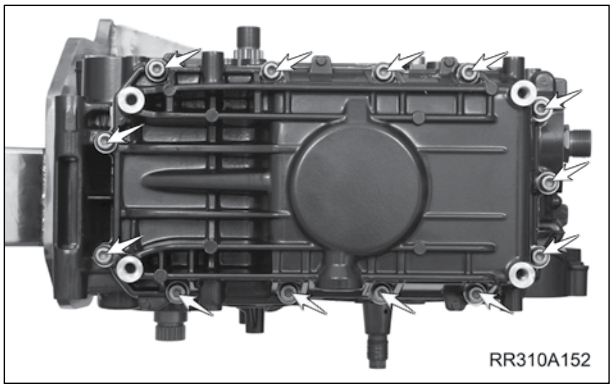
- Rotate the engine and Remove oil filter.

| | |
|---|---|
| Tool | Oil filter wrench |

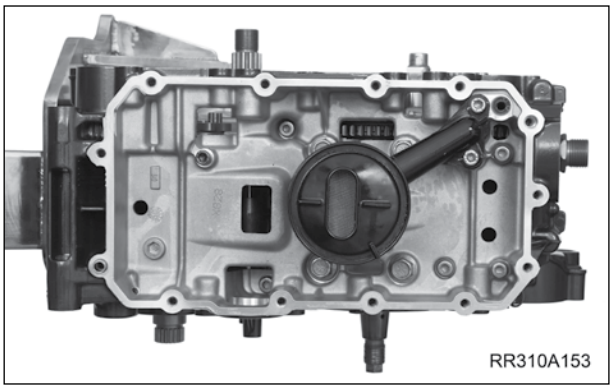



- Remove oil sump screws (13 nos).

| | |
|---|---|
| Tool | 6 mm Allen key bit |

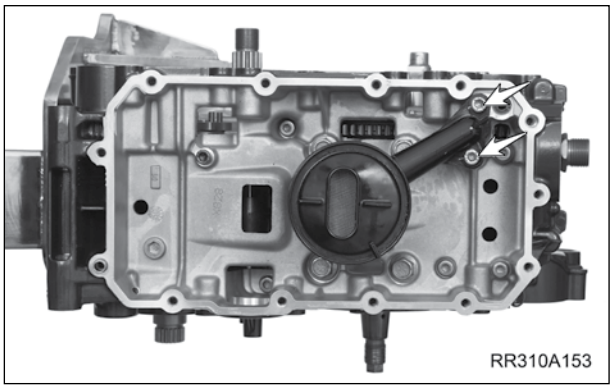



- Remove oil sump.



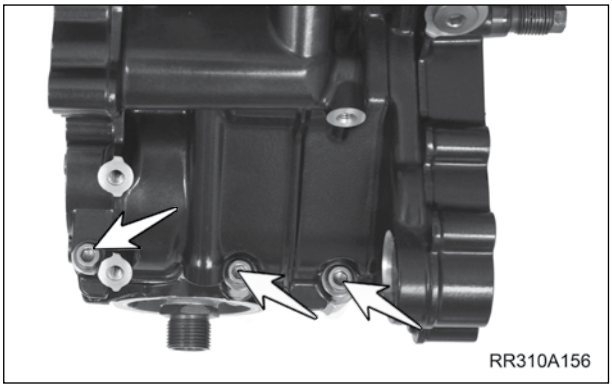

- Remove oil strainer screw ( 2 nos).

| | |
|---|---|
| Tool | 6 mm Allen Key bit |



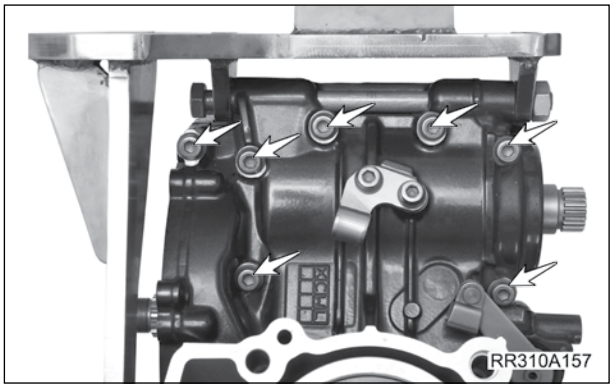
- Remove gear box mounting screws (3 nos).

| | |
|---|---|
| Tool | 6 mm Allen Key bit |



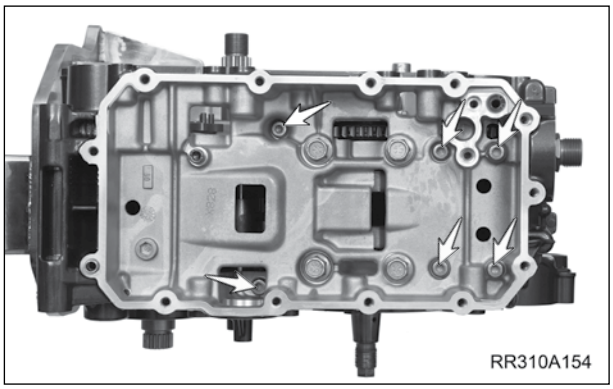

- Remove the gear box housing screws (7 nos) (Two screws have copper washers).

| | |
|---|---|
| Tool | 6 mm Allen Key bit |



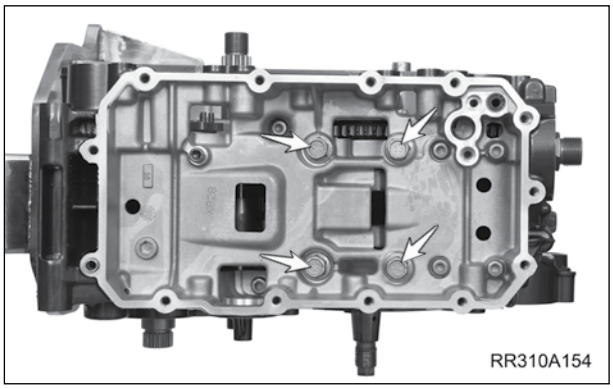

- Rotate the engine towards sump side, Remove screws (4 Nos).

| | |
|---|---|
| Tool | 6 mm Allen Key bit |

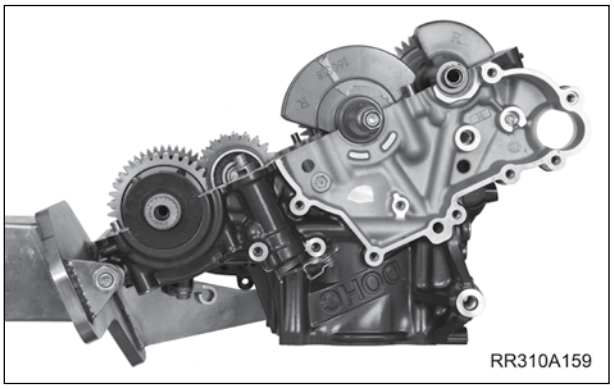



- Remove Flange screw (4 nos).

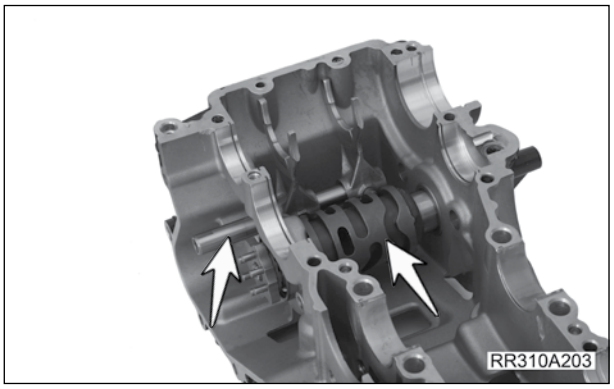
| | |
|---|---|
| Tool | 14 mm Hexagonal Socket |



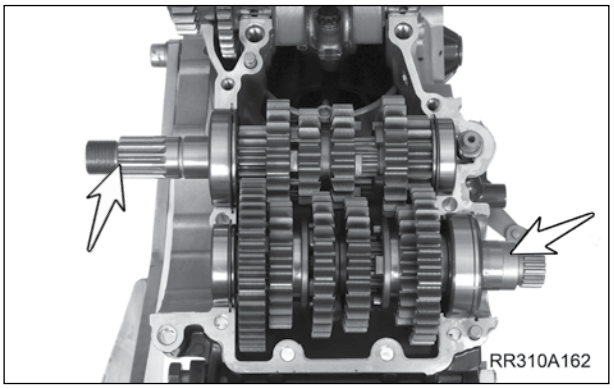
- Gently tap the housing with mallet and remove the bottom housing.



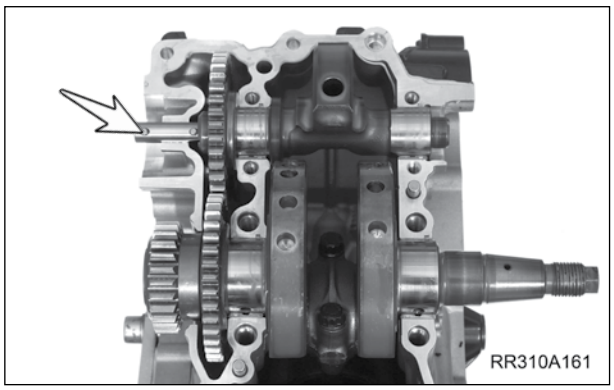

- Remove the pin from gear selector fork, and remove fork.
- Remove the gear shift cam.



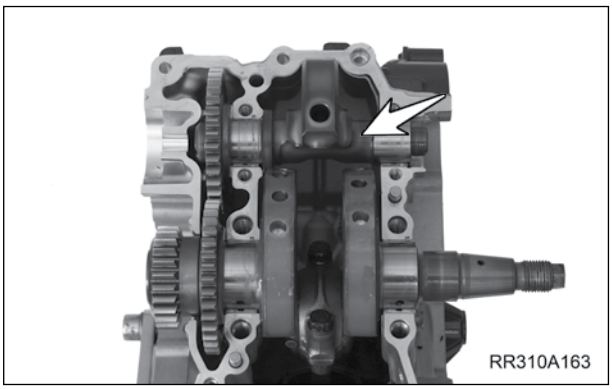

- Remove the Main shaft gear Assembly and counter shaft gear assembly.




- Remove the oil pump drive pin.

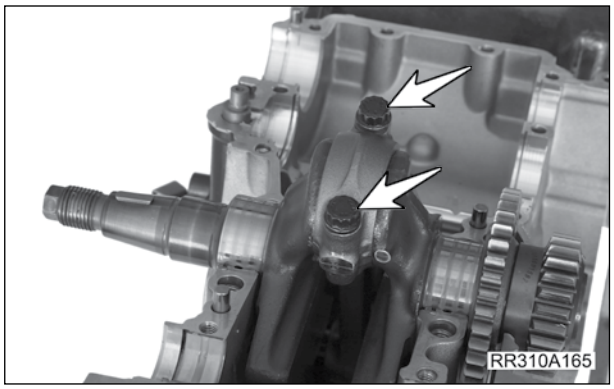


- Remove the balancer shaft.

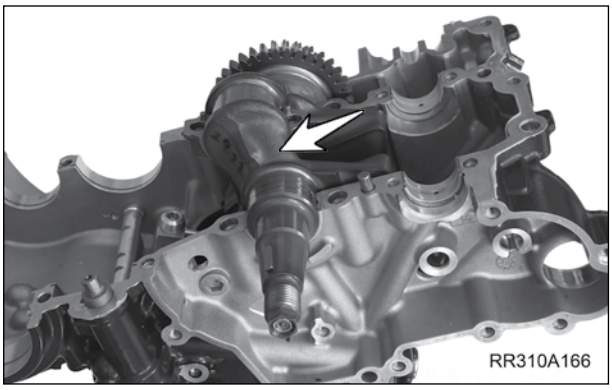



- Bring the piston to TDC, remove the connecting rod big end cup bolts (2 nos) and discard. (Image shown with piston at BDC for clarity purpose).

| | |
|---|---|
| Tool | 14 mm Torx Socket |

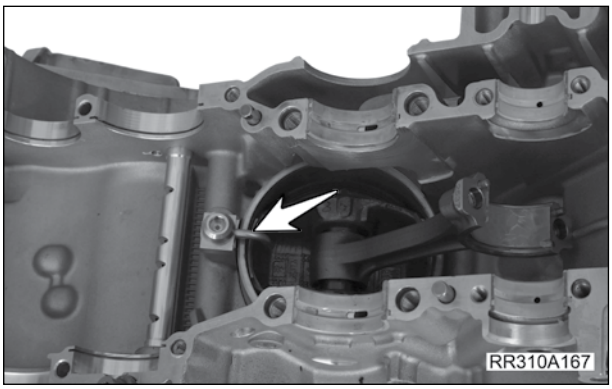



- Remove connecting rod big end and crank shaft.

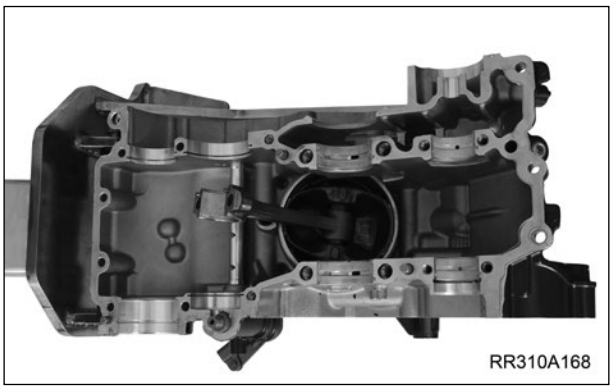



- Remove the piston oil spray nozzle.

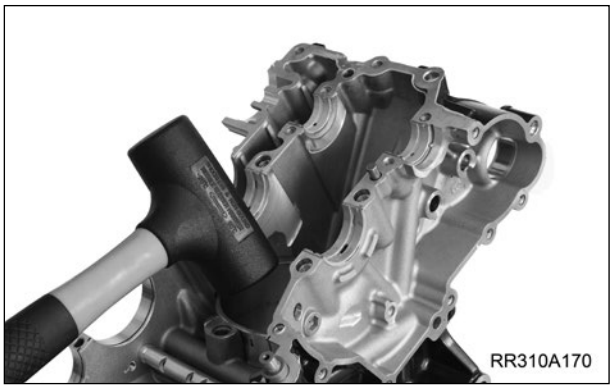
| | |
|---|---|
| Tool | 5 mm Allen Key |



- Push the connecting rod from the bottom and remove the piston along with connecting rod from the top of the engine. Ensure the connecting rod does not come in contact with the cylinder bore while removing.




- Remove the sleeve by tapping with rubber mallet from bottom of engine cylinder.



## ENGINE SERVICE DATA

| BALANCE SHAFT BEARING GRADING | | | | |
|---|---|---|---|---|
| **COMPONENT** | **NOMINAL** | | **TOL. GRADE** | |
| BALANCER SHAFT BEARING DIAMETER | Ø24 | | **N7020160** | |
| | | | **RED** | **BLUE** |
| | | | 0.002 | -0.007 |
| | | | -0.006 | -0.014 |
| BEARING SHELL THICKNESS | 1.5 | | **N7020170** | **NB020030** |
| | | | **GREEN** | **YELLOW** |
| | | OVER | -0.013 | -0.007 |
| | | UPTO | -0.007 | -0.001 |
| CRANKCASE BORE | Ø27 | | **N7020120** | |
| | | | 0.013 | |
| | | | 0 | |

| MATCHING | | | |
|---|---|---|---|
| **BALANCER SHAFT DIA** | **BEARING SHELL** | **MIN. CLEARANCE** | **MAX. CLEARANCE** |
| RED | GREEN | 0.002 | 0.045 |
| BLUE | YELLOW | 0.009 | 0.041 |

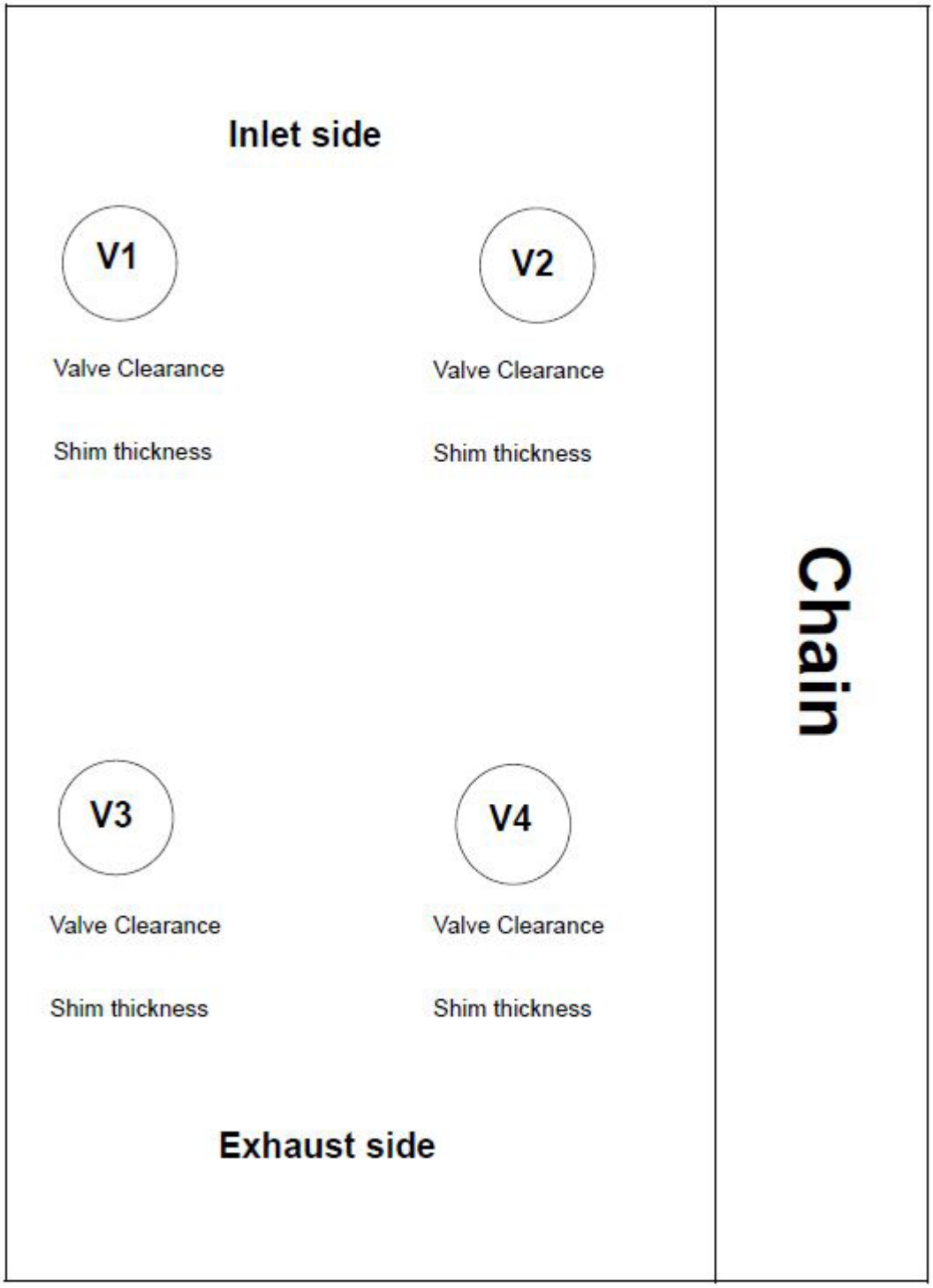
| CRANK PIN BEARING GRADING | | | | | |
|---|---|---|---|---|---|
| **COMPONENT** | **NOMINAL** | | **TOL. GRADE** | | |
| CRANKSHAFT CRANKPIN BEARING DIAMETER | Ø34 | | **N7020090** | | |
| | | | **ORANGE** | **GREEN** | |
| | | | 0.002 | -0.007 | |
| | | | -0.006 | -0.014 | |
| CONNECTING ROD BIG END BORE | Ø37 | | **N7020100** | | |
| | | | **RED** | **BLUE** | |
| | | | 0.008 | 0.009 | |
| | | | 0 | 0.016 | |
| CONNECTING ROD SHELL BEARING | 1.5 | | **N7020290** | **N7020300** | **N7020310** |
| | | | **RED** | **PURPLE** | **BLUE** |
| | | OVER | -0.019 | -0.015 | -0.011 |
| | | UPTO | -0.015 | -0.011 | -0.007 |

| MATCHING | | | | |
|---|---|---|---|---|
| **CRANKPIN DIA** | **CONNECTING ROD DIA** | **BEARING SHELL** | **MIN, CLEAR-ANCE** | **MAX. CLEARANCE** |
| ORANGE | RED | RED | 0.028 | 0.052 |
| GREEN | RED | PURPLE | 0.029 | 0.052 |
| ORANGE | BLUE | PURPLE | 0.029 | 0.052 |
| GREEN | BLUE | BLUE | 0.030 | 0.052 |

| CRANKSHAFT MAIN BEARING | | | | |
|---|---|---|---|---|
| **COMPONENT** | **NOMINAL** | | **TOL. GRADE** | |
| CRANKSHAFT MAIN BEARING DIAMETER | Ø34 | | **N7020090** | |
| | | | **RED** | **BLUE** |
| | | | 0.002 | -0.007 |
| | | | -0.006 | -0.014 |
| BEARING (GROOVED) SHELL THICKNESS | 2 | | **N7020190** | **NB020050** |
| | | | **BROWN** | **YELLOW** |
| | | OVER | -0.014 | -0.008 |
| | | UPTO | -0.008 | -0.002 |
| BEARING SHELL THICKNESS | 2 | | **N7020180** | **NB020040** |
| | | | **BROWN** | **YELLOW** |
| | | OVER | -0.014 | -0.008 |
| | | UPTO | -0.008 | -0.002 |
| CRANKCASE BORE | Ø38 | | **N7030120** | |
| | | | 0 | |
| | | | 0.015 | |

| MATCHING | | | |
|---|---|---|---|
| **CRANKSHAFT DIA** | **BEARING SHELL** | **MIN. CLEARANCE** | **MAX. CLEARANCE** |
| RED | BROWN | 0.014 | 0.049 |
| BLUE | YELLOW | 0.011 | 0.045 |

**Valve clearance and Shim data**



## ENGINE AND GEARBOX

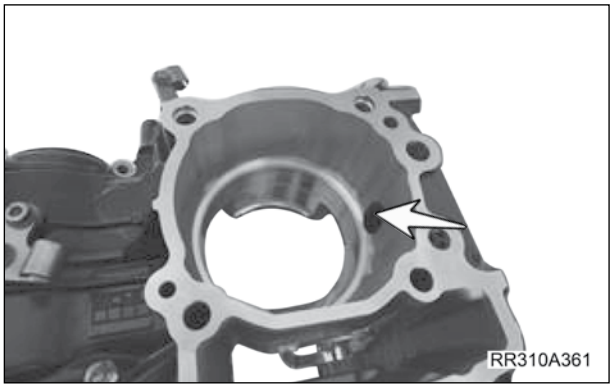
Component : Engine and Gear Box
Component condition : Mounted on Engine stand
Objective : Engine Assembly
Repair cycle : As required

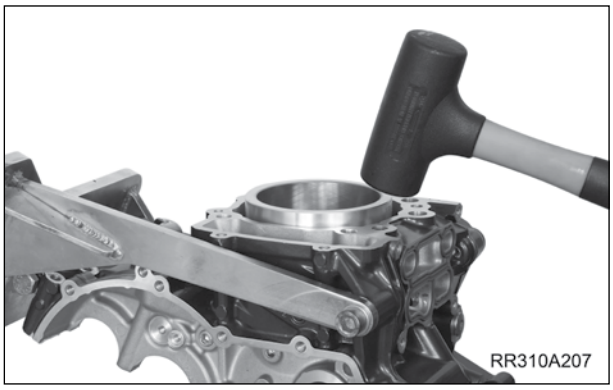
**CAUTION**

Always replace the o-rings on the liner.

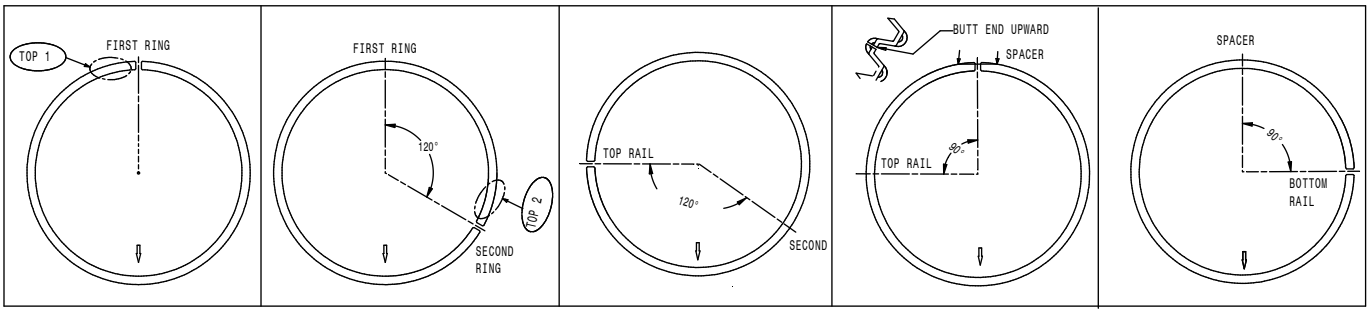

**NOTE**

Make sure that cylinder block hole is align with sleeve lubrication slit.



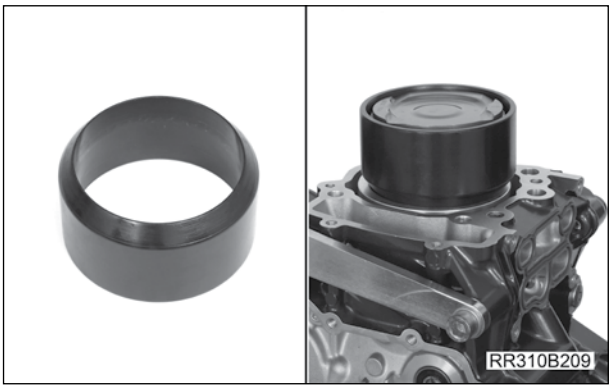



- Insert the piston into and arrange the piston rings as shown (Both Compression and oil rings).




- Position the piston on the bore sleeve using piston rings compressor tool.

| | |
|---|---|
| Tool | NB310100 |



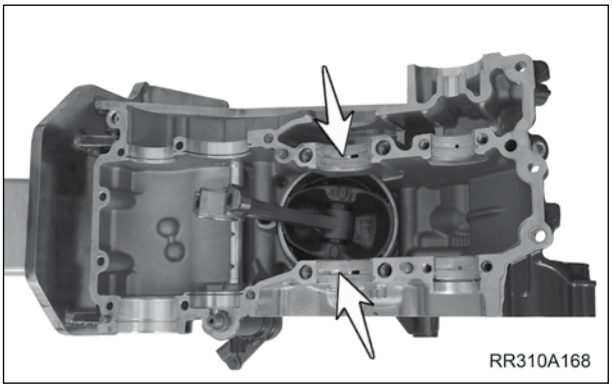

**NOTE**

Make sure that the (2) top ring should be in 120° to each other and top rail ring is 120° to second ring. The spacer ring is 90 deg. to the top rail ring and bottom rail ring is 90 deg. to spacer ring.)

**NOTE**

Inspect the shell bearing and bearing seating area for worn-out, cracks or scratch marks on the surface.

- Install the shell bearing on the block.

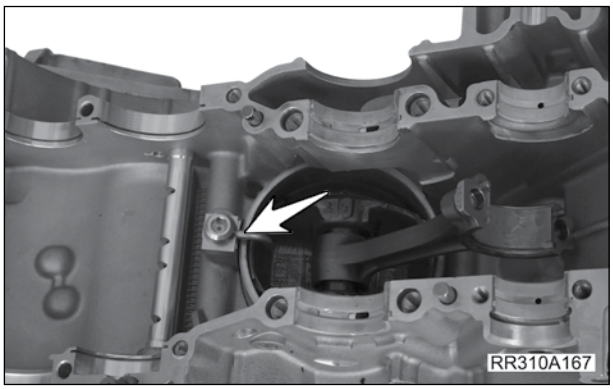



**CAUTION**

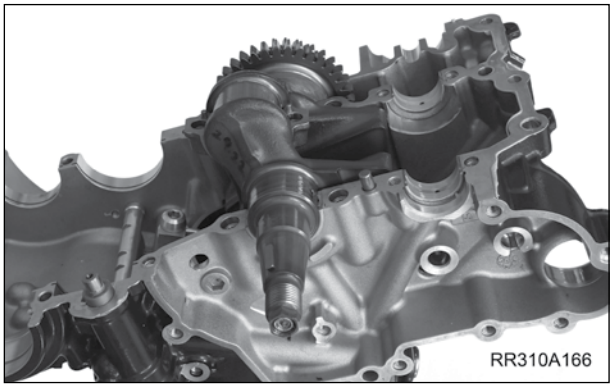
Check the colour marking on the bearing. Ensure the new bearing is of the same colour. Failure to match the colours may lead to enigne failure. Refer ***Engine service data*** for more details.

- Install the piston oil spray nozzle.

| | |
|---|---|
| Tool | 5mm Allen Key bit |
| Torque | 10 Nm |



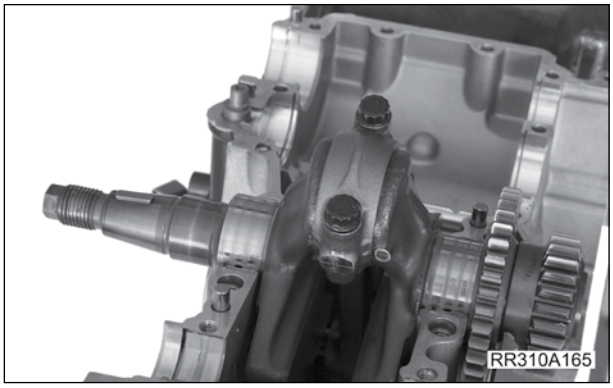
- Install the crankshaft on the block.




- Install the connecting rod cap to crankshaft with new bolts only.

**NOTE**

Position the piston to BDC, check the connecting rod cap shell bearing for any worn-out or cracks on the surface.




- Make sure that the mark on the connecting rod and connecting rod cap are aligned.

**CAUTION**

Check the colour marking on the bearing. Ensure the new bearing is of the same colour. Failure to match the colours may lead to enigne failure. Refer ***Engine service data*** for more details.

- Rotate the crankshaft such that the piston is in TDC.
- Tighten the connecting rod bolts as per the below specification.

| | |
|---|---|
| 1st Tightening | 10 Nm |
| 1st additional angle of rotation | 45° |
| 2nd additional angle of rotation | 90° |

| | |
|---|---|
| Tool | Torque wrench and angular torque wrench with 12 mm Torx bit |

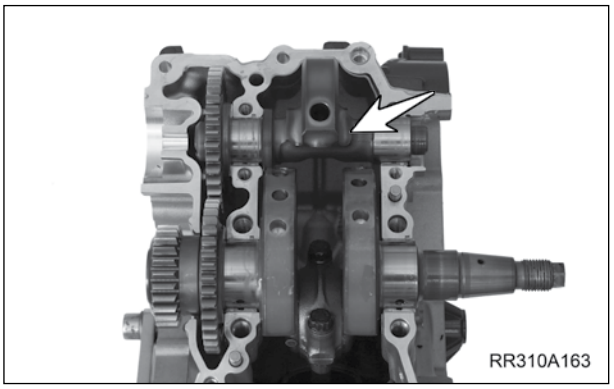
- Install the balancing shaft.

**CAUTION**

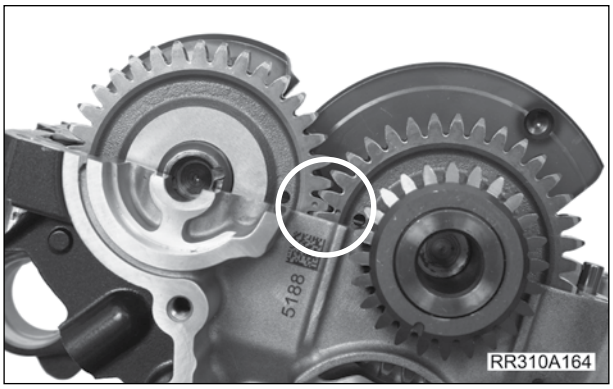
Check the colour marking on the bearing. Ensure the new bearing is of the same colour. Failure to match the colours may lead to enigne failure. Refer ***Engine service data*** for more details.

**NOTE**

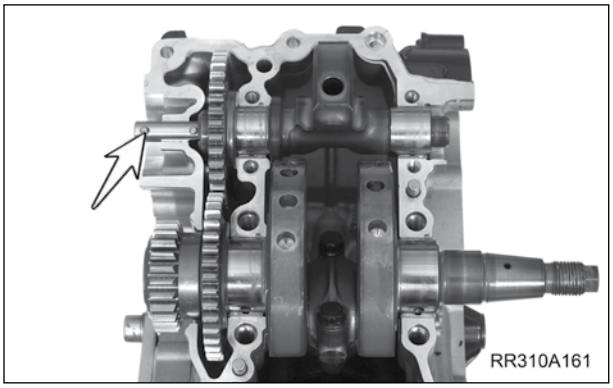
Check the shell bearing for any worn-out or cracks on the surface. Replace the bearings if required.



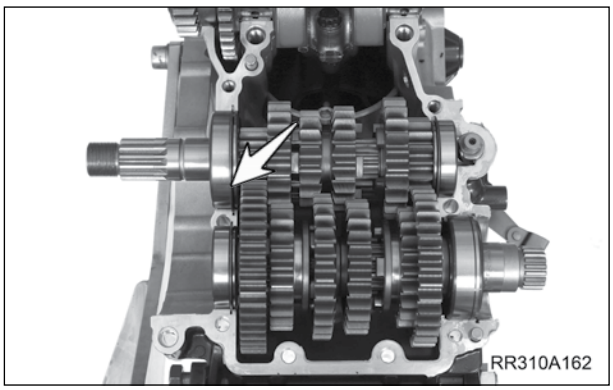

- The crankshaft gear mark and balancing shaft gear mark should be aligned with each other.



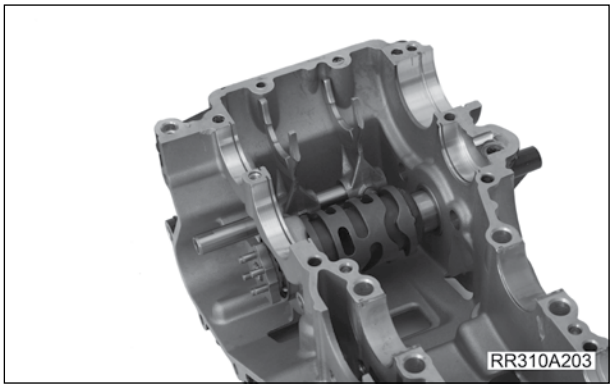

- Install the oil pump drive pin.




- Install the main shaft gear assembly and counter shaft gear assembly.
- Ensure the bearings are seated properly in the grooves of the upper housing.



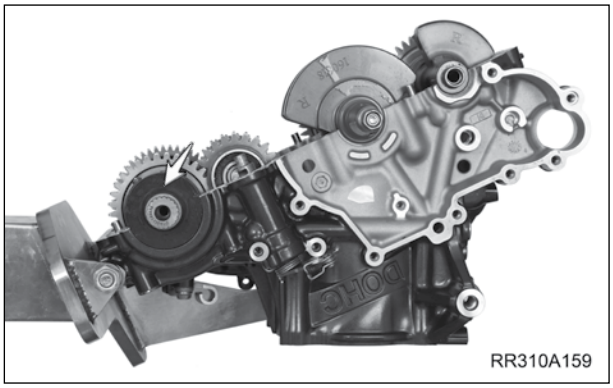
- Install the Gear selection cam in the bottom gear box housing.



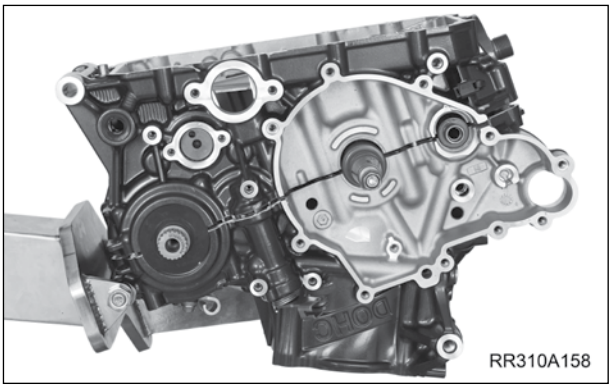

- Apply liquid gasket on upper and lower crankcase.

| | |
|---|---|
| Liquid sealant | Dow Corning D3100 |

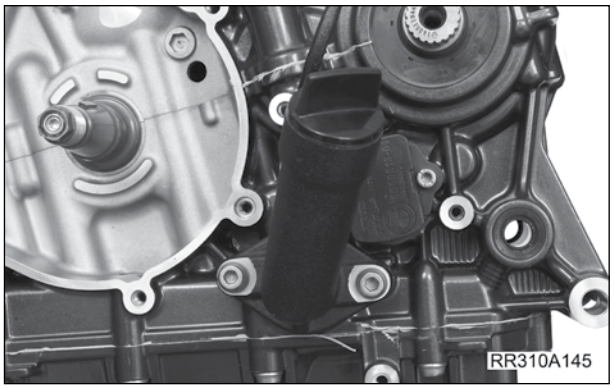
- Install oil seal on the output shaft.
- Align dowel pins.




- Install bottom housing on the block.

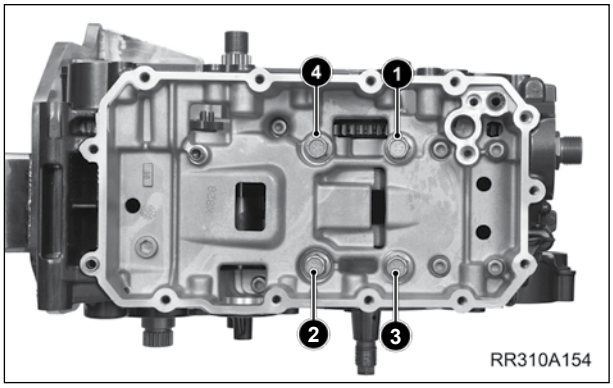



- Install gear position sensor and oil fill tube.



- Install flange bolts (4 nos) in the shown sequence.

| Tool | 14 mm Hexagonal Socket |
|---|---|

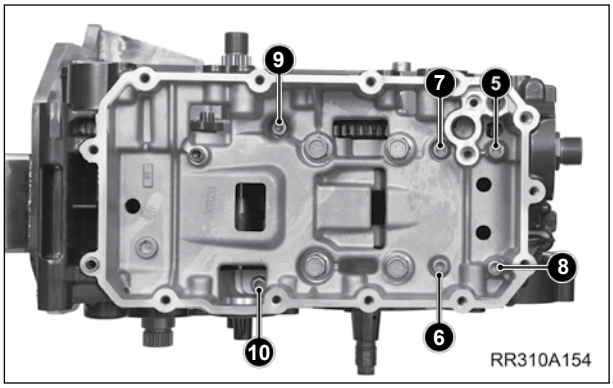



- Install the bolts.

| Tool | 6 mm Allen Key bit |
|---|---|

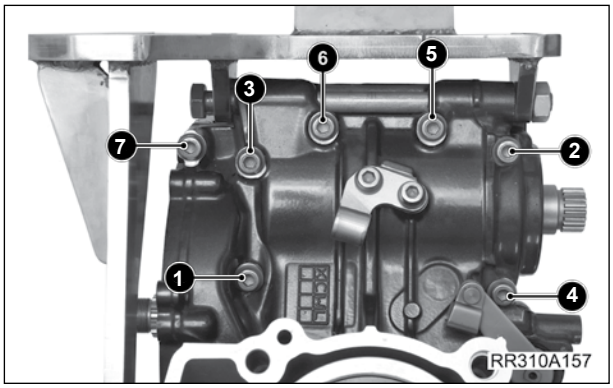
- Torque the bolts as per the below sequence.

| | |
|---|---|
| Bolt (1) to (4), 1st Tightening | 10 Nm |
| Bolt (5) to (10), 1st Tightening | 5 Nm |
| Bolt (1) to (4), additional angle of rotation | 90° |
| Bolt (5) to (10), 2nd Tightening | 10 Nm |




- Install the gear box housing bolts (7 nos) (Two screws has copper washers, replace copper washer with new).

| Tool | 6 mm Allen Key bit |
|---|---|

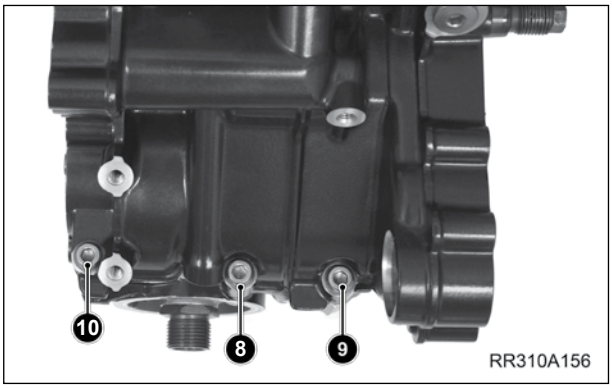



- Install gear box mounting bolts (3 nos).

| Tool | 6 mm Allen Key bit |
|---|---|

- Torque the bolts as per the below sequence.

| | |
|---|---|
| Bolt (1) to (10), 1st Tightening | 5 Nm |
| Bolt (1) to (10), 2nd Tightening | 10 Nm |

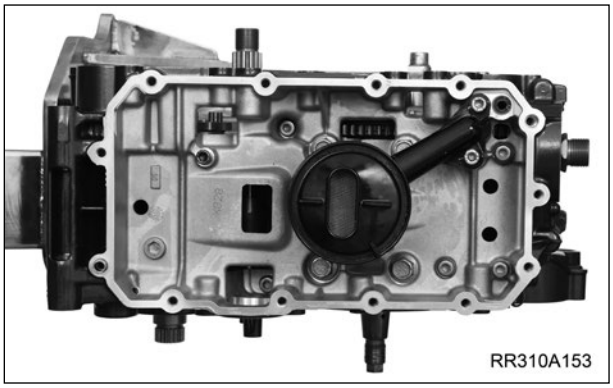


- Install the engine oil stainer screws.

| | |
|---|---|
| Tool | 6 mm Allen Key bit |
| Torque | 10 Nm |

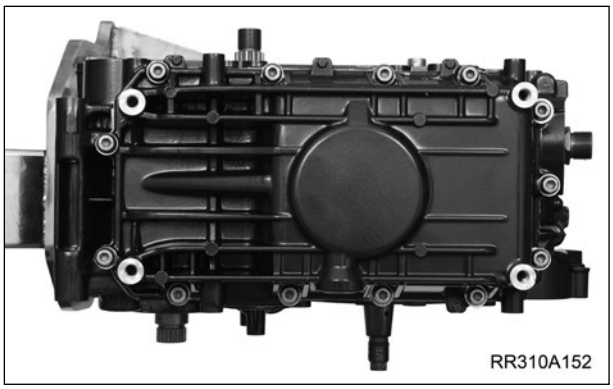
- Apply liquid sealant on the sump seating surface.

| | |
|---|---|
| Liquid sealant | Dow Corning D3100 |



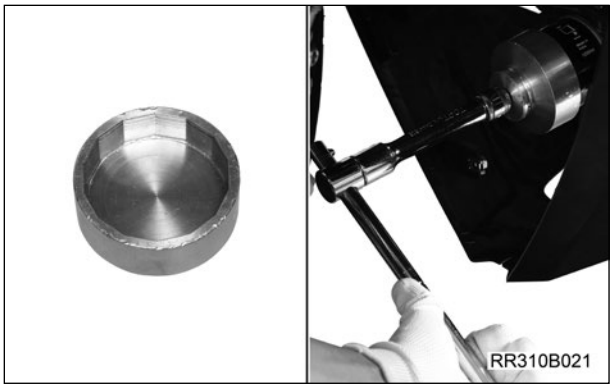

- Install the oil sump mounting screws (13 nos) as per the sequence shown

| | |
|---|---|
| Tool | 6 mm Allen Key bit |
| Torque | 10 Nm |



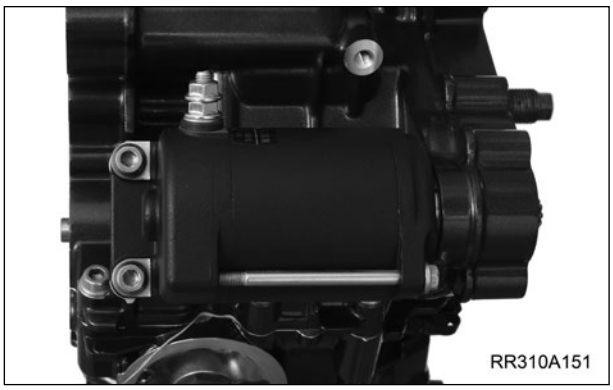

- Install oil filter (Always use new part).

| | |
|---|---|
| Tool | Oil filter wrench |
| Torque | 19 Nm |

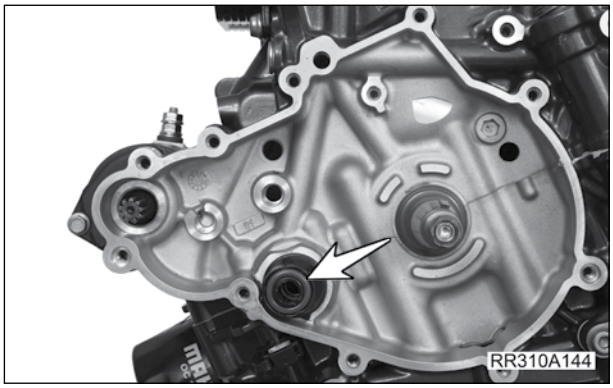



- Install the starter motor.

| | |
|---|---|
| Tool | 6 mm Allen Key |
| Torque | 10 Nm |

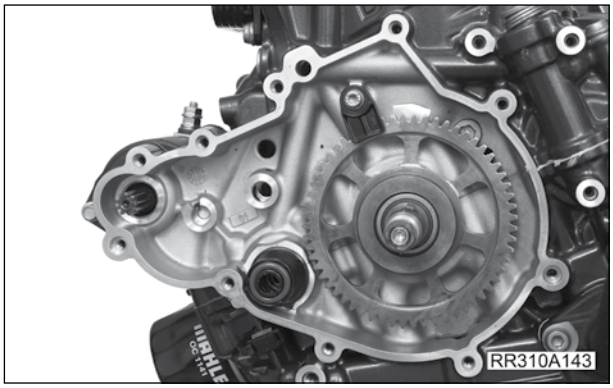


- Install the adapter.



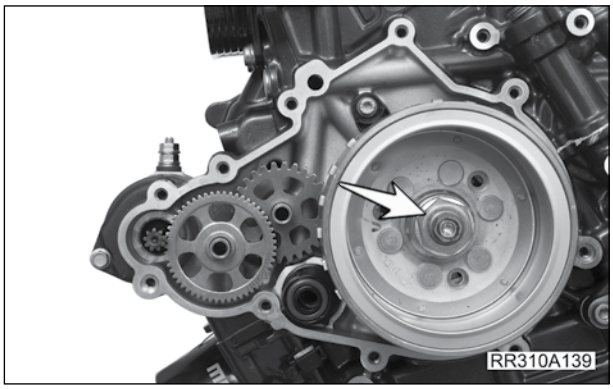

- Install magneto rotor gear on the shaft.
- Install rotor lock.

| | |
|---|---|
| Tool | 5 mm Allen Key bit |

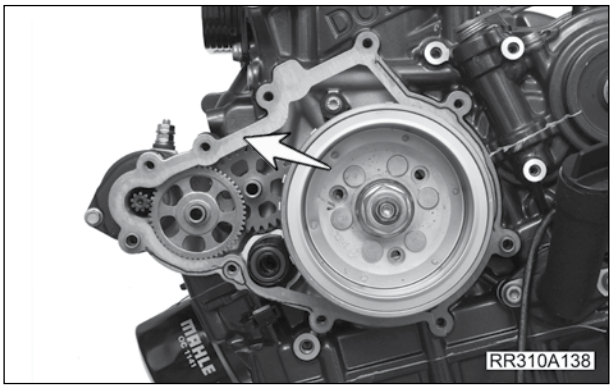



- Install the Idlers gears and pins (2 Nos).
- Install magneto rotor. Tighten rotor flange nut.

| | |
|---|---|
| Tool | 24 mm Extension Socket |
| Torque | 120 Nm |
| Loctite | Loctite 243 |

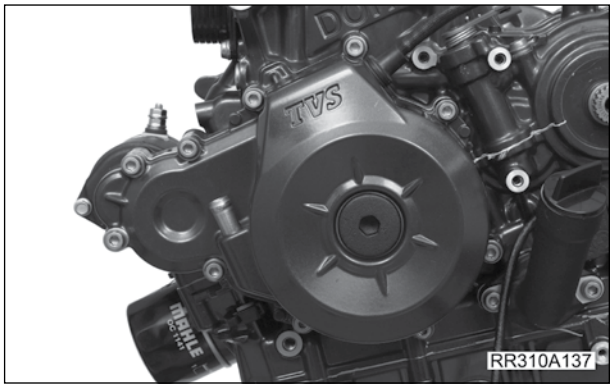



- Install gasket.



- Install stator with magneto cover. Tighten the bolts diagonally.

| | |
|---|---|
| Tool | 6 mm Allen key bit |
| Torque | 10 Nm |

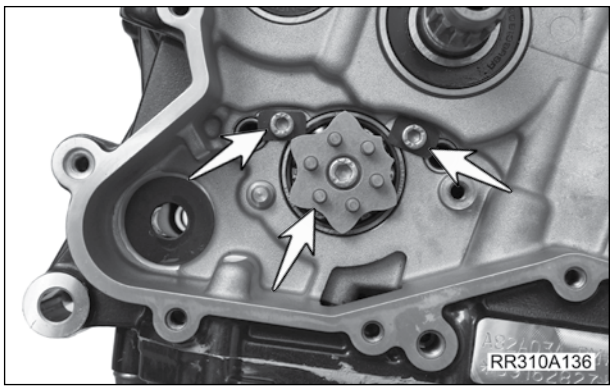



- Install the star index along with screw.

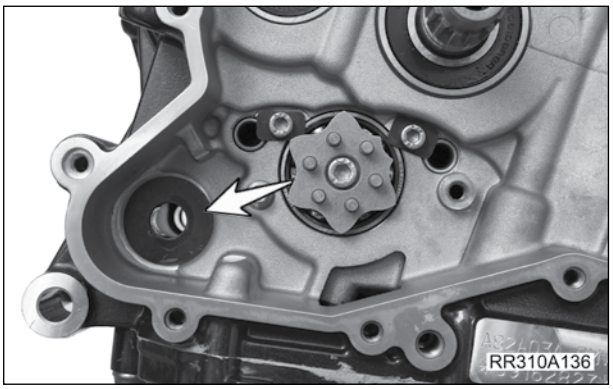
| | |
|---|---|
| Tool | 6 mm Allen Key |
| Torque | 10 Nm |

- Install bearing stopper locks.

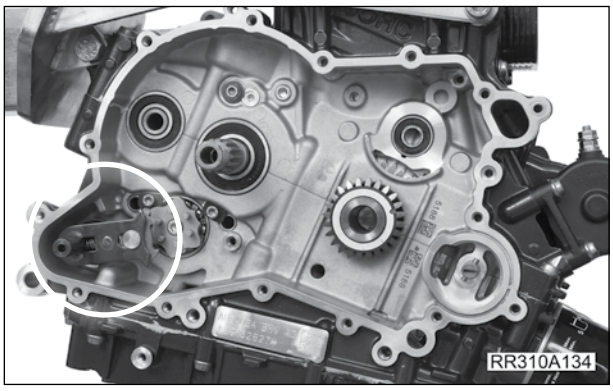
| | |
|---|---|
| Tool | 5 mm Allen Key |
| Torque | 8 Nm |



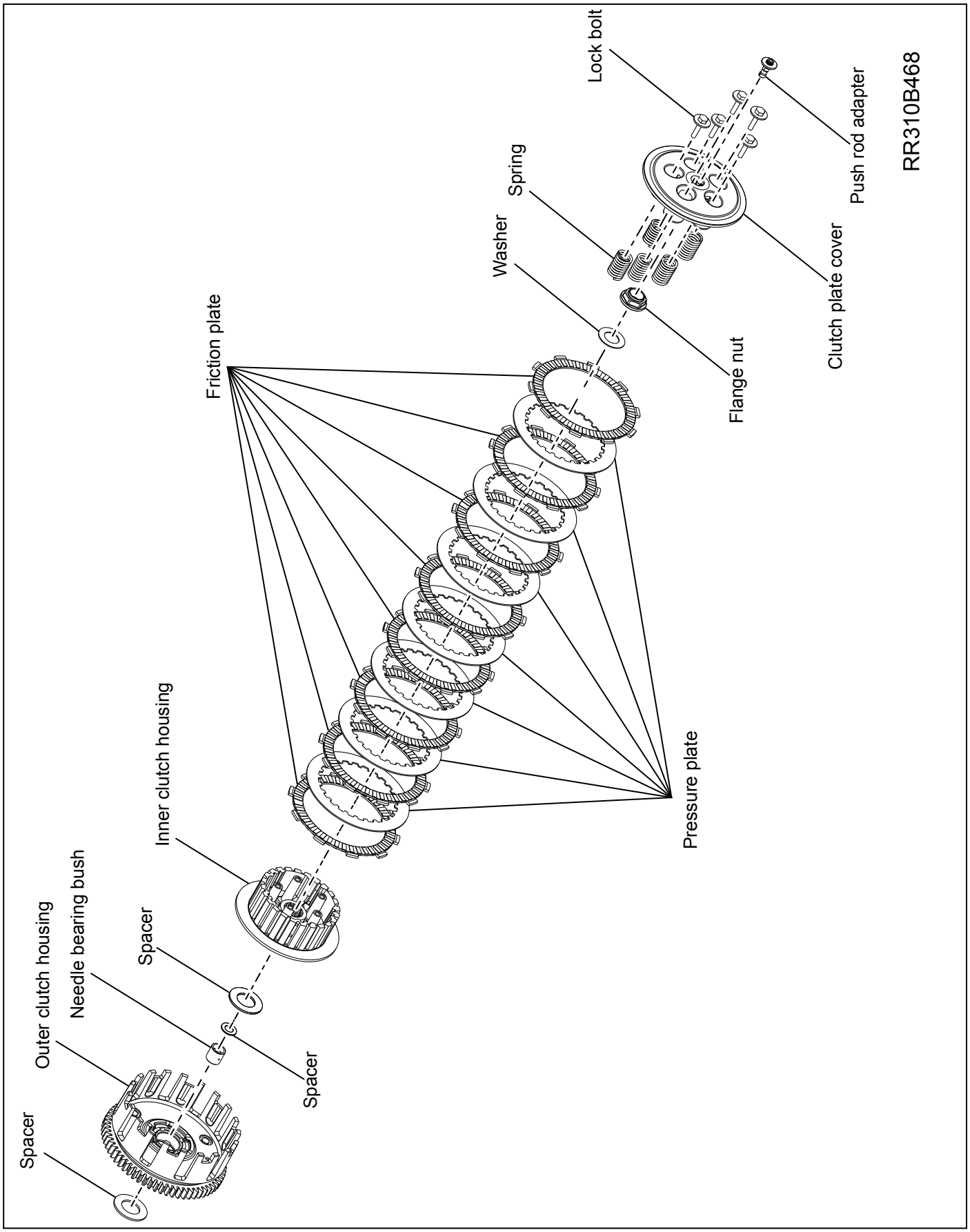

- Install spacer.




- Install the gear shifter rod assembly.
- Install clutch assembly. Refer ***Clutch - Install*** for procedure.
- Install oil pump assembly. Refer ***Oil pump – Install*** for procedure.
- Assemble cylinder head. Refer ***Cylinder head – Assembly*** for procedure.
- Install Cylinder head assembly. Refer ***Cylinder Head – Install*** for procedure
- Install water pump. Refer ***Water pump – Install*** for procedure.
- Fill engine oil TVSM TRU4 synthetic oil/MOTUL 3000 4T Plus MA2, Qty: 1700 ml.
- Fill coolant, Make: G48 Glycentine, Qty: 1000 ml (50:50).



## CLUTCH EXPLODED VIEW



## CLUTCH REMOVAL

| | |
|---|---|
| Component | : Clutch |
| Component condition | : On Ramp, Clutch removed |
| Objective | : Clutch Removal |
| Repair cycle | : As required |

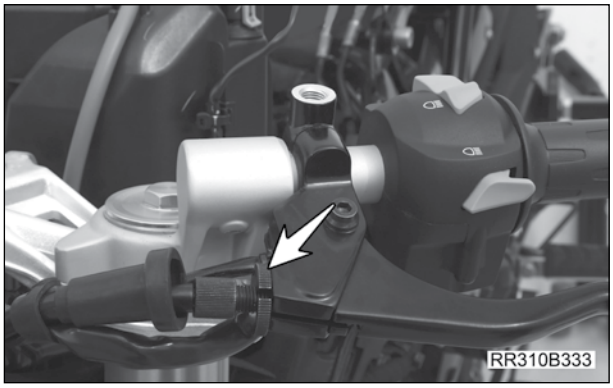
**Removal**

**NOTE**

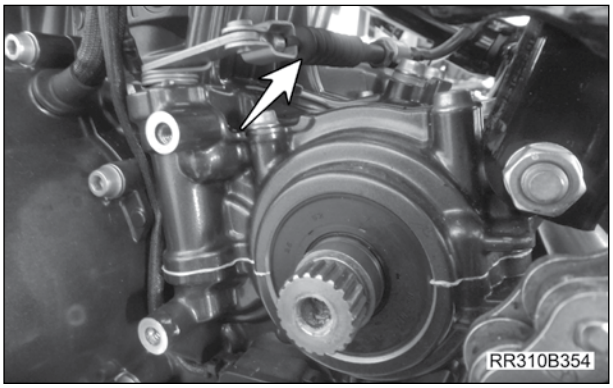
Clutch can be removed / installed without removing the engine from the vehicle. Images are shown on engine which is removed from vehicle for clarity purposes.

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the center engine guard. Refer to ***Center Engine guard*** procedure.
- Remove engine guard RH. Refer to ***Engine guard RH*** procedure.

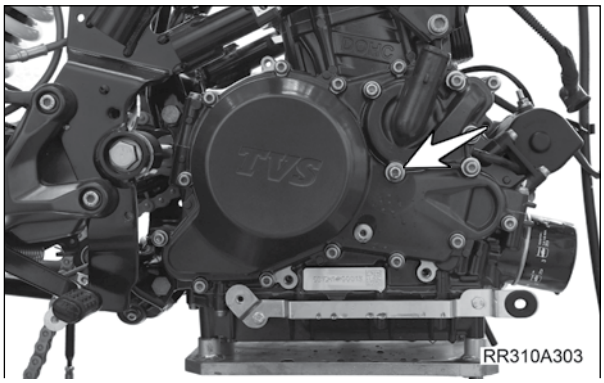
- Loosen the clutch cable at lever end.



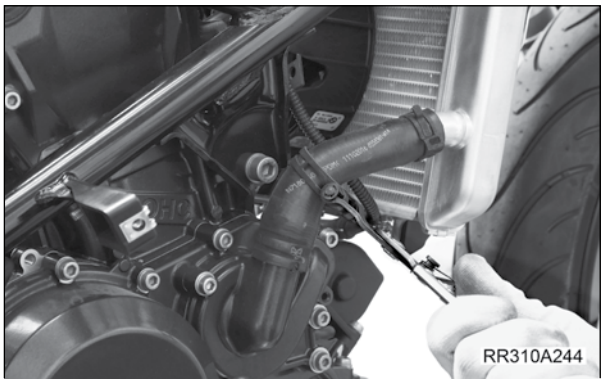

- Disconnect clutch cable at gearbox end.



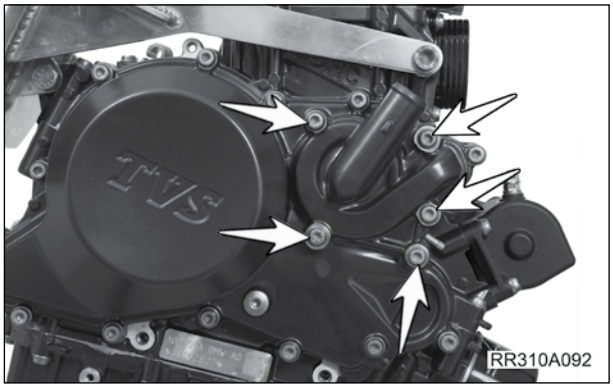
- Remove the coolant drain screw and collect the coolant in a clean container.



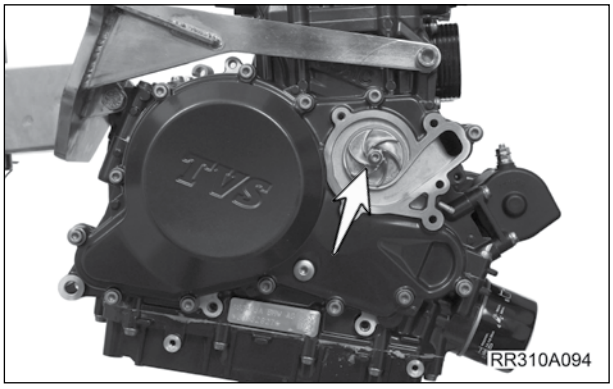

- Disconnect radiator bottom hose and remove the water pump cover.




- Remove water pump cover.

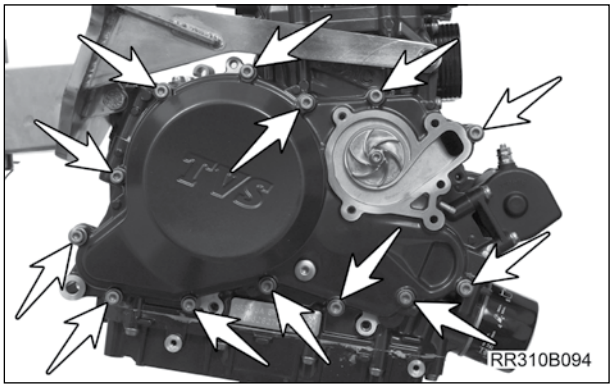



- Remove water pump impeller.



- Remove the clutch casing cover bolts (X13).

| Tool | Hexagonal Ball Spanner |
|---|---|

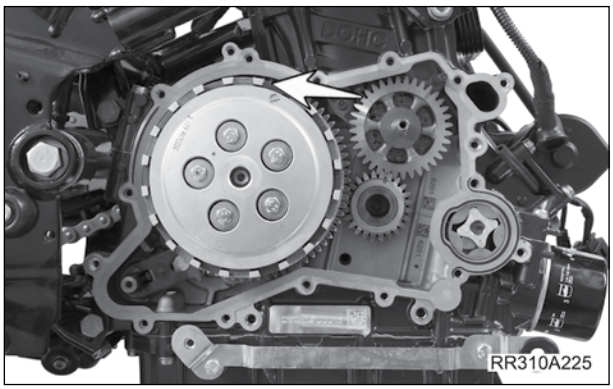



- Remove the clutch casing cover gasket and dispose. Do not reuse the gasket.
- Remove the Clutch cover plate.
- Insert TDC locking tool and lock crankshaft in TDC position

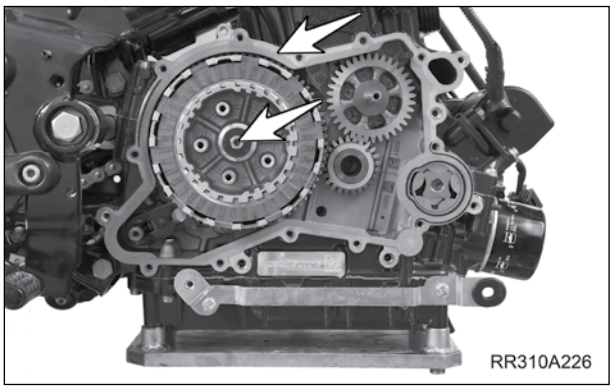
| Tool | N7310140 |
|---|---|

- Remove the spring loaded clutch cover plate bolts.

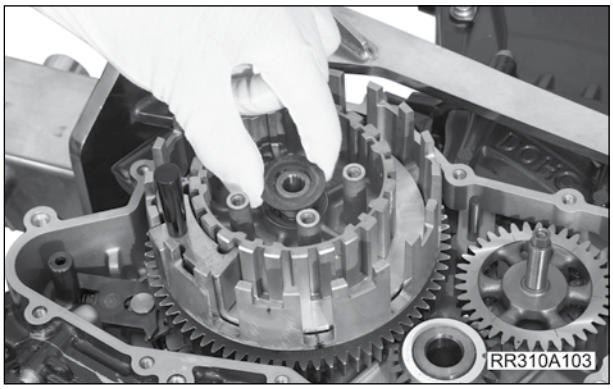
| Tool | 10 mm Socket |
|---|---|




- Remove the plunger assembly.
- Lift the Clutch plate and friction plate (Clutch plate X8, Friction plate X7).




- Lift and remove the Clutch pushrod adaptor.

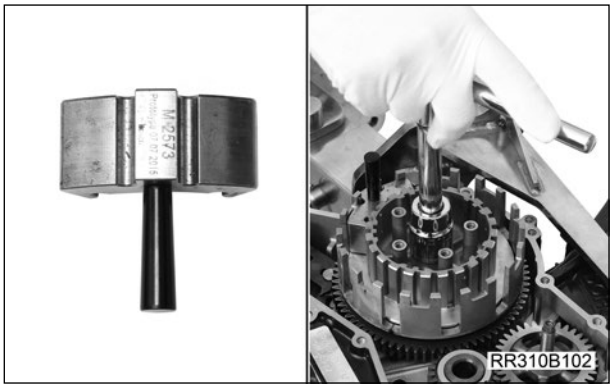


- Lift the Pushrod with magnetic stick.
- Lock the clutch housing using special tool.

| Tool | N7310110 |
|---|---|

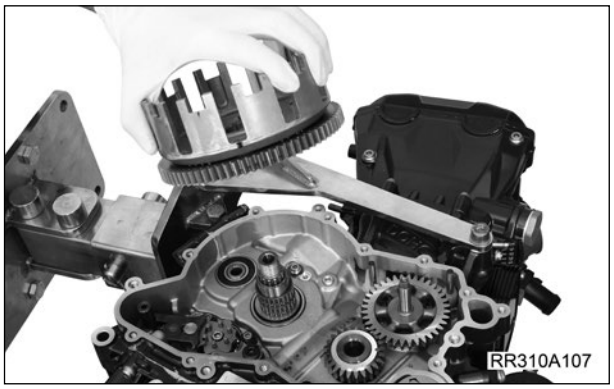
- Remove the Flange nut along with washer and dispose. (Do not resuse the castle lock nut).

| Tool | Extension Socket 24mm |
|---|---|

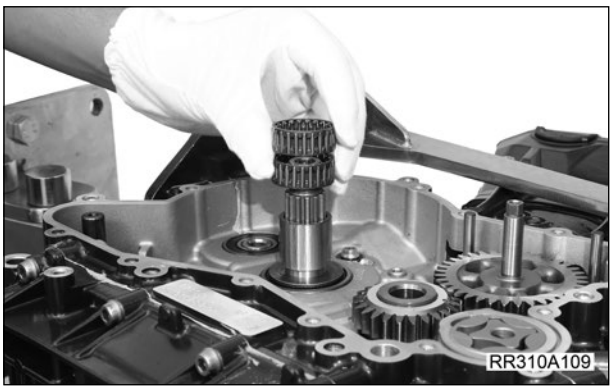



- Remove the Clutch hub.

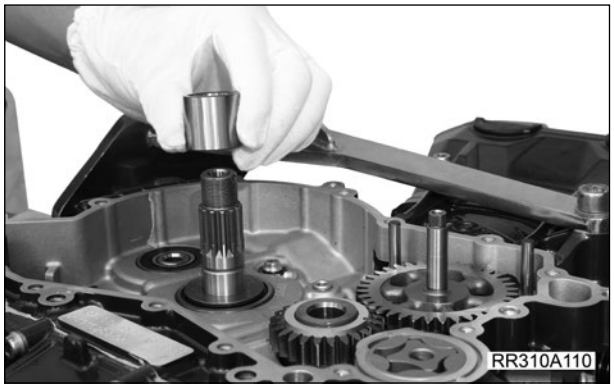

- Remove the primary driven gear assembly.



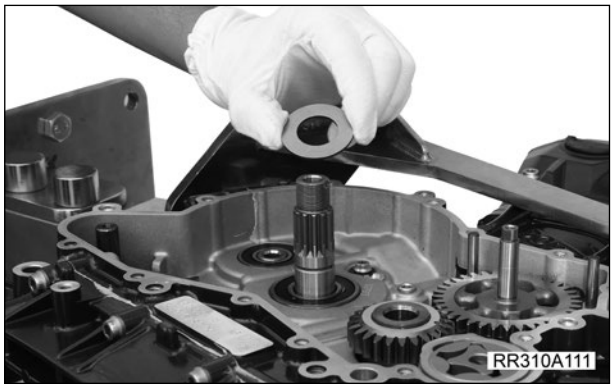

- Remove needle bearing (X2) from shaft.



- Remove the bush from shaft.




- Remove the spacer from shaft.



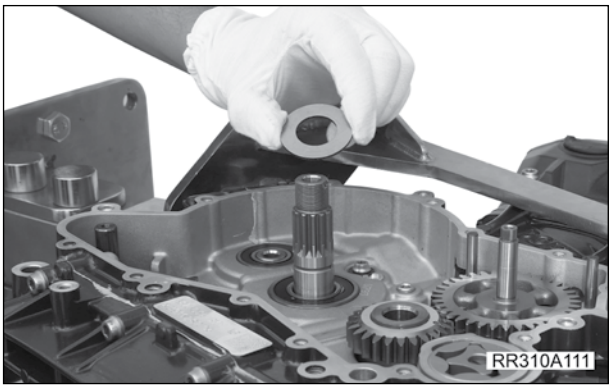
## CLUTCH INSTALLATION

Component : Clutch
Component condition : On Ramp, Clutch removed
Objective : Clutch Installation
Repair cycle : As required

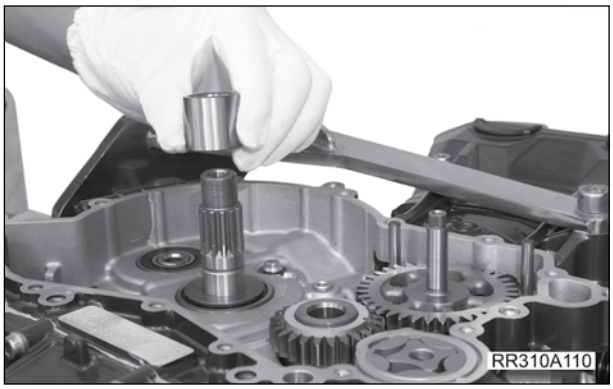
**NOTE**

Clutch can be removed / installed without removing the engine from the vehicle. Images are shown on engine which is removed from vehicle for clarity purposes.

- Install the spacer on the shaft.



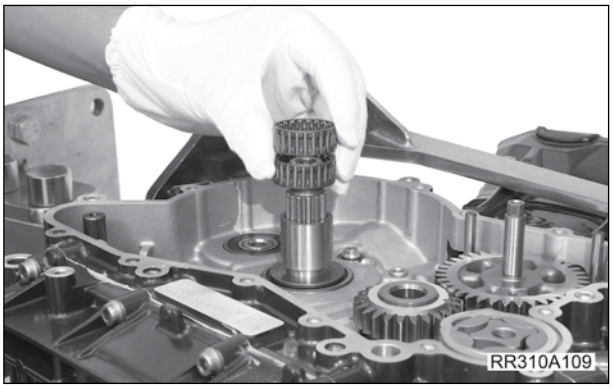

- Install the bush on the shaft. Inspect the bush for wear, pitting and any signs of damage. Replace the bush if necessary.




- Install needle bearing (X2) to the shaft. Inspect the bearing for wear, pitting and any signs of damage.

**NOTE**

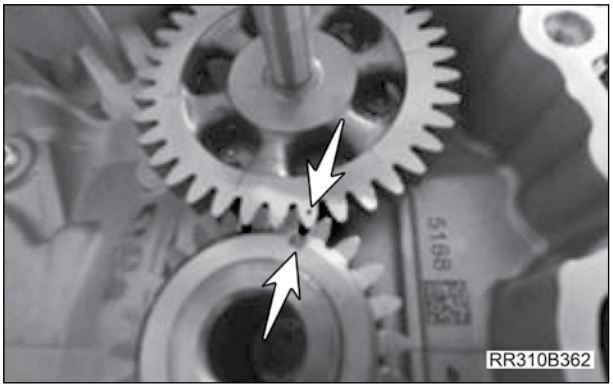
Replace if required.




- Align the timing mark on the gearbox input shaft to idler gear mark as shown.
- Install the outer clutch housing assembly.

**NOTE**

Check that the timing marks aligned in previous step is not dislodged once the gear on the housing meshes with the gear on the input shaft.

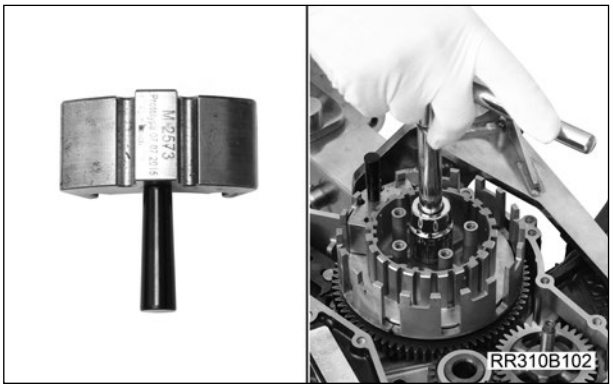


- Install the primary driven gear assembly.


- Install the Clutch hub.


- Lock the clutch housing.

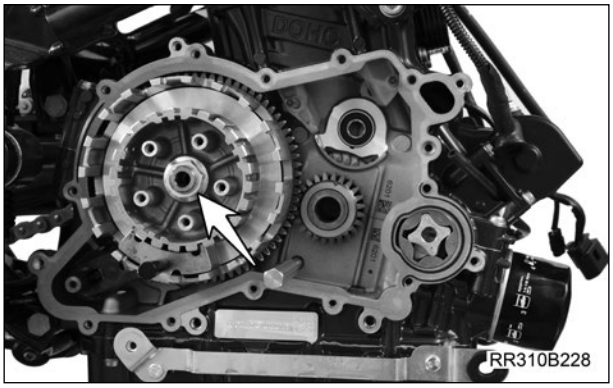
| | |
|---|---|
| Tool | N7310110 |



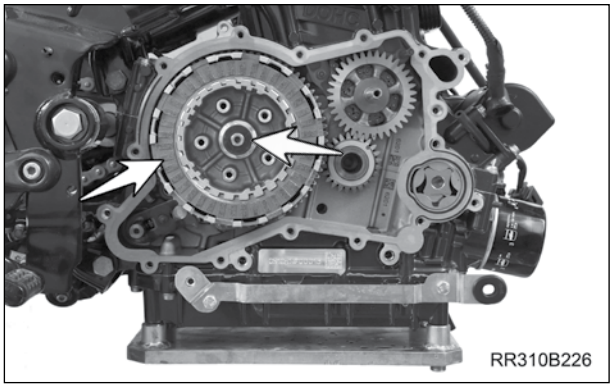

- Install new flange nut with washer.

| | |
|---|---|
| Tool | 24 mm Extension Socket |
| Torque | 80 Nm |

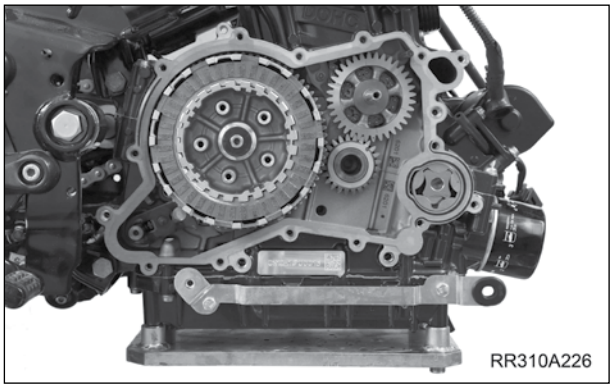
- Lock the flange nut in place by punching the upper part of the nut with a chisel.
- Install the pushrod.



- Install the clutch pushrod adaptor.
- Check clutch and friction plates for wear and tear, pitting and any damages. Replace if required.




- Assemble the clutch and friction plates. Clutch plate and friction plates alternate with the clutch plates at either ends.
- Install Clutch plate along with friction plate (Clutch plate X8, Friction plate X7).

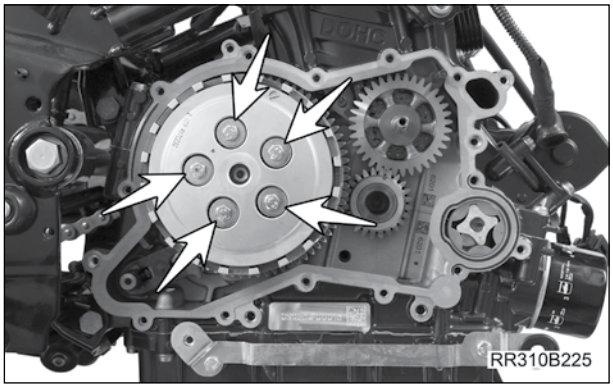



**NOTE**

The clutch and friction plates must always be replaced as a set. Never replace them individually.

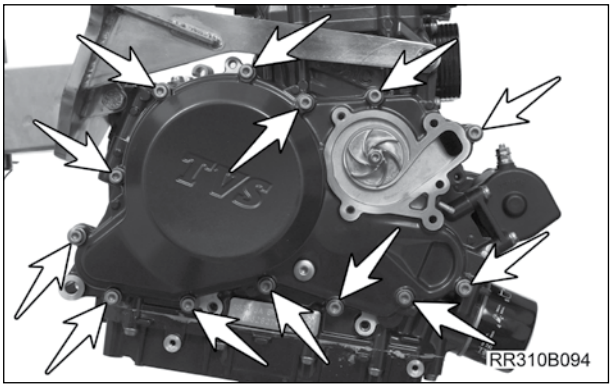
- Install the clutch cover plate mounting bolts along with springs. Tighten the bolts diagonally.

| | |
|---|---|
| Tool | 10 mm Extension Socket |
| Torque | 10 Nm |

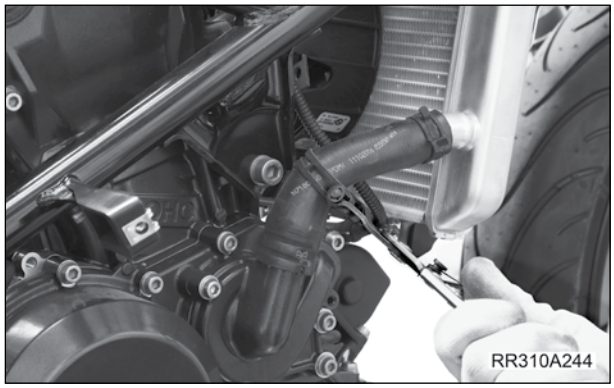



- Install new clutch cover gasket.
- Install the clutch housing cover.
- Install bolts.

| | |
|---|---|
| Tool | Allen screwdriver |
| Torque | 10 Nm |



- Install the impeller and the water pump cover. Refer ***Coolant pump removal and installation*** Procedure.

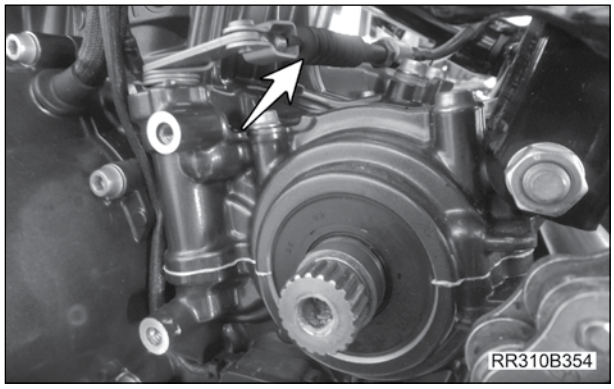



**NOTE**

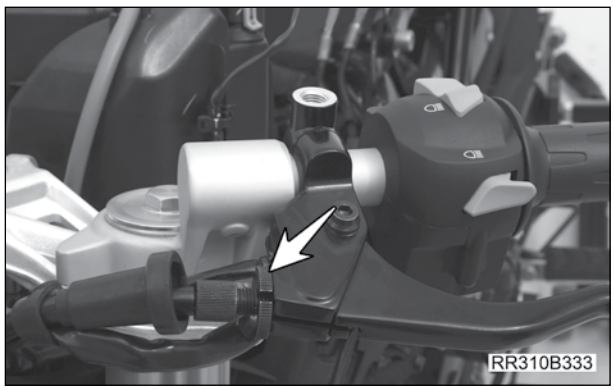
Replace water pump cover o-ring.

- Connect the radiator bottom hose and top up coolant.

- Install clutch cable at gearbox end.




- Install the clutch cable at lever end and adjust clutch play. Refer ***Clutch play*** procedure.




- Install engine guard RH. Refer to ***Engine guard RH*** procedure.
- Install the center engine guard. Refer to ***Center Engine guard*** procedure.
- Connect ***TVS Ride Scan Tool*** and run diagnostics.

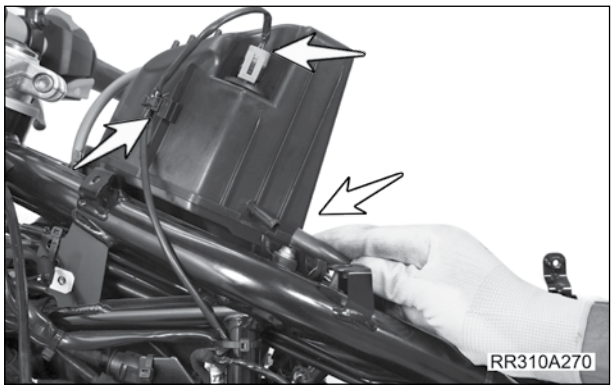
# AIR FILTER HOUSING AND DUCTS

Component : Air filter housing and Ducts
Component condition : Vehicle on ramp and component accessible
Objective : Air filter housing and Ducts Removal
Repair cycle : As required

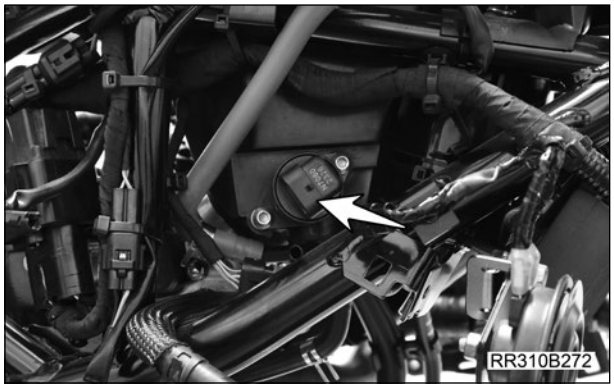
**Removal**

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the front and rear seat assembly. Refer ***Seat assembly remove*** for procedure.
- Remove the following cowls:
  - *Refer **Bottom cover Rear** for procedure.*
  - *Refer **Bottom cover Front** for procedure.*
  - *Refer **Side cowl upper LH** for procedure.*
  - *Refer **Side cowl upper RH** for procedure.*
  - *Refer **Fuel tank cover** for procedure.*
  - *Refer **Side cowl LH** for procedure.*
  - *Refer **Side cowl RH** for procedure.*
  - *Refer **Engine guard Center** for procedure.*
  - *Refer **Engine guard LH** for procedure.*
  - *Refer **Engine guard RH** for procedure.*
  - *Refer **Headlamp housing LH** for procedure.*
  - *Refer **Headlamp housing RH** for procedure.*
- Remove the fuel tank cover and fuel tank assembly. Refer ***Fuel tank – Removal*** for procedure.
- Remove radiator. Refer ***Radiator - Removal*** for procedure.
- Disconnect negative terminal of the battery.

- Remove the Intake Air Temperature sensor (IAT) connector from air filter assembly and release the wiring from the mounting clip.
- Disconnect secondary air hose.

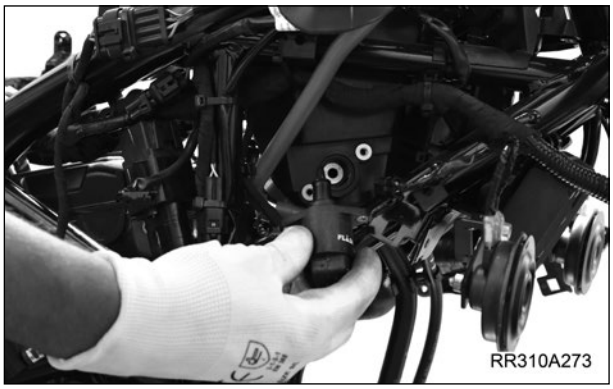


- Disconnect the electrical connector from IACV (Idle Air Control Valve).

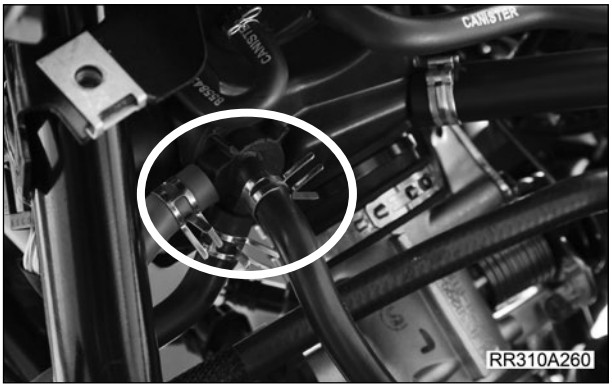



- Remove IACV valve assembly.

| | |
|---|---|
| Tool | 4 mm Allen Key |
| Torque | 5 Nm |



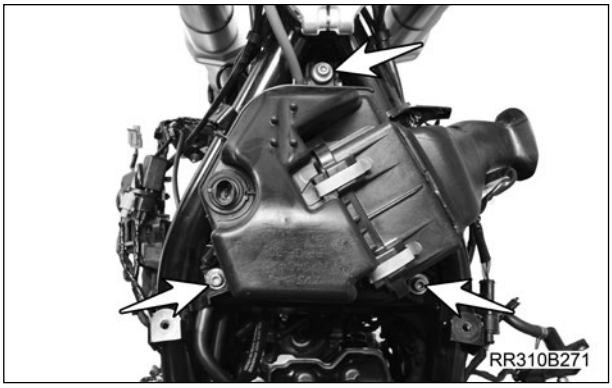

- Disconnect the Map sensor hose.
- Disconnect the Hose breather PCV.
- Disconnect the Hose inlet PTI.




- Remove the locking clip from throttle body.

- Remove the mounting screws from the air filter housing.

| | |
|---|---|
| Tool | 5 mm Allen Key |
| Torque | 10 Nm |




- Remove the Filter assy. from top.
- Close all intake openings with suitable plugs.


**Installation**

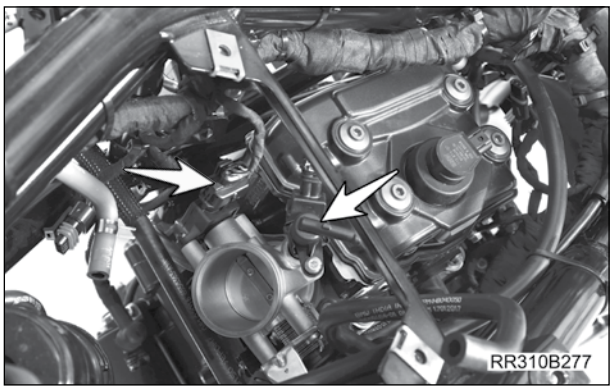
- Installation is the reverse order of removal.
- Connect the ***TVS Ride Scan Tool*** and run diagnostics.

## THROTTLE BODY REMOVAL

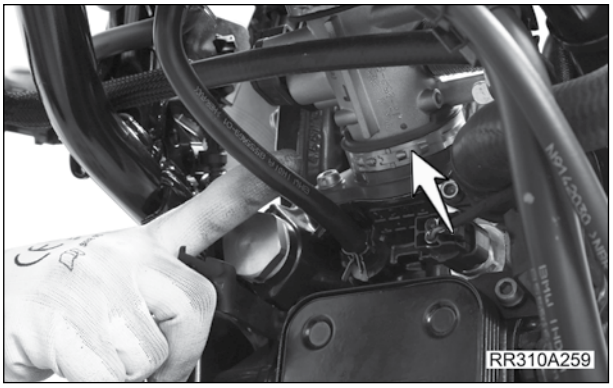
| | |
|---|---|
| Component | : Throttle body |
| Component condition | : Vehicle on ramp and component accessible |
| Objective | : Throttle body Removal |
| Repair cycle | : As required |

**Removal**

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the front and rear seat assembly. Refer ***Seat assembly remove*** for procedure.
- Remove the following cowls:
  - *Refer **Bottom cover Rear** for procedure.*
  - *Refer **Bottom cover Front** for procedure.*
  - *Refer **Side cowl upper LH** for procedure.*
  - *Refer **Side cowl upper RH** for procedure.*
  - *Refer **Fuel tank cover** for procedure.*
  - *Refer **Side cowl LH** for procedure.*
  - *Refer **Side cowl RH** for procedure.*
  - *Refer **Engine guard Center** for procedure.*
  - *Refer **Engine guard LH** for procedure.*
  - *Refer **Engine guard RH** for procedure.*
  - *Refer **Housing headlamp rear LH and RH** for procedure.*
  - *Refer **Headlamp housing components** for procedure.*
- Remove the fuel tank cover and fuel tank assembly. Refer ***Fuel tank – Removal*** for procedure.
- Remove radiator. Refer ***Radiator - Removal*** for procedure.
- Remove air filter housing and ducts. Refer A***ir filter housing and ducts*** for procedure.
- Disconnect negative terminal of the battery.
- Disconnect the throttle cable connection.
- Disconnect the throttle position sensor connector.
- Disconnect the Injector connector.



- Remove the throttle body lower hose clip.
- Remove the throttle body out and clear of the vehicle.




**Installation**

- Installation is the reverse order of removal.
- Connect the ***TVS Ride Scan Tool*** and run diagnostics.

# EXHAUST SYSTEM - REMOVAL AND INSTALLATION

| | |
|---|---|
| Component | : Exhaust system |
| Component condition | : Vehicle on ramp and component accessible |
| Objective | : Exhaust system - removal and installation |
| Repair cycle | : As required |

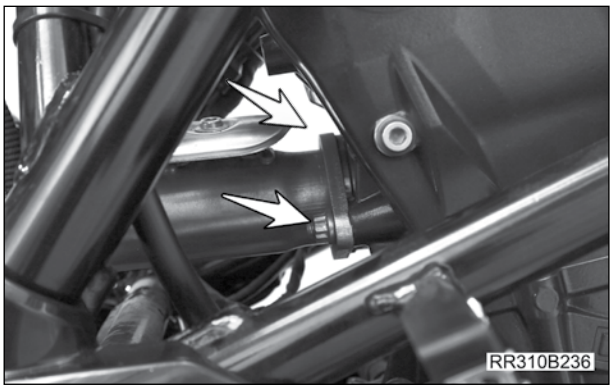
**Removal**

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the bottom cover. Refer ***Bottom cover removal*** procedure.
- Disconnect battery terminals.

- Disconnect the oxygen sensor connector and cut wire tags.

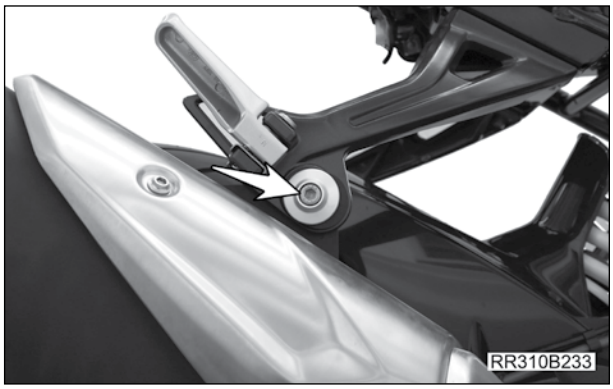

- Remove the exhaust system mounting nuts on either side of the engine.

| | |
|---|---|
| Tool | 10 mm Torx Socket |
| Torque | 14 Nm |



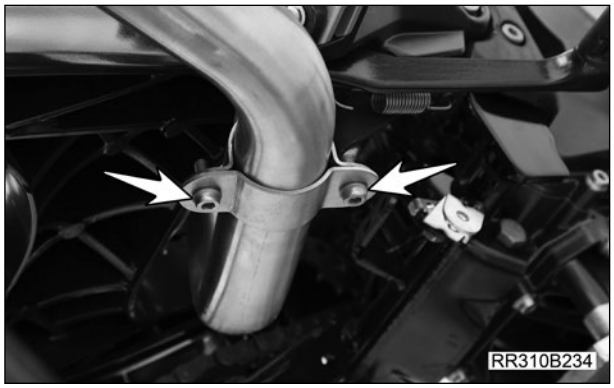

- Remove the exhaust system rear mounting screw.

| | |
|---|---|
| Tool | 10 mm Allen Key bit |
| Torque | 19 Nm |

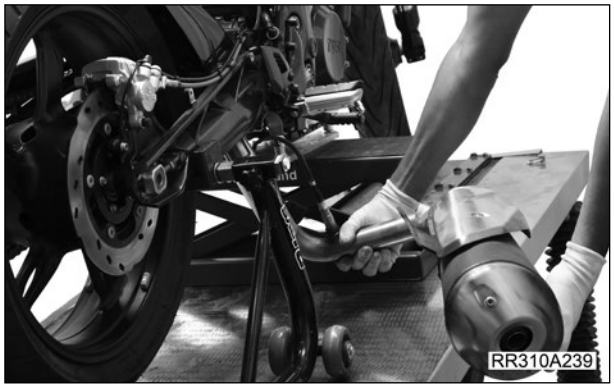


- Remove the exhaust system centre mounting clamp (two screws).

| | |
|---|---|
| Tool | 5 mm Allen Key bit |
| Torque | 10 Nm |




- Remove the exhaust assembly from the bottom.




**Installation**

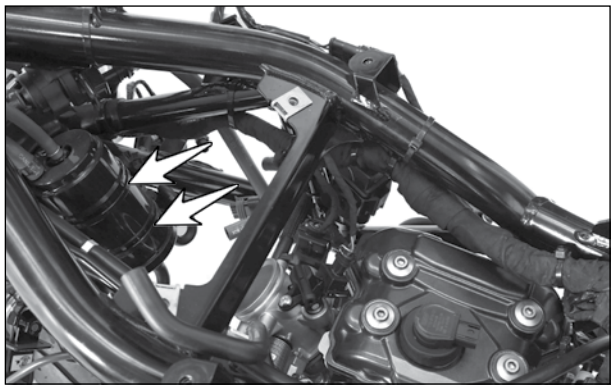
- Installation is the reverse order of removal.
- Connect the ***TVS Ride Scan Tool*** and run diagnostics.

## CANISTER

Component : Canister
Objective : Removal and Installation
Repair cycle : As required

**Removal**

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the front and rear seat assembly. Refer ***Seat assembly remove*** for procedure.
- Remove the following cowls:
  - *Refer **Bottom cover Rear** for procedure.*
  - *Refer **Bottom cover Front** for procedure.*
  - *Refer **Side cowl upper LH** for procedure.*
  - *Refer **Side cowl upper RH** for procedure.*
  - *Refer **Fuel tank cover** for procedure.*
  - *Refer **Side cowl LH** for procedure.*
  - *Refer **Side cowl RH** for procedure.*
  - *Refer **Engine guard Center** for procedure.*
  - *Refer **Engine guard LH** for procedure.*
  - *Refer **Engine guard RH** for procedure.*
  - *Refer **Housing headlamp LH and RH** for procedure.*
  - *Refer **Headlamp housing components** for procedure.*
- Remove the fuel tank cover and fuel tank assembly. Refer ***Fuel tank – Removal*** for procedure.
- Remove radiator. Refer ***Radiator - Removal*** for procedure.
- Remove air filter housing and ducts. Refer ***Air filter housing and ducts removal*** for procedure.
- Disconnect negative terminal of the battery.
- Disconnect all rubber hoses to the canister.
- Cut the wire tags and lift the canister clear off the vehicle.



**Installation**

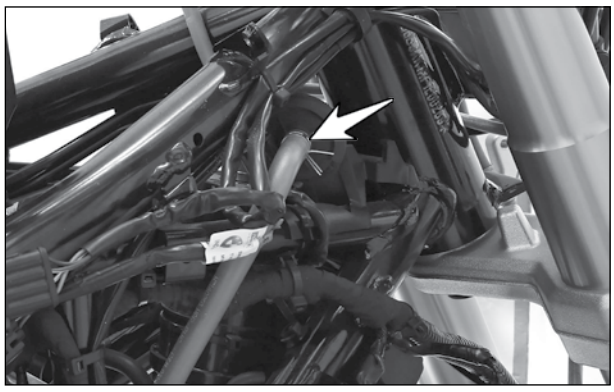
- Installation is the reverse order of removal.
- Connect the ***TVS Ride Scan Tool*** and run diagnostics.

## CANISTER PURGE VALVE

Component : Canister Purge Valve
Objective : Removal and Installation
Repair cycle : As required

**Removal**

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the front and rear seat assembly. Refer ***Seat assembly remove*** for procedure.
- Remove the following cowls:
  - *Refer **Bottom cover Rear** for procedure.*
  - *Refer **Bottom cover Front** for procedure.*
  - *Refer **Side cowl upper RH** for procedure.*
  - *Refer **Fuel tank cover** for procedure.*
  - *Refer **Side cowl RH** for procedure.*
  - *Refer **Engine guard Center** for procedure.*
  - *Refer **Engine guard RH** for procedure.*
  - *Refer **Housing headlamp RH** for procedure.*
- Disconnect negative terminal of the battery.
- Disconnect the hoses to the canister purge valve.
- Slide the purge valve out of the vehicle.
- Disconnect the electrical connector.



**Installation**

- Installation is the reverse order of removal.
- Connect the ***TVS Ride Scan tool*** and run diagnostics.

# FUEL INJECTORS

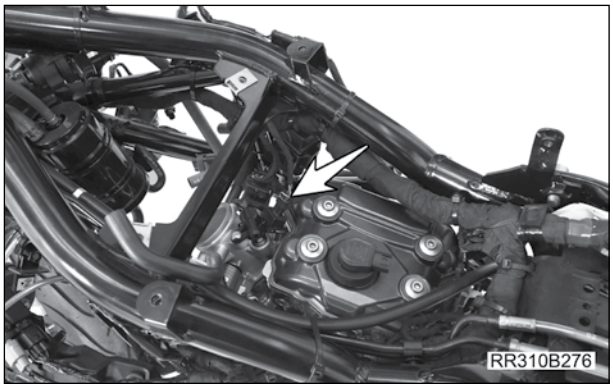
Component : Fuel Injectors
Component condition : Vehicle on ramp and component accessible
Objective : Fuel Injectors Removal and installation
Repair cycle : As required

**Removal**

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove fuel tank cover. Refer ***Fuel tank cover*** for procedure.
- Remove fuel tank. Refer ***Fuel tank*** for procedure.
- Disconnect the fuel hose to injector.
- Disconnect the Injector connector.

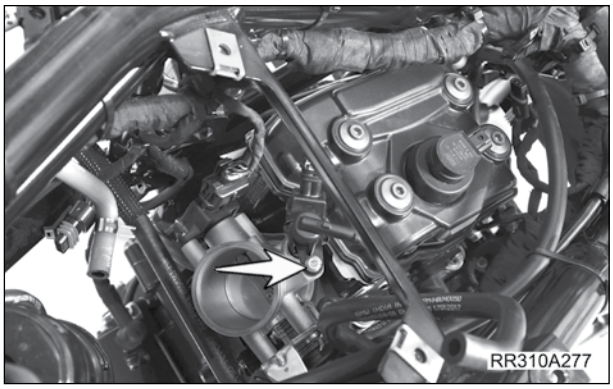
**NOTE**

It is not necessary to remove the side cowls and the air filter housing to remove the injector. The image shown with all cowls and air filter housing removed for clarity purpose.




- Remove the mounting bolt for the injector.

| | |
|---|---|
| Tool | 20 Torx |
| Torque | 5 Nm |
| Loctite | Loctite 243 |




- Pull the injector out gently and keep it on a clean surface. Ensure the O-rings on the injectors have also been removed.

**Installation**

- Installation is the reverse order of removal.
- Connect the ***TVS Ride Scan Tool*** and run diagnostics.

# FUEL TANK

Component : Fuel tank
Component condition : Vehicle on ramp and component accessible
Objective : Removal and Installation
Repair cycle : As required

**Removal**

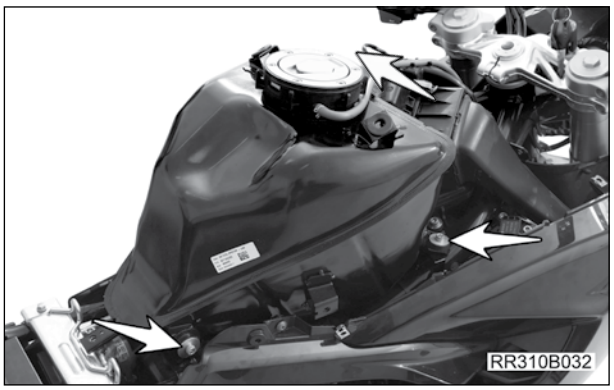
- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove both seats. Refer ***Seat removal*** for procedure.
- Remove upper cowl LH. Refer ***Upper cowl LH removal*** for procedure.
- Remove upper cowl RH. Refer ***Upper cowl RH removal*** for procedure.
- Remove the fuel tank cover. Refer to ***fuel tank cover*** procedure.
- Disconnect the EVAP rubber hose from the fuel tank inlet.
- Disconnect the fuel tank grounding.
- Remove the bolt securing the rear side of the fuel tank to the vehicle, on either sides.

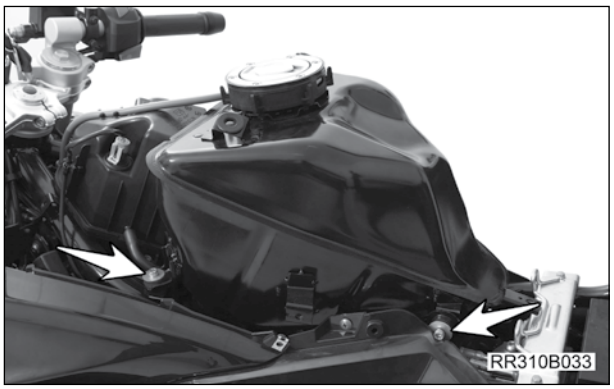
| Tool | 5 mm Allen Key |
|---|---|

- Remove the bolt securing the front of the fuel tank to the vehicle, on either sides.

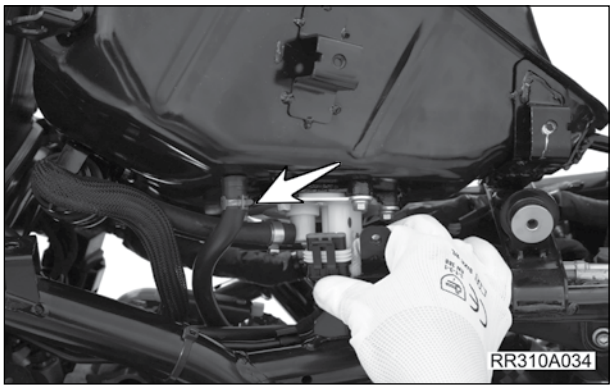
| Tool | 5 mm Allen Key |
|---|---|

- Remove the rubber bushings and keep them safe for reuse.




- Lift the fuel tank slightly.
- Disconnect the fuel pump electrical connector.
- Disconnect the bottom hose.



- Disconnect the fuel injector hose.
- Lift the tank clear off the vehicle.


**CAUTION**

Wipe all spilled fuel immediately.

**CAUTION**

Keep the fire extinguisher handy.

**Installation**

- Installation is the reverse order of removal.
- Perform fuel pump activation test and diagnostics using ***TVS Ride Scan Tool***.

## RADIATOR AND FAN

Component : Radiator and Fan
Component condition : Vehicle on ramp and component accessible
Objective : Radiator and Fan - Removal and Installation
Repair cycle : As required

**Removal**

**WARNING**

Do not drain coolant when engine is hot. Cooling system is a pressurized system. Do not open radiator cap when hot. Hot coolant may cause burns.

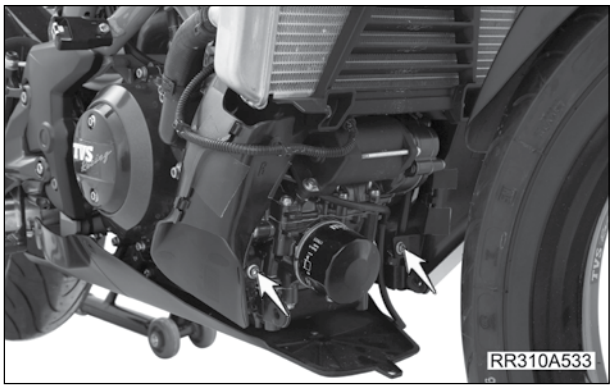
**CAUTION**

Hot coolant may cause burns, always wear gloves when handling engine oil and/or touching hot surfaces.

**CAUTION**

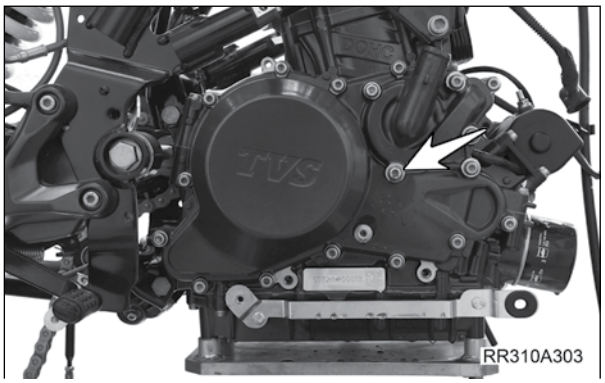
Do not come in direct contact with coolant. Always wear suitable protective equipment when working with hazardous chemicals like oil, coolant etc.

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the following cowls:
  - *Refer **Bottom cover Rear** for procedure.*
  - *Refer **Bottom cover Front** for procedure.*
  - *Refer **Side cowl upper LH** for procedure.*
  - *Refer **Side cowl upper RH** for procedure.*
  - *Refer **Side cowl LH** for procedure.*
  - *Refer **Side cowl RH** for procedure.*
  - *Refer **Engine guard Center** for procedure.*
  - *Refer **Engine guard LH** for procedure.*
  - *Refer **Engine guard RH** for procedure.*
- Remove air ducts on the LH and RH side of the radiator.
- Cut the wire tags and remove the ducts.

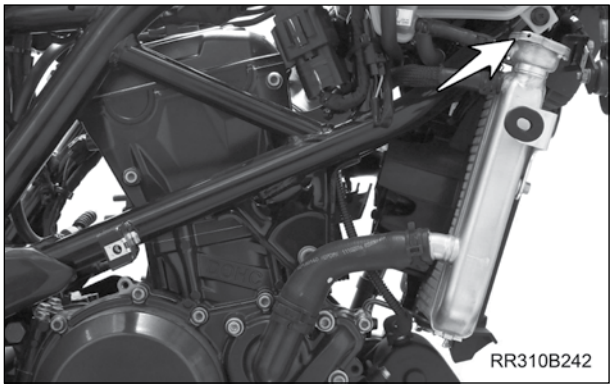


- Remove the coolant drain bolt and drain the coolant into a clean container or tray.

| | |
|---|---|
| Tool | 5 mm Allen Key bit |
| Torque | 10 Nm |

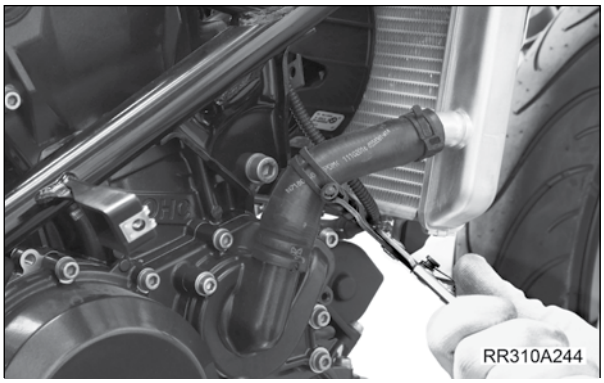



- Remove the radiator cap.



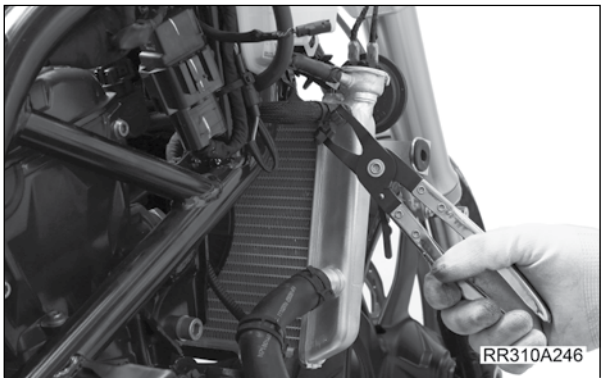

- Disconnect radiator RH side bottom hose.

| | |
|---|---|
| Tool | Hose Plier |




- Disconnect radiator RH side top hose.

| | |
|---|---|
| Tool | Hose Plier |



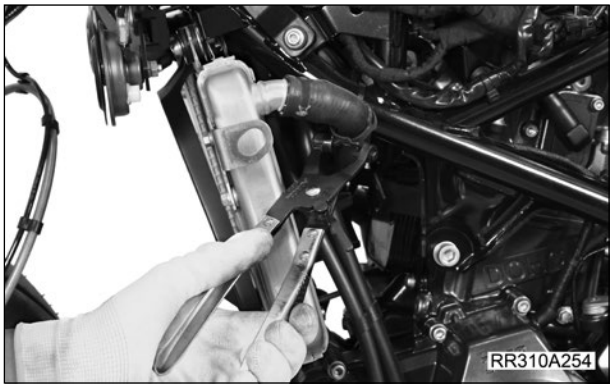
- Disconnect the coolant reservoir hose.


- Disconnect the radiator bottom hose on water pump.

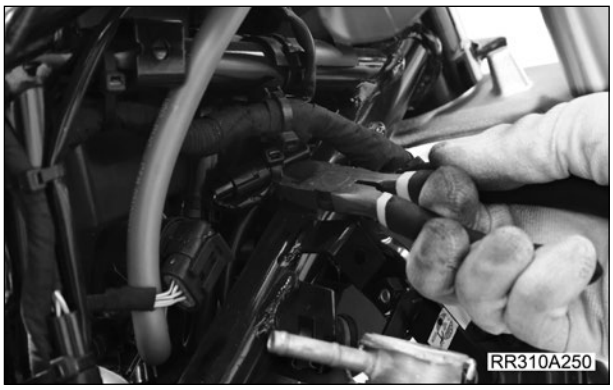
| | |
|---|---|
| Tool | Hose Plier |

- Drain radiator coolant.
- Disconnect the radiator bottom hose on water pump.

| | |
|---|---|
| Tool | Hose Plier |

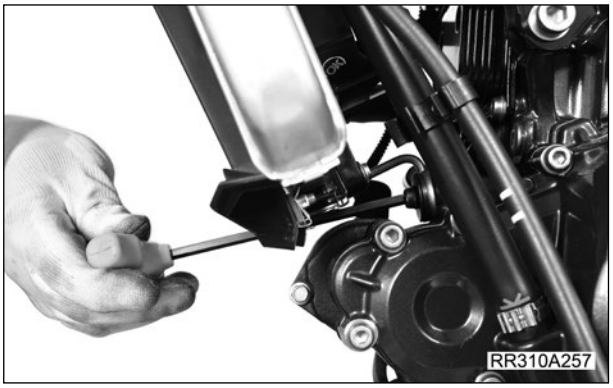



- Cut the cable tie and disconnect the radiator fan connector.



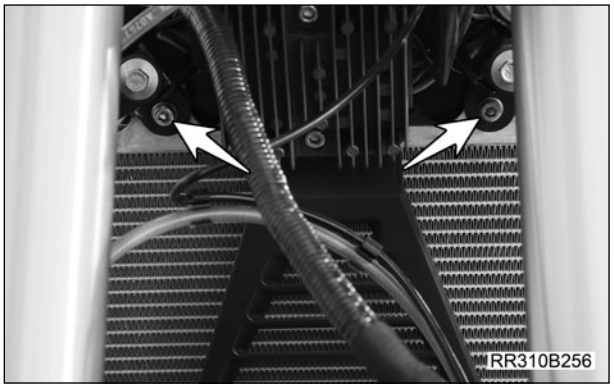

- Remove the radiator bottom mounting screw.

| | |
|---|---|
| Tool | 5 mm Allen Key screwdriver |
| Torque | 10 Nm |

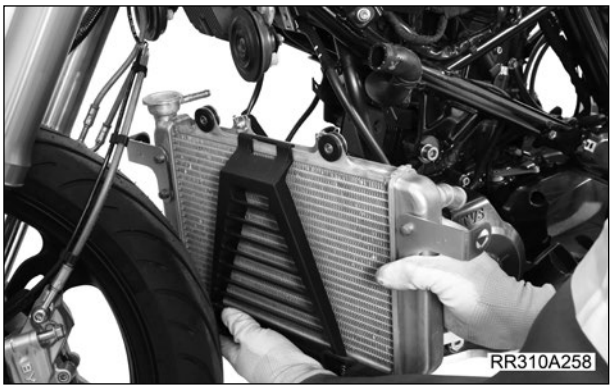


- Remove the radiator top mounting screws.

| | |
|---|---|
| Tool | 5 mm Allen Key bit |
| Torque | 10 Nm |




- Remove the radiator assembly along with fan assembly.




**Installation**

- Installation is the reverse order of removal.
- Check if all the hoses and clamps are secure and in place.
- Fill coolant in the radiator through the radiator cap. Quantity: 1000 ml (G48 Glycentine, 50:50)
- Fill coolant in the coolant tank to the maximum level.
- Perform diagnostics with TVS Ride Scan tool.
- Run the engine and check for fan operation. Refer ***Cooling system – Check*** for procedure.
- Top up coolant in the reservoir as required.

## COOLANT PUMP

Component : Coolant Pump
Component condition : Vehicle on ramp and component accessible
Objective : Coolant Pump - Removal and Installation
Repair cycle : As required

**Removal**

**WARNING**

Do not drain coolant when engine is hot. Cooling system is a pressurized system. Do not open radiator cap when hot. Hot coolant may cause burns.

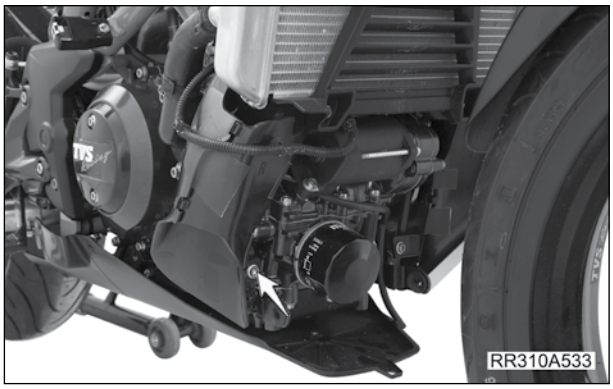
**CAUTION**

Hot coolant may cause burns, always wear gloves when handling engine oil and/or touching hot surfaces.

**CAUTION**

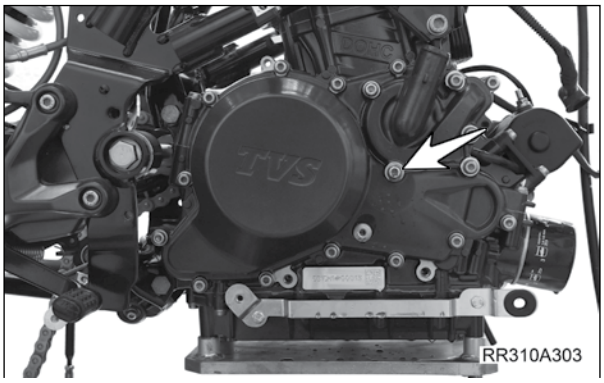
Do not come in direct contact with coolant. Always wear suitable protective equipment when working with hazardous chemicals like oil, coolant etc.

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the following cowls:
  - *Refer **Bottom cover Rear** for procedure.*
  - *Refer **Bottom cover Front** for procedure.*
  - *Refer **Side cowl upper RH** for procedure.*
  - *Refer **Side cowl RH** for procedure.*
  - *Refer **Engine guard Center** for procedure.*
  - *Refer **Engine guard RH** for procedure.*
- Remove air duct on the RH side of the radiator.
- Cut the wire tags and remove the ducts.



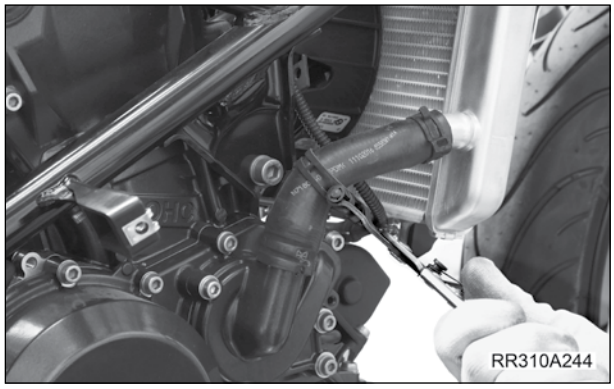

- Remove the coolant drain bolt and drain the coolant into a clean container or tray.

| | |
|---|---|
| Tool | 5 mm Allen Key bit |
| Torque | 10 Nm |



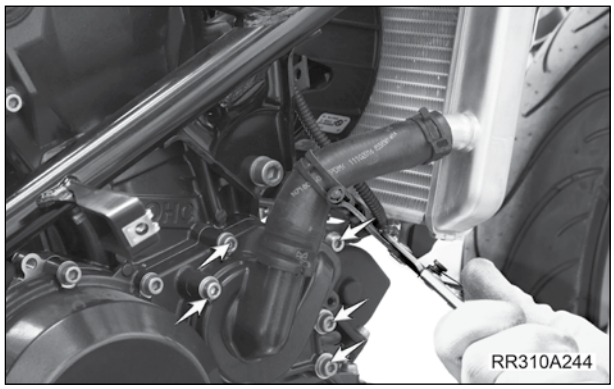
- Keep a suitable bin to drain the radiator coolant into. Remove the radiator coolant bottom hose.

| | |
|---|---|
| Tool | Hose Plier |

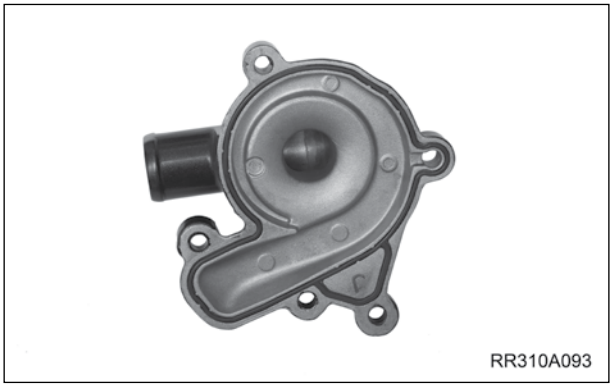



- Remove the water pump cover mounting screws (5 nos).

| | |
|---|---|
| Tool | Allen socket 6 mm |
| Torque | 10 Nm |

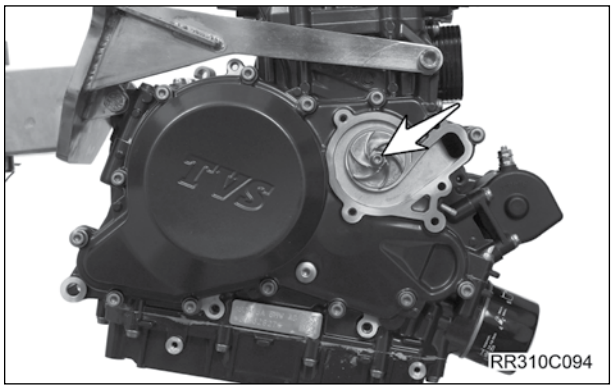



- Remove the water pump cover.




- Remove the Impeller screw and remove impeller.

| | |
|---|---|
| Tool | 6 mm Allen Key bit |
| Torque | 6 Nm |
| Loctite | Loctite 243 |



**Installation**

- Installation is the reverse order of removal.
- Check if all the hoses and clamps are secure and in place.

**NOTE**

Do not reuse old water pump packing, clutch cover gasket and coolant drain plug washer.Always replace when opened.

- Fill coolant in the radiator through the radiator cap. Quantity: 1000 ml (G48 Glysantin, 50:50)
- Fill coolant in the coolant tank to the maximum level.
- Perform diagnostics with ***TVS Ride Scan Tool***.
- Run the engine and check for fan operation. Refer ***Cooling system – Check*** for procedure.
- Top up coolant in the reservoir as required.

# THERMOSTAT

Component : Thermostat
Component condition : Vehicle on ramp and component accessible
Objective : Thermostat Removal
Repair cycle : As required

**WARNING**

Do not drain coolant when engine is hot. Cooling system is a pressurized system. Do not open radiator cap when hot. Hot coolant may cause burns.

**CAUTION**

Hot coolant may cause burns, always wear gloves when handling engine oil and/or touching hot surfaces.

**CAUTION**

Do not come in direct contact with coolant. Always wear suitable protective equipment when working with hazardous chemicals like oil, coolant etc.

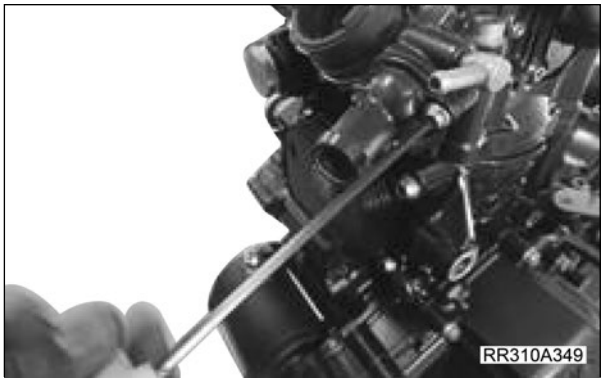
**NOTE**

Thermostat can be removed without removing any associated components or assemblies around it. Images are shown on engine which is removed from vehicle for clarity purposes.

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the following cowls:
  - *Refer **Bottom cover Rear** for procedure.*
  - *Refer **Bottom cover Front** for procedure.*
  - *Refer **Side cowl upper LH** for procedure.*
  - *Refer **Side cowl upper RH** for procedure.*
  - *Refer **Side cowl LH** for procedure.*
  - *Refer **Side cowl RH** for procedure.*
  - *Refer **Engine guard Center** for procedure.*
  - *Refer **Engine guard LH** for procedure.*
  - *Refer **Engine guard RH** for procedure.*
- Remove radiator. Refer ***Radiator removal*** procedure.

- Remove thermostat housing.

| | |
|---|---|
| Tool | 5 mm Allen Key bit |
| Torque | 10 Nm |




- Remove thermostat.


**Installation**

- Installation is the reverse order of removal.
- Check if all the hoses and clamps are secure and in place.
- Fill coolant in the radiator through the radiator cap. Quantity: 1000 ml (G48 Glysantin, 50:50)
- Fill coolant in the coolant tank to the maximum level.
- Perform diagnostics with ***TVS Ride Scan Tool***.
- Run the engine and check for fan operation. Refer ***Cooling system – Check*** for procedure.
- Top up coolant in the reservoir as required.

# OIL PUMP

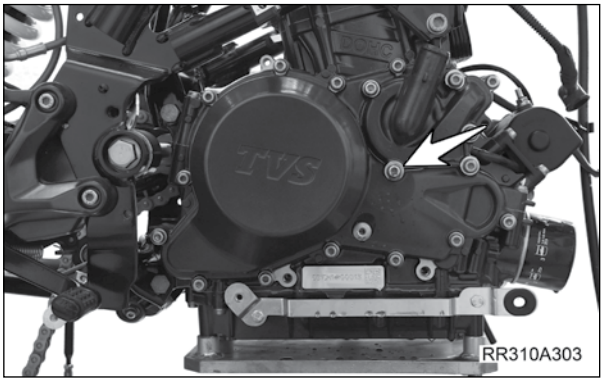
Component : Oil pump
Component condition : Vehicle on ramp and component accessible
Objective : Oil pump Removal
Repair cycle : As required

**Removal**

**NOTE**

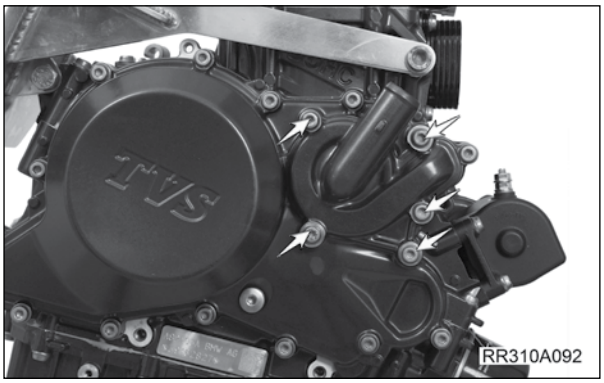
Clutch can be removed without removing the engine from the vehicle. Images are shown on engine which is removed from vehicle for clarity purposes..

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove Cover frame. Refer to ***Cover Frame*** procedure.
- Remove the center engine guard. Refer to ***Center Engine guard*** procedure.
- Remove the coolant drain screw and drain the coolant to a clean container.



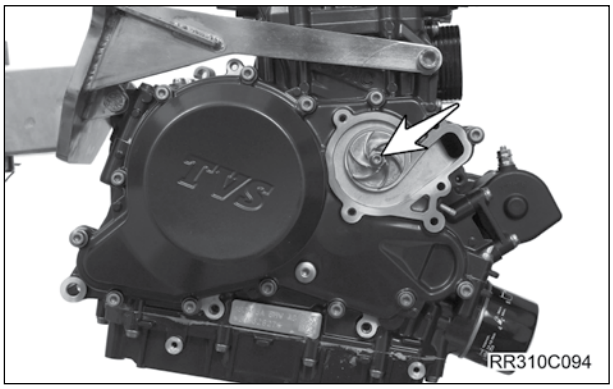

- Remove water pump cover.

| | |
|---|---|
| Tool | 10 mm Allen Key bit |
| Torque | 10 Nm |



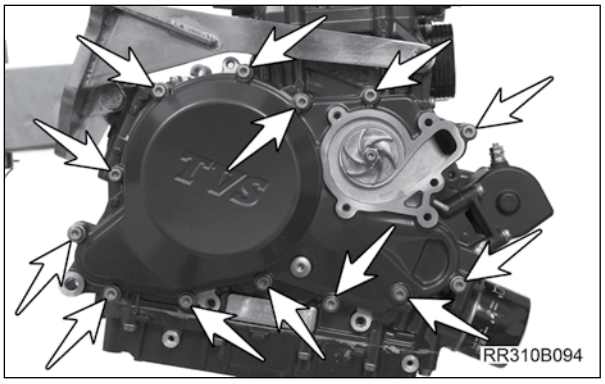

- Remove water pump impeller.

| | |
|---|---|
| Tool | 6 mm Allen Key bit |
| Torque | 6 Nm |
| Loctite | Loctite 243 |

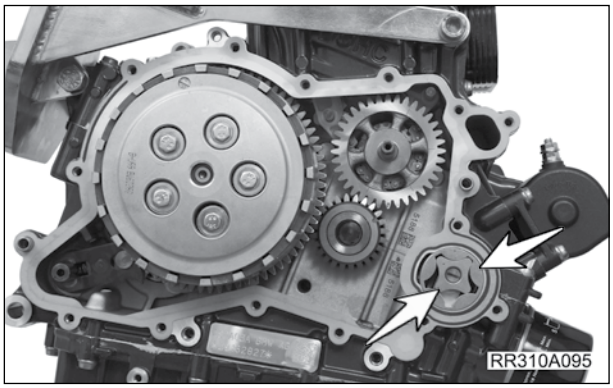


- Remove the clutch casing cover bolts (X13).
- Remove the clutch casing cover gasket and dispose.
- Do not reuse the gasket.

| | |
|---|---|
| Tool | 10 mm Allen Key bit |
| Torque | 10 Nm |




- Lift the oil pump gears (outer and inner) clear of the engine.




**Installation**

- Installation is the reverse order of removal.
- Perform coolant leak test.
- Connect ***TVS Ride Scan Tool*** and run diagnostics.

**CAUTION**

While installing the oil pump ensure the markings on the pump gears face outside. Wrong alignment and installation may lead to engine damage.

**NOTE**

Do not reuse old water pump packing, clutch cover gasket and coolant drain plug washer.Always replace when opened.

# IGNITION COIL

Component : Ignition Coil
Component condition : Vehicle on ramp and component accessible
Objective : Ignition Coil Removal
Repair cycle : As required

**CAUTION**

Use the recommended **NGK Make Spark Plug (LMAR9D - J)** only

**WARNING**

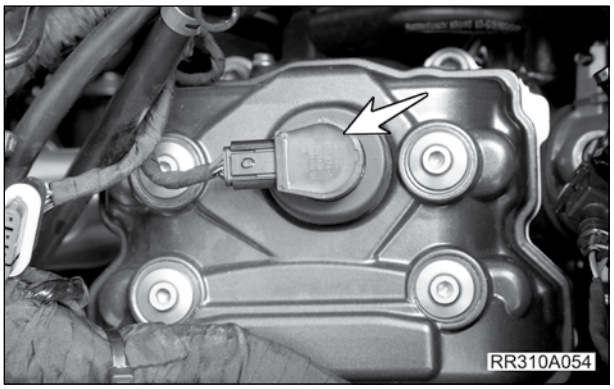
Do not clean or adjust the gap of spark plug. If any malfunction is observed in spark plug replace it.

Neglecting the replacement of spark plug will lead to difficulty in starting and poor performance.

Before removing the spark plug clean the surroundings of spark plug to prevent any foreign materials falling inside the cylinder bore.

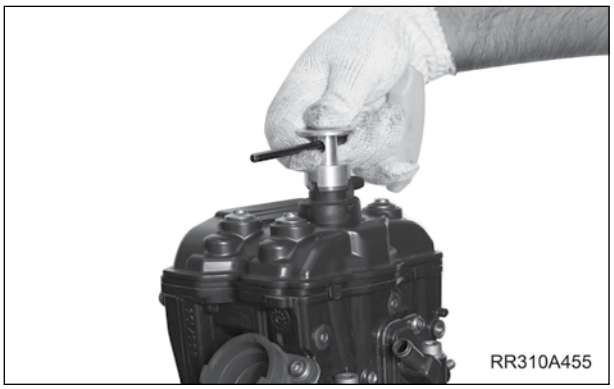
**Removal**

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove both seats. Refer ***Seat removal*** for procedure.
- Remove upper cowl LH. Refer ***Upper cowl LH removal*** for procedure.
- Remove upper cowl RH. Refer ***Upper cowl RH removal*** for procedure.
- Remove the fuel tank cover. Refer to ***fuel tank cover*** procedure.
- Remove fuel tank. refer ***Fuel tank removal*** procedure.




- Disconnect the electrical connection to ignition coil.
- Pull the ignition coil from the engine.

| Tool | N7310090 |
|---|---|




**Installation**

- Installation is reverse of removal.
- Connect the TVS Ride Scan Tool and run diagnostics.

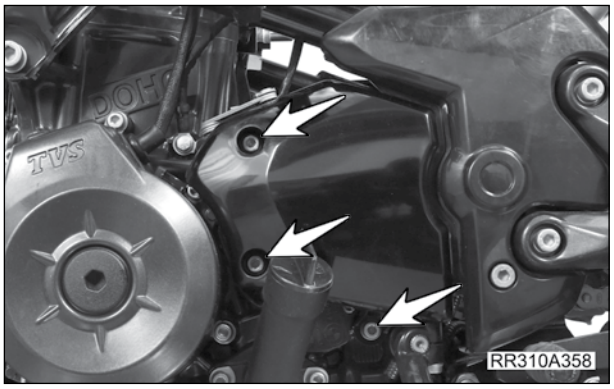
# FRONT SPROCKET

Component : Front sprocket
Component condition : Vehicle on ramp and component accessible
Objective : Front sprocket removal
Repair cycle : As required

**Removal**

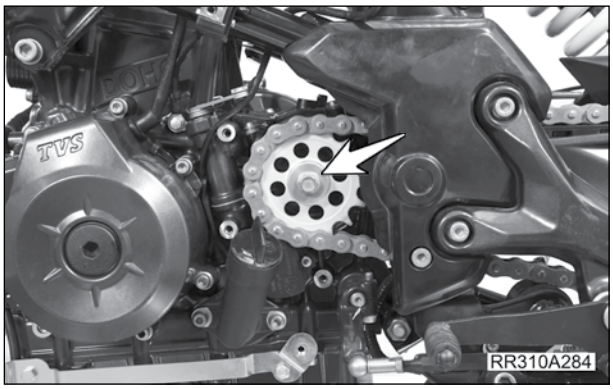
- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Slacken the chain.
- Remove the chain sprocket cover.

| | |
|---|---|
| Tool | 8 mm Allen Key bit |
| Tightening torque | 10 Nm |




- Remove the flange screw from sprocket, remove the sprocket.

| | |
|---|---|
| Tool | 10 mm bit with wrench |
| Tightening torque | 28 Nm |
| Loctite | Loctite 243 |



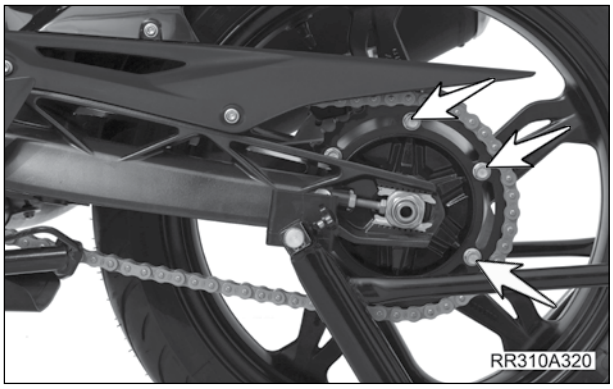

**Installation**

- Installation is the reverse procedure of Removal.

# REAR WHEEL SPROCKET

Component : Rear wheel sprocket
Component condition : Vehicle on ramp and component accessible
Objective : Rear wheel sprocket replace
Repair cycle : As required

**Removal**




- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the rear wheel. Refer to ***Rear wheel*** procedure.
- Remove the complete chain sprocket support with spacing bushing.
- Remove judder damper elements.
- Remove the spacing bushing and radial shaft seal .
- Clamp the sprocket in a bench vice.
- Remove screws.
- Separate sprocket and support.
- Remove sprocket from the bench vice.

**Installation**

- Installation is the reverse procedure of Removal.

**NOTE**

Tighten the nuts in diagonal pattern.

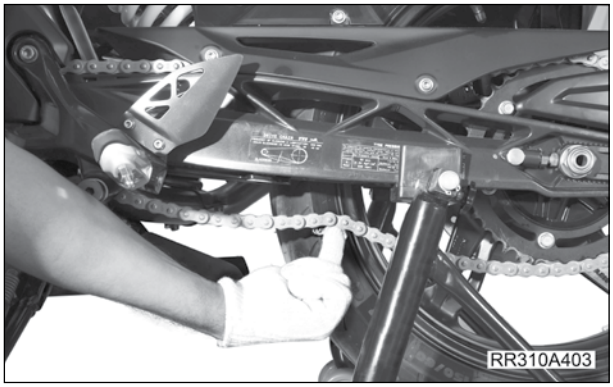
| | |
|---|---|
| Tightening torque | 30 Nm |

## DRIVE CHAIN REMOVAL AND INSTALLATION

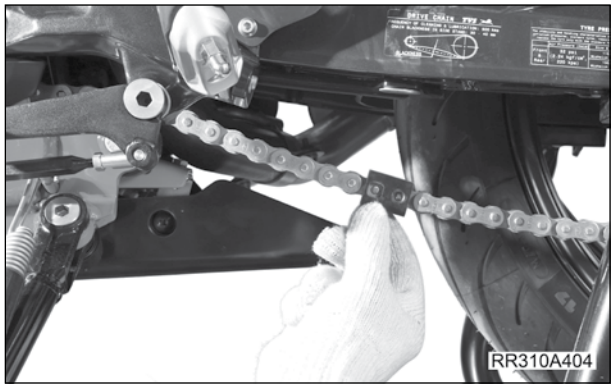
Component : Drive chain
Component condition : Vehicle on ramp and component accessible
Objective : Drive chain removal and installation
Repair cycle : Inspect the chain in every service and replace the drive chain every 12,000 kms, if required.

**⚠ WARNING**

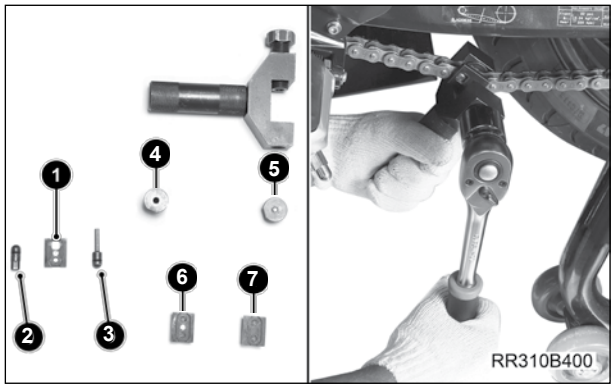
Chain that jumps off the sprocket could snag on the engine side sprocket or lock the rear wheel resulting in damage to vehicle and injury/death of the rider. Inspect chain damage regularly and replace whenever found damaged.

- Set the cutting pin on the drive chain.




- Insert the attachments to the special tool.
  ◦*Item (1), item (3) and item (4) are used to remove the old rivet.*
  ◦*Item (1), item (2) and item (5) are used to install a new rivet.*
  ◦ *Item (6) and item (7) are used to align the rivet with the links.*




- Fix the special tool on the chain and screw the handlebar into the body. Turn the special tool handle clockwise to extract the pin.
- Remove the chain from the vehicle.


**WARNING**

Ensure the sprockets are not damaged while pulling out the chain from the bike.

**NOTE**

Do not scratch the swingarm while pulling out the chain.

**NOTE**

Check the sprocket conditions and replace if required.

**Installation**

- Position the drive chain and loop it over the engine sprocket.
- Pull the chain with engine sprocket through and pull to the rear.
- Replace the link pin, link plate and the grease seals.
- Apply grease to the link pins and grease the seals.
- Engage the chain on the rear sprocket. Insert the link pins in the drive chain ends.
- Install the grease seals.
- Install the link plates and push the link plate by hand to fix it.

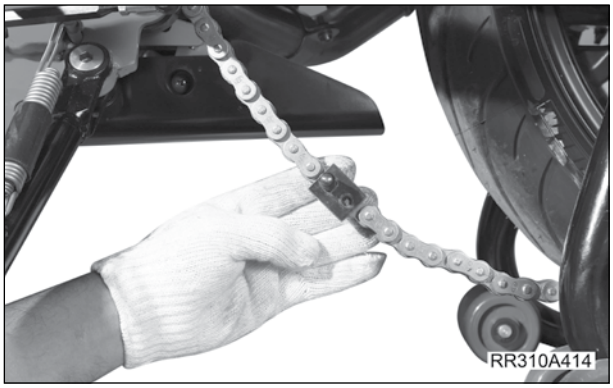
**NOTE**

Ensure the grease seals are set correctly.

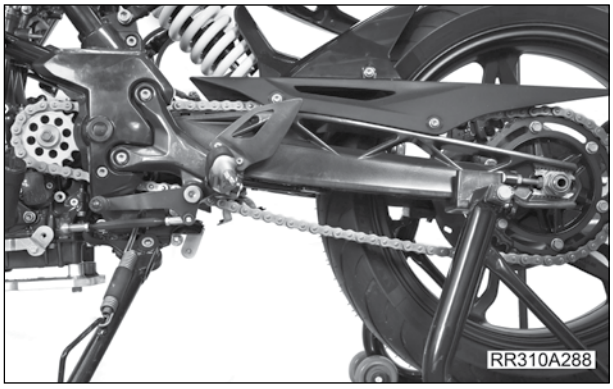
- Arrange the special tool for chain install.
- Fit the plate holder to link plate.
- Turn the in holder by hand until the plate holder touches the other link plate.
- Turn the pin holder by wrench clockwise until the two pins of link come into groove of the plate holder.
- Set the special tool for riveting the pin.
- Turn the pin holder till the riveting pin touches the link pin.
- Turn the wrench clockwise until the tip of the riveting pin hits the link pin.
- Rivet completely.
- Perform the same operation for the other pin too.

| | |
|---|---|
| Tightening torque | 50 Nm , 1st tightening |
| Rotate tool | 90° |
| Tightening torque | 50 Nm , 2nd tightening |

- Adjust the chain play. Refer ***Drive chain adjustment*** procedure.



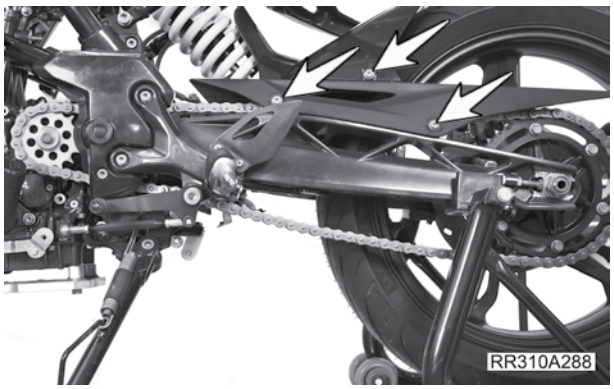




## DRIVE CHAIN GUIDE

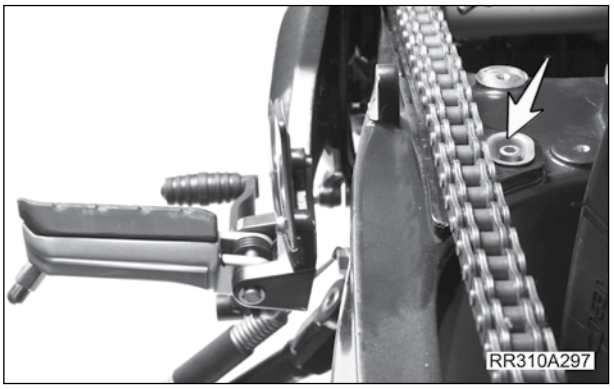
Component : Drive chain guide
Component condition : Vehicle on ramp and component accessible
Objective : Removal and Installation
Repair cycle : Inspect the drive chain guide every 10,000 kms and replace if necessary

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Visually inspect the drive chain guide for any damages. Replace the guide if found damaged.
- Take off the chain guard.

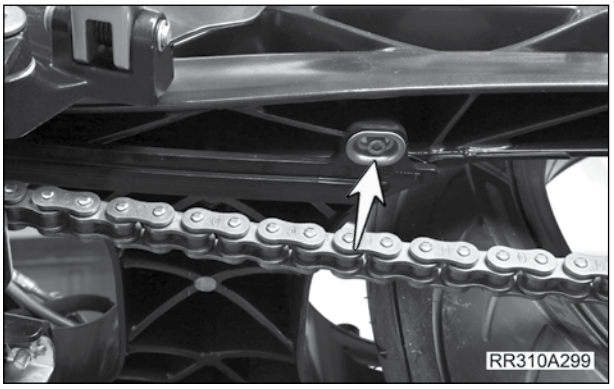



| | |
|---|---|
| Tool | 5 mm Allen Key bit |
| Tightening torque | 10 Nm |

- Remove the screws which holds the drive chain guide to the swing arm of the vehicle.
  - *Two bolts at the top.*
  - *One bolt at the bottom*




| | |
|---|---|
| Tool | 5 mm Allen Key bit |
| Tightening torque | 10 Nm |




- Installation is reverse the removal procedure.

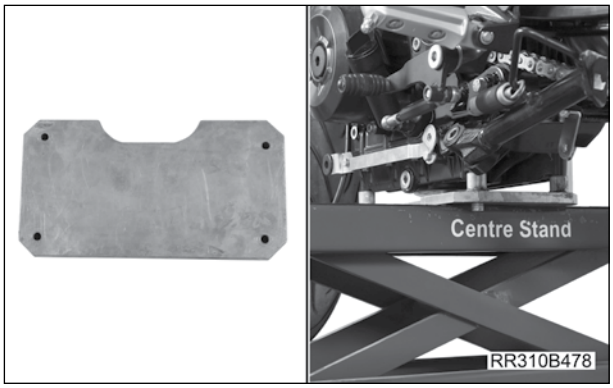
# FORK

Component : Fork
Component condition : Mounted on paddock stand
Objective : Fork replace
Repair cycle : As required

**Removal**

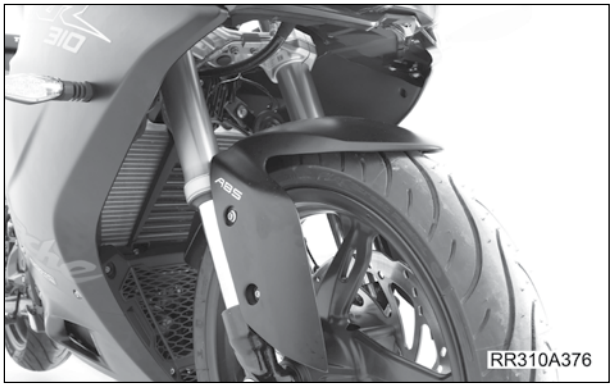
- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove Bottom cover. ***Refer to Bottom cover removal*** procedure.
- Remove side engine cowls LH and RH.
- Install the engine support plate below the engine.
- Align the scissor lift below the engine.
- Support the engine on the scissor lift.

| Tool | N7310100 |
|---|---|

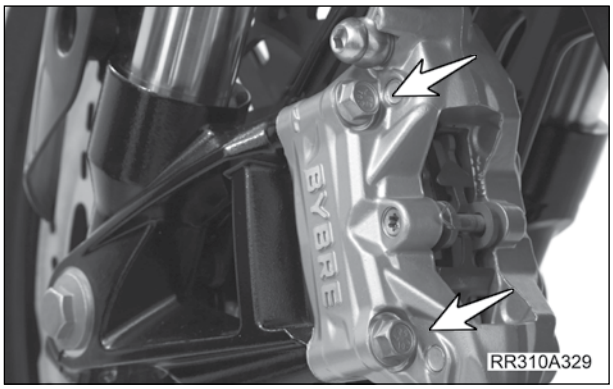



- Remove the front wheel cover.

| Tool | 5 mm allen key bit |
|---|---|
| Tightening torque | 5 Nm |

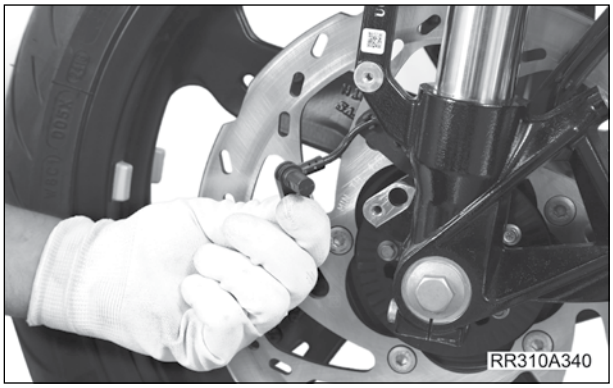



- Remove the bolts (2 nos.) from front caliper and keep them safe.
- Pull out the caliper from the vehicle and tag it in a safe area so that it will not disturb the service operation.



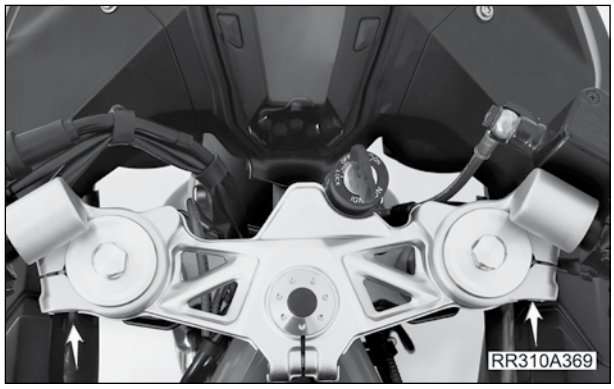
- Remove the screw and disconnect the wheel speed sensor.

| | |
|---|---|
| Tool | 5mm Allen key |
| Tightening torque | 5 Nm |




- Remove the front wheel. Refer ***Front wheel removal*** procedure.
- For RHS fork removal, remove brake hose clamp and keep it safe from repairing area.
- For LHS fork removal, remove wheel speed sensor bracket and keep it safe from repairing area.
- Loosen the upper bracket and the handle bar on the respective side.

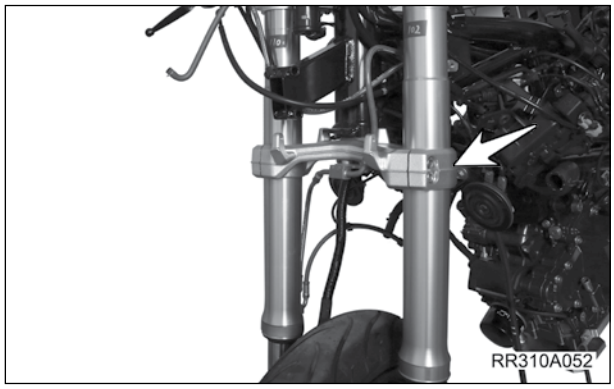
| | |
|---|---|
| Tool | 8 mm Allen key bit |
| Tightening torque | 19 Nm |




- Slightly slacken the cap bolt, if the fork needs to be overhauled.
- Slacken the Allen screws (4X), two on the middle fork leg and two on the top fork leg.
- Insert special tool, Slit Insert and carefully pull out the front fork off the fork legs.

| | |
|---|---|
| Tool | NB310050 |

| | |
|---|---|
| Tool | 8 mm Allen key bit |
| Tightening torque | 19 Nm |



**Installation**

- Install RHS and LHS fork leg and maintain the fork tube projection to 9mm.
- Tighten the Allen screws (8X).
- For RHS fork, install brake hose clamp.
- For LHS fork, install wheel speed sensor bracket.
- Install the front wheel. Refer ***front wheel install*** procedure.
- Install the screw and connect the wheel speed sensor.
- Install the bolts (2X) into front caliper.

| | |
|---|---|
| Tool | 12mm socket spanner |
| Tightening torque | 28 Nm |

- Remove the scissor lift.
- Install the front wheel cover.

**NOTE**

While installing the front wheel caliper bolts ensure to hand tighten both bolts. Tighten top bolt to recommended torque. Tighten bottom bolt to recommended torque. Again tighten the top bolt to recommended torque.

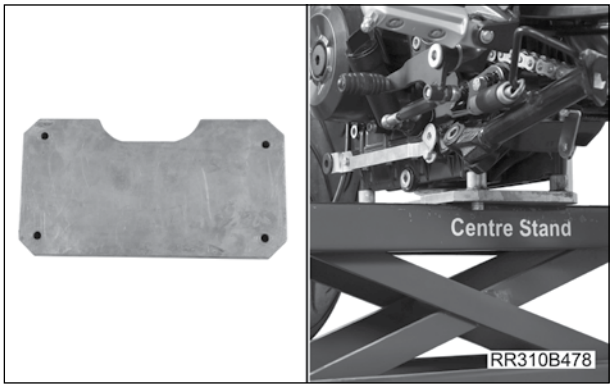
# REAR SHOCK ABSORBER

Component : Rear shock absorber
Component condition : Vehicle on ramp and component accessible
Objective : General service

## Replacement

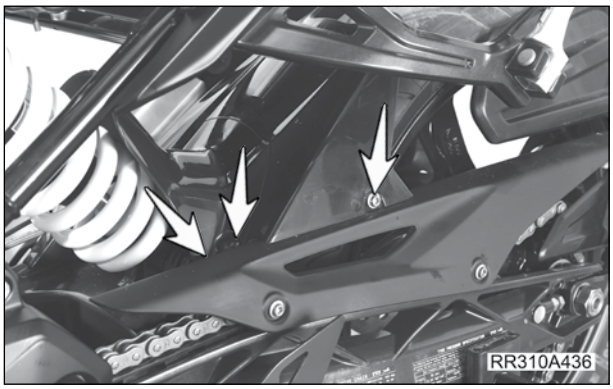
- Support the engine with scissor lift and special tool.

| | |
|---|---|
| Tool | N7310100 |



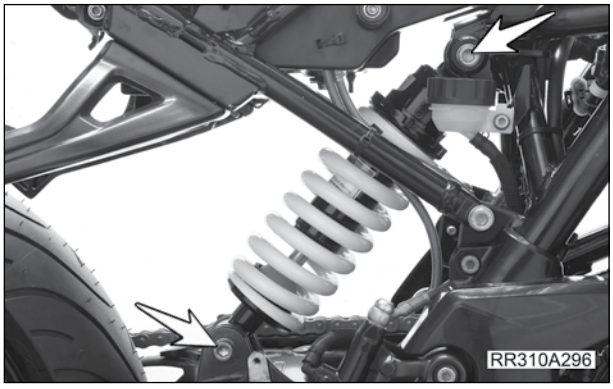

- Remove the wheel hugger front.

| | |
|---|---|
| Tool | philips screw driver |




- Remove the screw and the bushing from the bottom and the top of the suspension.

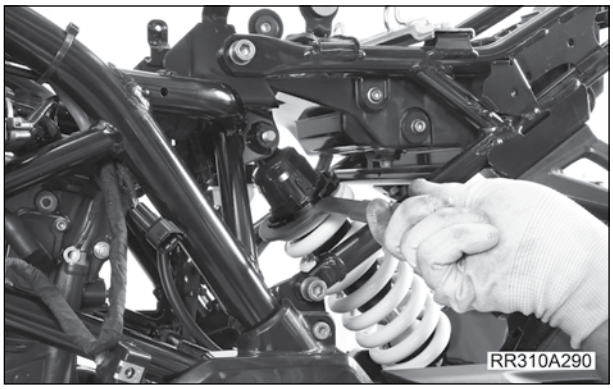
| | |
|---|---|
| Tool | 10 mm Allen Key bit |
| Torque | 58 Nm |
| Loctite | Loctite 243 |




- Shake and remove the suspension.
- Installation is reverse the removal procedure.

- Adjust the height of the suspension as required.
- *Turning anti-clockwise will increase the suspension height and vice-versa.*

| | |
|---|---|
| Tool | N7210010 |



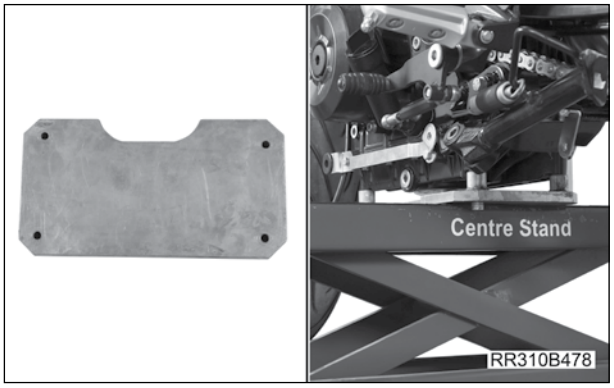
## SWING ARM BEARING REPLACE

Component : Swing arm bearing
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : Inspect and apply grease to the swing arm bearing every 5,000 kms

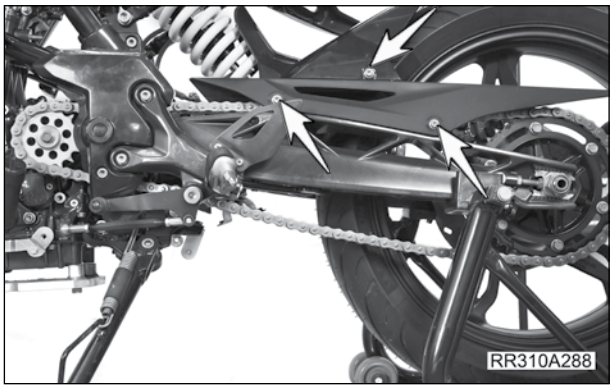
- Park the vehicle on the ramp.
- Remove engine bottom cover. Refer ***Engine bottom cover removal*** procedure.
- Install the engine support plate and lift the engine slightly using the scissor lift.

| | |
|---|---|
| Tool | N7310100 |

- Remove the rear wheel. Refer ***Rear wheel replace*** procedure.



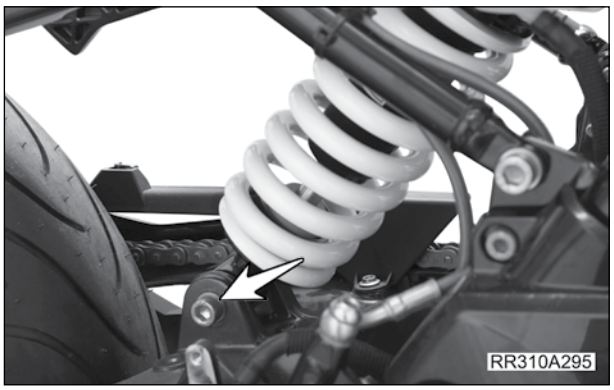

- Remove drive chain guard.




- Remove the rear suspension bottom mounting bolt.

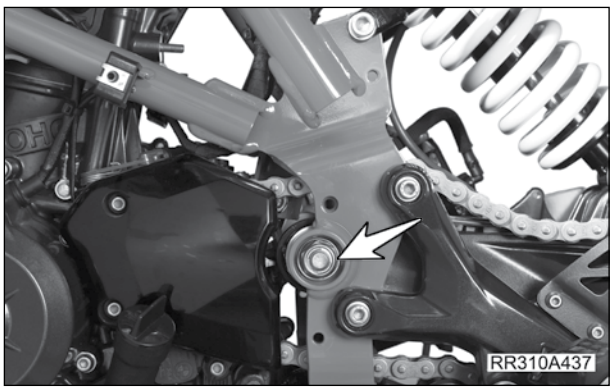
| | |
|---|---|
| Tool | 10 mm Allen Key bit |
| Tightening torque | 56 Nm |
| Loctite | Loctite 243 |

- Remove exhaust system. Refer ***Exhaust system removal*** procedure.



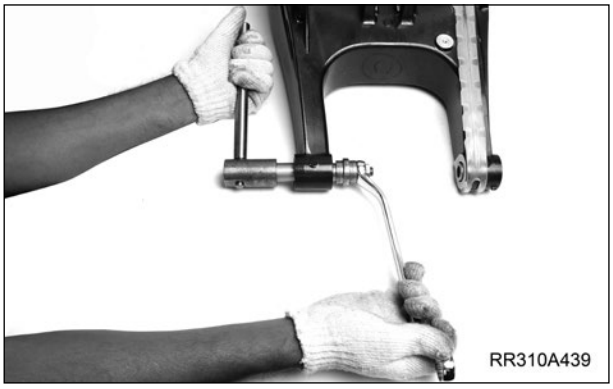

- Hold the swing arm bolt with the socket on the RHS of vehicle.
- Loosen and remove the nut from the LHS of the vehicle.

| | |
|---|---|
| Tool | 21 mm socket with wrench |
| Tightening torque | 135 Nm |
| Loctite | Loctite 243 |



- Pull out the shaft completely from the swing arm by tapping gently.
- Remove the dust seal and sleeve arm from the LHS swing arm assembly.
- Clean the sleeve, dust seal swing arm needle bearing and swing arm shaft using a clean cloth.
- Replace the seal and bearing if damaged.
- Do same on RHS also.
- Installation is the reverse of removal procedure.

| | |
|---|---|
| Tool | N7310080 |



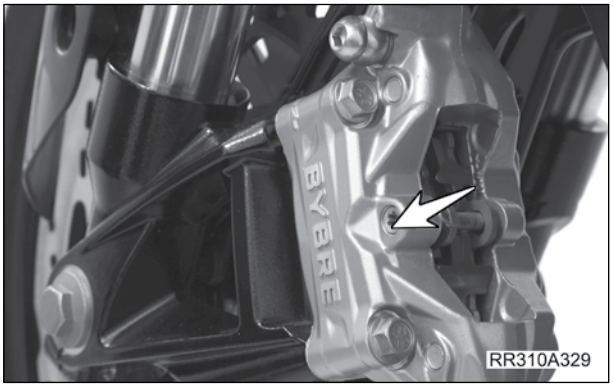
## FRONT WHEEL REMOVAL

Component : Front wheel removal
Component condition : Vehicle on ramp and component accessible
Objective : Front wheel removal and installation
Repair cycle : As required.

**Removal**

- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.

- Remove the bolts (2 nos.) from front caliper and keep them safe.
- Pull out the caliper from the vehicle and tag it in a safe area so that it will not disturb the service operation.

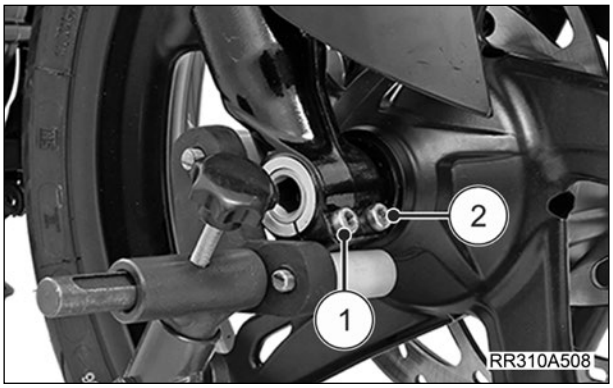


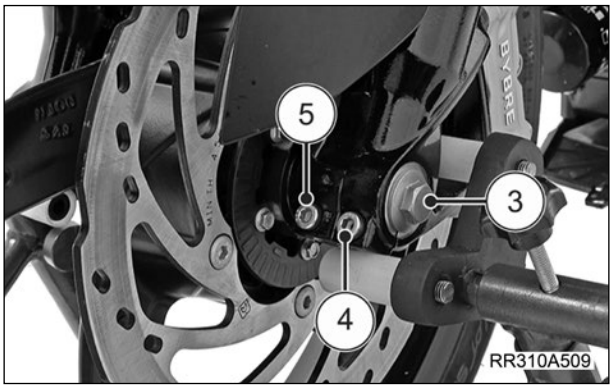

- Remove the screw and disconnect the wheel speed sensor.

| | |
|---|---|
| Tool | 5 mm Allen key |
| Tightening torque | 5 Nm |

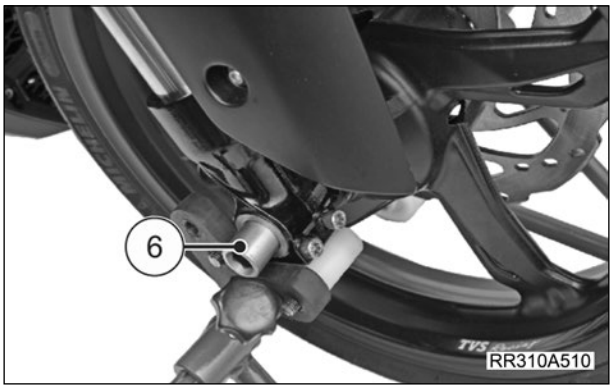
- Loosen the axle bolt (3).
- Loosen the fork mounting bolts (1), (2) on the RH side and (4), (5) on the LH side.

| | |
|---|---|
| Tool | 8 mm Allen Key bit |
| Tightening torque | 19 Nm |

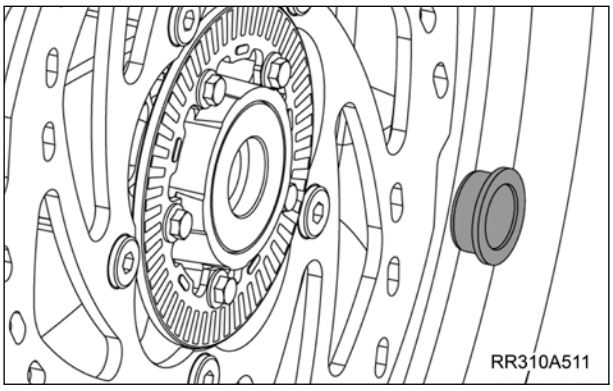



- Remove the axle (6) from the right side.




- Remove the spacer and preserve.




**Installation**

- Installation is the reverse of removal.
- Connect ***TVS Ride Scan Tool*** and run diagnostics.

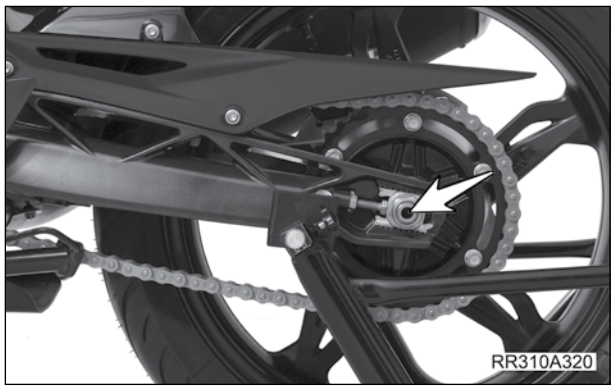
# REAR WHEEL

Component : Rear wheel
Component condition : Vehicle on ramp and component accessible
Objective : Rear wheel removal and installation
Repair cycle : As required

**Removal**

- Park the vehicle on the rear wheel paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the center axle nut and remove wheel hugger.

| | |
|---|---|
| Tool | 27 mm Allen key |
| Tightening torque | 100 Nm |

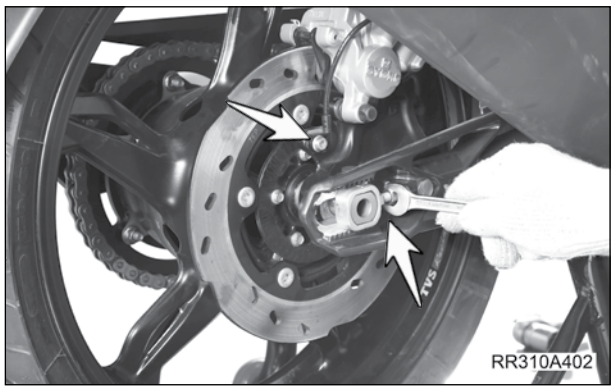



- Remove the wheel speed sensor.

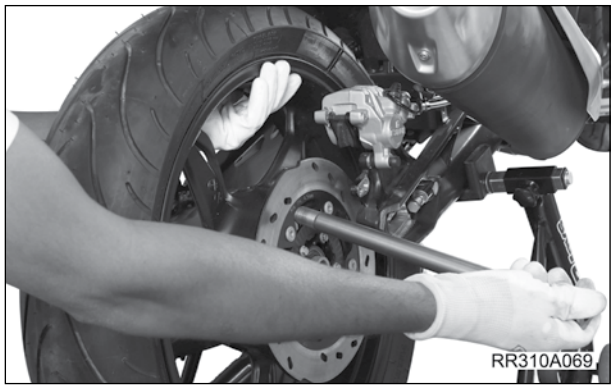
| | |
|---|---|
| Tool | 5 mm Allen key |
| Tightening torque | 5 Nm |

- Loosen the chain adjusting nut and bolt equally on both the sides.

| | |
|---|---|
| Tool | 13 mm open end |




- Remove the rear wheel axle from the right hand side.
- Slide the rear wheel out from behind.




**Installation**

- Installation is the reverse of removal.
- Adjust chain slackness. Refer ***Chain adjustment*** procedure.
- Connect ***TVS Ride Scan Tool*** and run diagnostics.

# TYRE

Component : Tyre
Component condition : Vehicle on ramp and component accessible
Objective : Tyre
Repair cycle : Inspect the tyre condition at the initial 1,000 kms and every 5,000kms there after

| | |
|---|---|
| Front Make & Model | Michelin - Pilot street radial |
| Rear Make & Model | Michelin - Pilot street radial |
| Front | 110 /70 - R17 |
| Rear | 150 /60 - R17 |

- Whenever the tyre pressure is checked, ensure to check the tyre treads and side walls for wear, damage and foreign objects.
- The tyres also to be checked for:
- Bumps or bulges in the sides of the tyre or in the tread.
- Cuts, splits or cracks in the tyre (replace the tyre without fail if found any of the above issues to ensure the safety of the rider).
- Replace the tyre when the tyre wears off to the tyre wear indicator level which is indicated by the arrow mark on the side surface of the tyre.
- Tread depth of the tyre should be minimum 2 mm if the vehicle speed is higher than 100 kmph, and it shall be minimum 1 mm if the vehicle speed is lesser than 100 kmph.

**NOTE**

Tightness in wheel rotation will increase the fuel consumption.

Check the tyre wear indicators for the timely replacement of tyres.

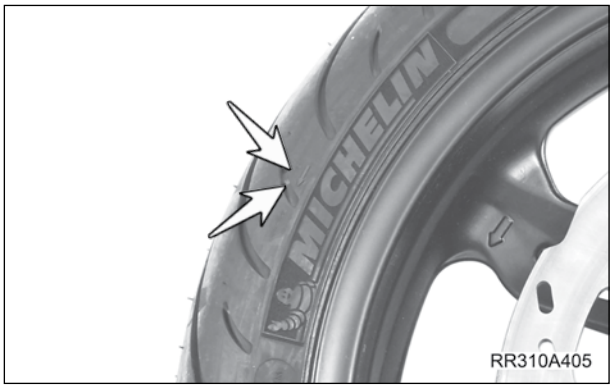
| | |
|---|---|
| Tread depth (min) | 2 mm (> 100 kmph) |
| | 1 mm (< 100 kmph) |

**Tyre rotation direction**

While assembling the tyre, ensure that the arrow mark provided on the tyre must match the direction of rotation.

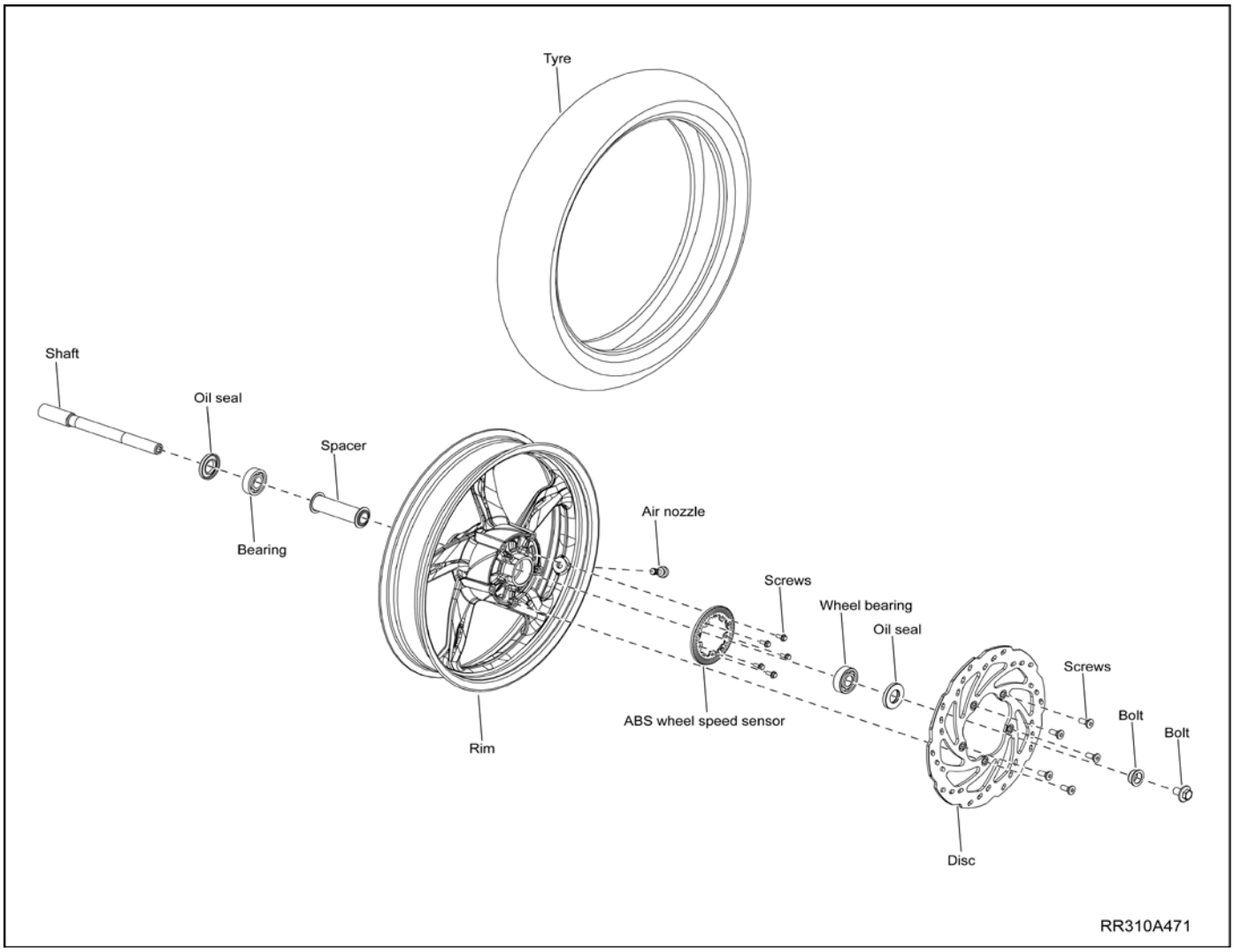
**NOTE**

Wheel balancing needs to be done every time the tyre is removed from the vehicle.



## WHEEL BEARING

Component : wheel Bearing
Component condition : Vehicle on ramp and component accessible
Objective : Replace wheel bearing front and rear
Repair cycle : As required



**Removal**

**NOTE**

Do not reuse the wheel bearing once removed. Always replace the old bearing with new.

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the front wheel. Refer ***front wheel replace*** procedure.
- Remove the spacer bush from the shaft.

**CAUTION**

Do not use sharp tool or hand to remove the bush.

**WARNING**

Ensure not to scratch the vehicle components. Cover the vehicle with mask if required.

- Remove the sealing ring and the circlip.
- Heat the wheel bearing to 100 degree Celsius using heater gun.
- Using suitable bearing puller, remove the LHS and RHS bearing off the wheel.
- Remove the spacer.

**Install**

- Clean the bearing seats.

**NOTE**

Install the bearings with their sealed sides face out.

- Install the RHS bearing using suitable pressing tool.
- Install the circlip and shaft seal.
- Install the bush with the shoulder down.
- Repeat the procedure for installing LHS bearing.
- Repeat the procedure for rear wheel also.

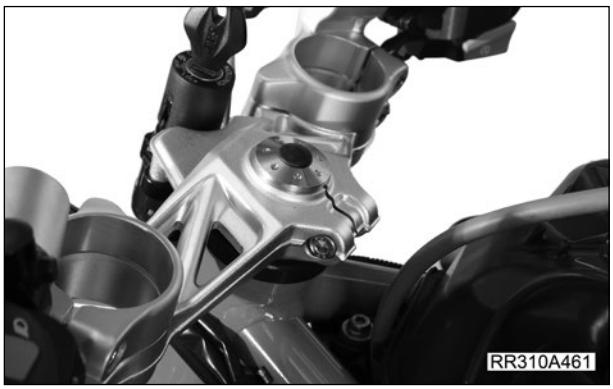
## HANDLE LH & RH

Component : Handle LH and RH
Component condition : Vehicle on ramp and component accessible
Objective : Handle LH and RH replace
Repair cycle : Replace the handle, if required.

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove screw and remove the left handlebar weight.
- Lift edge of handlebar grip and blow the compressed air below the grip and remove the grip.
- Remove screws from left multifunction switch.
- Separate the housing halves of multifunction switch, referring the lug arrow.
- Loosen the switch and let it hang from the cable.
- Remove screws and remove the clamping block.
- Loosen clutch lever fitting completely and allow it to dangle from the cable.
- Remove screw and remove the left handlebar weight.
- Lift edge of handlebar grip and blow the compressed air below the grip and remove the grip.
- Remove screw and disengage retaining plate.
- Remove the screws.
- Separate housing halves of multifunction switch, referring the arrow.
- Twist throttle grip to front
- Detach nipple and feed throttle cable out of multifunction switch.
- Remove throttle twistgrip.
- Loosen multifunction switch and let it hang from the cable.
- Remove screws.
- Remove clamping block and handlebars.
- Lift and remove the handlebar.
- Place a new handlebar and clamping block.
- Install screws.
- Position throttle grip so that the mounting for throttle cable points towards bottom.

| | |
|---|---|
| Tightening torque | 19 Nm |





- Feed throttle cable into multifunction switch and attach the nipple.
- Join the housing halves of multifunction switch making sure that the arrow engages the hole in handlebar.
- Hold retaining plate in position and install screw.
- Hold handlebar weight in position.
- Install screw and tighten.
- Position the clutch lever fitting and clamping block with mirror.

| | |
|---|---|
| Tightening torque | 19 Nm |

- Install screws and hand tighten.
- Align edge of clamping block to mark and tighten screws.
- Hold multifunction switch in position.
- Join housing halves of switch, make sure the arrow

| | |
|---|---|
| Tightening torque | 8 Nm |

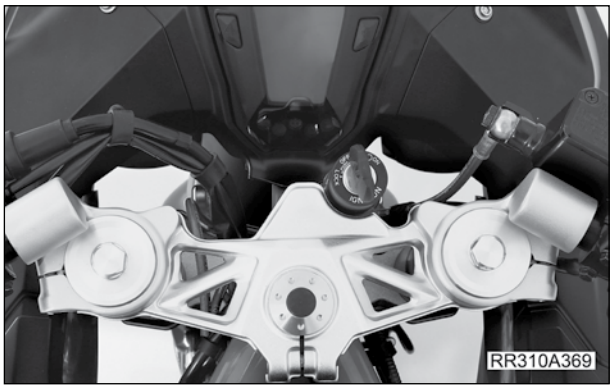
  engages in hole in the handlebar.
- Install the screws.
- Push handlebar grip onto handlebars upto the limit position using compressed air.
- Install screw and tighten.
- Check handlebar for any play. Refer ***Steering play adjust*** for procedure.

| | |
|---|---|
| Tightening torque | 19 Nm |

## UPPER BRACKET

Component : Upper bracket
Component condition : Vehicle on ramp and component accessible
Objective : Removal and Installation
Repair cycle : As required

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the Handle. Refer ***Handle removal*** procedure.
- Remove the RH side cowl. Refer ***RH side cowl removal*** procedure.
- Disconnect the ignition connector.



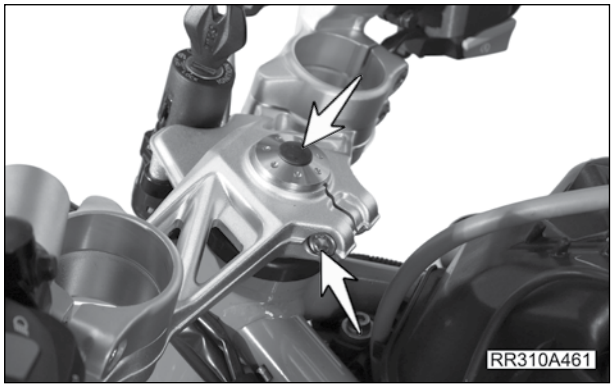

- Loosen the center clamping screw.

| | |
|---|---|
| Tool | 6 mm Allen Key bit |

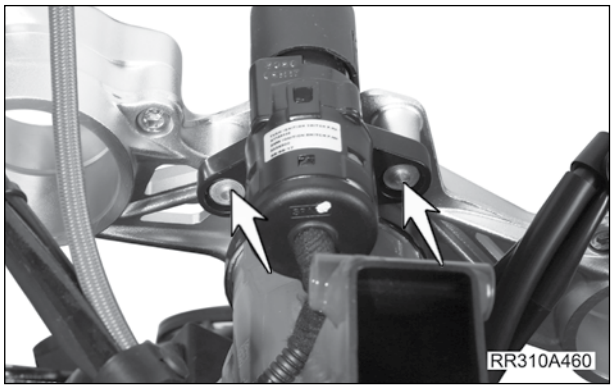
- Remove the grommet and remove the steering adjustor bolt.

| | |
|---|---|
| Tool | 8 mm Allen Key bit |
| Torque | 38 Nm |

- LIft the bracket up and clear off the vehicle.




- Mount the bracket on a vice and drill the ignition lock barrel mounting screws. Replace with new one.




- Installation is the reverse of removal procedure.
- Adjust steering play. Refer ***Steering play adjustment*** procedure.

## LOWER BRACKET

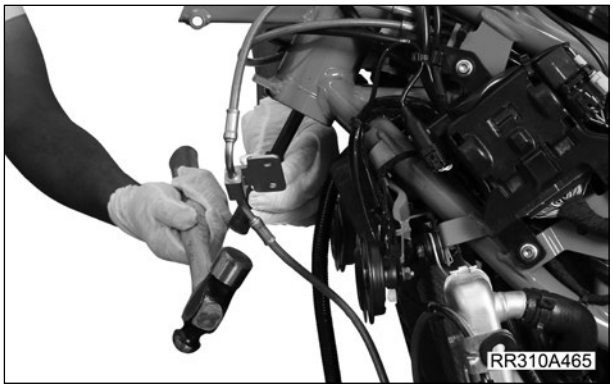
Component : Lower bracket
Component condition : Vehicle on ramp and component accessible
Objective : Lower bracket replace
Repair cycle : As required

**Remove**

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove Front upper bracket. Refer ***Front upper bracket removal*** for procedure.
- Remove front suspension. Refer Front ***Suspension replace*** procedure.
- Remove the handle bar. Refer ***Handle replace***

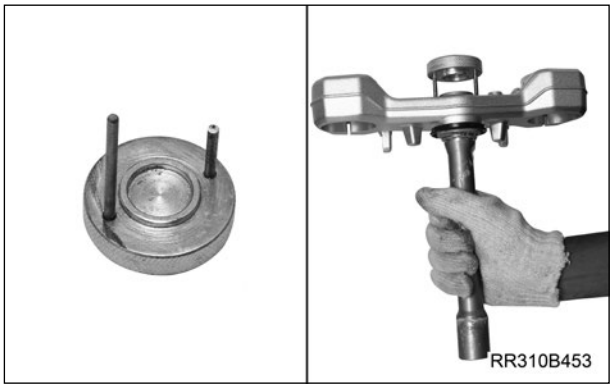
| Tool | NB310030 |
|---|---|






- Remove the steering cone from the handle.

| Tool | NB310020 |
|---|---|

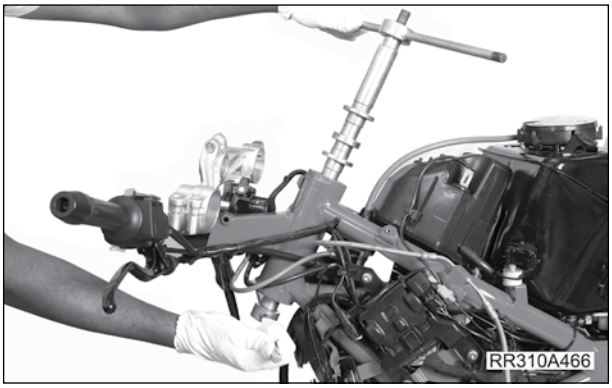


procedure.

- Remove the bearing from the chassis.

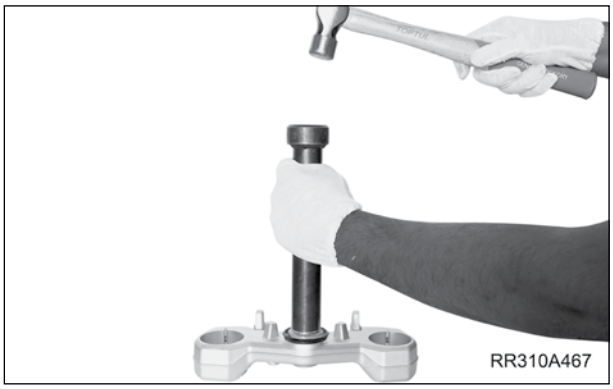
**Installation**

| | |
|---|---|
| Tool | NB310030 |
| Tool | NB310020 |




**NOTE**

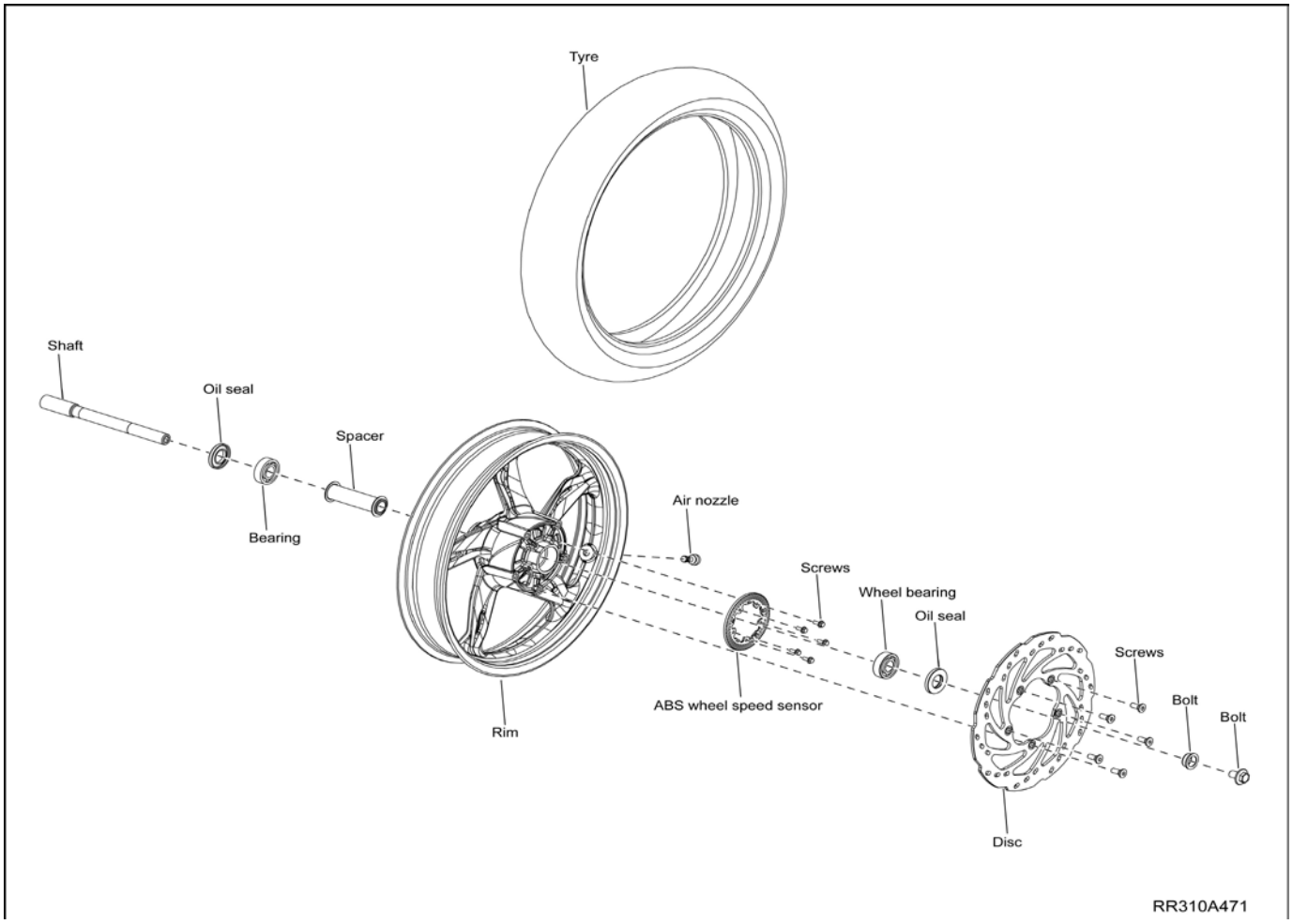
Do not tighten the clamping bolt 1 and adjusting screw. This will be done when adjusting the steering-head bearing play.




- Insert new bearings into the chassis.
- Install the handle bar. Refer ***Handle replace*** procedure.
- Check for the handle play. Refer ***Handle play check*** procedure.

## FRONT BRAKE DISC

Component : Front brake disc
Component condition : Vehicle on ramp and component accessible
Objective : Front wheel disc check and replace
Repair cycle : Front wheel disc must be checked at every 6,000kms and must be replaced at 30,000kms.




**Removal**

- Park the vehicle on the Front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Measure the thickness of the disc plate at atleast 4 different positions.
- If the measured thickness is less than recommended value, then replace the front brake disc.
- Remove front wheel. Refer ***Front wheel removal*** procedure.
- Remove mounting screws (X5) and lift the disc.

| | |
|---|---|
| Tool | 6 mm Allen Key |
| Torque | 32 Nm |
| Loctite | Loctite 243 |


**Installation**

- Installation is the reverse of removal.
- Tighten the mouting screws in a diagonal pattern.

## BRAKES BLEEDING - FRONT

Component : Front and rear brakes
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : Whenever required

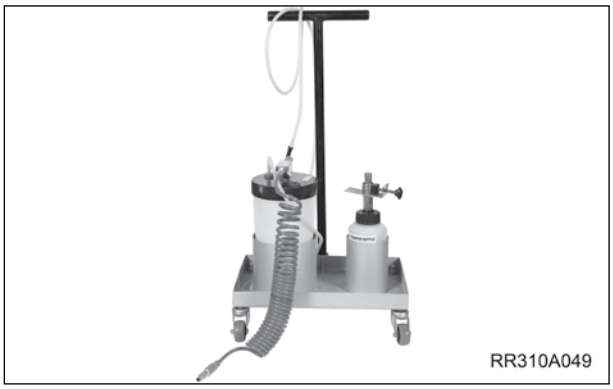
**CAUTION**

Cover all painted surfaces with suitable covers. Brake fluid may damage paint work. If brake fluid falls on any painted surface, wash immediately with water. Do not wipe it clean.

**NOTE**

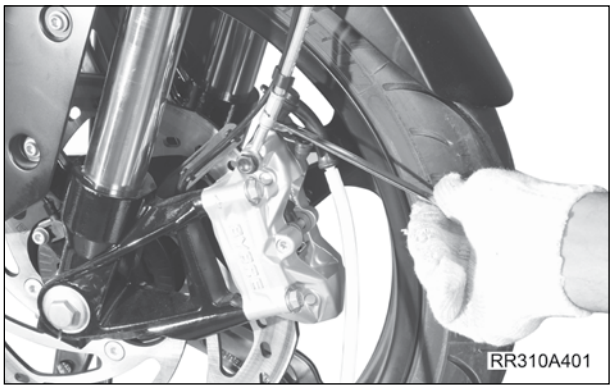
Use the recommended bleeding machine for bleeding procedure

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the dust cap from front brake caliper bleeding nipple.




- Insert a ring spanner on the bleeding nipple.

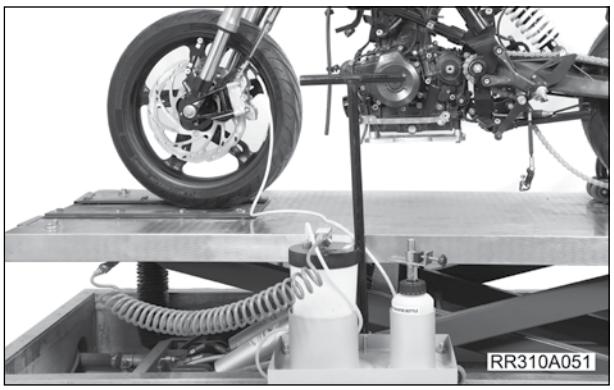
| | |
|---|---|
| Tool | 10 mm |




- Fix the caliper end of the bleeding machine to the bleeding nipple.

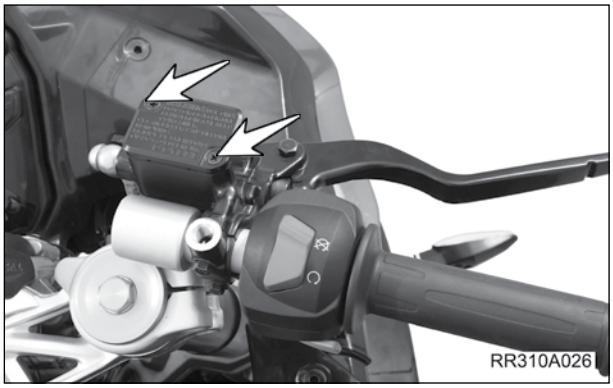
**NOTE**

Keep a tray below for any oil spills.



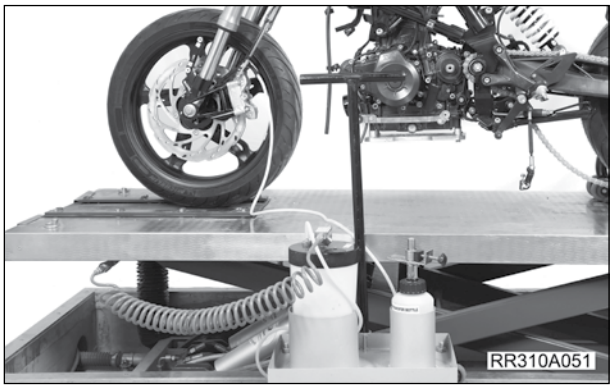
- Remove the screws from the front brake oil reservoir.

| | |
|---|---|
| Tool | Philips head screwdriver |

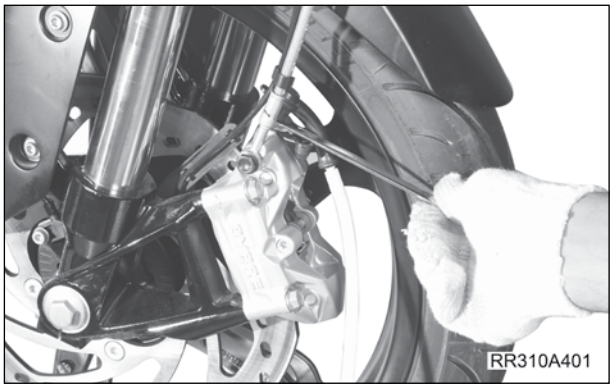



- Lift and remove the cap and the gasket.
- Fill the **Dot 4** Grade Brake Fluid oil till the upper permissible level in the reservoir.


- Connect the other end of the bleeding machine to the pneumatic pressure port.

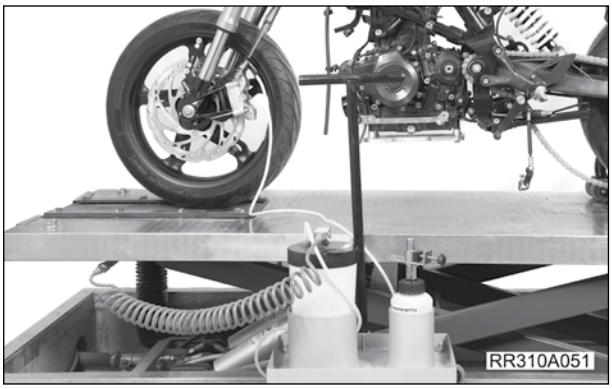



- Loosen the bleeding screw.



- Turn ON the nozzle lever on the bleeding machine.
- Fill the oil constantly into the reservoir.
- Turn the nozzle lever OFF on the machine if the fluid level in the reservoir goes dry.
- Allow the process to run till the oil coming from brake caliper will have no air bubbles.
- Once all the air bubbles have escaped tighten and lock the bleeding nut.

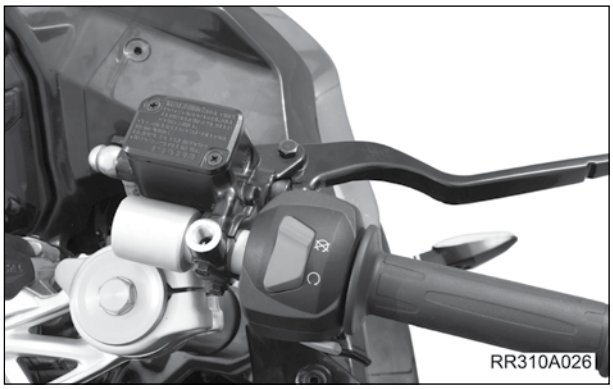
| | |
|---|---|
| Tool | 10 mm torx |




- Disconnect the caliper end of the bleeding machine.
- Fill the brake oil to permissible level. Check level in inspection window.
- Operate the front brake lever 4-5 times and ensure all the air bubbles in reservoir are escaped.
- Install the brake oil reservoir cap.


- Install the screws.

| | |
|---|---|
| Tool | Philips head screwdriver |




- Fix the rubber dust cap on the bleeding nipple.
- Check for the smooth operation of the front brakes.

**CAUTION**

Wipe off all oil from the floor and ramp. Oil is slippery and may cause injury/death.

# REAR WHEEL DISK

Component : Rear wheel disk
Component condition : Vehicle on ramp and component accessible
Objective : Rear wheel disk check and replace
Repair cycle : Rear wheel disk must be checked at every 6,000kms and must be replaced at 30,000kms.

**Removal**

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Measure the thickness of the disc plate at atleast 4 different positions.
- If the measured thickness is less than recommended value, then replace the rear wheel disc.
- Remove Rear wheel. Refer ***Rear wheel removal*** procedure.
- Remove mounting screws (X5) and lift the disc.

| | |
|---|---|
| Tool | 6 mm Allen Key |
| Torque | 32 Nm |
| Loctite | Loctite 243 |


**Installation**

- Installation is the reverse of removal.
- Tighten the mouting screws in a diagonal pattern.

## BRAKES BLEEDING - REAR

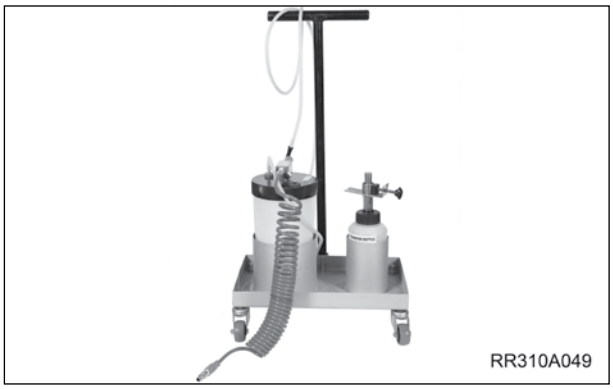
Component : Front and rear brakes
Component condition : Vehicle on ramp and component accessible
Objective : General service
Repair cycle : As required

**CAUTION**

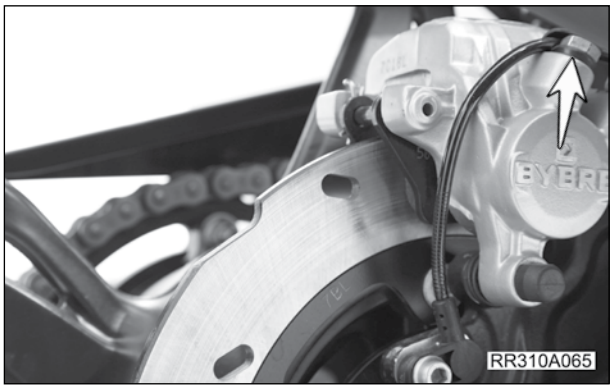
Cover all painted surfaces with suitable covers. Brake fluid may damage paint work. If brake fluid falls on any painted surface, wash immediately with water. Do not wipe it clean.

**NOTE**

Use the recommended bleeding machine for bleeding procedure




- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove the dust cap from rear brake caliper bleeding nipple.




- Insert a ring spanner on the bleeding nipple.

| | |
|---|---|
| Tool | 10 mm ring spanner |

- Fix the caliper end of the bleeding machine to the bleeding nipple.

**NOTE**

Keep a tray below for any oil spills.

- Remove the cap from the rear brake oil reservoir.
- Fill the **Dot 4 Grade Brake Fluid** oil till the upper permissible level in the reservoir.
- Connect the other end of the bleeding machine to the pneumatic pressure port.
- Loosen the bleeding screw.
- Turn ON the nozzle lever on the bleeding machine.

- Fill the oil constantly into the reservoir.
- Turn the nozzle lever OFF on the machine if the fluid level in the reservoir goes dry.
- Allow the process to run till the oil coming from brake caliper will have no air bubbles.
- Once all the air bubbles have escaped tighten and lock the bleeding nut.
- Disconnect the caliper end of the bleeding machine.
- Fill the brake oil to permissible level.
- Operate the rear brake lever 4-5 times and ensure all the air bubbles in reservoir are escaped.
- Fix the rubber dust cap on the bleeding nipple.
- Check for the smooth operation of the rear brakes.


| | |
|---|---|
| Tool | 10 mm torx |

**CAUTION**

Wipe off all oil from the floor and ramp. Oil is slippery and may cause injury/death.

## FRONT BRAKE PAD REPLACEMENT

**CAUTION**

Do not blow air to clean the pads. Brake pads contain harmful substances if inhaled. Always use a suitable mask before opening the pads.

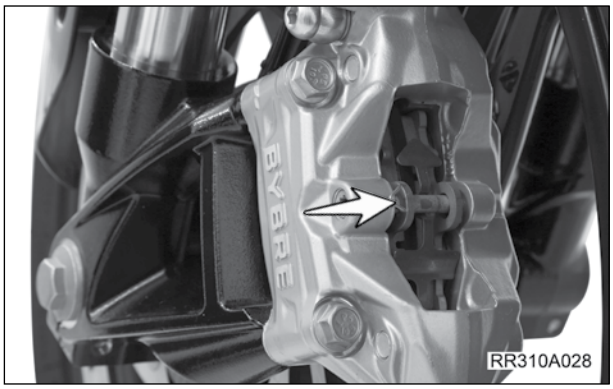
Replace the brake pad as a set. Braking performance will be adversely affected if brake pad is not replaced as a set. Always use TVS Genuine Parts for optimal performance.

**NOTE**

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

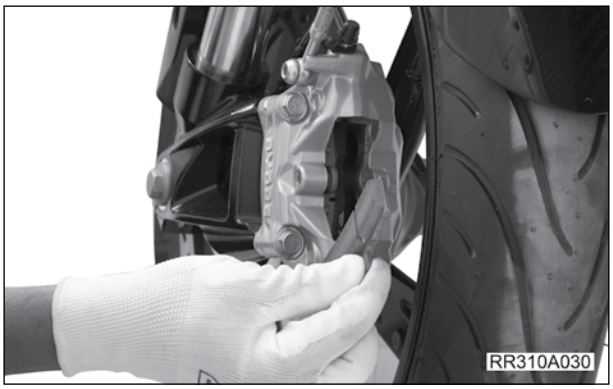
- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Pull out the lock spring from the caliper.
- Remove the bolt from the caliper.

| | |
|---|---|
| Tool | 25 mm torx |




- Release the clip.

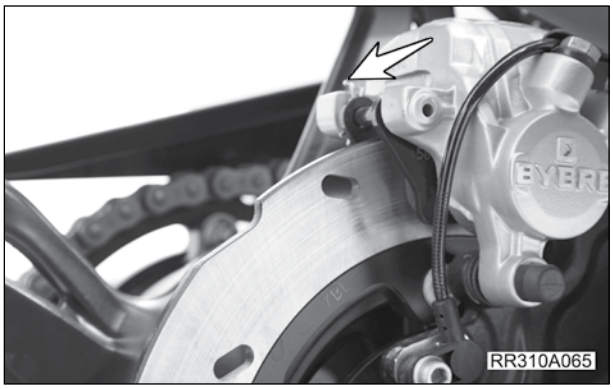

- Push the pads. They will fall off from the caliper.
- Installation is reverse the removal procedure.



## REAR BRAKE PAD REPLACEMENT

- Pull the lock pin out.
- Tap out the bolt from caliper.
- Pull out pads.
- Replace with new pads.
- Installation is reverse the removal procedure.

| | |
|---|---|
| Tool | ME99010595 |



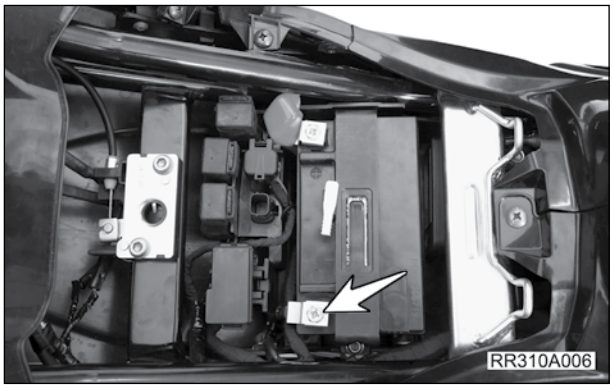
## MASTER CYLINDER FRONT AND REAR

Component : Brake master cylinder
Component condition : Vehicle on ramp and component accessible
Objective : Replace brake master cylinder
Repair cycle : As required

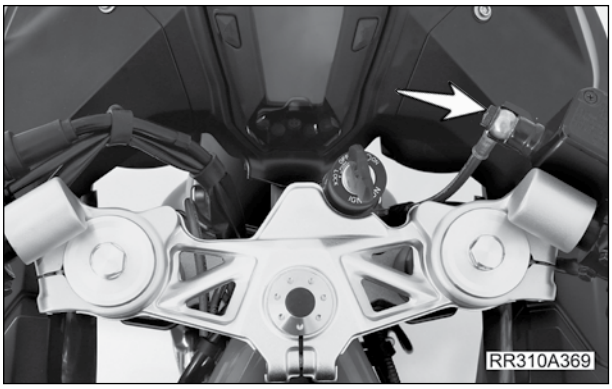
- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Drain the brake fluid from the respective reservoir by bleeding, on which side the master cylinder needs replacement.

**Front master cylinder**

- Disconnect the battery "-ve" cable connection.

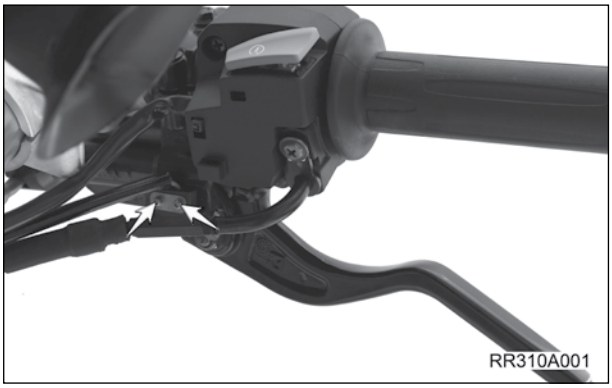



- Remove the front brake banjo bolt and washer.
- Cap all openings.



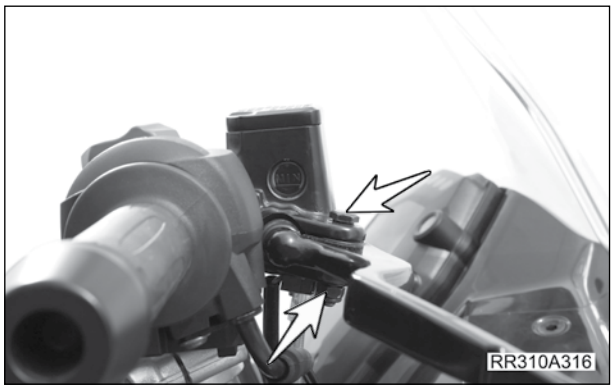

- Remove the front brake switch.

| | |
|---|---|
| Tool | 5 mm Allen key |



- Remove the front brake lever mounting bolt and nut.

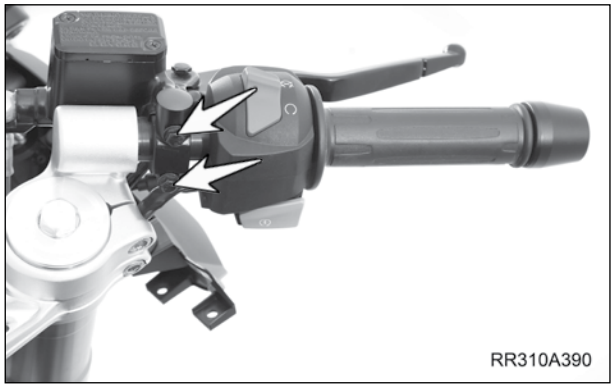
| | |
|---|---|
| Tool | 10 mm socket bit |
| Torque | 10 Nm |




- Remove the brake master cylinder mounting clamp.

| | |
|---|---|
| Tool | 10 mm socket bit |
| Torque | 10 Nm |

- Remove the brake master cylinder.

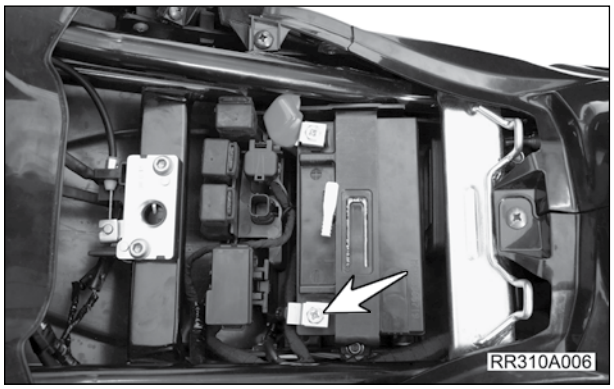



**Installation**

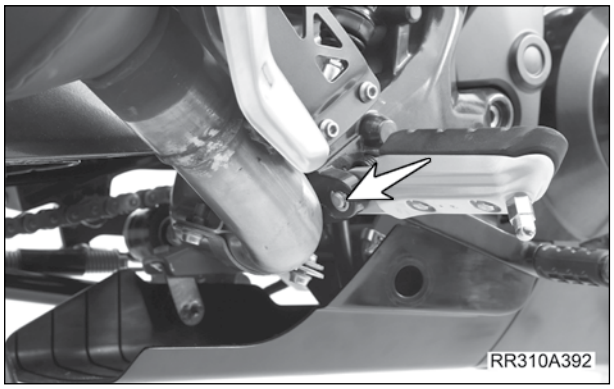
- Installation is reverse of removal.
- Perform brake bleeding. Refer ***Brake bleeding*** for procedure.

**Rear master cylinder**

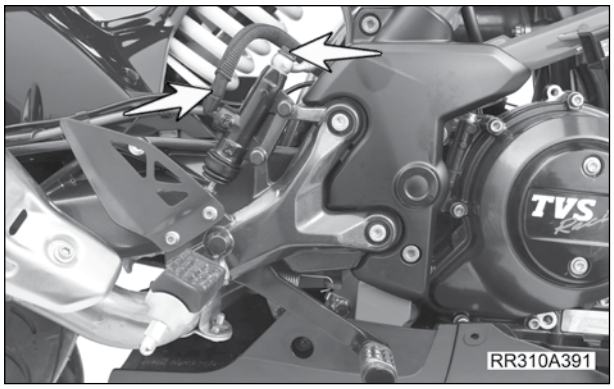
- Disconnect the battery "-ve" cable connection.




- Remove the circlip and pull the clevis pin out.
- Keep the front RH footpeg assembly aside.

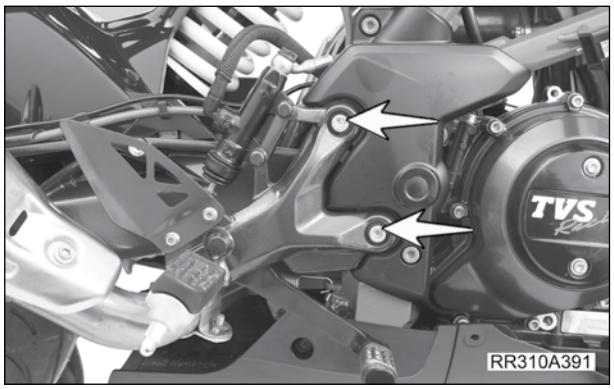


- Remove the rear brake banjo bolt and washer.
- Remove the return pipe.
- Cap all openings.




- Remove the footpeg bracket.

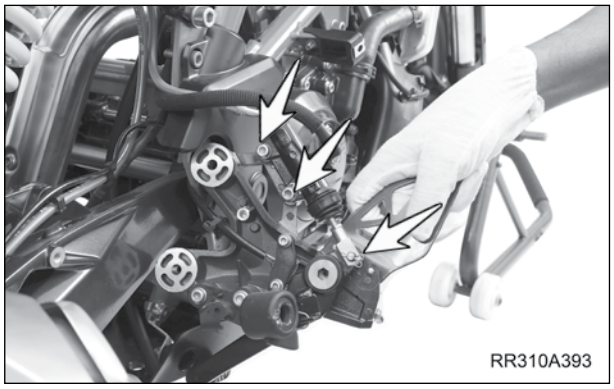
| | |
|---|---|
| Tool | 10 mm Allen Key bit |




- Remove the brake master cylinder mounting bolts and split pin.

| | |
|---|---|
| Tool | 10 mm Allen Key bit |

- Remove the brake master cylinder.




**Installation**

- Installation is reverse of removal.
- Perform brake bleeding. Refer ***Brake bleeding*** for procedure.

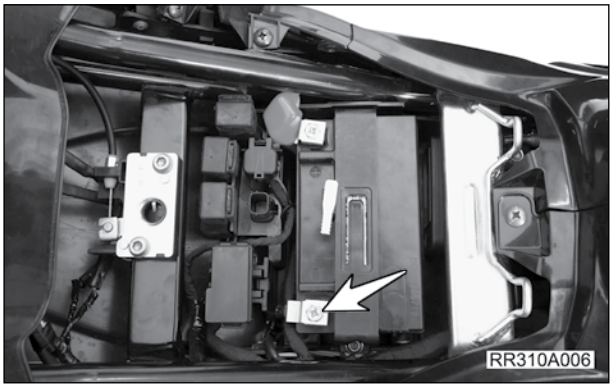
## BRAKE CALIPER ASSEMBLY - FRONT AND REAR

Component : Brake caliper assembly
Component condition : Vehicle on ramp and component accessible
Objective : Brake caliper assembly replace
Repair cycle : As required

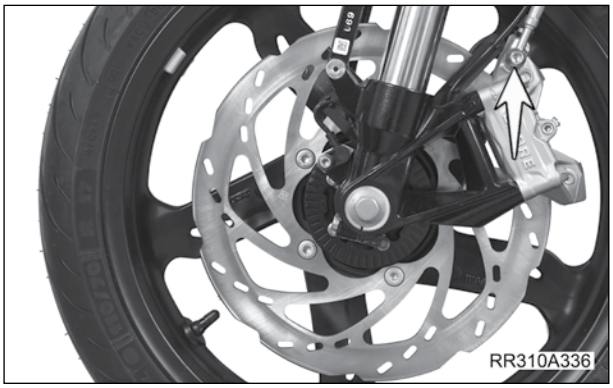
- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Drain the brake fluid from the respective reservoir by bleeding, on which side the master cylinder needs replacement.

**Front brake caliper**

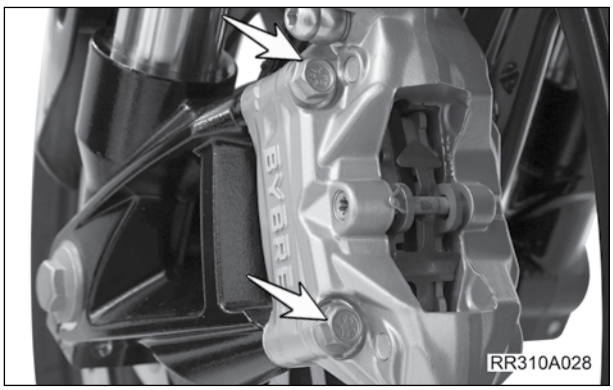
- Disconnect the battery "-ve" cable connection.




- Remove the banjo bolt and washer at caliper end.
- Cap all openings.




- Remove caliper mounting bolts and remove the calpier assembly out.



**Installation**

- Installation is reverse of removal.

**Torque sequence**

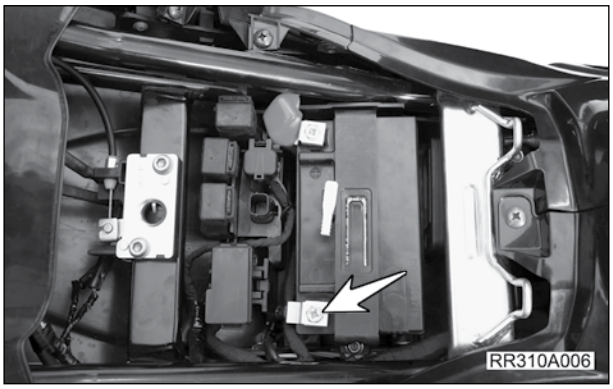
| Condition | Torque |
|---|---|
| Actuate front brake lever 5 times and hold | 28 Nm |
| Top and bottom mounting bolt | 28 Nm |
| Release brake lever | |
| Top and bottom mounting bolt | 28 Nm |

- Perform brake bleeding. Refer ***Brake bleeding*** for procedure.

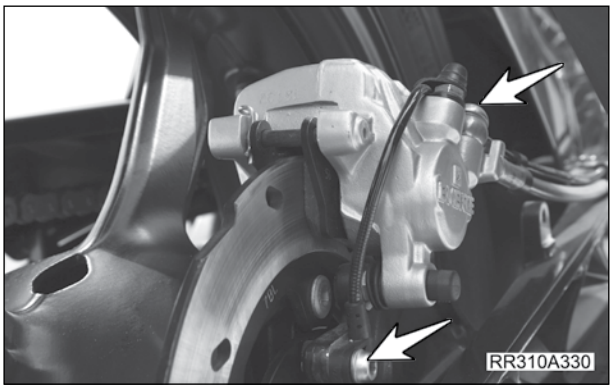
- Park the vehicle on the front paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Drain the brake fluid from the respective reservoir by bleeding, on which side the master cylinder needs replacement.

**Rear brake caliper**

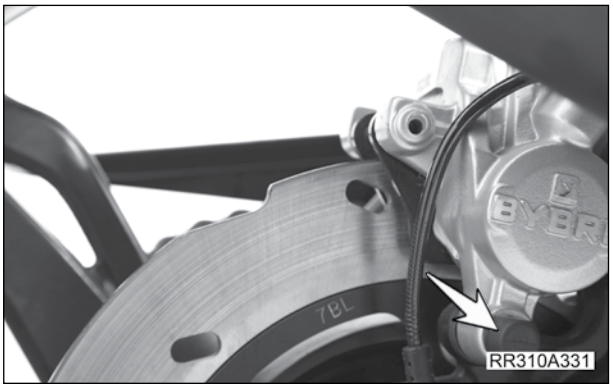
- Disconnect the battery "-ve" cable connection.




- Remove the banjo bolt and washer at caliper end.
- Remove wheel speed sensor.
- Cap all openings.



- Remove the dust cover and the mounting pin. Lift the caliper clear off the vehicle.




**Installation**

- Installation is reverse of removal.
- Perform brake bleeding. Refer ***Brake bleeding*** for procedure.

# BRAKE LINES

| | |
|---|---|
| Component | : Brake Lines |
| Component condition | : Vehicle on ramp and component accessible |
| Objective | : Precautions |
| Repair cycle | : As required |

**Precautions to be followed when replacing brake lines**

**CAUTION**

Cover all painted surfaces with suitable protection when working with brake fluid. Wipe any brake fluid immediately that may have spilled.

- Replace brake lines individually incase of damage or leakage.
- Always replace the banjo washers and bolts when installing brake lines.
- Perform brake bleeding on both the wheels irrespective of whichever line is replaced. Refer Brake bleeding procedure.
- Always use brake fluid from a sealed container only. Do not reuse old brake fluid.
- Use TVS genuine parts only.

**Installation**

- Clean the bearing seats.

**NOTE**

Install the bearings with their sealed sides face out.

- Install the RHS bearing using suitable pressing tool.
- Install the circlip and shaft seal.
- Install the bush with the shoulder down.
- Repeat the procedure for installing LHS bearing.

## HYDRAULIC ELECTRONIC CONTROL UNIT

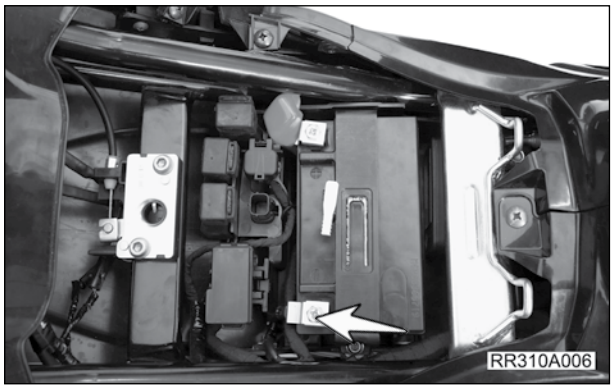
Component : Hydraulic Electronic Control Unit
Component condition : Vehicle on ramp and component accessible
Objective : Hydraulic Electronic Control Unit replace
Repair cycle : Hydraulic Electronic Control Unit must be replaced whenever required

**NOTE**

Remove the brake fluid (front and rear) by bleeding. Discard the brake fluid. Do not reuse.

**Replace**

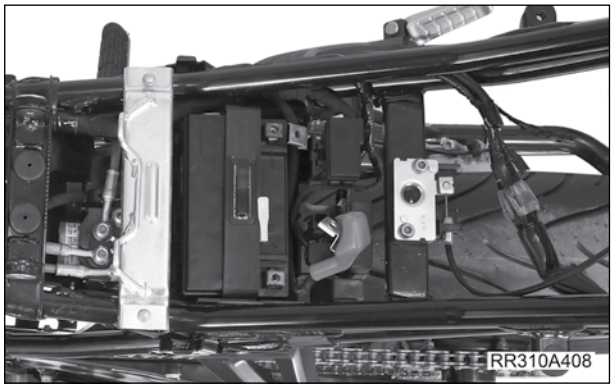
- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove seats. Refer ***Seats removal*** procedure.
- Remove Fuel tank cover. Refer ***Fuel tank cover removal*** procedure.
- Remove Fuel tank assembly. Refer ***Fuel tank assembly*** procedure.



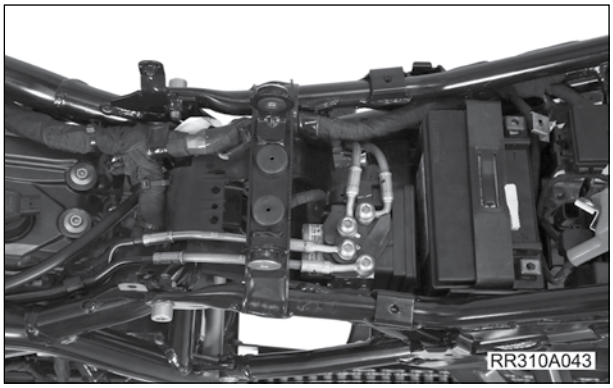

- Disconnect the battery terminals.

- Remove the locking plate bolts (X2).

| | |
|---|---|
| Tool | 8 mm socket bit |
| Torque | 6 Nm |

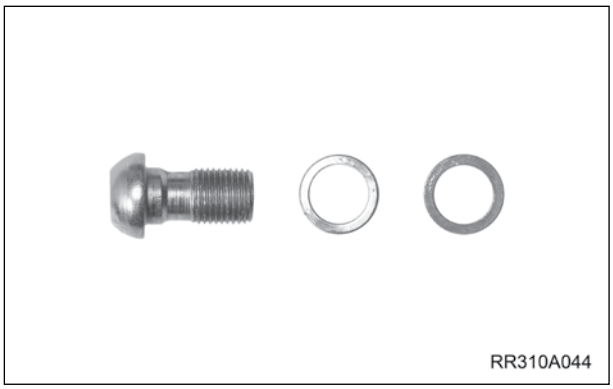


- Remove the Banjo bolts (X4) and washers (X8) on the HECU.

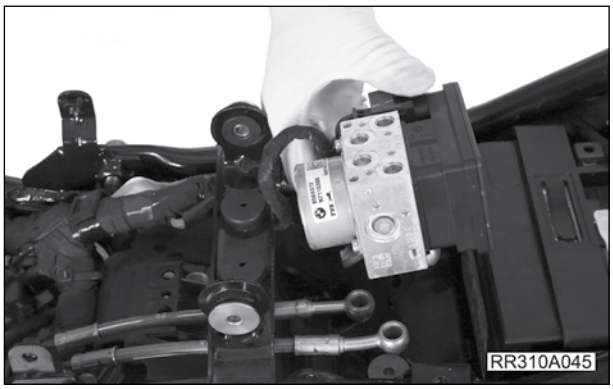



**NOTE**

Loosen the clamps for the brake tubes. Do not bend the tubes to remove the banjo or the HECU unit.




- Lift the HECU out and disconnect the electrical connector.
- Close all openings with a suitable cap.




**NOTE**

Brake fluid will spill when the brake tubes are disconnected. Plug the openings immediately and wipe the spilled fluid. Pour the fluid in the HECU unit into a container and dispose. Do not reuse the brake fluid.

- Installation is reverse the removal procedure.
- Bleed both brakes till new fluid comes out.
- Refer ***Brake Bleeding*** for procedure.
- Connect ***TVS Ride Scan Tool*** and run diagnostics.

# ELECTRICAL SYSTEM

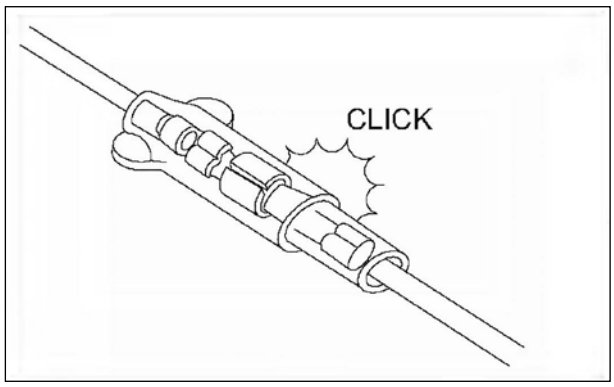
**Wiring Color Code Index**

| S.NO | CODE | WIRE COLOR |
|---|---|---|
| 01 | B | BLACK |
| 02 | BBr | BLACK WITH BROWN TRACER |
| 03 | BG | BLACK WITH GREEN TRACER |
| 04 | Bl | BLUE |
| 05 | BIB | BLUE WITH BLACK TRACER |
| 06 | BIW | BLUE WITH WHITE TRACER |
| 07 | BOr | BLACK WITH ORANGE TRACER |
| 08 | BR | BLACK WITH RED TRACER |
| 09 | Br | BROWN |
| 10 | BrBI | 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 | OrBI | 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 |

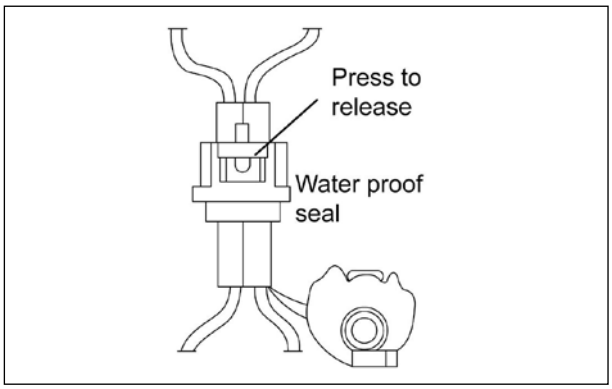
**Connector**

- When connecting a connector, be sure to push it in until a click sound is felt.
- Inspect connector for corrosion, contamination and breakage on its cover.
- Use TVS Ride Scan Tool for diagnostics.



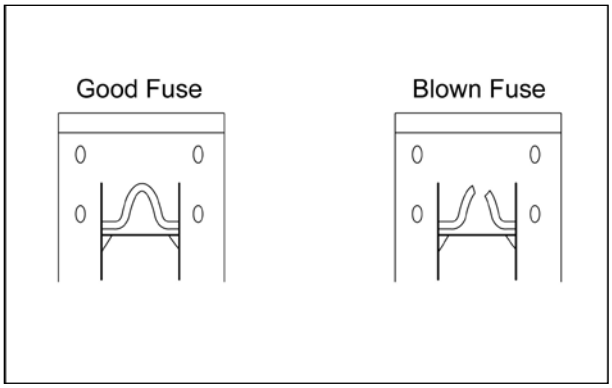

**Coupler**

- 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.
- 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. Ensure the presence of water proof seals in the couplers before reconnecting them.
- Use TVS Ride Scan Tool for diagnostics.



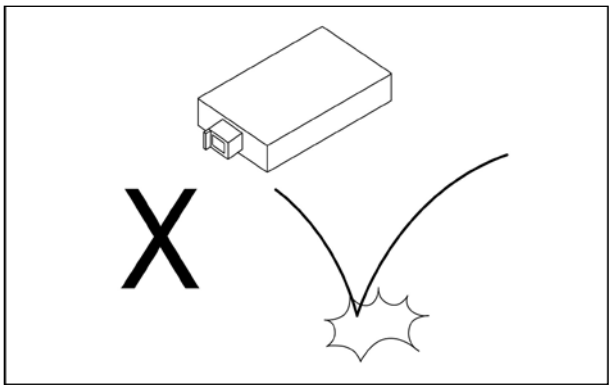

**Fuse**

- When a fuse blows, always investigate the cause, correct it and then replace the fuse.
- 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.
- Use TVS Ride Scan Tool for diagnostics.



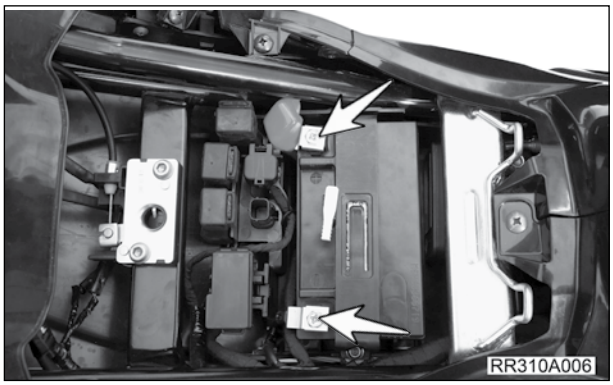

**Semiconductor equipped part**

- Be careful not to drop the parts with a semiconductor built in such as ECU unit, regulator cum rectifier and others.
- When inspecting these parts, follow the inspection instruction strictly. Neglecting proper procedure may cause damage to these parts.
- Follow ESD system to avoid ECU short circuit.



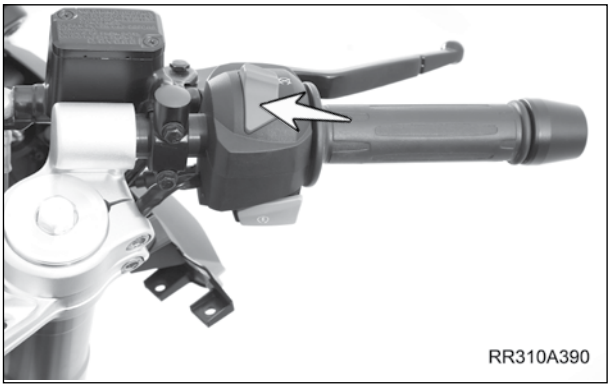
**Connecting Battery**

- 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.




**Engine Kill Switch**

- Engine kill switch is located at the right side handle bar assembly on the switch assembly handle RH.
- Disconnect the switch assembly handle RH coupler from main wiring harness and inspect the switch for continuity with multimeter.




| Tool | Multimeter |
|---|---|

| Lock Position | BW | BGr |
|---|---|---|
| PRESS UP (⊠) | | |
| PRESS DOWN (↺) | O——O | |

- Use TVS Ride Scan Tool for diagnostics.

**Checking the Stator Assembly with Multimeter**

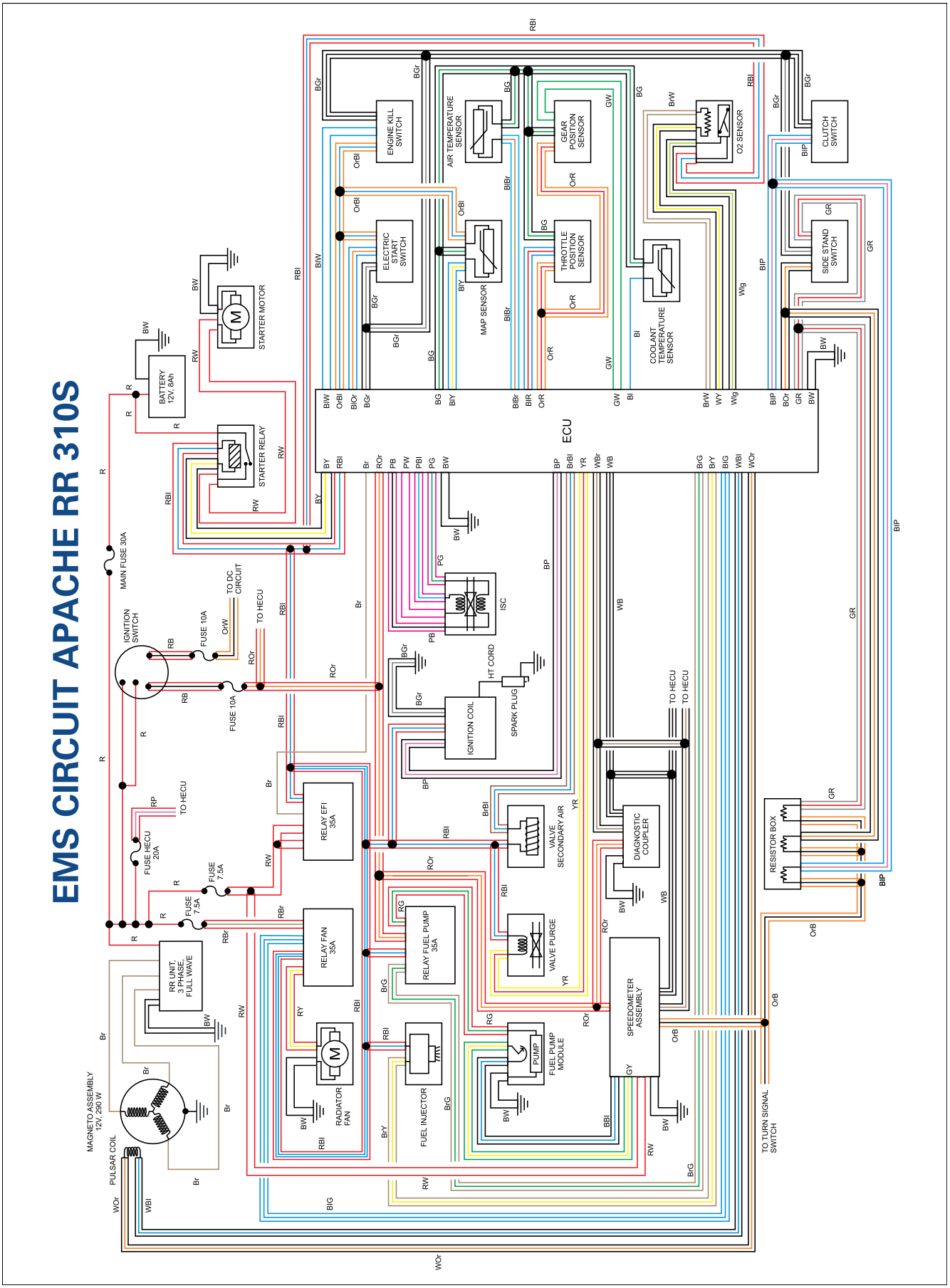
- Since there is a 3 phase magneto assembly used in this vehicle, the stator assembly checking procedure is entirely different from other vehicles. The resistance of the stator assembly is to be checked between all the three phases. Follow the procedure given below:
- Disconnect the stator assembly coupler from the main wiring harness.
- Use TVS Ride Scan Tool for diagnostics.
- Set the multimeter knob at 200 ohms position.

| Tool | RMS Multimeter |
|---|---|

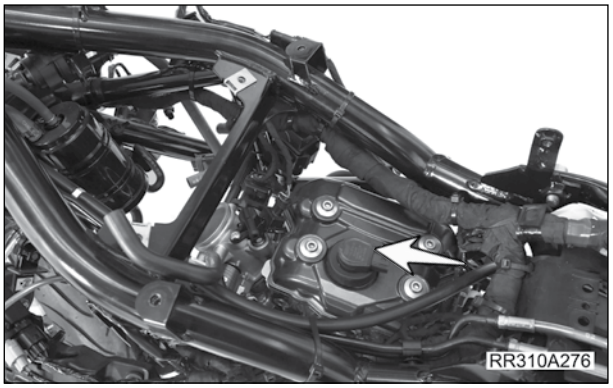
- There are three yellow wires (Y) coming out of the stator assembly. Connect the multimeter (+ve) lead to the first yellow wire (Y) and (-ve) lead to second yellow wire (Y) and measure the resistance.
- Similarly, check the resistance between second and third yellow wires. Also the third and first yellow wires. If any one phase resistance is not within the limit, replace the magneto stator assembly.

| Resistance across any two phase | 0.152 to 0.228 ohms |
|---|---|

# EMS CIRCUIT APACHE RR 310S



**Checking the Ignition Coil Assembly with Multimeter**




- The ignition coil is mounted on the cylinder head.
- Disconnect the wiring socket connecting the ignition coil.

| Tool | Multimeter |
|---|---|

- Connect the multimeter's '+ve' and '-ve' lead to the terminals of the ignition coil coupler to measure the primary winding resistance. If the resistance is not within the specified limit, replace the ignition coil assembly with a new one.

| Primary resistance | 0.6 to 1.3 ohms |
|---|---|

- If primary winding resistance is not OK, then change the ignition coil.
- Use TVS Ride Scan Tool for diagnostics.

**Checking the Pulsar Coil with Multimeter**

| Tool | Multimeter |
|---|---|

- Set pocket tester at 200 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.
- Measure the resistance. If resistance measured is not within the specified limit, replace pulsar coil with a new one.

| Pulsar coil (Br-W) | 104 to 156 ohms |
|---|---|

**Coolant Temperature Sensor**


- The coolant temperature sensor is fixed on the cylinder block to sense the coolant temperature and give input to the ECU in the form of resistance. Check the resistance of the sensor in the following manner:
- Set the multimeter at 20k ohms position.

| Tool | Multimeter |
|---|---|

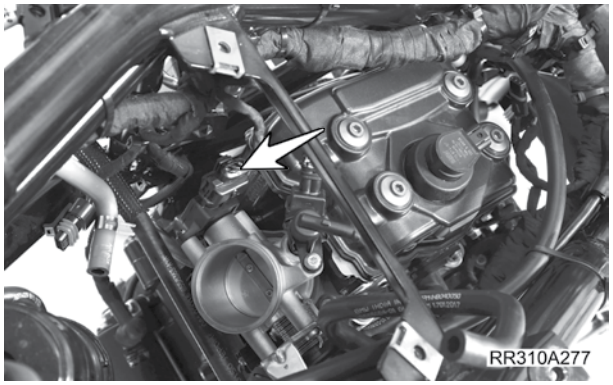
- Disconnect the thermal sensor coupler from main wiring harness. Connect the multimeter's '+ve' lead to the brown red (BrR) wire and '-ve' lead to the white red (WR) of the thermal sensor coupler and measure the resistance when engine is at room temperature.

| | |
|---|---|
| Resistance | 2.45 ± 0.16 K ohms |

- If the resistance measured is not within the specified limit, replace the sensor with a new one.
- Use TVS Ride Scan tool for diagnostics.

**Throttle position sensor (TPS)**

- A throttle position sensor gives position of the throttle to the ECU in the form of variable resistance. Check the voltage of the throttle position sensor in the following manner.
- Disconnect the TPS coupler from main wiring harness. Connect the multimeter's +ve lead to the pin no. 3 and -ve lead to the pin no. 1 of the throttle position sensor coupler and measure the voltage when engine is in cold condition.
- Set the multimeter at 0 to 5V range.
- Use TVS Ride Scan tool to determine the throttle position and output voltage.

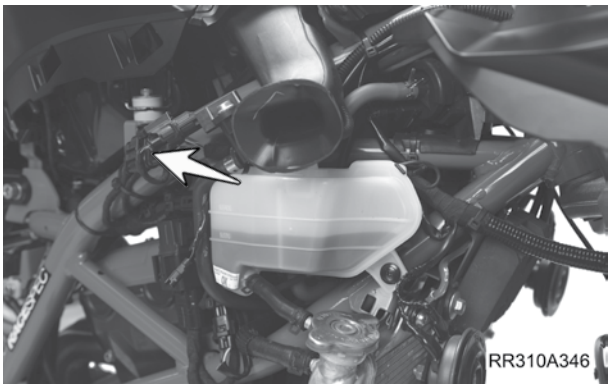



| | |
|---|---|
| Tool | Multimeter / Diagnostic tool |

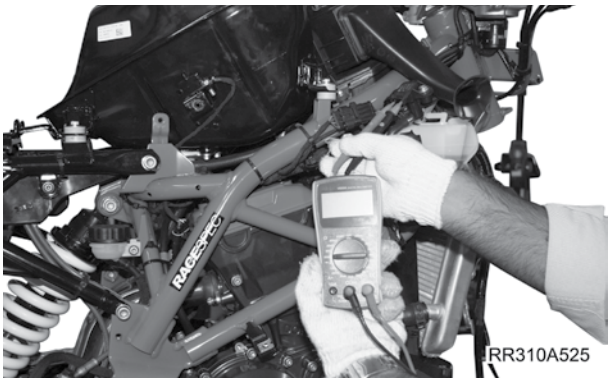
| | |
|---|---|
| Voltage | |

**Manifold Absolute Pressure Sensor (MAP) and Manifold Absolute Temperature Sensor (MAT)**

- The MAP sensor is used to find the pressure in the combustion chamber and the pressure difference is given to ECU in the form of voltage.
- The MAT sensor is used to find the temperature of the air in the manifold and the temperature is given to ECU in the form of resistance. Check the resistance of the MAT sensor in the following manner:
- Disconnect the MAT coupler from main wiring harness. Connect the multimeter's '+ve' lead to the pin no. 1 and '-ve' lead to the pin no. 2 of the MAT sensor coupler and measure the resistance when engine is in cold condition.
- Set the multimeter at 200k ohms position.




| | |
|---|---|
| Tool | Multimeter |
| MAT Resistance | 2.725 to 2.865 k ohms |

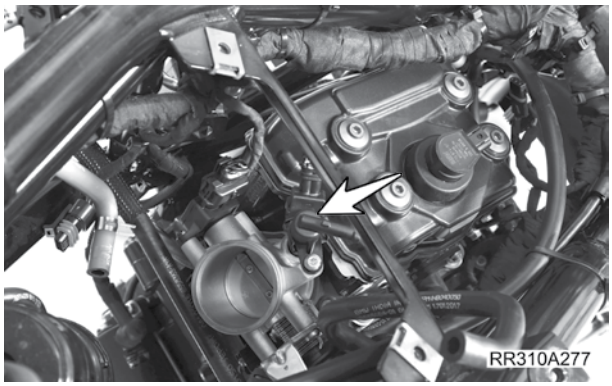



- Use TVS Tide Scan Tool for checking the MAP sensor.

| | |
|---|---|
| Tool | Diagnostic Tool |
| MAP Voltage | 3.4 to 3.8 V |
| Engine on condition | Sinusoidal fluctuation of vlotage |

**Fuel Injector**

- The fuel injector is used to inject the fuel into the combustion chamber based on the signal from the ECU. Check the resistance of the fuel injector in the following manner:
- Disconnect the fuel injector coupler from main wiring harness. Connect the multimeter's +ve lead to the brown yellow (BrY) wire and -ve lead to the red blue (RBI) wire of the fuel injector coupler.
- Set the multimeter at 200 ohms position.
- Use TVS Tide Scan Tool for diagnostics.

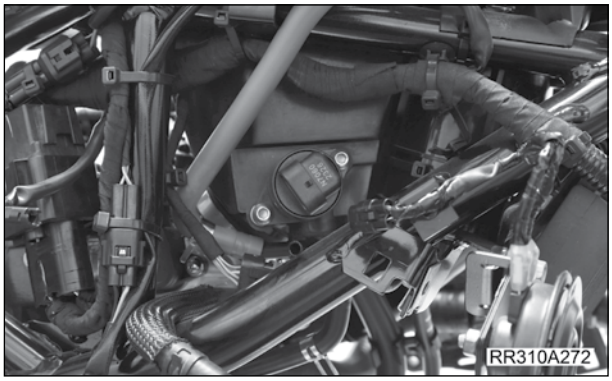



| | |
|---|---|
| Tool | Multimeter |

| | |
|---|---|
| Resistance | 12 ohms |

**Idle air control valve (IACV)**

- The Idle air control valve control the amount of air flow into the combustion chamber based on the ECU signals. Check the resistance of the fuel injector in the following manner:
- Disconnect the IACV coupler from main wiring harness. Connect the multimeter's +ve lead to the pink green (PG) wire and -ve lead to the black brown (BlBr) wire of the IACV coupler and also check the blue green (BG) wire.
- Set the multimeter at 200k ohms position.




| | |
|---|---|
| Tool | Multimeter |

| | |
|---|---|
| Resistance | 45.9 to 56.1 ohms |

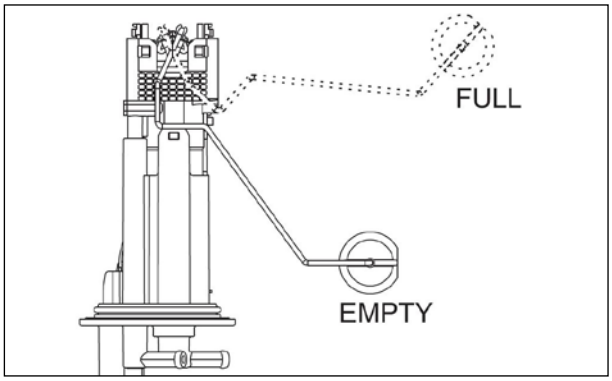
**Fuel pump module**

- The fuel pump module is fitted in the fuel tank, used to pressurize the fuel available in the fuel tank and supplied to the fuel injector. The fuel pump is also fitted with fuel gauge.
- The fuel pump module consits of two parts: Fuel Sensor and Fuel pump.

**Fuel Sensor**

- Check by visual inspection for damages.
- Check if the wiper arm is in contact with the resistor track.
- Measure resistance value for resistor pads:

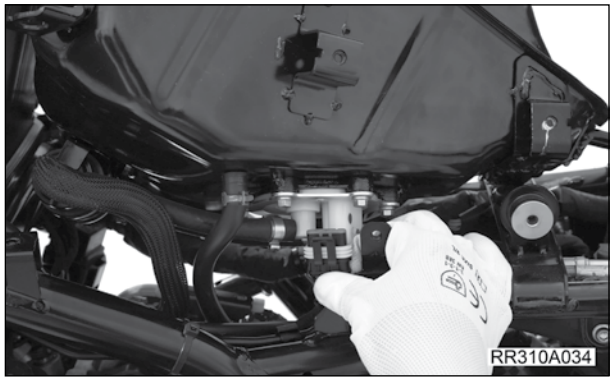
| | |
|---|---|
| Tool | Multimeter |
| Empty Condition | 19 ohms |
| Full Condition | 301 ohms |



**Fuel Pump**

- Check by visual inspection for damages.
- Check for supply by actuating the fuel pump via diagnostic tool.

| Tool | Diagnostic Tool |
|---|---|
| Reading at actuation | 2.2 A @12V DC |



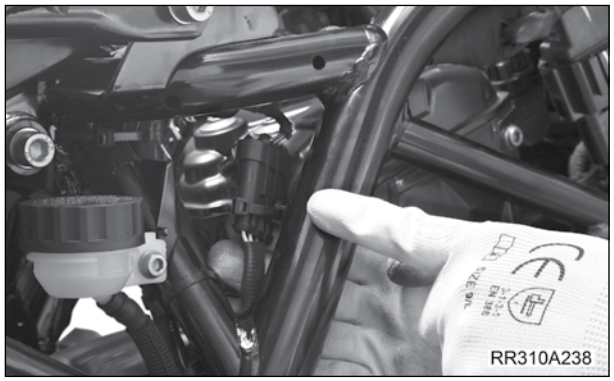

**0xygen Sensor**

- A oxygen sensor is fitted on muffler assembly is used to measure the amount the unburnt fuel coming out the combustion chamber. Check the resistance of the oxygen sensor in the following manner:
- Disconnect the oxygen sensor coupler from main wiring harness. Connect the multimeter to the brown and white wires.

| Tool | Multimeter |
|---|---|
| Heater resistance | 9 ohms |

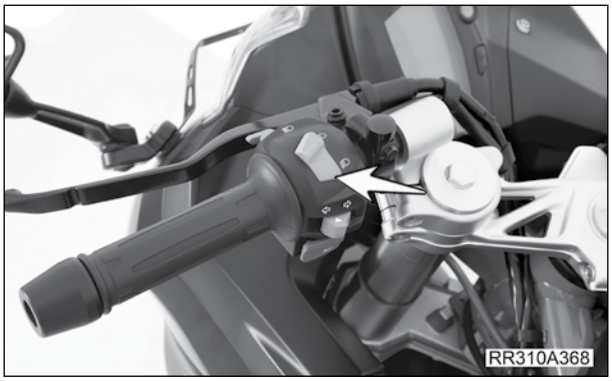
- Connect TVS Ride Scan Tool and check closed loop function.

| Tool | Diagnostic Tool |
|---|---|
| In closed loop condition -signal | Square wave fluctuation between 0.1 to 0.8V |

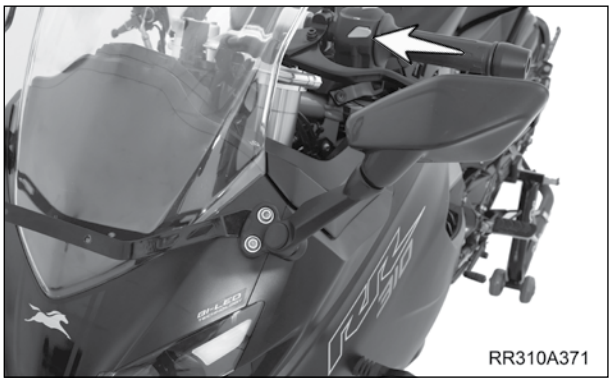



**Switch Beam Control**

- Switch beam control is provided on the switch assembly LH on the left hand side of the handle bar.
- Check the switch for continuity with the multimeter. Set multimeter at DC 20V range.
- Disconnect the Beam Switch connector.
- Switch on the ignition Connect multimeter + ve lead to Orange with White Tracer (OrW) of beam control switch and –ve lead to battery negative terminal or body ground.
- The voltage should be 12.0 ± 0.5 Volt in static condition or Ignition ON condition.
- The voltage should be 14.1 to 14.65 in engine ON condition.
- If the voltage is not to the specification check fuse-10A. If fuse is ok, replace the switch.
- If the voltage is not to the specification, replace beam control Switch.



**Pass-By Switch**



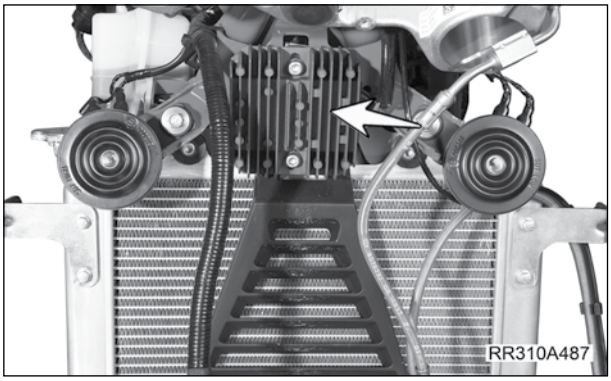

- Pass-by switch is provided on the switch assembly handle LH on the left side of the handle bar.
- Check the switch for continuity with the multimeter.
- Set multimeter at DC 20V range.
- Disconnect the Pass By Switch connector.
- Switch on the ignition Connect multimeter '+ ve' lead to Orange with White Tracer (OrW) of Pass by switch and '–ve' lead to battery negative terminal or body ground.
- The voltage should be 12.0 ± 0.5 Volt in static condition or Ignition ON condition.
- The voltage should be 14.1 to 14.65 in engine ON condition.
- If the voltage is not to the specification check Fuse 10A.
- Connect the Pass-By switch connector with Ignition ON and check the voltage with multimeter

| Switch Position | OrW | V |
|---|---|---|
| PRESS-ON | 12.0 ± 0.5 Volt | 12.0 ± 0.5 Volt |
| PRESS-OFF | 12.0 ± 0.5 Volt | 0 Volt |

- If the voltage is not to the specification replace Pass By Switch

**12V Regulation System**

**Regulator and Rectifier (RR UNIT)**




- The RR unit (regulator and rectifier) is fitted below the rear seat assembly near the tail lamp assembly.
- The RR unit consists as the name implies, regulator which regulates the voltage between 14.1V to 14.6V at any RPM and any load. Rectifier used for converting AC current to DC for charging and other purpose.
- Use TVS Ride Scan Tool for diagnostics.

**Horns (12V DC)**

- Set multimeter at DC 20V range.
- Disconnect the Front Brake Switch connector.
- Switch on the ignition. Connect multimeter '+ ve' lead to Green wire (G) of horn switch and '–ve' lead to battery negative terminal or body ground.
- The Voltage should be 12.0 ± 0.5 Volt
- If the voltage is not to the specification, check Voltage at "Horn RH and LH" Green wire (G).

- The Voltage should be 12.0 ± 0.5 Volt
- If the voltage is to the specification, check for open circuit between "Horn RH and LH" connector Green wire (G) and "Horn switch" connector Green wire (G).
- Use TVS Ride Scan Tool for diagnostics.

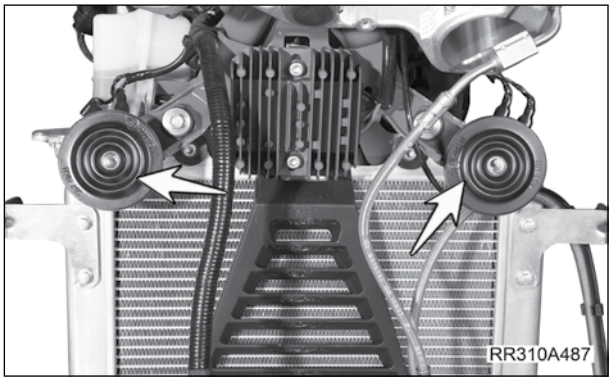
**Checking open circuit procedure between Horn and Horn switch**

- Disconnect the battery '-ve' terminal wait for two min and then disconnect the Horn RH and Horn switch connectors
- Set multimeter at 200 ohms position and check the resistance between Horn RH connector and Horn switch. Connect multimeter '+ve' lead to Horn LH Green wire (G) and '-ve' lead to Horn switch Green wire (G)
- If the resistance value is more than 5 ohms replace the wiring harness.
- Set multimeter at DC 20V range.
- Disconnect the Horn RH connector, With Ignition on Connect multimeter '+ ve' lead to Orange with White Tracer wire (OrW) of horn and '–ve' lead to battery negative terminal or body ground.
- The Voltage should be 12.0 ± 0.5 Volt
- If the voltage is not to the specification check Fuse 10A.
- Repeat procedure for LH connector.
- With Ignition off disconnect the battery '-ve' terminal wait for two min and disconnect the Horn Switch connector.
- Set multimeter to 200 ohms and check the resistance between Horn switch Black with White Tracer and ground.
- Connect multimeter '+ ve' lead to Black with White Tracer wire (BW) of horn switch and '–ve' lead to body ground.
- If the resistance is equal to zero ohms ground is ok and if the resistance is very high 10k ohms ground is open check the ground and rectify it.
- Connect the Horn switch connector with Ignition on.
- Check the voltage with multimeter

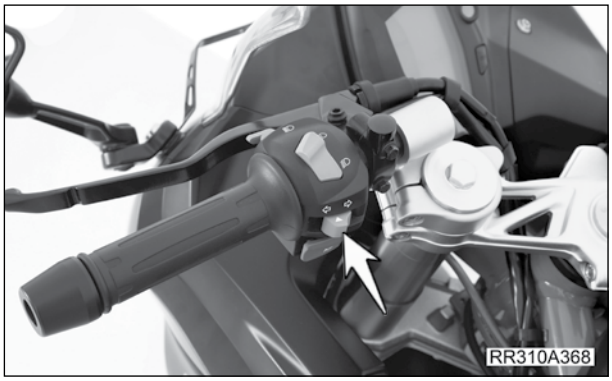
| | |
|---|---|
| Tool | Multimeter |

| Switch Position | G | BW |
|---|---|---|
| PRESS-ON | 0 Volt | 0 Volt |
| RELEASE-OFF | 12.0 ± 0.5 Volt | 0 Volt |

If the voltage is not to the specification, replace horn switch. Use TVS Ride Scan Tool for diagnostics.



**Turn Signal Lamps Front and Rear**

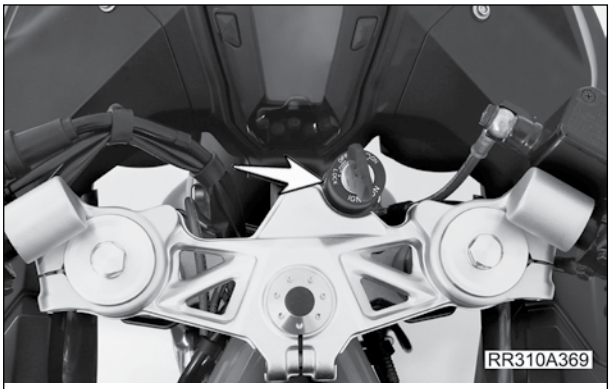



- Set multimeter at DC 20V range.
- Disconnect the Turn signal lamp Switch connector.
- Switch on the ignition Connect multimeter '+ ve' lead to Green with Black Tracer wire (GB) of beam control switch and '–ve' lead to battery negative terminal or body ground.
- The Voltage should be 12.0 ± 0.5 Volt
- If the voltage is not to the specification check Fuse 10A.
- Switch on the ignition Connect multimeter '+ ve' lead to Voilet with Black Tracer wire (VB) of beam control switch and '–ve' lead to battery negative terminal or body ground.
- The Voltage should be 12.0 ± 0.5 Volt
- If the voltage is not to the specification check Fuse 10A.
- Connect the turn signal lamp switch connector with Ignition on.
- Check the voltage with multimeter.
- Use TVS Ride Scan Tool for diagnostics.

| Switch Position | GB | VB |
|---|---|---|
| Slide Right | 0/12.0 ± 0.5 Volt | 0/12.0 ± 0.5 Volt |
| Slide Left | 0/12.0 ± 0.5 Volt | 0 /12.0 ± 0.5 Volt |
| Off Position | 12.0 ± 0.5 Volt | 12.0 ± 0.5 Volt |

If the voltage is not to the specification replace turn signal lamp switch.

**Ignition Lock**

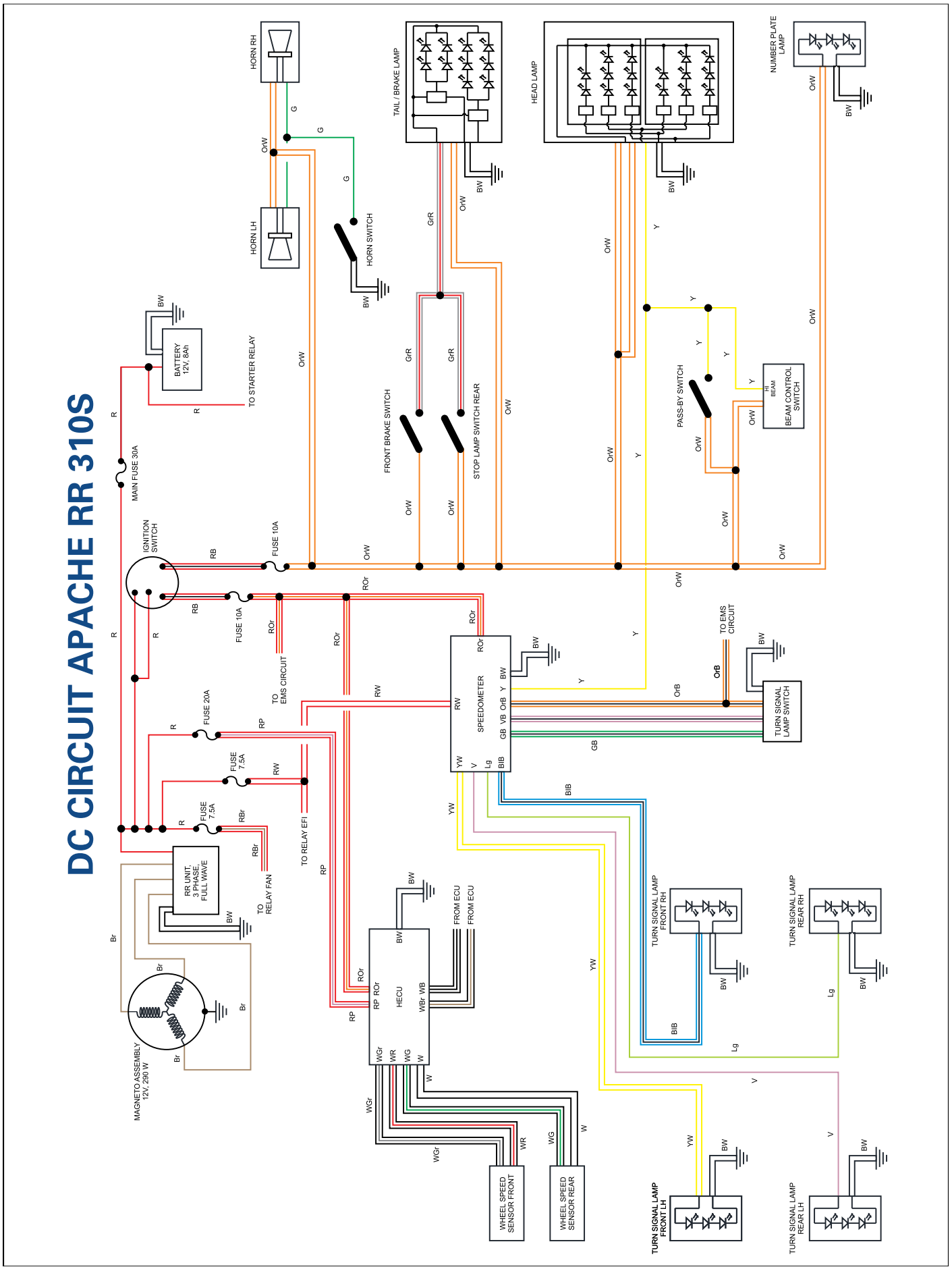



- The ignition lock is located on the handle bar assembly.
- Disconnect the coupler of ignition lock from the main wiring harness and inspect lock for continuity with the multimeter (multimeter).

| Tool | Multimeter |
|---|---|

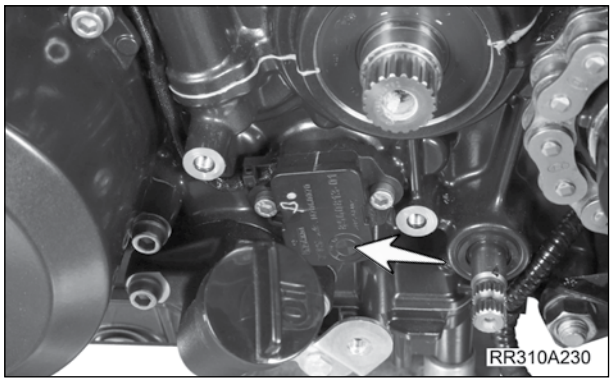
| Lock Position | R | RB |
|---|---|---|
| OFF | | |
| ON | O——— | ———O |

# DC CIRCUIT APACHE RR 310S



**Gear Position Sensor(Non contact type sensor)**

- The gear position sensor is mounted on the crankcase assembly LH below the front sprocket.
- There are two ways to check the function of the sensor. Using a multimeter, check the voltage at the green white wire, Or connect the TVS Ride Scan Tool and check the voltage. The volt based on the gear range should be as below:




| SL No. | Gear position | sensor signal % | sensor output voltage 'V' |
|---|---|---|---|
| 1 | 1st | 11.35±1 | 0.568±0.050 |
| 2 | Neutral | 19.08±1 | 0.954±0.050 |
| 3 | 2nd | 26.81±1 | 1.341±0.050 |
| 4 | 3rd | 42.27±1 | 2.114±0.050 |
| 5 | 4th | 57.73±1 | 2.887±0.050 |
| 6 | 5th | 73.19±1 | 3.660±0.050 |
| 7 | 6th | 88.65±1 | 4.433±0.050 |

**Charging Performance Check**

- Set the multimeter at DC 200 V range.
- Connect the multimeter's '+ve' lead of to positive terminal of the battery and '-ve' lead of multimeter to the negative terminal of the battery.
- 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 multimeter reading. The reading should be:

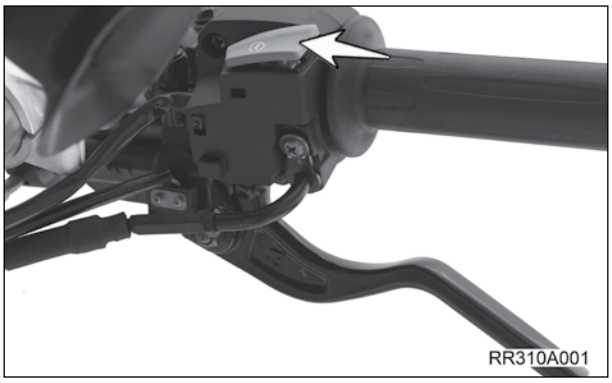
| | |
|---|---|
| Charging performance | 14.5 ± 0.3V at 2500 rpm and above |

- If the reading measured is not within the limit, check the stator coil resistance.
- If the stator coil resistance found OK, then replace the RR unit with a new one and re-check.

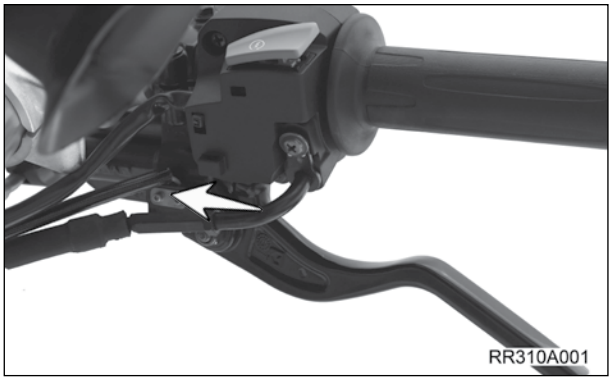
**Electric Starter Switch**

- Electric starter switch is located at the bottom side of switch assembly RH on the right hand side of the handle bar.
- Inspect switch for continuity using multimeter with the engine kill switch in 'ON position'.

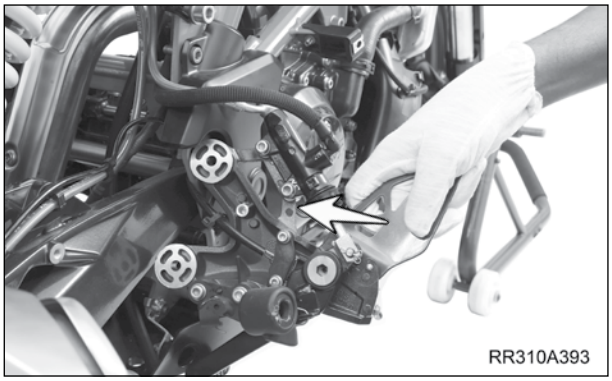
| Switch Position | OrBI | BGr |
|---|---|---|
| PRESS-ON | O——O | |
| RELEASE-OFF | | |



**Switch Assembly Stop Lamp Front and Rear (Brake Switches)**




- The brake switches are normally cloased switches.
- Set multimeter at DC 20V range.
- Disconnect the brake switch connector.
- Switch on the ignition and connect multimeter '+ ve' lead to Orange with White Tracer (OrW) of front brake switch and '–ve' lead to battery negative terminal or body ground.
- The Voltage should be 12.0 ± 0.5 Volt
- If the voltage is not to the specification check fuse-10A.
- Connect the front brake switch connector with Ignition on.
- Check the voltage with multimeter.

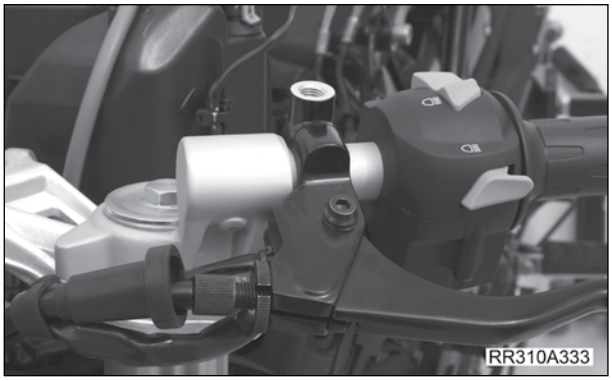



| Switch Position | OrW | GrR |
|---|---|---|
| Press - On | 12.0 ± 0.5 Volt | 12.0 ± 0.5 Volt |
| Release Off | 12.0 ± 0.5 Volt | 0 Volt |

- If the voltage is not to the specification replace front brake switch.
- Repeat the procedure for rear switch.

**Switch Assembly Clutch**

- Switch assembly clutch is located in the bracket clutch lever which is mounted on handle bar LH. .
- Inspect the switch for continuity with the multimeter.

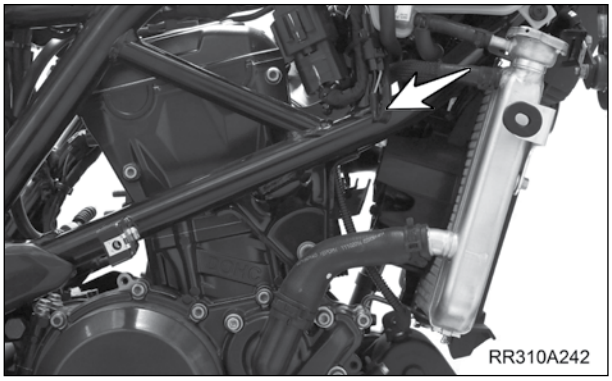



| Switch Position | GR | BIB |
|---|---|---|
| PRESS-ON | O———O | |
| RELEASE-OFF | | |

**Relay Self Starter (Starter Relay)**

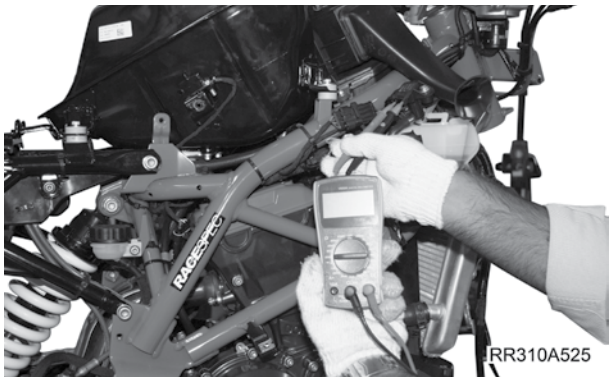
- Relay self starter is located on the left side of the vehicle on top of the air cleaner assembly.
- Inspect relay by checking the continuity using multimeter.

| 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, replace the starter relay and once again check for continuity. If problem persists, then replace the control unit and check.




**Battery**

- Remove seats. Refer ***Seat Removal*** procedure.
- Disconnect the battery's negative terminal first and then positive terminal.

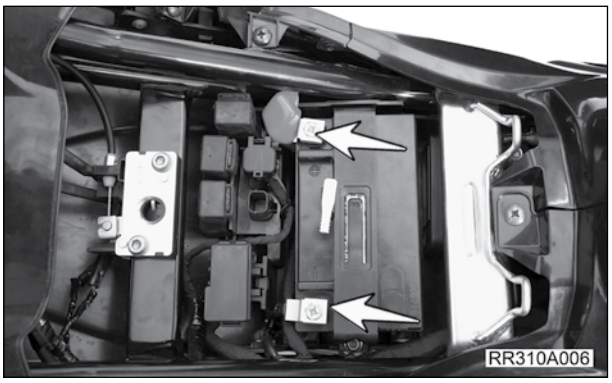
| Tool | 10 mm spanner |
|---|---|

| Tightening torque | 3 ± 1Nm |
|---|---|

- Remove the clamp.
- Take out the battery assembly.
- 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 multimeter.

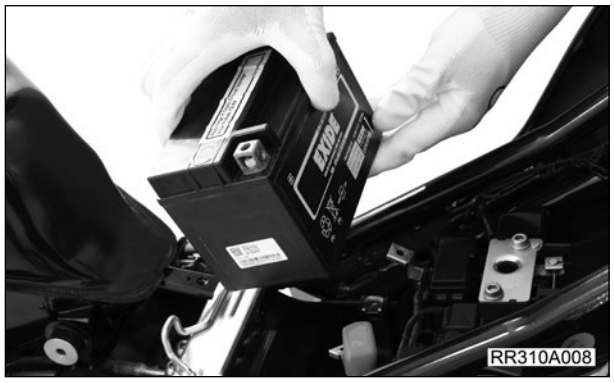
| Open circuit voltage | 12.9 Volts |
|---|---|

- 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.



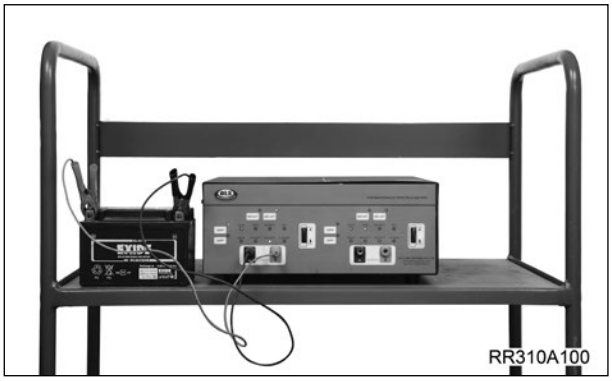

**Battery Charging**

- Constant current battery charger having the current output of 0.9 amps must be used for charging the 12V, 9 AH battery.
- If the battery charger has multiple battery charging facility (0.25/0.5A/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.
- 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. If this indicator is not glowing, then check the main fuse of the charger and replace the fuse if required.
- 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 (Bl is glowing.
- If the 'BADD BATT' 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.
- 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.




**Indication of full charge**

The stable consecutive readings showing 12.8 volt or more with 30 minutes of interval.

- 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.

**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 (H available In the charger) blows.

Correct the connection and replace the fuse before charging. Otherwise the battery may not get charged.

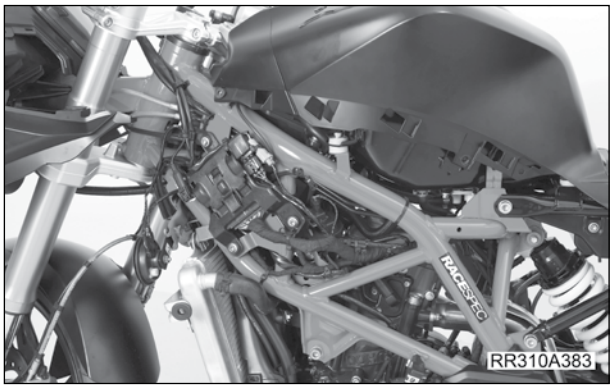
Use only constant current battery charger. Do not use constant voltage battery charger.

# ECU

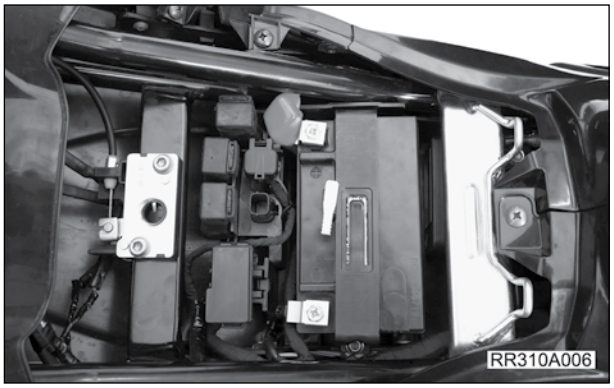
Component : ECU
Component condition : Vehicle on ramp and component accessible
Objective : ECU replace
Repair cycle : ECU must be replaced whenever required

**Removal**

- Park the vehicle on the paddock stand. Refer ***Parking vehicle on Paddock stand*** for procedure.
- Remove side cowl upper LH.
- Remove housing headlamp LH.
- Remove the side cowl LH. Refer to ***Side Cowl grill*** for procedure.
- Remove Engine guard LH. Refer to ***Engine guard LH*** for procedure.
- Remove Engine guard center. Refer to ***Engine guard LH*** for procedure.
- The ECU will be in the holder inside a bracket attached to LHS of the vehicle. Below the air filer. Above the radiator.



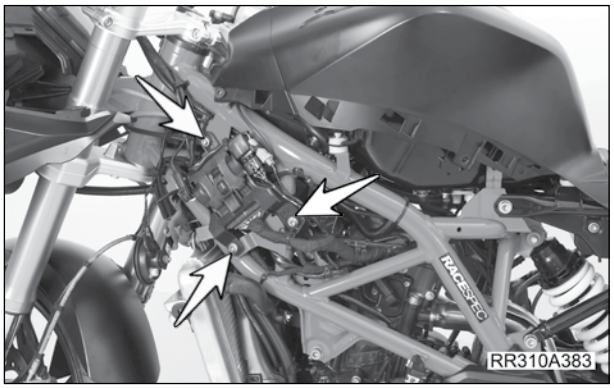

- Disconnect the battery terminals.



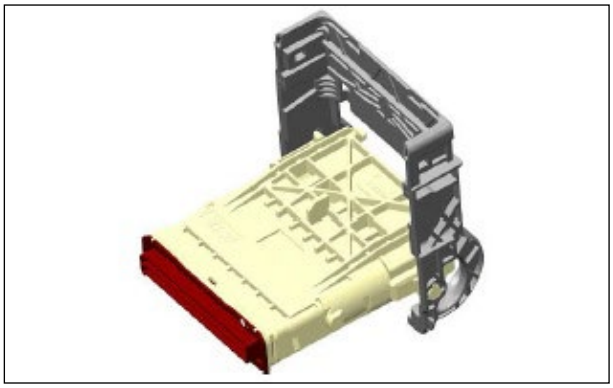

- Remove the screws.

| | |
|---|---|
| Tool | 5 mm Allen key bit |
| Torque | 5 Nm |

- Remove the ECU with connector from the ECU bracket by sliding the lock sideways.



- Press the two sides of the connector and lift the lever to vertical position.
- Gently pull the ECU out of the holder.

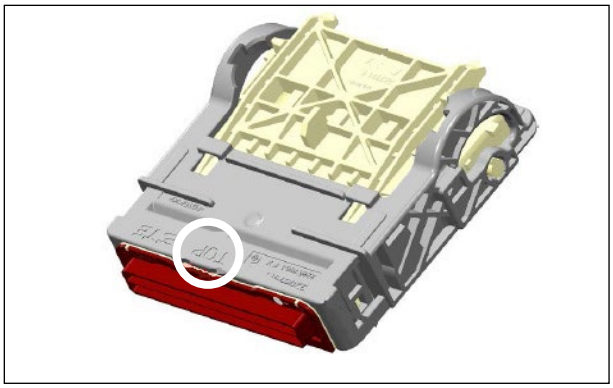


**Installation**

- Visually inspect the interface area for dust and damage if any.
- Ensure the seal saffron colour is in its proper position.
- Lift the locking lever completely up till it is vertical with respect to the ECU.
- Insert the ECU into the connector gently.
- Close the lever down firmly but gently. The lever pulls the ECU into the connector.
- Push the lever down till a clicking sound is heard signifying the lever is locked.
- Install the battery terminals.
- Run the TVS Ride Scan Tool and run diagnostics.

**NOTE**

While installing ensure the TVS logo on the ECU will be facing the folding side of the ECU holder. However, it will not fit-in reverse manner but forceful fit will break the locks on the holder.



**NOTE**

Ensure the saffron grip on the ECU is intact and is holding the ECU tightly. Replace the grip if it is loosely holding the ECU.

**Precautions while handling ECU**

- Follow ESD (electro static discharge) regulations while handling ECU.
- Grounding surface should be free of paint, grease dirt etc.
- ECU seal should be clean and dust free at the time of assembly.
- Always disconnect the ECU connectors & battery terminals before performing body repair or electrical repairs on the vehicle.
- Do not expose the ECU to moisture.
- Do not operate the ECU without a fuse.
- Do not use the ECU if dropped during assembly/ Handling.
- Do not mark anything on the ECU.
- Ensure the battery terminal are not shorted when ECU is connected. This will damage the ECU and render it non functional.
- ECU should not be opened / tampered with.

## TVS RIDE SCAN TOOL

Component : TVS Ride Scan Tool
Objective : Diagnostics

**Contents of Diagnostic Tool Kit**

A. Vehicle Communication Interface device (VCI)
B. Diagnostic Tool charging cable with adapter.
C. 6 Pin to 16 Pin Connector cable
D. Hand held Tool (Samsung tablet with pre installed ride scan App)


**Diagnostic Coupler**

CAN High and CAN Low lines are available at this end to interface with diagnostic tool for data manipulation and vehicle diagnosing.

**Location**

The diagnostic coupler is located below the seats next to the battery. Lift the covering flap to connect the connector.

**Metafab CTEK mxs 3.8 Battery Charger**

**NOTE**

Always connect the battery charger while performing diagnostics on the vehicle.

**NOTE**

Select the “Bike” mode before connecting the charger.

**Connecting Diagnostic Tool**

- Assemble VCI and connector cable (6 to 16 pin)

- Connect the other end of connector cable to diagnostic coupler on the vehicle.

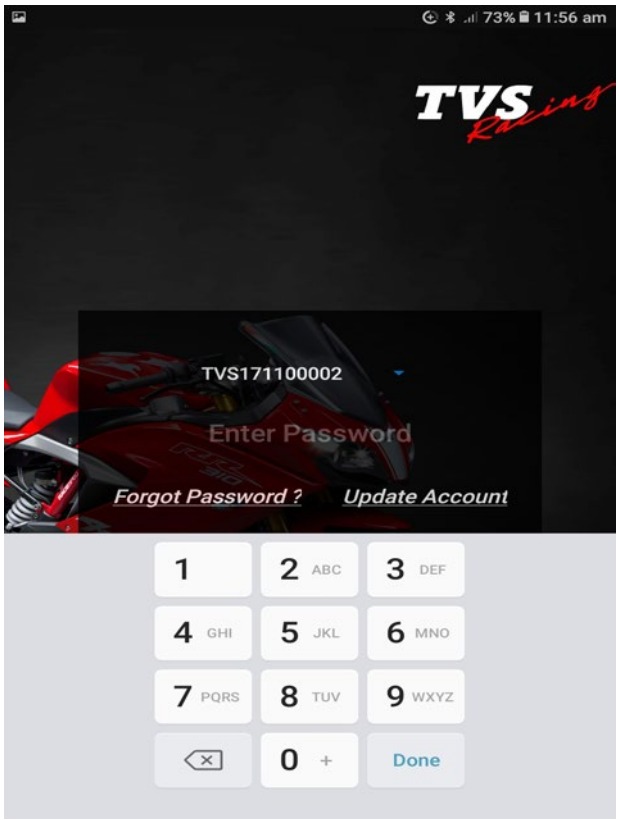
- Switch ON the ignition key.
- Wait for the indicator on the VCI to blink green- which indicates the connection is complete and VCI is working fine.

**First Time Logging In**

- Open Ride Scan app on your scan tool to connect it with vehicle ECU which enables syncing of data between two.
- Then follow the self navigated screens to continue.


- The following screens will come one after another once you open the Ride Scan app on scan tool.

- Input password using on screen keyboard and start the scan.



- Authenticated Vehicle Communication Interface (VCI) screen.


- Start the scanning process by tapping on the SCAN option.

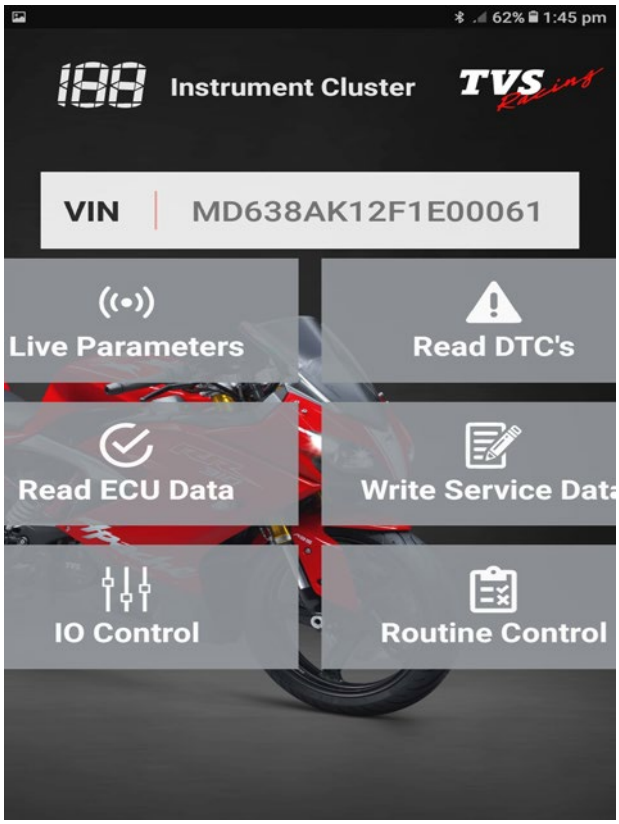
### Navigation

- Select the required option as per requirement.


- The following screens will appear based on the options selected.

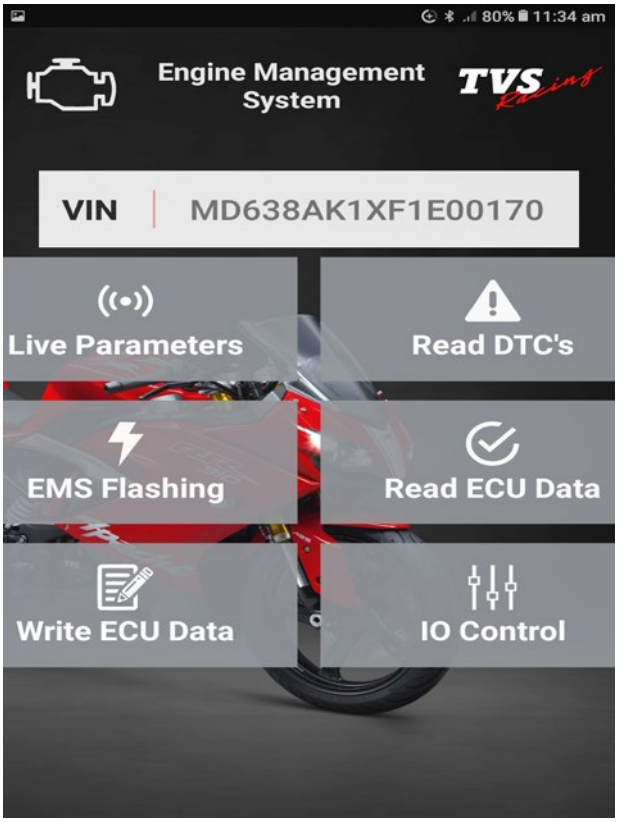
### Instrument Cluster

- Select this menu to interact with instrument cluster to read live data and diagnostics trouble code (DTC).



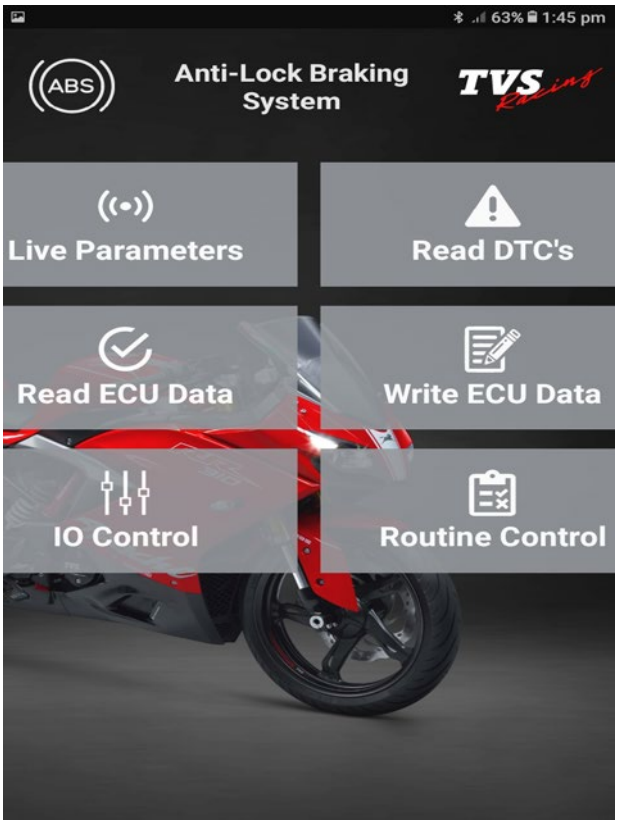
### Engine Management System

- Select this menu to diagnose EMS related problem.



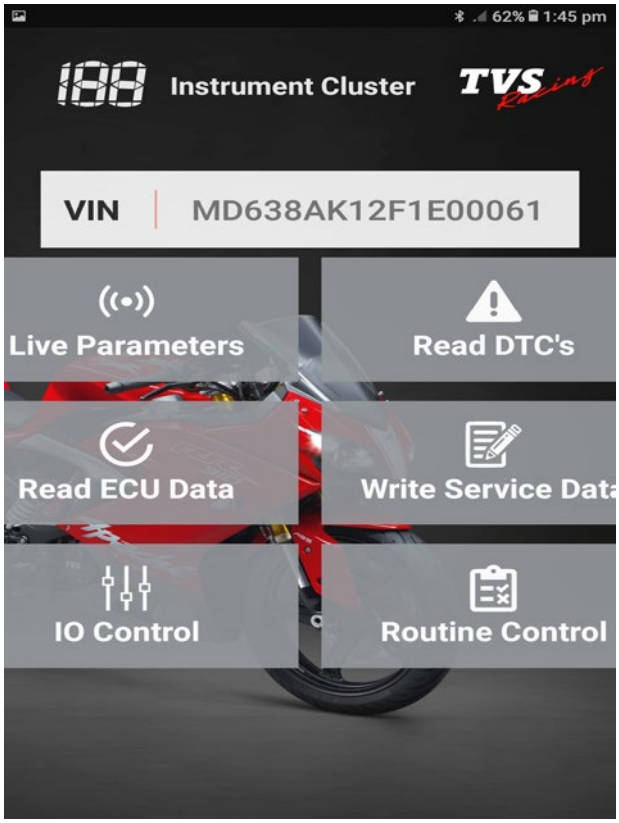

### Anti-Lock Braking System

- Select this menu to interact with HECU and to diagnose ABS.

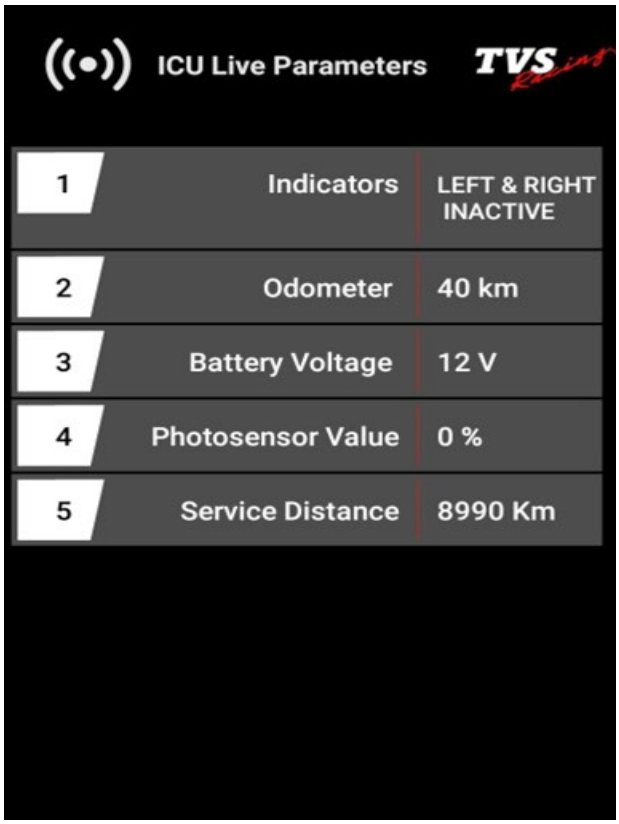


## Instrument Cluster - Navigation

- Select this menu to diagnose instrument cluster related faults and issues.

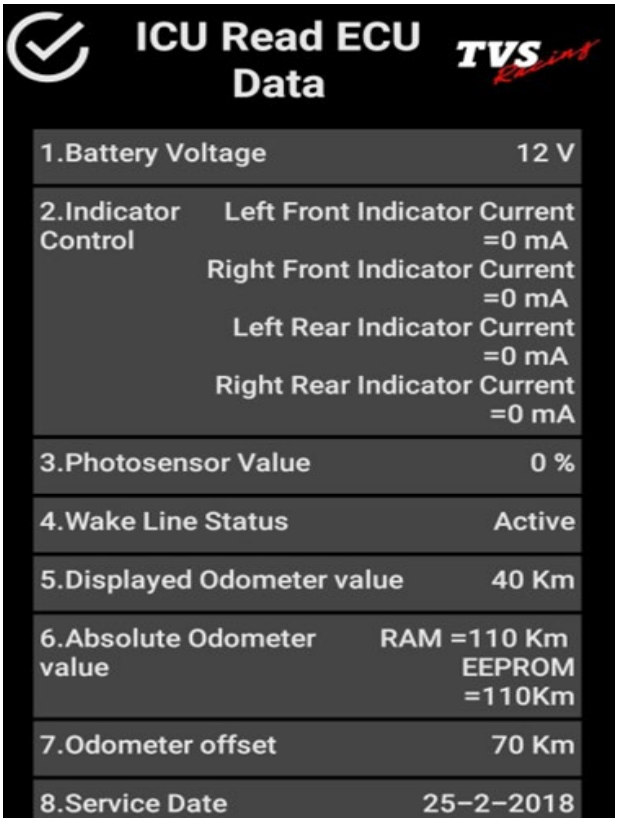



- Select "Live Parameters" to view instantaneous data.

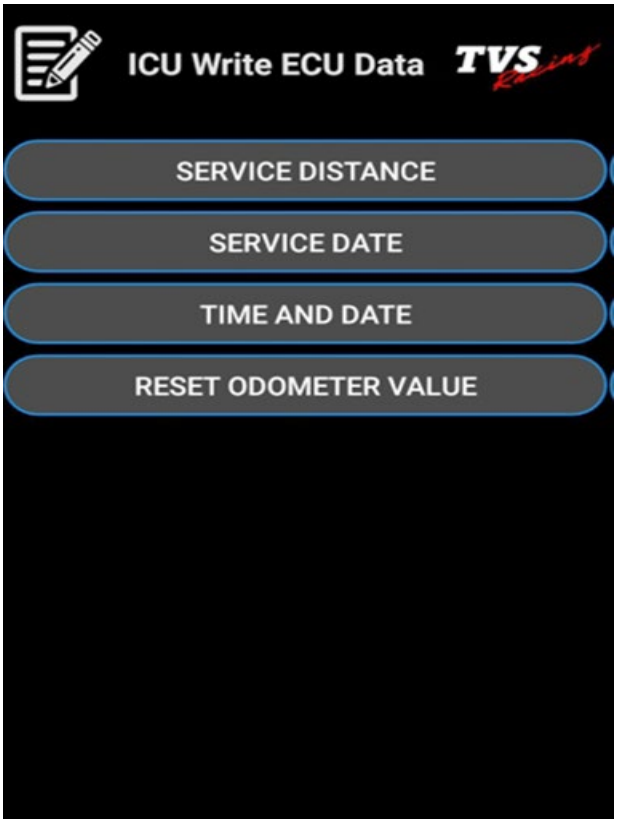


- Select "Read DTC's" to view registered or rectified DTC's. Select different ICU DTC's logs from drop down list.

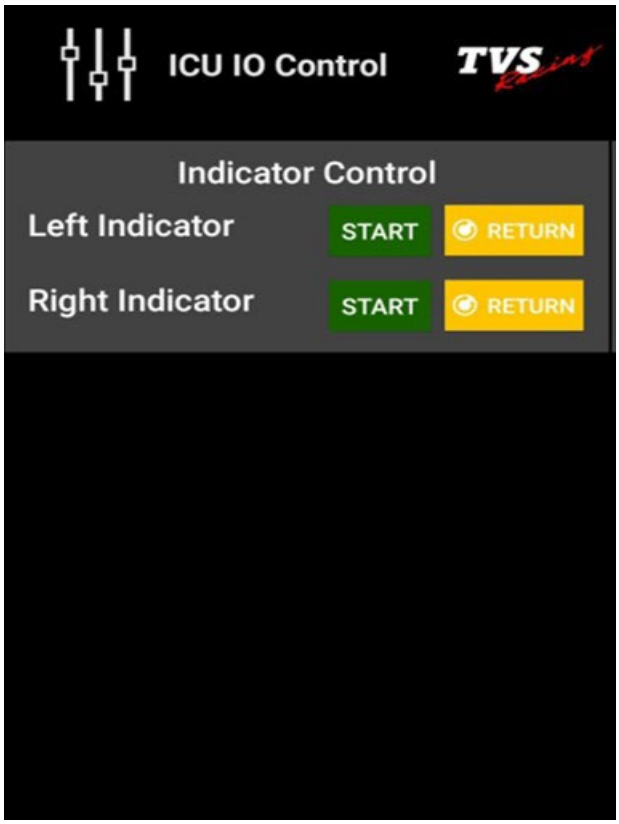
- Select "Read ECU data" to view instantaneous data.



- Select "Write service data" to edit vehicle related data.
- Tap to the specific menu to change the data as required.



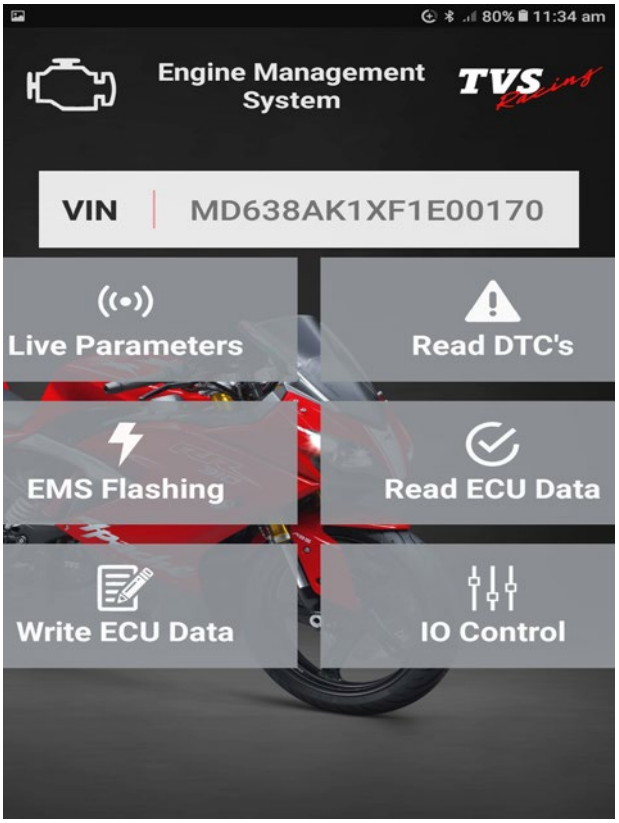

- Select "IO control" to perform actuation test.



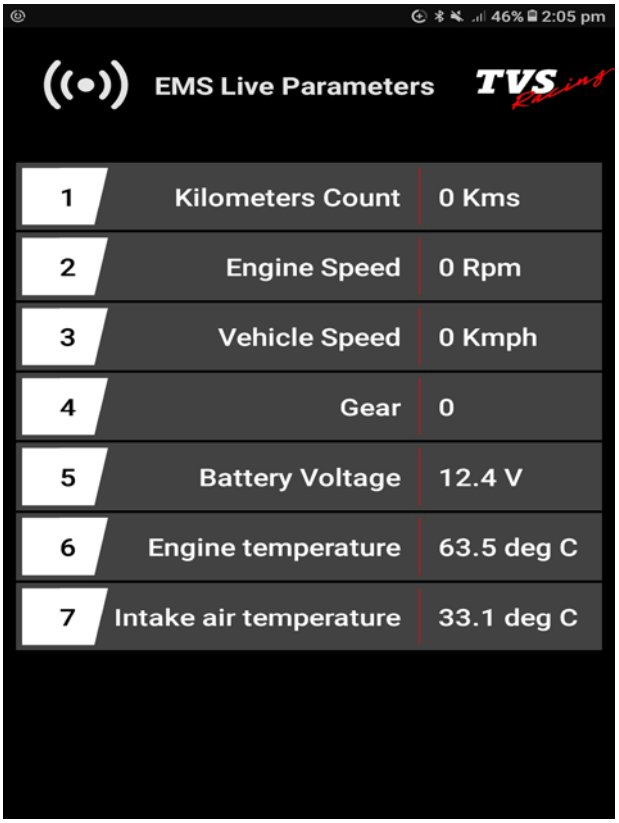
## EMS - Navigation

**NOTE**

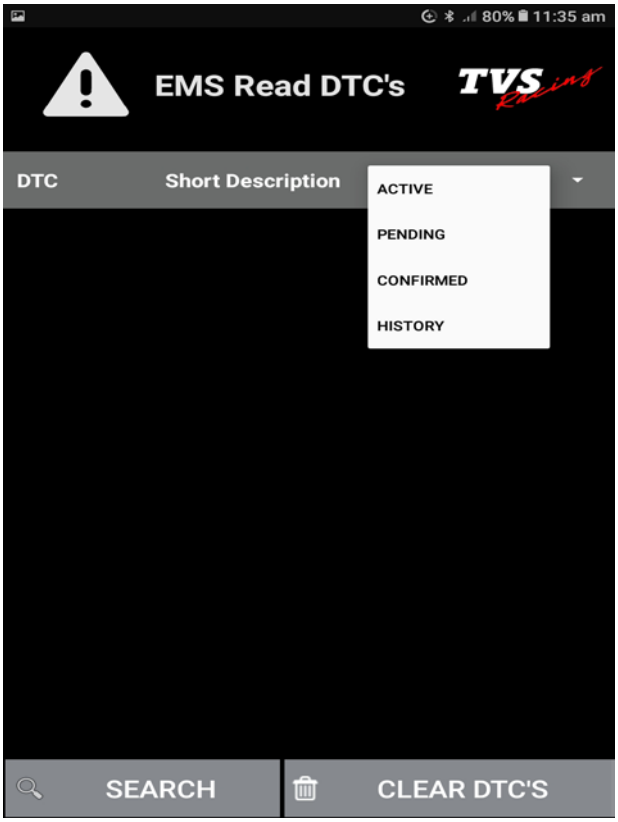
EMS Flashing option is not available for dealerships.



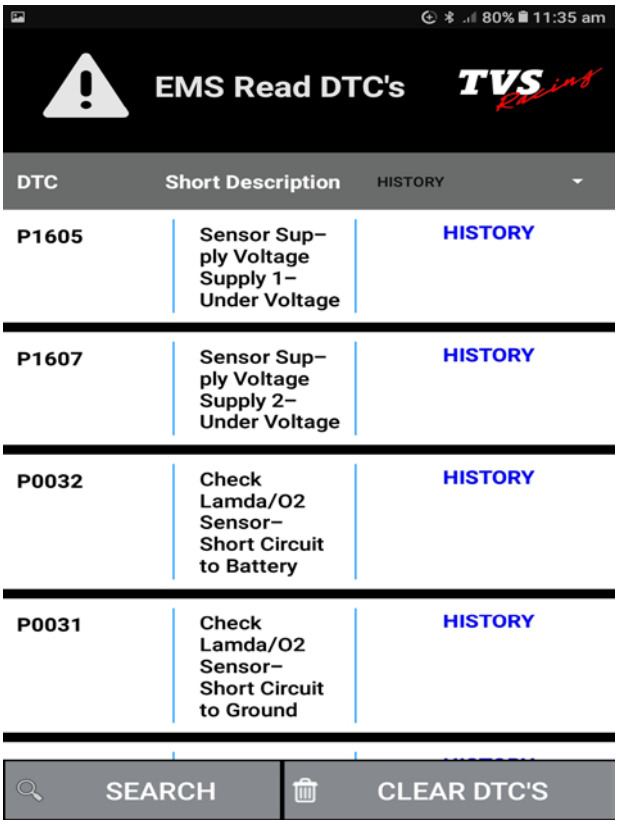

- Select "EMS Live Parameters" to view instantaneous data.



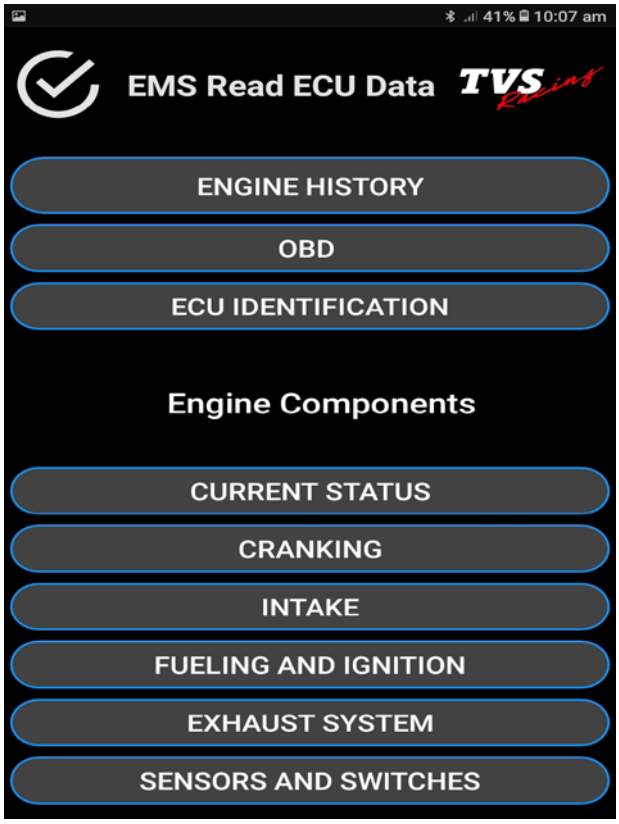
- Select "Read DTC's" to view registered or rectified DTC's.



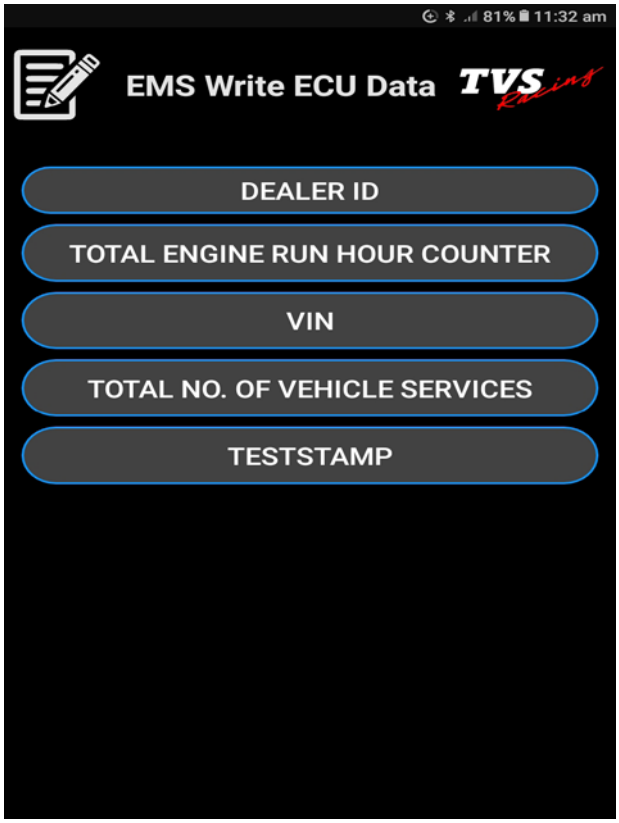

- Select different logs from the drop down list.



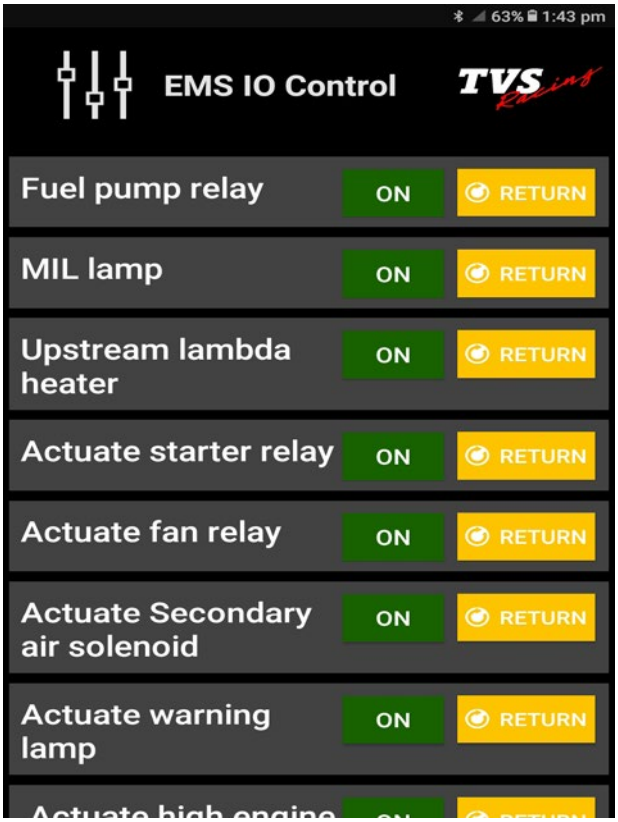
- Select "Read ECU Data" to view instantaneous data.




- Select "Write service data" to edit vehicle related data.
- Tap to the specific menu to change the data as required.

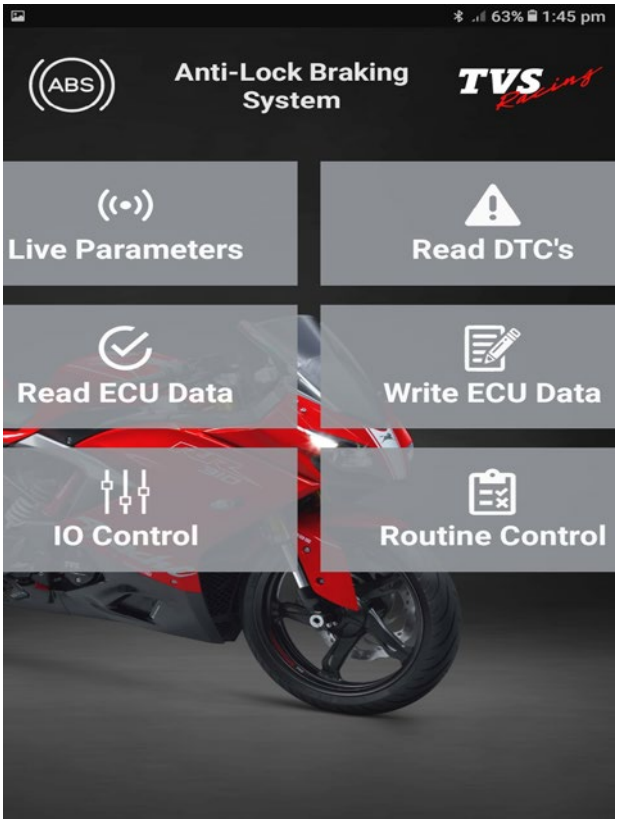


- Select "EMS  IO control" to perform actuation test.

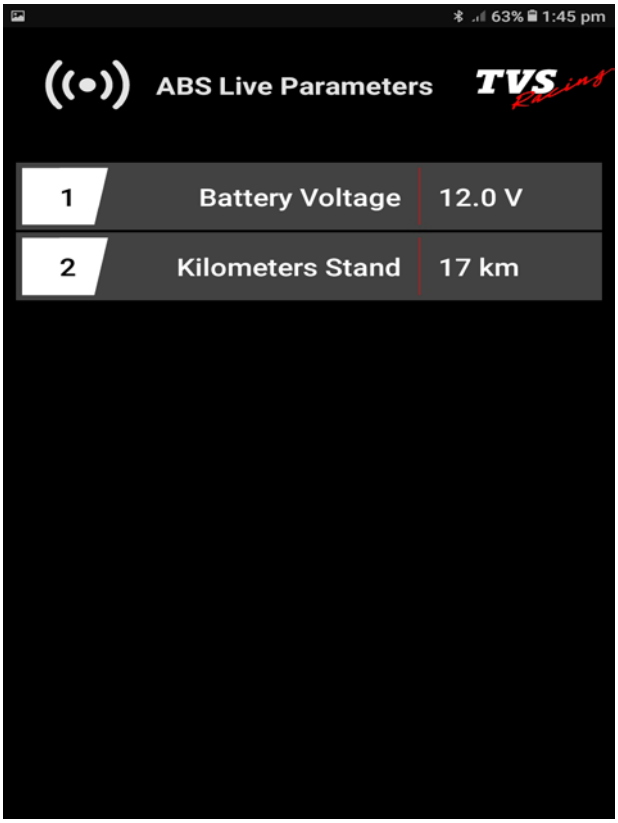


## ABS - Navigation

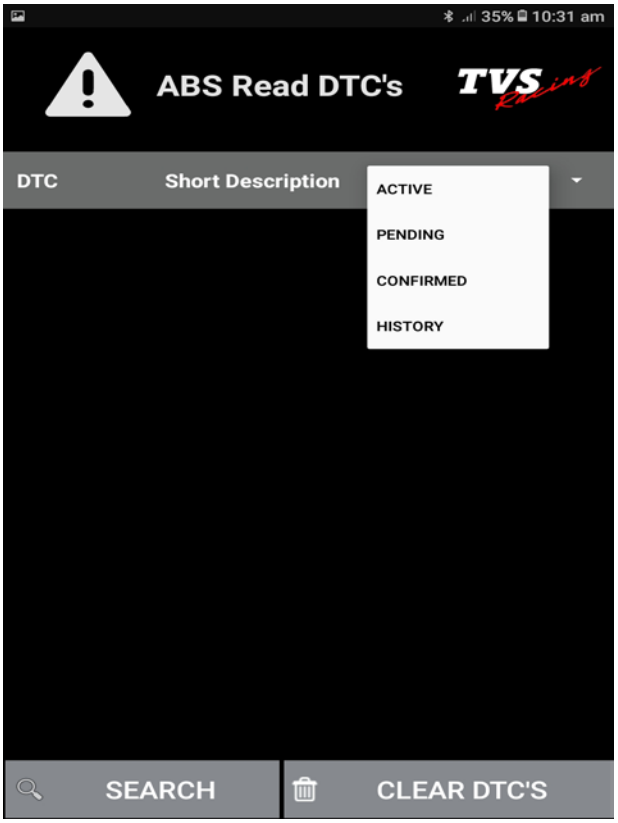
- Select this menu to diagnose ABS related faults and issues.



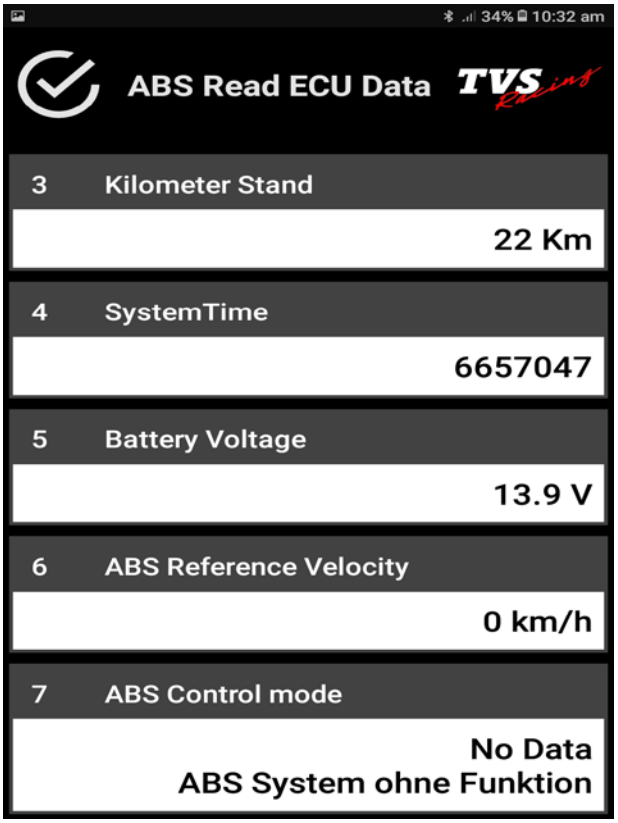

- Select "ABS Live Parameters" to view instantaneous data.



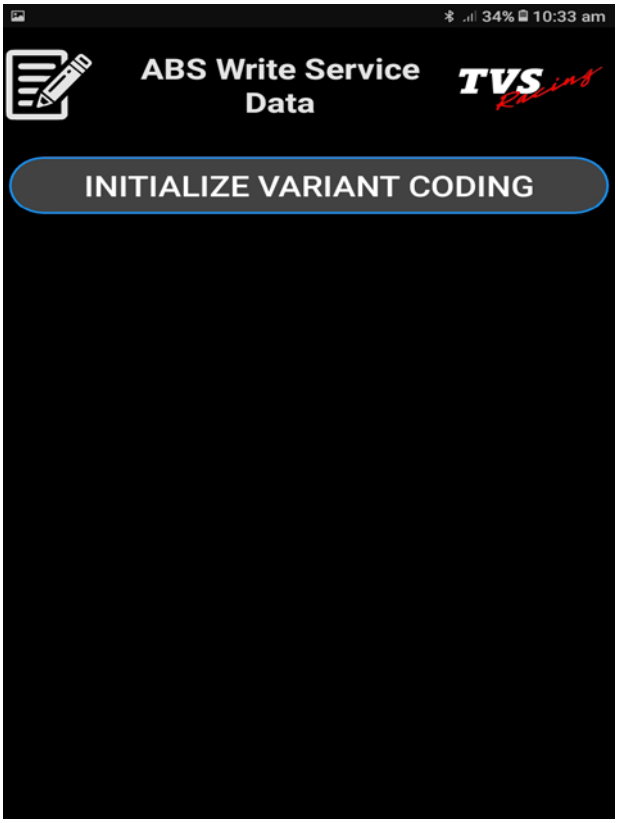
- Select "Read DTC's" to view registered or rectified DTC's.




- Select "Read ECU Data" to view instantaneous data.



- Select "Write service data" to edit vehicle related data.
- Tap to the specific menu to change the data as required.




- Select "IO control" to perform actuation test.