



**TVS**

*Apache*

RTR 160 & 180

## SERVICE MANUAL



TVS APACHE RTR 160 & 180 SERVICE MANUAL

### PT TVS Motor Company Indonesia

#### Office Sales & Marketing

PT TVS Motor Company Indonesia

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Telp: +62 267 86 10121 Fax: +62 267 86 10124

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**PT TVS MOTOR COMPANY INDONESIA**

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## TVS APACHE RTR160 SINGLE DISC

1



Fig. 1.1

## TVS APACHE RTR160 DUAL DISC



Fig. 1.1



## TVS APACHE RTR180 DUAL DISC



Fig. 1.3

### VEHICLE IDENTIFICATION NUMBERS

#### LOCATIONS

##### FRAME NUMBER

- The frame serial number is engraved on the frame of right side of the steering head pipe. (Fig. 1.4)



Fig. 1.4

##### ENGINE NUMBER

- The engine serial number is engraved on the left side crankcase near cylinder block. (Fig. 1.5)

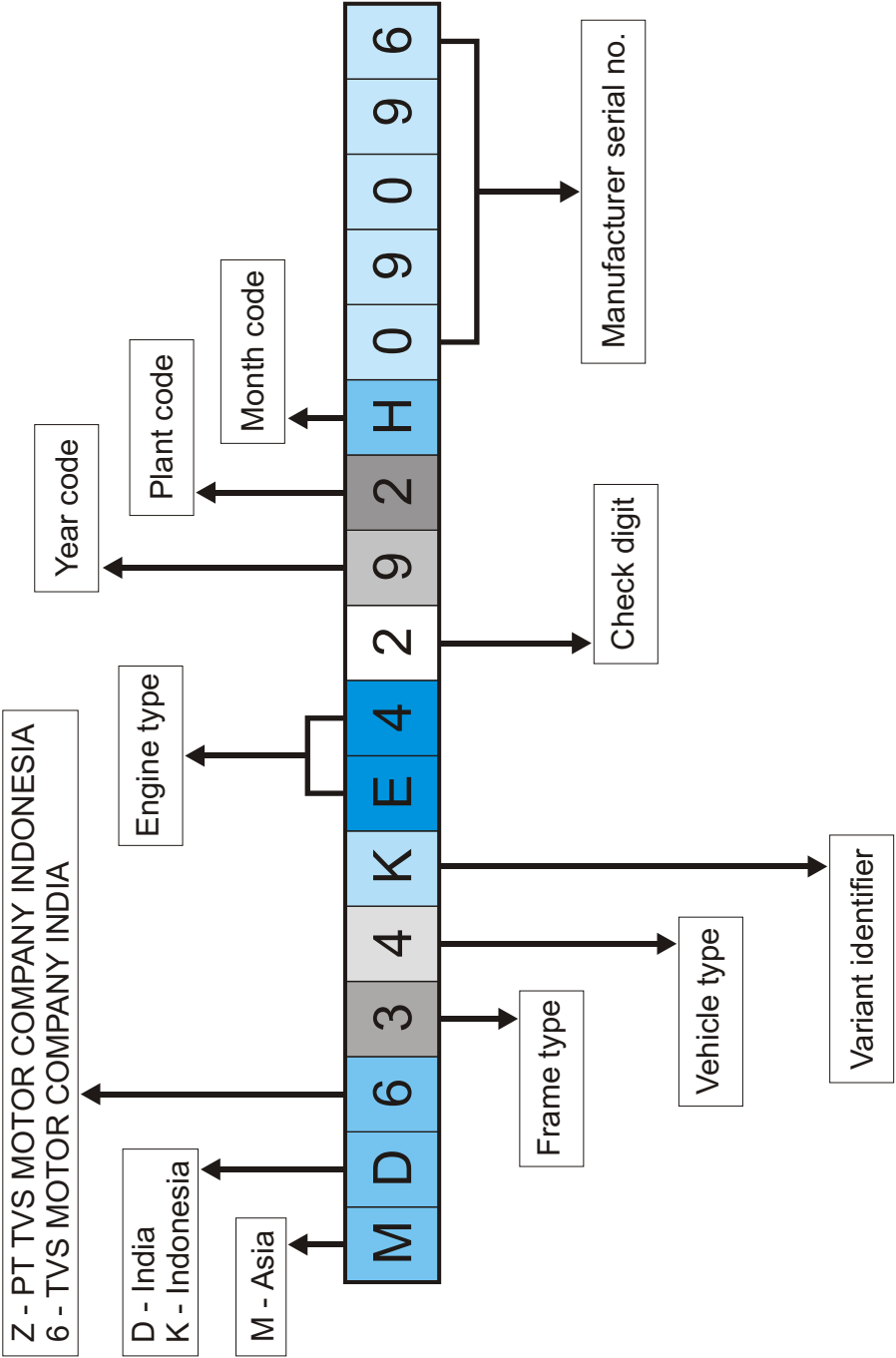


Fig. 1.5



SYSTEM FOLLOWING IN FRAME NO. IDENTIFICATION

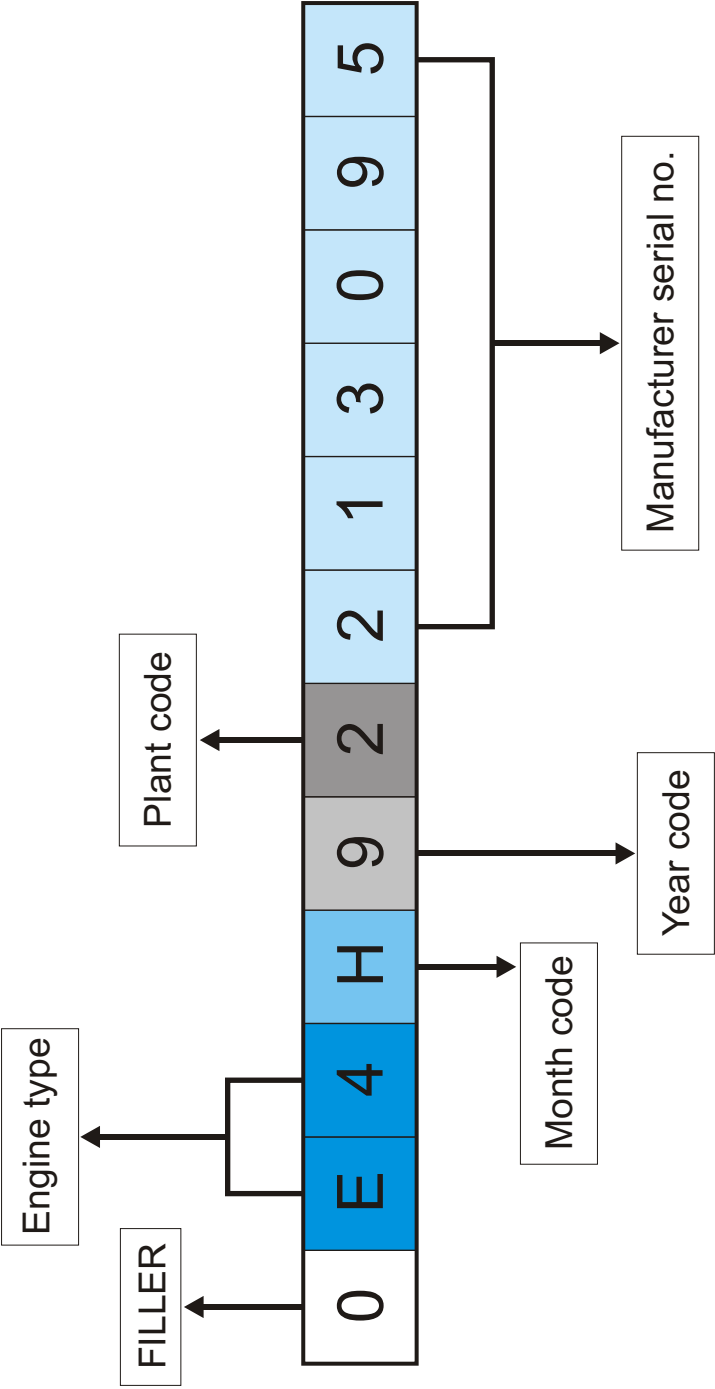
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SYSTEM FOLLOWING IN ENGINE NO. IDENTIFICATION

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## TECHNICAL SPECIFICATIONS

|                                            | Apache RTR 160                            |           | Apache RTR 180 |
|--------------------------------------------|-------------------------------------------|-----------|----------------|
|                                            | Single Disc                               | Dual Disc | Dual Disc      |
| DIMENSIONS AND WEIGHT                      |                                           |           |                |
| Overall length                             | 2020 mm                                   |           | 2085 mm        |
| Overall width                              | 730 mm                                    |           |                |
| Overall height                             | 1050 mm                                   | 1105 mm   |                |
| Seat height                                | 790 mm                                    |           |                |
| Ground clearance                           | 180 mm                                    |           | 165 mm         |
| Wheel base                                 | 1300 mm                                   |           | 1326mm         |
| Kerb weight (with toolkit and 90% of fuel) | 136 kg                                    | 139 kg    | 137 kg         |
| Pay load                                   | 130 kg                                    |           |                |
| Maximum laden weight                       | 266 kg                                    | 269 kg    | 267 kg         |
|                                            |                                           |           |                |
| ENGINE                                     |                                           |           |                |
| Type                                       | 4 stroke, air cooled, single cylinder OHC |           |                |
| Bore                                       | 62 mm                                     |           | 62.5 mm        |
| Stroke                                     | 52.9 mm                                   |           | 57.8 mm        |
| Piston displacement                        | 159.7 cc                                  |           | 177.4 cc       |
| Carburettor type (Ucal Mikuni)             | BS26 X39Z1                                |           | BS29           |
| Air filter                                 | Double polyurethane foam filter element   |           |                |
| Oil filter                                 | Wire mesh and micronic paper filter       |           |                |
| Lubrication system                         | Forced wet sump                           |           |                |
| Compression ratio                          | 9.5 : 1                                   |           |                |
| Maximum power @ 8500 rpm                   | 11.19 kW(15.2 BHP)                        |           | 12.52kW(17BHP) |
| Maximum torque @ 6000 rpm                  | 13.1 Nm                                   |           | 15.5 Nm        |
| Maximum speed                              | 118 km / hr                               |           | 124 km / hr    |
| Engine idling rpm                          | 1400 ± 100 rpm                            |           |                |
| Starting system                            | Kick starter & Electric starter           |           |                |
|                                            |                                           |           |                |
| TRANSMISSION                               |                                           |           |                |
| Clutch                                     | Wet, multi-plate type - Manual over ride  |           |                |
| Transmission                               | 5 speed constant mesh                     |           |                |
| Gear shift pattern                         | 1 down and 4 up, toe shift                |           |                |
| Primary reduction (Helical gears)          | 3.095 (65/21)                             |           |                |
| Final reduction (Chain and Sprocket)       | 3.384 (44/13)                             |           | 3.286 (46/14)  |
| Overall reduction (at top gear)            | 9.22                                      |           | 8.95           |



## TECHNICAL SPECIFICATIONS

|                                      | Apache RTR 160                                                                              |                       | Apache RTR 180           |
|--------------------------------------|---------------------------------------------------------------------------------------------|-----------------------|--------------------------|
|                                      | Single Disc                                                                                 | Dual Disc             | Dual Disc                |
| <b>GEAR RATIO</b>                    |                                                                                             |                       |                          |
| First gear                           | 2.917 (35/12)                                                                               |                       |                          |
| Second gear                          | 1.857 (26/14)                                                                               |                       |                          |
| Third gear                           | 1.333 (24/18)                                                                               |                       |                          |
| Fourth gear                          | 1.050 (21/20)                                                                               |                       |                          |
| Fifth gear (top gear)                | 0.880 (22/25)                                                                               |                       |                          |
|                                      |                                                                                             |                       |                          |
| <b>CHASSIS</b>                       |                                                                                             |                       |                          |
| Frame                                | Double cradle synchro - stiff                                                               |                       |                          |
| Front suspension and travel          | Telescopic, oil damped 105 mm travel                                                        |                       |                          |
| Rear suspension and travel           | Monotube inverted gas filled 5 step adjustable hydraulic shocks with rectangular swing arm. |                       |                          |
| Steering angle                       | 82°                                                                                         |                       |                          |
| Caster angle                         | 25.5°                                                                                       |                       |                          |
| Trail length                         | 81.3 mm                                                                                     |                       | 84.3 mm                  |
| Turning radius                       | 2010 mm                                                                                     |                       | 2150 mm                  |
| Brakes - Front (Hand operated)       | 270 mm dia petal disc                                                                       |                       |                          |
| - Rear (Foot operated)               | 130 mm (Drum)                                                                               | 200 mm dia petal disc |                          |
| Tyre size - Front                    | 90/90 x 17"                                                                                 |                       | 90/90 x 17" (Tube Less)  |
| - Rear                               | 100/80 x 18"                                                                                |                       | 100/80 x 17" (Tube Less) |
| Tyre pressure - Solo (Front)         | 1.75 kg / cm2 (25 PSI)                                                                      |                       |                          |
| (Rear)                               | 2.00 kg / cm2 (28 PSI)                                                                      |                       |                          |
| - Dual (Front)                       | 1.75 kg / cm2 (25 PSI)                                                                      |                       |                          |
| (Rear)                               | 2.25 Kg / cm2 (32 PSI)                                                                      |                       |                          |
|                                      |                                                                                             |                       |                          |
| <b>ELECTRICAL</b>                    |                                                                                             |                       |                          |
| Type                                 | AC generator                                                                                |                       |                          |
| Ignition system                      | IDI - Dual mode digital ignition                                                            |                       |                          |
| Ignition timing (At coinciding mark) | 5.0° ± 2° at 1500 rpm                                                                       |                       |                          |
| (Full advance)                       | 34.0° ± 2° at 10000 rpm                                                                     |                       |                          |
| Spark plug                           | (BOSCH) UR5DDC - Twin electrode                                                             |                       |                          |
| Battery type                         | 12 V, 9.0 Ah                                                                                |                       |                          |
| Body earthing                        | Negative terminal                                                                           |                       |                          |





## TECHNICAL SPECIFICATIONS

|                                        | Apache RTR 160              |                      | Apache RTR 180 |
|----------------------------------------|-----------------------------|----------------------|----------------|
|                                        | Single Disc                 | Dual Disc            | Dual Disc      |
| <b>ELECTRICAL</b>                      |                             |                      |                |
| Generator                              | 12 V, 100 W                 |                      |                |
| Head lamp                              | 12 V, 35/35 W HS1 (Halogen) |                      |                |
| Position lamp                          | 12 V, 4 W x 2 Nos           |                      |                |
| Tail lamp                              | 12 V, 0.5 W (LED)           |                      |                |
| Brake lamp                             | 12 V, 3.5 W (LED)           |                      |                |
| Turn signal lamp                       | 12 V, 10 W x 4 Nos          |                      |                |
| Number plate lamp                      | 12V, 4 W                    |                      |                |
| Instrument panel lamp                  | LCD / LED indicators        |                      |                |
| Horn type                              | 12 V, DC x 2Nos             |                      |                |
| Fuse                                   | 12V, 10 A                   |                      |                |
|                                        |                             |                      |                |
| <b>CAPACITIES</b>                      |                             |                      |                |
| Fuel tank (including reserve)          | 16.0 litres                 |                      |                |
| Reserve                                | 2.5 litres                  |                      |                |
| Front fork oil (grade)                 | Teleshockab oil             |                      |                |
| Front fork oil (qty) GIL               | 140 ± 2.0 ml per leg        | 140 ± 2.0 ml per leg |                |
| TOP                                    | 152 ± 2.5 ml per leg        |                      |                |
| Engine cum transmission oil (grade)    | 4T oil                      |                      |                |
| Engine cum transmission oil (quantity) | 1000 ml (During service)    |                      |                |
|                                        | 1100 ml (During overhaul)   |                      |                |
| Disc brake fluid                       | DOT 3 / DOT 4               |                      |                |

**Note:**

Specifications are subject to change on account of continuous improvements in the product.



### RUNNING - IN PERIOD

The first 1000 kms is a crucial part. Proper running-in operation during this time helps in ensuring a longer life and smooth performance of **TVS Apache RTR**.

The reliability and performance of **TVS Apache RTR** depends on special care and restraint exercised during running-in period. It is especially important that you avoid operating the engine in a manner, which could expose the engine parts to excessive heat. Maximum recommended speed during running-in is 50 kmph.

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

### PRECAUTIONS AND GENERAL INSTRUCTIONS

Observe the following precautions without fail when dismantling and reassembling.

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





## LIST OF HAND TOOLS REQUIRED

1. **Flat head spanners:**  
7 mm, 8 mm, 10 mm, 12 mm and 14 mm.
2. **Ring spanners:**  
8 mm, 9 mm, 10 mm, 11 mm, 12 mm, 13 mm, 14 mm, 16 mm, 17 mm, 22 mm, 27 mm, and 32 mm.
3. **Tubular spanners:**  
8 mm, 10 mm, 12 mm, 14 mm, 16 mm and 17 mm.
4. **Socket spanners:**  
8 mm, 10 mm, 12 mm, 13 mm, 14 mm, 17 mm, 22 mm, 27 mm and 32 mm.
5. **Allen keys:**  
4 mm, 6 mm, 8 mm, 10 mm and 12 mm.
6. **Screw drivers:**  
Flat screw driver-small, flat screw driver, phillips head screw driver no. 1, phillips head screw driver no. 2 and phillips head screw driver no. 3.
7. **Hammers:**  
Nylon hammer, rubber mallet and metal hammer.
8. **Pliers:**  
Straight nose plier, combination plier, water pump plier, external circlip plier-6 inch and external circlip plier-7 inch.
9. **Others:**  
Drift, chisel, plug spanner, compression gauge, special adopter, micrometer, vernier calliper, dial gauge, battery charger, feeler gauge, pocket tester, impact driver set, tachometer, hydrometer and hot plate.

## LIST OF SPECIAL TOOLS REQUIRED

| Sl. no. | Part no. | Description                                |
|---------|----------|--------------------------------------------|
| 1       | 0312401  | Universal oil seal remover                 |
| 2       | 1313501  | Front fork oil seal installer              |
| 3       | 2310300  | Assembly tool steering cups                |
| 4       | M1310010 | Holder assembly magneto                    |
| 5       | M1310020 | Puller assembly magneto                    |
| 6       | M1310070 | Tappet adjuster                            |
| 7       | M1310110 | Puller assembly crankcase                  |
| 8       | M1310160 | Holder front fork cylinder                 |
| 9       | N2310010 | Clutch holding tool                        |
| 10      | N2310020 | Clutch nut tightening tool                 |
| 11      | N2310070 | Mandrel gear shaft oil seal                |
| 12      | N2310080 | Mandrel drive shaft R side bearing         |
| 13      | S1310020 | Extractor assembly inlet and exhaust valve |
| 14      | S1311110 | Extractor main bearing                     |



## APPLICATION OF SPECIAL TOOLS

### 1. Universal oil seal remover - 0312401

- Used to remove oil seal from the front fork outer tube and crankcase. (Fig. 1.7)

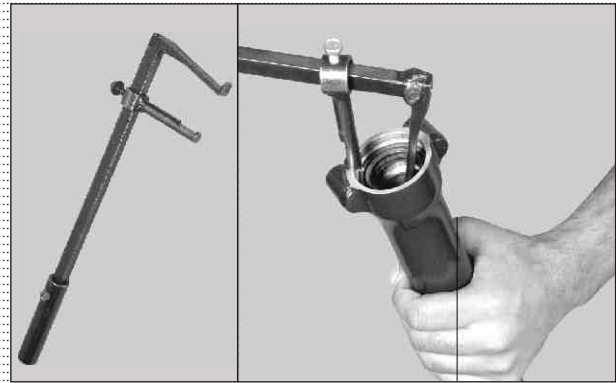


Fig. 1.7

### 2. Front fork oil seal installer - 1313501

- To install front fork oil seal and dust cap. (Fig 1.8)

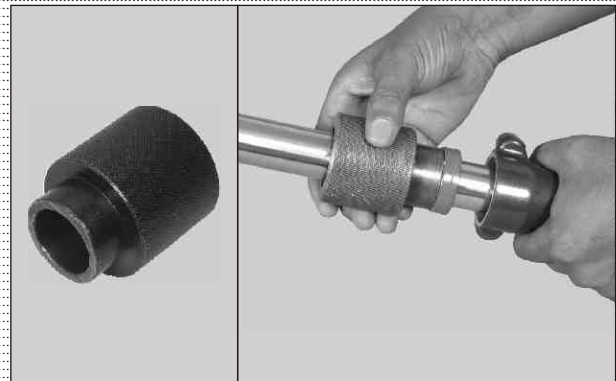


Fig. 1.8

### 3. Assembly tool steering cups - 231030000

- To install cup bottom and cup top in the frame steering stem. (Fig 1.9)

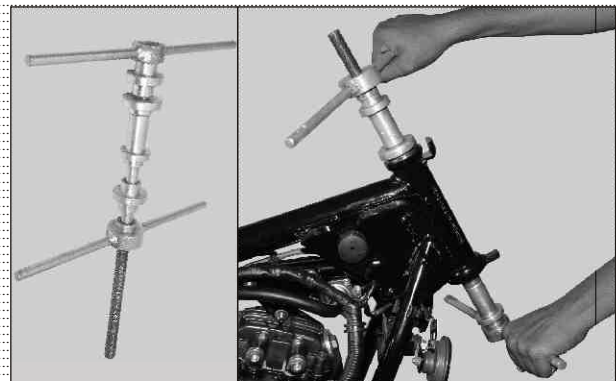


Fig. 1.9

### 4. Holder assembly magneto - M1310010

- To hold magneto rotor while loosening or tightening the nut magneto. (Fig 1.10)

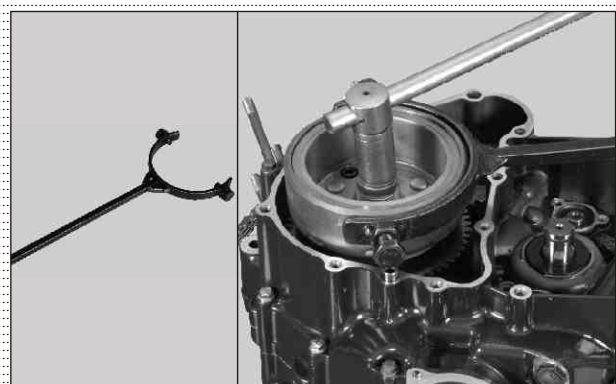


Fig. 1.10



## 5. Puller assembly magneto - M1310020

- To remove magneto rotor from the crankshaft assembly. (Fig 1.11)

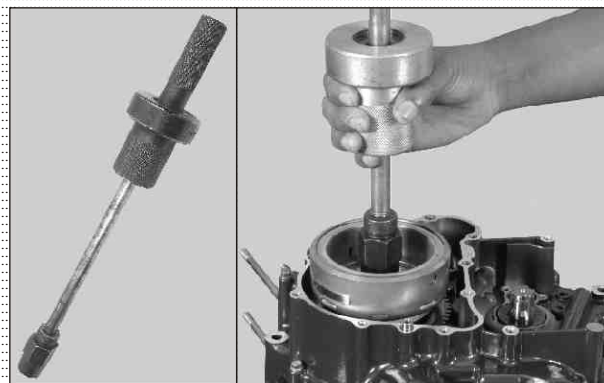


Fig. 1.11

## 6. Tappet adjuster - M1310070

- Used to loosen and tighten the tappet adjusting screw. (Fig 1.12)

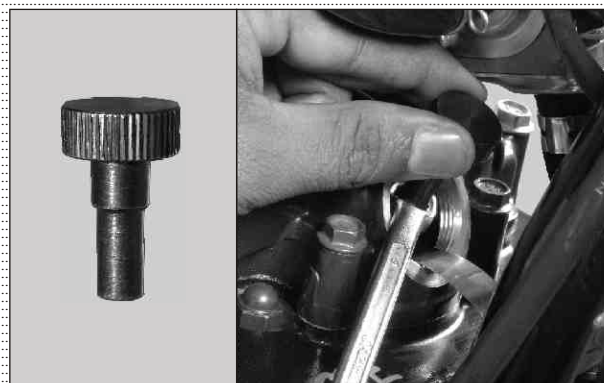


Fig. 1.12

## 7. Puller assembly crankcase - M1310110

- To separate crankcase Land R. (Fig 1.13)

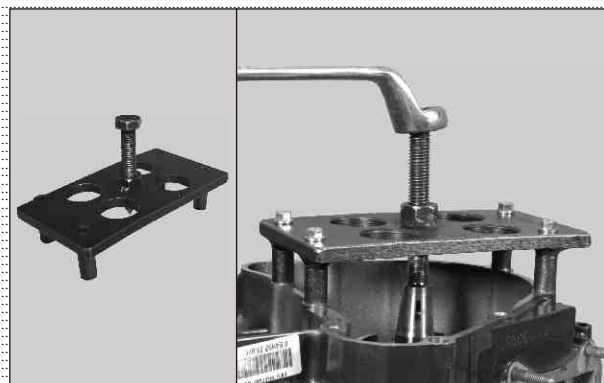


Fig. 1.13

## 8. Holder front fork cylinder - M1310160

- To hold the front fork piston while removing or assembling piston bolt in GIL make leg assy. (Fig 1.14)

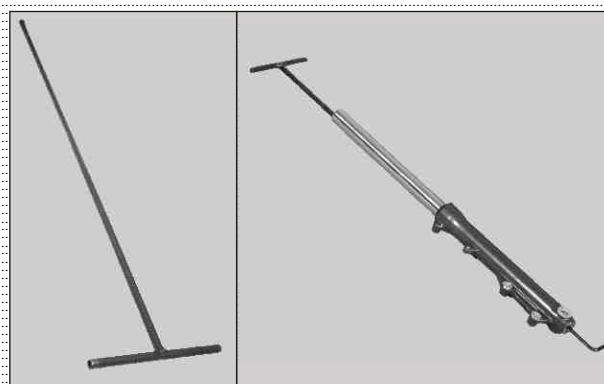


Fig. 1.14



## 9. Clutch holding tool - N2310010

- To hold disc clutch pressure while loosening and tightening the nut clutch shaft. (Fig 1.15)

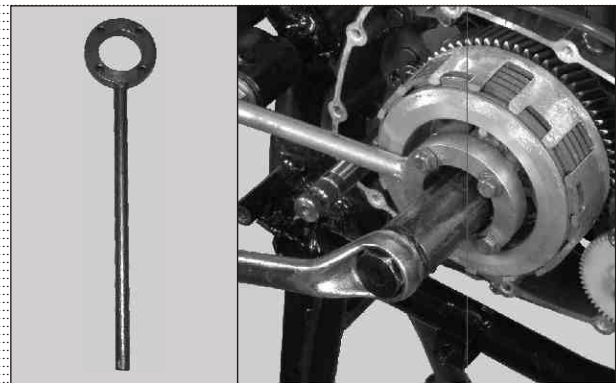


Fig. 1.15

## 10. Clutch nut tightening tool - N2310020

- Used to loosen and tighten the nut clutch shaft. (Fig 1.16)

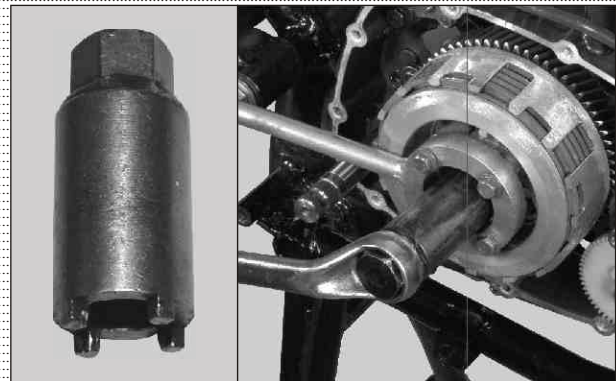


Fig. 1.16

## 11. Mandrel gear shaft oil seal - N2310070

- To install oil seal in gear shift shaft. (Fig 1.17)

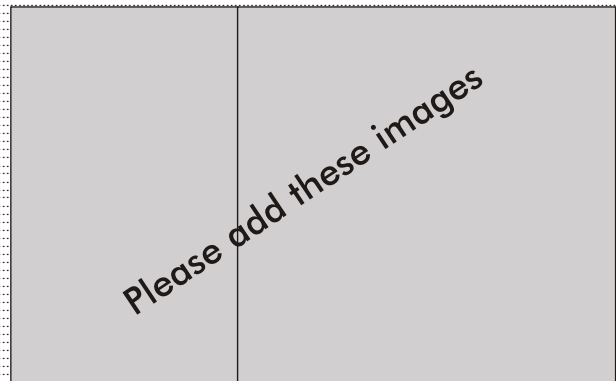


Fig. 1.17

## 12. Mandrel drive shaft R side bearing - N2310080

- To install oil seal in kick starter shaft. (Fig 1.18)

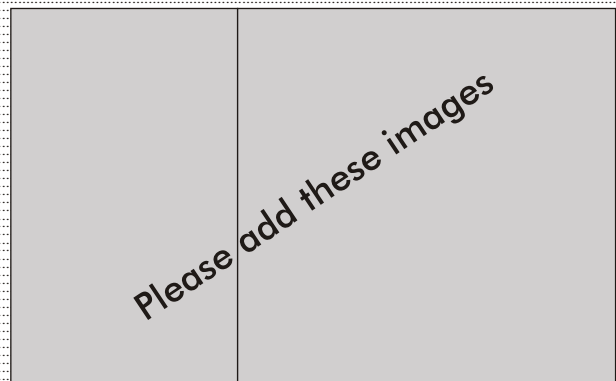


Fig. 1.18



## 13.Extractor assembly inlet and exhaust valve - S1310020

- To remove and install the inlet & exhaust valve cottervalves. (Fig 1.19)

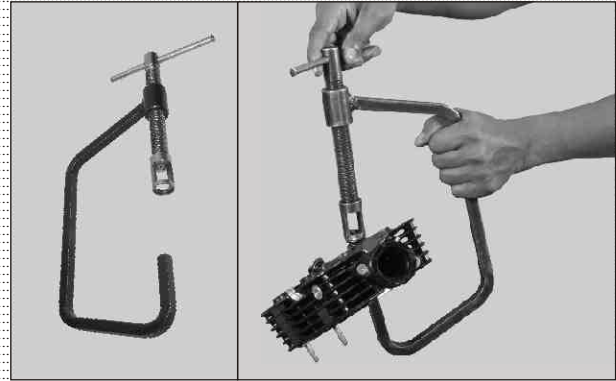


Fig. 1.19

## 14.Extractor main bearing - S1311110

- To remove main bearing from crankshaft. (Fig 1.20)



Fig. 1.20



## PERIODIC MAINTENANCE

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

**Note:**

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

2

**PERIODIC MAINTENANCE SCHEDULE - FREE SERVICES**

| ITEM                                      | Period<br>km | 1 month<br>500 - 600 | 3 months<br>2000 - 2500 | 6 months<br>4500 - 5000 | 9 months<br>7500 - 8000 | 12 months<br>11500 - 12000 |
|-------------------------------------------|--------------|----------------------|-------------------------|-------------------------|-------------------------|----------------------------|
| Engine cum transmission oil               |              | R                    | R                       | R                       | R                       | R                          |
| Oil filter                                |              | R                    | R                       | R                       | R                       | R                          |
| Oil sump filter                           |              | I & C                | I & C                   | I & C                   | I & C                   | I & C                      |
| Spark plug                                |              | I & C                | I & C                   | I & C                   | R                       | I & C                      |
| Compression pressure                      |              | —                    | —                       | I                       | —                       | I                          |
| Air cleaner elements <sup>2</sup>         |              | I & C                | I & C                   | I & C                   | I & C                   | I & C                      |
| Engine pipe breather                      |              | —                    | C                       | C                       | C                       | C                          |
| Carburettor assembly <sup>3</sup>         |              | —                    | C & A                   | C & A                   | C & A                   | C & A                      |
| Tappet clearance <sup>3</sup>             |              | I & A                | I & A                   | I & A                   | I & A                   | I & A                      |
| Fuel cock sediment bowl                   |              | C                    | C                       | C                       | C                       | C                          |
| Clutch cable                              |              | I & A                | I & A                   | I & A                   | I & A                   | I & A                      |
| Throttle cable                            |              | —                    | I & A                   | I & A                   | I & A                   | I & A                      |
| Steering play & smooth operation          |              | I & A                | I & A                   | I & A                   | I & A                   | I & A                      |
| All fasteners <sup>3</sup>                |              | I & A                | I & A                   | I & A                   | I & A                   | I & A                      |
| Drive chain <sup>3</sup>                  |              | C, L & A             | C, L & A                | C, L & A                | C, L & A                | C, L & A                   |
| All bulbs and horn                        |              | I                    | I                       | I                       | I                       | I                          |
| Head lamp beam                            |              | I & A                | I & A                   | I & A                   | I & A                   | I & A                      |
| Battery electrolyte level                 |              | I & T                | I & T                   | I & T                   | I & T                   | I & T                      |
| Specific gravity and voltage <sup>4</sup> |              | I                    | I                       | I                       | I                       | I                          |
| Brakes                                    |              | I & A                | I & A                   | I & A                   | I & A                   | I & A                      |
| Tyres (air pressure)                      |              | I & A                | I & A                   | I & A                   | I & A                   | I & A                      |
| Idling CO%                                |              | I & S                | I & S                   | I & S                   | I & S                   | I & S                      |

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

<sup>2</sup>Replace parts if necessary    <sup>3</sup>If necessary    <sup>4</sup>Recharge if necessary

(.....contd.)





## PERIODIC MAINTENANCE SCHEDULE - PAY SERVICES

| ITEM                                      | Period<br>km | 15 months<br>14500-15000 | 18 months<br>17500-18000 | 21 months<br>20500-21000 | 24 months<br>23500-24000 | 27 months<br>26500-27000 | 30 months<br>19500-30000 |
|-------------------------------------------|--------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Engine cum transmission oil               |              | R                        | R                        | R                        | R                        | R                        | R                        |
| Oil filter                                |              | R                        | R                        | R                        | R                        | R                        | R                        |
| Oil sump filter                           |              | I & C                    | I & C                    | I & C                    | I & C                    | I & C                    | I & C                    |
| Spark plug                                |              | R                        | I & C                    | I & C                    | R                        | I & C                    | R                        |
| Compression pressure                      |              | –                        | I                        | I                        | I                        | I                        | I                        |
| Air cleaner elements <sup>2</sup>         |              | I & C                    | I & C                    | I & C                    | I & C                    | I & C                    | I & C                    |
| Engine breather pipe                      |              | C                        | C                        | C                        | C                        | C                        | C                        |
| Carburettor assembly <sup>3</sup>         |              | C & A                    | C & A                    | C & A                    | C & A                    | C & A                    | C & A                    |
| Tappet clearance <sup>3</sup>             |              | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    |
| Head cylinder / piston                    |              | –                        | D                        | –                        | –                        | –                        | –                        |
| Fuel cock sediment bowl                   |              | C                        | C                        | C                        | C                        | C                        | C                        |
| Clutch cable                              |              | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    |
| Throttle cable                            |              | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    |
| Steering play & smooth operation          |              | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    |
| Front fork oil                            |              | –                        | R                        | –                        | –                        | –                        | –                        |
| All fasteners <sup>3</sup>                |              | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    |
| Drive chain <sup>3</sup>                  |              | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    |
| All bulbs and horn                        |              | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    |
| Head lamp beam                            |              | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    |
| Battery electrolyte level                 |              | I & T                    | I & T                    | I & T                    | I & T                    | I & T                    | I & T                    |
| Specific gravity and voltage <sup>4</sup> |              | I                        | I                        | I                        | I                        | I                        | I                        |
| Brakes                                    |              | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    | I & A                    |
| Tyres (air pressure)                      |              | I & T                    | I & T                    | I & T                    | I & T                    | I & T                    | I & T                    |
| Idling CO%                                |              | I & S                    | I & S                    | I & S                    | I & S                    | I & S                    | I & S                    |

R - Replace, C - Clean, I - Inspect, T - Top up, A - Adjust, D - Decarbonise, TI - Tighten, S - Set

<sup>2</sup>Replace parts if necessary    <sup>3</sup>If necessary    <sup>4</sup>Recharge if necessary



## LUBRICATION SCHEDULE

Running parts must be lubricated periodically. Insufficient lubrication will cause rapid wear and severe damages to the components. Lubricate following parts as per the schedule:

| ITEM                          | Period<br>KM | INITIAL<br>500 - 600                                    | EVERY<br>2000 - 2500 | EVERY<br>4500 - 5000 | EVERY<br>9500 - 10000 |
|-------------------------------|--------------|---------------------------------------------------------|----------------------|----------------------|-----------------------|
| Throttle grip                 |              | –                                                       | –                    | –                    | Grease                |
| Brake cam                     |              | –                                                       | –                    | Grease               | Grease                |
| Kick starter pedal pivot      |              | SAE 20W40                                               | SAE 20W40            | SAE 20W40            | SAE 20W40             |
| Brake pedal shaft             |              | Grease                                                  | Grease               | Grease               | Grease                |
| Throttle cable & clutch cable |              | 4T oil                                                  | 4T oil               | 4T oil               | 4T oil                |
| Drive chain                   |              | Recommended chain spray                                 |                      |                      |                       |
| Steering stem races           |              | Clean and lubricate with fresh Grease at every 12000 km |                      |                      |                       |
| Swing arm races               |              | Clean and lubricate with fresh Grease every year        |                      |                      |                       |

### Warning:

Do not apply more grease on cam brakes. The grease may get on to the brake shoe linings resulting in brake slippage.

### Note:

Before lubricating each part, clean them thoroughly, remove rusty spots if any. Lubricate exposed parts which are subjected to rust with either engine oil or grease whenever the vehicle is used / operated under wet or rainy conditions.



## 21 FREE SERVICE CHECK POINTS

### 1. Oil change and oil level check

- Check oil level on the gauge, make sure that oil level is between minimum and maximum level. (Fig. 2.1A) (Refer page no 2-13 for oil change procedure.)
- While changing engine oil, inspect strainer for any damage. Replace if required. (Fig. 2.1B)

|              |                           |
|--------------|---------------------------|
| Oil Quantity | 1000 ml (during service)  |
|              | 1100 ml (during overhaul) |

Replace engine oil at every service.

### 2. Oil filter change

- Change oil filter at every service. (Fig. 2.2) (Refer page no 2-14 for oil filter changing procedure.)

Replace oil filter at every service with new one.

### 3. Air filter cleaning

- Check filter element for any damage at every service. Replace if necessary.
- Clean filter complete air by immersing it in suitable solvent (Kerosene) and wash thoroughly. (Fig. 2.3) (Refer page no 2-10 for air filter cleaning procedure.)

### 4. Carburettor

- Inspect carburettor venturi for any black carbon deposition, clean it thoroughly. (Fig. 2.4B) (Refer chapter 4 - Fuel, lubrication and exhaust system page 4-9 for further details.)
- Check idle RPM, adjust if necessary. (Fig. 2.4B) (Refer page no 2-12 for idle rpm adjustment procedure.)

|          |                |
|----------|----------------|
| Idle RPM | 1400 $\pm$ 100 |
|----------|----------------|

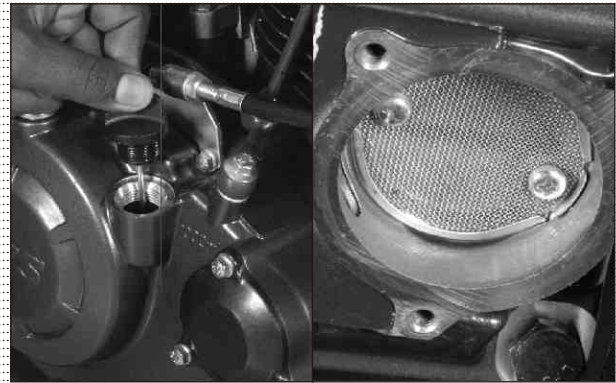


Fig. 2.1A

Fig. 2.1B

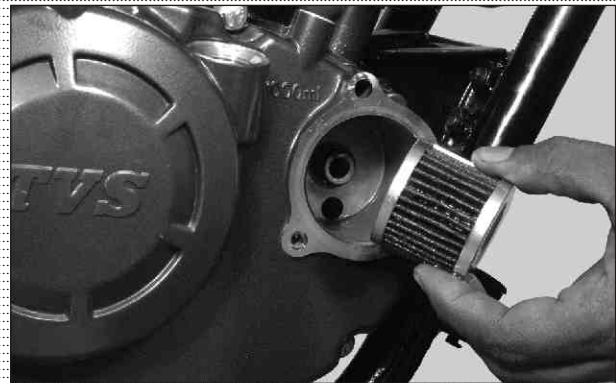


Fig. 2.2



Fig. 2.3



Fig. 2.4A

Fig. 2.4B



## 5. Spark plug cleaning

- Check the colour of spark plug and clean at every service. (Fig. 2.5) (Refer page no 2-19 for further details)

Replace spark plug with a new one at every 8000 kms.

Spark plug

BOSCH UR5DDC

### Caution:

Do not adjust the spark plug electrode gap. It is strictly not recommended

## 6. Valve and tappet clearance

- Check and reset tappet clearance if necessary. (Fig. 2.6) (Refer page no 2-17 for further details)

| Valve       | Standard |
|-------------|----------|
| Inlet valve | 0.06 mm  |
| Exhaust     | 0.08 mm  |

## 7. Steering adjustment and handle bar freeness

- Check handle bar freeness, adjust if necessary. (Fig. 2.7) (Refer page no 2-37 for further details)

## 8. Fuel line check

- Inspect fuel hose for any damage. Also clean fuel cock sediment bowl. (Fig. 2.8) (Refer chapter 4 - Fuel, lubrication and exhaust system for fuel cock cleaning procedure.)



Fig. 2.5



Fig. 2.6



Fig. 2.7

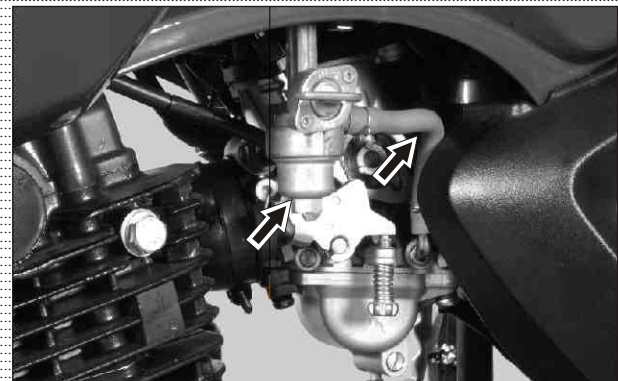


Fig. 2.8



## 9. Chain adjustment

- Inspect drive chain for slackness, adjust the slackness if found more or less than specified limit. (Fig. 2.9) (Refer page no 2-34 for chain adjustment procedure.)

|           |            |
|-----------|------------|
| Slackness | 20 - 30 mm |
|-----------|------------|

- Lubricate drive chain periodically for better performance.



Fig. 2.9

## 10. Brake fluid level check

- Check front brake fluid level, if found below the lower level top up with fresh brake fluid. (Fig. 2.10) (Refer page no 2-23 for further details.)

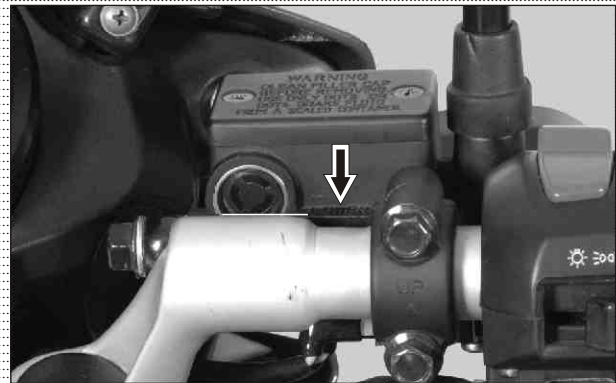


Fig. 2.10

- Also check rear brake fluid level (In Apache RTR DD), ensure that brake fluid is between minimum and maximum level. (Fig. 2.11) (Refer page no 2-28 for further details.)
- Replace the brake fluid, once in a year or every 20000kms.



Fig. 2.11

## 11. Rear brake adjustment

- Check rear brake free play (In case of rear drum brake model), adjust if necessary. (Fig. 2.12) (Refer page no 2-27 for brake adjusting procedure.)

|           |            |
|-----------|------------|
| Free play | 15 - 25 mm |
|-----------|------------|



Fig. 2.12





## 12. Brake switches

- Check proper working of brake switches and adjust the rear brake switch if necessary. (Fig. 2.13)



Fig. 2.13

## 13. Throttle free play adjustment

- Check throttle free play, and set the play if required. (Fig. 2.14) (Refer page no 2-22 for throttle free play adjustment procedure.)
- Check smooth operation of grip comp throttle, lubricate inner cable if necessary.

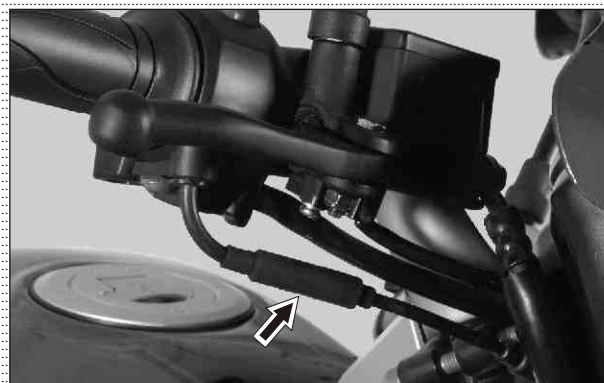


Fig. 2.14

## 14. Clutch lever play adjustment

- Measure free play at lever end. If play found more or less, adjust it to specified level. (Fig. 2.15) (Refer page no 2-22 for clutch free play adjustment procedure.)

|           |           |
|-----------|-----------|
| Free play | 5 - 10 mm |
|-----------|-----------|



Fig. 2.15

## 15. Check all switches and bulbs

- Check proper functioning of all switches and bulbs. (Fig. 2.16)



Fig. 2.16



## 16. Check all bolts and nuts

- Check tightness of bolts and nuts, especially engine mounting, front and rear wheel axle nuts, and swing arm mounting. (Fig. 2.17)



Fig. 2.17

## 17. Head lamp beam adjustment

- Check head lamp beam position and adjust if required. (Fig. 2.18) (Refer page no 2-21 for head lamp beam adjustment procedure.)

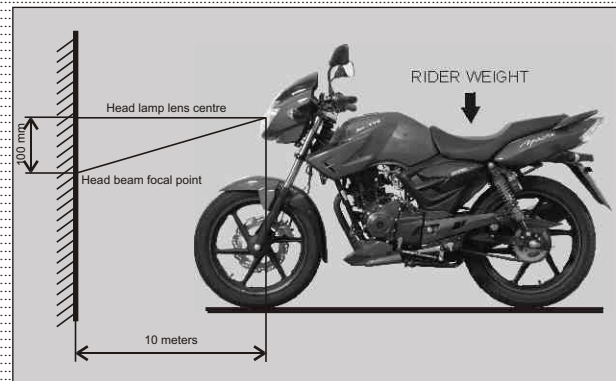


Fig. 2.18

## 18. Battery top up and voltage check

- Check battery electrolyte level. It should be between minimum and maximum level. If not top up with distilled water only.
- Check battery voltage. If voltage is lesser than 12V, charge the battery. (Fig. 2.19) (Refer page no 2-20 for further details.)

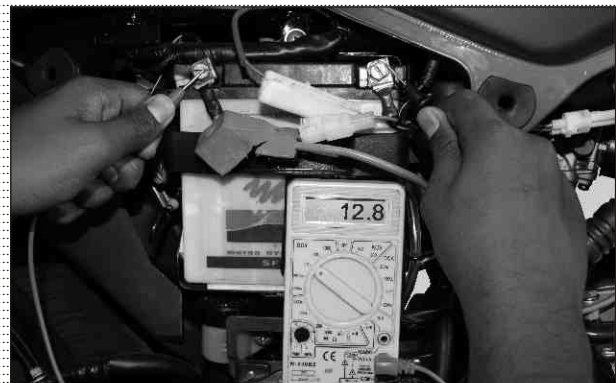


Fig. 2.19

## 19. Tyre pressure check

- Check tyre pressure and maintain specified tyre pressure for good road stability and longer tyre life. Inflate tyres to the pressure as given below. (Fig. 2.20)

| Tyre pressure | Front<br>Kg/cm <sup>2</sup> (psi) | Rear<br>Kg/cm <sup>2</sup> (psi) |
|---------------|-----------------------------------|----------------------------------|
| Solo riding   | 1.75 (25)                         | 2.00 (28)                        |
| Dual riding   | 1.75 (25)                         | 2.25 (32)                        |



Fig. 2.20



## 20. Emission check

- Check and set CO level at engine idling speed. (Fig. 2.21) (Refer chapter 4 - Fuel, lubrication and exhaust system for carburettor cleaning procedure.)

|                      |           |
|----------------------|-----------|
| Idling CO% (RTR-160) | 0.8 ~ 1.8 |
| Idling CO% (RTR-180) | 2 ~ 3     |

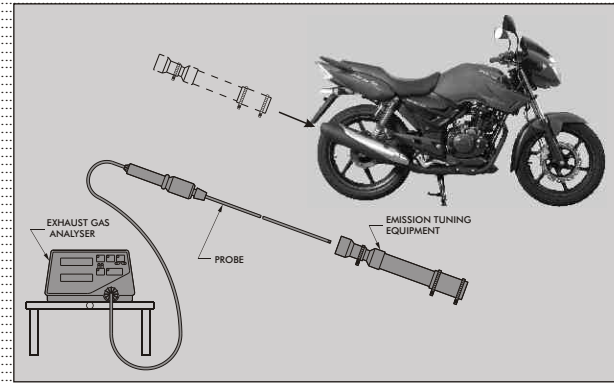


Fig. 2-21

## 21. Test drive

- Test drive the vehicle and ascertain smooth functioning of all controls and parts.
- Clean the vehicle before delivery.





## MAINTENANCE AND TUNE-UP PROCEDURE

### AIR CLEANER ASSEMBLY

Inspect and clean at initial 500 km and every 3000 km there after. Replace the parts if necessary.

- The clogged air cleaner assembly increases the resistance for air intake, resulting in decreased power output and increased fuel consumption. Check and clean the filter complete air cleaner in the following procedure:
- Loosen and remove (M6X16 - 1 no.) CRR pan head screw from cover frame L mounting. (Fig. 2.22)

Phillips head screw driver

- Take out cover frame L by carefully dislocating it from lugs.

- Loosen and remove CRR pan head screws (M5x16 - 4 nos.) Take out inlet complete air cleaner and trap complete flame along with the filter complete air cleaner. (Fig. 2.23)

Phillips head screw driver

- Separate the filter complete air cleaner (both layers) from trap complete flame (Fig. 2.24)

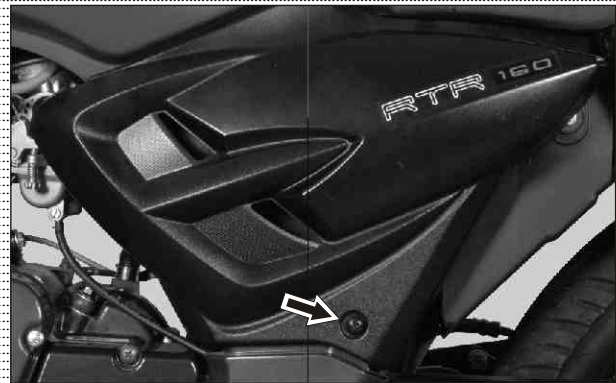


Fig. 2.22

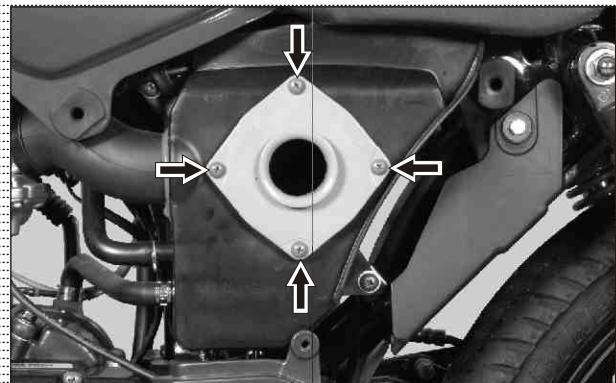


Fig. 2.23



Fig. 2.24



- Fill a pan of suitable size with cleaning solvent (Kerosene). Immerse the filter complete air cleaner in solvent and wash it thoroughly. (Fig. 2.25)

**Caution:**

**Do not use benzene for cleaning the filter complete air cleaner.**

- Squeeze the solvent off the washed filter by pressing it between palms of hands. Do not twist or wring the filter, else it will develop fissures.
- Immerse the filter in a pool of 4T oil, and squeeze the excess oil off the filter to make it slightly wet.
- Clean case complete air cleaner thoroughly.
- Reassemble parts in the reverse order of dismantling.

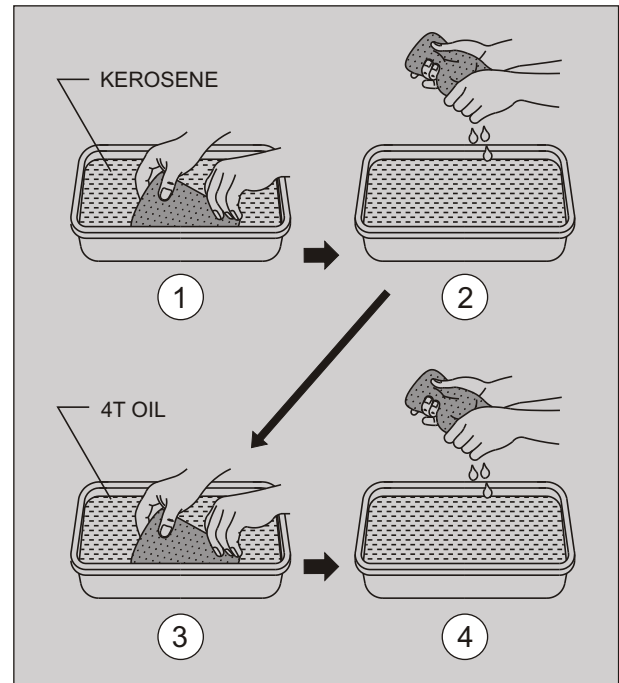


Fig. 2.25

**Caution:**

**Before and after cleaning operation, examine the filter complete air cleaner for any tear or cut. Replace if found torn or cut.**

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

Check that gasket inlet (A) and gasket trap flame (B) is intact and in good condition. (Fig. 2.26)

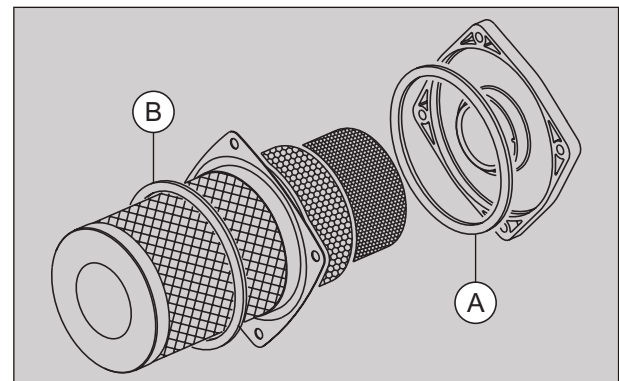


Fig. 2.26

## CARBURETTOR ASSEMBLY

**Clean & adjust at every 3000 km**

- If engine performance is good, the adjuster (A) (MCS screw) need not be disturbed. The idling speed can be adjusted only by the adjuster (B) (idling screw) to  $1400 \pm 100$  rpm. Rotating the adjuster in clockwise direction increases the rpm and rotating in counter clockwise decreases the rpm. (Fig. 2.27)

**Note:**

**Inspect and set idling speed after attending other maintenance jobs.**

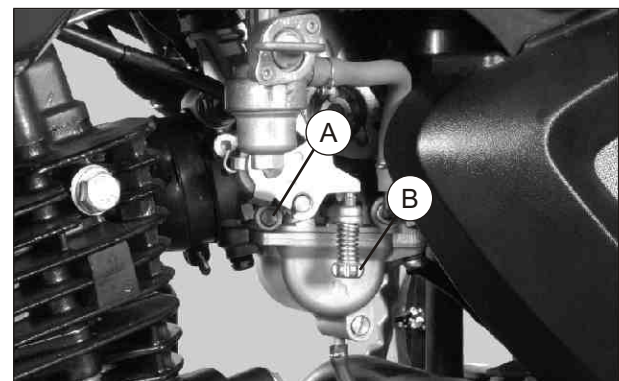


Fig. 2.27



- If there is performance deterioration, clean the carburettor and tune.

**Note:**

Before tuning carburettor, correct the free play of cable assembly throttle to 1.0 mm to 2.0 mm. (refer page no. 2-22 for details)

**Tune the carburettor as mentioned below:**

- Turn the mixture volume control screw, to specified turns out from the fully in (tight) position. (Fig. 2.28)

|                | MCS Position |
|----------------|--------------|
| Apache RTR 160 | $2 \pm 1$    |
| Apache RTR 180 | $3 \pm 2$    |

Flat screw driver (small)

**Caution:**

Do not over tighten the mixture volume control screw against its seat as it will damage the mixing body assembly and its seating.

- Start the engine and allow it to warm up.
- Connect tachometer cord to the H.T. Lead to know the engine rpm.

Tachometer

- Adjust idling screw so that engine rpm idles at  $1400 \pm 100$  rpm. (Fig. 2.29)
- After adjusting idling rpm check CO% and readjust the mixture volume control screw if necessary. (refer chapter "Fuel, lubrication and exhaust system" page no. 4-11 for details).

**Cleaning Procedure**

- For removing, dismantling and cleaning of the carburettor assembly (refer chapter "fuel, oil and exhaust system" page no. 4-9)

**Note:**

After remounting carburettor assembly check for smooth operation of grip complete throttle

**HOSE FUEL**

Replace at every three years

- Inspect hose fuel and connections for any damage and leakage (Fig 2.30). If any leakage noticed, replace the part.



Fig. 2.28



Fig. 2.29

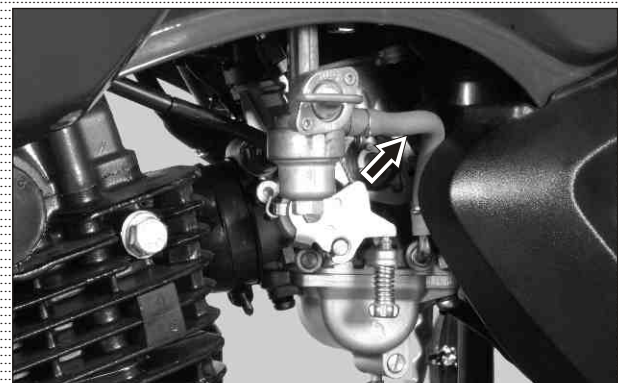


Fig. 2.30



## CAP FUEL STRAINER

**Change at initial 500 km and every 3000 km there after.**

- Dirty cup fuel strainer with sediment or water, affects the smooth flow of benzine and may cause loss of engine power.
- Loosen and remove cup fuel strainer retaining cock assembly fuel in 'OFF' position. (Fig. 2.31)

10mm spanner

- Remove 'O' ring and filter. (Fig. 2.32)
- Clean filter and cup fuel strainer.
- Reassemble parts in the reverse order of removal.

## ENGINE CUM TRANSMISSION OIL CHANGE

**Replace at initial 500 km and every 3000 km there after.**

- After certain period of use, the engine cum transmission oil will get contaminated and accelerates the wear of sliding and interlocking surface. Replace engine cum transmission oil periodically by following the procedure given below:
- Start the engine and allow it to warm up. Remove gauge oil level to facilitate easy draining of oil. (Fig. 2.33)
- Keep a bowl under the engine.
- Loosen and remove hexagonal flange head bolts (M6x20 - 3 nos.). (Fig. 2.34)

8 mm spanner

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

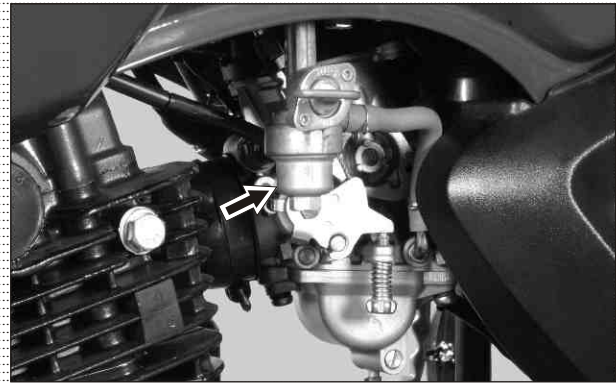


Fig. 2.31

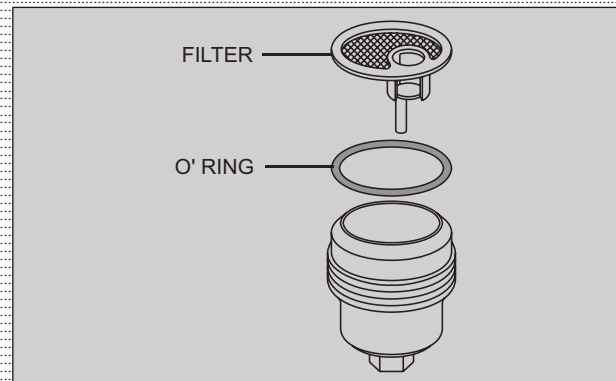


Fig. 2.32

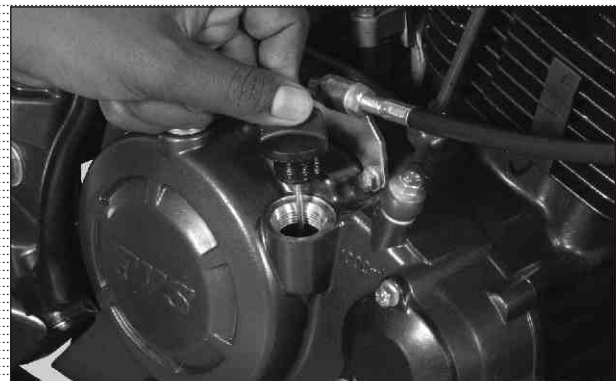


Fig. 2.33

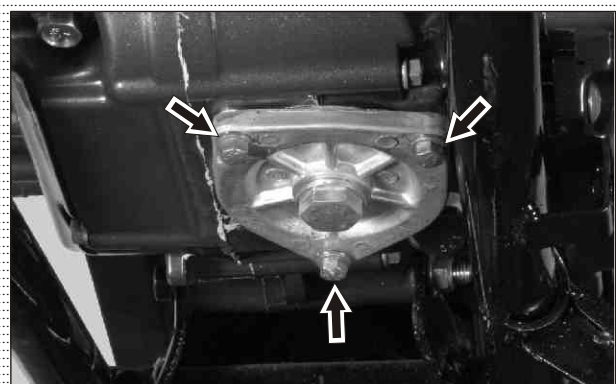


Fig. 2.34



# PERIODIC MAINTENANCE



- Loosen CRR pan head screw (M4x10 - 2 nos.) and remove the strainer complete engine oil. (Fig. 2.35) Inspect strainer for any damage. Replace if necessary. Otherwise clean and reassemble in the reverse order of removal.

## Note:

While reassembling, ensure that 'O' ring is fitted in cap oil strainer.

- Fill recommended 4T oil. (refer chapter "general information" page no. 1-9 for oil recommendation)

|              |                          |
|--------------|--------------------------|
| Oil Quantity | 1000 ml (During service) |
|              | 1100 ml(During overhaul) |

- Reassemble gauge oil level.

## ENGINE CUM TRANSMISSION OIL LEVEL

- Place the vehicle on centre stand on a flat surface.
- Unscrew gauge oil level and wipe it cleanly. Insert the gauge into its position by threading in.
- Check oil level. The oil level should be between minimum and maximum level. (Fig. 2.36)
- If oil level is below the minimum level, top-up with the recommended oil upto the maximum level.
- Reassemble gauge oil level.

## FILTER COMPLETE ENGINE OIL

Replace at initial 500 km and every 3000 km there after.

- Before removing filter complete engine oil, drain the engine cum transmission oil as per the procedure mentioned above.
- Loosen and remove hexagonal flange bolts (M6x65 - 2 nos. and M6x16 - 1 no.). (Fig. 2.37)

8 mm spanner

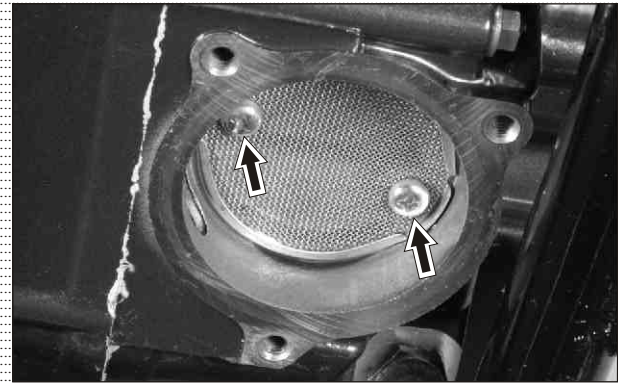


Fig. 2.35

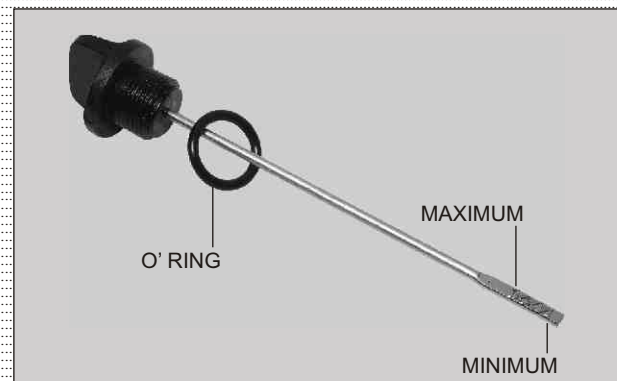


Fig. 2.36

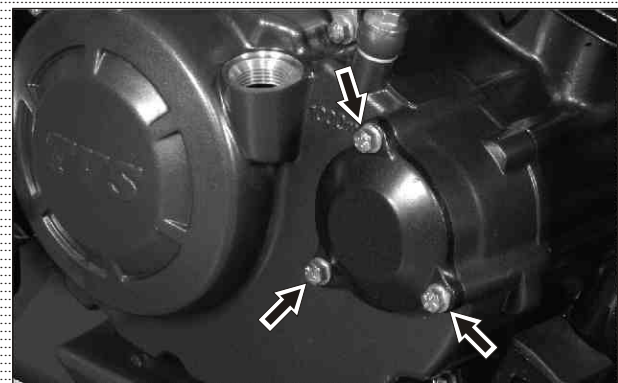


Fig. 2.37

## PERIODIC MAINTENANCE



- Remove cap oil filter along with 'O' ring and spring oil filter cap.
- Remove filter complete engine oil (A) and 'O' ring (B). (Fig. 2.38)

### Note:

Keep a bowl while opening cap oil filter to collect the left over oil.

While reassembling, remember to assemble the 'O' rings (A & D) and spring oil filter (B). (Fig. 2.39)

Locate seal end (C) of the filter towards crankshaft. (Fig. 2.39)

Whenever the filter complete engine oil is replaced, it is recommended that the engine cum transmission oil is also replaced.

- Reassemble parts in the reverse order of dismantling.

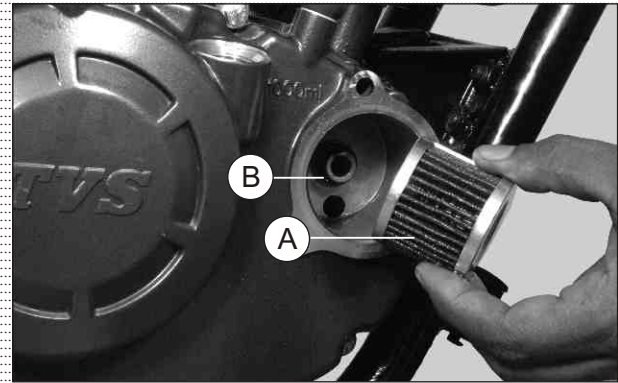


Fig. 2.38

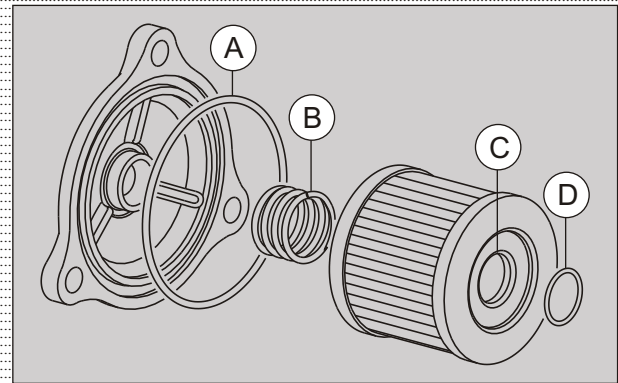


Fig. 2.39

## COMPRESSION PRESSURE

Inspect every 6000 km upto 18000 km and every 3000 km there after.

- Warm-up the engine to normal operating temperature before starting test.
- Switch off the engine, disconnect sparkplug cap and remove sparkplug.
- Mount the compression gauge adaptor to spark plug hole ensuring no leak. (Fig. 2.40)

### Compression gauge and special adaptor

- With the fuel cock knob and ignition switch in 'OFF' position, open the throttle fully. Now crank the engine by kick starter for five to six kicks. Note the highest reading on compression gauge, it is compression pressure.

### Compression Pressure

|               |                                            |
|---------------|--------------------------------------------|
| Standard      | 10 - 13 kg/cm <sup>2</sup> (142 - 184 psi) |
| Service Limit | 8 kg/cm <sup>2</sup> (113 psi)             |



Fig. 2.40

2



- If compression pressure is high, it indicates high carbon deposition on combustion chamber and piston crown.
- If compression pressure is low, pour 3 to 5 cc of fresh engine oil into the cylinder through sparkplug hole and re-check the compression.
- If compression increases from previous value, check for:
  - Leaky gasket cylinder head.
  - Worn piston rings.
  - Worn cylinder and piston.
  - Piston ring struck in the grooves.
- If compression is same as the previous value, check the valves for leakage.

## HEAD COMPLETE CYLINDER, PISTON AND PISTON RINGS

**Decarbonise at every 18000 km.**

- Carbon deposits in the combustion chamber of head complete cylinder and on piston crown will increase the compression ratio and may cause pre-ignition or over heating. Carbon deposition at exhaust side of head complete cylinder will prevent smooth flow of exhaust, reducing the engine power output. Remove carbon deposits periodically using suitable cleaning solvent. (Fig. 2.41)

### Note:

**Decarbonise the combustion chamber after removing both the valves.**

- Ensure not to damage the surface of the combustion chamber while decarbonising.

## VALVE, GUIDE VALVE AND SEAT VALVE

**Decarbonise at every 18000 km.**

- Carbon deposits on valve stem (Fig. 2.42) rubs continuously on guide valve and this will result in increased clearance between the valve and guide valve.

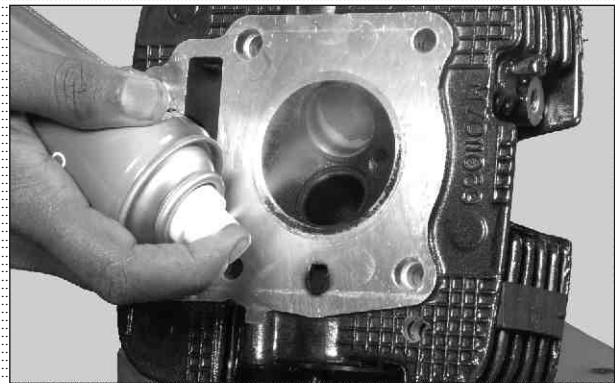


Fig. 2.41

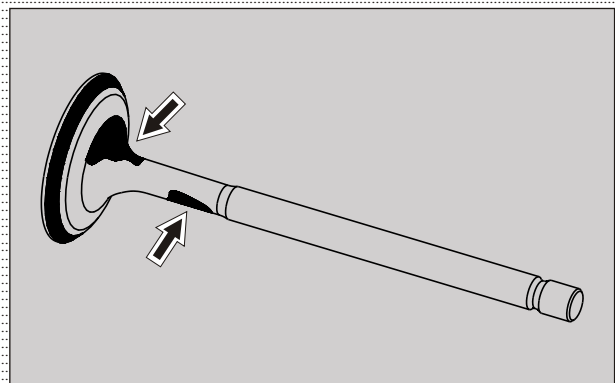


Fig. 2.42





- Check and clean carbon deposits on valve stem and guide valve.
- Carbon deposition on valve seating causes improper seating of valve, thereby causing leakage and this will affect idling rpm, pick up and fuel consumption. This will also lead to erratic running and starting trouble.
- Clean seat valve with benzine and inspect it for wear. Replace valve if there is any pitting or sharp edges at the seating area. (refer chapter "servicing of engine" for valve, guide valve and valve seat servicing procedure)

## VALVE (TAPPET) CLEARANCE

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

- Remove cover frame R by unlocking the cover frame lock using control key. (Fig. 2.43)
- Take out cover frame R by carefully dislocating it from the lugs.
- Gently pull out cable complete seat and take out the seat assembly by dislocating it from the lug. (Fig. 2.44)
- Turn fuel cock knob to 'OFF' position and disconnect fuel hose from the carburettor assembly.
- Remove hexagonal flange bolt (M8x25 - 1 no.) from the fuel tank mounting along with bush fuel tank rear mounting. (Fig. 2.45)
- Remove fuel tank complete from its position by dislocating it from the cushion fuel tank front and disconnecting fuel sender unit wiring socket.

### Note:

While reassembling fuel tank complete, ensure that fuel sender unit wiring socket is connected and fuel tank drain hose is routed properly.



Fig. 2.43

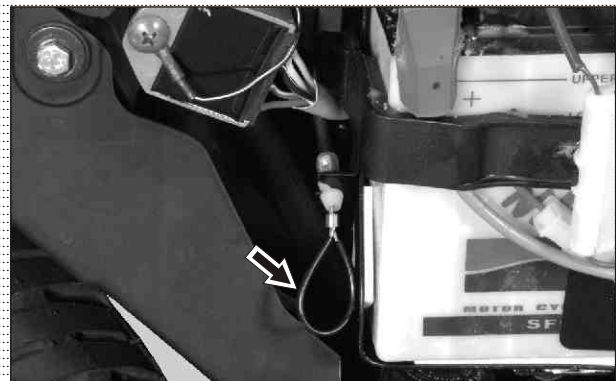


Fig. 2.44

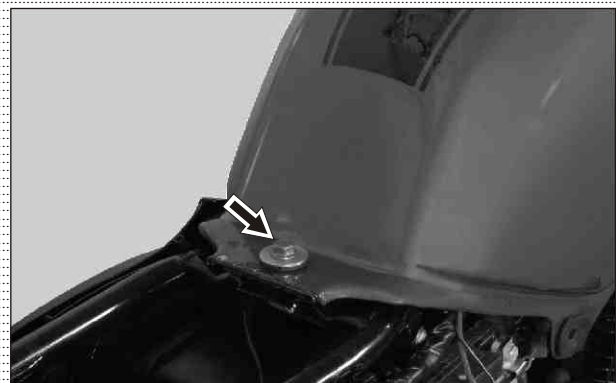


Fig. 2.45

## PERIODIC MAINTENANCE



- Disconnect HT (High Tension) card and remove the sparkplug (A). (Fig. 2.46)

Plug spanner

- Remove both the cap inspection hole (B). (Fig. 2.46)

17 mm spanner

- Remove plug TDC (A) and plug crankshaft hole (B). (Fig. 2.47)

17 mm spanner

10 mm allen key

- Align the TDC mark (A) on rotor assembly with centre of the inspection hole provided in the cover magneto by rotating the rotor assembly. (Fig. 2.48)

17 mm tubular spanner

### Note:

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

- Measure valve clearance when the engine is in cold condition. (Fig. 2.49)

0310100

Feeler gauge

| Valve       | Standard |
|-------------|----------|
| Inlet valve | 0.06 mm  |
| Exhaust     | 0.08mm   |

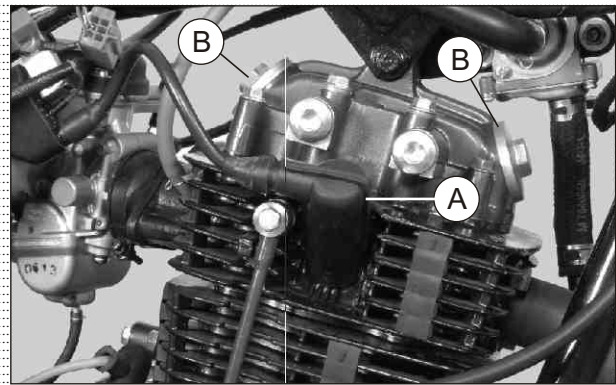


Fig. 2.46

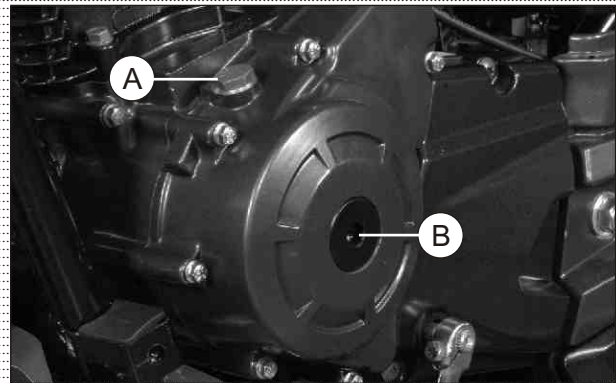


Fig. 2.47

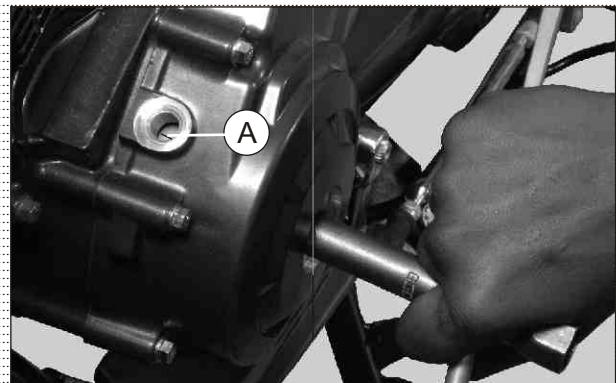


Fig. 2.48



Fig. 2.49



- If clearance measured is incorrect, loosen the nut tappet adjusting. (Fig. 2.50)

9 mm spanner

- Adjust valve clearance using a special tool. (Fig. 2.50)

M1310010 Tool, tappet adjuster

Feeler gauge

- After obtaining specified clearance tighten the nut tappet adjusting, holding the screw tappet adjusting in the same position using special tool.

## SPARKPLUG

- Check sparkplug for its type. (Fig. 2.51)

Sparkplug BOSCH UR5DDC

**Clean at initial 500 km and every 3000 km there after. Replace at every 8000 km.**

- It is very important to take special care for sparkplug, failing which it leads to starting problem and poor performance.
- Carbon deposits on sparkplug gap prevent good sparking and cause misfiring. Remove sparkplug and clean it properly.

### Caution:

**Before removing sparkplug, use compressed air to blow away any dirt around sparkplug mounting to prevent it from falling inside the cylinder. Close the plug hole with clean cloth.**

- Check spark plug for wear of central and ground electrodes. If either of them are worn-out replace the sparkplug with a new one.

### Caution:

**Do not adjust the spark plug electrode gap**

**Do not use flared steel cables to clean sparkplug.**

**Use only recommended make and type of sparkplug**

- Do not over tighten or cross thread the sparkplug as otherwise aluminium threads of head complete will be damaged.



Fig. 2-50



Fig. 2.51



## BATTERY ASSEMBLY

**Check and top-up at initial 500 km and every 3000 km there after.**

- Visually inspect the surface of battery assembly container. If any sign of cracking or electrolyte leakage from sides of the battery assembly are noticed, replace battery assembly with a new one.
- If the battery assembly lead terminals are found rusty with an acidic white powdery substance, then clean them with sand paper.
- Check output voltage of the battery.
- It should be more than 12.8 V when measured using a multimeter. (Fig. 2.52)

### Note:

**If battery output voltage is less than 11V, then the battery should be recharged**

- Add distilled water, as necessary to keep the surface of the electrolyte above the lower level line but not above the upper level line. (Fig. 2.53)

### Caution:

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

### Note:

**while removing the battery assembly terminals, remove '-ve' terminal first. While reconnecting, connect '+ve' terminal first.**

- Periodically check the electrolyte for specific gravity by using a hydrometer to find the state of charge. If battery is getting discharged frequently check the charging system. (Fig. 2.54)

**Electrolyte specific gravity at 30° C**

| Battery type | Charged | Under charged |
|--------------|---------|---------------|
| 12V9.0 Ah    | 1.28    | 1.24          |

- If specific gravity reading is not in normal condition, it indicates that battery assembly needs recharging. Recharge the battery assembly with constant current battery charger.

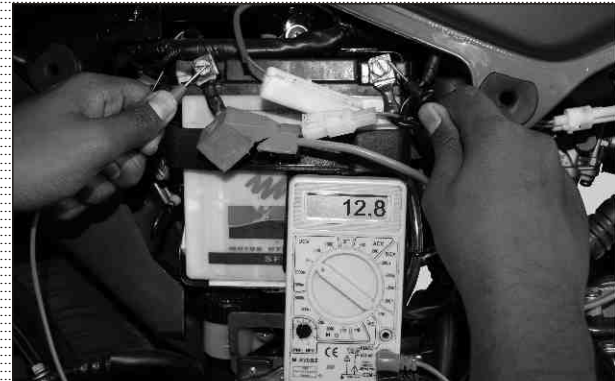


Fig. 2.52



Fig. 2.53

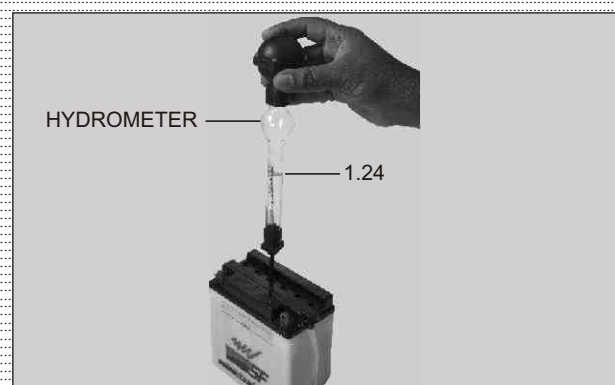


Fig. 2.54





## HEAD LAMP BEAM ADJUSTMENT

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

- Keeping the bike in a straight line, sit on the bike to aim the headlamp beam vertically. Focus headlamp high beam on a vertical screen, which is at a distance of 10 meters from the headlamp's centre point. Adjust headlamp assembly such that the focal point of high beam on the screen is 100 mm lower than the headlamp beam centre. (Fig. 2.55)

**Note:**  
Headlamp focus should be adjusted only when the headlamp is in high beam.

2

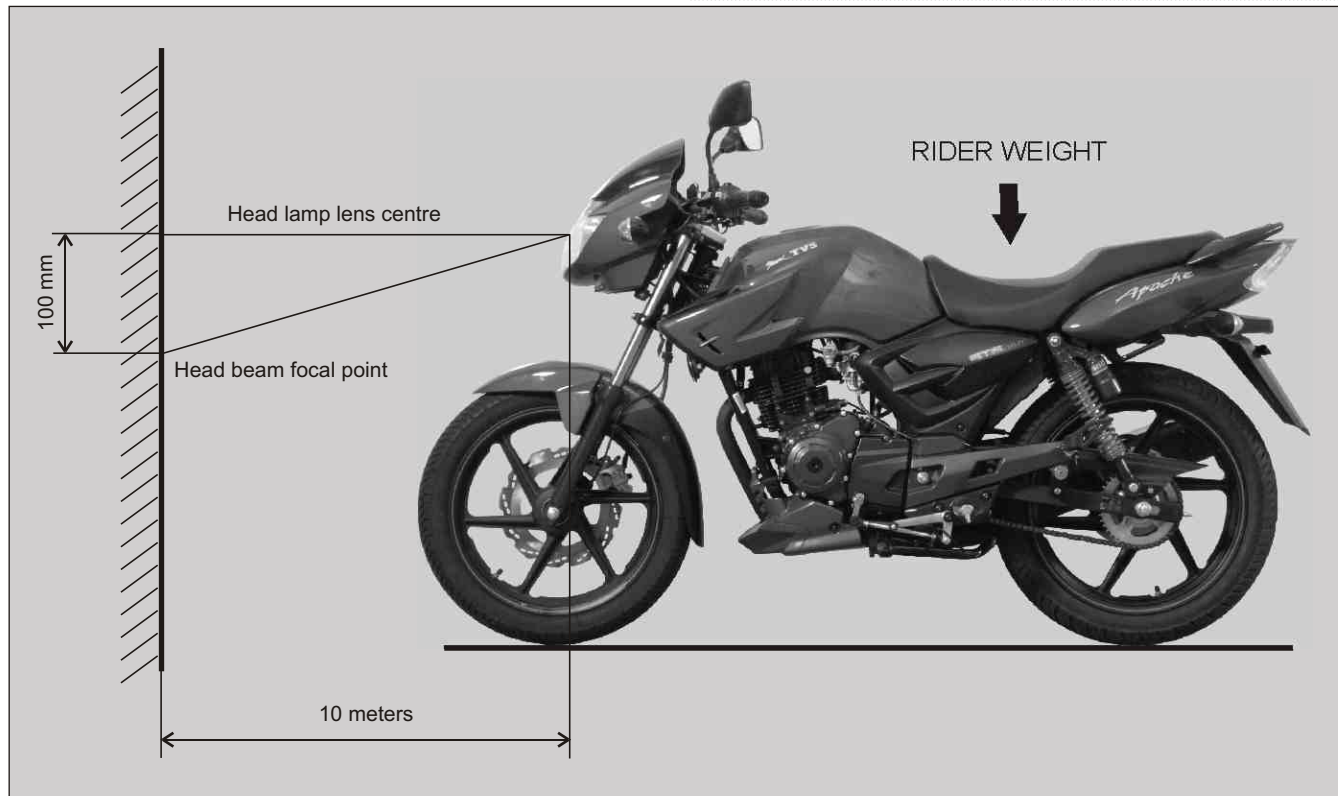


Fig. 2.55

- For adjusting the beam focus, slightly loosen hexagonal screw (M6x20 - 1 no) of housing headlamp front bottom mounting. (Fig. 2.56)
- Carefully adjust the headlamp assembly by pressing forward or reverse to obtain the specified focus length. Holding the headlamp in that position tighten the screw.



Fig. 2.56



## CABLE ASSEMBLY THROTTLE - FREE PLAY

**Inspect and adjust at every 3000 km.**

- For checking cable assembly throttle play, first dislocate the boot throttle (A) from its position. (Fig. 2.57)
- Gently pull the cable assembly throttle holding the adjuster (B) to check the free play. If free play is more or less adjust as follows:

|           |              |
|-----------|--------------|
| Free play | 1.0 - 2.0 mm |
|-----------|--------------|

- Loosen lock nut (A) and turn adjuster (B) 'in' or 'out' until the specified play is obtained. (Fig. 2.58)

8 mm spanner

- Tighten lock nut (A) while holding the adjuster (B) in place. (Fig. 2.58)
- After adjusting, start the vehicle, let the engine run in idle, turn the handle bar to extreme right and left, check whether idling rpm varies. If it varies check routing of cable and readjust the free play.

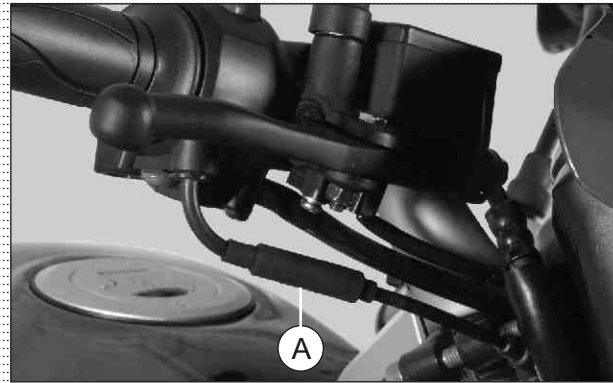


Fig. 2.57

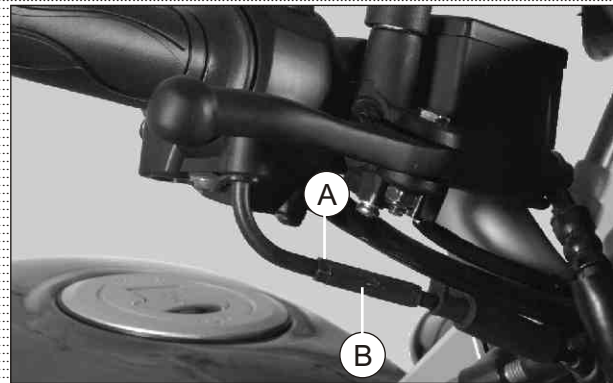


Fig. 2.58

## CABLE ASSEMBLY CLUTCH - FREE PLAY

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

- Cable assembly clutch free play is one of the most important adjustments, which may need to check regularly for smoother gear shifting and better life of the clutch plates.
- Measure free play at the lever assembly clutch end as shown in the figure (Fig. 2.59)

### Note:

**Adjust clutch play when the engine is in cold condition.**

|           |           |
|-----------|-----------|
| Free play | 5 - 10 mm |
|-----------|-----------|

- If play is more or less, loosen the lock nut (A) and turn the adjusting nut (B). Clockwise rotation reduces the play and counter clockwise rotation increases the play. After adjusting to specified play tighten the lock nut (A), holding the adjusting nut (B) in the that position. (Fig. 2.60)

12 mm spanner



Fig. 2.59

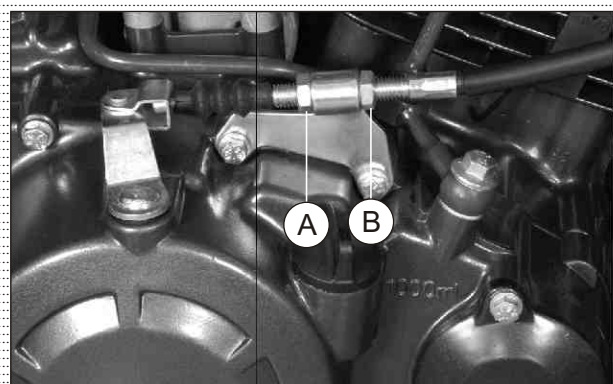


Fig. 2.60





## BRAKES

**Warning:**  
Brakes are for personal safety and should always be maintained in proper condition.

### FRONT BRAKE (DISC BRAKE)

Check and top-up brake fluid at initial 500 km and every 3000 km there after. Change the brake fluid and replace the primary, secondary cups of cylinder assembly master (piston kit) at every 20000 km. Replace hose complete brake at every three years.

#### Brake fluid and its handling

##### Inspecting brake fluid level

- Be sure to check fluid level in the reservoir. For inspecting brake fluid level, place the bike firmly on center stand with the handlebar positioned straight.
- If the level is found to be lower than the mark 'LOWER' provided on the reservoir, replenish the reservoir with the fresh brake fluid. (Fig. 2.61)

|             |                |
|-------------|----------------|
| Brake fluid | DOT 3 or DOT 4 |
|-------------|----------------|

**Note:**

Since the Glycol based brake fluid used by the manufacturer in these bikes, do not use, do not use or mix different types of fluid such as silicon based and petroleum based fluid for refilling the system, otherwise damage sustained will be serious.

Do not use any brake fluid taken out from old or used, or unsealed containers.

Ensure no water enters the brake fluid container. Because brake fluid has hygroscopic property, and its boiling point falls excessively if water is mixed with it.

Check brake hose for any cracks and hose joints for leakage.

**Caution:**

Do not squeeze the brake lever when the reservoir cap is removed, otherwise brake fluid will sometimes spill out.

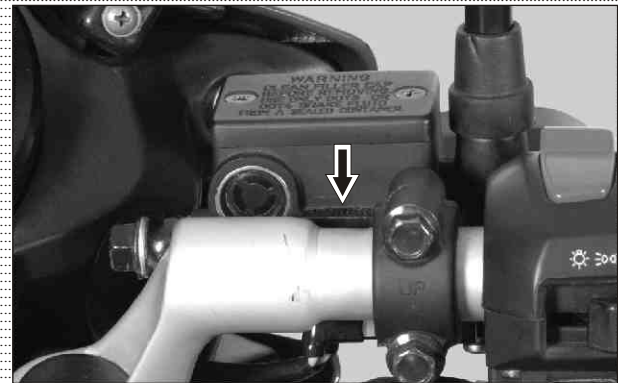


Fig. 2.61

**Caution:**

Do not put the removed reservoir cap on the speedometer or tachometer. Brake fluid will damage the paint surface and instrument cluster lenses.

**Air bleeding from brake system**

- If brake lever travel becomes excessive or the lever feels a soft or spongy feeling, air bleeding must be carried out as per following procedure:

**Note:**

It is best, if two persons perform air bleeding. Keep the fluid level in the reservoir just above the 'Lower' mark during the bleeding procedure.

1. Attach bleeder tube to the bleeder screw after removing the cap bleeder as shown in (Fig. 2.62). A transparent tube is useful in finding air bubble expelled from the system.
2. The open end of tube must be submerged in a clean container partially filled with brake fluid.
3. Fill the reservoir with the brake fluid.
4. Fix the cap on the reservoir to prevent a spout of brake fluid and entry of dust.
5. Develop pressure in the hydraulic system by operating rapidly the brake lever several times and then holding the lever tight.
6. Unscrew (open) the bleeder by half turn and depress the lever all the way inside. Do not release the lever until the bleeder screw is tightened fully. (Fig. 2.63)

10 mm spanner

7. Repeat step 5 and 6 until air bubbles disappear in the bleeder tube or container and screw in (close) the bleeder screw securely.
8. Remove bleeder tube and install the bleeder valve dust cap.
9. Check fluid level in the reservoir and replenish if necessary, after the completion of bleeding operation.
10. Reinstall diaphragm and tighten reservoir cap securely.

**Caution:**

Do not reuse the brake fluid drained from the system.



Fig. 2.62



Fig. 2.63



## Brake fluid replacement

- Boiling point of brake fluid falls considerably with absorption of moisture which may take place during a long period of use. Therefore, it is recommended to replace old brake fluid with fresh one periodically.

Replace brake fluid every 1 year or 20,000 km

- On changing brake fluid, extreme attention should be paid so as not to mix any foreign materials because they would block the return port of the master cylinder resulting in the brake dragging or squeaking.

When brake fluid needs to be changed, perform the following procedure:

1. Attach a bleeder tube to the bleeder. Drain out (old) brake fluid by squeezing the brake lever with bleeder opened condition until the brake fluid disappears in the bleeder tube.
2. Once the brake fluid is drained out from the system completely, carry out the same procedure as described in 'air bleeding' from brake system.

## Hose complete brake

- Inspect hose complete brake for any cracks or leakage. If leakages found, replace hose as below:
- Flush brake fluid by opening bleeder at caliper assembly with a tube on the bleeder head to a clean container (refer air bleeding).
- Remove banjo bolts (2 nos.) at both ends of the hose complete brake. Take out the gaskets. (Fig. 2.64A & 2.64B)

12 mm spanner

- Remove the screw along with spring washer and take out clamp hose under bracket. (Fig. 2.65)
- Remove hexagonal screw along with the spring washer and take out clamp brake hose. (Fig. 2.65)
- Remove brake hose from the vehicle.

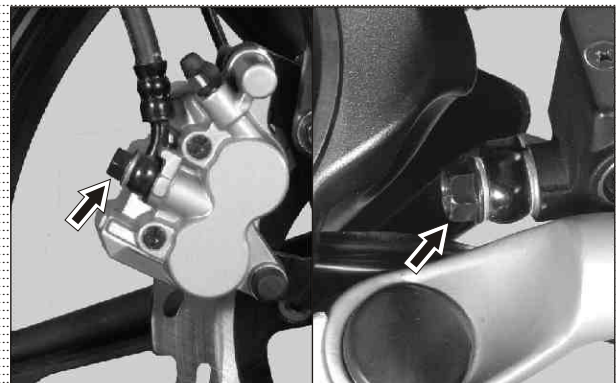


Fig. 2.64A

Fig. 2.64B

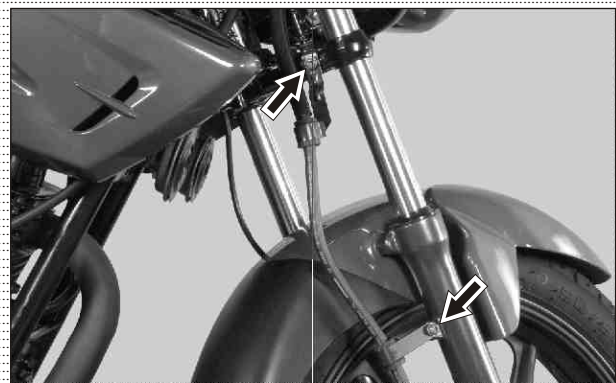


Fig. 2.65



## Caution:

Immediately wipe off the brake fluid contacting any part of the bike. The fluid reacts chemically with paint, plastics, rubber materials etc., and will damage them severely.

- Reassemble new brake hose in the reserve order of dismantling.
- Tighten banjo bolts at both the ends along with gaskets (2 nos. each side).

12 mm spanner

## Caution:

Ensure to assemble new gaskets on the banjo bolts. Do not use old gaskets.

- Bleed the air from the brake circuit after reassembling the brake hose. (refer air bleeding system page 2-24).

Replace brake hose at every 3 year or 60,000 km.

## Brake pads replacement

- Remove caliper mounting bolts and take out the caliper. (Fig. 2.66)

12 mm spanner

## Caution:

Remove front brake lever before dismantling the caliper assembly.

## Note:

Clean mud and dust off around the front wheel and caliper prior to dismantling.

- Remove plug pin (2 nos) from the body caliper. (Fig. 2.67)

Flat head screw driver

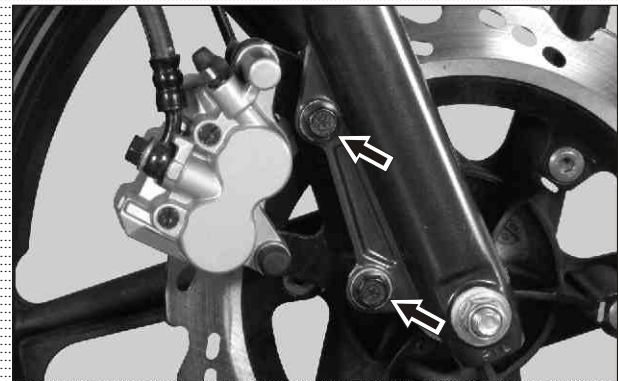


Fig. 2.66

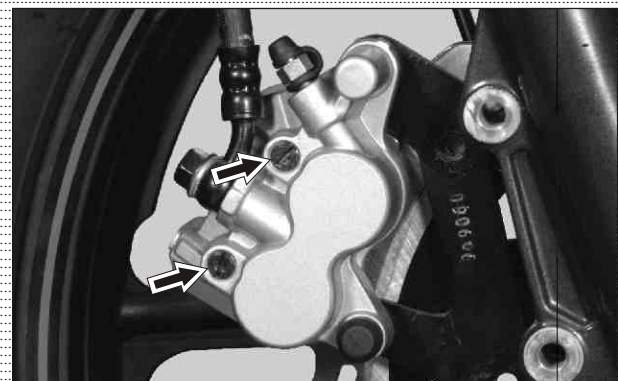


Fig. 2.67



## PERIODIC MAINTENANCE



- Loosen and take out pin hanger (2nos). (Fig. 2.68)

5 mm allen key

- Pull out pad complete inner and pad complete outer by hand. (Fig. 2.69)

### Inspection of brake pads

- Observe wear limit line marked on the pad and check wear condition of brake pads. (Fig. 2.70)  
If wear exceeds the limit line then replace the pads as a set with a new one.

#### Note:

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

#### Caution:

It is recommended to replace brake pads only as a set for better braking performance.

- Apply grease to the pin bolts of the bracket complete front.
- For reassembly of brake pads follow the reverse order of dismantling procedure.

### REAR BRAKE (DRUM BRAKE MODEL)

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

- Measure the travel distance of brake pedal complete by applying the rear brake. (Fig. 2.71)

Pedal free play

15 - 25 mm

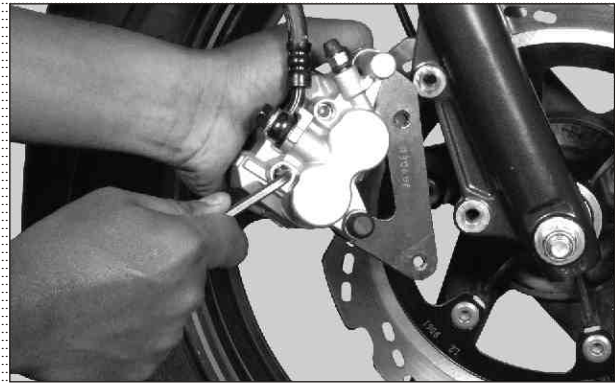


Fig. 2.68

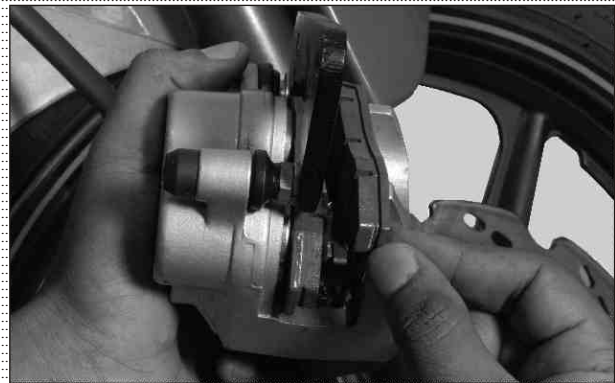


Fig. 2.69

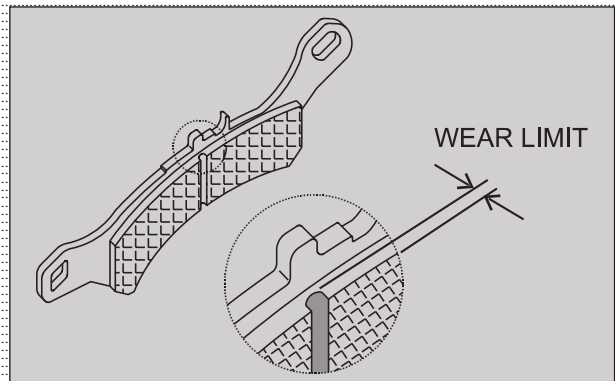


Fig. 2.70



Fig. 2.71

2



- If distance is more or less, turn the rear brake adjusting nut to get the specified play. Clockwise rotation of nut decreases the play and counter clockwise rotation increases the play. (Fig. 2.72)

14 mm spanner

- Brake lining wear indicator (A) is provided on the panel assembly rear. (refer page 2-32 for brake wear limit details)

## REAR BRAKE (DISC BRAKE MODEL)

### Inspecting brake fluid level

- Be sure to check fluid level in the reservoir. For inspecting brake fluid level, put the bike firmly on center stand and remove cover frame R. (refer page 2-17 for removing cover frame R)
- If level is found to be lower than the mark 'MIN' provided on the reservoir, replenish with the specified fresh brake fluid. (Fig. 2.73) (refer page 2-24 for brake fluid and its handling, air bleeding and brake fluid replacement details)

### Hose complete brake

- Inspect hose complete brake for any damage or leakage. If leakages found, replace the hose as below:
- Flush the brake fluid by opening bleeder screw at caliper assembly with a tube on the bleeder head to a clean container (refer brake bleeding).
- Remove banjo bolts (2 nos.) at both the ends of hose complete brake and take out gaskets. (Fig. 2.74A & Fig. 2.74B)

12 mm spanner

- Dislocate hose from the guide hose swing arm. (Fig. 2.75)
- Remove brake hose from the vehicle.

#### Caution:

Immediately wipe off the brake fluid contacting any part of the bike. The fluid reacts chemically with paint, plastics, rubber materials etc., and will damage them severely.

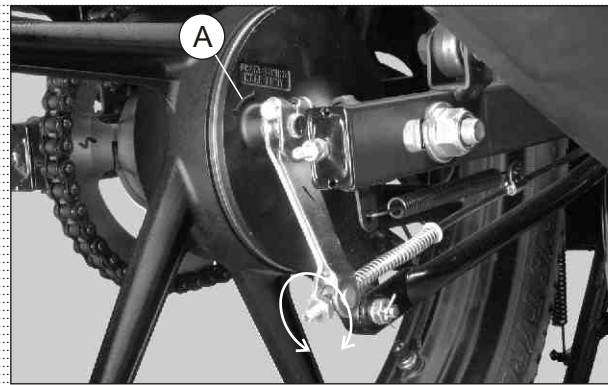


Fig. 2.72



Fig. 2.73

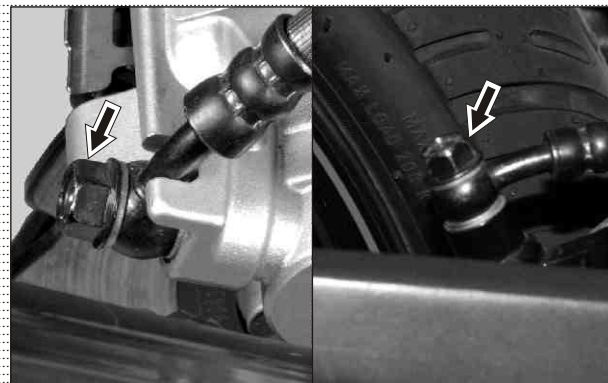


Fig. 2.74A

Fig. 2.74B

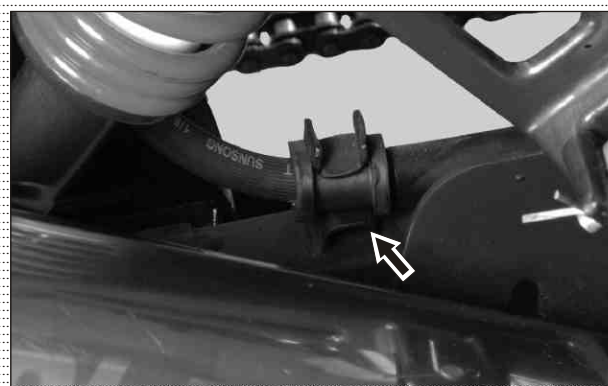


Fig. 2.75





- Reassemble new brake hose in the reserve order of dismantling.
- Tighten banjo bolts at both the ends along with gaskets (2 nos. each side).

## Caution:

Ensure that new gaskets are assembled with the banjo bolts. Do not use old gaskets. Also take special care to ensure that brake hose is not in contact with any moving component.

- Bleed air from the brake circuit after reassembling the brake hose. (refer air bleeding system).

Replace brake hose every 3 year or 60,000 km.

## Rear Brake pads replacement

- Loosen and remove rear wheel axle 'U' nut. (Fig. 2.76A)

22 mm spanner

- Slightly pull out axle rear from the left side, while gently tapping at right side. (Fig. 2.76B)
- Dislocate caliper assembly from the slot provided on swing arm complete by pulling towards rear side.
- Remove spacer rear axle R. (Fig. 2.77)

- Loosen and remove plug pin (1 no) from the body complete caliper assembly . (Fig. 2.78A)

Flat head screw driver

- Loosen and take out pin hanger (1no). (Fig. 2.78B)

5 mm allen key

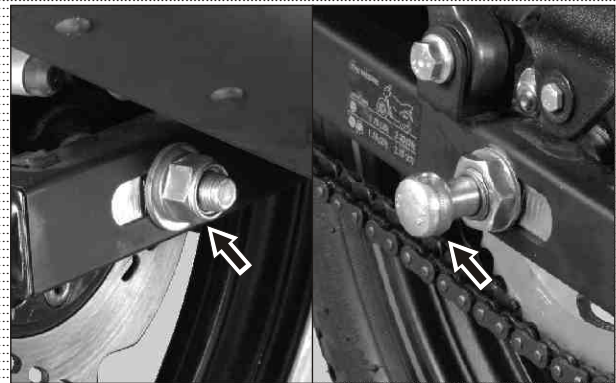


Fig. 2.76A

Fig. 2.76B

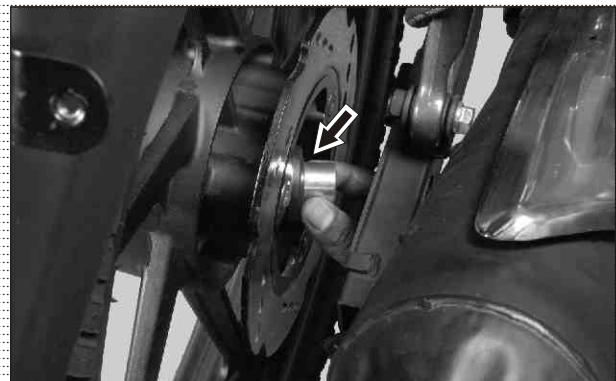


Fig. 2.77

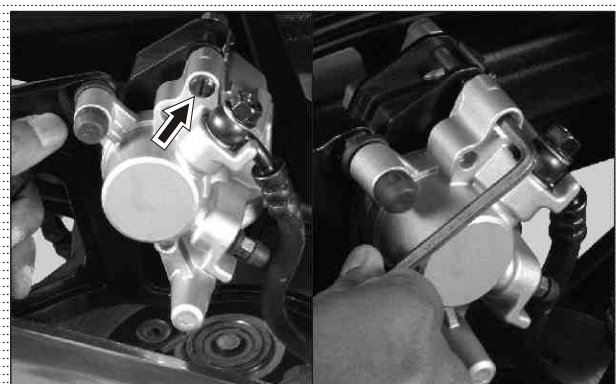


Fig. 2.78A

Fig. 2.78B



- Pull out pad complete inner and pad complete outer by hand. (Fig. 2.79)

## Inspection of brake pads

- Observe the wear limit line marked on the pad and check wear condition of brake pads. (Fig. 2.70) If wear exceeds the limit line then replace the pads as a set with a new one. (Refer page no 2-27 for inspection of brake pads)

## WHEEL ASSEMBLY FRONT (DISC BRAKE MODEL)

### Removal

- Place the bike on center stand and place a jack or block to keep the front wheel off the ground.
- Remove 'U' nut along with the punched washer. (Fig. 2.80)

17 mm spanner

- Draw out axle front from L side along with washer while gently tapping at R side (Fig. 2.81)
- Take out wheel assembly front along with the disc plate and spacer complete L.
- Take out speed sensor from the wheel assembly front and hang it on the frame itself.

### Note:

After taking out front wheel assy keep some cushion in between the brake pads, to avoid binding.

### Reassembly

- Reassemble wheel assembly front in the reverse order of disassembly and removal.
- Before assembling front wheel assembly, lubricate the axle front and bearings.
- Make sure that the slot (A) in the speed sensor fits over the stopper (B) on the front fork outer tube L. (Fig. 2.82)



Fig. 2.79

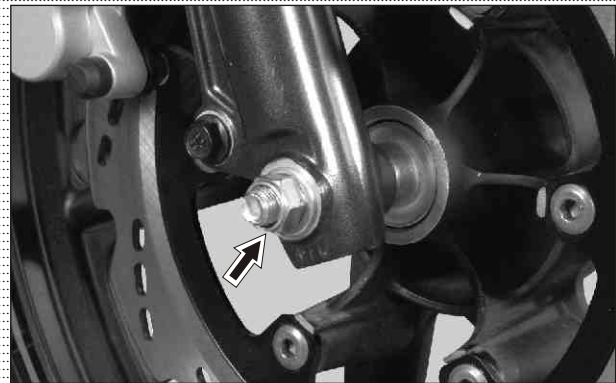


Fig. 2.80



Fig. 2.81

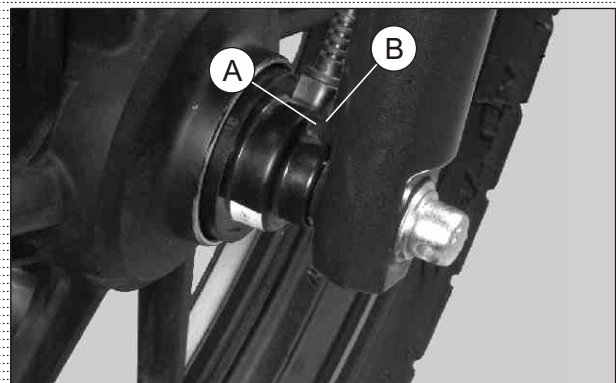


Fig. 2.82



- Remove jack or block placed while removing the wheel assembly.
- Before tightening 'U' nut of axle front, stroke the fork assembly front several times to check for proper fork action.
- Tighten 'U' nut.

## Note:

While remounting front wheel assembly ensure to locate the disc in between the brake pads after removing cushion.

## WHEEL ASSEMBLY REAR (DRUM BRAKE MODEL)

- Remove nut rear brake rod adjuster (A). (Fig. 2.83)

14 mm spanner

- Remove split pin (B) from the torque link rear mounting. (Fig. 2.83)

Nose plier

- Remove hexagonal nut (M8) (C) along with the wave spring washer and take out bolt torque link rear. (Fig. 2.83)

14 mm spanner

- Dislocate rod rear brake complete from the lever rear brake cam.
- Take out pin rear brake rod, spring rear brake rod adjuster and punched washer.
- Loosen and remove 'U' nut (M14x1.5) from the axle complete rear along with the washer. (Fig. 2.84)

22 mm spanner

- Pull out axle complete rear by gently tapping at other side. (Fig. 2.85A)
- Remove spacer rear axle R. (Fig. 2.85B)
- While tilting the bike to the left side, take out the wheel assembly rear.

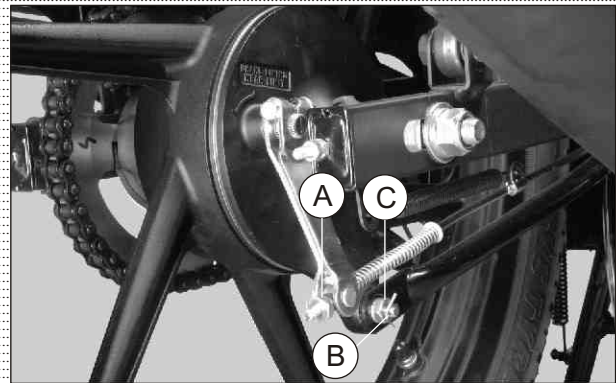


Fig. 2.83

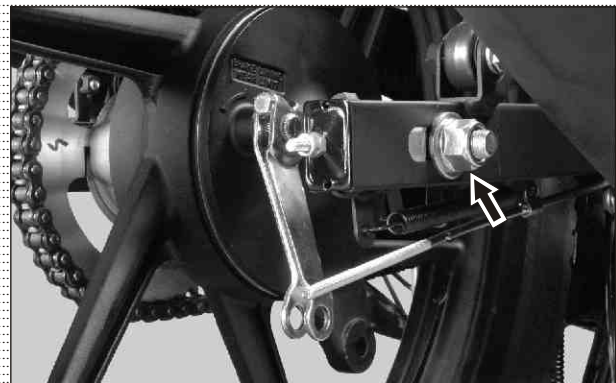


Fig. 2.84

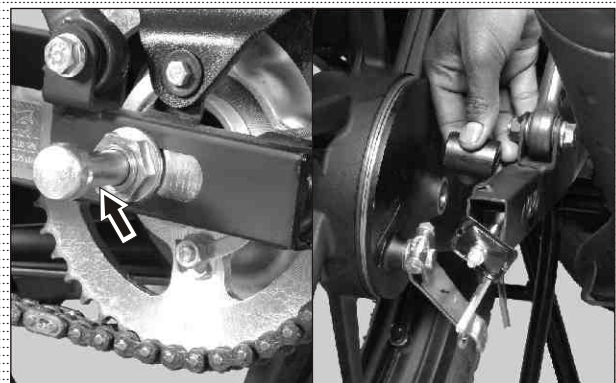


Fig. 2.85A

Fig. 2.85B



- Take out panel assembly rear from the wheel assembly rear. (Fig. 2.86)

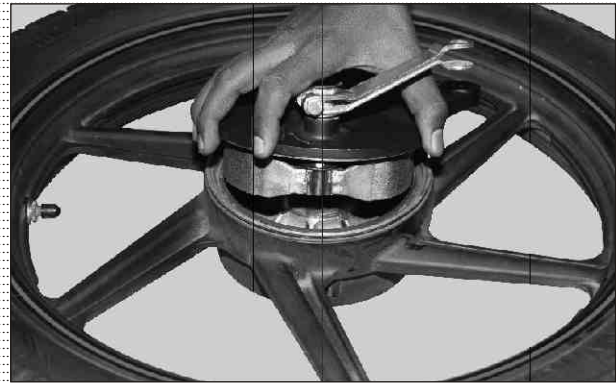


Fig. 2.86

## Panel assembly (rear wheel)

- Remove brake shoe set (rear) from the panel assembly rear along with spring brake shoe. (Fig. 2.87)

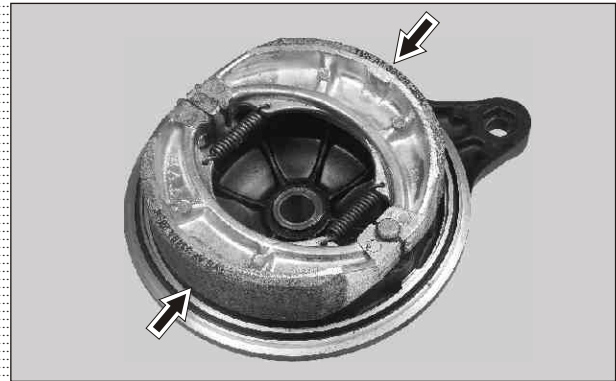


Fig. 2.87

## INSPECTION

Before inspection, clean all necessary components with suitable cleaning solvent and lubricate them.

## Shoe complete brake

- Inspect lining brake shoe surface for glaze. Minor glaze can be corrected by cleaning with coarse emery paper.

**Note:**  
After polishing shoe comp brake, clean the surface with dry cloth.

- Highly glazed shoes must be replaced.
- Measure lining brake shoe thickness as shown. (Fig. 2.88) If the thickness measured is less than the service limit, replace shoe complete brake with a new one as a set.

Vernier caliper

Service limit

1.5 mm

**Note:**  
Replace shoe complete brake only as a set .

- Inspect brake shoe spring for correct stiffness and any damage.

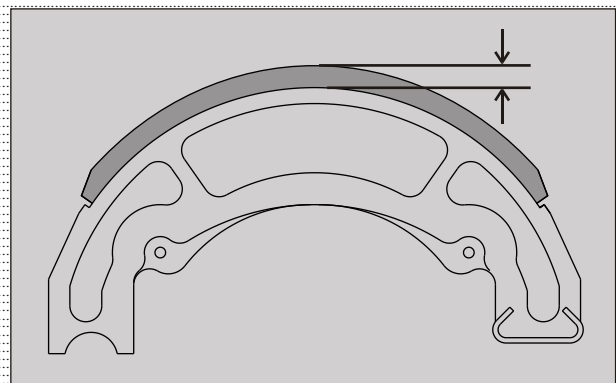


Fig. 2.88





## Brake drum (alloy wheel rear)

- Measure inner diameter of the brake drum (rear wheel) at 3 to 4 places. If diameter exceeds the service limit, then replace the alloy wheel rear with a new one. (Fig. 2.89)

Vernier caliper

|               |          |
|---------------|----------|
| Service limit | 130.7 mm |
|---------------|----------|

- Inspect brake drum inner surface for grease or scratches. Use a rag soaked in lacquer thinner or solvent to clean the drum. Minor scratches can be polished with an emery paper.
- If the brake drum scored heavily then replace the alloy wheel rear.

## WHEEL ASSEMBLY REAR (DISC BRAKE MODEL)

### Removal

- Remove 'U' nut (M14x1.50) from the axle complete rear along with washer. (Fig. 2.90A)

22mm spanner

- Pull out axle complete rear by gently tapping at other end. (Fig. 2.90B)
- Dislocate caliper assembly from the slot provided on swing arm complete by pulling towards rear side.
- Remove spacer rear axle R. (Fig. 2.91)
- While tilting the bike to the left side, take out wheel assembly rear.

### Reassembly

- Reassemble wheel assembly rear in the reverse order of disassembly and removal.
- Make sure that the pipe (A) in the caliper assembly fits between the guides (B) on the swing arm complete. (Fig. 2.92)

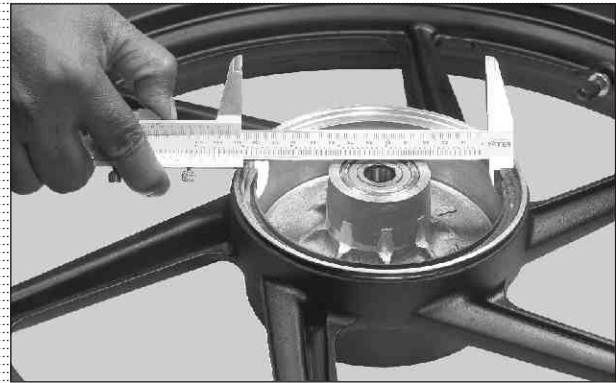


Fig. 2.89

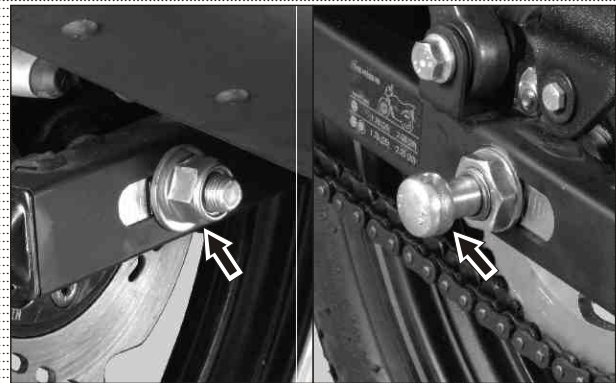


Fig. 2.90A

Fig. 2.90B

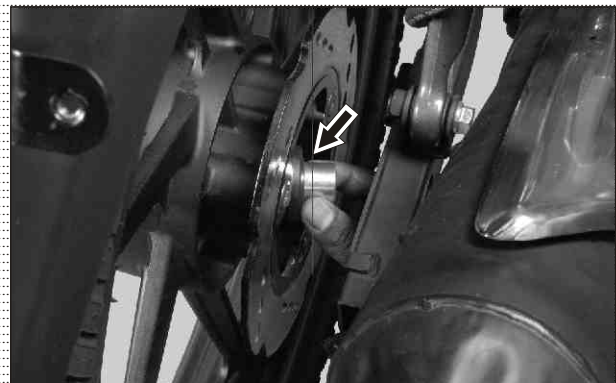


Fig. 2.91

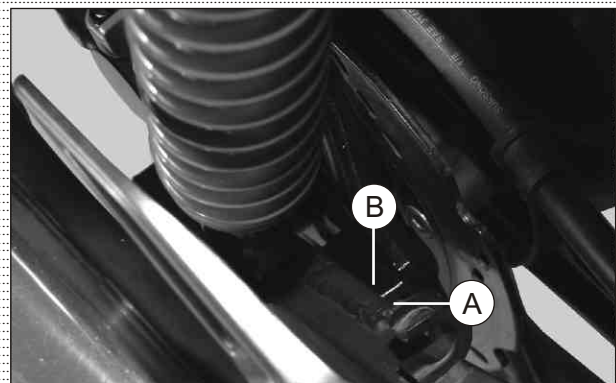


Fig. 2.92



## CHAIN ASSEMBLY DRIVE

Inspect, clean and adjust at initial 500 km and every 3000 km. If necessary, check and adjust at every 1000 km.

Lubricate on the vehicle at every 1000 km by proper lubricant.

- Place the bike firmly on centre stand.
- Put the transmission in neutral gear and turn the rear wheel slowly by hand.
- Visually inspect chain assembly drive for the below listed possible abnormalities.
  - Loose pins.
  - Damaged rollers.
  - Rusted links.
  - Twisted or seized links.
  - Excessive wear.
- If any defects found, chain assembly drive must be replaced with a new one.

### Chain slackness:

- Place the bike firmly on centre stand.
- Check the drive chain for specified slackness. (Fig. 2.93)

|           |            |
|-----------|------------|
| Slackness | 20 - 30 mm |
|-----------|------------|

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

- Loosen 'U' nut of axle complete rear. (Fig. 2.94)

22 mm spanner



Fig. 2.93



Fig. 2.94



## PERIODIC MAINTENANCE



- Loosen hexagonal nut of sprocket drum assembly mounting. (Fig. 2.95)

27 mm spanner



2

Fig. 2.95

- Loosen lock nut (A and B) and turn the nut chain adjuster (C and D) looking at the line mark on chain adjuster L and R (E and F). Threading in reduces the slackness and threading out increases the slackness. After achieving specified slackness tighten the lock nut (A and B). (Fig. 2.96 & Fig. 2.97)

10 mm spanner

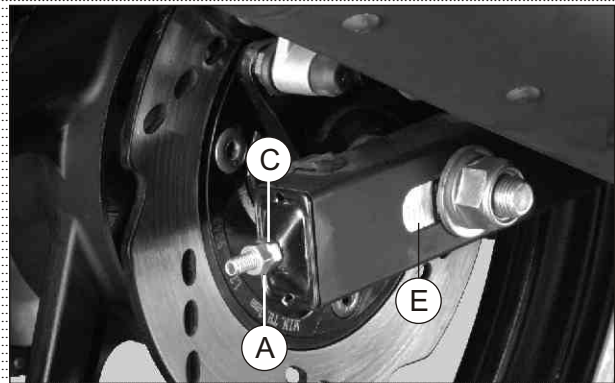


Fig. 2.96

### Caution:

To maintain proper wheel alignment, adjust both the chain adjuster uniformly.

### Warning:

Adjustment of chain slackness will disturb the original brake adjustment. Hence it is highly essential to check and readjust the rear brake.

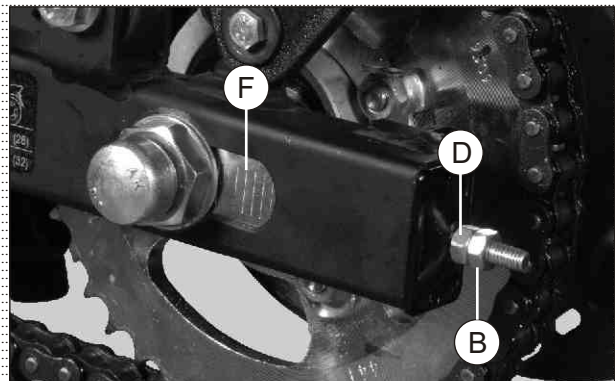


Fig. 2.97

### Chain cleaning

Clean and lubricate chain assembly drive off the vehicle at every 3000 Km.

- Loosen hex bolts (M6x12 - 2 nos.) from cover complete chain and take out cover complete chain. (Fig. 2.98)

10 mm spanner

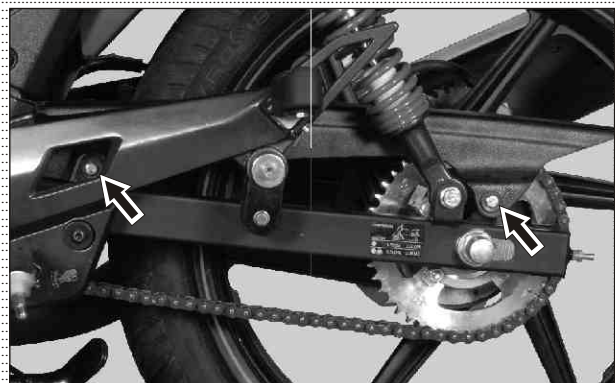


Fig. 2.98

# PERIODIC MAINTENANCE



- Unlock link set of chain assembly drive and remove it. (Fig. 2.99)

Combination plier

- Clean chain assembly drive by dipping in kerosene or diesel. Brush off any dirt sticking to it.
- After taking out from the soaking wipe off excess kerosene or diesel with soft cloth and allow it to dry.

## Warning:

**Do not use metal wire brush or any other hard brushes, as this will damage 'O' ring.**

**Do not soak the chain in kerosene or diesel for more than 10 mins.**

## Chain wear

- Count 21 pins on the chain assembly drive and measure the distance between 20 pitch. (Fig. 2.100) If measured distance exceeds the service limit, replace the chain with a new one.

Service limit

256 mm

Vernier caliper

## Chain lubrication

If measured distance is within the limit, lubricate chain by carrying out following steps :

- Mix grease and 4T engine oil in 1:1 proportion thoroughly.
- Lubricate the chain by soaking in this mixture for minimum 15 mins. (Fig. 2.101)
- Drain the excess mixture by hanging chain in vertical direction for 10mins.

## Caution:

**Do not use molten grease to lubricate 'O' ring chain.**

- Reassemble chain in the reverse order of removal.

## Note:

**Before reassembling chain assembly, clean the sprocket engine and sprocket rear.**

## Warning:

**Assemble link set chain lock plate in such way that the slit end faces the opposite direction of the chain rotation to avoid severe damages. (Fig. 2.102)**

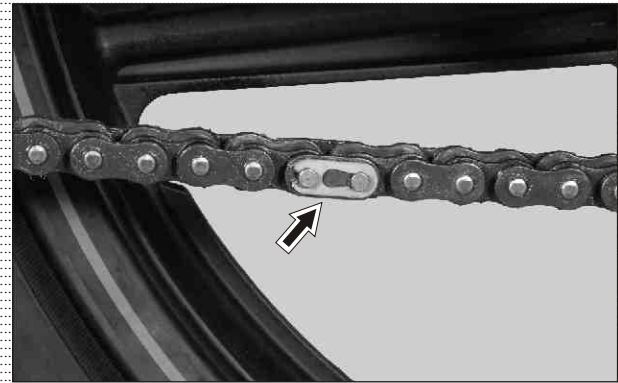


Fig. 2.99

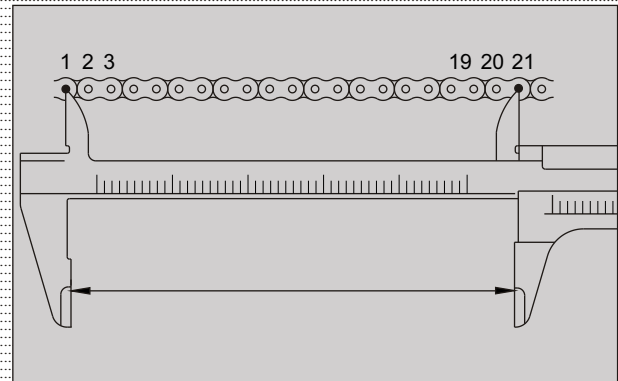


Fig. 2.100

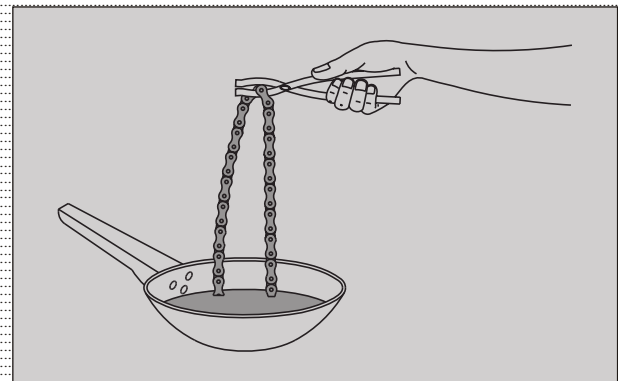


Fig. 2.101

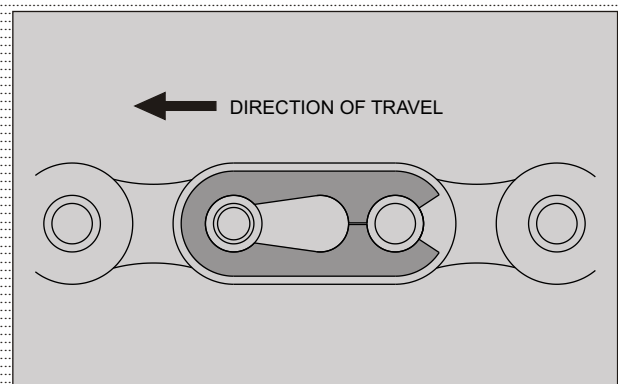


Fig. 2.102



## STEERING

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

- Steering should be adjusted correctly for smooth movement of handlebar and for safe riding. Stiff steering prevents smooth movement of handle bar resulting in poor directional stability and too loose steering causes vibration and damage to the steering bearings.
- Check to see that there is no play in the steering bearings. (Fig. 2.103) If any play is found, adjust the steering as explained below:
- Remove hexagonal socket head screw (M6x30 - 2 nos.) from the cover upper bracket mounting and remove cover upper bracket. (Fig. 2.104)

5mm Allen key

- Slightly loosen the lock nut steering. (Fig. 2.105)

32 mm spanner

- Using special tool turn the arrestor steering stem either clockwise or anticlockwise to reduce or to increase steering play respectively. (Fig. 2.106)

0313801

Universal clamp wrench

- Tighten lock nut steering to the specified torque. (Refer chapter-7 "Service information" page no. 7-8 for torque details)

### Note:

After adjustment ensure smooth movement of handle bar. When slowly moved by hand, it should move freely from the centre position to either left or right with its own weight.



Fig. 2.103

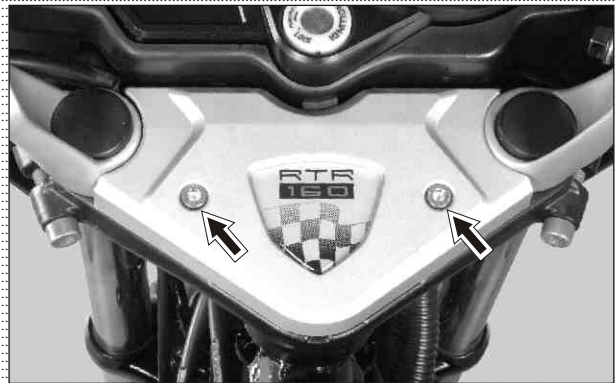


Fig. 2.104

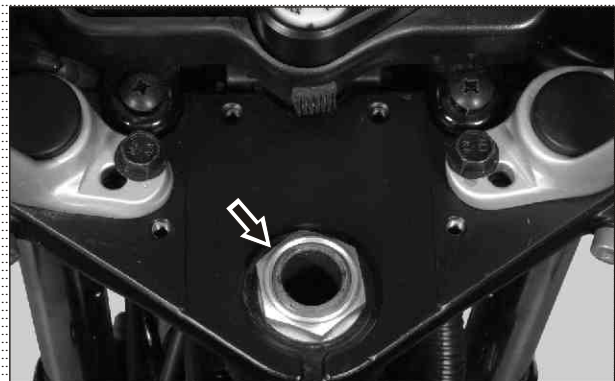


Fig. 2.105



Fig. 2.106



- If any play is still found, inspect following items and replace affected parts wherever necessary. (refer chapter “chassis” for removal, checking and reassembly procedures)
  - Wear of race steering inner and outer.
  - Wear of cup bottom and cone bottom.
  - Wear or damage of balls steering.
  - Number of balls.
  - Distortion of lower bracket complete.

| Number of balls   |                |
|-------------------|----------------|
| Upper race 22 nos | (4.762 mm dia) |
| Lower race 19 nos | (6.35 mm dia)  |

## FRONT FORK OIL

**Inspect for leakage at initial 500 km and every 3000 km there after. Change every 18000 km.**

- Remove both leg assemblies front fork. (Refer chapter “chassis” for removal, cleaning and assembly procedures)
- Drain fork oil and clean the leg assemblies.
- Pour recommended brand oil of specified amount from the top of the inner tube assembly. (Fig. 2.107)

| Oil quantity per leg |                 |
|----------------------|-----------------|
| GIL make             | 140 ± 2.0 ml    |
| TOP make             | 152 ± 2.5 ml    |
| Specification        | Teleshockab oil |

**Warning:**  
Apache RTR comes with ‘GIL or TOP’ make of front fork, care must be taken such that leg assembly oil quantity always matches with its respective make.

## TYRES

**Inspect at initial 500 km and at every 3000 km there after.**



Fig. 2.107

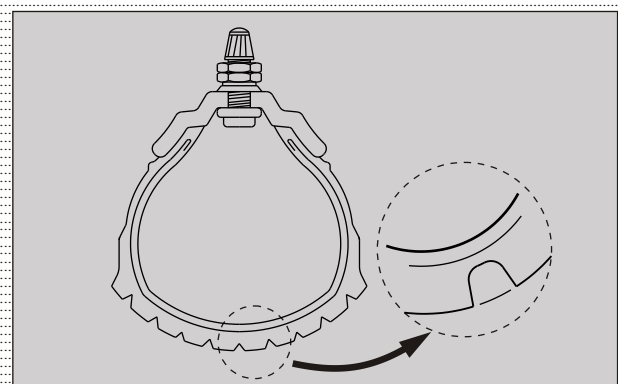


Fig. 2.108





## Tyre tread condition:

- Using the vehicle with excessively worn tyres will decrease riding stability and consequently invite a dangerous situation due to loss of control. It is highly recommended to replace the tyre with a new one when the groove depth of tyre from tread surface reaches the following specifications: (Fig. 2.108)

| Service limit |        |
|---------------|--------|
| Front         | 1.5 mm |
| Rear          | 1.5 mm |

Tyre depth gauge

### Note:

Tyre depth also can be checked by tyre wear indicator. (Fig. 2.109)

## Tyre pressure:

- Under inflated tyres wear faster, affect stability and smooth cornering. Over inflated tyres decrease area of tyre contact with ground causing skid or loss of control.
- Maintain proper tyre pressure for good road stability and longer tyre life. Inflate tyres in cold condition to the pressure as given below: (Fig. 2.110)

Tyre pressure gauge

| Tyre pressure | Front<br>Kg/cm <sup>2</sup> (psi) | Rear<br>Kg/cm <sup>2</sup> (psi) |
|---------------|-----------------------------------|----------------------------------|
| Solo riding   | 1.75 (25)                         | 2.00 (28)                        |
| Dual riding   | 1.75 (25)                         | 2.25 (32)                        |

## BOLTS AND NUTS

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

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



Fig. 2.109



Fig. 2.110

2



## PERIODIC MAINTENANCE



### LUBRICATION POINTS

**Warning:**

Do not apply too much grease to the brake cam shafts. If grease gets on the linings, brake slippage will result.

**Note:**

Lubricate exposed parts which are subject to rust, with either motor oil or grease whenever the vehicle has been operated under wet or rainy conditions.

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



Fig. 2.111



## ENGINE OVERHAUL

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

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

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

## CLUTCH REMOVAL AND SERVICING

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

- Loss of power
- Jerking of vehicle
- Any abnormal noise from clutch
- Drain engine cum transmission oil as explained in chapter "Periodic maintenance". After draining always measure the oil quantity using a measuring jar.
- Remove filter complete engine oil as explained in chapter "Periodic maintenance".
- Remove hexagonal bolt (M8x35 - 1 no) from the lever assembly kick starter mounting and pull out lever assembly kick starter. (Fig. 3.1)
- Loosen lock nut (A) and adjusting nut (B) from the cable assembly clutch mounting. (Fig. 3.2)

13 mm spanner

12 mm spanner

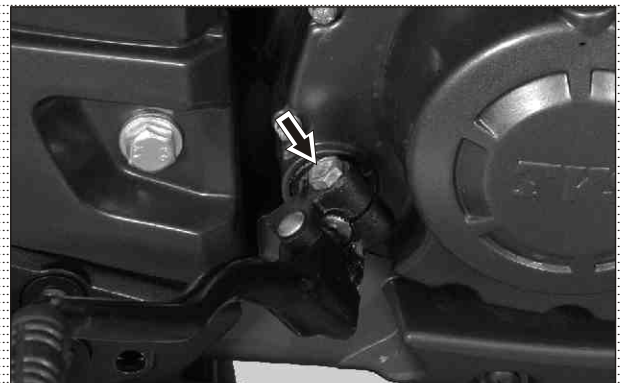


Fig. 3.1

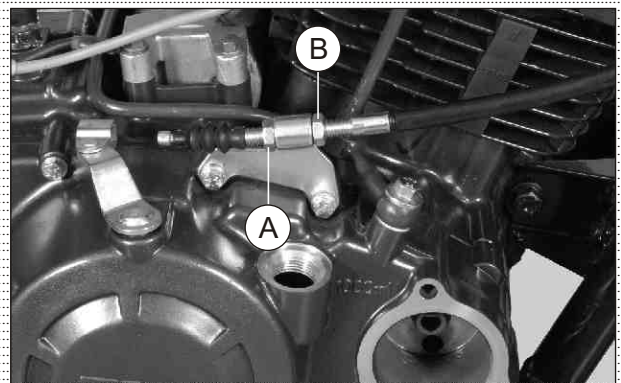


Fig. 3.2



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

20 mm spanner

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

- Remove union bolt oil pipe along with gasket oil pipe union (2 nos). (Fig. 3.5)

10 mm spanner

**Note:**

While reassembling ensure the presence of gaskets at both side of the pipe complete oil.

- Remove hexagonal flange bolts (M6x30 - 10 nos) from the cover clutch mounting. (Fig. 3.6)

8 mm spanner

- Take out cover clutch by gently tapping.

Nylon hammer

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

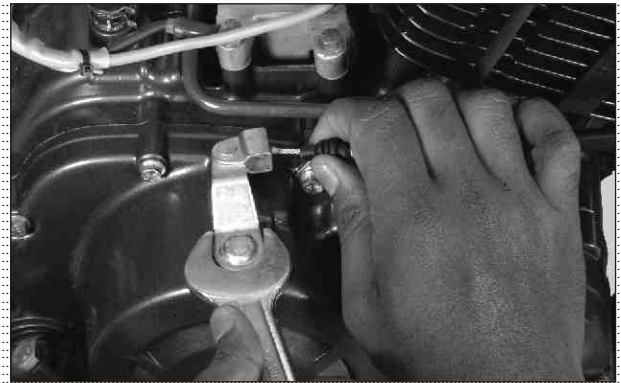


Fig. 3.3

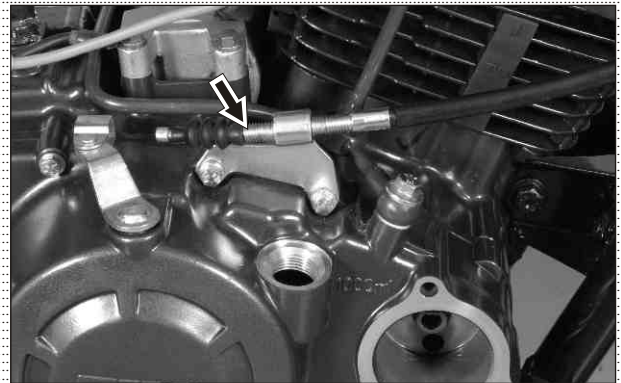


Fig. 3.4



Fig. 3.5

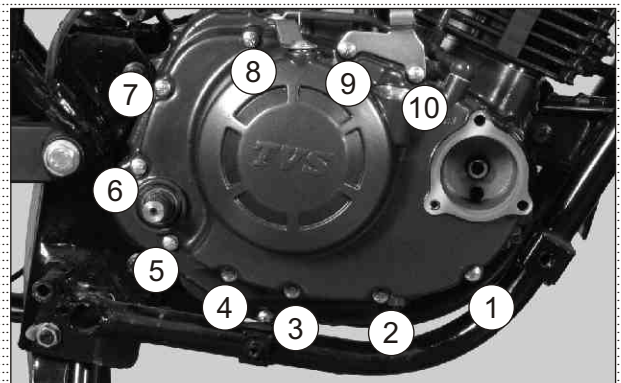


Fig. 3.6



- Collect pin clutch release from cover clutch / clutch assembly.
- Take out adopter pin clutch release from the clutch assembly. (Fig. 3.7)

**Note:**

Inside the adopter clutch release, a steel ball is provided. While reassembling ensure the presence of the ball.

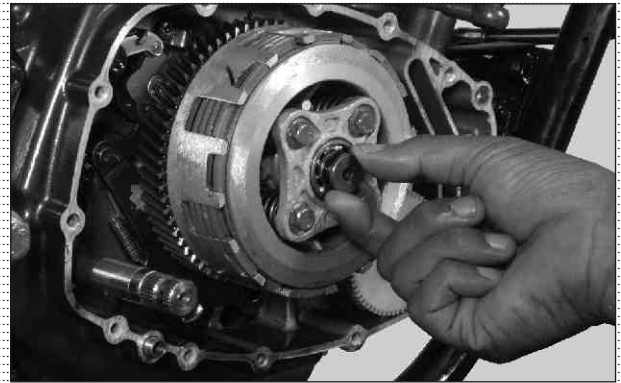


Fig. 3.7

- Remove hexagonal flange head bolts (M6x20 - 4 nos) from the plate clutch release mounting. (Fig. 3.8)

10 mm spanner

**Note:**

Carry out uniform loosening and tightening of plate clutch release bolts in crisscross pattern to avoid uneven loading of plate.

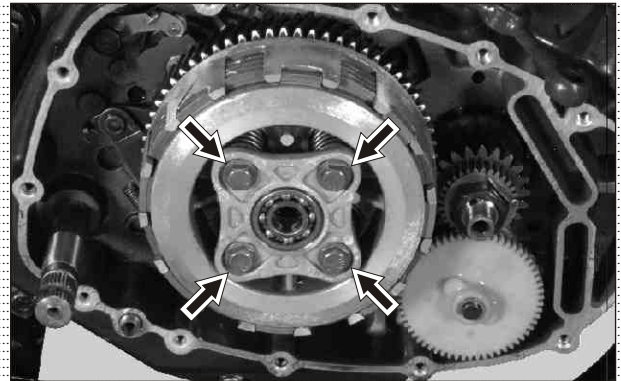


Fig. 3.8

- Take out plate clutch release.
- Take out spring clutch (4 nos). (Fig. 3.9)

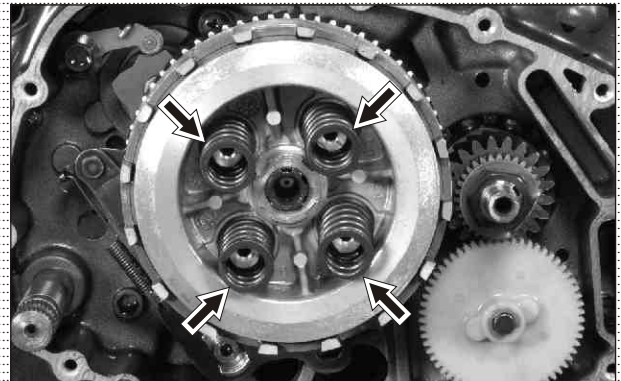


Fig. 3.9

- Using special tool hold the disc clutch pressure and remove nut clutch shaft (slotted nut). (Fig. 3.10)

N2310010

Clutch holding tool

N2310020

Clutch nut tightening tool

24 mm spanner

**Caution:**

Assemble all the bolts (4 nos) of plate clutch release along with the clutch holding special tool. Do not experiment with two bolts mounted diagonally.

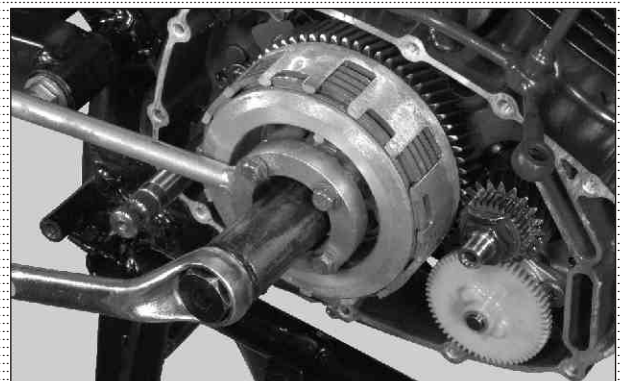


Fig. 3.10





- Take out spring disc from clutch shaft. (Fig. 3.11)

**Note:**

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

- Pull out disc clutch pressure along with the hub clutch, plate clutch drive (5 nos) and plate clutch driven (4 nos) as a set. (Fig. 3.12)

- Separate disc clutch pressure, hub clutch, plate clutch drive and plate clutch driven. (Fig. 3.13)

- Remove thrust washer clutch hub from the shaft complete counter. (Fig. 3.14A)
- Pull out gear assembly primary driven from the shaft complete counter along with clip primary driven gear. (Fig. 3.14B)

**Note:**

While reassembling, lock the gear assembly primary driven with gear complete kick starter driven gear groove.

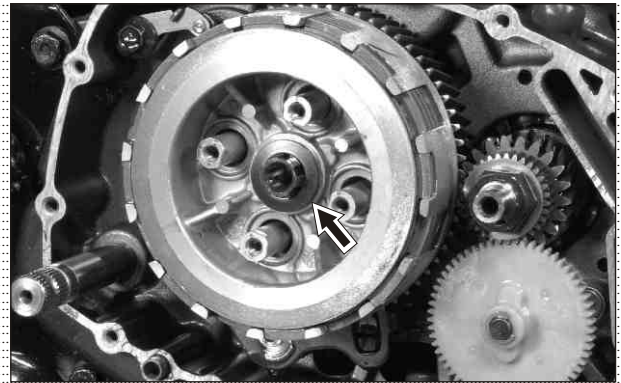


Fig. 3.11

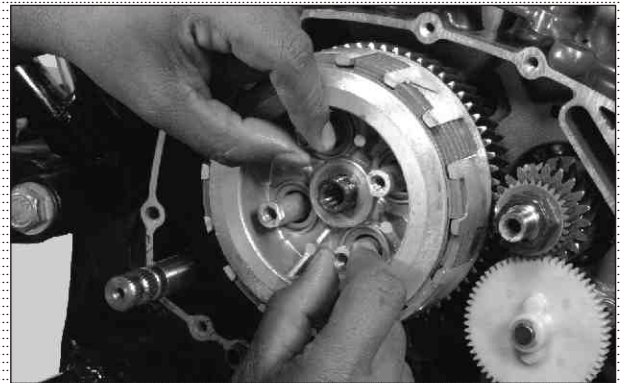


Fig. 3.12

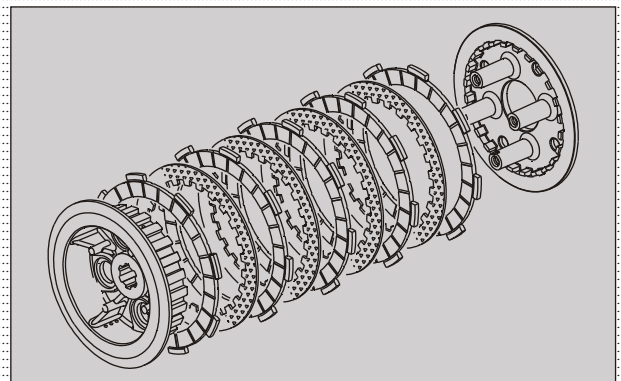


Fig. 3.13

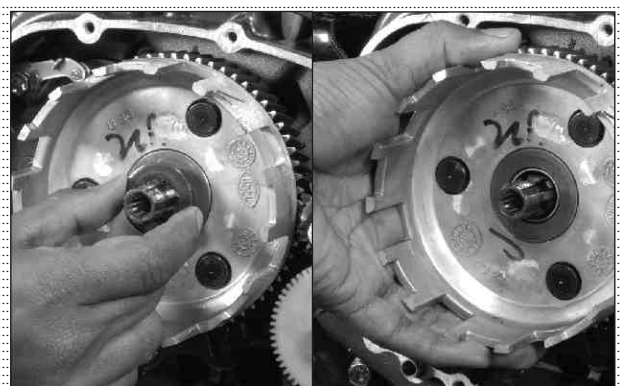


Fig. 3.14A

Fig. 3.14B





## INSPECTION

### Plate clutch drive

- Inspect plate clutch drive thickness using vernier caliper. (Fig. 3.15).
- If thickness is less than the service limit, change the plate clutch drive as a set.

Vernier caliper

|               |        |
|---------------|--------|
| Service limit | 2.6 mm |
|---------------|--------|

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

Vernier caliper

|               |         |
|---------------|---------|
| Service limit | 15.2 mm |
|---------------|---------|

- Also check plates for burning due to excessive friction / contaminated or low oil level. Inspect plate clutch drive claws for indents (cut marks) due to regular thrust from the housing clutch.

### Plate clutch driven

- Inspect plate clutch driven distortion using a feeler gauge and surface plate as shown in the figure. (Fig. 3.17)
- Check plates individually. Hold the plates with three fingers and insert the feeler gauge between the surface plate and driven plate at 3 to 4 locations.
- If distortion is more than the service limit change the plate clutch driven as a set.

|               |        |
|---------------|--------|
| Service limit | 0.1 mm |
|---------------|--------|

### Spring clutch

- Measure free length of the spring clutch. If it reaches the service limit, replace with new one. (Fig. 3.18)

Vernier caliper

|               |         |
|---------------|---------|
| Service limit | 28.7 mm |
|---------------|---------|

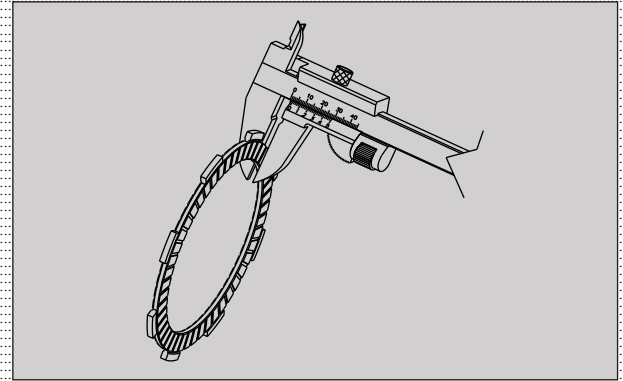


Fig. 3.15

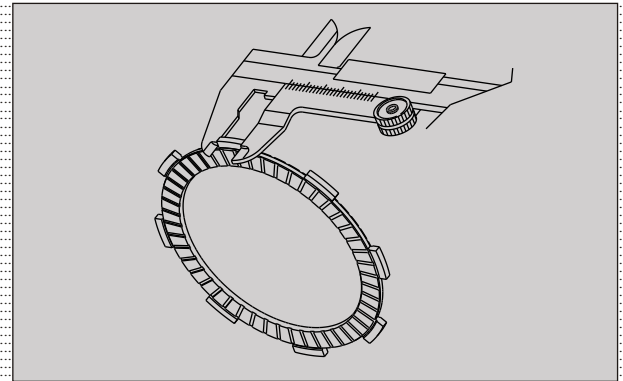


Fig. 3.16

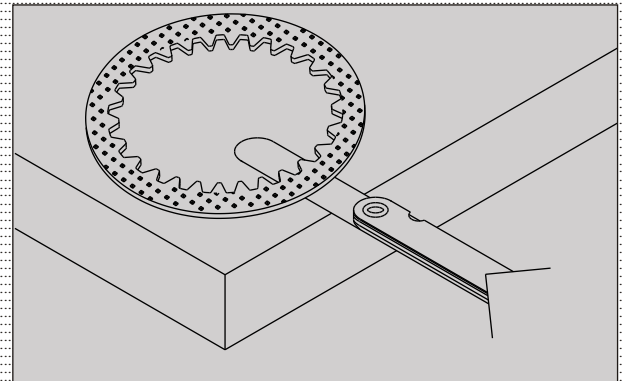


Fig. 3.17

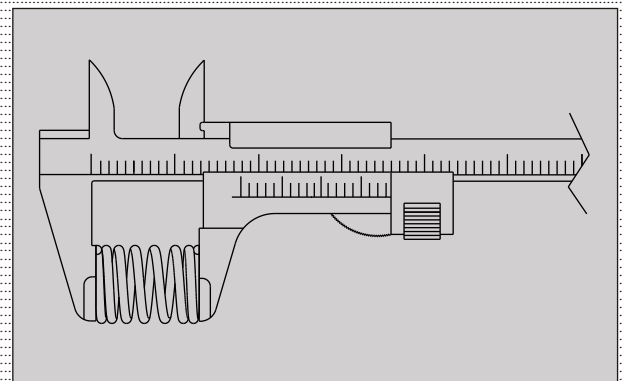


Fig. 3.18



## Caution:

Spring clutch is graded and identified with different colour codes. While reassembling ensure the spring clutches of same colour codes are assembled.

### Gear assembly primary driven (housing clutch)

- Inspect housing clutch for the indents / cuts created by the plate clutch drive. (Fig. 3.19)



Fig. 3.19

### Hub clutch

- Inspect hub clutch for wear. If any ridges or cuts formed in the hub clutch by the clutch plates, then replace with a new one. Also check lubrication holes for any blockage. (Fig. 3.20)

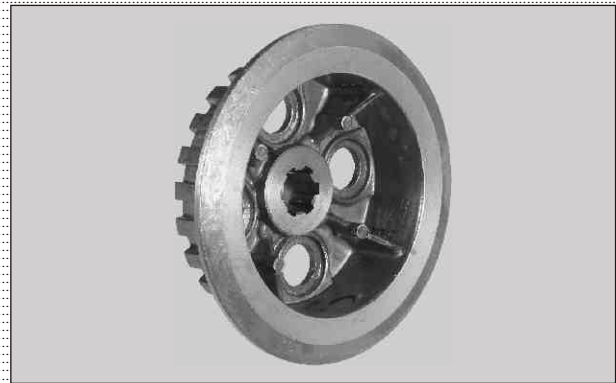


Fig. 3.20

## REASSEMBLY

- Reassemble parts in the reverse order of disassembly.
- While reassembling, inspect the bearing clutch release plate for any abnormal noise and smooth rotation. Replace bearing with a new one if found defective.
- While reassembling, ensure the clutch plates are held firmly together by checking the play between the drive plates after tightening the plate clutch release. (Fig. 3.21)
- Before reassembling cover clutch, ensure that the pin clutch release and ball are assembled properly inside the adopter clutch release. Also inspect the gasket cover clutch for any damage.
- Adjust clutch play. (refer chapter-2 “periodic maintenance” page no. 2-22 for adjustment procedure)
- Refill engine cum transmission oil. (refer chapter-2 “periodic maintenance” page no. 2-13 for oil filling procedure)

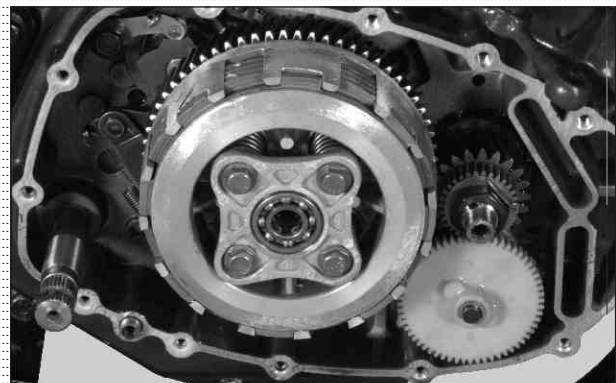


Fig. 3.21



## ENGINE ASSEMBLY - REMOVAL FROM THE VEHICLE

The procedure for engine assembly removal is sequentially explained in the following steps:

- Clean engine assembly thoroughly before taking it out from the vehicle.
- Drain engine cum transmission oil as explained in the chapter "periodic maintenance".
- Remove clutch assembly as explained earlier. (refer page no. 3.1)
- Turn the fuel cock knob to 'OFF' position. Dislocate hose clip and disconnect fuel hose from carburettor assembly. (Fig. 3.22)

Nose plier

- Loosen and remove (M6x16 - 1 no) CRR pan head screw from the cover frame L mounting. (Fig. 3.23)
- Take out cover frame L by carefully dislocating it from the lugs.
- Unlock cover frame R by control key. (Fig. 3.24)
- Take out cover frame R by carefully dislocating it from the lugs.
- Gently pull out cable complete seat and take out seat assembly by dislocating it from the lugs. (Fig. 3.25)

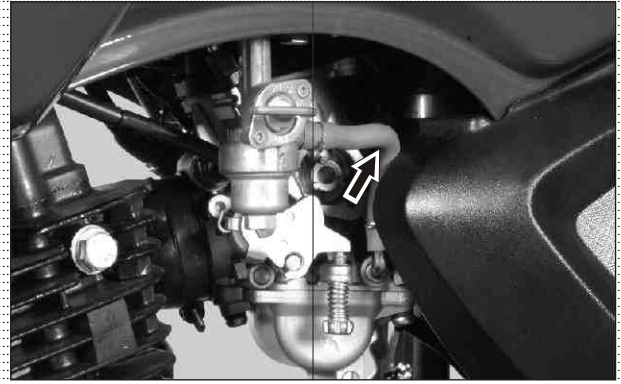


Fig. 3.22



Fig. 3.23



Fig. 3.24

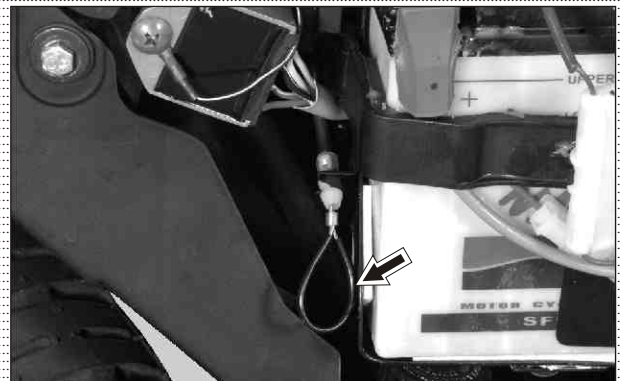


Fig. 3.25

3



- Remove hexagonal flange bolt (M8x25 - 1 no) from the fuel tank mounting along with bush fuel tank rear mounting. (Fig. 3.26)

12 mm spanner

- Remove fuel tank complete from its position by dislocating it from the cushion fuel tank front and disconnecting fuel sender unit wiring socket.

**Note:**  
while reassembling fuel tank complete, ensure that fuel sender unit wiring socket is connected and fuel tank drain hose is routed properly .

- Disconnect HT cord from the spark plug and remove spark plug. (Fig. 3.27)

Plug spanner

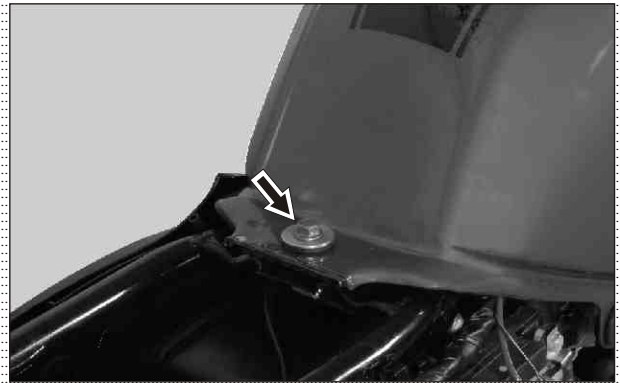


Fig. 3.26

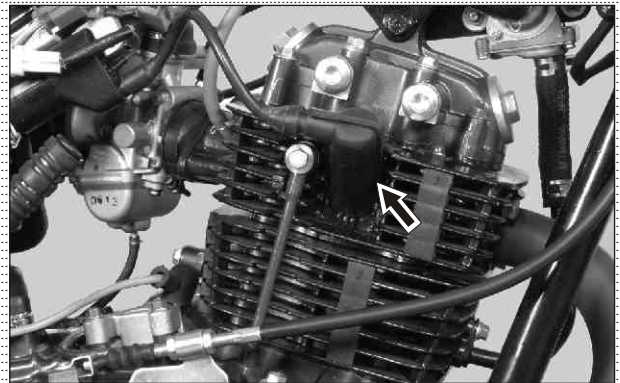


Fig. 3.27

- Dislocate boot (A), remove '+ ve' terminal screw and disconnect the wire from the motor assembly starter. (Fig. 3.28)
- Remove mounting bolt (B) (M6x25 - 1 no) of motor assembly starter motor assembly and disconnect the '- ve' wire. (Fig. 3.28)

Philips head screw driver

**Note:**  
Before disconnecting wires from the starter motor assembly, make sure that battery assembly is disconnected from the wiring harness.

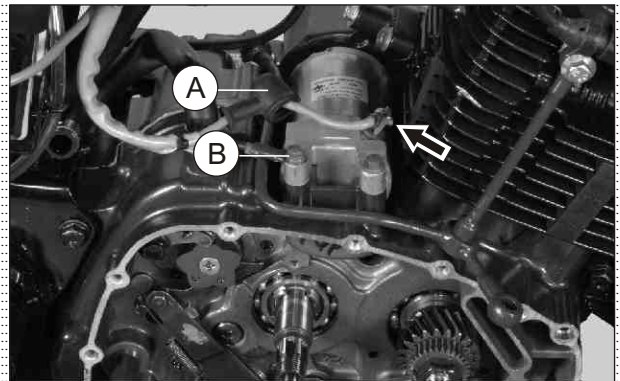


Fig. 3.28

- Dislocate hose clip (A) & (B) from the tube breather and take out tube breather. (Fig. 3.29)

Nose plier

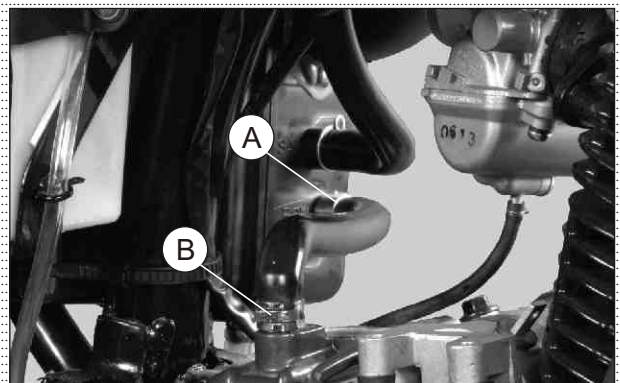


Fig. 3.29





- Dislocate hose clip (A) from the hose air inlet and pull out hose air inlet. (Fig. 3.30)

Nose plier

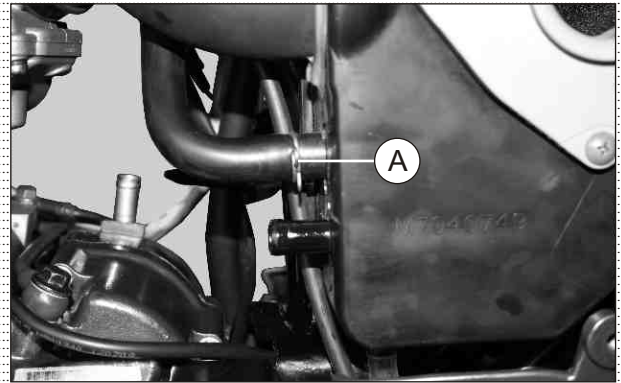


Fig. 3.30

- Remove CRR pan head screw (M6x16 - 2 nos) along with punched washer from the air cleaner mounting. (Fig. 3.31)

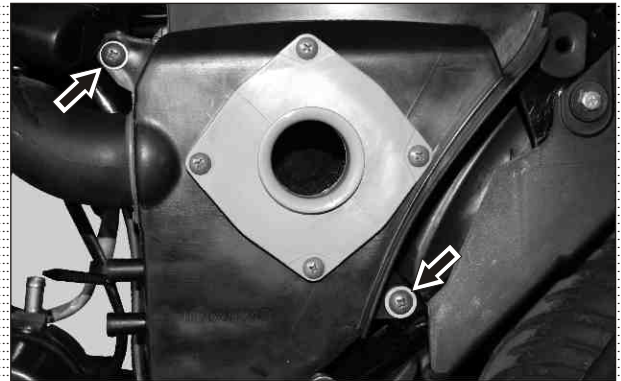


Fig. 3.31

- Loosen clamp outlet pipe screw (A). (Fig. 3.32)
- Remove air cleaner assembly.
- Loosen clamp intake pipe screw (B) from the other side of the carburettor. (Fig. 3.32)
- Gently pull out carburettor assembly from the pipe complete intake and place it on the frame along with cable assembly throttle and cable complete choke.

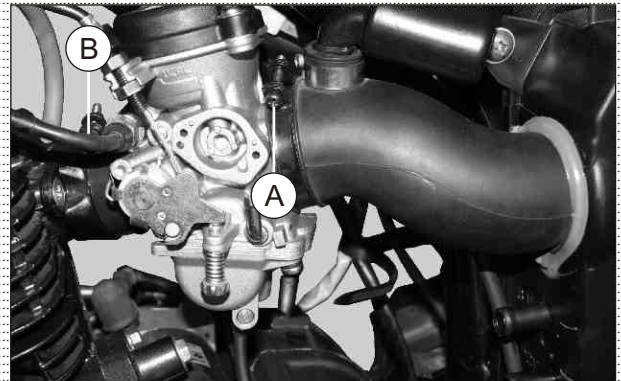


Fig. 3.32

- Remove hexagonal screw (A) (M6x20 - 1 no) from the arm gear shifter and remove SBHC screw (B) from the gear shifter lever mounting. (Fig. 3.33)

10 mm spanner

5 mm allen key

- Pull out gear shifter linkage assy.

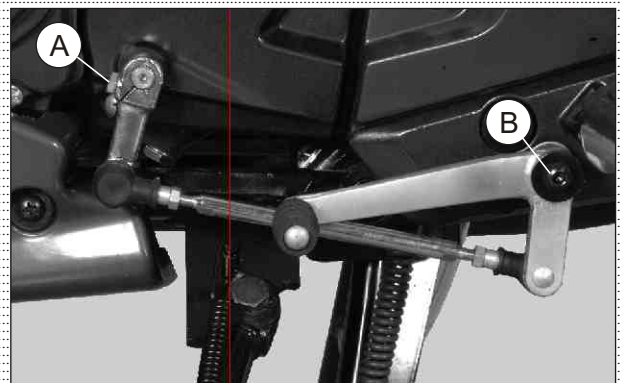


Fig. 3.33



## SERVICING OF ENGINE



- Remove CRR pan head screw (M6x20 - 2 nos) from the cover engine sprocket and take out cover engine sprocket. (Fig. 3.34)

Philips head screw driver

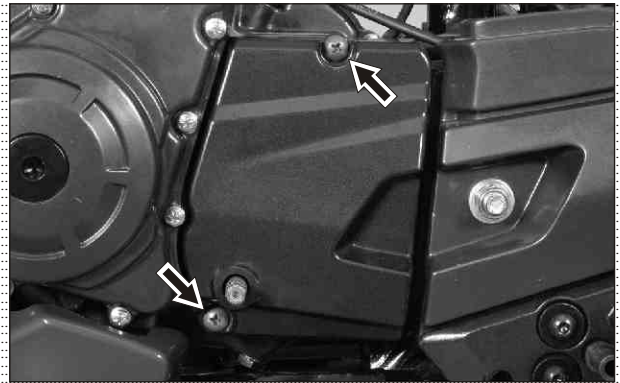


Fig. 3.34

- Remove hexagonal screw (M5x10 - 2 nos) from the lock plate engine sprocket. (Fig. 3.35)

8 mm spanner

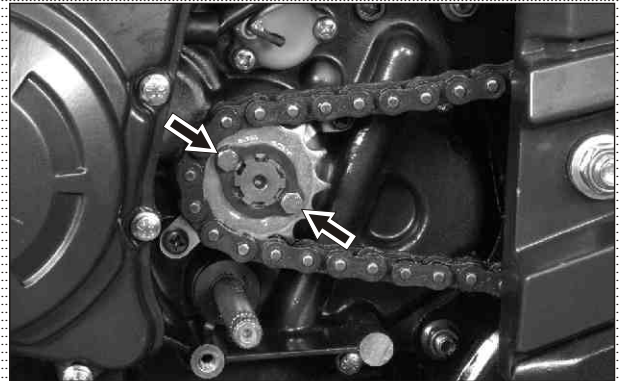


Fig. 3.35

- Take out lock plate after dislocating it from the shaft complete drive grooves.
- Pull out chain assembly drive along with sprocket engine.
- Dislocate sprocket from the drive chain. Hang the drive chain in the frame.
- Disconnect all the wiring sockets from magneto assembly connected to wiring harness. (Fig. 3.36)

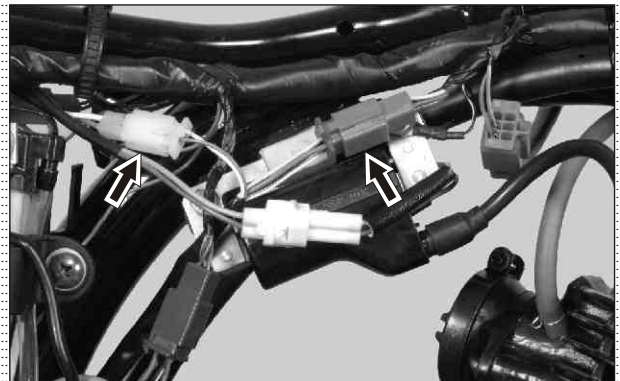


Fig. 3.36

- Remove hexagonal flange bolt (M8x25 - 2 nos) from the muffler complete front mounting. (Fig. 3.37)

12 mm spanner

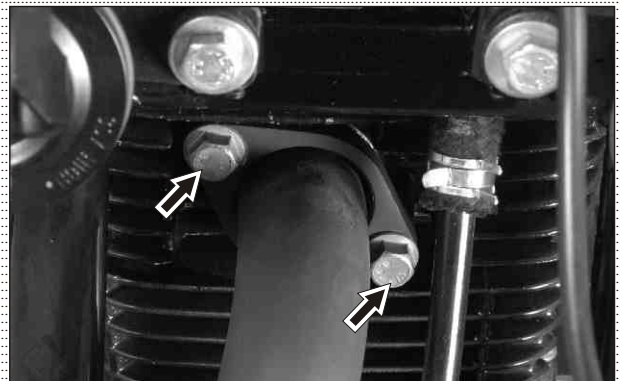


Fig. 3.37



- Remove hexagonal bolt (M8x60 - 1 no) from the muffler assembly rear mounting along with punched washers and 'U' nut. (Fig. 3.38)

12 mm spanner

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

- Take out gasket exhaust from the head complete cylinder. (Fig. 3.39)

Small screw driver

**Note:**

While reassembling replace the gasket exhaust pipe with a new one.

- Remove hexagonal screw (M6x16 - 1 no) along with spring washer and take out pipe complete secondary air injection along with the 'O' ring. (Fig. 3.40)

8 mm spanner

**Note:**

While reassembling do remember to assemble 'O' ring in the pipe complete secondary air injection.

- Dislocate hose clip (A) and disconnect the hose air cut valve (B). (Fig. 3.41)
- Dislocate hose clip no.1 (C) and disconnect the hose air outlet (D) from the secondary air injection valve. (Fig. 3.41)

Nose plier

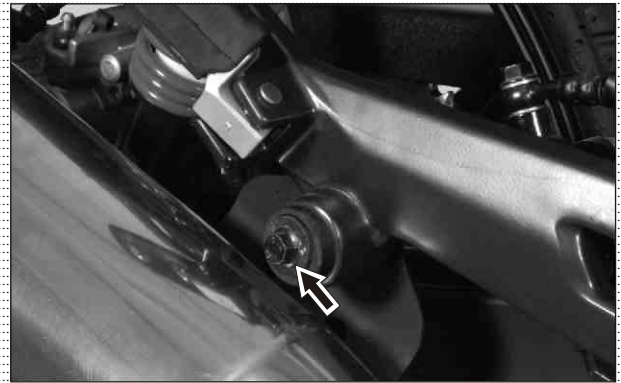


Fig. 3.38

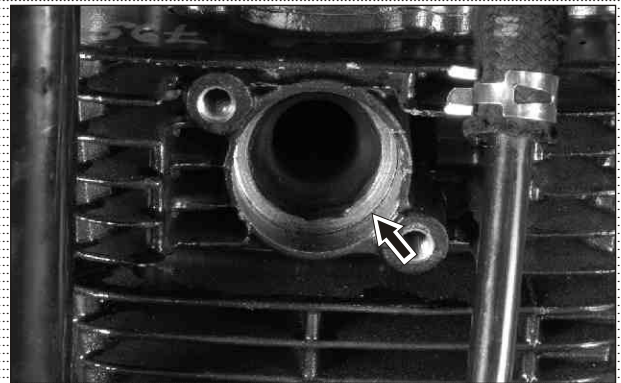


Fig. 3.39

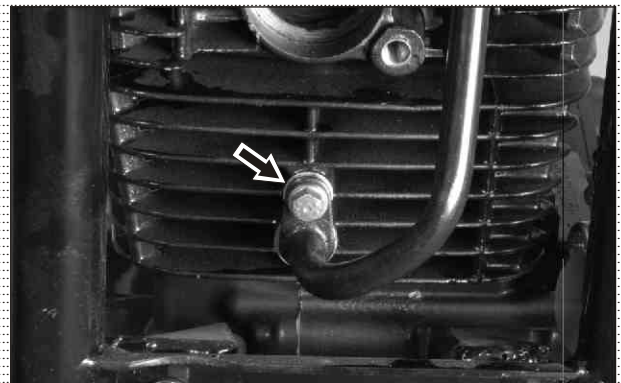


Fig. 3.40

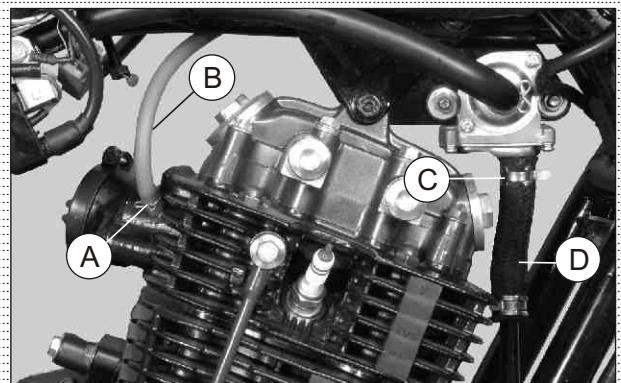


Fig. 3.41



- Remove engine assembly top mounting hexagonal flange bolt (M8x55 - 3 nos). (Fig. 3.42)

12 mm spanner

- Take out both the bracket engine mounting upper L and R along with the secondary air injection valve.

- Remove hexagonal flange bolt (M8x72 - 1 no) from the front mounting of engine. (Fig. 3.43)

12 mm spanner

- Remove hexagonal bolts (M8x16 - 4 nos) from the bracket complete engine mounting front L & R and separate the bracket complete guard center. (Fig. 3.44)

12 mm spanner

- Take out bracket engine mounting front L & R.

- Remove hexagonal flange bolts (M8x95 - 1 no) and (M8x120 - 1 no) from the rear mounting of the engine assembly. (Fig. 3.45)

12 mm spanner

**Note:**

While removing mounting bolts, always bottom bolt should be removed first.

Engine mounting nuts are of self locking type and therefore should not be reused.

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

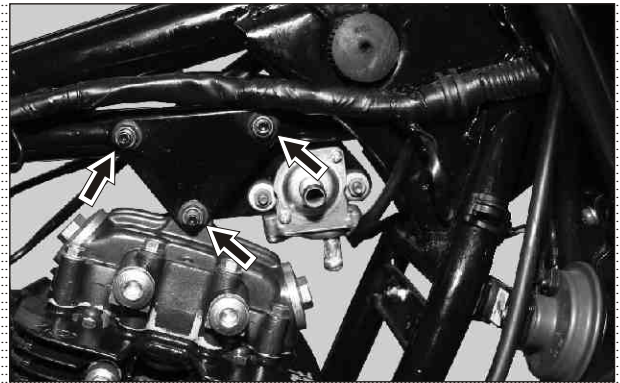


Fig. 3.42

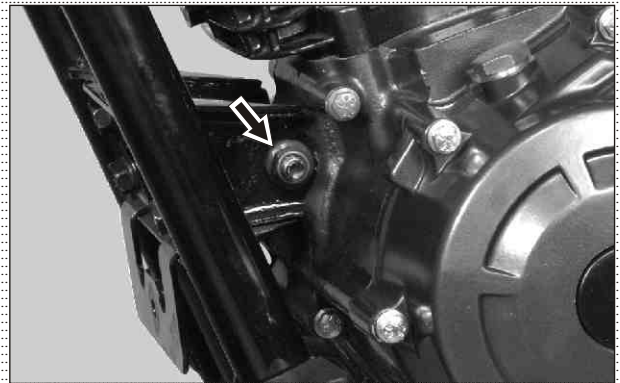


Fig. 3.43

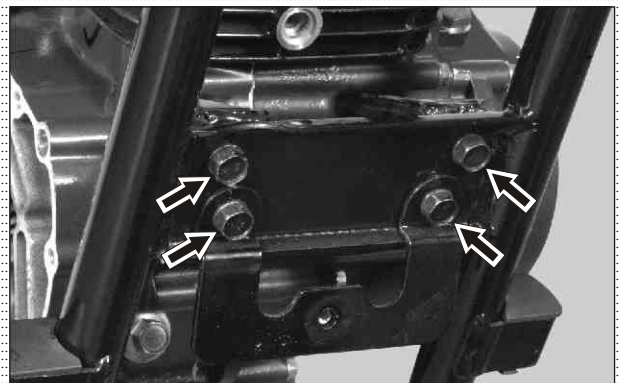


Fig. 3.44

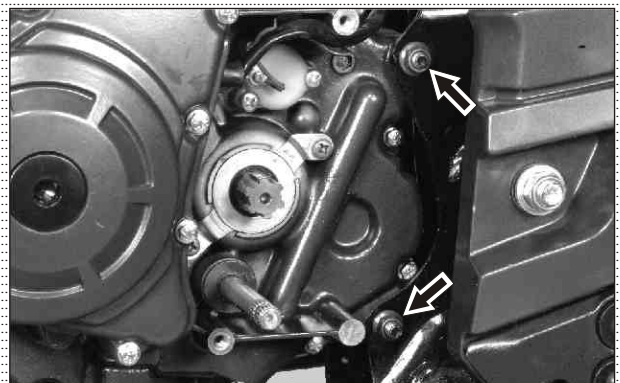


Fig. 3.45





## ENGINE ASSEMBLY - DISASSEMBLY

- Remove circlip from the shaft complete gear shift and take out washer. (Fig. 3.46)

0310017

Snap ring plier - External

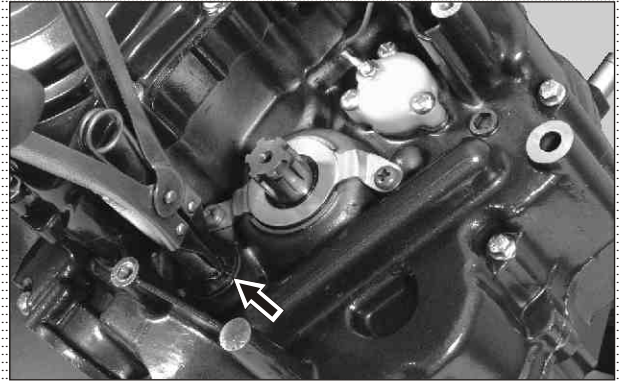


Fig. 3.46

- Remove CRPH screw (M6x12 - 2 nos) from the retainer drive shaft mounting. (Fig. 3.47)

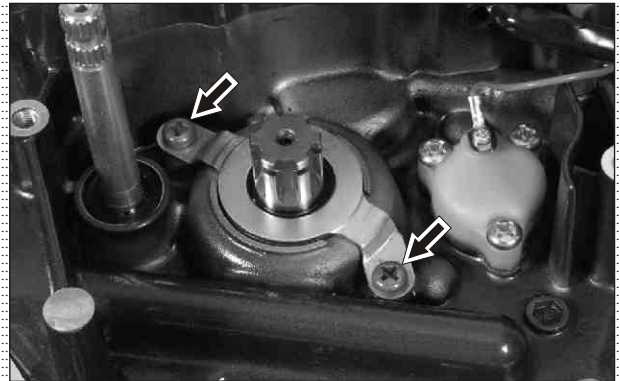


Fig. 3.47

- Loosen CRR pan head screw and disconnect the neutral earth wire from the body gear shift switch. (Fig. 3.48)



Fig. 3.48

- Remove CRR pan head screw (M5x20 -3 nos) along with spring and plain washer from the body gear shift mounting. (Fig. 3.49)

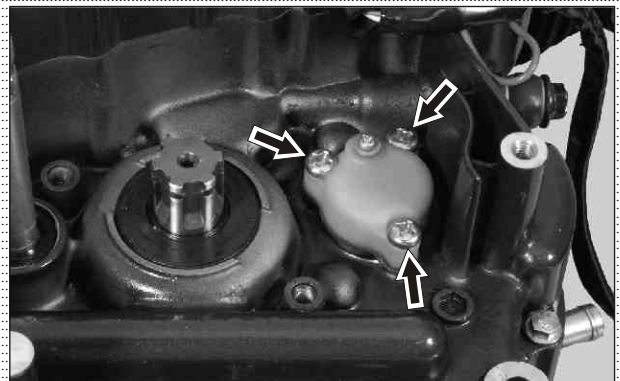


Fig. 3.49

3



- Take out gasket gear shift switch.
- Remove contact complete gear shift switch (A) by loosening recessed CSK head screw (B). (Fig. 3.50)

**Note:**

While reassembling contact comp gear shift, locate the projection of contact to the groove on shaft for proper indication of neutral position.

- Remove hexagonal flange bolts (M6x40 - 9 nos) from the cover magneto mounting. (Fig. 3.51)

8 mm spanner

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

Nylon hammer

- Take out gasket magneto cover and dowel pin.

- Remove spacer starter idle gear (A) and pin magneto cover (B). (Fig. 3.52)

- Take out gear starter idle (C). (Fig. 3.52)

Nose plier

- Remove stopper starter gear. (Fig. 3.53)

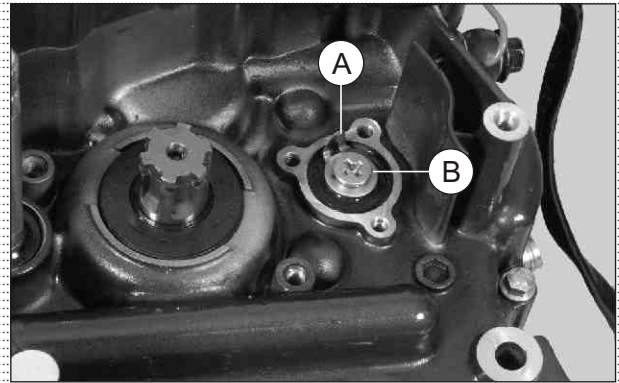


Fig. 3.50

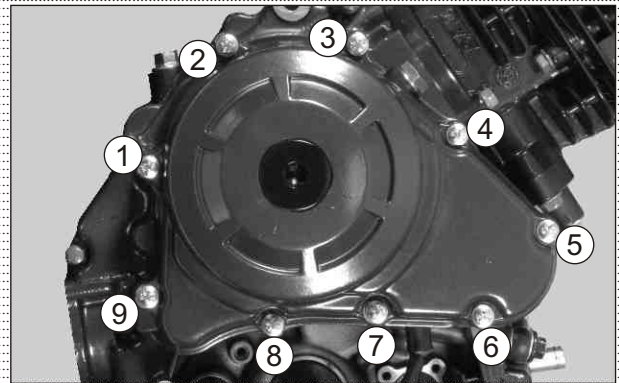


Fig. 3.51

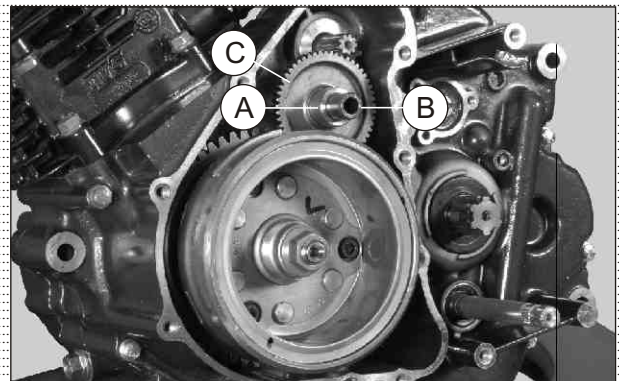


Fig. 3.52

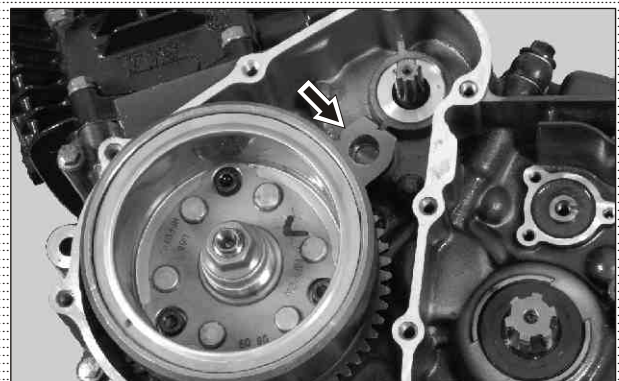


Fig. 3.53





- Remove union bolt oil pipe (2 nos) along with gaskets oil pipe union (4 nos) and take out the pipe complete head T/M oil. (Fig. 3.54)

10 mm spanner

### Caution:

While reassembling union bolts, ensure that bolt having smaller oil delivery hole (black finish) is assembled on the crankcase complete L and other two bolts having larger oil delivery hole (bright finish) are assembled on crankcase complete R and head assembly cylinder. (Fig. 3.55A)

### Note:

While reassembling, locate the gasket oil pipe union on both the side of the pipe end as shown in the figure. (Fig. 3.55B)

- Remove hexagonal flange bolt (M6x25 - 1 no) from the motor assembly starter mounting and remove the motor assembly starter along with the 'O' ring. (Fig. 3.56)

8 mm spanner

### Note:

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

- Remove bolt gear shift cam stopper and pull out stopper complete gear shift along with the spring gear shift cam stopper and shim. (Fig. 3.57)

10 mm spanner

### Note:

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

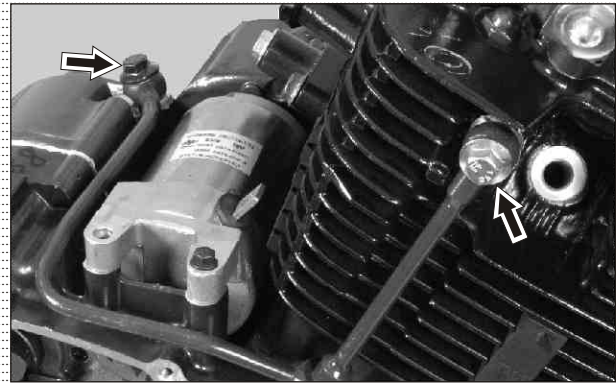


Fig. 3.54

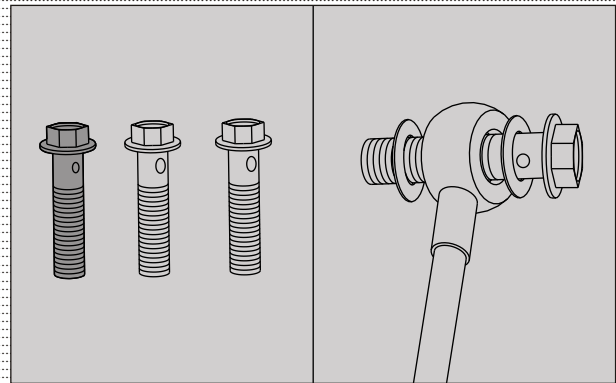


Fig. 3.55A

Fig. 3.55B

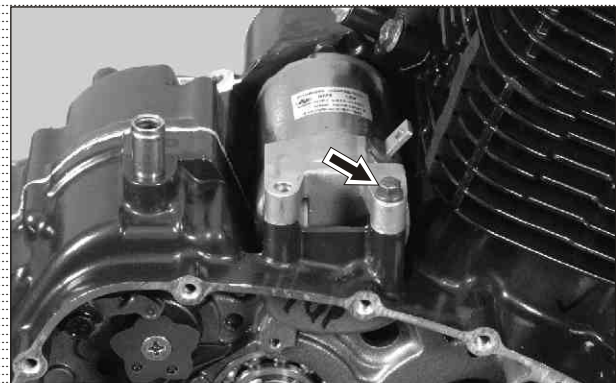


Fig. 3.56

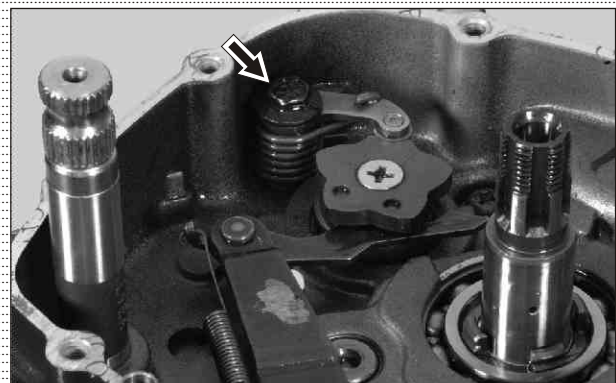


Fig. 3.57



- Remove recessed CSK head screw (M6x16 - 1 no) from the index star mounting and take out index star. (Fig. 3.58)

Philips head screw driver

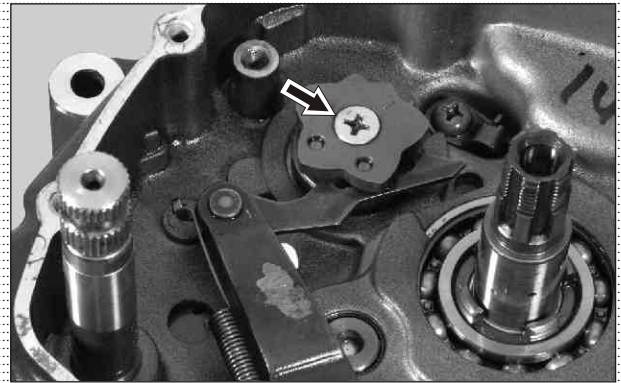


Fig. 3.58

- Remove shaft complete gear shift by pulling outside. (Fig. 3.59)

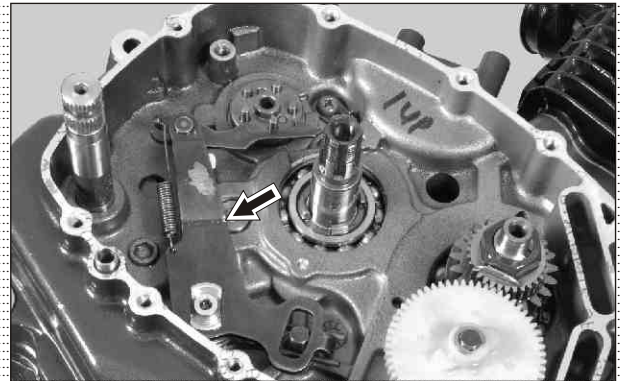


Fig. 3.59

- Remove pin holder complete from the cam gear shift. (Fig. 3.60)



Fig. 3.60

- Remove CRR pan head screw (M6x12 - 1 no) from the retainer T/M oil guide and take out the retainer. (Fig. 3.61A)

Philips head screw driver

- Gently pull out guide T/M oil from the crankcase assembly. (Fig. 3.64B)

Nose plier

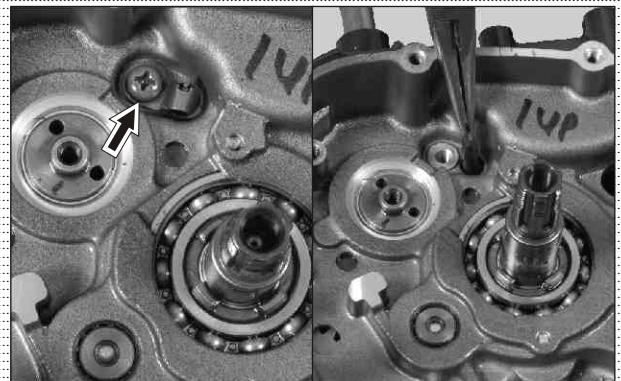


Fig. 3.61A

Fig. 3.61B

- Remove E-ring from the oil pump shaft and take out gear oil pump driven. (Fig. 3.62)

Small flat screw driver

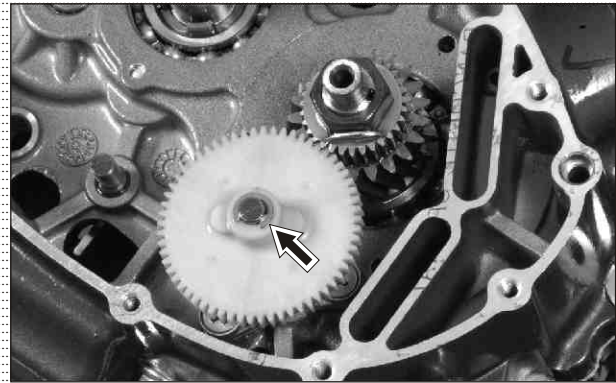


Fig. 3.62

- Remove pin oil pump driven gear (A). (Fig. 3.63)

Nose plier

- Remove CRR CSK head screw (M6x20 - 3 nos) from the pump assembly oil and pull out pump assembly. (Fig.3.63)

Philips head screw driver

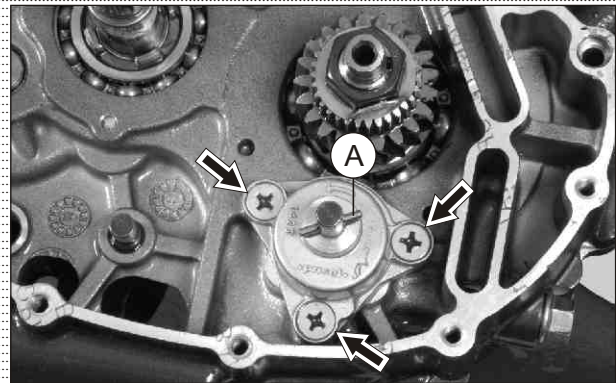


Fig. 3.63

- Unfold washer primary driven gear. (Fig. 3.64)

Chisel / metal hammer



Fig. 3.64

- Using special tool, hold the rotor assembly and remove hexagonal nut (M6x1.5). (Fig. 3.65)

M1310010      Holder assembly magneto

22 mm spanner

- Take out washer primary drive gear.

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



Fig. 3.65





- Remove gear oil pump drive (A). (Fig. 3.66)
- Remove gear primary drive (B). (Fig. 3.66)

**Note:**

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

- Take out key (4x4x15) from the crankshaft assembly. (Fig. 3.67)

Nose plier

- Remove bolt adjuster assembly tensioner and take out the bolt. (Fig. 3.68)

10 mm spanner

- Take out 'O' ring (A). (Fig. 3.69)
- Remove hexagonal screws (M6x20 - 2 nos) from the adjuster assembly tensioner mounting and take out adjuster along with the gasket. (Fig. 3.69)

10 mm spanner

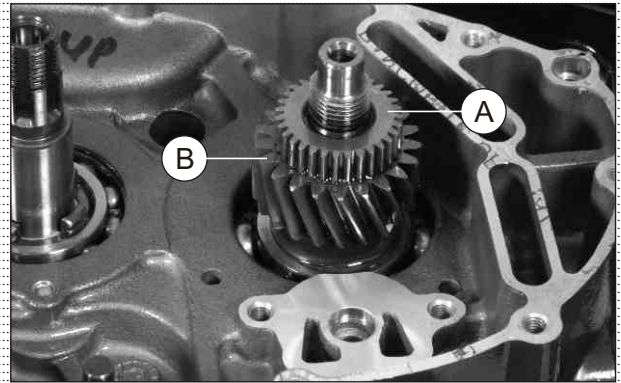


Fig. 3.66

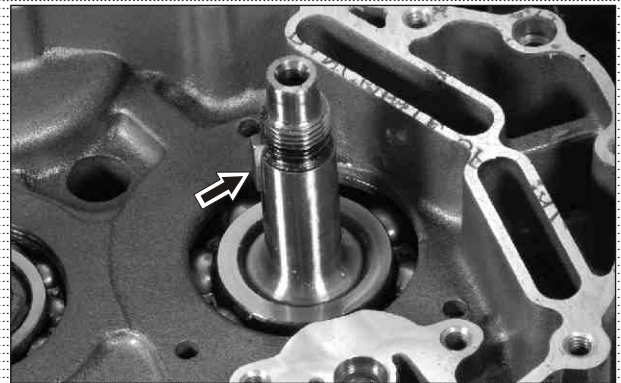


Fig. 3.67

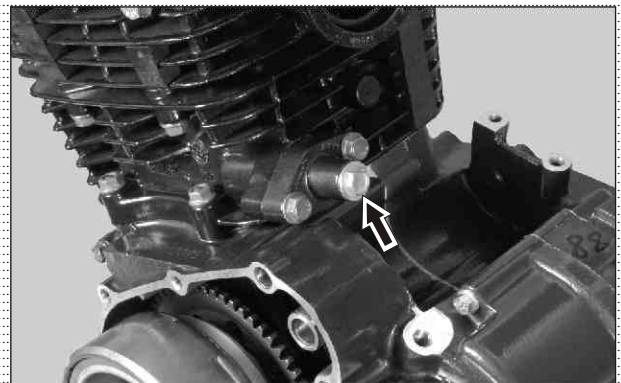


Fig. 3.68

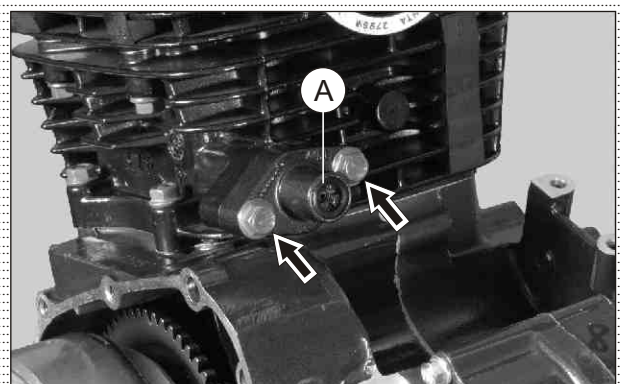


Fig. 3.69



- Remove both the cap inspection hole along with 'O' ring. (Fig. 3.70)

17 mm spanner

**Note:**

While reassembling cap inspection hole ensure that 'O' ring is fitted.

- Align TDC mark (A) on rotor assembly with the crankcase mark (B) by rotating the rotor assembly. (Fig. 3.71)

17 mm tubular spanner

**Note:**

At this point both the arm complete valve rocker should be free. Otherwise rotate the rotor assembly for a another full rotation and align the mark again.

- Remove hexagonal flange bolts (M6x55 - 4 nos (A), M6x45 - 2 nos (B) and M6x35 - 4 nos (C)) from cover cylinder head mounting along with 4 nos of gasket cylinder head. (Fig. 3.72)

10 mm spanner

**Note:**

While reassembling, insert all the bolts first and check equal height of bolts from their respective seating surfaces. Before tightening, inspect the gasket cylinder head cover bolt for any damage. Replace if necessary.

- Take out pin cylinder head cover knock - 2nos (A). (Fig. 3.73)

Nose plier

- Take out plug cylinder head (B). (Fig. 3.73)

**Caution:**

While reassembling, apply liquid gasket on plug cylinder head periphery.

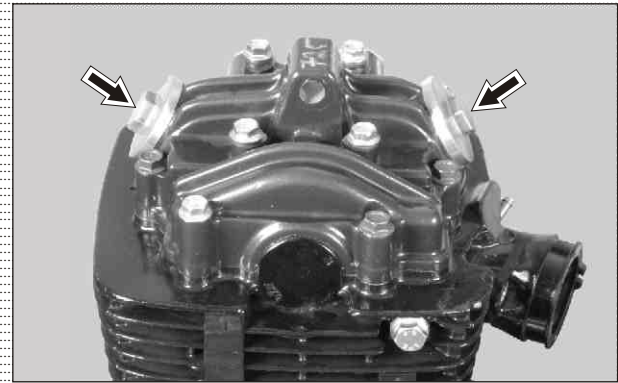


Fig. 3.70

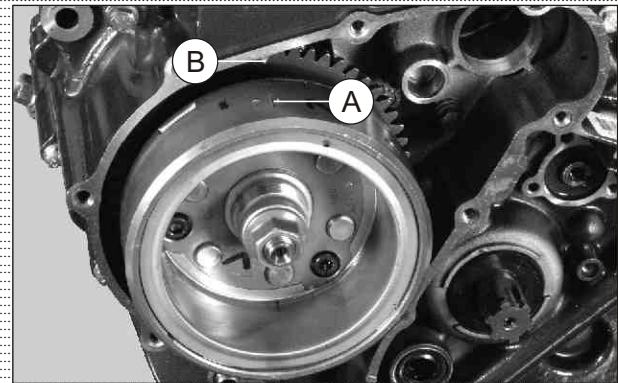


Fig. 3.71

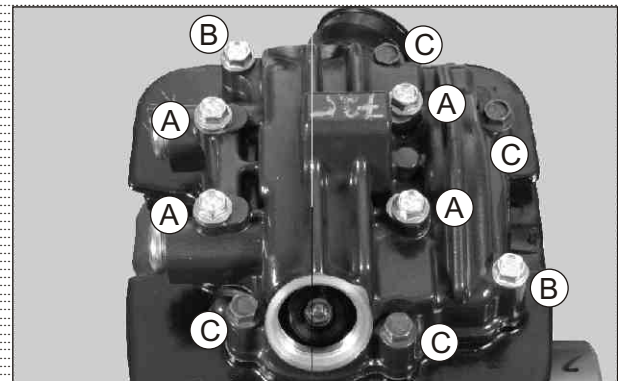


Fig. 3.72

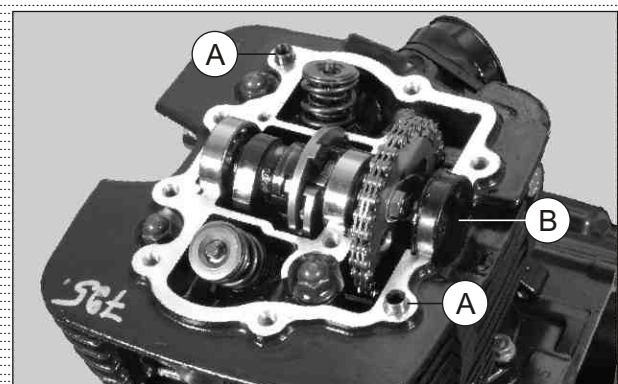


Fig. 3.73





- Dislocate cam chain from the cam sprocket and take out cam shaft assembly. (Fig. 3.74)
- Hold chain complete camshaft drive using a good quality copper wire to prevent the chain from falling into crankcase assembly and hang it on the head complete cylinder.

- **Unfold the washer sprocket. (Fig. 3.75)**

Chisel / metal hammer

- Remove hexagonal screws (M6x12 - 2 nos) from the sprocket camshaft. (Fig. 3.76)

8 mm spanner

- Remove washer sprocket and sprocket 34T.

- Take out pin sprocket knock from the camshaft complete. (Fig. 3.77)

Nose plier



Fig. 3.74



Fig. 3.75



Fig. 3.76



Fig. 3.77



- Take out C-ring camshaft from the head complete cylinder. (Fig. 3.78)

Nose plier



Fig. 3.78

- Remove hexagonal flange nuts (M6 - 2 nos) fastened to head complete cylinder and cylinder complete. (Fig. 3.79)

10 mm spanner

- Remove hexagonal flange nuts (M6 - 2 nos) fastened to cylinder complete and crankcase complete L. (Fig. 3.79)

10 mm spanner

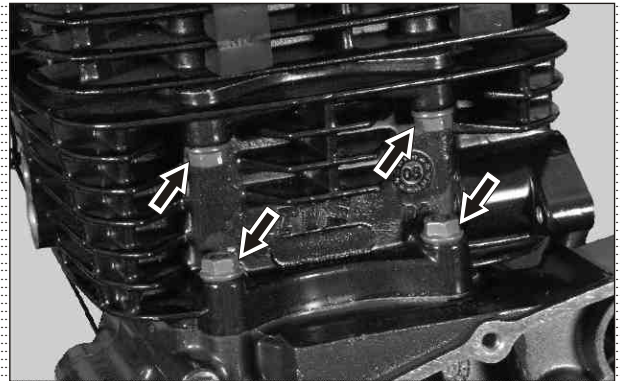


Fig. 3.79

- Remove domed nut with flange (M8 - 4 nos) from the head complete cylinder mounting, in a diagonal sequence. (Fig. 3.80)

12 mm spanner

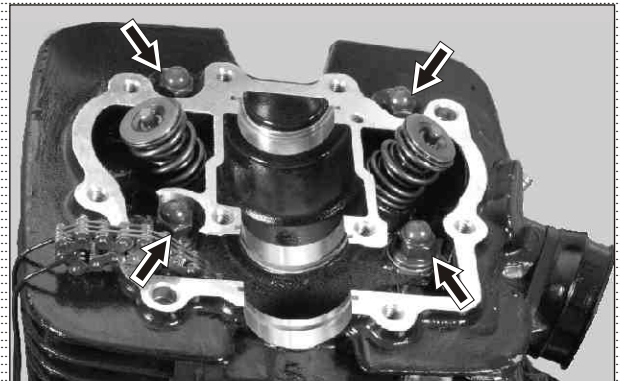


Fig. 3.80

- Remove punched washers (4 nos) from the head complete cylinder. (Fig. 3.81)

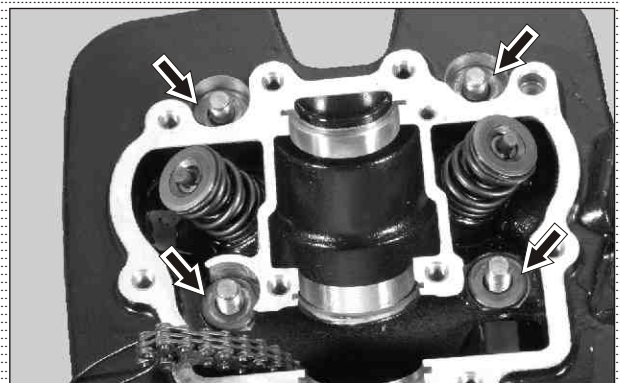


Fig. 3.81

3



- Holding the chain, gently lift the head complete cylinder as an assembly along with tensioner cam chain. (Fig. 3.82)

**Note:**

Gently tap with rubber mallet if required for easy removal of head complete cylinder.

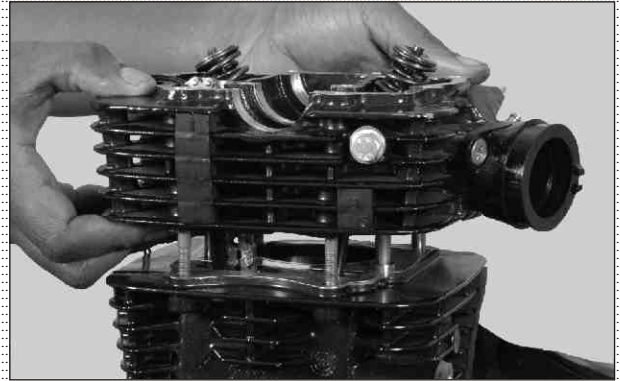


Fig. 3.82

- Take out gasket cylinder head. (Fig. 3.83)

**Note:**

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

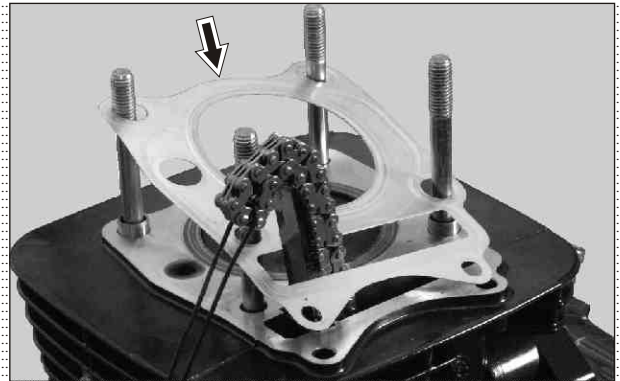


Fig. 3.83

- Remove dowel pin cylinder head knock (2 -nos).
- Remove guide cam chain (A) from the cylinder complete. (Fig. 3.84)

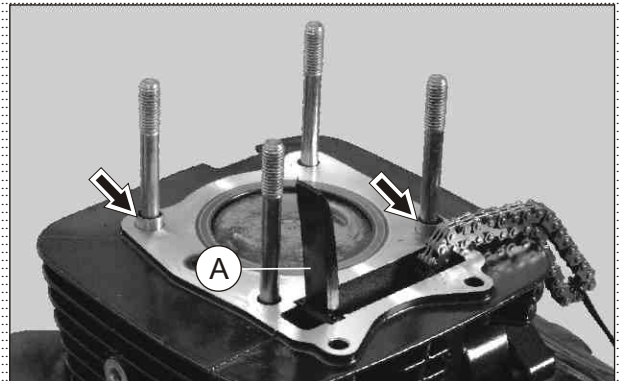


Fig. 3.84

- Gently pull out cylinder complete by holding the connecting rod by hand to avoid any damages to the piston assembly and crankcase. (Fig. 3.85)
- Remove gasket cylinder and dowel pin cylinder knock.

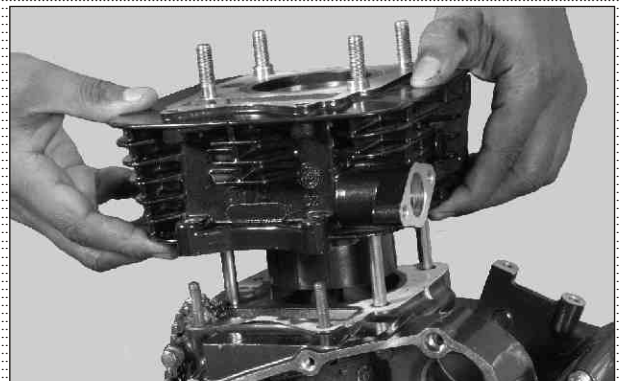


Fig. 3.85

Nose plier





- Place a clean cloth in the crankcase assembly bore to prevent the falling of circlip piston pin inside the crankcase while removing. (Fig. 3.86)
- Remove circlip piston pin from any one side of the piston. (Fig. 3.86)

Nose plier

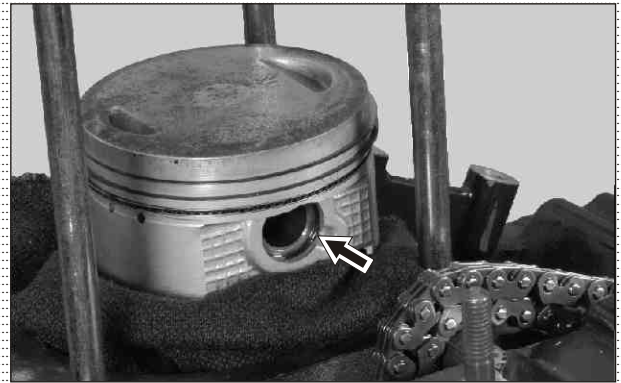


Fig. 3.86

- Gently push and take out pin piston from the piston and then take out piston along with the rings piston. (Fig. 3.87)



Fig. 3.87

- Remove hexagonal flange bolt (M6x55 - 1 no.) from the crankcase assembly R. (Fig. 3.88)

8 mm spanner

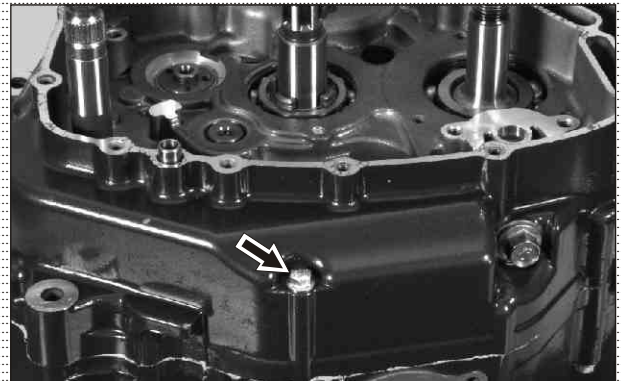


Fig. 3.88

- Using special tool hold the rotor assembly and remove hexagonal flange nut (M12x1.25) of rotor assembly mounting. (Fig. 3.89)

M1310030      Holder assembly magneto

17 mm spanner

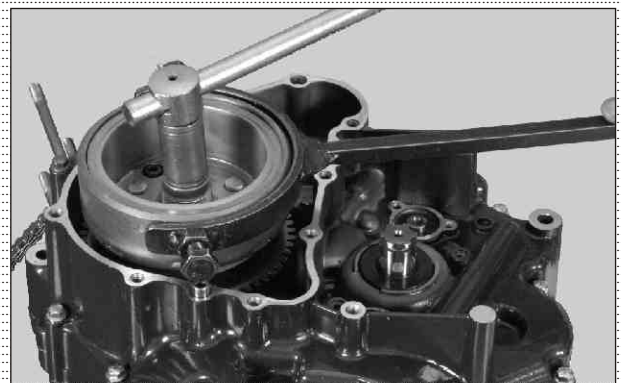


Fig. 3.89

3



- Remove rotor assembly by using a special tool. (Fig. 3.90)

M1310020

Puller assembly magneto

**Note:**

Always keep the rotor assembly on a non metallic surface with open side, facing upwards.

The magneto rotor assembly always comes out along with clutch starter one way and gear complete starter clutch. (Fig. 3.91)



Fig. 3.90

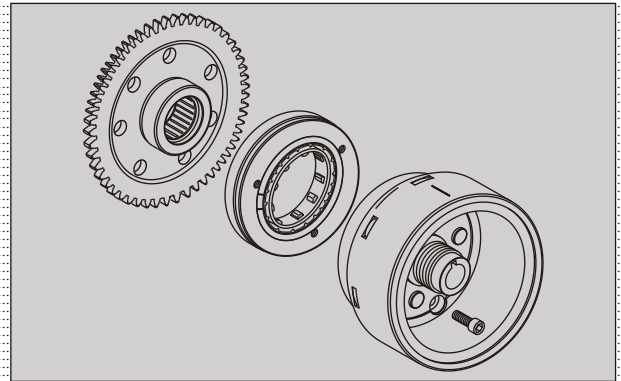


Fig. 3.91

- Remove chain complete camshaft drive. (Fig. 3.92)

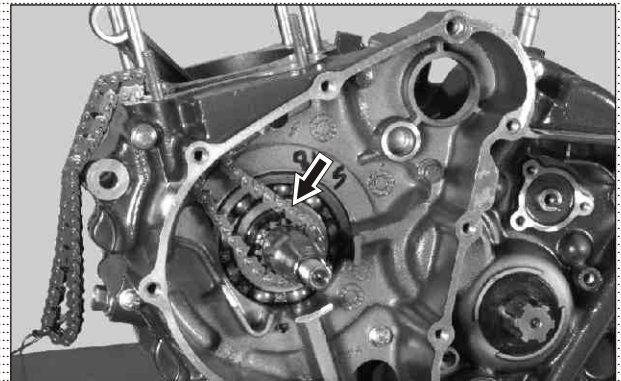


Fig. 3.92

- Take out woodruff key. (Fig. 3.97)

Nose plier

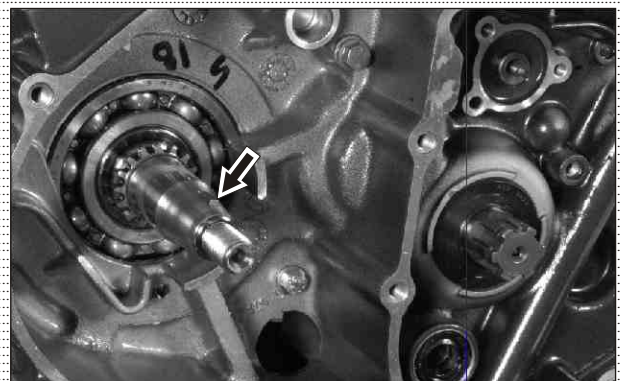


Fig. 3.93





- Remove hexagonal flange bolts (M6x55 - 8 nos (A), M6x75 - 3 nos (B) and M6x95 - 1 no (C)) from the crankcase mounting. (Fig. 3.94)

8 mm spanner

**Note:**

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

- Using special tool separate the crankcase assembly by pulling the crankcase complete L. (Fig. 3.95)

M1310110 Puller assembly

17 mm spanner

8 mm spanner

- Take out pin crankcase (2 nos).

Nose plier

- Take out shim (16x30.5x0.5) (A) from the shaft kick starter. (Fig. 3.96)
- Take out shim (15x30x1) (B) from the shaft complete drive. (Fig. 3.96)
- Take out bearing kick starter driven gear along with the thrust washer and shim (C). (Fig. 3.96)
- Take out gear kick starter drive from the shaft kick starter. (Fig. 3.97)

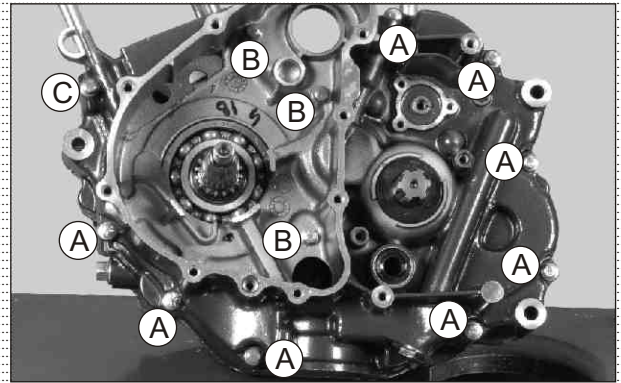


Fig. 3.94

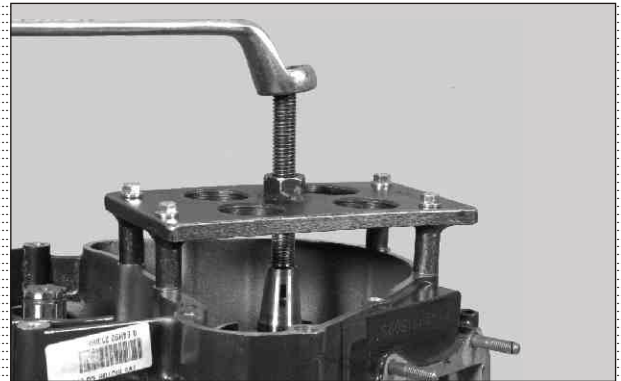


Fig. 3.95

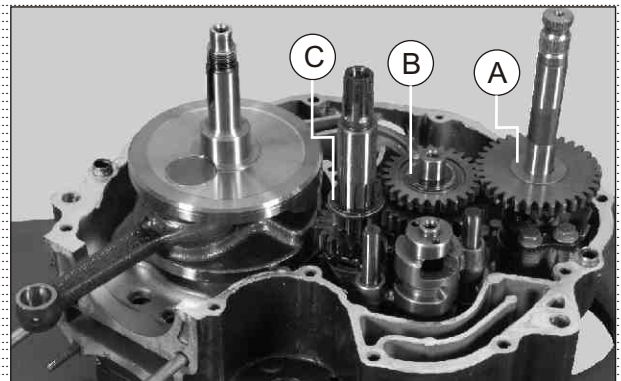


Fig. 3.96

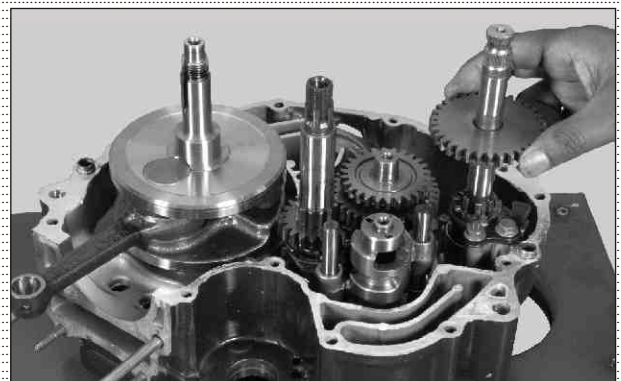


Fig. 3.97

3

- Take out shaft shift fork (2 nos) from the fork gear shifts. (Fig. 3.98A & Fig. 3.98B)

Nose plier

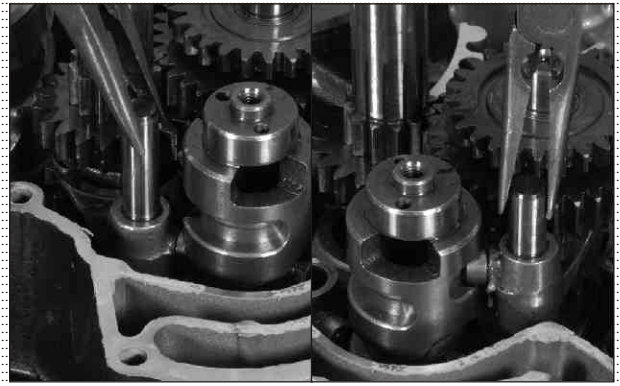


Fig. 3.98A

Fig. 3.98B

- Dislocate fork gear shift no. 1, fork gear shift no. 2 and fork gear shift high speed from cam gear shift. (Fig. 3.99)
- Take out cam gear shift from the crank case assembly. (Fig. 3.99)



Fig. 3.99

- Take out fork gear shift no. 1, fork gear shift no. 2 and fork gear shift high speed from gears along with spacer roller gear shift fork pin (3 nos). (Fig. 3.100)

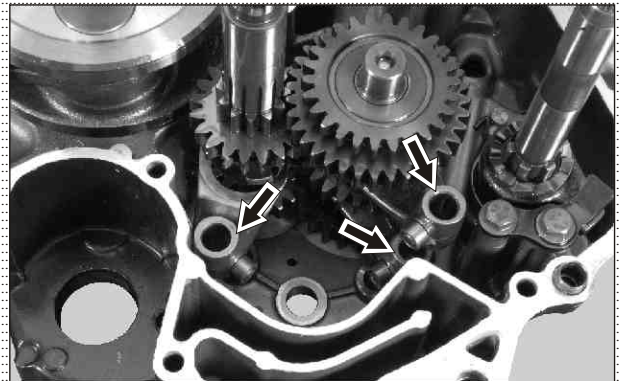


Fig. 3.100

- Take out shaft complete drive and shaft complete counter along with the gears as an assembly. (Fig. 3.101)

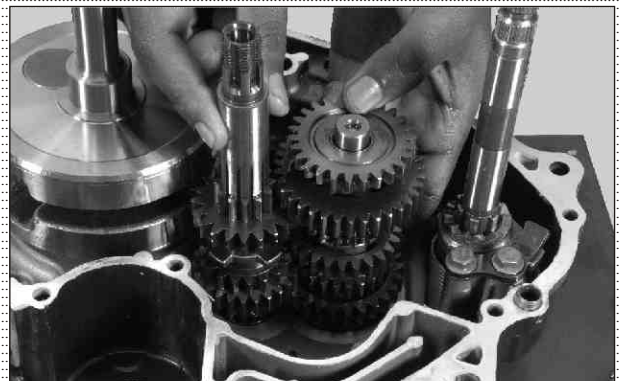


Fig. 3.101



- Take out thrust washer (20x27x1) from the shaft complete drive seating area (above the ball bearing). (Fig. 3.102)

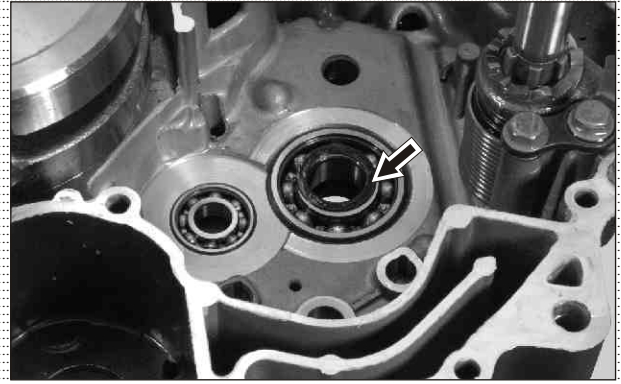


Fig. 3.102

- Pull out crankshaft assembly by gently tapping it from the other side. (Fig. 3.103)

Nylon hammer

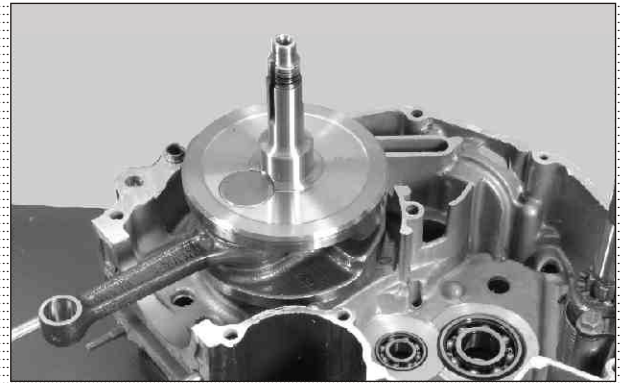


Fig. 3.103

- Rotate the shaft kick starter using lever assembly kick starter and release the starter kick from the guide kick starter. (Fig. 3.104)

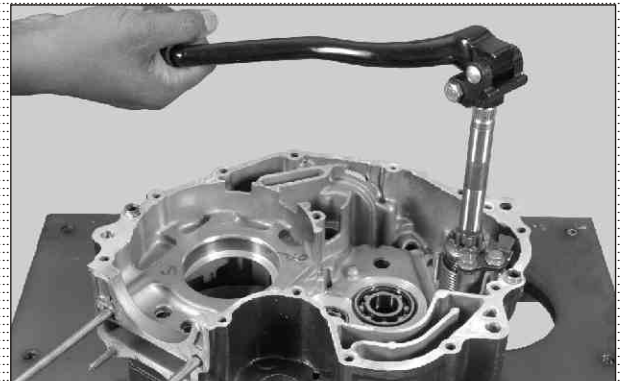


Fig. 3.104

- Take out starter kick and spring kick starter from the shaft kick starter. (Fig. 3.105)

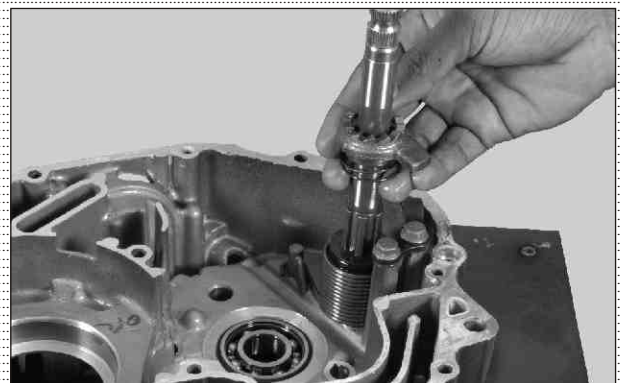


Fig. 3.105





- Pull out shaft kick starter along with shim, spring kick shaft return and guide kick starter spring. (Fig. 3.106)

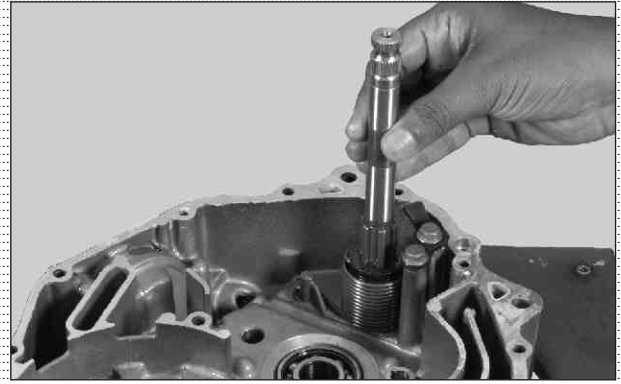


Fig. 3.106

- Separate guide kick starter spring, spring kick shaft return and shim (14x32x1). (Fig. 3.107)

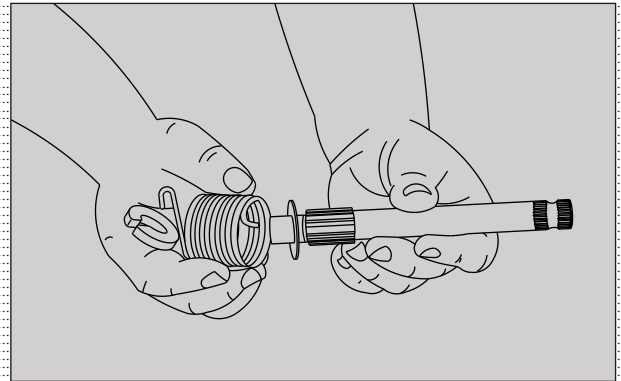


Fig. 3.107

- Using special tool remove ball bearing (6207) from the crankshaft assembly (in case the bearing comes with crankshaft). (Fig. 3.108)

S1311110

Extractor main bearing

17 mm spanner

## Note:

Remove bearings, only if they need to be replaced. Unnecessary removal of bearings should be avoided, otherwise can damage the bearing and can cause deterioration to the interference fit. It is sufficient to clean and lubricate the bearing in assembled condition.

- Using special tool, ball bearings (6207, 63/28, 6001 RS, 6006 and 6204 RS) can be removed and reassembled. (Fig. 3.109)

S1310500

Bearing installer set

Metal hammer

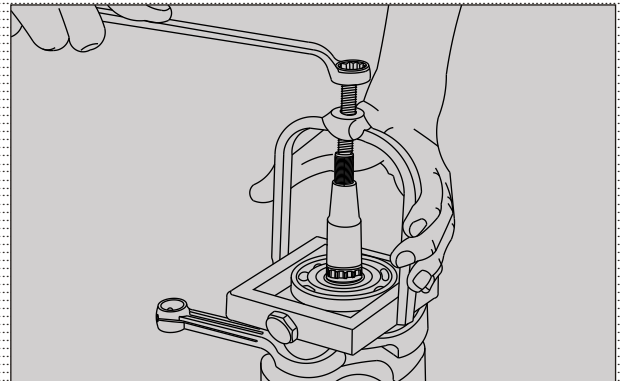


Fig. 3.108



Fig. 3.109

- Using special tool remove the oil seals.(Fig. 3.110)

0312401

Universal oil seal remover



Fig. 3.110

## TRANSMISSION

### SHAFT COMPLETE DRIVE - DISASSEMBLY

- Take out gear complete kick starter idle. (Fig. 3.111)

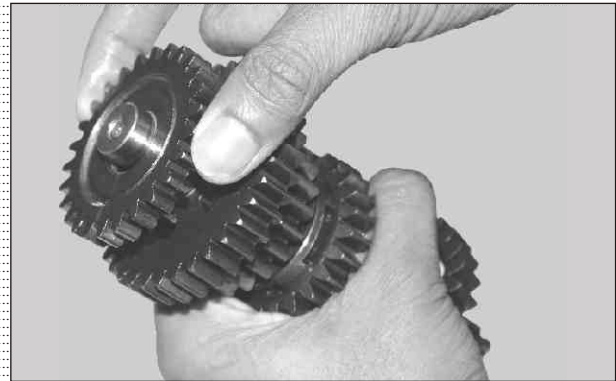


Fig. 3.111

- Take out gear complete 1st driven. (Fig. 3.112A)
- Take out shim (16.6x24x1) from the shaft. (Fig. 3.112B)

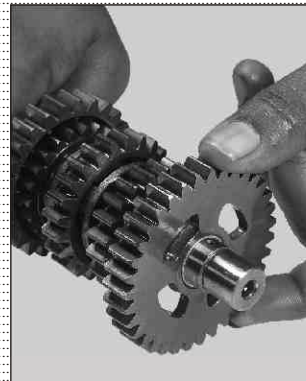


Fig. 3.112A



Fig. 3.112B

- Take out gear 4th drive. (Fig. 3.113)



Fig. 3.113

3





- Remove circlip (20x1.2). (Fig. 3.114)

0310017

Snap ring plier - External

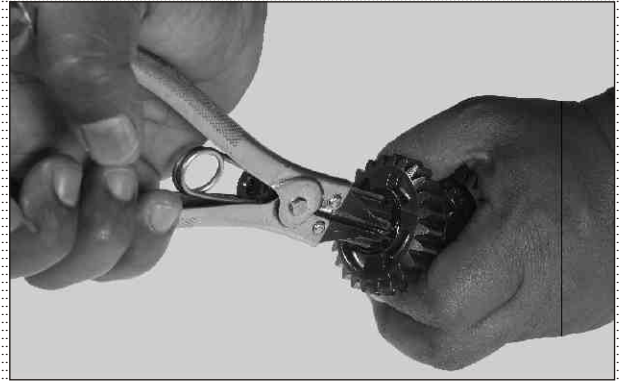


Fig. 3.114

- Take out shim (A). (Fig. 3.115)
- Take out gear 3rd driven (B). (Fig. 3.115)

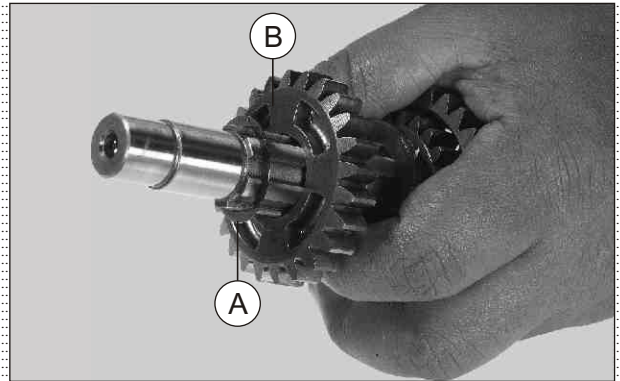


Fig. 3.115

- Take out gear 5th driven. (Fig. 3.116)



Fig. 3.116

- Take out gear 2nd driven along with bush. (Fig. 3.117)

**Note:**

While reassembling gears ensure the proper assembly of bush.

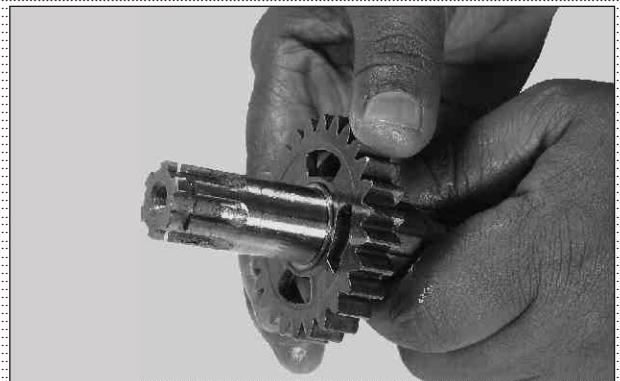


Fig. 3.117



## INSPECTION

**Shaft complete drive / shaft complete counter / cam gear shift / drive gears and driven gears.**

- Before inspection, clean all the components thoroughly with cleaning solvent.
- Carefully inspect all parts for any scoring marks, breakage, wear of splined surface of the shafts / gear teeth. Replace damaged parts with the new ones.
- Using a feeler gauge, check the clearance between fork gear shift and its seating groove on the gear. (Fig. 3.118) If measured clearance exceeds the service limit, determine whether the gear or the fork gear shift should be replaced with a new one.

| 0310100                             | Feeler gauge  |
|-------------------------------------|---------------|
| Description                         | Service limit |
| Fork gear shift to groove clearance | 0.50mm        |

## REASSEMBLY

- For reassembly, reverse the removal procedure. While reassembling gears, attention must be given to the locations and positions of washers and circlips. The exploded view clearly guides proper mounting of the gears, washers and circlips. (Fig. 3.119)

### Caution:

Always use new circlips at the time of reassembly.

When installing a new circlip, care must be taken not to expand the end gap larger than the required to slip circlip over the shaft.

After installing a new circlip, always ensure that it is completely seated in its groove and securely being locked.

The flat surface of the circlip should always face towards the component being locked.

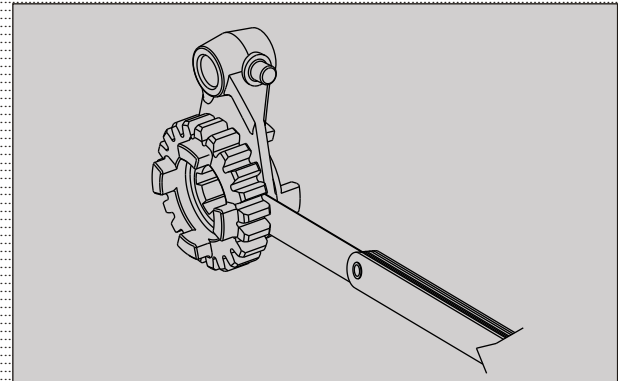


Fig.3.118

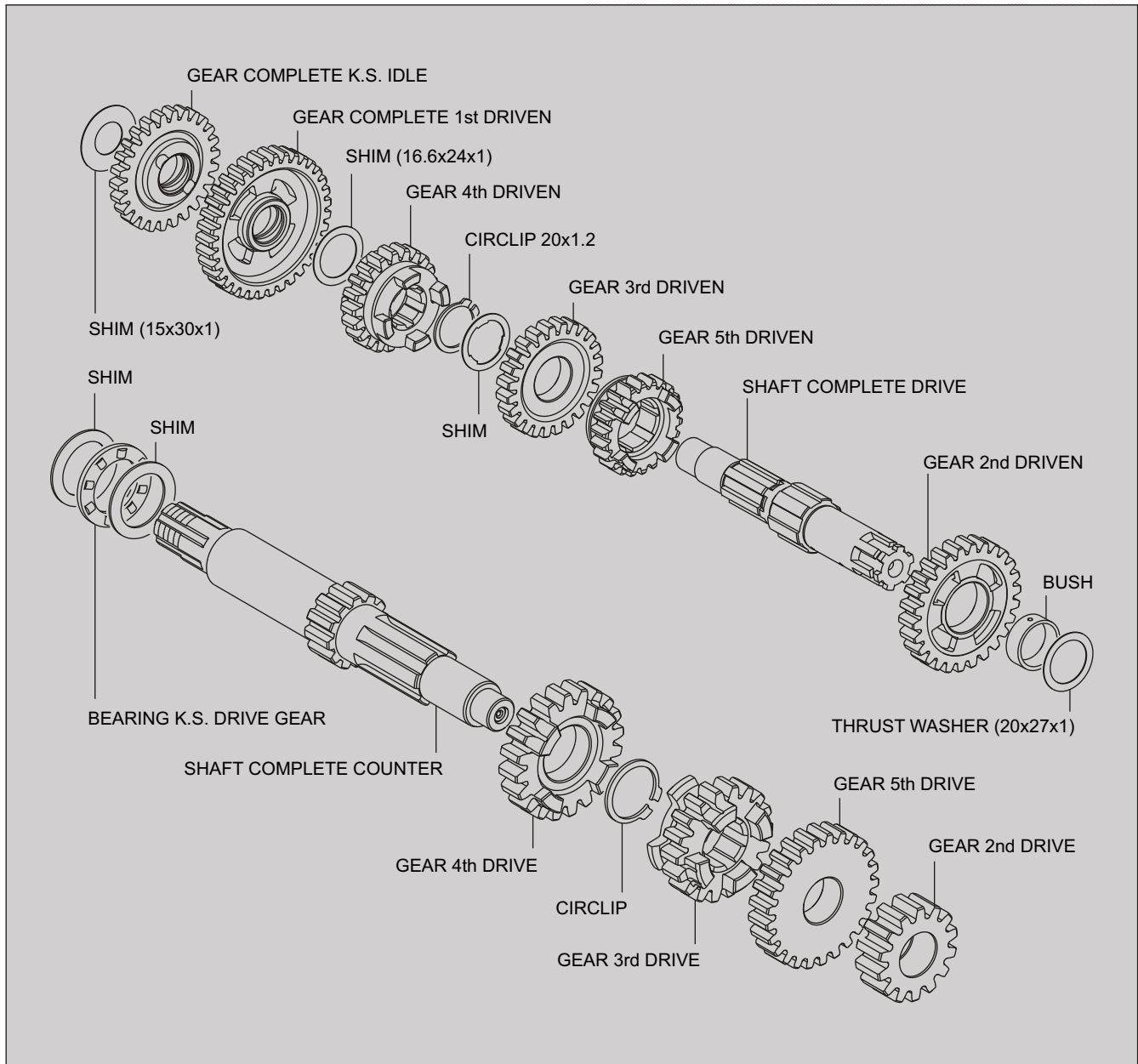


Fig. 3.119

## COVER CYLINDER HEAD - DISASSEMBLY

- Remove both the plug rocker arm shaft (inlet & exhaust ) along with the gasket. (Fig. 3.120)

8 mm allen key



Fig. 3.120



- Thread in M6 bolt into shaft rocker arm and gently pull out both the shaft valve rocker arm from the cover cylinder head. (Fig. 3.121)
- Remove arm valve rocker complete (A). (Fig. 3.121)
- Similarly remove other arm valve rocker complete (B) (Fig. 3.121).

## INSPECTION

### Cover cylinder head

- After cleaning liquid gasket from the surfaces of the cover cylinder head, inspect surface for any scratches, high and low spots. If noticed, remove them using a fine emery paper (400 grade) placed over the surface plate.
- Using feeler gauge and surface plate, check cover cylinder head for distortion . (Fig. 3.122)

Feeler gauge

Surface plate

|               |         |
|---------------|---------|
| Service limit | 0.05 mm |
|---------------|---------|

### Shaft valve rocker arm

- Inspect shaft valve rocker arm for any damages.
- Measure outer diameter (OD) of shaft valve rocker arm. If OD is less than service limit, replace the shaft. (Fig. 3.123)

Outside micrometer

|               |           |
|---------------|-----------|
| Service limit | 11.686 mm |
|---------------|-----------|

#### Note:

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

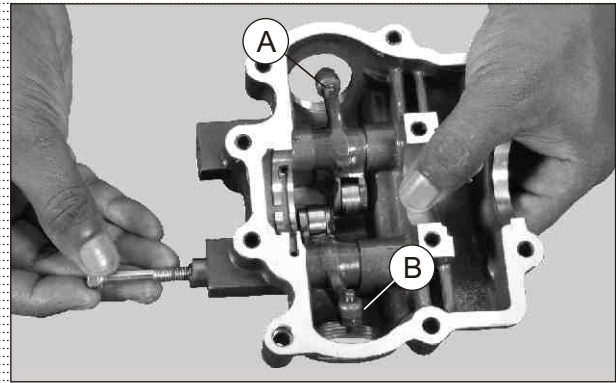


Fig. 3.121

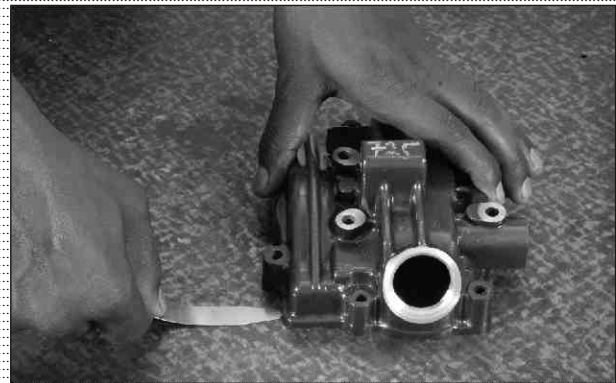


Fig. 3.122

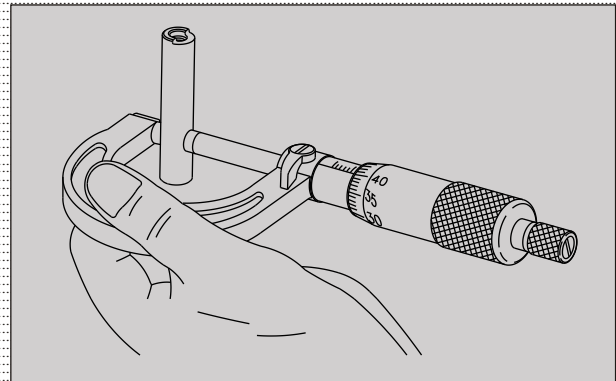


Fig. 3.123





## Arm complete valve rocker

- In TVS Apache RTR arm complete valve rocker has roller follower. Roller follower is a steel roller housed with a needle cage. This decreases the load exerted by the valve train on engine by reducing the friction. (Fig. 3.124)

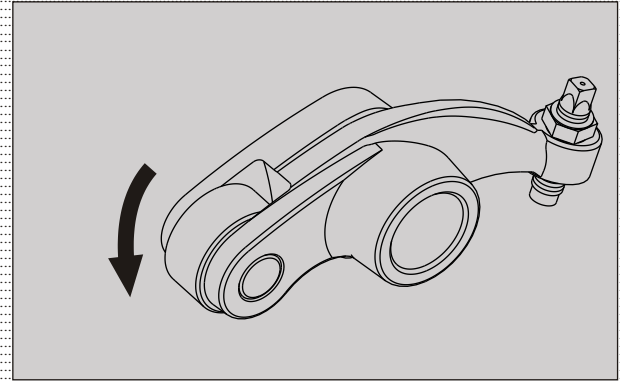


Fig. 3.124

- Inspect arm complete valve rocker (rocker arm) for wear, damage or clogged oil hole. Measure the internal diameter (ID). If ID is more than the service limit, replace the arm. (Fig. 3.125)

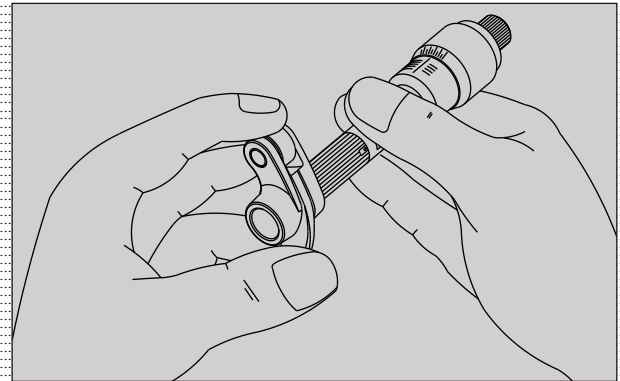


Fig. 3.125

Inside micrometer

Standard

12.30 mm

## REASSEMBLY

- Reassemble cover cylinder head in reverse order of removal.

### Caution:

While reassembling shaft valve rocker arm, relief cut given in both the shaft should face each other to enable the cover cylinder head bolts to enter into the groove. (Fig. 3.126)

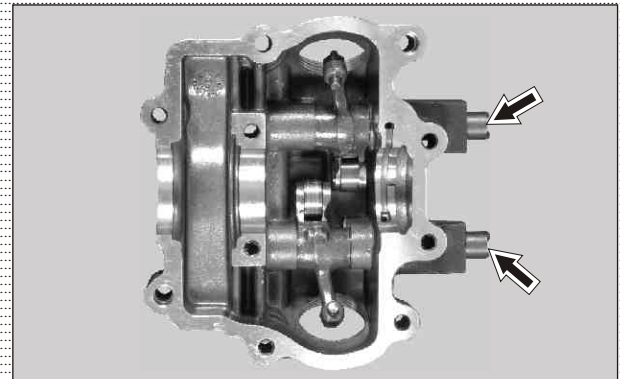


Fig. 3.126

## HEAD COMPLETE CYLINDER

### DISASSEMBLY

- Remove bolt cam chain tensioner and remove the tensioner cam chain. (Fig. 3.127)

12 mm spanner

- Take out the gasket.

### Note:

While reassembling tensioner cam chain ensure that gasket is assembled (copper).

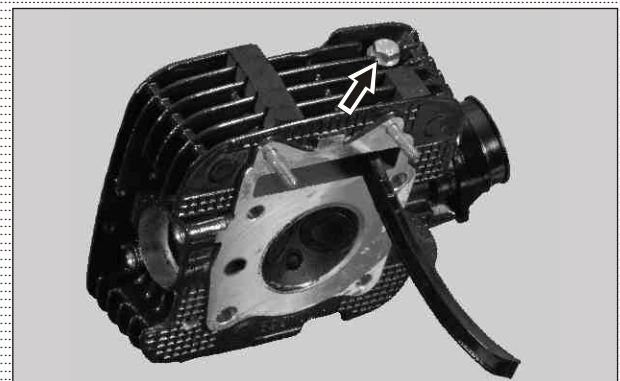


Fig. 3.127



- Mount the special tool to remove the valves as the movable jaw of the tool rests on retainer valve spring (Fig. 3.128A) and the fixed end to rest at the center of the valve face. (Fig. 3.128B)
- Slowly tighten the special tool to compress the spring valve.

S1310020

Extractor assembly, inlet and exhaust valve

## Caution:

To prevent loss of tension of the spring valve, do not compress the spring more than required.

- Remove two cotter valve from the valve stem. (Fig. 3.129)

Nose plier

- Loosen and take out special tool.
- Remove retainer valve spring, spring valve outer and spring valve inner. (Fig. 3.130)

- Gently, push down the valve from top and remove the valve from combustion chamber side. (Fig. 3.131)

## Note:

While removing valve, check for the free movement of valve. Also check valve for bend and runout. Replace the valve incase of bend or runout.

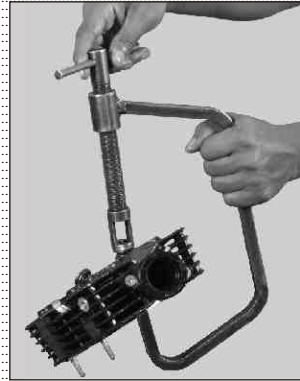


Fig. 3.128A



Fig. 3.128B



Fig. 3.129



Fig. 3.130

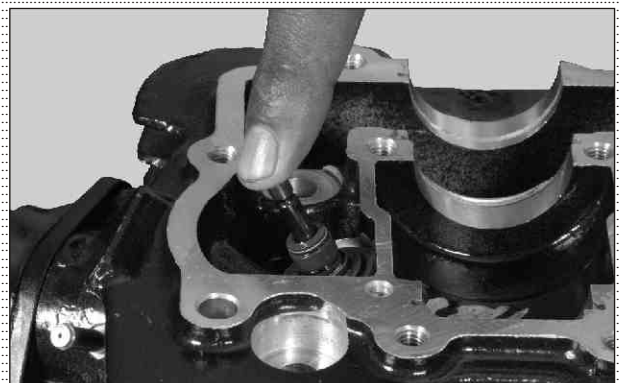


Fig. 3.131

3



- Take out seal valve stem oil. (Fig. 3.132)

Nose plier

**Note:**

While reassembling, replace the seal valve stem oil with a new one.

- Take out seat valve spring. (Fig. 3.133)

Nose plier

- Repeat same procedure for removal of other valve.

**Note:**

The pipe complete intake need to be removed only incase of replacement. For removing the pipe intake loosen and remove the CRR pan head screws (2 nos). (Fig. 3.134)

## DECARBONISING

### Head complete cylinder

- Carbon deposits on the combustion chamber of the head complete cylinder increase the compression ratio which would result in pre-ignition and over heating. Carbon deposited at exhaust manifold prevents smooth flow of exhaust, thereby reducing the engine power output.
- Decarbonise combustion chamber of head complete cylinder using suitable decarbonising spray. (Fig. 3.135)

**Note:**

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

**Caution:**

Do not damage the surface of combustion chamber while decarbonising.

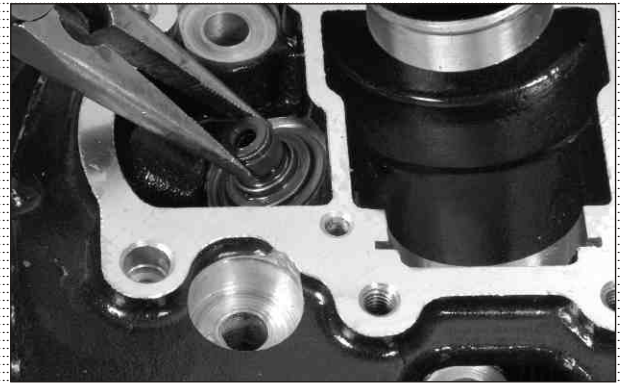


Fig. 3.132

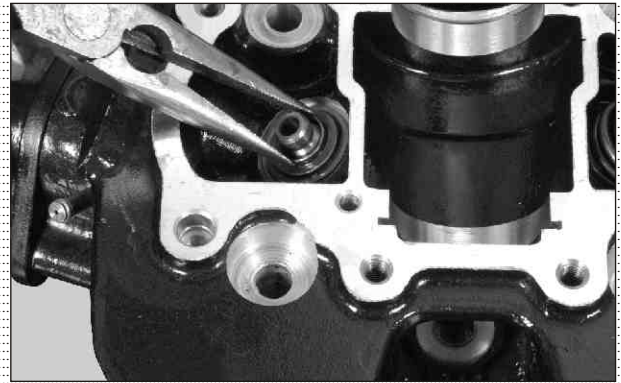


Fig. 3.133



Fig. 3.134

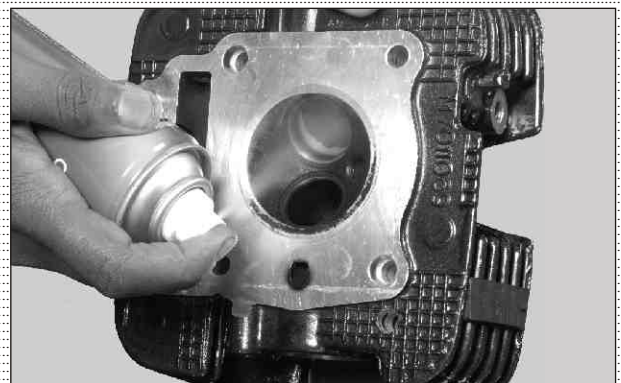


Fig. 3.135



## Seat valve

- Carbon deposits on valve seating causes improper seating of valves, thereby causing leakage and this also affects idling, pickup and mileage. This also leads to erratic running and starting trouble.

## Valve and valve guide

- Carbon deposits on valve stem rubs continuously on guide valve, results in increased clearance between stem and guide valve. Clean valve stem with the cleaning solvent. (Fig. 3.136)
- Clean guide valve and remove any carbon build up by using carbon removers.
- Clean other parts of head complete cylinder thoroughly with suitable cleaning solvent.

## INSPECTION

### Head complete cylinder

#### Note:

Remove stud bolts cylinder head (2 nos) from the head complete cylinder before removing scratches.

- Place head complete cylinder on a surface plate, using straight edge and feeler gauge check distortion.
- If measured value exceeds the limit, replace the head complete cylinder with a new one. (Fig. 3.137)

Feeler gauge

Surface plate

Service limit

0.05 mm

### Cam chain

- Measure distance across 20 pitches (21 links) to know the service limit of cam chain. (Fig. 3.138)

Vernier caliper

Service limit

127.22

- Replace if found beyond the limit.

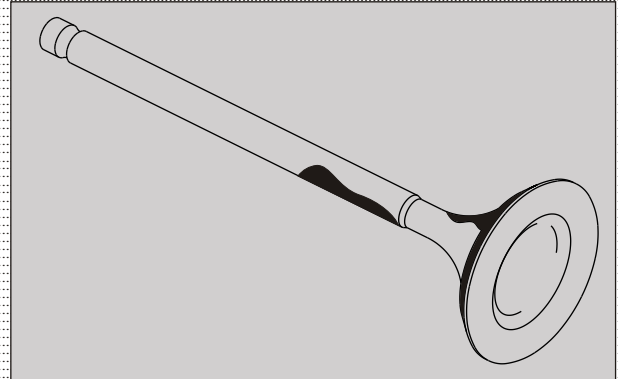


Fig. 3.136



Fig. 3.137

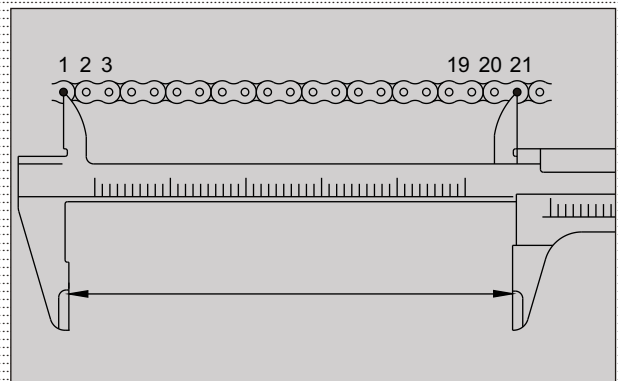


Fig. 3.138





## Camshaft complete

- Check camshaft complete for runout, wear of cam lobes and journals. Any of these could cause the engine to produce abnormal noise, vibration or lack of power output.
- Wornout cam lobes may lead to improper valve operation resulting in reduced power output.
- Measure cam lobe height. If the lobe height is less than specified service limit then, replace the camshaft complete with a new one. (Fig. 3.139)

Outside micrometer

| Service limit |           |
|---------------|-----------|
| Inlet         | 33.510 mm |
| Exhaust       | 33.390 mm |

- Inspect ball bearings (6003 - 2 nos) of camshaft for abnormal play or pitting.
- Measure runout with a dial gauge. Replace the camshaft with a new one if measured runout exceeds the limit. (Fig. 3.140)

|               |                          |
|---------------|--------------------------|
| 0313070       | V - block set (4"x3"x3") |
| 0313050       | Dial gauge (1/100 mm)    |
| 0313060       | Magnetic stand           |
| Service limit | 0.08 mm                  |

## Valve intake and valve exhaust

- Inspect both the valves for trueness, burning, scratches, abnormal wear or bend.
- Measure outside diameter of valve stem on the operational area. (Fig. 3.141)

Outside micrometer

|                    |                  |
|--------------------|------------------|
| Standard (inlet)   | 4.990 - 4.975 mm |
| Standard (exhaust) | 4.970 - 4.955 mm |

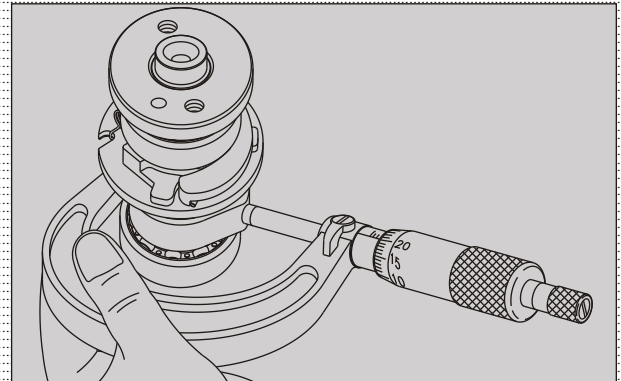


Fig. 3.139

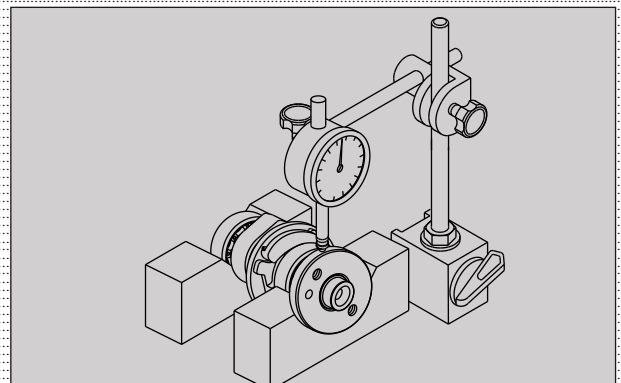


Fig. 3.140

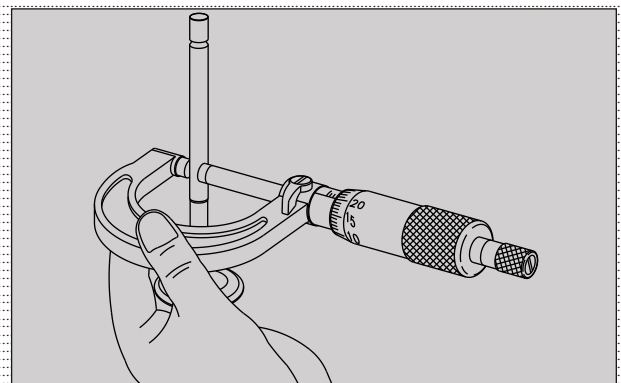


Fig. 3.141



- Using special tools, measure the runout on valve stem and valve face. Replace valve with a new one if measured runout exceeds the service limit. (Fig. 3.142)

|         |                          |
|---------|--------------------------|
| 0313070 | V - block set (4"x3"x3") |
| 0313050 | Dial gauge (1/100 mm)    |
| 0313060 | Magnetic stand           |

| Service limit  |          |
|----------------|----------|
| Runout on stem | 0.05 mm  |
| Runout on face | 0.075 mm |

- Check valve for smooth movement in the guide valve.
- Measure thickness of valve head. If thickness is less than the service limit, replace the valve with a new one. (Fig. 3.143)

Vernier caliper

| Service limit     |              |
|-------------------|--------------|
| Inlet and exhaust | 0.5 mm (min) |

## Valve stem condition

- Inspect valve stem end face (A) for pitting and wear. If pitting or wear noticed, resurface the valve stem end, ensuring the length (1) is not reduced to less than 3.8 mm. If this end length turns less than 3.8 mm, the valve must be replaced with a new one. (Fig. 3.144)

## Spring valve

- Measure free length of the inner and outer springs. (Fig. 3.145). If they are below service limit replace them with new ones

Vernier caliper

| Service limit |          |
|---------------|----------|
| Inner spring  | 30.00 mm |
| Outer spring  | 30.00 mm |

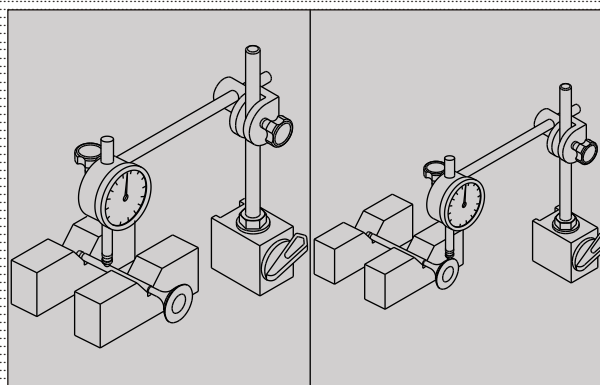


Fig. 3.142

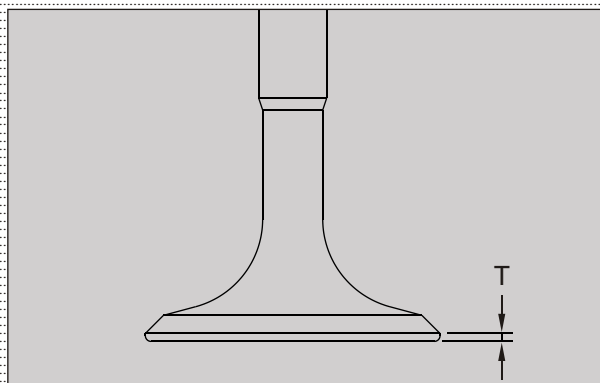


Fig. 3.143

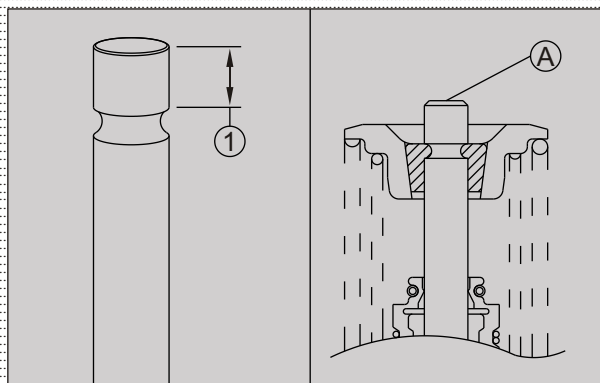


Fig. 3.144

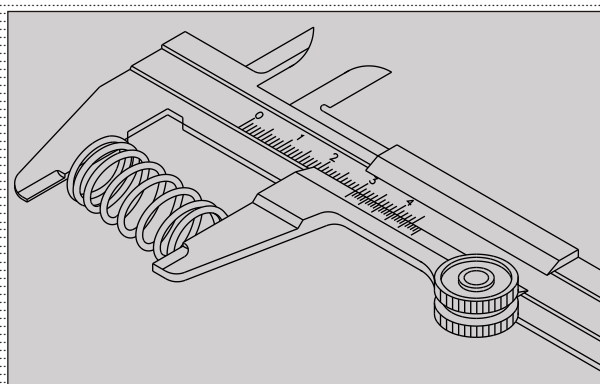


Fig. 3.145



## CYLINDER HEAD ASSEMBLY - EXPLODED VIEW

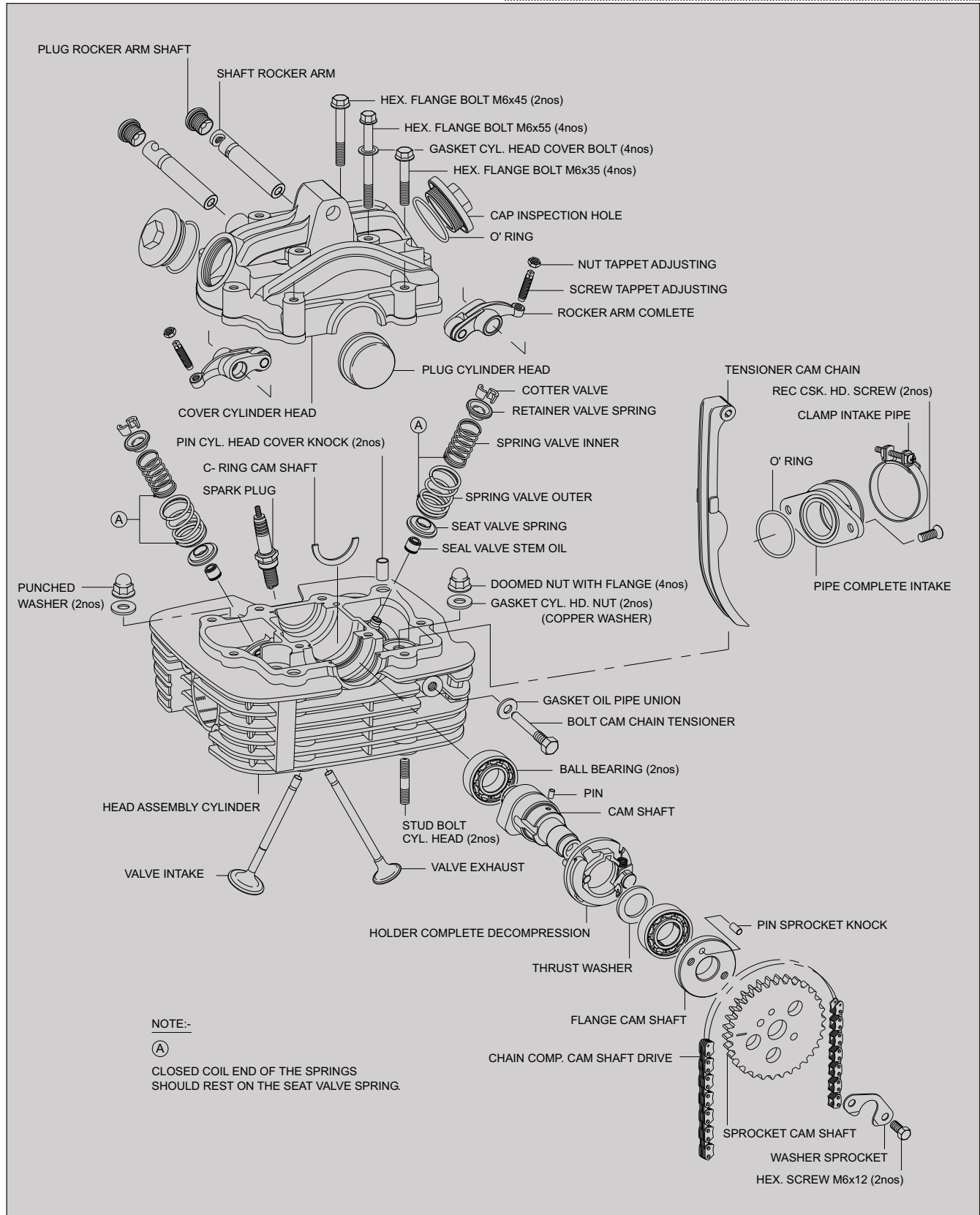


Fig. 3.146



## REASSEMBLY

### Head complete cylinder

- For reassembly, reverse the removal procedure and taking care of the following points. Refer exploded view for assembly details. (Fig. 1.146)
- Assemble seat valve spring and a new seal valve stem oil.
- While assembling valves, insert smoothly into the guide to avoid the damage to the seal valve stem oil.
- Assemble spring valve inner and spring valve outer and retainer valve spring.

#### Note:

The diameter of valve intake is larger than the diameter of valve exhaust.

Lubricate both the valve stems before installing.

The smaller pitch of valve springs must be assembled downwards only. (Fig. 1.147)

Ensure proper seating of the cotter valves in its groove by gently tapping on valve stem. (Fig. 1.148)

## LEAK CHECK AND LAPPING

### Head complete cylinder

- After assembling valves, pour benzine into the inlet port and look for any leakage of benzine around valve inlet seating. If leakage noticed, rectify valve inlet and its seat by lapping. (Fig. 3.149)
- Similarly check valve exhaust.

#### Note:

While checking valve exhaust the secondary air injection port opening provided in head complete cylinder must be closed.

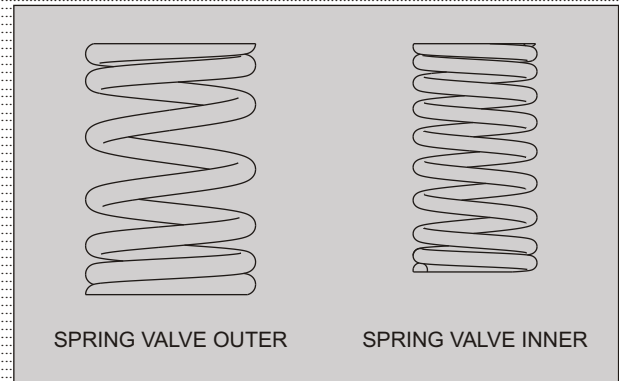


Fig. 3.147



Fig. 3.148

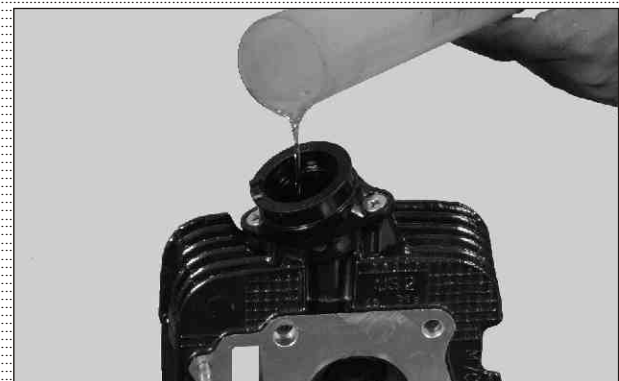


Fig. 3.149





- Apply lapping compound uniformly right round the valve face. (Fig. 3.150)

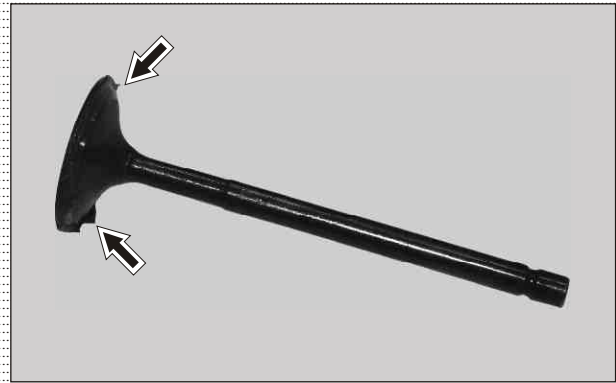


Fig. 3.150

- Hold the valve head with a lapping stick, rub the valve against its seating by applying very light force till the perfect seating is obtained. (Fig. 3.151)

**Caution:**

While lapping, avoid entering of compound into the valve guide through the stem. Otherwise it increases the clearance between guide and valve.

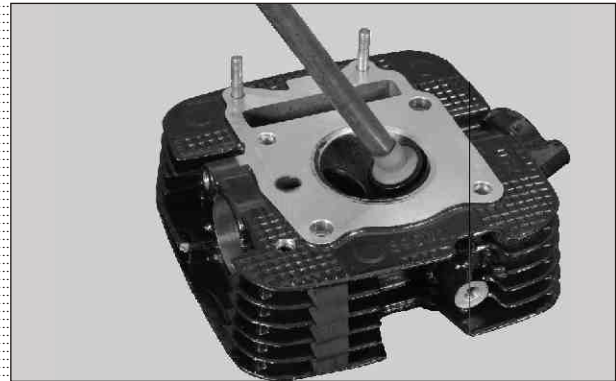


Fig. 3.151

## ENGINE COMPONENTS - INSPECTION

### Bearings

- Wash bearings with a cleaning solvent and lubricate with engine oil before inspecting.
- Inspect play of each bearing before fixing it. Hold inner race and rotate the outer race by hand and observe for any abnormal noise and smooth rotation. Replace bearing with a new one if found defective. (Fig. 3.152)

**Note:**

Do not use compressed air to clean the bearings.

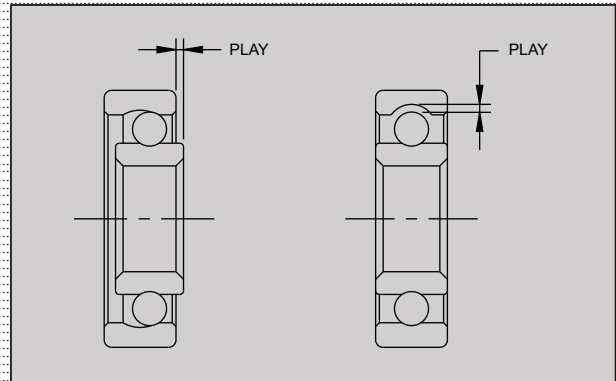


Fig. 3.152

### Oilseal

- Damage to the oil seal lip (A) may result in leakage of oil. Inspect for damage and always replace damaged oilseals with the new ones. (Fig. 3.153)

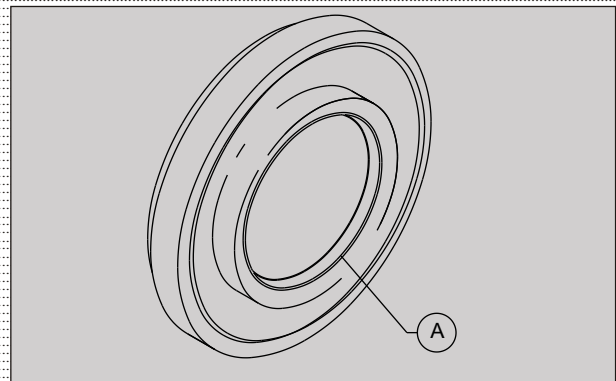


Fig. 3.153



## Crankshaft assembly - runout

- Support crankshaft assembly with 'V' blocks of anvil. Mount the dial indicator at positions shown to read the runout. Runout should be within the service limit. (Fig. 3.154)
- Excessive runout of crankshaft assembly causes abnormal engine vibration and bearing noises. Such vibration shortens engine life.

|         |                          |
|---------|--------------------------|
| 0313070 | V - block set (4"x3"x3") |
| 0313050 | Dial gauge (1/100 mm)    |
| 0313060 | Magnetic stand           |

|               |        |
|---------------|--------|
| Service limit | 1.0 mm |
|---------------|--------|

## Condition of big end bearing - crankshaft assembly

- Measure big end wear of connecting rod by the deflection of small end. If deflection exceeds the limit, replace the crankshaft assembly with a new one. (Fig. 3.155)

|               |      |
|---------------|------|
| Service limit | 3 mm |
|---------------|------|

- Also holding the crankshaft assembly in hand, shake the connecting rod to find out the radial play. If any play is noticed, then replace the crankshaft assembly with a new one. (Fig. 3.156)

- Measure connecting rod big end side clearance with a feeler gauge. If clearance exceeds the service limit, replace the crankshaft assembly with a new one. (Fig. 3.157)

|         |              |
|---------|--------------|
| 0310100 | Feeler gauge |
|---------|--------------|

|               |         |
|---------------|---------|
| Service limit | 0.65 mm |
|---------------|---------|

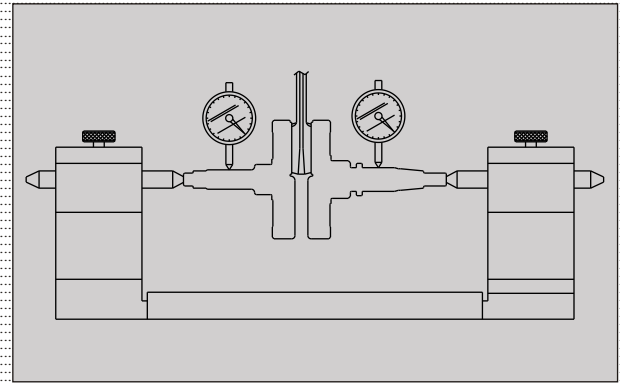


Fig. 3.154

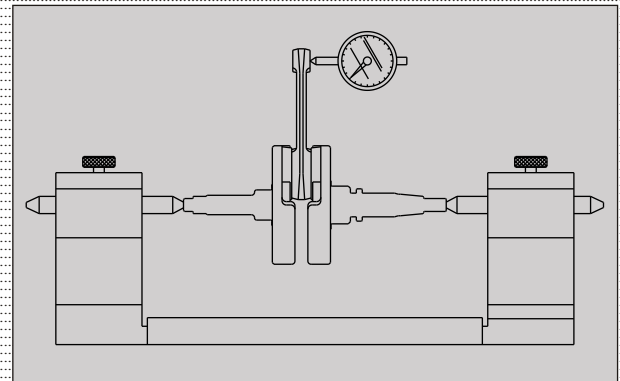


Fig. 3.155

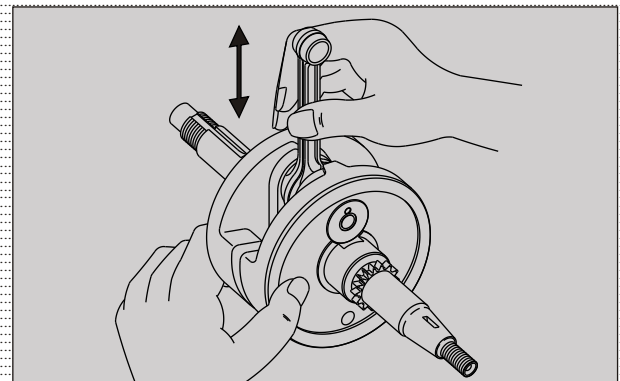


Fig. 3.156

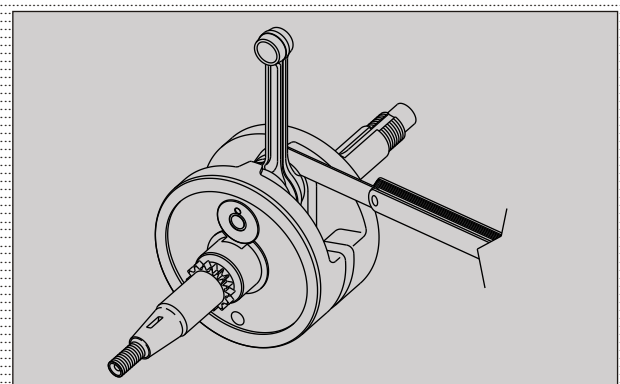


Fig. 3.157



## Connecting rod small end diameter

- Measure internal diameter (ID) of the connecting rod small end. If ID is more than the service limit, replace the crankshaft assembly with a new one. (Fig. 3.158)

|               |           |
|---------------|-----------|
| Service limit | 15.040 mm |
|---------------|-----------|

## Cylinder complete

- The wear of cylinder wall is determined from the diameter reading taken at 20 mm from the bottom surface of the cylinder. (Fig. 3.159 and Fig. 3.160)

### Cylinder gauge

- If wear exceeds the service limit, replace the cylinder block or rework the cylinder to the next oversize by using a boring machine. The cylinder must be honed after boring.
- The cylinder blocks are manufactured with slightly increased diameters which are all identified with their respective colour grades as below:

| Cylinder bore diameter - RTR 160 |                  |               |
|----------------------------------|------------------|---------------|
| Colour                           | Size (mm)        | Service limit |
| Blue                             | 62.000 to 62.005 | 62.110 mm     |
| Yellow                           | 62.005 to 62.010 |               |
| Red                              | 62.010 to 62.015 |               |

| Cylinder bore diameter - RTR 180 |                  |               |
|----------------------------------|------------------|---------------|
| Colour                           | Size (mm)        | Service limit |
| Blue                             | 62.500 to 62.505 | 62.610 mm     |
| Yellow                           | 62.505 to 62.510 |               |
| Red                              | 62.510 to 62.515 |               |

### Note:

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

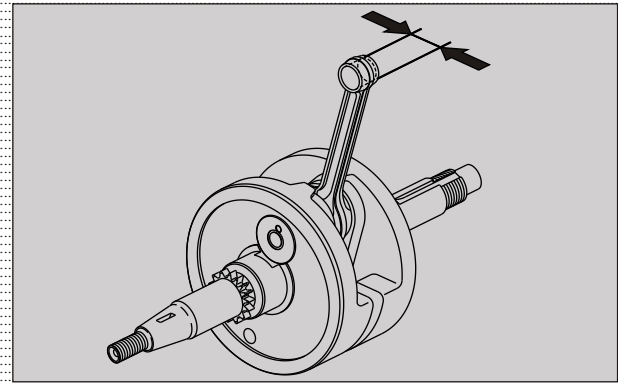


Fig. 3.158

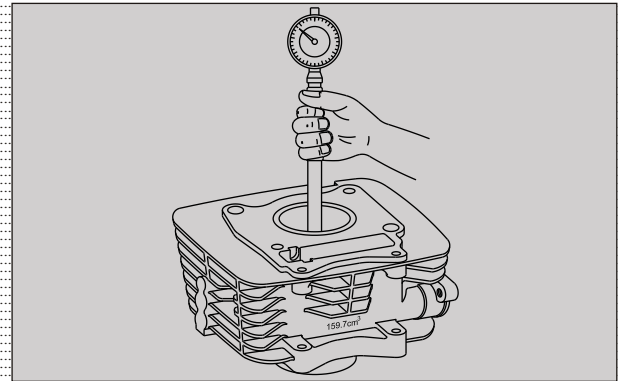


Fig. 3.159

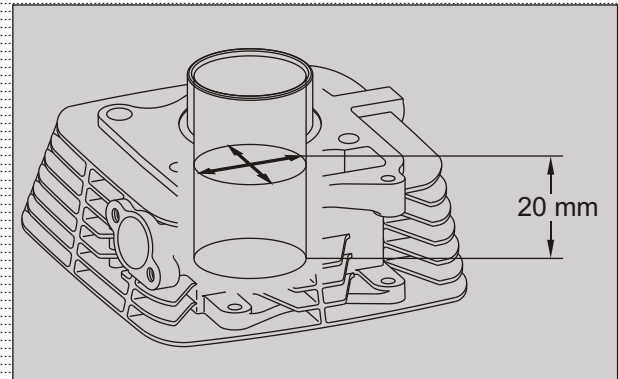


Fig. 3.160



## Piston

- Remove ring piston 1st (A), ring piston 2nd (B) and ring piston oil (C). (Fig. 3.161)

### Caution:

**Do not expand the rings more, it may loose it's mechanical properties.**

- Decarbonise piston and ring grooves. After cleaning the grooves, fit the rings and rotate them in their respective grooves to make sure that they rotate freely.
- Carbon deposits in the groove are liable to cause the rings piston to stuck in the groove, and this leads to reduced engine power output. (Fig. 3.162)

### Note:

**While cleaning ring grooves on the piston, take care not to damage the grooves. Use an old broken ring to clean the grooves.**

- If piston sliding surface is badly scored or scuffed due to overheating, it must be replaced. Shallow grooves or minor scuff can be removed by smoothing with a fine emery paper (400 grade). (Fig. 3.163)
- Inspect piston for damage or crack. Replace if required.
- To check piston wear, measure the diameter at right angles to the pin piston and at a point which is 10 mm from the bottom. If diameter is less than the service limit, replace the piston. (Fig. 3.164)

## Outside micrometer

| Piston diameter - RTR 160 |                                     |               |
|---------------------------|-------------------------------------|---------------|
| Colour code               | Size (mm)                           | Service limit |
| Blue                      | 61.970 - 61.975                     | 61.875 mm     |
| Yellow                    | 61.975 - 61.980                     |               |
| Red                       | 61.980 - 61.985                     |               |
| Pink                      | 62.250 (I <sup>st</sup> over size)  |               |
| White                     | 62.500 (II <sup>nd</sup> over size) |               |

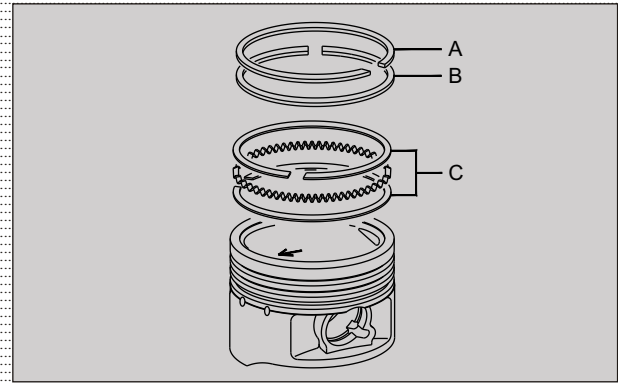


Fig. 3.161

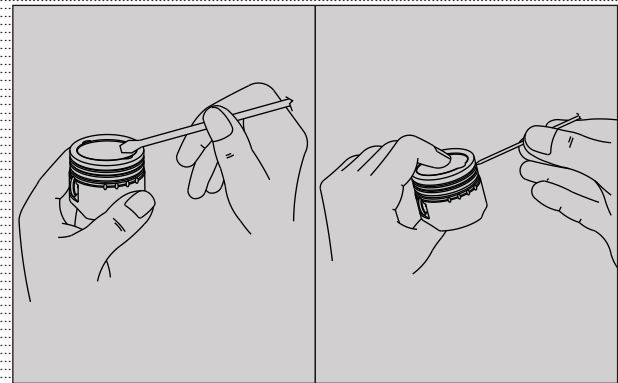


Fig. 3.162

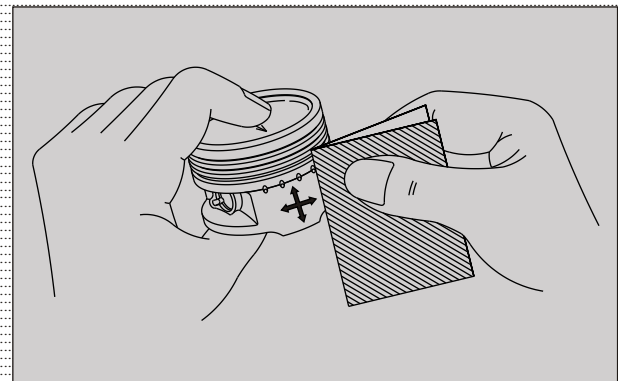


Fig. 3.163

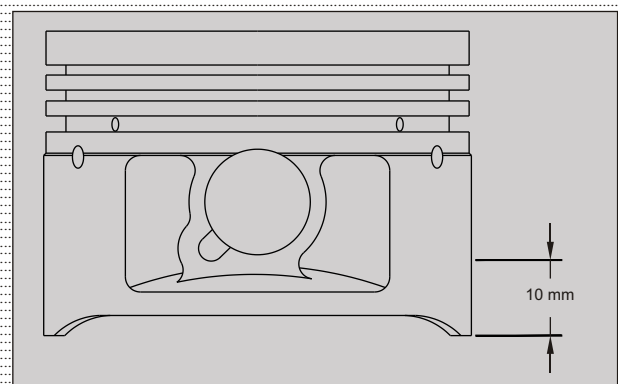


Fig. 3.164



| Piston diameter - RTR 180 |                                     |               |
|---------------------------|-------------------------------------|---------------|
| Colour code               | Size (mm)                           | Service limit |
| Blue                      | 62.470 - 62.475                     | 62.380 mm     |
| Yellow                    | 62.475 - 62.480                     |               |
| Red                       | 62.480 - 62.485                     |               |
| Pink                      | 62.750 (I <sup>st</sup> over size)  |               |
| White                     | 63.000 (II <sup>nd</sup> over size) |               |

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

| Cylinder to piston clearance - RTR 160 |                    |               |
|----------------------------------------|--------------------|---------------|
| Item                                   | Standard           | Service limit |
| Cylinder                               | 62.000 - 62.015 mm | 62.110 mm     |
| Piston                                 | 61.970 - 61.985 mm | 61.875 mm     |
| Clearance                              | 0.020 - 0.025      | 0.120 mm      |

| Cylinder to piston clearance - RTR 180 |                    |               |
|----------------------------------------|--------------------|---------------|
| Item                                   | Standard           | Service limit |
| Cylinder                               | 62.500 - 62.515 mm | 62.610 mm     |
| Piston                                 | 62.470 - 62.485 mm | 62.380 mm     |
| Clearance                              | 0.020 - 0.025      | 0.120 mm      |

## Ring set piston

- As the rings wear out, end gap increases resulting in reduced engine power output.
- The end gap of each ring (top and 2nd) is measured with the ring fitted securely in the cylinder bore at 20 mm from cylinder bottom. (Fig. 3.165)
- If gap exceeds the limit, replace the rings with new ones.

|               |         |
|---------------|---------|
| Service limit | 0.70 mm |
|---------------|---------|

## Feeler gauge

- Inspect rings for proper tension by measuring its free end gap. If it is less than the service limit, replace rings as a set. (Fig. 3.166)

| Service limit |        |
|---------------|--------|
| First ring    | 5.5 mm |
| Second ring   | 4.4 mm |

## Vernier caliper

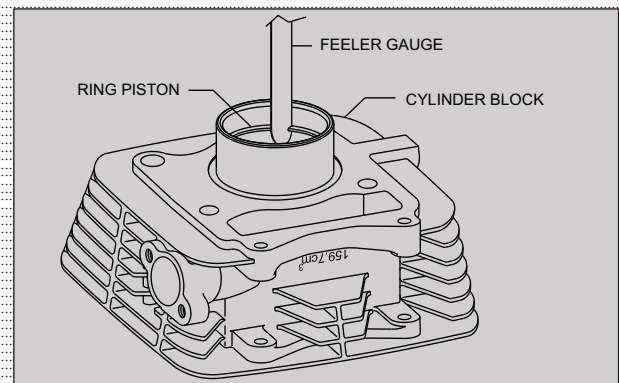


Fig. 3.165

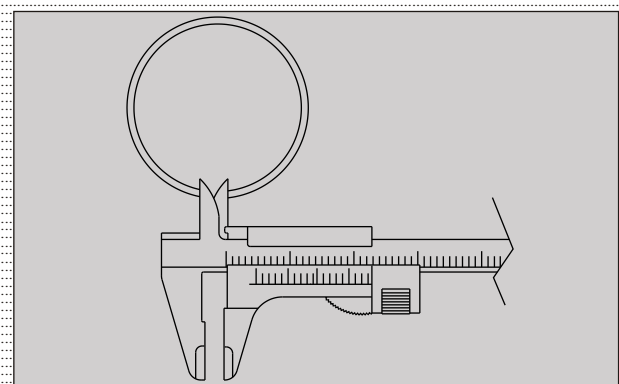


Fig. 3.166





## ENGINE COMPONENTS - REASSEMBLY

### Rings piston - reassembly

- Assemble separator oil ring, locating its end gap towards exhaust side of the piston at 45 degree to the left from the center. (Fig. 3.167)

#### Note:

Assemble separator oil ring in such a way that its triangle shaped end (Fig. 3.168) facing upward (triangle facing towards piston top).

- Assemble oil ring (bottom) locating its end gap towards exhaust side of the piston at 45 degree to the right from the center. (Fig. 3.167)
- Assemble oil ring (top) locating its end gap towards exhaust side of the piston at 45 degree to the left from the center. (Fig. 3.167)

- Assemble ring piston 2nd locating its end gap towards inlet side of the piston at 60 degree to the right from the center. (Fig. 3.169)
- Assemble ring piston 1st locating its end gap towards inlet side of the piston at 60 degree to the left from the center. (Fig. 3.169)

#### Note:

While installing, care must be taken not to damage the piston and rings piston.

Before installing piston, rings should rotate freely in their respective grooves.

Install 1st and 2nd rings with the marking on the ring 'TOP1' and 'TOP2' (Fig. 3.170) facing up (mark facing towards piston top).

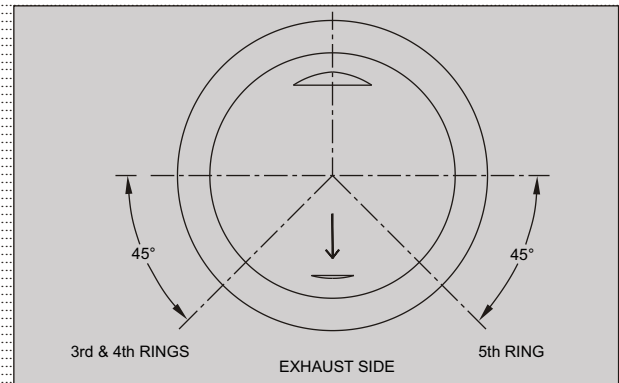


Fig. 3.167

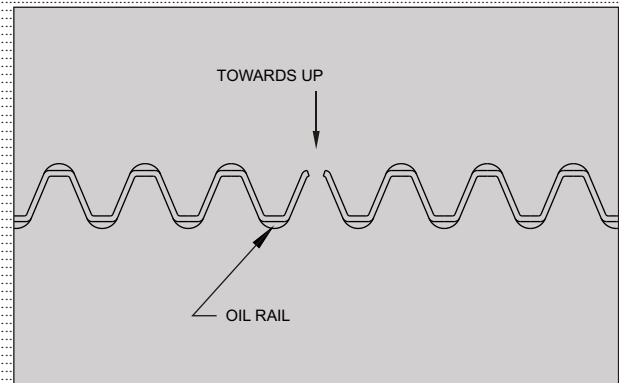


Fig. 3.168

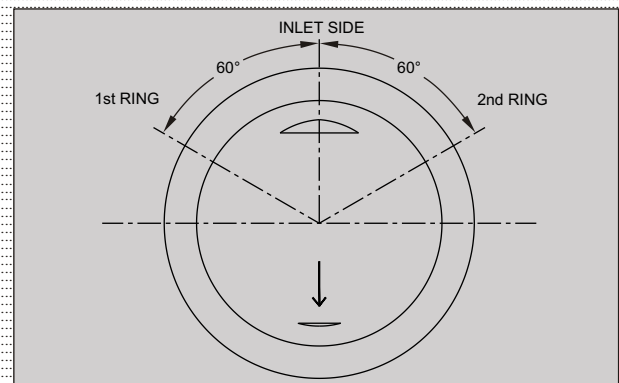


Fig. 3.169

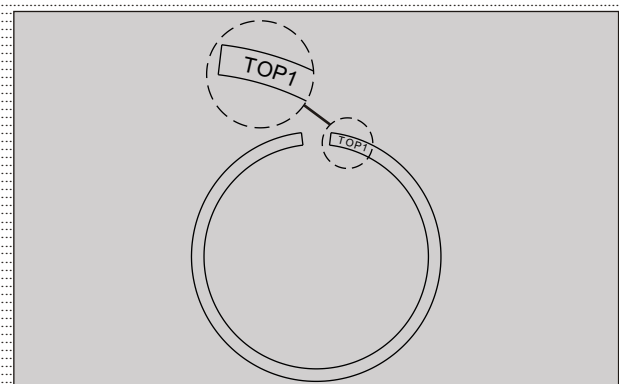


Fig. 3.170

# SERVICING OF ENGINE

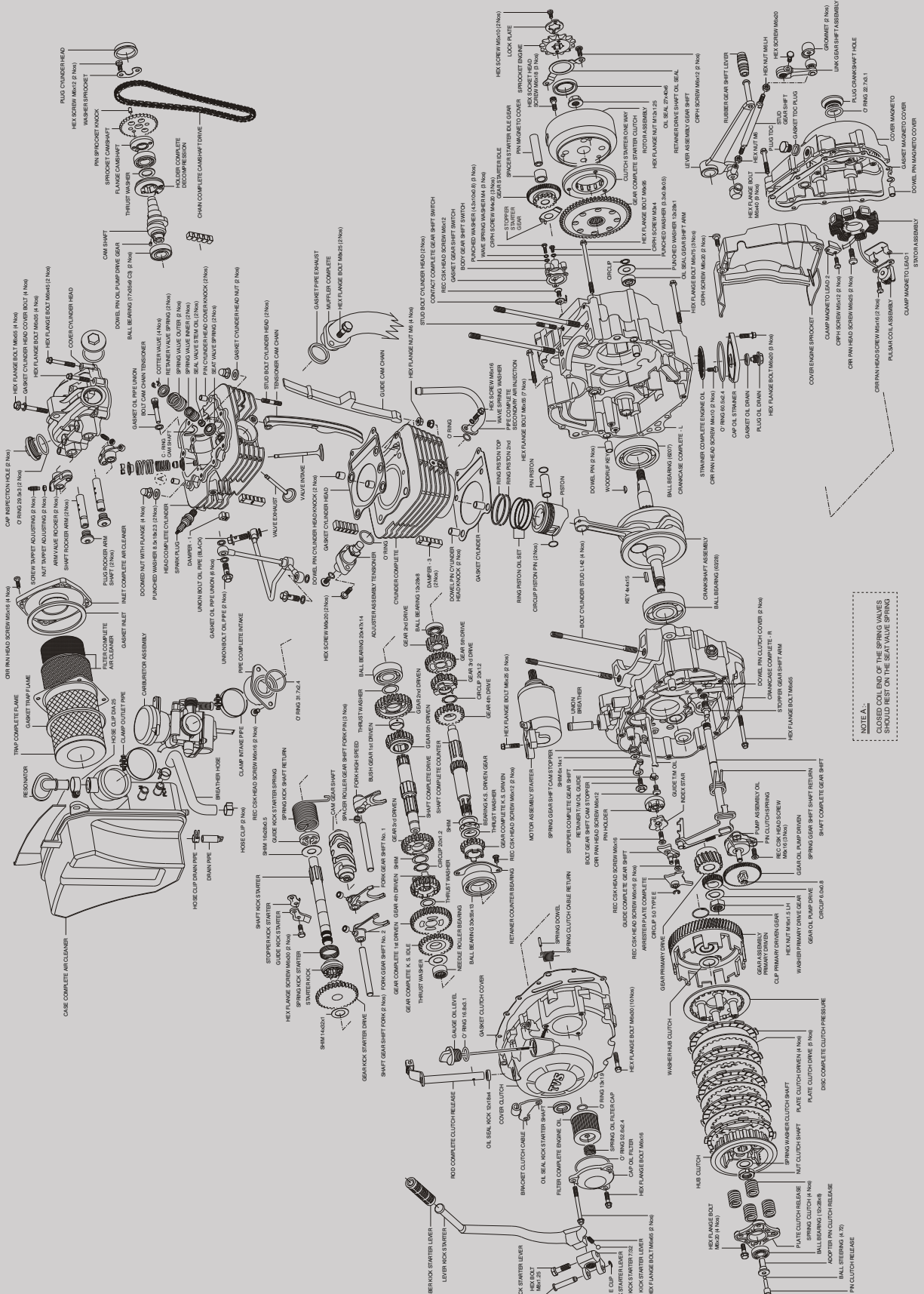
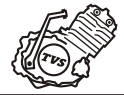


Fig. 3.171



## ENGINE ASSEMBLY - REASSEMBLY

- Refer engine exploded view for assembly details. (Fig. 3.171)
- Reassemble parts carefully in the reverse order of disassembly.
- Never reuse gaskets, circlips, 'O' rings and oilseals when the engine is overhauled.
- After installing a circlip ensure that it is seated properly in its groove, by rotating it.
- Always use recommended special tools.

### Bearings

- For reassembling bearings use a special tool.

#### Note:

Whenever bearings are replaced it is recommended that both L & R bearings are replaced as a set to have better results. Make sure that bearings are not misaligned with the fitting.

### Oil seals

To fit the oilseals to the crankcase follow the procedure given below:

- Apply grease to the lip of oilseal.
- Use only specified special tool for assembling the oilseals.
- When fitting oilseal over the shaft check that the lip seats over the shaft perfectly all around the circumference without any distortion.
- Apply engine oil on each running and sliding part before installing them during reassembly.

### Fasteners

- Tighten all fasteners to the specified torque using torque wrench. (Refer torque chart in page no. 7-8 & 7-9 for torque specification)



## Crankcase - reassembly

- Remove gasket material on the mating surfaces of crankcase assembly L & R and thoroughly remove oil stains.
- Clean the crankcase L & R completely and ensure that no dirt, burr, dust and foreign particles exist.
- Assemble crankshaft assembly in the crankcase assembly L. (Fig. 3.172)

### Note:

While assembling crankshaft take extra care not to cause any dent, damage and scratches to the machined surfaces.

## Kick starter

- Refer exploded view for assembly sequence.
- Assemble shaft kick starter, guide kick starter spring, spring kick shaft return and shim in the reverse order of dismantling. (Fig. 3.173)

### Note:

While assembling ensure that spring kick starter return hook is located on the lug (A) provided in the crankcase assembly.

- Assemble spring kick starter and starter kick in shaft kick starter assembly. (Fig. 3.174)

### Note:

While reassembling starter kick, match the mark (A) on the starter kick with the punch mark (B) on shaft kick starter. (Fig. 3.175)

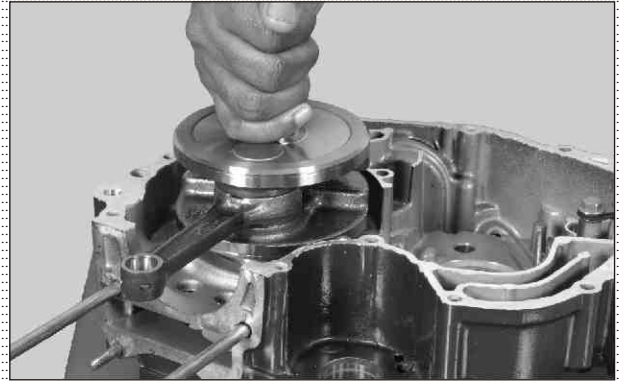


Fig. 3.172

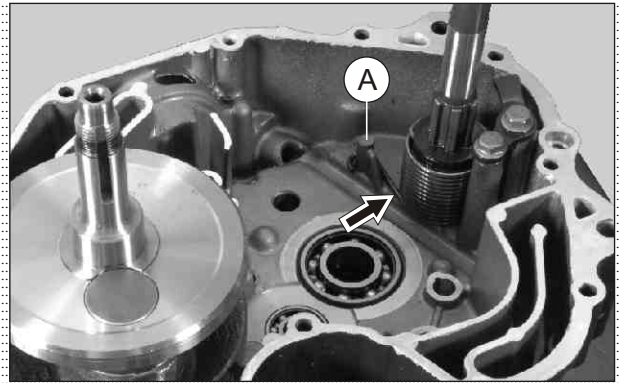


Fig. 3.173

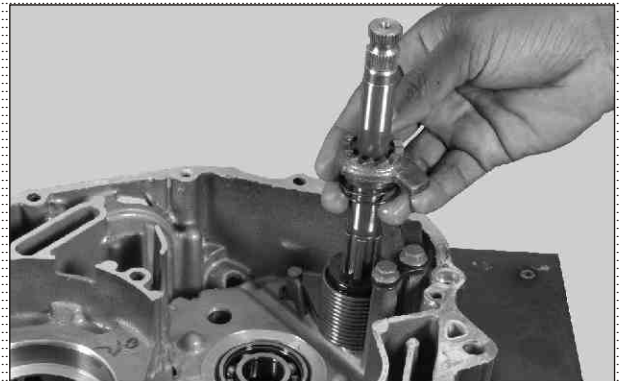


Fig. 3.174

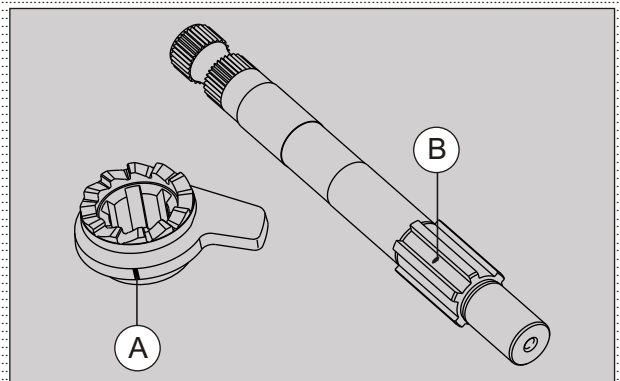


Fig. 3.175



- After assembling starter kick on the shaft, rotate shaft by one full clockwise rotation with the lever kick starter. Holding shaft in that position, press the starter kick and lock it under the guide kick starter (A). (Fig. 3.176)

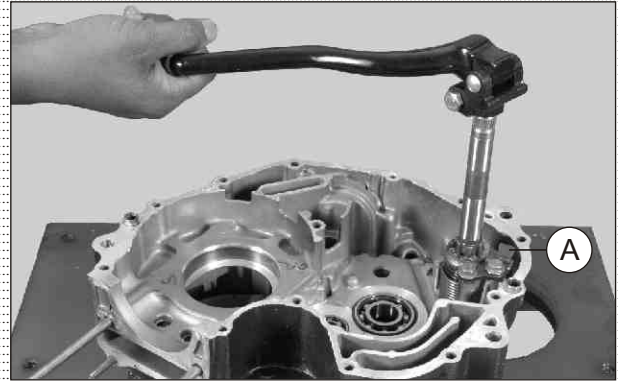


Fig. 3.176

- Assemble thrust washer (20x27x1) on the shaft complete drive assembly. (Fig. 3.177)

**Note:**

While assembling shafts in the crankcase, apply little grease to the washer to avoid falling of washer



Fig. 3.177

- Assemble shaft complete counter and shaft complete drive together as an assembly in the crankcase assembly L along with gear complete kick starter idle. (Fig. 3.178)

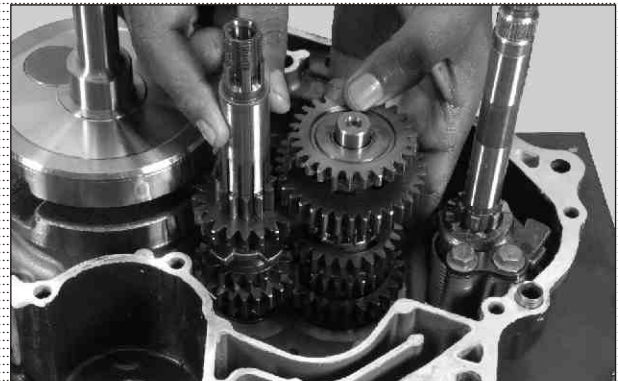


Fig. 3.178

- Assemble fork gear shift no. 1, fork gear shift no. 2 and fork gear shift high speed along with spacer roller gear shift fork pin (3 nos) on their respective position (respective grooves of the gears). (Fig. 3.179)

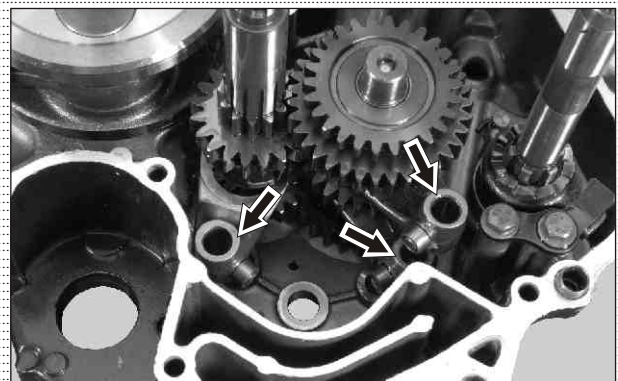


Fig. 3.179



- Assemble cam gear shift in the crankcase assembly and locate the shift forks on their respective grooves of the cam gear shift. (Fig. 3.180)
- Assemble shaft shift forks (2 nos) (A) in the crankcase assembly through shift forks. (Fig. 3.180)

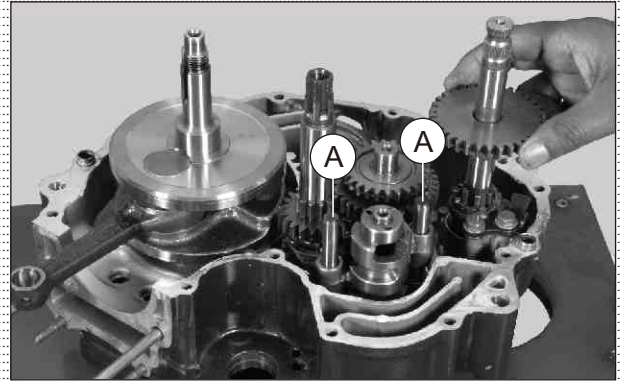


Fig. 3.180

- Assemble bearing kick starter driven gear along with shim and thrust washer on the shaft complete counter. (Fig. 3.181)

**Note:**

While assembling shim, assemble it below the bearing kick starter driven gear.



Fig. 3.181

- Assemble shim (15x30x1) on the shaft complete drive above the gear complete kickstarter idle. (Fig. 3.182)



Fig. 3.182

- Assemble gear kick starter drive and shim (16x30.5x0.5) on the shaft kick starter. (Fig. 3.183)

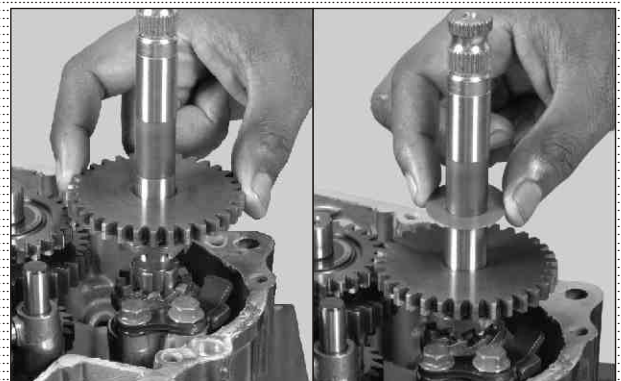


Fig. 3.183



- Apply liquid gasket uniformly to the mating surfaces of the crankcase assembly L and assemble the crankcase assembly R. (Fig. 3.184)

Nylon hammer

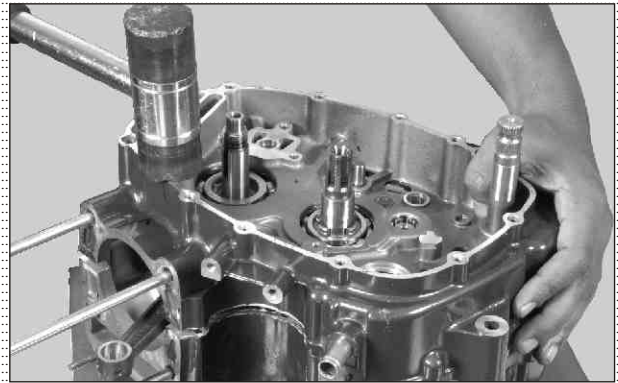


Fig. 3.184

- Assemble and tighten hexagonal flange bolts (M6x55 - 8 nos, M6x75 - 3 nos and M6x95 - 1 no) on the crankcase complete L. (Fig. 3.185)

8 mm spanner

## Note:

Observe screw length from the crankcase surface and ensure that screws are in their respective places while reassembling. Tighten the screws in crisscross pattern.



Fig. 3.185

- Assemble and tighten hexagonal flange bolt (M6x55 - 1 no) on the crankcase complete R. (Fig. 3.186)

8 mm spanner

## Note:

After tightening crankcase bolts, check for the free rotation of shaft complete drive, and shaft complete counter and crankshaft assembly.

If large resistance is felt, gently tap on the shaft complete drive and shaft complete counter assemblies with nylon hammer.

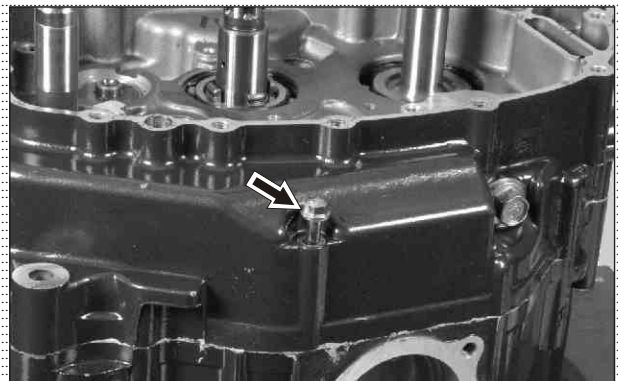


Fig. 3.186

## Clutch

- Before assembling cover clutch, ensure that adopter clutch release and ball are assembled on the clutch assembly. (Fig. 3.187A)
- Also ensure that pin clutch release is assembled on the cover clutch. (Fig. 3.187B)



Fig. 3.187A



Fig. 3.187B



## Valve timing and valve clearance

### Valve timing

- While reassembling sprocket cam shaft, follow the below given procedures:
- Rotate rotor assembly and match the TDC mark (A) on rotor assembly and the mark (B) on crankcase assembly L. (Fig. 3.188A)
- At this position, ensure that the mark (C) on sprocket cam shaft matches with the surface edge of head complete cylinder (D). (Fig. 3.188B)

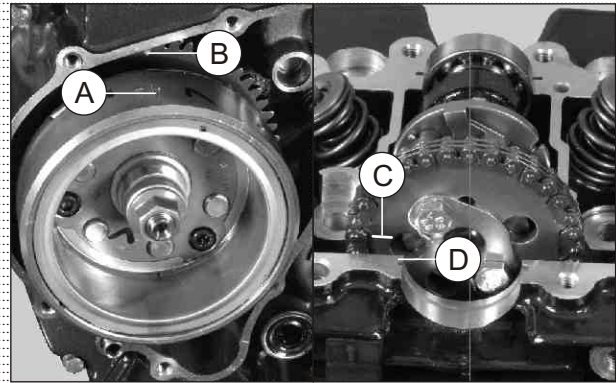


Fig. 3.188A

Fig. 3.188B

### Valve clearance

- Adjust valve clearance to the specified limit. (refer chapter "periodic maintenance" for procedure and specification)
- Before starting the vehicle, fill up engine cum transmission oil and carry out all the other adjustments. Tune the engine as prescribed in "periodic maintenance".

### Running-in after overhaul

- The rebuilt / overhauled engine should undergo running-in.
- Do not overload the engine immediately after overhaul as it may result in rapid wear of components due to overstrain, overheat and overload.
- This will have a impact through out the life of the rebuilt components resulting in under performance of vehicle.



## COVER FUEL TANK - REMOVAL (DUAL DISC VERSION)

- Loosen and remove CRR pan head screw (M6x12) mounted at inner side of cover fuel tank. (Fig. 4.1)
- Loosen and remove CRR pan head screw (M6x12) mounted at bottom of cover fuel tank. (Fig. 4.2)
- Dislocate cover fuel tank lugs from the cushion by slightly pushing cover fuel tank towards front and pull out cover fuel tank.
- Loosen and remove CRR flanged pan head tap screw (4.3x13 - 2nos) from the cover fuel tank inner. (Fig. 4.3A)
- Loosen and remove CRR flanged pan head tap screw (4.3x13 - 2nos) mounted at inner side of cover fuel tank. (Fig. 4.3B)
- Separate cover fuel tank inner.
- Carry out similar procedure to separate another side cover fuel tank

## REMOVAL

- Reassemble components in the reverse order of removal.

### Note:

While reassembling of cover fuel tank, make sure the presence of cushion cover fuel tank (A) (2 nos) and retainer clip (B) (2 nos) at fuel tank complete. (Fig. 4.4)

Worn or damaged cushions should be replaced with new one

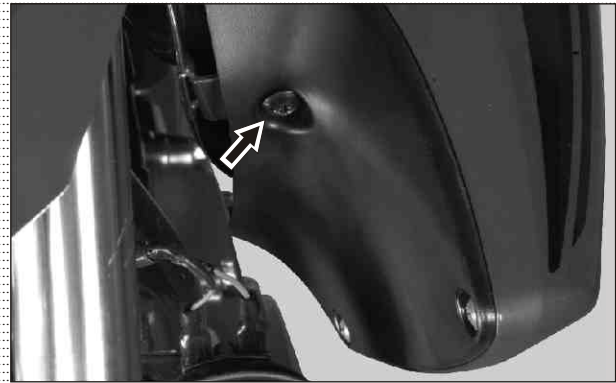


Fig. 4.1

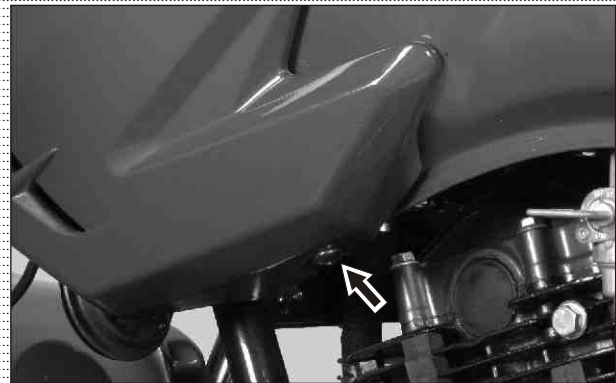


Fig. 4.2



Fig. 4.3A

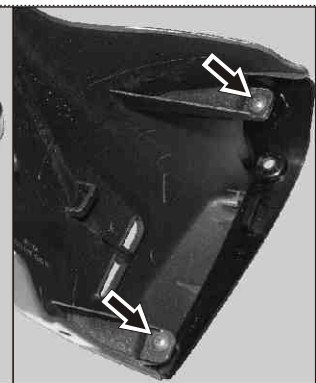


Fig. 4.3B

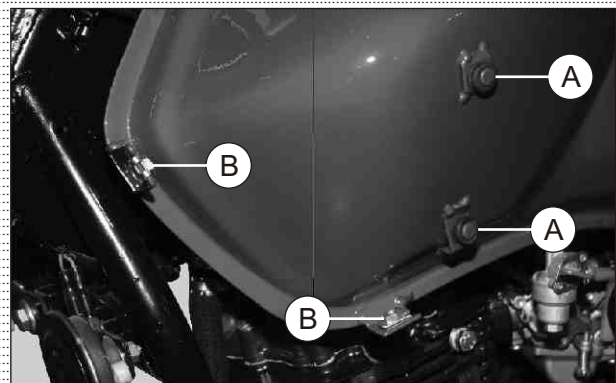


Fig. 4.4





## FUEL TANK COMPLETE AND FUEL COCK ASSEMBLY

- The fuel tank complete is located on frame tube near the steering pivot with a lockable cap assembly fuel tank (A) and manually operated fuel cock assembly at the bottom left side of the tank (B). (Fig. 4.5)

- The cap assembly fuel tank can be opened with the ignition key.

- A fuel sender unit is mounted at the bottom side of the fuel tank. (Fig. 4.6)

|               |                       |
|---------------|-----------------------|
| Tank capacity | Main - 16 litres.     |
|               | Reserve - 2.5 litres. |

- Clean fuel tank complete periodically. Inspect tank for any leakage. If any leakage is noticed, replace the fuel tank with a new one.

## REMOVAL

- Refer chapter "periodic maintenance" page no. 2-11 for removal procedure of the tank complete fuel from vehicle.

### Note:

**Before removing fuel tank complete, drain the benzine completely.**

- Remove hexagonal screws (M6x20 - 2 nos.) along with punched washers and gaskets from the fuel cock assembly mounting and take out the fuel cock assembly along with 'O' ring fuel cock joint. (Fig. 4.7)

10 mm spanner

### Note:

**While reassembling the fuel cock assembly, ensure that 'O' ring and gasket are fitted.**

- Remove CRR flanged pan head screws (M4x12 - 4 nos.) from the fuel sender unit mounting and take out the fuel sender unit along with the gasket. (Fig. 4.8)

Philips head screw driver

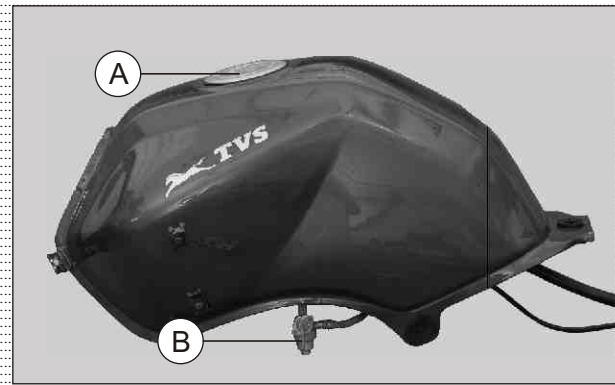


Fig. 4.5



Fig. 4.6

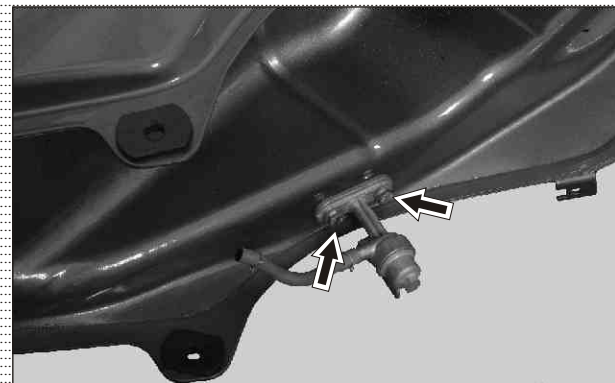


Fig. 4.7

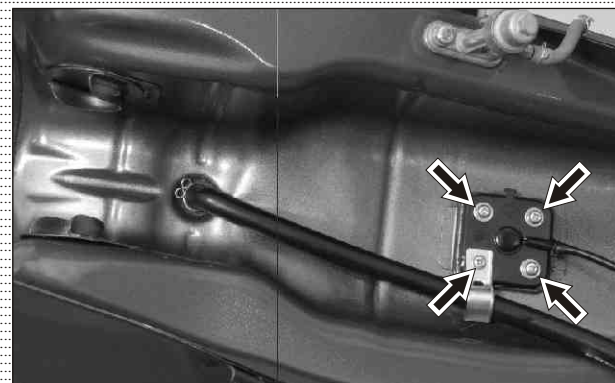


Fig. 4.8





## CLEANING

- Clean fuel tank complete thoroughly with a suitable cleaning solvent.

### Note:

Before reassembling fuel tank complete, the solvent used for cleaning should be cleaned and dried.

### Caution:

While removing and cleaning the fuel tank complete, care should be taken not to damage the painted surface.

## FUEL COCK ASSEMBLY

- Filter (A) is fixed to the fuel cock assembly and inserted to the fuel tank complete, that facilitates the main and reserve level. (Fig. 4.9)
- Generally water and other impurities get collected in benzene. The filter helps in filtering the fine impurities in benzene before they enter the fuel cock assembly. Clean the filter periodically. Visually inspect the filter, replace it with a new, in case of it is found damaged.
- The fuel cock assembly is also provided with a cup fuel strainer (B) and a filter. The cup fuel strainer collects the impurities and therefore must be periodically checked and cleaned. (Fig. 4.9)

10 mm spanner

### Note:

Replace 'O' ring with a new one while reassembling. (Fig. 4.10)

- Use compressed air to clean any obstruction in the passage of the fuel cock assembly.
- Finally reassemble components in the reverse order of dismantling.

## HOSE FUEL

- Visually inspect the hose fuel for crack or leakage at its mounting point. If any crack or leakage noticed replace hose fuel with a new one.

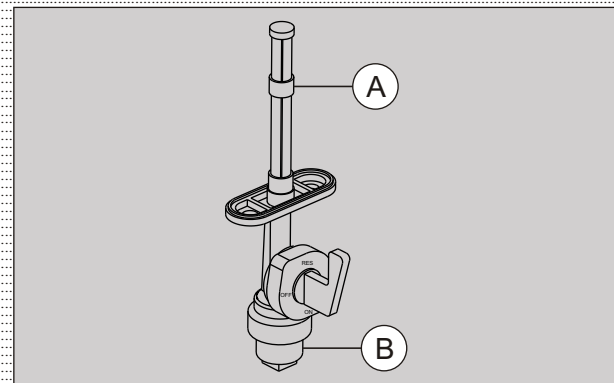


Fig. 4.9

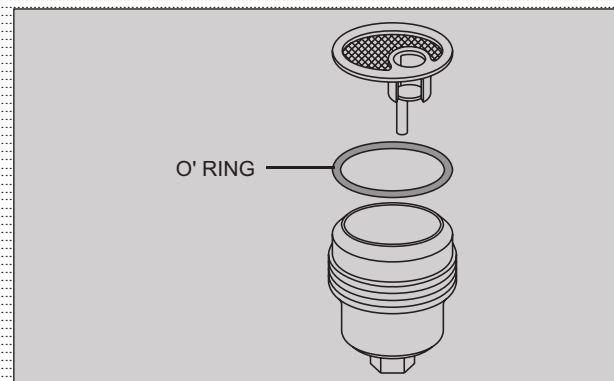


Fig. 4.10



## CARBURETTOR ASSEMBLY

### REMOVAL FROM THE VEHICLE

- The maintenance of the carburettor assembly requires cleaning periodically in order to avoid blockage of jets, passages and setting idle CO% recommended by the manufacturer.
- To remove carburettor follow the following procedure:
- Loosen and remove (M6x16 - 1 no.) CRR pan head screw from cover frame L mounting. (Fig. 4.11)

Philips head screw driver

- Take out cover frame L by carefully dislocating it from the lugs.

#### Note:

Before removing the carburettor assembly turn the knob fuel cock to 'OFF' position and disconnect the hose fuel from the carburettor. (Fig. 4.12)

- Loosen and remove CRR pan head screws (M6x16 - 2 nos.) along with the punched washers from air cleaner assembly mounting. (Fig. 4.13)
- Loosen CRR pan head screw of clamp outlet pipe and dislocate outlet pipe from the carburettor. (Fig. 4.14)



Fig. 4.11



Fig. 4.12

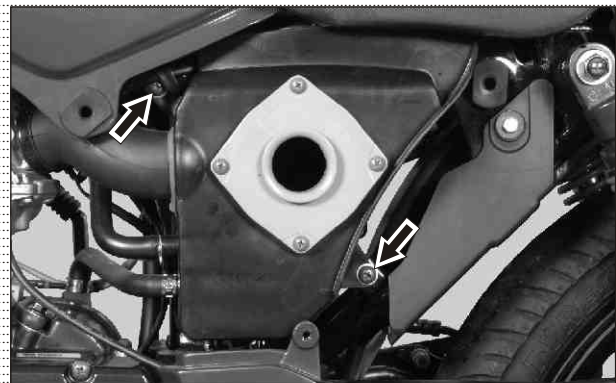


Fig. 4.13



Fig. 4.14



- Loosen and remove throttle cable assembly adjuster and disconnect cable from the carburettor assembly. (Fig. 4.15)

10 mm spanner

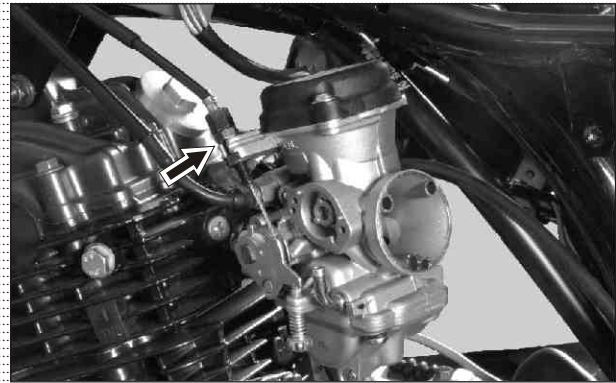


Fig. 4.15

- Loosen and remove guide holder assembly and take out cable assembly choke along with the plunger starter, spring starter, 'O' ring starter and cap starter. (Fig. 4.16)

12 mm spanner

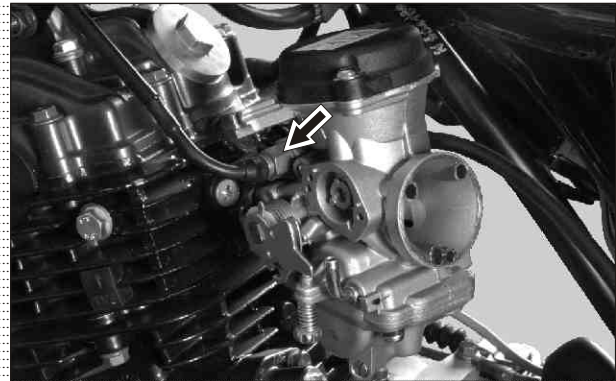


Fig. 4.16

- Loosen CRR pan head screw of the clamp intake pipe and gently pull out carburettor assembly from the pipe intake. (Fig. 4.17)

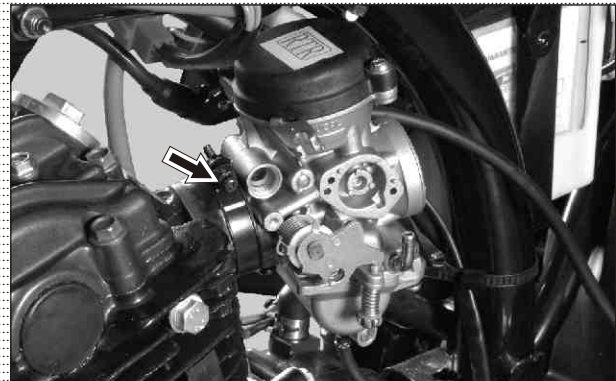


Fig. 4.17

## DISASSEMBLY

- Remove hose air vent (A) and hose drain (B). (Fig. 4.18)

Nose plier

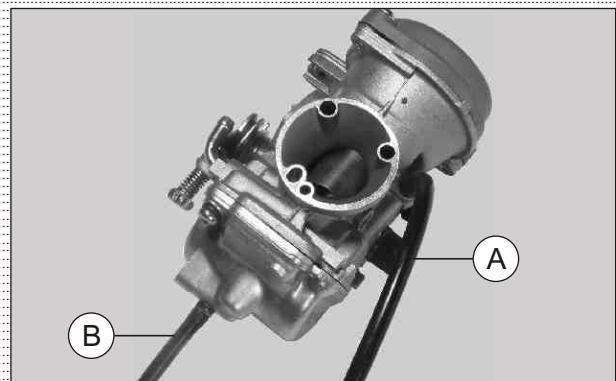


Fig. 4.18



- Remove screw diaphragm cover (2 nos.) and take out cover diaphragm. (Fig. 4.19)

Philips head screw driver



Fig. 4.15

- Take out spring diaphragm . (Fig. 4.20A)
- Remove piston valve assembly along with the diaphragm. (Fig. 4.20B)

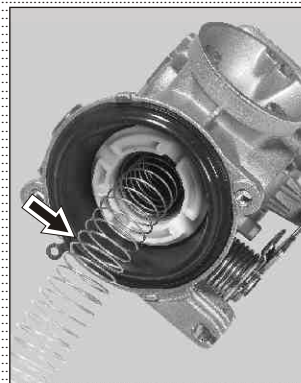


Fig. 4.20A

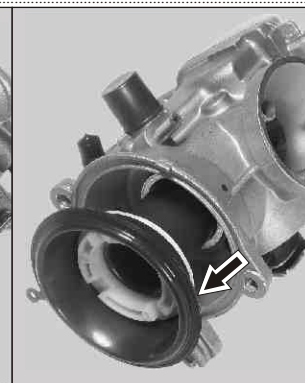


Fig. 4.20B

- Loosen and remove idling screw (A) along with spring idling screw and packing idling screw. (Fig. 4.21)
- Remove mixture control screw (B) along with spring MCS, washer MCS and 'O' ring MCS. (Fig. 4.21)

Flat screw driver

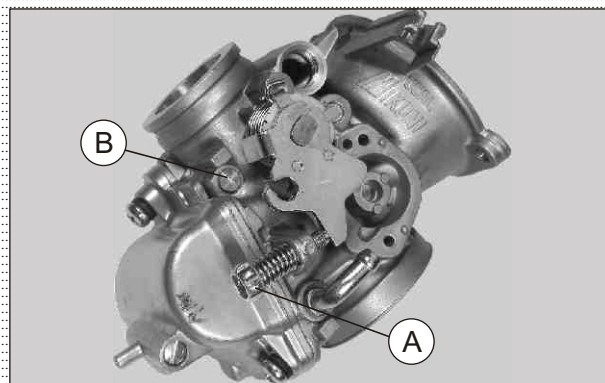


Fig. 4.21

- Loosen screw float chamber (2 nos.) and remove float body assembly along with the seal bowl. (Fig. 4.22)



Fig. 4.22





- Remove screw valve seat. (Fig. 4.23)

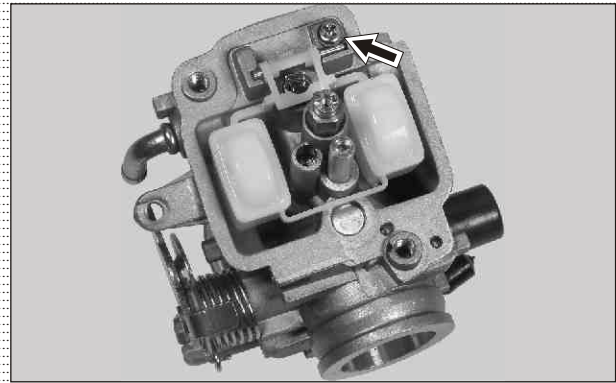


Fig. 4.23

- Separate float assembly, pin float and the needle valve assembly. (Fig. 4.24)

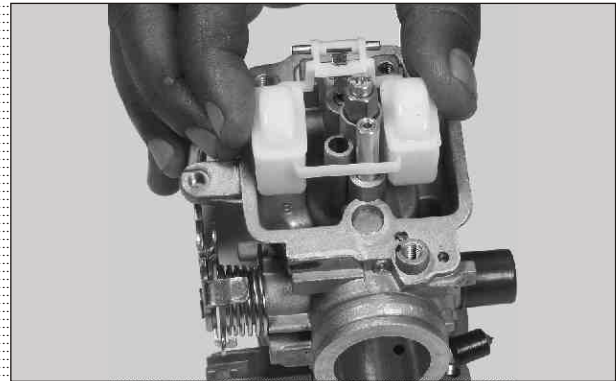


Fig. 4.24

- Remove pilot jet. (Fig. 4.25)

Flat screw driver (small)

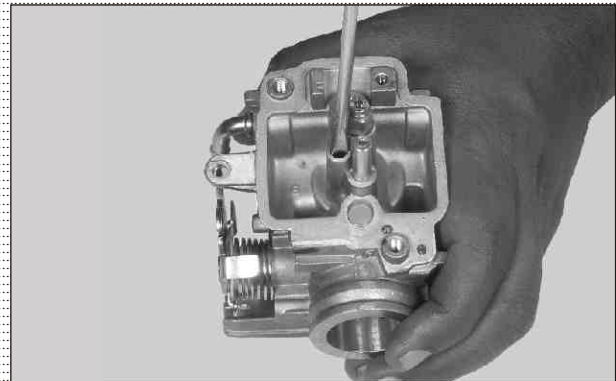


Fig. 4.25

- Remove main jet (A). (Fig. 4.26)

Flat screw driver (big)

- Remove jet holder along with the 'O' ring (B). (Fig. 4.26)

8 mm spanner

## Note:

The jet holder need to be removed only if necessary.

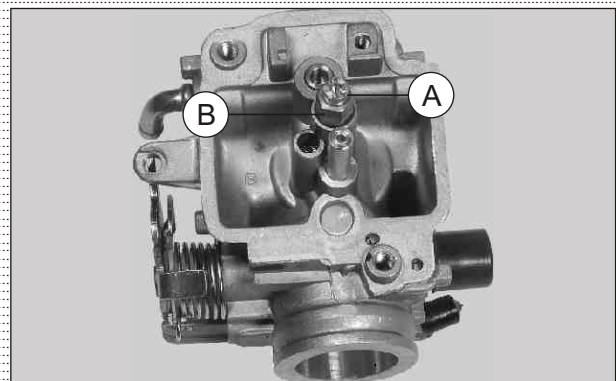


Fig. 4.26





- Remove air jet from the mixing body located at the air filter end. (Fig. 4.27)

Flat screw driver

## PISTON VALVE DISASSEMBLY

**Warning:**  
It is recommended not to disassemble the piston valve assembly during every service of the carburettor.

- Remove ring piston valve and carefully remove diaphragm from the piston valve. (Fig. 4.28)
- Remove screw plate jet needle (2 nos.) and take out plate jet needle, spring jet needle and packing jet needle. (Fig. 4.29)
- Push jet needle from the bottom and remove the jet needle with 'E' ring jet needle and ring jet needle. (Fig. 4.30)
- Reassemble piston valve assembly in the reverse order of the removal.

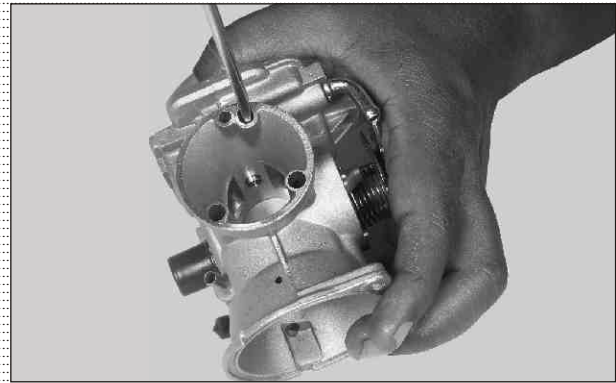


Fig. 4.27

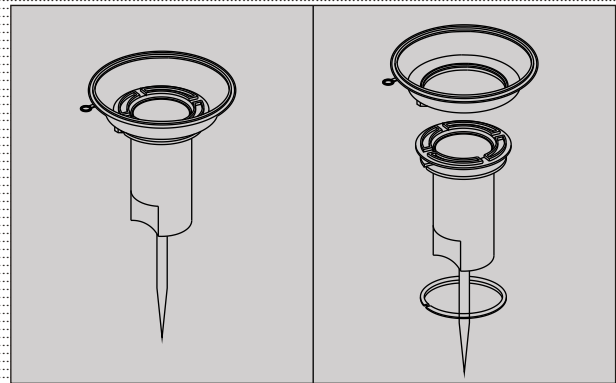


Fig. 4.28

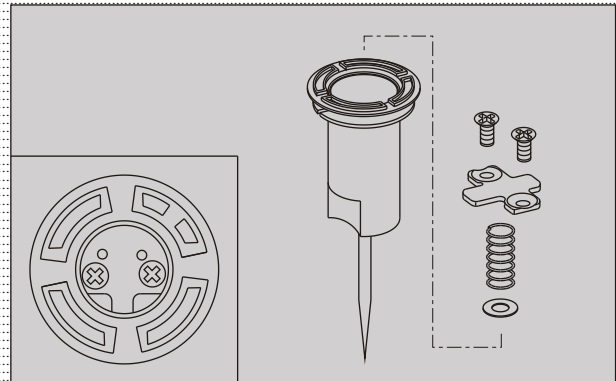


Fig. 4.29

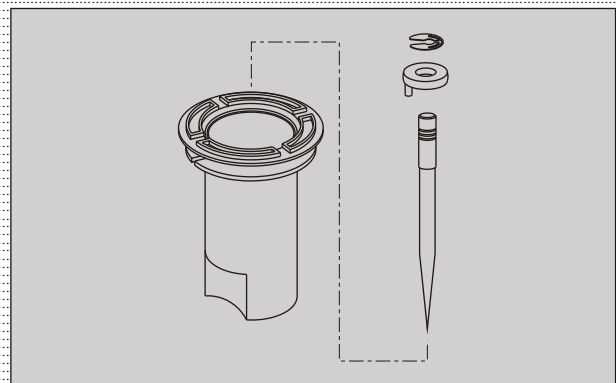


Fig. 4.30



- Do not change the position of the 'E' ring on jet needle (2nd from the top notch) (Fig. 4.31) and jet sizes which will have effect on the engine performance and lead to premature wear of engine parts, decreased fuel economy and poor pick-up.

## Note:

While reassembling locate the projection of ring jet needle in the hole provided in the piston valve.

While assembling diaphragm on the piston valve, locate projection of the diaphragm on the groove of piston valve. (Fig. 4.32)

- After assembling, make sure that the jet needle moves up and down on side ways by light finger force.

## MAINTANANCE

- Maintaining a full level of benzine in the fuel tank complete does not allow it to rust and also reduces rust deposition in the carburettor assembly.
- While the choke lever is in 'ON' position, do not open the throttle otherwise it may cause flooding of the carburettor.
- Clean filter complete air cleaner regularly, as a blocked or damaged filter will have adverse effect on carburettor / engine performance.

## CLEANING

- Spray carburettor cleaner in all passages (Fig. 4.33) to ensure no blockage due to dust, dirt, gum or carbon deposit.
- Then blow with compressed air. (Fig. 4.34)

## Caution:

Do not use wires to clean the jets.

Remove all rubber parts from the carburettor assembly before cleaning it with a cleaning solution. This will prevent damage or deterioration of the rubber parts.

Do not use compressed air on an assembled carburettor which may cause damage to the float system.

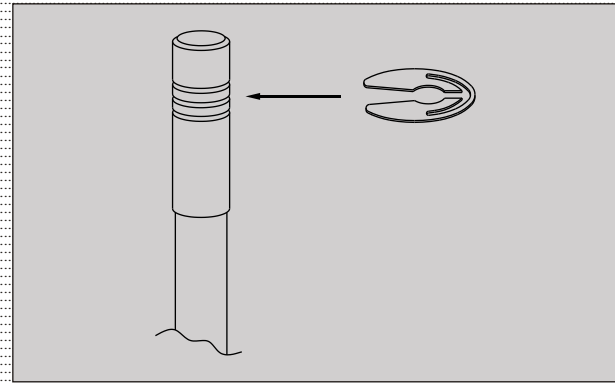


Fig. 4.31

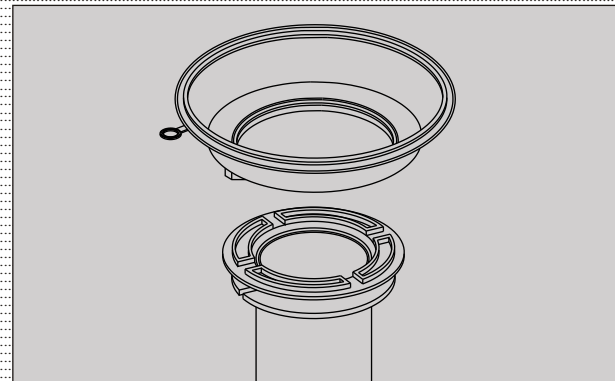


Fig. 4.32



Fig. 4.33

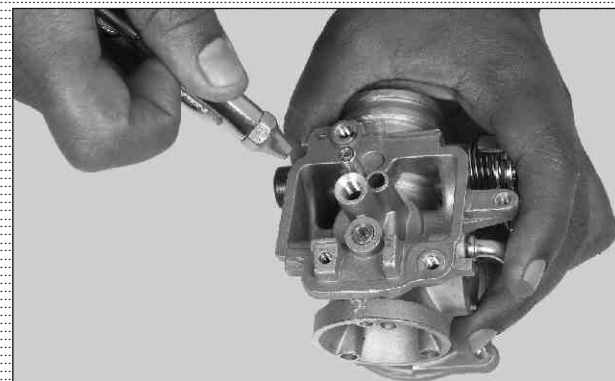


Fig. 4.34



## INSPECTION - NEEDLE VALVE ASSEMBLY

- Any foreign particles on needle valve assembly and its seating may cause improper sealing resulting in over flow of petrol. Similar kind of problem also occur in case of needle valve assembly and its seating area are worn-out. Conversely if the needle valve assembly sticks, the benzene does not flow into the float body assembly.
- If needle valve assembly is wornout as shown (Fig. 4.35) replace it with a new one.
- Inspect piston valve, needle jet, jet needle, pilot jet, main jet, mixture control screw and 'O' rings for any wear or abnormal damage. If any damage is noticed, replace damaged parts with new ones.

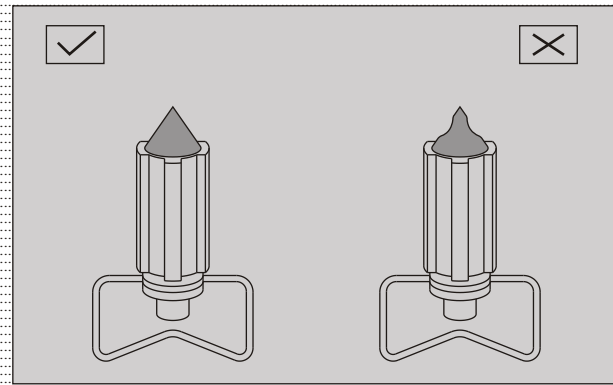


Fig. 4.35

## REASSEMBLY

Reassemble parts in the reverse order of dismantling procedure, and ensuring the following. Refer carburettor exploded view for assembly details. (Fig. 4.36)

## EXPLODED VIEW

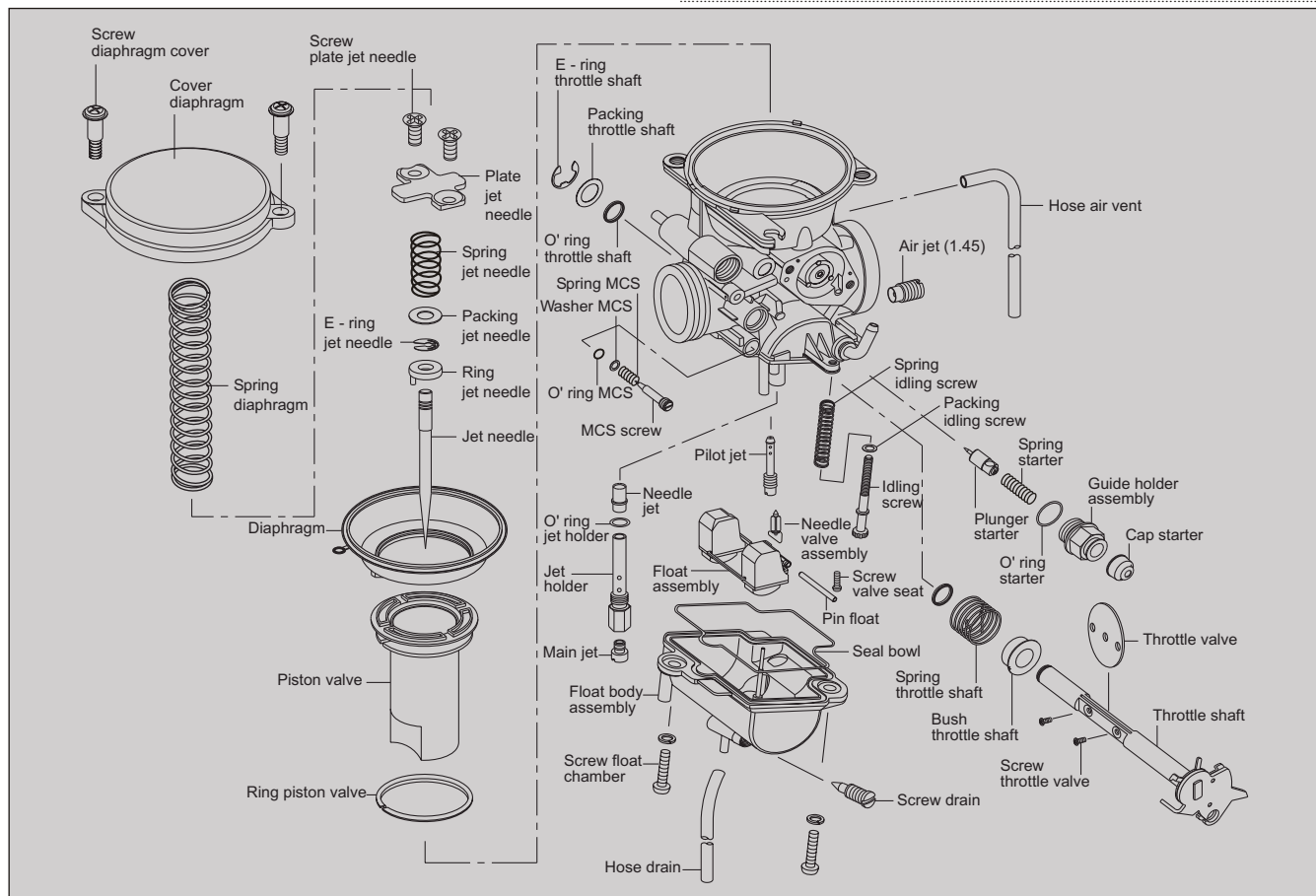


Fig. 4.36



## Note:

Ensure that the pilot jet is not tightened beyond the limit as this will cause damage to its head and removal from the mixing body becomes very difficult.

- While reassembling the carburettor always use new gaskets and 'O' rings.
- Assemble piston valve in such a way that the hook like projection of diaphragm matches with the groove of mixing body. (Fig. 4.37)
- Remount carburettor assembly on the vehicle in the reverse order of removal.

## Note:

While reassembling, check for smooth movement of choke plunger and piston valve in the carburettor mixing body.

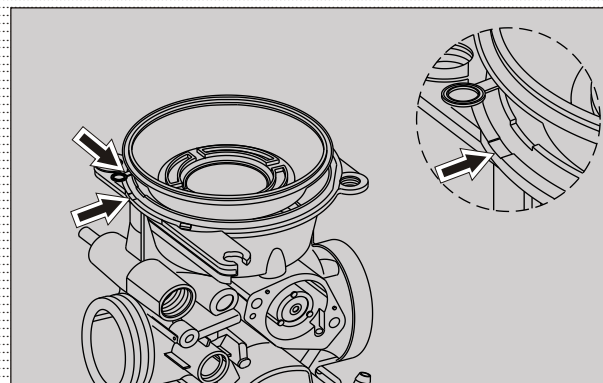


Fig. 4.37

## CARBURETTOR TUNING

- After remounting carburettor assembly on the vehicle, adjust the mixture volume control screw (MCS) (A) as per the specification. Turning out makes rich mixture and turning in makes lean mixture. (Fig. 4.38)

|                | MCS Position        |
|----------------|---------------------|
| Apache RTR 160 | $2 \pm 1$ turns out |
| Apache RTR 180 | $3 \pm 2$ turns out |

## Caution:

Before adjusting mixture volume control screw (MCS), vehicle to be warmed up for a minimum period of 3 minutes.

## Idle speed setting

- Adjust idle speed as per specification. Turning in the adjuster (B) increases the rpm. Turning out reduces the idling rpm. (Fig. 4.38)

|            |                |
|------------|----------------|
| Idle speed | $1400 \pm 100$ |
|------------|----------------|

Tachometer

## CO setting

- However, after adjusting idle speed, the proper setting of idle CO is recommended in order to make the bike environment friendly by meeting the emission regulations.

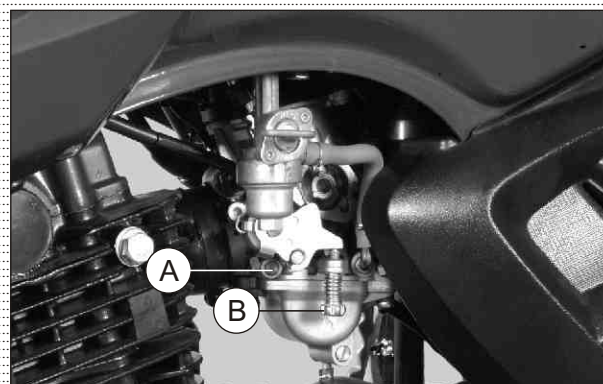


Fig. 4.38

4





- Adjust idle speed once again and check CO%. Rotate the throttle grip 2-3 times and check CO% at stable idling rpm.

|                      |         |
|----------------------|---------|
| Idling CO% (RTR 160) | 0.8~1.8 |
| Idling CO% (RTR 160) | 2~3     |

Exhaust gas analyser

## Note:

It is recommended to adjust air screw and idle screw by using exhaust gas analyser and tachometer respectively.

## LUBRICATION SYSTEM

- Lubrication system consists of a strainer at sump, an oil pump and a filter at cover clutch. The oil circuit is as shown in lubrication chart. (Fig. 4.39)
- Always clean the oil passages whenever repair is performed.
- Replace oil along with the oil filter as per maintenance schedule. (refer chapter "Periodic maintenance")

## OIL STRAINER

- Oil strainer is provided at the bottom of crankcase R. (Fig. 4.40)
- Periodically clean the oil strainer and inspect it for any damage.

## Carburettor specifications RTR 160

| Description            | Specification            |
|------------------------|--------------------------|
| Carburettor type       | Ucal Mikuni BS26 - X39Z1 |
| Main jet               | 105                      |
| Needle jet             | P-2                      |
| Jet needle             | 4DHZ56                   |
| E- ring position       | 2nd from top             |
| Pilot jet              | 15                       |
| Air jet                | 145                      |
| Throttle valve         | 120° (26 BC 1/84)        |
| MCS screw              | 2½ ± 1½ turns out        |
| Idling rpm             | 1400 ± 100               |
| Idling CO % (with SAI) | 0.8 ~ 1.8 (By Volume)    |

## Carburettor specifications RTR 180

| Description            | Specification       |
|------------------------|---------------------|
| Carburettor type       | Ucal Mikuni BS29    |
| Main jet               | 125                 |
| Needle jet             | P-0                 |
| Jet needle             | 4DHL42              |
| E- ring position       | 2nd from top        |
| Pilot jet              | 20                  |
| Air jet                | 145                 |
| Throttle valve         | 120° (26 BC 1/84)   |
| MCS screw              | 3 ± 2 turns out     |
| Idling rpm             | 1400 ± 100          |
| Idling CO % (with SAI) | 2 ~ 3 % (By Volume) |

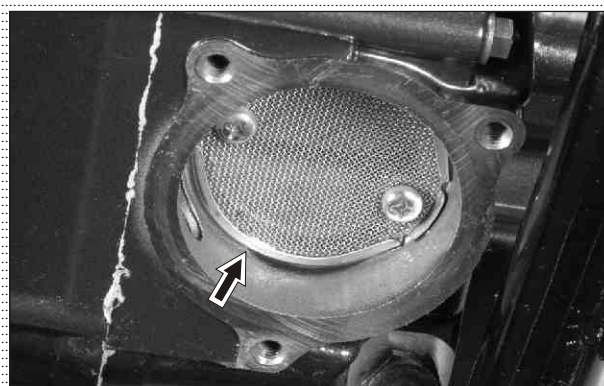


Fig. 4.40

## 4



## Fuel, lubrication and exhaust system 4-13



## OIL PUMP ASSEMBLY

- The pump assembly oil is mounted in the crankcase R, just below the gear primary drive. (Fig. 4.41)
- For replacement of pump assembly oil, first drain engine oil and remove cover clutch. (refer chapter "servicing of engine" for details)
- Remove E-ring (A) and pull out gear oil pump driven (B). (Fig. 4.41)

Flat screw driver (small)

- Remove pin oil pump driven gear (A). (Fig. 4.42)

Nose plier

- Remove CSK head screw (M6x20 - 3 nos.) and take out pump assembly oil. (Fig. 4.42)
- For reassembly, follow removal sequence in reverse order.
- After assembling oil pump assembly rotate the gear oil pump driven by hand and check for sticky rotation or any damage.

### Note:

While assembling, make sure that the drive pin of pump driven gear is in place

## FILTER COMPLETE ENGINE OIL

- The filter complete engine oil should be periodically inspected, cleaned and changed if necessary with a new one. (Fig 4.43)

### Note:

Whenever the filter complete engine oil is replaced, it is recommended that engine oil is also replaced.

- The procedure for changing oil and filter complete engine oil is explained in detail in chapter "periodic maintenance" page no. 2-13

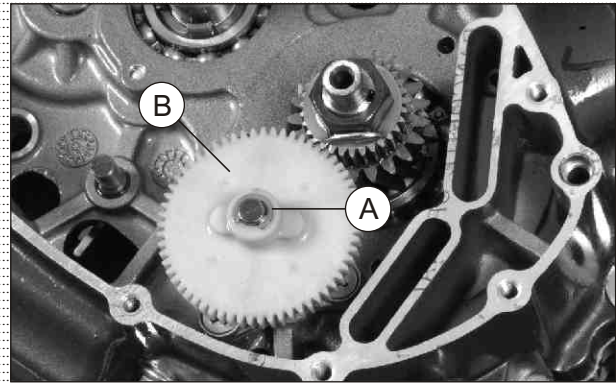


Fig. 4.41

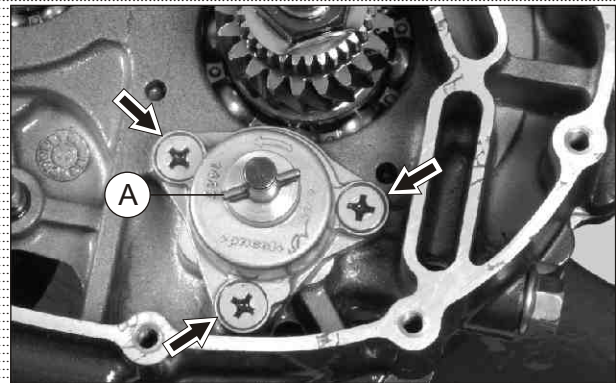


Fig. 4.42

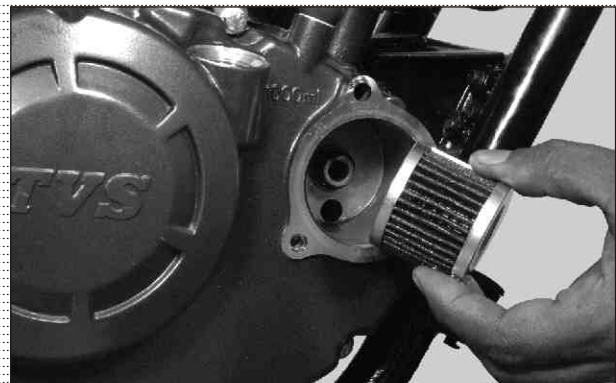


Fig. 4.43



## EXHAUST EMISSION CONTROL

- The pollutants emitted from the exhaust system are harmful to environment. If combustion is absolutely complete, there would not be any atmospheric pollution from the exhaust system. Water and carbon dioxide are the products of perfect and complete combustion. However, complete combustion is difficult to achieve in internal combustion engines.
- There are three major pollutants in the exhaust emission. They are:-
  1. Unburnt hydrocarbons (HC)
  2. Carbon monoxide (CO)
  3. Nitrogen oxides (NO<sub>2</sub>)

## WHY DOES THE GASOLINE FAIL TO BURN COMPLETELY?

- There are several reasons for incomplete combustion. Some of them are:-
  1. Weak spark
  2. Improper air-fuel mixture ratio
  3. Adulterated petrol
  4. Wrong ignition timing
  5. Low compression
  6. Excessive valve over lap
  7. Improper idle speed
  8. Incorrect exhaust system

## POLLUTION CONTROL

- With the enforcement of various motor vehicle rules, standards have been set for allowable percentage of CO emitted from the exhaust gases as shown below:

|           |                   |
|-----------|-------------------|
| By mass   | Below 2.0 gm / km |
| By volume | Below 3.5 %       |



## EXHAUST SYSTEM

- The exhaust system consists of parts right from exhaust valve to muffler assembly through which the exhaust gasses pass.
- Normally in four stroke vehicles, the muffler assembly will not be so dirty as two stroke vehicles unless the system is corrupted because of oil mixing with petrol unknowingly etc.
- But whenever the muffler assembly is removed from the engine, the exhaust gasket should be replaced to avoid leakage.

## SECONDARY AIR INJECTION VALVE

- Secondary air injection valve is mounted on the frame below the tank complete fuel near engine assembly top mounting bracket. (Fig. 4.44)

## WORKING PRINCIPLE

- This is the unit used in exhaust emission control system. The secondary air injection system induces filtered air into the exhaust manifold. Whenever there is negative pressure pulses in the exhaust system, the fresh air will be taken into the exhaust. This charge of fresh air dilutes considerable amount of hydrocarbons (HC) and carbon monoxide (CO) in the exhaust gases into carbon dioxide ( $\text{CO}_2$ ) and water ( $\text{H}_2\text{O}$ ). (Fig. 4.45)
- There is a reed valve which acts as a check valve, prevents reverse airflow from exhaust. Only fresh air is allowed into the exhaust manifold.
- There is also a diaphragm assembly in this valve. Under sudden closure of throttle, high vacuum is generated in the intake manifold. Because of this high vacuum, the diaphragm assembly is pulled up and the fresh air intake to exhaust is cut off. Under the sudden closed throttle condition, some amount of high density unburnt gases are exhausted. These unburnt gases when come in contact with fresh air in the hot exhaust, they ignite and create a bursting sound (after burn). Because of this after burn, high temperature is created in this system and this high temperature causes pre-ignition in the combustion chamber also. Because of this pre-ignition, knocking effect is created and thus the efficiency of the engine is decreased. Fresh air cut off at the closed throttle condition, will help to avoid the after burn.



Fig. 4.44

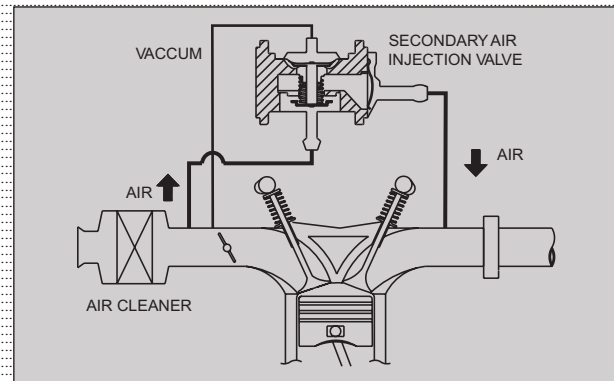


Fig. 4.45





## FUNCTION

- Clean air from air cleaner assembly is passed through the inlet port (A). The outlet (B) which has a reed valve connected to exhaust manifold. Another line from intake manifold (D) is connected to chamber (C). The port (D) has a small orifice than the other ports. The fresh and filtered air passes from port (A) to port (B). When there is a suction in chamber (C) the diaphragm is pulled up, closing the valve at (D). The airflow from port (A) to (B) is closed. Depending upon the vacuum created in the intake manifold, the amount of airflow from port (A) to (B) is controlled. (Fig. 4.46)

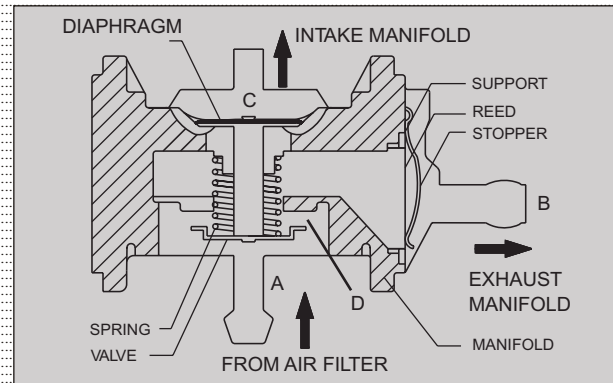


Fig. 4.46

## REMOVAL

- Remove hose clip (A) from hose air inlet and pull out the hose from secondary air injection valve. (Fig. 4.47)
- Remove hose clip (B) from hose air outlet and pull out the hose from secondary air injection valve. (Fig. 4.47)

Nose plier

- Remove clip (A) from the hose air cut valve and pull out the hose from secondary air injection valve. (Fig. 4.48)

Nose plier

- Remove hexagonal bolt (M6x30 - 2 nos.) from secondary air injection valve mounting and take out the valve along with punched washers (4 nos.). (Fig. 4.49)

10 mm spanner

- For reassembly, reverse the removal sequence.

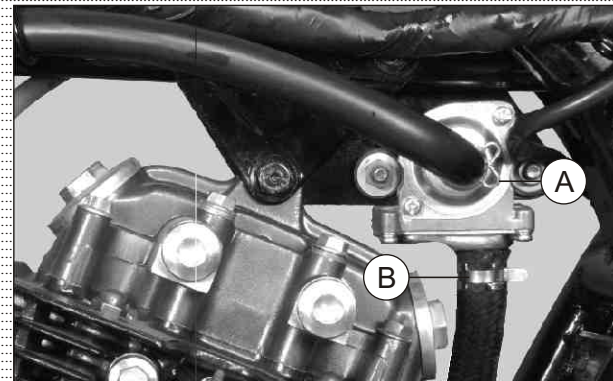


Fig. 4.47

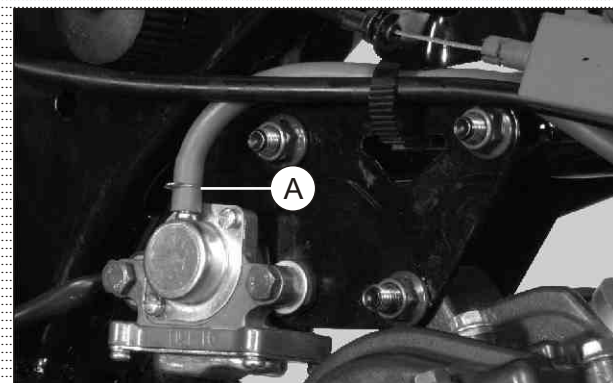


Fig. 4.48

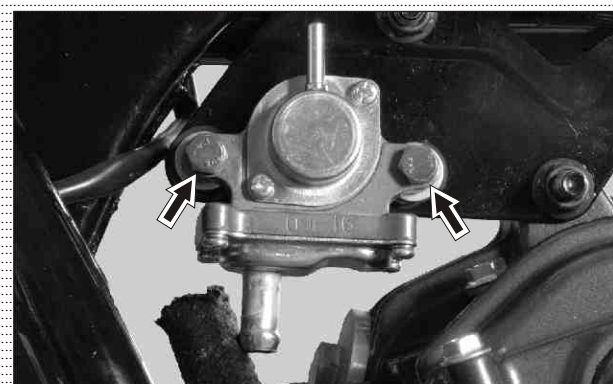


Fig. 4.49



## PREVENTIVE MAINTENANCE (EMISSION)

- While every new vehicle leaving the factory is certified and is meeting the exhaust emission standards, the CO level in the exhaust gases may get altered depending upon altitude and also over a period of time depending upon usage or lack of maintenance. It is therefore necessary whenever the vehicle is serviced, inspect the CO level and tune up the engine to maintain the emission standards.

### Caution:

Increased CO level in exhaust gases not only pollutes the air badly but also affects the engine performance.

## MEASURING CO LEVEL IN EXHAUST EMISSION

- When the engine performance is generally good, tuning of carburettor assembly by adjustment of mixture control screw and idling screw will help to control the CO level in exhaust gases. Many equipments are available to measure CO level in exhaust gases. Before measuring the emission, it is important to understand the measuring procedure, controls and maintenance aspects of that equipment by referring to the individual manufacturer's manual.

## TO CHECK AND SET THE CO

- Use the emission tuning kit (K310440) supplied by TVS-M and follow the guidelines given below:-

### Guidelines:

1. Warm up the vehicle by running the engine in idling speed for 5 - 8 minutes or run the vehicle for 3 to 4 kms at 40 kmph speed.
2. Check the idling rpm with the help of tachometer. If required adjust idling rpm as per the specification (refer chapter "periodic maintenance" page no. 2-5 for details).
3. In case of erratic idling (variation beyond spec.), set right the same before proceeding for setting the CO.
4. Fix the tube extension on to the silencer. Tighten the clamps to avoid any leakage.



5. Insert the probe of exhaust gas analyser into the extension tube to the extent of 30 to 60 cms.
6. Press the key 'M' for Horiba or 'Enter Key' for Hermann exhaust gas analyser to measure the CO emission.
7. Wait for few seconds till the reading stabilizes on the screen.
8. Note the CO and HC readings are shown on the screen.

**Note:**

On completion of CO check, keep the analyser in 'measurement mode' for approx. 30 minutes for fresh air circulation. Then turn the power 'OFF'.

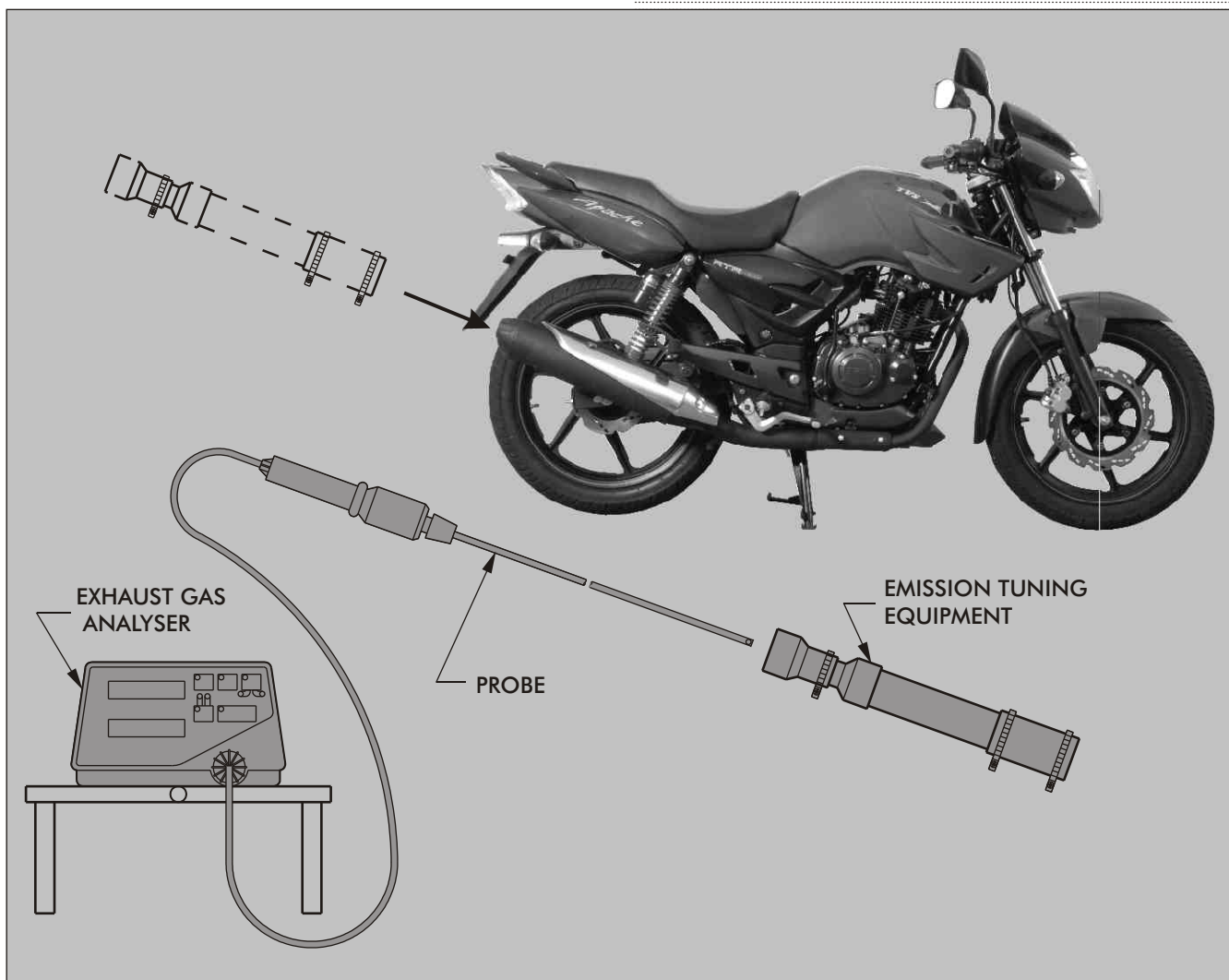


Fig. 4.37



## WIRE COLOUR CODE INDEX

| Sl. No. | CODE | WIRE COLOUR              |
|---------|------|--------------------------|
| 01      | B    | BLACK                    |
| 02      | BW   | BLACK WITH WHITE TRACER  |
| 03      | Bl   | BLUE                     |
| 04      | BIB  | BLUE WITH BLACK TRACER   |
| 05      | BIG  | BLUE GREEN               |
| 06      | BIR  | BLUE WITH RED TRACER     |
| 07      | BIW  | BLUE WITH WHITE TRACER   |
| 08      | Br   | BROWN                    |
| 09      | G    | GREEN                    |
| 10      | GB   | GREEN BLACK              |
| 11      | GR   | GREEN WITH RED TRACER    |
| 12      | GW   | GREEN WITH WHITE TRACER  |
| 13      | GY   | GREEN WITH YELLOW TRACER |
| 14      | Gr   | GREY                     |
| 15      | LBl  | LIGHT BLUE               |
| 16      | Lg   | LIGHT GREEN              |
| 17      | Or   | ORANGE                   |
| 18      | R    | RED                      |
| 19      | RW   | RED WITH WHITE TRACER    |
| 20      | V    | VIOLET                   |
| 21      | W    | WHITE                    |
| 22      | WR   | WHITE WITH RED TRACER    |
| 23      | Y    | YELLOW                   |
| 24      | YB   | YELLOW BLACK             |
| 25      | YBl  | YELLOW WITH BLUE TRACER  |
| 26      | Yor  | YELLOW ORANGE            |
| 27      | YR   | YELLOW WITH RED TRACER   |
| 28      | YW   | YELLOW WITH WHITE TRACER |



## PRECAUTIONS

### CONNECTOR

- When connecting a connector, be sure to push it in until a click sound is heard. (Fig. 5.1)
- Inspect connector for corrosion, contamination and breakage on its cover.

### COUPLER

- With a lock type coupler, be sure to release the lock before disconnecting it and push it in fully till it gets locked. (Fig 5.2)
- When disconnecting coupler, be sure to hold the coupler itself and do not pull the lead wires.
- Inspect each terminal on the coupler for being loosen or bent.
- Inspect each terminal for any corrosion or contamination.

### FUSE

- When a fuse blows, always investigate the cause, correct it and then replace the fuse. (Fig 5.3)
- Do not use a fuse of a different capacity.
- Do not use wire or any other substitute for the fuse.

### SEMI-CONDUCTOR EQUIPPED PART

- Be careful not to drop the parts with built-in semiconductor such as a TCI unit, regulator / rectifier and others. (Fig. 5.4)
- When inspecting these parts, follow the inspection instruction strictly. Neglecting specified procedure may cause damage to these parts.

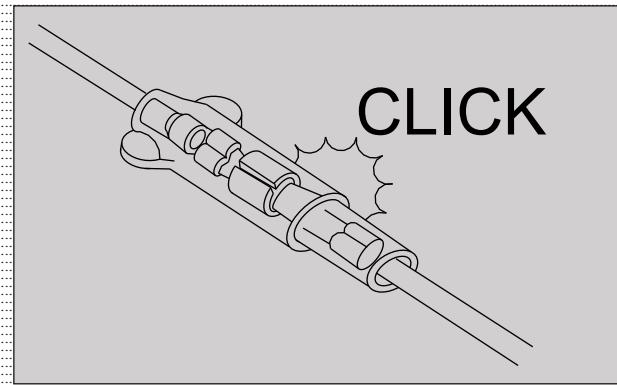


Fig. 5.1

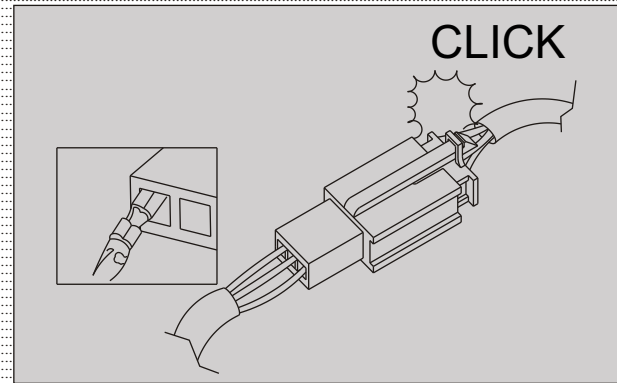


Fig. 5.2

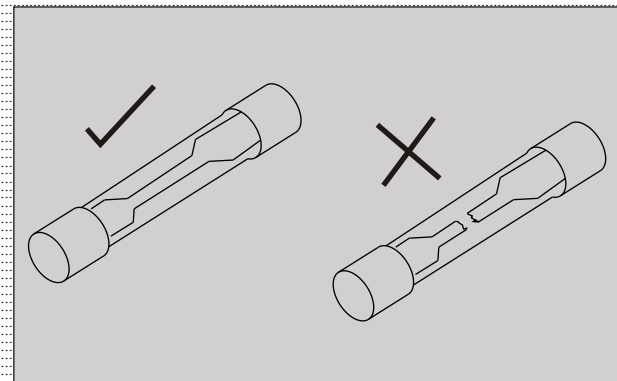


Fig. 5.3

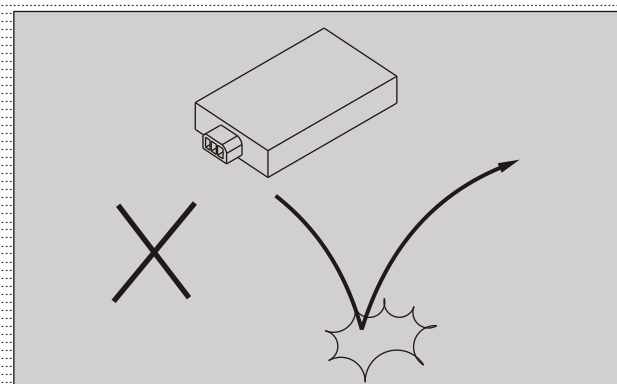


Fig. 5.4





## CONNECTING BATTERY

- For battery disassembly or servicing, be sure to disconnect the negative terminal first.
- When connecting terminals to the battery, connect the negative terminal last.
- If any terminal of the battery is found to be corroded, remove the battery, pour warm water over it and clean with a wire brush.
- Apply petroleum jelly on the terminals after the completion of connection and cover positive terminal with the boot. (Fig. 5.5)

TVS Apache RTR electrical system is divided into four systems, they are:-

1. Ignition circuit
2. Lighting circuit
3. Charging circuit
4. Electric starter circuit

## IGNITION SYSTEM

The ignition system consists of a magneto assembly, battery assembly, TCI unit (Transistor controlled ignition - digital DC), throttle switch, ignition coil assembly (inductive discharge ignition - IDI), ignition lock, engine kill switch and a spark plug. (Fig. 5.6)

The output from pulsar coil is directly connected to TCI unit. DC output from the battery is also connected to the TCI unit through ignition lock. The TCI unit is connected with the ignition lock, engine kill switch and throttle switch. When the ignition lock and the engine kill switch is in 'OFF' condition the output from the TCI unit gets earth, thus the engine will not start. From the TCI unit, DC output and earth is connected to the ignition coil.

The pulsar coil produces the signals whenever the pip in the magneto periphery passes. Based on the signals, the microcontroller equipped in the TCI will collapse the primary winding voltage in fraction of seconds. This in turn develops high voltage across the secondary winding of ignition coil due to mutual induction. This high voltage is given to sparkplug through HT lead of IDI coil.

Throttle switch is fitted on the frame and is operated through throttle cable. Throttle switch has a slider over the PCB (printed circuit board) that has two circuits for operating at part throttle and at full throttle condition for ignition timing variation. This kind of timing curve gives the required power and performance without compromising on fuel efficiency.

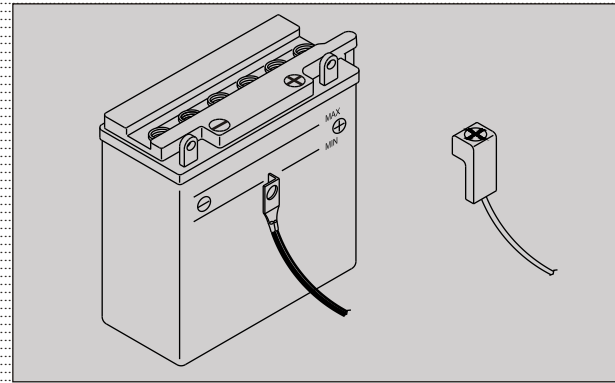


Fig. 5.5

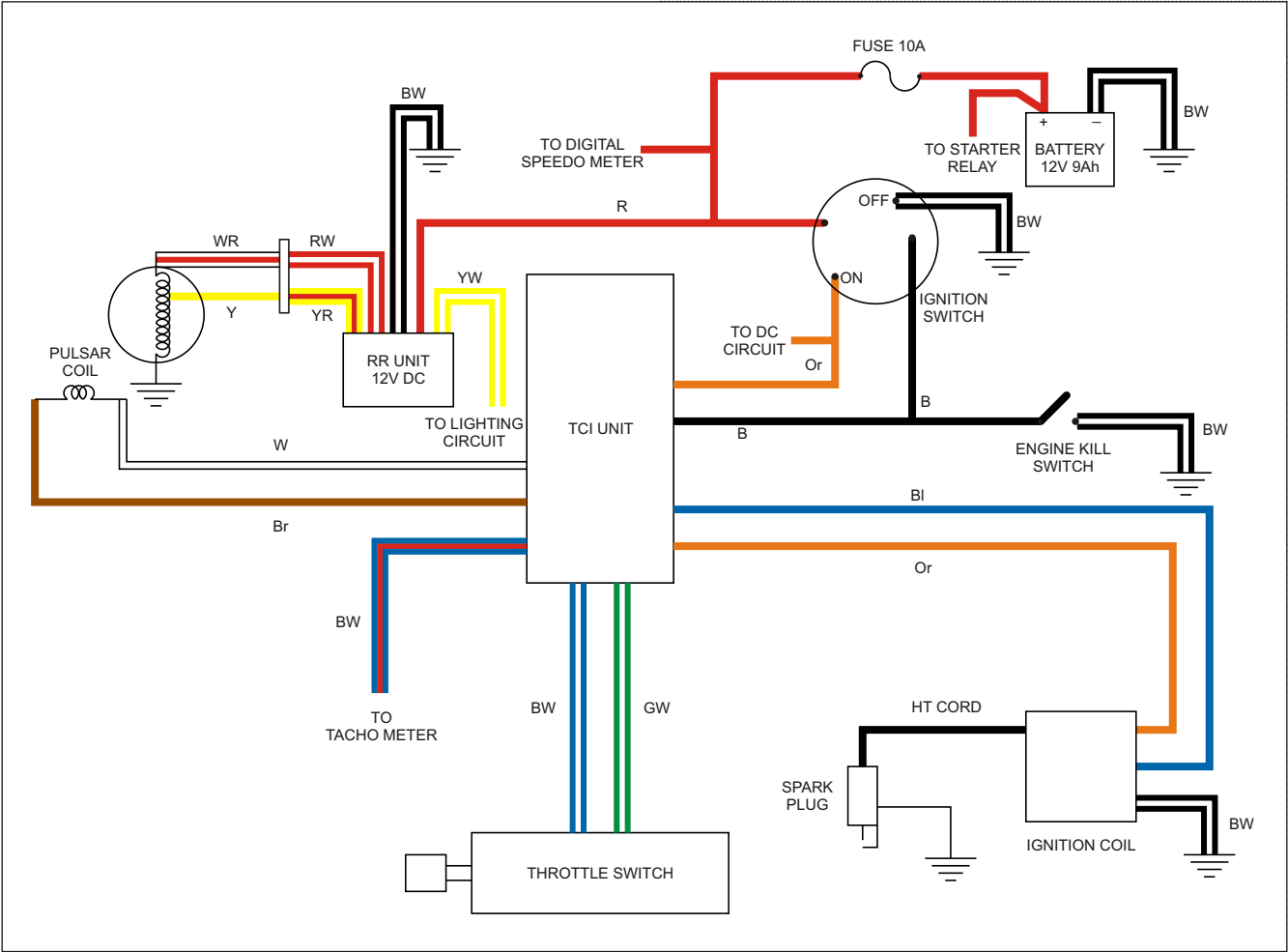


Fig. 5.6

IGNITION LOCK

- The ignition lock is located on the speedometer assembly. (Fig. 5.7)
- Inspect ignition lock for continuity with the multimeter. Set the multimeter to continuity mode.

Multimeter

| KEY POSITION | B     | BW | R     | Or |
|--------------|-------|----|-------|----|
| OFF          | ○ — ○ |    |       |    |
| ON           |       |    | ○ — ○ |    |

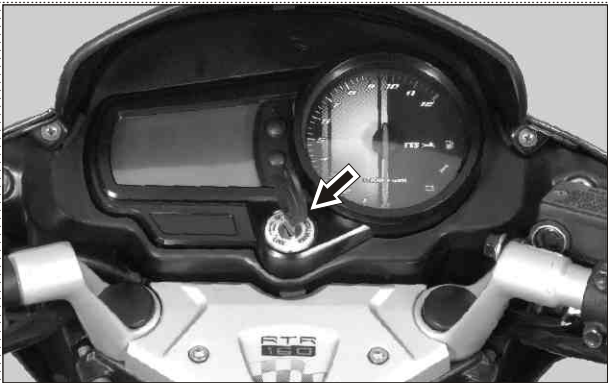


Fig. 5.7



ENGINE KILL SWITCH

- Engine kill switch is located at the right side of handle bar assembly on the switch assembly handle R. (Fig. 5.8)
- Inspect switch for continuity with multimeter.

| SWITCH POSITION                                                                                  | B                                                                                 | BW |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----|
| PRESS UP (  )   |  |    |
| PRESS DOWN (  ) |                                                                                   |    |

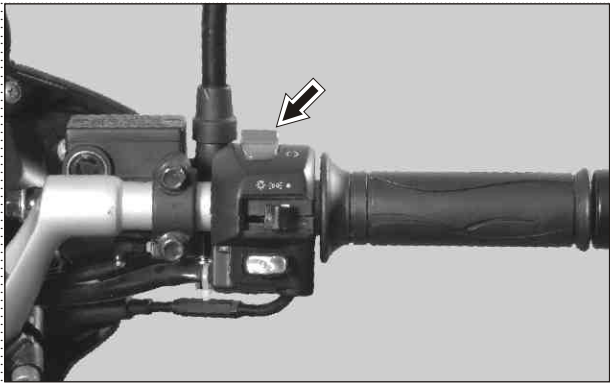


Fig. 5.8

PULSER COIL

- Set multimeter position to 2000
- Connect multimeter '+ve' lead to the brown wire (Br) from pulser coil and '-ve' lead to white wire (W) from pulser coil. (Fig. 5.9) Measure the resistance. If resistance is not within the specified limit, replace pulser coil with a new one.

|                      |                |
|----------------------|----------------|
| Pulser coil (Br - W) | 175 - 275 ohms |
|----------------------|----------------|

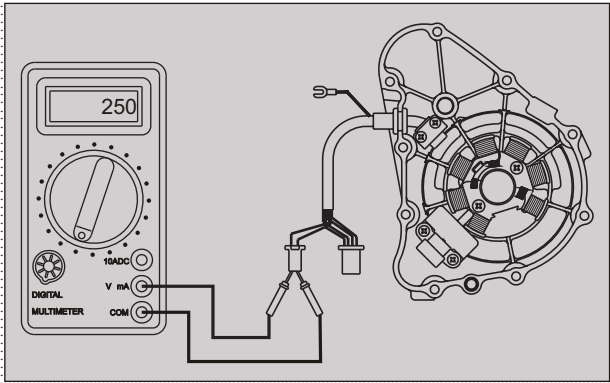


Fig. 5.9

IGNITION COIL

Primary winding

- Set multimeter position to 200
- Check resistance of the primary winding by connecting '+ve' lead of multimeter to orange wire (Or) and '-ve' lead to blue wire (Bl). (Fig. 5.10)

|                         |           |
|-------------------------|-----------|
| Primary coil resistance | 2 - 3 ohm |
|-------------------------|-----------|

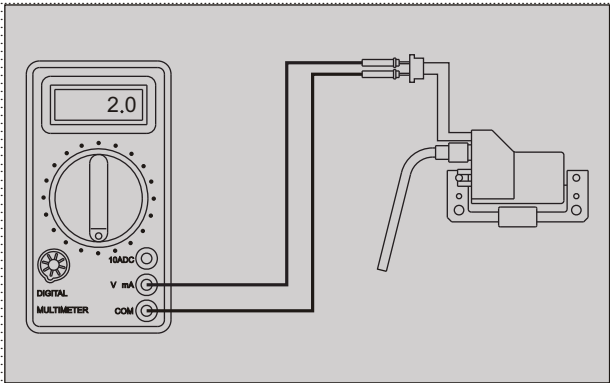


Fig. 5.10

- If primary winding resistance is OK, then check the secondary winding.

Secondary winding

- Set multimeter position to 20 k
- Connect '+ve' lead of multimeter to the HT cord and '-ve' lead to the blue wire (Bl). (Fig. 5.11)

|                           |                  |
|---------------------------|------------------|
| Secondary coil resistance | 12.0 - 14.0 Kohm |
|---------------------------|------------------|

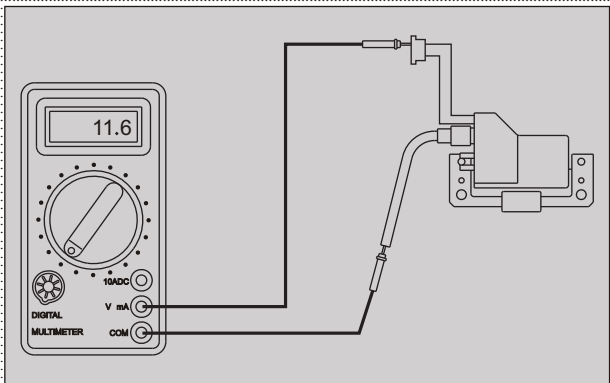


Fig. 5.11

- If resistance of windings is not within the limit, replace ignition coil assembly with a new one.



## SUPPRESSOR CAP

- Disconnect HT cord from the engine. Pull out the boot from HT cord and separate suppressor cap.
- Inspect suppressor cap terminal for loose fitment and rusting.
- Measure suppressor cap resistance.(Fig. 5.12)
- If resistance is not matching the specified limit or it is damaged, replace suppressor cap with new one.

|                           |        |
|---------------------------|--------|
| Suppressor cap resistance | 5Kohms |
|---------------------------|--------|

## SPARKPLUG

- Neglecting the maintenance of sparkplug leads to poor performance of engine. If the sparkplug is used for a longer period, the electrode gradually burns away and carbon builds up along the inside part. (refer chapter "periodic maintenance" page no. 2-19 for sparkplug cleaning and maintenance).

### Caution:

Always use only recommended make and type of sparkplug.

|           |              |
|-----------|--------------|
| Sparkplug | BOSCH UR5DDC |
|-----------|--------------|

## THROTTLE SWITCH

- Throttle switch assembly is fitted on the left side of the frame, closer to engine assembly top mounting bracket. (Fig. 5.13) Inspect throttle switch assembly for continuity with the multimeter.
- Check throttle switch for free sliding.

| SWITCH POSITION | BIW | GW |
|-----------------|-----|----|
| ECONOMY MODE    | ○   | ○  |
| POWER MODE      |     |    |

- While assembling throttle switch or throttle cable, adjust throttle switch as follows: (Fig. 5.14)
  - Loosen mounting screws.
  - Rotate throttle grip fully.
  - Match the ring mark as shown in the figure by sliding the body of switch and then tighten the screws.

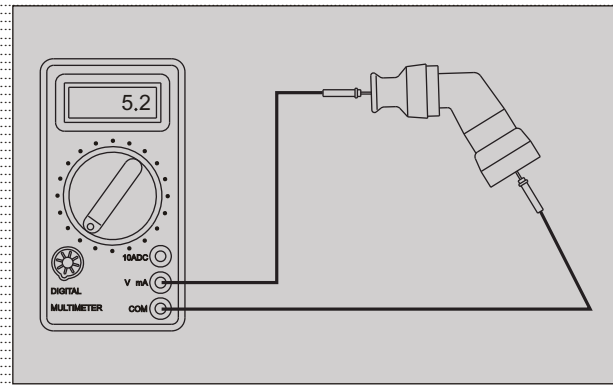


Fig. 5.12



Fig. 5.13

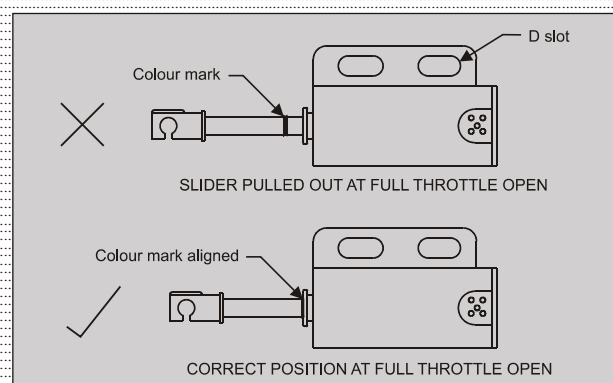


Fig. 5.14

- The lighting system consists of magneto assembly, 12V DC regulator (RR unit). The lighting cum charging coil in the magneto assembly supplies alternating current (AC) regulated by the regulator to the following bulbs/LED:
  - Head lamp
  - Position lamps
  - High beam indicator lamp
  - Tachometer lamp
  - Speedometer assembly
  - Tail lamp
  - Number plate lamp
- Due to magnetic induction, the alternating current (AC) is produced in the magneto and passes to the regulator (RR unit). Regulator controls the magneto output voltage between 12 to 14 volts. Thus the regulated voltage is supplied to lighting system as shown in the figure. (Fig. 5.15)



### Electrical system 5-7





## LIGHTING SWITCH

- Head lamp and position lamps can be operated by switch lighting on the switch assembly handle R. (Fig. 5.16)
- Inspect switch for continuity with the multimeter.

| SWITCH POSITION | YW | Gr | YBI |
|-----------------|----|----|-----|
| OFF - ( ● )     |    |    |     |
| PO - ( ☼ )      | ○  | ○  |     |
| ON - ( ≡ )      | ○  | ○  | ○   |

## BEAM CONTROL SWITCH

- The head lamp is connected to the switch lighting through a switch beam control provided on the switch assembly handle L. (Fig. 5.17)
- Inspect switch for continuity with the multimeter.

| SWITCH POSITION        | YBI | YOr | WR |
|------------------------|-----|-----|----|
| PRESS UP ( ≡ ) - HIGH  | ○   | ○   |    |
| PRESS DOWN ( ≡ ) - LOW | ○   |     | ○  |

## AC DC PASS BY LAMP

- The pass by lamp consists of pass by switch and pass by relay.
- In this system headlamp high beam is works on both AC and DC current.

## PASS BY RELAY

- The head lamp and high beam indicator lamp are connected with lighting switch and beam control switch through pass by relay, provided at the housing head lamp rear. (Fig. 5.18) (Refer page 5.16 for removal of housing head lamp removal)
- On turning the ignition switch ON, the pass by lamp works on DC before starting the vehicle.
- Once the engine is started, both lighting switch and high beam switches are in on condition and relay pass by cuts DC power and connects AC supply to head lamp.

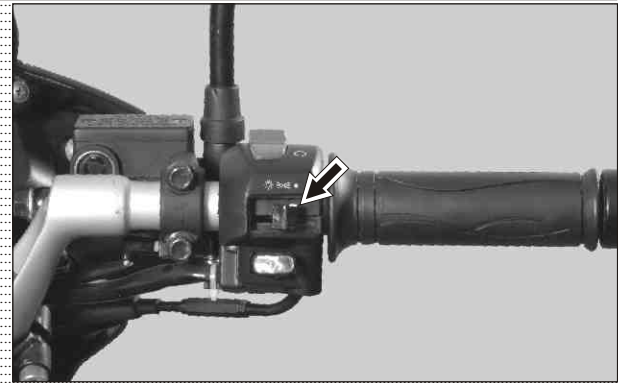


Fig. 5.16



Fig. 5.17

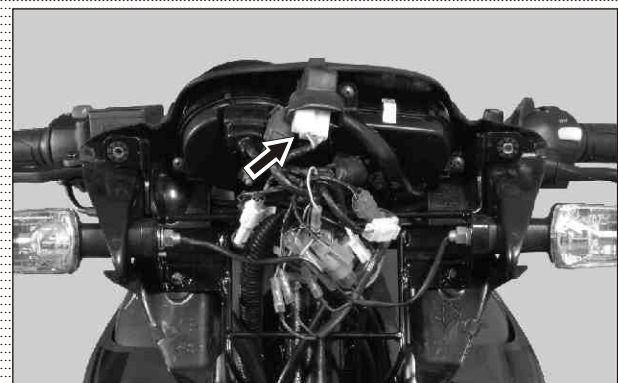


Fig. 5.18



- Inspect relay pass by for continuity with the multimeter.

| SWITCH POSITION    | Or  | Y | YO |
|--------------------|-----|---|----|
| PASS BY SWITCH ON  | ○—○ | ○ |    |
| PASS BY SWITCH OFF |     | ○ | ○  |

## PASS BY SWITCH

- The head lamp and high beam, pass by relay are connected through pass by switch provided on the switch assembly. (Fig. 5.19)
- Inspect switch for continuity with the multimeter.

| SWITCH POSITION | GB  | BW |
|-----------------|-----|----|
| PRESS - ON      | ○—○ | ○  |
| RELEASE - OFF   |     |    |

## 12V REGULATION SYSTEM

### REGULATOR (RR UNIT)

- The RR unit (regulator cum rectifier) is fitted on the frame below the seat assembly near the battery assembly. (Fig. 5.20)
- The RR unit consists as the name implies, regulator which regulates the AC voltage between 12V - 14V constantly, and rectifier which converts AC input into DC output used for charging and other DC circuits.

### LIGHTING PERFORMANCE CHECK

- Set the pocket tester's knob to AC 200 V voltage range.
- Connect pocket tester terminals between the output yellow white wire (YW) from the regulator and the black with white tracer wire (BW).
- Start the engine. Connect the tachometer and adjust the engine rpm to 4000 approx. (Fig. 5.21)
- Turn the light switch 'ON'. The pocket tester reading should be  $14 \pm 0.3V$ .

|                      |                                     |
|----------------------|-------------------------------------|
| Lighting performance | $14 \pm 0.3V$ at 4000 rpm and above |
|----------------------|-------------------------------------|

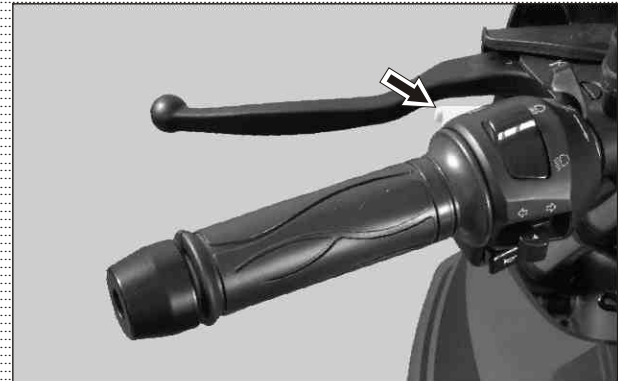


Fig. 5.19



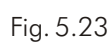
Fig. 5.20



Fig. 5.21

- Set multimeter position to 200
- Connect the pocket tester (+ve) lead to the yellow wire (Y) from the magneto assembly and (–ve) lead to black (B) wire from the body (earth). (Fig. 5.22) Measure the resistance.
- If resistance is not within the specified limit, replace the coil assembly with a new one.

- The charging system and DC system consists of a magneto assembly, 12V DC regulator, fuse 10A, ignition lock and a battery assembly. (Fig. 5.23)





- The output current from the lighting and charging coil is connected to the 12V DC regulator where it is converted to direct current (DC). This direct current charges the battery assembly and further connected to the following:
  - Horn L & R
  - Turn signal lamps
  - Neutral lamp
  - Stop lamp
  - Tachometer
  - Speedometer assembly
  - Pass by relay
  - TCI unit

**HORNS (12V DC)**

- The horns are mounted on the frame at the front side of the vehicle below the fuel tank. (Fig. 5.24)
- The DC output wire (Or) from the ignition lock is connected to the horns directly and the negative green wire (G) from the horns is connected to earth through horn switch.
- The horn switch is located on the switch assembly handle L. (Fig. 5.25)
- Inspect switch for continuity with the multimeter.

| SWITCH POSITION | G | BW |
|-----------------|---|----|
| PRESS - ON      |   |    |
| RELEASE - OFF   |   |    |

**TURN SIGNAL LAMP SWITCH FRONT AND REAR**

- The DC output from the ignition lock is connected to the switch turn signal through a flasher unit (relay turn signal) mounted below the seat assembly near the regulator. (Fig. 5.26)
- The DC output wire orange (Or) from the ignition lock is connected to the flasher unit and the output from the flasher unit is connected to the switch turn signal through light blue wire (Lbl).
- The switch turn signal is located on the switch assembly handle L. (Fig. 5.27)
- Inspect switch for continuity with the multimeter.



Fig. 5.24

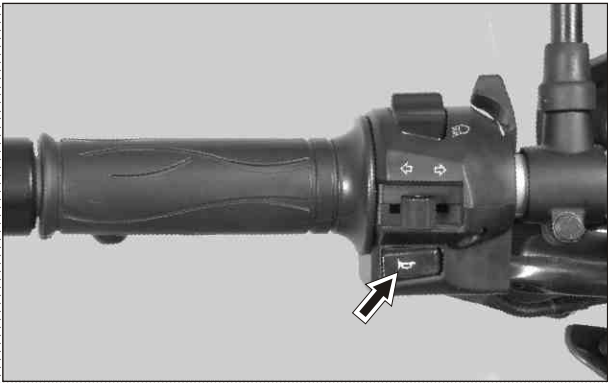


Fig. 5.25

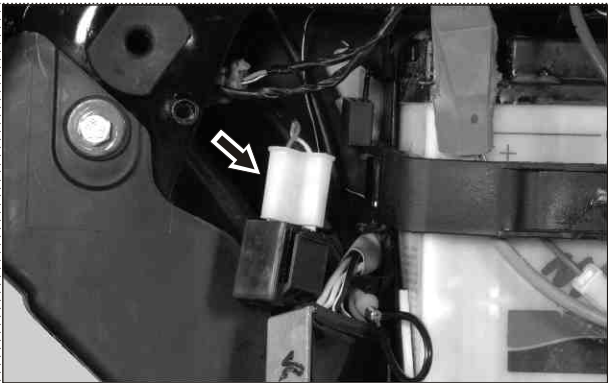


Fig. 5.26

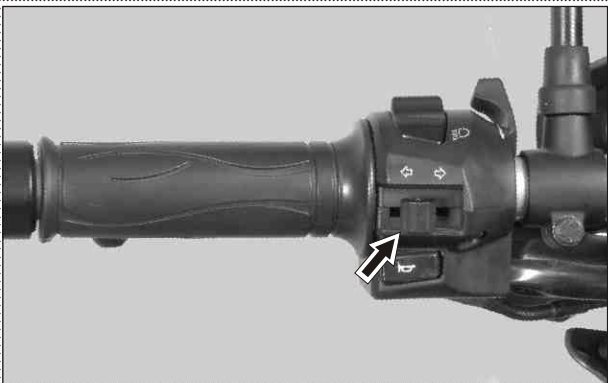


Fig. 5.27





| SWITCH POSITION   | V   | Lbl | Lg |
|-------------------|-----|-----|----|
| TO LEFT (←)       | ○—○ |     |    |
| PRESS AND RELEASE |     | ○   |    |
| TO RIGHT (→)      |     | ○—○ |    |

## NEUTRAL LAMP

- The DC output from the ignition lock is directly connected to the neutral indicator lamp of speedometer assembly and the bulb is earthen through a gear shift switch mounted on the crankcase assembly L just above the engine sprocket. (Fig. 5.28)
- Inspect the switch for continuity with the multimeter.

| SWITCH POSITION         | BI  | BW/BODY |
|-------------------------|-----|---------|
| NEUTRAL                 | ○—○ |         |
| SHIFT GEAR FROM NEUTRAL |     |         |

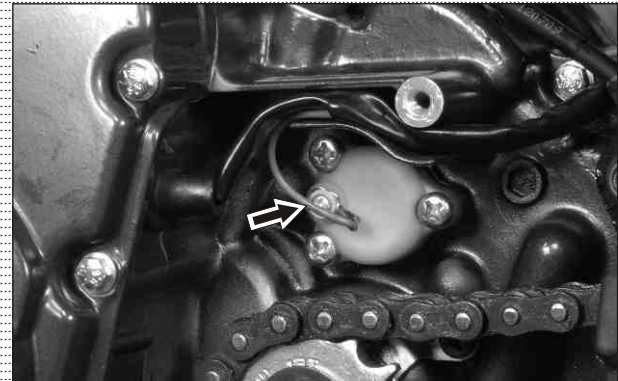


Fig. 5.28

## STOP LAMP (BRAKE LAMP)

- The DC output from ignition lock is connected to the stop lamp through switch assembly brake front and rear (brake switch). Switch assembly brake (front) is fitted on the lever assembly brake. (Fig. 5.29)
- Inspect switch for continuity with the multimeter.

| SWITCH POSITION     | Or  | W |
|---------------------|-----|---|
| APPLY FRONT BRAKE   | ○—○ |   |
| RELEASE FRONT BRAKE |     |   |



Fig. 5.29

- Switch assembly stop lamp rear is fitted on the frame below the battery assembly near the mounting of the swing arm complete and operated by the pedal complete brake. (Fig. 5.30)
- Inspect the switch for continuity with the multimeter.

| SWITCH POSITION    | Or  | W |
|--------------------|-----|---|
| APPLY REAR BRAKE   | ○—○ |   |
| RELEASE REAR BRAKE |     |   |



Fig. 5.30





FUEL LEVEL INDICATOR

- TVS Apache RTR has digital fuel indicator on speedometer assembly and connected to the DC output. This indicator is earthed through a fuel sender unit (consists of variable resistor).
- The fuel sender unit is fitted at bottom of the tank complete fuel. (Fig. 5.31)
- Inspect fuel sender unit for continuity with the pocket tester by connecting its '+ve' lead to green with yellow tracer wire (GY) and '-ve' lead to the black with white tracer wire (BW) from the fuel sender unit.



Fig. 5.31

CHARGING PERFORMANCE CHECK

- Set the multimeter position to DC 200 V range.
- Remove the cover frame R.
- Connect the pocket tester '+ve' lead to the positive terminal of the battery assembly and '-ve' lead to the negative terminal of the battery assembly. (Fig. 5.32)
- Start and warm up the engine. Switch on the lights.
- Connect the tachometer to find out the engine rpm and increase the engine speed as given below:

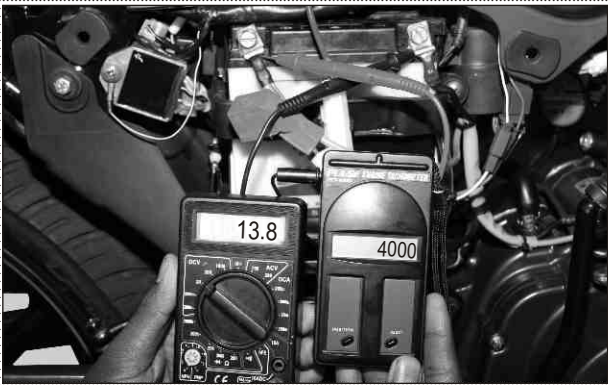


Fig. 5.32

|                      |                                     |
|----------------------|-------------------------------------|
| Charging performance | $14 \pm 0.3V$ at 4000 rpm and above |
|----------------------|-------------------------------------|

**Note:**  
While checking the charging current, switch on all the lights.

- Reassemble the cover frame R.

CHARGING COIL

- Connect the pocket tester '+ve' lead to the white with red tracer wire (WR) from the lighting cum charging coil and '-ve' lead to black wire (B) from the body (earth). Measure the resistance. If resistance is not within the specified limit, replace the coil with a new one. (Fig. 5.33)

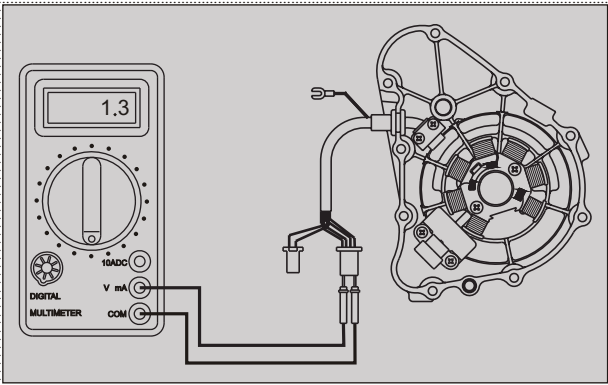


Fig. 5.33

|                     |                 |
|---------------------|-----------------|
| Resistance (WR - B) | 0.01 - 1.5 ohms |
|---------------------|-----------------|



## ELECTRIC STARTER SYSTEM

- The starter system consists of battery assembly, ignition lock, starter motor assembly, starter relay assembly, starter switch, engine kill switch, neutral switch and clutch switch.
- In TVS Apache RTR, while pressing the starter switch with the transmission in neutral (by applying the clutch incase of the transmission in any gear) and ignition lock, engine kill switches are in 'ON' condition, the current flows through the starter relay which activates the starter relay to complete the starter motor assembly circuit. (Fig. 5.34)
- Now the current passes from the battery assembly to the starter motor assembly through a thick grey wire. A thick black wire is connected from the starter motor to the battery negative terminal. Since high current is passed these wires, thicker wires are provided.

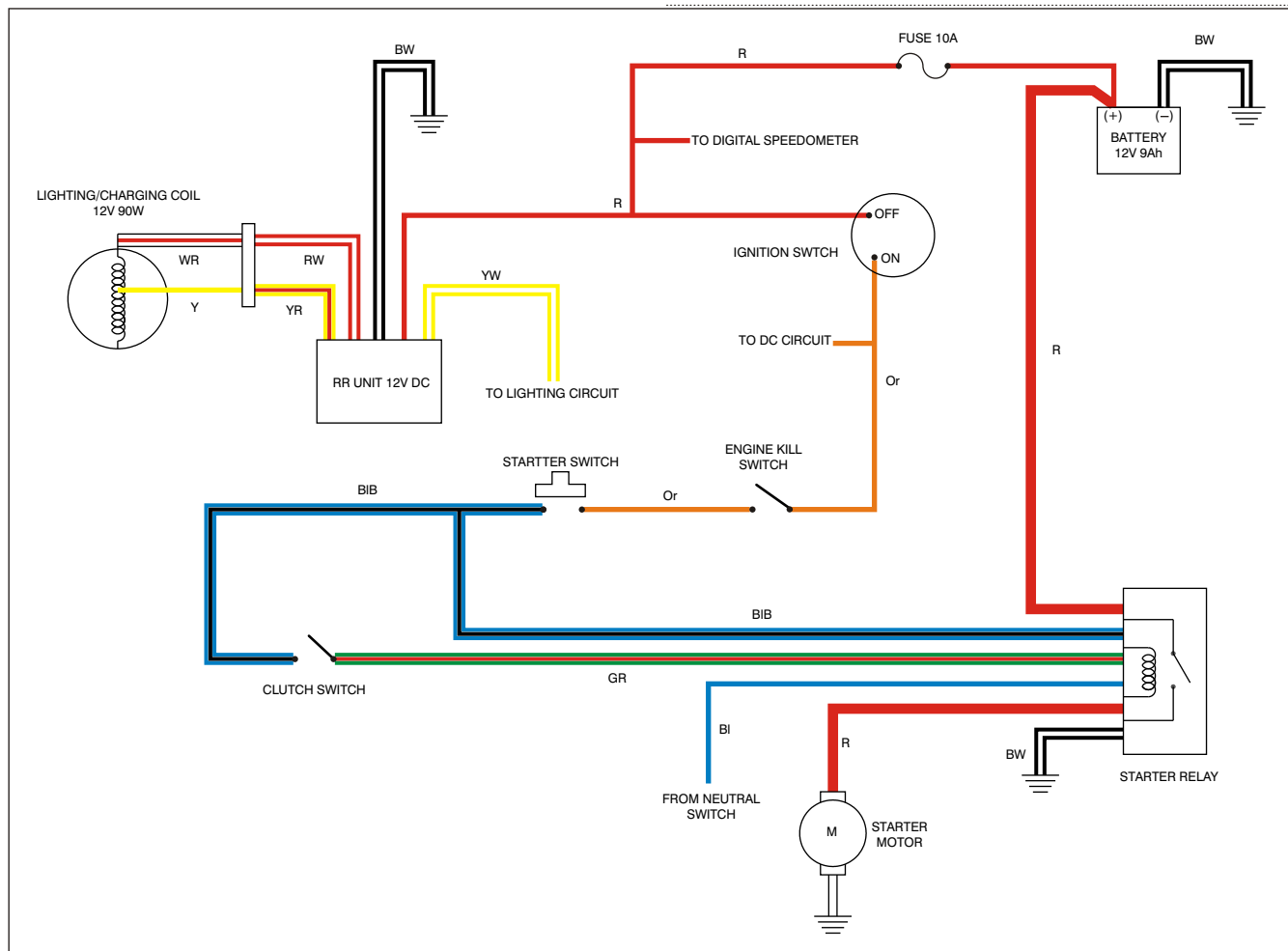


Fig. 5.34



- To start the starter motor assembly at frequent intervals the motor is connected with a mechanical starter relay. The relay contains a electromagnet, energised by the DC supply through starter switch as shown. (Fig. 5.34) The magnetised coil connect the terminal contacts to complete the starter motor circuit.

ELECTRIC STARTER SWITCH

- Electric starter switch is located at the bottom side of switch assembly R. (Fig. 5.35)
- Inspect switch for continuity using multimeter with the engine kill switch is in 'ON' position.

| SWITCH POSITION | BIB | Or |
|-----------------|-----|----|
| PRESS (ON)      |     |    |
| RELEASE (OFF)   |     |    |

SWITCH ASSEMBLY CLUTCH

- Switch assembly clutch is located at the bracket clutch lever which is mounted in handle bar L. (Fig. 5.36)
- Inspect the switch for continuity with the multimeter.

| SWITCH POSITION | BIB | GR |
|-----------------|-----|----|
| PRESS (ON)      |     |    |
| RELEASE (OFF)   |     |    |

STARTER RELAY

- Inspect starter relay by checking the continuity across the wire using pocket tester. (Fig. 5.37)
- Inspect switch for continuity with the multimeter.

| SWITCH POSITION | Gr | Gr |
|-----------------|----|----|
| NOT ENERGISED   |    |    |
| ENERGISED       |    |    |

(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 is in 'ON' position.)

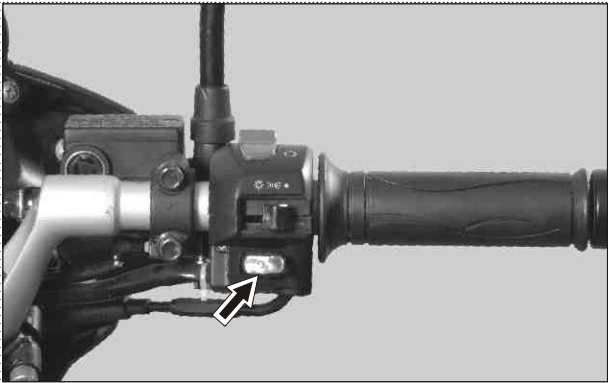


Fig. 5.35

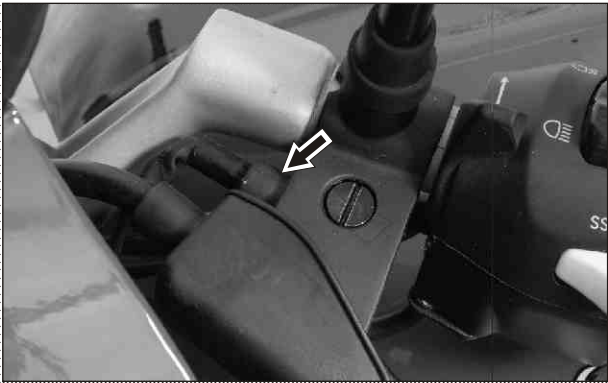


Fig. 5.36



Fig. 5.37



## BULBS REPLACEMENT

### LAMP ASSEMBLY TURN SIGNAL - BULB

- Remove one no of self tapping screw from the turn signal lamp housing and take off lens along with the holder assembly and bulb. (Fig. 5.38)



Fig. 5.38

- Remove bulb holder from the housing and replace the bulb with a new one. (Fig. 5.39) Reassemble the parts and tighten the self tapping screw.



Fig. 5.39

|                  |         |
|------------------|---------|
| Turn signal lamp | 12V 10W |
|------------------|---------|

- Similarly perform above procedure for other three turn signal lamps.

### HEAD LAMP ASSEMBLY - BULB

- Remove hexagonal screw (M6x20 - 2 nos.) from the housing head lamp front top mounting. (Fig. 5.40)

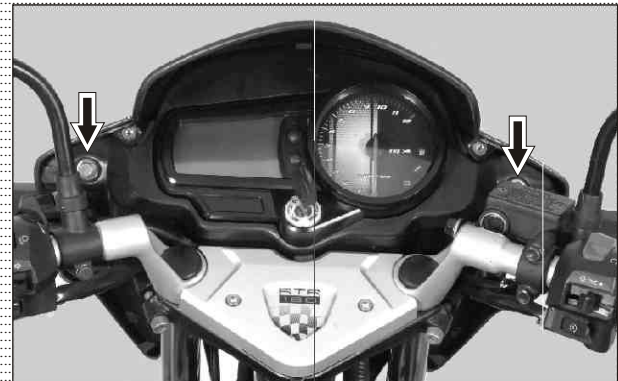


Fig. 5.40

|               |
|---------------|
| 10 mm spanner |
|---------------|

- Slightly loosen housing head lamp front bottom mounting nut. (Fig. 5.41)

|               |
|---------------|
| 10 mm spanner |
|---------------|

- Tilt the housing head lamp forward.
- Dislocate boot head lamp and pull out the socket head lamp bulb.



Fig. 5.41





- Take out head lamp bulb by snapping out the clip. (Fig 5.42)

|                |                       |
|----------------|-----------------------|
| Head lamp bulb | 12V35/35 HS (Halogen) |
|----------------|-----------------------|

- Assemble new bulb and reassemble the parts in the reverse order of dismantling.

**Note:**

After reassembling head lamp, readjust the head lamp beam. (refer chapter "periodic maintenance" page 2-21)

**Caution:**

Do not touch the halogen bulb at its tip and glass as it will reduce bulbs life and performance.

## POSITION LAMP - BULB REPLACEMENT

- Repeat the steps given above.
- Tilt the housing head lamp forward.
- Pull out position lamp bulb holder and replace the bulbs with new ones. (Fig. 5.43)

|                    |        |
|--------------------|--------|
| Position lamp bulb | 12V 4W |
|--------------------|--------|

- Reassemble parts in the reverse order of dismantling.

**Note:**

After reassembling the head lamp, readjust the head lamp beam. (refer chapter "periodic maintenance" page 2-21)

## SPEEDOMETER ASSEMBLY

### ODO / TRIP METER SETTING

Odometer registers the total distance covered by the vehicle in kilometers. The digit after the dot mark denotes one tenth of a kilometer.

Trip meter indicates the trip distance traveled in kilometer. Option is provided to measure two different distances as "Trip-A & Trip-B". These can be reset whenever required.

- Press set button (A) for few seconds to change the odometer to Trip-A. Follow the same procedure to change from Trip-A to Trip-B and Trip-B to odometer. (Fig. 5.44)



Fig. 5.42



Fig. 5.43

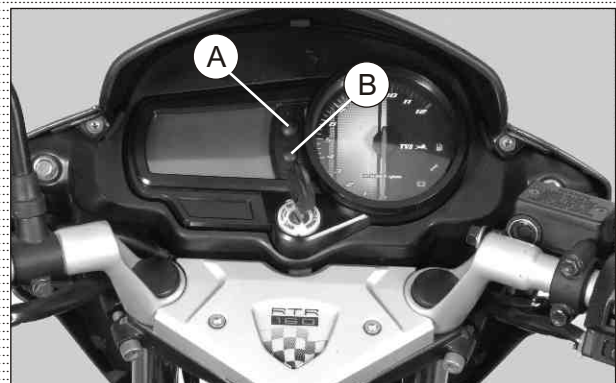


Fig. 5.44





- To reset trip meter, select the mode required and press and hold the mode button (B) for few seconds. Selected trip meter resets to zero. (Fig. 5.45)

## DIGITAL CLOCK SETTING

- Set digital speedometer mode as 'ODO' to adjust the digital clock.
- Press and hold set button (A) for few seconds to change clock timing format from 12 hour to 24 hour or vise versa. (Fig. 5.45)
- Press and hold mode button (B) for few seconds to change digital clock in to reset mode. (Fig. 5.45)
- Press the set button (A) to increase the hours. (while hour digits are blinking) (Fig. 5.45)
- To switch the setting of hours to minutes, press the mode switch button (B) again for few seconds. (Fig. 5.45)
- While hour digits are blinking, press set button (A) to set hour digits from the progressive digits display for a each set button press. (Fig. 5.45)

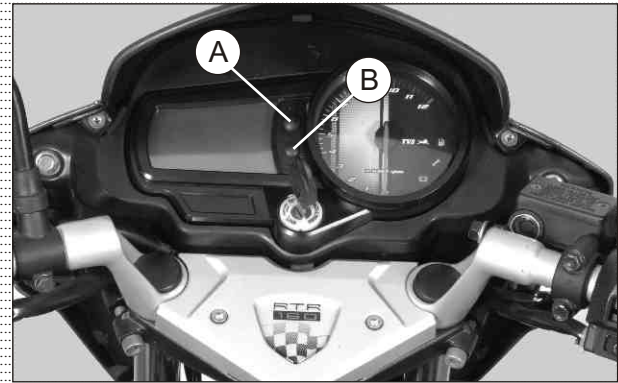


Fig. 5.45

## REPLACEMENT

- Remove housing head lamp front along with the head lamp assembly.
- Disconnect terminals from turn signal lamps L & R from the wiring harness by gently pulling.
- Loosen turn signal lamp L & R mounting nuts. Take out nut along with the spring washers and turn signal lamps L&R. (Fig. 5.46)

17 mm spanner

- Take out the turn signal lamps L & R.
- Remove the pass by relay from housing head lamp rear by dis locating from the cable guide. (Fig. 5.47)

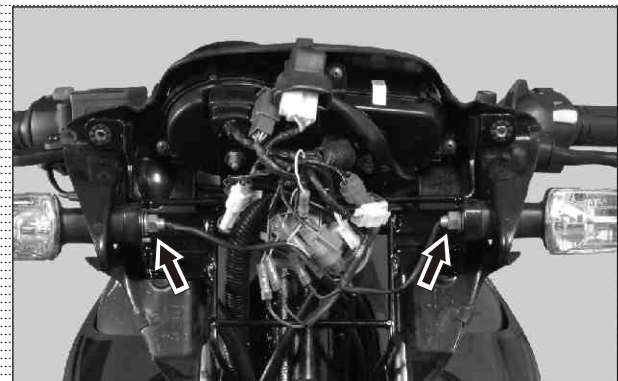


Fig. 5.46

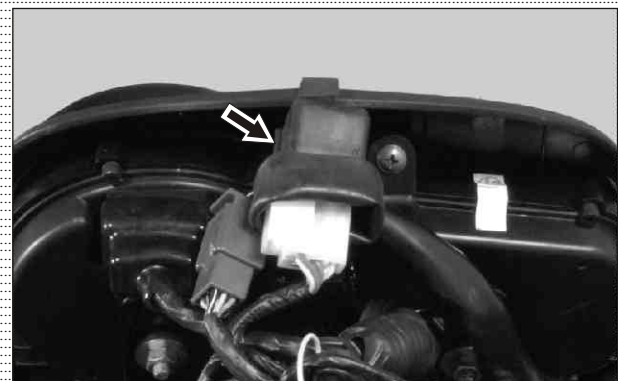


Fig. 5.47



- Disconnect coupler from the speedometer assembly by gently pressing the lock. (Fig. 5.48)



Fig. 5.48

- Loosen and remove hexagonal nuts (A) (M6 - 3nos) along with the plain washer from the speedometer assembly mounting. (Fig. 5.49)

10 mm spanner

**Note:**

While reassembling ensure the presence of the grommets at speedometer mounting bracket.

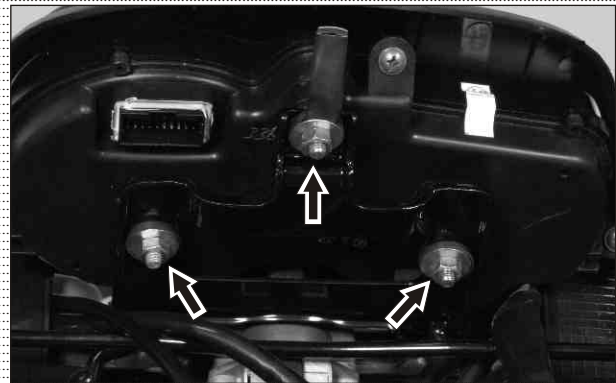


Fig. 5.49

- Remove CRR pan head screws (M6X16 - 2nos) from the housing head lamp rear L & R side. (Fig. 5.50)

Philips head screw driver

- Take out the housing head lamp rear along with the speedometer assembly.

**Note:**

While reassembling ensure that all cushions are assemble at respective place.

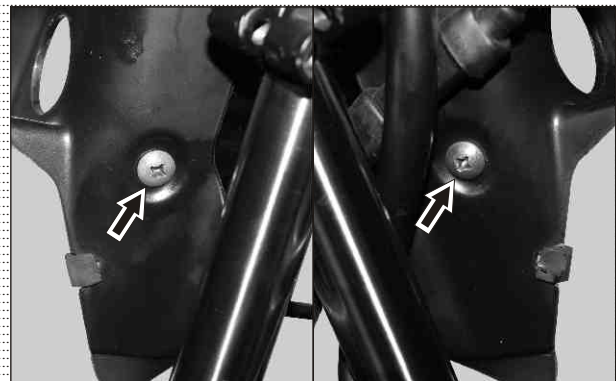


Fig. 5.50

- Remove CRR flanged pan head tap screws (ST4.2x13 - 3 nos) to separate the speedometer assembly from the housing head lamp rear. (Fig. 5.51)

Philips head screw driver

- Replace speedometer with new one.
- Reassemble parts in the reverse order of dismantling.

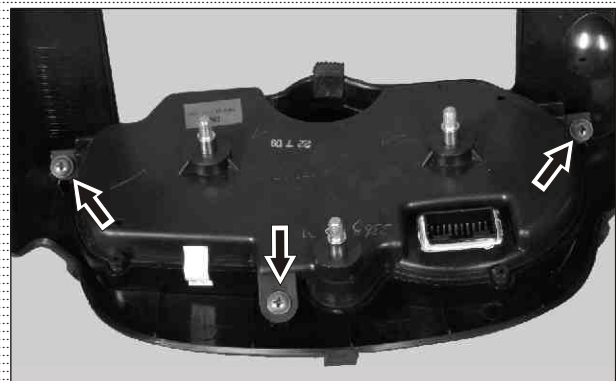


Fig. 5.51



## LAMP ASSEMBLY REAR COMBINATION

- Remove pillion handle by unscrewing the mounting bolts. (M8x25 - 4nos) (Fig. 5.52)

12 mm spanner

- Take out punched washer 2 nos from the pillion handle bar mounting. (Fig. 5.53)

### Note:

While reassembling ensure that punched washers are located at pillion handle mounting. (Fig. 5.53)

- Remove hexagonal screws (M6x25 - 3 nos) along with the plain washer. (Fig. 5.54)

10 mm spanner

- Disconnect tail lamp and number plate lamp coupler.

- Remove CRR pan head screws (M6x20 - 2nos) from the bottom tail cover mounting L&R. (Fig 5.55A & Fig. 5.55B)

- Take out tail cover L&R along with tail cover center and lamp assembly rear combination.

Philips head screw driver

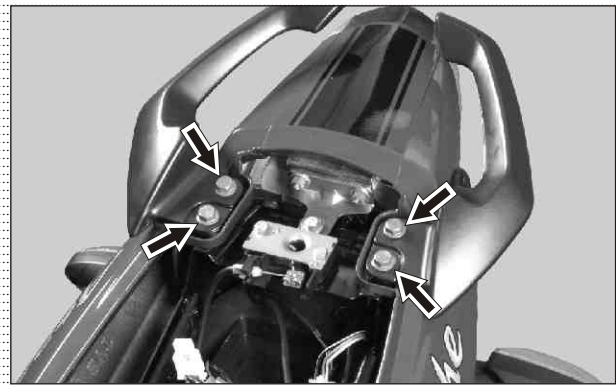


Fig. 5.52

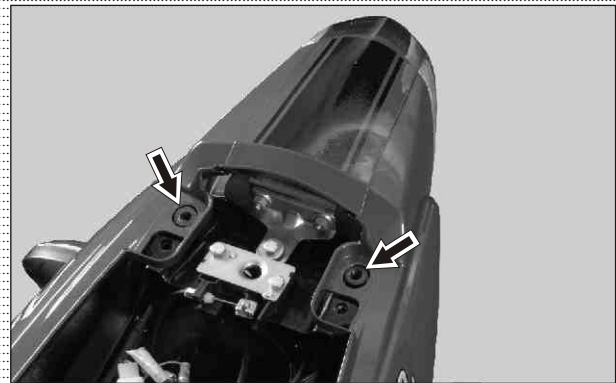


Fig. 5.53

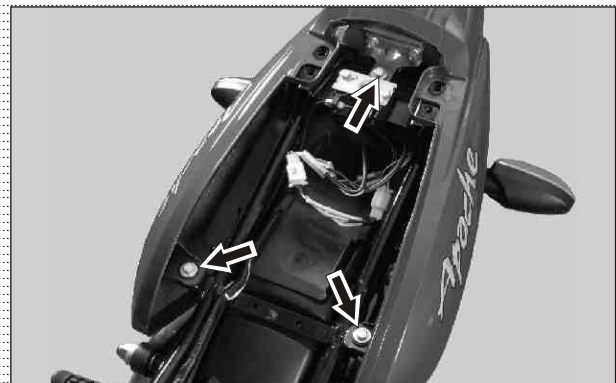


Fig. 5.54

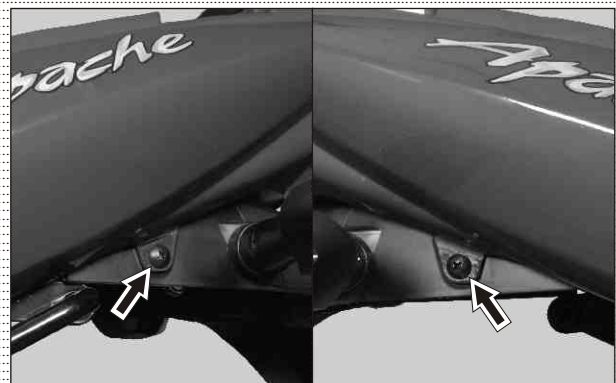


Fig. 5.55A

Fig. 5.55B



- Remove hex nuts (M6 - 4 nos) from the tail bracket along with punched washer. (Fig. 5.56)

10 mm spanner

- Pull out tail lamp assembly towards rear and take out lamp assembly.
- Replace lamp assembly with new one.
- Reassemble the parts in the reverse order of dismantling.

**Note:**

While reassembling ensure that the presence of the grommet (A) in the tail cover. (Fig. 5.56)

## NUMBER PLATE ILLUMINATOR - BULB

- Remove mounting nuts (2 nos.) and take out the number plate illuminator as an assembly. (Fig. 5.57A)

8 mm spanner

- Take out rubber grommet and pull out bulb holder along with the bulb.
- Remove bulb from the holder and replace with a new one. (Fig. 5.57B)
- Reassemble parts in the reverse order of removal.

## ADJUSTMENTS

### HEAD LAMP BEAM ADJUSTMENT

For adjusting head lamp beam refer chapter "periodic maintenance" page no. 2-21.

### SWITCH ASSEMBLY STOP LAMP - REAR

- The switch assembly stop lamp rear can be adjusted by turning the adjuster nut (A) in or out. (Fig. 5.58)

**Note:**

To adjust switch assembly, do not turn the body switch assembly (B) while holding the adjuster nut (A).

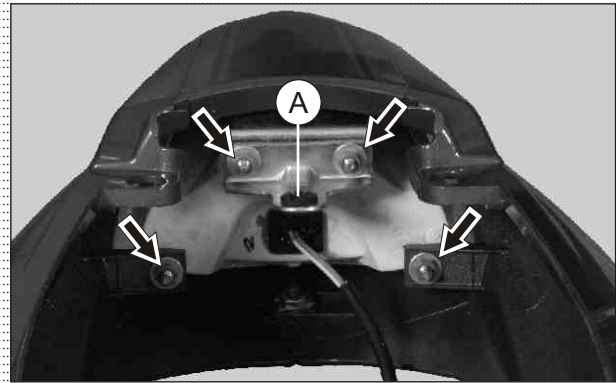


Fig. 5.56

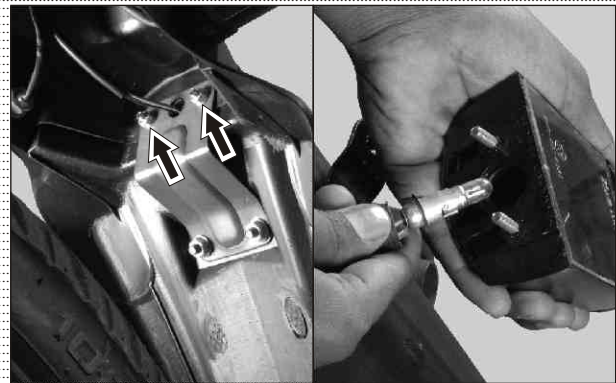


Fig. 5.57A

Fig. 5.57B

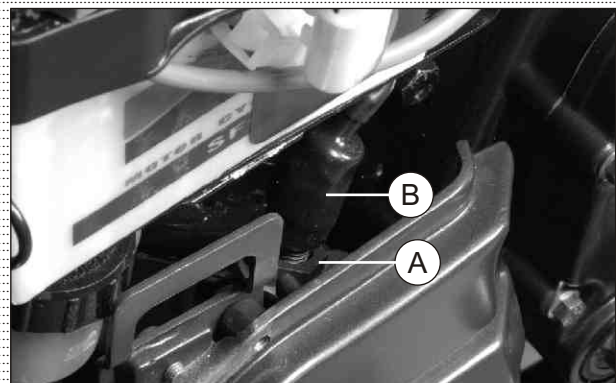


Fig. 5.58





## BATTERY ASSEMBLY

### Removal

- Remove cover frame R. (Refer chapter "Periodic maintenance" page no. 2-17 for details)
- Disconnect the battery assembly terminals. (Fig. 5.59)
- Remove clamp by removal of CRR pan head screw (M6x16 - 1no) (A) and take out the battery assembly. (Fig. 5.59)

#### Note:

Clean the battery surfaces after removing it from the vehicle.

### Servicing

- Visually inspect the surface of battery assembly. If any signs of cracking or electrolyte leakage are noticed, replace battery with a new one.
- If battery lead terminals are found to be corroded or coated with an acidic white powdery substance, then clean it with emery paper. (Fig. 5.60)

## ELECTROLYTE LEVEL

- Before recharging battery assembly through battery charger, inspect electrolyte level. The electrolyte level must be between lower and upper level mark provided on the battery assembly case. (Fig. 5.61)
- If level is below the lower mark, remove filler caps (A) (6 nos.). (Fig. 5.61) and top up the level in each cell with distilled water only.

#### Cation:

Add only distilled water for doing top up of electrolyte level.

- Measure electrolyte specific gravity reading using hydrometer. (Fig. 5.62) If reading is not within the specified limit, it indicates that the battery assembly needs recharging.

Hydrometer

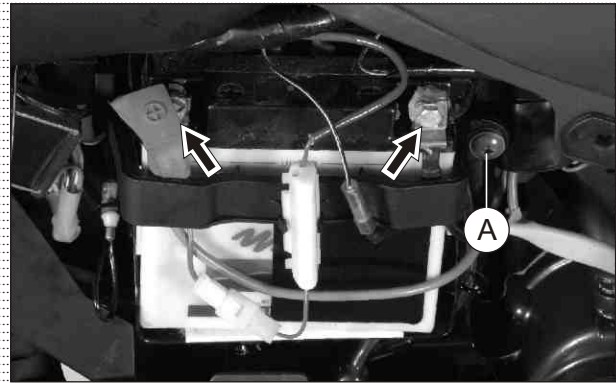


Fig. 5.59



Fig. 5.60

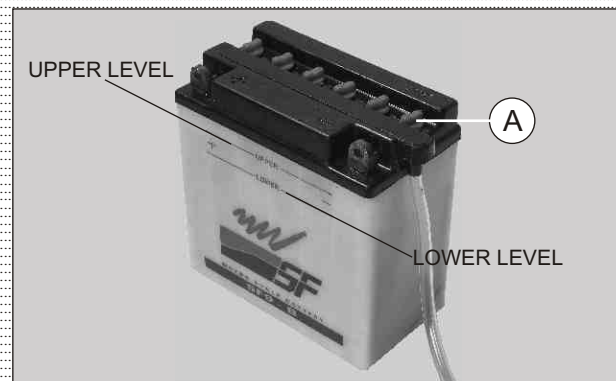


Fig. 5.61



Fig. 5.62





**Note:**

Hold the hydrometer to the level of eye and observe gradual increment on the flat scale bordering on lower meniscus. (Fig. 5.63)

## BATTERY CHARGER

Battery charger

**Cation:**

Always use constant current battery charger having current output lesser than 0.9A. Do not use constant voltage battery charger.

**Note:**

Normally, multiple batteries can be charged simultaneously. Incase of charging multiple batteries, all batteries connected to the charger should be uniform Ah capacity batteries. (9 Ah in case Apache RTR)

## CHARGING PROCEDURE

- Incase of single battery, connect negative lead of the battery charger to the '– ve' terminal of the battery assembly and positive lead of the battery charger to '+ ve' terminal of the battery assembly. (Fig. 5.64)
- Incase of multiple batteries, all batteries must be connected in series contact with the battery charger. (Fig. 5.65)
- Connect positive lead from the charger to '+ ve' terminal of the first battery assembly and '– ve' terminal of the first battery to be connected to the '+ ve' terminal of second battery and so on.
- Now connect the '– ve' terminal of the last battery to the negative lead of the charger.
- To charge multiple batteries, set selector knob to the position corresponding to the number of batteries being connected.
- If the continuity of any one of the batteries is not complete, then all other batteries will not be charged due to incomplete circuit.
- Before charging batteries, connect battery charger to the main while ensuring power 'ON' indicator glowing.
- If power on indicator bulb is not glowing, then check charger fuse.

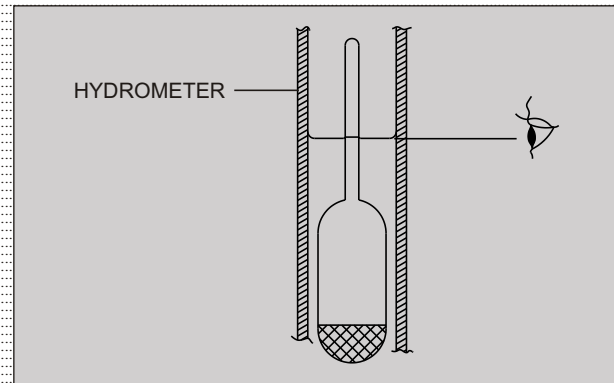


Fig. 5.63

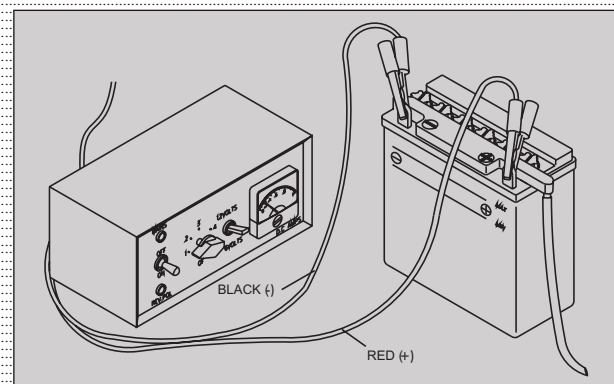


Fig. 5.64

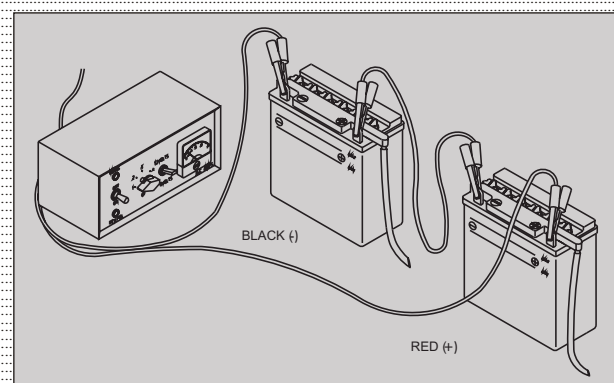


Fig. 5.65



**Caution:**  
Loosen and remove all the filler caps while charging.

Keep fire and sparks away from batteries when they are being charged.

## INDICATION OF FULL CHARGE

The following are the indication of full charge:

- Battery assembly can be considered to be fully charged when three consecutive specific gravity (SG) readings taken at intervals of 30 minutes each, indicating a reading of 1.28 for 9.0 Ah battery. (Fig. 5.65)
- Free gasses coming out from each battery cells.
- The output voltage should be more than 12.8 Volts when measured using multimeter. (Fig. 5.66)

**Note:**  
If battery assembly output voltage is less than 11V, irrespective of correct specific gravity readings, battery assembly needs to be replaced with a new one.



Fig. 5.65

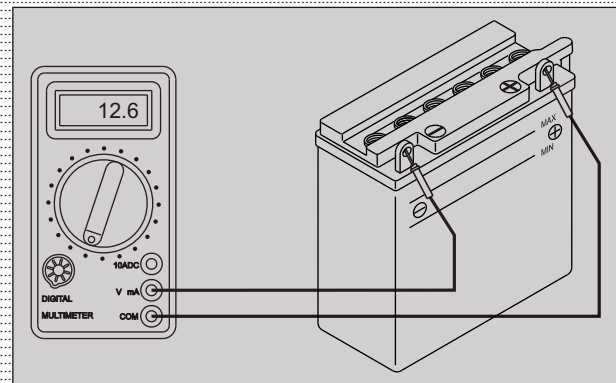


Fig. 5.66

## REVERSE POLARITY

- In case of reverse polarity, the polarity indicator will glow along with the buzzer sound in the latest chargers. This means reverse connection. The positive lead of the charger is connected to the '–ve' terminal of the battery assembly and negative lead of the charger is connected to '+ve' terminal of the battery assembly. In case of reverse polarity, the fuse provided in the charger breaks the circuit.
- The fuse needs to be replaced before further charging. After replacing fuse ensure that the power on indicator light glows.

**Note:**  
Before, replacing fuse correct the polarity by reversing the connection.

- Reassemble battery assembly on the vehicle in the reverse order of dismantling.

**Note:**  
Before reinstalling battery assembly on the vehicle, fix the filler caps and vent pipe with proper routing.



## WHEEL ASSEMBLY FRONT - REMOVAL

- Remove wheel assembly front along with disc plate, spacer complete L and speed sensor. (refer chapter "periodic maintenance" page no. 2-30 for removal procedure)

### Note:

After taking out front wheel assembly keep some cushion in between the brake pads, to avoid binding.

## DISC REPLACEMENT

- Remove screw special (M8 - 6 nos) from the disc plate mounting and take out disc plate from the alloy wheel front. (Fig. 6.1)

6 mm allen key

## Removal of bearings

- Heat the wheel assembly front (brake drum) by placing the wheel assembly front on a hot plate upto 125° C. (Fig. 6.2)

Hot plate

- Tap out bearing L & R and spacer complete front hub with a suitable mandrel. (Fig. 6.3)

Nylon hammer

Drift

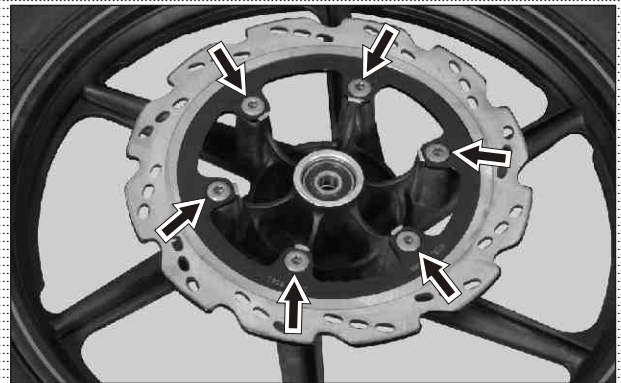


Fig. 6.1

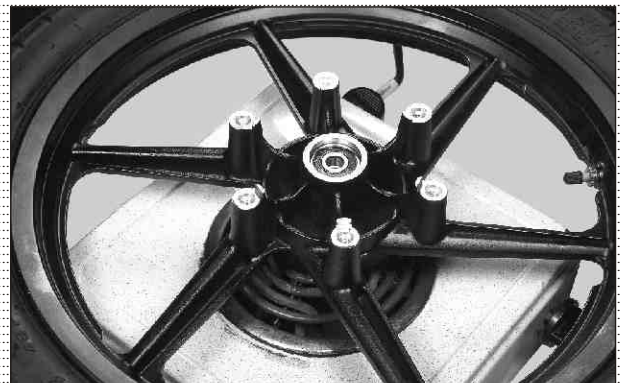


Fig. 6.2



Fig. 6.3



## INSPECTION

Before inspection, clean all necessary components with suitable cleaning solvent and lubricate them.

### Wheel bearings

- Inspect wheel bearings inner race for play by hand while fixing it in the hub complete front wheel. (Fig. 6.4)
- Rotate inner race by hand to inspect whether abnormal noise occurs or rotating smoothly.
- Replace bearing if found defective.

#### Note:

Worn or loose wheel bearing must be replaced with a new one before attempting to true a alloy wheel.

### Axle front

- Using the special tools, check axle front for run out (straightness) and replace the axle with a new one if run out exceeds the limit. (Fig.6.5)

|         |                      |
|---------|----------------------|
| 0313050 | Dial gauge (0.01 mm) |
|---------|----------------------|

|         |                |
|---------|----------------|
| 0313060 | Magnetic stand |
|---------|----------------|

|         |                      |
|---------|----------------------|
| 0313070 | V - block - 4"x3"x3" |
|---------|----------------------|

|               |               |
|---------------|---------------|
| Service limit | 0.25 / 100 mm |
|---------------|---------------|

#### Warning:

Do not attempt to straighten a bent axle.

### Alloy wheel front

- Using the special tools, measure run out of alloy wheel front. An excessive amount of run-out is usually due to a bent alloy wheel. (Fig. 6.6)

|         |                      |
|---------|----------------------|
| 0313050 | Dial gauge (0.01 mm) |
|---------|----------------------|

|         |                |
|---------|----------------|
| 0313060 | Magnetic stand |
|---------|----------------|

|               |        |
|---------------|--------|
| Service limit | 1.0 mm |
|---------------|--------|

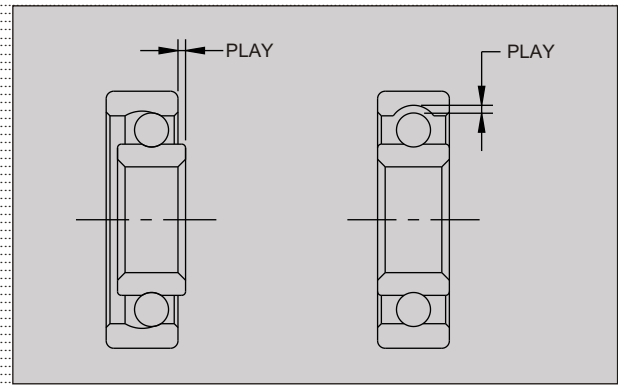


Fig. 6.4

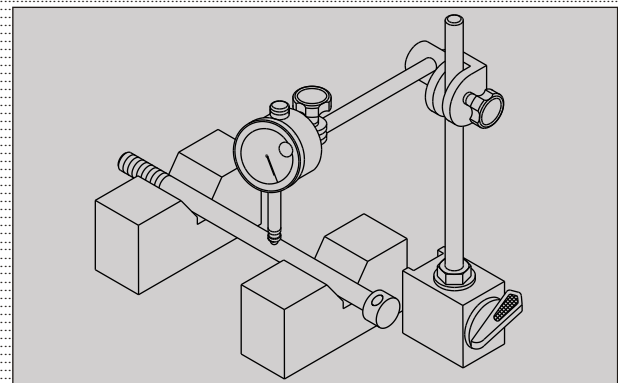


Fig. 6.5

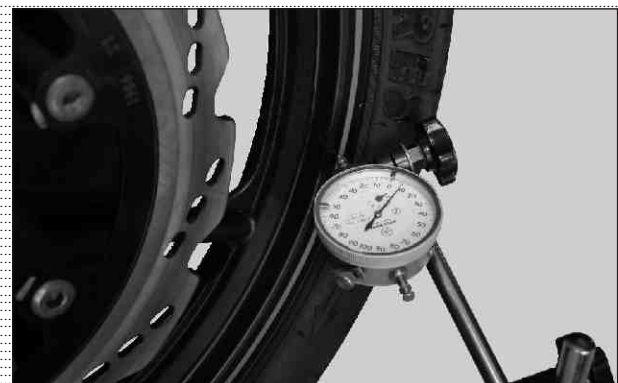


Fig. 6.6



## Tyre front

- Using vehicle with excessively worn tyres will decrease riding stability and consequently invite a dangerous situation due to loss of control. It is highly recommended to replace the tyre with a new one when the groove depth of tyre from tread surface reaches the service limit. (Fig. 6.7)

Tyre depth gauge

|               |        |
|---------------|--------|
| Service limit | 1.5 mm |
|---------------|--------|

### Note:

Tyre depth can also be checked by tyre wear indicator (TWI). (Fig. 6.8)

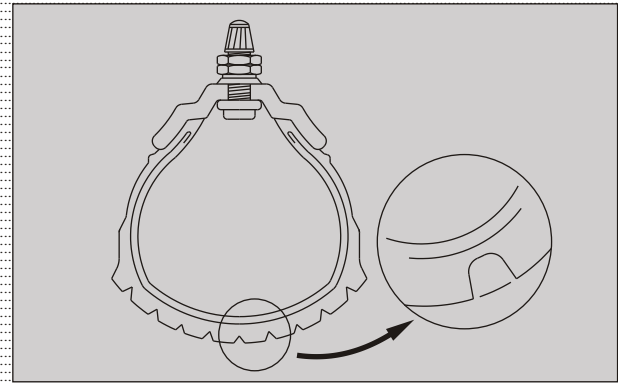


Fig. 6.7



Fig. 6.8

## Tyre inflation pressure

- Inflation pressure affects tyre life to a greater extent. So it is necessary to maintain proper inflation pressure. (Fig. 6.9)

Tyre pressure gauge

### Pressure:

|             | Front<br>Kg/cm2 (psi) | Rear<br>Kg/cm2 (psi) |
|-------------|-----------------------|----------------------|
| Solo riding | 1.75 (25)             | 1.75 (25)            |
| Dual riding | 2.00 (28)             | 2.25 (32)            |

### Note:

Tyre pressure should be checked when the tyre is cold.



Fig. 6.9

## TUBELESS TYRE - 180

Refer page no 6-33 for puncture repairing procedure and replacement of valve tubeless tyre.





## REASSEMBLY

- Reassemble wheel assembly front in the reverse order of disassembly and removal. Please refer wheel assembly front exploded view (Fig. 6.10 & Fig. 6.11) for assembly details and carry out following steps:

## FRONT WHEEL ASSEMBLY (RTR 160) - EXPLODED VIEW

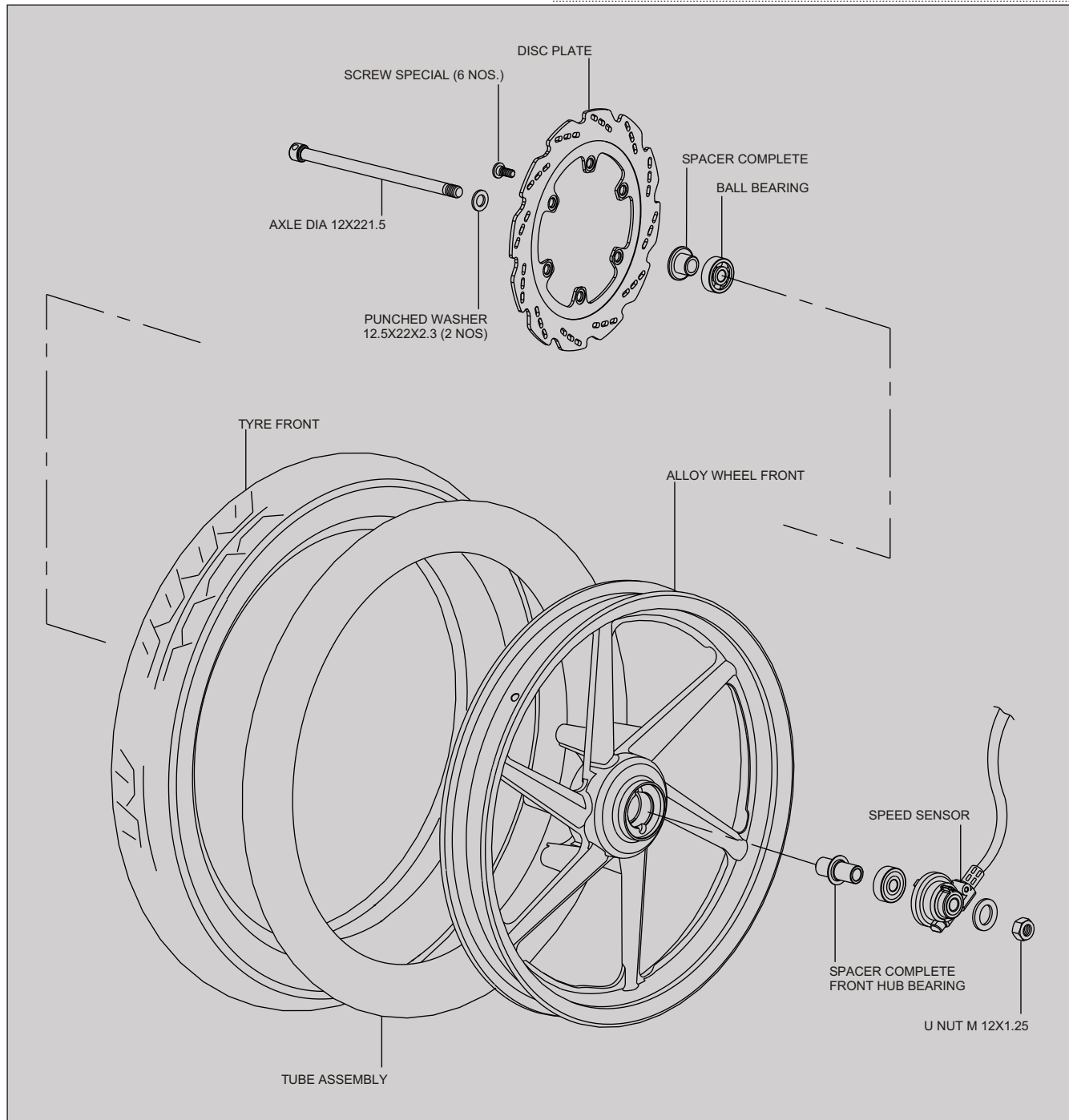


Fig. 6.10



## FRONT WHEEL ASSEMBLY (RTR 180) - EXPLODED VIEW

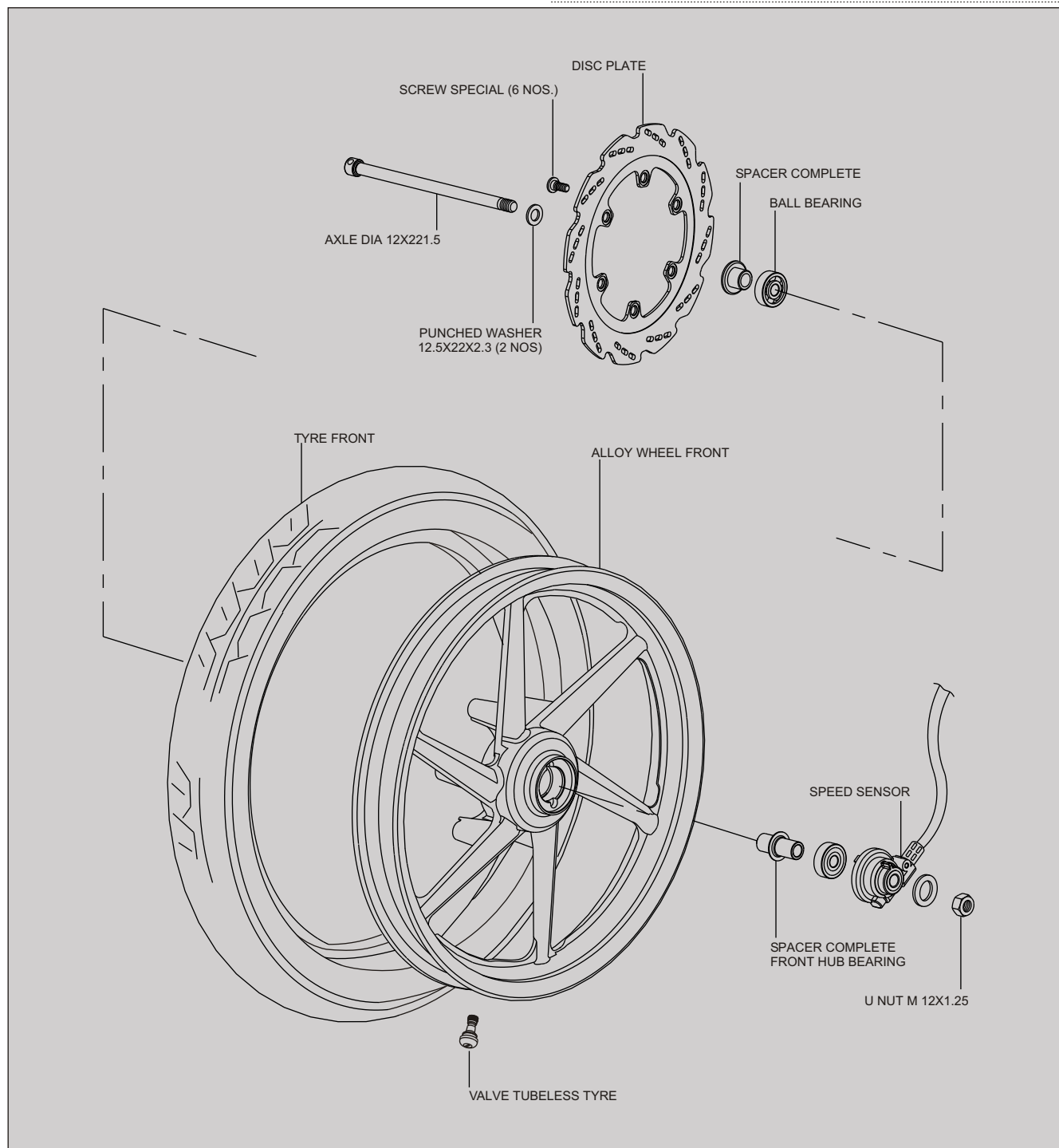


Fig. 6.11



- Before assembling front wheel assembly, lubricate the axle front and bearings.
- While assembling match the pip (A) in the speed sensor with the stopper (B) on the front fork tube outer L. (Fig. 6.12)
- Remove jack or block placed during the removal of wheel assembly.
- Before tightening 'U' nut of axle front, stroke the fork assembly front several times to check for proper fork action.
- Tighten the 'U' nut.

**Note:**

While remounting front wheel assembly locate the disc in between the brake pads after removing cushion.

## DISC BRAKE SYSTEM FRONT

- Refer chapter "periodic maintenance" for removal, inspection and replacement of the following:
  - Brake pads
  - Hose complete brake
- Also refer for brake fluid handling, replacement and air bleeding in the brake system.

## CALIPER ASSEMBLY - REMOVAL AND DISMANTLING

- Bleed out brake fluid from the brake circuit.
- Remove banjo bolt and take out gaskets. (Fig. 6.13)

12 mm spanner

- Remove caliper assembly mounting bolts and take out the caliper assembly. (Fig. 6.14)

12 mm spanner

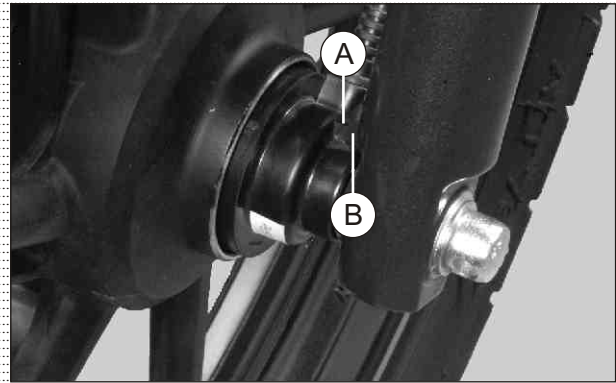


Fig. 6.12

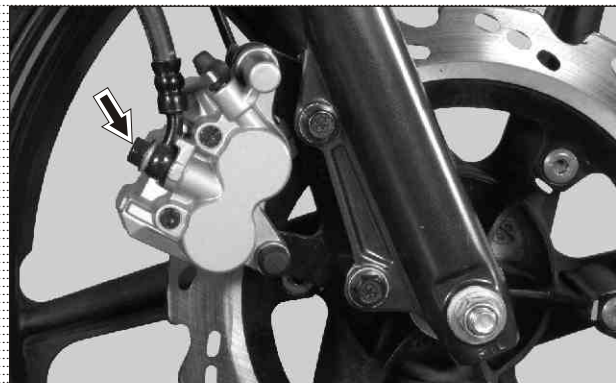


Fig. 6.13

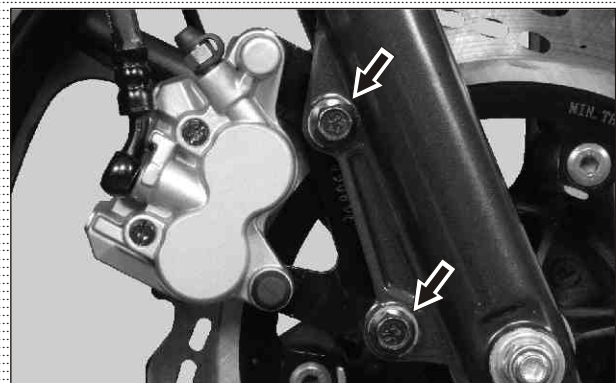


Fig. 6.14



- Remove plug pin (2 nos) from the body. (Fig. 6.15)

Flat head screw driver

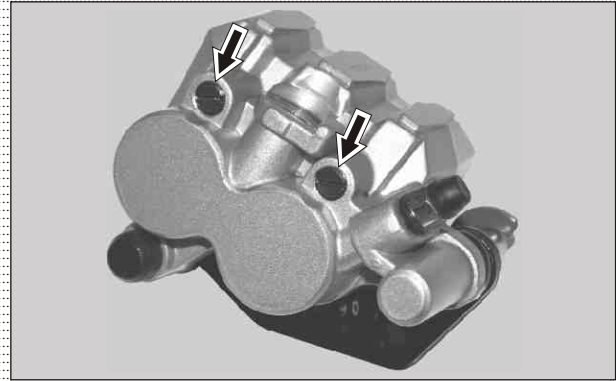


Fig. 6.15

- Remove pin hanger (2 nos). (Fig. 6.16)

5 mm allen key

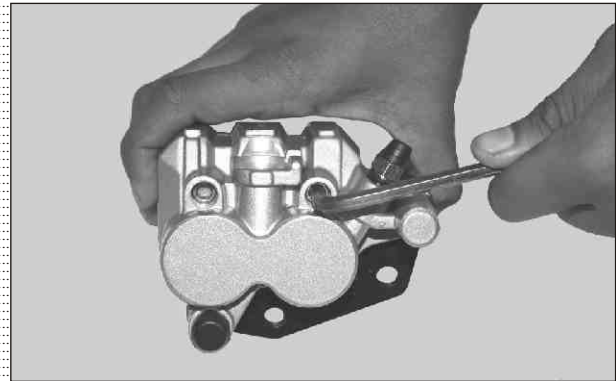


Fig. 6.16

- Pull out pad complete inner and pad complete outer by hand. (Fig. 6.17)



Fig. 6.17

- Remove spring pad from the caliper housing. (Fig. 6.18)

Nose plier

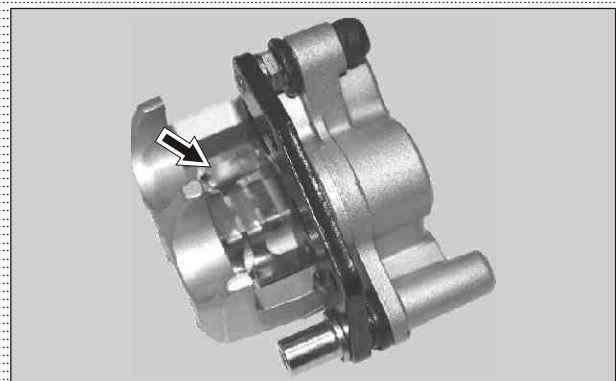


Fig. 6.18



- Remove bracket complete front by sliding out after dislocating the boot-B and bush boot pin from the pin grooves. (Fig. 6.19)



Fig. 6.19

- Carefully pull out boots from the caliper assembly housing. (Fig. 6.20)

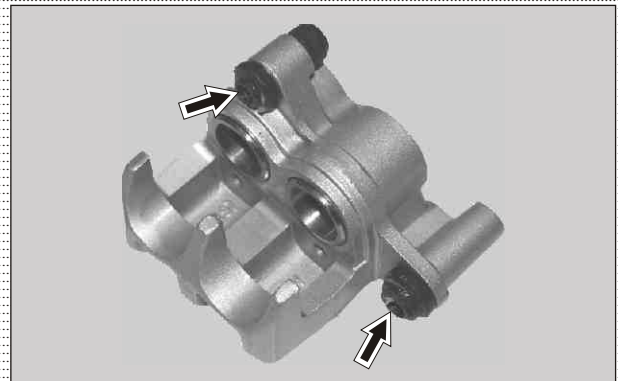


Fig. 6.20

- Insert a spacer in between the piston caliper and the caliper body (at pad position) and then apply compressed air through inlet port of the caliper to slide both the pistons out. (Fig. 6.21)

**Caution:**

Be careful while applying compressed air as it pushes the pistons forcefully. Do not use high pressure air which may damage to pistons.

**Note:**

Take out both the piston simultaneously.

Never use nose plier to pull out the piston as it may cause scratches.



Fig. 6.21

- Remove dust seals 1 and 2 from the caliper bore carefully. (Fig. 6.22)

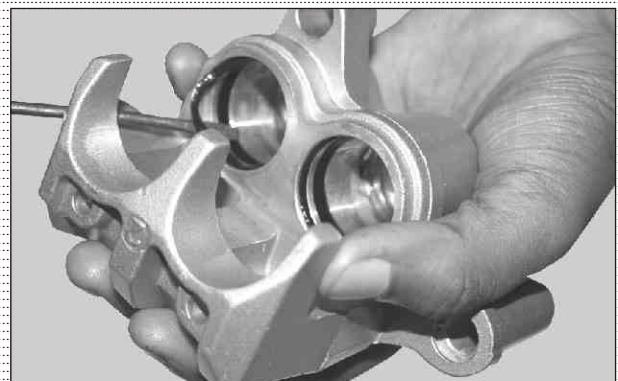


Fig. 6.22





- Unplug the cap bleeder and Remove bleeder screw. (Fig. 6.23)

10 mm spanner

- Clean parts thoroughly with the fresh brake fluid.

### Caution:

Never use kerosene, petrol or other solvents for cleaning the brake system. Otherwise rubber parts will be damaged. Do not wash the pads and also take care that brake fluid is not splashed on pads.

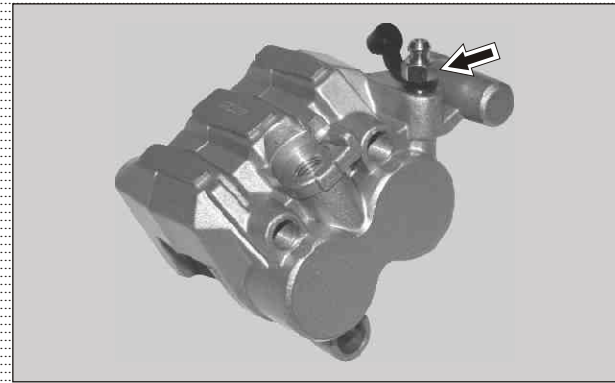


Fig. 6.23

## INSPECTION OF CALIPER ASSEMBLY

Inspect the following parts:

- Pin hangers for any bend.
- Bracket complete front for loose lugs.
- Piston and caliper bore for any scratches.
- Piston and dust seals for any damage.
- All rubber boots
- After completion of above inspection, replace defective parts.

## ASSEMBLING OF CALIPER ASSEMBLY

- Insert dust seal-1 (2 nos) and dust seal-2 (2 nos) in the caliper housing seal grooves and ensure perfect seating without any twist of the seals. (refer exploded view on page no. 6-14 for assembly details.)
- Slowly insert both the pistons smeared with new DOT3 or DOT4 brake fluid straight into the bore without damaging the piston and ensure that pistons slide inside.
- Assemble spring pad on the caliper housing.
- Assemble boot-B and bush boot pin on the caliper housing.
- Apply little grease on pin bolts of the bracket complete front. Assemble bracket complete front by ensuring both the boots are properly seated in the groove provided in pin bolts.
- Assemble pad inner and pad outer.



- Assemble pin hangers by locating it properly in the holes of pad inner and outer.
- Fix the plug pin.
- Fix the bleeder screw along with cap bleeder screw.
- Remount caliper assembly to the fork outer tube and remount brake hose along with the gaskets.
- Bleed the system thoroughly.

## DISC PLATE SERVICING

### Inspection (with disc mounted on wheels)

- Face out of the disc plate should not be more than the limit specified below. Measure disk plate face out on the largest periphery of the disc plate with a dial indicator as shown in the fig. 6.24. If the face out exceeds the limits, check whether the cause lies in the front wheel bearing or the disc plate itself. Replace defective parts.

|               |                   |
|---------------|-------------------|
| 0313060       | Magnetic stand    |
| 0313050       | Dial gauge (0.01) |
| Standard      | 0.05 mm           |
| Service limit | 0.10 mm           |

#### Note:

Wipe out disc plate surface with a dry soft cloth before inspection.

- Remove disc plate from the alloy wheel and measure thickness of the disc plate at the worn-out portion as shown in the fig. 6.25, if thickness is lesser than the service limits then replace the disc plate.

|               |        |
|---------------|--------|
| Micrometer    |        |
| Standard      | 4.0 mm |
| Service limit | 3.5 mm |

## DISC REPLACEMENT

- Replace brake disc plate if it is found defective. (refer page no. 6-1 for removal procedure)



Fig. 6.24



Fig. 6.25



## MASTER CYLINDER - REMOVAL AND DISMANTLING

- Bleed out brake system completely.
- Remove hose complete brake from the master cylinder and take out gaskets. (Fig. 6.26)

12 mm spanner

- Remove rear view mirror R.
- Disconnect terminals from the switch front stop lamp switch. (Fig. 6.27)

- Remove master cylinder fluid reservoir cap by unscrewing screws (2 nos). (Fig. 6.28)
- Take out plate diaphragm.
- Take out diaphragm from the reservoir assembly.

- Remove lever R by removing the hand lever bolt and flange nut. (Fig. 6.29)

10 mm spanner



Fig. 6.26



Fig. 6.27



Fig. 6.28

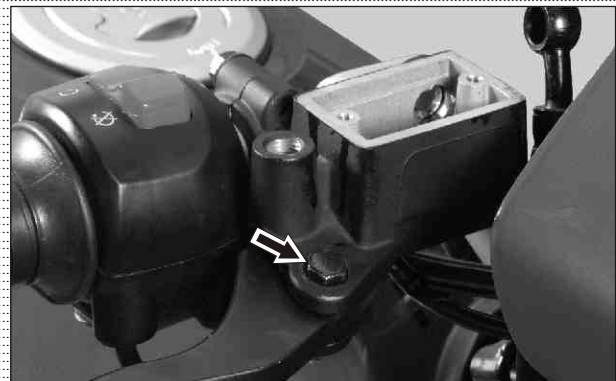


Fig. 6.29



- Remove holder by unscrewing holder mounting bolts (2 nos) and take out the master cylinder. (Fig. 6.30)

10 mm spanner

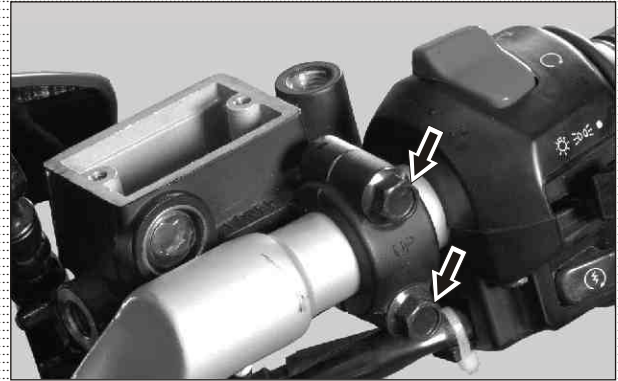


Fig. 6.30

- Remove switch assembly from the master cylinder by removing the screw. (Fig. 6.31)

Phillips screw driver

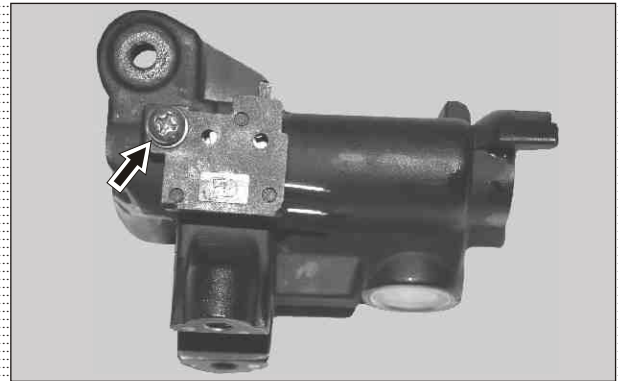


Fig. 6.31

- Remove boot from the cylinder by using a blunt tool. (Fig. 6.32)

**Note:**  
While removing boots assembly care must be taken not to damage it.



Fig. 6.32

- By holding master cylinder by hand slightly press the piston with thumb finger and remove the circlip from the master cylinder by using circlip plier without damaging the piston and cylinder. (Fig. 6.33)

Circlip plier



Fig. 6.33



- Slowly pull out piston along with the P - cup, S - cup and spring. (Fig. 6.34)
- Clean the system thoroughly using fresh brake fluid.

## Caution:

Never use kerosene, petrol or other solvents for cleaning the brake system. Otherwise rubber parts will be damaged.

## INSPECTION

Inspect following parts:

- Master cylinder for any scratches or other damage.
- Piston and cup surface for scratches or other Damage.
- Piston boot and other components for wear and damage.
- Master cylinder recuperation and feed port for any blockage, if so clear blockage using compressed air.
- After completing above inspection, replace defective parts.

## REASSEMBLY

- Reassemble master cylinder in the reverse order of dismantling. Refer fig. 6.36 for assembly details.

## Caution:

Apply brake fluid to the cylinder bore and all internal parts before inserting piston assembly into the bore.

- Remount master cylinder to the handle bar and fix the holder in 'UP' direction. (Fig. 6.35)

10 mm spanner

## Note:

Always tighten the top bolt first and then the bottom one.



Fig. 6.34



Fig. 6.35



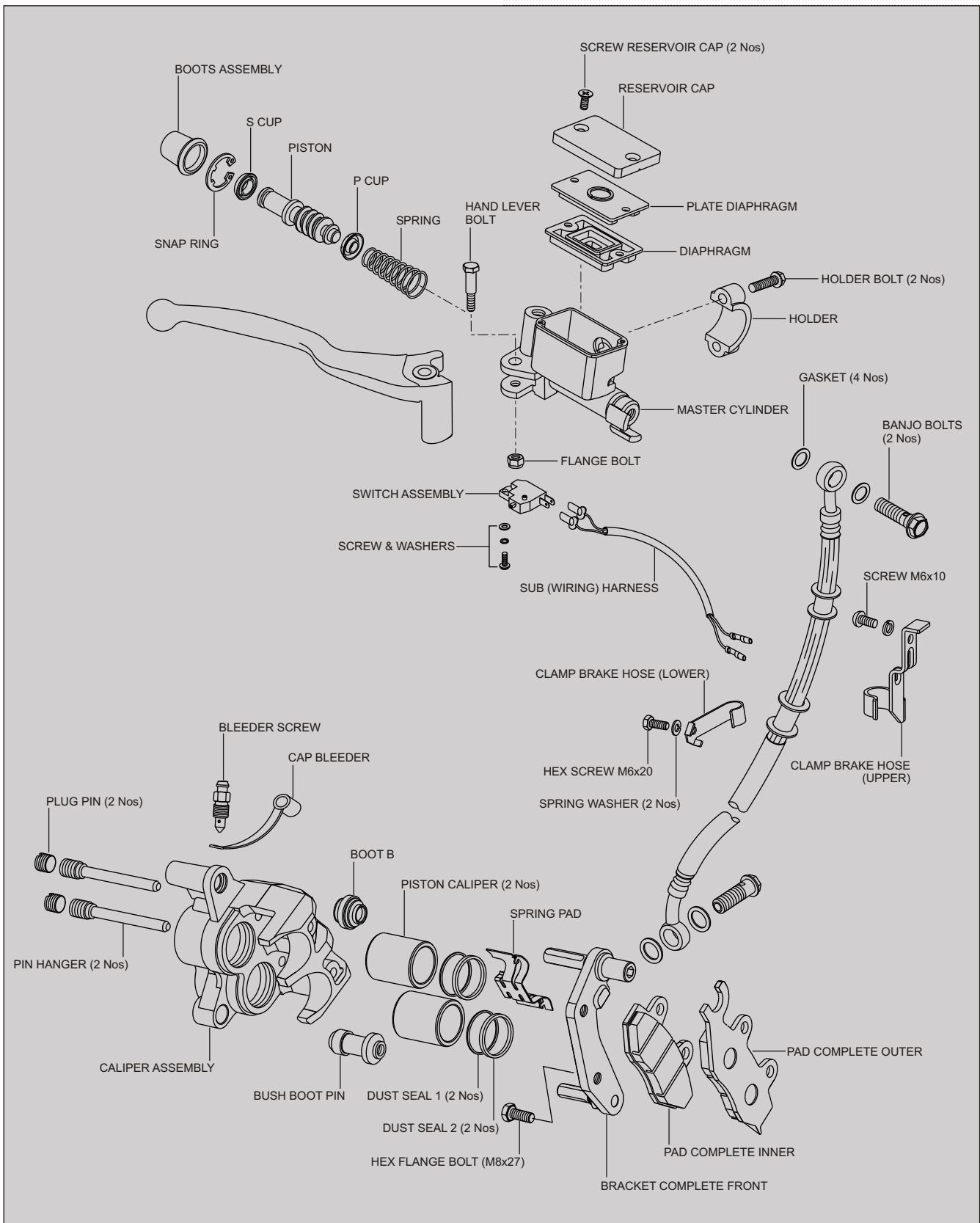


Fig. 6.36



## Note:

Mount master cylinder to the handle bar such that reservoir becomes horizontal when the bike is placed on centre stand and steering is kept straight.

- Fix hose complete brake to the master cylinder outlet port along with the banjo bolt and gaskets.
- Fill the reservoir with fresh DOT3 or DOT4 brake fluid above the level 'LOWER' marked on the reservoir. (Fig. 6.37)
- Bleed the system thoroughly.
- Fix the reservoir cap along with diaphragm and tighten screws.
- Connect terminals of the brake light switch.

Replace following parts at every 2 years or 40,000 km:

- Piston along with P-cup, S - cup, Spring and boot assembly.
- Reservoir cap and diaphragm.
- Caliper dust seal-1 and dust seal-2.



Fig. 6.37

## FORK ASSEMBLY FRONT

### OIL REPLACEMENT

- Dismantle wheel assembly front (refer chapter "periodic maintenance" page no 2-30 for dismantling procedure).
- Remove caliper assembly along with hose complete brake. Keep some cushion in between the brake pads, to avoid binding.
- Remove hexagonal screws (M8x20 - 4 nos) along with wave spring washer (4 nos) from the fender front mounting. (Fig. 6.38)

13 mm spanner.

- Take out brace front fender.

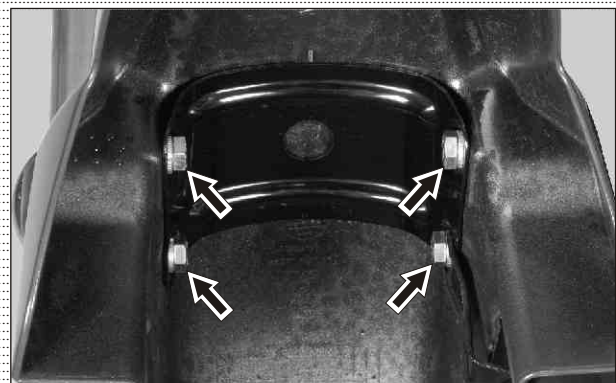


Fig. 6.38



- Remove cap front fork (A) (2 nos) from the handle bar assembly. (Fig. 6.39)
- Loosen allen screws (B) (M6x30 -2nos) and take out cover assembly upper bracket. (Fig. 6.39)

5 mm allen key

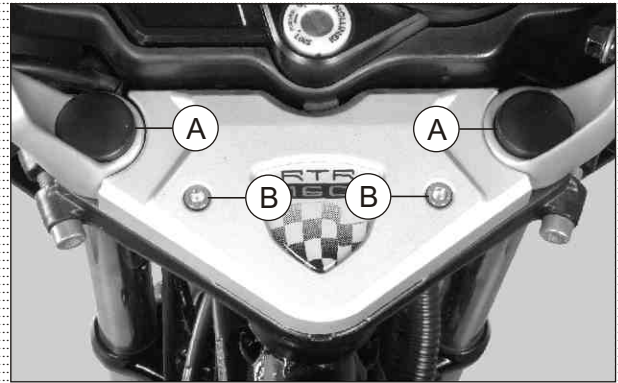


Fig. 6.39

- Loosen nut front fork (A) by 2-3 threads before removal of leg assembly L & R. (Fig. 6.40)

12 mm allen key

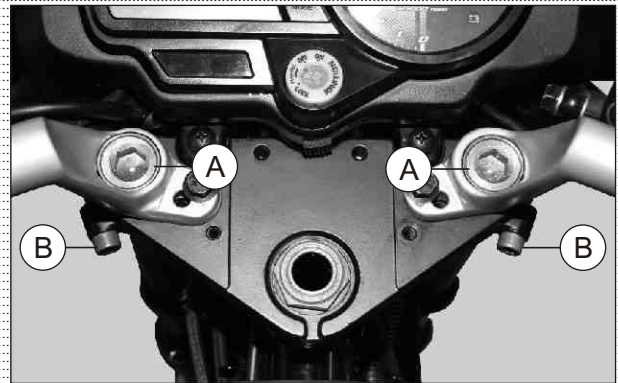


Fig. 6.40

- Loosen hexagonal socket head screws (B) (M8x40 - 2 nos) from the lower bracket complete (fork upper mounting). (Fig. 6.40)

8 mm allen key

- Loosen hexagonal screws (M8x40 - 2 nos) from the lower bracket complete (fork lower mounting). (Fig. 6.41)

13 mm spanner



Fig. 6.41

## Caution:

Hold fork leg assembly while loosening the hexagonal bolt to avoid sudden fall of leg assembly.

- Pull out leg assembly R. (Fig. 6.42).
- Similarly pull out leg assembly L.
- Identify the make of leg assembly (refer page no. 6-18 for identification details)

## Note:

Take extra care not to cause any dent, damage and scratches to inner tubes during dismantle and reassembly.

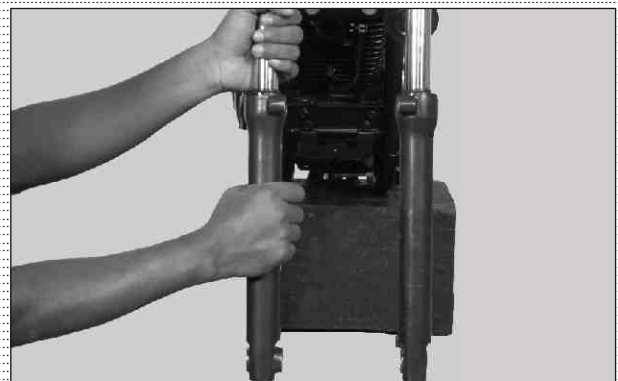


Fig. 6.42



- Remove nut front fork along with 'O' ring. (Fig. 6.43)

14 mm allen key

**Note:**

While reassembling replace the 'O' ring with a new one.

- Take out spacer front fork, washer spring seat and spring front fork. (Fig. 6.44)

**Note:**

Allow oil to drain completely from the spring front fork by holding halfway lifted for minimum one minute.

- Turn leg assembly front fork upside down, holding outer tube by hand, pump inner tube 'in' and 'out' to drain the oil completely. (Fig. 6.45)

**Note:**

Hold leg assembly front fork inverted for few minutes to drain the oil completely.

- Clean leg assembly front fork with kerosene.

- Fill measured amount of fork oil as per the specification. (Fig. 6.46)

**Note:**

Make sure that measuring jar is clear from any dust, burr, dirt and foreign particles. Also ensure that workplace is neat and clean.

|                         |                      |
|-------------------------|----------------------|
| Oil quantity (GIL make) | 140 ± 2.0 ml per leg |
|-------------------------|----------------------|

|                         |                      |
|-------------------------|----------------------|
| Oil quantity (TOP make) | 152 ± 2.5 ml per leg |
|-------------------------|----------------------|

|                   |                 |
|-------------------|-----------------|
| Oil specification | Teleshockab oil |
|-------------------|-----------------|



Fig. 6.43

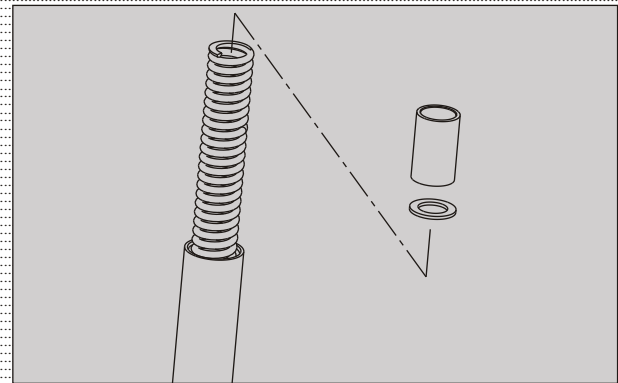


Fig. 6.44



Fig. 6.45



Fig. 6.46



**Note:**

Fill only fresh fork oil in case drained oil is contaminated. After filling oil, slowly pump leg assembly front fork 'up' and 'down' to remove air lock / gaps.

- Both apache RTR SD & DD comes with 'GIL' or 'TOP' make of front fork assy. Make can be identified by the mark 'GIL' or 'TOP' which are provided on the lower end of their respective outer tube L & R. (Fig. 6.47)

**Note:**

Always fill the oil quantity as specified with respect to the make of leg assembly. Do not interchange the oil quantity between GIL and TOP make.

In a front fork, assembling different leg assembly such as Leg assembly L with GIL make and leg assembly R with TOP make or vice versa is not recommended. Refer service information bulletin for interchangeability of parts & leg assembly between GIL & TOP make.

- Check spring front fork length. (refer page no. 6-19 for checking procedure)
- Install spring front fork with its smaller pitch end facing upward. (Fig. 6.48)
- Assemble washer spring seat and spacer front fork.
- Before installing nut front fork, lightly apply grease to the 'O' ring.
- Remount leg assembly front fork L & R.
- Tighten top mounting screws (2 nos) (fork upper mounting) to the specified torque. (Refer Chapter "Service information page no. 7-9 for torque sheet)
- Tighten hexagonal bolts (2 nos) (fork lower mounting) to the specified torque.
- Reassemble front fender and front wheel assembly in the reverse order of removal.

**Note:**

While reassembling leg assembly care must be taken not to cause any dent, damage and scratches to inner tubes.

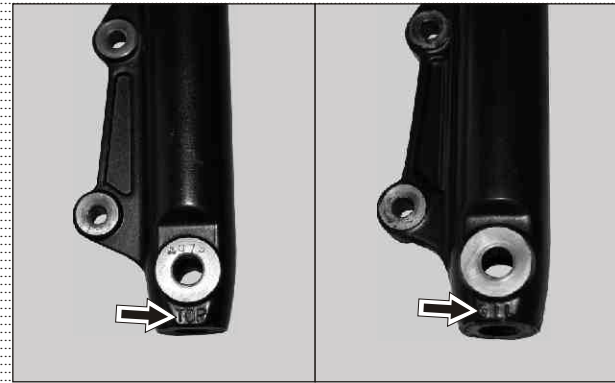


Fig. 6.47

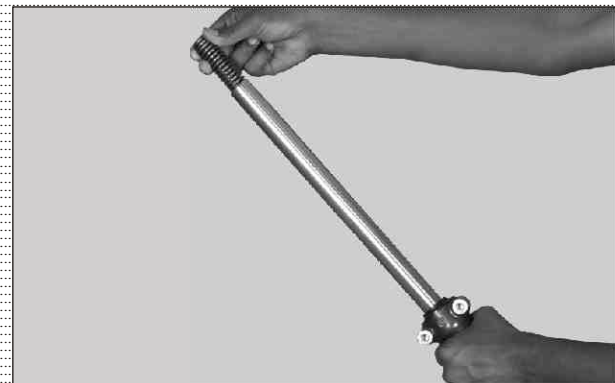


Fig. 6.48





## LEG ASSEMBLY FRONT FORK - DISMANTLING

- Remove both the leg assembly front fork L and R. (refer page no. 6-16)
- Remove top mounting nuts, spacer front fork, washer spring seat and spring front fork.
- Drain the oil completely. (refer page no. 6-17 for oil draining procedure)
- Holding the piston by using a special tool, remove hexagonal allen screw using allen key. (Fig. 6.49)

M1310160

Holder front fork cylinder

6 mm allen key

- Pull out inner tube assembly along with the piston from the fork outer tube.

- Remove piece oil lock from the bottom of the piston front fork. If it does not come out with piston, remove it from the fork outer tube. (Fig. 6.50)

### Note:

Take extra care not to cause any dent, damage and scratches to outer tube inner wall & piece oil lock.

- Remove piston front fork and spring front fork from the inner tube assembly. (Fig. 6.51)

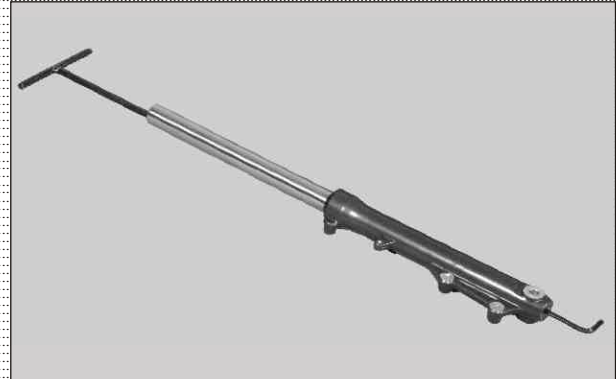


Fig. 6.49

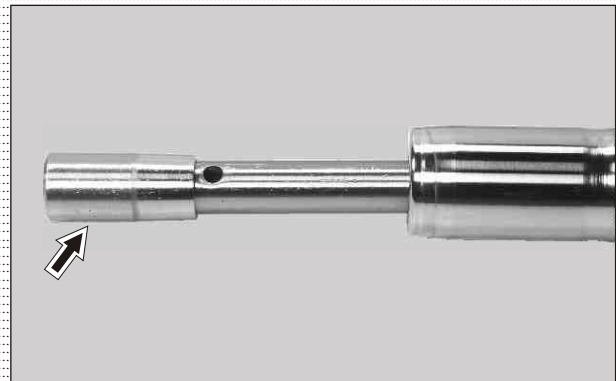


Fig. 6.50



Fig. 6.51



- Remove dust seal from the fork outer tube. (Fig. 6.52A)
- Remove snap ring from the fork outer tube. (Fig. 6.52B)

Flat screw driver

## Note:

Take extra care not to cause any dent, damage and scratches to outer tube inner wall.

- Slightly heat the fork outer tube by placing it on the hot plate. Remove seal oil using the special tool. (Fig. 6.53)

Hot plate

0312401

Universal oil seal remover

## Note:

Take extra care not to cause any dent, damage and scratches to outer tube inner wall.

## Caution:

Replace seal oil with a new one at the time of reassembly.

## INSPECTION

- Before inspection clean all the components with a cleaning solvent.
- Inspect piston front fork and piston ring for wear and any damage. (Fig. 6.54) Replace with new one if any damage is noticed.
- Inspect outer surface of the inner tube assembly and sliding surface of fork outer tube for any scuffing or flaws. Replace inner tube/outer tube if any surface defects and flaws are found.

## Spring front fork

- Measure free length (A) of the spring front fork. If the length is shorter than service limit or deformation of spring, replace it with a new one. (Fig. 6.55)

Service limit (GIL make)

435.0 mm

Service limit (TOP make)

393.5 mm



Fig. 6.52A



Fig. 6.52B



Fig. 6.53



Fig. 6.54

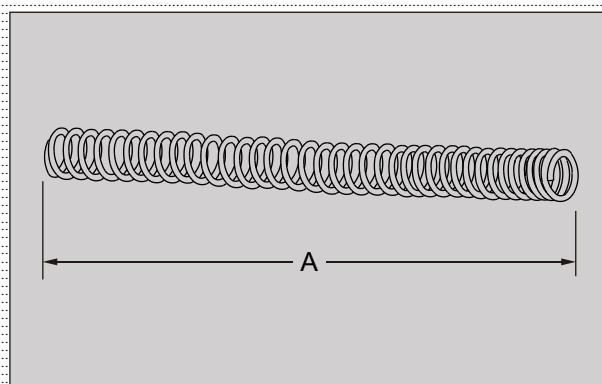


Fig. 6.55



## REASSEMBLY

Reassemble and remount the leg assemblies front fork in the reverse order of disassembly while carrying out the following steps:

- Refer leg assembly front fork exploded view (Fig. 6.56) for assembly details.
- Clean all the components completely and ensure that components are free from any dirt, bust and foreign particles.
- Insert piston front fork along with spring front fork slowly so that it slides down into the inner tube assembly and protrudes from the bottom. Assemble piece oil lock.
- Lubricate inner surface of the fork outer tube and outer surface of the inner tube assembly by fork oil before assembling the seal oil.
- Apply thread lock to the hexagonal allen screw of the piston front fork before assembly.

### Caution:

**Replace allen screw packing with a new one during reassembly**

- Install new seal oil using a special tool. (Fig. 6.57)

1313501

Front fork oil seal installer

### Note:

**Before installing seal oil apply little grease on the lip of seal oil.**

- Reassemble snap ring.

### Note:

**Take extra care not to cause any dent, damage and scratches to inner tube.**

- Reassemble dust seal using a special tool. (Fig. 6.58)
- Fill fork oil as per specification. (refer page no. 6-16)
- Assemble washer spring seat & spacer front fork.
- Remount front fork assembly.

### Note:

**After filling oil, slowly pump the leg assembly front fork up and down to remove air lock / gaps.**

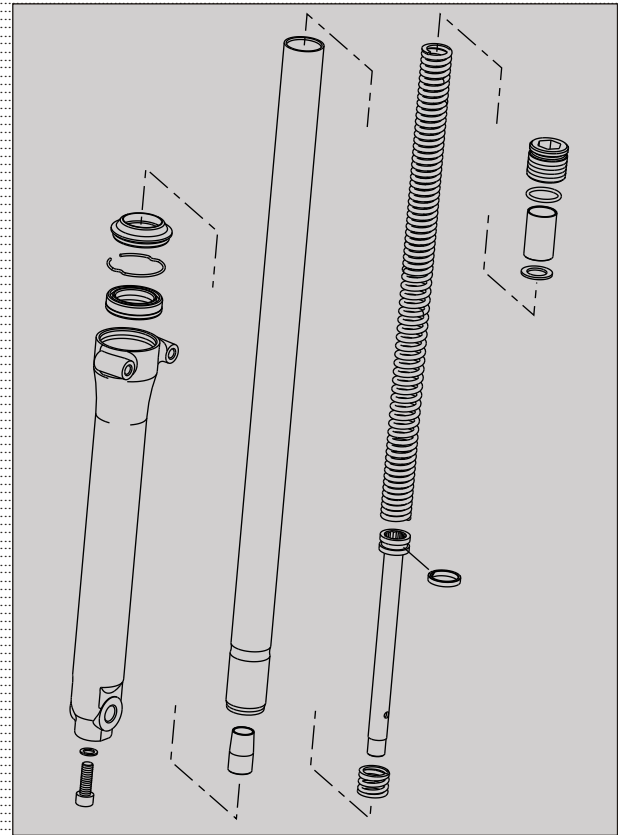


Fig. 6.56

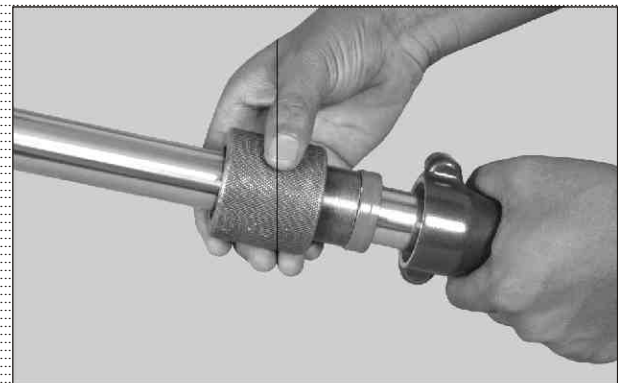


Fig. 6.57



Fig. 6.58



**Note:**

Install spring with its smaller pitch facing upward. Before installing the nut front fork, apply grease to the 'O' ring.

## LOWER BRACKET COMPLETE (STEERING STEM) - DISMANTLING

- Remove housing head lamp front. (refer chapter "electrical system" page no. 5-16 for removal procedure)
- Disconnect control cables (which are routed through the bracket complete head lamp housing) and dislocate from the bracket.
- Disconnect socket speed sensor.
- Disconnect all the wiring sockets.
- Remove both the leg assembly front fork. (refer page no. 6-14)
- Remove bracket complete head lamp housing along with turn signal lamps L & R, housing head lamp rear L & R and speedometer assembly as sub assembly by removing mounting screws (M6x20 - 2 nos). (Fig. 6.59)

10 mm spanner

**Note:**

While reassembling bracket complete head lamp housing ensure that plug (2 nos) are located at the bottom legs of the bracket.

- Remove lock nut steering and special washer. (Fig. 6.60)

32 mm spanner

- Gently lift the handle bar assembly. Support and hang the handle bar assembly at the side of the fuel tank complete.

**Note:**

Ensure that the cables are not too much stretched or bent.

- Gently draw out lower bracket complete by loosening and removing the arrester steering stem using a special tool, while holding the lower bracket complete. (Fig. 6.61)

0313801

Universal clamp wrench

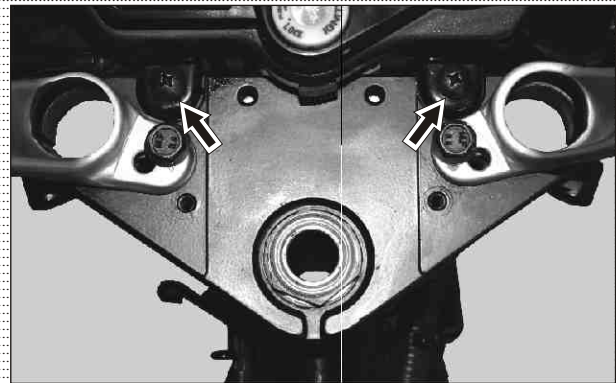


Fig. 6.59

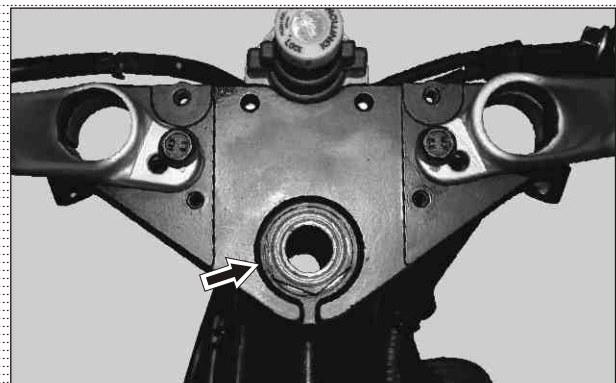


Fig. 6.60



Fig. 6.61



**Note:**  
Steering balls tend to fall, hence they should be collected carefully.

- Remove dust seal steering upper. (Fig. 6.62A)
- Remove race steering outer. (Fig. 6.62B)
- Remove upper and lower steering balls.

| Position | Qty    | Size     |
|----------|--------|----------|
| Upper    | 22 nos | 4.762 mm |
| Lower    | 19 nos | 6.350 mm |

- Draw out race steering inner fitted on the top end of the steering pivot pipe (frame) using special tool. (Fig. 6.63)

3310280 Mandrel steering cups

- Draw out cup bottom fitted on the bottom end using special tool.

Chisel / metal hammer

## INSPECTION

Before inspection wash all the components with a solvent.

- Inspect removed parts for the following abnormalities and replace defective parts with the new.
  - Handle bar distortion.
  - Handle holder complete for wear.
  - Races for wear and pitting. (Fig. 6.65)
  - Worn or damaged steel ball. (Fig. 6.65)
  - Distortion of lower bracket complete. (Fig. 6.65)



Fig. 6.62A

Fig. 6.62B



Fig. 6.63



Fig. 6.64

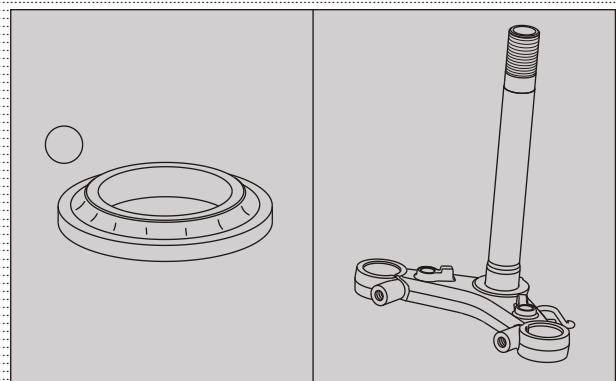


Fig. 6.65





## REASSEMBLY

- Reassemble lower bracket complete, leg assembly front fork L & R, handle bar assembly and wheel assembly front in the reverse order of disassembly while carrying out the following steps:
- Refer lower bracket complete exploded view (Fig. 6.66) for assembly details.

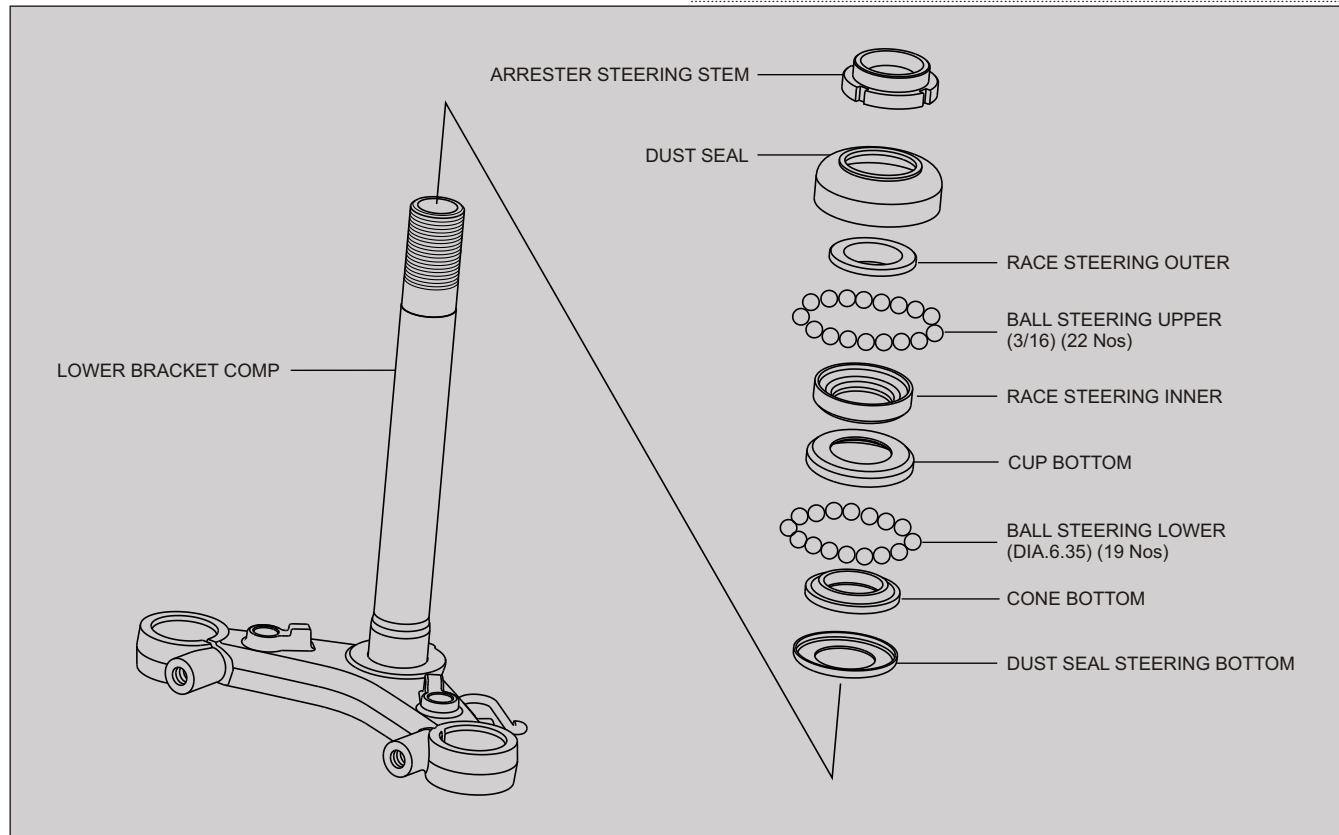


Fig. 6.66

### Race steering inner and cup bottom

- Assemble cup bottom and race steering inner by using a special tool. (Fig. 6.67)

231030000

Assemble tool steering cups

#### Note:

Always replace cup, cone and races as a set.

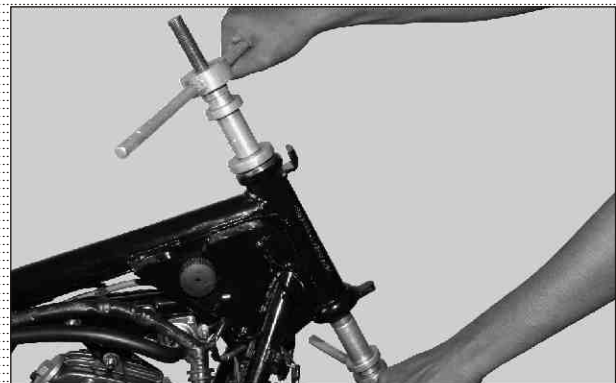


Fig. 6.67



## Steering ball

- Apply grease to the upper inner race (Fig. 6.68A) and lower cup bottom when installing the steel balls. (Fig. 6.68B)

Bechem grease

- Install specified quantity of steering balls at upper inner race and lower cup bottom. (refer page no. 6-21 for the specified quantity)

### Note:

While assembling steering balls ensure that no dust, dirt and foreign particles exist.

### Caution:

Do not interchange the lower and upper steering balls.

## Cone bottom

- Install cone bottom to the lower bracket complete (steering stem) by using the special tool and apply grease. (Fig. 6.69)
- Reassemble lower bracket complete along with race steering outer in the reverse order of disassembly.
- Turn the lower bracket complete right and left, five or six times for proper seating of steering balls. (Fig. 6.70)
- Turn back the arrester steering stem by  $\frac{1}{4}$  to  $\frac{1}{2}$  turns using the special tool.

0313801

Universal clamp wrench

### Note:

This adjustment may vary from bike to bike.

- Tighten locknut steering to the specified torque.

### Warning:

Steering should be adjusted correctly for smooth movement of handle bar and for safe riding. Stiff steering prevents smooth movement of handle bar resulting in poor directional stability and too loose steering causes vibration and damage to the steering races.

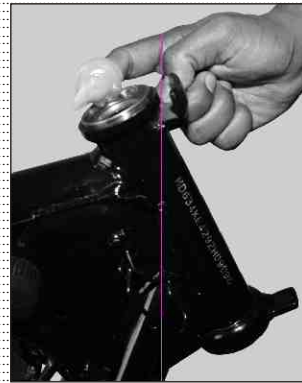


Fig. 6.68A



Fig. 6.68B

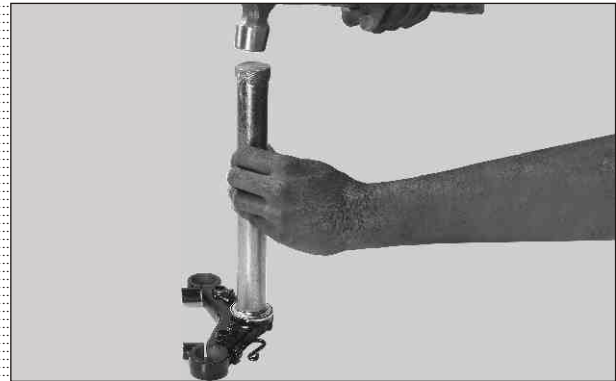


Fig. 6.69

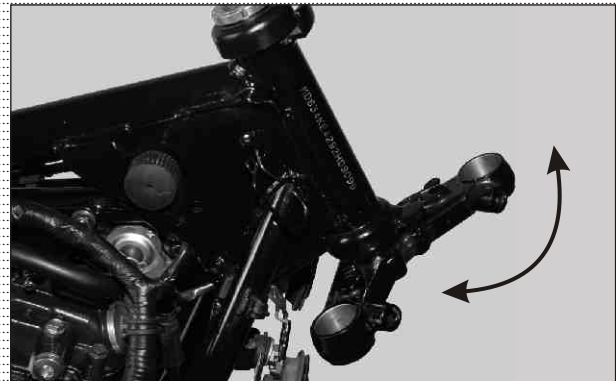


Fig. 6.70



## WHEEL ASSEMBLY REAR (DISC BRAKE) - REMOVAL

- Remove wheel assembly rear along with disc plate, spacer complete R and absorber shock rear wheel hub. (refer chapter "periodic maintenance" Page no. 2-30 for removal procedure)

### Note:

After taking out rear wheel assembly keep some cushion in between the brake pads, to avoid binding.

## DISC REPLACEMENT

- Remove screw special (M8 - 3 nos) from the disc plate mounting and take out disc plate from the alloy wheel rear. (Fig. 6.71)

6 mm allen key

## REMOVAL OF BEARINGS

### Warning:

It is recommended to remove the bearings only in case of replacement.

### Note:

Before heating wheel assembly rear it is recommended to remove the absorber rear wheel hub shock. (Fig. 6.72)

- Place wheel assembly rear (brake drum) on a hot plate and heat to approximately 125°C. (Fig. 6.73)

Hot plate

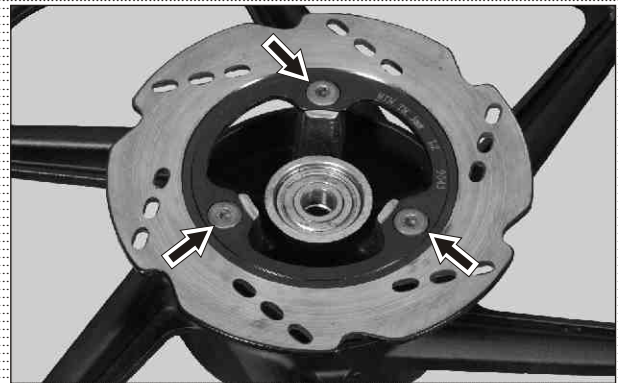


Fig. 6.71

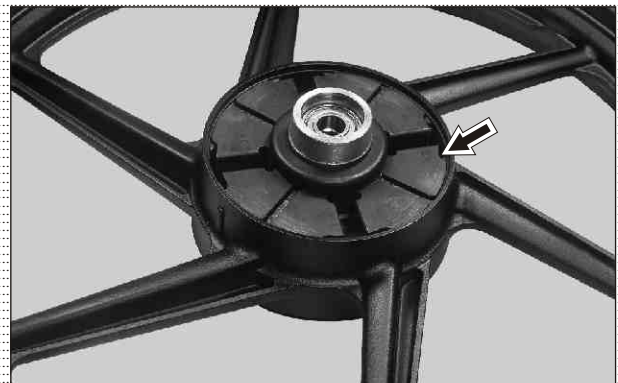


Fig. 6.72



Fig. 6.73



- Draw out bearings from the wheel assembly rear. (Fig. 6.74)

Drift

Nylon hammer

## SPROCKET DRUM ASSEMBLY - REMOVAL

- Dismantle wheel assembly rear as explained in the chapter "periodic maintenance" page no. 2-30.
- Remove hexagonal screw (A) (M6x20 - 1 no) from arm gear shifter and remove the hexagonal allen screw (B) from gear shifter lever mounting. (Fig. 6.75)

10 mm spanner

5 mm allen key

- Pull out gear shifter linkage assy.
- Remove CRR pan head screws (M6x20 - 2 nos) and take out cover engine sprocket. (Fig. 6.76)

Philips head screw driver

- Remove hexagonal screw (M6x12 - 2 nos) from the chain cover mounting. (Fig. 6.77)

10 mm spanner

- Remove chain cover complete.

### Note:

While assembling chain cover, care must be taken on proper seating of chain cover to avoid chain assembly rubbing with chain cover.



Fig. 6.74

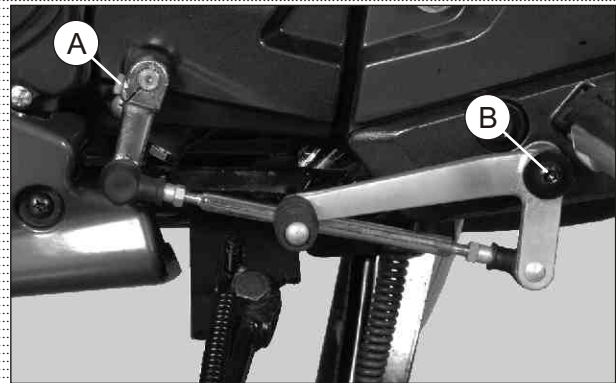


Fig. 6.75

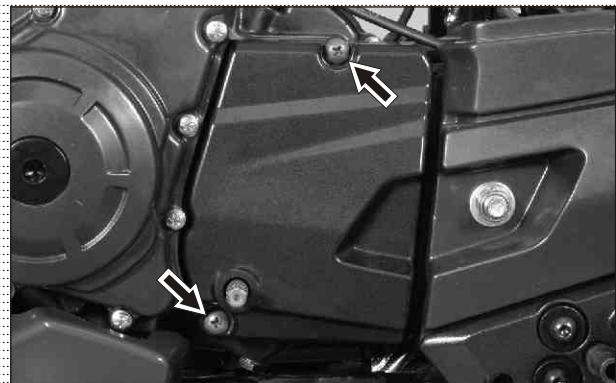


Fig. 6.76



Fig. 6.77





- Disconnect link set chain and remove chain assembly drive. (Fig. 6.78)

Nose plier

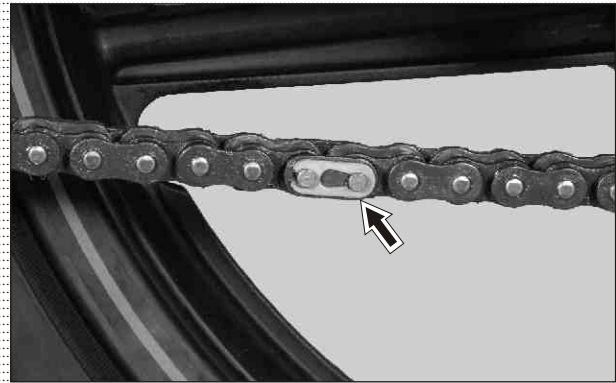


Fig. 6.78

- Remove hexagonal nut (M20x1.5) along with a washer from the sprocket drum assembly mounting. (Fig. 6.79)

27 mm spanner



Fig. 6.79

- Take out spacer rear axle L from the sprocket drum assembly. (Fig. 6.80)



Fig. 6.80

- Flatten the washer rear sprocket. (Fig. 6.81)

Chisel / metal hammer

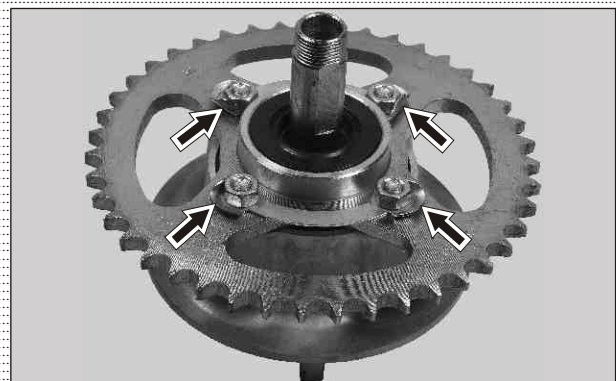


Fig. 6.81





- Remove hexagonal nut (M8 - 4nos). (Fig. 6.82)
- Take out sprocket rear.

13 mm spanner

**Note:**  
Ensure locking of both the washer sprocket while reassembling.

- Heat the drum rear sprocket on a hot plate to approximately 125° C. (Fig. 6.83)

Hot plate

- Draw out ball bearing, from drum rear sprocket along with the shaft rear sprocket. (Fig. 6.84)

Drift

Nylon hammer

## INSPECTION

**Before inspection, clean all necessary components with suitable cleaning solvent and lubricate them.**

- Inspect wheel bearings, axle complete rear and alloy wheel rear. (Refer page 6-2 for checking procedure)

## Chain assembly

- Clean chain assembly by dipping it in kerosene and brush off as much dirt as possible. Take out the chain assembly from the kerosene and dry it.

**Note:**  
After drying lubricate the chain assembly. (Refer chapter "periodic maintenance" page no 2-35 for chain lubrication, chain wear checking and adjustment details.

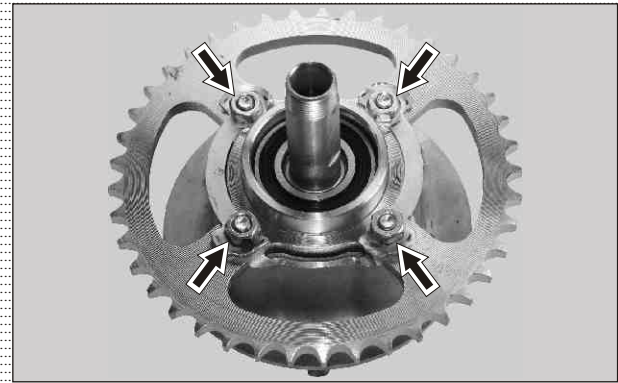


Fig. 6.82



Fig. 6.83

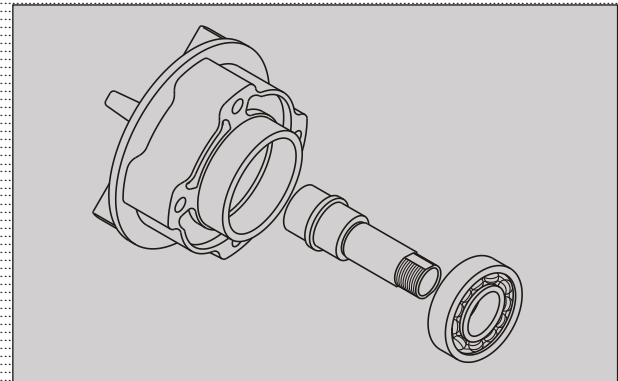


Fig. 6.84



## Sprocket rear

- Inspect sprocket rear teeth for wear. If they are worn-out as illustrated (Fig. 6.85), replace the sprocket with a new one.

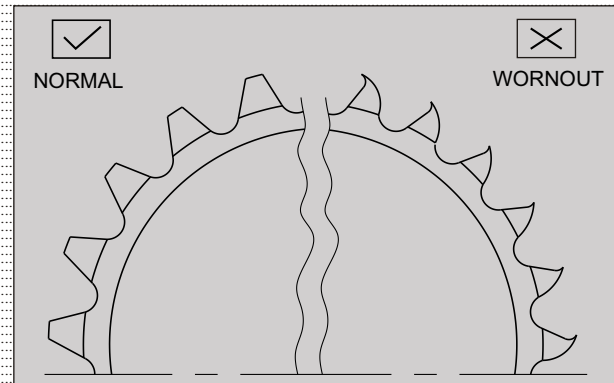


Fig. 6.85

## Absorber rear wheel hub shock

- Inspect absorber rear wheel hub shock for wear, deformation or damage and replace with new if required. (Fig. 6.86)

## Tyre rear

- For proper braking and riding stability, the tyre should have sufficient tread depth. If the tread depth reaches the wear limit, replace the tyre with a new one. (refer page 6-3 for checking procedure)

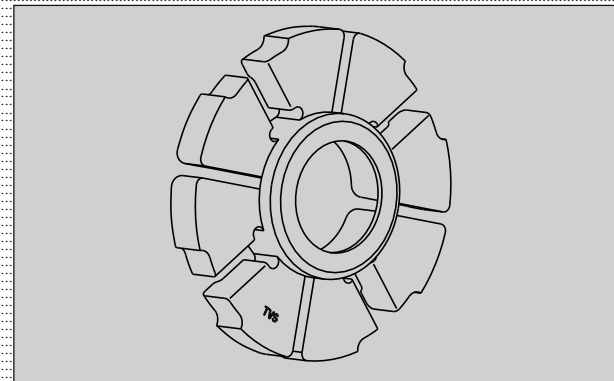


Fig. 6.86

## Tyre inflation pressure

- Tyre inflation pressure affects tyre life to a great extent. So it is necessary to maintain proper inflation pressure. (Refer page 6-3 for checking procedure)

## REASSEMBLY

- Reassemble and remount wheel assembly rear in the reverse order of disassembly. Also carry out the following steps. Refer wheel assembly (disc brake) exploded view (Fig. 6.87 & 6.88 ) for assembly details.

### Note:

While reassembling the disc plate apply specified thread lock to the disc plate mounting bolts.

After remounting the wheel assembly rear, readjust the chain assembly slackness to 20 - 30 mm. (Refer chapter "periodic maintenance" page no. 2-34).

- Before assembling rear wheel assembly, lubricate the axle rear and bearings.



## REAR WHEEL ASSEMBLY (DISC BRAKE) - EXPLODED VIEW

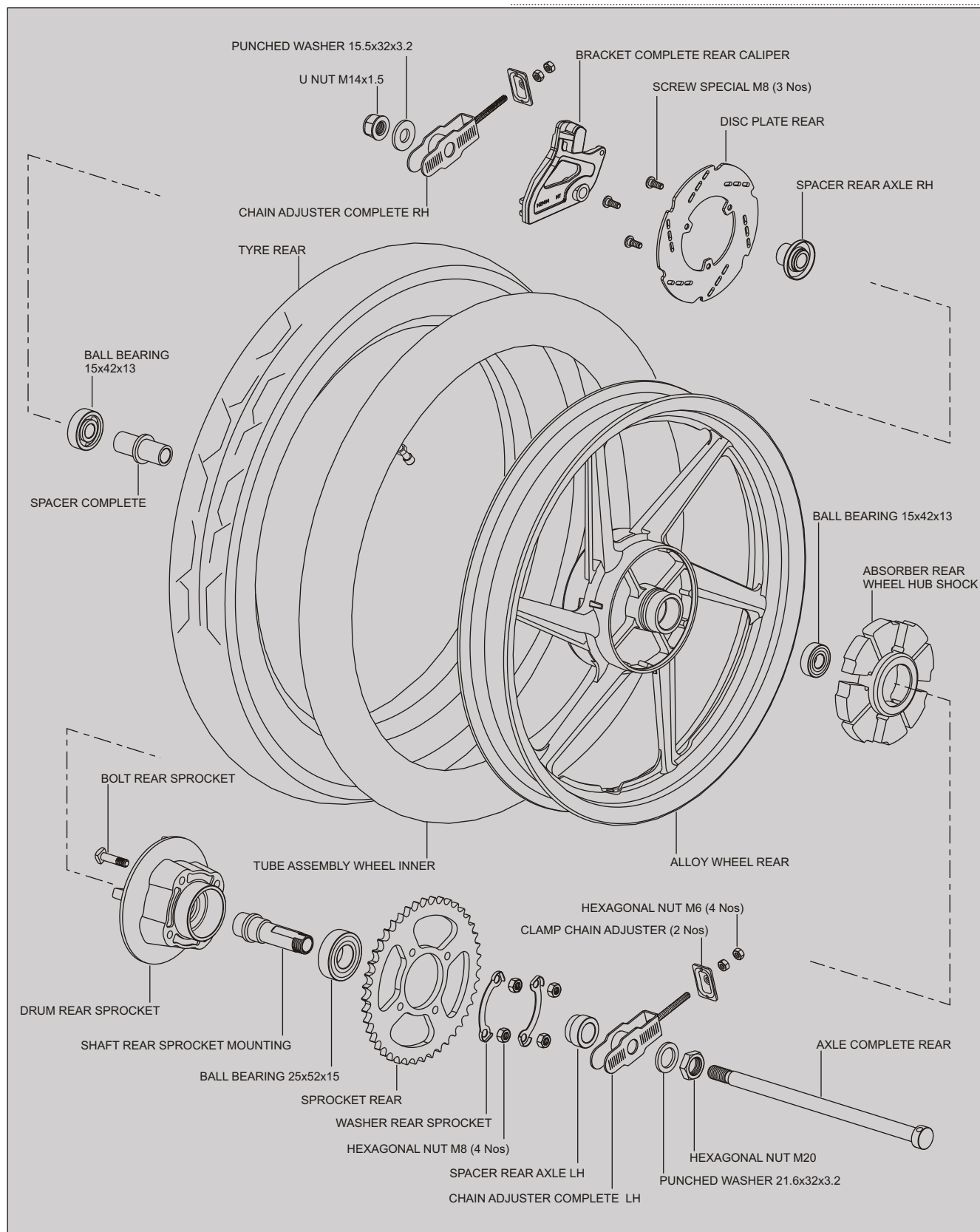


Fig. 6.87



## REAR WHEEL ASSEMBLY (DISC BRAKE - RTR 180) - EXPLODED VIEW

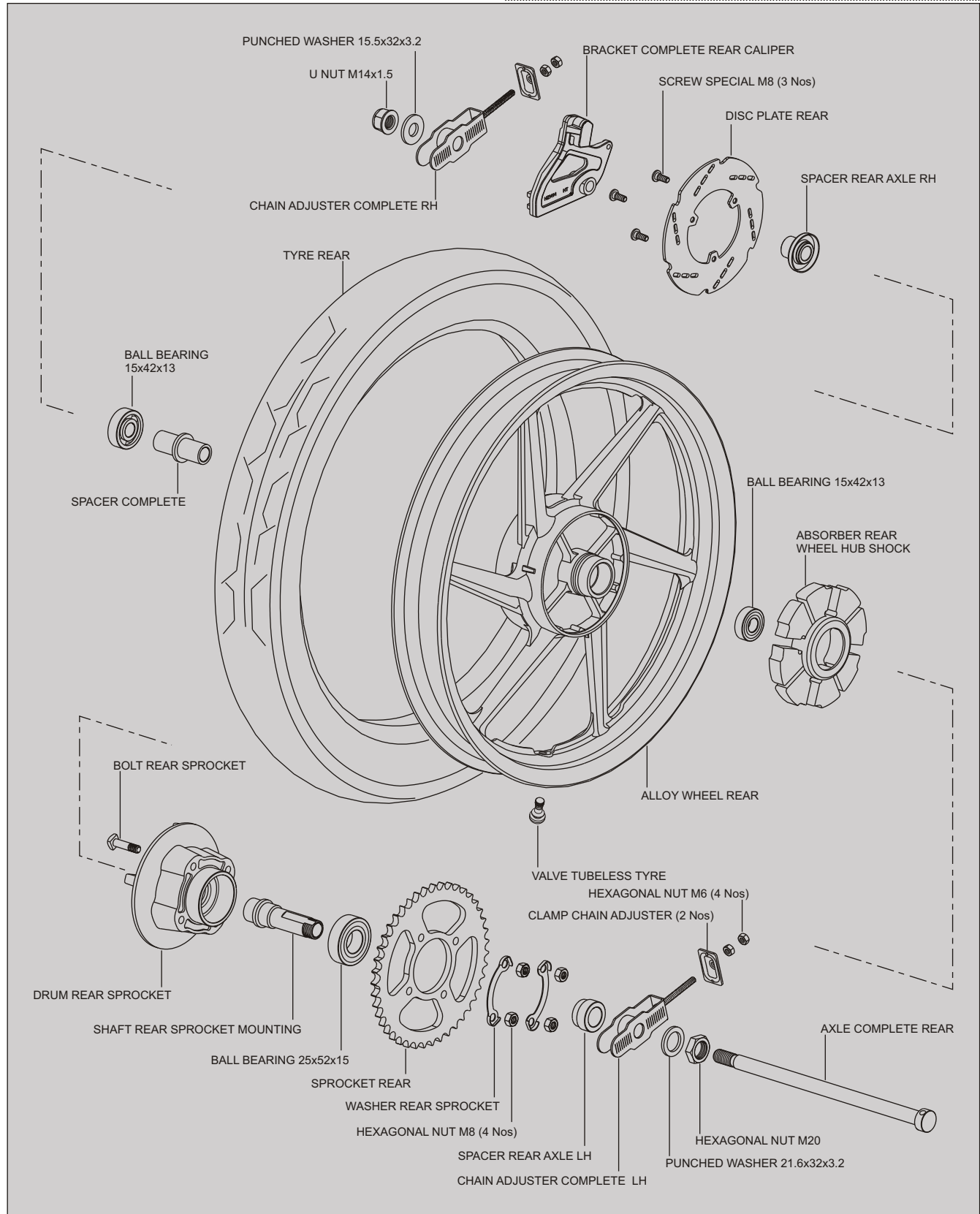


Fig. 6.88



- Make sure that the slot (A) in the bracket complete caliper assembly fits over the stopper (B) on the swing arm assembly. (Fig. 6.89)
- Tighten 'U' nut.

**Note:**

While remounting rear wheel assembly ensure to locate the disc in between the brake pads after removing the hard material between the pads.

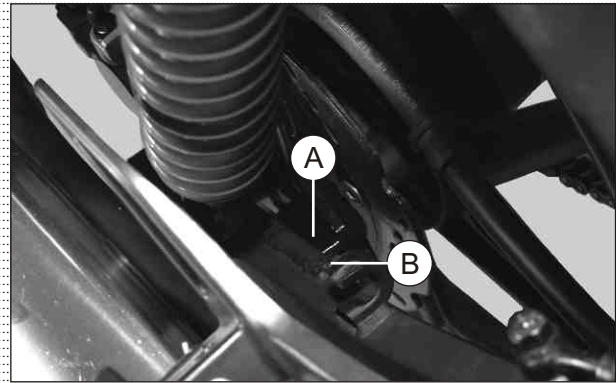


Fig. 6.89

## TUBELESS TYRE (RTR 180)

### PUNCTURE REPAIR

Tubeless tyre fitted in Apache RTR 180 provides the benefit of repairing punctured tyre, without removing the wheel assembly. Hence repairing can be performed in vehicle stand still condition and repairing procedure is as follows:

- Keep the bike firmly on center stand.
- Identify the punctured location and make a visible mark. (Fig. 6.90A)
- Pull out nail or puncture causing object from the tubeless tyre using a combination plier.(Fig. 6.90B)

Combination plier

- Insert reaming tool exactly into the punctured point and carefully ream the puncture hole by. (Fig. 6.91)
- Take a cold mending strip and insert it between the strip holding jaws of strip inserting tool. (Fig. 6.92)

**Note:**

After inserting strip, ensure that strip is held at the middle point of strip length.(Fig. 6.92)

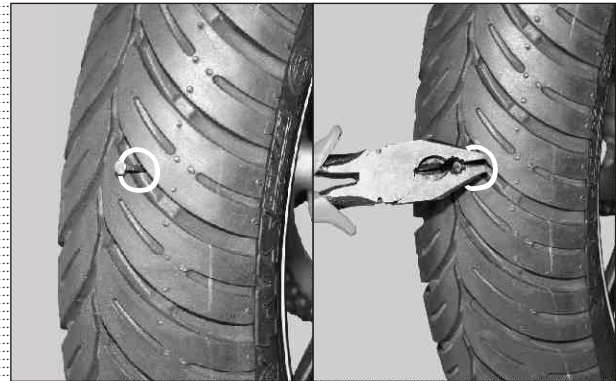


Fig. 6.90A

Fig. 6.90B

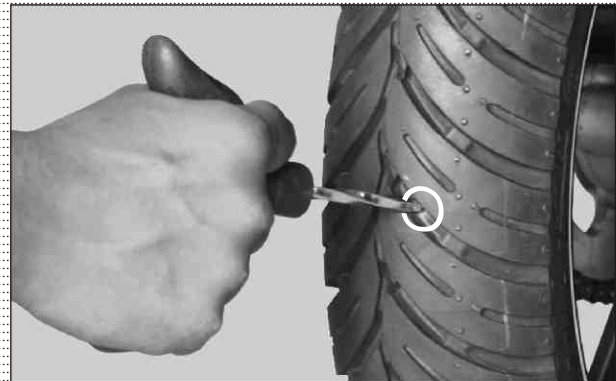


Fig. 6.91

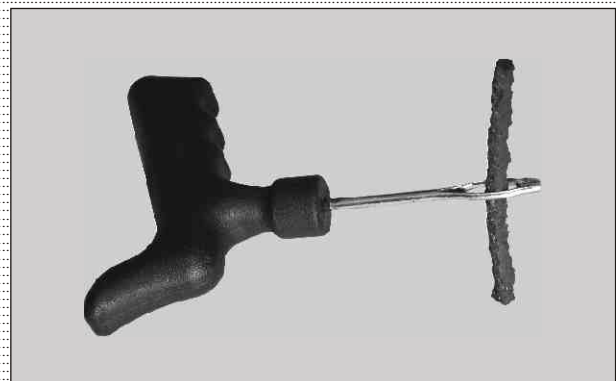


Fig. 6.92





- Insert strip inserting tool along with stripe into the reamed hole till the strip goes inside at least more than half of its folded length. (Fig. 6.93)
- Leaving the strip in that position, gently pull out the strip inserting tool.

**Note:**

While pulling out strip inserting tool, ensure that the strip does not come out along with the tool.

- Take out the tool completely and cut remaining strip leaving 5mm from surface of tyre. (Fig. 6.94)
- Fill air to specified limit and checkout for any leakage.

## REPLACEMENT OF VALVE TUBELESS TYRE RTR 180

Valve tubeless tyre in RTR 180 alloy wheel can be replaced by following below given procedure:

- Remove wheel assembly from the vehicle. (Refer chapter "Periodic maintenance" page no. 2-30 & 2-33 for wheel assembly removal procedure)
- Remove tyre from the alloy wheel.

**Caution:**

Use of normal tyre levers for removal of tubeless tyre by any puncture repair shop may cause severe damage to the tyre seating area of alloy wheel, which leads to improper sealing and loss of air. Hence it is recommended that removal of tubeless tyre is performed by using a tyre removal machine.

- Keep the alloy wheel on a level surface.
- Applying gentle load on valve tail, cut the valve tubeless tyre at the alloy wheel neck area and takeout separated piece. (Fig. 6.95A)

Hand knife

- Push out remaining part of valve from the alloy wheel using a phillips head screw driver. (Fig. 6.95B)



Fig. 6.93

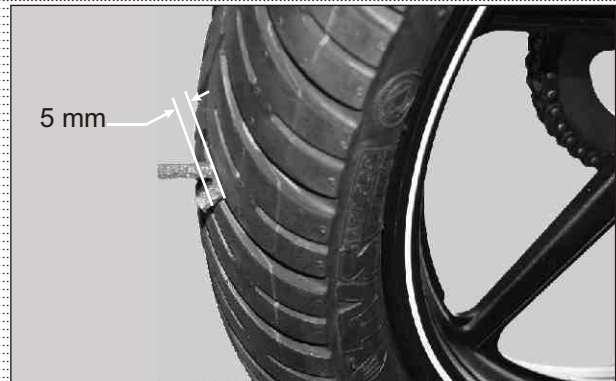


Fig. 6.94

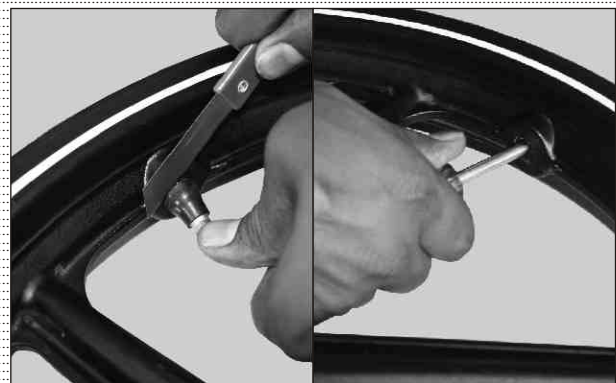


Fig. 6.95A

Fig. 6.95B



- Locate and seat new valve tubeless tyre to the valve mounting hole from outer periphery of alloy wheel. (Fig. 6.96A)
- Using a suitable mandrel, gently tap the valve head and ensure that valve is seated properly.(Fig.6.96B)
- Reassemble parts in reverse order of disassembly.

**Note:**

While reassembling tyre, it is recommended to apply a little amount of soap solution over the alloy wheel at the tyre seating area for ease of assembly.



Fig. 6.96A

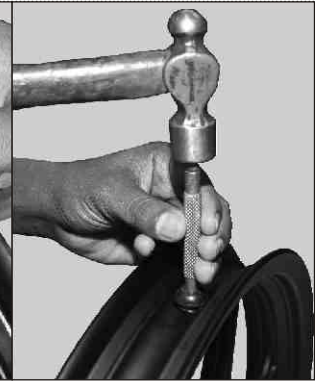


Fig. 6.96B

## DISC BRAKE SYSTEM REAR

- Refer chapter “periodic maintenance” for removal, inspection and replacement of the following:
  - Brake pads
  - Hose complete brake
- Also refer for brake fluid handling, replacement and air bleeding in the brake system.

## CALIPER ASSEMBLY - REMOVAL AND DISMANTLING

- Remove cover frame R by unlocking cover frame lock. (Refer chapter - 2 “Periodic maintenance” page no. 2-17 for cover frame R opening procedure)
- Bleed out brake fluid from the brake system.
- Remove banjo bolt and take out the gaskets. (Fig. 6.97)

12 mm spanner

- Remove wheel assy rear along with the disc plate (Refer chapter “Periodic Maintenance” page no. 2-32 for wheel assy rear removal)
- Take out bracket complete along with the caliper assembly.
- Remove plug pin from the caliper housing. (Fig. 6.98)

Flat head screw driver



Fig. 6.97

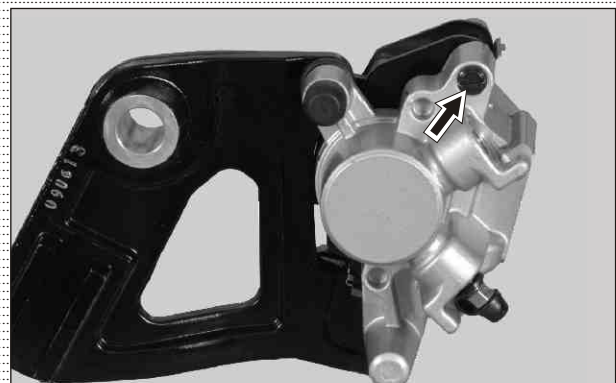


Fig. 6.98



- Remove pin hanger . (Fig. 6.99)

5 mm allen key

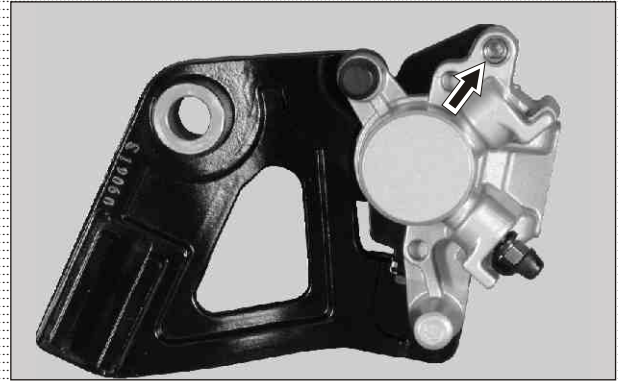


Fig. 6.99

- Take out pad complete inner and pad complete outer. (Fig. 6.100)

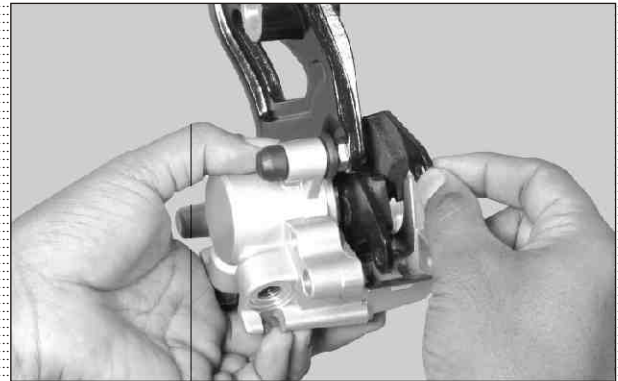


Fig. 6.100

- Remove spring pad from the caliper housing. (Fig. 6.101)

Nose plier

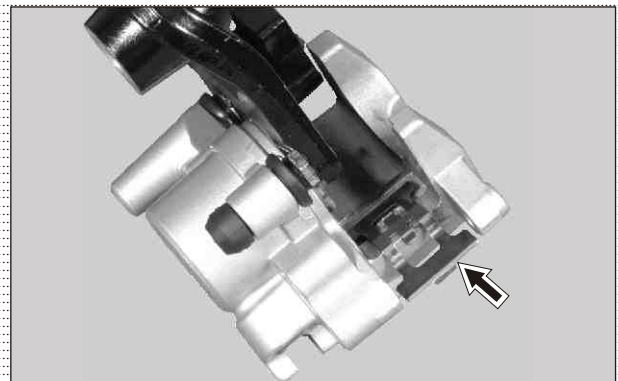


Fig. 6.101

- Remove bracket complete rear caliper by sliding out after dislocating boot-B and bush boot pin from the pin grooves. (Fig. 6.102)



Fig. 6.102



- Carefully pull out boots from the caliper assembly housing. (Fig. 6.103)

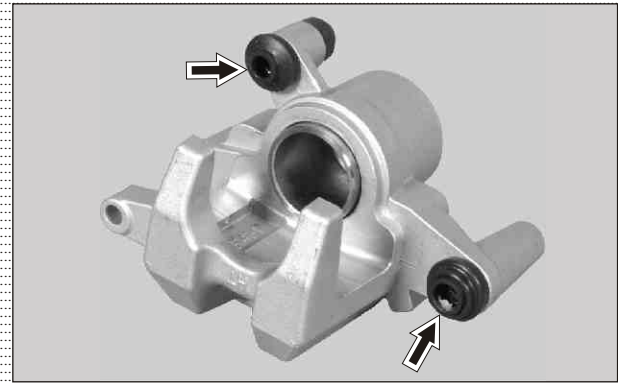


Fig. 6.103

- Insert a spacer between piston caliper and the caliper housing (at pad position) and then apply compressed air through the inlet port of the caliper to slide pistons out. (Fig. 6.104)

**Caution:**

Be careful while applying compressed air as it will shoot the piston forcefully. Do not use high pressure air to prevent damage to the piston.

Do not use nose plier to pull out the piston as it may cause scratches.



Fig. 6.104

- Remove dust seals 1 and 2 with a bent plastic / brass tool to avoid scratches on the caliper bore. (Fig. 6.105)

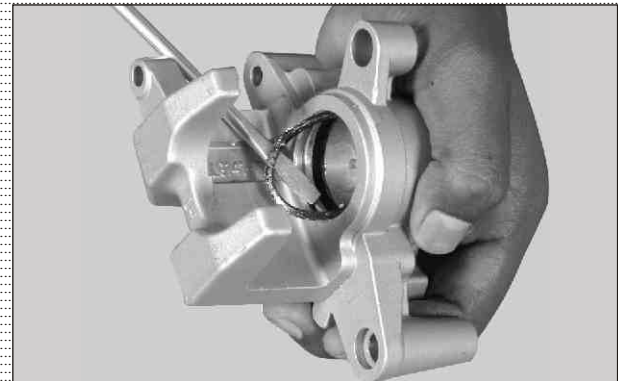


Fig. 6.105

- Unplug cap bleeder and remove bleeder screw. (Fig. 6.106)

8 mm spanner

- Clean parts thoroughly with fresh brake fluid.

**Caution:**

Never use kerosene, petrol or other solvents for cleaning brake system. Otherwise rubber parts get damaged. Do not wash the pads and also take care that brake fluid is not splashed on pads.

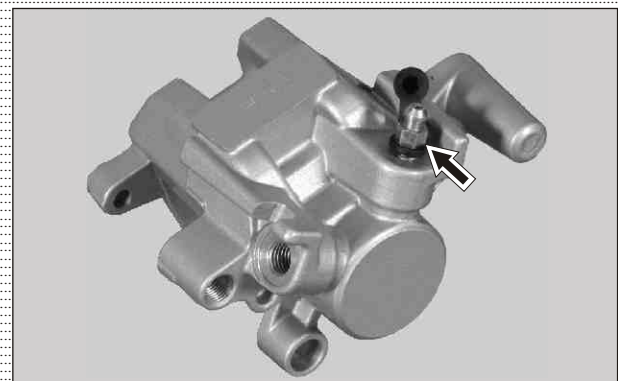


Fig. 6.106



## CALIPER ASSEMBLY REAR - INSPECTION

Inspect the following parts:

- Pin hangers for any bend.
  - Bracket complete front for loose lugs.
  - Piston and caliper bore for any scratches.
  - Piston and dust seals for any damage.
- After completion of above inspection, replace defective parts as required.

## ASSEMBLING OF CALIPER ASSEMBLY

- Insert dust seal-1 (2 nos) and dust seal-2 (2 nos) in the caliper housing seal grooves and ensure perfect seating without any twist of the seals. (refer exploded view on page on. 6-38 for assembly details.)
- Insert piston smeared with fresh DOT 3 or DOT 4 brake fluid straight into the bore slowly without damaging the piston and ensure that piston slides into caliper bore.
- Assemble spring pad and plate bracket on the caliper housing.
- Assemble boot-B and bush boot pin on the caliper housing.
- Apply little grease to the pin bolts of the bracket complete caliper. Assemble bracket complete caliper by ensuring proper seating of both the boots in their respective grooves.
- Assemble pad inner and pad outer.
- Assemble pin hangers by locating it properly in the holes of the pad inner and outer.
- Fix the plug pin.
- Fix the bleeder screw and cap bleeder.
- Remount wheel assy rear and spacer R.
- Remount caliper assembly rear by locating the slot provided on bracket comp caliper with the stopper provided on swing arm comp.
- Tighten 'U' nut rear axle.
- Remount brake hose along with the gaskets.
- Bleed the system thoroughly.





## DISC PLATE SERVICING

Inspect disc plate as explained in front disc plate servicing. (Refer page 6-9 for disc plate inspection )

Micrometer

|               |       |
|---------------|-------|
| Standard      | 4 mm  |
| Service limit | 3.5mm |

## DISC PLATE REPLACEMENT

- Replace disc plate if found to be defective. (Refer page no. 6.24 for removal procedure)

## MASTER CYLINDER (REAR DISC BRAKE) - REMOVAL AND DISMANTLING

- Remove cover frame R by unlocking cover frame lock. (Refer chapter - 2 page 2-17 for cover frame R removal procedure)
- Bleed the brake system completely.
- Remove hose complete brake from the master cylinder and take out gaskets. (Fig. 6.107)

12 mm spanner

- Remove master cylinder fluid reservoir cap. (Fig. 6.108)
- Take out plate diaphragm.
- Take out diaphragm from the reservoir assembly.
- Remove CRR pan head screw (A) (M6x16 - 1 no.) from the reservoir mounting. (Fig. 6.108)

Philips head screw driver

- Disconnect terminals from the switch rear brake lamp. (Fig. 6.109)



Fig. 6.107

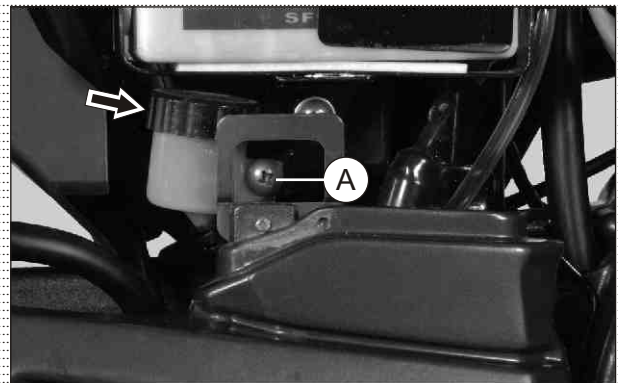


Fig. 6.108

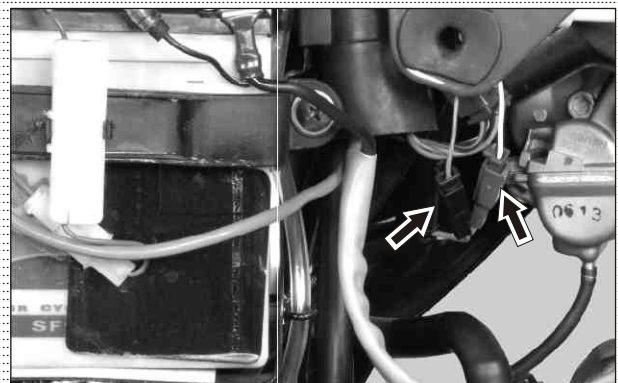


Fig. 6.109



- Loosen rider footrest R bottom mounting bolt. (Fig. 6.110)

8 mm allen key



Fig. 6.110

- Remove 'U' nut (M12) rear swing arm pivot. (Fig. 6.111)

17 mm spanner



Fig. 6.111

- Draw out shaft complete swing arm along with punched washer by gently tapping at the other side. (Fig. 6.112)

Nylon hammer

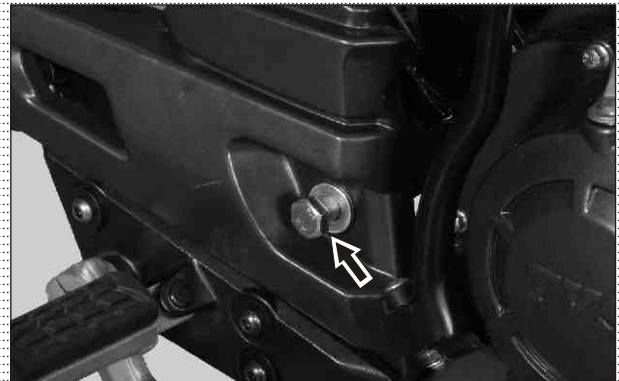


Fig. 6.112

- Remove split pin (A) and take out cotter pin. (Fig. 6.113)

Nose plier

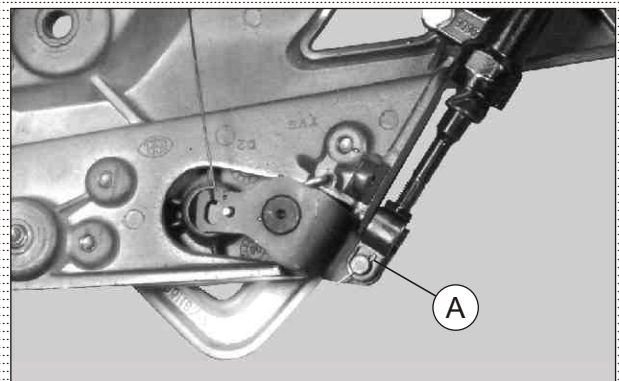


Fig. 6.113



- Remove clip hose (A) and take out hose oil (B). (Fig. 6.114)
- Remove hexagonal screws (M6x40 - 2 nos) along with punched washers. (Fig. 6.114)

13 mm spanner

- Take out master cylinder assembly from the pillion footrest R.

- By firmly holding master cylinder housing, remove the circlip (A) by using circlip plier. (Fig. 6.115)

Circlip plier

- Take out insert (B) from the master cylinder assembly. (Fig. 6.115)

- Take out 'O' ring (A) from the master cylinder assembly. (Fig. 6.116)

- Carefully lift the boot from cylinder by using a blunt tool. (Fig. 6.117A)

## Note:

While removing the boots assembly take care not to damage it.

- By firmly holding master cylinder by hand slightly press the push rod and remove circlip from the master cylinder by using circlip plier without damaging the cylinder. (Fig. 6.117B)

Circlip plier

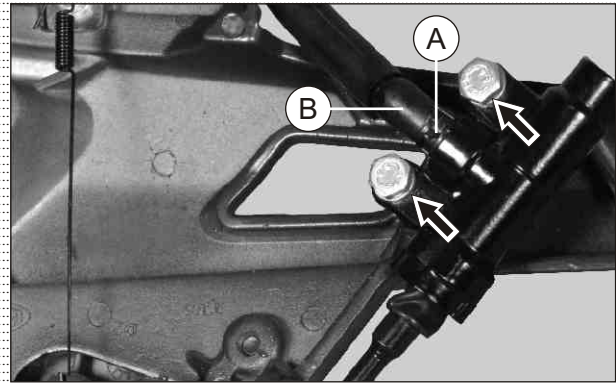


Fig. 6.114

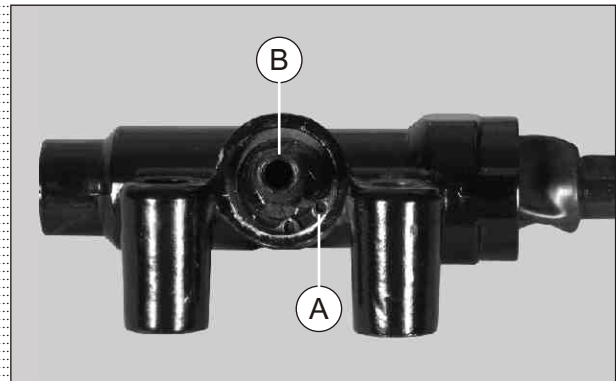


Fig. 6.115

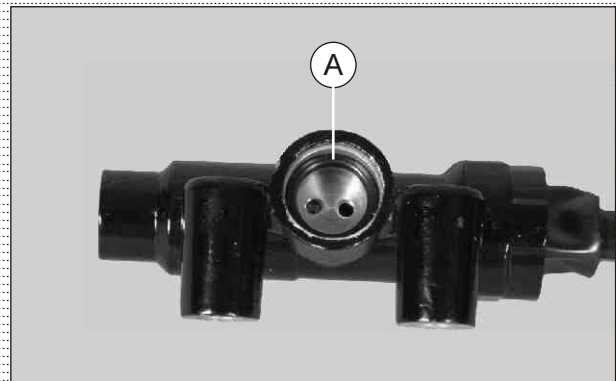


Fig. 6.116



Fig. 6.117A

Fig. 6.117B



- Slowly pull out piston along with P - cup, S - cup and spring. (Fig. 6.118)
- Clean the system thoroughly using fresh brake fluid.

## Caution:

Never use kerosene, petrol or other solvents for cleaning the brake system. Otherwise rubber parts get damaged. Do not wash the pads and also take care that brake fluid is not splashed on to the pads.

## INSPECTION

Inspect the following parts:

- Master cylinder for any scratches or other damage.
- Piston and cup surface for scratches or other Damage.
- Piston boot and other components for wear and damage.
- Master cylinder recuperation and feed port for any blockage, if so clear the blockage using compressed air.
- After completion of above inspection, replace defective parts as required.

## REASSEMBLY

- Reassemble master cylinder in the reverse order of dismantling. Refer exploded view for assembly details. (Fig. 6.120)

## Caution:

Apply brake fluid to the cylinder bore and all internal parts before inserting into the bore.

- Fix the hose complete brake rear to the master cylinder outlet port along with the banjo bolt and gaskets.
- Fill the reservoir with DOT3 or DOT4 brake fluid upto the level 'MAX' marked on the reservoir and bleed the system thoroughly. (Fig. 6.119)
- Fix the reservoir cap along with plate diaphragm and diaphragm.
- Tighten reservoir mounting screw.
- Connect rear brake lamp switch terminals.

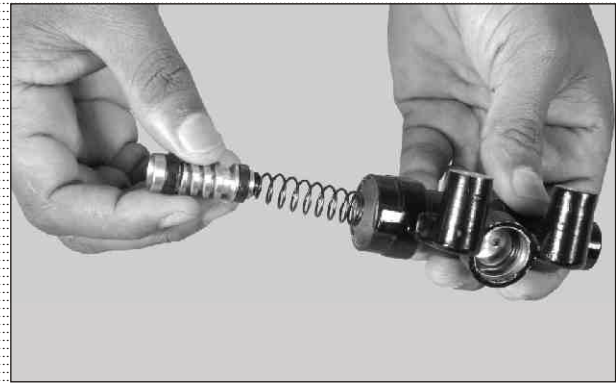


Fig. 6.118

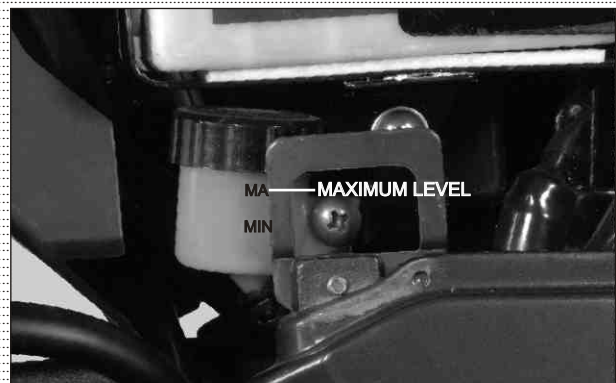


Fig. 6.119



## REAR DISC BRAKE - EXPLODED VIEW

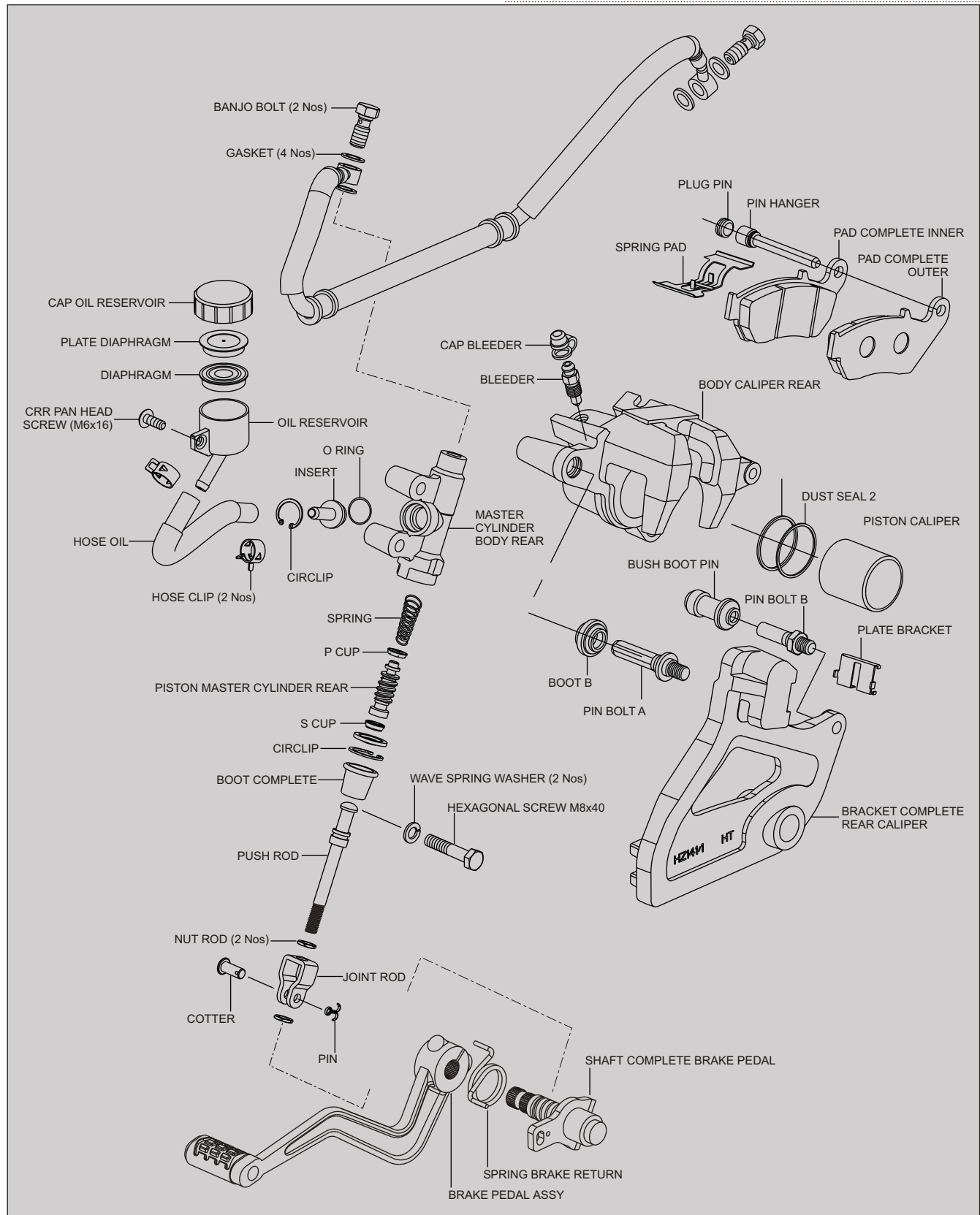


Fig. 6.120





Replace following parts at every 2 years or 40,000 km.

- Piston along with P-cup, S - cup, Spring and boot assembly.
- Diaphragm plate and diaphragm.
- Caliper dust seal-1 and dust seal-2

## WHEEL ASSEMBLY REAR (DRUM BRAKE) - REMOVAL

- Before removing wheel assembly rear observe the effectiveness of brake and wear of shoe complete brake.
- Adjust rear brake properly. (refer chapter "periodic maintenance" page no. 2-27 for brake adjustment and wheel assembly removal procedure)

### Warning:

Brakes are items of personal safety and should always be maintained in proper adjustment.

## PANEL ASSEMBLY REAR - DISMANTLING

- Remove brake shoe set (rear) from the panel assembly rear along with spring brake shoe. (Fig. 6.121)

- Remove hexagonal nut M6. (Fig. 6.122)

10 mm spanner

- Remove punched washer and hexagonal bolt (M6x33). (Fig. 6.122)

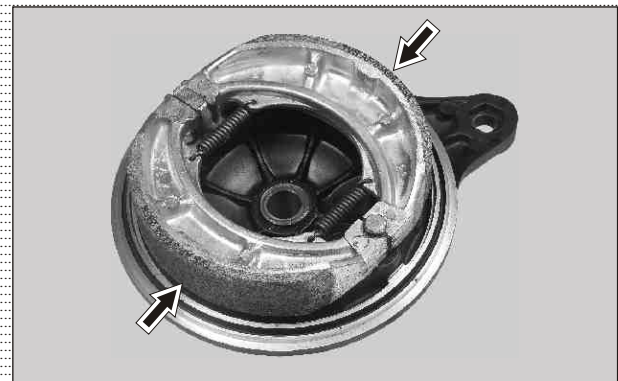


Fig. 6.121

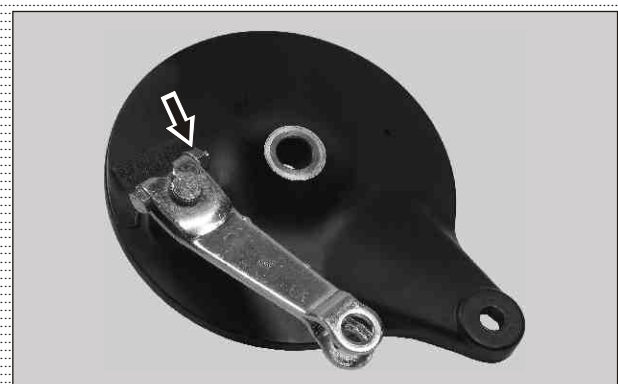


Fig. 6.122



- Pull out lever rear brake cam and remove punched washer and 'O' ring brake cam. (Fig. 6.123)
- Remove cam brake by gently tapping. (Fig. 6.123)

Nylon hammer

## Note:

Apply little grease to the cam brake before installing.

## Warning:

Do not apply too much grease on the cam brake. If the grease gets on to the lining brake, slippage will occur.

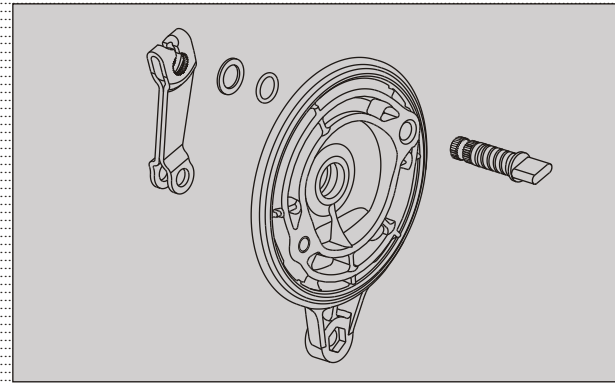


Fig. 6.123

## REMOVAL OF BEARINGS

## Warning:

It is recommended to remove the bearings only in case of replacement.

- Remove bearings as explained earlier. (Refer page no 6-2 for removal procedure)

## INSPECTION

Before inspection, clean all necessary components with suitable cleaning solvent and lubricate them.

- Inspect wheel bearings, axle complete rear, alloy wheel rear, tyre rear, tyre inflation pressure rear as explained earlier. (Refer page 6-2 for checking procedure)
- Inspect chain assy, sprocket rear, absorber rear wheel hub, as explained earlier. (Refer page 6-27 for checking procedure)
- Inspect shoe complete brake and brake drum (alloy wheel rear) as explained earlier. (Refer chapter - 2 "Periodic Maintenance" Page 2-32 for checking procedure)

## REASSEMBLY

- Reassemble and remount wheel assembly rear in the reverse order of disassembly. Refer wheel assembly rear exploded view (Fig. 6.124) for assembly details.

Diagram illustrating the components of a rear wheel assembly, showing the wheel, tire, and various mounting hardware.

Key components labeled include:

- PUNCHED WASHER 15.5x32x3.2
- U NUT M14x1.5
- CHAIN ADJUSTER COMPLETE RH
- SPACER REAR AXLE RH
- TYRE REAR
- BALL BEARING 15x42x13
- SPACER COMPLETE
- HEXAGONAL BOLT M6x33
- LEVER BRAKE CAM
- PUNCHED WASHER 6.5x13x1
- HEXAGONAL NUT M6
- PUNCHED WASHER 14.5x22x1.6
- O RING BRAKE CAM
- CAM BRAKE
- SET BRAKE SHOE ASSEMBLY
- PANEL BRAKE REAR
- SPRING BRAKE SHOE
- PROTECTOR WHEEL INNER TUBE
- ALLOY WHEEL REAR
- ABSORBER REAR WHEEL HUB SHOCK
- BALL BEARING 15x42x13
- BOLT REAR SPROCKET
- TUBE ASSEMBLY WHEEL INNER
- DRUM REAR SPROCKET
- SHAFT REAR SPROCKET MOUNTING
- BALL BEARING 25x52x15
- SPROCKET REAR
- WASHER REAR SPROCKET
- HEXAGONAL NUT M8 (4 Nos)
- SPACER REAR AXLE LH
- CHAIN ADJUSTER COMPLETE LH
- HEXAGONAL NUT M6 (4 Nos)
- CLAMP CHAIN ADJUSTER (2 Nos)
- HEXAGONAL NUT M20
- PUNCHED WASHER 21.6x32x3.2
- AXLE COMPLETE REAR

## Chassis 6-46



## Note:

After remounting wheel assembly rear, readjust the chain assembly slackness to 20 - 25 mm. Readjust the brake (refer chapter "periodic maintenance").

## SWING ARM COMPLETE

### REMOVAL

- Remove wheel assembly rear along with panel assembly rear. (Refer chapter "Periodic maintenance" [page 2-31](#)) (Incase of drum brake model)
- Remove wheel assembly along with disc plate and dislocate the caliper assembly rear. (Refer chapter "Periodic maintenance" [page 2-30](#)) (Incase of disc brake model)
- Remove cover engine sprocket, chain case complete, chain assembly and sprocket drum assembly.
- Disconnect brake return spring from the swing arm complete. (Fig. 6.125) (Incase of drum brake model)

Straight nose plier

- Loosen shock absorber top mounting domed nut on both sides. (Fig. 6.126A & Fig. 6.126B)

17 mm spanner

- Remove hexagonal flange bolts (M10x36 - 2 nos) of shockabsorber rear lower mounting from both sides of swing arm complete. (Fig. 6.127)

14 mm spanner

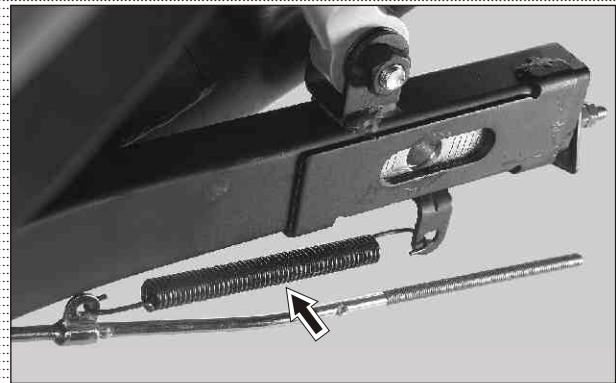


Fig. 6.125



Fig. 6.126A

Fig. 6.126B

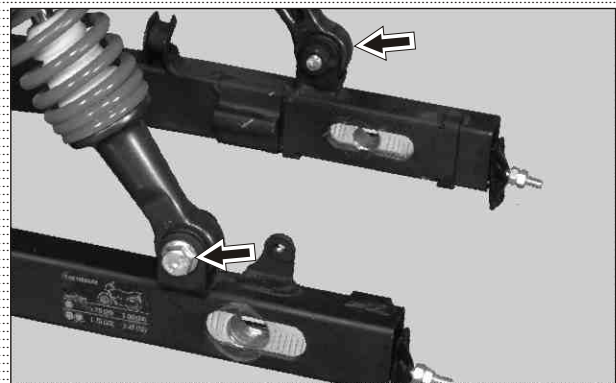


Fig. 6.127



- Remove CRR pan head screw (M6x16 - 1 no.) from the reservoir mounting. (Fig. 6.128) (In case of disc brake model)

Philips head screw driver

- Loosen rider footrest comp L & R mounting bolts. (Fig. 6.129A & Fig. 6.129B)

8 mm allen key

- Remove 'U' nut (M12) rear swing arm pivot. (Fig. 6.130)

17 mm spanner

- Take out punched washer.

- Draw out shaft complete swing arm along with the punched washer by gently tapping at the other side. (Fig. 6.131)

Nylon hammer

- Take out swing arm complete from the frame assembly.

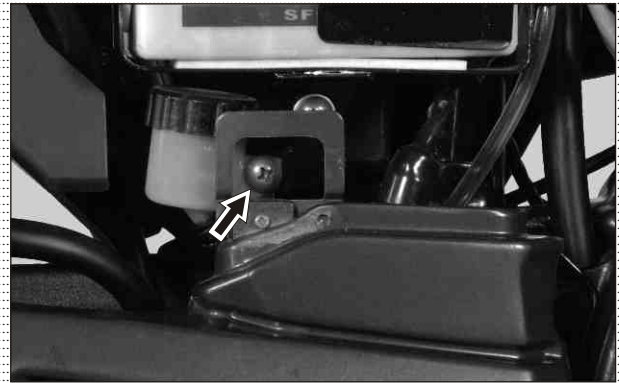


Fig. 6.128

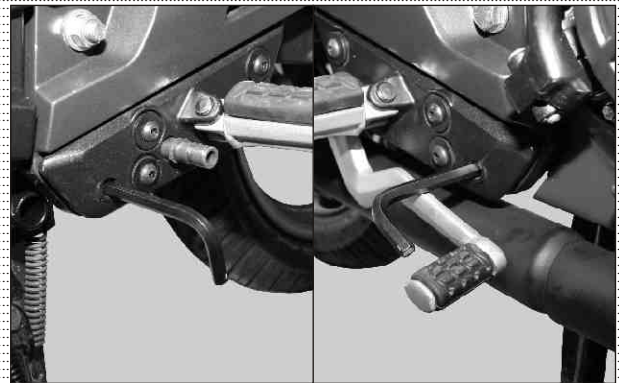


Fig. 6.129A

Fig. 6.129B



Fig. 6.130



Fig. 6.131





- Remove split pin. (Fig. 6.132) (In case of drum brake model)

Nose plier

- Remove hexagonal nut (M8) and take out the punched washer and spring.
- Remove torque link complete rear.

14 mm spanner

- Take out buffer chain touch (A) from the swing arm assembly. (Fig. 6.133)
- Draw out both the bush swinging arm if required. (Fig. 6.133)

## INSPECTION

### Shaft complete swing arm

- Using special tools, check shaft complete swing arm for run-out and replace it with a new one if run-out exceeds the limit. (Fig. 6.134)

|         |                      |
|---------|----------------------|
| 0313050 | Dial gauge (0.01 mm) |
|---------|----------------------|

|         |                |
|---------|----------------|
| 0313060 | Magnetic stand |
|---------|----------------|

|         |           |
|---------|-----------|
| 0313070 | V - block |
|---------|-----------|

|               |         |
|---------------|---------|
| Service limit | 0.60 mm |
|---------------|---------|

## REASSEMBLY

Reassemble and remount swing arm complete in the reverse order of removal. Refer exploded view for assembly details. (Fig. 6.135A - disc brake model) (Fig. 6.135B - drum brake model)

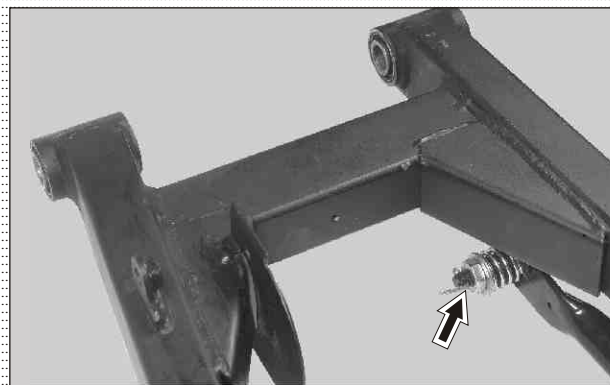


Fig. 6.132

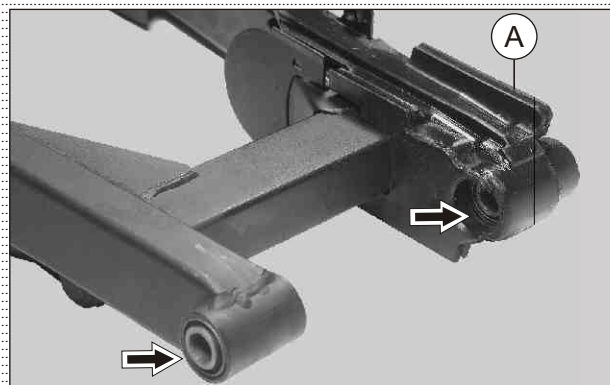


Fig. 6.133

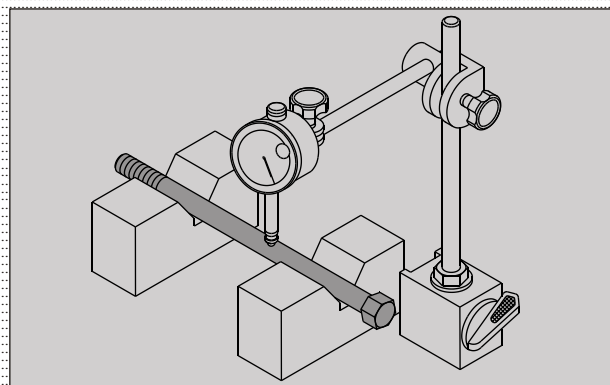


Fig. 6.134

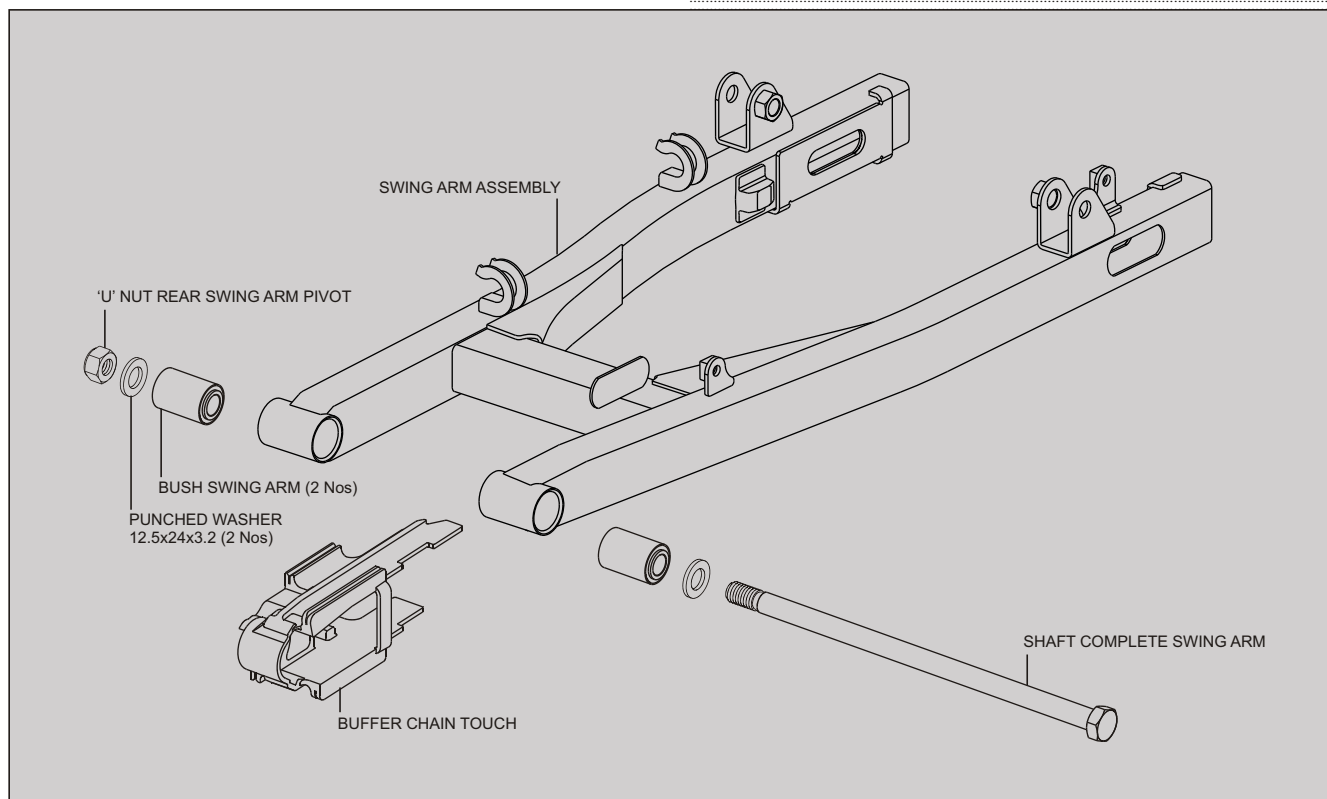


Fig. 6.135A

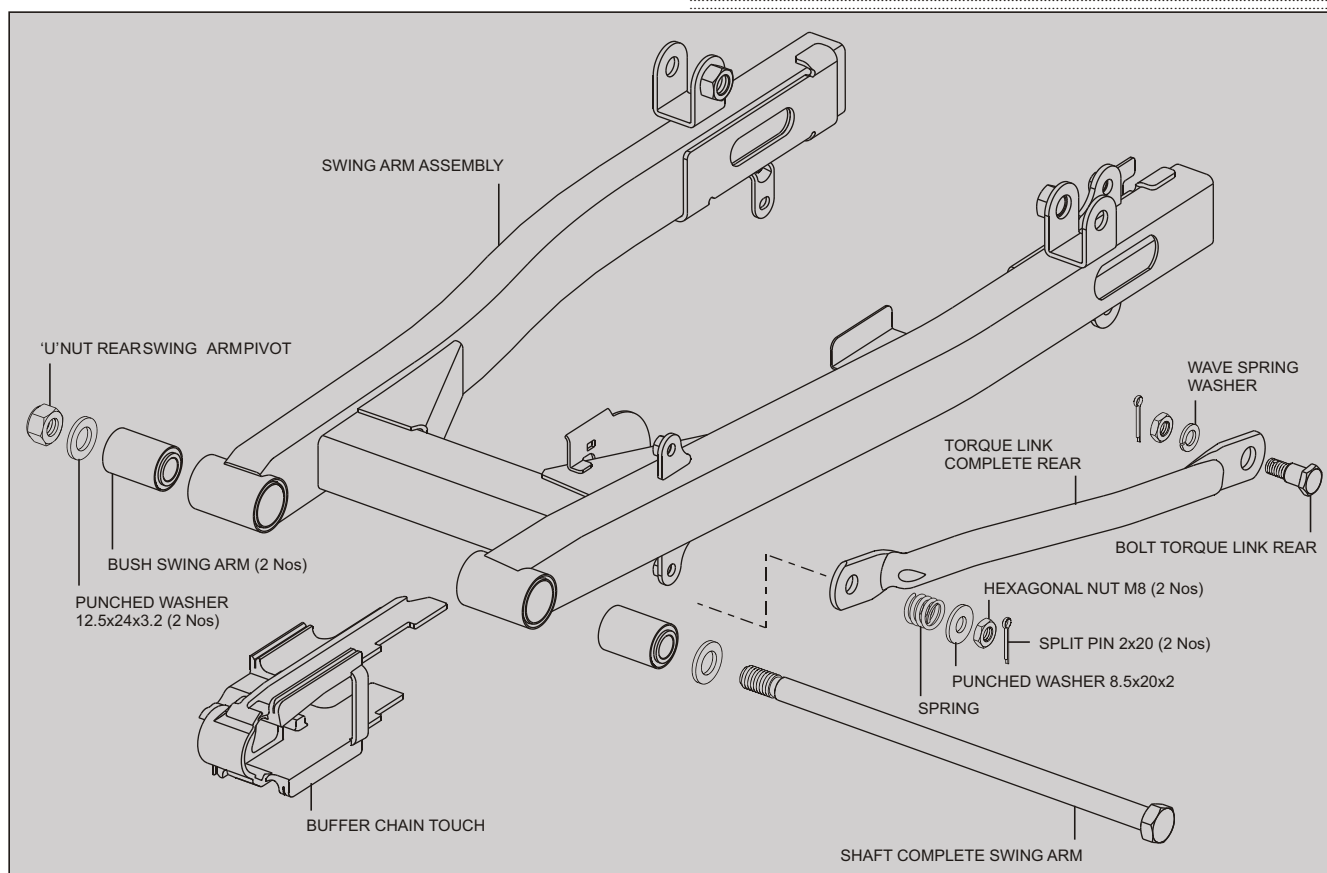


Fig. 6.135B



## FLAP REAR FENDER RTR180

### Removal

Apache RTR 180 is fitted with specially designed rear fender which can be altered to enhance its elegant look. Rear fender can be altered as follows:

- Place the bike firmly on centre stand.
- Remove hexagonal nut (A) from the reflex reflector mounting and take out reflex reflector. (Fig.6.136)

8 mm spanner

- Remove CRR pan head screw (B) (M6x16) from the flap rear fender bottom mounting. (Fig.6.136)

10 mm spanner

- Remove hexagonal nut (2 Nos.) from the bracket license plate mounting and take out bracket license plate. (Fig.6.137)

10 mm spanner

- Remove hexagonal bolts (M6x20 - 2nos) from the rear mud flap top L mounting. (Fig. 6.138A)

10 mm spanner

- Remove hexagonal bolts (M6x20 - 2nos) from the rear mud flap top L mounting. (Fig. 6.138A) & Fig 138B)

10 mm spanner

- Take out flap rear fender.

- Reassemble bracket license to its original position on rear fender.

10 mm spanner

- Assemble reflex reflector to the rear fender at flap rear fender bottom mounting. (Fig 6.139)

8 mm spanner

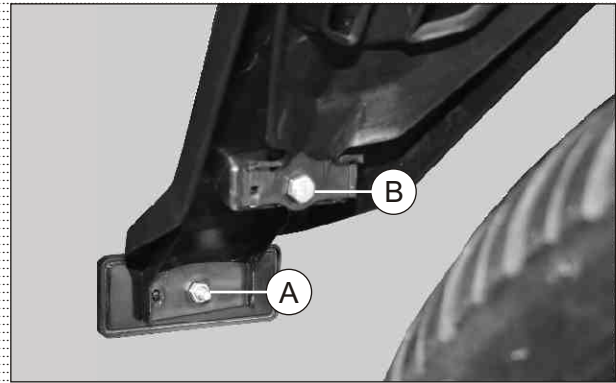


Fig. 6.136

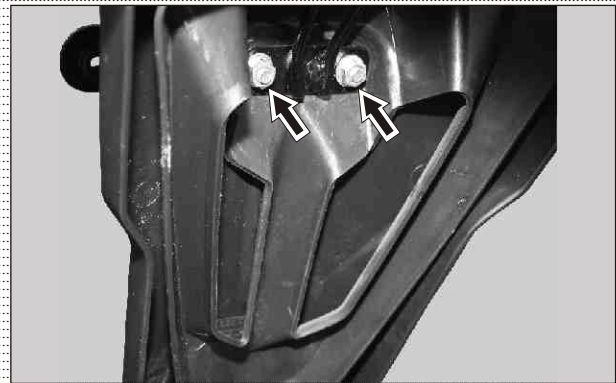


Fig. 6.137

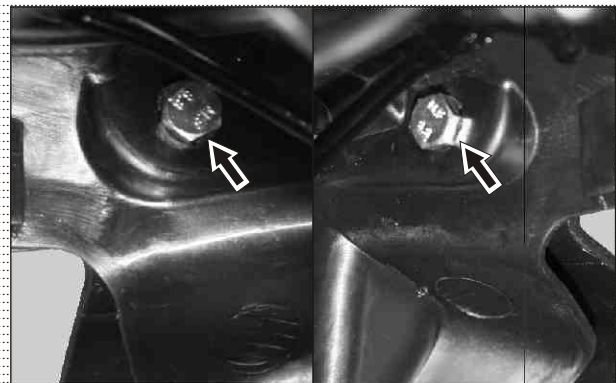


Fig. 6.138A

Fig. 6.138B



Fig. 6.139



## Note:

Rear fender having no flap may not avoid mud splashing completely as it has through holes. Hence It is strongly recommended to assemble flap rear fender to the rear fender while running on wet road conditions.

## MIRROR ASSEMBLY L & R

### REMOVAL

- Dislocate grommet mirror and move it upwards such that nut mirror mounting is visible. (Fig. 6.140)
- Holding mirror R by hand loosen the mirror mounting fastener in clockwise direction and rotate the mirror R in clockwise direction to remove it. (Fig 6.141)

14 mm spanner

## Caution:

Keep in mind that the Mirror R has left hand thread. Therefore loosening direction is opposite to normal right hand thread. (clockwise direction).

- Holding mirror L by hand loosen the mirror mounting fastener in counter clockwise direction and rotate the mirror L in counter clockwise direction to remove it. (Fig 6.142)

### REASSEMBLY

- Reassemble the mirror in reverse order of removal.
- After assembling mirror, set the mirror post (A) position in such a way that rear side visibility is clear. (Fig 6.142)
- Set the mirror housing as required. (Fig 6.143).



Fig. 6.140

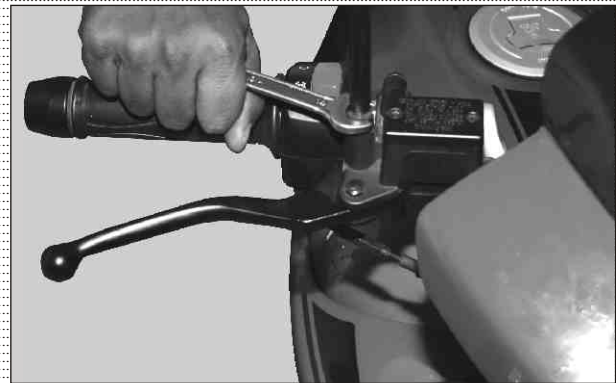


Fig. 6.141

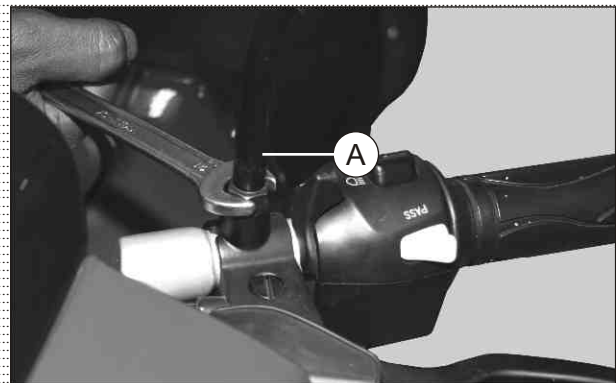


Fig. 6.142

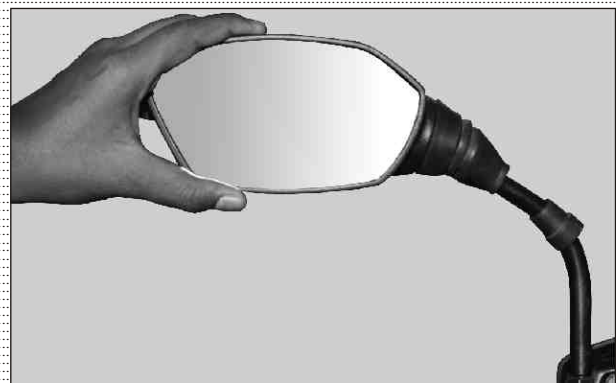


Fig. 6.143



## SERVICE DATA

### VALVE AND VALVE GUIDE

Unit : mm

| S.No. | DESCRIPTION                         |                  | STANDARD                       | SERVICE LIMIT |
|-------|-------------------------------------|------------------|--------------------------------|---------------|
| 1     | Valve diameter                      | Inlet<br>Exhaust | 27.220<br>24.220               | —             |
| 2     | Valve clearance                     | Inlet<br>Exhaust | 0.06<br>0.08                   | —             |
| 3     | Valve stem (OD)                     | Inlet<br>Exhaust | 4.990 - 4.975<br>4.970 - 4.955 | —             |
| 4     | Guide valve (ID)                    | Inlet<br>Exhaust | 5.000 - 5.012                  | 0.035         |
| 5     | Guide valve to valve stem clearance | Inlet<br>Exhaust |                                | 0.50          |
| 6     | Valve stem runout                   | Inlet<br>Exhaust | 0.01                           | 0.05          |
| 7     | Valve head thickness                | Inlet<br>Exhaust | 0.75<br>0.70                   | 0.5           |
| 8     | Valve head radial runout            | Inlet<br>Exhaust | 0.03                           | 0.075         |
| 9     | Spring valve free length            | Inner<br>Outer   | 30.00<br>33.80                 | -<br>-        |

### CAM SHAFT COMPLETE & HEAD COMPLETE CYLINDER (CYLINDER HEAD)

Unit : mm

| S.No. | DESCRIPTION                       |                  | STANDARD                           | SERVICE LIMIT    |
|-------|-----------------------------------|------------------|------------------------------------|------------------|
| 1     | Cam lobe height                   | Inlet<br>Exhaust | 33.790 - 33.830<br>33.670 - 33.710 | 33.510<br>33.390 |
| 2     | Cam shaft complete runout         | —                | 0.003                              | 0.080            |
| 3     | Arm complete valve rocker (ID)    | Inlet<br>Exhaust | 12.000 - 12.018                    |                  |
| 4     | Shaft valve rocker arm (OD)       | Inlet<br>Exhaust | 11.996 - 11.984                    |                  |
| 5     | Head complete cylinder distortion | —                | —                                  | 0.05             |
| 6     | Cover cylinder head distortion    | —                | —                                  | 0.05             |



## SERVICE INFORMATION



### CYLINDER, PISTON AND RINGS PISTON

Unit : mm

| S.No. | DESCRIPTION                                   |                         | STANDARD                                        | SERVICE LIMIT        |
|-------|-----------------------------------------------|-------------------------|-------------------------------------------------|----------------------|
| 1     | Compression pressure                          | –                       | 10-13 kg/cm <sup>2</sup>                        | 8 kg/cm <sup>2</sup> |
| 2     | Cylinder to piston clearance                  | –                       | 0.025 - 0.035                                   | 0.120                |
| 3     | Cylinder bore diameter                        |                         |                                                 |                      |
|       | RTR 160cc                                     | –                       | 62.000 - 62.015                                 | 62.110               |
|       | RTR 180cc                                     | –                       | 62.500 - 62.515                                 | 62.610               |
| 4     | Piston diameter (measure 10mm from skirt end) |                         |                                                 |                      |
|       | RTR 160cc                                     | –                       | 61.970 - 61.985                                 | 61.875               |
|       | RTR 180cc                                     | –                       | 62.475 - 62.490                                 | 62.380 - 62.395      |
| 5     | Cylinder complete distortion                  | –                       | –                                               | 0.05                 |
| 6     | Ring piston free end gap                      | Top<br>2nd              | approx 7.0<br>approx. 5.5                       | 5.5<br>4.4           |
| 7     | Ring piston closed end gap                    | Top<br>2 nd             | 0.20 - 0.350<br>0.350 - 0.50                    | 0.70<br>0.70         |
| 8     | Ring to piston groove clearance               | Top<br>2 nd             | 0.015 - 0.045<br>0.015 - 0.045                  | 0.15<br>0.15         |
| 9     | Ring piston groove width                      | Top<br>2 nd<br>Oil ring | 0.805 - 0.820<br>0.805 - 0.820<br>1.505 - 1.520 | –                    |
| 10    | Ring piston thickness                         | Top<br>2 nd             | 0.775 - 0.790                                   | –                    |
| 11    | Piston pin hole (ID)                          | –                       | 15.002 - 15.008                                 | 15.030               |
| 12    | Pin piston (OD)                               | –                       | 14.996 - 14.998                                 | 14.980               |

### CRANKSHAFT COMPLETE

Unit : mm

| S.No. | DESCRIPTION                           | STANDARD        | SERVICE LIMIT |
|-------|---------------------------------------|-----------------|---------------|
| 1     | Connecting rod small end (ID)         | 15.006 - 15.014 | 15.040        |
| 2     | Connecting rod deflection             | –               | 3.00          |
| 3     | Connecting rod big end side clearance | 0.20 - 0.40     | 0.65          |
| 4     | Connecting rod big end width          | 16.95 - 17.00   | –             |
| 5     | Crank web to web width                | 46.3 ± 0.1      | –             |
| 6     | Crankshaft complete runout            | 0.05            | 0.10          |

## SERVICE INFORMATION



### CLUTCH

Unit : mm

| S.No. | DESCRIPTION                                                     | STANDARD        | SERVICE LIMIT |
|-------|-----------------------------------------------------------------|-----------------|---------------|
| 1     | Lever assembly gear shift play (to adjust clutch play at cover) | 5 - 15          | —             |
| 2     | Plate clutch drive thickness                                    | 2.920 - 3.080   | 2.60          |
| 3     | Plate clutch drive claw width                                   | 15.750 - 15.850 | 15.20         |
| 4     | Plate clutch driven distortion                                  | —               | 0.10          |
| 5     | Spring clutch free length                                       | 29.5            | 28.7          |

### TRANSMISSION SPECIFICATION

| S.No. | DESCRIPTION             |                                                                      | SPECIFICATION                                                                     |
|-------|-------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 1     | Primary reduction ratio |                                                                      | 3.095 (65/21)                                                                     |
| 2     | Final reduction ratio   | RTR 160cc<br>RTR 180cc                                               | 3.384 (44/13)<br>3.286 (46/14)                                                    |
| 3     | Gear ratio              | First gear<br>Second gear<br>Third gear<br>Fourth gear<br>Fifth gear | 2.917 (35/12)<br>1.875 (26/14)<br>1.333 (24/18)<br>1.050 (21/20)<br>0.880 (22/25) |

### TRANSMISSION

Unit : mm

| S.No. | DESCRIPTION                           |                                                      | STANDARD      | SERVICE LIMIT |
|-------|---------------------------------------|------------------------------------------------------|---------------|---------------|
| 1     | Shift fork roller to groove clearance | Fork low speed<br>Fork high speed<br>Fork high speed | 0.050 - 0.200 | 0.3           |
| 2     | Drive chain - 20 pitch length         |                                                      | 254           | 259.4         |
| 3     | Drive chain slack                     |                                                      | 20 - 30       | —             |

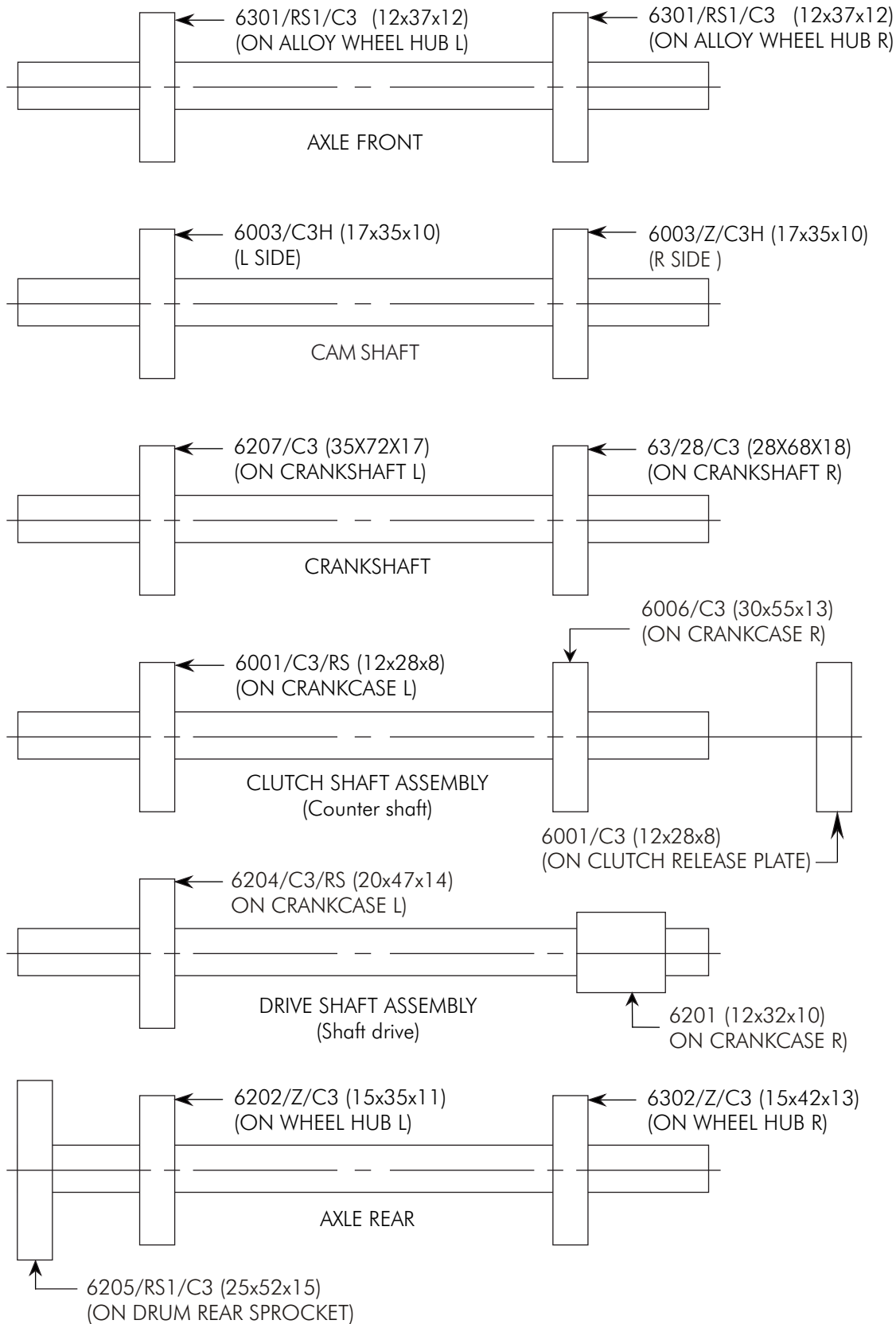
### SUSPENSION

Unit : mm

| S.No. | DESCRIPTION                        |                          | STANDARD                   | SERVICE LIMIT     |
|-------|------------------------------------|--------------------------|----------------------------|-------------------|
| 1     | Front fork stroke length           |                          | 105                        | —                 |
| 2     | Front fork spring length           | (GIL make)<br>(TOP make) | 445<br>403.5               | 435<br>393.5      |
| 3     | Front fork oil grade               |                          | Teleshockab oil            |                   |
| 4     | Front fork oil capacity (each leg) | (GIL make)<br>(TOP make) | 140 ± 2 ml<br>152 ± 2.5 ml | 140 ± 2.5 ml<br>— |



## BEARING SPECIFICATION





## CARBURETTOR ASSEMBLY

| S.No. | DESCRIPTION                       | SPECIFICATION   |                   |
|-------|-----------------------------------|-----------------|-------------------|
|       |                                   | RTR 160         | RTR 180           |
| 1     | Carburettor type                  | BS26-X39        | BS29              |
| 2     | Carburettor identification number | Z1              | -----             |
| 2     | Main Jet                          | 105             | 125               |
| 3     | Needle Jet                        | P-2             | P-0               |
| 4     | Jet Needle                        | 4DHZ56          | 4DHL42            |
| 5     | E - Ring position                 | 2nd from top    | 2nd from top      |
| 6     | Pilot Jet                         | 15              | 20                |
| 7     | Pilot air jet (1)                 | 145             | 145               |
| 8     | Piston valve                      | 120             | 120               |
| 9     | Mixture control screw             | $2 \pm 1$       | $3 \pm 2$         |
| 10    | Idling rpm                        | $1400 \pm 100$  | $1400 \pm 100$    |
| 11    | Idling CO%                        | 3.5 % By Volume | 2 ~ 3 % By Volume |



## ELECTRICAL

| S.No. | DESCRIPTION                                                      | SPECIFICATION                                                                             |
|-------|------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| 1     | Ignition timing<br>At coinciding mark<br>Full advance            | $5^{\circ} \pm 2^{\circ}$ BTDC @ 1500 rpm,<br>$34^{\circ} \pm 2^{\circ}$ BTDC @ 10000 rpm |
| 2     | Pulsar coil resistance                                           | 175 - 275 ohms                                                                            |
| 3     | Ignition coil resistance<br>Primary winding<br>Secondary winding | 2 - 3 ohm<br>12 - 14 K ohms                                                               |
| 4     | Lighting coil resistance                                         | 0.01 - 1.0 ohm                                                                            |
| 5     | Charging coil resistance                                         | 0.01 - 1.5 ohms                                                                           |
| 6     | Suppressor cap resistance                                        | 5 K ohms                                                                                  |
| 7     | Battery (Type / Amp.)                                            | 12V - 9Ah                                                                                 |
| 8     | Generator                                                        | 12V - 100W                                                                                |
| 9     | Spark plug                                                       | BOSCH UR5DDC - Twin electrode                                                             |
| 10    | Head lamp - high / low beam                                      | 12V - 35/35W x 1                                                                          |
| 11    | Tail lamp                                                        | 12V - 0.5 (LED)                                                                           |
| 12    | Brake lamp                                                       | 12V - 3.5W (LED)                                                                          |
| 13    | Turn signal lamp                                                 | 12V - 10W x 4                                                                             |
| 14    | Instrument panel lamp                                            | LCD/LED indicator                                                                         |
| 15    | Turn signal indicator lamp                                       | LCD/LED indicator                                                                         |
| 16    | Fuel level sensor resistance<br>Full<br>Empty                    | $12.5 \pm 0.3$ ohms<br>$76 \pm 5$ ohms                                                    |
| 17    | Horn                                                             | 12VDC x 2                                                                                 |
| 18    | Fuse                                                             | 12V 10A                                                                                   |





## BRAKE AND WHEEL ASSEMBLY

Unit : mm

| S.No. | DESCRIPTION                                      |                       | STANDARD                                                             | SERVICE LIMIT |
|-------|--------------------------------------------------|-----------------------|----------------------------------------------------------------------|---------------|
| 1     | Front brake free play                            |                       | –                                                                    | –             |
| 2     | Rear brake pedal free play (Drum brake)          |                       | 15 - 20                                                              | –             |
| 3     | Hub complete (brake drum) ID                     | Front<br>Rear         | –<br>130                                                             | –<br>130.7    |
| 4     | Shoe complete brake (brake shoe) thickness       | Front<br>Rear         | –<br>–                                                               | –<br>1.5      |
| 5     | Disc plate face out (Disc brake Fr & Rr)         |                       | 0.05                                                                 | 0.1           |
| 6     | Disc plate thickness (Disc brake Fr & Rr)        |                       | 4                                                                    | 3.5           |
| 7     | Alloy wheel runout (Fr & Rr)                     | Axial<br>Radial       | –                                                                    | 1 mm          |
| 8     | Axle runout                                      | Front<br>Rear         | 0.25/100 mm                                                          |               |
| 9     | Tyre size<br>RTR 160 & 180<br>RTR 160<br>RTR 180 | Front<br>Rear<br>Rear | 90/90 x17"<br>100/80x18"<br>100/80x17"                               | –             |
| 11    | Tyre tread depth                                 | Front<br>Rear         | –<br>–                                                               | 1.5 or TWI    |
| 12    | Tyre pressure- Front                             | Solo<br>Dual          | 1.75 kg/cm <sup>2</sup> (25 PSI)<br>2.00 kg/cm <sup>2</sup> (28PSI)  | –             |
| 13    | Tyre pressure - Rear                             | Solo<br>Dual          | 1.75 kg/cm <sup>2</sup> (25 PSI)<br>2.25 kg/cm <sup>2</sup> (32 PSI) | –             |

### Note:

Any part in use is subject to wear and tear. The maximum amount of acceptable wear is called "Service Limit". Any part which is within the service limit is expected to provide a satisfactory period of service life.



## TIGHTENING TORQUE

### ENGINE

| S.No. | DESCRIPTION                                           | QUANTITY | TORQUE IN Nm |
|-------|-------------------------------------------------------|----------|--------------|
| 1     | Hexagonal flange bolt, cover cylinder head mounting   | 10       | 8 - 12       |
| 2     | Cap inspection hole (cover tappet)                    | 2        | 22 -25       |
| 3     | Domed nut, cylinder head mounting                     | 4        | 22 - 27      |
| 4     | Hexagonal flange nut, cylinder head mounting          | 2        | 10           |
| 5     | Hexagonal flange nut,cylinder mounting                | 2        | 10           |
| 6     | Hexagonal screw, cam sprocket mounting                | 2        | 10-12        |
| 7     | Hexagonal screw, adjuster assembly tensioner mounting | 2        | 8 - 10       |
| 8     | Bolt, adjuster assembly tensioner                     | 1        | 5 - 7        |
| 9     | Hexagonal screw, tensioner cam chain mounting         | 1        | 8 - 10       |
| 10    | Union bolt, oil pipe                                  | 3        | 12 - 16      |
| 11    | Hexagonal flange nut, crankcase mounting              | 13       | 8 - 12       |
| 12    | Hexagonal nut, gear primary mounting                  | 1        | 60 - 80      |
| 13    | Nut, clutch shaft                                     | 1        | 35 - 45      |
| 14    | Hexagonal flange bolt, cover clutch mounting          | 10       | 8 -12        |
| 15    | Hexagonal flange bolt, cap oil filter mounting        | 3        | 8 -12        |
| 16    | Hexagonal flange nut, magneto rotor mounting          | 1        | 75 - 85      |
| 17    | Hexagonal screw, sprocket engine mounting             | 2        | 10 - 12      |
| 18    | Hexagonal flange bolt, cover magneto mounting         | 9        | 8 -12        |
| 19    | Plug oil drain                                        | 1        | 20 - 25      |
| 20    | Hexagonal bolt, lever kick starter mounting           | 1        | 22 - 25      |
| 21    | U nut, engine mounting                                | 6        | 30 - 35      |
| 22    | Hexagonal flange bolt, muffler comp front mounting    | 2        | 12 -20       |
| 23    | Hexagonal flange bolt, engine front bracket mounting  | 4        | 37 - 45      |
| 24    | Spark plug                                            | 1        | 10 - 12      |



## TIGHTENING TORQUE

### CHASSIS

| S.No. | DESCRIPTION                                                | QUANTITY | TORQUE IN Nm |
|-------|------------------------------------------------------------|----------|--------------|
| 1     | U nut, axle front                                          | 1        | 50 - 70      |
| 2     | Hexagonal nut, lever front brake cam                       | 1        | 6.7 - 8.3    |
| 3     | Hexagonal screw, front fender mounting                     | 4        | 16 - 20      |
| 4     | Hexagonal socket head cap screw, front fork upper mounting | 2        | 70 - 110     |
| 5     | Bolt, front fork lower mounting (under bracket complete)   | 2        | 18 - 24      |
| 6     | Lock nut, steering                                         | 1        | 60 - 100     |
| 7     | Bolt, handle bar comp holder                               | 2        | 9 - 13       |
| 8     | Bolt, rider footrest assembly mounting                     | 2        | 16 - 20      |
| 9     | Nut, stand complete centre mounting                        | 1        | 36 - 40      |
| 10    | Nut, swingarm assembly mounting                            | 1        | 44 - 54      |
| 11    | Nut, footrest assembly pillion                             | 2        | 16 - 20      |
| 12    | Nut, shockabsorber mounting                                | 2        | 22 - 34      |
| 13    | Bolt, shockabsorber mounting                               | 2        | 32 - 40      |
| 14    | Nut, torque link complete mounting                         | 1        | 10 - 16      |
| 15    | Nut, panel assembly rear mounting                          | 1        | 11 - 16      |
| 16    | Nut, sprocket (rear sprocket)                              | 4        | 20 - 30      |
| 17    | Nut, shaft rear sprocket mounting (drum mounting)          | 1        | 55 - 70      |
| 18    | Bolt, lever rear brake cam (rear brake lever)              | 1        | 6.7 - 8.3    |
| 19    | Nut, axle complete rear                                    | 1        | 50 - 70      |
| 20    | Bolt, handle holder comp                                   | 2        | 16 - 20      |
| 21    | Bolt, chain case complete mounting                         | 2        | 16 - 20      |
| 22    | Nut, side stand mounting                                   | 1        | 32 - 40      |
| 23    | Bolt, rear fender mounting                                 | 4        | 16 - 20      |
| 24    | Nut, muffler assembly mounting (at rear)                   | 1        | 16 - 20      |



## SPECIAL MATERIAL REQUIRED FOR MAINTENANCE

The following recommended materials are required for maintenance work on TVS Apache and should be kept in hand for ready use.

| S.No.                    | APPLICATION                                                                                                                             | MATERIAL                                                           |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| <b>LUBRICATION</b>       |                                                                                                                                         |                                                                    |
| 1                        | Oil seal lip, swing arm assembly pivot, centre stand pivot, pedal complete brake pivot, steering races, steering cup and steering cone. |                                                                    |
| 2                        | Engine cum transmission oil                                                                                                             | 4T oil                                                             |
| <b>ADHESIVES</b>         |                                                                                                                                         |                                                                    |
| 1                        | Fastening nuts adhesion                                                                                                                 | Anabond thread locker                                              |
| 2                        | Fastening rubber, plastics and ceramic                                                                                                  | Anabond (Eng) Cyanoacrylate adhesive 202 and 201 Dendrite adhesive |
| 3                        | Bearing fitment adhesive                                                                                                                | Specfit                                                            |
| <b>CLEANING SOLVENTS</b> |                                                                                                                                         |                                                                    |
| 1                        | Crankcase, shafts, gears and filter air cleaner                                                                                         | Inflammable solvent like kerosene.                                 |
| 2                        | Piston and rings                                                                                                                        | Carbon tetra chloride and Acetone carbon chloride.                 |
| 3                        | Carburettor                                                                                                                             | Carbon tetra chloride                                              |

## USE OF GENUINE TVS MOTOR COMPANY PARTS

When replacing any part of the machine, always use TVS-M genuine parts only. Non genuine parts reduce the performance and cause failures.

## FUEL

| ITEM                                 | SPECIFICATION    |
|--------------------------------------|------------------|
| Fuel type                            | Unleaded Benzine |
| Fuel tank capacity including reserve | 16 litres        |
| Reserve                              | 2.5 litres       |



## TROUBLE SHOOTING

### A. STARTING TROUBLE

| STEP | REASON                                     | POSSIBLE CAUSE                               | COUNTER MEASURE                                                               |
|------|--------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------------|
| 1    | No fuel flow to carburettor                | No fuel in fuel tank                         | Fill petrol                                                                   |
|      |                                            | Clogged fuel filter / fuel cock              | Clean                                                                         |
|      |                                            | Blockage of vent hole in cap Assy. fuel tank | Clear vent hole                                                               |
| 2    | No spark / weak spark / intermittent spark | Incorrect spark plug gap                     | Correct gap                                                                   |
|      |                                            | Dirty / excess gap spark plug                | Clean and adjust gap                                                          |
|      |                                            | Bridging of electrodes                       | Clean and adjust gap                                                          |
|      |                                            | Loose suppressor cap                         | Correct / fix properly                                                        |
|      |                                            | Defective ignition coil                      | Replace                                                                       |
|      |                                            | Defective ignition switch                    | Replace                                                                       |
|      |                                            | Defective digital CDI unit (combined CDI)    | Replace                                                                       |
|      |                                            | Defective pulsar coil                        | Replace                                                                       |
|      |                                            | Defective source coil                        | Replace                                                                       |
|      |                                            | Oily sparkplug                               | Check oil leakages through Rings, valves into combustion chamber and correct. |
| 3    | Incorrect valve timing                     | Valve timing marks not matching              | Correct valve timing                                                          |
|      |                                            | Improper valve tappet clearance              | Adjust tappets                                                                |
| 4    | Induction leakage                          | Loose carburettor mounting                   | Tighten                                                                       |
|      |                                            | Damaged intake pipe and gasket               | Replace                                                                       |
| 5    | Improper carburation                       | Sticky / worn out float needle               | Clean / replace                                                               |
|      |                                            | Loose main jet / pilot jet                   | Tighten                                                                       |
|      |                                            | Blocked passages                             | Clean the passages                                                            |
|      |                                            | Incorrect air screw adjustment               | Tune up correctly                                                             |
|      |                                            | Excessive CO                                 | Tune up correctly                                                             |
|      |                                            | Incorrect jet size                           | Replace with specified size                                                   |
|      |                                            | Incorrect float height                       | Correct                                                                       |





## TROUBLE SHOOTING

### A. STARTING TROUBLE (Contd.)

| STEP | REASON           | POSSIBLE CAUSE                       | COUNTER MEASURE                |
|------|------------------|--------------------------------------|--------------------------------|
| 6    | Poor compression | Leakage through gasket cylinder head | Tighten bolts / replace gasket |
|      |                  | Incorrect valve clearances           | Adjust to specification        |
|      |                  | Worn out piston rings                | Replace                        |
|      |                  | Worn out cylinder and piston         | Replace                        |
|      |                  | Leakage through valve                | Do lapping and correct         |

### B. POOR PICK-UP

| STEP | REASON                      | POSSIBLE CAUSE             | COUNTER MEASURE             |
|------|-----------------------------|----------------------------|-----------------------------|
| 1    | No free movement of vehicle | Brake binding              | Adjust both brakes          |
|      |                             | Low tyre pressure          | Inflate to specification    |
|      |                             | Jammed wheel bearings      | Replace / lubricate         |
|      |                             | Tight chain                | Adjust free play            |
| 2    | Improper ignition           | Refer complaint No. A.2    |                             |
|      |                             | Refer complaint No. A.3    |                             |
| 3    | Improper carburation        | Refer complaint No. A.5    |                             |
| 4    | Clutch slippage             | Incorrect free play        | Adjust as per specification |
|      |                             | Burnt drive, driven plates | Check and replace           |
| 5    | Poor compression            | Refer complaint No. A.6    |                             |

### C. SMOKY EXHAUST (WHITE SMOKE)

| STEP | REASON                               | POSSIBLE CAUSE                           | COUNTER MEASURE                |
|------|--------------------------------------|------------------------------------------|--------------------------------|
| 1    | Burning of oil in combustion chamber | Oil mixed in fuel                        | Replace fuel in tank and clean |
|      |                                      | Adulterated fuel                         | Replace fuel in tank and clean |
|      |                                      | Improper routing / clogged breather pipe | Correct routing / clean        |
|      |                                      | Damaged seal valve stem oil / valve stem | Replace                        |
|      |                                      | Incorrect fitment of 2nd and Oil rings   | Fit properly                   |
|      |                                      | Worn out piston rings                    | Replace Rings                  |
|      |                                      | Worn out cylinder and piston             | Replace cylinder and piston    |
|      |                                      | Engine oil level exceeded maximum limit  | Fill to the specified level    |



## TROUBLE SHOOTING

### D. SMOKY EXHAUST (BLACK SMOKE)

| STEP | REASON            | POSSIBLE CAUSE                 | COUNTER MEASURE   |
|------|-------------------|--------------------------------|-------------------|
| 1    | Very rich mixture | Sticky / worn out float needle | Correct / replace |
|      |                   | Worn out jets                  | Replace           |
|      |                   | Clogged air filter             | Clean / replace   |
|      |                   | Punctured float                | Replace           |
|      |                   | Choke plunger stuck            | Correct           |

### E. ENGINE OVER HEATING

| STEP | REASON                      | POSSIBLE CAUSE                  | COUNTER MEASURE               |
|------|-----------------------------|---------------------------------|-------------------------------|
| 1    | Poor cooling                | Cooling fins covered with mud   | Clean                         |
| 2    | No free movement of vehicle | Refer cause No.1 of complaint B |                               |
| 3    | Incorrect ignition          | Refer cause No.2 of complaint A |                               |
| 4    | Poor lubrication            | Incorrect type of oil           | Use recommended oil           |
|      |                             | Low quantity / poor quality     | Top up / replace as specified |
|      |                             | Oil filter clogged              | Clean / replace               |
|      |                             | Defective oil pump              | Replace                       |
|      |                             | Blocked oil passages            | Clean / Correct               |
| 5    | Clutch slippage             | Refer cause No.4 of complaint B |                               |
| 6    | High compression pressure   | Excessive carbon deposition     | Decarbonise engine & muffler  |
| 7    | Incorrect valve timing      | Maladjusted valve clearance     | Check and adjust              |
| 8    | Incorrect sparkplug         | Wrong heat range of sparkplug   | Replace                       |

### F. HEAD LAMP NOT WORKING

| STEP | REASON                  | POSSIBLE CAUSE                      | COUNTER MEASURE                |
|------|-------------------------|-------------------------------------|--------------------------------|
| 1    | Bulb fused              | Defective bulb                      | Replace                        |
|      |                         | High voltage flow to bulb           | Check regulator voltage output |
| 2    | No power supply to bulb | Loose contact in bulb holder/switch | Correct contacts               |
|      |                         | No power supply from lighting coil  | Check lighting coil resistance |



## TROUBLE SHOOTING

### G. HORN NOT WORKING

| STEP | REASON                 | POSSIBLE CAUSE                                                                                                         | COUNTER MEASURE                                                                |
|------|------------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| 1    | No sound               | Blown fuse<br>No / discharged battery<br>Defective horn<br>Defective horn button<br>Wiring cut / disconnected terminal | Replace<br>Fix / recharge<br>Replace<br>Correct / replace<br>Replace / connect |
| 2    | Weak / irregular sound | Loose connection<br>Discharged battery<br>Incorrect tuning of horn                                                     | Correct<br>Recharge<br>Tune properly                                           |
| 3    | Rippling noise         | Defective horn<br>Loose clamp                                                                                          | Replace / tune<br>Correct                                                      |

### H. HIGH FUEL CONSUMPTION

| STEP | REASON        | POSSIBLE CAUSE                                                  | COUNTER MEASURE  |
|------|---------------|-----------------------------------------------------------------|------------------|
| 1    |               | Refer causes B. 1, 2, 3, 4 & 5.                                 |                  |
| 2    | Fuel leakages | Leakage through fuel tank, fuel hose, fuel cock and carburettor | Correct leakages |

### I. EXCESSIVE CO

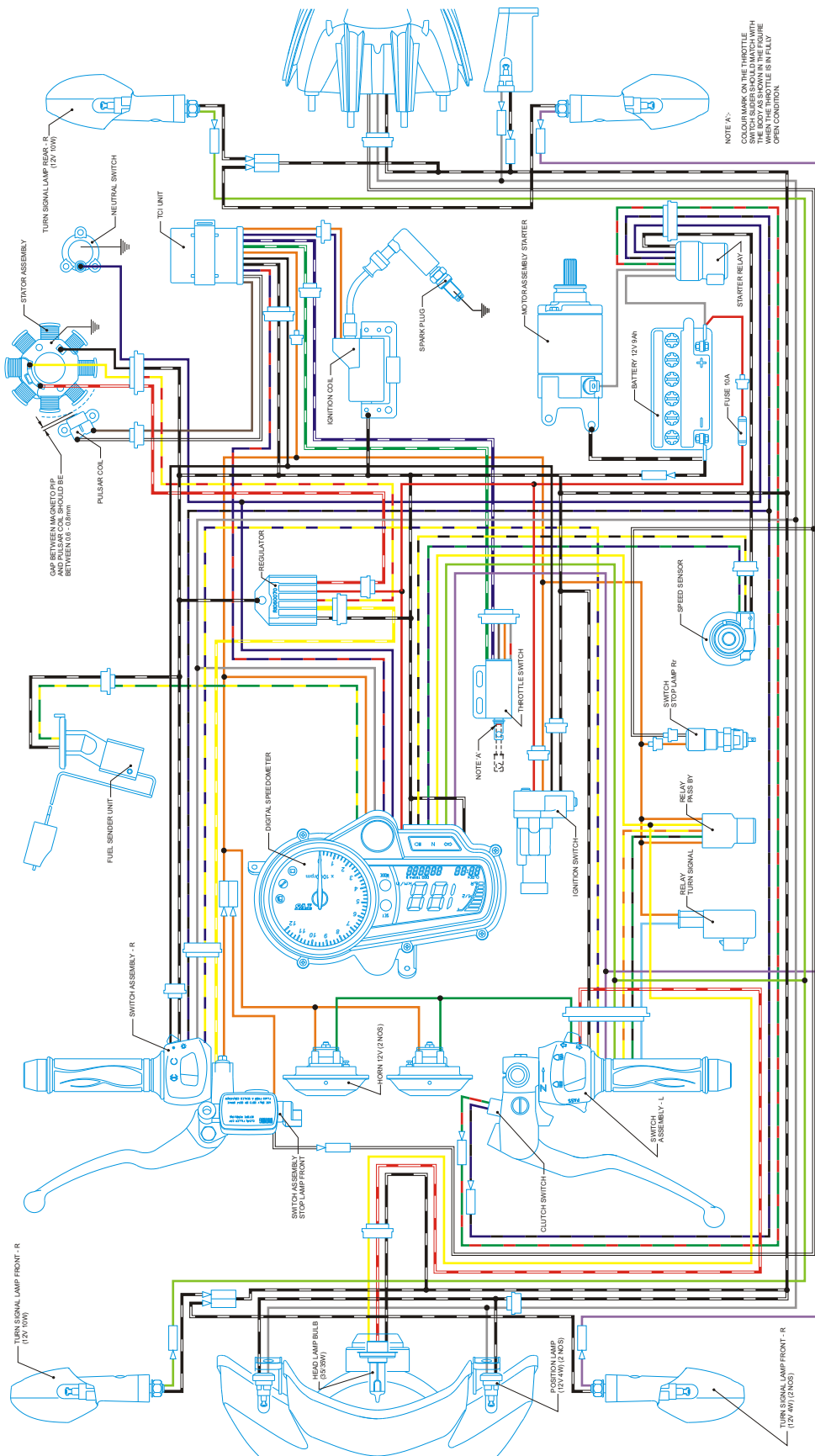
| STEP | REASON                                 | POSSIBLE CAUSE                          | COUNTER MEASURE |
|------|----------------------------------------|-----------------------------------------|-----------------|
| 1    | Improper carburation                   | Refer causes A.5                        |                 |
| 2    | Malfunctioning of exhaust gas analyser | Wrongly selected settings / accessories | Correct         |
| 3    | Rich mixture                           | Refer causes D. 1                       |                 |

### J. JERKY MOVEMENT / ABNORMALITY OF ENGINE RPM

| STEP | REASON       | POSSIBLE CAUSE      | COUNTER MEASURE |
|------|--------------|---------------------|-----------------|
| 1    | Excessive CO | Improper idling rpm | Adjust idling   |



TVS APACHE RTR 160 & 180 - WIRING DIAGRAM



| WIRE COLOUR CODE | FROM                                 | TO                                          |
|------------------|--------------------------------------|---------------------------------------------|
| WHITE RED        | STATOR ASSEMBLY, BEAM CONTROL SWITCH | STATOR ASSEMBLY, HORN LAMP LOW BEAM         |
| YELLOW           | PASS BY RELAY                        | DIGITAL SPEEDOMETER AND HORN LAMP HIGH BEAM |
| YELLOW BLACK     | HUB DRIVE SPEEDO                     | DIGITAL SPEEDOMETER                         |
| YELLOW BLUE      | LIGHT SWITCH                         | BEAM CONTROL SWITCH                         |
| YELLOW ORANGE    | PASS BY SWITCH                       | PASS BY RELAY                               |
| YELLOW RED       | STATOR ASSEMBLY, HORN                | REGULATOR                                   |
| YELLOW WHITE     | REGULATOR                            | LIGHT SWITCH                                |

| WIRE COLOUR CODE | FROM                                | TO                                                                                                         |
|------------------|-------------------------------------|------------------------------------------------------------------------------------------------------------|
| LIGHT GREEN      | TURN SIGNAL SWITCH                  | TURN SIGNAL LAMP R (F & R)                                                                                 |
| ORANGE           | IGNITION SWITCH                     | DIGITAL SPEEDOMETER, TC UNIT, IGNITION COIL, P & R BRAKE SWITCH, HORN, PASS BY RELAY AND RELAY TURN SIGNAL |
| RED              | REGULATOR                           | IGNITION SWITCH, BATTERY, DIGITAL SPEEDOMETER, REGULATOR                                                   |
| RED WHITE        | STATOR ASSEMBLY, HORN               | TURN SIGNAL LAMP L (F & R)                                                                                 |
| VIOLET           | TURN SIGNAL SWITCH                  | TURN SIGNAL LAMP L (F & R)                                                                                 |
| WHITE            | PULSAR COIL, STOP LAMP SWITCH F & R | TC UNIT AND BRAKE LAMP                                                                                     |

| WIRE COLOUR CODE | FROM                            | TO                                                                  |
|------------------|---------------------------------|---------------------------------------------------------------------|
| GREEN            | HORN SWITCH                     | HORN                                                                |
| GREEN BLACK      | RELAY PASS BY                   | PASS BY SWITCH                                                      |
| GREEN RED        | CLUTCH SWITCH                   | STARTER RELAY                                                       |
| GREEN WHITE      | TC UNIT                         | THROTTLE SWITCH                                                     |
| GREEN YELLOW     | FUEL SENDER ASSEMBLY            | DIGITAL SPEEDOMETER                                                 |
| GREY             | LIGHT SWITCH                    | DIGITAL SPEEDOMETER, POSITION LAMP, TAIL LAMP AND NUMBER PLATE LAMP |
|                  | BATTERY ASSEMBLY, STARTER RELAY | STARTER MOTOR ASSY                                                  |
| LIGHT BLUE       | RELAY TURN SIGNAL               | TURN SIGNAL SWITCH                                                  |

| WIRE COLOUR CODE | FROM               | TO                                    |
|------------------|--------------------|---------------------------------------|
| BLACK            | STATOR ASSY, HORN  | STATOR ASSY, HORN                     |
| BLACK WHITE      | ENGINE HALL SWITCH | ENGINE HALL SWITCH                    |
| BLUE             | NEUTRAL SWITCH     | DIGITAL SPEEDOMETER AND STARTER RELAY |
| BLUE BLACK       | STARTER SWITCH     | CLUTCH SWITCH                         |
| BLUE GREEN       | HUB DRIVE SPEEDO   | DIGITAL SPEEDOMETER                   |
| BLUE RED         | TC UNIT            | DIGITAL SPEEDOMETER                   |
| BLUE WHITE       | THROTTLE SWITCH    | TO UNIT                               |
| BROWN            | PULSAR COIL        | TO UNIT                               |