TVS

TVS MOTOR COMPANY

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TVS KING DELUXE

TVS

The King of Autos.

SERVICE MANUAL

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SERVICE MANUAL

SER.MAN/TVS KING DELUXE - REVISION - 1

NOTICE

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

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

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

FOREWORD

We are happy to provide you the first edition of new **TVS KING DELUXE** three wheeler's service manual.

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

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

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

While servicing, certain parts may require replacement. For ordering spares please refer **Parts catalogue of TVS KING DELUXE** three wheeler. The illustrations in this manual may not give you the exact name, part number and quantities.

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

You may also contact us at

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

HOW TO READ THIS MANUAL

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

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

Heading:- **CYLINDER HEAD COMPLETE**

Sub heading:- **Decarbonising**

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

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

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

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

Hand tools :-

17 mm spanner

Special tools :-

Part number	Description
N231 002 0	Clutch nut tightening tool

Service limits :-

Service limit	0.05 mm

GROUP INDEX

Chapter 1

GENERAL INFORMATION

CONTENTS

VEHICLE IDENTIFICATION NUMBERS

LOCATIONS

CHASSIS NUMBER

- Chassis number can be located on the right side of 'B' pillar partition on the driver side as shown in the figure. (Fig. 1.1)

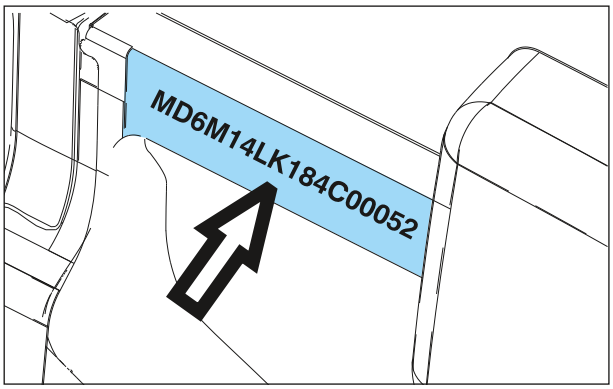


Fig. 1.1

ENGINE NUMBER

- Engine number can be located on crank case RH side near the rear mounting as shown in the figure.(Fig. 1.2)

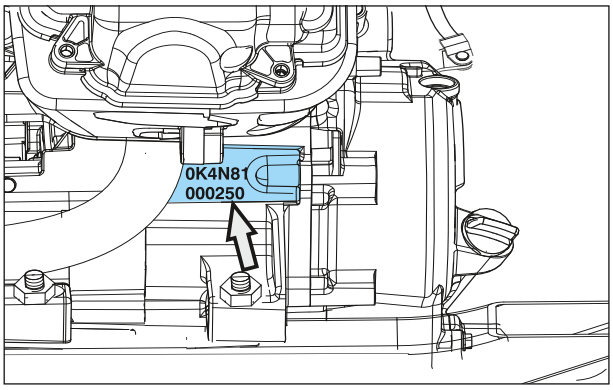


Fig. 1.2

ENGINE NUMBER

Engine Type (K2 - 2S, K4 - 4S) | Year Code | Running serial number 000001 To 999999 (Six digits)

0	K	4	H	D	1	9	9	9	9	9	9

Version | Month Code | Plant Code

0 - Regular Power
A - High Power

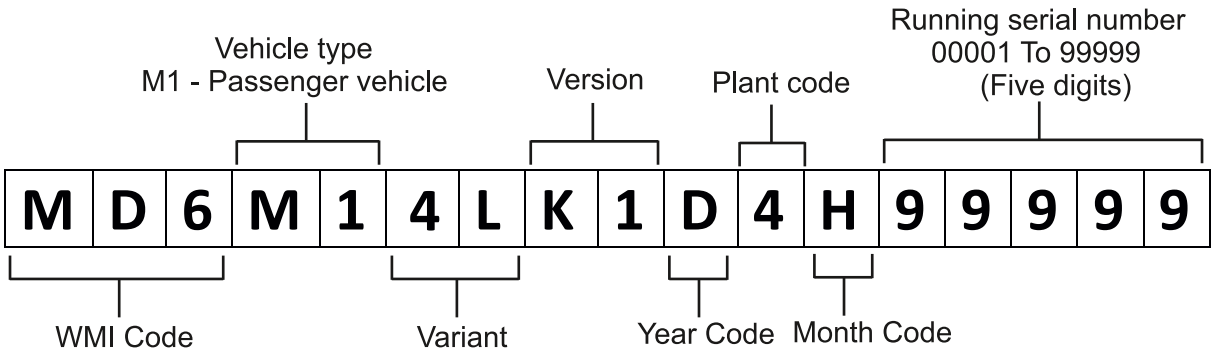
Year Code		Year Code		Year Code	
2008	8	2016	G	2024	R
2009	9	2017	H	2025	S
2010	A	2018	J	2026	T
2011	B	2019	K	2027	U
2012	C	2020	L	2028	V
2013	D	2021	M	2029	W
2014	E	2022	N	2030	X
2015	F	2023	P		

Plant Code	
1	Hosur
2	Mysore
3	HP
4	3W Hosur

Variant	
2P	2S Petrol
2L	2S LPG
2C	2S CNG
4P	4S Petrol
4L	4S LPG
4C	4S CNG

Month	Code
January	A
February	B
March	C
April	D
May	E
June	F
July	G
August	H
September	K
October	L
November	N
December	P

CHASSIS NUMBER



Year Code		Year Code		Year Code	
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Month	Code
January	A
February	B
March	C
April	D
May	E
June	F
July	G
August	H
September	K
October	L
November	N
December	P

Variant	
2P	2S Petrol
2L	2S LPG
2C	2S CNG
4P	4S Petrol
4L	4S LPG
4C	4S CNG

Plant Code	
1	Hosur
2	Mysore
3	HP
4	3W Hosur

Version	
K	Regular Power
A	High Power

TECHNICAL SPECIFICATION

DIMENSION AND WEIGHT

Overall length	2647mm (petrol); 2647mm (LPG); 2647mm (CNG)
Overall width	1329 mm
Overall height	1740mm (petrol); 1740 mm(LPG); 1740(CNG)
Ground clearance	194mm (unladen) / 169mm (Laden)
Wheel Base	1985mm (petrol); 1985 mm(LPG); 1985(CNG)
Wheel Track	1150 mm
kerb weight	325 kg (petrol); 360 kg(LPG); 385 kg(CNG)
Pay load	320 kg(pet); 320 kg(LPG); 320 kg(CNG)
Maximum laden weight	645kg(pet); 680 kg(LPG); 705 kg(CNG)

ENGINE

Type	4 Stroke, single cylinder forced air cooled, (SI) spark engine
Bore	62 mm
Stroke	66 mm
Piston displacement	199.26cc
Carburetor type	UCAL, VM18
Air filter	Foam filter
Lubrication system (engine)	Forced wet sump
Lubrication system(Gear box and differential)	Wet sump
Compression ratio	Petrol: 9.6 ± 0.3 : 1, LPG: 9.9 ± 0.3 : 1, CNG: 9.6 ± 0.3 : 1
Maximum power	6.42±0.2KW(8.7BHP)@5250±300rpm (Petrol) (RP)
	7.3±0.2KW(9.8BHP)@5500±250rpm (Petrol) (HP)(wherever applicable)
Maximum power	6.0KW(8.1BHP)@5000±300rpm (LPG) (RP)
	6.9±0.2KW(9.3BHP)@5500±250rpm (LPG) (HP) (wherever applicable)

Maximum power	5.5 ±0.3KW(7.4BHP)@5000 ±300 rpm (CNG) (RP) 6.3KW(8.4BHP)@5500 rpm (CNG) (HP) (wherever applicable)
Maximum torque	14.5Nm @ 3500 ± 300 rpm (Petrol) (RP) 15±0.4Nm @ 3250 ± 250 rpm (Petrol) (HP) (wherever applicable)
Maximum torque	14.6Nm @ 3250 ± 250 rpm (LPG) (RP) 14.5 ± 0.2Nm @ 3500 ± 250 rpm (LPG) (HP) (wherever applicable)
Maximum torque	12.9Nm @ 3250 ± 300 rpm (CNG) (RP) 13Nm @ 3500 rpm (CNG) (HP) (wherever applicable)
Maximum speed	55 ± 2 km / hr
Engine idling rpm	GS (1150 ± 50rpm); GS+ (1250 ± 100) LS (1150 ± 50rpm Petrol mode & Gas mode rpm is same) LS+ (1250 ± 100rpm Petrol mode) & (1150 ± 100rpm Gas mode) ZS (1250 ± 50rpm Petrol mode) & (1100 ± 50rpm Gas mode) ZS+ (1250 ± 100rpm Petrol mode) & (1150 ± 100rpm Gas mode)
Starting system	Electric system / hand starter system

TRANSMISSION

Clutch	Wet - Multi plate type
Transmission	4 speed forward, 1 reverse speed with 2 neutral constant mesh fork and cam type
Differential	Integral with engine
Gear shift pattern	All forward down hand operated & reverse up
Primary reduction	3.375 (81/24)
Final reduction	2.955 (65/22)

GEAR RATIO

First gear	3 (39/13)
Second gear	1.619 (34/21)
Third	1.0769 (28/26)
Fourth gear (top)	0.793 (23/29)
Reverse gear	2.909 (32/11)

CHASSIS

Frame	Semi - monocoque chassis made of pressed longitudinal and crossed members.
Front suspension	Trailing arm, co - axial constant rate helical coil spring, hydraulic double acting shock absorber.
Rear suspension	Trailing arm, independent rear wheels, co - axial constant rate helical coil spring, hydraulic double acting shock absorber.
Steering angle	53º LH / 46º RH
Caster angle	19º
Turning radius	2550mm LH / 2700 mm RH
Gradeability	10º

BRAKES

Front & Rear drum	Foot operated, internally expending shoe, with auto adjuster, hydraulic Transmission, dual circuit master cylinder.
Parking	Mechanically operated on rear brakes
Rim size	Front and Rear - 3.00D x 8
Tyre size	4.0-8, 6 ply rating
Tyre pressure	
Un - laden	Front - 30 psi, 2.11 kg/cm² Rear - 30 psi, 2.11 kg/cm²
Laden	Front - 30 psi, 2.11 kg/cm² Rear - 34 psi, 2.39 kg/cm²

ELECTRICAL

Type	12 V, Negative ground
Ignition	DC Digital TCI
Spark plug	BOSCH UR 6DE
Battery type	12V 32Ah (electric) maintenance free.
Body earthing	Negative terminal
Generator	Fly wheel magneto, 12V, 130W @ 1500rpm

Head lamp	12V, 35/35W X 2, Twin Headlamp
Tail / brake lamp	12V, 5/21 W X 2
Reverse lamp	12V, 21 W X 1
Turn signal lamp	12V, 10 W X 4
Number plate lamp	12V, 5W X 1
Position lamp	12V, 4W X2
Speedometer lamp	12V, 2W X 1
All instrument panel lamp	12V, 2W X 1
Horn type	12V DC - 98.1 dB(A)
Fuse	12V, 15Ax1 (GS) 12V, 15Ax1, 5Ax1, 2Ax1 (LS & ZS)
Fuse	12V, 20Ax1 (GS+) 12V, 20Ax1, 5Ax1, 2Ax1 (LS+ & ZS+)

CAPACITY

Fuel Tank Capacity	8 litres (petrol), 3 litres (LPG & CNG)
LPG Cylinder Capacity	16.4 litres of water 80% filling limit
CNG Cylinder Capacity	28 and 33 litres of water (wherever applicable)
Engine Oil	SAE 20W40
Differential & Transmission oil (grade)	SAE 20W40
Engine oil quantity	1750 ml
Differential oil quantity	250 ml
Brake Fluid grade	Brakes DOT 3 / DOT 4
Brake Fluid reservoir quantity	250 ml

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

Fuel and Oil Recommendation

Application	Quantity	Recommended grade	Manufacturer/Brand
Engine cum transmission oil (4Stroke)	1750ml	SAE 20W40	TVS TRU 4, AP 1 SL, JASO Ma2
Differential oil	250 ml	SAE 20W40	TVS TRU 4, AP 1 SL, JASO Ma2
Brake fluid	250 ml	DOT 3 / DOT 4	TVS Girling
Grease (muff cup)	120 g	IPOL IPLEX RR3	IPOL
Grease (Steering, Hand starter, Speedometer drive gear and cable)	30 g	MP3/BECHEM PREMIUM III	Castrol / BECHEM

SPECIAL FEATURES IN TVS KING DELUXE

- Auto decompression mechanism for easy starting
- Silent cam chain for smooth engine performance and longer life
- Secondary air injection for least emission and cleaner environment (wherever applicable)
- Low engine oil pressure warning lamp to safe guard engine.
- Forced lubrication system for longer engine life
- Roller cam follower (RCF) for lower engine friction and longer life.
- Multi curve digital TCI
- Single piece glass windshield for unobstructed and wide view.
- Auto Starter motor cut-off for longer life of starter motor.
- Starter Relay Timer for better durability of starter motor.

RUNNING - IN PERIOD

- The first 2000 km is a crucial part. Proper running-in operation during this time helps in ensuring a longer life and smooth performance of TVS King Deluxe

Km	1st	2nd	3rd	4th
0 - 2000	10 km / h	15 km / h	25 km / h	40 km / h

LIST OF HAND TOOLS REQUIRED

1.Flat head spanners:

8 mm, 10 mm, 12 mm, 13 mm, 14 mm, 15 mm, 17 mm,19 mm, 25 mm, and 28 mm

2.Ring spanners:

8 mm, 9 mm, 10 mm, 12 mm, 13 mm, 14 mm, 16 mm, 17 mm, 20 mm, 22 mm and 32 mm

3.Tubular spanners:

8 mm,10 mm, 12 mm, 13 mm, 14 mm and 17 mm

4.Socket spanners:

8 mm, 10 mm, 12 mm, 13 mm, 14 mm, 17 mm, 19 mm, 20 mm and 22 mm

5. Allen keys:

4 mm, 5 mm, 6 mm, 8 mm, 10 mm and 12 mm

6.Screw drivers:

Flat head screw driver - small, flat head 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 and snap ring circlip plier

9.Others:

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

SPECIAL TOOLS & ITS APPLICATION

1. Engine fixture - G3310670

- To hold the engine and to rotate 360º in different directions as required by technician.
- Mount the engine on engine fixture as shown in the figure. Lock the engine at different orientation by using Knob. (Fig. 1.3)

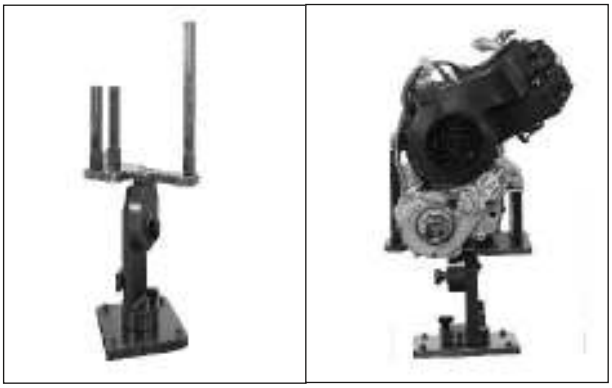


Fig. 1.3

2.Differential fixture - G3310740

- To hold the differential assembly while loosening the bolt.
- Fix the differential assembly as shown in the figure and loosen the bolt. (Fig. 1.4)

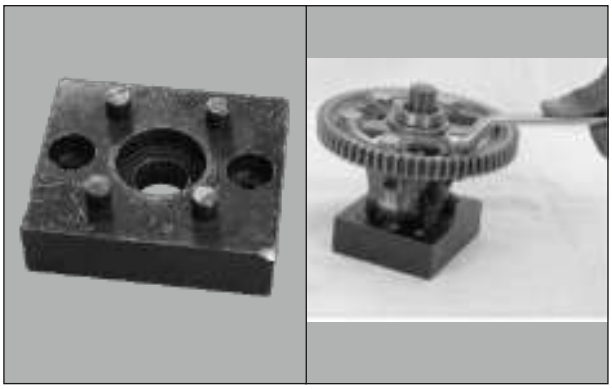


Fig. 1.4

3. Holding tool primary driven gear - G3310710

- To hold the primary drive & driven gear while loosening and tightening the clutch nut.
- Mesh the gear sector primary drive gear holding tool along with primary driven and primary drive as shown in the figure. (Fig. 1.5)

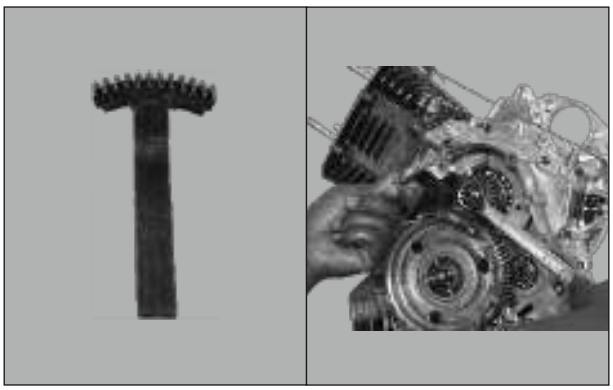


Fig. 1.5

4. 21mm Eastman socket spanner

- To loosen and tighten the clutch nut.
- Insert the 21 mm Eastman socket spanner through plate release clutch and tighten the clutch nut using Tommy rod.(Fig. 1.6)

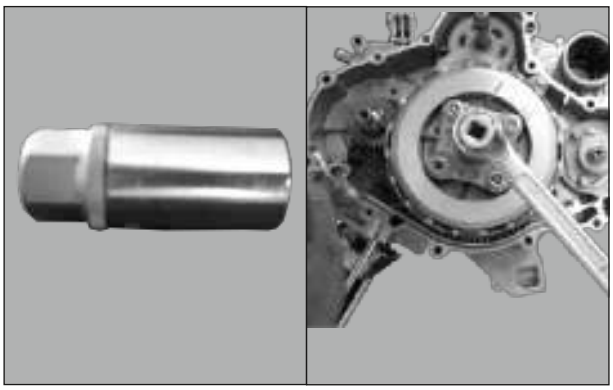


Fig. 1.6

5. Holder assembly magneto - G3310680

- To hold the magneto rotor while loosening and tightening the hexagonal flange nut M12X1.25
- Insert the pin magneto holder inside the slot provided on magneto rotor and lock the position by adjusting the nut magneto. (Fig. 1.7)

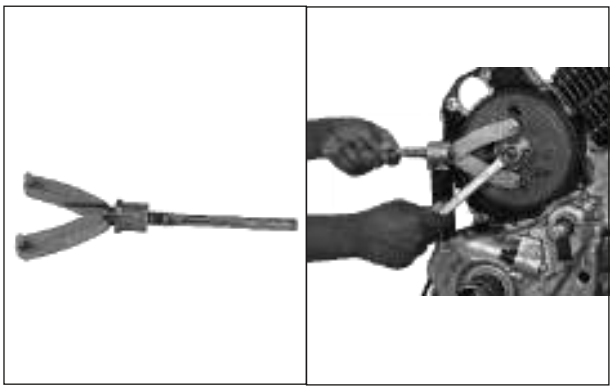


Fig. 1.7

6. Puller assembly magneto- G3310410

- To separate the magneto rotor from crankshaft.
- Insert 3 nos. of M8X50 bolts through circular plate (A) and tighten with magneto rotor. Tighten the centre bolt (B) magneto puller by using Tommy rod (C). (Fig. 1.8)

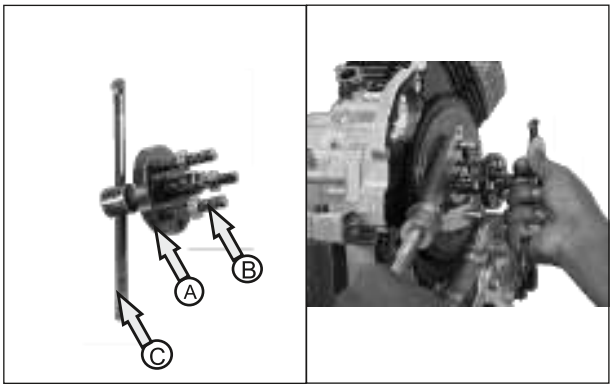


Fig. 1.8

7. Holding tool dog driven & muff cup - G3310690

- To hold the dog drive and muff cup.
- Insert the muff cup holding tool inside the muff cup slots as shown in the figure while tightening the muff-cup bolt.
- Hold the dog driven and rotate it against the spring tension and lock it at the required point. (Fig. 1.9)

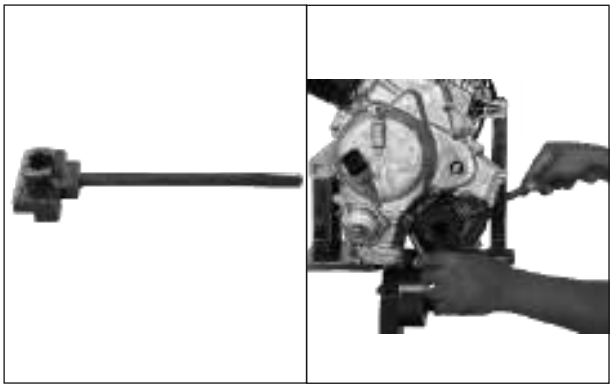


Fig. 1.9

8. Holding tool dog driven & muff cup - G3310690

- To hold the dog drive and muff cup.
- Mark the long leg and dog driven with the cover differential mark Engage Dog driven with shaft , Hand starter about 5 mm .Rotate clockwise, still it crosses Damper hand starter . Push it inside till dog driven hole matches with the starter. (Fig. 1.10)

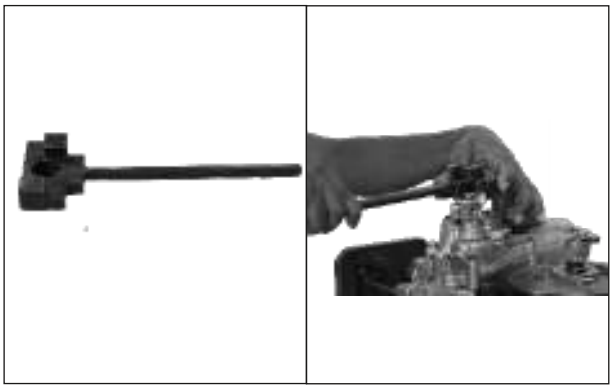


Fig. 1.10

9. Holding tool connecting rod - G3310290

- To hold the connecting rod while loosening and tightening the primary drive gear hexagonal nut M16X1.5
- Hold the connecting rod with the connecting rod stopper as shown in the figure.(Fig. 1.11)

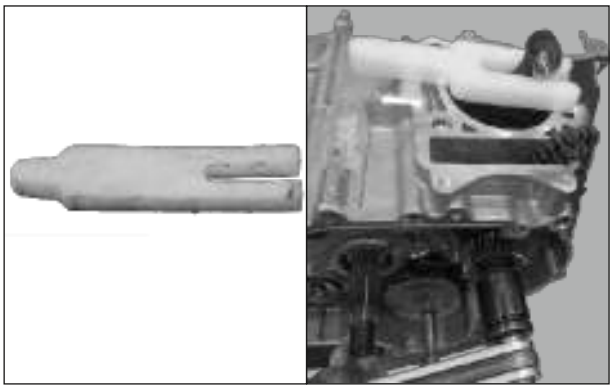


Fig. 1.11

10. Needle bearing puller - G3310480

- To take out the needle bearings from crankcase.
- Insert the bearing puller inside the needle bearing and lock it by tightening the centre rod. Hold the mass tap it upwards to take out the bearing.(Fig. 1.12)

Fig. 1.12

11. Bearing puller - G3310470

- To assemble the bearings on crankcase.
- Assemble the required adapter and locator on the punch and place the assembly on the bearing as shown in the figure and apply glow with a mallet on punch to assemble bearing inside the crankcase.(fig. 1.13)

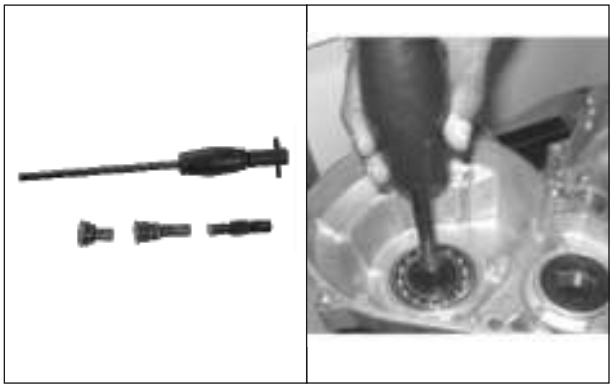


Fig. 1.13

12. Assembly tool bearing - G3310510

- To assemble the bearings oil seal on crankcase / cover crank case and cover differential
- Assemble the required adapter and locator on the punch and place the assembly on the bearings oil seal as shown in the figure and apply glow with a mallet on punch to assemble bearings oil seal.(Fig. 1.14)

Fig. 1.14

13. Assembly tool oil seal - G3310720

- To assemble the oil seals on crankcase.
- Put the tool along with the oil seal as shown in the figure and apply gently glow with a mallet to assemble oil seal.(Fig. 1.15)

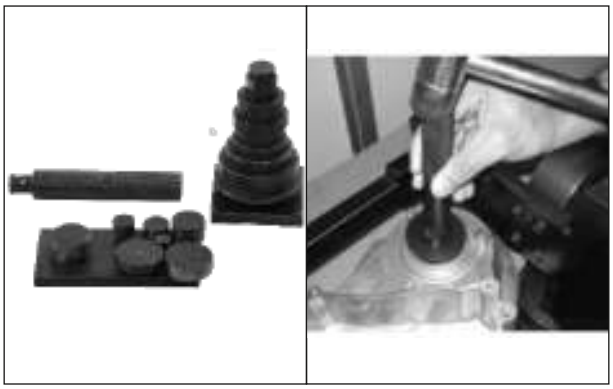


Fig. 1.15

14. Assembly tool oil seal - G3310540

- To assemble the oil seals on crankcase.
- Put the tool along with the oil seal as shown in the figure and apply gently glows with a mallet to assemble oil seal.(Fig. 1.16)

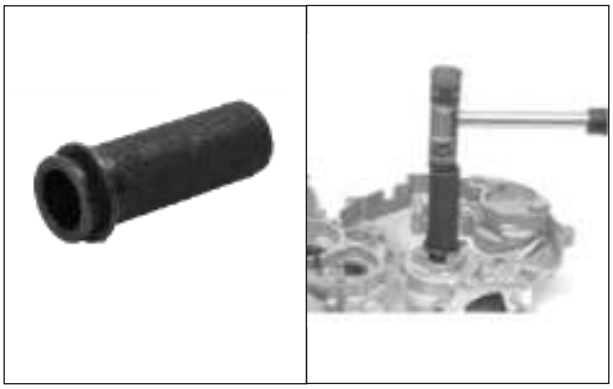


Fig. 1.16

15. Assembly tool oil seal - G3310600

- To assemble the oil seals on crankcase.
- Put the tool along with the oil seal as shown in the figure and apply gently glows with a mallet to assemble oil seal.(Fig. 1.17)

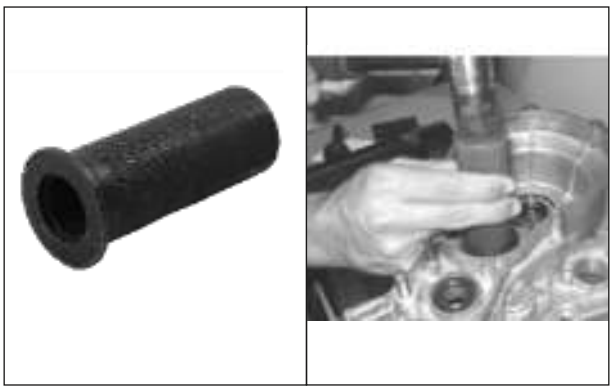


Fig. 1.17

16.Assembly tool needle bearing - G3310530

- To assemble the needle bearing on the crankcase LH.
- Assemble the needle bearing on crank case LH as shown in figure and apply glow by using a mallet to assemble needle bearing. (Fig. 1.18)

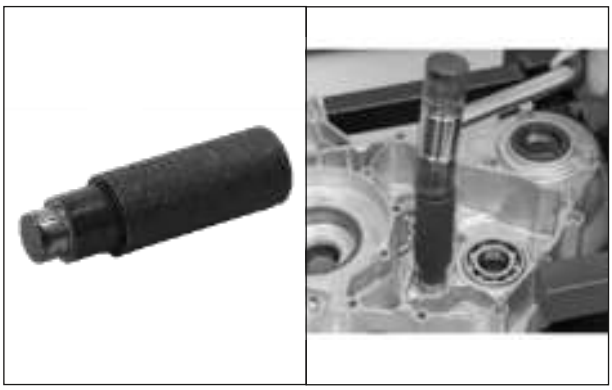


Fig. 1.18

17. Assembly tool crank shaft - G3310500

- To assemble the crank shaft on crankcase.
- Assemble the rod crank shaft puller (A) on crank shaft at magneto side. Insert the hollow pipe (B) on rod crank shaft puller and seat it on crank case and tighten the handle assembly crank shaft puller ©. (Fig. 1.19)

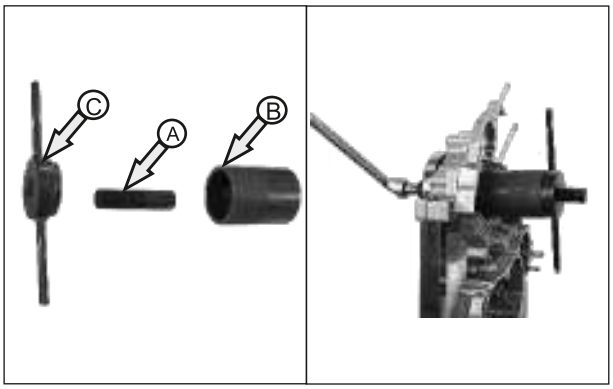


Fig. 1.19

18. Extractor piston pin - G3310420

- To take out the piston pin from piston assembly to separate piston from connecting rod.
- Assemble the tool on piston as shown in fig. and rotate the centre bolt to take out the piston pin.(Fig. 1.20)

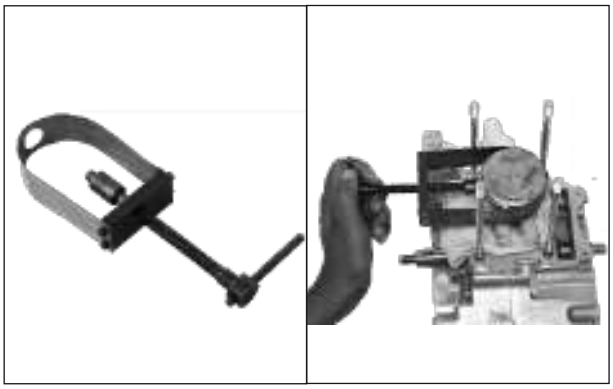


Fig. 1.20

19. Extractor assembly inlet & Exhaust valve - S1310020

- Locate the special tool to remove the valves as the movable jaw of the tool rests on retainer valve spring(fig.) and the other end (fixed jew) to rest at the center of the valve face.
- Slowly tighten the special tool to compress the spring valve .
- Take out the cotter pin 2 nos. from the valve stem.
- Loosen and take out the special tool.(Fig. 1.21)

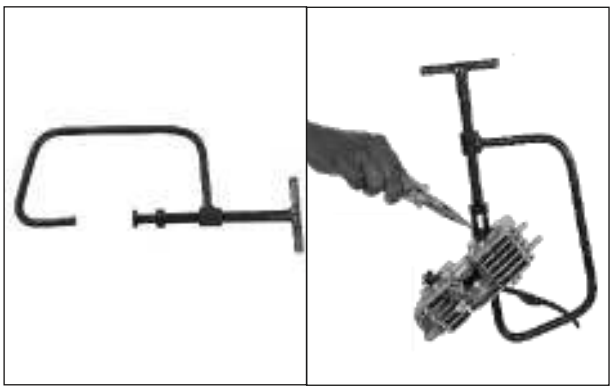


Fig. 1.21

20. Assembly tool silent block pivot tube - G3310560

- To assemble the silent block on trailing arm.
- Insert the plate A, silent block (1 no) in the bolt and insert it through the trailing arm end 1.Place the plate B from end 2 and tighten the nut. Insert the plate A in the bolt and insert it through the trailing arm from end 1 . Place the silent block (1 no) ,plate A from end 2 and tighten the nut.(Fig. 1.22)

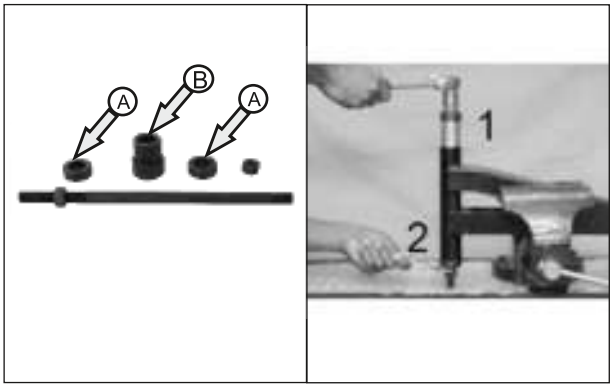


Fig. 1.22

21. Assembly tool silent block trailing arm - G3310580

- To remove and assemble the silent in front trailing arm. Put the front trailing arm assembly on fly press base plate.

- Keep the tool A on front trailing arm assembly and apply the load by using fly press to take out the silent block. Keep the Silent block , tool B on front fork trailing arm assembly and apply the load by using fly press to assemble the silent block.(Fig. 1.23)

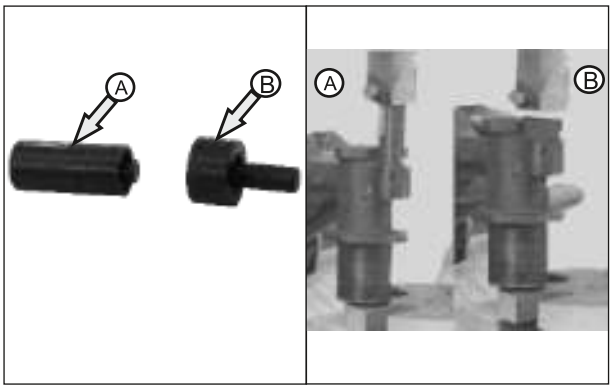


Fig. 1.23

22.Assembly tool pivot pin steering column - G3310650

- To take out the pivot pin and needle roller bearing from front fork assembly.

- Keep the pin A on front fork assembly as shown in figure and apply the load by fly press and take out the pivot pin. Keep the pin B on front fork assembly and take out the damaged needle bearing.(Fig. 1.24)

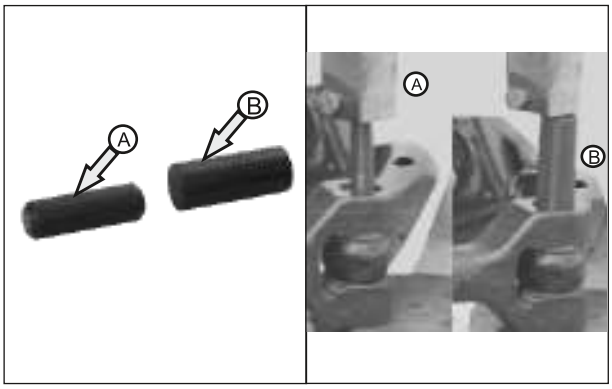


Fig. 1.24

23.Assembly tool, lock nut steering column - G3310570

- To loosen and tighten the lock nut steering column.

- Insert the tool as shown in figure and apply the load with the help of tommy rod.(Fig. 1.25)

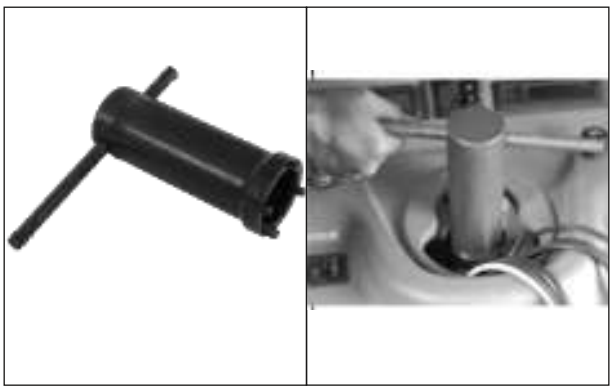


Fig. 1.25

24.Assembly tool cone bottom - G3310590

- To assemble the steering cone on chassis. Insert and position the bottom race , assembly tool , cone bottom on steering column. Insert the nut and tighten it by using assembly tool cone bottom.(Fig. 1.26)

Fig. 1.26

25.Assembly tool head tube races - G3310550

- To assemble the head tube races on head tube.
- Insert the tool and races as shown in figure and Tighten the nut by using 36 mm open end spanner.(Fig. 1.27)

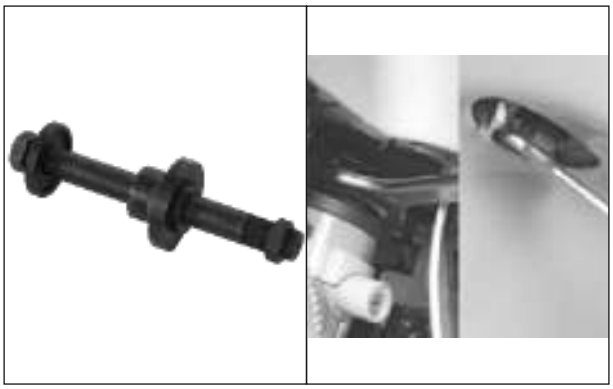


Fig. 1.27

26. Spanner lock nut steering - G3310640

- To tighten the front fork chuck nut.
- Keep the spanner on chuck nut slot and loosen / tighten the chuck nut to the required torque.(Fig. 1.28)

Fig. 1.28

27. Tappet adjuster - G4310010

- Loosen the hexagonal nut tappet adjusting using 9 mm ring spanner. insert the tappet adjusting tool on top end of valve stem.
- Rotate the tool to adust the gap.
- Then tighten the hexagonal nut.(Fig. 1.29)

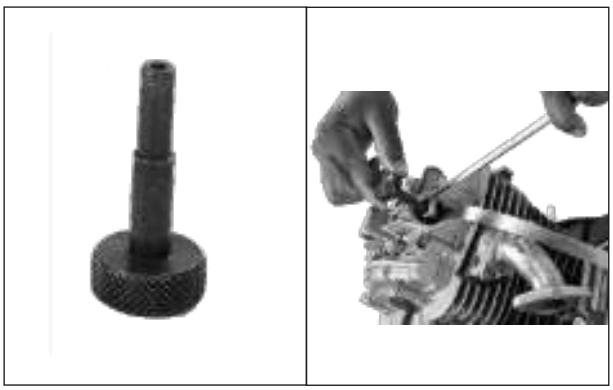


Fig. 1.29

Chapter 2

PERIODIC MAINTENANCE

CONTENTS

TVS KING GS & GS+ PERIODIC MAINTENANCE SCHEDULE

S.no	Sub activity	Activities	750	5000	10000	15000	20000	25000	30000	35000	40000	45000	50000
1		Engine oil	Check and top up every 1000 kms										
2	Check & Top up	Differential Oil.	•	•		•		•		•		•	
3		Brake fluid in brake fluid reservoir	•	•	•	•	•	•	•	•	•	•	•
4		Engine foundation bolt	•		•		•		•		•		•
5		Exhaust pipe, silencer mounting fasteners	•	•	•	•	•	•	•	•	•	•	•
6		Wheel nuts & brakes for effective working	•	•	•	•	•	•	•	•	•	•	•
7	Check & Adjust	Valve tappet clearance			•		•		•		•		•
8		Oil circulation at cylinder over head camshaft	•	•	•	•	•	•	•	•	•	•	•
9		Carburetor - idle speed, CO%, HC											
10		Control cables free play and adjust If required.	•	•	•	•	•	•	•	•	•	•	•
11		Tyre pressure											
12	Clean & adjust	Spark plug	•	•		•		•		•			•
13		Decarbonize cylinder head and piston							•				
14	Replace	Engine Oil	•	•	•	•	•	•	•	•	•	•	•
15		Differential oil			•		•		•		•		•
16		Engine Oil filter	•	•	•	•	•	•	•	•	•	•	•
17		Air Filter Element - Paper / Foam							F•		•P		
18	Replace	Spark plug			•		•		•		•		•
19		Oil Pump drive Chain and Guide Chain									•		
20		Brake Fluid											•
21	Clean	Vehicle	•	•	•	•	•	•	•	•	•	•	•
22		Air filter element	•	•	•	•	•	•	•	•	•	•	•
23		Carburetor	Only In case of complaint										
24		Petrol tank.	Only In case of complaint										
25		Oil strainer (Replace if damaged)	•	•	•	•	•	•	•	•	•	•	•
26	Inspect	Compression pressure			•		•		•		•		•
27		Assembly Chain Tensioner	Only In case of complaint										
28	Electrical	Check all lights, horn & switches functioning	•	•	•	•	•	•	•	•	•	•	•
29		Battery Voltage, Charge if Required apply Pet. Jelly	•	•	•	•	•	•	•	•	•	•	•
30	Greasing	Steering races & balls			•		•		•		•		•
31		Speedo gear & pinion	•		•		•		•		•		•
32		Muff cup (Flange)			•		•		•		•		•
33		Brake lever fulcrum point		•	•	•	•	•	•	•	•	•	•
37		Hand starter front & rear shaft			•		•		•		•		•
35	Others	Tyre rotation		•	•	•	•	•	•	•	•	•	•
36		SAI Filter Clean / Replace									•		

TVS KING LS, LS+ & ZS, & ZS+ PERIODIC MAINTENANCE SCHEDULE

S.no	Sub activity	Activities	750	5000	10000	15000	20000	25000	30000	35000	40000	45000	50000
1		Engine oil	Check and top up every 1000 kms										
2	Check & Top up	Differential Oil.	•	•		•		•		•		•	
3		Brake fluid in brake fluid reservoir	•	•	•	•	•	•	•	•	•	•	•
4		Engine foundation bolt	•		•		•		•		•		•
5		Exhaust pipe, silencer mounting fasteners	•	•	•	•	•	•	•	•	•	•	•
6		Wheel nuts & brakes for effective working	•	•	•	•	•	•	•	•	•	•	•
7	Check & Adjust	Valve tappet clearance			•		•		•		•		•
8		Oil circulation at cylinder over head camshaft	•	•	•	•	•	•	•	•	•	•	•
9		Carburetor - idle speed, CO%, HC											
10		Control cables free play and adjust If required.	•	•	•	•	•	•	•	•	•	•	•
11		Tyre pressure											
12	Clean & adjust	Spark plug	•	•		•		•		•			•
13		Decarbonize cylinder head and piston							•				
14	Replace	Engine Oil	•	•	•	•	•	•	•	•	•	•	•
15		Differential oil			•		•		•		•		•
16		Engine Oil Filter	•	•	•	•	•	•	•	•	•	•	•
17		Air filter Element - Paper									•		
18	Replace	Spark plug			•		•		•		•		•
19		Oil Pump drive Chain and Guide Chain									•		
20		Brake Fluid											•
21	Clean	Vehicle	•	•	•	•	•	•	•	•	•	•	•
22		Air filter element	•	•	•	•	•	•	•	•	•	•	•
23		Carburetor	Only In case of complaint										
24		Petrol tank.	Only In case of complaint										
25		Oil strainer (Replace if damaged)	•	•	•	•	•	•	•	•	•	•	•
26	Inspect	Compression pressure			•		•		•		•		•
27		Assembly Chain Tensioner	Only In case of complaint										
28	Electrical	Check all lights, horn & switches functioning	•	•	•	•	•	•	•	•	•	•	•
29		Battery Voltage, Charge if Required apply Pet. Jelly	•	•	•	•	•	•	•	•	•	•	•
30	Greasing	Steering races & balls			•		•		•		•		•
31		Speedo gear & pinion	•		•		•		•		•		•
32		Muff cup (Flange)			•		•		•		•		•
33		Brake lever fulcrum point		•	•	•	•	•	•	•	•	•	•
34		Hand starter front & rear shaft			•		•		•		•		•
35	Others	Tyre rotation		•	•	•	•	•	•	•	•	•	•
36		SAI Filter Clean / Replace									•		
37	LPG / CNG	All pipes & hoses joints for Gas leak if any	•	•	•	•	•	•	•	•	•	•	
38		Replace flexible & Low Pressure hose	Once in an year										
39		Electrical connection checking	Only in case of complaint										
40		Ventilation hose installation											
41		Petrol hose checking											
42		Multi valve / vapor box checking	Only in case of complaint										
43		LPG reducer /CNG 1st & 2 stage regulator service	Only in case of complaint										
44		Check for LPG Vacuum Hose crack & Replace											
45		Clean Gas air Mixture (LPG / CNG)	Only in case of complaint										
46		All Hydraulic Pressure Test (LPG Tank)	Every 5 years once										
47		All Hydraulic Pressure Test (CNG Tank)	Every 3 Years once										
48		Replace - 1st Stage & Gas Solenoid Filter									•		

PERIODIC MAINTENANCE
AIR CLEANER ASSEMBLY - FOAM FILTER

Inspect and clean at initial 750 km and every 5000 kms there after

- The Air cleaner assembly is fitted inside the engine cabin.
- For cleaning the foam complete filter air cleaner, first remove loosen and remove the knobs top and bottom from Tail door. Also, unlock the tail door using control key. Open the tail door.(Fig. 2.1)
- Loosen and remove 8 nos. CRPH head screws M6X16 from the Philips head screw driver cover air cleaner using screw driver.(Fig. 2.2)

Philips head screw driver

- Take out the cover air cleaner along with Tube inlet and seal air filter.
- Take out the support air cleaner, foam complete filter air cleaner and flame trap complete from case air cleaner.
- Loosen and remove 4 nos. CRR pan head tap screw from deflector cover air cleaner. (Fig. 2.3)

Philips head screw driver

- Clean the interior of case air cleaner, cover air cleaner, deflector cover air cleaner, support air cleaner and flame trap complete using compressed air and cloth.
- Clean the foam complete filter air cleaner using solvents like kerosene or diesel. Remove the excess solvent from the foam by squeezing out. Do not wriggle the foam, else it may tear off. Soak the foam complete filter air cleaner using fresh engine oil for uniform application and squeeze the excess oil. Ensure the weight of the filter not more than 1.5 times of its weight after soaking in engine oil.(Fig. 2.4).

Fig. 2.1

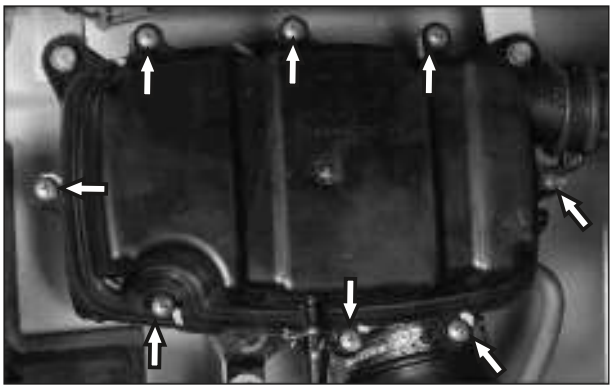


Fig. 2.2

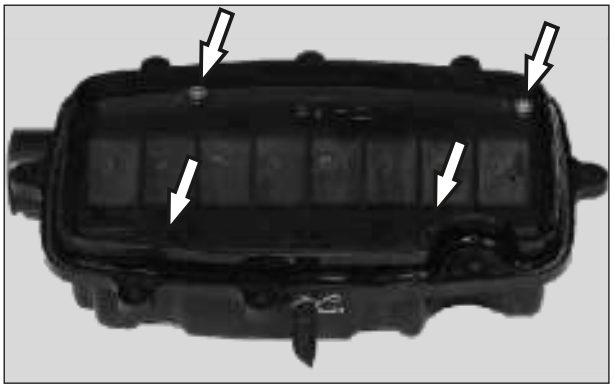


Fig. 2.3

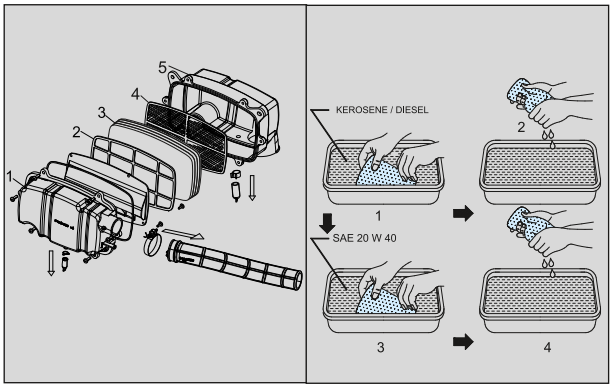


Fig. 2.4

- Refit all the components in the reverse order of removal.

Caution: Do not use petrol for cleaning the foam complete filter.
Replace foam complete filter if torn or cut.
Position the foam complete filter snugly and correctly so that no air will by pass without getting filtered. Rapid wear of valves, guide valves, seals valve stem oil, piston, ring piston and cylinder is often caused by defective or incorrectly fitted foam complete filter element.
Check if the seal air cleaner is intact and in good condition.

AIR CLEANER ASSEMBLY - PAPER FILTER

Inspect and clean at initial 750 km and every 10000 km there after

- Disconnect the clip and disconnect breather hose PCV from air cleaner assembly.
- Loosen three snap clips in the cover. (Fig. 2.5)
- Remove cover from the air cleaner assembly and clean the drain plug. (Fig. 2.6)
- Remove the filter element from the housing
- Clean the filter using pressurised air <2 bar (29 psi)only from inside keeping both the ends open. (Fig. 2.7)

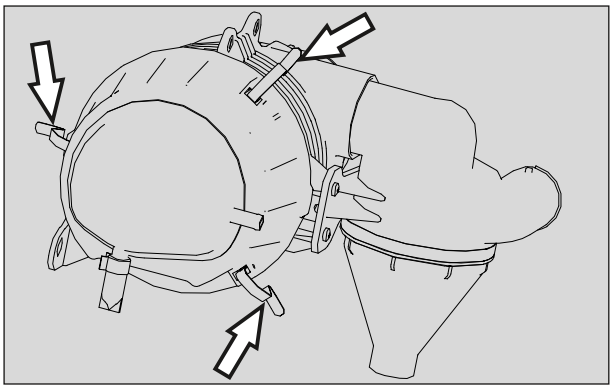


Fig. 2.5

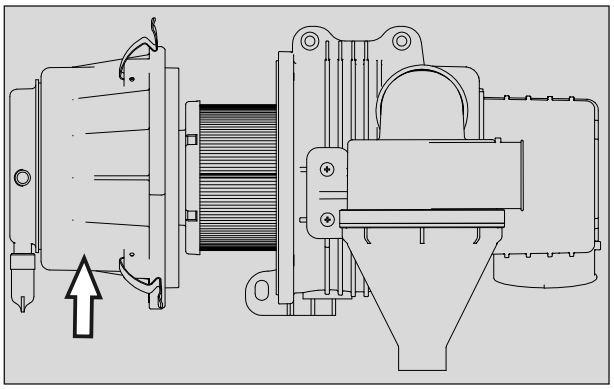


Fig. 2.6

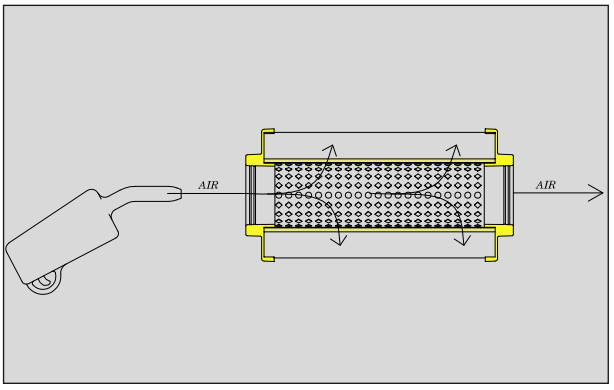


Fig. 2.7

- Housing can be wiped by clean cloth .
- After cleaning, assemble the cover by aligning the shown the projections or orienting the drain plug downwards. (Fig. 2.8)
- Reassemble all the parts in the reverse order of removal.

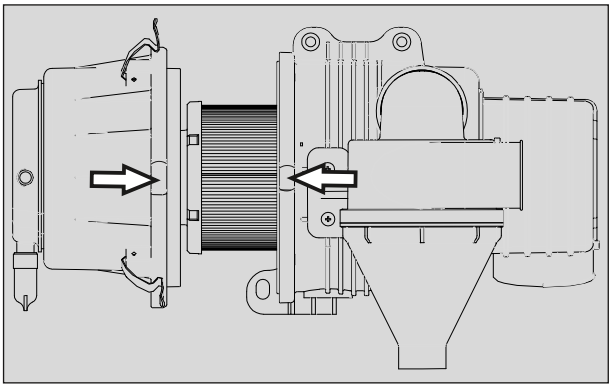


Fig. 2.8

ENGINE CUM TRANSMISSION OIL LEVEL CHECKING

- For checking the oil level, clean the area around the gauge oil level, loosen and remove the gauge oil level by rotating in anti-clockwise direction.(Fig. 2.9)
- Wipe out the oil from the gauge oil level.
- Re insert the gauge oil level in its hole without threading in. Take out the gauge oil level, hold in vertical position and closer to your eye level for checking the oil level.
- The oil should be between the minimum and maximum marks on the gauge oil level.(Fig. 2.10)
- If the oil level is below the minimum mark, top up using fresh engine oil SAE 20W40.

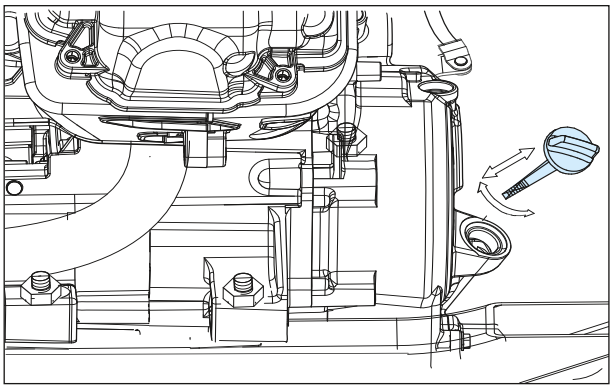


Fig. 2.9

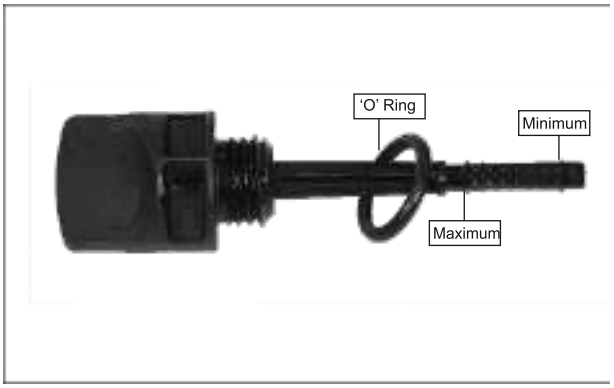


Fig. 2.10

ENGINE CUM TRANSMISSION OIL REPLACEMENT

- Before draining the engine oil, check the available level of oil with gauge oil level. This is to understand the consumption level of engine oil.
- Warm up the engine for ease and complete draining of oil.
- Clean the area around the gauge oil level, loosen and remove the gauge oil level by rotating in anti-clockwise direction, this will help in oil flowing out faster.

- Place a clean measuring jar below the cover oil strainer on engine.

- Loosen and remove 2nos. Hexagonal flange nut M6 from the cover strainer mounting. (Fig. 2.11)

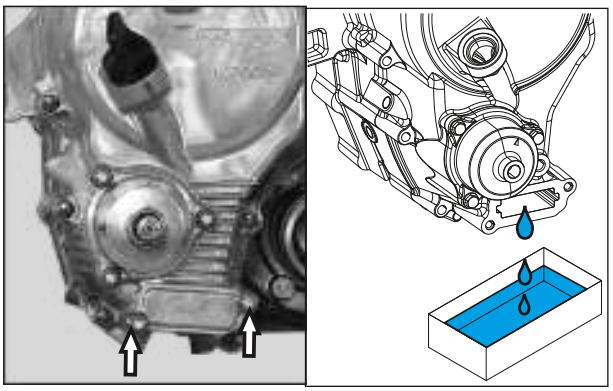


Fig. 2.11

- Take out the cover oil strainer (A) and pull out the oil strainer (B).and inspect for any damage. Replace if necessary. Other wise clean and reassemble the oil strainer. (Fig. 2.12)

10mm spanner, Nose plier

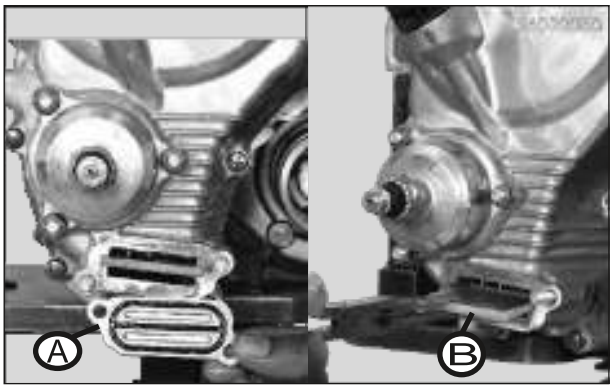


Fig. 2.12

- Also, loosen and remove the Magnetic drain plug from the crankcase L along with gasket for draining of engine oil. (Fig. 2.13)

17mm spanner

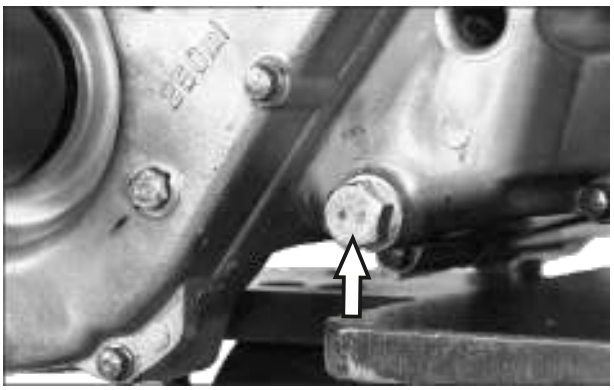


Fig. 2.13

- The drained out oil should not be less than 1200ml (After covering 5000km).

- Clean the cover oil strainer and oil strainer (Ensure availability of 'O' ring). Refit the same in reverse order of removal.

- Fill fresh SAE 20W40 engine oil through gauge oil level mounting hole using flexible funnel.

Oil capacity 1750 ml (Periodic maintenance)
1800 ml (Engine overhauling)

Note: Before adding the fresh oil, Check the condition of Oil filter comp engine oil and replace it if required with a new one.

While reassembling the strainer comp engine oil, match the taper portion strainer with crankcase.

DIFFERENTIAL OIL

OIL LEVEL CHECKING

- To check the differential oil level, loosen and remove the oil level hexagonal screw M6X12 (A) along with Oil seal 8X19X5 (B).(Fig. 2.14)

- If the oil starts flowing out means the oil level is correct. If not, top up with fresh SAE20W40 oil till the oil just starts to flow out.

- Refit the Oil level screw along with Oil seal immediately and tighten.

10mm spanner

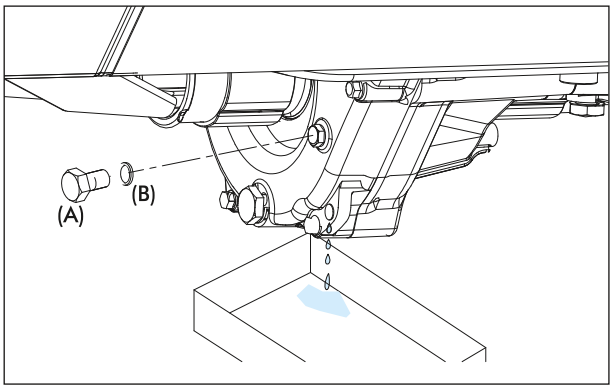


Fig. 2.14

OIL REPLACEMENT

Replace at initial 750 km and every 5000 km there after

- Place a clean measuring jar below the Plug TDC oil drain and filling bolt.

- Clean the area around the Plug TDC oil drain and filling bolt (A) on the top of cover differential, then loosen and remove along with sealing washer Oil drain & filling bolt(B).(Fig. 2.15)

- Loosen and remove the Plug TDC oil drain and filling bolt (A) along with sealing washer Oil drain & filling bolt (B) at the bottom of cover differential.(Fig. 2.16)

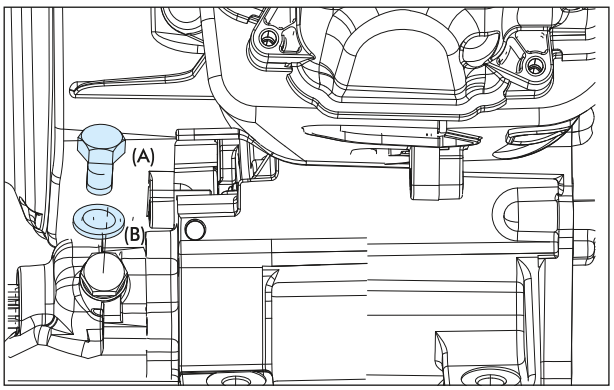


Fig. 2.15

17 mm spanner

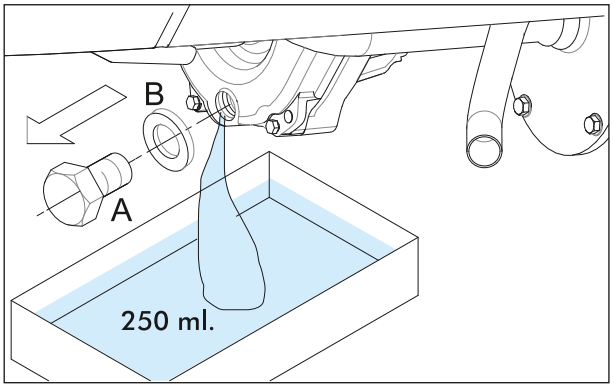


Fig. 2.16

- Allow the oil to drain out completely.

- Measure the drained oil quantity. It should be around 250ml.

- Refit the the Plug TDC oil drain and filling bolt (A) along with sealing washer Oil drain & filling bolt (B) at the bottom of cover differential. (Fig. 2.16)

- Fill fresh SAE20W40 oil using flexible funnel.

- Refit the Plug TDC oil drain and filling bolt (A) along with sealing washer Oil drain & filling bolt (B) on the top of cover differential. (Fig. 2.17)

17 mm spanner

Oil capacity 250ml (Periodic maintenance) 300ml (Overhauling)

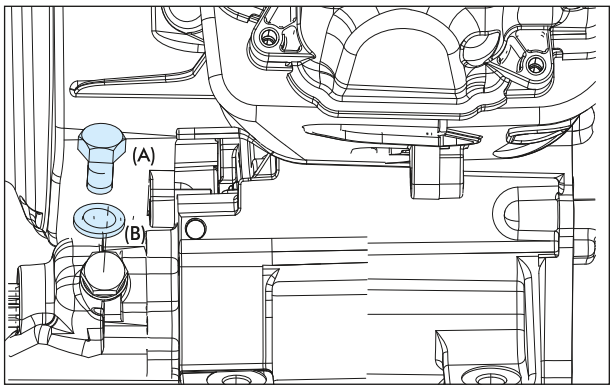


Fig. 2.17

FILTER COMPLETE ENGINE OIL REPLACEMENT

- Replace filter complete engine oil whenever engine oil is replaced (or every 5000km).

- For replacing filter, drain the engine cum transmission oil as mentioned above.

- Please note that Oil pressure switch is fitted on the cap oil filter and connected by a wire with main wiring harness.

- Loosen and remove Hex nut M6 along with spring washer from the switch. Disconnect the wire. (Fig. 2.18)

10mm spanner

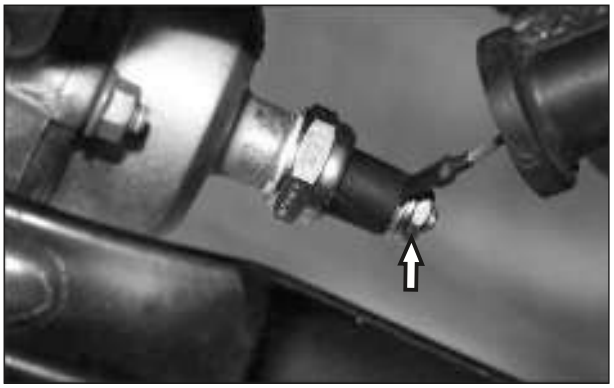


Fig. 2.18

- Loosen and remove 3 nos. Hexagonal flange nut M6 from the cap oil filter.(Fig. 2.19)

10 mm spanner

Note: During assembly of cover oil filter ensure the arrow mark should be face towards upside. (Fig. 2.19)

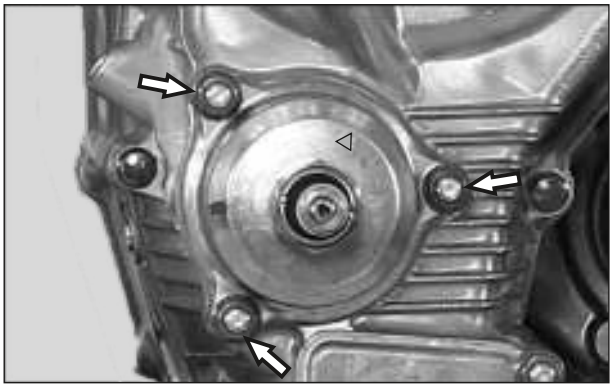


Fig. 2.19

- Remove the cap oil filter (A) along with 'O' ring (B) and Spring (C).(Fig. 2.20)

10mm spanner

- Take out the filter complete engine oil along with seal (D). Clean the filter mounting area on the cover crankcase R.(Fig. 2.20)

- Fit new filter complete engine oil along with new seal(D) in the cover crankcase R.

- Refit the cap oil filter (A) along with spring (C) and 'O'ring (B) in the reverse order of its removal. Ensure no damage to the 'O'ring and its proper seating.(Fig. 2.20)

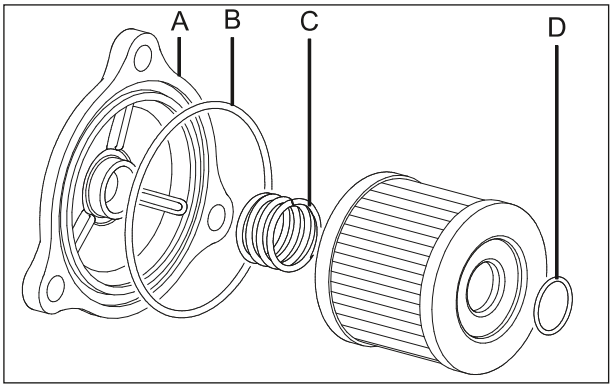


Fig. 2.20

COMPRESSION PRESSURE

- Warm up the engine to normal operating temperature before checking compression pressure.

.

- Stop the engine, disconnect the sparkplug cap and remove the sparkplug.

The checking procedure is as follows:

- Mount the compression gauge adaptor to sparkplug hole, taking care to make the connection leak Proof. (Fig. 2.21)

Compression gauge and special adaptor (A)

- Switch 'OFF' ignition, open the throttle fully, and crank the engine five to six times with the hand starter, and note the highest reading as the compression pressure.(Fig. 2.22)

Compression Pressure (Standard)	9.7~10.8 :1kg/cm²

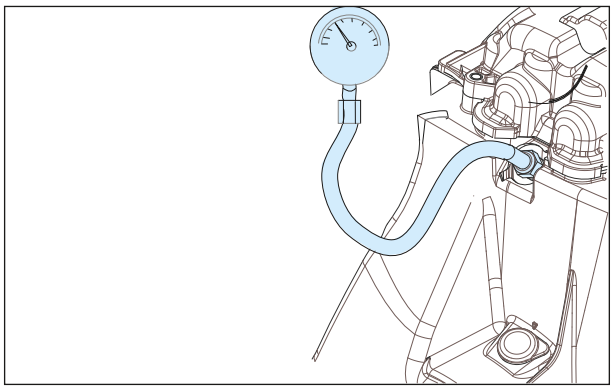


Fig. 2.21

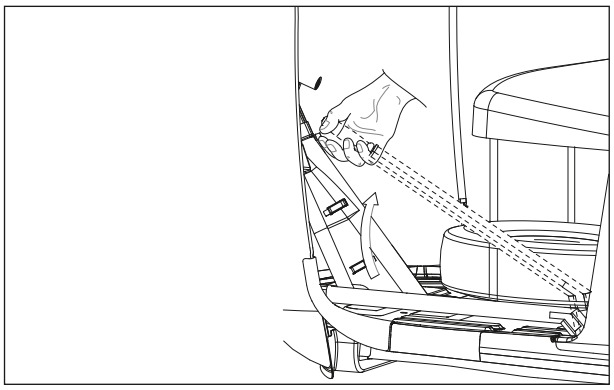


Fig. 2.22

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

- If the compression is low, pour 3 to 5 ml of clean engine oil into the cylinder through the sparkplug hole and re-check the compression.

- If the compression increases from the previous value, check the cylinder, piston and piston rings for,
  - Leaking gasket cylinder head.
  - Worn piston rings.
  - Worn cylinder and piston.
  - Piston ring stuck in the grooves.

- If compression is the same as the previous value, check the valves for leakage

Check the compression pressure every 10000 kms.

CYLINDER HEAD, PISTON, PISTON RINGS AND RING GROOVES DECARBONISING

- Refer chapter - Servicing of engine, Page No.3.37 for Cylinder head Page No.3.33 for Piston, Rings and Ring grooves

Decarbonise every 15000 kms.

Note: Decarbonise the head complete cylinder combustion chamber after removing both the valves. (refer chapter "servicing of engine" page no.60 for dismantling procedure)

- For decarbonising procedure of valves, valve guides and valve seats - refer chapter "servicing of engine", page no. 3.38

Decarbonise every 15000 kms.

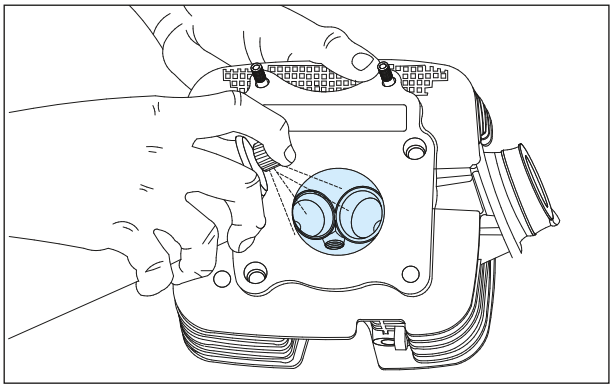


Fig. 2.23

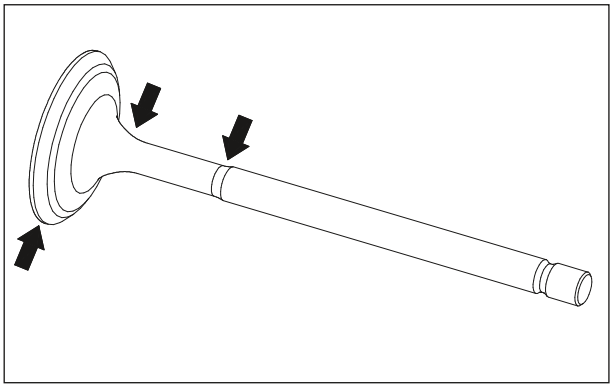


Fig. 2.24

VALVE TAPPET CLEARANCE

- Tappet clearance should be adjusted only in engine cold condition.
- Before adjusting the tappet clearance check for the correct valve timing.
- This can be checked as below:
- Remove the cowl complete top air cooling, for removal, refer chapter ''Service of engine" Page no.3.11
- Remove the cap inspection hole along with 'O' ring (29.5x3) from cover cylinder head. (Fig. 2.25)

17mm spanner

- Remove the plug TDC from the Cowl complete bottom air cooling. (Fig. 2.26)
- Rotate the magneto rotor by rotating the fan. Match the 'T' mark(1) on the rotor with the '—' mark (2) on crankcase L. Ensure the engine is in compression stroke, by shaking both Inlet and exhaust valves. If there is a clearance observed in both the valves it indicate it is in compression stroke, else, rotate the rotor by 360 to bring it to compression stroke.(Fig. 2.27)

17mm spanner

- Now, check the tappet clearance using feeler gauge.
- Insert the appropriate feeler gauge in between the rocker arm and valve stem, inspect the clearance. (Fig. 2.28)

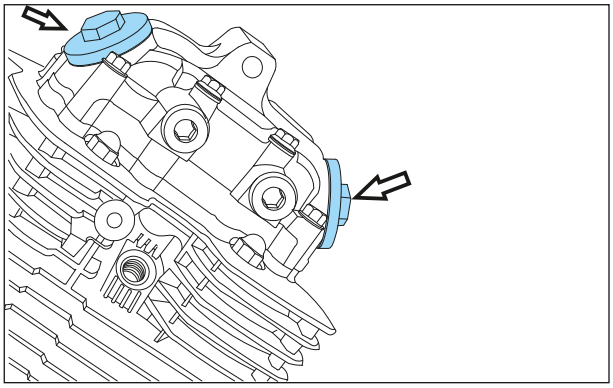


Fig. 2.25

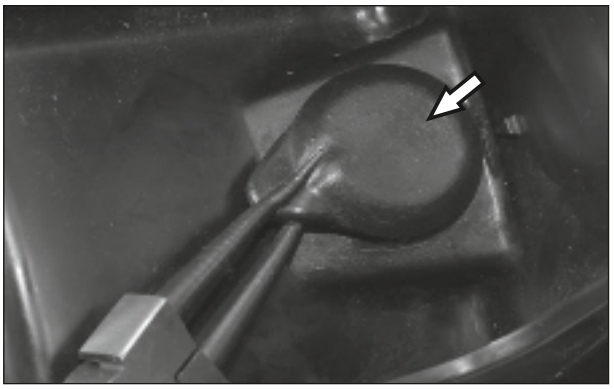


Fig. 2.26

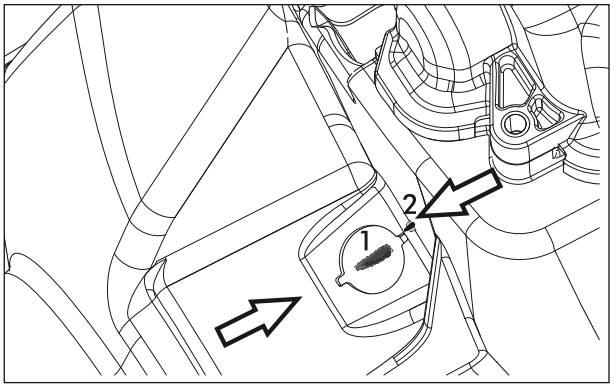


Fig. 2.27

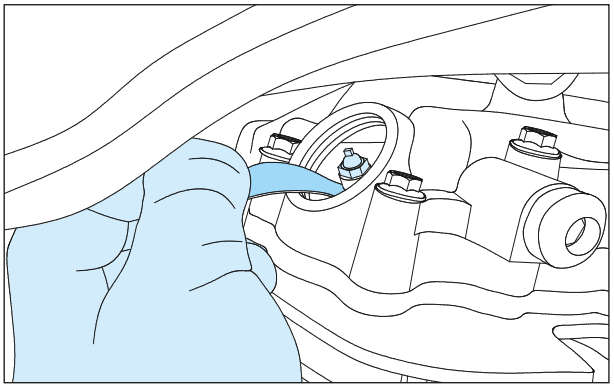


Fig. 2.28

- If there is any variation in gap mentioned below adjust the same as explained below.

Inlet valve clearance	0.06 mm

Exhaust valve clearance	0.07 mm

- Loosen the tappet hex. nut. (Fig. 2.29)

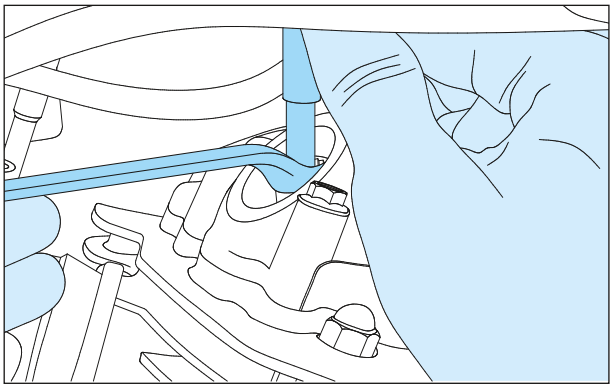


Fig. 2.29

- Place the feeler gauge (A) and adjust the clearance using the special tool (B). (Fig. 2.30)

G4310010	Tightening tool, tappet adjuster

Feeler gauge

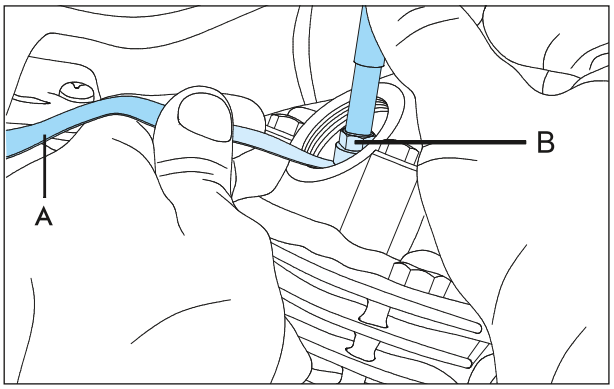


Fig. 2.30

- Always while setting the clearance make sure that little resistance is felt in the feeler gauge. Then lock the nut using the spanner.

9 mm spanner

Caution: While tightening the lock nut, ensure that the tappet adjuster has not rotated.

- After adjustment check the clearance with next oversize feeler gauge to ensure the tappet is set accurately.

- Reassemble the cap inspection hole.

- Insert the cap timing mark inspection on cowl complete bottom air cooling.

Inspect and set the valve tappet clearance every 10000 kms.

SPARK PLUG

- Check the type of spark plug.

FUEL TYPE	SPARK PLUG TYPE
PETROL	BOSCH UR 6DE
LPG	BOSCH UR 6DE
CNG	BOSCH UR 6DE

- Disconnect suppressor cap from spark plug. (Fig. 2.31)

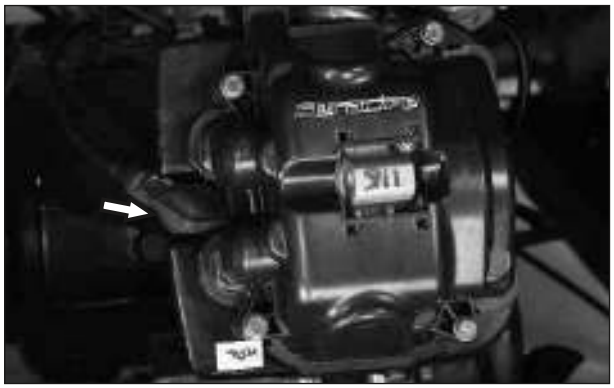


Fig. 2.31

- Loosen and remove spark plug.(Fig. 2.32)

Spark plug spanner or 16 mm Tubular spanner

Clean & adjust gap at initial 750 km & every 5000 kms thereafter. Replace at every 10000 kms.

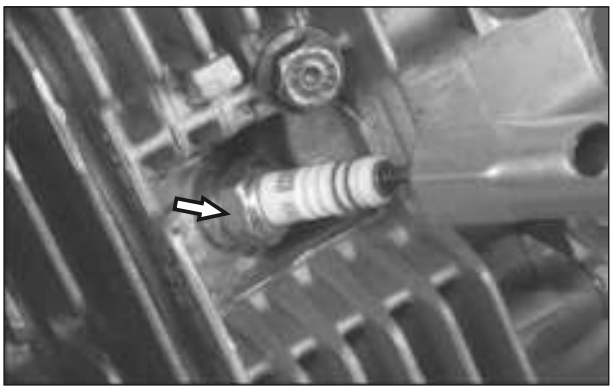


Fig. 2.32

SPARK PLUG CLEANING

- Improper cleaning the spark plug leads to difficult in starting and poor engine performance.
- Carbon deposits on the spark plug gap will prevent good sparking and causes misfiring.
- Remove the spark plug and clean the deposits by sand blasting and clean with compressed air in air in the spark plug cleaning machine. (Fig. 2.33)

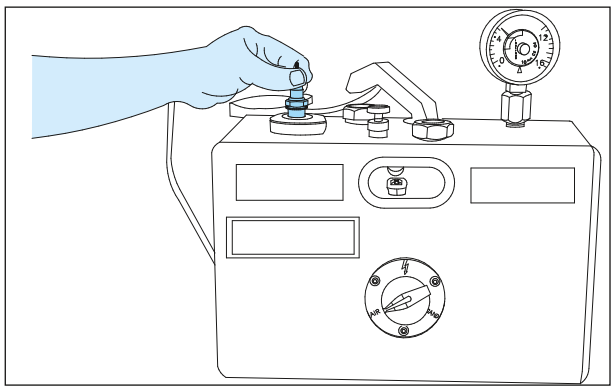


Fig. 2.33

- Carbon deposits on the spark plug gap will prevent good sparking and causes misfiring.

Caution: Before removing the spark plug, use compressed air to blow away any dirt accumulated in the surrounding area of spark plug to prevent it from falling into the cylinder. Close the plug hole with clean cloth.

- Check the spark plug for correct spark performance in the spark plug tester. (Fig. 2.34)

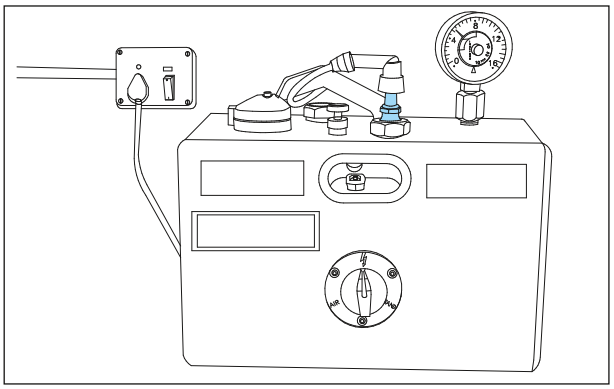


Fig. 2.34

Note: While checking the spark performance, ensure that the selector knob (A) of the machine is in checking mode (⚡) as shown in the figure. (Fig. 2.34)

Caution: Do not use flared steel cables to clean spark plug. Use only recommended make and type of spark plug.

- Reset the spark plug gap to the specified limit. (Fig. 2.35)
- The gauge must just go in and come out of the gap.
- Adjust the gap to the specified limit.

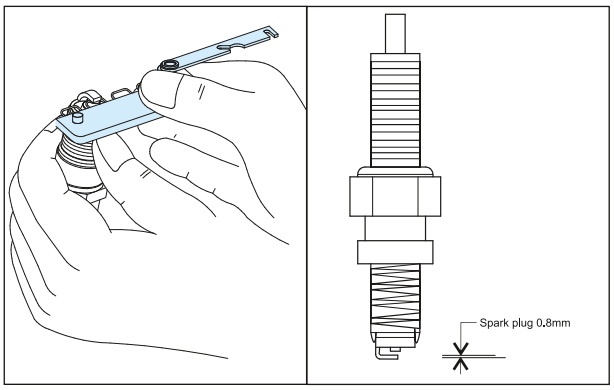


Fig. 2.35

Feeler gauge	
Spark plug gap	0.6 - 0.7 mm

- Refit the spark plug and tighten it, reconnect the suppressor cap to the spark plug.
- Do not over tighten the spark plug. Tight it with in specified torque. of 10 - 12 Nm

CUP FUEL STRAINER

Clean every 750km & every 10000 kms there after

- Dirty, cup fuel strainer with sediment or water affects the smooth flow of petrol and may cause loss of engine power.
- Loosen and remove the cup fuel strainer leaving the cock assembly fuel in 'OFF' position. (Fig. 2.36)

10 mm Spanner

- Remove the 'O' ring and filter cup. (Fig. 2.37)
- Clean the filter cup and cup fuel strainer.
- Re-assemble the parts in the reverse order of removal

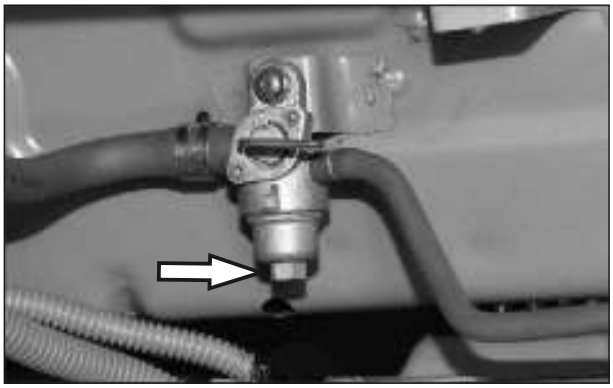


Fig. 2.36

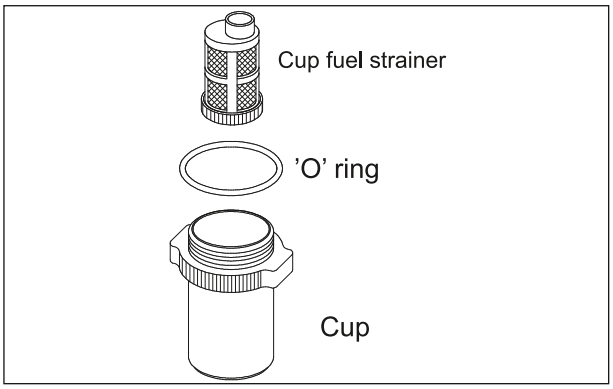


Fig. 2.37

CARBURETOR ASSEMBLY

Clean and adjust & inspect CO% & HC every 10000 km.

CARBURETOR CLEANING PROCEDURE

- If there is a performance deterioration, clean the carburetor and tune. For cleaning carburetor assembly (refer chapter 'fuel, lubrication & exhaust system' page no 4.3)

TUNING PROCEDURE

TUNING OF CARBURETOR IN PETROL VEHICLE

- Adjust the engine idle speed as follows: Warm up the engine (running the vehicle in 40 km/hr in top gear for about 3 to 4 km).
- Check and correct the throttle cable free play – 3 to 4 mm For free play adjustment procedure (Refer chapter "periodic maintenance" Page No.2.39)
- Close the air screw fully by rotating it clockwise.(Fig. 2.38)
- Now, slowly take out by rotating the air screw in anticlockwise direction by 2 ± 1 turn out. (Fig. 2.38)
- start the engine and allow to warm up.
- Check the engine rpm using tachometer (Mode position in 21:42).
- Rotate the idle rpm adjustment screw in or out so that the engine idles at 1150±50 rpm. (Fig. 2.39)

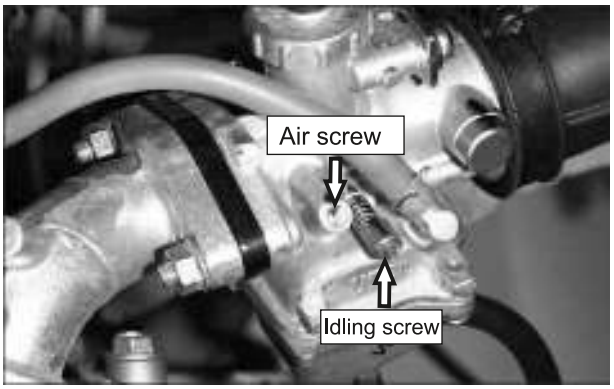


Fig. 2.38

Fig. 2.39

Flat head screw driver and Tachometer

Fuel type	Idling rpm
Petrol	1150 ± 50

Air screw 1¼ ± ¼ turns out from fully closed position

TUNING OF LPG VEHICLE IN PETROL MODE

- For tuning the carburetor of LPG vehicle follow below procedure:
- First keep the change over switch in 'P' mode. (Fig. 2.40)
- Then follow the procedure given for petrol vehicle (above).

Fig. 2.40

Fuel type	Idling rpm
Petrol	1150±50

Air screw 1¼ ± ¼ turns out from fully closed position

TUNING THE LPG VEHICLE IN LPG MODE

- Keep the changeover switch in Neutral mode - 'N'. (Fig. 2.41)
- Run the vehicle till the petrol in carburetor bowl gets exhausted.

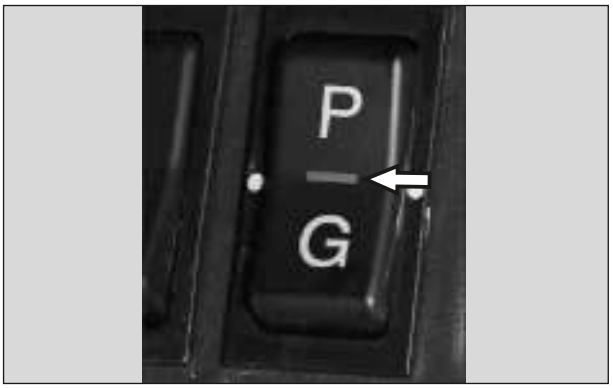


Fig. 2.41

- Keep the changeover switch in 'G' LPG mode and run the vehicle in 40km/hr speed for 1 to 2 km. (Fig. 2.42)

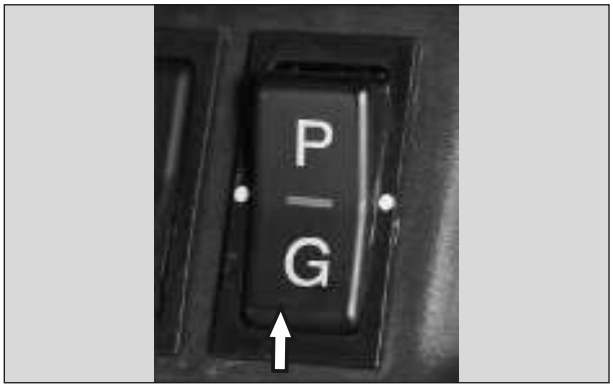


Fig. 2.42

- Remove the power screw cap. Tighten the power screw fully. (Fig. 2.43)
- Take out the screw by 1½ ± 1/8 turns
- Fix the cap power screw start the engine, allow to warm up.
- Keep the tachometer in 21:42 mode and connect the rpm antenna to the HT cord.
- Loosen the lock nut from the LPG reducer idling screw. (Fig. 2.43)
- Turn idling screw on LPG reducer so that the engine idles at 1150±50 rpm (Fig. 2.44)
- Lock the lock nut on idling screw.

Flat Head screw driver, Tachometer

Fuel type	Idling rpm
LPG	1150±50 rpm

Air screw - 1½ ± 1/8 turn out

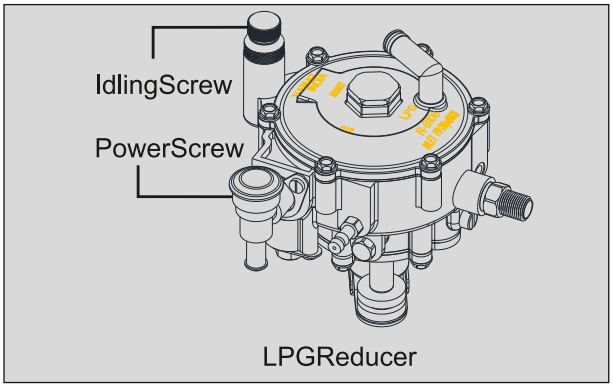


Fig. 2.43

Fig. 2.44

PROCEDURE FOR TUNING VEHICLE IN CNG MODE DIRECTLY

- Ensure fitment of cover intake.
- Check all the CNG connection and ensure no leakage
- Warm up the engine by running the vehicle for about 2 to 3 km
- Close the air screw in carburetor and open it by 1.25 turns out. (Fig. 2.45)

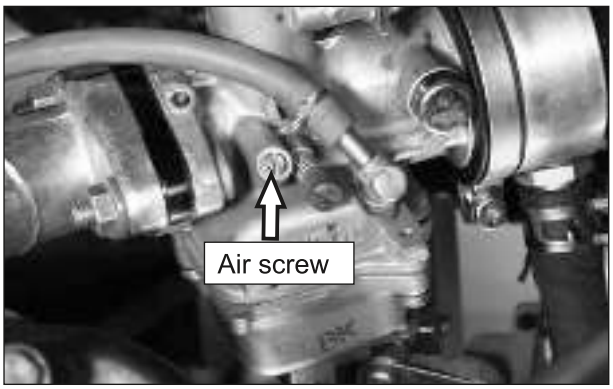


Fig. 2.45

- Close the adjuster screw (Idling) in the carburetor and open the screw to such and extent that the bottom of the screw head is in line with the air screw mounting hole in carburetor (aluminum casting)- show with figure. (Fig. 2.46)

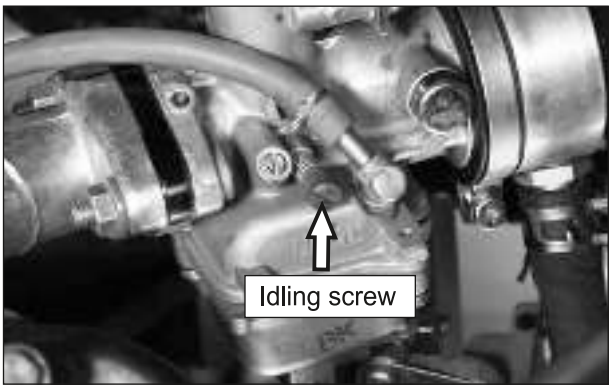


Fig. 2.46

- Close the power screw in the reducer unit and open it 10 turns out. (Fig. 2.47)
- Fully open the idling screw in the reducer unit and insert (screw) in its hole (thread) by 3 turns in. (Fig. 2.47)

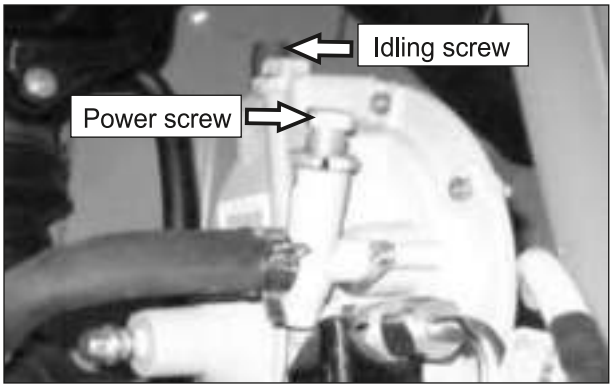


Fig. 2.47

First follow the procedure A:

- Press the self starter button and try to start the vehicle.
- While continue to crank the engine, slowly turn in the idling screw in the reducer so that the engine starts. It is suggested that the throttle is opened by about 5% (slight throttle opening) while cranking.
- Once the engine is started, allow it to idle for a moment, then turn in the idling screw slowly, the rpm of the engine reduces and the engine will try to go off. (Fig. 2.48)

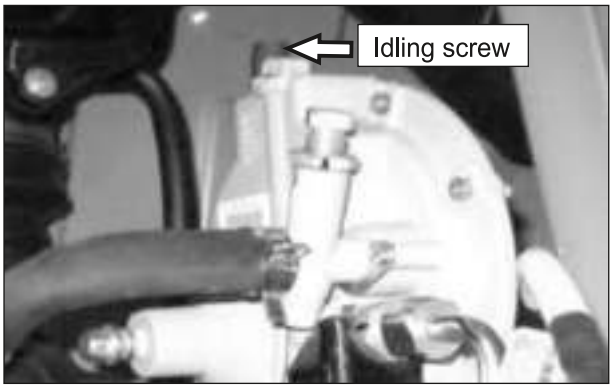


Fig. 2.48

- At this point, slowly rotate the idling screw of the reducer in opposite direction so that the rpm increases and engine firing is uniform. Tighten the lock nut by hand so that the screw position is not changed. (Fig. 2.48)
- Set the engine idling rpm at 1250 +/- 50
- If required the idling screw in the reducer unit can be adjusted by turning in or out by listening to the engine firing carefully.

- Switch of the engine and restart, open the throttle slowly and check the engine firing and now let the engine run in idle speed. Ensure stability of idling rpm.
- Lock all the lock nuts.
- Fix the rubber cap over the idling screw of reducer unit.

Procedure B:

- Fully open the idling screw in the reducer unit and insert (screw) in its hole (thread) by 3 turns in.
- Now, press the self starter button and try to start the vehicle. In case of not starting, continue to crank and slowly turn out the screw so that the engine starts.
- Allow engine to run in idle rpm for a moment.
- Once the engine is idling, try to turn in the idling screw so that the rpm of the engine reduces and the engine is about to go off.
- At this point, slowly rotate the idling screw of the reducer in opposite direction so that the rpm increase and engine firing is uniform. Tighten the lock nut by hand so that the screw position is not changed.
- Set the engine idling rpm at 1250 ± 50.
- If required the idling screw in the reducer unit can be adjusted by turning in or out by listening to the engine firing carefully.
- Switch of the engine and restart, open the throttle slowly and check engine firing and now let the engine run in idle speed. Ensure stability of idling rpm.
- Lock all the lock nuts.
- Fix the rubber cap over the idling screw of reducer unit.

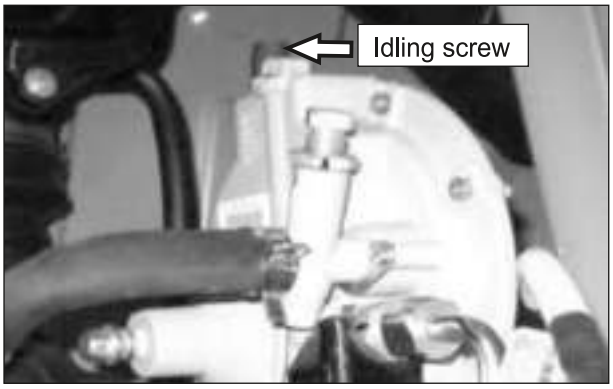


Fig. 2.49

PROCEDURE FOR TUNING 4S CNG DUAL MODE:

- Please follow the below mentioned procedure to set the engine idle RPM in petrol mode:
- Set the selector switch in petrol mode. (Fig. 2.50)
- Start the engine and warm up (Note: A warm engine means, engine has been running at an average speed of 40 kmph - In top gear for 9 minutes or engine oil temperature to reach 60°C.)
- Ensure no. of airscrew turns of carburettor set as per spec – 1 ¼ ± ¼ turns out.
- Set engine idle RPM in petrol mode by adjusting Carburettor idle screw – 1250 ± 50 rpm. (Fig. 2.51)

Note: Do not disturb carburetor idle screw here after.

- Please follow the below mentioned procedure to set the engine idle RPM in Gas mode:
- Change the selector switch to Neutral mode and empty the petrol from carburetor bowl. (Fig. 2.52A)
- Change the selector switch to Gas mode. (Fig. 2.52B)
- Keep / ensure the LPG kit power screw as per specification:10 ½ (±½) turns out. (Fig. 2.53)
- Keep CNG kit idle screw number of turns just below the specification: 7 ±1½ turns out. (Fig. 2.53)
- Start the engine and increase CNG reducer gas idle screw turns till engine idling RPM becomes stable in the range between 1100 ± 50 (Initial specification 7 ± 1½) (Idle screw no. of turns will reduce as the vehicles cover more distance. Adjust idle screw as required for the stable engine idle RPM)

Fig. 2.50

Fig. 2.51

Fig. 2.52A

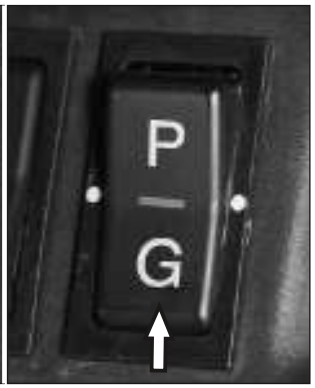


Fig. 2.52B

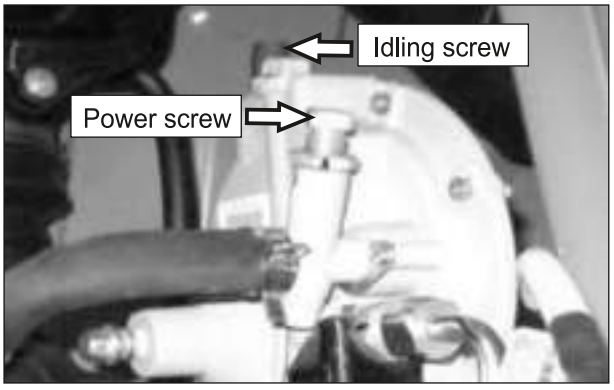


Fig. 2.53

TUNING PROCEDURE GS+

TUNING OF CARBURETOR IN PETROL VEHICLE

- Adjust the engine idle speed as follows:
  Warm up the engine (running the vehicle in 40 km/hr in top gear for about 3 to 4 km).

- Check and correct the throttle cable free play – 3 to 4 mm For free play adjustment procedure (Refer chapter "periodic maintenance" Page No.2.39.)

- Close the air screw fully by rotating it clockwise.(Fig. 2.54)

- Now, slowly take out by rotating the air screw in anticlockwise direction by 1¼ turn out. (Fig. 2.54)

- Start the engine and allow to warm up.

- Check the engine rpm using tachometer (Mode position in 21:42).

- Rotate the idle rpm adjustment screw in or out so that the engine idles at 1250±100 rpm. (Fig. 2.55)

Flat head screw driver and Tachometer

Fuel type	Idling rpm
Petrol	1250±100

Air screw 1¼ ± ¼ turns out from fully closed position

TUNING OF LPG VEHICLE IN PETROL MODE

- For tuning the carburetor of LPG vehicle follow below procedure:

- First keep the change over switch in 'P' mode. (Fig. 2.56)

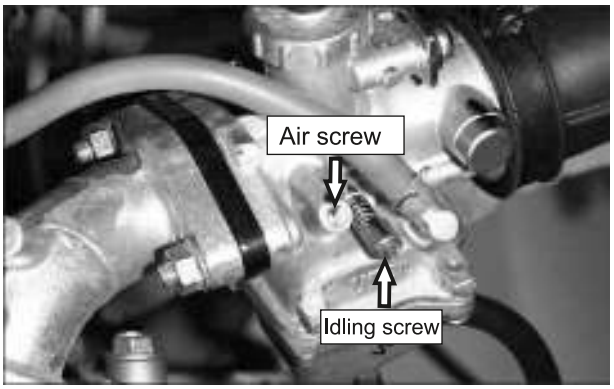


Fig. 2.54

Fig. 2.55

Fig. 2.56

- Then follow the procedure given for petrol vehicle (above).

Fuel type	Idling rpm
Petrol	1250 ± 100

Air screw 1¼ ± ¼ turns out from fully closed position

TUNING VEHICLE IN LPG / CNG MODE

- Keep the changeover switch in Neutral mode - 'N'. (Fig. 2.57)
- Run the vehicle till the petrol in carburetor bowl gets exhausted.
- Keep the changeover switch in 'G' LPG mode and run the vehicle in 40km/hr speed for 1 to 2 km. (Fig. 2.57)
- Remove the power screw cap. Tighten the power screw fully. (Fig. 2.58)
- Take out the screw by 2 ½ ± 1/8 turns
- Fix the cap power screw
- Start the engine, allow to warm up.
- Keep the tachometer in 21:42 mode and connect the rpm antenna to the HT cord.
- Loosen the lock nut from the LPG reducer idling screw. (Fig. 2.58)
- Turn idling screw on LPG reducer so that the engine idles at 1150± 100 rpm (Fig. 2.59)
- Lock the lock nut on idling screw.

Flat Head screw driver, Tachometer

Fuel type	Idling rpm
LPG	1150± 100 rpm

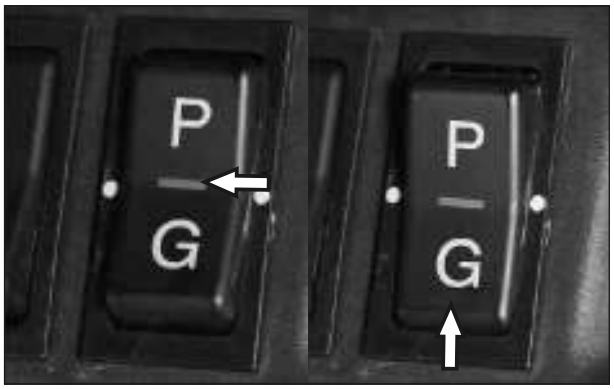


Fig. 2.57

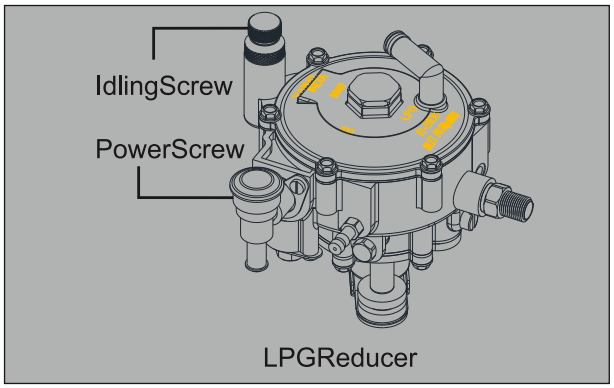


Fig. 2.58

Fig. 2.59

MEASURING CO LEVEL IN EXHAUST EMISSION FOR PETROL VEHICLE

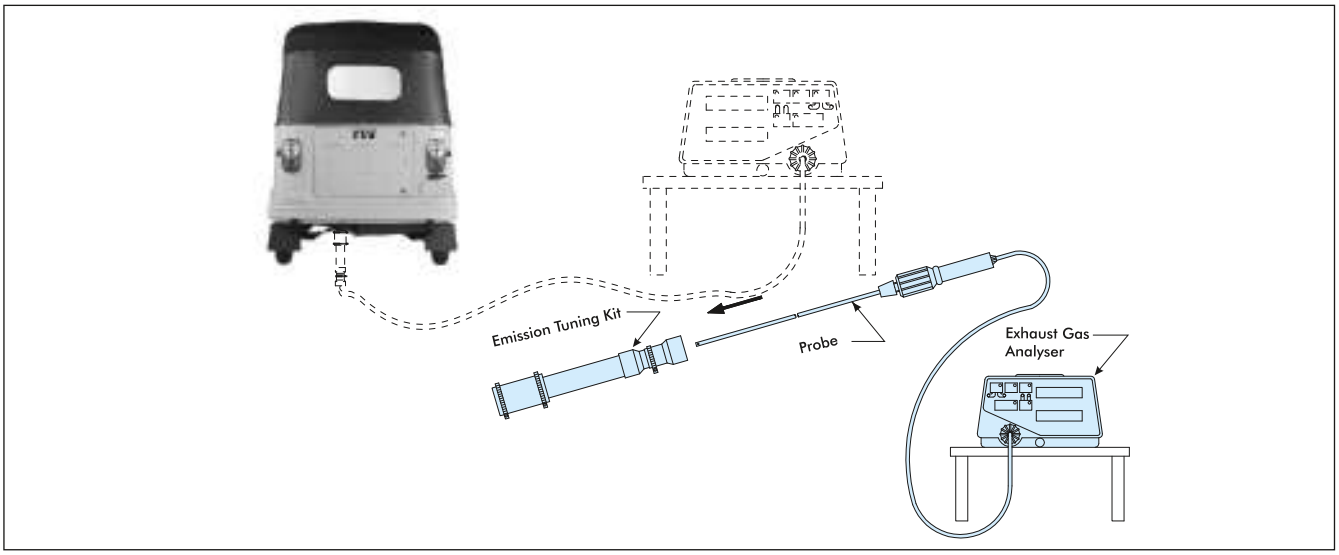


Fig. 2.60

MEASURING CO LEVEL IN EXHAUST EMISSION FOR PETROL VEHICLE

When the engine performance is generally good, tuning of carburetor assembly by adjusting mixture control screw and idling screw will help to control the CO level in exhaust gases. Many brands of 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:-

For Petrol Vehicle

Start the engine and run on road in top gear at an average speed of 40 kph for 1 or 2 km or run the vehicle in top gear to achieve 55 ~ 65 ° C engine oil temperature.
The induction and exhaust systems of test vehicle shall be examined for leakage of air.
Methods for checking the induction leak at the carburetor joints and the leak at exhaust pipe gasket area are described below.

Induction Leak

Ensure there is no leak in the induction system, as this may disturb the carburetion. To check the induction leak, pour petrol over the induction system joints and look for the change in idle RPM & HC ppm (to be measured at tail pipe).
If there is no change in idle rpm /HC ppm - No leak in Induction system is ensured.
If the engine idling RPM rises / the engine cuts off -check for the induction system leak and correct.

Exhaust Leak

Ensure there is no leak at exhaust pipe mounting area, as this may lead to the dilution of exhaust gas with ambient air.
To check the exhaust gas leak, block the exhaust gas at tail pipe and do not allow any exhaust gas to escape to atmosphere.
This will lead to engine cut off. Thus no leak in exhaust system ensured. If the engine continue to idle

check for exhaust system leak and correct.

Note: Exhaust gas analyzer calibration :The portable exhaust gas analyzer is to be calibrated periodically as per the instruction manual recommendations supplied by the equipment manufacturer.

For idling rpm setting and carburetor tuning procedure refer chapter 'Periodic Maintenance' page number 15

Test Procedure
After warm up, Idling RPM of the test vehicle should be adjusted by idle adjusting screw (Throttle stop screw) of carburetor.
For CO setting, the exhaust muffler should be connected with an extension tube. The sampling probe should be inserted in to the extension tube (min 60 cm) as recommended by the analyzer instruction manual.

Note down the CO reading when idling RPM is stable. If it exceeds the limits, then adjust the Air Screw to achieve proper CO% at specified idling RPM.

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'.

FOR LPG VEHICLE IN PETROL MODE
First set Idling in Petrol mode, (refer chapter Periodic Maintenance page number 15) and then LPG can be tuned.

Adjust the Engine Idle speed as follows: -

Start the engine & allow it to warm up.

A warm engine means an engine, which has been run at an avg. speed of 40 kmph in top gear for 3 to 4 km or engine oil temperature is 60°C.

Induction Leak
Ensure there is no leak in the induction system, as this may disturb the carburetion. To check the induction leak, pour petrol over the induction system
joints and look for the change in idle RPM & HC ppm (to be measured at tail pipe).If there is no change in idle rpm /HC ppm - No leak in Induction system is ensured. If the engine idling RPM rises / the engine
cuts off -check for the induction system leak and correct.

Exhaust Leak
Ensure there is no leak at exhaust pipe mounting area, as this may lead to the dilution of exhaust gas with ambient air.
To check the exhaust gas leak, block the exhaust gas at tail pipe and do not allow any exhaust gas to escape to atmosphere.
This will lead to engine cut off. Thus no leak in exhaust system ensured. If the engine continue to idle check for exhaust system leak and correct.

Note: Exhaust gas analyzer calibration: The portable exhaust gas analyzer is to be calibrated periodically as per the instruction manual recommendations supplied by the equipment manufacturer.

For idling rpm setting and carburetor tuning procedure refer chapter Periodic Maintenance page number

Turn the idle screw so that the engine idles at 1250 ± 100

The Idling CO < <1.5% @ Tail Pipe

Incase the CO & HC do not meet the above specs, adjust the air screw of carburetor till achieve the above specifications.

For LPG vehicle in LPG Mode
Keep the change over switch in neutral mode
Run the vehicle till the petrol in bowl is exhausted.

Keep the change over switch in LPG mode & run the vehicle in 40 kph for 1 to 2 km.
Keep/ensure the power screw at 2 ½ ± 1/8 turns out.

Keep/ensure the idle screw at 3 turns out.

Turn the idle screw of reducer & adjust the idle rpm between 1150 (± 100)

The Idling CO <0.4% @ Tail Pipe

Lock idle screw by lock nut.

Test Procedure
After warmup, Idling RPM of the test vehicle should be adjusted by idle adjusting screw (Throttle stop screw) of carburetor.

For CO setting, the exhaust muffler should be connected with an extension tube.
The sampling probe should be inserted in to the extension tube (min 60 cm) as recommended by the analyzer instruction manual.

Note down the CO reading when idling RPM is stable. If it exceeds the limits, then adjust the Air Screw to achieve proper CO% at specified idling RPM.

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'.

FOR CNG VEHICLE IN PETROL MODE
First set Idling in Petrol mode , refer the chapter Periodic Maintenance page number15 and then CNG can be tuned.

Adjust the Engine Idle speed as follows:-
Start the engine & allow it to warm up.
A warm engine means an engine, which has been run at an avg. speed of 40 kmph in top gear for 3 to 4km or engine oil temperature is 60° C.

Induction Leak
Ensure there is no leak in the induction system, as this may disturb the carburetion. To check the induction leak,
pour petrol over the induction system joints and look for the change in idle RPM & HC ppm (to be measured at tail pipe).
If there is no change in idle rpm /HC ppm - No leak in Induction system is ensured. If the engine idling RPM rises / the
engine cuts off -check for the induction system leak and correct.

Exhaust Leak
Ensure there is no leak at exhaust pipe mounting area, as this may lead to the dilution of exhaust gas with ambient air.

To check the exhaust gas leak, block the exhaust gas at tail pipe and do not allow any exhaust gas to escape to atmosphere.
This will lead to engine cut off. Thus no leak in exhaust system ensured. If the engine continue to idle check for exhaust system leak and correct.

Note : Exhaust gas analyzer calibration: The portable exhaust gas analyzer is to be calibrated periodically as per the instruction manual recommendations supplied by the equipment manufacturer.

Please follow the below mentioned procedure to set the engine idle RPM in petrol mode:
Set the selector switch in petrol mode.
Start the engine and warm up (Note: A warm engine means, engine has been running at an average speed 40 kmph - in top gear for 9 minutes or engine oil temperature to reach 60°c.)

Ensure no. of air screw turns of carburetor set as per specification - 1¼ ± ¼ turns out

Set engine idle RPM in petrol mode by adjusting carburetor idle screw-1250 ± 100.

Note: Do not disturb carburetor idle screw here after

Please follow the below mentioned procedure to set the engine idle RPM in Gas mode:
Change the selector switch to neutral mode and empty the petrol from carburetor bowl.

Change the selector switch to Gas mode.

Keep /ensure the CNG kit power screw as per specification : 2 ½ ± 1/8 turns out.

Keep CNG kit idle screw number of turns just below the specification : 3± 1½ turns out.

Start the engine and increase CNG reducer gas idle screw turns till engine idling RPM becomes stable in the range between 1150±100 rpm

Note: Idle screw no .of turns will reduce as the vehicles cover more distance. Adjust idle screw as required for the stable engine idle RPM.

Power screw setting:
Do not rev - up the engine to full throttle without load to adjust the power screw

With the manufacturers recommended power screw setting run the vehicle on level road with full throttle to find the vehicle max speed.

Max speed can be set between 50 to 55 kmph, with good idle stability and drive feel with reasonable mileage.
Check for drive feel and fuel economy.
If found and reported for poor pick up or not climbing gradient, increase power screw turns in steps of 1/4 turn and verify and clear.
If mileage reported lower than the normal average value in that city terrain, decrease the number of power screw turns in steps of 1/4 turn and verify. (check for the idle RPM and adjust if required as explained above)

Idle emission measurements:

Measure idle emission at the tail pipe and specification is CO <0.4% @ Tail Pipe

Idle CO measurement before CAT (provision given in exhaust pipe but measurement should be done by plugging the SAI)

Specification with stable engine idle RPM , CO can be set between 0.5 to 1.5 %

Test Procedure

After warmup, Idling RPM of the test vehicle should be adjusted by idle adjusting screw (Throttle stop screw) of carburetor.

For CO setting, the exhaust muffler should be connected with an extension tube. The sampling probe should be inserted in to the extension tube (min 60 cm) as recommended by the analyzer instruction manual.

Note down the CO reading when idling RPM is stable. If it exceeds the limits, then adjust the Air Screw to achieve proper CO% at specified idling RPM.

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'.

TVS KING DELUXE 4S PETROL GS+	
Engine idling rpm (Petrol)	1250±100 rpm
Idle CO (Petrol)	<1.5% @ Tail Pipe
TVS KING DELUXE 4S LPG LS+	
Engine idling rpm (LPG)	1150±100 rpm
Idle CO (LPG)	<0.4% @ Tail Pipe
Engine idling rpm (Petrol)	1250±100 rpm
Idle CO (Petrol)	<1.5% @ Tail Pipe
TVS KING DELUXE 4S CNG ZS+	
Engine idling rpm (CNG)	1150±100 rpm
Idle CO (CNG)	<0.4% @ Tail Pipe
Engine idling rpm (Petrol)	1250±100 rpm
Idle CO (Petrol)	<1.5% @ Tail Pipe

MUFFLER ASSEMBLY

REMOVAL FROM CHASSIS AND CYLINDER BLOCK

- Loosen and remove 2 nos. hexagonal special nuts from the exhaust side of cylinder head. (Fig. 2.61)

13 mm Spanner

- Hold the muffler body mounting bolt to engine cradle.

12 mm Socket & Ratchet spanner

- Loosen the lock nut and take out the bolts along with one plain washer and one spring washer in the nut side and one bigger plain washer in the bolt head side. (Fig. 2.62)

12 mm Spanner

- Separate the tail pipe of the muffler assembly from the exhaust port and take out the muffler assembly.

- Take out the gasket exhaust port pipe.

Note: during the assembly of exhaust complete always replace the gasket exhaust with new one. While decarbonizing the muffler assembly replace the gasket muffler tail pipe with new one.

- For decarbonising the muffler loosen and remove the hex. nut 2 nos. along with spring washer. (Fig. 2.63)

- Blow air inside the body muffler, pipe exhaust and the tail pipe and remove the carbon deposited in that areas.

8 &10 mm Spanner

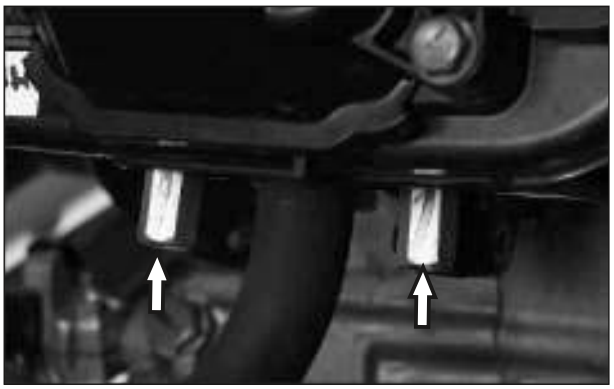


Fig. 2.61

Fig. 2.62

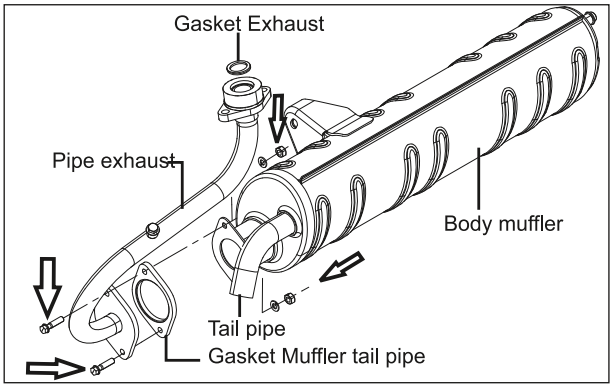


Fig. 2.63

BATTERY

- Battery is fitted under the passenger seat.
- Battery voltage can be checked without removal of seat, instead by connecting the positive lead of multimeter (Red wire) to the Starter relay output (Red) wire and touching the Negative lead of multimeter (Black wire) to the cylinder head (unpainted area) inside the engine cabin.
- The measured voltage should not be below 11 Volts. If it is less than 11 Volts, recharge the battery using table charger.
- For table charging of battery, it should be removed from the vehicle.

REMOVAL BATTERY FROM THE VEHICLE

- Loosen and remove 2 nos. Hexagonal nut M6 from Passenger seat bottom.(Fig. 2.64)

10 mm spanner

- Take out the passenger seat.
- Loosen and remove 2nos. CRPH screws M6X16 from the Lid battery box. Take out the lid. (Fig. 2.65)

Philips head screw driver

- Disconnect the negative terminal from the battery first and then the positive terminal. Whereas, while reconnecting the terminals, please connect the positive terminal first and negative terminal next. (Fig. 2.66)
- Loosen and remove 2 nos. Hexagonal flange bolts M6X 25 along with 2nos. each plain washer and spring washer from clamp battery. (Fig. 2.66)

10 mm spanner

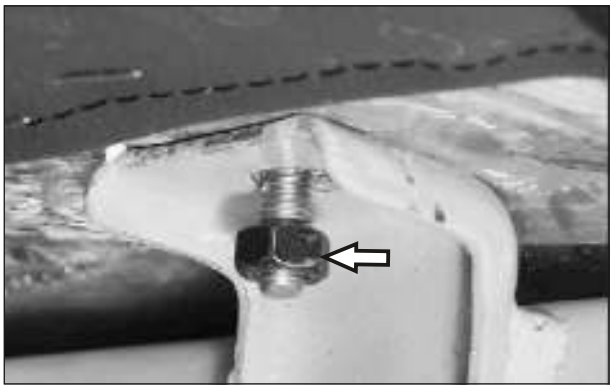


Fig. 2.64

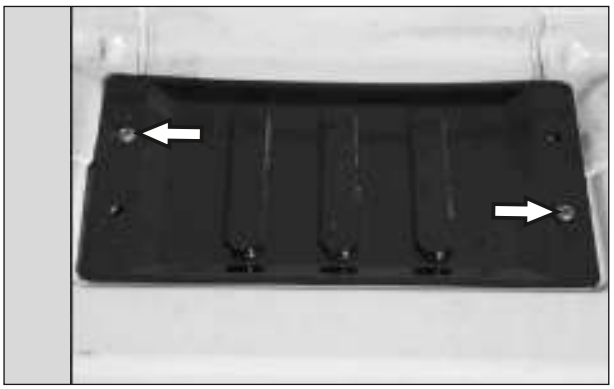


Fig. 2.65

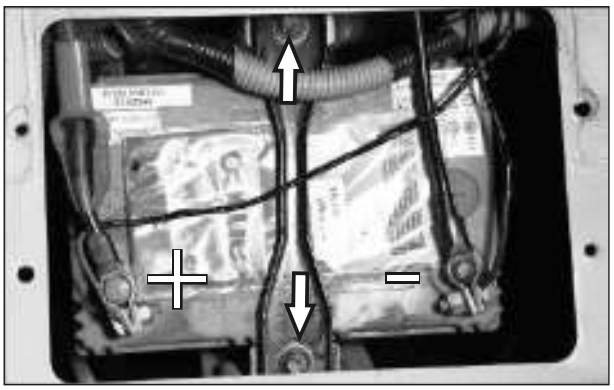


Fig. 2.66

- Take out clamp battery.
- Using lifting tool battery, lift the battery from its box. (Fig. 2.67)
- Re assemble all parts in the reverse order of dismantling.
- While reconnecting the terminals, check terminals for any corrosion, if corroded, wash the terminals with warm water and wire brush. Wipe out the terminal using dry cloth. Apply petroleum jelly on both terminals.

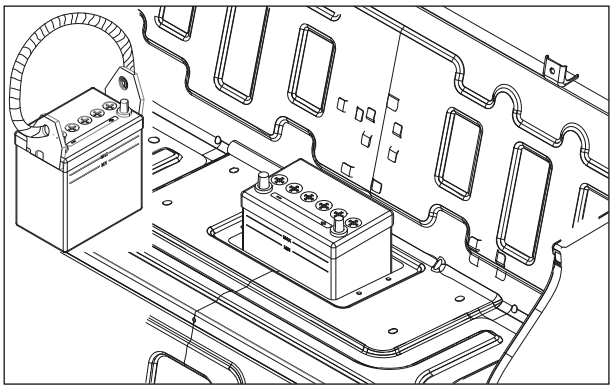


Fig. 2.67

10 mm spanner

Philips head screw driver

Lifting tool battery

CHARGING OF BATTERY

Caution: Use only constant current battery charger of current output not more than 3.2A for 32 Ah batteries

- For battery charging procedure refer chapter electrical page number 6.26.

AUTO BRAKE ADJUSTER

BRAKE FLUID LEVEL

- The reservoir in vehicles manufactured after date (10.02.2014) is integrated with the Master cylinder itself.

- Check if the brake fluid level is in between the 'MAX' and 'MIN' level. (Fig. 2.68)

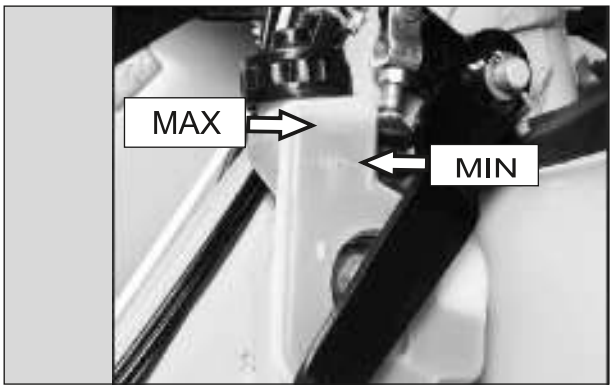


Fig. 2.68

- Top up if required by removing the cap reservoir brake fluid with DOT3 or DOT4 brake fluid upto MAX level. (Fig. 2.69)


Fig. 2.69

Manual Bleeding procedure:

- Begin at the corner furthest from the driver and proceed in order towards the driver. (Left rear, right rear and front) While the actual sequence is not critical to the bleed performance it is easy to remember the sequence as the farthest to the closest. This will also allow the system to be bled in such a way as to minimize the amount of potential cross-contamination between the new and old fluid.

- Locate the bleeder screw at the rear of the caliper body (or drum brake wheel cylinder.) Remove the rubber cap from the bleeder screw and don't lose it. (Fig. 2.70)

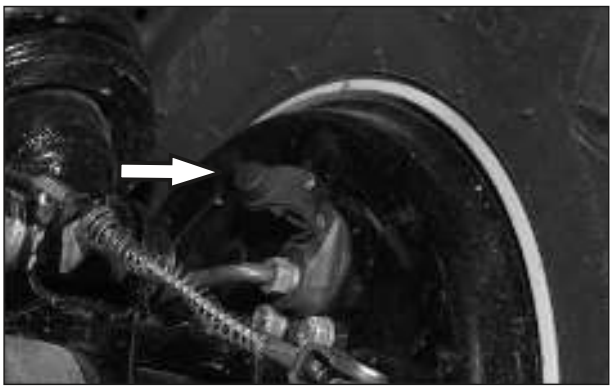


Fig. 2.70

- Place the box-end wrench over the bleeder screw. An offset wrench works best since it allows the most room for movement.

- Place one end of the clear plastic hose over the nipple of the bleeder screw. (Fig. 2.71)

- Place the other end of the hose into the disposable bottle. (Fig. 2.71)


Fig. 2.71

- Place the bottle for waste fluid on top of the caliper body or drum assembly. Hold the bottle with one hand and grasp the wrench with the other hand.

- Instruct the assistant to "apply." The assistant should pump the brake pedal three times, hold the pedal down firmly, and respond with "applied." Instruct the assistant not to release the brakes until told to do so. (Fig. 2.72)

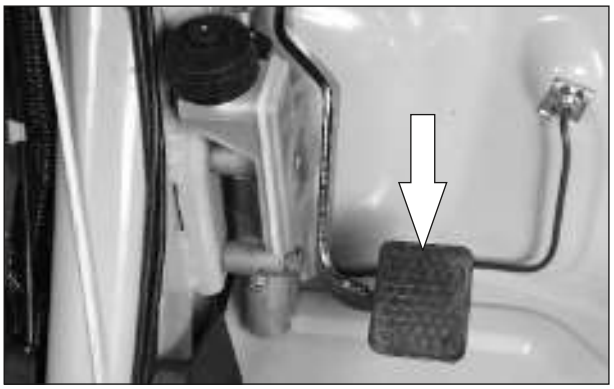


Fig. 2.72

- Loosen the bleeder screw with a brief ¼ turn to release fluid into the waste line. The screw only needs to be open for one second or less. (The brake pedal will "fall" to the floor as the bleeder screw is opened. Instruct the assistant in advance not to release the brakes until instructed to do so.). (Fig. 2.73)

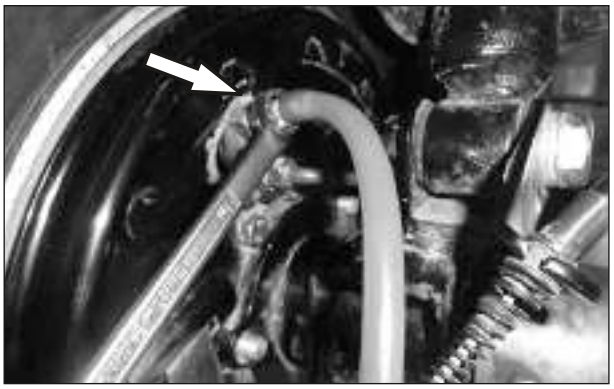


Fig. 2.73

9 mm spanner

- Close the bleeder screw by tightening it gently.

Note: that one does not need to pull on the wrench with ridiculous force. Usually just a quick tug will do.

- Instruct the assistant to "release" the brakes.

Note: Do not release the brake pedal while the bleeder screw is open, as this will suck air back into the system. (Fig. 2.74)

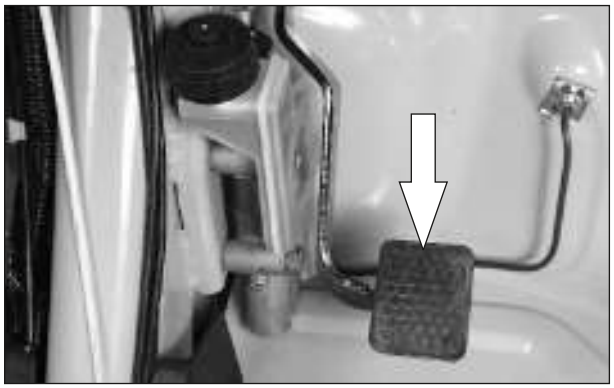


Fig. 2.74

- The assistant should respond with released.

- Inspect the fluid within the waste line for air bubbles.

- Continue the bleeding process (steps 11 through 16) until air bubbles is no longer present. Be sure to check the brake fluid level in the reservoir after bleeding each wheel! Add fluid as necessary to keep the level at the MAX marking. (Typically, one repeats this process 5-10 times per wheel when doing a 'standard' bleed.)

- Move systematically towards the driver – left rear, right rear and front - repeating the bleeding process at each corner. Be sure to keep a watchful eye on the brake fluid reservoir and keep it full at all times.

- When all three corners have been bled, spray the bleeder screw (and any other parts that were moistened with spilled or dripped brake fluid) with brake cleaner and wipe dry with a clean rag. (Leaving the area clean and dry will make it easier to spot leaks through visual inspection later) Try to avoid spraying the brake cleaner directly on any parts made of rubber or plastic, as the cleaner can make these parts brittle after repeated exposure.

- Test the brake pedal for a firm feel. (Bleeding the brakes will not necessarily cure a "soft" or "mushy" pedal – since pad taper and compliance elsewhere within the system can contribute to a soft pedal. But the pedal should not be any worse than it was prior to the bleeding procedure)

OPEN BLEEDING PROCEDURE

- Attach the bleed tube to the Caliper / wheel cylinder bleed screw farthest from themaster cylinder, and place the other end of the tube in a clean glass jar containing sufficient brake fluid to submerge the end of the tube. (Fig. 2.75)

Fig. 2.75

- Open the bleed screw ½ to ¾ of a turn, sufficient to allow the brake fluid to flow freely. (Fig. 2.76)

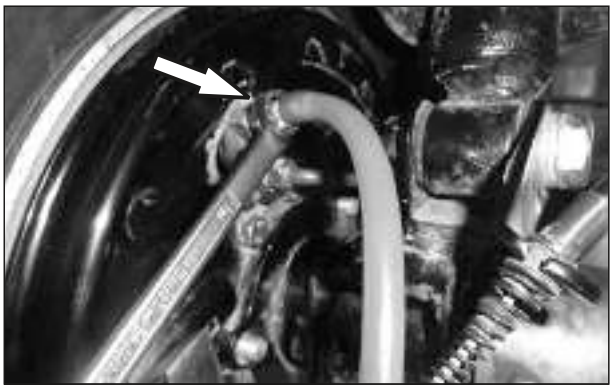


Fig. 2.76

- Depress the foot pedal slowly throughout the full stroke of the pedal and allow it to return slowly to its stop. (Fig. 2.77)
- Remove the floor mat or any other object, which may obstruct the full stroke of thepedal. There should be an interval of three to four seconds before making the next stroke. This action should be repeated until bubbles of air cease to appear at the end of the bleed tube.
- Close the bleed screw immediately after the last downward stroke of the pedal. Whilst the pedal is thus held, securely tighten the bleed screw and remove the tube.
- Replace the dust cover on the bleed screw.
- Ensure that the fluid level in the master cylinder reservoir does not fall low enough to cause air to be drawn into the system, throughout the bleeding operation.
- Repeat the same procedure on all other Calipers / wheel cylinders, ending with that nearest to the master cylinder.
- If the bleeding of any cylinder continues without success for a considerable time it may be that air is being drawn – in past the bleed screw threads.

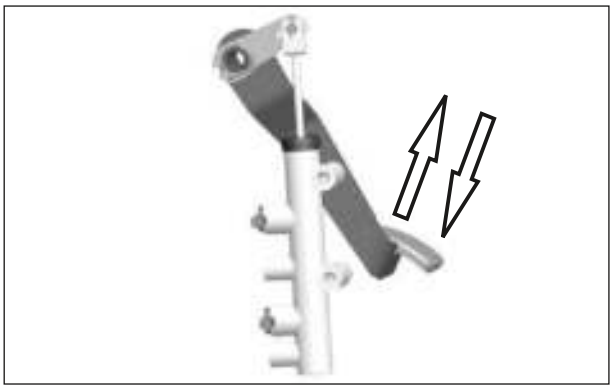


Fig. 2.77

- In such instances, the bleed screw should be closed at the end of each downward stroke of the pedal, allowing the pedal to return fully to its stop before re-opening. Tighten the bleed screw finally after the last downward stroke of the pedal.

- Replace the dust cover on the bleed screw.

- Once Open bleeding is completed as illustrated above, Close bleeding procedure to be followed. Essentially Open bleeding is done to ensure fluid is filled on all lines and free flow of brake fluid is ensured due to pressure head in reservoir when brakes are not applied and also during brake application.

CLOSE BLEEDING PROCEDURE

- Attach the bleed tube to the Caliper / wheel cylinder bleed screw farthest from the master cylinder, and place the other end of the tube in a clean glass jar containing sufficient brake fluid to submerge the end of the tube. (Fig. 2.78)

Fig. 2.78

- Apply and release the foot pedal to around half stroke of the available pedal travel swiftly for around 4 ~ 5 times continuously and hold the brake pedal. (Fig. 2.79)

- This is essentially to create a pressurized brake fluid inside the brake circuit and any air left will get caught for release. (Fig. 2.79)

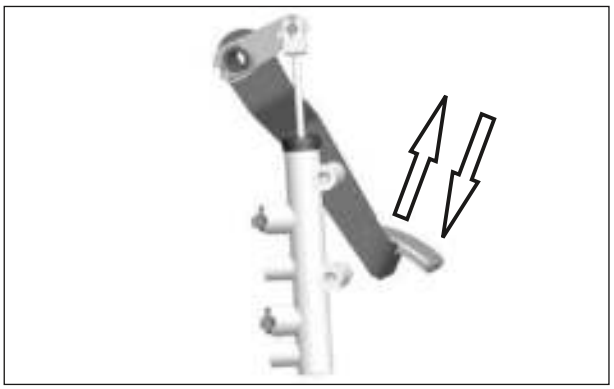


Fig. 2.79

- Do not open the bleed screw. Now Open the bleed screw ½ to ¾ of a turn, sufficient to allow the brake fluid to flow freely. (Refer fig 4 on left side).Close the bleed screw immediately.

- Do not open the bleed screw. Now Open the bleed screw ½ to ¾ of a turn, sufficient to allow the brake fluid to flow freely. (Fig. 2.80). Close the bleed screw immediately.

Note: While opening the bleed screw, the firmly held pedal will get depressed; the driver should hold it firmly till the bleed screw is closed after removal of pressurized fluid and air.

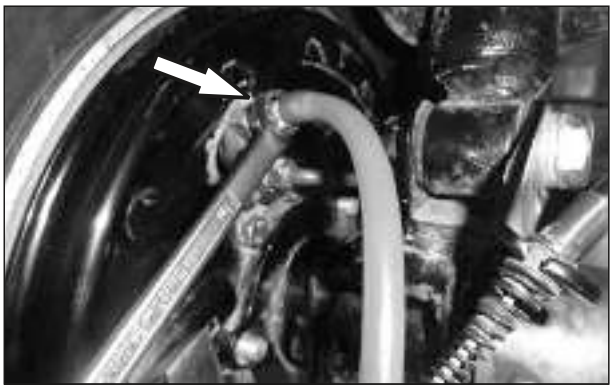


Fig. 2.80

- This action should be repeated until bubbles of air cease to appear at the end of the bleed tube. Close the bleed screw immediately after the last downward stroke of the pedal.

- Whilst the pedal is thus held, securely tighten the bleed screw and remove the tube. Replace the dust cover on the bleed screw.

- Ensure that the fluid level in the master cylinder reservoir does not fall low enough to cause air to be drawn into the system, throughout the bleeding operation.

- Repeat the same procedure on all other Calipers / wheel cylinders, ending with that nearest to the master cylinder.
- If the master cylinder has a bleed screw fitted, bleed master cylinder again to confirm that all air is expelled.

- After the bleeding operation, top up the master cylinder reservoir to a level of ¾" below the top of filler opening, and replace the filler cap.

- After completion of bleeding, apply the brake pedal hard and check for any leak at the joints and bleed screws.

PARKING BRAKE

- Check parking brake for effective working.
- Else adjust the parking brake cable free play at the parking brake lever end. (Fig. 2.81)

Fig. 2.81

CONTROL CABLES

- Cable assembly clutch - free play

Check and adjust at initial 750 km and every 5000km thereafter

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

- Ensure that the engine is in cold condition and measure the free play at the clutch lever end from engaged position to before clutch begins to disengage. (Fig. 2.82)

Free play	10 - 20 mm

- Loosen the lock nut (A)and hold the adjuster nut (B). (Fig. 2.83)

- Pull the adjuster bolt away from the rod complete clutch release to reduce free play and towards it to increase free play. (Fig. 2.84)

- Check the free play at the lever clutch end.(Fig. 2.82). Shift the gear to 4th in engine off and stand still condition and check the free play at clutch lever. Minimum 5mm free play is required.

- Tighten the lock nut by holding the adjuster bolt after the specified free play is achieved.

12 mm Spanner

- Check the free play of rod complete clutch in cover clutch assembly and ensure minimum 7 degree of free play.

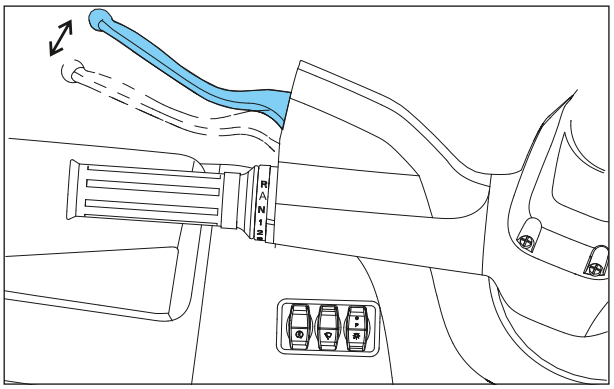


Fig. 2.82

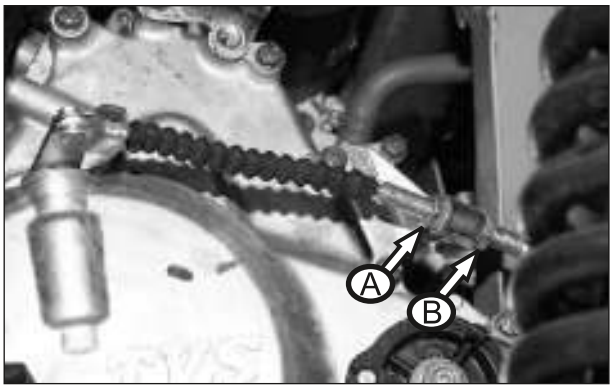


Fig. 2.83

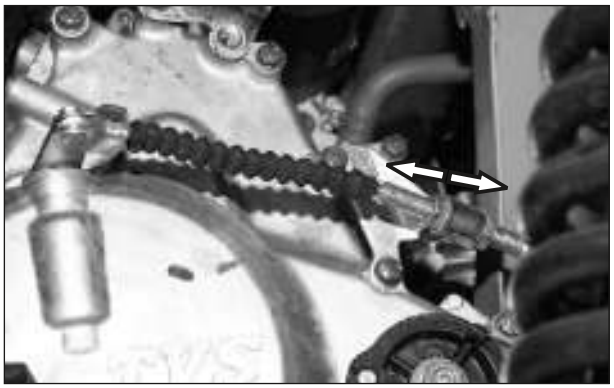


Fig. 2.84

CABLE ASSEMBLY THROTTLE - FREE PLAY

Check and adjust at initial 750 km and every 5000km thereafter

- For checking the throttle cable free play, rotate the throttle slowly till the carburetor piston valve gets actuated. If the free play is more or less adjust as follows. (Fig. 2.85)

Free play	2 - 3 mm

- Adjust the free play by holding the adjuster bolt (B), loosening the lock nut (A) on throttle cable. (Fig. 2.86)
- Pull the adjuster bolt away from the pulley throttle to reduce the free play and towards the pulley throttle to increase the free play.
- Hold the adjuster bolt (B) and tighten the lock nut (A).(Fig. 2.86)

CABLE ASSEMBLY GEAR - FREE PLAY

Check and adjust at initial 750 km and every 5000km thereafter

- Check the free play by rotating the tube complete gearshift and check if the neutral 'N' indicator glows on the tell tale cluster. (Fig. 2.87)
- Holding the adjuster bolt 'A' loosen the lock nut 'B' on cable gearshift white. (Fig. 2.88A)

10 mm Spanner

- Holding the adjuster bolt 'A' loosen the lock nut 'B' on cable gearshift black (Fig. 2.88B)

10 mm Spanner

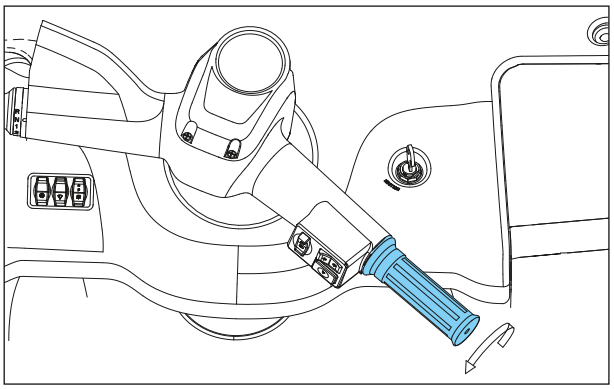


Fig. 2.85

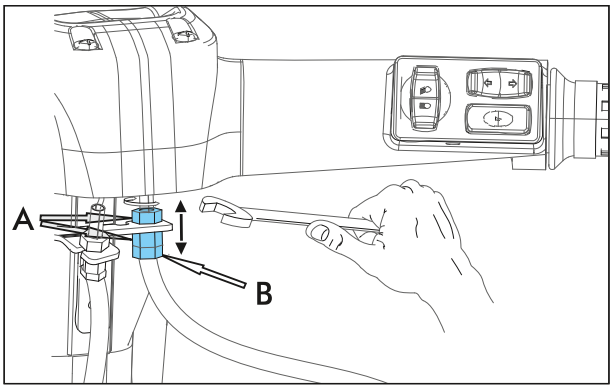


Fig. 2.86

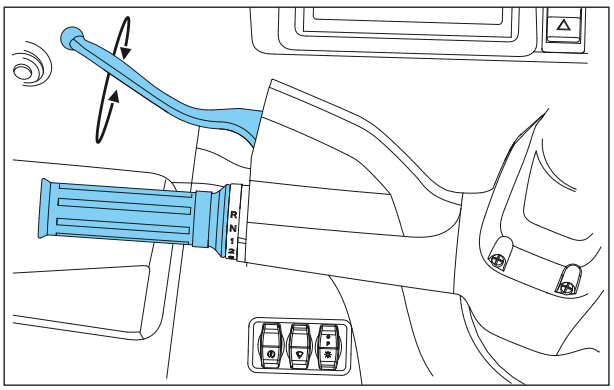


Fig. 2.87

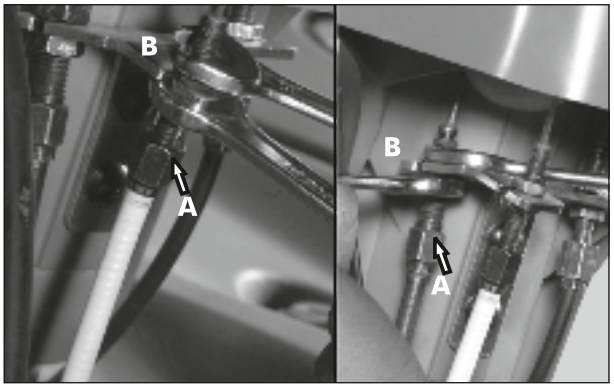


Fig. 2.88A Fig. 2.88B

- For adjusting free play of forward gears pull the adjuster bolt of gear cable white away from the pulley gearshift to reduce free play and towards it to increase free play. (Fig. 2.89 A)

- Check the free play by rotating the tube complete gearshift and checking if the position of the neutral 'N' mark on indicator gearshift coincides with the mark on the handlebar. (Fig. 2.90)

- Tighten the lock nut 'B' holding the adjuster bolt 'A' for both the cables after checking the free play.

- For adjusting free play of reverse gear pull the adjuster bolt of gear cable white away from the pulley gearshift to reduce free play and towards it to increase free play. (Fig. 2.89 B)

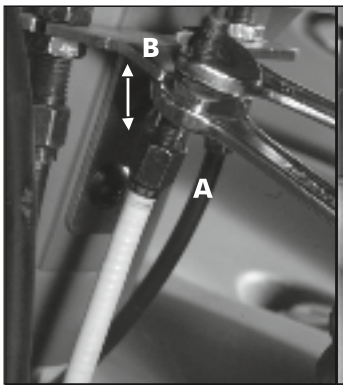


Fig. 2.89A

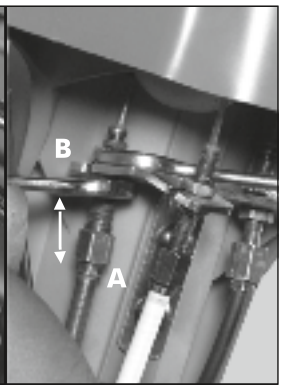


Fig. 2.89B

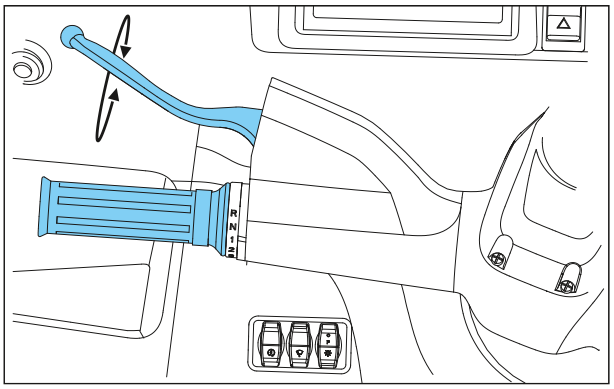


Fig. 2.90

FASTENERS TIGHTENING

ENGINE FOUNDATION

- Hold the bolt front engine mounting and tighten nut engine mounting front. (Fig. 2.91)

14, 17 mm	spanner

Tightening Torque	30 Nm

Note : After tightening the rear engine foundation bolt rotate the cup engine mounting front. Make sure it should rotate slightly

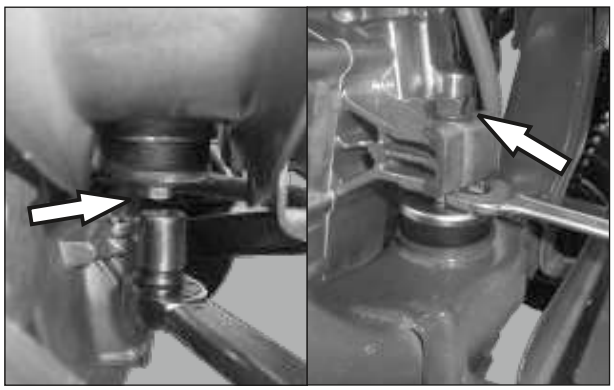


Fig. 2.91

- Hold the nut engine mounting rear and tighten engine mounting bolt rear. (Fig. 2.92)

14, 17 mm	spanner

Tightening Torque	40 Nm

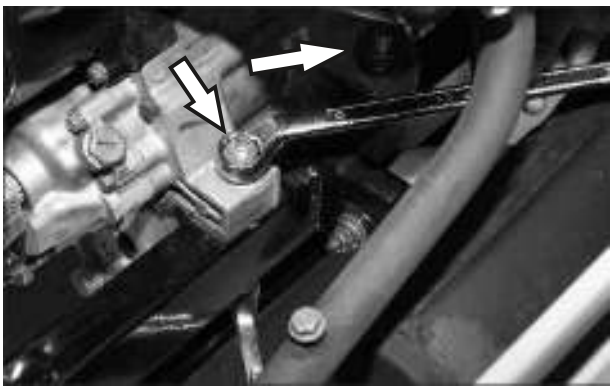


Fig. 2.92

EXHAUST MOUNTING

- Tighten the exhaust mounting on block. (Fig. 2.93A)

13 mm spanner

- Tighten exhaust mounting bolt on chassis by holding the nut. (Fig. 2.93B)

12 mm ring & socket spanner, ratchet & extension rod

Tightening Torque	12 - 18 Nm

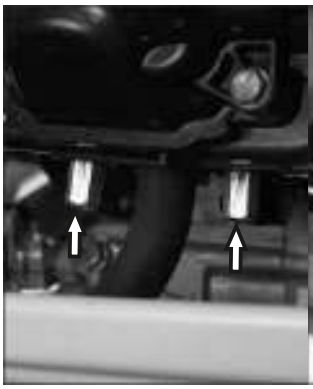


Fig. 2.93A

Fig. 2.93B

WHEEL NUTS

- Tighten the wheel nuts in cross pattern to the specified torque. (Fig. 2.94)

17 mm spanner

Tightening Torque	48 - 52 Nm

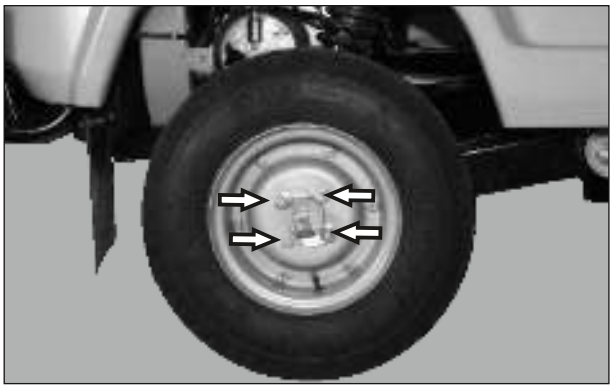


Fig. 2.94

SHOCK ABSORBER MOUNTING BOLTS

- Tighten shock absorber top and bottom mounting bolts to the specified torque. (Fig. 2.95A)

18 mm spanner

Tightening Torque	58 - 68 Nm

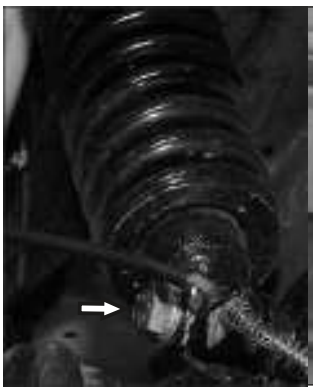


Fig. 2.95A

Fig. 2.95B

HANDLEBAR MOUNTING BOLTS

- Hold the hexagonal bolt using and tighten the hexagonal nut (Fig. 2.95B)

17 mm spanners (2nos)

Tightening Torque	38 - 42 Nm

DASHBOARD FASTENERS

- Tighten dashboard fasteners 6 nos. using Philips head screw driver. (Fig. 2.96)

Philips head screw driver

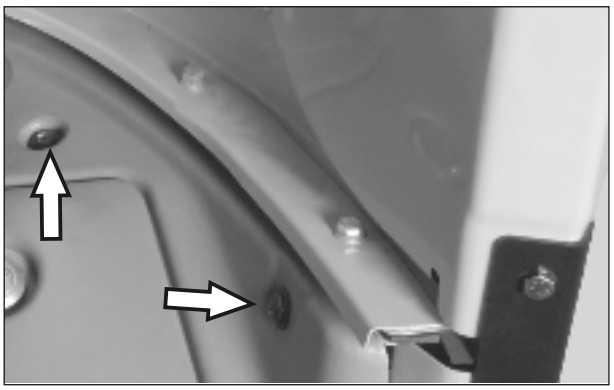


Fig. 2.96

REAR VIEW MIRROR FASTENERS

- Tighten rear view mirror mounting bolts.(Fig. 2.97A)

14, 17 mm spanner

WINDSHIELD FASTENERS

- Tighten windshield frame bolts 10nos. using 10 mm spanners (Fig. 2.97B)

10mm spanners (2 nos.)

SOFT TOP FRAME FASTENERS

- Tighten soft top frame bolts using 10 mm spanners.

10 mm spanners (2 nos.)

STEERING

Check and adjust at initial 750 km and every 5000km thereafter

- 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 will cause vibration and damage to the steering bearings.

- Check to see that there is no play in the steering bearings. If any play found, adjust the steering as explained below.

STEERING PLAY ADJUSTMENT

- For adjusting the steering play, loosen the steering lock nut (top) using special tool. Then using the same special tool, loosen or tighten the steering lock nut (bottom) as required. (Fig. 2.98)

- Check and tighten the steering lock nut (top).

Fig. 2.97A

Fig. 2.97B

Fig. 2.98

G3310640	Spanner lock nut steering

If any play is still found, inspect the following for wear and tear:

- Sleeve
- Dust seal
- Lock nut (top)
- Friction plate
- Lock nut (bottom)
- Dust cover inner
- Insert top
- Inner race top
- Cage assembly
- Outer race top

Ball Cage assembly Top	19 balls
Ball cage assembly Bottom	19 balls

LUBRICATION OF STEERING BALLS

Clean and lubricated every 10000kms

- Loosen and remove 2nos. Philips head screw M4x15 cover handle bar mounting along with punched washer from cover handle bar. (Fig. 2.99A)

Philips head screw driver

- Loosen and disconnect the cable assembly speedometer from the speedometer. (Fig. 2.99B)

- Loosen and remove 2 nos. CRR pan head screw M5x10 bracket cable guide and separate bracket comp. cable guide from handle bar. (Fig. 2.100A)

- Hold the hexagonal bolt M10x80 handle bar mounting and loosen and remove the hexagonal nut M10x1.5 handle bar mounting. (Fig. 2.100B)

17 mm spanner

Fig. 2.99A

Fig. 2.99B

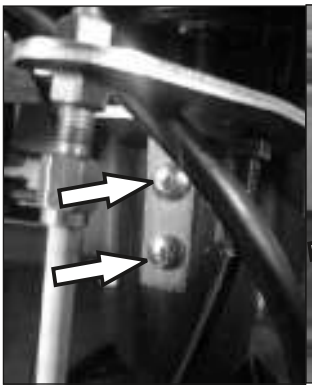


Fig. 2.100A

Fig. 2.100B

- Take out the hexagonal nut M10x1.5 handle bar mounting along with spring washer, punched washer and white color punched washer.
- Take out the hexagonal bolt M10x80 handle bar mounting from handle bar.
- Disconnect the speedometer lamp coupler and switch assembly RH coupler from wiring harness. (Fig. 2.96)

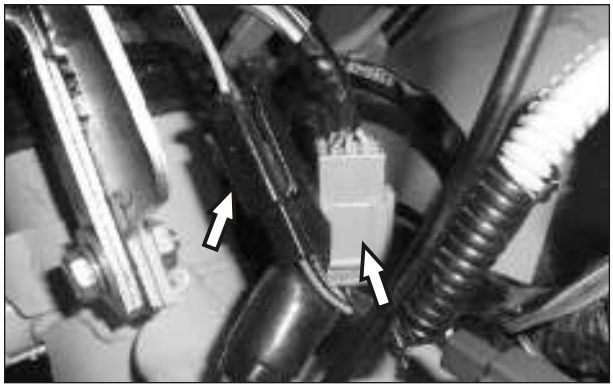


Fig. 2.101

- Separate the handle bar from the steering column (Fig. 2.102)

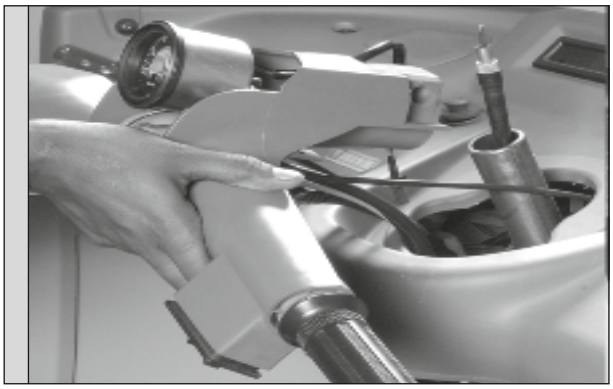


Fig. 2.102

- Loosen and remove 2 nos. hexagonal screws M6X20 along with punched washer (2 nos.) and spring washer (2 nos.) from damper handle bar(Fig. 2.103)
- Take out the damper handle bar

8 & 10 mm spanners

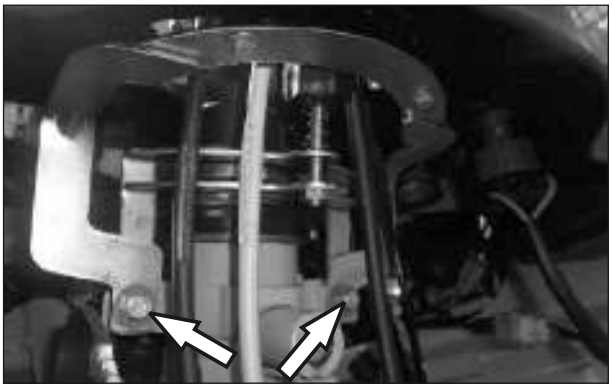


Fig. 2.103

- Apply the brake and hold the brake pedal using plug spanner in the master cylinder.
- Disconnect the Flexible hose front from back plate front for removal, refer chapter chassis page no.5.15
- Take out the sleeve steering column and dust seal top from steering column.
- Loosen and remove the lock nut (Top) for steering column using special tool (Fig. 2.104)

G3310570	Assembly tool lock nut steering

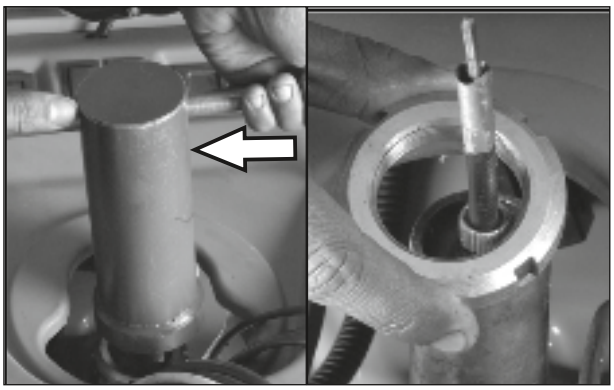


Fig. 2.104

- Take out the friction plate assembly. (Fig. 2.105)
- Loosen and remove the lock nut (bottom) steering column using special tool. (Fig. 2.105)

G3310570	Assembly tool lock nut steering

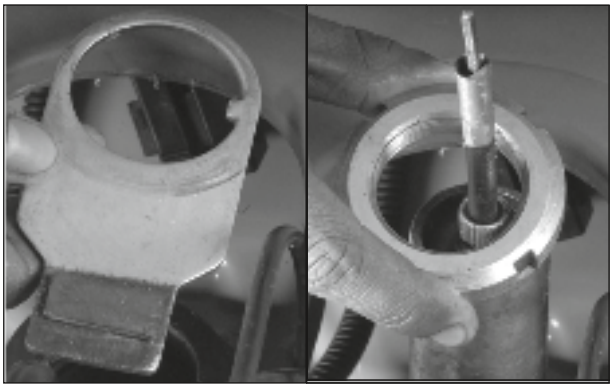


Fig. 2.105

- Take out the dust cover inner ,insert top, inner race top and ball cage assembly top. (Fig. 2.106)
- Place a jack under the vehicle and lift it. (Fig. 2.106)
- Separate the steering column from chassis.

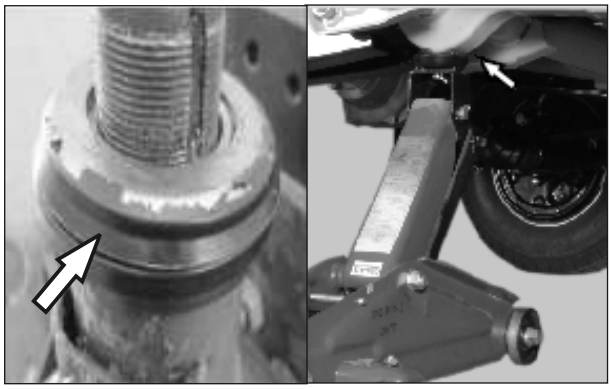


Fig. 2.106

REASSEMBLY STEERING COLUMN

- Check the condition of grease applied on head tube race top and bottom race.
- Check the condition of grease, If found contaminated, wipe off all old grease and re- apply fresh grease. (Fig. 2.107)
- Make sure that race seated evenly over the head tube.
- Apply the grease evenly all over the race.
- Apply grease on ball race assembly Lower and place it on the race track as shown. (Fig. 2.107)

Bechem premium	III	grease

Fig. 2.107

- Apply grease on the inner race Top and assemble over the ball race assembly.(Fig. 2.108)
- Take the insert top and insert it over the inner race top.
- Make sure the insert top sits over the top race edge.
- Take the dust cover and place it over the inner race top.
- Make sure the dust cover sits over the inner race top and covers the ball race against the dust.(Fig. 2.109)

Fig. 2.108

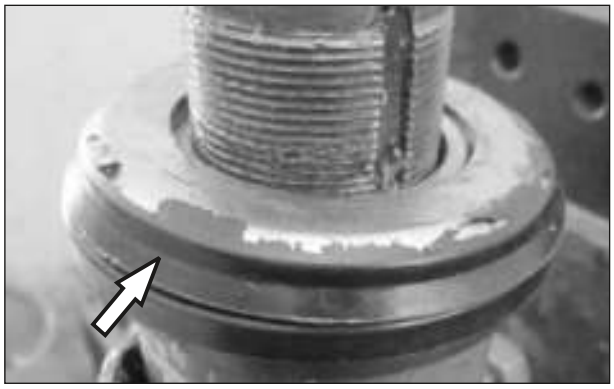


Fig. 2.109

- Insert and hold the steering column assembly from the bottom and assemble the lock nut tighten to 35 to 45Nm torque. (Fig. 2.110)
- Hold the steering column upwards. Loosen the lock nut by 30 to 40 degree and re-tighten it to 25±3 Nm.

Fig. 2.110

- Assemble the friction plate assembly over the steering column in the designated groove and then assemble one more lock nut over the Friction plate. Tighten it to 80 ± 5Nm torque.(Fig. 2.111)
- Assemble the dust seal top on the steering column ,(just insert and do not push it till the bottom closer to the lock nut) Over this, insert the sleeve steering column and slide it down till it touches the lock nut.

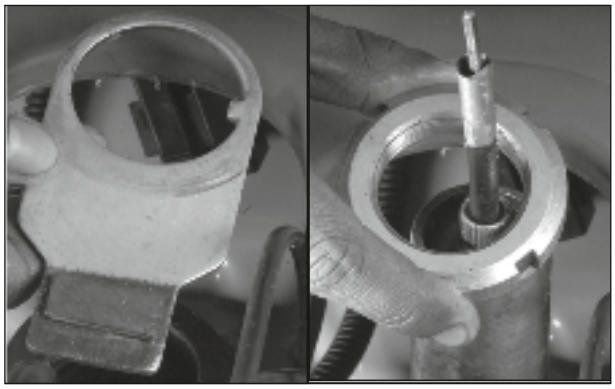


Fig. 2.111

- Assemble Damper assembly on steering column to the head tube assembly using wave spring washer, punched washer and hexagonal screw with tightening torque 6 to 7 Nm.(Fig. 2.112)

- Tighten the adjuster bolt damper assembly ,along with adjuster spring damper on damper assembly fully. While tightening make sure that friction plate assembly should be in center and aligned to vehicle longitudinal axis.

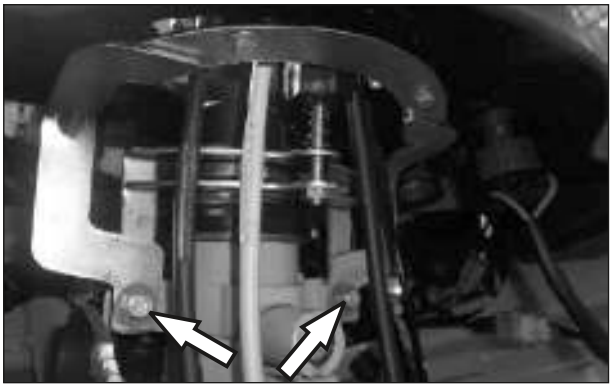


Fig. 2.112

HAND STARTER ASSEMBLY

Check and adjust at initial 750km and every 5000 km

- To adjust hand starter play.

- Hold the Tube Comp, Hand starter and loosen Hex nut M10 'A'.(Fig. 2.113)

15, 17mm	spanner

- Tighten the eye bolt RH to reduce play. Loosen the eye bolt to increase play. (Fig. 2.113)

- Similarly adjust the play at eye bolt LH near engine end.(Fig. 2.113)

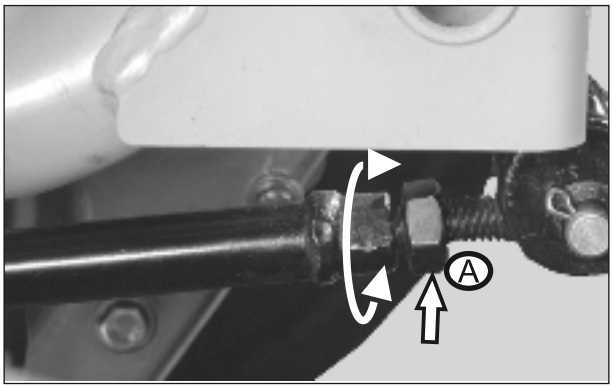


Fig. 2.113

LUBRICATION

RIGHT SUPPORT, FRONT SHAFT H/S

- Clean and lubricate every 10000 kms
- Clean the old grease and apply fresh grease using grease gun

SHAFT COMPLETE, REAR H/S

- Clean and lubricate every 10000 kms
- Clean the old grease and apply fresh grease using grease gun.

MP Grease no.3, Servo Gem no.3, Bechem Premium, Kluber centroplex 2

TYRE TREAD CONDITION

- Inspect every 5000 kms
- Replace tyres once it wears upto Tyre Wear Indicator (TWI) mark. (Fig. 2.114)
- Measure the groove depth of tyre from tread surface. Replace the tyres with a new one, once it reaches the service limit.

Service limit	0.8 mm

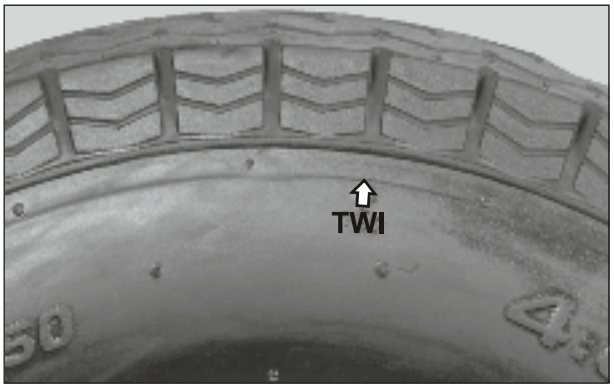


Fig. 2.114

TYRE ROTATION

- Do the tyre rotation every 5000 kms
- For tyre rotation follow the sequence shown. (Fig. 2.115)

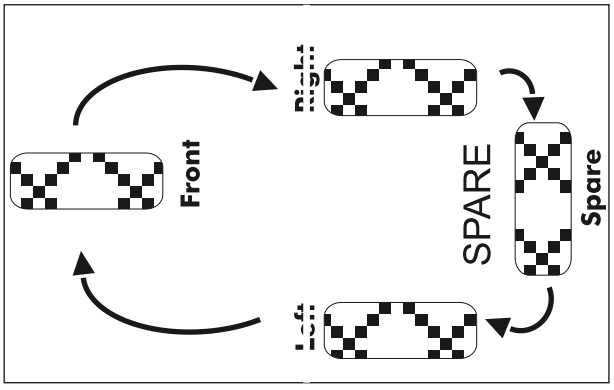


Fig. 2.115

TYRE PRESSURE

- Under inflated tyres wear faster, affect stability and smooth cornering. Over inflated tyres decrease area of tyre contact with ground causing skid or loss of control. (Fig. 2.116)

- Maintain the correct tyre pressure for good thread stability. and longer tyre life. Inflate tyres in cold condition to the pressure given below.

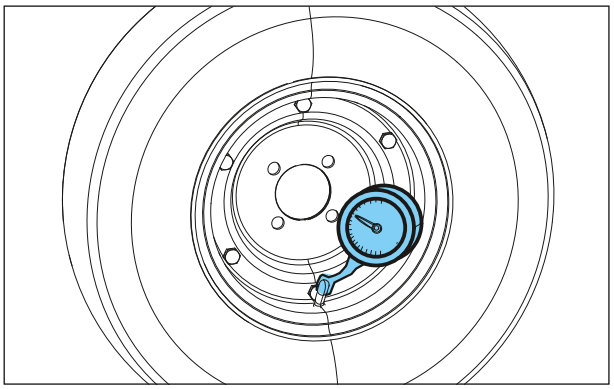


Fig. 2.116

Tyre pressure

Position	Un - laden	Laden
Front	30 psi	30 psi
Rear	30 psi	34 psi

Tyre pressure gauge

MUFF CUP GREASING

- Loosen and remove Hexagonal Nut M14X2 from Trailing arm bolt M14X245 along with spring washer. (Fig. 2.117)

Fig. 2.117

- Loosen the screw from the Clip bellow small end on both trailing arm end and engine end. (Fig. 2.118)

- Slide away the bellows from both Muff cups to access the greasing area.

- Lift the wheel so that the trailing arm bolt comes out partially.

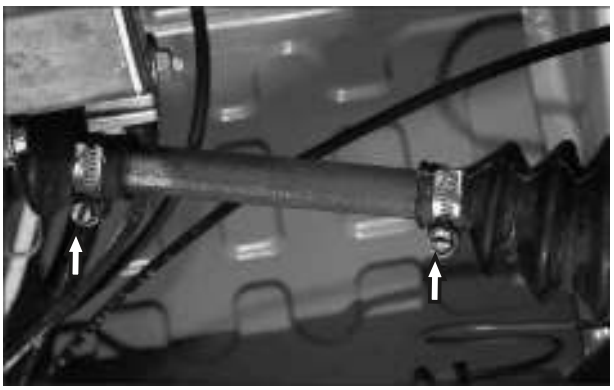


Fig. 2.118

- Remove propeller shaft by lifting the wheel along with slider blocks on both sides and buffers on both sides (Buffer on trailing side-4mm thick and engine side-9mm).
- Wipe out the old grease from both muff cups, clean the slider blocks, propeller shaft and other parts.
- Inspect slider blocks and Pin propeller shaft for wear and tear. In case of uneven wear, replace with new.
- Fill the muff cups with fresh grease – 30gm each side and apply grease buffer and slider block and reassemble in the reverse order.(Fig. 2.119)
- Reassemble the propeller shaft in the reverse order of removal.

Flat head Screw driver.

Fig. 2.119

CONTENTS

Chapter 3

SERVICING OF ENGINE

ENGINE DISMANTLING

ENGINE ASSEMBLY REMOVAL FROM CHASSIS:

- Before removing the engine, drain the engine cum transmission oil and differential oil from the engine refer chapter "Periodic Maintenance" Page No.10 for detailed procedure

Note: Remove Both positive and negative terminal from battery before removing the engine from vehicle.

- Loosen and remove 2 nos. M6 hexagonal flange nuts from Carburetor mounting. (Fig. 3.1)

- Separate the carburetor from Pipe intake along with insulator pad.

10 mm spanner

- Remove the muffler assembly from engine for detailed procedure refer Chapter 'periodic maintenance' page no: 20

- Loosen and remove 2 nos. hexagonal bolt (M6x16) along with spring washers from bracket starter motor.

- Loosen and remove 2nos. hexagonal flange bolt M6X16 (B) to separate the starter motor bracket from cover crankcase R. (Fig. 3.2)

- Loosen and remove 1 no. hexagonal flange bolt M6X50 (A) to separate the bracket SAI (Secondary Air Injection) unit from cover crankcase R. (Wherever applicable). (Fig. 3.2)

8mm spanner

Note: While assembly, ensure the bracket SAI is fitted with the welded nuts facing towards the Engine. (wherever applicable)

- Dislocate the hose clip and disconnect the SAI hose air outlet (A) from pipe complete secondary Air injection. (Fig. 3.3) (wherever applicable)

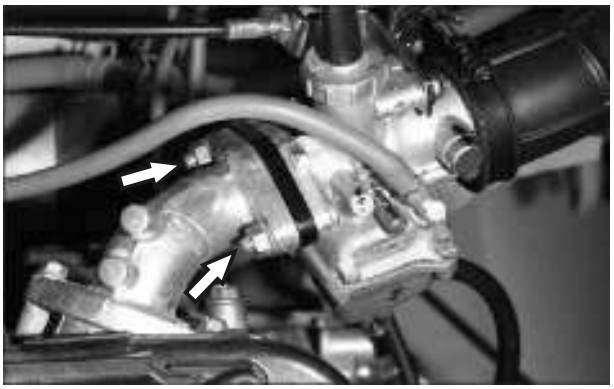


Fig. 3.1

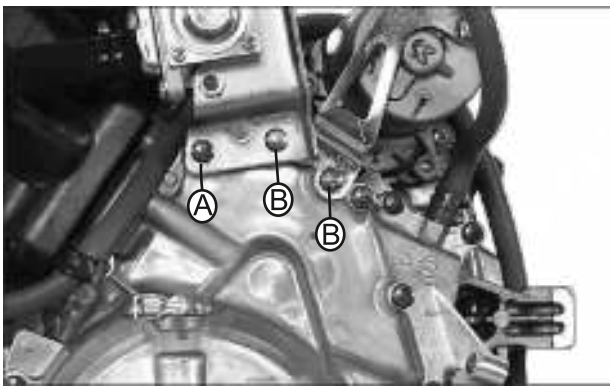


Fig. 3.2

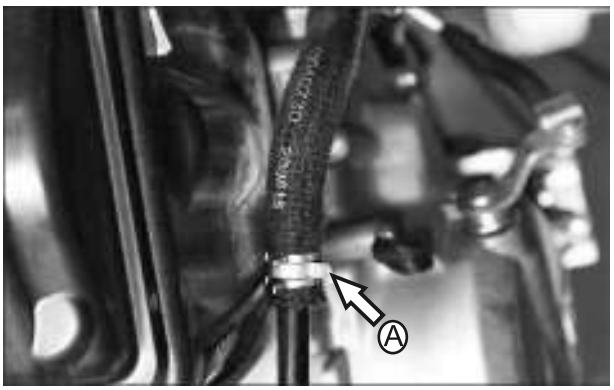


Fig. 3.3

- Dislocate the clip and disconnect the hose air cut valve intake pipe (B) from the pipe intake complete. (Fig. 3.4) (wherever applicable)

Nose Plier

- Dislocate the clip and disconnect vacuum hose (LPG reducer unit) (C) from the pipe intake complete.(Fig. 3.4) (wherever applicable)

- Dislocate the clip and disconnect breather hose PCV (D) from air cleaner assembly.(Fig. 3.5)

- Dislocate the clip and disconnect breather hose PCV from crankcase R.

- Dislocate the grommet from Oil pressure switch, loosen and remove the M6 nut along with spring washer from switch to disconnect the wire.(Fig. 3.5.)

10mm spanner

- Reassemble the all parts in the reverse order of dismantling.

DISMANTLING GEAR SHIFTING CABLES FROM ENGINE:

- Remove the cable assembly clutch, gear shift cable White, gear shift cable Black along with pulley gear shift from engine for detailed procedure refer Chapter “Chassis” page no: 5.5

REMOVE PROPELLER SHAFT:

- Remove the propeller shaft from the engine for detailed procedure refer chapter “Periodic Maintenance” Page No.30

ELECTRICAL CONNECTIONS

- Loosen and disconnect the positive (Red) cable and negative (Black) cables (2nos.) from starter motor.(Fig. 3.6)

- Disconnect the neutral switch coupler from wiring harness(A).(Fig. 3.7)
- Loosen and remove 2 nos. hexagonal screw (M6X16)along with plain washer from Cover TCI (B). (fig. 3.7)
- Take out the cover TCI.

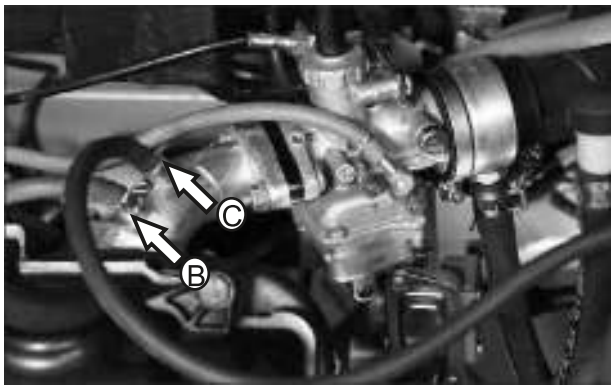


Fig. 3.4

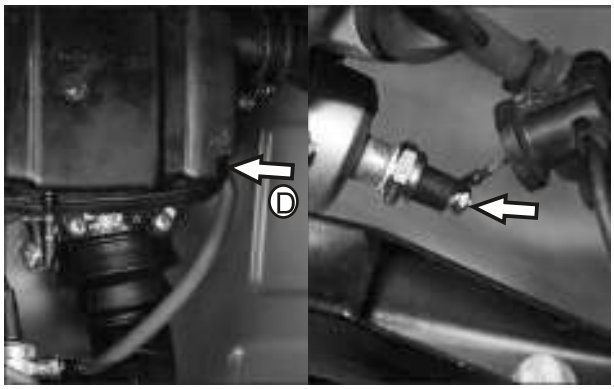


Fig. 3.5

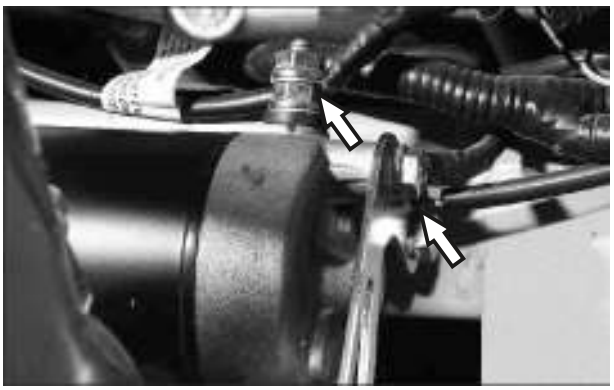


Fig. 3.6

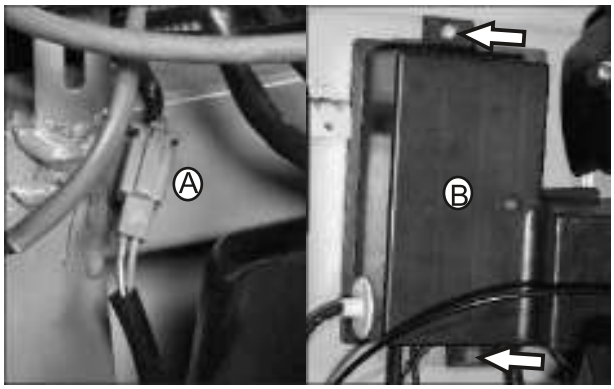


Fig. 3.7

- Disconnect the magneto output coupler (A), Pulsar coil coupler (B) and Brake Lamp Coupler (C) . (fig. 3.8)
- Reassemble the all parts in the reverse order of dismantling.

Note: Incase of (GS+, LS+ and ZS+) DC magneto need to disconnect magneto output coupler (A) & pulsar coil coupler (B) only

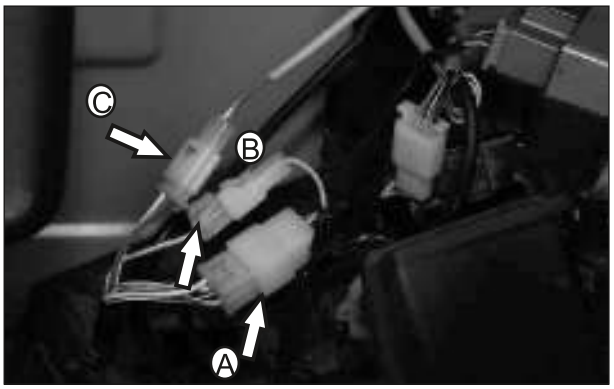


Fig. 3.8

REMOVE HAND STARTER MECHANISM

- Take out the spring clip rear, hand starter from support shaft hand starter engine end. (Fig. 3.9)
- Unfold the split pin and pull out the split pin from the pin hand starter and take out the pin hand starter. Separate the eye bolt from shaft complete rear hand starter. (Fig. 3.9)

Nose plier

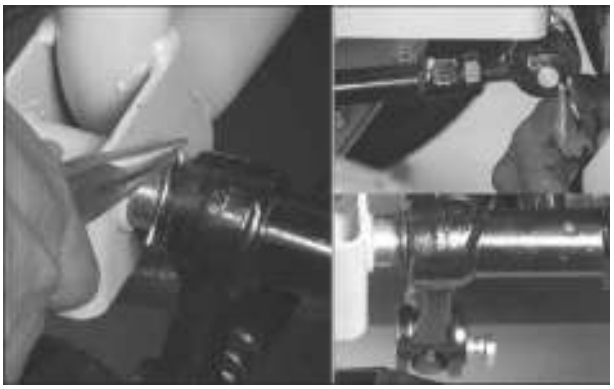


Fig. 3.9

- Press the support shaft hand starter and separate it from the shaft complete rear hand starter. (Fig. 3.10)
- Separate the shaft complete rear hand starter along with Isolator hand starter from the dog driven. (Fig. 3.10)
- Reassemble the all parts in the reverse order of dismantling.

Note : While reassembly ensure proper play in hand starter for the smoother operation

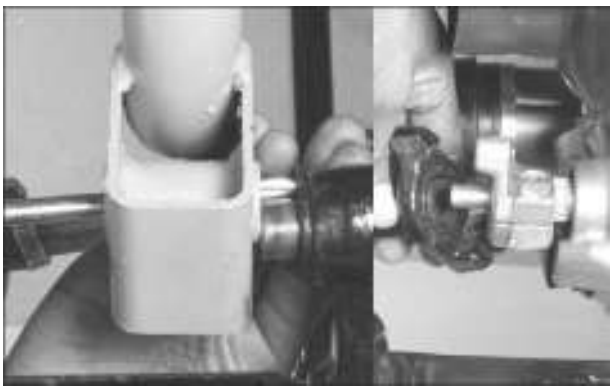


Fig. 3.10

SEPARATING ENGINE FROM CHASSIS:

- Loosen and remove 1no. Hexagonal nut M8 from both side link rear engine cradle along with a punched washer and a spring washer.
- Take out the hexagonal flange screw M8x20 from top side rear engine cradle link. Remove the link rear engine cradle. (Fig. 3.11)

13 mm spanner

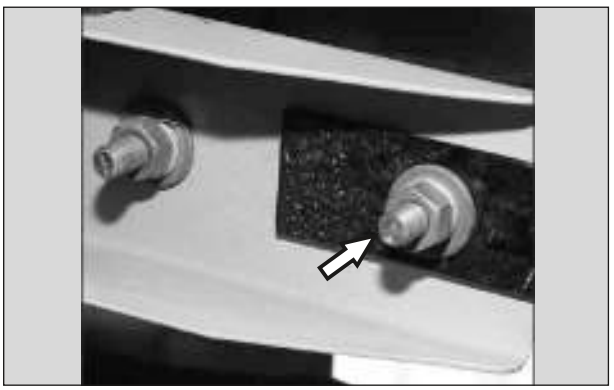


Fig. 3.11

- Loosen 2nos. Hexagonal nuts M10 by holding the bolt rear engine mounting from the rear engine mounting cradle. Remove the nuts along with 2nos. Punched washer and 1no. Spring washer from top side of each bolt. (fig. 3.11)

14,17mm spanner

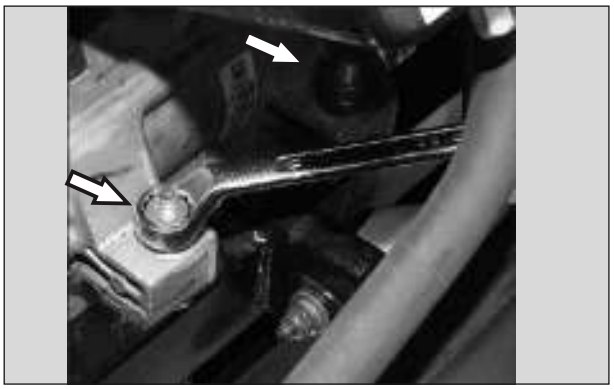


Fig. 3.8

- Take out 2nos. Hexagonal bolts M10x1.25x110 along with two punched washer from bottom side of rear engine mounting cradle. (Fig. 3.12)

- Remove Battery from vehicle for detailed procedure refer chapter "periodic maintenance" page no.20

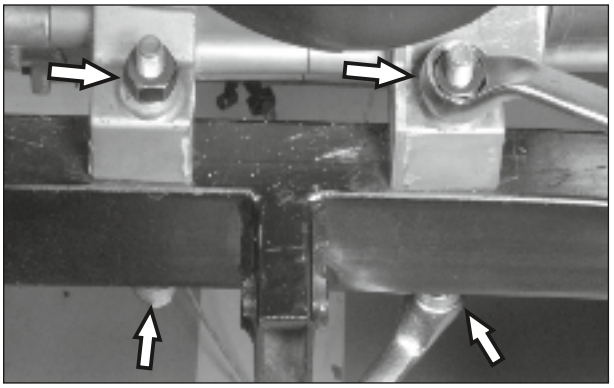


Fig. 3.12

- Loosen and remove 1no. Hexagonal nut M10 along with a punched washer and a spring washer from front engine mounting (A). (Fig. 3.13)

17mmspanner

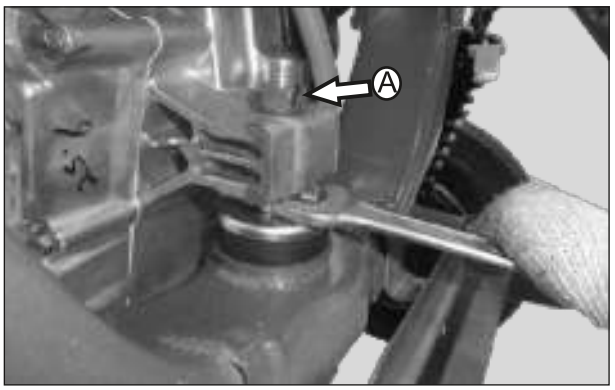


Fig. 3.13

- Loosen and remove the hexagonal flange bolt M10x1.25 front engine mounting. By holding the nut in between the engine & front engine mounting cradle (B). (Fig. 3.14)

14,17mmspanner

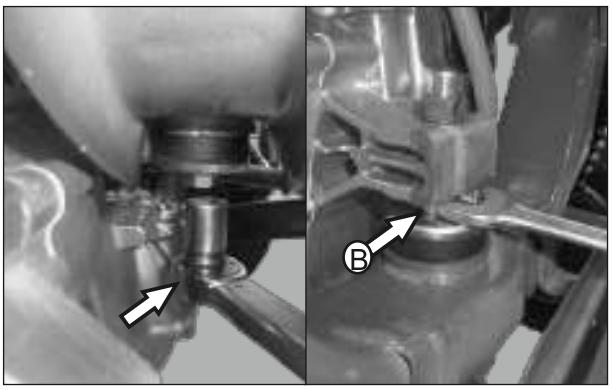


Fig. 3.14

Note: While tightening the front engine mounting bolt, tighten the bolt to exact torque and make sure that cup bottom engine mounting could be rotated with two fingers.

- Lift the engine and separate it out from the chassis. Mount the engine on the engine fixture.
- Mounting the engine to chassis is the reverse order of the removal procedure.

REMOVAL OF CLUTCH

REMOVE FILTER COMPLETE ENGINE OIL:

- Remove filter complete engine oil from the cover crank case R, for detailed procedure refer chapter “Periodic Maintenance” page no: 11

Note: Filter complete engine oil should be replaced before reassembling the part.

REMOVE BRACKET ABUTMENT CLUTCH:

- Loosen and remove 2 nos. hexagonal flange bolt M6X50 to separate the bracket abutment clutch from cover crank case R (Fig. 3.15)

8 mm spanner

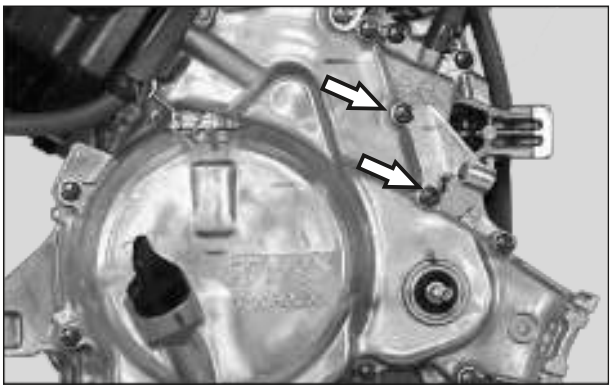


Fig. 3.15

REMOVE COVER CRANK CASE R:

- Loosen and remove 9 nos. hexagonal flange bolt M6x50 from Cover crank case R. (Fig. 3.16)
- Loosen and remove 2 nos. hexagonal flange bolt M6x122 from Cover crank case R. (Fig. 3.17)

8 mm spanner

- Gently tap the cover crank case and separate the cover crank case from the crank case R.

Nylon hammer

- Take out the gasket Cover crank case R
- Reassemble the all parts in the reverse order of dismantling.

Note : During reassembly scrape out the gasket material sticking on to the cover crank case machined surface or Crank case R machined surface to avoid oil leakage and use new gasket.

REMOVE OIL PUMP ASSEMBLY SPROCKET:

- Remove the guide chain oil pump drive along with spring from crank case R. (Fig. 3.18)

10 mm spanner

- Loosen and remove 1 no. Hexagonal bolt M5x10 from the gear oil pump drive along with 1 no. 5.5X10X1 mm punched washers.
- Take out the gear oil pump drive. (Fig. 3.19)

8 mm spanner

- Take out the chain oil pump drive.

Note : While reassembling the chain oil pump drive ensure the chain is assembled in the direction marked on the link.
It is always recommended to replace a new oil pump chain during engine overhaul.

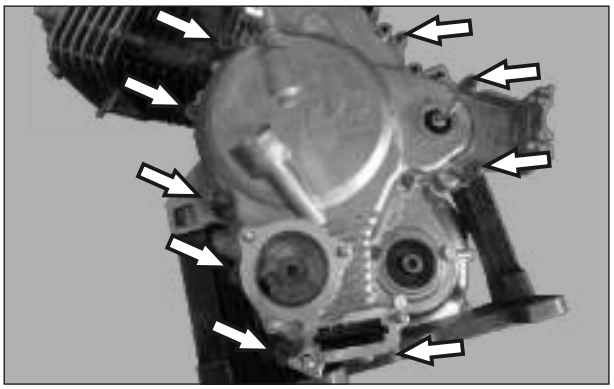


Fig. 3.16

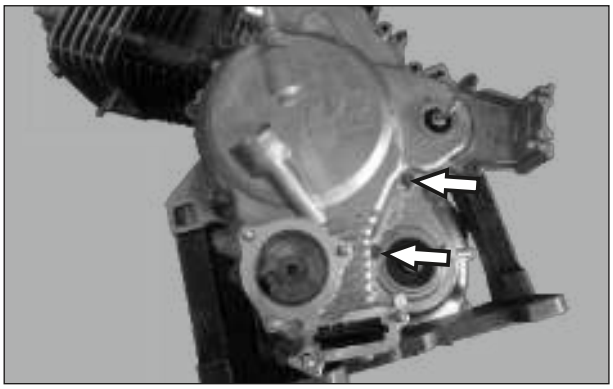


Fig. 3.17

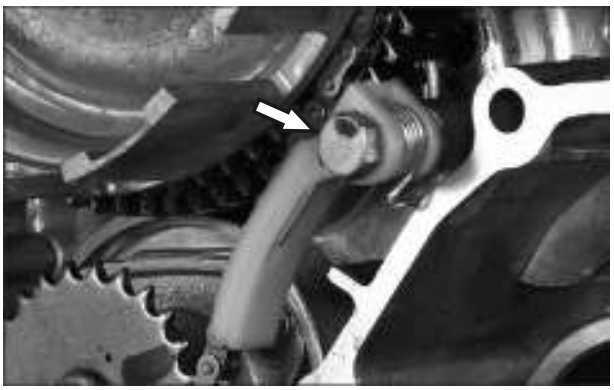


Fig. 3.18

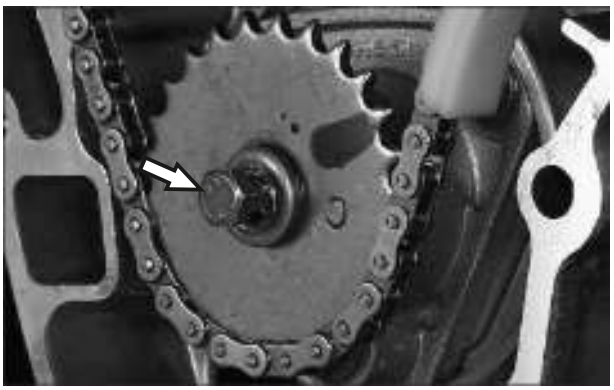


Fig. 3.19

REMOVE CENTER ASSEMBLY CLUTCH:

- Lock the gear assembly primary driven and gear primary drive using special tool Holding Tool Primary Driven Gear.

G3310710	Holding Tool Primary Driven Gear

- Loosen and remove the 1 no.M16 hexagonal flange nut from center assembly clutch using 21mm Socket spanner.(Fig. 3.20)

Note: the width of the socket is not more than 28mm

21 mm Socket spanner

- Take out the hexagonal flange nut and disc spring. (Fig. 3.21)
- Reassemble the all parts in the reverse order of dismantling.

Note: To loosen the nut clutch, rotate in clock wise direction.

Note : While reassembly, ensure that the conical surface of the disc spring faces downwards.

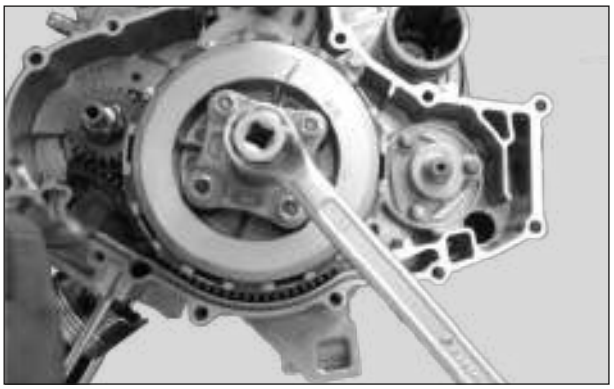


Fig. 3.20

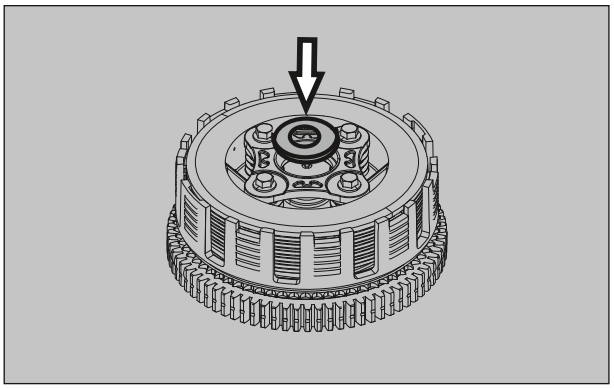


Fig. 3.21

REMOVE GEAR PRIMARY DRIVE:

- Loosen and remove 1 no. Hexagonal nut along with a disc spring from gear primary drive (Fig. 3.22)

22 mm spanner

Note : While reassembling the nut clutch and nut gear primary drive, apply the thread lock .

Note: While reassembly, ensure that the conical surface of the disc spring faces downwards.

- Take out the Gear Primary Drive

Fig. 3.22

- Take out the wood ruff key 6.5X13X4 from the crankshaft. (Fig. 3.23)
- Reassemble the all parts in the reverse order of dismantling.

Nose plier

CLUTCH SUB ASSEMBLY:

- Loosen uniformly and remove 4 nos. hexagonal flange bolt (M6x25) from plate clutch release.(Fig. 3.24)

10 mm spanner

- Take Plate clutch release. (Fig. 3.25)
- Take out the spring clutch 4 nos. (Fig. 3.25)
- Take out the hub clutch and spacer clutch 8 mm thick (Fig. 3.25)
- Take out the washer and spring clutch judder. (Fig. 3.25)

Note: While reassembly, ensure that the conical surface of the judder ring faces outwards.

- Take out the 1 no. plate clutch drive Type B (Fig. 3.25)
- Take out the 3nos. plate clutch drive Type A (Fig. 3.25)
- Take out the 1 no. plate clutch drive Type C (Fig. 3.25)
- Take out the 4nos.plate clutch driven. (Fig. 3.25)
- Take out the disc clutch release and gear assembly primary driven from the counter shaft (Fig. 3.25)
- Take out the spacer gear primary driven along with the shim of 20X32X1.5.
- Reassemble the all parts in the reverse order of dismantling.

Fig. 3.23

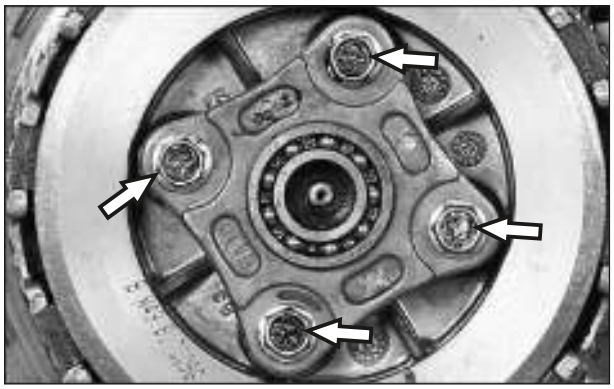


Fig. 3.24

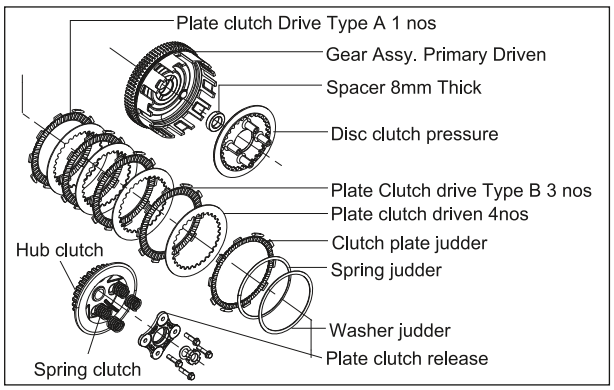


Fig. 3.25

CLUTCH INSPECTION

- Plate clutch drive and driven inspection for detailed procedure refer chapter “engine” page no:58

SPRING CLUTCH:

- Spring clutch inspection for detailed procedure refer chapter “engine” page no:58

REMOVE REVERSE GEAR MECHANISM:

- Loosen and remove 1 no. M6X30 hexagonal flange bolt (A) from retainer arm reverse. (Fig. 3.26)

8 mm spanner

Note: While reassembling the bolt retainer arm reverse, apply the thread lock paste on the thread.

- Take out the Retainer arm reverse (B) and plate stopper reverse (C) from index star. (Fig. 3.26)
- Remove the circlip 11x1.0 from arm stopper reverse. (Fig. 3.27)

External circlip plier

- Separate the Arm stopper reverse and Plate lock arm spring reverse from drive shaft. (Fig. 3.27)
- The profile on the plate of the spring reverse gear stopper lever sits on the profile cut on shaft drive. (Fig. 3.27)
- Separate the spring gearshift cam lock arm from Plate lock arm spring reverse position
- Re - assemble the all parts in the reverse order of dismantling.

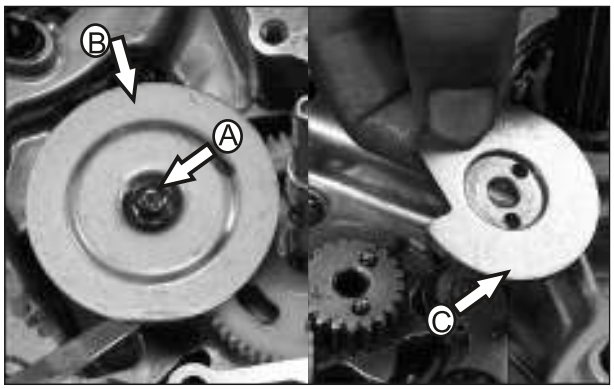


Fig. 3.26

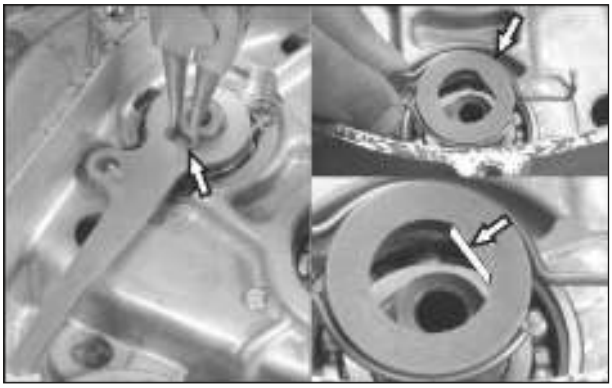


Fig. 3.27

REMOVE GEAR SHIFTER MECHANISM:

- Loosen and remove the bolt, Gear Shift Cam Stopper. (A)(Fig. 3.28)
- Take out the stopper complete gear shift and special washer 6X12X1 along with spring gear shift cam Stopper. (B & C) (Fig. 3.28)

10 mm spanner

- Pull out the locator pin index.(D) (Fig. 3.28)

Nose plier

Note: While reassembly locate one end of the spring on the groove provided on stopper complete Gear shift.

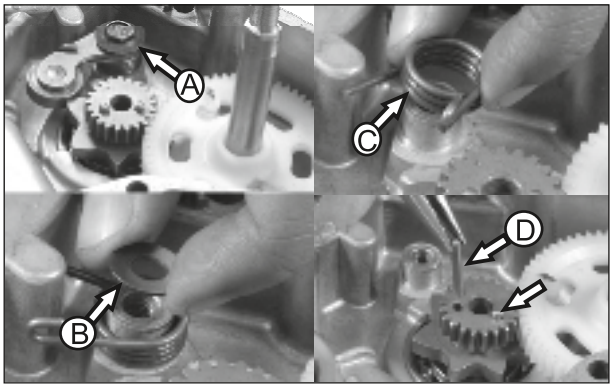


Fig. 3.28

- Remove 2nos.Circlip external from gear shift shaft along with washer(12x1.0) (Fig. 3.29)
- Pull out the gearshift shaft .
- Take out the index star.

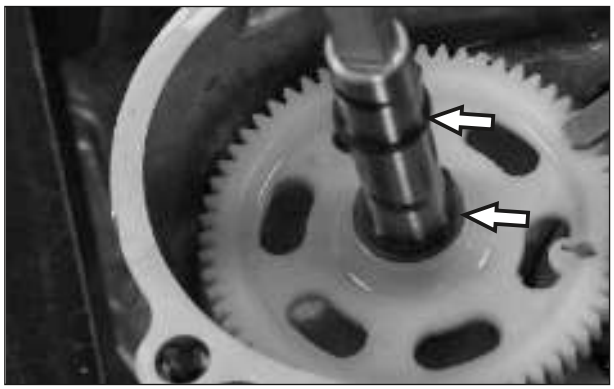


Fig. 3.29

- Separate the gear from shaft gearshift by taking out the lock pin. (Fig. 3.30)
- Take out the 2 nos. dowel pin from the crank case RH.
- Reassemble the all parts in the reverse order of dismantling.

Nose plier & External circlip plier

Note: While reassembling make sure that punch mark on the index star and arrow on gear, shift shaft are coinciding to ensure neutral position.

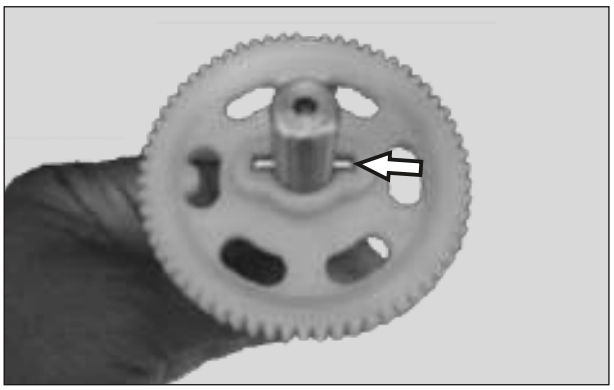


Fig. 3.30

REMOVE OIL PUMP ASSEMBLY:

- Loosen and remove 2 nos. M6X16 hexagonal flange bolt.(A) (Fig. 3.31)
- Loosen and remove 1 no. M6X25 hexagonal flange bolt (B) (Fig. 3.31)

8 mm spanner

- Separate the rotor gear and stator gear from oil pump and clean the gear as well as pump body in kerosene.

Note: While reassembling the rotor gears of oil pump make sure that ' Dot ' mark on the gear should face upwards.

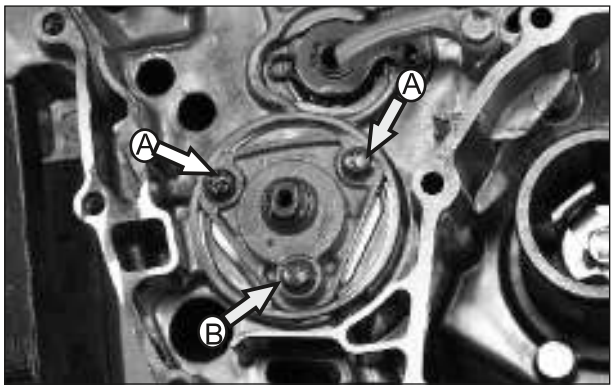


Fig. 3.31

REMOVE PIPE INTAKE COMPLETE:

- Loosen and remove2 nos. M6X20 hexagonal flange bolts from pipe intake complete. (Fig. 3.32)

8 mm spanner

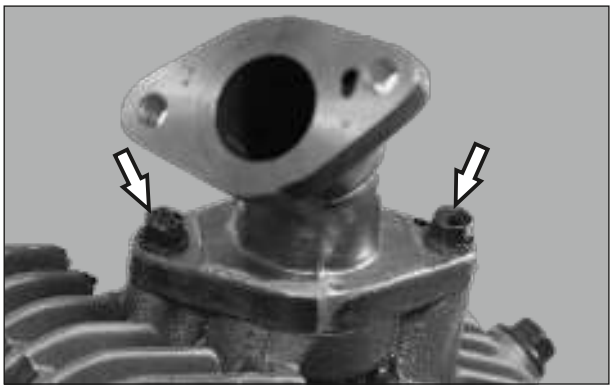


Fig. 3.32

- Separate the pipe intake complete from the cylinder head.
- Remove the gasket pipe intake.(Fig. 3.33)
- Clean the pipe intake complete.

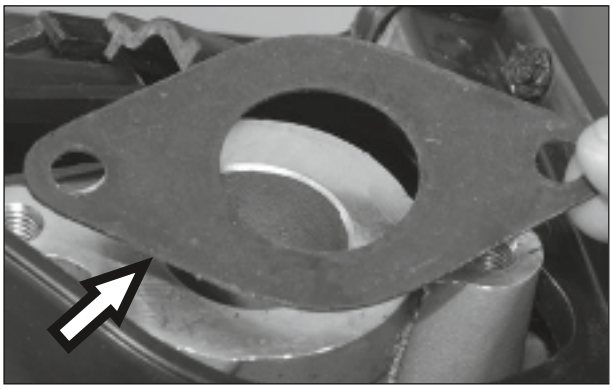


Fig. 3.33

REMOVE COWL AIR COOLING:

- Uniformly loosen and remove 4 nos. hexagonal flange bolt M6X35 from the cowl top air cooling. (Fig. 3.34)

10 mm spanner

- Take out the cowl top air cooling.

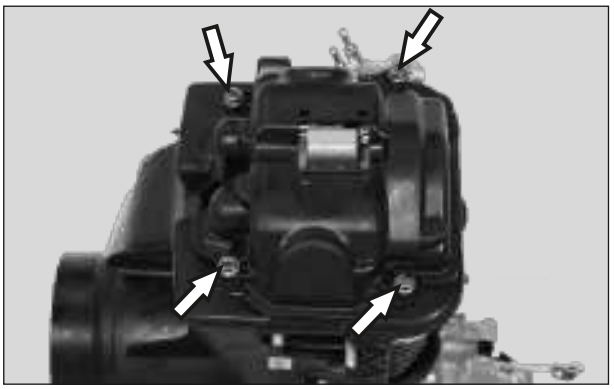


Fig. 3.34

- Remove the cap timing mark inspection on cowl LH. (Fig. 3.35)
- Rotate fan and match the timing mark on magneto rotor to the arrow mark on the cowl LH. (Fig. 3.35)

17 mm Tubular spanner, nose plier

Note: At this point the arm complete valve rocker should be free, other wise rotate rotor 360° & align the mark again

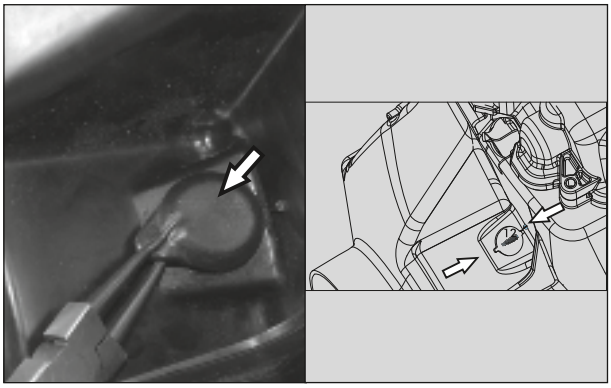


Fig. 3.35

- Loosen and remove 2 nos. hexagonal flange bolt M6X20 along with clamp wire routing. from cowl LH (A). (Fig. 3.36)
- Loosen and remove 2nos. hexagonal flange bolt M6X20 from cowl LH (B) . (Fig. 3.36) Remove the Cowl LH.

8 mm spanner

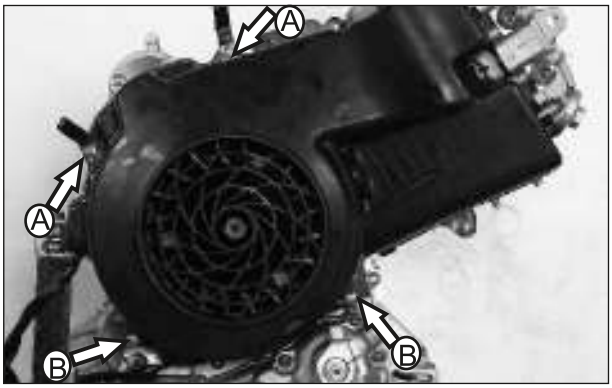


Fig. 3.36

- Loosen and remove 2 nos. hexagonal flange bolt M6X20 and separate the cowl RH.(Fig. 3.37)

8 mm spanner

- Reassemble the all parts in the reverse order of dismantling.

Caution: During the assembly of Cowl LH, RH and top make sure that all three should be seated properly to avoid air leakage to get proper cooling.

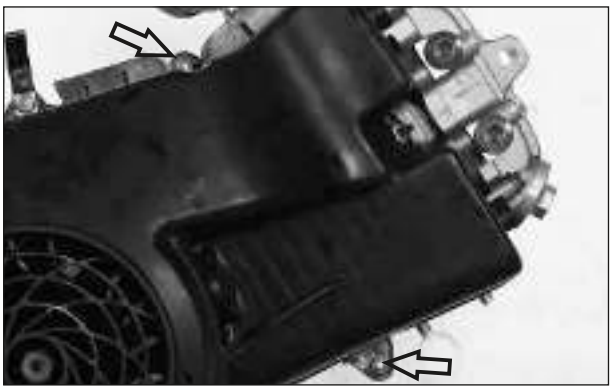


Fig. 3.37

REMOVE FAN ENGINE COOLING:

- Loosen and remove 3 nos. hexagonal flange bolt M6X35 along with 3 nos. wave spring washer and 3 nos. punched washer from fan engine cooling. (Fig. 3.38)

10mm spanner

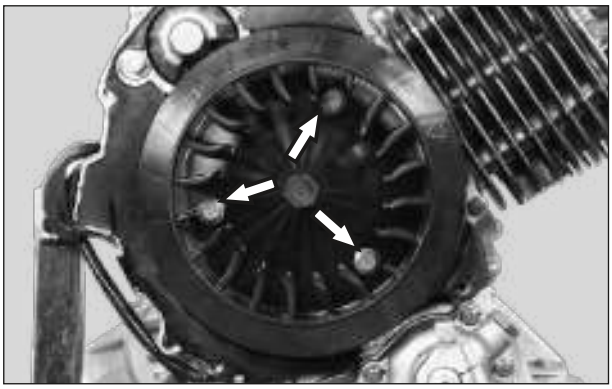


Fig. 3.38

REMOVE MAGNETO:

- Hold the magneto rotor assembly using special tool. (Fig. 3.39)

G3310680	Holder assembly magneto

- Loosen and remove 1no. Hexagonal flange nut (M12X1.25). (Fig. 3.39)

17 mm spanner

Note: While reassembling, apply thread lock on the flange nut magneto assembly.

- Hold the magneto in its position and fix the puller assembly magneto on magneto rotor by tightening 3 bolts on the rotor (Fig. 3.40)

13 mm spanner

- Insert a rod in the hole provided on the puller assembly magneto and rotate in clock wise direction to pull out the magneto rotor from the stator assembly (Fig. 3.40)

G3310410	Puller assembly magneto

- Take out the back plate cowling.

- Take out the wood ruff key of 6.5X13X4 from the crank shaft assembly. (Fig. 3.41)

Nose plier

Caution: While pulling the magneto rotor from crank shaft fix the Special tool properly to avoid damage on the crank shaft.

- Loosen and remove 2 nos. hexagonal flange bolt M6X20 from pulsar coil and take out the pulsar coil (1). (Fig. 3.42)

  Separate magneto wiring harness guide (2) and Pull out the wiring harness grommet from the crank case LH (3). (Fig. 3.42)

8 mm spanner

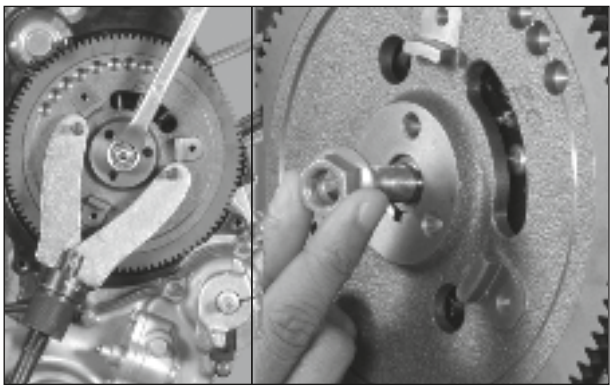


Fig. 3.39

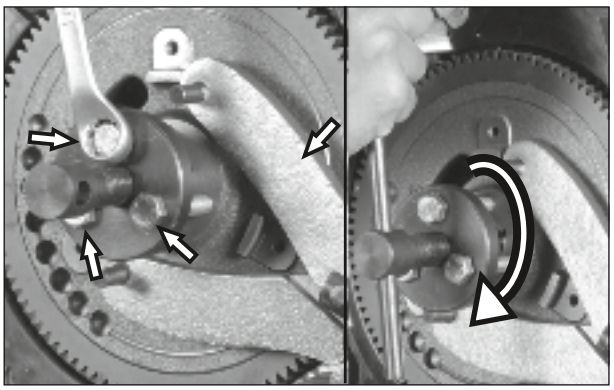


Fig. 3.40

Fig. 3.41

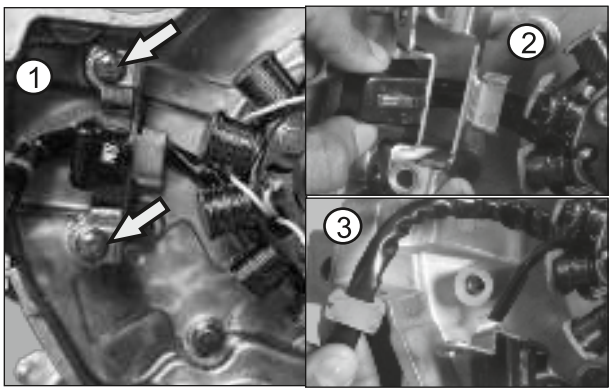


Fig. 3.42

- Loosen and remove 3 nos. hexagonal flange bolt M6X25 from stator assembly.(Fig. 3.43)

8mm spanner

- Takeout the stator assembly (A). (Fig. 3.43)

- Take out the stopper oil seal (B). (Fig. 3.43)

Note: While assembly, ensure that the wiring harness is routed from under the stator and below the clamp wiring harness.

- While assembly, ensure that the pulsar coil is fitted with the metallic pip facing the rotor.

- Ensure the presence of stopper oil seal on the crank case L

- Loosen and remove 2 nos. hexagonal flange bolt M6X20 and separate the switch gear position from the crankcase.(Fig. 3.44)

8 mm spanner

Note: While assembly, inspect the 'O' ring switch gear position for any damage.

- Take out the pin contact switch along with spring contact switch. (Fig. 3.44)

Nose plier

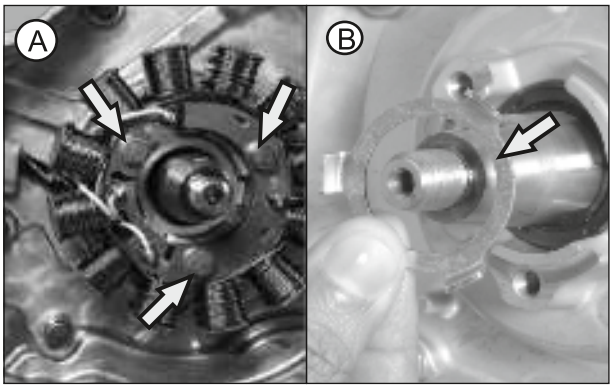


Fig. 3.43

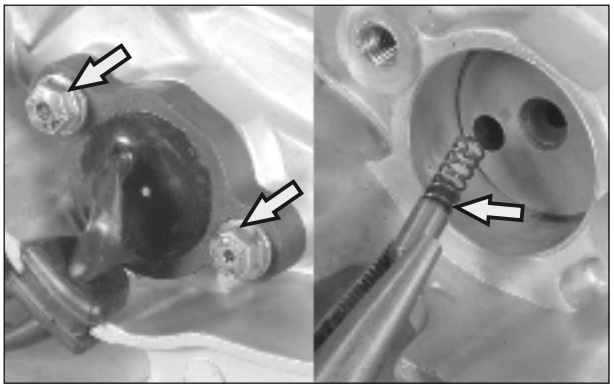


Fig. 3.44

REMOVE OF STARTER MOTOR:

- Loosen & remove 2 nos. hexagonal bolts of (M8X40) along with from crankcase LH. (Fig.3.45)

14 mm spanner

- Separate the starter motor from the crank case LH.

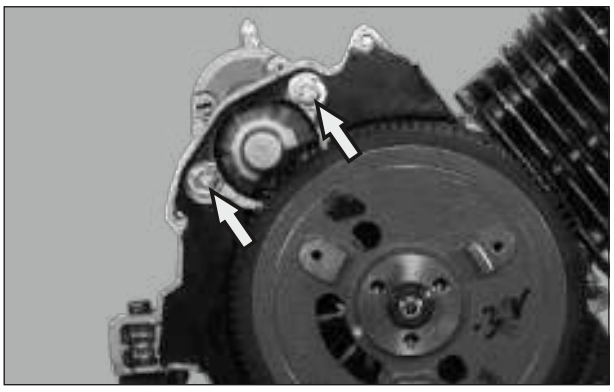


Fig. 3.45

REMOVE OF SPARK PLUG:

- Loosen and remove spark plug. (Fig. 3.46)

16 mm Tubular spanner

Spark plug specification Bosch UR 6 DE

Note: Before reassembling the old Spark plug, clean the plug and reset the gap to the specified limit.

- However it is recommended to replace new TVS Motor company genuine spark plug during engine overhaul for better performance of the engine.
- Refer chapter "Periodic maintenance" page number :13 for inspection and cleaning procedure of spark plug.

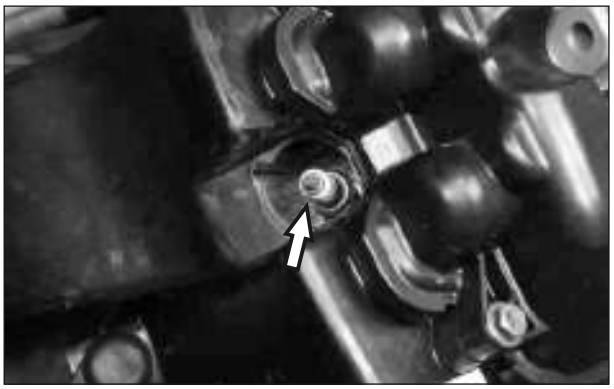


Fig. 3.46

REMOVE ADJUSTER ASSEMBLY TENSIONER:

- Remove the bolt adjuster assembly tensioner (A) and take out the bolt along with the spring and 'O' ring. (Fig. 3.47)
- Loosen and remove 2 nos. hexagonal bolt M6x16 from the adjuster assembly tensioner mounting and take out the adjuster along with gasket. (B) (Fig. 3.47)

10 mm spanner

Note: While assembling the chain tensioner replace the gasket chain tensioner and O ring with new one.

- Adjust the tensioner for properly to avoid noise and chain wear.

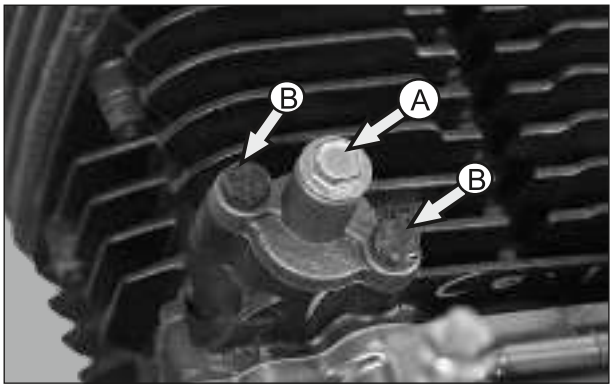


Fig. 3.47

REMOVE COVER CYLINDER HEAD:

- Remove both the cap inspection hole along with ' O ' ring from the cover cylinder head. (Fig. 3.48)

17 mm spanner

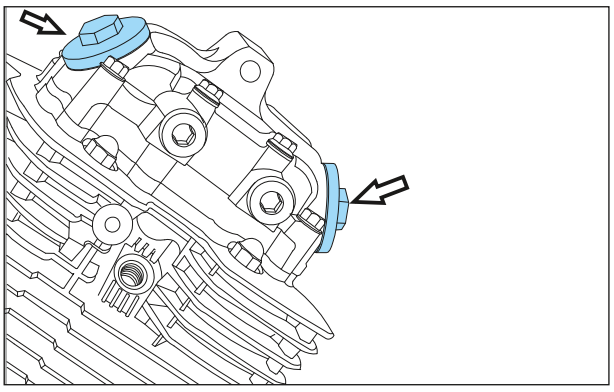


Fig. 3.48

Note: While reassembling, the cap inspection ensure the presence of the 'O' ring.
Before removing the Cowl LH air cooling align the mark on the magneto rotor to mark on the Cowl LH,

- Loosen and remove 4 nos. M6X35 hexagonal flange bolt from cover cylinder head. (A) (Fig. 3.49)
- Loosen and remove 2 nos. M6X45 hexagonal flange bolt from cover cylinder head.(B) (Fig. 3.49)
- Loosen and remove 4nos. M6X55 hexagonal flange bolt along with copper seal washers. (C) (Fig. 3.49)
- Remove cover cylinder head by tapping with nylon hammer.
- During re assembly apply small amount of liquid gasket.
- Reassemble the all parts in the reverse order of dismantling.

10 mm spanner and Nylon hammer

Recommended Liquid Gasket Anabond 116

Note: During the assembly of M6X55 bolts on cover cylinder head apply thread lock.
While reassembling, insert all the bolts and ensure equal height of the bolts from their respective seating surface. Before tightening, also inspect the gasket cylinder head cover bolt for any damage, replace if necessary.

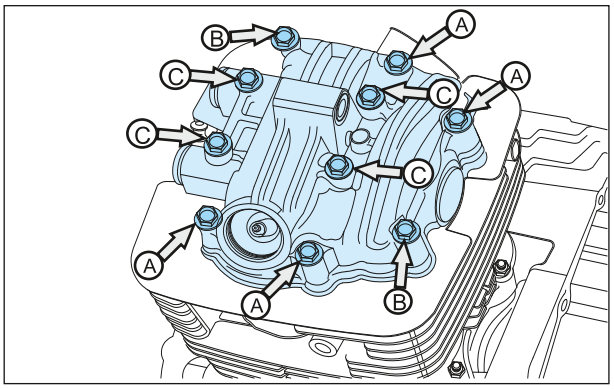


Fig. 3.49

REMOVE SHAFT ROCKER ARM:

- Loosen and remove both the plug rocker shafts (inlet & exhaust side) along with the gasket breather plug from the cover cylinder head. (Fig. 3.50)

8 mm Allen key

- Screw in a M6 bolt in to the shaft rocker arm, gently pull out the shaft rocker arm from the cover cylinder head. ((Fig. 3.50)

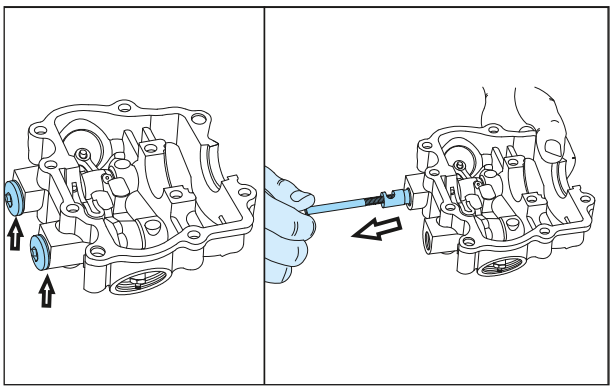


Fig. 3.50

Note: While assembling the shaft rocker arm, ensure that the cut mark on the shaft rocker arm matches with the cut on the cover cylinder head.

- Remove the rocker arm assembly .
- Take out the rocker arm assembly from the cover cylinder head.(Fig. 3.51)
- Inspection of the cover cylinder head and rocker arm assembly.
- Similarly remove the other rocker arm assembly from the cover cylinder head.
- Take out the 2 nos. Tubular dowel cylinder head cover knock of dia 8mm (A). (Fig. 3.52)
- Take out the plug cylinder head (B). (Fig. 3.52)

Nose plier

- Reassemble the all parts in the reverse order of dismantling.

REMOVE CAM SHAFT COMPLETE :

- Unfold the washer sprocket (A). (Fig. 3.53)

Chisel & Metal hammer

- Press and hold the right side bearing portion of cam shaft complete firmly. Hold the rotor assembly using special tool,

- loosen and remove the 2 nos. hexagonal bolt M6x12 from sprocket cam shaft mounting. (B) (Fig. 3.54)
- Remove the washer sprocket.

G3310680	Holder assembly magneto

10 mm spanner

Caution: Ensure that washer, sprocket and bolts does not fall inside the engine.

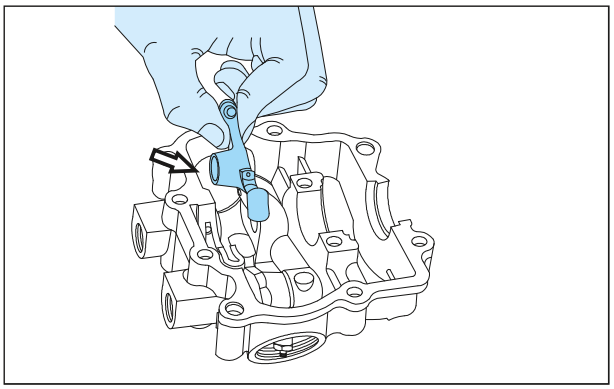


Fig. 3.51

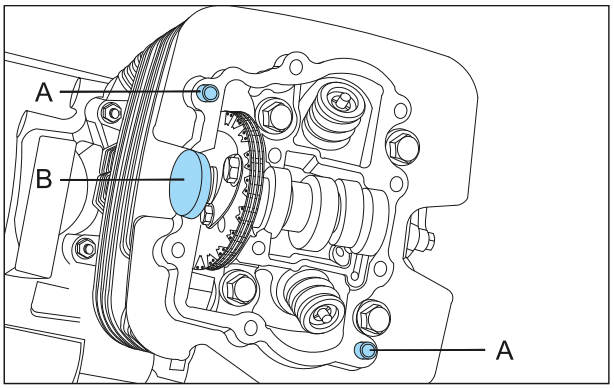


Fig. 3.52

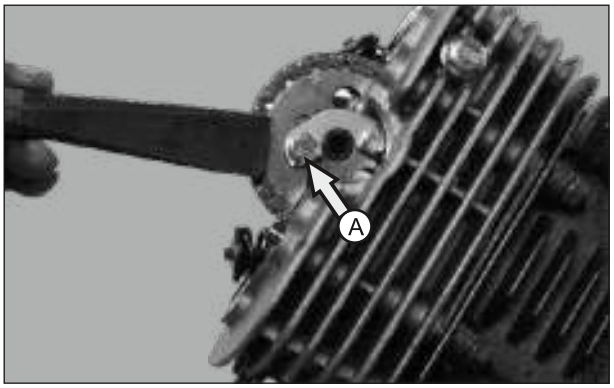


Fig. 3.53

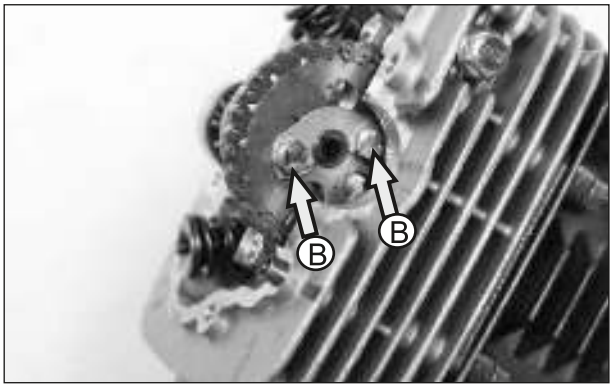


Fig. 3.54

- Pull out the sprocket camshaft along with the cam drive from the camshaft complete. Dislocate the cam chain from the sprocket camshaft and take out the sprocket camshaft. (Fig. 3.55)

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

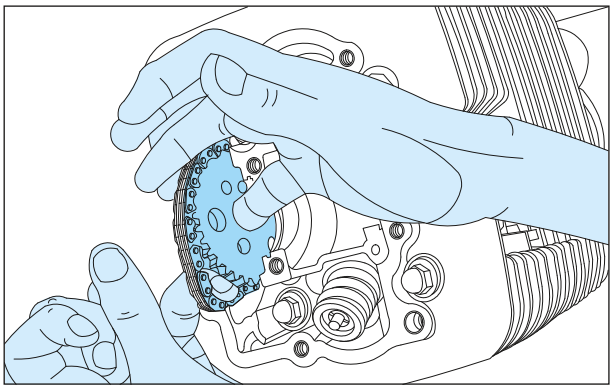


Fig. 3.55

- Remove the pin sprocket knock (A) from the camshaft complete and take out the cam shaft complete (B) from the cylinder head. (Fig. 3.56)

- Take out the C washer from the groove on the cylinder head.

- Reassemble the all parts in the reverse order of dismantling.

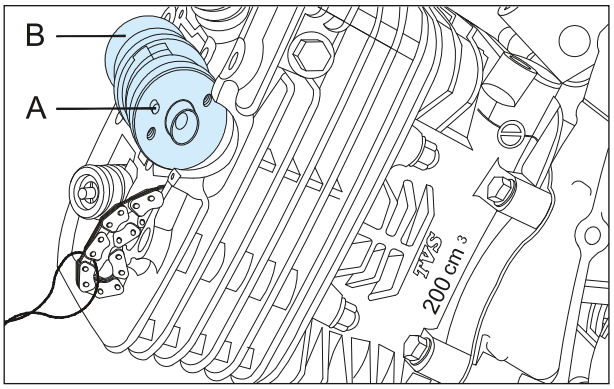


Fig. 3.56

Nose plier

Caution: Ensure that pin sprocket knock from cam shaft complete does not fall inside engine.

REMOVE HEAD COMPLETE CYLINDER:

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

- Similarly, remove the hexagonal bolts (M6X20 - 2 nos.) fastened to cylinder block complete and crankcase complete R (Fig. 3.57)

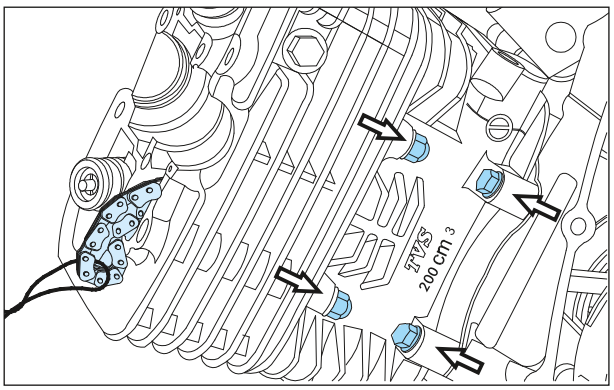


Fig. 3.57

8 & 10 mm spanner

Caution: Before loosening the cylinder head nuts always loosen the above 2 nuts and 2 bolts first.

- Loosen and remove 1no.Domed nut with flange M8 cylinder head (A) from top LH side of the cylinder head.

- Take out the copper washer (Gasket cylinder head nut) of 8.5X17X2.3 (Fig. 3.58)

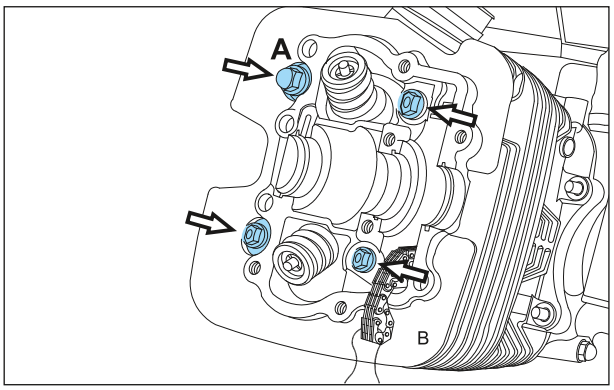


Fig. 3.58

- Loosen and remove 3 nos. hexagonal flange nut M8 (B) from cylinder head.
- Take out the3 nos. plain washer of 8.5X18.5X2.3 (Fig. 3.59)

12 mm spanner

Caution: While reassembling, ensure that the copper washer(Gasket cylinder head nut) are assembled only on the bolts top cylinder stud L.

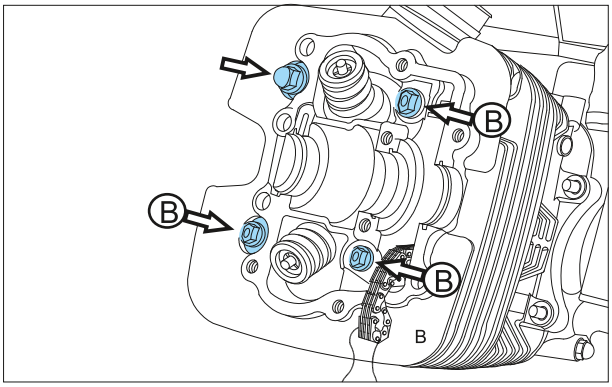


Fig. 3.59

- Holding the cam chain, gently lift the head complete cylinder as an assembly along with tensioner cam chain. (Fig. 3.60)

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

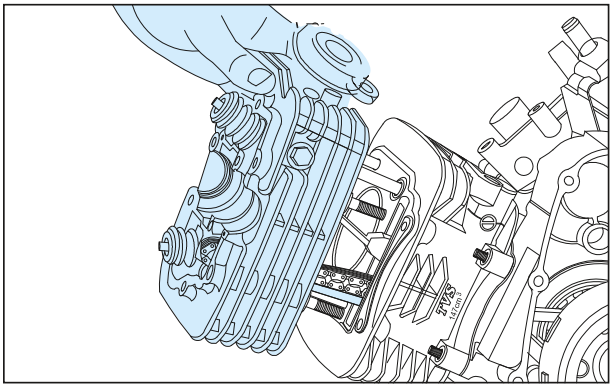


Fig. 3.60

- Take out the gasket cylinder head.

Note: During assembly of cylinder head replace the gasket with new one. Ensure the profile of the gasket is matching with the profile of the cylinder block Inspect the Tensioner cam chain side for wear & tear and damage. If so replace the tensioner cam chain with new one.

- To replace the tensioner cam chain loosen and remove 1 no. Stud bolt cylinder head along with washer cam chain tensioner from cylinder head. (Fig. 3.61)

12 mm spanner

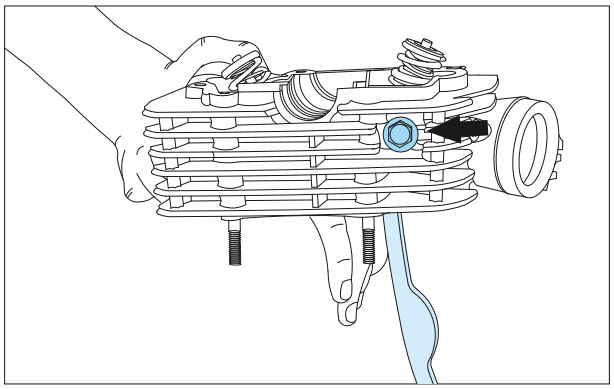


Fig. 3.61

- Remove the 2 nos. Tubular dowel from the cylinder block.

Nose plier

Caution: While assembling the tensioner cam chain ensure the assembly of washer cam chain tensioner.

- Locate the special tool to remove the valves as the movable jaw of the tool rests on retainer valve spring (Fig. 3.62) and the other end (fixed jaw) to rest at the center of the valve face. (Fig. 3.62)

- Slowly tighten the special tool movable jaw to compress the spring valve.

S1310020	Extractor assy. Inlet & Exhaust valve

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

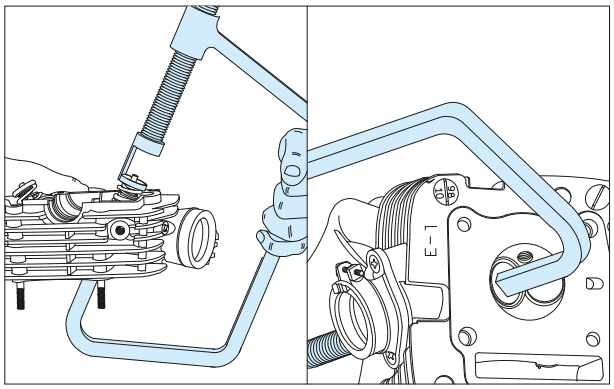


Fig. 3.62

- Remove two cotter valve from the valve stem. (Fig. 3.63)

Nose plier

Note: While assembling the cotter valve grooved portion of the cotter valve should be upside

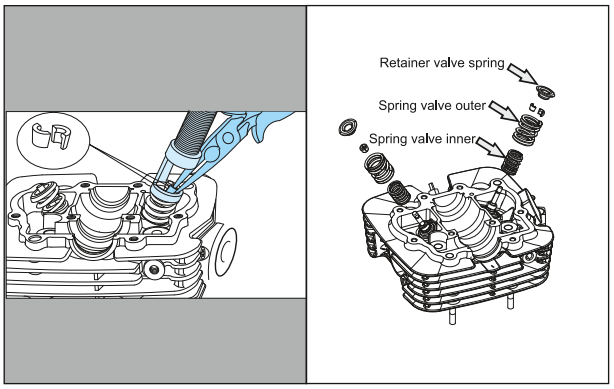


Fig. 3.63

- Loosen and take out the special tool.

- Take out the retainer valve spring.(Fig. 3.64)

- Remove the Spring valve outer and Spring valve inner . (Fig. 3.64)

Note: While assembling the spring valve inner and outer, locate the coil with lesser pitch towards seat valve spring (downwards).

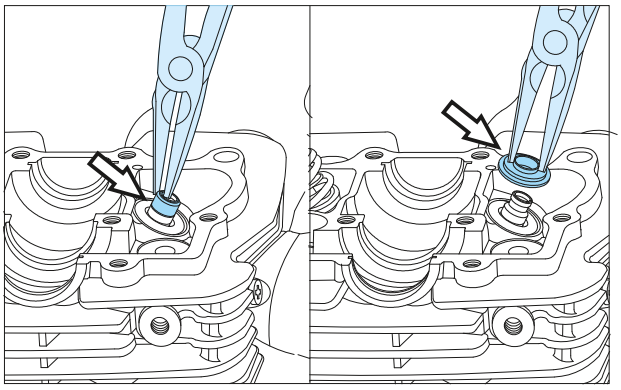


Fig. 3.64

- Gently, push down the valve from top and remove the valve from the combustion chamber side.(Fig. 3.65)

Note: While removing the valve, check for the free movement of the valve. If not check the valve for bend and runout. Replace the valve incase of bend or runout.

- Repeat the same procedure for other valve also.

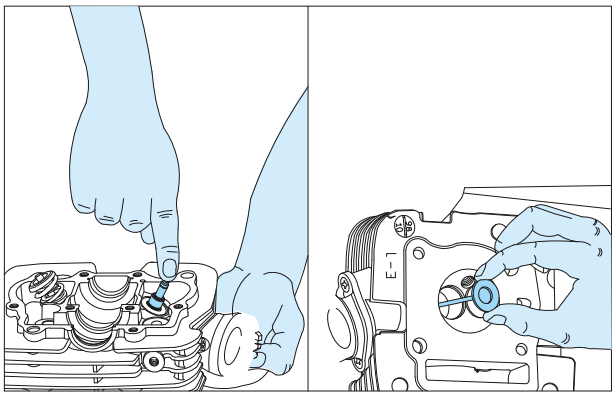


Fig. 3.65

- Remove the seal valve stem oil.

Nose plier

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

- Remove the seat valve spring.

Nose plier

- Repeat the same procedure for the removal of other valve also.
- Decarbonising, cleaning and inspection of cylinder head, block and valve assembly (refer chapter "Service of engine" page no: 60)
- Reassemble the all parts in the reverse order of dismantling.

Note: Inspect the seat valve guide for damage if so replaces the seal valve guide with new one.

REMOVE CYLINDER BLOCK COMPLETE:

- Pull out the guide cam chain from the cylinder block complete. (Fig. 3.66)

Note: While assembly, make sure that guide cam chain (opposite to tensioner). Should seat properly on the groove of the cylinder block complete.

- Remove the tie from the cam chain and take out the cam chain from the Crank shaft.

- Pull up the cylinder block complete by keeping the connecting rod holding tool below the piston to avoid damage the of piston while removing the cylinder block complete. (Fig. 3.67)

G3310290	Connecting rod holding tool

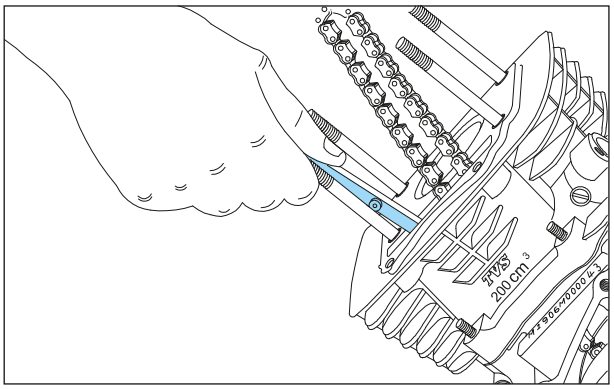


Fig. 3.66

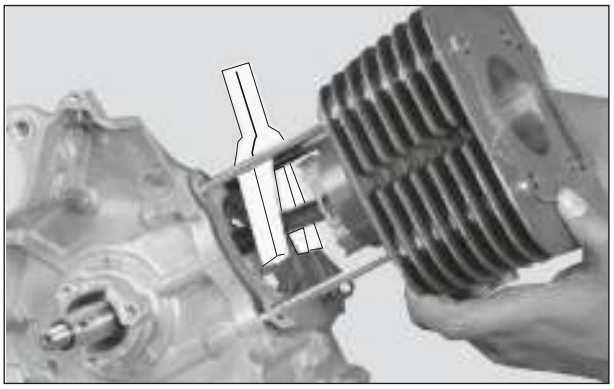


Fig. 3.67

- Place a clean cloth in the crankcase assembly bore to prevent circlip piston pin from falling inside the crankcase while removing the circlip. (Fig. 3.68)

- Remove the circlip piston pin from any one side of the piston. (Fig. 3.68)

Nose plier

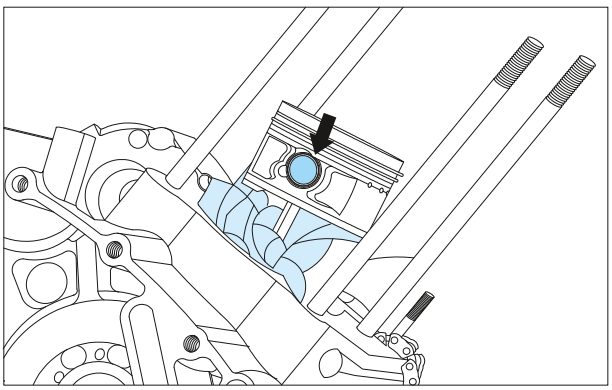


Fig. 3.68

- Gently push and take out the pin piston from the piston and then remove the piston along with the rings piston from the connecting rod.

Note: During assembly, set the circlip properly on the piston groove & rotate the circlip by using small connector to ensure the proper seating of the circlip on the groove.

PISTON:

- Remove the ring piston top (A). (Fig. 3.69)
- Remove the piston ring 2nd (B). (Fig. 3.69)
- Remove the 3 piece oil ring (C). (Fig. 3.69)

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

- Decarbonising & cleaning of piston for detailed procedure refer chapter 'engine' page no:56
- Take out the gasket cylinder block.
- Take out the 2 nos. Tubular dowel from Cylinder block & crank case RH.

Nose Plier

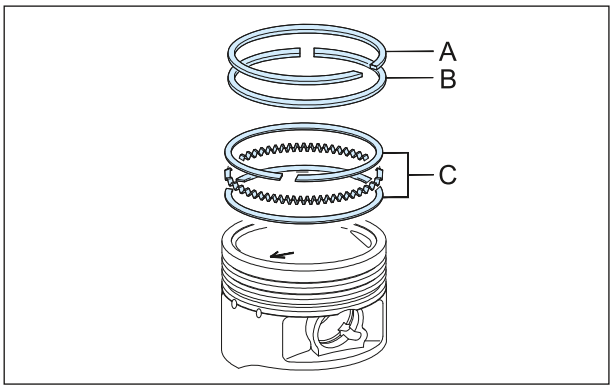


Fig. 3.69

REMOVE MUFF CUP:

- Un lock the muff cup bolt lock plate complete.

Flat chisel & Hammer

- Hold the muff cup using special tool and loosen and remove the 1 no. hexagonal screw M8X20 along with lock plate complete from muff cup . (Fig. 3.70)
- Pull out the muff cup from the differential. (Fig. 3.70)
- Repeat the same procedure for other side also.

G3310690	Holding tool, dog driven and Muff cup

13 mm spanner & nose plier

Tightening torque	18±2 Nm

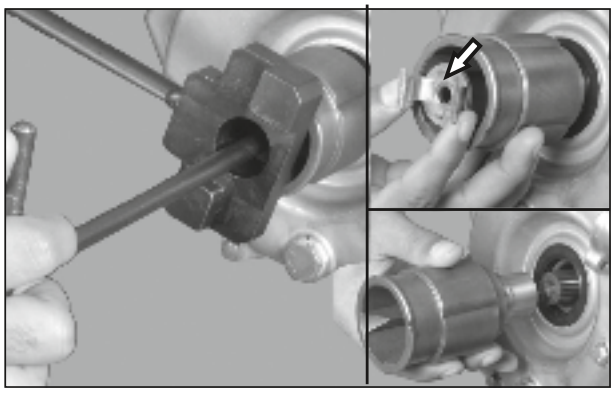


Fig. 3.70

DIFFERENTIAL ASSEMBLY REMOVAL

REMOVE DOG DRIVEN:

- Loosen and remove the 1 no. hexagonal bolt M8X25 from dog driven.

12 mm spanner

- Hold the dog driven using special tool and rotate a little bit in clock wise direction then tap gently, allow the dog to rotate in anti-clockwise direction and take out the dog from shaft hand starter. (Fig. 3.71).

G3310690	Holding tool, dog driven and Muff cup

Note: While assembly ensure the projected portion of dog driven must seat on the damper and match with the projection on crankcase.

- Loosen and remove 1 no. hexagonal flange Bolt M6x55 from damper hand starter and take out the damper hand starter. (Fig. 3.72)

REMOVE FARE METER: (WHEREVER APPLICABLE)

- Loosen & remove 2 nos. M6X16 hexagonal flange bolt from the cover fare meter drive, and separate the cover fare meter. (A) (Fig. 3.73) (wherever applicable)

8 mm spanner

- Take out the fare meter drive (B). (Fig. 3.73) (wherever applicable)
- Separate the worm fare meter from cap complete fare meter unit.
- Separate the 'O' ring from the cap complete fare meter unit.(C)(Fig. 3.73). (wherever applicable)

Small flat head screw driver

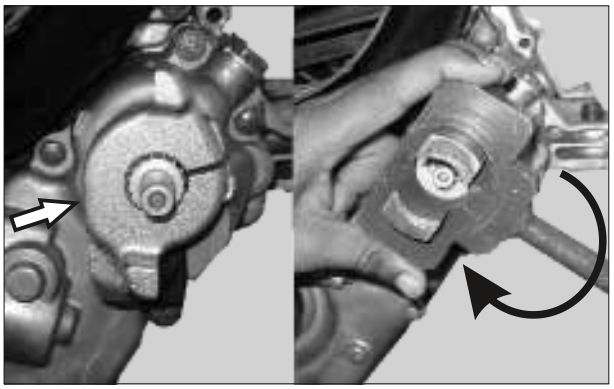


Fig. 3.71

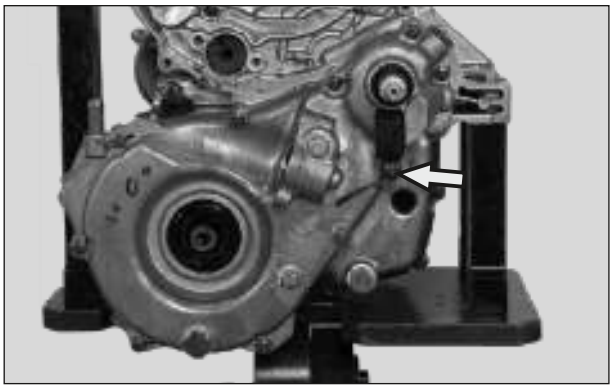


Fig. 3.72

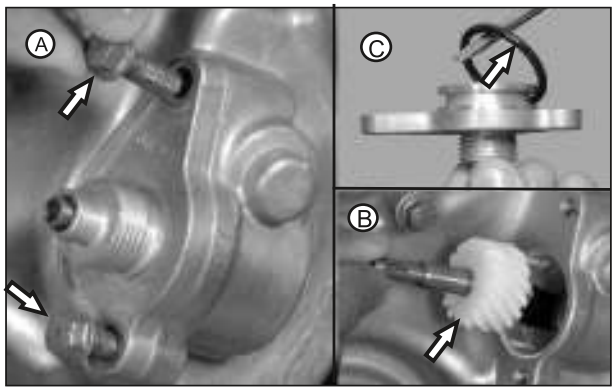


Fig. 3.73

REMOVE COVER DIFFERENTIAL:

- Loosen and remove 7 nos. hexagonal flange bolt M6X30 and 2 nos. hexagonal flange bolt M6X55(A)from the cover differential.(Fig. 3.74)

8 mm spanner

- Take out the cover differential and gasket cover differential.
- Take out the 1 no. Tubular dowel on crankcase LH differential side.

Nose plier

- Take out the differential assembly by gently tapping it from crank case LH.
- Take out the gear final drive from the drive shaft. (Fig. 3.75)

Note: While assembly ensure the differential gear final drive cut portion faces upward.

DIFFERENTIAL SUB ASSEMBLY

- Fix differential assembly onto Differential fixture.

G3310740	Differential Fixture

- Unlock the lock plate, differential using chisel and mallet.
- Loosen and remove 6 nos. hexagonal screws M10X20 and take out the lock plates.

14 mm spanner

- Separate the Gear, Final Driven from the housing complete differential.
- Take out the bevel gear.
- Take out the lock pin satellite gear.
- Pull out the pin satellite gear and take out the satellite gears.
- Take out the shim differential housing(Fig. 3.76).

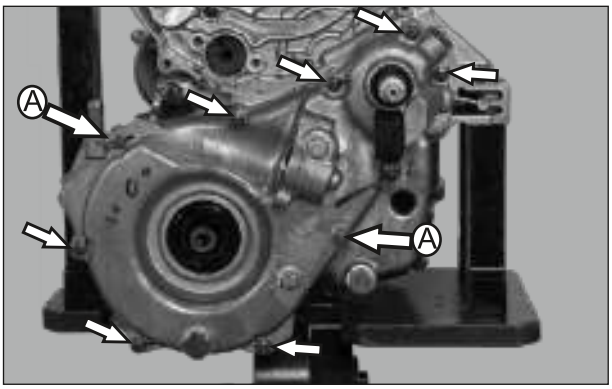


Fig. 3.74

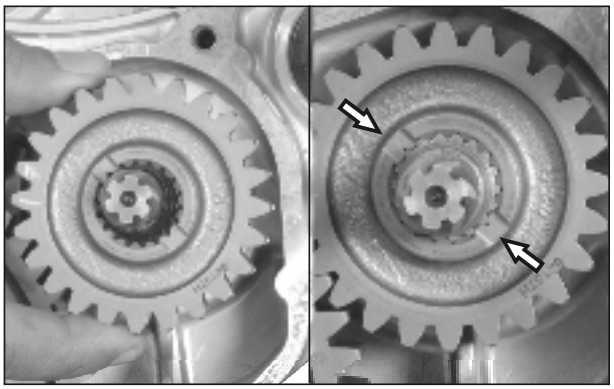


Fig. 3.75

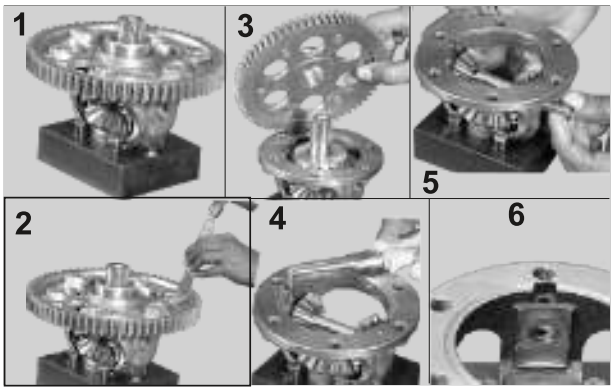


Fig. 3.76

- Separate the other bevel gear from housing complete differential.

REMOVE HAND STARTER MECHANISM:

- Dis - locate spring hand start from the hook bolt.
- Take out the spacer from spring hand starter (A). (Fig. 3.77)
- Dis-locate spring hand start from shaft hand start in locator hole on shaft hand start (B). (Fig. 3.77)
- Take out the spring hand start from shaft hand start.
- Take out the punched washer of 18X39X3 from shaft hand start. (Fig. 3.78)

Note: During the assembly of Spring hand start ensure that spring is seated properly on the hole of the shaft hand start and hook provided on crank case LH

SEPARATING CRANK CASE LH & RH:

- Loosen & remove the 9 nos. hexagonal flange bolt of M6X50 from the crank case LH.(A) (Fig. 3.79)
- Loosen and remove the 2 nos. hexagonal flange bolt of M6X94 from the crank case LH.(B) (Fig. 3.79)
- Loosen and remove the 1 no. hexagonal flange bolt of M6X75 from the crank case LH. (C) (Fig. 3.79)

8 mm spanner.

- Loosen & remove the 3 nos. hexagonal flange bolt of M6X50 from crankcase RH. (Fig. 3.80)

8 mm spanner.

- Separate the crankcase RH from the crankcase LH by gently tapping the crankcase RH by using nylon mallet.

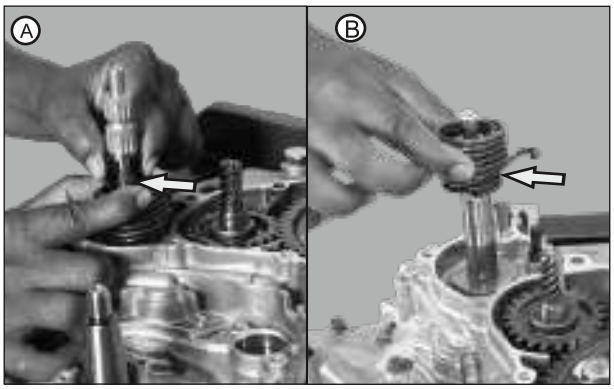


Fig. 3.77

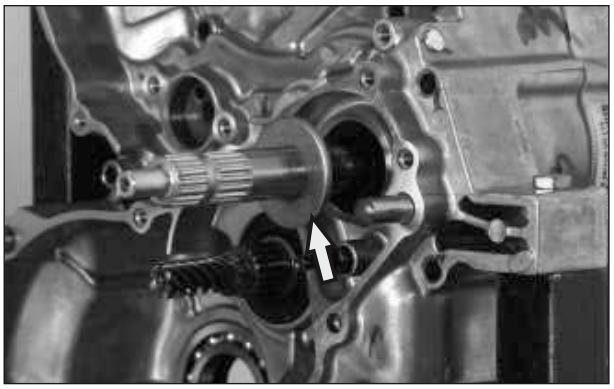


Fig. 3.78

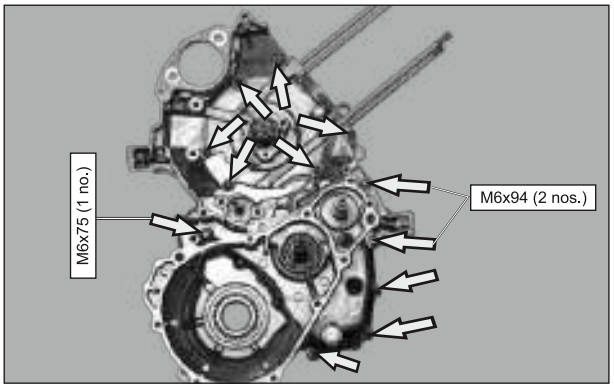


Fig. 3.79

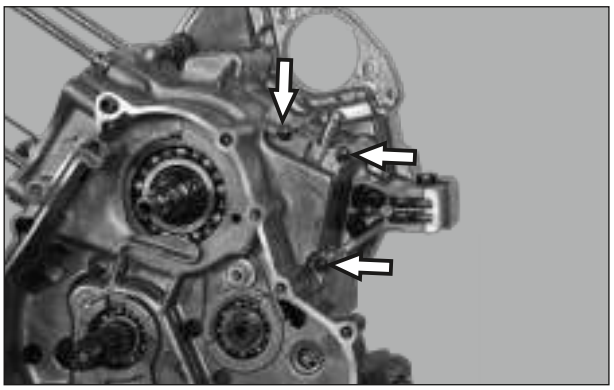


Fig. 3.80

Nylon mallet hummer

- Take out the gasket crankcase.

Note: While assembly, replace the gasket with new one.

- Take out plain washer of 17X24X1 (1 no.) from the drive shaft assembly. (Fig. 3.81)

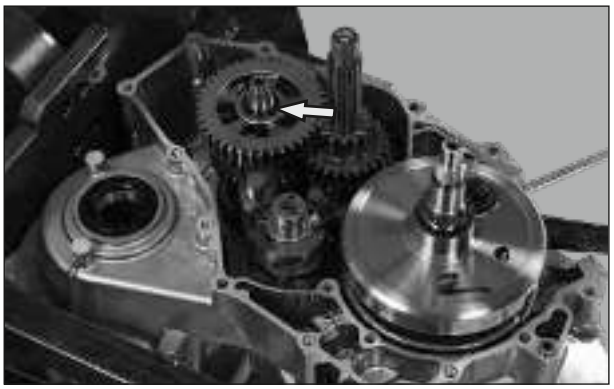
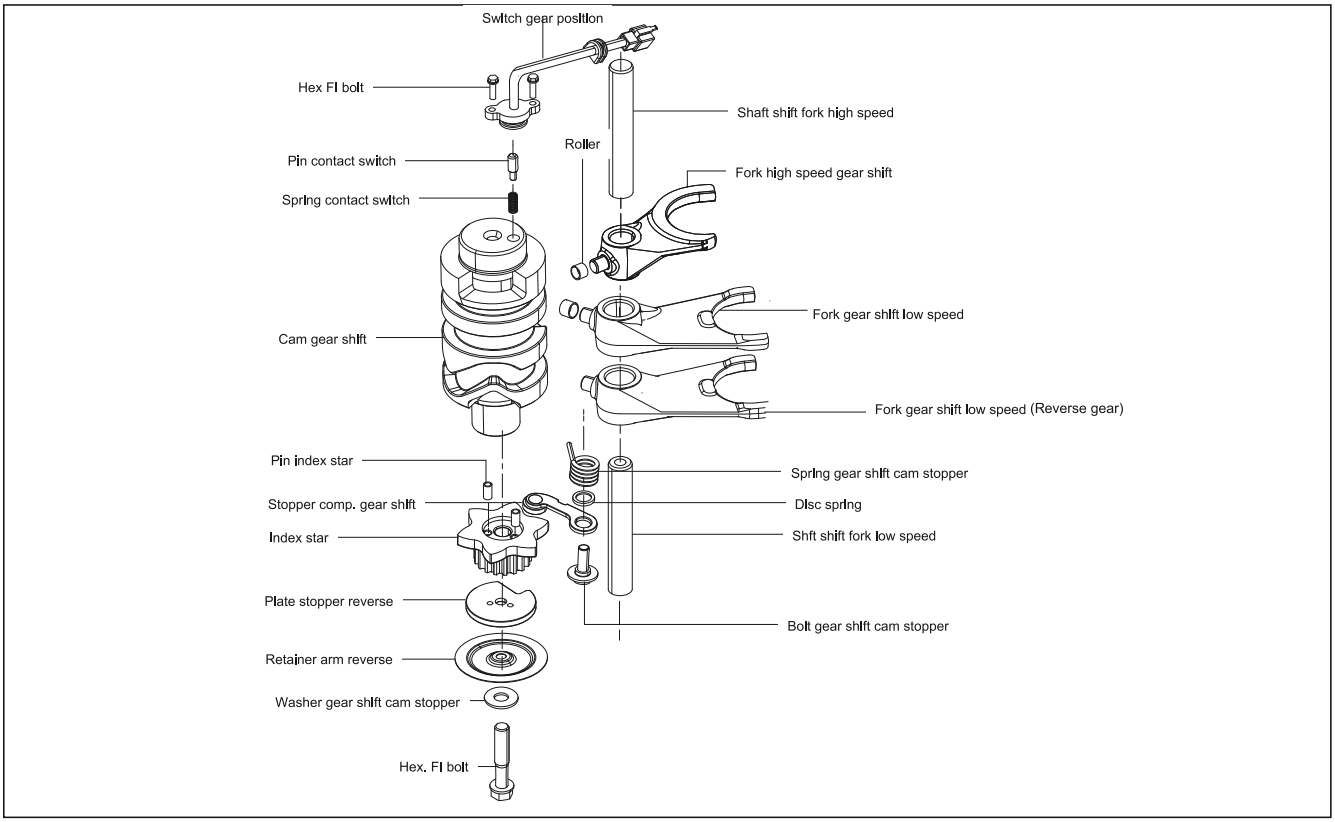


Fig. 3.81

TRANSMISSION



- Take out Pin shift fork high speed (A). (Fig. 3.82)
- Take out Pin fork shift low speed (A). (Fig. 3.82)

Nose plier

- Dis-locate the forks from groove cam gearshift (B). (Fig. 3.82)
- Pull out the cam gearshift from Crank case LH (C). (Fig. 3.82)

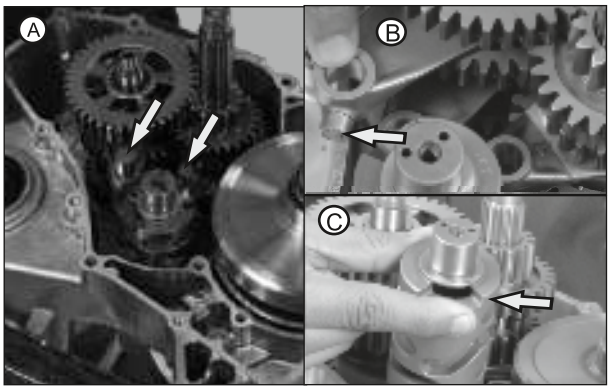


Fig. 3.82

- Take out the fork gearshift high speed along with spacer roller gearshift fork pin from gear 2nd drive. (Fig. 3.83)
- Take out the fork gearshift low speed along with spacer roller gearshift fork pin from gear 3rd driven. (Fig. 3.83)
- Take out the fork gearshift low speed reverse gear from gear 4th driven. (Fig. 3.83)
- Separate the spacer roller gearshift fork pin from fork gear shift high speed and fork gear shift low speed.

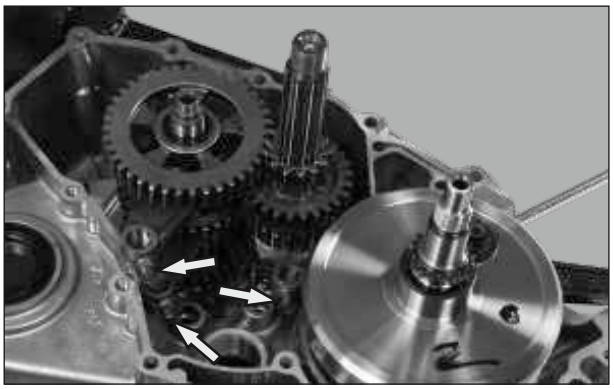


Fig. 3.83

Note: The fork gearshift high speed along with spacer roller gearshift fork pin should assemble to the gear 2nd drive. (Fig. 3.84)

The fork gearshift low speed with spacer roller gearshift fork pin should assemble to the gear 3rd driven. (Fig. 3.84)

The fork gearshift low speed reverse gear without spacer roller gear shift fork pin should assemble to the gear 4th driven. (Fig. 3.84)

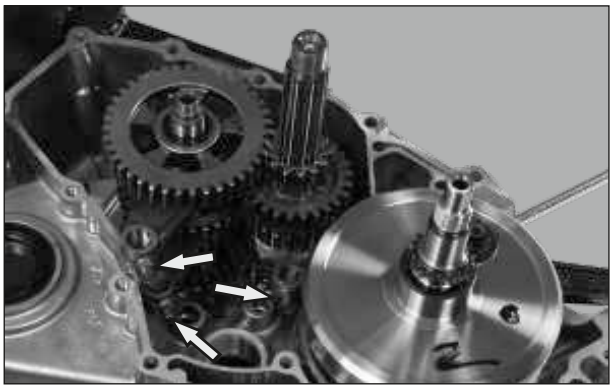


Fig. 3.84

- Take out the counter and drive shaft gear assembly together from the crank case LH.
- Pull out the shaft hand start from the crankcase LH (A). (Fig. 3.85)
- Take out spring ratchet hand start from crankcase LH. (B) (Fig. 3.85)

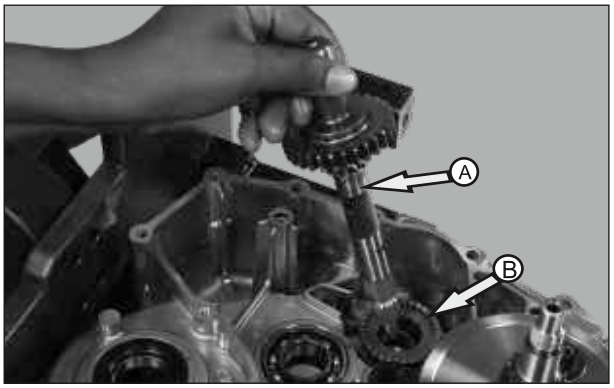


Fig. 3.85

- Take out the plain washer hand starter shaft of thickness 20.5X34X1.3 from crankcase LH. (A) (Fig. 3.86)
- Take out plain washer counter shaft of 21X30X1.8 from the crankcase LH. (B) (Fig. 3.87)
- Tap the crankshaft and take out the crankshaft.

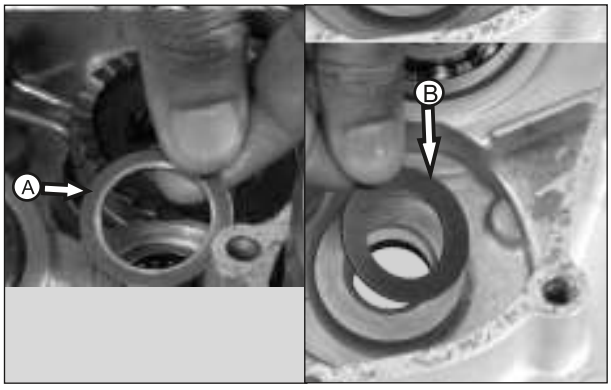


Fig. 3.87

SHAFT COUNTER AND SHAFT DRIVE ASSEMBLY

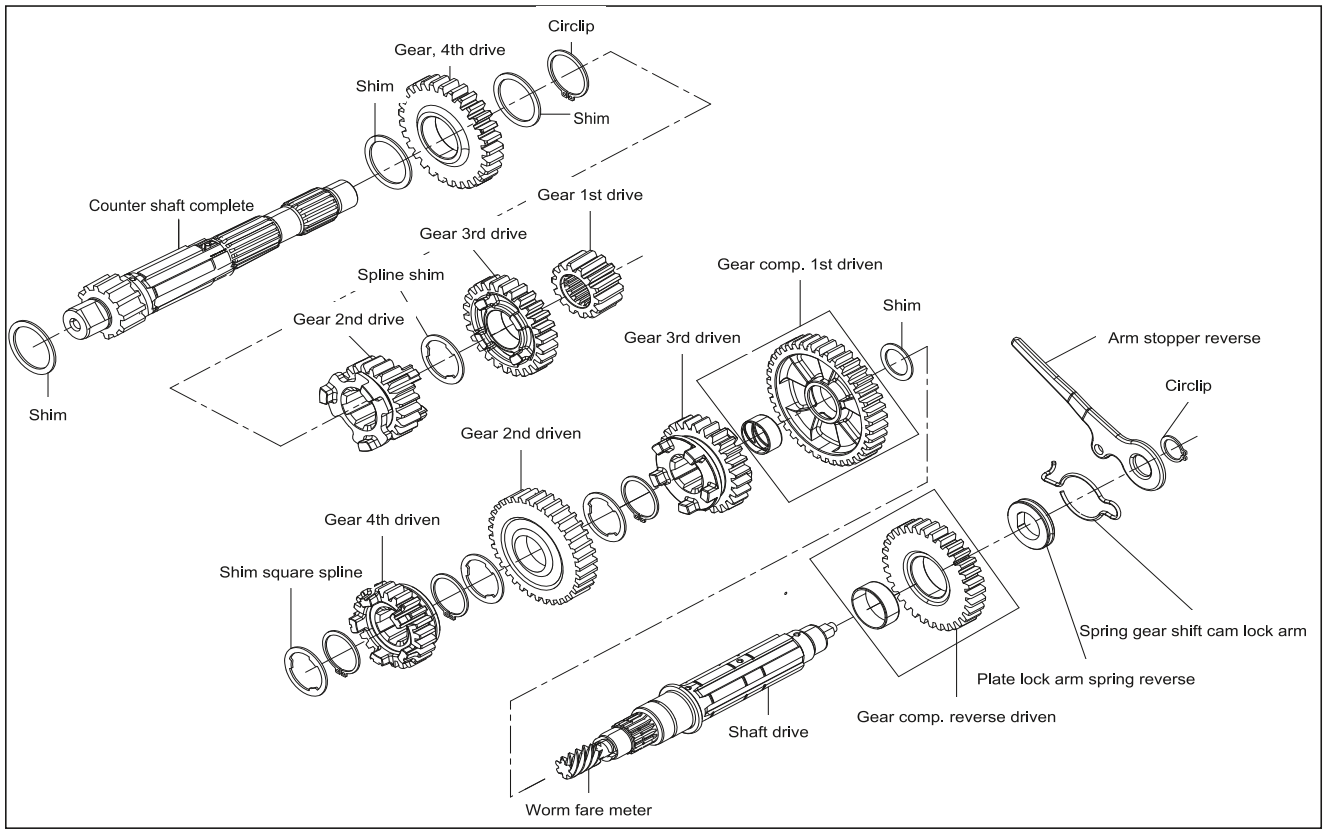


Fig. 3.88

REMOVE COUNTER SHAFT ASSEMBLY

- Take out the gear 1st drive from counter shaft complete. (Fig. 3.84)

Note: While reassembly ensure that the spline surface faces top

- Take out the gear 3rd drive from counter shaft complete. (Fig. 3.88)
- Take out spline shim.
- Take out the gear 2nd drive from counter shaft complete. This gear has the collar for fork gear shift high speed. (Fig. 3.88)
- Take out the circlip and shim.

External circlip plier

- Take out the gear 4th drive from counter shaft complete. (Fig. 3.88)
- Take out the shim. (Fig. 3.88)

REMOVE SHAFT DRIVE ASSEMBLY:

- Take out the gear 1st driven from shaft drive. (Fig. 3.88)
- Take out the gear 3nd driven from shaft drive. This gear has the collar for fork gear shift low speed. (Fig. 3.88)
- Take out the circlip and spline shim.

External circlip plier

- Take out the gear 2nd driven from shaft drive. (Fig. 3.88)
- Take out spline shim and circlip.

External circlip plier

- Take out gear 4th driven from shaft drive. This gear has the collar for fork gear shift reverse. (Fig. 3.88)
- Take out the circlip and spline shim

External circlip plier

- Take out the gear complete reverse driven from shaft drive.(Fig. 3.88)

REMOVAL & INSTALLATION OF CRANK CASE OIL SEALS AND BEARINGS

- Using special tool the ball bearings 6001,6002, 6003,6205, 6206, 16007 can be removed.

G3310470	Ball Bearing Puller

- Using special tool the needle bearing HK1812B can be installed.

G3310480	Needle Bearing Puller

- Using special tool the bearings 6001,6002,6003, 6205,6206, 16007 can be installed with the suitable adaptor.

G3310510	Assembly tool ball bearing

- Using special tool the needle bearing HK1812B can be installed.

G3310530	Assembly tool needle bearing

- Using special tool oil seals can be assembled with the suitable adaptor

G3310720,540,600	Assembly tool oil seals

ENGINE COMPONENTS – INSPECTION
BEARINGS:

- Wash the bearings with a cleaning solvent and lubricate with engine oil before inspecting.
- Inspect the play of each bearing before fixing it. Hold the inner race and rotate the outer race by hand and observe for any abnormal noise and smooth rotation. Replace the bearing with a new one if found defective. (Fig. 3.89)

Note: Do not use compressed air to clean the bearings.

OIL SEAL:

- Damage to the lip (A) of the oil seal may result in leakage of the oil. Inspect for damage and be sure to replace the damaged oil seals with the new ones. (Fig. 3.90)

CRANKSHAFT COMPLETE

RUNOUT:

- Support the crankshaft assembly with 'V' blocks of anvil.
- Mount the dial indicator at the positions shown to read the runout. Runout should be within the service limit. (Fig. 3.91)
- Excessive runout of crankshaft assembly causes abnormal engine vibration and bearing noises. Such vibration shortens engine life.

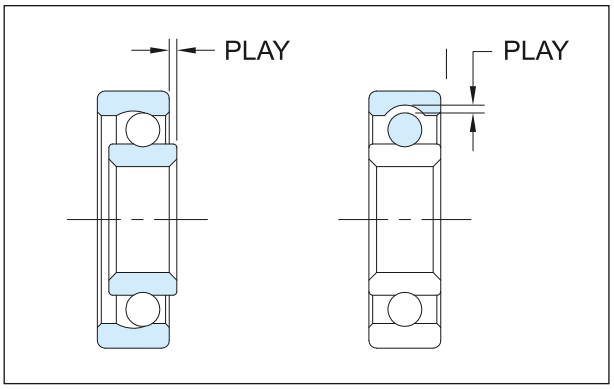


Fig. 3.89

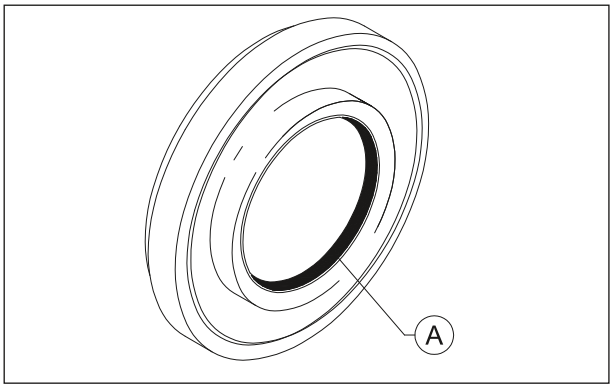


Fig. 3.90

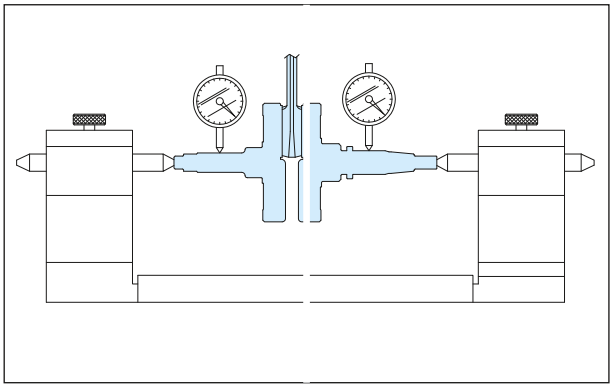


Fig. 3.91

031 307 0 031 305 0 031 306 0	V - block set (4“x3“x3“) Dial gauge (1/100 mm) Magnetic stand

Service limit	1 mm

CONDITION OF THE BIG END BEARING:

- Measure the big end wear of connecting rod using a dial gauge by the deflection of small end. If the deflection exceeds the limit, replace the crankshaft assembly with a new one. (Fig. 3.92)

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. 3.93)

- Measure the connecting rod big end side clearance with a feeler gauge. If the clearance exceeds the service limit, replace the crankshaft assembly with a new one. (Fig. 3.94)

Feeler gauge

Service limit	0.65mm

CONNECTING ROD SMALL END DIAMETER:

- Measure the internal diameter (I.D) of the connecting rod small end. If the I.D is more than the service limit, replace the crankshaft with a new one. (Fig. 3.94)

Service limit	15.040 mm

CYLINDER:

- The wear of the cylinder wall is determined from the diameter reading taken at three locations from the top of the cylinder. (Fig. 3.95 and Fig. 3.96)

Cylinder gauge

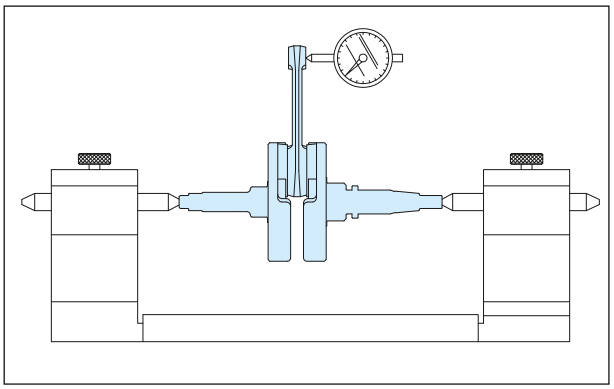


Fig. 3.92

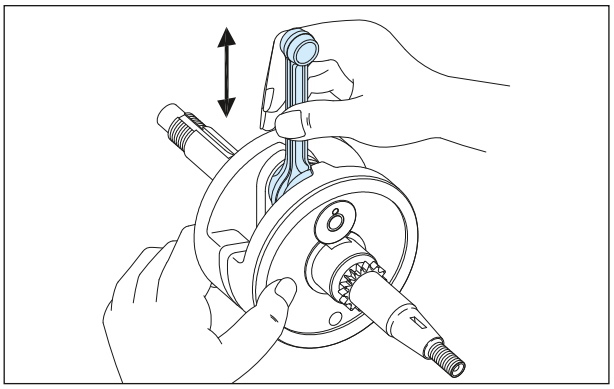


Fig. 3.93

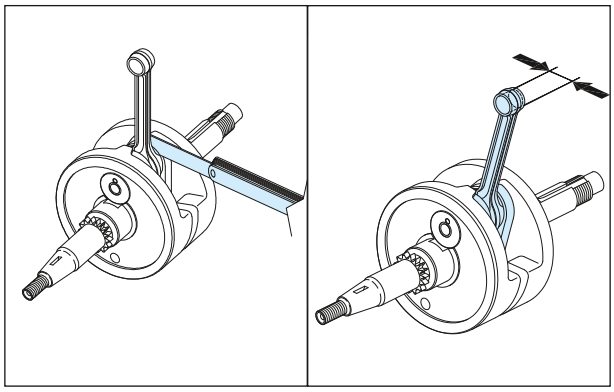


Fig. 3.94

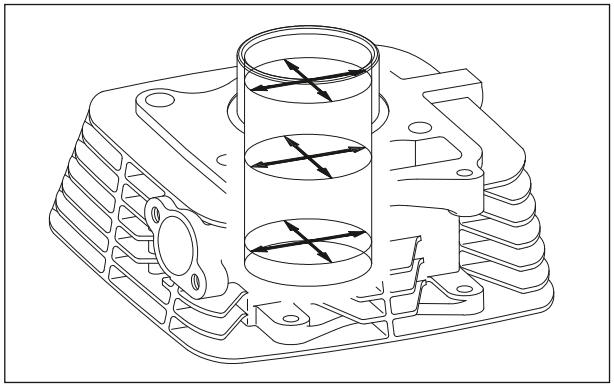


Fig. 3.95

- Set the dial of the bore gauge using this diameter on the micrometer. Measure the bore diameter at 20 mm from the cylinder top surface. (Fig.3.96)

- If the 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.

Service limit	62.125 mm

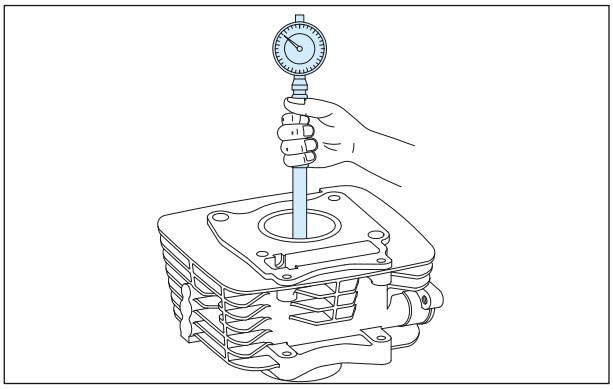


Fig. 3.96

PISTON:

- Measure the piston diameter using micrometer at right angles to the piston pin and at a point which is 7.5 mm from the skirt end. (Fig. 3.97)

Micrometer	
Service limit	62.885 mm

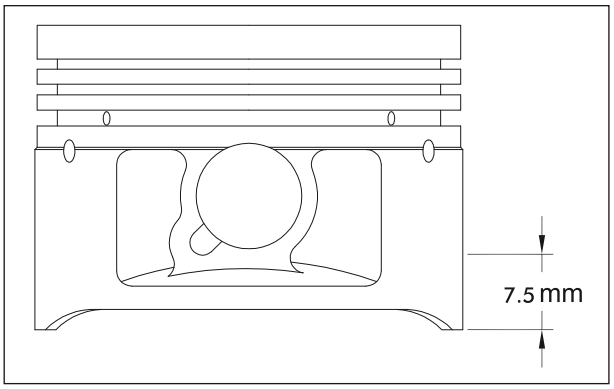


Fig. 3.97

CYLINDER TO PISTON CLEARANCE:

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

- Be sure to measure the diameter at right angles to the piston pin and at a point 'A' which is 21mm from the bottom.

- Remove the ring piston 1st (A),the ring piston 2nd (B) and ring piston oil (C) (Fig. 3.98)

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

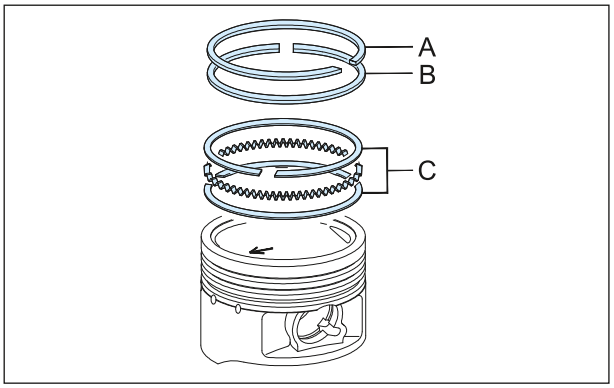


Fig. 3.98

PISTON DECARBONISING:

- Decarbonise the 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 in the groove is liable to cause the rings piston to stuck in the groove, and this will lead to reduced engine power output. (Fig. 3.99)

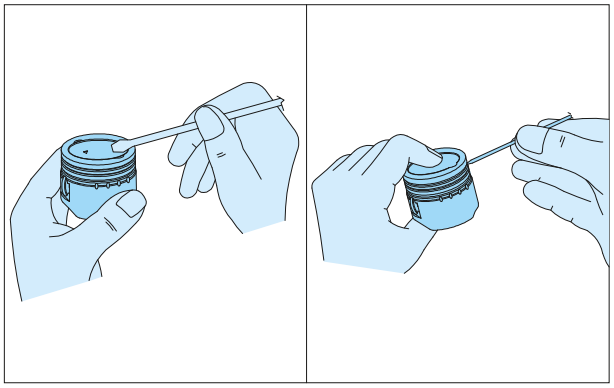


Fig. 3.99

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

RING PISTON:

- As the rings wear out, its close end gap increases resulting in reduced engine power output.
- The close end gap of each ring is to be measured with the ring fitted squarely in the cylinder bore at 20 mm from the cylinder bottom. (Fig. 3.100)

Service limit	0.7 mm

Feeler gauge

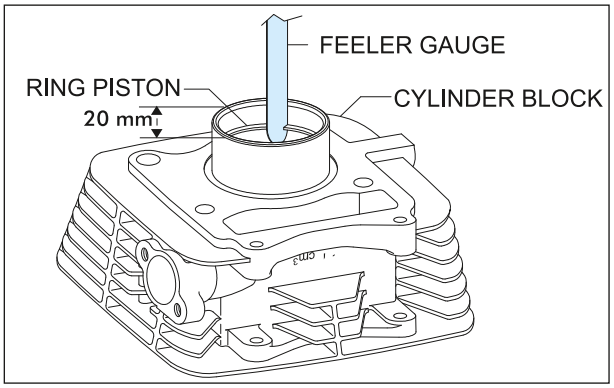


Fig. 3.100

- If the gap exceeds the limit, replace the rings as a set.
- Inspect for proper tension of the rings by measuring its free end gap. if it is less than the service limit, replace the rings as a set. (Fig. 3.101)

Service limit	mm
First ring	5.7
Second ring	4.4

Vernier Caliper

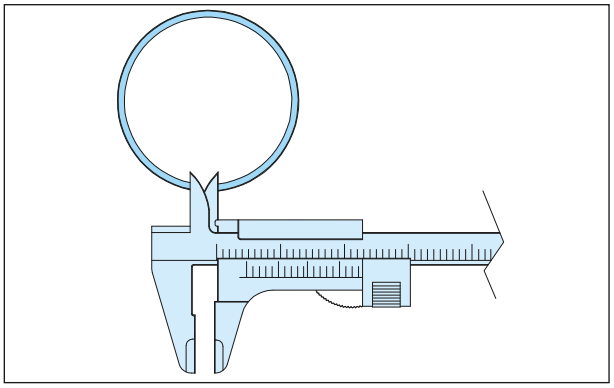


Fig. 3.101

Note: Before assembling the piston to the connecting rod, be sure to apply lubricating oil to the connecting rod big end bearing , small end bearing and piston.

The arrow mark on the piston crown must point towards the exhaust side.

CLUTCH

Plate clutch drive and driven

- As clutch plates remain in oil, they are subject to lesser wear and tear and therefore last longer. Their life depends largely on the quality of transmission oil used and the way clutch is used.
- The plates are to be replaced when found worn-out, distorted, bulged out or burnt.
- Measure the thickness and claw width of plate clutch drive (5 nos.) using special tool. (Fig. 3.102 and Fig. 3.103)

Vernier caliper

Service limit	mm
Plate clutch drive thickness	2.6
Plate clutch drive claw width	13.5

- Using special tool check the wear and distortion of plate clutch driven (4 nos.) as shown in figure. (Fig. 3.104)

Feeler gauge & Vernier caliper

Service limit	mm
Plate clutch driven distortion	0.1

Spring Clutch:

- Spring clutch which have lost their tension cause clutch slippage, resulting in loss of power and rapid wear of the clutch plates.
- Remove the spring clutch (4 nos.) from the hub clutch. For removal of spring clutch (refer chapter "Service of engine" page no: 37)
- Measure the free length of the spring clutch (4 nos.). (Fig. 3.105)

Vernier caliper

Service limit	mm
Free length of spring clutch	27.8

Note: If any one of them is less than the service limit, replace all the springs with a new as a set.

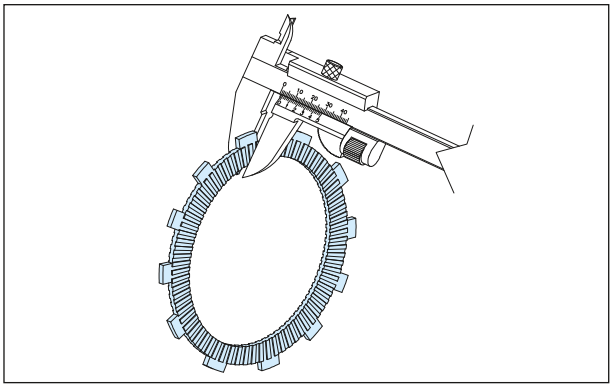


Fig. 3.102

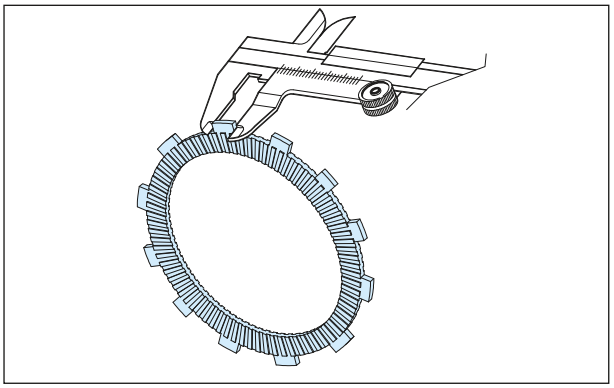


Fig. 3.103

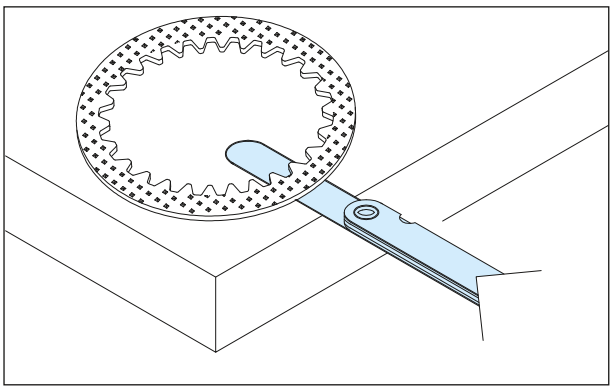


Fig. 3.104

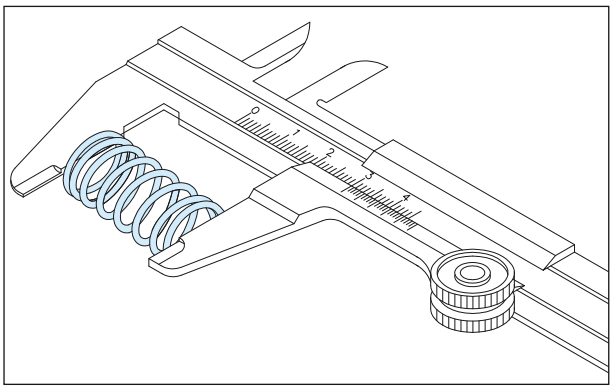


Fig. 3.105

Shaft complete counter /shaft complete drive/ camshaft /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 and tear of splined surface of the shafts / gear teeth. Replace the damaged parts with new ones.
- Using a feeler gauge, check the clearance between fork gear shift and its seating groove on the gear. (Fig. 3.106) If the clearance exceeds the service limit, determine whether the gear or the fork gear shift should be replaced with a new one.

Feeler gauge	
Service limit	mm
Fork gear shift to groove clearance	0.5

COVER CYLINDER HEAD:

- After cleaning the liquid gasket from the surfaces of the cover cylinder head, inspect the surface for any scratches, high and low spots. If noticed, remove them using a fine emery paper (400 grade) placed over the surface plate. (Fig. 3.107)
- Using feeler gauge and surface plate, check for distortion of cover cylinder head. (Fig. 3.108)

Feeler gauge	
Service limit	mm
Cover cylinder head	0.05

SHAFT ROCKER ARM:

- Inspect the shaft rocker arm for any damages
- Measure the outer diameter (OD) of shaft rocker arm. If the OD is less than the service limit, replace the shaft. (Fig. 3.109)

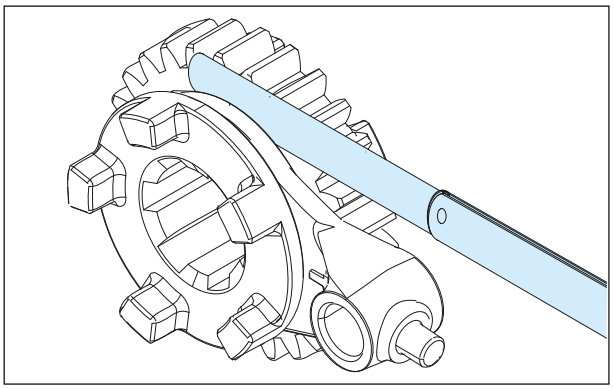


Fig. 3.106

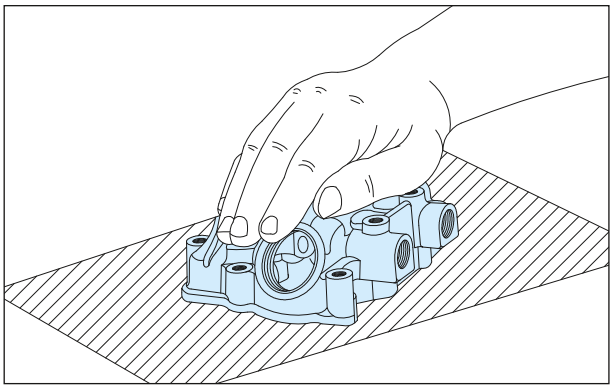


Fig. 3.107

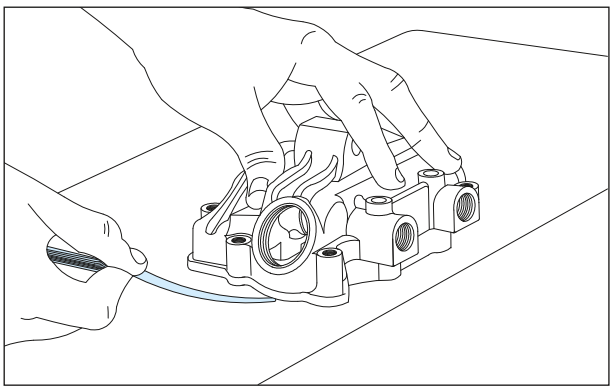


Fig. 3.108

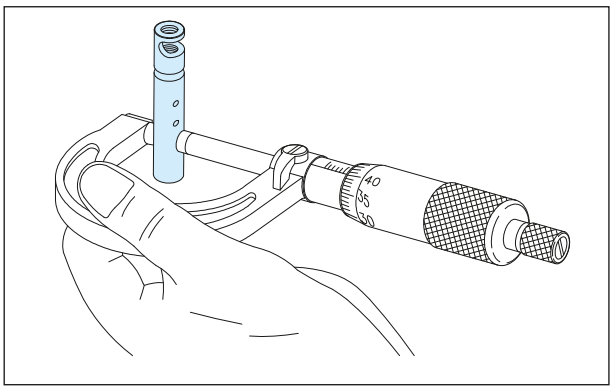


Fig. 3.109

Out side Micrometer	
Standard diameter	11.984~11.966 mm

Note: The OD should be checked at the seating area of shaft rocker arm.

ROCKER ARM ASSEMBLY:

- Inspect the rocker arm assembly for wear and damage. Measure the internal diameter (ID). If the ID is more than the service limit, replace the arm. (Fig. 3.110)

Inside Micrometer	
Standard diameter	12.0~12.018 mm

Caution: While reassembling the relief cut given in both the shaft valve rocker arm should face each other to enable the cover cylinder head bolts to enter into the groove. (Fig. 3.110)

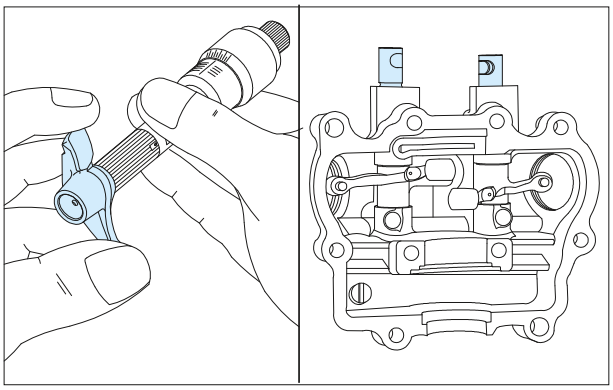


Fig. 3.110

CYLINDER HEAD:

Decarbonising

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

- Decarbonise the combustion chamber of head complete cylinder using suitable decarbonising spray. (Fig. 3.111)

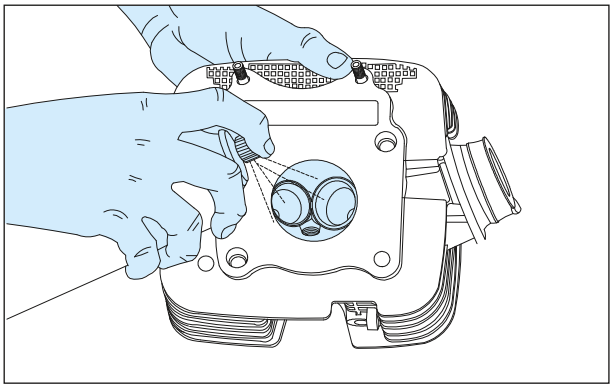


Fig. 3.111

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

Caution: Do not damage the surface of the combustion chamber while decarbonising.

SEAL VALVE:

- Carbon deposition on valve seating will cause valves not to seat properly thereby causing leakage and this will affect idling, pickup and mileage. This will also lead to erratic running and starting trouble.

VALVE AND VALVE GUIDE:

- Carbon deposits on the valve stem rubs continuously on guide valve and this will result in increased clearance between the valve stem and guide valve. Clean the valve stem with the cleaning solvent. (Fig. 3.112)

- Clean the guide valve to remove any carbon built up by using carbon removers.

- Clean other parts of head complete cylinder thoroughly with suitable cleaning solvent.

INSPECTION OF CYLINDER HEAD:

- After cleaning the liquid gasket from the surfaces of the head complete cylinder, inspect the surface for any scratches, high and low spots. If noticed, remove them using a fine emery paper (400 grade) placed over the surface plate. (Fig. 3.113)

- Using straight edge and feeler gauge, check for the distortion of head complete cylinder. If the reading exceeds the limit, replace the head complete cylinder with a new one. (Fig. 3.114)

Feeler gauge, Straight Edge scale & Surface plate.

Standard diameter	0.05 mm

CAM SHAFT COMPLETE:

- Check the 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.

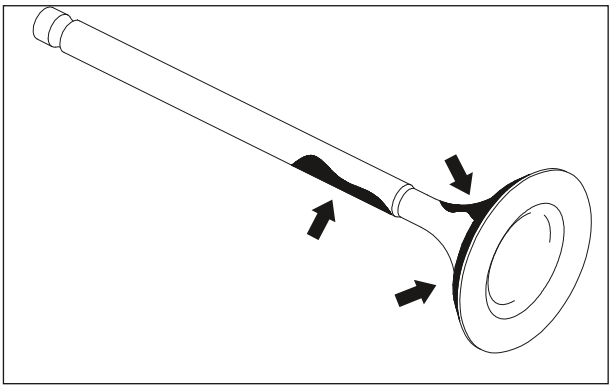


Fig. 3.112

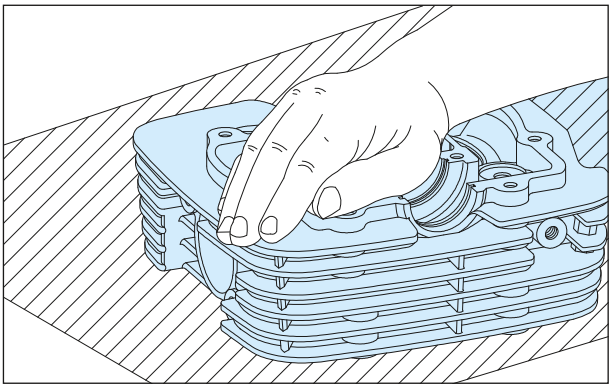


Fig. 3.113

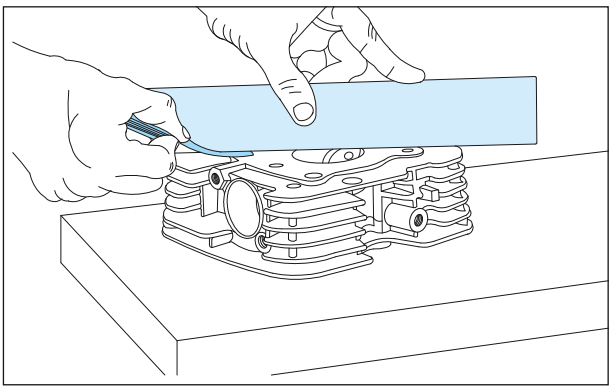


Fig. 3.114

- Measure the cam lobe height. If the lobe height is less than the service limit then, replace the camshaft complete with a new one. (Fig. 3.115)

Out side Micrometer

Petrol and CNG model only (wherever applicable)

Inlet cam lobe height (Standard)	32.79mm
Exhaust cam lobe height (Standard)	32.79mm

LPG model only (wherever applicable)

Inlet cam lobe height (Standard)	32.482mm
Exhaust cam lobe height (Standard)	32.788mm

Petrol, LPG and CNG (HP engine) (wherever applicable)

Inlet cam lobe height (Standard)	33.712mm
Exhaust cam lobe height (Standard)	33.697mm

- Inspect the ball bearings 2 nos. of camshaft for abnormal play or pitting.
- Measure the runout with a dial gauge. Replace the camshaft with a new one if the runout exceeds the limit. (Fig. 3.116)

Dial gauge

Service limit	0.08 mm

VALVE INTAKE AND EXHAUST :

- Inspect each valve for trueness, burning, scratches, abnormal wear or bend.
- Measure the outside diameter of valve stem on the operational area. (Fig. 3.117)

Out side Micrometer

Inlet (Standard)	4.990~4.975mm
Exhaust (Standard)	4.970~4.955mm

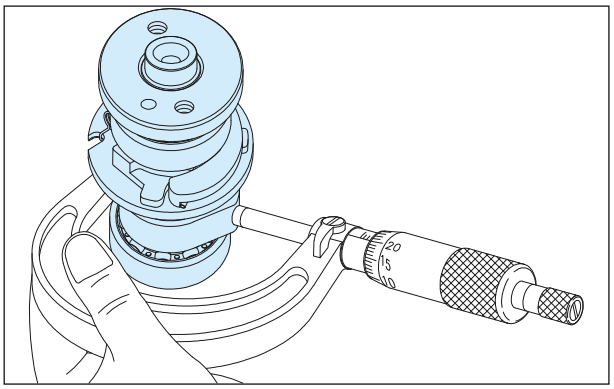


Fig. 3.115

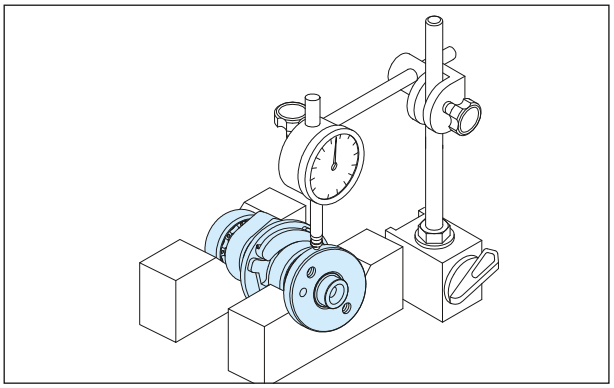


Fig. 3.116

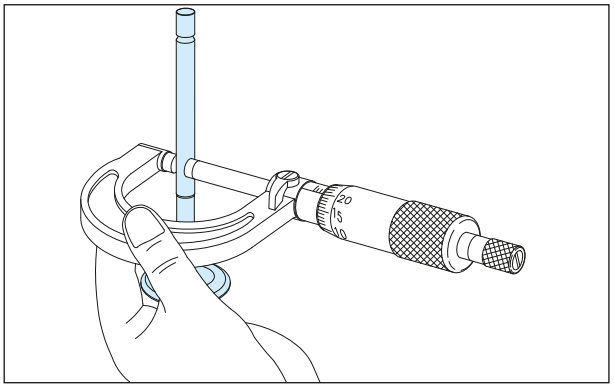


Fig. 3.117

- Using the special tools, measure the runout on valve stem and valve face. Replace the valve with new one if runout exceeds the service limit.(Fig. 3.118)

V Block set (4"X3"X3"), Dial gauge (1/100mm) & Magnetic stand

Service limit	mm
Runout of stem	0.05
Runout of face	0.075

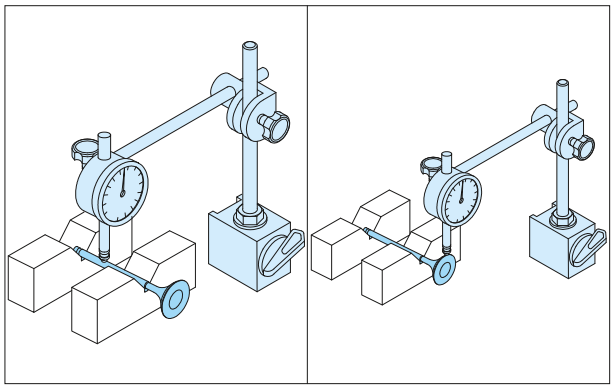


Fig. 3.118

- Check the valve for smooth movement in the guide valve.
- Measure the thickness of valve head. If the thickness is less than the service limit, replace the valve with a new one. (Fig. 3.119)

Vernier caliper

Service limit Inlet & Exhaust valve	mm 0.05

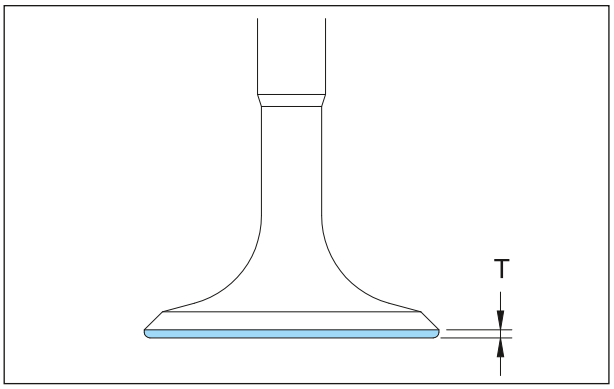


Fig. 3.119

VALVE STEM CONDITION:

- Inspect the valve stem end face (A) for pitting and wear. If pitting or wear noticed, resurface the valve stem end, provided the length (B) is not reduced to less than 3.8 mm. If this length becomes less than 3.8 mm, the valve must be replaced with a new one. (Fig. 3.120)

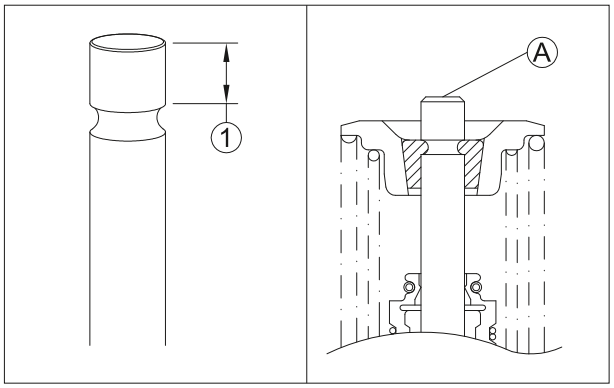


Fig. 3.120

VALVE SPRING:

- Measure the free length of the inner and outer springs. (Fig. 3.121)

Vernier caliper

Valve spring inner (Standard inner)	30.91 mm
Valve spring outer (Standard inner)	30.82 mm

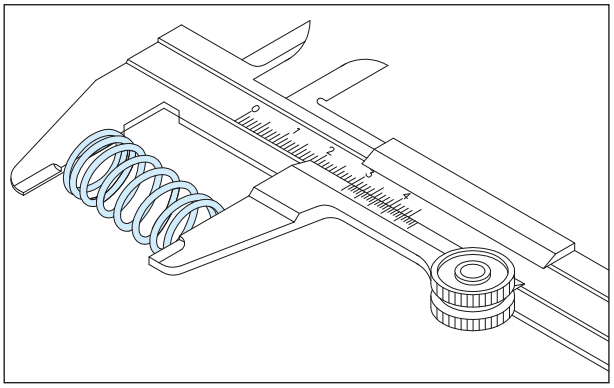


Fig. 3.121

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

- Lubricate both the valve stems before installing.
- Ensure proper seating of the cotter valve in its groove by gently tapping on valve stem

ADJUSTER ASSEMBLY TENSINOER:

- Check the adjuster assembly tensioner arm (A), if the arm is found to be in the extreme out position, then replace the cam chain with a new one. (Fig. 3.122)

Caution: While reassembling the adjuster assembly tensioner, push the arm (A) fully inside by pressing the lock provided on it.

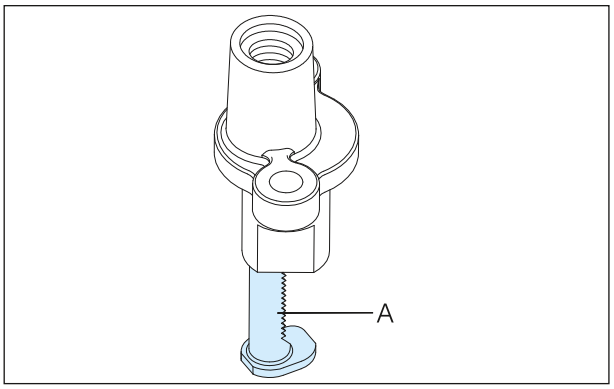


Fig. 3.122

ENGINE REASSEMBLY

CRANKSHAFT ASSEMBLY:

- Clean all the engine components and inspect before assembling.
- Take the Crankcase L, place the same on engine stand such that the mating surface with Crankcase R is on the upper side.
- Take crankshaft assembly, insert it in the bearing mounting area in Crankcase L. Use the special tool to pull the cranksaft till it's seating in the crankcase L. This special tool need to be threaded on to the crankshaft L from the other side of crankcase L and rotated the handle for pulling the crankshaft completely in. (Fig. 3.123)

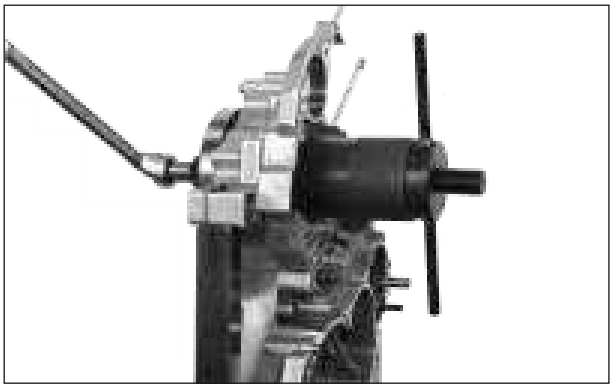


Fig. 3.123

G3310500	Assembly tool Crank shaft

- After assembling the crankshaft, remove the special tool from crankshaft LH side. While removing the tool, the crankshaft may rotate which should be prevented by fastening the Hex Nut for primary drive gear on the crankshaft R and holding it by a spanner.

20 mm spanner

SHAFT HAND STARTER ASSEMBLY:

- Place a shim of 1.5mm thickness on the Crankcase L where the Ratchet, hand starter is assembled. After placing the ratchet hand starter, insert the shaft hand starter on the LH through ratchet hand start. Ensure proper seating of spring ratchet hand start on Crankcase L. (Fig. 3.124)

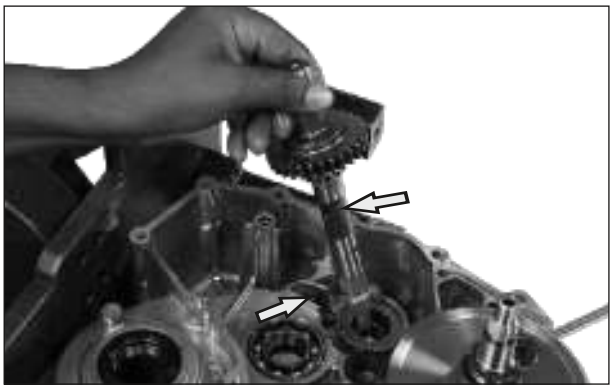


Fig. 3.124

TRANSMISSION ASSEMBLY:

- Place a shim of 1.8mm thick on the crankcase L where the counter shaft is inserted. (Fig. 3.125)

Fig. 3.125

- Take the counter shaft and drive shaft assembly and assemble both together in the crankcase L. Add a shim (17x24x1.0) over the driver shaft (top side).
- Insert the fork gear shift low speed (without spacer roller gear shift fork pin) in the groove of 4th gear driven on shaft drive.(Fig. 3.126)
- Now, Insert the fork gear shift low speed (with spacer roller gear shift fork pin) in the groove of gear 3rd driven on shaft drive.(Fig. 3.126) .
- Insert the fork gear shift high speed (with spacer roller gear shift fork pin) in the groove of gear 2nd drive on counter shaft complete. (Fig. 3.126)

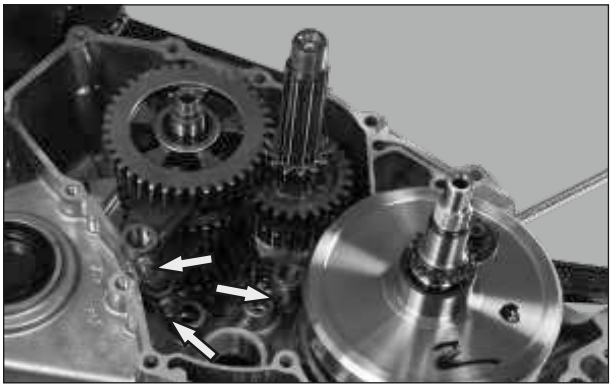


Fig. 3.126

- After assembling all the three fork gear shifts, assemble the Cam gear shift on crank case L (A). (Fig . 3.127)
- Now, locate the other end of fork gear shift high speed (spacer roller), fork gear shift low speed (spacer roller) and fork gear shift low speed (reverse gear) (without spacer roller) on the respective grooves in cam gear shift.(B) (Fig. 3.127).
- Insert the pin shift fork in the crankcase L through Fork gear shift high speed. Similarly, the pin fork shift low speed through fork gear shift low speed. (C) (Fig. 3.127)
- Fix 2nos. dowel pins before assembling the crankcase R over crankcase L.

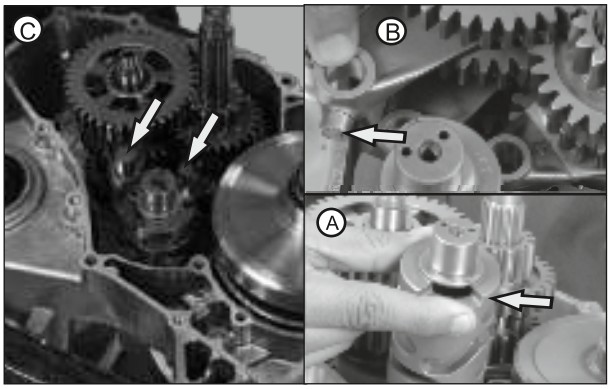


Fig. 3.127

- Ensure the mating surfaces of both Crankcase L and R are clear off old gasket. Fix a new gasket.

CRANKCASE R ASSEMBLY:

- Assemble the crank case assembly R over the crank case assembly L, if required gently tap.

- Fasten the crankcases with 3 nos. of Hexagonal flange bolt (M6x50) on crankcase R. (Fig. 3.128)

8 mm spanner

- Now, flip the engine assembly so that the crankcase L is on top side.

- Fasten the crankcases with 9 nos. of hexagonal flange bolt (M6x50) on crank case L. (Fig. 3.129)

- Also, with 2 nos. Hexagonal flange bolt (M6x95), and 1 no. Hexagonal flange bolt (M6x75) on crank case L . (Fig. 3.129)

- Tighten all the flange bolts to the specified torque.

8 mm spanner

GEAR SHIFTER AND REVERSE GEAR MECHANISM:

- Once again flip the crankcase assembly such that the Crankcase R is on the top side.

- Now, insert 2 nos. Pin index star on the Cam gear shift. (Fig. 3.130)

- Assemble the index star on Cam gear shift by correctly locating the Pins Index star. (Fig. 3.130)

- After this, take the spring gear shift cam, locate the hook end of the spring on the groove of Stopper complete gear shift.

- Insert the bolt gear shift cam stopper through this stopper and spring, insert a shim (6X12X1)on the bolt gear shift cam stopper.

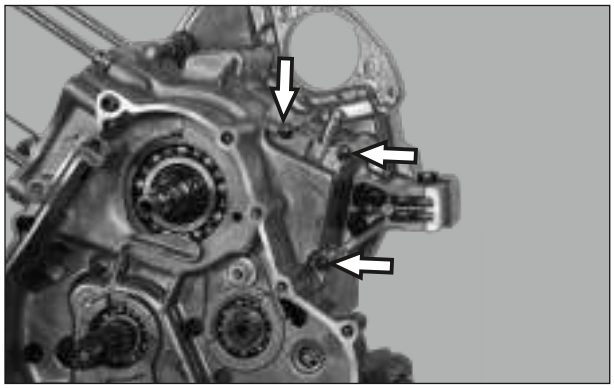


Fig. 3.128

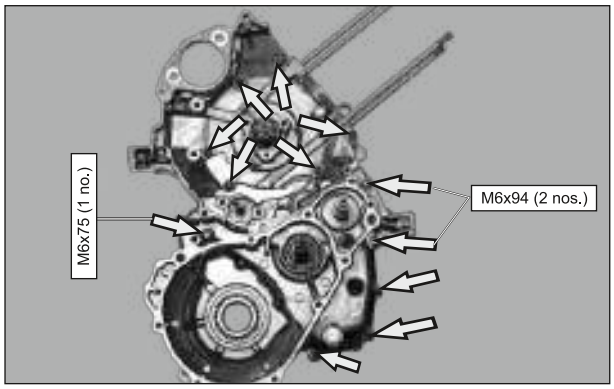


Fig. 3.129

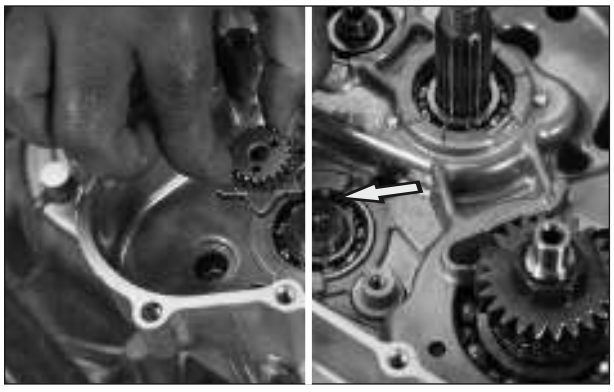


Fig. 3.130

- Now, assemble the bolt on Crankcase R by ensuring the straight end of spring gear shift cam getting locked with the crankcase R.

- Tighten the bolt to the specified torque. Ensure free movement of stopper comp gear shift on bolt gear shift cam stopper. (Fig. 3.131)

- Now, pull the roller end of stopper comp gear shift and place it between two teeth on Index star.

- Assemble the gear shift shaft (Nylon gear wheel) in the crankcase R. While assembling ensure the arrow mark on the Nylon wheel is matched with the dot/arrow mark on the Index star. This is to ensure the transmission is in neutral position. (Fig. 3.132)

- Assemble the Plate stopper reverse on the Index star by properly locating over the pin index star. (A) (Fig. 3.133)

- Now, assemble retainer arm reverse over the plate stopper reverse. (B) (Fig. 3.133)
- Fasten all the above with a Hex Flange bolt M6x30 with a washer. Tighten the bolt (C). (Fig. 3.133)

8 mm spanner

- Then, assemble the reverse gear mechanism on shaft drive.
- Assemble, the spring gear shift cam lock arm on the Plate lock arm spring reverse.
- Also, assemble arm stopper reverse on Plate lock arm spring reverse, such that the straight end of the spring is inserted in the hole provided on arm stopper reverse.

- Fix this plate lock arm spring reverse assembly on the shaft drive by ensuring the other end of spring gear shift cam lock arm is properly located on the crankcase projection and also the chamfered edge of arm stopper reverse is seated in plate stopper reverse. (A) (Fig. 3.134)
- Lock the reverse mechanism on shaft drive with a circlip (11x1.0). (B) (Fig. 3.134)

Fig. 3.131

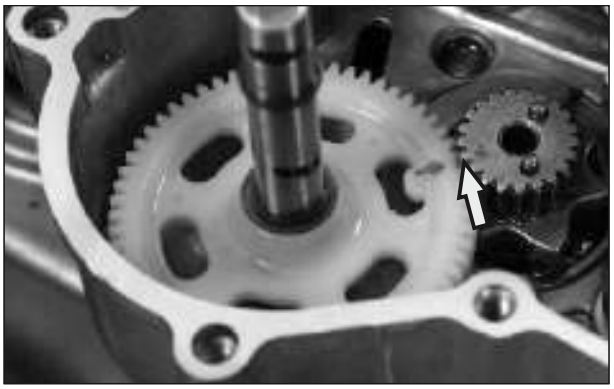


Fig. 3.132

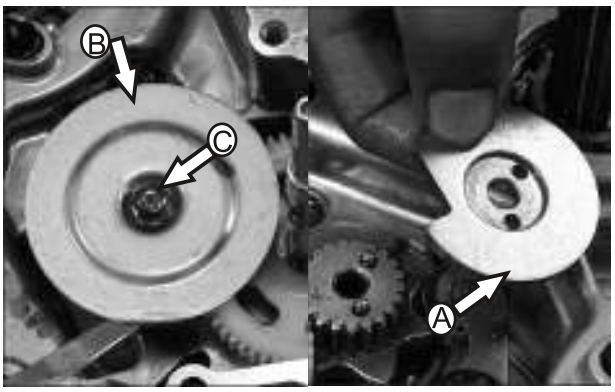


Fig. 3.133

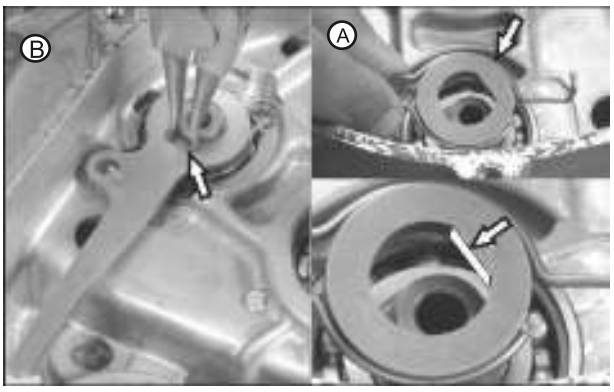


Fig. 3.134

External circlip plier

PRIMARY DRIVE AND DRIVEN GEAR ASSEMBLY:

- Assemble the cam chain on crank shaft.
- Fix the key primary drive on crank shaft key way. Assemble the gear primary drive on crankshaft R.
- Hold the connecting rod using special tool, tighten the gear primary drive using hexagonal nut along with spring disc. (Fig. 3.135)

Note: While reassembly, ensure that the conical surface of the disc spring faces downwards.

Fig. 3.135

- Insert the shim (20x32x1.5) clutch and spacer clutch over the counter shaft.
- Assemble gear assembly primary driven and spacer clutch 8mm shim.
- Assemble the center assembly clutch and mount the center assembly clutch using 1 no. Hexagonal flange nut along with disc spring.
- Hold the gear assembly primary driven using special tool. Then tighten the nut clutch. (Fig. 3.136)

G3310710	Holding tool primary driven gear
Socket spanner 20 & 22mm	

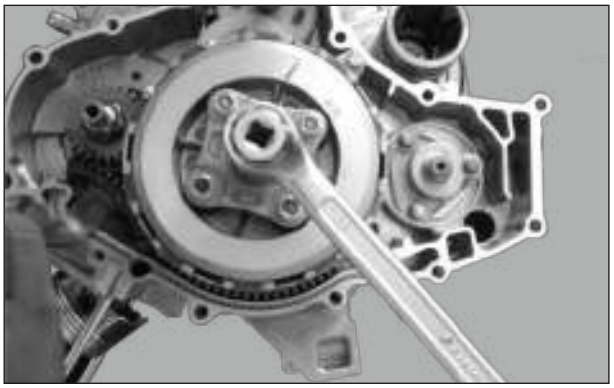


Fig. 3.136

OIL PUMP:

- During the re- assembly of oil pump make sure that 'DOT' mark on gear (1) and gear (2) of oil pump are in the same line and are visible before assembling. (Fig. 3.137)
- Tighten the oil pump assembly with 3 nos. Hexagonal flange bolt (M6x16) figure (A)and M6x20 (B). (Fig. 3.137)

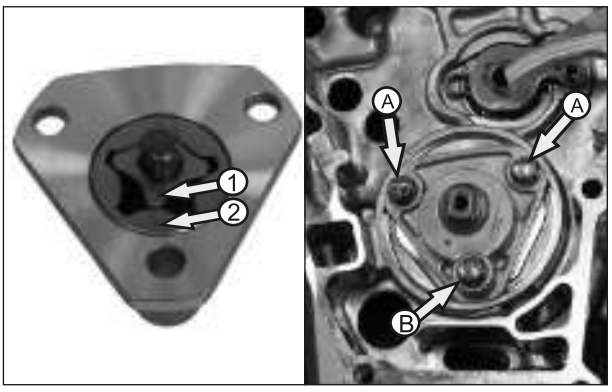


Fig. 3.137

- Assemble the roller chain 86 link oil pump drive over the sprocket on gear assembly primary driven. Make sure the arrow mark on chain faces upwards.

- Now, take the sprocket 25T with the 'C' mark facing upwards, insert in the roller chain and assemble to the oil pump. Ensure, the sprocket is mounted properly on the oil pump by matching the double 'D' slot.

- Tighten the oil pump assembly sprocket 25T using1 no. Hexagonal screw M5x10 sprocket oil pump mounting along with washer sprocket oil pump mounting. (Fig. 3.138)

8 mm spanner

- Now, assemble the roller chain 86 link oil pump drive guide along with spring. Mount the guide using special bolt on crankcase R. (Fig. 3.139)

10 mm spanner

LH SIDE:

- Turn engine to LH side. Assemble neutral switch pin along with spring on the cam gear shift.

- Assemble and tighten the neutral switch using 2 nos. Hexagonal flange bolt (M6x20). Then the rubber grommet on the wires to be inserted properly on crankcase groove. (Fig. 140)

- Insert the stopper oil seal on the crank shaft LH side.

- Assemble and tighten the stator assembly with 3 nos. Hexagonal flange bolt M6x20.Figure then assemble the pulsar coil with 2 nos. Hexagonal flange bolt (M6x20) along with clamp wiring harness. (Fig. 3.141)

- Ensure proper seating of Magneto wire grommet on crank case. (Fig. 3.141)

8 mm spanner

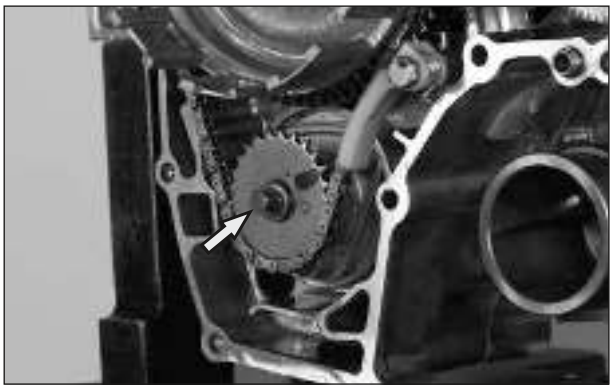


Fig. 3.138

Fig. 3.139

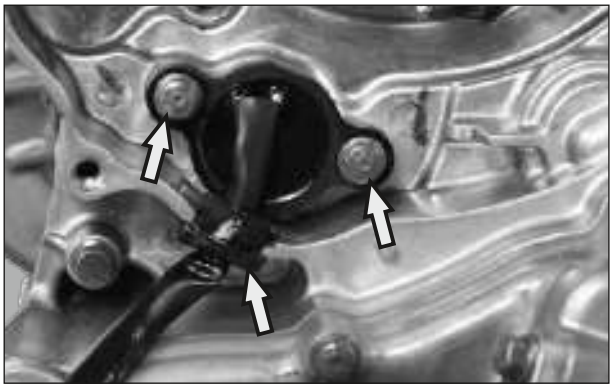


Fig. 3.140

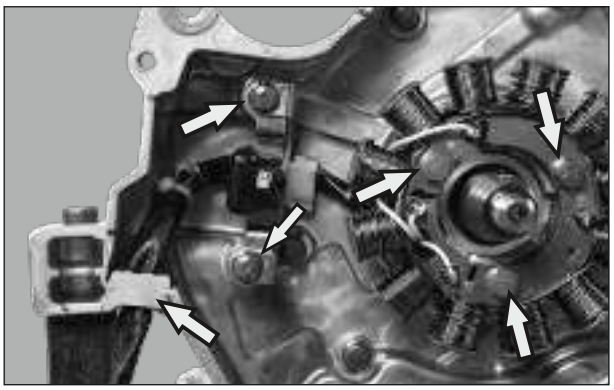


Fig. 3.141

- Now, Assemble the back plate air cooling on Crankcase L.
- Insert the wood ruff key (magneto rotor) on the crank shaft L key way.
- Assemble the magneto rotor on crank shaft. Ensure proper seating of magneto rotor on wood ruff key.
- Hold the magneto rotor using special tool.(Fig. 3.142)
- Tighten the Hexagonal flange nut (M12x1.5) of the magneto rotor.

G3310680	Holder assembly magneto,
17 mm spanner	

- Assemble the fan engine cooling on to magneto rotor.
- Tighten the 3 nos. Hexagonal flange bolt (M6x25) along with Plain washer and Spring washer on each bolt. (Fig. 3.143)

10 mm spanner

PISTON AND PISTON RINGS ASSEMBLY:

- Take the piston and rings. First, assemble the separator oil ring on the piston oil ring groove, keep the open ends towards exhaust side of the piston at 45 degree to the left from the centre (B). (Fig. 3.144)

Note: Assemble the separator oil ring in such a way to ensure its triangle shaped end (Fig. 3.144) (B) facing upward (triangle facing towards piston top).

- Assemble the oil ring (bottom) keeping its open end gap towards exhaust side of the piston at 45 degree to the right from the centre (B). (Fig. 3.144)
- Assemble the oil ring (top) keeping its open end gap towards exhaust side of the piston at 45 degree to the left from the centre (B). (Fig. 3.144)

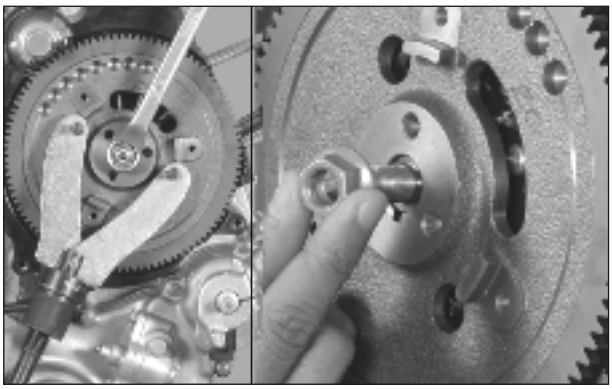


Fig. 3.142

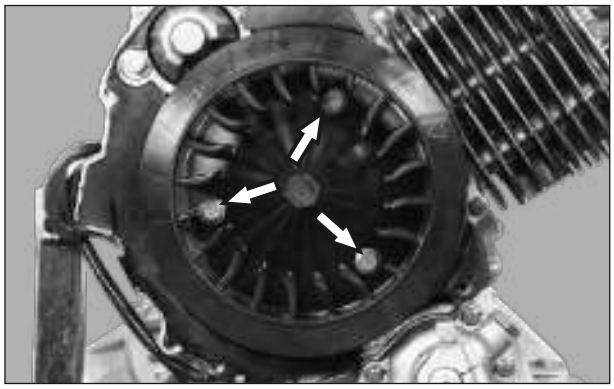


Fig. 3.143

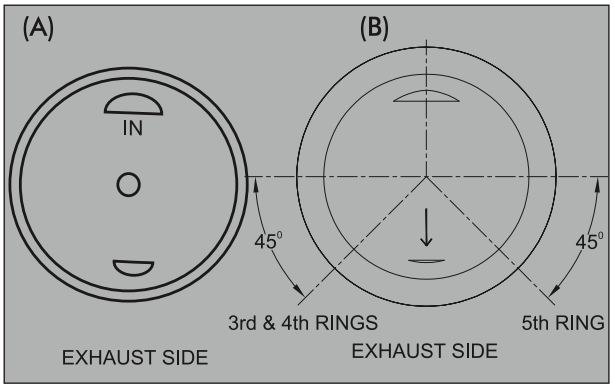


Fig. 3.144

- Assemble the ring piston 2nd keeping its open end gap towards inlet side of the piston at 30 degree to the right from the center. (Fig. 3.145)

- Assemble the ring piston 1st keeping its open end gap towards inlet side of the piston at 30 degree to the left from the center. (Fig. 3.145)

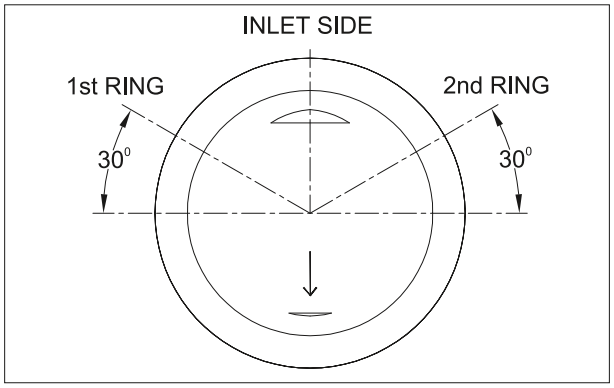


Fig. 3.145

Note: Avoid damage to the piston and rings piston during installation.
Before assembling the piston, check the rings rotate freely in their respective grooves.
Install the 1st and 2nd rings with the marking on the ring 'TOP1' and 'TOP2' (Fig. 3.146) facing upwards

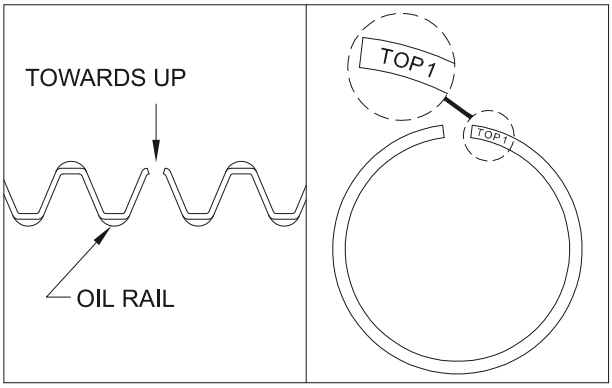


Fig. 3.146

- Place a clean cloth in the crank case assembly bore to prevent falling of piston circlip inside the crankcase while assembling piston.

- Insert the piston pin in the piston and now assemble the piston to connecting rod and insert the piston pin fully. Lock the piston pin with the circlip 17x1.0. (Fig. 3.147)

Nose plier

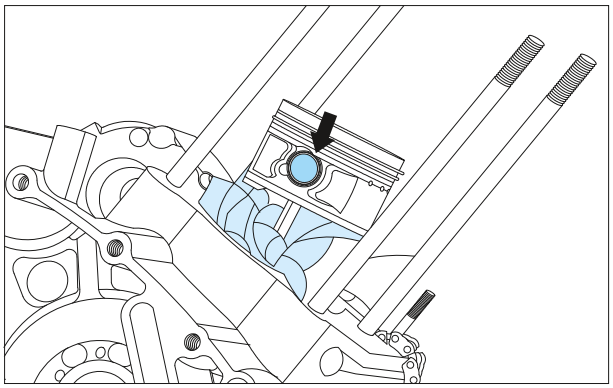


Fig. 3.147

- Now, for assembling the cylinder block, first insert tubular dowel pins 2 nos. on crankcase.

- Place the new gasket cylinder block comp on crankcase.

- Apply fresh engine oil on the piston assembly and inside of the cylinder bore.

- Assemble the cylinder block on the crankcase, ensure the dowel pins are matched.

- While assembling the cylinder block, insert the cam chain though the cylinder block and hold using a clean copper wire.

- Loose assemble the hexagonal flange bolt (M6x20- 2nos.) through cylinder block complete to the crank case assembly LH.

- Insert the guide cam chain on cylinder block complete and ensure its proper seating in the groove on cylinder block. (Fig. 3.148)

- Insert the tubular dowel 2 nos. on cylinder block. Assemble the gasket cylinder head.

CYLINDER HEAD ASSEMBLY:

- Before assembling the cylinder head assembly, check the cylinder head for any leakages between valves and valve seats.

VALVE LEAK TESTING AND LAPPING:

- While assembling the spring valve outer (A) and spring valve inner (B), locate the coil with lesser pitch towards seat valve spring (downwards). (Fig. 3.149)

- Assemble the inlet and exhaust valve to the cylinder head in the reverse order of dismantling procedure. Refer page number. 3.20

- After assembling the valves pour the petrol into the inlet port and look for any leakage of petrol around the inlet valve seating. (Fig. 3.150)

- If any leakage noticed, rectify the valve and its seat by lapping.

- Similarly check the leakage between exhaust valve and its seating.

VALVE LAPPING:

- First apply the course valve lapping compound uniformly right round the valve face. (Fig. 3.150)

- Insert the valve back to its position on head. Fix the suction head valve lapping stick on the valve and turn it side to side.Continues lapping till the grinding noise comes down.
- Then take out the valve and clean the lapping compound off it and also in the head.
- Then take your fine lapping compound and do the same thing with it until the leaks stops. Clean off the valve and in side the heads again. (Fig. 3.151)

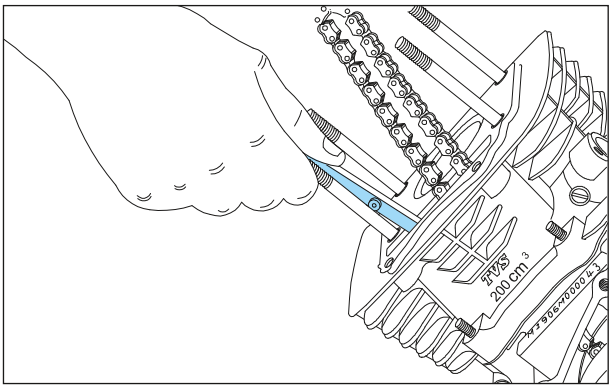


Fig. 3.148

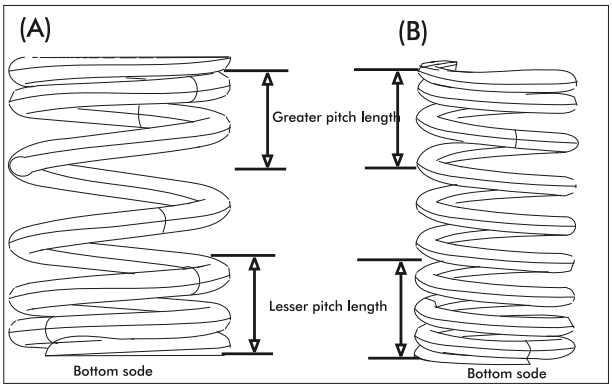


Fig. 3.149

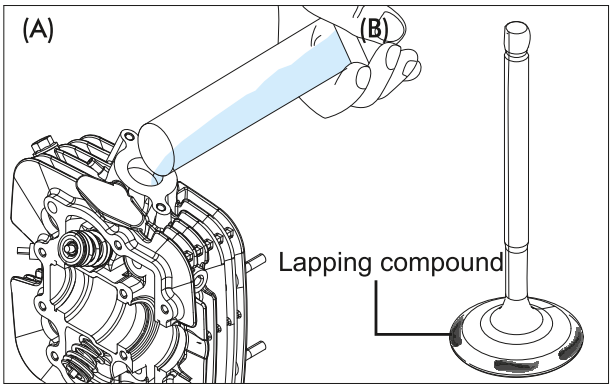


Fig. 3.150

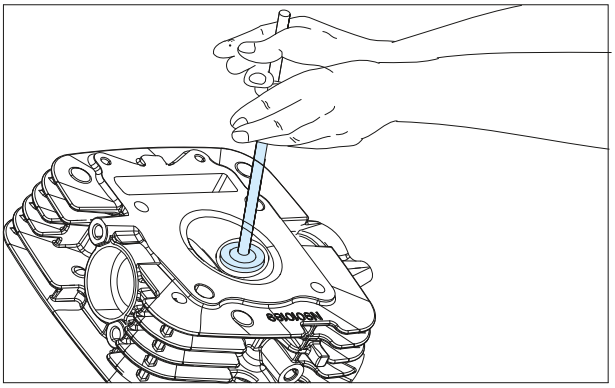


Fig. 3.151

- Re- assemble the valves to the cylinder head in the reverse order of the dismantling procedure refer page number : 3.20

Warning: While lapping, avoid entering of compound into the valve guide through the stem, which will Increase the clearance between guide and valve.

CYLINDER HEAD ASSEMBLY:

- Now, assemble the cylinder head assembly. Loose assemble the 2 nos. hexagonal flange nut M6.
- At the same time pull out the cam chain using copper wire through the cylinder head.
- Place one copper washer (gasket cylinder head nut) 8.5x17x2.3 (A) and three nos. plain washers 8.5x18.5x2.3 (B) on crankcase studs 4 nos. Fit a doomed nut on the stud where copper washer is used to prevent oil leakage and 3 nos. Hexagonal flange nut M8 on other three studs. to the cylinder head along with plain washer. Tighten all the four nuts in criss cross pattern to the specified torque. (Fig. 3.152)

12 mm spanner

- Tighten the hexagonal flange nut M6 , 2 nos. fitted to the cylinder head studs. (Fig. 3.153)
- Also, Tighten 2 nos. hexagonal flange bolt (M6x20) connecting cylinder block complete and the crank case assembly LH. (Fig. 3.153)

8, 10 mm open end spanner

- Insert the C-ring cam shaft on cylinder head groove.(Fig. 3.154)
- Assemble the cam shaft complete on the cylinder head (B) . (Fig. 3.154)
- Insert the pin sprocket knock to the cam shaft complete (A) . (Fig. 3.154)

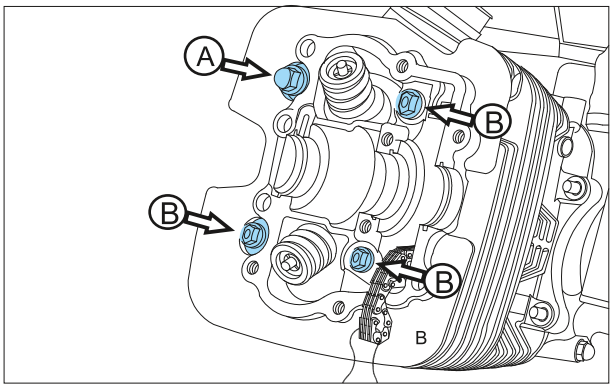


Fig. 3.152

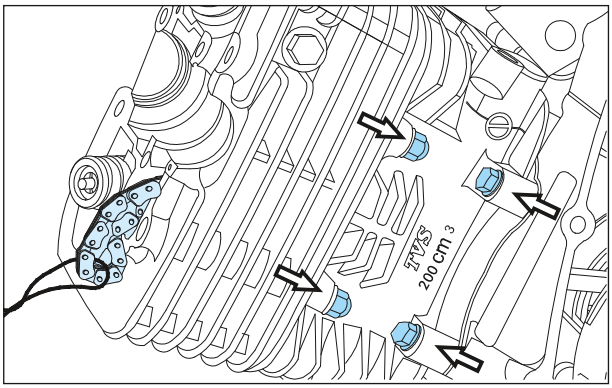


Fig. 3.153

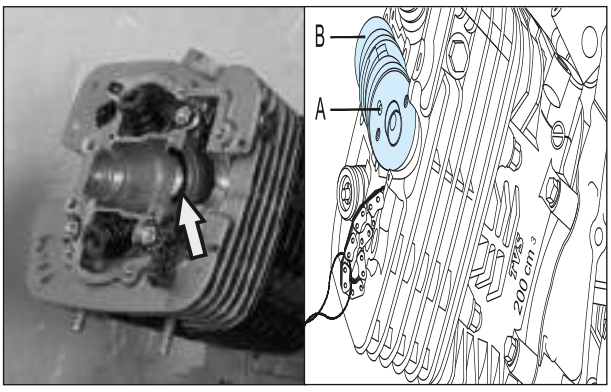


Fig. 3.154

VALVE TIMING:

- While reassembling the sprocket cam shaft, ensure the following :
- Ensure 'T' mark (1)on the magneto rotor matches with the '--' mark (2)on crankcase L. Hold the sprocket such that the horizontal line (3)on the sprocket is parallel with the cylinder head bottom surface (A) (Fig. 3.155 and Fig. 3.156)
- Now, assemble the sprocket camshaft on to the cam shaft. Ensure availability of Pin sprocket knock in position.
- Assemble and tighten 2 nos. Hexagonal screw M6x10.5 along with washer sprocket. After fold the washer sprocket.

10 mm spanner, chisel and metal hammer

- Insert the plug cylinder head on the cylinder head assembly groove.
- Insert the 2 nos. tubular dowel on the cylinder head assembly.
- Assemble the cover cylinder head.
- Assemble and tighten 4 nos. Hexagonal flange bolt (M6x55) along with copper washer to the cover cylinder head (C). (Fig. 3.157)
- Assemble and tighten 2 nos. Hexagonal flange bolt (M6x45) to the cover cylinder head. (B) (Fig. 3.157)
- Assemble and tighten the 4 nos. Hexagonal flange bolt (M6x35) to the cover cylinder head. (A) (Fig. 3.157)

10 mm spanner

TAPPET CLEARANCE:

- For the valve tappet clearance procedure (refer chapter `periodic maintenance` page no: 2.11)
- Assemble and tighten the 2 nos. cap inspection hole along with 'o' ring.(Fig. 3.158)

17 mm spanner

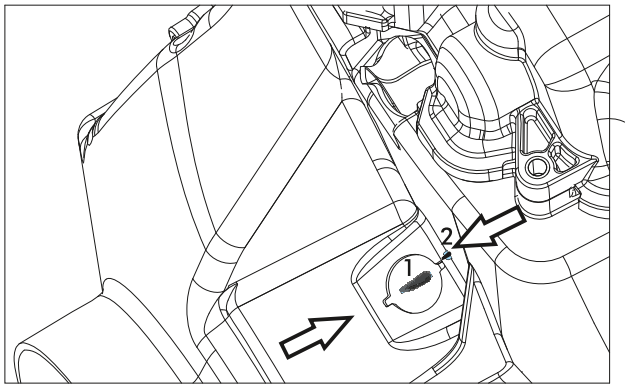


Fig. 3.155

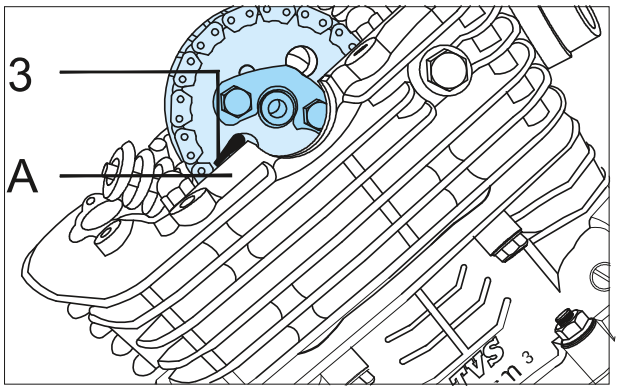


Fig. 3.156

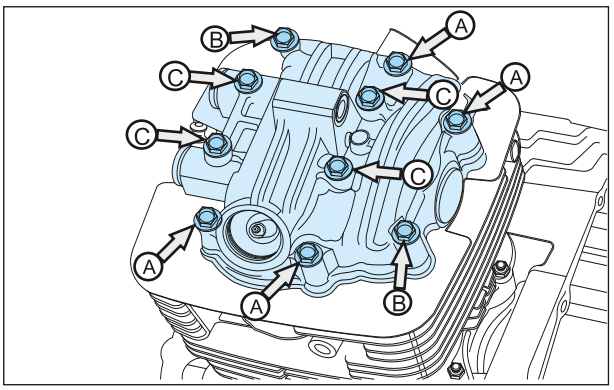


Fig. 3.157

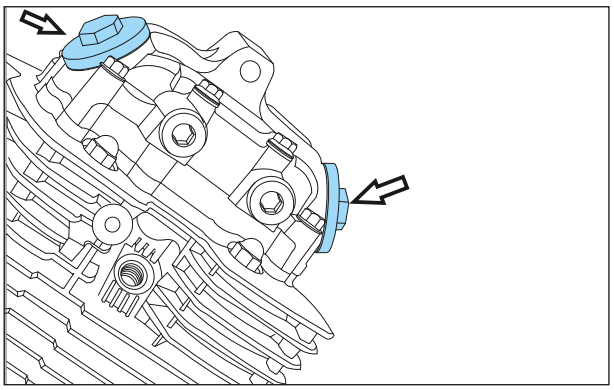


Fig. 3.158

HAND STARTER SHAFT - SPRING ASSEMBLY:

- Insert the punched washer (18x39x3) on the hand starter shaft. (Fig. 3.159)
- Insert one end of the spring such that it should go through the hole provided on the shaft hand starter and assemble the guide hand starter spring so that the spring does not come out of the hole in shaft. (Fig. 3.159)

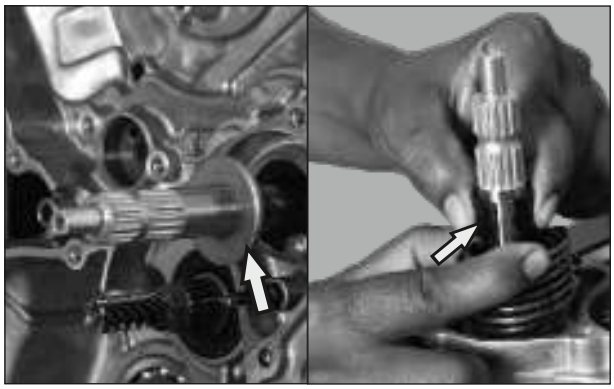


Fig. 3.159

- Now, using a clutch spring hook, pull the other end of spring and locate it on the crankcase.(Fig. 3.160)
- Assemble the gear final drive 22 teeth on the shaft drive.
- Assemble the differential assembly on crankcase L.
- Insert the tubular dowel (10X12)1 no. on crank case L

.

Fig. 3.160

- Place the gasket cover differential and assemble the cover differential.
- While fastening the cover differential, insert the damper head start in the hex flange bolt (M6x55)(A). (Fig. 3.161)
- Now, assemble the other 2 nos. Hexagonal flange bolt (M6x55) and 7 nos. Hexagonal flange bolt (M6x30) to the cover differential (B). (Fig. 3.161). Tighten the bolts.

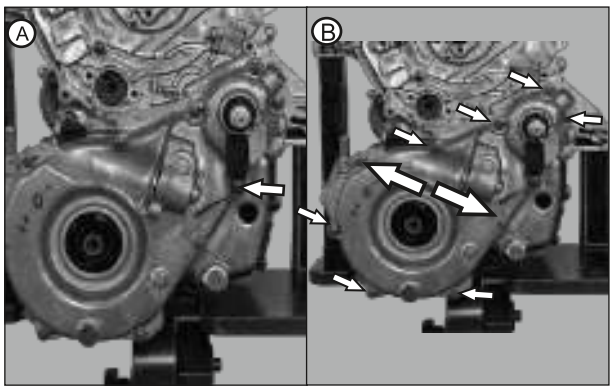


Fig. 3.161

8 mm spanner

- Assemble the shaft complete fare meter drive on cover differential (wherever applicable). (Fig. 3.162)
- Assemble the cap engine side fare meter along with 'o' ring. (Fig. 3.162)
- Tighten the cap engine side fare meter using 2 nos. hexagonal flange bolt (M6x16). (Fig. 3.162)

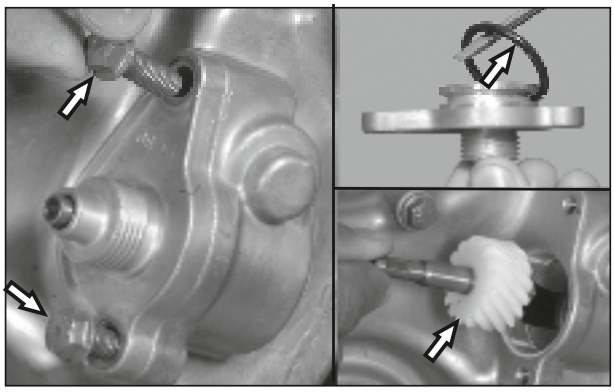


Fig. 3.162

8 mm spanner

COVER CLUTCH ASSEMBLY:

- Assemble the ball bearing on the centre assembly clutch.(Fig. 3.163)
- Insert the pin clutch release on the rod complete clutch release. (Fig. 3.163)
- Insert 2 nos. dowel pin on the crank case R. Place the gasket and assemble cover clutch.

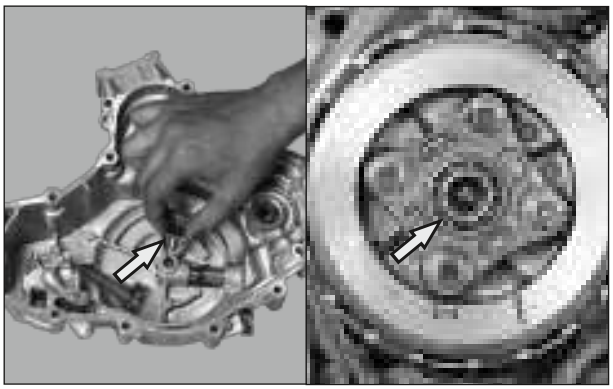


Fig. 3.163

- Assemble the cover clutch along with clutch bracket.
- Fasten the clutch cover with 9 nos. Hexagonal flange bolt (M6x50). and 2 nos. Hexagonal flange bolt (M6x122) (A). (Fig. 3.164)

8 mm spanner

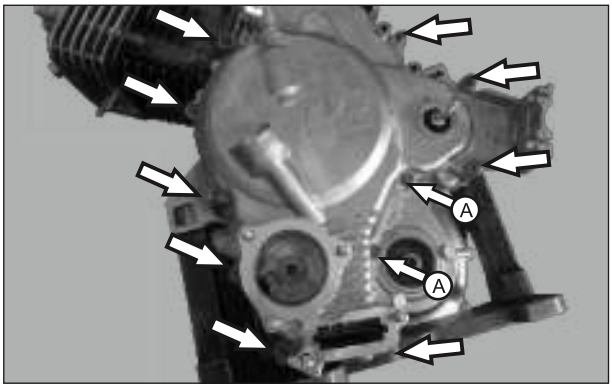


Fig. 3.164

SAI UNIT ASSEMBLY:(wherever applicable)

- Assemble the sai unit along with bracket mounting starter motor. Tighten 1 no. hexagonal flange bolt M6x50 (A) and tighten the 2 nos. hexagonal flange bolt M6x16 (B). (Fig. 3.165)
- Re assemble the SAI pipe to the exhaust side of the cylinder block and tighten 1 no. hexagonal Flange bolt M6X16 along with spring washer.(Fig. 3.165)

8 mm spanner

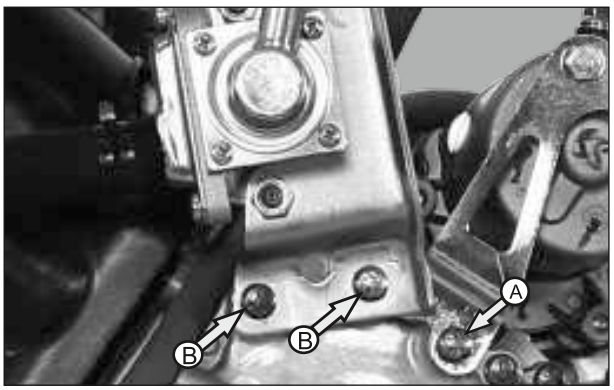


Fig. 3.165

Note: Before assembling the SAI pipe make sure the presence of O ring.

- Make sure that SAI pipe is properly seated in its position.
- If any damage on the O ring replace the O ring with new one.(Fig. 3.166)

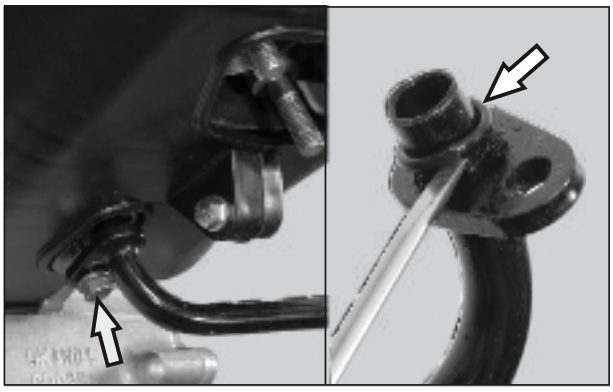


Fig. 3.166

ASSEMBLY THE STARTER MOTOR:

- Insert the starter motor on the crank case LH. (Fig. 3.167)
- Tighten the 2 nos. Hexagonal bolt (M8x50). (Fig. 3.167)
- Assemble and tighten the bracket mounting starter motor using 2 nos. Hexagonal bolt (M6x16) along with 2 nos. Spring washer. (Fig. 3.167)

10 and 13 mm spanner

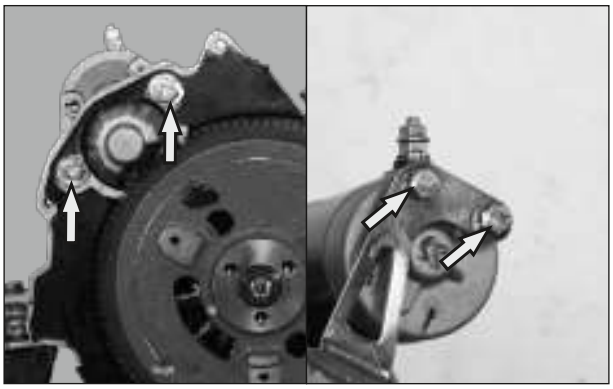


Fig. 3.167

ADJUSTER ASSEMBLY TENSIONER:

- Assemble the adjuster chain tensioner, keeping the tensioner arm in closed condition to the cylinder block complete along with gasket.
- Fasten the Adjuster Chain tensioner with 2nos. Hexagonal screw M6x16 (A). (Fig. 3.168)
- Now, insert and tighten the adjuster chain tensioner spring bolt. (B) (Fig. 3.168)

10 mm spanner

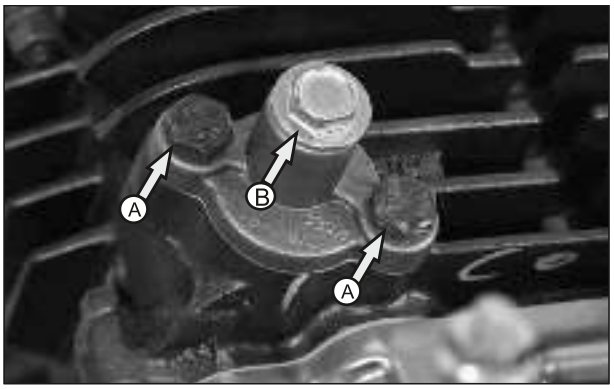


Fig. 3.168

MUFF CUP ASSEMBLY:

- Insert the muff cup on to the differential shaft.
- Insert the lock plate complete to the muff cup.
- Hold the muff cup using special tool.(Fig. 3.169)
- Tighten 1 no. Hexagonal bolt (M8x20). (Fig. 3.169)

G3310690	Holding tool dog driven and muff cup

13 mm spanner

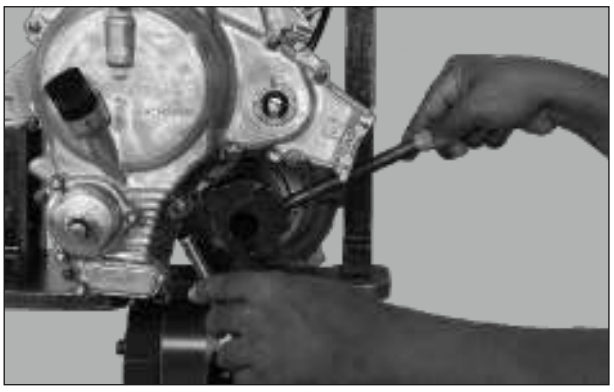


Fig. 3.169

DOG DRIVEN ASSEMBLY:

- To assemble the dog driven on to the shaft hand start, first partially insert the dog driven with open end matching with the arrow mark on the cover differential.
- Then rotate the dog driven using special tool by one and a half turn in clock wise direction and press the dog driven fully inside and remove the tool carefully. (Fig. 3.170)
- Fasten 1 no. Hexagonal bolt (M8x1.25x25) for locking the dog driven.

G3310690	Holding tool, dog driven and muff cup

12 mm spanner

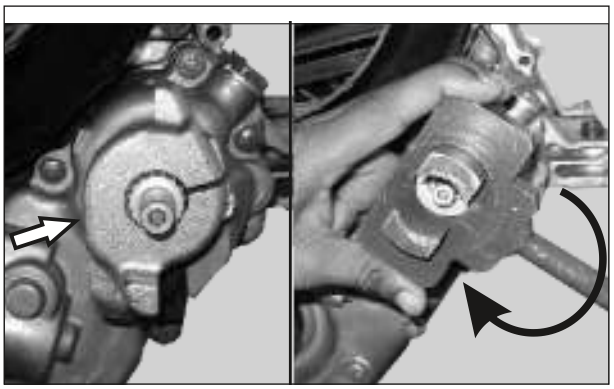


Fig. 3.170

INTAKE PIPE ASSEMBLY:

- Assemble the 'O' ring on the insulator pad. Then, assemble the intake pipe along with Insulator pad to the cylinder head assembly.
- Fasten with 2 nos. Hexagonal flange bolt (M6x20) to the intake pipe. (Fig. 3.171)

8 mm spanner

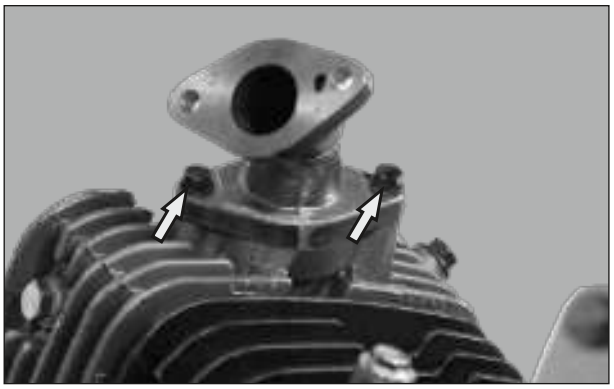


Fig. 3.171

COWL ASSEMBLY:

- Assemble the cowl RH and cowl LH. Fasten them together with 6 nos. hexagonal flange bolt (M6x20) along with clamp wire routing. (Fig. 3.172)

8 mm spanner

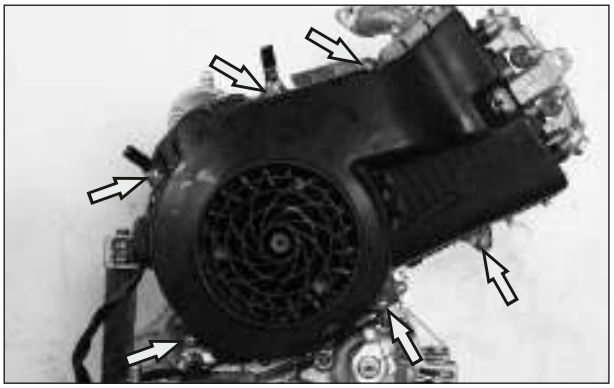


Fig. 3.172

- Assemble the cowl complete top air cooling to the cowl RH and cowl LH.
- Fasten with 4 nos. Hexagonal flange bolt (M6x25). (Fig. 3.173)

10 mm spanner

- Insert the cap timing mark inspection on cowl RH.

Fig. 3.173

CONTENTS

Chapter 4

FUEL, LUBRICATION AND EXHAUST SYSTEM

TANK COMPLETE FUEL AND FUEL COCK ASSEMBLY PETROL MODEL

REMOVAL

- Drain the fuel completely through the fuel cock.
- Remove the hose clip and disconnect the hose fuel tank from the fuel tank. (Fig. 4.1)

Nose plier

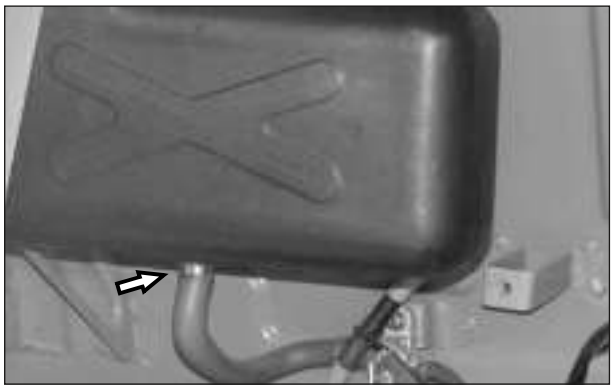


Fig. 4.1

- Loosen and remove 4 nos. Hexagonal nut M8 along with 4 nos. Punched washer and 4 nos. Spring washer from cross member camp cabin support rear mounting. (Fig. 4.2)

12 mm spanner

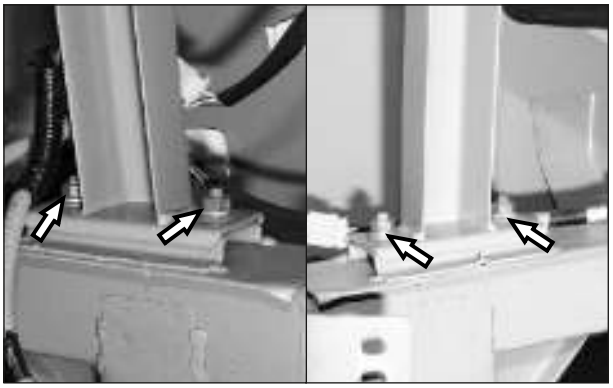


Fig. 4.2

- Remove the passenger seat as explained in chapter “Chassis” page no. 5-31
- Loosen and remove 2 nos. Hexagonal bolt (M8x35) along with plain washer and spring washer from passenger cabin. (Fig. 4.3)

13 mm spanner

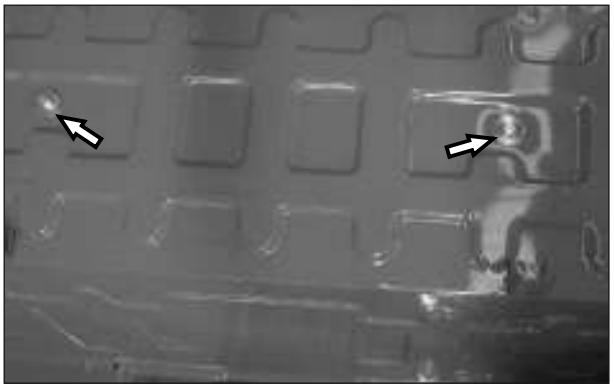


Fig. 4.3

- Lift the cabin partially then remove the cross member complete cabin support rear from chassis.
- Loosen and remove 1 no. Hexagonal flange bolt (M6x25) along with a punched washer and a spring washer from fuel tank assembly mounting (A). (Fig. 4.4)
- Loosen and remove 1 no. Hexagonal flange bolt (M6x60) along with a punched washer, a spring washer and bush fuel tank from fuel tank assembly mounting (B). (Fig. 4.4)

8 mm spanner

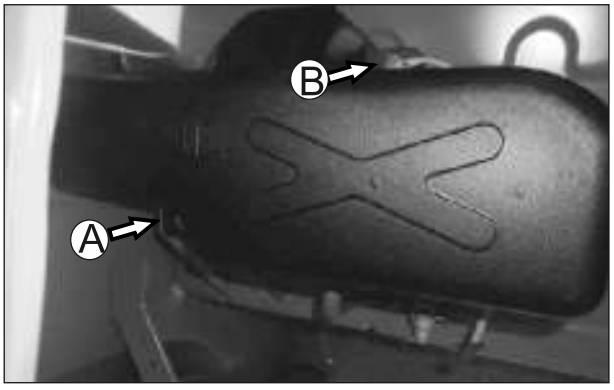


Fig. 4.4

- Disconnect the fuel gauge unit coupler from wiring harness rear. (Fig. 4.5)
- Take out the fuel tank from cabin 'L' bracket.
- Reassemble the all parts in the reverse order of dismantling.

8 mm spanner

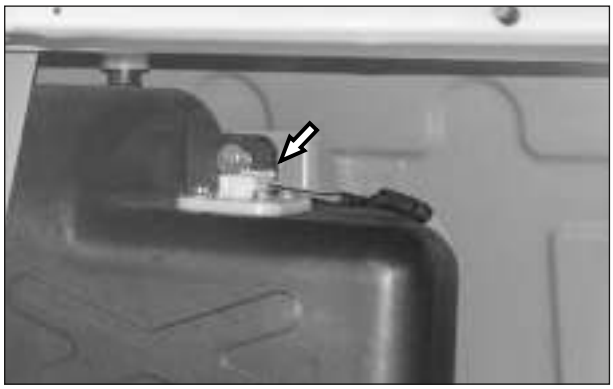


Fig. 4.5

TANK COMPLETE FUEL AND FUEL COCK ASSEMBLY LPG AND CNG MODEL

REMOVAL:

- Drain the fuel completely through fuel cock.
- Remove the hose clip and disconnect the hose fuel tank from the fuel tank. (Fig. 4.6)

Nose plier

Fig. 4.6

Loosen and remove 4 nos. Hexagonal nut M8 along with 4 nos. Punched washer and 4 nos. Spring washer from cross member camp cabin support rear mounting. (Fig. 4.7)

12 mm spanner

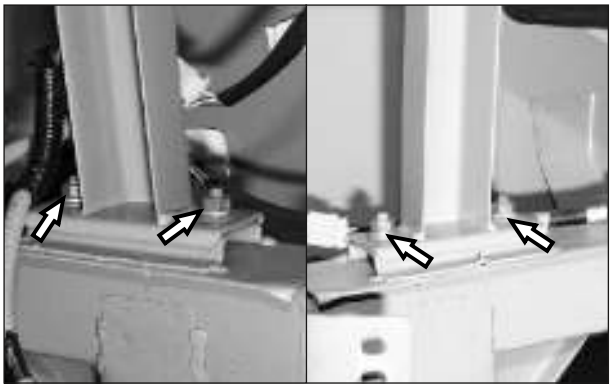


Fig. 4.7

- Remove the passenger seat as explained in chapter “Chassis” page no. 5-31
- Loosen and remove 2 nos. Hexagonal bolt (M8x35) along with plain washers and spring washers from passenger cabin. (Fig. 4.8)

13 mm spanner

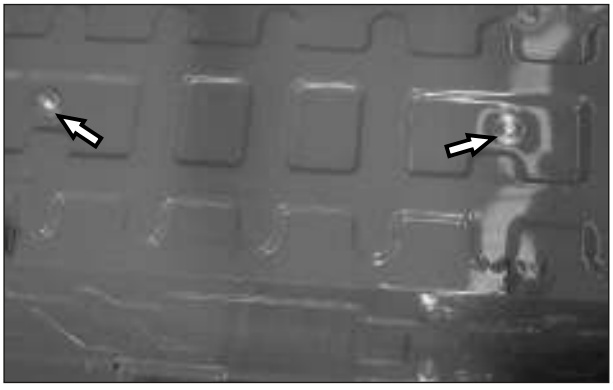


Fig. 4.8

- Lift the cabin partially then remove the cross member camp cabin support rear from chassis.

- Loosen and remove 2 nos. Hexagonal flange bolt (M6x25) along with punched washer and spring washer from fuel tank assembly mounting. (Fig. 4.9)
- Take out the fuel tank from cabin 'L' bracket.
- Reassemble the all parts in the reverse order of dismantling.

10 mm spanner

Fig. 4.9

FUEL COCK ASSEMBLY:

- Sediments or water in the fuel cock sediment bowl will affect the smooth flow of petrol and causes loss of engine power.
- Turn the fuel cock assembly lever to 'OFF' position.
- Remove the fuel cock assembly sediment bowl.(Fig. 4.10)

10 mm spanner

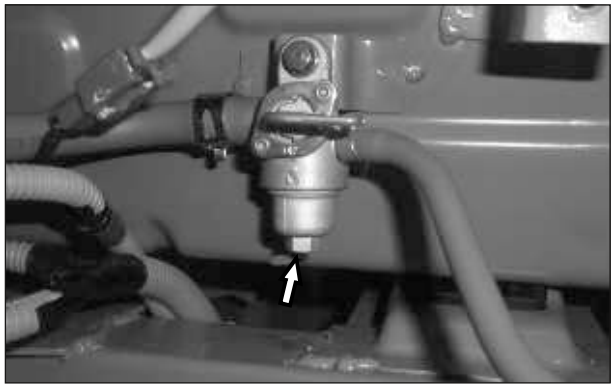


Fig. 4.10

- Take out the 'o' ring and fuel filter.(Fig. 4.11)
- Clean the fuel filter and sediment bowl using cleaning solvent.
- Reassemble the all parts in the reverse order of dismantling.

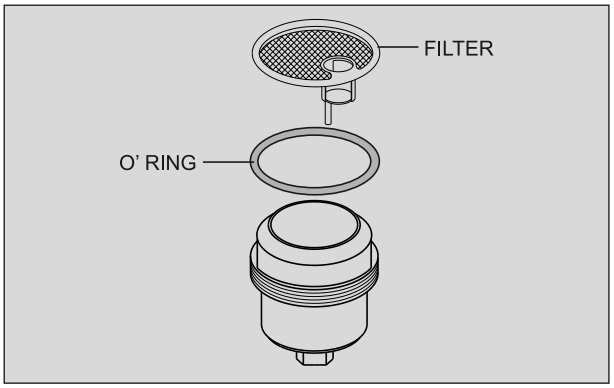


Fig. 4.11

FUEL SENDER UNIT

- A fuel sender unit is mounted at the top side of fuel tank.
- Remove the hexagonal flange screw (M5x10 - 4 nos.) from the mounting of fuel sender unit. (Fig. 4.12)

10 mm spanner

- Take out the fuel sender unit along with the gasket.

Note: Assemble the fuel sender unit in such a way that the arrow mark (A) matches with the arrow mark of the fuel tank (B). (Fig. 4.12)

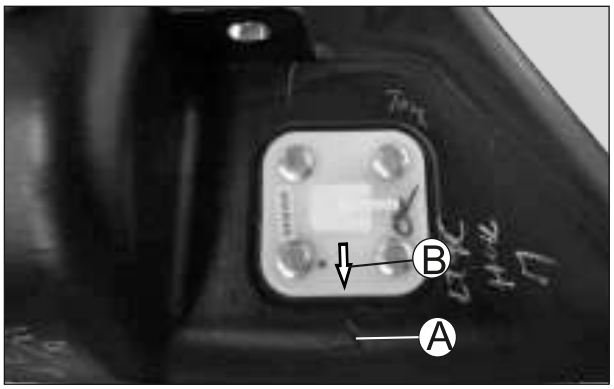


Fig. 4.12

CARBURETOR ASSEMBLY

REMOVAL FROM THE VEHICLE:

Note: Before removing the carburetor assembly, turn the fuel cock to 'OFF' position and disconnect the fuel hose from the carburetor

In Petrol vehicles

- Turn the Fuel cock assembly lever to 'OFF' position.
- Loosen and remove the mixing cap assembly (throttle) from carburettor assembly. (Fig. 4.13)

Fig. 4.13

- Loosen and remove the screw assembly (choke lever) along with spring washer from bracket choke cable.(Fig. 4.14)
- Separate the bracket choke cable and disconnect the choke cable.

Philips head screw driver & Plier

Fig. 4.14

- Disconnect the hose fuel cock out let from carburetor. (Fig. 4.15)
- Disconnect the hose drain.
- Disconnect the hose air vent.
- Loosen and remove 1 no. Hose clip dia 43 mm from carburetor mounting. (Fig. 4.15)
- Separate the tube outlet air filter from carburetor.

Philips head screw driver

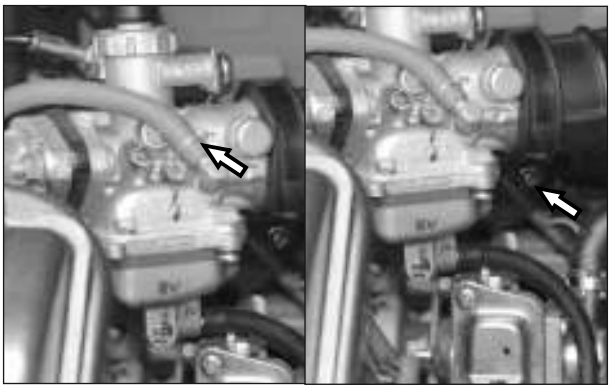


Fig. 4.14

- Loosen and remove 2 nos. Hexagonal flange nut M6 from intake manifold. (Fig. 4.16)
- Separate the carburetor along with adapter and 'O' ring from intake manifold.

10 mm spanner

- Reassemble the all parts in the reverse order of dismantling. Ensure availability of 'O' ring and proper fitment of adopter.

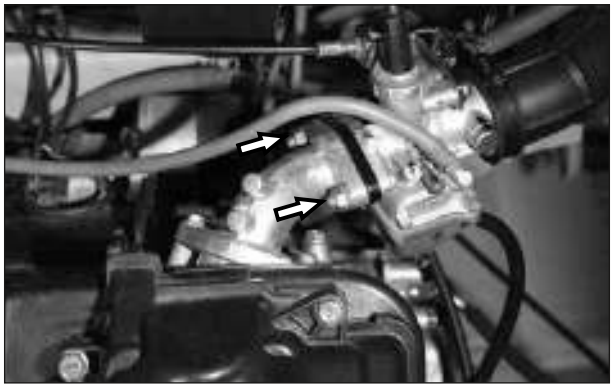


Fig. 4.16

In LPG & CNG vehicles

- Turn the Fuel cock assembly lever to 'OFF' position.
- Remove the mixing cap assembly (throttle) as explained in page no. 4-4
- Remove the screw assembly (choke lever) along with spring washer from bracket choke cable. (Fig. 4.17)
- Separate the bracket choke cable and disconnect the choke cable.

Philips head screw driver

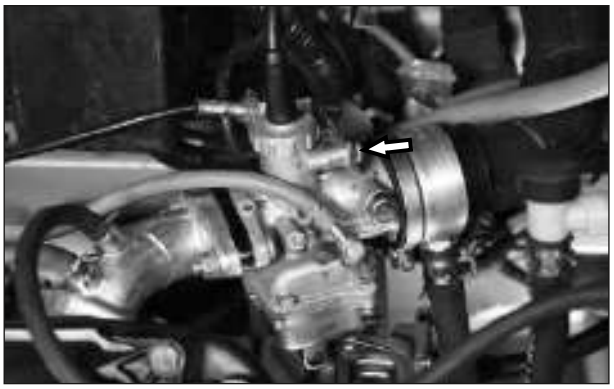


Fig. 4.17

- Disconnect the hose solenoid LPG / CNG from carburetor (A). (Fig. 4.18)
- Disconnect the hose drain.
- Disconnect the hose air vent.
- Loosen and remove 1 no. Hose clip carburetor mounting. Separate the mixer body assembly from carburetor (B). (Fig. 4.18)

Philips head screw driver & Nose plier

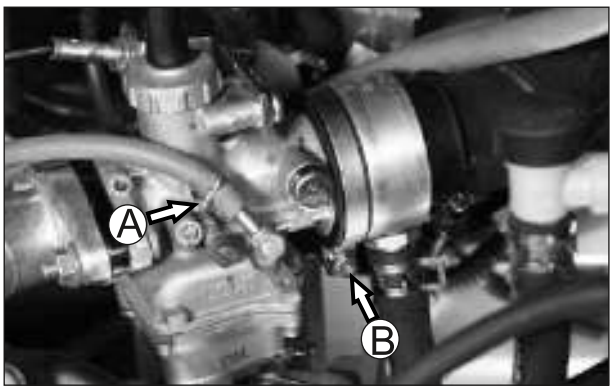


Fig. 4.18

- Loosen and remove 2 nos. Hexagonal flange nut M6 from intake manifold. (Fig. 4.19)

10 mm spanner

- Separate the carburetor along with adapter and 'O' ring from intake manifold.
- Reassemble the all parts in the reverse order of dismantling. Ensure availability of 'O' ring and proper fitment of adopter.

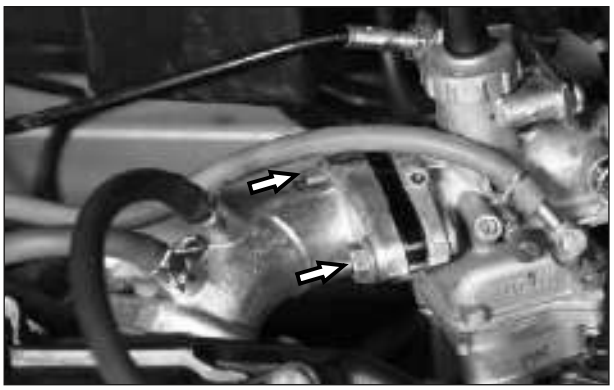


Fig. 4.19

CARBURETOR ASSEMBLY - EXPLODED VIEW

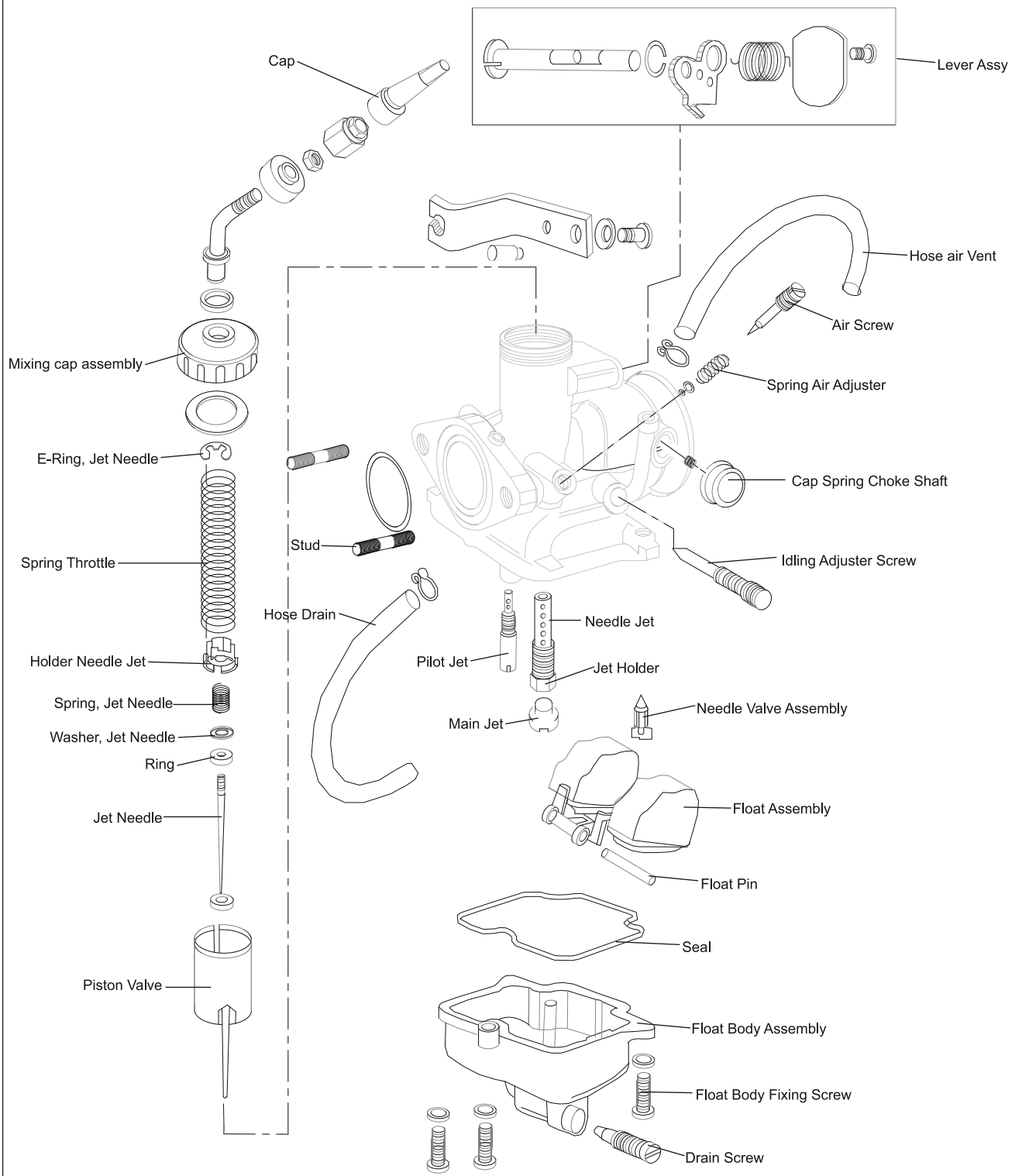


Fig. 4.20

DISMANTLING OF CARBURETOR:

- Remove the air screw (A) along with spring air adjuster, E washer air screw and 'o' ring, similarly idling adjuster screw (B) along with spring from the carburetor. (Fig. 4.21)

Flat head screw driver

Note: Ensure to replace the 'O' ring during reassembly.

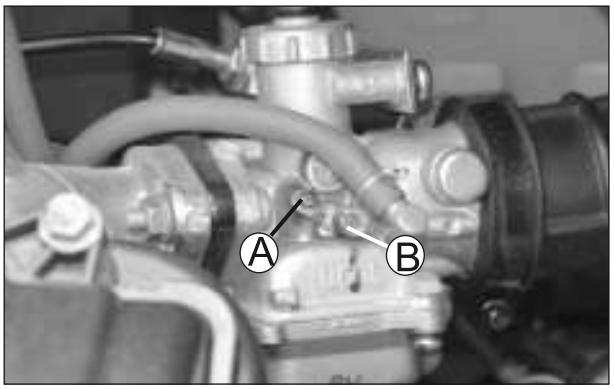


Fig. 4.21

- Loosen and remove 3 nos. float body fixing screw from the float body assembly mounting. (Fig. 4.22)
- And take out the float body assembly along with seal.

Phillips head screw driver

Note: while reassembling ensure the assembly of seal in the float body assembly groove.

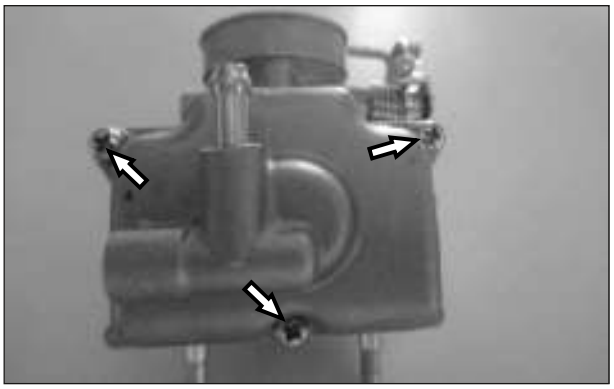


Fig. 4.22

- If the seal found distorted/damaged, replace with new one.
- Remove the float pin (A) and take out the float assembly (B) along with needle valve assembly.(Fig. 4.23)

Nose plier

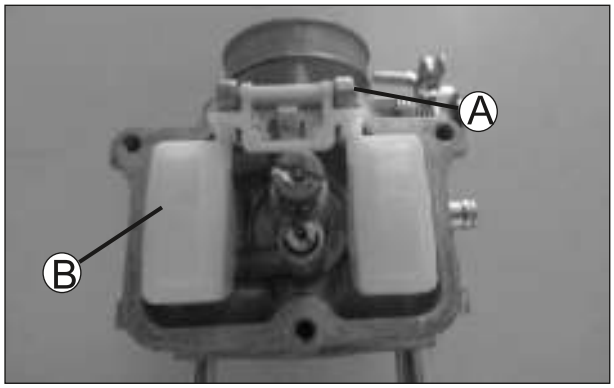


Fig. 4.23

- Loosen and remove carefully the main jet (A) while holding the jet holder (B). (Fig. 4.24)

Flat screw driver

8 mm spanner

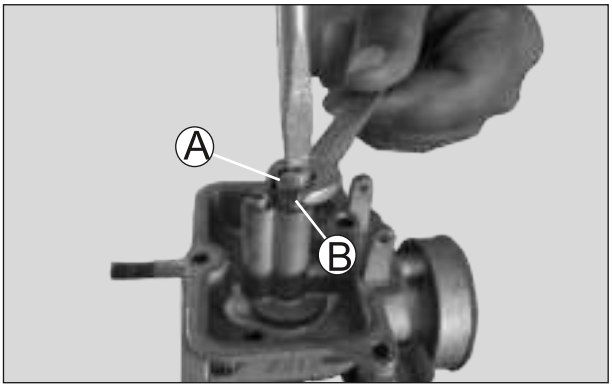


Fig. 4.24

- Loosen and remove the jet holder (B) and carefully push out the needle jet from bottom of the hole. (Fig. 4.25)

Note: Remove the jet holder and needle jet only if.

8 mm spanner

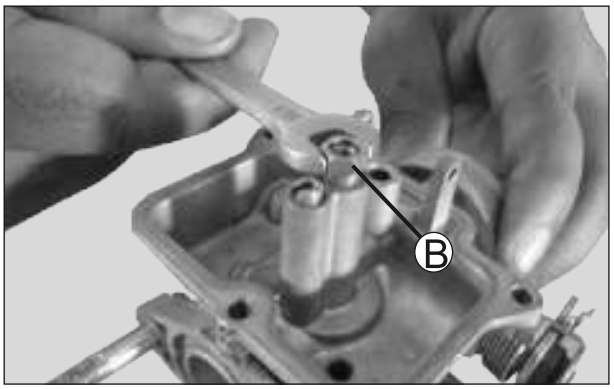


Fig. 4.25

- Remove the pilot jet (C). (Fig. 4.26)

Flat head screw driver

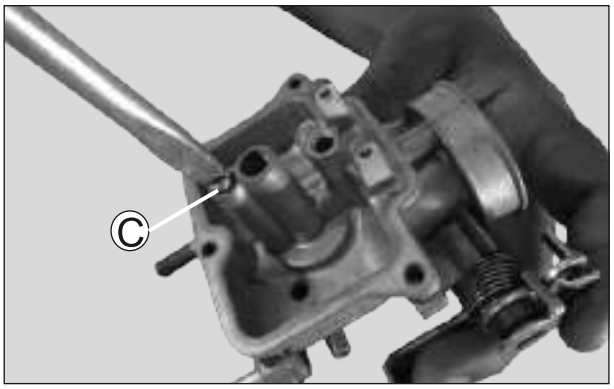


Fig. 4.26

	PETROL (RP) BSIV	PETROL (HP) BSIV	LPG & CNG (RP) BSIII	LPG & CNG (HP) BSIV
Description	**Specification**	**Specification**	**Specification**	**Specification**
Carburetor type	Vm18	Vm18	Vm18	Vm18
Main jet	85	87.5	72.5	70.0
Pilot jet	15	15	12.5	15
E- ring position	2nd FROM TOP	2nd FROM TOP	2nd FROM TOP	2nd FROM TOP
Jet needle	J8 - 4KO7 - 2/3	T - UFSC8048 - 2/3	U - 4DNT1 - 2	U - 4DI51
Needle jet	0 - 7M	0 - 5M	0 - 2M	0 - 5M
Air screw (No.of turns out)	1¼ ± ¼ turns	1¼ ± ¼ turns	1¼ ± ¼ turns	1¼ ± ¼ turns
Idling rpm	1150 ± 50 rpm	1250 ± 100 rpm	1150±50 rpm(LPG) 1250±20 rpm (CNG)	1250 ± 100 rpm

PISTON VALVE DISMANTLING:

Warning: It is not recommended to disassemble the piston valve during every carburetor service. Disassemble only if necessary.

- Disconnect the inner cable throttle assembly from piston valve for detailed procedure refer chapter 'chassis ' page no: 5-25
- Remove the jet needle along with E- clip by pushing it from the bottom of the piston valve(Fig. 4.27).

PISTON VALVE -INSPECTION AND REASSEMBLY:

- Inspect the piston valve, jet needle and other items for any excessive wear or damage. If found any replace with a new one.
- Reassemble the piston valve in the reverse order of removal.
- Do not change the position of the E-clip on jet needle (Fig. 4.28) and (2nd from the top notch) jet sizes which will have effect on the engine performance and lead to premature wear of engine parts, loss in fuel economy and poor pick-up.

CLEANING:

- Spray carburetor cleaner in all passages to ensure no blockage due to dust, dirt, gum or carbon deposits. (Fig. 4.29)
- After cleaning with the spray, blow compressed air to clean the passages thoroughly. (Fig. 4.30)

Caution: Do not use wires to clean the jets. Remove all the rubber parts form the carburetor assembly before cleaning with carburetor spray. This will prevent damage or deterioration of the rubber parts.

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

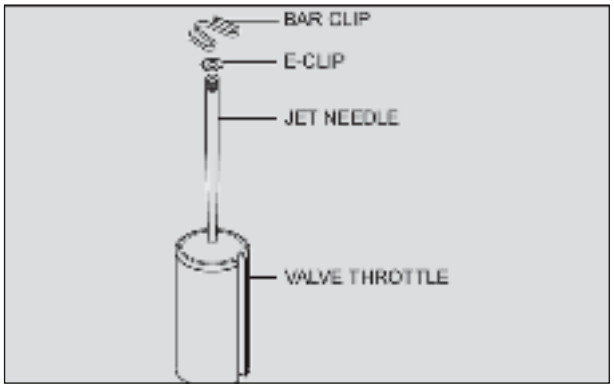


Fig. 4.27

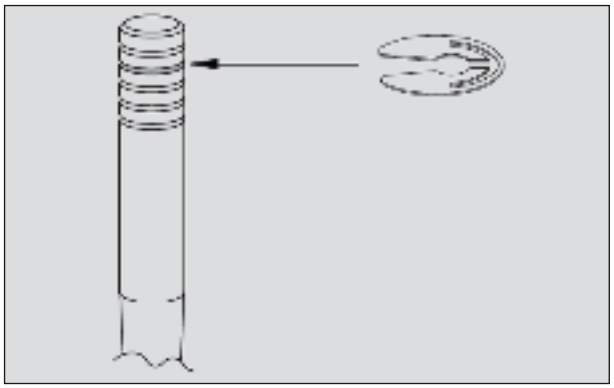


Fig. 4.28

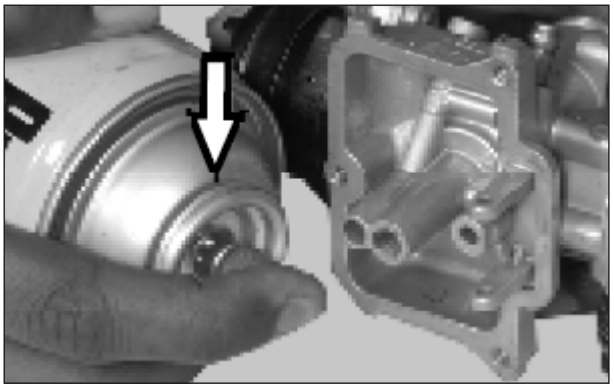


Fig. 4.29

Fig. 4.30

INSPECTION:

NEEDLE VALVE ASSEMBLY

- If the foreign matter is stuck in between the valve seat and the needle, the petrol will continue to flow and cause over flow. If the valve seat and needle are worn out beyond the permissible limits, similar trouble will occur. Conversely, if the needle sticks, the petrol will not flow in to the float chamber.

- Remove the carburetor, float chamber, float, clean the float chamber and float parts with petrol. If the needle is worn out as shown in the (Fig. 4.31) replace it together with a valve seat. Clean the fuel passage of the mixing chamber with compressed air.

- Reassemble the all parts in the reverse order of dismantling.

Note: Ensure that the jets and screws are not tightened too much as this will cause damage to its head. Check for smooth movement of choke plunger and piston valve in the carburetor mixing body.

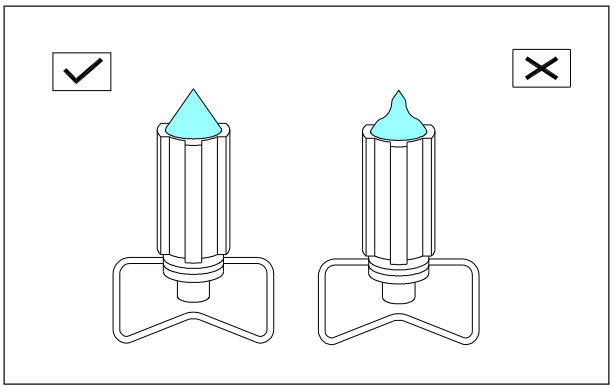


Fig. 4.31

IDLING ADJUSTMENT:

- After mounting the carburetor assembly on the vehicle, tune the carburetor. Carburetor tuning procedure (refer chapter "periodic maintenance" page no: 15)

LUBRICATION SYSTEM:

- Lubrication system is very important in any engine to perform well even at higher speed and temperature. So maintaining the lubrication system is very essential to safeguard the engine.

- The lubrication system used in this vehicle is called as positive lubrication system. It contains a trochoid oil pump which delivers oil to the lubrication circuit from the sump.

- During every service fill up 1750 ml quantity of fresh Engine oil .

- In TVS King Deluxe Engine Lubrication is by two methods :-

    1.Splash Lubrication
    2.Pressurised Lubrication

- By Splash lubrication method, the Gear box Assembly, Connecting rod and all bearings are lubricated.

- By pressurised lubrication method, the oil pump assembly, Rocker arm assembly, Piston pin, cam shaft, Crank shaft ends, Piston rings, Valves & Valve springs are lubricated.

EXHAUST SYSTEM:

- The exhaust system consist of parts right from exhaust valve to muffler assembly through which the exhaust gasses pass.

SERVICING MUFFLER:

- For removal of muffler assembly from chassis and cylinder block (refer chapter "periodic maintenance" page no: 20)

- But whenever the muffler assembly is removed from the engine, the exhaust gasket should be replaced to avoid leakage.

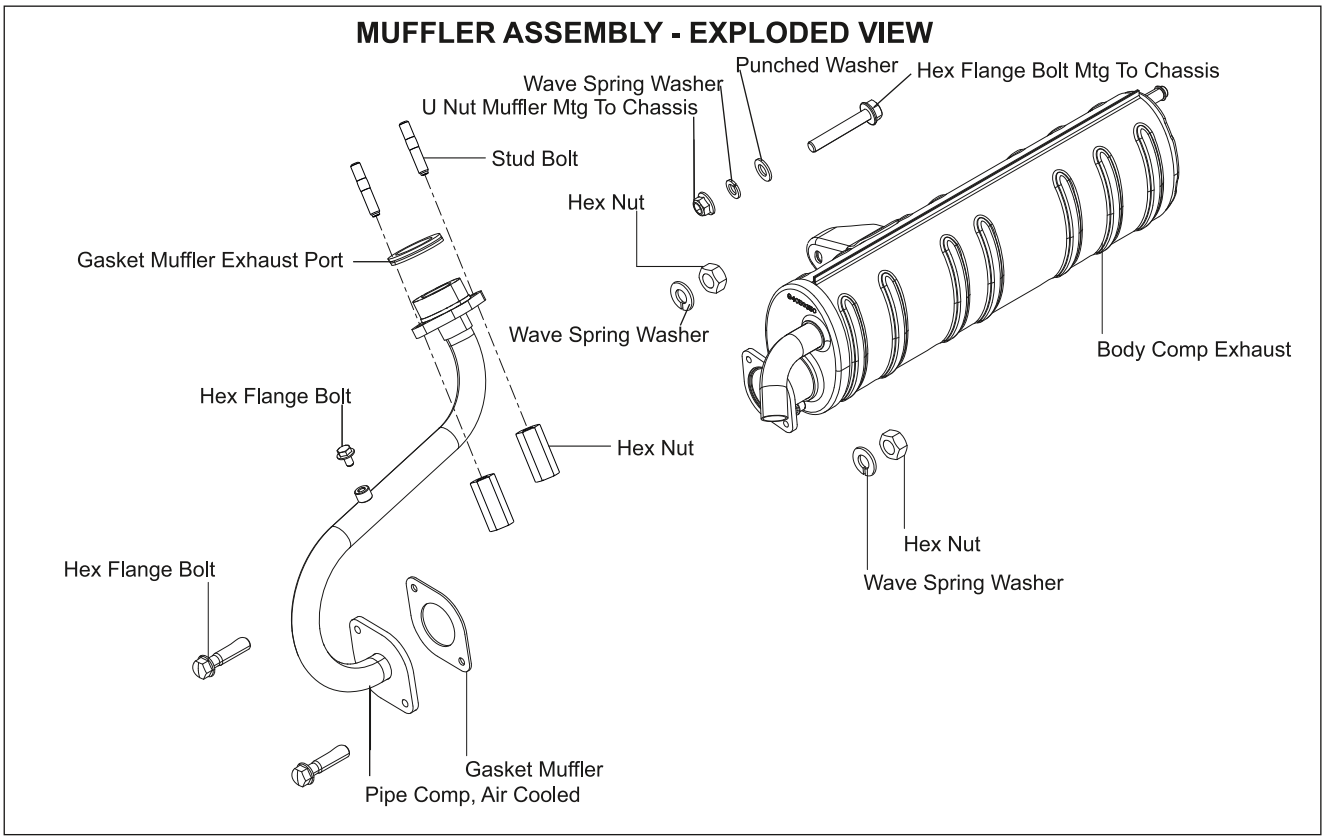


Fig. 4.32

- Hold the hexagonal flange bolts (M6x20) and loosen nuts and take out along with spring washer.

8, 10 mm spanner

- Separate the exhaust assembly along with catalytic converter from body exhaust. (Fig. 4.32)
- Clean the body exhaust using wire brush.
- Re-assemble the exhaust pipe assembly.
- While reassembly, the exhaust pipe should face the direction of exhaust mounting bracket on muffler body.
- While reassembly, replace the gasket, exhaust port and gasket exhaust. (Fig. 4.32)

SECONDARY AIR INJECTION(SAI)

- Secondary air injection assembly is mounted on the cover crankcase R. (Fig. 4.33)

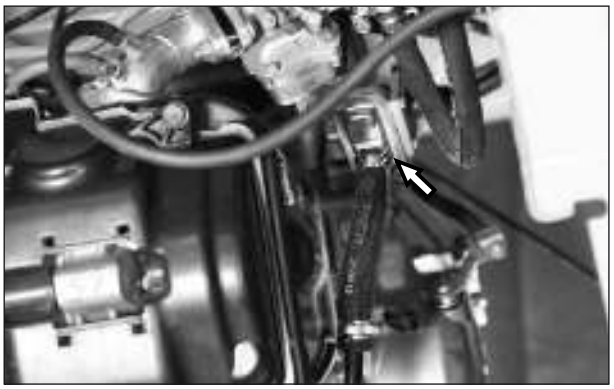


Fig. 4.33

WORKING PRINCIPLE:

- This is the unit used in exhaust emission control system. The secondary air injection system induces fresh filtered air into the exhaust manifold. Whenever there is negative pressure pulses in the exhaust system, the fresh air will be drawn into the exhaust. This charge of fresh air dilutes considerable amount of hydrocarbons (HC) and carbon monoxide (CO) in the exhaust gasses into carbon dioxide (CO2) and water (H2O). (Fig.4.34)

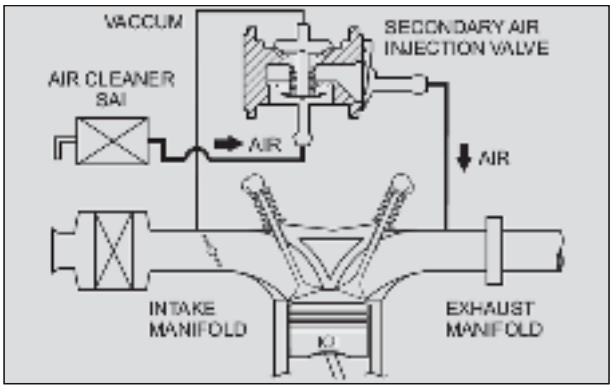


Fig. 4.34

- There is a reed valve which acts as a check valve, prevents revers airflow from exhaust. Only fresh air is allowed into the exhaust manifold.

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 pipe intake complete (D) is connected to chamber (C) . the port(D) has a small orifice than the other parts. The fresh and filtered air passes from port (A) to port (B).

- Whenever 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. 4.35)

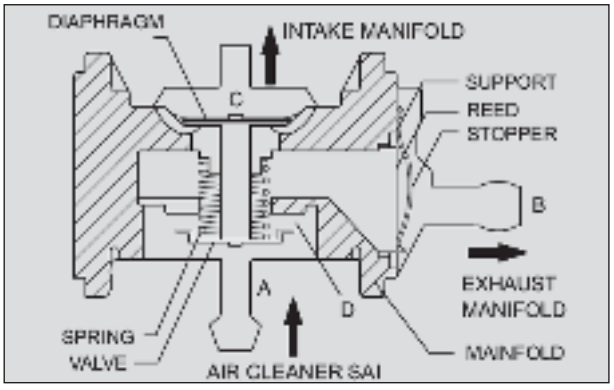


Fig. 4.35

REMOVAL:

- Dislocate the hose clip (A) and disconnect the hose air inlet (B) from air filter outlet tube (GS, LS & ZS). (Fig. 4.36A) or TCI box(GS+, LS+ & ZS+) secondary air injection valve.(Fig. 4.36B)

Nose plier

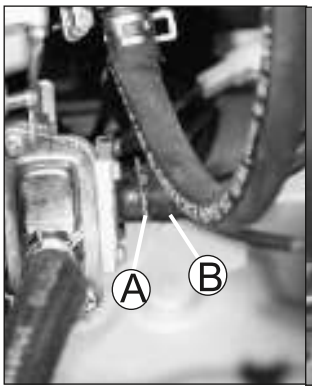


Fig. 4.36A

Fig. 4.36B

- Dislocate the clip hose air outlet (A) from hose air outlet (B) and pull out the hose air outlet from secondary air injection valve.(Fig. 4.37)

Nose plier

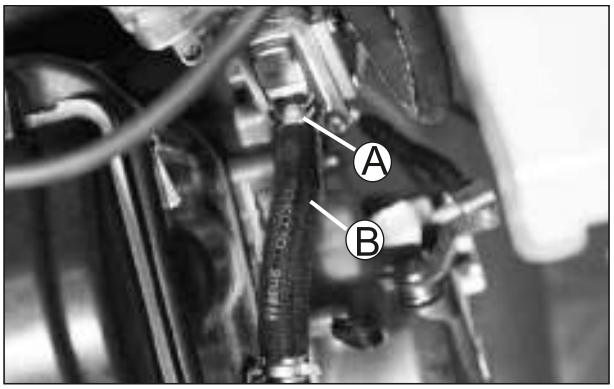


Fig. 4.37

- Dislocate the hose clip dia 7 to intake pipe (A) from hose air cut valve intake pipe (B) and pull out the hose air cut valve intake pipe from pipe intake complete. (Fig. 4.38)

Nose plier

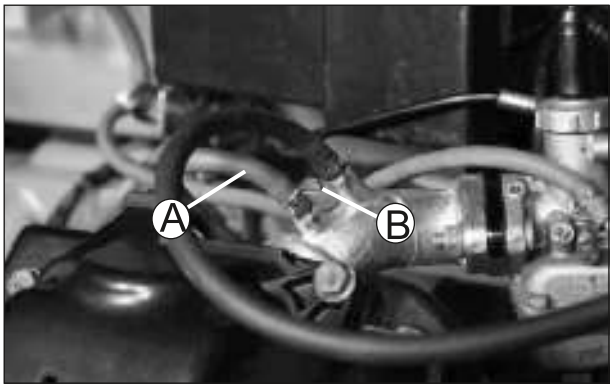


Fig. 4.38

- Remove the 2 hexagonal flange bolt (M6X20 - 2 nos.) from the mounting of secondary air injection valve and take out the secondary air injection valve.(Fig. 4.39)

8 mm spanner

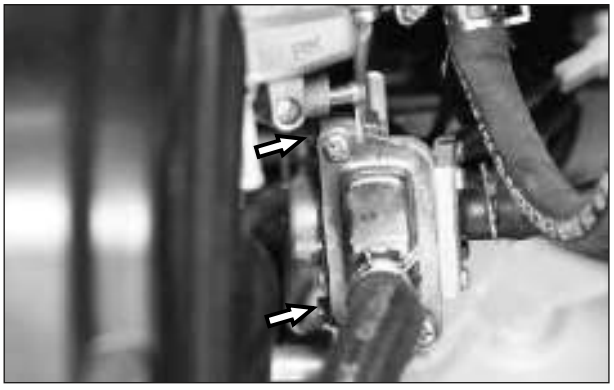


Fig. 4.39

AIRFILTER SAI REPLACEMENT (GS+, LS+ & ZS+)

- Unlocated the air filter SAI from passenger cabin bracket. (Fig. 4.40)

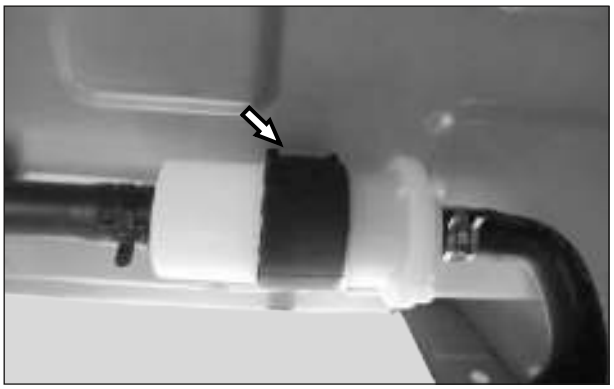


Fig. 4.40

- Dislocated the hose clip (A & B) from hose air inlet and hose sai inlet. Pull out both hoses (C & D) from air filter SAI. (Fig. 4.41)

Nose plier

Note: While reassembling, check for tear and damage of boot SAI filter in the air filter SAI.

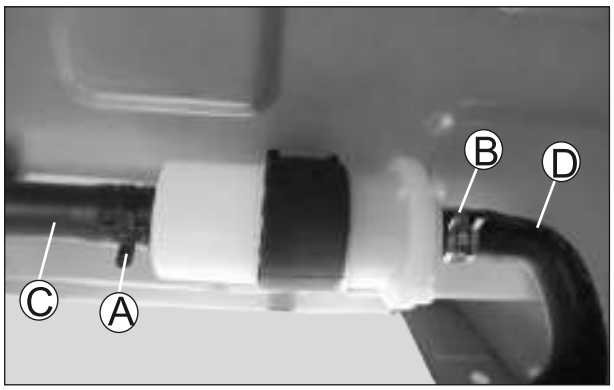


Fig. 4.41

CONTENTS

Chapter 5

CHASSIS

WHEEL ASSEMBLY

REMOVAL:

- Slightly loosen 4 nos. Hexagonal nut (M10x1.5) from wheel. (Fig. 5.1)
- Follow same procedure for other 2 wheels.

17 mm spanner

Note: Loosen and tighten the wheel nuts in criss cross pattern while removal and assembly

- Lift the vehicle using jack. (Fig. 5.2)

Caution: Place wheel blocks before lifting the vehicle to avoid vehicle movement.

Place jack under the chassis at the position indicated in the figure

- Loosen and remove the wheel nuts (M10x1.5) completely along with spring washer.
- Take out the wheel from axle.

REMOVE RIM PLATE:

- Rim plate needs to be replaced if it is bent.
- Loosen and remove 6 nos. Hexagonal nut M8 along with spring washer and punched washer from rim assembly (Fig. 5.3).
- Separate the rim plate from closing ring.

13 mm spanner

Note: Loosen and tighten the nuts in criss cross pattern while dismantling and assembling to avoid bend in rim plate and closing ring.

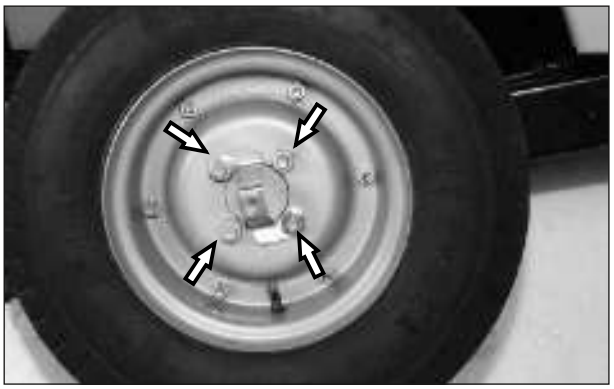


Fig. 5.1

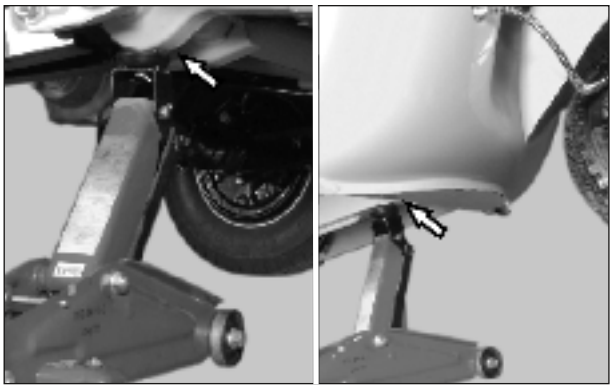


Fig. 5.2

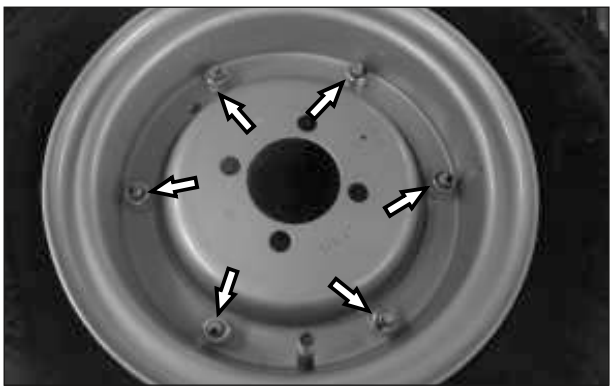


Fig. 5.3

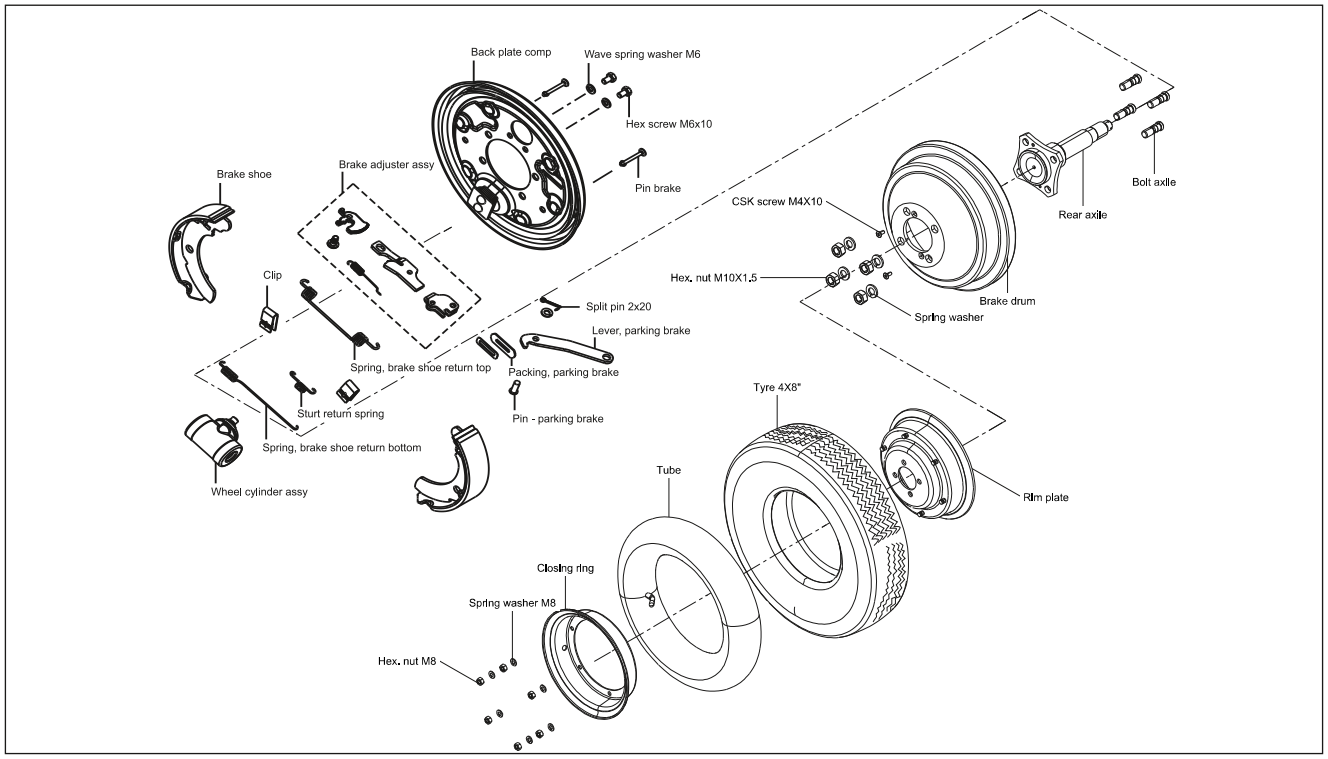


Fig. 5.4

TYRE:

- 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. 5.5)

Tyre depth gauge:

Service limit	0.8 mm

Note: Tyre depth can also be checked by Tyre Wear Indicator (TWI) (Fig. 5.6)

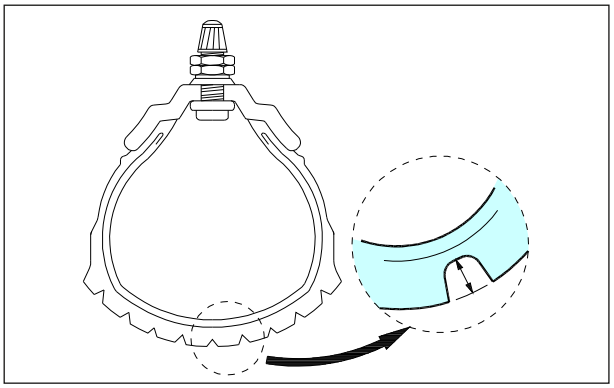


Fig. 5.5

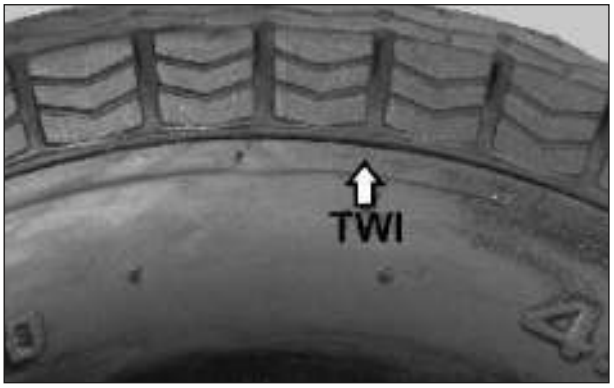


Fig. 5.6

REMOVAL:

- Deflate the tyre to 0.5 psi.
- Separate the closing ring from the tyre.
- Fully deflate the tube and separate it from the tyre.
- Replace the tyre and assemble it in reverse order of dismantling.

TYRE PRESSURE:

- Inflation pressure affects tyre life to a great extent.
- Higher pressure will cause central wear (balding) of the tread
- Lower pressure will cause cracks on the walls of the tyre
- So it is necessary to maintain the correct inflation pressure.

Tyre pressure gauge:

Tyre pressure in psi		
	Un laden	**laden**
Front	30 psi	30 psi
Rear	30 psi	34 psi

Note: Tyre pressure must be always measured in cold condition. (Fig. 5.7)

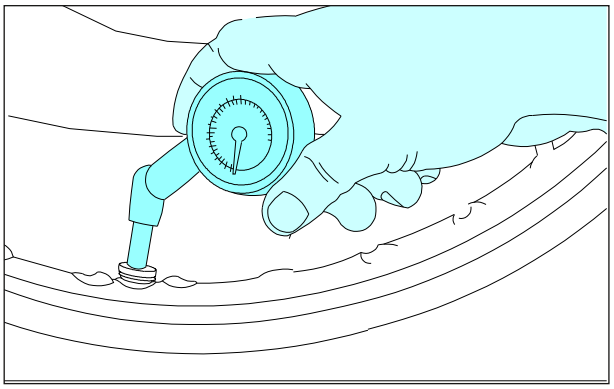


Fig. 5.7

CONTROL CABLE REPLACEMENTS:

CLUTCH CABLE REPLACEMENT:

- Hold the adjuster nut (B) with a spanner. (Fig. 5.8)
- Loosen the lock nut (A) from cable assembly clutch adjuster using spanner (Fig. 5.8)

12 mm spanner

- Disconnect the cable inner clutch from rod complete clutch release (C) and disconnect it from Bracket abutment clutch (D). (Fig. 5.8)
- Hold the special bolt M6 on lever assembly clutch with a flat screw driver.
- Loosen and remove nylon lock nut M6 from the bottom side of the lever assembly clutch. (Fig. 5.9)

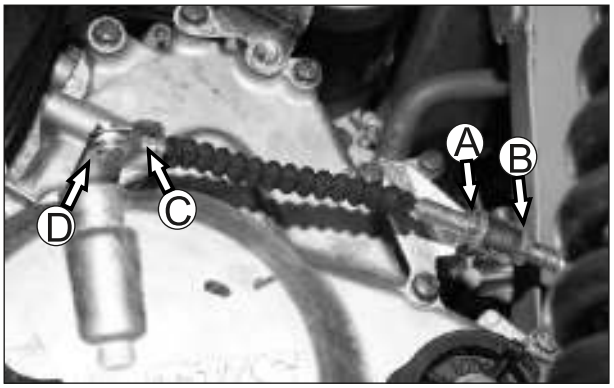


Fig. 5.8

10 mm spanner

Flat head screw driver

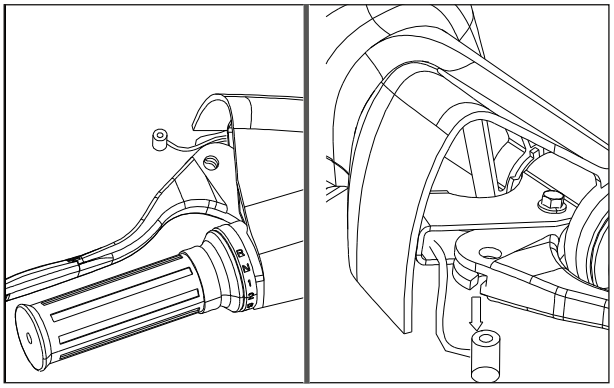


Fig. 5.9

- Separate the lever assembly clutch from handle bar.
- Disconnect cable assembly clutch from lever assembly clutch and pull out from below the dash board.
- Join the old cable and new cable with insulation tape.
- Pull out cable assembly clutch from the front till the new cable assembly clutch comes out through routing hole on the chassis.
- Remove the insulation tape and take out the old cable assembly clutch.
- Assemble the cable assembly clutch to the lever assembly clutch.
- Reassemble the lever assembly clutch Into the handle bar.
- Connect the cable assembly clutch at rear end through Bracket abutment clutch.
- Connect cable inner clutch to rod complete clutch release.
- Adjust clutch cable free play and tighten lock nut. (refer chapter "periodic maintenance" page no: 23)

CABLE INNER CLUTCH REPLACEMENT:

- Disconnect cable inner clutch from lever assembly clutch and pull it out from the lever assembly clutch. (Fig. 5.10)
- Connect the cable inner clutch to the lever assembly clutch and insert it through the cable assembly clutch outer.
- Pull out the cable inner clutch at the engine end through bracket abutment clutch.
- Pull the cable inner clutch and connect it to rod complete clutch release through pinch bolt.

8 mm spanner & Nose plier

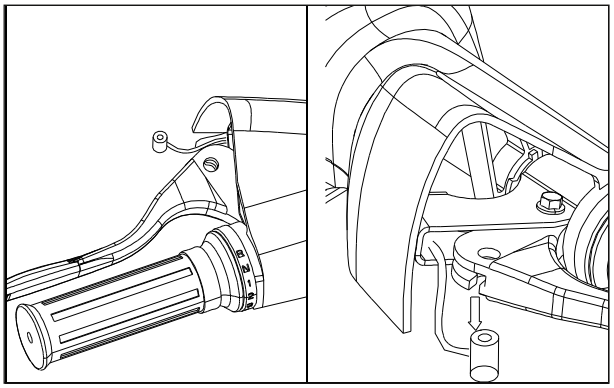


Fig. 5.10

- Adjust the play and tighten pinch bolt. (For all the cable free play adjustment refer chapter "periodic maintenance" page no:23)

GEAR CABLES & THROTTLE CABLE:

- For replacing gear cables and throttle cable, loosen 2 nos. Philips head screw (M4x15) and remove cover handle bar. (Fig. 5.11)

Philips head screw driver

Fig. 5.11

GEAR CABLES REPLACEMENT:

- Loosen the lock nut from the adjuster cable assembly white gear shift (A). (Fig. 5.12)

10 mm spanner

- Loosen the lock nut from the adjuster cable assembly black gearshift (B). (Fig. 5.12)

12 mm spanner

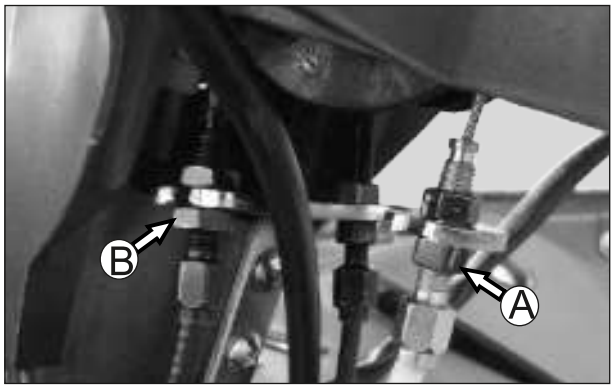


Fig. 5.12

- Loosen and remove 2 nos. CRR pan head screw (M5x10) from bracket complete cable guide and dislocate the bracket from it's seating. (Fig. 5.13)

Philips head screw

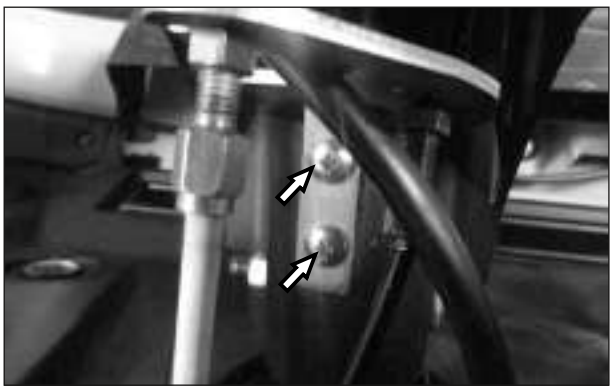


Fig. 5.13

- For ease of removing the cable assembly white gearshift from Handle bar Pulley gear shift, rotate the handle bar downwards. Similarly remove the cable assembly black gearshift from Pulley gear shift by rotating the handle bar upwards. (Fig. 5.14)

- Then remove the cables from bracket complete cable guide.

Fig. 5.14

At engine end:

- Loosen the lock nut (A) from adjuster cable assembly white gear shift.(Fig. 5.15)

10 mm spanner

- Loosen the lock nut (B) from adjuster cable assembly black gear shift.(Fig. 5.15)

12 mm spanner

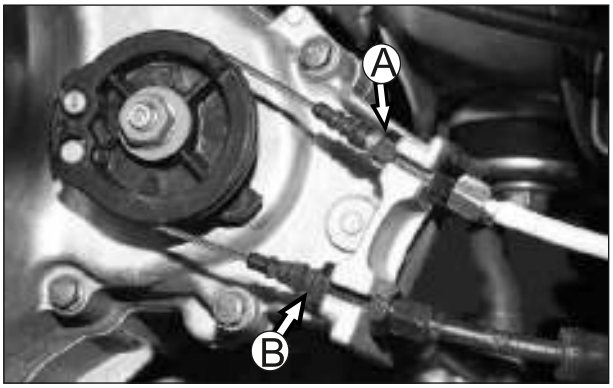


Fig. 5.15

- Disconnect cable inner gear shift from the pulley gear shift. (Fig. 5.16)
- Pull out and separate the cable adjuster bolt from cover crankcase R.

Fig. 5.16

- Loosen and remove 1 no. Hexagonal nut M8 from pulley gear shift. (Fig. 5.17)

13 mm spanner

- Take out the spring washer and plain washer.
- Take out the pulley gear shift along with D washer from the shaft gear shift.
- Join new cables to old cable with insulation tape.
- Pull out cables gear shift from the front till the new cables gear shift comes out at the routing hole on the chassis front end.
- Disconnect the old cables gear shift from the new cables gear shift.
- Reassemble the all parts in the reverse order of dismantling.
- Adjust cable free play and tighten lock nut. (For setting the free-play refer chapter "Periodic maintenance" page no: 23)

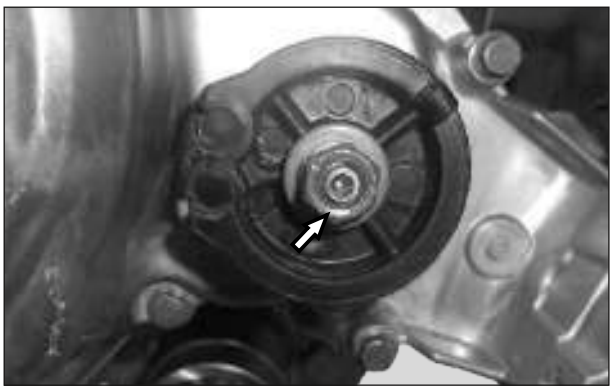


Fig. 5.17

GEAR CABLE INNER REPLACEMENT:

- Disconnect and pull out the cable inner gear shift from handle bar pulley gearshift.
- Pull out the cable inner gear shift from cable assembly outer gearshift.
- Connect the cable inner gear shift to the handle bar pulley gear shift.
- Insert the cable inner gear shift through cable assembly outer gear shift.
- Connect the cable inner gear shift to the pulley gear shift by routing it through pinch bolts and holes provided on the pulley gear shift (Fig. 5.18)

8 mm spanner & Nose plier

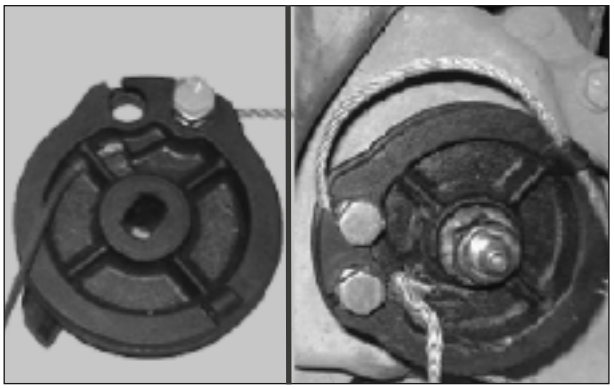


Fig. 5.18

THROTTLE CABLE REPLACEMENT:

- Loosen and remove mixing cap assembly (throttle) from carburetor assembly. and take out piston valve.(Fig. 5.19)

Fig. 5.19

- Compress the spring throttle and dislocate the cable from the piston valve.(Fig. 5.20)
- Separate piston valve, spring throttle and cap carburetor from throttle cable.

Fig. 5.20

At handle bar end:

- Hold the adjuster nut (A) and loosen the lock nut (B) on cable assembly throttle at handle bar end and take it out of the bracket complete cable guide.(Fig. 5.21)

10 mm spanner

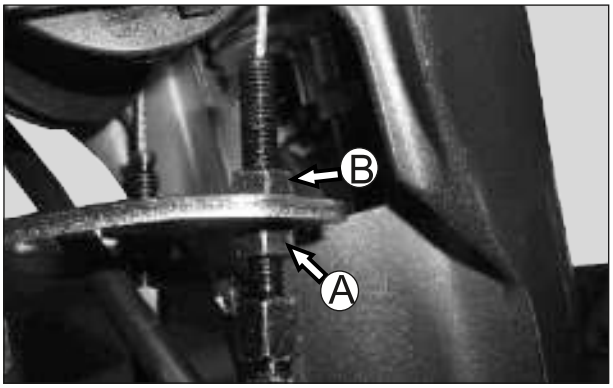


Fig. 5.21

- Disconnect cable from pulley throttle (A), at handle bar end. (Fig. 5.22)

Nose plier

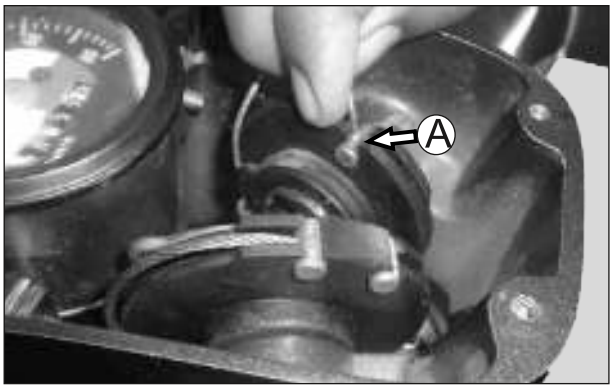


Fig. 5.22

- Pull out the adjuster from the bracket complete Cable guide. Join new cable throttle assembly to old cable throttle assembly with insulation tape.

- Pull out cable throttle assembly from the front till the new cable throttle assembly comes at the routing hole on the chassis front end. Separate the old cable throttle assembly from the new cable throttle assembly.

- Connect the cable throttle assembly to the pulley through Bracket complete Cable guide.

- Reassemble the all parts in the reverse order of dismantling.

- Adjust cable free play and tighten lock nut. (For setting the free - play refer chapter “periodic maintenance” page no: 23)

FRONT FORK ASSEMBLY

- The front fork needs to be dismantled if the steering races, balls, pivot pin, needle bearing pivot pin are worn out and needs to be replaced or if the steering column gets bent.

REMOVE AXLE:

- Loosen and remove 1 no. CRR pan head screw (M5 x 20) from speedometer cable mounting at the wheel end. (Fig. 5.23)

Fig. 5.23

- Take out the CRR pan head screw along with a plain washer. Disconnect cable speedometer from the hub drive.
- Loosen and remove 3 nos. CSK screw (M4 x 10) from hub drive. (Fig. 5.24)

Philips head screw driver

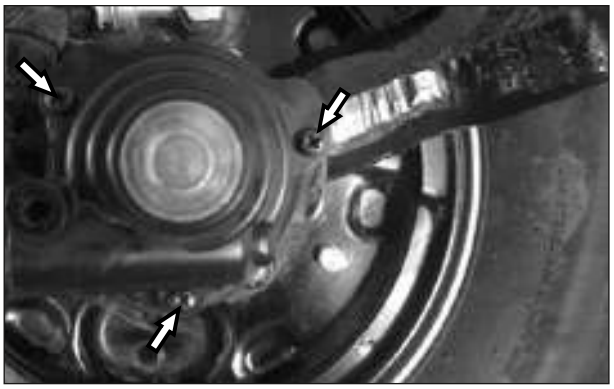


Fig. 5.24

- Take out the speedo drive assembly along with gasket hub drive.
- Remove wheel assembly, for removal, procedure (refer chapter "Chassis" page no:5.1)
- Loosen and remove the hexagonal flange U nut axle. (Fig. 5.25)

22 mm socket spanner & tommy rod

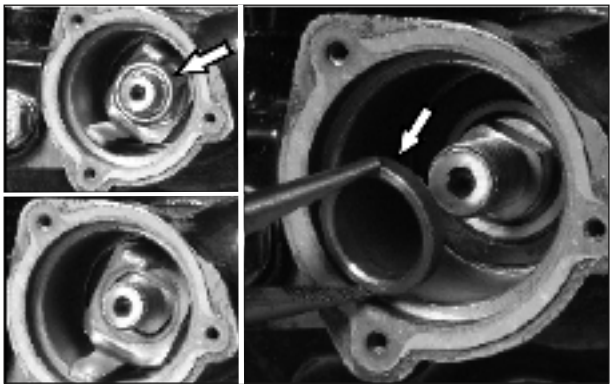


Fig. 5.25

- Take out the speedo drive complete.
- Take out the distance piece from axle front.

Nose plier

- Loosen and remove 2 nos. CSK screw (M4 X 10) from the brake drum. (Fig. 5.26)
- Take out the brake drum.
- Take out the axle front.

Philips head screw driver

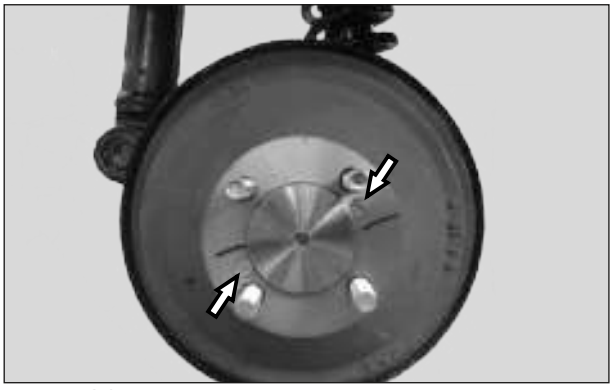


Fig. 5.26

- Loosen and remove 4 nos. Hexagonal screw (M8 X 16) from back plate complete front. (Fig. 5.27)
- Separate the back plate from steering column.

14 mm spanner

- Reassemble the all part in the reverse order of dismantling.

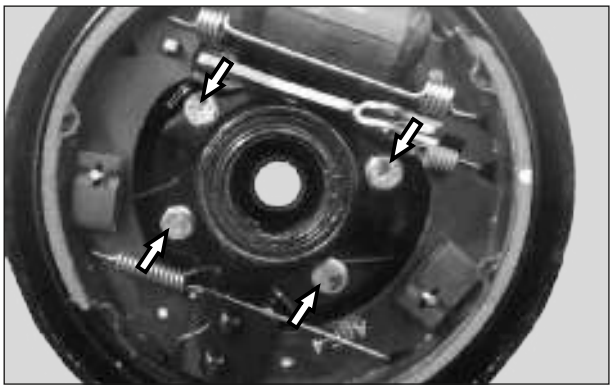


Fig. 5.27

REMOVE STEERING COLUMN ASSEMBLY:

- Remove the steering column. For removal, (refer chapter "periodic maintenance" page no:26)

REMOVE FRONT FENDER:

- Hold the hexagonal screw M6x30 on the top side. (Fig. 5.28)
- Loosen and remove the 4 nos. M6 hexagonal nut along with wave spring washers from the bottom of the front fender. (Fig. 5.28)

10 mm spanner

- Take out the 4 nos. Hexagonal nut along with wave spring washer. Take out the 4 nos. Hexagonal bolt along with punched washer from front fender. Separate the front fender from steering column.
- Reassemble the all parts in the reverse order of dismantling.

Fig. 5.28

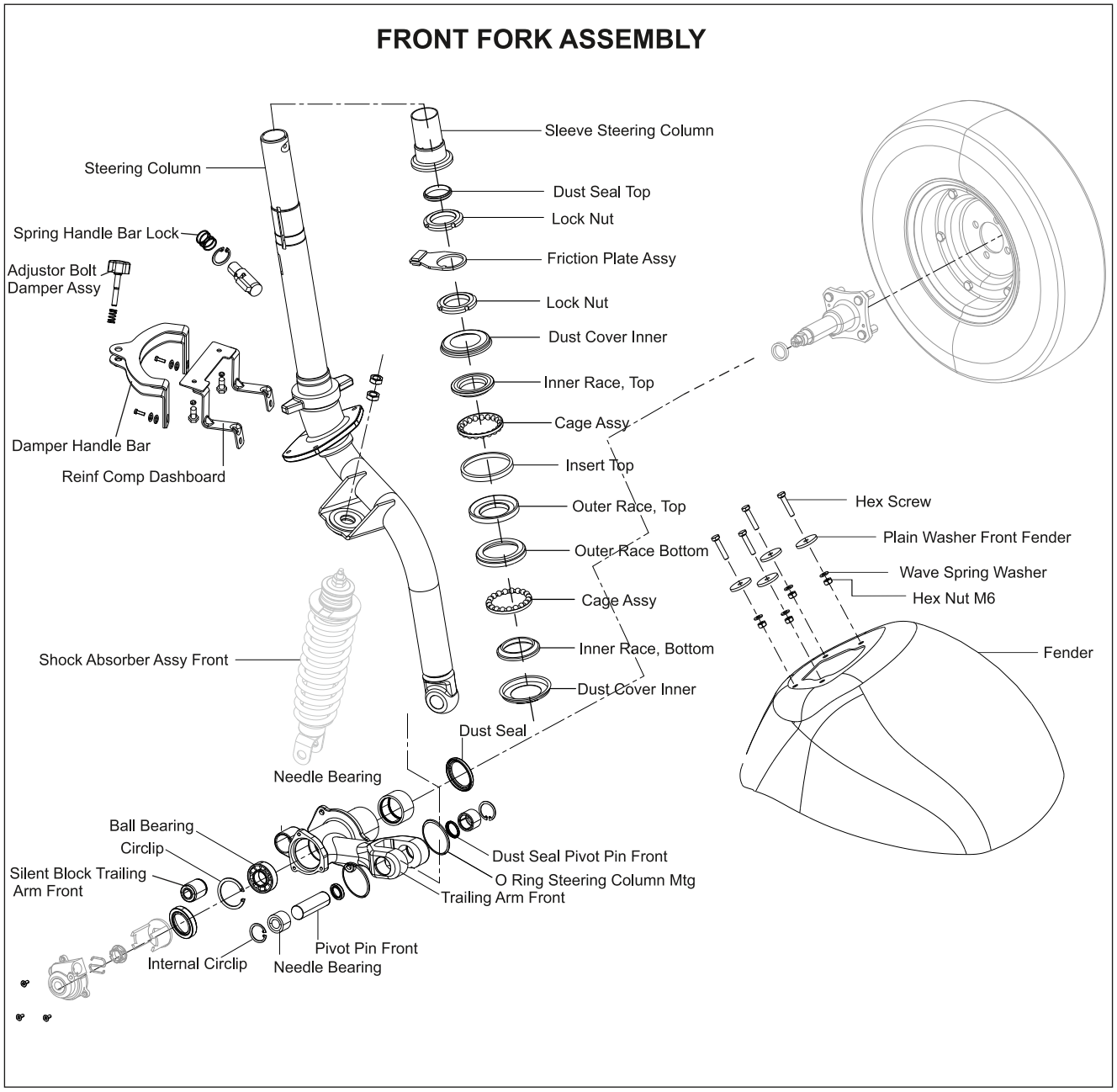


Fig. 5.29

REMOVE FRONT SHOCK ABSORBER:

- Hold the hexagonal bottom nut front shock absorber assembly top mounting (B). (Fig. 5.30)
- Loosen and remove 1 no. hexagonal nut top from front shock absorber assembly top mounting (A). (Fig.5.30)

14 mm spanner

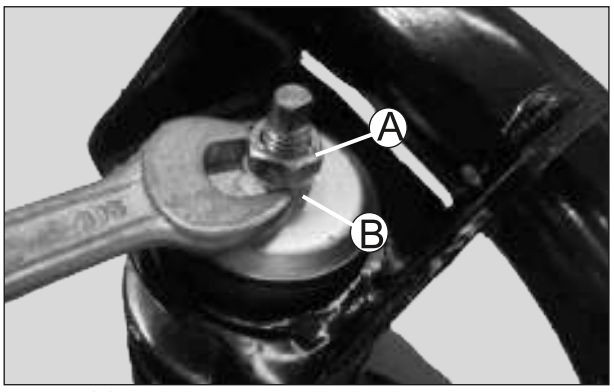


Fig. 5.30

- Hold the stud of the front shock absorber assembly top mounting with spanner. (Fig. 5.31)
- Loosen and remove 1 no. hexagonal nut (bottom) from shock absorber assembly top mounting (B). (Fig. 5.31)
- Take out the retainer washer and rubber bush from front shock absorber assembly.

6 mm open end spanner & 14 mm spanner

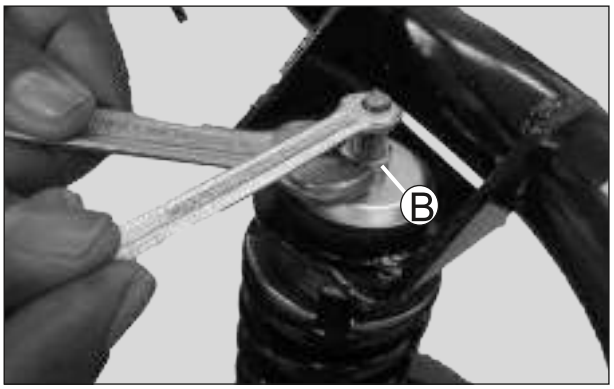


Fig. 5.31

- Loosen and remove 1 no. hexagonal bolt (M12 x 1.75 x 55) along with punched washer and wave spring washer from front shock absorber assembly bottom mounting (C).(Fig. 5.32)

18 mm spanner

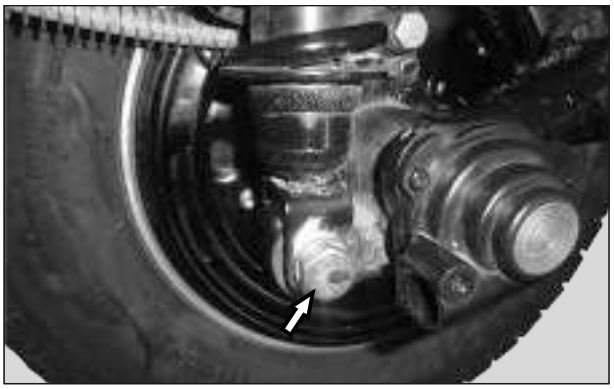


Fig. 5.32

- Take out the front shock absorber assembly from steering column.
- Reassemble the all parts in the reverse order of dismantling.

REMOVE STEERING COLUMN CONE SET:

- Draw out the outer race top fitted on the top end of the steering pivot tube using special tool. (Fig. 5.31)

Mandrel steering cups

Metal hammer

Fig. 5.33

- Similarly, draw out the outer race bottom fitted on the bottom end of the steering pivot tube using special tool (A). (Fig. 5.34)
- Remove inner race bottom and dust cover inner from steering column (B). (Fig. 5.34)

Chisel / Metal hammer

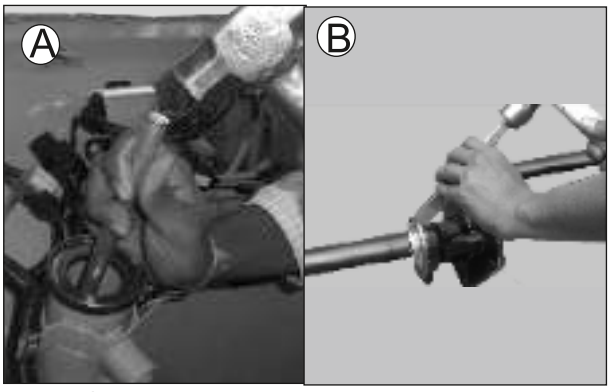


Fig. 5.34

RE ASSEMBLY OF STEERING COLUMN CONE SET:

- Reassembly the outer race top and outer race bottom to steering pivot tube using special tool. (Fig. 5.35)

G3310550	Assembly tool, head tube races
32 mm spanners (2 nos.)	

Note: Make sure that the race edge seats perfectly with head tube

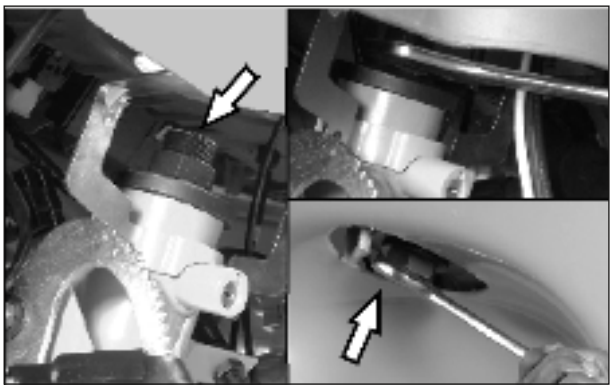


Fig. 5.35

- Place inner race bottom along with dust cover inner onto steering column (Fig. 5.36), press the inner race bottom fully on the steering column using special tool (Fig. 5.36).

- Insert the lock nut M38 and tighten it by using special tool.

G3310590	Assembly tool, cone bottom
G3310570	Assembly tool, lock nut steering column

Note: Make sure that there is no gap between the dust cover and steering column.

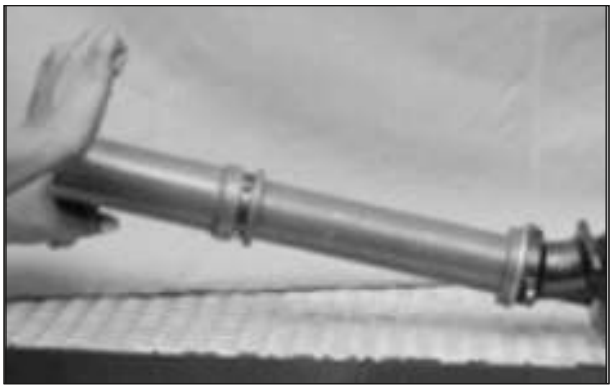


Fig. 5.36

- The inner race / the dust cover should not be in loose condition on steering column

- For re – assembly of the steering column and handle bar (refer chapter " periodic maintenance" page no:26).

REMOVE PIVOT PIN:

- Remove the internal circlip on both the side of the pivot pin. (Fig. 5.37)

- Place the front fork under the Hydraulic press and push out the pivot pin along with needle bearings. (Fig. 5.37)

- Remove the broken needle bearing using special tool. (Fig. 5.37)

G3310650	Extractor, pivot pin steering column

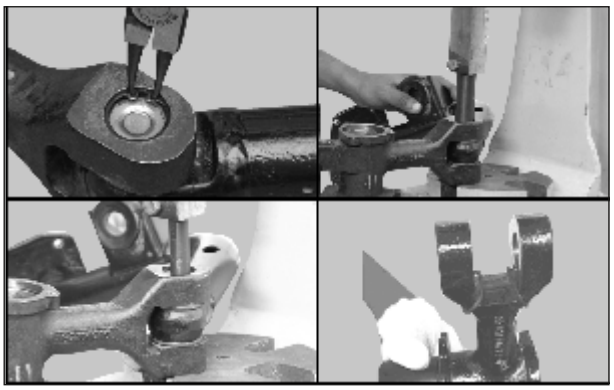


Fig. 5.37

REASSEMBLY OF PIVOT PIN:

- Manually, insert one O - ring in each fork of front trailing arm (FTA).
- Apply grease to the FTA dust seal and manually insert the dust seal from its chamfered end into the FTA bore from inside the fork gap.

Note: The chamfered end on dust seal is having metal insert. And the opposite end is marked with number – HTA 3889.

- Mount the steering column sub – assembly and FTA subassembly on the pivot pin – pressing machine and align the 20 mm diameter bores on steering column and FTA. (Fig. 5.38)
- Insert the pivot pin adaptor on FTA bore.
- Insert the pivot pin through the pivot pin adaptor.
- Load the pivot pin pressing tool / pin in the top ram.
- Operate the pivot pin - pressing button. This completes the pivot pin pressing operation. (Fig. 5.39)
- Load the Needle roller bearing (NRB) into the bottom bunk. Ensure that the cavity is open from top side.
- Load the needle roller bearing (NRB) in top bunk. Ensure that the cavity is open from bottom side.
- Operate the press. This completes the bottom needle roller bearing (NRB) pressing followed by the top needle roller bearing (NRB).
- Assemble circlip. Ensure proper seating of circlip into the groove. (Fig. 5.40)

Internal circlip plier

- Similarly, assemble the circlip into the other fork of FTA.
- Manually, pull over the 'O' - rings into the gap of steering column.

Fig. 5.38

Fig. 5.39

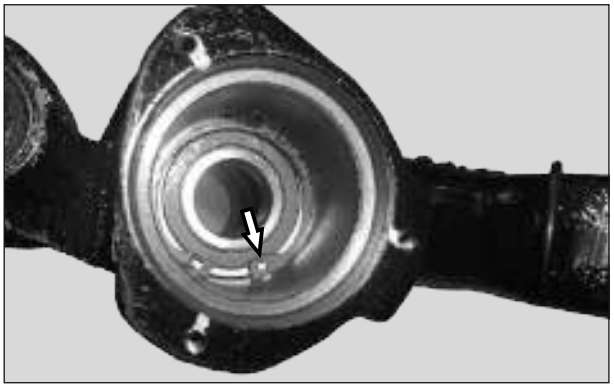


Fig. 5.40

WHEEL BEARINGS:

- Remove the front axle (For procedure refer chapter "Chassis" page no. 5.6)
- Inspect the play in wheel bearings before removal from the trailing arm front wheel.
- Rotate the inner race by hand to check for any abnormal noise.
- Replace the bearing if there is a play or noise or if the bearing does not rotate smoothly.
- For removal of bearing, first remove the circlip. (Fig. 5.41)

Internal circlip plier

- Pull out the ball bearing using special tool with the adaptor (Fig. 5.42).

G3310300, 310, 320, 370	Bearing puller

- Reassemble the bearings using special tool with a suitable adaptor. Assemble the circlip.

G3310510	Assembly tool bearing

Note: Ensure that the circlip is sitting in the groove.

- Similarly, check the needle bearing for it's proper condition. Replace if it is damaged. For replacing, remove the dust seal needle bearing and then remove the Needle bearing using special tool.
- While fitment of new Needle bearing, ensure the letters on the needle bearing face outwards.

INSPECTION:

- Check the axle for run out using special tool. (Fig. 5.43)
- Replace the axle with a new one, if the run out exceeds the limit.

031 3050	Dial gauge (0.01mm)
031 3060	Magnetic stand
031 3070	V – block – 4" x 3" x 3"

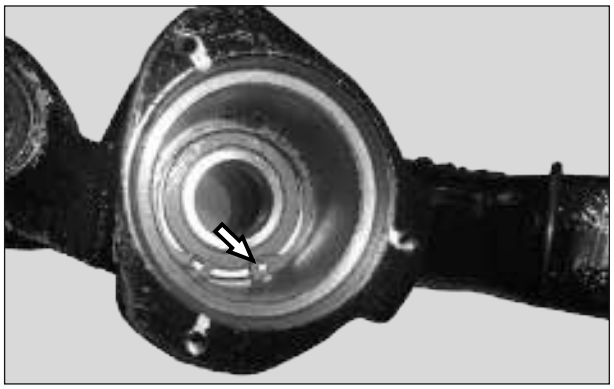


Fig. 5.41

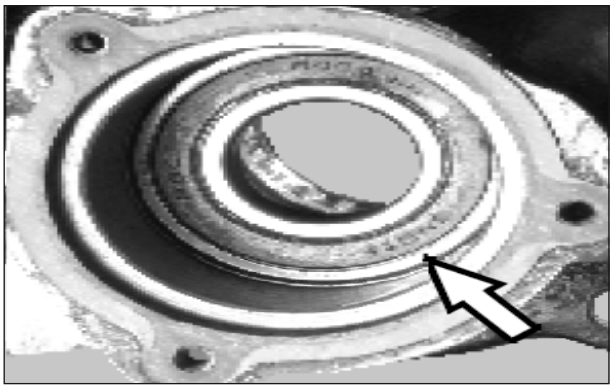


Fig. 5.42

Fig. 5.43

Service limit	mm
Front axle	0.1
Rear axle	0.1

BRAKES:

FRONT BRAKE:

- Remove wheel assembly (Refer chapter "Chassis" page no. 5.1)
- Remove brake drum (refer chapter " Chassis" page no: 5.6)
- Remove 2 nos. of clip from pin brake. (Fig. 5.44)

Nose Plier

- Dislocate the heel end of the brake shoe. Twist the brake shoe upwards & take out the brake shoes along with spring brake shoe return top, spring brake shoe return bottom, brake adjuster assembly and strut return spring. (Fig. 5.45)
- Reassemble all the parts in the reverse order of dismantling.

INSPECTION:

- Check the brake shoes for wear and tear by measuring the shoe thickness (Fig. 5.46). If it is less than the service limit replace the shoe.

Vernier caliper

Service limit	5 mm

Note: Brake shoe liner can be checked without removing brake shoe assembly from the back plate

Caution: Replace the brake shoe as a set, otherwise braking performance will be adversely affected

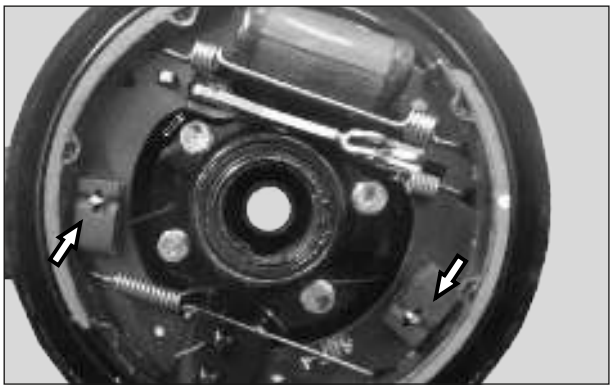


Fig. 5.44

Fig. 5.45

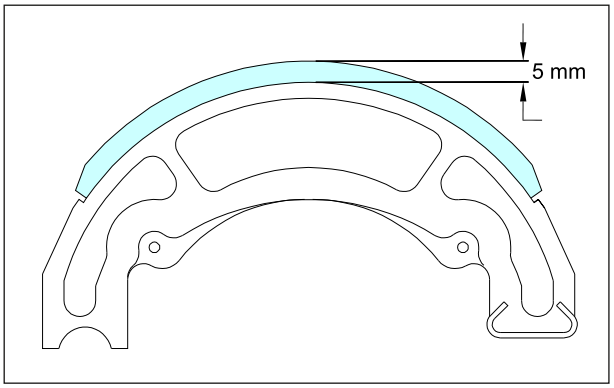


Fig. 5.46

BRAKE DRUM:

- Measure brake drum inner diameter. (Fig. 5.47)
- If it is more than the service limit replace the brake drum.

Vernier caliper	
Service limit	170.5 mm

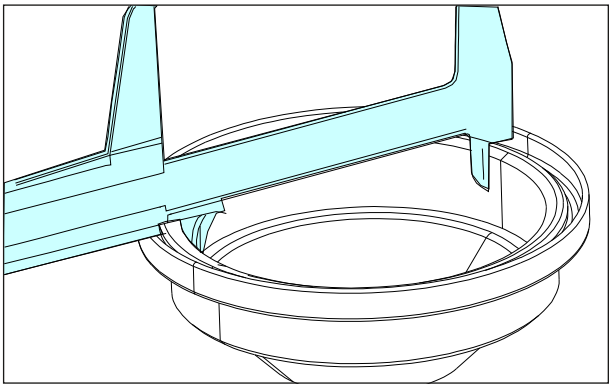


Fig. 5.47

REMOVE REAR BRAKE:

- Remove wheel assembly (Refer chapter "Chassis" page no. 5.1)
- Remove brake drum (refer chapter "Chassis" page no: 5.6)
- Unfold the split pin from lever parking brake. Take out the pin parking brake and separate the parking brake cable assembly. (Fig. 5.48)
- Remove 2 nos. clips from pin brake. (Fig. 5.49)

Nose Plier

- Dislocate the heel end of the brake shoe, twist the brake shoe upwards & take out the brake shoes along with spring brake shoe return top, spring brake shoe return bottom, brake adjuster assembly, lever parking brake and strut return spring. (Fig. 5.50)
- Take out the plate parking brake and pin parking brake.
- Reassemble all the parts in the reverse order of dismantling.

Note: Brake shoe liner can be checked without removing brake shoe assembly from the back plate

Caution: Replace the brake shoe as a set, otherwise braking performance will be adversely affected

Fig. 5.48

Fig. 5.49

Fig. 5.50

REMOVE WHEEL CYLINDER KIT:

- Remove brakes procedure refer details above .
- Place a tray below the part while dismantling.
- Remove the dust cover from wheel cylinder on one side.
- Take out the piston along with spring. (Fig. 5.51)
- Separate the seal from piston.
- Follow the same procedure for other side also.
- Clean the wheel cylinder inner surface, dust cover, piston, seal and spring using clean cloth.
- Check the wheel cylinder inner surface, dust cover, piston, seal and spring for any damage.
- Reassemble the all part in the reverse order of removal. Ensure brake bleeding is done before vehicle is on road, for detailed brake bleeding procedure refer chapter 22 - periodic maintenance chapter)

Flat head screw driver small

Note: Replace the any damage part with the new one.

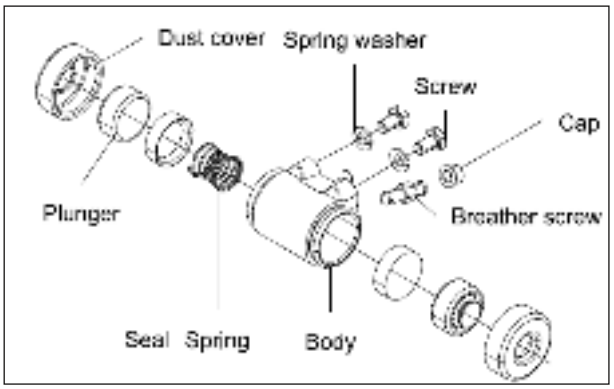


Fig. 5.51

MASTER CYLINDER EXPLODED VIEW

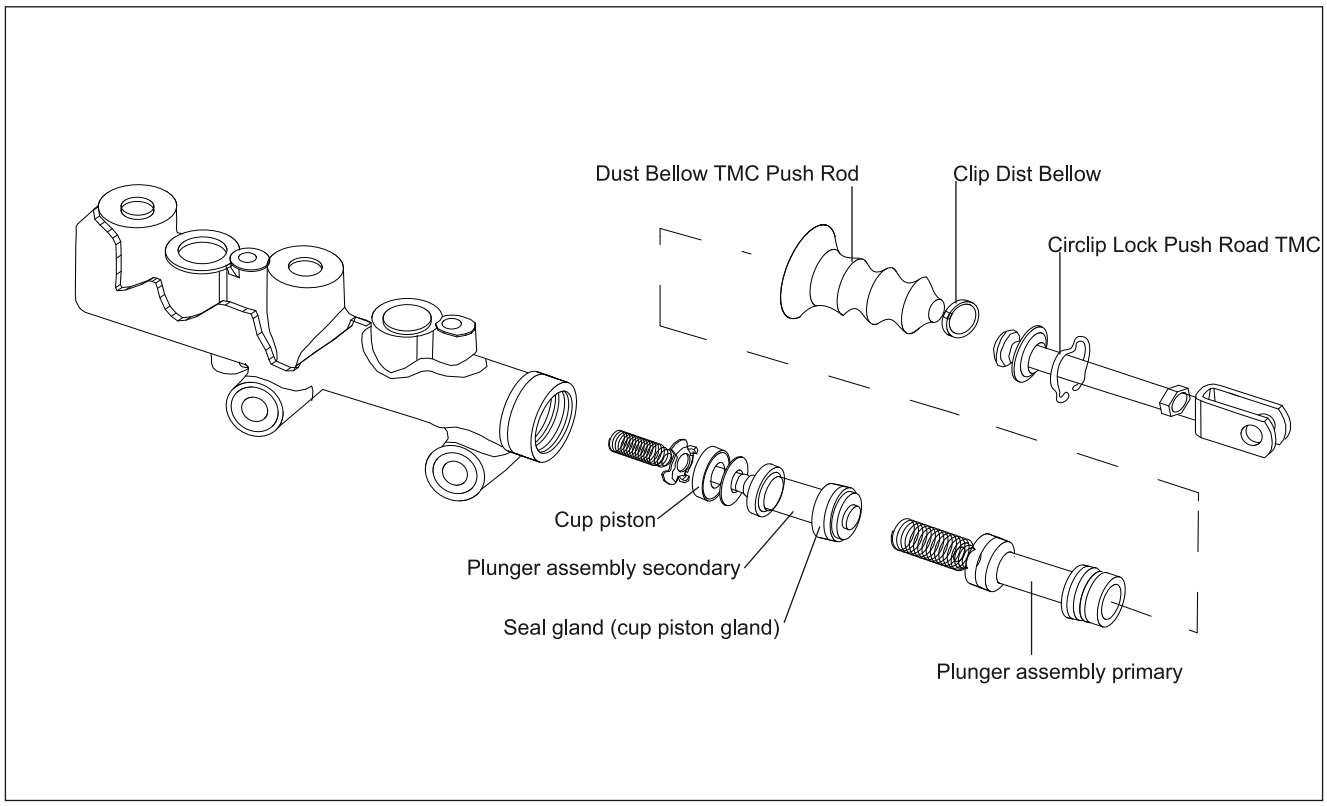


Fig. 5.52

DISMANTLING MASTER CYLINDER:

- Remove the breather screw cap from the wheel cylinder.
- Fix a transparent tube to breather screw and place the other end of the tube immersed in a clean container filled with the brake fluid. (Fig. 5.53)

Fig. 5.53

- Pump the brake pedal a few times to build the pressure in the hydraulic system.
- keeping the brake pedal in pressed condition, loosen the breather screw. Drain out the brake fluid completely from reservoir tank. (Fig. 5.54)
- Follow same procedure on other two wheels for draining the brake fluid.

8 mm spanner

Fig. 5.54

- Unfold the split pin (2.0x20 pin TMC) from pin master cylinder.
- Remove the split pin (2.0x20 pin TMC) from pin master cylinder. Take out the pin master cylinder. (Fig. 5.55)

Nose plier

Fig. 5.55

- Lift the brake pedal complete partially. Remove spring brake switch from brake pedal complete. Unfold the split pin (3.2x25) brake pedal mounting pin.
- Remove the split pin (3.2x25) brake pedal mounting pin along with punched washer (14.5x22x1.6) Znb. Take out the brake pedal complete along with torsion spring brake from fulcrum point. (Fig. 5.56)

Fig. 5.56

- Loosen and remove bundy tube assembly front and bundy assembly center from master cylinder assembly.(Fig. 5.57)

10 mm spanner and nose plier

Fig. 5.57

- Loosen and remove 2 nos. Hexagonal nut (M10 8Zng) along with wave spring washer (M10 Znb) from chassis. (Fig. 5.58)

17 mm spanner and nose plier

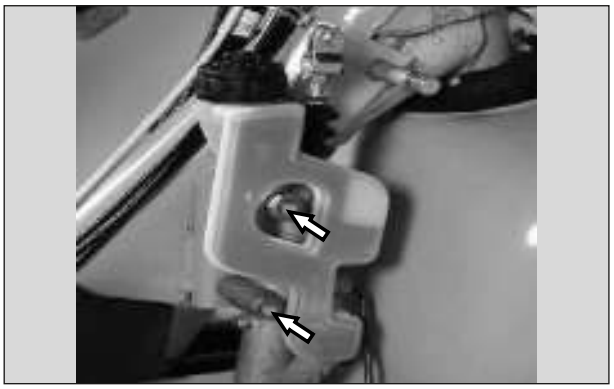


Fig. 5.58

- Separate the master cylinder assembly from chassis.
- Loosen and remove 2 nos. Hexagonal flange bolt (M6x1.25x16) from reservoir assembly mounting.(Fig. 5.59)
- Separate the reservoir assembly from master cylinder assembly.

10 mm spanner

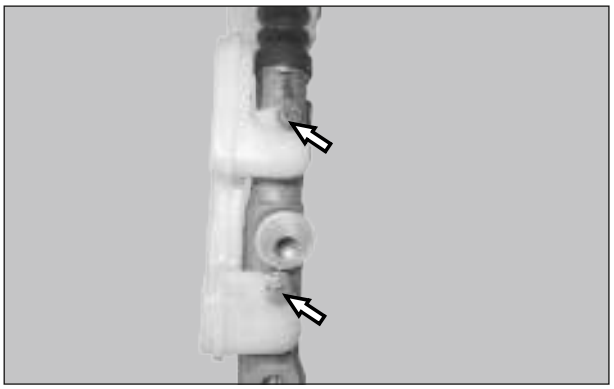


Fig. 5.59

- Disconnect the dust bellow TMC push rod from master cylinder assembly using flat screw driver.
- Disconnect the circlip lock push rod TMC using internal circlip plier.(Fig. 5.60)
- Take out the push rod TMC. (Fig.5.60)

Fig. 5.60

- Remove the plunger assembly primary along with seal gland (cup piston gland) and spring.(refer exploded view of master cylinder assembly)
- Remove the plunger assembly secondary along with seal gland (cup piston gland) and retainer spring .(refer exploded view of master cylinder assembly)
- Reassemble all the parts in the reverse order of dismantling.

Flat screw driver and internal

Note: Ensure brake bleeding is done before vehicle is on road, for detailed brake bleeding procedure refer chapter 22 - periodic maintenance chapter)

BRAKE HOSE FRONT:

- Inspect the brake hose for any cracks or leakage.
- If leakage found, replace with a new hose as below:
- Flush the brake fluid by opening breather screw at wheel cylinder assembly(Refer bleeding procedure)
- Remove the clip flexible hose and take out the shim oiled for flexible hose cowl joint. (Fig. 5.61)
- Hold the integral bolt of flexible hose and loosen the bundy tube nut. (Fig. 5.62)

10, 19 mm spanner and nose plier

Torque	15 Nm

- Take out the flexible hose front and shim oiled for flexible hose cowl joint at cowl front. Loosen the banjo bolt along with 2 nos. Packing banjo bolt front and separate it from the wheel cylinder. (Fig. 5.63)
- Replace the flexible hose assembly front.
- Reassemble the all parts in the reverse order of dismantling.
- Ensure brake bleeding is done before vehicle is on road, for detailed brake bleeding procedure refer chapter “Periodic maintenance” page. no.2.32)

14 mm spanner

Note: Ensure that the hose does not have any twist & it should not rub with wheel & Shock absorber front after complete assembly.

Fig. 5.61

Fig. 5.62

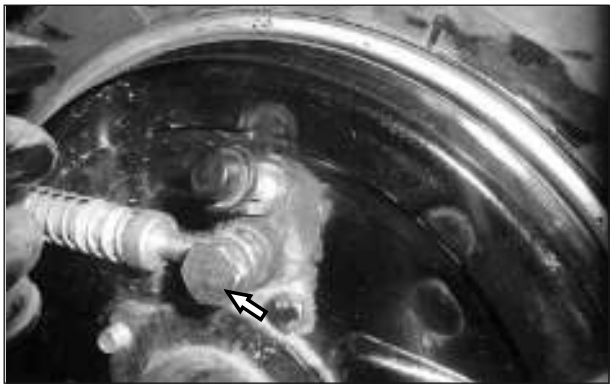


Fig. 5.63

AIR BLEEDING FROM BRAKE SYSTEM:

- Air bleeding procedure (refer chapter 'periodic maintenance ' page no: 2.32)

DRIVE SYSTEM

PROPELLER SHAFT:

- For removal of propeller shaft (refer chapter "periodic maintenance" page no: 2.50)

INSPECTION:

SLIDER AND PIN

Note: Worn out slider and pin will result in noise and loss of power transmission to wheels resulting in lower pick up and loss in fuel economy.

- Measure the wall thickness of slider as shown. (Fig. 5.64)
- Replace with new set if the thickness is less than the service limit.
- The pin can be separated from the propeller shaft using a press.

Service limit	2 mm

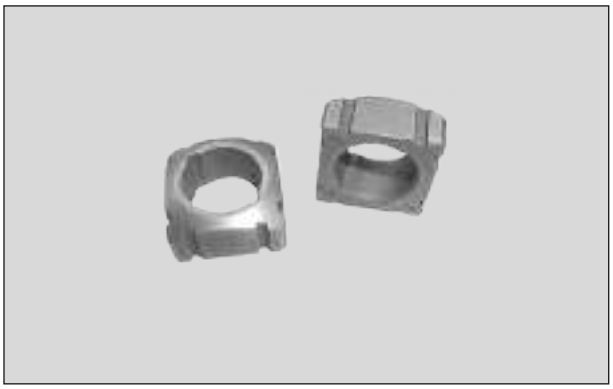


Fig. 5.64

BELLOWS

- Inspect the bellows for any crack or tear. (5.65)

Note: Torn bellows will result in dust entry into muff cup and slider resulting in faster wear of these components.

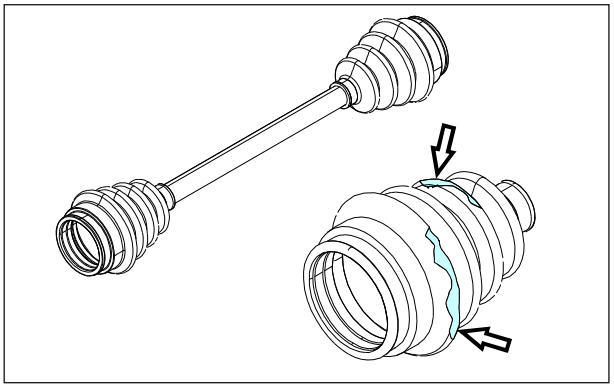


Fig. 5.65

BELLOW REPLACEMENT

- Insert a flat screwdriver at the small end of the bellow, expand and dislocate the bellow from propeller shaft and take out.
- While refitting, apply grease on the propeller shaft, pin, slider block and bellow small end.
- First insert the bellow on the propeller shaft. Insert the screwdriver from big end of the bellow and pull over small end of the bellow on the spherical end of propeller shaft . (Fig. 5.66)

Flat head screw driver

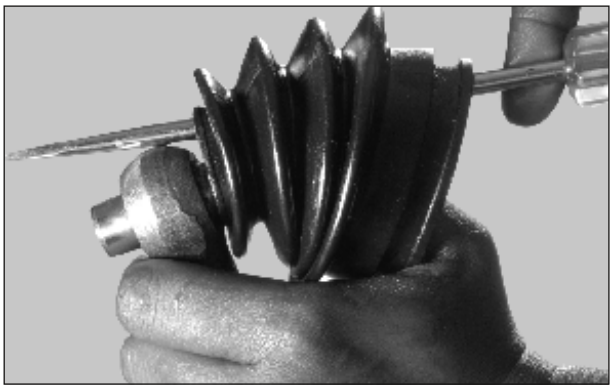


Fig. 5.66

REMOVE MUFF CUP ENGINE SIDE

- Remove muff cup engine side (refer chapter “servicing of engine” page no:48)

REMOVE MUFF CUP WHEEL SIDE AND AXLE COMPLETE REAR:

- Remove the propeller shaft (refer chapter "periodic maintenance") page no:30
- Remove the rear wheels (refer chapter "chassis") page no:5.1
- Remove brake drum (refer chapter ‘ Chassis ’ page no: 5.6)
- Hold the muff cup using special tool. (Fig. 5.67)

G3310690	holding tool, dog driven and muff cup

- Loosen and remove the hexagonal flange 'U' nut axle (M14) from axle complete rear.(Fig. 5.67)

22 mm socket spanner and tommy rod

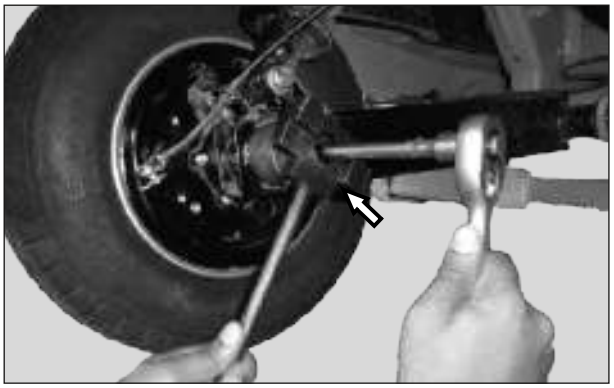


Fig. 5.67

- Take out the muff cup on wheel side from axle complete rear. (Fig. 5.68)
- Take out the axle complete rear from trailing arm.

Nylon mallet

- Check run out of the rear axle (refer procedure from chapter “chassis” page no: 5.11)
- Reassemble the all parts in the reverse order of dismantling.

REMOVE TRAILING ARM:

- Unfold the bundy tube clamps. Take out the bundy tube from trailing arm clamps . (Fig. 5.69)
- Loosen and remove bundy tube assembly rear from wheel cylinder assembly rear.

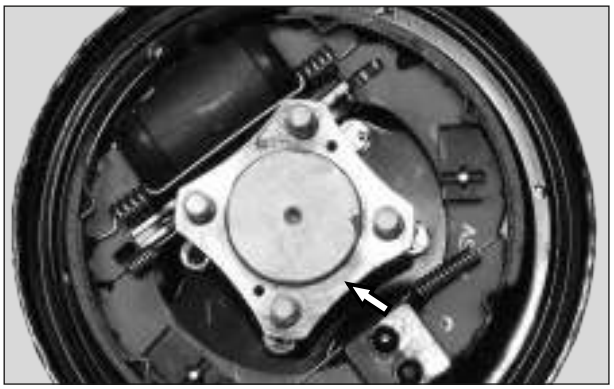


Fig. 5.68

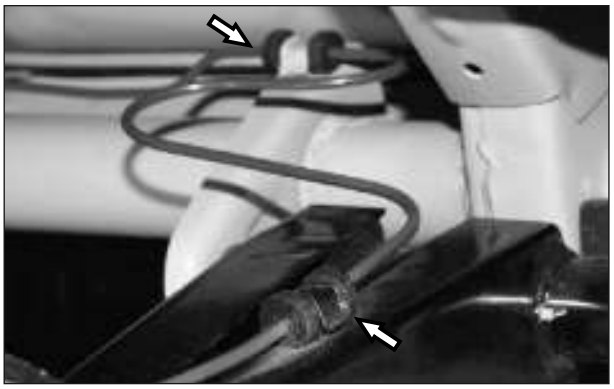


Fig. 5.69

- Unfold the parking brake split pin (A) and pin (B) from lever parking brake. (Fig. 5.70)
- Disconnect the parking brake cable from trailing arm complete rear. (C)(Fig. 5.70)
- Remove the muff cup wheel side and axle complete rear procedure above.

Nose plier

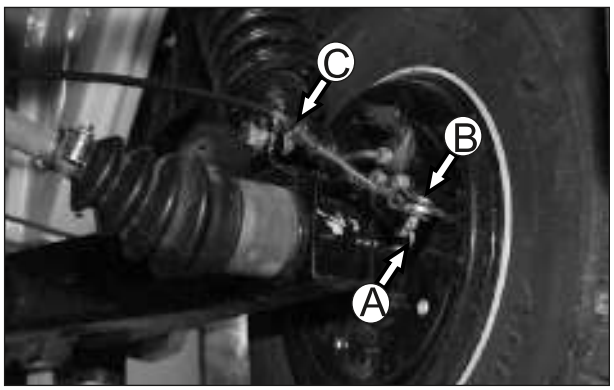


Fig. 5.70

- Loosen and remove 4 nos. hexagonal screw (M8x16) from back plate complete. (Fig. 5.71)
- Separate the back plate complete from trailing arm complete rear.
- Remove the rear shock absorber (refer the page. no. 5-26)

12 mm spanner

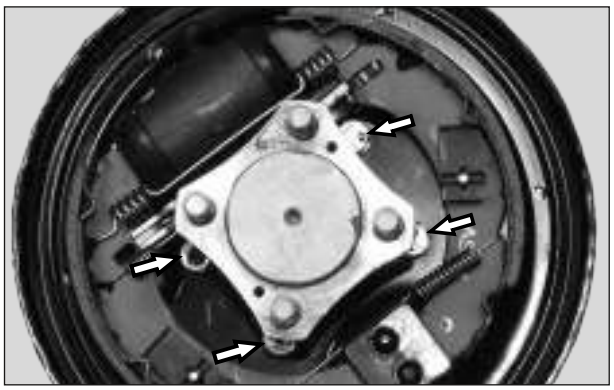


Fig. 5.71

- Take out the trailing arm bolt (M14x245) from trailing arm complete rear.
- Separate the trailing arm complete rear from chassis.(Fig. 5.72)

22 mm spanner

Fig. 5.72

REMOVE REAR SHOCK ABSORBER:

- Loosen and remove 1 no. Hexagonal bolt (M12x1.75x55) from bottom mounting of shock absorber, along with a punched washer, wave spring washer from trailing arm complete rear. (B) (Fig. 5.73)
- Loosen and remove 1 no. Hexagonal bolt (M12x1.75x55) from top mounting of shock absorber , along with a punched washer, wave spring washer from trailing arm complete rear. (A) (Fig.5.73)

18 mm spanner

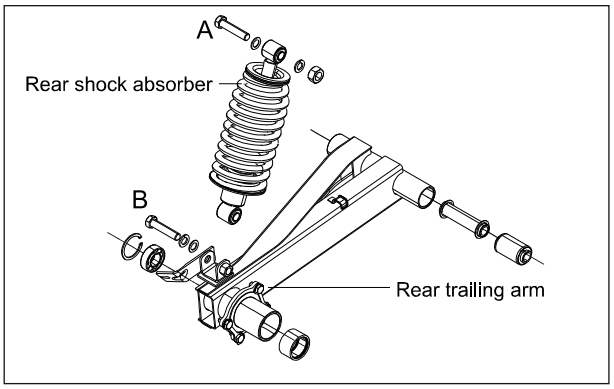


Fig. 5.73

- Separate the shock absorber from the chassis and trailing arm.
- Reassemble the all parts in the reverse order of dismantling.

REMOVE FRONT SHOCK ABSORBER:

- Lift the vehicle using jack.
- Loosen and remove 1 no. CRR pan head screw (M5 x 20) along with plain washer from speedo meter cable mounting. (Fig.5.74)
- Disconnect the speedometer cable from the hub drive.

Philips head screw

Fig. 5.74

- Hold the hexagonal screw M6x30 on the top side. (Fig. 5.75)
- Loosen and remove the 4 nos. M6 hexagonal nut along with wave spring washers from the bottom of the front fender.

10 mm spanner

- Take out the 4 nos. Hexagonal nut along with wave spring washer.
- Take out the 4 nos. Hexagonal bolt along with punched washer from front fender.
- Loosen the hexagonal bolt (M12 x 1.75 x 55) from the front shock absorber assembly bottom mounting.(C), do not remove the bolt (Fig. 5.76).

18 mm spanner

Fig. 5.75

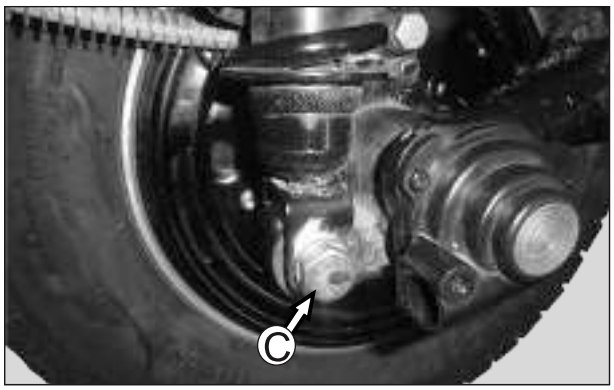


Fig. 5.76

- The top mounting of front shock absorber has two nuts, one on the top and the second at the bottom. Hold the hexagonal bottom nut (B). (Fig. 5.77)
- Loosen and remove the top hexagonal nut from front shock absorber assembly top mounting (A). (Fig. 5.77)

14 mm spanner

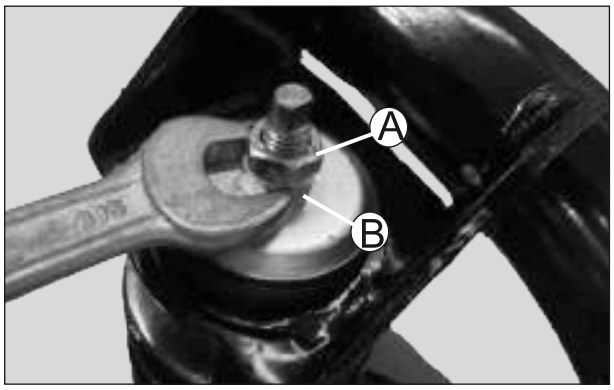


Fig. 5.77

- Hold the shock absorber stud with a spanner so that the bottom nut can be removed. (Fig. 5.78)
- Hold the trailing arm with one hand.
- Loosen and remove the hexagonal nut (bottom) from shock absorber assembly top mounting(B). (Fig. 5.78)
- Take out the retainer washer and rubber bush from front shock absorber assembly.

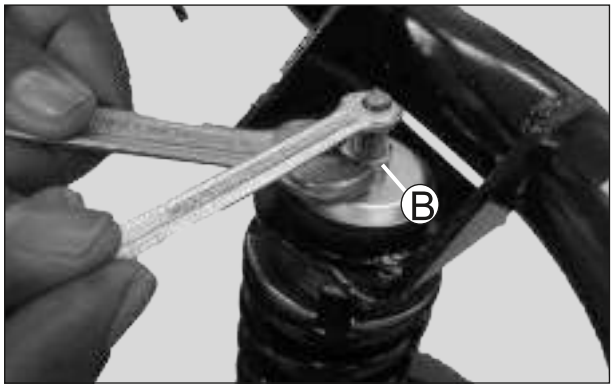


Fig. 5.78

6 mm open end spanner and 14 mm spanner

- Now, take out the already loosened hexagonal bolt(M12 x 1.75 x 55) along with punched washer and wave spring washer from front shock absorber assembly bottom mounting (C).(Fig. 5.79)
- Take out the front shock absorber assembly from steering column.
- Reassemble with a new one front shock absorber.
- Reassemble the all parts in the reverse order of dismantling.

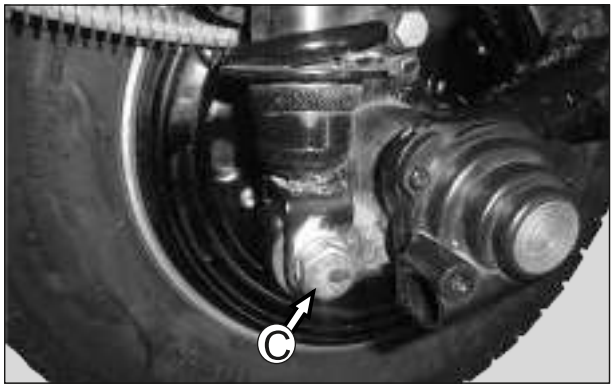


Fig. 5.79

REMOVE PASSENGER BODY:

- To carry out repairs like tinkering, welding and painting the cabin needs to be separated from the chassis.
- Loosen and remove the knobs top and bottom from tail door. Also, unlock the tail door using control key. Open the tail door. (Fig. 5.80)

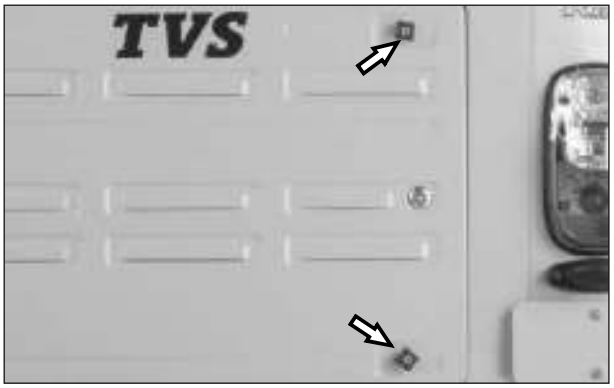


Fig. 5.80

- Close the fuel cock to OFF position.
- Disconnect hose fuel cock from carburetor (A). (Fig. 5.81)
- Disconnect fuel warning switch coupler from wiring harness rear (B) (wherever applicable). (Fig. 5.81)

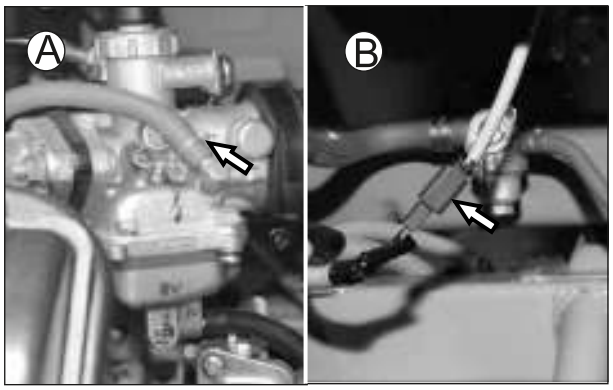


Fig. 5.81

- Disconnect breather hose PCV from air cleaner assembly (C). (Fig. 5.82)
- Loosen and remove the tube out let air filter hose clip from carburetor intake (D) (Fig. 5.82)

Philips head screw driver

- Pull out the tube out let air filter from carburetor.

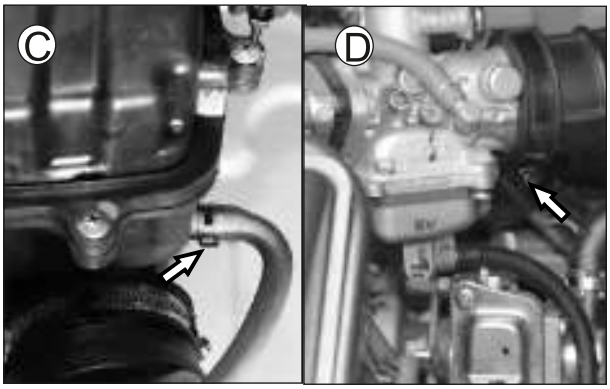


Fig. 5.82

- Disconnect the starter relay from cabin. (Fig. 5.83)
- Pull out the suppressor cap from spark plug.
- Loosen and remove 1 no. hexagonal flange bolt (M6 x 25) of earth cable from cowl LH and seperate the earth cable. (Fig. 5.83)

8 mm spanner

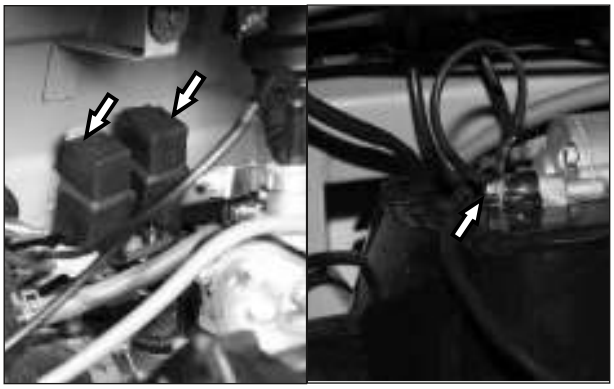


Fig. 5.83

- Disconnect rear combination lamp LH coupler from wiring harness rear. (Fig. 5.84)
- Disconnect rear combination lamp RH coupler and lamp assembly license plate coupler from wiring harness rear. (Fig. 5.84)

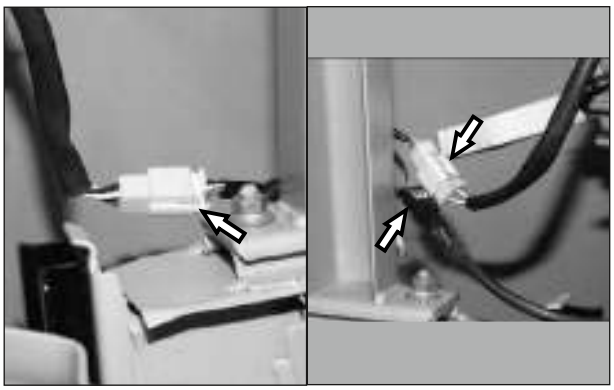


Fig. 5.84

- Loosen and remove 2 nos. hexagonal screw (M6x16) (A) from the cover TCI along with plain washer. (Fig. 5.85)
- Take out the cover TCI (B). (Fig. 5.85)

10 mm spanner

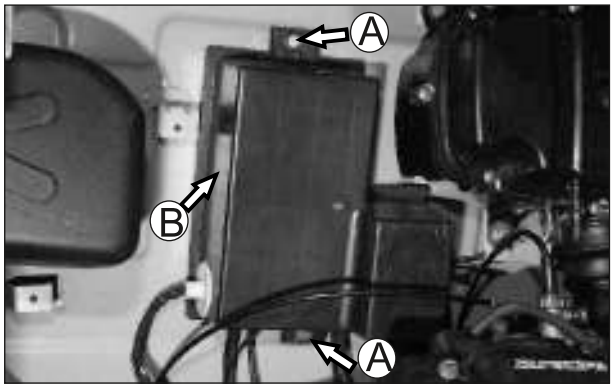


Fig. 5.85

- Pull out the TCI unit (C) from the mounting on cabin. (Fig. 5.86)
- Loosen and remove 1 no. hexagonal screw (M6x16) (D) from ignition coil assembly top mounting and separate the earth cables. (Fig. 5.86)

10 mm spanner

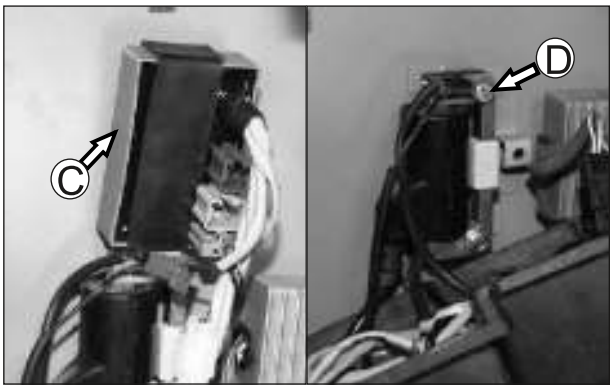


Fig. 5.86

- Disconnect out put wire from TCI coupler to ignition coil.(A) (Fig. 5.87)
- Disconnect RR unit coupler from wiring harness.(B) (Fig. 5.87)

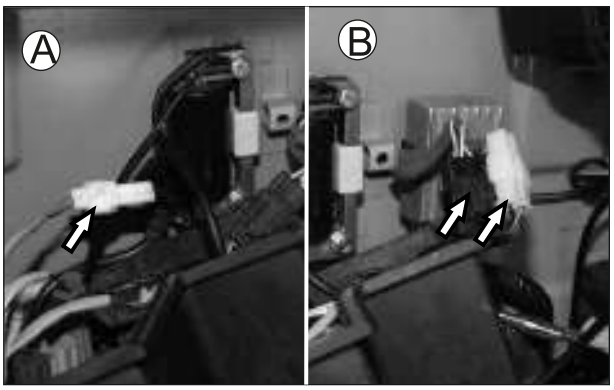


Fig. 5.87

- Loosen and remove 2 nos. Hexagonal nut M6 passenger bottom seat mounting. (Fig. 5.88)
- Loosen and remove 3 nos. Hexagonal nut M6 along with 1 no. Plain washer passenger top seat mounting. (Fig. 5.88)

10 mm spanner

- Take out the passenger bottom seat and passenger top seat.

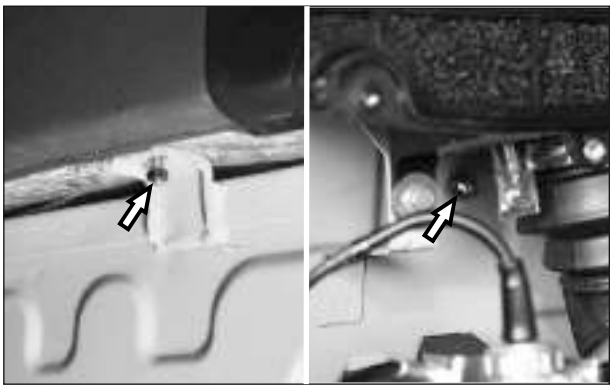


Fig. 5.88

- Loosen and remove 6 nos. CRR pan head screw (M6x16) from side cover passenger seat LH and RH. (Fig. 5.89)

Philips head screw driver

- Take out the side cover passenger seat.

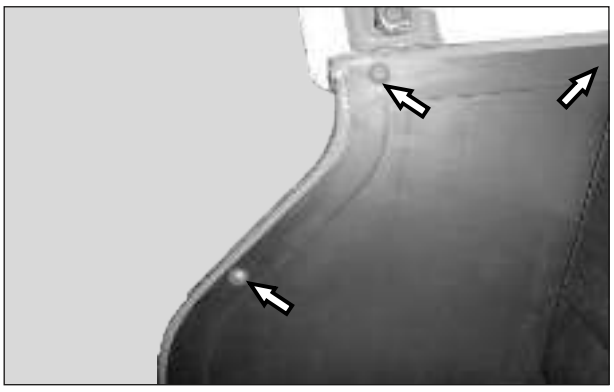


Fig. 5.89

- Unlock button assembly floor mat LH and RH. (Fig. 5.90)
- Take out the grommet sill level LH and RH.

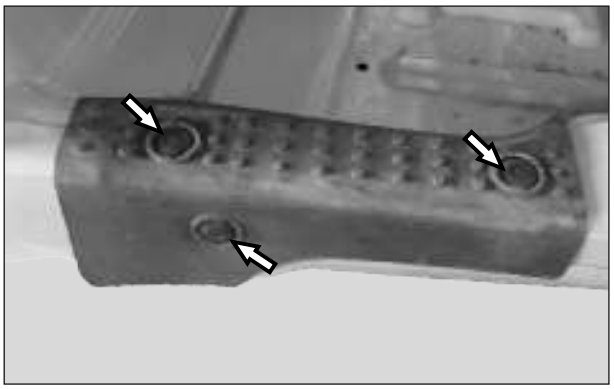


Fig. 5.90

- Loosen and remove 2 nos. Hexagonal screw (M8 x 1.25 x 25) from cabin mounting. (Fig. 5.91)

12 mm spanner

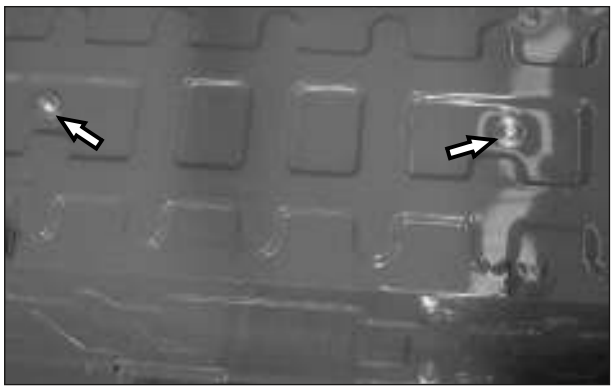


Fig. 5.91

- Close the tail door and lock it using control key. (Fig. 5.92)
- Take out the passenger cabin from chassis.
- Reassemble all the parts in the reverse order of dismantling.

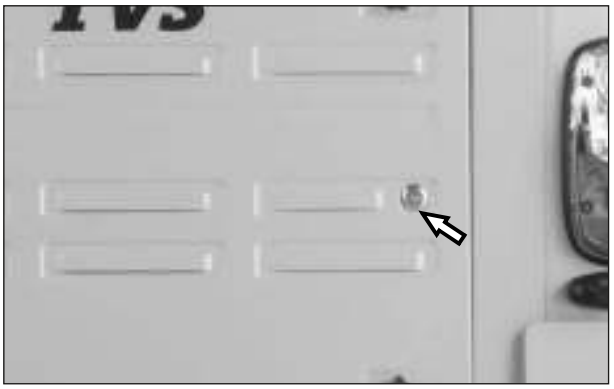


Fig. 5.92

REMOVE PASSENGER BODY (GS+, LS+ & ZS+)

- To carry out repairs like tinkering, welding and painting the cabin needs to be separated from the chassis.
- Loosen and remove the knobs top and bottom from tail door. Also, unlock the tail door using control key. Open the tail door. (Fig. 5.93)

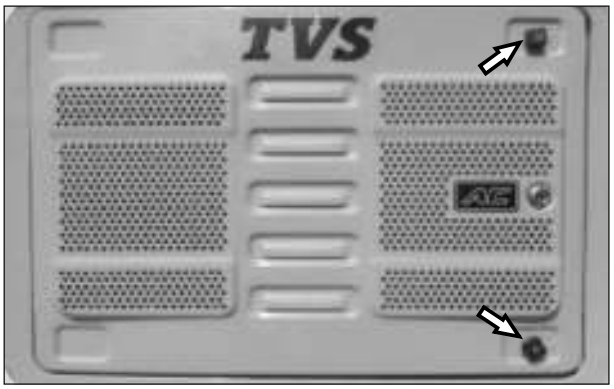


Fig. 5.93

- Close the fuel cock to OFF position.
- Disconnect hose fuel cock from carburetor (A). (Fig. 5.94)
- Disconnect fuel sender unit coupler from wiring harness rear (B) (wherever applicable). (Fig. 5.94)

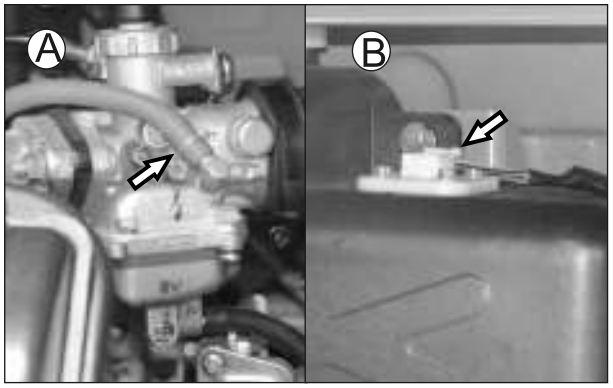


Fig. 5.94

- Disconnect breather hose PCV from air cleaner assembly (C). (Fig. 5.95)
- Loosen and remove the tube out let air filter hose clip from carburetor intake (D) (Fig. 5.95)

Philips head screw driver & Nose plier

- Pull out the tube out let air filter from carburetor.
- Loosen and remove hexagonal screw (M6x16 - 2 nos.) along with wave spring washer (2 nos.) and Punched washer (2 nos.) (A) from air cleaner assembly top mounting. (Fig. 5.96)
- Loosen and remove hexagonal screw (M6x16 - 1 no.) along with a wave spring washer (1 no.) and a punched washer (1 no.) (B). from air cleaner assembly bottom mounting. (Fig. 5.96)

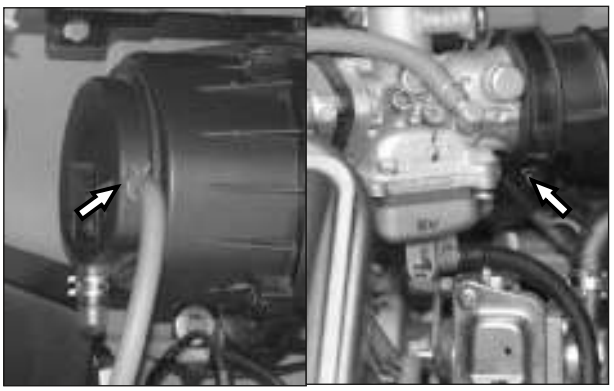


Fig. 5.95

10 mm spanner

- Gently pull the air cleaner assembly and take out from flange inlet complete.

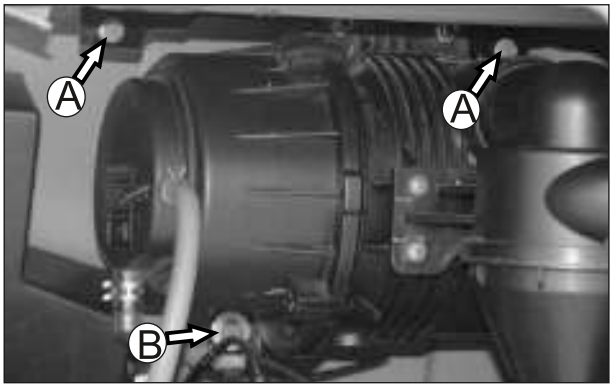


Fig. 5.96

- Disconnect the starter relay from cabin. (Fig. 5.97)
- Pull out the suppressor cap from spark plug.
- Loosen and remove 1 no. hexagonal flange bolt (M6 x 25) of earth cable from cowl LH and seperate the earth cable. (Fig. 5.97)

8 mm spanner

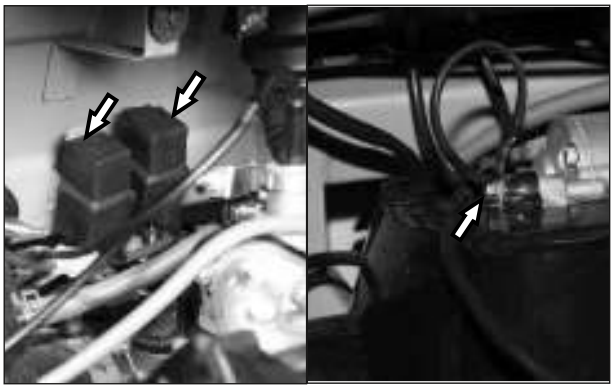


Fig. 5.97

- Air filter SAI removal procedure as explained in chapter 'Fuel, lubrication and exhaust system' page no. 4.15

- Disconnect rear combination lamp LH coupler from wiring harness rear. (Fig. 5.98)
- Disconnect rear combination lamp RH coupler and lamp assembly license plate coupler from wiring harness rear. (Fig. 5.98)

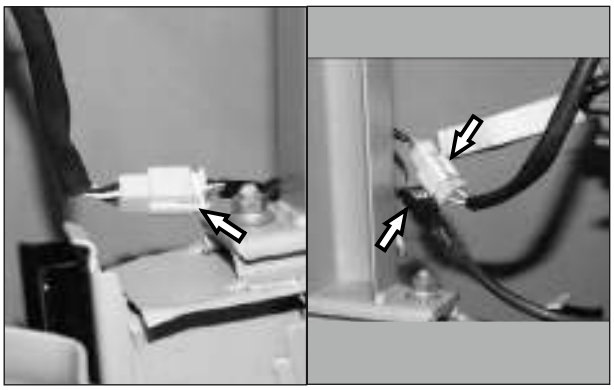


Fig. 5.98

- Loosen and remove 2 nos. hexagonal screw (M6x16) (A) from the cover TCI along with punched washer. (Fig. 5.99)
- Take out the cover TCI (B). (Fig. 5.99)

10 mm spanner

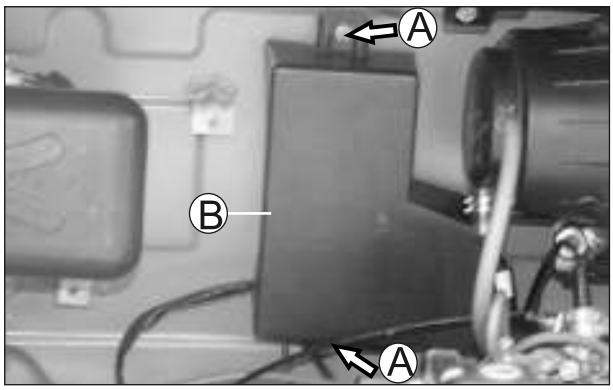


Fig. 5.99

- Pull out the TCI unit (C) from the mounting on cabin. (Fig. 5.100)
- Loosen and remove 1 no. hexagonal screw (M6x16) (D) from ignition coil assembly top mounting and separate the earth cables. (Fig. 5.100)

10 mm spanner

Fig. 5.100

- Disconnect out put wire from TCI coupler to ignition coil.(A) (Fig. 5.101)
- Disconnect RR unit coupler from wiring harness.(B) (Fig. 5.101)

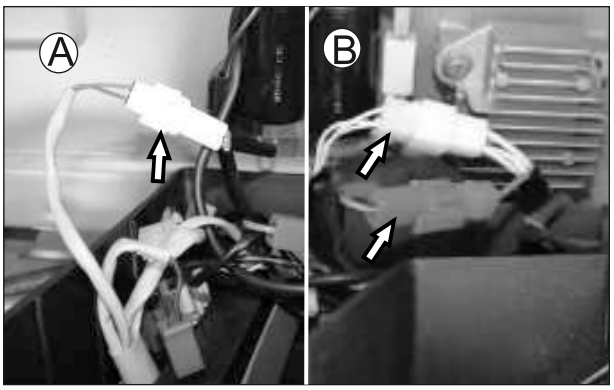


Fig. 5.101

- Loosen and remove 2 nos. Hexagonal nut M6 passenger bottom seat mounting. (Fig. 5.102)
- Loosen and remove 3 nos. Hexagonal nut M6 along with 1 no. Plain washer passenger top seat mounting. (Fig. 5.102)

10 mm spanner

- Take out the passenger bottom seat and passenger top seat.

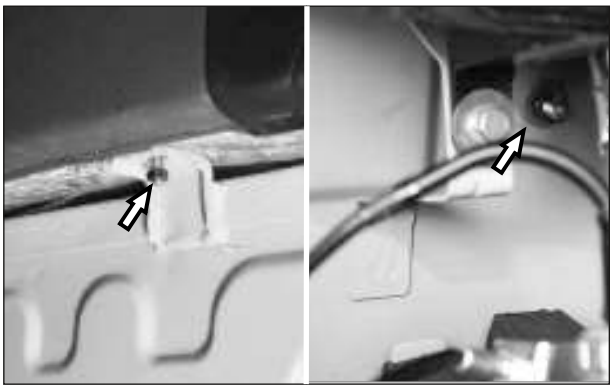


Fig. 5.102

- Loosen and remove 6 nos. CRR pan head screw (M6x16) from side cover passenger seat LH and RH. (Fig. 5.103)

Philips head screw driver

- Take out the side cover passenger seat.

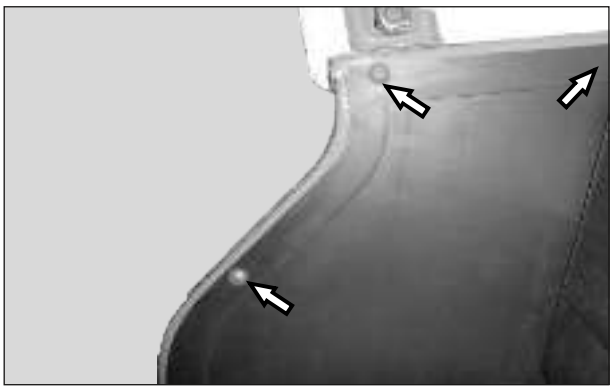


Fig. 5.103

- Unlock button assembly floor mat LH and RH. (Fig. 5.104)
- Take out the grommet sill level LH and RH.

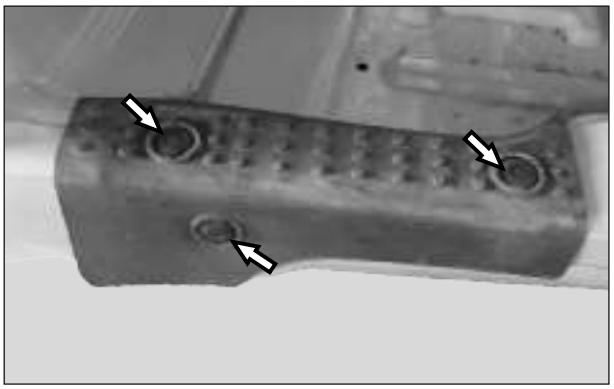


Fig. 5.104

- Loosen and remove 2 nos. Hexagonal screw (M8 x 1.25 x 25) from cabin mounting. (Fig. 5.105)

12 mm spanner

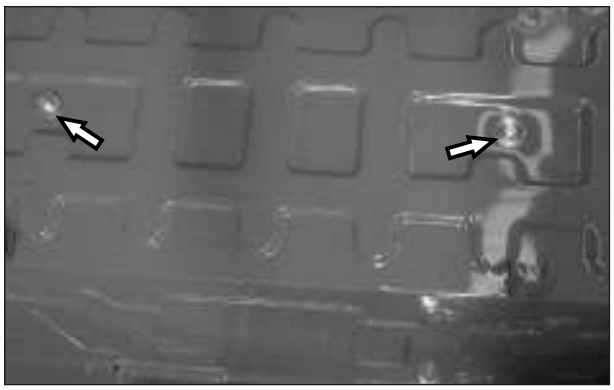


Fig. 5.105

- Close the tail door and lock it using control key. (Fig. 5.106)
- Take out the passenger cabin from chassis.
- Reassemble all the parts in the reverse order of dismantling.

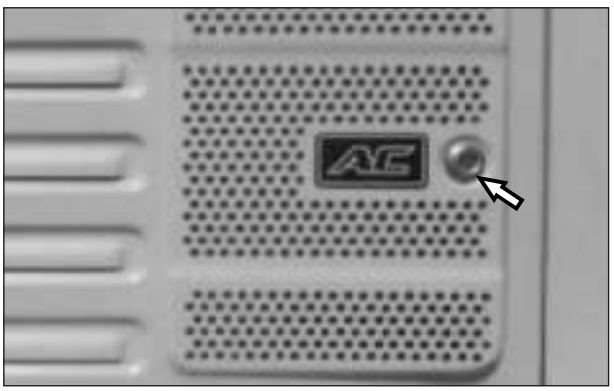


Fig. 5.106

PASSENGER CABIN

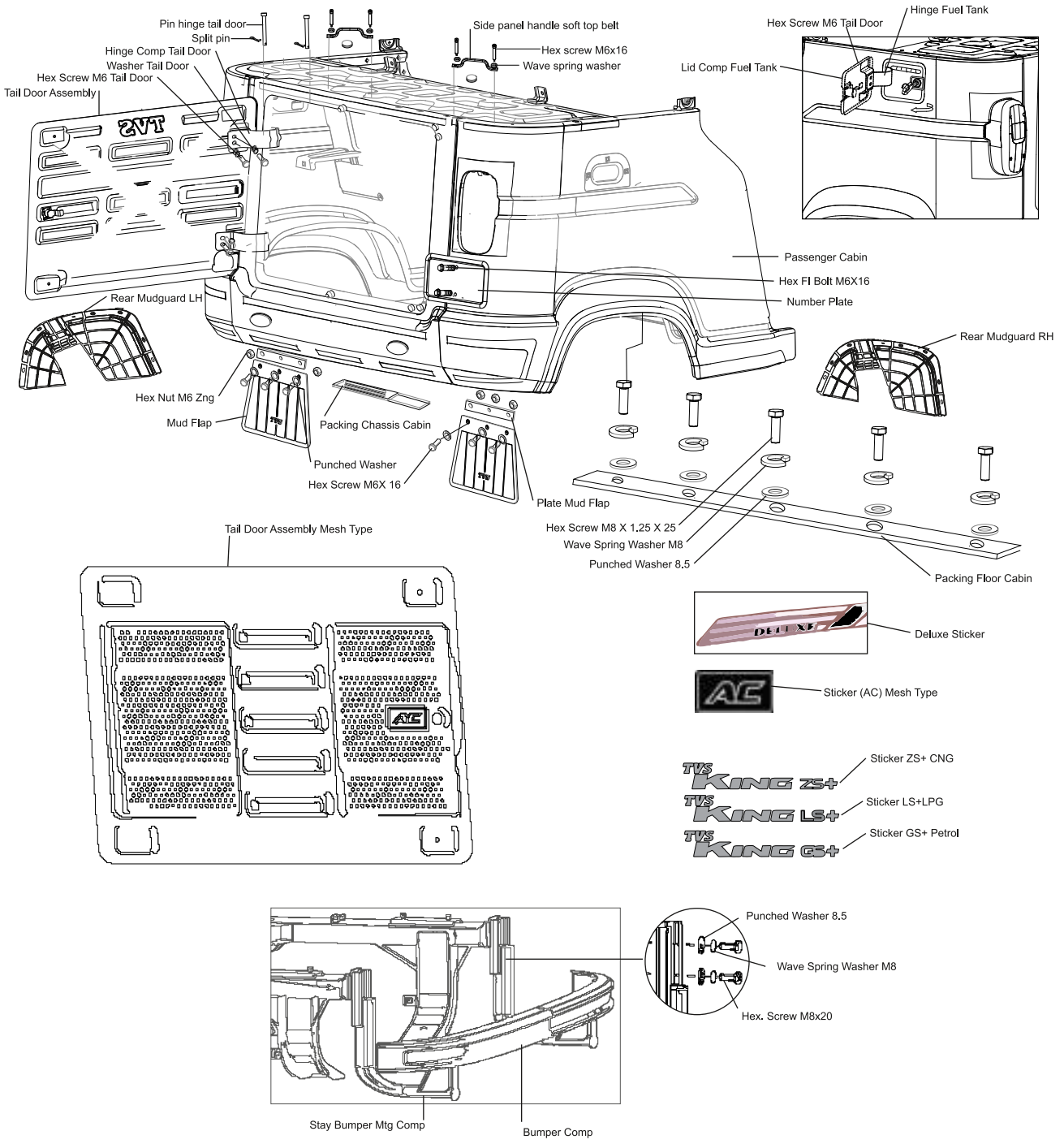


Fig. 5.107

Chapter 6

ELECTRICAL SYSTEM

CONTENTS

WIRE COLOUR CODE INDEX

SI. NO.	CODE	WIRE COLOUR
01	B	BLACK
02	BR	BLACK WITH RED TRACER
03	BY	BLACK WITH YELLOW TRACER
04	BW	BLACK WITH WHITE TRACER
05	Bl	BLUE
06	BlR	BLUE WITH RED TRACER
07	BlW	BLUE WITH WHITE TRACER
08	Br	BROWN
09	BrB	BROWN WITH BLACK TRACER
10	BrW	BROWN WITH WHITE TRACER
11	G	GREEN
12	GB	GREEN WITH BLACK TRACER
13	GR	GREEN WITH RED TRACER
14	GW	GREEN WITH WHITE TRACER
15	GY	GREEN WITH YELLOW TRACER
16	Gr	GREY
17	GrR	GREY WITH RED TRACER
18	Lg	LIGHT GREEN
19	Lbl	LIGHT BLUE
20	Or	ORANGE
21	R	RED
22	RB	RED WITH BLACK TRACER
23	RW	RED WITH WHITE TRACER
24	V	VIOLET
25	W	WHITE
26	WBl	WHITE WITH BLUE TRACER
27	WR	WHITE WITH RED TRACER
28	Y	YELLOW
29	YR	YELLOW WITH RED TRACER
30	TBl	YELLOW WITH BLUE TRACER
31	YW	YELLOW WITH WHITE TRACER

CONNECTING BATTERY:

- For battery disassembly or servicing, be sure to disconnect the negative terminal first.
- When connecting terminals to the battery, connect the + ve terminal first.
- If any terminal of the battery is found with corrosion, remove the battery, pour warm water over it and clean with a wire brush.
- Apply petroleum jelly on the terminals after the completion of the connection and cover the positive terminal with the boot. (Fig. 6.1)
- TVS KING Deluxe vehicle Consists of the following Circuits in the Electrical system

1. Ignition circuit * 2. Lighting circuit *
3.Charging circuit * 4. Starting circuit*
5. LPG circuit 6. CNG circuit

* Applicable for All the variants (Petrol ,LPG,CNG)

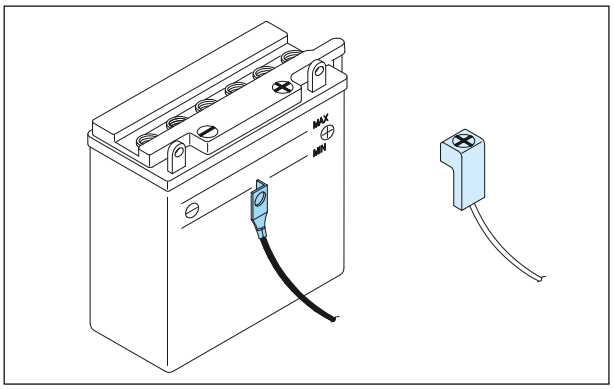


Fig. 6.1

IGNITION SYSTEM

- The ignition system consists of a magneto assembly, battery assembly, digital TCI unit (Transistor Controlled Ignition unit DC digital), ignition switch, ignition coil assembly and a spark plug.
- The output from pulsar coil and starting coil is directly given to TCI unit. The TCI unit is also connected with the ignition switch.
- When the ignition switch is in OFF position the 'DC' input to the TCI gets disconnected and then the engine will not start.
- The pulsar coil produces the signals whenever the pip on the magneto periphery passes through.
- Based on the signals, the micro controller installed in the TCI will give input to the primary wingdings (thicker turns) of ignition coil where voltage will collapse in fraction of a second.

- This in turn develops high voltage across the secondary winding's (thinner turns) of ignition coil due to mutual induction. This high voltage passes to spark plug through HT lead of ignition coil.

IGNITION SWITCH

- The ignition switch is located on the right side dashboard Inspect the ignition switch for continuity with the multi meter as below: (Fig. 6.2)

- Place the multimeter position in continuity inspection mode, connect '+ve' probe of multimeter in orange (Or) wire and '-ve' probe of multimeter red (R) wire from ignition switch as shown in (Fig. 6.2) a Beep sound should be heard when ignition switch is in ON position and should switch off when turned to off position.

KEY POSITION	Or	R
OFF		
ON	○	○

Fig. 6.2

CONNECTOR

- When connecting a connector, be sure to push it in until a click is felt. (Fig. 6.3)

- Inspect the connector for corrosion, contamination and breakage on its cover.

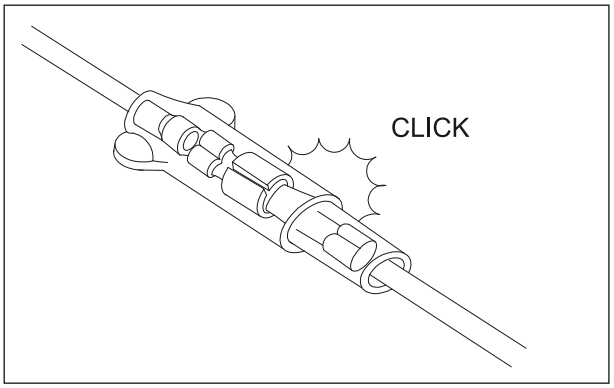


Fig. 6.3

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. 6.4)

- When disconnecting the coupler, be sure to hold the coupler itself and do not pull the lead wires.

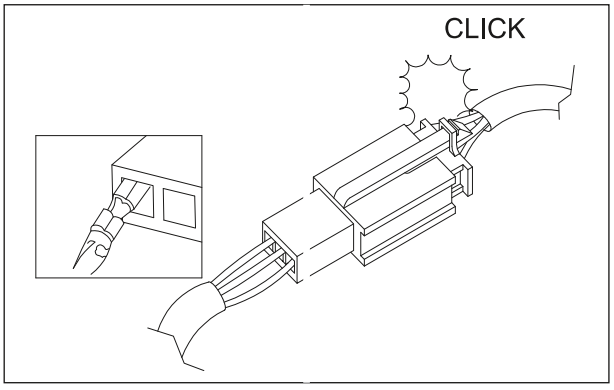


Fig. 6.4

- Inspect each terminal on the coupler for not being loose 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. 6.5)
- Always use specified fuse only.
- Do not use wire or any other substitute for the fuse.

SEMICONDUCTOR EQUIPPED PART

- Be careful not to drop the parts with built-in semiconductor such as a TCI unit, regulator/rectifier and others. (Fig. 6.6)
- When inspecting these parts, follow inspection instruction strictly. Neglecting proper procedure may cause damage to these parts.

CHECKING THE IGNITION COIL ASSEMBLY WITH MULTIMETER

- With the multi meter continuity and resistance values of both primary and secondary coils can be checked.
- Set the multimeter knob in 200 Ω position Check resistance of the primary winding by connecting '+ve' probe of the multimeter to the orange (Or) wire and ' - ve' probe of the multimeter to the blue (Bl) wire.(Fig. 6.7)

Note: Engine should be in off position.

Primary coil resistance	2.5 – 4 ohm

- If the primary resistance is OK, then check the secondary winding.
- Set multi meter knob to 200 kΩ. Connect '+ve' probe of the multimeter to the HT cord and '- ve' probe of the multimeter to the blue (Bl) wire.(Fig. 6.8)

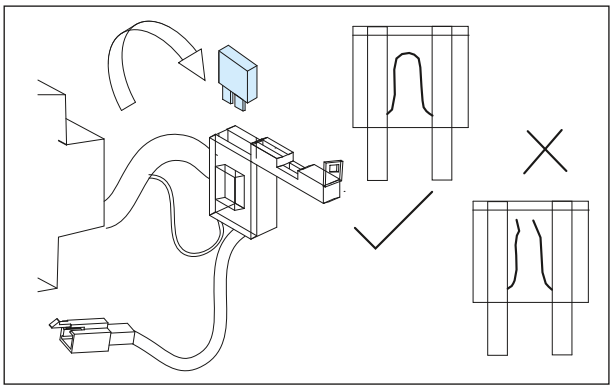


Fig. 6.5

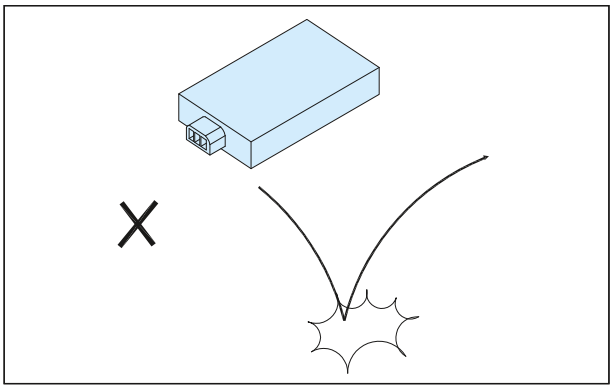


Fig. 6.6

Fig. 6.7

Fig. 6.8

Note: Engine should be in off position.

Secondary coil resistance	13 – 22 k ohm

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

CHECKING THE PULSER COIL WITH MULTIMETER

- Set the multimeter knob to 2000 Ω.
- Connect '+ve' probe of the multimeter to the brown (Br) wire and '- ve' probe of the multimeter to the white (W) wire from the pulser coil. (Fig. 6.9).

Note: Engine should be in off position.

Pulser coil (Br – W)	160 – 200 ohm

Fig. 6.9

LIGHTING SYSTEM

- 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.
  - Headlamp
  - High beam indicator lamp
  - Brake lamp
- Due to magnetic induction AC is produced in the magneto and connected to the light switch.
- When the light switch is in ON position, the current passes to the RR unit. Regulator controls the magneto output voltage between 12 and 14 volts. Thus the regulated voltage is supplied to the lighting system as shown in the fig.
- Headlights can be operated by the switch on the left hand side of the dashboard Inspect the switch for continuity with multimeter. (Fig. 6.10)

Fig. 6.10

- Set the multimeter knob position in continuity inspection mode, connect '+ve' probe of the multimeter to the orange (Or) wire and '-ve' probe of the multimeter to the grey (Gr) wire from parking light switch. Beep sound should be heard. (Fig. 6.11)

Note: Ensure the parking light switch is ON before continuity test.

Ignition switch should be 'OFF' position.

Fig. 6.11

- Set the multimeter knob position in continuity inspection mode, connect '+ve' probe of the multimeter to the yellow with red tracer (YR) wire and '-ve' probe of the multimeter to the yellow with white tracer (YW) wire from head light switch. Beep sound should be heard. (Fig. 6.12)

Note: Ensure the head light switch is ON before continuity test.

Ignition switch should be 'OFF' position.

Fig. 6.12

SWITCH POSITION	Or	Gr	YR	YW
Parking	○	○		
HL ON / Parking	○	○	○	○
OFF				

- The head lamp is connected to a beam control switch assembly handlebar - RH inspect the switch for continuity with multimeter.

- Set the multimeter knob position in continuity inspection mode, connect '+ve' probe of the multimeter to the brown with blue tracer (BrBl) wire and '-ve' probe of the multimeter to the red with white tracer (RW) wire from low beam switch. Beep sound should be heard. (Fig. 6.13)

Note: Ensure the low beam light switch is ON before continuity test.

Ignition switch should be 'OFF' position.

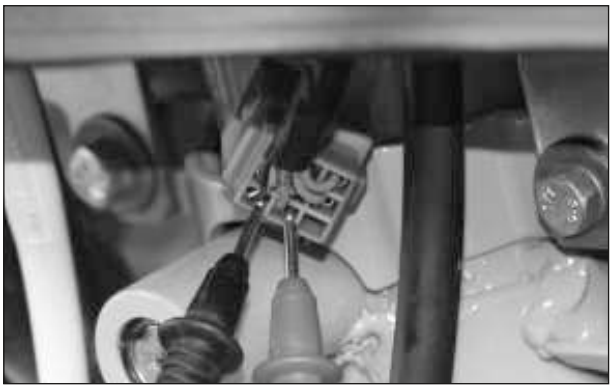


Fig. 6.13

- Set the multimeter knob position in continuity inspection mode, connect '+ve' probe of the multimeter to the brown with blue tracer (BrBl) wire and '-ve' probe of the multimeter to the yellow (Y) wire from high beam switch. Beep sound should be heard.(Fig. 6.14)

Note: Ensure high beam switch is ON before continuity test.
Ignition switch should be in 'OFF' position.

SWITCH POSITION	Y	BrBl	RW
PRESS UP LOW		○	○
PRESS DOWN HIGH	○	○	

Fig. 6.14

REGULATION SYSTEM

- The RR unit is fitted inside engine cabin inside the Cover TCI.
- Loosen and remove 2 nos. Hexagonal screw (M6x16) along with punched washer from cover TCI. (Fig. 6.15)
- Take out the cover TCI.
- The RR unit consists of a regulator which regulates the AC voltage to a constant 12 V, rectifier which converts AC input to DC output used for charging and other DC circuits.

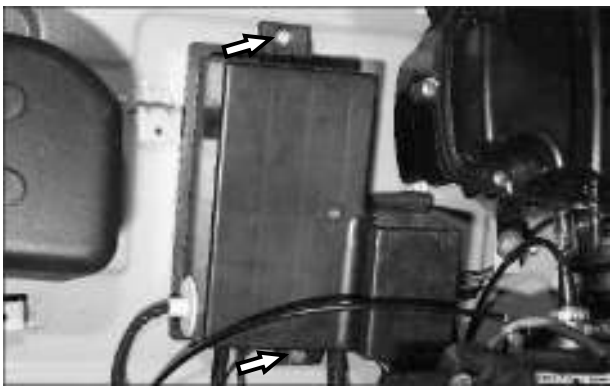


Fig. 6.15

LIGHTING COIL:

- Set the multimeter knob to 200 Ω.
- To check the resistance of lighting coil
- Ensure Engine should be switched OFF.
- Connect '+ve' probe of the multimeter to the Yellow with Red tracer (YR) wire from the magneto assembly and '-ve' probe of the multimeter to the Black with White tracer (BW) wire from the magneto assembly. (Fig. 6.16)
- If the resistance is not within the specified limit, replace the coil assembly with a new one.

Lighting coil (YR - BW)	0.5 Ω - 0.8 Ω

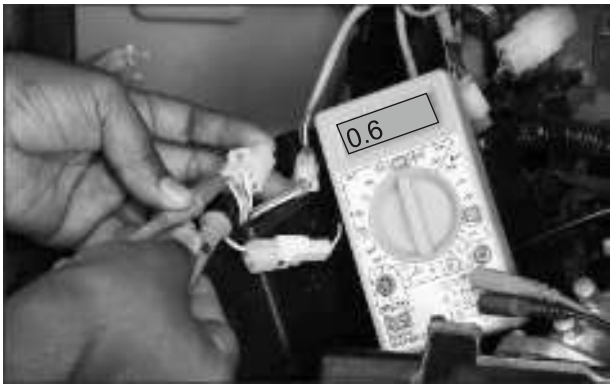


Fig. 6.16

LIGHTING PERFORMANCE CHECK

Condition :1

- Set the multimeter knob to AC 200 V.
- For open circuit voltage AC (disconnect magneto lighting coil coupler)
- Connect the '+ve' probe of the multimeter to the Yellow with Red tracer (YR) wire from the magneto assembly and '-ve' probe of the multimeter to the Black with White trace (BW) wire from the magneto assembly. (Fig. 6.17)
- Then start the engine. Connect tachometer and increase the engine rpm to 1200rpm.
- Measured output should be between 13V AC to 15V AC.

Lighting performance	13 ~ 15 V AC

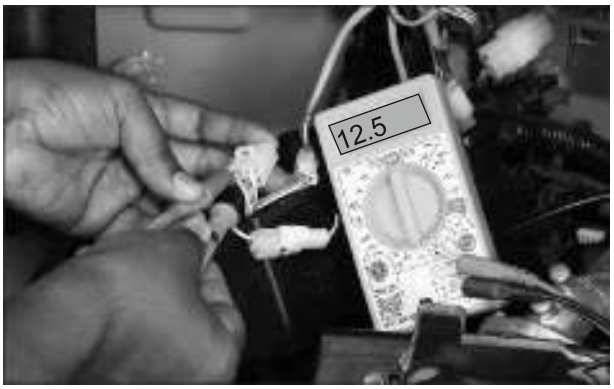


Fig. 6.17

LIGHTING PERFORMANCE CHECK

Condition :2

- Set the multimeter knob to AC 200 V.
- For open circuit voltage AC (disconnect magneto lighting coil coupler)
- Connect the '+ve' probe of the multimeter to the Yellow with Red tracer (YR) wire from the magneto assembly and '-ve' probe of the multimeter to the Black with White trace (BW) wire from the magneto assembly. (Fig. 6.18)
- To start the engine and Connect tachometer and increase the engine rpm to 5500 rpm.
- Measured Output form magneto should be between 55V AC to 60V AC.

Lighting performance	55 ~ 60 V AC

Fig. 6.18

CHARGING AND DC SYSTEM

- The charging system and DC system consists of a magneto assembly, 12V DC regulator, 15A fuse, Ignition switch and a battery assembly.

- The AC output from the lighting and charging coil is connected to the 12V DC regulator where it is converted to direct current (DC). This DC charges the battery and is connected to the following electrical components of the vehicle.

- Horn, Wiper motor, Turn signal lamps, Reverse lamp, beeper (Reverse alarm), position lamp, Neutral lamp, Tell-tale lamp, Tail lamp, License plate lamp, Low fuel warning lamp, Speedometer lamp, Mobile phone charging socket, Driver cabin lamp (On selected variants), Engine Compartment lamp (On selected variants). Music System (On selected variants). Gas level indicators (on Selected variants), Fuel / Gas Solenoids (On selected variants).

HORN 12V DC

- The horn is mounted on the cowl at the front side behind the logo grill. Loosen and remove 4 nos. CRR Pan Head screws and remove the logo grill. (Fig. 6.19)

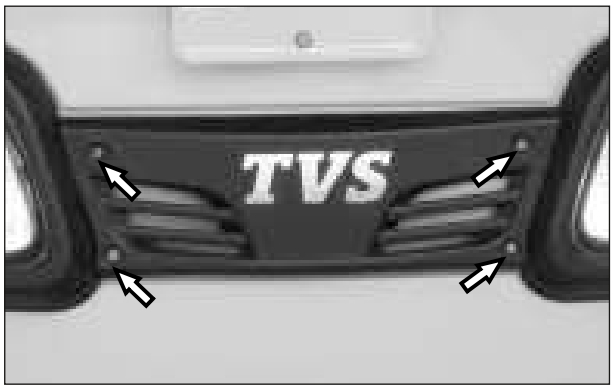


Fig. 6.19

- The +ve DC output wire Orange (Or) is connected to the horn and from horn negative Green wire (G) is connected to (–ve) through horn switch. (Fig. 6.20)

- The horn switch is located on the switch assembly handlebar – RH. Inspect the switch for continuity with multimeter.

- Switch OFF the Ignition switch, remove the connector from switch assembly handlebar connecting to wiring harness front.

Fig. 6.20

- Set Multimeter in continuity inspection mode, connect +ve probe of the multimeter to the Green (G) wire and -ve probe of the multimeter to the Black with white tracer (BW) wire. Beep sound should be heard when horn switch is pressed and should stop when switch is released. (Fig. 6.21)

SWITCH POSITION	G	BW
PRESS ON	○	○
RELEASE OFF		

Fig. 6.21

TURN SIGNAL LAMPS FRONT AND REAR

- The DC output from the ignition switch is connected to Electronic flasher unit through switch turn signal lamp and hazard warning lamp switch.

- Electronic flasher unit is mounted under the dashboard as shown in (Fig. 6.22) Inspect the Electronic flasher unit for continuity with the multimeter.

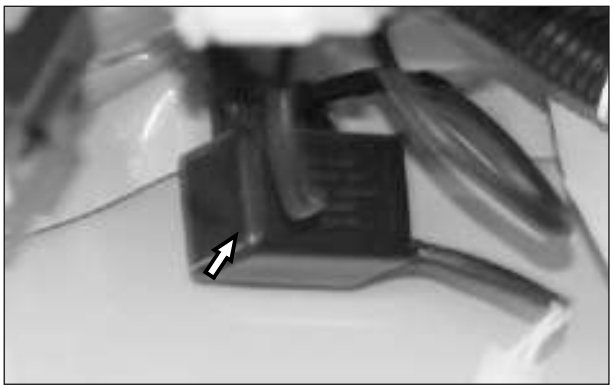


Fig. 6.22

- Set multimeter to continuity inspection mode. Connect '+ve ' probe of the multimeter to the input terminal White with Green tracer (WG) wire and '-ve' probe of the multimeter to the output terminal Light blue (Lbl) wire. Beep sound should be heard. Replace the Electronic flasher unit with a new one if there is no continuity. (Fig. 6.23)

Note: Ignition switch should be in ' OFF' position.

Fig. 6.23

- The switch turn signal is located on the switch assembly handle bar – R Inspect the switch for continuity with multimeter.

- Set multimeter to continuity inspection mode. Connect '+ve ' probe of the multimeter to the input terminal Light blue(Lbl) wire and '-ve' Probe of the multimeter to the output terminal Voilet (V) wire. Turn the switch to Left side mode Beep sound should be heard. Replace the switch assembly handle bar with a new one if there is no continuity. (Fig. 6.24)

- Similarly connect '+ve ' probe of the multimeter to the input terminal Light blue (Lbl) wire and '-ve' probe of the multimeter to the output terminal Light green (Lg) wire. Turn the switch to Right side mode. Beep sound should be heard. Replace the switch assembly handle bar with a new one if there is no continuity. (Fig. 6.24)

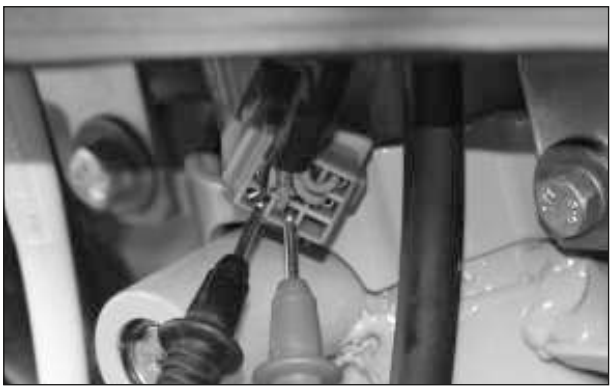


Fig. 6.24

Note: Ignition switch should be in 'OFF' position. Beep sound should be heard only when switch is in turned to either Left or Right position.

SWITCH POSITION	V	Lbl	Lg
TO LEFT	○	○	
CENTRE			
TO RIGHT		○	○

NEUTRAL LAMP

- The DC output from the ignition Switch is directly connected to the neutral indicator lamp of tell-tale lamp cluster and the bulb is connected to (-ve) through switch gear position mounted on the crankcase assembly L near the magneto. Inspect the switch for continuity.

- Set the multimeter knob position in continuity inspection mode, connect '+ve' probe of the multimeter to the brown with white tracer (BrW) wire and '-ve' probe of the multimeter body earth (Body earth) from neutral switch as shown in figure. (Fig. 6.25)

Fig. 6.25

- Beep sound should be heard only in neutral position. If not heard or heard continuously after shifting gears replace switch gear position.

Note: Ensure vehicle in neutral position before continuity test. Ignition switch should be in 'OFF' position.

SWITCH POSITION	GW	Body earth	BrW
NEUTRAL		○	○
REVERSE / ALERT	○	○	

STOP LAMP (BRAKE LAMP)

- The AC output from the RR unit is connected to the brake lamp through brake light switch.

Fig. 6.26

- Brake light switch is fitted on the bracket located in the Head tube, it is connected to brake pedal complete through spring brake switch. Inspect the brake light switch for continuity with multimeter. (Fig. 6.26)

- Switch OFF the Ignition switch, remove the connector from wiring harness front which connects to brake light switch.

- Set Multimeter in continuity inspection mode, connect +ve probe of the multimeter to the orange (Or) wire and -ve probe of the multimeter to the white (W) wire. Beep sound should be heard only when brake pedal is pressed and should stop when brake pedal is released. Replace switch assy if found malfunctioning. (Fig. 6.27)

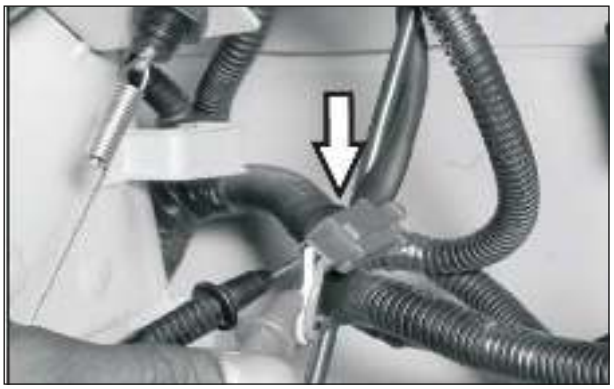


Fig. 6.27

Note: Ignition switch should be ' OFF' position.

SWITCH POSITION	Or	W
APPLY ON	○	○
RELEASE OFF		

LOW FUEL LEVEL WARNING LAMP (Only in petrol version)

- The low fuel level warning lamp is located on tell-tale lamp cluster and connected to the DC output. This lamp is connected to (–ve) through a fuel warning switch (float).

- The switch is fitted to the fuel tank assembly. Inspect the fuel warning switch for continuity.
- Drain the fuel from fuel tank in refer chapter "Fuel lubrication and exhaust system for detailed procedure; page no: 4-1).
- Set Multimeter position to continuity inspection mode then connect '+ve' probe of the multimeter to the Green with yellow tracer (GY) wire and '-ve' probe of the multimeter to Black with white tracer wire (BW) wire. (This is only available in Petrol vehicle not in LPG & CNG). Beep sound should be heard. (Fig. 6.28)

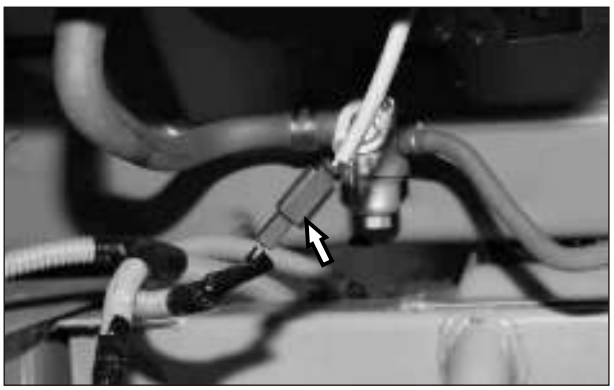


Fig. 6.28

Note: Applicable only for exclusive Petrol variants only. Fuel level should be empty for inspecting the switch. If not drain the fuel tank and inspect the switch.

SWITCH POSITION	GY	BW
LOW FUEL LEVEL	○	○
NORMAL		

CHARGING COIL:

- Set the multimeter knob to 200 Ω.
- For check the resistance (Charging coil out from stator coil)
- Connect the '+ve' probe of the multimeter to the White with Red tracer (WR) wire from the magneto assembly and '-ve' probe of the multimeter to the White with Black trace (WB) wire from the magneto assembly. (Fig. 6.29)
- If the resistance is not within the specified limit, replace the coil assembly with a new one.

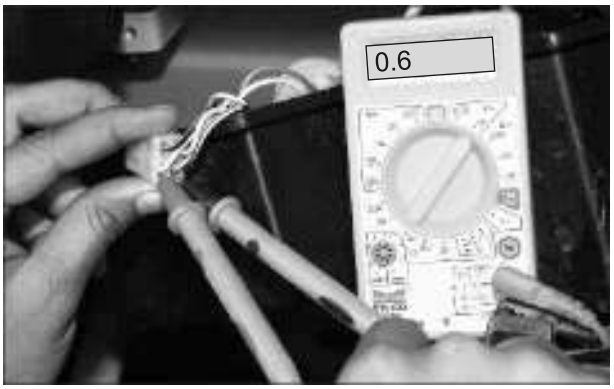


Fig. 6.29

Charging coil (WR - WB)	0.5 Ω - 0.8 Ω

Note: Engine should be switched OFF.

CHARGING PERFORMANCE CHECK:

Condition:1

- Set the multimeter knob to AC 200 V.
- For open circuit voltage AC (disconnect magneto charging coil coupler)
- Connect the '+ve' probe of the multimeter to the White with Red tracer (WR) wire from the magneto assembly and '-ve' probe of the multimeter to the White with Black trace (WB) wire from the magneto assembly. (Fig. 6.30)
- Then start the engine. Connect tachometer and increase the engine rpm to 1200.

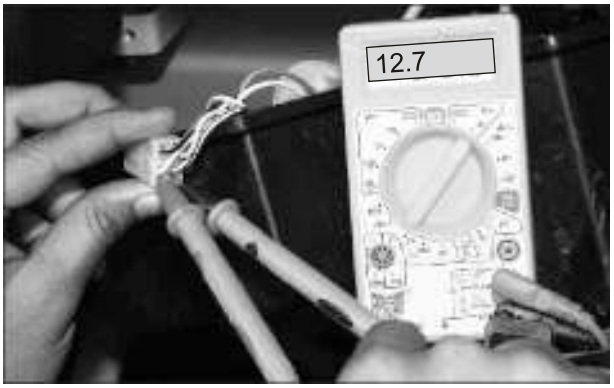


Fig. 6.30

Note: Ensure battery is full charged before performing the test.

Charging performance	12 ~ 15 V AC

CHARGING PERFORMANCE CHECK

Condition:2

- Set the multimeter knob to AC 200 V.
- For open circuit voltage AC (disconnect magneto charging coil coupler)
- Connect the '+ve' probe of the multimeter to the White with Red tracer (WR) wire from the magneto assembly and '-ve' probe of the multimeter to the White with Black tracer (WB) wire from the magneto assembly. (Fig. 6.31)
- Then start the engine. Connect tachometer and Increase the engine rpm to 5500 approx.

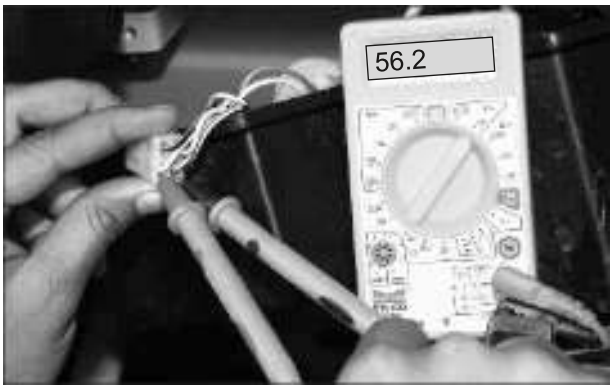


Fig. 6.31

Note: Ensure battery is full charged before performing the test.

Charging performance	55 ~ 58 V AC

BRAKE COIL:

- Set the multimeter knob to 200 Ω.
- For check the resistance (Brake coil out from stator coil)
- Connect the '+ve' probe of the multimeter to the White with Grey tracer (WGr) wire from the magneto assembly and '-ve' probe of the multimeter to the Body earth (Body earth). (Fig. 6.32)
- If the resistance is not within the specified limit, replace the coil assembly with a new one.

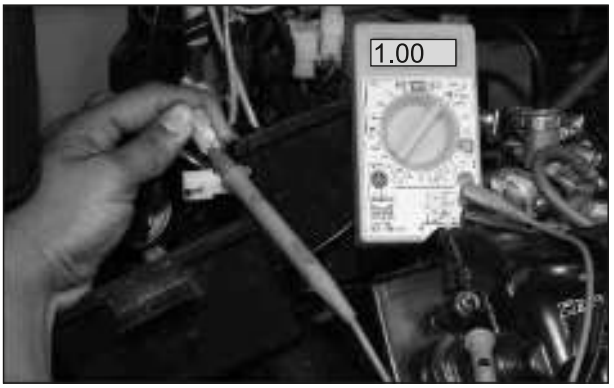


Fig. 6.32

Brake coil (WGr - Body earth)	0.7 Ω - 1.2 Ω

Note: Engine should be switched OFF.

BRAKE COIL PERFORMANCE CHECK:

Condition:1

- Set the multimeter knob to AC 200 V.
- For open circuit voltage AC (disconnect magneto brake coil coupler)
- Connect the '+ve' probe of the multimeter to the White with Grey tracer (WGr) wire from the magneto assembly and '-ve' probe of the multimeter to the Body earth (Body earth). (Fig. 6.33)
- Then start the engine. Connect tachometer and increase the engine rpm to 1200.

Brake coil performance	12 ~ 15 V AC

Fig. 6.33

BRAKE COIL PERFORMANCE CHECK:

Condition:2

- Set the multimeter knob to AC 200 V.
- For open circuit voltage AC (disconnect magneto brake coil coupler)
- Connect the '+ve' probe of the multimeter to the White with Grey tracer (WGr) wire from the magneto assembly and '-ve' probe of the multimeter to the Body earth (Body earth). (Fig. 6.34)
- Then start the engine. Connect tachometer and increase the engine rpm to 5500.

Brake coil performance	56 ~ 59 V AC

Fig. 6.34

ELECTRIC STARTER SYSTEM

- The starter system consists of starter motor assembly, starter relay, starter switch, neutral switch and ignition switch.
- While pressing the starter switch with the transmission in neutral, the current flows to the starter relay and TCI unit to activate the starter relay to close the starter motor assembly circuit.
- Now the current passes from the battery to the starter motor assembly through a thick red wire.
- A thick black wire is connected from battery to the starter motor. Since the current flow is high, thick wires have been provided.
- To start the starter motor assembly at frequent intervals the motor is connected with a mechanical starter relay.The relay contains a electromagnet energized by the DC supply through starter switch as shown. The magnetized coil will connect the terminal contacts to close starter motor circuit.

ELECTRIC STARTER SWITCH

- Electric starter switch is located on the dashboard switch assembly L. Inspect the switch for continuity.(Fig. 6.35)
- Set the multimeter in continuity inspection mode, connect '+ve' probe of the multimeter to the orange (Or) wire and '-ve' probe of the multimeter to the red with blue tracer (RBI) wire of dashboard switch assembly L. Beep sound should be heard only when the switch is pressed. (Fig. 6.35)

Note: Ignition switch should be 'OFF' position.

SWITCH POSITION	Or	RBI
PRESS (ON)	○	○
PRESS (OFF)		

Fig. 6.35

HAZARD WARNING SWITCH

- It is located on the center of the dashboard. Inspect the switch for continuity. (Fig. 6.36)

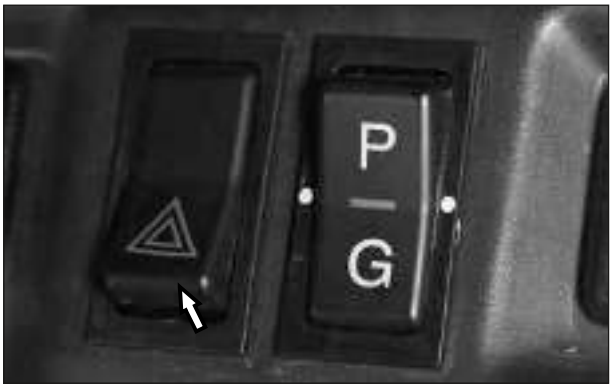


Fig. 6.36

- Set the multimeter position in continuity inspection mode, connect '+ve' probe of the multimeter to the red with black tracer (RB) wire and '-e' probe of the multimeter to the white with green tracer (WG) wire from hazard warning switch as shown in figure. (Fig. 6.37). Beep sound should be heard when hazard warning switch is in 'ON' position and should be switch 'OFF' when hazard to 'OFF' position. (Fig. 6.)

Fig. 6.37

SWITCH POSITION	RB	WG	Or	V	Lbl	Lg
ON	○	○		○	○	○
OFF		○	○			

SERVICING OF STARTERMOTOR ASSEMBLY

Dismantling

- Loosen and disconnect the '+ve' red terminal and '-ve' black cables from starter motor. refer chapter "Service of engine" page no: 3-2.
- Remove the cowl LH air cooling as explained the chapter "Service of engine" page no. 3-10
- Remove the starter motor from engine as explained chapter " Service of engine " page no. 3-11

- Loosen and remove 4nos. Hexagonal screw M5X16 along with 4 nos. punched washer and 4 nos. spring washer from the fixing bracket assembly. Remove the gasket between fixing bracket assembly and inter bracket. (Fig. 6.38)

8 mm spanner

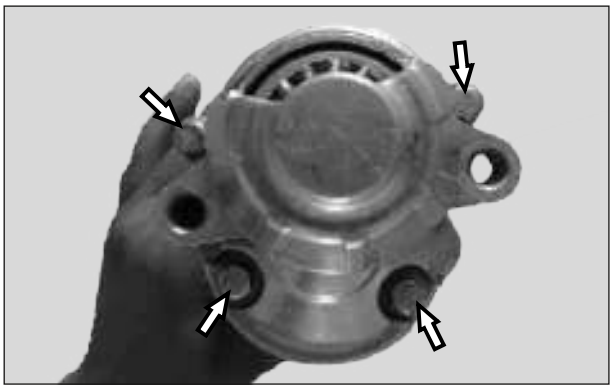


Fig. 6.38

- Separate the fixing bracket assembly from inter bracket. (Fig. 6.39)
- Remove the bendix drive assembly from the Inter Bracket assembly. (Fig. 6.39)

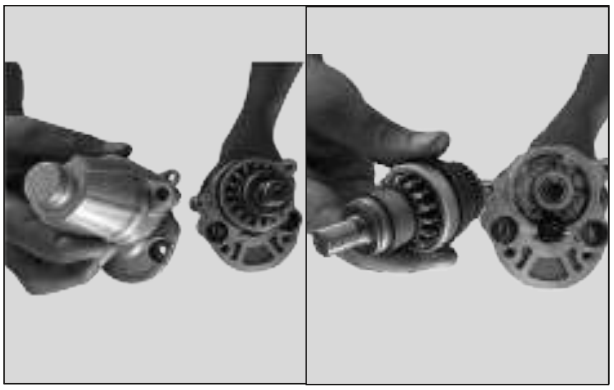


Fig. 6.39

- Loosen and remove the 2 nos. Hexagonal flange through bolt from the Inter bracket assembly. (Fig. 6.40)

8 mm spanner

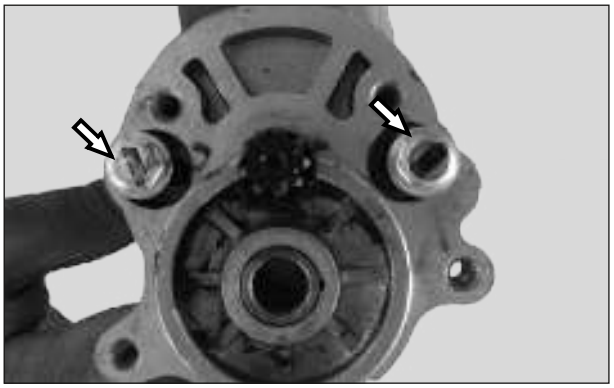


Fig. 6.40

- Remove and separate the Inter Bracket assembly from the yoke assembly. (Fig. 6.41)
- Remove the Yoke Sealing ring from the yoke assembly at inter bracket end.

Fig. 6.41

- Hold the yoke assembly, press the armature coil assembly and pull out yoke assembly as shown in fig. (Fig. 6.42)
- Separate sealing ring from Yoke assembly at CE Bracket end.

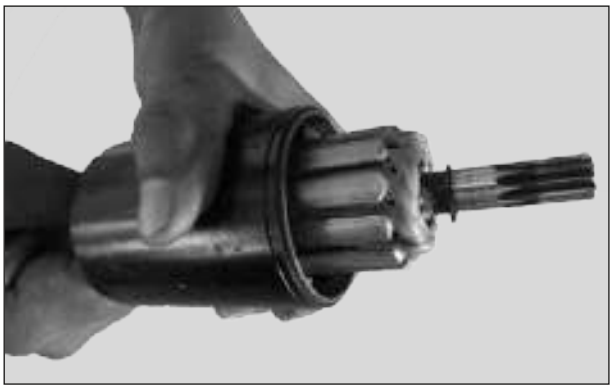


Fig. 6.42

- Separate the armature coil assembly from CE bracket. (Fig. 6.43)
- Remove terminal flange nut (Positive) from CE bracket.
- Remove the Plain washer, Insulator washer and Sealing Ring from the CE bracket assembly.

Fig. 6.43

- Loosen and remove the 2nos. brush eyelet assembly and Hex screws from the CE bracket assembly as shown in fig.

6 mm spanner

- Remove the Brush box kit (A) from the CE bracket assembly as shown in fig. (Fig. 6.44)

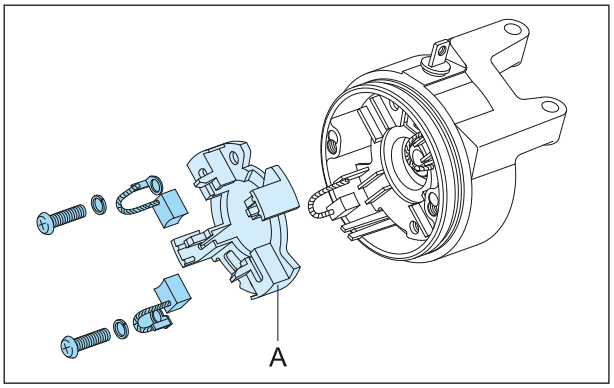


Fig. 6.44

- Clean all the parts thoroughly. Replace worn out parts and Reassemble. Assembly procedure is the reverse of dismantling.

Note: Replace the rubber seals while reassembly

INSPECTION

Armature coil assembly

- Before checking, thoroughly clean the commutator segments and armature core surfaces.
- Connect the test probes of the multimeter tester between all the commutator segments and check the continuity. It should have continuity, otherwise the armature coil assembly is defective. (Fig. 6.45)
- Check the continuity between armature coil assembly shaft and commutator segments. There should be no continuity. (Fig. 6.46)
- Inspect the brushes for wear and replace if worn.
- Reassemble the all parts in the reverse order of dismantling.

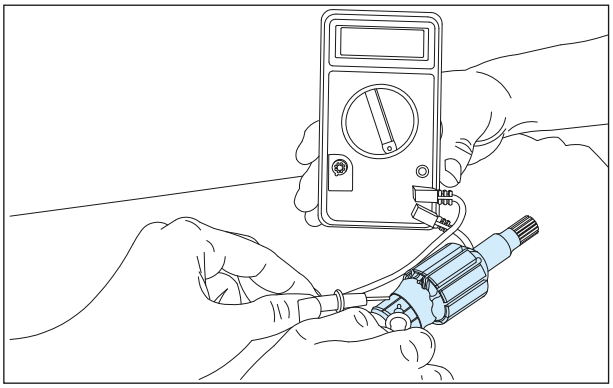


Fig. 6.45

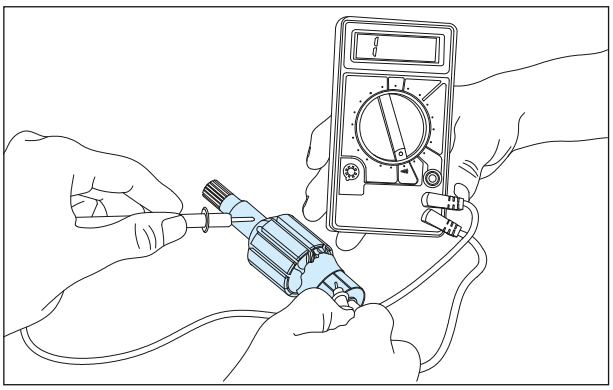


Fig. 6.46

CARBON BRUSHES - REPLACEMENT

- Loosen and remove brush eyelet assembly (negative brushes) and 2nos. Hexagonal flange head screws from the brush box.
- Mounting and take out the brush starter (2 nos.). (Fig. 6.47)

6 mm spanner

- Take out the plate brush holder (A) from the frame assembly commutator end. (Fig. 6.47)
- To change the carbon brushes, replace the old part with new brush box assembly kit from spare parts. (Fig. 6.47)
- Reassemble the all parts in the reverse order of dismantling.

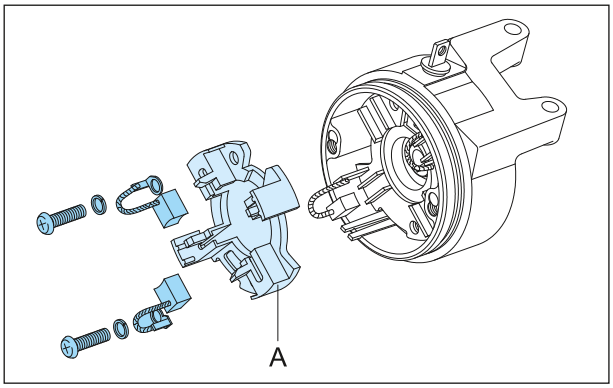


Fig. 6.47

Note: Before reassembling clean all the parts and inspect for any damage.

Replace all seals with the new one.

Apply little grease.

INSPECTION - STARTER RELAY

- Starter Relay can be checked by checking continuity and voltage between the battery positive terminal and relay positive terminal.
- Disconnect the starter motor terminals.(Refer chapter servicing of engine page no: 2-34)
- Switch ON ignition. Set Multimeter position to continuity inspection mode. Connect the multimeter '+ve' probe to +ve terminal of battery and '-ve' probe to relay terminal connecting starter motor '+ve' terminal (Fig. 6.48) When starter switch is pressed beep sound should be heard if not replace the relay and inspect.

Fig. 6.48

- Check the continuity and voltage.

SWITCH POSITION	Battery +ve	Battery -ve
Press (ON)	○	○
Release (OFF)		

- Switch ON ignition. Set Multimeter position to 20V DC mode. Connect the multimeter '+ve' probe to '+ve' terminal of battery and '-ve' probe to relay terminal connecting starter motor'+ve' terminal (Fig. 6.49) Check voltage when starter switch is pressed.

Fig. 6.49

voltage (Battery +ve and starter +ve)	11 ~ 12 V

BULBS REPLACEMENT

FRONT INDICATOR LAMP ASSEMBLY – BULB

- Loosen and remove 4 nos. CRR pan head screw (M6x16) from logo grill assembly. (Fig. 6.50)
- Take out the logo grill assembly.

Philips head screw driver

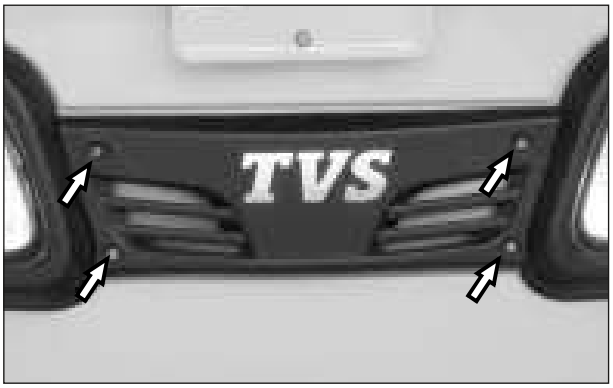


Fig. 6.50

- Loosen and remove 1no. CRR pan head screw from bezel cowl front and separate the bezel cowl front. (Fig. 6.51)

Philips head screw driver


Fig. 6.51

- Loosen and remove 1no. Pan head screw from front indicator lamp assembly. (Fig. 6.52)

Flat head screw driver

- Take out the front indicator glass.
- Remove the bulb and replace the bulb with a new one .
- Reassemble the all parts in the reverse order of dismantling.


Fig. 6.52

HEAD LAMP ASSEMBLY – BULB

- It is located under the dashboard and can be accessed from inside the driver cabin.
- Take out the dust sealing rubber(A). (Fig. 6.53)
- Take out the headlamp bulb by snapping out the clip(B). (Fig. 6.53A)

Head lamp bulb	12V, 35/35W

Caution : While re-assembling the bulb head lamp insect the Earth Strip on the Holder is properly located inside the groove provide on the Holder (Fig. 6.53B)

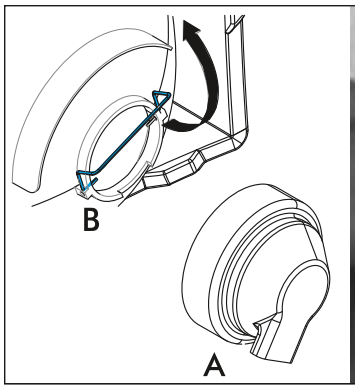


Fig. 6.53A

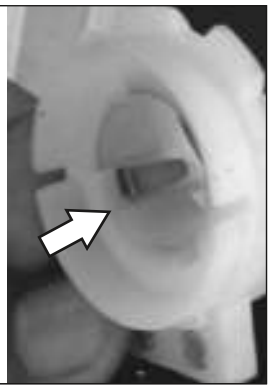


Fig. 6.53B

- Pull out the holder head lamp bulb from head lamp assembly.
- Remove the bulb and replace the bulb with a new one.
- Reassemble the all parts in the reverse order of dismantling.

POSITION LAMP BULB (PARKING LAMP BULB)

- It is located inside the headlamp and can be accessed from inside the driver cabin.
- Pull out the parking lamp bulb holder (C) from the headlamp assembly. (Fig. 6.54)
- Remove the bulb and replace the bulb with a new one.
- Reassemble the all parts in the reverse order of dismantling.

Position lamp bulb	12V,5W

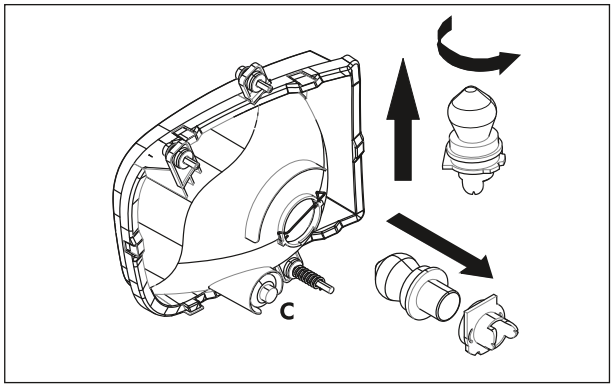


Fig. 6.54

SPEEDOMETER ASSEMBLY BULB

- Remove the cover handlebar (Refer chapter Periodic Maintenance, Page No.26)
- Pull out the bulb holder from speedometer assembly. (Fig. 6.55)
- Remove the bulb and replace the bulb with a new one.
- Reassemble the all parts in the reverse order of dismantling.

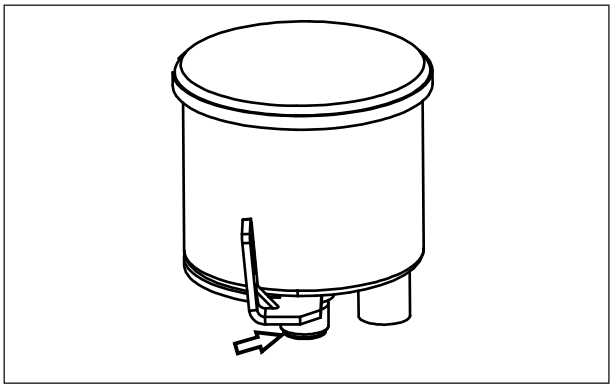


Fig. 6.55

Speedometer lamp bulb	12V, 2W

- The following bulbs can be replaced by removing from tell tale lamp cluster.(Fig. 6.56)

Turn Signal Indicator lamp 12V 2W
Neutral indicator lamp 12V 2W
High beam indicator lamp 12V 2W
Low fuel warning lamp 12V 2W
(applicable only for exclusive petrol variants)

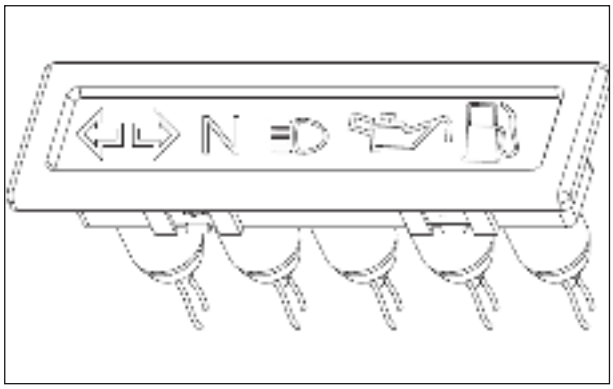


Fig. 6.56

Low oil warning lamp	12V, 2W

LAMP ASSEMBLY REAR COMBINATION

- Loosen and remove 4 nos. Pan head screw along with 4 nos. Plain washer and 4 nos. Rubber washer from rear combination lamp . (Fig. 6.57)

Philips head screw driver

- Take out the rear combination lamp glass from rear combination lamp.
- Remove bulbs from holder and replace with new one.
- Reassemble the all parts in the reverse order of dismantling.

Reverse Lamp	12V, 21W
Brake Lamp	12V, 21W

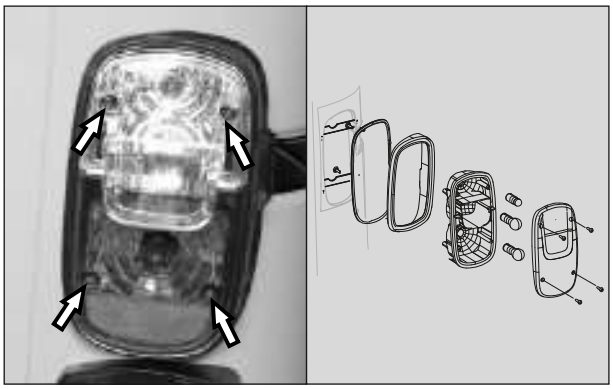


Fig. 6.57

WIPER SWITCH

- It is located on the switch LH on dashboard. Check continuity.
- Set Multimeter in continuity inspection mode, connect +ve probe of the multimeter to the orange (Or) wire and -ve probe of the multimeter to the Blue with White tracer (W) wire. Beep sound should be heard only in switch ON position. (Fig. 6.58)

Note: Ignition switch should be in 'OFF' position.

SWITCH POSITION	Or	BlW
ON	○	○
OFF		

Fig. 6.58

BATTERY ASSEMBLY

Removal

- Refer procedure in chapter "Periodic Maintenance" Page no.20

Note: Clean the battery casing after removing it from the vehicle.

SERVICING BATTERY

- For servicing the battery refer procedure in chapter "Periodic Maintenance" Page no.20

Note: The battery provided is maintenance free. Do not top up with distilled water.

BATTERY CHARGER

Caution: Use only constant current battery charger of current output not more than 3.2A for 32 Ah batteries. (Fig. 6.59)

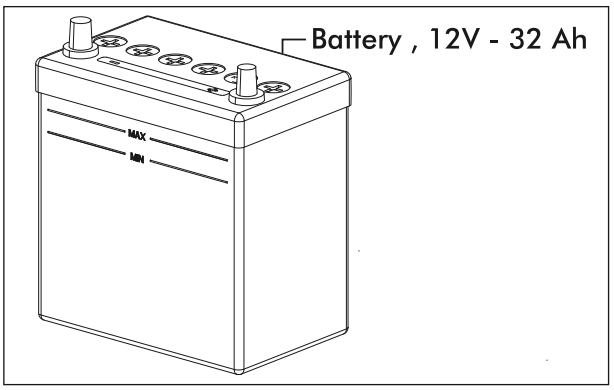


Fig. 6.59

CHARGING PROCEDURE

- In case of single battery, connect the positive lead of the battery charger to the '+ ve' terminal of the battery assembly and negative lead of the battery charger to '– ve' terminal of the battery assembly. (Fi g. 6.60)

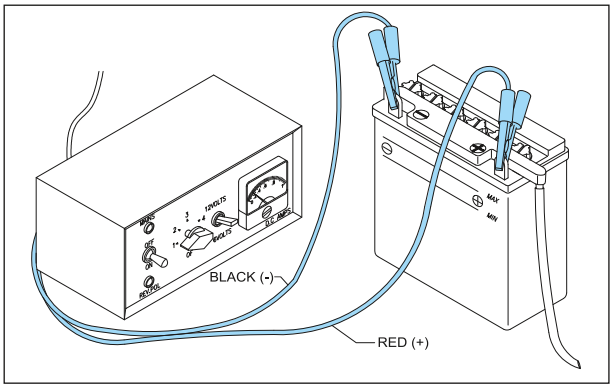


Fig. 6.60

- Incase of multiple batteries, batteries must be connected in series with the battery charger.(Fig. 6.61)
- Connect the positive lead from 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.

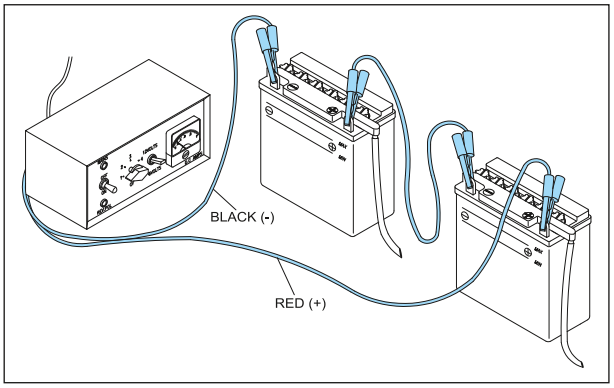


Fig. 6.61

- Now connect the '– ve' terminal of the last battery to the negative lead of the charger.
- To charge multiple batteries, set the selector knob to the position corresponding to the number of batteries connected.
- If the continuity of any one of the batteries is not OK, then all other batteries will not be charged due to incomplete circuit.
- Before connecting the batteries, connect the battery charger to the main and ensure that the power 'ON' indicator bulb is glowing.
- If the power 'ON' indicator bulb is not glowing, then check the charger fuse.

Caution: Keep filler caps removed while charging. Keep fire and sparks away from batteries when they are being charged.

Battery Rating	Charging Current	Duration
32Ah	3.2 A	8 - 10 hours

- As the battery gets fully charged the ammeter needle on the charger will come down to initial reading on the scale. This is the indication for full charge of the battery. (Fig. 6.62)
- The output voltage should be more than 12.6 V. (Fig. 6.62)

Note: If the battery voltage is < 11V then the battery needs to be replaced with a new one.

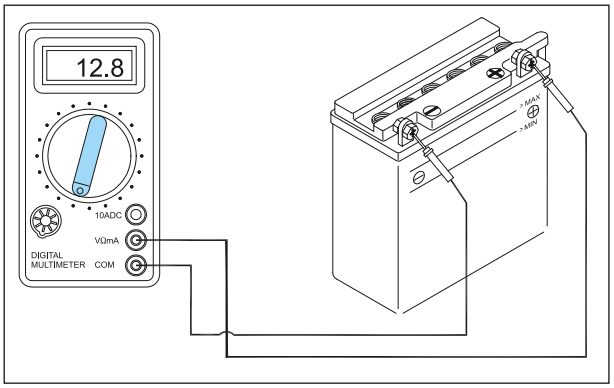


Fig. 6.62

OIL PRESSURE SWITCH

- The function of oil pressure switch (OPS)is to give warning indication to the customer about low lube oil pressure, to avoid engine seizure.
- If the engine oil pressure is less than 0.4±0.15 bar or oil level is 100ml and below the OPS will get closed and Cause the tell-tale symbol to glow this give up warning to the driver.

- The OPS (Oil pressure switch)can be check the continuity between wires as follows: (Fig. 6.63)

IGNITION ON	RY	Body earth
Engine OFF	○	○
Engine ON(oil qty ok)		
Engine ON(oil qty Low)	○	○

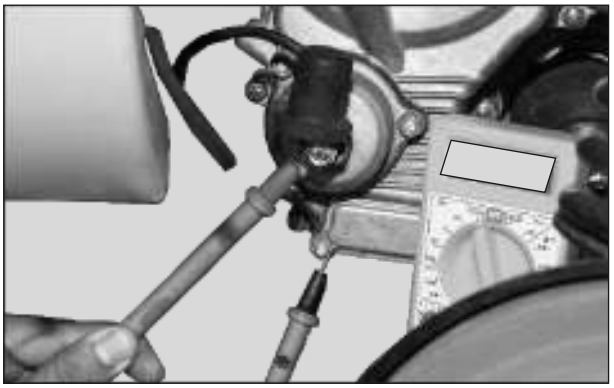


Fig. 6.63

- The functioning of OPS on vehicle is as below.

Condition	Oil level	Low oil pressure Indication on the	Idling RPM
Ignition key ON Engine running @ Idling RPM	No oil in Engine	Continuously ON	1250
	100 ml	Continuously ON	1250
	200 ml	Flickering	1250
	300 ml	Flickering	1250
	400 ml	Flickering	1190
	500 ml	OFF	1190

LPG ELECTRICAL SYSTEM

- The LPG System consists of Battery, Ignition switch, Changeover switch, Float in LPG tank, gas level gauge meter, gas level indicator, Petrol solenoid, Gas solenoid.

Fig. 6.64

PETROL SOLENOID

- The petrol solenoid is located inside the engine cabin below the petrol tank. Check resistance (Fig. 6.64)

- The DC output wire orange (Or) from the ignition switch is connected to the changeover switch. The changeover switch is connected to petrol solenoid and the petrol mode indicator on gas Level indicator LPG, through a 2A fuse via White with Green tracer (WG) wire. The petrol solenoid is earthened through negative black with white tracer (BW) wire to the battery.

- The changeover switch is located on the dashboard centre. (Fig. 6.65)

Fig. 6.65

Petrol solenoid can be checked as follows:

- Set the multimeter knob 200 Ω
- Connect multimeter '+ve' probe of multimeter to the white with Green tracer (WG) and '-ve' probe of multimeter to the Black with white tracer (BW). Measure resistance. If it is not with in specified limlt, replace solenoid with new one. (Fig. 6.66)

Resistance (WG - BW)	less than 20 ohm


Fig. 6.66

GAS SOLENOID (LPG)

- The gas solenoid is located on the multi function valve assembly. Check resistance. (Fig. 6.67)
- The DC output wire (Or) from the ignition switch is connected to the change over switch. The change over switch is connected by a Blue with Black tracer (BlB) wire to 5A fuse. The Blue with Black tracer (BlB)wire is connected to safety car device. The Red wire (R) wire from the car safety device is connected to the gas solenoid and gas mode indicator on gas level indicator LPG.
- The safety car device is connected to the gas solenoid through Red (R) wire. Car safety unit is integrated with TCI.
- The gas solenoid is earthed through the black with white tracer (BW) to the battery.


Fig. 6.67

Gas solenoid can be checked as follows:

- Set the multimeter knob 200 Ω.
- Connect multimeter '+ve' probe of multimeter to the Red (R)wire and '-ve' probe of multimeter to the Black (B) wire. (Fig. 6.68)
- If the resistance is not within the specified limit, replace the gas solenoid with a new one.

Resistance (R-BW)	18 ~ 20 Ω

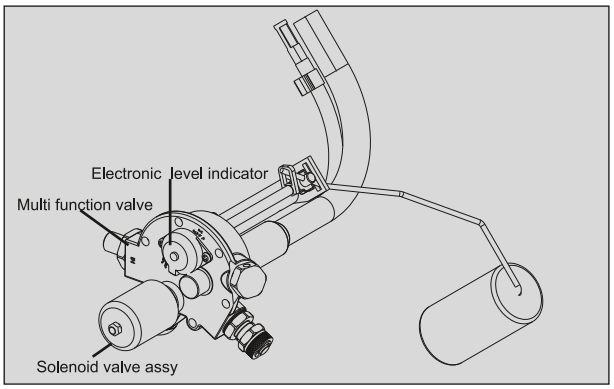


Fig. 6.68

CONTENT GAUGE AND GAS LEVEL INDICATOR LPG:

- The float in the LPG cylinder operates the content gauge meter needle on multi valve, which varies the resistance in the switch on content gauge meter and accordingly varies the current supply to gas level indicator. Thus the number of LEDs lit varies according to the gas level. (Fig. 6.69)

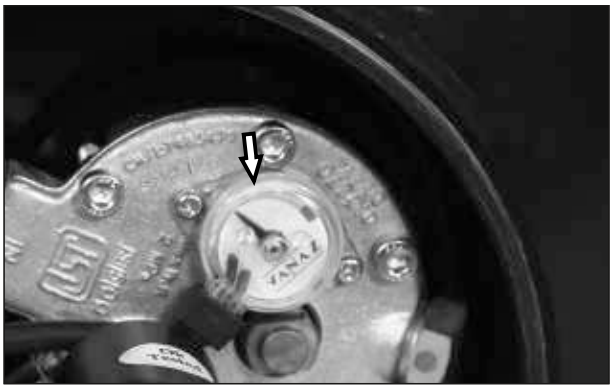


Fig. 6.69

- The gas level indicator, LPG gets input from content gauge by blue (Bl) wire and is earthed by black with white (BW) wire through the gas level indicator. (Fig. 6.70)
- Measure the resistance between the Blue (Bl) and Black with white tracer (BW) wire. The value for various levels indicated on the gas level indicator are as follows:

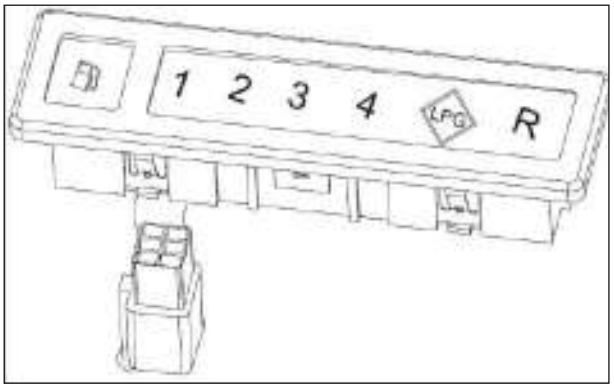


Fig. 6.70

Gas Level	Resistance (kohm)
R	6 ± 0.5 k Ω
1	4.5 ± 0.5 k Ω
2	3.0 ± 0.5 k Ω
3	1.5 ± 0.5 k Ω
4	0 ± 0.5 k Ω

CNG ELECTRICAL SYSTEM

- The CNG system consists of Battery, Ignition switch, Changeover switch, gas pressure gauge sensor, gas level indicator, Petrol solenoid, Gas solenoid, and micro switch.
- The Petrol, Gas solenoid and car safety functions are similar to LPG.
- The AC output current from the charging coil is connected to the 12 V DC regulator where it is converted to DC. The DC charges the battery assembly and further connected to the DC operated loads

PETROL SOLENOID

- The petrol solenoid is located inside the engine cabin below the petrol tank. (Fig. 6.71)
- The DC output wire orange (Or) from the ignition switch is connected to the changeover switch. The changeover switch is connected to petrol solenoid and the petrol mode indicator on gas Level indicator, CNG through a 2 A fuse via white with green tracer (WG) wire. The petrol solenoid is earthed through negative black with white (BW) wire to the battery.

Petrol solenoid can be checked as follows:

- Set the multimeter knob 200Ω.
- Connect the multimeter '+ve' probe of the multimeter to the White wit Green tracer (WG) and '-ve' probe of the multimeter to the Black with white tracer (BW). If the resistance is not within the specified limit, replace the petrol solenoid with a new one. (Fig. 6.72)

Resistance (WG-BW)	18 ~ 20 Ω

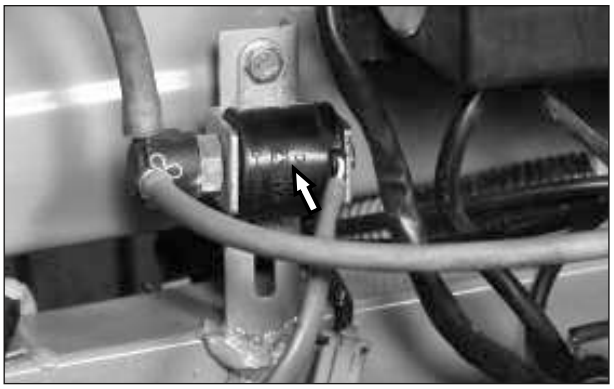


Fig. 6.71

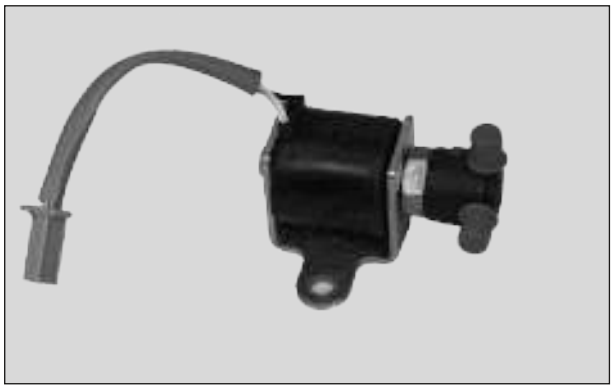


Fig. 6.72

GAS SOLENOID (CNG)

- The gas solenoid is located in the engine cabin mounted on RH longitudinal member. The DC output wire orange (Or) from the ignition switch is connected to the Changeover switch. The changeover switch is connected to the gas Level indicator, CNG through a 5A fuse and via Blue with Black tracer (BlB) wire. The supply to the gas solenoid is through a red (R) wire. The gas solenoid is earthed through Black with White trace (BW) wire to the battery. (Fig. 6.73)

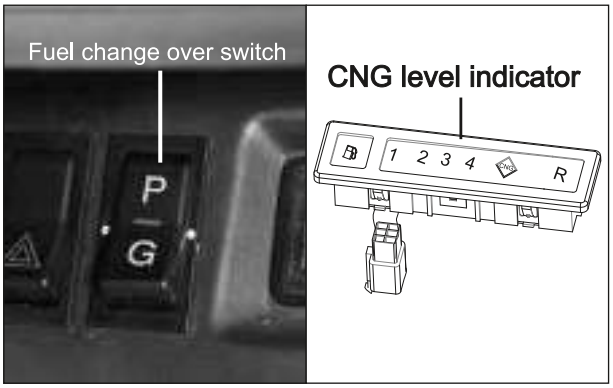


Fig. 6.73

Gas solenoid can be checked as follows:

- Set the multimeter knob 200 Ω
- Connect the multimeter '+ve' probe of the multimeter to the Red (R) wire and '-ve' probe of the multimeter to the Black with white tracer (BW). Measure the resistance. (Fig. 6.74)
- If the resistance is not within the specified limit, replace the gas solenoid with a new one.

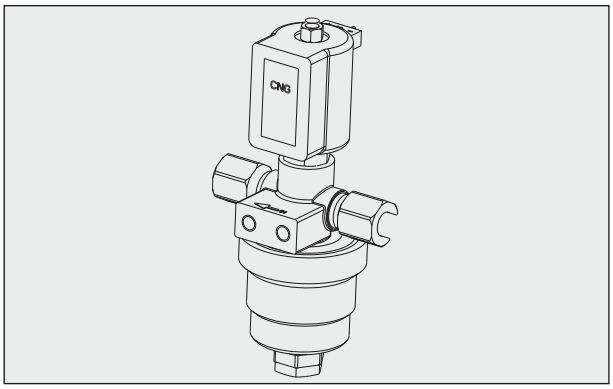


Fig. 6.74

Resistance (R-BW)	18 ~ 20 Ω

PRESSURE GAUGE AND GAS LEVEL INDICATOR CNG:

- The gas level indicator, CNG gets input from pressure gauge by blue (Bl) wire and Pink (P) wire. It is earthed by black with white tracer (BW) wire. (Fig. 6.75)
- The CNG level gauge can be checked as follows:
- Measure the voltage between Pink (P) and Black with white tracer (BW) wire.
- The value for various levels indicated on the gas level indicator, CNG are as follows:

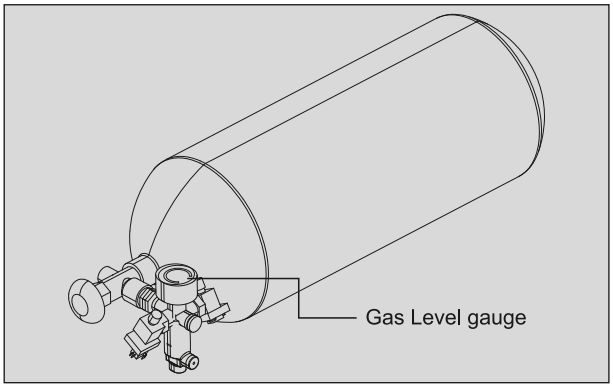


Fig. 6.75

Gas Level	Voltage (V)
R	>4.71 ± 20mv
1	4.71 ± 20mv
2	3.41 ± 20mv
3	2.01 ± 20mv
4	<1.31 ± 20mv

MICRO SWITCH

- The micro switch is a safety function device which cuts off ignition if the dust plug is not inserted completely into the filler unit in first stage reduction unit. The dust plug presses the switch which opens the contact grounds the TCI unit to body causing function of spark plug.(Fig. 6.76)
- If the dust plug is not inserted completely the contacts are open and TCI is not earthed to body. Hence no spark is produced at the spark plug.
- The micro switch can be checked by checking the continuity as follows:
- Set the multimeter position continuity inspection mode, Connect the multimeter '+ve' probe of the multimeter to the Black(B) and '-ve' probe of the multimeter to the Black with white tracer (BW).

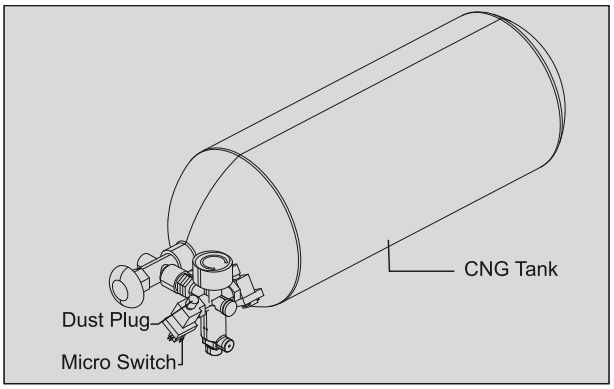


Fig. 6.76

DUST PLUG POSITION	B	BW
FITTED	○	○
REMOVED		

INSPECTION OF ELECTRICAL COMPONENTS TVS KING DELUXE + VARIANTS

IGNITION SWITCH

- The ignition switch is located on the right side dashboard Inspect the ignition switch for continuity with the multi meter as below: (Fig. 6.77)

- Place the multimeter position in continuity inspection mode, connect '+ve' probe of multimeter in orange (Or) wire and '-ve' probe of multimeter red (R) wire from ignition switch as shown in (Fig. 6.78) a Beep sound should be heard when ignition switch is in ON position and should switch off when turned to off position.

KEY POSITION	Or	R
OFF		
ON	○	○

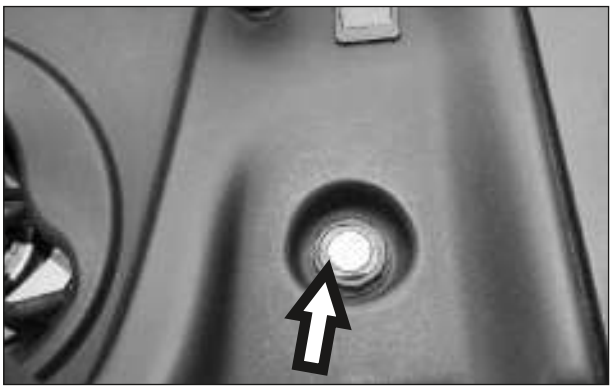


Fig. 6.77

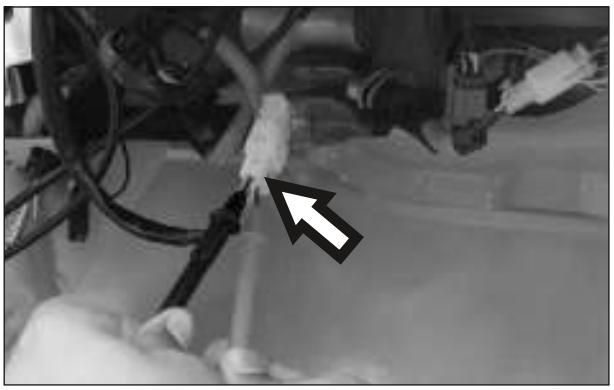


Fig. 6.78

CHARGING COIL:

- Set the multimeter knob to 200 Ω.

- For check the resistance (Charging coil out from stator coil)

- Connect the '+ve' probe of the multimeter to the Yellow Wire 1 (Y) wire from the magneto assembly and '-ve' probe of the multimeter to the another Yellow Wire 2 in sequencfrom the magneto assembly. (Fig. 6.79 & 80)

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

Charging coil (Y1 - Y2)	0.5 Ω - 0.8 Ω
Charging coil (Y2 - Y3)	0.5 Ω - 0.8 Ω
Charging coil (Y3 - Y1)	0.5 Ω - 0.8 Ω

Note: Engine should be switched OFF.

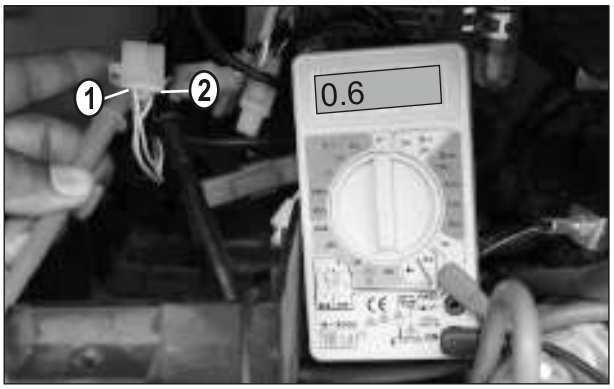


Fig. 6.79

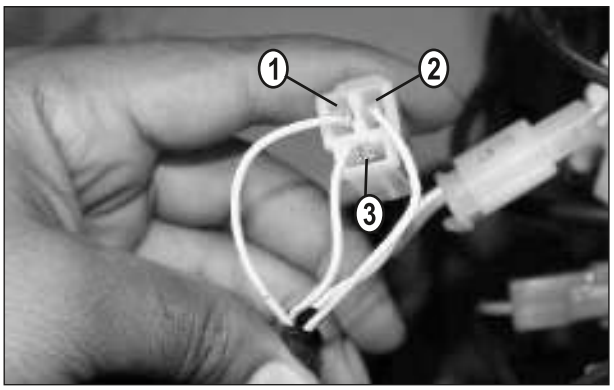


Fig. 6.80

FUEL SENDER UNIT

- Fuel gauge in the fuel level gauge indicates the amount of fuel available in the tank.

- The fuel gauge works based on the resistance signal receive from the fuel sender unit. Fuel sender unit resistance changes in accordance with the quantity of fuel available tn the tank.

- The fuel sender unit is fitted on the top of the fuel tank assembly. (Fig. 6.81)

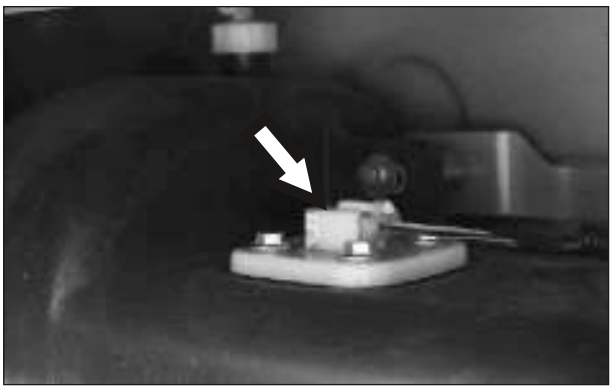


Fig. 6.81

- Inspect the fuel sender unit for continuity with pocket tester by connecting '+ve' lead of pocket tester to green with yellow tracer wire (GY) and '-ve' lead of pocket tester to black with white tracer wie (BW). (Fig. 6.82)

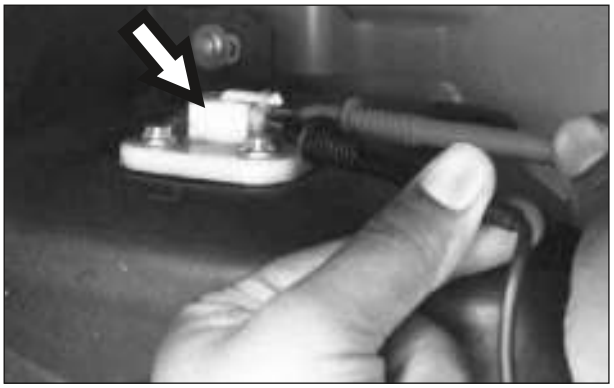


Fig. 6.82

- Set pocket tester to 200 Ω range and check the resistance of fuel sender unit. Connect '+ve' lead of pocket tester to green with yellow tracer wire (GY) and '-ve' lead of pocket tester to black with white tracer wie (BW). If the resistance value is not within the specified limit, then replace the fuel sender unit with new. (Fig. 6.83)

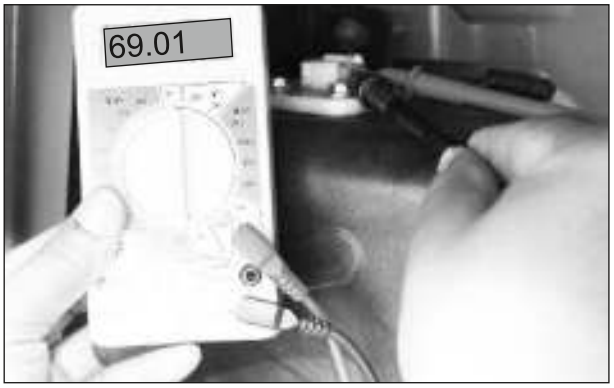


Fig. 6.83

LED INDICATION	VOLUME IN LITRES	RESISTANCE IN Ω
R	<0.9	98 ± 2.5
2	1.4	84 ± 2.0
3	2.1	70 ± 2.0
4	3.5	48 ± 2
5	4.9	25 ± 2
6	>6.1	7 ± 2

Note: Low Fuel warning indicator will start blinking when the fuel level is less than one litre. (Fig. 6.84)

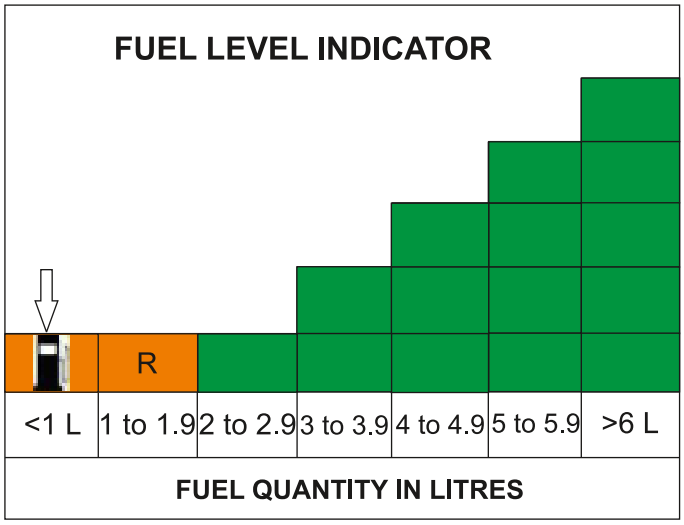


Fig. 6.84

BATTERY MAINTAINING PROCEDURE

1. Check the OCV of the batteries while receiving. Optimum OCV = > 12.4 V (OCV: Open Circuit Voltage)

Voltage(V)	State of charge (%)
12.49	100
12.28	80
12.08	50
11.88	25
11.69	Discharged

2. As Battery is a perishable product it should be despatched in 3 months from the date of charging code punched on the battery to the Dealer / Customer.

3. When the vehicle is switched of please disconnect the terminals to the battery as it would lead to discharge due to leakage current in the vehicle . It can be done by disconnecting the fuse , removing the key from the vehicle and ignition switch off .

4. Careful handling is necessary so that the container or the Terminal is not broken.

5. When the vehicle is in stock yard for > 2 months start the vehicle once in a week and keep it in on condition for 15 minutes in order to avoid stratification in battery.

6. Take care of the polarity while connecting cables to the battery. Fix the positive cable first.

7. It is dealers responsibility to ensure a good battery (OCV ≥ 12.4) is present in every vehicle at the point of customer hand over. This will ensure the battery is covered by New Vehicle Warranty.

8. Follow first in first out policy in order to avoid Self discharge / stratification. (refer flow chart given below)

9. If Vehicle Kept Under Stock More Than 2 to 3 months time battery requires Bench Charging.

BATTERY CHARGING INSTRUCTION

1. The Electrolyte used in our Battery is Dilute Sulphuric Acid.

Note : Use Only Battery Grade Acid and Distilled water. Acid should be Clear & Transparent

Electrolyte Specific Gravity

Electrolyte Temperature	Filling in Specific Gravity		Full Charged Electrolyte
	Conventional Battery (Domestic)	Dry Charged Battery (Exp)	
10°C	1.240	1.255	1.260
20°C	1.230	1.245	1.250
30°C	1.220	1.235	1.240

1. Charging Current and voltage to be set as follows for our 12V 32 AH batteries

Initial Charging : Current : 1.5 Amps
Voltage : 12 V

Recharging : Current : 2 Amps
Voltage : 12 V

2. Battery Electrolyte Temperature should not be more then 30° C while filling.

3. Electrolyte should be filled up the Max level using Syringe avoiding the Spillage.

4. Time log between acid filling and charging the battery should no be less than 1 hour and note more than 2 hours.

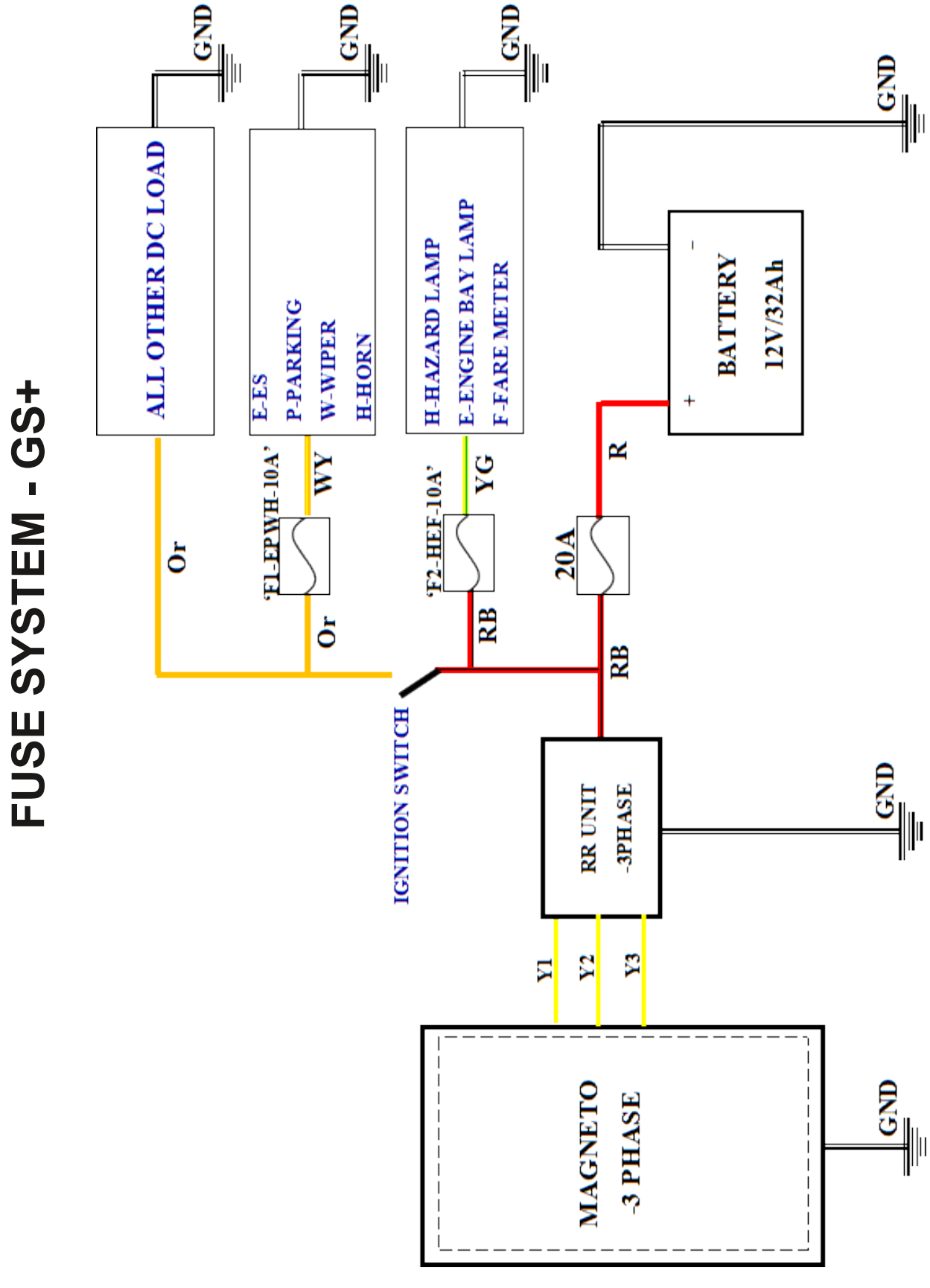
5. While Connecting & Disconnecting the Battery from Charger, switch off the Charger from Power Supply

Charging Period

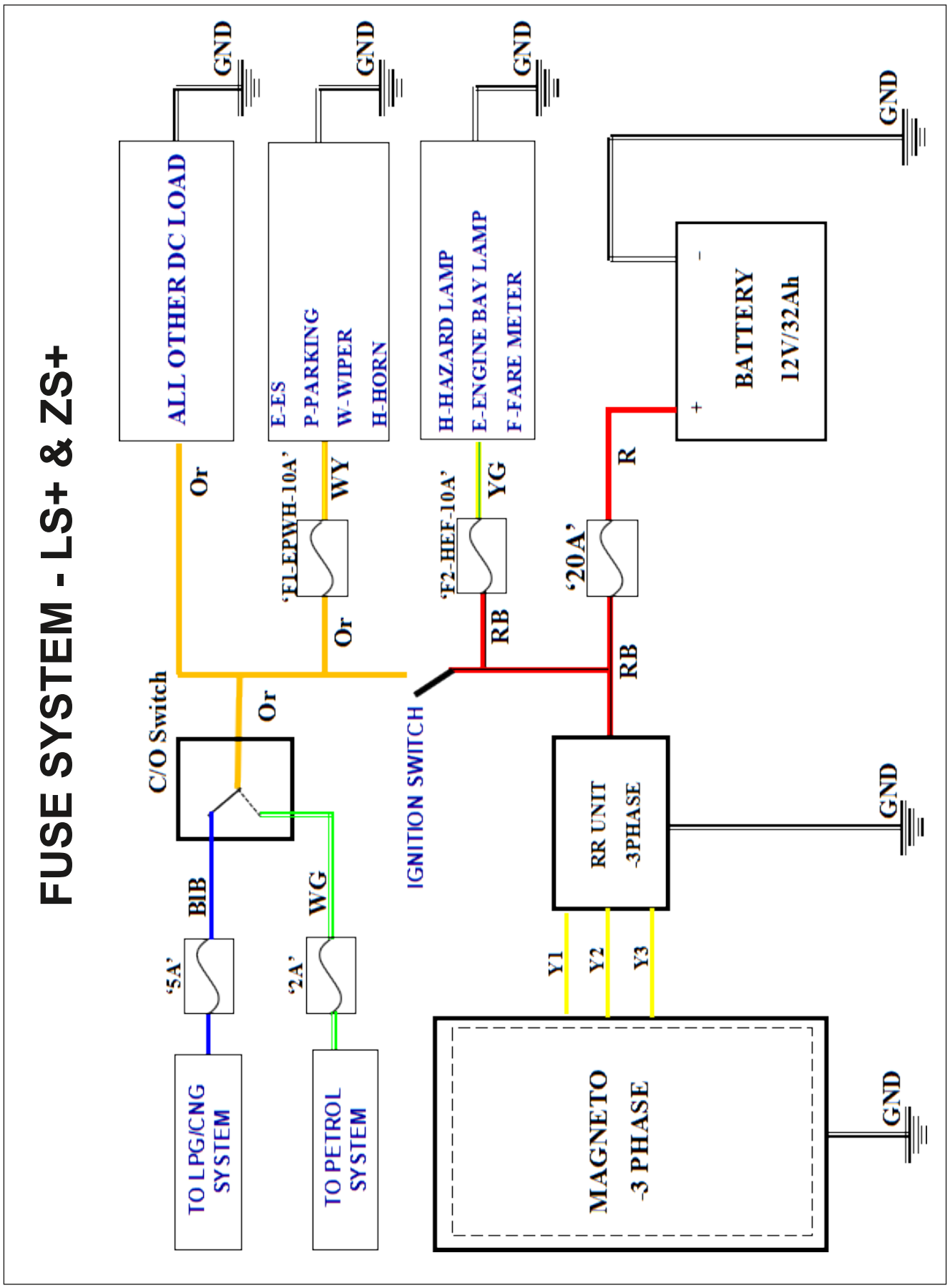
Specific Gravity of Electrolyte	1.200	1.170	1.140	1.100
Charging Hours	8 -12	18 - 24	30-36	42 - 48

6 .Charging should be continued till specific gravity Reached 1.240

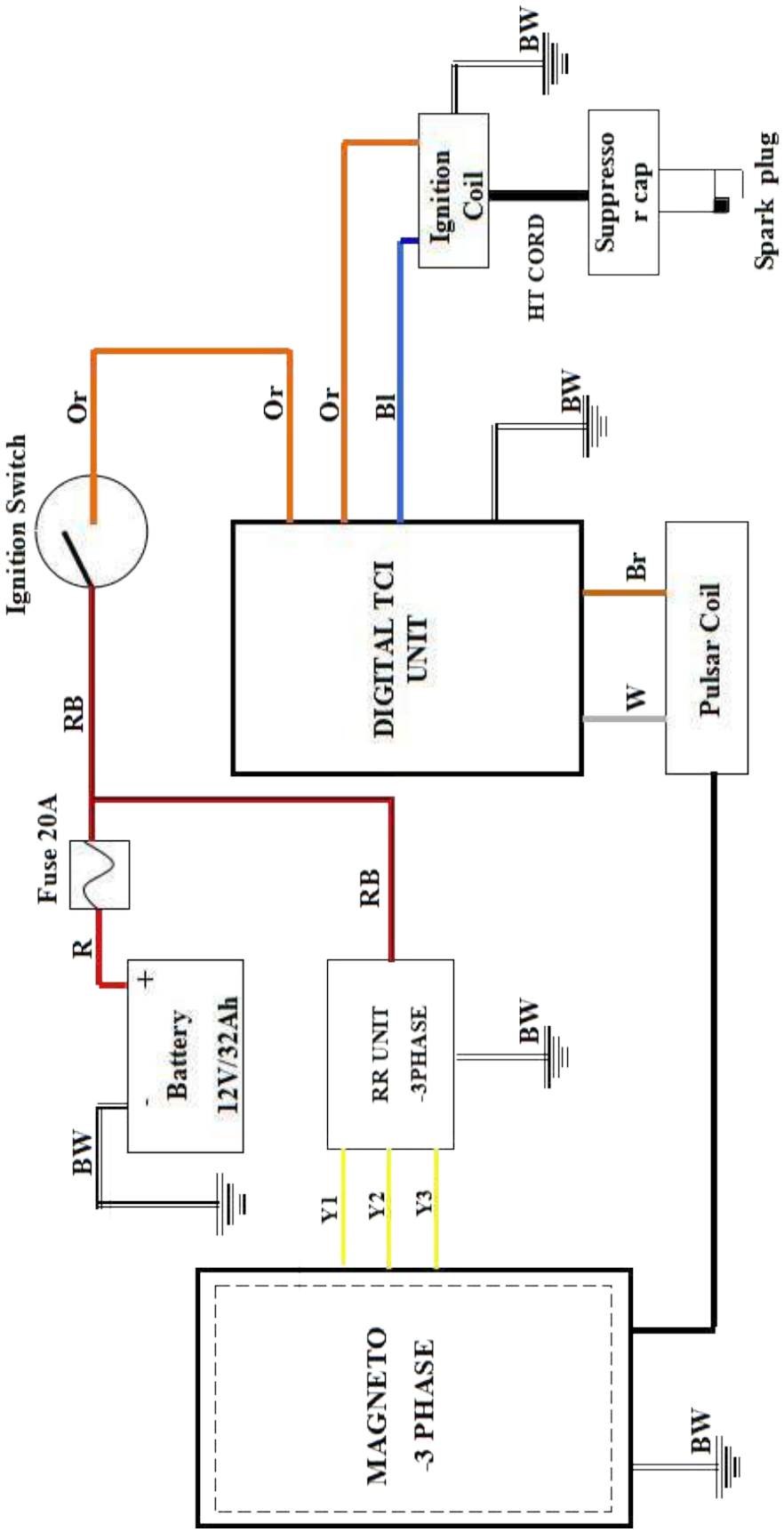
FUSE SYSTEM - GS+



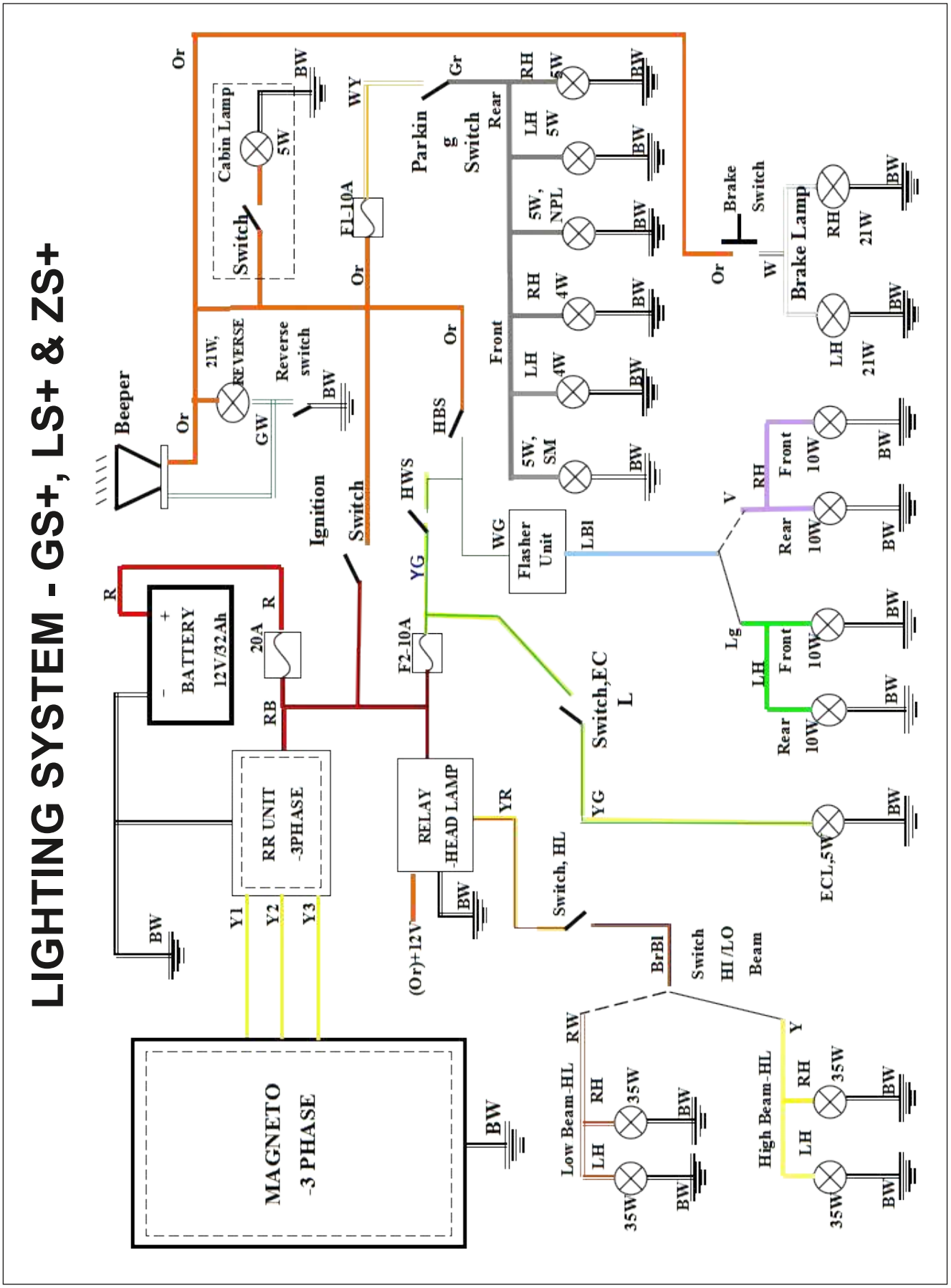
FUSE SYSTEM - LS+ & ZS+



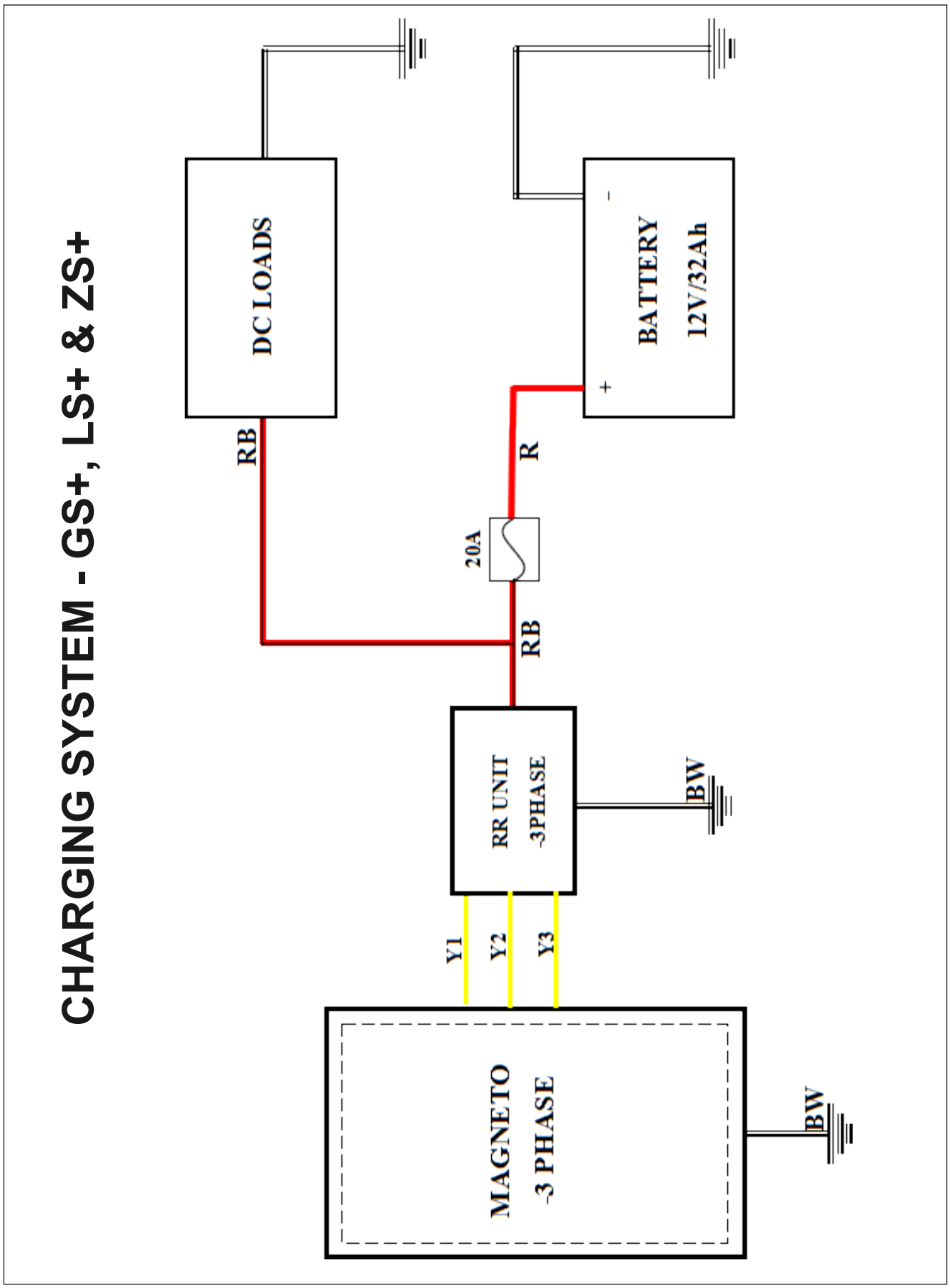
IGNITION SYSTEM - GS+, LS+ & ZS+



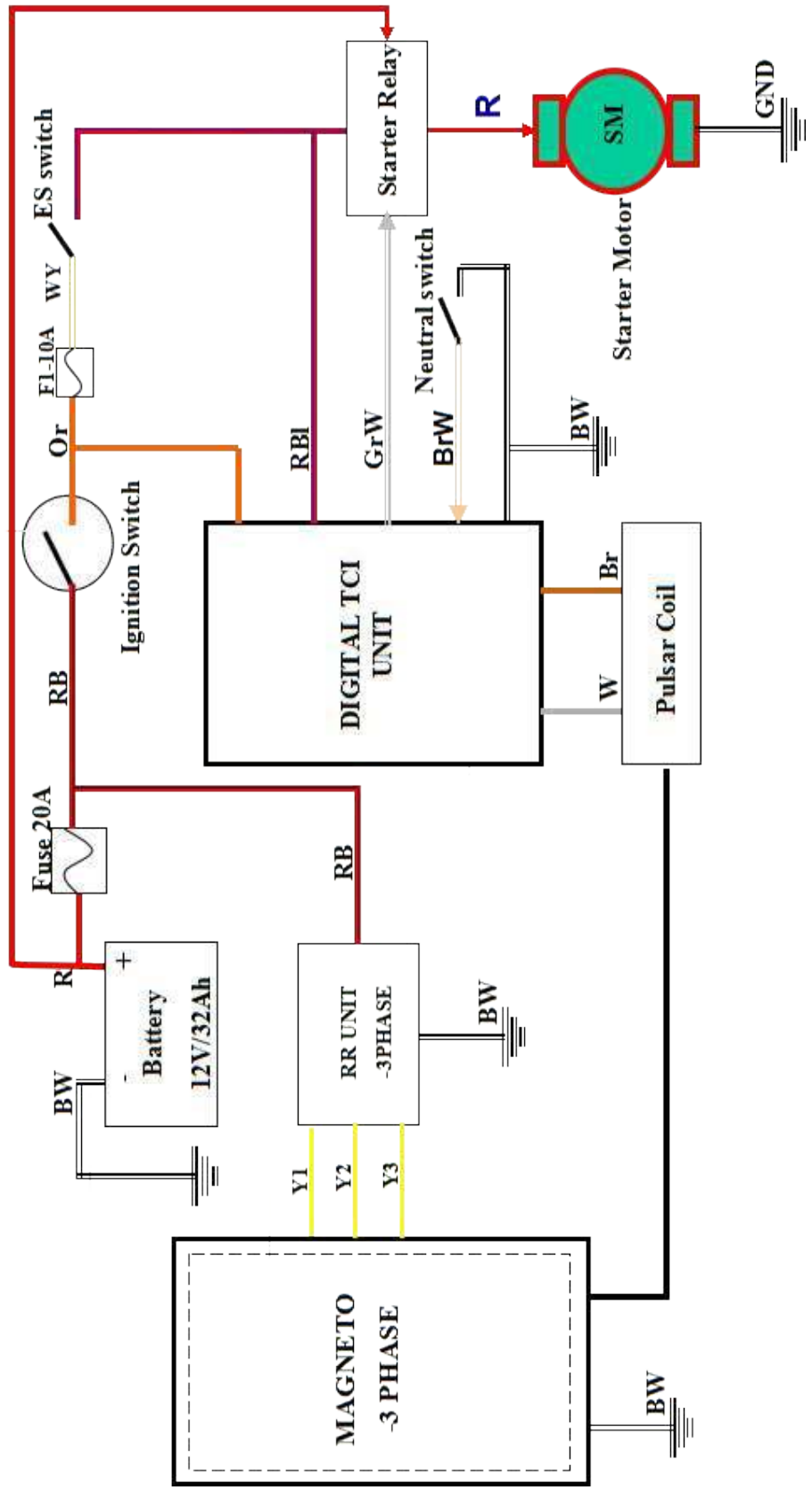
LIGHTING SYSTEM - GS+, LS+ & ZS+



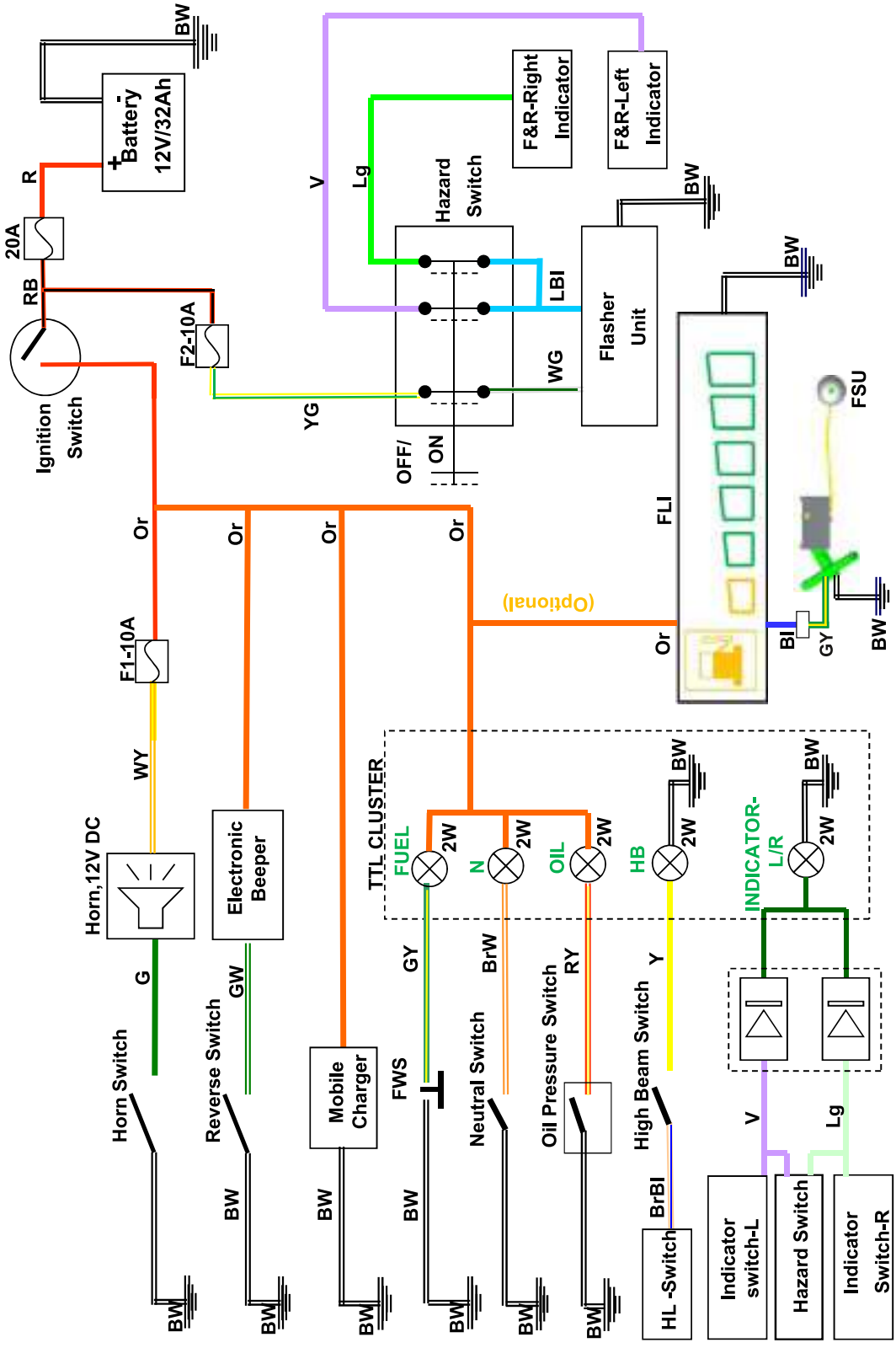
CHARGING SYSTEM - GS+, LS+ & ZS+



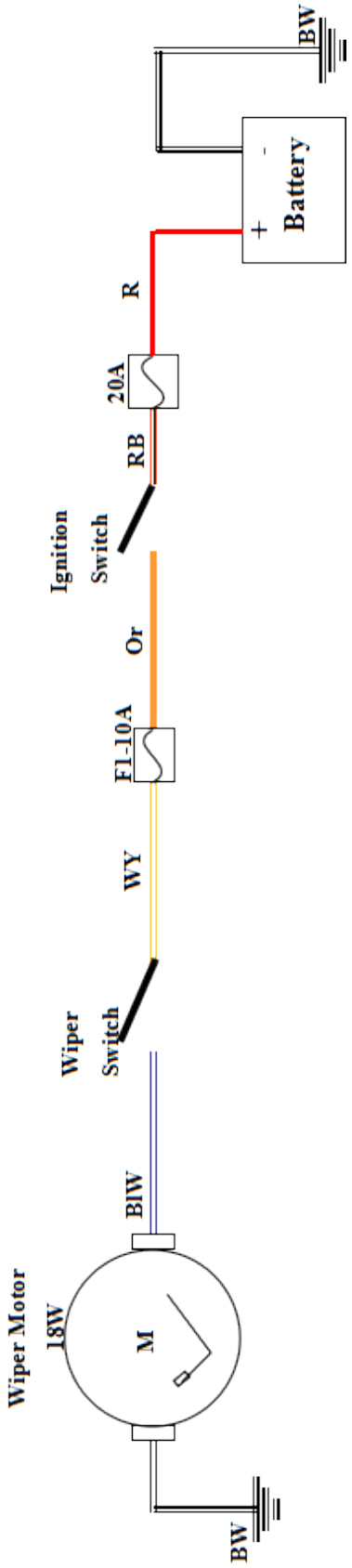
STARTING SYSTEM - GS+, LS+ & ZS+

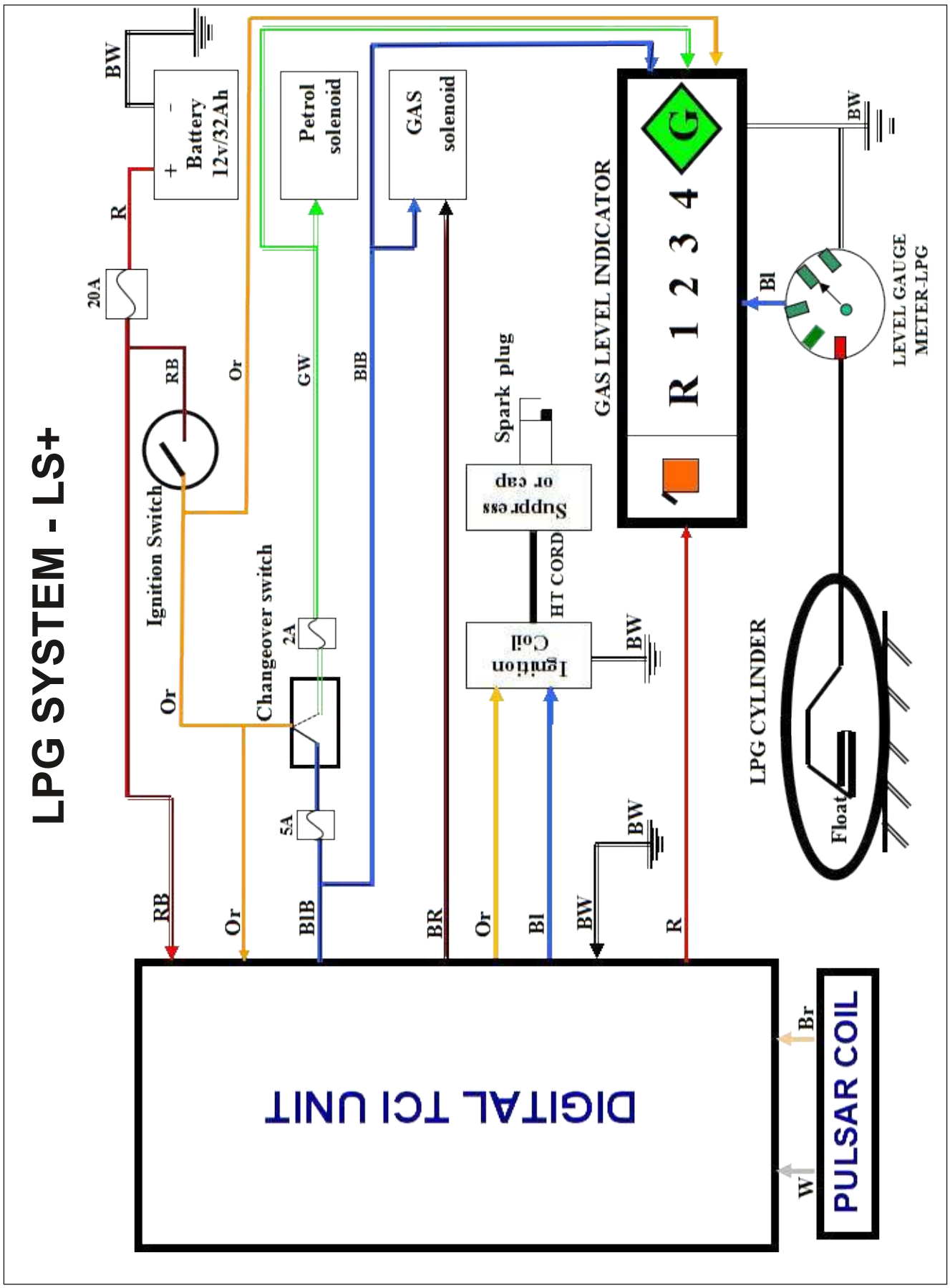


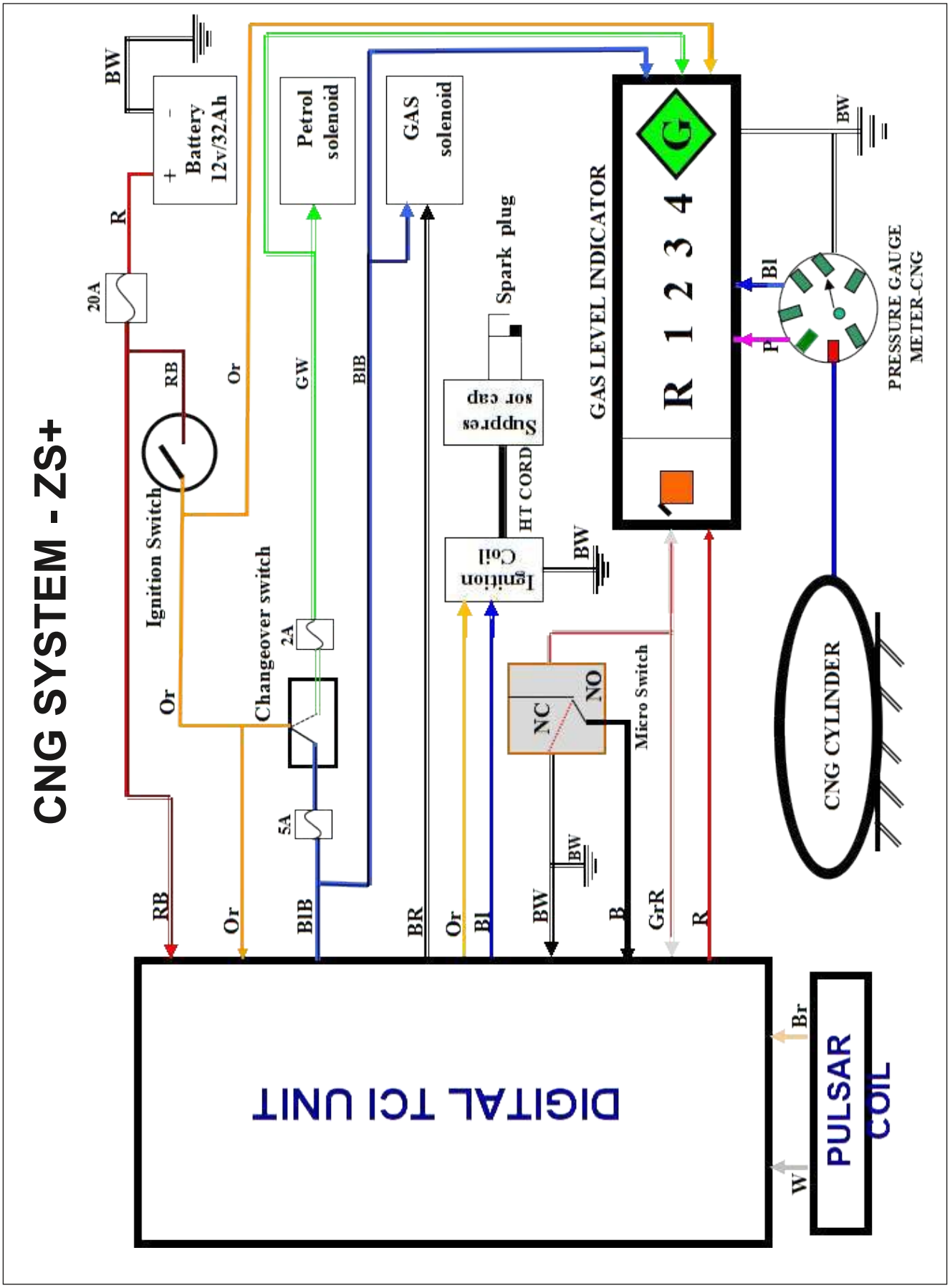
USER INTERFACE SYSTEM - GS+, LS+ & ZS+



WIPING SYSTEM - GS+, LS+ & ZS+




LPG SYSTEM - LS+
BW
Battery 12v/32Ah
+
-
R
20A
RB
Ignition Switch
Or
Changeover switch
2A
5A
GW
BlB
Petrol solenoid
GAS solenoid
Spark plug
Suppr ess or cap
HT CORD
Ignition Coil
GAS LEVEL INDICATOR
G
R 1 2 3 4
Bl
LEVEL GAUGE METER-LPG
LPG CYLINDER
Float
BR
DIGITAL TCI UNIT
Br
W
PULSAR COIL


CNG SYSTEM - ZS+
DIGITAL TCI UNIT
PULSAR COIL
Br
W
BW
Battery 12v/32Ah
+
-
R
20A
RB
Ignition Switch
Or
Changeover switch
2A
5A
BlB
GW
Petrol solenoid
GAS solenoid
BlB
BR
Spark plug
Suppressor cap
HT CORD
Ignition Coil
BW
Or
Bl
BW
NC
NO
Micro Switch
B
GrR
R
GAS LEVEL INDICATOR
R 1 2 3 4
G
BW
Bl
P
PRESSURE GAUGE
METER-CNG
CNG CYLINDER

Chapter 7

LPG SYSTEM

CONTENTS

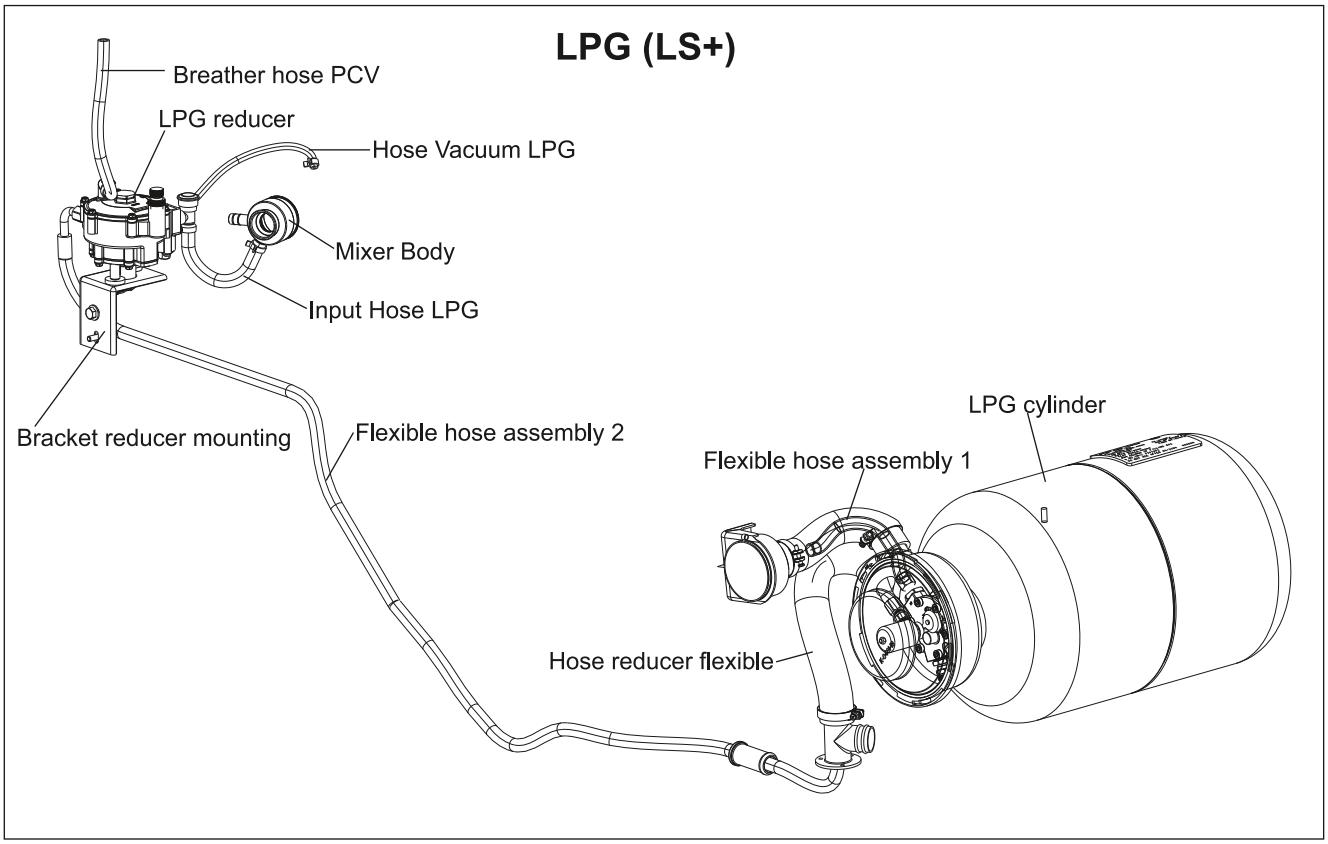

LPG (LS+)
Breather hose PCV
LPG reducer
Hose Vacuum LPG
Mixer Body
Input Hose LPG
Bracket reducer mounting
Flexible hose assembly 2
LPG cylinder
Flexible hose assembly 1
Hose reducer flexible

Fig. 7.1

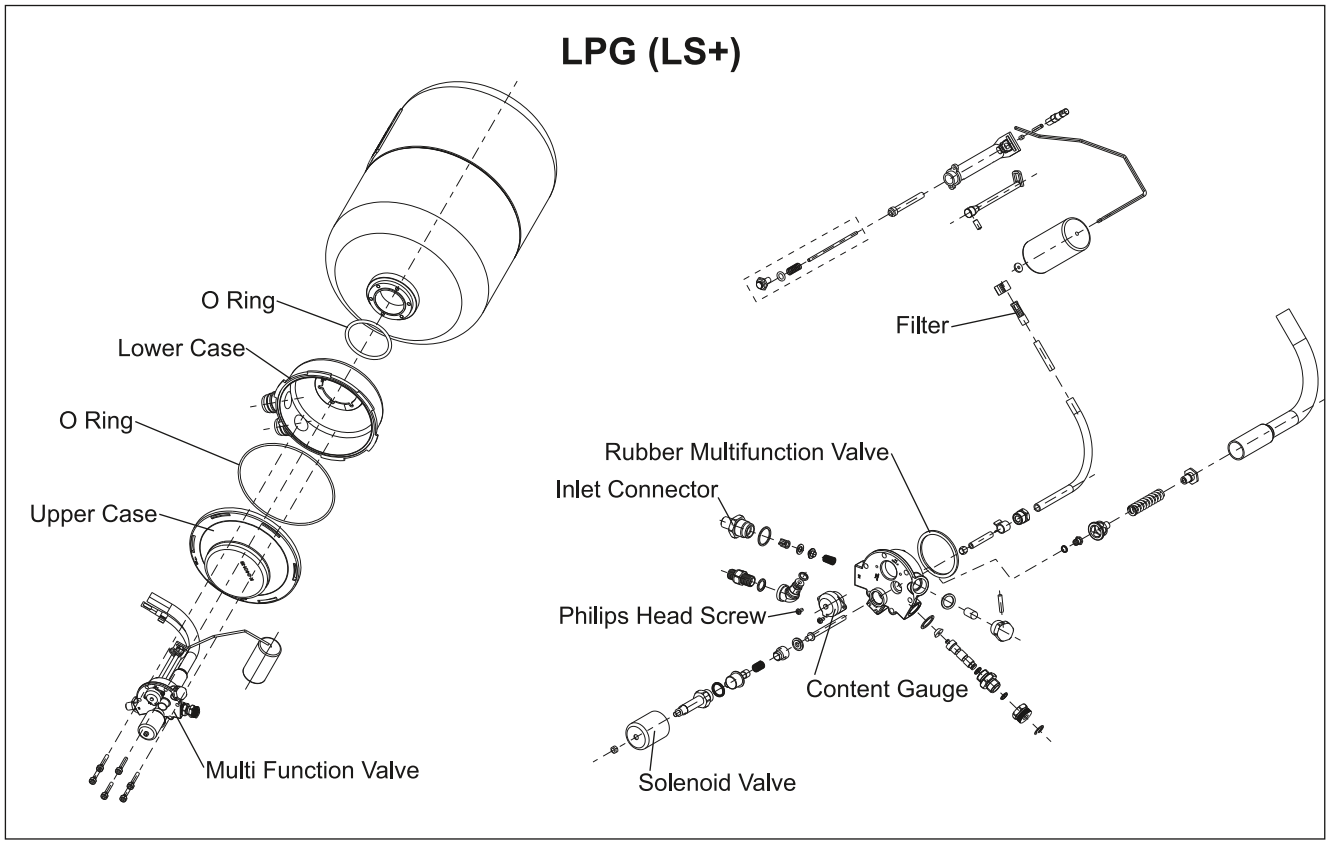

LPG (LS+)
O Ring
Lower Case
O Ring
Upper Case
Multi Function Valve
Filter
Rubber Multifunction Valve
Inlet Connector
Philips Head Screw
Content Gauge
Solenoid Valve

Fig. 7.2

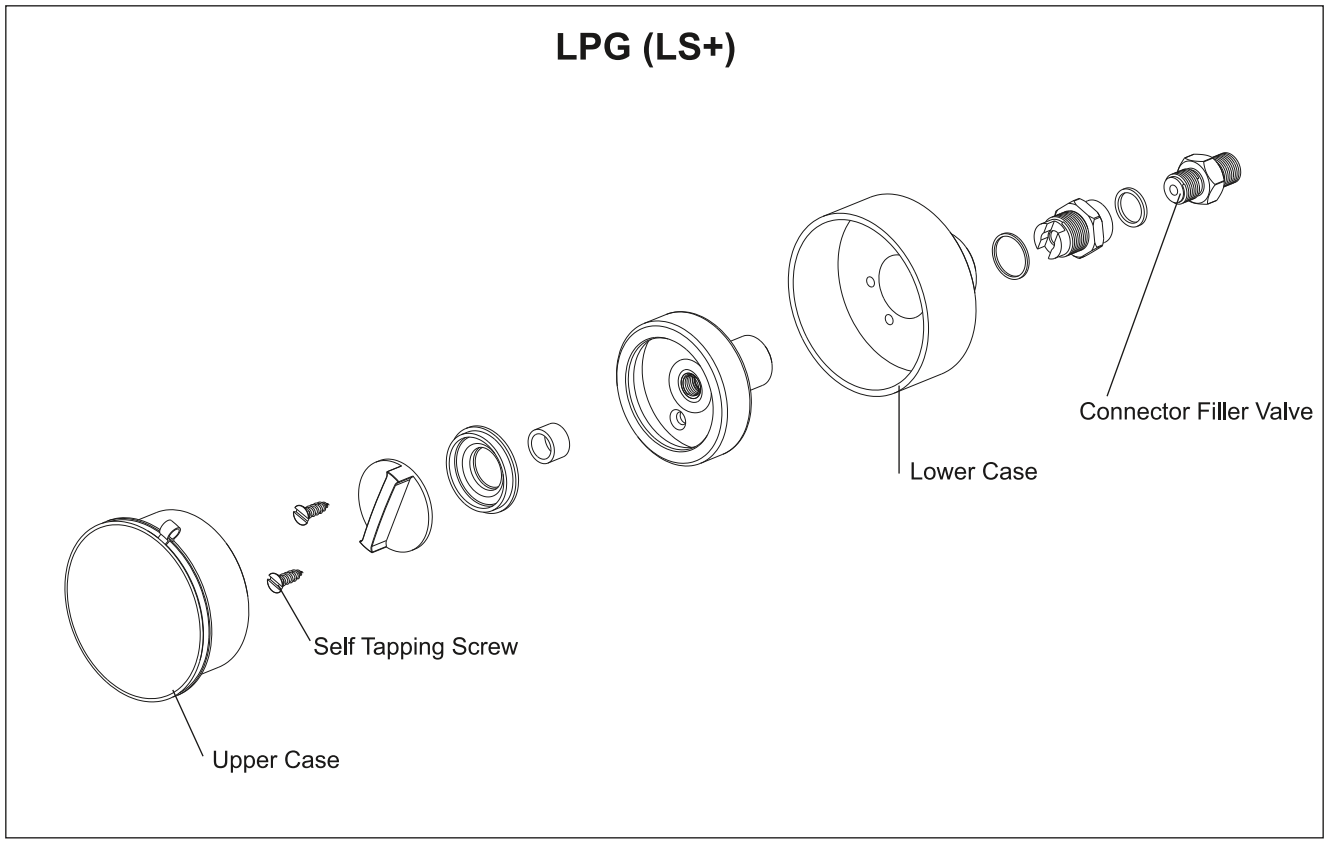

LPG (LS+)
Connector Filler Valve
Lower Case
Self Tapping Screw
Upper Case

Fig. 7.3

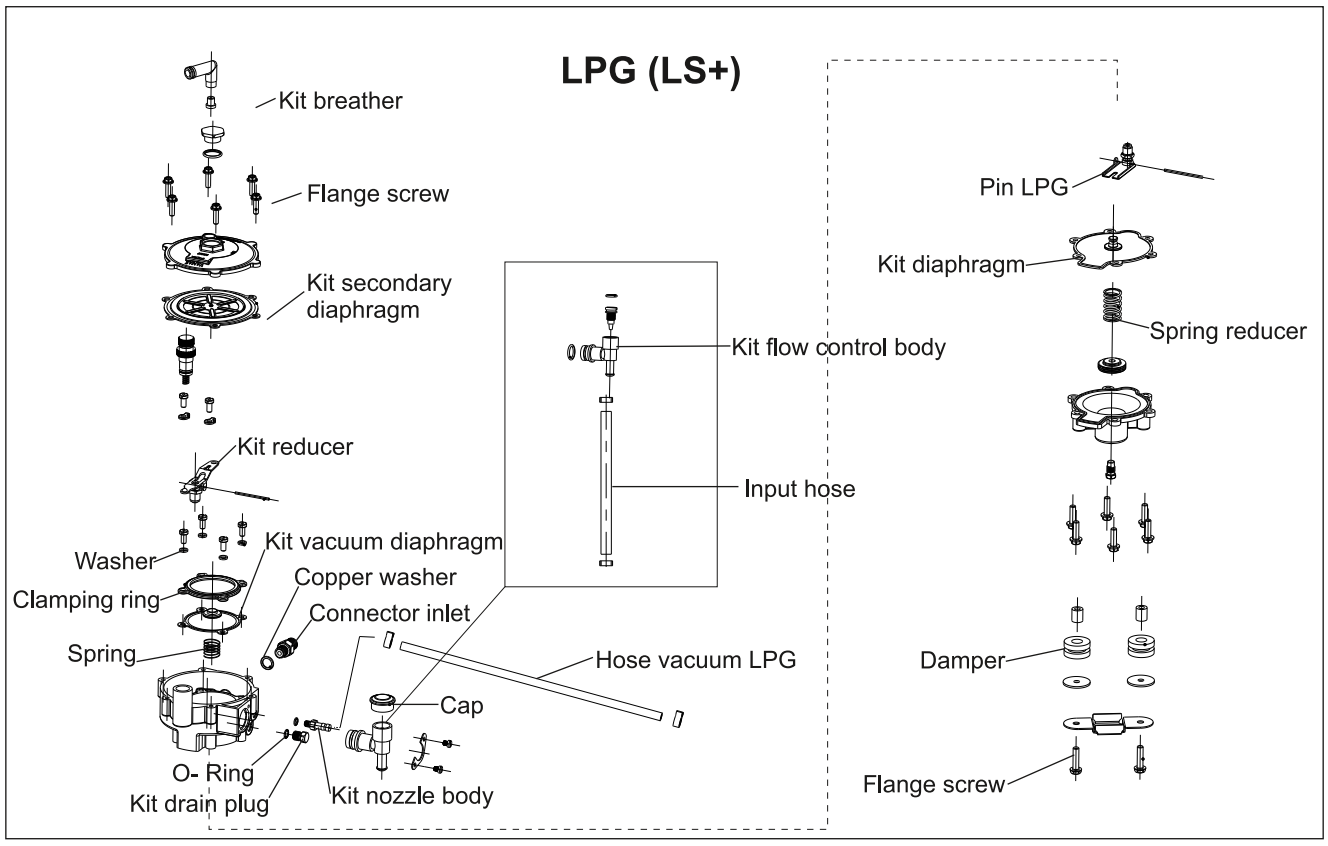

LPG (LS+)
Kit breather
Flange screw
Kit secondary diaphragm
Kit reducer
Washer
Clamping ring
Spring
Kit vacuum diaphragm
Copper washer
Connector inlet
O- Ring
Kit drain plug
Kit nozzle body
Cap
Hose vacuum LPG
Kit flow control body
Input hose
Pin LPG
Kit diaphragm
Spring reducer
Damper
Flange screw

Fig.7.4

DESCRIPTION OF LPG SYSTEM

- LPG fuel is a mixture of butane and propane. LPG is an alternate fuel technology system adapted to Petrol vehicles without altering the basic engine. The unique feature of the LPG system is the provision of switch over to petrol mode of operation by a change over switch located at the dashboard.

- LPG Storage cylinder is located below the driver seat. This cylinder is of 20.6 Litres Water capacities. This cylinder connection goes through the two-stage pressure reducer and a manual flow adjuster to a gas - air mixer fitted between air - cleaner unit and carburetor.

- LPG Cylinder assembly is consist of a multifunction valve (MFV), which has safety features like in- built fusible plug & pressure relief valve & a Manual shut off valve. Excess flow check valve, 80% fill limiter and remotely operated solenoid valve.

- A content gauge fitted on MFV to indicate quantity of LPG inside the cylinder and senses the gas level in the cylinder and sends signal to the indicator fitted on the dashboard, which indicates the quantity of LPG by means of LED's.

- The Pressure reducer reduces the gas pressure to the sub-atmospheric level. Gas- air mixer body draws gas, according to the engine requirements.

- To run the vehicle on petrol when we select petrol mode from selector switch, petrol solenoid valve energizes & allows petrol to flow through carburetor. In CNG mode, the Petrol solenoid valve de-energizes and prevents the flow of petrol to the carburetor.

- The gas and air is supplied to the engine through gas air mixer proportional to the engine requirement.

- The vehicle can be re-fueled through the refueling valve using filling gun available at the auto LPG dispensing station

LPG KIT COMPONENTS

A) AUTO LPG TANK

B) MULTI FUNCTION VALVE

C) FILLER VALVE

D) VAPOR BOX ASSEMBLY

E) LPG FLEXIBLE HOSE

F) LOW PRESSURE RUBBER HOSE

G) PETROL SOLENOID VALVE

H) LPG REDUCER UNIT

I) GAS AIR MIXER BODY

J) CHANGE OVER SWITCH

Note: Auto LPG tank supplied by Tank manufacturer

DESCRIPTION OF LPG KIT COMPONENTS

A) AUTO LPG TANK

- LPG Tank are made with high quality steel, through submerged arc welding. These tanks are manufactured to operate at the rate of 10Kg/ Cm2 and hydraulic pressure tested up to 45 bar. (Fig. 7.5)

Fig. 7.5

- Tanks are constructed in different lengths and diameters to select according to the space available in the Vehicle. The liters capacity varies with the dimensions of the tank. It is mandatory to fill only 80% of the total capacity for safety reasons. Over filling beyond 80% limit can result dangerous conditions. The tank must be installed irremovably inside the vehicle and away from the passenger area.

- The tanks are provided with standard flange where the Multi function valve is fitted and maintained. It is possible to re fill and extract of LPG from the tank. For the Multi function valve to function correctly, it is necessary for the diameter and the inclination of the tank to correspond to those of the Multi function valve.

- It is the responsibility of the installer to check at the first re-filling, that the Multi function valve works perfectly, in particular concerning the fuel level.

- The tanks are tested and approved by THE CHIEF CONTROLLER OF EXPLOSIVES, NAGPUR.

Note: A test certificate is valid for 5 years for each tank from the date of manufacturing. This certificate must accompany the tank throughout the period of this validity until it expires.

TANK SPECIFICATION

Diameter : 270 mm

Total Capacity : 20.6 Litres

80 % filling : 16.5 Litres

B) MULTIFUNCTION VALVE

- Multi function valve is a component of LPG fuel system that is installed in the tank and incorporates devices for filling and extracting fuel. (Fig. 7.6)

- Multi function valves are constructed in 0 degree, 30 degree and 90 degree with respect to the vertical plane and in various sizes.

- For the Multi function valve to function correctly, it is necessary for the diameter and the inclination of the tank to correspond to those of the Multi function valve.

- This is the component of LPG system installed in the tank, which has the following safety features. These features help in maintaining the safety function of the LPG System.

Fig. 7.6

- 80% filling limit.

- Excess flow control Valve.

- Pressure relief Valve.

- Thermal fuse.

- Content Gauge (Level indicator).

- Remote Controlled shut off valve (Solenoid Valve on the Multi function valve outlet.)

- Manual control knob- Inlet & Outlet

MULTI VALVE SPECIFICATION

Fitment angle : 0° deg from vertical angle

C) FILLER VALVE

- This valve is used for re-filling auto LPG into the tank. It has got a non-return valve to avoid reversing of fuel during filling. (Fig. 7.7)

Fig. 7.7

D) VAPOR BOX ASSEMBLY

- This encloses the Multi function valve and the piping inside the vehicle compartments. In case of leakage on Multi function valve or from the pipeline, the leaked gas will be vent to the atmosphere outside the vehicle compartment through the enclosed ventilation hose.

- This Vapor Box is provided with two openings on the body. This is used for connecting the ventilation hose, which effectively encloses the flexible hose and also takes out the leaked gas if any from cylinder or Multi function valve. (Fig. 7.8)

Fig. 7.8

E) LPG FLEXIBLE HOSE

- This connects auto LPG Tank to the filler valve as well as the LPG reducer unit. This flexible hose carries the high-pressure gas. (Fig. 7.9)

Fig. 7.9

SPECIFICATION

- Filler valve to Multi function valve inlet - ID - 12mm & OD - 16 mm

- Multi function valve outlet to pressure reducer - ID - 12mm & OD - 16 mm.

F) LOW PRESSURE RUBBER GAS HOSE

- This is a special rubber hose, which carries low - pressure gas from the pressure reducer to mixer through flow control valve. (Fig. 7.10)

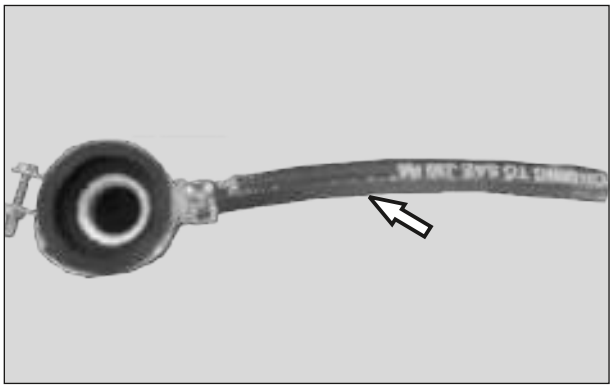


Fig. 7.10

G) PETROL SOLENOID VALVE

- This is located on the petrol line between petrol tank and carburetor. When the driver selects the LPG operation, the power supply to the petrol solenoid is cut off to ensure that petrol is not flowing to the carburetor. (Fig. 7.11)

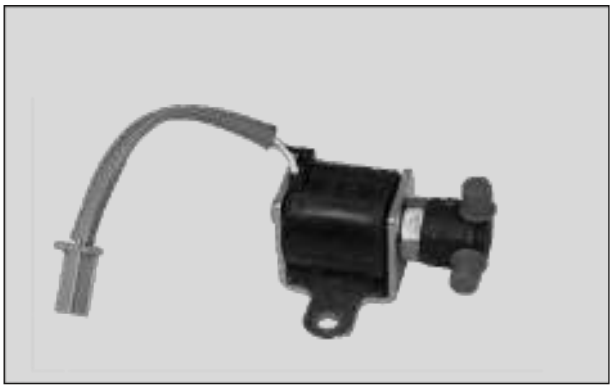


Fig. 7.11

H) LPG REDUCER UNIT

- This is a two-stage Vacuum type pressure reducer, which reduces the pressure of gas to sub atmospheric pressure and supply the gas as per the requirements of the engine. In Vacuum reducer, there is a special vacuum diaphragm, which acts as the safety device to open or close the gas passage. When engine stops, the vacuum diaphragm comes in to play and closes the passage of gas.

- In the 3 wheelers the Multi function valve extracts only vapors hence hot water circulation is not required. (Fig. 7.12)

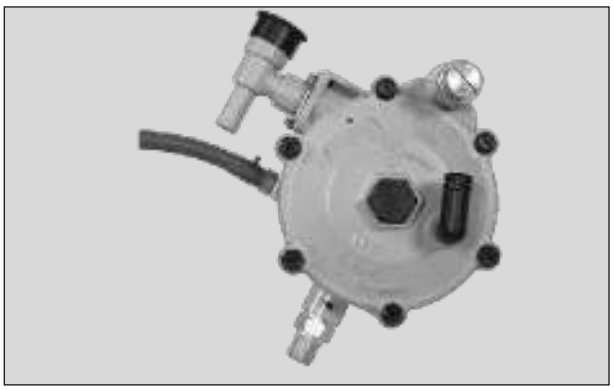


Fig. 7.12

I) GAS AIR MIXER BODY

- The mixer is part of the LPG system that has the job to metering the correct quantity of gas into the engine.
- Mixer body is optimized for each model of vehicle application.

- It is not recommended to extend the gas outlet to carburetor directly without gas air mixer. Flow rate of LPG and air cannot be optimized which can lead to poor performance and poor emission levels, in case gas air mixer is not installed. (Fig. 7.13)

Fig. 7.13

J) CHANGE OVER SWITCH & WIRING HARNESS

- This is a Three-way switch. One can select 100% petrol operation (P) or 100% LPG operation (G) or Neutral (N), which cuts off both petrol and LPG to enable change over operation. (Fig. 7.14)

Fig. 7.14

- This switch is connected to tell-tale lamp which indicate the fuel mode in which the vehicle is been operated and the level fuel available in the tank by means of LED indication. The petrol mode is indicated in Yellow color with pump symbol. In Gas mode it comprises of a double color LED's red and green, indicating respectively the reserve and the four green LED's with G Symbol. (R, 1, 2, 3, 4, G). (Fig. 7.15)

Fig. 7.15

- LPG System Wiring Harness is routed from change over switch to the LPG kit compartments.
- To protect the switch and other electrical units from accidental excess current and subsequent damage, on line fuse has to be used. Standard automotive blade type 5 amps fuse should be used.
- We recommend the use of correct rated fuses. Higher rated fuse can cause damage to the changeover switch.

INSTRUCTION FOR FILLING IN AUTO LPG INTO TANK

- Tank must be filled only to a maximum of 80% of their total capacity.
- This 80% limit makes the tank safer in case of temperature/pressure rises beyond its limit.
- Over filling beyond 80% limit can result in dangerous conditions.
- The tank is fitted with Multi function valve, which limits filling by blocking flow when effective capacity is reached.

- LPG can be re – filled only from authorized auto LPG dispensing stations approved by Government of India.
- When the vehicle is re-filled with the Auto LPG always ensure that the vehicle is parked in gear and that the parking brake is applied.
- After refueling Auto LPG, ensure that the dust cover is put back on the filler Valve.
- Gas filling from external tanks or from external source is not recommended as this would result in non-functioning of Multi function valve 80% cut-off.

OPERATING PROCEDURE - CHANGE OVER SWITCH

- For LPG operation, the changeover switch installed on the dashboard should be set to 'G' position, crank the engine. (Fig. 7.16)
- After starting the vehicle, accelerate the engine progressively.
- To change over switch from LPG to petrol, change the switch position directly to 'P' position. (Fig. 7.17)
- To change over switch from petrol to LPG operation, brings the vehicle to halt. Set the changeover switch to neutral position. Allow the engine to run till it jerks. Now change the switch to position 'G'. The engine will start to run on LPG. (Fig. 7.18B)
- If the change over switch from petrol to LPG is made without going through neutral switch position '-', the engine may back fire & stop. (Fig. 7.18A)
- Frequent change over between petrol and LPG will lead to wastage of petrol/LPG.
- All electrical accessories like battery, ignition coil and spark plug must be maintained in good working condition.

Fig. 7.16

Fig. 7.17

Fig. 7.18A Fig. 7.18B

DO'S

- Shut off the manual valve fitted on MFV in case the vehicle is not in use for longer period.
- In case of leakage, check for leakage with neutral soap solution & make the joint leak proof. If leakage does not stop then immediately turn 'OFF 'manual shut off valve. Contact the nearest authorized service station.
- When the vehicles are taken for body repairs (welding etc.) the LPG in the cylinder should be consumed completed and then remove Auto LPG tank.
- Use only tested / approved LPG tank.
- Use only BIS certified / approved multi-function valve.
- If rubber hoses develop visible cracks immediately replace them.
- Use only correct rated fuse for LPG System.

DON'T'S

- Do not switch over LPG mode while the vehicle is running in petrol mode.
- Don't allow anybody to smoke while re-filling.
- Don't keep any flammable items near the LPG system.
- Don't open the reducer or any LPG components without correct knowledge.
- Don't use accessories which are not been original components. All the components used in the kit have been individually tested and approved by the authorized government testing agencies.
- Never tune or repair kit components by unauthorized & untrained staff.
- Don't try to fill LPG cylinder beyond 80% filling limit.

- Don't replace temperature & pressure relief device on the multifunction valve by dummy parts. (Use genuine spares only)
- Avoid short-circuiting of electrical connections.

SAFETY TIPS:

- In case of leakage, close the manual shut off valve immediately, also switch off the ignition.
- Don't try to fill the LPG beyond the 80% of the tank Capacity.
- Don't adjust any of the Multi-function valve setting on your own.
- During the leak test in the LPG system, 2-3 lit. Gas should be in a LPG cylinder.
- Always ensure that the ducting connections are tight so that Incase of leakage the gas vents out of vehicle to the atmosphere.
- Test your cylinder as per safety requirements every 5 years.
- Always keep the earthling of the wiring harness intact at all times.
- Always keep filler valve plastic cap on the filler connector.
- Always work in good Ventilated workshop area.
- Never discharge LPG in public places or in prohibited or closed areas. In such condition, the vehicle should be taken to remote place & away from the electrical transmission line to release the LPG safely.
- Ensure availability of Fire Extinguisher in the workshop.
- Ensure availability of First Aid box at the workshop.
- Use the Correct rate fuse.
- Don't take any flammable material near to the gas components.

TUNING OF LPG KIT

- Tuning of LPG refer procedure chapter “Periodic Maintenance” page no:

DRAINING OIL FROM REDUCER:

- The Oil can be drained from both primary & secondary chamber of regulator without dismantling the regulator from Chassis by following procedure.
- Switch off the Vehicle.
- Loosen and remove screw drain plug from primary chamber. (Fig. 7.19)

10 mm spanner

- Switch ON the Key momentarily to operate Gas solenoid on multi function valve once or twice. The Oil from primary chamber can be easily drained.
- Refit the screw drain plug on primary chamber.
- Loosen and remove screw drain plug from secondary chamber. (Fig. 7.20)

10 mm spanner

- Drain the Oil from secondary chamber.
- Refit the screw drain plug on secondary chamber.
- Switch ON the Key, and check the leakages at all joints with neutral soap solution. Ensure that all Kit joints are leak proof.

Drain oil every 5ooo kms

SERVICING OF LPG KIT COMPONENTS

LPG REDUCER

REMOVE LPG REDUCER FROM CHASSIS:

- Ensure that manual valve outlet is closed in the Multi-function valve assembly. (Fig. 7.21)

Fig. 7.19

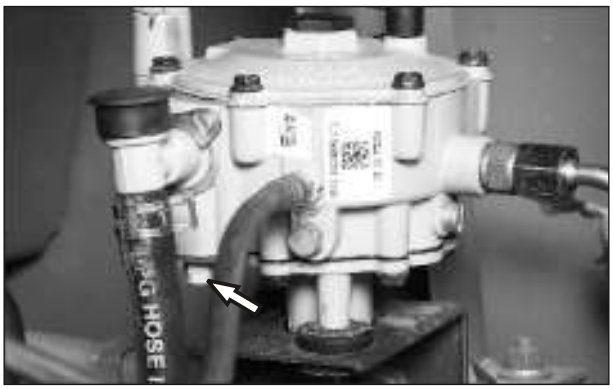


Fig. 7.20

Fig. 7.21

- Loosen and remove flexible hose assembly from LPG reducer. (Fig. 7.22A)
- Loosen the self-tensioner clip by using the nose plier and disconnect low pressure hose (LPR to Mixer unit) (A).(Fig. 7.22B)
- Disconnect vacuum connection on manifold (B). (Fig. 7.22B)

17 mm spanner, Nose Plier

- Loosen and remove 1 no. Hexagonal nut M8 along with wave spring washer and plain washer from chassis. (Fig. 7.23)
- Take out the 1 no. Hexagonal flange bolt M8x20 from chassis.

13 mm spanner

- Loosen and remove 1 no. Hexagonal bolt M6x16 along with wave spring washer and plain washer from chassis. (Fig. 7.23)
- Separate the LPG reducer from chassis.

10 mm spanner

- Loosen and remove 2 nos. Hexagonal flange screw along with kit reducer mounting and LPG reducer bracket.

PRIMARY STAGE:

- Loosen and remove 6 nos. Hexagonal flange screw from bonnet primary. (Fig. 7.24)

8 mm spanner

- Take out the bonnet primary. Do not disturb the pressure adjusting screw.
- Take out the spring and kit primary diaphragm which is engaged with the lever kit primary reducer. (Fig. 7.25A)
- Loosen and remove 2 nos Cheese head Screw along with 2 nos. Lock washer from kit primary reducer. After take out the lever along with pin from kit primary reducer. (Fig. 7.25B)

Flat head screw driver

Fig. 7.22A

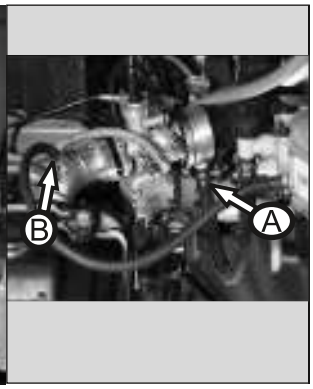


Fig. 7.22B

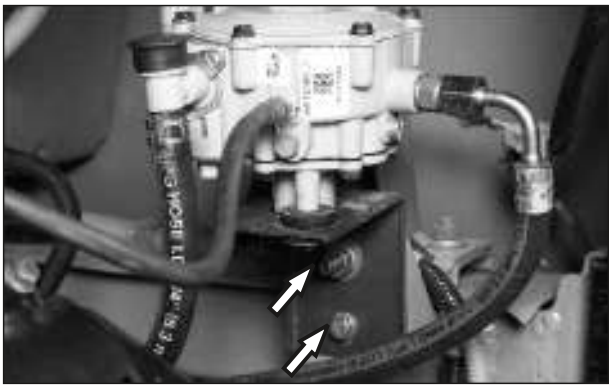


Fig. 7.23

Fig. 7.24

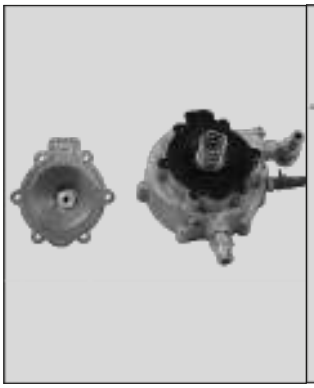


Fig. 7.25A

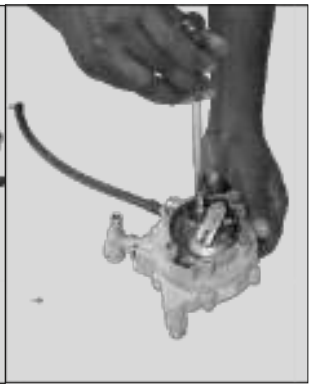


Fig. 7.25B

- Inspect the chamber for any presence of oil, if found clean with dust free cloth.
- Inspect the kit primary reducer and kit primary diaphragm condition. Clean the diaphragm carefully with dust free cloth. Replace the diaphragm only if found damaged otherwise use the same one.
- Re assemble the all parts in the reverse order of dismantling.

Note: During opening of primary stage bonnet, make sure that proper clamping has been done since the diaphragm is spring loaded.

Don't use sharp-ended tools for opening diaphragm.

Clean the diaphragm with dust free cloth.

Don't repair, the punctured / damaged diaphragm.

Don't damage the screws.

Caution: Close the Multi function valve (MFV) manual valve outlet before doing any servicing of kit components. Consume all gas from fuel line.

SECONDARY STAGE:

- Remove Breather hose from second stage breather elbow.
- Loosen and remove 6 nos. Hexagonal flange screw from bonnet secondary. Take out the bonnet secondary. (Fig. 7.26)

8 mm spanner

- Remove kit idle screw along with spring, 'O' ring and spring guide. (Fig. 7.27)
- Remove flow control cap and flow adjuster screw.
- Loosen and remove 2 nos. Screw (M5x8) kit flow control body mounting. (Fig. 7.27)
- Take out the kit flow control body along with 'O' ring.

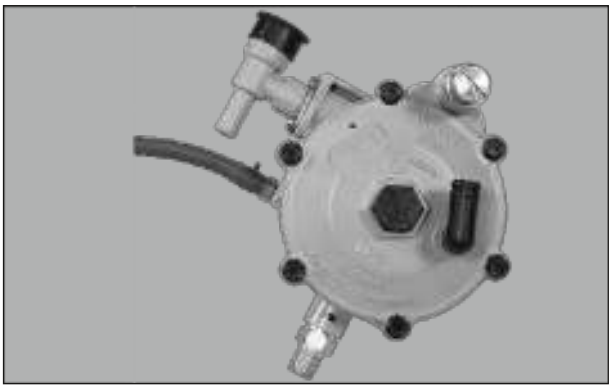


Fig. 7.26

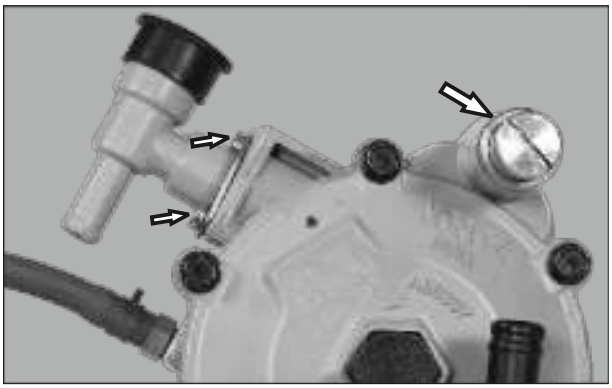


Fig. 7.27

Flat head screw driver

- Take out the secondary diaphragm which is engaged with the lever kit secondary reducer.
- Loosen and remove 2 nos. Cheese head screw along with 2 nos. Lock washer. From kit secondary reducer. After take out the lever along with pin from kit secondary reducer unit. (Fig. 7.28)

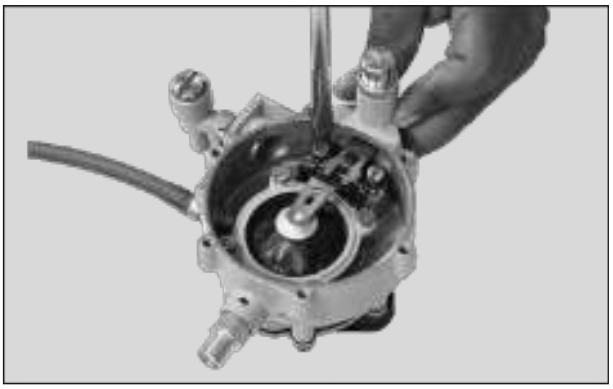


Fig. 7.28

Flat head screw driver

- Apply air pressure from inlet connector to clean the flow passage through primary & secondary seat.
- Inspect the chamber for any presence of oil, if found clean with dust free cloth.
- Inspect the kit secondary reducer and kit secondary diaphragm condition. Clean the diaphragm carefully with dust free cloth.
- Replace the diaphragm only if found damaged otherwise use the same one.
- Replace the idling screw 'O' Ring & flow control 'O' rings if found damaged.
- Re assemble the all parts in the reverse order of dismantling.

KIT VACUUM DIAPHRAGM:

- Loosen and remove 4 nos. Cheese head screw along with 4 nos. Spring washer from vacuum seal. (Fig. 7.29)
- Take out the vacuum seal, kit vacuum diaphragm and spring.
- Clean the diaphragm with dust free cloth.
- Inspect the diaphragm for puncture. If necessary replace the kit vacuum diaphragm. Check spring for its condition. If necessary replace with new one.
- Check for vacuum diaphragm leakages. If so correct it.

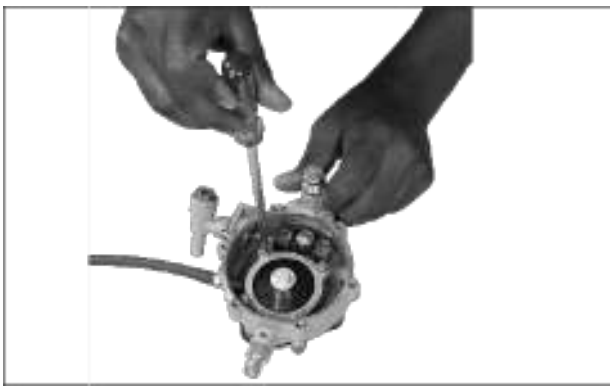


Fig. 7.29

- Clean the vacuum hole by applying air pressure.
- Re - assemble the all parts reverse order of dismantling.

Note: Keep all removed parts in clean and dust free area.

Don't use sharp-ended tools for opening diaphragm

Don't repair the punctured/damaged diaphragm

Don't damage or misplace the bolts , Spring washers & Nuts

Avoid duplicates, use genuine spares only.

MULTIFUNCTION VALVE SERVICING

- Never repair or service Multifunction Valve by unauthorized & untrained staff.
- Servicing to be done at TVS authorized service center only.
- Do not open the Multifunction Valve (MFV) till any problem observed related to the Multifunction Valve.

PROCEDURE TO REPLACE THE MULTIFUNCTION VALVE.

- Before going for replacement of the Multifunction valve (MFV), please ensure that LPG in the tank is fully consumed or Tank should be totally empty.
- Remove the Upper case & Lower case of the Vapor box assembly. (Fig. 7.30)
- Loosen the hose reducer flexible clamp and disconnect the hose reducer flexible from lower case (inlet) (A). (Fig. 7.31)
- Loosen the hose reducer flexible clamp and disconnect the hose reducer flexible from lower case (outlet) (B). (Fig. 7.31)

Philips head screw driver

Fig. 7.30

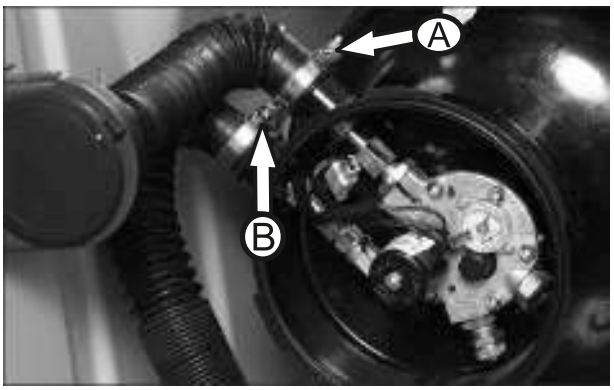


Fig. 7.31

- Loosen and remove the inlet flexible hose and outlet flexible hose from Multifunction valve (Fig. 7.32)

17 mm Spanner

Note: Ensure that 'O' Ring is placed in the Inlet & outlet pipe while tightening.

Ensure no Damage in the both the Inlet & outlet flexible hose.

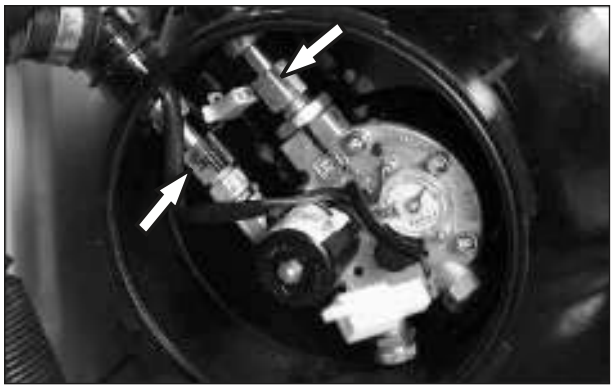


Fig. 7.32

- Loosen and remove 2 nos. Self-tapping screw from 'T' piece. (Fig. 7.33A)

Philips head screw driver

- Pull out the flexible hose assembly from hose reducer flexible through the 'T' piece.
- Disconnect the multifunction valve wiring harness coupler from front wiring harness. (Fig. 7.33B)
- Pull out the multifunction valve wiring harness from chassis.
- Take out the grommet from the 'T' piece.
- Pull out the multifunction valve wire from 'T' piece through the hose reducer flexible.
- Loosen and remove 1 no. Hexagonal nut M5 from gas solenoid. After take out the gas solenoid. (Fig. 7.34A)

8 mm spanner

- Loosen and remove the mounting 6 nos. Allen screw from the multifunction valve. (Fig. 7.34B)

4 mm Allen key

- Take out the multifunction valve along with lower case and 'O' ring from LPG cylinder. (Fig. 7.35)
- Re - assemble the all parts in the reverse order of dismantling.

Fig. 7.33A

Fig. 7.33B

Fig. 7.34A

Fig. 7.34B

Fig. 7.35

Note: Check the float function (for its free movement)

Check the suction tube filter for any blocks or damage.

Check the Multifunction valve rubber Seal for its condition.

Check the spring valve solenoid for proper seating. Make sure the correct function of manual cock.

Check Vapor box O-ring for any external damage.

Replace O-ring, seal and other serviceable components if in need

LEAKAGE TEST:

- Make mild soap and water mixture and fill it in a bottle. Spray this solution at the places stated below. Bubbles will be formed if there is any leakage

  Filler valve joint

  Cylinder and multi-function valve

  Gas inlet joint at multi-function valve

  Gas outlet joint at multi-function valve

  Gas inlet joint at regulator

  Gas outlet joint at regulator

  Gas inlet joint at pipe intake

- High pressure tube from multifunction valve to regulator.

Note: Gas solenoid should be 'ON' while doing the leak test on the above mentioned points

CONTENT GAUGE FUNCTION CHECKING

- Content gauge checking without removal of multifunction valve (MFV): Unscrew the content gauge & for checking function of Content Gauge, rotate magnetic field by using iron metal source and monitor the arrow movement and respective indication on dashboard. (Fig. 7.36)

- Content gauge checking by removal of MFV: For checking the function of Content gauge, lift the float by hand and confirm all LED's on dashboard are glowing correctly.

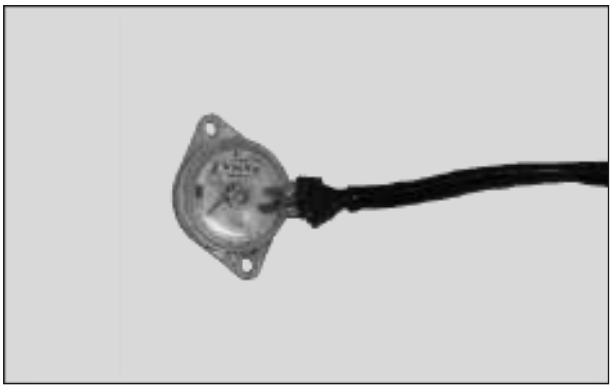


Fig. 7.36

REPLACEMENT OF CONTENT GAUGE WITH NEW ONE

- Remove screw M3 x 5 by using screw driver without slipping Philip head.(Fig. 7.37)

- Disconnect wiring coupler from multifunction valve wire.

- Install new Content Gauge. Tight screws M3x5 by using screw driver.

Philips head screw driver

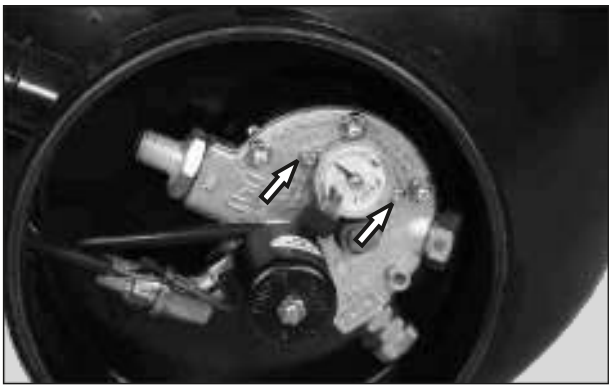


Fig. 7.37

- Connect wiring coupler multifunction valve wire.

- Switch on the ignition key.

- Shift change over switch on gas mode.

- Checking the function of Content gauge, lift the float by hand and confirm all LED's on dashboard are glowing correctly. Assemble on MFV body by tightening the screws.

REPLACEMENT OF 80% FILL LIMITER ASSEMBLY WITH NEW ONE

- Remove the Multifunction Valve as per procedure of 'Multifunction Valve' removal. (refer page number: 7.15)

- Remove screw M4, (2 nos.) by using 3 mm Allen key. (Fig. 7.38)

- Mark the position of float & float rod, for easy installation of new 80% cut-off assy.

Fig. 7.38

- Remove the 80% cut-off assy.Fix the new 80% cut-off assy. Ensure the direction of float rod. The direction of float. and bend portion of rod should be below the deep tube and aluminum tube.

- Tight Allen screw M4, (2 nos.) by using 3 mm Allen key.

MIXER ASSEMBLY SERVICING:

- Unscrew the mixer clamp and remove mixer Clean the mixer venturi holes and nozzle with pressurized air & then with dust free cloth.

- If found cracks on mixer rubber, replace with new mixer otherwise use the same one. (Fig. 7.39)

Fig. 7.39

TROUBLE SHOOTING

1.THE VEHICLE DOES DOT START ON GAS MODE

PROBABLE CAUSE	CORRECTIVE ACTION
Solenoid valve (On MFV) not Working	Loose Connection of Battery / Couplers of wiring harness. Make firm Connections. Check Gas line fuse if found blown off replace with Correct rated fuse. Check Solenoid operation by selector Switch ON / OFF. If Faulty, replace solenoid valve.
Gas cylinder empty	Fill the gas in cylinder
MFV Manual shut off Valves Closed	Open Shut - off valve on Multi function valve
Gas line choked	Check if gas is coming through pipe at vaporaiser end.
No spark	Check Spark at Spark plug and set the spark plug gap / replace spark plug if required.
Presence of petrol in the carburetor	Consume Petrol from the Carburetor keeping selector switch in neutral position then Switch over to LPG mode.

Selectors switch mal-functioning	Check and replace the switch.
Disengagement of Low Pressure Hose from mixer / reducer	Put it in the right position and clamp It firmly.
Excess gas flow / rich mixture	Adjust and optimize the gas flow.
Gas air mixer not working properly	Remove mixer, Clean the mixer & gas entering holes. Check for wear / damage
Excess flow valve closed	Close the Multi function valve outlet manual shut-off valve fully & reopens.

2. ENGINE RUN ON GAS WITH ERRATIC IDLING

PROBABLE CAUSE	CORRECTIVE ACTION
Carburetor Idle adjustment not correct	Check & adjust Carburetor Idle screw as per idle adjustment procedure on Petrol Mode.
Idling gas flow not correct	Check & adjust the reducer Idling screw as per idling adjustment procedure in LPG mode
Leaking of petrol in Gas mode	Check petrol solenoid valve / selector switch and correct.
Leakage through Air intake system	Ensure no leakage through Air intake.
Air Filter choking	Clean, if necessary replace
Weak Spark	Check ignition system & correct
Spark plug gap not proper	Adjust spark plug gap / Replace if required
Throttle not closing fully	Check throttle cable & Adjust play in cable.

3. ENGINE RUN ON GAS BUT DOES NOT REACH FULL POWER

PROBABLE CAUSE	CORRECTIVE ACTION
Gas cylinder almost Empty	Check & fill
Gas hose connection broken/crushed	Replace
Gas Air mixer clogged	Remove mixer, Clean the mixer tube and gas entering holes by Pressurized air & cloth.
Air Cleaner choking	Clean, if necessary replace.
Excess flow valve closed	Close the Multi function valve outlet manual shut-off valve fully & reopen

Inadequate flow of gas	Adjust the gas flow to an optimum level.
Poor gas air mixing of mixing system	Check the carburetion and the suitability.

4. HIGH CONSUMPTION OF GAS

PROBABLE CAUSE	CORRECTIVE ACTION
Choked air cleaner element	Clean / replace.
Leakage of high-pressure line/multi function valve/Gas solenoid/joints	Check and arrest the Leakage.
Excess flow of gas	Bring the gas flow to an optimum level.
Improper gas air mixer.	Check and replace with the recommended gas air mixer.
High idling speed	Set idling in carburetor and gas idling in vaporizer
Wrong indication of fuel level indicator	Check and correct.

5. IN PETROL MODE NOT WORKING

PROBABLE CAUSE	CORRECTIVE ACTION
Empty petrol tank	Fill the petrol
Petrol Solenoid not getting power	Check electrical connections / couplers.
Defective solenoid	Replace solenoid coil.
Improper earthling	Make firm earthling.
Selectors switch mal-functioning	Check and replace the switch.

6. SELECTOR SWITCH NOT WORKING

PROBABLE CAUSE	CORRECTIVE ACTION
No power supply to switch.	Make firm connection. Loose connection of battery/couplers/adopters. Check main line fuse if found blown off, Replace fuse with correct ratings.
Improper inductive pick up signal	Maintain firm connection from ignition coil
Improper adjustments of timing delay	Correct the delay settings.

7. AUTOMATIC FILL LIMITOR NOT WORKING PROPERLY

PROBABLE CAUSE	CORRECTIVE ACTION
Multi function valve fitment angle	Check multi function valve fitment angle to be 0 deg. with respect to the horizontal axis
Parking the vehicle in slope during filling	Check the plain surface level during gas filling
Wrong fitment of multi function valve	Check the free movement of float unit.

Chapter 8

CNG SYSTEM

CONTENTS

ABOUT CNG :

- CNG contains methane (CH4) and small amount of ethane (C2H6) and other hydrocarbons. The technology for the use of CNG as an alternate energy sources has got wide acceptance and the contribution of CNG in reducing the pollution is well known.
- Besides, an attractive saving in running cost has favored the increasing demand for the CNG Vehicles.

- Also the use of CNG enhances the conservation of valuable energy sources and reducing the environmental pollution.

CNG Kit

- In case of 3 wheelers CNG cylinder is located below the driver seat or below passenger seat, depending upon the suitability and space availability. This cylinder is rated for a maximum filling pressure of 200 bar.
- The cylinder connection goes through the CNG cylinder valve, First stage reduction unit with refueling unit, two stage CNG reducer and a manual flow adjuster to a gas-air Mixer (mixer body CNG) fitted between air filter and carburettor.

- CNG Cylinder consists of a cylinder valve, which has safety features like in - built excess temperature & pressure relief device & a Manual shut off valve. Pressure gauge is fitted on first stage reduction unit, which senses the gas pressure in the cylinder and gives the signal to the ECU cum Gas Level indicator CNG fitted on the dashboard, which indicates the quantity by means of glowing LED's.

- In CNG Mode operation, power supply to the Petrol solenoid valve gets cut, thus prevents the flow of petrol to the carburetor. The CNG solenoid valve is energizes and delivers the gas to Two stage CNG reducer. The Two stage CNG reducer reduces the gas pressure to the atmospheric pressure in two stages.
- The gas is supplied to the engine through gas air mixer proportional to the engine requirement. The vehicle can be re-fueled through the refueling unit at the filling station.

- Filter gas solenoid valve is fitted in between first stage reduction unit& Two stage CNG reducer which acts as a shut-off valve. It opens only when we select gas mode from change over switch and will be shut-off in petrol mode.

CNG WORKING SYSTEM (FLOW CHART)

CNG Cylinder with valve

⇩

First stage reduction unit
(with in -built refueling unit)

⇩

Filter solenoid valve
(Through flexible hose)

⇩

Second stage CNG reduction valve
(Through flexible hose)

⇩

Mixer assembly
(Through flexible hose)

⇩

Engine

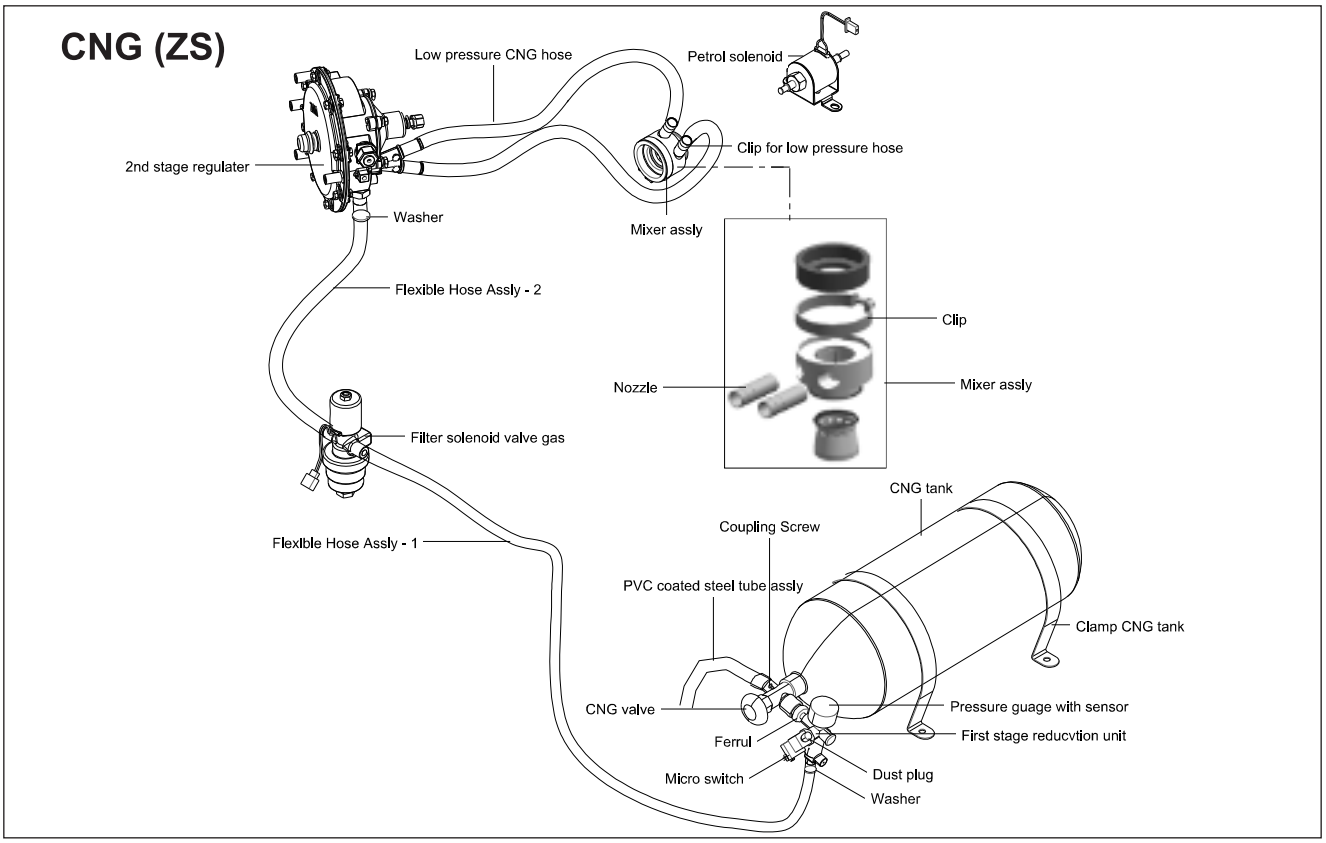

CNG (ZS)
Low pressure CNG hose
Petrol solenoid
2nd stage regulater
Clip for low pressure hose
Washer
Mixer assly
Flexible Hose Assly - 2
Clip
Nozzle
Mixer assly
Filter solenoid valve gas
CNG tank
Coupling Screw
Flexible Hose Assly - 1
PVC coated steel tube assly
Clamp CNG tank
CNG valve
Pressure guage with sensor
Ferrul
First stage reducvtion unit
Micro switch
Dust plug
Washer

Fig. 8.1

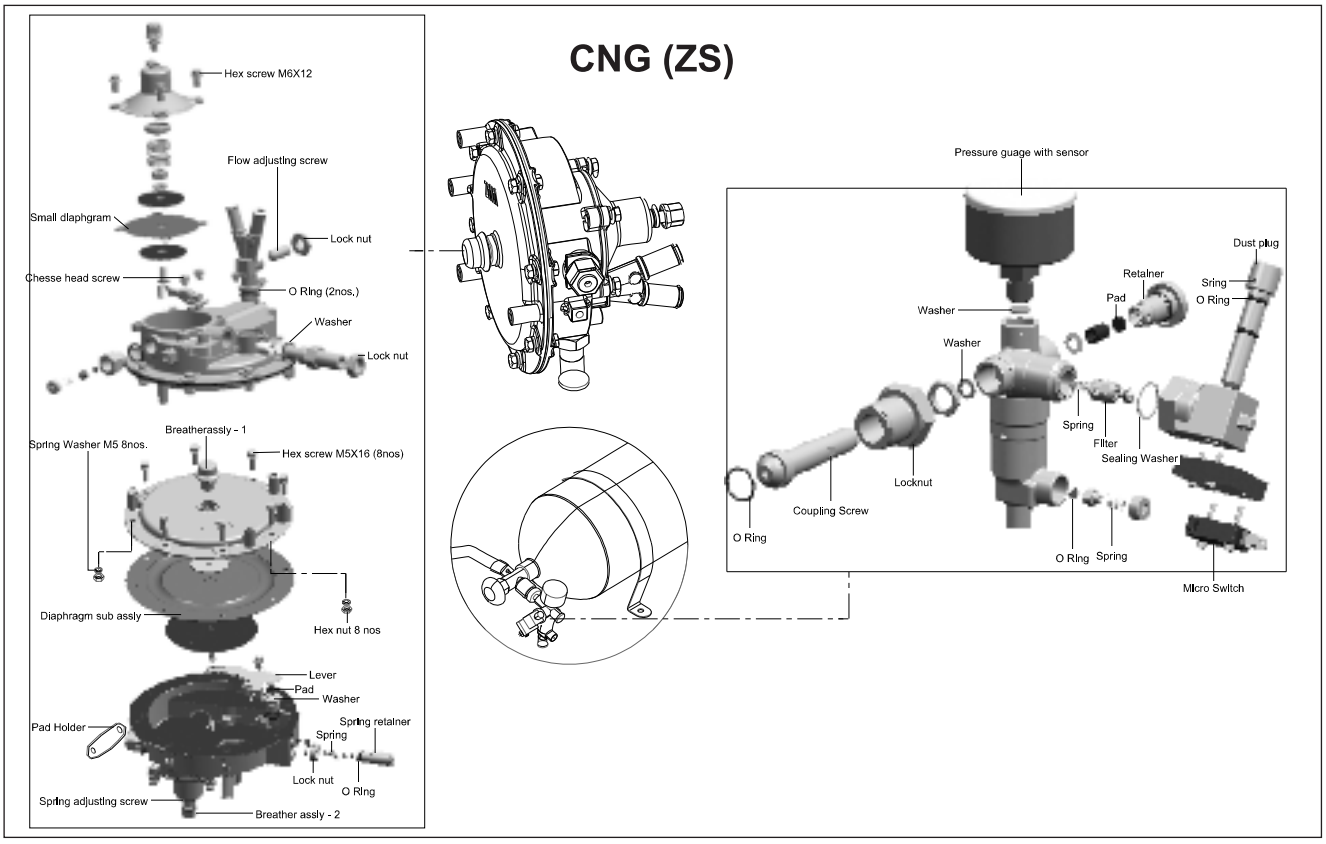

CNG (ZS)
Hex screw M6X12
Flow adjusting screw
Small diaphgram
Lock nut
Chesse head screw
O Ring (2nos.)
Washer
Lock nut
Breatherassly - 1
Spring Washer M5 8nos.
Hex screw M5X16 (8nos)
Diaphragm sub assly
Hex nut 8 nos
Lever
Pad
Washer
Pad Holder
Spring retainer
Spring
Lock nut
O Ring
Spring adjusting screw
Breather assly - 2
Pressure guage with sensor
Dust plug
Retainer
Sring
O Ring
Pad
Washer
Washer
Spring
Filter
Sealing Washer
Locknut
Coupling Screw
O Ring
O Ring
Spring
Micro Switch

Fig. 8.2

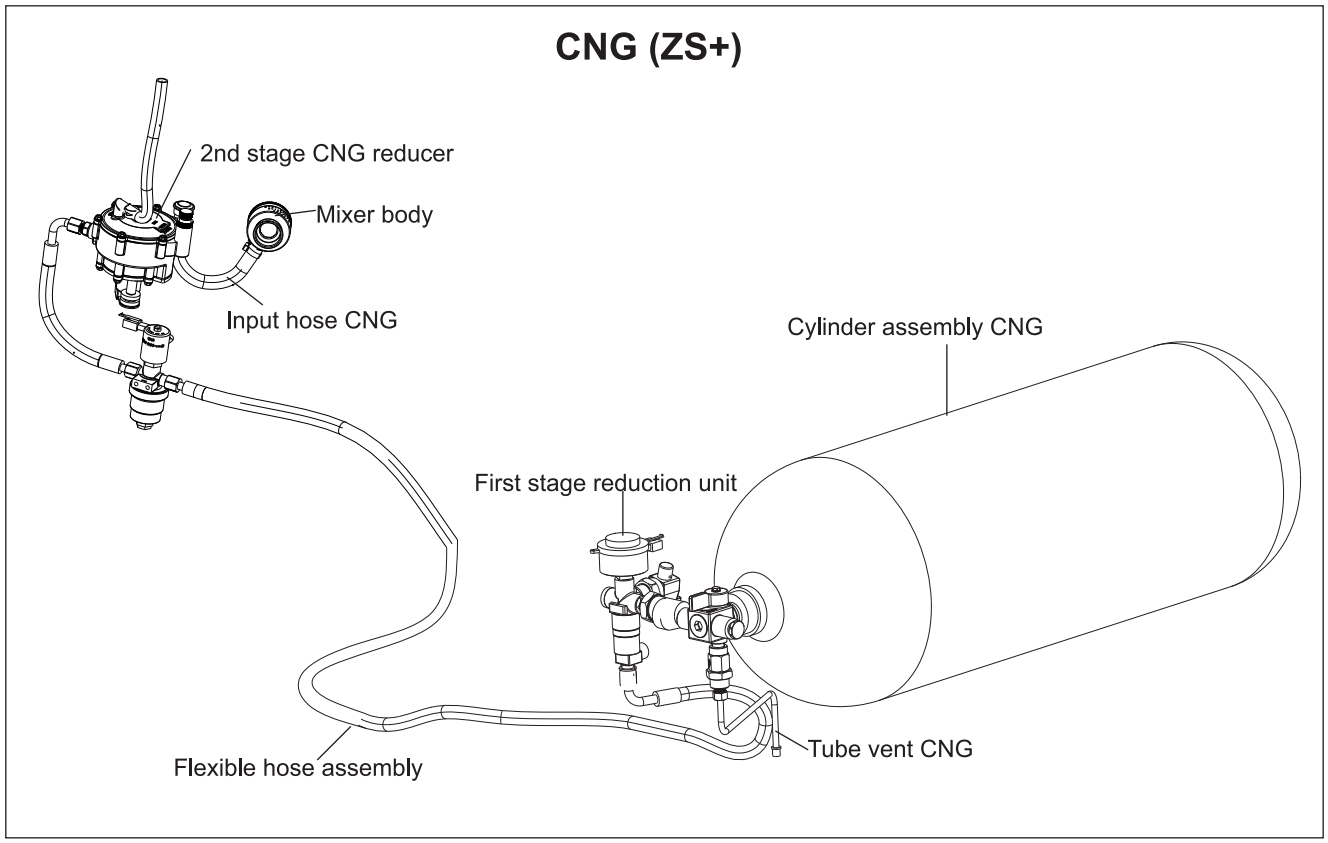

CNG (ZS+)
2nd stage CNG reducer
Mixer body
Input hose CNG
Cylinder assembly CNG
First stage reduction unit
Tube vent CNG
Flexible hose assembly

Fig. 8.3

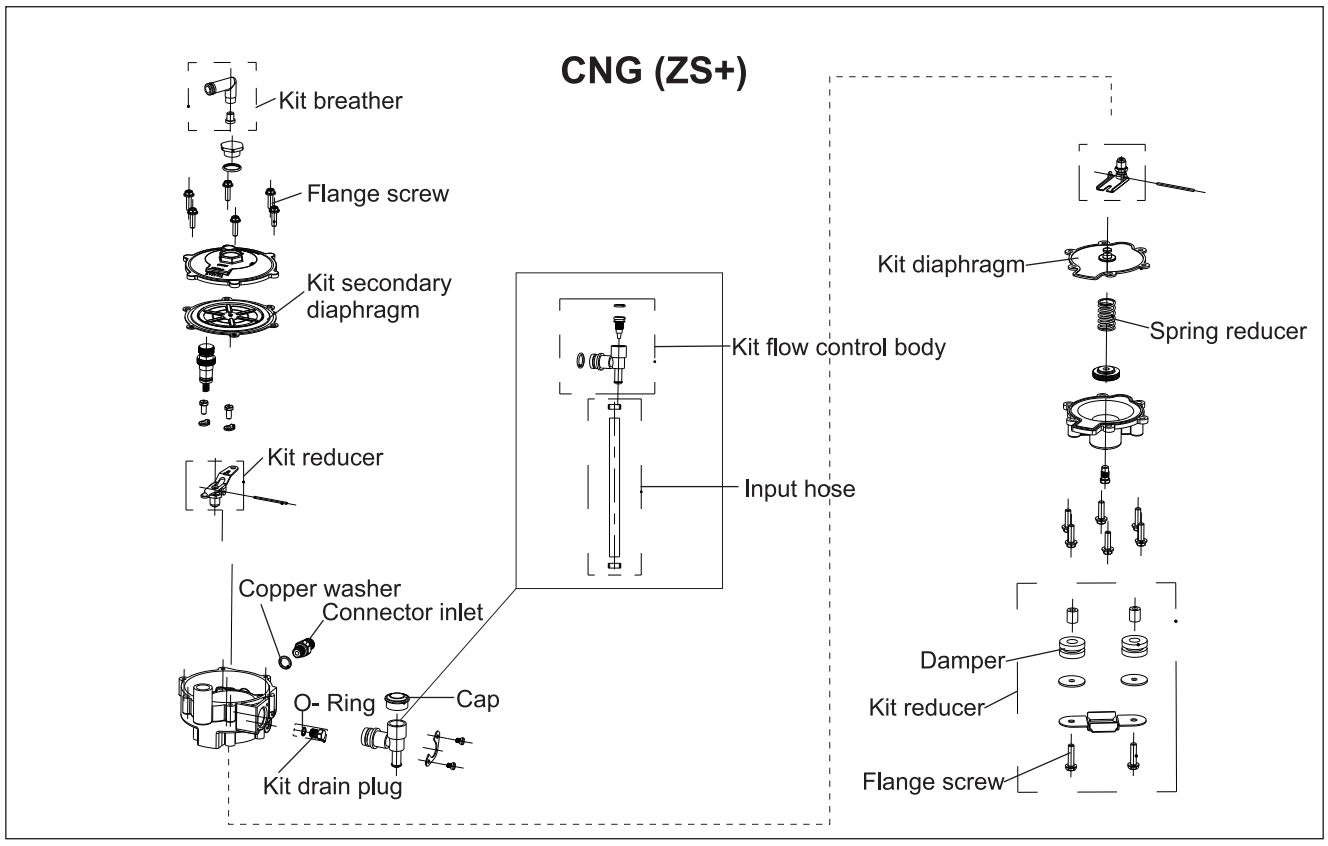

CNG (ZS+)
Kit breather
Flange screw
Kit secondary diaphragm
Kit reducer
Copper washer
Connector inlet
O- Ring
Cap
Kit drain plug
Kit flow control body
Input hose
Kit diaphragm
Spring reducer
Damper
Kit reducer
Flange screw

Fig. 8.4

COMPONENTS OF CNG KIT

A) First stage reduction unit

B) Flexible hose assembly - 1

C) Filter Gas solenoid valve

D) Two stage CNG reducer

E) Low pressure hose assembly

F) Petrol solenoid valve

G) Mixer body CNG

H) Mode indicator

I) CNG Cylinder valve

J) Tube vent CNG (PVC coated steel tube)

DESCRIPTION OF CNG KIT COMPONENTS

A) FIRST STAGE REDUCTION UNIT

- First stage reduction unit reduces cylinder pressure of 200 bar to 3 - 4 bar. Refueling unit and micro switch are inbuilt with first stage reduction unit. Micro switch is provided for safety purpose. Pressure gauge senses the cylinder pressure and by glowing LED's through Gas level indicator shows the gas level to driver. (Fig. 8.5)

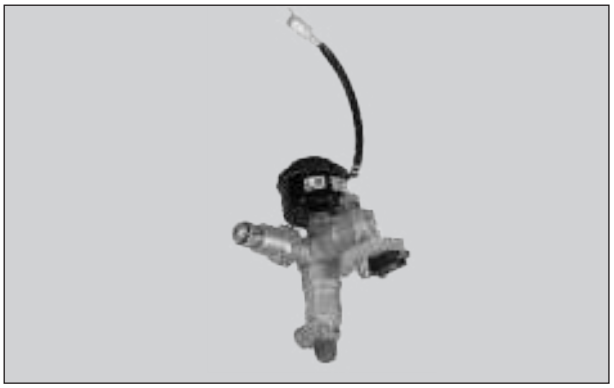


Fig. 8.5

B) FLEXIBLE HOSE ASSEMBLY - 1

- Flexible hose assembly - 1 is used to connect outlet of first stage reduction unit to the inlet of filter gas solenoid valve and flexible hose assembly - 2 is used to connect outlet of filter gas solenoid valve to the inlet of two stage CNG reducer. By simply tightening the end connections the flexible hoses can be easily fitted. (Fig. 8.6)

Fig. 8.6

C) FILTER GAS SOLENOID VALVE

- Filter gas solenoid valve is fitted in between first stage reduction unit & two stage CNG reducer which acts as a shut-off valve. It opens only when we select gas mode from change over switch and will be shut-off in petrol mode. (Fig. 8.7)

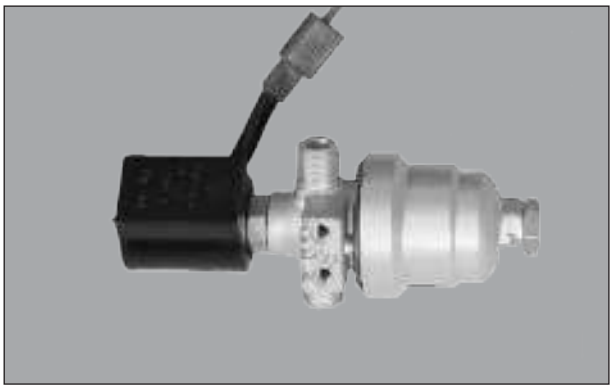


Fig. 8.7

D) TWO STAGE CNG REDUCER

- The two stage CNG reducer reduces the gas pressure from 4 bar to the atmospheric pressure in two stages. It is provided with idling & flow adjuster screw (power screw) for tuning as per engine requirement. (Fig. 8.8)

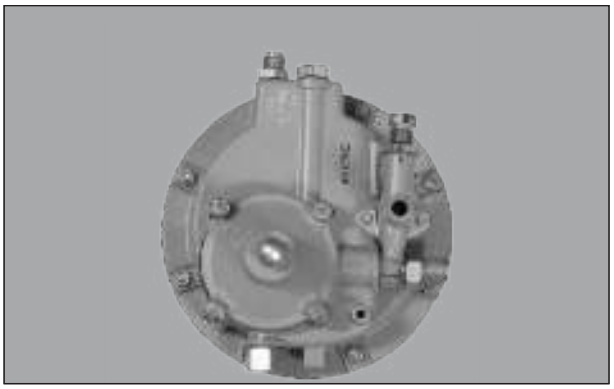


Fig. 8.8

E) LOW PRESSURE HOSE ASSEMBLY

- The two stage CNG reducer outlet is connected to the inlet of the Mixer body CNG through low pressure hose assembly. It is fitted firmly on both ends by means of clips. (Fig. 8.9)

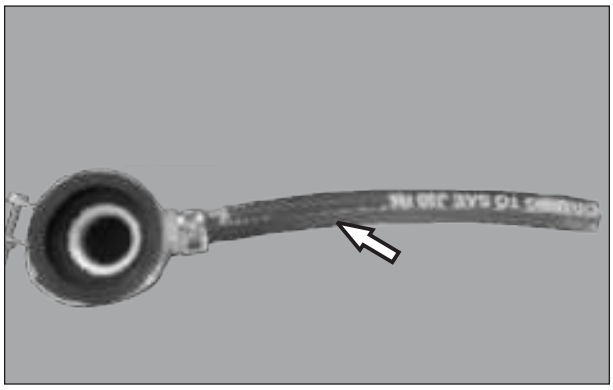


Fig. 8.9

F) PETROL SOLENOID VALVE

- To run the vehicle on petrol when we select petrol mode from change over switch, petrol solenoid valve energizes & allows petrol to flow through carburetor. In CNG mode, the Petrol solenoid valve de-energizes and prevents the flow of petrol to the carburetor. (Fig. 8.10)

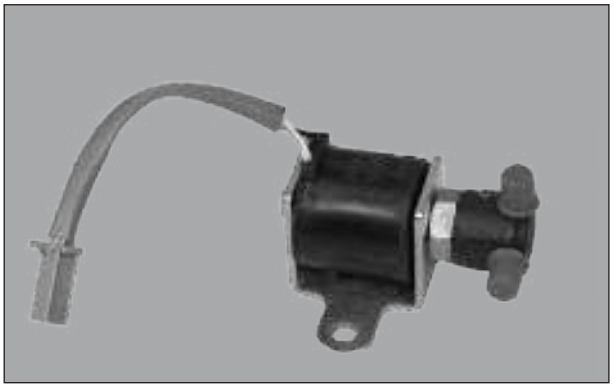


Fig. 8.10

G) MIXER BODY CNG

- The gas and air is supplied to the engine through gas air mixer proportional to the engine requirement. (Fig. 8.11)

Fig. 8.11

H) MODE INDICATOR

- Electronic control unit with Gas level indicator CNG senses the cylinder pressure & indicate through glowing LED's. With this unit initially for 3 seconds gas is allowed to flow through the system for easy starting. This acts as a prime time. A fuse is provided for electrical safety of the unit. (Fig. 8.12)

Fig. 8.12

I) CNG CYLINDER VALVE

- It is mounted on the cylinder. It controls (ON-OFF) supply of CNG gas as indicated. It should be closed while carrying out servicing, maintenance and when vehicle is parked overnight.

- In case of any leakage is observed, shut-off valve should be closed immediately. (Fig. 8.13)

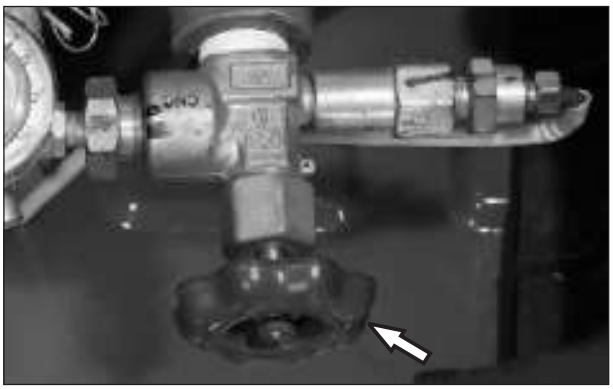


Fig. 8.13

J) TUBE VENT CNG(PVC COATED STEEL TUBE)

- Steel tube (tube vent) is designed to withstand the working pressure of 200 kg/cm2.

- In case of any leakage through CNG cylinder valve the gas is vented to the atmosphere safely through steel tube (tube vent).

- PVC shielding is provided to avoid damage to the tube. (Fig. 8.14)

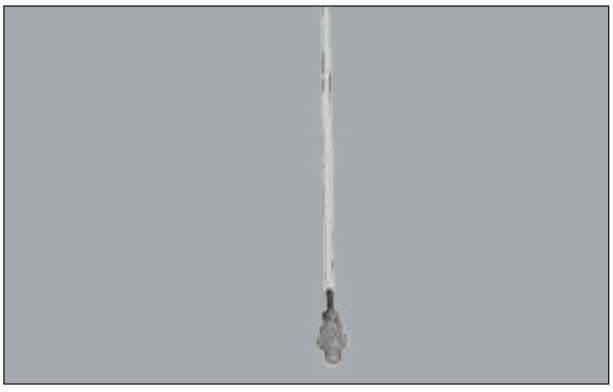


Fig. 8.14

DO'S

- Shut off the manual cylinder valve in case the vehicle is not in use for longer period.
- In case of leakage immediately turn 'OFF ' the CNG cylinder valve & check for leakage with neutral soap solution & make the joints leak proof.
- When the vehicle is taken for body repairs (welding etc.) the CNG cylinder should be emptied and removed.
- Use only tested / approved CNG cylinder.
- Use only tested / approved CNG cylinder valve.
- Use only 5 Amp fuse for electronic controller.
- If flexible hoses develop visible cracks immediately replace them.

DON'T'S

- Don't keep any flammable items near the CNG system.
- Don't use spares which are not been original components.
- Don't open the reducer or any CNG components without correct knowledge.
- Never tune or repair kit components by unauthorized & untrained staff.
- Avoid short-circuiting of electrical connections.
- CNG pressure gauge, LED indicators are pre-calibrated at factory end before dispatch. Do not disturb the settings.

SAFETY TIPS :

- Do not switch over CNG mode while the vehicle is running in petrol mode.
- In case of leakage, close the cylinder valve immediately, also switch off the ignition.
- During the leak test in the CNG system the line pressure should be 100 to 200 bar.
- Don't try to fill CNG cylinder beyond 200 bar pressure.
- Don't replace temperature & pressure relief device on the CNG cylinder valve by dummy disc in case of failure. Use genuine spares only.
- Always ensure that the venting connections are tight and the gas vents out to the atmosphere in case of leakage.
- Test your cylinder for strength as per safety requirements every five years from the date of previous testing by CCOE-approved agency.
- Don't carry out any welding & fabrication work near the CNG cylinder.
- Always work in good ventilated workshop area.
- Don't take any flammable material near gas components.
- Never discharge CNG in public places or in prohibited and closed areas.
- Use the correct rated fuse in the electrical unit.
- Use genuine original spares and avoid duplicates.
- Always keep the earthing of the wiring harness intact at all the times.
- Avoid short-circuiting of electrical connections.

TUNING OF THE VEHICLE ON CNG

- CNG vehicle tuning procedure refer chapter “periodic maintenance” page no:

LEAKAGE TEST:

- Make mild soap and water mixture and fill it in a bottle. Spray this solution at the places stated below. Bubbles will be formed if there is any leakage.
- Filler valve joint
- CNG Cylinder valve
- First stage reduction unit and flexible hose assembly-I
- Gas inlet joint at filter gas solenoid valve regulator
- Gas outlet joint at filter gas solenoid valve regulator
- Gas inlet joint at two stage CNG reducer
- Gas outlet joint at two stage CNG reducer
- Low pressure hose assembly joint
- If any leak found tighten the joints

28, 25, 19, 14mm spanner

Note: While doing the leak test make sure that CNG solenoid valve should be ‘ ON ’ position and engine must be in running condition.

CNG HOSE REPLACEMENT

- Close the manual CNG cylinder valve.
- Hold the flexible hose assembly from first stage reduction unit. (Fig. 8.15)
- Loosen and remove flexible hose assembly nut from first stage reduction unit. (1) (Fig. 8.15)
- Loosen and remove flexible hose assembly nut from filter gas solenoid valve. (2) (Fig. 8.16)
- Take out the flexible hose assembly from chassis.
- Reassemble the new one flexible hose assembly.
- Reassemble the all parts in the reverse order of dismantling.

19 mm spanner
Vise grip plier

PAPER FILTER SOLENOID CNG ELEMENT:

- Loosen and remove drain bolt Gas solenoid filter along with 'O' ring drain plug solenoid from bowl CNG solenoid. (Fig. 8.17)
- Loosen bowl CNG solenoid and take out the paper filter solenoid CNG along with 'O' ring bowl CNG solenoid. (Fig. 8.18)
- Refit the new one paper filter solenoid CNG and clean the all parts.
- Reassemble the all parts in the reverse order of dismantling.

17 mm spanner

Note: While re-assembling the bowl CNG solenoid ensure the presence of 'O' Ring and replace with new one if damaged also ensure the proper seating.

Fig. 8.15

Fig. 8.16

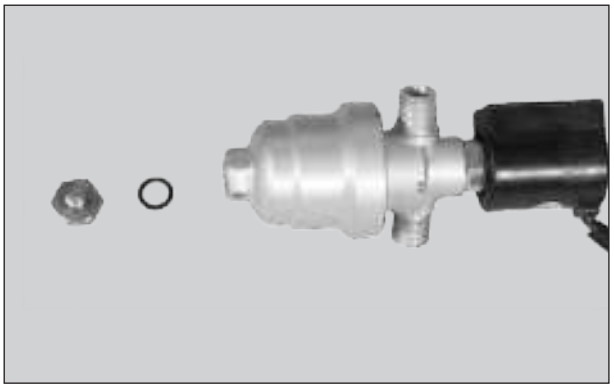


Fig. 8.17

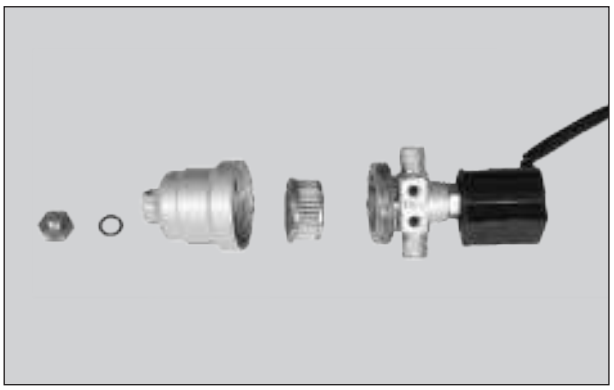


Fig. 8.18

FILLER UNIT FILTER CLEANING

- Close the manual shut off valve.
- Loosen and remove the retainer first reducer along with 'O' ring cap brass filter tube and nylon washer from the first stage reduction unit using 6mm allen key. (Fig. 8.19)
- Take out the brass filter (filter first reducer). (Fig. 8.20)
- Clean the filter using petrol and compressed air. Replace the 'O' ring on retainer if it is damaged or not seating properly.
- Refit the brass filter (filter first reducer) into the retainer with the open face facing out.

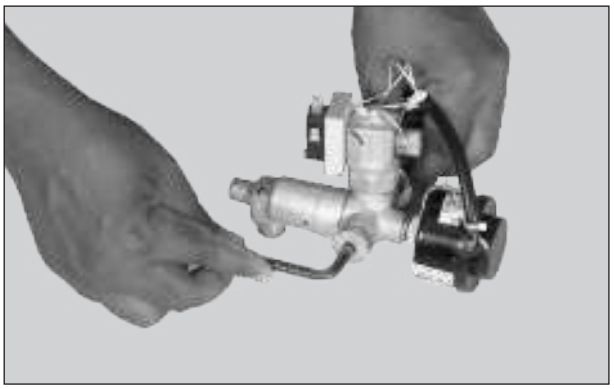


Fig. 8.19

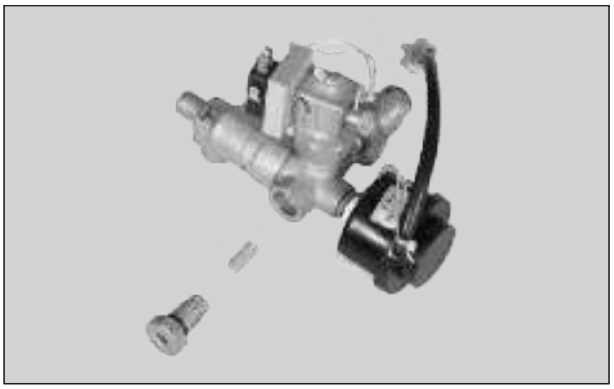


Fig. 8.20

SERVICING OF TWO STAGE CNG REDUCER

REMOVE TWO STAGE CNG REDUCER FROM CHASSIS:

- Close the manual CNG cylinder valve
- Hold the flexible hose assembly-2, from filter gas solenoid valve. (Fig. 8.21)
- Loosen and remove flexible hose assembly-2, nut from filter gas solenoid valve. (Fig. 8.21)

19 mm spanner
Vise grip plier

Fig. 8.21

- Loosen the self-tensioner clip by using the nose plier and disconnect low pressure hose assembly (LPR to Mixer body).(Fig. 8.22A)
- Loosen and remove 1 no. Hexagonal nut M8 along with wave spring washer and plain washer from chassis. (Fig. 8.22B)
- Take out the 1 no. Hexagonal flange bolt M8x20 from chassis.

13 mm spanner

- Loosen and remove 1 no. Hexagonal bolt M6x16 along with wave spring washer and plain washer From chassis. (Fig. 8.22B)

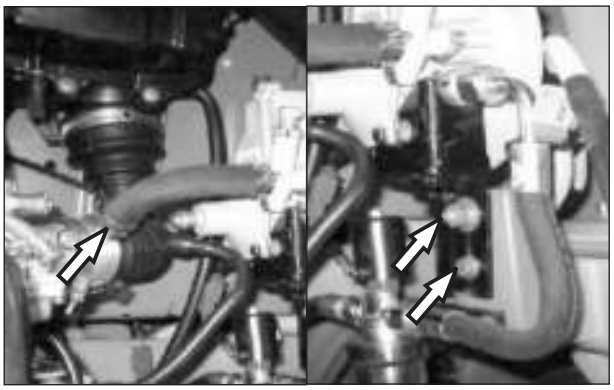


Fig. 8.22A Fig. 8.22B

- Separate the two stage CNG reducer from chassis.

10 mm spanner

REMOVE BONNET FIRST STAGE:

- Loosen and remove 8 nos. Hexagonal screw M5x16 along with 8 nos. Wave spring washer and 7nos.hexagonal nut M5 from bonnet first stage. (Fig. 8.23)

8 mm spanner

- Take out the bonnet first stage.
- Take out the diaphragm first stage from lever first stage diaphragm. (Fig. 8.24A)
- Loosen and remove 2nos.screw along with 2nos.punched washer from bonnet first stage. (Fig. 8.24B)
- Take out the lever first stage diaphragm along with pin from bonnet first stage.

Flat head screw driver

- Loosen and remove idling screw along with spring from reducer. (Fig. 8.25)
- Loosen and remove lock nut flow adjuster screw (A). (Fig. 8.26)
- Loosen and remove flow adjuster screw along with 'O' ring (B). (Fig. 8.26)

Flat head screw driver

- Inspect the diaphragm first stage and lever first stage diaphragm condition. Clean the diaphragm carefully with dust free cloth. Replace the diaphragm only if found damaged otherwise use the same one.
- Reassemble the all parts in the reverse order of dismantling.

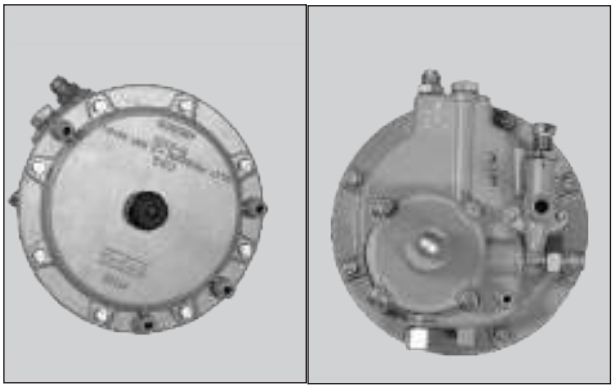


Fig. 8.23

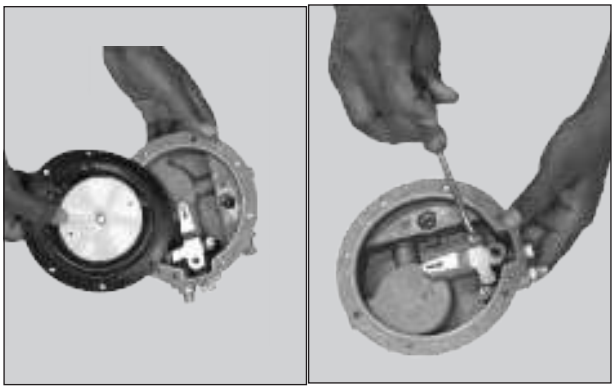


Fig. 8.24A Fig. 8.24B

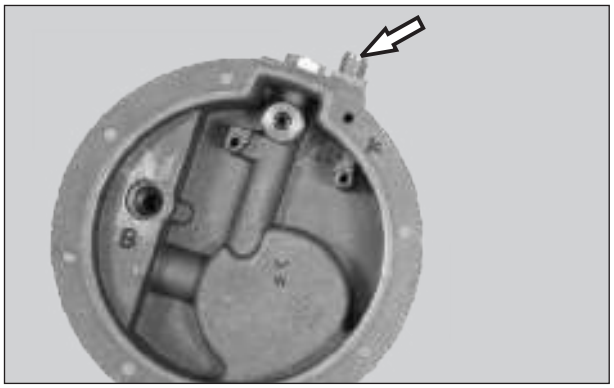


Fig. 8.25

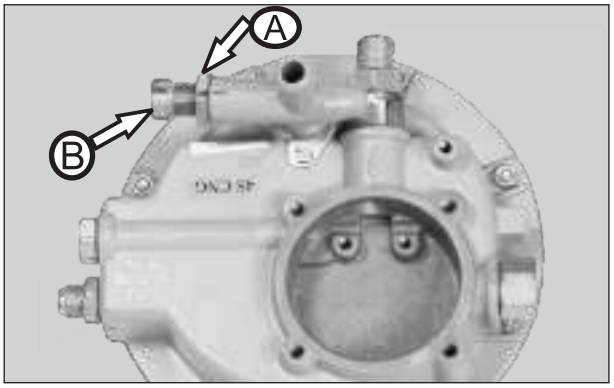


Fig. 8.26

REMOVE BONNET SECOND STAGE:

- Loosen and remove 4nos. Hexagonal screw M6x12 along with 4nos. Wave spring washer from bonnet second stage. (Fig. 8.27)

10 mm spanner

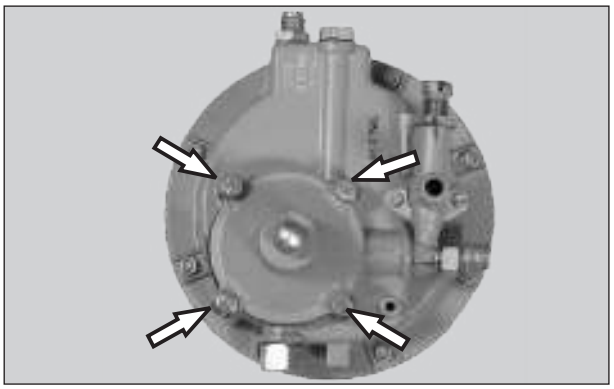


Fig. 8.27

- Take out the small diaphragm second stage from lever second stage diaphragm.(Fig. 8.28)

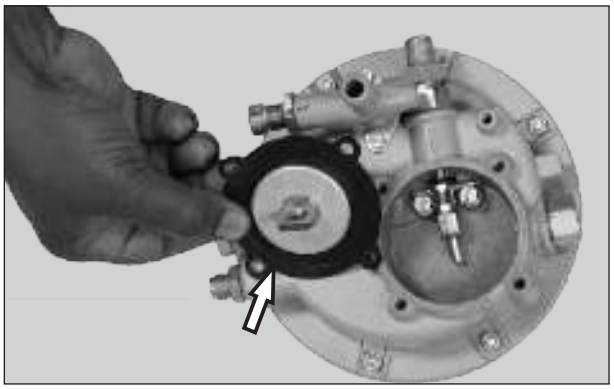


Fig. 8.28

- Loosen and remove 2nos.screw along with 2nos.punched washer from bonnet second stage. (Fig. 8.29)
- Take out the lever second stage diaphragm along with pin from bonnet second stage.

Flat head screw driver

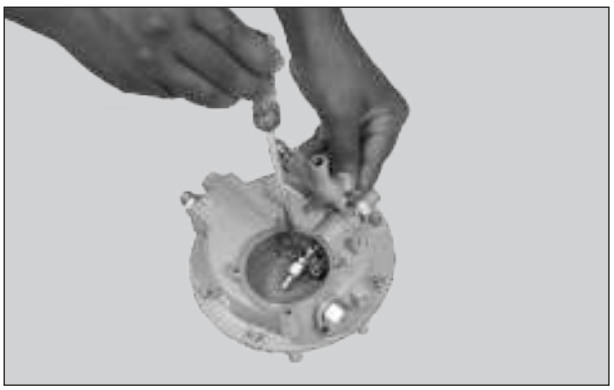


Fig. 8.29

- Inspect the small diaphragm second stage and lever second stage diaphragm condition.Clean the diaphragm carefully with dust free cloth. Replace the diaphragm only if found damaged otherwise use the same one.
- Reassemble the all parts in the reverse order of dismantling.

TROUBLE SHOOTING FOR CNG

NOT STARTING

PROBABLE CAUSE	CORRECTIVE ACTION
Dust plug is not in position.	Put the dust plugin correct position.

NO GAS SUPPLY

PROBABLE CAUSE	CORRECTIVE ACTION
Empty cylinder	Fill the gas in Cylinder
Cylinder shut off valve OFF	Open the CNG cylinder valve
Selector switch Malfunctioning	Check & Replace the switch
Solenoid valve not working	Check battery voltage - charge if it is discharged. Fuse blown off - replace it. Electrical connection loose - make proper connections.
CNG filter blocked	Clean / Replace.
Presence of Petrol in the carburetor	Empty petrol from the carburetor .
Improper tuning on Gas Mode.	Tune the vehicle as per tuning procedure.
TCI unit not working Properly	Check & Replace if require.
No spark	Check & Replace the spark plug.
Poor compression Pressure	Check & Do the needful.

IDLING UNSTABLE

PROBABLE CAUSE	CORRECTIVE ACTION
Carburetor idle adjustment not correct	Check & Adjust correctly
Improper Vehicle Tuning On Gas and Petrol	Tune the vehicle properly as per procedure given
Idle Spring Damage	Replace
Leaking of Petrol in Gas Mode	Check & replace the solenoid valve
Air Cleaner Chocked	Clean Air cleaner properly
Worn out spark plug	Replace
Throttle not closing fully	Check Throttle cable & throttle

NO OR LESS POWER

PROBABLE CAUSE	CORRECTIVE ACTION
Filter element in first stage reduction unit blocked	Clean or Replace filter element.
Air Cleaner Chocked	Clean Air cleaner properly
Empty Cylinder	Fill the gas in cylinder
Excessive or Less flow of Gas	Tune the vehicle properly.

HIGH CONSUMPTION OF GAS OR LESS MILEAGE

PROBABLE CAUSE	CORRECTIVE ACTION
Chocked Air cleaner	Clean / Replace
Leakage at Flexible hose assembly / First Stage reduction unit / Second stage CNG reducer / Filter Gas Solenoid valve/ Joints & Connections.	Check and arrest the leakage
Excess flow of Gas / Improper Gas Air Mixer / High Idling Speed.	Tune vehicle Properly as per procedure.
Brakes not working Properly	Check Brake System for Functioning.
Speedometer not working Properly	Check & correct the speedometer.
Improper Method of Mileage testing	Test with proper method.

CONTENTS

Chapter 9

INSTALLATION

WINDSHIELD ASSEMBLY

- Place the sealing cowl windshield on cowl pip end facing upwards as shown in (Fig. 6.1)
- Place the windshield frame assembly
- Align the hole on windshield frame assembly, rubber sealing cowl windshield and cowl.
- Insert the 10 nos. Hexagonal screw M6x20 along with 10 nos. Plain washer and 10 nos. wave spring washer (Fig. 9.1)
- Hand tighten the 2 nos. hexagonal nut M6 at the extreme end of the cowl windshield joint.(Fig. 9.1)
- Align the other holes one by one stretching the rubber sealing cowl windshield and fix the windshield with the cowl.
- Completely tighten all the bolts.

10mm spanner

- Assemble the bracket cowl windshield driver side (A) and bracket cowl windshield front side (B) along with rubber cushion cowl windshield (C) to the cowl windshield. (Fig. 9.2)
- Loosen and tighten the 3 nos. Hexagonal screw M6x20 along with 3 nos. Plain washer 3 nos. Wave spring washer and 3 nos. Hexagonal domed nut M6. (Fig. 9.2)

10mm spanner

SOFT TOP ASSEMBLY

- Insert the soft top front 'B' pillar in the tube partition wall.
- Fit the back rest driver and fasten it with Hexagonal nut M6 4 nos along with Plain washer and wave spring washer 4 nos .(Fig. 9.3)

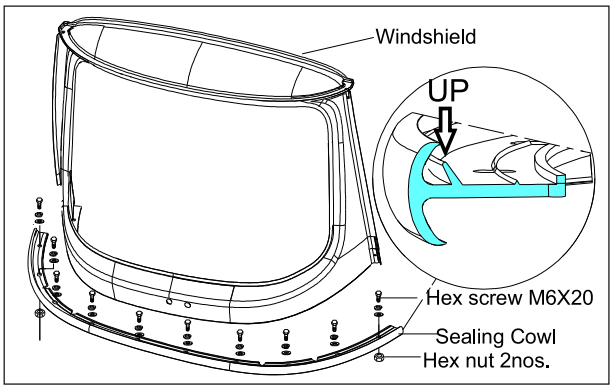


Fig. 9.10

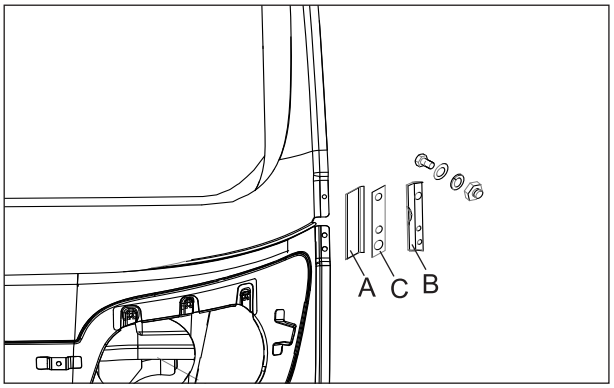


Fig. 9.2

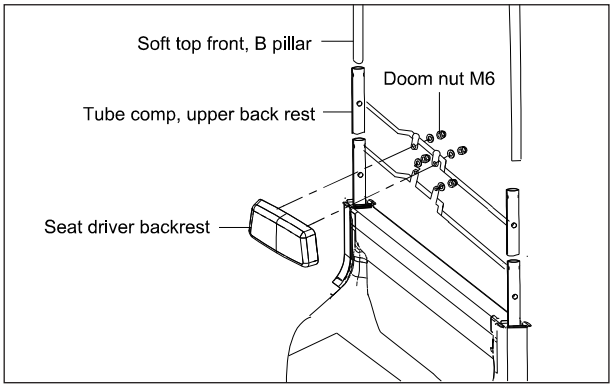


Fig. 9.3

- Assemble the soft top complete rear 'C' pillar assembly in the bracket soft top cabin welded nut by hexagonal screw M6x16 along with a plain washer and a wave spring washer. Ensure the hexagonal screw head facing inside the passenger cabin. (Fig. 9.4)

- Follow the same procedure for other side also.

10mm spanner

- Take the side tube from the inside of the soft top front "B" pillar. (Fig. 9.5)

- Assemble side tube to the soft top complete rear "C" pillar assemble using 1 no. Hexagonal screw M6x16 along with a plain washer, a wave spring washer and a hexagonal nut M6 . (Fig. 9.5)

- Tighten the fasteners. Ensure hexagonal screw head facing soft top canvas.

10 mm spanner

- Insert the hand hold inside the side tube. Ensure that smaller loop of the hand hold will go inside the side tube and the stitches are facing on inside. (Fig. 9.6)

- Ensue that the 2 nos. Hand hold should be in the passenger cabin side before fitting the bracket side tube. (Fig. 9.6)

- Assemble the side tube other end to the windshield frame using 1 no. Hexagonal screw M6x16 along with a plain washer, a wave spring washer and a hexagonal nut M6. (Fig. 9.7A)

- Tighten the fasteners. Ensure hexagonal screw head facing soft top canvas.

10 mm spanner

- Assemble the bracket side tube 'B' pillar and bracket cross member 'B' pillar with fastener 2 nos. Hexagonal screw M6x16 along with 2 nos. Plain washer, 2 nos. Wave spring washer and 2 nos. Hexagonal nut m6. (Fig. 9.7B)

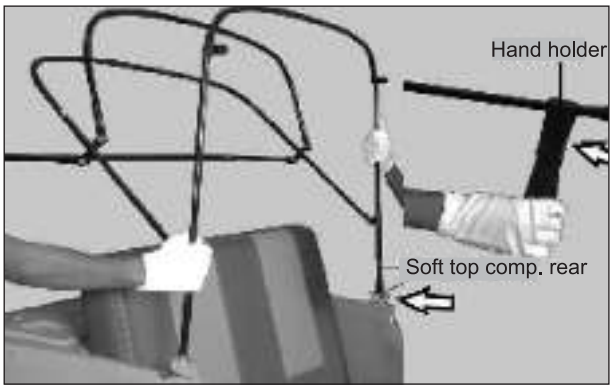


Fig. 9.4

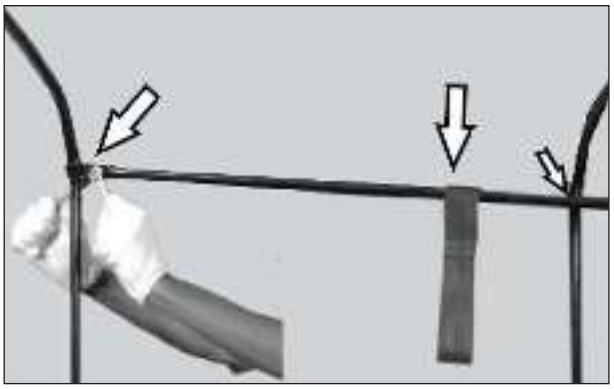


Fig. 9.5

Fig. 9.6

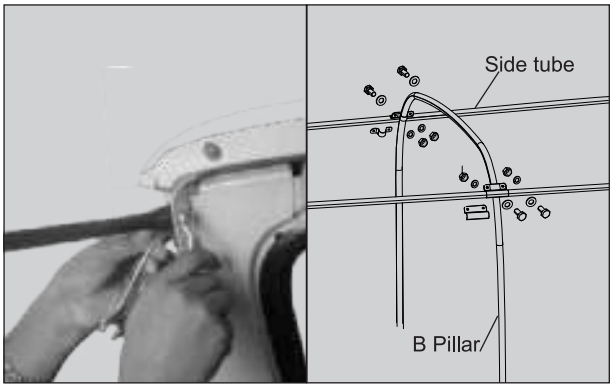


Fig. 9.7A Fig. 9.7B

- Loosen and tighten the fasteners. Ensure the hexagonal screw head facing soft top canvas side.
- Follow the same procedure for assemble the RH side also.

WOOD STICK MIDDLE SOFT TOP ASSEMBLY:

- Place the wood stick middle soft top above the windshield frame. (Fig. 9.8)

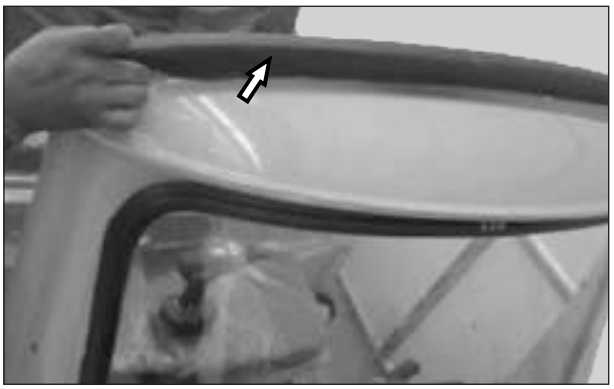


Fig. 9.8

- Drill the 7 holes in the wood stick middle soft top through the 7 holes on the windshield frame. (Fig. 9.9)
- Assemble the wood stick middle soft top to the windshield frame with 7 nos. M5 pan head screw and 7 nos with punched washer.

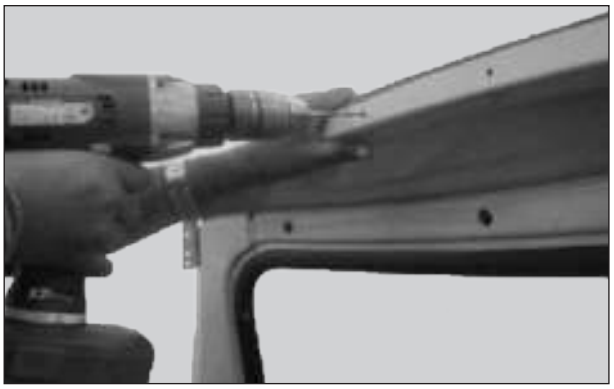


Fig. 9.9

- Hand tighten to be done for the 7 nos Screws. (Fig. 9.10)

Flat head screw driver

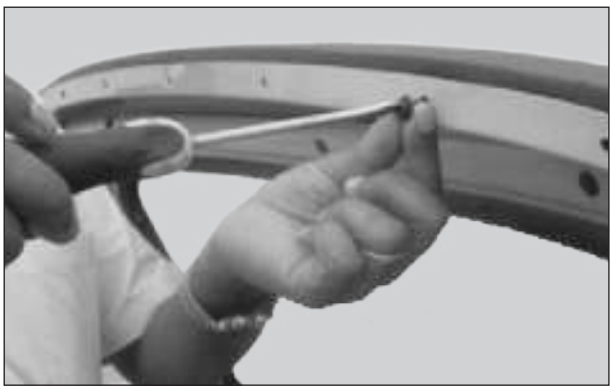


Fig. 9.10

RETAINING STRAP SOFT TOP ASSEMBLY:

- Insert the retaining strap soft top inside side panel handle and position the side panel handle on the passenger luggage area. (Fig. 9.11A)
- Loosen and tighten the 2 nos. hexagonal screw M6x16 along with 2 nos. Plain washer 2 nos. Wave spring washer to the side panel handle. (Fig. 9.11B)

10 mm spanner

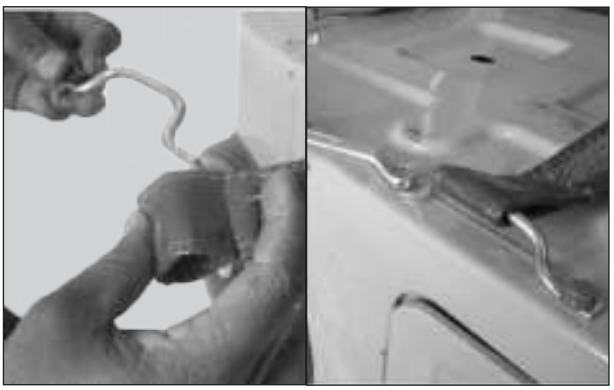


Fig. 9.11A Fig. 9.11B

- The stitched portion should face outside while inserting the retaining strap soft top.
- Spread the soft top complete rear 'C' pillar and position the front and rear equal distance from frame center. (Fig. 9.12)

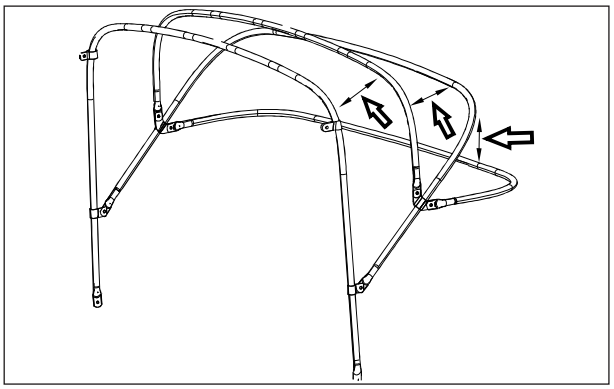


Fig. 9.12

- Pull the soft top retaining strap soft top tightly & assemble it on the wood stick middle soft top in full tension condition by hammering 3 or 4 small nails for each belt. (Fig. 9.13)
- Ensure that the LH and RH retaining strap soft top should be located at an equal distance from the center of the wood stick middle soft top and parallel to each other. (Fig. 9.13)

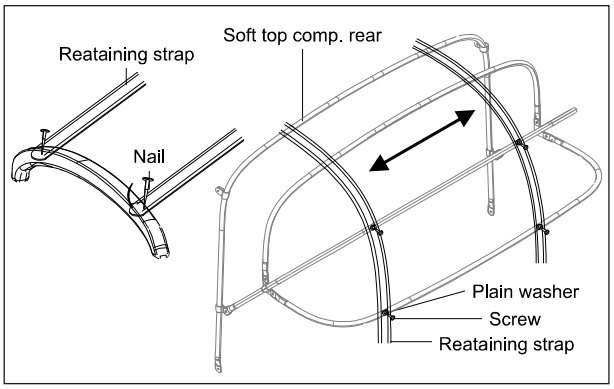


Fig. 9.13

- Straighten the packing soft top canvas and remove bends by hammering with a mallet. (Fig. 9.14A)
- Insert the packing soft top canvas inside the soft top canvas. (Fig.9.14B)
- Place the soft top canvas on the cabin assembly.
- Soft top canvas shall be kept in sunlight for 3hrs minimum for elasticity.

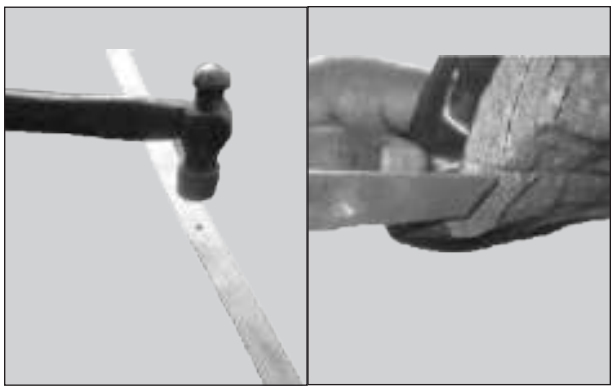


Fig. 9.14A Fig. 9.14B

- Ensure that the rear bottom part of the soft top canvas stretches equally at the right hand side & left hand side. (Fig. 9.15)
- Drill Ø3 mm drill at 11 place with regular interval (235 ± 10mm) as per the (Fig. 9.15).

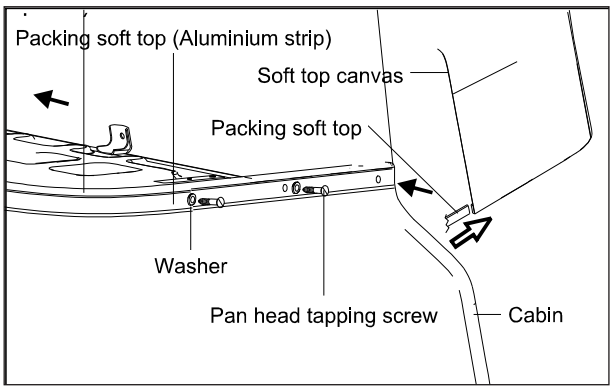


Fig. 9.15

- Starting of holes shall be 25mm maximum from the side panel face. (Fig. 9.16A)
- Hand tightening the 11 nos. CSK head tapping screw self tapping (3.5x16) along with cup washer self tapping in the cabin. (Fig. 9.16B)

Flat head screw driver

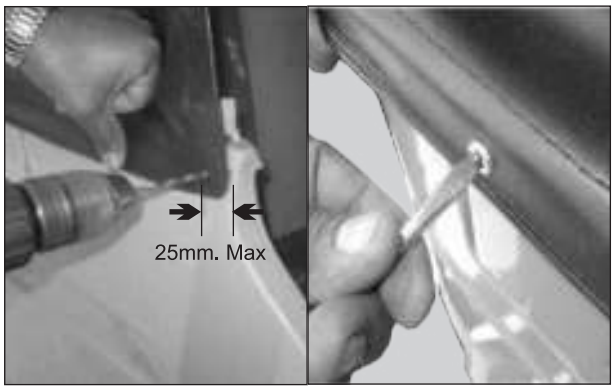


Fig. 9.16A Fig. 9.16B

- Stretch the soft top canvas and nail if on to the wood stick middle soft top in respective intervals as required. (Fig. 9.17)

Hammer

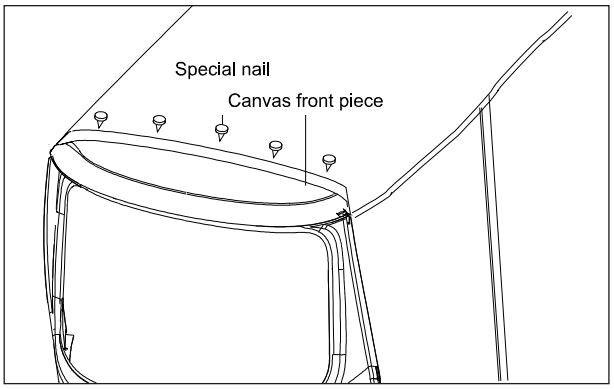


Fig. 9.17

- Properly cut the extra projected canvas. (Fig. 9.18)

Fig. 9.18

- Soft top canvas small piece shall be in sunlight to 3 hrs minimum. (Fig. 9.19)

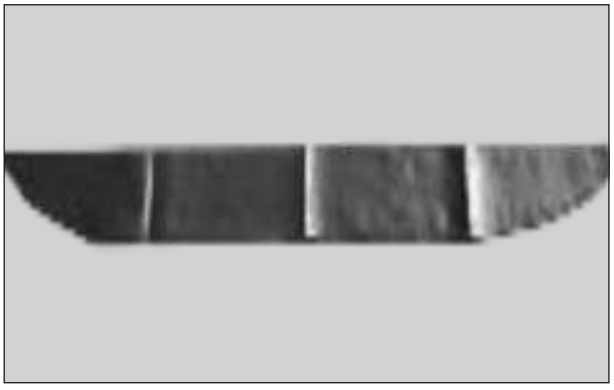


Fig. 9.19

- Assemble and tighten the CRPH screw (M6x16 - 2 nos.) along with punched washer (2 nos.) and hexagonal nut (M6 - 2 nos.) as shown in the soft top canvas small piece at wind shield assembly bracket soft top frame LH. (Fig. 9.20)

Philips head screw driver

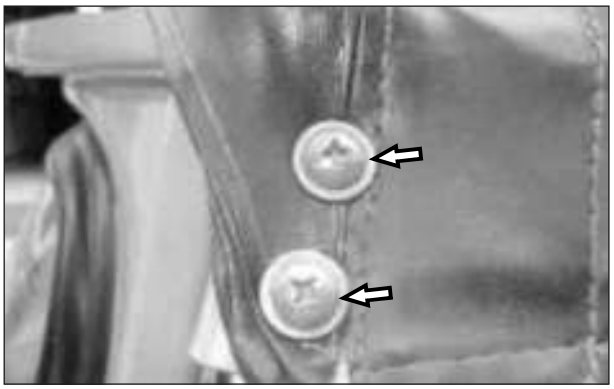


Fig. 9.20

- Pull the soft top canvas small piece at wood stick middle soft top in respective interval as required. (Fig. 9.21)

Hammer

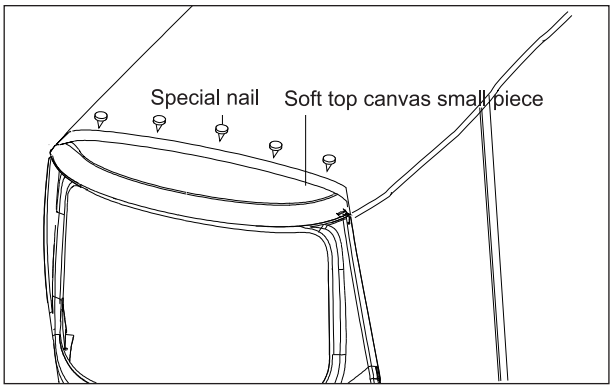


Fig. 9.21

- Assemble and tighten the CRPH screw (M6x16 - 2 nos.) along with punched washer (2 nos.) and hexagonal nut (M6 - 2 nos.) as shown in the soft top canvas small piece at wind shield assembly bracket soft top frame RH. (Fig. 9.22)

Philips head screw driver

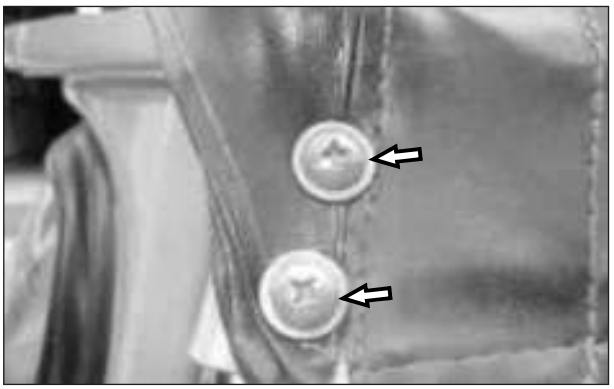


Fig. 9.22

- Canvas soft top assembled condition. (Fig. 9.23)

Fig. 9.23

MIRRORS

- Insert the mirror assembly rear view into the bush provided on windshield frame on either side. (Fig. 9.24)
- Fasten it to the windshield frame using a hexagonal nut M10.
- Pull out the rubber boot. (Fig. 9.24)
- Hold the nut on one side and tighten on the other side.

14 & 7mm spanner

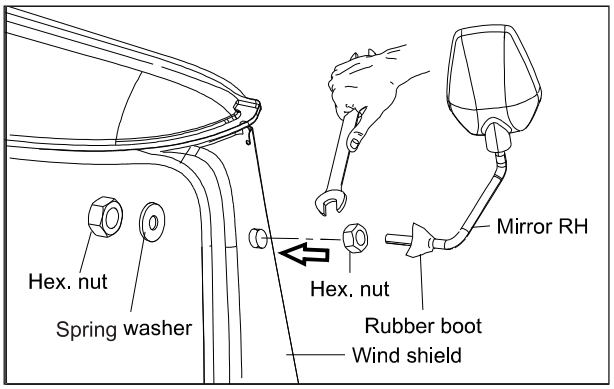


Fig. 9.24

WIPER MOTOR

- Mount the wiper motor assembly onto the windshield frame bracket.
- Align the wiper motor assembly shaft to the hole on the windshield frame.
- Insert and tighten the 3 nos. Hexagonal screw M6x20 along with a wave spring washer and a plain washer each bolt. (Fig. 9.25)

10 mm spanner

- Insert the rubber grommet motor mounting inside the hole on the wind shield frame. (Fig. 9.25)
- Position the wiper blade assembly on the shaft wiper motor assembly and tighten dome nut. (Fig. 9.25)
- Route the coupler through hole on dashboard and connect it to the front wiring harness.

10 mm spanner

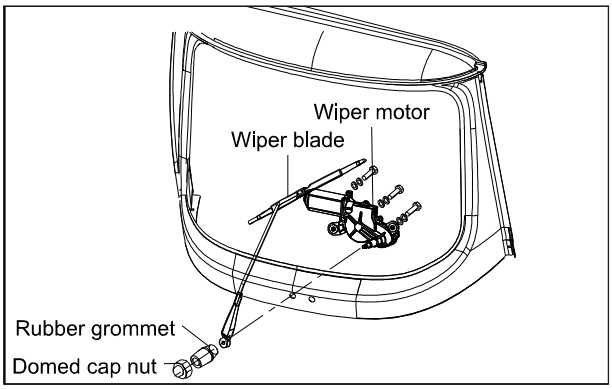


Fig. 9.25

FITMENT OF DRIVER CABIN LAMP

Fitment of bracket to Engine Bay Lamp:

- Loosen and tighten the 2 nos. CRPH screw (M6X12) mount the engine bay lamp along with bracket. (Fig. 9.26)

Philips head screw driver

- Ensure the complete assembly of engine bay lamp (along with bracket)
- Assembly of Engine Bay Lamp on vehicle:
- Mount the complete assembly of engine bay lamp on vehicle at RH side of wind shield assembly bracket soft top frame with screw. Using 2nos. CRPH screw (M6X16), wave spring washer (M6 - 2 nos.) and hexagonal nut (M6 - 2 nos.).(Fig. 9.27)

Philips head screw driver

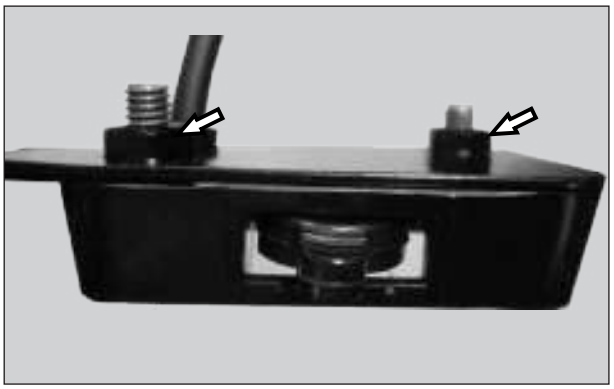


Fig. 9.26

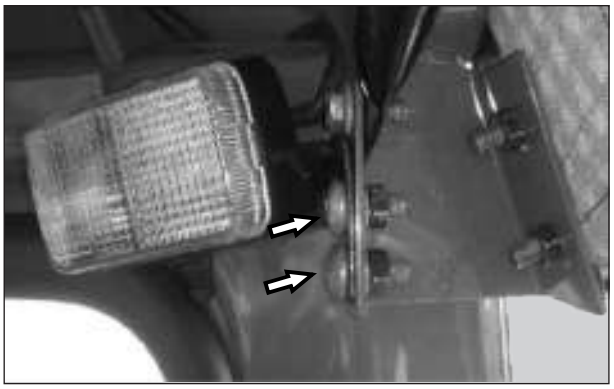


Fig. 9.27

- Cord Set Cabin Lamp, Main routing through Windshield:
- Taping of both terminals for easy routing with insulation tape. (Fig. 9.28A)
- Identify and route the terminals through windshield top hole. (Fig. 9.28A)
- Identify and pull out the terminals through windshield bottom hole on right side. (Fig. 9.28B)

Fig. 9.28A

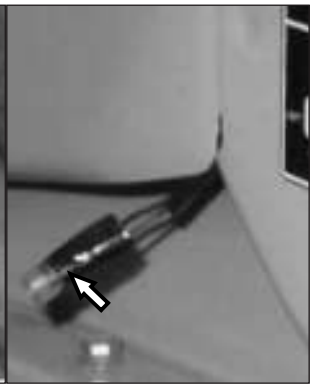


Fig. 9.28B

- Pull out the whole length of harness.
- Connect both lamp & wiring harness couplers and ensure visibility of couplers outside the windshield. (Fig. 9.29)

Fig. 9.29

Cord Set Cabin Lamp, Main routing through Dashboard:

- Route the harness left side as shown in figure. (Fig. 9.30)
- Identify and route the cord set, Main via wiper motor harness routing. (Fig. 9.30)

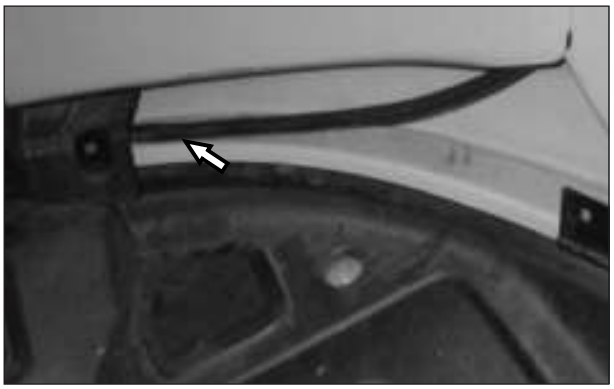


Fig. 9.30

- Ensure both wiper & Cord set cabin lamp, Main routing through dashboard hole.
- Take out the harness from bottom of the dashboard near by hazard switch. (Fig. 9.31)

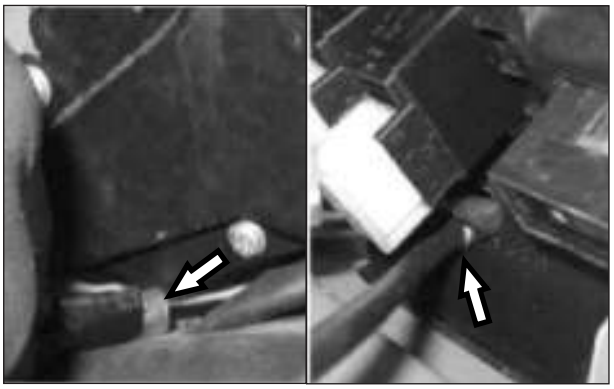


Fig. 9.31

- Connect Cord set cabin lamp, main to Front wiring harness.(Fig. 9.32)
- Ensure the proper matting connection cord set cabin, main. (Fig. 9.32)

Note: Switch on the ignition key and check the ON & OFF functioning of “Driver cabin lamp”.

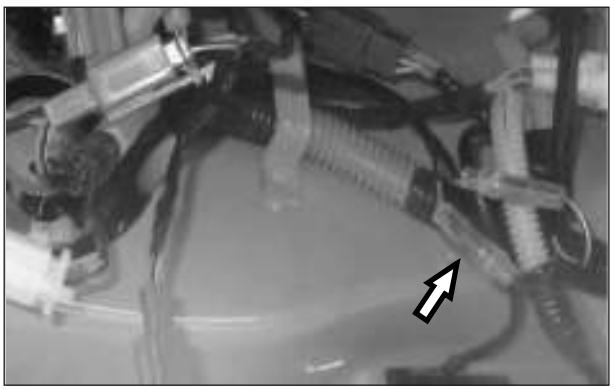


Fig. 9.32

DRIVER CABIN LAMP REPLACEMENT:

- Remove the lamp glass from engine bay lamp.
- Loosen and remove 2 nos. CRPH screw (M6X12) lamp mounting from bracket engine bay lamp. (Fig. 9.33)

Philips head screw driver

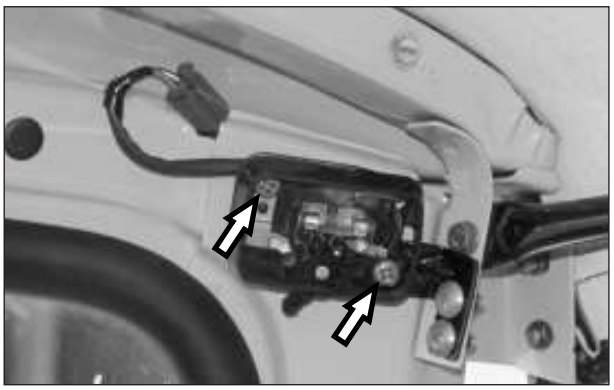


Fig. 9.33

- Disconnect engine bay lamp coupler from cord set cabin main. (Fig. 9.34)
- Take out the lamp and replace the engine bay lamp with a new one.
- Reassembly the all parts in the reverse order of dismantling.

Fig. 9.34

ENGINE BAY LAMP REPLACEMENT:

- It is located in engine cabin inside the cross member camp cabin support rear.(Fig. 9.35)
- Remove the lamp glass from engine bay lamp. (Fig. 9.35)

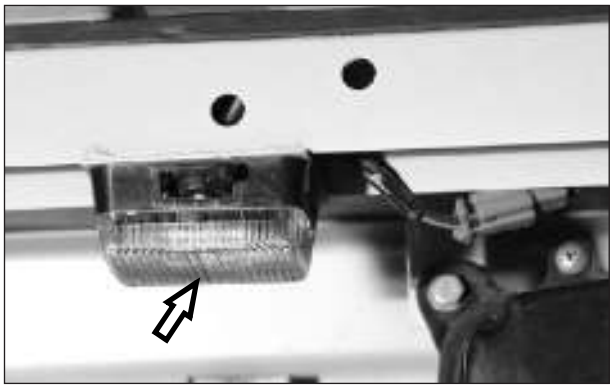


Fig. 9.35

- Loosen and remove 2 nos. Self tapping screw engine bay lamp mounting from cross member camp cabin support rear. (Fig. 9.36)

  Flat head screw driver
- Disconnect engine bay lamp coupler from rear wiring harness.
- Take out the lamp and replace lamp with a new one.
- Reassembly the all parts in the reverse order of dismantling.

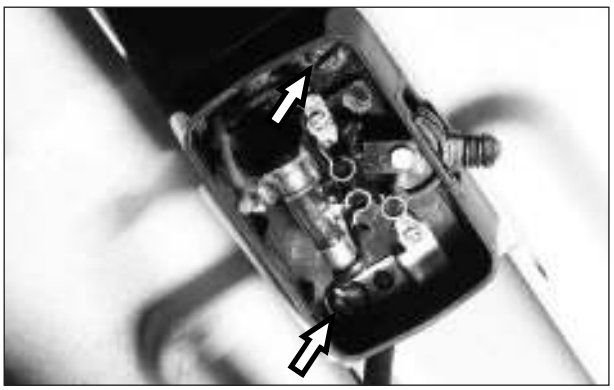


Fig. 9.36

CONTENTS

Chapter 10

SERVICE INFORMATION

SERVICE DATA

CYLINDER, PISTON AND RING PISTON

Unit: mm

S. No.	DESCRIPTION	STANDARD	SERVICE LIMIT
1	Cylinder to piston clearance	0.025 - 0.055	0.135
2	Cylinder bore diameter	62.015 - 62.020	62.125
3	Piston diameter (Measure at 20mm from skirt end)	61.985 - 61.990	61.885
4	Ring piston free end gap Top 2nd	 Appox 7.0 Appox 5.8	 5.7 4.4
5	Ring piston closed end gap	0.20 - 0.35	0.7
6	Pin bore diameter	15.002 - 15.008	15.030
7	Pin Piston OD	14.996 - 15.00	14.980

CRANK SHAFT 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
3	Connecting rod big end side clearance	0.2 - 0.4	0.65
4	Crank web to web width	54 ± 0.2	-
5	Crankshaft complete runout	0.05	1

CLUTCH

Unit: mm

S. No.	DESCRIPTION	STANDARD	SERVICE LIMIT
1	Clutch free play at lever end (in cold condition)	15 - 20	-
2	Plate clutch drive thickness	3 + 0.05	2.6
3	Plate clutch drive claw width	14 + 0.05	13.5
4	Plate clutch driven distortion	-	0.1
5	Spring clutch free length	29.3	27.8

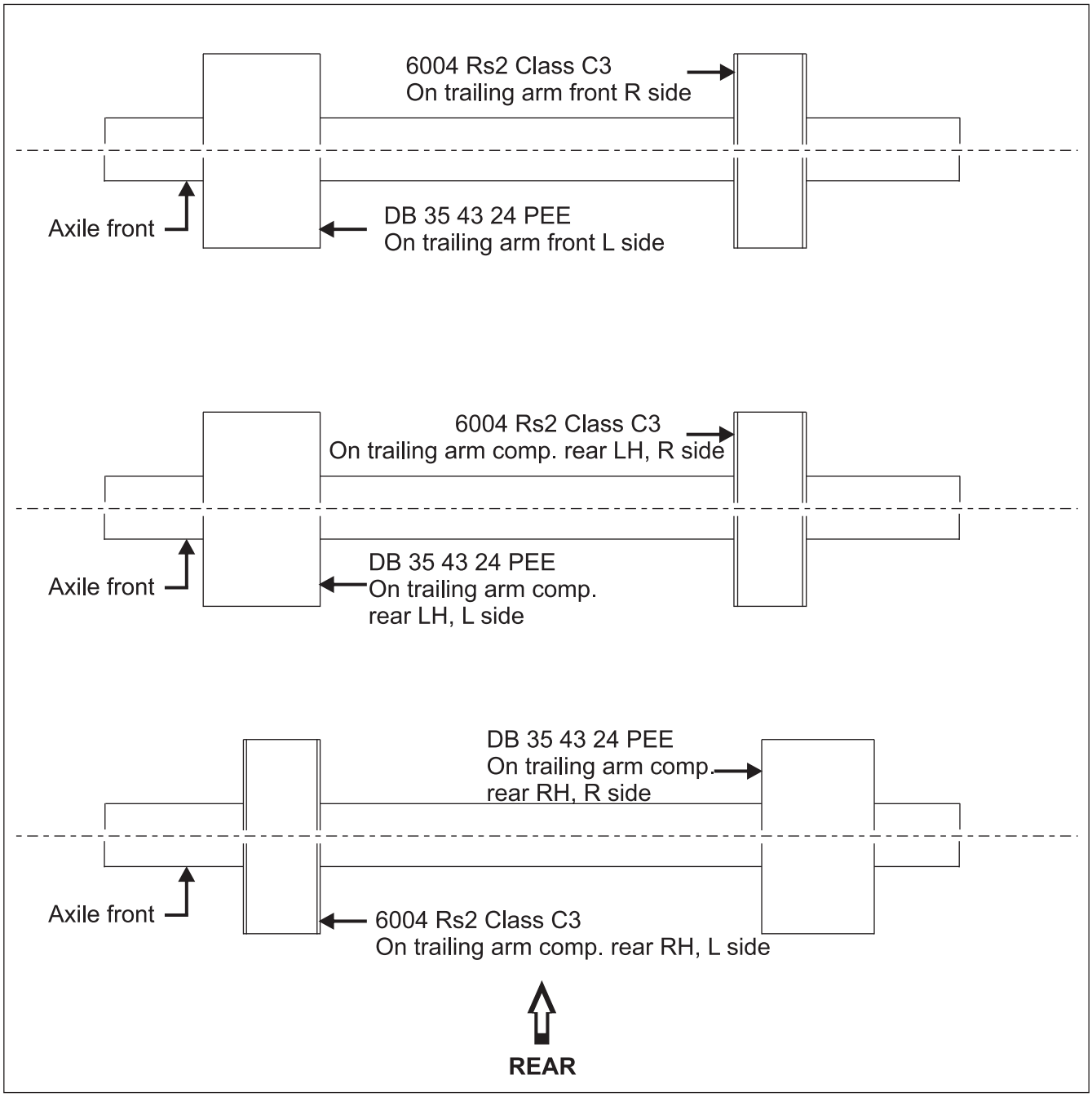
TRANSMISSION (Shift fork to groove clearance)

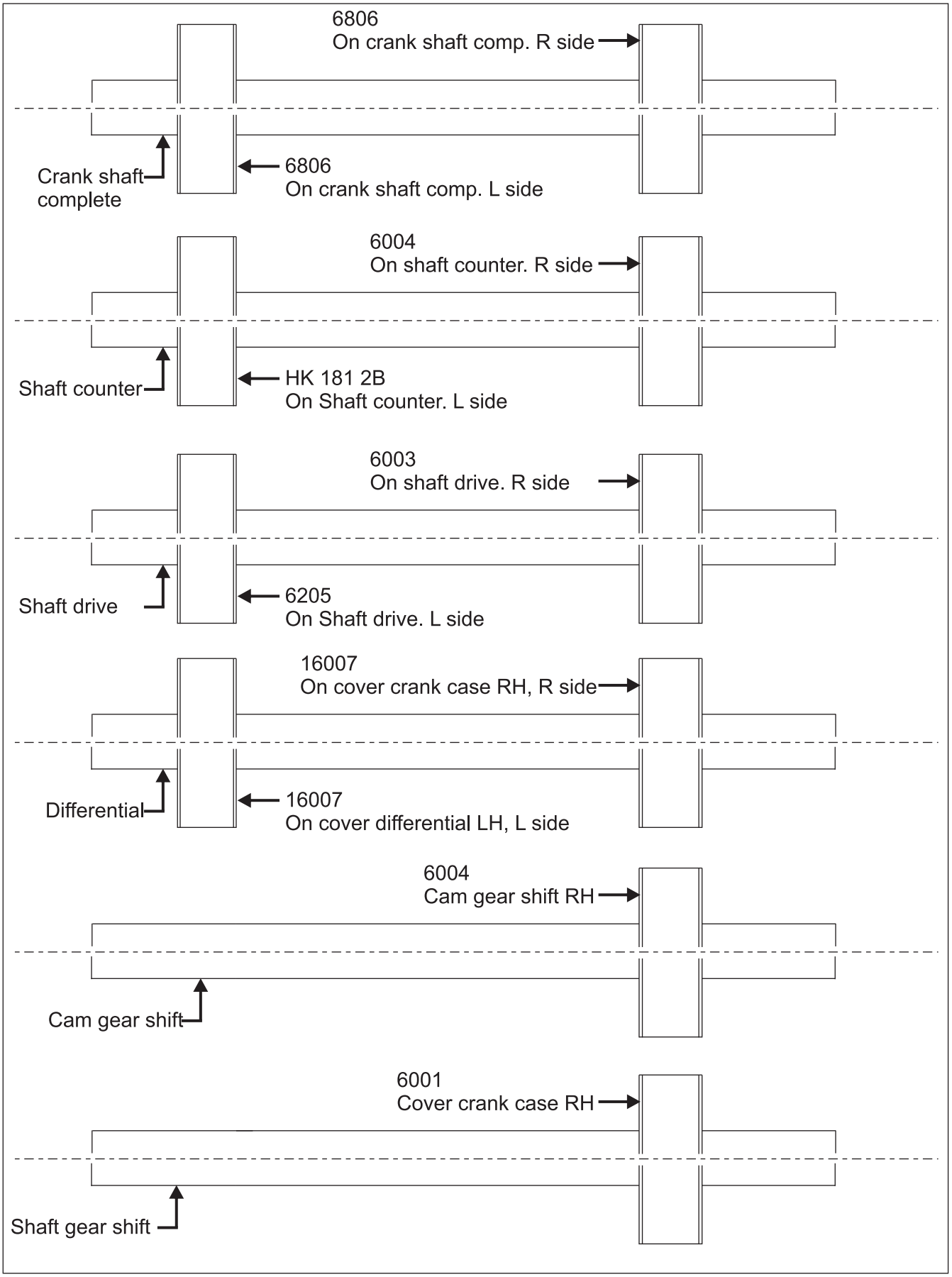
Unit: mm

S. No.	DESCRIPTION	STANDARD	SERVICE LIMIT
1	Fork low speed	0.1 - 0.45	0.65
2	Fork High speed	0.1 - 0.45	0.65
3	Fork low speed for reverse	0.05 - 0.25	0.65

TRANSMISSION SPECIFICATION

S. No.	DESCRIPTION	SPECIFICATION
1	Primary reduction ratio	3.375 (81/24)
2	Final reduction ratio	2.955 (65/22)
3	First gear	3 (39/13)
4	Second gear	1.619 (34/21)
5	Third gear	1.0769 (28/26)
6	Fourth gear	0.793 (23/29)
7	Reverse Gear	2.909 (32/11)




6806
On crank shaft comp. R side
Crank shaft
complete
6806
On crank shaft comp. L side
6004
On shaft counter. R side
Shaft counter
HK 181 2B
On Shaft counter. L side
6003
On shaft drive. R side
Shaft drive
6205
On Shaft drive. L side
16007
On cover crank case RH, R side
Differential
16007
On cover differential LH, L side
6004
Cam gear shift RH
Cam gear shift
6001
Cover crank case RH
Shaft gear shift

CARBURETOR SPECIFICATION

	PETROL (RP) BSIV	PETROL (HP) BSIV	LPG & CNG (RP) BSIII	LPG & CNG (HP) BSIV
Description	**Specification**	**Specification**	**Specification**	**Specification**
Carburetor type	Vm18	Vm18	Vm18	Vm18
Main jet	85	87.5	72.5	70.0
Pilot jet	15	15	12.5	15
E- ring position	2nd FROM TOP	2nd FROM TOP	2nd FROM TOP	2nd FROM TOP
Jet needle	J8 - 4KO7 - 2/3	T - UFSC8048 - 2/3	U - 4DNT1 - 2	U - 4DI51
Needle jet	0 - 7M	0 - 5M	0 - 2M	0 - 5M
Air screw (No.of turns out)	1¼ ± ¼ turns	1¼ ± ¼ turns	1¼ ± ¼ turns	1¼ ± ¼ turns
Idling rpm	1250 ± 100 rpm	1250 ± 100 rpm	1150±50rpm(LPG) 1250±50rpm(CNG)	1250 ± 100rpm

ELECTRICAL

S. No.	DESCRIPTION	SPECIFICATION
1	Plug spark gap	0.6 – 0.7 mm
2	Pulsar coil resistance	160 Ω - 200 Ω
3	Ignition coil resistance Primary Secondary	 2.5 Ω - 4 Ω 13 kΩ - 22 kΩ
4	Lighting coil resistance	0.5 Ω - 0.8 Ω
5	Charging coil resistance	0.5 Ω - 0.8 Ω
6	Battery (Type/Amp)	12V 32Ah (maintenance free)
7	Headlamp - High/Low beam	12V,35/35W x 2,TwinHeadlamp
8	Position lamp	12V, 4W x 2
9	Tail lamp	12V, 5W x 2
10	Brake lamp	12V, 21W x 2
11	Turn signal lamp	12V, 10 W x 4
12	Speedometer lamp	12V, 2W x 1
13	License Plate Lamp	12V, 5W x 1
14	Reverse lamp	12V, 21 W x 1
15	Tell -Tale Lamp cluster (Neutral, Turn signal, (High beam, Low oil and low fuel indicators)	12V, 2W x 1
16	Wiper motor	12V, 18W x 1
17	Horn	12V DC - 98.1 dB(A)

BRAKE AND WHEEL ASSEMBLY

S. No.	DESCROPTION	STANDARD	SERVICE LIMIT
1	Hub complete (Brake drum) ID	170	170.5
2	Shoe complete brake (Brake shoe) thickness		5
3	Axle run out		0.1
4	Tyre size		4.0 - 8, 6 Ply Rating
5	Tyre tread depth	7± 0.5	0.8
6	Tyre Pressure - Front	Unladen Laden	30psi, 2.11 kg/ cm2 30psi, 2.11 kg/ cm2
7	Tyre Pressure - Rear	Unladen Laden	30psi, 2.11 kg/ cm2 34psi, 2.34 kg/ cm2

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 performance. The part needs to be replaced once it reaches service limit.

TIGHTENING TORQUE

ENGINE

S. No.	DESCRIPTION	TORQUE in Nm
1	Bolt, Star Index	8 - 10
2	Bolt, Stopper gearshift	8 - 10
3	Nut, Clutch	45 - 55
4	Drain Plug, transmission oil	12 - 15
5	Nut, Primary drive gear	60 - 70
6	Nut, Magneto rotor assembly	45 - 55
7	Nut, Cylinder head	18 - 22
8	Nut, Intake manifold	8 - 10
9	Spark plug	25 - 30
10	Drain Plug, differential oil	12 - 15
11	Bolt, Muff cup	16 - 20

CHASSIS

S. No.	DESCRIPTION	TORQUE in Nm
1	Front fender bolt	25 - 30
2	Front wheel	48 - 52
3	Arrester nut initial	65 ± 5
4	Steering lock nut tightening	70 ± 5
5	Engine mounting Front bolt	15
6	Engine mounting Rear bolt	40
7	Engine mounting Front bolt nut	30
8	Rear Shock absorber LH &RH top tightening	58 - 68
9	Rear Shock absorber LH &RH bottom tightening	58 – 68
10	Rear trailing arm axle LH &RH	93 – 101
11	Handle bar bolt	38 – 42
12	Front shock absorber bottom bolt	58 - 68
13	Front shock absorber top bolt	59 - 68
14	Front axle nut	93 - 101
15	Rear axle nut	93 - 101
16	Front wheel rim nut	30 - 40
17	Rear wheel rim nut	31 - 40
18	Banjo bolt	25
19	Back plate bolt	17 - 19
20	Front wheel mounting nut	48 - 52
21	Rear wheel mounting nut	48 - 52
22	Wheel cylinder mounting bolt	5.1 - 6.1
23	Cabin tower nut	12 - 18
24	Bundy tube folding	15
25	Master cylinder mounting nut	37 - 43
26	Muffler mounting to engine	12 -18
27	Muffler mounting to cradle	12 - 18
28	Wind shield bolt	5 - 7
29	Resilient mounting rubber bolt	20 - 30
30	Wiper motor	29 - 31
31	Horn bolt torque	10 - 14
32	Damper assembly	7 - 9

SPECIAL MATERIAL REQUIRED FOR MAINTENANCE

The following recommended materials are required for maintenance work on TVS KING and should be kept in hand for ready use.

LUBRICATION

S. No.	APPLICATION	MATERIAL
1	Steering races and balls, Pivot bolt trailing arm, Left support, front Hand starter and	MP Grease no.3, Servo Gem no.3, Bechem Premium III, Kluber centroplex 2
2	Shaft Comp, rear H/S , Speedometer Pinion gear	MP Grease no.3, Servo Gem no.3, Bechem Premium III, Kluber centroplex 2
3	Engine oil	SAE 20W40
4	Transmission and Differential oil	SAE 20W 40 oil

ADHESIVES

S. No.	APPLICATION	MATERIAL
1	Fastening nuts adhesion	Anabond thread locker
2	Fastening rubber bead on windshield glass and between windshield and cowl	Fixobond PC – 80A
3	Fastening plastic parts, speedo hub drive assembly	Anabond 666T

CLEANING SOLVENT

S. No.	APPLICATION	MATERIAL
1	Crankcase, Shaft, Gear and filter air cleaner	Inflammable solvent like kerosene, diesel etc,.
2	Piston and Rings, Cylinder Head	Carbon tetra chloride and acetone carbon chlotide
3	Carburettor	Carbon tetra chloride

TROUBLE SHOOTING

A. STARTING TROUBLE

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
1	No fuel flow to carburetor	No fuel in fuel tank	Fill petrol
		Clogged fuel filter/fuel cock	Clean
		Blockage of vent hole in Cap assembly. Fuel tank	Clear vent hole
2	No spark/ weak spark/ Intermittent spark	Battery dead	Replace
		Incorrect spark plug gap	Correct gap
		Dirty spark plug	Clean
		Bridging of electrodes	Clean and adjust gap
		Loose suppressor cap	Correct / Fix properly
		Water entry between suppressor cap	Clean
		Oily spark plug	Check oil leakages through rings, valve into combustion chamber and correct
		Defective ignition coil	Replace
		Defective TCI unit	Replace
		Defective ignition switch	Replace
		Defective pulsar coil	Replace
3	Incorrect valve timing	Valve timing marks not matching	Correct valve timing
		Improper valve tappet clearance	Adjust tappets
4	Induction leakage	Loose carburetor mounting	Tighten
		Damaged intake pipe, gasket	Replace
5	Improper carburation	Sticky/ worn out float needle	Clean / Replace
		Loose main jet/ pilot jet	Tighten
		Blocked passages	Clean the passage
		Incorrect air screw adjustment	Tune the correctly
		Incorrect jet size	Replace with specified size

TROUBLE SHOOTING

STARTING TROUBLE

		Incorrect float height Blockage of air filter inlet	Correct Correct
6	Poor compression	Leakage through gasket Cylinder head Incorrect valve clearances Worn out piston rings Worn out cylinder and piston Leakage through valve	Tighten nuts/Replace gasket Adjust to specification Replace Replace Do lapping and correct

B. POOR PICK UP

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
1	No free movement of vehicle	Brake binding Low tyre pressure Jammed slider block and Muff cup, wheel bearings	Adjust brakes on all wheels Inflate to specification Replace / Lubricate
2	Improper ignition	Refer complaint No. A2 Refer complaint No. A3	
3	Improper carburation	Refer complaint No. A5	
4	Clutch slippage	Incorrect free play Burnt drive, driven plates	Adjust as per specification Check and replace
5	Poor compression	Refer complaint No. A6	

C. SMOKY EXHAUST (White smoke)

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
1	Burning of oil in combustion chamber	Oil mixed in fuel Adulterated fuel Damaged seal valve stem oil / valve stem Incorrect fitment of 2nd and oil rings Worn out piston rings	Replace fuel in tank and clean Replace fuel in tank and clean Replace Fit properly Replace rings

		Worn out cylinder and piston Engine oil level exceeded maximum limit	Replace cylinder and piston Fill to the specified level

D. SMOKY EXHAUST (Black smoke)

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
1	Very rich mixture	Sticky/worn out float needle Worn out Jets Clogged air filter Punctured float Choke plunger stuck	Correct/replace Replace Clean / Replace Replace Correct

E. ENGINE OVER HEATING

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
1	Poor cooling	Cooling fins cover with mud Wrong fitment of cylinder head	Clean fit in correct direction i.e, top must be readable in straight direction
2	No free movement of vehicle	Refer complaint No.B.1	
3	Incorrect ignition	Refer complaint No.A.2	
4	Poor lubrication	Incorrect type of oil Low quantity/poor quality Oil filter clogged Defective oil pump Blocked oil passages	Use recommended oil Top up/ replace with specified oil Clean / Replace Replace Clean/correct
5	Clutch slippage	Refer complaint No.B.4	
6	High compression pressure	Excessive carbon deposition	Decarbonise engine and muffler
7	Incorrect spark plug	Wrong heat range of spark plug	Replaced with specified

F. HIGH FUEL CONSUMPTION

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
1	Refer Complaint Nos. B.1,2,3,4, and 5		
2	Fuel leakages	Leakage through fuel tank	Correct leakages
		Fuel cock and carburetor	Correct leakages

G. HEAD LAMP NOT WORKING

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
1	Bulbs fused	Defective bulb	Replace
		High voltage flow to bulb	Check regulator output voltage
2	No power supply to bulb	Loose contact in bulb holder / switch	Correct contacts
		Loose contact in wiring coupler	Correct contacts
		No power supply from lighting coil	Check lighting coil resistance

H. HORN NOT WORKING

STEP	REASON	POSSIBLE CAUSE	COUNTER MEASURE
1	No sound	Blown fuse	Replace
		No / discharged battery	Fix / recharge
		Defective horn	Replace
		Defective horn button	Correct / replace
		Wiring cut / disconnected terminal	Replace / connect
2	Weak / irregular sound	Wiring cut / disconnected terminal	Replace / connect
		Loose connection	Correct
		Discharged battery	Recharge
		Earthing with body	Correct
		Incorrect tuning of horn	Tune properly