Training Note

BAJAJ RE

RE 4S

RE 4S Petrol/LPG/CNG

The Training Notes are a comprehensive training guide on service and maintenance operations and procedures to be followed by service personnel at authorised service centres and dealerships whilst attending to the RE 4S Petrol/LPG/CNG. The Training Note covers standard workshop procedures, simplified for easy learning and understanding for service technicians worldwide.

NOTICE

All information contained in this Training Note is based on the latest product information at the time of publication. Bajaj Auto Limited accepts no liability for any inaccuracies or omissions in this publication, although every possible care has been taken to make it as complete and accurate as possible. All procedures and specifications subject to change without prior notice. The right is reserved to make such changes at any time without prior notice.

DOC. NO.: 71112611 REV. 00, NOV 2016

CIN L65993PN2007PLC130076

Contents

Contents

Key Learning Points

- Understanding the complete anatomy of Vehicle
- Technical Specifications and Performance Parameter
- Vehicle Salient features

CHAPTER 1

Know Your Vehicle

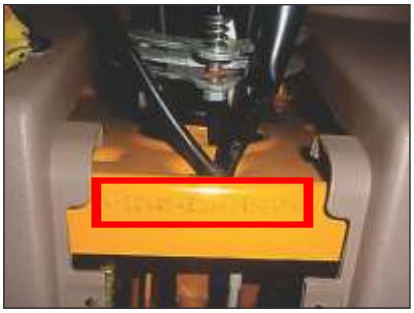
Vehicle Identification

Location of Parts

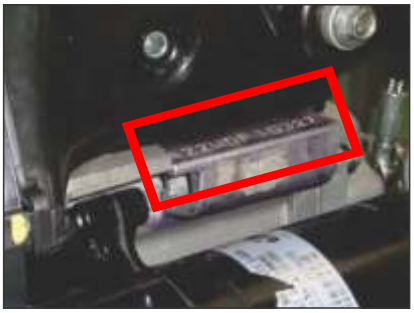
Salient Features

Technical Specifications

Vehicle Identification - Maxima



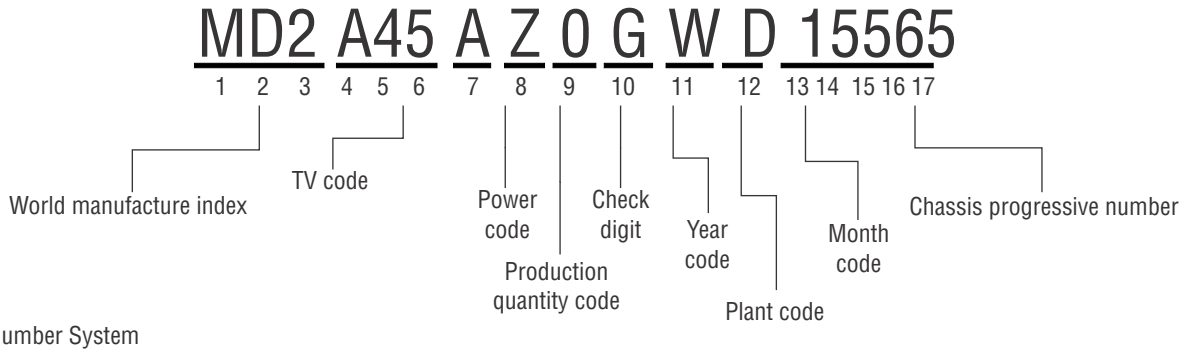
The Engine & Chassis serial numbers are used to register the vehicles. They are the only means of identifying your particular vehicle from the other of the same model & type. These serial numbers may be needed by your dealer when ordering the parts. In the event



of theft, the investigating authorities will require both these numbers in addition to the model, type & any special features of your vehicle that can help identification.

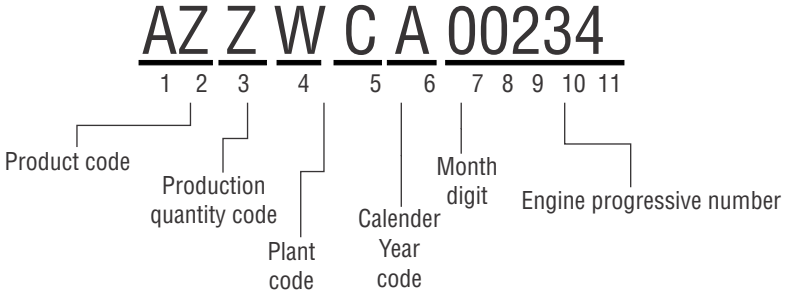
Chassis Number System

1-3 represents	:	World Manufacturer index
4-6 represents	:	Type & Variant code (TV code)
7 represents	:	Power code
8 represents	:	Production quantity code
9 represents	:	Check digit
10 represents	:	Year code
11 represents	:	Plant code
12 represents	:	Month code
13-17 represents	:	Chassis progressive number

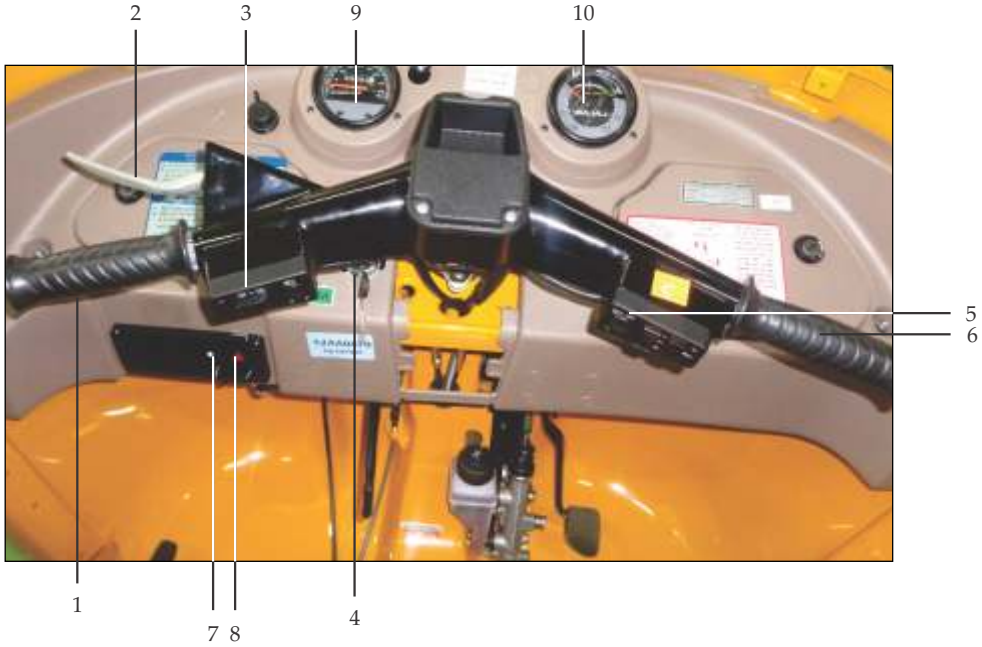


Engine Number System

1-2 represents	:	Product code
3 represents	:	Production quantity code
4 represents	:	Plant code
5 represents	:	Calender year code
6 represents	:	Month code
7-11 represents	:	Engine progressive number



Location of Parts



1. Gear change twist grip
2. Clutch lever
3. Switch LH
4. Ignition switch
5. Switch RH
6. Accelerator grip
7. Stereo Switch
8. Hazard switch
9. Speedometer
10. Tell Tale Indicator Assly.

For Petrol

For LPG & CNG Gas

Instrument Cluster

1. Battery charging indicator
2. Neutral indicator
3. Oil pressure indicator
4. Petrol mode indicator
5. Gas mode indicator

Location of Parts

Clutch Lever

- Clutch operating Lever is located on left side of handle as shown in the figure.
- Do not keep clutch lever in pressed condition always in engine running condition, it will shorten the life of clutch parts.
- Maintain correct clutch lever free play of 4~5mm.

Brake Pedal

- Brake operating pedal is located on right side of floor Board as shown in figure.

Brake oil container

- It is located on chassis near & brake pedal.
- Always maintain brake oil level between upper (Max) and lower (Min) level.
- Always use recommended brake fluid (DOT3)

Steering Lock

- Locked and unlocked positions are as shown in the above figure.
- Steering is locked only when handle bar is in extreme left position.
- After confirming the locking of the handle bar take out the Key from the lock barrel.

Parking Brake

- It is located on right hand side of driver seat.
- Pull the lever in upward position so that the reverse gear lever is “ON”

Spare Wheel

- It is located below driver’s seat.

Location of Parts

Battery

- High power, heavy duty 12V, 32 Ah battery.
- Ensure electrolyte level in each cells to be between min and max level, as indicated on battery.

Reverse Gear Lever

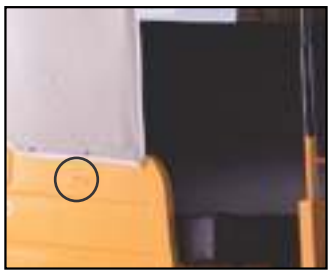
- It is located below dashboard
- To apply the reverse gear, pull the reverse gear lever all the way up. To release the reverse gear push the button “B” in middle of the Lever and lower to its original Position.

Salient Features

Features
- DTS-i engine.

Advantages
- Complete combustion.
- Better throttle response.
- Less pollution.
- More mileage.

Benefits
- Powerful engine with more mileage.



Features
- Optimized air intake.

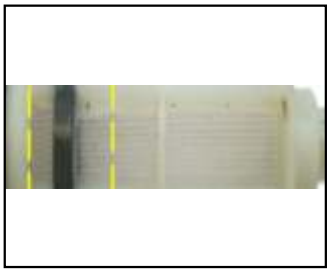
Advantages
- Maximized air passage for duct.
- Minimized dirt and dust entry.
- Minimize possibility of piston scuffing and cylinder scoring.

Benefits
- Improve engine components life & less engine repair cost.

Features
- Dual oil filtration system.

Advantages
- Micro level oil filtration.
- Better lubrication to engine components.
- Reduced oil drain interval.

Benefits
- Low operating cost & no brake down.



Features
- Oil cooler.

Advantages
- Retains the viscosity of oil.
- Enhanced oil flow.
- Optimum engine cooling and cleaning.

Benefits
- High performance with low downtime.

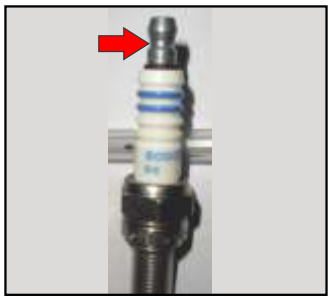
Features
- Anti judder clutch.

Advantages
- Smooth clutch operation.
- Reduce clutch burning.
- Smooth gear shifting.

Benefits
- Jerk free ride with ease in gear shifting.

Salient Features

PERFORMANCE



Features
- Solid post spark plug

Advantages
- Ensures higher retention of the plug cap on the spark plug, preventing it from coming off or loosening.
- Provides a positive & distinctly fellable click during plug cap fitment.

Benefits
- Repeated removal & fitment of plug cap does not deteriorate its locking and retention ability.

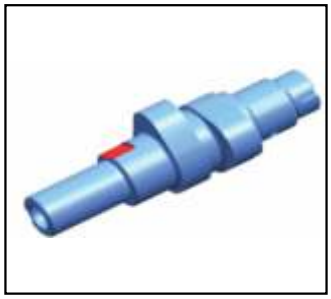
To reduce the Engine oil consumption :

- 'J' groove added on piston skirt top
- End gap of piston ring top and ring bottom reduced.

Features
- CDI incorporates new proprietary software optimizing engine performance in all speed and load conditions.

Advantages
- Easy starting
- Reduced Misfiring and enhanced complete combustion
- More Mileage.

Benefits
- Hassle free starting at all engine operating conditions.



Features
- Revised camshaft/valve timing

Advantages
- The new revised camshaft ensures better drivability.

Benefits
- Better low end torque enables the engine to accelerate quickly and avoid frequent gear changes.

Salient Features

PERFORMANCE

Features
- High strength 'Y' frame

Advantages
- Withstand Heavy Load.
- No sagging of chassis.

Benefits
- Long life chassis resulting in low repair & maintenance cost.

Features
- Muscular scudo

Advantages
- Aerodynamic shape.
- More leg space.
- Clean cabin look.
- Trendy exterior look.

Benefits
- A strong muscular look with more leg space.

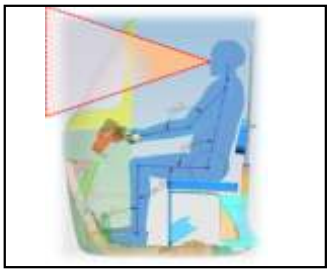
Heat radiated from exhaust system is reduced by

- Double tube (pipe in pipe) construction of complete header tube outside muffler improved durability of entire silencer assembly .

Features
- Heightened wind shield

Advantages
- Good Visibility.
- Stylish Appearance

Benefits
- Comfortable driving with good visibility.



- Oil pressure indicator is Provided on Instrument console for Petrol Vehicles.
- In the event of oil pressure drop or low engine oil level the indicator glows continuously. Thus indicating the driver to stop the vehicle and check the cause.

Salient Features

COMFORT & STYLE

Features
- Ergonomic handlebar position

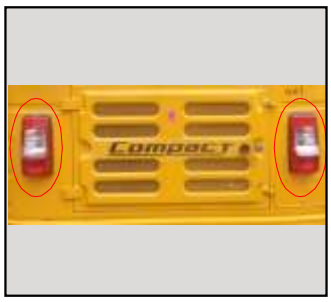
Advantages
- Better reach to Handle bar.
- More knee clearance.
- No obstruction while turning the vehicle.

Benefits
- Fatigue reduced, can drive for more hours.

Features
- New turn indicator position

Advantages
- Reduce the Possibilities of Breakage during Turning
- Stylish look.

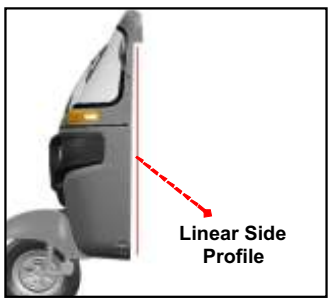
Benefits
- Stylish vehicle with less repair cost.



Features
- Body flushed tail lamps

Advantages
- Compact Rear View look

Benefits
- Stylish vehicle as per customer demand.



Features
- Linear side profile

Advantages
- Elegant Side View look.

Benefits
- Stylish vehicle as per customer demand.

Features
- Ergonomic switches & controls

Advantages
- Ergonomic placement of Switches and Knobs.
- No interference of knobs / key with knee.

Benefits
- Comfortable driving & easy operation of the knobs.

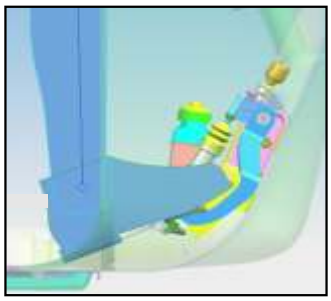
Salient Features

COMFORT & STYLE

Features
- Heightened hood pipe

Advantages
- Enhanced Head room space.

Benefits
- Stylish vehicle as per customer demand.



Features
- Quick reach brake pedal

Advantages
- No heel rest required.
- Easy accessing of Brake Pedal.
- Comfortable Sitting Posture

Benefits
- Fatigue reduced, can drive for more hours.

- Reverse gear lever shifted to front side on Y member (LH Side).

- Equalizer bracket welded on right hand side main member.
- Hand lever on right side member.

Salient Features

DELIGHT

Features
- Car type ignition switch

Advantages
- No Separate Starter Button is required.

Benefits
- Unique experience with less electrical maintenance.

Features
- Water splash guard

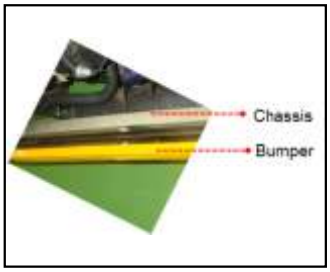
Advantages
- Sealed floor board.
- Prevent water splash entry in to driver cabin.

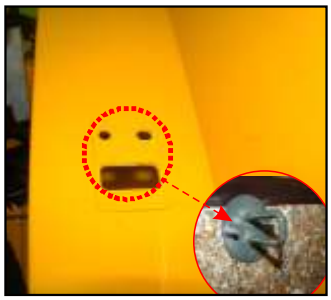
Benefits
- Clean cabin look.

Features
- Rear engine door having grill for better heat dissipation.

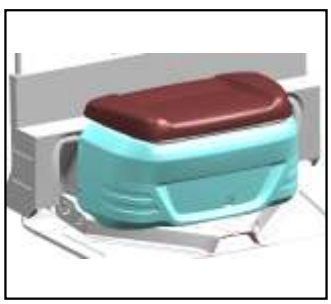
Advantages
- Rigid support.
- Less damage to the body during rear collision.

Benefits
- Low maintenance & less repair cost.





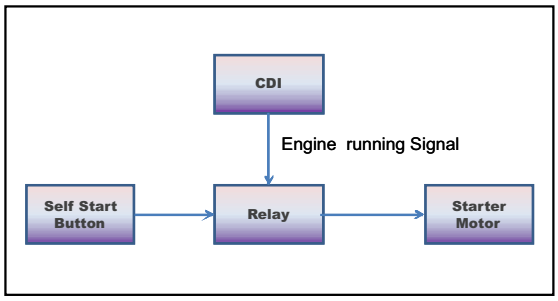
- Slot provided in body for insertion of hook (Integral part of driving seat) for lockable enclosure.



- Lockable enclosed space called 'Enclosure' below Driver's seat.
- Improved protection for Battery, Spare wheel & Jack.
- Clean looks due to Enclosure, masking the Battery, Spare Wheel, Jack & Junction Box.

Salient Features

DELIGHT



Features

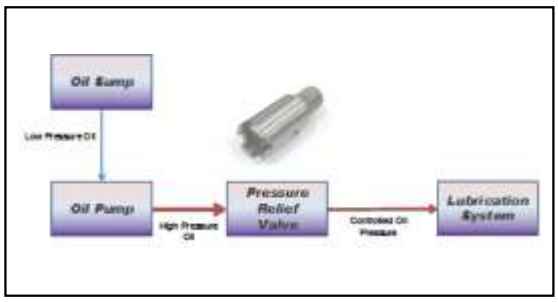
- Starter interlocking mechanism

Advantages

- Starter motor will not operate in engine running condition.
- Minimize the possibility of starter motor damage.

Benefits

- Minimize starter motor repair cost lead to more saving maintenance.



Features

- Pressure relief valve

Advantages

- Enhanced safety for Engine oil Filter element.
- Minimize the Possibility of Oil burning.

Benefits

- Low operating cost & no brake down.

Notes

Technical Specifications

ENGINE & TRANSMISSION

Engine Type	:	Four Stroke, spark ignition, forced air cooled
No. of cylinders	:	One
Bore	:	63.5 mm
Stroke	:	62.8 mm
Engine displacement	:	198.88 CC
Compression ratio		
Petrol	:	9.87±1.0:1
LPG	:	9.87±1.0:1
CNG	:	10.5±1.0:1
Maximum net power		
Petrol	:	7.45 KW @ 4500±250 rpm
LPG	:	7.25 KW @ 4750±250 rpm
CNG	:	7.00 KW @ 4750±250 rpm
Maximum net torque		
Petrol	:	17.30 Nm @ 3500±250 rpm
LPG	:	16.30 Nm @ 3500±250 rpm
CNG	:	14.90 Nm @ 3750±250 rpm
Idling rpm		
Petrol	:	1300 ~ 1400 RPM
LPG	:	1250 ~ 1400 RPM
CNG	:	1250 ~ 1400 RPM
Transmission	:	4 forward & 1 reverse
Overall Gear ratio		
First gear	:	30.86:1
Second gear	:	17.05:1
Third gear	:	10.72:1
Fourth gear	:	7.46:1
Fifth gear	:	6.06:1
Reverse gear	:	27.09:1
Clutch	:	Multi plate wet (7 plates)
Spark plug	:	2 Nos. (Champion-RG6HCC / BOSCH-UR6CC)

CHASSIS AND BODY :

Chassis frame	:	Monocoque chassis
Suspension		
Front & Rear suspension	:	Spring - Helical Coil Compression Shock absorber - Hydraulic, double acting
Brake Type		
Front & Rear Brake	:	Hydraulic expanding friction shoe type.
Parking	:	Mechanical expanding friction shoe type
Tyres		
Front & Rear	:	4.00-8, 4PR / 4.00-8, 6PR

Front tyre pressure(Unladen) : 2.1 kg/cm^2 (30 PSI)

Rear tyre pressure(Unladen) : 2.4 kg/cm^2 (34 PSI)

PETROL TANK

Petrol		Full : 8 Liters, Reserve : 1.5 Liters
LPG	:	20.6 Liters of water 16.5 Liters of LPG: Petrol tank (Limphome) - 3 Liters
CNG	:	4kg (29 or 30 liters cylinder) at 200 Bar & 150c : Petrol tank (Limphome) - 3 Liters

CONTROLS

Steering	:	Handlebar
Throttle (Accelerator) of handle bar	:	Twist grip type on right hand
Gears		
Forward	:	Twist grip operated on left side of handle bar
Revers CNG / LPG	:	Hand Operated lever on right side of seat for
Reverse	:	Hand Operated lever below dashboard for petrol
Brakes Front & Rear	:	Single control, right foot operated hydraulic brakes with TMC.

ELECTRICAL

System	:	12 V DC
Battery	:	12V 32 Ah
Head lamp	:	35/35W (Halogen, Hs1) 2Nos
Tail/stop lamp	:	5/21 W or 5/18 W
Reverse lamp	:	10 W
Pilot lamp	:	5 W
Turn signal lamp	:	10 W
Wiper System arrangement	:	Electrical wiper motor, 12V DC with parking
Horn	:	12V DC

DIMENSIONS

Overall Length	:	2635mm
Overall Width	:	1300mm
Overall Height	:	1704mm
Wheel base	:	2000mm
Turning circle radius	:	2880mm
Min Ground Clearance	:	200mm
Rear wheel track	:	1150mm

WEIGHTS

Vehicle Kerb Weight		
Petrol	:	348 kg
LPG	:	368 kg
CNG	:	389 kg
Gross weight		
Petrol	:	678 kg
LPG	:	698 kg
CNG	:	719 kg

GRADEABLITY (in first gear)

Petrol	:	19% (10.80^0) max.
LPG	:	16.5% (9.10^0) max.
CNG	:	15% (8.53^0) max.

Notes

Key Learning Points

- Understanding on Vehicle Maintenance
- PDI & Periodic Maintenance Schedule
- Lubrication chart

CHAPTER 2

I Check....I Maintain

Pre-Delivery Inspection Checklist

Periodic Maintenance Schedule

Lubrication Chart

Schedule Maintenance

Procedure for Fitment of Oil Filter on the Engine

Pre-Delivery Inspection Checklist

Frame No. | | | | | | | | | | | | | | | |

Engine No. | | | | | | | | | | |

Dealers Name _____ Dealers Code _____

Date of PDI _____ PDI done by _____

Please ensure that following checks are carried out during PDI before delivery of vehicle.

Points to check	Specification
Transit Damage:	
Check the vehicle for any transit damages	On exteriors
Performance:	
Check gear shifting and clutch for proper adjustment and working.	
Check and adjust engine idling.	Petrol : 1300~1400 Rpm LPG : 1250~1400 Rpm CNG : 1250~1400 Rpm
Check for drivability, hesitation.	
Checks/ Play/ Adjustment/ Cable	
Check and adjust all control cables.	
Accelerator cable	Free Play 2 - 3 mm
Choke cable	
Gear cables	
Hand brake cable	
Reverse gear cable	
Clutch lever free play	4 - 5 mm
Brake pedal	10 -15 mm
Check and correct tyre inflation pressure including that of spare wheel.	Front :2.1 kg/cm^2 (30 PSI) Rear : 2.4 kg/cm^2 (34 PSI)
Electrical related:	
Check all lights, horn, and wiper motor and switch operation for satisfactory working.	

Periodic Maintenance Schedule

Sr. No.	Operation	RECOMMENDED ODOMETER READING km								
		1K	5K	10K	15K	20K	25K	30K	35K	
1.	Vehicle washing & Cleaning	CL	CL	CL	CL	CL	CL	CL	CL	
2.	Clean/replace Air filter element	CL	CL	CL	CL	CL	CL	CL	CL	Replace after every 40,000 km
3.	Clean/Replace breather tube filter	CL	CL	R	CL	R	CL	R	CL	Replace After every 10,000 km
4.	Check all lights for working	C,A	C,A	C,A	C,A	C,A	C,A	C,A	C,A	Switches, indicators etc
5.	Replace oil strainer	R		R		R		R		Replace after every 10,000 km
6.	Check/adjust steering column tight race & lock nut	C,A		C,A		C,A		C,A		Tight lock nut to recommended torque
7.	Clean/Adjust/ Replace Spark plug gap	C,A		C,A		R		C,A		Replace after every 20,000 km
8.	Adjust Idling speed & CO %	C,A		C,A		C,A		C,A		
9.	Check & adjust valve clearance	C,A		C,A		C,A		C,A		Adjust if required
10.	Check /Replace fuel pipes	C,R		C,R		C,R		C,R		
11.	Check Battery electrolyte level & top up	C,T		C,T		C,T		C,T		
12.	Do Tyre rotation (seq.1 & seq.2)		A	A	A	A	A	A	A	Seq 1 at 5k,15k,25k....km Seq 2 at 10k,20k,30k....km
13.	Replace prop. shaft rubber buffers		R	R	R	R	R	R	R	
14.	Replace Oil Filter			R		R		R		Replace after every 10,000 km
15.	Replace Fuel filter			R		R		R		Replace after every 10,000 km
16.	Check and adjust control cables			C,A		C,A		C,A		
17.	Check front/rear shock absorbers for any defect			C,R		C,R		C,R		
18.	Check & top up brake fluid			C,T		C,T		C,T		Replace after every 40,000 km
19	De-carbonising engine							CL		After every 30,000 km
20.	Check brake liner wear, replace if required				C			R		Replace after every 30,000 km

GAS Kit Related

Sr. No.	Operation	RECOMMENDED ODOMETER READING km								
		1K	5K	10K	15K	20K	25K	30K	35K	
1.	Check gas leakages	C,A,R		C,A,R		C,A,R		C,A,R		
2.	Replace gas filter element solenoid CNG			R		R		R		Replace after every 10,000 km
3.	Check gas filter HPR CNG, replace if required							C,R		Replace if required
4.	Clean Gas regulator							CL		Open Power valve
5.	Replace all rubber components of gas kit									After every three (3) years
6.	Gas cylinder retesting									After every three (3) years

A- Adjust **C**- Check **CL**-Clean **L**-Lubricate **R**-Replace **T**-Top up

Lubrication Chart

Sr. No.	Operation	RECOMMENDED ODOMETER READING km								
		1K	5K	10K	15K	20K	25K	30K	35K	
1.	Replace/top up Gear Box oil replace*	R	T	R	T	R	T	R	T	Replace After every 10,000 km. **Top up at every 1000 km**
2.	Replace/top up Differential oil		T	R	T	R	T	R	T	Replace After every 10,000 km
3.	Grease Steering races, balls			L		L		L		After every 10,000 km
4.	Grease Front suspension	L	L	L	L	L	L	L	L	
5.	Grease Front & Rear axles (Grease nipple)	L	L	L	L	L	L	L	L	
6.	Grease Propeller shaft flanges	L	L	L	L	L	L	L	L	
7.	Grease Gear shifter sector	L	L	L	L	L	L	L	L	
8.	Grease Fare/Speedo meter drive	L	L	L	L	L	L	L	L	
9.	Speedometer inner greasing			L		L		L		Every 10,000 km
10.	Apply petroleum jelly on Battery terminals	L	L	L	L	L	L	L	L	

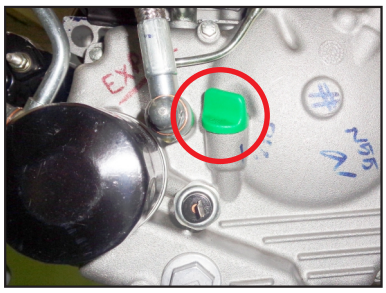
Recommended Oil for Sr. No. 1 & 2 : Bajaj DTS-i 10000 4T Premium

Recommended Grease for Sr. No. 3 to 9 : Lithium based grease a) IOL - Servo Rr3 or b) HP-AP3or c) Castrol - NLGI3 or d)VolvolineNLGI3 or equivalent

A- Adjust **C**- Check **CL**-Clean **L**-Lubricate **R**-Replace **T**-Top up

It is strongly recommended to use only "Bajaj DTS-i 10000 4T Premium" Genuine engine oil. In case any other engine oil of same specifications is used, the replacement frequency of Sr. No. 1 will be at every 5000 Km.

Schedule Maintenance



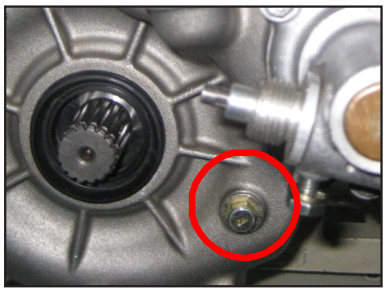
OIL LEVEL PLUG

Engine Oil:

Engine Oil level checking procedure :

- Park the vehicle on level surface to check the oil level.
- Remove the oil level dipstick.
- Oil level can be measured by means of dip stick.
- Remove the dip stick carefully.
- Wipe off the dip stick with clean cloth.
- Re-insert the dip stick fully & screw in fully. Take out to note the oil level.
- In case the oil level is below the lower mark, top it up to the upper mark.

  NOTE : Two different grade and brands of oil should not be mixed.



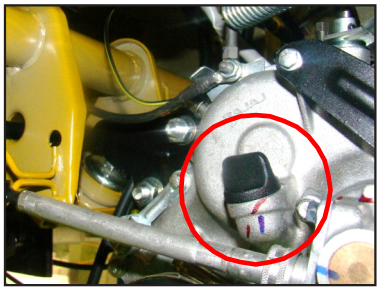
DRAIN PLUG

Engine Oil replacement :

Replace oil as per Lubrication Chart.

For replacing Engine oil :-

- Run the engine for about 10 minutes to warm up.
- Place the vehicle on a level ground so that the oil settles down.
- Remove oil drain plug. Let the oil drain completely.
- Replace the sealing washer & then tighten the drain plug.
- Remove oil filing plug cum dipstick and pour the correct quantity of recommended oil.
- Check the oil level as described above.
- Fit back breather pipe & clip properly. Ensure that there is no oil leakage.



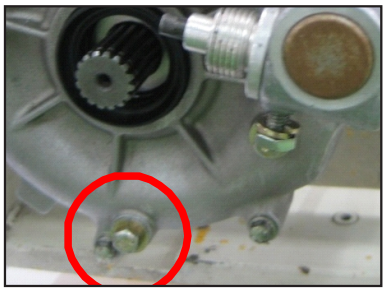
FILLING PLUG

Differential Oil:

Differential Oil level checking procedure:

- Place the vehicle on a level ground.
- Let the oil settle for a few minutes.
- Oil level can be measured by means level plug.
- Remove the level plug carefully.
- Note the oil should flow out from level plug.
- In case the oil level is below the level plug top up to desired level.

  NOTE : Two different grade and brands of oil should not be mixed



Drain Bolt

Differential Oil replacement :

Replace oil as per Lubrication Chart.

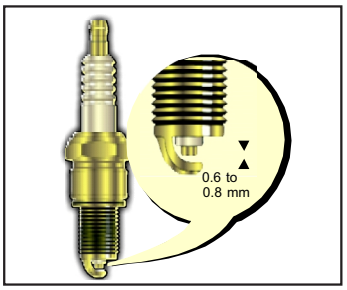
For replacing Differential oil:-

- Run the vehicle for about 2 ~ 3 km or 10 minutes.
- Place the vehicle on a level ground so that the oil settles down.
- Remove oil drain plug. Let the oil drain completely.
- Replace the sealing washer & then tighten the drain plug.
- Remove oil filling plug and pour the correct quantity of recommended oil.
- Check the oil level
- Fit the oil filling plug. Ensure that there is no oil leakage.

Schedule Maintenance

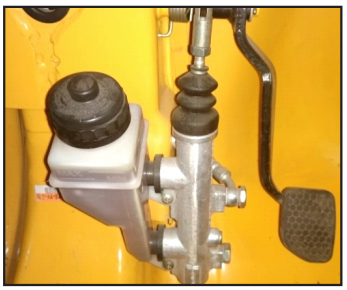
Spark Plug :

- Clean any dirt from around spark plug base.
- Remove spark plug by using plug spanner provided in the tool kit.
- Spark plug gap : 0.6 to 0.8 mm.
- Spark plug:Champion : PRG6HCC / BOSCH - UR6CC
- Spark plug cap : Resistive



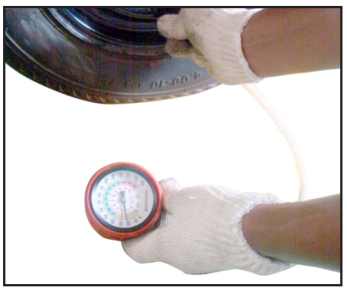
Free play for :

a. Brake pedal : 10-15 mm
b. Clutch lever : 4-5 mm
c. Accelerator grip : 2-3 mm
d. Choke Lever : 2-3 mm



Tyre Pressure:

Keep appropriate tyre pressure as mentioned below to increase life of
The tyre and for better fuel consumption.
Front : 2.1 kg/cm2 (30 psi)
Rear : 2.4 kg/cm2 (34 psi)
Tyre Size : 4.00 - 8, 6PR (All four tyres)



Wiper Motor :

- Before washing vehicle, wrap the wiper motor with polythene sheet to prevent water entry inside the motor.

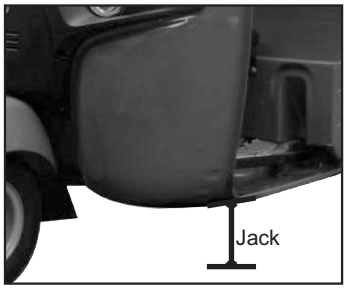


Fig. 'A'

Changing wheel and tyres :
Pull the parking brake and loosen the wheel retaining nuts. Place the jack as shown in Fig. 'A' (For removing Front wheel) and Fig. 'B' (For removing Rear wheel) then jack up the vehicle until the wheel clears the ground. Then remove the securing nuts and take out the wheel. On assembling progressively screw the wheel nuts in criss-cross and lower the vehicle slowly to the ground, then tighten the nuts.

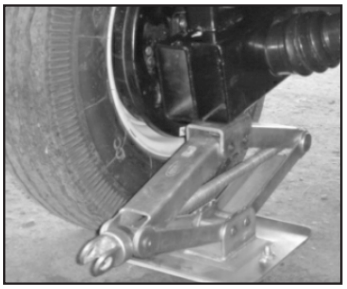
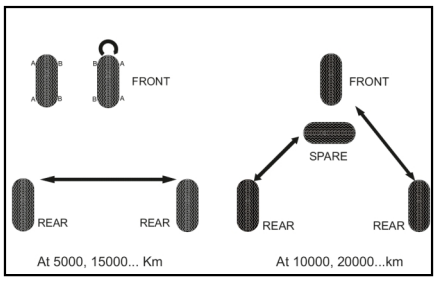


Fig. 'B'

Schedule Maintenance

Tyre Rotation:



Tyre rotation :
The wheels are interchangeable provided they are correctly inflated. To even out tyre tread wear it is necessary to rotate it after every 5,000 kms and inflate it to the specified pressure. The best tyres should always be kept at the rear wheels which are driving wheels, thereafter follow the sequence of rotation. As shown in the fig. 'C'.

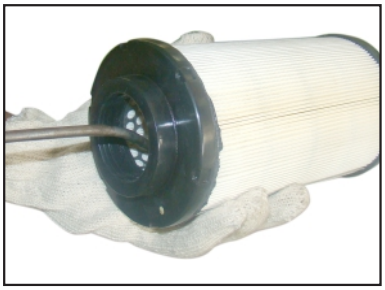
Engine Oil:
Replace the oil in accordance with periodic maintenance chart.

Application	Recommended Oil Grade	Equivalent Grade	Quantity
Engine Oil	Bajaj DTS-i 10000 4T Premium Engine Oil SAE 20W50	SAE 20W50 API "SL + JASO MA2"	For Refilling 1600 ml For Overhauling 2200 ml
Differential Oil			For Refilling 320 ml

Note :
Two different grade and brands of oil should not be mixed.

Procedure for Fitment of Oil Filter on the Engine

Air Filter Cleaning :
Clean Air filter element as per standard SOP



Blow dry air pressure from inside to outside.

Check condition of sealing ring on filter cartridge.

Check for any physical damages to filter cartridge.

Remove dust accumulated in filter bowl with a clean cloth.

Important :

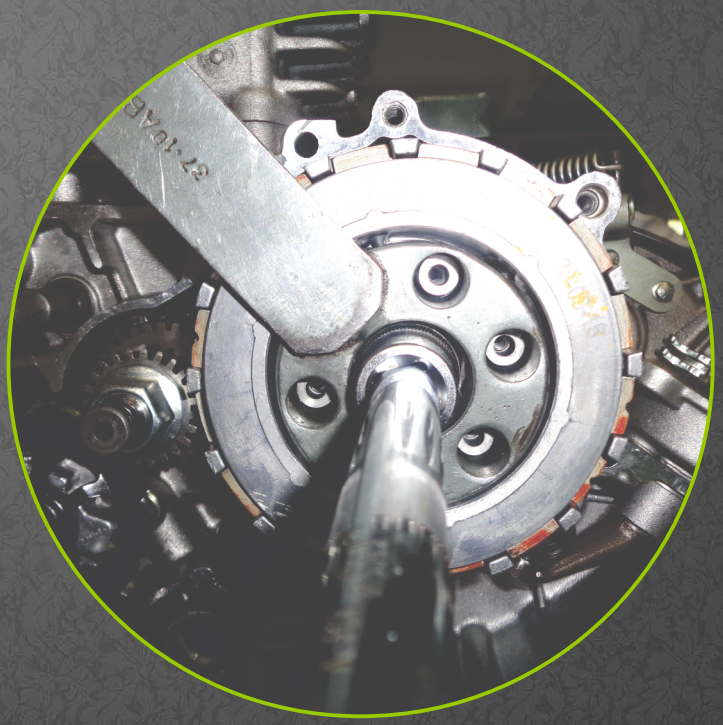
- Filter needs to be cleaned at every 5,000 kms and replaced at every 40,000 kms. However if vehicle is operating in dusty area cleaning frequency is to be increased and filter to be replaced filter after 8 cleanings or 40,000 kms. qwhichever is earlier.
- Do not tap air filter cartridge on floor or with any hard object.
- Never blow air from outside to inside as this will enlarge the filter holes permanently.
- Keep air pressure at 2Kg/Cm2 while cleaning air filter.
- Never use air coming out immediately after starting the compressor as initially moisture comes flows out with air.
- Never use air from a compressor which has a complaint of oil throw.
- Never wash air filter cartridge with any liquid agent. Always use dry air for cleaning air filter.
- Never puncher the air filter element.

Check air filter with the help of bulb. Put a glowing bulb inside the filter element and inspect the light coming out from outside. Any sharp light spot indicates that filter is punctured.

Notes

Key Learning Points

Use of Special Tools



CHAPTER 3

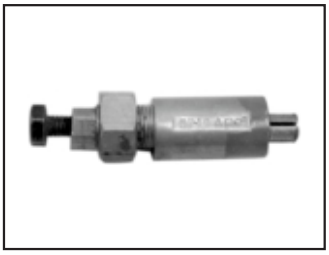
Tools & Gadgets

Special Tools with Applications

Special Tools with Applications

Bearing Extractor

Part No : 37 1001 10
Application : To be used for removing crankshaft bearing from crankcase clutch side

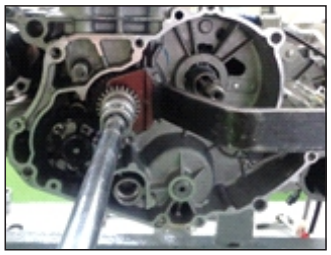


Bearing Extractor

Part No : 37 1003 02
Application : To be used for removing needle bearing from crankcase clutch cover side.

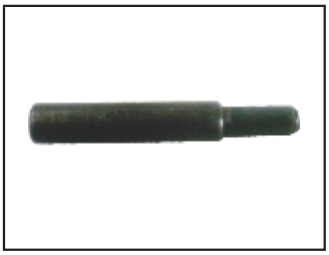
Primary Gear Holder

Part No : 37 10AB 16
Application : To be used for holding the primary gear while tightening/loosening the crankshaft nut.



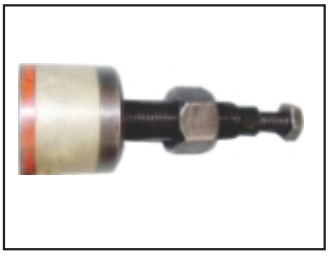
Tool For Extracting Bearing

Drawing : 37 10BA 61
Application : To be used to remove the main shaft bearing from differential cover.



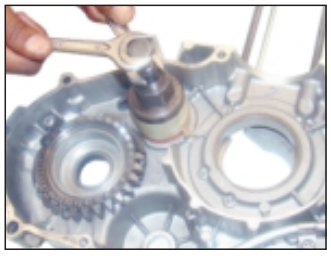
Piston Pin Drift

Drawing : 37 1010 06
Application : To be used for removing piston pin.



Tool for Extracting Bearing

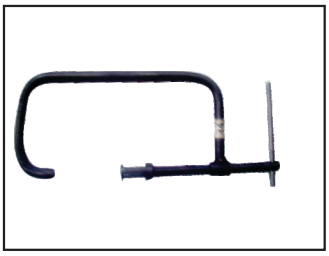
Drawing : 37 10BA 61
Application : To be used to remove the M G shaft ball bearing from the clutch side crankcase.



Special Tools with Applications

Magneto Rotor Holder

Part No : 37 1030 54
Application : To be used to hold the magneto rotor while tightening/loosening the rotor nut. Also used for holding the cam sprocket.

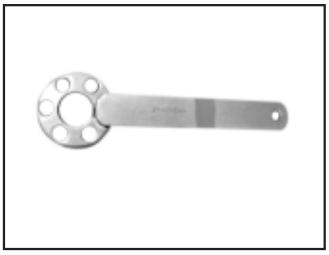


Valve Spring Compression

Drawing : 37 1031 08
Application : To be used for taking out inlet / exhaust valves by compression springs.

Magneto Rotor Puller

Drawing : 37 10AB 24
Application : To be used for removing the magneto rotor from crankshaft.

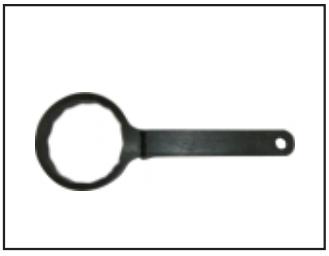


Clutch Holder

Drawing : 37 10AB 25
Application : To hold the clutch assembly while removing / tightening the clutch nut.

Tappet Adjuster

Drawing : 37 1031 53
Application : To be used for adjust the valve screw.

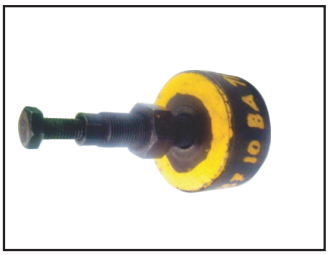


Oil Filter Wrench

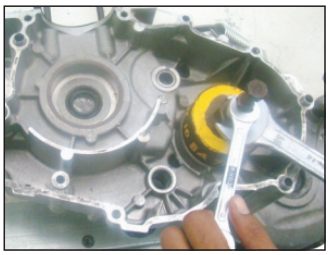
Drawing : AN 9025 41
Application : To be used for removing the oil filter.

Special Tools with Applications

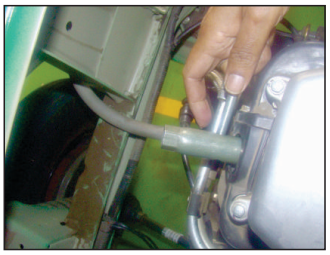
Bearing Extractor	
Drawing	: 37 1003 02
Application	: To be used for removing main shaft needle bearing from crankcase cover side.

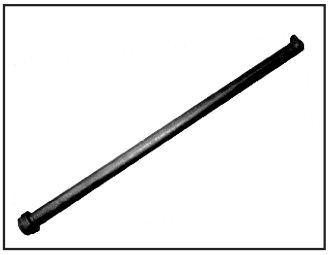


Bearing Extractor	
Drawing	: 37 10BA 71
Application	: To be used for removing main shaft ball bearing from the crankcase magneto side.

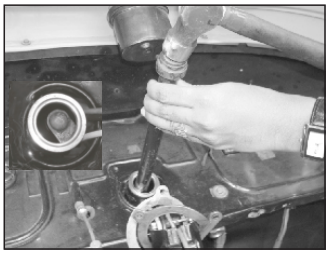


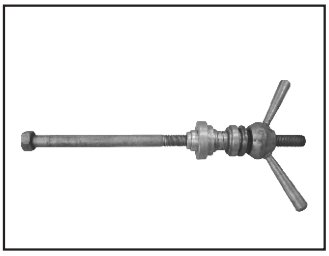
Spark Plug Spanner	
Drawing	: BH 2310 01
Application	: To be used for loosening or tightening the spark plug .



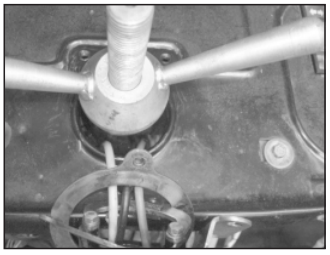


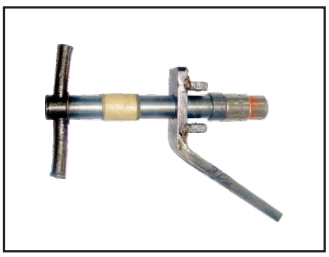
Tool for removing upper and lower bearing race from chassis	
Drawing	: 37 1805 06
Application	: To be used fro removing upper & lower race from chassis.



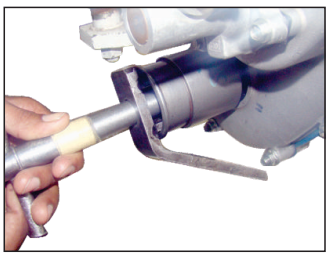


Assembly tool for fitting upper and lower bearing race on chassis	
Drawing	: 37 1801 06
Application	: To be used fro fitting upper & lower bearing race or chassis.

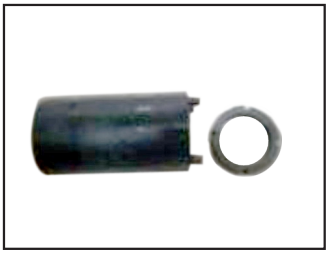




Flange Holder	
Drawing	: 37 1724 10
Application	: To be used for removing and fitting the flange.



Special Tools with Applications



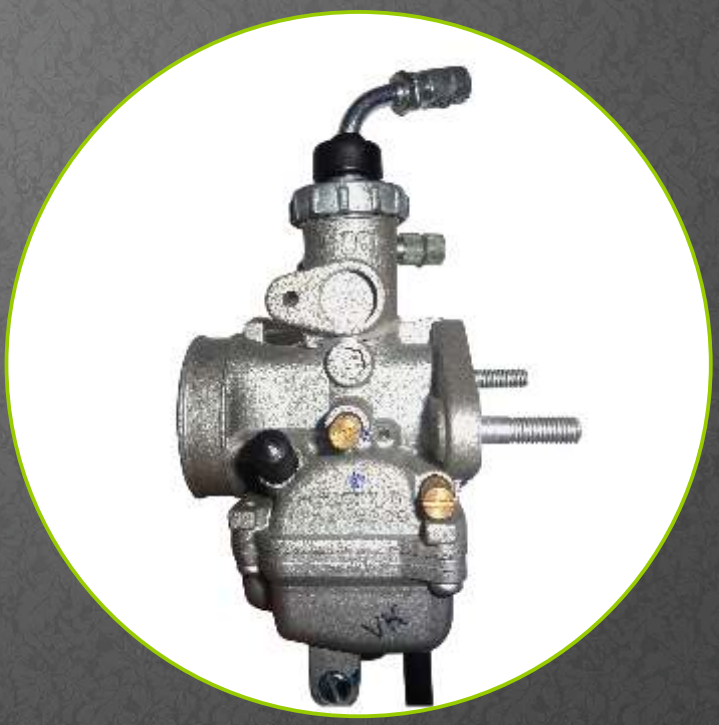
Socket For Steering Column Nut	
Drawing	: F4 1AZ2 204
Application	: To tighten lock nut & ring nut to specified torque (4.5 ~ 5.0 kgfm)

Bearing Driver Set	
Drawing	: 37 1030 61
Application	: To be used for fitting crankcase bearing.

Notes

Key Learning Points

- Understanding of Carburettor & its Specifications
- SOP - Engine Tuning Procedure
- Carburettor Do's & Don'ts



CHAPTER 4

Fuel System - Petrol

Carburettor Specifications

Working & Functions of Carburettor

Engine Tuning Procedure

- SOP Engine idle rpm setting

- SOP Carburettor tuning with CO gas analyser

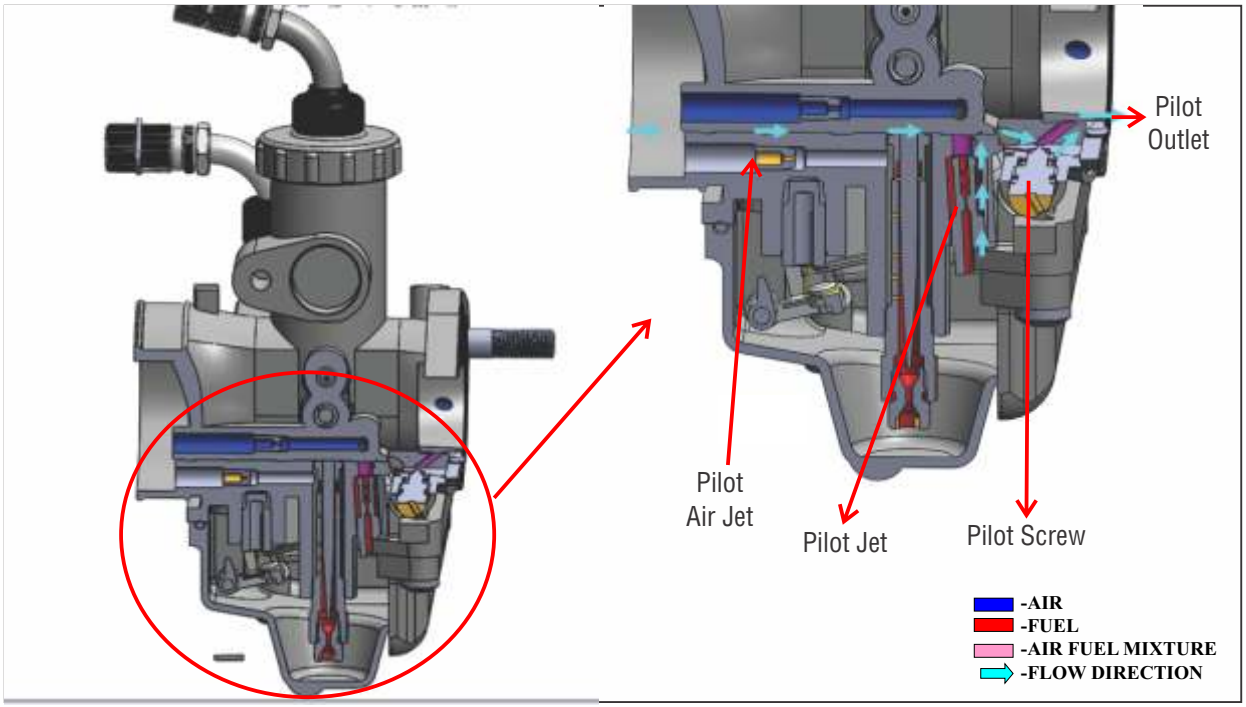
Carburettor Do's & Don'ts

Carburettor Specifications

Make	UCAL
Type	UVD 20
Idling speed	1300 ~ 1400 rpm
VC Screw setting	2.5 ± $1^{1/2}$ Turns Out (Ref. Value)
Main Jet	107.5
Jet needle length	52.5
Jet needle marking	U5HL3
Pilot jet	12.5
Float height	16 mm

Working & Function of Carburettor

Pilot Circuit:
Variable Venturi Carburettor



Function

The Pilot Circuit provides the air fuel mixture at idling and at small throttle opening when the main system is not in operation.

Construction

The Pilot Circuit consists of a pilot jet to meter the fuel and Volume Control Screw (VCS) to control the amount of air-fuel mixture passing through pilot circuit.

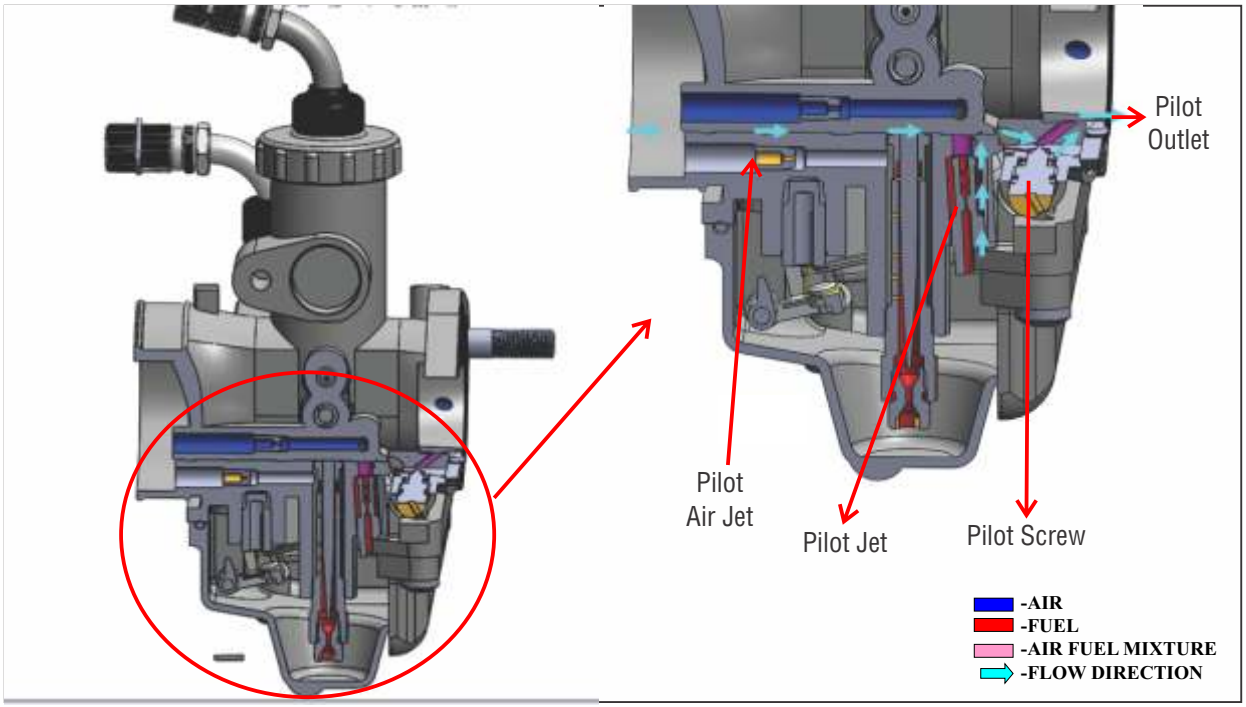
Working

Air jet provides the meter quantity of air towards the pilot jet through properly adjusted pilot screw. Fuel from the bowl is metered by the pilot jet and mixed with the air. The atomize fuel riches the venturi to the pilot outlet and mixes with the air flowing through the main bore. The pilot outlet is located on manifold side of the Carburettor and is just covered by the piston valves wall. Since the piston valve is almost closed at idling the pilot outlet is only a partially exposed to the manifold vacuum hence it gives minimum fuel just to run the engine.

- Pilot Jet
- Volume control screw (VCS) / pilot screw
- Piston Valve

Working & Function of Carburettor

Progression Circuit:
Variable Venturi Carburettor



Function

The progression circuit provides the air-fuel mixture at small throttle opening when pilot circuit is still working but unable to meet the engine demands on small throttle opening.

Construction

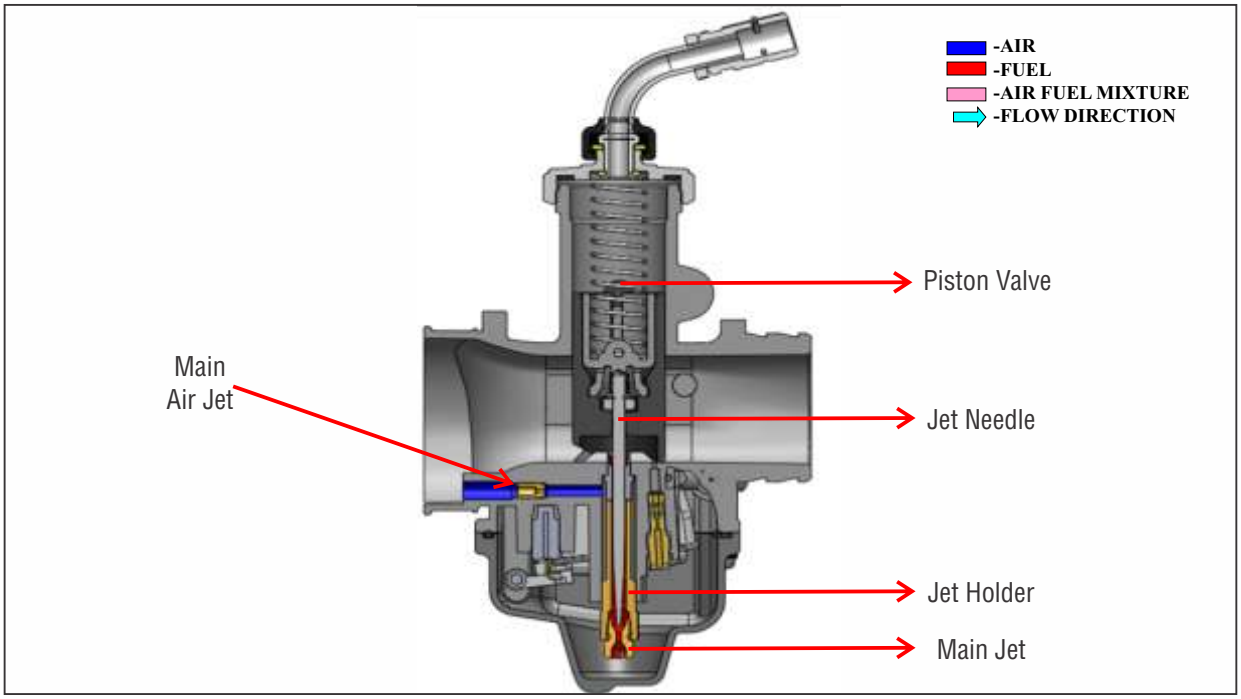
The progression circuit follows the path of pilot circuit and the construction is same as that of pilot circuit

Working

When the piston valve is raised from idling pilot outlet is fully exposed to the manifold vacuum and supplies fuel to its full extent which is sufficient to meet the engine requirement at slow speed. This air fuel mixture supplied mainly from the pilot outlet.

Working & Function of Carburettor

Main Circuit:
Variable Venturi Carburettor



- Main Jet
- Volume Control Screw(VCS)
- Piston Valve

Function

The Main Circuit provides air fuel mixture by lifting up the piston valve in direct proportion to the engine demand. This assures the correct venture size and air velocity throughout the mid range operation of the engine. Mainly from the pilot outlet.

Constriction

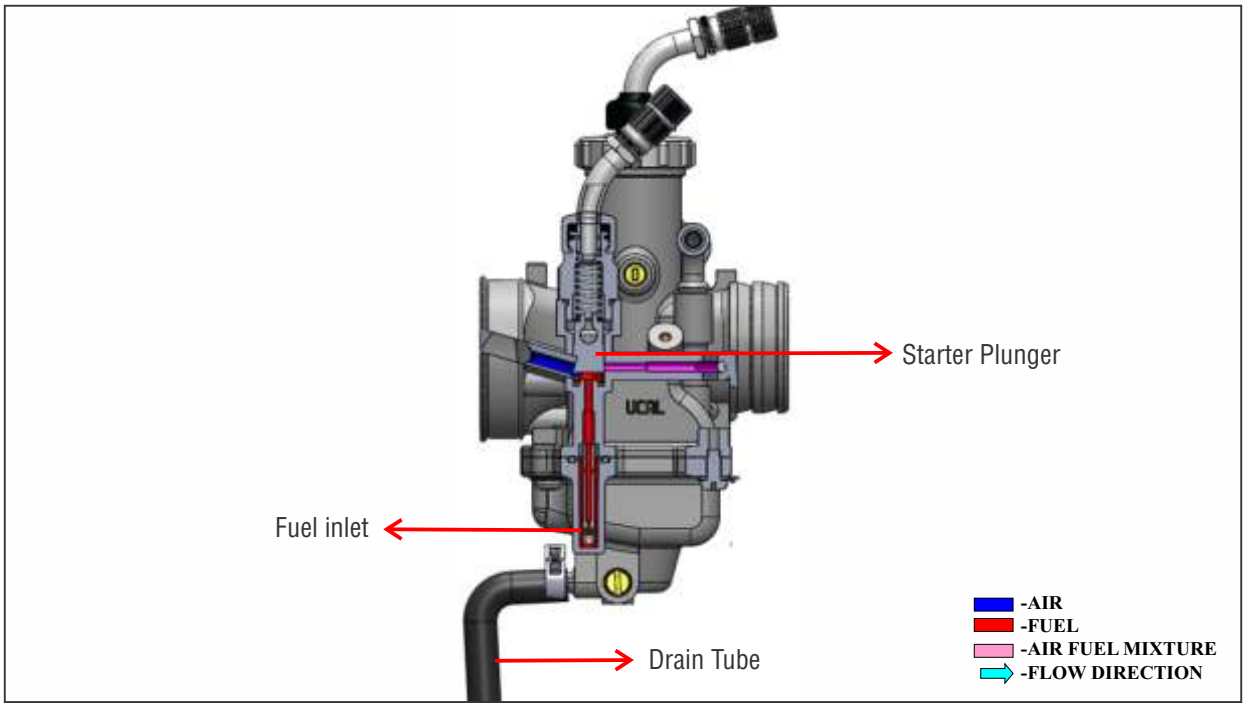
The Main Circuit consists of piston valve, jet needle, needle jet and main jet. To assist in atomization an air bleed circuit is incorporated in the main metering system and it aids fuel vaporization by introducing air into the fuel before it enters them in air stream.

Working

The jet needle is a tapered needle attach to the piston valve which points downward through the center of the Carburettor venturi. When the piston valve is raised from pilot outlet (progression hole) the needle jet is fully exposed to the manifold vacuum. This wide opening of piston valve creates vacuum inside the venturi and more air rushes inside the venturi from the air filter. The air bleed circuit incorporated in the main metering system helps to assist in atomization / vaporization of the air fuel mixture and discharges the mixture through the needle jet Into the main air stream. The position of jet needle relative to the needle jet determines the amount of fuel flowing through the clearance between them. Actually the main circuit is combination of circuits that works together to achieve correct air fuel mixture. The pilot circuit is still operational but its contribution to the total air fuel mixture is relatively less.

Working & Function of Carburettor

Starter Circuit:
Variable Venturi Carburettor



- Fuel Inlet
- Choke Valve / Starter Plunger
- Drain Tube

Function

The function of starter circuit is to provide rich air fuel mixture on starting / cold starting. At cold engine condition the air is dense also the engine parts are cold enough this does not allow the petrol to vaporize properly this leads to starting trouble.

Construction

The Starter Circuit consists of a choke valve which blocks the supply of main air stream going inside the Carburettor. The choke valve is operated by cable or lever.

Working

The choke valve is operated by a cable or lever. As the choke valve is lifted, it completely block the main air from passage that leads to the venturi and thus rich mixture is supplied to the engine. With the choke valve fully lifted almost all the air that goes to the engine has to pass through the pilot circuit passage. This creates enough suction to draw fuel up from the bowl in to the pilot circuit outlet hole. Here the fuel is mixed with the air and the rich mixture is drawn into the engine at the time of cold starting.

SOP: Engine Idle RPM Setting

Sr. No.	Activity / Inspection Points	General Tools, Special Tools and M&T's Instruments	Important Tips
1	Before starting the vehicle, make sure free flow of fuel from fuel tank to carburettor. Start the vehicle, warm up engine till engine oil temperature is between 60 to 65°C. To do this run the vehicle at speed < 40 KMPH for 3 to 4 KMS. <u>Note:</u> Ensure minimum 1 litter of petrol in the Fuel Tank. It is not mandatory to have temperature meter as the desired temperature will be achieved by running the vehicle for 3 to 4 KMS at speed < 40 KMPH.	  Temperature meter 	<u>For Service Vehicles (Non PDI),</u> following preliminary checks to done before doing Carburettor Tuning: 1. Clean Air Filter 2.Clutch free play should be between 4-5 mm 3.Check & ensure Spark plug gap of 0.6 to 0.8 mm. 4.Tappet setting.
2	Turn the VCS (Volume control screw) of carburettor gently in clock wise direction till the screw gets fully closed. (Engine may die down)	Connector (Long Shank 6 " minus type Screw driver),  VCS	Caution: The screw should not be tightened with great force to avoid breaking of screw tip or damage of carburettor internally.
3	Turn out VCS in anti-clock wise direction 2.5 Turns from fully closed position. Restart the engine if already stopped. Adjust engine idling rpm of carburettor to: 1400 ± 100, with idle control screw.	Connector (Long Shank 6 " minus type Screw driver), Idle Control Screw  Digital Tachometer 	Open out the idle control screw to reduce the rpm.
4	Turn the VCS in each direction gradually to identify the position where idle rpm is maximum. This is the final VCS setting.		Standard VCS Setting 2.5 ± 1 1/2 turns out, for ref only.
5	Do engine idle speed correction only if required. Test ride and check vehicle performance and Drive-ability		

SOP: Carburettor Tunning Procedure with CO Gas Analyser

Sr. No.	Activity / Inspection Points	General Tools, Special Tools and M&T's Instruments	Important Tips
1	Switch 'ON' the CO gas analyser & let it warm up for at least 15 minutes before taking the first reading	CO Gas Analyser  	
2	Before starting the vehicle, make sure free flow of fuel from fuel tank to carburettor. Start the vehicle, warm up engine till engine oil temperature is between 60 to 65°C. To do this run the vehicle at speed < 40 KMPH for 3 to 4 KMS. <u>Note:</u> Ensure minimum 1 litter of petrol in the Fuel Tank. It is not mandatory to have temperature meter as the desired temperature will be achieved by running the vehicle for 3 to 4 KMS at speed < 40 KMPH.	Temperature meter    Measure engine oil temperature by taking out dip stick cap on clutch cover side.	<u>For Service Vehicles (Non PDI),</u> following preliminary checks to done before doing Carburettor Tuning: 1. Clean Air Filter 2.Clutch free play should be between 4-5 mm 3.Check & ensure Spark plug gap of 0.6 to 0.8 mm. 4.Tappet setting.
3	Turn the VCS (Volume control screw) of carburettor gently in clock wise direction till the screw gets fully closed. (Engine may die down)	Connector (Long Shank 6 " minus type Screw driver), Digital Tachometer 	**Caution:** The screw should not be tightened with great force to avoid breaking of screw tip or damage of carburettor internally.
4	Switch off engine and remove the screw on silencer exhaust pipe. Insert CO checking probe and make sure that probe is firmly placed inside the exhaust pipe.	CO Checking probe  	**Caution:** Make sure that the hose of the CO Checking probe is not bent or damaged.
5	Turn out VCS in anti-clock wise direction 2.5 Turns from fully closed position. Restart the engine to check CO%. The CO% should be with-in 2 to 4% at idle rpm. Specified range for engine idle rpm is: 1400 ± 100.If CO% is not with-in specified range, then adjust VCS to get standard CO%		**Note:** Ensure that all electrical loads (lighting, wiper motor) are switched off while CO setting. Turn VCS in anti-clock wise direction to increase CO% and to reduce CO% turn VCS in clockwise direction. Standard VCS Setting 2.5 ± 1 1/2 turns out, for ref only.
6	Confirm engine idle rpm is as per specification once the specified CO% is achieved. Adjust idle control screw of carburettor, only if required.	Connector (Long Shank 6 " minus type Screw driver), Digital Tachometer   Idle control screw	

Carburettor Do's & Don'ts

Handling

- Use appropriate screw drivers.

- Never use oversize screw drivers.
- Do not over tighten the jets and screws.
- These will damage the jets and their seats.

Cleaning

- For cleaning always use carburettor cleaner like
  - Acetone
  - Carbon Tetra chloride
  - Aerosol
  - CVC spray

- Never clean the carburettor with water.
- Jets & air passages will get clogged due to sediments if cleaned by water.

Maintenance

Ensure
- Jets
  - Holes are clean.
  - Holes are not worn out.
  - Size as per specification.

Replace
- Jets
  - Worn out jet.
  - Incorrect size jet.

- Float is in good condition.

- Punctured, Squeezed and distorted float.

- Float Pin
  - Tip having no wear mark.
  - Spring loaded pin is free in movement.

- Worn out tip.
- If spring loaded pin is sticky.

- Jet needle no wear at taper portion.

- Needle worn out at taper portion.

- Piston valve
  - No wear mark.

- Piston valve worn out. Scoring marks.

Overhaul carburettor at every 10,000 kms. and insepct the parts.

Notes

Key Learning Points

- Understanding of Carburettor & its Specifications
- SOP - Engine Tuning Procedure
- Understanding of working & function of LPG System

CHAPTER 5

Fuel System - LPG

Carburettor Specifications

SOP Engine idle rpm setting & tuning procedure

LPG System - Working Principle

Carburettor Specifications

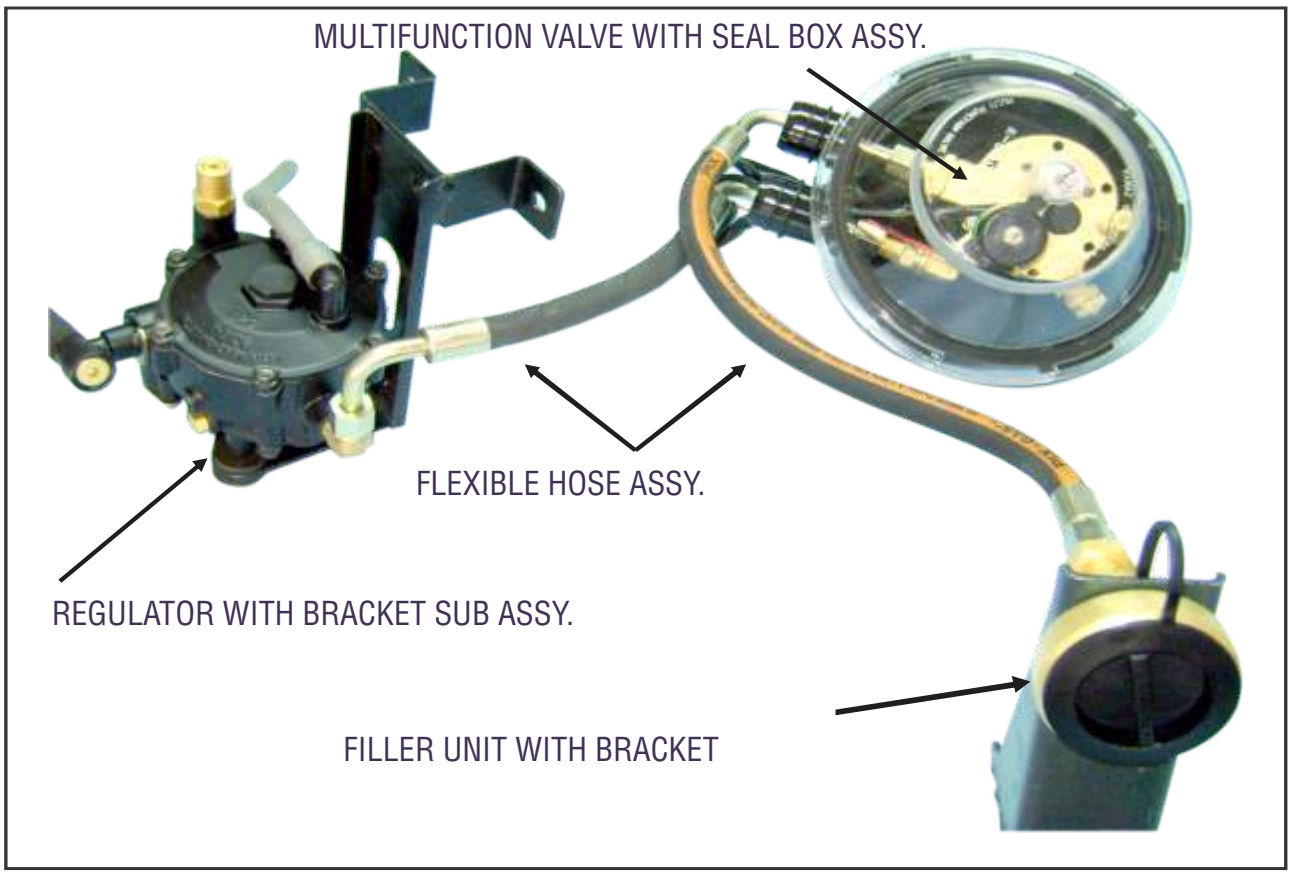
Make	UCAL
Type	UVD 22
Idling speed	1250 ~ 1400 rpm
VC Screw setting	2.5 Turns Out (Avg. for ref.)
Main Jet	67.5
Jet needle length	50.3
Jet needle marking	T-UFSC9337-2
Pilot jet	12.5
Float height	14.4 mm

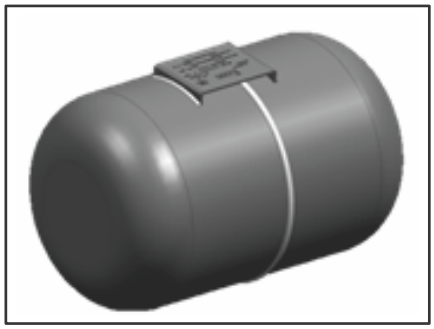
SOP Engine idle RPM Setting & Tuning Procedure

Sr	Activity		Method / Procedure	Instrument	RE Compact LPG 4S
1	Petrol Mode Idle setting cum throttle position fixing for gas mode operation. To be ensured and adjusted if required, at PDI and defined service intervals.	1	Warm up the engine at specified speed.	Ch. Dynamometer or Plain Road	3 ~ 4 km at < 40 kmph
		2	Set idle speed with the help of idle screw on the carburettor. Open out to reduce the speed.	Pulse Engine Tachometer	1550 ± 200 rpm
		3	Set idle CO with the help of Volume control screw on the carburettor. (Open out to increase CO).Check AFR.	CO Machine with AFR Indication	CO - 1.50% ±0.75% AFR - 13.5 ±0.5
		4	Ensure that all electrical loads (lighting and wiper motor if fitted), are switched off while setting.		VCS Turns Out - 2.5 Ave for reference.
2	Gas Mode Power Setting. To be ensured and adjusted if required, at PDI and defined service intervals.	1	CNG - Ensure cylinder pressure while setting & checking. LPG - Ensure quantity of gas in the cylinder before setting. It is important to complete the setting within 15 kms maximun running after the gas filling. If running exceedes, refill 1 lit gas before setting.	Visual	3 ~ 4 litres minimum.
		2	With fuel selection switch in neutral mode, run the vehicle at specified speed with throttle <50%, till petrol in the carburettor bowl is completely exhausted. Choke may be used to consume the petrol faster.	Chassis Dynamometer	Dynamometer 'N Constant' Mode. Speed : 45 km/h
		3	Switch over to Gas mode and continue running the vehicle with Full Throttle.	---	--
		4	Set CO with the help of power screw on gas regulator. (Open out to increase CO).Check AFR.	CO Machine	1.0 % ± 0.50% AFR -15 ± 1
			If Chassis dynamometer is not available, follow procedure as below---		
		5	Consume petrol as above Sr.2 & switch over to gas mode by running on plain road.	---	---
		6	Preset gas power screw to approximate turns out from full closed position.		3.25
		7	Allow the engine to idle. Do preliminary gas mode idling adjustments with idle screw if required.	Pulse Engine Tachometer	1050 ± 100 rpm Idle Screw depth - Ave 5.25 mm
		8	Turn the power screw to such an extent that engine does not rev vp in neutral, above specified speed even with wot.	Pulse Engine Tachometer	6000 rpm
		9	Gradually turn out power screw, counterclockwise, to the minimum outward position at which engine attains target speed with wot. (Ensure that the engine is not reved up to wot continuously. Power screw is expected to be taken out in small steps & check engine speed for short duration of < 5 sec.)	Pulse Engine Tachometer	7000 rpm
		10	Take out power screw further to the specified value.	---	3/4 Turn
		11	Confirm drivability at all throttle/speed/gear conditions and adjust the power screw further if required.	---	---
		12	This method can ensure setting close to the specifications. However use of chassis dynamometer & CO analyzer is recommended for precision.	---	---
3	Gas Mode Idle Setting. To be done on engines on which 'throttle position fixing & Power setting' is done	1	Allow the engine to idle in warmed up stage.	---	---
		2	Rev up the engine with flick of throttle for 2~3 times.	Pulse Engine Tachometer	3000 rpm
		3	**For vehicles fitted with limphome carburetor.** Set idle CO, AFR and speed only with the help of idle screw on the gas regulator. (Open out to increase CO). **For monofuel vehicles fitted with Throttle Body** Set idle CO, AFR and speed with the help of idle screw on the gas regulator and throttle body . (Gas idle screw - Open out to increase CO). (Throttle body idle screw - Push in to increase speed).	CO Machine Pulse engine tachometer	CO - < 0.5 % AFR - 18.0 ± 2.5 Speed - 1300 ± 150 rpm
		4	Repeat stage 2 and confirm the repeatability of idle speed.	--	--
		5	Ensure that all electrical loads (lighting and wiper motor if fitted), are switched off while setting.		--

Working Principle

Auto LPG Container





20.6 Liters Tank

Function

Auto LPG Container (tank) is used to store LPG at a pressure of 10 bar.

Construction

Fabricated by sheet metal with different welding joints.

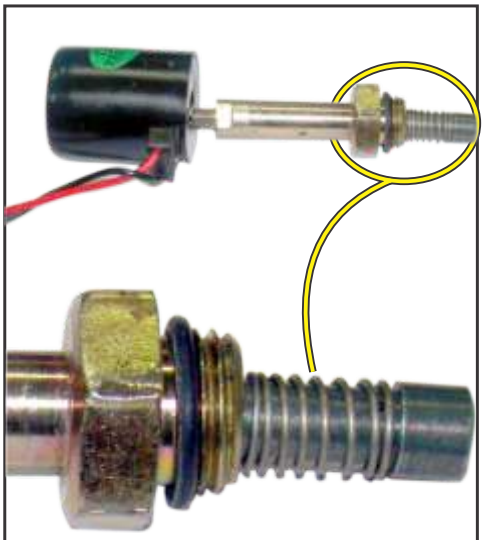
Working

Auto LPG container is mounted 0^{0} to the horizontal plane at rear side below passenger seat. Particular attention has to be paid to the fact that the tank must not be filled up to 100% with liquid LPG. The LPG container has capacity of 20.6 liters of water (16.5 liters of LPG when filled 80%).The reserve capacity of LPG tank is 5~6 liter.

Working Principle

Multi Function Valve

Solenoid Valve



Plunger

Function
Solenoid valve is provided to switch OFF / ON the gas flow from LPG tank to LPR assembly when ignition switch is operated.

Working
Solenoid valve is connected to solenoid circuit. When ignition is ON, current reaches to the coils and magnetizes it. This in turn pull the plunger up, hence opening the gas passage. From solenoid valve gas reaches to LPR through a small hole.

Notes

Key Learning Points

- Understanding of Carburettor & its Specifications
- SOP - Engine Tuning Procedure
- Understanding of working & function of CNG System

CHAPTER 6

Fuel System - CNG

Carburettor Specifications

SOP Engine idle rpm setting & tuning procedure

CNG System - Working Principle

Carburettor Specifications

Item	Specification
Make	UCAL
Type	UVD 22
Idling speed	1250 ~ 1400 rpm
VC Screw setting	2.5 Turns Out (Avg. for ref.)
Main Jet	77.5
Jet needle length	52.5
Jet needle marking	T-UFSC9337-2
Pilot jet	12.5
Float height	14.4 mm

SOP Engine idle RPM Setting & Tuning Procedure

Sr	Activity		Method / Procedure	Instrument	RE Compact CNG 4S
1	Petrol Mode Idle setting cum throttle position fixing for gas mode operation. To be ensured and adjusted if required, at PDI and defined service intervals.	1	Warm up the engine at specified speed.	Ch. Dynamometer or Plain Road	3 ~ 4 km at 40 kmph
		2	Set idle speed with the help of idle screw on the carburettor. Open out to reduce the speed.	Pulse Engine Tachometer	1500 ± 200 rpm
		3	Set idle CO with the help of Volume control screw on the carburettor. (Open out to increase CO).Check AFR.	CO Machine with AFR indication	CO - 1.50% ±0.75% AFR - 13.5 ±0.75 VCS Turns Out - 2.5 Ave for reference.
		4	Ensure that all electrical loads (lighting and wiper motor if fitted), are switched off while setting.		
2	Gas Mode Power Setting. To be ensured and adjusted if required, at PDI and defined service intervals.	1	CNG - Ensure cylinder pressure while setting & checking. LPG - Ensure quantity of gas in the cylinder before setting. It is important to complete the setting within 15 kms maximun running after the gas filling. If running exceedes, refill 1 lit gas before setting.	Visual	100 ± 30 bar, Recommended.
		2	With fuel selection switch in neutral mode, run the vehicle at specified speed with throttle <50%, till petrol in the carburettor bowl is completely exhausted. Choke may be used to consume the petrol faster.	Chassis Dynamometer	Dynamometer 'N Constant' Mode. Speed : 40 km/h
		3	Switch over to Gas mode and continue running the vehicle with Full Throttle.	---	--
		4	Set CO with the help of power screw on gas regulator. (Open out to increase CO).Check AFR.	CO Machine	1.25 % ± 0.35% AFR -16 ± 1
			If Chassis dynamometer is not available, follow procedure as below---		
		5	Consume petrol as above Sr.2 & switch over to gas mode by running on plain road.	---	---
		6	Preset gas power screw to approximate turns out from full closed position.		5.5
		7	Allow the engine to idle. Do preliminary gas mode idling adjustments with idle screw if required.	Pulse Engine Tachometer	1050 ± 100 rpm Idle Screw depth - Ave 6.5 mm
		8	Turn the power screw to such an extent that engine does not rev vp in neutral, above specified speed even with wot.	Pulse Engine Tachometer	6000 rpm
		9	Gradually turn out power screw, counterclockwise, to the minimum outward position at which engine attains target speed with wot. (Ensure that the engine is not reved up to wot continuously. Power screw is expected to be taken out in small steps & check engine speed for short duration of < 5 sec.)	Pulse Engine Tachometer	6800 rpm
		10	Take out power screw further to the specified value.	---	1 1/4 Turns
		11	Confirm drivability at all throttle/speed/gear conditions and adjust the power screw further if required.	---	---
		12	This method can ensure setting close to the specifications. However use of chassis dynamometer & CO analyzer is recommended for precision.	---	---
3	Gas Mode Idle Setting. To be done on engines on which 'throttle position fixing & Power setting' is done	1	Allow the engine to idle in warmed up stage.	---	---
		2	Rev up the engine with flick of throttle for 2~3 times.	Pulse Engine Tachometer	3000 rpm
		3	**For vehicles fitted with limphome carburetor.** Set idle CO, AFR and speed only with the help of idle screw on the gas regulator. (Open out to increase CO). **For monofuel vehicles fitted with Throttle Body** Set idle CO, AFR and speed with the help of idle screw on the gas regulator and throttle body . (Gas idle screw - Open out to increase CO). (Throttle body idle screw - Push in to increase speed).	CO Machine Pulse engine tachometer	CO - < 0.3 % AFR - 21 ± 3 Speed - 1250 ± 150 rpm
		4	Repeat stage 2 and confirm the repeatability of idle speed.	--	--
		5	Ensure that all electrical loads (lighting and wiper motor if fitted), are switched off while setting.		--

Working Principle

Multi Function Valve

CNG Cylinder

Manual Shut Off Valve

Function

Gas Cylinder

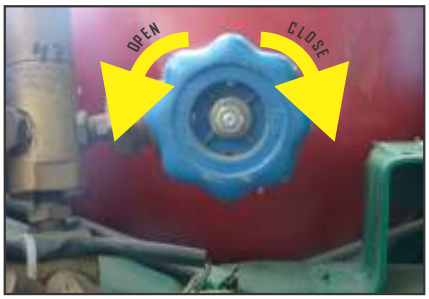
- CNG Cylinder is used to store CNG at a high pressure (Upto 260 bar) Shut off Valve is also called emergency valve. This valve has to be closed manually in case of any leakages in gas lines. This is also advised to close this valve when vehicle is parked at a place for long duration e.g. in nights.

Construction

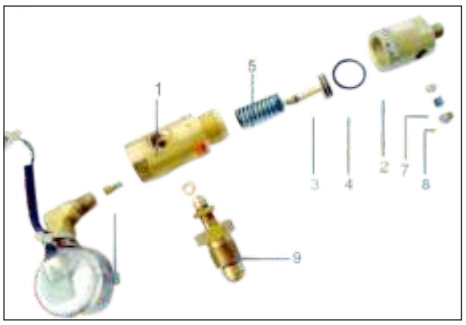
- Fabricating steel in single mould without any welding joints makes CNG Cylinder. This is done as cylinder has to withstand high pressures of as high upto 335 bar. Manual shut off valve is fitted on the supply passage of cylinder and works like a tap. Manual shut off valve also contains a burst disc which ruptures when pressure in the cylinder reaches to unsafe level. It also contains a fusible plug, which melts down and releases the gas when temperature reaches beyond 100^{0}C.

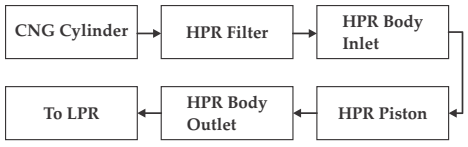
Working

- To close the gas flow manual shut off valve cock should be fully screwed in. This closes the cylinder supply passage gas flow stops. To open gas flow manual shut off valve cock should be fully unscrewed. This open the cylinder supply passage and gas flow starts. Closed & Open Position of shut off Valve



Working Principle





Function

- Filler unit is used while filling the gas in cylinder. Pressure gauge indicates the available gas pressure in cylinder at any point of time. High pressure regulator reduces CNG pressure from 200 bar to 1 bar approximately.

Construction

- Filler unit consists of a filler valve and dust plug. Dust plug has two “O” rings to prevent any gas leakages. A micro switch is also provided on the filler which is connected with the engine starting circuit. Pressure gauge consists of a dial and needle. Dial is connected to gas level indicator at dashboard, which indicates the quantity of gas to driver.

High Pressure Regulator (HPR)

- Body Inlet
- Body Outlet
- Piston Assly
- ‘O’ Rings
- Main Spring
- Filter
- Pressure Relief Valve
- Pressure Relief Valve Spring

Working

- Gas enters into body inlet though the inlet side at a high pressure. Gas flows through the small holes on piston tube and enters inside tube which is connected to lower chamber of piston. The main spring continuously apply a pressure on the gas available in the lower chamber. Since the size of lower chamber is more then the piston tube orifice, gas pressure comes down to appx 10 bar, which is then delivered through he outlet. If the pressure in the outlet body reaches more than 15 bar, pressure relief valve is activated which releases excess pressure & delivery of pressure is maintained at 10 bar approx.

Working Principle

Function

- CNG filter receives CNG from HPR filter any dust or impurities in CNG & delivers clean CNG to solenoid valve. Solenoid valve acts as open shut door. When valve is open CNG flows to Low Pressure Regulator (LPR) and when valve is closed CNG flow stops.

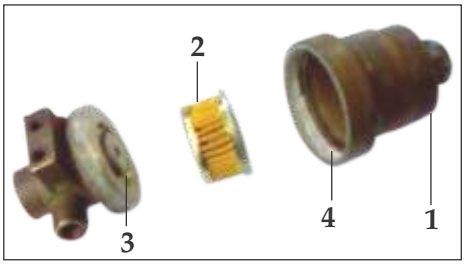
Construction

Filter assembly consists of following parts

- Filter Housing
- Filter
- 'O' Ring Small
- 'O' Ring Big

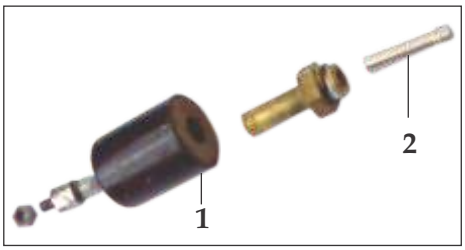
Solenoid assembly consists of following parts

- Solenoid Coil
- Solenoid Plunger
- Assembly

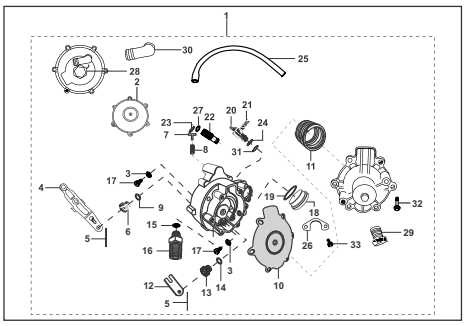


Working

Solenoid valve is connected to solenoid circuit. When ignition is on current reaches to the coils which magnetize the coil. This in turn pull the plunger back, hence opening the gas passage. From solenoid valve gas reaches to filter bowl through a small hole, passes through the nylon strainer and reaches to the inner side of filter. Gas passes through the paper filter and comes to the outer side of filter after filtrations. From there it is delivered to LPR stage 1.



Working Principle



Function

- LPR stage 1 reduces CNG pressure from 10 bar to 0.3 bar. This is also called primary reduction.

Working

- Gas enters through orifice of the primary chamber. Since, size of the orifice is less than compared to primary chamber, gas expands hence reduce the pressure to 0.3 bar appx. When more gas fills up in primary chamber diaphragm lifts up. Diaphragm is connected with front end of primary lever, hence front end of the lever also lifts up. Due to the leverage action rear end of the lever which has a rubber valve, comes down and at one point of time closes the orifice. The gas flow stops. This process is repeated in each suction stroke of the engine.

Notes

CHAPTER 7

Engine & Transmission

Lubrication System

SOP of Engine Dismantling

SOP of Engine Assembling

Service Limits - Engine

Tightening Torques - Engine

Lubrication System :

LUBRICATION

Basic function of lubricating oil is to provide lubrication in between the running parts, by forming an oil film between two parts.

Beside lubrication, lubricating oil also has some other important functions, which are described below:

CLEANING

Engine produce contaminants like varnish & lacquers. Detergents are mixed in lubricating oil to clean away high temperature deposits like carbon etc.

Dispersants are mixed in lubricating oil, which keep insoluble suspended in oil.

PROTECTION

Oil provides a durable film protecting metal parts from water and acids formed during combustion process.

COOLING

Oil is circulated through out the engine, which takes away substantial amount of heat from engine. Due to this oil becomes hot and it's viscosity goes down. Hence, it is required that oil must be cooled to make it re usable again and give optimum performance. Oil cooler cools down the oil and engine can be operated for longer periods continuously.

SEALING

To prevent blow by or loss of compression, oil acts as secondary sealant.

DESCRIPTION OF LEADING COMPONENTS IN LUBRICATION SYSTEM

Oil Strainer :

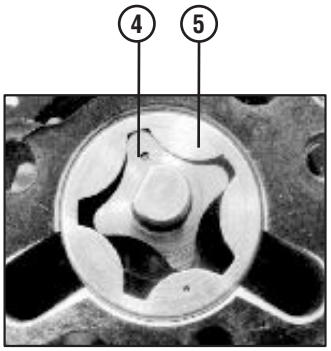
Oil strainer filters the course impurities from engine oil. It has to be cleaned at every 5000 kms.

Note : Take care of "O" ring while fitting oil strainer.

Oil pump

Instructions while assembly of this pump.

- Pump should be thoroughly cleaned and then assembled properly in a very clean area.
- It should be checked that inner and outer rotors (4 and 5) of the pump are rotating freely.
- There are three mounting screws. Top two screws are small in thread length i.e. 18 mm. should be mounted at top and the bottom screw is long in thread length i.e. 30 mm is mounted along with a locating dowel pin.



Care is to be taken that in case this long screw is placed in a wrong place then there are chances of crankshaft getting jam.

- There are two 'O' rings to be mounted on right crankcase, behind the oil pump. While assembly these 'O' rings should be checked for its perfect placement.

Lubrication System :

Oil Filter

Paper type oil filer is provided for filtering fine impurities present in oil. This filter should be replaced 10000 kms.

Note : Take care of 'O" ring, and do not over tighten the engine oil filter.

Oil Cooler

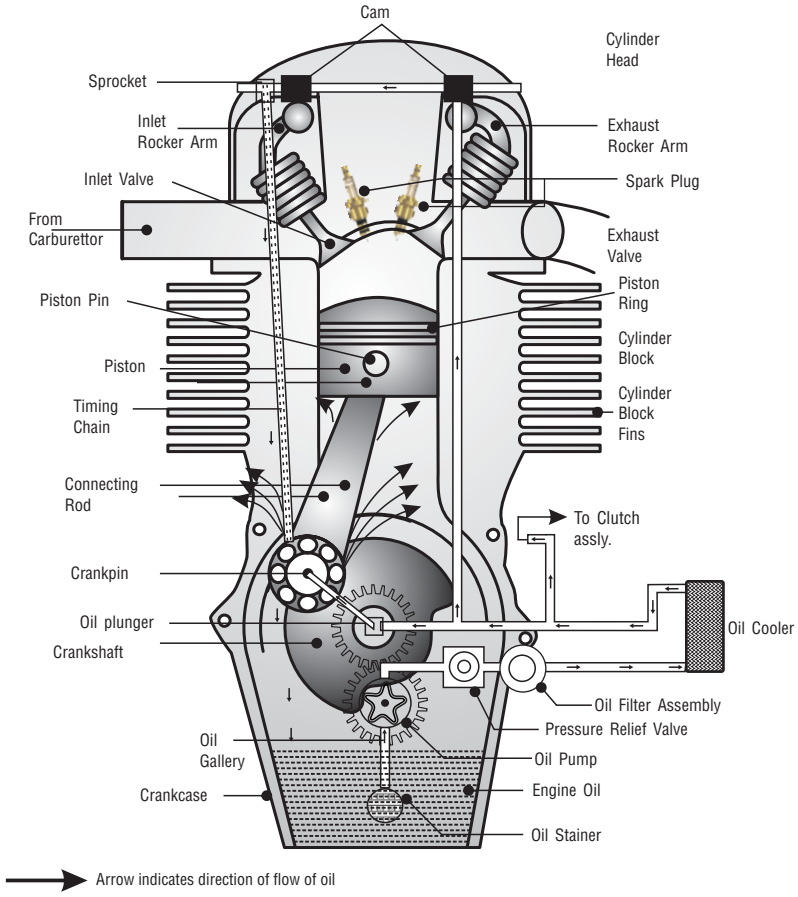
Oil cooler is made up of aluminum alloy and has 7 tubes. It also has aluminum fins throughout the length of tubes. Fins increase the surface area, which in turn help in better heat dissipation. Oil cooler is painted black in colour for better heat radiation.

Oil cooler is fitted in front of fan, which draws fresh air through oil cooler. Hence oil gets cooled efficiently than the conventional system.

Do's and Dont's of Oil Cooler

1. Hold oil cooler at it's frame and not on the cooling area.
2. Always straighten the fins with a blade if found bent.
3. External cleaning of oil cooler should be done with low air pressure or with water at low pressure. Do not forget to check and correct fins.
4. Check all mounting fasteners of oil cooler.

Lubrication System



SOP of Engine Dismantling

Removal of oil Cooler

Remove

- Oil cooler pipes from oil cooler ends.
  Using tool : 8mm 'T' spanner

Remove

- Banjo bolt from oil filter housing with two copper washers.
  Using tool : 15mm ring spanner

Remove

- Connector with four copper washers from clutch cover assembly.
  Using tool : 17mm open end spanner

Remove

- 2 bolts holding front bracket oil cooler
- Rear bracket
- Take out oil cooler and rear bracket.
  Using tool : 8mm 'T' spanner

Notes :

SOP of Engine Dismantling

Removal of Cowlings

Remove

- 2 bolts from fan cover top side
- 2 bolts from clutch side
- 2 central bolts from intake & exhaust side

Using tool : 8mm & 10mm ''T' spanner

Remove

- 2 nos. lug take out cowling carefully from either side

Dismantling Cylinder head side

Remove

- Cylinder head top cover

Using tool : 8mm 'T'spanner

Remove

- Both spark plug from cylinder head
- Grub screw (2.5mm)
- Sleeve spark plug

Using Sp. tool : Box spanner

Using tool : 2.5mm allen key

Loosen

- Center bolt of cam chain tensioner
- Retract the cam chain tensioner by tightening the adjusting screw

Remove

- Cam chain tensioner bolts

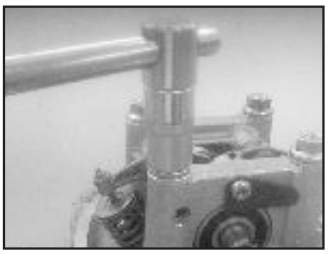
Using tool : 8mm T spanner, small screw driver

- Rotate magneto assembly and ensure that the piston is at TDC and lines on camshaft sprocket are parallel with cylinder head. So both the rocker arms are free.

SOP of Engine Dismantling

Remove
- Special bolt from sprocket
- Sprocket while holding the chain with suitable wire or rope.
- Spacer

Using tool : 10mm ''T' spanner

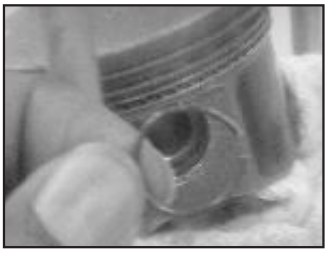


Remove
- 2 bolts (8mm) first
- 4 nuts (14mm) from cylinder head in criss-cross pattern

Using tool : 8mm ''T' spanner, 14mm box spanner respectively

- Pull out cylinder head assembly by holding the chain with a rope.

Remove
- Head gasket
- Guide chain from non-tension side
- Dowel pin (2 nos.)
- Pull out cylinder block assembly
- Block gasket.



Remove
- 2 snap rings from piston.

Note : Cover the crankcase bore using a lint free cloth.

- Tap out piston pin with the help of piston pin drift and remove piston.

Using Sp. tool : Piston pin drift

SOP of Engine Dismantling

Dismantling Rotor Side

Remove

- Fan from rotor side by removing 3 bolts.
  Using tool : 8mm ''T' spanner

Remove

- Rotor cowling by removing 2 bolts.
  Using tool : 8mm 'T' spanner

Remove

- Starter motor rear bracket by removing 1 bolt on starter motor and 1 bolt on crankcase.

Using tool : 8mm T spanner and 12 mm ring spanner respectively

Remove

- Starter motor with bendix drive by removing 3 bolts.

Using tool : 10mm T spanner

Remove

- Split pin and washer from kick shaft.

SOP of Engine Dismantling

Remove

- Rotor nut with special washer by holding it with rotor holder.

Using Sp. tool : Rotor Holder (37-1030-54)

- Pull out rotor with the help of magneto puller and carefully collect woodruff key.

Using Sp. Tool : Magnet Puller (37-10AB-24)

Remove

- Stator plate wiring harness lock plate by removing 1 bolt.

Remove

- Stator plate by removing 3 mounting allen screws.

Using tool :Allen key

- Then remove pick up coil by removing 2 mounting allen screws. Take out stator plate assembly with pick up coil and wiring.

Using tool :Allen key

<u>Dismantling Clutch Cover Side</u>

Remove

- Oil filter with Sp.tool

Using tool : 8mm 'T' spanner

SOP of Engine Dismantling

Remove
- Oil strainer cap and take out strainer.

Using tool : 22mm ring spanner

Remove
- Clutch cover by removing 12 bolts on clutch cover
- Gasket

Using tool : 8mm T spanner

Remove
- Oil plunger and spring from crankshaft.

- Tap out gear shifter pin and pull out sector from gear shifting lever.

Using tool : Straight probe and hammer

Remove
- Plain washer
- Gear shifter housing with oil seal by removing 2 Allen screws with Plain and spring washer

Using tool : 5mm Allen key

- Take out gear shifting lever and gasket along with the plain washer.

SOP of Engine Dismantling

Remove
- Bearing & bush from clutch
- 6 bolts from clutch.

Using tool : 8mm T spanner

Remove
- Spring retainer plate
- 6 nos springs

- Hold the clutch wheel with the help of clutch holder

Loosen
- Clutch nut.

Using Sp. tool : Clutch Holder (37-10AB-25)
Using tool : 21mm socket and T handle

- Pull out Clutch assembly, steel bush and plain washer.

- Hold crankshaft primary gear with primary gear holder

Loosen
- Crankshaft nut.

Using Sp. tool : Primary gear holder (37-10AB-16)
Using tool : 21mm socket and T handle / Ring spanner

Remove
- Needle pin from crankshaft.
- Take out oil pump driving gear from crankshaft.

SOP of Engine Dismantling

Remove
- 2 short Philip head screws
- 1 long Philip head screw from oil pump.
- Take out oil pump assembly.

Using tool : Philip head screw driver

Remove
- Crankshaft primary gear
- Collect 2 woodruff keys.

Remove
- Pull out chain tensioner pin
- Chain guide from tension side

<u>Separating Crankcase Halves</u>

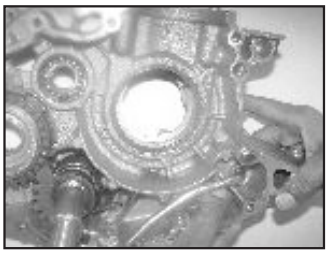
Remove
- Crankcase-joining bolts
- 3 bolts from clutch side
- 8 bolts from magneto side

Using tool : 8mm T spanner

- Separate both crankcase halves tapping lightly

Remove
- Gasket.

Using tool : Plastic hammer



Remove
- Crankshaft carefully

SOP of Engine Dismantling

- Pull out multiple gear shaft assembly and cluster gear assembly with plain washer.

Remove
- Plastic thrust washer from main shaft
- Pull out main shaft assembly by aligning cut given on counter shaft with main shaft gear

Precaution : In case main shaft is removed, it can be assembled back only by removing fare meter drive unit.

Remove
- Dumper rubber

<u>Dismantling Differential Side</u>

Remove
- Reverse lever spring.

Remove
- Bolts from fare meter drive unit
- Fare meter assembly.

  Using tool : 8mm T spanner

Remove
- 8 bolts
- 1 nut in differential cover

Using tool : 8mm T spanner, 10mm ring spanner

SOP of Engine Dismantling

Remove
- Hallow dowel pin

Remove
- Reverse control gear

Remove
- Hard washer
- Intermediate spline shaft

Remove
- Reverse gear
- Reverse idler gear with plain washers

Remove
- Differential assembly.

SOP of Engine Dismantling

Crankcase Clutch Side Dismantling

Remove

- 1 Philip head screw with stopper plate
- Take out ratchet gear.

Using tool : Philip Head Screw Driver

Remove

- 1 Philip head screw on clamp provided for oil condensation pipe
- Pipe with sealing ring.

Using tool : Philip Head Screw Driver

Notes :

SOP of Engine Dismantling

Cylinder Head Dismantling

Remove

- Stopper plate by removing screw

Using tool : Philip Head Screw Driver

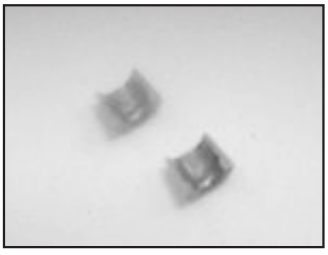
- Take out inlet and exhaust rocker arm shafts by using a bolt.

Note : Inlet rocker arm shaft is longer than the exhaust.

- Take out both rocker arms

- Take out camshaft

- Using valve spring compressor and adaptor Sp. tool press down the valve spring retainer



Remove

- Collets & keep it carefully

SOP of Engine Dismantling

Loosen

- Valve spring compressor and take out valve spring retainer, valve Spring and spring seat

- Push out valve one by one
- Similarly remove the other valve

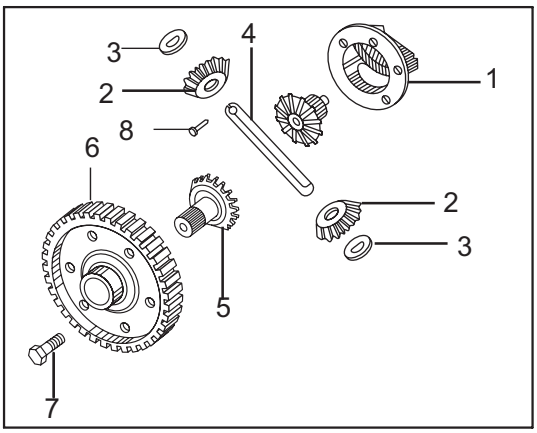
Notes :

SOP of Engine Assembling

Assembly Of Differential

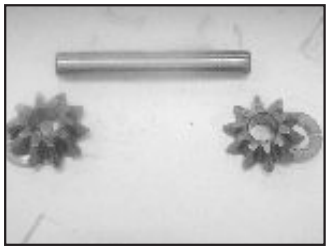
Exploded View:

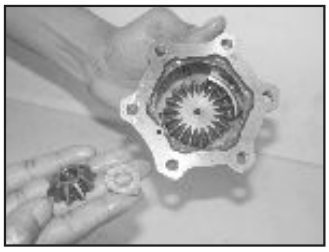
1. Satellite Gear housing.
2. Satellite Gear
3. Spacer
4. Pin Bevel Gear



5. Bevel Gear
6. Differential Gear.
7. Flange Bolt.
8. Pin

- Fix the Bevel Gear into the satellite Gear Housing.

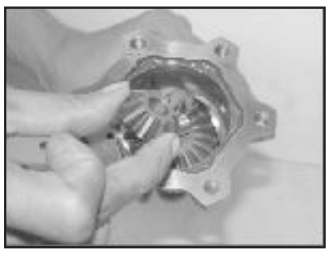


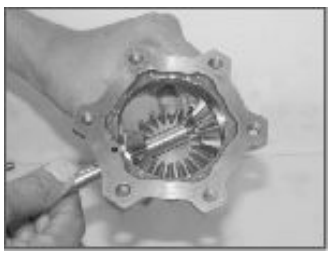


- Match the Spacer and Satellite Gear on one side of Satellite Gear Housing.
- Slide the Pin from one end of Satellite Gear Assembly.

- Similarly fix the other Satellite Gear & Spacer.

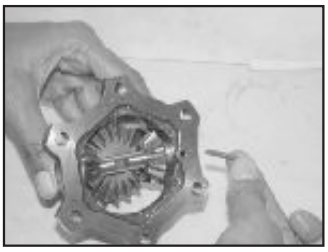
NOTE: The Curvature on the spacer will match the Satellite Gear Housing Inner Diameter.



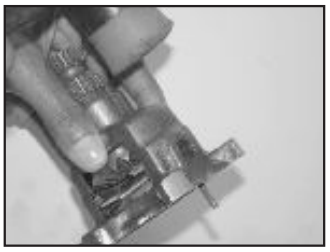


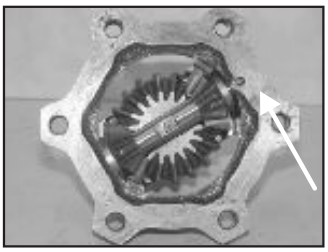
- Assembly the Pin and match the Lock Pin Guide with respect to Satellite Gear groove.
- If required Tap the same for correct alignment.

SOP of Engine Assembling



- Fix the Lock Pin





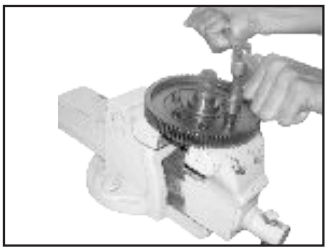
- Check and ensure for correct fitment on the Satellite Gear Housing Flat Surface.
- Fit the another Bevel Gear on Differential Gear.

- Align and assemble the complete Satellite Gear Assembly on the Differential Gear.

- Fix 6 nos. of Pre-coated Bolts along with on the differential gear.
- Tighten the 6 Bolts to specified torque.

NOTE:

- Alternatively use loctite for thread locking.
- Take Assistance from team member to hold the differential gear.



- Fix the complete assembly on a Bench vice and tighten the bolts at specified torque.

- Check for the free Rotation of the Satellite Gears along with the complete assembly.

SOP of Engine Assembling

Dismantling Of Main Shaft Assembly

Remove

- The cup gear shifters

Remove

- The 2 nos. ball & spring set

Remove

- Circlip from main shaft first gear side
- Tongue washer

Remove

- 1st gear
- 2nd gear
- 3rd gear and
- 4th gear one by one

- Straighten the lock washer provided at gear shifting stem.

Loosen and Remove

- Stem.

Note : Please note that the cross and stem have LH threads.

Remove

- Cross by rotating it and aligning it in the Plane of main shaft slot.

SOP of Engine Assembling

Assembly Of Main Shaft

Fit

- The circlip in the groove on shaft side.
- Shoulder washer.

Note : Shoulder washer are available in five differential size

- Put the cross through the slot at the relieve portion, rotate and locate in 4 slots. Ensure that the profile portion of the cross is towards hole for guide bush.

MAIN SHAFT SUB - ASSEMBLY

Fit

- The guide bush ensuring the groove for guiding cross profile is towards cross and they match while fitting.

- Insert the stem along with washer and fix the stem in threading of cross. Please

Note : The cross and stem have LH threads.

- Tighten the stem with suitable spanner by holding the guide bush. Lock the same by bending the washer against the relieve provided on stem and guide bush.

Note : The guide steam is having the LH thread

Fit

- The 4th speed gear on main shaft through stem side. Ensure that the flat portion around the ID of the gear is towards circlip side.
- The 3rd speed gear ensuring that the markings on forging and identification mark is facing towards 2nd speed gear.

SOP of Engine Assembling

Fit
- 2nd speed gear ensuring the markings are towards 1st speed gear.
- The 1st speed gear ensuring that the flat portion around the ID of the gear is Towards stem side.

Fit
- The shoulder washer of required thickness depending on the clearance between gear face and circlip. Specified clearance - 0.15 - 0.40mm
- Circlip.

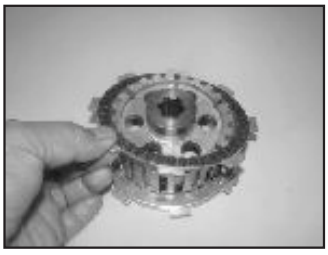
Assembly Of Clutch
- There are thee major parts

(A) Clutch housing
(B) Clutch Wheel
(C) Clutch hub

Fit
- Plain washers & anti judder spring into clutch hub
- Anti judder washers & spring and the Clutch plate within larger inner diameter.
- Clutch plate on clutch hub
- Steel plate taking core of edge profile

Note : Profile of all steel plates should be in same direction.

Fit
- Other clutch plates and steel plates alternately one by one or clutch hub.



- Keep lugs of 6 plates in one direction and Bottom clutch plate in alternate position.

Fit
- Clutch wheel.

SOP of Engine Assembling

Fit

- Clutch housing.

- Clutch is ready for fitment on engine.

Assembling Differential Side

- Assemble reverse idler gear along with thrust washer

- Assemble differential assembly onto the crankcase rotor side.

- Insert main shaft assembly from crankshaft side and at the same time insert from differential side.

- Insert the inter mediate spline shaft

SOP of Engine Assembling

Fit
- 2 dowels
- Differential cover gasket

- Insert the hard washer
- Insert the reverse control gear

- Insert the dowel pin
- Ensure the reverse gear control lever dog is properly seated in the slot

Fit
- Differential cover.
- Apply loctite on 8 nos flange bolts and tighten to the torque as per specified torque. Also tighten one no nut on the Stud.

Using Tool : 8mm T spanner and 10mm ring spanner, Torque Wrench, 8mm socket, 10 mm socket

Fit
- Fare meter drive with 8mm bolt

Using Tool : 8mm T spanner

Fit
- Back reverse lever return spring.

SOP of Engine Assembling

Assembling Crankcase Halves

- Insert the damper rubber
- Insert the multiple gear shaft

- Insert crankshaft assembly into position. Tap with plastic hammer if required.

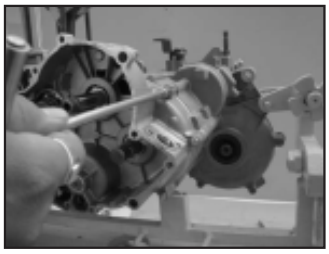
Fit

- Plastic washer on main shaft front end
- Gasket
- Take care of 4 dowels

Fit

- Kick shaft assembly with hardened washer onto crankcase Clutch side.

- Insert 2 nos. hallow dowel pin
- Assemble both the crankcases in Position by slightly tapping and shaking.



Fit

- All crankcase-joining bolts
- 3 bolts from clutch side
- 8 bolts from magneto side
- Torque tighten to specified torque.

Using Tool : 8mm T spanner, Torque Wrench, 8mm socket

SOP of Engine Assembling

Assembling Clutch Cover Side

- Insert timing chain
- Hold the chain with the help of suitable wire or rope.

Note: Chain should never be allowed to fail. Hence, care is required to hold the chain with rope or wire.

- Insert the cam chain guide tensioner with the lock pin

Fit

- 2 Woodruff keys on crankshaft
- Insert crankshaft primary gear keeping the projected boss Outside.

Fit

- 2 nos. 'O' rings for oil pump
- 1 dowel on bottom hole
- 1 dowel on upper hole

Fit

- Oil pump with the help of 3 phillips head screws (2 short & 1 long)
- Long screw would go in dowel hole

Using Tool : Phillips head screw driver

Fit

- Oil pump driving gear on crankshaft along with one woodruff key

SOP of Engine Assembling

- Insert cross pin on crankshaft and fit crankshaft nut.

- Hold primary gear with the help of primary gear holder and tighten the nut to specified torque.

Using Tool : 21 mm socket and Torque Wrench
Using Special Tool : Primary Gear Holder (37-10AB-16)

Fit
- Hardened washer,
- Steel bush
- Clutch assembly on countershaft
- Clutch nut

- Hold the clutch with the help of clutch holder and tighten clutch nut to specified torque.

Using Tool : 21mm socket and Torque Wrench
Using Special Tool : Clutch Holder (37-10AB-25)

Fit
- 6 clutch springs in position
- Spring retainer plate
- 6 screws
- Tighten screws.

Using Tool : 8 mm T spanner

Fit
- Gear shifter gasket in position
- Insert gear shifting lever from bottom housing with oil seal from top ensuring that the lever dog goes inside the slot in stem
- Insert the gear shifter with the correct washer

SOP of Engine Assembling

Fit
- 2 Allen screws and tighten.

Using Tool : 5mm Allen Key

Fit
- Plain washer and assemble sector on gear shifting lever with the help of pin.

Note : Apply grease on the tip of the neutral switch & selector plate profile

Fit
- Push rod on clutch assembly
- Spring
- Plunger on crankshaft

Fit
- Clutch cover gasket
- Clutch cover taking care of 2 dowels
- Tighten 12 bolts to specified torque.

Using Tool : 8mm T spanner, Torque Wrench, 8mm socket

- Assemble oil supply pipe for clutch with the help of connector on one side and banjo bolt on other side with copper washers.

Fit
- Oil strainer with O ring
- Magnetic ring
- Back oil strained cap

SOP of Engine Assembling

Fit

- The screw on type oil filter

Assembling Rotor Side

Fit

- Stator plate assembly with 3 nos. Allen bolt
- Head screws
- Spring washers
- Plain washers
- Pick up coil with 2 nos. (4mm) allen bolt

Fit

- The lock plate
- 1 no. (8mm) bolt

Fit

- Woodruff key on crankshaft & assemble rotor on crankshaft.

Fit

- Special washer
- Rotor nut

- Hold rotor with the help of special rotor holder and tighten rotor nut to specified torque.
  Using Tool : Torque Wrench, 19mm Socket
  Using Special Tool : Rotor Holder (37-1030-54)

SOP of Engine Assembling

Fit

- Starter Motor with the help of 3 bolts and tighten to specified torque.

Using Tool : 10mm T spanner

Fit

- Starter motor rear bracket with the help of one bolt on starter motor and other on crankcase.

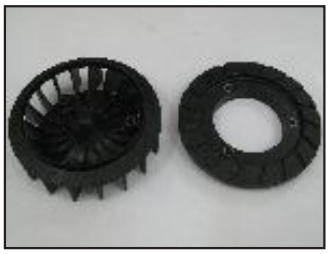
Using Tool : 8mm T spanner and 12mm ring spanner

Notes :

SOP of Engine Assembling

Fit
- Internal cowling component with 3 bolts

Using Tool : 8mm T spanner



Fit
- Fan with the help of 3 bolts
- 3 plain washers

Using Tool : 8mm T spanner

Fit
- Oil scrapper ring in 3rd groove of piston
- Oil rail in 3rd groove on top of oil scrapper ring making the joint look like the letter “M”. If fitted otherwise, there are chances of engine consuming oil
- Another oil scrapper ring in 3rd groove above oil rail
- 2nd compression ring in 2nd groove keeping the markings given on ring face on top side
- 1st compression ring in 1st groove keeping the markings given On ring face on top side.

Fit
- Piston assembly on connecting rod keeping “IN” mark etched on piston crown towards carburetor side. Use piston pin drift to guide piston pin.

Using Special Tool : Piston Pin Drift
- 2 snap rings

Stagger the rings as described below:
1. Keep open end of top ring towards silencer side.
2. Keep open end of 2nd ring towards carbureter side.
3. Keep oil rail “W” joint towards silencer side.
4. Keep oil scrapper rings at 30 deg to “W” joint of oil ring expander on both left & right side

SOP of Engine Assembling

Fit
- Cylinder block gasket
- Insert timing chain in chain pocket of cylinder block take out from top. Also ensure that guide chain is kept upright.

Fit
- Cylinder head gasket
- 2 nos. dowel pin
- Insert guide chain (non tension side) in position

- Insert cylinder head assembly by pulling the chain through Chain pocket area.

Fit
- 4 bolts tighten to specified torque

Note : Opposite side nuts should be tightened.
Using Tool : Torque Wrench, 13mm socket.

Fit
- 2 flange bolts on side of cylinder head and tighten to specified Torque.

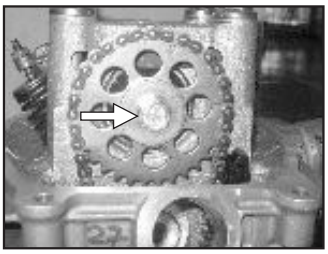
Using Tool : Torque Wrench, 10mm long socket.

Remove
- Wire or rope from timing chain and rotate rotor so that timing mark on rotor matches with the pointer provided on Crankcase.

SOP of Engine Assembling

- Insert the spacer on the camshaft

- Insert sprocket keeping the mark provided on sprocket towards top. Adjust chain without rotating the engine so that mark on sprocket matches with the mark given on cylinder head.



- Assemble sprocket in this position and tighten special bolt to specified torque.

Using Tool : Torque Wrench by holding the camshaft Holder

- Assemble the chain tensioner with 2 bolts and release the Screw

- Adjust tappet clearance with the help of special tool and feeler gauge as per specified limits.

Using Tool : Feeler Gauge

Using Sp. Tool : Valve adjusting screw holder (37 1031 53)

Fit

- The head cover with gasket and 4 bolts

Using Tool : 8mm T spanner

SOP of Engine Assembling

Fit
- The sleeve spark plug with 2nos. 'O' ring
- Tighten with the grub screw with allen key

Using tool : 2.5mm Allen key

Assembling Cowlings

Fit
- Fan cover with 3 bolts

Using tool : 8mm T spanner

Fit
- Cowling intake & exhaust by guiding the lug properly

Fit
- Cowling clutch side with the help of 6 bolts (4bolts - 8mm, 2bolts - 10mm)

Using Tools : 8mm T spanner

Assembling Oil Cooler

Fit
- Oil cooler front bracket with 3 bolts.

Using Tool : 8mm T spanner

Fit
- Oil cooler
- Oil cooler side bracket with 8mm long bolt mounted on crankcase

Using Tool : 8mm T spanner

SOP of Engine Assembling

Fit
- Oil pipe with dome nut
- 4 copper washers on clutch housing

Using Tool :17mm ring spanner

Fit
- Other oil pipe with banjo bolt
- 2 copper washers

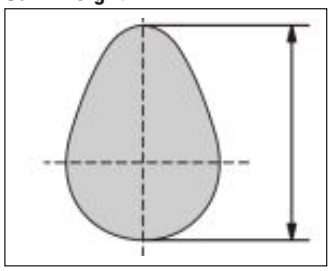
Using Tool : 15mm ring spanner

Notes :

Service Data : Engine

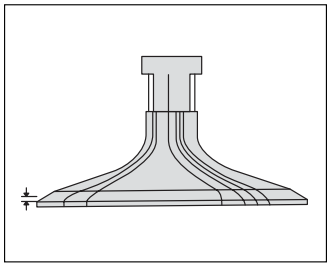
All dimensions are in mm.

Cam Height



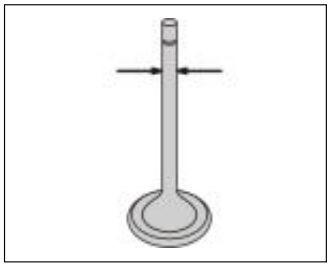
	Intake	Exhaust
Std.Limit	30.83~30.93	30.87~30.97
Ser.Limit	30.73	30.77

Valve Head Thickness



	Intake	Exhaust
Std.Limit	0.65~0.85	0.95~1.15
Ser.Limit	0.45	0.75

Valve Stem Diameter



	Intake	Exhaust
Std.Limit	5.495~5.510	5.480~5.495
Ser.Limit	5.480	5.465

Valve Spring Free Length

	Intake & Exhaust
Std.Limit	42.42
Ser.Limit	40.92

Friction Plate Thickness

Std. Limit	2.9 ~ 3.1
Ser. Limit	2.75

Steel Plate Warp

Std. Limit	0.1
Ser. Limit	0.2

Clutch Spring Free Length

Std. Limit	28.6
Ser. Limit	28.0

Valve Clearance

Std. Limit	0.05
Ser. Limit	0.10

Cylinder / Piston Clearance

Std. Limit	19 ~ 39 micron
Ser. Limit	—

Rocker Arm Inside Dia.

Std. Limit	10.000 ~ 10.015
Ser. Limit	—

Cylinder Bore

Std. Limit	63.500 ~ 63.508
Ser. Limit	63.6

Piston Diameter (from bottom : 9.5mm)

Std. Limit	63.469 ~ 63.481
Ser. Limit	63.444

Service Data : Engine

All dimensions are in mm.

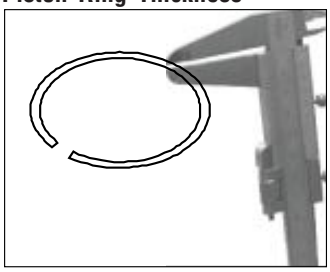
Compression Pressure

Std. Limit	13 ~ 14 kg/cm^2
Ser. Limit	10.5 kg/cm^2

Piston Ring End Gap

	Top Ring	2nd Ring	Oil
Std.Limit	0.20~0.35	0.30~0.50	0.20~0.7
Ser.Limit	0.60	0.75	—

Piston Ring Thickness



	Top Ring	2nd Ring	Oil
Std.Limit	0.97~0.99	0.970~0.995	1.870~1.970
Ser.Limit	0.90	0.90	—

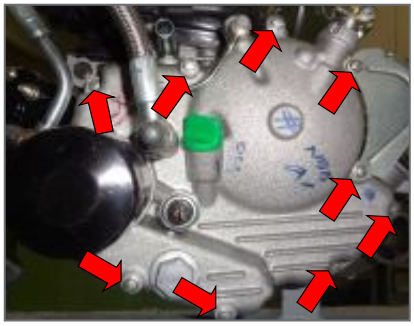
Piston Ring Groove Width

	Top Ring	2nd Ring	Oil
Std.Limit	1.020~1.040	1.020~1.040	2.000~2.020
Ser.Limit	1.110	1.110	—

Notes :

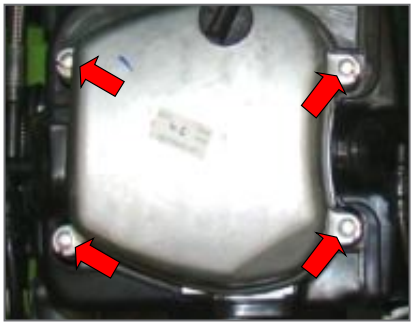
Tightening Torque : Engine

Crank case & clutch cover bolts



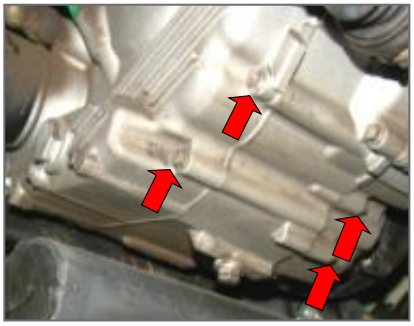
1.1 ~ 1.3 kgm

Cylinder head cover bolts



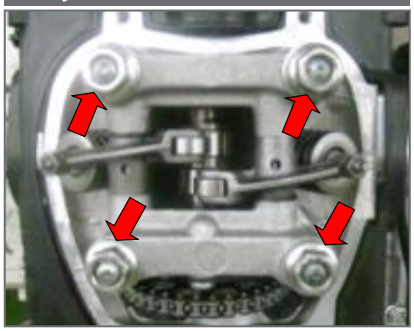
1.1 ~ 1.3 kgm

Crankcase halves joining



0.9 ~ 1.1 kgm

Cylinder head stud dome nuts

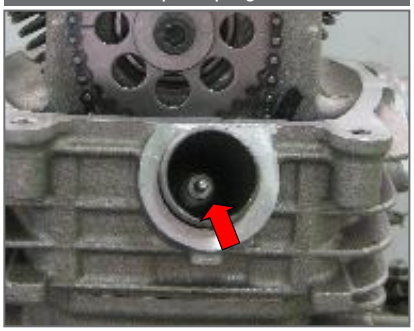


4.0 ~ 4.2 kgm

Cam sprocket bolt

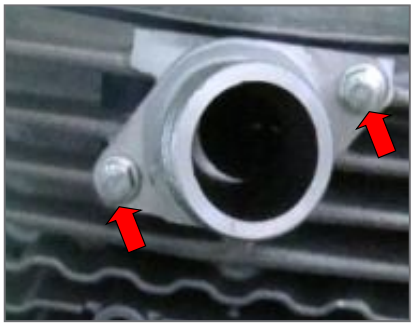
1.8 ~ 2.1 kgm, Loclite - 243

Spark plug



1.3 ~ 1.5 kgm

Intake manifold mgt. bolts

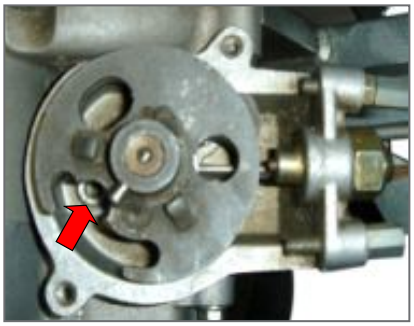


1.1 ~ 1.3 kgm

Crankcase drain bolt

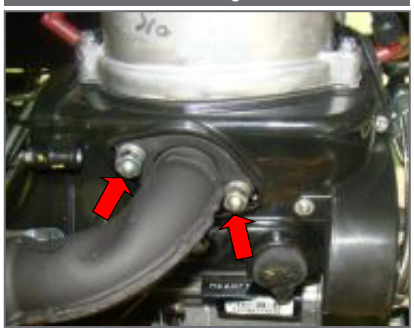
2.7 ~ 3.3 kgm

Gear shifter mounting bolt



1.1 ~ 1.3 kgm

Silencer mtg. nut

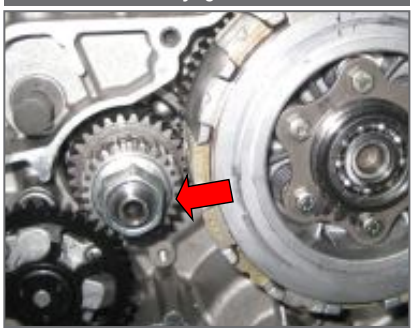


1.8 ~ 2.2 kgm

Clutch nut

8.5 ~ 9.0 kgm

Primary gear nut



8.5 ~ 9.0 kgm

Tightening Torque : Engine

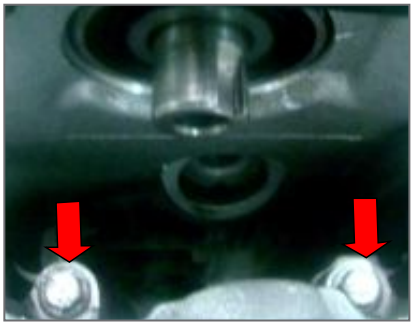
Oil filter assy.

1.2 ~ 1.6 kgm

Oil strainer plug

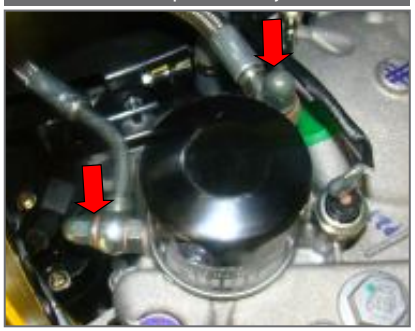
1.1 ~ 1.3 kgm

Cylinder bolt 2 Nos.



1.1 ~ 1.3 kgm

Bolt special banjo



2.2 ~ 2.4 kgm

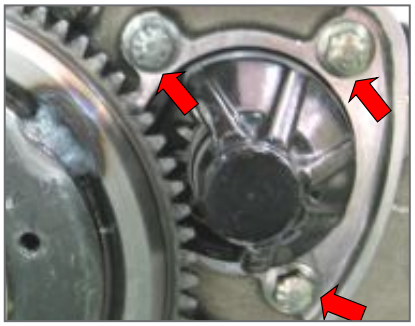
Fan cover mtg. bolts

1.4 ~ 1.6 kgm

Nut for magneto rotor

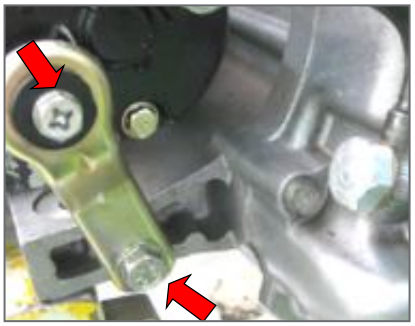
7.0 ~ 7.5 kgm

Starter motor mtg. bolts



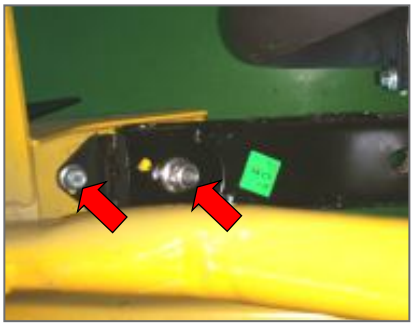
1.5 ~ 1.9 kgm, Loctite - 243

Starter motor support bkt. bolts



1.1 ~ 1.3 kgm

Engine mtg. bracket bolts

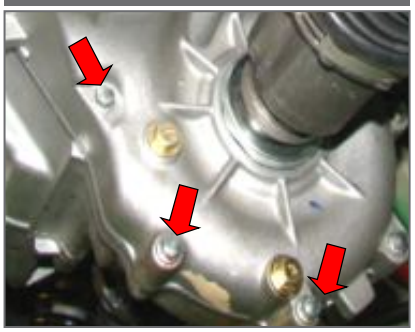


3.5 ~ 4.0 kgm

Differential drain bolt

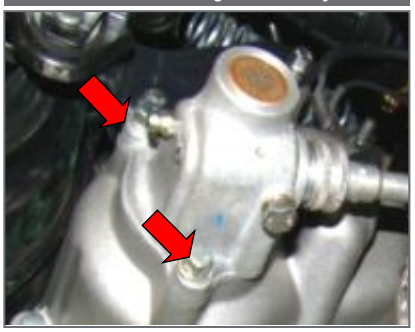
1.5 ~ 1.8 kgm

Differential cover bolts



0.9 ~ 1.1 kgm

Fare meter hsg. assembly



0.6 ~ 0.8 kgm

Notes

Key LearningPoints

- Front & Rear Suspension Dismantling & Assembling
- Brake System Function
- Steering System & it's Maintenance

CHAPTER 8

Chassis & Suspension

Front Suspension Dismantling & Assembling

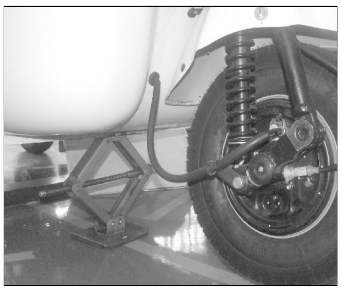
Rear Suspension Dismantling & Assembling

Steering System Maintenance

Brake System

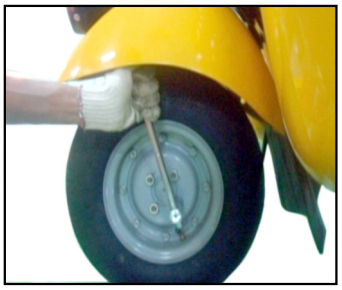
Precautions Tips

Front Suspension Dismantling & Assembling



1

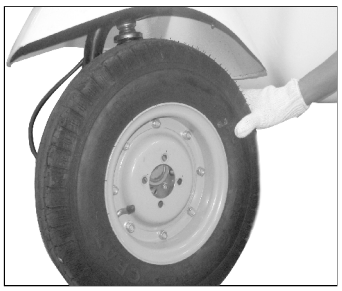
- Put the vehicle on jack/stand.



2

REMOVE :

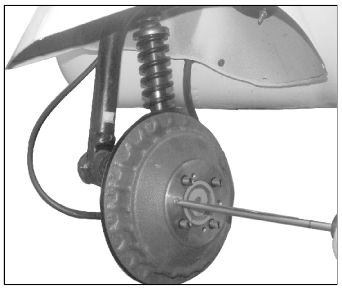
- Loosen 4 Bolts (14mm)



3

REMOVE :

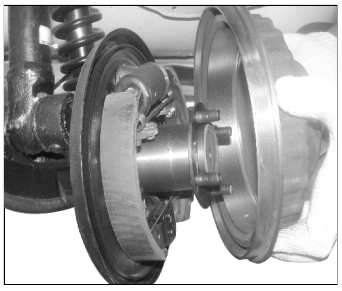
- 4 spring / plan washers
- Front wheel



4

REMOVE :

- 2 screws from the brake drum

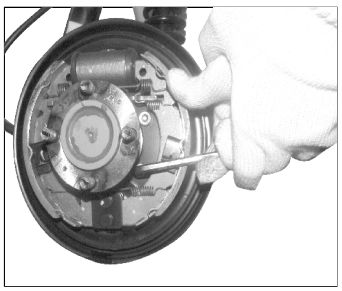


5

REMOVE :

- The brake drum from hub

NOTE : Assembly procedure is the reverse of dismantling .



6

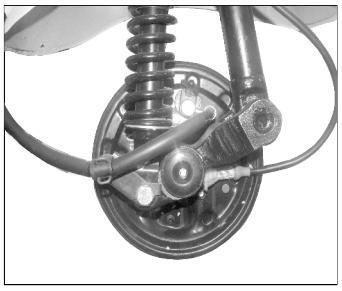
REMOVE :

Now remove 4 allen bolts (6mm) with the help of allen key

7

REMOVE :

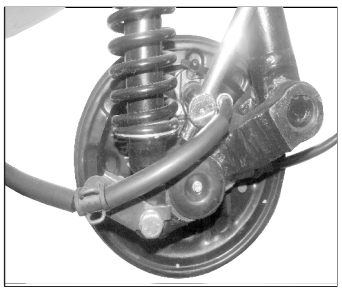
- FSA mounting upper nuts (14mm)



8

REMOVE :

- The link mounting nylock nut (19mm) & bolt take out the link from the front Suspension

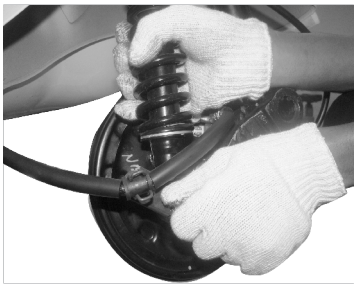


9

REMOVE :

- FSA mounting lower nut (21mm).

Front Suspension Dismantling & Assembling

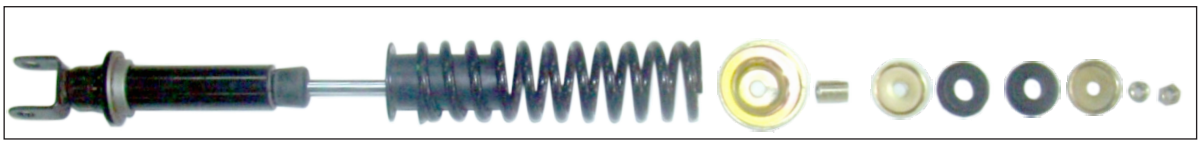


10

REMOVE :

- Now remove the suspension assembly from the mounting

Front Suspension Explode View



Notes :

Rear Suspension Dismantling & Assembling

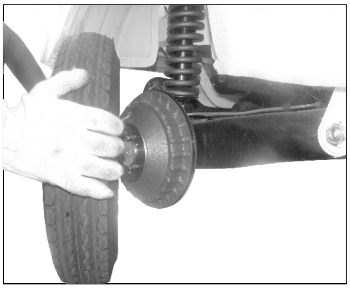
1

- Put the vehicle on jack/stand.

2

REMOVE :

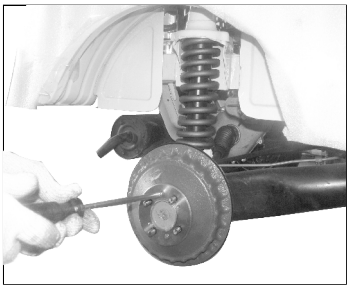
- Loosen 4 nuts (14mm) of Rear wheel rim.



3

REMOVE :

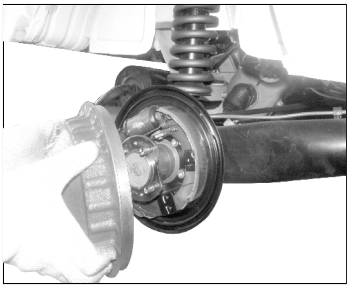
- Rear wheel .
- Spring & plan washer.



4

REMOVE :

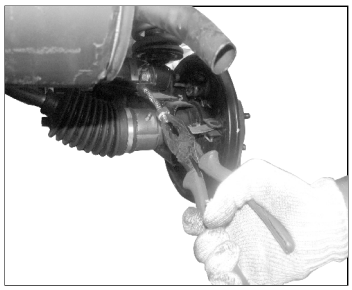
- Rear brake drum 2 screws



5

REMOVE :

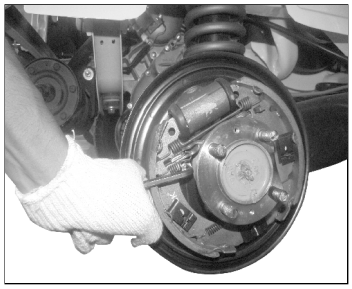
- Pull out the brake drum from the hub



6

REMOVE :

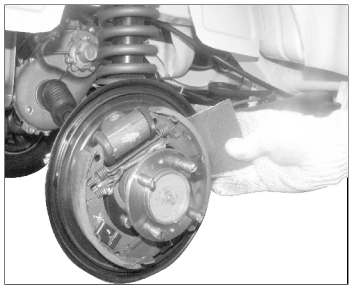
- Parking brake inner cable from drum plate



7

REMOVE :

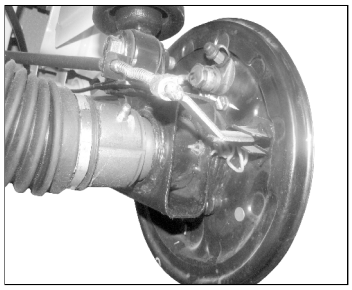
- Remove 4 allen bolt (6mm).
- Rear wheel axle by gently tapping from another end.



8

REMOVE :

- Dust the brake shoe with help of sand paper



9

REMOVE :

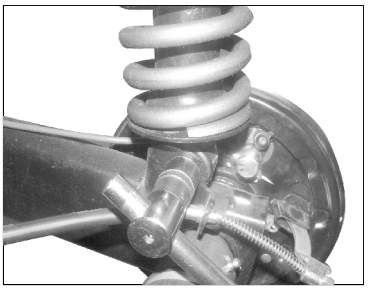
- Banjo bolt of brake line from the rear side of back plate

10

REMOVE :

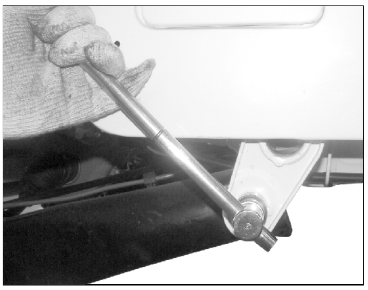
- Remove the 2 bolts (17mm) of RSA upper bolt

Rear Suspension Dismantling & Assembling



11

- Remove the 2 bolts(19mm) of RSA lower bolt with open end

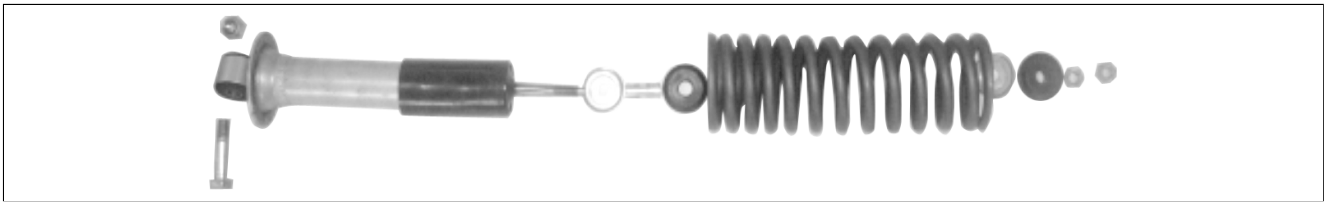


12

REMOVE :

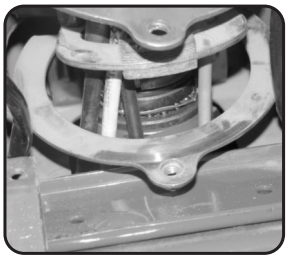
- Remove the long bolt (22mm) of trailing arm with open end

Exploded view of RSA



Notes :

Steering System Maintenance

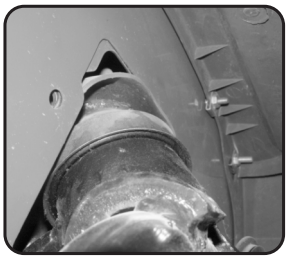


Clean & Lubricate both ball bearings with grease at every 10000 kms.

Check & adjust steering column vertical play by adjusting lock ring with the help of socket for steering column ring nut special tool (No. 37 1801 01). Play should not be there.

Replace steering column bearings if any sideways play is noticed in steering column any damage or fitting marks on the bearing .

Handle bar lock bolt should be tightened as per specified torque. Steering may fail in case this bolt is kept loose.

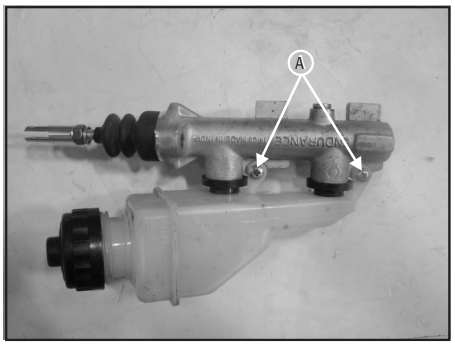


Check for any bend or damages to steering column as this may lead to directional instability.

Do not increase the maximum travel of steering from lock to lock positions.

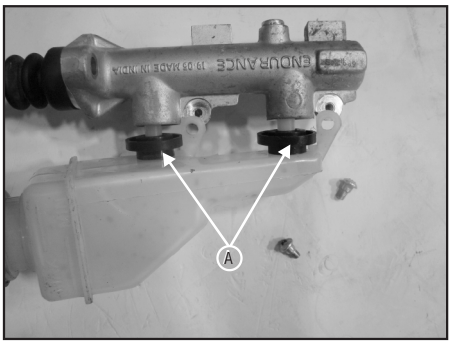
Brake System

DISMANTLING OF THE TANDEM MASTER CYLINDER

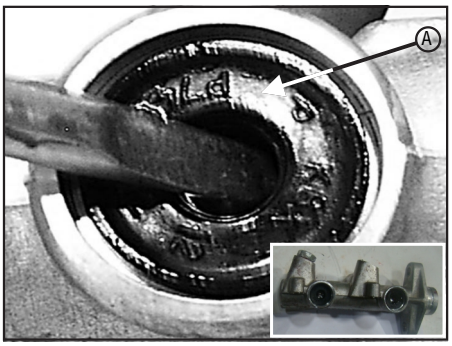


Unscrew and remove :

- Reservoir mounting bolts (A)



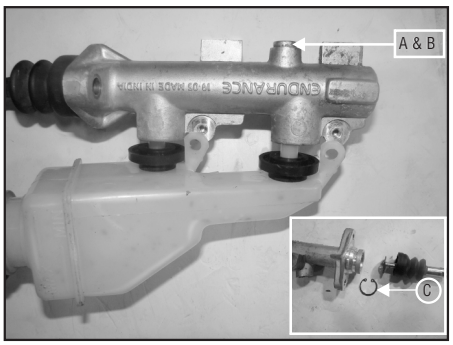
- Hold the brake fluid reservoir (A) and by rocking it on both sides, lift the same out of the rubber grommets fitted on to the TMC ports.



Remove

- Rubber grommet (A) from the TMC inlet ports

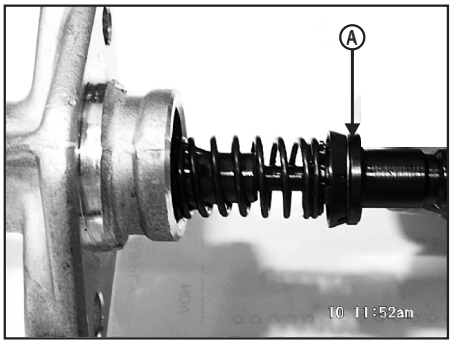
Note: Use a connector or screw driver with blunt edge.



Remove

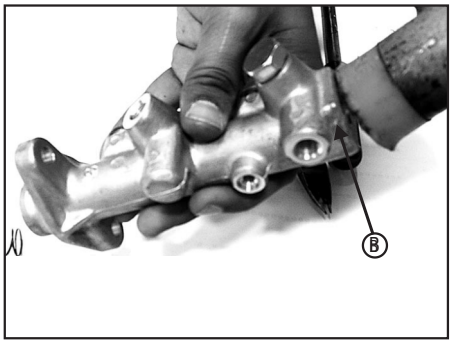
- Piston stop screw (A), Copper gasket (B) and the Circlip (C) by slightly depressing the primary piston, .

Note : Without removal of the Piston stop screw, the secondary piston cannot be taken out.



Remove

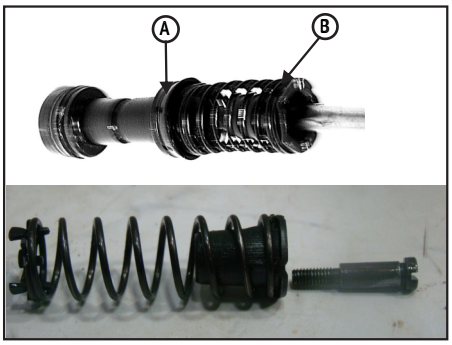
- Primary piston (A)
- Secondary piston



Note: Slightly tap on the Cylinder flange (B) by a plastic mallet.

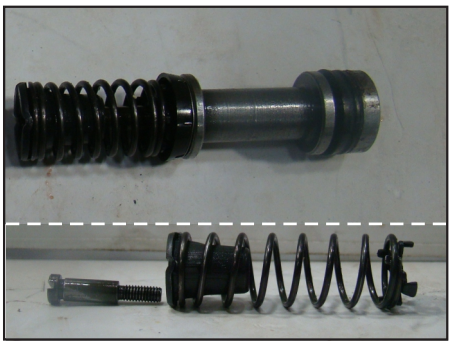
Brake System

DISMANTLING OF THE TANDEM MASTER CYLINDER



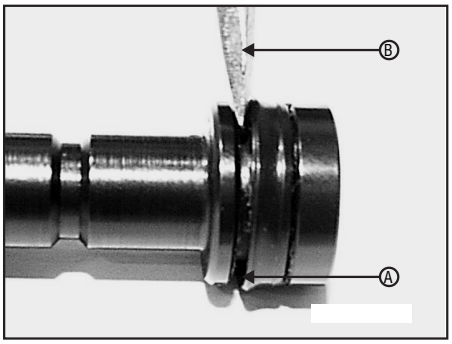
Unscrew the Connecting screw from the Primary plunger (A) by slightly compressing the Spring retainer (B) on the primary piston assembly

Remove
Primary spring (A), Spring retainer (B), Seal (C) & the Seal shim (D) from the primary plunger.



Remove

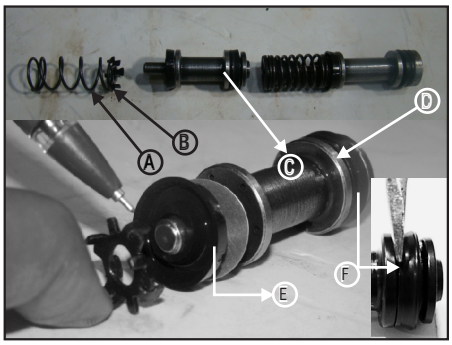
- Primary spring (A) , Spring retainer (B), Seal (C) & the Seal shim (D) from the primary plunger.



Remove

- Back seal (A) from the primary plunger.

Note: Use a blunt edged connector or screwdriver (B)



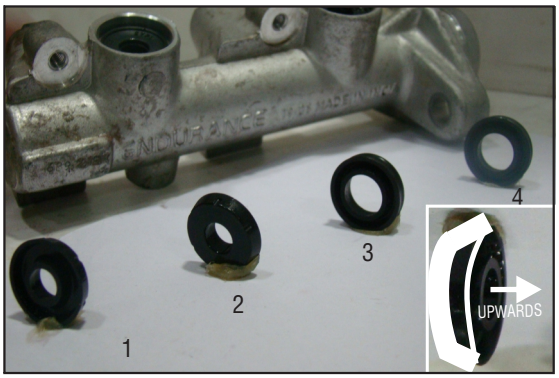
Remove

- Secondary spring (A), Seal retainer(B), Pressure seal (C), Seal shim (D) from the front end of the secondary piston.

Remove

- Back seal (E) from the Secondary plunger.

Note: Use a blunt edged connector or screwdriver (F).

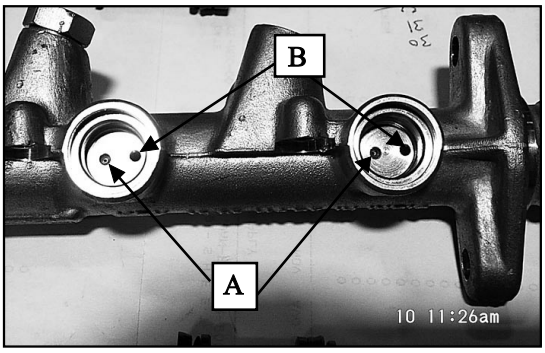


Care to be taken while assembly of TMC:
(I) Direction of seals
There are four seals and the direction of each seal is very important. The bottom most seal ensures pressure built up in the fluid for the application of rear brakes. The pressure in fluid, built between second and third seal supplies brakes fluid to front brakes. The fourth i.e. top most seal is responsible for ensuring there are no small leakages from the TMC. Any seal if placed in opposite direction would result in improper functioning of brakes.

Note: The first, third and fourth seal lips face downwards only the second seal lip faces upwards.

Brake System

Dismantling Of The Tandem Master Cylinder

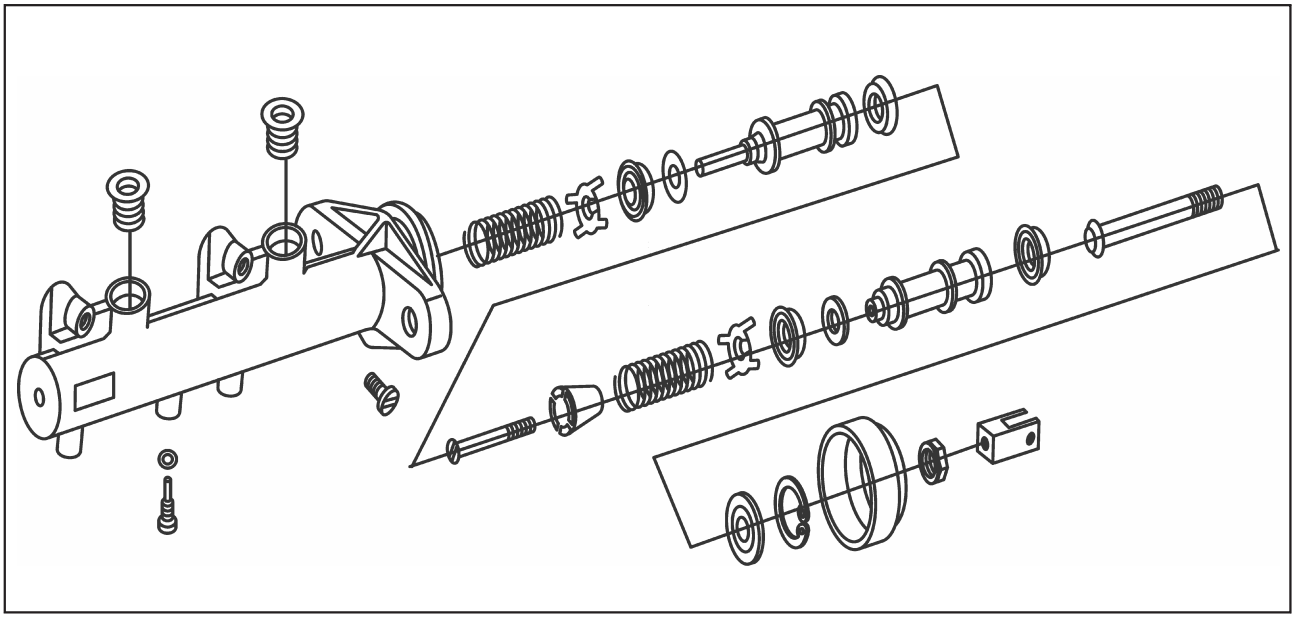


- Discard all rubber parts.
- Clean all other parts using fresh brake fluid or alcohol and ensure these parts are kept in a clean tray or on a clean sheet of paper.
- Ensure visually that the feed port holes (2 compensating holes (A) + 2 vent holes (B)) are clear. Do not poke these holes with sharp instruments.

Examination of TMC and Internal Parts

1. Examine the bore of the TMC. If it is not scored , ridged or pitted and smooth, if felt, the TMC can be rebuilt with the genuine spare parts kit. If in case of slightest doubt on the bore condition, like deep groves or score marks in the bore then a new cylinder assembly should be replaced.
2. Examine both the pistons for rust, ridges or burrs. Ensure both the plungers are in good condition, free from the above conditions.
3. If contamination is observed in the removed seals, (seals would have swollen and the size would have enlarged compared to the new seals) ensure all rubber parts in the system including rear wheel cylinder seals, front wheel cylinder / caliper seals and the front and rear rubber hoses must be discarded and the ensure system to be flushed with new brake fluid.

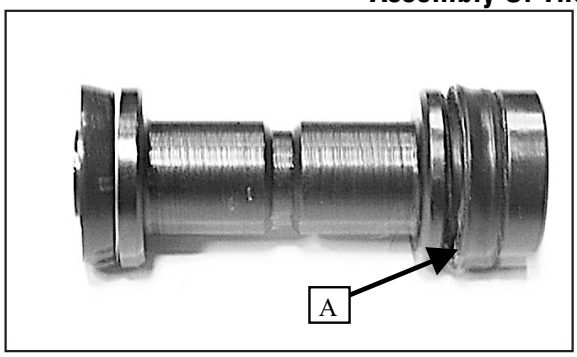
TMC - Exploded View



CAUTION : NEVER USE ANY MINERAL OIL BASE FLUIDS LIKE KEROSENE, DIESEL, PETROL etc. FOR CLEANING OF REMOVED PARTS USE ONLY ALCOHOL OR FRESH BRAKE FLUID FOR CLEANING OR REMOVED PARTS.

Brake System

Assembly Of The Tandem Master Cylinder



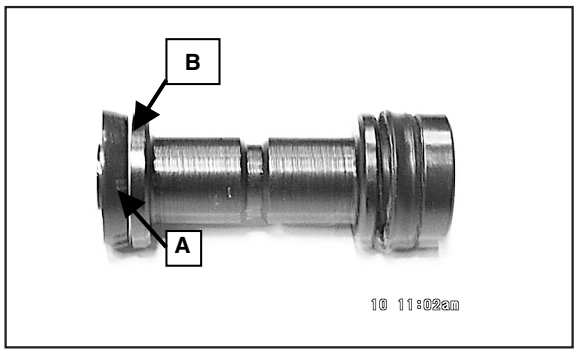
PRIMARY PISTON ASSEMBLY.

1. Ensure the hands are clean and clear from any mineral oil, grease etc.
2. Dip the primary piston and rubber parts in fresh brake fluid.

Fit

- Primary back seal (A) on to the plunger groove.

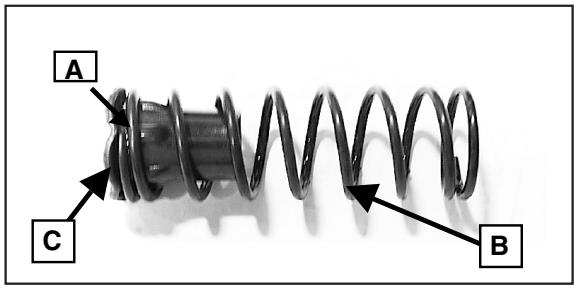
Note: Ensure that the Seal lip is facing towards the stem of the plunger.



Fit

- Seal shim (A) and the Pressure seal (B) on to the stem side of the primary piston.

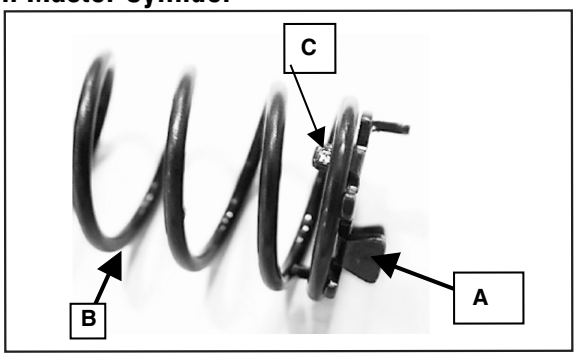
Note: Ensure that the Seal lip is facing towards the primary spring.



Fit

- Spring retainer (A) into the Primary spring (B).

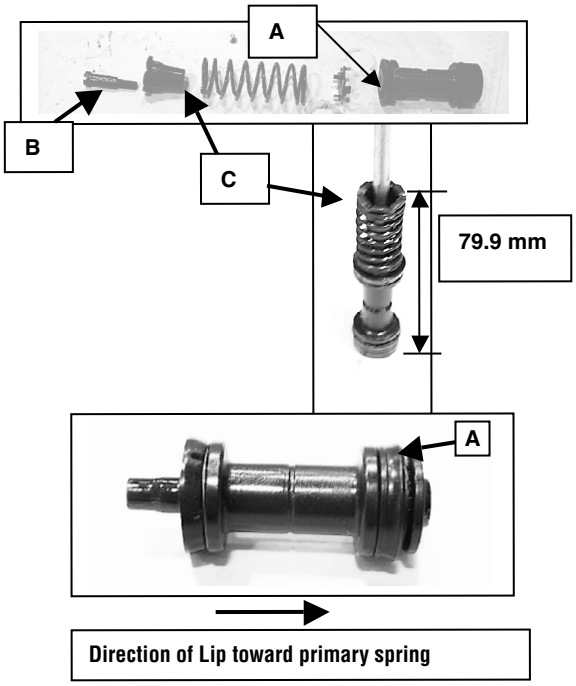
Note: Ensure the flange (C) of the spring retainer seats flush with the spring coil.



Fit

- Seal retainer (A) onto the primary spring (B).

Note: Ensure that the small petals (C) are towards the spring.



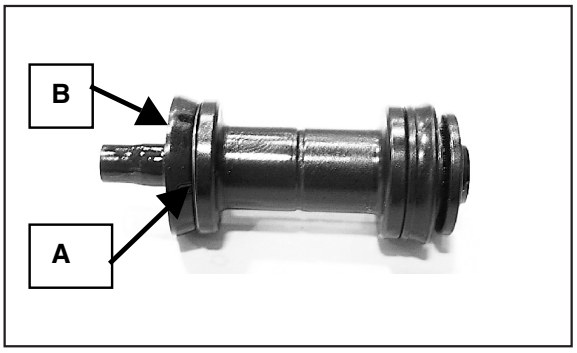
- Align the above unit on to the primary piston stem (A) and insert the retaining screw (B) through the spring retainer (C) hole.
- Screw in the retaining screw till the shoulder of the screw butts against the plunger stem by compressing slightly the spring retainer against the spring.

Note:

In case of any doubts , the length of the primary piston assembly complete must be 79.9 mm.

Brake System

Assembly Of The Tandem Master Cylinder



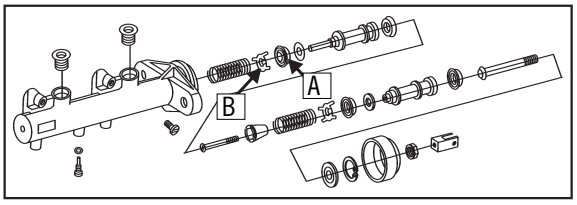
SECONDARY PISTON ASSLY.

- Dip the secondary piston and all rubber parts in fresh brake fluid.

Fit

- Secondary back seal (A) on to the secondary piston groove.

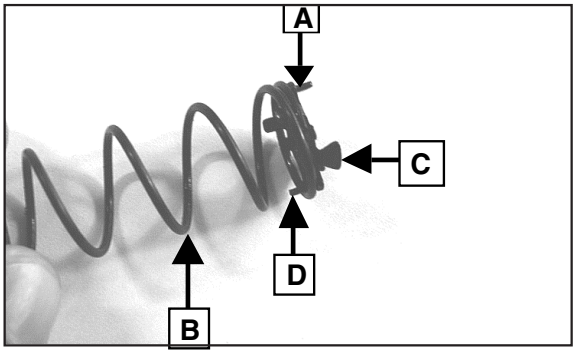
Note: Ensure that the lip of the seal is facing towards the primary spring.



Fit

- Seal shim (A) and the Pressure seal (B) on to the stem side of the primary piston.

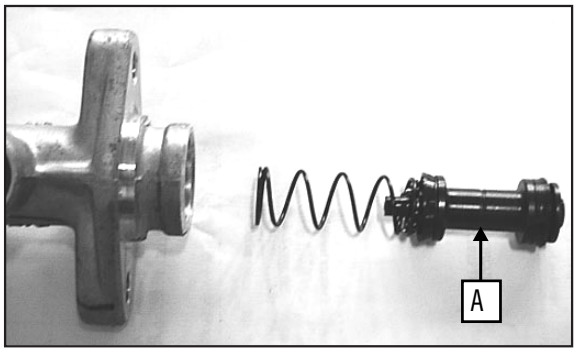
Note: Ensure that the Seal lip is facing towards the primary spring.



Fit

- Seal retainer (A) and the Secondary spring (B)

Note : At the time of fitment of seal retainer ensure that the big petals C of retainer are towards the seal and the small petals (D) are towards the spring.

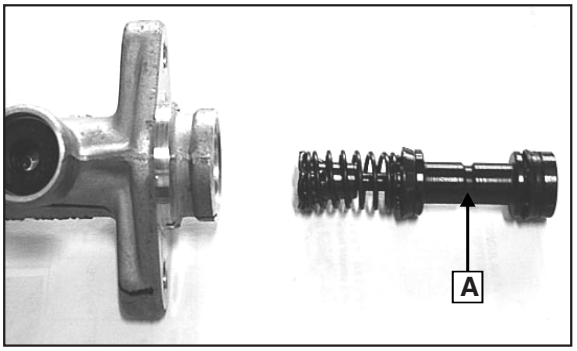


TMC ASSEMBLY

- Lubricate the bore of the TMC liberally with fresh brake fluid Insert
- Secondary piston assembly (A) into the bore, with the spring end leading.

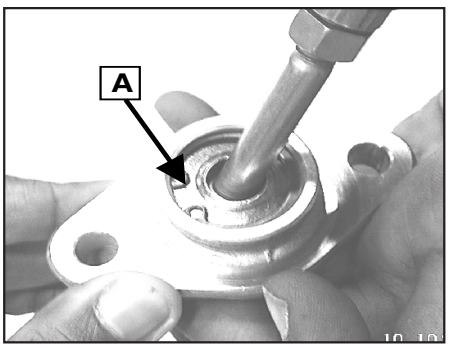
Note:

Care must be taken to properly guide the seals into the bore and thereby avoiding any damage to the seals.



Insert

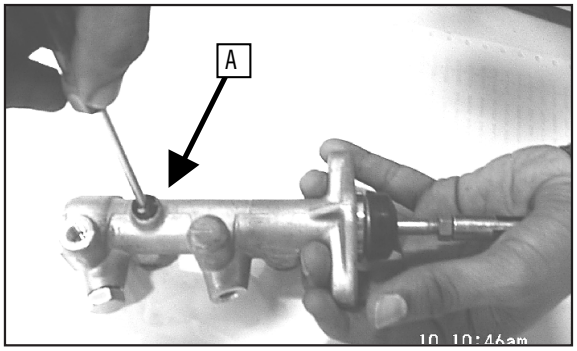
- Primary piston assembly (A) into the bore, with the spring end leading in the bore.



- Assemble the push rod complete to the cylinder with the Circlip (A). Ensure the seating of the circlip, squarely into the TMC groove.

Brake System

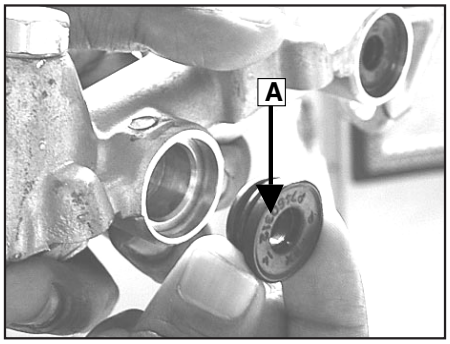
Assembly Of The Tandem Master Cylinder



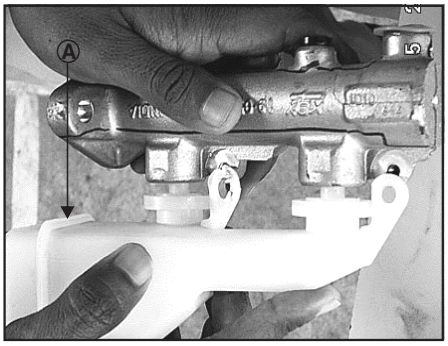
- Depress the push rod to actuate the primary piston couple of times to ensure the quick return of the piston.

DO NOT ADJUST THE SET LENGTH OF THE PUSH ROD ASSEMBLY, AS THIS IS SET AT FACTORY TO ACCOMMODATE THE PEDAL BOX CONFIGURATION.

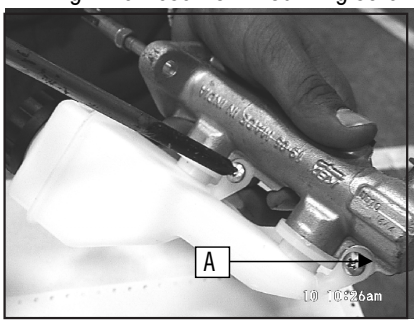
- Depress the push rod to actuate the primary piston couple of times to ensure the quick return of the piston.



- Fit the fluid reservoir Grommets (A) after liberally lubricating the inlet ports with fresh brake fluid.



- Position the Reservoir into the Reservoir grommets (A) and by slightly rocking the reservoir on to the sides, press it home .
- Align the Reservoir mounting screws (A) and tighten it



- Before fitting the TMC on to the vehicle, the cylinder must be bled on the bench initially. Fill brake fluid in the reservoir and by holding the TMC in a vice, stroke the master cylinder, till the fluid comes out of both the outlet parts.
- After fitting the TMC on to the vehicle, the outlet pipes are to be connected and torque tightened.

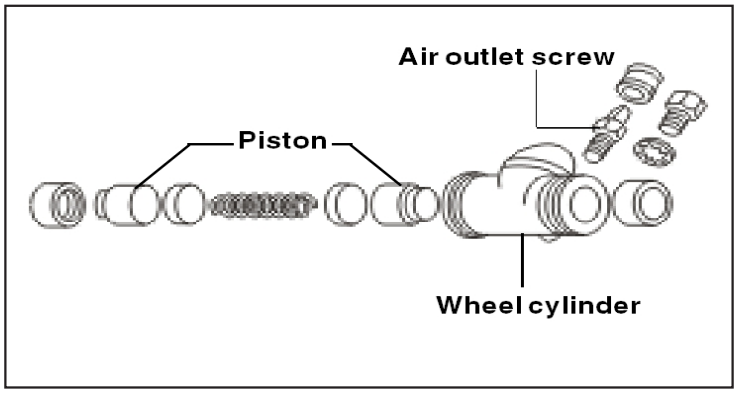
Notes :

Brake System

Wheel Cylinder

DISMANTLING WHEEL CYLINDER

a) Remove packings, Piston & Spring from the wheel cylinder as shown in fig.



Wheel cylinder

WHEEL CYLINDER:

1) Having removed the unit from the vehicle and stripping down the various components proceed with the overhaul taking into consideration the points mentioned on the master cylinder group.
2) By blowing through compressed air, check that the air bleeder vent and oil inlet are not blocked.
3) Maximum play between metallic piston and cylinder should not exceed 0.30 mm.
4) On reassembling the oil seals, between which is fitted the reaction spring, ensure that the groove faces are opposed and the rubber and seats applied on the shafts have their flat surfaces in the contact with the metal pistons. After the above inspection and adjustment while it is still clamped !n the vice, proceed as follows:

- Refill the oil reservoir.
- Using a punch, thrust the piston forwards two or three items until the cylinder body is full of oil.
- Bring the piston to the end of its stroke so as to release trapped air and a small quantity of oil. Block the oil outlet hole by hand.
- Gradually release the pressure on the piston ensuring that it returns to the end of its stroke so that the oil can flow from the reservoir to the cylinder body.
- Repeat the previous operation until on thrusting forward the piston on oil jet escapes from the outlet hole without indication of air inclusions, then block the outlet and permit the piston to return to its resting position. (N.B.: After the above operations, add oil to the reservoir so as to keep it full)
- Having checked that the tube connections have no leakages or deformations, proceed with the assembly of the group to the chassis connecting the loaded master cylinder to its hydraulic circuit.
- Check that the rivets retaining the brake linings do not project beyond the level of the contact face.

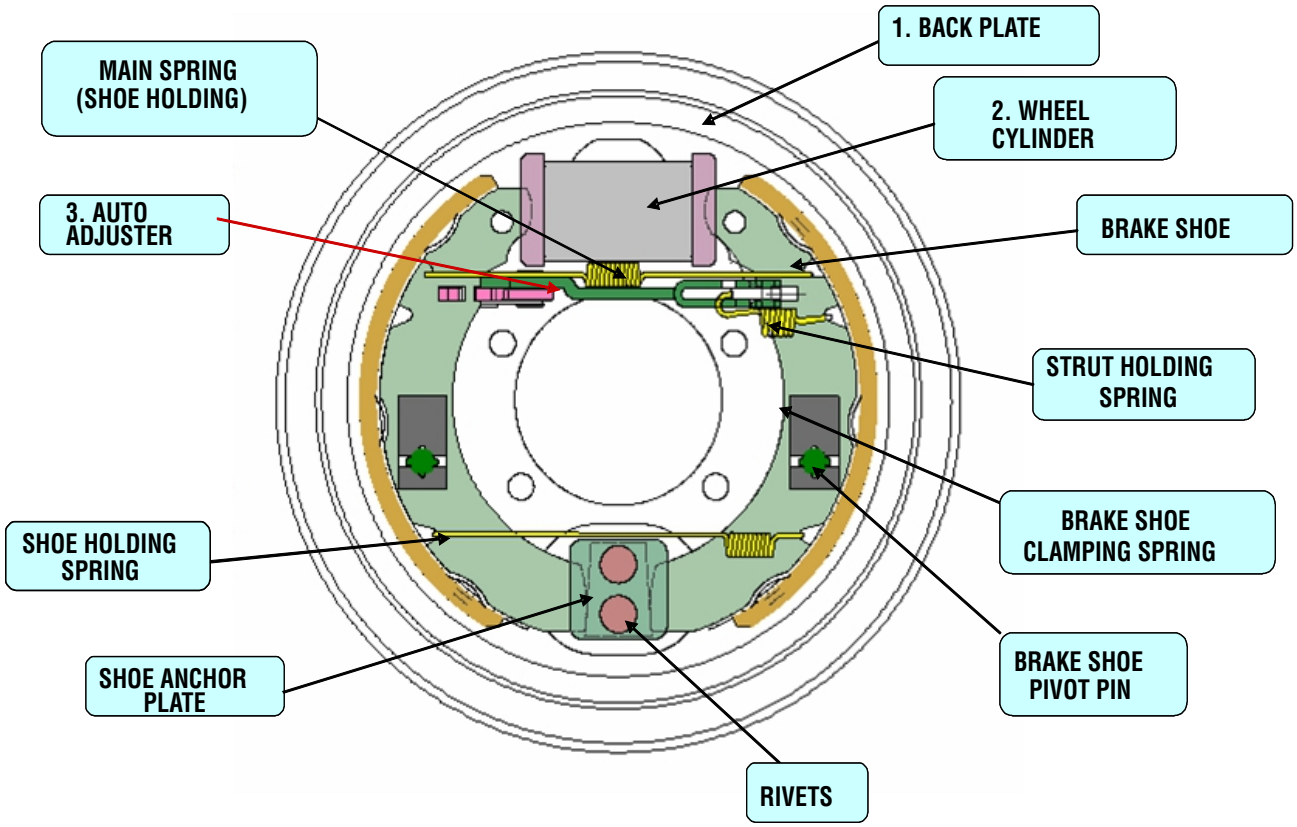
Brake System

What is Panel Assembly

The drum brake consists of two parts

- Brake Drum – Which is rotating member & brought to rest when brake is applied.
- Panel Assembly- which is a set of Fixed elements like Brake Shoes , Wheel Cylinders etc.

PANEL ASSEMBLY NOMENCLATURE



PANEL ASSEMBLY

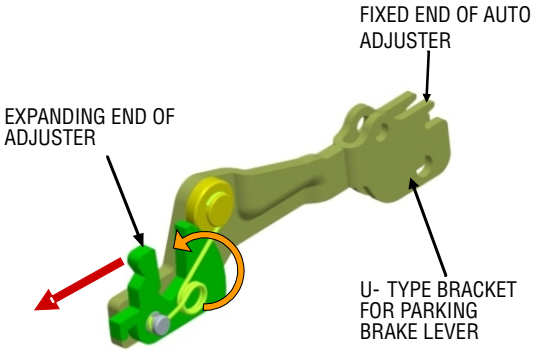
Brake System

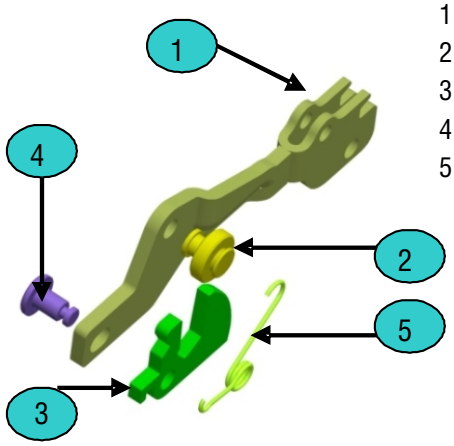
WHY AUTO ADJUSTER IS REQUIRED ?

1. In a conventional drum brakes, the Wheel cylinder piston stroke is increased by wear of brake shoe lining, which in Turn results in an increase in pedal travel.
2. For this reason a regular shoe adjustment is required to bring the pedal travel back to normal.

The object of self-adjuster drum brakes is to keep the Pedal travel constant.

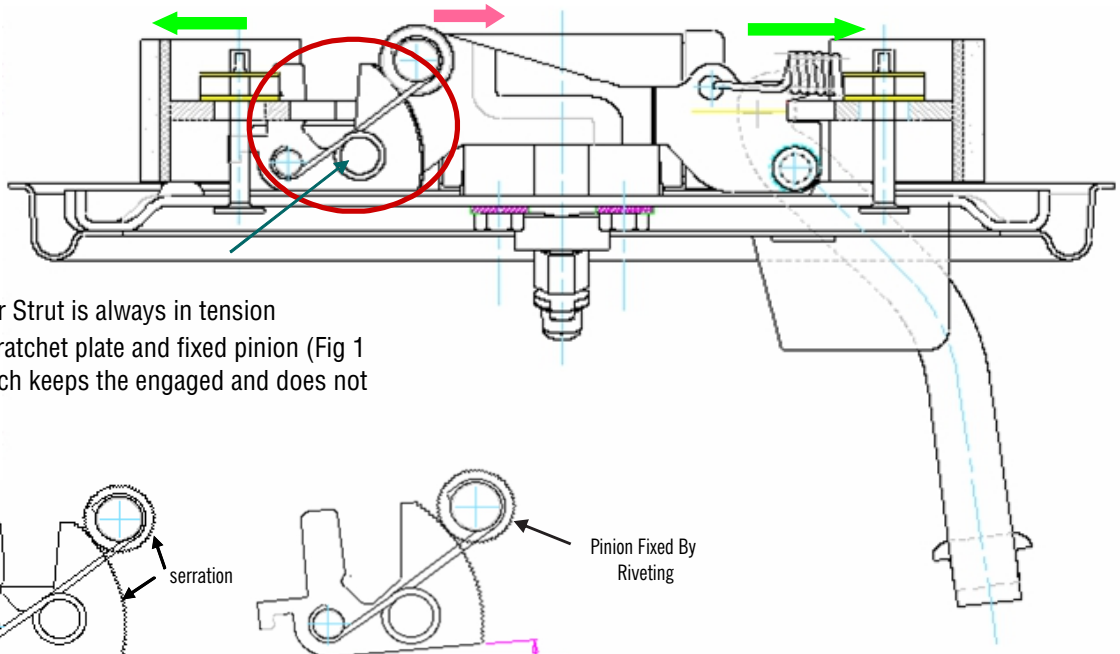
Auto adjuster Assembly
(INCREMENTAL – RATCHET TYPE)





1.Strut Plate Assy.
2.Pinion
3.Ratchet Plate
4.Ratchet Pivot Pin
5.Spring For Strut

How Auto Adjuster works ?



Spring for Strut is always in tension Between ratchet plate and fixed pinion (Fig 1 &2) , which keeps the engaged and does not rotate.

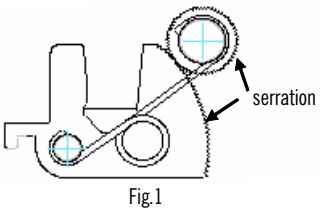


Fig.1

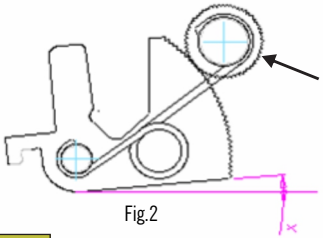
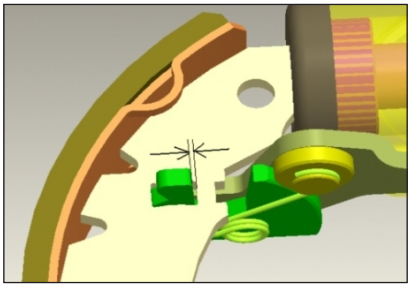


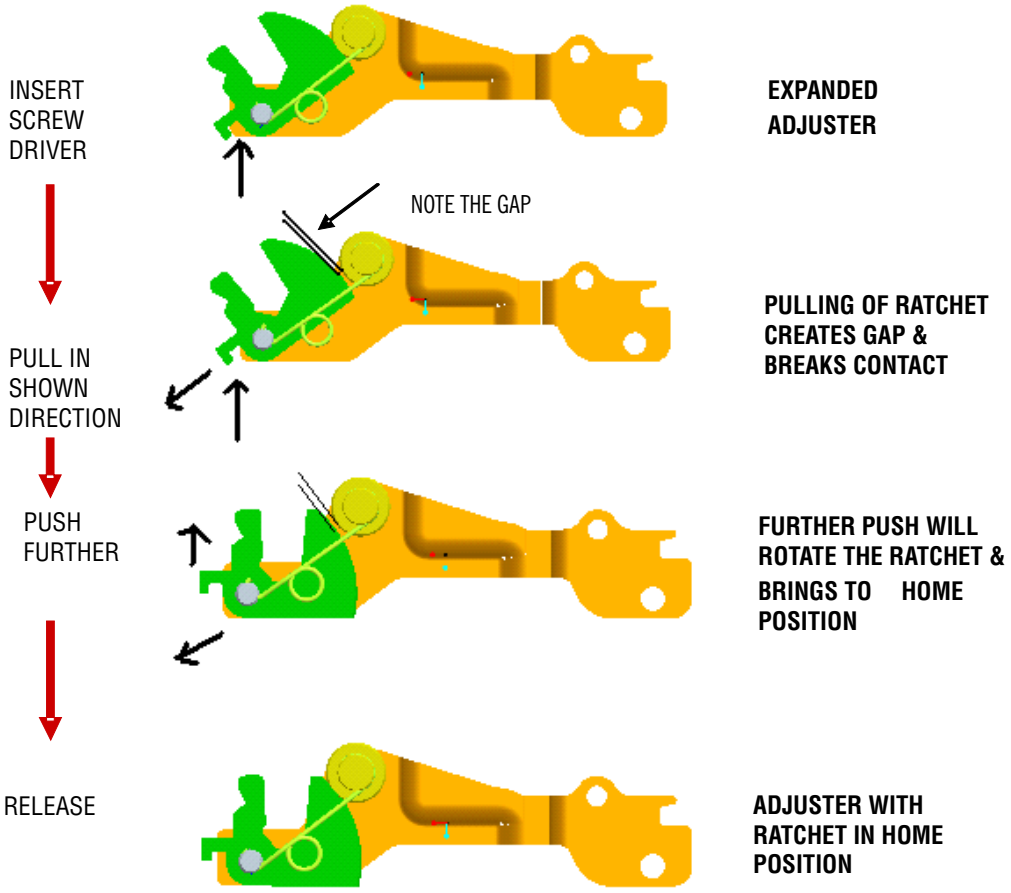
Fig.2

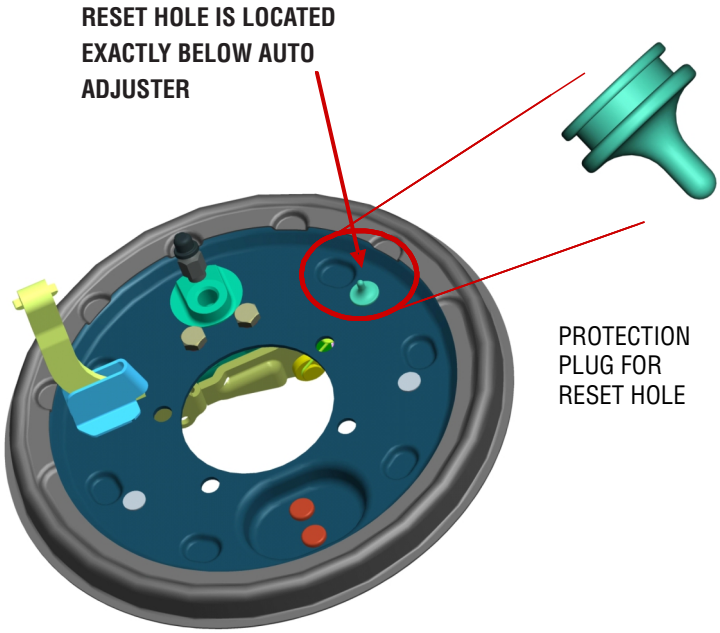


When Brake is applied , wheel cylinder pushes the shoes outwards (Refer the figure below showing the force directions) . This results in pulling of Ratchet End & strut end opposite to each other. Auto adjuster slot on shoe will allow idle movement of 1.5 mm for normal working gap . When the gap increases due to shoe wear , the pulling action will rotate the ratchet and settles in next teeth (Refer. Fig 2)

Brake System

Resetting The Auto Adjuster To Home Position





Precautions Tips :

PRECAUTIONS TO BE TAKEN DURING BRAKE OVERHAUL :

1. Do not use wire dry brush or compressed air for brake liner cleaning. Instead use a dampened (in the brake fluid) cloth for cleaning the brake parts.
2. If any hydraulic brake component is removed or disconnected from the brake system bleed the brake system for the removal of air after repair is completed.
3. Use only dot 3 brake fluid.

NOTICE:

Never polish lining with sand paper. If lining is polished with sand paper, hard particles of sand paper will be deposited in the lining and may damage drum. When it is required to correct lining, replace it with new shoes in axle set only.

Wheel Cylinder :

When removing Brake Drum, check Wheel Cylinder for oil leakage. If any leakage is found, rectify the same.
Inspect Wheel Cylinder dismantled parts for wear, crack, corrosion or damage.

CLEAN WHEEL CYLINDER COMPONENTS WITH FRESH DOT3 BRAKE FLUID ONLY

Assembly Strut :

Inspect the adjusting nut and pawl for wear, crack or damage.

Springs :

Inspect for damage or weakening. if found defective, replace.
Brake Plate assembly :

1. Tighten Wheel Cylinder to Brake Back Plate.
2. Then take-off bleeder plug cap & connect pipe to wheel Cylinder just enough to prevent fluid from leaking.
3. Tighten the brake pipe which was connected in step 2.
4. Reinstall the, bleeder plug, cap, to prevent dust entry.
5. Assemble parts in the reverse order of removal.

NOTICE:

WHEN INSTALLING SHOES, DON'T CAUSE DAMAGE TO WHEEL CYL. BOOTS.

6. Install shoe hold down springs by pushing down them in place & turning hold down pins.
7. Ensure that strut is located correctly in shoe web slot.
8. Install brake drum after making sure that inside of brake drum or brake shoes are free from dirt and oil.

Notes :

Notes

Key Learning Points

- **Battery: Charging process & maintenance**
- **Checking & inspection of all electrical components**
- **Electrical circuit diagrams**

CHAPTER 9

Electricals

Maintenance Electrical

Electrical Checking Procedure

Electrical Circuit Diagrams

Maintenance : Electrical

BATTERY:

As you are aware that, periodic maintenance and care of battery helps to enhance its life. Given below compiled information on battery maintenance.

1) BATTERIES ON NEW VEHICLES.

A) CHECKING OF BATTERY ON NEW VEHICLE IN PDI

1) Check the battery open circuit voltage.
2) If battery voltage in received condition is less than 12 V; inform the details in attached format (Annex-1) to warranty dept. Preserve the record at your end to send it to warranty dept. along with warranty claim in case battery failure has taken place during warranty for manufacturing defect.
   Please note that, failures on these batteries if not accepted by Exide dealers are to be claimed to BAL along with this record & Exide dealers inspection report.
3) If battery manufacturing date is more than 2 months old for dry charged batteries and 1 month old for charged batteries, inform it to warranty dept. in format given in Annexure -1If any of these batteries failed with in warranty claim them under warranty to BAL along with this report as well as battery checking report from Exide dealer.
4) Charge the battery externally and put on vehicle.
5) Ensure that battery cables are fixed firmly and petroleum jelly is applied to battery terminals.

B) DRY CHARGED BATTERY CHARGING PROCEDURE:

1) Remove the short plastic plug on the exhaust vent outlet and replace it with the long open tube provided with battery.
2) Do not crimp or bend the exhaust tube. This is a safety device to remove fumes. Blockage of this tube may cause damage to the battery.
3) Fill each cell with dilute sulphuric acid of 1.25 specific gravity (1.25 at room temp. for use above 10^0C and 1.28 at room temp for use below 10^0C).
4) Keep the battery as it is for half an hour.
5) Keep vent plugs open. Connect battery to charger and charge at proper current as indicated below.

Battery type	Battery charger part no.	Current setting	Charging time required
12V 32 Ah	69 7538 28	2A	14 ~ 16 hours @ 2A

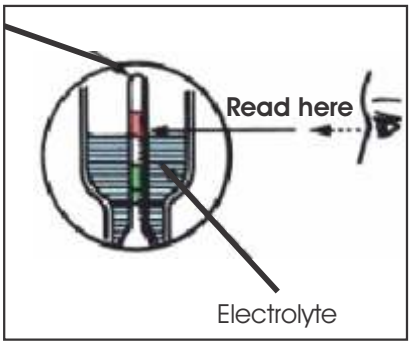
7) After the battery charging is over, charge indicator LED will lit.
8) The Terminal voltage with battery connected to charger, when measured with multi meter should show voltage between 14.5 to 15.2 V, when the battery is fully charged
9) Stop Charging when Charging is over. For a fully charged Battery, open circuit voltage should be greater than 12.3 V, measured after one hour of charging.
10) Specific gravity of individual cells, should be > 1.25 when measured after one hour of charging
11) If Specific gravity of any one or more cells is lower than 1.18, refer the battery to Exide dealer as Battery may be defective.
12) After charging, put filling caps firmly into place and wash off acid spillage with water and dry the battery.

Maintenance : Electrical

C) CHECKING THE SPECIFIC GRAVITY:

The charged condition of the individual cell can be checked by measuring specific gravity of electrolyte in that cell. The specific gravity of electrolyte can be checked by using Hydrometer having small diameter spout.

For measuring the specific gravity bring the electrolyte in the hydrometer to eye level and read the graduations on the float scale bordering on the lower meniscus (i.e. curved down portion of electrolyte surface) as shown in the fig.



D) BATTERY INSTALLATION:

a) Ensure that in all cells the level of electrolyte is near the maximum level mark.
b) To clean & dry the surface, wipe the top of the battery with a clean cloth. Fasten the battery firmly with bracket and allied fasteners.
c) Connect cables to the positive and negative terminals properly. Reverse connections will damage the charging system permanently.
d) Always connect the "negative (earthing) terminal last".
e) Clean the battery terminals and cable connections. Smear them with petroleum jelly to avoid corrosion (NEVER USE ORDINARY GREASE).
f) Route the battery vent tube properly. Do not fold or crimp as it may cause damage to the battery.
g) Check that the battery cables connections are firm and cables do not rub against any metal components.

2) CARE OF IN USE BATTERIES

For optimum performance and longer battery life, the maintenance of battery is important. The condition of the battery should be checked at least once in a 45 days as follows:

1) Always keep the battery dry and clean.
2) Visually inspect the surface of the battery container. If there are any signs of cracking or electrolyte leakage from battery, replace the battery.
3) The electrolyte level inside all the cells should be checked after every 45 days and topped up, if necessary with distilled water only. Never use acid or ordinary tap water for topping up, since it will shorten the battery life.

A) BATTERY CHARGING PROCEDURE FOR IN USE BATTERIES

1. Clean the Container and lid surface for dust.
2. Measure and record the Battery Open Circuit Voltage(OCV) as received
3. Remove the 6 filler caps before start of charging
4. Check the Electrolyte level in all cells.
5. If level is below minimum level, add distilled water to bring it to minimum level + 3mm
6. If level is above minimum level, do not add distilled water
7. Measure the Specific Gravity of individual cells of the Battery and record the readings. Difference between specific gravities of cells should be < 50 points; else refer to Exide dealer
8. Keep the Vent Plug open.
9. Check Battery Charger Open Circuit Voltage. It should be minimum 15.2 V.
10. Keep the current setting in the Charger as indicated below.

Maintenance : Electrical

Sr. No.	Parameter	For Kick start & Self start
1	Make	Excide & Amco. Kick start is not applicable.
2	Voltage	12 Volt
3	Cpacity	32 Ah
4	Specific gravity of electrolyte	1.25 at 27°C, 1.28 at 20°C
5	Initial charging duration	10~15 hrs (depending upon the condition of the battery)
6	Charging current specification	2 Amp

11. Firmly connect the Charger Clamps to the Battery terminals with proper polarity
12. If polarity is wrong, buzzer will turn ON with LED glowing in red color. Correct the connections and proceed.
13. When battery is connected to charger, charge indicator lamp will go off.
14. Normal charging duration is as indicated below for a fully discharged battery as shown above in the chart. For a partly discharged battery, it would be lower.
15. After the battery charging is over, charge indicator LED will lit.
16. The Terminal voltage with battery connected to charger, when measured with multi meter should show voltage between14.5 to 15.2 V, when the battery is fully charged.
17. Stop Charging when Charging is over. For a fully charged Battery, open circuit voltage should be greater than 12.3 V, measured after one hour of charging.
18. Specific gravity of individual cells, should be > 1.22 when measured after one hour of charging.
19. If Specific gravity of any one or more cells is lower than 1.18, refer to Exide dealer as Battery may be defective
20. After Charging, Ensure the Electrolyte level in all cells is at the max level indicated on front side of the battery. If not, top up with distilled water
21. After charging, put filler caps firmly into place and wash off acid spillage with water and dry the battery.
22. Apply Petroleum Jelly on the Battery Terminals

Note:

1. Avoid frequent topping of Electrolyte in field, e.g. If Electrolyte is 3-4 mm above Min level, there is no need to top up.
2. Check the open circuit voltage and Electrolyte level of Battery in field as per regular maintenance once in 45 days.
3. If Charger Clamps are oxidized or rusted, then replace the Cable.

Maintenance : Electrical

3) BATTERY SULPHATION:

A sulphated battery is one which has been left standing in a discharged condition or undercharged to the point where abnormal lead sulphate has formed on the plates (sulphated cells looks like white crystal like sugar) where this happens, the chemical reaction within the battery get affected and results in loss of capacity.

Mostly the causes of sulphation are as below:

1) Under charging.
2) Standing in a partially or completely discharged condition for long time.
3) Low electrolyte level If electrolyte level is permitted to fall below the top of the battery plates, then the exposed surfaces will harden and becomes sulphated.
4) Adding acid If acid is added to a cell in which sulphation exists, the condition will be aggravated.
5) High specific gravity If specific gravity is higher then the recommended valve (1.240) then sulphation may occur.
6) High temperature accelerates sulphation, of an idle, partially discharged battery.

VOLTAGE OF THE SULPHATED BATTERY:

Cells of the sulphated battery will show low specific gravity and no load voltage. If no load voltage is less then 9V for 12V battery, then following procedure may be adopted.

a) Check voltage before charging.
b) Charge for two hours.
c) Check voltage every one hour. If voltage increases, then continue charging.
But if voltage does not increase, stop charging and disconnect the Charger otherwise battery charger will get permanently damaged.
d) If the battery is not badly sulphated, then it can be revived by special Treatment. In such case, it is advisable to give sulphated battery to authorized dealer of battery manufacturer for necessary special treatment.

4) NON-USE MAINTENANCE (MAINTENANCE WHILE NOT IN USE):

When the vehicle is likely to remain off-road for a longer time (say more then a month) then non-use maintenance should be carried out as follows, otherwise the battery may get sulphated and permanently damaged.

a) Remove the battery from the vehicle.
b) Maintain electrolyte level 1/4th above the plates.
c) During off service period, battery should be charged once a month.
d) Keep the battery fully charged.
e) Store the battery in cool, dry place.
f) Keep the battery away from rain, moisture and direct sunlight

Notes :

Electrical Checking Procedure

Gas / Petrol Changeover Selector Switch:

Measuring & Testing Equipment : Multimeter

Meter Range & condition	Wire Connections		Standard Value
	Meter +ve	Meter -ve	
• Ignition switch should be OFF	Pink/Blue	Red/Black	Beep sound should be heard only switch is in Gas Mode position
• The Selector switch coupler to be kept disconnected	Gray/Red	White/Green	Beep sound should be heard only switch is in Petrol Mode position

Hazard Switch:

Measuring & Testing Equipment : Multimeter

Meter Range & condition	Wire Connections		Standard Value
	Meter +ve	Meter -ve	
• Ignition switch should be OFF	Blue	Gray/Red	Beep sound should be heard only switch is in Hazard Mode position
• The Hazard switch coupler to be kept disconnected	Green/ Yellow	Gray/Red	Beep sound should be heard only switch is in Indicator Mode position

Ignition Switch:

Measuring & Testing Equipment : Multimeter

	Red	Yellow/ Green	Red/ White	Red/ Yellow	Red/ Black	White/ Black
OFF	●	●	●	●	●	●
Parking	●	●	●	●	●	●
ON	●	●	●	●	●	●
Ignition	●	●	●	●	●	●

Electrical Checking Procedure

Starter Relay:

Measuring & Testing Equipment : Multimeter

Meter Range (Ohms)	Wire Connections		Standard Value
	Meter +ve	Meter -ve	
• Ignition switch should be ON • The Starter Motor to be kept disconnected • ES switch pressed	Relay Positive	Relay Negative	Beep sound should be heard only ES Switch is pressed.

Starter Coil:

Measuring & Testing Equipment : Multimeter

Meter Range (Ohms)	Wire Connections		Standard Value
	Meter +ve	Meter -ve	
200 Ohms	Yellow	Yellow	0.1 ~ 1 Ohms

R. R. Unit:

Measuring & Testing Equipment : Multimeter

condition	Meter Range (Ohms)	Wire Connections		Standard Value
		Meter +ve	Meter -ve	
Engine @ Idling RPM, Head Lamp should be OFF	200 V DC	Positive terminal	Negative terminal	Min: 13.5 V Max: 14.7 V
Engine @ 2500 RPM, Head Lamp should be OFF	20 V DC	Positive terminal	Negative terminal	Min: 14.0 V Max: 14.7 V

Electrical Checking Procedure

Pick-up Coil:

Measuring & Testing Equipment : Multimeter

Meter Range (Ohms)	Wire Connections		Standard Value
	Meter +ve	Meter -ve	
2 K Ohms	Green	Blue/White	180 ~ 220 Ohms

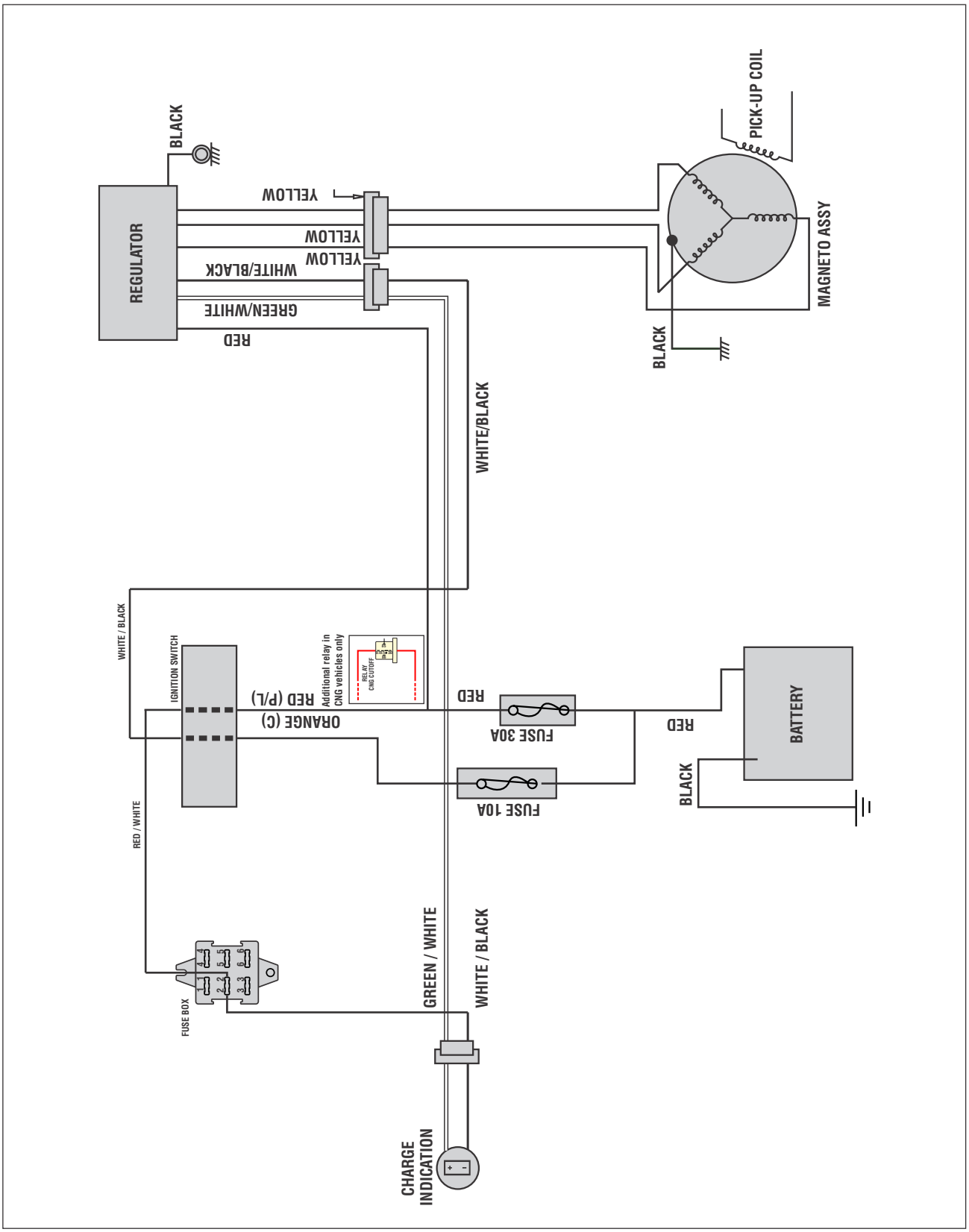
H.T.Coil:

Measuring & Testing Equipment : Multimeter

Meter Range (Ohms)	Wire Connections		Standard Value
	Meter +ve	Meter -ve	
Primary Winding			
200 Ohms	Black/Red or Black	Black/Yellow	0.4+0.7Ohms
Secondary Winding			
20 K Ohms	Black/Yellow	HT Cable Output	4.5~8 Ohms

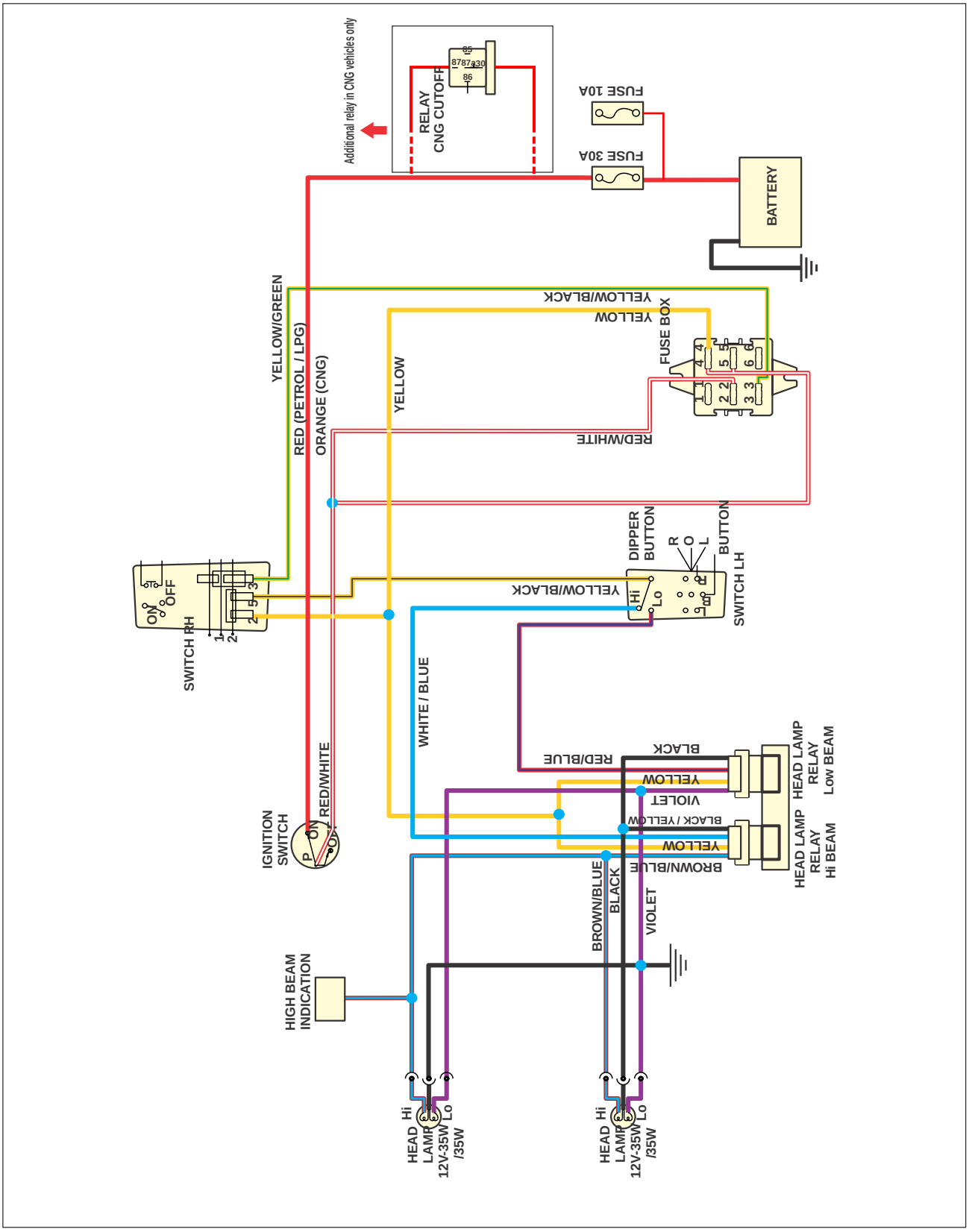
Electrical Circuit Diagrams

BATTERY CHARGING CIRCUIT (Petrol / LPG / CNG)



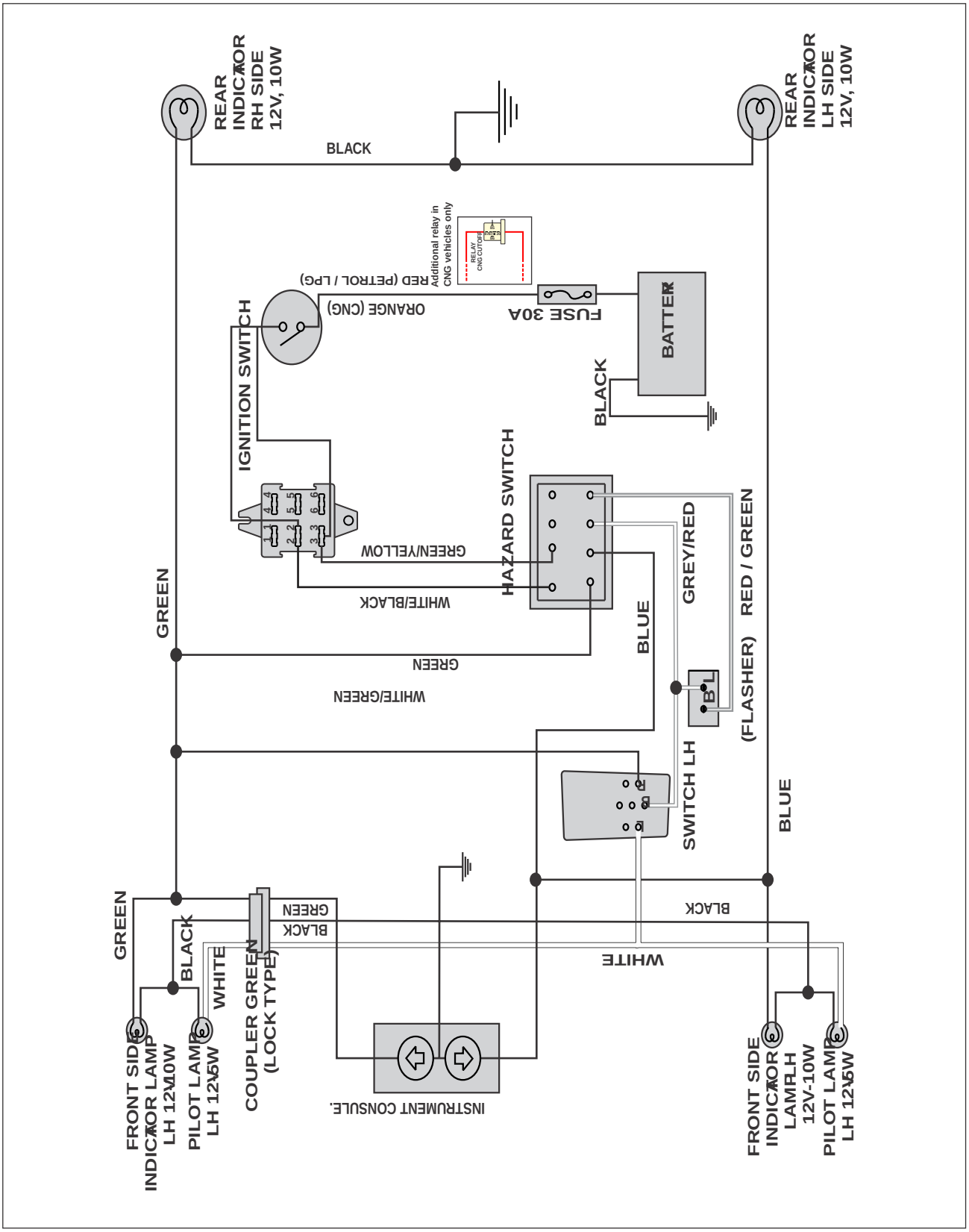
Electrical Circuit Diagrams

HEAD LAMP, HIGH BEAM-LOW BEAM CIRCUIT (LPG/CNG)



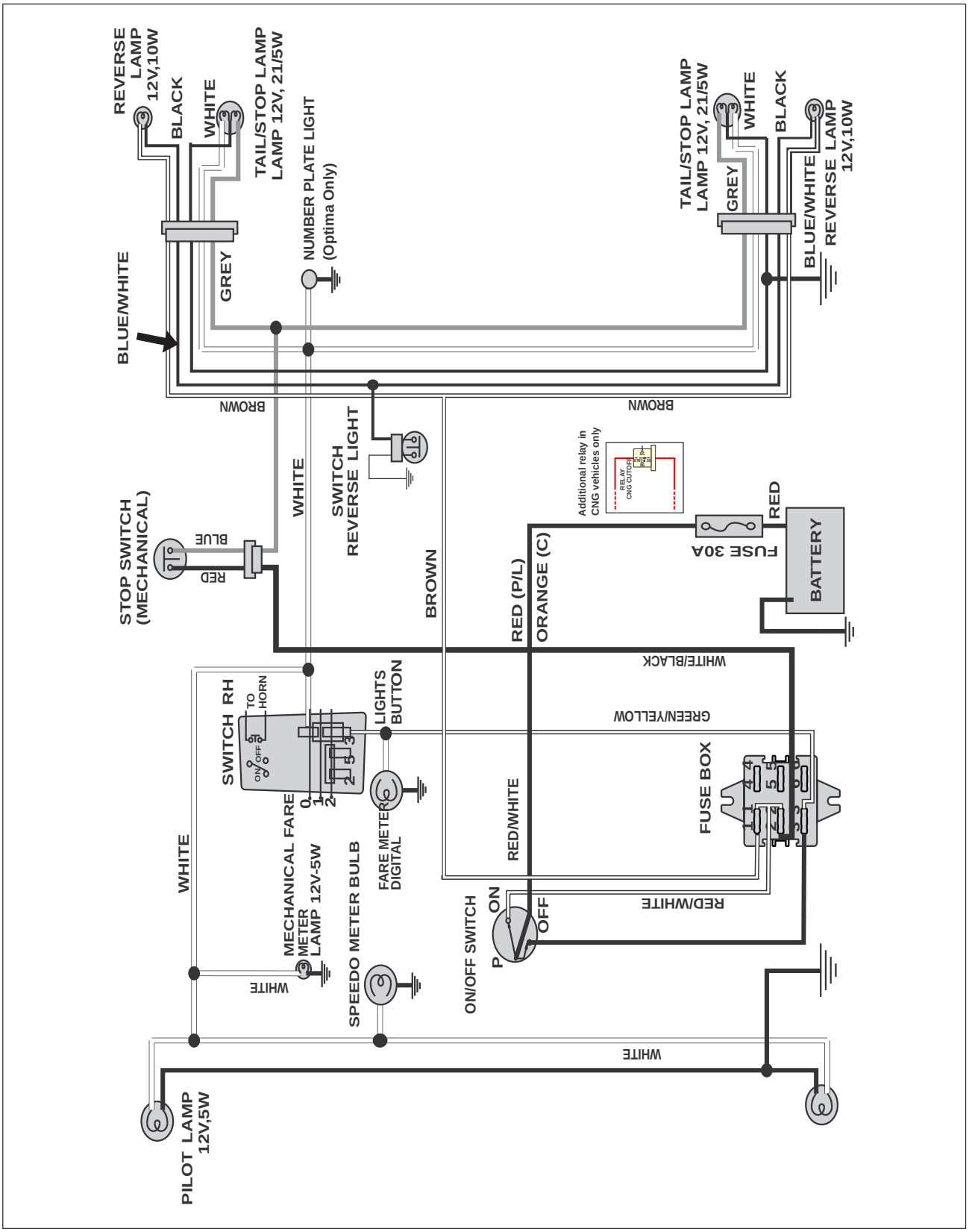
Electrical Circuit Diagrams

SIDE INDICATOR / HAZARD CIRCUIT (Petrol / LPG / CNG)



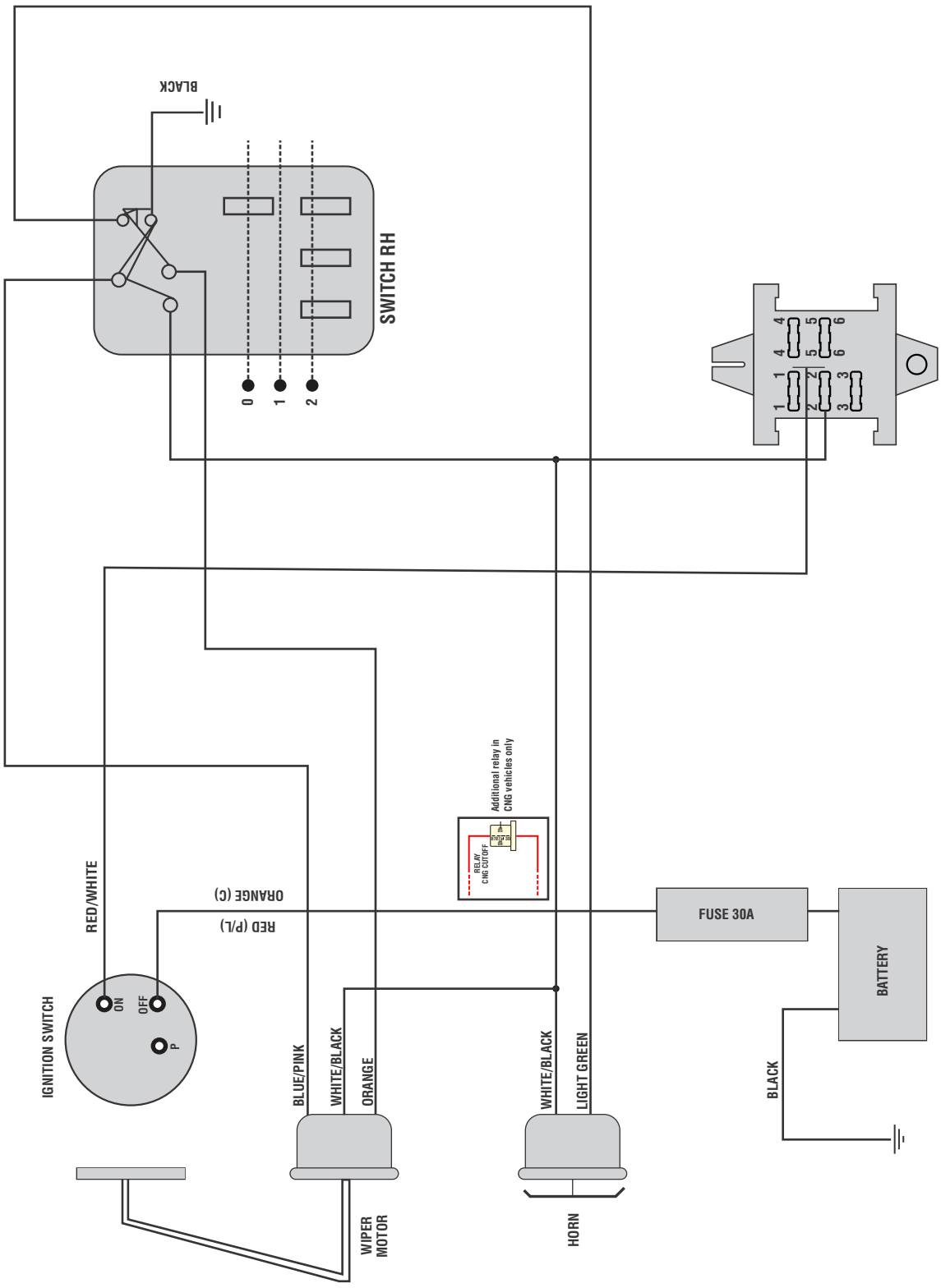
Electrical Circuit Diagrams

TAIL/STOP LAMP, PILOT & REVERSE LAMP CIRCUIT (Petrol / LPG / CNG)



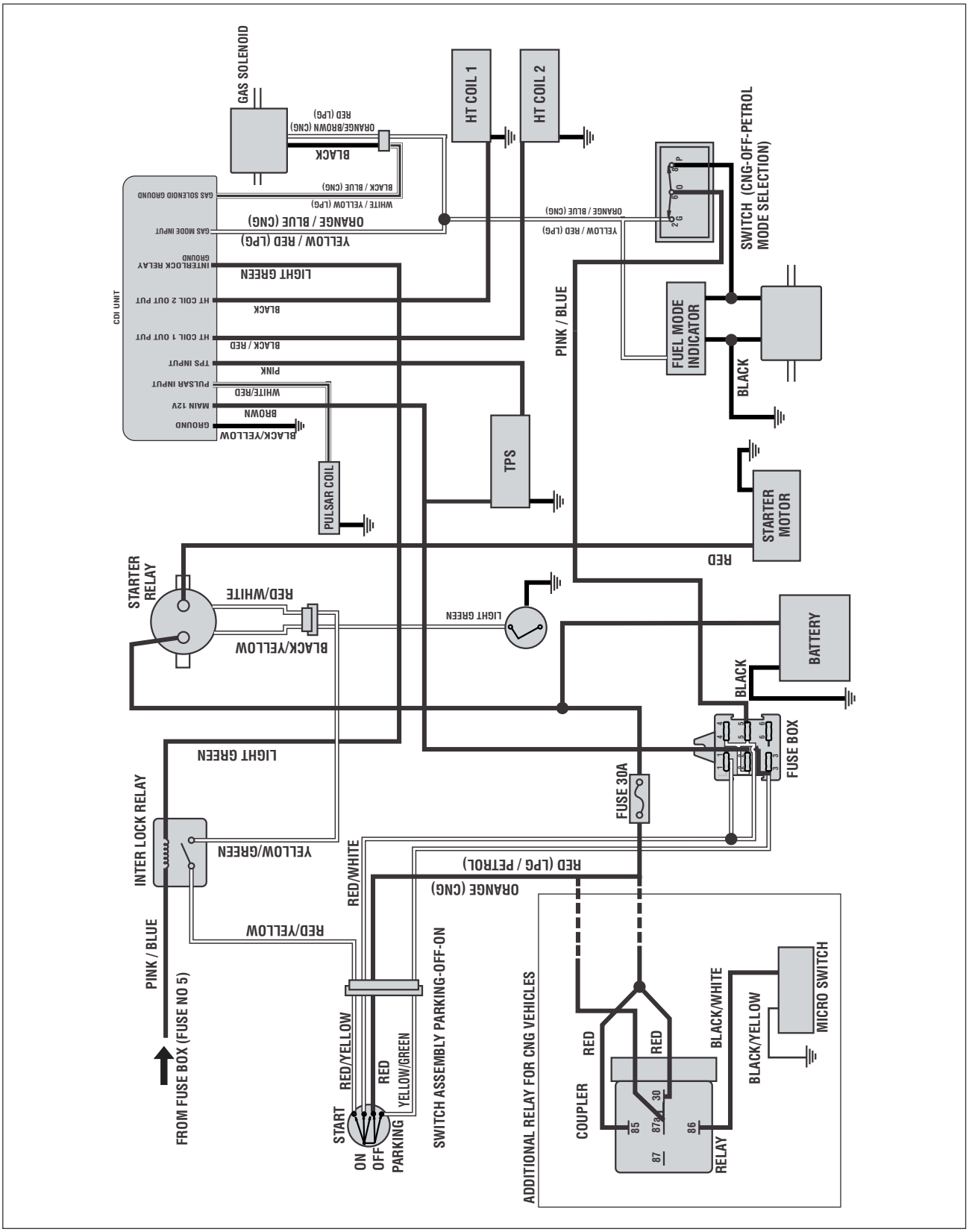
Electrical Circuit Diagrams

WIPER & HORN CIRCUIT (Petrol / LPG / CNG)



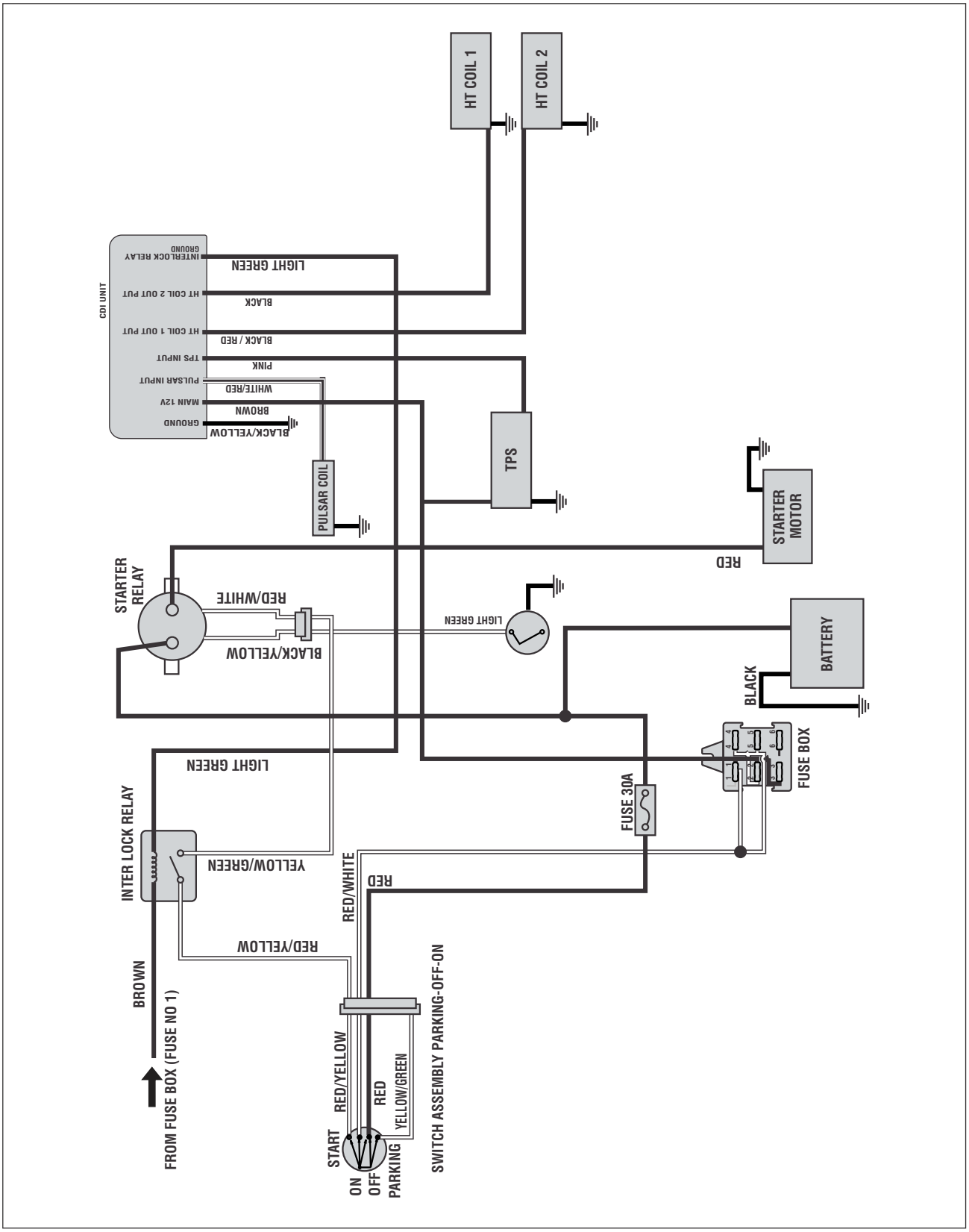
Electrical Circuit Diagrams

IGNITION / STARTER CIRCUIT (LPG / CNG)



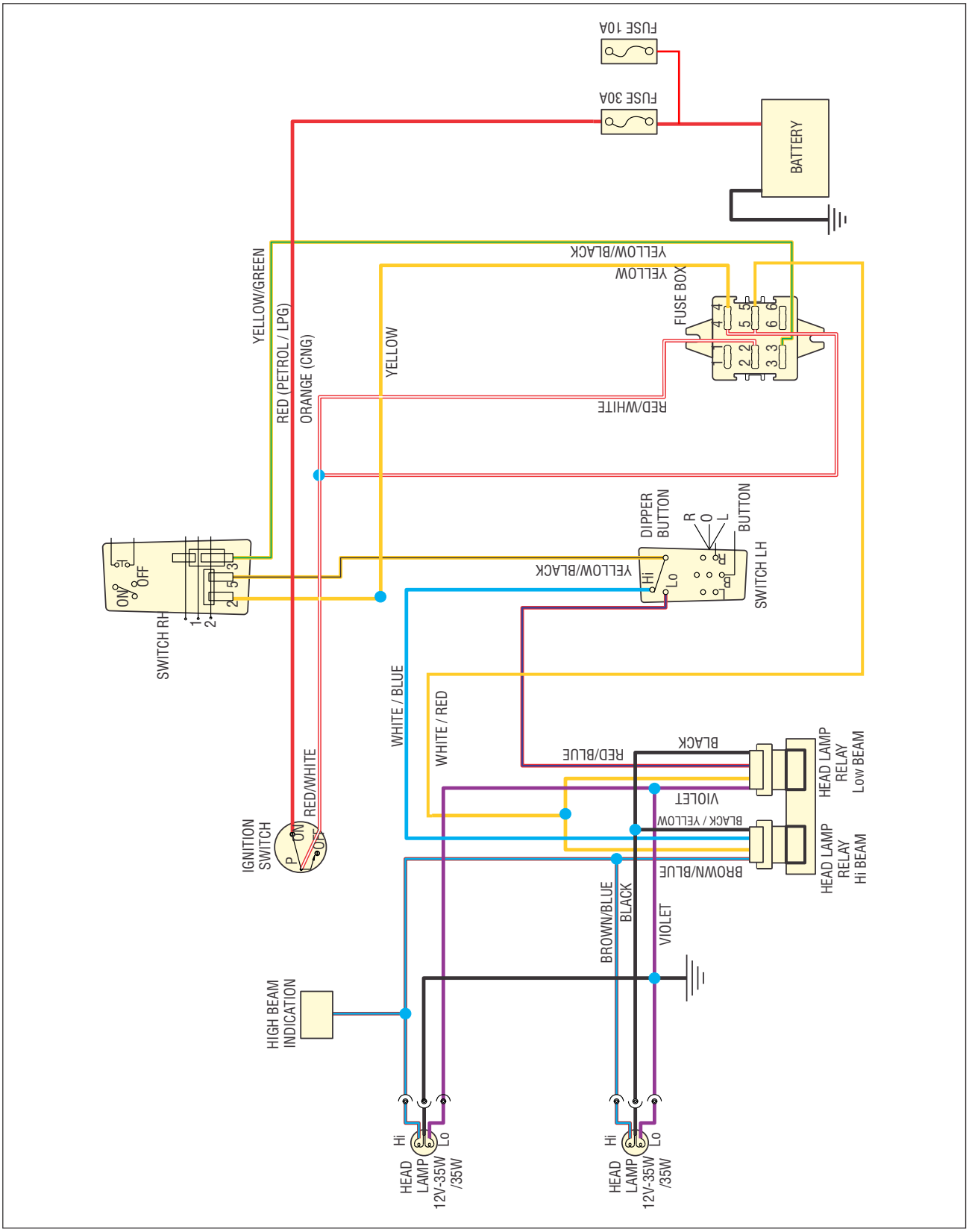
Electrical Circuit Diagrams

IGNITION / STARTER CIRCUIT (PETROL)



Electrical Circuit Diagrams

HEAD LAMP CIRCUIT (PETROL)



Notes

Bajaj Auto Limited
Akurdi Pune 411 035 India

Tel | +91 20 27472851
Fax | +91 20 27407385

www.bajajauto.com

CIN number : CIN L65993PN2007PLC130076