

ANDHRA PRADESH STATE ROAD TRANSPORT CORPORATION Mechanical Engineering Department

Office of the VC& MD, Bus Bhavan, Hyderabad - 624

No : OP3/462(3)/Volvo/2009-MED

CIRCULAR NO. 15/2009 - MED Dt.06.07.2009

- Sub: VEHICLES Maintenance of VOLVO buses- Issuing of comprehensive guidelines and Instructions Reg.
- Ref: 1. Circular No. 11/2003 MED Dt 08.04.2003.
 - 2. This Office Lr. No. OP3/462(12)/05-MED Dt. 11.04.2005.
 - 3. Circular No. 17/2005 MED Dt. 24.12.2005.
 - 4. This Office Lr. No. Even Dt. 02.11.2006 & 20.11.06 of CME (0).
 - 5. Circular No. 13/2007 MED Dt. 12.05.2007.
 - 6. Circular No. 19/2008 MED Dt. 05.09.2008.

1. INTRODUCTION:

Corporation has introduced Volvo B7R A/C buses in April 2003 as "Garuda" services, to meet the demand of high-end customers and inducted more number of Volvo buses in view of the good response and demand from the customers. At present 106 Volvo buses of Mark-1, Mark-2 and Mark-3 are in operation both on interstate & intrastate routes Spreading in 14 depots.

As the vehicles are having different features from the existing vehicles, adequate no.of drivers were trained by M/s VIPL at their Bengaluru training centre, so that only trained and qualified drivers are allowed to handle the vehicle. The technicians & Supervisors were also trained by M/s VIPL for carrying out the Preventive maintenance activities at Depot level itself.

Besides this, to impart on the job training to our technicians and also to make the depots self reliant in handling the vehicles without relying much on authorised service dealer, a Service Support agreement was also entered into with M/s VIPL for a period of six months. This Support was mainly confined to major centres like Hyd, VJA, VSP & TPT and other depots were attached to these sites. This arrangement has helped to a great extent to improve the confidence levels of technicians at depots.

In spite of taking all the precautions before inducting such high end vehicle into our fleet, the operational efficiency of these vehicle is far from satisfactory and complaints of unreliable operation are pouring in besides making these vehicles non available for operation for longer periods.

During the year 2008-09 about 2987 vehicle days were lost due to off road, thus resulting only in 92% fleet utilisation at corporate level. This is equivalent to keeping the vehicle off road for a period of one month on an average in a year. Scant attention is given at some of the depots to put these vehicles roadworthy, which is evident from the fleet utilisation ranging from 80% to 100%. Further the BD rate of these high end vehicles is also not upto the satisfactory level.

The analysis on expenditure incurred on these 106 vehicles shows that it is on high side and during the year 2008-09 it has gone up by almost 86 paise when compared to previous year.

All the above indicate, that the instructions issued by corporate office for maintenance of these vehicles is being neglected at various levels. It is noticed that, the vehicles are not given adequate time for attending to various basic attentions, resulting in increased risk of failure & heavy expenditure due to consequential damages.

Considering all the above, the following comprehensive instructions are once again issued for strict implementation.

2. MAINTENANCE OF THE VEHICLES:

WASHING & SWEEPING OF BUSES: since these vehicles are intended for elite customers, utmost care shall be taken to keep the vehicle in trim condition without giving scope for complaints. The following instructions may be followed for upkeep of Volvo vehicles:

- i) The flooring of the vehicle shall be swept daily using hand brush (not broomstick) & cleaned with Vacuum cleaner once in a week. Before sweeping, the carpet provided in the gangway and on the steps shall be removed and dusted, so as to avoid any dust inside the vehicle.
- Chemical washing of seats and Interior with fabric lining shall be undertaken during every basic service (roughly monthly once). Instructions were already issued through letter no. OP2/462(upkeep)/08-09-MED dated 15.07.08 for identifying the agency for such works and meeting the necessary expenditure with delegation of powers.
- iii) Vehicles shall not be washed with "Car washer" and exclusive men shall be provided with movable trolley for wiping the body & glasses with wet cloth/sponge. While cleaning, the liquid soaps alkaline in nature shall not be used since it affects the paint coating, which may fade in due course. The wind screen glass and side glasses shall be cleaned after wash with dry cloth to avoid strains on the glasses. Already instructions were issued through circular no. PD-15/2008, Dt. 25.02.2008 for providing extra men for washing & sweeping of Garuda buses, which may be followed while engaging the men through tender.
- iv) The head rest covers also shall be cleaned on daily basis with wet cloth and when ever cracks on the cover are observed on the foam Rexine covers, they shall be replaced immediately. The cracked head rest cover gives feeling of irritation to the commuter.
- v) The side curtains shall be replaced with spare curtains during every basic service.

PREVENTIVE MAINTENANCE SCHEDULES:

As in the case of other vehicles, the Volvo vehicles shall be undertaken for preventive maintenance on Daily (Schedule-I), weekly (Schedule-II), basic service at every 25000KMs for Mark-1&2 and 30000 KMs for Mark-3(Schedule-III) and Annual service at every 1,00,000 KMs for Mark-1&2 and 1,20,000 KMs for Mark-3(Schedule-IV).

The preventive maintenance due statement generated through VEMAS shall also reflect the programme of VOLVO vehicles, which include Schedule-II, Schedule-III, Schedule-IV, Filter changes, Oil changes, Coolant changes, Air filter changes etc., depending on the periodicity prescribed. The backlog on maintenance shall be reviewed at various levels and corrective action shall be taken.

DAILY (Schedule-I) MAINTENANCE: Besides washing and sweeping, the Daily maintenance include checking of Oils, Coolant, Tyre inflation & replenishment if necessary, Belt tension, functioning of wiper, fuses, all lights, vision mirror, retarder dash board warning lamp and attending running repairs & log sheet complaints. The details of inspection to be carried during Schedule-I are given at **Annexure-A**.

WEEKLY (Schedule-II) MAINTENANCE: The weekly maintenance includes daily maintenance and activities like Battery maintenance, Lubrication, Inspection of silencer bedding, under chassis, Tightness check of Shack absorber mounting, Fuel Tank mounting bolts etc. Draining of water from water separator, tapping of cyclone filter, cleaning of radiator and Inter cooler and Air filter etc. The details of inspection to be carried during Schedule-II are given at **Annexure-B**.

BASIC SERVICE(Schedule-III): The basic service will be carried out at every 25000 KMs in case of Mark-1&2 vehicles and 30000 KMs for Mark-3 vehicles. The vehicle shall be stopped invariably for full day for attention of Basic Service. The date of carrying out Basic service should be intimated in advance to the concerned, for alternate arrangement of operation of service. The reservation of the service on the day of basic service attention may be stopped in order to avoid constraint to supply the vehicle for operation.

The basic service includes daily, weekly service and activities like Engine oil change, Engine oil filter change, HSD oil filter change and checking of the plays and adjustment of Fan Hub bearing, Clutch etc. The details of basic service check list during Schedule-III for Mechanic and other Artisan are given at Annexure-C.

ANNUAL SERVICE (Schedule-IV): Every 4th Basic service i.e., 1.00 lakh Kms for Mark-1&2 and 1.20 lakh Kms for Mark-3 is called as Annual service. The vehicle should be stopped invariably for attention of Annual Service for 1 or 2 days basing on the requirement. The Annual service includes daily, weekly, Basic service and activities like FIP timing, Injector pressure, Tappet clearance, Radiator & inter cooler servicing, Wheel alignment, Torque tightening etc. The details of basic service check list during Schedule-IV for Mechanic and other Artisan are given at Annexure-D.

Preferably, the vehicles shall be fixed to the mechanics for carrying out Schedule-I, II, III, IV. So that the preventive maintenance is carried effectively.

3. TOOLS AND T&P REQUIREMENT:

TOOLS: The list of Basic tools and Special tools required for maintenance was already communicated as Annexure-C and Annexure-B through Volvo Service Support Agreement. Instructions were also issued for procurement of the same and use invariable to carryout preventive maintenance. If any of the depots are not having the regular special tools and other tools action shall be taken immediately for procurement of the same. The list of the same special tools & other tools are once again enclosed at **Annexure -E** for convenience of the field people.

Further, it is observed that the special tools for removal and fitment of tubeless tyres are not available at some of the Volvo operating depots. Hence the Depot Managers are advised to procure the tool kit and Tiger grease required to assemble tubeless tyre from the authorised supplier whose address is given below:

M/s Sarveshwari Technologies Limited 355, Deepali, Pitampura, New Delhi, 110 034. Phone no. 011-27023750, Fax: 011- 27011629 Website: www.sarveshwari.com, www.garageequipment.com

4. STOCKING OF VOLVO SPARES:

The list of essential spares to be stocked at depots for Volvo Mark-1, Mark-2 and Mark-3 (9400) are given at Annexure-F. Unless the stocks are available at the depots, it is not possible to carry out preventive maintenance. Further extending the life of spare beyond its life, may result in consequential damage and increases expenditure in future.

All the Depot Managers are advised to keep sufficient stocks based on the number of Volvo buses. The Dy. CMEs shall workout the requirement of these spares and to be discussed during LFC (Limit Fixation Committee). All the COSs are advised to keep the required stock of Volvo spares as per the LFC decisions.

5. FLOAT AGGREGATES:

Though the life of the aggregates is considerably high when compared to other vehicles, there is a need to provide float aggregates & major spares to minimise the vehicle off road days. Previously sanctions were given for provision of float assembly in respect of FIP's, Injectors, Self Starter, Alternator, Radiator assembly etc. it is proposed to provide one set of minor float aggregates like FIP's, Injectors, Self Starter, Alternator, Radiator assembly, Turbocharger etc., for a fleet of upto 10 Volvo vehicles, two sets for a fleet of 10-20 Volvo vehicles and three sets for a fleet of above 20 vehicles.

However, in case of Engine & Gearbox, we can provide one float Engine & Gear box at Uppal workshop and another set at Vijayawada workshop, which can be utilised by the depots in emergency.

The above float aggregates for Mark-I & II can be developed from the vehicles that are going to be stabled for scrap after taking into consideration of present float and there is no need to purchase separately. Only for Mark-3 vehicles, there is a need to provide Injector sets as float, UPL and VJA procure from M/s Volvo. Separate sanction may be taken for the same.

The Works Managers are advised to gear up for overhauling of Engines at the workshop itself, duly making necessary arrangement for procurement of tools required and imparting training to the mechanics. Under no circumstance the loose spares from the float aggregate shall be given to the depots.

Further, the FIPs & Injectors can be directly get overhauled at BOSCH authorised service centre (M/s Secunderabad Engineering Corporation) instead of sending the same to M/s Sree Harsha.

6. MID TERM ATTENTION:

During the brainstorming session conducted at corporate office on Volvo vehicles, majority of officers and supervisors have opined that, there is a need to refurbish the vehicle at around 7.00 lakh KMs, so as to get an extended life from the same.

In this connection it is proposed to undertake a 'mid term attention' at around 7.00 lakh KMs, wherein the engine top overhaul and body refurbishing is undertaken after physically inspecting the engine for 'compression' test and body for its condition in respect of upholstery, panels, structure, painting etc.

The Dy. CME of the region shall organise this exercise and give recommendations for the works to be undertaken during midterm attention.

7. SCRAPPING POLICY:

Corporation has taken a decision for replacement of Volvo vehicles at a mileage of 10.00 lakh KMs basing on the economics of operation. However, the scrapping of the vehicle is purely on the condition of the vehicle and ongoing expenditure to be incurred for continuation of operation of vehicle.

In this connection, instructions were issued vide letter no. R&D/Misc(60)/06 dated 13.03.08 for inspection of the vehicle after crossing 10.00 lakh KMs by the committee consisting of Dy.CME & Dy. CTM of the region for the recommendation on either for scrapping or for continuation of the vehicle operating on short distance routes duly incurring minimum expenditure. For the convenience of the committee, a proforma is designed and communicated vide letter no. *Volvo/ Scrapreport/08-MED, dt.05.09.2008* which can be utilized for inspection of the vehicle and giving recommendations.

While submitting the proposal, the committee shall also recommend the vehicle to be kept in auction in ' as is where is condition ' i.e., in running condition, or duly fitting the scrap aggregates, so as to facilitate in obtaining the approval of competent authority.

Further, for the convenience of the 'Upset value committee; the weights of individual aggregates & components of the vehicles were communicated vide letter no. Volvo/Upsetvalue/08-MED dated 03.10.08, which can be taken into consideration for arriving at the 'Upset Value' of the vehicles kept in auction.

8. PERFORMANCE REVIEW:

One of the reasons for large variation in the performance of the vehicles is due to lack of review and inspection at various levels. The instructions were already issued for submission of the operational data of these vehicles in three parts, vide letter no. OP3/462(13)/04-MED Dt. 25.09.07 and it can be utilised for compilation at Regional, Zonal & Corporate level and may be reviewed regularly.

The Regional Managers have to bestow their personal attention for reviewing the performance during the Depot Managers meeting and shall also organise for inspection of the vehicles at bus stations and depot at random for the upkeep and condition of the vehicles. The Dy. CMEs shall cover the inspection of these vehicles during their depot visit and special note shall be given in the inspection report. They shall also ensure implementation of the Preventive maintenance checklist communicated for the improved health of the vehicle and reduced expenditure.

The Depot Managers are advised to ensure the implementation of the above instructions in the true spirit and enhance the image of these vehicles among the commuters.

VICE CHAIRMAN & MANAGING DIRECTOR

Encl : As above

То

All Depot Managers.

Copy to: Dir (Vig. & security), ED (E&IT), ED (O&MIS), ED (A&P), FA, CAO & OSD & Secretary to Corporation for information

- Copy to: All ED (Zones) for information.
- Copy to: CCOS, CME (O), CME(C&B), CM(R&T), CFM, CAO, CA for information

Copy to: CE(IT) with an advice to incorporate the above maintenance schedules in the VEMAS module.

Copy to: All Regional Managers for necessary action.

Copy to: All Dy.CMEs/WMs/COSs for necessary action

Copy to: All Dy.CAOs & AOs for information.

Copy to: Dy.CME(C&B), Dy,CME(IEU), Dy.CME(P) for information.

Copy to: Principal, TA/HPT, & all ZSTCs.

Copy to: Manual section, H.O.

Copy to: All Maintenance in-charges for necessary action.

SCHEDULE-I : Daily Work list

MECHANIC:

- 1. Check all Oil/Coolant levels Top-up if required,
- 2. Check for Oil/Fuel/Coolant leakages arrest if required.
- 3. Check Accelerator Cable Ball Joints for play and Cable for alignment with Outer.
- 4. Check for EPG (Exhaust Pressure Governor) function i.e., for proper connection and function of Solenoid switch.
- 5. Check Engine rubber mountings for damage and replace if damaged
- 6. Check Air filter indicator, clean if required. The cleaning should be done by rolling the filter on plane surface. **Do not** use **pressurised air**, which may damage/ puncture the filter.
- 7. Tap cyclone filter to remove dust.
- 8. Check Hose pipe and clamping from Air filter to inlet, attend if required
- 9. Check noise in Fan hub bearing and Idler pulley, change if required.
- 10. Check all belts for wear and damages, replace if required.
- 11. Check belt tensioner for proper function
- 12. Check AC Return Air Filter Clean if dust is collected
- 13. Check AC Drive belts for proper tension and wear & tear
- 14. Check AC Condenser coil for clogging & obstructions
- 15. Check the AC refrigerant fittings and the compressor for any oil and dirt, which indicates leakage, attend if required.
- 16. Check all nuts and bolts of Under chassis for proper tightness
- 17. Check air leakages from pressure line, Air drier regulator etc.
- 18. Check for Oil traces/Water from air tank.
- 19. Check Reaction rod , bolts of Differential unit for tightness.
- 20. Check Air bellow for proper function and arrest leakages if any.
- 21. Check condition of Air bellow levelling valve ball joint seating.
- 22. Check Gear lever ball joints for play, attend if required
- 23. Check Tyre inflation in all tyres including spare and correct if required. (for Mark-1 i.e., 11.00 R 20 tyres: Front- 110 PSI / 7.70 Kg/Cm², Rear-105 PSI / 7.35 Kg/Cm² and for Mark-2 &3 i.e., 295/80 R 22.5 Tubeless tyres: Front- 115 PSI/ 8.10 Kg/ Cm², Rear-120PSI/ 8.45 Kg/ Cm²)
- 24. Check for tyre NSD and uneven wear.
- 25. Check the AC hoses for wear and improper routing , correct if required.
- 26. Check for proper function of Speedometer, which has direct effect on retarder function.
- 27. Check for proper function of all gauges in dash board, attend if necessary.
- 28. Attend log sheet complaints/Driver reports.
- 29. Any other work as entrusted by superiors.

ELECTRICIAN:

- 1. Check all lights, replace if required, check fuses, replace if required.
- 2. Check Warning lamps function with buzzer, replace if required
- 3. Check Alternator charging, the out voltage should be 28 Volts.
- 4. Check Battery Electrolyte leak, keep the batteries clean and keep the batteries intact.
- 5. Check for retarder function and observe for Retarder fault code, attend if required.
- 6. Check for loose contacts in Electrical Connectors of AC system, correct if required.
- 7. Check for AC Condenser & Evaporator Fan Operation.
- 8. Check for Cooling Efficiency $(22^{\circ} C)$.
- 9. Attend log sheet complaints/Driver reports.
- 10. Any other work as entrusted by superiors

COACH BUILDER:

- 1. Check for proper functioning of Passenger & Driver doors
- 2. Check for proper functioning of Rear view mirrors
- 3. Check for Driver seat adjustment
- 4. Check for proper functioning of Luggage compartment doors
- 5. Check for proper functioning of Passenger seats, inclination mechanism
- 6. Attend log sheet complaints/Driver reports.
- 7. Any other work as entrusted by superiors.

SCHEDULE-II : Weekly Work list

All items of Daily work list and the following items to be attended.

MECHANIC:

- Lubricate all greasing points (17 points for Mark-1 i.e., 4-Slack Adjusters, 4- 'S' cam bushes, 2- PP shaft UJ cross & Yoke, 2- King Pin bottom, 4- King pin Top, 1-Steering Damper and 1 point (Steering Damper)for Mark-2 & 3).
- 2. Check proper functioning of Coolant level sensor. Takeout the Coolant level sensor from the reservoir and check for buzzer sound & warning glow indication in dash board.
- 3. Check for Brake liner life and stroke (for Mark-I Adjust if required.).
- 4. Clean Radiator and Intercooler by external flushing. Use pre regulated jet for avoiding damage of fins. Caution: precaution must be taken to avoid damage of fins while performing cleaning of Radiator and Intercooler.
- 5. Check for Silencer mounting pads for damage, replace if required.
- 6. Clean Air Filter. To clean Air filter just roll on level surface. Do not use compressed air for cleaning, which may damage/ puncture the Air filter.
- 7. Check for proper tightness of Fuel tank mounting bolts, proper padding and Strap fitment.
- 8. Check for Shock absorber mounting for proper tightness and function of Shock absorbers.
- 9. Check for Clutch fluid level, function of Master cylinder (i.e., free movement) Check & attend if required
- 10. Check for Clutch Play, i.e., Basic setting for Mark-1 is 95-105 mm, for Mark-2 & 3 is 165 to 195. the Stroke length should be 27 to 30 mm for all three Models.
- 11. Check for Rear and Front Wheel Hub Bearing noise.
- 12. Check for Rear and Front Wheel Hub and Disc spline play for Mark-2 and 3
- 13. Check for AC Compressor Oil Level after 15 minutes of operation.
- 14. Check for tightness AC Compressor mounting bolts.
- 15. Check for damage of AC Compressor Rubber mounting, replace if required.
- 16. Check for AC Refrigerant Pressure / Level.
- 17. Drain Condensate Water from AC system.
- 18. Attend log sheet complaints/Driver reports.
- 19. Any other work as entrusted by superiors

ELECTRICIAN:

- 1. Check for Battery Electrolyte level & replenish as per requirement.
- 2. Check for Battery specific Gravity, and application of Jelly on terminals.
- 3. Check for proper functioning of AC Fuses in Relay Panel.
- 4. Check for proper function of AC Main Fuse 150 / 200 Amps
- 5. Attend log sheet complaints/Driver reports.
- 6. Any other work as entrusted by superiors

TYRE MECHANIC:

- 1. Check for tyre inflation and correct.
- 2. Check for tyre NSD and uneven wear.
- 3. Attend log sheet complaints/Driver reports.
- 4. Any other work as entrusted by superiors

SCHEDULE-III : Basic Service Work list

(At Every 25,000 Kms for Mark-1 & 2 and At Every 30,000 Kms for Mark-3 vehicles) MECHANIC:

- 1. Chassis lubrication
- 2. Check coolant for contamination and coolant level.
- 3. Check drive belts for damage.
- 4. Check of Radiator fan, bearing play, fan shroud and fan ring with rubber seal.
- 5. Check of Radiator rubber mountings for wear & tear.
- 6. Check for Intercooler inspection for leakages.
- 7. Change engine oil & filter and check for any foreign particle in decanted oil.
- 8. Check Belt tensioner condition for noise and free movement.
- 9. Check for exhaust leakage and arrest if required.
- 10. Check for EPG (Exhaust Pressure Governor) function i.e., for proper connection and function of Solenoid switch.
- 11. Check for proper mounting of alternators.
- 12. Check engine rubber mountings for damage and replace if required.
- 13. Check Engine idling speed and adjust if required.
- 14. Check Intake manifold and hoses for leakage and for proper routing, attend if required.
- 15. Check Turbocharger rotor free rotation i.e., shaft play and for oil leakage, attend if required.
- 16. Check fuel pipes for proper routing and leakage, attend if required.
- 17. Check for proper fuel tank mounting, inter connecting hoses, venting and mounting, attend if required.
- 18. Replace water separator if due, otherwise check water separator for fuel system, drain condensation.
- 19. Check Fuel filter protection plate for proper mounting.
- 20. Clean Fuel tank Strainer.
- 21. Check function of Pneumatic fuel stop Cylinder.
- 22. Check Anti-roll bar Bushes for wear & tear.
- 23. Check V-stay rod Bushes for wear & tear.
- 24. Check wear & tear of Reaction rod bushes.
- 25. Check tightening torque of 650 Nm for 'U' bolts(Rear Axle) and 'I' bolts (Front Axle).
- 26. Check for gear shifting movement, attend if required.
- 27. Check gear shift linkage and clutch pedal for play, attend if required.
- 28. Check bearing clearance in pinion and rear axle input shaft. Leakage would be indication of damage of oil seal and shaft play.
- 29. Replace gear oil if due, check oil leakage from gearbox, tightness bolts.
- 30. Check propeller shaft, universal joints, sliding joints for play and attend if required.
- 31. Check Rear axle round bolts for tightness.
- 32. Clean Rear axle breather.
- 33. Check of seals for speedometer sensor and joint coupling.
- 34. Check oil level in rear axle.
- 35. Check slack in mechanical linkage for clutch.
- 36. Check oil level in Gearbox.
- 37. Clean gearbox breather.
- 38. Checking fluid level in the clutch fluid reservoir.
- 39. Check of AC compressor for proper function.
- 40. Check fluid levels in windscreen fluid reservoirs.
- 41. Check function of wipers, attend if required.
- 42. Check air drier (condensation), replace filter insert if due.
- 43. Check brake disks and brake callipers for Mar-2 & 3, attend if necessary.
- 44. Check function of Parking brake and Blocking valve.
- 45. Check Brake chamber mounting and proper function.
- 46. Check life of brake liner for Mark-1/Brake pads for Mark-2 & 3 and replace if required.
- 47. Check compressed air lines and hoses for proper routing and for air leakage, attend if required.
- 48. Check Retarder oil leakage and check coolant hose condition.
- 49. Check oil level in retarder
- 50. Check function of service brakes
- 51. Check Slack adjuster function. Adjust brake for Mark-1 vehicles.
- 52. Check air drier

- 53. Check steering link system for play and attend if required.
- 54. Check for tightness on power steering pump mounting, for oil leakages and contamination of oil, attend if necessary.
- 55. Check oil level for power steering
- 56. Check for King pin play and Front hub play, attend if required.
- 57. Check condition of air bellows, level sensors (mark-3) and level valves of air suspension, attend if required.
- 58. Check rear wheels hubs for noise and play, attend if required.
- 59. Check tightness of Front and Rear Hubs.
- 60. Check Rear & Front Wheel Hub Disc spline play and attend if required.
- 61. Check for un even wear of tyre and attend accordingly.
- 62. Attend log sheet complaints/Driver reports and complaints repeated (Vehicle back history).
- 63. Any other work as entrusted by superiors

ELECTRICIAN:

- 1. Check for proper function of speedometer, instruments panel.
- 2. Check loose contacts in Electrical Connectors.
- 3. Check fault codes in the vehicle control units and attend if required.
- 4. Check batteries for- dust, leakage, acid density, liquid level, connections and battery box condition, attend if required.
- 5. Check for proper function of driver's controls and attend if required.
- 6. Check all Electrical connections and cables of alternators, starter motor for proper routing.
- 7. Check for proper functioning of retarder controls, PP (Proportionate) Valve connection routing and keep it dust free.
- 8. Check for proper functioning of warning symbols, control lamps and buzzer.
- 9. Function check of all lamps.
- 10. Start of engine and check of starter functioning.
- 11. Check alternator for voltage output of 28 Volts, attend if required.
- 12. Check AC Condenser & Evaporator Fan for proper Operation.
- 13. Check AC system Cooling Efficiency (22° C)
- 14. Check all AC Fuses in Relay Panel for proper function.
- 15. Check AC Main Fuse 150 / 200 Amps for proper function.
- 16. Attend log sheet complaints/Driver reports and complaints repeated (Vehicle back history).
- 17. Any other work as entrusted by superiors

COACH BUILDER:

- 1. Check proper function of rear-view mirrors and attend if required.
- 2. Check for proper functioning of Door opening and closing.
- 3. Check for Luggage compartment doors and locks for proper functioning.
- 4. Check for Sun roofs
- 5. Check for proper fitment of body side panels and waist rail.
- 6. Check for proper fitment of Windscreen glass and windows glasses, attend if required.
- 7. Check Driver's seat condition and seat adjustment, attend if required.
- 8. Check for availability of Hammer to break the emergency glass if necessary.
- 9. Check Floor, floor hatches for proper condition and rectify if required.
- 10. Check all Passenger seat condition and attend if required.
- 11. Check proper functioning of Roof hatches and attend if required.
- 12. Check all Seats for proper Inclination mechanism and attend if required..
- 13. Attend log sheet complaints/Driver reports and complaints repeated (Vehicle back history).
- 14. Any other work as entrusted by superiors

TYRE MECHANIC:

- 1. Check for tyre inflation and correct.
- 2. Check for tyre NSD and uneven wear.
- 3. Attend tyre rotation and also disc rotation if required.
- 4. Attend log sheet complaints/Driver reports and complaints repeated (Vehicle back history).
- 5. Any other work as entrusted by superiors

SCHEDULE-IV : Annual Service Work list

(At Every 1,00,000 Kms for Mark-1 & 2 and At Every 1,20,000 Kms for Mark-3 vehicles)

MECHANIC:

- 1. Chassis lubrication
- 2. Check coolant for contamination and coolant level.
- 3. Check drive belts for damage.
- 4. Check of Radiator fan, bearing play, fan shroud and fan ring with rubber seal.
- 5. Check of Radiator rubber mountings for wear & tear.
- 6. Check for Intercooler inspection for leakages.
- 7. Change engine oil & filter and check for any foreign particle in decanted oil.
- 8. Check Belt tensioner condition for noise and free movement.
- 9. Check for exhaust leakage and arrest if required.
- 10. Check for EPG (Exhaust Pressure Governor) function i.e., for proper connection and function of Solenoid switch.
- 11. Check for proper mounting of alternators.
- 12. Check engine rubber mountings for damage and replace if required.
- 13. Check Engine idling speed and adjust if required.
- 14. Check Intake manifold and hoses for leakage and for proper routing, attend if required.
- 15. Check Turbocharger rotor free rotation i.e., shaft play and for oil leakage, attend if required.
- 16. Check Tappet clearance and adjust accordingly.
- 17. Injector Pressure testing to be done.
- 18. Check fuel pipes for proper routing and leakage, attend if required.
- 19. Check for proper fuel tank mounting, inter connecting hoses, venting and mounting, attend if required.
- 20. Replace water separator if due, otherwise check water separator for fuel system, drain condensation.
- 21. Check Fuel filter protection plate for proper mounting.
- 22. Clean Fuel tank Strainer.
- 23. Check function of Pneumatic fuel stop Cylinder.
- 24. Check Anti-roll bar Bushes for wear & tear.
- 25. Check V-stay rod Bushes for wear & tear.
- 26. Check wear & tear of Reaction rod bushes.
- 27. Check tightening torque of 650 Nm for 'U' bolts(Rear Axle) and 'I' bolts (Front Axle).
- 28. Check for gear shifting movement, attend if required.
- 29. Check gear shift linkage and clutch pedal for play, attend if required.
- 30. Check bearing clearance in pinion and rear axle input shaft. Leakage would be indication of damage of oil seal and shaft play.
- 31. Replace gear oil if due, check oil leakage from gearbox, tightness bolts.
- 32. Check propeller shaft, universal joints, sliding joints for play and attend if required.
- 33. Check Rear axle round bolts for tightness.
- 34. Clean Rear axle breather.
- 35. Check of seals for speedometer sensor and joint coupling.
- 36. Check oil level in rear axle.
- 37. Check slack in mechanical linkage for clutch.
- 38. Check oil level in Gearbox.
- 39. Clean gearbox breather.
- 40. Replace Inertia mass Bearing for Mark-2 vehicles
- 41. Checking fluid level in the clutch fluid reservoir.
- 42. Check of AC compressor for proper function.
- 43. Check fluid levels in windscreen fluid reservoirs.
- 44. Check function of wipers, attend if required.
- 45. Check air drier (condensation), replace filter insert if due.
- 46. Check brake disks and brake callipers for Mar-2 & 3, attend if necessary.
- 47. Check function of Parking brake and Blocking valve.
- 48. Check Brake chamber mounting and proper function.
- 49. Check life of brake liner for Mark-1/Brake pads for Mark-2 & 3 and replace if required.
- 50. Check compressed air lines and hoses for proper routing and for air leakage, attend if required.
- 51. Check Retarder oil leakage and check coolant hose condition.

- 52. Check oil level in retarder
- 53. Check function of service brakes
- 54. Check Slack adjuster function. Adjust brake for Mark-1 vehicles.
- 55. Check air drier
- 56. Check steering link system for play and attend if required.
- 57. Check for tightness on power steering pump mounting, for oil leakages and contamination of oil, attend if necessary.
- 58. Check oil level for power steering
- 59. Check for King pin play and Front hub play, attend if required.
- 60. Check condition of air bellows, level sensors (mark-3) and level valves of air suspension, attend if required.
- 61. Check rear wheels hubs for noise and play, attend if required.
- 62. Check tightness of Front and Rear Hubs.
- 63. Check Rear & Front Wheel Hub Disc spline play and attend if required.
- 64. Check for un even wear of tyre and attend accordingly.
- 65. Attend log sheet complaints/Driver reports and complaints repeated (Vehicle back history).
- 66. Any other work as entrusted by superiors

ELECTRICIAN:

- 1. Check for proper function of speedometer, instruments panel.
- 2. Check loose contacts in Electrical Connectors.
- 3. Check fault codes in the vehicle control units and attend if required.
- 4. Check batteries for- dust, leakage, acid density, liquid level, connections and battery box condition, attend if required.
- 5. Check for proper function of driver's controls and attend if required.
- 6. Check all Electrical connections and cables of alternators, starter motor for proper routing.
- 7. Check for proper functioning of retarder controls, PP (Proportionate) Valve connection routing and keep it dust free.
- 8. Check for proper functioning of warning symbols, control lamps and buzzer.
- 9. Function check of all lamps.
- 10. Start of engine and check of starter functioning.
- 11. Check alternator for voltage output of 28 Volts, attend if required.
- 12. Check AC Condenser & Evaporator Fan for proper Operation.
- 13. Check AC system Cooling Efficiency (22° C)
- 14. Check all AC Fuses in Relay Panel for proper function.
- 15. Check AC Main Fuse 150 / 200 Amps for proper function.
- 16. Attend log sheet complaints/Driver reports and complaints repeated (Vehicle back history).
- 17. Any other work as entrusted by superiors

COACH BUILDER:

- 1. Check proper function of rear-view mirrors and attend if required.
- 2. Check for proper functioning of Door opening and closing.
- 3. Check for Luggage compartment doors and locks for proper functioning.
- 4. Check for Sun roofs
- 5. Check for proper fitment of body side panels and waist rail.
- 6. Check for proper fitment of Windscreen glass and windows glasses, attend if required.
- 7. Check Driver's seat condition and seat adjustment, attend if required.
- 8. Check for availability of Hammer to break the emergency glass if necessary.
- 9. Check Floor , floor hatches for proper condition and rectify if required.
- 10. Check all Passenger seat condition and attend if required.
- 11. Check proper functioning of Roof hatches and attend if required.
- 12. Check all Seats for proper Inclination mechanism and attend if required..
- 13. Attend log sheet complaints/Driver reports and complaints repeated (Vehicle back history).
- 14. Any other work as entrusted by superiors

TYRE MECHANIC:

- 1. Check for tyre inflation and correct.
- 2. Check for tyre NSD and uneven wear.
- 3. Attend tyre rotation and also disc rotation if required.
- 4. Wheel Alignment to be done.
- 5. Wheel balancing to be done
- 6. Attend log sheet complaints/Driver reports and complaints repeated (Vehicle back history).
- 7. Any other work as entrusted by superiors.

TOOLS REQUIRED FOR VOLVO MAINTENANCE

SPECIAL TOOLS

TOOLS & MEASURING INSTRUMENTS FOR TOOL ROOM - 1 Set Per Depot

1	FILTER WRENCH 94MM	100006671		
1	FILTER WRENCH 94MM	V00006671		
		1/0066601	1	
2	OIL FILTER WRENCH	VO9999179	1	
3	EXTRACTOR	VO9998011	1	
4	SETTING INDICATOR	VO9998645	1	
5	MANDREL	VO9998012	1	
6	TURNING TOOL	VO9998068	1	
7	EXTRACTOR	VO9996738	1	
8	STANDARD HANDLE	VO9991801	1	
9	MANDREL	VO9992061	1	
10	SLEEVE- DRIFT/ADAPTER	VO9996736	1	
11	SOCKET WRENCH	VO9996773	1	
12	SOCKET WRENCH	V09996443	1	
13	STANDARD HANDI F	V09992000	1	
14	MANDREL	V09996175	1	
15	SPINDI F	V09992619	1	
16	HYDRALII IC CYLINDER	V09992671	1	
10	CRANK	V09992071	1	
19		V09992072	1	
10		V09992033	1	
20		V09992070	1	
20		V099990201	1	
21		V099990545	1	
22	MANDREL	V09996546	1	
23			1	
24	PRESSING TOOL	V09996861	1	
25	PULLER	V09996/96	1	
26	EXTRACTOR	V09996657	1	
27	EXTRACTOR	VO9998532	1	
28	PULLER	VO9996419	1	
29	MANDREL	VO9996420	1	
30	RAM 10 TON (HYDRAUL CYL.) VO9996600			
31	HYDRAULIC PUMP	VO9809726	1	
32	INSTALL SLEEVE	VO9996276	1	
33	FILTER WRENCH 108MM	VO9996672	1	
34	CENTERING MANDREL	VO9992640	1	
35	FXPANDER	V09998550	1	
36	MANDRFI	V09992003	1	
37	PULLER	V09992576	1	
38		V09996091	1	
50		V09990091	1	
39	Socket wrench	VO 9996940	0	
40		VU 9996640	0	
41	Assembly Tool	VO 9998946 VO 9998573	0	
44	Mandrel	VO 9996171	0	
45	Mandrel	VO 9992677	0	
46	Sleeve	VO 9998457	0	

Image: space of the system of the s	S.No.	DESCRIPTION	SIZE	Qty
1 Torque Wrench 3 - 14 Nm 1 2 Torque Wrench 14 - 68 Nm 1 3 Torque Wrench 70 - 340 Nm 1 4 Torque Wrench 450 - 1380 Nm 1 5 Vernier Caliper 15 Cm 1 6 Measuring Tape 5 m 1 7 Dial Gauge (Mitutuyo) 1 8 Bore Dial Gauge (Mitutuyo) 50 to 150 mm 1 9 Micro meter (outside) 10 - 25 mm 1 10 Micro meter (outside) 25 - 50 mm 1 11 3/4" Square Drive 65 mm 1 12 3/4" Square Drive 50 mm 1 13 3/4" Square Drive 50 mm 1 14 3/4" Square Drive 36 mm 1 15 3/4" Square Drive 36 mm 1 14 3/4" Square Drive 32 mm 1 15 3/4" Square Drive 32 mm 1 16 3/4" Squ				
2 Torque Wrench 14 - 68 Nm 1 3 Torque Wrench 70 - 340 Nm 1 4 Torque Wrench 450 - 1380 Nm 1 5 Vernier Caliper 15 Cm 1 6 Measuring Tape 5 m 1 7 Dial Gauge (Mitutuyo) 1 8 Bore Dial Gauge (Mitutuyo) 50 to 150 mm 1 9 Micro meter (outside) 10 - 25 mm 1 10 Micro meter (outside) 25 - 50 mm 1 12 3/4" Square Drive 65 mm 1 13 3/4" Square Drive 55 mm 1 14 3/4" Square Drive 50 mm 1 14 3/4" Square Drive 50 mm 1 15 3/4" Square Drive 36 mm 1 15 3/4" Square Drive 32 mm 1 16 3/4" Square Drive 32 mm 1 17 3/4" Square Drive 22 mm 1 18 3/4" Sq	1	Torque Wrench	3 - 14 Nm	1
3 Torque Wrench 70 - 340 Nm 1 4 Torque Wrench 450 - 1380 Nm 1 5 Vernier Caliper 15 Cm 1 6 Measuring Tape 5 m 1 7 Dial Gauge (Mitutuyo) 1 8 Bore Dial Gauge (Mitutuyo) 50 to 150 mm 1 9 Micro meter (outside) 10 - 25 mm 1 10 Micro meter (outside) 25 - 50 mm 1 12 3/4" Square Drive 60 mm 1 13 3/4" Square Drive 50 mm 1 14 3/4" Square Drive 50 mm 1 15 3/4" Square Drive 50 mm 1 16 3/4" Square Drive 36 mm 1 17 3/4" Square Drive 32 mm 1 18 3/4" Square Drive 32 mm 1 19 3/4" Square Drive 27 mm 1 20 3/4" Square Drive 21 mm 1 21 3/4" Sq	2	Torque Wrench	14 - 68 Nm	1
4 Torque Wrench 450 - 1380 Nm 1 5 Vernier Caliper 15 Cm 1 6 Measuring Tape 5 m 1 7 Dial Gauge (Mitutuyo) 1 8 Bore Dial Gauge (Mitutuyo) 50 to 150 mm 1 9 Micro meter (outside) 10 - 25 mm 1 10 Micro meter (outside) 25 - 50 mm 1 11 3/4" Square Drive 65 mm 1 12 3/4" Square Drive 60 mm 1 13 3/4" Square Drive 50 mm 1 14 3/4" Square Drive 50 mm 1 15 3/4" Square Drive 36 mm 1 16 3/4" Square Drive 33 mm 1 17 3/4" Square Drive 32 mm 1 18 3/4" Square Drive 32 mm 1 19 3/4" Square Drive 27 mm 1 20 3/4" Square Drive 27 mm 1 21 3/4" Squ	3	Torque Wrench	70 - 340 Nm	1
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6Measuring Tape5 m17Dial Gauge(Mitutuyo)18Bore Dial Gauge (Mitutuyo)50 to 150 mm19Micro meter (outside)10 - 25 mm110Micro meter (outside)25 - 50 mm1113/4" Square Drive65 mm1123/4" Square Drive60 mm1133/4" Square Drive50 mm1143/4" Square Drive50 mm1153/4" Square Drive50 mm1163/4" Square Drive36 mm1173/4" Square Drive36 mm1183/4" Square Drive30 mm1193/4" Square Drive30 mm1203/4" Square Drive27 mm1213/4" Square Drive21 mm1223/4" Square Drive21 mm123Circlip Plier Outer10"124Circlip Plier Inner10"125Pipe Wrench600 mm126Steel Rule600 mm1273/4" Drive T Rod(Heavy Duty)1283/4" SQUARE DRIVE EXTENSION ROD125 mm1293/4" SQUARE DRIVE EXTENSION ROD250 mm130Gear box Trolley11	5	Vernier Caliper	15 Cm	1
7Dial Gauge Bore Dial Gauge (Mitutuyo)18Bore Dial Gauge (Mitutuyo)50 to 150 mm19Micro meter (outside) $10 - 25 \text{ mm}$ 110Micro meter (outside) $25 - 50 \text{ mm}$ 111 $3/4"$ Square Drive 65 mm 112 $3/4"$ Square Drive 60 mm 113 $3/4"$ Square Drive 50 mm 114 $3/4"$ Square Drive 50 mm 115 $3/4"$ Square Drive 50 mm 116 $3/4"$ Square Drive 36 mm 117 $3/4"$ Square Drive 36 mm 118 $3/4"$ Square Drive 30 mm 120 $3/4"$ Square Drive 30 mm 121 $3/4"$ Square Drive 21 mm 122 $3/4"$ Square Drive 21 mm 123Circlip Plier Outer $10"$ 124Circlip Plier Inner $10"$ 125Pipe Wrench 600 mm 126Steel Rule 600 mm 127 $3/4"$ Drive T Rod(Heavy Duty)128 $3/4"$ SQUARE DRIVE EXTENSION ROD 250 mm 129 $3/4"$ SQUARE DRIVE EXTENSION ROD 250 mm 130Gear box Trolley11	6	Measuring Tape	5 m	1
8 Bore Dial Gauge (Mitutuyo) 50 to 150 mm 1 9 Micro meter (outside) 10 - 25 mm 1 10 Micro meter (outside) 25 - 50 mm 1 11 3/4" Square Drive 65 mm 1 12 3/4" Square Drive 60 mm 1 13 3/4" Square Drive 60 mm 1 14 3/4" Square Drive 50 mm 1 15 3/4" Square Drive 50 mm 1 16 3/4" Square Drive 36 mm 1 17 3/4" Square Drive 33 mm 1 18 3/4" Square Drive 32 mm 1 19 3/4" Square Drive 30 mm 1 20 3/4" Square Drive 27 mm 1 21 3/4" Square Drive 21 mm 1 22 3/4" Square Drive 21 mm 1 23 Circlip Plier Outer 10" 1 24 Circlip Plier Outer 10" 1 25 <td< td=""><td>7</td><td>Dial Gauge</td><td>(Mitutuyo)</td><td>1</td></td<>	7	Dial Gauge	(Mitutuyo)	1
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14 3/4" Square Drive 50 mm 1 15 3/4" Square Drive 45 mm 1 16 3/4" Square Drive 36 mm 1 17 3/4" Square Drive 33 mm 1 18 3/4" Square Drive 32 mm 1 19 3/4" Square Drive 30 mm 1 20 3/4" Square Drive 27 mm 1 21 3/4" Square Drive 24 mm 1 22 3/4" Square Drive 21 mm 1 23 Circlip Plier Outer 10" 1 24 Circlip Plier Inner 10" 1 25 Pipe Wrench 600 mm 1 26 Steel Rule 600 mm 1 27 3/4" Drive T Rod (Heavy Duty) 1 28 3/4" SQUARE DRIVE EXTENSION ROD 125 mm 1 29 3/4" SQUARE DRIVE EXTENSION ROD 250 mm 1 30 Gear box Trolley 1 1	13	3/4" Square Drive	55 mm	1
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17 3/4" Square Drive 33 mm 1 18 3/4" Square Drive 32 mm 1 19 3/4" Square Drive 30 mm 1 20 3/4" Square Drive 27 mm 1 21 3/4" Square Drive 24 mm 1 22 3/4" Square Drive 21 mm 1 23 Circlip Plier Outer 10" 1 24 Circlip Plier Inner 10" 1 25 Pipe Wrench 600 mm 1 26 Steel Rule 600 mm 1 27 3/4" Drive T Rod (Heavy Duty) 1 28 3/4" SQUARE DRIVE EXTENSION ROD 125 mm 1 29 3/4" SQUARE DRIVE EXTENSION ROD 250 mm 1 30 Gear box Trolley 1 1	16	3/4" Square Drive	36 mm	1
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21 3/4" Square Drive 24 mm 1 22 3/4" Square Drive 21 mm 1 23 Circlip Plier Outer 10" 1 24 Circlip Plier Inner 10" 1 25 Pipe Wrench 600 mm 1 26 Steel Rule 600 mm 1 27 3/4" Drive T Rod (Heavy Duty) 1 28 3/4" SQUARE DRIVE EXTENSION ROD 125 mm 1 29 3/4" SQUARE DRIVE EXTENSION ROD 250 mm 1 30 Gear box Trolley 1 1	20	3/4" Square Drive	27 mm	1
22 3/4" Square Drive 21 mm 1 23 Circlip Plier Outer 10" 1 24 Circlip Plier Inner 10" 1 25 Pipe Wrench 600 mm 1 26 Steel Rule 600 mm 1 27 3/4" Drive T Rod (Heavy Duty) 1 28 3/4" SQUARE DRIVE EXTENSION ROD 125 mm 1 29 3/4" SQUARE DRIVE EXTENSION ROD 250 mm 1 30 Gear box Trolley 1 1	21	3/4" Square Drive	24 mm	1
23 Circlip Plier Outer 10" 1 24 Circlip Plier Inner 10" 1 25 Pipe Wrench 600 mm 1 26 Steel Rule 600 mm 1 27 3/4" Drive T Rod (Heavy Duty) 1 28 3/4" SQUARE DRIVE EXTENSION ROD 125 mm 1 29 3/4" SQUARE DRIVE EXTENSION ROD 250 mm 1 30 Gear box Trolley 1 1	22	3/4" Square Drive	21 mm	1
24 Circlip Plier Inner 10" 1 25 Pipe Wrench 600 mm 1 26 Steel Rule 600 mm 1 27 3/4" Drive T Rod (Heavy Duty) 1 28 3/4" SQUARE DRIVE EXTENSION ROD 125 mm 1 29 3/4" SQUARE DRIVE EXTENSION ROD 250 mm 1 30 Gear box Trolley 1 1	23	Circlip Plier Outer	10"	1
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26Steel Rule600 mm1273/4" Drive T Rod(Heavy Duty)1283/4" SQUARE DRIVE EXTENSION ROD125 mm1293/4" SQUARE DRIVE EXTENSION ROD250 mm130Gear box Trolley1	25	Pipe Wrench	600 mm	1
273/4" Drive T Rod(Heavy Duty)1283/4" SQUARE DRIVE EXTENSION ROD125 mm1293/4" SQUARE DRIVE EXTENSION ROD250 mm130Gear box Trolley1	26	Steel Rule	600 mm	1
283/4" SQUARE DRIVE EXTENSION ROD125 mm1293/4" SQUARE DRIVE EXTENSION ROD250 mm130Gear box Trolley1	27	3/4" Drive T Rod	(Heavy Duty)	1
293/4" SQUARE DRIVE EXTENSION ROD250 mm130Gear box Trolley1	28	3/4" SQUARE DRIVE EXTENSION ROD	125 mm	1
30 Gear box Trolley 1	29	3/4" SQUARE DRIVE EXTENSION ROD	250 mm	1
	30	Gear box Trolley		1

TOOLS FOR MECHANIC

SCREW DRIVERs:							
1	SQUARE ROD FLAT	6"	1				
2	SQUARE ROD FLAT	12"	1				
3	SQUARE ROD - STAR	TIP NO.2	1				
4	SQUARE ROD - STAR	TIP NO.3	1				
5	Screw Driv. HAMMERING	806 HM 1					
6	ADJUSTABLE SPANNERS	-	1				
7	1/2" SQUARE DRIVE T HANDLE	300 mm	1				
8	1/2" SQUARE DRIVE EXTENSION ROD	75 mm	1				
9	1/2" SQUARE DRIVE EXTENSION ROD	125 mm	1				
10	1/2" SQUARE DRIVE EXTENSION ROD	250 mm	1				

SL. NO. DESCRIPTION SIZE Qby NO. 1/2" SQUARE DRIVE HANDLE 250 mm 1 11 1/2" SQUARE DRIVE HANDLE 250 mm 1 12 MOMEP PLIER - 1 13 CUTTING PLIER - 1 14 MOSE PUER - 1 15 HAMMER 800gm 1 16 HAMMER 500gm 1 17 VICE GRIP PLIER 10" 1 18 CHTSRE PUNCH - 1 19 PIPE WRENCH 15" 1 10 ADUSTABLE WRENCH 15" 1 22 CHISEL 100 mm 1 23 9 mm 1 24 9 mm 1 25 9 mm 1 26 10 mm 1 27 SQUARE DRIVE HEX 15 mm 23 10 mm 1 24 10 mm 1 27 <th colspan="5">TOOLS FOR MECHANIC</th> <th colspan="4">TOOLS FOR MECHANIC</th>	TOOLS FOR MECHANIC					TOOLS FOR MECHANIC			
NO. P NO. P NO. P 11 11/2* SQUARE DRIVE 250 mm 1 <td< td=""><td>SL.</td><td>DESCRIPTION</td><td colspan="2">TON SIZE Oty SL. DESCRIF</td><td>DESCRIPTION</td><td>SIZE</td><td>Qty</td></td<>	SL.	DESCRIPTION	TON SIZE Oty SL. DESCRIF		DESCRIPTION	SIZE	Qty		
11 1/2" SQUARE ORIVE REVERSABLE AATCHET HANDLE 250 mm 1 13 CUTTING PLUER - 1 14 MOSE PLIER - 1 15 HAMMER 800gm 1 16 HAMMER 500gm 1 16 HAMMER 500gm 1 17 VICE CRIP PLIER 10 - 18 CENTRE PLUCH 1 - 18 CENTRE PLUCH 1 - 19 PIPE WEENCH 5" 1 24 0AUSETABLE WEENCH 5" - 23 FELER GAUGE (26 Blades) 0.07 0.10 1 73 77 76 - - 24 10 mm 1 - - 25 CAUSETABLE MERCH 5" - - 26 10 mm 1 - - 24 10 mm 1 - - 25 CHER SAUGE (26 Blades) 0.07 1.0	NO.			• • •	N	0.			ς,
IEVERSABLE AATCHET HANDLE LOUMM I OD O I 12 MONKEY PLER - 1 68 - 1 13 OUTTNOP LIER - 1 69 70 10-11 mm 1 15 HAMMER 800gm 1 71 59ANNER SET 16-17 mm 1 16 HAMMER 800gm 1 73 - 16-17 mm 1 19 PIPE WRENCH 0'' 1 76 - 16-27 mm 1 20 ADUSTABLE WRENCH 0'' 1 77 - 20-23 mm 1 21 CHISEL 100 mm 1 77 -	11	1/2" SOLIARE DRIVE	250 mm	1	6	57		67 mm	1
HANDLE - <td></td> <td>REVERSABLE RATCHET</td> <td>250 1111</td> <td>-</td> <td></td> <td></td> <td></td> <td>0,1111</td> <td>-</td>		REVERSABLE RATCHET	250 1111	-				0,1111	-
12 MONKEY PLIER - 1 13 CUTTING FLIER - 1 14 MOSE PLIER 125 mm 1 15 HAMMER 800gm 1 16 HAMMER 500gm 1 17 VICE GRIP PLIER 10 ⁻¹ 1 18 CENTRE PUNCH - 1 19 PIPE WRENCH 15 ⁻¹ 1 20 ADJUSTABLE WRENCH 8 ⁻¹ 75 21 CHISEL 100 mm 1 72 22 CHISEL 100 mm 1 72 23 FEELER GAUGE (26 Blades) mm 80 70 11 11 11 11 11 11 11 24 8 mm 1 80 81 81 81 25 9 mm 1 81 81 81 82 30 12 ⁻¹ SQUARE DRIVE HEX 15 mm 81 81 81 312		HANDLE							
13 CUTTING PLIER - 1 14 MOSE PLIER 125 ml 1 15 HAMMER 800gm 1 16 HAMMER 500gm 1 17 VICE GRUP PURCH 10° 1 18 CENTRE PUNCH 1 72 19 PIE WERNCH 15° 1 72 20 ADJUSTABLE WERNCH 8° 1 76 21 CHISEL 100 mm 1 77 30-32 mm 22 CHISEL 100 mm 77 30-32 mm 1 24 9 mm 1 80 80 80 25 10 mm 1 82 80 12-11 mm 1 24 9 mm 1 81 80 81 12-11 mm 1 26 10 mm 1 82 12-11 mm 1 12-11 mm 1 27 SQUARE DRIVE HEX 15 mm 1 82 1	12	MONKEY PLIER	-	1 68		58		89 mm	1
14 NOSE PLIER 125 mm 1 15 HAMMER 800gm 1 17 VICE GRIP PLIER 10" 1 18 CENTRE PUNCH - 1 19 PIPE WERNCH - 1 20 ADUSTALE WENCH 8" 1 21 CHISEL 100 mm 1 22 CHISEL 100 mm 77 23 FEELER GAUGE (26 Blades) 03 TO 1.00 1 77 77 78 3-32 nm 24 9 nm 1 80 9 nm 1 81 127 SQUARE DRIVE HEX 16 nm 81 24 11 mm 1 82 13 1/2" SQUARE DRIVE HEX 16 nm 81 33 12 mm 1 82 34 13 17 nm 1 34 12 mm 1 91 34 12 mm 1 91 36 <td>13</td> <td>CUTTING PLIER</td> <td>-</td> <td>1</td> <td colspan="2">1 69</td> <td></td> <td>1011 mm</td> <td>1</td>	13	CUTTING PLIER	-	1	1 69			1011 mm	1
15 HAMMER 800gm 1 16 HAMMER 500gm 1 17 VICE GRUP PUER 10" 1 18 CETTRE PUNCH - 1 19 PIPE WRENCH 15" 1 20 ADJUSTABLE WRENCH 15" 1 21 CHISEL 100 mm 1 22 CHISEL 100 mm 77 23 FEELER GAUGE (26 Blades) 03 TO 1.00 1 24 9 mm 1 80 25 12.mm 1 80 12 9 mm 1 81 26 10 mm 82 12 11 mm 82 12 11 mm 82 12 13 mm 1 27 SQUARE DRIVE HEX 16 mm 13 12.mm 1 13 12.mm 1 24 7 mm 1 25 SQUARE DRIVE HEX 16 mm	14	NOSE PLIER	125 mm	1	7	70		1213 mm	1
16 HAMMER 500gm 1 17 VICE GRIP PLIER 10" 1 18 CENTRE PUNCH - 1 19 PIPE WRENCH 15" 1 20 ADJUSTABLE WRENCH 15" 1 21 CHISEL 150 mm 1 22 CHISEL 150 mm 1 23 FEELER GAUGE (26 Blades) .03 TO 1.00 1 77 78 - - - 24 8 min 1 80 - - 30 .03 TO 1.00 1 - - - 24 9 mm 1 80 - - - 31 12 mm 1 80 - - - - 33 DOCKT SET - SHORT 16 mm - - - - - - - - - - - - - - - - - -<	15	HAMMER	800am	1	7	71	DOUBLE ENDED	1415 mm	1
17 VICE GRUP PLIER 10" 1 18 CENTRE PUNCH - 1 19 PIPE WRENCH 15" 1 20 ADJUSTABLE WRENCH 8" 1 21 CHISEL 100 mm 1 22 CHISEL 100 mm 1 23 FEELER GAUGE (26 Blades) 0.370 1.00 1 24 8 mm 1 80 26 10 mm 1 82 110 mm 1 82 12 11 mm 1 82 13 11 mm 1 82 14 17 mm 1 82 12" SQUARE DRIVE HEX 16 mm 87 30 12" SQUARE DRIVE HEX 16 mm 87 31 12" SQUARE DRIVE HEX 16 mm 1 33 12" mm 1 88 34 27 mm 1 24-27 mm 36 30 mm 1 91 6 mm <tr< td=""><td>16</td><td>HAMMER</td><td>500gm</td><td>1</td><td>7</td><td>/2</td><td>SPANNER SET</td><td>1617 mm</td><td>1</td></tr<>	16	HAMMER	500gm	1	7	/2	SPANNER SET	1617 mm	1
18 CENTRE PUNCH - 1 19 PIPE WRENCH 15" 1 20 ADJUSTABLE WRENCH 8" 1 21 CHISEL 100 mm 1 22 CHISEL 100 mm 1 23 FFELER GAUGE (26 Blades) .03 TO 1.00 1 76 .03 TO 1.00 1 76 24 .04 State .03 TO 1.00 1 78 .04 State .03 TO 1.00 1 79 .07 State .03 TO 1.00 1 25 .03 TO 1.00 1 .03 TO 1.00 1 10 .03 TO 1.00 1 .03 TO 1.00 .03 TO 1.00 .03 TO 1.00 12 .03 TO 1.00	17	VICE GRIP PLIER	10"	1	7	73		1819 mm	1
19 PIPE WRENCH 15" 1 20 ADDISTABLE WRENCH 8" 1 21 CHISEL 100 mm 1 22 CHISEL 150 mm 1 23 FEELER GAUGE (26 Blades) 0.370 1.00 1 24 8mm 1 78 32-36 mm 1 25 9 mm 1 80 81 10-11 mm 1 26 10 mm 1 82 1 10-11 mm 1 28 12 mm 1 83 14-15 mm 1 12-12 mm 1 29 17 mm 1 83 87 12-22 mm 1 12-22 mm	18	CENTRE PUNCH	-	1	7	74		2022 mm	1
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21 CHISEL 100 mm 1 22 CHISEL 150 mm 1 23 FELER GAUGE (26 Blades) .03 TO 1.00 1 24 10 mm 1 77 78 30-32 mm 1 24 10 mm 1 79 6-7 mm 1 10-11 mm 1 25 9 mm 1 10 mm 1 80 81 10-11 mm 1 10-11 mm	20	ADJUSTABLE WRENCH	8"	1	1 7			2427 mm	1
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23 FEELER GAUGE (26 Blades) .03 TO 1.00 1 24 8 mm 1 25 9 mm 1 26 9 mm 1 27 10 mm 1 30 11 mm 1 31 12 mm 1 33 12 mm 1 34 15 mm 1 35 50CKET SET - SHORT 16 mm 36 77 mm 1 37 17 mm 1 38 22 mm 1 36 27 mm 1 37 30 mm 1 24 mm 1 17 mm 19 mm 1 27 mm 37 30 mm 1 38 35 5 mm 36 7 mm 1 37 7 mm 1 40 27 mm 1 41 7 mm 1 42 7 mm 1 44	22	CHISEL	150 mm	1	7	78		3236 mm	1
24 mm mm server 8 25 30 31 10 mm 1 81 27 11 mm 1 81 12 81 29 30 14 mm 1 84 81 31 1/2" SQUARE DRIVE HEX 16 mm 86 7 16-17 mm 1 33 33 33 33 86 7 16-37 mm 1 34 35 36 16 mm 1 87 36 30-32 mm 1 36 19 mm 1 90 30-32 mm 1 2-4-27 mm 1 37 37 30 mm 1 92 30 30-32 mm 1 39 30 mm 1 92 7 mm 1 30-32 mm 1 41 1/2" SQUARE DRIVE ALLEN 6 mm 1 97 7 mm 1 10 mm <td>23</td> <td>FEELER GAUGE (26 Blades)</td> <td>.03 TO 1.00</td> <td>1</td> <td>7</td> <td>79</td> <td></td> <td>67 mm</td> <td>1</td>	23	FEELER GAUGE (26 Blades)	.03 TO 1.00	1	7	79		67 mm	1
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127 11	26		10 mm	1	8	32		1213 mm	1
28 12 mm 1 13 mm 1 84 RING SPANNERS SET 16-17 mm 1 30 13 mm 1 14 mm 1 85 12-23 mm 1 31 14 mm 1 16 mm 1 87 12-23 mm 1 32 SOCKET SET - SHORT 16 mm 1 87 1 24-27 mm 1 34 17 mm 1 18 mm 1 90 30-32 mm 1 35 36 27 mm 1 92 3 8 mm 1 37 24 mm 90 30 mm 91 90 30-32 mm 1 38 27 mm 1 92 93 10 mm 1 10 mm	27		11 mm	1	8	33		1415 mm	1
29 30 31 31 32 33 33 34 34 35 36 36 37 37 36 37 37 37 37 36 37 37 37 38 39 30 30 30 30 30 30 30 30 30 30 30 30 30	28		12 mm	1	8	34	RING SPANNERS SET	1617 mm	1
30 1/2" SQUARE DRIVE HEX 15 mm 1 15 mm 1 21-23 mm 1 31 15 mm 1 16 mm 1 86 22-22 mm 1 33 SOCKET SET - SHORT 16 mm 1 89 25-28 mm 1 34 17 mm 1 89 25-28 mm 1 25-28 mm 1 36 19 mm 1 90 30-32 mm 1 30-32 mm 1 37 24 mm 91 91 6 mm 1 30-32 mm 1 38 27 mm 1 92 93 8 mm 1 1 40 32 mm 1 96 11 mm 1	29		13 mm	1	8	35		1819 mm	1
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32 33 34 34 36 37 37 38 37 37 38 37 37 38 37<	31	1/2" SOLIARE DRIVE HEX	15 mm	1	8	37		2123 mm	1
33 34 17 mm 1 89 25-28 mm 1 36 18 mm 1 90 30-32 mm 30-32 mm 30-32 mm 1 36 21 mm 1 91 92 30-32 mm 1 91 7 mm 1 92 7 mm 1 91 8 mm 1 1 7 mm 1 92 9 9 mm 1 1 91 9 mm 1 10 mm 1 92 9 mm 1 91 10 mm 1 91 10 mm 1 10 mm <td>32</td> <td>SOCKET SET - SHORT</td> <td>16 mm</td> <td>1</td> <td>8</td> <td>38</td> <td></td> <td>2427 mm</td> <td>1</td>	32	SOCKET SET - SHORT	16 mm	1	8	38		2427 mm	1
34 35 36 37 37 38 39 39 40 40 40 40 40 40 40 40 40 40 40 40 40	33	SOCKET SET SHOKT	17 mm	1	8	39		2528 mm	1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	34	_	18 mm	1	9	90		3032 mm	
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37 24 mm 1 93 8 mm 1 38 27 mm 1 94 94 95 94 95 97 10 mm 1 9 mm 1 10 mm 1 9 mm 1 10 mm 1 10 mm 1 9 mm 1 10 mm <td< td=""><td>36</td><td>-</td><td>21 mm</td><td>1</td><td>9</td><td>92</td><td></td><td>7 mm</td><td>1</td></td<>	36	-	21 mm	1	9	92		7 mm	1
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39 30 mm 1 95 10 mm 1 40 32 mm 1 96 96 11 mm 1 41 5 mm 1 97 98 98 12 mm 1 42 5 mm 1 98 99 13 mm 1 11 mm 1 43 6 mm 1 99 100 15 mm 1 16 mm 1 44 1/2" SQUARE DRIVE ALLEN 8 mm 1 101 100 16 mm 1 16 mm 1 46 1/2" SQUARE DRIVE ALLEN 8 mm 1 100 100 100 15 mm 1 16 mm 1 17 mm 1 17 mm 1 17 mm 1 17 mm 1 100 100 10	38	-	27 mm	1	9	94		9 mm	1
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41 4 mm 1 97 42 5 mm 1 5 mm 1 43 5 mm 1 99 13 mm 1 44 1/2" SQUARE DRIVE ALLEN 6 mm 1 100 101 15 mm 1 46 46 12 mm 1 100 mm 1 100 15 mm 1 47 10 mm 1 100 101 100 101 16 mm 1 48 17 mm 1 102 100 18 mm 1 18 mm 1 49 17 mm 1 104 102 10 mm 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 </td <td>40</td> <td></td> <td>32 mm</td> <td>1</td> <td>9</td> <td><u> </u></td> <td></td> <td>11 mm</td> <td>1</td>	40		32 mm	1	9	<u> </u>		11 mm	1
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44 45 45 HEAD SOCKET 1/2" SQUARE DRIVE ALLEN HEAD SOCKET 7 mm 1 8 mm 1 0 10 mm 100 101 100 100 10 mm 100 100 100 100 100 100 100 15 mm 1 1 16 mm 1 1 16 mm 1 1 1 10 mm 100 100 100 47 10 mm 1 12 mm 1 10 mm 1 10 10 10 10 10 10 10 10 10 10 10 10 10	43	-	<u>6 mm</u>	1		<u>19</u>		14 mm	1
45 46 47 HEAD SOCKET 8 mm 1 10 mm 101 102 102 101 102 101 102 47 10 mm 1 102 17 mm 1 48 14 mm 1 102 103 104 17 mm 1 49 17 mm 1 104 104 104 19 mm 1 50 10 mm 1 10 mm 1 105 20 mm 1 51 10 mm 1 10 mm 1 107 22 mm 1 53 14 mm 1 107 108 23 mm 1 24 mm 1 55 1/2" SQUARE DRIVE LONG (DEEP) HEX SOCKET 16 mm 1 111 111 25 mm 1 56 1/2" SQUARE DRIVE HEAVY DUTY IMPCT SOCKET - 18 mm 1 115 30 mm 1 66 1/2" SQUARE DRIVE HEAVY DUTY IMPCT SOCKET - 18 mm 1 110 111 111 111 66 1/2" SQUARE DRIVE HEAVY DUTY IMPCT SOCKET - 18 mm 1 111 111 111 111 11	44	1/2" SQUARE DRIVE ALLEN	7 mm	1		00		15 mm	1
46 10 mm 1 102 17 mm 1 47 12 mm 1 103 COMBINATION 18 mm 1 48 14 mm 1 103 104 19 mm 1 49 17 mm 1 103 104 19 mm 1 50 17 mm 1 105 106 107 108 21 mm 1 51 12 mm 1 13 mm 1 106 107 22 mm 1 23 mm 1 54 15 mm 1 17 mm 1 108 22 mm 1 23 mm 1 24 mm 1 25 mm 1 26 mm 1 27 mm 1 111 111 27 mm 1 111 111 111 29 mm 1 111	45	HEAD SOCKET	8 mm	1		01		16 mm	1
47 12 mm 1 103 COMBINATION 18 mm 1 48 14 mm 1 104 SPANNER 19 mm 1 50 10 mm 1 105 106 22 mm 1 51 12 mm 1 107 106 22 mm 1 52 13 mm 1 107 22 mm 1 54 15 mm 1 107 23 mm 1 55 1/2" SQUARE DRIVE LONG 16 mm 110 24 mm 1 56 1/2" SQUARE DRIVE LONG 17 mm 111 112 26 mm 1 57 18 mm 1 112 27 mm 1 112 57 18 mm 1 112 27 mm 1 114 29 mm 1 58 19 mm 1 114 114 114 114 114 114 114 114 115 115 115 115 115 115 115 115 116 114 114 114 115 116	40	-	10 mm	1	1	02		17 mm	1
To 14 mm 1 104 SPANNER 19 mm 1 49 17 mm 1 105 20 mm 1 20 mm 1 50 10 mm 1 106 106 22 mm 1 51 12 mm 1 10 mm 1 22 mm 1 52 13 mm 1 107 22 mm 1 23 mm 1 54 15 mm 1 14 mm 1 109 24 mm 1 55 1/2" SQUARE DRIVE LONG 16 mm 1 110 25 mm 1 56 (DEEP) HEX SOCKET 16 mm 1 111 26 mm 1 57 18 mm 1 114 29 mm 1 29 mm 1 59 21 mm 1 116 31 mm 1 30 mm 1 61 1/2" SQUARE DRIVE HEAVY 18 mm 119 mm 111 117 32 mm 1 62	4/	4	12 mm	1		03	COMBINATION	10 mm	1
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50 12 mm 1 111 1 1 59 21 mm 1 115 30 mm 1 60 24 mm 1 115 31 mm 1 61 27 mm 1 116 31 mm 1 62 32 mm 1 117 32 mm 1 63 1/2" SQUARE DRIVE HEAVY DUTY IMPCT SOCKET - 18 mm 1 119 OIL CAN 250 ml 1 64 DUTY IMPCT SOCKET - 21 mm 1 120 CHOIR BRUSH - 1 65 BLACK 24 mm 1 122 TEST LAMP - 1	58	1	19 mm	1		14		20 mm	1
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63 1/2" SQUARE DRIVE HEAVY 18 mm 1 119 OIL CAN 250 ml 1 64 DUTY IMPCT SOCKET - 19 mm 1 120 CHOIR BRUSH - 1 65 BLACK 24 mm 1 122 TEST LAMP - 1	62	1	32 mm	1	1	18	STEEL RULE	300 mm	-
64 1/2" SQUARE DRIVE HEAVY 19 mm 1 120 CHOIR BRUSH - 1 65 BLACK 21 mm 1 121 WIRE BRUSH - 1 66 24 mm 1 122 TEST LAMP - 1	63		18 mm	1		19	OIL CAN	250 ml	1
65 BLACK 21 mm 1 121 WIRE BRUSH - 1 66 24 mm 1 122 TEST LAMP - 1	64	1/2" SQUARE DRIVE HEAVY	19 mm	1		20	CHOIR BRUSH	-	1
66 DLACK 24 mm 1 122 TEST LAMP - 1	65	DUTT IMPCT SUCKET -	21 mm	1		21	WIRE BRUSH	-	1
	66	DLACK	24 mm	1	1	22	TEST LAMP	-	1

EESENTIAL SPARES FOR VOLVO VEHICLES

S.No	Group	Code	Description	Mark-I	Mark-II	Mark-III	Remarks
1	-	OL	Engine oil	1161278	1161278	67-18001	
2		OL	Engine oil	21039495	21039495	21039495	For Retarder
3		OL	Differential oil	1161279	1161279	1161279	
4		OL	Gear oil	1161280	1161280	1161280	
5		OL	Steering oil	1161941	1161941	1161941	
6		VO	Coolant	1089238	1089238	1089238	
7		VO	Brake fluid	85112076	85112076	85112076	
8	SERVICE AND	VO	Oil filter	466634	466634	20998807	Oil Filter Kit for Mark-3
9		VO	Bypass filter	477556	477556		
10		VO	Filter	349619	349619	349619	Steering Filter
11		VO	Air filter	1544449	1544449	8149064	Air Filter
12		VO	Air filter	1660903	1660903		
13		VO	Fuel filter kit	8193841	8193841	20998805	Fuel Filter
14		VO	Fuel filter	8159975	8159975	20853583	Water Separator
15		VO	Filter cartridge	20773824	20773824	20773824	Air Drier Cartridge (Part No. Changed from 20546795)
1		VO	V-belt	9958479	9958479	20581953	Fan Belt
2		VO	Top alternator belt	9958477			
3	ENGINE BELT DRIVE	VO	Bottom alternator belt	978273			
4		VO	V-ribbed belt		20564267	20860507	Alternator Belt
5		VO	Idler roller			20759364	
6		VO	Idler roller			20795659	
7		VO	Belt tensioner	3093090	3183643	3183643	
8		VO	Idler belt	9958478	9958478		
1		VO	Rubber cushion	20776308	20776308	20499474	Engine Bedding - Rear
2	ENGINE AND	VO	Rubber cushion			20502976	Engine Bedding - Front
3	ACCESSONIES	VO	Radiator hose	9517020	9517020		RADIATOR HOSE
4		VO	Elbow	20416038	20416038		RADIATOR ELBOW
5		VO	Coolant pipe	20522073	20522073		
1	ELECTRICAL	VO	Voltage regulator	21058175	20523391	20918011	
2		VO	Relay		3173824	20795890	For Starter Motor
1		VO	Clutch	20569139	20569139	20569139	Pressure Plate with release Brg
2		VO	Clutch disc	20366370	20366370	20366370	
3		VO	Clutch servo	1673067	8171722	8171722	Common For Mark 2
4		VO	Master cylinder	1669488	1669488	1628218	
5		VO	Ball joint	85108331	85108331	1190131	Gear Cable Ball Joint
6		VO	Ball joint			1190132	Gear Cable Ball Joint
7		VO	Bearing	85108766	85110086	85110086	For Inertia Mass
8		VO	Seal		85110083	85110083	(Gearbox)
9		VO	Lock ring	85108767	85108767	85108767	(

S.No	Group	Code	Description	Mark-I	Mark-II	Mark-III	Remarks
1		VO	Sensor			20928544	Wheel Speed Sensor
2	AIR & BRAKES	VO	Brake pad kit	3097168-F 3097169-R	20918891	21024702	
1	WHEELS & STEERING	VO	Kingpin kit	3090267	85108338	20751021	
1		VO	Anti-roll bar	70321664	9959538	9959538	Front
2		VO	Rubber bushing	9959304	9516524	9516524	For Front Anti-roll Bar
3		VO	Link		9521922	9521922	Front Anti-roll Bar Link
4		VO	Anti-roll bar	8157253	70371200	10371200	Rear
5		VO	Stay		20994420	20994420	Rear Anti-roll Bar Link
6	SUSPENSION	VO	Rubber bushing	9519245	70371206	70371206	For Rear Anti-roll Bar
7		VO	Shock absorber	3177327	20485166	20485166	Front
8		VO	Shock absorber	3177328	70371256	70371256	Rear
9		VO	Air bellow	1137888	1137888	1137888	Front
10		VO	Bellows	1134445	20540789	20540789	Rear- Rear
11		VO	Bellows	1134445	20540792	20540792	Rear -Front
12		VO	Bushing		70371217	70371217	For Reaction Rod