ELECTRICAL

INTRODUCTION

The electrical system of **XENON EURO V** is a combination of electrical and electronic devices. The electrical system incorporates the number of electrical aggregates and special accessories apart from the standard ones. This includes a variety of telltale lamps and audio warning signals operated by various electronic control units. These are included in PART A of this manual.

The trouble shooting of **XENON EURO V** should begin by reading errors logged by various ECUS'/controllers using a diagnostic tester and by confirmation that the controller no longer logs the error. Every effort has been done in this manual to simplify the troubleshooting of a vehicle.

Details of wiring harness, their routing and electrical circuit schematics of different systems are included in PART B of this Manual. These are only for guidance during troubleshooting. However, due to continuous improvements on the product, the actual wiring layout, locations of components and connectors, the wire colour codes etc. are likely to be different on the vehicle which would be informed to you from time to time.

TABLE OF CONTENT

PART A

1. TECHNICAL SPECIFICATIONS

System Voltage	: 12 Volts.
Alternator Capacity	: 125 Amps.
Starter motor capacity	: 12 V, 2.25 Kw.
Battery	: 12V, 80 Ah, MF
Windscreen Wiper and Washer	: 2 Speed with intermittent wiping and 1.5 Lit. capacity windscreen washer water reservoir.
Instruments	: Speedometer (*km/hr)*,
	: Tachometer (*RPM*.),
	: Odometer (*km)*, and Trip meter (*km)*,
	: Fuel Gauge with reserve indication,
	: Water Temperature,
	: Engine RPM meter.
Tell tales lamps on instrument Cluster	: Battery charging,
	: Low engine oil pressure,
	: Hand brake and Brake fluid level,
	: Direction indicators (L/R),
	: Main beam,
	: Seat belt,
	: Door ajar,
	: Hazard warning,
	: 4X4 High and 4X4 low indication,
	: Immobilizer,
	: Engine Check
	: Indicator for high water level in sedimentor,
	: Front and rear fog lamps.
Combination Switch	: With self cancelling turn signals.
Tail Lamp	: Three function tail lamp
Head Lamp	: Semi-sealed European beam asymmetrical pattern with Halogen lamp with leveling device. Built-in front parking lamp.
Head Lamp Rotary Switch	: For Auto head lamp,
	: Parking lamp,
	: Head lamp ON,
	: Front fog lamp ON,
	: Rear fog lamp ON.

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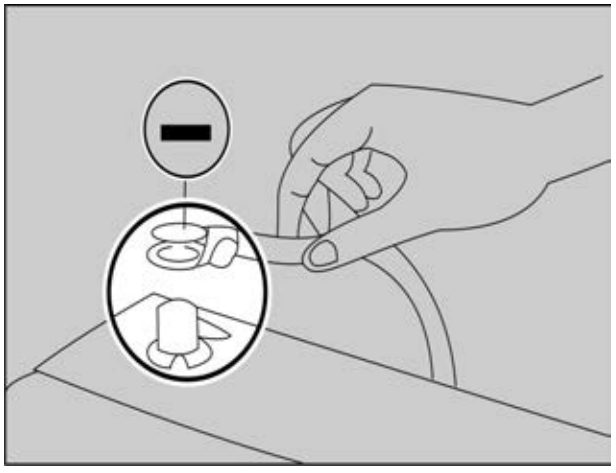
Other Features	: 1. Rear fog lamps,
	: 2. Blinkers on side bonnet,
	: 3 Two roof lamps,
	: 4. Provision for Radio / Cassette player,
	: 5. Provision for Trailer socket,
	: 6.Rear number plate lamps,
	: 7 Spoiler on wiper blades,
	: 8 Hazard warning switch,
	: 9 Radio antenna,
	: 10 High mount stop lamp,
	: 11 Ignition switch with Illumination ring,
	: 12 Door ajar lamp and puddle lamps,
	: 13 Front fog lamps,
	: 14 Provision for music system,
	: 15 Cluster with digital clock,
	: 16 Central locking.
Optional Fitments	: Speedometer with miles / hr primary and km / hr secondary scale and odometer in miles.

2. GENERAL ELECTRCIAL PRECAUTIONS

1. Before Troubleshooting:

- Always disconnect the negative (-) battery cable, before disconnecting (+) cable. While reinstalling the battery, first connect the positive (+) cable and then the negative (-) battery cable.



- Always disconnect the negative (-) battery cable, unless battery voltage is required to perform the diagnosis or repair.
- Check the fuses in fuse box.
- Check the battery for damage, state of charge, and clean and tight connections.
- Do not reverse the negative (-) and positive (+) battery cable connections; serious damage to the vehicle electrical system will result.
- Check the alternator belt tension.

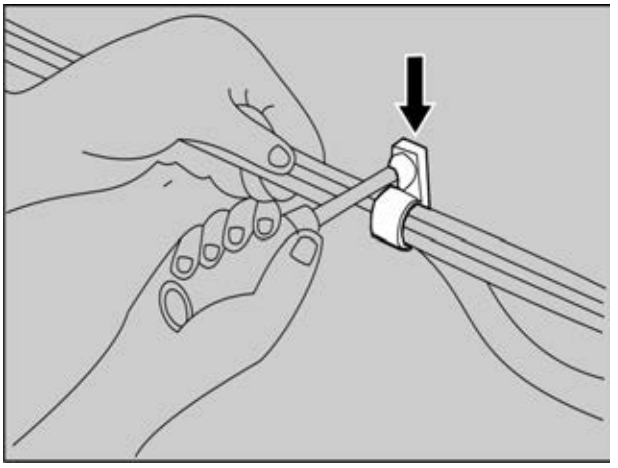
! CAUTION:

- *Do not quick-charge a battery unless the battery ground cable has been connected, you will damage the alternator diodes.*
- *Do not attempt to crank the engine with the battery ground cable connected incompletely.*

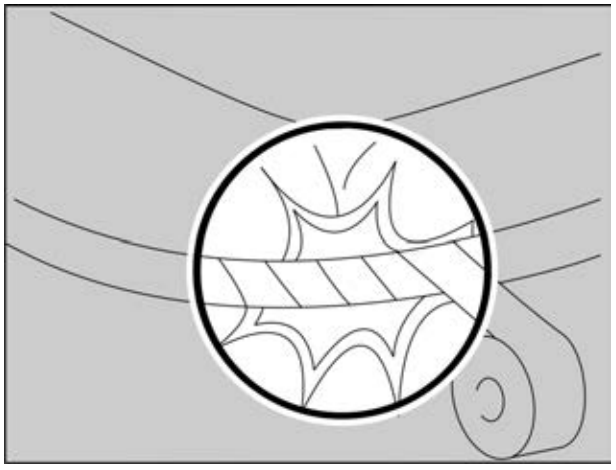
! WARNING:

- *Keep all open flames and sparks away from the battery! During normal operation, batteries generate dangerous explosive gases that may explode if exposed to open flames or sparks.*
- *Battery electrolyte is harmful and will cause chemical burns and damage to vehicle surfaces. Wear a protective face shield /clothing and take care when working with the battery.*

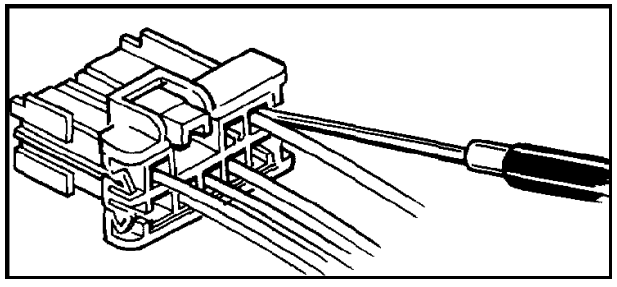
2. Switch off ignition prior to making any connection or disconnection in the system as electrical surge caused by disconnecting 'live' connections can damage electronic components.
3. Ensure hands and work surfaces are clean and free of grease, scarf, etc. as grease collects dirt which can cause tracking or high-resistance contacts. When handling printed circuit boards, treat them as you handle a disc - hold by the edges only, because some of the electronic components are susceptible to body static.
4. Secure the wiring harness by using clamps so that there is no slack. However, for any harness which passes to the engine or other vibrating parts of the vehicle, allow some slack within a range that does not allow the engine vibrations to cause the harness to come into contact with any of the surrounding parts, and then secure the harness by using a clamp.



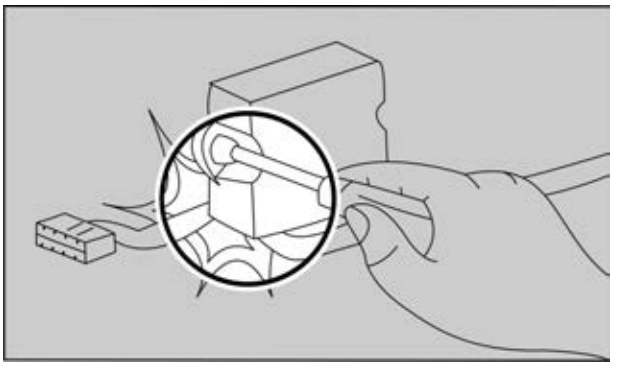
5. Don't damage the insulation when connecting a wire. Do not use wires or harnesses with a broken insulation. Repair by wrapping with protective tape or replace with new ones if necessary.
6. If any section of a wiring harness interferes with the edge of a part or a corner, replace the part of harness or wrap the section of the harness with core tube.



7. To prevent damage to the electrical/ electronic parts (*especially controllers or semi conductors*) or to prevent fire:
   a. Before disconnecting any components, make sure the negative battery cable is disconnected or the ignition switch is rotated to the “OFF” position.
   b. When replacing any fuse, make sure to use the specified capacity fuse. Using a fuse with a larger capacity can cause damage to the electrical parts or a fire.
   c. Do not handle electrical/electronic parts (*ECU, relay, etc)* roughly or drop them.
   d. Do not expose electrical/electronic parts to high temperature (*approximately 80°C (170°F) or higher*) or water.
   e. For open back connectors be sure to insert the tester probe in to the back side (*wiring harness side*) of the connector for inspection. For sealed back connectors apply the tester probe to the terminal as gently as possible not to damage or deform the terminal. Make sure to use probe with tapered tip.



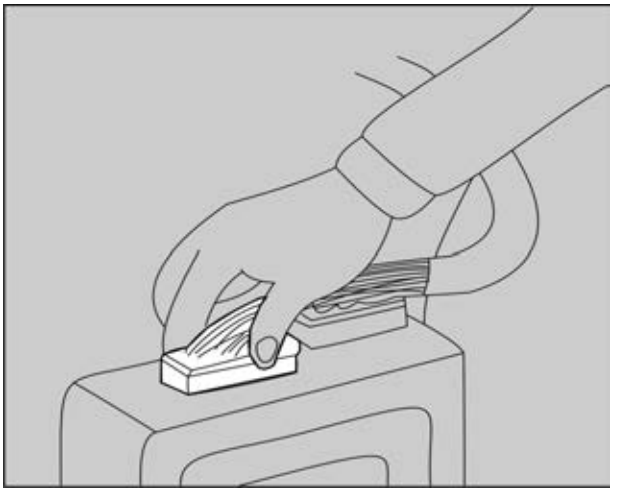
   f. Before commencing work on an ignition system, all high tension terminals, adapters and diagnostic equipment for testing should be inspected to ensure that they are adequately insulated and shielded to prevent accidental personal contact and to minimize the risk of shock.
8. When installing any of the vehicle parts, be careful not to pinch or damage any of the wiring harness.



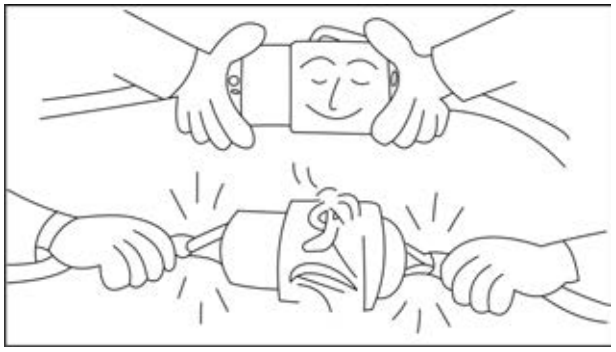
9. Connectors and Harnesses

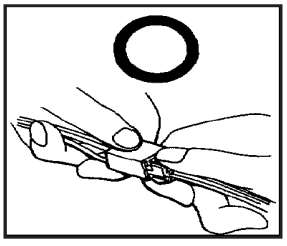
The engine compartment of a vehicle is a particularly hostile environment for electrical components and connectors. Always ensure these items are dry and oil free before disconnecting and connecting test equipment. Never force connectors apart either by using tools or by pulling on the wiring harness. Always ensure locking tabs are disengaged before removal and note orientation to enable correct reconnection. Ensure that any protective covers and substances are replaced if disturbed.

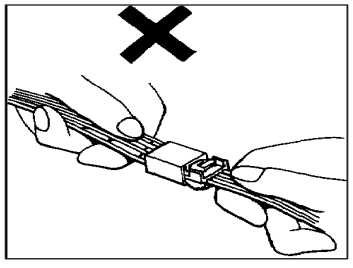
   a. Make sure that connectors are connected securely.

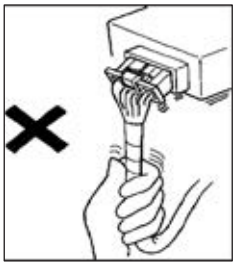


b. When disconnecting a connector pull it off from the mating connector by holding on both connectors. Never try to disconnect connectors by pulling on their wires.

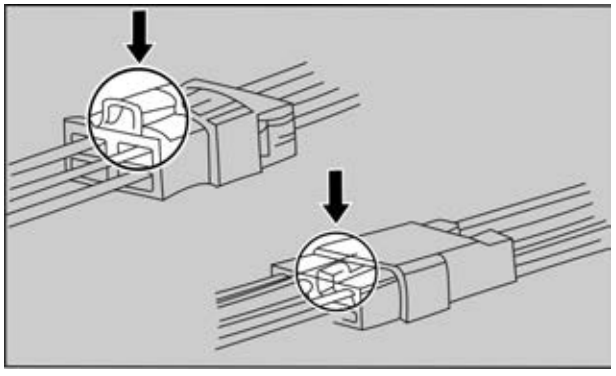




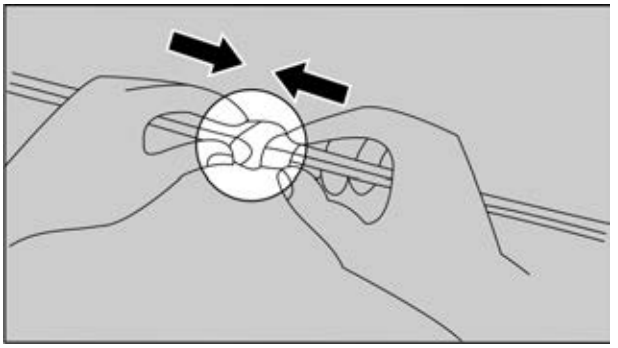




c. While disconnecting the interconnection connector, press in the direction indicated by arrows in the illustration.

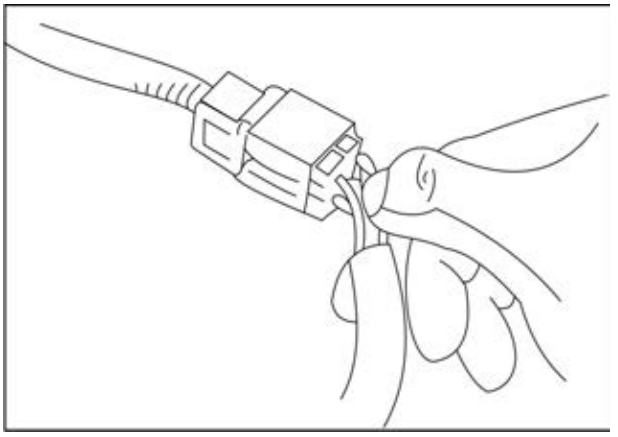


d. While connecting the interconnection connectors, insert the connectors until a “snap” noise is heard.



e. Dirt / corroded terminals result in improper contact. The terminals should be cleaned carefully. Improper contact pressure between mating terminals disturbs the connectivity between them. Replace the damaged connector body to avoid exposure of the terminals in case of inadequate contact pressure.

Ensure proper connection between the terminals to the wire. Rectify the loose connection by repairing / replacing the wire harness. Worn out insulation of the wire may result in short circuit. Avoid water entering in the connectors.



10. Before removing a faulty component, refer to the Workshop Manual for removal procedures. Ensure the starter switch is turned to the ’OFF’ position, the battery is disconnected and any disconnected harnesses are supported to avoid any undue strain at terminals. When replacing the component keep oily hands away from electrical connection areas and push connector’s home until any locking tabs fully engage.

3 ELECTRICAL COMPONENTS AND SYSTEMS

3.1 BATTERY

FUNCTION:

The battery has three major functions in the electrical system:

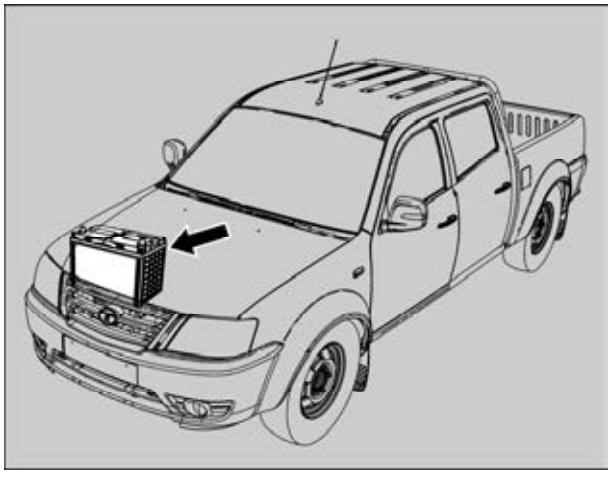
- It is a source of electrical energy for cranking the engine.
- Once the engine is cranked, it is getting charged from alternator.
- Also it provides electrical energy to the vehicle loads whenever the alternator output current is not able to meet the demand or when the alternator is fails.

SPECIFICATION: 12V, 80 A/H,

Specific Gravity: 1.27 ± 0.01

LOCATION:

Battery is located in the right side of the engine compartment on panel wheel arch inner RH.



BATTERY DO'S AND DON'TS:

DO'S:

- Think Safety First.
- Do regular inspection and maintenance especially in hot weather.
- Recharge batteries immediately after discharge.

DON'TS:

- Don't add acid.
- Don't store batteries with tools and other equipment haphazardly placed.
- Don't disconnect battery cables while the engine is running (*battery acts as a stabilizer*).
- Don't put off recharging batteries.
- Don't add tap water as it may contain minerals that will contaminate the electrolyte.
- Doesn't discharge a battery any deeper than you possibly have to?
- Don't mix different size and types of batteries.

FACTORS AFFECTING BATTERY LIFE:

The reasons that most batteries fail prematurely are related to one or more of the following:

1. Improper charging
2. Lack of water
3. Installation
4. Operational issues

NOTE: *The user has control over most of the conditions that lead to premature failure.*

1. IMPROPER CHARGING:

- **Over charging**

  Charging a battery greatly in excess of what is required is harmful in several ways.

- **Under charging**
  - A battery operated with insufficient charge over a long period of time may develop a type of sulphate in the plates which is dense, hard and crystalline and which cannot be electrochemically converted to normal active material again.
  - A battery operated in an undercharged condition is unable to deliver the full power intended for it. Constant undercharge results in Sulphation of plates and a running down of cells. This also causes lead sulphate deposits on separators which create a short circuit between positive and negative plates.

- **Leaving Battery Idle**

  Causes the battery to run down due to self-discharge. The lead sulphate crystals formed as a result of self-discharge grow as the battery stands idle and are not easily converted back on recharge. The Sulphation in other words tends to become permanent thus affecting battery capacity and lowering battery life.

- **High Specific gravity**

  It is destructive for both positive and negative plates to separator and shortens battery life.

2. LACK OF WATER

- **Impure topping –up water**
  - Impure water or electrolyte introduces impurities into the battery, which accumulate with each such topping – up.
  - The most common impurities are iron and chlorine, which attack plates and shorten overall life.
  - This will result in higher water loss and premature failure.
- **Neglecting topping-up**

  De-mineralized water (*DM*) water or distilled water is one of the four essential chemicals of a lead acid battery and under normal conditions of operation the only component of the battery, which is lost as the result of charging. It should be replaced as soon as the liquid level falls to the top of the separator. If water is not replaced, plates will soon be exposed and the acid will reach a dangerously high concentration that may oxidize the separator. It further can permanently impair the performance of the plates. Plates cannot play full part in the battery reactions unless they are completely covered by the electrolyte. Acid should not be added to cells.

3. INSTALLATION:

- **Loose Hold –downs**

  Container damages arise from gross mishandling or dropping batteries, from hold-downs either over tightened or extremely loose. This may physically damage the plates and separators in cells or cause leakage of electrolyte so that the battery becomes unserviceable.

- **Excessive loads**

  A battery should never be used to propel the car by the use of the starter motor with clutch engaged except in a great emergency. This may produce extremely high internal battery temperature and may also damage the starter motor.

4. OPERATIONAL PROBLEMS

- **Discharge without recharge**

  A fully discharged or near fully discharged cell will be damaged and possibly ruined if not recharged within 24 to 48 hours. As a battery discharges, the electrolyte starts changing from an acid solution to almost pure water. Lead dissolves in water and some of the plate material mixes with water to form lead hydrate. Lead hydrate causes the plate surfaces to turn white and, because it is conductive it forms a short circuit between the plates rendering the battery permanently damaged.

- **Over discharge**

  Over discharge causes abnormal expansions of the active materials in the plates which leads to permanent damage and also recharge problems.

BATTERY TESTING

Battery testing has two basic elements

1. Visual Inspection
2. State of Charge
   a. Specific Gravity
   b. Open Circuit Voltage
3. Capacity or Heavy load test

1. VISUAL INSPECTION

- Battery service should begin with a thorough visual inspection. This inspection may reveal simple, easily correctable problems.
- Check for cracks in the battery container and broken terminals. Either may allow electrolyte leakage and warrant battery replacement.
- Check for broken cable or connectors. Replace as needed.
- Check for corrosion on terminals and dirt or acid on the battery top. Clean the terminals – and battery top with a mixture of water and baking soda. A battery wire brush tool is

required to remove hard scales if any on the terminals.

- Check for a loose battery hold-down or loose cable connection, clean and tighten as needed.
- Check Electrolyte fluid level. The level can be viewed from the translucent plastic case or by removing vent caps. The proper level is 1/2" above the separator. Add distilled water if necessary. Do not overfill.
- Check the cloudy or discolored electrolyte cause by overcharging or vibration. This could cause high self discharge. Correct the cause and replace the battery.

2.STATE OF CHARGE

The state of charge of a battery can be easily checked in one of two ways

a. Specific Gravity Test

b. Open Circuit Voltage Test

c. Capacity or Heavy load test

a. Specific Gravity Test Procedure

- Wear suitable eye protection.
- Remove vent plugs from the battery cells.
- Squeeze the hydrometer bulb and insert the pickup tube into the cell up to the plate's top.
- Slowly release the bulb to draw in only enough acid to cause the float to rise. Do not remove the tube from the cell.
- Read the specific gravity indicated on the float. Be sure the float is drifting free, not in contact with the sides of top of the barrel. Bend down to read the hydrometer at eye level. Disregard the sight curvature of liquid on the float.
- Record your readings and repeat the procedure for the remaining cells.

Specific gravity varies with the temperature. If the electrolyte temperature is substantially above $27^{O}C$ add seven points (0.007) to the observed specific gravity reading for every $10^{O}C$ by which the actual temperature is above $27^{O}C$. Deduct seven points per $10^{O}C$ where the observed reading is below $27^{O}C$ to obtain the temperature corrected reading at $27^{O}C$.

Eg, for observed gravity 1.240 at $35^{O}C$, true gravity is 1.240 + (0.007/10 X 8) = 1.2456 at $27^{O}C$.

Specific gravity should not be measured immediately after topping up a cell as the added distilled water will not have diffused enough and gives a false reading. A charge for sixty minutes or more after topping up will mix the electrolyte and allow accurate readings to be taken.

NOTE:

If there is insufficient electrolyte in the cells to obtain a hydrometer reading, tilt the battery at 30 deg angle to one side to increase the electrolyte over the plates. If the level is still low, top up all cells with distilled water and mix by charging the battery to attain full charge. Then take specific gravity readings, applying temperature correction if the battery has become hot due to charging, and continue according to the battery testing procedure.

b. Open circuit Voltage Procedure

- A digital multimeter must be used to check the battery's Open-circuit voltage.
- Turn the headlamps high beam for 30 sec to remove any surface charge.
- Turn the headlamp off, and connect the digital voltmeter across the battery terminals.
- Read the volt in the multimeter. A fully charged battery will have an open circuit voltage of 12.60V.

c. Capacity or Heavy load Test Procedure

- Install the Load Tester.
- Load the battery by turning the load increase control until the ammeter reads 3 times the AH rating or one-half the cold cracking ampere (CCA) rating.
- Maintain the load for no more than 15 sec. and note the voltmeter reading
- If the voltmeter reading is
  a) 9.6 V or more, the battery is good.
  b) 9.5 V or below, the battery is defective and needs replacement.

DE-MINERALIZED / DISTILLED WATER TOP UP PROCEDURE:

- Open the vent caps and look inside the fill wells.
- Check electrolyte level. The minimum level is at the top of the plates.

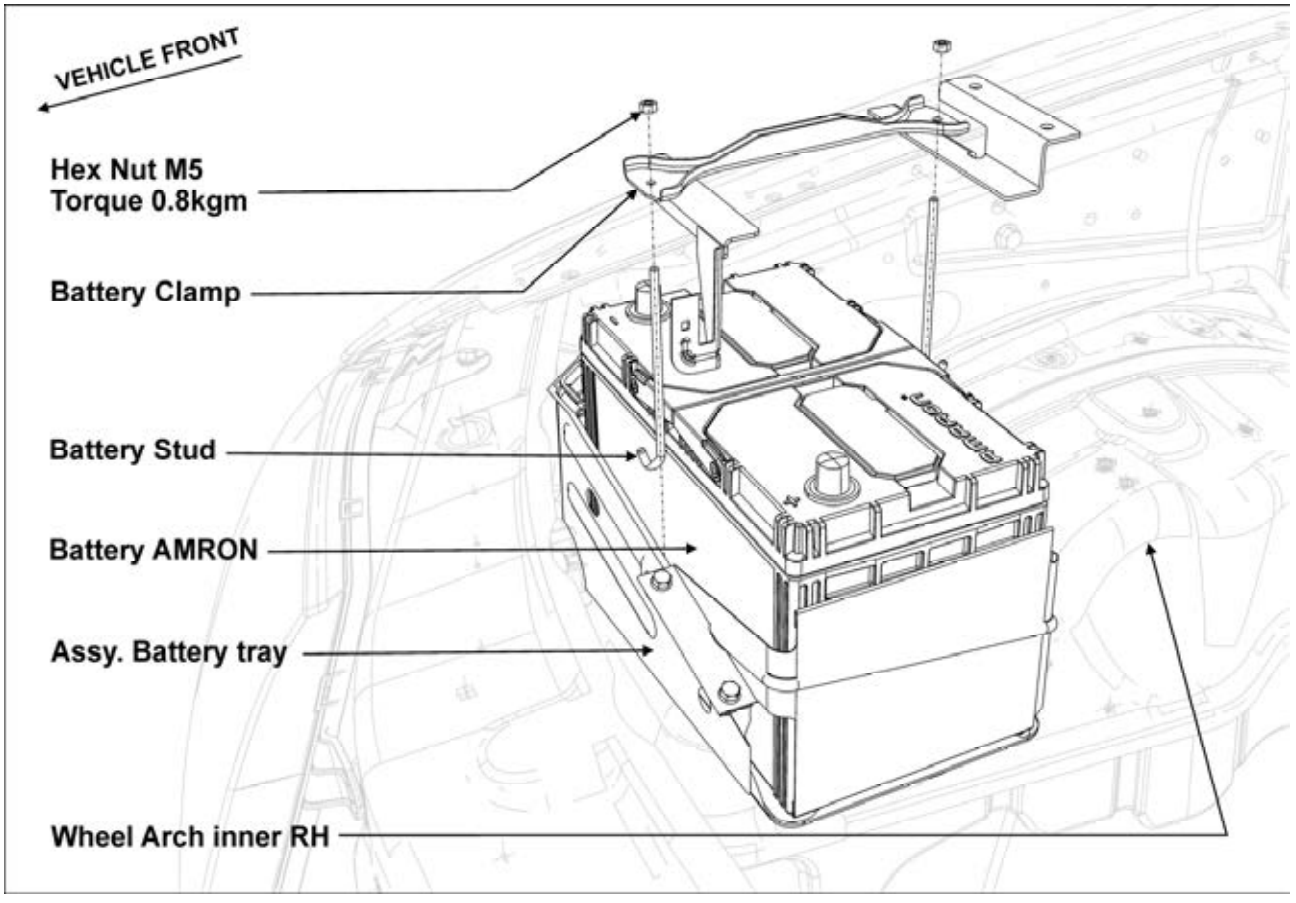
- If necessary add just enough water to cover the plates at this time.
- Put batteries on a complete charge before adding any additional water
- Once charging is completed, open the vent caps and look inside the fill wells.
- Add water until the electrolyte level is 1/8" below the bottom of the fill well.
- Clean, replace and tighten all vent caps.

!! WARNING: *Never add acid to a battery.*

BATTERY CLEANING

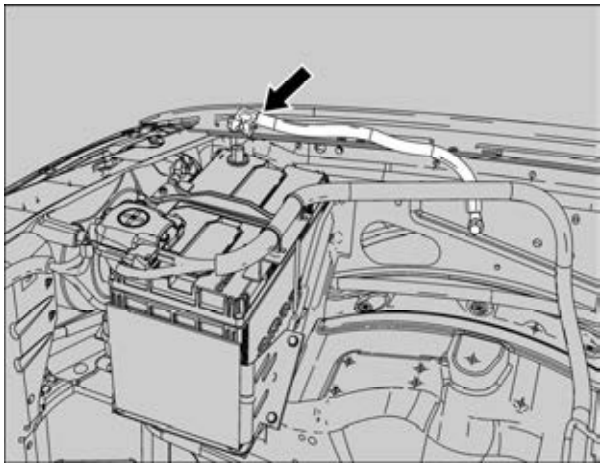
- Batteries seem to attract dust, dirt, and grime. Keeping them clean will help you spot trouble signs if they appear and avoid associated problems.
- Check that all vent caps are tightly in place
- Clean the battery top with a cloth or brush and a solution of baking soda and water.
- When cleaning, do not allow any cleaning solution or other foreign matter to get inside the battery. (*Flooded batteries*)
- Rinse with water and dry with a clean cloth.
- Clean battery terminals and the inside of cable clamps using a post and clamp cleaner.
- Clean terminals will have a bright metallic shine.
- Reconnect the clamps to the terminals and thinly coat them with petroleum jelly (*Vaseline*) to prevent corrosion.
- Keep the area around batteries clean and dry.

FITMENT DETAIL WITH TIGHTENING TORQUE:

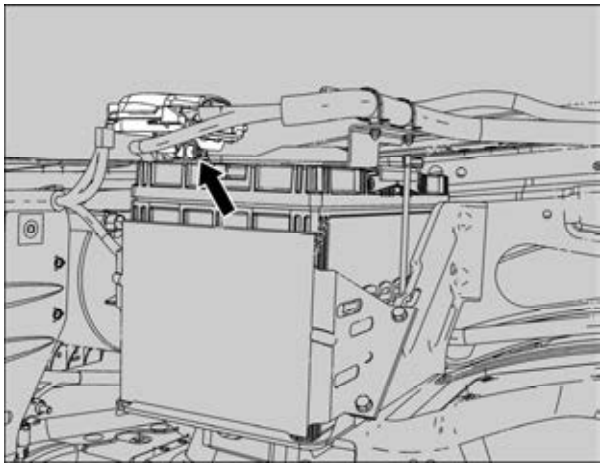


REMOVAL:

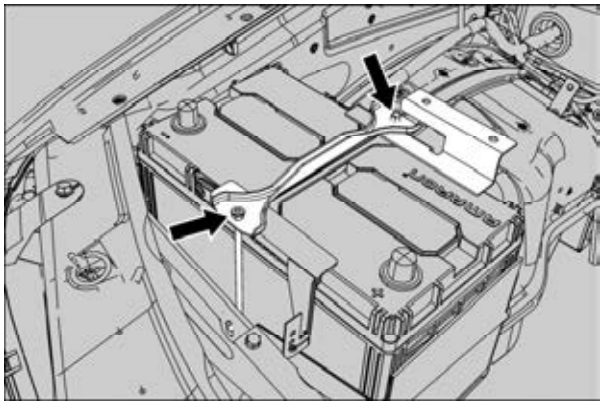
1. Disconnect the negative terminal of battery by loosening its mounting bolt.



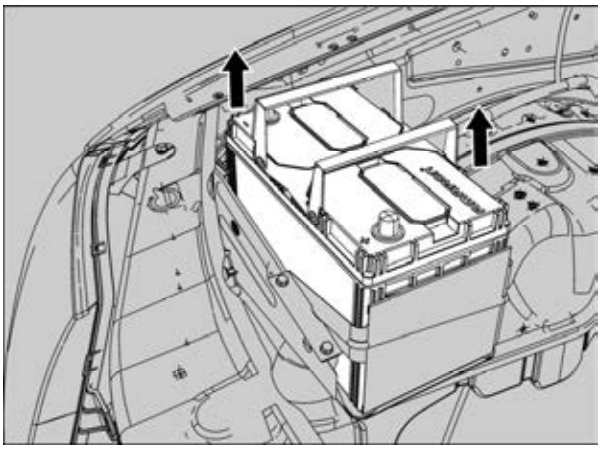
2. Disconnect the positive terminal of battery by loosening its mounting bolt.



3. Remove the battery mounting clamp with stud by two mounting nuts.



4. Take out the battery.



REFITMENT:

1. Place the battery in battery tray.
2. Place the battery top clamp on battery by matching two holes with battery tray.
3. Fit the two mounting nuts on both side clamps.

   Tightening Torque of both nuts – 0.8 Kgfm
4. Tight the mounting nut of positive terminal of battery.
5. Connect the negative terminal of battery.

DIAGNOSTIC INFORMATION AND PROCEDURES:

CONDITION	POSSIBLE CAUSE	CORRECTION/REFERENCE ITEM
Battery getting discharged frequently	Leakage current is high due to extra accessories fitted on the vehicle.	Measure the leakage current. If it is greater than 22 mA, disconnect the idle power consuming accessories.
Battery not getting charged	Alternator belt loose.	Tighten belt
	Battery terminals loose.	Tighten the terminals.
	Battery terminals corroded.	Clean the terminals.
	Alternator voltage regulator setting wrong.	Check alternator output voltage. It should be between 14.25 V and 14.75 V. Otherwise replace the regulator with a genuine spare.
	Idle speed of engine too low.	Adjust engine idle speed.

3.2 ALTERNATOR

GENERAL DESCRIPTION:

The alternator is a rotary machine that transforms mechanical energy into electrical energy. It is 12-pole synchronous generator with integrated rectifier in three-phase current bridge circuit with voltage-limiting Zener diode and attached multifunction controller. The alternator is air cooled and be able to function in the engine compartment of the vehicle.

PRECAUTIONS:

DO'S

- The operation of the alternator is only permissible with assembled regulator and with connected 12V battery.
- The alternator is mounted in the vehicle with a bracket directly onto the engine. Direct mounting without a bracket is also possible.
- The alternator has to be driven by a V-belt or a poly V-belt. The tensioning of the belt can be performed by tilting the alternator or by a separate belt-tensioning pulley.
- Correct alternator operation can only be achieved when the specified direction of rotation and the belt tension is maintained.

DON'TS

- Swapping of the battery connections even for a short period can result in pre-damage or functional failure of the alternator and is therefore NOT PERMISSIBLE!!
- Dismantling of the battery cables can lead to the loosening of the battery positive cable bolt on the alternator side. It is necessary to fasten the bolt to the maximum fastening torque
- It is not permitted to make a direct connection between the positive and ground with the alternator rotating.
- **Plug in connection:** Insufficient contact can lead to failed output signal hence it is necessary to ensure proper plug in connection.
- Axial load on the alternator rotor shaft is not permitted especially not by hitting as this can cause pre-damaged bearings.
- The alternator must not be dropped or exposed to any shocks out of normal conditions. The function of the alternator is not guaranteed afterwards.
- When the pulley is mounted by the customer the dimensional tolerances and the tightening torque must be kept within specified limits. Otherwise the pulley can become loose or the drive shaft can be damaged.
- It is not allowed to store the alternator in wet condition. This applies for installed as well as for not installed alternators.
- If the alternator is exposed to an engine cleaning process, a drying process should be done prior to storage of the engine.
- Do not disconnect the battery cable while engine is running.

REGULAR MAINTENANCE:

- Check the general condition of the battery.
- Ensure correct battery electrolyte level.
- Ensure electrical connections are tight and secure.
- Check and ensure mounting bolts are tightened properly.
- Ensure the belt of the alternator is in good condition.
- Check the belt tension ensure it should be neither too tight nor too loose.
- Ensure alternator cooling slots are clear.

ALTERNATOR SPECIFICATION:

1	Type	SIA 130 INTERNAL FAN ALTERNATOR
2	Storage temperature range	-25°C to +105°C (Continuous) 115°C to 120°C (5 Min Max)
3	Operating temperature range	-30°C to +100°C (Continuous) 100°C to 115°C (5 Min Max)
4	Rated voltage	DC 12 V
5	Nominal output	70 A(Hot at 13.5 V, 5000rpm output)
6	Output current	See fig. performance curve
7	Setting voltage	14.2 – 14.8
8	Weight	4.7 Kg
9	Direction of rotation	Clock wise (*Viewed from pulley side*)
10	Permissible max. speed	18000 rpm at full output const. running
11	Generating system and configuration	Generating current is thee phase alternation, and it is rectified by the rectifier built in the generator and output voltage is controlled by built in IC regulator
12	Magnetic and fan sound	Be free from harmful magnetic fan sound

SALIENT FEATURES:

- Star connected 3 phase output winding wound on a laminated stator.
- 12 pole rotor, carried on ball-race bearing in aluminum bracket.
- Rectifier converts the generated A.C into D.C.
- Built in hybrid regulator provides voltage control and diagnosis.
- Less weight and compact in size.
- The alternator is cooled by means of two internal fans one each assembled on either side of rotor assembly.

TIGHTENING TORQUE DETAILS:

DESCRIPTION	TIGHTENING TORQUE in Kgfm
Pulley Hexagon nut	8.0 to 8.5
Insul bush nut	0.45 to 0.55
Rectifier and regulator screw	0.3 to 0.4
Bearing retainer screw	0.2 to 0.53
Protective Cap Screw	0.25 to 0.3
Hexagon through bolt	0.55 to 0.70
A point screw	0.15 to 0.20

ALTERNATOR CHARGING SYSTEM CHECKS ON THE VEHICLE:

SWITCH ON THE IGNITION

DOES WARNING LAMP GLOW ?

NO → CHECK WARNING LAMP FOR ANY DEFECT. CHECK "WL" TERMINAL IN ALTERNATOR FOR PROPER CONNECTION.

YES

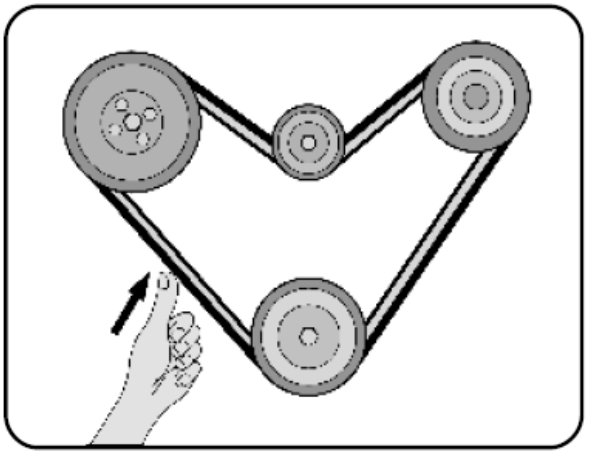
RUN THE ENGINE AT IDLE SPEED

DOES WARNING LAMP GO OFF ?

NO → CHECK THE BELT TENSION. IF FOUND SLACK ADJUST THE BELT DEFLECTION TO BE 10-15mm WHEN PRESSED MIDWAY AT THE LONGEST POINT BETWEEN PULLEYS (REFER FIGURE BELOW) AND CHECK FOR CHARGING. IF THE UNIT IS STILL NOT CHARGING REMOVE THE ALTERNATOR AND CHECK.

RAISE THE ENGINE SPEED TO AROUND 2800 ± 200 RPM.

YES



ENSURE THAT THE AMMETER READING IS LESS THAN 20A. INCASE THE BATTERY IS DISCHARGED ALLOW CHARGING OF BATTERY TILL THE AMMETER READING COMES TO LESS THAN 20A. CONNECT THE VOLTMETER ACROSS THE ALTERNATOR MAIN TERMINALS. CHECK THE VOLT METER READING

DOES THE VOLTMETER READ BETWEEN 14.0 TO 14.8 VOLTS ?

NO → REMOVE THE ALTERNATOR AND CHECK REGULATOR

YES

SWITCH "ON" THE PARKING LAMP, HEADLAMP, TAIL LAMP AND OTHER ELECTRICAL LOADS EXCEPT HEATER.

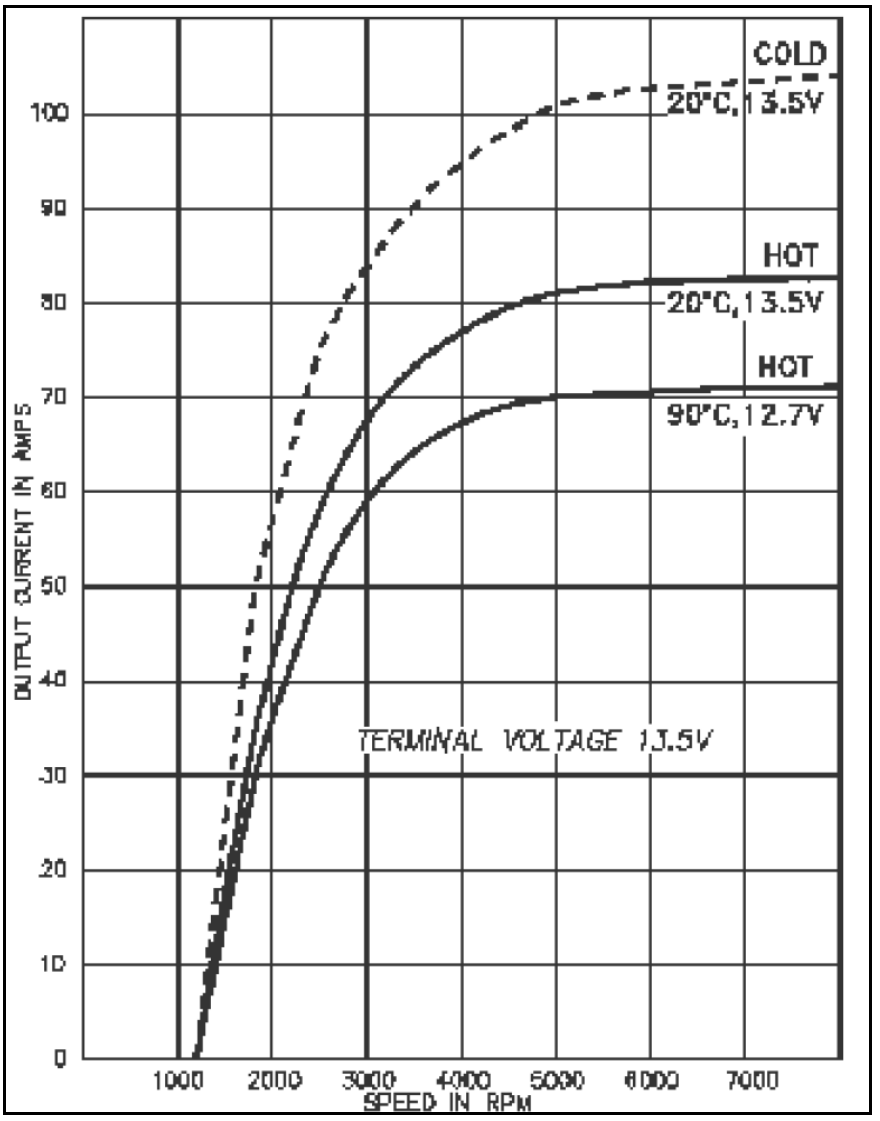
IS RATED CURRENT OUTPUT REACHED WITHOUT VOLTAGE DROPPING BELOW 13.5 VOLTS ?

NO → REMOVE THE ALTERNATOR AND CHECK

YES

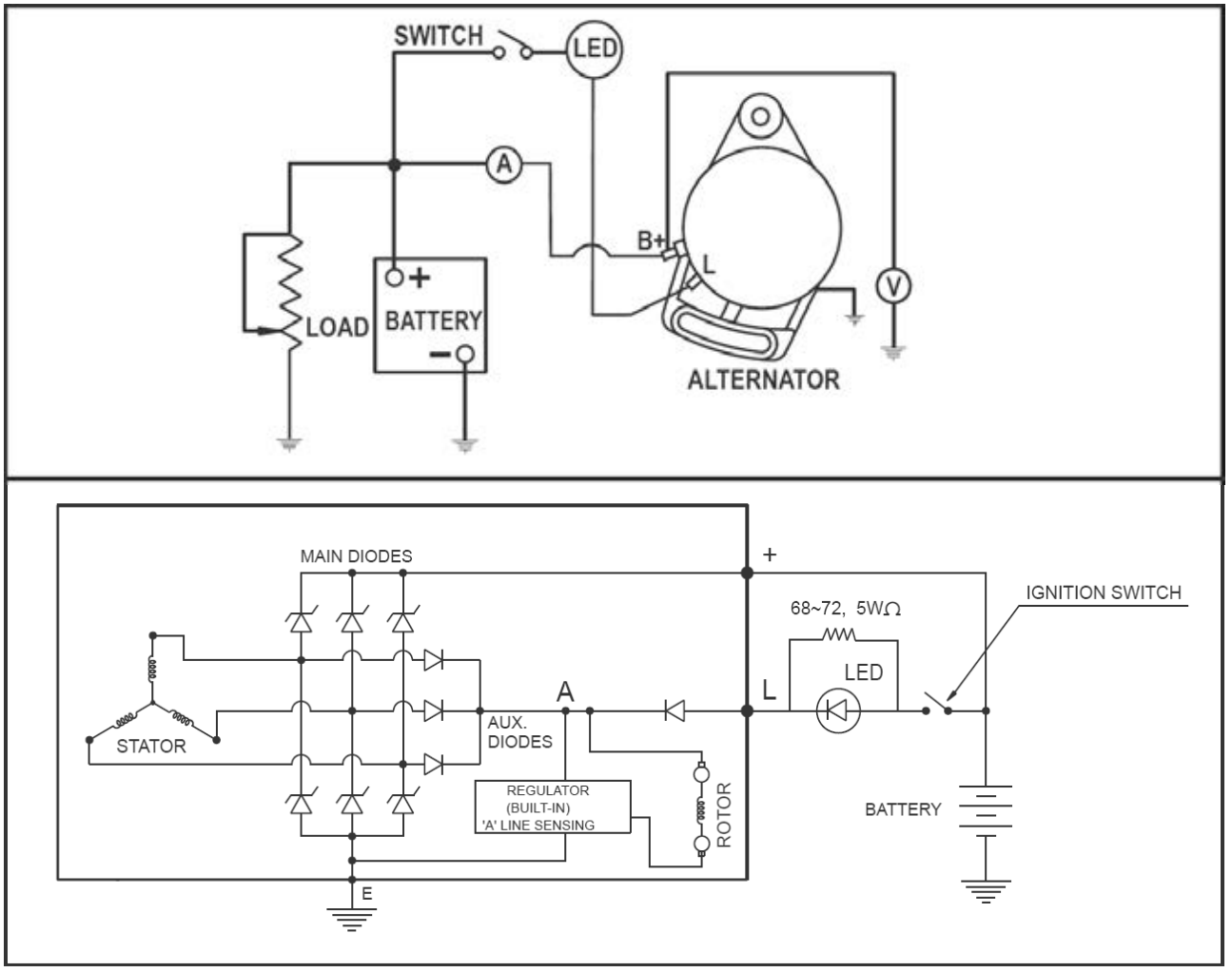
ALTERNATOR FOUND ACCEPTABLE

PERFORMANCE CURVE:



ELECTRICAL

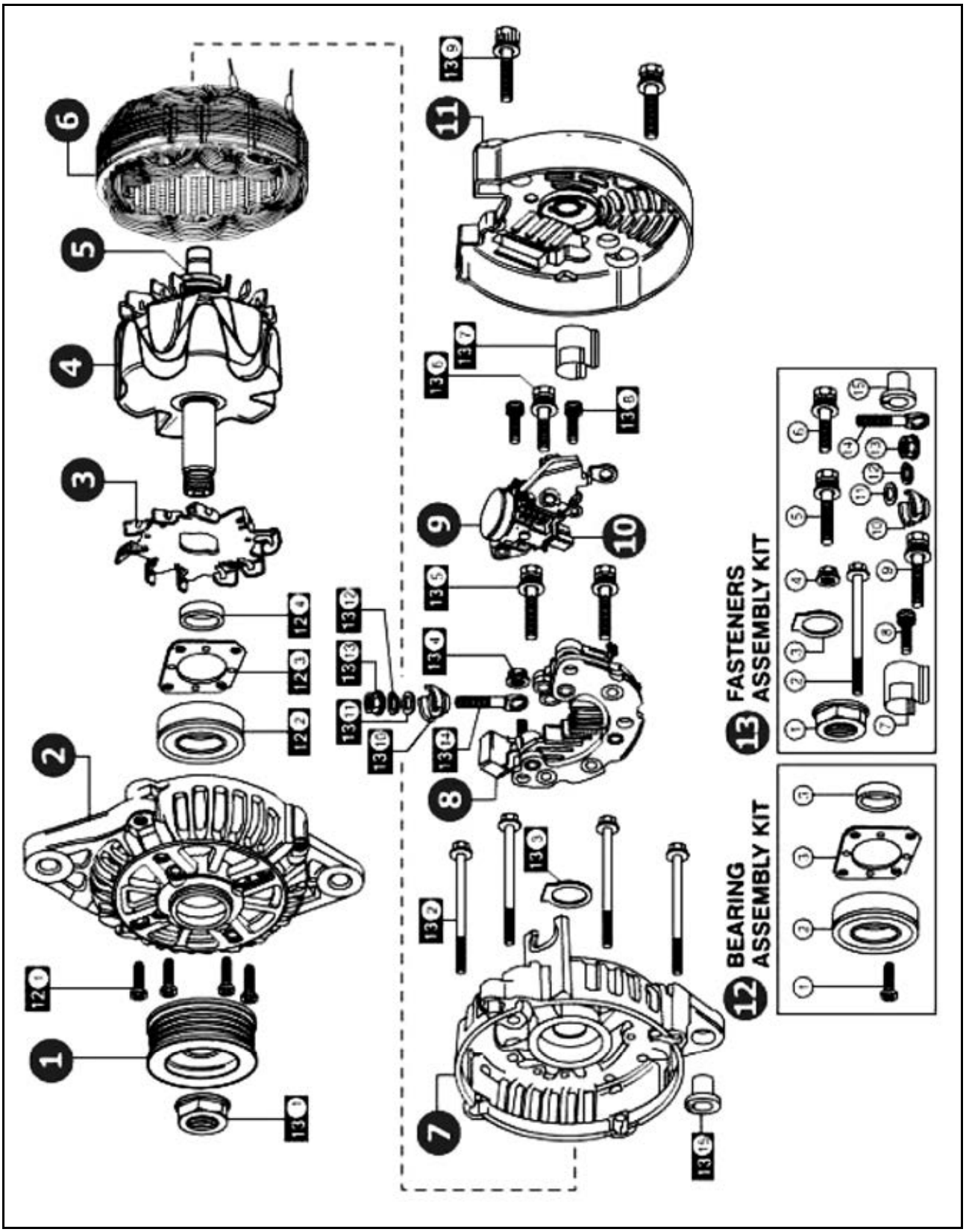
WIRING DIAGRAM:



PART LIST:

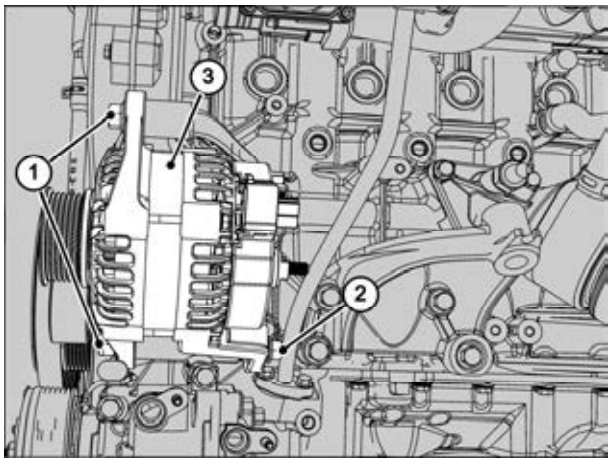
SR.NO	DESCRIPTION	SR.NO	DESCRIPTION
1	Pulley	12	Hexagonal Screw
2	Counter Sunk-Head Screw	13	Rectifier
3	Spacer Ring	14	Washer And Screw Assembly
4	Drive End Shield	15	Transistor Regulator
5	Deep Groove Ball Bearing	16	Oval-Head Screw
6	Cover Plate	17	Washer And Screw Assembly
7	Rotor	18	Protective Cap
8	Fitting Ring	19	Flanged Nut
9	Stator	20	Hexagonal Nut
10	Slip Ring End Shield	21	Protective Cap
11	Bush	22	Protective Cap for OAP

EXPLODED VIEW:



REMOVAL:

1. Remove the Alternator belt *(Refer alternator belt removal procedure).*
2. Disconnect the electrical connection.
3. Loosen and remove the front mounting bolts (1) and the rear mounting bolt (2) to remove the Alternator (3).



DISMANTLING PROCEDURE

Before dismantling the parts, note own the position of various parts, in order to ensure their proper replacement on reassembly. Follow the step by step procedure mentioned below:

1. REPAIR INSTRUCTIONS:

1. Unscrew the terminal flanged nut.

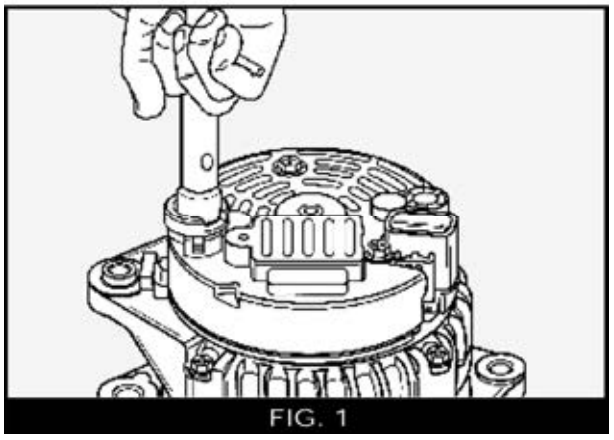


FIG. 1

2 Unscrew the rear cover moulding fixing screws 2 Nos.

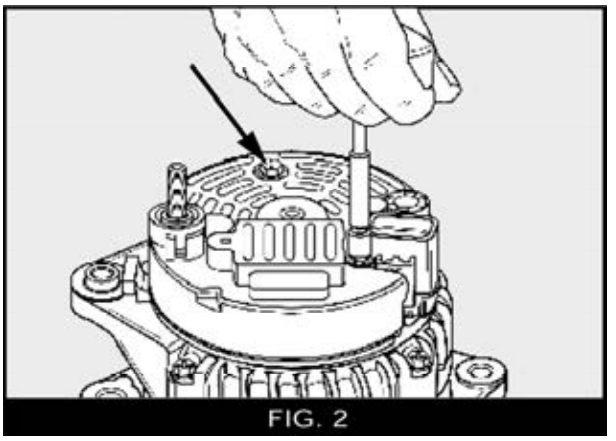


FIG. 2

3 Remove and separate the rear cover moulding fixing screws, spring washer and plain washer.

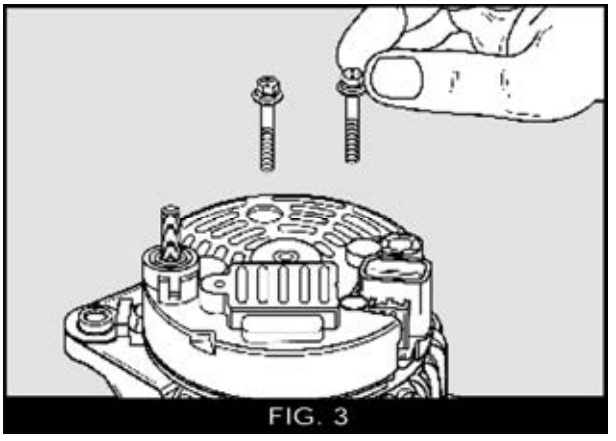


FIG. 3

4. Remove and separate the rear cover moulding from the alternator

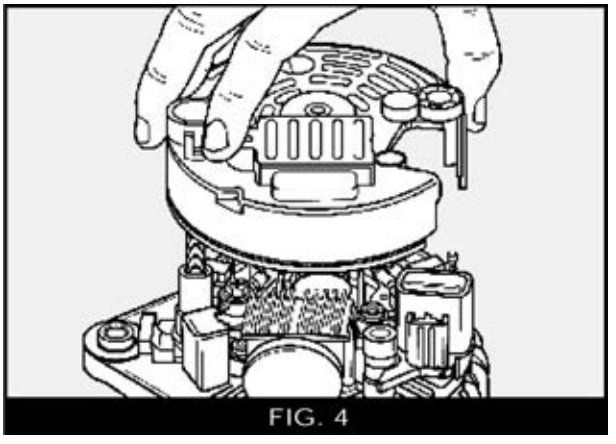


FIG. 4

5 Remove and separate the Spacer from the terminal.

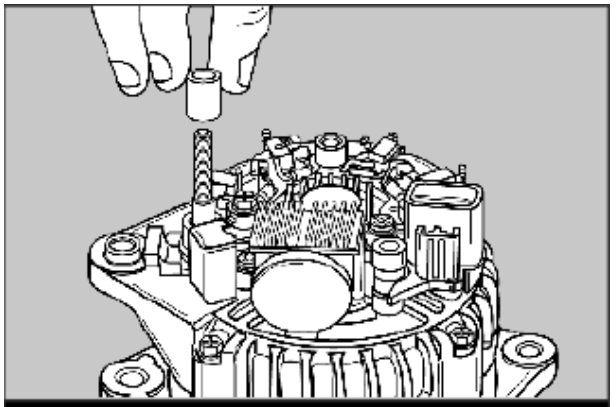


FIG. 5

6. Remove and separate the brush box moulding from the alternator.

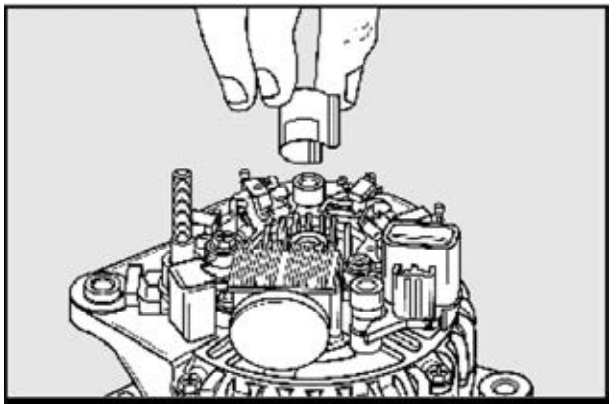


FIG. 6

7 Unscrew the 2 nos. regulator and connector moulding assembly fixing screws.

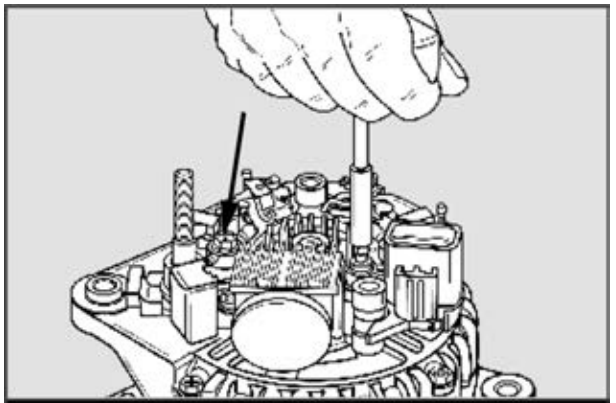


FIG. 7

8 Separate the regulator and connector moulding assembly from the unit.

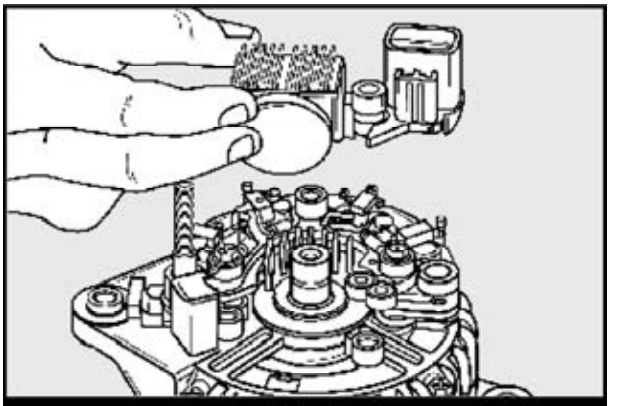


FIG. 8

9 Unscrew the 2 nos. Rectifier assembly fixing screws.

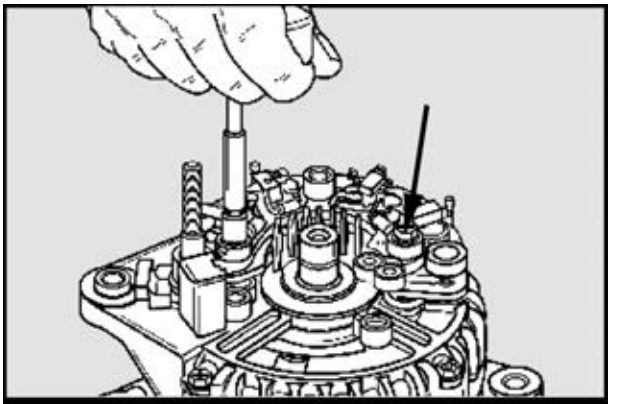


FIG. 9

10 Remove the 2 nos. fixing screw, spring washer and plain washer from the rectifier assembly.

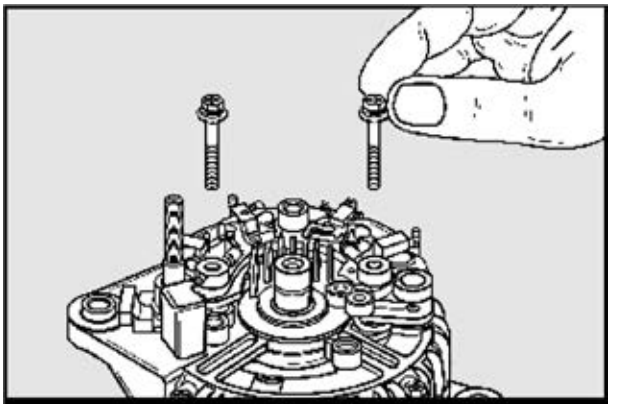


FIG. 10

11 Remove and separate the rectifier assembly from the unit.

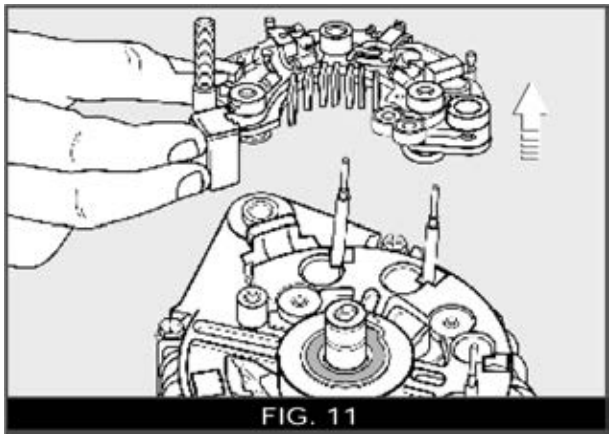


FIG. 11

12 Remove the Rubber seal.

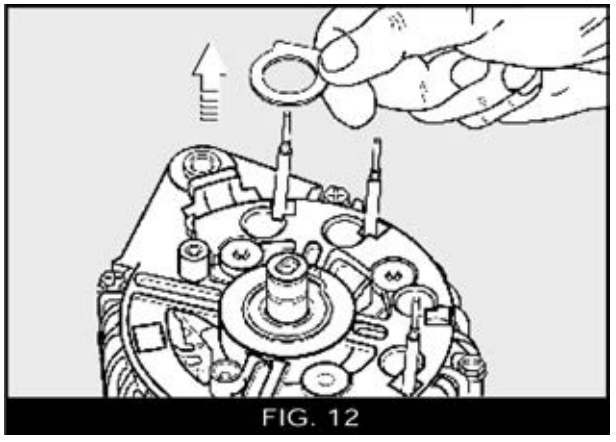


FIG. 12

13 Unscrew the through bolt 4 nos. shown.

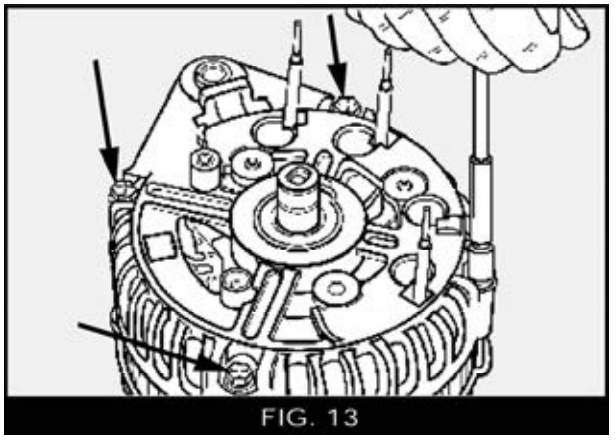


FIG. 13

14 Gently pull out the SRE bracket assembly.

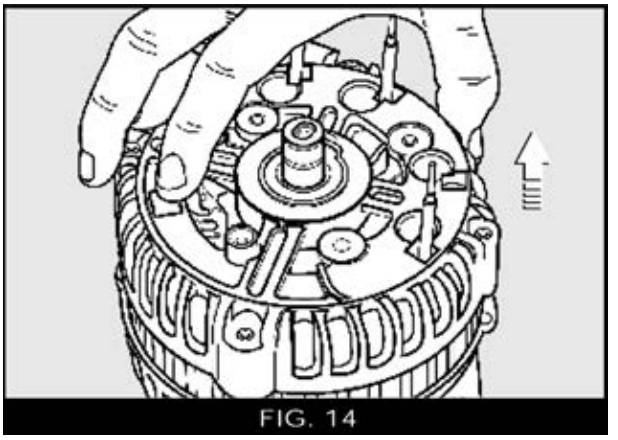


FIG. 14

15 Clamp the rotor assembly in a soft jaw and unscrew the pulley nut.

NOTE:

Take care of rotor claws from getting damaged.

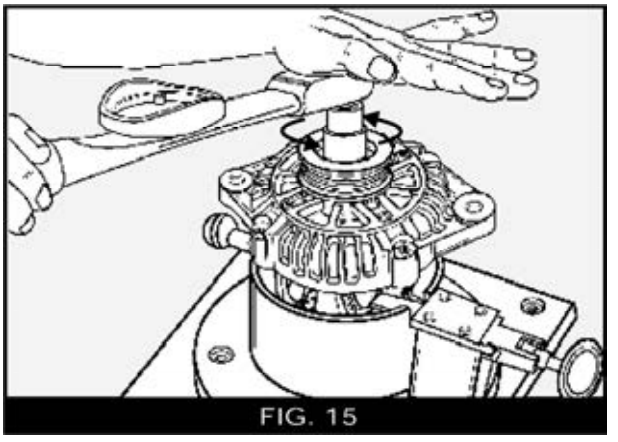


FIG. 15

16 Remove the nut.

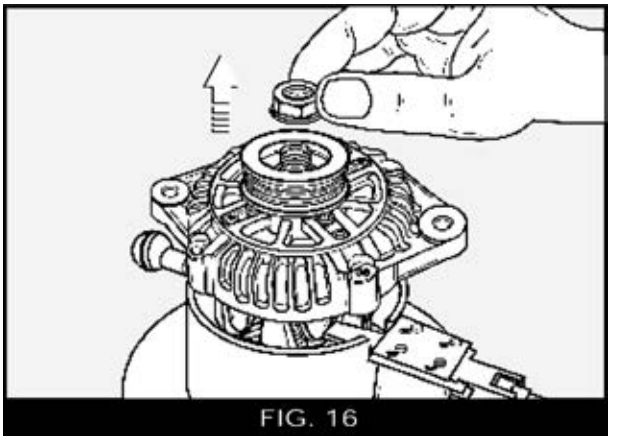


FIG. 16

17 Remove the pulley from DE bracket assembly.

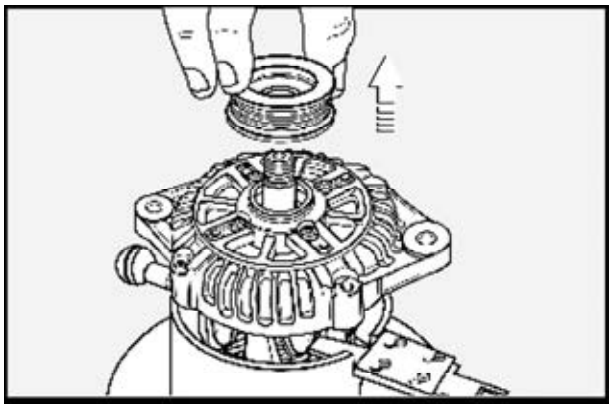


FIG. 17

18 Remove and separate the DE bracket assembly from the stator winding assembly.

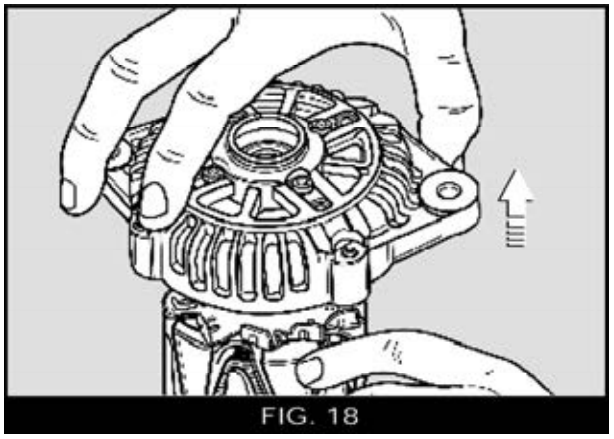


FIG. 18

19 Remove the spacing collar from the rotor assembly.

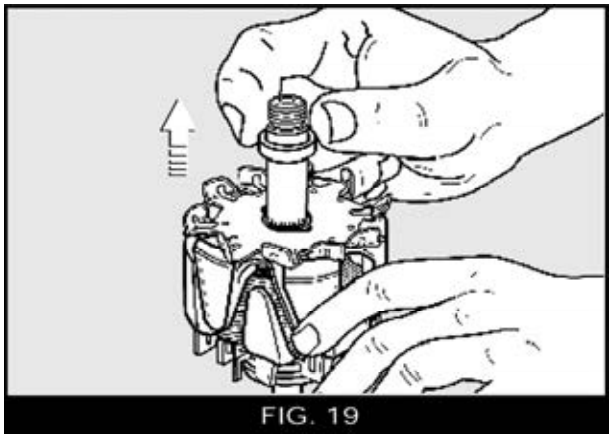


FIG. 19

20 Remove and separate the DE Fan from the Rotor assembly.

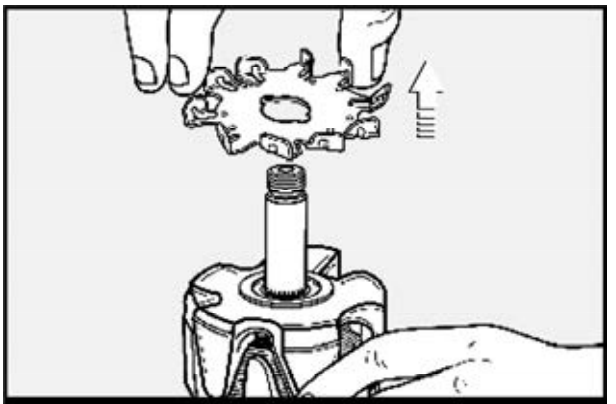


FIG. 20

21 Unscrew the 4 nos front end bearing retaining plate fixing screws.

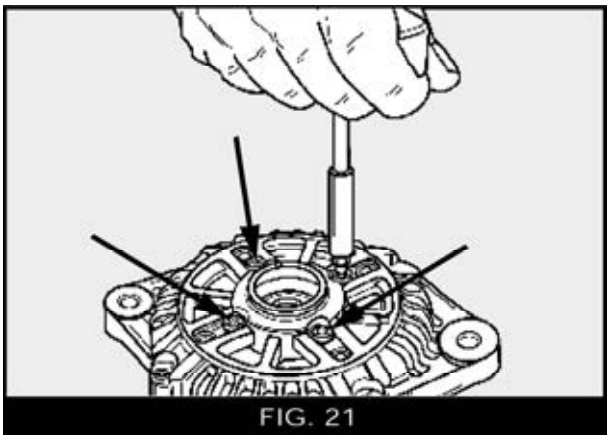


FIG. 21

22 Remove the DE ball bearing ront by using a soft pusher rod.

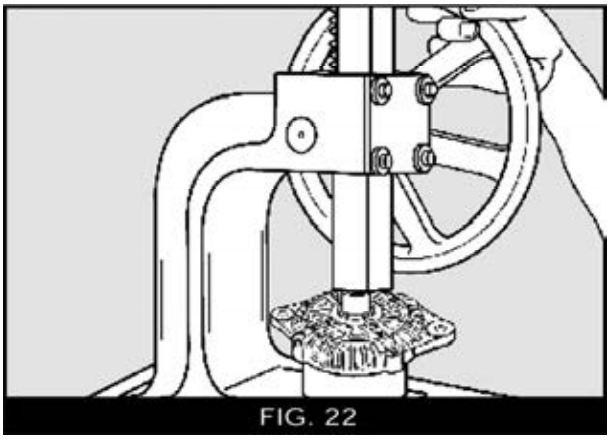


FIG. 22

2. BENCH INSPECTION:

On dismantling the unit conduct the following checks**:**

2.1 Brush check:

If the brushes are below the minimum required length renew the brushes in sets not individually.

De' solder the brush lead assy. INSERT New brush assembly and solder. Make sure that the brushes move freely inside the brush box.

NOTE:

Minimum required Brush Length : ***7.5 mm****.*

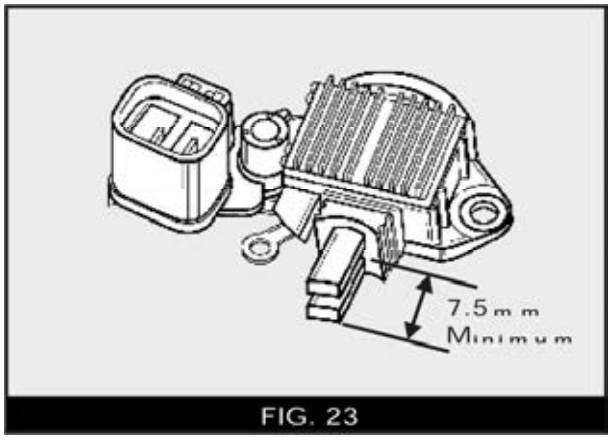


FIG. 23

2.2 Slip ring check:

If the surface is very rough and cannot be polished, replace the rotor assembly. There should not be any trace of oil or grease on the slip ring surface.

NOTE:

Clean slip ring surface with a fine piece of cloth and ensure that the surface is smooth and clean.

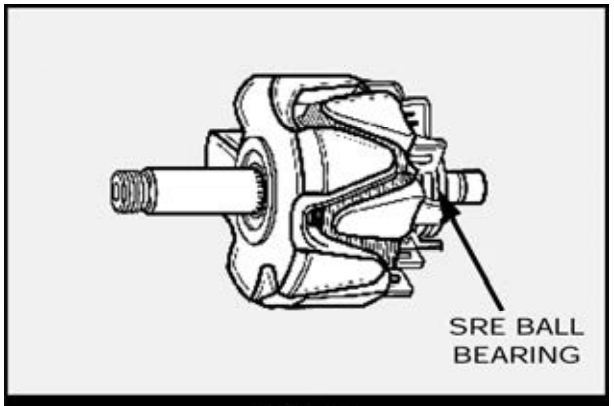


FIG. 24

2.3 Bearing check (SRE and DE):

Bearing should rotate freely without any excessive play. If play is observed, the bearings should be replaced.

2.4 Rotor assembly check:

Resistance Check: Use ohm meter 0-10 ohm range and connect as shown in fig. Connect the probes of the meter to the slip ring. The value should be 2.78 + 0.08 – 0.14 o at 20 C ohms. If value is outside this limit, change the rotor assembly.

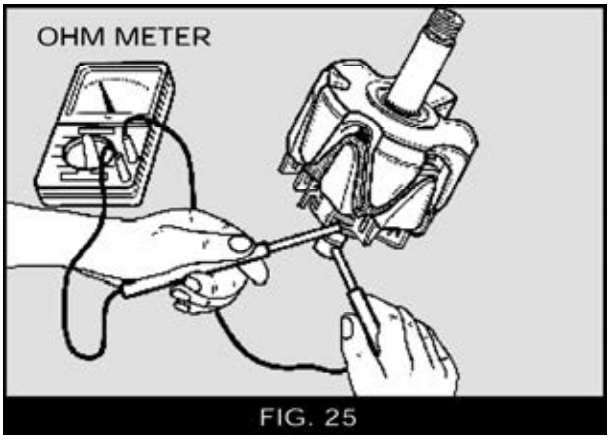


FIG. 25

2.5 Rotor ground test:

Using 230 volt AC main supply, connect a 15W bulb as shown in figure 26. Connect one of the probes to the slip ring and the other to the shaft. The lamp should not glow. If the lamp glows it indicates earthing. Replace the rotor assembly.

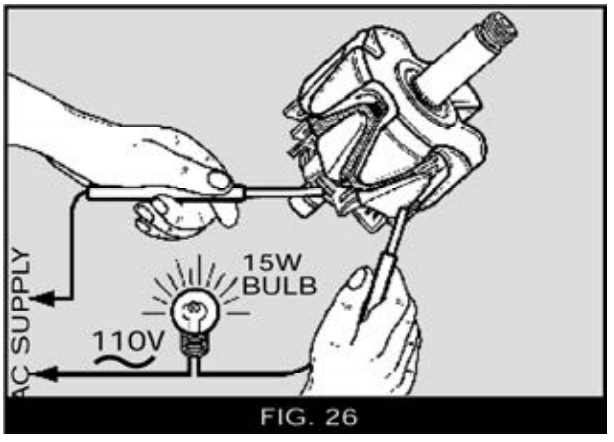


FIG. 26

2.6 Stator insulation test:

Using 230 volt AC main supply, connect a 15W bulb. Connect one of the probes to any of the three leads and the other probe to the body. The lamp should not glow. If the lamp glows it indicates poor insulation. Replace the stator assembly.

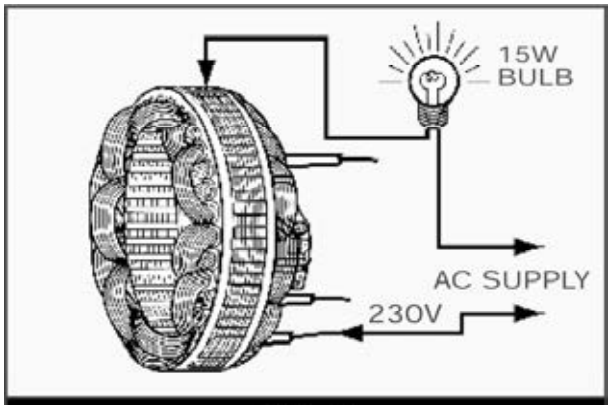


FIG. 27

2.7 Stator winding resistance check:

Use Ohm meter with two probes connect thicker wire and lead 1. The Value should read around 0.180 to 0.202 O Ohms at 20 C. Repeat it between star connection and lead 2 and 3

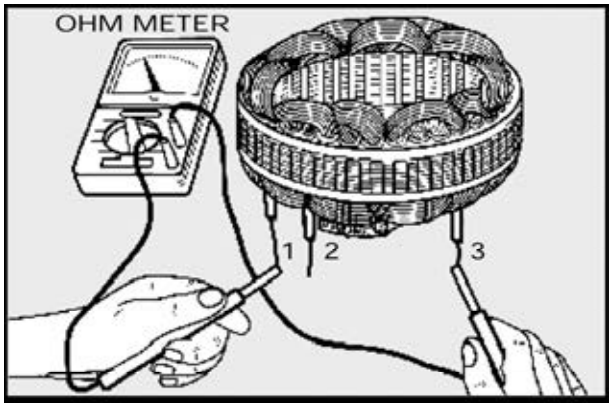


FIG. 28

2.8 Rectifier assembly check:

Remove the rectifier assembly from the unit and check as follows:

2.8.1 Testing of positive heat sink diodes:

A. Continuity check:

Connect as shown in figure. Use multimeter with two probes. Connect the negative probe of the multimeter to positive terminal and positive probe to phase connecting points one by one on the rectifier assembly. It should not indicate open circuit. Replace the rectifier assembly if it is open circuit.

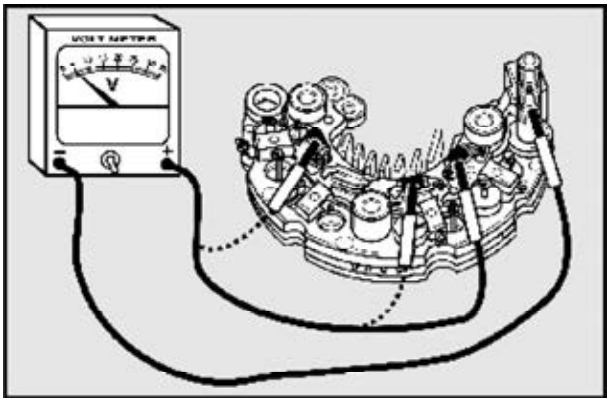


FIG. 29

B. No Continuity check :

Connect as shown in figure. Use multimeter with two probes. Connect positive probe of multimeter to positive terminal and negative probe to phase connector points one by one on the rectifier assembly. All diodes should indicate no continuity. If there is continuity it indicates short circuit. Replace the rectifier assembly.

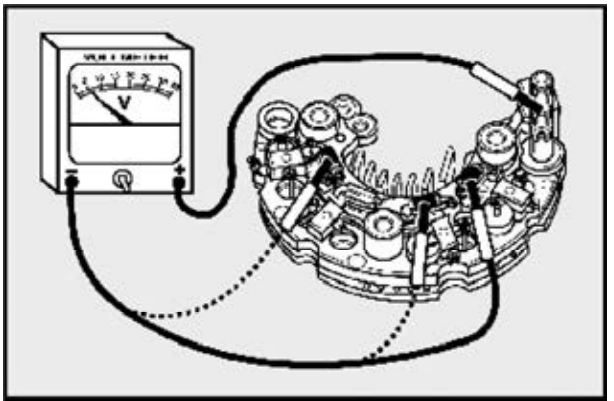


FIG. 30

2.8.2 Testing of negative heat sink diodes

A. Continuity check:

Connect as shown in figure. Use the multimeter with two probes. Connect the negative probe of multimeter to phase connecting points and positive probe to rectifier body. All diodes should indicate continuity. If not, it indicates open circuit. Replace the rectifier assembly.

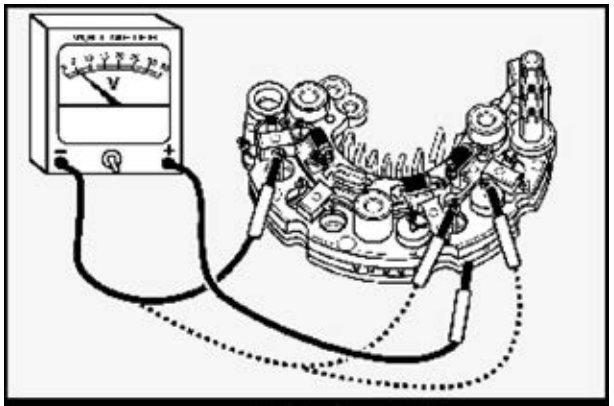


FIG. 31

B. No Continuity check:

Connect as shown in figure. Use the multimeter with two probes. Connect positive probe of multimeter to phase connecting points and negative probe to rectifier body. Now all diodes should indicate no continuity. If not, it indicates short circuit. Replace rectifier assembly.

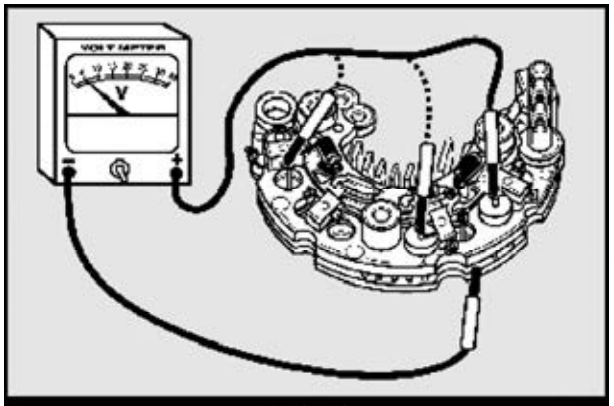


FIG. 32

2.9 Regulator check:

Use LTVS authorised test equipment for checking Regulators and test as per instructions given in the test equipment manual. Connect the negative to the equipment as per the markings on the Regulator.

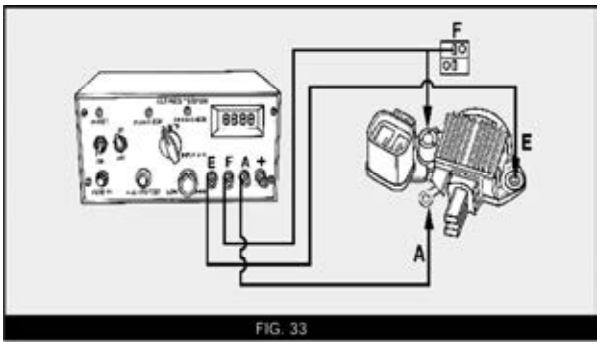


FIG. 33

3. Re-assembly:

It is reverse order of dismantling procedure. Note the following precautions.

Tightening the 4 nos. front end bearing retaining plate fixing screws in the DE Bracket assembly.

Insert the DE Fan and Spacing collar in the rotor assembly.

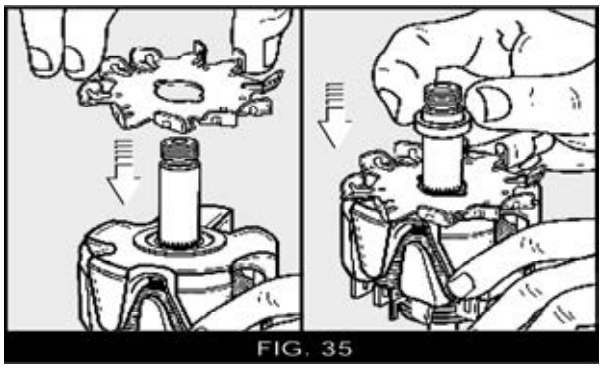


FIG. 35

To fix the DE Bracket assembly in the Rotor assembly and also insert the Pulley on DE Bracket assembly.

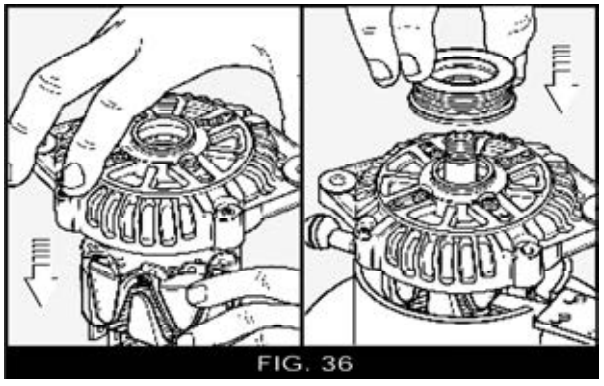


FIG. 36

Insert the Nut on the Pulley then Clamp the rotor assembly in a soft jaw and tighten the pulley nut carefully.

NOTE:

Take care of rotor claws from getting damaged.

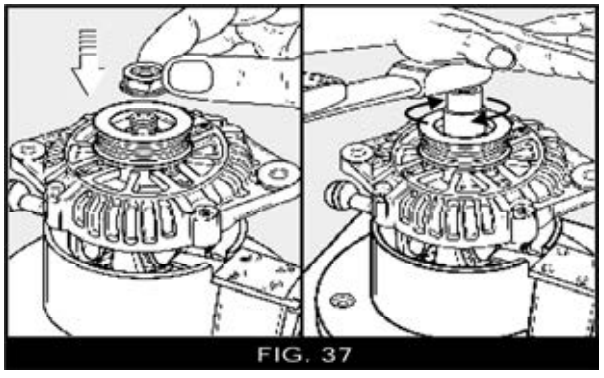


FIG. 37

Blow hot air over the rear bracket bearing housing for a few seconds till to temperature of the bearing housing is 105°C over the ambient temperature. After fixing the screws 2 nos. as shown in fig

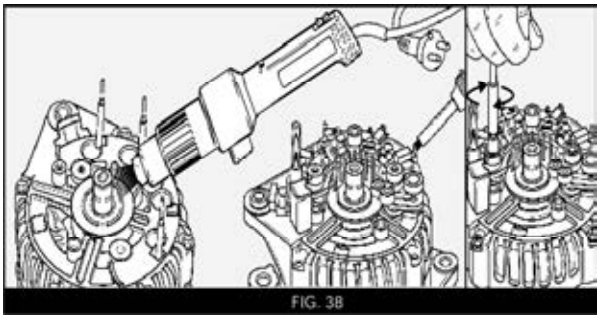


FIG. 38

Insert the Rubber Seal then fix the Rectifier assembly after tightening the 2 nos. Rectifier fixing screws.

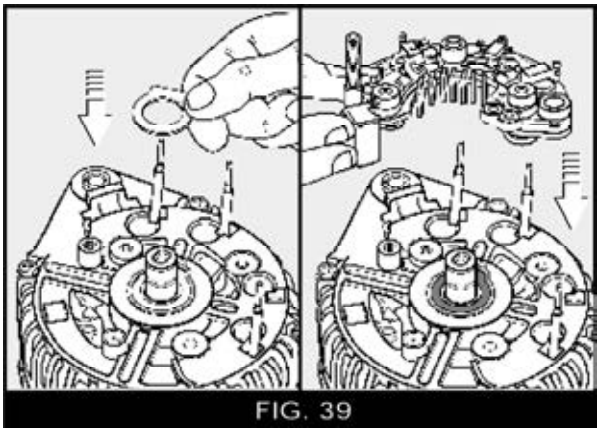


FIG. 39

Insert the SRE Bracket assembly and fix to tighten the 4 nos. Through Bolt in the body.

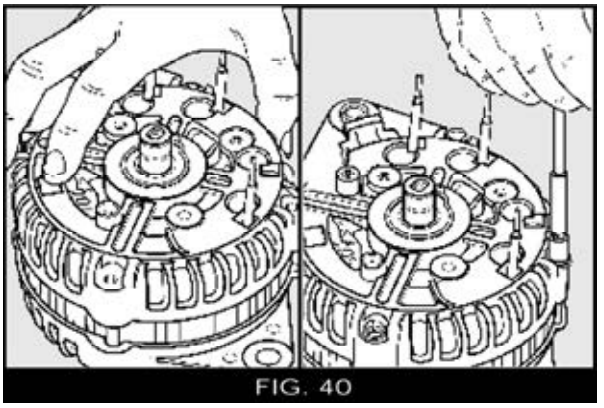


FIG. 40

Insert the regulator and connector moulding assembly and fix to tighten the 2 nos. Regulator earth screw and spring washer in the Alternator.

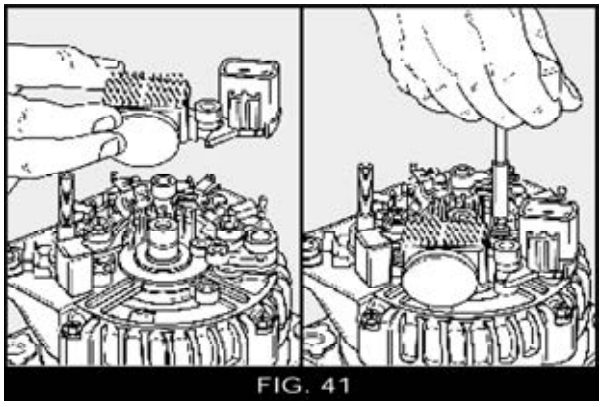


FIG. 41

Smoothly spacer and brush box moulding as shown in fig.

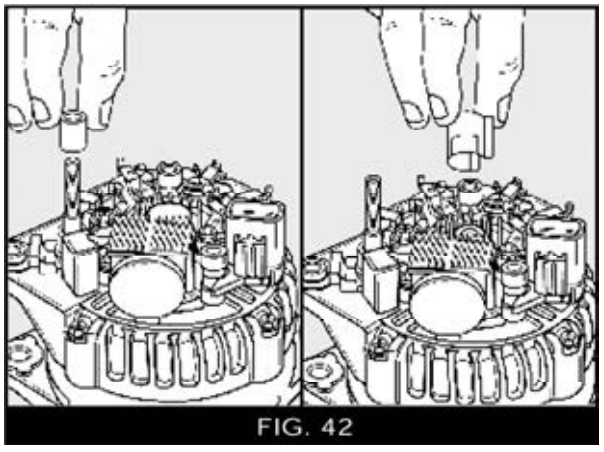


FIG. 42

Insert the rear cover moulding then fix to tighten the 2 nos. fixing screw in the alternator.

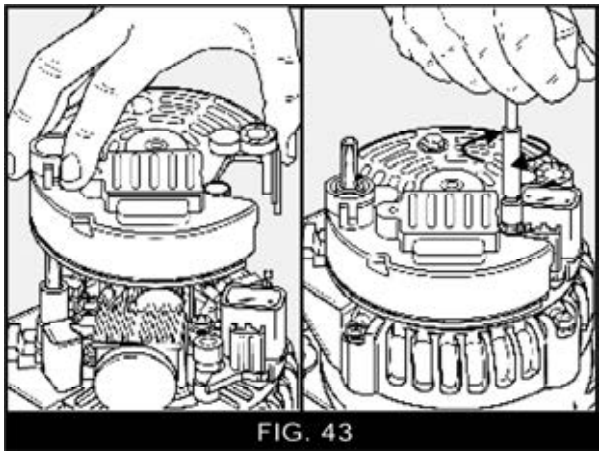


FIG. 43

Insert the terminal bush and fix the nut tightening.

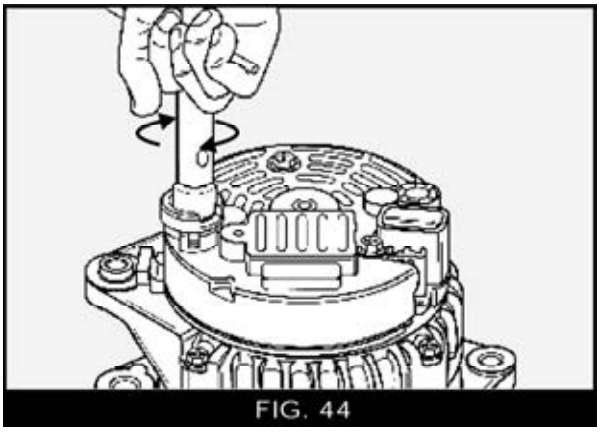


FIG. 44

4. Exclusive tools requirement:

A. To pre-heat rear bracket Hot Air Blower Motor:

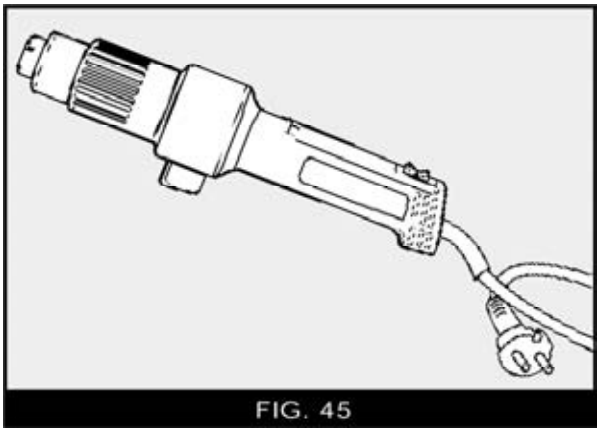


FIG. 45

B. Pulley nut removal base assembly tool:

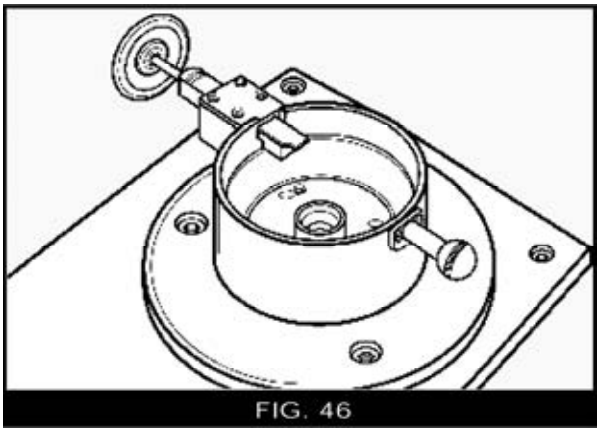


FIG. 46

5. Testing after Re assembly:

Test the Alternator in a test bench as per diagram shown in page (5) and read the values as per the specification.

TROUBLE SHOOTING:

BEFORE STARTING ENSURE THE BATTERY CONDITION.

DEFECT	POSSIBLE CAUSES	REMEDY
1. Warning lamp does not appear, when Ignition switch is on.	A) If the bulb does not light, ground WL terminal of the alternator.	
	B) If the bulb now lights the caused are:	
	i) Jammed brushes or brush lead adrift.	Free brushed, Replace, if necessary.
	ii) Dirty slip ring	Clean the slip ring
	iii) Rotor open circuit	Check that the ends of the rotor winding are soldered properly to slip ring terminals. Resolder the windings, if open, or replace the rotor.
	C) If the bulb does not light even after grounding WL Terminal, the causes are :	
	iv) Fused warning lamp bulb.	Check for short circuit, if any, in the wiring harness. After rectifying the short replace bulb.
	v) Short circuited warning lamp holder.	Replace Holder.
	vi) Short circuited warning lamp holder.	Replace Holder..
	D) If still WL does not appear when Ignition switch is on, the cause is faulty Regulator.	Replace regulator
2. Warning lamp glows dim	i) High resistance in warning lamp.	Check and correct.
	ii) Regulator defective	Replace Regulator.
	iii) Rotor defective.	Replace Rotor.
3. Warning lamp 'on'. Ammeter shows no charge while engine is running.	i) Loose belt.	Tighten the belt to the limits as indicated in routine maintenance.
	ii) Aux. diode lead 'A' open.	Check diode connection and trace short. Rectify if possible or replace rectifier assembly.
	iii) Shorted rotor	Replace rotor.
	iv) Stator open/shorted	Replace stator assembly.
4. Warning lamp 'on' or dim but ammeter shows charges (low output)	i) Faulty bridge.	Replace defective heat sink assy.
5. Warning lamp goes off. Ammeter shows low output.	i) Faulty rectifier bridge.	Replace defective heat sink assy.
	ii) Stator winding short.	Rectify or replace stator assembly.
6. Warning lamp (Ammeter) flickers considerably.	i) High resistance in the negative line.	Check connections and ensure use of recommended wire.
	ii) Slip ring dirty.	Clean the slip ring and recheck.
7. Overcharging (Battery gases)	i) Faulty regulator.	Replace Regulator.
	ii) Rotor shorted to earth on negative side.	Rectify or replace rotor assembly

3.3 STARTER MOTOR

GENERAL DESCRIPTION:

The starting system consists of Ignition switch, Starter relay, Battery, Starter motor and starter fuses. The starter motor has high power DC motor and starter solenoid which uses the battery voltage to motor to crank the engine.

In TATA XENON gear reduction starter motor is used.

PRECAUTIONS:

Do's

- Starter motor should be firmly mounted on to the engine ensuring proper electrical grounding.
- Tightening torque for terminal connections and threaded Mounting hole should be as per specification.
- Use suitably designed wiring hardness to prevent short circuiting of starter terminals
- During testing, ensure proper connection of Starter Motor, Battery and Solenoid terminals with available power source.
- Before carrying out work on the engine near the Starter or on the Starter itself, the battery or power source must be disconnected.

DONT'S

- For Starter Motor testing, avoid striking of power source cable with Starter Motor battery and solenoid terminals.
- In order protect Starter Motor terminals from painting marks, avoid application of grease. During painting of engine, avoid spread of paint on pinion, pinion shaft
- Starter Motor should not be used for Green Engine Starting and Green Engine priming. Alternative methods have to be used (e*.g. Dyno based start or Slave Starter*).
- The Starter Motor should not be used as the prime mover for the vehicle as in cases where the vehicle gets drained of fuel and the Starter Motor is subjected to drive the vehicle.
- After engine fires, Starter Motors should not be subjected to operation.

ROUTINE CHECKS:

- Ensure that the starter motor mounting bolts to the engine are securely fastened for proper earthing.
- Check electrical connections are clean and tight.
- Cables should be examined for fractures particularly where the strands enter the terminal lugs.
- Inspect fixing bracket for any cracks
- Check the general condition of the battery.
- Ensure correct battery electrolyte level.
- Check smooth functioning of ignition key switch

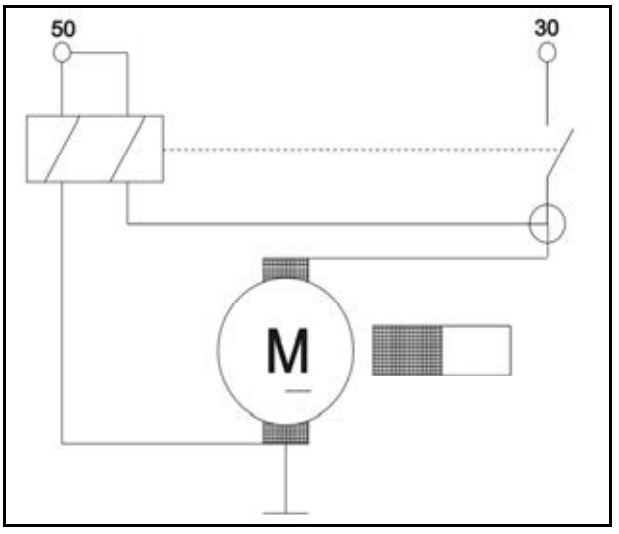
STARTER MOTOR SPECIFICATIONS:

Voltage		12 Volts	
Type		R74 – E35 12V ®	
Rating		2.25kW	
Rotation		clockwise viewed from pinion	
Weight		3.7 kg (Approximate)	
Internal gear ratio		4.36	
Performance		Test condition	Guarantee
Spec. at +20 °C	No load	11.3 V	120 A (max), 3600 rpm (min)
	Load 1	10 V, 10 NM	450 A (max), 1950 rpm (min)
	Load 2	8.2 V,20NM	800 A (max), 950 rpm (min)
Solenoid		Pull – in voltage	8 V (max) at +20 °C

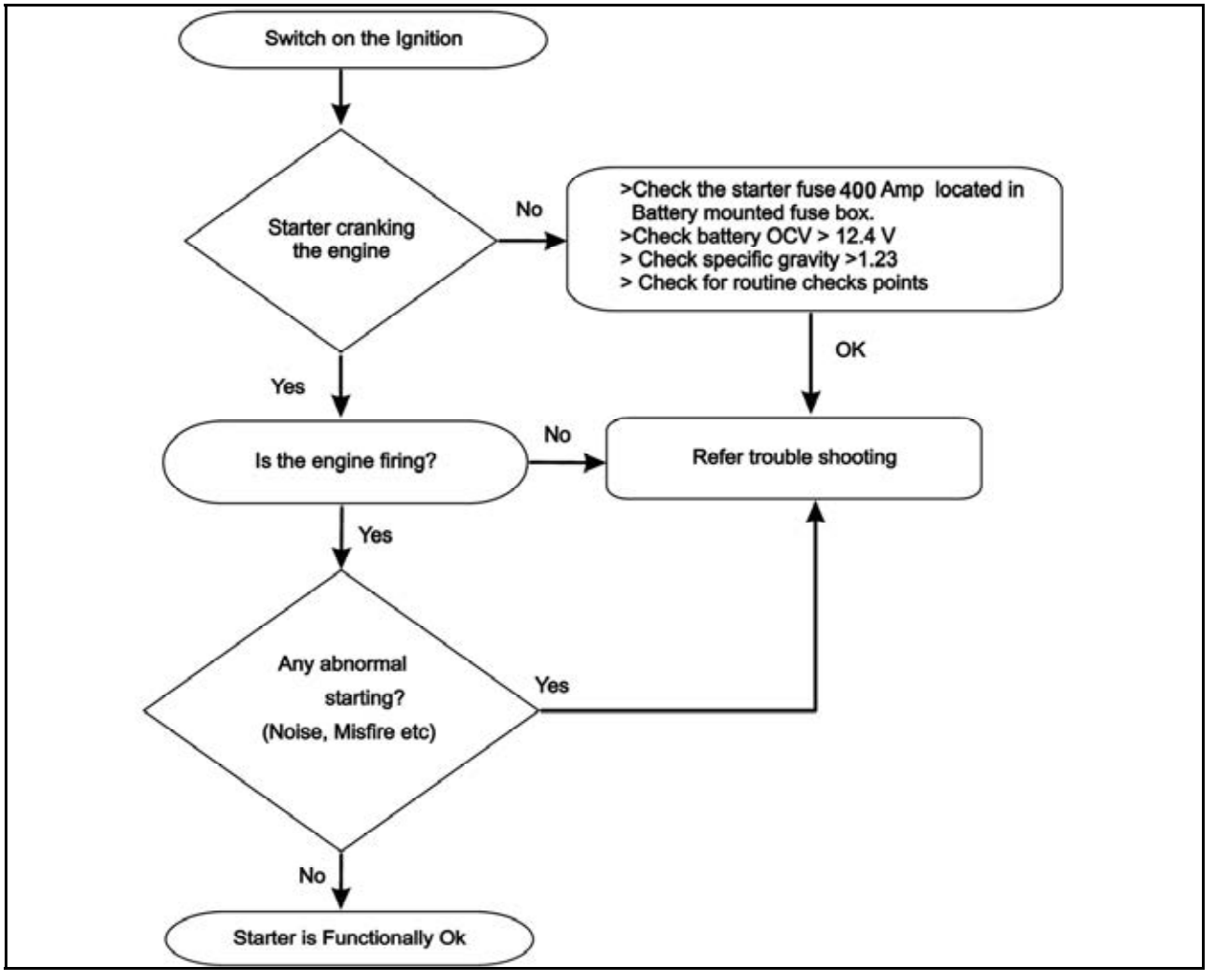
SALIENT FEATURS:

- Start – Stop motor
- Reinforced armature.
- Special bearing grease.
- Long life characteristics by new brush-slip ring system and reinforced end shields.
- Designed for application with High Thermal load.

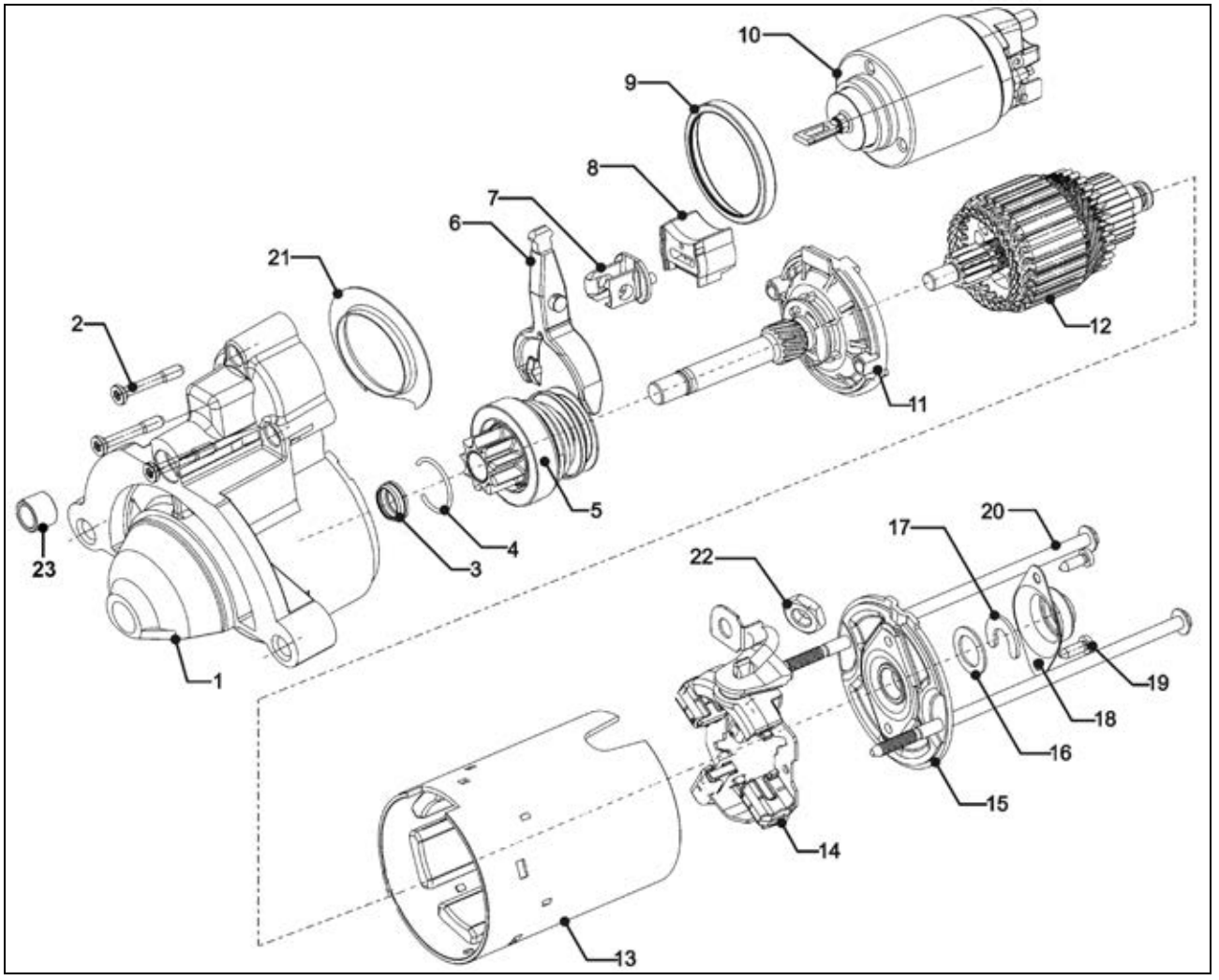
CIRCUIT DIAGRAM:



STARTER SYSTEM LEVEL CHECKS ON VEHICLE:



EXPLODED VIEW:



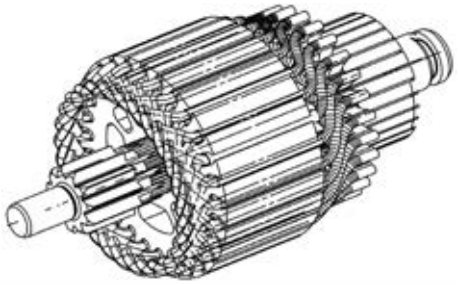
PART LIST:

SR.NO.	DESCRIPTION	SR.NO.	DESCRIPTION
1	Drive End Shield	13	Stator Frame
2	Counter Sunk Screws	14	Brush Holder
3	Retainer	15	Commutator End Shield
4	Stop Ring	16	Shim
5	Over Running Clutch Drive	17	Retaining Washer
6	Fork Lever	19	Closure Cap
7	Bearing Pedestal	18	Screw
8	Seal	20	Hexagon Screw
9	Seal Ring	21	Cover Disc
10	Solenoid Switch	22	Hexagon Nut
11	Epicycloidal Gear Train	23	Dowel
12	Armature		

CONSTRUCTION:

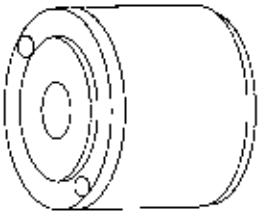
The Construction of the Starter Motor is as follows

- **ARMATURE ASSEMBLY:**



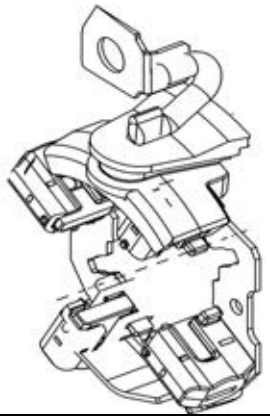
Moulded commutator high speed operation two part epoxy varnish impregnation for high fling resistance. Dynamically balanced Armature for less noise and longer bearing life. Welded joint for Armature conductors for enhanced thermal rating.

- **YOKE ASSEMBLY:**

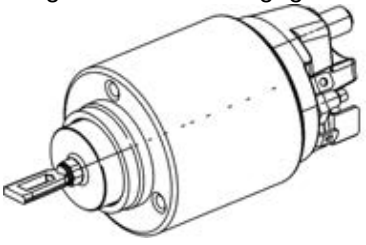


Deep drawn yoke with Permanent magnet.

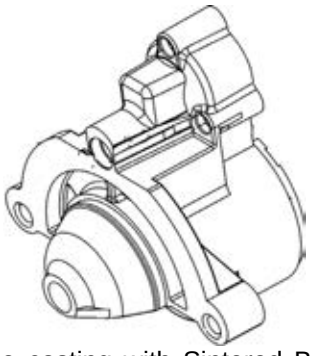
- **BRUSH GEAR ASSEMBLY:** Epoxy glass filled laminates for high temperature, Rivet less BG operation.



- **SOLENOID SWITCH:** Internal body and terminal cover moulding with built – in engagement spring.

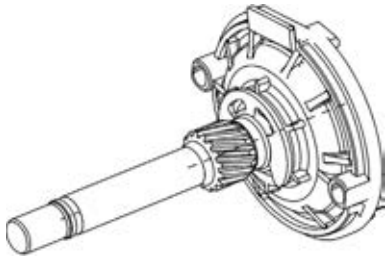


- **FIXING BRACKET ASSEMBLY:**



Aluminum die casting with Sintered Bearing Bush offers longer bearing life.

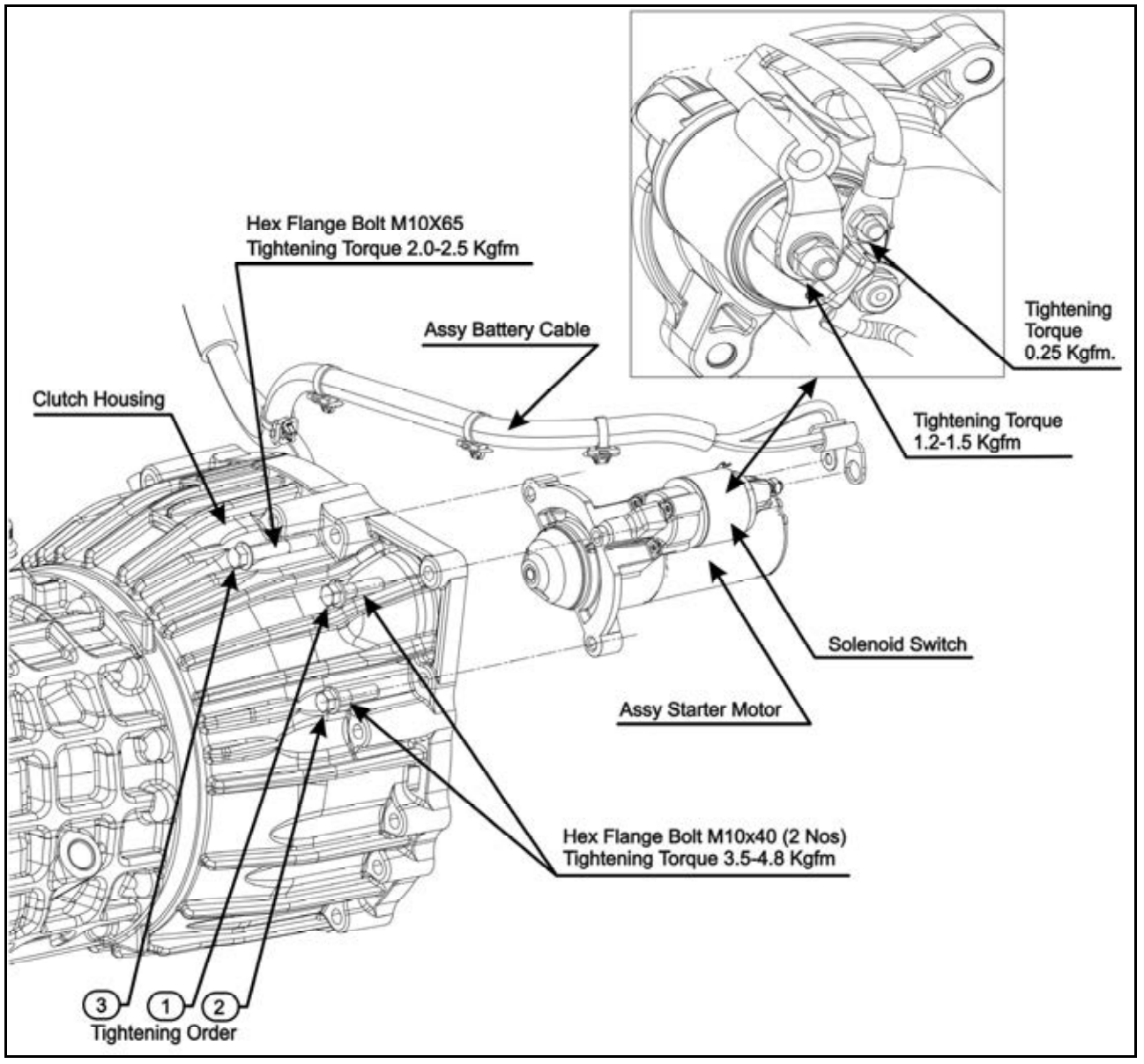
- **DRIVE SHAFT AND INTERNAL GEAR ASSEMBLY:**



1. **Gear shaft:** Steel forged heat – treated shaft with helix to house the drive
2. **Planetary Gear:** Sintered gears with sintered bush bearing consistent dimensional control.
3. **Internal Gear:** Plastic gear (*GF45*) With Sintered Bearing, bearing for increased output.

4. **Over running clutch sleeve:** Extruded heat–treated steel helical spline for drive.

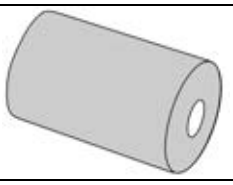
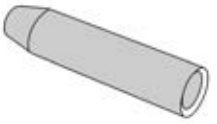
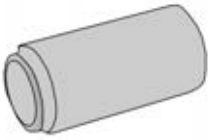
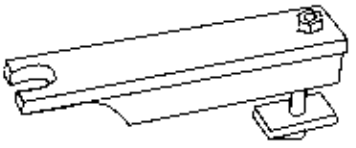
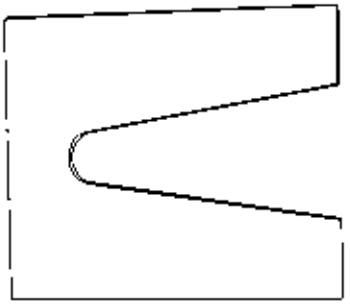
FITMENT DETAILS WITH TIGHTENING TORQUE:



DESCRIPTION	TIGHTENING TORQUE in Kgfm
Solenoid Screws	0.75 ± 0.1
Hexagon Screw (*Through bolts*)	0.75 ± 0.1
Hexagon nut at Terminal 45	0.85 ± 0.15

ELECTRICAL

SPECIAL TOOLS LIST:

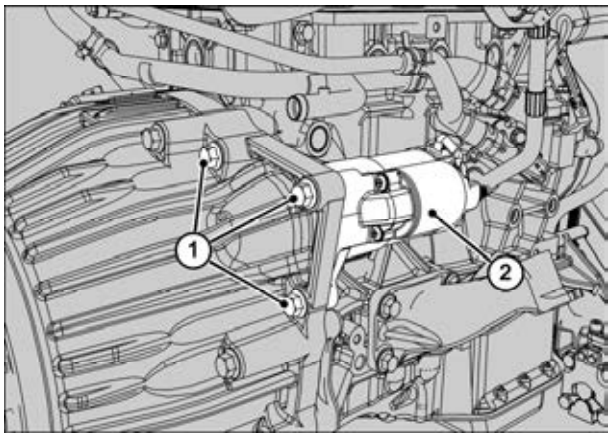
SR. NO	DESCRIPTION	PART.NO.	APPLICATION	TOOLS
1	Brush holder	H-S/KDEP 188 F 002 H30 169	For holding carbon brushes while removing / assembling BRUSH HOLDER	
2	Ram	03-KDAL 5496 F 002 H30 152	For pushing out stop ring	
3	Sleeve	03-KDAL 5028 9 681 033 340	For assembling spring ring	
4	Holding tool	03-KDAL 5487 F 002 H31 104	For holding armature while assembling spring ring.	
5	Supporting plate	H-S/KDEP 189 F 002 H30 801	For holding armature while assembling spring ring.	

REMOVAL:

1. Remove the air filter assembly; *(Refer Air filter assembly removal process).*

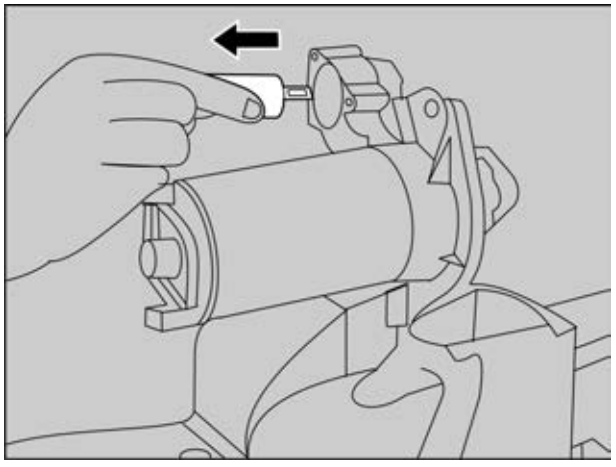
2. Disconnect the electrical connections of the starter motor.

3. Loosen and remove the 3 mounting bolts (1) and remove the starter motor (2).



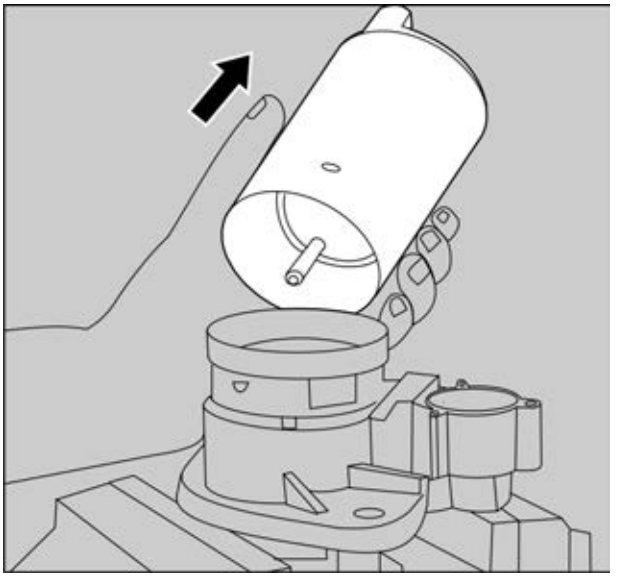
DISMANTLING:

1. Clamp the starter motor by its 'eye' on a vice. Unscrew nut on the solenoid and remove the supply terminal. Loosen the three fastening screws from the solenoid and remove the solenoid. Remove the armature and return spring.



2. Loosen screws on the rear closing cap but do not remove yet.

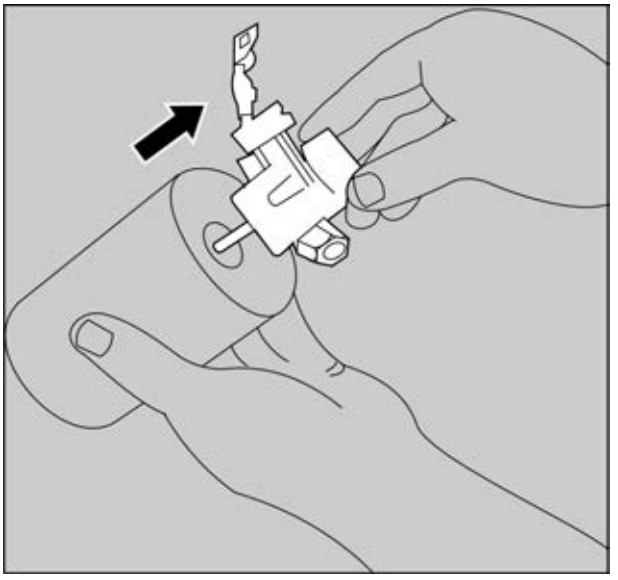
3. Unscrew through bolts. Mount the starter motor vertically on the vice. Remove stator frame with closure cap, armature and commutator end shield from the drive end housing.



4. Unscrew screws and remove closure cap from commutator end shield. Remove retaining (lock) washer and shims from armature shaft. Remove commutator end shield.

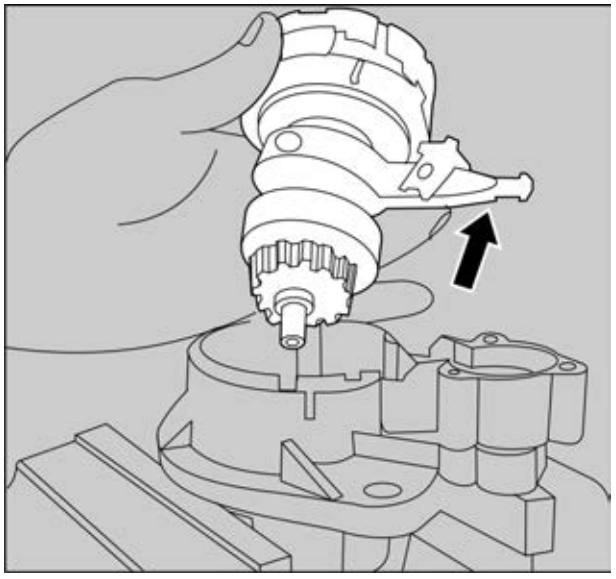
5. Insert tool H-S/KDEP188 onto the armature shaft and slide the brush plate on to the tool. Pull the tool with the brush plate off the armature shaft.

6. Pullout the armature from the stator frame.

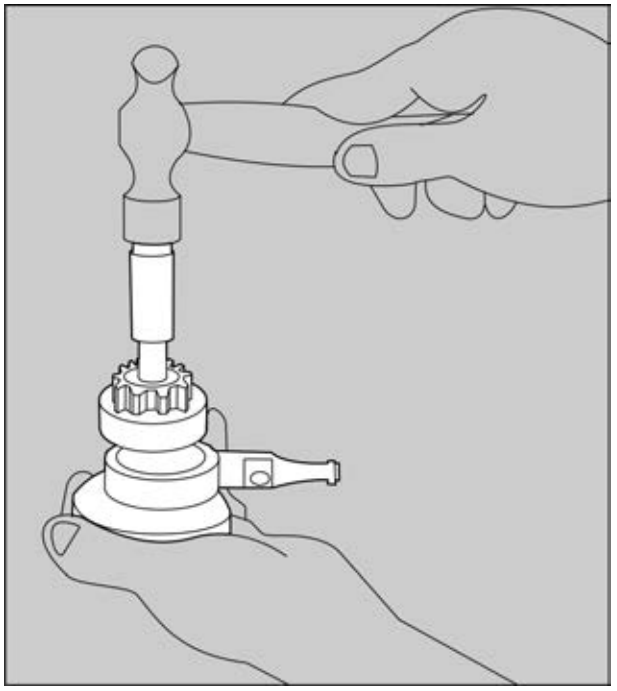


7. Mark the relative positions of the drive end housing, the ring gear plate and the ring gear cover plate (*parts of epicycloid gear train*) with respect to each other using a marker.

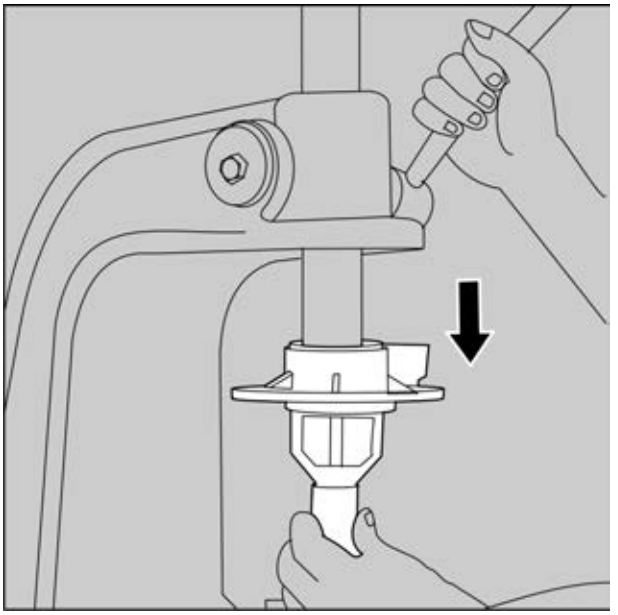
8. Pullout rubber seal. Pullout bearing pedestal. Remove epicycloid gear with overrunning clutch and fork lever from drive end bearing housing.



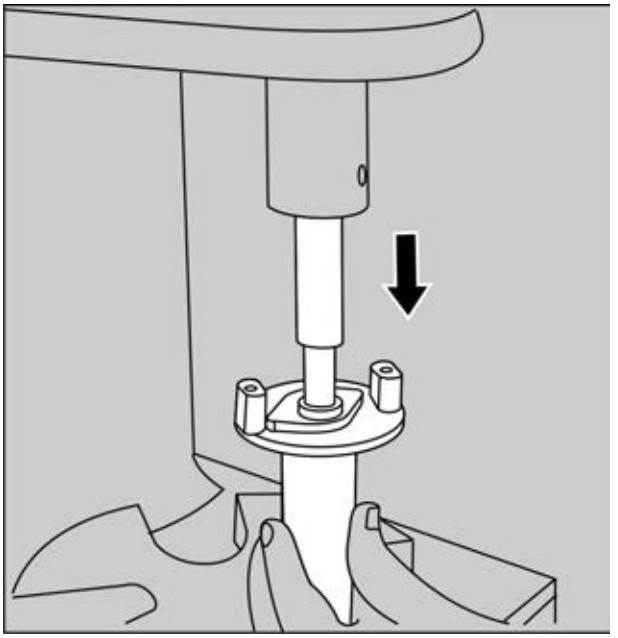
9. Using mounting sleeve 03-KDAL 5028 and a light hammer, knock back the stop ring. Using suitable pliers, bend the ends of the retainer wide apart. Remove retainer. Remove drive pinion from the drive shaft.



10. Using an Arbor Press, press out sintered bush from drive end bearing housing using tool H-S/KDEP 1132/0/1 and replace with a new one using the same tool.

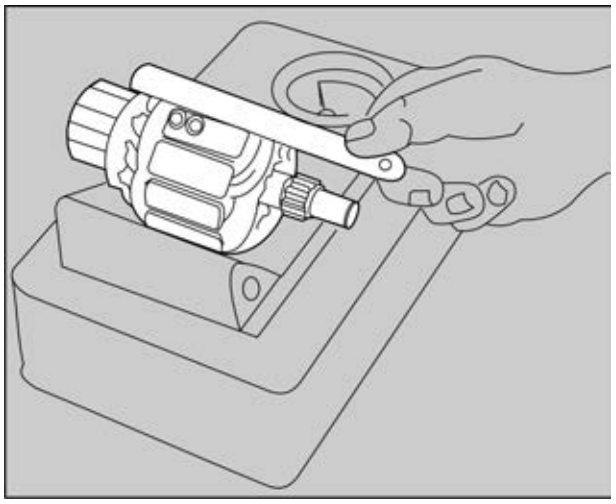


11. Using an Arbor Press, press out bush from commutator end shield using tool H-S/KDEP 1132/0/1 and replace with a new one using the same tool.



CLEANING AND INSPECTION:

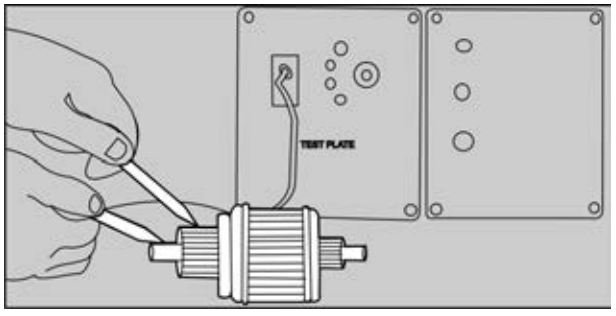
1. Armature, overrunning clutch, stator and solenoid must be cleaned only with compressed air.
2. Examine all parts for wear and damage.
3. Check the armature for inter-turn short circuit with a growler.



4. Test for short circuit to ground using 03-KDAW 9984 and 03-KDAW 9985,

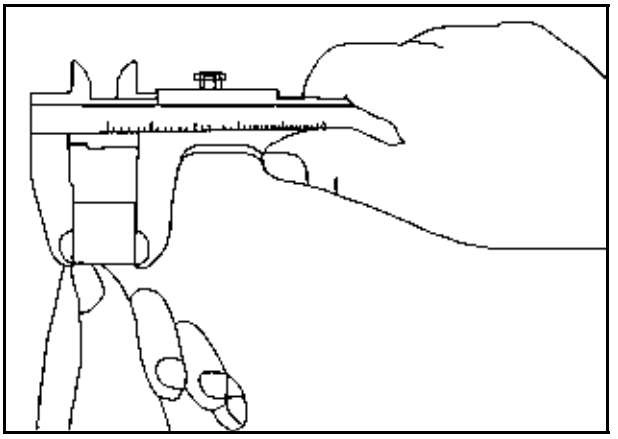
   Test voltage: 40V AC for 12V starter.

   With one probe on the armature shaft, run the other probe along the circumference of the commutator segments. The indicator lamp should not glow. Replace armature if short circuited.



5. Examine the stator frame and permanent magnets for damage. If damaged, replace the stator frame.
6. Check ring gear for cracks and wear. Check bushings in the ring gear and drive shaft. Renew drive shaft with ring gear if damaged/worn.
7. Brush Length Check:

   Unlock the brush holders on the brush plate and check carbon brushes. Minimum allowable length of carbon brushes 4.5mm.If carbon brushes are to short or broken then replace the entire brush plate.

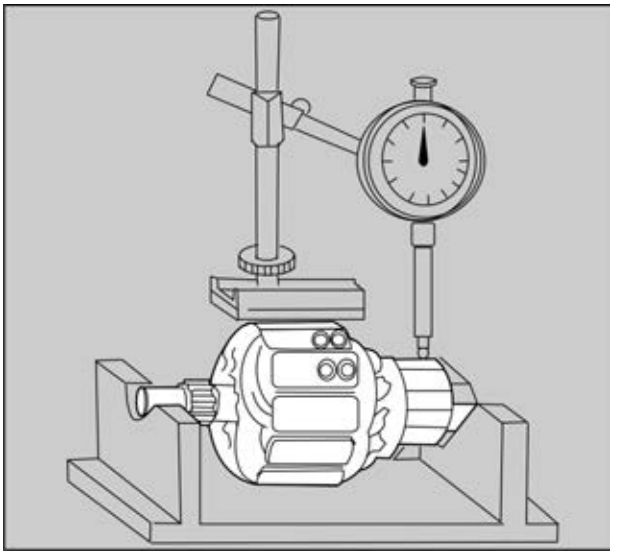


8. Commutator run-out check**:**

   Check the commutator run- out as shown in fig. Max. Allowable run out: At commutator – 0.01 mm, at laminated core – 0.05 mm. If it exceeds the limits give a fine cut on the commutator on a lathe, if it is not possible replace the Armature.

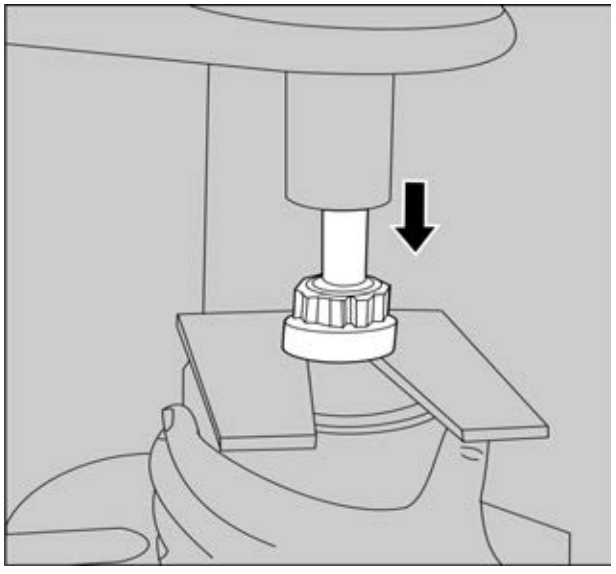
   If worn points are visible on the commutator, under cut the commutator with carbide until worn points are no longer visible.

   Commutator Min Dia: 31.2 mm

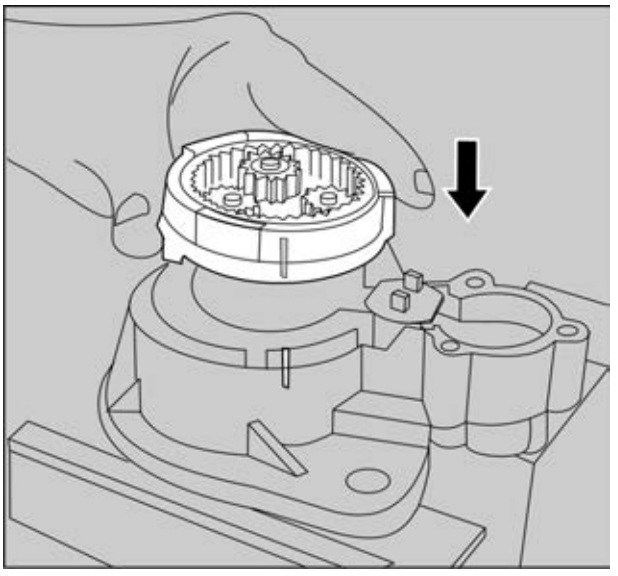


ASSEMBLY:

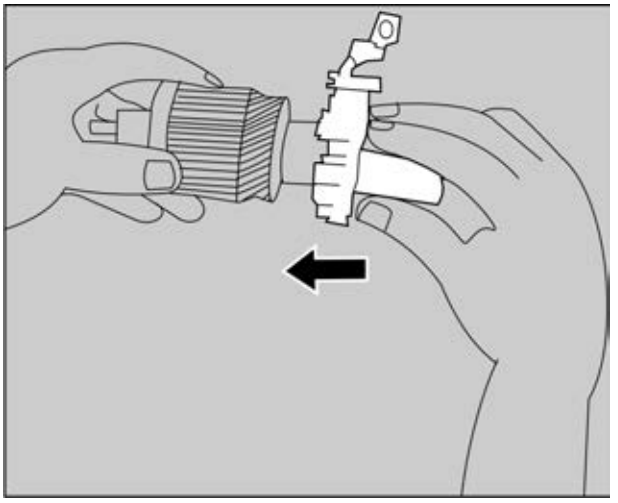
1. Lightly oil pinion bearing surface. Lightly grease spiral splines of armature shaft.
2. Slide overrunning clutch with fork lever and bearing pedestal on to drive shaft. Slide stop ring onto shaft.
3. Using pliers slightly open up new retainer and insert into armature ring groove.
4. Slide mounting sleeve 03-KDAL 5028 onto armature shaft (*turned side of sleeve pointing to retainer*) and caulk retainer into stop ring using 03-KDAL 5487 and a mallet. Alternatively, press the retainer into the stop ring with tool 03-KDAL 5028 using an Arbor Press supporting the pinion on supporting plate H-S/KDEP 189 as shown in figure.



5. Align the marks made during dis-assembly and insert the epicycloidal gear with pinion, overrunning clutch, fork lever and bearing pedestal into the drive end bearing housing. Insert rubber seal.
6. Align the marks and position the cover plate on the ring gear

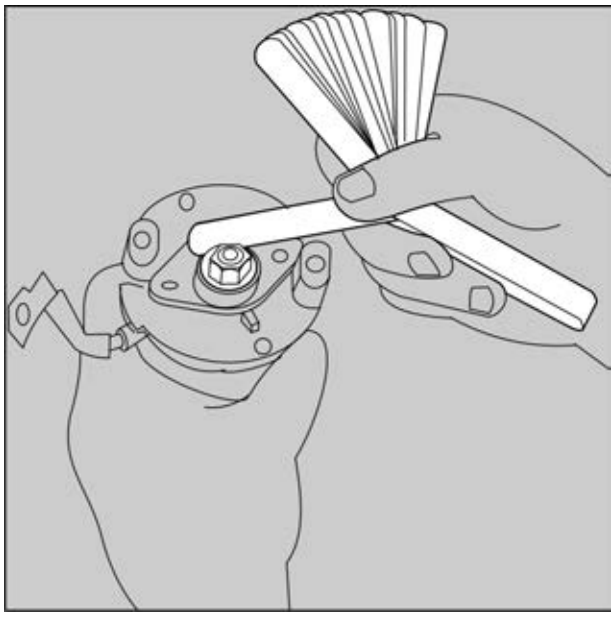


7. Position tool H-S/KDEP 188 with brush plate on the armature shaft at the commutator end and slide the brush plate over the commutator, making sure that the brush holders are properly seated at anchor point. Remove the tool.



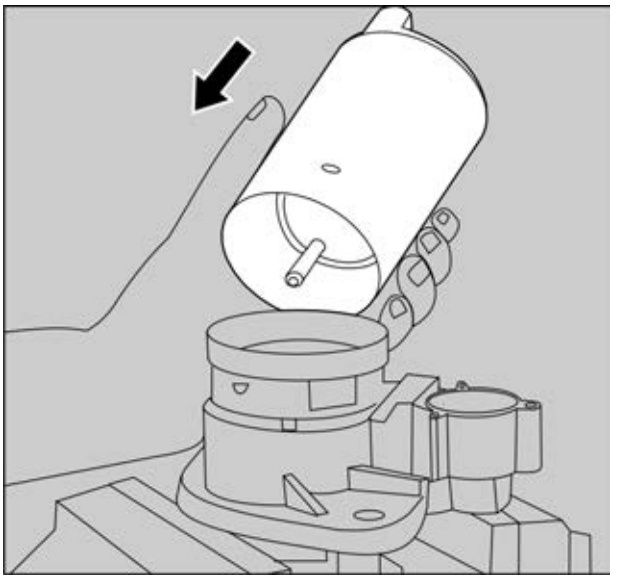
8. Lightly oil gasket (felt ring) with oil and insert on commutator end.
9. Slide commutator end shield onto armature shaft.

10. With the help of a feeler gauge, set armature end play to 0.05 to 0.4 mm using only one shim. (*Shims of thicknesses 1.0, 1.2 and 1.4 mm are available*). Insert lock washer. Lightly grease holding disc and shim with silicon grease. Mount seal and closing cap and lightly tighten the screws by hand.



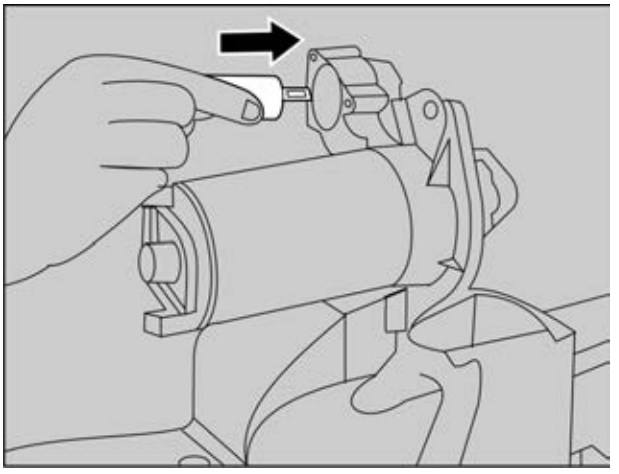
11. Slide armature with brush plate and commutator end shield carefully into stator frame. Fit rubber seal on terminal 45 (*brush plate*) into groove on stator frame. Position the stator frame on the drive end bearing housing. Turn the pinion until the armature latches into the gear wheels. The groove on the stator frame fits on to the sealing rubber of the bearing pedestal.

12. Position the through bolts and tighten to 4.5 to 6.0 Nm. Tighten the fastening screws of closure cap to 1.4 to 2.0 Nm



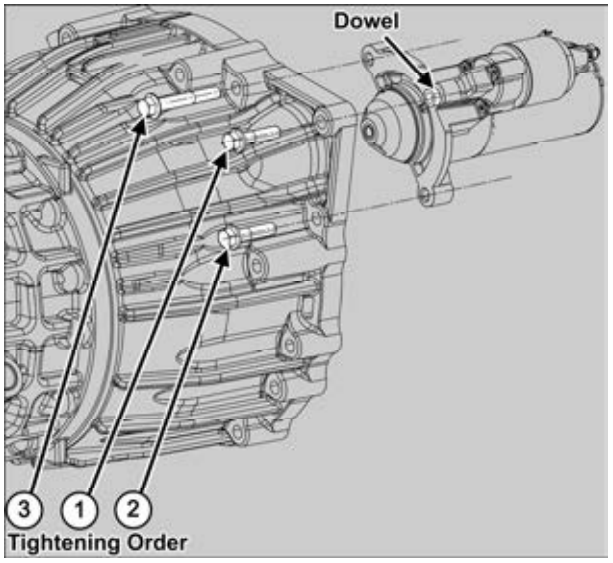
13. Hook the solenoid armature into the fork lever. Insert solenoid armature return spring and screw down the solenoid housing to torque (*4.5 to 6.3 Nm*).

14. Reconnect the supply terminal and tighten nut with washer on the solenoid.



REFITMENT:

1. Match the dowel with corresponding hole on the clutch housing.



2. Fit the three mounting bolts and tight with specified torque and sequence/order. (*Refer above given fitment detail figure for tightening torque)*
3. Connect the electrical connection of the starter motor.

! CAUTION:

Tighten all the mounting bolts of starter motor in given order with desired torque. Do not exceed torque value, it will result in damage.

TROUBLE SHOOTING:

CONDITION	POSSIBLE CAUSE	CORRECTION/REFERENCE ITEM
Starter not rotating	Brush Holder Fuse opened	Replace Brush holder
	Brushes completely worn out	Replace Brush holder
	Solenoid Defective	Replace Solenoid
	Epicycloidale Gear Train *(EGT)* Damaged	Replace EGT
Starter not taking load *(Only free run)*	Brushes completely worn out	Replace Brush holder
	Solenoid Defective	Replace Solenoid
	Over running clutch *(ORC)* slipping in both direction	Replace ORC
	Grease deposition on commutator brush track	Replace armature
	Epicycloidale Gear Train *(EGT)* Damaged	Replace EGT
Starter pinion damage	Solenoid Defective	Replace Solenoid
Starter flange broken	Defective Drive End Flange *(DEF)*	Replace DEF / Bearing
Starter pinion oscillating freely	Solenoid Defective	Replace Solenoid
	Bearing damage due to water / Mud entry	Replace DEF / Bearing
	Bearing broken / Damaged	Replace DEF / Bearing
Starter motor not working *(burnt)*	Solenoid Defective	Replace Solenoid
	Armature Defective	Replace armature
	Armature Burnt	Replace armature
	Brush Guide melted / Damaged	Replace Brush Holder
Pinion moving freely axially	Solenoid Defective	Replace Solenoid
	Fork lever Worn out / Melted	Replace fork lever

4 LIGHTING SYSTEM

4.1 BULB SPECIFICATIONS

SR.NO.	DESCRIPTION	CAP TYPE	SPECIFICATION	QTY/VEH.
1	Head lamp-Main	P43t	H4 12 V 55/60W	2
2	Head Lamp-Position Lamp	W5W	12 V 5W	2
3	Head Lamp-Turn indicator	PY21	12V 24W	2
4	Side Repeater Indicator	W3W	12 V 5W	2
5	Tail Lamp –Stop	BAY15d	12 V 21W	2
6	Tail Lamp – Turn indicator	BAU15s	12 V 5W	2
7	Tail Lamp – Position	Wedge Type	12 V 5W	4
8	Front Fog Lamp	-	H11 12 V 55W	2
9	Rear Fog Lamp	BAW 15s	12 V PR21W	1
10	High mounted stop lamp	-	LED	1
11	Registration plate Lamp	W2.1 X9.5D	12 V 5W	2
12	Front roof lamp	FESTOON LAMP	12 V 10W	1
		Wedge Type	12 V 5W	2
13	Rear roof lamp	Wedge Type	12 V 5W	1
14	Puddle lamp	C5W	12 V 5W	4
15	Door Ajar Lamp	-	LED	4
16	Engine Lamp	BA15s	12 V 10W	1
17	Reverse Indicator Lamp	BA15s	12 V P21W	1

4.2 TORQUE VALUE TABLE

APPLICATION	TORQUE VALUE IN Kgfm
Hex Nut M6 for Head lamp mounting (*1 no*.)	0.5 to 0.6
Hex flange screw M6 x 16 for Head lamp mounting (*2 nos*.)	0.5 to 0.6
Hex FL Nut AM6 TS17430-8-SS8451S2-Y for Tail Lamp mounting (2 *nos*.)	0.6
Hex Nut M6 for High mounted stop lamp mounting (*4 nos*.)	0.6
CR pan head screw M4 x 30 for front fog lamp mounting	0.6
FL TAP SCR C-ST4.8X16 for Rear Fog Lamp & Reverse Indicator	0.6

4.3 DIAGNOSTIC INFORMATION AND PROCEDURES FOR ALL LAMPS

CONDITION	POSSIBLE CAUSE	CORRECTION/REFERENCE ITEM
1.HEAD LAMP		
Single head lamp (*RH or LH*) not working	1. Head Lamp connector *(6 pole*) loose.	1. Fix the connector properly.
	2. Bulb fused.	2. Replace bulb.
Single head lamp (*RH or LH*) not working in high/low beam properly	1. High/Low beam filament in the bulb blown.	1. Replace bulb.
	2. High/Low beam terminal (*Pink/Blue wire*) has come out off the connector.	2. Insert the terminal into the connector properly.
Both lamps not working in high/low beam	1. Head lamp high/low beam fuse (*15A*) in engine relay & fuse box loose/blown.	1. Fix the fuse in the base properly. If blown, check for short in the circuit and then replace the fuse.
	2. Connectors at Head lamp rotary switch loose/8 pole connector from main W/H to cockpit W/H loose	2. Fix the connectors properly.
	3. High/Low beam switch in Head lamp rotary switch faulty.	3. Replace Head lamp rotary switch.
	4. BCM connector loose.	4. Fix the connector properly.
	5. Relay faulty.	5. Replace relay.
High beam does not come on when flash switch is activated	1. Connectors at combi switch loose.	1. Fix the connectors properly.
	2. Flash switch faulty.	2. Replace combi switch.
	3. High beam bulb blown.	3. Replace bulb.
	4. High beam relay faulty.	4. Replace relay.
2.FRONT TURN SIGNAL LAMPS		
Front right/left signal lamps not working	1. Connector(6 *pole*) at the lamp loose	1. Fix the connector properly.
	2. Bulb loose/fused.	2. Fix the bulb properly. Replace bulb if blown.
	3. BCM output open.	3. Repair the wiring harness.
	4. Wiring harness short circuited	4. Repair the Wiring harness.
3.REVERSE LAMPS		
Single reverse lamp not working	1. Bulb loose/fused.	1. Fix the bulb properly. Replace bulb if blown.
	2. 6 pole connector from main W/H to Rear Cluster Lamp loose	2. Fix the connector properly
4.DOOR AJAR LAMPS		
Door ajar lamp not working	1. Bulb loose/fused.	1. Fix the bulb properly. Replace bulb if blown.
	2. 2 pole connector from main W/H to Rear Cluster Lamp loose	2. Fix the connector properly

CONDITION	POSSIBLE CAUSE	CORRECTION/REFERENCE ITEM
4.FRONT PARKING LAMPS		
Single front parking lamp not working	1. Connector (*6 poles*) loose.	1. Fix the connector properly.
	2. Bulb loose/fused.	2. Fix the bulb properly. Replace bulb if blown.
	3. Parking lamp LH/RH fuses (5A) in cockpit fuse & relay box loose/blown.	3. Fix the fuse properly in the base. If blown, check for short in the circuit and then replace the fuse..
	4. Battery supply not reaching to parking lamp LH/RH fuse input.	4. Check the continuity from battery to the lamps through the master light switch, main W/H and Floor W/H connectors and rectify the discontinuity in the circuit
Both front parking lamps not working	1. Head lamp rotary switch connector loose.	1. Fix the connector properly.
	2. Head lamp rotary switch faulty.	2. Replace Head lamp rotary switch.
	3. BCM output wire loose.	3. Repair the wiring harness.
	4. Parking lamp relay faulty.	4. Replace relay.
	5. Both Head Lamps connectors loose	5. Fix the connectors properly.
5.REAR PARKING LAMPS		
Single rear parking lamp not working	1. Parking lamp LH/RH fuse (*5A*) in cabin fuse box loose/blown.	1. Fix the fuse properly in the base. If blown, check for short circuit in the circuit and then replace the fuse.
	2. 6 pole connector from floor W/H to Rear Cluster Lamp loose	2. Fix the connector properly
	3. Bulb loose/fused.	3. Fix the bulb properly. Replace bulb if blown.
	4. Battery supply not reaching to parking lamp LH/RH fuse input.	4. Check the continuity from battery to the lamps through the master light switch, main W/H and Floor W/H connectors and rectify the discontinuity in the circuit.
Both rear parking lamps not working	1. Head lamp rotary switch connector loose.	1. Fix the connector properly.
	2. Head lamp rotary switch faulty	2. Replace Head lamp rotary switch.
	3. BCM output open or short circuit.	3. Repair wiring harness.
	4. Parking lamp relay faulty.	4. Replace relay.
6.REAR TURN SIGNAL LAMPS		
Rear right/left turn signal lamps not working	1. Connector (*6 pole*) loose.	1. 1. Fix the connector properly.
	2. Bulb loose/fused.	2. Fix the bulb properly. Replace bulb if blown.
No indicator lamp is working	1. BCM output open or short circuit.	1. Repair wiring harness.
	2. Combi switch faulty.	2. Replace combi-switch.
	3. Connector (*6 pole*) loose..	3. Fix the connector properly.

CONDITION	POSSIBLE CAUSE	CORRECTION/REFERENCE ITEM
7.STOP LAMP		
Single stop lamp not working	1. 6 pole connector from floor W/H to Rear Cluster Lamp loose.	1. Fix the connector properly.
	2. Bulb loose/fused.	2. Fix the bulb properly. Replace bulb if blown.
Both stop lamps not working	1. Single lamp fuse (*5A*) cabin fuse box loose/blown.	1. Fix the fuse properly in the base. If blown replace the fuse.
	2. Connector (*6 pole*) loose.	2. Fix the connector properly.
	3. Brake lamp switch setting is not proper /switch faulty.	3. Adjust the switch setting / replace switch if faulty.
8.REAR FOG LAMP		
Single lamp not working	1. 2 pole connector loose.	1. Fix the connector properly.
	2. Bulb loose/fused.	2. Fix the bulb properly. Replace bulb if blown.
Rear fog lamp switch symbol not lighting	1. Bulb loose/fused.	1. Fix the bulb properly. Replace bulb if blown
	2. Rear fog lamp relay faulty.	2. Replace relay
9.HIGH MOUNTED STOP LAMP		
High mounted stop lamp not working	1. 2 pole connector loose.	1. Fix the connector properly.
	2. Bulb loose/fused.	2. Fix the bulb properly. Replace bulb if blown.
10.REGISTRATION PLATE LAMPS		
Single registration plate lamp not working	1. Lamp connector loose	1. Fix the connector properly
	2. Bulb blown	2. Replace bulb
	3. Parking lamp fuse (*5A*) in cockpit fuse & relay box loose/blown.	3. Fix the fuse properly in the base. If blown then replace the fuse.
Both registration plate lamp not working	1. Master light switch faulty	1. Replace master light switch.
11.SIDE REPEATER LAMPS		
Side repeater lamps o	1. Connectors (*2 pole*) at the lamps loose.	1. Fix the connector properly.
	2. Bulb blown..	2. Replace bulb.
12.REVERSE INDICATOR LAMP		
	1. Connectors (*2 pole*) at the lamps loose.	1. Fix the connector properly.
	2. Bulb blown.	2. Replace bulb.
13.PUDDLE LAMPS		
	1. Connectors (*2 pole*) at the lamps loose.	1. Fix the connector properly.
	2. Bulb blown.	2. Replace bulb.

4.4 HEAD LAMP

HEAD LAMP BEAM ADJUSMENT:

This system consists of the headlamp leveling switch and headlamp leveling motor. It is used to lower both headlight low beam aiming angles from the initial setting level by operating the leveling switch on the master light switch. The head light must be properly aimed in order to maintain maximum road safety as regards proper road illumination and to reduce the glare on the on coming traffic. It is recommended to check the aiming of head lamps periodically and whenever bulbs are replaced.

NOTE:

*When inspecting and adjusting the headlight beam, make sure to set the leveling switch to the **"0"** position with the ignition switch "ON".*

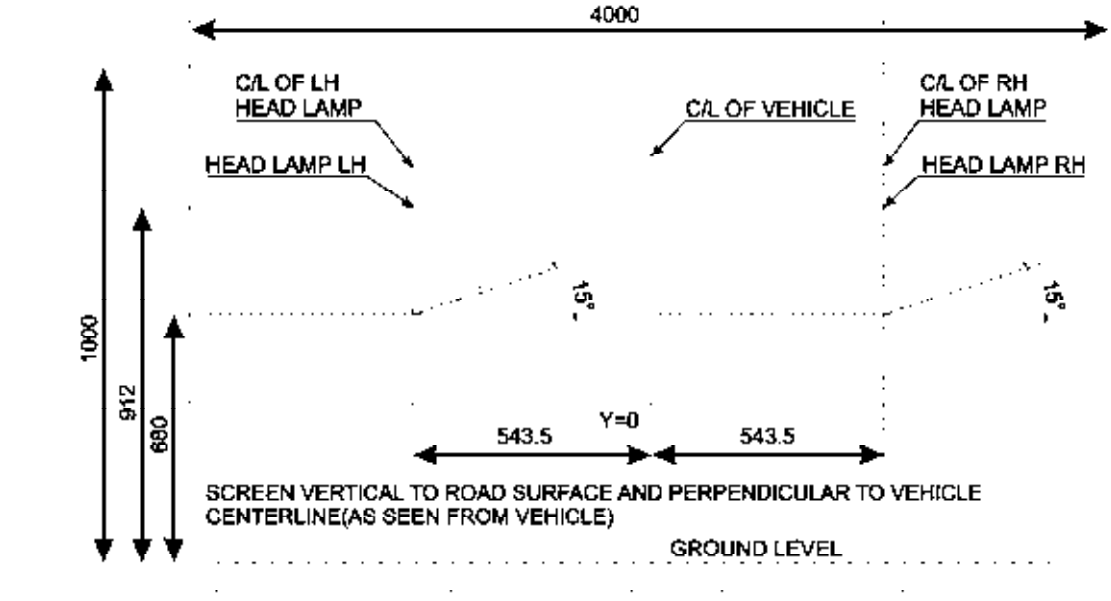
Before adjusting the headlamp beam:

1. The tyre pressure should be as specified for unladen condition and the car should be on level ground.
2. Vehicle should be on level ground & in unladen condition (*only driver, spare wheel & STD accessories*).
3. Vehicle should be rolled for a few meters after loading to allow the suspension springs to settle.
4. The headlamp should be set one at a time by either putting OFF the opposite side lamp or masking.
5. Use suitable screw driver of required length to reach the toothed wheel adjustment.
6. The head lamp leveling switch should be in “zero” position.

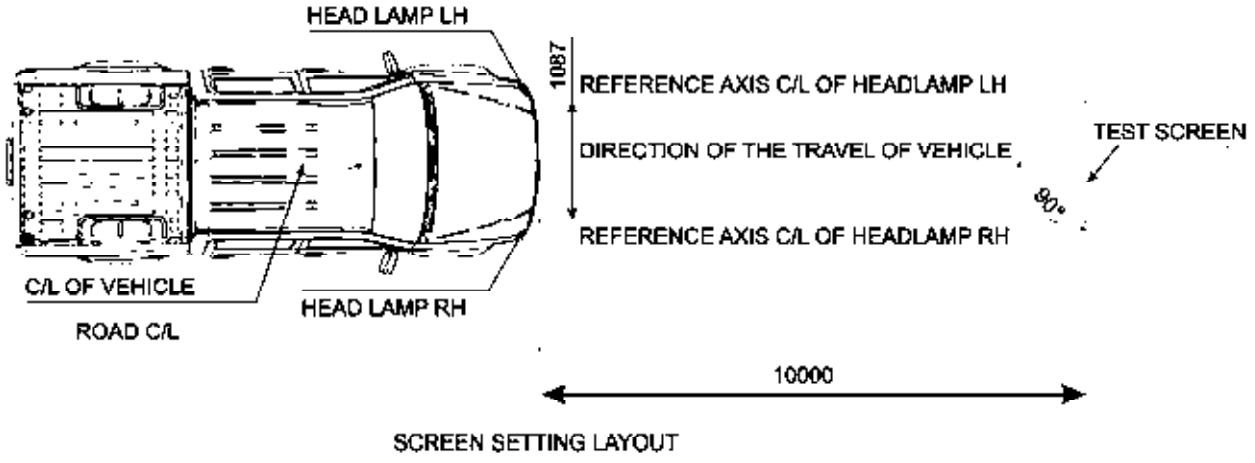
Procedure for aiming & leveling setting of headlamps low beam for LH traffic:

1. Dimension, Arrow, lines and values should not appear on the screen.
2. Screen colour should be light and non-reflecting and marking lines should be dark and 5 mm thick with sharp features.
3. The screen details are shown for LHD vehicle headlamp setting .Headlamp setting for RHD vehicle will be mirror opposite.

SCREEN MARKING AND VEHICLE POSITION FOR MEASUREMENT AT 10 M (10,000 mm) FROM HEAD LAMP



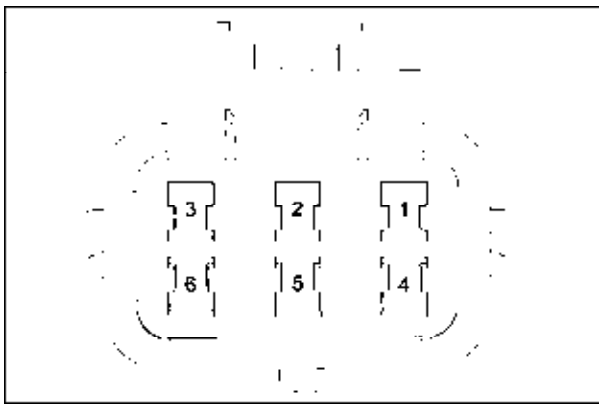
XENON HEAD LAMP SETTING SCREEN (LH TRAFFIC) AT 10 M (10,000 mm) FROM HEAD LAMP



SCREEN SETTING LAYOUT

CONNECTOR DETAILS:

A. MAIN CONNECTOR DETAILS:

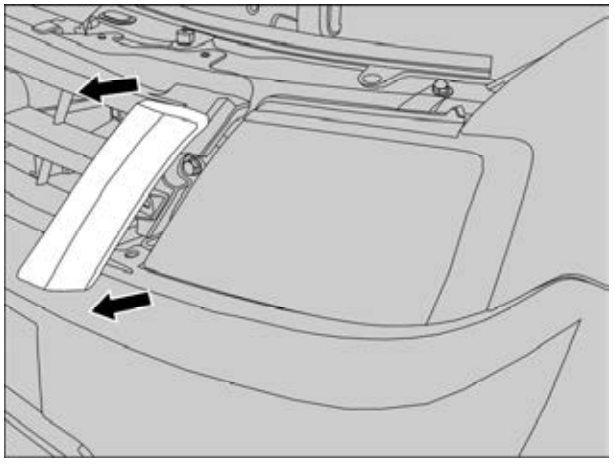


PINOUT DETAILS:

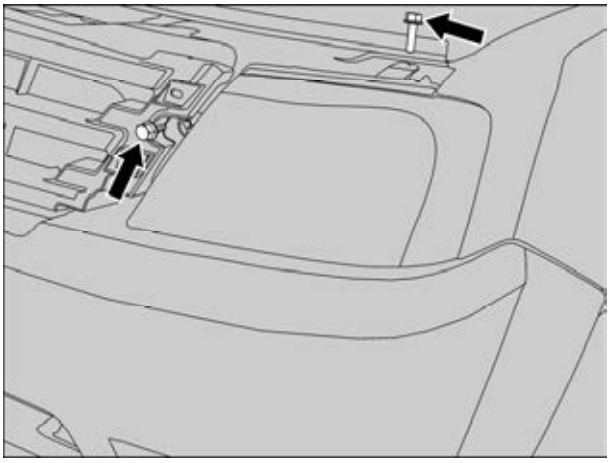
PIN NO	DESCRIPTION
1	Ground
2	Low Beam
2	High Beam
4	Position / Parking
5	
6	Turn

REMOVAL:

1. Open the bonnet.
2. Pry out the finisher grill assembly LH.



3. Remove the 2 mounting bolts & 1 Nut (behind the fender assembly) of head lamp.



4. Disconnect electrical connection.
5. Take out the lamp.

REFITMENT:

1. Connect the electrical connection.
2. Tighten the head lamp mounting screws & bolts.

   Tightening torque for screws & bolts -0.6 Kgfm
3. Fit the front bumper.
4. Close the bonnet.

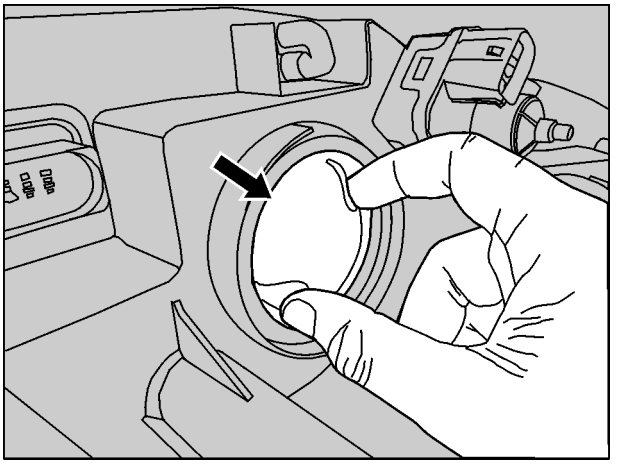
NOTE:

For removal of RH head lamp follow the same procedure.

BULB REPLACEMENT PROCEDURE:

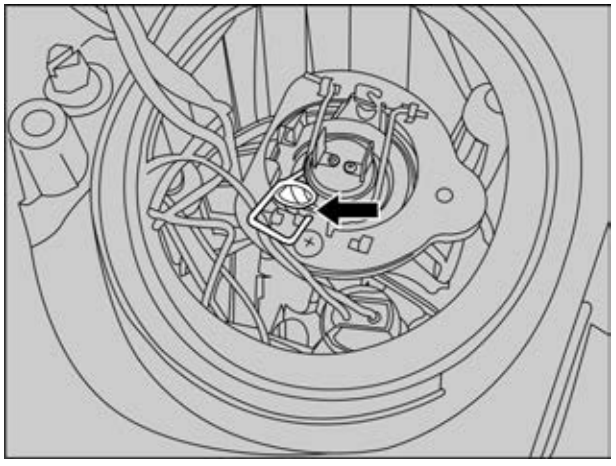
- **MAIN BEAM (*H4 12 V 55/60W*)**

1. Open the bonnet
2. Remove the rubber dust Cap.

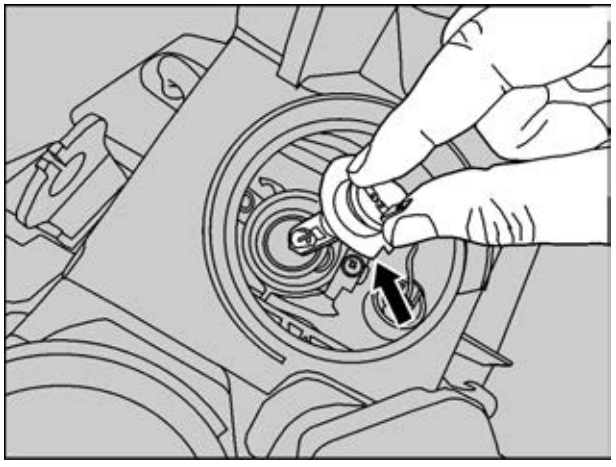


3. Disconnect the electrical Connection of bulb.

4. Release the retainer bulb spring by slightly pressing & sliding towards arrow.



5. Remove the defective high beam bulb and replace with new one.



6. Lock the retainer blub spring to its position.

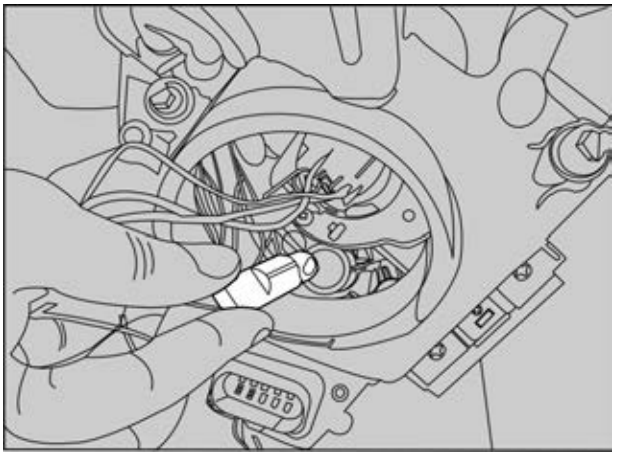
7. Connect the electrical connection.

8. Fit the rubber dust cap.

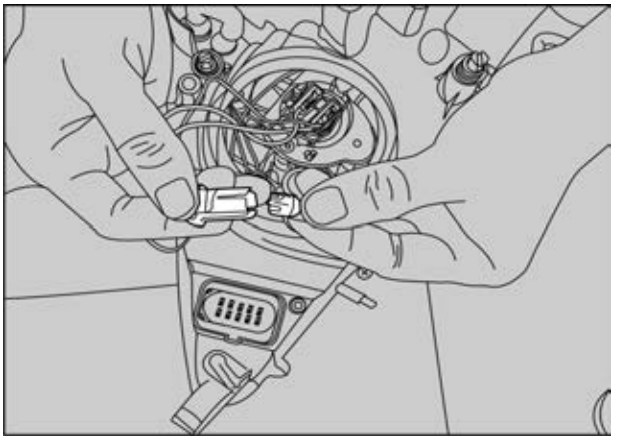
- **PARKING/POSITION BULB(*12V , 5W*):**

1. Remove the rubber Dust Cap.

2. Remove the bulb along with holder.



3. Pull out the bulb from bulb holder and replace with new one.



4. Fit the bulb assembly into its position.

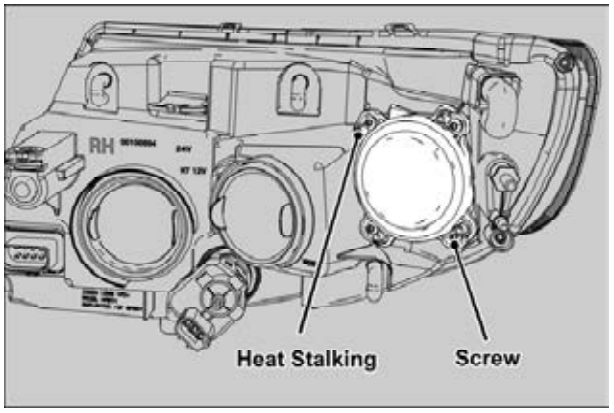
5. Fit the rubber dust cap.

- **TURN INDICATOR BULB (*12V,24W*):**

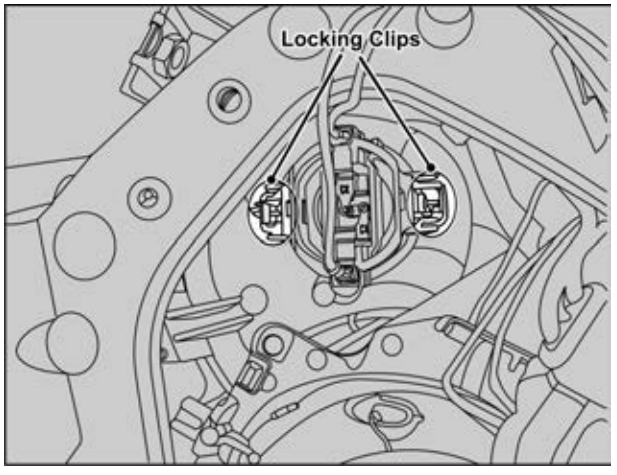
NOTE:

User can not service this bulb (PY24W).It is possible only at service center after removal of the Head lamp from vehicle.

1. Cut out Heat staking bosses (*4 Places*).
2. Remove the screws from position (*4 Places*).
3. Remove Plastic Dust Cover.



4. Using two fingers press locking clips as indicated to release the bulb.



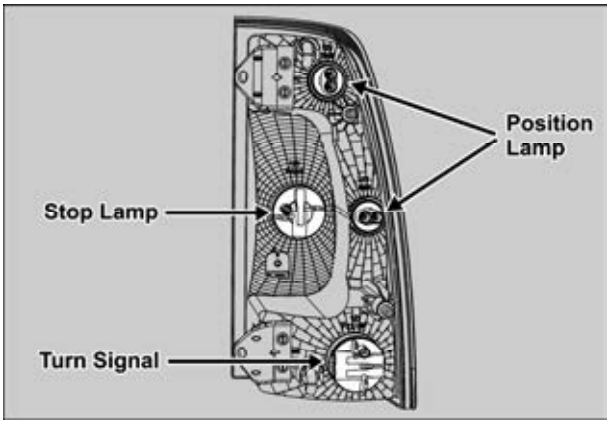
5. Remove the bulb from fuse holder and replace with new one.
6. Fit the assembly into its proper position.
7. Fit the rubber dust cap.

4.5 TAIL LAMP

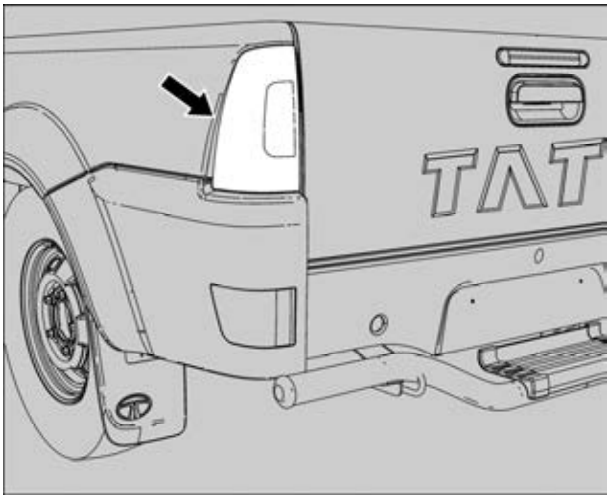
Tail lamp consists of the following bulbs:

1. Turn indicator – 12V, 5W
2. Tail/stop light – 12V, 21W
3. Position - 12V, 5 W - 2 nos.

It is fitted on fender assembly.



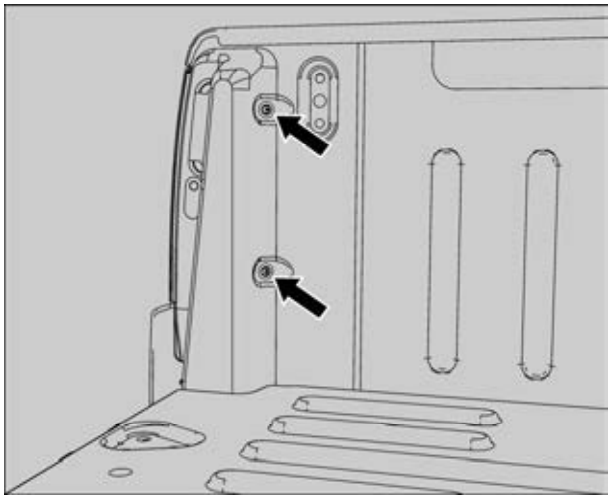
LOCATION:



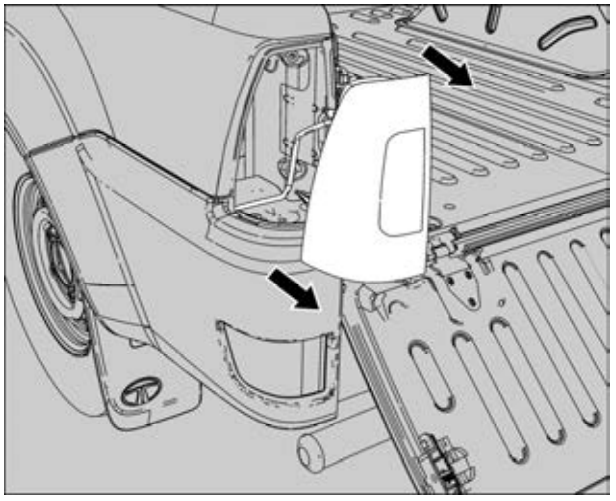
REMOVAL:

1. Open the tailgate.

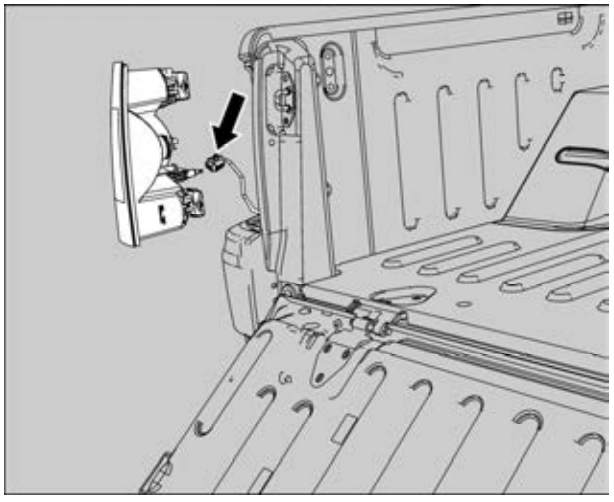
2. Remove two mounting screw of Tail lamp.



3. Pry out the lamps from its location.



4. Disconnect the electrical connection.



5. Take out the lamp.

INSPECTION:

1. Check the connectors for any loose terminals or wires broken at the terminal ends.
2. Check the filaments of the bulb if blown replace faulty bulb.

REFITEMNT:

1. Connect the electrical connection.
2. Align the lamp with its two locating catcher.
3. Tighten its two mounting screw.

   Tightening torque for screw – 0.6 Kgfm.

BULB REPLACEMENT PROCEURE:

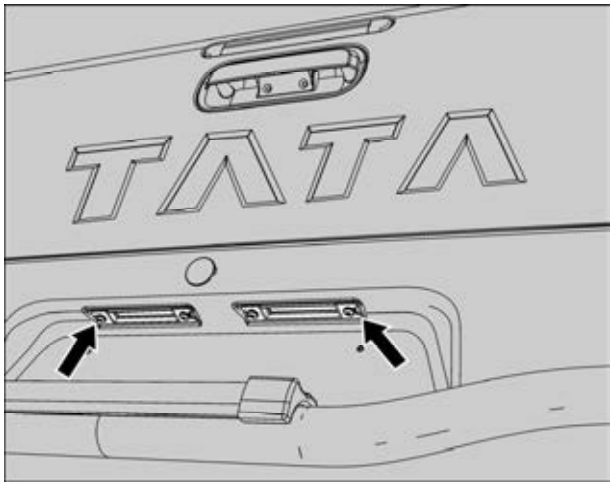
NOTE:

Same procedure is applicable for all the bulbs of tail lamp.

1. Remove the tail lamp.
2. Rotate the bulb holder in anticlockwise direction and remove the assy.
3. Take out the bulb from holder and replace with new one.
4. Rotate the bulb holder in clockwise direction for fitment.(*Arrow mark provided on the bulb holder*)
5. Fit the tail lamp assembly.

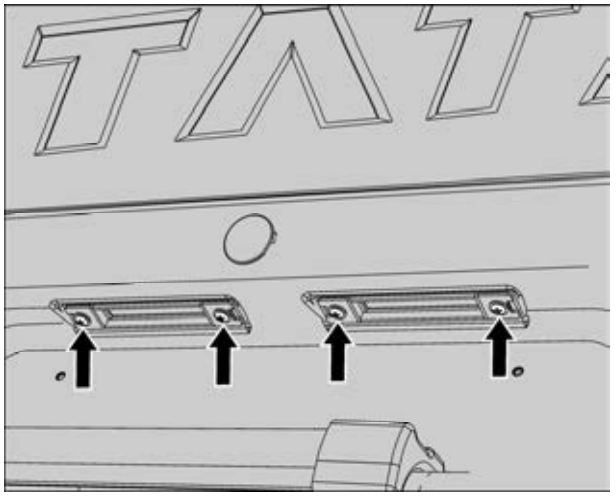
4.6 REGISTRATION PLATE LAMP

It consists of two bulbs of ratting 12V, 5W. It is fitted on rear closing panel assembly.

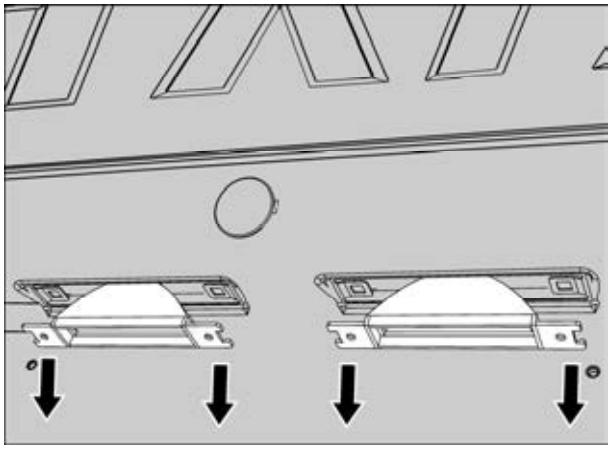


REMOVAL:

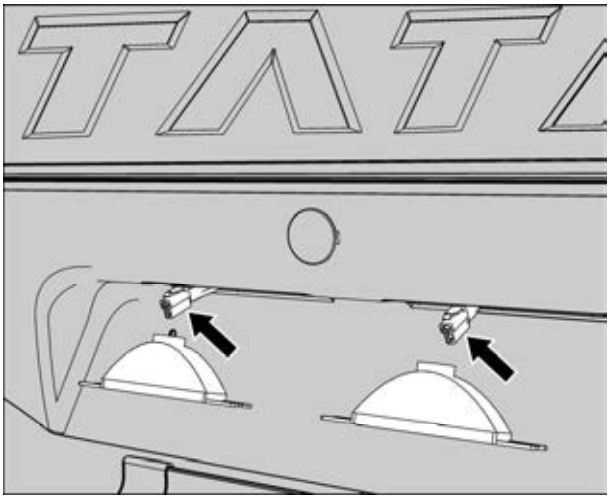
1. Remove 2 mounting screw of each registration plate lamp.



2. Pry out the lamp assembly from the cutout provided on rear closing panel assembly.



3. Disconnect the electrical connection.



4. Take out the lamp.

REFITMENT:

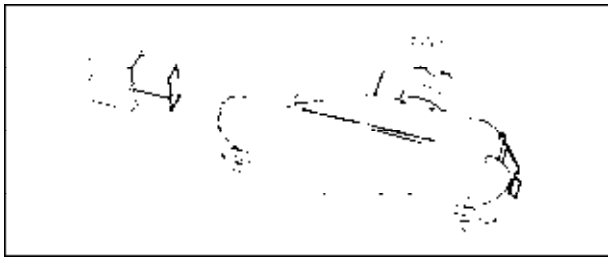
1. Connect the electrical connection.
2. Fit the lamp into the cutout provided on the rear closing panel assembly.

BULB REPLACEMENT PROCEDURE:

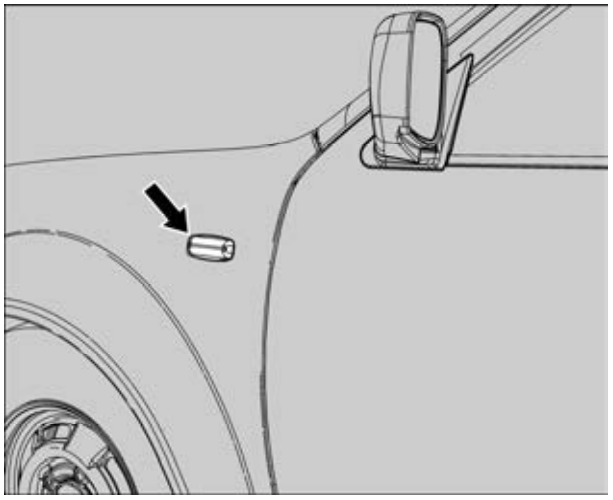
1. Remove the registration plate lamp assembly.
2. Remove the bulb from the bulb holder and replace with new one.
3. Fit the reg. plate lamp assembly.

4.7 SIDE REPEATER LAMP

It consists of bulb of rating 12V, 5W.It is fitted on fender outer LH and RH.

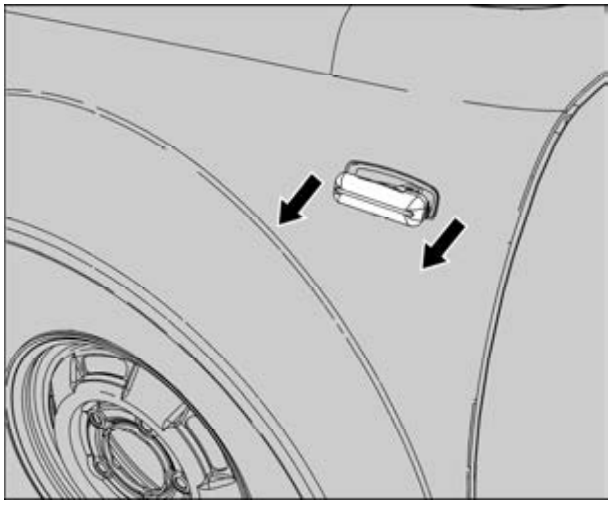


LOCATION:

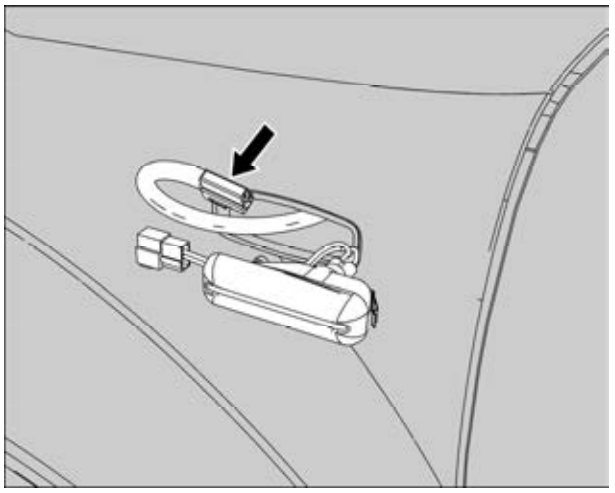


REMOVAL:

1. Pry out the lamp assembly from the cutout.



2. Disconnect the electrical connection.



3. Take out the lamp

REFTIMENT:

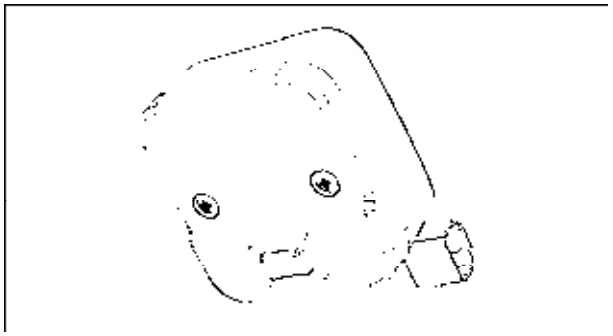
1. Connect the electrical connection.
2. Fit the lamp assembly into the cutout provided on fender outer (*Snap fitted*).

BULB REPLACEMENT PROCEDURE:

1. Pry out the lamp assembly from the cutout.
2. Replace with new one.
3. Fit the lamp assembly.

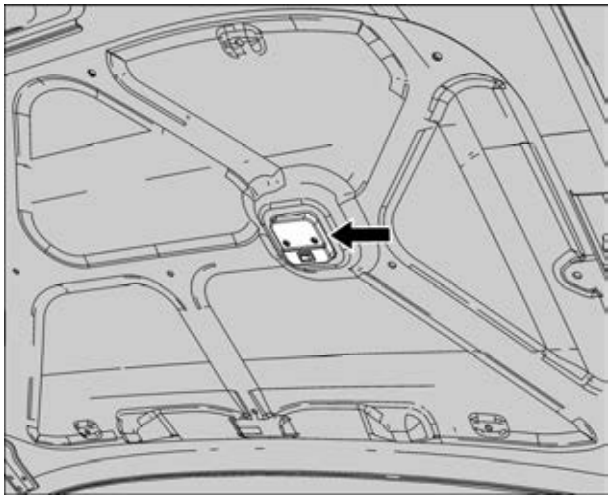
4.8 ENGINE LAMP

It consists of bulb of rating 12V; 10W.It is fitted on bonnet assembly.



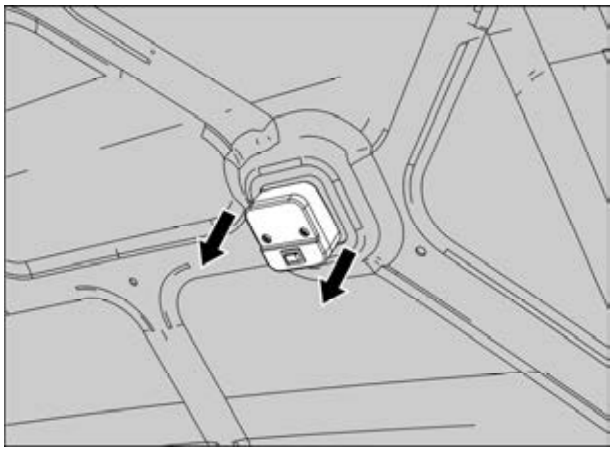
NOTE: *Same procedure is applicable for all door lamps.*

LOCATION:

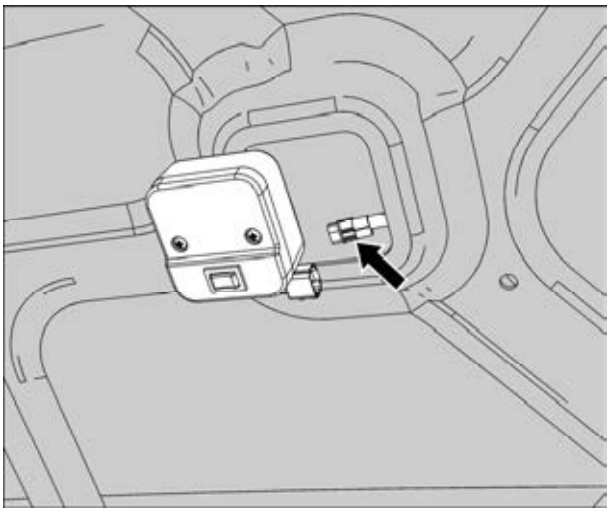


REMOVAL:

1. Pry out the lamp assembly from the cutout.



2. Disconnect the electrical connection.



3. Take out the lamp

REFITMENT:

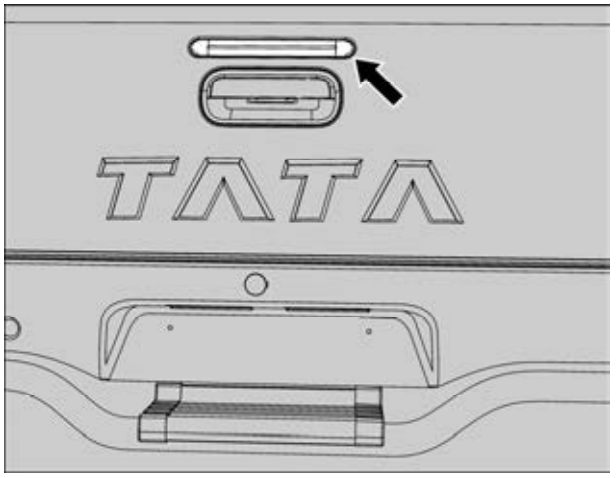
1. Connect the electrical connection.
2. Fit the lamp assembly into the cutout provided on bonnet assembly (*Snap fitted)*.

BULB REPLACEMENT PROCEDURE:

1. Remove the engine lamp assembly.
2. Remove the lens
3. Take out the bulb from holder and replace with new one.
4. Fit the engine lamp assembly.

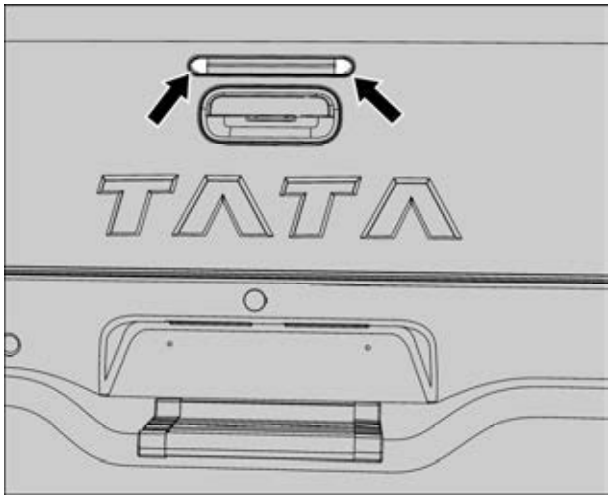
4.9 HIGH MOUNTED STOP LAMP

This lamp is LED type. It is mounted on the tail gate assembly.

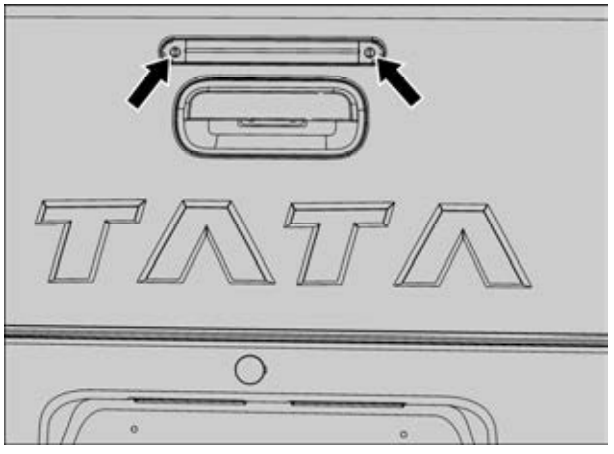


REMOVAL:

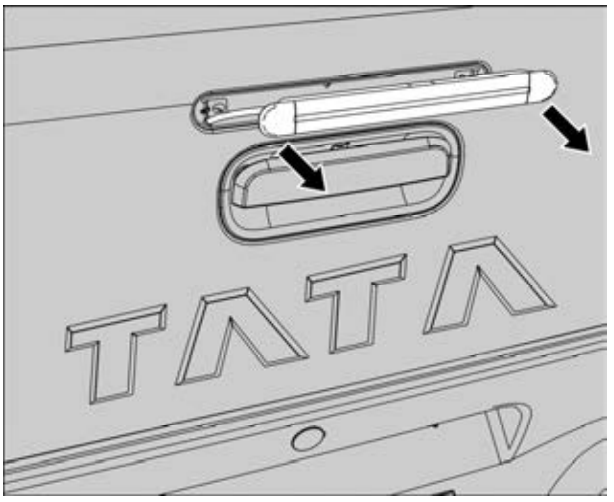
1. Pry out two caps for mounting screws of high mounted stop lamp.



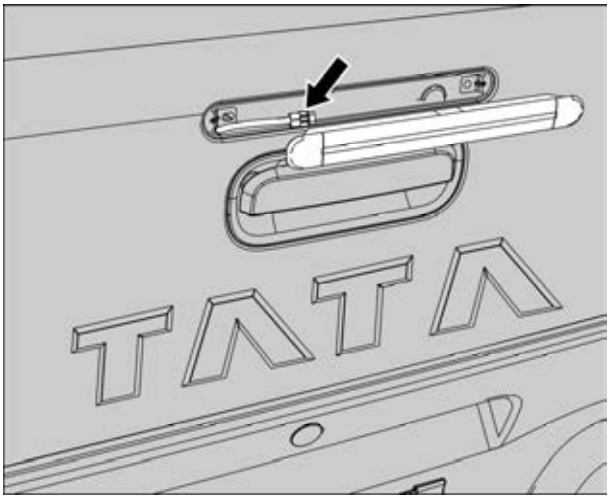
2. Remove two mounting screws of high mounted stop lamp.



3. Pry out the high mounted stop lamp assembly.



4. Disconnect the electrical connection.



REFITMENT:

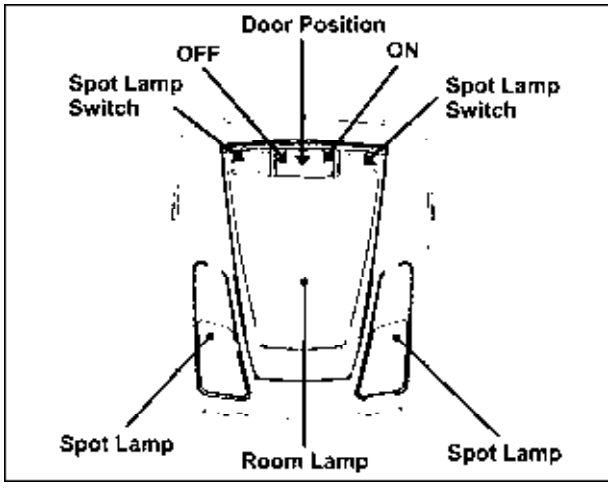
1. Connect the electrical connection.
2. Locate the high mounted stop lamp into the cutout provided on the tail gate assembly
3. Tighten the two mounting screws of high mounted stop lamp.

   Tightening torque of screws – 0.6 Kgfm
4. Fit the two caps for mounting screw of high mounted stop lamp.(*Snap fitted*).

4.10 FRONT ROOF LAMP

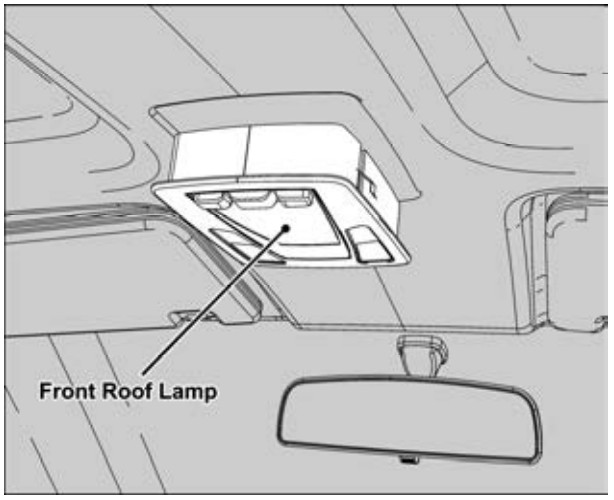
Front roof lamp is fitted with a three-way switch. Switch has ON, OFF and DOOR positions. In the ON or OFF position, the lamp is directly controlled by the switch .In ON or OFF position, no lamp dimming is used.

In the DOOR position, the lamp operation is controlled directly by the BCM. It consists of 1 bulb of 12 V 10W and 2 bulb of 12 V 5W rating. These roof lamps also consist of two spot lamps which are controlled by individual switch.

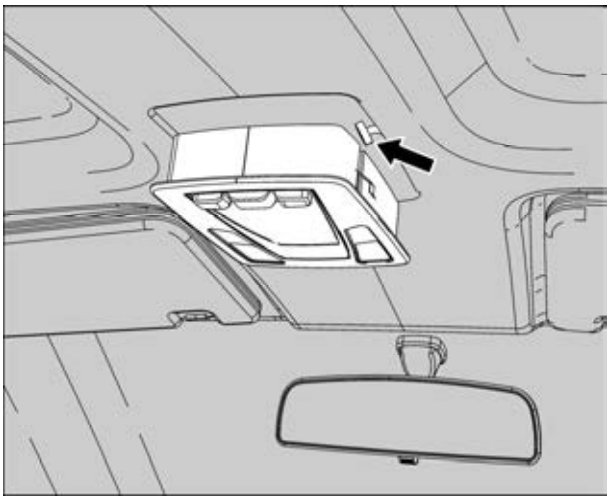


REMOVAL:

1. Pry out the roof lamp assembly from the roof lining assembly.



2. Disconnect the electrical Connection.



3. Take out the lamp.

INSPECTION:

1. Check the filaments in the bulb if blown replace the faulty bulb.
2. Check for damages in the locks area.

1. REFITMENT:

1. Connect the electrical connection.
2. Fit the roof lamp into cutout provided on roof lining assembly.(*Snap fitted*)

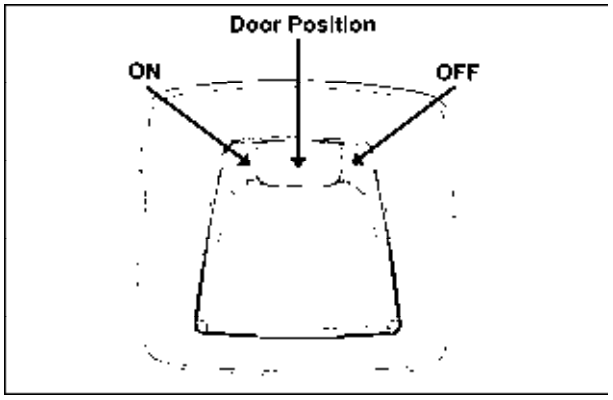
BULB REPLACEMENT PROCEDURE:

1. Remove the roof lamp.
2. Remove the bulb and replace with new one.
3. Fit the front roof lamp assembly.

4.11 REAR ROOF LAMP

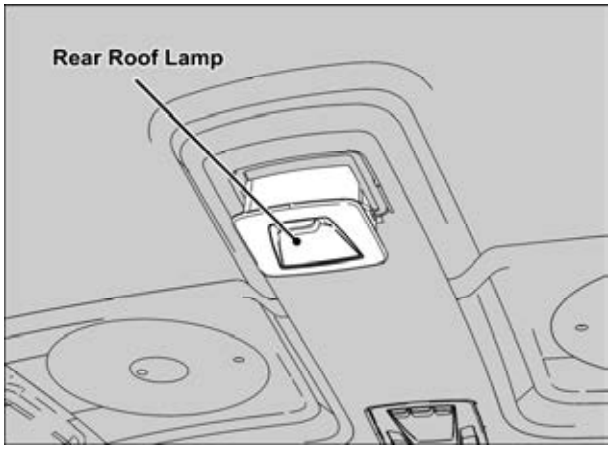
Rear roof lamp is fitted with a three-way switch. Switch has ON, OFF and DOOR positions. In the ON or OFF position, the lamp is directly controlled by the switch. In ON or OFF position, no lamp dimming is used.

In the DOOR position, the lamp operation is controlled directly by the BCM. It consists of 1 bulb of 12 V 5W rating.

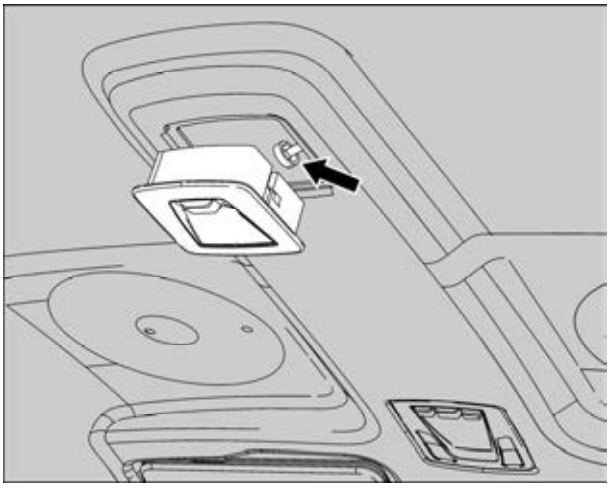


REMOVAL:

1. Pry out the roof lamp assembly from the roof lining assembly.



2. Disconnect the electrical connection.



3. Take out the lamp.

INSPECTION:

1. Check the filaments in the bulb if blown replace the faulty bulb.
2. Check for damages in the locks area

REFITMENT:

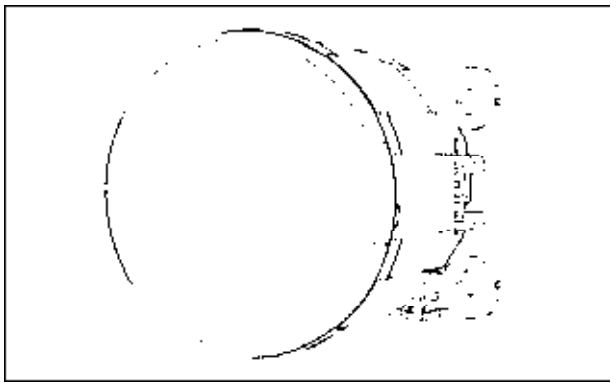
1. Connect the electrical connection.
2. Fit the roof lamp into cutout provided on roof lining assembly.(*Snap fitted*)

BULB REPLACEMENT PROCEDURE:

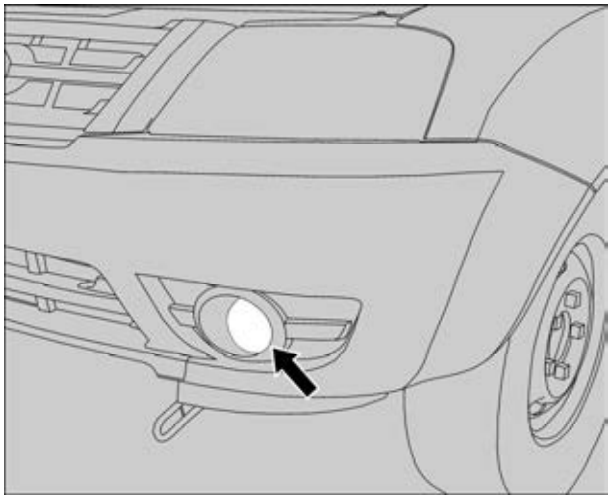
1. Remove the roof lamp.
2. Remove the bulb and replace with new one.
3. Fit the rear roof lamp Assembly.

4.12 FRONT FOG LAMP

The fog lamps are located in the lower part of the front bumper. The bulb used for the fog lamp function is a halogen H11 bulb, 12V - 55W.Fog lamp on/off is done by using Head lamp rotary switch.

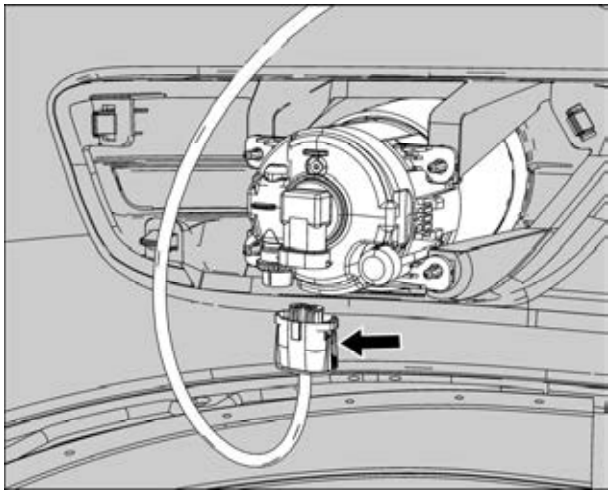


LOCTION:

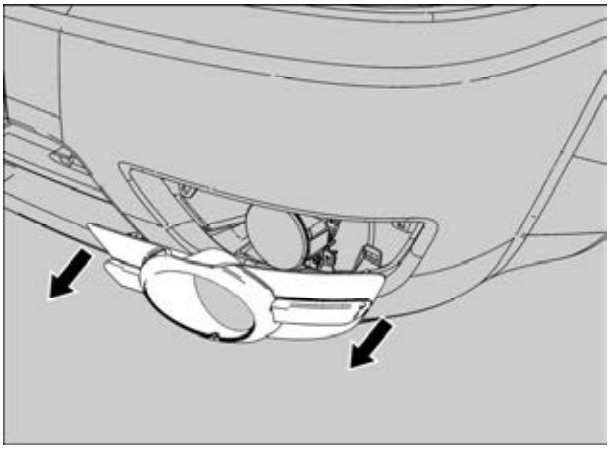


REMOVAL:

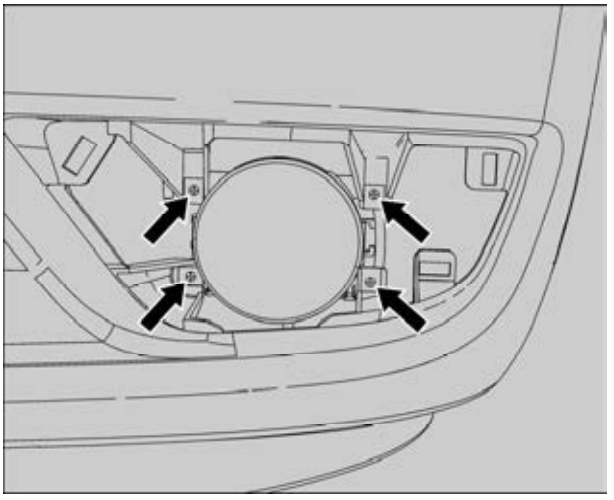
1. Disconnect the electrical connection of fog lamp.



2. Pry out the front fog lamp adaptor (*Snap fitted*).



3. Remove the four mounting screw of fog lamp



4. Take out the fog lamp.

REFITMENT:

1. Fit the 4 mounting screws of fog lamp assembly.

   Tightening torque for screws – 0.6 kgfm.

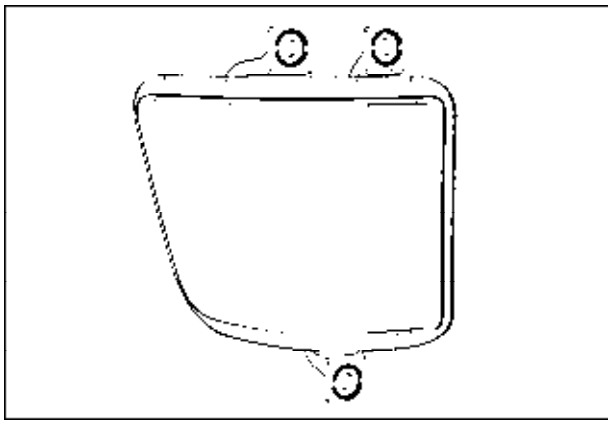
2. Fit the fog lamp adaptor on bumper (*Snap fitted*).
3. Connect the electrical connection.

BULB REPLACEMENT PROCEDURE:

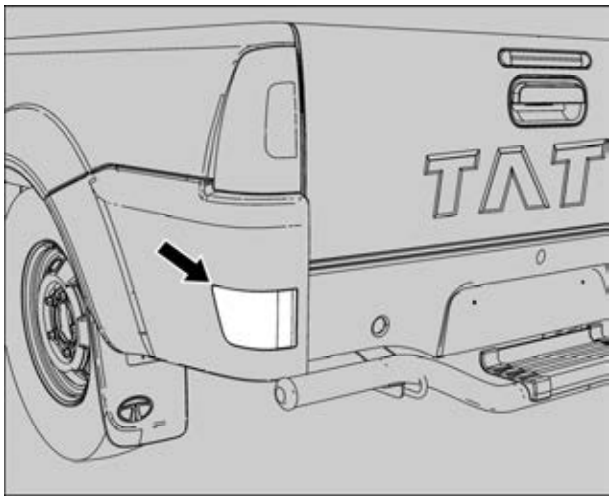
1. Remove the front fog lamp assembly.
2. Remove the lens of front fog lamp.
3. Remove the bulb assembly by rotating in anticlockwise direction.
4. Take out the bulb from holder and replace with new one.
5. Fit the assembly by rotating in clockwise direction.
6. Fit the front fog lamp assembly.

4.13 REAR FOG LAMP:

The fog lamp is located in the lower part of the rear corner LH. The bulb used for the fog lamp function is 12V, 21W.Fog lamp on/off is done by using head lamp rotary switch.

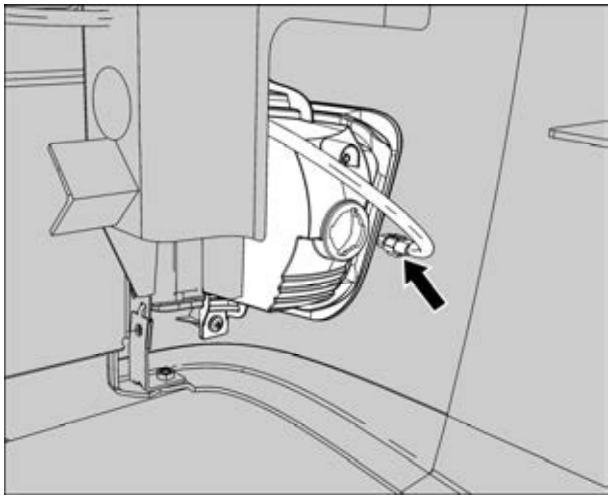


LOCATION:

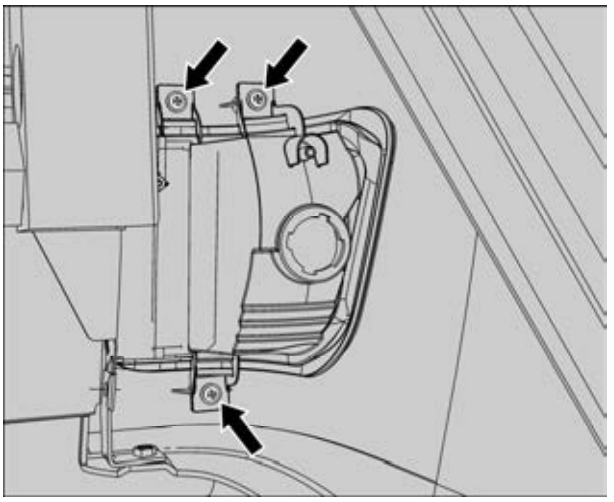


REMOVAL:

1. Disconnect the electrical connection of fog lamp.



2. From the back side of rear corner assembly remove the 3 mounting screws of fog lamp.



3. Take out the fog lamp.

REFITMENT:

1. Fit the assembly in the cut out on the rear corner assembly LH.
2. Tighten the 3 mounting screws of fog lamp assembly.

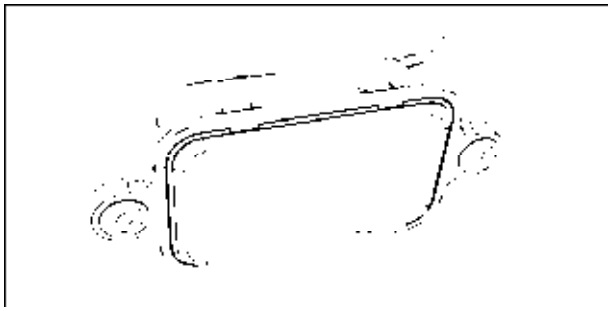
   Tightening torque for screws – 0.6 kgfm.
3. Connect the electrical connection.

BULB REPLACEMENT PROCEDURE:

1. Remove the rear fog lamp assembly.
2. Remove the bulb assembly by rotating in anticlockwise direction.
3. Take out the bulb from holder and replace with new one.
4. Fit the assembly by rotating in clockwise direction.
5. Fit the rear fog lamp assembly.

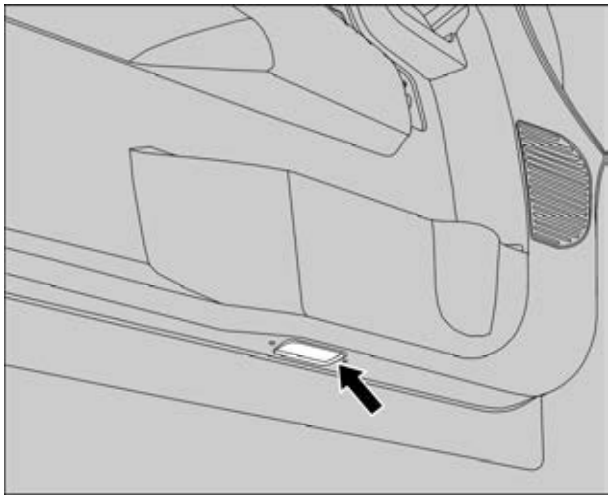
4.14 PUDDLE LAMP

It consists of bulb of rating 12V, 5W. The door ajar lamp is fitted on door trim.



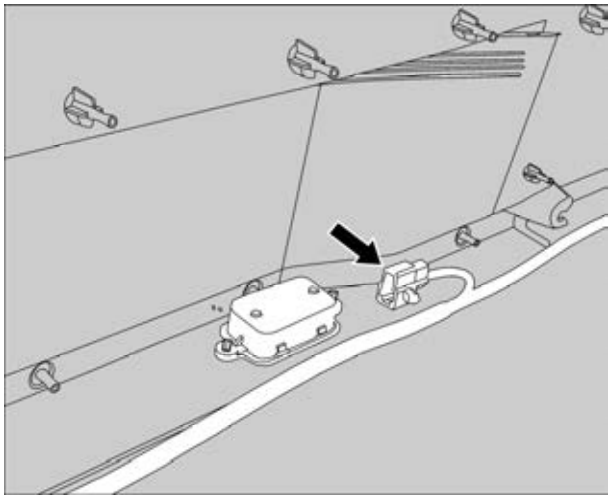
NOTE: *Same procedure is applicable for all door lamps.*

LOCATION:

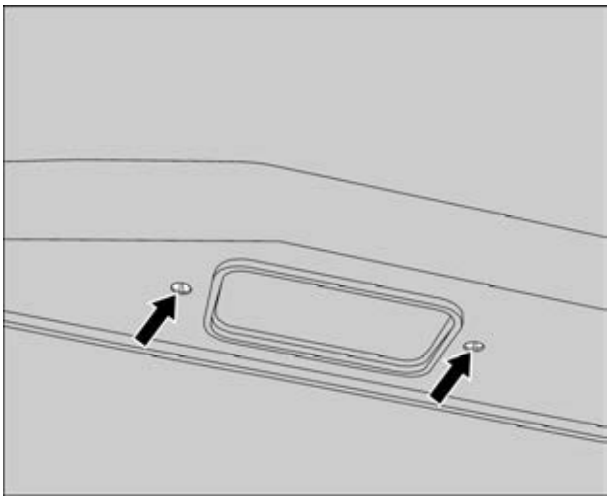


REMOVAL:

1. Remove door trim (*Refer body section*).
2. Disconnect the electrical connection.



3. Remove two mounting screws of puddle lamp.



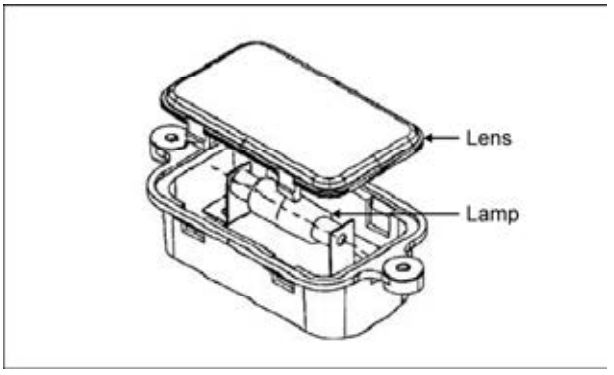
4. Take out the lamp

REFITMENT:

1. Locate the lamp into the cutout provided on the door trim
2. Tighten the two mounting screws of puddle lamp.
3. Connect the electrical connection.
4. Fit the door trims (*Refer body section*).

BULB REPLACEMENT PROCEDURE:

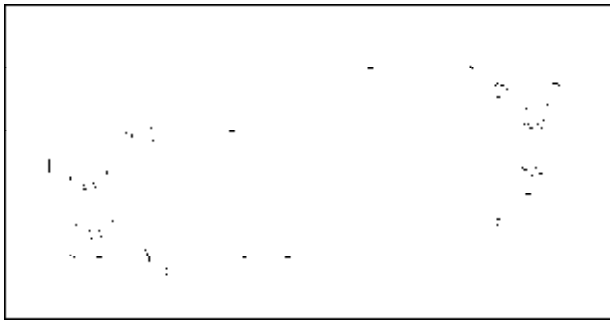
1. Remove the puddle lamp assembly.
2. Remove the lens (*Snap fitted*).



3. Take out the bulb and replace with new one.
4. Fit the bulb assembly
5. Fit the lens (*Snap fitted*).
6. Fit the puddle lamp assembly.

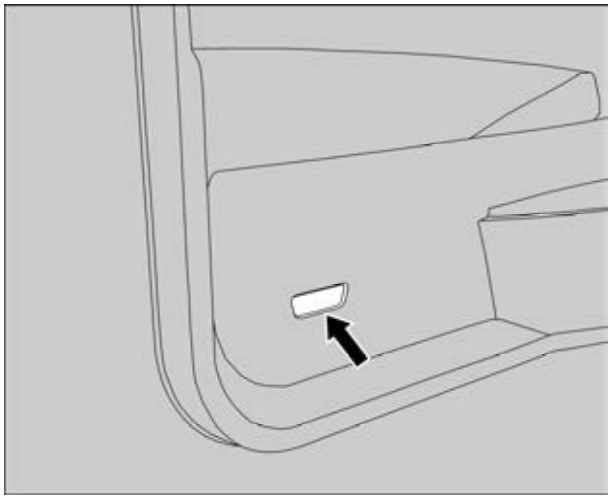
4.15 DOOR AJAR LAMP

The door ajar lamp is lamp is LED type It is fitted on door trim.



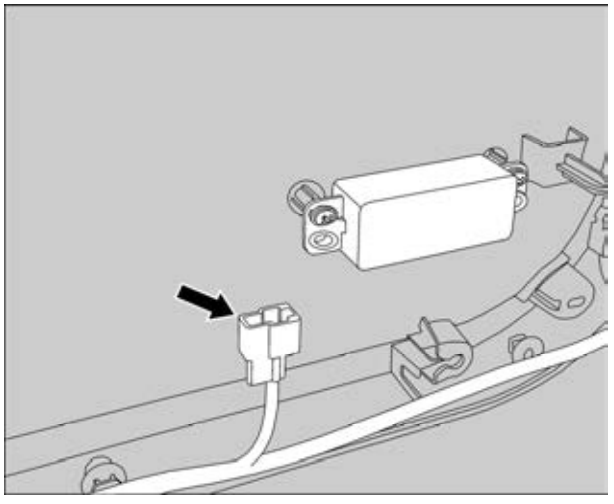
NOTE: *Same procedure is applicable for all door lamps.*

LOCATION:

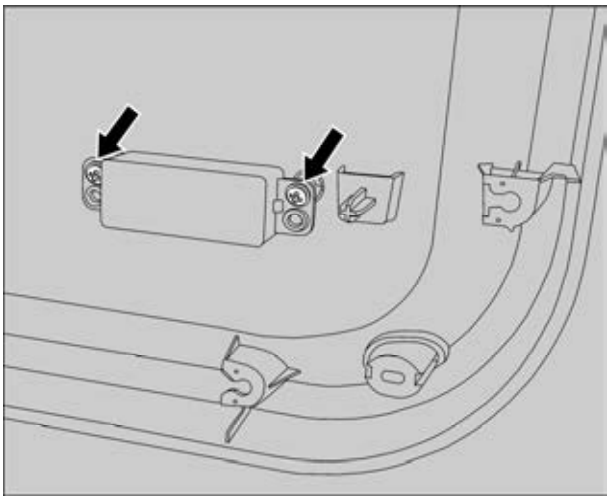


REMOVAL:

1. Remove door trim (*Refer body section*).
2. Disconnect the electrical connection.



3. Remove two mounting screws of door ajar lamp.



4. Take out the lamp

REFITMENT:

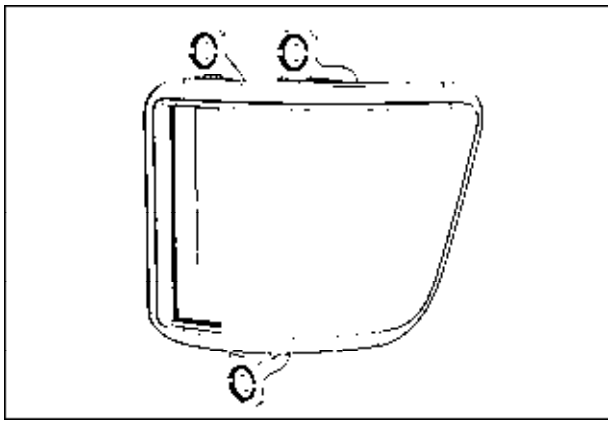
1. Locate the lamp into the cutout provided on the door trim
2. Tighten the two mounting screws of door ajar lamp.
3. Connect the electrical connection.
4. Fit the door trims (*Refer body section*).

BULB REPLACEMENT PROCEDURE:

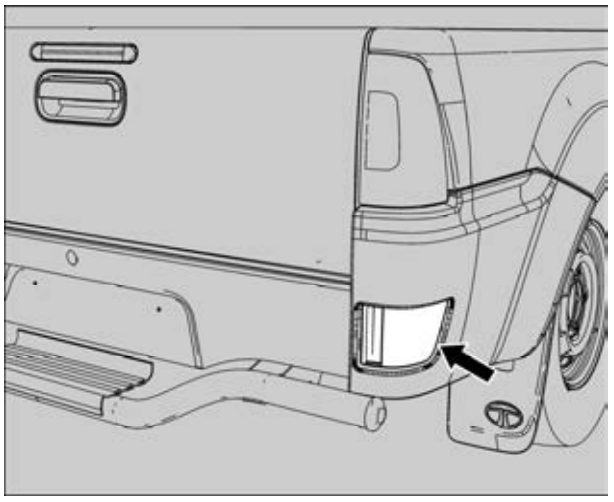
1. Remove the door ajar lamp assembly.
2. Replace with new one.
3. Fit the door ajar lamp assembly.

4.16 REVERSE INDICATOR LAMP

The fog lamp is located in the lower part of the rear corner LH. The bulb used for the fog lamp function is 12V, 21W.Fog lamp on/off is done by using head lamp rotary switch.

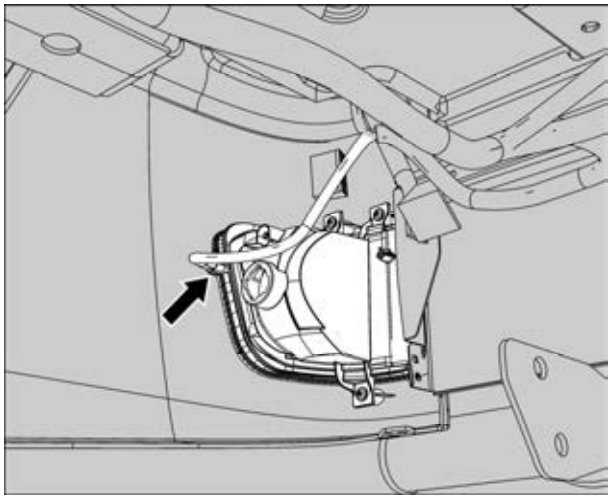


LOCATION:

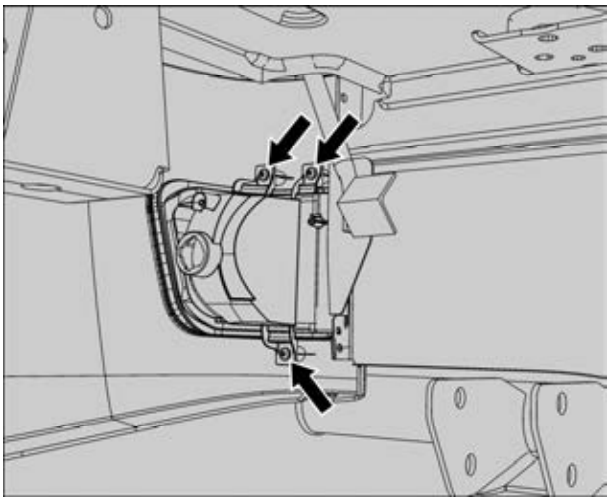


REMOVAL:

1. Disconnect the electrical connection of fog lamp.



2. From the back side of rear corner assembly remove the 3 mounting screws of fog lamp.



3. Take out the fog lamp.

REFITMENT:

1. Fit the assembly in the cut out on the rear corner assembly LH.
2. Tighten the 3 mounting screws of fog lamp assembly.

   Tightening torque for screws – 0.6 kgfm.
3. Connect the electrical connection.

BULB REPLACEMENT PROCEDURE:

1. Remove the rear fog lamp assembly.
2. Remove the bulb assembly by rotating in anticlockwise direction.
3. Take out the bulb from holder and replace with new one.
4. Fit the assembly by rotating in clockwise direction.
5. Fit the rear fog lamp assembly.

5 FUSE AND RELAY BOX

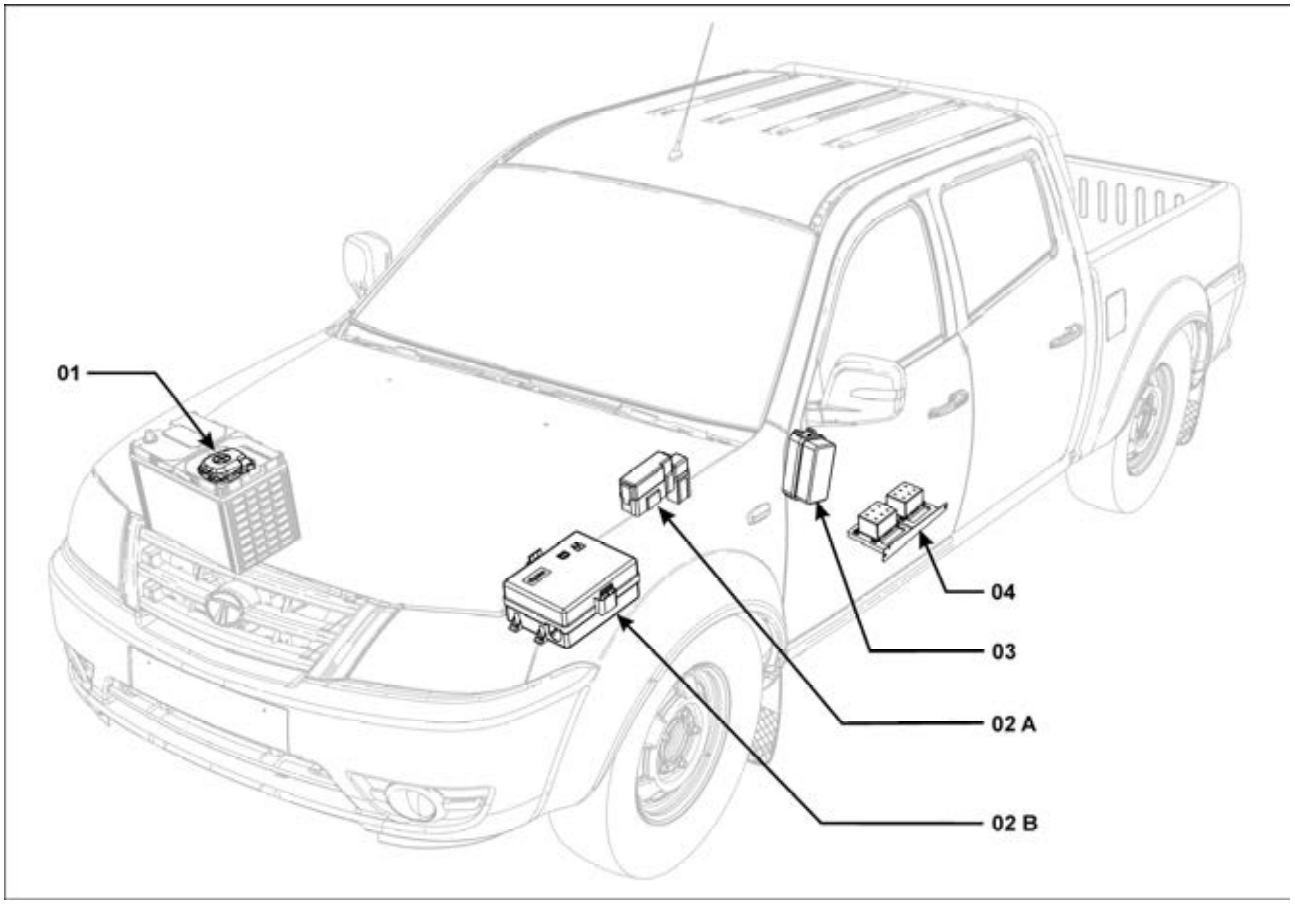
The fuses & relays are located in four fuse boxes,

1. Battery mounted fuse box or BDU (Battery distribution unit) mounted on battery in engine compartment.
2. Engine compartment fuse & relay box:

A. Maxi fuse box is mounted on ECU mounting bracket on wheel arch LH in the engine compartment.

B. Fuse & Relay box is mounted on bracket on wheel arch LH in the engine compartment.

3. Cabin fuse & relay box is mounted under the dashboard on driver side LH.
4. Window winding & Central locking Relay box is mounted on the bracket below driver seat.



01- Battery mounted fuse box

02- Engine compartment fuse & relay box

A. Maxi fuse box.

B. Fuse & Relay box

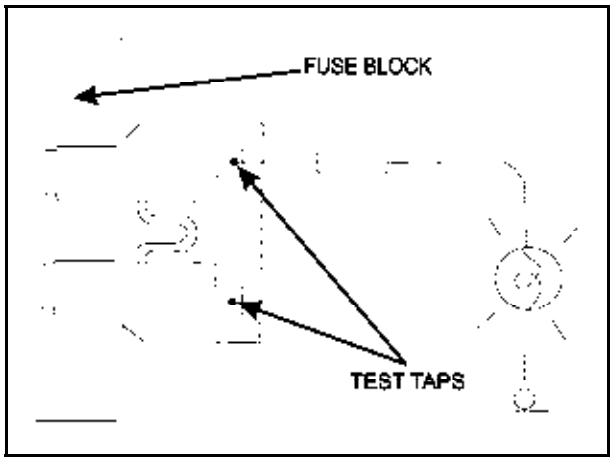
03- Cabins fuse & relay Box.

04- Window winding & Central Locking Relay box

CHECKING FUSES:

If any electrical unit in the vehicle has stopped functioning, fuses should be checked first.

A blade type fuse has test taps provided to allow checking of the fuse itself without removing it from the fuse block. The fuse is okay if the test light comes on when its one lead is connected to the test taps (*one at a time*) and the other lead is grounded. Remember to turn the ignition switch to ON to ensure all circuits are live.



- **CAUTIONS IN EVENT OF BLOWN FUSE**

When a fuse is blown, there are two probable causes. One is that it is blown due to flow of current exceeding its rating. The other is that it is blown due to repeated on/off current flowing through it. Which of these two causes were responsible for the fuse to be blown can be determined by visual check as described below.

1. Fuse blown due to current exceeding rating

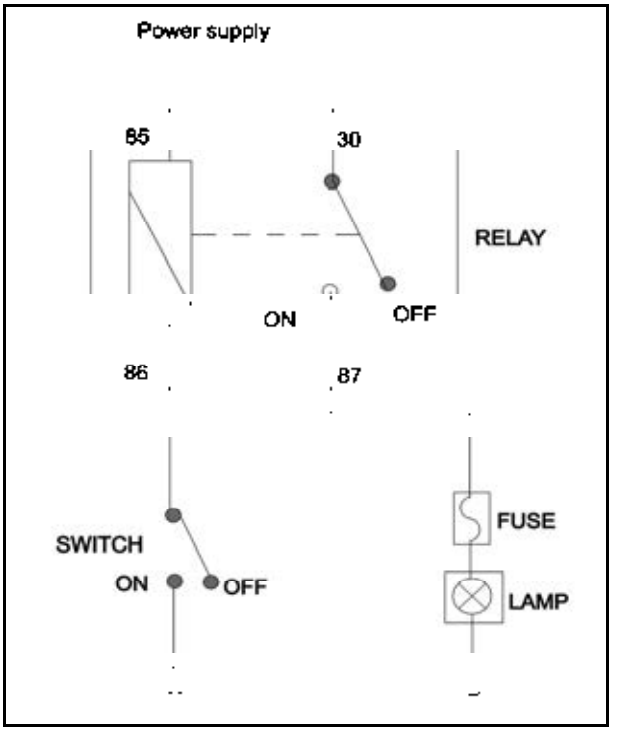
The illustration shows the state of a fuse blown due to this cause. In this case, do not replace the fuse with a new one quickly since a current heavy enough to blow the fuse has flowed through it. First, check the circuit for shorts and check for abnormal electric parts. After correcting shorts or replacing parts, use only a fuse of the same capacity as a replacement. Never use a fuse of larger capacity than the original fuse. If a larger capacity fuse is used, electric parts or wiring could be damaged, or could start a fire.

2. Fuse blown due to repeated turning current on and off:

The illustration shows the state of a fuse blown due to repeated current on/off. Normally, this type of problem occurs after a fairly long period of use and is less frequent than above. In this case, simply replace with a new fuse of the same capacity.

CHECKING RELAYS:

1. By using a relay, a heavy current can be turned on and off by a switch using much less current. For example, in the circuit shown here, when the switch is turned on (*closed*), current flows to the coil of the relay. Then, its contact is turned on (*closed*) and the light comes on. The current flowing through the switch is much less than that for the light.



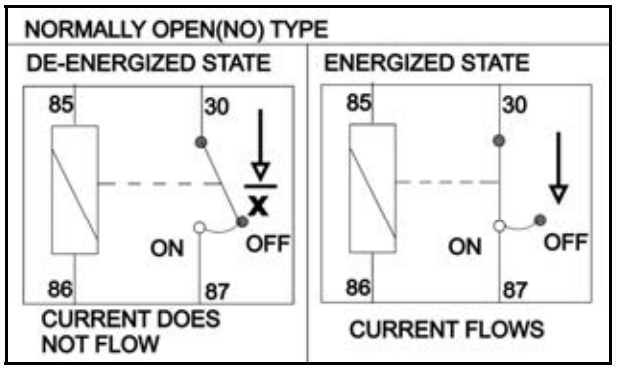
2. Relays may be classified as the normally open-type or the normally closed-type, depending on their contact construction.

NOTE: *The De-energized state means that no current is flowing through the coil. The energized state means that current is flowing through the coil.*

(a)The normally open-type

When a normally open relay as illustrated here is checked, there should be no continuity between terminals 30 and 87 when the relay is de-energized. There should be continuity between terminals 30 and 87 when battery voltage and ground are applied to terminals 85 and 86. The relay condition is determined by this check.

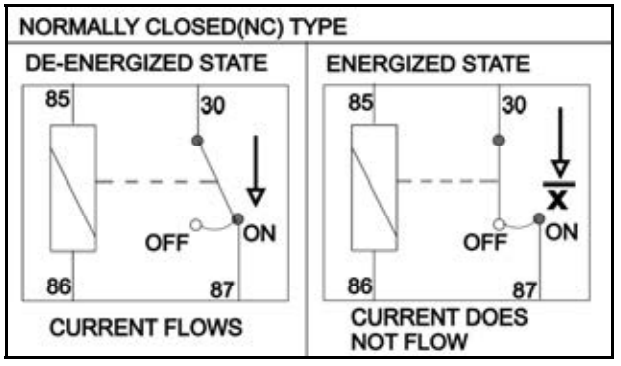
NOTE: *Check the relay in both condition, i.e. energized and not energized*



(b)The normally closed-type

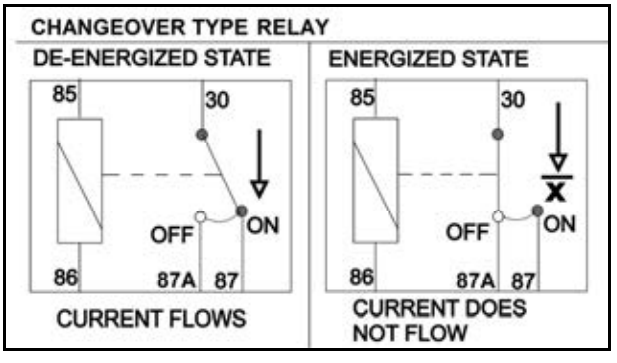
When a normally closed relay as illustrated here is checked, there should be continuity between terminals 30 and 87 when the relay is de-energized. There should be no continuity between terminals 30 and 87 when battery voltage and ground are applied to terminals 85 and 86. The relay condition is determined by this check.

NOTE: *Check the relay in both conditions, i.e. Energized and not energized.*



(c)The NO NC (Changeover) type

It has 2 relay out pins. One will be in contact in the changeover state as in NC relay. When it is energized it breaks the NC contact and connects the other output pins.



5.1 BATTERY MOUNTED FUSE BOX (*BDU*):

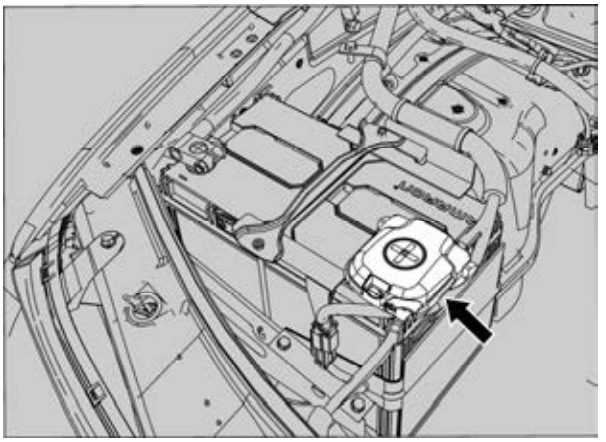
This fuse box is directly mounted on battery positive terminal. Bus-bar type construction is used.

Advantages of using Separate Battery Fuses

- Splits the load from other equipment
- Reduce the number of cables
- Reduces the number of Splices
- Reduces the risk of Thermal Incidents
- Reduces the cost and complexity of other components e.g. if the starter circuit has a failure only the starter will be not operate – not full vehicle failure

Fuses-Designed for high current protection. Ideal for starter motor & alternator protection.

LOCATION:



FUSE DETAILS:

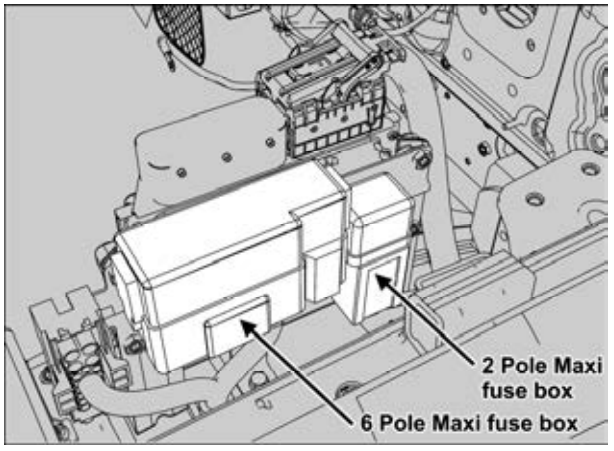
SR.NO.	FUNCTION	RATING
1	Starter Motor	CAL 4.
2	Alternator	125 Amps.

5.2. ENGINE COMPARTMENT FUSE & RELAY BOX:

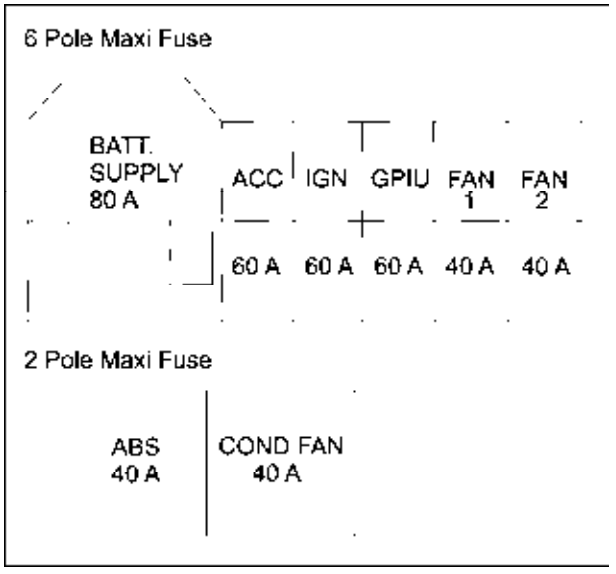
A.MAXI FUSE BOX:

This fuse box is mounted on EMS ECU mounting bracket. It contains one 6 pole maxi fuse box & one 2 pole maxi fuse box. For details refer top view of maxi fuse box.

LOCATION:



MAXI FUSE BOX DETAILS:



REMOVAL:

1. Disconnect the negative terminal of battery.
2. Disconnect the connection of Maxi fuse box.
3. Pry out the 6 pole & 2 pole maxi fuse box.

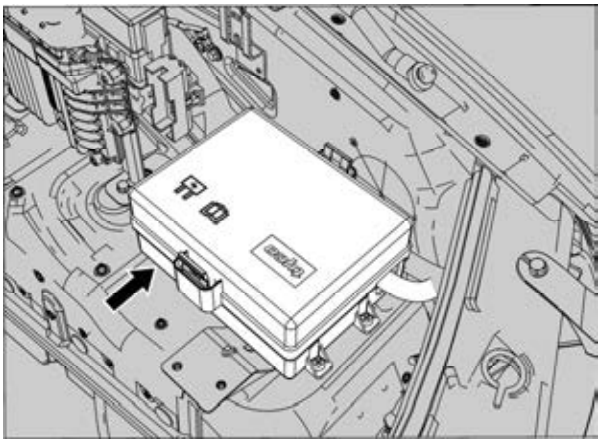
REFITMENT:

Follow the reverse procedure for refitment.

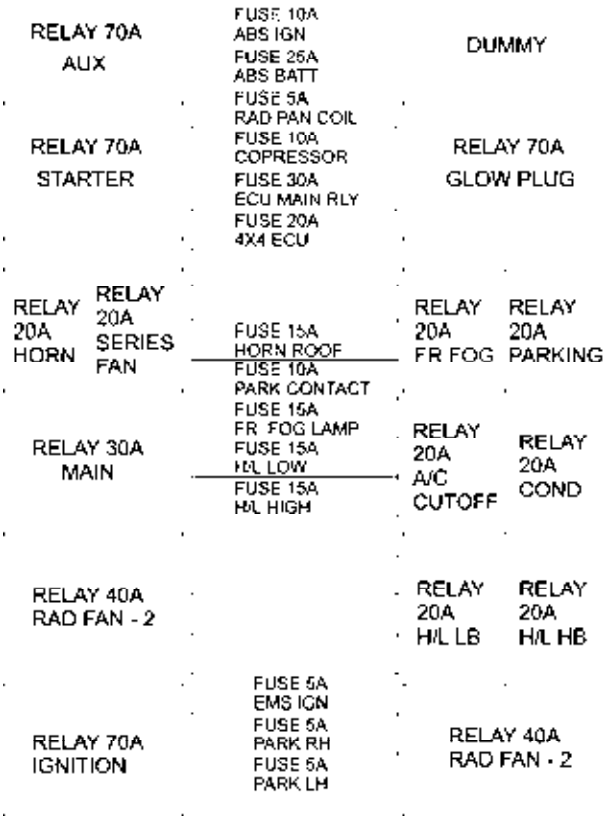
B.FUSE & RELAY BOX:

This fuse box is mounted on bracket on wheel arch LH in the engine compartment. It consists of fuses & relays. For details refer top view of fuse & relay box.

LOCATION:



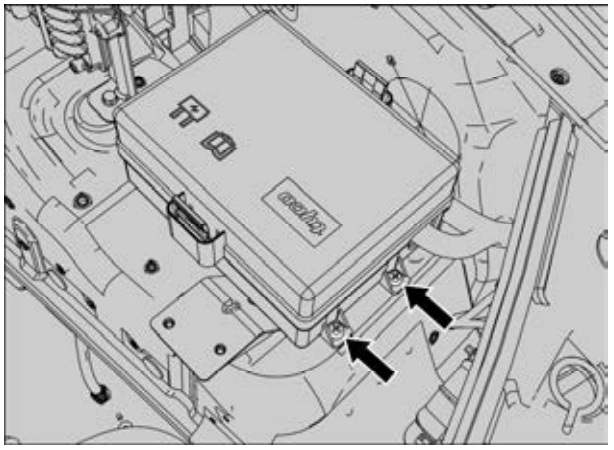
FUSE & RELAY BOX DETAILS:



REMOVAL:

1. Disconnect the negative terminal of battery.
2. Disconnect the connection of fuse & relay box.

3. Remove the four mounting screw of fuse & relay box.



4. Take out the fuse & relay box.

REFITMENT:

1. Locate & fix the fuse & relay box with four mounting screw

   Tightening torque is 0.58 kgfm.

2. Connect connection of fuse box.

3. Connect the negative terminal of battery.

FUSE & RELAY REPLACEMNET:

1. Remove the cover of the fuse box.

2. Take out the fuse or relay from its base.

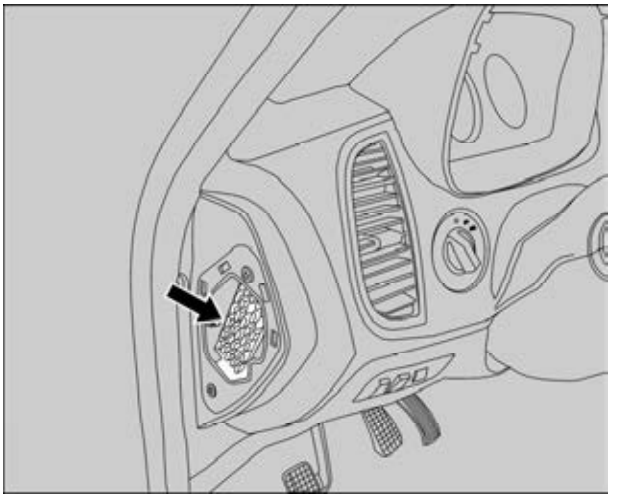
3. Check the Fuse/relay.

4. If faulty replace with same ratting of fuse & relay.

5.3. CABIN FUSE BOX:

Cabin fuse & relay box is mounted under the dashboard on driver side LH. . For details refer top view of cabin fuse & relay box.

LOCATION:



CABIN FUSE & RELAY BOX DETAILS:

ROTARY SW 10 A	IGN TION RELAY 10 A	HVAC 20 A	AMMO IGN 5 A	REAR DEMIST 10 A	REAR FOG LAMP 10 A
ENGINE 10 A	CRANK SIGNAL 5 A	MIRROR SW 10 A	AMMO 10 A	BLOWER 20 A	SRS 10 A
ACC SIGNAL 5 A		WIPER 20 A	BCM IGN 5 A	STOP LAMP 10 A	REV LAMP 10 A
AUDIO 10 A	CDL 20 A	BCM 30 A	ELECT TAPING 10 A	PADDLE LAMP/ DR AJAR LAMP 10 A	AC ON 5 A
WW DRIVER DOOR 25 A	WW CO-DR DOOR 25 A	WW RR DOOR RH 25 A	WW RR DOOR LH 25 A	WW RLY COIL 5 A	C GAR LIGHTER 25 A

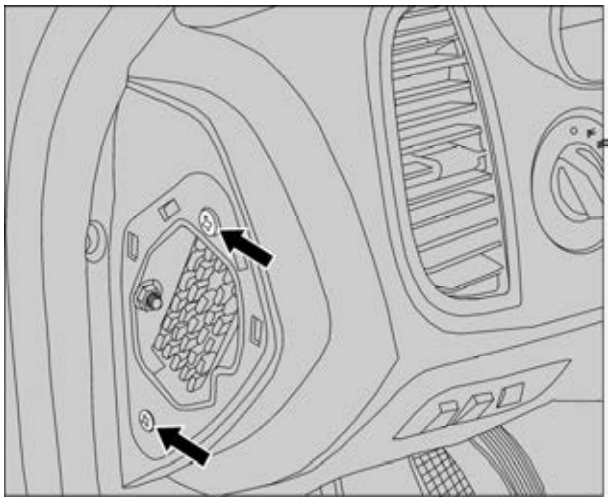
REMOVAL:

1. Disconnect the negative terminal of battery.

2. Disconnect the connection of fuse & relay box.

3. Pry out the dashboard LH side cover.

4. Remove the two mounting screw of fuse & relay box.



5. Take out the cabin fuse box.

REFITMENT:

1. Locate & fix the fuse & relay box with four mounting screw

   Tightening torque is 0.58 kgfm.

2. Connect connection of fuse box.

3. Connect the negative terminal of battery.

FUSE REPLACEMNET:

1. Remove the cover of the fuse box.

2. Take out the fuse from its base.

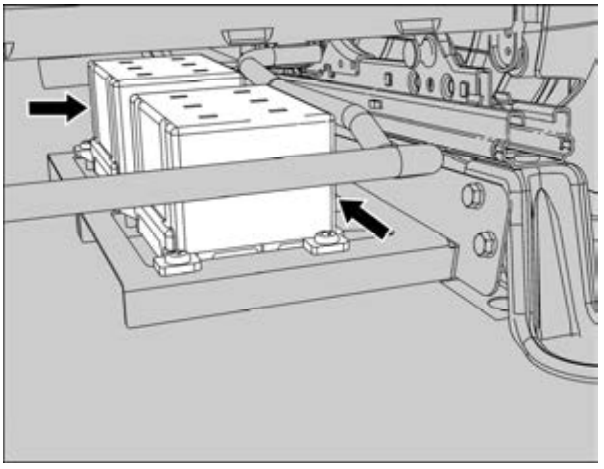
3. Check the Fuse.

4. If faulty replace with same ratting of fuse.

5.4. WINDOW WINDING & CENTRAL LOCKING RELAY BOX:

Window winding & central locking relay box is mounted under driver seat. For details refer top view of window winding & central locking relay box.

LOCATION:

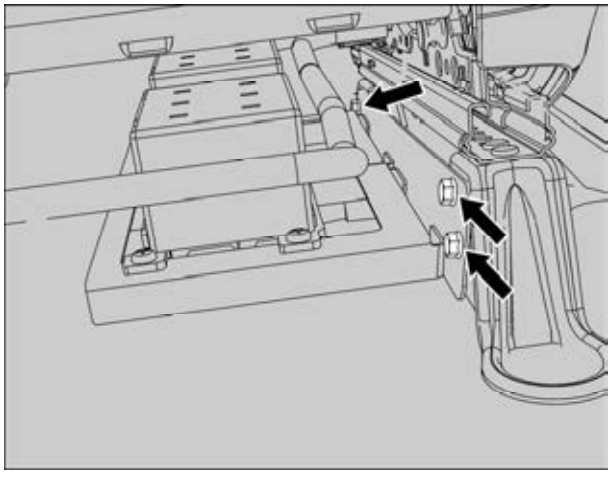


WINDOW WINDING & CENTRAL LOCKING RELAY BOX DETAILS:

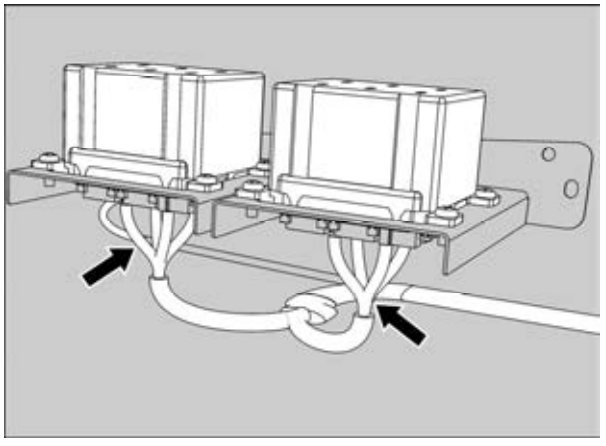
CO DRIVER DR UNLOCK RLY 12V,20A(NO/NC)	SLOW/FAST RLY 12V,20A(NO/NC)	DUMMY
DRIVER DR UNLOCK RLY 12V,20A(NO/NC)	INT WIPE RLY 12V,20A(NO/NC)	
RR DEMIST RLY 12V,20A(NO)	REAR FOG RLY 12V,20A(NO)	DUMMY
ALL DR LOCK RLY 12V,20A(NO/NC)		
DUMMY	DRIVER DOOR EXPRESS DN CONTROLLER	REAR DOOR RH DUAL RLY CONTROLLER
DUMMY	REAR DOOR LH DUAL RLY CONTROLLER	CO DRIVER DOOR DUAL RLY CONTROLLER

REMOVAL:

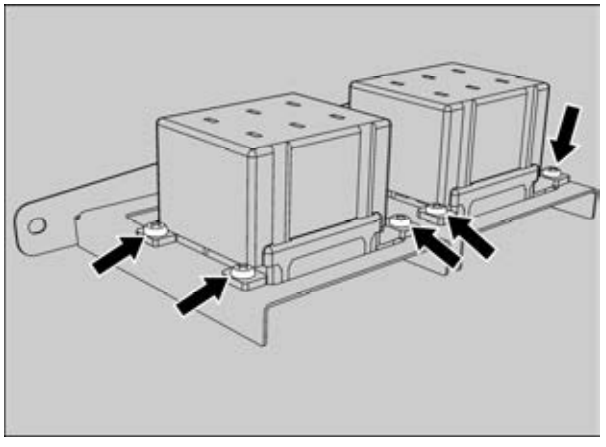
1. Disconnect the negative terminal of battery.
2. Remove the three mounting screw of relay & window winding controller support



3. Disconnect the connection of relay box.



4. Remove the eight mounting screw of relay box.



5. Take out the window winding & central locking relay box

REFITMENT:

1. Locate & fix the window winding & central locking relay box with eight mounting screw.

   Tightening torque is 0.58 kgfm.
2. Connect connection of relay box.
3. Locate & fix the relay & window winding controller support with three mounting screw.

   Tightening torque is 0.95 kgfm
4. Connect the negative terminal of battery.

REPLACEMENT PROCEDURE FOR RELAYS

1. Turn the ignition key to lock position.
2. Check each relay, if faulty replace with same rating relay.
3. If replaced relay of same rating is not working properly, there is probably a serious electrical problem.

REPLACEMENT PROCEDURE FOR FUSES

1. Turn the ignition key to lock position.
2. Check each fuse & look for broken/open controls link wire inside the fuse. If it is burnt, replace it with one of the spare fuses of same rating.
3. If replaced fuse of same rating burns out then, there is probably a serious electrical problem.

NOTE:

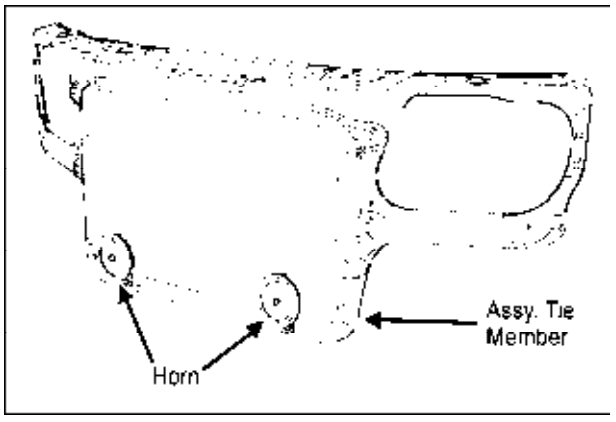
Use designated fuses only.

6 HORN

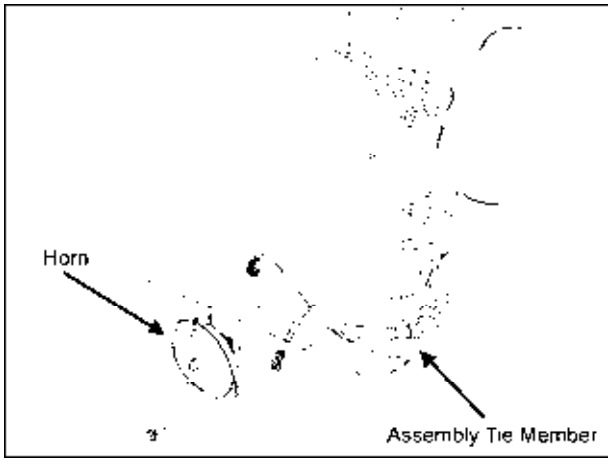
The vehicle is equipped with a horn system consisting of a low tone horn a high tone horn. The horns are operated by pressing the sides of the steering wheel cover *(around the Air Bag)* with the horn symbol. The horns are activated through a relay located in the engine compartment fuse and relay box. The circuit is protected by a dedicated fuse. The horns are always enabled for safety reasons even with the ignition OFF or the key is extracted.

LOCATION:

High tone horn is located on RH and LH side of Assy. Tie member.

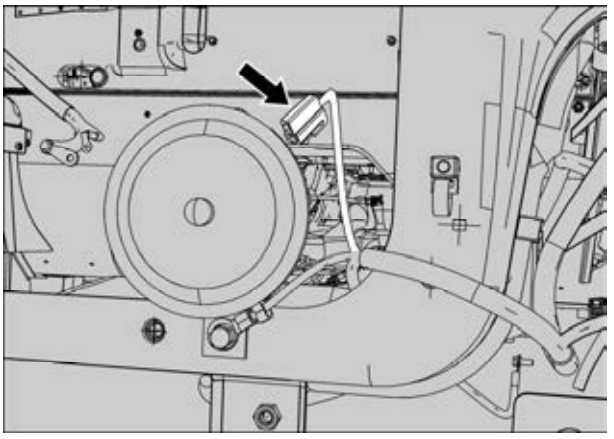


FITMENT DETAILS:

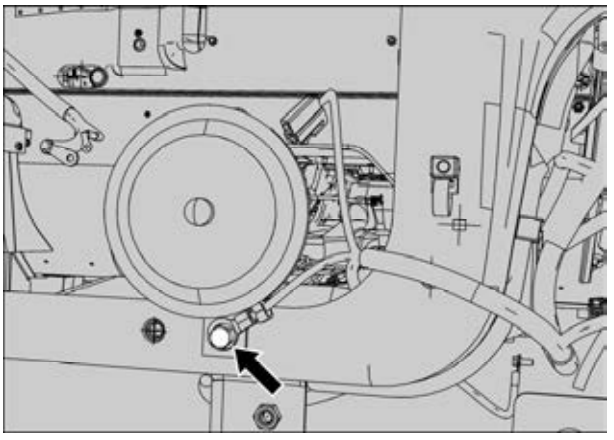


REMOVAL:

1. Remove the front bumper assembly (*Refer body section*).
2. Disconnect electrical connection.



3. Remove the one mounting bolt of the horn.



4. Take out the horn.

INSPECTION:

Connect the positive terminal of the horn to battery (+) and negative terminal to battery (-). If a clean and sharp sound is heard, then horn is OK. If no sound is heard, check continuity of the horn coil using a multimeter.

REFITMENT:

1. Align the horn to match mounting hole on assembly cross member lower complete and fit one mounting bolt.

   Tightening torque for bolt – 0.95 Kgfm

2. Connect the electrical connection.

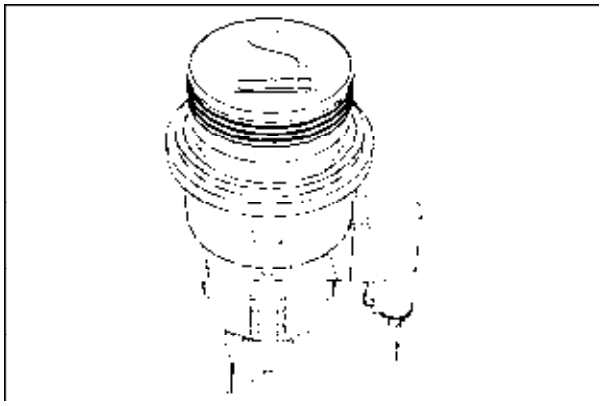
DIAGNOSTIC INFORMATION & PROCEDURES:

CONDITION	POSSIBLE CAUSES	CORRECTION/REFERENCE ITEM
Horn not working	Grounding point loose	Tighten the grounding properly
	Terminals at horn loose	Connect the terminals properly
	Horn fuse *(15A)* in engine fuse and relay box loose/blown	Fix the fuse firmly in the base. Replace if blown
	Horn switch contact in steering pad improper	Adjust horn switch contact in steering pad properly
Horn sounds distorted	Horn terminals loose	Connect the terminals properly
	Horn setting screw disturbed	Adjust the setting screw till a clean and sharp sound is obtained
Horn Continuous ON	Horn Switch contact stuck	Repair the horn switch contact
	Wiring short to ground	Repair the wiring connection

7 CIGAR LIGHTER

To use Cigar lighter, press the button on the knob and wait 15 seconds, after that button returns automatically to its initial position and the cigar lighter is ready for use.

The cigar lighter device comprises a power socket on which the cigar lighter heater coil is fitted. Instead of the cigar lighter device, the socket can be used to supply power to the equipment which operates on 12V.

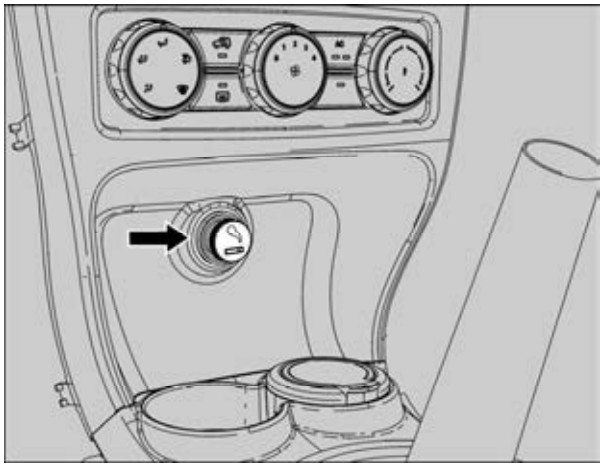


! CAUTION:

- *Handle lighter carefully to avoid injury. If lighter does not pop out, remove it to avoid overheating.*
- *Avoid smoking inside vehicle, it may spoil inside ambience, interiors etc.*

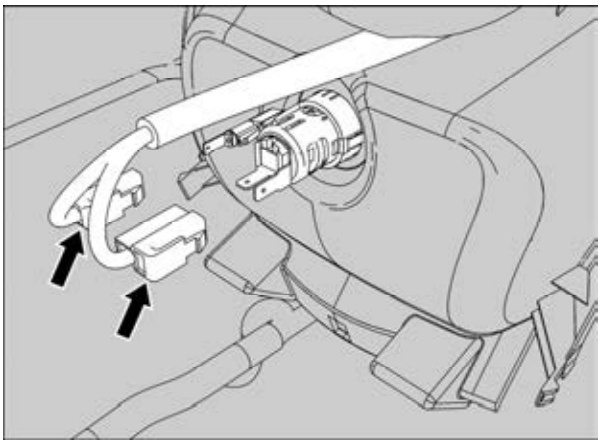
LOCATION:

It is fitted on Center console for airbag assembly.

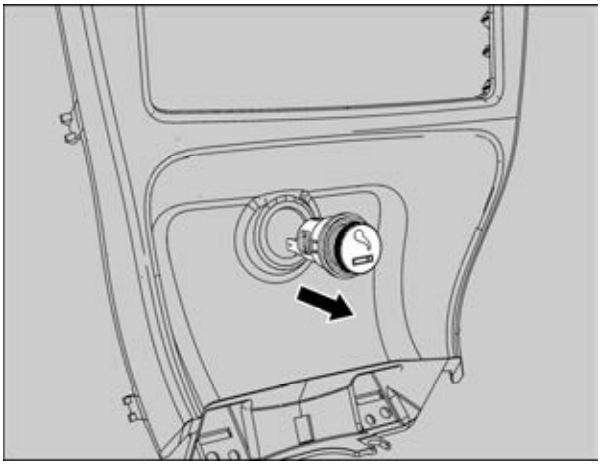


REMOVAL:

1. Remove Center console for airbag assembly (*Refer body section).*
2. Disconnect the electrical connection of cigar lighter.



3. Pry out the Cigar lighter from the Center console for airbag assembly.



REFITMENT:

1. Locate and fit (*snap fit*) the Cigar lighter in the cutout of Center console for airbag assembly.
2. Connect the electrical connection to the Cigar lighter.
3. Fit the Center console for airbag assembly (Refer *body section)*.

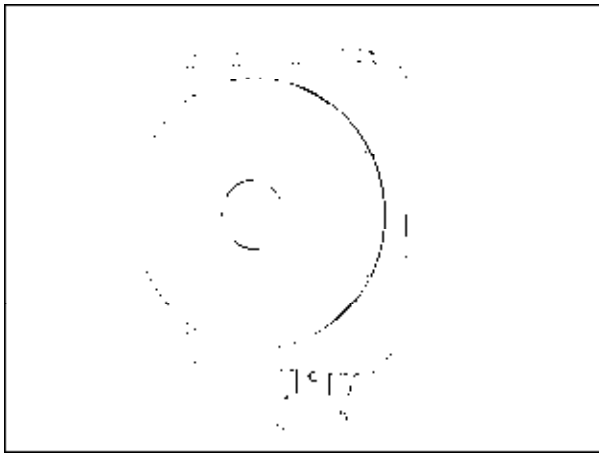
INSPECTION:

- Take out the heater unit and check for worn edge on the element spot connection. Also check for spread of tobacco or other material on the element.
- Using multimeter, check the resistance value of element, it should be 1.7 ohms

8 BUZZER:

FUNCTION:

Its function is to generate the warning sound to alert the driver about any abnormal condition of vehicle. It receives the input from the BCM unit.

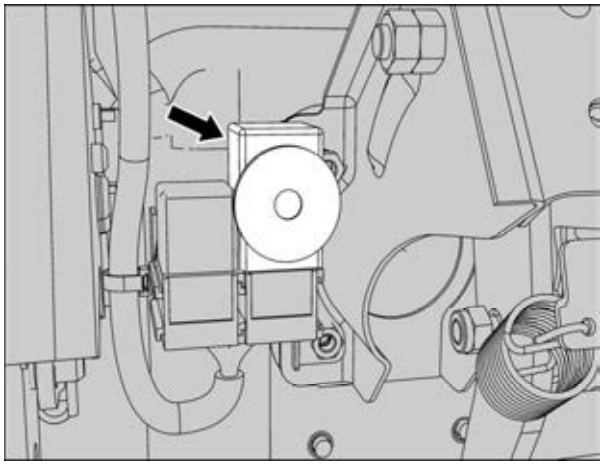


SPECIFICATIONS:

Operating Voltage	12 V dc
Operating Current	200mA
dB at 100 ±10 mm	100
Leakage Current	500 Micro Amp.
Vehicle Level Noise	70dB

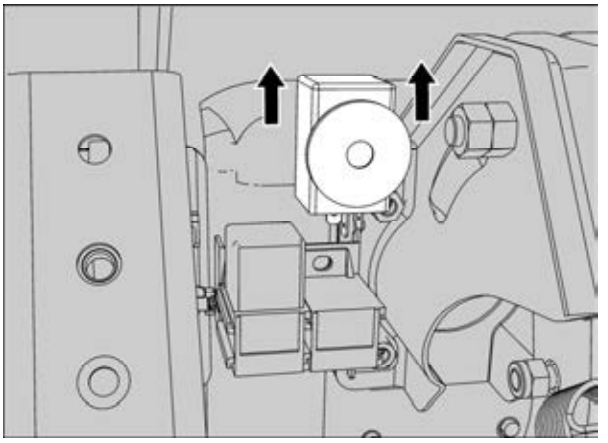
LOCATION:

It is fitted behind the glove box on firewall.



REMOVAL:

1. Remove steering column lower cover.
2. Disconnect the electrical connection of buzzer.
3. Carefully pull out the buzzer from its base.



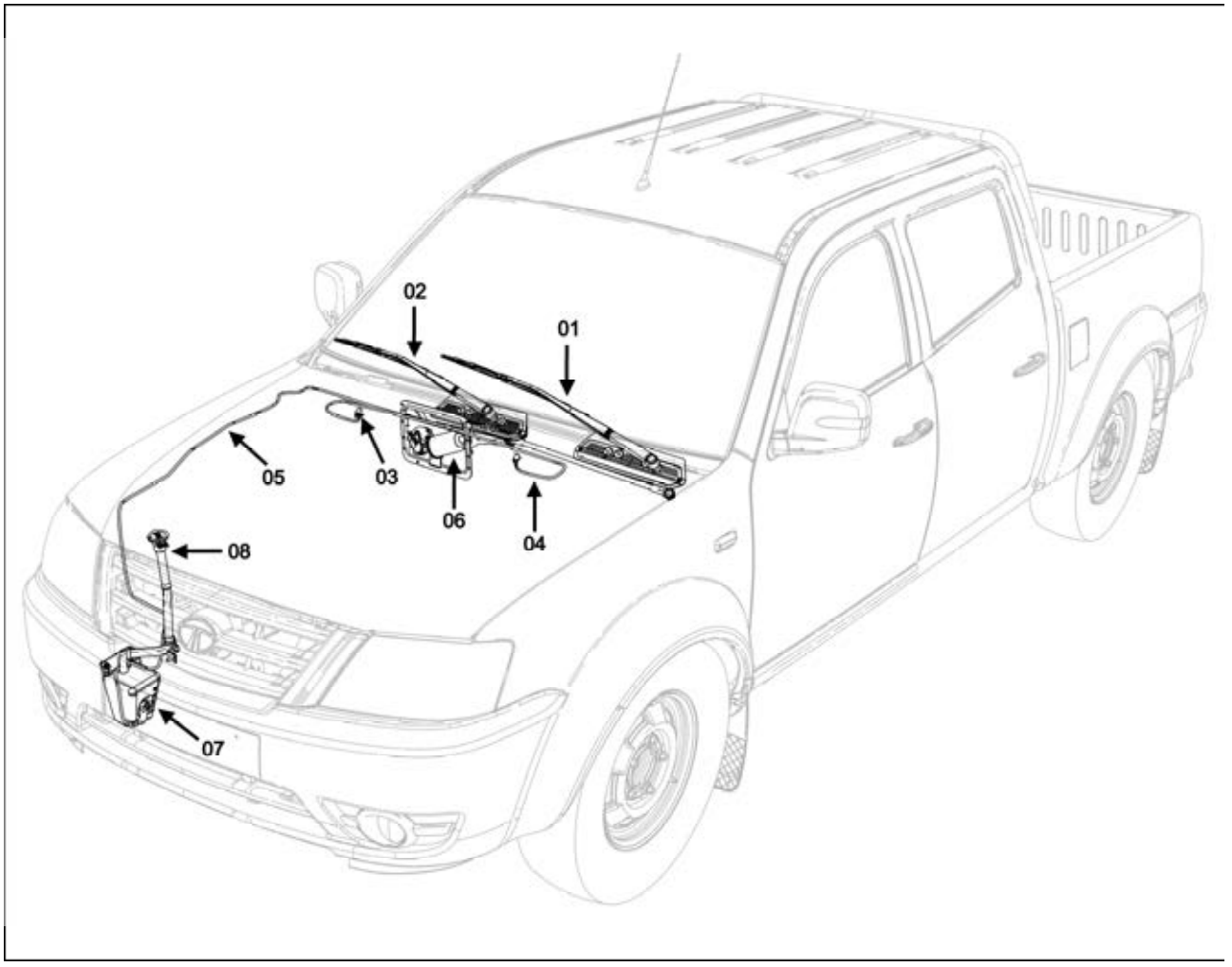
REFITMENT:

1. Fit the buzzer on to the buzzer base.
2. Connect the electrical connection to the buzzer.
3. Fit the steering column lower cover**.**

3.7 WIPER AND WASHER SYSTEM

1. FRONT WIPER AND WAHSER SYSTEM COMPONENT LOCATIONS

The illustration below locates and identifies the main components in the wiper and washer system, which is operated by RH side stalk of a combi-switch.



SR. NO.	DESCRIPTION
01	Wiper Arm And Blade Driver Side.
02	Wiper Arm And Blade Co-Driver Side.
03	Nozzle
04	Washer Hose (T Joint to nozzle)
05	Washer Hose (Pump to T Joint)
06	Assy Wiper Motor
07	Washer Bottle 1.2 Lit
08	Washer Bottle Filler neck

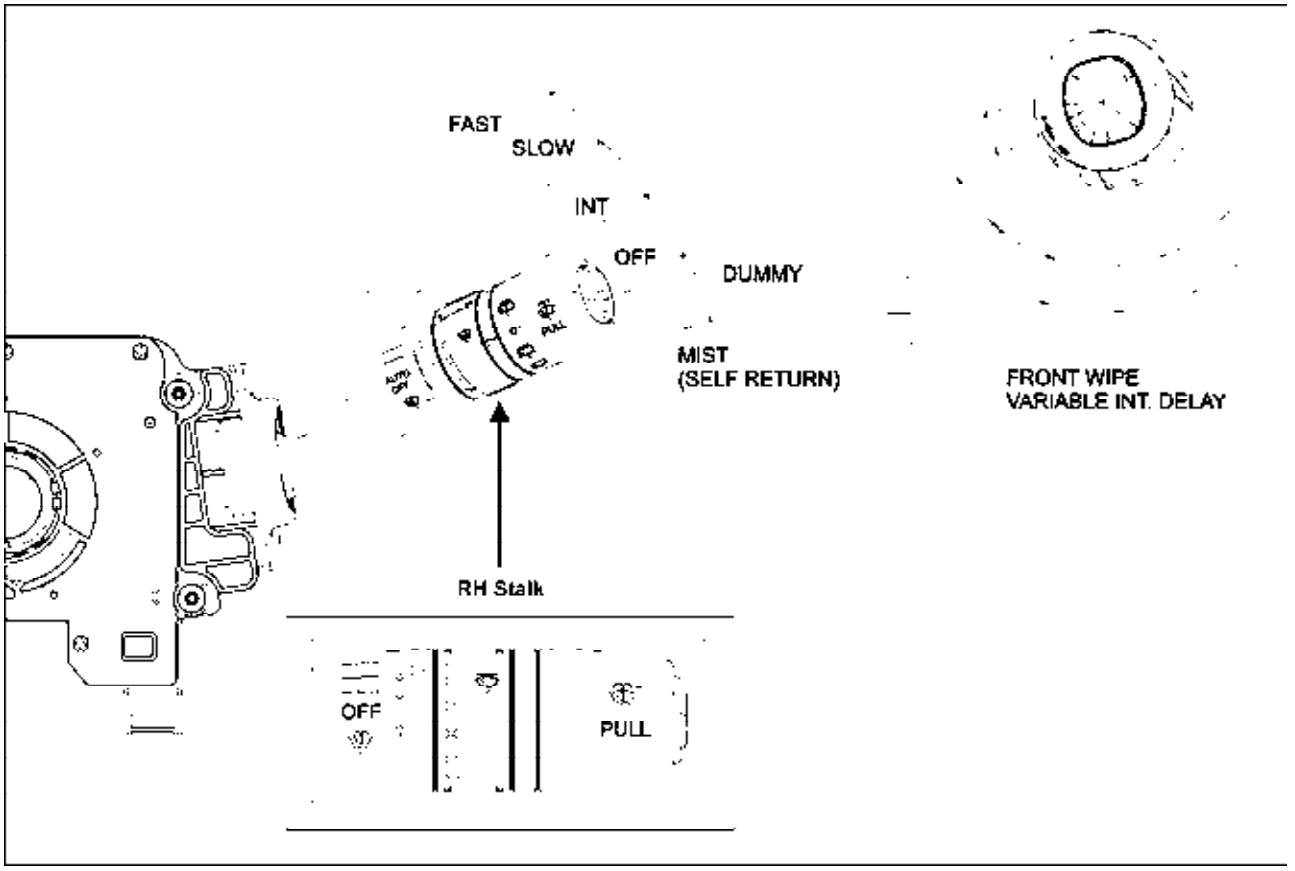
DESCRIPTION:

The wiper system comprises front wipers which are powered by electric motors. A washer reservoir is located behind the front right bumper on mounting bracket and its filler neck is provided near battery in the engine compartment. Pump supplies washer fluid to the front nozzle for windshield glass washing. Operation of the front and washers is controlled by BCM and the driver using switches located on a combination switch stalk.

Control of the wipers and washers is achieved by the following components:

- BCM
- Front wiper relays (*ON/OFF & Slow/fast relays*)
- Front wash/wipe switch.
- Front wiper motor assembly.
- Front washer pump motor.
- Fuses.

2 FRONT WASH/WIPE SWITCH FUNCTIONALITY



FRONT WASH AND WIPE:

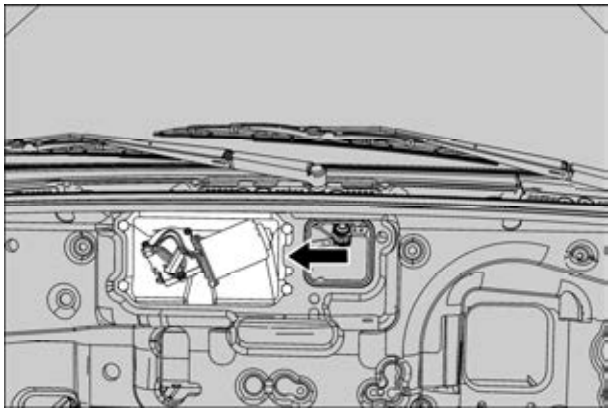
- MIST (*Single Wipe*)
- OFF
- INTERMITTENT/AUTO *(Controlled by BCM)*
- LOW SPEED *(Not controlled by BCM)*
- HIGH SPEED *(Not controlled by BCM)*

3. WIPER SYSTEM COMPONENTS:

1 WIPER MOTOR

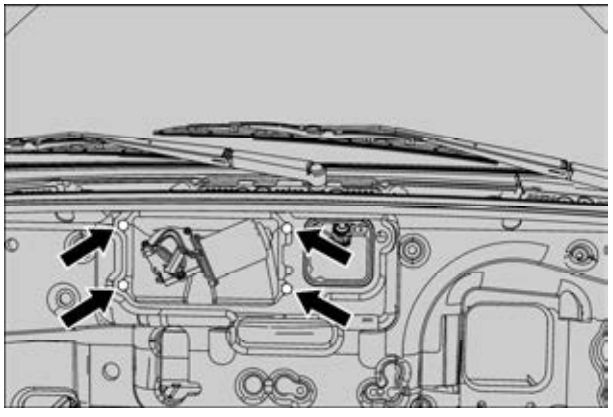
LOCATION:

The front wiper motor assembly is fitted on firewall assembly.

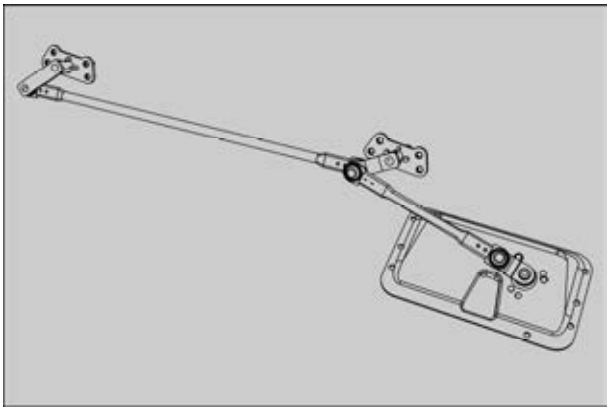


REMOVAL:

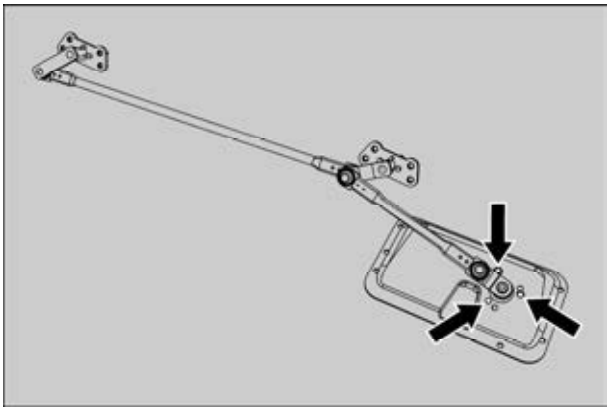
1. Disconnect the negative terminal of battery.
2. Remove both side wiper arm and blade assembly. *(Refer wiper arm and blade assembly removal procedure)*
3. Loosen and remove 4 no. of screws of leaf grill assembly.*(Refer wiper arm and blade assembly removal procedure).*
4. Disconnect the wiper motor connector.
5. Remove four mounting screws of wiper motor.



6. Take out the wiper motor linkage assembly along with wiper motor.



7. Remove three mounting bolts of wiper motor and take out wiper motor from wiper linkage.



REFITMENT:

1. Fit the wiper motor on the wiper linkage assembly.

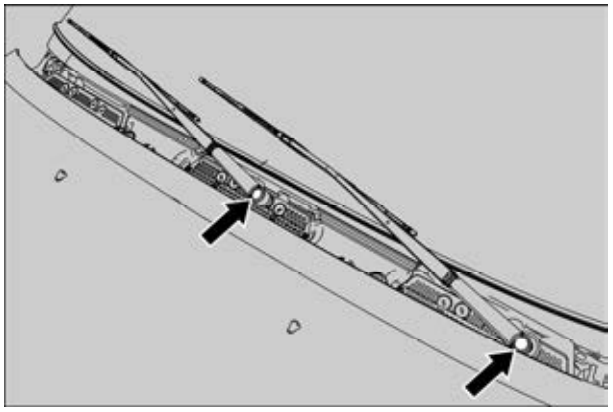
   Tightening torque for bolts – 0.8 Kgfm.
2. Locate and fit the wiper motor assembly with four mounting screw.

   Tightening torque for bolts – 0.8 Kgfm.
3. Locate and fit the leaf grill assembly with four mounting screw *(Refer wiper arm and blade assembly removal procedure).*
4. Connect the electrical connection of wiper motor and fit the wiring harness as per routine.
5. Fit the wiper arm & blade assembly *(Refer wiper arm and blade assembly removal procedure)*
6. Connect the negative terminal of battery.

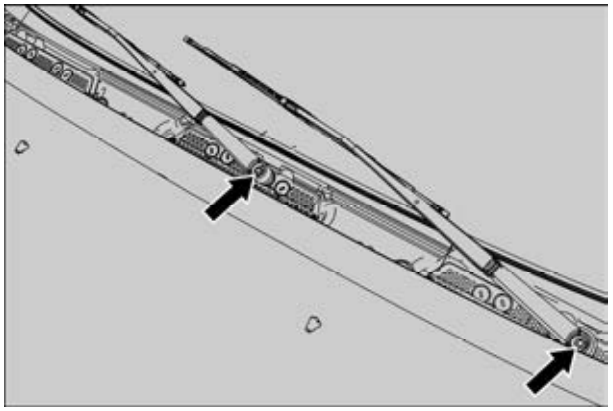
2 FRONT WIPER ARM & BLADE

REMOVAL

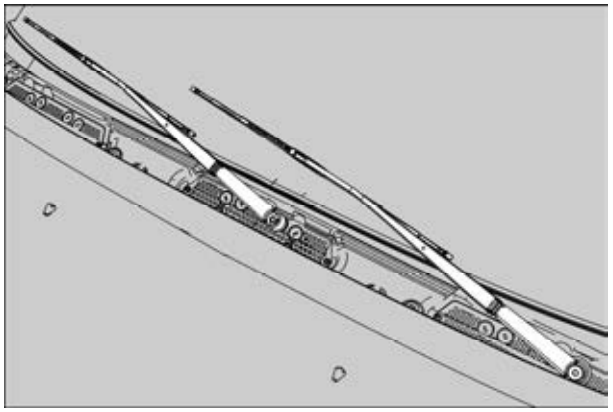
1. Remove the rubber cap of wiper blade mounting screw.



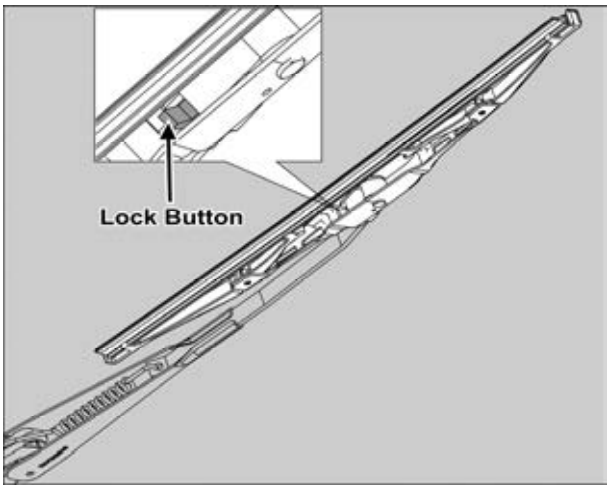
2. Remove mounting nut of wiper arm assembly.



3. Take out the wiper arm and wiper blade assembly from the shaft.



4. Press the lock button and push down the blade assembly from its location and take out the wiper blade assembly from wiper arm.



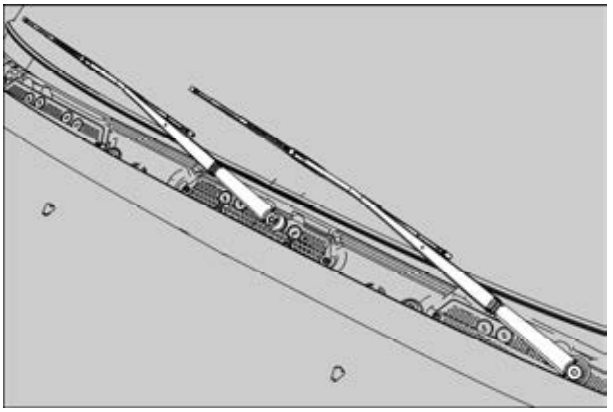
INSPECTION: Inspect wiper blade rubber for any cut. If found, replace the wiper blade assembly.

REFITMENT:

1. Before fitting the wiper arm & blade assembly bring the wiper motor to the parking position. This can be done by switching ON the Ignition and giving a single wipe.

NOTE: *Switch OFF the Ignition only after the motor has stopped.*

2. Fit the wiper arm in its parking position to the shaft locating it on the splines so that the wiper blade is just clear of the windshield glass. As shown in the below figure.



NOTE:

Co-driver side wiper ARM &blade assembly should be aligned with marking provided on the black band of the windshield glass.

3. Fit mounting nut and tighten with specified torque.

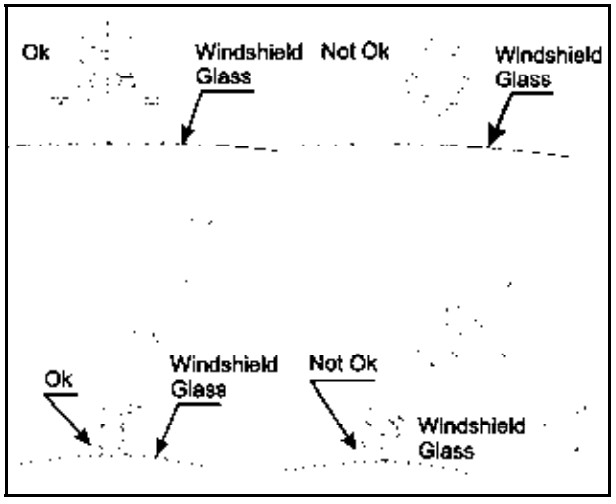
   Tightening toque for Nut: 2.5 Kgfm

4. Fit the rubber cap of wiper blade mounting screw.

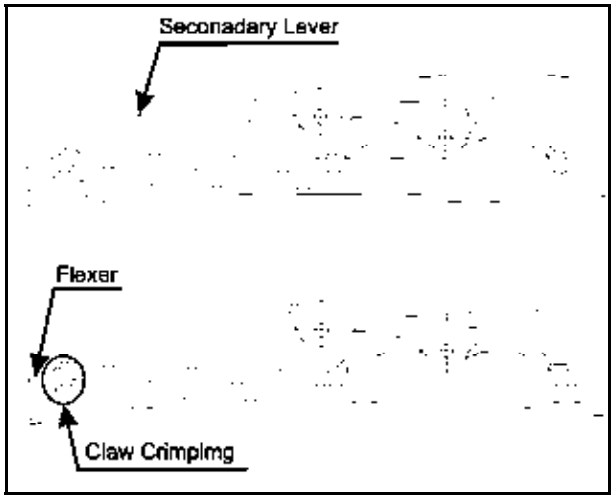
5. Check the correct operation of wiper.

3 WIPER CARE

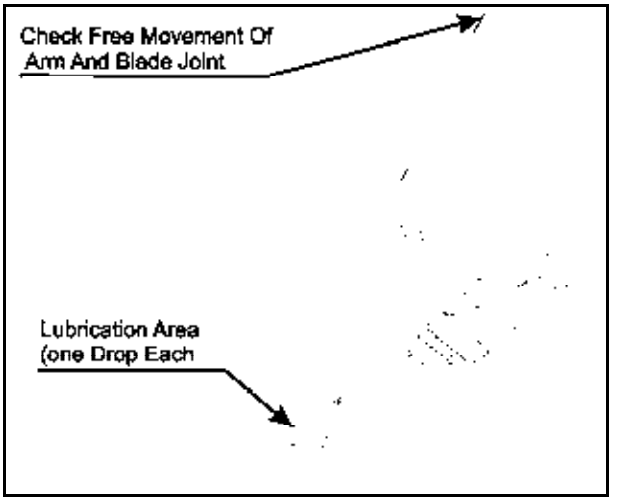
1. Wiper blade attack angle on wind shield glass should be 90 deg i.e. perpendicular. Remove wiper blade and rest wiper arm on wind shield glass in the centre position. Check the gap between arm strip and glass. Adjust by twisting wiper arm.



2. Straighten the secondary lever & yoke, if found twisted. Slide the flexer inside the rubber, if found protruding out and crimp the claw to avoid it from coming out again.



3. Lubricate (*one drop*) hinge joint area in each vehicle service to achieve proper arm pressure.



4. Check the wiper blades at least twice a year or when they seem less effective. Substances such as tree sap and some hot wax treatments used by commercial car washes reduce the effectiveness of wiper blades.

5. If the wiper blades do not wipe properly, clean both the windshield and wiper blades using undiluted windshield wiper solution or a mild detergent. Rinse thoroughly with clean water. To avoid damaging the blades, do not use fuel, kerosene, paint thinner, or other solvents.

6. When replacing wiper blade assemblies, always use specified parts or equivalents. To make replacing the wipers easy, turn the ignition to ACC, and then turn the wipers on. When the wiper reaches the vertical position, turn the ignition to LOCK.

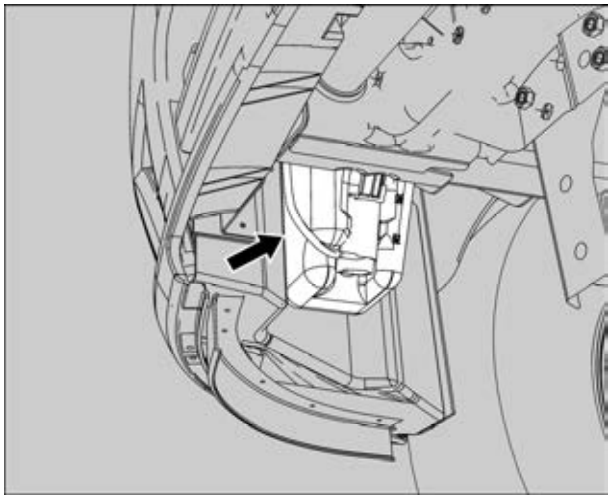
4. WAHSHER SYSTEM COMPONENTS:

1 WAHSER BOTTLE

Capacity- 1.2 Lit.

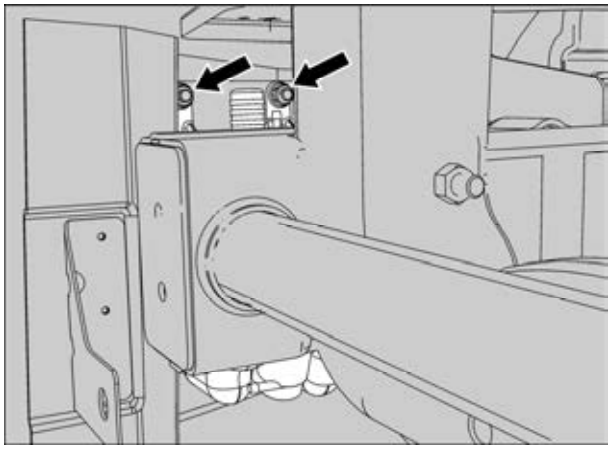
LOCATION:

It is located behind the front bumper on mounting bracket and its filler neck is provided near battery in the engine compartment.



REMOVAL:

1. Remove the bumper assembly (*For procedure refer body section*).
2. Disconnect the electrical connections of washer pump.
3. Disconnect filler pipe and vent pipe connection to the washer bottle and hose connections of washer pump.
4. Remove two mounting nuts of washer bottle.



5. Take out the washer bottle assembly.

INSPECTION: Check the washer bottle for cracks and leakages if any.

REFITMENT:

1. Align the washer bottle to match mounting holes on washer bottle mounting bracket.
2. Fit the mounting nuts and tight with specified torque.

   Tightening torque for bolts -0.5 Kgfm
3. Connect the filler pipe and vent pipe connection to the washer bottle and hose connections of washer pump.
4. Connect the electrical connections of washer pump.
5. Fit the front bumper assembly. (*For procedure refer body section)*

NOTE:

After installation, add water up to the upper level of the washer bottle & check for water leakage.

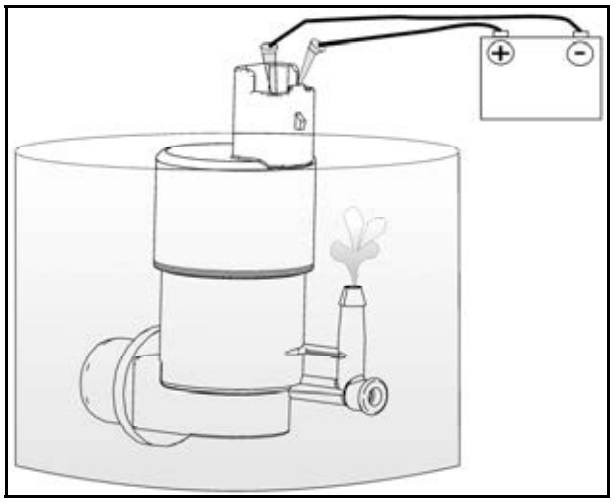
2 WASHER PUMP

REMOVAL:

1. Remove the front bumper assembly. (*For procedure refer body section*)
2. Disconnect the electrical connection of washer pump.
3. Disconnect the washer hose from the washer pump.
4. Pull out the washer pump from its location.

INSPECTION:

1. Partially dip the washer pump in a water filled jar and connect battery (+) and (−) terminals to pump (+) and (−) terminals respectively to check pumping rate.



2. Connect the positive (+) lead from the battery to terminal 2 and the negative (−) lead to terminal 1, check that the pump operates. If operation is not as specified, replace the pump.

! CAUTION:

These tests must be performed quickly to prevent the coil from burning out.

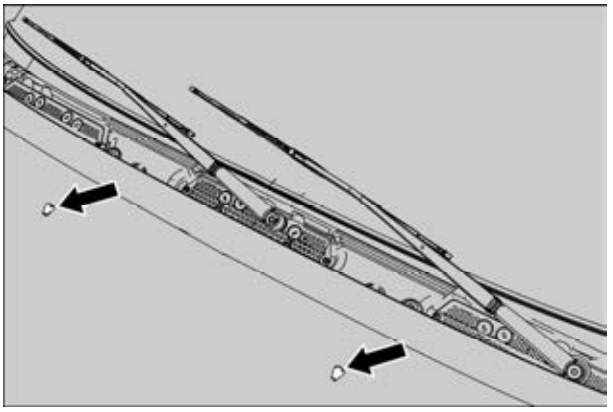
REFITMENT:

1. Locate the washer pump on the washer bottle hole and press it inside.
2. Connect electrical connection to the washer pump.
3. Check for leakage.
4. Connect the washer hose to the washer pump.
5. Fit the front bumper assembly. (*For procedure refer body section)*

3 WAHSER NOZZLE

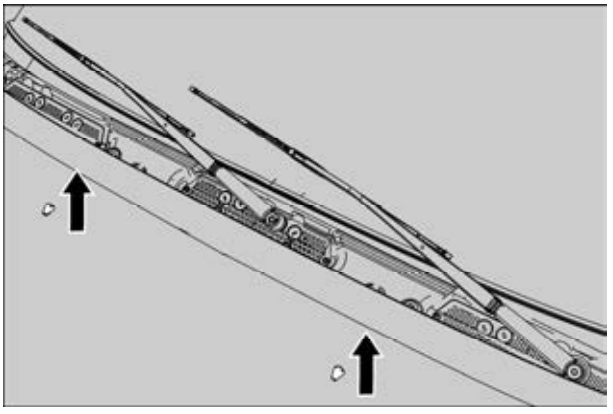
LOCATION:

Nozzles fitted on bonnet assembly.



REMOVAL

1. Open the bonnet.
2. Disconnect the connection of washer pipe.
3. Fry out the front nozzle from bonnet (*Snap fitted*).



2. Pull out the nozzle assemble from the cutout & disconnect the washer hose.

INSPECTION:

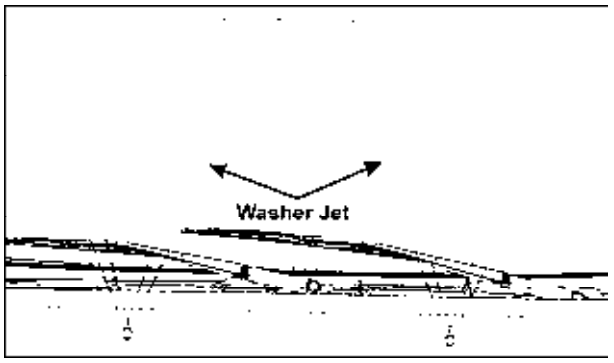
Blow air in the injection direction and make sure that air flows only one way. Make sure that the reverse direction is not possible. Check periodically nozzle for air trapping / dust entry.

REFITMENT

1. Pull out the washer hose from the cutout & connect to the washer nozzle.
2. Snap fit the nozzle into the cutout.

NOZZLE SETTING:

1. See the water jet spot, if it is in the middle zone of the windscreen as shown in below fig then OK.



2. If the water jet is not at the middle of windscreen screen, then adjust the nozzle tip angle manually such that water jet spot should be at the middle of windscreen glass.

3. All four jet should be on same level.

5 DIAGNOSTIC INFORMATION AND PROCEDURES

CONDITION	POSSIBLE CAUSE	CORRECTIVE ACTION/REFERENCE ITEM
Wiper system not working at all	Wiper motor Connector (*6 pole)* loose	Fix the connector properly
	Wiper motor faulty	Replace wiper motor
Wiper system does not work in all speeds	Faulty combi switch	Replace Combi switch
Wiper not working in intermittent delay mode	Intermittent wiper Relay loose	Fix the relay properly
	No output from BCM	Refer BCM Diagnosis
Windscreen washer not working	Water tank empty	Fill tank with Windscreen washer fluid
	Washer tube joints are open	Connect the joints properly
	2 pole washer pump connector loose	Connect the connector properly
	Windscreen washer pump faulty	Replace pump
	Windscreen washer switch in combi-switch stalk faulty	Replace combi switch
Both Washer and Wiper Not working	Wash wiper fuse (*20 A*) in cabin fuse box loose/blown	Fix the fuse in the base properly. Replace if blown

10 INSTRUMENT CLUSTER

1. DESCRIPTION:

Instrument cluster provides different vehicle related functional and warning information to driver in terms of switching on the telltales and flashing the test message in the driver information system (DIS).

It is located on the dashboard in front of the driver seat.

The Instrument Cluster has following features,

1.1 Four Analogue Gauges :

1. Speedometer
2. Tachometer
3. Temperature gauge
4. Fuel gauge

1.2 Driver Information system *(DIS)*:

Message Centre has following features,

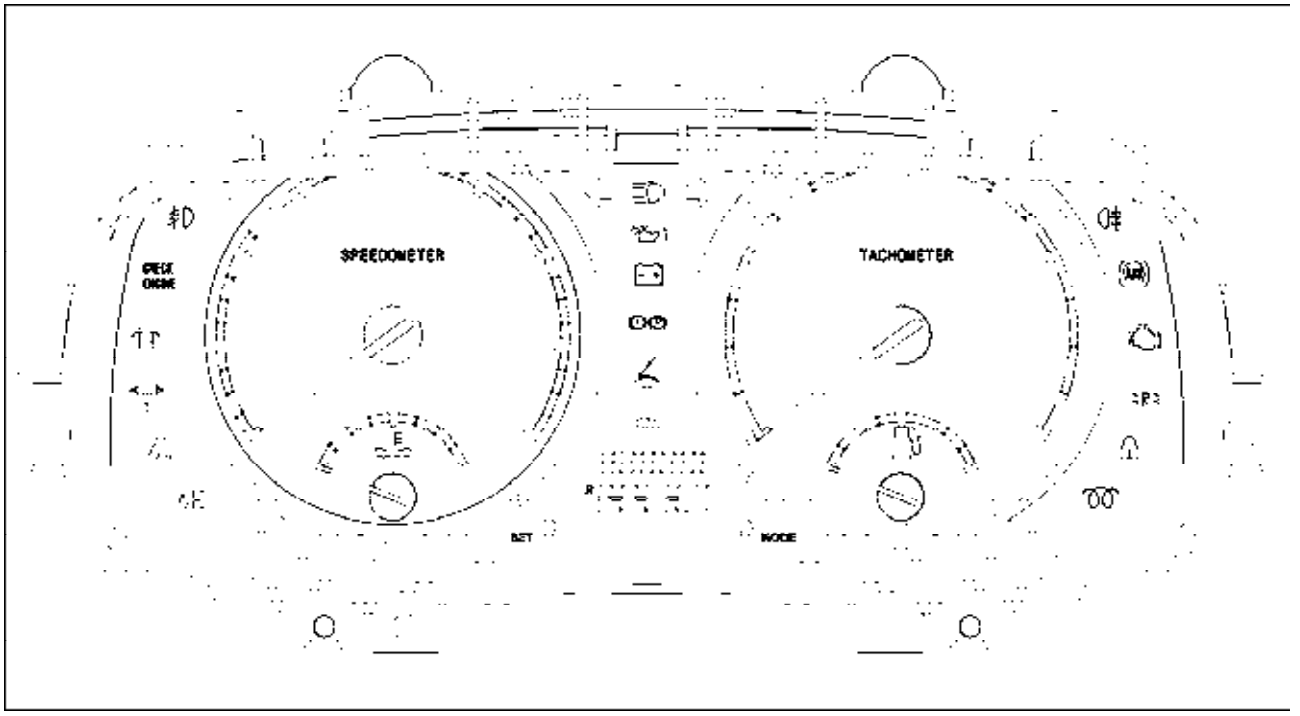
1. DPF (Diesel Particulate Filter) Full Indicator.
2. Liquid Crystal Display (Digital Clock).
3. Passenger Air Bag activation Indicator.
4. Fuel Filter Clogging Indicator.
5. Passenger Air Bag Deactivation Indicator

1.3 Tell tales (*Functional and Warning Indicators*)

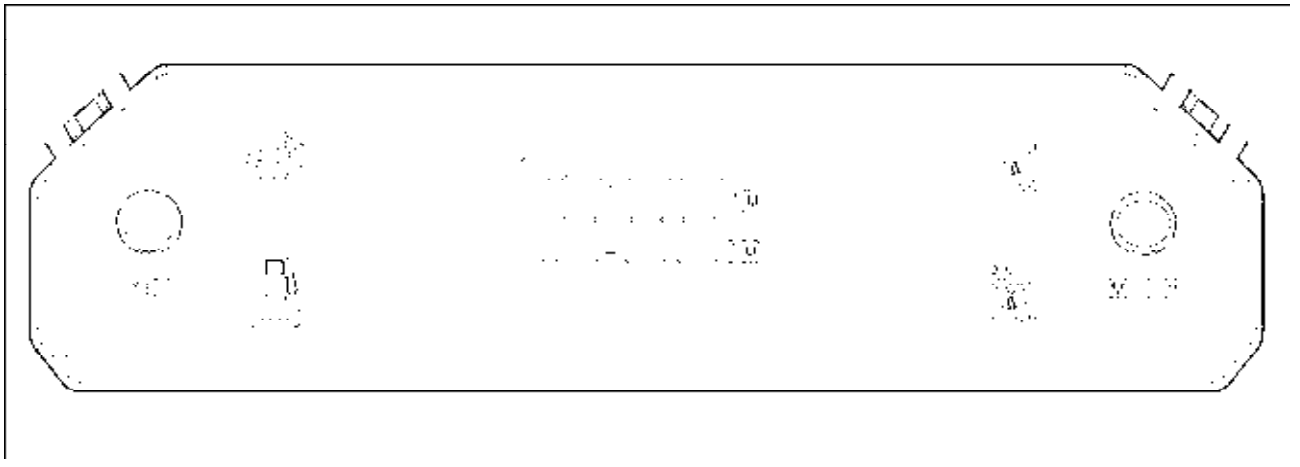
1.4 Specifications:

1. Rated voltage	: 12 V DC Negative ground
2. Operating voltage	: 9 V to 16 V DC
3. Test Voltage	: 13.5 V DC
4. Operating temperature	: -30°C to +85°C
5. Storage Temperature	: -40°C to +95°C
6. Display Visible	: -20°C to +80°C

2. ARTWORK DESIGN (*RENDERING*):



3. Driver Information system (DIS):



4. TELL TALES MATRIX:

SR. NO	TELL TALES	COLOUR	SYMBOL	PRE-CHECK	BUZZER ENABLED
				Cluster	
1	Turn Left	Green		X	√ (*Continues*)
2	Turn Right	Green		X	√ (*Continues)*
3	High Beam	Blue		X	X
4	Battery Charging	Red		X	X
5	SRS	Red		√	X
6	Park Brake Applied	Red		√	X
	Brake Fluid Oil level low				X
7	Diesel Pre-Heat	Amber		√	X
8	Check Engine	Red	Check Engine	√	X
9	Malfunction Indication lamp	Amber		√	X
10	Low Engine Oil Pressure	Red		X	X
11	Water In Fuel	Amber		√	√ (*Continues*)
12	ABS	Amber		√	X
13	Seat Belt	Red		√	√ (*Continues*)
14	Immobilizer	Red		X	X
15	Front Fog	Green		X	X
16	Rear Fog	Amber		X	X
17	Door open	Red		X	X
18	Transfer Mode	Green		X	X
		Green		X	X

5. TELL TALES DESCRIPTION:

1. Turn Indicator (Left/Right):

Turn signal lamps (Direction Indicator) can be operated only when the ignition supply is 'ON and by using the turn indicator switch on the combi switch. The direction indicator arrow (LHS) ⬅ and ➡ (RHS) on the instrument cluster flashes along with external indicator lights as selected.

2. High Beam Indicator:

This indicator lights up when the headlamp high beam is 'ON'.

3. Battery Charging Indicator:

This indicator lights up when 'IGN' is turned 'ON' and goes 'OFF' after the engine starts.

! CAUTION

If it remains 'ON' while the engine is running, it indicates that the battery is not charging. Check and rectify the problem.

4 Park Brake / Brake Fluid Oil level:

This indicator has multiple functions as follows,

- When ignition key is turned to 'IGN' position, it lights up for 3 seconds and goes off.
- It lights up with "park brake On" text message when parking brake is applied and goes off when parking brake is released.
- It lights up with "Brake fluid low" text message when brake fluid oil level is low.
- It lights up with "EBD fault" text message when ABS / EBD system has some fault (*valid for vehicles having ABS system only*)

5. Diesel Pre-Heat indicator:

This indicator, applicable for diesel engines, comes on when engine starting-aid is provided by activating glow plugs. Engine should be started only after this indicator goes off.

6. MIL indicator:

This indicator indicates that's there is a malfunction in the engine / wiring harness or EMS. The functioning of this lamp is as follows.

- Comes "ON" when key is in 'IGN' position and goes 'OFF' when EMS performances the systems check.
- Remains 'ON' if there is a fault in the EMS system.

! CAUTION

When "service/malfunction/Check Engine" lamp is ON while engine is running, engine's performance deteriorates marginally and sometimes drastically. Check and rectify the problem.

7. Low Engine Oil Pressure Indicator:

When the ignition key is turned to the 'IGN' position, symbol lights up and goes off as soon as the required engine oil pressure is developed after starting the engine. If the low oil pressure indicator does not glow or remains 'ON' with the 'IGN' on and engine is running, it indicates a fault in the electrical circuit/lubrication system. Check & get the problem attended to at an authorized service station.

8. Low Fuel Indicator:

It comes on when fuel level is low and needs fuel refilling at the earliest. In case of any related fault, it blinks. Check and rectify the problem.

9. High Temperature Warning:

This indicator lights up when engine is hot, which may be due to insufficient coolant in the coolant tank or due to any other defect. Check and rectify the problem.

! CAUTION

- *Never remove the radiator pressure cap from the radiator when the engine is hot.*
- *Do not restart the engine until the problem has been duly attended.*

10. Water in fuel indicator:

This light comes "ON" when there is excess water in the fuel sedimenter. In this case it is recommended to take your vehicle to nearest service outlet or drain the water from the sedimenter yourself. Please refer to fuel filter and fuel system in maintenance section.

! CAUTION

If water is not drained from the sedimenter, it can cause serious damage to engine.

11. ABS Indicator:

ABS indicator light on in instrument cluster illuminates approx. for 3 to 5 sec. when the ignition key is turned to 'ON' position. This is normal and indicates the system is performing a

self check. If the light does not illuminate when ignition is 'ON' or remains illuminated after initial self check and while driving or flashes, fault may exist in the ABS system.

In this case also the normal braking system is still effective and can able to provide normal stopping ability.

In this condition it is recommended to taking your vehicle to the nearest Dealer / service outlet and get your vehicle attended as soon as possible if the warning light stays on.

12. Supplementary Restraint System (SRS) Indicator:

SRS indicator light on instrument cluster illuminates approx. for 3 sec. when the ignition key is turned to 'ON' position. This is normal and indicates the system is performing a self check. If the light does not illuminate when ignition is ON or remains illuminated after initial self check and while driving of flashes, fault may exist in the system, get the defect rectified by authorized service outlet.

13. Seat Belt Indicator:

Seat Belt warning Indicator initially flashes with Audio alarm for 6 secs. after completion of pre-check functionality (*Continuous On for 3 secs. @ every Ignition ON*) if seat belt is not fastened and lamp shall be made ON continuously with out Audio alarm until the vehicle Speed exceeds 16 km/h or Seat Belt is fastened.

When Vehicle Speed exceeds 16 km/h, the lamp will flash with Audio alarm for 6 secs., at the end of this first time period the lamp shall be made On continuously with out audio alarm for 24 seconds and later the same sequence (*6 seconds of flashing the lamp with Audio alarm and 24 seconds of Lamp ON continuously with out Audio alarm*) shall be repeated until Driver seat belt is fastened or Vehicle Speed reduced to 5 km/h.

14. Immobilizer Warning:

Immobilizer system disables engine starting, if original key is not used, for safety purpose. The user has to use "original key" only for authentication and unlocking the vehicle. Please refer to Immobilizer section for details.

- Lamp blink: Vehicle is in immobilized condition and when key is not inserted.
- Lamp Off: Normal condition (*Authenticated user*) and engine will start
- Lamp On: Problem with key / system. Please refer to nearest Authorized Service outlet.

15. Front Fog Indicator (Provision):

This symbol (Green coloured) lights up when the front fog lamps are switched 'ON'.

16. Rear Fog Lamp Indicator (Provision):

This symbol (Amber coloured) lights up when the rear fog lamps are switched 'ON'.

17. Door Open Warning:

Prior to driving ensure that all the doors are properly closed. If any one of the doors is partially open, the corresponding door open indicator will comes on.

In addition, in case any one of the door is not properly closed an audio beep will come continuously, when the key is inserted.

18. Transfer Mode:

With ignition 'ON' and transfer case switch in 2H mode both 4H and 4L indicator light on instrument panel should glow for a few seconds only and goes 'OFF'. Continuous illumination indicates an electrical fault. Do not run the vehicle if both 4H and 4L indicator are ON. The 4H or 4L indicator light will glow only when the transfer case is either in 4H or 4L mode.

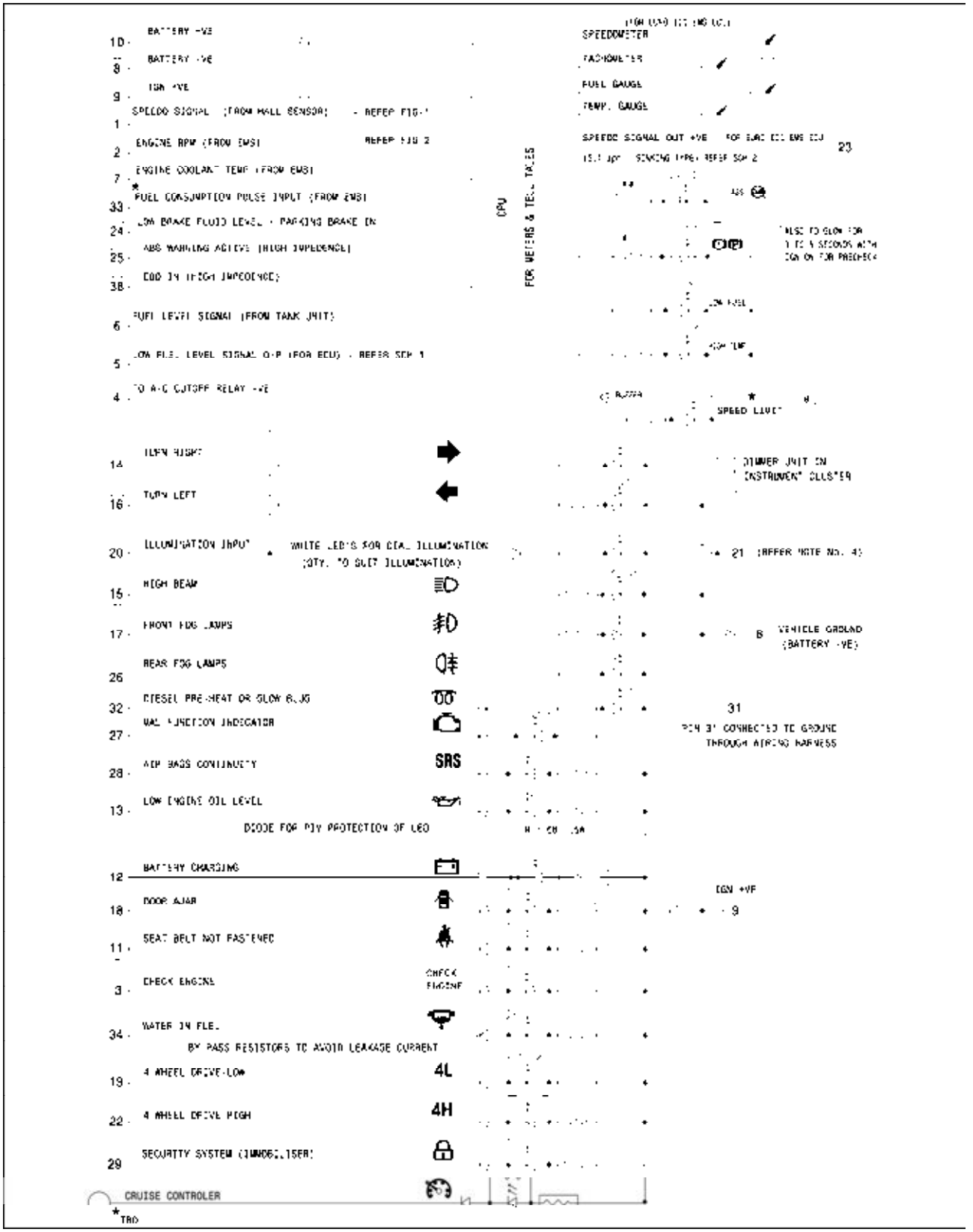
19. Check Engine Indicator:

This lamp turns 'ON' for 3 Secs. when key is turned to IGN position. The lamp goes 'OFF' after 3 secs. if the EMS (Engine Management System) is working properly.

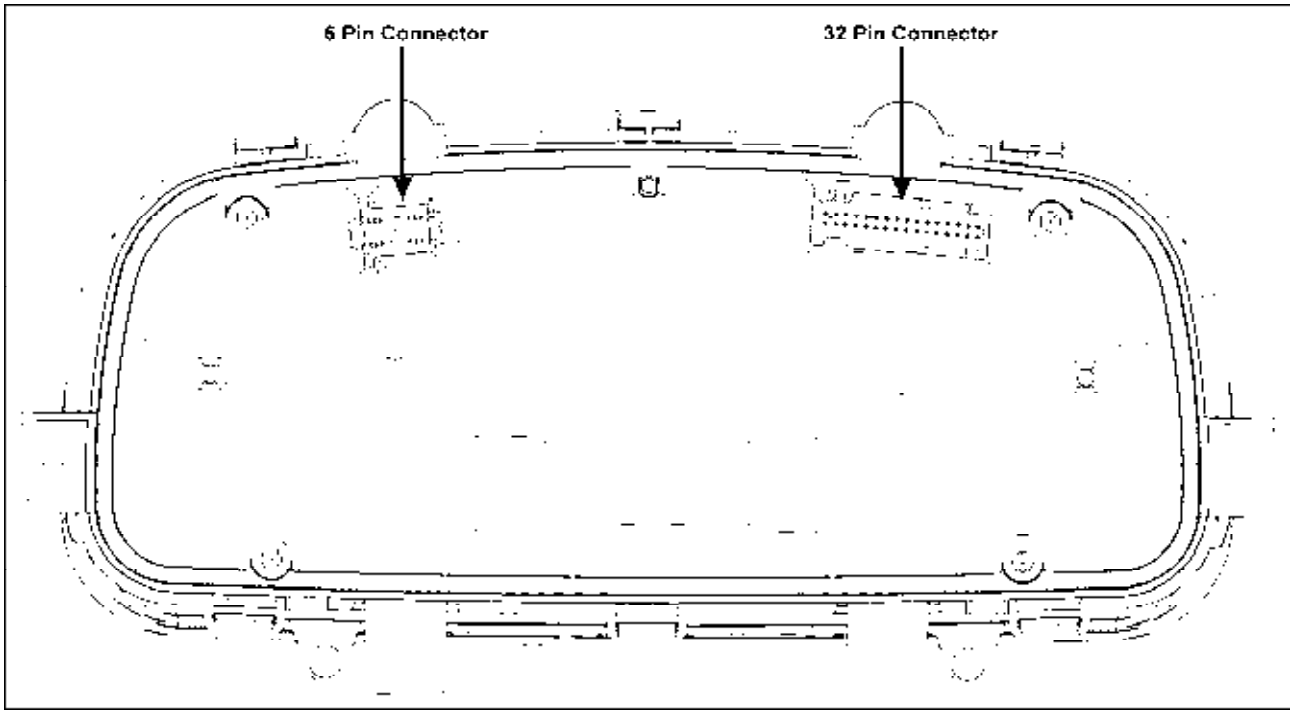
! CAUTION

When Check Engine Indicator stay 'ON' continuously even after 3 secs. after IGN is turned 'ON' or vehicle is in running condition get the problem attended immediately, at an authorized service provider.

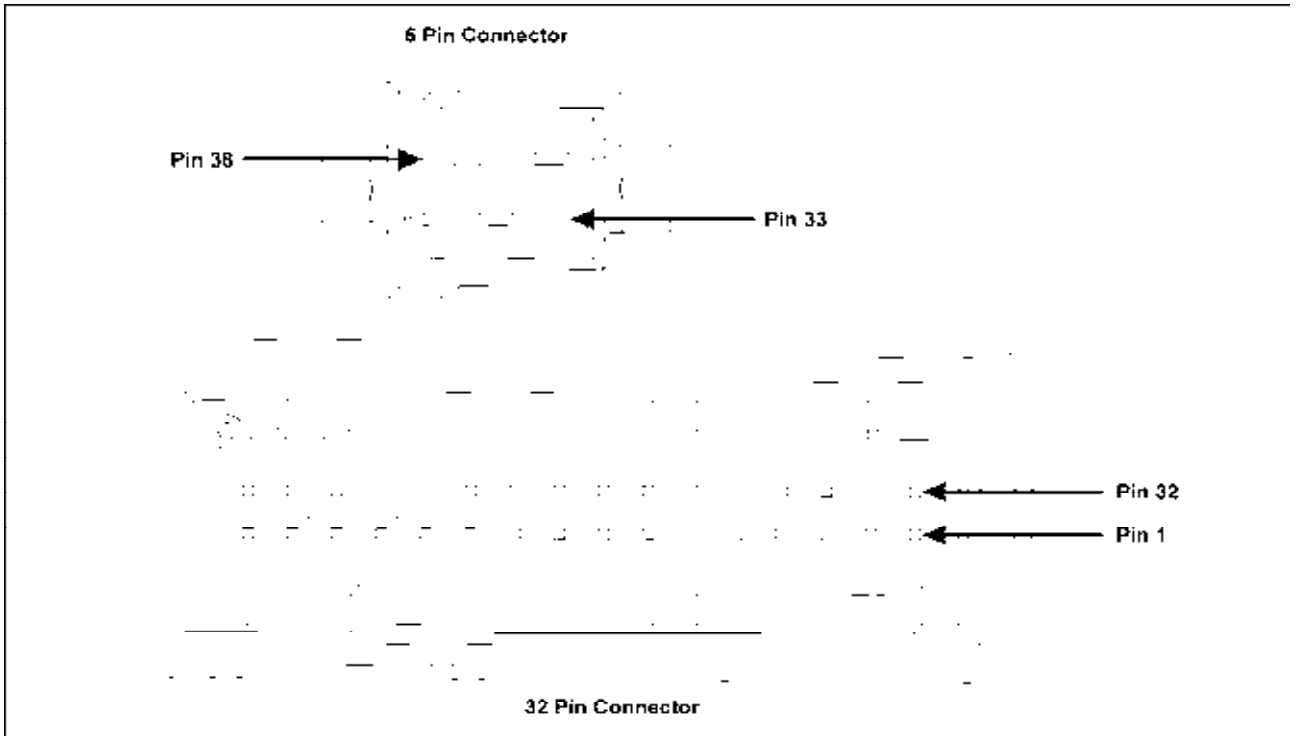
6. CONNECTION DETAILS:



7 CONNECTOR DETAILS:
A. Cluster rear side image:



B. Connector Details:



C.32 Pin Connector Pin-outs Details:

PIN NO.	SIGNAL NAME
1	Speedo signal
2	Engine RPM
3	Check Engine
4	To A/C Cutoff relay -ve
5	Low fuel level signal O/P (for ECU)
6	Fuel level signal (from tank unit)
7	Engine coolant temp. (from EMS)
8	Battery -ve
9	Ign +ve
10	Battery +ve
11	Seat belt warning
12	Battery charging
13	Low engine oil level
14	Turn Right
15	High Beam
16	Turn Left
17	Front Fog lamps
18	Door Open Warning
19	4L
20	Illumination I/P
21	A/C Panel Illumination
22	4H
23	Speedo signal out +ve
24	Low Brake fluid level / parking brake IN
25	ABS warning active (High Impedance)
26	Rear Fog lamps
27	MIL
28	Air bag continuity
29	Security system
30	NC
31	Ground
32	Diesel pre-heat

D. 6 Pin Connector Pin-outs Details:

PIN NO.	SIGNAL NAME
33	Fuel consumption pulse I/P from EMS
34	Water In fuel
35	NC
36	NC
37	NC
38	EBD IN (High Impedance)

8. ODOMETER AND TRIP METER:

The odometer records the total distance the car have been driven. The trip meter can be used to measure the distance traveled on each trip or between fuel fillings. Keep track of the odometer reading and follow the maintenance schedule regularly for meeting service requirements.

Odometer, Trip meter and Illumination intensity control on instrument panel (LCD) :

The instrument panel has an LCD to display the following:

Main Odometer (Non- resettable) - Counts up to 999999 kms

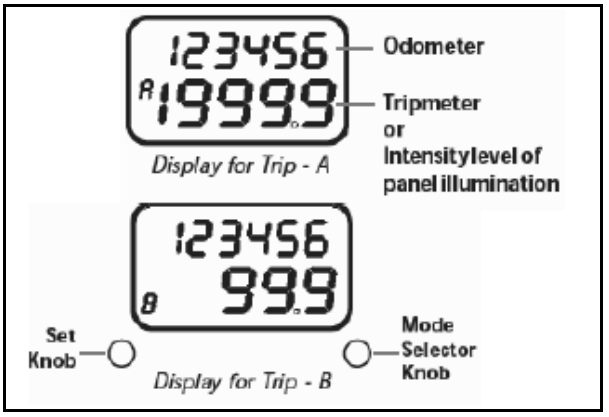
A. Trip meter A (Resettable) - Counts up to 1999.9 kms.

B. Trip meter B (Resettable) - Counts up to 1999.9 kms.

C. Intensity level of instrument panel illumination – selection among preset levels.

LCD has two line display. The first line displays the Odometer count. The second line displays either of Trip meter A, Trip meter B, Intensity level of panel illumination. The selection and control of functions are done through 'MODE' and 'SET' push buttons (knobs) provided on either side of the LCD.

The 'MODE' knob is used to select one of the Trip meter A, Trip meter B OR Intensity level of panel illumination. Switching among the above three functions can be done by pressing the knob.

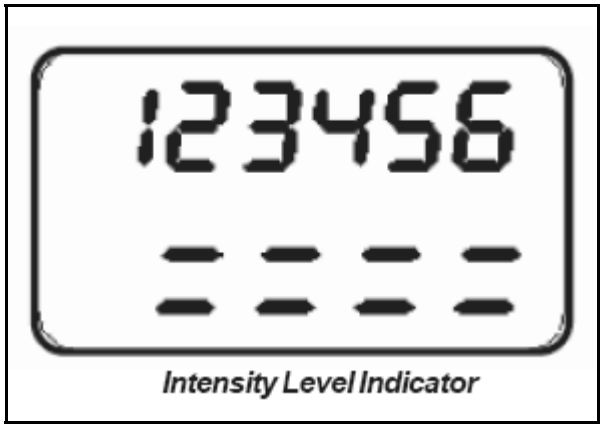


The 'SET' knob is used to control the chosen function. Pressing the knob for a few seconds resets the chosen trip meter and varies the intensity level of instrument panel illumination. The panel illumination intensity varies among preset levels as follows:

= Min

= = = = Max

This display returns to Trip meter A after a few seconds of intensity level selection, if left in this mode.



Intensity Level Indicator

NOTE:

Main odometer and trip meter *A indication will remain on display even if the ignition key is removed.*

9. SPEEDOMETER GAUGE DETAILS:

This indicates the instantaneous vehicle speed in km/h to the driver for permitting a safe drive.

The speedometer range is '0' km/h – '200' km/h.

10. TACHOMETER GAUGE DETAILS:

This indicates the instantaneous engine speed in revolutions per minute (rpm) to the driver for permitting an economical and safe drive. For better economy, drive the vehicle in the Green zone of the Tachometer. Avoid Driving in the Red zone of Tachometer to protect the engine from damages.

11. FUEL GAUGE DETAILS:

The fuel gauge indicates the approximate fuel level in the tank. Refill the fuel tank at the earliest, before the needle touches the red band on the gauge. At this point, only 5-7 litres of fuel is remaining in tank and it is advised to get fuel filled immediately.

.

12. TEMPERATURE GAUE DETAILS:

The gauge indicates the temperature of the engine coolant. The red zone at 'H' indicates temperature higher than the normal. Avoid driving, when the pointer is in the red zone. It indicates engine overheating, which may be due to insufficient coolant in the radiator or due to any other defect. At this stage take the car to the nearest Tata authorized Service outlet for necessary attention.

13. AUDIBLE WARNING:

SR. NO.	BUZZER ON CONDITIONS
1	Driver Seat Belt is not fastened (*refer Seat Belt warning strategy below*).
2	Key-in Ignition and Driver Door is opened.
3	Key taken out, Park lamp is ON and Driver Door is opened.

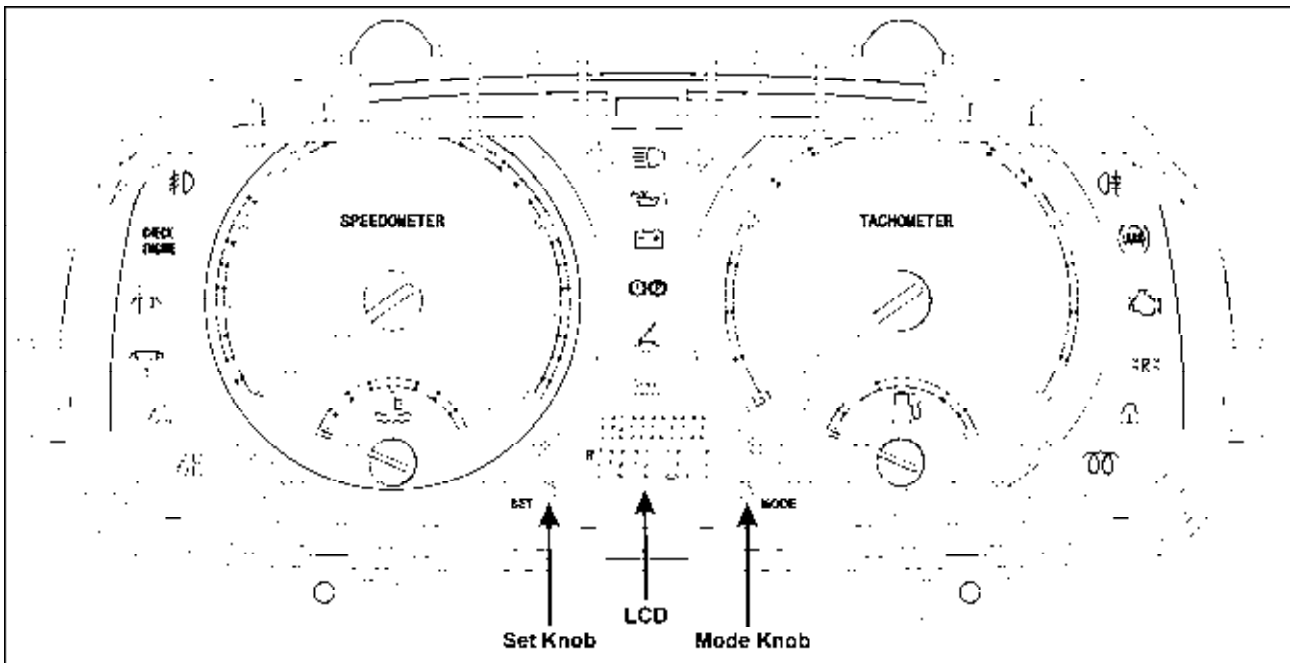
14. SEAT BELT WARNING STRATEGY:

Seat Belt warning Indicator initially flashes with Audio alarm for 6 secs. after completion of pre-check functionality (*Continuous On for 3 secs. @ every Ignition ON*) if seat belt is not fastened and lamp shall be made ON continuously with out Audio alarm until the vehicle Speed exceeds 16 km/h or Seat Belt is fastened.

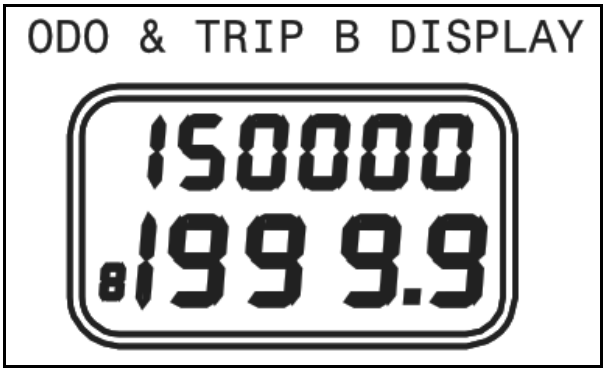
When Vehicle Speed exceeds 16 km/h, the lamp will flashes with Audio alarm for 6 secs., at the end of this first time period the lamp shall be made On continuously with out audio alarm for 24 seconds and later the same sequence (*6 seconds of flashing the lamp with Audio alarm and 24 seconds of Lamp ON continuously with out Audio alarm*) shall be repeated until Driver seat belt is fastened or Vehicle Speed reduced to 5 km/h

15. SWITCH FUNCTIONS:

15.1 Switches location:



15.2 Multifunctional LCD, Odometer, Dimmer and Trip meter (A and B), Digital clock, ambient temperature:



LCD has two line displays. The first line displays the Odometer count. The second line displays either of Trip meter A, Trip meter B, Dimmer and Intensity level of panel illumination.

The selection and control of functions are done through 'MODE' and 'SET' push buttons (knobs) provided on either side of the LCD.

The 'MODE' knob is used to select one of Trip meter A, Trip meter B, and Intensity level of panel illumination.

Odometer and Trip meter (on LCD):

The odometer record the total distance the vehicle has been driven. The trip meter can be used to measure the distance traveled on each trip or between fuel fillings. Keep track of the odometer reading and follow the maintenance schedule regularly for meeting service requirements.

NOTE: *Please note that each knob has to be pressed and released to change the function.*

Trip odometer count can be reset by pressing ‘SET’ knob for over 10 sec when display indicates Trip ‘A’ or Trip ‘B’.

SR.NO.	DISPLAY	WITH MODE KNOB PRESSED	WITH MODE SET PRESSED
1	Main Odometer	Display changes to Trip A	----------
2	Trip A	To change the display to trip B	Knob to reset trip A
3	Trip B	To change the display to Dimmer	Knob to reset trip B
4	Dimmer	To change the display to Ambient temperature	Adjust illumination brightness 25%,50%,75%,100%,75%,50%,25%
5	Clock	To change the display to trip A	To set the clock (hrs. and sec.)

LCD FEATURES:

A. Multifunction LCD

Colour: Black Text with background.

B. Trip meter (A and B)

Type: 7 Segments, indication by 4 digits and 1 decimal

Range: 0.0 to 1999.9

Resolution: 0.1 km or miles

Trip meter reading shall over flow to “0.0” after it crosses 1999.9 km.

Trip- A (as applicable)

Trip- B (as applicable)

Trip meter reset

Trip meter (A and B) can be reset by pressing the “SET” knob slightly longer when particular Trip meter is selected.

C. Dimmer for Cluster, LCD and Instrument panel illumination (as applicable)

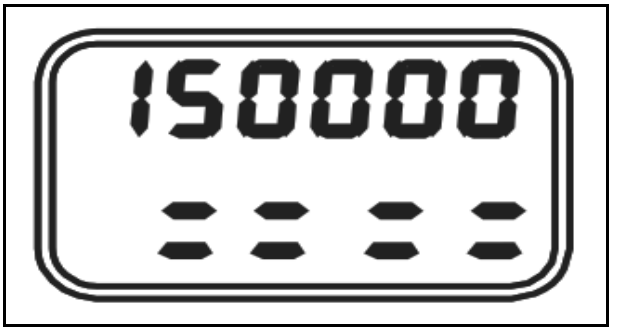
You can adjust the LCD brightness that is best suited to you and it is shown by the number of Dashes on the display,

A. 2 Dashes => 25 %

B. 4 Dashes => 50 %

C. 6 Dashes => 75 %

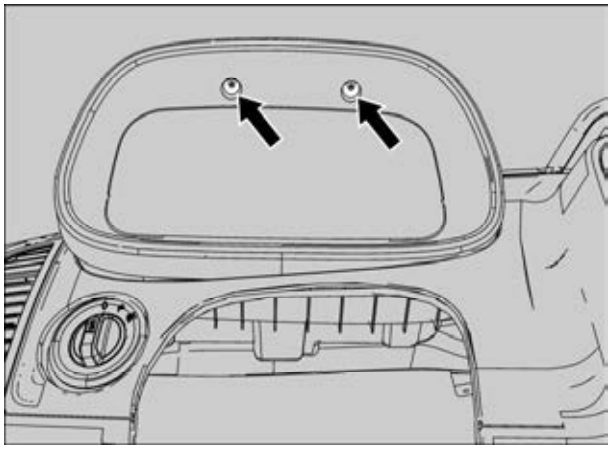
D. 8 Dashes => 100 %



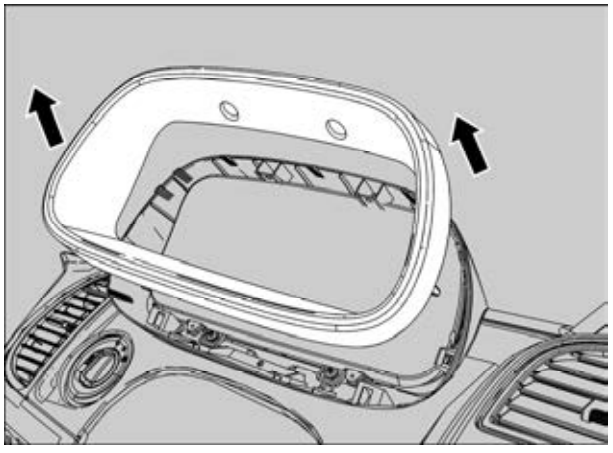
After selecting the dimming level, the display will show the next information (e.g. Main Odometer) after 20 secs. To see the next information earlier press the “MODE” knob.

16. REMOVAL OF INSTRUMENT CLUSTER:

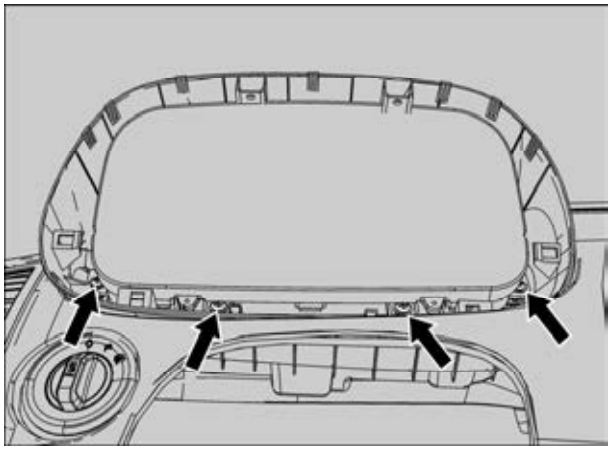
1. Remove two mounting screws of Instrument cluster finisher.



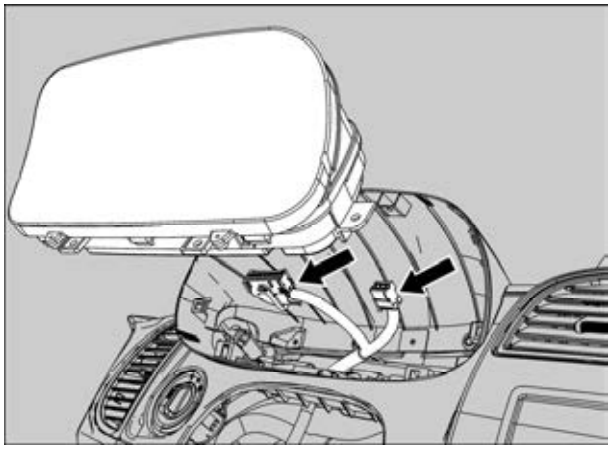
2. Carefully pry out the instrument cluster finisher.



2. Remove four mounting screws of Instrument cluster.



3. Disconnect the electrical connection of Instrument cluster.



4. Take out the cluster.

REFITMENT:

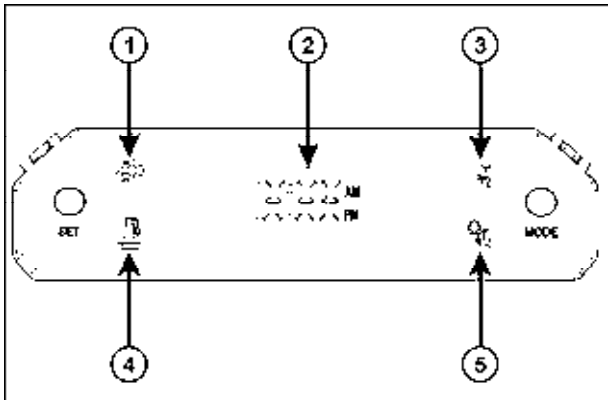
1. Connect the electrical connection of instrument cluster.
2. Tighten the four mounting screws of instrument cluster.

   Tightening torque of screws – 0.60 Kgfm
3. Fit the instrument cluster finisher with to mounting screw.

   Tightening torque of screws – 0.30 Kgfm

17. DIS DETAILS:

This unit is mounted on dashboard above the instrument cluster.



1. DPF FULL Indicator:

This symbol indicates that the diesel particulate filter is full and requires regeneration manually. When ignition is turned “ON”, this symbol comes “ON” and goes “OFF”. If the symbol remains “ON”, you have to regenerate the DPF manually.

2. DIGTAL CLOCK:

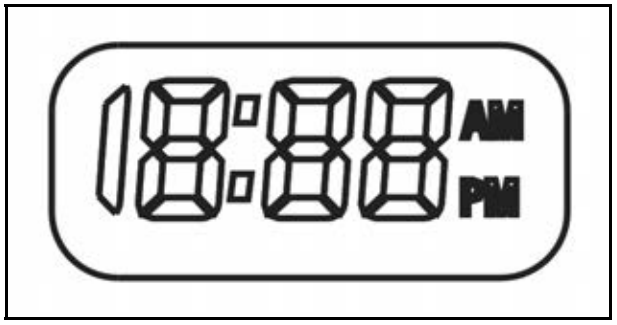
Digital clock is display in the center of DIS system. It will turn 'ON' with ignition ‘ON’

Type: 7 segments, 4 digits

Range: 00:00 hrs.

Resolution: 24 hours clock

This feature has 24 hour display format, which can be user selected through "MODE" an "SET" knobs provided.



Digital Clock

Procedure for digital clock setting:

1. The clock can be set using both the ‘SET’ and ‘MODE’ keys.
2. Pressing the ‘SET’ knob for 5 secs. will cause the displayed time to flash i.e. clock setting mode.
3. At entry into clock setting mode, Hours digit will flash first.
4. While the Hours data is flashing, pressing and releasing the SET key will toggle between minutes and hours.
5. While the numbers flashing, pressing the MODE key will advance the displayed number.
6. While the numbers are flashing, if no keys are pressed for 5 secs. Then the current value displayed are stored and the display stops flashing.

3. Passenger Airbag indicator:

This symbol lights up when the PAB switch is 'ON' or passenger Airbag activated.

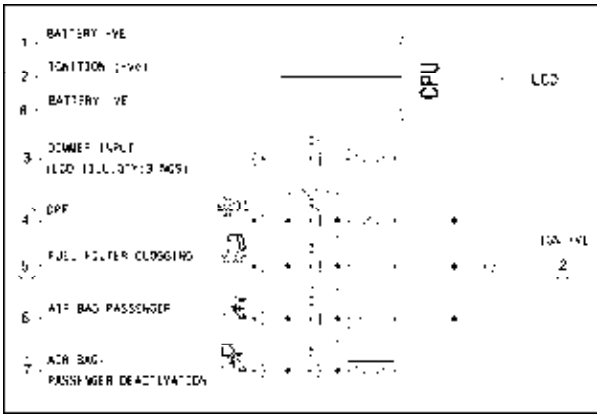
4. Fuel filter clogging indicator:

This symbol lights up when fuel filter clogs.

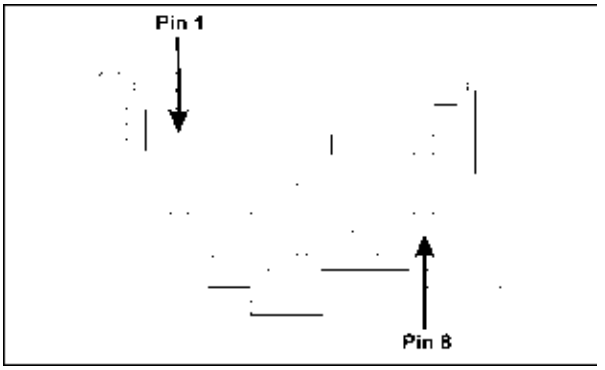
5. Passenger Airbag deactivation indicator :

This lamp comes ‘ON’ for 3 secs. when key is turn to IGN position there after it will be ‘OFF’ for 2 secs. it will again turn ‘ON’ if PAB switch is in ‘OFF’ position i.e. Passenger Airbag is deactivated.

A.DIS Connection details :



B.DIS Connector details:

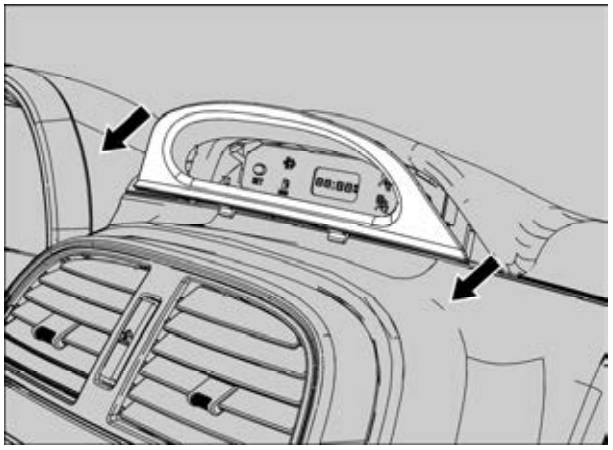


C.DIS Pin Out details:

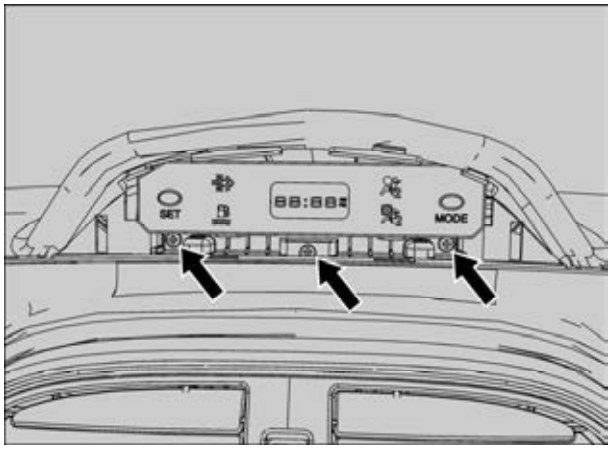
PIN NO.	SIGNAL NAME
1	Battery +Ve
2	Ignition +Ve
3	Dimmer I/P
4	DPF
5	Fuel filter clogging
6	Air bag passenger
7	Air bag passenger deactivation
8	Battery -Ve

18. REMOVAL OF DRIVER INFORMATION SYSTEM:

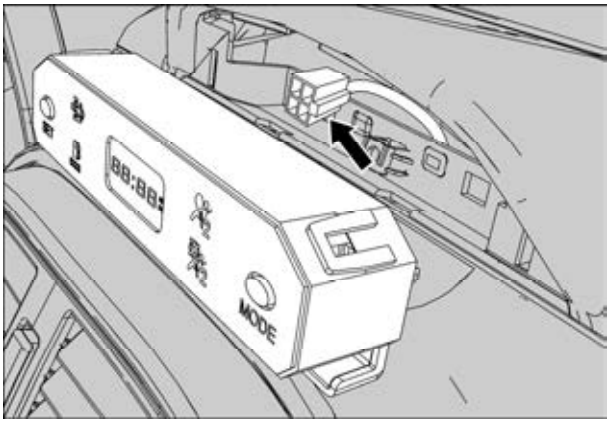
1. Carefully pry out the Driver information system finisher.



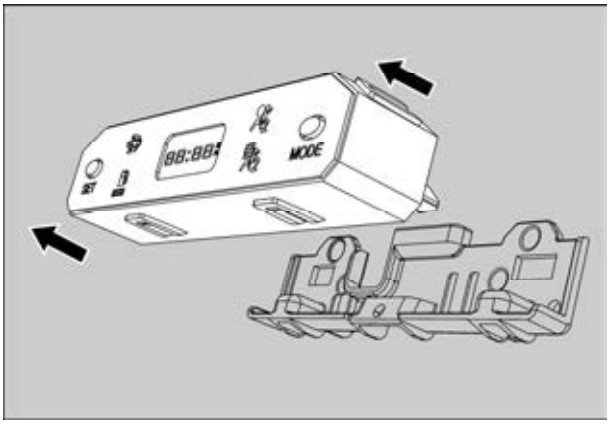
2. Remove three mounting screws of Driver information system.



3. Disconnect the electrical connection of Driver information system



4. Pry out the Driver information system from the DIS adapter.



5. Take out the Driver information system.

REFITMENT:

1. Fit the Driver information system in DIS adaptor (*Snap fitted*).
2. Connect the electrical connection of Driver information system.
3. Tighten the three mounting screws of Driver information system.

   Tightening torque of screws – 0.50 Kgfm

3. Fit the Driver information system finisher (*Snap fitted*).

11 SWITCHES

11.1 COMBINATION – SWITCH

FUNCTIONS:

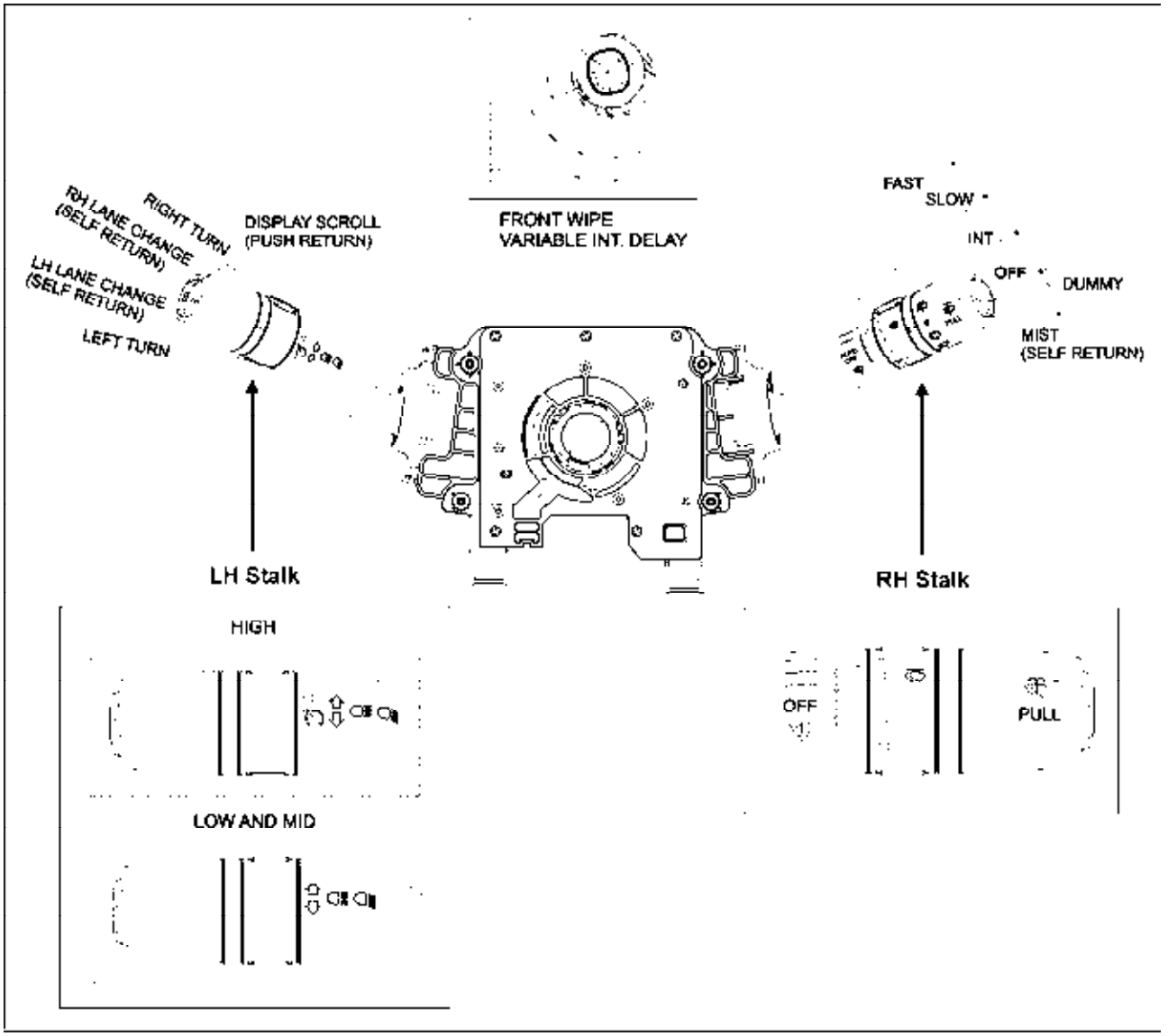
LEFT SIDE COMBI-STALK:

- Direction indicator LH and RH with lane change feature.
- *Dip (low) and Main (High*) *beam*) and passing (*Flash*)

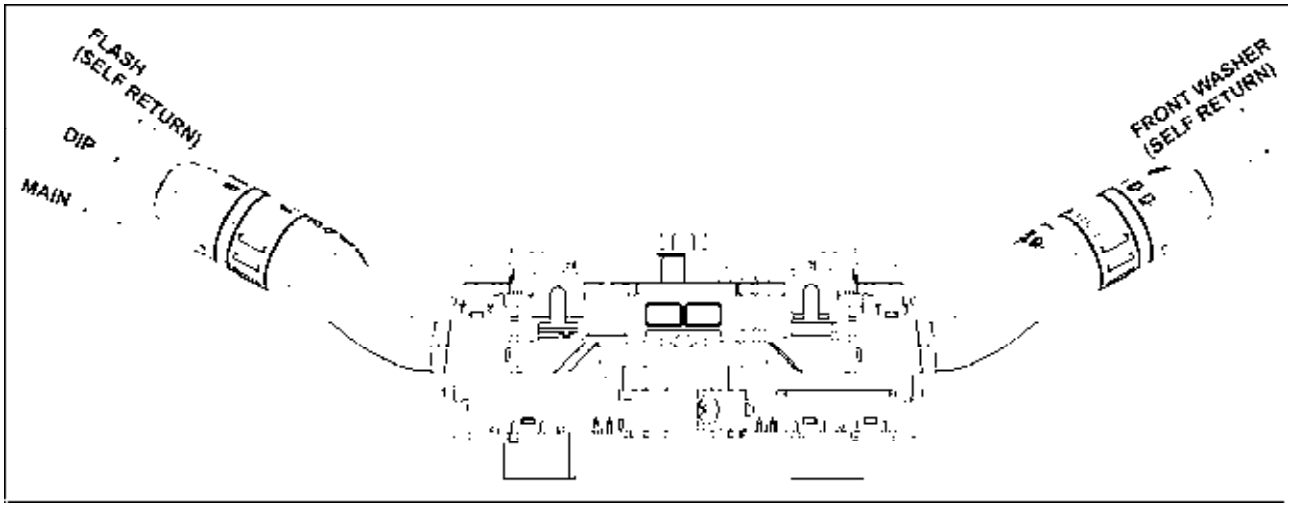
RIGHT SIDE COMBI-STALK: (*Refer BCM Section*)

- Front Wiper and Washer Controls

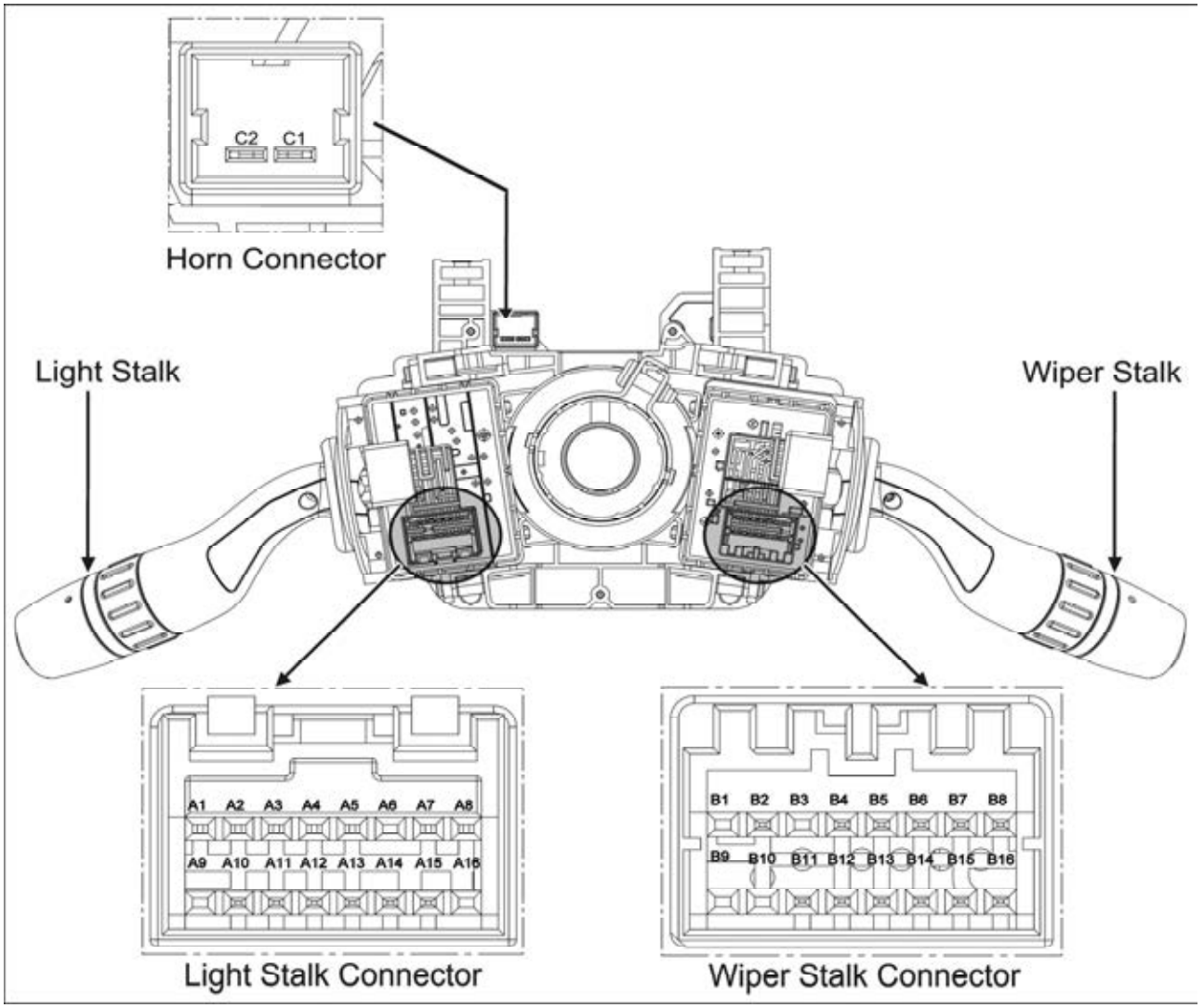
OPERATIONAL DETAILS:



HEAD LIGHT AND FLICK WASH OPERATION:



CONNECTOR DETAILS:

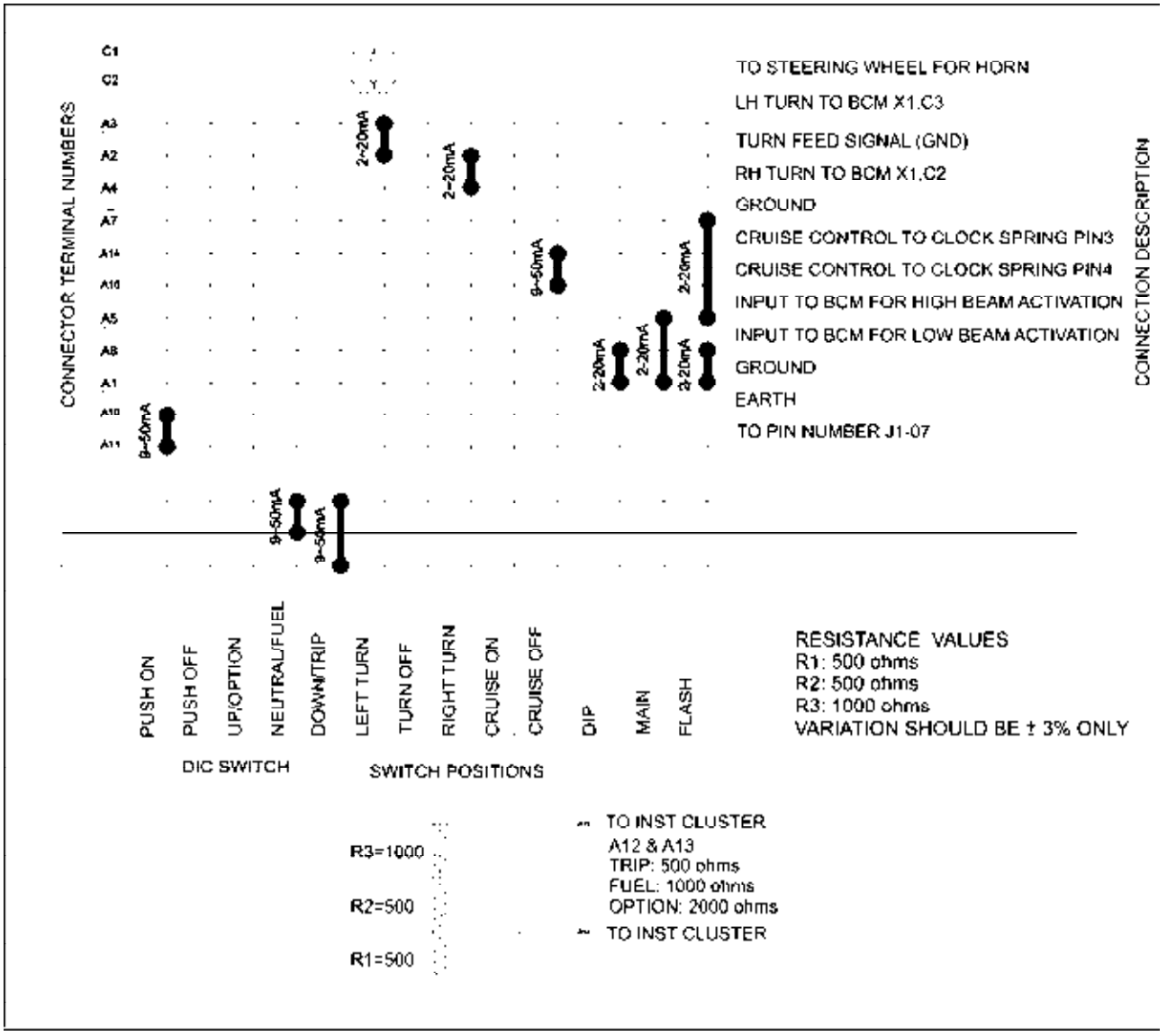


PINOUT DETAILS:

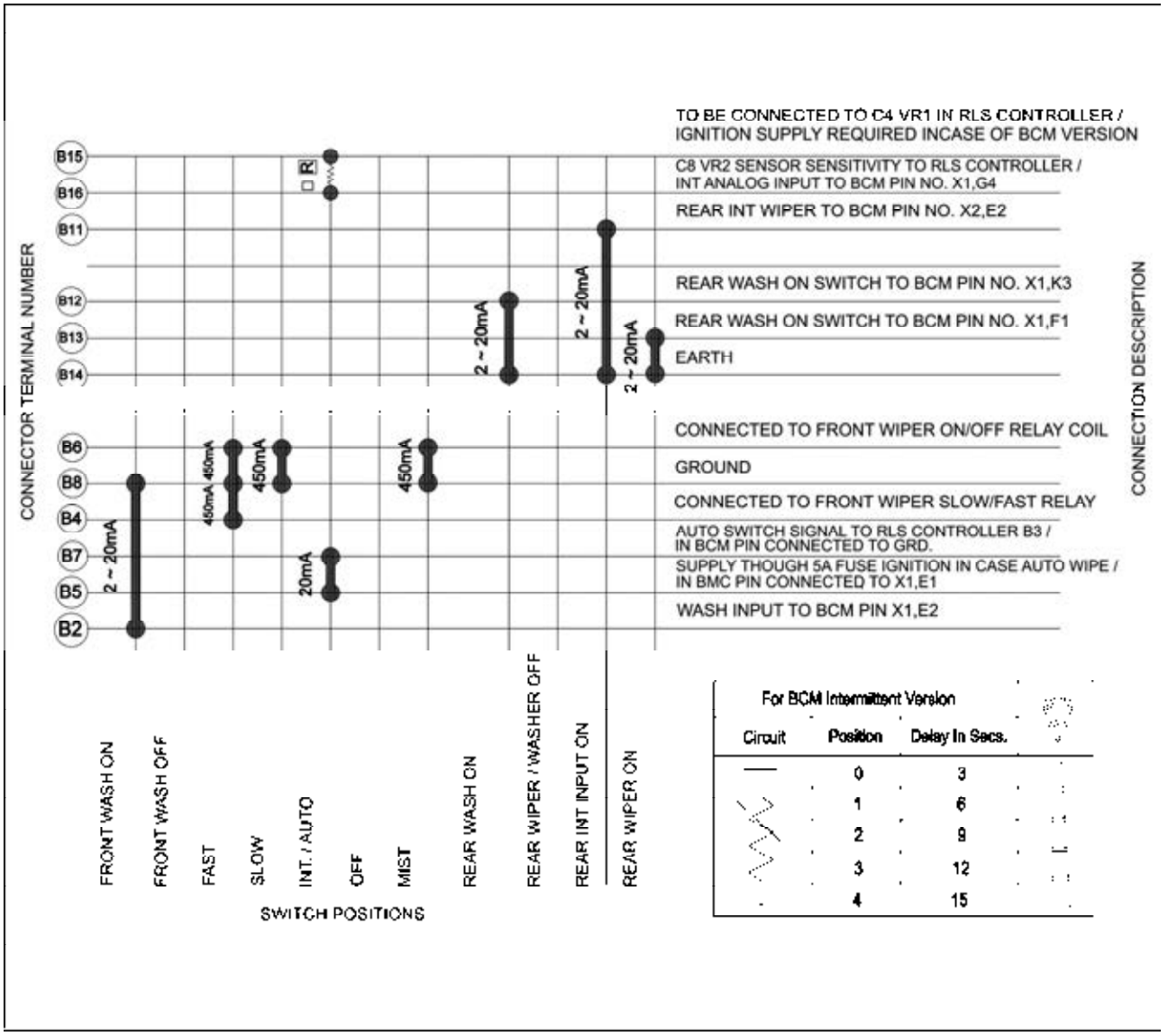
WIPER STALK CONNECTOR		**LIGHT STALK CONNECTOR**	
PIN NO	**DESCRIPTION**	**PIN NO**	**DESCRIPTION**
B1	Blank	A1	Ground
B2	Front wash ON	A2	Turn Feed Signal (GND)
B3	Blank	A3	LH Turn (TO BCM)
B4	Fast (To slow / Fast relay)	A4	RH Turn (TO BCM)
B5	INT / Auto switch signal (To front wiper ON/OFF relay)	A5	High Beam (Input to BCM)
B6	Mist (To front wiper ON/OFF relay)	A6	Blank
B7	INT / Auto switch signal (To RLS controller B3)	A7	Ground
B8	GND	A8	Low beam (Input to BCM)
B9	Blank	A9	Blank
B10	Blank	A10	Push On (EARTH)
B11	Rear INT (To BCM pin no. X2,E2)	A11	Push On (To pin no J1-07)
B12	Rear Wash ON (To BCM pin no. X1,K3)	A12	DIC Switch-1 (To inst.cluster)
B13	Rear Wiper ON (To BCM pin no. X1,F1)	A13	DIC Switch-2 (To inst.cluster)
B14	Earth	A14	Cruise control (To clock spring Pin 3)
B15	INT (To C4 VR1 in RLS controller)	A15	Cruise control (To clock spring Pin 4)
B16	INT (C8 VR2 sensor sensitivity to RLS controller)	A16	Blank
HORN CONNECTOR			
C1	To steering wheel for horn *(+ve*)	C2	To steering wheel for horn (*-ve*)

CONNECTION DETAILS:

LIGHTING CIRCUIT:

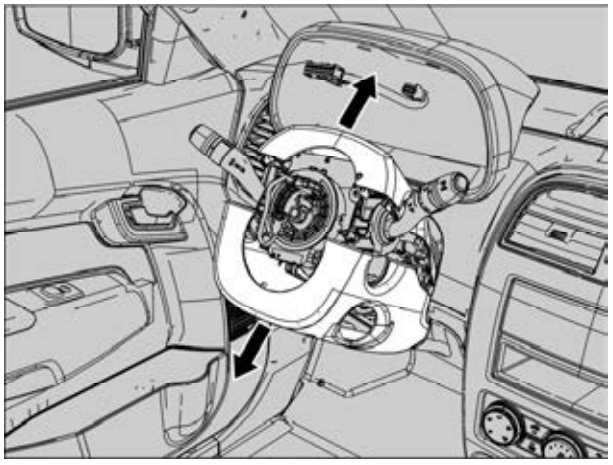


WIPER CIRCUIT:

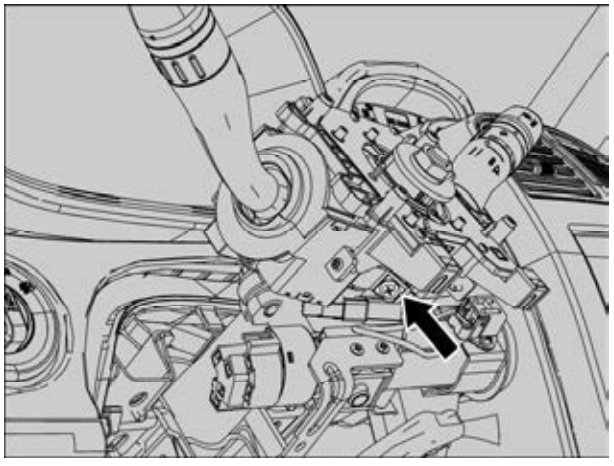


REMOVAL:

1. Remove the steering wheel (*For procedure refer steering section*).
2. Loosen three fixing screws of assy nacelle lower and assy nacelle upper, located in bottom side of assy nacelle lower.
3. Dismantle both nacelle from snap fitting and take out the both nacelle.



4. Disconnect the all connectors of combi-switch, and clock spring.
5. Remove the clock spring (*if fitted*) (For *procedures refer SRS section*).
6. Loosen one mounting screw of combi-switch and pull out the combi-switch assembly.

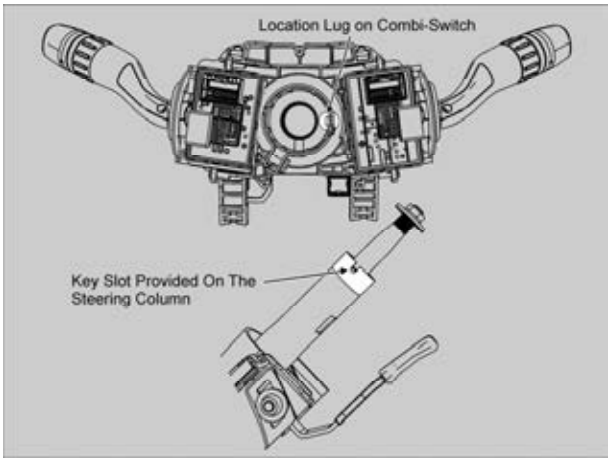


INSPECTION:

1. Disconnect the combi. Switch connectors.
2. Using multimeter, check the continuity or resistance values between the terminals according to switch position. If continuity not found, replace the switch.

REFITMENT:

1. Insert the combi-switch assembly into the steering column and aligned the location lug with the key slot provided on steering column.



2. Tighten the one mounting screw of combi-switch

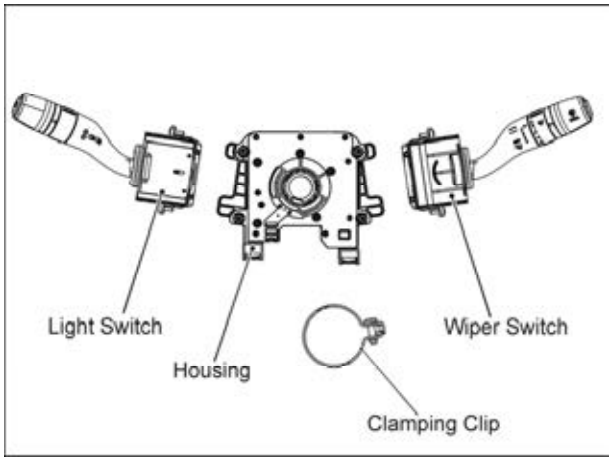
   Tightening torque for the screw – 0.18 Kgfm.

NOTE:

- *There should not be any lateral movement.*
- *There should not be any damage or deformation observed on the combi switch housing and the mounting screw.*

3. Fit the clock spring (*If fitted*) (*For procedure refer SRS section*).
4. Connect all the connectors of combi-switch, and clock spring.
5. Snap fit the assy lower nacelle and assy upper nacelle, and fit the three mounting screws in the assy nacelle lower.
6. Fit the steering wheel properly. (*For procedure refer steering section*).

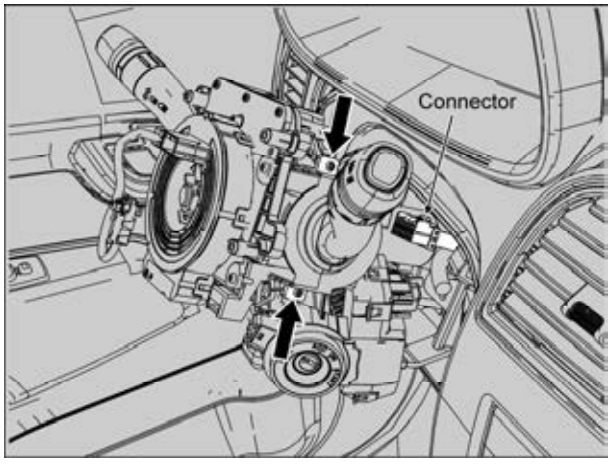
COMBI SWITCH CHILD PARTS:



STALK REPLACEMENT:

REMOVAL:

1. Remove the both assy nacelle upper and lower.
2. Disconnect the wiring harness connector from the combi-switch stalk.
3. Remove two mounting screws of light control lever as shown in below given figure.



4. Take out the defective stalk.

REFITMENT:

1. Align the new stalk in the combi-switch housing.
2. Fit the two mounting screws.

   Tightening torque for screws – 0.06 Kgfm.
3. Connect the electrical connection to the switch.
4. Snap fit the assy lower nacelle and assy upper nacelle, and tighten the three mounting screws in the assy nacelle lower.

11.2 STEERING LOCK CUM IGNITION SWITCH

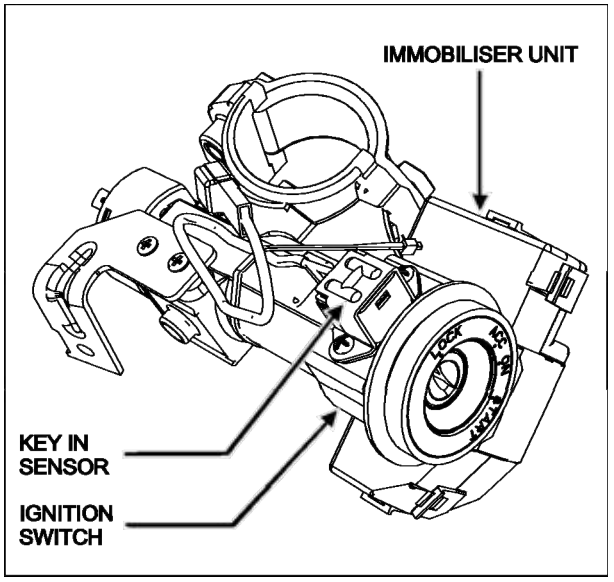
(Ignition Switch with Immobilizer can version plus key ring illumination)

SWITCH FUNCTION: It has four Functions.

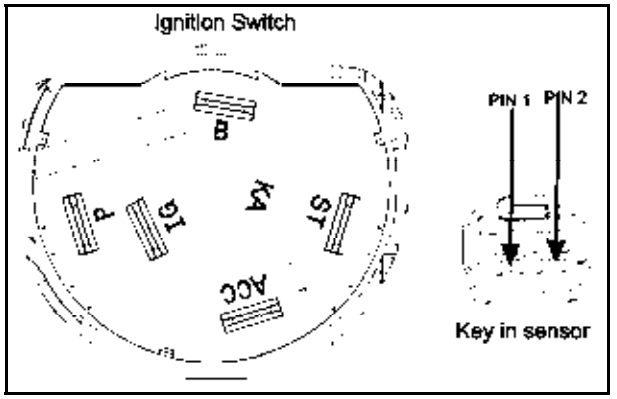
- LOCK - Steering Locked
- ACC - All electrically Accessories 'ON'.
- ON – IGNITION ON, RUN STATE
- START - Engine Crank

IMMOBILIZER FUNCTION: (*For Details refer Immobilizer section*)

KEY IN SENSOR: Give signal regarding the Key Status.



CONNECTOR DETAILS:



PINOUT DETAILS:

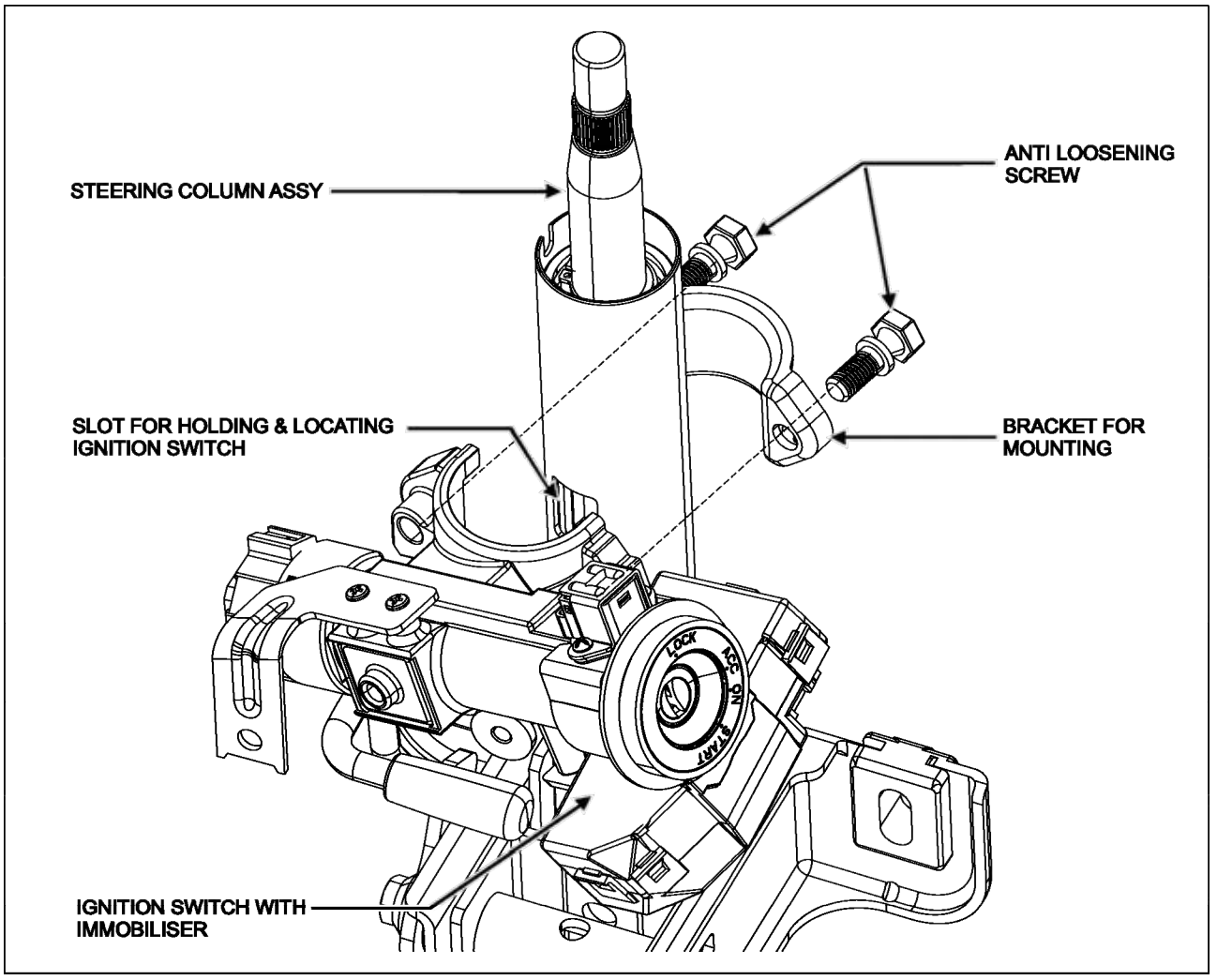
PIN NO	DESCRIPTION
Ignition Switch	
KA	Key in Sensor
B	Battery
ACC	Accessories
IG	Ignition ON
ST	Start
P	Parking
Key In SENSOR	
PIN 1	Supply
Pin 2	Signal

CONNECTION DETAILS:

		POSITION				
		KEY OUT	KEY IN			
		LOCK	LOCK	ACC	ON	START
TERMINALS	KEY IN SENSOR	•	•	•	•	•
	BATTERY (B)	•	•	•	•	•
	ACCESSORIES (ACC)			•	•	
	ON (IG)				•	•
	START (ST)					•
	PARKING (P)	•	•			
KEY ROTATION FORWARD		L	L	F	F	F
KEY ROTATION BACKWARD		L	F	F	F	F

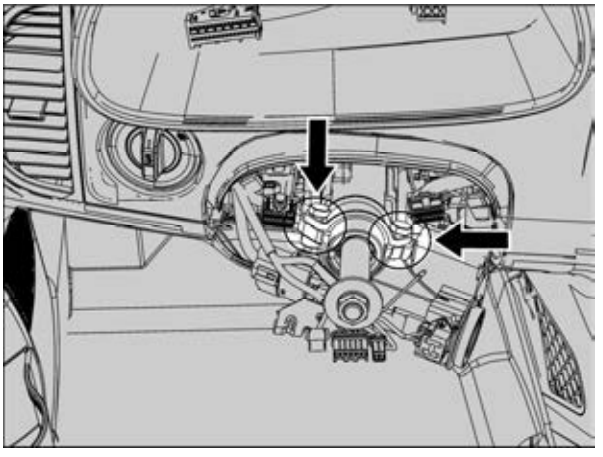
L - STEERING LOCK, F - STEERING FREE

FITMENT DETAILS:



REMOVAL:

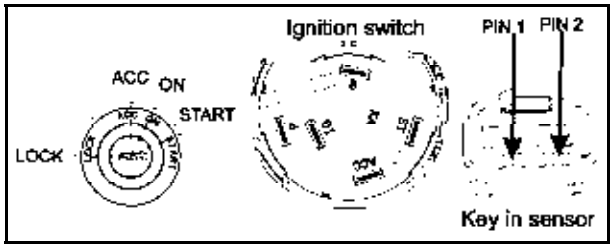
1. Remove the combi-switch. (*Refer combi switch section*).
2. Disconnect the electrical connection of ignition Switch, immobilizer unit and key-in sensor.
3. Break heads of two mounting bolts (*self breaking type screws*) with the help of chisel.



4. Take out the assembly from its locating latch.

INSPECTION:

Inspect the switch continuity.



TERMINAL	SWITCH POSITION	SPECIFIED CONDITION
(B) - (P)	LOCK	CONTINUITY
(B) - ACC	ACC	CONTINUITY
(B) - ACC - IG	ON	CONTINUITY
(B) - ACC - IG - ST	START	CONTINUITY
ALL POSITION	KEY IN SENSOR	CONTINUITY

If result is not as per specified, then replace the switch assembly.

REFITMENT:

1. Disassemble the mounting bracket of new ignition switch.
2. Locate the ignition switch to steering column cutout with latch lock. (*Refer fitment details image)*.
3. Tighten the ignition switch to steering column with the two self breaking screws.

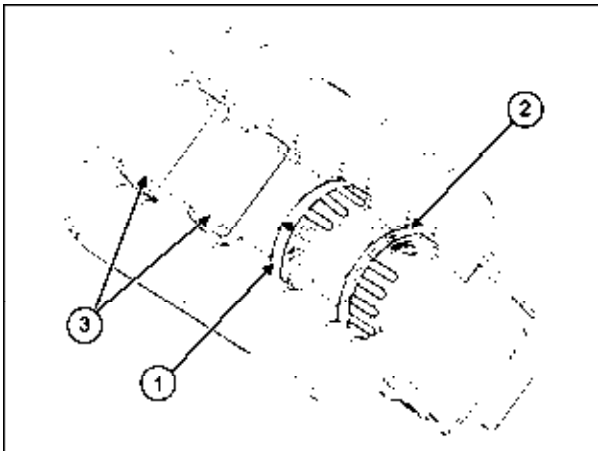
   Tightening Torque for screws – 1.3-1.5 Kgfm

NOTE:

There should not be any rotary movement of the lock on column when fully tightened as specified

4. Connect the electrical connection of ignition Switch, immobilizer unit & key in sensor.
5. Fit the combi switch assembly.

11.3 FACIA SWITCHES



FUNCTIONS:

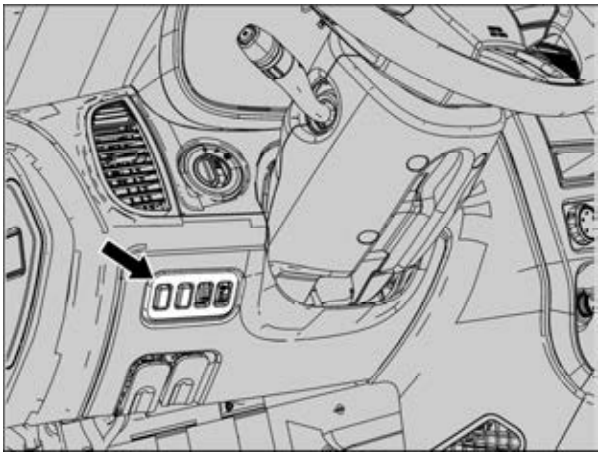
1 – Transfer Case (4X4) Switch

2 – Head Lamp Leveling Switch

3 – Dummy Knobs

LOCATION:

It is fitted on the dashboard to left of steering wheel.

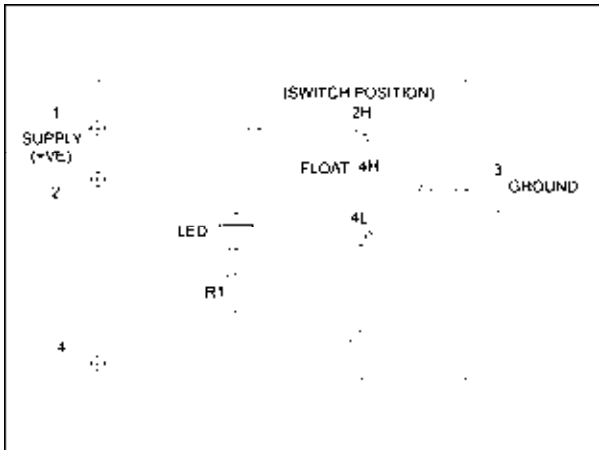


It consists of Transfer case switch and Head lamp leveling switch.

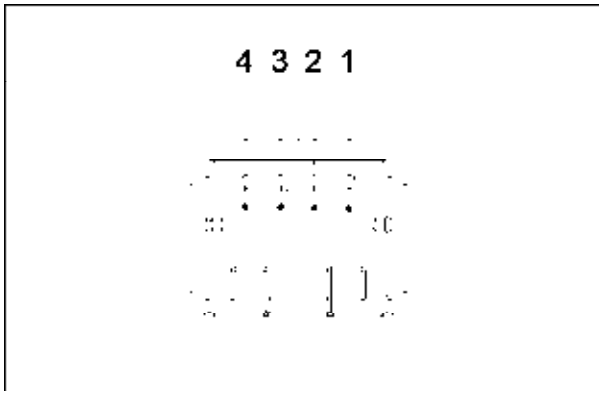
11.3.1 Transfer Case (4X4) Switch –

Transfer case switch allows the driver to electrically shift the vehicle driving mode from 4x2 or 4x4H or 4x4L.

Connection Details:



Connector Details:



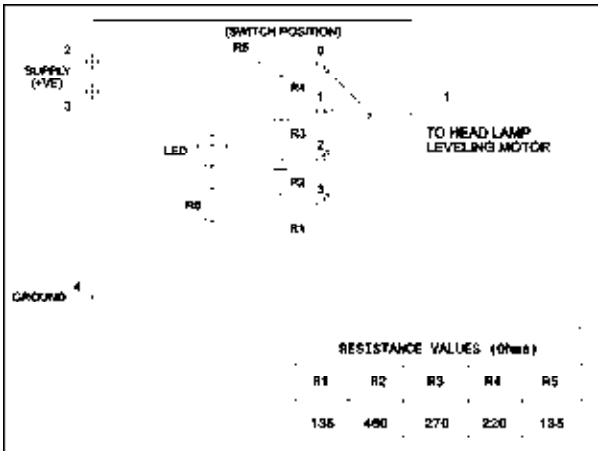
Pin out Details

Pin No.	Description
1	2H
2	Led Input
3	Ground
4	4L

11.3.2 Head Lamp Leveling Switch –

Head lamp leveling switch is used for adjusting the level of head lamp.

Connection Details:

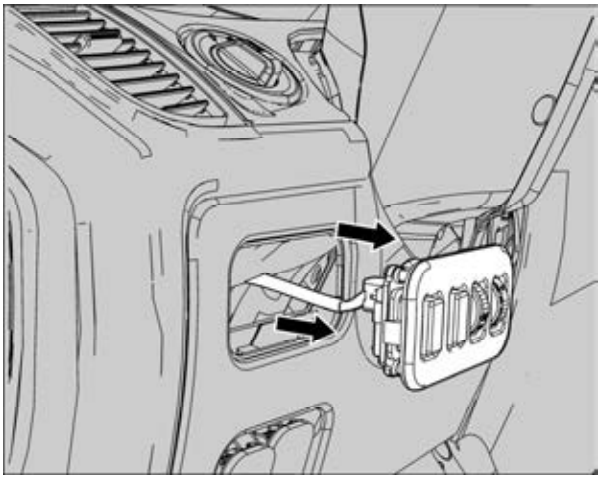


Connector Details:

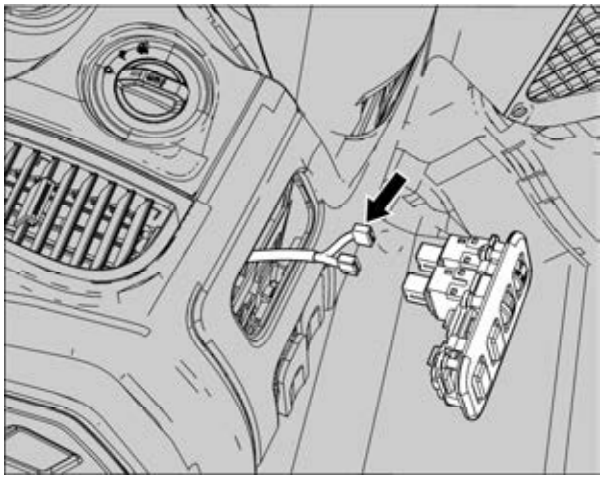
Pin No.	Description
1	Signal to HLL motor
2	VCC
3	+Ve for illumination
4	Ground

REMOVAL OF FACIA SWITCH:

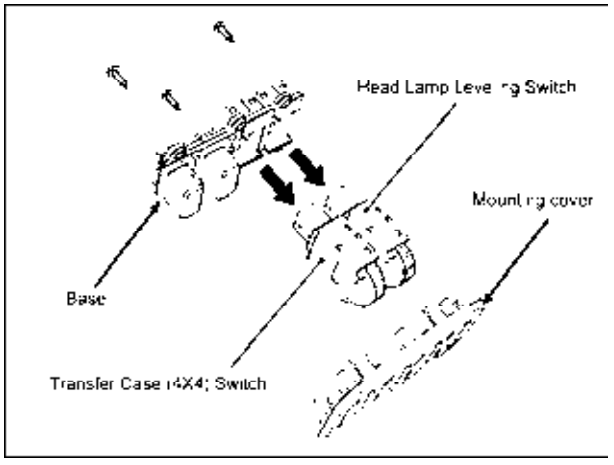
1 Carefully pry out the master light switch along with connection.



2 Disconnect the electrical connections of 4X4 switch and head lamp leveling switch.



3 Remove the three mounting screws. Pry out the HLL switch and 4X4 switch from base cover.



RE-FITMENT:

1 Carefully fix the switch tightly to base cover and assemble the facia switch.

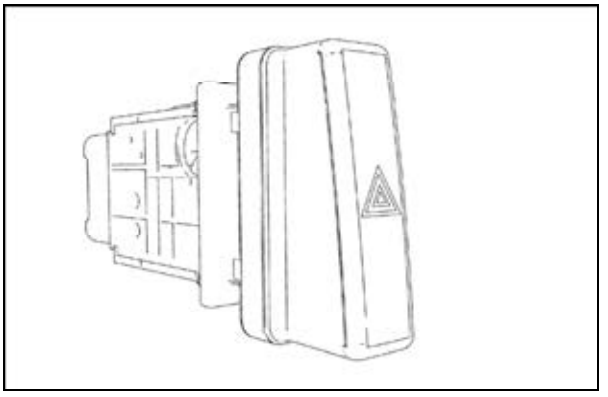
2 Connect the electrical connection.

3 Locate the facia switch into the cutout provided on dashboard and insert it tight.

11.4 HAZARD WARNING SWITCH

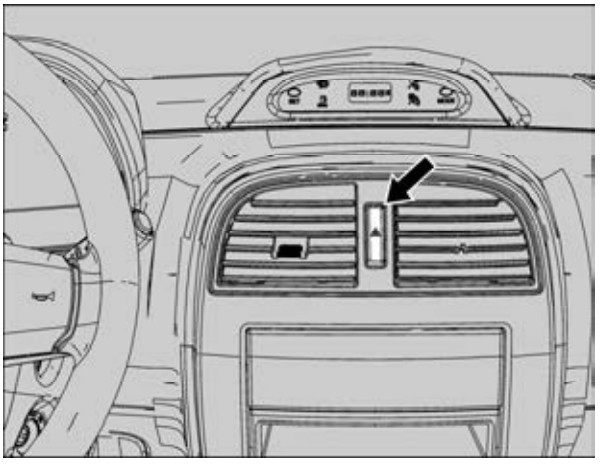
FUNCTION:

Hazard warning is used in case of breakdown especially during night and the car has to be parked at the side of the road. This switch can also be used when the car is operated in adverse conditions. This switch can be operated without Ignition ON.



LOCATION:

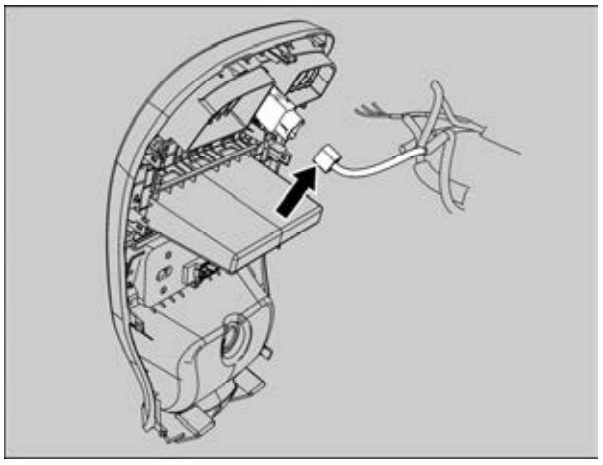
It is fitted on the Centre finisher.



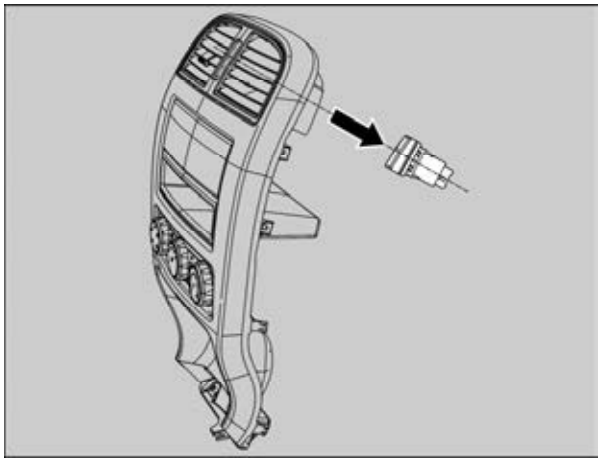
REMOVAL:

1. Remove Center console assembly (Refer *body section*).

2. Disconnect the electrical connection of hazard warning switch.

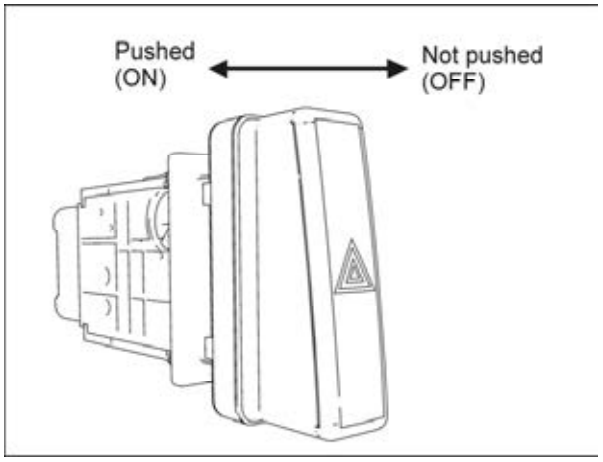


3. Pry out the Hazard warning switch from centre console.



INSPECTION:

Test the switch with a multimeter. Clip the probe of the multimeter to switch terminal & body ground and check the continuity.



CONDITION	SPECIFIED
Not Pushed(OFF)	No continuity
Pushed(ON)	Continuity

If not as per specified condition, then replace the switch.

REFITMENT

1. Locate & fit (*snap fit*) the switch in the cutout of centre console.
2. Connect the electrical connection of the hazard warning switch.
3. Fit the Center console assembly (Refer *body section*).

11.5 WINDOW WINDING SWITCHES

FUCTION:

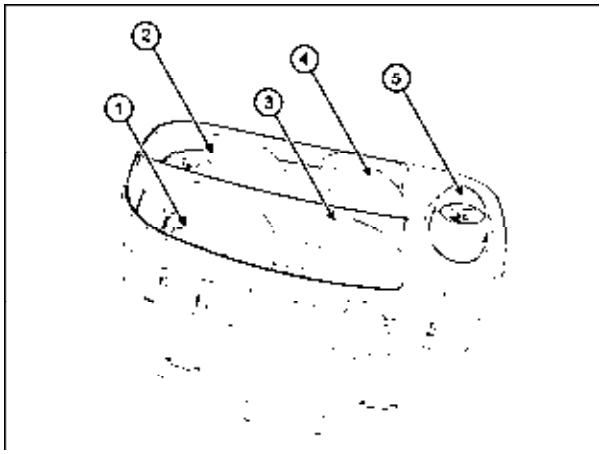
Window winding switches are used to move the window glasses UP & Down. It gives the signal to window winding controller. Then window winding Controller sense the signal from low current switches and operate the window motor according to switch position (*Auto Up / Auto Down*).

The set of switches to control the windows is located on floor console beside gear so that apart from driver, co-driver and passengers sitting behind can also operate all the windows. Switches are used only tc provide a mode signal to controller. For further operation, motor current does not pass through the switch.

Door window winding switch consist of following switches:

a) Window winding switches for all doors

b) Inhibit switch



1 – Front LH door window

2 – Front RH door window

3 – Rear LH door window

4 – Rear RH door window

5 - Inhibit switch

WINDOW WINDING SWITCHES:

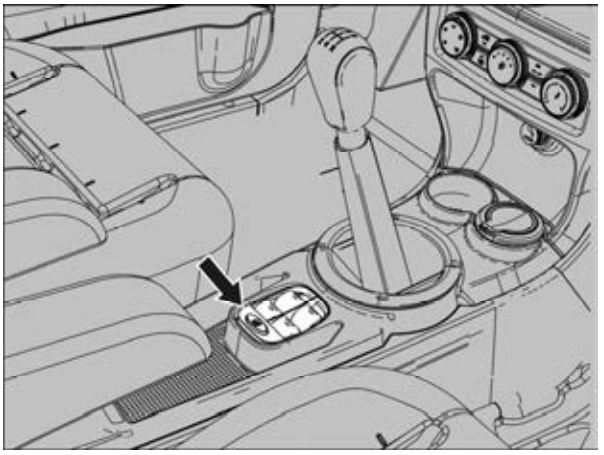
The window winding switch has two positions:

- Express Down (*ED*)
- Express Up (*EU*)

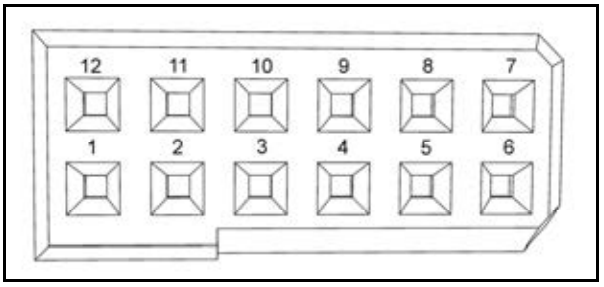
CHILD / WINDOW LOCK SWITCH:

In switch circuit, driver has an option to disable the rear switches by locking the window lock switch. The rear power window operation is disabled when the window lock switch of the power window master switch is pressed (*LED OFF*). The rear power windows operation is enabled when the window lock switch is pressed again (*LED ON*).

LOCATION: This is located on floor console beside gear.



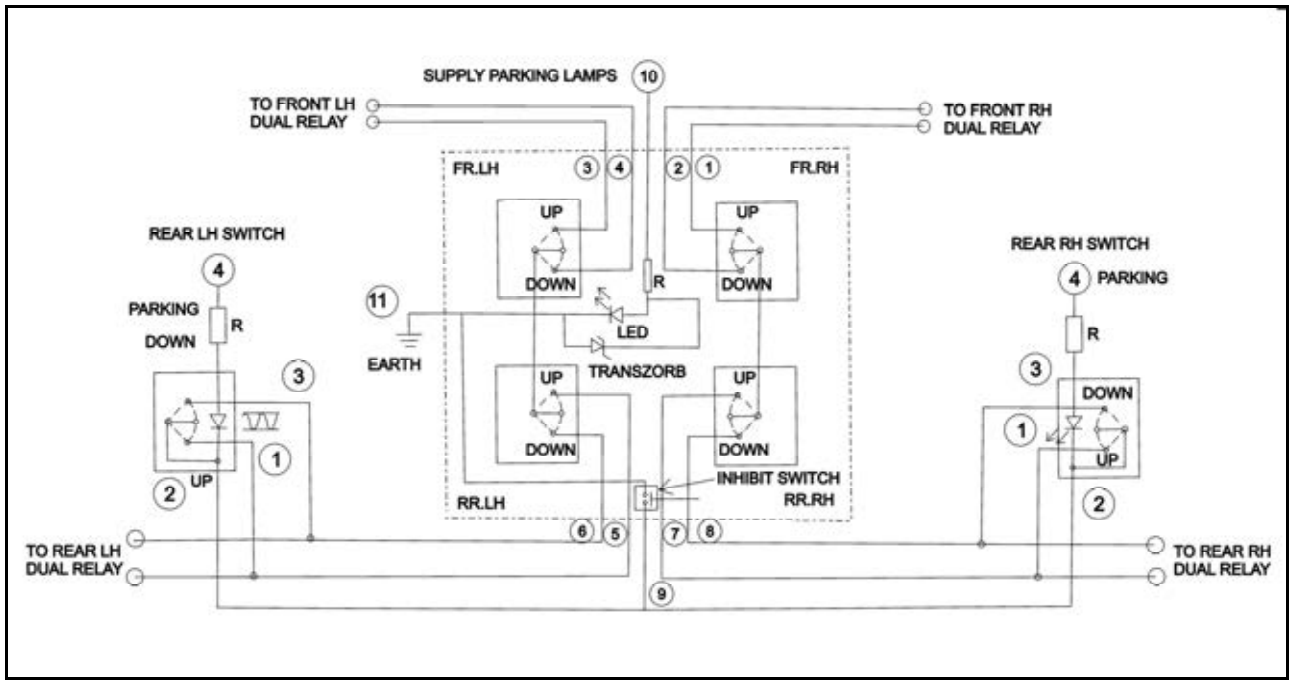
CONNECTOR DETAILS:



PINOUT DETAILS:

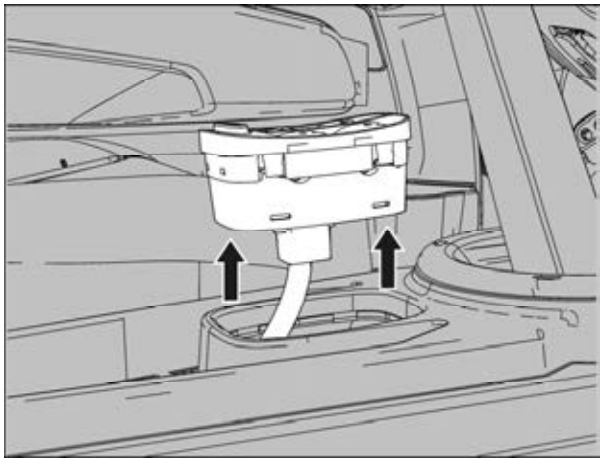
PIN.NO.	DESCRIPTION
1	FRONT R.H (UP)
2	FRONT R.H (DOWN)
3	FRONT L.H (UP)
4	FRONT L.H (DOWN)
5	REAR L.H (UP)
6	REAR L.H (DOWN)
7	REAR R.H (UP)
8	REAR R.H (DOWN)
9	INHIBIT
10	FOR ILLUMINATION
11	EARTH
12	Dummy

CONNECTION DETAILS:

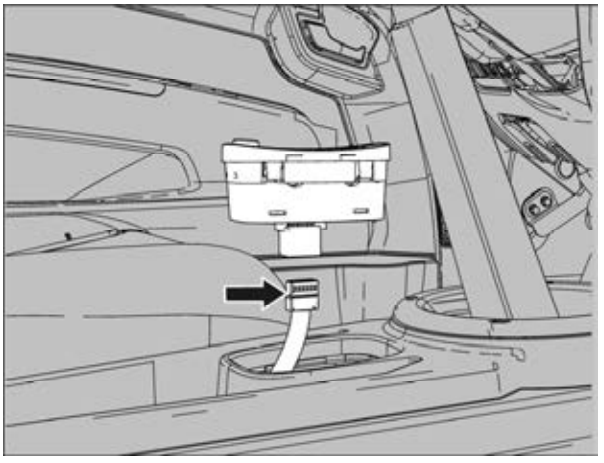


REMOVAL:

1. Pry out the Window winding switch from floor console assembly.



2. Disconnect the electrical connection of window winding switch.



3. Take out the Window winding switch.

REFITMENT:

1. Connect the electrical connection of Window winding switch.
2. Locate the Window winding switch into the cutout provided on dashboard and insert it tight.

INSPECTION:

Window Winding switches:

1. Check the basic function (*Manual operation function)*.

- Turn the ignition switch ON.
- Check that the door glass move up when the power window switch from driver door switch is pulled UP and moves down when the switch is pushed DOWN.
- Check that the door glass moves up when the individual power window switch of each door is pulled UP, and moves down when the switch is pushed DOWN.

2. Check the auto down operation function.

- Turn the ignition switch ON.
- Check that the AUTO DOWN function operates to fully open the door glass when the power window switch from driver door switch is pushed DOWN.
- Check that the door glass will stop when the applicable window switch is pulled UP during the AUTO DOWN operation.

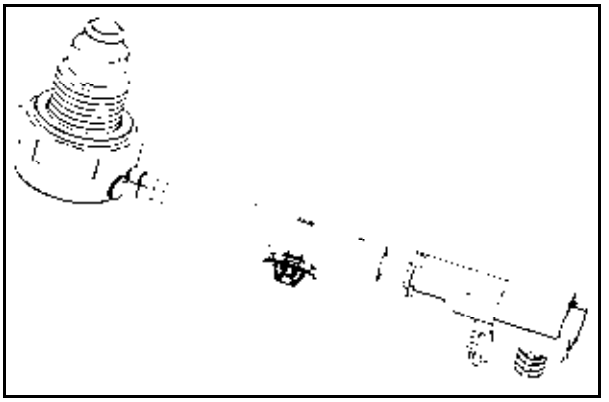
Window lock switch:

- Check that the rear power window operation is disabled when the window lock switch of the power window master switch is pressed.

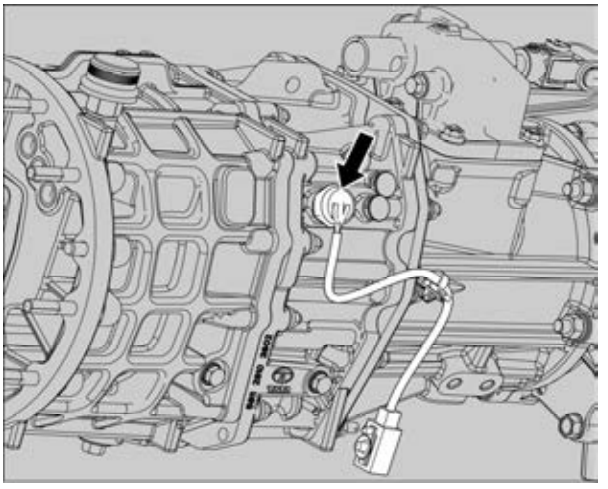
Check that the rear power windows can be operated when the window lock switch is pressed again.

11.6 REVERSE LIGHT SWITCH

FUNCTION: An open switch that prevents from voltage being applied to the backup lights until the vehicle is put in reverse. Putting the vehicle in reverse closes the contact and applies power to the tail lamp lights.

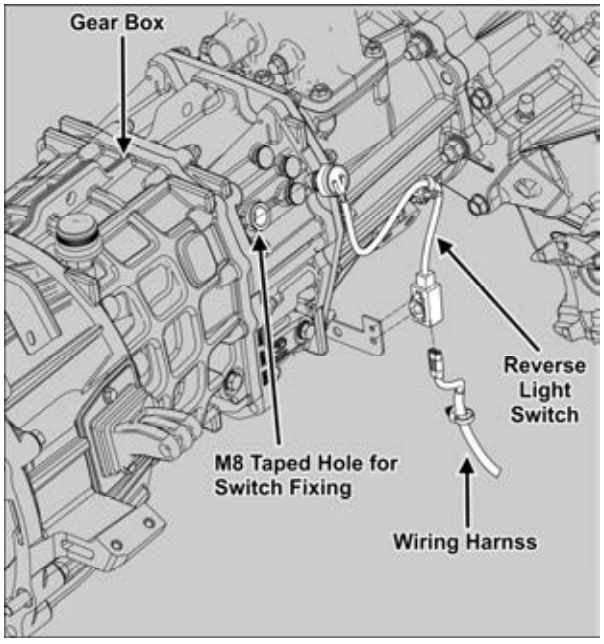


LOCATION: It is located on the Gear box.



REMOVAL:

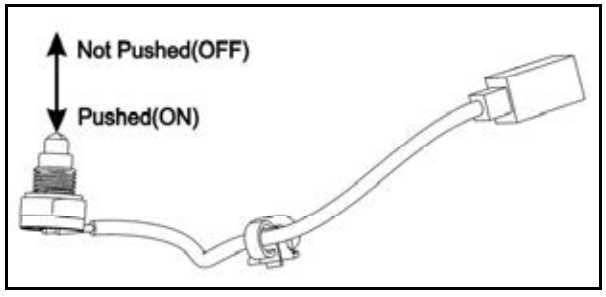
1. Disconnect the wiring harness connector.



2. Remove the pigtail clips from the bracket.
3. Loosen mounting nut and remove the reverse light switch from taped hole and take out the reverse light switch.

INSPECTION:

Test the switch with a Multimeter. Clip the probe of the multimeter to switch terminal and check the continuity.



CONDITION	SPECIFIED
Not Pushed(OFF) (Reverse gear not applied)	No Continuity
Pushed(ON) (Reverse gear applied)	continuity

If not as per specified condition, then replace the switch.

FITMENT:

1. Align the reverse light switch to hole provided on the gear box and tighten it.

   Tightening torque: 4 ± 0.5 Kgfm

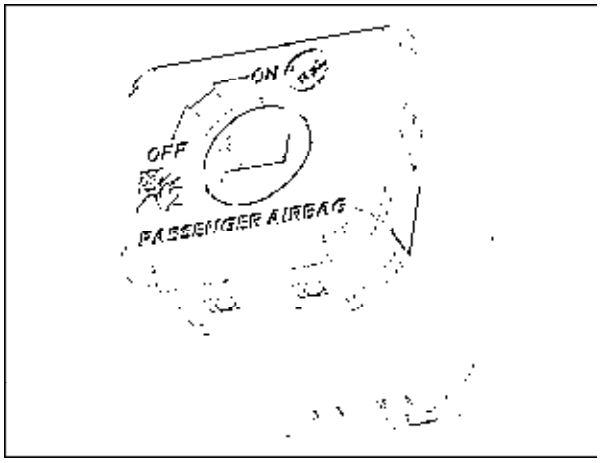
2. Fix the wiring harness by inserting the pigtail clip into the bracket.
3. Connect the wiring harness.

11.7 PASSENGER AIRBAG (PAB) SWITCH

FUNCTION:

Passenger airbag switch allows the driver to disable the passenger airbag in case a child occupant is sitting on the co-driver seat.

The PAB deactivation and activation can be performed using the Ignition Key

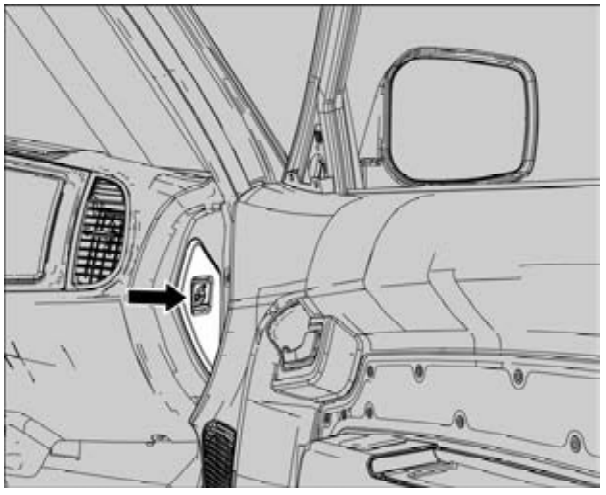


NOTE

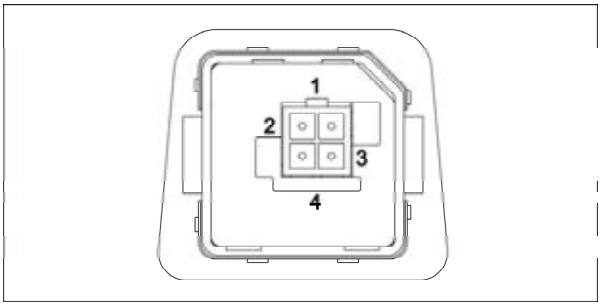
Before starting a trip, the driver should check the status of the PAB on the indicator provided on the roof.

LOCATION:

It is fitted on RH side of the vehicle at dashboard side end.

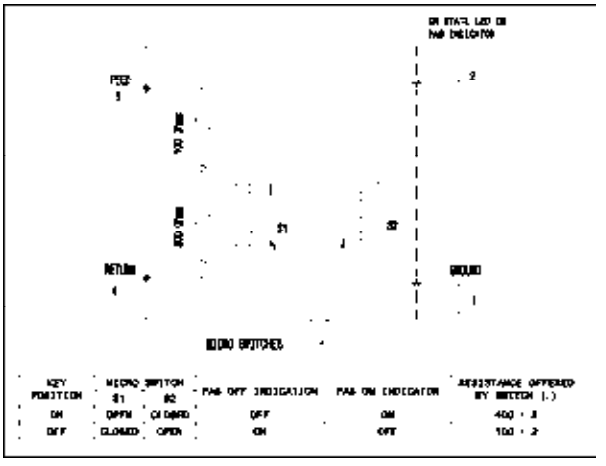


CONNECTOR DETAILS:



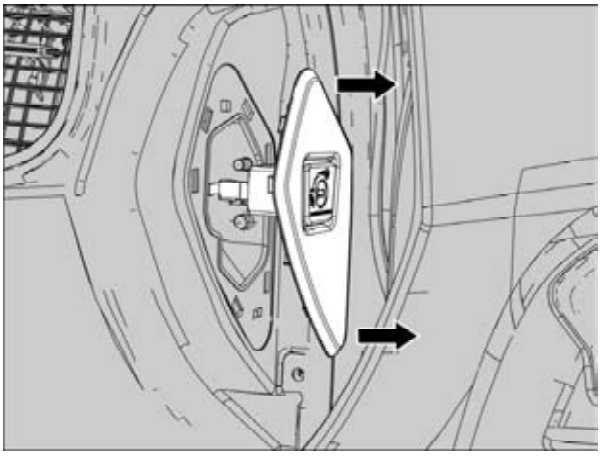
Pin No.	Description
1	Ground
2	ON state LED in PAB indicator
3	Feed (From Airbag)
4	Return (To Airbag ECU)

CONNECTION DETAILS:

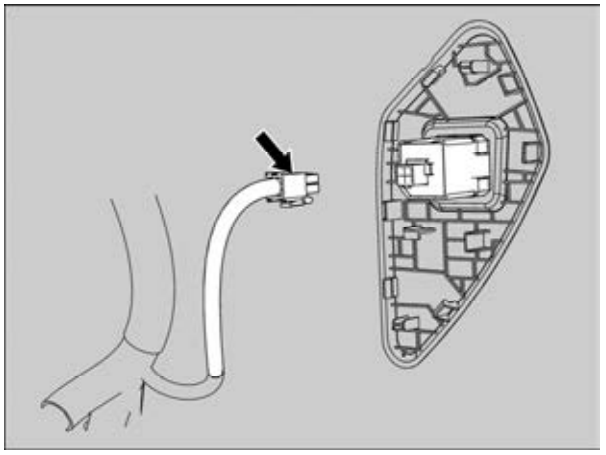


REMOVAL:

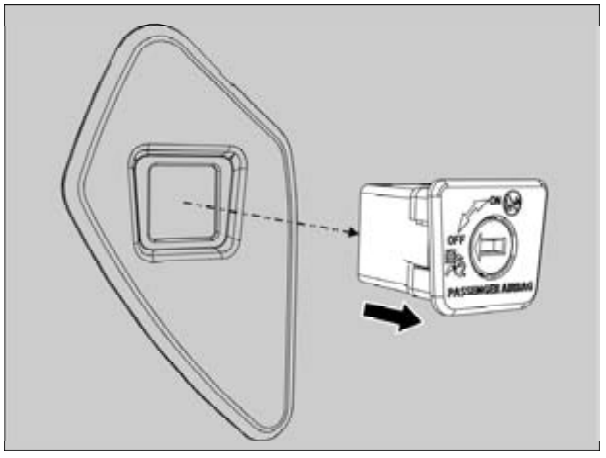
1. Carefully pry out the dashboard side cover along with PAB switch and its connector.



2. Disconnect the electrical connection of PAB switch.



3. Pry out PAB switch from the dashboard side cover.



REFITMENT:

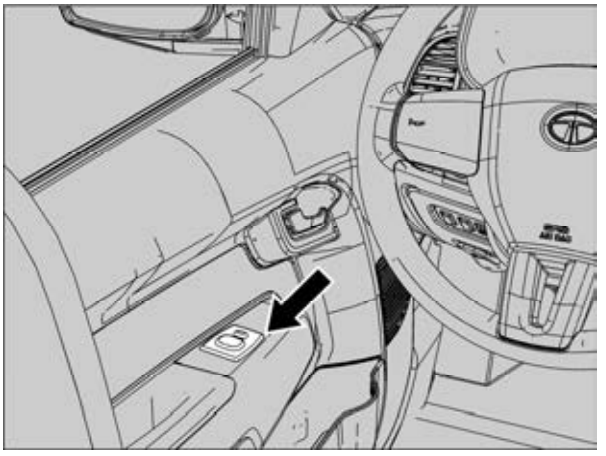
1. Fix the PAB switch with dashboard side cover (*Snap fitted*).
2. Connect the electrical connection of the PAB switch.
3. Fix the dashboard side cover along with the PAB on the dashboard (*Snap fitted*)

11.8 POWER MIRROR SWITCH

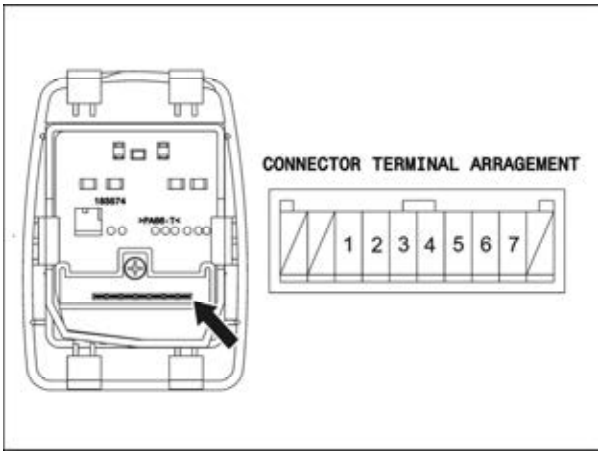
For adjusting the mirror, first select the RH or LH side mirror using selector switch 'R' and 'L' . Then push the appropriate edge of adjustment switch to move the mirror left, right, up & down.

LOCATION:

It is located on the front LH door.



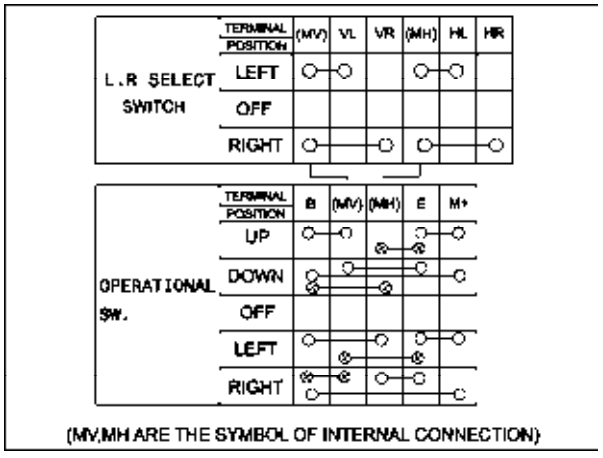
CONNECTOR DETAILS:



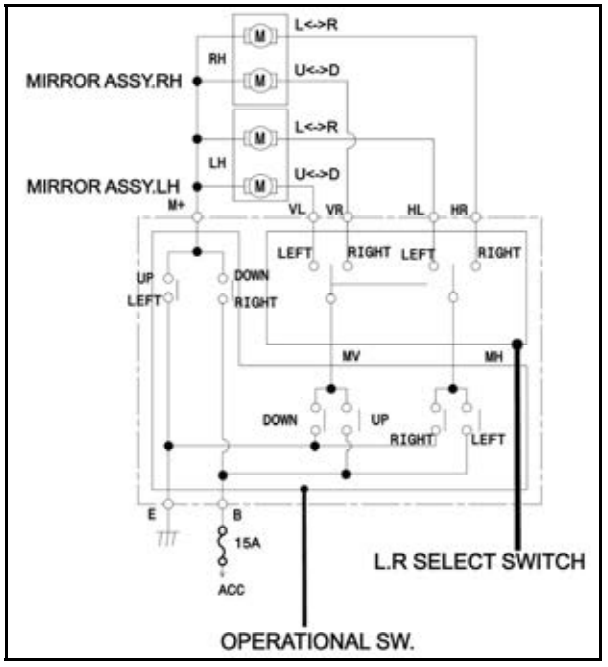
PINOUT DETAILS:

SR. NO.	DISCRIPTION
1	B
2	EARTH
3	+VE
4	Horizontal Left
5	Vertical Left
6	Vertical Right
7	Horizontal Right

OPERATIONAL DETAILS:

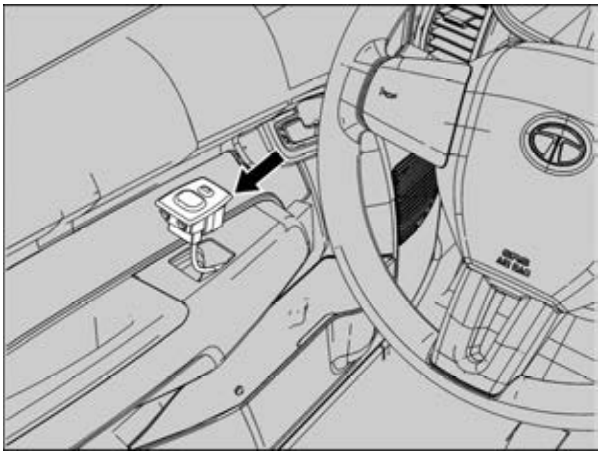


CIRCUIT DIAGRAM:

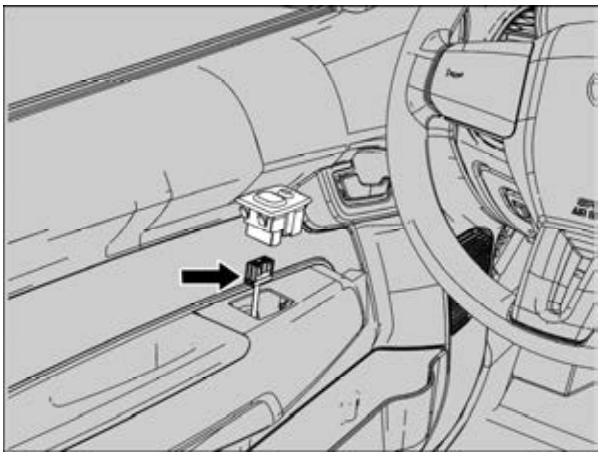


REMOVAL:

1. Pry out the Mirror adjustment switch from front LH door.



2. Disconnect the electrical connection of mirror adjustment switch.

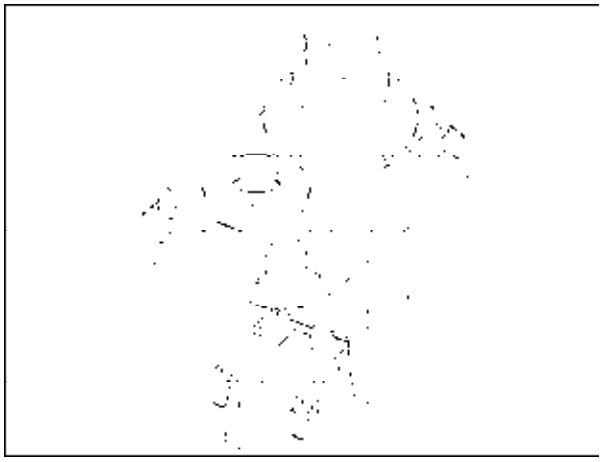


3. Take out the mirror adjustment switch**.**

REFITMENT:

1. Connect the electrical connection of mirror adjustment switch.
2. Fit the mirror adjustment switch in its location on door.*(snap fitted)*

11.9 BONNET SWITCH

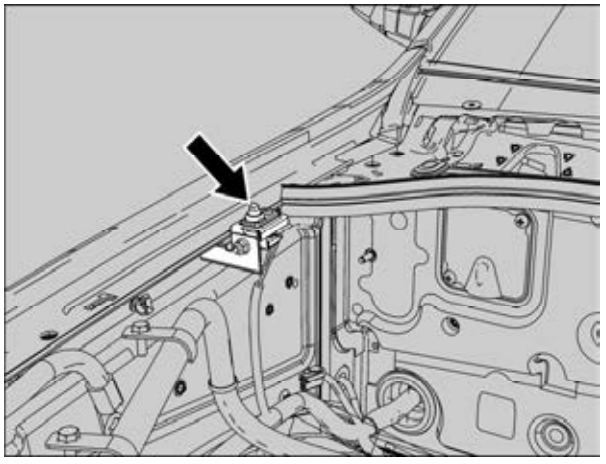


FUNCTION:

Bonnet switch is switched on or off in response to opening and closing of bonnet.

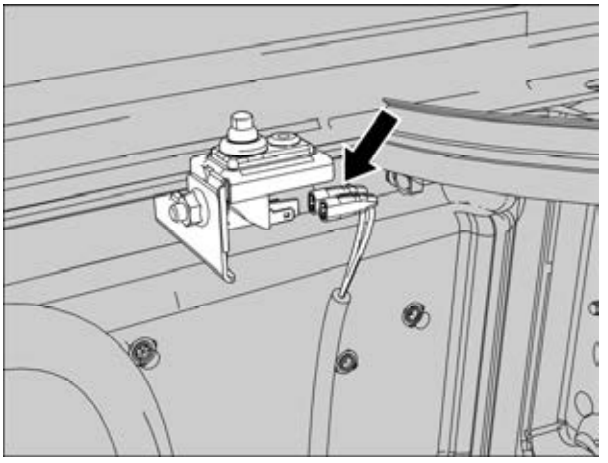
LOCATION:

It is fitted on Assembly Panel outer RH.

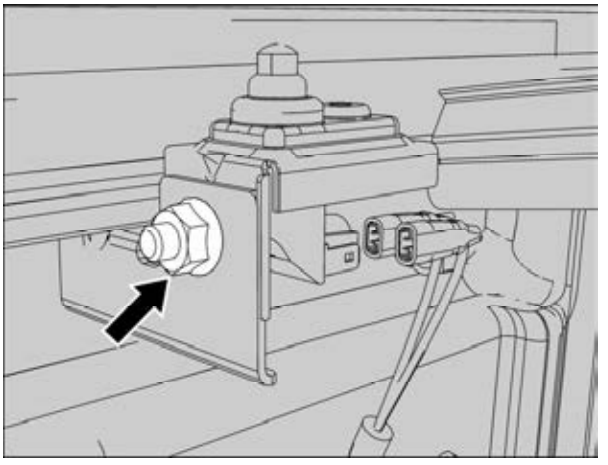


REMOVAL:

1. Open the bonnet and disconnect the electrical connection of bonnet switch.



2. Remove one mounting screw of bonnet switch and take out the switch.



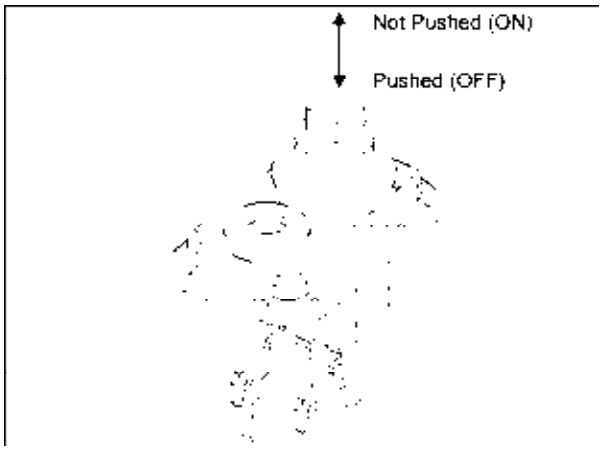
REFITMENT:

1. Fit the bonnet switch on the bracket.
2. Tighten the mounting screw.

   Tightening toque for screw – 0.95 Kgm
3. Connect the electrical connection to the bonnet switch.

INSPECTION:

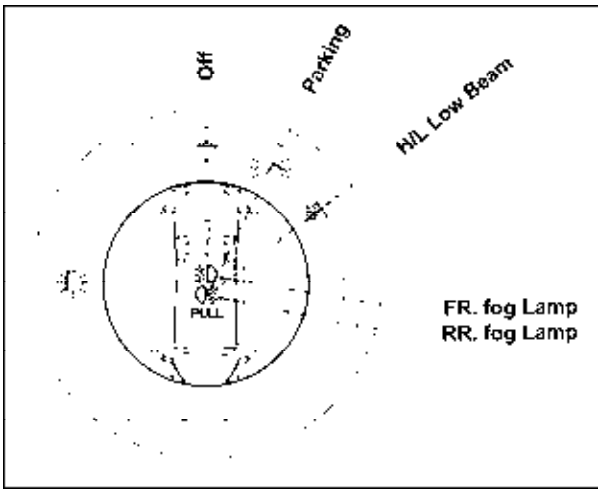
Test the switch with a Multimeter. Clip the probe of the multimeter to switch terminal and check the continuity.



CONDITION	SPECIFIED
Not Pushed(ON)	Continuity
Pushed(OFF)	No continuity

If not as per specified condition, then replace the switch.

11.10 HEAD LAMP ROTARY SWITCH:



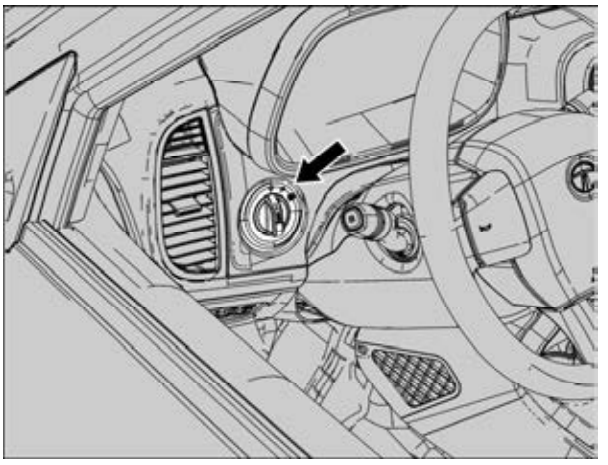
FUNCTIONS:

1. Head lamp ON
2. Parking lamp
3. Front fog lamp
4. Rear fog lamp

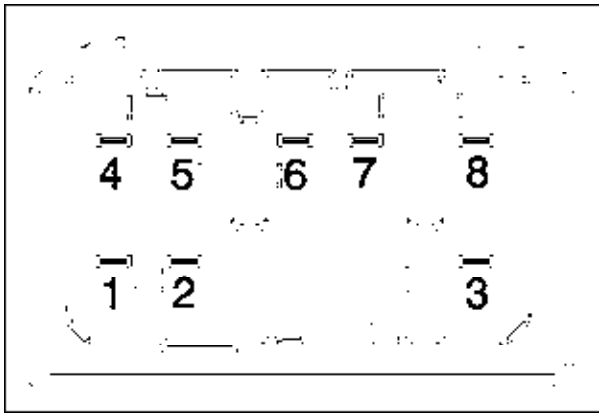
Note: *For operation of Front & rear fog lamp, Pull out the Knob when the Knob is at parking or head lamp on position wit ignition ON.*

LOCATION:

It is fitted on LH side of steering column on dashboard upper.



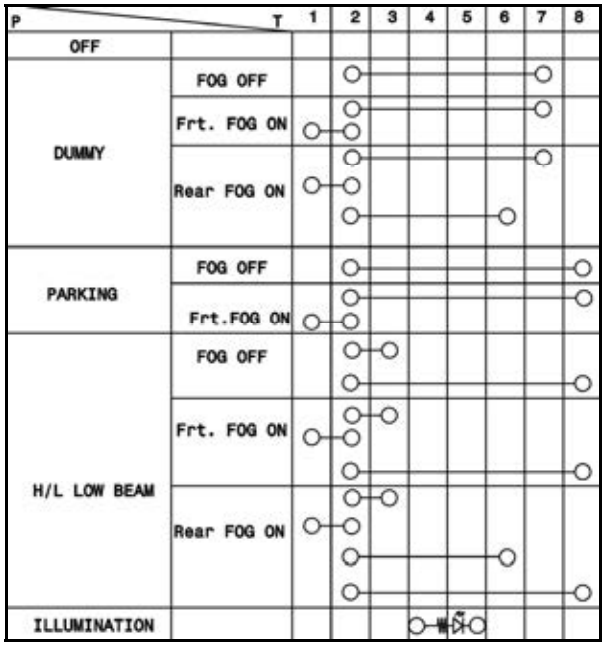
CONNECTOR DETAILS:



PINOUT DETAILS:

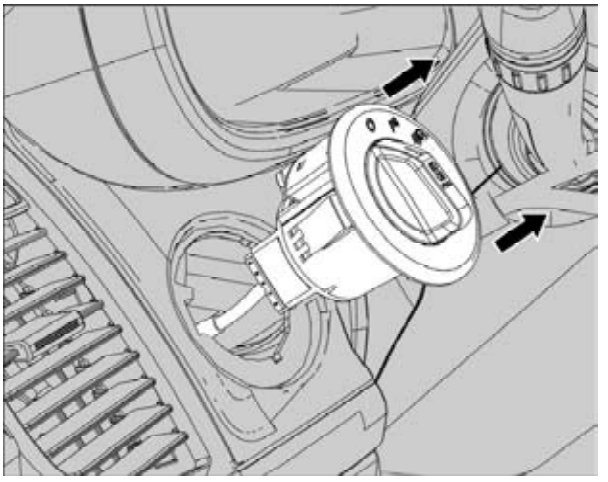
PIN NO	DESCRIPTION
1	Front fog lamp
2	Auto lighting (+ve)
3	Head lamp low beam
4	ILL (+ve)
5	Illumination relay coil ILL (-ve)
6	Rear fog lamp
7	Dummy
8	Parking

CONNECTION DETAILS:

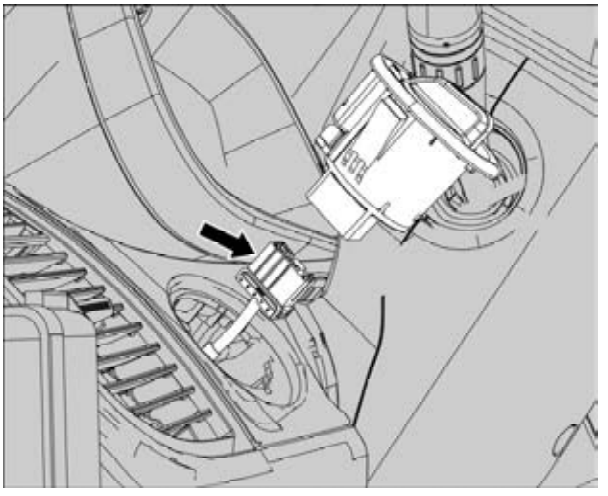


REMOVAL:

1. Carefully pry out the head lamp rotary switch with connection.



2. Disconnect the electrical connection of head lamp rotary switch.



3. Take out the head lamp rotary switch

REFITMENT:

1. Connect the electrical connection of head lamp rotary switch.
2. Locate the head lamp rotary switch into the cutout provided on dashboard (*Snap fitted*).

11.11 HAND BRAKE SWITCH

FUNCTION:

It gives signal to the instrument cluster regarding the position of Hand brake Lever.

LOCATION: It is fitted on parking brake bracket.

REMOVAL

1. Remove the floor console. *(Refer Procedure from Body Section)*.
2. Disconnect the electrical connection from hand brake switch.
3. Remove one mounting screw and take out the hand brake switch.

INSPECTION:

Check switch for continuity.

OFF Position (Parking brake released)	No continuity
ON Position (Parking Brake lever pulled up)	Continuity

If checked result is not specified, replace switch.

REFITMENT:

1. Locate the switch on the hand brake lever bracket and fit one mounting screw.
2. Connect the electrical connection to the switch.
3. Fit the floor console *(Refer Procedure from Body Section).*

12 WINDOW WINDING CONTROLLER

INTRODUCTION:

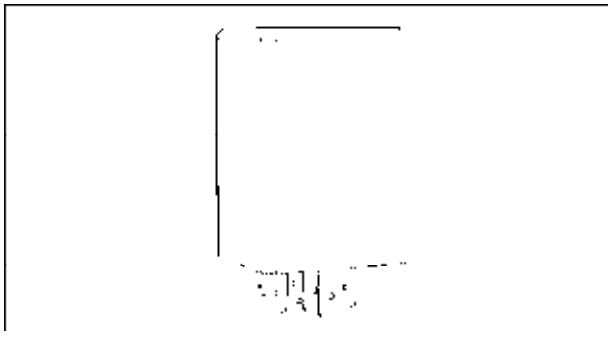
Power window system consists of controller *integrated relays*), low current switches and Window winding Regulator Motor.

Window winding controller is an integrated control which controls the movement of all four windows**.** Controller senses the signal from low current switches and operates the window winding motors according to switch position (*Manual UP/ Manual Down/Auto Down*). At the same time controller also monitors the window position. When window has reached either of the end position, supply to motor is cutoff thereby protecting the motor from overheating. Whether the window is moving or has reached the end position is decided by monitoring the motor current.

Running Current: Current drawn by motor while the window is moving up or down.

Locking Current: Current drawn by motor when the window has reached the end position and thereby motor also stops running and locks.

Locking current is much higher than running current. Controller is programmed for maximum permitted Running Current and Minimum permitted locking current.



As long as the controller senses the motor current is below the maximum running current, it allows motor to operate but the moment it senses the motor current is above the minimum locking current then within 't' seconds controller will stops the motor supply.

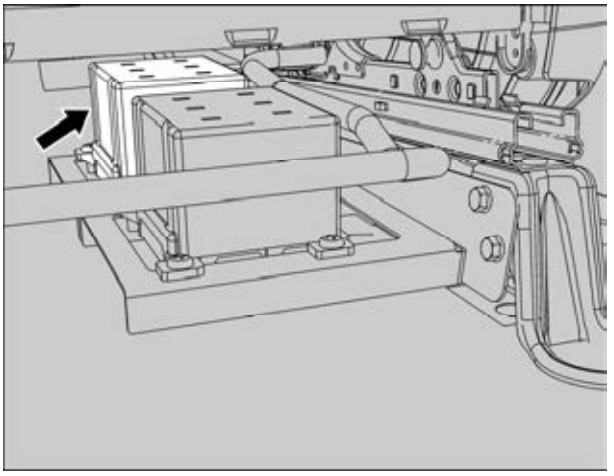
At a time one or more than one or all windows can be operated together. Window will operate in mode respective to its switch operation – MU (*Manual up*), MD (*Manual Down*), AD (*Auto Down*). Each window operation is monitored independent of other windows.

SPECIFICATION:

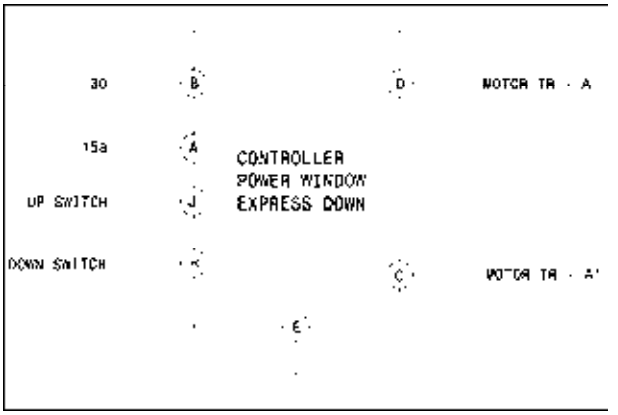
Nominal Voltage	10 – 15 V
Operating Voltage Range	10 – 16 V
Operating Load	Window winder motor
Operating Temperature	- 30ºC to +85ºC
Storage Temperature	- 40ºC to +85ºC

LOCATION:

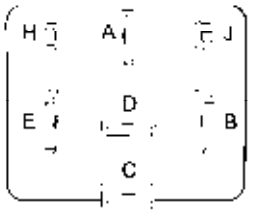
It is located below the driver seat on relay and window winding controller support.



CONNECTION DIAGRAM:



CONNECTOR DETAILS:



OPERATION:

Controller allows windows to move when the following inputs are present.

- Ignition is ON or

If the input is present then window winding controller will operate the motor as per window winding Switch request.

NOTE:

If driver door is opened then Acc delay get immediately cancelled.

There is an individual switch at each window and a set of switches in the driver's door, so the driver can operate all the windows. Switches are used only to provide a mode signal to controller for further operation. Motor current does not pass through the Switches.

Each switch has four positions,

- OFF
- Manual Up
- Manual Down
- Express Down

When a particular mode is operated, ground signal appears on particular terminal Manual Up, Manual Down or Express Down. In case of Auto down ground signal appears on both MD and AD terminals.

Child Lock Functionality

In switch circuit driver has an option to disable the passenger switches by locking the window lock switch (*Inside the driver door window winding switch*). This disconnects ground line to passenger switches. Rear LH and RH window winding switches are disabled.

When parking is switched ON, LED on the window winding switches of driver as well as passenger switches will be ON. Lock / unlock switch LED is also on when it is in unlock mode.

Window winding controller functionality during cranking:

During cranking the vehicle, the following are the window winding operations,

- In Manual Up and Manual Down mode, the windows stop moving during cranking and only start moving after cranking if the user is still operating the switch.
- If Expess Down is active and user cranked the vehicle then window movement should stop until vehicle get cranked and after that express down function get automatically activated without user intervention.

FUCTIONALITY DETAILS:

1. Manual Up mode

Controller operates in manual up mode only when any power window switch is pressed in up position.

Window will start moving in up direction while the Up switch kept pressed unless the window reaches its top end position.

- Controller stops window motor from moving in upward direction, if the up position switch is released by driver /co-driver/passenger before window reached its top end position. Any further window movement takes place only if driver /co-driver/passenger press the switch again.
- If window switch is pressed continuously in up position by driver /co-driver/passenger after window reached its top end position, then controller checks the locking current of window motor and if locking current is present then controller cut off the motor supply to protect the motor.
- If power window is at top end position and up position switch is again pressed by driver /co driver/passenger, then controller check the locking current of window motor for‘t’ sec and if locking current is present then it cut off the system supply.

2. Manual Down mode:

Controller operates in manual down mode when any power window switch is pressed in down position. Window will start moving in downward direction while the Down switch is kept pressed unless it reached to its bottom end position.

- Controller stops window motor from moving in downward direction, if the down position switch

is released by driver /co-driver/passenger before window reached its bottom end position. Any further window movement takes place only if driver /co-driver/passenger pressed the switch again in any position.

- If window switch is pressed continuously in down position by driver /co-driver/passenger after window reached its bottom end position, then controller checks the locking current of window motor and if locking current is present then controller cut off the motor supply to protect the motor.
- If power window is at bottom end position and down position switch is again pressed by driver /co-driver/passenger then controller check the locking current of window motor for 't' sec and if locking current is present then it cut off the system supply.

- **Express down mode:**

Controller operates in Express down mode when power window switch is pressed momentarily in down position for more than 0.3 seconds. Window will start moving in downward direction while it reaches the bottom end position.

E.g. let driver press the power window switch in express down position then window start movement in downward direction and it continuously moving in downward direction till it reached its bottom end position.

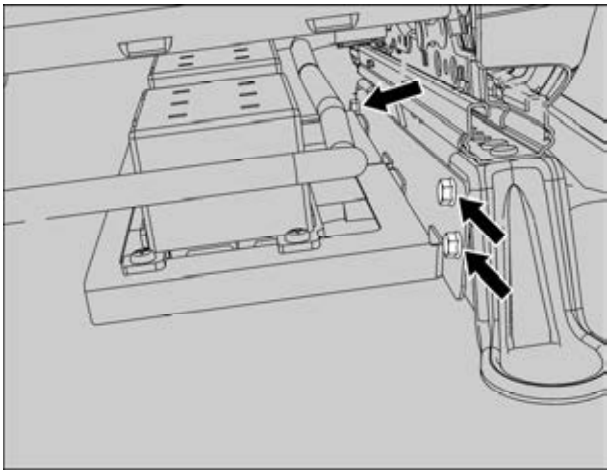
- Controller stops power window motor to operate in express down mode, if switch is pressed again in manual up/manual down position by the driver /co-driver/passenger before window reached to its bottom end position. If driver want to move in up/down mode then driver should first release the position switch which is pressed for stopping the express down mode and then press position switch again for further movement..

  E.g. Let driver press the power window switch in express down position, then window start movement in downward direction if before reached its bottom end position driver press up/manual down position switch then controller will stop the window motor to operate in express down mode. If driver want to move in up/down mode then driver should first release the up/manual down position switch which is pressed for stopping the express down mode and then press up/down position switch again for further movement.

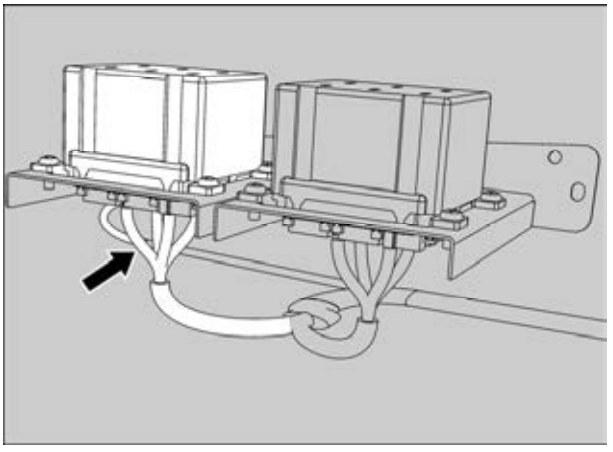
- If power window is at bottom end position and express down position switch is again pressed by driver /co driver/ passenger then controller check the locking current of window motor for 't' sec and if locking current is present then it cuts off the supply to motor.

REMOVAL:

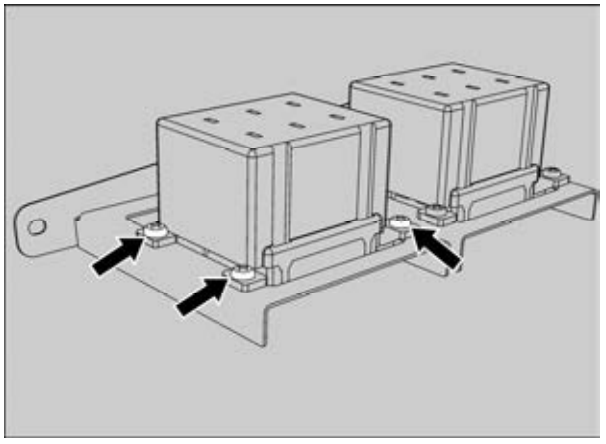
1. Disconnect the negative terminal of battery.
2. Remove the three mounting screw of relay and window winding controller support



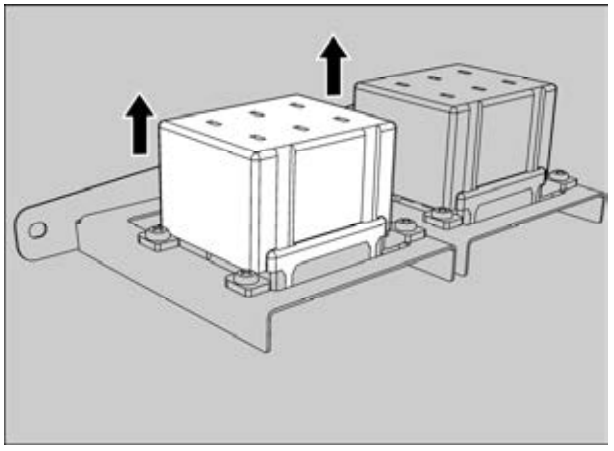
3. Disconnect the electrical connection.



4. Remove the four mounting screw of relay box.



5. Pry out the window winding controller from the base.



4. Take out the controller.

REFITMENT:

1. Locate the window winding controller on the base.
2. Tighten the four mounting screw of window winding controller.

   Tightening torque for screws – 0.58 Kgfm

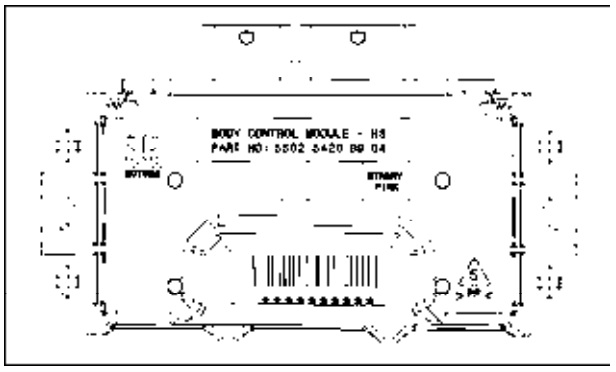
3. Connect the electrical connection.
4. Tighten the three mounting screws of window winding controller support.

   Tightening torque for bolts – 0.95 Kgfm.

13 BODY CONTROL MODULE (*BCM*)

DESCRIPTION:

The body control module is the primary hub that maintains functions, such as internal and external lighting, security and access control, comfort features for doors, and other convenience controls.



BCM Power mode

The BCM will support the following power modes internally.

- STANDBY / SLEEP
- RUN

In STANDBY mode, current consumption should be minimized by keeping minimum circuitries active. BCM goes in sleep mode after approx 30sec, when vehicle get successfully lock through remote and all the BCM outputs are OFF.

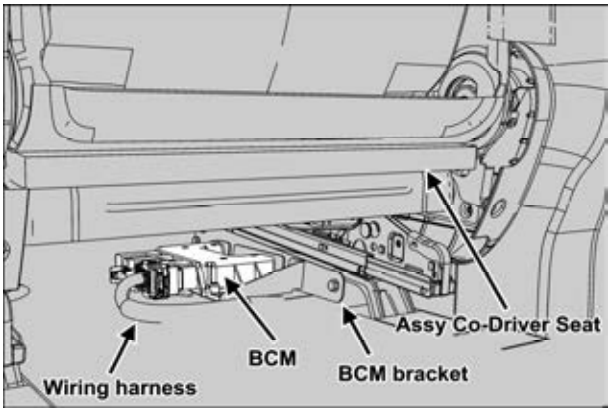
In RUN mode, all circuits are active & full functionality is available.

NOTE:

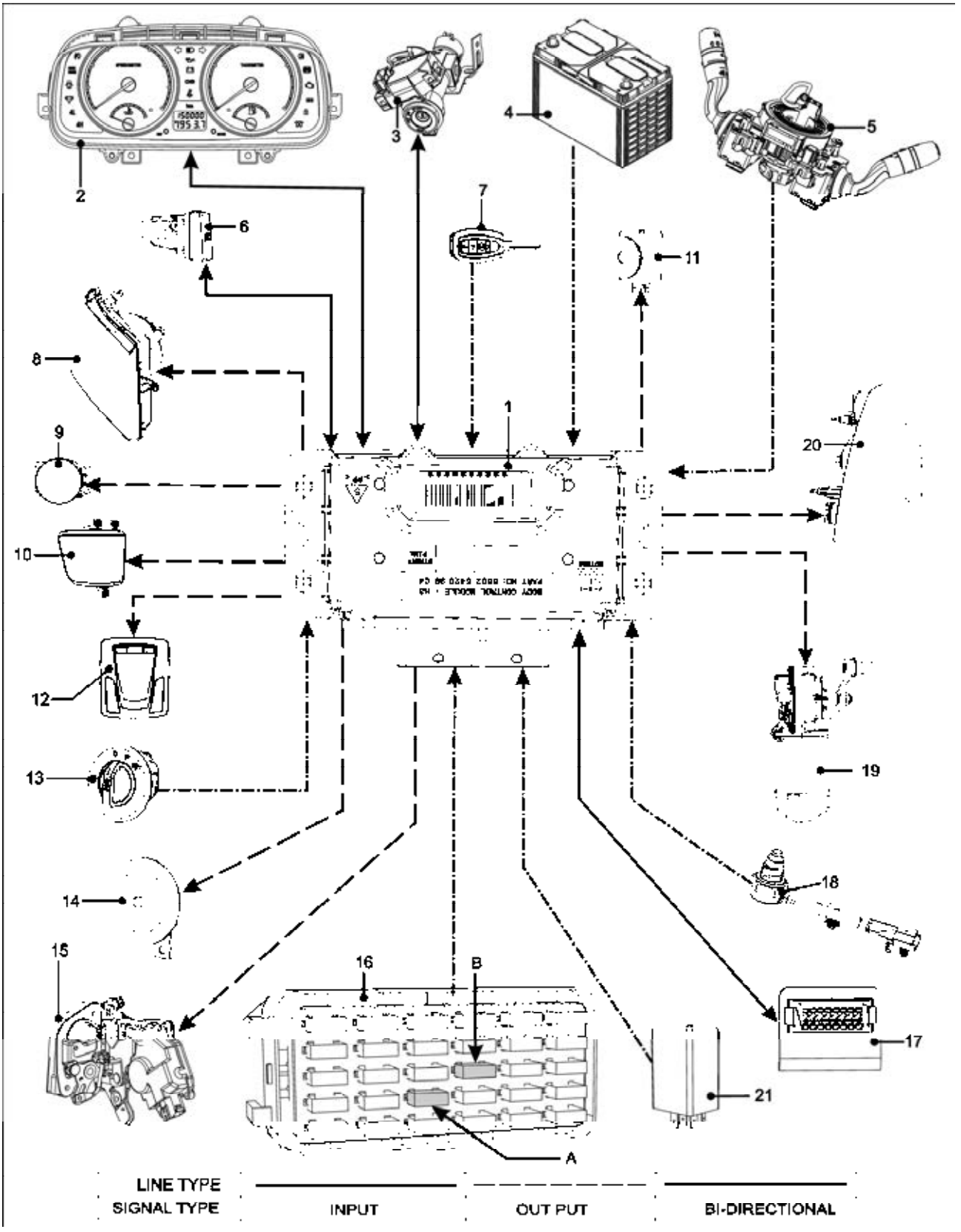
In case of Shorts to GND and over temperature on output side are protected by the Thermal Protection strategy of driver.

LOCATION:

It is located on BCM mounting bracket below the Co-Driver sear assembly.



BCM CONTROL SCHEMATICS:

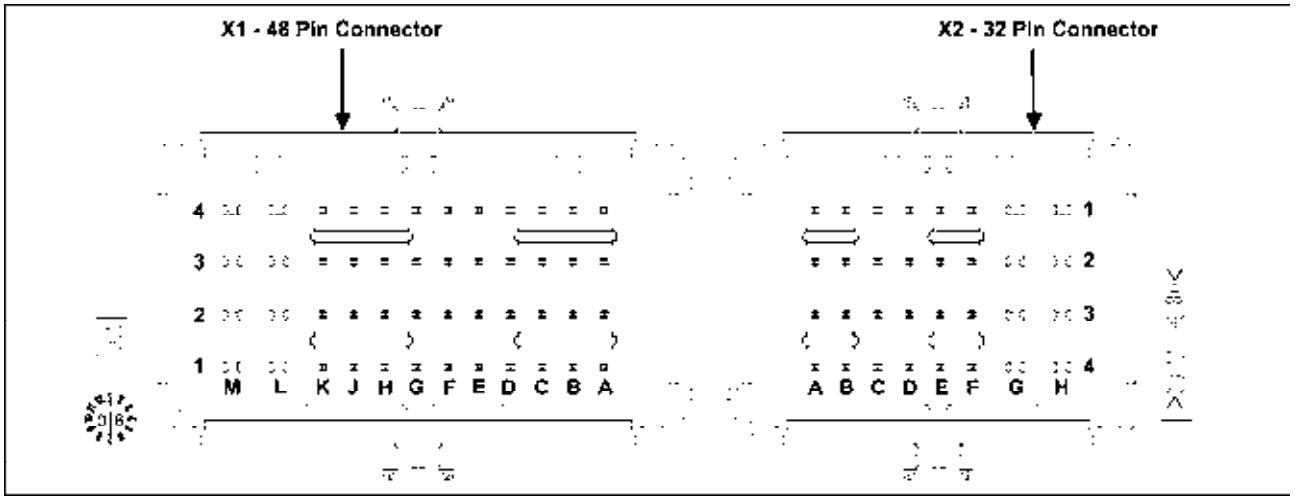


ELECTRICAL

DESCRIPTION:

SR. No	DESCRIPTION	SR. No	DESCRIPTION
1	Body Control Module	12	Roof Lamp
2	Instrument Cluster	13	Head Lamp Rotary Switch
3	Ignition Switch	14	Horn
4	Battery 12V,80 Ah	15	Door Latch Assy.(*Actuator*)
5	Combi. Switch	16	Cabin Fuse Box A. BCM BATTERY (30A). B. BCM 2 IGN (5A).
6	Hazard Warning Switch		
7	Remote Key	17	Diagnostic Connector
8	Assy. Head Lamp	18	Reverse Light Switch
9	Front Fog Lamp	19	Front Wiper Motor
10	Rear Fog Lamp	20	Tail Lamp
11	Buzzer	21	Window Winding Controller

BCM CONNECTOR DETAILS:



PINOUT DETAILS OF 32 PIN CONNECTOR:

PIN. NO.	SIGNAL DESCRIPTION	SIGNAL TYPE	ACTIVE LEVEL
X2.A1	All Doors Lock Relay	DO	Low
X2.A2	HRW Coil Relay	DO	High
X2.A3	Spare LC High side Output	DO	High
X2.A4	Seat Belt Switch Input	DI	Low
X2.B1	Driver Door Unlock Relay	DO	Low
X2.B2	Spare High Input	DI	High
X2.B3	Driver Door Lock switch	DI	Low
X2.B4	Spare Low Input	DI	Low
X2.C1	Other Door s Unlock Relay	DO	Low
X2.C2	Odometer Signal (Speed)	PWM	Pull Up to 5V
X2.C3	Driver Door Unlock Switch	DI	Low
X2.C4	Head Lamp Switch	DI	High
X2.D1	Vehicle Horn Relay	DO	Low
X2.D2	Ignition Switch	DI	High
X2 D3	Spare High Input	DI	High
X2.D4	Crank Switch	DI	High
X2.E1	Door Open LED Output	DO	Low
X2.E2	Spare Low Input	DI	Low
X2.E3	Spare Low Input	DI	Low
X2.E4	Front Fog Lamp Switch	DI	High
X2.F1	Front Wiper Motor Intermittent Relay	DO	Low
X2.F2	HRW Switch	DI	Low
X2.F3	Spare LC Low Side Output	DO	Low
X2.F4	Seat belt Not Fastened LED	DO	Low
X2.G1	V Batt.		
X2.G2	V Batt		
X2.G3	Digital Ground		
X2.G4	Digital Ground		
X2.H1	Front Wash Motor	DO	High
X2.H2	Trailer Electric Left Lamp	DO	High
X2.H3	Dip / Low Beam Relay	DO	High
X2.H4	Rear Fog Lamp Relay	DO	High

PINOUT DETAILS OF 48 PIN CONNECTOR:

PIN. NO.	SIGNAL DESCRIPTION	SIGNAL TYPE	ACTIVE LEVEL
X1. A1	Spare High Input	DI	High
X1. A2	Dip / Low beam Switch	DI	Low
X1. A3	Tick Tock Relay	DO	High
X1. A4	High / Main Beam Relay	DO	High
X1. B1	Parking/Side Light Switch	DI	High
X1 .B2	V Batt		
X1. B3	Key In Switch	DI	High
X1. B4	Hazard Warning LED (Not Applicable)	DO	High
X1. C1	Spare High Input	DI	High
X1. C2	Left Turn Switch	DI	Low
X1. C3	Right Turn Switch	DI	Low
X1. C4	Key Ring Illumination Output	PWM	High
X1. D1	Hazard Warning Switch	DI	Low
X1. D2	Can High (Not Applicable)	CAN	
X1. D3	Can Low (Not Applicable)	CAN	
X1. D4	Spare LC Low Side output	DO	Low
X1. E1	Front Wiper Intermittent Fault	DI	Low
X1. E2	Front Wash Switch	DI	Low
X1. E3	Ground		
X1. E4	Buzzer	DI	Low
X1. F1	Spare Low Input	DI	Low
X1. F2	V Batt		
X1. F3	Spare LC Low Side output	DO	Low
X1. F4	Daytime Running Light	Do	High
X1. G1	Rear Fog Lamp Switch	DI	High
X1. G2	Spare K Line		
X1. G3	Engine RPM	PWM	Pull Up to 5V
X1. G4	Front Wiper Intermittent Setting	AI	
X1.H1	Co-Driver Door Switch	DI	Low
X1.H2	Driver Door Switch	DI	Low
X1.H3	Rear Left Door Switch	DI	Low
X1.H4	Main High Beam Switch	DI	Low
X1. J1	Rear Right Door Switch	DI	Low
X1. J2	Inertia Signal From ACU	DI	Low
X1. J3	Spare Analog Input	AI	
X1. J4	Bonnet Switch	DI	Low
X1. K1	Diagnostic K Line		

X1. K2	Front Wiper Parking Switch	DI	Low
X1. K3	Spare Low Input	DI	Low
X1. K4	Front Fog Lamp Relay	DO	High
X1. L1	Ground		
X1. L2	V Batt		
X1. L3	V Batt		
X1.L4	Spare HC Output	PWM	High
X1. M1	Left Indicator Lamps	PWM	High
X1. M2	Right Indicator Lamps	PWM	High
X1. M3	Trailer Electric Right lamp	DO	High
X1. M4	Roof Lamp	PWM	High

BCM SIGNAL DESCRIPTION:

SR NO.	SIGNAL TYPE	SIGNAL DESCRIPTION
1	DI	Digital input
2	DO	Digital output
3	AI	Analog input
4	PI	Pulse input
5	PWM	Pulse width modulated
6	RF	Radio Frequency

FUNCTIONALITY:

The BCM will provide a following functionality support to vehicle operation. The list of each BCM functions is as below.

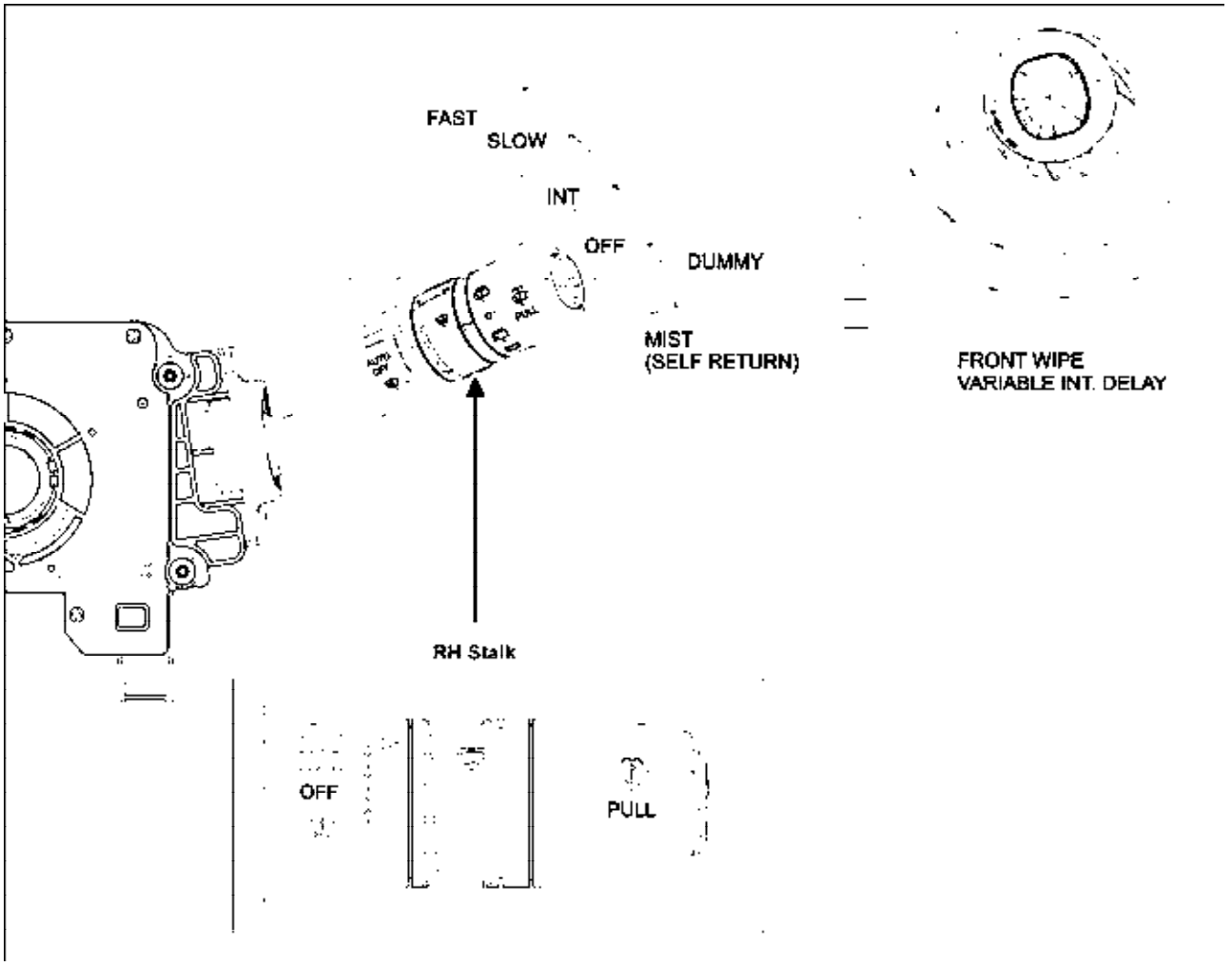
FUNCTIONS:

1. Front Wipe & wash
2. Exterior Lighting
   A. Parking & Low beam
   B. Direction indicators & hazard
   C. Front & Rear Fog Lamp
3. Interior lighting
   A. Roof mounted interior lighting
   B. Key hole illumination
4. Convenience
   A. Delayed accessory power OFF
   B. Approach lights
   C. Heated rear window
5. Locking & security
   A. Central door locking
   B. Remote key less entry (*RKE*)
   C. Audiable warning
   D. Remote learning

1. FRONT WIPE & WASH:

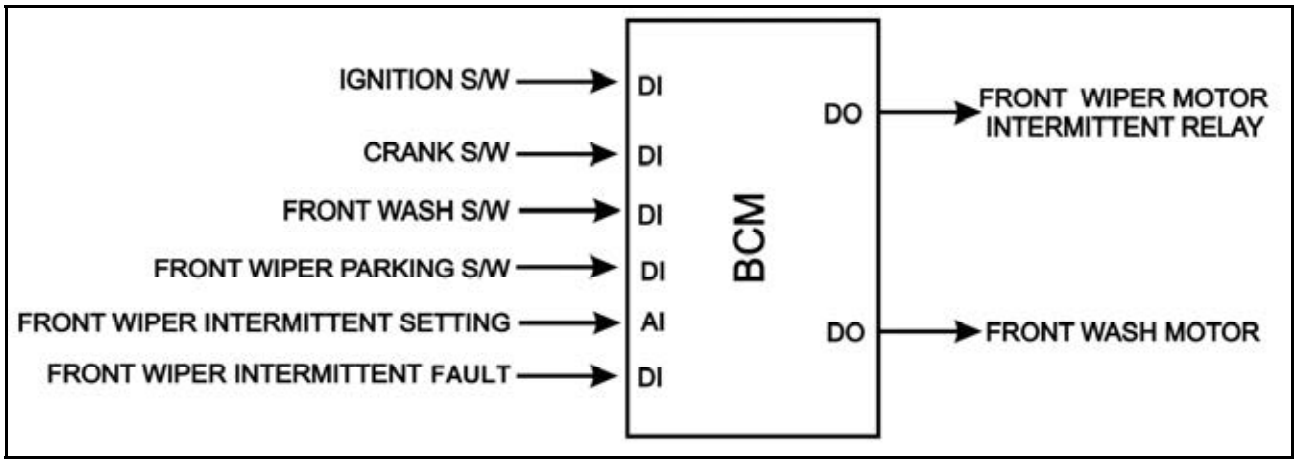
Front windscreen wipe and wash is active in vehicle power states ON. If front wiping or washing is active and the vehicle power state changes from ON to CRANK, washing will stop immediately & wiper will stop after parking position. If any other vehicle power state (*KEY IN, ACC & KEY OUT*) is entered, then front wiper system and washer will stop immediately..

Front windscreen wipe and wash functions will be driver controlled by the Combi Switch.



INPUT/OUTPUT DIAGRAM:

SIGNAL	LEVEL	TYPE
Ignition S/W	High	Input
Crank S/W	High	Input
Front Wash S/W	Low	Input
Front Wiper Parking S/W	Low	Input
Front Wiper Intermittent Setting	Analog	Input
Front Wiper Intermittent fault	Low	Input
Front Wiper Motor Intermittent Relay	Low	Output
Front Wash Motor	High	Output



INPUT/OUTPUT DIAGRAM:

A. FRONT WIPE:

There are five wiping modes of Front wiper:

- OFF
- FLICK WIPE (*not controlled by BCM*)
- INTERMITTENT (*controlled y BCM*)
- LOW SPEED (*not controlled by BCM*)
- HIGH SPEED (*not controlled by BCM*)

The wiper park position input switch is used to detect when the wiper blade is at the bottom of the wind screen.

OFF

In this state the front wipers should be in the park position. (*Indicated by the wiper park switch being active*) When the wiper mode is changed from FLICK WIPE, INTERMITTENT, LOW SPEED, or HIGH SPEED to OFF the wiper continues the current wipe operation until the park switch indicates the wiper is in the park position.

FLICK WIPE

When FLICK WIPE is selected, the wipers move once across the windshield at low speed and return to the park position. If FLICK WIPE is permanently selected (*switch held on*), then the wipers will move continuously across the windshield at low speed. This mode is not controlled by the BCM but will be detected as LOW SPEED by the state change of the front wiper parking switch input.

INTERMITTENT WIPE:

Front wiper intermittent relay will be ON when Front Wiper Intermittent fault input is ON, ignition switch is ON & crank is OFF. Front Wiper Motor Intermittent Relay will be made OFF when wiper reaches to parking position, unless driven externally. There are five steps of the intermittent wipe delay: 3, 6,9,12 & 15 seconds as per front wiper intermittent setting input. If Front Wiper Intermittent fault input is ON the delay between successive wipes will be 6 seconds, provided front intermittent wipe input is open circuit, ignition switch is ON & crank is OFF. Front wiper will not start next cycle if crank input is ON. When crank goes OFF front wiper resumes its normal operation.

If delay between successive wipes changed from high to low value an immediate wipe (without delay) is executed & next wipes will be executed with shorter delay selected. If delay between successive wipes changed from low to high value next wipe is executed with longer delay selected.

Delay Table:

For BCM Intermittent Version

Circuit	Position	Delay In Secs.
	0	3
	1	6
	2	9
	3	12
	4	15

LOW SPEED

When LOW SPEED is selected then the wipers will move continuously across the windshield at low speed. This mode is not controlled by the BCM but will be detected by the state change of the front wiper parking switch input.

HIGH SPEED

When HIGH SPEED is selected then the wipers will move continuously across the windshield at high speed. This mode is not controlled by the BCM but will be detected by the state change of the front wiper parking switch input.

B. FRONT WASH:

Front wash motor will be ON when front wash switch is pressed. Ignition is ON & crank is OFF. Front wiper intermittent relay will be ON 0.5 seconds after front wash motor becomes ON.

Front wash motor will be made OFF when front wash switch is released or ignition is turned OFF. If front wash motor is ON & crank is made ON, wash motor will be switched OFF & wash cycle is paused.

After crank becomes OFF, wash cycle will resumes its normal operation if it was not completed. Front wiper motor intermittent relay will be made ON to have 3 wipes after wash finishes, During 3 sweeps after wash, if crank is ON next wiping cycle will be paused until crank becomes OFF.

Wash function should override wipe function. If front wash switch is ON for more than 30 seconds wash motor will be switched OFF.

C. DRIP WIPE

At the end of three sweeps after wash, drip wipe will be executed after 5 seconds. If wiping mode is flick, low or high speed, drip wipe will not be executed. If intermittent wipe interval is less than or equal to 6 seconds drip wipe will not occur. If intermittent wipe interval is more than 6 seconds single drip wipe will occur after 5 seconds. It will reset the timer for next intermittent wipe with selected interval.

If Front Wiper is not at parking position and Ignition Switch is ON, BCM will make Front Wiper Relay ON to park the wipers.

2. EXTERIOR LIGHTING:

A.FRONT HEAD LIGHTING & PARKING:

The BCM will control the Parking Lights, High Beam, Low beam, Front Fog lights and Rear Fog light. The Head lamp rotary switch is directly connected to the BCM inputs. The Head lamp rotary switch provides a mechanical interlock to control the operation of front and rear fog lights.

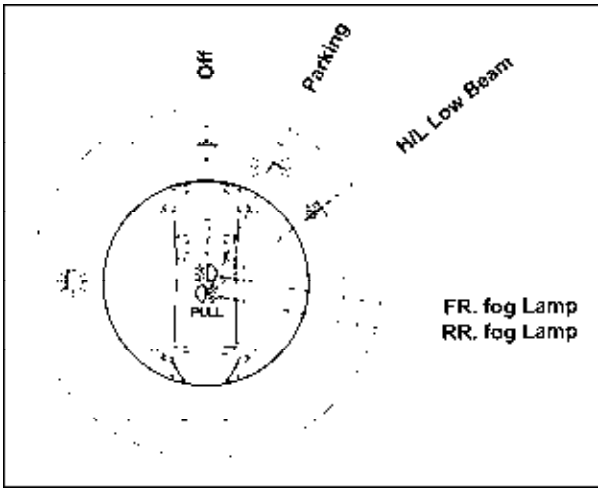
If ignition, headlamp & high beam switch input is ON, then only high beam relay will be ON. Dip/low beam relay & high beam relays are made OFF, if ignition is turned OFF or head lamp switch is turned OFF provided it is not driven by other cause.

Headlamp high beam and Dip beam relay will remain ON until headlamp flash switch is sensed by means of high beam & low beam inputs present simultaneously. Provided Ignition and Headlamp switch is ON.

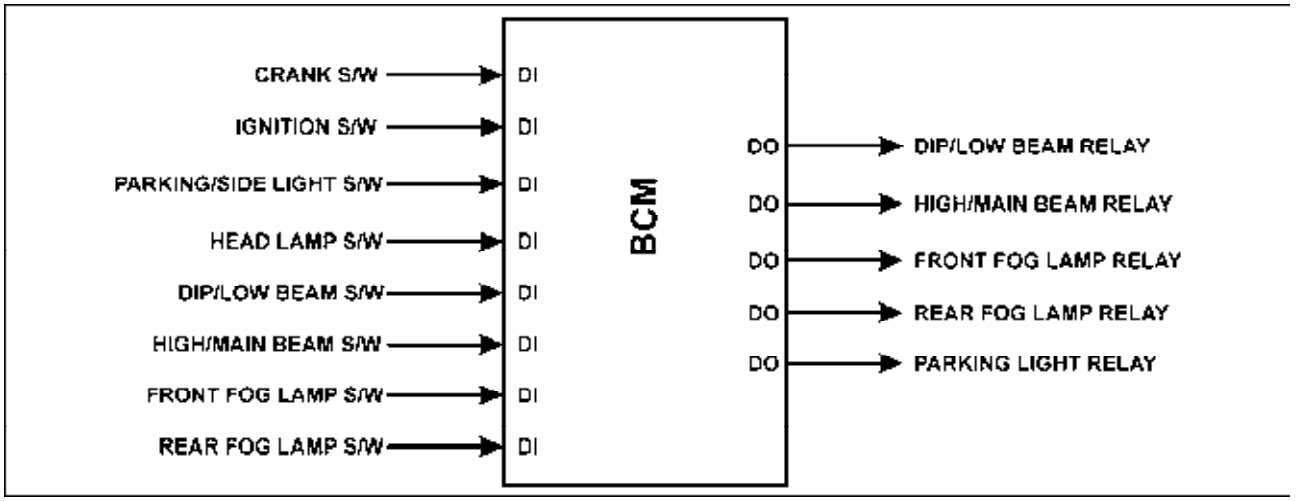
Head lamp flash is sensed by means of high beam and low beam inputs, head lamp high beam is turned ON, provided head lamp switch is OFF.

Dip/low beam relay and high beam relay outputs are made OFF until crank input is present.

If crank is ON, a front & rear fog lamp Relay goes OFF immediately. When crank goes OFF, both outputs resume their normal operation.



INPUT/OUTPUT DIAGRAM:



SIGNAL	LEVEL	TYPE
Ignition Switch	High	Input
Crank switch	High	Input
Head lamp on switch	High	Input
Parking / Side light switch	High	Input
Dip / Low beam switch	Low	Input
Main / High beam switch	Low	Input
Dip / Low beam relay	High	Output
Main / High beam relay	High	Output
Front Fog lamp switch	High	Input
Rear Fog lamp switch	High	Input
Front Fog lamp relay	High	Output
Rear Fog lamp relay	High	Output

FRONT FOG LAMP OPERATION:

Front fog lamp relay will come ON if:

1. Ignition switch is ON.
2. Parking/side light switch or head lamp switch is ON.
3. Front fog lamp switch is ON.

Front fog lamp relay will go off if:

1. Ignition switch is off.
2. Parking/side light switch & head lamp switch both are off.
3. Front fog switch is off.

REAR FOG LAMP OPERATION:

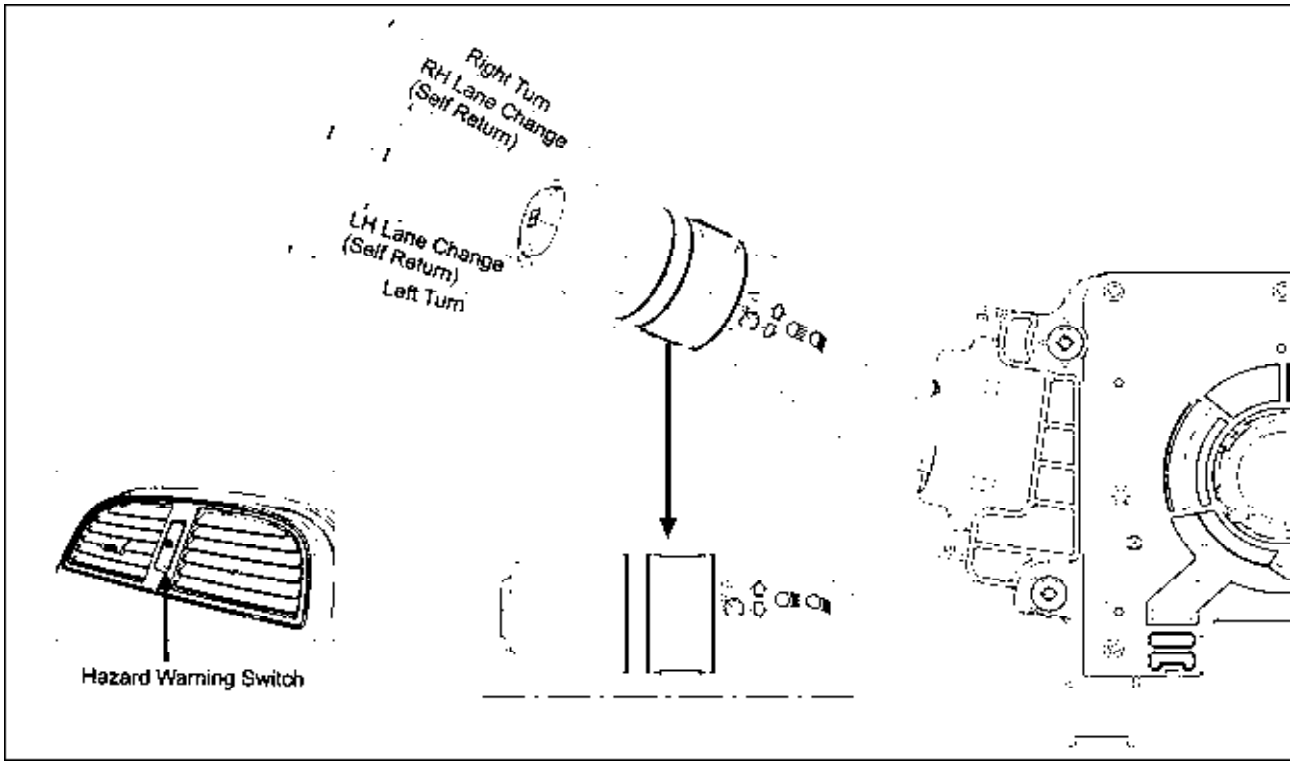
Rear fog lamp relay will come ON if:

1. Ignition switch is ON.
2. Parking/side light switch or head lamp switch is ON.
3. Front fog lamp switch is ON.
4. Rear fog lamp switch is ON.

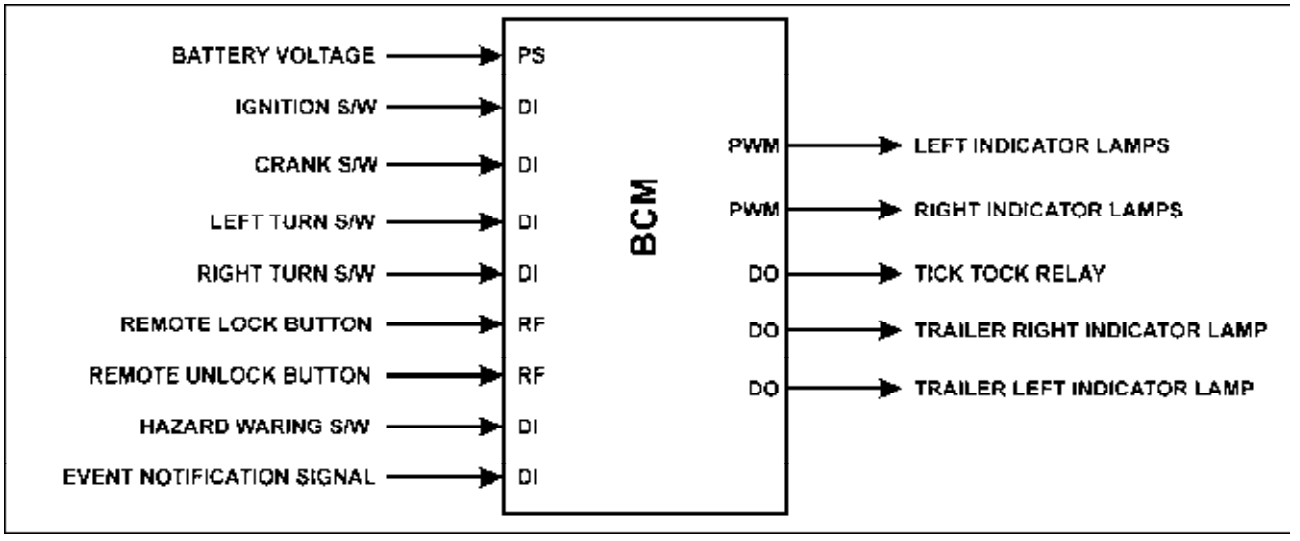
Rear fog lamp relay will go off if:

1. Ignition switch is off.
2. Parking/side light switch & head lamp switch both are off.
3. Front fog lamp switch goes off.
4. Rear fog lamp switch is off.

B.DIRECTION INDICATORS & HAZARD WARNING:



INPUTS/OUTPUTS DIAGRAM:



SIGNAL	LEVEL	TYPE
Battery Voltage	PS	Input
Ignition S/W	High	Input
Crank S/W	High	Input
Left turn S/W	Low	Input
Right turn S/W	Low	Input
Remote lock button	RF	Input
Remote unlock button	RF	Input
Hazard warning s/w	Low	Input
Event Notification Signal	Low	Input
Tick Tock relay	High	Output
Left indicator Lamps	High	PWM O/P
Right indicator Lamps	High	PWM O/P
Trailer Right indicator lamp	High	Output
Trailer Left indicator lamp	High	Output

A.RIGHT TURN INDICATOR:

Right indicator lamps of tractor - trailer & tick-tock relay outputs will come ON, if ignition is ON and indicator stalk is moved to right indicator position. (i.e. right turn switch is made ON). The right indicator lamps of tractor - trailer & tick-tock relay output will be turned ON & OFF with the frequency of 85 flashes per minute (90 ± 30 flashes per minute) (50 % duty cycle).

If trailer is present & bulb failure is detected either on Right indicator lamps of tractor or trailer then, frequency of flashing & tick tock relay will be changed to >140 flashes per minute (50% duty cycle).

If trailer absent & bulb failure is detected on Right indicator lamps of tractor then frequency of flashing & tick tock relay will be changed to >140 flashes per minute (50% duty cycle).

If the indicator stalk is moved to right indicator position, (right turn switch is made ON) for time 100mseconds to 700mseconds, right indicator lamps of tractor – trailer output will give 3 flashes (three flash mode). During three flash modes if the user moves the indicator stalk to the same side (i.e. right turn switch made ON again) for time period 100mseconds & 700mseconds, the current three flashes mode is completed & indicator stalk movement is ignored.

If the indicator stalk is moved to right indicator position (right turn switch is made ON) for more than 700mseconds or less than 100 msec. time

100mseconds time period then 3 flashing mode get cancel.

During three flash modes, if the user moves the indicator stalk to the opposite side (i.e. left turn switch is made ON), the current three flash modes will be cancelled immediately. If the indicator stalk remains in that position (i.e. left turn switch is made ON) for the time period 100mseconds to 700mseconds, left indicator lamps of tractor - trailer and tick-tock relay output will give three flashes (three flash mode).

B.LEFT TURN INDICATOR:

Left indicator lamps of tractor - trailer & tick-tock relay outputs will come ON, if ignition is ON and indicator stalk is moved to left indicator position. (i.e. left turn switch is made ON). The left indicator lamps of tractor - trailer & tick-tock relay output will be turned ON & OFF with the frequency of 85 flashes per minute (90 +/- 30 flashes per minute) (50 % duty cycle).

If trailer is present & bulb failure detected either on Left indicator lamps of tractor or trailer, frequency of flashing & tick tock relay will be changed to >140 flashes per minute (50% duty cycle).

If trailer is absent & bulb failure detected on Left indicator lamps of tractor, frequency of flashing & tick tock relay will be changed to >140 flashes per minute (50% duty cycle).

If the indicator stalk is moved to left indicator position (left turn switch is made ON) for time period 100mseconds to 700mseconds, left indicator lamps of tractor - trailer output will give 3 flashes (three flash mode). During three flash modes if the user move the indicator stalk to the same side (i.e. left turn switch made ON again) for time period 100mseconds & 700mseconds, the current three flashes mode is completed & indicator stalk movement is ignored.

If the indicator stalk is moved to left indicator position (left turn switch is made ON) for more than 700mseconds or less than 100mseconds time period then 3 flashing mode get cancel.

During three flash modes, if the user moves the indicator stalk to the opposite side (i.e. right turn switch is made ON), the current three flash modes will be cancelled immediately. If the indicator stalk remains in that position (i.e. right turn switch is made ON) for the time period 100mseconds to 700mseconds, right indicator lamps of tractor - trailer and tick-tock relay output will give three flashes (three flash mode).

If the bulb failure is detected (in trailer present/not present condition), 6 flashes will be given instead of 3 flashes during three flash modes. Exterior directional indicator lamps failure (one lamp failure) detection will be inhibited when the battery voltage is below 8V (under voltage) or above 16V (over voltage) or vehicle power state is crank.

NOTE:

Four flashes are required to detect one lamp failure condition.

Trailer turn indicator lamps will be made ON, if trailer is detected (connected).

TRAILER DETECTION LOGIC:

On every Ignition cycle, trailer indicator lamps (Left – Right) are made ON for brief time. If trailer detection fails on Ignition ON, then it will be tried on every left or right turn input for that ignition cycle, respective trailer lamp is made ON only once.

ON time of trailer lamp is dependent on the respective tractor indicator lamps ON time. Provided Ignition be ON.

C.HAZARD WARNING:

When Hazard warning switch is made ON, right-left direction indication lamps of tractor – trailer & Tick-tock relay outputs will start flashing simultaneously. All mentioned outputs will be turned ON & OFF with the frequency of 85 flashes per min (90 +/- 30 flashes per min) (50% duty cycle). Flashing rate should not change under failure of any of the lamps.

Hazard warning function deactivated, if Hazard warning switch is made OFF. Hazard function will override right turn or left turn function.

During Hazard ON condition, if user press lock or unlock key on the remote, flashing period (ON-OFF) time of all outputs will get changed, if lock button on remote is press, two long flashes (500mseconds ON. 500mseconds OFF) will be given. Or if unlock button on remote is press single long flash (1500mseconds ON & 500mseconds OFF) will be given.

D ENS (EVENT NOTIFICATION SIGNAL):

Event notification signal is a digital type.

On Ignition input, BCM receive Event Notification Signal from ACU. BCM starts monitoring ENS for initial 6sec period and then ignore ENS for next 2sec period. If BCM observe or receive active low signal for brief time during initial 6sec period, then Inertia input will be ignored for that entire Ignition cycle or Inertia functionality will be disabled for that Ignition cycle.

After completing initial 8sec period of ENS, BCM again start monitoring for 100msec active low ENS signal for that Ignition cycle. If BCM gets 100msec active low ENS signal BCM unlock all the actuators & start flashing until next ignition cycle.

ENS functionality will override the Left turn, Right turn and Hazard functionality.

NOTE:

In case of accidents BCM receive activated Event notification signal.

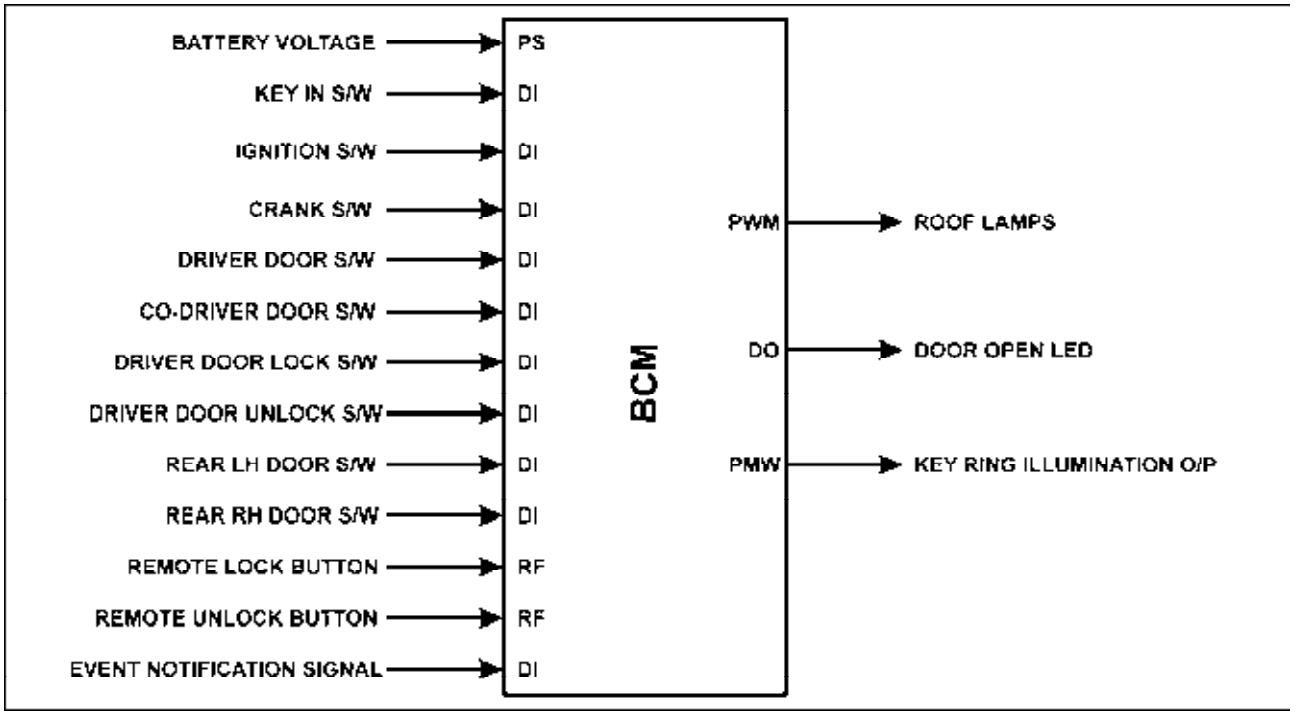
3. INTERIOR LIGHTING:

Interior lighting covers the following lighting functions:

- Roof mounted interior lighting.
- Key hole illumination.

Interior Lighting is active in all Vehicle Power States.

INPUT/OUTPUT DIAGRAM:



SIGNAL	LEVEL	TYPE
Battery Voltage	PS	Input
Key in switch	High	Input
Ignition switch	High	Input
Crank	High	Input
Driver door switch	Low	Input
Co-Driver door switch	Low	Input
Driver door lock switch	Low	Input
Driver door unlock switch	Low	Input
Rear left door switch	Low	Input
Rear right door switch	Low	Input
Event Notification Signal	Low	Input
Remote lock button	RF	Input
Remote unlock button	RF	Input
Door open LED	Low	Output
Roof lamp	High	PWM O/p
Key ring illumination output	High	PWM O/P

A. ROOF MOUNTED INTERIOR LIGHTING:

When ignition is ON, Door Open LED will come ON as soon as any of the doors (except bonnet) is opened. If door open LED is ON & ignition turns to OFF then door open LED will turn OFF, also door Open LED will turn OFF when all doors are closed. This functionality will work even though battery voltage is below 10.5 volts.

Roof lamp will be made ON in 3 seconds gradually if any door is opened (theatre illumination). The roof lamp will remain ON for 30 seconds after all doors are closed & then goes OFF in 3 seconds gradually (theatre dimming).

If any door is opened, Roof lamp made ON for 10min. Before completion of 10 mins, if another door (except bonnet) is opened then roof lamp ON time will be inhibited for next 10 mins. Provided ignition is OFF.

Roof lamp will be made ON in 3 seconds gradually if unlock button on remote is pressed & ignition is OFF (theatre illumination).

Once all doors are closed & roof lamp is ON for 30 seconds & any of the doors is reopened within this period, then timer will be inhibited for 10 minutes until all doors are again closed provided ignition is OFF.

Roof lamp is OFF after 10 minutes & all doors are now closed. Roof lamp will brighten to ON & remain ON for 30 seconds before dimming to OFF, provided ignition is OFF.

When vehicle state changes from ignition to key out roof lamp will brighten to ON, provided all doors are closed. If any door is open & ignition is ON, roof lamp will remain continuously ON, even if battery voltage goes below 10.5 volt.

If any door is open, ignition is ON & roof lamp is ON, then closing the door make roof lamp OFF in 3 seconds (theatre dimming effect).

If vehicle get successfully locked through remote roof lamp goes off with theatre dimming effect.

Roof lamp will not work if battery voltage remains below 10.5 volts for 10 seconds or more. This function will continue to work again if battery voltage comes above 11 volts.

Event Notification Signal Strategy:

Ignition is ON and 8 sec period of ENS signal initialization is over. Then Roof lamp will be made ON for entire Ignition cycle, if BCM receive the 100msec active low ENS signal.

NOTE:

In case of accidents BCM receive activated Event notification signal.

B. KEY HOLE ILLUMINATION:

Key ring illumination output will come ON when,

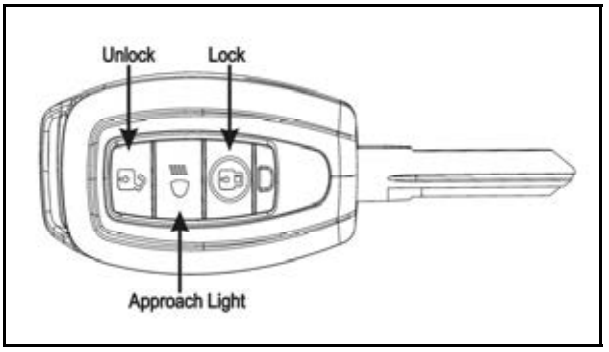
a) Key is out & driver door actuator is unlock and

b) Driver door is opened.

Key ring illumination output become ON(0-100% intensity) & goes OFF (100 – 0 % intensity) in 2 seconds with theatre dimming effect. Key ring illumination output will be switched OFF when ignition is ON or vehicle is successfully locked through remote or 60 seconds are over. If key ring illumination output is ON/OFF & driver door is open, closing the driver door will make key ring illumination output ON for 60 seconds, provided vehicle is unlock. If vehicle is lock the key ring illumination output will not come ON.

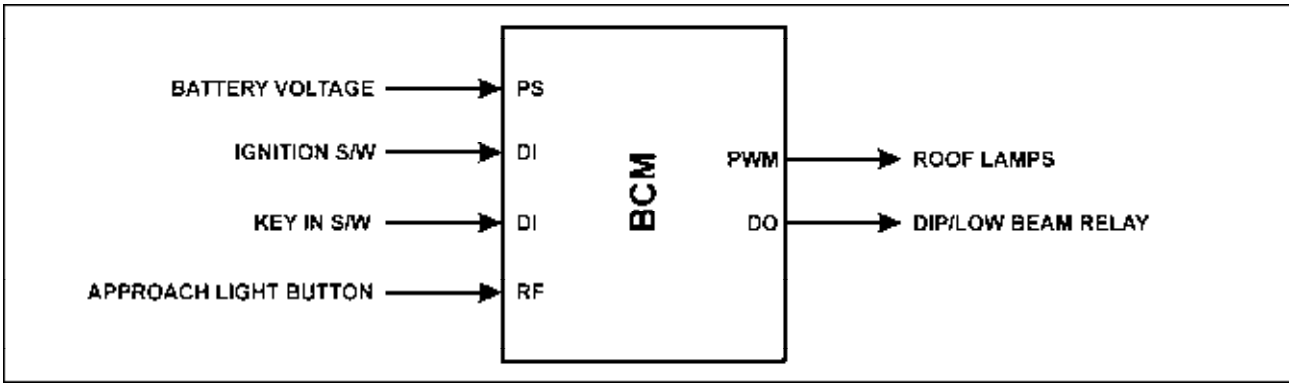
4. CONVENIENCE:

A.APPROACH LIGHTS:



If key is out & approach light button on remote is pressed, dip/low beam relay & roof lamp outputs are made ON. All output lights are made OFF, if ignition is made ON or 30 seconds are over or approach light button on remote is pressed again, provided those outputs are not driven by other cause. Roof lamp will come ON with theatre dimming effect & goes OFF with theatre dimming effect, provided it is not driven by other inputs. If Force Panic is active, first approach light button press will cancel Force Panic & do not lead to activation/deactivation of the function. This function cannot be activated, if battery voltage is below 10.5 volt.

INPUT/OUTPUT DIAGRAM:



SIGNAL	LEVEL	TYPE
Battery	PS	Input
Ignition switch	High	Input
Key in switch	High	Input
Approach light button	RF	Input
Dip / Low beam relay	High	Input
Roof lamp	High	PMW O/P

B.HEATED REAR WINDOW:

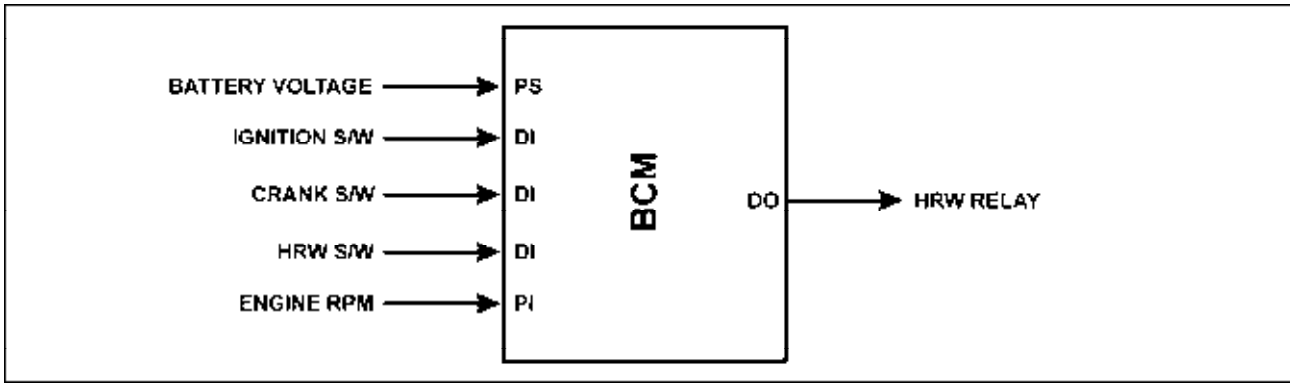
If HRW relay is OFF and HRW Switch is pressed for at least 100 ms and Battery Voltage is more than 10.5 V and Engine RPM is more than idle RPM (600 RPM) and Ignition is ON then HRW Relay is switched ON. If HRW Relay is ON and 15 minutes has passed since HRW Relay was made ON or HRW switch is pressed for at least 100 ms or Battery Voltage is below 10.5 V for 10 s or Ignition is turned OFF or Engine RPM is less than idle RPM (600 RPM), then HRW Relay is switched OFF.

If Heated Rear Window is cancelled, the heated rear window relay output is immediately switched off and, where necessary, the heated rear window timer is reset. When crank is made ON Heated Rear Window output is paused, Heated Rear Window output will resumes its normal operation when crank goes OFF.

NOTE:

Idle RPM value 600 is only threshold value, to confirm that engine is running.

INPUT/OUTPUT DIAGRAM:

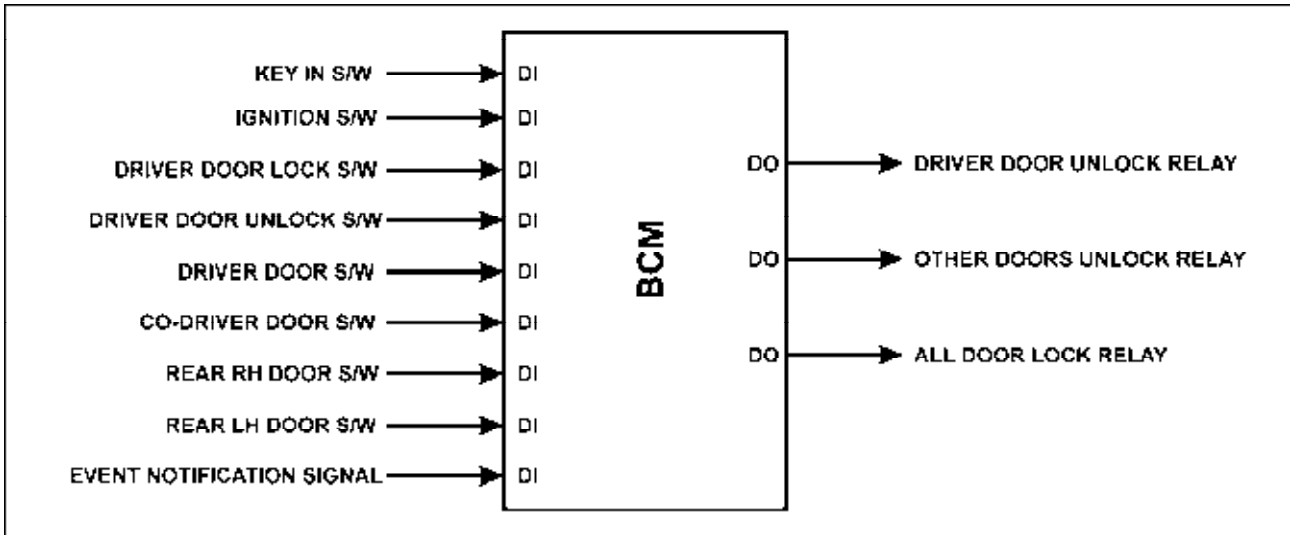


SIGNAL	LEVEL	TYPE
Battery	PS	Input
Ignition switch	High	Input
Crank switch	High	Input
HRW switch	Low	Input
Engine RPM	PI	Input
HRW relay	High	Output

5. LOCKING & SCEURITY:

A.CENTRAL DOOR LOCKING:

INPUTS/OUTPUTS DIAGRAM:



SIGNAL	LEVEL	TYPE
Key In switch	High	Input
Ignition switch	High	Input
Event Notification Signal	Low	Input
Driver Door Lock switch	Low	Input
Driver Door Unlock switch	Low	Input
Driver door switch	Low	Input
Co-Driver Door switch	Low	Input
Rear Right Door switch	Low	Input
Rear Left Door switch	Low	Input
Odometer signal (Vehicle speed)	PWM	Input
Driver Door Unlock Relay	Low	Output
Others Door Unlock Relay	Low	Output
All Doors Lock Relay	Low	Output

a. Unlocking:

When vehicle is unlock manually from driver door, driver door and other doors unlock relay will be made ON briefly and all actuators get unlock.

b. Reverse cycling:

When vehicle is lock manually from driver door, all doors lock relay will be made ON briefly and all actuators get lock, provided all doors are closed. If any door is open (except driver door and bonnet) and vehicle is tried to lock manually from driver door, then actuators are driven to lock position and again back to unlock position immediately.

NOTE:

Bonnet door is not considered for reverse cycling.

c. End of Line Configurable Feature: Speed Base One Time Auto Drive Away Locking

When ignition is ON & Vehicle speed goes above 12 kmph, all doors will get lock after 1 second provided all doors are closed. In single ignition cycle only one time auto locking will takes place.

Vehicle is lock & ignition is ON, if key is taken out from key ignition barrel, driver door & other doors unlock relay will be made ON briefly & all actuators get unlock immediately.

d. End of Line Configurable Feature: Speed Base Multiple Time Auto Drive Away Locking

If ignition is turned ON & vehicle speed goes above 12 kmph, all doors will get lock after 1 second, provided all doors are closed. If ignition is ON & speed is above 12 kmph, on door open to close action vehicle will get auto lock after 3 seconds, provided all doors are closed.

Vehicle is unlock & ignition is ON, vehicle speed goes below 12 kmph & again goes above 12 kmph, vehicle get auto lock after 1 seconds, provided all doors are closed. Vehicle is locked & ignition is ON, if key is taken out from key ignition barrel, driver door and other doors unlock relay will be made ON briefly & all actuators will get unlock. Auto locking will not take place, if master actuator is open.

e. ENS Strategy:

Ignition is ON and 8 sec period of ENS signal initialization is over. Then BCM will unlock all the actuators, if BCM receive the 100msec active low ENS signal.

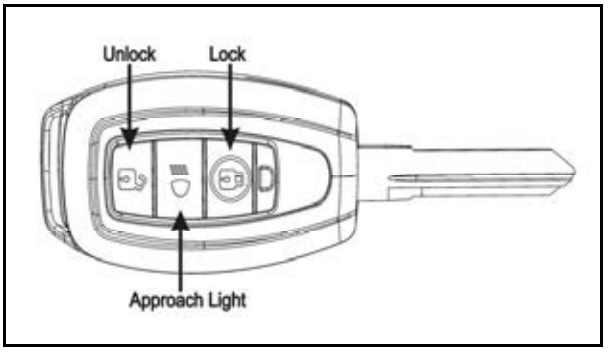
NOTE:

1. *In case of accidents BCM receive activated Event notification signal, central door locking will not be possible until ENS is present.*
2. *Thermal cut off feature is provided with central door locking.*
3. *Co-driver door actuator will not lock, if that door is open.*
4. *Driver door actuator will not lock, if driver door is open.*

B.REMOTE KEYLESS ENTRY (*RKE*):

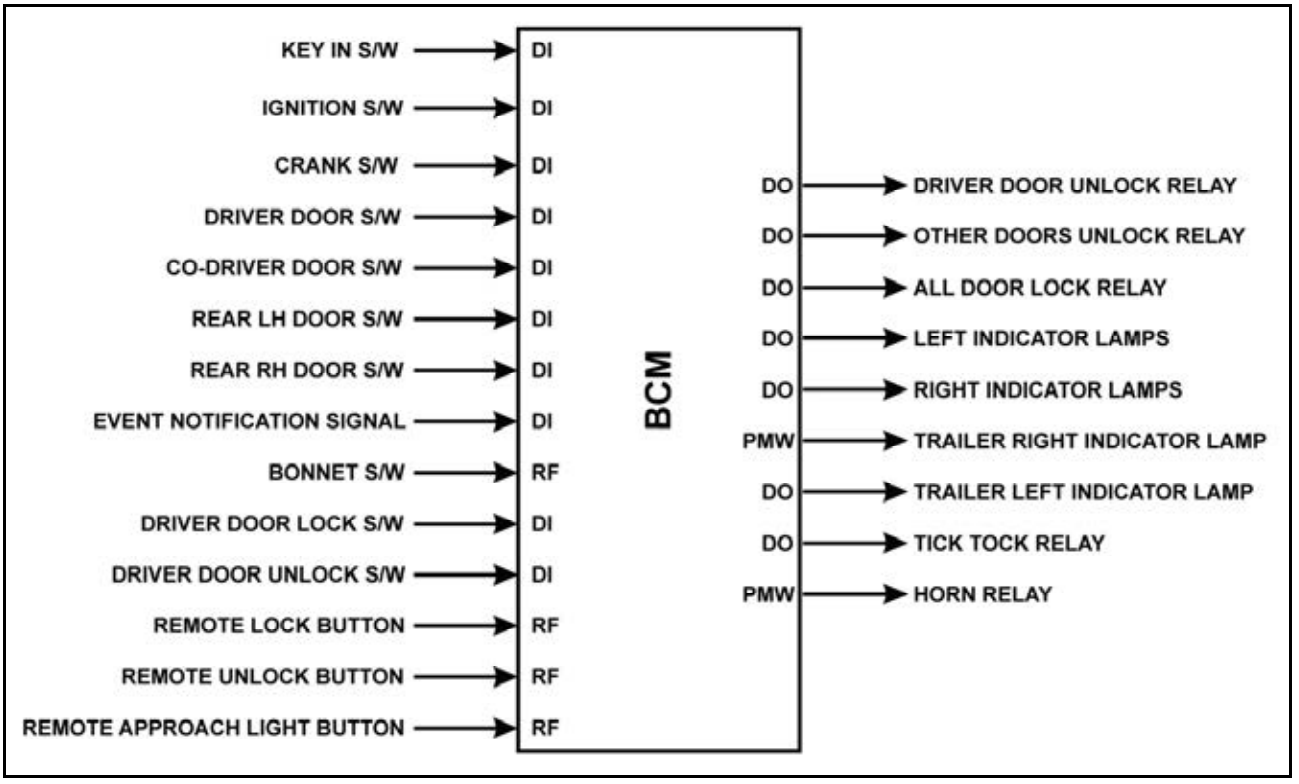
Remote key is having 3 buttons:

- Unlock
- Approach light
- Lock



INPUT/OUTPUT DIAGRAM:

SIGNAL	LEVEL	TYPE
Key In S/W	High	Input
Ignition S/W	High	Input
Crank S/W	High	Input
Co-Driver Door S/W	Low	Input
Driver Door S/W	Low	Input
Rear Right Door S/W	Low	Input
Rear Left Door S/W	Low	Input
Driver Door Lock S/W	Low	Input
Driver Door Unlock S/W	Low	Input
Co-Driver Door Lock S/W	Low	Input
Co-Driver Door Unlock S/W	Low	Input
Remote Lock Button	RF	Input
Remote Unlock Button	RF	Input
Tailgate S/W	Low	Input
Inertia S/W	High	Input
Bonnet S/W	Low	Input
Head Lamp Switch	High	Input
All Door Lock Relay	Low	Output
Driver Door Unlock Relay	Low	Output
Other Doors Unlock Relay	Low	Output
Left Indicator Lamps	PWM	Output
Right Indicator Lamps	PWM	Output
Left Indicator Tell Tale	High	Output
Right Indicator Tell Tale	High	Output
Horn	Low	Output
Parking/Side Light Switch	High	Output
Dip/Low Beam Relay	High	Output



NOTE:

Whenever flashes are given, both the tractor – trailer Indicator lamps are made ON.

a. End of Line Configurable Feature: - Reverse Cycling:

Pre Condition: - Key is out

If actuator(s) is unlock & lock button is pressed on remote, then actuators get lock & RKE state will change to lock state. On completion of successful lock operation two flashes (250 msec ON, 250 msec OFF) will be given.

If lock button is pressed on remote & driver door actuator is fail (i.e. stuck to unlock position or open), mislock sound will be given & vehicle state will be unlocked. If lock button on remote is pressed & driver door is open (other doors are closed), mislock sound will be given. Then all actuator get locks and only Driver door actuators gets unlock immediately. Provided two stage unlocking is configured in the BCM and vehicle remains in the unlock state.

If lock button on remote is pressed & any other door is open (except driver door), mislock sound will be given. All actuators get lock and again unlock immediately, vehicle remains in unlock state.

During lock operation, if unlock button on remote is pressed, after completing lock operation it will respond to unlock button press.

After successful lock operation if any door is open, then remote lock request will be ignored. After closing, all the doors if user press locks button on remote all actuators will get lock & two flashes will be given. In this condition, bonnet input is not considered.

NOTE:

1) Mislock sound time is 50ms.

2) Bonnet door is not considered for reverse cycling.

b. End of Line Configurable Feature: Single Stage Unlocking:

Pre Condition: - RKE is in lock state & unlock button is pressed on remote.

Driver door & other doors unlock actuators are made ON & RKE state change to unlock state. A successful unlocking operation is acknowledged by giving single flash (750mseconds ON, 250mseconds OFF).

During unlock operation, if lock button on remote is pressed, after completion of unlock operation it will respond to remote lock request. During unlock operation, if unlock button on remote is pressed, it will be ignored.

c. End of Line Configurable Feature: Two Stage Unlocking:

Pre Condition: - RKE is in lock state & unlock button on remote is pressed

Driver door actuator gets unlocked & RKE state changes to unlock state. After completing driver door actuator's unlock operation, if user presses again unlock button on remote, all actuator get unlock. RKE will remain in unlock state. A successful unlock operation is acknowledged by giving single long flash (750mseconds ON, 250mseconds OFF).

During unlock operation, if lock button on remote is pressed, after completion of unlock operation it will respond to remote lock request. During unlock operation if unlock button on remote is pressed it will be ignored.

No feedback is given on successful unlock operation if actuator is faulty.

d. Locate:

Vehicle is in lock state & lock button on remote is press, 2 flashes (250mseconds ON, 250mseconds OFF) will be given without changing the RKE state. During locate operation, if unlock button on remote is pressed. After completing two flashes, it will respond to unlock button press.

NOTE:

Locate mode is used to locate vehicle in parking area.

e. ENS Signal Strategy:

Ignition is ON and 8 sec period of ENS signal initialization is over. Then BCM will unlock all the actuators, if BCM receive the 100msec active low ENS signal.

NOTE:

In case of accident BCM receive activated Event notification signal. Remote locking will not be possible until ENS is present.

f. End of Line Configurable Feature: Auto Relocking:

Pre Condition: - Vehicle is in Lock State & Unlock Button on remote is pressed.

After unlock operation through remote, if

1) Door is not opened or

2) Key In is not sensed or

3) Ignition is not detected and

45 seconds time has elapsed from last unlock key press on remote, doors actuator will get relock. 45 seconds timer reset after every remote unlock request. If key in or Ignition input is present or ENS is present, the lock button press on remote is ignored. RKE state remains unchanged and no feedback will be given. If Key In or Ignition input is present, the unlock button press on remote should result in normal functionality as mentioned above. RKE will enter in unlock state.

g. Disarm State:

If vehicle is in arm or pre arm state (i.e. vehicle state is lock) & remote unlock button is pressed. Vehicle goes in disarm state. During 20 seconds pre arm state, if ignition or crank is made ON vehicle returns to disarm state.

Vehicle goes in disarm state, if vehicle is in unlock state due to: -

1) Reverse Cycling

2) On ENS Activation

NOTE:

Theft cannot be detected in disarm and pre-arm state.

h. Pre Arm State:

On remote lock button press, the vehicle changes the state from disarm to 20 seconds pre arm. When vehicle get auto relock after 45 seconds vehicle will enter into pre – arm state, if it was unlocked from pre arm state (provided auto relock feature is enable).

i. Arm State & Theft State:

Vehicle enters in arm state, after completion of 20 seconds time period of pre arm state. VAS starts hooting for 27 seconds & flashing for 4 mins 30 secs due to any of the following conditions: -

1) On close to open door transition.

2) Ignition is made ON.

3) Crank input is made ON.

When vehicle get auto relock after 45 seconds vehicle enter in arm state if it was unlocked from arm state (provided auto relock feature is enable).

During 20 seconds pre arm state, if lock & unlock button on remote is pressed simultaneously. Force Panic state get activated, on pressing lock/unlock button on remote vehicle will enter into arm state.

Vehicle is in arm state, battery is removed or power is made OFF & then door is opened or ignition is made ON, power ON will active theft alarm indicators. Vehicle is in theft state (hooting/flashing is ON), power is made OFF/ battery is removed, if power is made ON again, theft condition (hooting & flashing) will be activated.

NOTE:

A maximum of 10 alarm sequences (theft conditions) can be detected in same arm state. Once the vehicle goes in disarm state, the counter resets to zero.

C.REMOTE LEARNING:

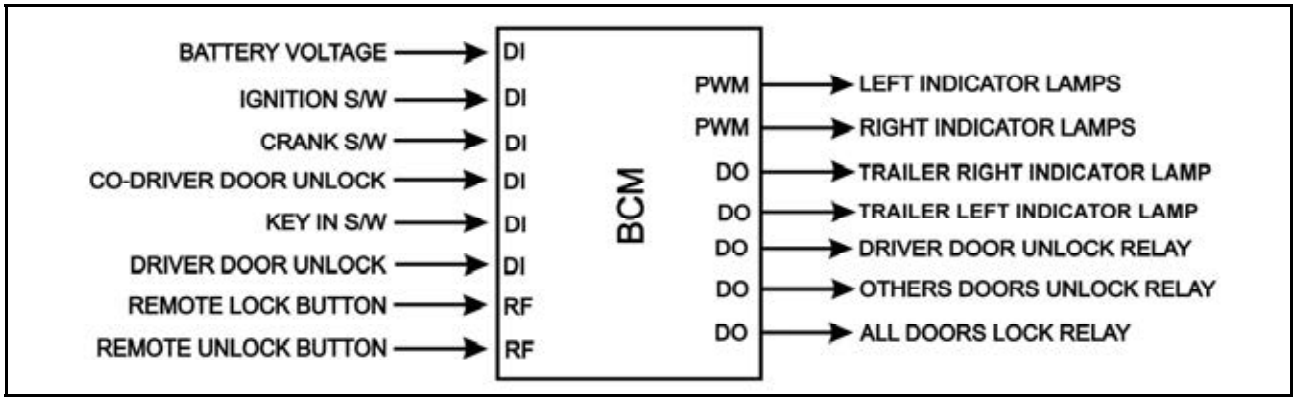
j. Force Panic:

When both remote lock & remote unlock buttons on remote are pressed simultaneously Force Panic state gets activated. Hooting & flashing will start simultaneously. The hooting & flashing can be stopped by either lock or unlock or approach button press. It will return to disarm state if Force Panic is activated from disarm state; otherwise it will go in arm state.

NOTE:

During Force Panic state, if lock or unlock button on remote is pressed. It will stop Force Panic indication &no actuator operation take place.

INPUT/OUTPUT DIAGRAM:



SIGNAL	LEVEL	TYPE
Battery Voltage	High	Input
Key-In switch	High	Input
Ignition switch	High	Input
Crank switch	High	Input
Driver Door Unlock	Low	Input
Co-Driver Door Unlock	Low	Input
Remote Lock Button	RF	Input
Remote Unlock Button	RF	Input
Left Indicator Lamps	PWM	Output
Trailer right indication lamp	PWM	Output
Trailer left indication lamp	High	Output
Right Indication Tell Tale	High	Output
Driver Door Unlock Relay	Low	Output
All Doors Lock Relay	Low	Output
Others Doors Unlock Relay	Low	Output

LEARNING PROCESS OF NEW REMOTE AT USER END:

1. Driver door should be unlock, insert key into ignition barrel. Turn ignition “OFF to ON & ON to OFF” 4 times in 6 seconds Two flashes of Tractor and Trailer left-right indication lamps will be given.

NOTE:

If crank is made ON remote learning procedure will be canceled.

2. After two flash, to learn the remote press lock & unlock button on remote simultaneously, within 10 seconds that remote will get learn with that BCM & all previously learnt remote will get unlearn.

Left – right turn direction lamps of Tractor and Trailer flashes twice at the same time and door actuators move to lock position & back to unlock position, as a confirmation that remote is learnt.

3. To learn next remote repeat the step 2 within 10 sec.

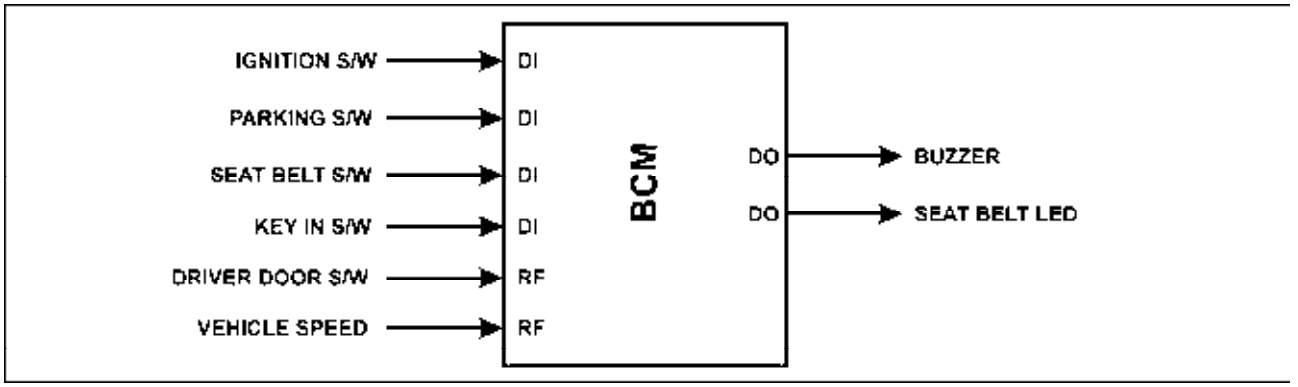
4. Remote key learning end with single long flash if, ignition is made ON or 10 seconds are over or maximum numbers of remote keys are learnt.

NOTE:

Maximum 4 RF keys may be learnt to a BCM at any one time.

D.AUDIABLE WARNING:

INPUT/OUTPUT DIAGRAM:



SIGNAL	LEVEL	TYPE
Ignition switch	High	Input
Parking switch	High	Input
Set belt switch	High	Input
Key-In S/W	High	Input
Driver Door switch	Low	Input
Vehicle speed	PI	Input
Buzzer	Low	Output
Seat belt LED	Low	Output

a. Lights on warning:

Lights on warning, is only active in Vehicle Power State OFF. If the vehicle exterior lights are illuminated (parking lights) due to rotary switch and the driver door is open, the buzzer will sound continuously with 1.43Hz to warn the driver that the lights are on.

The buzzer is cancelled when:

1. The lights are switched OFF OR

2. The driver’s door is closed OR

3. Vehicle Power State changes to IGNITION, RUN or CRANK.

b. Key in warning:

Key In warning is only active in Vehicle Power State OFF. If the key in switch indicates that the key is in the ignition and the driver's door is open, the buzzer will sound continuously with 2.5Hz to warn the driver that the key is in the ignition.

The buzzer is cancelled when:

1. The key is removed. OR

2. The driver's door is closed OR

3. Vehicle Power State changes to IGNITION, RUN or CRANK.

c. Seat Belt Warning:

Seat Belt functionality is applicable only for the driver seat. Seat Belt warning lamp will be controlled by BCM as follows:-

1. For the Seat belt warning lamp, initial LED health check is done for 3 seconds for each ignition cycle.

1. Initial Signal Requirements:

Seat belt is not fastened and vehicle speed is less than 16 KMPH, Buzzer and Seat belt warning LED will start flashing with 1Hz frequency & 50 % duty cycle for 6 seconds. After completion of the flashes seat belt tell tale shall be made on continuously. Signal shall start immediately after the ignition is switched ON and initial LED health check is done.

In one of the following conditions the warning sequence is stopped and the lamp is made OFF.

1. Seat belt is fastened.

2. The vehicles ignition is turned off.

If there is any change of status in seat belt wearing – "buckled to unbuckled" the lamp shall be made ON continuously without audio signal. The change of status signal is required if ignition is made ON and vehicle speed is less than or equal 16kmph.

During initial signal, if the vehicle speed is exceeded the 16 kmph, then initial signal continues for 6 sec, after that seat belt tell tale lamp will be made ON for 24 sec with buzzer OFF, then final signal start(final signal is explained below).

2. Final Signal Requirements:

The signal is triggered when the vehicle is in RUN/START mode, the vehicle speed is greater than 16km/h and driver seat belt is unfastened.

The final signal sequence start with buzzer and seat belt warning LED will start flashing at 1 Hz with 50 % duty cycle for a 6 seconds period. After completion of the flashes Seat Belt Warning LED shall be made ON continuously without buzzer for 24 seconds. This warning sequence (6 seconds of flashing the seat belt warning LED and Buzzer, 24 seconds of seat belt warning LED ON and Buzzer OFF) shall be repeated. Until seat belt is fastened.

Once the final signal sequence is started and subsequently if the vehicle speed drops below 10 km/h then the final signal sequences shall be stopped and seat belt warning LED shall be made ON continuously without buzzer.

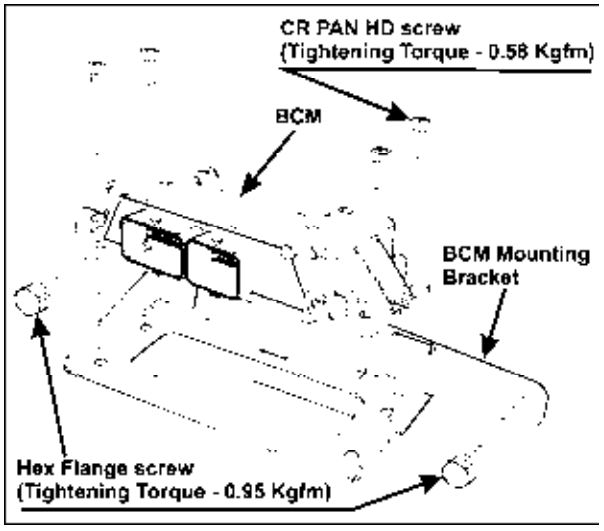
In one of the following conditions the final signal sequence is stopped and the seat belt warning LED is made OFF

1. Driver fastens the seat belt or

2. The vehicles ignition is turned off.

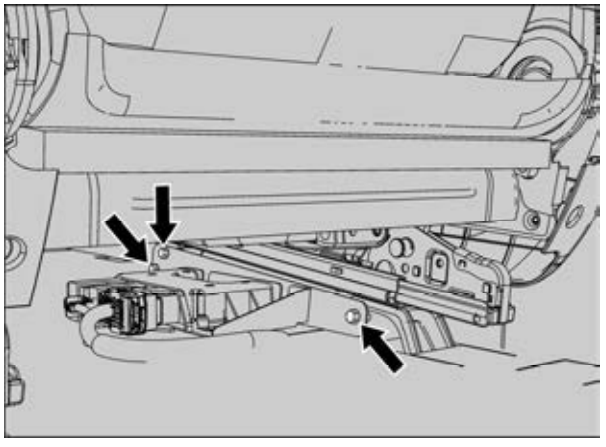
If during the journey, after final signal has stopped, if any change of status in seat belt wearing – "buckled to unbuckled" the final signal cycle shall start immediately if the vehicle speed is greater than 16kmph.

FITMENT DETAILS:

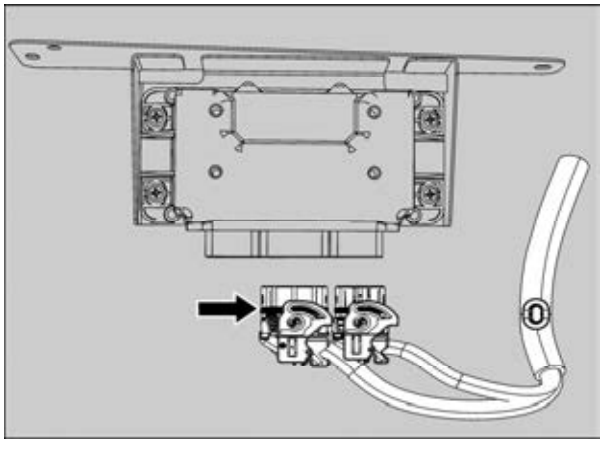


REMOVAL:

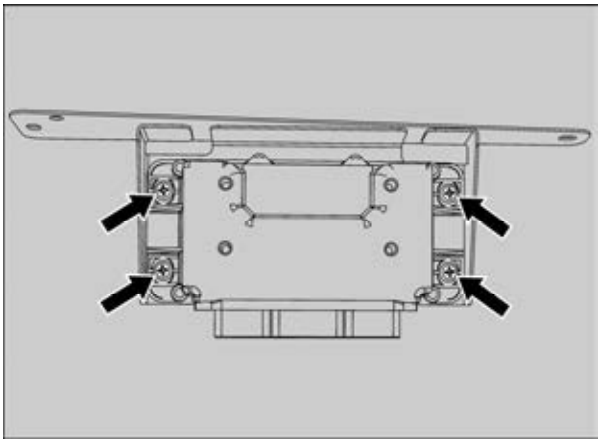
1. Loosen and remove the three screws of BCM mounting bracket.



2. Remove the electrical connector of BCM.



3. Loosen and remove the four screws of BCM mounting.



4. Take out the BCM from Vehicle.

REFITMENT:

1. Fit the BCM on mounting bracket mounted using four screws.

   Tightening torque for nuts - 0.58 kgfm.

2. Connect the electrical connector of BCM.
3. Fit the BCM mounting bracket on using three screws.

   Tightening torque for nuts - 0.95 kgfm.

14 IMMOBILIZER SYSTEM

1. DESCRIPTION:

Immobilizer system is designed to prevent vehicle theft by electronically disabling the engine starting system. The engine can be started only with vehicle's original immobilizer ignition key, which has an electronic identification programmed code.

Immobilizer unit (*ICU*) is an add-on part on the ignition switch, fitted on the steering column. The engine can be started only with the vehicle's original immobilizer ignition key. The electronic key communicates the identification code to ICU when the key is turned to the "Ignition ON" position.

Immobilizer comes with two Electronic keys (*E-key*).

! CAUTION

As CAN communication protocol doesn't work beyond 18V, vehicle will not start under "Jump Start with voltage > 18 V" conditions.

ABBRIVATIONS:

SCL - Steering Column Lock

ICU - Immobilizer control unit

EMS - Engine management system

ECU - Electronic control unit

DTC - Diagnostic Trouble Code

E-Key - Electronic Key (*With transponder*)

W/H - Wiring Harness

BCM - Body Controller Module

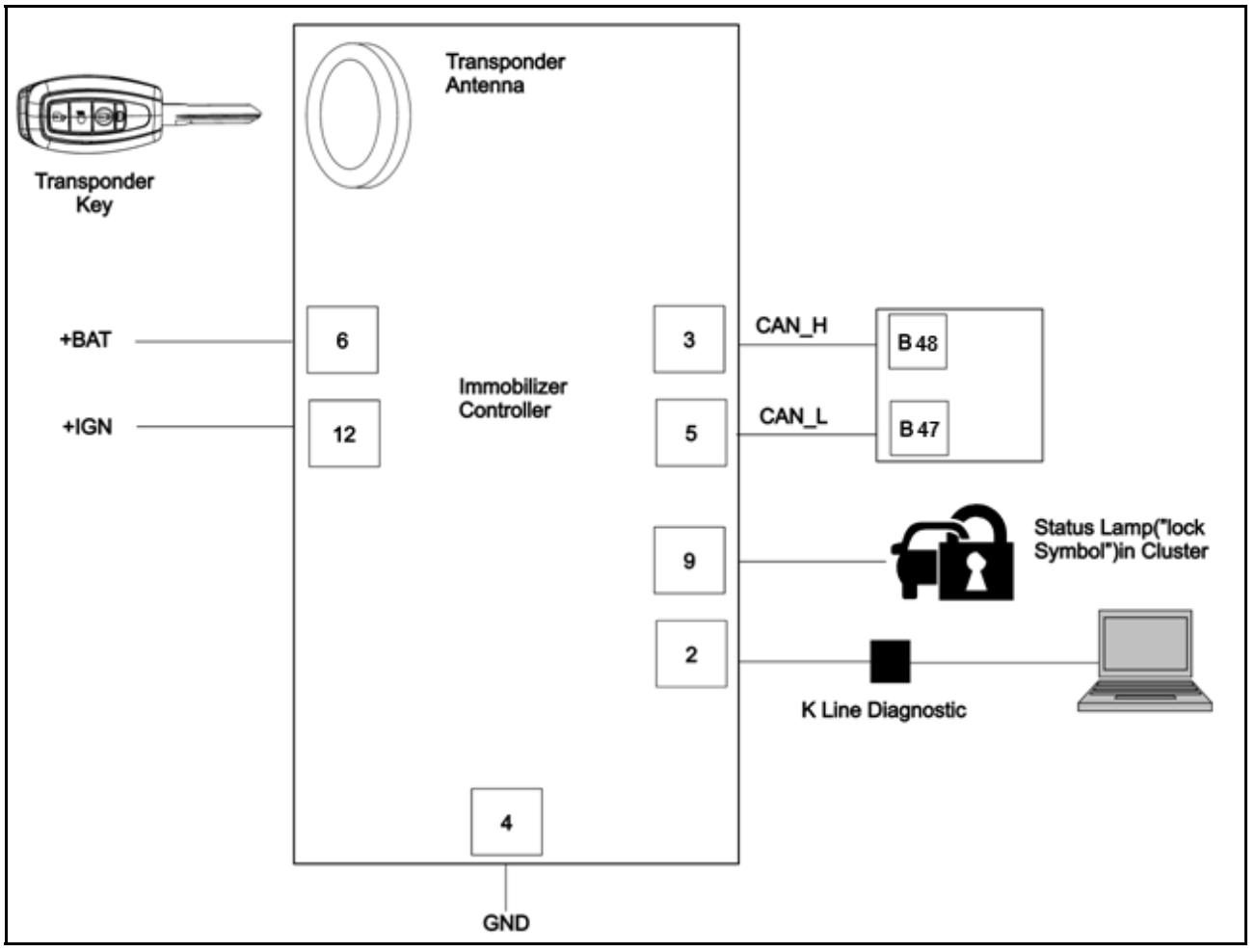
CAN_L - CAN Low

CAN_H - CAN High

2. BASIC SPECIFICATIONS:

1. Operating voltage range	: 8 V to 16 Vdc
2. Operating temperature range	: -40°C to +85°C
3. Storage Temperature range	: -40°C to +85°C
4. Standby current	: 0.6 mA typical. @13.5 Vdc
5. Vehicle mounting location	: Steering column along with ignition switch
6. Diagnostics	: KWP2000 protocol over k-line
7. Unlock Mechanism	: CAN 2.0B based

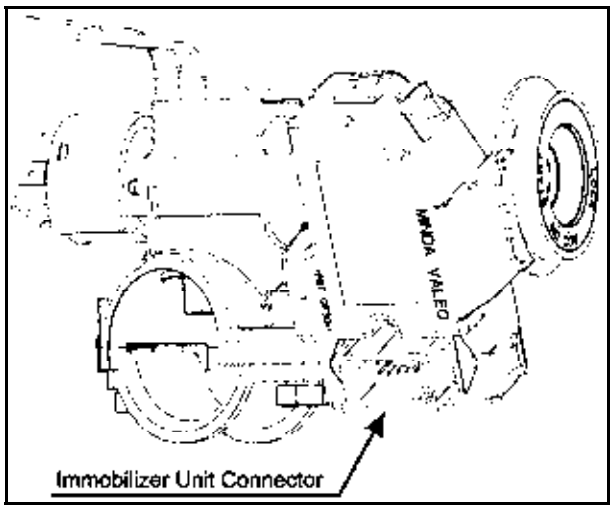
3.BLOCK DIAGRAM

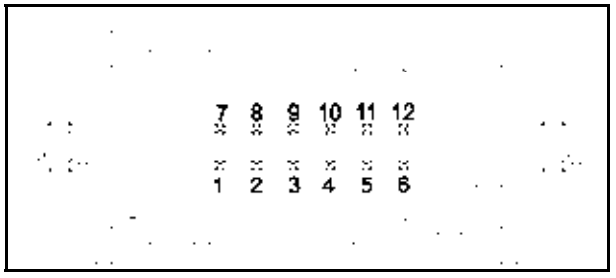


Immobilizer connector	Instrument cluster TATA XENON
Status lamp Pin 9	Pin 29

Immobilizer connector	EMS vehicle connector TATA XENON
CAN_H PIN 3	PIN B48
CAN_L PIN 5	PIN B47

4. IMMOBILIZER CONNECTOR & PINOUT DETAILS:





PIN NO	DESCRIPTION
1	NC
2	K-line Diagnostics
3	CAN_H
4	GND
5	CAN_L
6	Battery *(+12V*)
7	NC
8	NC
9	Status Lamp ("*lock symbol*") in cluster
10	NC
11	Light guide
12	Ignition *(+12V*)

5. IMMOBILIZER WORKING PRINCIPLE:

The EMS ECU and the immobilizer are paired together by an encrypted secret code called as "AES secret key", to improve the security of the vehicle. This AES secret key is generated using the vehicle identification number (*VIN*) and it is unique for each vehicle. Both immobilizer and the EMS ECU are programmed with same secret key for mutual authentication. If any one of EMS or ICU has different/wrong secret key, vehicle will be locked (*engine cannot be started*).

If EMS or Immobilizer is changed in a vehicle, it is required pairing operation (*EMS ECU & ICU programmed with same secret key*) for proper mutual authentication. The pairing of EMS and Immobilizer can be done through diagnostic tester.

Immobilizer comes with two Electronic keys (*E-key*). These E-keys are learned for that immobilizer and are unique to that Immobilizer & vehicle. The E-key of other vehicles will not work with this immobilizer and vice versa.

If anyone of the E-key is lost, it is recommended to approach authorized dealer for new E-key. It is possible to learn new keys with the help of diagnostic tester. *(Refer the key learning procedure).*

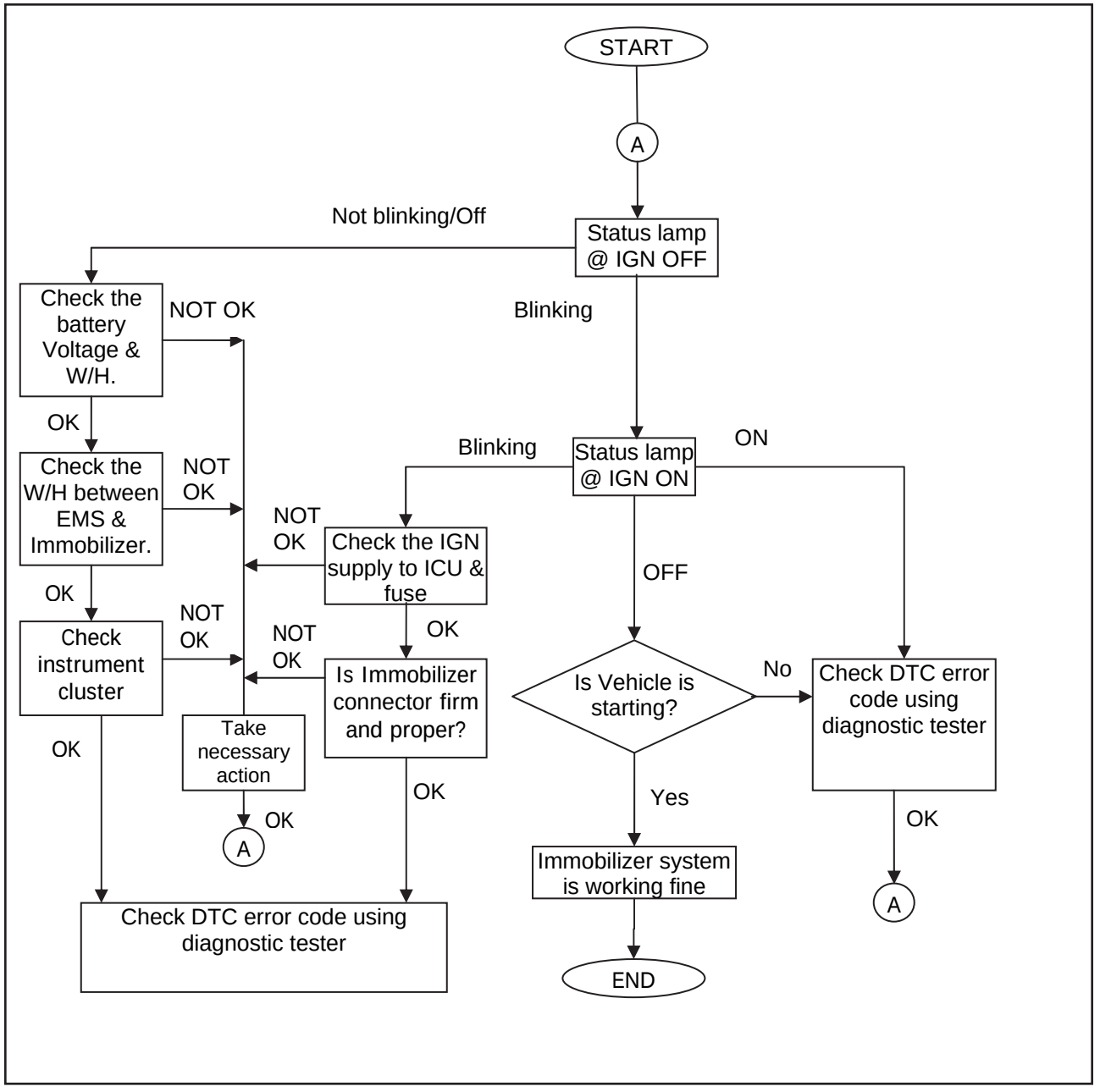
If both the keys are lost, it is not be possible to learn the new keys for that immobilizer, as original key is required during E-key learning operation.

Immobilizer system status on Starting:

- During Ignition off, immobilizer status lamp ("*Lock" symbol on the instrument cluster*) blinks, indicating Immobilizer is awaiting E-key.
- When the ignition key is turned to the "ON" position,

  1. If the status lamp goes OFF indicates that the system is working and the vehicle is unlocked (*Engine is ready to start*).
  2. If the status lamp is continuously ON, there may be something wrong with key or with the immobilizer system.

6. TROUBLESHOOTING THROUGH IMMOBILIZER STATUS LAMP



7. DIAGNOSTIC TROUBLESHOOTING TABLE FOR BOTH EMS & ICU, WITH DTCS

Following chart has useful information, under different operating conditions, which may occur on vehicle. This is valid for TATA XENON E - V EMS ECU

NO	SCENARIO (*BETWEEN IMMO & EMS*)	DTC CODES		STATUS LAMP ("*LOCK" SYMBOL*)		VEHICLE STARTING	REMARKS
		EMS	IMMO	IGN OFF	IGN ON		
1.	CAN_H wire open circuit	IVN DTCs	-	Blink	OFF	No	NO_RESPONSE and CAN_MUTE error
2.	CAN_L wire open circuit	IVN DTCs	-	Blink	OFF	No	NO_RESPONSE and CAN_MUTE error
3.	CAN_H & CAN_L wires swapped	IVN DTCs	-	Blink	OFF	No	CAN_OFF and CAN_MUTE error
4.	CAN_H & CAN_L short	IVN DTCs	-	Blink	OFF	No	CAN_OFF and CAN_MUTE error
5.	Both CAN_H & CAN_L open	IVN DTCs	-	Blink	OFF	No	Service Lamp come ON
6.	No battery supply to ICU	-	P0560 P0562	OFF	OFF	Yes	No degradation in Immo function
7.	No Ignition supply to ICU	U0167	-	Blink	Blink	No	Service Lamp come ON
8.	No Ground connection to ICU	U0167	P0560 P0562	OFF	OFF	No	Service Lamp come ON
9.	Different AES key code in EMS & ICU	U0426	U0401	Blink	ON	No	-
10.	Battery supply < 8V	U0426	P0560 P0562	Blink	OFF	No	-
11.	Battery supply > 16V	U0426	P0560 P0563	Blink	OFF	No	-
12.	Mechanical key (*without transponder*)	P0513	B1343	Blink	ON	No	-
13.	Wrong E-key (*mismatch of transponder & code in ICU*)	P0513	B1342/ P0513	Blink	ON	No	-
14.	Immobilizer unit not connected	U0167	-	OFF	OFF	No	Service Lamp come ON

DIAGNOSTIC USER MANUAL

1. SCANNER

1.1 GENERAL

This scanner is used to scan the connected ECU in the XENON EURO-V vehicle. It is child scanner for which the parent is Ace Xenon Winger scanner. The communication settings saved by the parent scanner is used by this scanner.

The vehicle by default has the following ECU(s)

1. EMS
2. IMMO
3. BCM
4. AIRBAG
5. ABS 8.1

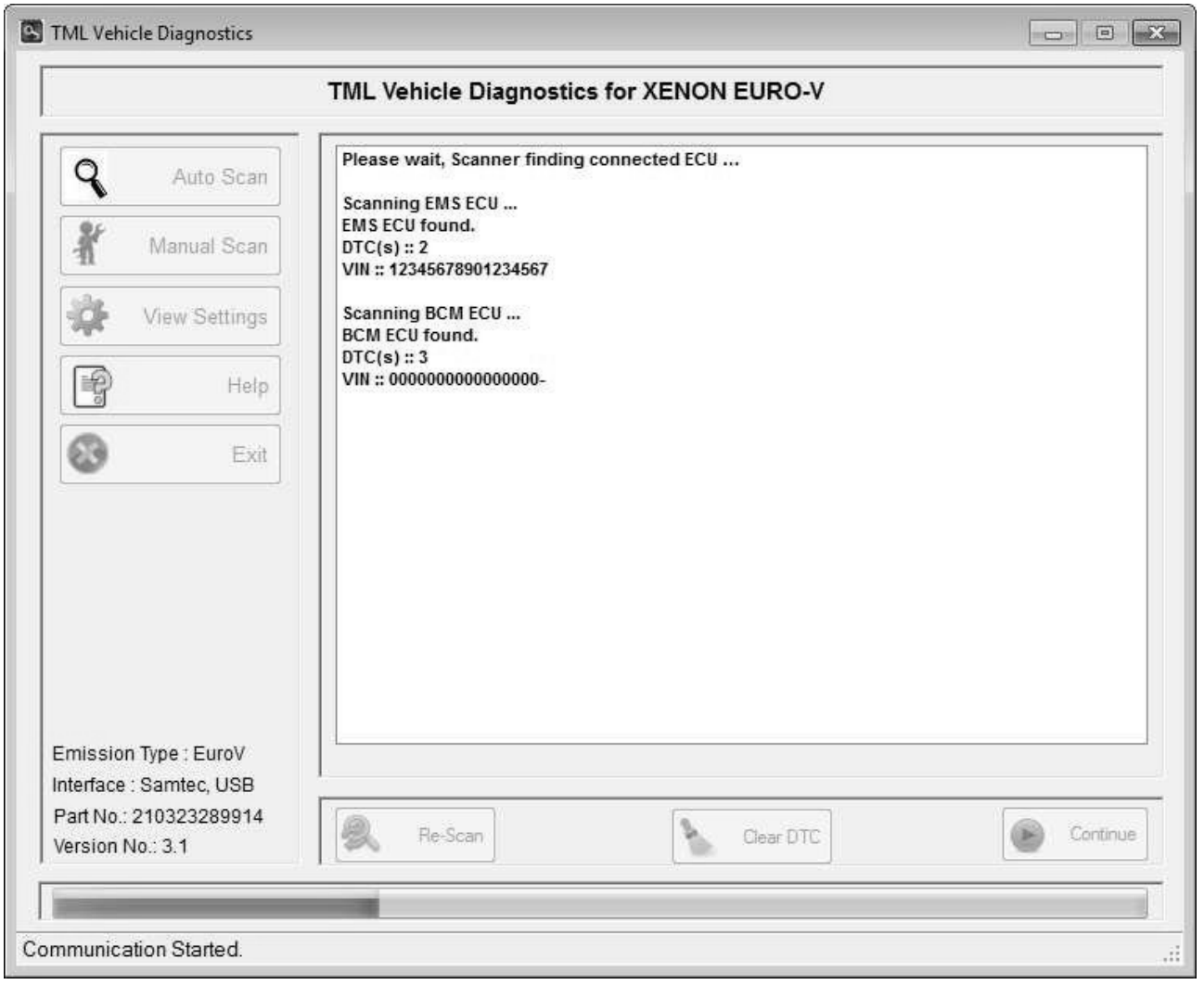
1.2 SERVICES

Following are service are provided by the XENON EURO-V Scanner:

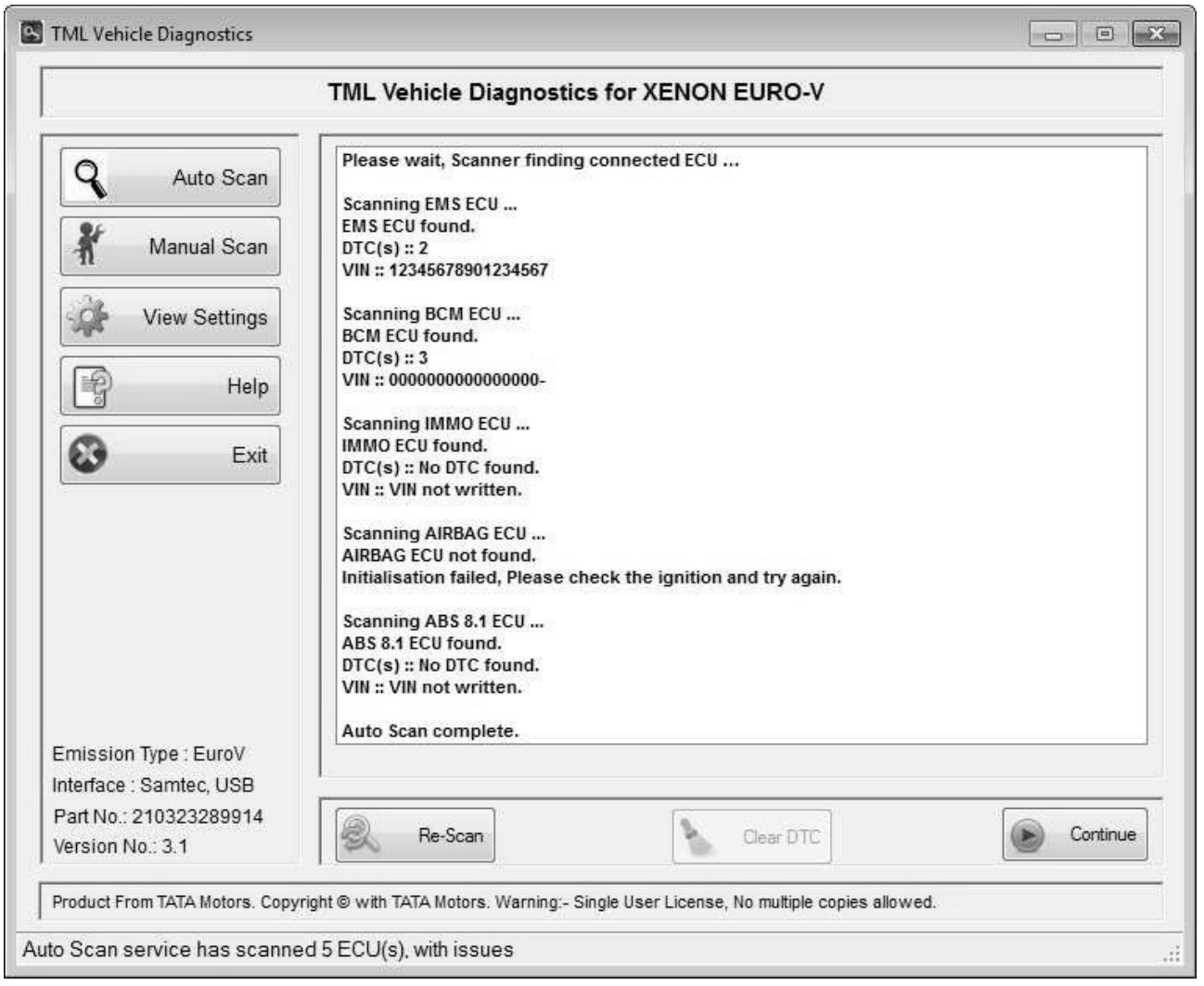
1. Auto Scan
2. Manual Scan
3. Re-Scan
4. Clear DTC
5. View Settings

1.2.1 AUTO SCAN

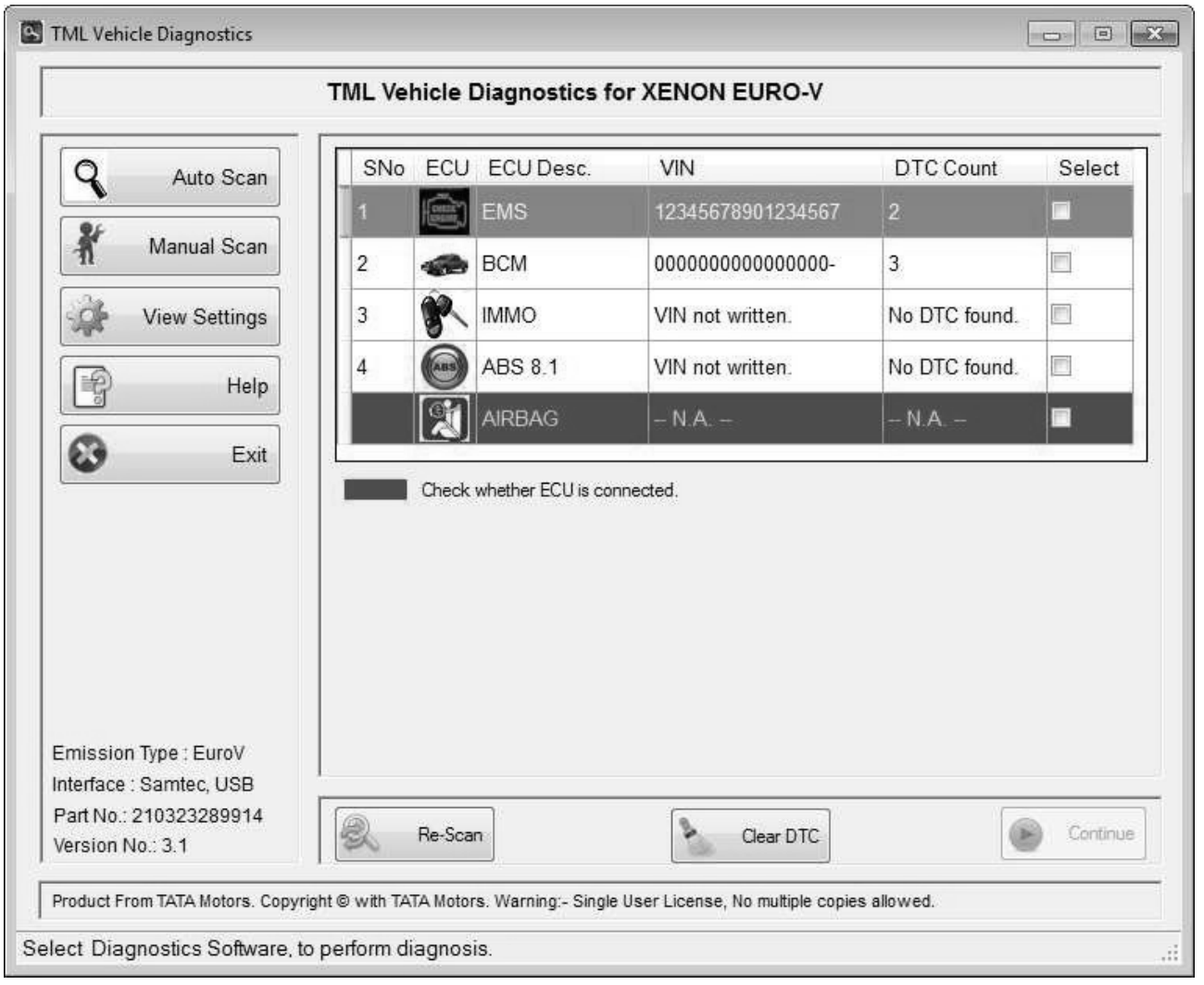
In Auto Scan service, the scanner will automatically scan the ECU connected in the vehicle. Auto scan service will read the VIN and DTC count for each of the scanned ECU.



If any of the ECU is not found in Auto scan, it would be the case that ECU is either not connected or there is some issue in the connectivity of the ECU. In this case user can perform the re-scan service.



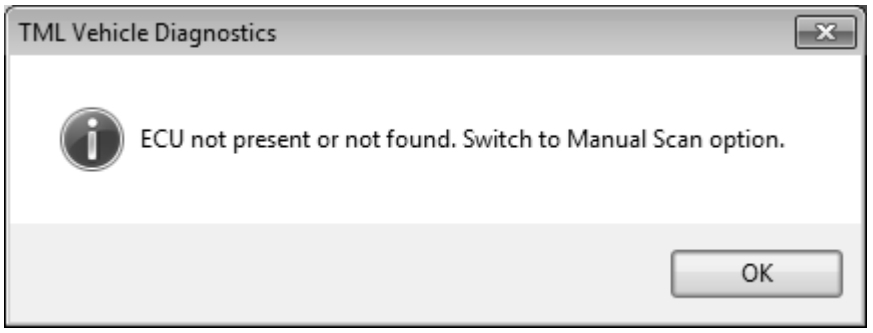
When scanner completes its scanning process, user can click ***Continue,*** to proceed. Here the user can view the summary of the Auto Scan service. Summary will be provided as displayed below.


TML Vehicle Diagnostics
TML Vehicle Diagnostics for XENON EURO-V
Auto Scan
Manual Scan
View Settings
Help
Exit
SNo ECU ECU Desc. VIN DTC Count Select
1 EMS 12345678901234567 2
2 BCM 0000000000000000- 3
3 IMMO VIN not written. No DTC found.
4 ABS 8.1 VIN not written. No DTC found.
AIRBAG -- N.A. -- -- N.A. --
Check whether ECU is connected.
Emission Type : EuroV
Interface : Samtec, USB
Part No.: 210323289914
Version No.: 3.1
Re-Scan
Clear DTC
Continue
Product From TATA Motors. Copyright © with TATA Motors. Warning:- Single User License, No multiple copies allowed.
Select Diagnostics Software, to perform diagnosis.


SNo ECU ECU Desc. VIN DTC Count Select
1 EMS VIN not written. 2
2 BCM 00000000000000000 1
3 IMMO VIN not written. 2
4 AIRBAG VIN not written. 5
5 ABS 8.1 VIN not written. No DTC found.

The ECU which are not found will be displayed in red, indication issue in the connection / ECU physically not present in the vehicle.

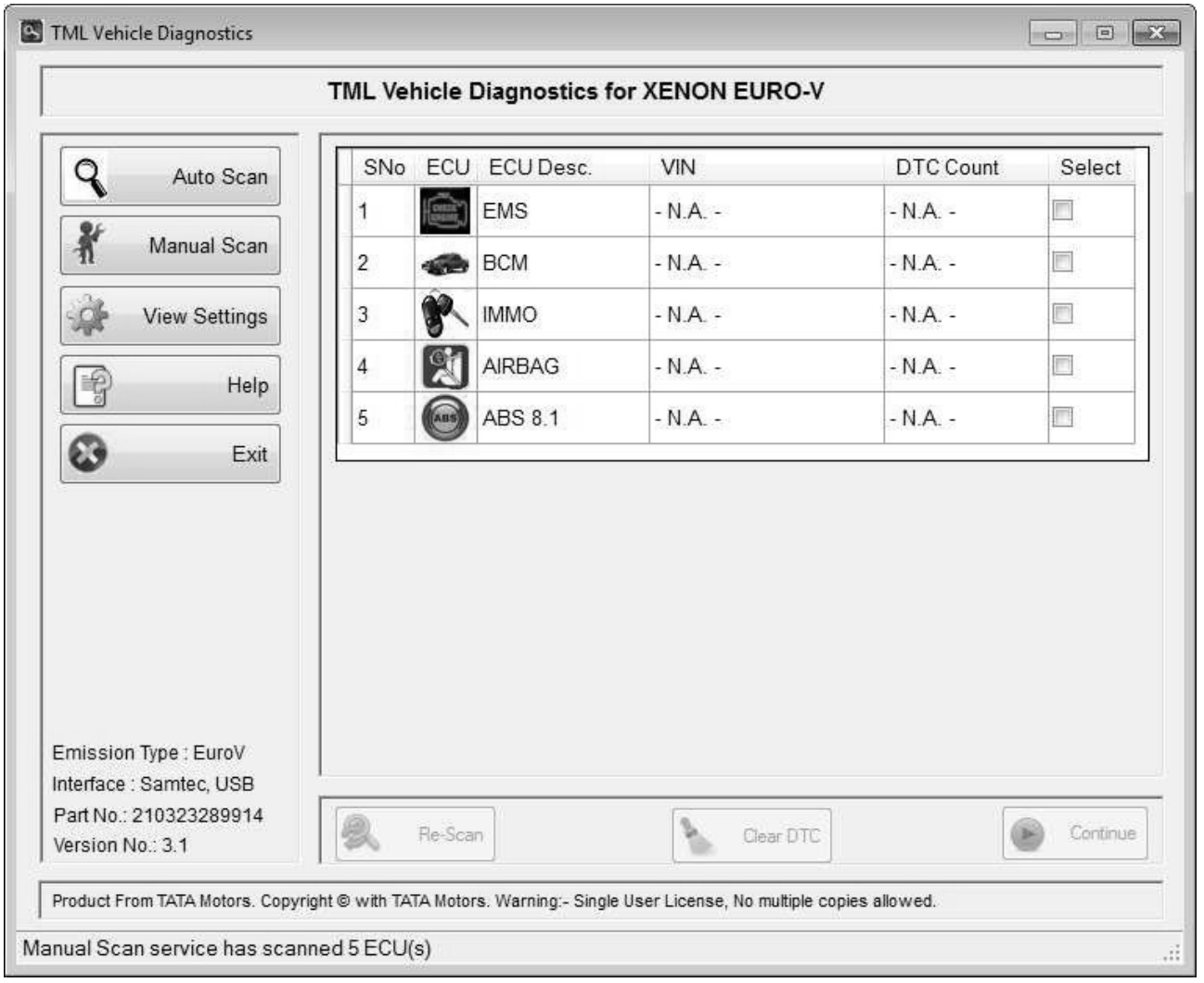
User can select one of the connected ECU to perform diagnostic. If user tries to run the ECU in red, i.e. non – connected ECU, scanner will give the following message.



In this case user has to choose Manual Scan option to run such ECU software.

1.2.2 MANUAL SCAN

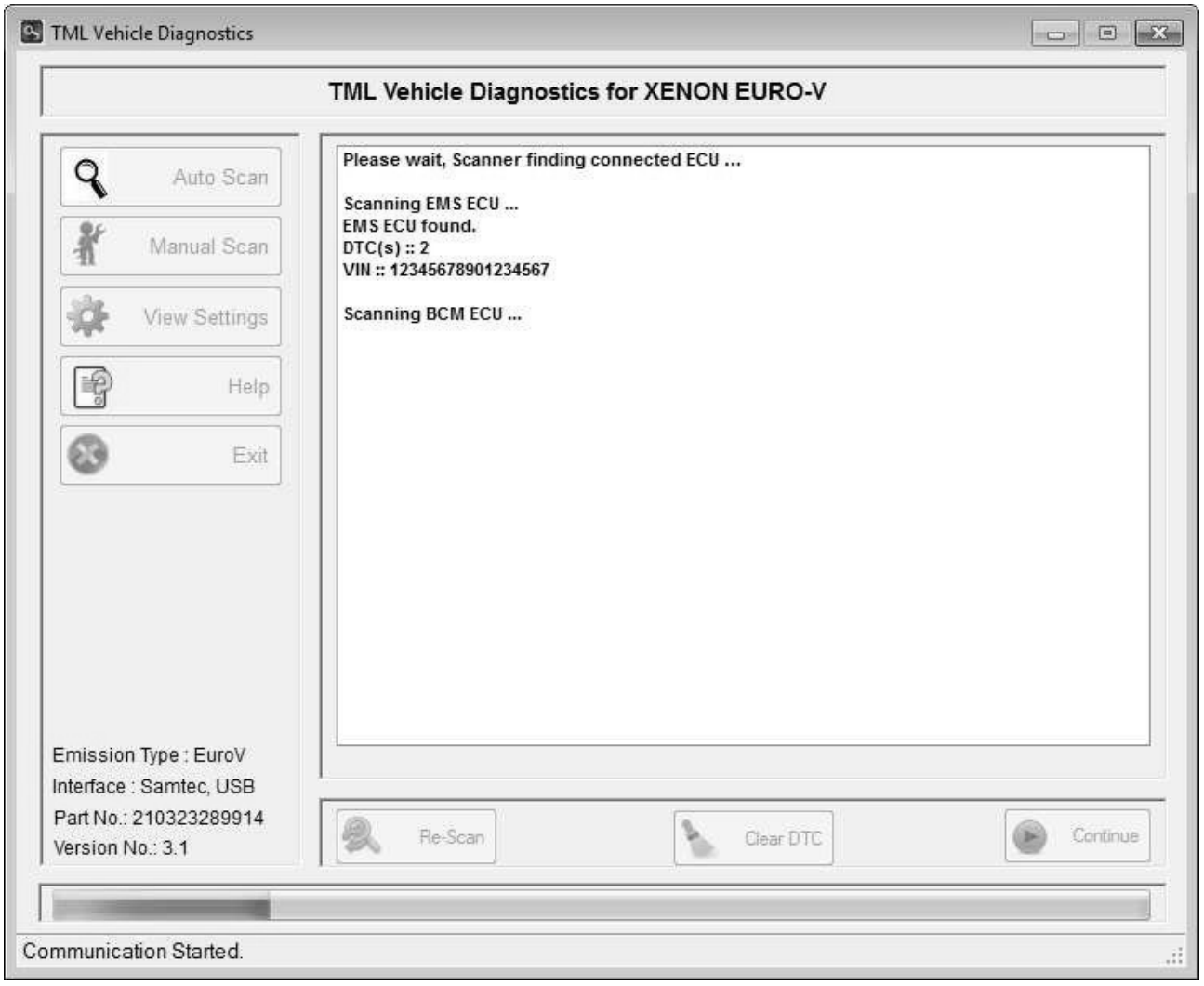
In Manual Scan service the Scanner will list the default ECU which should be present in the higher configuration of the vehicle. It is not mandatory that the listed ECU would be present in the connected vehicle.



Manual Scan service can be used when user knows about the ECUs present in the vehicle. User can select one of the ECU to perform diagnostic.

1.2.3 RE-SCAN

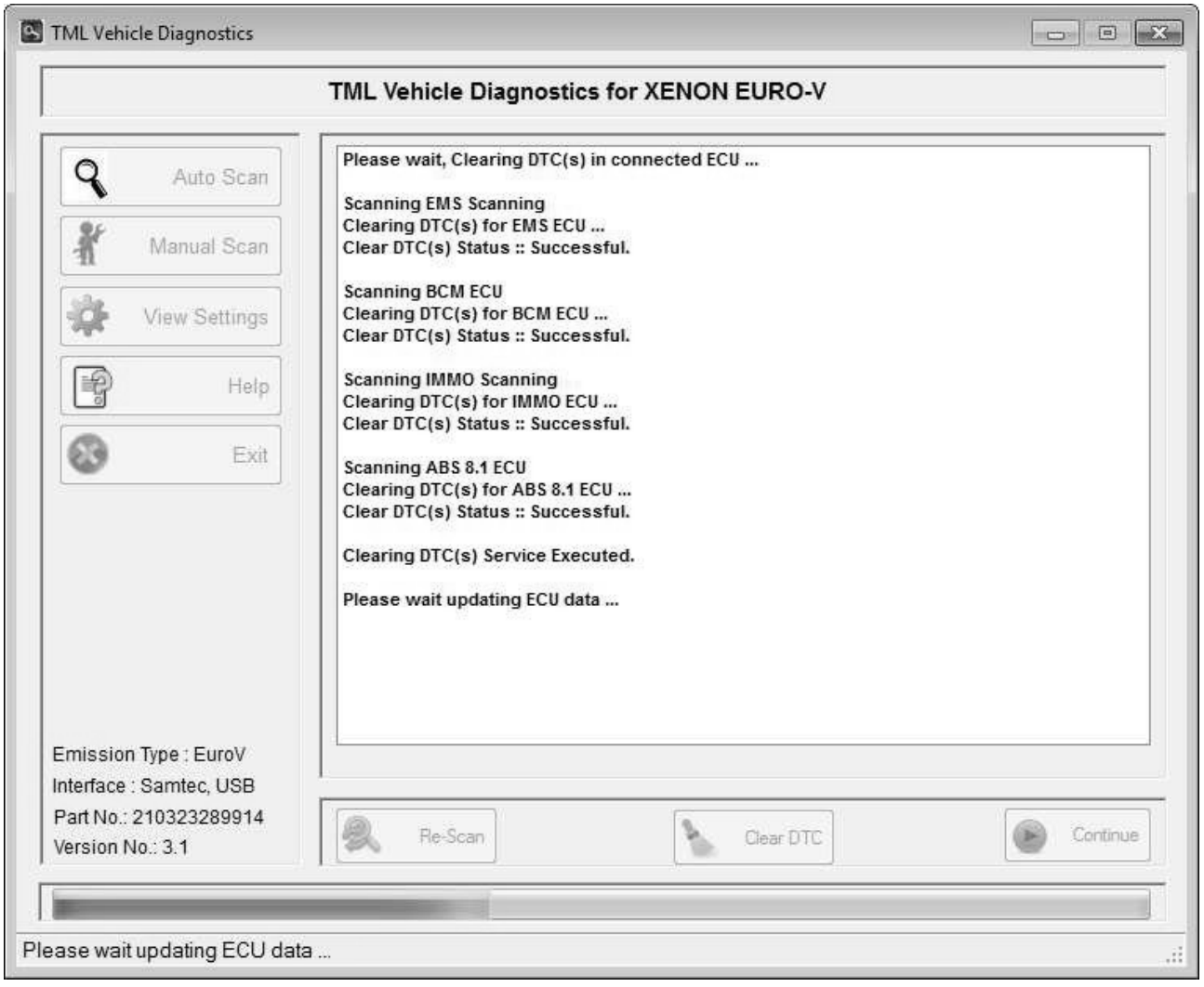
This service is used, when it happens that any of the ECU is not found during the Auto Scan process. This service will re-scan the ECU connected in the vehicle.



Similar to the Auto Scan service it will read the VIN and DTC count of the connected ECU.

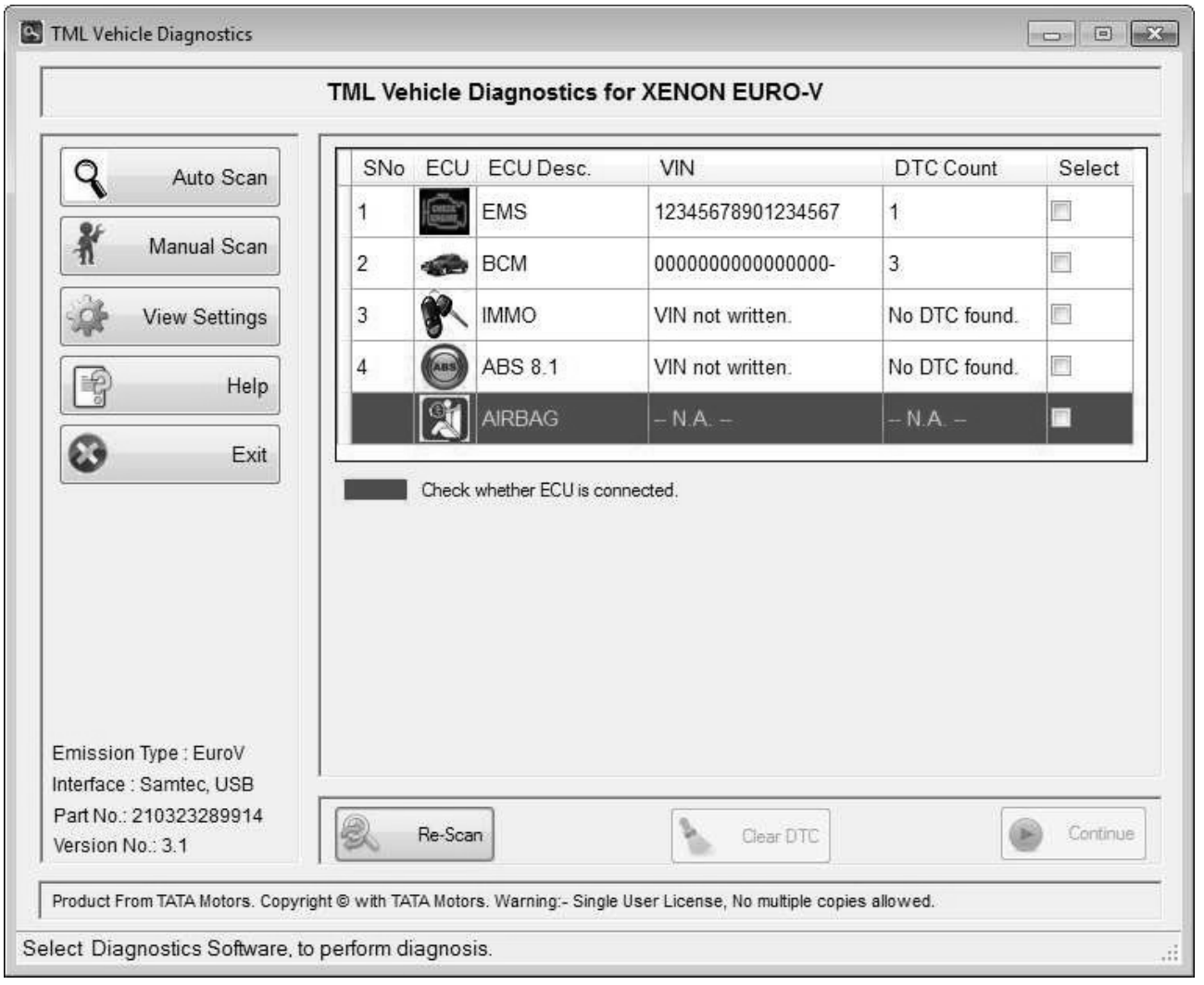
1.2.4 CLEAR DTC

This service is applicable when any of the ECU is found in the Auto Scan service. For the scanned ECU, when this service is executed, it will clear the DTC present in the ECU one by one.



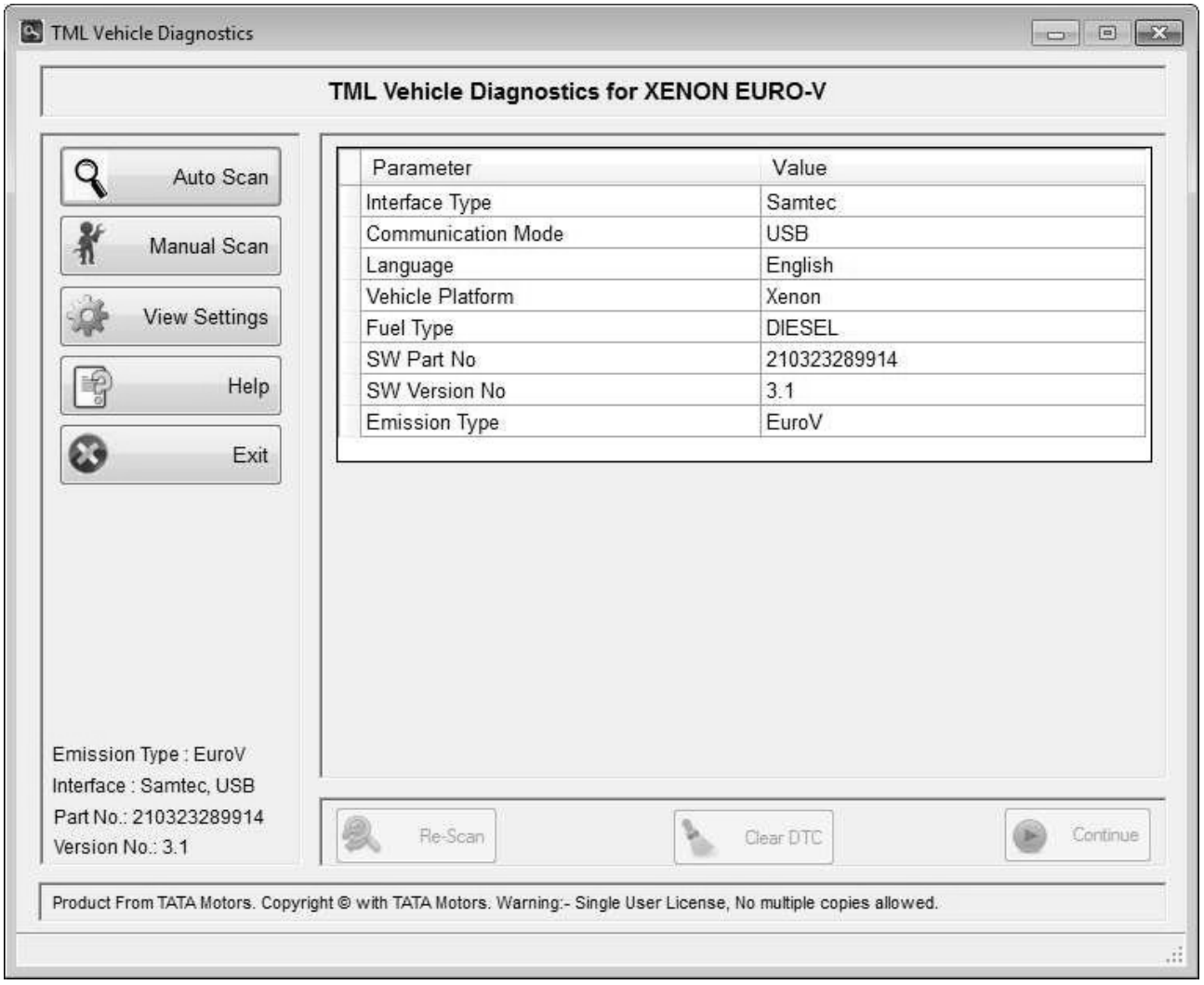
It will skip the ECU which are not found for clearing DTC.

After the service is executed, the scanner will update the status on DTC count in the summary page of scanned ECU.



User can now select any of the ECU to perform diagnostic.

1.2.5 VIEW SETTINGS



This will display the communication settings saved by user in the parent scanner.

2. INTEGRATED DIAGNOSTIC TESTERS

2.1 EMS

2.1.1 GENERAL

EMS ECU is the heart of the vehicle. EMS stands for Engine Management System and as the name indicates it records all engine related data in the vehicle.

Through EMS ECU various activities such as Leak Detection, Actuators Test can be performed in the vehicle. In the improved anti theft mechanism EMS ECU is paired with Immobilizer ECU.

2.1.2 SALIENT FEATURES

The Diagnostic Tester software for Safari EMS is capable to communicate with ECU in the vehicle through Serial K-Line Interface. The tester comprises of an Interface Unit and custom built application software. The user friendly application software can be easily installed on Windows Desktop or Laptop.

The interface unit is lightweight and compact in size to facilitate easy portability. It works on vehicle battery supply.

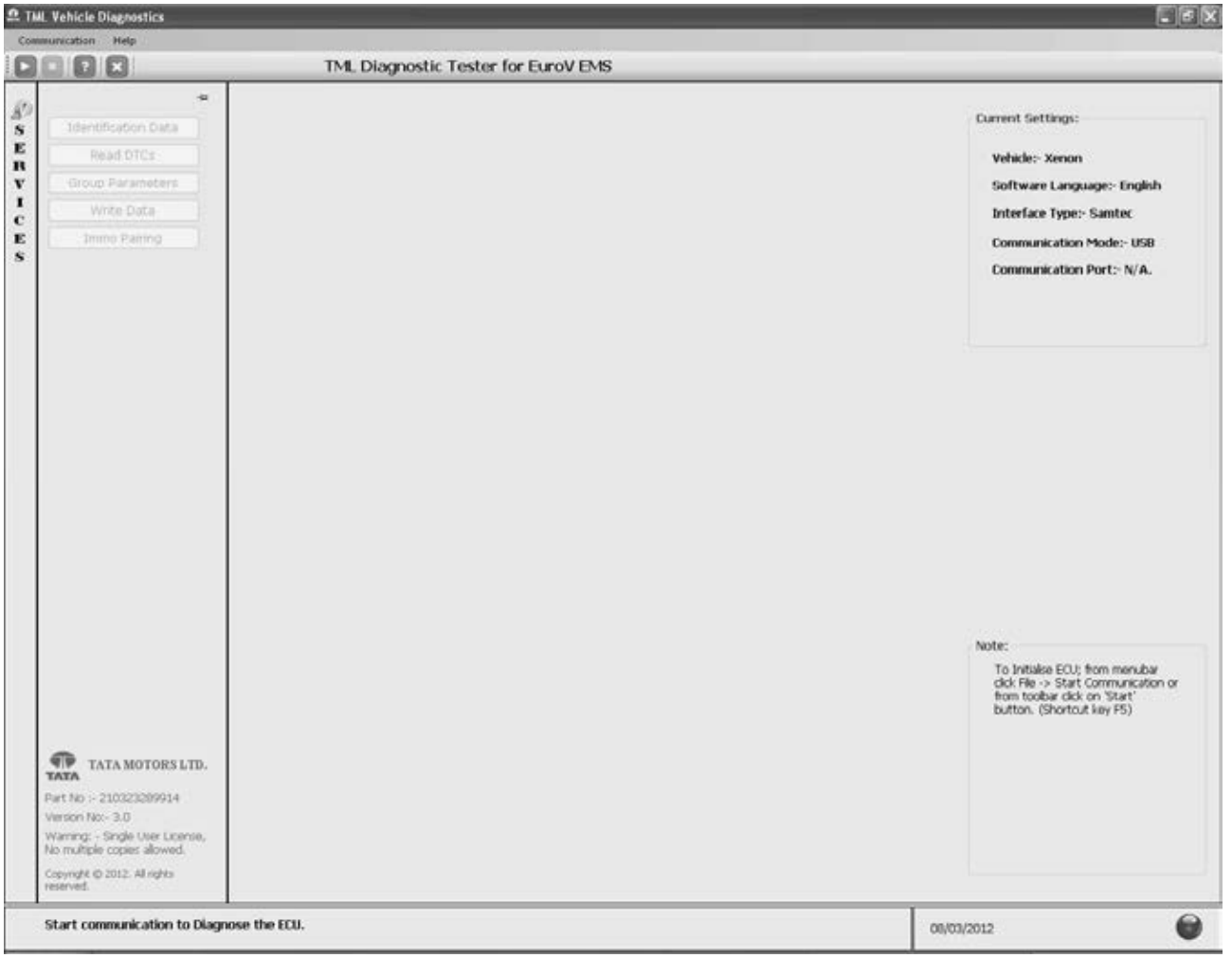
The tester application executes all the commands supported by EMS ECU, which helps in diagnosis of EMS ECU.

Following service are provided by the Diagnostic Tester application:

1. Read ECU Identification data
2. Reading and Clearing the DTC(s)
3. Read Group Parameters
4. Write Data
5. Immobilizer Pairing

2.1.3 MAIN SCREEN

The below screen will be displayed after selecting EMS option from scanner application. The current configuration settings are displayed on the right hand corner of window.

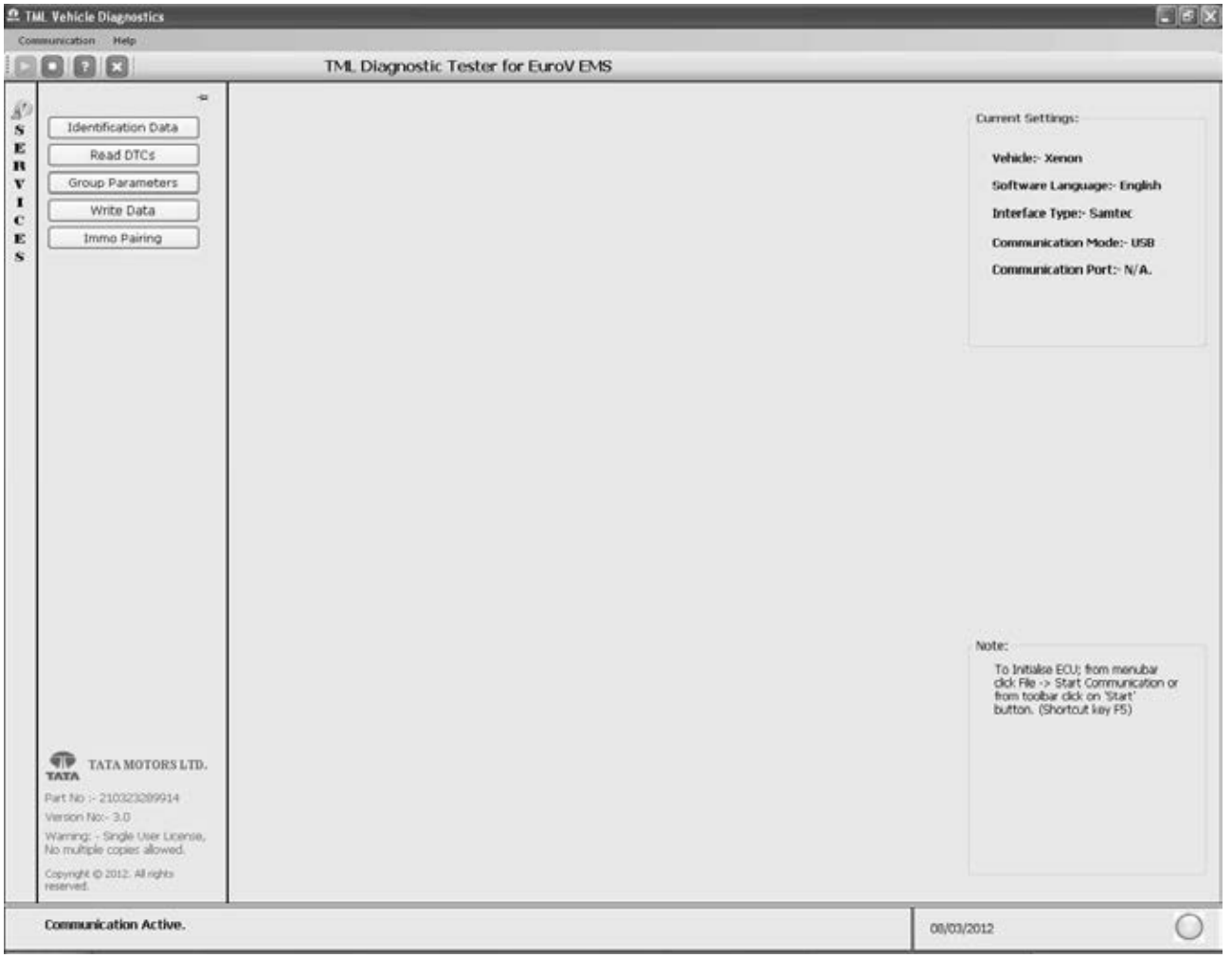


NOTE:

Click on Start Communication (Shortcut Key F5) to establish the communication with ECU.

2.1.4 SERVICES PANEL

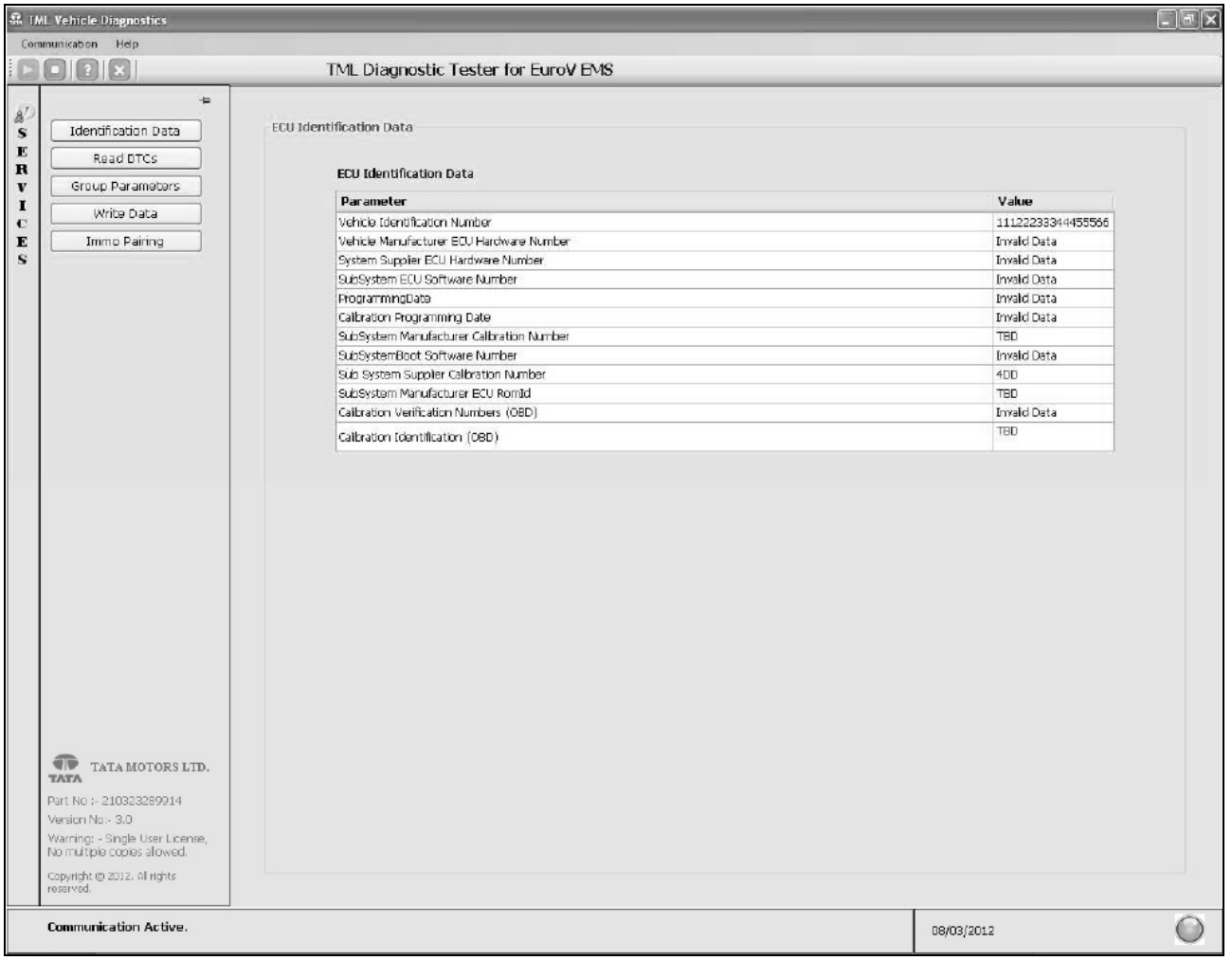
On successful communication the Services Panel will be enabled to the user which will cater the services supported by the ECU.



Click on respective service buttons to read data from ECU. Auto hide button for services panel can be used to have bigger preview area for displayed results.

2.1.5 IDENTIFICATION DATA

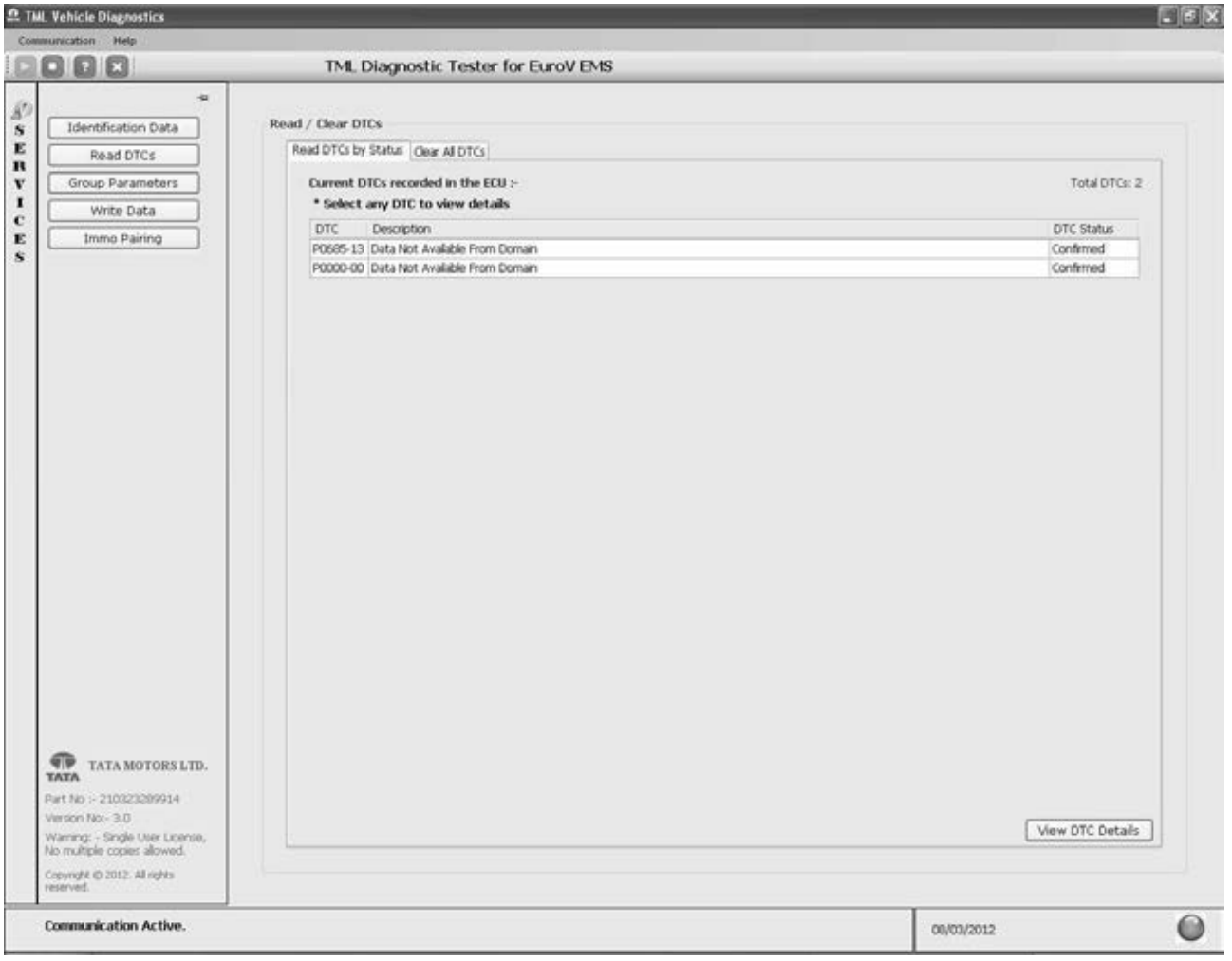
The Identification data service provides information of ECU firmware along with Vehicle Identification Number (VIN).



2.1.6 READ AND CLEAR DTCs

DTCs recorded in the ECUs can be viewed along with the remedial measures which shall help the technician in diagnosing the vehicle. Only Emission DTCs read or clear service is also provided in the diagnostic tool.

After resolving the DTCs they can be cleared from ECU memory. The screens are as shown below.

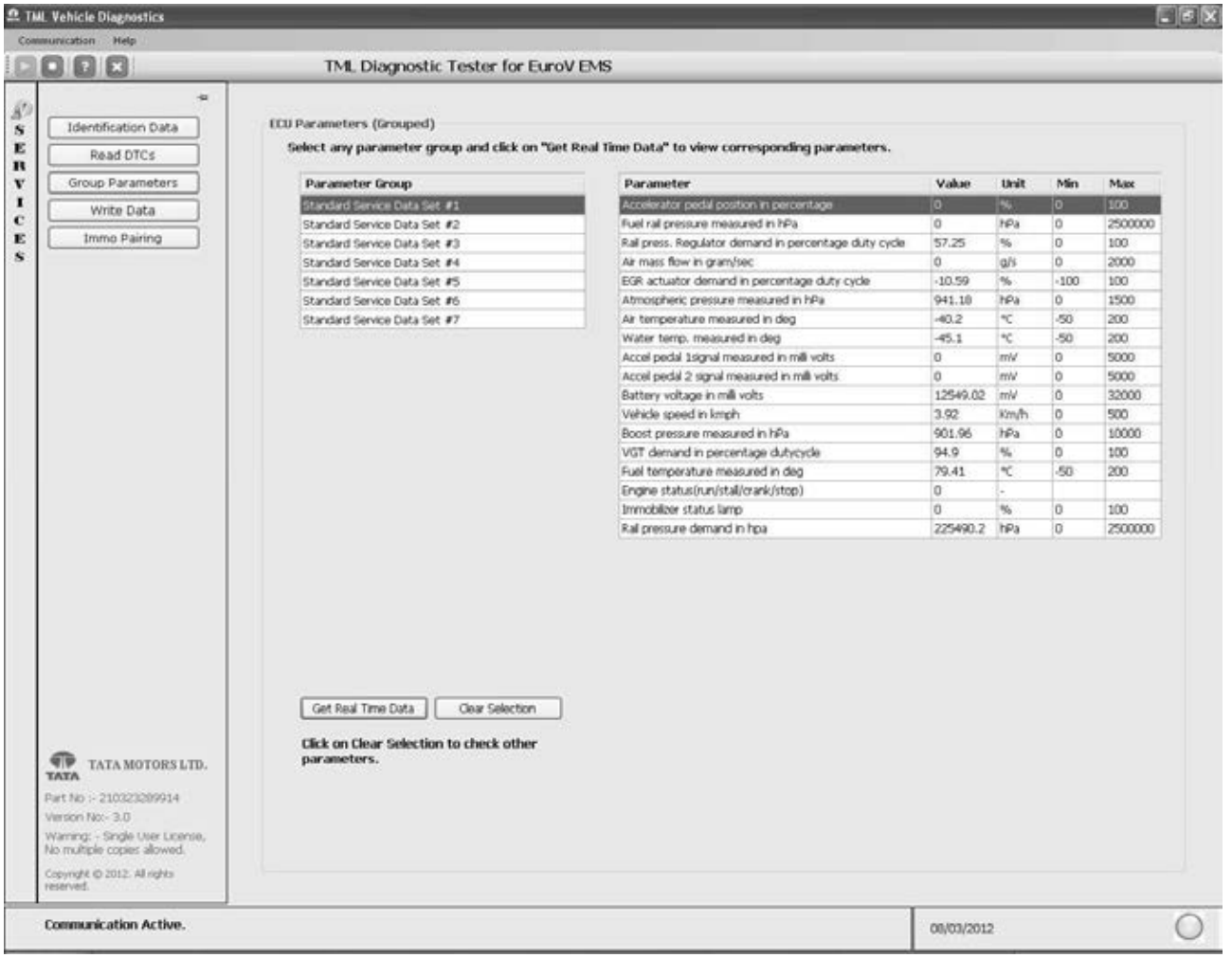


When the DTCs are available in the ECU then select any DTC from the list to view the environmental and freeze frame data for corresponding DTC.

Change the tab from Read DTCs to Clear DTCs which will clear the available DTCs in the ECU.

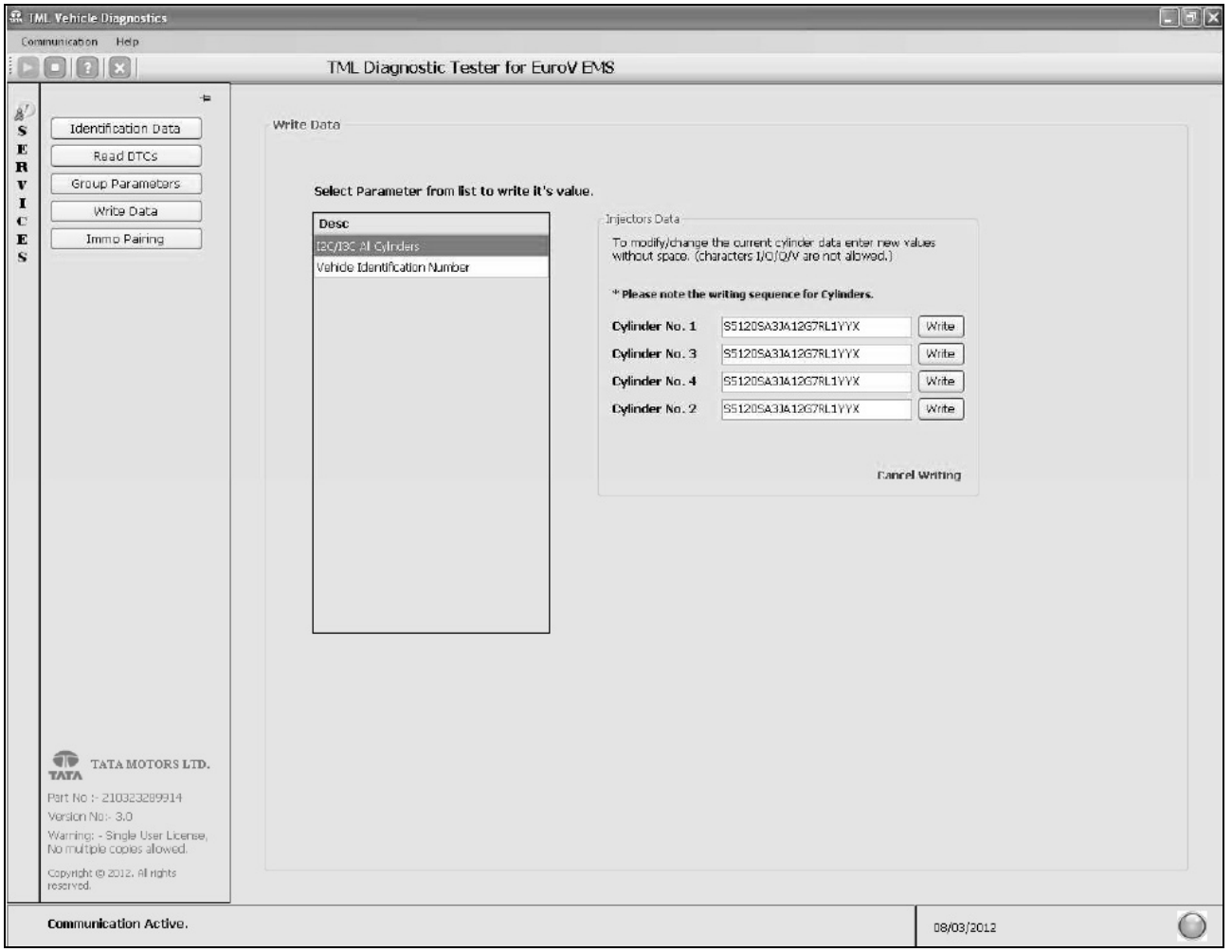
2.1.7 GROUP PARAMETERS

Engine parameters are clubbed into groups for better viewing and comparing all together. Click on Get Real Time Data to start fetching data from ECU and clear selection to stop fetching data.



2.1.8 WRITE DATA

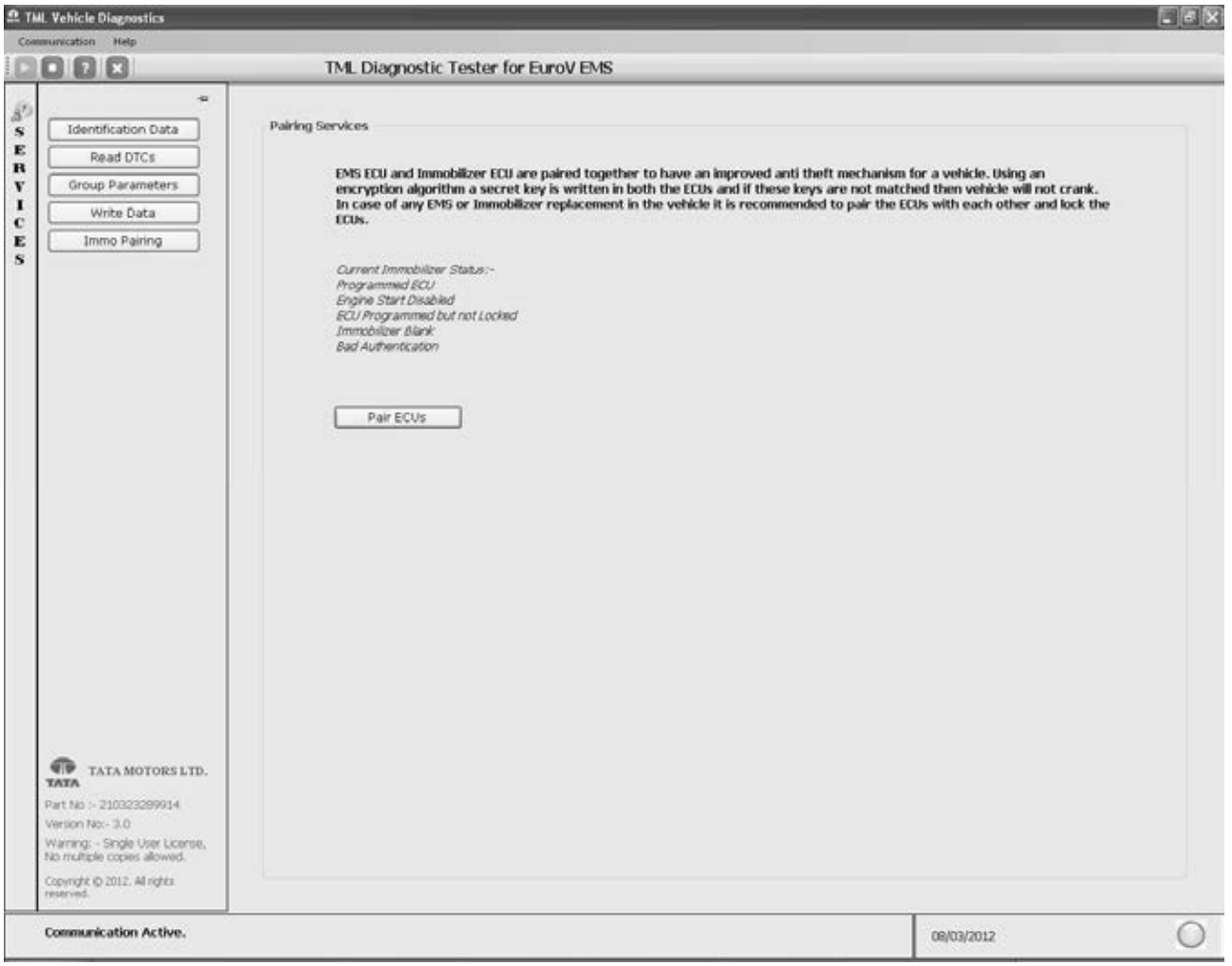
Various parameters are allowed to modify in the field in case of ECU replacement. Sample screen is as below.



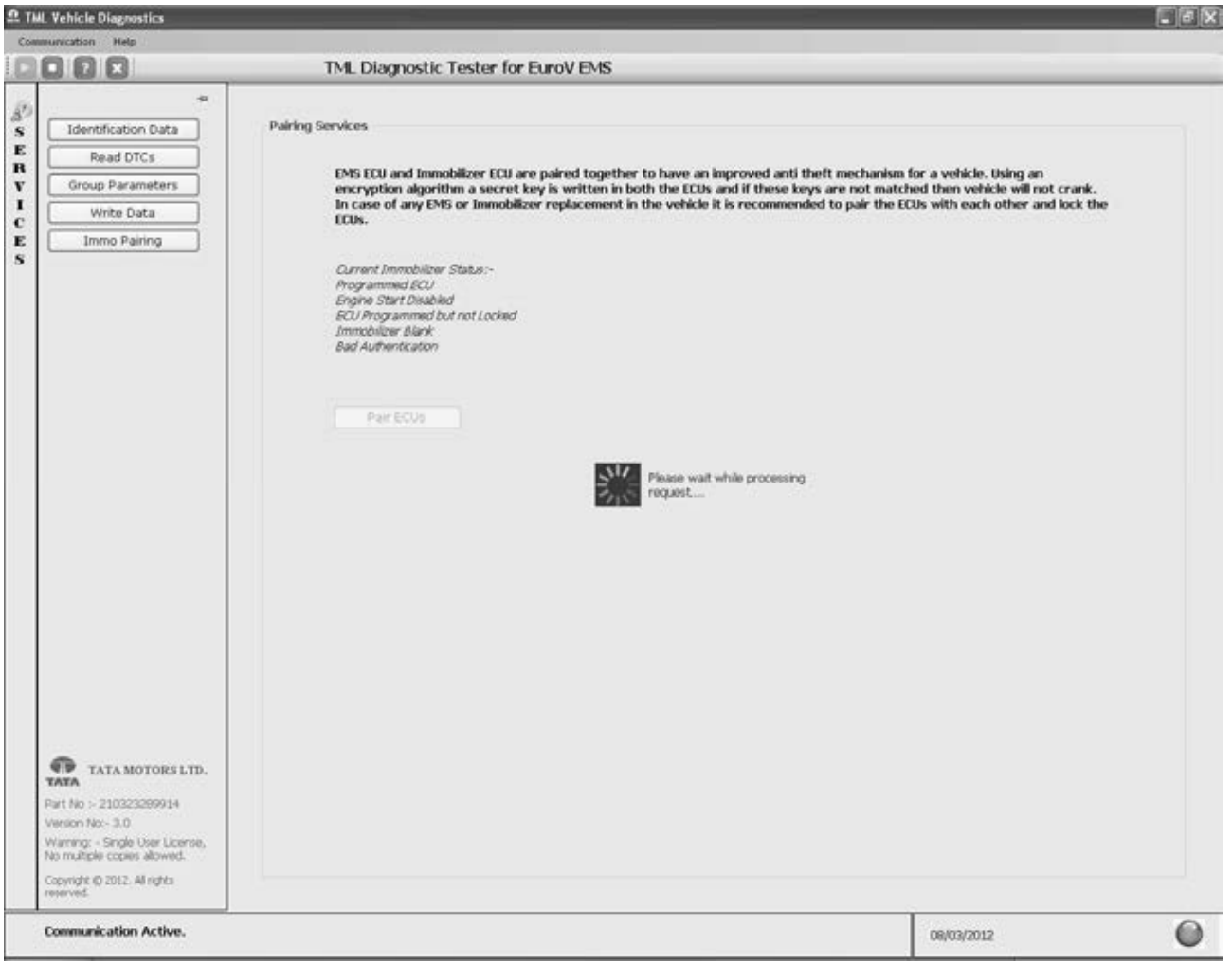
2.1.9 IMMOBILIZER PAIRING

As part of the new antitheft mechanism in the vehicles the EMS ECU needs to be paired with Immobilizer ECU.

Read the instructions before paring the ECUs. It is recommended to understand the pairing process thoroughly to avoid the problems that can be caused if process not followed properly.



Pairing process takes few moments to complete the activity and user should not perform any other activity in between the pairing process.


TML Vehicle Diagnostics
Communication
Help
TML Diagnostic Tester for EuroV EMS
SERVICES
Identification Data
Read DTCs
Group Parameters
Write Data
Immo Pairing
Pairing Services
EMS ECU and Immobilizer ECU are paired together to have an improved anti theft mechanism for a vehicle. Using an encryption algorithm a secret key is written in both the ECUs and if these keys are not matched then vehicle will not crank. In case of any EMS or Immobilizer replacement in the vehicle it is recommended to pair the ECUs with each other and lock the ECUs.
Current Immobilizer Status :-
Programmed ECU
Engine Start Disabled
ECU Programmed but not Locked
Immobilizer Blank
Bad Authentication
Pair ECUs
Please wait while processing request....
TATA MOTORS LTD.
Part No :- 210323289914
Version No:- 3.0
Warning: - Single User License, No multiple copies allowed.
Copyright © 2012. All rights reserved.
Communication Active.
08/03/2012

2.2 BCM

2.2.1 GENERAL

This is a module for the interior lighting, a module for the door locks and so forth. A BCM gathers all these separate modules under one system so that they function together instead of separately, a format easier to both manufacture and troubleshoot.

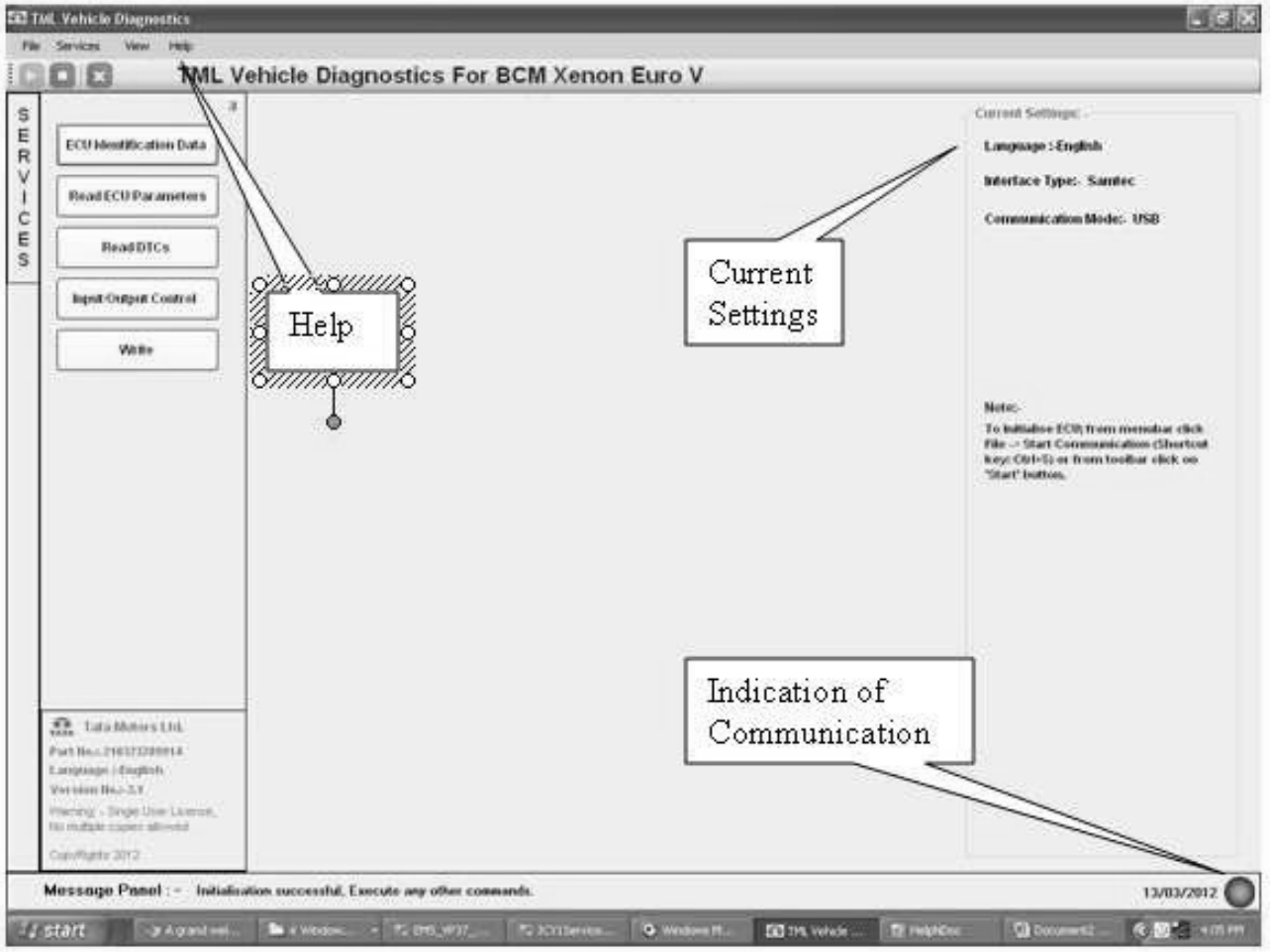
2.2.2 SALIENT FEATURES

- The Diagnostic Tester software for BCM is capable to communicate with ECU in the vehicle through Serial K-Line Interface. The tester comprises of an Interface Unit and custom built application software. The user friendly application software can be easily installed on Windows Desktop or Laptop.
- The interface unit is lightweight and compact in size to facilitate easy portability. It works on vehicle battery supply.
- The tester application executes all the commands supported by BCM ECU, which helps in diagnosis of BCM ECU.
- Following service are provided by the Diagnostic Tester application:
    1. Read ECU Identification data, Manufacturing Information
    2. Read ECU Parameters
    3. Reading and clearing DTCs
    4. Input output Control Other
- Other Feature :
    1. Off line File Display like wiring Diagram, Saved DTC Files.
    2. SAMTEC Interface Support.

2.2.3 MAIN SCREEN

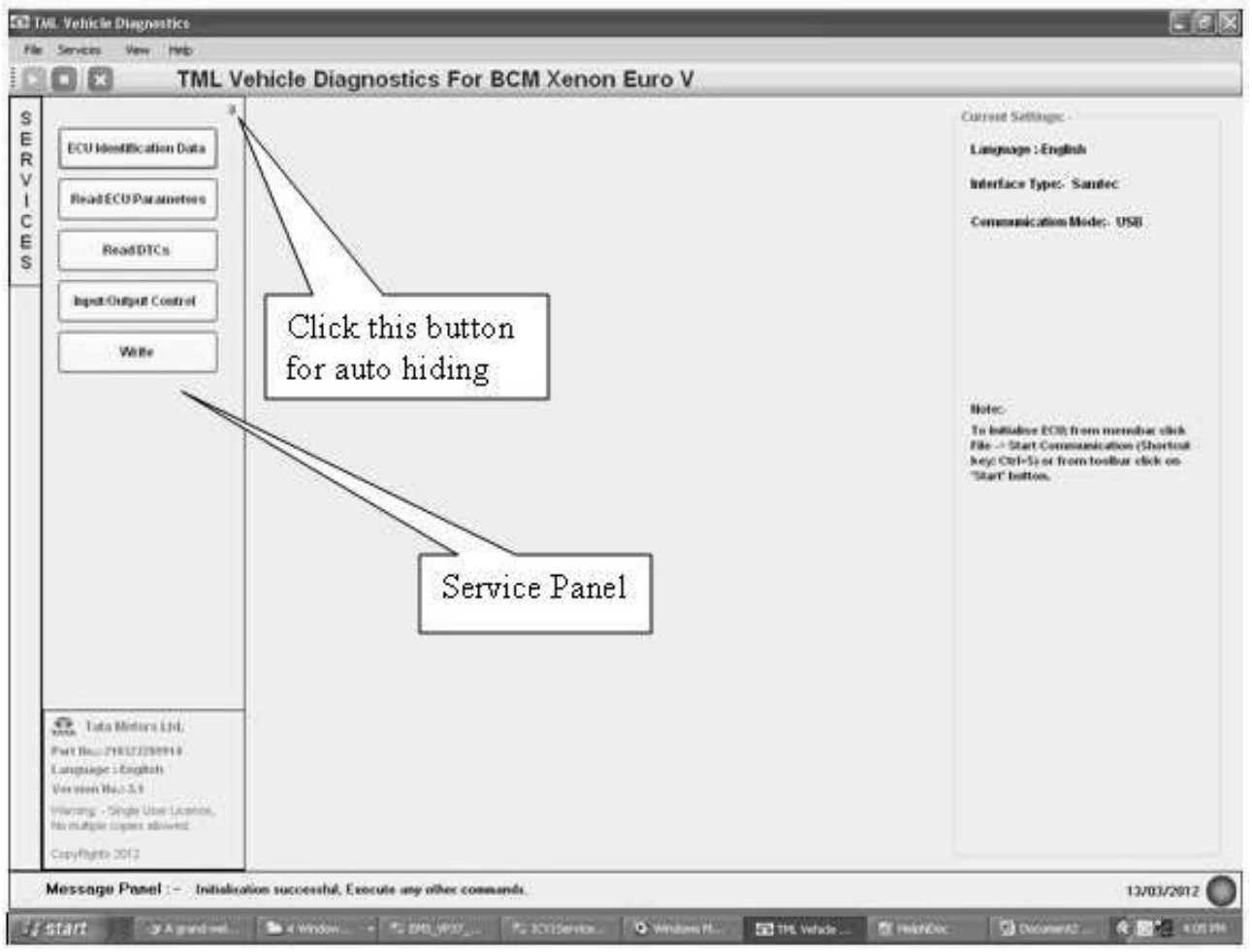
The below is the main screen for the BCM .User has to click on Start button which is in green to start the communication with BCM. At the right hand side User gets the Current setting information as showing below screen.

After successful start user will enable to use different services implemented with service menu or service side screen. User also gets help from Help menu as in below screen.



2.2.4 SERVICE PANEL

Once the communication is established successfully the Services option in the menu is gets activated. Also the SERVICES panel on the left side of the window is made visible. Clicking on service buttons will activate the respective service and the data related to it gets displayed on the Window.

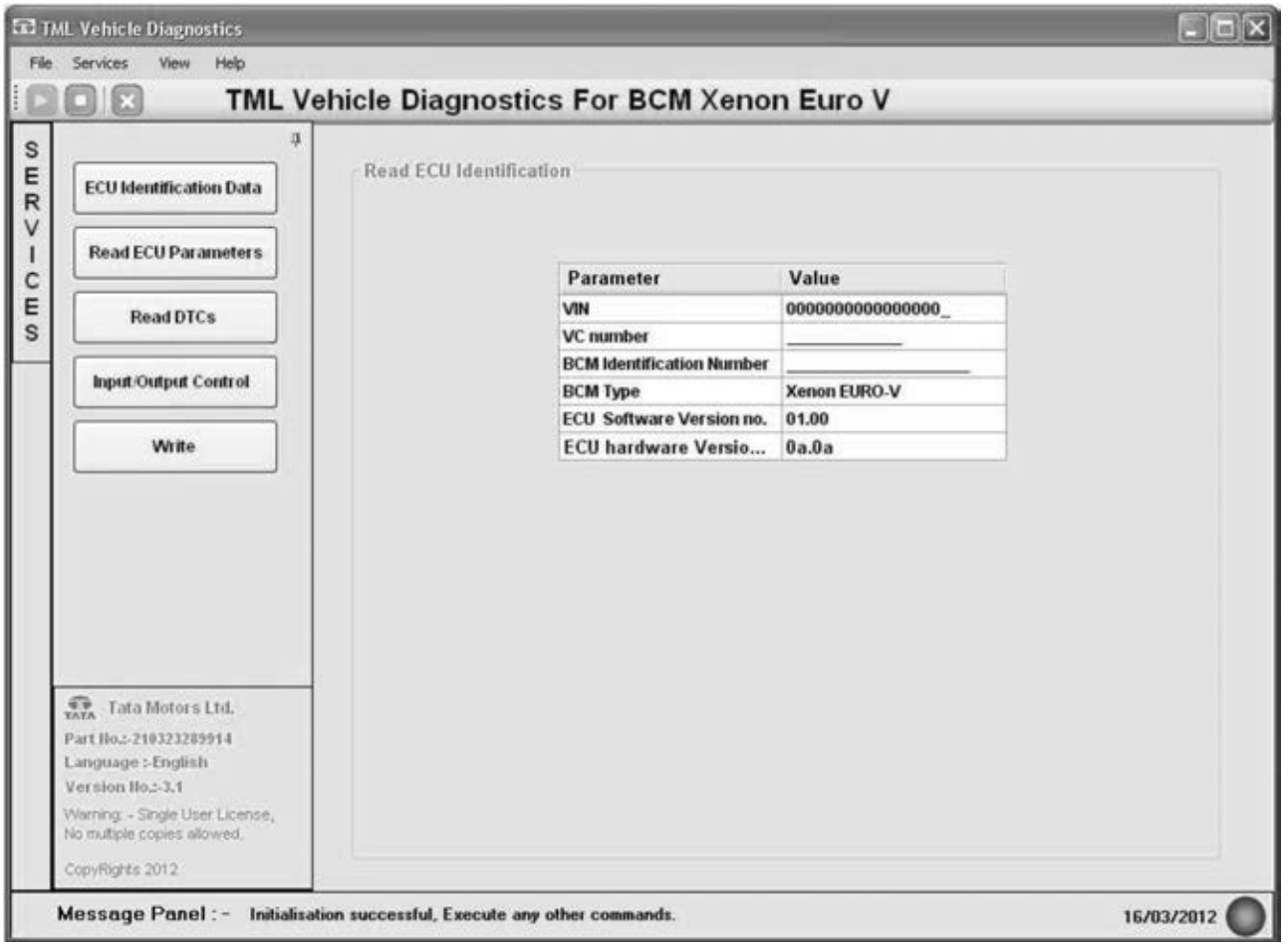


NOTE:

Services panel can be hidden to make the preview area bigger. The auto hide option is given on right top corner of services panel.

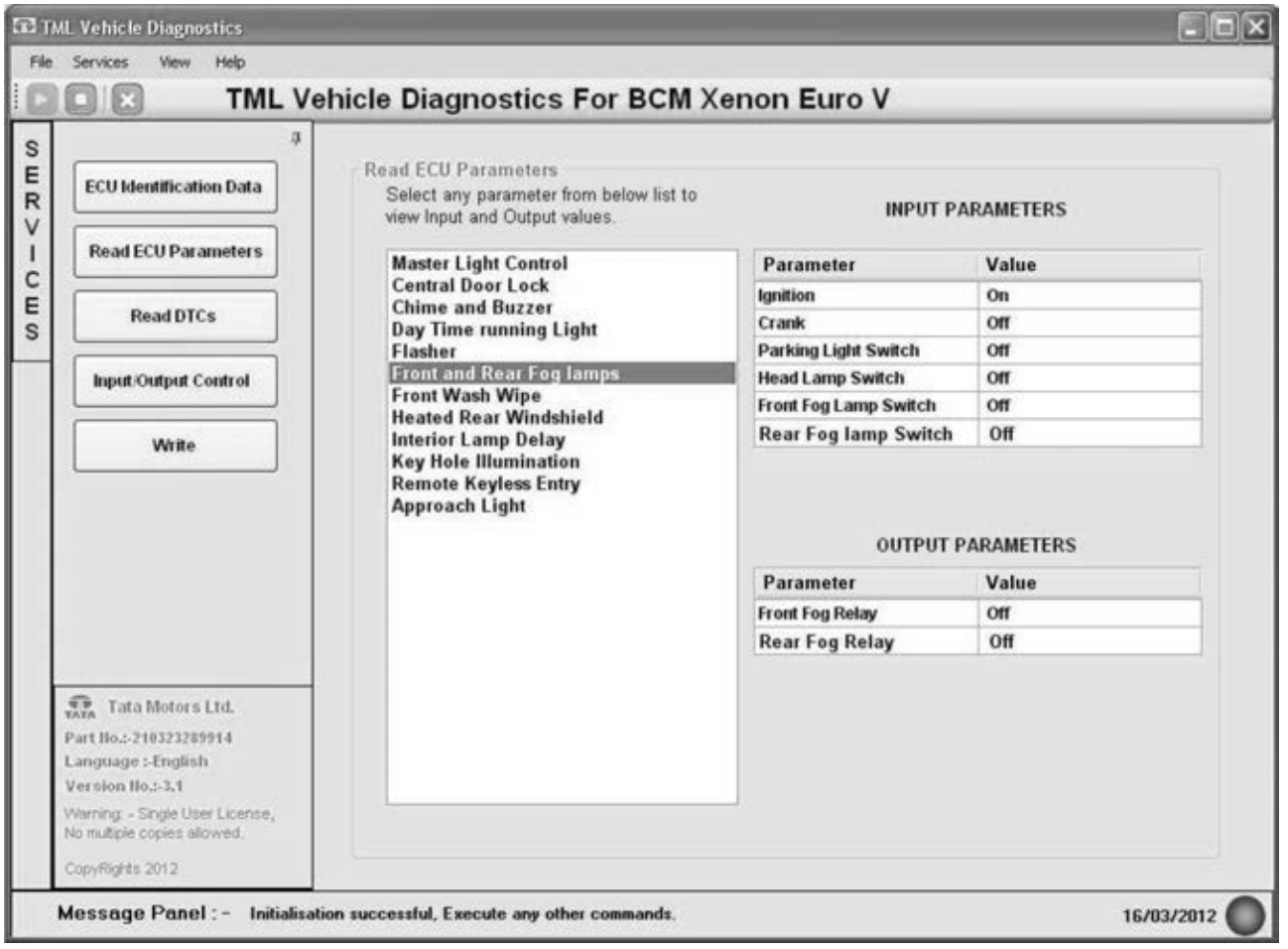
2.2.5 ECU INFORMATION DATA

Read the identification data in the ECU such as Vehicle Name, System Name, Specification information, VIN no, BCM Identification Number, VC Number, BCM Type, ECU Software version no., ECU hardware version no.



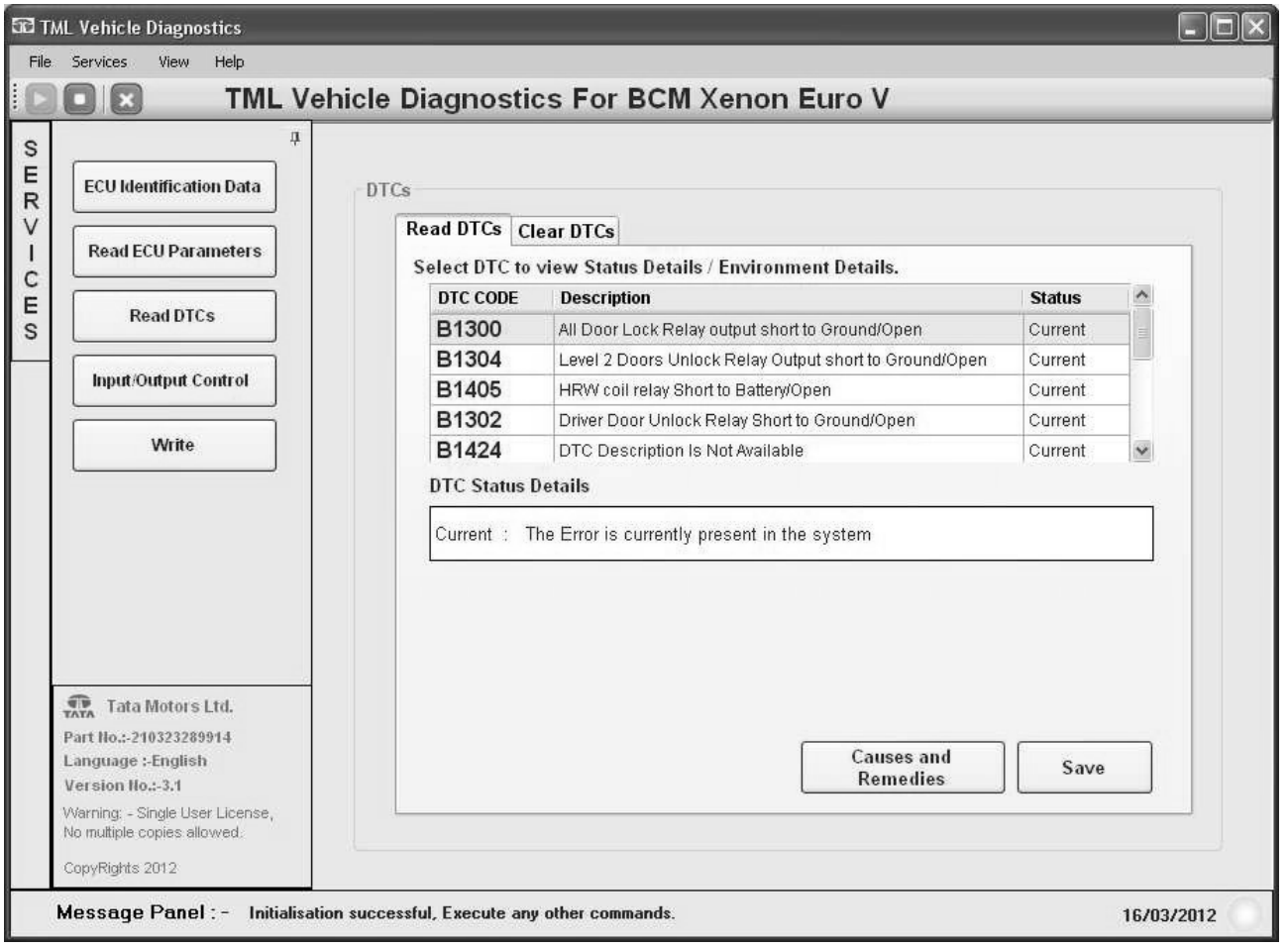
2.2.6 READ ECU PARAMETERS

Reading of ECU data is differentiated with input and output parameter. This will display real time status of parameters.



2.2.7 READ DTC

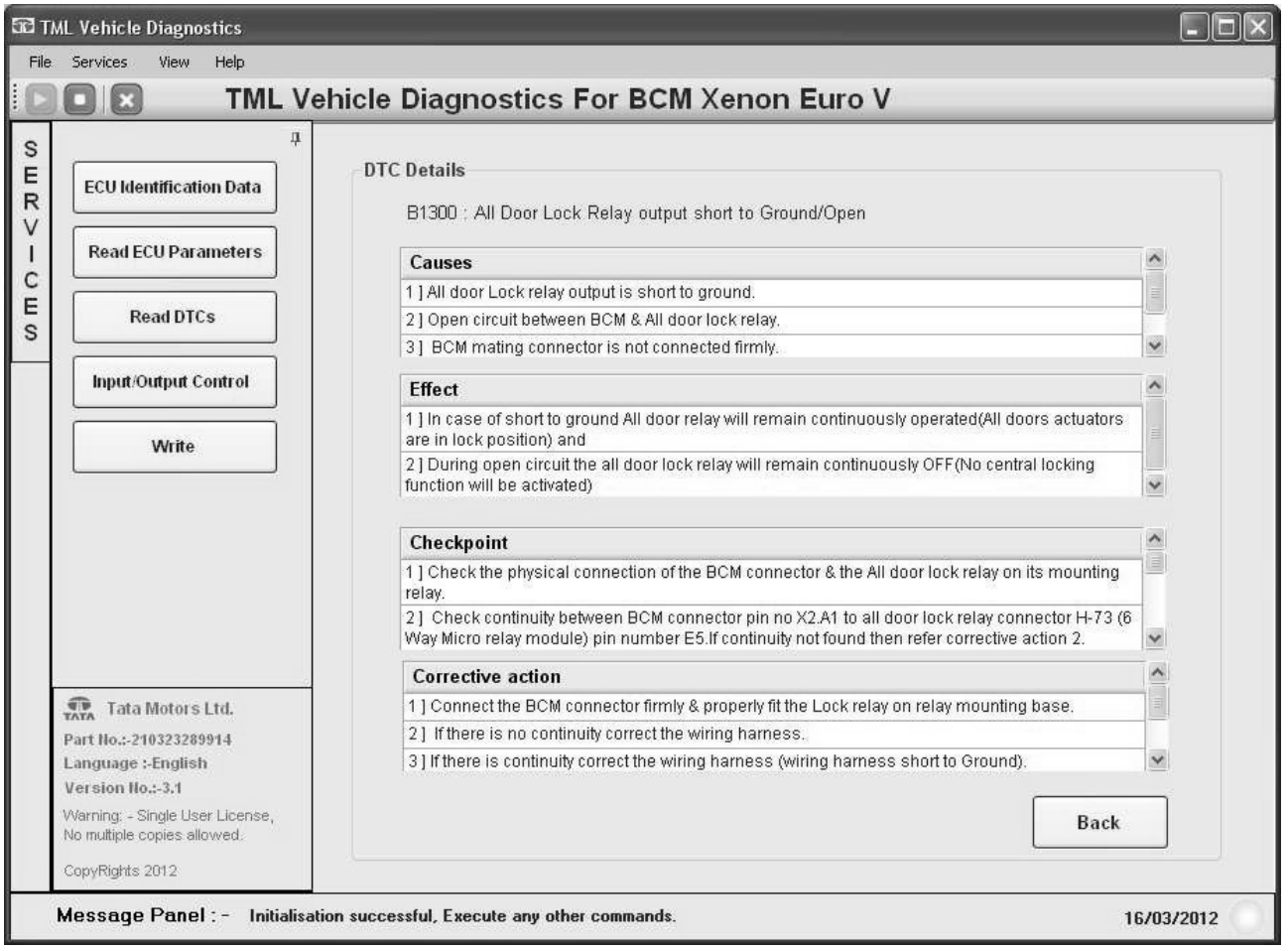
The service reads errors present in the ECU .To save DTC Click on Save button showing with below screen.



NOTE:

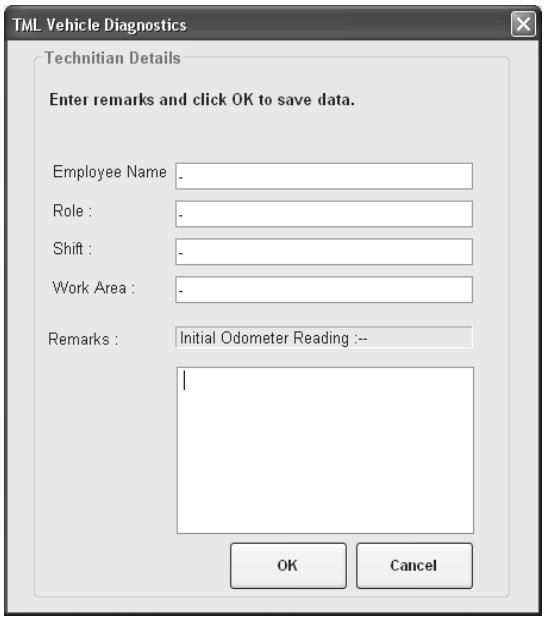
After successfully reading the DTCs user can save DTC data in the CSV file format during Read DTC view.

Select any DTC from the list to view Causes & Remedies.

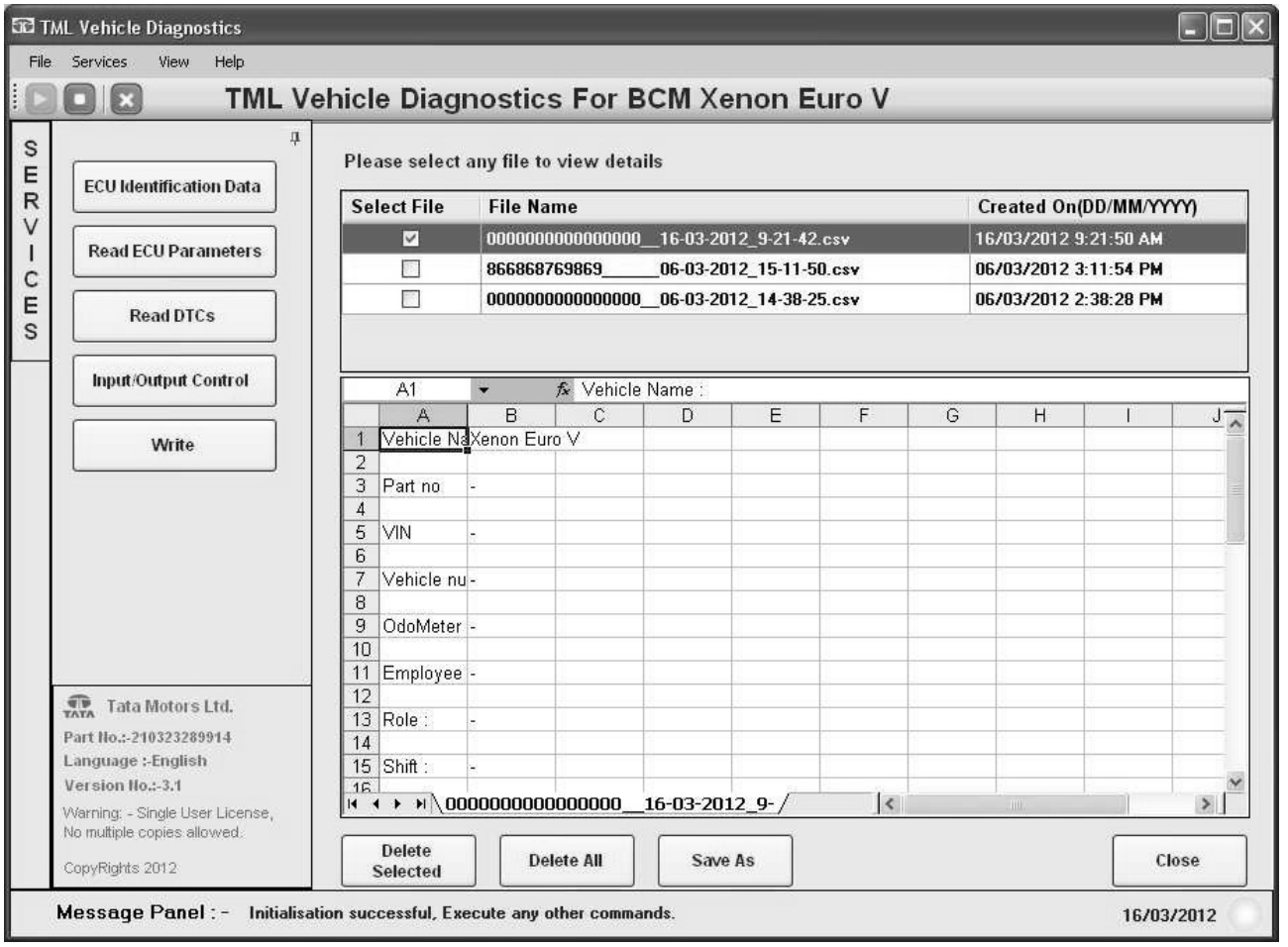


Save DTC: -

While saving the DTC records user will be prompted to enter certain details as Vehicle, Service Engineer, Technician, and Remarks etc. To ensure the uniqueness of VIN it will be displayed automatically to the user.

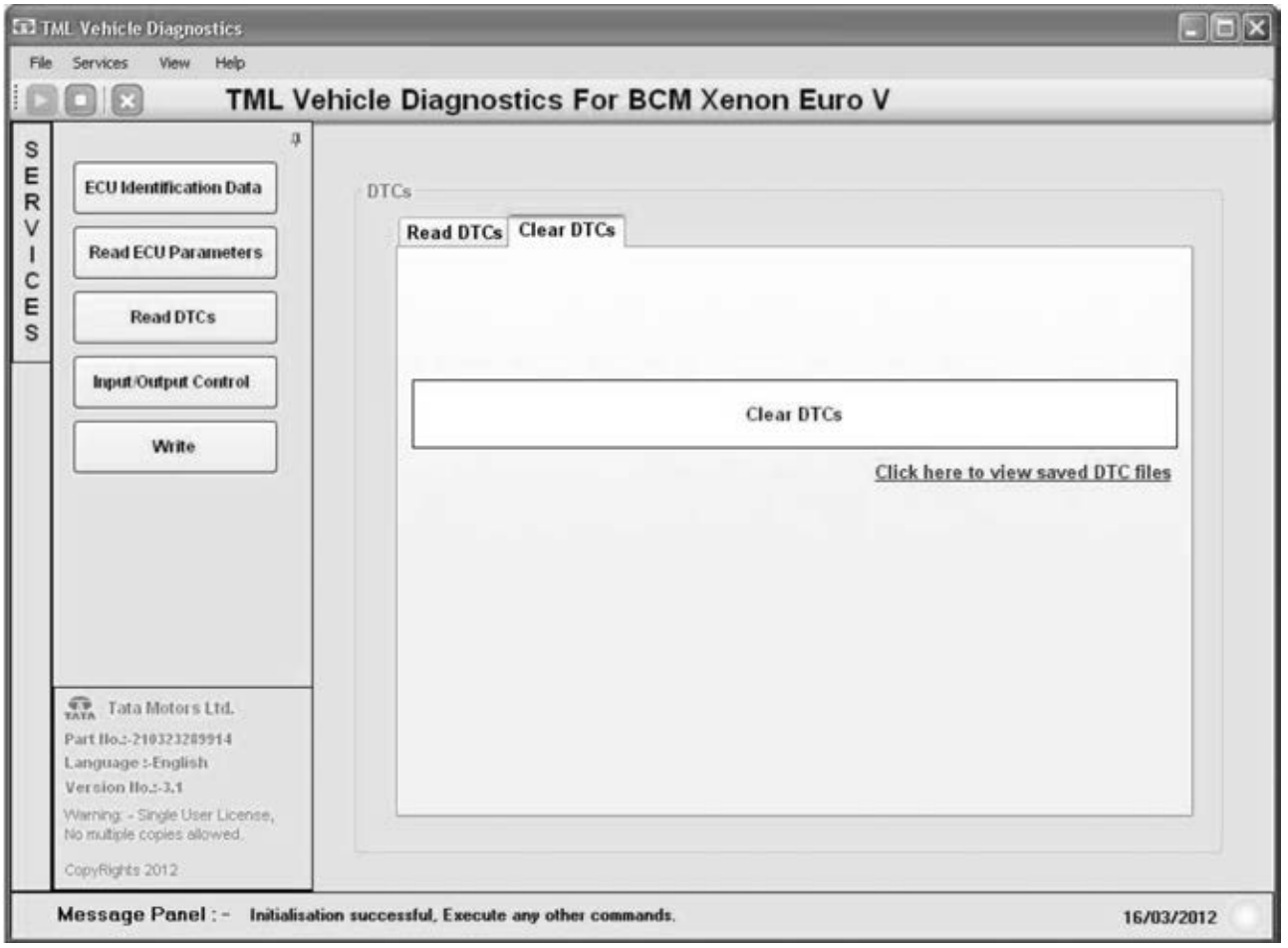


After filling data use will get Form which have embedded CSV file which is saved recently. Also this form contains list of all files present with saving folder for DTC file.



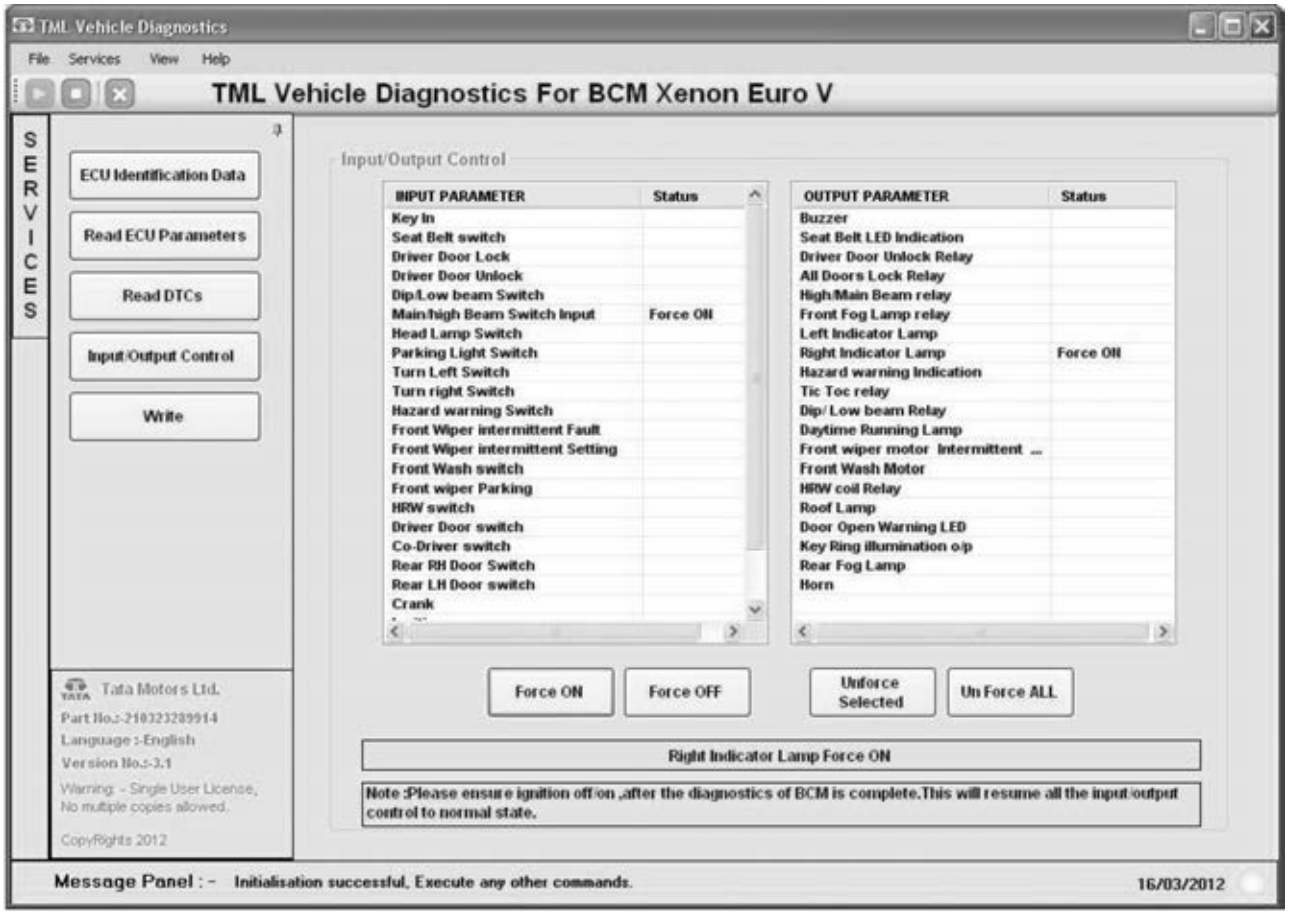
2.2.8 CLEAR DTC

All errors will be cleared from ECU. User needs to ensure that errors are physically cleared from the system.



2.2.9 INPUT OUTPUT CONTROL

The Input/output test in the ECU diagnostic is required to check the inputs/outputs of the ECU. The tool will allow user to check the inputs/outputs and display the results of the test.



2.3 IMMO

2.3.1 GENERAL

The Immobilizer is used for the security of vehicle. Immobilizer talks with EMS ECU over the CAN and after the successful authentication only engine can be start. Through Immobilizer various activities such as Pairing and Key Learning can be performed in the vehicle.

2.3.2 SALIENT FEATURES

The Diagnostic Tester software for Safari Immobilizer is capable to communicate with ECU in the vehicle through Serial K-Line Interface. The tester comprises of an Interface Unit and custom built application software. The user friendly application software can be easily installed on Windows Desktop or Laptop.

The interface unit is lightweight and compact in size to facilitate easy portability. It works on vehicle battery supply.

The tester application executes all the commands supported by Immobilizer ECU, which helps in diagnosis of Immobilizer ECU.

Following service are provided by the Diagnostic Tester application:

1. Read ECU Identification Data
2. Reading and Clearing DTCs
3. Write data
4. Locking and key routines
5. Pair Immobilizer ECU with EMS ECU

2.3.3 MAIN SCREEN

The below screen guides user the general settings and operating instructions of the Diagnostic Tester application.

NOTE:

Communication shall start automatically when Immobilizer ECU is selected for diagnostics from the scanner application.

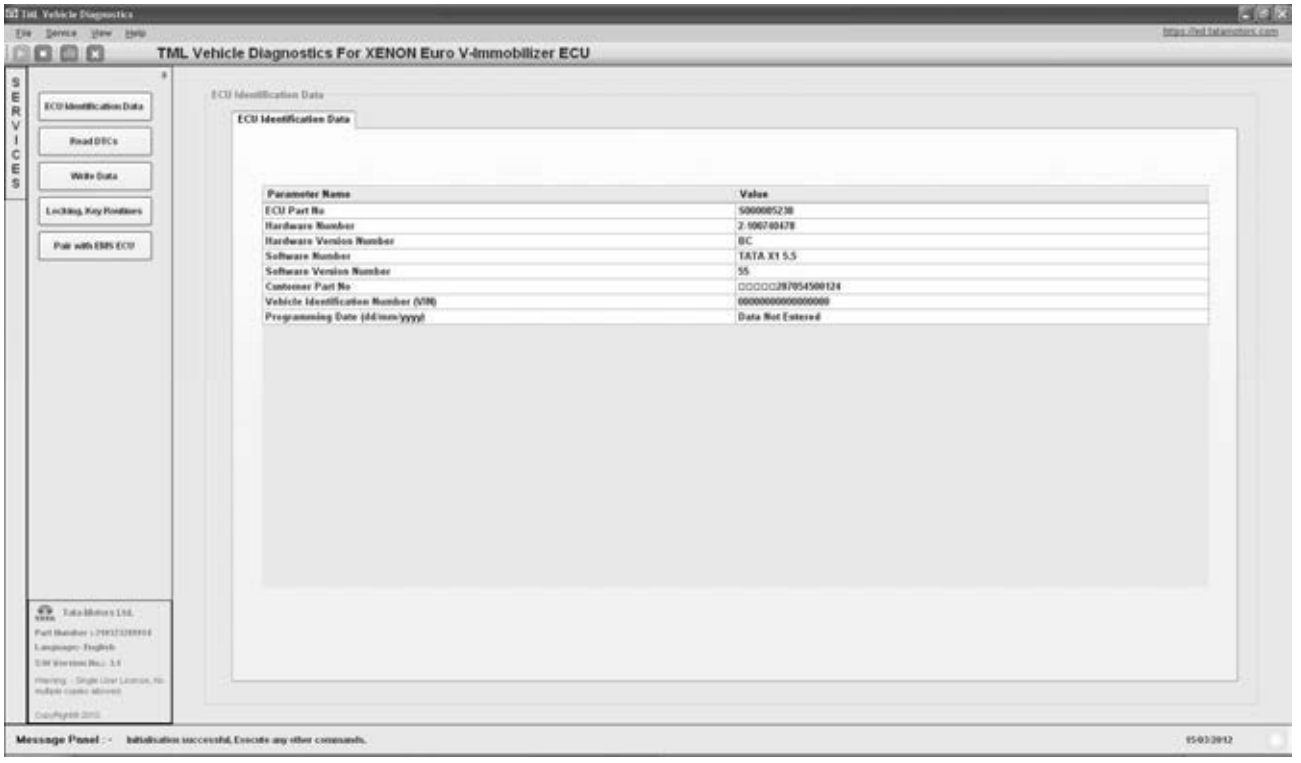
2.3.4 SERVICES PANEL

On successful communication the Services Panel will be visible to the user which will cater the services supported by the ECU.

Click on the service buttons to execute the corresponding service. Auto hide button for services panel can be used to have bigger preview area for displayed results.

2.3.5 IDENTIFICATION DATA

The Identification data service provides information of ECU firmware along with Vehicle Identification Number (VIN).



2.3.6 READ AND CLEAR DTCs

DTCs recorded in the ECUs can be viewed along with the remedial measures which shall help in diagnosing the vehicle.

After resolving the DTCs they can be cleared from ECU memory.

DTCs can be saved for future reference. It requires technician and vehicle related information to save the DTCs in Excel file format.

The screens are as shown below.

When the DTCs are available in the ECU then select any DTC from the list and click on Causes and Remedies button to view the remedial measures.

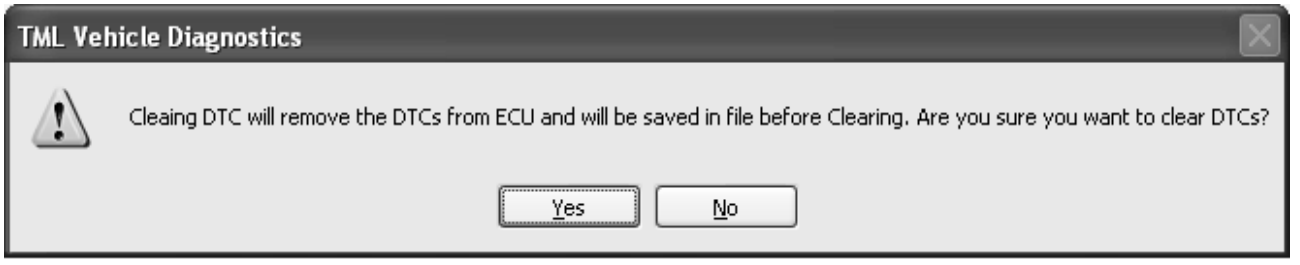
The DTCs can be saved for later future reference or may be to generate vehicle report. The DTCs related or vehicle problem related feedback can be provided to Diagnostic

Support Team. Just click on the Feedback button available on the DTC preview screen. The feedback can be submitted against particular DTC or only symptoms can be provided.

Change the tab from Read DTCs to Clear DTCs which will clear the available DTCs in the ECU.

After submitting the feedback the data will be collected automatically whenever the user connects the PC/Laptop to the internet.

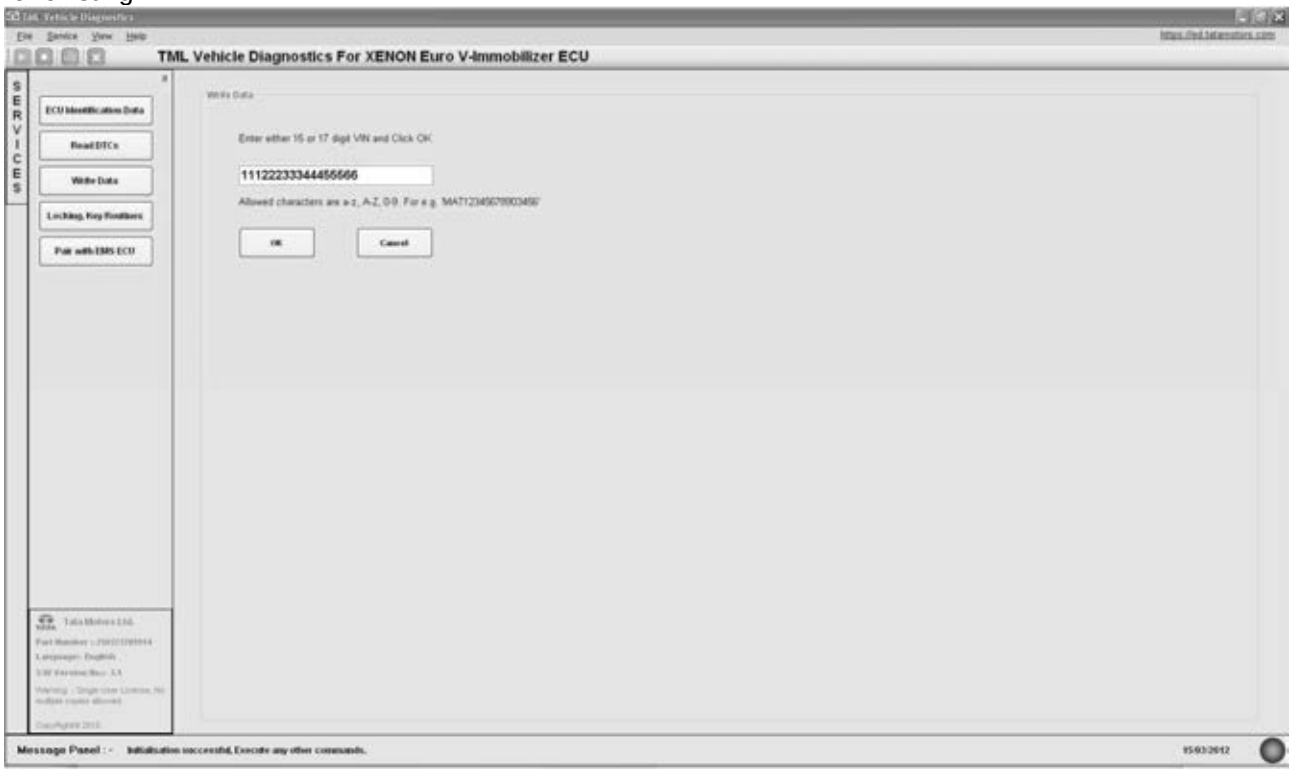
Changing to Clear DTCs option user is prompted for confirmation of clearing DTCs.



After clearing the DTCs the screen is displayed intimating user about DTC cleared.

2.3.7 WRITE DATA

Write Data is used to change the VIN in the ECU. If VIN already present in the ECU then user will be prompted for existing VIN.



2.3.8 LOCKING AND KEY ROUTINES

This service allows user:

1) Know transponder key status
2) Lock pairing
3) Add any transponder key

Lock Pairing-

NOTE:
If user exits from pairing routine without locking then user have to lock AES-SK using this Service. It is mandatory to lock AES-SK after Pairing for security reasons.

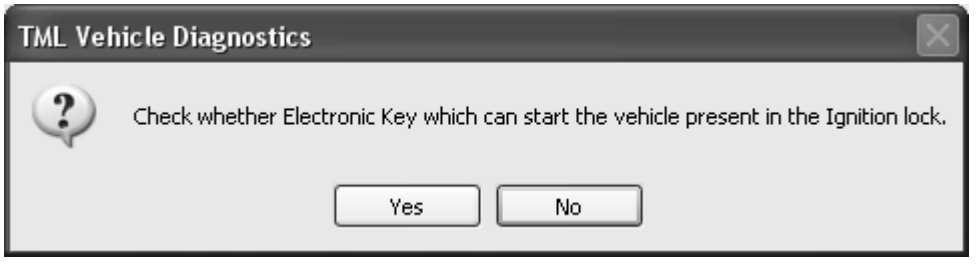
On selecting sub-function “Lock Pairing”, a message box will pop up for user’s confirmation.

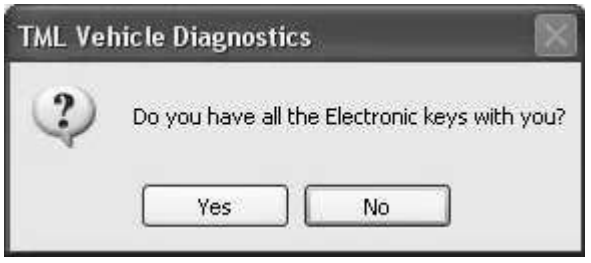
Transponder Keys Learning Add -

This procedure is necessary when there is any need to convert mechanical key (M-Key) to electronic key (E-Key) because vehicle can be cranked only using right electronic key.

NOTE:
This tester will only initiate this process. The user has to complete the further steps of key-learning manually, refer to service manual. The manual mistakes cannot be rectified by the tester; the whole process has to be repeated again in such cases.

On selecting sub-function "ADD Transponder Keys", some messages will appear. Read all the messages and select accordingly.





2.3.9 PAIR WITH EMS

As part of the new antitheft mechanism in the vehicles the EMS ECU needs to be paired with Immobilizer ECU.

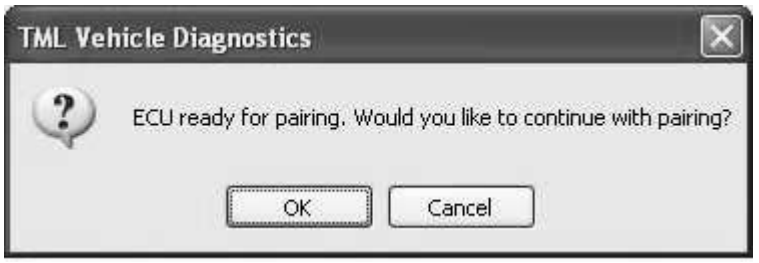
Read the instructions before paring the ECUs. It is recommended to understand the pairing process thoroughly to avoid the problems that can be caused if process not followed properly.

After replacing the Immobilizer ECU, user has to perform the “Pair EMS ECU” function. Pairing is a process which is required for proper cranking of vehicle when user replaces the EMS or the Immobilizer ECU from the vehicle.

NOTE: *This process must be executed after replacing the ECU*

This service is used to pair the Immobilizer with EMS ECU (which is also connected in K-Line). The concept of pairing is the part of improved security and anti theft mechanism of the vehicle. The encrypted security key is entered in both ECUs and the EMS and Immobilizer are said to be paired when the key is matching in both ECUs.

Click on Start Pairing button to perform the pairing process.



After completion of paring the user will be prompted to lock the pairing process and it is recommended to lock the pairing for security reasons.

NOTE:
It is mandatory to lock AES-SK for security reasons. If you exit from pairing routine without locking then you have to lock AES-SK from the 'Routine By LID' Service. Kindly ensure this, without this step the pairing is in-complete.

NOTE:
The circuit schematic for the ECU is available for reference. Click on View -7Circuit Schematic from menu options.

2.4 AIRBAG

2.4.1 GENERAL

An airbag is a vehicle safety device. It is an occupant restraint consisting of a flexible envelope designed to inflate rapidly in an automobile collision, to prevent vehicle occupants from striking interior objects such as the steering wheel or window. Airbag ECU is the crucial ECU of the vehicle as far as safety is concern.

Through Airbag ECU various activities such as lock unlock the ECU, Enable disable the

Airbag feature can be performed in the vehicle.

2.4.2 SALIENT FEATURES

The Diagnostic Tester software for Airbag ECU is capable to communicate with ECU in the vehicle through Serial K-Line Interface. The tester comprises of an Interface Unit and custom built application software. The user friendly application software can be easily installed on Windows Desktop or Laptop.

The interface unit is lightweight and compact in size to facilitate easy portability. It works on vehicle battery supply.

The tester application executes all the commands supported by AIRBAG ECU, which helps in diagnosis of AIR-BAG ECU.

Following service are provided by the Diagnostic Tester application:

1. Read ECU Information
2. Reading and Clearing DTCs
3. Read Vehicle Data
4. Input / Output Control
5. Write Data in ECU
6. Rest ECU
7. Read Crash Data

2.4.3 MAIN SCREEN

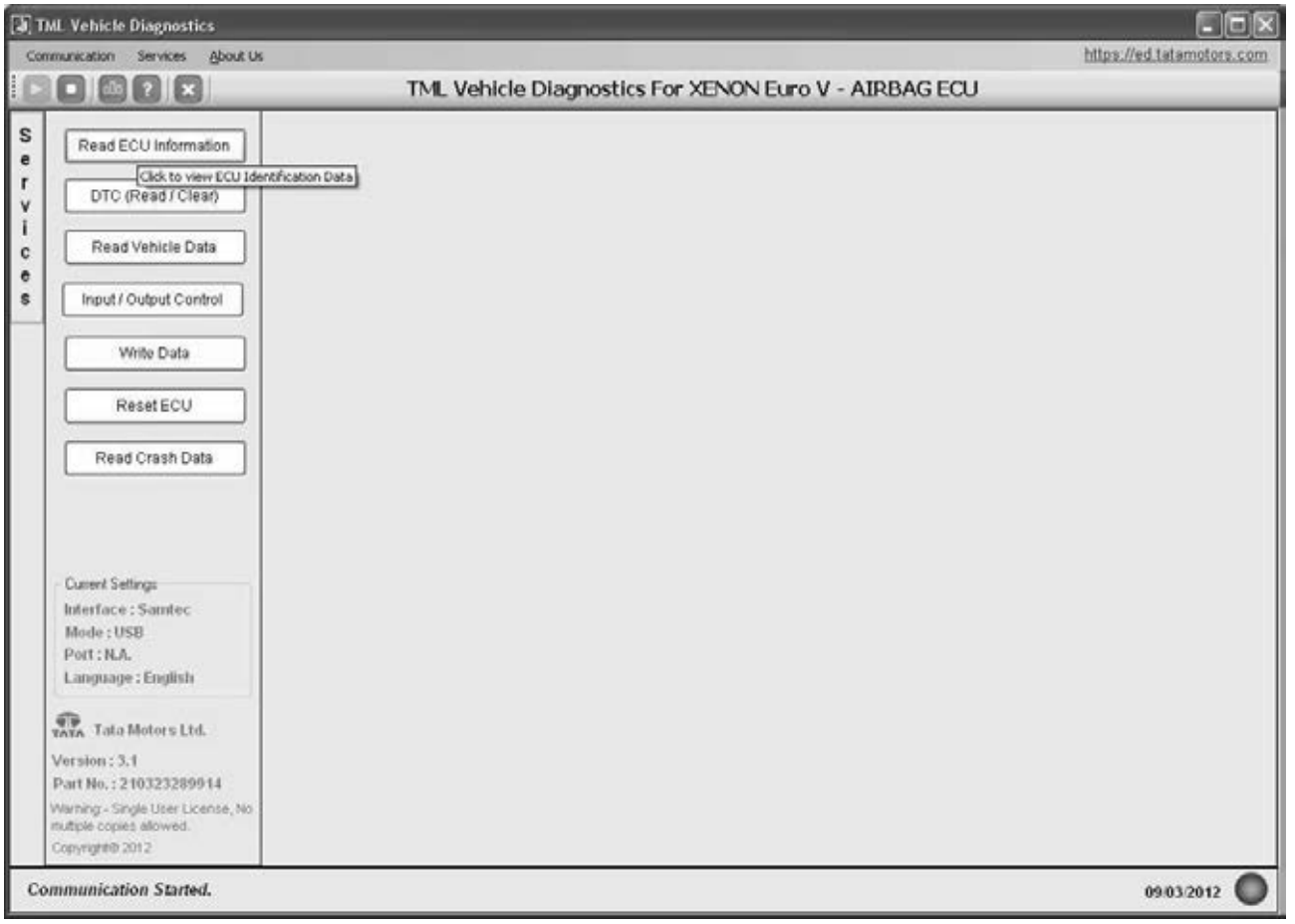
The below screen guides user the general settings and operating instructions of the Diagnostic Tester application.

NOTE:

Communication shall start automatically when Airbag ECU is selected for diagnostics from the scanner application.

2.4.4 SERVICES PANEL

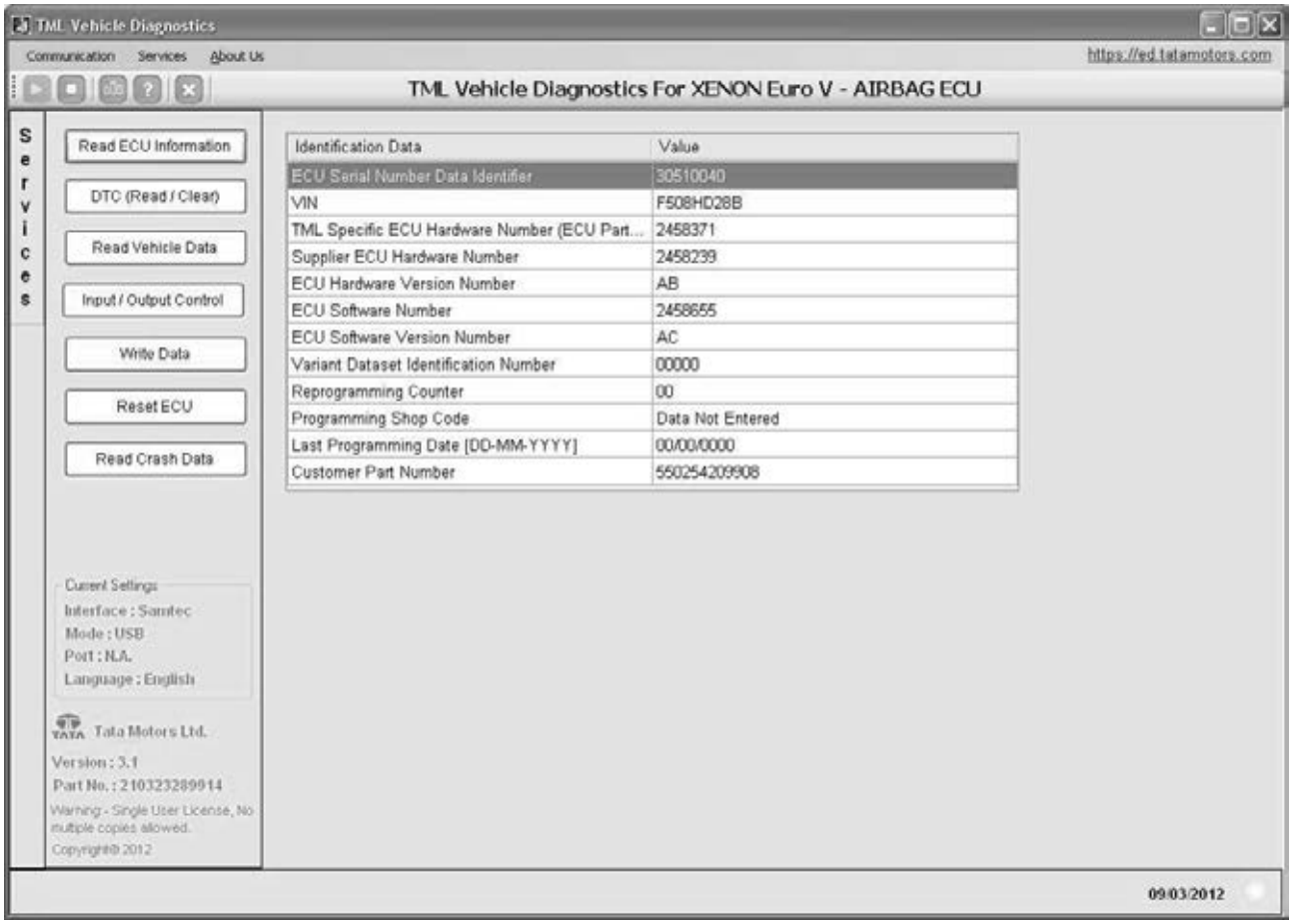
On successful communication the Services Panel will be visible to the user which will cater the services supported by the ECU.



Click on the service buttons to execute the corresponding service.

2.4.5 ECU INFORMATION DATA

The ECU Information Data service provides information of ECU firmware along with Vehicle Identification Number (VIN).

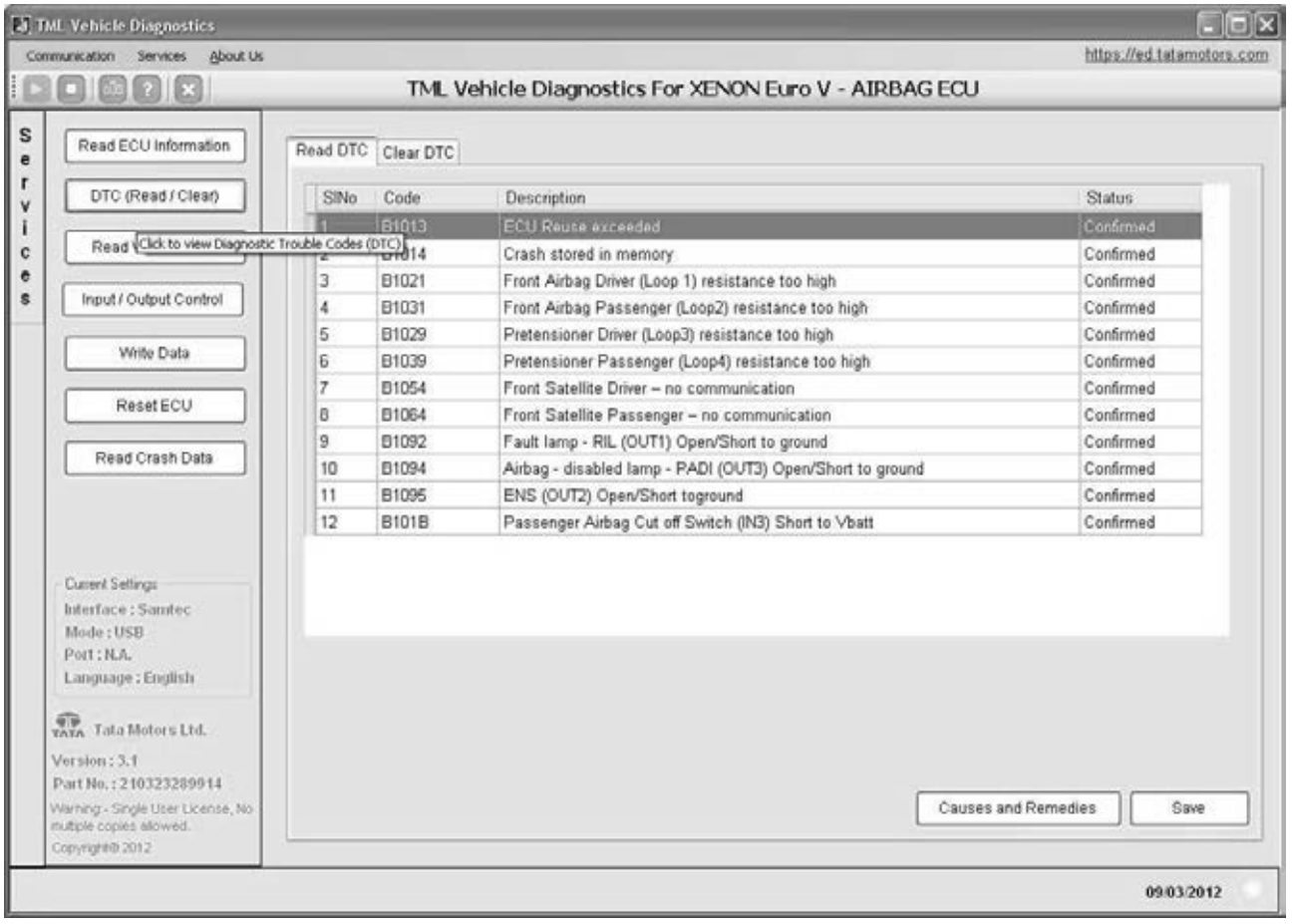


2.4.6 READ AND CLEAR DTC

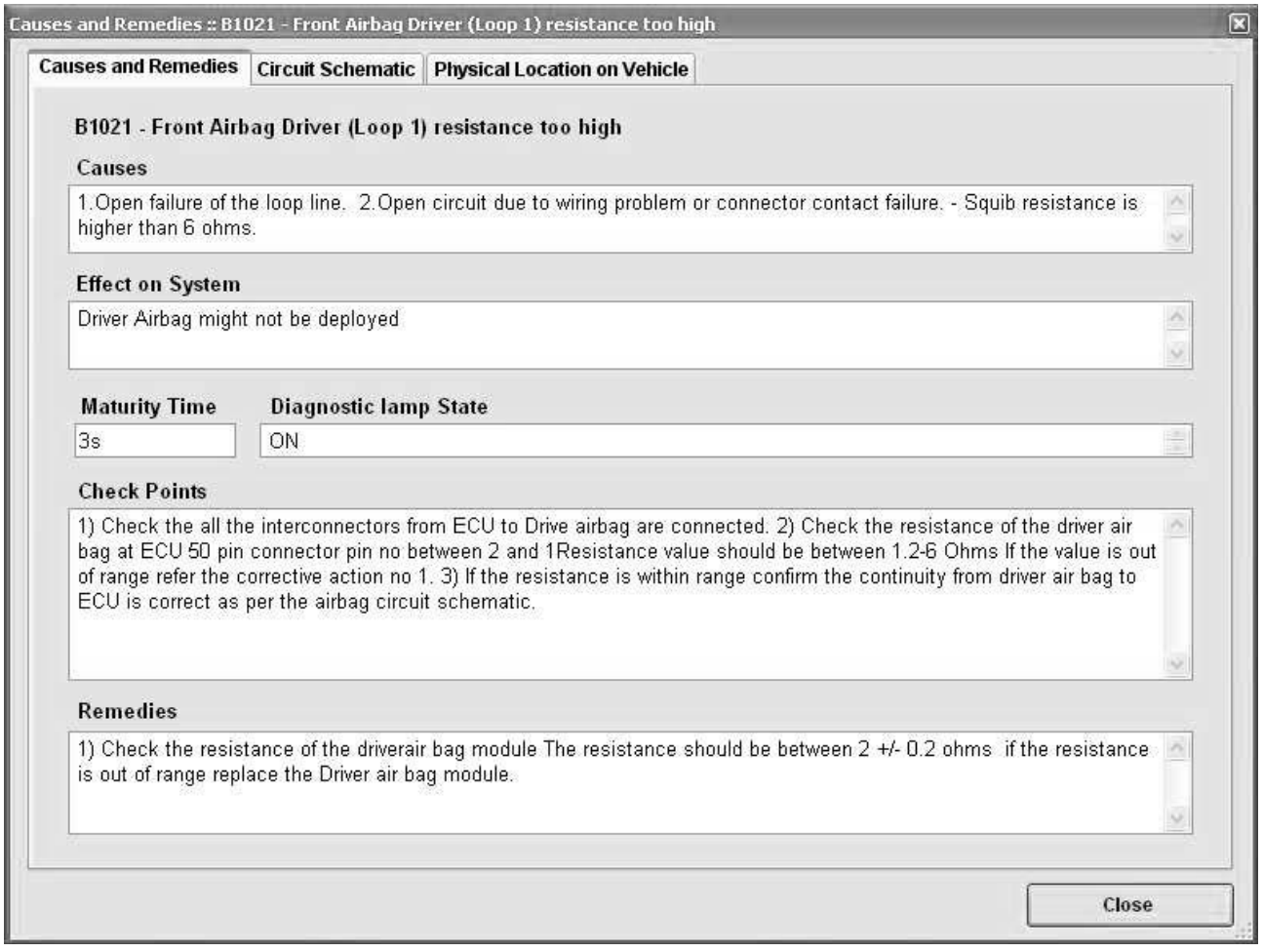
DTCs recorded in the ECUs can be viewed along with the remedial measures which shall help in diagnosing the vehicle.

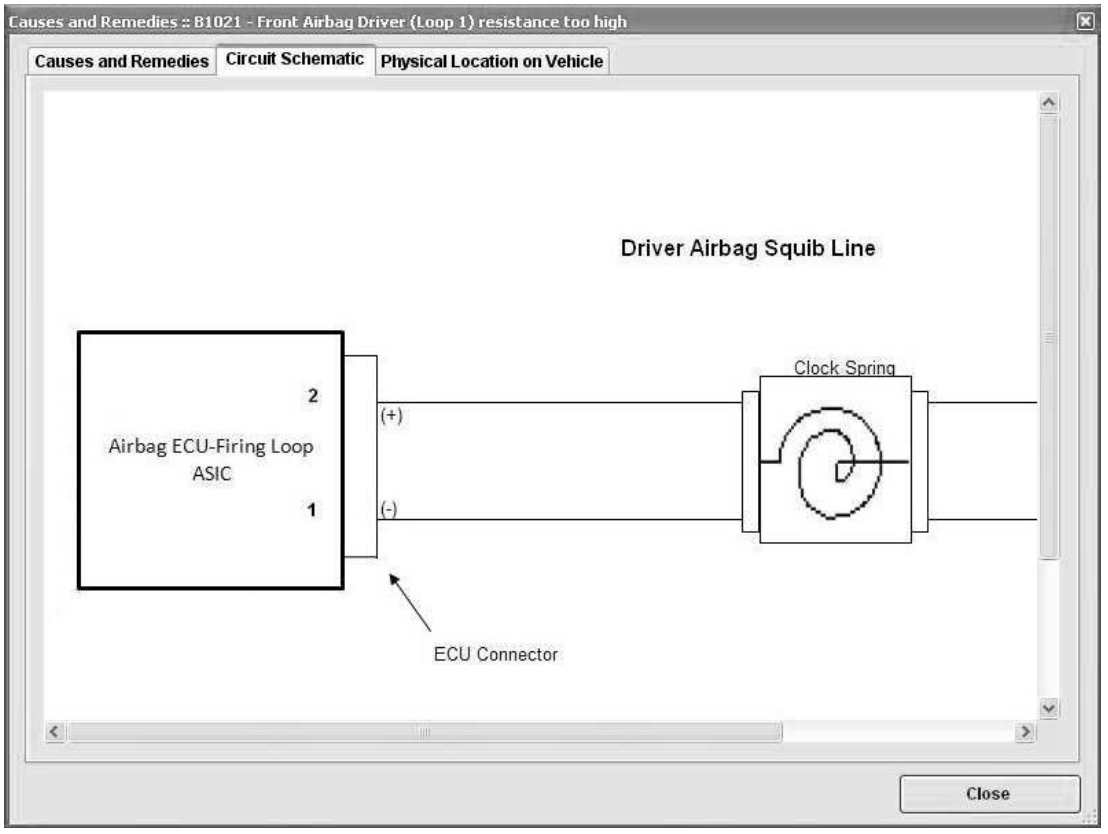
After resolving the DTCs they can be cleared from ECU memory.

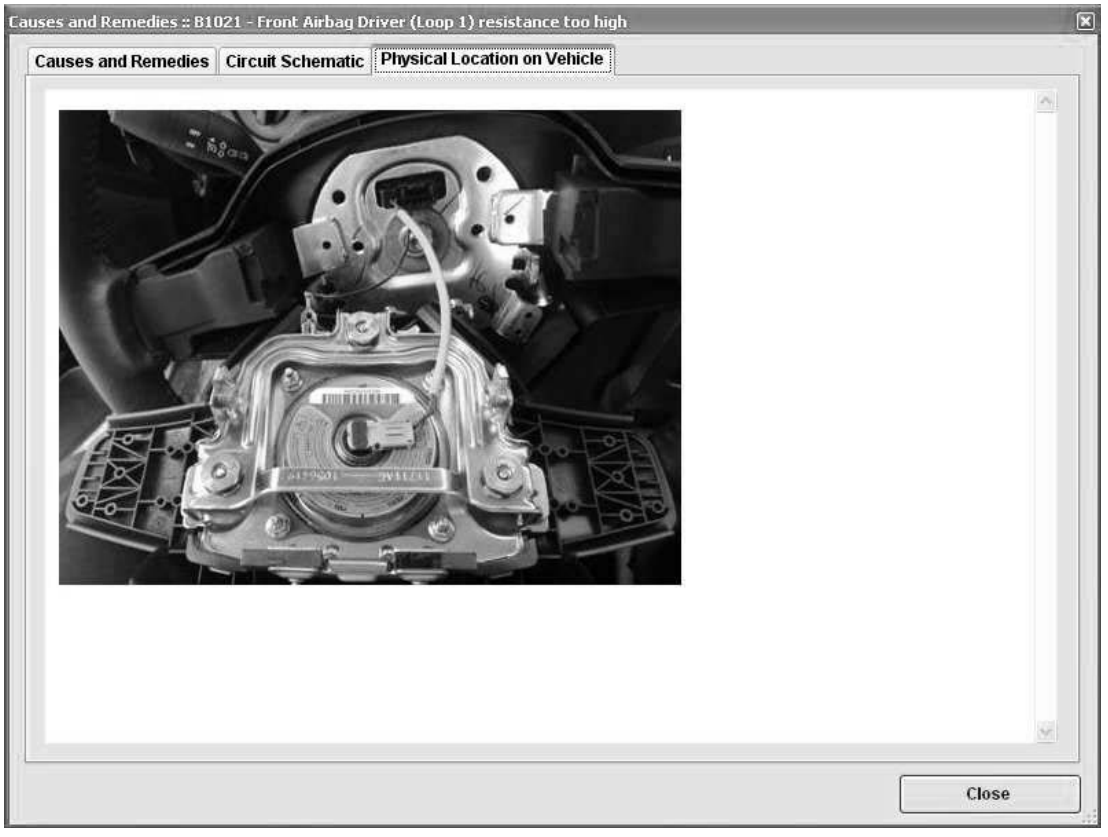
DTCs can be saved for future reference. It requires technician and vehicle related information to save the DTCs in Excel file format. The screens are as shown below;

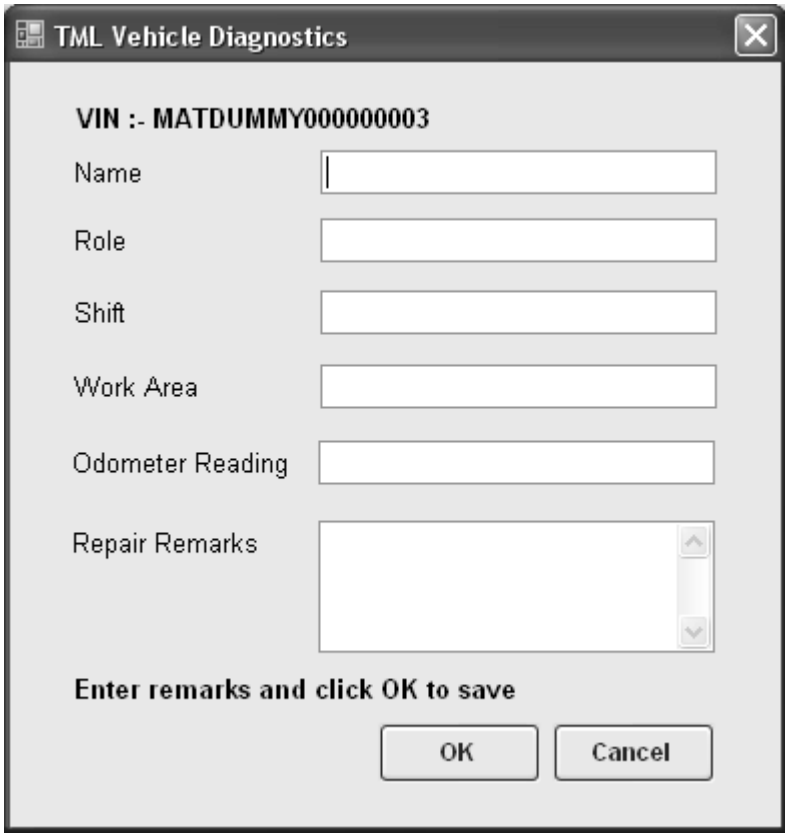


Select any DTC from the list to view Causes and Remedies.

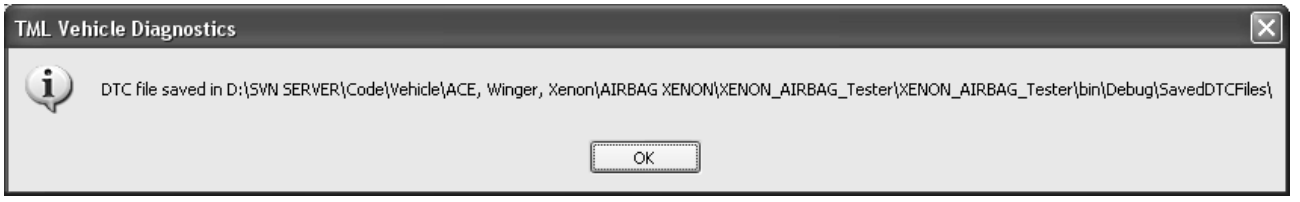

Causes and Remedies :: B1021 - Front Airbag Driver (Loop 1) resistance too high
Causes and Remedies
Circuit Schematic
Physical Location on Vehicle
B1021 - Front Airbag Driver (Loop 1) resistance too high
Causes
1.Open failure of the loop line. 2.Open circuit due to wiring problem or connector contact failure. - Squib resistance is higher than 6 ohms.
Effect on System
Driver Airbag might not be deployed
Maturity Time
3s
Diagnostic lamp State
ON
Check Points
1) Check the all the interconnectors from ECU to Drive airbag are connected. 2) Check the resistance of the driver air bag at ECU 50 pin connector pin no between 2 and 1Resistance value should be between 1.2-6 Ohms If the value is out of range refer the corrective action no 1. 3) If the resistance is within range confirm the continuity from driver air bag to ECU is correct as per the airbag circuit schematic.
Remedies
1) Check the resistance of the driverair bag module The resistance should be between 2 +/- 0.2 ohms if the resistance is out of range replace the Driver air bag module.
Close


Causes and Remedies :: B1021 - Front Airbag Driver (Loop 1) resistance too high
Causes and Remedies
Circuit Schematic
Physical Location on Vehicle
Driver Airbag Squib Line
2
Airbag ECU-Firing Loop
ASIC
1
(+)
(-)
Clock Spring
ECU Connector
Close

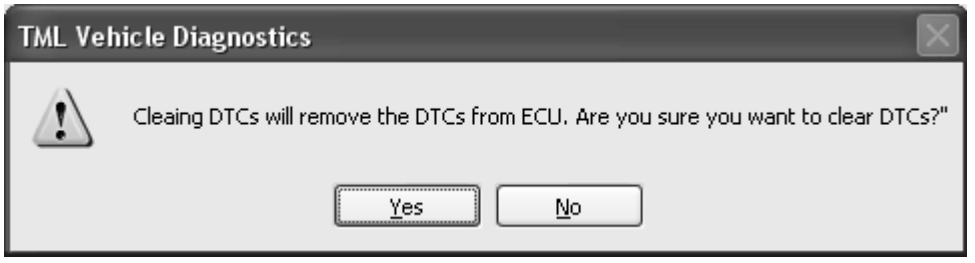

Causes and Remedies :: B1021 - Front Airbag Driver (Loop 1) resistance too high
Causes and Remedies
Circuit Schematic
Physical Location on Vehicle
Close



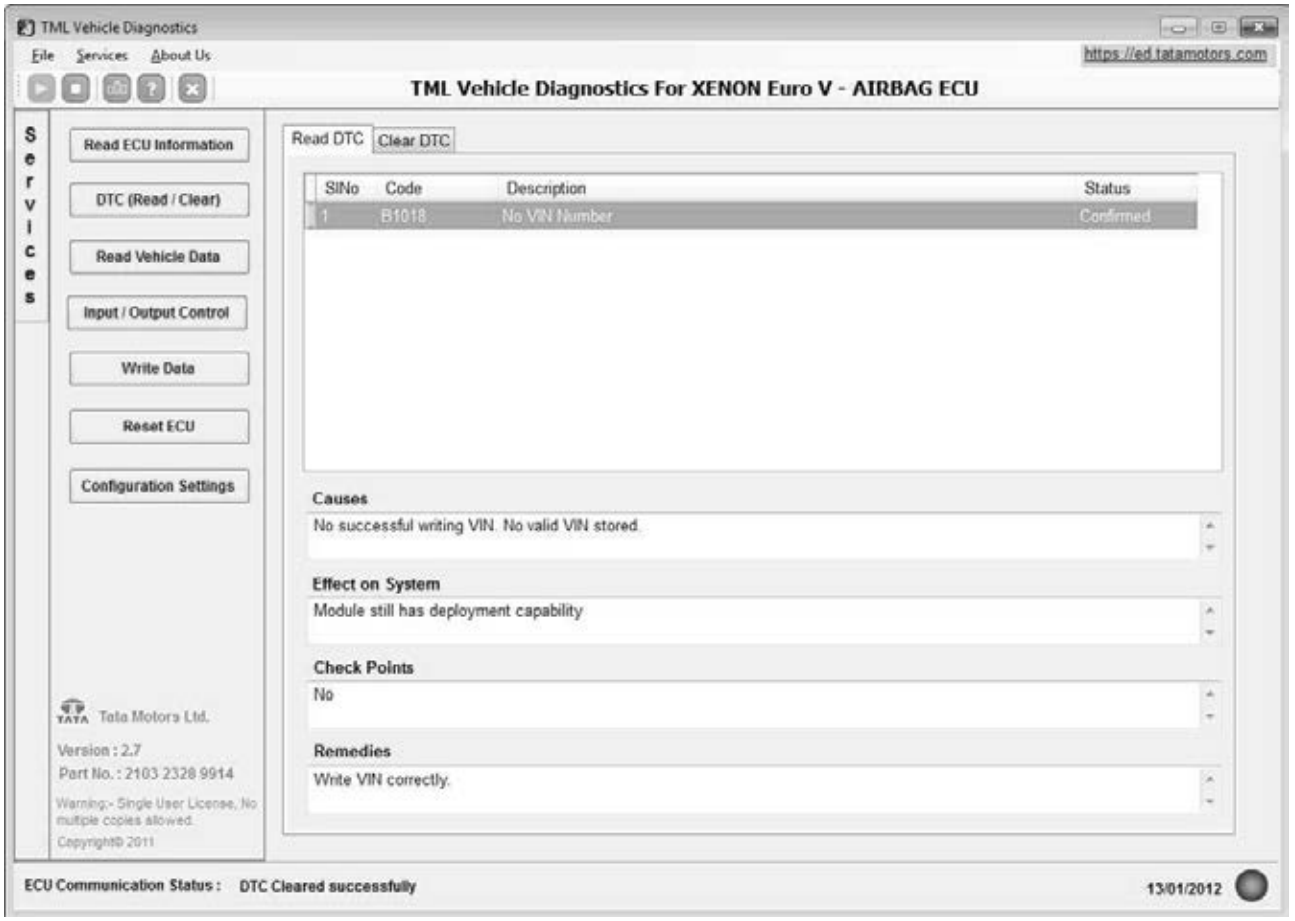
User has to specific required details and then save DTC. The DTC file will be saved in the default application path. On saving application will specify the path on the screen.



Change the tab from Read DTCs to Clear DTCs which will clear the available DTCs in the ECU. Changing to Clear DTCs option user is prompted for confirmation of clearing DTCs.

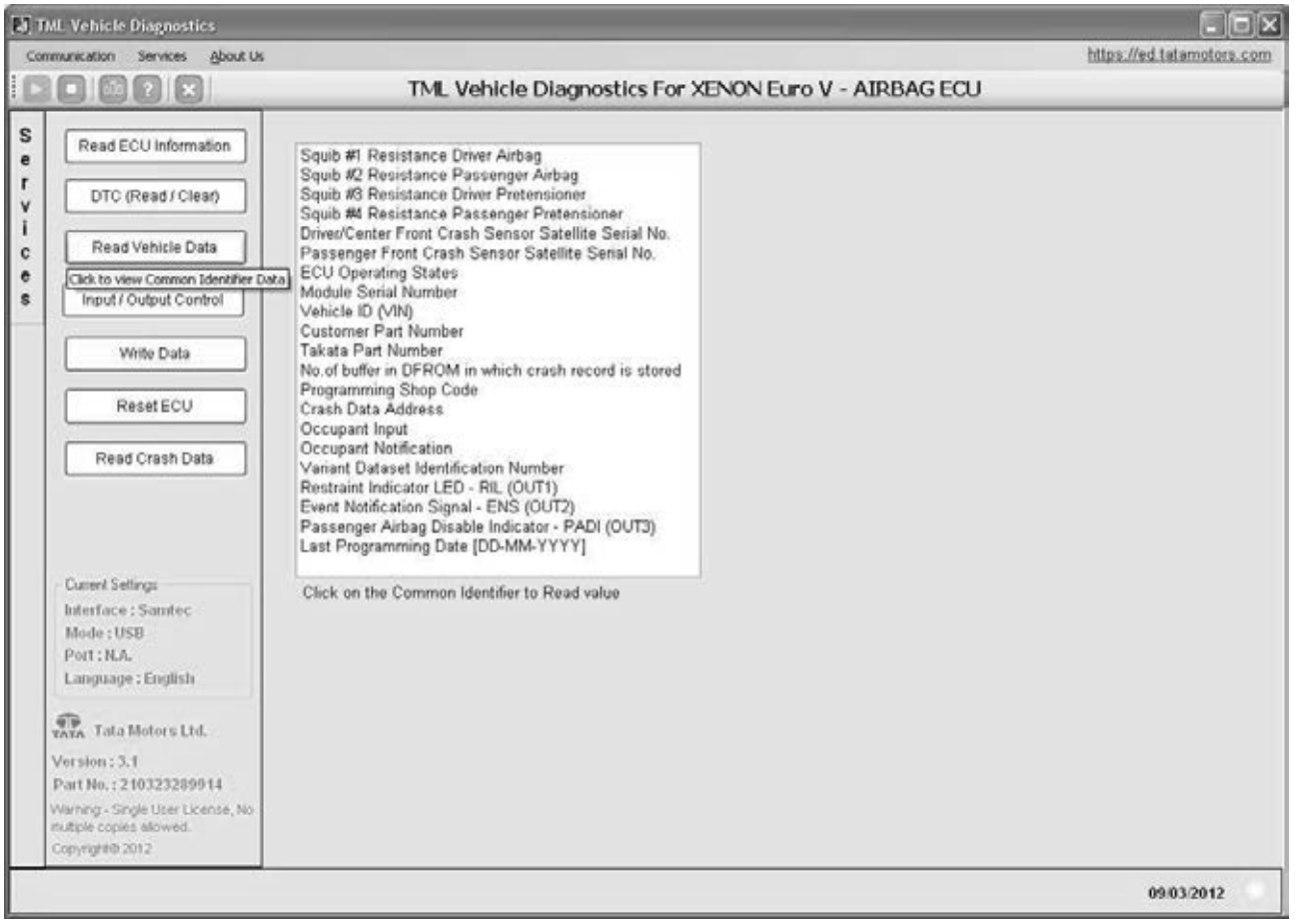


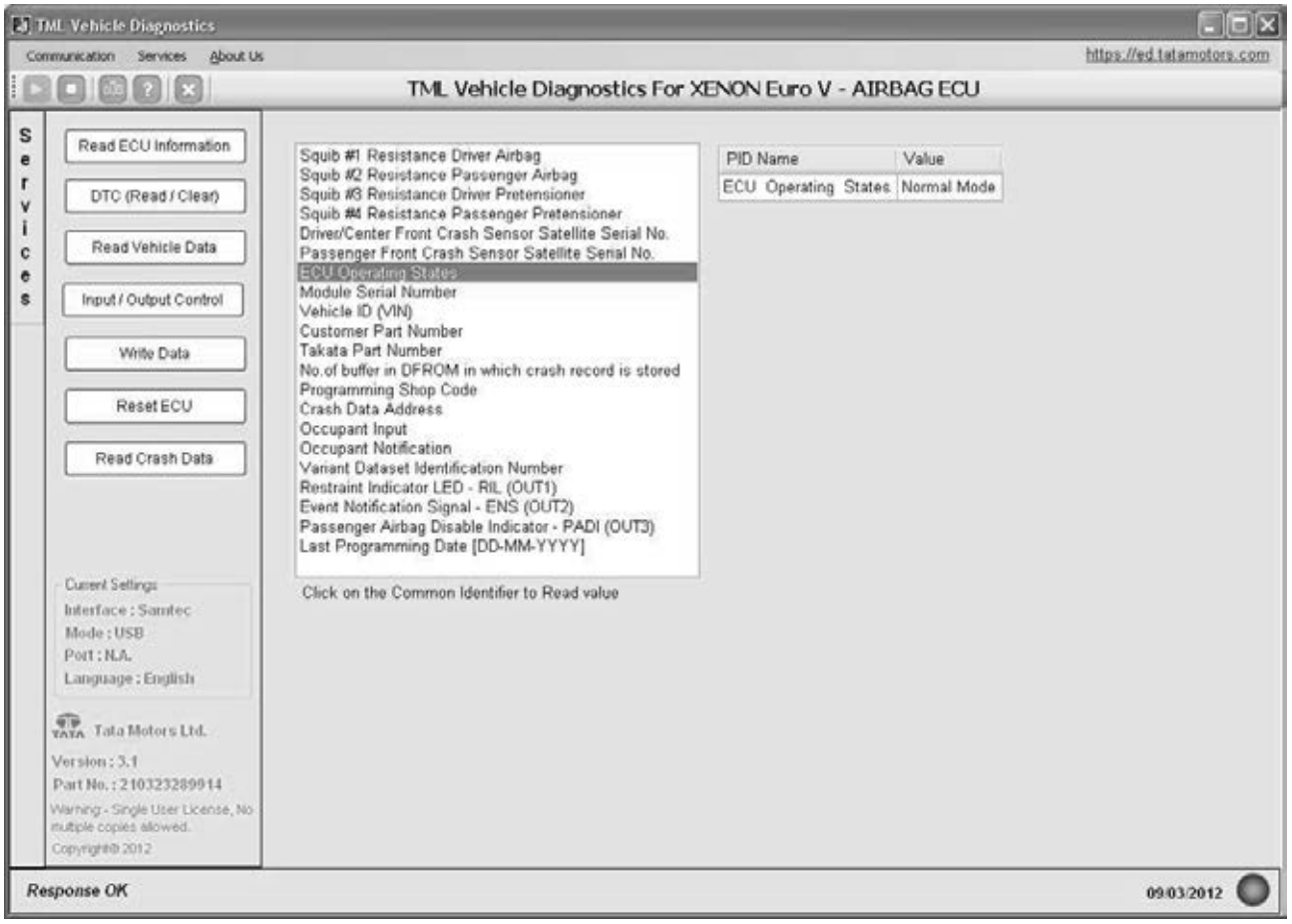
After clearing the DTCs the following screen would be displayed.



2.4.7 READ VEHICLE DATA

Vehicle significant data can be read here. Select any parameter from the list to view data.




TML Vehicle Diagnostics
Communication
Services
About Us
https://ed.tatamotors.com
TML Vehicle Diagnostics For XENON Euro V - AIRBAG ECU
Services
Read ECU Information
DTC (Read / Clear)
Read Vehicle Data
Input / Output Control
Write Data
Reset ECU
Read Crash Data
Squib #1 Resistance Driver Airbag
Squib #2 Resistance Passenger Airbag
Squib #3 Resistance Driver Pretensioner
Squib #4 Resistance Passenger Pretensioner
Driver/Center Front Crash Sensor Satellite Serial No.
Passenger Front Crash Sensor Satellite Serial No.
ECU Operating States
Module Serial Number
Vehicle ID (VIN)
Customer Part Number
Takata Part Number
No.of buffer in DFROM in which crash record is stored
Programming Shop Code
Crash Data Address
Occupant Input
Occupant Notification
Variant Dataset Identification Number
Restraint Indicator LED - RIL (OUT1)
Event Notification Signal - ENS (OUT2)
Passenger Airbag Disable Indicator - PADI (OUT3)
Last Programming Date [DD-MM-YYYY]
Click on the Common Identifier to Read value
PID Name
Value
ECU Operating States
Normal Mode
Current Settings
Interface : Sanitec
Mode : USB
Port : N.A.
Language : English
Tata Motors Ltd.
Version : 3.1
Part No. : 210323289914
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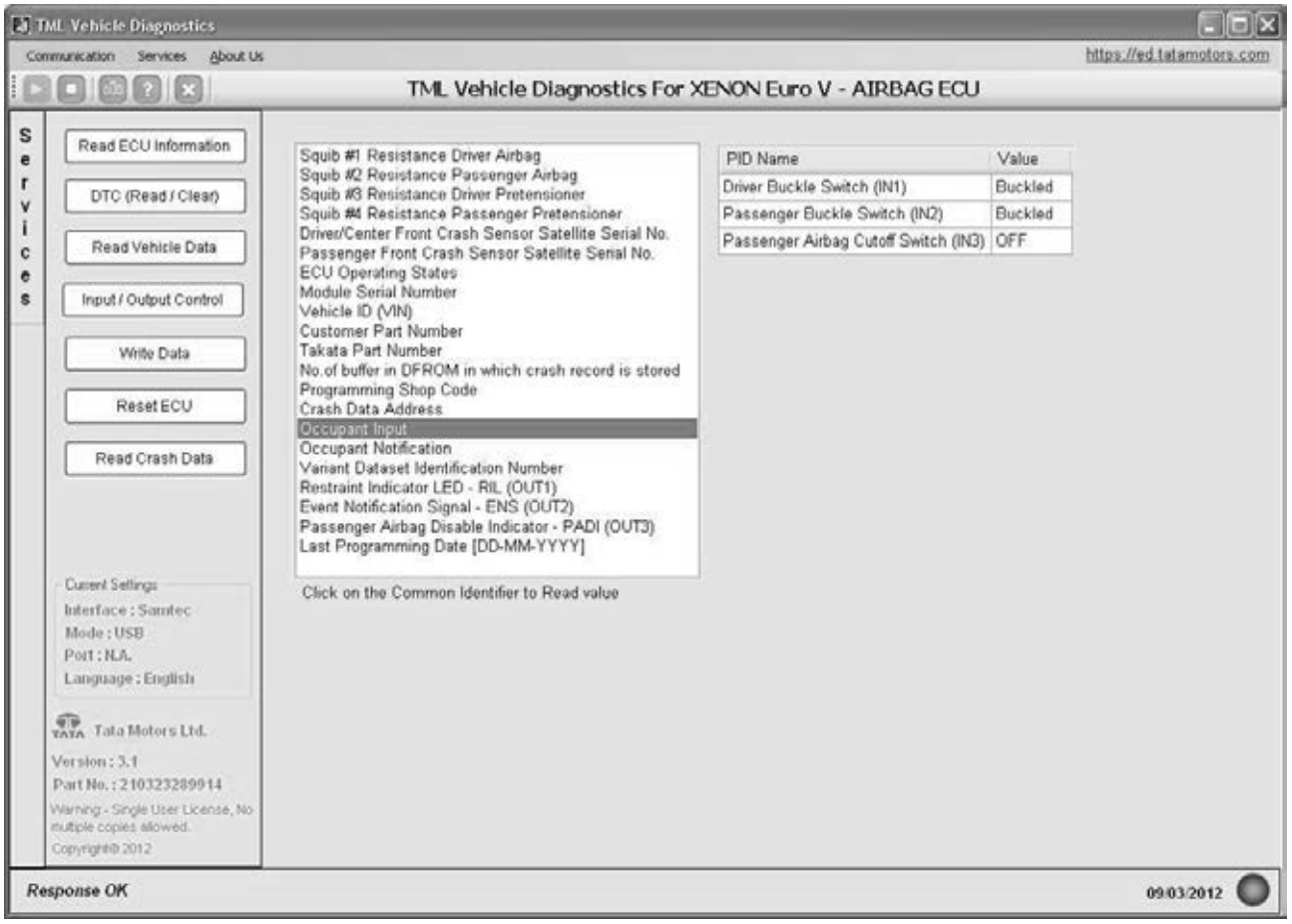
Response OK
09/03/2012


TML Vehicle Diagnostics
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Services
About Us
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TML Vehicle Diagnostics For XENON Euro V - AIRBAG ECU
Services
Read ECU Information
DTC (Read / Clear)
Read Vehicle Data
Input / Output Control
Write Data
Reset ECU
Read Crash Data
Squib #1 Resistance Driver Airbag
Squib #2 Resistance Passenger Airbag
Squib #3 Resistance Driver Pretensioner
Squib #4 Resistance Passenger Pretensioner
Driver/Center Front Crash Sensor Satellite Serial No.
Passenger Front Crash Sensor Satellite Serial No.
ECU Operating States
Module Serial Number
Vehicle ID (VIN)
Customer Part Number
Takata Part Number
No.of buffer in DFROM in which crash record is stored
Programming Shop Code
Crash Data Address
Occupant Input
Occupant Notification
Variant Dataset Identification Number
Restraint Indicator LED - RIL (OUT1)
Event Notification Signal - ENS (OUT2)
Passenger Airbag Disable Indicator - PADI (OUT3)
Last Programming Date [DD-MM-YYYY]
Click on the Common Identifier to Read value
PID Name
Value
Driver Buckle Switch (IN1)
Buckled
Passenger Buckle Switch (IN2)
Buckled
Passenger Airbag Cutoff Switch (IN3)
OFF
Current Settings
Interface : Sanitec
Mode : USB
Port : N.A.
Language : English
Tata Motors Ltd.
Version : 3.1
Part No. : 210323289914
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Response OK
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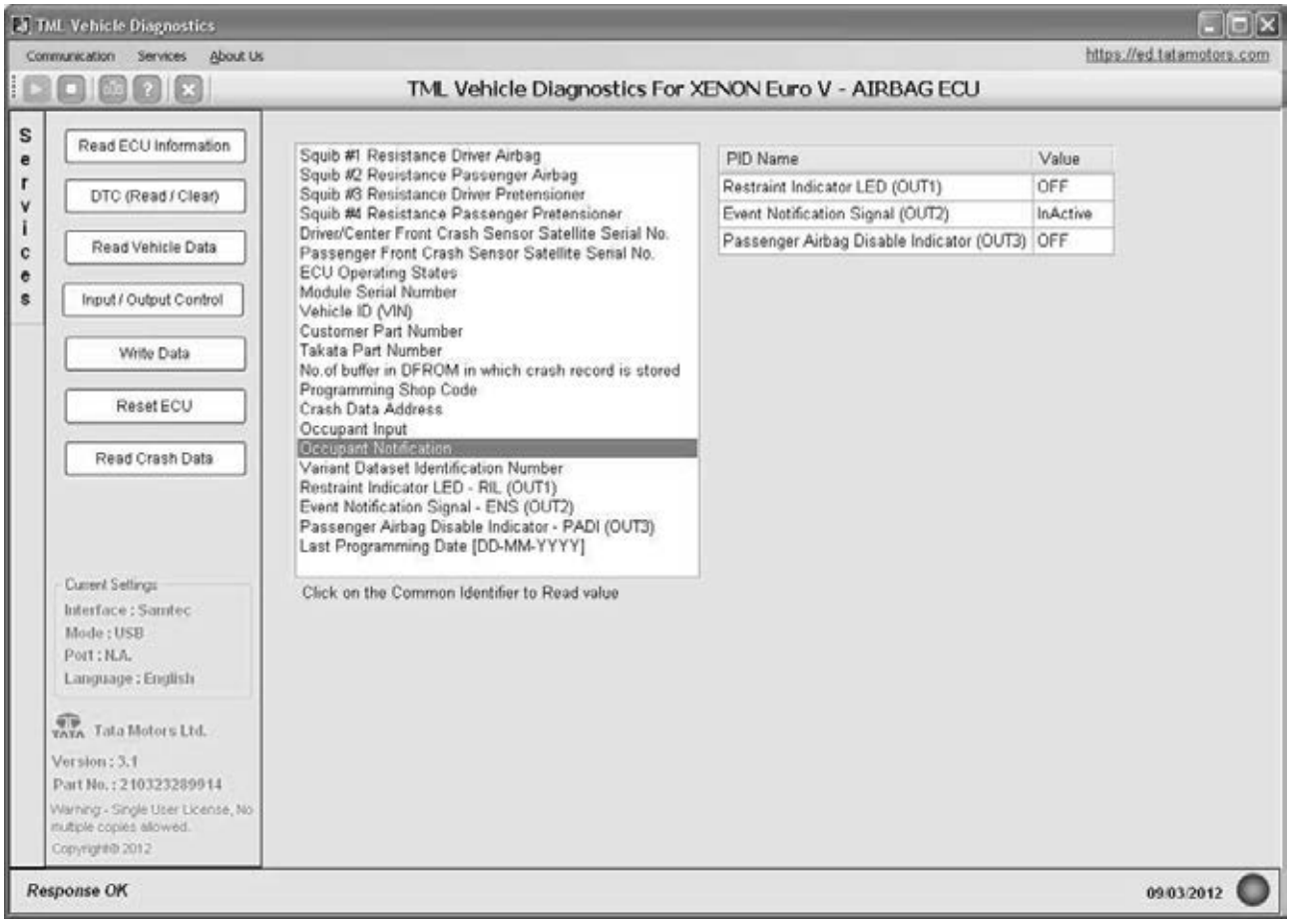
TML Vehicle Diagnostics
Communication
Services
About Us
https://ed.tatamotors.com
TML Vehicle Diagnostics For XENON Euro V - AIRBAG ECU
Services
Read ECU Information
DTC (Read / Clear)
Read Vehicle Data
Input / Output Control
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Squib #2 Resistance Passenger Airbag
Squib #3 Resistance Driver Pretensioner
Squib #4 Resistance Passenger Pretensioner
Driver/Center Front Crash Sensor Satellite Serial No.
Passenger Front Crash Sensor Satellite Serial No.
ECU Operating States
Module Serial Number
Vehicle ID (VIN)
Customer Part Number
Takata Part Number
No.of buffer in DFROM in which crash record is stored
Programming Shop Code
Crash Data Address
Occupant Input
Occupant Notification
Variant Dataset Identification Number
Restraint Indicator LED - RIL (OUT1)
Event Notification Signal - ENS (OUT2)
Passenger Airbag Disable Indicator - PADI (OUT3)
Last Programming Date [DD-MM-YYYY]
Click on the Common Identifier to Read value
PID Name
Value
Restraint Indicator LED (OUT1)
OFF
Event Notification Signal (OUT2)
InActive
Passenger Airbag Disable Indicator (OUT3)
OFF
Current Settings
Interface : Sanitec
Mode : USB
Port : N.A.
Language : English
Tata Motors Ltd.
Version : 3.1
Part No. : 210323289914
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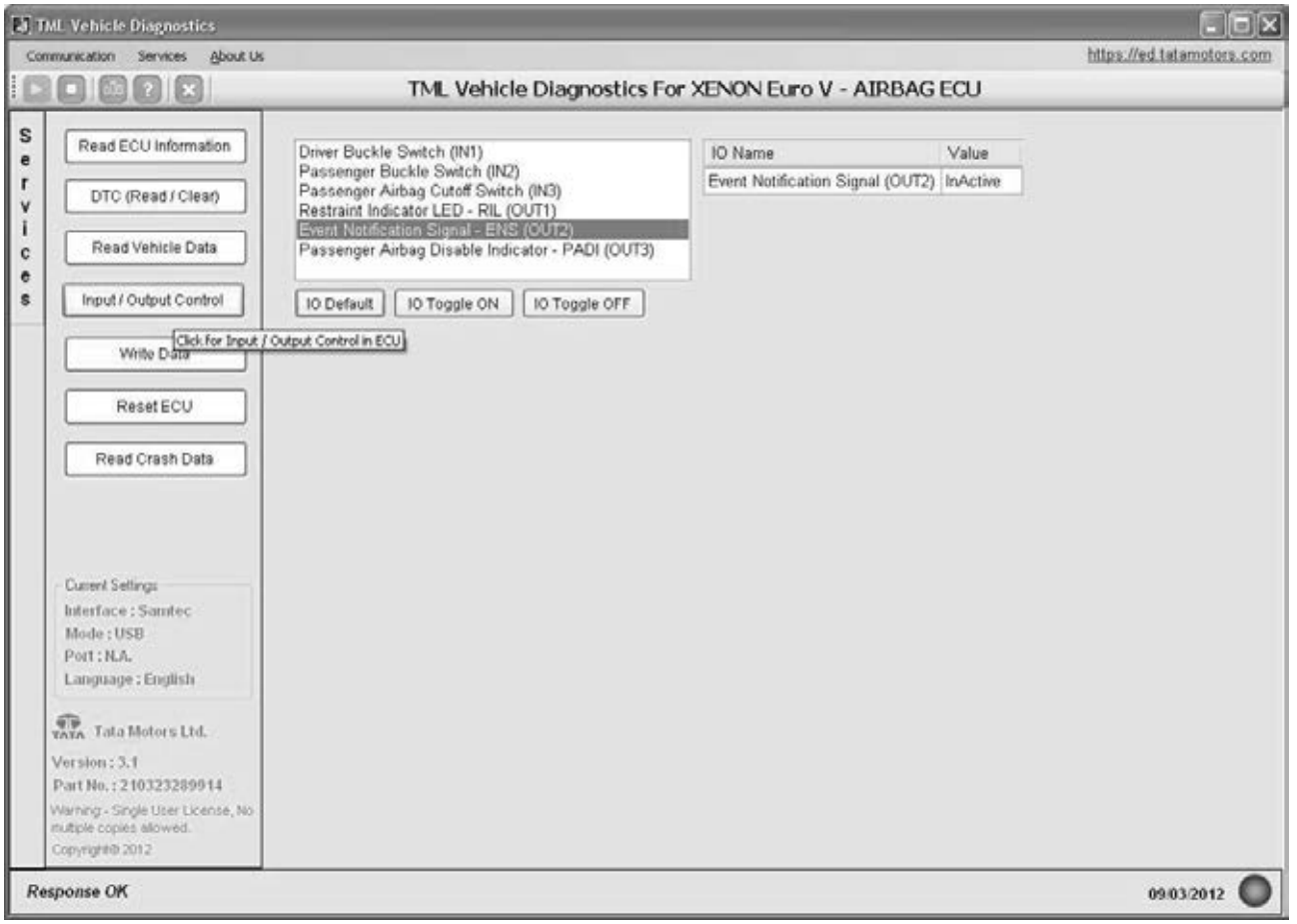
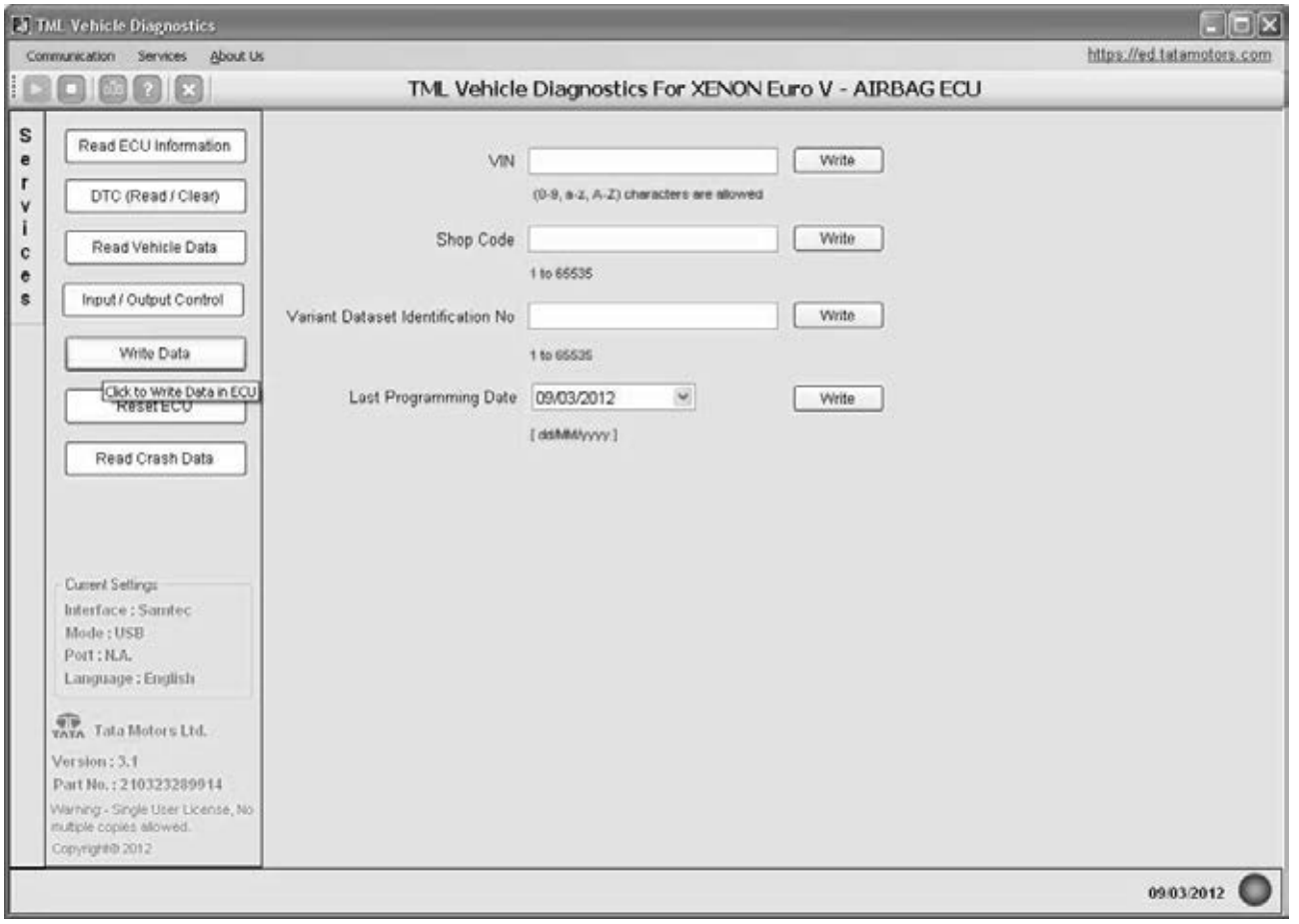
2.4.8 ACTUATORS TEST

Input Output controls can be tested for their functioning through the Diagnostic tool. Select any parameter from the list and click on the Start Test button.



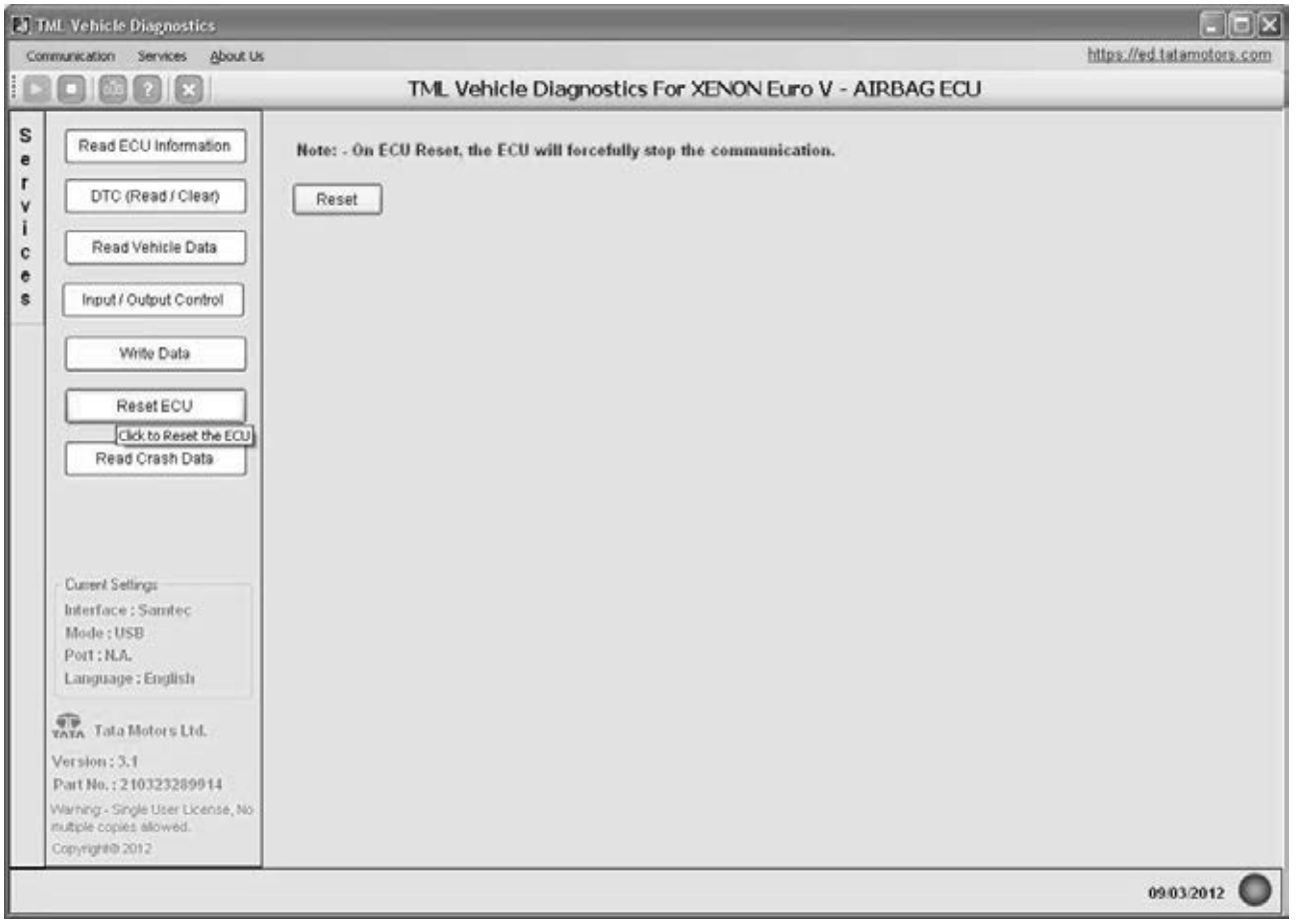
2.4.9 WRITE DATA IN ECU

Data can be written in ECU using this service.



2.4.10 RESET ECU

This service will Reset the ECU to default condition.



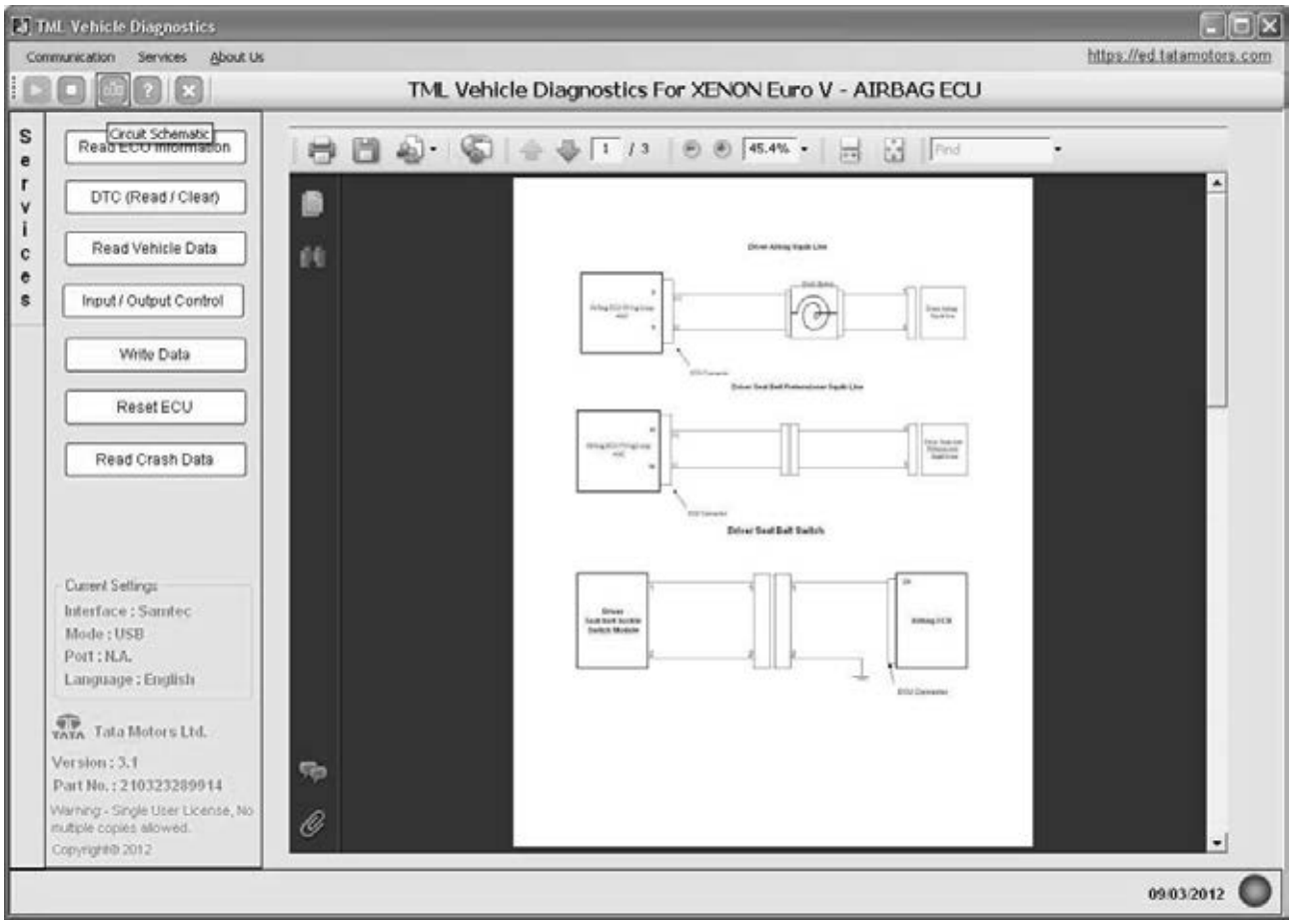
2.4.11 READ CRASH DATA

This service will only be used by Domain people to analyze the after crash information and hence it is password protected.

2.4.12 CIRCUIT DIAGRAMS

NOTE:

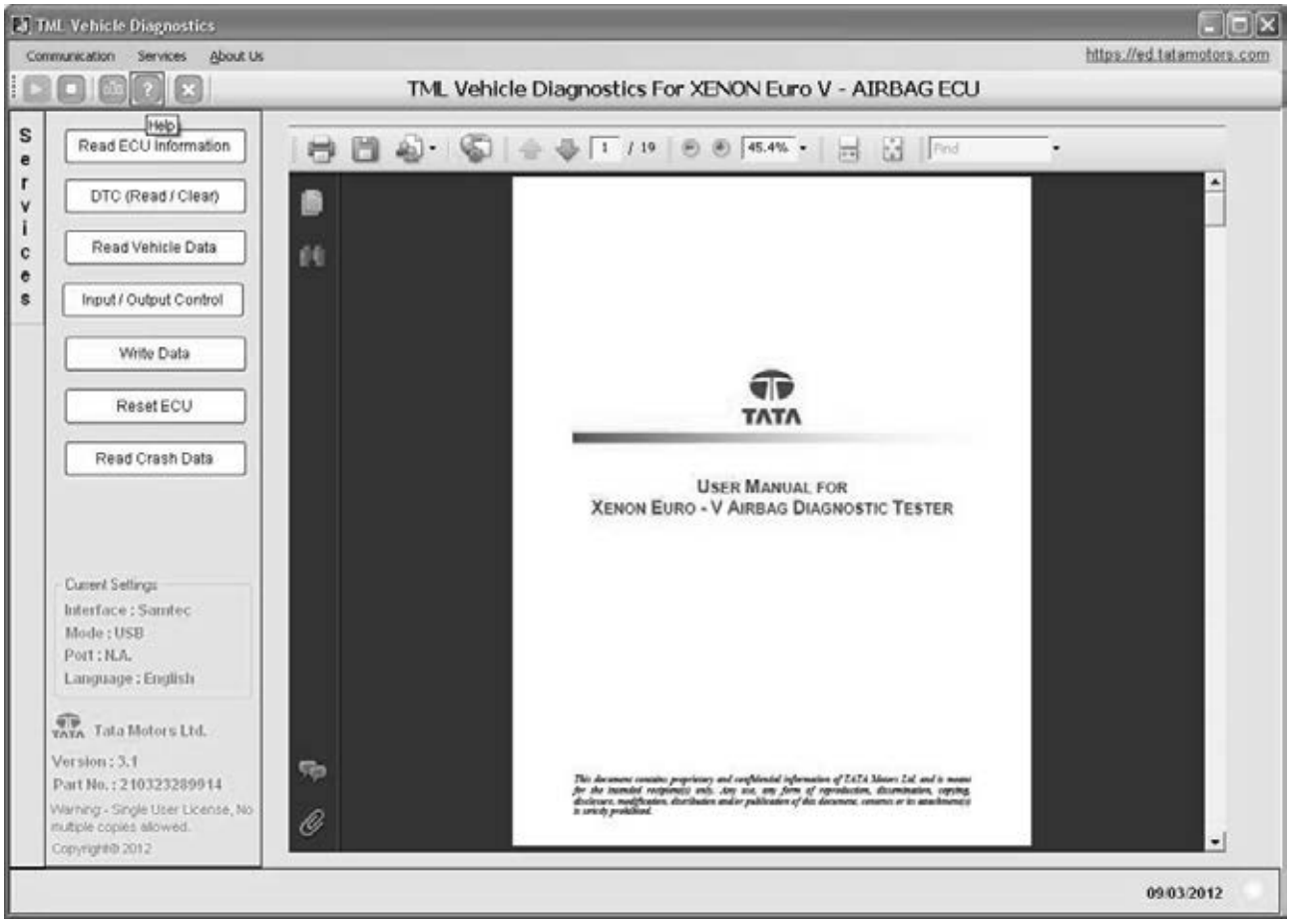
The circuit schematic for the ECU is available for reference; this can be viewed on clicking the Circuit Schematic icon in the menu options.



2.4.13 USER MANUAL

NOTE:

The help file required for the application can be viewed by click the Help icon in the menu options.



2.5 ABS

2.5.1 GENERAL

An Anti-lock Braking system (ABS) and Electronic Stability Program (ESP) ECU controls the complete functioning of brakes in vehicle

2.5.2 SALIENT FEATURES

The Diagnostic Tester software for Safari ABS is capable to communicate with ECU in the vehicle through Serial K-Line Interface. The tester comprises of an Interface Unit and custom built application software. The user friendly application software can be easily installed on Windows Desktop or Laptop.

The interface unit is lightweight and compact in size to facilitate easy portability. It works on vehicle battery supply.

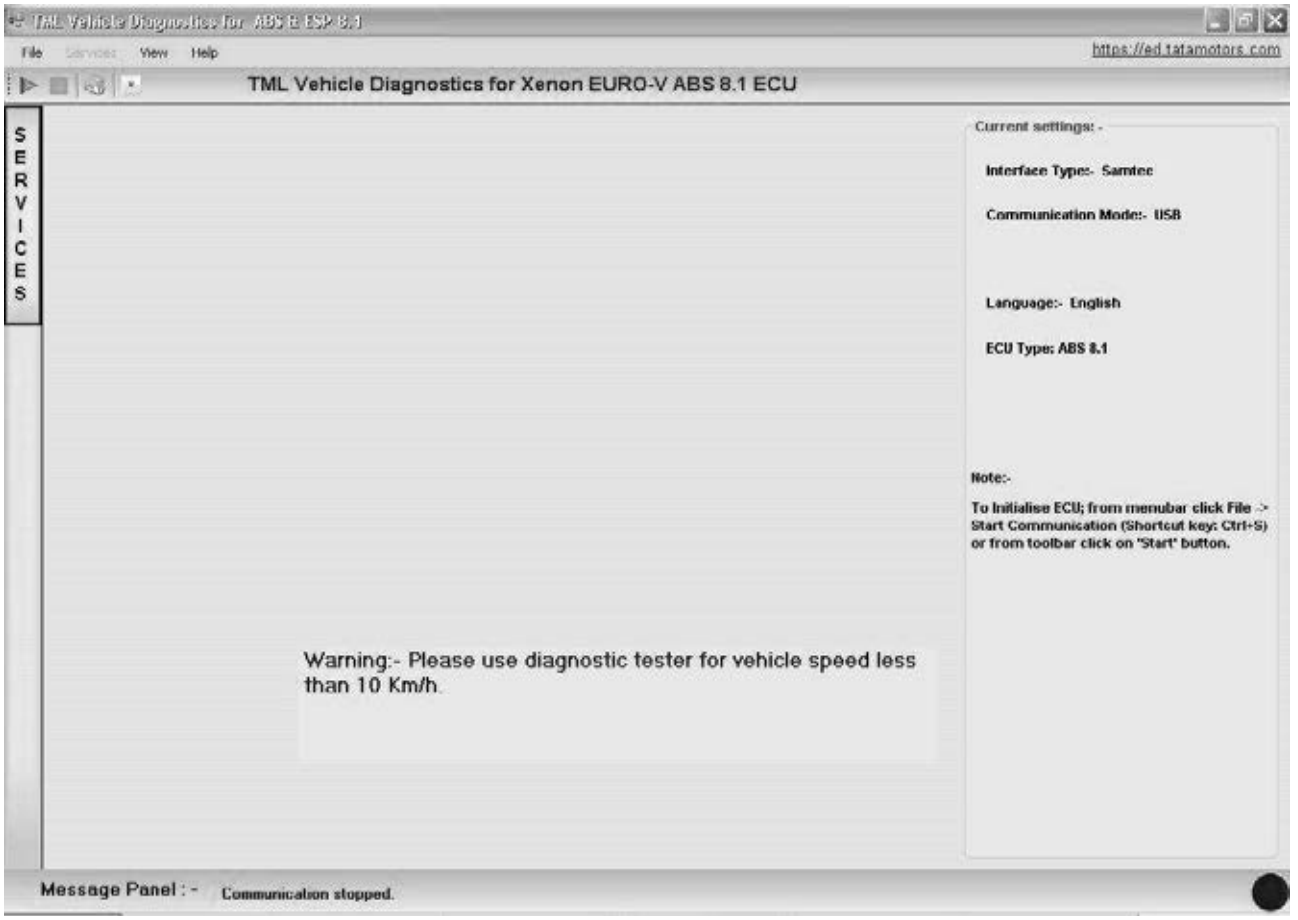
The tester application executes all the commands supported by ABS ECU, which helps in diagnosis of ABS ECU.

Following service are provided by the Diagnostic Tester application:

1. Read ECU Identification Data
2. Read ECU Parameters
3. Reading and clearing DTCs
4. Dynamic Information
5. Input Output Control

2.5.3 MAIN SCREEN

The below screen guides user the general settings and operating instructions of the Diagnostic Tester application.

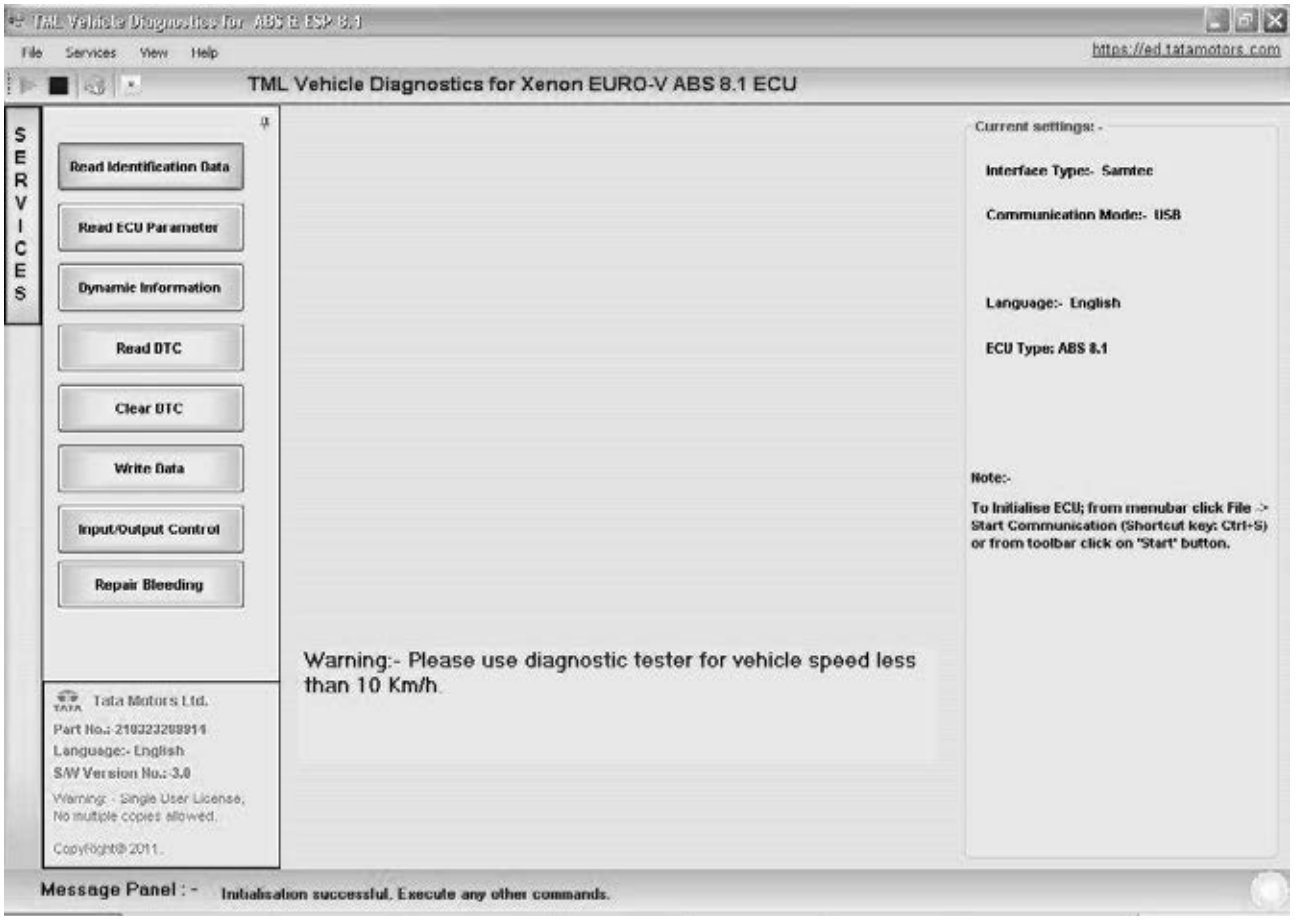


NOTE:

Communication shall start automatically when ABS ECU is selected for diagnostics from the scanner application.

2.5.4 SERVICES PANEL

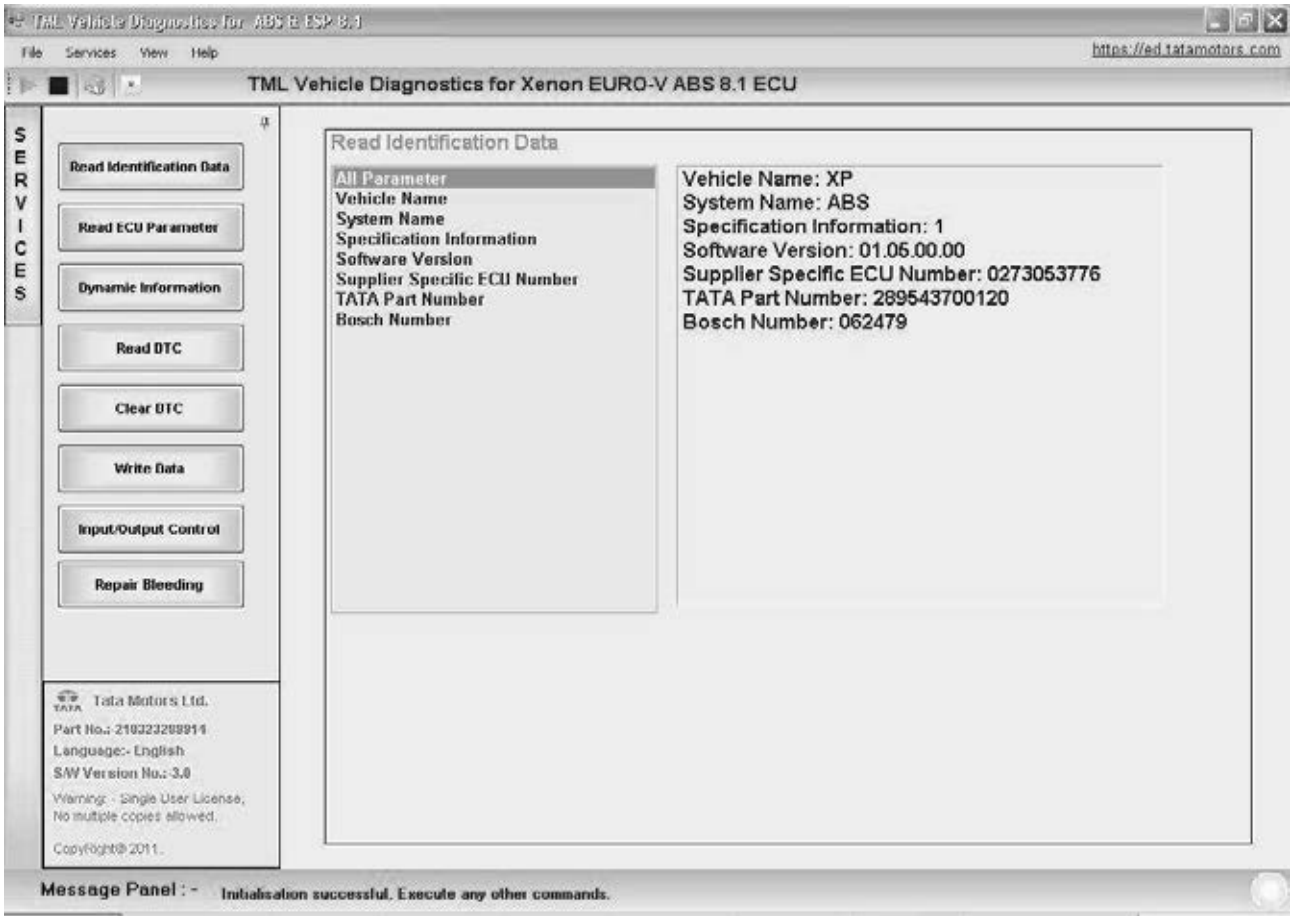
On successful communication the Services Panel will be visible to the user which will cater the services supported by the ECU.



Click on the service buttons to execute the corresponding service. Auto hide button for services panel can be used to have bigger preview area for displayed results.

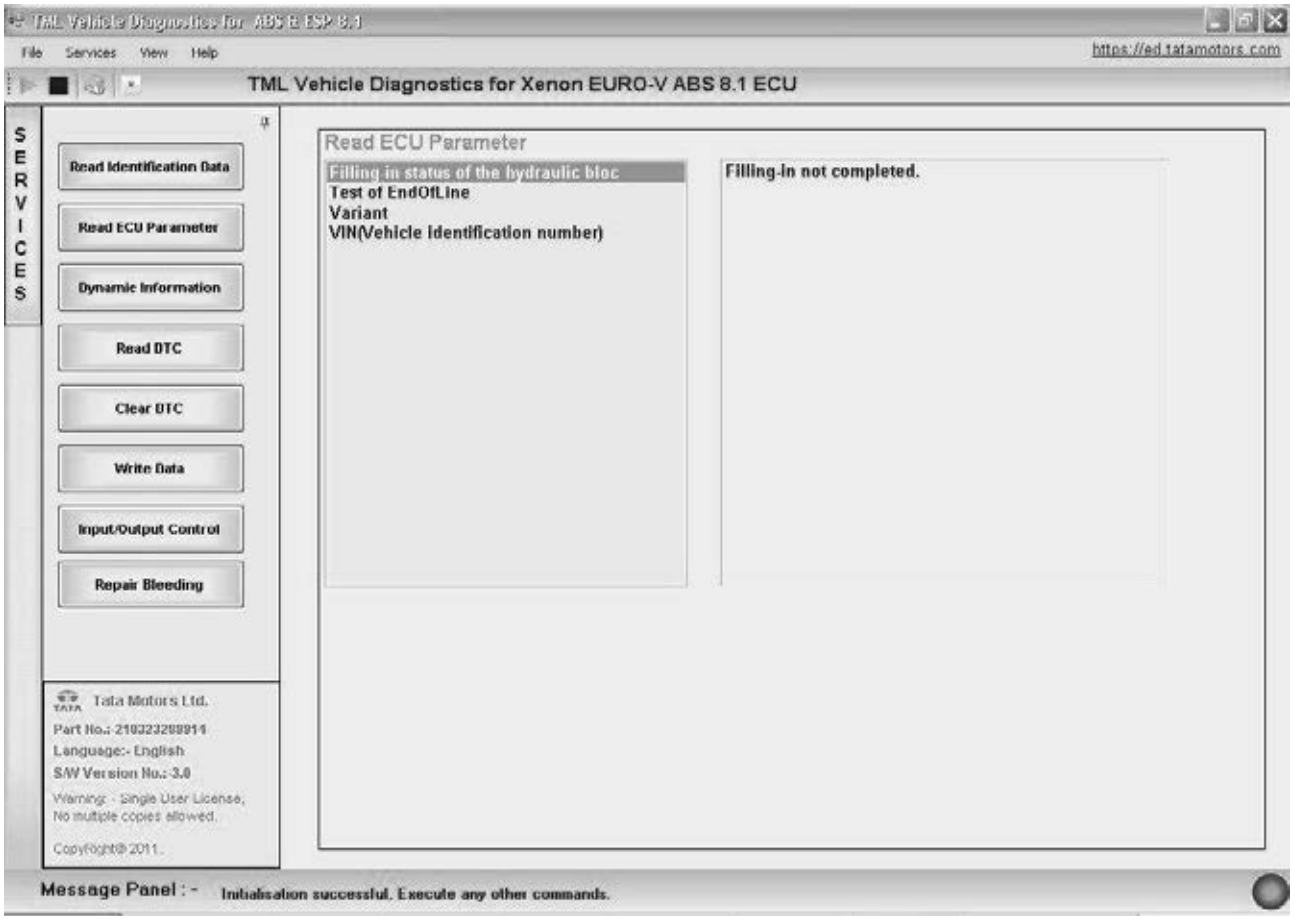
2.5.5 IDENTIFICATION DATA

Read the identification data in the ECU such as Vehicle Name, System Name, Specification information, VIN no, ECU Software version no, ECU hardware version number etc.



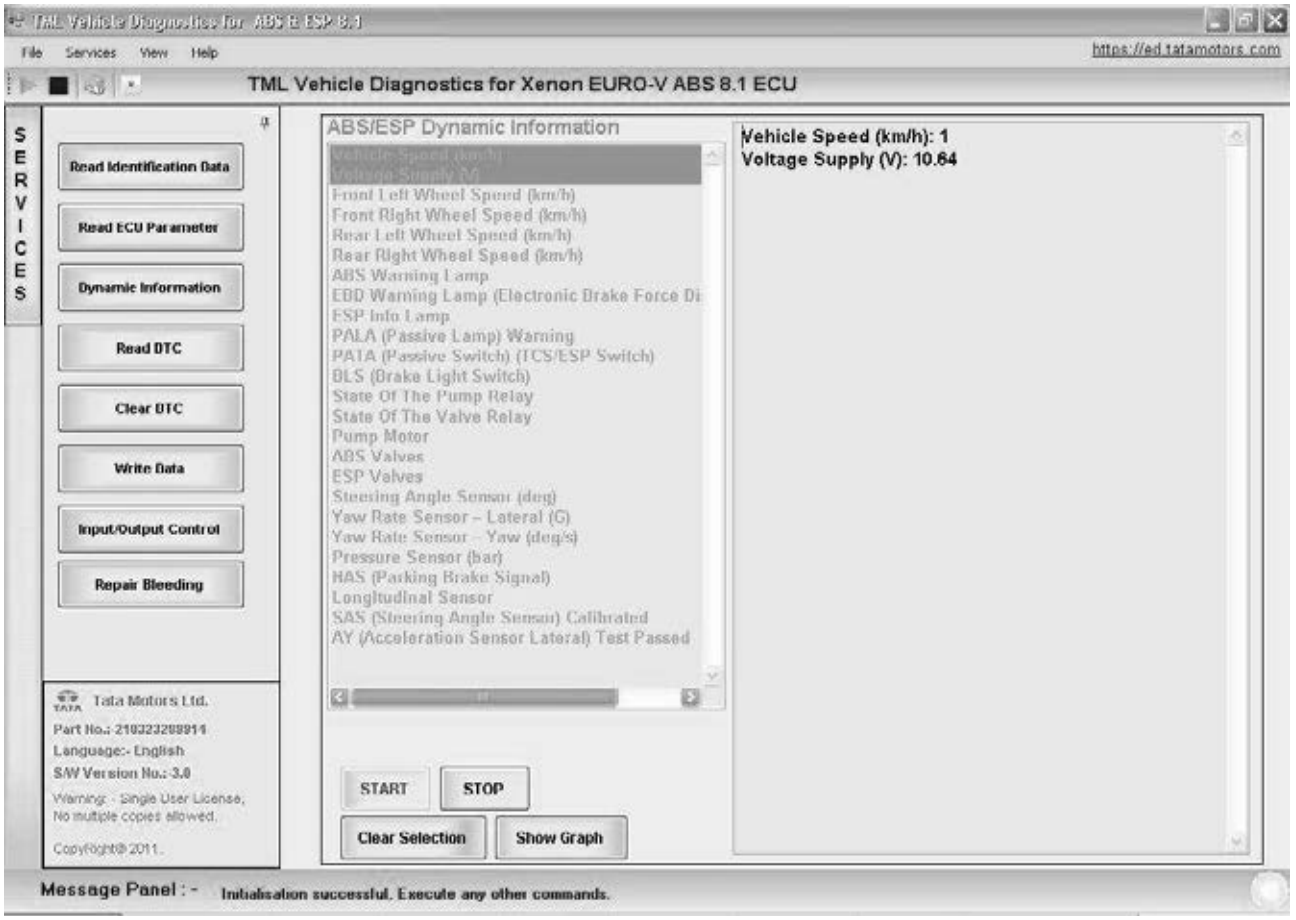
2.5.6 READ ECU PARAMETERS

This service displays the VIN Number, Variant Code Test of End of line and Filling Status of the hydraulic bloc of the ECU.



Dynamic Information:

In this service user can able to se the parameter values dynamically as the value of the parameter changes such as vehicle Speed engine Speed etc.

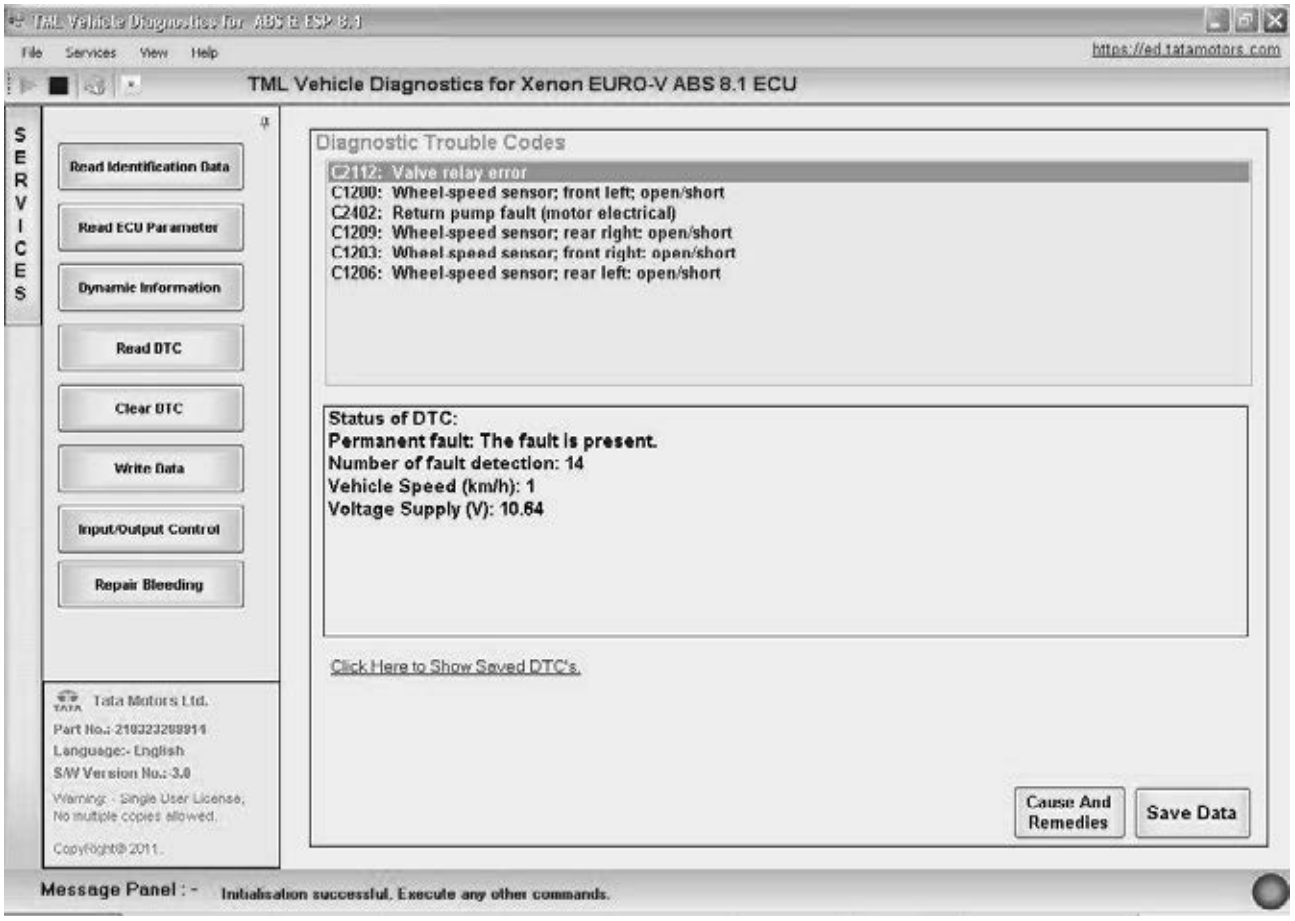

TML Vehicle Diagnostics for ABS & ESP 8.1
File
Services
View
Help
https://ed.tatamotors.com
TML Vehicle Diagnostics for Xenon EURO-V ABS 8.1 ECU
SERVICES
Read Identification Data
Read ECU Parameter
Dynamic Information
Read DTC
Clear DTC
Write Data
Input/Output Control
Repair Bleeding
Tata Motors Ltd.
Part No.: 210323289914
Language:- English
S/W Version No.: 3.0
Warning: - Single User License, No multiple copies allowed.
Copyright© 2011.
ABS/ESP Dynamic Information
Front Left Wheel Speed (km/h)
Front Right Wheel Speed (km/h)
Rear Left Wheel Speed (km/h)
Rear Right Wheel Speed (km/h)
ABS Warning Lamp
EBD Warning Lamp (Electronic Brake Force Di
ESP Info Lamp
PALA (Passive Lamp) Warning
PATA (Passive Switch) (TCS/ESP Switch)
BLS (Brake Light Switch)
State Of The Pump Relay
State Of The Valve Relay
Pump Motor
ABS Valves
ESP Valves
Steering Angle Sensor (deg)
Yaw Rate Sensor – Lateral (G)
Yaw Rate Sensor – Yaw (deg/s)
Pressure Sensor (bar)
HAS (Parking Brake Signal)
Longitudinal Sensor
SAS (Steering Angle Sensor) Calibrated
AY (Acceleration Sensor Lateral) Test Passed
Vehicle Speed (km/h): 1
Voltage Supply (V): 10.64
START
STOP
Clear Selection
Show Graph
Message Panel : -
Initialisation successful. Execute any other commands.

2.5.7 READ AND CLEAR DTCS

DTCs recorded in the ECUs can be viewed along with the remedial measures which shall help in diagnosing the vehicle.

After resolving the DTCs they can be cleared from ECU memory.

DTCs can be saved for future reference. It requires technician and vehicle related information to save the DTCs in Excel file format. The screens are as shown below;

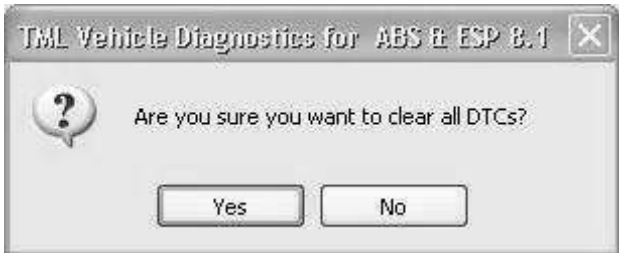


When the DTCs are available in the ECU then select any DTC from the list and click on Causes and Remedies button to view the remedial measures.

The DTCs can be saved for later future reference or may be to generate vehicle report.

Clicking on Clear DTCs button will clear the available DTCs in the ECU.

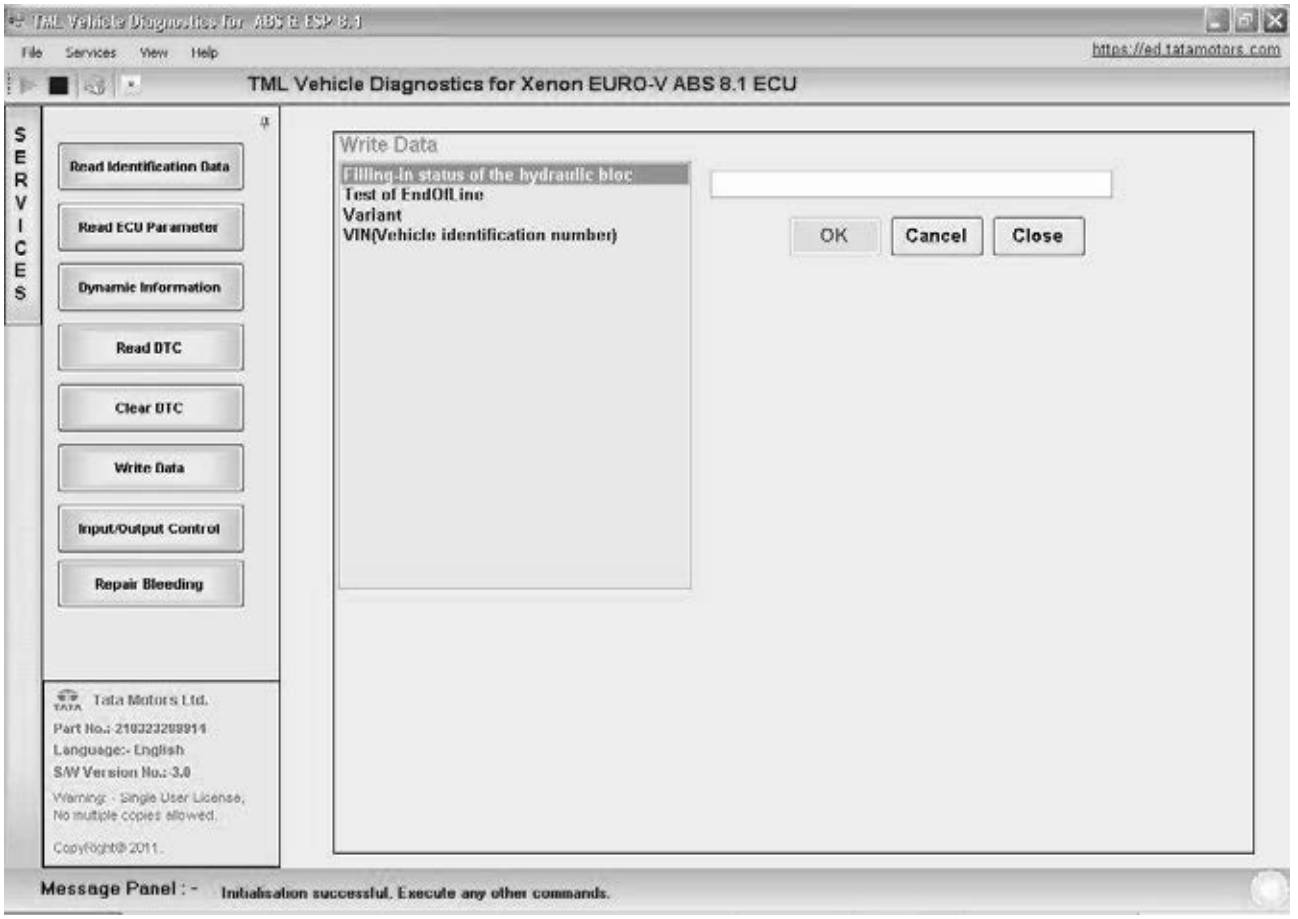
Before clearing the DTCs, the user is prompted for confirmation of clearing DTCs.



After clearing the DTCs the screen is displayed intimating user about DTC cleared.

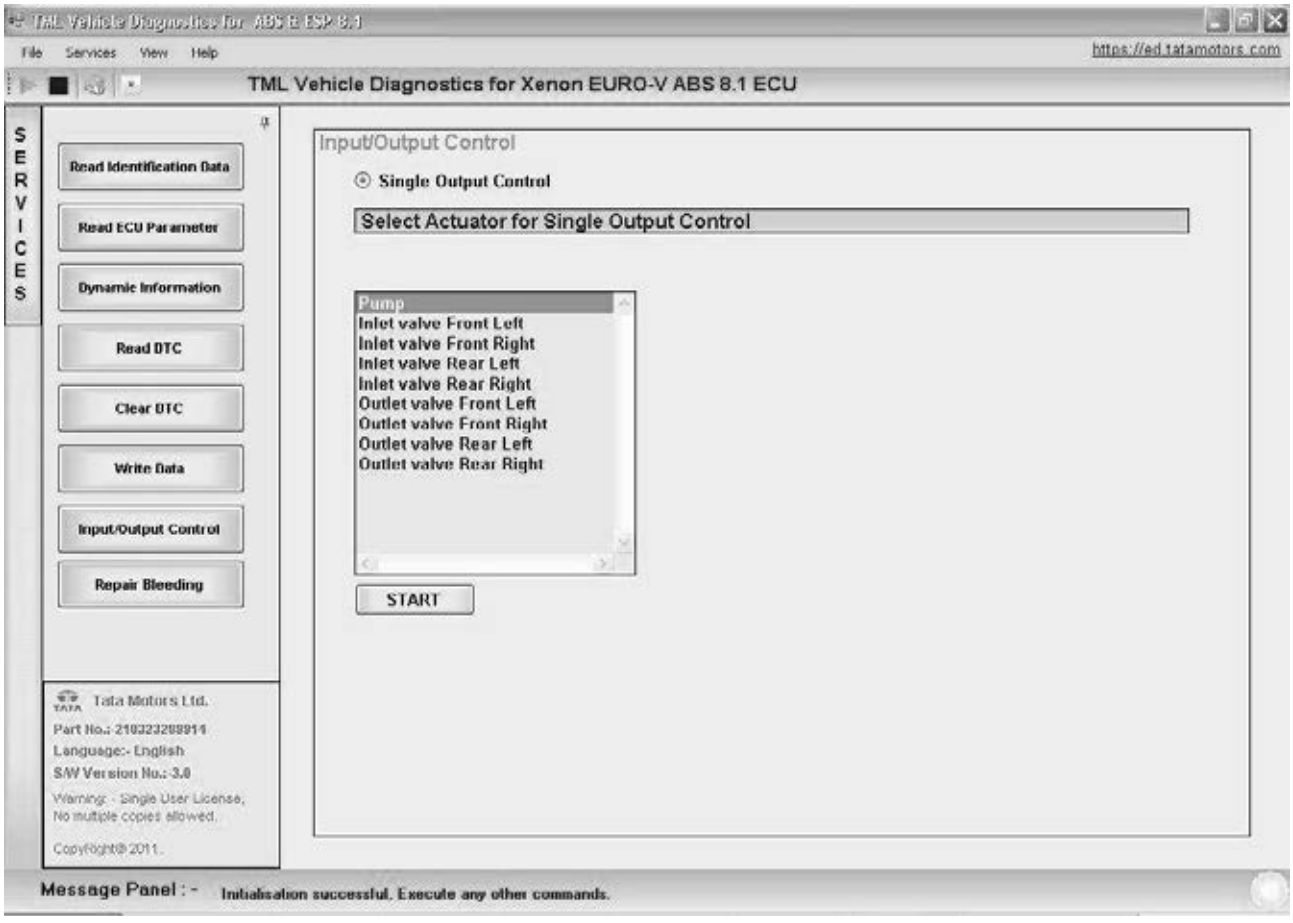
2.5.8 WRITE DATA

Write data allows user to enter variant information of ECU.



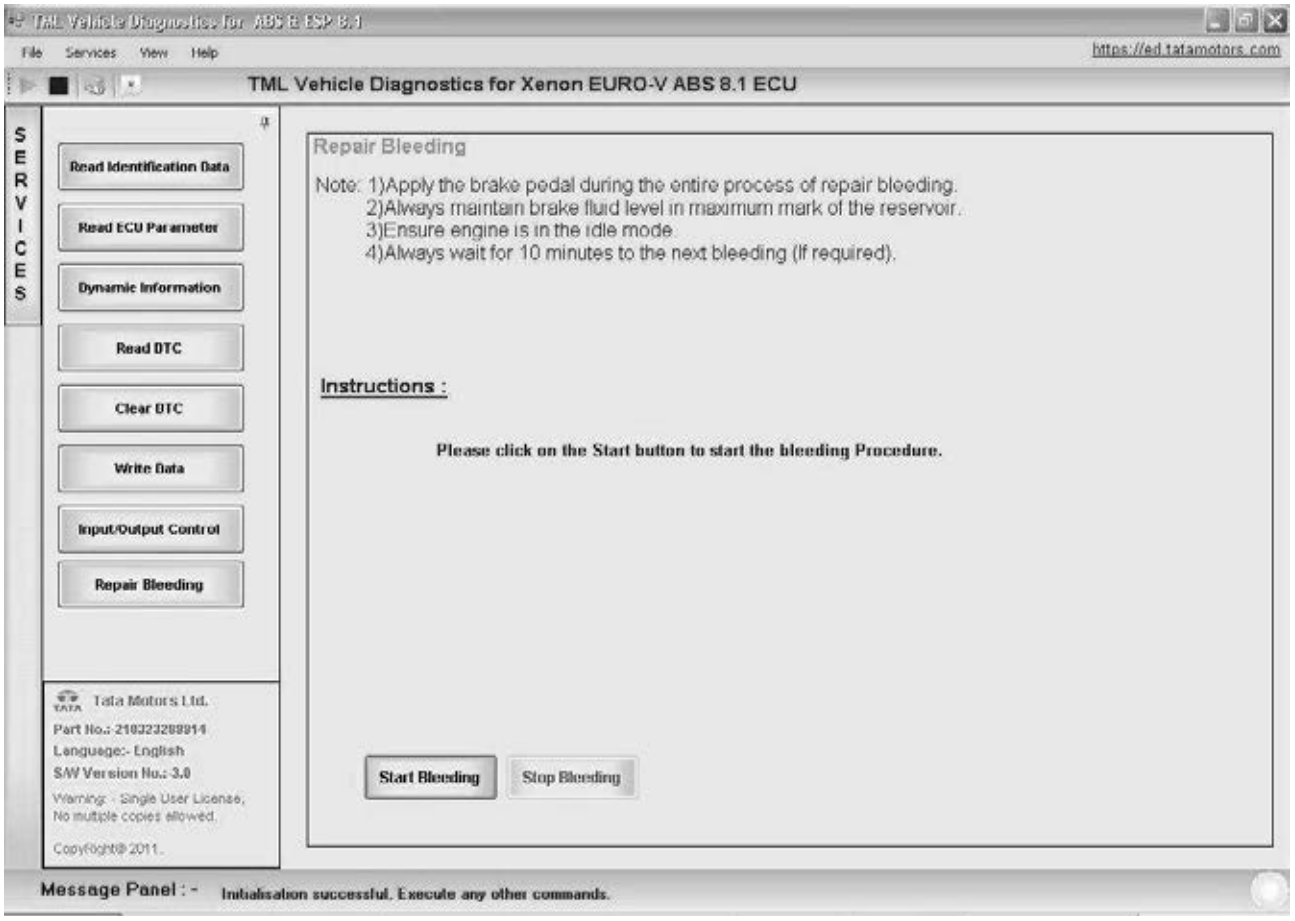
2.5.9 INPUT OUTPUT CONTROL

The IO control is used by the tester to actuate the input signal, internal ECU function or control an output (actuator) of an electronic system without the input signal. The response from the ECU for this service ensures proper functioning in the ECU.



2.5.10 REPAIR BLEED

The repair bleed service is used to perform the bleeding test to ensure that the hydraulic system of ABS is of bubble and Air free.

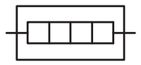
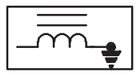
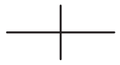
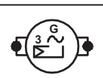
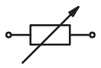
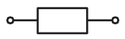


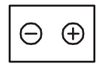
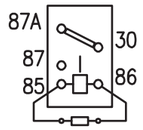
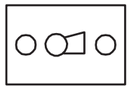
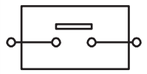
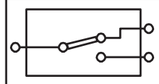
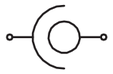
NOTE:
The circuit schematic for the ECU is available for reference. Click on View → Circuit Schematic from menu options.

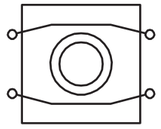
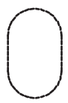
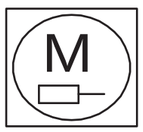
TABLE OF CONTENTS

CIRCUIT SCHEMATICS

SYMBOL

SYMBOL	DESCRIPTION
	CIGARETTE LIGHTER
	HEATER DEFROSTER
	MAGNETIC CLUTCH
	CABLE JOINT
	CROSSOVER WITH JOINT
	CROSSOVER WITHOUT JOINT
	LAMP/BULB
	MOTOR
	ALTERNATOR
	SLO BLO FUSE (FUSE LINK)
	FAST ACTING FUSE
	LED
	DIODE
	VARIABLE RESISTOR
	RESISTOR

SYMBOL	DESCRIPTION
	BATTERY
	ANALOGUE CLOCK
	GROUND OR EARTH
	GAUGE
	RELAY
	RELAY
	HORN/ BUZZER
	SINGLE WAY SWITCH
	TWO WAY SWITCH
	CONNECTOR

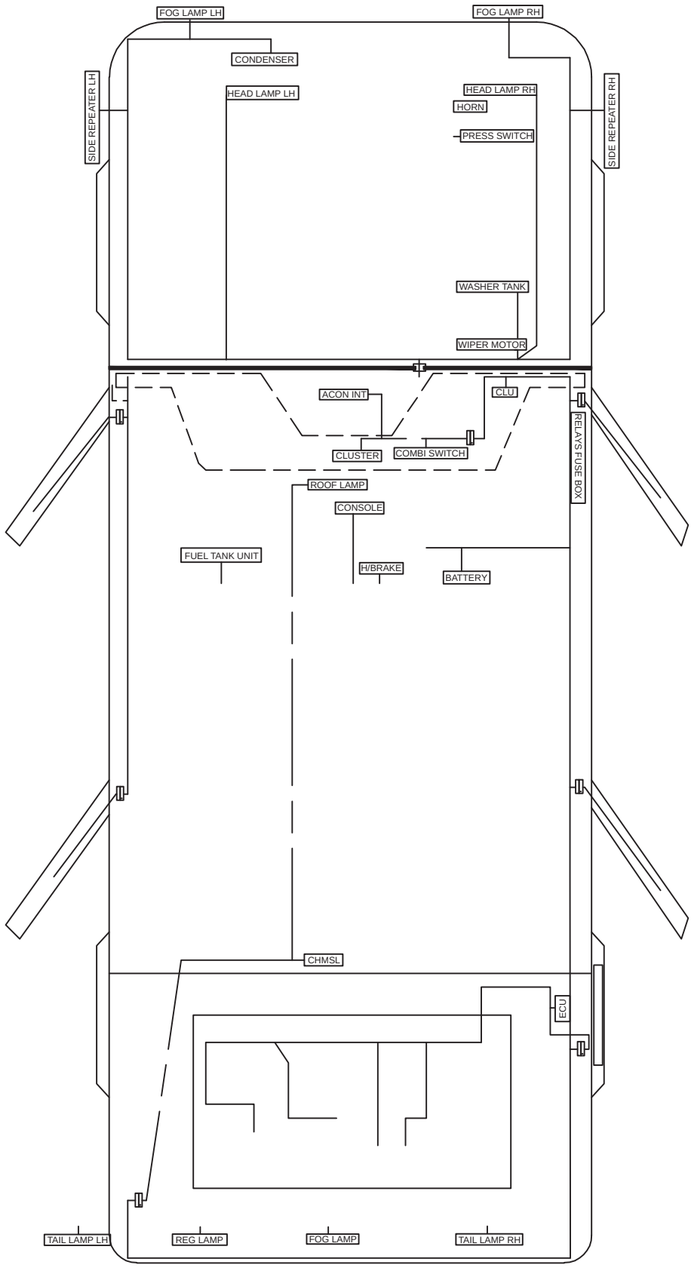
SYMBOL	DESCRIPTION
	CLOCKSPRING
	WIRE TWIST
	WIRE SCREEN
	STARTER W/ENGAGEMENT SOLENOID

COLOUR CODES

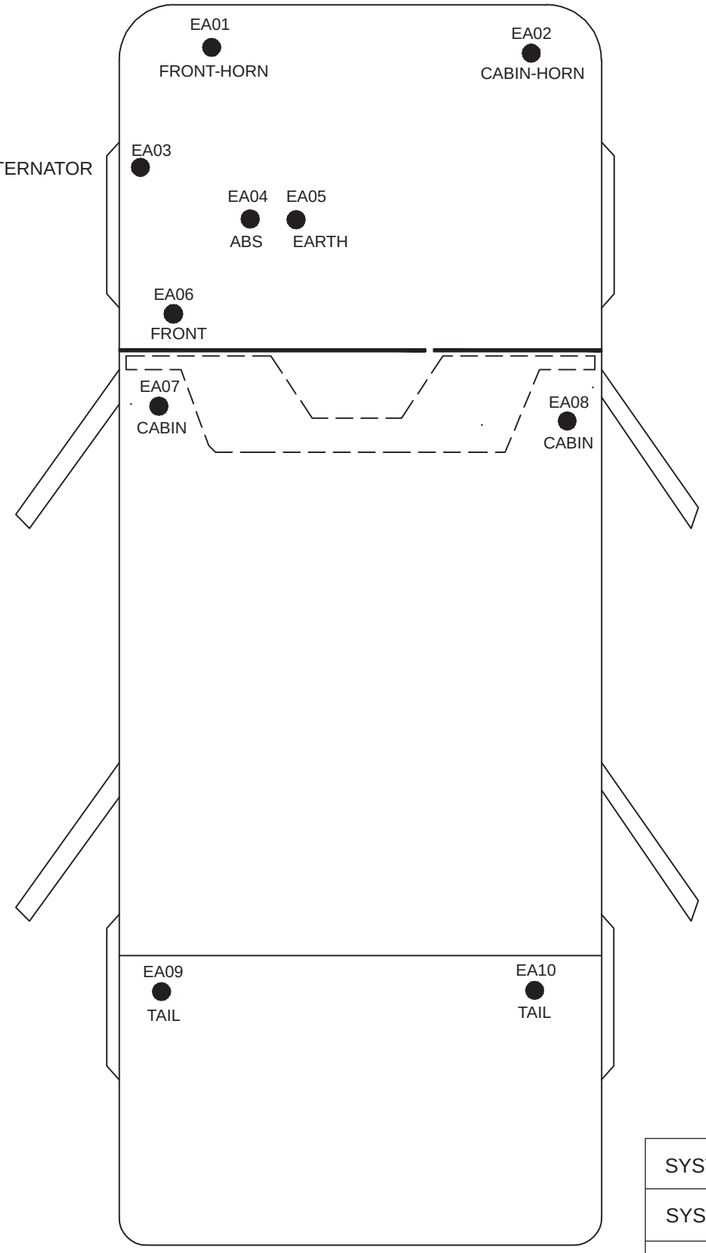
CODE	CABLE COLOUR
B	BLACK
BR	BROWN
G	GREEN
GY	GREY
L	BLUE
O	ORANGE
P	PINK
R	RED
W	WHITE
Y	YELLOW
V	VIOLET
LG	LIGHT GREEN
Sb	SKY BLUE

SYSTEM CODE	
SYSTEM NAME	**SYMBOLS & COLOUR CODES**
SHEET NO.	SHEET 1

TOPOLOGY



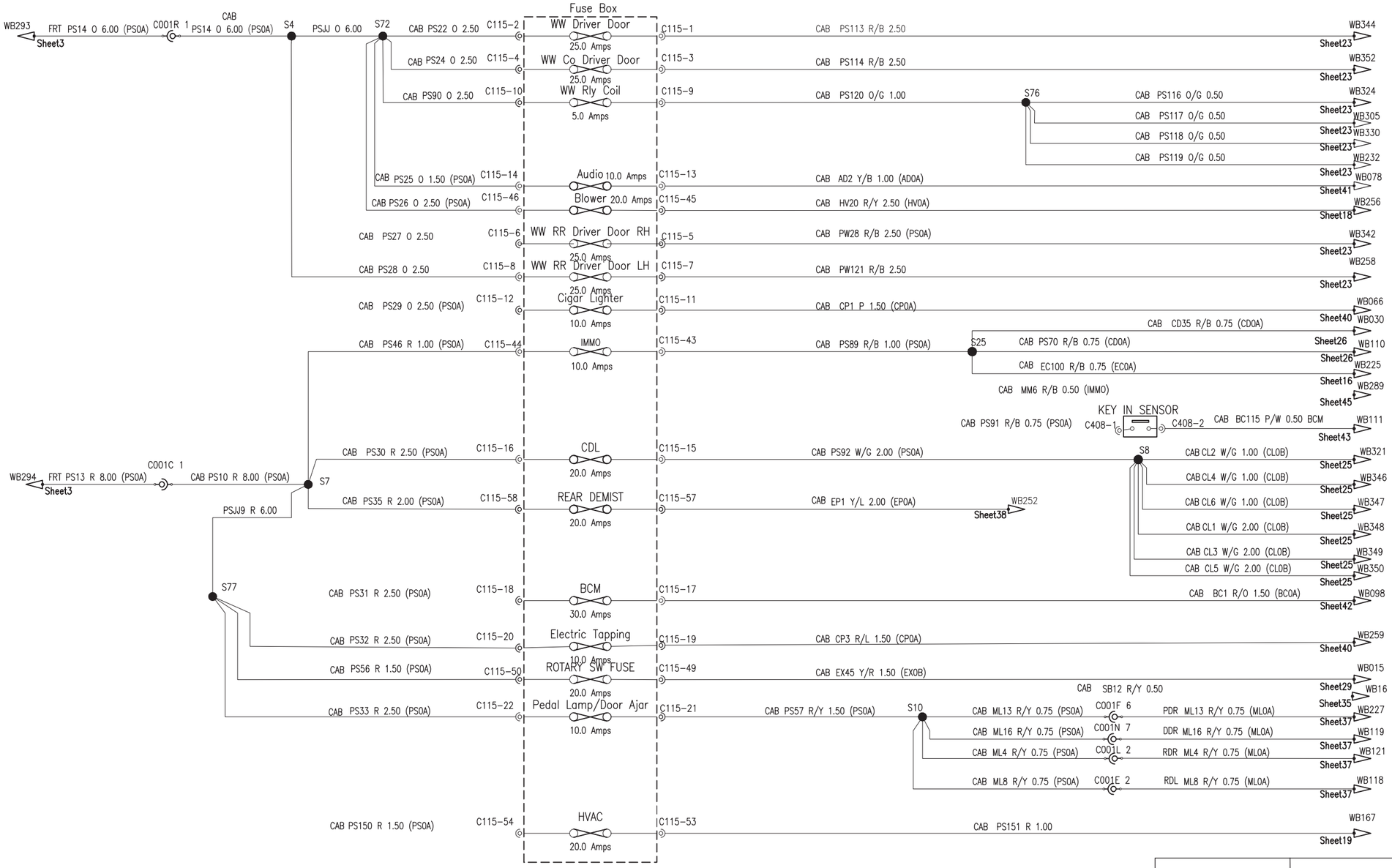
BATT,EMS,& ALTERNATOR



MAIN WH
DOOR WH
ROOF
ENGINE COMPARTMENT
INTERCONNECTS

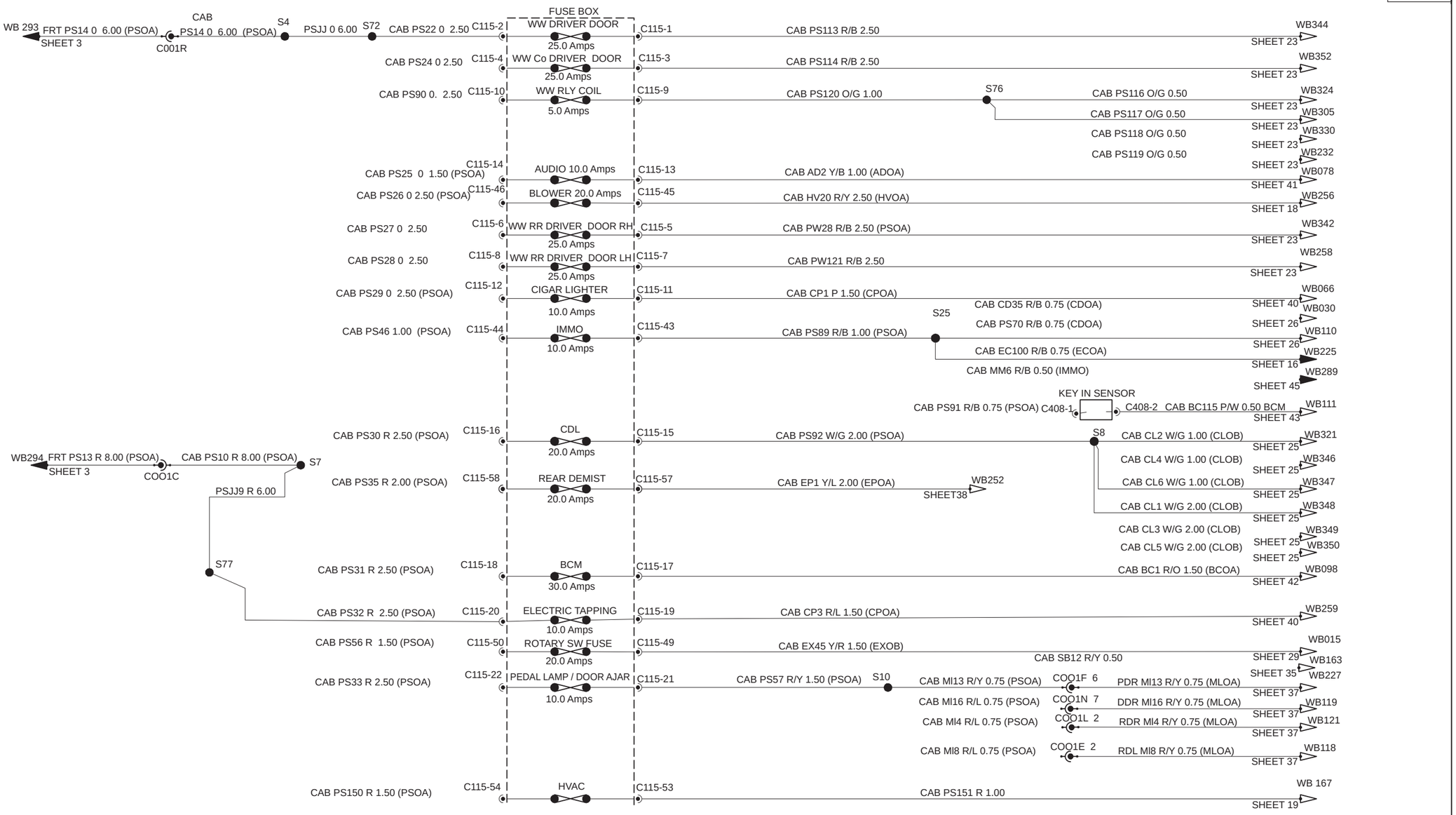
SYSTEM CODE	
SYSTEM NAME	**TOPOLOGY**
SHEET NO.	SHEET 2

POWER SUPPLY



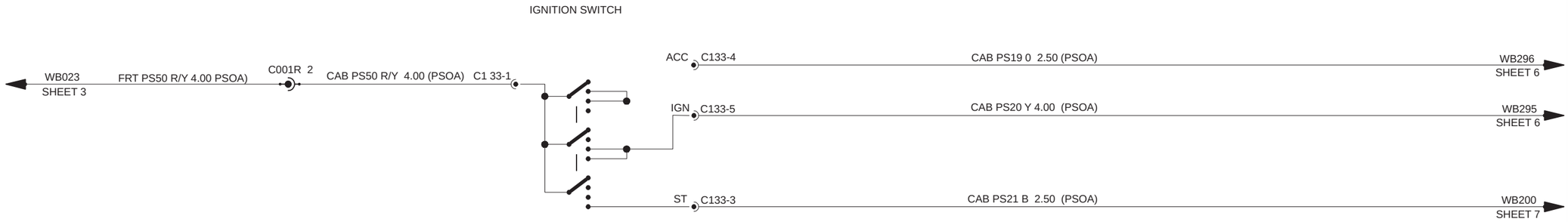
SYSTEM CODE	PS0A
SYSTEM NAME	**POWER SUPPLY**
SHEET NO.	SHEET 3

POWER SUPPLY



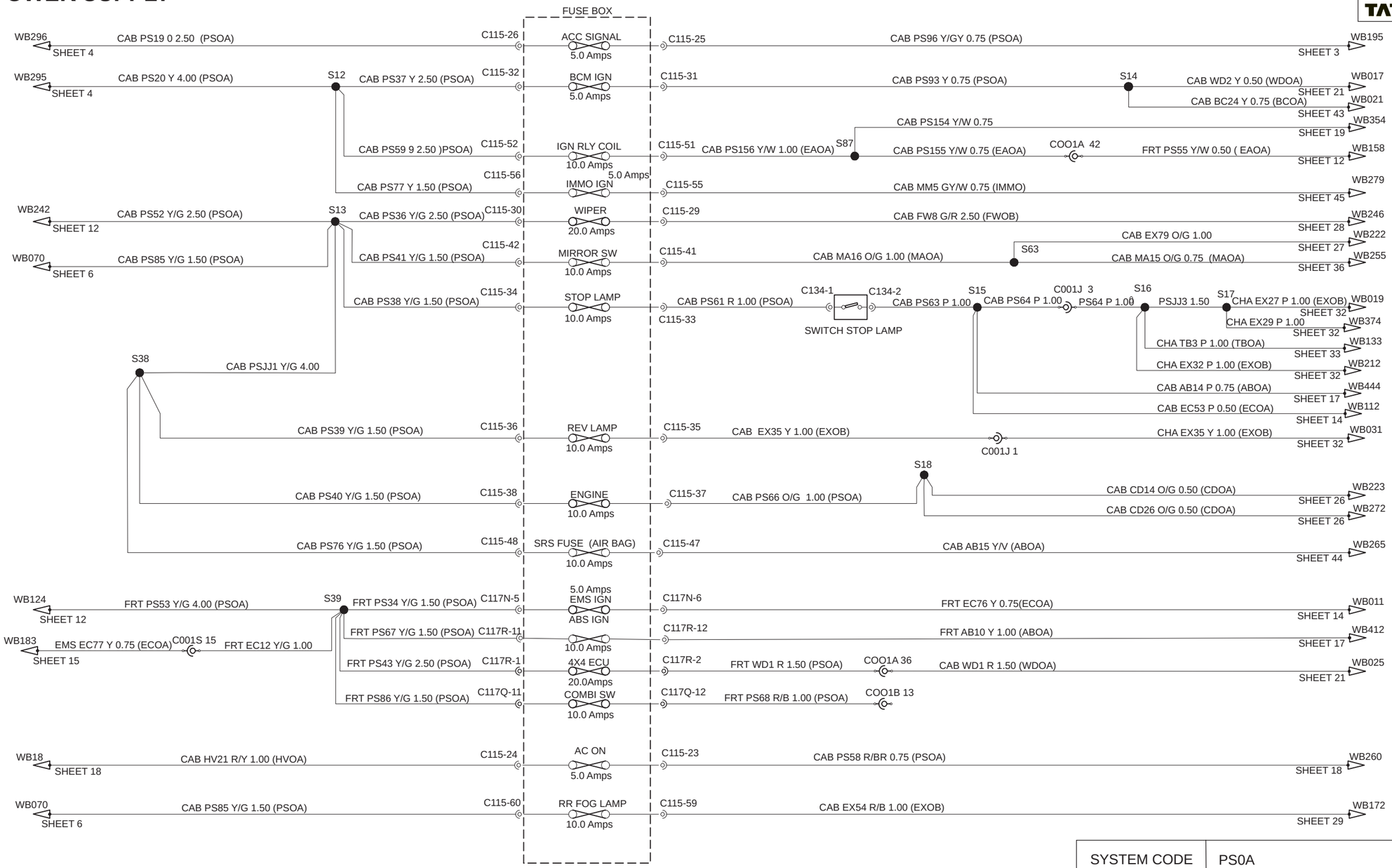
SYSTEM CODE	PS0A
SYSTEM NAME	**POWER SUPPLY**
SHEET NO.	SHEET 4

POWER SUPPLY



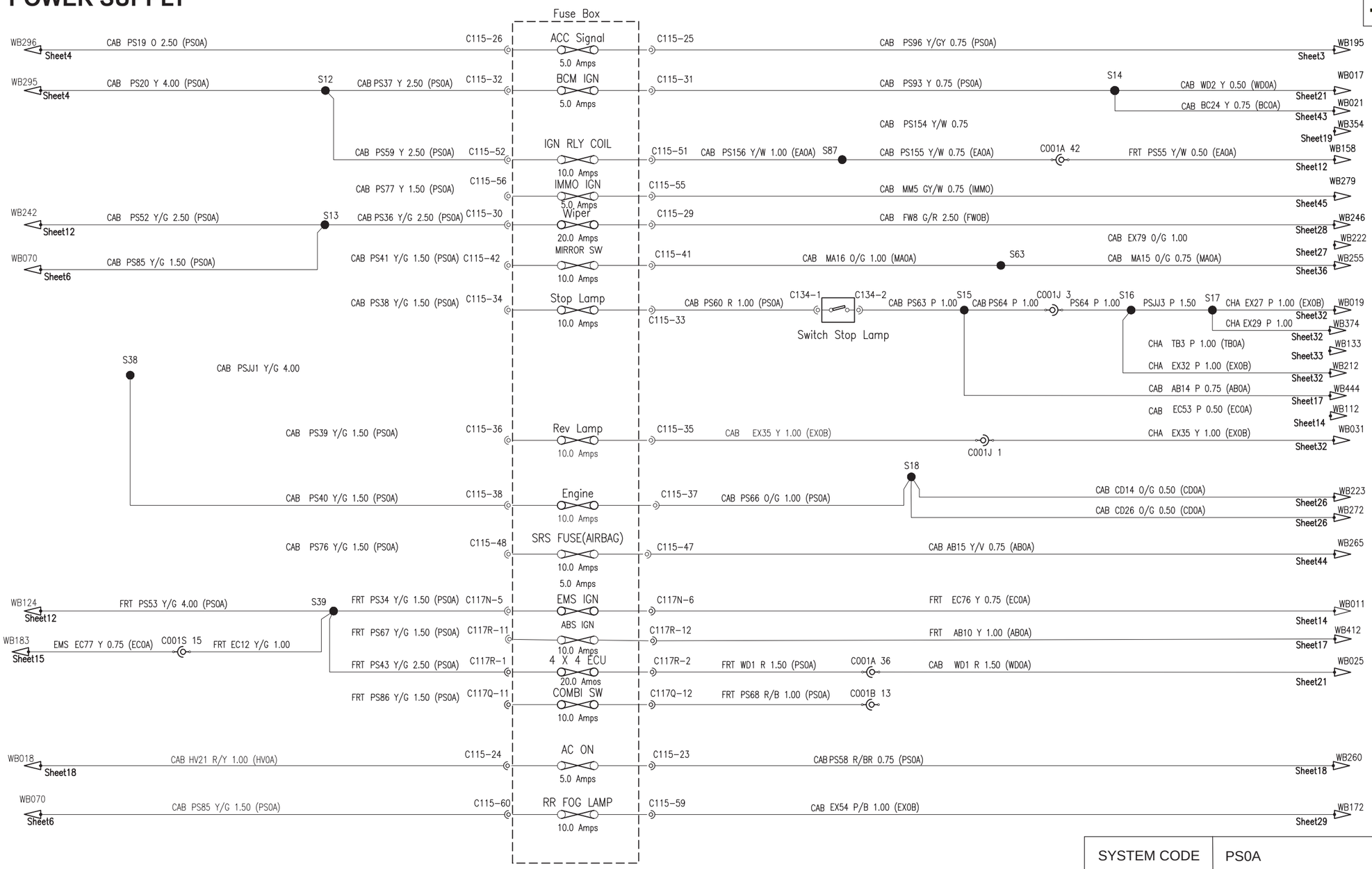
SYSTEM CODE	PS0A
SYSTEM NAME	**POWER SUPPLY**
SHEET NO.	SHEET 5

POWER SUPPLY



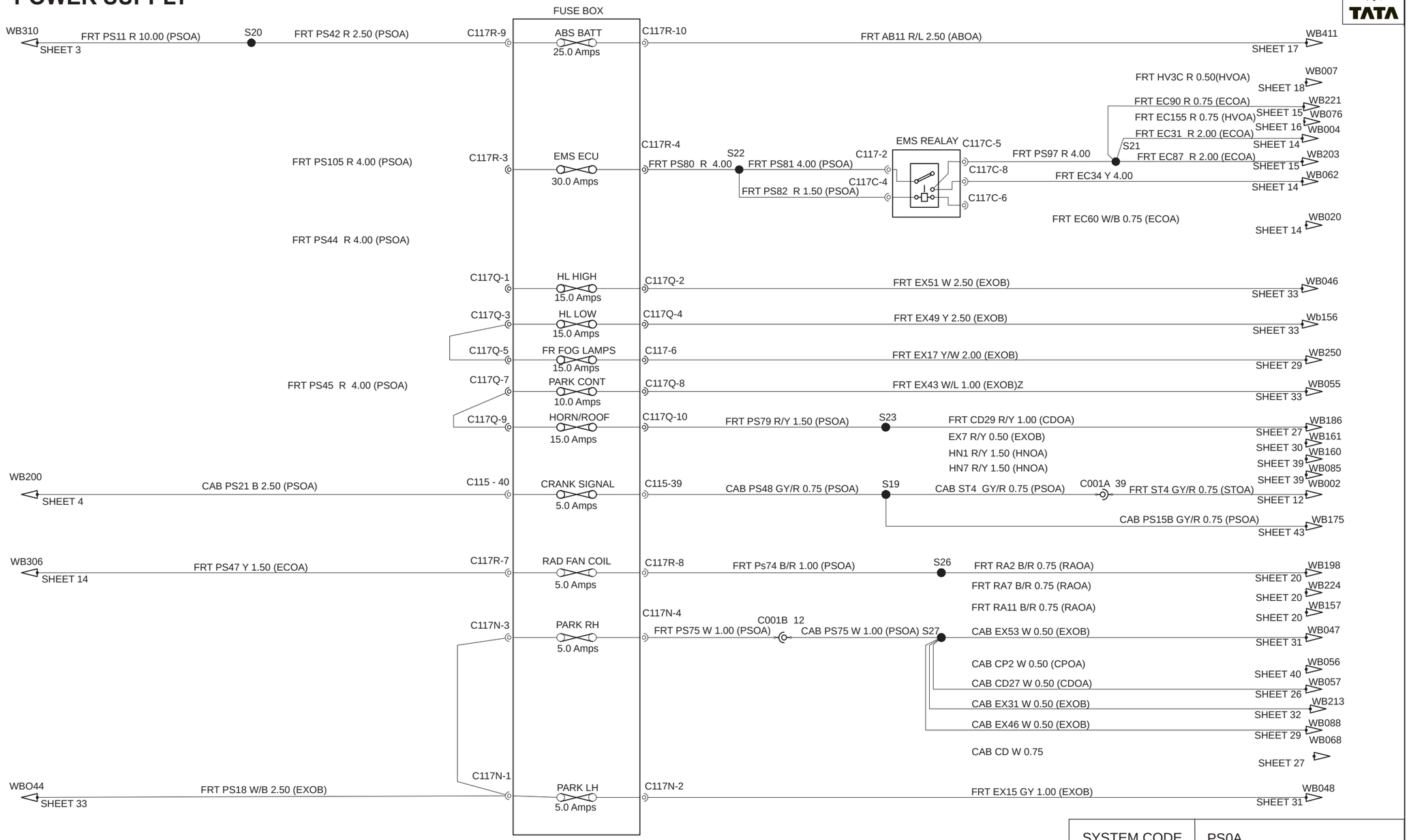
SYSTEM CODE	PS0A
SYSTEM NAME	**POWER SUPPLY**
SHEET NO.	SHEET 6

POWER SUPPLY



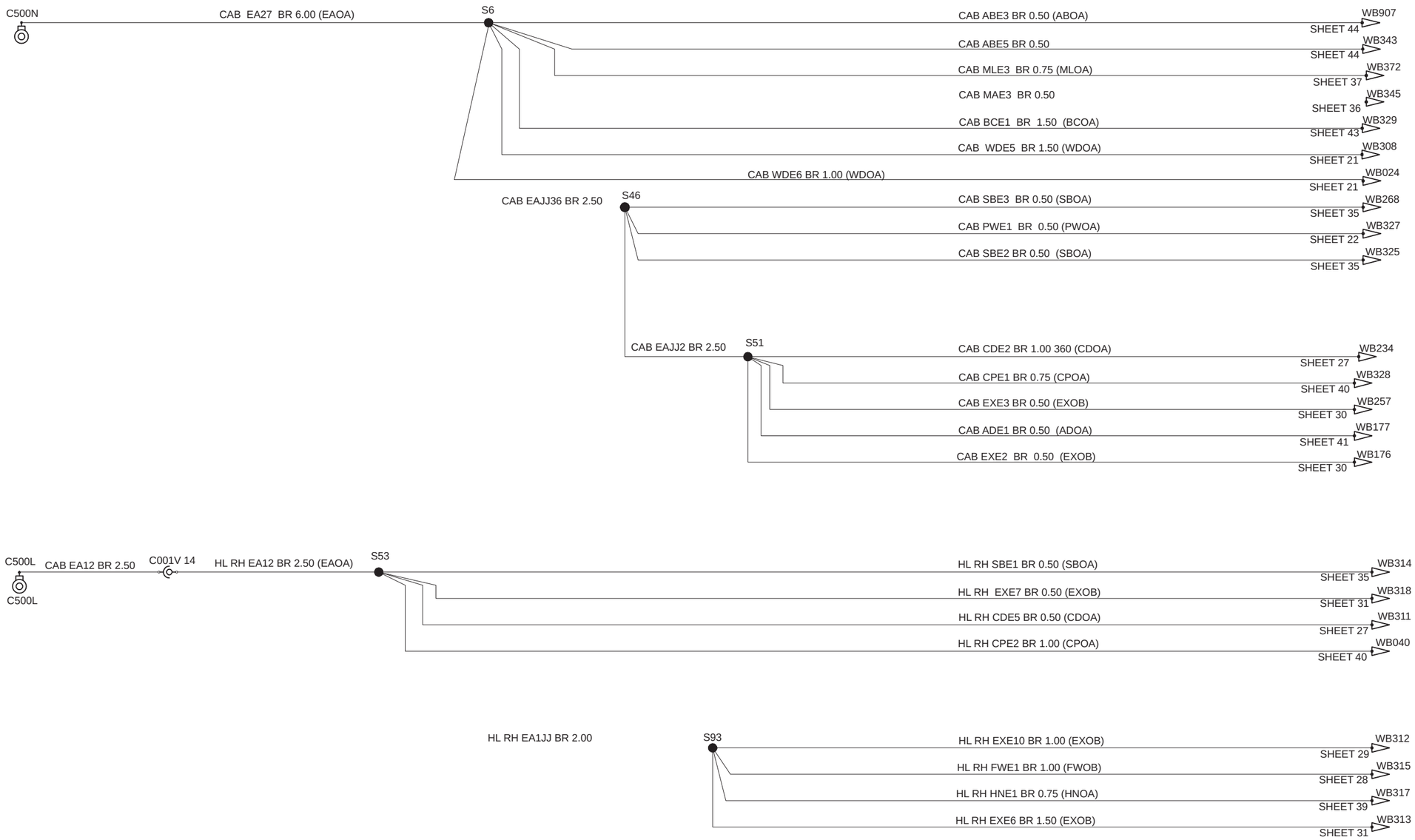
SYSTEM CODE	PS0A
SYSTEM NAME	**POWER SUPPLY**
SHEET NO.	SHEET 7

POWER SUPPLY



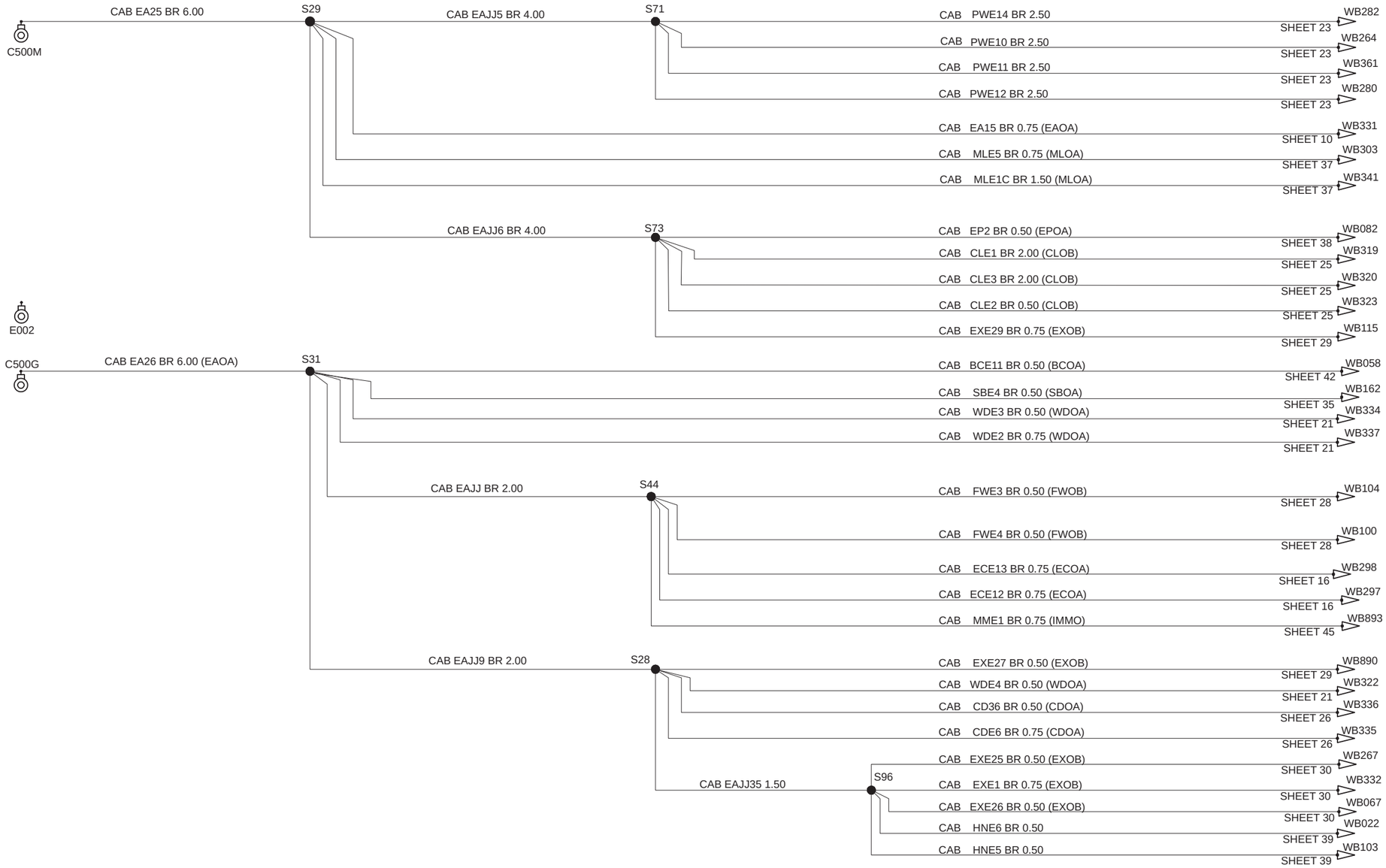
SYSTEM CODE	PS0A
SYSTEM NAME	**POWER SUPPLY**
SHEET NO.	SHEET 8

EARTH



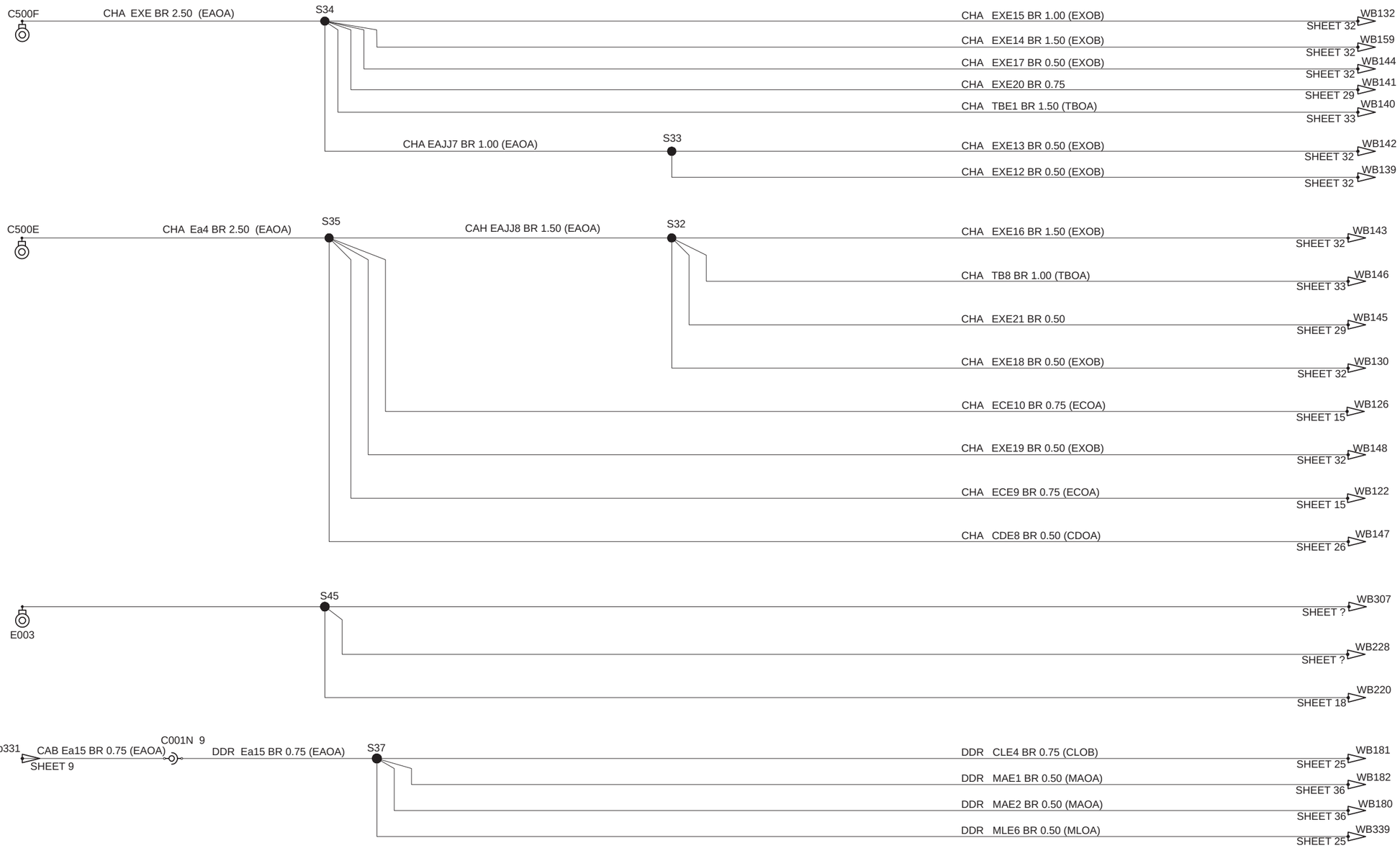
SYSTEM CODE	EA0A
SYSTEM NAME	**EARTH**
SHEET NO.	SHEET 9

EARTH



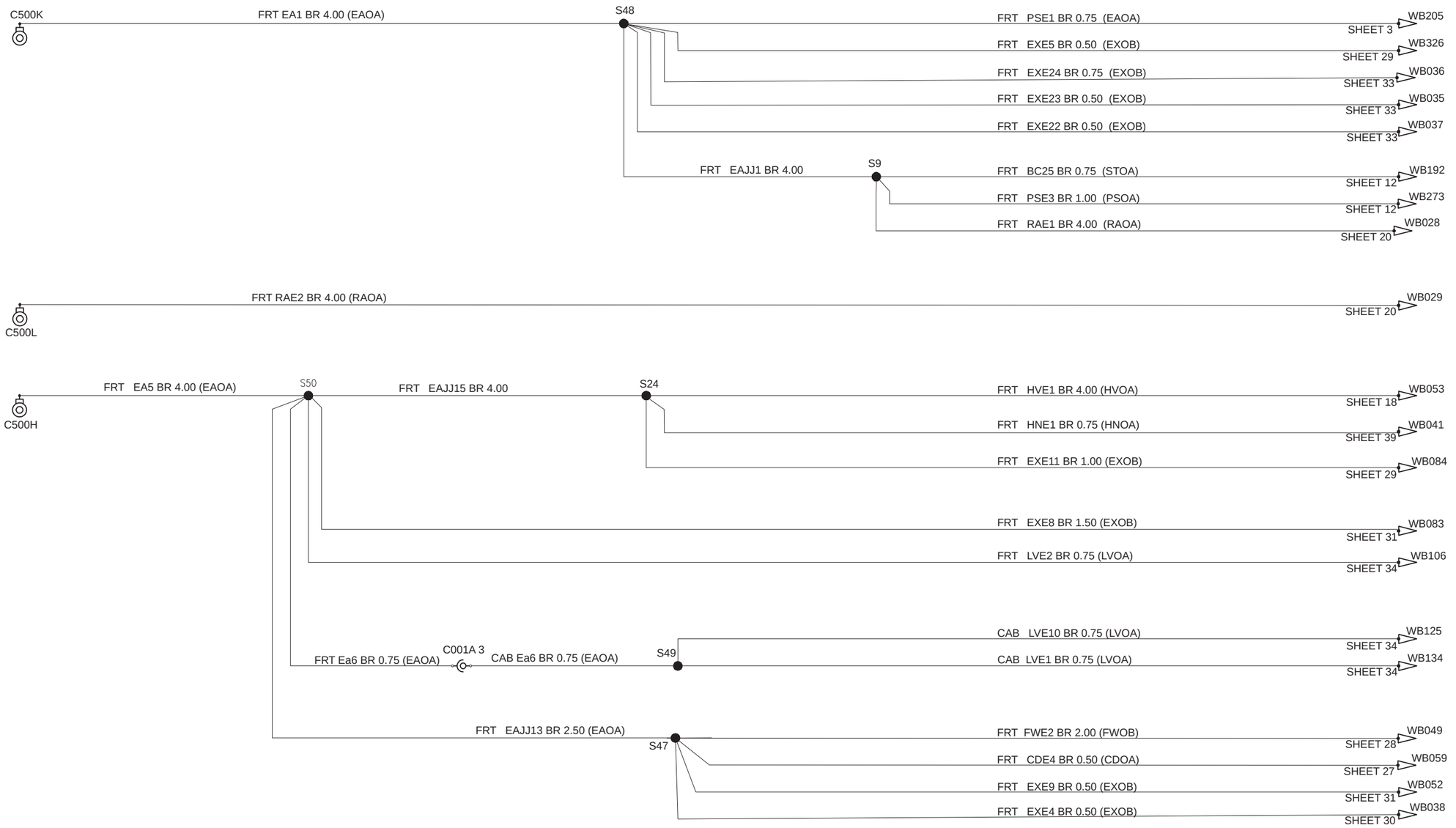
SYSTEM CODE	EA0A
SYSTEM NAME	**EARTH**
SHEET NO.	SHEET 10

EARTH



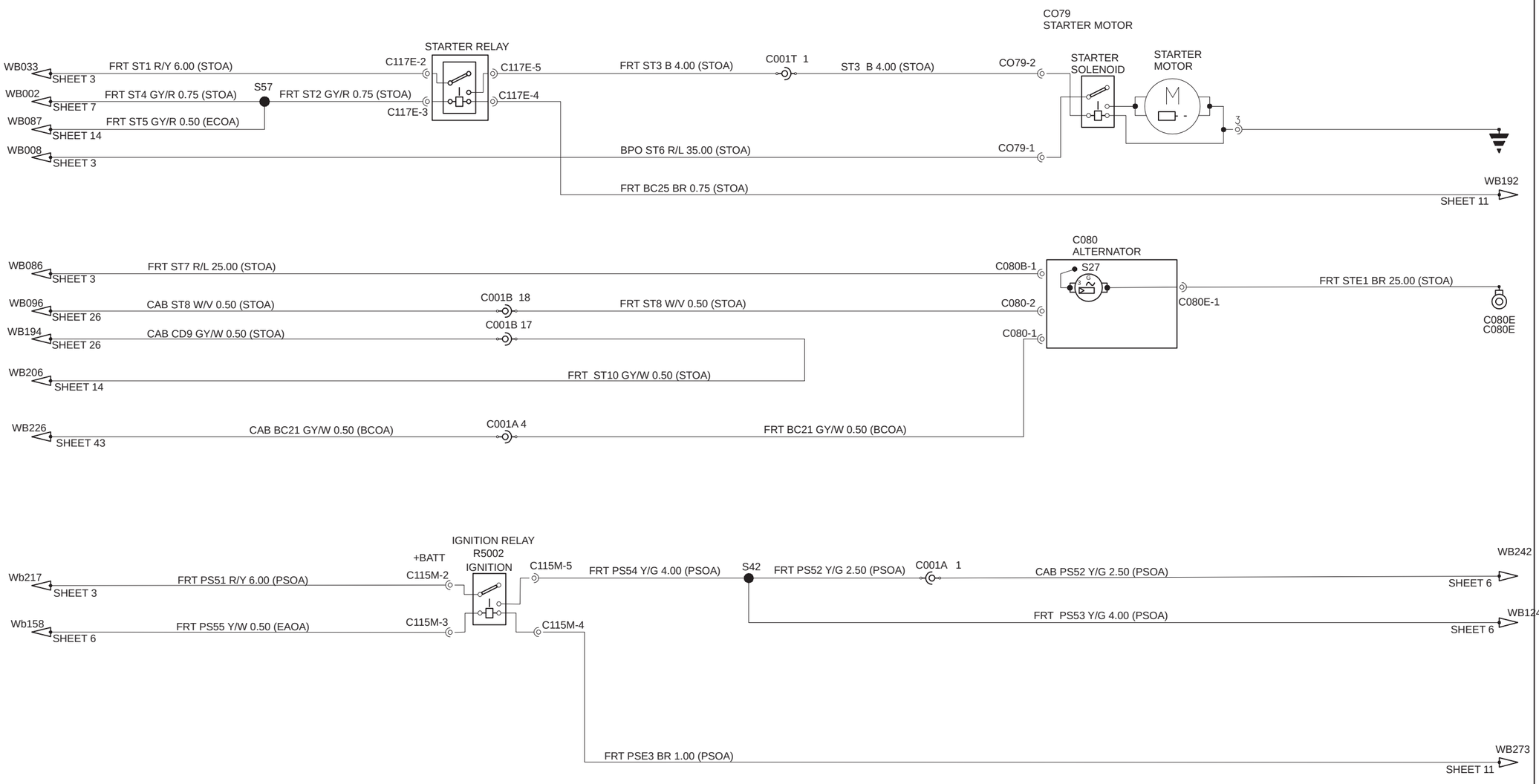
SYSTEM CODE	EA0A
SYSTEM NAME	**EARTH**
SHEET NO.	SHEET 11

EARTH



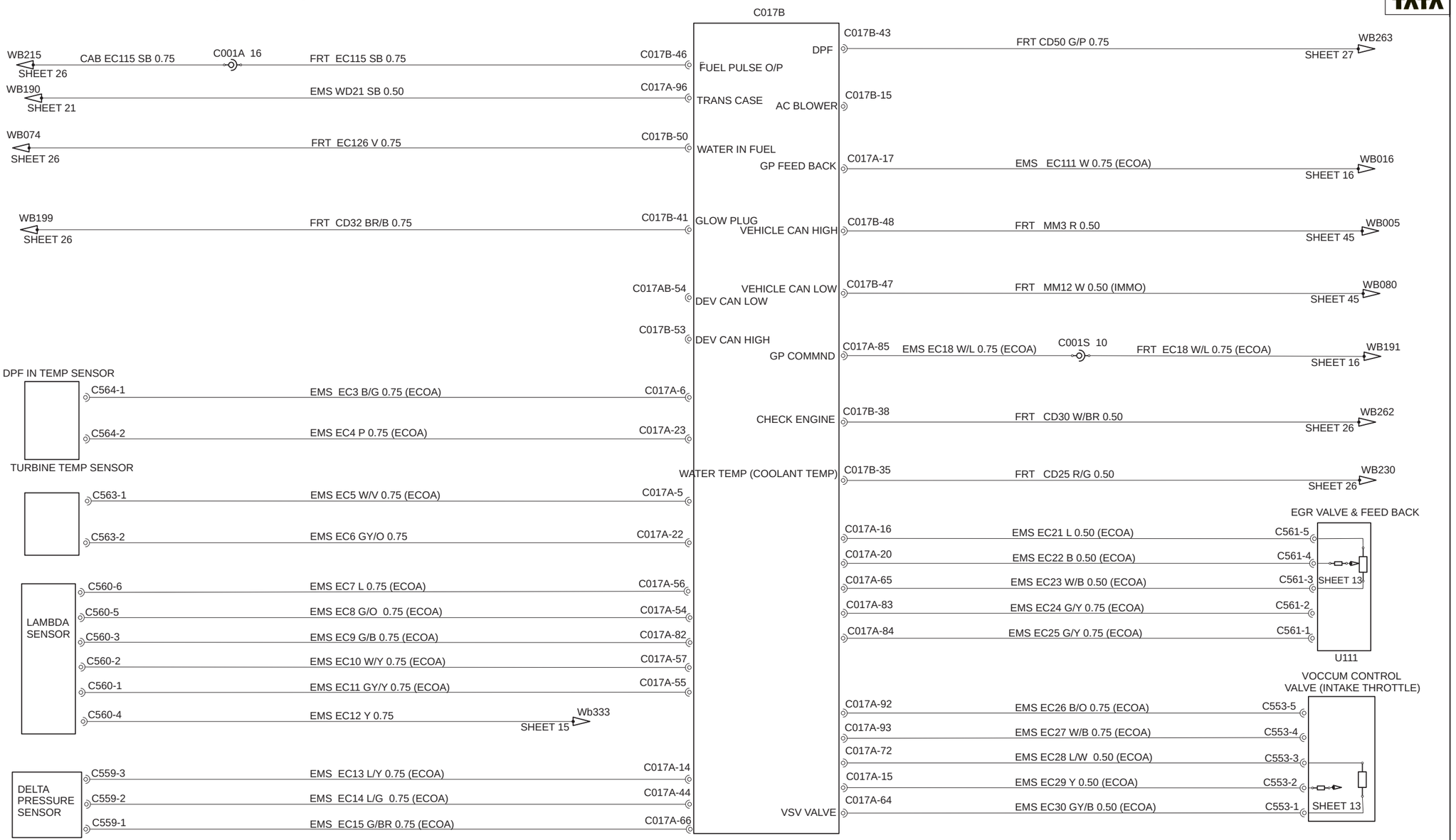
SYSTEM CODE	EA0A
SYSTEM NAME	**EARTH**
SHEET NO.	SHEET 12

STARTER AND CHARGING



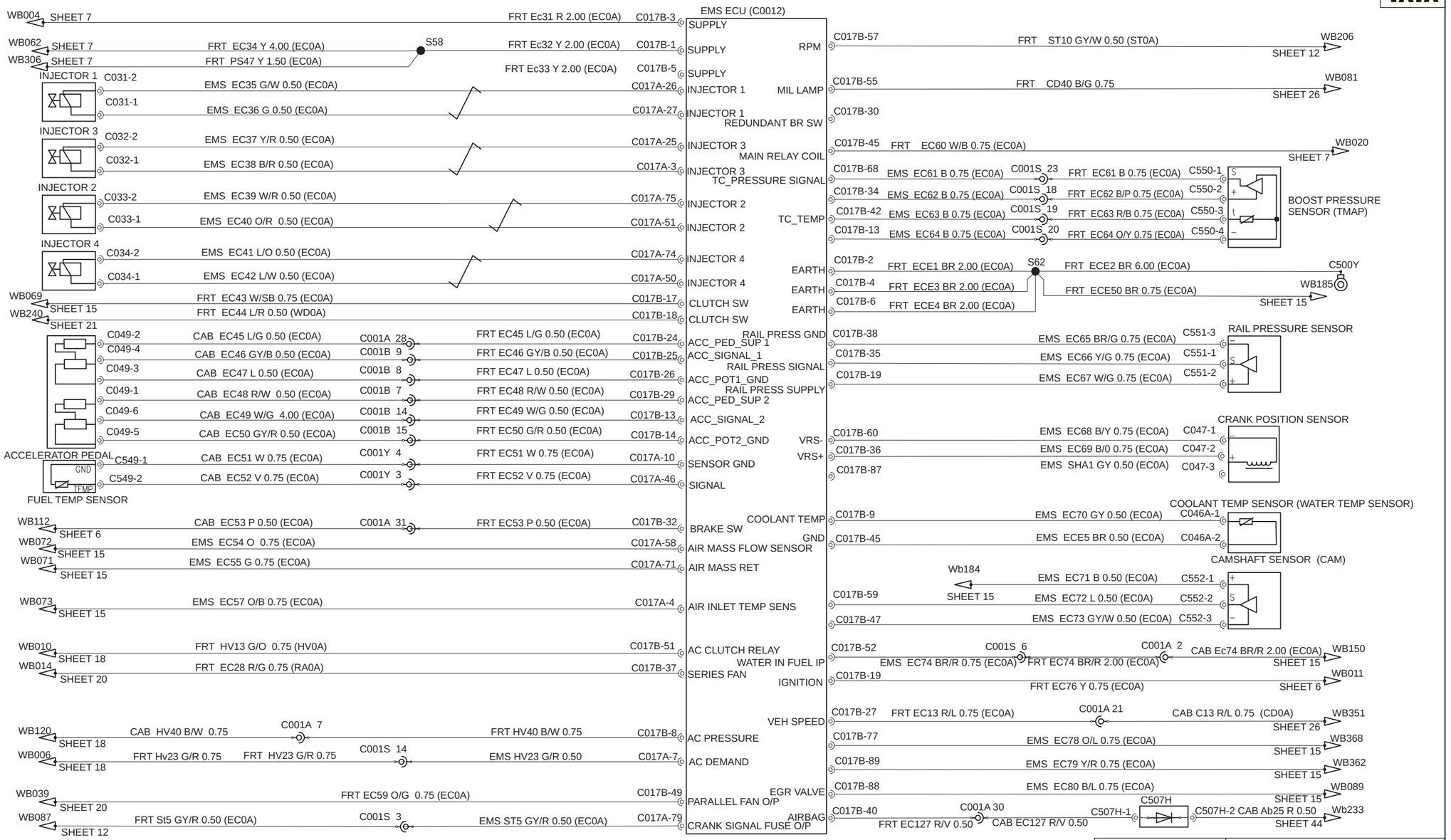
SYSTEM CODE	ST0A
SYSTEM NAME	**STARTER AND AHARGING**
SHEET NO.	SHEET 13

ENGINE CONTROL (DIESEL)



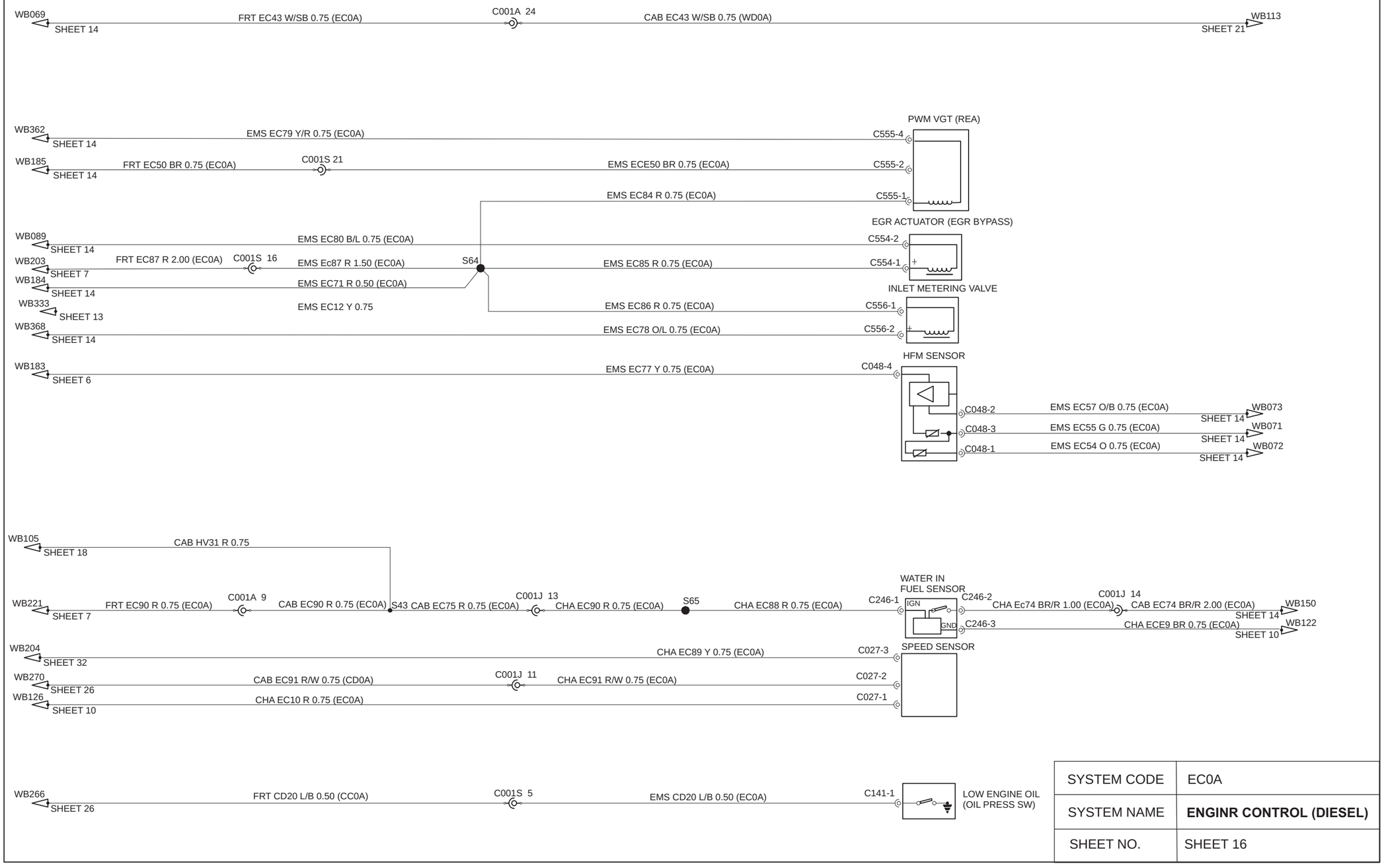
SYSTEM CODE	EC0A
SYSTEM NAME	**ENGINR CONTROL (DIESEL)**
SHEET NO.	SHEET 14

ENGINE CONTROL (DIESEL)



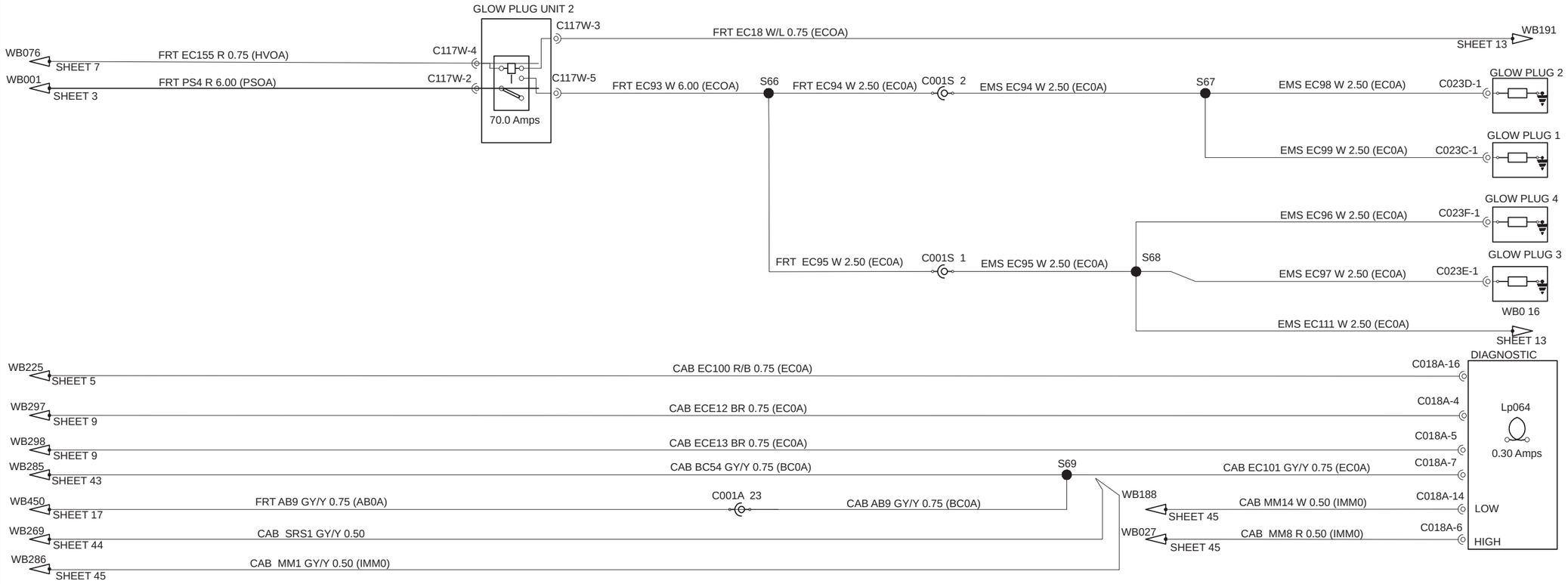
SYSTEM CODE	EC0A
SYSTEM NAME	**ENGINR CONTROL (DIESEL)**
SHEET NO.	SHEET 15

ENGINE CONTROL (DIESEL)



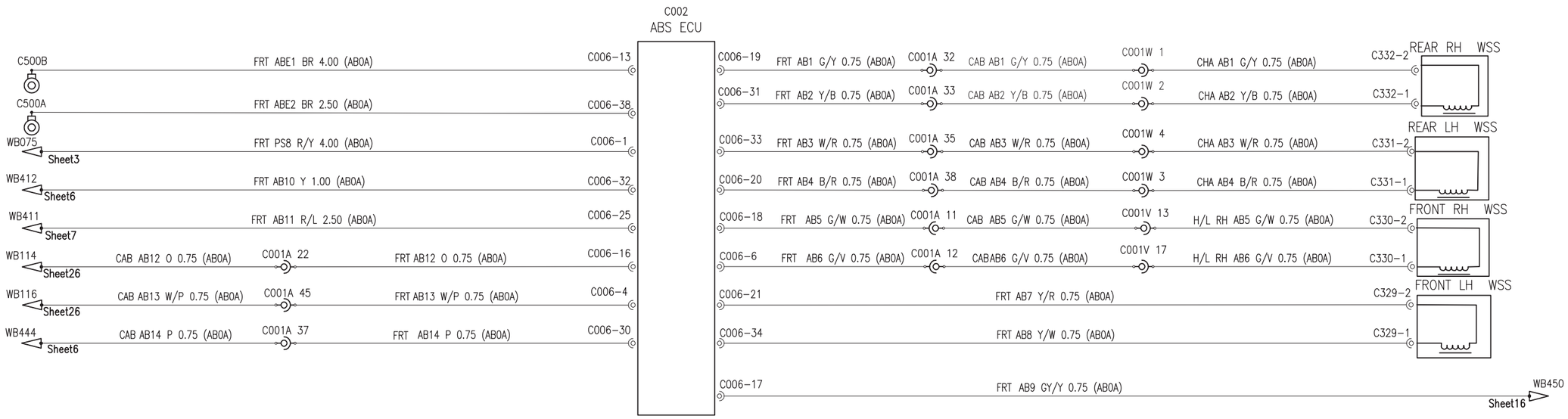
SYSTEM CODE	EC0A
SYSTEM NAME	**ENGINR CONTROL (DIESEL)**
SHEET NO.	SHEET 16

ENGINE CONTROL (DIESEL)



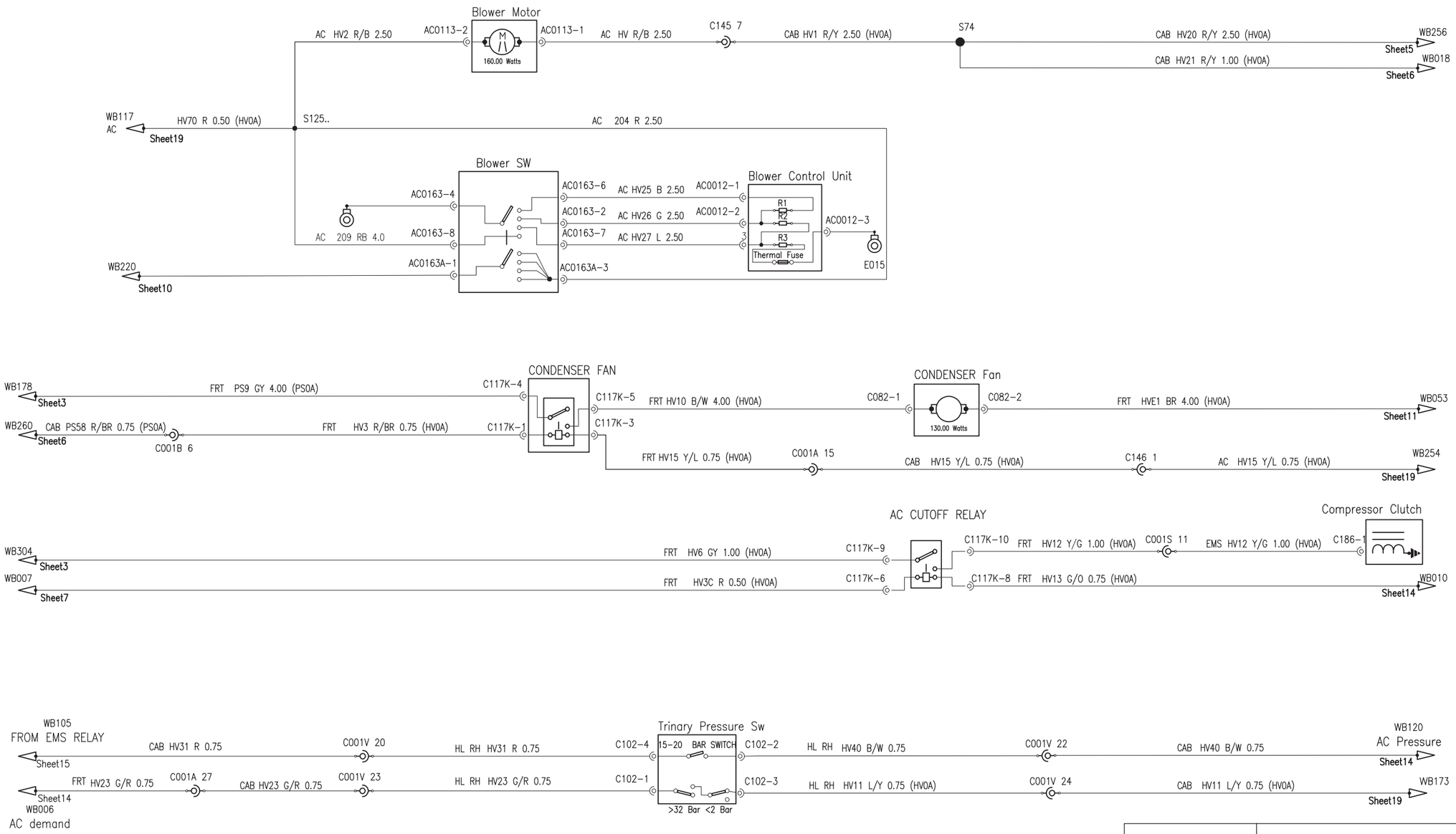
SYSTEM CODE	EC0A
SYSTEM NAME	**ENGINR CONTROL (DIESEL)**
SHEET NO.	SHEET 17

ANTI-LOCK BRAKE SYSTEM



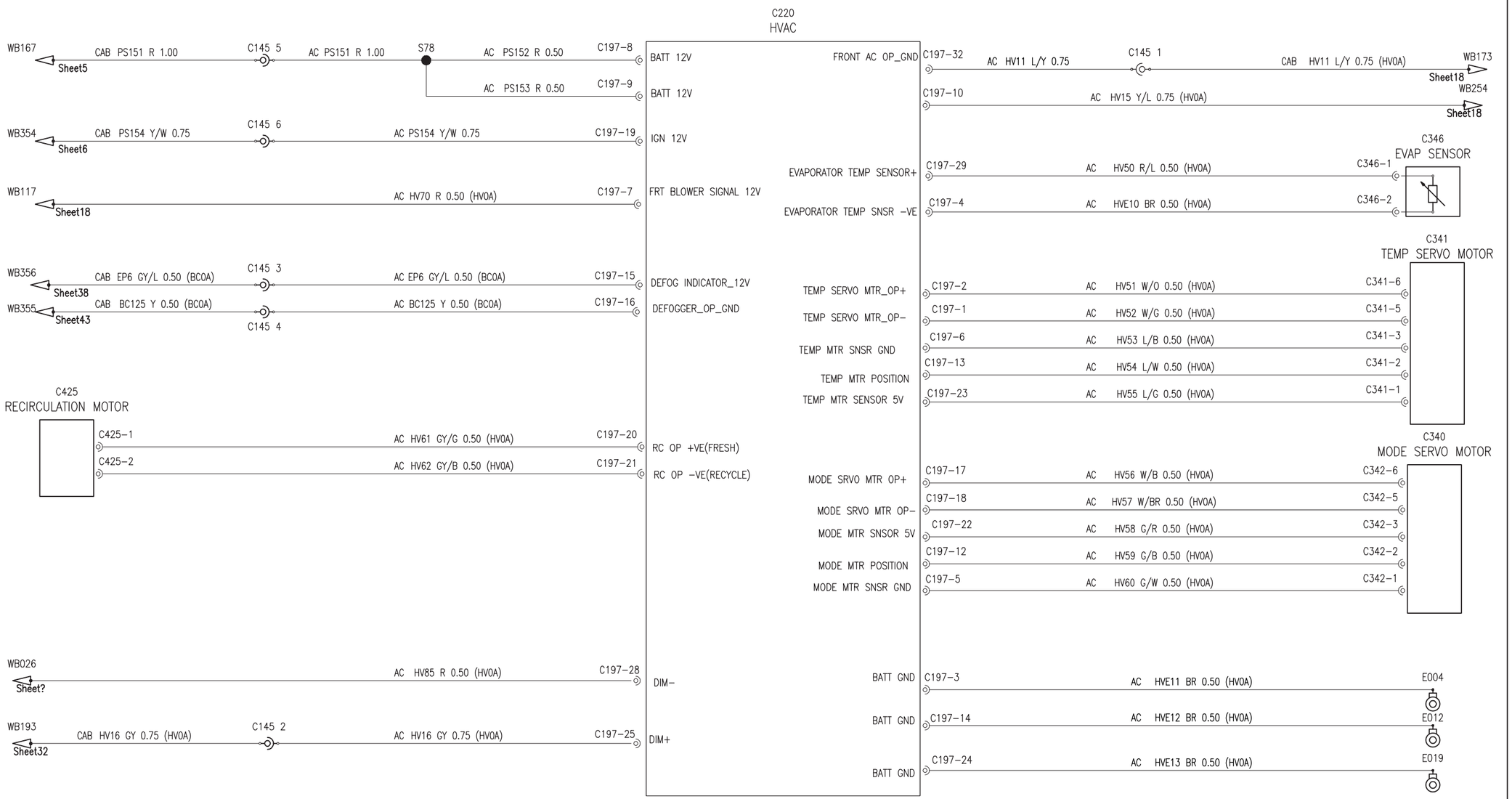
SYSTEM CODE	AB0A
SYSTEM NAME	**ANTI-LOCK BRAKE SYATEM**
SHEET NO.	SHEET 18

HVAC (MANUAL)



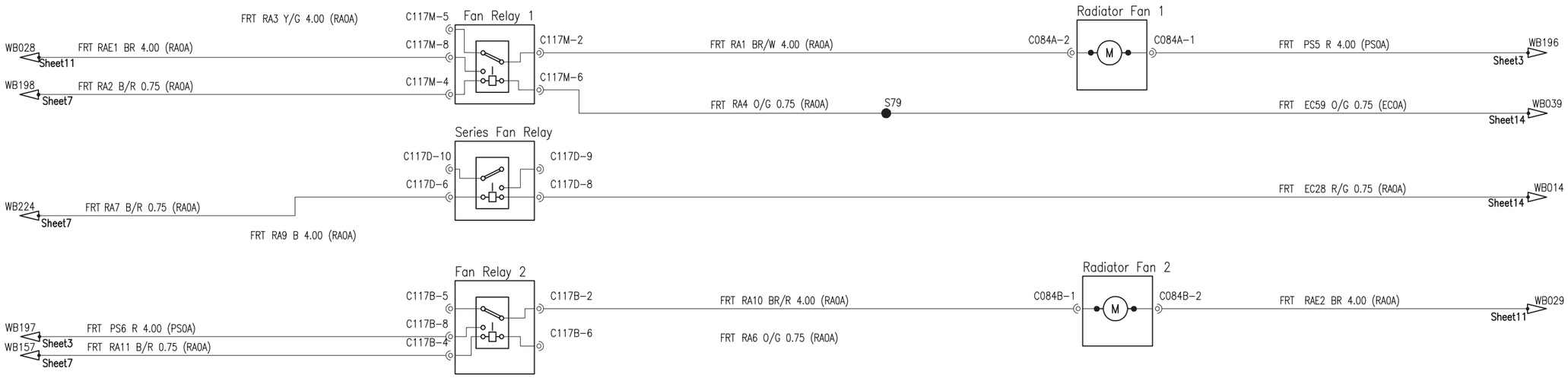
SYSTEM CODE	HV0A
SYSTEM NAME	**HVAC (MANUAL))**
SHEET NO.	SHEET 19

HVAC (MANUAL)



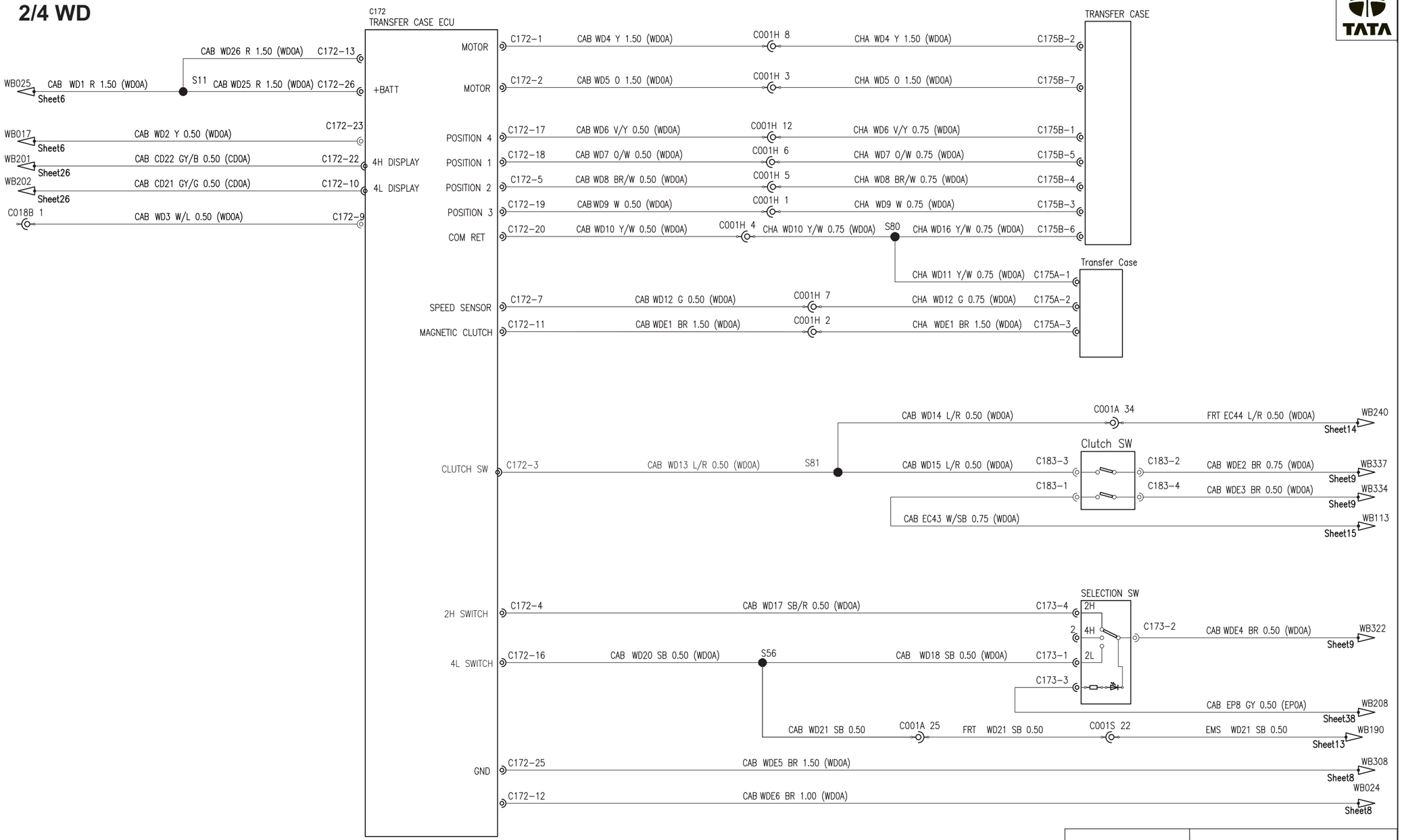
SYSTEM CODE	HV0A
SYSTEM NAME	**HVAC (MANUAL))**
SHEET NO.	SHEET 20

RADIATOR FANS



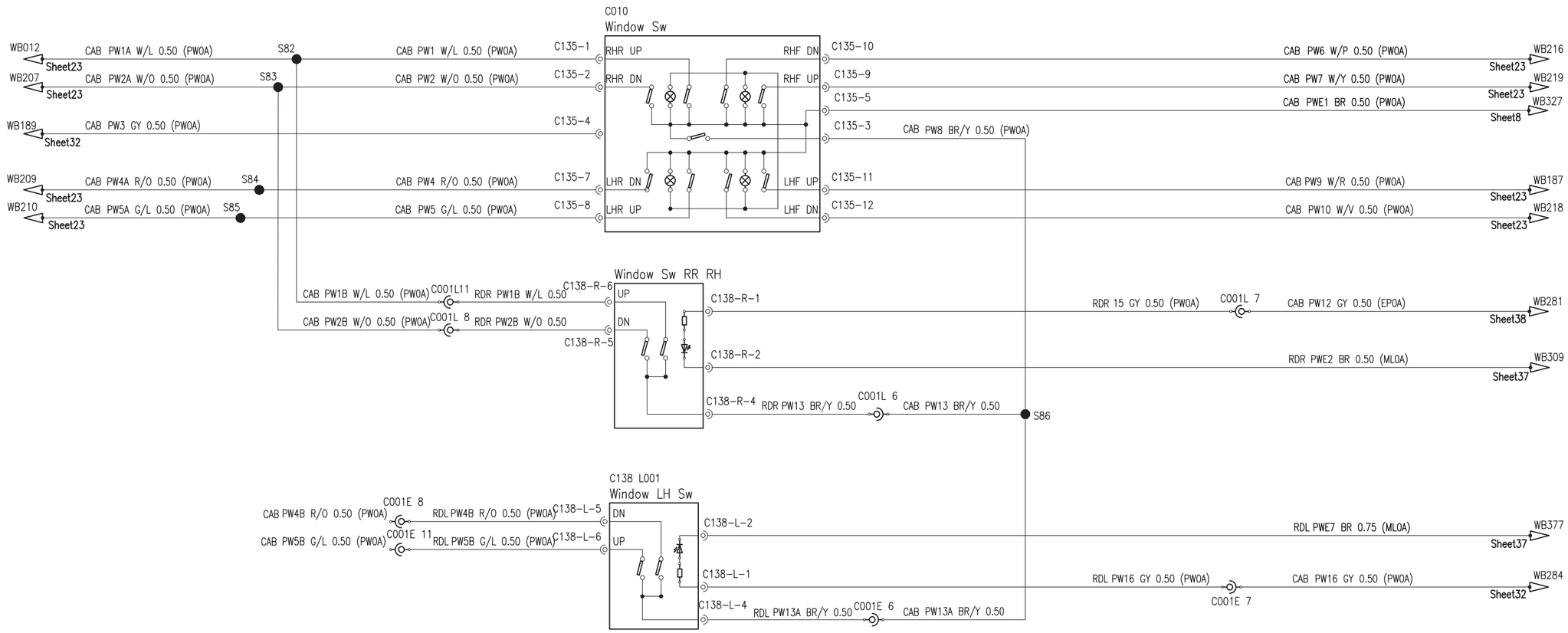
SYSTEM CODE	RA0A
SYSTEM NAME	**RADIATOR FANS**
SHEET NO.	SHEET 21

2/4 WD



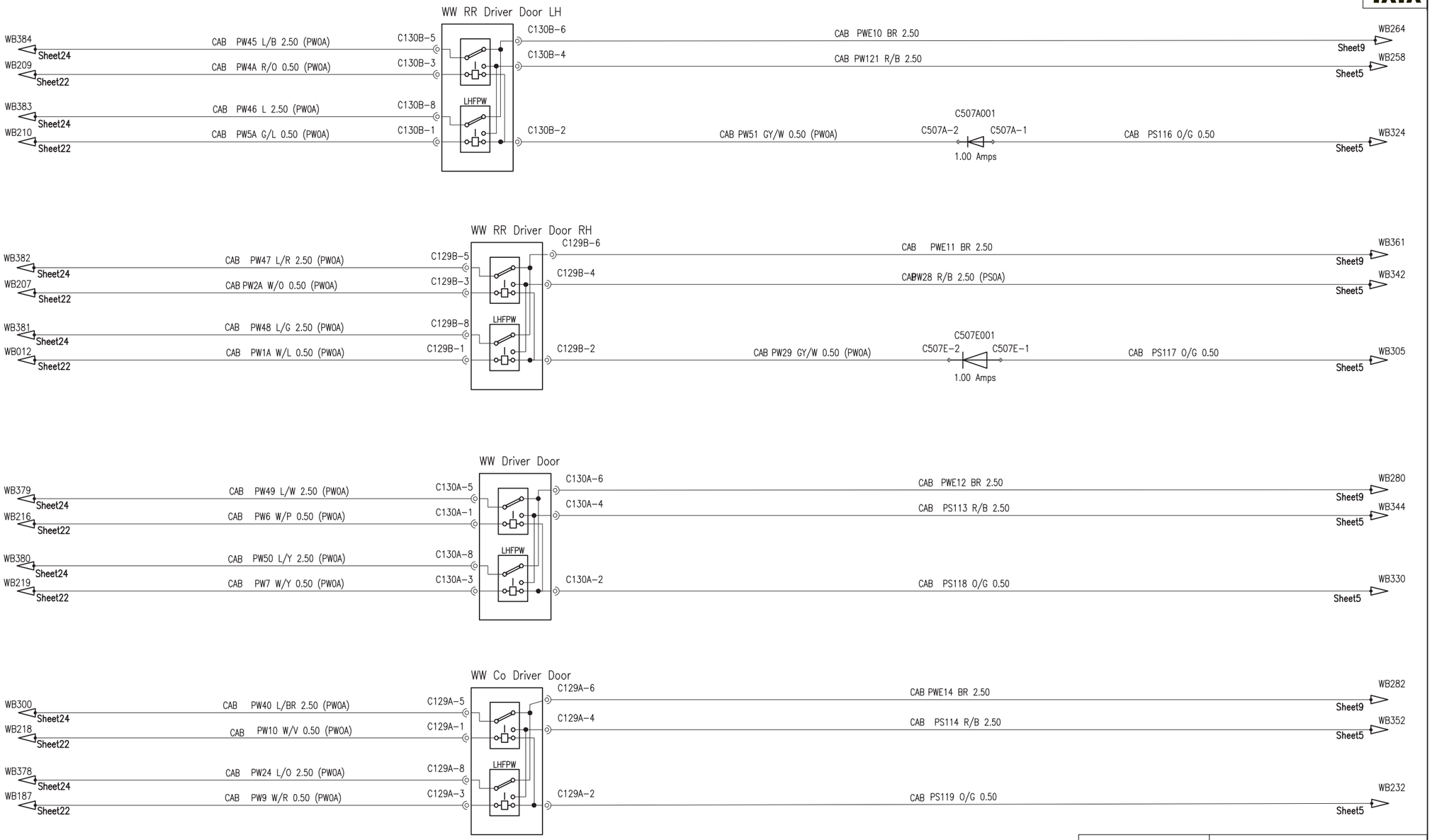
SYSTEM CODE	WD0A
SYSTEM NAME	**2/4 WD**
SHEET NO.	SHEET 22

POWER WINDOWS



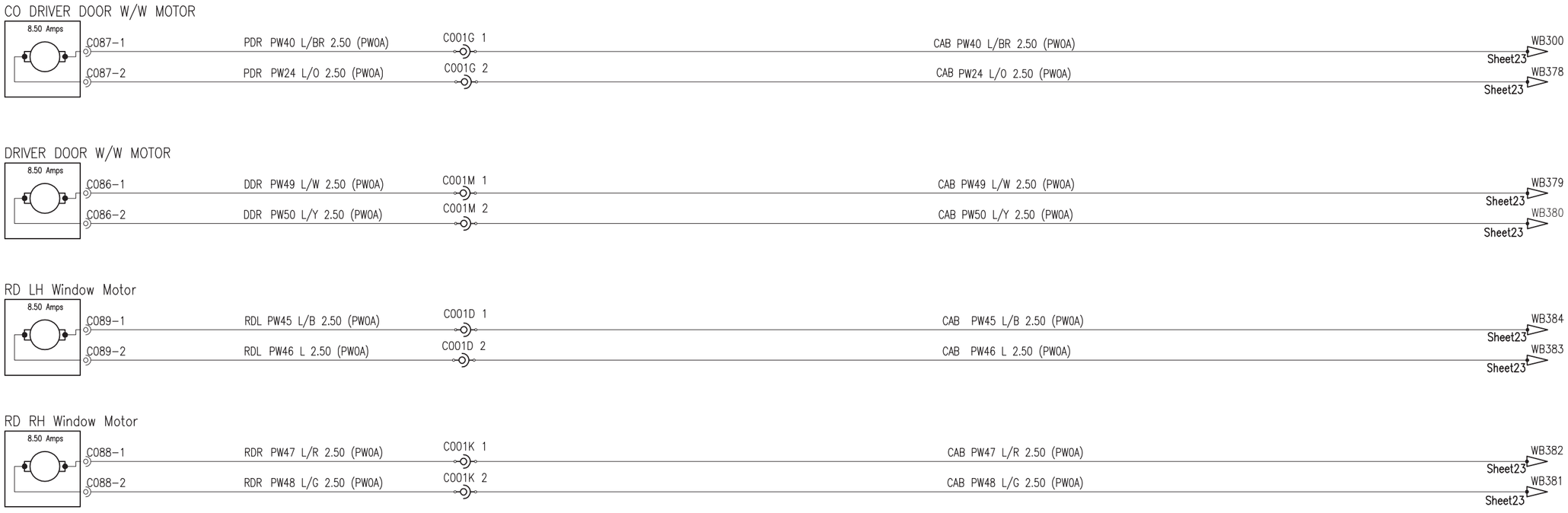
SYSTEM CODE	PW0A
SYSTEM NAME	**POWER WINDOWS**
SHEET NO.	SHEET 23

POWER WINDOWS



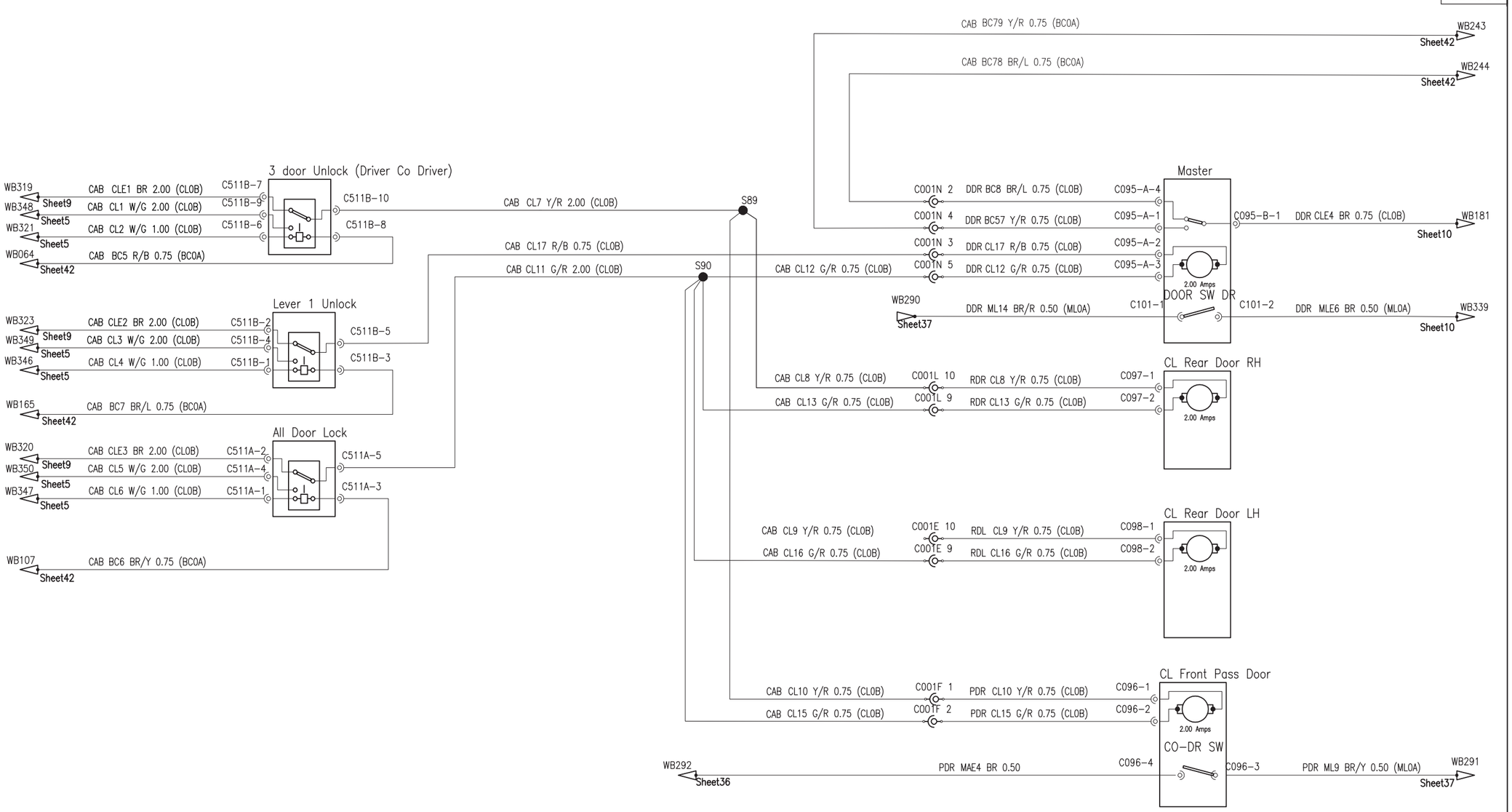
SYSTEM CODE	PW0A
SYSTEM NAME	**POWER WINDOWS**
SHEET NO.	SHEET 24

POWER WINDOWS



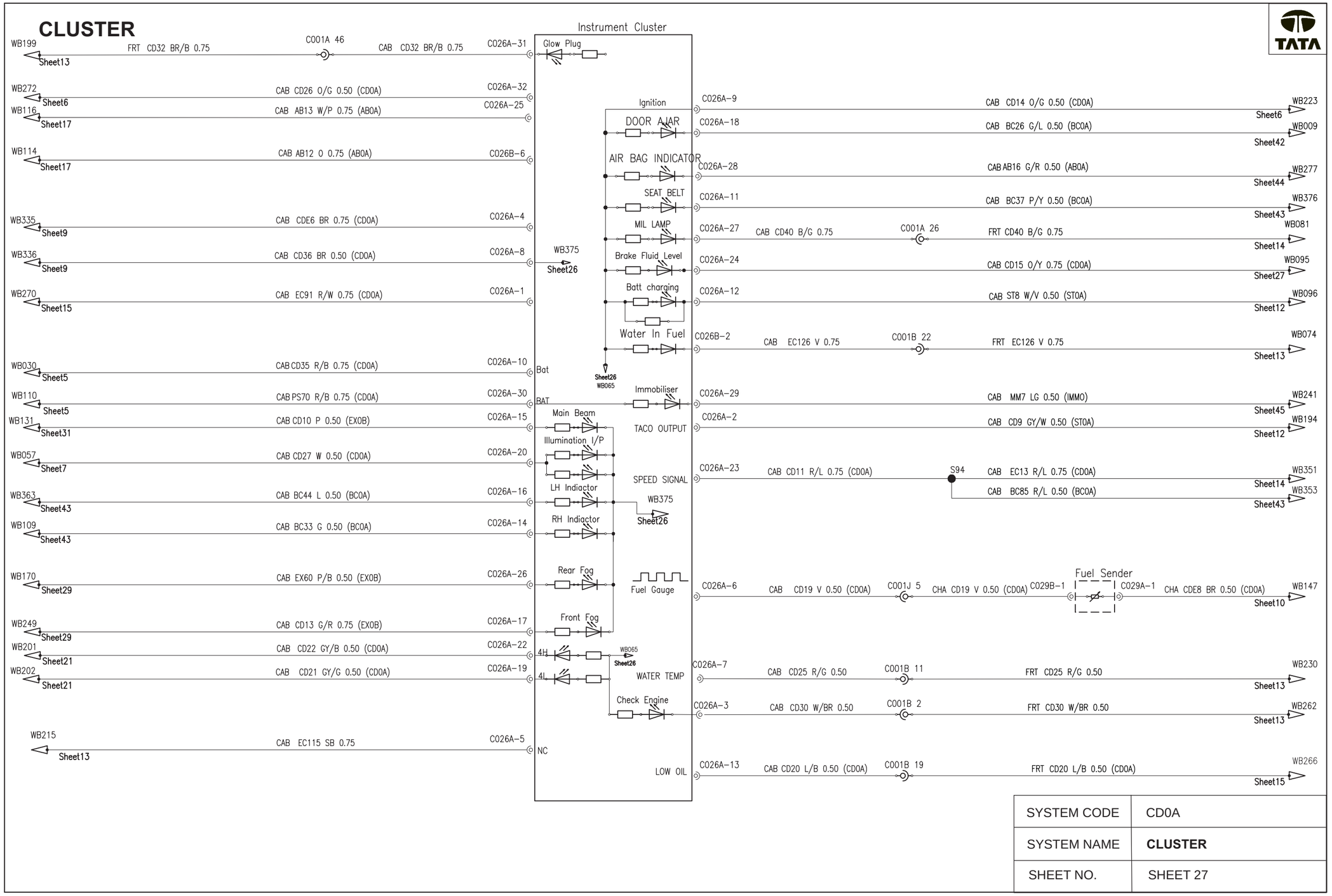
SYSTEM CODE	PW0A
SYSTEM NAME	**POWER WINDOWS**
SHEET NO.	SHEET 25

CENTRAL DOOR LOCKING



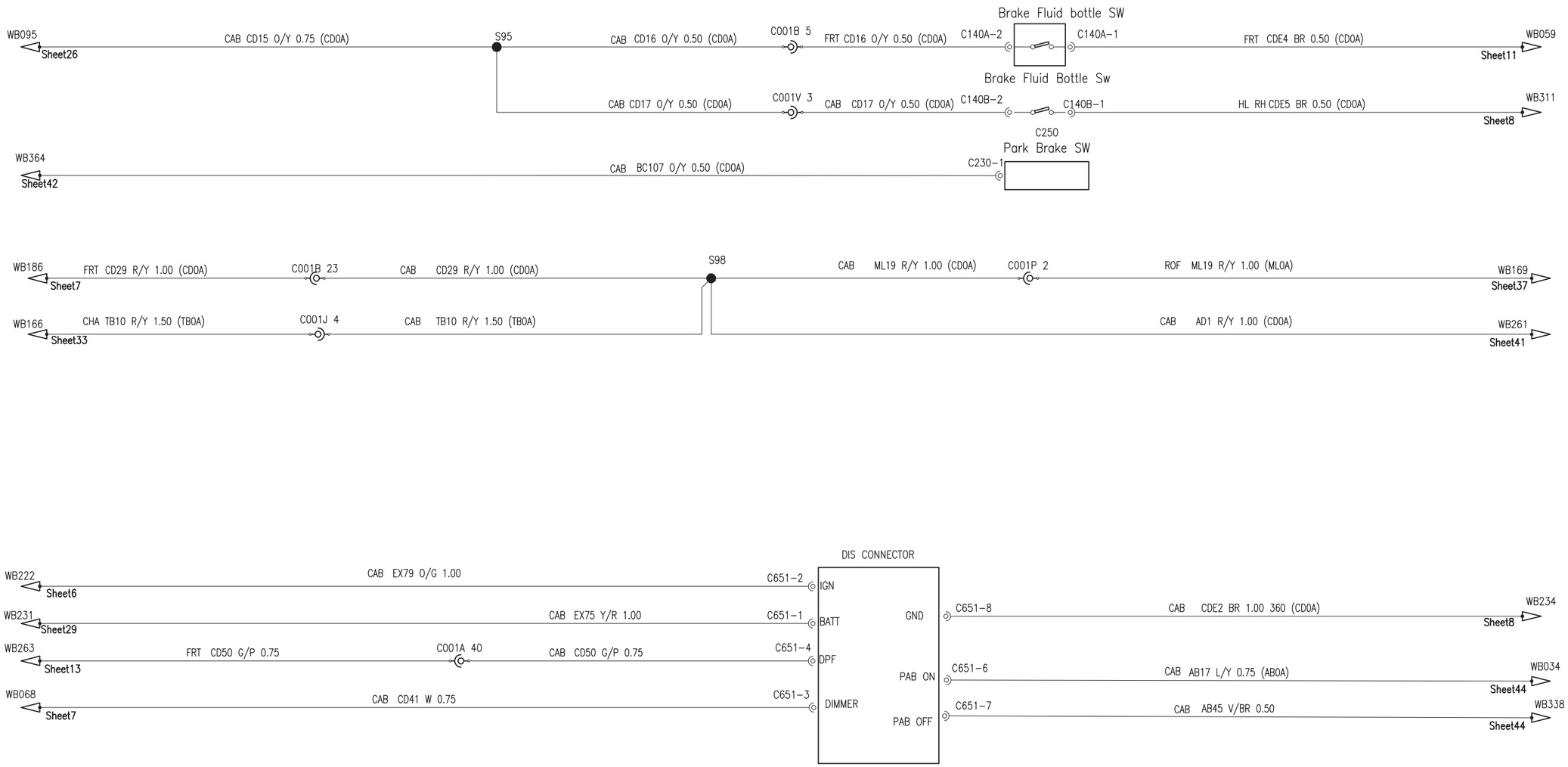
SYSTEM CODE	CL0B
SYSTEM NAME	**CENTRAL DOOR LOCKING**
SHEET NO.	SHEET 26

CLUSTER



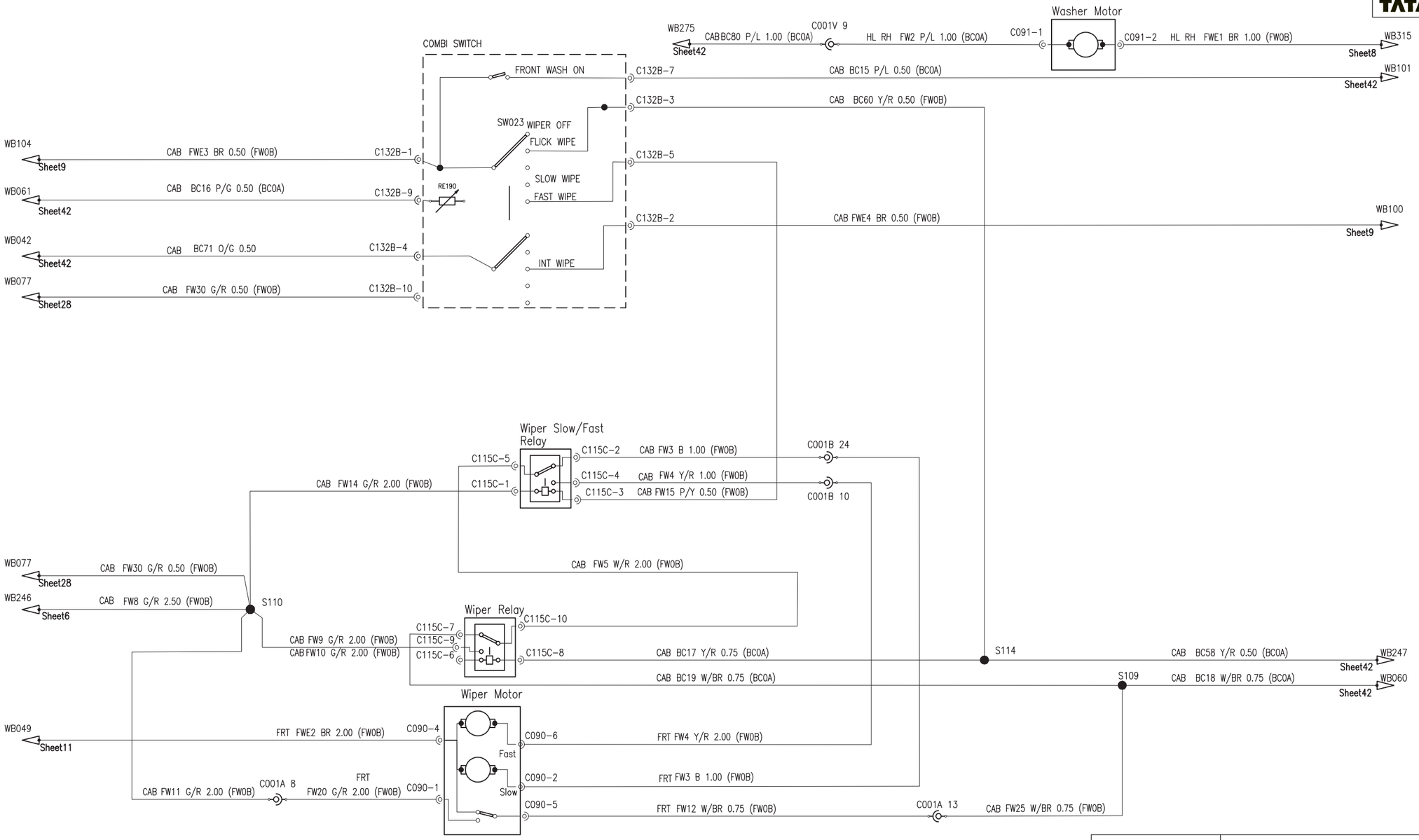
SYSTEM CODE	CD0A
SYSTEM NAME	**CLUSTER**
SHEET NO.	SHEET 27

CLUSTER



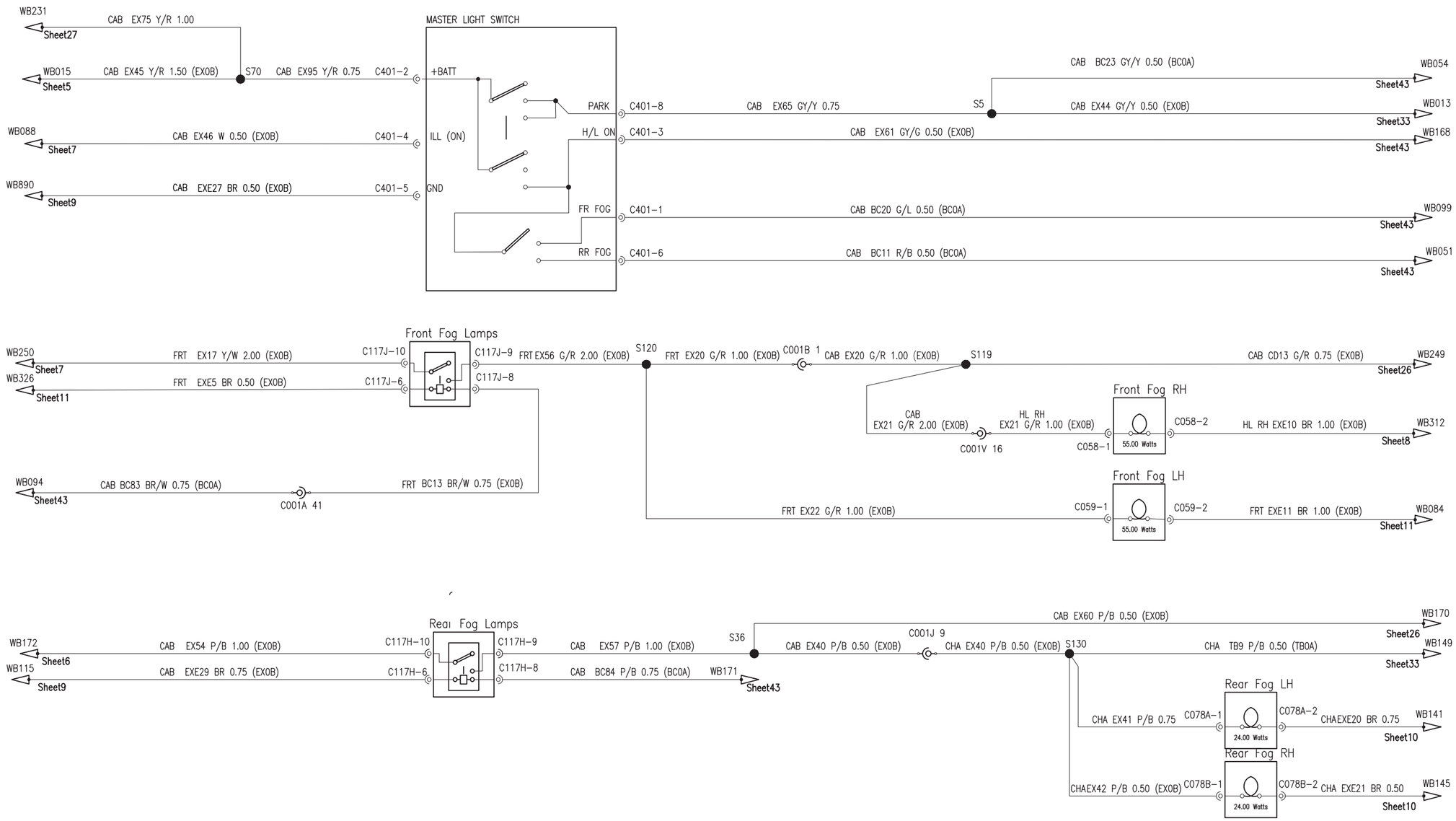
SYSTEM CODE	CD0A
SYSTEM NAME	**CLUSTER**
SHEET NO.	SHEET 28

FRONT WIPER PASSIVE



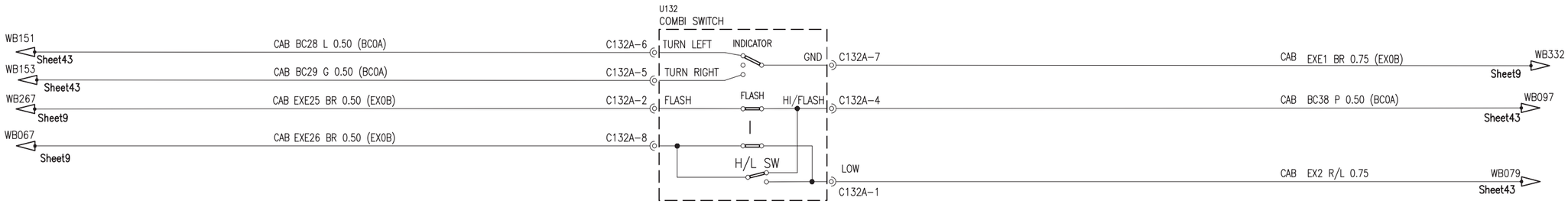
SYSTEM CODE	FW0B
SYSTEM NAME	**FRONT WIPER PASSIVE**
SHEET NO.	SHEET 29

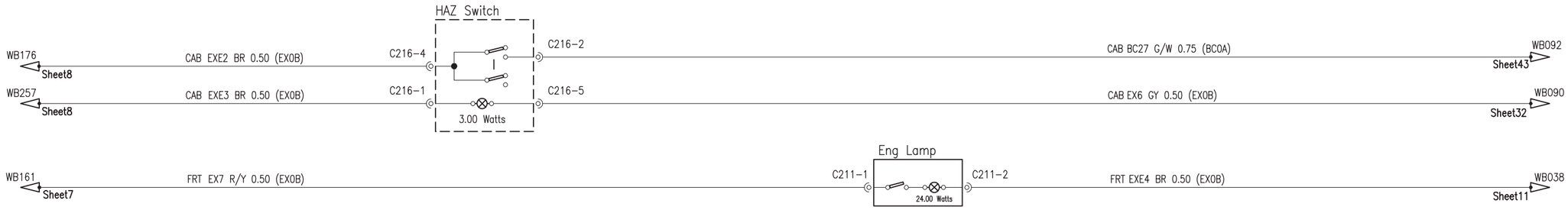
EXTERIOR LIGHTING



SYSTEM CODE	EX0B
SYSTEM NAME	**EXTERIOR LIGHTING**
SHEET NO.	SHEET 30

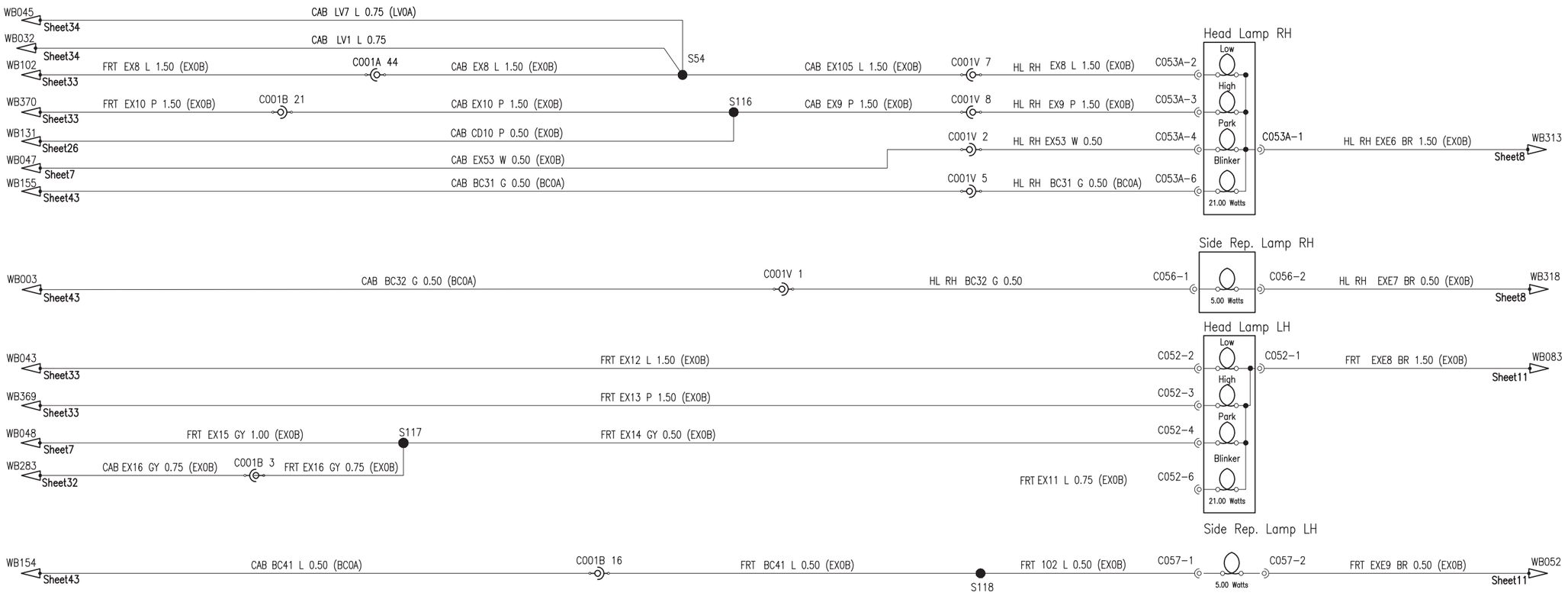
EXTERIOR LIGHTING





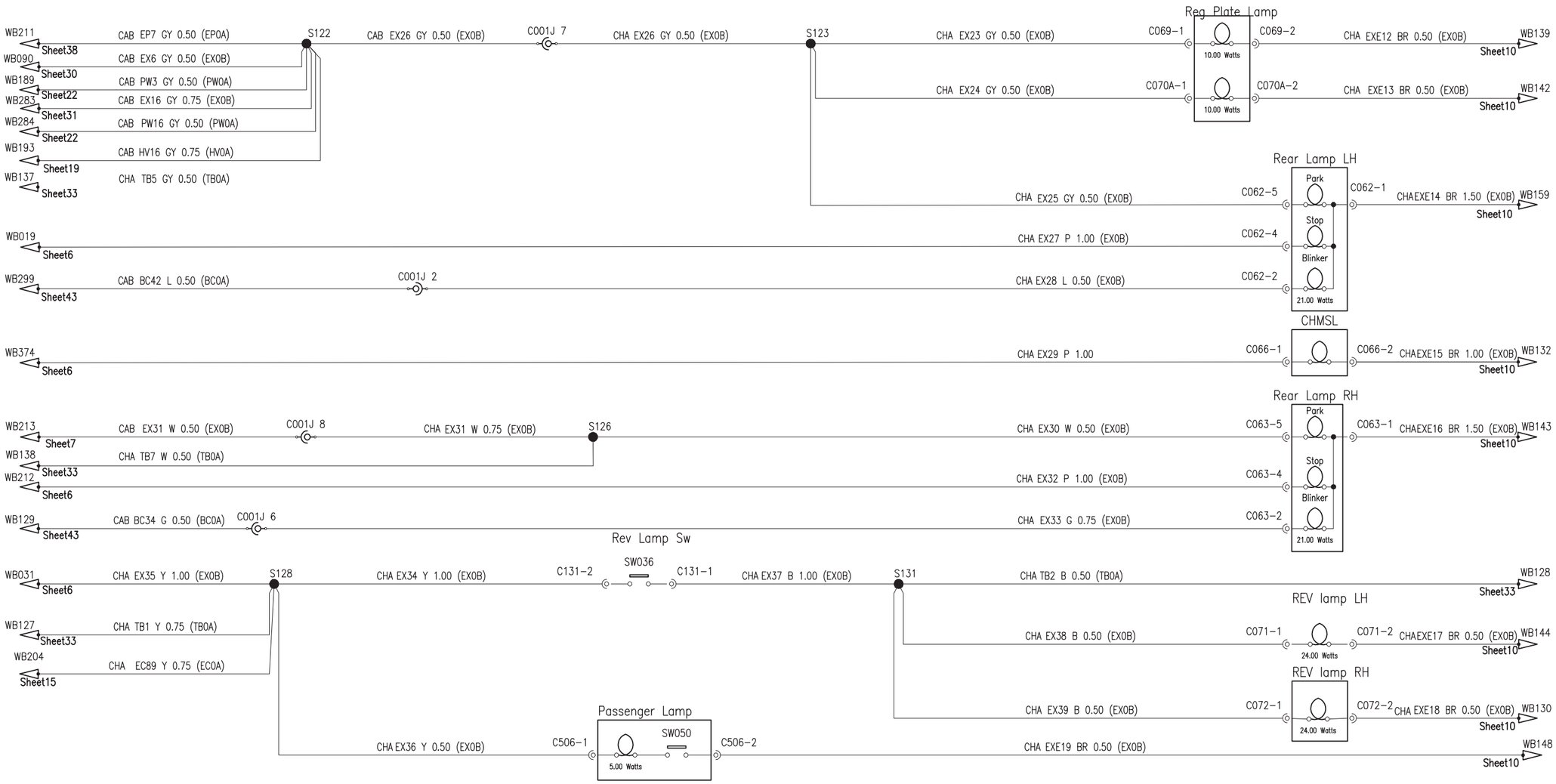
SYSTEM CODE	EX0B
SYSTEM NAME	**EXTERIOR LIGHTING**
SHEET NO.	SHEET 31

EXTERIOR LIGHTING



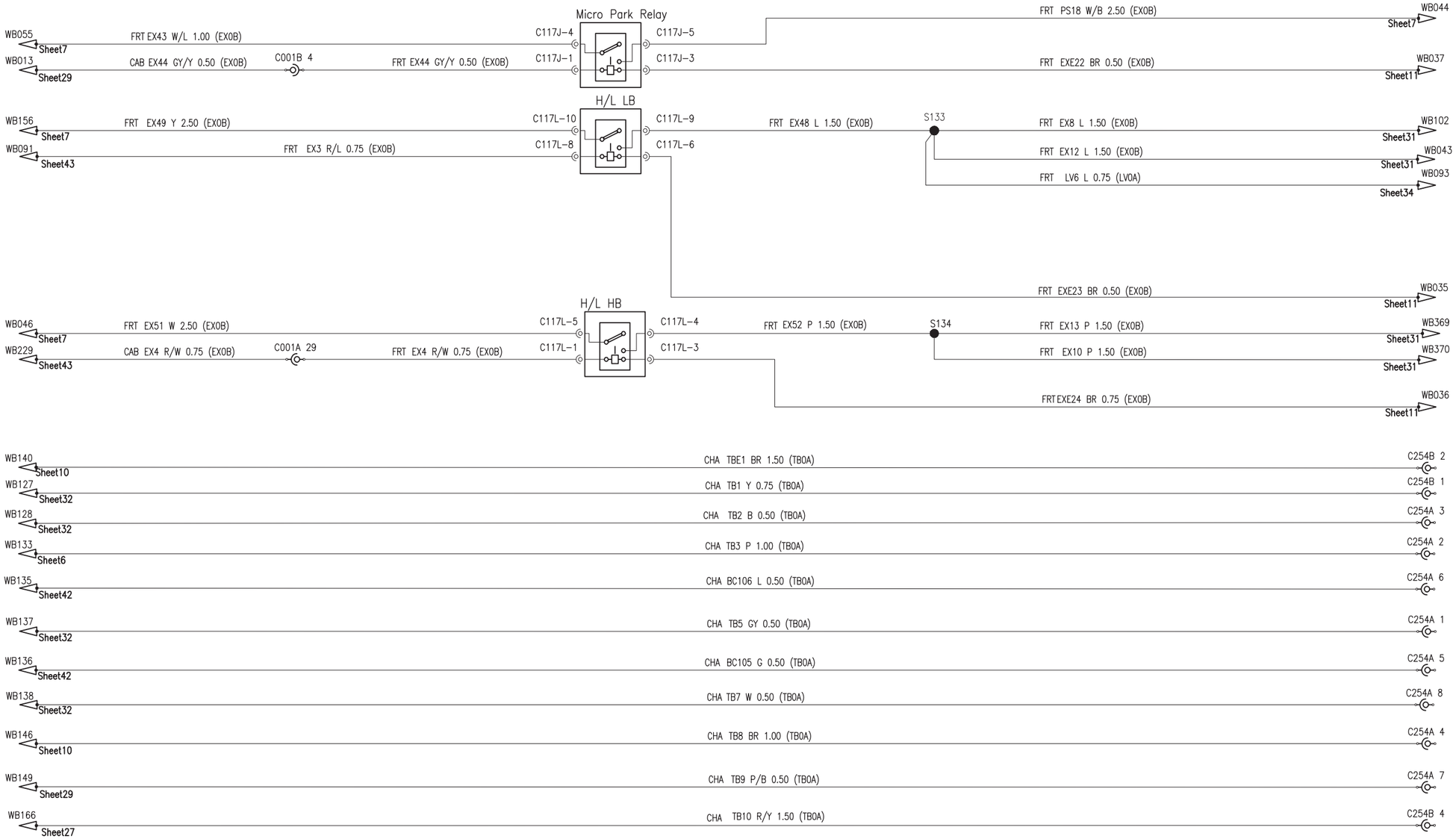
SYSTEM CODE	EX0B
SYSTEM NAME	**EXTERIOR LIGHTING**
SHEET NO.	SHEET 32

EXTERIOR LIGHTING



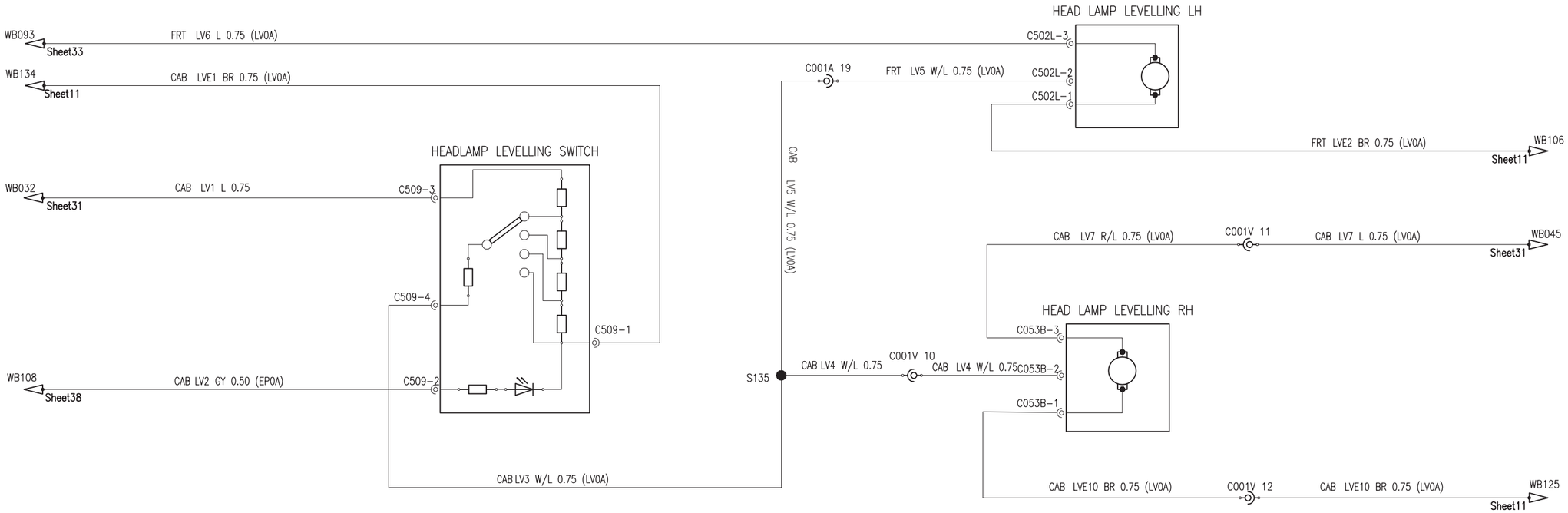
SYSTEM CODE	EX0B
SYSTEM NAME	**EXTERIOR LIGHTING**
SHEET NO.	SHEET 33

EXTERIOR LIGHTING



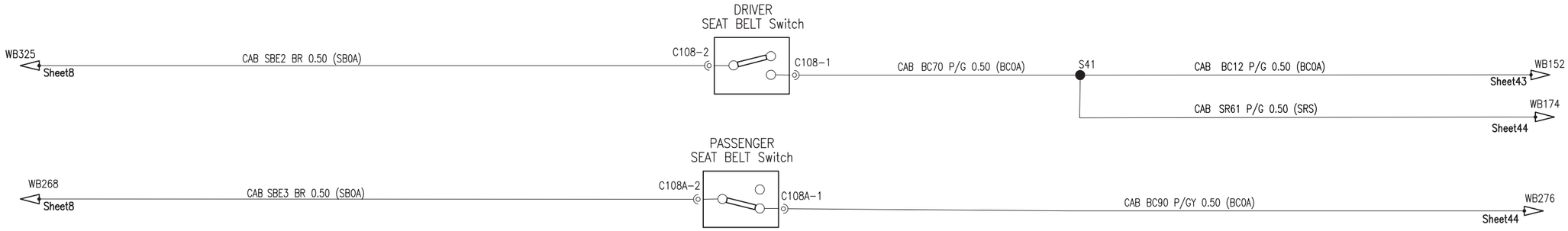
SYSTEM CODE	EX0B
SYSTEM NAME	**EXTERIOR LIGHTING**
SHEET NO.	SHEET 34

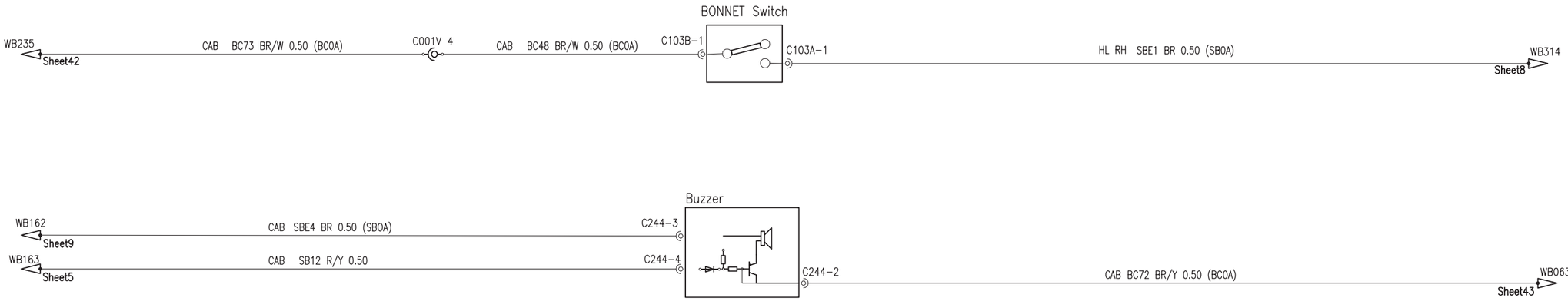
EXTERIOR LIGHTING



SYSTEM CODE	EX0B
SYSTEM NAME	**EXTERIOR LIGHTING**
SHEET NO.	SHEET 35

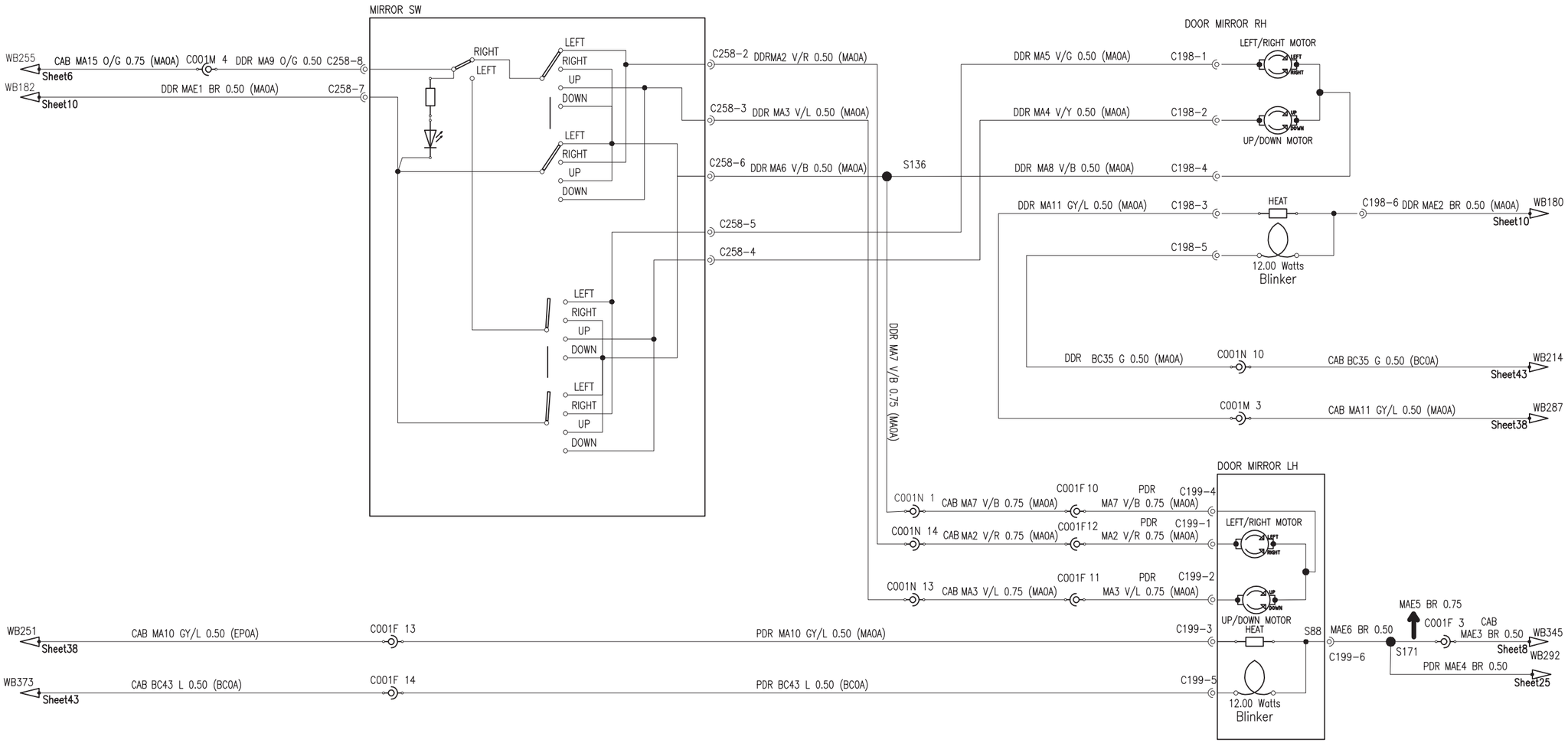
SEAT BELT WARNING





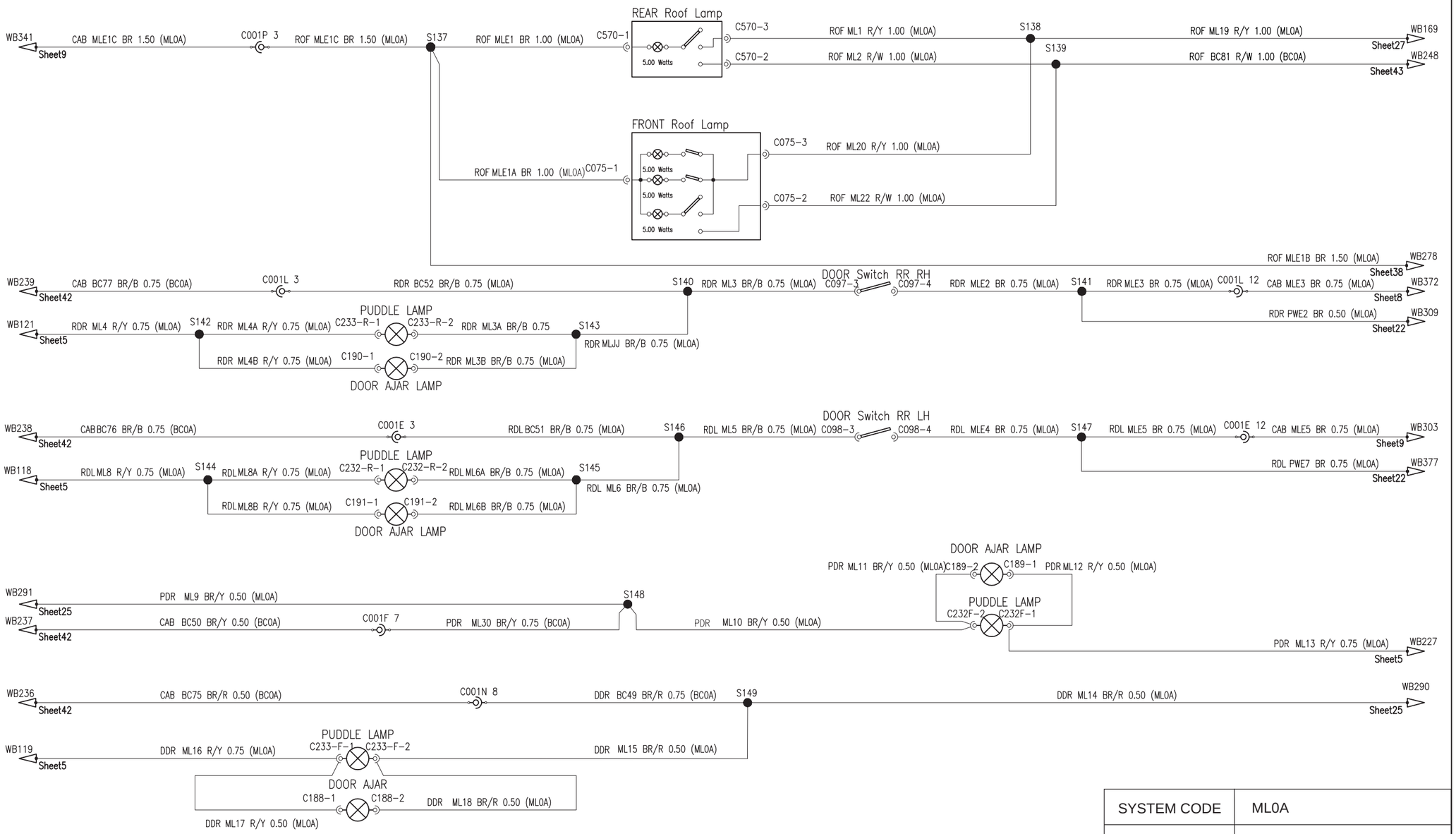
SYSTEM CODE	SB0A
SYSTEM NAME	**SEAT BELT WARNING**
SHEET NO.	SHEET 36

SIDE MIRROR



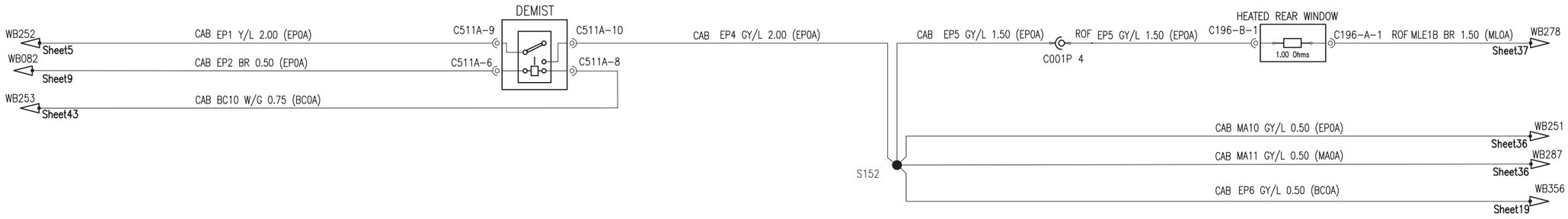
SYSTEM CODE	MA0A
SYSTEM NAME	**SIDE MIRROR**
SHEET NO.	SHEET 37

INTERIOR LAMP



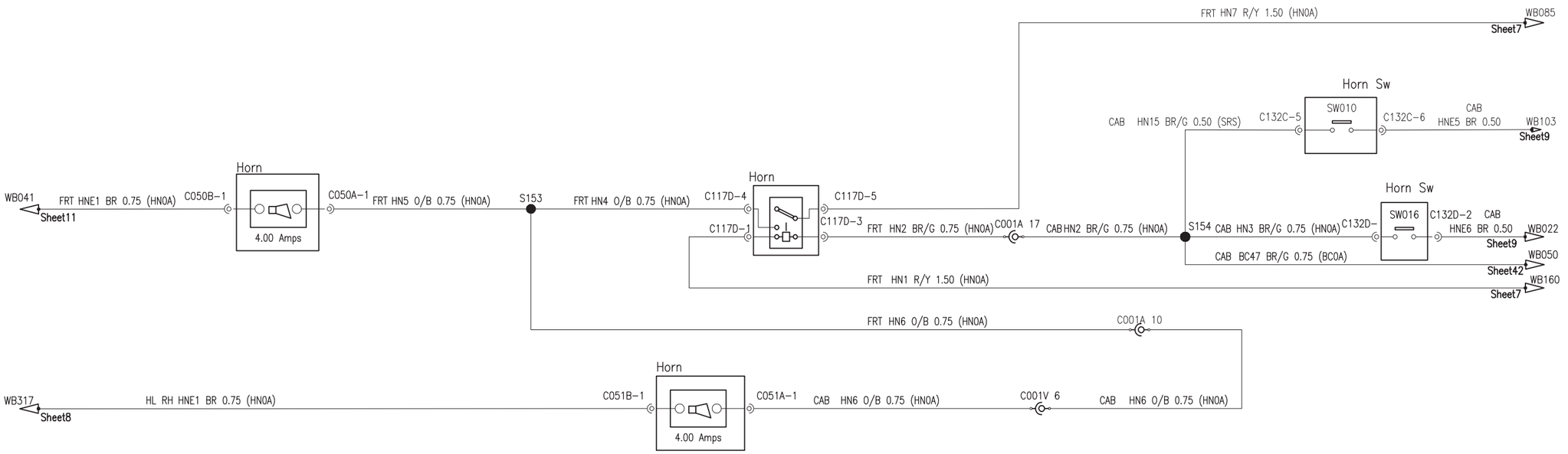
SYSTEM CODE	ML0A
SYSTEM NAME	**INTERIOR LAMPS**
SHEET NO.	SHEET 38

HRW



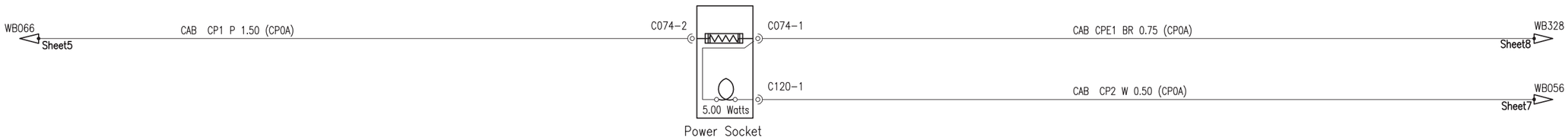
SYSTEM CODE	EP0A
SYSTEM NAME	**HRW**
SHEET NO.	SHEET 39

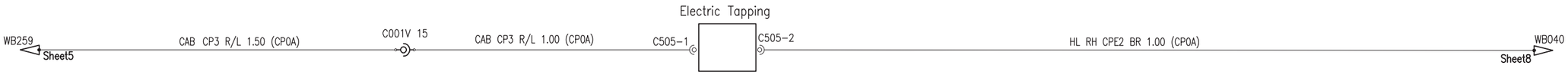
HORN



SYSTEM CODE	HN0A
SYSTEM NAME	**HORN**
SHEET NO.	SHEET 40

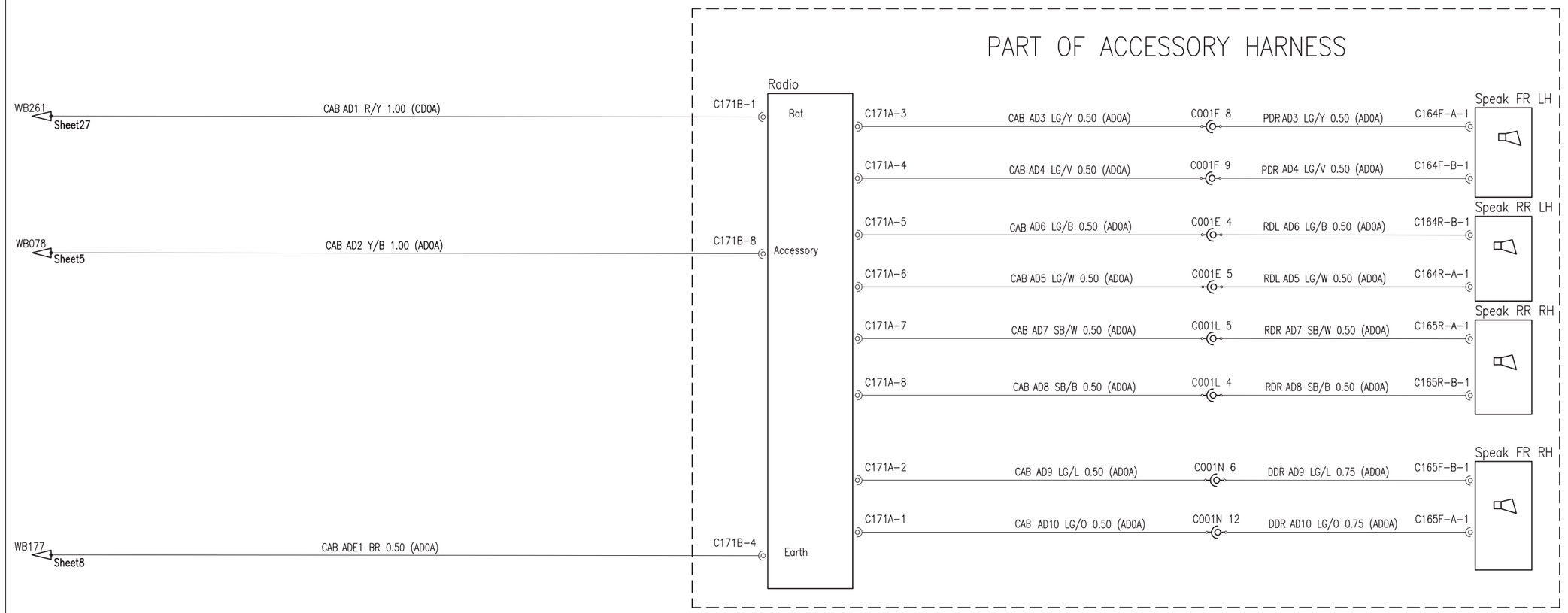
POWER SOCKET & CIGAR LIGHTER





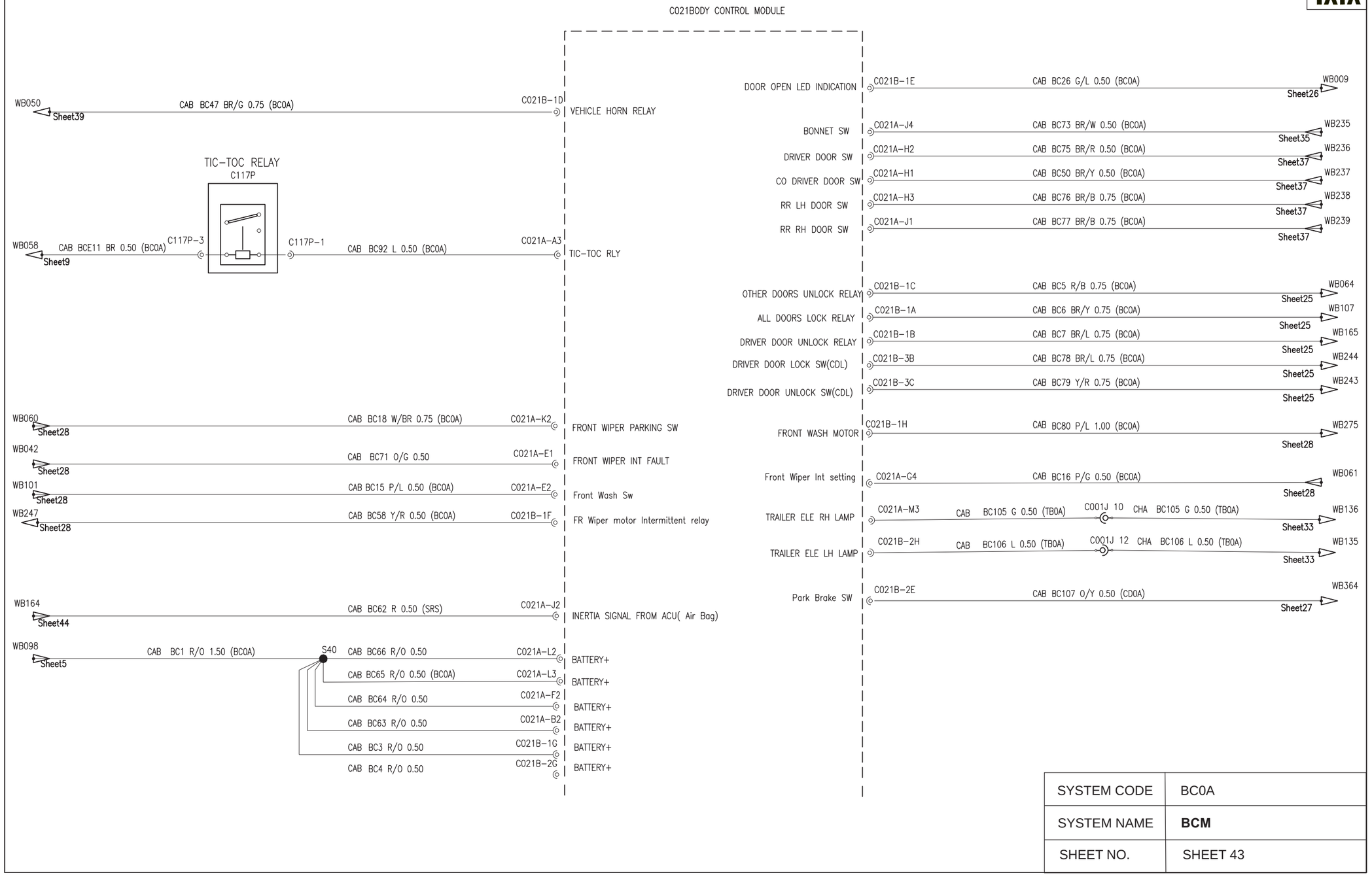
SYSTEM CODE	CP0A
SYSTEM NAME	**POWER SOCKET & CIGAR LIGHTER**
SHEET NO.	SHEET 41

AUDIO



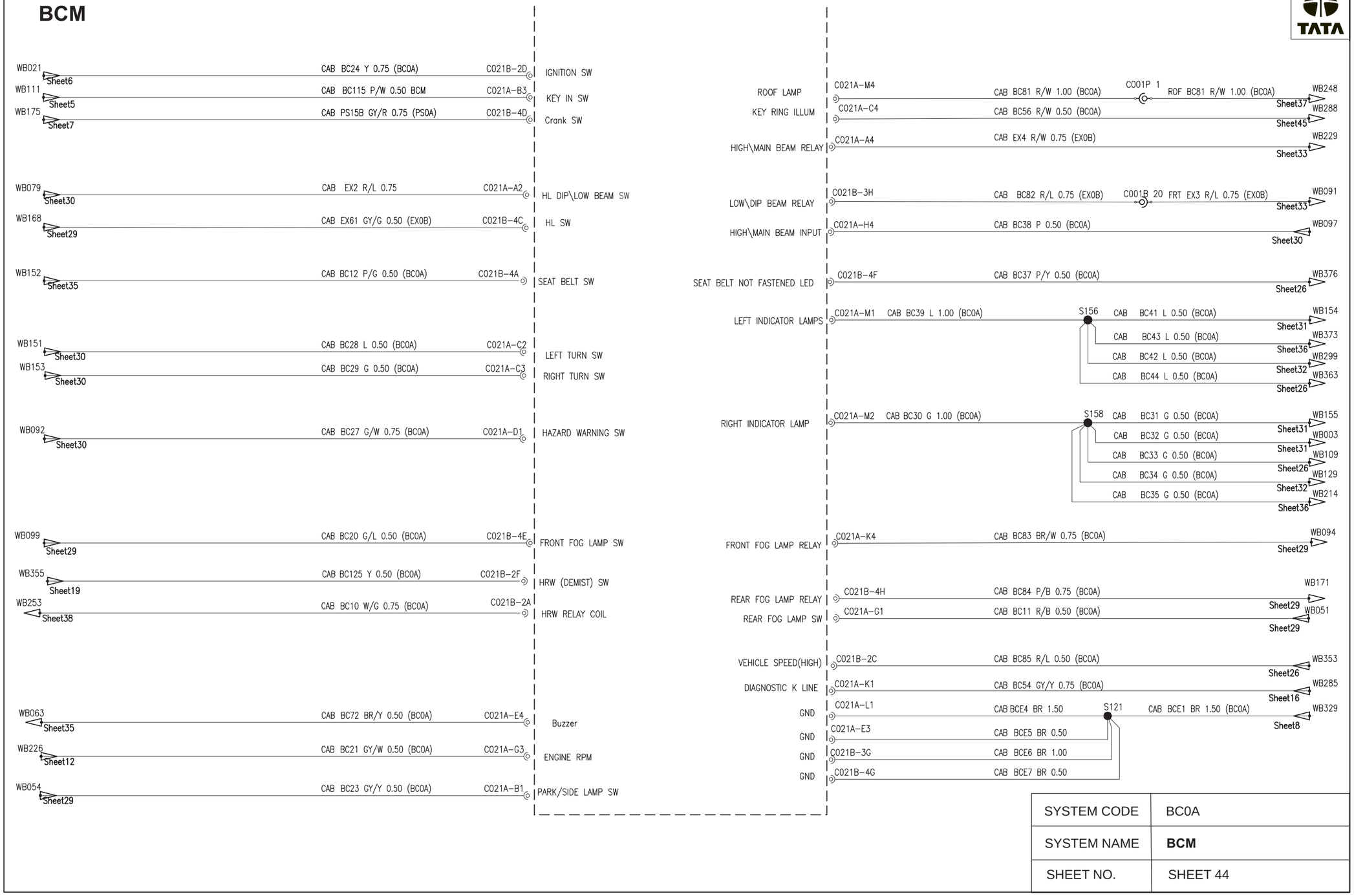
SYSTEM CODE	AD0A
SYSTEM NAME	**AUDIO**
SHEET NO.	SHEET 42

BCM



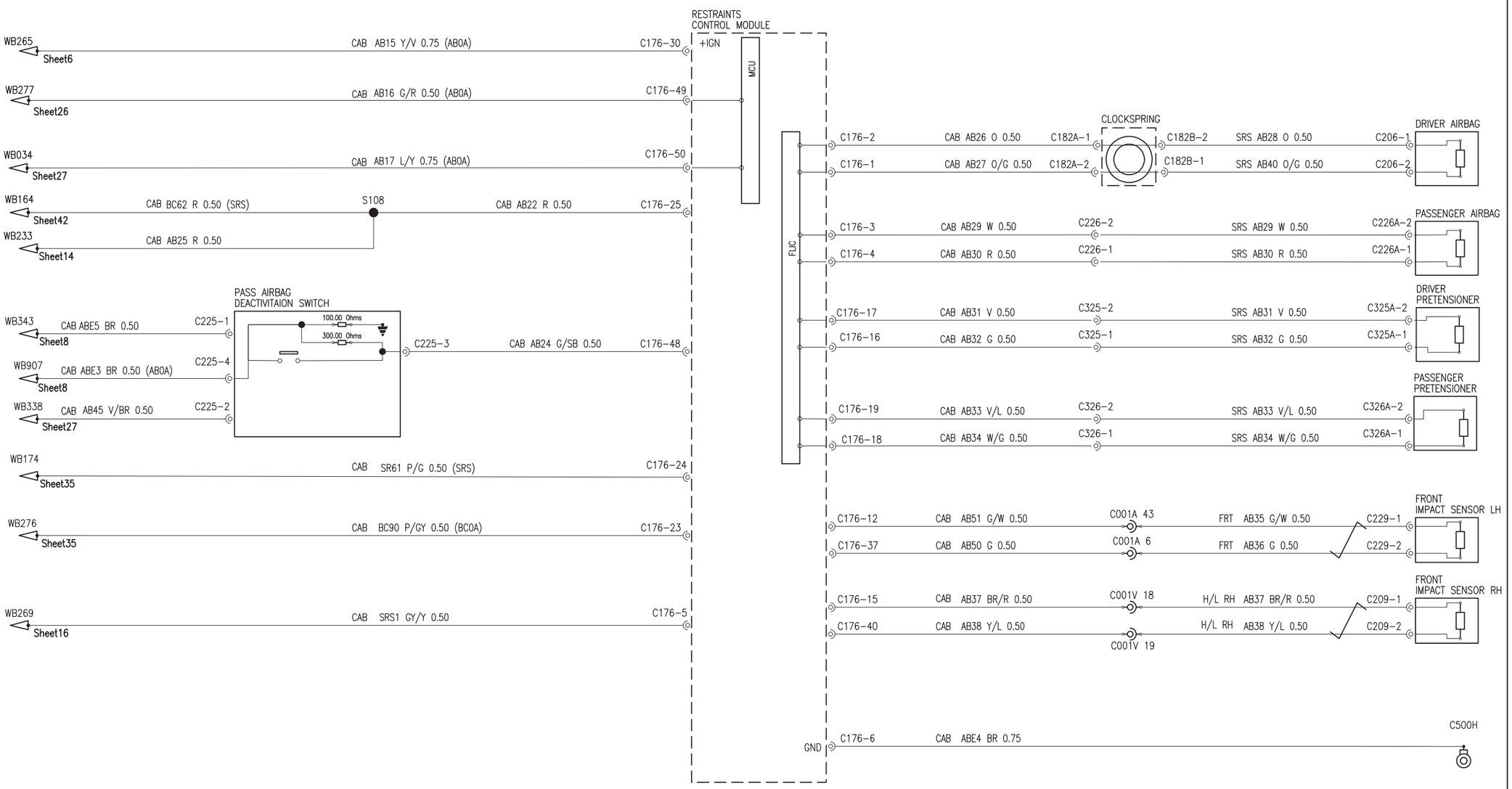
SYSTEM CODE	BC0A
SYSTEM NAME	**BCM**
SHEET NO.	SHEET 43

BCM



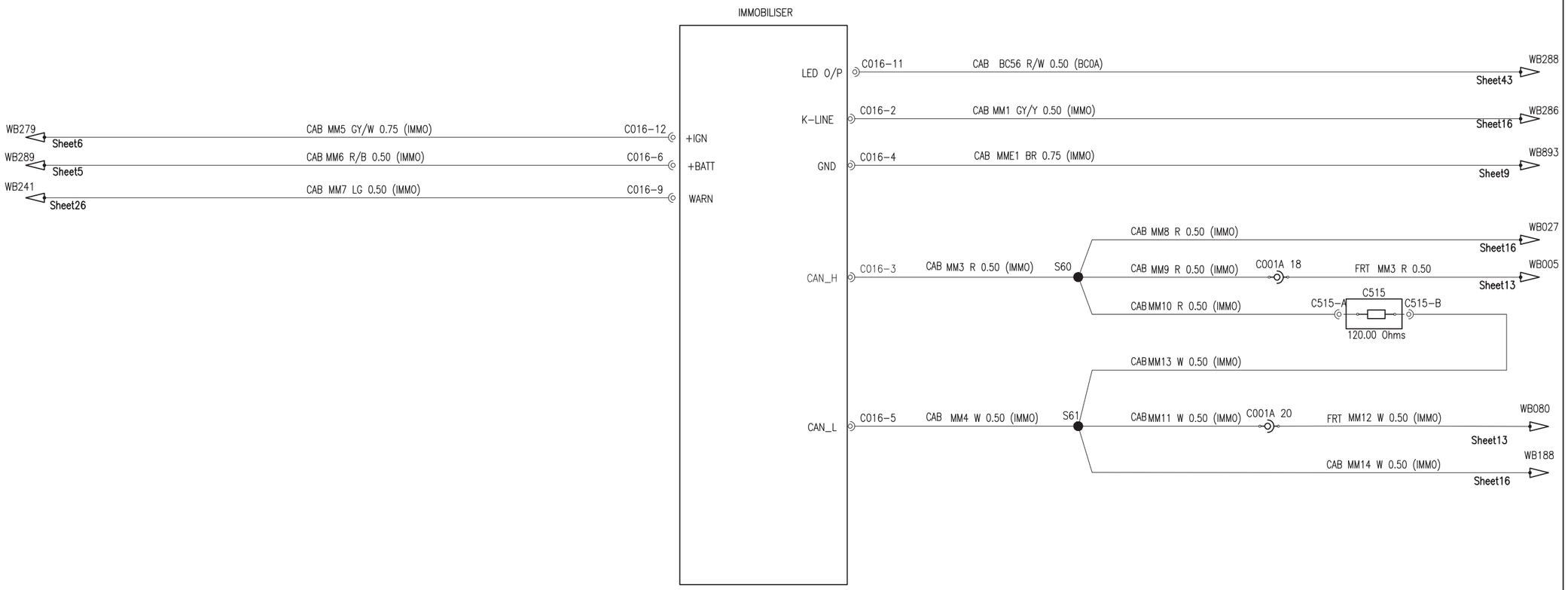
SYSTEM CODE	BC0A
SYSTEM NAME	**BCM**
SHEET NO.	SHEET 44

AIR BAG SYSTEM



SYSTEM CODE	BC0A
SYSTEM NAME	**AIR BAG SYSTEM**
SHEET NO.	SHEET 45

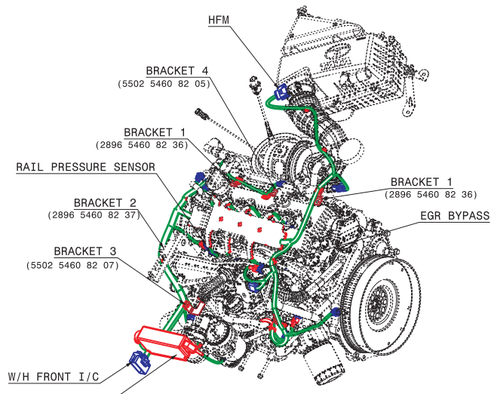
IMMOBILISER



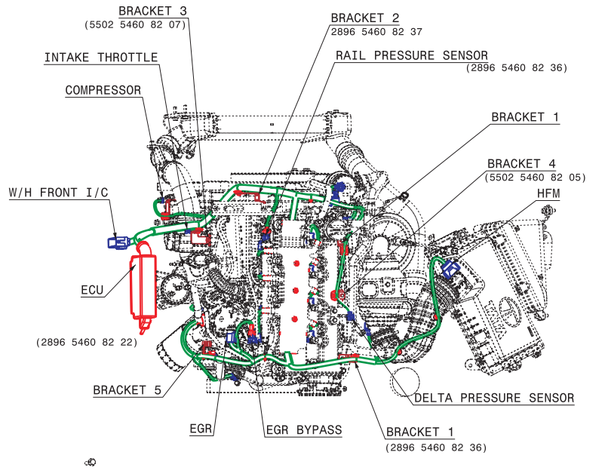
SYSTEM CODE	MM0A
SYSTEM NAME	**IMMOOBILISER**
SHEET NO.	SHEET 46

INFORMATION FITMENT DRAWINGS

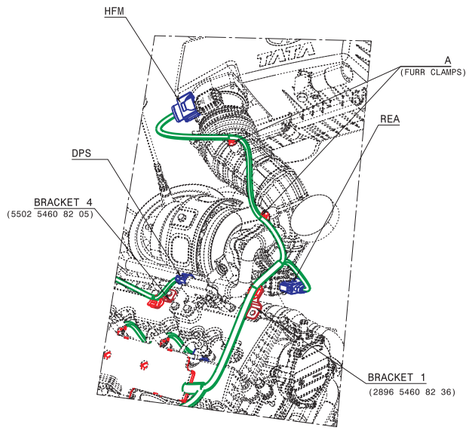
FITMENT DRG. W/H EMS



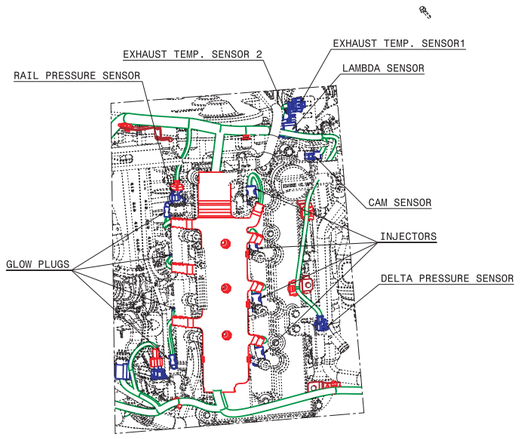
VIEW 1 (View From Left Side)



Top View
(VIEW 2)

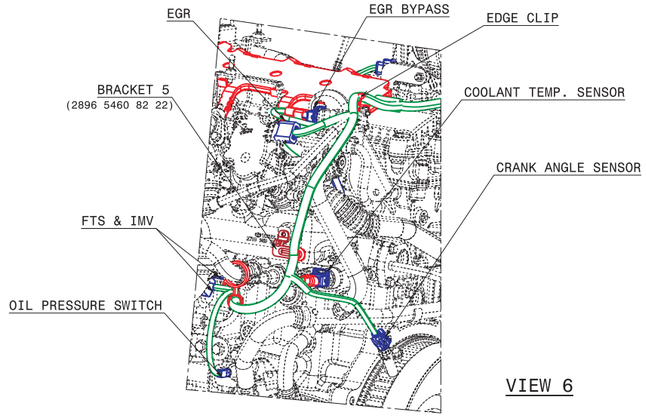


VIEW 3



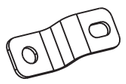
VIEW 4

VIEW 5



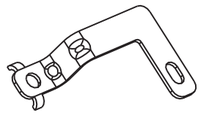
VIEW 6

BRACKET 1



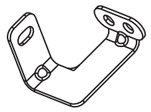
TML PART NO. 2896 5460 82 36

BRACKET 2



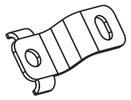
TML PART NO. 2896 5460 82 37

BRACKET 3



TML PART NO. 5502 5460 82 07

BRACKET 4



TML PART NO. 5502 5460 82 05

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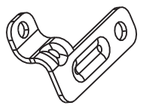
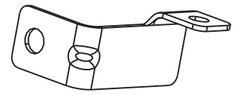


TML PART NO. 2896 5460 82 22

BRACKET 6

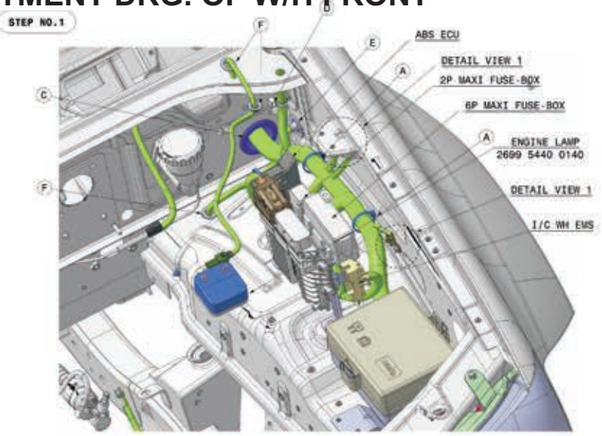


TML PART NO. 5502 5460 43 03

DRG / PART NO.	5502 5460 00 01
SHEET NO.	1

FITMENT DRG. OF W/H FRONT

STEP NO.1



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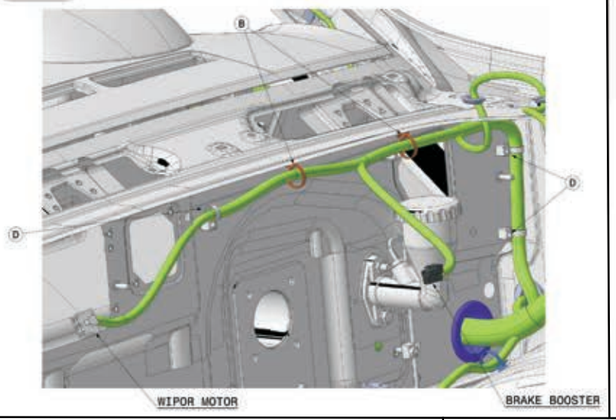
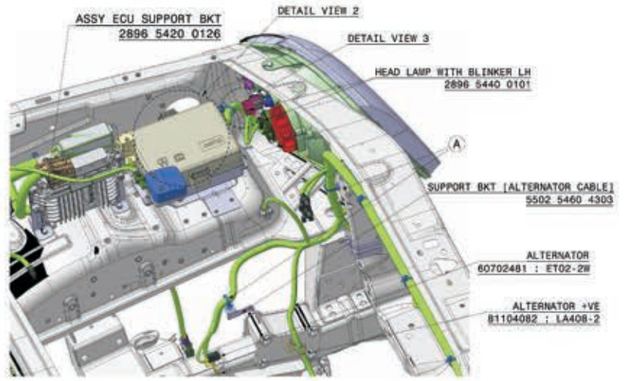
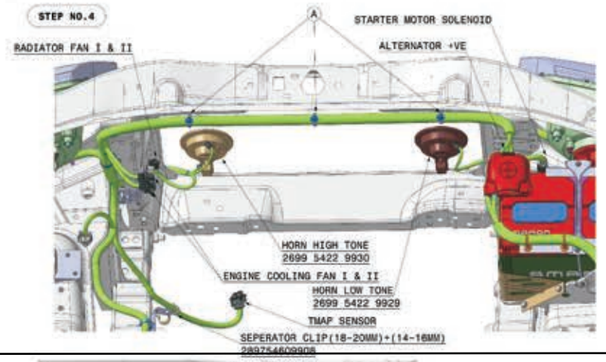


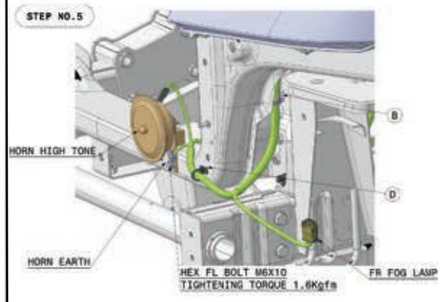
STEP NO.3



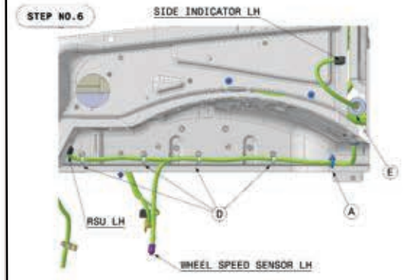
STEP NO.4



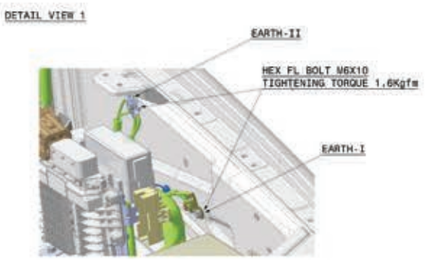
STEP NO.5

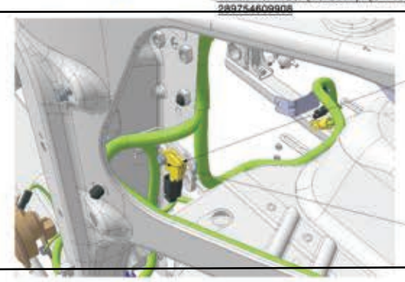


STEP NO.6

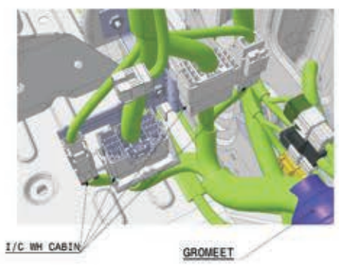


DETAIL VIEW 1

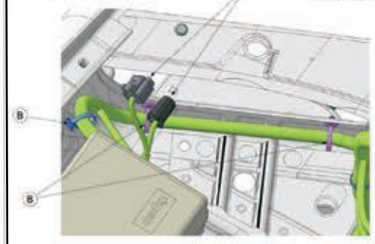




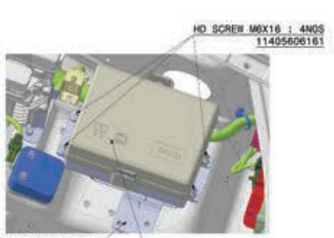
STEP NO.7



DETAIL VIEW 3

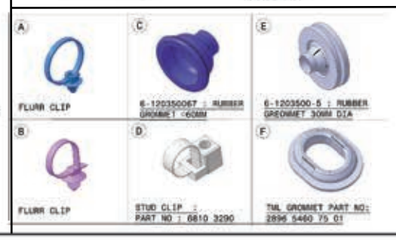


DETAIL VIEW 2



NOTE:-
1)ALL THE CLAMPS CLAMPED PROPERLY ON MARKED LOCATIONS
2)SECURE WIRING HARNESS BY USING CABLE TIE AND CLAMPS SO THAT THERE IS NO SLACK.
3)HARNESS SHOULD NO BE COME IN CONTACT WITH MAOVING AND HOT PARTS.IT IS ALREADY SHOWN IN IMAGES.
4)ADDITIONAL CLAMPS AND CABLE TIES CAN BE ADDED IF REQUIRED.
5)AT THE TIME OF CONNECTION AND DISCONNECTION OF CONNECTORS MAKE SURE PULL ONLY CONNECTOR NOT WIRING HARNESS

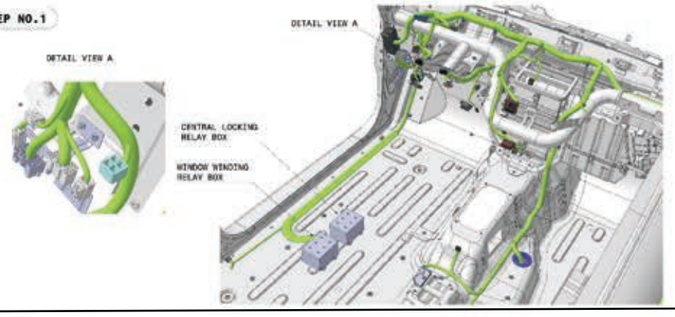
ELECTRICAL EARTHING PROCEDURE:-
1) ENSURE THAT EARTHING HOLES ON BODY IN WHITE ARE PROPERLY MASKED BEFORE PRE-TREATMENT AND PANTING.
2) REMOVE STICKER FROM MASKED HOLE ON BODY IN WHITE.
3) ENSURE THAT THE MASKED HOLE ON BODY IN WHITE.
4) APPLY LAYER OF ELECTRICALLY CONDUCTIVE GREASE(TYPE NO.MOSIL EC424) ON THE MASKED AREA. ENSURE ENTIRE MASKED AREA IS COVERED WITH ELECTRICALLY CONDUCTIVE GREASE.
5) PUT "TIN PLATED EARTHING LUG" ONTHE WELD NUT ALREDY PROVIDED ON CROSS MEMBER AS SHOWN IMAGE.
6) TIGHTEN THE BOLT WITH APPROPRIATE TORQUE.

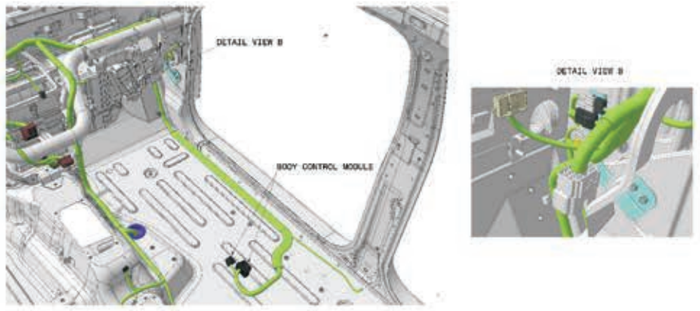


DRG / PART NO.	5502 5460 00 02
SHEET NO.	2

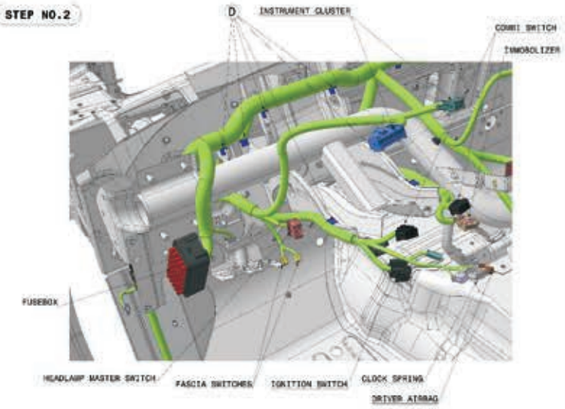
FITMENT DRG. OF W/H CABIN

STEP NO.1

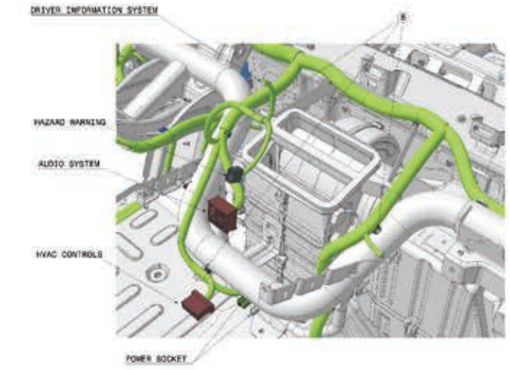




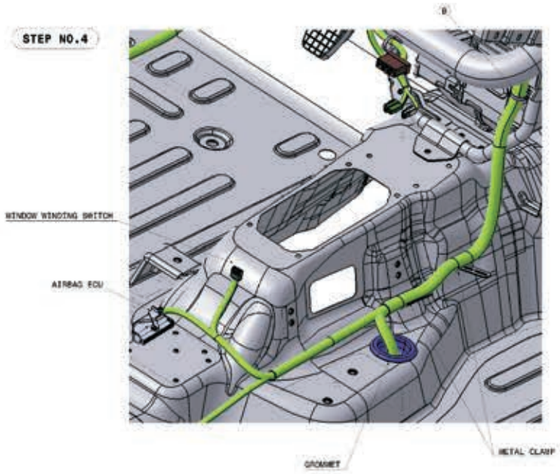
STEP NO.2



STEP NO.3



STEP NO.4



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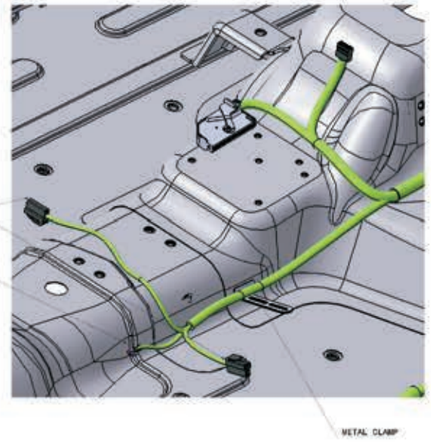
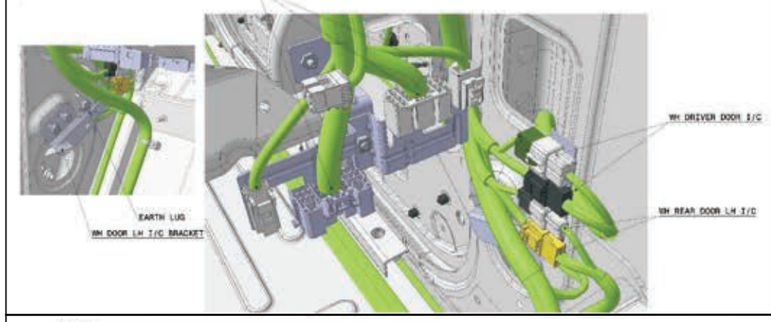


STEP NO.7



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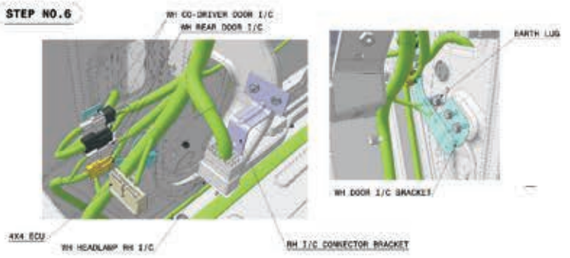
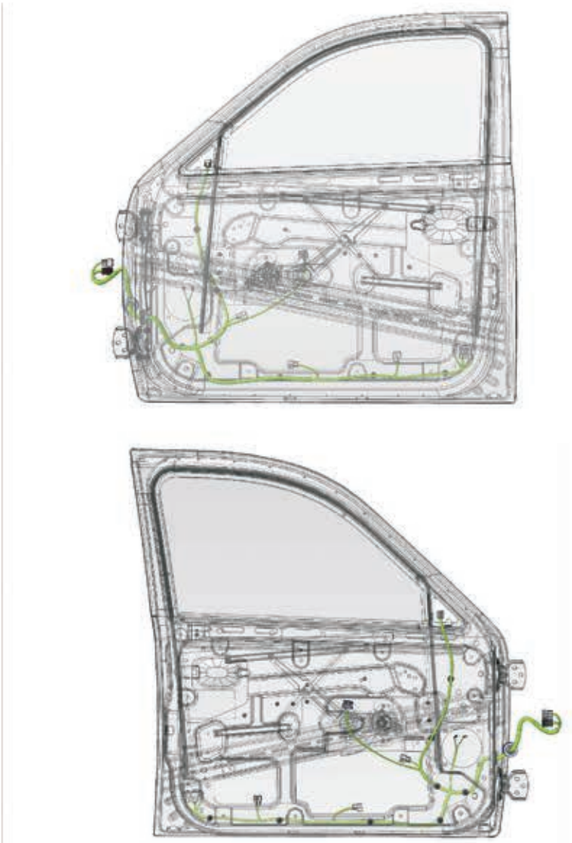


NOTE:-
1)ALL THE CLAMPS CLAMPED PROPERLY ON MARKED LOCATIONS
2)SECURE WIRING HARNESS BY USING CABLE TIE AND CLAMPS SO THAT THERE IS NO SLACK.
3)HARNESS SHOULD NO BE COME IN CONTACT WITH MAOVING AND HOT PARTS.IT IS ALREADY SHOWN IN IMAGES.
4)ADDITIONAL CLAMPS AND CABLE TIES CAN BE ADDED IF REQUIRED.
5)AT THE TIME OF CONNECTION AND DISCONNECTION OF CONNECTORS MAKE SURE PULL ONLY CONNECTOR NOT WIRING HARNESS

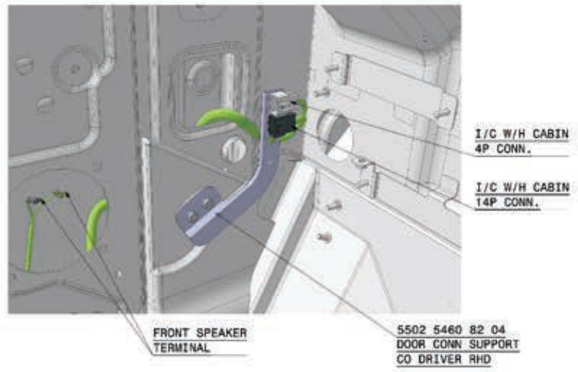
ELECTRICAL EARTHING PROCEDURE:-
1) ENSURE THAT EARTHING HOLES ON BODY IN WHITE ARE PROPERLY MASKED BEFORE PRE-TREATMENT AND PANTING.
2) REMOVE STICKER FROM MASKED HOLE ON BODY IN WHITE.
3) ENSURE THAT THE MASKED HOLE ON BODY IN WHITE.
4) APPLY LAYER OF ELECTRICALLY CONDUCTIVE GREASE(TYPE NO.MOSIL EC424) ON THE MASKED AREA.
ENSURE ENTIRE MASKED AREA IS COVERED WITH ELECTRICALLY CONDUCTIVE GREASE.
5) PUT "TIN PLATED EARTHING LUG" ONTHE WELD NUT ALREDY PROVIDED ON CROSS MEMBER AS SHOWN IMAGE.
6) TIGHTEN THE BOLT WITH APPROPRIATE TORQUE.

DRG / PART NO.	5502 5460 00 03
SHEET NO.	3

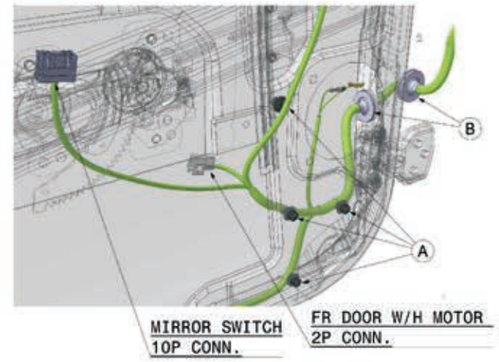
INFO. FITMENT DRG. FOR DR. DOOR W/H



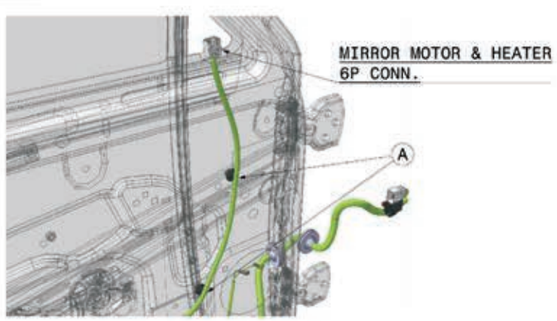
STEP NO.1



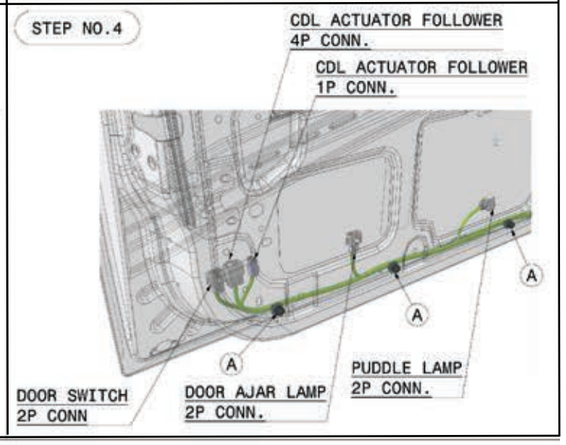
STEP NO.2



STEP NO.3



STEP NO.4



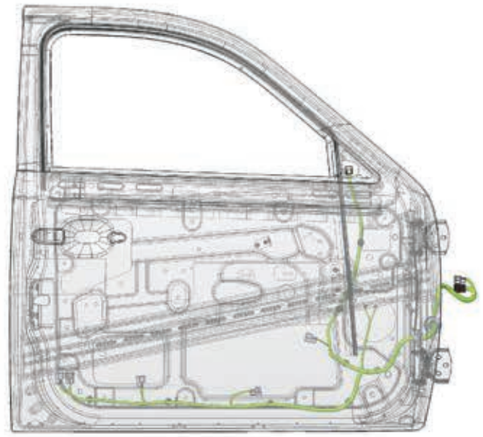
A		QTY 08	TREE CLIP DIA 10 PART NO.63708001550
B		QTY 02	GROMMET 30DIA PART NO.71000337

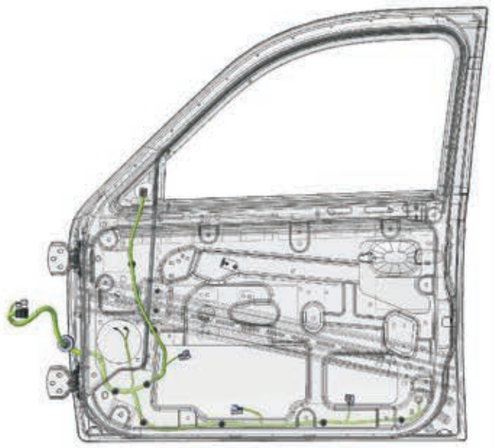
AFTER COMPLETION CHECK THE ENTIRE WIRING HARNESS AND ITS ROUTING TO ENSURE THAT WIRING HARNESS IS FITTED PROPERLY TO MAINTAIN ZERO DEFECT.

NOTE:
1) ALL THE CLAMPS CLAMPED PROPERLY ON MARKED LOCATIONS.
2) HARNESS SHOULD NOT BE COME IN CONTACT WITH MOVING AND HOT PARTS.
3) ADDITIONAL CLAMPS AND CABLE TIE CAN BE USED IF REQUIRED.
4) AT THE TIME OF CONN & DISCONN. OF CONNECTORS MAKE SURE PULL ONLY CONNECTORS NOT THE WIRING HARNESS.

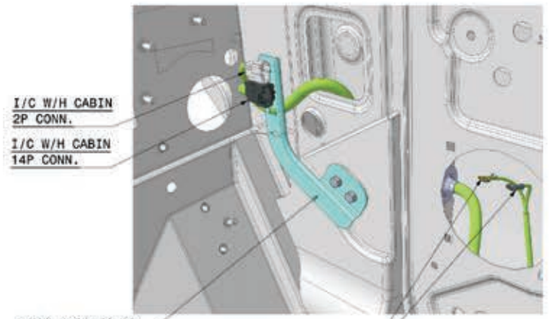
DRG / PART NO.	2894 5460 00 04
SHEET NO.	4

INFO. FITMENT DRG. FOR CO-DR. DOOR W/H

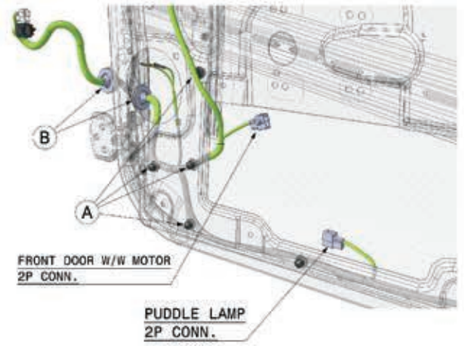




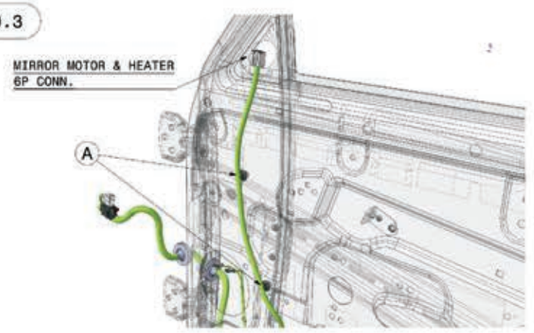
STEP NO.1



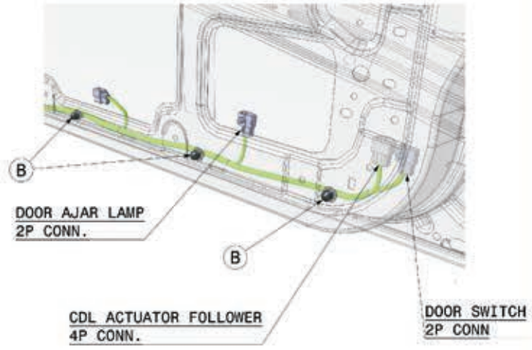
STEP NO.2



STEP NO.3



STEP NO.4



A		QTY 06	TREE CLIP DIA 10 PART NO.63708001550
B		QTY 02	GROMMET 30DIA PART NO.71000337

AFTER COMPLETION CHECK THE ENTIRE WIRING HARNESS AND ITS ROUTING TO ENSURE THAT WIRING HARNESS IS FITTED PROPERLY TO MAINTAIN ZERO DEFECT.

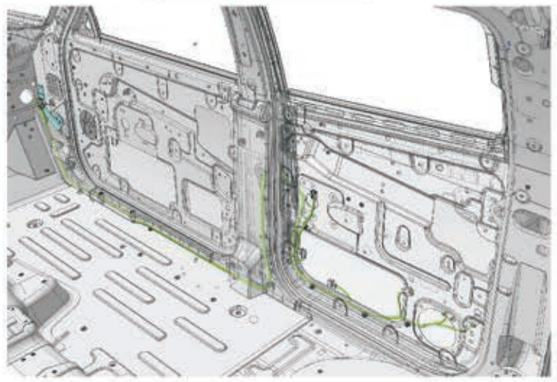
NOTE:

1) ALL THE CLAMPS CLAMPED PROPERLY ON MARKED LOCATIONS.
2) HARNESS SHOULD NOT BE COME IN CONTACT WITH MOVING AND HOT PARTS.
3) ADDITIONAL CLAMPS AND CABLE TIE CAN BE USED IF REQUIRED.
4) AT THE TIME OF CONN & DISCONN. OF CONNECTORS MAKE SURE PULL ONLY CONNECTORS NOT THE WIRING HARNESS.

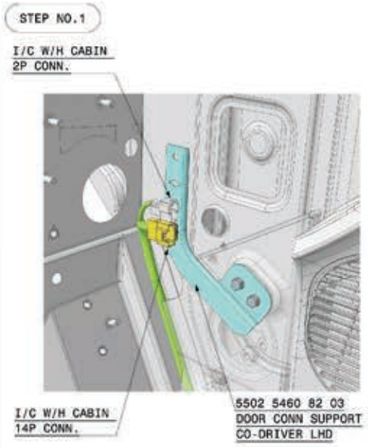
DRG / PART NO.	2894 5460 00 05
SHEET NO.	**5**

INFO. FITMENT DRG. FOR REAR DOOR W/H

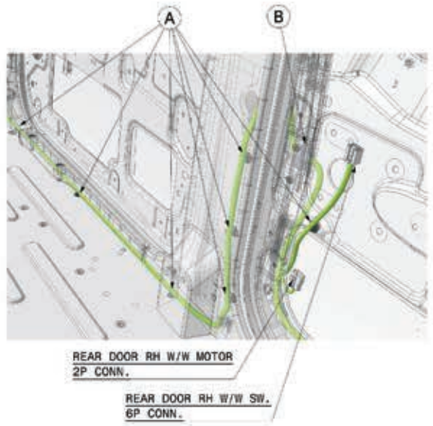
W/H REAR DOOR RH LAYOUT



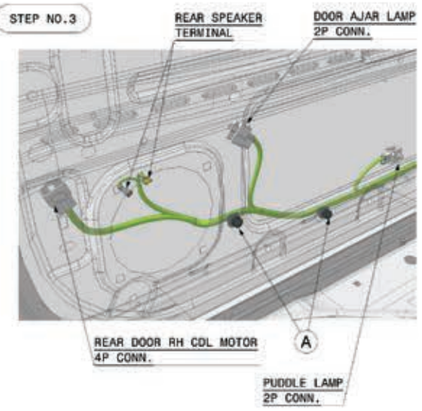
STEP NO.1



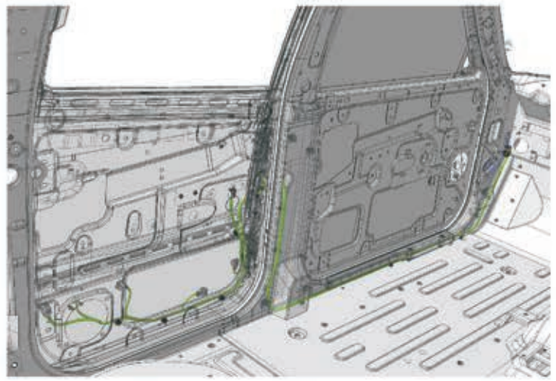
STEP NO.2



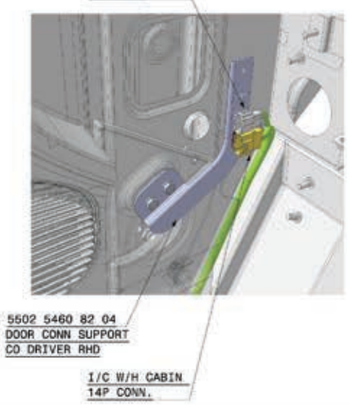
STEP NO.3



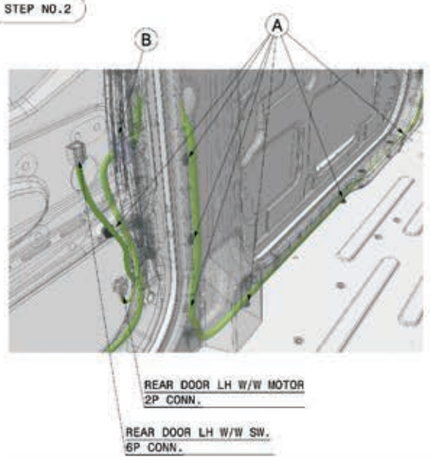
W/H REAR DOOR LH LAYOUT



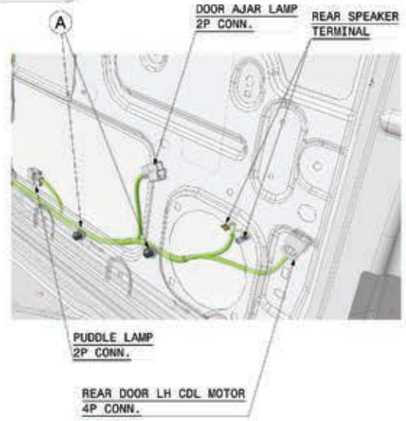
STEP NO.1



STEP NO.2



STEP NO.3



A		QTY 10	TREE CLIP DIA 10 PART NO.6-1203511-1
B		QTY 02	GROMMET 30DIA PART NO.71000337

AFTER COMPLETION CHECK THE ENTIRE WIRING HARNESS AND ITS ROUTING TO ENSURE THAT WIRING HARNESS IS FITTED PROPERLY TO MAINTAIN ZERO DEFECT.

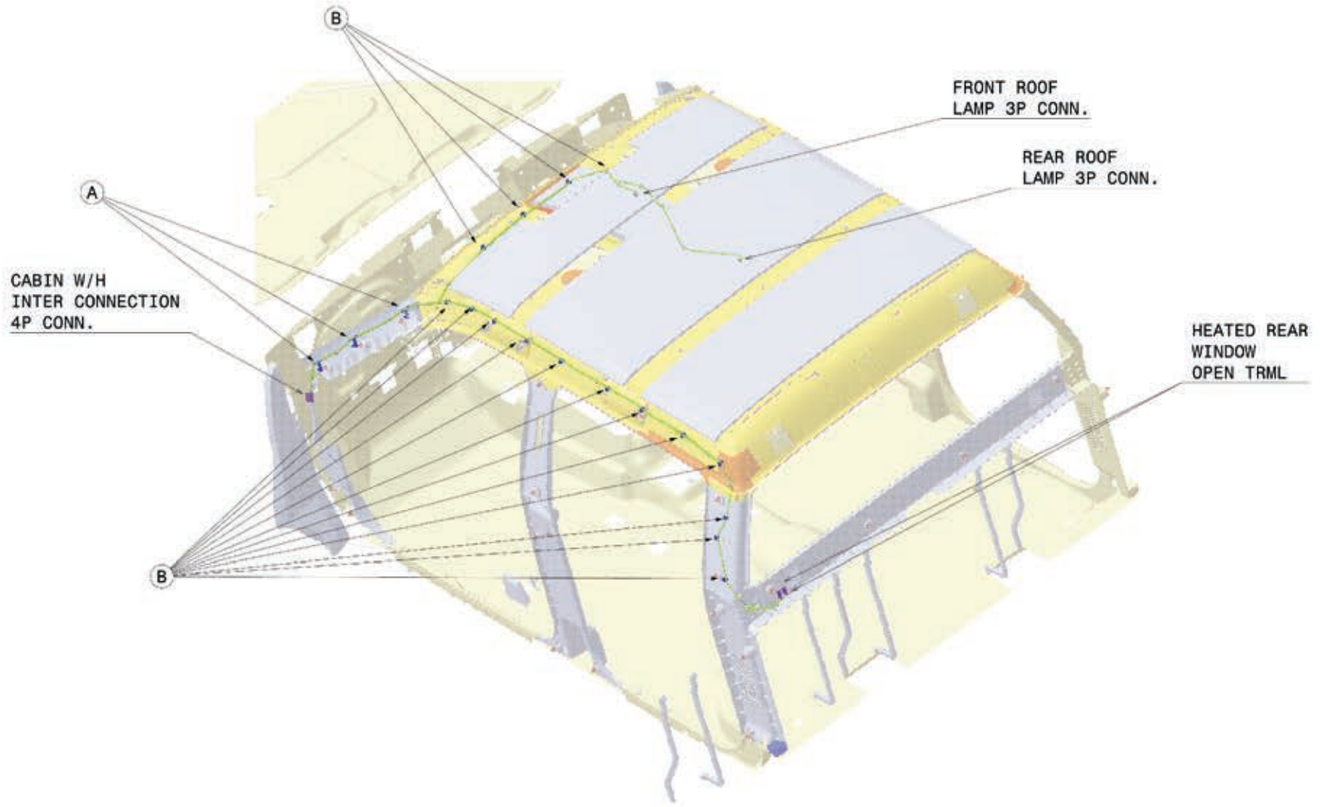
NOTE:

1) ALL THE CLAMPS CLAMPED PROPERLY ON MARKED LOCATIONS.
2) HARNESS SHOULD NOT BE COME IN CONTACT WITH MOVING AND HOT PARTS.
3) ADDITIONAL CLAMPS AND CABLE TIE CAN BE USED IF REQUIRED.
4) AT THE TIME OF CONN & DISCONN. OF CONNECTORS MAKE SURE PULL ONLY CONNECTORS NOT THE WIRING HARNESS.

DRG / PART NO.	2894 5460 00 06
SHEET NO.	**6**

INFO. FITMENT DRG. FOR ROOF W/H

STEP NO.1



1) LAY DOWN THE WIRING HARNESS ON THE ROOF OF THE CAB.
2) CONNECT THE INTERCONNECTION OF CABIN W/H AND THEN CLAMP CLIPS TO ROUTE WIRING HARNESS ON CAB ROOF.
3) CONNECT THE FRONT ROOF LAMP,REAR ROOF LAMP AND HEATED REAR WINDOW CONNECTION TO COMPLETE THE ROUTING OF ROOF WIRING HARNESS.

A	QTY	B	QTY
	03		16
T CLIP PART NO.9-1203502-6		BODY CLIP 7MM DIA PART NO. 6-1203511-1	

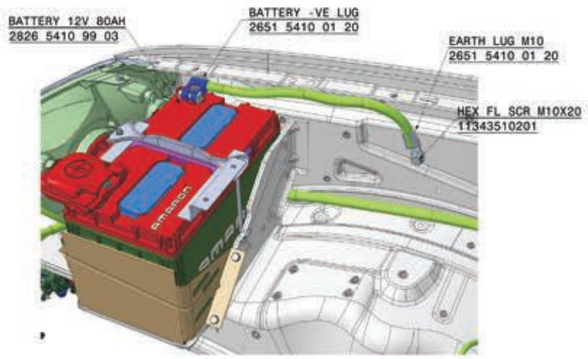
AFTER COMPLETION CHECK THE ENTIRE WIRING HARNESS AND ITS ROUTING TO ENSURE THAT WIRING HARNESS IS FITTED PROPERLY TO MAINTAIN ZERO DEFECT.

NOTE:
1) ALL THE CLAMPS CLAMPED PROPERLY ON MARKED LOCATIONS.
2) HARNESS SHOULD NOT BE COME IN CONTACT WITH MOVING AND HOT PARTS.
3) ADDITIONAL CLAMPS AND CABLE TIE CAN BE USED IF REQUIRED.
4) AT THE TIME OF CONN & DISCONN. OF CONNECTORS MAKE SURE PULL ONLY CONNECTORS NOT THE WIRING HARNESS.

DRG / PART NO.	2894 5460 00 07
SHEET NO.	7

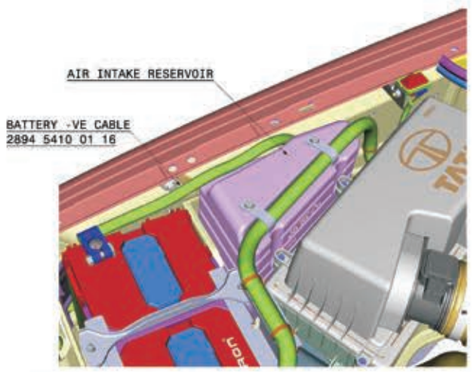
INFO. FITMENT DRG. OF BATTERY CABLE

STEP NO.1



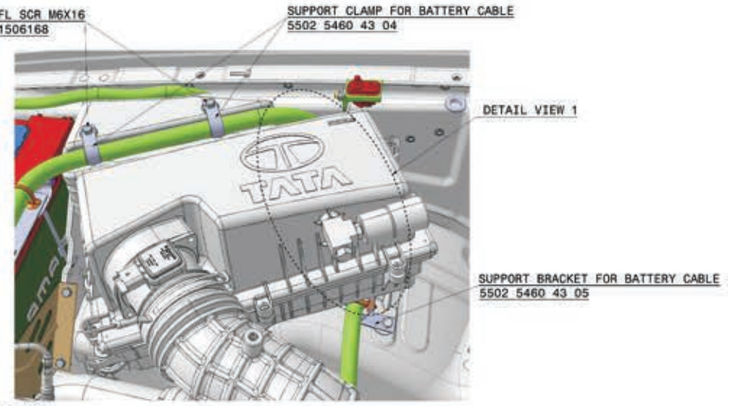
STEP NO.1:
1)LAY DOWN BATTERY -VE CABLE AS SHOWN IN ABOVE.
2)FIX EARTHING LUG BY HEX FL SCR M10X20 WITH PROPER TORQUE.

STEP NO.2



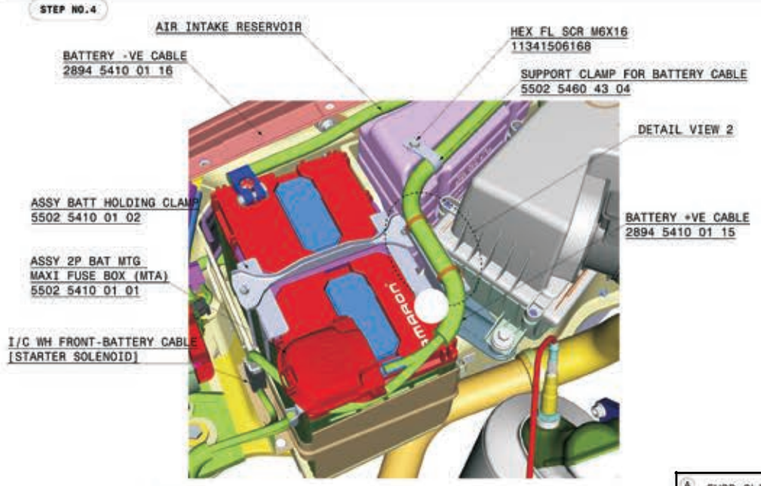
STEP NO.2:
1)FIX BATTERY -VE LUG ON BATTERY -VE TERMINAL.
2)TIGHTEN LUG BY APPLICATION OF TORQUE.

STEP NO.3



STEP NO.3:
1)FIX BATTERY CABLE SUPPORT CLAMP ON AIR INTAKE RESERVOIR AS SHOWN IN FIG.
2)TIGHTEN SUPPORT CLAMP BY APPLICATION OF TORQUE.
3)FIX +VE BATTERY CABLE ON SUPPORT BRACKET AS SHWON IN FIG.

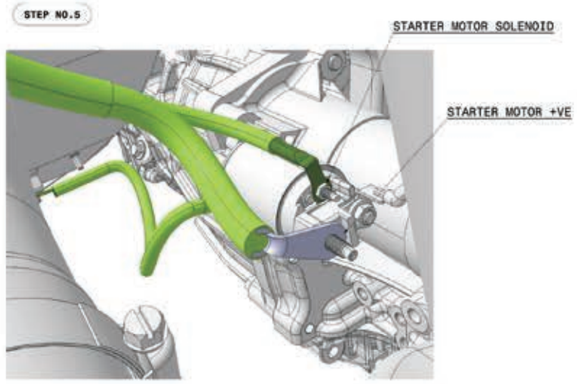
STEP NO.4



STEP NO.4:
1)LAY DOWN BATTERY +VE CABLE AS SHOWN IN FIG.
2)BATTERY +VE TERMINAL ON BATTERY WITH PROPER TORQUE.
3)FIX CLIP ON BATTERY CLAMPING BRACKET AS SHOWN IN FIG
4)FIX BATTERY CABLE SUPPORT BKT ON AIR INTAKE RESERVOIR AS SHOWN IN FIG

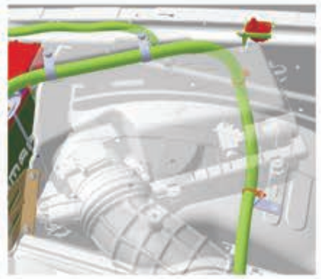
A FURR CLIP

STEP NO.5



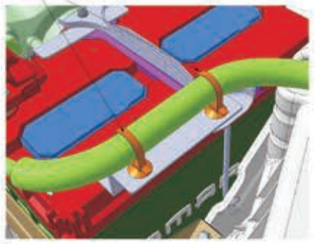
STEP NO.3:
1)FIX STARTER MOTOR SOLENOID CONNECTION AS SHOWN IN FIG.
2)TIGHTEN STARTER SOLENOID LUG BY APPLICATION OF TORQUE.
3)FIX BATTERY CABLE ON STARTER MOTOR +VE AS SHWON IN FIG.
4)TIGHTEN STARTER MOTOR +VE LUG BY APPLICATION OF TORQUE.

DETAIL VIEW 1



DETAIL VIEW 2

A

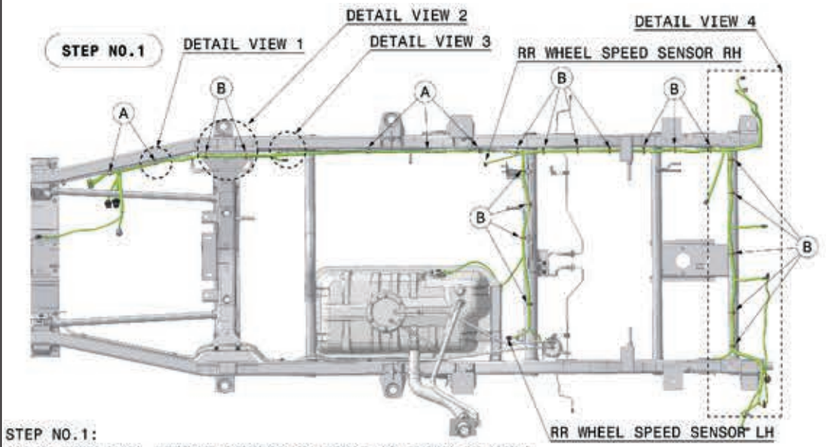


NOTE:-
1)ALL THE CLAMPS CLAMPED PROPERLY ON MARKED LOCATIONS
2)SECURE WIRING HARNESS BY USING CABLE TIE AND CLAMPS SO THAT THERE IS NO SLACK.
3)HARNESS SHOULD NO BE COME IN CONTACT WITH MAOVING AND HOT PARTS.IT IS ALREADY SHOWN IN IMAGES.
4)ADDITIONAL CLAMPS AND CABLE TIES CAN BE ADDED IF REQUIRED.
5)AT THE TIME OF CONNECTION AND DISCONNECTION OF CONNECTORS MAKE SURE PULL ONLY CONNECTOR NOT WIRING HARNESS

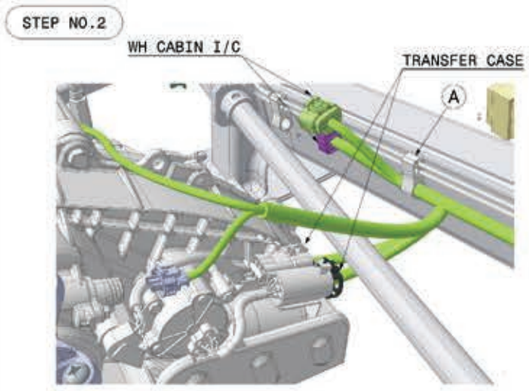
ELECTRICAL EARTHING PROCEDURE:-
1) ENSURE THAT EARTHING HOLES ON BODY IN WHITE ARE PROPERLY MASKED BEFORE PRE-TREATMENT AND PANTING.
2) REMOVE STICKER FROM MASKED HOLE ON BODY IN WHITE.
3) ENSURE THAT THE MASKED HOLE ON BODY IN WHITE.
4) APPLY LAYER OF ELECTRICALLY CONDUCTIVE GREASE(TYPE NO.MOSIL EC424) ON THE MASKED AREA.
   ENSURE ENTIRE MASKED AREA IS COVERED WITH ELECTRICALLY CONDUCTIVE GREASE.
5) PUT "TIN PLATED EARTHING LUG" ONTHE WELD NUT ALREDY PROVIDED ON CROSS MEMBER AS SHOWN IMAGE.
6) TIGHTEN THE BOLT WITH APPROPRIATE TORQUE.

DRG / PART NO.	5502 5460 00 07
SHEET NO.	**8**

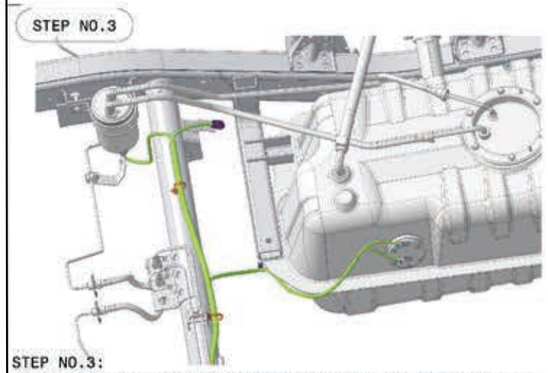
INFO. FITMENT DRG. OF W/H TAIL



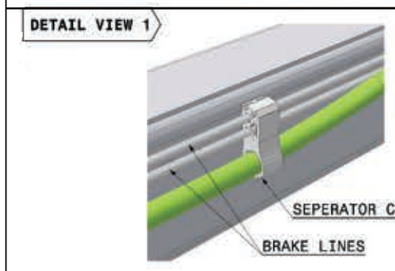
STEP NO.1:
1)LAY DOWN TAIL WIRING HARNESS ON FRMAE AS SHOWN IN VIEW.
2)FIX WIRING HARNESS BUNDLE THROUGH THE SEPERATOR CLIP(A) AVAILABLE OB BRAKE LINES
3)FIX THE CLIPS(B) ON HOLES PROVIDED IN FRAME AS SHOWN IN VIEW.

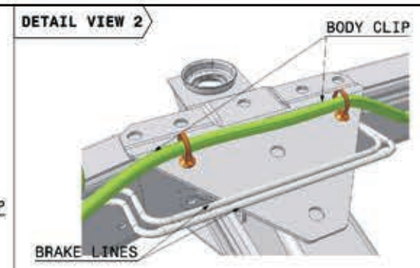


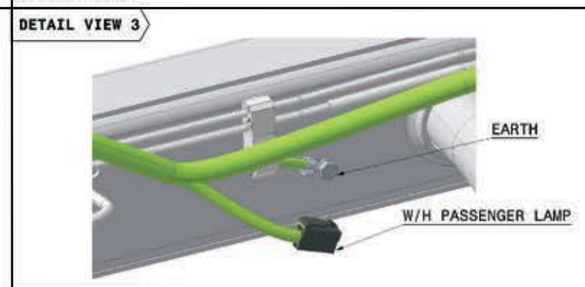
STEP NO.2:
1)LAY DOWN TAIL WIRING HARNESS ON FRMAE AS SHOWN IN VIEW.
2)FIX WIRING HARNESS BUNDLE THROUGH THE SEPERATOR CLIP(A) AVAILABLE OB BRAKE LINES
3)CONNECT THE WH CABIN I/C, WHEEL SPEED SENSOR, TRANSFER CASE CONNECTIONS .

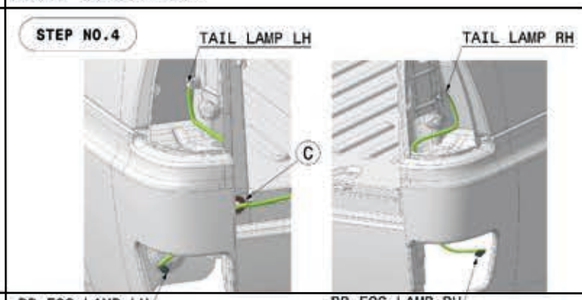


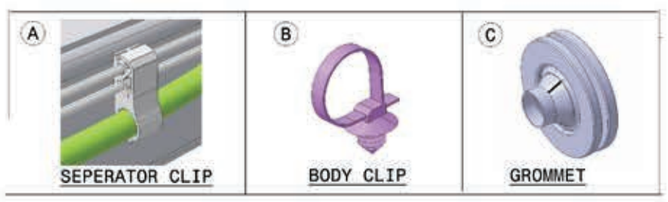
STEP NO.3:
1)LAY DOWN TAIL WIRING HARNESS ON FRMAE AS SHOWN IN VIEW.
2)FIX WIRING HARNESS BUNDLE THROUGH THE SEPERATOR CLIP(A) AVAILABLE OB BRAKE LINES
3)CONNECT THE WH CABIN I/C, WHEEL SPEED SENSOR, WATER IN FUEL SENSOR CONNECTIONS .

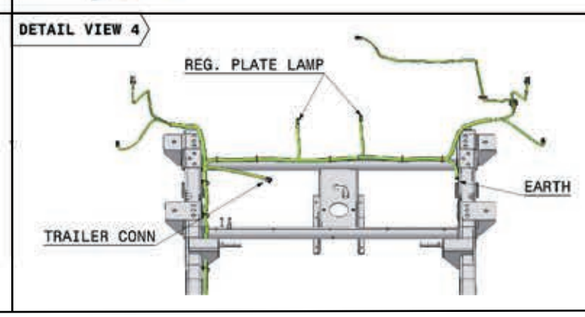


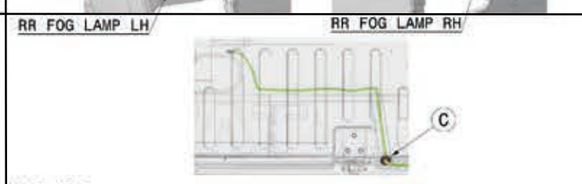












STEP NO.3:
1)LAY DOWN TAIL WIRING HARNESS ON FRMAE AS SHOWN IN VIEW.
2)FIX THE GROMMET IN LOAD BODY KEEPING STOP LAMP BUNDLE INSIDE THE TAILGATE OF LOAD BODY
2)CONNECT THE TAIL LAMP LH-RH, RR FOG LAMP LH-RH, STOP LAMP CONNECTIONS AS SHOWN IN VIEW.

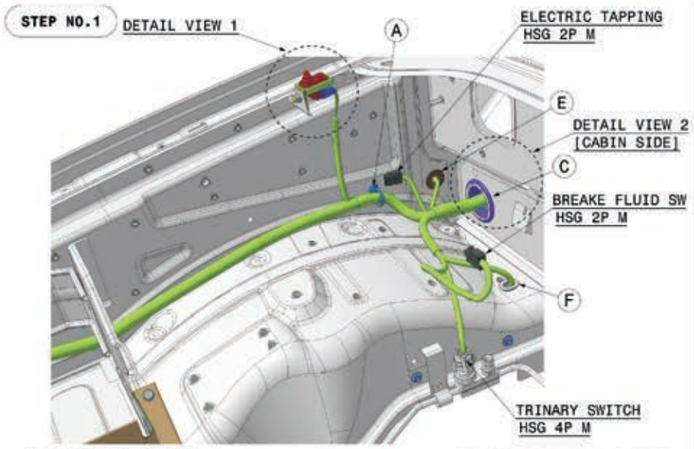
ELECTRICAL EARTHING PROCEDURE:-
1) ENSURE THAT EARTHING HOLES ON BODY IN WHITE ARE PROPERLY MASKED BEFORE PRE-TREATMENT AND PANTING.
2) REMOVE STICKER FROM MASKED HOLE ON BODY IN WHITE.
3) ENSURE THAT THE MASKED HOLE ON BODY IN WHITE.
4) APPLY LAYER OF ELECTRICALLY CONDUCTIVE GREASE(TYPE NO.MOSIL EC424) ON THE MASKED AREA ENSURE ENTIRE MASKED AREA IS COVERED WITH ELECTRICALLY CONDUCTIVE GREASE.
5) PUT "TIN PLATED EARTHING LUG" ONTHE WELD NUT ALREDY PROVIDED ON CROSS MEMBER AS SHOWN IMAGE.
6) TIGHTEN THE BOLT WITH APPROPRIATE TORQUE.

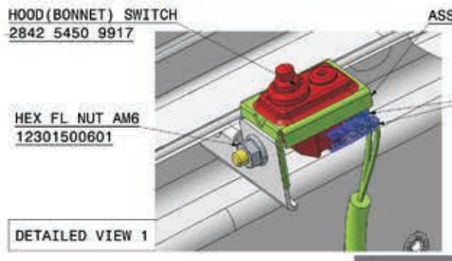
NOTE:-
1)ALL THE CLAMPS CLAMPED PROPERLY ON MARKED LOCATIONS
2)SECURE WIRING HARNESS BY USING CABLE TIE AND CLAMPS SO THAT THERE IS NO SLACK.
3)HARNESS SHOULD NO BE COME IN CONTACT WITH MAOVING AND HOT PARTS.IT IS ALREADY SHOWN IN IMAGES.
4)ADDITIONAL CLAMPS AND CABLE TIES CAN BE ADDED IF REQUIRED.
5)AT THE TIME OF CONNECTION AND DISCONNECTION OF CONNECTORS MAKE SURE PULL ONLY CONNECTOR NOT WIRING HARNESS

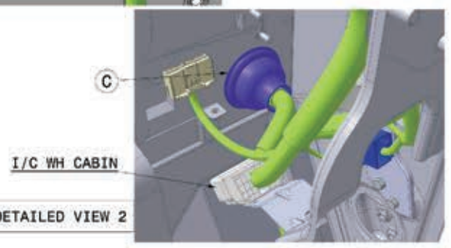
DRG / PART NO.	5502 5460 00 05
SHEET NO.	9

INFO. FITMENT DRG. OF W/H HEADLAMP RH

STEP NO.1 DETAIL VIEW 1

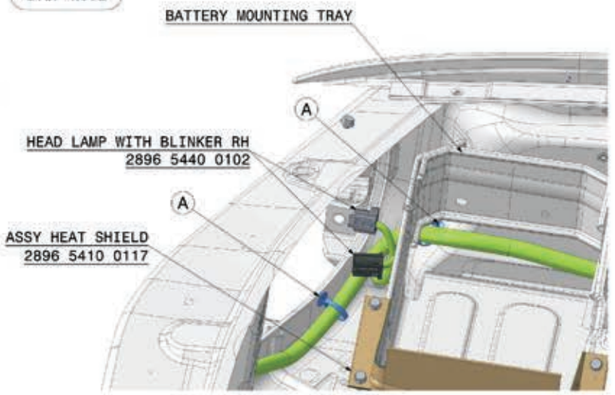






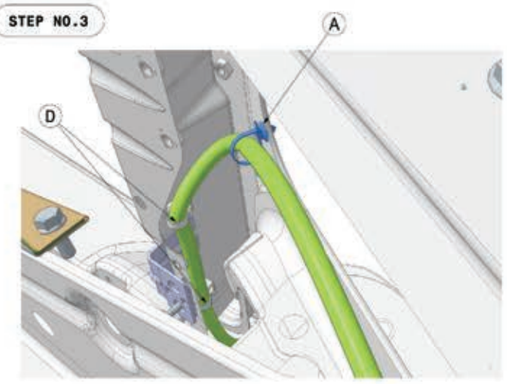
STEP NO.1:
1)KEEP THE I/C CONNECTOR PORTION OF THE WIRING HARNESS INSIDE THE CABIN.
2)THEN FIX THE GROMMET PROPERLY IN CUT OUT PROVIDED FOR GROMMETS(C,E,F).
3)LAY DOWN THE WIRING HARNESS ENGINE SIDE PORTION TO GROMMET AS SHOWN IN VIEW.
4)FIX THE FLUR CLIP A AS SHOWN IN VIEW.
5)DO THE TRINARY SW, BONET SW, SIDE IND, I/C WH CABIN CONNECTIONS.

STEP NO.2



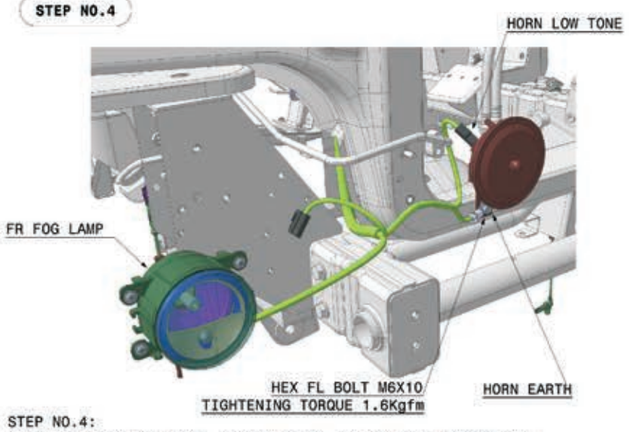
STEP NO.2:
1)FIX FLUR CLIP A ON FRONT TIE MEMBER AS SHOWN IN VIEW.
2)DO THE HEADLAMP CONNECTIONS.

STEP NO.3



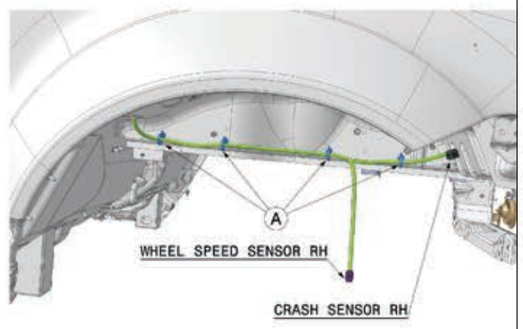
STEP NO.5:
1)FIX FLUR CLIP A ON FRONT TIE MEMBER AS SHOWN IN VIEW.
2)FIX THE STUD CLIP D AS SHOWN IN VIEW.

STEP NO.4



STEP NO.4:
1)DO THE HORN LOW TONE, WASHER PUMP, FR FOG LAMP CONNECTION.
2)FIX EARTHING LUG BY M6 BOLT WITH PROPER TORQUE.

STEP NO.5



STEP NO.5:
1)FIX CLIP A ON WHEEL ARCH PANEL HOLE AS SHOWN IN VIEW.
2)DO THE WHEEL SPEED SENSOR RH, CRASH SENSOR RH CONNECTIONS.


FLURR CLIP


6-120350067 : RUBBER GROMMET <60MM


6-1203500-5 : RUBBER GREOMNET 30MM DIA

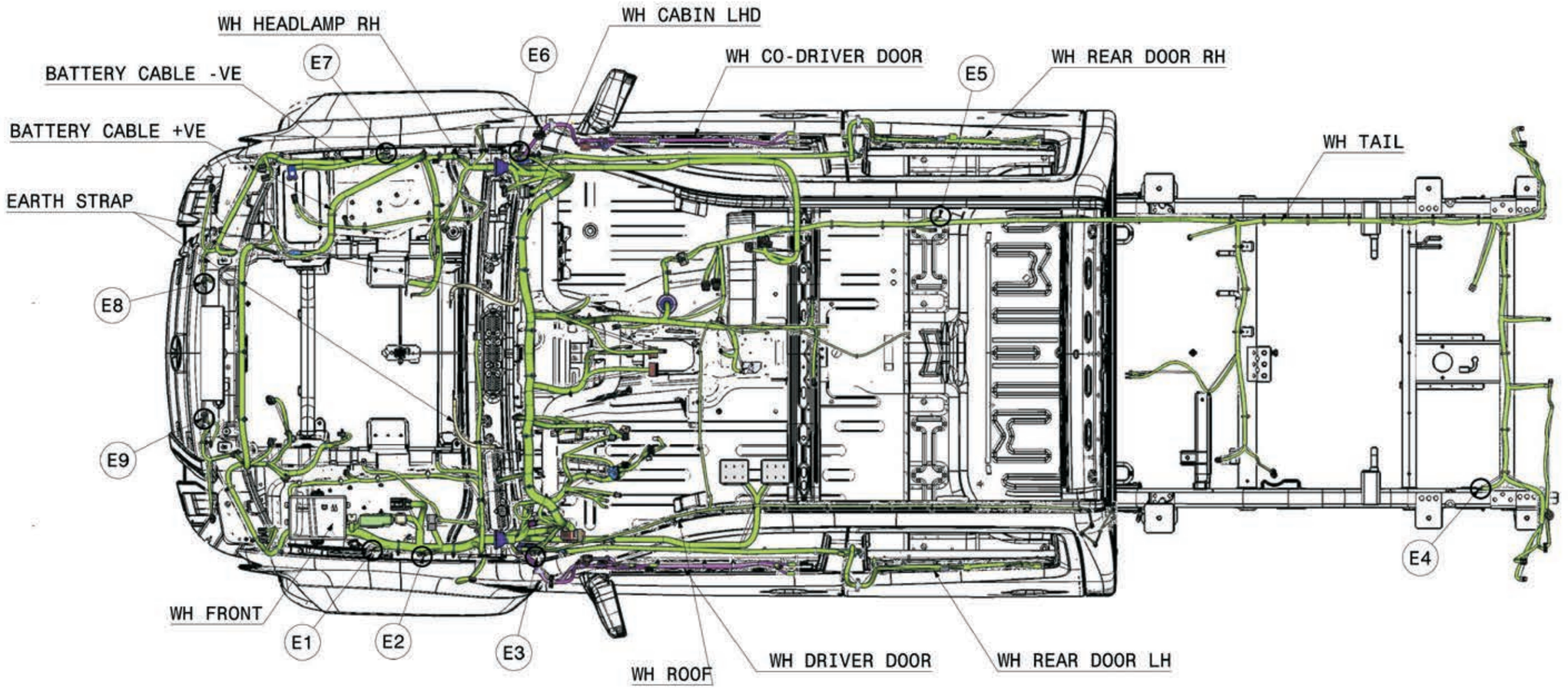

FLURR CLIP


STUD CLIP : PART NO : 6810 3290


TML GROMMET PART NO: 2896 5460 75 01

DRG / PART NO.	5502 5460 00 06
SHEET NO.	10

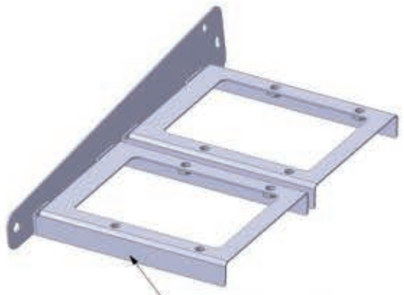
INFO. FITMENT DRG. OF EARTHING LOCATION



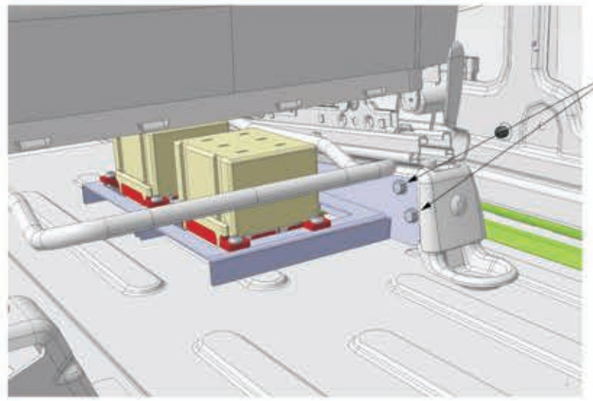
E1 : WH FRONT GROUND POINT WITH M6 SCREW [ABS ECU EARTHING]
E2 : WH FRONT GROUND POINT WITH M6 SCREW [ENGINE ECU EARTHING]
E3 : WH CABIN LH SIDE GROUND POINT WITH M6 SCREW
E4 : WH TAIL LH SIDE ON FRAME WITH M6 SCREW
E5 : WH TAIL RH SIDE ON FRAME WITH M6 SCREW
E6 : WH CABIN RH SIDE GROUND POINT WITH M6 SCREW
E7 : BATTERY CABLE GROUND WITH M10 SCREW
E8 : HORN RH GROUND WITH M6 SCREW
E9 : HORN LH GROUND WITH M6 SCREW

DRG / PART NO.	5502 5460 00 04
SHEET NO.	**11**

INFORMATION FIT. DRAWING OF RELAY AND WW CONTROLLER

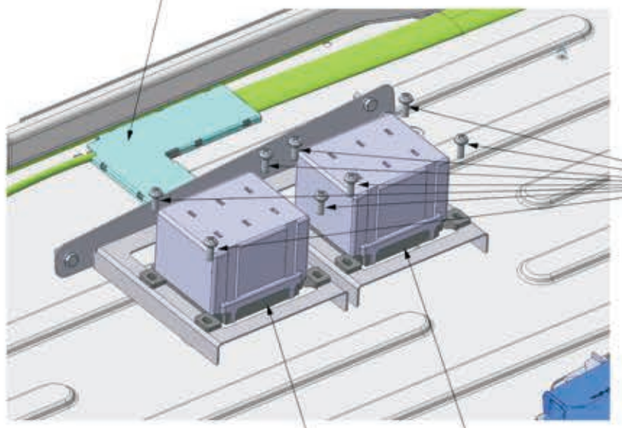


5502 5420 01 07 : 1 NO
RELAY AND W/W CTRL SUPPORT

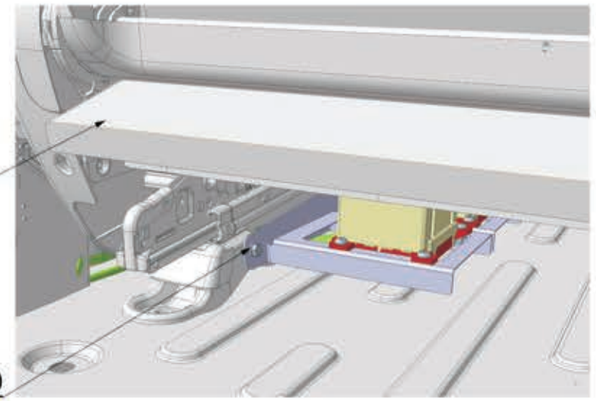


HEX FL SCR M6X16
TS17130-8.8-SS8451S2-Y : 2 NOS
Max Net Torque 9.3 Nm (0.95 kgfm)

W/H CABIN XENON 2.2L EURO-V
[PLASTIC CHANNEL]



ASSY DRIVER SEAT LHD (SAFARI TYPE)
WITH MTG FEET FOR XENON AIRBAG



CR PAN HD SCREW M6X16
IS7483 SS8451S2-Y : 8 NOS
Max. Net Torque 5.7 Nm (0.58 kgfm)

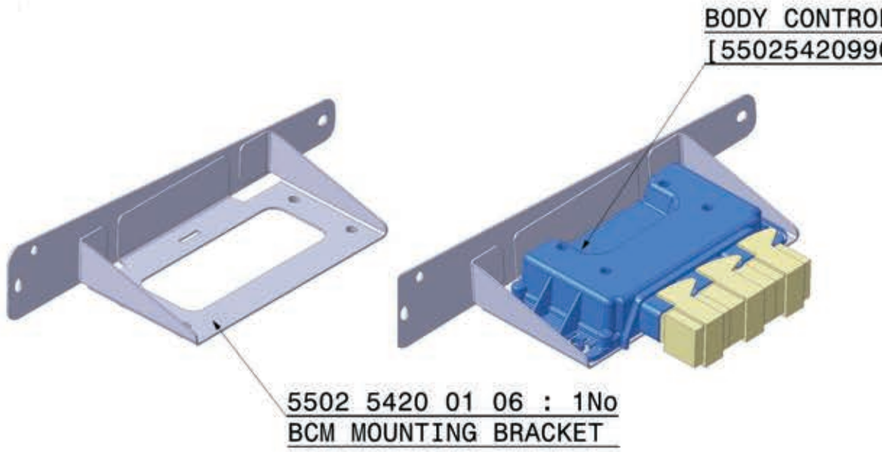
HEX FL SCR M6X16
TS17130-8.8-SS8451S2-Y : 1 NO
Max Net Torque 9.3 Nm (0.95 kgfm)

DOOR LOCK-UNLOCK RELAY BOX

WINDOW WINDING CONTROLLER RELAY BOX

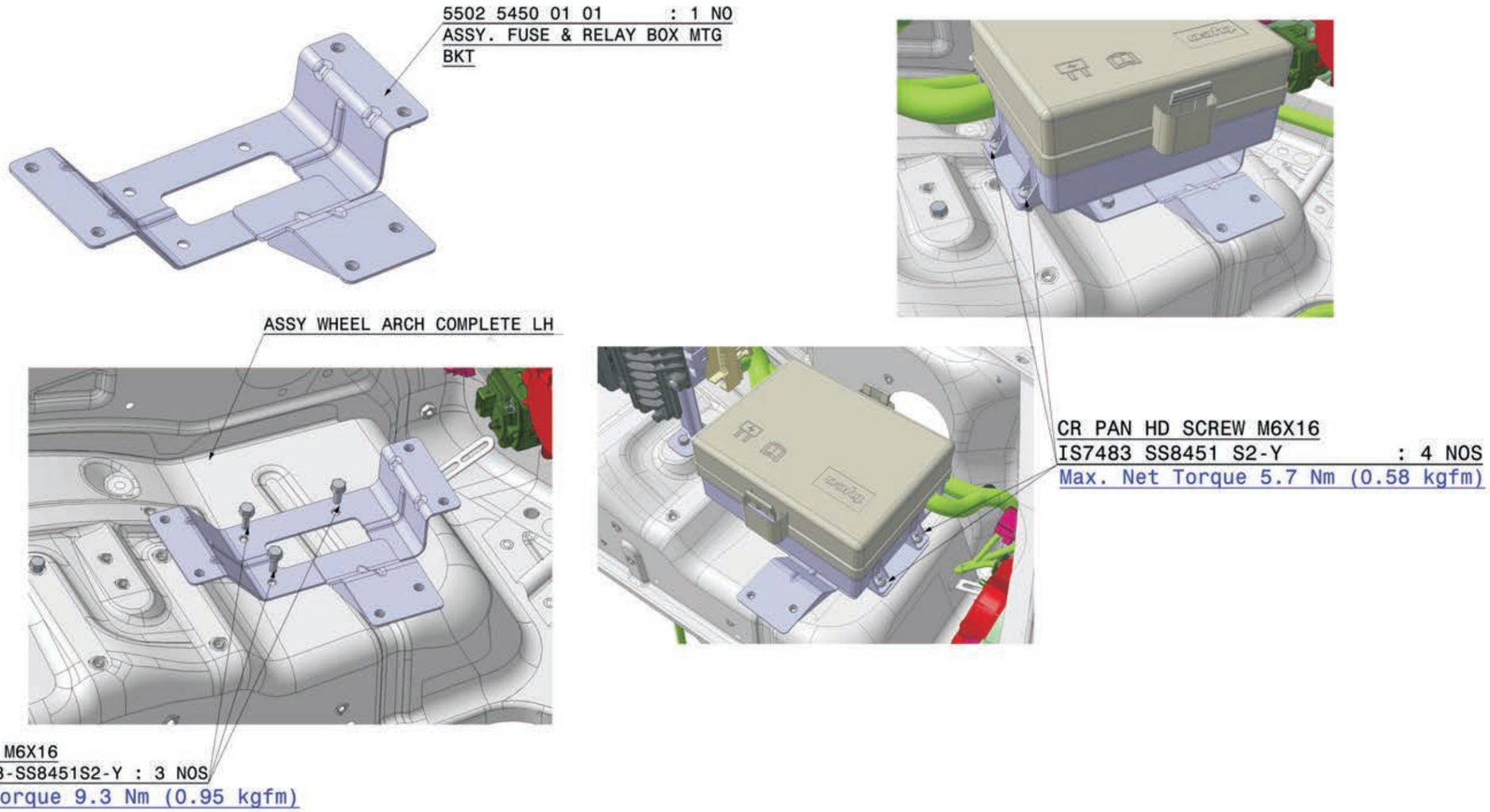
DRG / PART NO.	5502 5420 0004
SHEET NO.	12

INFORMATION FIT. DRAWING OF BCM MTG. BKT.



DRG / PART NO.	5502 5420 0005
SHEET NO.	13

INFORMATION FIT. DRAWING OF FUSE BOX BKT.



DRG / PART NO.	5502 5420 00 05
SHEET NO.	**14**

DIAGNOSTIC TROUBLE CODES (DTC’s)

1. ENGINE MANAGEMENT SYSTEM (*EMS*):

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0645	A/C Clutch Relay Control Circuit	0	This fault code will be logged only if the following conditions are fulfilled. 1. Ignition switch shall be in ignition on condition. 2. AC request switch shall be in on condition/AC shall be turned ON. This DTC will appear due to the following reasons: 1. AC relay control pin is short circuit to battery 2. AC relay control pin open circuit 3. AC relay control pin short circuit to ground.	1. Check fuse connected to battery (+ve) voltage supply and AC clutch relay is not blown off and also check fuse connected to EMS power relay and battery (+ve) voltage supply is not blown off. Replace the fuse if found faulty. 2. This fault will come along with other AC relay related faults P0646, P0647 as it is a global fault. 3. Follow the rectification procedure of P0646/P0647 with which this DTC P0645 is appearing.	
P0645	A/C Clutch Relay Control Circuit	13	This fault code will be logged only if the following conditions are fulfilled. 1. Ignition switch shall be in ignition on condition. 2. AC request switch shall be in on condition/AC shall be turned ON. This DTC will appear due to the following reasons: 1. AC relay control pin open circuit	1. Check fuse connected to battery (+ve) voltage supply and AC clutch relay is not blown off and also check fuse connected to EMS power relay and battery (+ve) voltage supply is not blown off. Replace the fuse if found faulty. 2. Check the compressor control relay connection; Perform necessary repairs if connection is faulty. 3. Check electrical continuity between ECU pin B51 to Air condition relay as per circuit schematic; follow electrical continuity check procedure; Replace/rectify harness if required. 4. Check ECU pins for damage pins for damage pins for damage pins for damage pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether supply is available to AC compressor when AC request is ON; else check ignition switch and relay. 6. Check ECU pins for damage; Replace ECU, if problem persists. 7.Confirmatory check after rectification Perform actuator test for AC clutch and check if it is working fine	
P0645	A/C Clutch Relay Control Circuit	11	This fault code will be logged only if the following conditions are fulfilled. 1. Ignition switch shall be in ignition on condition. 2. AC request switch shall be in on condition/AC shall be turned ON. This DTC will appear due to the following reasons: 1. AC relay control pin is short circuited to ground.	1. Check fuse connected to battery (+ve) voltage supply and AC clutch relay is not blown off and also check fuse connected to EMS power relay and battery (+ve) voltage supply is not blown off. Replace the fuse if found faulty. 2. Check the compressor control relay connection; Perform necessary repairs if connection is faulty. 3. Check electrical continuity between ECU pin B51 to Air condition relay as per circuit schematic; follow electrical continuity check procedure; Replace/rectify harness if required. 4. Check ECU pins for damage pins for damage pins for damage pins for damage pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether supply is available to AC compressor when AC request is ON; else check ignition switch and relay. 6. Check ECU pins for damage; Replace ECU, if problem persists. 7.Confirmatory check after rectification Perform actuator test for AC clutch and check if it is working fine	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0645	A/C Clutch Relay Control Circuit	12	This fault code will be logged only if the following conditions are fulfilled. 1. Ignition switch shall be in ignition on condition. 2. AC request switch shall be in on condition/AC shall be turned ON. This DTC will appear due to the following reasons: 1. AC relay control pin is short circuited to battery.	1. Check fuse connected to battery (+ve) voltage supply and AC clutch relay is not blown off and also check fuse connected to EMS power relay and battery (+ve) voltage supply is not blown off. Replace the fuse if found faulty. 2. Check the compressor control relay connection; Perform necessary repairs if connection is faulty. 3. Check electrical continuity between ECU pin B51 to Air condition relay as per circuit schematic; follow electrical continuity check procedure; Replace/rectify harness if required. 4. Check ECU pins for damage pins for damage pins for damage pins for damage pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether supply is available to AC compressor when AC request is ON; else check ignition switch and relay. 6. Check ECU pins for damage; Replace ECU, if problem persists. 7.Confirmatory check after rectification Perform actuator test for AC clutch and check if it is working fine	
PBA82	Coolant drive output : short circuit to Battery	12	This fault gets logged if the output of Coolant Driver to Instrument cluster is short circuit With Battery	1. Check the continuity between the EMS ECU pins B35 & Instrument Cluster connector pin no 7. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
PBA82	Coolant drive output : short circuit to ground	11	This fault gets logged if the output of Coolant Driver to Instrument cluster is short circuit with Ground	1. Check the continuity between the EMS ECU pins B35 & Instrument Cluster connector pin no 7. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
P260E	A flag to indicate a OC fault on the DPF lamp input SUP : open circuit	13	This fault gets logged if the output of DPF Lamp Driver to DIS is Open Circuit	1. Check the continuity between the EMS ECU pins B43 & DIS DPF lamp Pin. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
P260E	A flag to indicate a SC fault on the DPF lamp input SUP : short circuit	12	This fault gets logged if the output of DPF Lamp Driver to DIS is Short Circuit With Battery	1. Check the continuity between the EMS ECU pins B43 & DIS DPF lamp Pin. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
P260E	A flag to indicate a SC2G fault on the DPF lamp input SUP : short circuit to ground	11	This fault gets logged if the output of DPF Lamp Driver to DIS is Short Circuit With Ground	1. Check the continuity between the EMS ECU pins B43 & DIS DPF lamp Pin. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
PA66E	Short circuit to Vbatt detected failure on fuel consumption pulse output (CF value)	12	This fault gets logged if the output of Fuel Consumption Pulse Driver to DIS is Short Circuit With Battery	1. Check the continuity between the EMS ECU pins B46 & Fuel Consumption Display input Pin. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
PA66E	Short circuit to ground detected failure on fuel consumption pulse output (CF value)	11	This fault gets logged if the output of Fuel Consumption Pulse Driver to DIS is Short Circuit With Ground	1. Check the continuity between the EMS ECU pins B46 & Fuel Consumption Display input Pin. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
P1675	A flag to indicate a soft fault on the CEL lamp input : open circuit	13	This fault gets logged if the output of Check Engine Lamp Driver to Instrument Cluster is Open Circuit	1. Check the continuity between the EMS ECU pins B38 & Instrument Cluster connector pin no 3. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
P1675	A flag to indicate a soft fault on the CEL lamp input : short circuit	12	This fault gets logged if the output of Check Engine Lamp Driver to Instrument Cluster is short circuit to battery	1. Check the continuity between the EMS ECU pins B38 & Instrument Cluster connector pin no 3. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
P1675	A flag to indicate a soft fault on the CEL lamp input : short circuit to ground	11	This fault gets logged if the output of Check Engine Lamp Driver to Instrument Cluster is short circuit to ground	1. Check the continuity between the EMS ECU pins B38 & Instrument Cluster connector pin no 3. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
P0381	A flag to indicate a soft fault on the glow plug lamp output : open circuit	13	This fault gets logged if the output of Glow Plug Lamp Driver to Instrument Cluster is Open Circuit	1. Check the continuity between the EMS ECU pins B41 & Instrument Cluster connector pin no 32. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
P0381	A flag to indicate a soft fault on the glow plug lamp output : short circuit to ground	11	This fault gets logged if the output of Glow Plug Lamp Driver to Instrument Cluster is short circuit to ground	1. Check the continuity between the EMS E pins B41 & Instrument Cluster connector pin no 32. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
P0381	A flag to indicate a soft fault on the glow plug lamp output : short circuit to battery	12	This fault gets logged if the output of Glow Plug Lamp Driver to Instrument Cluster is short circuit to battery	1. Check the continuity between the EMS ECU pins B41 & Instrument Cluster connector pin no 32. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
P0650	Open circuit detected on MIL output driver	13	This fault gets logged if the output of Malfunction Indicator Lamp Driver to Instrument Cluster is Open Circuit	1. Check the continuity between the EMS ECU pins B55 & Instrument Cluster connector pin no 27. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
P263B	Short circuit to Vbatt detected on MIL output driver	12	This fault gets logged if the output of Malfunction Indicator Lamp Driver to Instrument Cluster is short circuit to battery	1. Check the continuity between the EMS ECU pins B55 & Instrument Cluster connector pin no 27. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P263A	Short circuit to ground detected on MIL output driver	11	This fault gets logged if the output of Malfunction Indicator Lamp Driver to Instrument Cluster is short circuit to ground	1. Check the continuity between the EMS ECU pins B55 & Instrument Cluster connector pin no 27. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
PA366	soft fault flag associated with the TACO driver : open circuit	13	This fault gets logged if the output of TACO Driver to Instrument Cluster is Open Circuit	1. Check the continuity between the EMS ECU pins B57 & Instrument Cluster connector pin no 2. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
PA366	soft fault flag associated with the TACO driver fault : short circuit	12	This fault gets logged if the output of TACO Driver to Instrument Cluster is short circuit to battery	1. Check the continuity between the EMS ECU pins B57 & Instrument Cluster connector pin no 2. 2. Check for Short Circuit in W/H. 3. Rectify if any issues found.	
PA366	soft fault flag associated with the TACO driver fault : short circuit to ground	11	This fault gets logged if the output of TACO Driver to Instrument Cluster is short circuit to ground	1. Check the continuity between the EMS ECU pins B57 & Instrument Cluster connector pin no 2. 2. Check for Short Circuit in W/H. 3. Rectify if any issues found.	
P0501	Vehicle speed sensor consistency fault: To validate the calculated raw speed data, a consistency check is performed in this module regarding indicated torque and engine speed information. If this check is failed, a consistency fault is raised	64	This Fault will log if Vehicle speed sensor signal is not consistent	1. Check the continuity between the EMS ECU pins B27 & Instrument Cluster connector pin no 23. 2. Check for Short Circuit in W/H 3. Check for intermittent Contact in connector. 4. Rectify if any issues found.	
P0503	Vehicle speed sensor overrun fault	38	This Fault will log if Vehicle speed sensor signal is above threshold Speed	1. Check the continuity between the EMS ECU pins B27 & Instrument Cluster connector pin no 23. 2. Check for Short Circuit in W/H 3.Check for intermittent Contact in connector. 4. Rectify if any issues found.	
P0500	Vehicle speed sensor signal loss fault	31	This Fault will log if Intermittent / full Signal Loss	1. Check the continuity between the EMS ECU pins B27 & Instrument Cluster connector pin no 23. 2. Check for Short Circuit in W/H 3.Check for intermittent Contact in connector. 4. Rectify if any issues found.	
PB26A	Open circuit on Water In Fuel lamp	13	This fault gets logged if the output of Water In Fuel Lamp Driver to Instrument Cluster is Open Circuit	1. Check the continuity between the EMS ECU pins B50 & Instrument Cluster connector pin no 34. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
PB26A	Short circuit on Water In Fuel lamp	12	This fault gets logged if the output of Water In Fuel Lamp Driver to Instrument Cluster is short circuit to battery	1. Check the continuity between the EMS ECU pins B50 & Instrument Cluster connector pin no 34. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
PB26A	Short circuit to ground on Water In Fuel lamp	11	This fault gets logged if the output of Water In Fuel Lamp Driver to Instrument Cluster is short circuit to ground	1. Check the continuity between the EMS ECU pins B50 & Instrument Cluster connector pin no 34. 2. Check for Short Circuit in W/H 3. Rectify if any issues found.	
P0100	Mass or Volume Air Flow Sensor "A" Circuit	00	1. This DTC is a grouping fault for all AMF sensor related faults. 2. This DTC gets logged along with any of the following DTC's: P0100-27, P0101-56, P00BD-64, P00BC-64, P06B0-1C, P0A03-15, and P0102-11.	1. As this DTC gets logged along with any of the following DTC's: P0100-27, P0101-56, P00BD-64, P00BC-64, P06B0-1C, P0A03-15, and P0102-11. 2. Follow the Rectification procedure of any of the faults, associated with this fault to resolve this fault.	
P0100	Mass or Volume Air Flow Sensor "A" Circuit	27	1. This DTC gets logged when the rate of change of Air mass flow sensor input signal is above a maximum calibrated threshold.	1. Check fuse connected to battery power supply is not blown off and also check fuse of ignition power supply is not blown off. Replace the fuse if found defective. Check the sensor connector for proper fitment; damage etc., ensure proper fitment of the connector with the sensor. 2. Check sensor for oxidation rust, etc., if noticed clean the deposits. 3. Check for electrical continuity between ECU pins A58, A71 and A04 to sensor connector pins 3, 5 & 4. Check continuity between Ignition switch inputs to sensor connector pin 2 and rectify electrical discontinuity if noticed. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 4. Check whether the AMF sensor signal pin A58 is Short circuited to Battery or ground. If so, then rectify the wiring harness connections. 5. Replace AMF sensor in case of any physical damage to sensor or if the problem still persists. 6. Replace the EMS ecu if the problem still persists	
P0101	Mass or Volume Air Flow Sensor "A" Circuit Range/Performance	56	1. This DTC gets logged if the AMF sensor is either not learned or wrongly learnt.	1. Check whether the AMF sensor is learnt according to specifications. 2. Relearn the AMF sensor. 3. If the problem still persists then replace AMF sensor. 4. If the problem still persists then replace the EMS ECU.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P00BD	Mass or Volume Air Flow "A" Circuit Range/Performance - Air Flow Too High	64	1. This DTC gets logged if the Air mass flow sensor input value is higher than maximum OBD permissible threshold calibrated. 2. OBD permissible thresholds are calculated by ECU using the parameters - Engine speed, Boost pressure, atmospheric pressure, Inlet air temperature and DPF soot density values.	1. Check fuse connected to battery power supply is not blown off and also check fuse of ignition power supply is not blown off. Replace the fuse if found defective. 2. Check the sensor connector for proper fitment; damage etc., ensure proper fitment of the connector with the sensor. 3. Check sensor for oxidation rust, etc., if noticed clean the deposits. 4. Check for electrical continuity between ECU pins A58,A71 and A04 to sensor connector pins 3, 5 & 4. Check continuity between Ignition switch inputs to sensor connector pin 2 and rectify electrical discontinuity if noticed. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether the AMF sensor signal pin A58 is Short circuited to Battery or ground. If so, then rectify the wiring harness connections. 6. Replace AMF sensor in case of any physical damage to sensor or if the problem still persists. 7. Replace the EMS ecu if the problem still persists.	
P00BC	Mass or Volume Air Flow "A" Circuit Range/Performance - Air Flow Too Low	64	1. This DTC gets logged if the Air mass flow sensor input value is lower than minimum Engine system permissible threshold calibrated. 2. Engine system permissible thresholds are calculated by ECU using the parameters - Engine speed, Boost pressure, atmosp	1. Check fuse connected to battery power supply is not blown off and also check fuse of ignition power supply is not blown off. Replace the fuse if found defective. 2. Check the sensor connector for proper fitment; damage etc., ensure proper fitment of the connector with the sensor. 3. Check sensor for oxidation rust, etc., if noticed clean the deposits. 4. Check for electrical continuity between ECU pins A58,A71 and A04 to sensor connector pins 3, 5 & 4. Check continuity between Ignition switch inputs to sensor connector pin 2 and rectify electrical discontinuity if noticed. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether the AMF sensor signal pin A58 is Short circuited to Battery or ground. If so, then rectify the wiring harness connections. 6. Replace AMF sensor in case of any physical damage to sensor or if the problem still persists. 7. Replace the EMS ecu if the problem still persists.	
P06B0	Sensor Power Supply "A" Circuit/Open	1C	1. Air mass flow sensor shall get a power supply voltage of 12V from Ignition supply 2. If the Air mass flow sensor is receiving an out of range supply voltage from Ignition Supply then this fault gets logged.	1. Check continuity between the AMF sensor connector pin 2 and the Ignition switch supply. Rectify the wiring harness connections in case of any issue. 2. Check whether the AMF sensor connector pin 2 is Short circuited to ground. If so, then rectify the wiring harness connections. 3. Replace AMF sensor if the problem still persists. 4. Replace EMS ecu if the problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0A03	Mass or Volume Air Flow Sensor "A" Circuit High	15	ECU detects mass or volume air flow circuit high if the following condition arises: 1. Airflow volume in the inlet manifold is above the upper threshold because of the air mass flow sensor signal pin is open circuit/Short circuit to battery.	1. Check fuse connected to battery power supply is not blown off and also check fuse of ignition power supply is not blown off. Replace the fuse if found defective. 2. Check the sensor connector for proper fitment; damage etc., ensure proper fitment of the connector with the sensor. 3. Check sensor for oxidation rust, etc., if noticed clean the deposits. 4. Check for electrical continuity between ECU pins A58,A71 and A04 to sensor connector pins 3, 5 & 4. Check continuity between Ignition switch inputs to sensor connector pin 2 and rectify electrical discontinuity if noticed. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether the AMF sensor signal pin A58 is Short circuited to Battery or ground. If so, then rectify the wiring harness connections. 6. Replace AMF sensor in case of any physical damage to sensor or if the problem still persists. 7. Replace the EMS ecu if the problem still persists.	
P0102	Mass or Volume Air Flow Sensor "A" Circuit Low	11	ECU detects mass or volume air flow circuit high if the following condition arises: 1. Airflow volume in the inlet manifold is below the lower threshold because of Air mass flow sensor signal pin SC to GND.	1. Check fuse connected to battery power supply is not blown off and also check fuse of ignition power supply is not blown off. Replace the fuse if found defective. 2. Check the sensor connector for proper fitment; damage etc., ensure proper fitment of the connector with the sensor. 3. Check sensor for oxidation rust, etc., if noticed clean the deposits. 4. Check for electrical continuity between ECU pins A58, A71 and A04 to sensor connector pins 3, 5 & 4. Check continuity between Ignition switch inputs to sensor connector pin 2 and rectify electrical discontinuity if noticed. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether the AMF sensor signal pin A58 is Short circuited to Battery or ground. If so, then rectify the wiring harness connections. 6. Replace AMF sensor in case of any physical damage to sensor or if the problem still persists. 7. Replace the EMS ecu if the problem still persists.	
P0340	Camshaft Position Sensor "A" Circuit	29	1. This DTC gets logged if the EMS ECU is receiving implausible Cam signal from Cam shaft sensor. 2. This signal is monitored by EMS ECU only if: - Reverse firing not detected - No DMF protection - Battery voltage below the limits defined by an hysteresis Maximum battery voltage to enable the monitoring conditions Minimum battery voltage to disable the monitoring conditions - Injection speed/Engine speed above the limits defined by a hysteresis: Maximum engine speed to disable the monitoring conditions Minimum engine speed to enable the monitoring conditions	1. Check fuse connected to battery power supply and EMS power relay is not blown off. Replace if found faulty. 2. Check sensor connections for rust dirt etc; Ensure clean connector pins and proper fitment. 3. Check gap between cam sensor tip to cam shaft gear. Gap should be close to 1 mm. 4. Check Electrical continuity between ecu pins A59, A47 and Cam sensor connector pins 2 &3. Check continuity between EMS ecu main relay supply to CAM sensor connector pin 1 and if necessary replace/ rectify the harness. 5. Check whether CAM shaft signal pin A59 is either short circuited to battery or ground. If so, rectify the wiring harness connections. 6. Visually check sensor. Check for metallic particles/burr in sensor tip; Clean the sensor tip and cam to remove any foreign particle; Check the CAM target wheel, in case of any damage replace target wheel. 7. Check the mounting of CAM sensor; Mount it properly if any issue is found. 8. Capture the CAM sensor signal and Crank sensor signal pulses on oscilloscope and for every 60 crank pulses,	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				9. Replace the CAM sensor if problem still persists. 10. Replace the EMS ecu if the problem still persists.	
P0340	Camshaft Position Sensor "A" Circuit	2F	1. This DTC gets logged if the EMS ecu is receiving Erratic Cam signal from Cam shaft sensor. 2. This signal is monitored by EMS ecu only if: - Reverse firing not detected - No DMF protection - Battery voltage below the limits defined by an hysteresis: Maximum battery voltage to enable the monitoring conditions Minimum battery voltage to disable the monitoring conditions - Injection speed/Engine speed above the limits defined by a hysteresis: Maximum engine speed to disable the monitoring conditions Minimum engine speed to enable the monitoring conditions.	1. Check fuse connected to battery power supply and EMS power relay is not blown off. Replace if found faulty. 2. Check sensor connections for rust dirt etc; Ensure clean connector pins and proper fitment. 3. Check gap between cam sensor tip to cam shaft gear. Gap should be close to 1 mm. 4. Check Electrical continuity between ecu pins A59, A47 and Cam sensor connector pins 2 &3. Check continuity between EMS ecu main relay supply to CAM sensor connector pin 1 and if necessary replace/ rectify the harness. 5. Check whether CAM shaft signal pin A59 is either short circuited to battery or ground. If so, rectify the wiring harness connections. 6. Visually check sensor. Check for metallic particles/burr in sensor tip; Clean the sensor tip and cam to remove any foreign particle. Check the CAM target wheel, in case of any damage replace target wheel. 7. Check the mounting of CAM sensor, Mount it properly if any issue is found 8. Capture the CAM sensor signal and Crank sensor signal pulses on oscilloscope and for every 60 crank pulses / CAM pulses shall be available. 9. Replace the CAM sensor if problem still persists. 10. Replace the EMS ecu if the problem still persists.	
P0340	Camshaft Position Sensor "A" Circuit	31	1. This DTC gets logged if the EMS ecu is not receiving Cam signal from Cam shaft sensor. 2. This signal is monitored by EMS ecu only if: - Reverse firing not detected - No DMF protection - Battery voltage below the limits defined by an hysteresis: Maximum battery voltage to enable the monitoring conditions Minimum battery voltage to disable the monitoring conditions - Injection speed/Engine speed above the limits defined by a hysteresis: Maximum engine speed to disable the monitoring conditions Minimum engine speed to enable the monitoring conditions	1. Check fuse connected to battery power supply and EMS power relay is not blown off. Replace if found faulty. 2. Check sensor connections for rust dirt etc; Ensure clean connector pins and proper fitment. 3. Check gap between cam sensor tip to cam shaft gear. Gap should be close to 1 mm. 4. Check Electrical continuity between ecu pins A59, A47 and Cam sensor connector pins 2 &3. Check continuity between EMS ecu main relay supply to CAM sensor connector pin 1 and if necessary replace/ rectify the harness. 5. Check whether CAM shaft signal pin A59 is either short circuited to battery or ground. If so, rectify the wiring harness connections. 6. Visually check sensor. Check for metallic particles/burr in sensor tip; Clean the sensor tip and cam to remove any foreign particle. Check the CAM target wheel, in case of any damage replace target wheel. 7. Check the mounting of CAM sensor, Mount it properly if any issue is found 8. Capture the CAM sensor signal and Crank sensor signal pulses on oscilloscope and for every 60 crank pulses / CAM pulses shall be available. 9. Replace the CAM sensor if problem still persists. 10. Replace the EMS ecu if the problem still persists. 11. Replace the EMS ecu if the problem still persists	
P0340	Camshaft Position Sensor “A” Circuit	38	1. This DTC gets logged if EMS ECU is receiving Cam signal intermittently.	1. Check fuse connected to battery power supply and EMS power relay is not blown off. Replace if found faulty. 2. Check sensor connections for rust dirt etc; Ensure clean connector pins and proper fitment. 3. Check gap between cam sensor tip to cam shaft gear. Gap should be close to 1 mm. 4. Check Electrical continuity between ecu pins A59, A47 and Cam sensor connector pins 2 &3. Check continuity between EMS ecu main relay supply to	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				CAM sensor connector pin 1 and if necessary replace/ rectify the harness. 5. Check whether CAM shaft signal pin A59 is either short circuited to battery or ground. If so, rectify the wiring harness connections. 6. Visually check sensor. Check for metallic particles/burr in sensor tip; Clean the sensor tip and cam to remove any foreign particle. Check the CAM target wheel, in case of any damage replace target wheel. 7. Check the mounting of CAM sensor, Mount it properly if any issue is found 8. Capture the CAM sensor signal and Crank sensor signal pulses on oscilloscope and for every 60 crank pulses, 9. Replace the CAM sensor if problem still persists. 10. Replace the EMS ecu if the problem still persists.	
P0335	Crankshaft Position Sensor "A" Circuit	67	EMS ecu generates virtual teeth from the engine position and speed acquired by the camshaft signal. After synchronization between CAM shaft edges and virtual teeth is done, EMS ecu calculates accurate engine speed. Hence the strategy predicts the position of the crankshaft teeth between the next two camshaft edges. If the predicted crank shaft virtual teeth come early to the CAM shaft edges then this fault will gets logged.	1. Visually check sensor for metallic particles/burr in sensor tip and flywheel teeth; if noticed clean the sensor tip and flywheel to remove any foreign particle. 2. Check for gap between crank sensor and fly wheel. If the gap is not according to design specifications then correct the alignment of sensor. 3. Check for physical damage of fly-wheel; Replace flywheel if found faulty. 4. Check sensor connections for rust dirt etc; Ensure clean connector pins and proper fitment. 5. Check Electrical continuity between ECU pins A60, A36 and crank sensor connector pins 1 & 2 as per circuit schematic; follow Electrical continuity check procedure. Replace/ Rectify Harness if required. 6. Check whether the Crank sensor pins A60, A36 are either short circuited to ground/battery. If so then rectify the wiring harness connections according to circuit schematics. 7. Replace the crank sensor if the problem still persists. 8. Check ECU; if problem still persist Replace ECU. 9.After rectification, test engine in following cycle a) Start the engine, in neutral gear and press the accelerator pedal fully (as quickly as possible) for engine to go from Idle to fly up. b) Stay at fly up for few seconds and suddenly release the accelerator for the engine to come back to idle. 10. Repeat the above cycle 3 to 4 times and check the DTC does not reappear.	
P0335	Crankshaft Position Sensor "A" Circuit	31	This DTC gets logged if the EMS ECU is not receiving Crank signal from Crank shaft sensor/RPM sensor.	1. Visually check sensor for metallic particles/burr in sensor tip and flywheel teeth; if noticed clean the sensor tip and flywheel to remove any foreign particle. 2. Check for gap between crank sensor and fly wheel. If the gap is not according to design specifications then correct the alignment of sensor. 3. Check for physical damage of fly-wheel; Replace flywheel if found faulty. 4. Check sensor connections for rust dirt etc; Ensure clean connector pins and proper fitment. 5. Check Electrical continuity between ECU pins A60, A36 and crank sensor connector pins 1 & 2 as per circuit schematic; follow Electrical continuity check procedure. Replace/ Rectify Harness if required. 6. Check whether the Crank sensor pins A60, A36 are either short circuited to ground/battery. If so then rectify the wiring harness connections according to circuit schematics. 7. Replace the crank sensor if the problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				8. Check ECU; if problem still persist Replace ECU. 9.After rectification, test engine in following cycle a) Start the engine, in neutral gear and press the accelerator pedal fully (as quickly as possible) for engine to go from Idle to fly up. b) Stay at fly up for few seconds and suddenly release the accelerator for the engine to come back to idle. 10. Repeat the above cycle 3 to 4 times and check the DTC does not reappear.	
P0335	Crankshaft Position Sensor “A” Circuit	38	This DTC gets logged if the EMS ECU is receiving less pulses than expected per crank shaft revolution from Crank/RPM sensor.	1. Visually check sensor for metallic particles/burr in sensor tip and flywheel teeth; if noticed clean the sensor tip and flywheel to remove any foreign particle. 2. Check for gap between crank sensor and fly wheel. If the gap is not according to design specifications then correct the alignment of sensor. 3. Check for physical damage of fly-wheel; Replace flywheel if found faulty. 4. Check sensor connections for rust dirt etc; Ensure clean connector pins and proper fitment. 5. Check Electrical continuity between ECU pins A60,A36 and crank sensor connector pins 1 & 2 as per circuit schematic; follow Electrical continuity check procedure. Replace/ Rectify Harness if required. 6. Check whether the Crank sensor pins A60,A36 are either short circuited to ground/battery. If so then rectify the wiring harness connections according to circuit schematics. 7. Replace the crank sensor if the problem still persists. 8. Check ECU; if problem still persist Replace ECU. 9.After rectification, test engine in following cycle a) Start the engine, in neutral gear and press the accelerator pedal fully (as quickly as possible) for engine to go from Idle to fly up. b) Stay at fly up for few seconds and suddenly release the accelerator for the engine to come back to idle. 10. Repeat the above cycle 3 to 4 times and check the DTC does not reappear.	
P0335	Crankshaft Position Sensor "A" Circuit	78	This DTC gets logged if the Air Gap between the Crank sensor and the Flywheel is not according to design specifications.	1. Visually check sensor for metallic particles/burr in sensor tip and flywheel teeth; if noticed clean the sensor tip and flywheel to remove any foreign particle. 2. Check for gap between crank sensor and fly wheel. If the gap is not according to design specifications then correct the alignment of sensor. 3. Check for physical damage of fly-wheel; Replace flywheel if found faulty. 4. Check sensor connections for rust dirt etc; Ensure clean connector pins and proper fitment. 5. Check Electrical continuity between ECU pins A60,A36 and crank sensor connector pins 1 & 2 as per circuit schematic; follow Electrical continuity check procedure. Replace/ Rectify Harness if required. 6. Check whether the Crank sensor pins A60,A36 are either short circuited to ground/battery. If so then rectify the wiring harness connections according to circuit schematics. 7. Replace the crank sensor if the problem still persists. 8. Check ECU; if problem still persist Replace ECU. 9.After rectification, test engine in following cycle a) Start the engine, in neutral gear and press the accelerator pedal fully (as	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				quickly as possible) for engine to go from Idle to fly up. b) Stay at fly up for few seconds and suddenly release the accelerator for the engine to come back to idle. 10. Repeat the above cycle 3 to 4 times and check the DTC does not reappear.	
U0426	Invalid Data Received From Vehicle Immobilizer Control Module	86	This DTC gets logged When the CAN Mutual authentication between Immobilizer and engine EMS is failed / Pairing is not done.	1. Check proper connectivity of CAN High (Pin No.B48) and CAN Low (Pin No.B47) lines in EMS ECU connector. If any issue found then establish continuity by rectifying wiring harness connections. 2. Check whether CAN High (Pin No.B48) and CAN Low (Pin No.B47) of EMS ecu are either shorted to battery or ground. If so, then rectify the wiring harness connections. 3. Check whether the Immobilizer is getting power supply. 4. Do Pairing as per recommended procedure. 5. Clear DTC. 6. Check the error again & ensure that there is no error. IF error still persists then replace Immobilizer. 7. IF problem still persists then replace EMS ecu.	
P0513	Incorrect Immobilizer Key	95	This DT gets logged When the immobilizer could not identify the ignition key used for the starting due to the following reasons: - Wrong E key inserted. - Key not learnt.	1. Replace key with original E-key. 2. Check with good key whether vehicle is starting? If yes, learn the faulty key through diagnostics. (Refer to KEY learning procedure). If the vehicle is not starting with good key, ICU may be faulty. 4. Replace the ICU. 5. Erase the DTC 6. Turn ignition off & wait for some time. 7. Switch On the ignition & check the error through diagnostic again & ensure that the fault is cleared.	
P0633	Immobilizer Key Not Programmed - ECM/PCM	54	This DTC gets logged When the CAN Mutual authentication between Immobilizer and engine EMS is failed due to following reasons: - New EMS ECU: AES key is not written - Pairing not done/unsuccessful - AES key code in ICU & EMS ECU is different	1. Check whether the Immobilizer is getting power supply. 2. Do Pairing as per recommended procedure. 3. Clear DTC. 4. Check the error again & ensure that there is no error. If error still persists then replace Immobilizer. 5. If problem still persists then replace EMS ecu.	
P0A05	Manifold Absolute Pressure/Barometric Pressure Sensor Circuit	49	EMS ECU estimates the atmospheric pressure values under the conditions of Atmospheric pressure sensor faulty/ sensor not present with the help of Inlet air flow, Inlet pressure and temperature. Manifold absolute pressure circuit range /performance fault	1. Check fuse connected to battery power supply is not blown off and also check fuse of ignition power supply is not blown off. Replace the fuse if found defective. 2. Check the sensor connector for proper fitment; damage etc., ensure proper fitment of the connector with the sensor. 3. Check sensor for oxidation rust, etc., if noticed clean the deposits. 4. Check for electrical continuity between ECU pins A58,A71 and A04 to sensor connector pins 3, 5 & 4. Check continuity between Ignition switch supply inputs to sensor connector pin 2 and rectify electrical discontinuity if noticed. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether the AMF sensor signal pin A58 is Short circuited to Battery or ground. If so, then rectify the wiring harness connections. 6. check whether the EMS ecu inlet temperature pin A04 is short circuited to battery/Ground or open circuited because of wrong connections of wiring	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				harness, if so rectify the wiring harness connections to make them inline with circuit schematics 7 Replace AMF sensor in case of any physical damage to sensor or if the problem still persists. 8. Replace the EMS ecu if the problem still persists.	
P2B26	Barometric Pressure Sensor "A" Circuit	00	1. This fault is a grouping fault for all atmospheric pressure sensor faults. 2. It will come along with any of the following faults: P0A05-49, P2B29-49,P2228-49	1. Replace ECU if this fault appears.	
P2B29	Barometric Pressure Sensor "A" Circuit High	49	This fault gets logged due to Atmospheric sensor failure, which is mounted on EMS ECU	1. Replace ECU if this fault appears.	
P2228	Barometric Pressure Sensor "A" Circuit Low	49	This fault gets logged due to Atmospheric sensor failure, which is mounted on EMS ECU	1. Replace ECU if this fault appears.	
P0563	System Voltage High	17	1. This DTC gets logged if the Battery voltage sensed by EMS ECU is higher than max calibrated threshold value for battery voltage.	1 Check if the correct battery is fitted. Replace the battery if wrong battery is installed. 2. Check & ensure main power hold rely is working properly. 3. Check and ensure whether the battery terminal's are connected properly and they are tight. Check for oxidation on battery terminals, in case of oxidation capture the observation and forward it to battery supplier. 4. Check the charging circuit; Rectify the charging circuit if faulty. 5. Check ECU pin no 6,2 & 4 are getting ground connection and 1,3 & 5 are connected to battery positive – 12 V supply. 6. Check resistance between the vehicle chassis ground and ECU ground with the help of ohmmeter, if the resistance is too high then fix ECU ground. 7. Check ECU; Replace ECU if problem still persists. 8. Confirmatory check after rectification Check battery voltage in diagnostic tool. A) Reading should be close to 12 V if alternator is not charging. B) Reading should be close to 14 V if alternator is charging	
P0562	System Voltage Low	16	1. This DTC gets logged if the Battery voltage sensed by EMS ECU is less than min calibrated threshold value for battery voltage.	1. Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check if the correct battery is fitted. Replace the battery if wrong battery is installed. 3. Check & ensure main power hold rely is working properly. 4. Check and ensure whether the battery terminal's are connected properly and they are tight. Check for oxidation on battery terminals, in case of oxidation capture the observation and forward it to battery supplier. 5. Check the charging circuit; Rectify the charging circuit if faulty. 6. Check ECU pin no 6,2 & 4 are getting ground connection and 1,3 & 5 are connected to battery positive – 12 V supply. 7. Check resistance between the vehicle chassis ground and ECU ground with the help of ohmmeter, if the resistance is too high then fix ECU ground. 8. Check ECU pins for damage; Replace ECU if problem still persists. 9. Confirmatory check after rectification Check battery voltage in diagnostic tool. A) Reading should be close to 12 V if alternator is not charging.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				B) Reading should be close to 14 V if alternator is charging	
P259F	Turbocharger "A" Boost Control Position At High Limit	85	Manifold absolute pressure -turbocharger/supercharger boost sensor correlation fault gets logged when : - The measured pressure exceeds an upper limit of the calculated boost pressure value	1. Check for Reference voltage fault P0651. If present; Follow Reference voltage check and rectification Procedure, to correct this fault before proceeding further. 2. Check inlet air circuit for clogging; wrong assembly/fitment etc; Ensure proper fitment. 3. Check sensor connections for rust dirt etc; clean the sensor connections and ensure proper fitment. 4. Visually check sensor; Replace sensor if damaged. 5. Check whether the atmospheric pressure value is consistent and correct by monitoring the parameter visible in Diagnostic tool. 6. Check for any leakage before VGT ; Check the airlifter; 7. Check ECU pins for damage, if problem still persists replace the ECU. 8. After rectification ensure the following before handing over to customer. a) Boost pressure value reads by the ECU is = Atmospheric pressure at ignition key is on. b) Boost pressure value reads by the ECU is < Atmospheric pressure when the engine is at idle. c) Boost pressure value reads by the ECU is > Atmospheric pressure when the engine is at fly-up.	
P259E	Turbocharger "A" Boost Control Position At Low Limit	84	Manifold absolute pressure -turbocharger/supercharger boost sensor correlation fault gets logged when : - The measured pressure is less than a lower limit of the calculated boost pressure value	1. Check for Reference voltage fault P0651. If present; Follow Reference voltage check and rectification Procedure, to correct this fault before proceeding further. 2. Check inlet air circuit for clogging; wrong assembly/fitment etc; Ensure proper fitment. 3. Check sensor connections for rust dirt etc; clean the sensor connections and ensure proper fitment. 4. Visually check sensor; Replace sensor if damaged. 5. Check whether the atmospheric pressure value is consistent and correct by monitoring the parameter visible in Diagnostic tool. 6. Check for any leakage before VGT ; Check the airlifter; 7. Check ECU pins for damage, if problem still persists replace the ECU. 8. After rectification ensure the following before handing over to customer. a) Boost pressure value reads by the ECU is = Atmospheric pressure at ignition key is on. b) Boost pressure value reads by the ECU is < Atmospheric pressure when the engine is at idle. c) Boost pressure value reads by the ECU is > Atmospheric pressure when the engine is at fly-up.	
P0651	Sensor Reference Voltage "B" Circuit/Open	1C	This fault gets logged if the Boost Pressure sensor is not receiving proper voltage supply from EMS ECU power supply 2.	1. This fault will lead to the faults of boost pressure sensor, cruise control, differential pressure sensor, pedal position sensor. As all these sensors are supplied by EMS ecu voltage supply 2. 2. Check the continuity between the EMS ecu pin A42 (Boost pressure sensor supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A42 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				3. Check the continuity between the EMS ecu pin A43 (cruise control supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A43 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the EMS ecu pin A66 (DPF sensor supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A66 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 5. Check the continuity between the EMS ecu pin B29 (pedal position sensor 2 supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin B29 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 6. If the problem still persists then replace EMS ecu.	
P0238	Turbocharger/Supercharger Boost Sensor "A" Circuit High	12	This DTC will get logged if the Boost pressure sensor signal pin is short circuited to battery.	1. Check for Reference voltage fault P0651. If present; Follow Reference voltage check and rectification Procedure, to correct this fault before proceeding further. 2. Check inlet air circuit for clogging; wrong assembly/fitment etc; Ensure proper fitment of the inlet air circuit. 3. Check sensor connections for rust dirt etc; clean the sensor connections and ensure proper fitment. 4. Visually check sensor; Replace sensor if damaged. 5. Check Electrical continuity between ECU pins A68, A42, & A13 to Boost pressure sensor connector pins as per circuit schematics; Follow Electrical continuity check procedure. Replace/ Rectify Harness if required. 7. Check whether the boost pressure sensor signal pin is short circuited to battery. If so then rectify the wiring harness connections according to circuit schematics. 8. Check the resistance of the sensor, it should be according to design specifications at various vehicle conditions. Replace the sensor if problem still persists. 9. Check EC; if problem still persists replace the ECU. 10. After rectification ensure the following before handing over to customer. a) Boost pressure value reads by the ECU is = Atmospheric pressure at ignition key is on. b) Boost pressure value reads by the ECU is < Atmospheric pressure when the engine is at idle. c) Boost pressure value reads by the ECU is > Atmospheric pressure when the engine is at fly-up.	
P0237	Turbocharger/Supercharger Boost Sensor "A" Circuit Low	14	This DTC will get logged if the Boost pressure sensor signal pin is either short circuited to ground or open.	1. Check for Reference voltage fault P0651. If present; Follow Reference voltage check and rectification Procedure, to correct this fault before proceeding further. 2. Check inlet air circuit for clogging; wrong assembly/fitment etc; Ensure proper fitment of the inlet air circuit. 3. Check sensor connections for rust dirt etc; clean the sensor connections and ensure proper fitment. 4. Visually check sensor; Replace sensor if damaged.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				5. Check Electrical continuity between ECU pins A68, A42, & A13 to Boost pressure sensor connector pins as per circuit schematics; Follow Electrical continuity check procedure. Replace/ Rectify Harness if required. 7. Check whether the boost pressure sensor signal pin is short circuited to battery. If so then rectify the wiring harness connections according to circuit schematics. 8. Check the resistance of the sensor, it should be according to design specifications at various vehicle conditions. Replace the sensor if problem still persists. 9. Check ECU; if problem still persists replace the ECU. 10. After rectification ensure the following before handing over to customer. a) Boost pressure value reads by the ECU is = Atmospheric pressure at ignition key is on. b) Boost pressure value reads by the ECU is < Atmospheric pressure when the engine is at idle. c) Boost pressure value reads by the ECU is > Atmospheric pressure when the engine is at fly-up.	
P0236	Turbocharger/Supercharger Boost Sensor "A" Circuit Range/Performance	64	This DTC gets logged if the EMS ECU finds the Boost pressure sensor input signal value is not plausible/out of calibrated range, at any engine operating condition.	1. Check for Reference voltage fault P0651. If present; Follow Reference voltage check and rectification Procedure, to correct this fault before proceeding further. 2. Check inlet air circuit for clogging; wrong assembly/fitment etc; Ensure proper fitment of the inlet air circuit. 3. Check sensor connections for rust dirt etc; clean the sensor connections and ensure proper fitment. 4. Visually check sensor; Replace sensor if damaged. 5. Check Electrical continuity between ECU pins A68, A42, & A13 to Boost pressure sensor connector pins as per circuit schematics; Follow Electrical continuity check procedure. Replace/ Rectify Harness if required. 7. Check whether the boost pressure sensor signal pin is short circuited to battery. If so then rectify the wiring harness connections according to circuit schematics. 8. Check the resistance of the sensor, it should be according to design specifications at various vehicle conditions. Replace the sensor if problem still persists. 9. Check ECU; if problem still persists replace the ECU. 10. After rectification ensure the following before handing over to customer. a) Boost pressure value reads by the ECU is = Atmospheric pressure at ignition key is on. b) Boost pressure value reads by the ECU is < Atmospheric pressure when the engine is at idle. c) Boost pressure value reads by the ECU is > Atmospheric pressure when the engine is at fly-up.	
P0234	Turbocharger/Supercharger "A" Over boost Condition	1C	This DTC gets logged if EMS ECU finds the Boost pressure sensor input signal is greater than Maximum calibrated threshold for boost pressure	1. Check for Reference voltage fault P0651. If present; Follow Reference voltage check and rectification Procedure, to correct this fault before proceeding further. 2. Check inlet air circuit for clogging; wrong assembly/fitment etc; Ensure proper fitment of the inlet air circuit. 3. Check sensor connections for rust dirt etc; clean the sensor connections and ensure proper fitment.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				4. Visually check sensor; Replace sensor if damaged. 5. Check Electrical continuity between ECU pins A68, A42, & A13 to Boost pressure sensor connector pins as per circuit schematics; Follow Electrical continuity check procedure. Replace/ Rectify Harness if required. 7. Check whether the boost pressure sensor signal pin is short circuited to battery. If so then rectify the wiring harness connections according to circuit schematics. 8. Check the resistance of the sensor, it should be according to design specifications at various vehicle conditions. Replace the sensor if problem still persists. 9. Check ECU; if problem still persists replace the ECU. 10. After rectification ensure the following before handing over to customer. a) Boost pressure value reads by the ECU is = Atmospheric pressure at ignition key is on. b) Boost pressure value reads by the ECU is < Atmospheric pressure when the engine is at idle. c) Boost pressure value reads by the ECU is > Atmospheric pressure when the engine is at fly-up.	
P0504	Brake Switch “A” / ”B” Correlation	62	1. This fault gets logged if ECU observes lack of correlation between main brake switch input and redundant brake switch/brake safety switch.	1. Check fuse connected to ignition relay is not blown off and also check fuse connected to ignition power supply is not blown off. Replace if found faulty. 2. Check, if the Brake lights are on even when no brake pedal is pressed. 3. Check the brake switch setting; If the problem is with the brake setting performs the necessary repairs. 4. Check Electrical continuity between ECU pins B32 & B30 to break pedal connector as per circuit schematics; Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether either EMS ecu pins B32/2 re short circuited to battery or ground. If so, then rectify wiring harness connections according to circuit schematics. 6. Check and replace ECU still problem persists. 7. After rectification ensure the following checks for main brake and redundant brake switches before handing over the vehicle to customer. A) When pedal is not pressed - Respective switch parameter in tata diagnostic tool should be less than 5%. B) When the pedal is fully pressed - Respective switch parameter in tata diagnostic tool should be more than 95 %. C) Ensure brake light is not glowing when the brake pedal is not pressed.	
P0571	Brake Switch "A" Circuit	00	EMS ECU detects brake switch A circuit fault if any of the following condition is true - 1: Brake deceleration fault is raised: - In this stage brake deceleration fault is raised when the vehicle acceleration drops below minimum acceleration value which is allowed for diagnostic in deceleration when brake is not engaged. 2: Brake acceleration fault is raised: In this stage brake acceleration fault is raised when the vehicle acceleration above the maximum acceleration value allowed for diagnostic in acceleration when brake is engaged. 3: Brake correlation fault is raised. In detail, EMS ecu compares the brake switch status with the environmental conditions like vehicle speed, vehicle acceleration and	1. Check fuse connected to ignition relay is not blown off and also check fuse connected to ignition power supply is not blown off. Replace if found faulty. 2. Check, if the Brake lights are on even when no brake pedal is pressed. 3 Check the brake switch setting; If the problem is with the brake setting perform the necessary repairs. 4. Check Electrical continuity between ECU pins B32 & B30 to break pedal connector as per circuit schematics; Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether either EMS ecu pins B32/2 re short circuited to battery or ground. If so, then rectify wiring harness connections according to circuit schematics. 6. Check and replace ECU still problem persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
			vehicle deceleration and if any mismatch is found then it raises a brake switch fault.	7. After rectification ensure the following checks for main brake and redundant brake switches before handing over the vehicle to customer. A) When pedal is not pressed - Respective switch parameter in tata diagnostic tool should be less than 5%. B) When the pedal is fully pressed - Respective switch parameter in tata diagnostic tool should be more than 95 %. C) Ensure brake light is not glowing when the brake pedal is not pressed. 8:-Check fuse connected to brake light switch is not shorted or defective. If found defective replace it	
P0201	Injector Circuit/Open - Cylinder 1	1B	1. This DTC gets logged, if wiring harness resistance of Injector in cylinder 1 exceeds the upper threshold.	1. Check injector connector; Key off ignition and wait for 20 seconds. Disconnect the injector clean and reconnect properly. Check if problem vanishes. 2. Perform Injector cylinder 1 actuator test with the help of I/O control command of injector cylinder 1. If this test fails then it is confirmed that there is some issue with either injector wiring harness/Injector itself. 3. Check the wiring harness resistance between the Injector cylinder 1 and EMS ecu, the resistance value should be less than 1 ohm. If the resistance found is out of range then replace wiring harness of injector. Check the resistance between two injector terminals it should be less than 4 ohms. 4. Check for fault codes - P0201 or P0263 or PB147 or PB148. If any of these faults appear then resolve these faults by following their rectification procedure. 5. Replace wiring harness if problem still persists. 6. Replace injector if problem still persists 7. Replace ECU if problem still persists.	
P0203	Injector Circuit/Open - Cylinder 3	1B	1. This DTC gets logged, if wiring harness resistance of Injector in cylinder 3 exceeds the upper threshold.	1. Check injector connector; Key off ignition and wait for 20 seconds. Disconnect the injector clean and reconnect properly. Check if problem vanishes. 2. Perform Injector cylinder 3 actuator tests with the help of I/O control command of injector cylinder 3. If this test fails then it is confirmed that there is some issue with either injector wiring harness/Injector itself. 3. Check the wiring harness resistance between the Injector cylinder 3 and EMS ecu, the resistance value should be less than 1 ohm. If the resistance found is out of range then replace wiring harness of injector. Check the resistance between two injector terminals it should be less than 4 ohms. 4. Check for fault codes - P0203 or P0269 or P2A50 or P2A51. If any of these faults appear then resolve these faults by following their rectification procedure. 4. Replace wiring harness if problem still persists. 5. Replace injector if problem still persists 6. Replace ECU if problem still persists.	
P0204	Injector Circuit/Open - Cylinder 4	1B	1. This DTC gets logged, if wiring harness resistance of Injector in cylinder 4 exceeds the upper threshold.	1. Check injector connector; Key off ignition and wait for 20 seconds. Disconnect the injector clean and reconnect properly. Check if problem vanishes. 2. Perform Injector cylinder 4 actuator tests with the help of I/O control command of injector cylinder 4. If this test fails then it is confirmed that there is some issue with either injector wiring harness/Injector itself. 3. Check the wiring harness resistance between the Injector cylinder 3 and	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				EMS ecu, the resistance value should be less than 1 ohm. If the resistance found is out of range then replace wiring harness of injector. Check the resistance between two injector terminals it should be less than 4 ohms. 4. Check for fault codes - P0204 or P0272 or P2A50 or P2A51. If any of these faults appear then resolve these faults by following their rectification procedure. 4. Replace wiring harness if problem still persists. 5. Replace injector if problem still persists 6. Replace ECU if problem still persists.	
P0202	Injector Circuit/Open - Cylinder 2	1B	1. This DTC gets logged, if wiring harness resistance of Injector in cylinder 2 exceeds the upper threshold.	1. Check injector connector; Key off ignition and wait for 20 seconds. Disconnect the injector clean and reconnect properly. Check if problem vanishes. 2. Perform Injector cylinder 2 actuator tests with the help of I/O control command of injector cylinder 2. If this test fails then it is confirmed that there is some issue with either injector wiring harness/Injector itself. 3. Check the wiring harness resistance between the Injector cylinder 3 and EMS ecu, the resistance value should be less than 1 ohm. If the resistance found is out of range then replace wiring harness of injector. Check the resistance between two injector terminals it should be less than 4 ohms. 4. Check for fault codes - P0202 or P0266 or PB147 or PB148. If any of these faults appear then resolve these faults by following their rectification procedure. 4. Replace wiring harness if problem still persists. 5. Replace injector if problem still persists 6. Replace ECU if problem still persists.	
P0201	Injector Circuit/Open - Cylinder 1	1A	1. This DTC gets logged, if wiring harness resistance of Injector in cylinder 1 is below the lower threshold.	1. Check injector connector; Key off ignition and wait for 20 seconds. Disconnect the injector clean and reconnect properly. Check if problem vanishes. 2. Perform Injector cylinder 1 actuator test with the help of I/O control command of injector cylinder 1. If this test fails then it is confirmed that there is some issue with either injector wiring harness/Injector itself. 3. Check the wiring harness resistance between the Injector cylinder 3 and EMS ecu, the resistance value should be less than 1 ohm. If the resistance found is out of range then replace wiring harness of injector. Check the resistance between two injector terminals it should be less than 4 ohms. 4. Check for fault codes - P0201 or P0263 or PB147 or PB148. If any of these faults appear then resolve these faults by following their rectification procedure. 4. Replace wiring harness if problem still persists. 5. Replace injector if problem still persists 6. Replace ECU if problem still persists.	
P0203	Injector Circuit/Open - Cylinder 3	1A	1. This DTC gets logged, if wiring harness resistance of Injector in cylinder 3 is below the lower threshold.	1. Check injector connector; Key off ignition and wait for 20 seconds. Disconnect the injector clean and reconnect properly. Check if problem vanishes. 2. Perform Injector cylinder 3 actuator tests with the help of I/O control command of injector cylinder 3. If this test fails then it is confirmed that there is some issue with either injector wiring harness/Injector itself. 3. Check the wiring harness resistance between the Injector cylinder 3 and	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				EMS ecu, the resistance value should be less than 1 ohm. If the resistance found is out of range then replace wiring harness of injector. Check the resistance between two injector terminals it should be less than 4 ohms. 4. Check for fault codes P0203 or P0269 or P2A50 or P2A51. If any of these faults appear then resolve these faults by following their rectification procedure. 4. Replace wiring harness if problem still persists. 5. Replace injector if problem still persists 6. Replace ECU if problem still persists.	
P0204	Injector Circuit/Open - Cylinder 4	1A	1. This DTC gets logged, if wiring harness resistance of Injector in cylinder 4 is below the lower threshold.	1. Check injector connector; Key off ignition and wait for 20 seconds. Disconnect the injector clean and reconnect properly. Check if problem vanishes. 2. Perform Injector cylinder 4 actuator tests with the help of I/O control command of injector cylinder 4. If this test fails then it is confirmed that there is some issue with either injector wiring harness/Injector itself. 3. Check the wiring harness resistance between the Injector cylinder 3 and EMS ecu, the resistance value should be less than 1 ohm. If the resistance found is out of range then replace wiring harness of injector. Check the resistance between two injector terminals it should be less than 4 ohms. 4. Check for fault codes P0204 or P0272 or P2A50 or P2A51. If any of these faults appear then resolve these faults by following their rectification procedure. 4. Replace wiring harness if problem still persists. 5. Replace injector if problem still persists 6. Replace ECU if problem still persists.	
P0202	Injector Circuit/Open - Cylinder 2	1A	1. This DTC gets logged, if wiring harness resistance of Injector in cylinder 2 is below the lower threshold.	1. Check injector connector; Key off ignition and wait for 20 seconds. Disconnect the injector clean and reconnect properly. Check if problem vanishes. 2. Perform Injector cylinder 2 actuator tests with the help of I/O control command of injector cylinder 2. If this test fails then it is confirmed that there is some issue with either injector wiring harness/Injector itself. 3. Check the wiring harness resistance between the Injector cylinder 3 and EMS ecu, the resistance value should be less than 1 ohm. If the resistance found is out of range then replace wiring harness of injector. Check the resistance between two injector terminals it should be less than 4 ohms. 4. Check for fault codes P0202 or P0266 or PB147 or PB148. If any of these faults appear then resolve these faults by following their rectification procedure. 4. Replace wiring harness if problem still persists. 5. Replace injector if problem still persists 6. Replace ECU if problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P268C	Cylinder 1 Injector Data Incompatible	56	This DTC gets logged due Injector C2I values are not learned for injector cylinder 1 to EMS ECU.	1. Rewrite the C2I values of the Injector cylinder 1 to EMS ECU by respecting power down and up delay. 2. Check electrical continuity between ECU to main power hold rely connector as per circuit schematics; Follow electrical continuity check procedure. 3. Check whether the main relay control pin of EMS ecu is Open circuit/short circuit to Vbatt. In case any short circuits/open circuits are found then rectify wiring harness connections. 4. If the problem still persists then replace EMS ecu.	
P268E	Cylinder 3 Injector Data Incompatible	56	This DTC gets logged due to the Injector C2I values are not learned for injector cylinder 3 to EMS ECU.	1. Rewrite the C2I values of the Injector cylinder 3 to EMS ECU by respecting power down and up delay. 2. Check electrical continuity between ECU to main power hold rely connector as per circuit schematics; Follow electrical continuity check procedure. 3. Check whether the main relay control pin of EMS ecu is Open circuit/short circuit to Vbatt. In case any short circuits/open circuits are found then rectify wiring harness connections. 4. If the problem still persists then replace EMS ecu.	
P268F	Cylinder 4 Injector Data Incompatible	56	This DTC gets logged due to the Injector C2I values are not learned for injector cylinder 4 to EMS ECU.	1. Rewrite the C2I values of the Injector cylinder 4 to EMS ECU by respecting power down and up delay. 2. Check electrical continuity between ECU to main power hold rely connector as per circuit schematics; Follow electrical continuity check procedure. 3. Check whether the main relay control pin of EMS ecu is Open circuit/short circuit to Vbatt. In case any short circuits/open circuits are found then rectify wiring harness connections. 4. If the problem still persists then replace EMS ecu.	
P268D	Cylinder 2 Injector Data Incompatible	56	This DTC gets logged due to the Cylinder 2 or Injector C2I values are not learned for injector cylinder 2 to EMS ECU.	1. Rewrite the C2I values of the Injector cylinder 2 to EMS ECU by respecting power down and up delay. 2. Check electrical continuity between ECU to main power hold rely connector as per circuit schematics; Follow electrical continuity check procedure. 3. Check whether the main relay control pin of EMS ecu is Open circuit/short circuit to Vbatt. In case any short circuits/open circuits are found then rectify wiring harness connections. 4. If the problem still persists then replace EMS ecu.	
P0604	Internal Control Module Random Access Memory (RAM) Error	44	This DTC gets logged due to EMS ECU Internal RAM failure	1. Check for any physical damage of EMS ECU pins, if found then replace EMS ECU. 2. Check for proper ground connection of EMS ECU; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is late. 4. Replace the EMS ecu if problem still persists	
P0830	Clutch Pedal Switch "A" Circuit	00	1. This Fault is a grouping fault for all clutch pedal switch related faults - P170A-2F, P170B-2F, and P083F-62.	1. As this fault comes along with P170A-2F, P170B-2F, and P083F-62. 2. Follow the rectification procedure of any of the above faults for solving this fault.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P170A	Clutch Pedal Position Sensor/Switch Maximum Stop Performance	2F	This fault gets logged if the EMS ECU doesn't detects any clutch transitions though the vehicle speed has crossed a maximum calibrated threshold of 80 kmph	1. Check whether the clutch pedal connector is connected or not. Refit the connector tightly. 2. Check the clutch switch setting; If the problem is with the clutch setting then perform the necessary repairs. 3. Check Electrical continuity between ECU pins B17 & B18 to clutch pedal connector as per circuit schematics; Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 4. Check whether either EMS ecu pins B17/B18 are short circuited to battery or ground. If so, then rectify wiring harness connections according to circuit schematics. 5. Check and replace ECU still problem persists. 6. After rectification ensure the following checks for clutch switches before handing over the vehicle to customer. A) When pedal is not pressed - Respective switch parameter in tata diagnostic tool should be less than 5%. B) When the pedal is fully pressed - Respective switch parameter in tata diagnostic tool should be more than 95 %.	
P170B	Clutch Pedal Position Sensor/Switch Minimum Stop Performance	2F	This fault gets logged if the EMS ECU doesn't detects any clutch transitions though the vehicle speed has crossed a maximum calibrated threshold of 80 kmph	1. Check whether the clutch pedal connector is connected or not. Refit the connector tightly. 2. Check the clutch switch setting; If the problem is with the clutch setting then perform the necessary repairs. 3. Check Electrical continuity between ECU pins B17 & B18 to clutch pedal connector as per circuit schematics; Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 4. Check whether either EMS ecu pins B17/B18 are short circuited to battery or ground. If so, then rectify wiring harness connections according to circuit schematics. 5. Check and replace ECU still problem persists. 6. After rectification ensure the following checks for clutch switches before handing over the vehicle to customer. A) When pedal is not pressed - Respective switch parameter in tata diagnostic tool should be less than 5%. B) When the pedal is fully pressed - Respective switch parameter in tata diagnostic tool should be more than 95 %.	
P083F	Clutch Pedal Switch "A" / "B" Correlation	62	This fault gets logged if EMS ECU finds a mismatch between the two clutch pedal inputs to EMS ECU.	1. Check whether the clutch pedal connector is connected or not. Refit the connector tightly. 2. Check the clutch switch setting; If the problem is with the clutch setting then perform the necessary repairs. 3. Check Electrical continuity between ECU pins B17 & B18 to clutch pedal connector as per circuit schematics; Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 4. Check whether either EMS ecu pins B17/B18 are short circuited to battery or ground. If so, then rectify wiring harness connections according to circuit schematics. 5. Check and replace ECU still problem persists. 6. After rectification ensure the following checks for clutch switches before handing over the vehicle to customer. A) When pedal is not pressed - Respective switch parameter in tata diagnostic tool should be less than 5%.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				B) When the pedal is fully pressed - Respective switch parameter in tata diagnostic tool should be more than 95 %.	
P0A15	Engine Coolant Temperature Sensor 1 Circuit	64	1. EMS ECU performs coolant temperature plausibility check if the following conditions are met: - there is no coolant sensor fault - and the engine has run during at least minimum elapsed time in Running for plausibility diagnosis	1. Check Sensor connector. If removed refit the connector. 2. Check continuity between ECU pins A45 and A09 to coolant temperature sensor connector pins 2 & 1 respectively and rectify wiring harness if any short circuit to GND/Short circuit to Vbatt/open circuit is found. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 3. Clean the sensor connections and ensure proper fitment. 4. Check Sensor Characteristics (measure voltage and resistance at sensor terminals) Sensor voltage should be 5 V and resistance as given is specifications; Replace sensor if found faulty 5. Check ECU; Replace ECU; if problem still persists. 6. After rectification if possible carry out following check Soak the vehicle for more than 12 hrs (preferably over night) Then check if all the system temperature values (coolant, fuel, inlet air) are close to each other.	
P0A15	Engine Coolant Temperature Sensor 1 Circuit	15	ECU detects Engine coolant temperature sensor circuit high if the detected coolant temperature is upper than the referenced maximum coolant temperature value due to Sensor signal pin open circuit / Short circuit to battery.	1. Check Sensor connector. If removed refit the connector. 2. Check continuity between ECU pins A45 and A09 to coolant temperature sensor connector pins 2 & 1 respectively and rectify wiring harness if any short circuit to GND/Short circuit to Vbatt/open circuit is found. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 3. Clean the sensor connections and ensure proper fitment. 4. Check Sensor Characteristics (measure voltage and resistance at sensor terminals) Sensor voltage should be 5 V and resistance as given is specifications; Replace sensor if found faulty 5. Check ECU; Replace ECU; if problem still persists. 6. After rectification if possible carry out following check Soak the vehicle for more than 12 hrs (preferably over night) Then check if all the system temperature values (coolant, fuel, inlet air) are close to each other.	
P0A15	Engine Coolant Temperature Sensor 1 Circuit	11	ECU detects Engine coolant temperature sensor circuit high if the detected coolant temperature is less than the referenced minimum coolant temperature value due to Sensor signal pin short circuit to GND.	1. Check Sensor connector. If removed refit the connector. 2. Check continuity between ECU pins A45 and A09 to coolant temperature sensor connector pins 2 & 1 respectively and rectify wiring harness if any short circuit to GND/Short circuit to Vbatt/open circuit is found. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 3. Clean the sensor connections and ensure proper fitment. 4. Check Sensor Characteristics (measure voltage and resistance at sensor terminals) Sensor voltage should be 5 V and resistance as given is specifications; Replace sensor if found faulty 5. Check ECU; Replace ECU; if problem still persists. 6. After rectification if possible carry out following check Soak the vehicle for more than 12 hrs (preferably over night) Then check if all the system temperature values (coolant, fuel, inlet air) are close to each other.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0A15	Engine Coolant Temperature Sensor 1 Circuit	00	1. This fault is a grouping fault for all coolant temperature sensor faults - P0A15-64, P0A15-13, and P0A15-11.	1. As this fault comes along with any of the faults - P0A15-64, P0A15-13, and P0A15-11. 2. Follow the rectification procedure of any of the above mentioned faults to rectify this fault.	
PA710	Dual Mass Fly wheel	07	This fault is logged by EMS ECU if it detects any DMF resonance while engine starting or stopping condition.	1. Check for any physical damages of flywheel. 2. Replace the flywheel if it is damaged badly, so that it is unable to smoothen the engine vibrations.	
P042A	Catalyst Temperature Sensor Circuit ,Bank 1, Sensor 2	00	1. This fault is a grouping fault for all DOC temperature output sensor faults - P042A-15, P042A-64, P042A-11,P042A-2F	1. As this fault comes along with any of the faults - P042A-15, P042A-64, P042A-11, and P042A-2F. 2. Follow the rectification procedure of any of the above mentioned faults to rectify this fault.	
P042A	Catalyst Temperature Sensor Circuit, Bank 1, Sensor 2	15	ECU set this fault of catalyst temperature sensor circuit high if following condition takes place:- 1. DOC temp out signal pin is short circuited to Vbatt or Open circuited	1. Check the continuity between the EMS ecu pins A06 & A23 to the DOC temp out sensor connector pins. Rectify if any issues found. 2. Check wiring harness connections between the EMS ecu and the DOC temp out sensor and rectify if any wrong connections/splices are found. 3. Check whether the DOC temp out sensor signal pin A06 is Short circuited to battery. If So, rectify the wring harness connections of DOC temp out sensor. 4. Check for rust/dirt on the sensor connector. If any dirt/rust found then clean and refit the connector. 5. Check for any damage on EMS ecu pins and Sensor connector pins. 6. Replace the sensor if the problem still persists. 7. Replace the EMS ecu if the problem still persists.	
P042A	Catalyst Temperature Sensor Circuit, Bank 1, Sensor 2	64	This fault gets logged If the DOC temp value is greater than calibratable threshold (A882 Adcnts, according to existing calibration) from starting/crank on and the DOC out temp doesn't vary for some threshold time after engine starts running.	1. Check the continuity between the EMS ecu pins A06 & A23 to the DOC temp out sensor connector pins. Rectify if any issues found. 2. Check wiring harness connections between the EMS ecu and the DOC temp out sensor and rectify if any wrong connections/splices are found. 3. Check whether the DOC temp out sensor signal pin A06 is Short circuited to battery. If So, rectify the wring harness connections of DOC temp out sensor. 4. Check for rust/dirt on the sensor connector. If any dirt/rust found then clean and refit the connector. 5. Check for any damage on EMS ecu pins and Sensor connector pins. 6. Replace the sensor if the problem still persists. 7. Replace the EMS ecu if the problem still persists.	
P042A	Catalyst Temperature Sensor Circuit, Bank 1, Sensor 2	11	ECU set this fault of catalyst temperature sensor circuit high if following condition takes place:- 1. DOC temp out signal pin is short circuited to ground	1. Check the continuity between the EMS ecu pins A06 & A23 to the DOC temp out sensor connector pins. Rectify if any issues found. 2. Check wiring harness connections between the EMS ecu and the DOC temp out sensor and rectify if any wrong connections/splices are found. 3. Check whether the DOC temp out sensor signal pin A06 is Short circuited to battery. If So, rectify the wring harness connections of DOC temp out sensor. 4. Check for rust/dirt on the sensor connector. If any dirt/rust found then clean and refit the connector. 5. Check for any damage on EMS ecu pins and Sensor connector pins. 6. Replace the sensor if the problem still persists. 7. Replace the EMS ecu if the problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P042A	Catalyst Temperature Sensor Circuit, Bank 1, Sensor 2	2F	This DTC gets logged If the difference between the filtered temperature value(first order filter used inside the EMS ECU for filtering sensor input) and raw temperature value from sensor is greater than some calibrated maximum threshold value due to noise	1. Check the continuity between the EMS ecu pins A06 & A23 to the DOC temp out sensor connector pins. Rectify if any issues found. 2. Check wiring harness connections between the EMS ecu and the DOC temp out sensor and rectify if any wrong connections/splices are found. 3. Check whether the DOC temp out sensor signal pin A06 is Short circuited to battery. If So, rectify the wring harness connections of DOC temp out sensor. 4. Check for rust/dirt on the sensor connector. If any dirt/rust found then clean and refit the connector. 5. Check for any damage on EMS ecu pins and Sensor connector pins. 6. Replace the sensor if the problem still persists. 7. Replace the EMS ecu if the problem still persists.	
P060B	Internal Control Module A/D Processing Performance	49	This DTC gets logged due to the failure in Analog digital converter of EMS ECU	1. Check for any physical damage of EMS ECU pins, if found then replace EMS ECU. 2. Check for proper ground connection of EMS ECU; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is late	
P042A	Catalyst Temperature Sensor Circuit, Bank 1, Sensor 2	62	This fault gets logged if The absolute difference between real After-DOC temperature and estimated raw After-DOC temperature is not below a calibrated threshold value in normal Engine operating condition.	1. Check the continuity between the EMS ecu pins A06 & A23 to the DOC temp out sensor connector pins. Rectify if any issues found. 2. Check wiring harness connections between the EMS ecu and the DOC temp out sensor and rectify if any wrong connections/splices are found. 3. Check whether the DOC temp out sensor signal pin A06 is Short circuited to battery. If So, rectify the wring harness connections of DOC temp out sensor. 4. Check for rust/dirt on the sensor connector. If any dirt/rust found then clean and refit the connector. 5. Check for any damage on EMS ecu pins and Sensor connector pins. 6. Replace the sensor if the problem still persists. 7. Replace the EMS ecu if the problem still persists.	
P2002	Particulate Filter Efficiency Below Threshold	7A	If the DPF is leaking somehow, the differential pressure or normalized differential pressure (soot ash index) would drop to values smaller than the pressure drop of a clean new filter in some cases (i.e. after regeneration). If the soot ash index drops b	1. Check for any physical damages of DPF, which is leading to DPF leaking. 2. If possible, seal the DPF leak area else replace with a new DPF (Leak before the filter or on the filter itself). 3. Try to perform filter regeneration : warm engine (5min) then launch regeneration cycle and drive necessary time 4. Replace DPF if problem still persists. Replace the EMS ecu if the problem still persists.	
P249F	Excessive Time To Enter Closed Loop Particulate Filter Regeneration Control	00	This fault is a grouping fault for the following faults P2002-95,P2463-97	1. As this fault logs along with any of the faults- P2002-95, P2463-97. 2. Follow the rectification procedure of any of the above faults for resolving this fault.	
P2002	Diesel Particulate Filter Efficiency Below Threshold	95	This fault gets logged if the inlet and outlet pipe/tube connections of Delta pressure sensor are reversed	1. Check the correctness of Inlet and outlet pipe/tube mechanical connections of Delta pressure sensor. 2. Rectify the mechanical connections if any issue is found. 3. Try to perform filter regeneration : warm engine (5min) then launch regeneration cycle and drive necessary time 4. Replace the EMS ecu if the problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P2463	Particulate Filter Restriction - Soot Accumulation	97	This Fault gets logged if the delta pressure sensor inlet tube is blocked	1. Check for blockage of inlet pipe/tube of Delta pressure sensor. 2. Clean the blockage and reconnect the tube. 3. Try to perform filter regeneration: warm engine (5min) then launch regeneration cycle and drive necessary time 4. Replace the EMS ECU if t	
P2463	Particulate Filter Restriction - Soot Accumulation	64	This fault gets logged if the Delta pressure sensor signal is found implausible (out of the calibrated threshold range) by EMS ECU at any of the engine operating conditions.	1. Check for any fault corresponding to Intake air or rail pressure system. If present then rectify them by following its rectification procedure. Check the continuity between the EMS ecu pins A66,A44 & A14 to the DPF sensor connector pins. Rectify if any issues found. 2. Check wiring harness connections between the EMS ecu and the DPF sensor and rectify wiring harness connections if any short circuits to battery/open circuit/short circuit to ground of DPF sensor signal pin A14 are found. 3. Check for rust/dirt on the sensor connector. If any dirt/rust found then clean and refit the connector. 4. Check for any damage on EMS ecu pins A66,A44 & A14 and Sensor connector pins. 5. Replace the sensor if the problem still persists. 6. Try to perform filter regeneration : warm engine (5min) then launch regeneration cycle and drive necessary time 7. Replace the EMS ecu if the problem still persists.	
P2452	Particulate Filter Pressure Sensor "A" Circuit	00	This fault is a grouping fault for all DPF sensor related faults: P2452-1C, P2452-15, and P2452-11.	1. As this fault logs along with any of the following faults - P2452-1C, P2452-15, and P2452-11. 2. Follow the rectification procedure of any of the above faults appearing with this fault for resolving this fault.	
P2452	Particulate Filter Pressure Sensor "A" Circuit	1C	This fault gets logged if the DPF sensor is not receiving proper Voltage supply from EMS ECU reference voltage supply 2.	1. Check for the EMS ECU reference voltage supply fault P0651. 2. Follow the rectification procedure of P0651 for rectifying this fault.	
P2452	Particulate Filter Pressure Sensor "A" Circuit	15	ECU logs this fault when the DP sensor input value is greater than calibrated maximum threshold value for DP input. The main reason for this fault occurrence is DP sensor signal pin is Short circuited to battery / open circuit.	1. Check the continuity between the EMS ecu pins A66,A44 & A14 to the DPF sensor connector pins. Rectify wiring harness connections if any issues found. 2. Check wiring harness connections between the EMS ecu and the DPF sensor and rectify if any short circuit to battery/open circuit of DPF sensor signal pin A14 are found. 3. Check for rust/dirt on the sensor connector. If any dirt/rust found then clean and refit the connector. 4. Check for any damage on EMS ecu pins A66,A44 & A14 and Sensor connector pins. Replace sensor connector if sensor connector pins are damaged. 4. Replace the sensor if the problem still persists. 5. Replace the EMS ecu if the problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P2452	Particulate Filter Pressure Sensor "A" Circuit	11	1. ECU logs this fault when the DP sensor input value is less than calibrated minimum threshold value for DP input. The main reason for this fault occurrence is DP sensor signal pin is Short circuited to Ground.	1. Check the continuity between the EMS ecu pins A66,A44 & A14 to the DPF sensor connector pins. Rectify wiring harness connections if any issues found. 2. Check wiring harness connections between the EMS ecu and the DPF sensor and rectify if any short circuit to battery/open circuit of DPF sensor signal pin A14 are found. 3. Check for rust/dirt on the sensor connector. If any dirt/rust found then clean and refit the connector. 4. Check for any damage on EMS ecu pins A66,A44 & A14 and Sensor connector pins. Replace sensor connector if sensor connector pins are damaged. 4. Replace the sensor if the problem still persists. 5. Replace the EMS ecu if the problem still persists.	
P24A4	Particulate Filter Restriction - Soot Accumulation Too High	93	1. This fault gets logged if the diesel particulate filter is completely filled with soot particles.	1. Try to perform filter regeneration : warm engine (5min) then launch regeneration cycle and drive necessary time 2. If the problem still persists then remove the DPF from the vehicle and burn it in an oven for burning soot particles and refit on the vehicle. 3. If the problem still persists then replace DPF 4. Replace the EMS ecu if the problem still persists.	
P2463	Particulate Filter Restriction - Soot Accumulation	97	EMS ECU detects this fault under the following conditions 1. Ash accumulation / amount of soot in the DPF become abnormally high and do overload the filter. ECU then logs a fault and adapts the regeneration immediately	1. Try to perform filter regeneration : warm engine (5min) then launch regeneration cycle and drive necessary time 2. If the problem still persists then remove the DPF from the vehicle and burn it in an oven for burning soot particles and refit on the vehicle. 3. If the problem still persists then replace DPF 4. Replace the EMS ecu if the problem still persists.	
P2463	Particulate Filter Restriction - Soot Accumulation	97	1. Ash accumulation / amount of soot in the DPF become abnormally high and do plug the filter. ECU then logs a fault and adapts the regeneration immediately	1. Try to perform filter regeneration : warm engine (5min) then launch regeneration cycle and drive necessary time 2. If the problem still persists then remove the DPF from the vehicle and burn it in an oven for burning soot particles and refit on the vehicle. 3. If the problem still persists then replace DPF 4. Replace the EMS ecu if the problem still persists.	
P2459	Particulate Filter Regeneration Frequency	92	EMS ECU detects DPF regeneration frequency fault while adapting following strategy- The average regeneration duration and the average regeneration mileage intervals are calculated over the last value of the total number of history for excessive regeneration	1. Check DPF for soot accumulation and if soot accumulation is high then try to perform filter regeneration : warm engine (5min) then launch regeneration cycle and drive necessary time 2. If the problem still persists then remove the DPF from the vehicle and burn it in an oven for burning soot particles and refit on the vehicle. 3. If the problem still persists then replace DPF 4. Replace the EMS ecu if the problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0685	ECM/PCM Power Relay Control Circuit	13	ECU detects ECM/PCM power relay control circuit open fault if following condition takes place - 1. If a reset occurs but is not due to ESM strategy or shutdown strategy, the dropout cu relay fault is raised.	1. Check whether the fuse of main relay is blown off, if so then replace it. Check the Main relay contacts; If any contact weld is found then Replace Main relay. 2. Check electrical continuity between ECU to main power hold rely connector as per circuit schematics; Follow electrical continuity check procedure. Replace/rectify harness if required. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 3. Check whether the main relay control pin of EMS ecu is Open circuit/short circuit to Vbatt. In case any short circuits/open circuits are found then rectify wiring harness connections. 4. Check & replace the ECU if the problem persists.	
P245A	EGR Cooler Bypass Control Circuit	13	1. This fault gets logged the EGR cooler bypass control pin of EMS ECU is open circuited.	1. Check fuse connected to ECU main relay and +ve voltage of battery supply and ensure its functioning properly. Replace if found faulty. 2. Check the continuity between the EMS ecu pin A88 to the DPF sensor connector pins. Rectify wiring harness connections if any issues found. 3. Check for rust/dirt on the sensor connector. If any dirt/rust found then clean and refit the connector. 4. Check for any damage on EMS ecu pin A88 and Sensor connector pins. Replace sensor connector if sensor connector pins are damaged. 5. Replace the sensor if the problem still persists. 6. Replace the EMS ecu if the problem still persists.	
P245A	EGR Cooler Bypass Control Circuit	11	1. This fault gets logged if the cooler bypass control pin of EMS ecu is short circuited to Ground	1. Check fuse connected to ECU main relay and +ve voltage of battery supply and ensure its functioning properly. Replace if found faulty. 2. Check the continuity between the EMS ecu pin A88 to the DPF sensor connector pins. Rectify wiring harness connections if any issues found. 3. Check whether the EMS ecu pin A88 is short circuited to ground. If so, then rectify the wiring harness connections. 4. Check for rust/dirt on the sensor connector. If any dirt/rust found then clean and refit the connector. 5. Check for any damage on EMS ecu pin A88 and Sensor connector pins. Replace sensor connector if sensor connector pins are damaged. 6. Replace the sensor if the problem still persists. 7. Replace the EMS ecu if the problem still persists.	
P245A	EGR Cooler Bypass Control Circuit	12	1. This fault gets logged if the cooler bypass control pin of EMS ecu is short circuited to battery	1. Check fuse connected to ECU main relay and +ve voltage of battery supply and ensure its functioning properly. Replace if found faulty. 2. Check the continuity between the EMS ecu pin A88 to the DPF sensor connector pins. Rectify wiring harness connections if any issues found. 3. Check whether the EMS ecu pin A88 is short circuited to ground. If so, then rectify the wiring harness connections. 4. Check for rust/dirt on the sensor connector. If any dirt/rust found then clean and refit the connector. 5. Check for any damage on EMS ecu pin A88 and Sensor connector pins. Replace sensor connector if sensor connector pins are damaged. 6. Replace the sensor if the problem still persists. 7. Replace the EMS ecu if the problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0489	EGR "A" Control Circuit Low	19	EMS ECU detects EGR current limitation fault if following condition is true: - 1. Current taken by EGR unit is either higher or lower than specified calibratable limits	1. Check the electrical continuity between the EMS ecu pins A83 and A84 to the EGR valve DC motor connector. Rectify if any wiring harness connectivity issues are found. 2. Check for rust/dirt on the connector and clean it if any rust/dirt found. 3. Check whether EMS ecu pins A83 & A84 are either short circuited to vbatt/ground/short circuited across. If so, then rectify the wiring harness connections to make them inline with circuit schematics. 4. Remove the Actuator, Check the resistance across the actuator positive and negative terminals, if the resistance is not in design specified range then replace EGR actuator. 5. Check ECU pins for any damage. 6. If problem still persists then change Motorized EGR valve. 7. If problem still persists then replace ECU.	
P0403	EGR "A" Control Circuit/Open	13	EMS ECU detects this fault if the following condition is true: - 1. EGR actuator H bridge drive pins of EMS ecu are open circuited	1. Check the electrical continuity between the EMS ecu pins A83 and A84 to the EGR valve DC motor connector. Rectify if any wiring harness connectivity issues are found. 2. Check for rust/dirt on the connector and clean it if any rust/dirt found. 3. Check whether EMS ecu pins A83 & A84 are either short circuited to vbatt/ground/short circuited across. If so, then rectify the wiring harness connections to make them inline with circuit schematics. 4. Remove the Actuator, Check the resistance across the actuator positive and negative terminals, if the resistance is not in design specified range then replace EGR actuator. 5. Check ECU pins for any damage. 6. If problem still persists then change Motorized EGR valve. 7. If problem still persists then replace ECU.	
P0403	EGR "A" Control Circuit/Open	4B	EMS ECU detects this fault if the following condition is true: - 1. Over temperature fault on the actuator drive is set	1. Check whether EMS ecu pins A83 & A84 are short circuited across/Short circuited to Battery/Short circuited to ground. If so, then rectify the wiring harness connections. 2. Visually check the device for mechanical damage; Incase of mechanical damage replace EGR actuator. 3. Remove the Actuator, Check the resistance across the actuator positive and negative terminals, if the resistance is not in design specified range then replace EGR actuator. 4. Check ECU pins for any damage. 5. If problem still persists then change Motorized EGR valve. 6. If problem still persists then replace ECU.	
P0403	EGR "A" Control Circuit/Open	2B	EMS ECU detects this fault if the following condition is true: - 1. EGR actuator H bridge drive pins are short circuited across.	1. Check the electrical continuity between the EMS ecu pins A83 and A84 to the EGR valve DC motor connector. Rectify if any wiring harness connectivity issues are found. 2. Check for rust/dirt on the connector and clean it if any rust/dirt found. 3. Check whether EMS ecu pins A83 & A84 are either short circuited to vbatt/ground/short circuited across. If so, then rectify the wiring harness connections to make them inline with circuit schematics. 4. Remove the Actuator, Check the resistance across the actuator positive and negative terminals, if the resistance is not in design specified range then replace EGR actuator. 5. Check ECU pins for any damage.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				6. If problem still persists then change Motorized EGR valve. 7. If problem still persists then replace ECU.	
P0489	EGR "A" Control Circuit Low	11	EMS ECU detects this fault if the following condition is true: - 1. Any of EGR actuator H bridge drive pins of EMS ecu are short circuited to ground.	1. Check the electrical continuity between the EMS ecu pins A83 and A84 to the EGR valve DC motor connector. Rectify if any wiring harness connectivity issues are found. 2. Check for rust/dirt on the connector and clean it if any rust/dirt found. 3. Check whether EMS ecu pins A83 & A84 are either short circuited to vbatt/ground/short circuited across. If so, then rectify the wiring harness connections to make them inline with circuit schematics. 4. Remove the Actuator, Check the resistance across the actuator positive and negative terminals, if the resistance is not in design specified range then replace EGR actuator. 5. Check ECU pins for any damage. 6. If problem still persists then change Motorized EGR valve. 7. If problem still persists then replace ECU.	
P048A	EGR "A" Control Circuit High	12	EMS ECU detects this fault if the following condition is true: - 1. Any of EGR actuator H bridge drive pins of EMS ecu are short circuited to battery.	1. Check the electrical continuity between the EMS ecu pins A83 and A84 to the EGR valve DC motor connector. Rectify if any wiring harness connectivity issues are found. 2. Check for rust/dirt on the connector and clean it if any rust/dirt found. 3. Check whether EMS ecu pins A83 & A84 are either short circuited to vbatt/ground/short circuited across. If so, then rectify the wiring harness connections to make them inline with circuit schematics. 4. Remove the Actuator, Check the resistance across the actuator positive and negative terminals, if the resistance is not in design specified range then replace EGR actuator. 5. Check ECU pins for any damage. 6. If problem still persists then change Motorized EGR valve. 7. If problem still persists then replace ECU.	
P0487	EGR Throttle Control Circuit "A" /Open	16	EMS ECU detects this fault if the following condition is true: - 1. Under voltage fault on the actuator drive is set	1. Check if the correct battery is fitted. Replace battery if wrong battery is installed. 2. Check & ensure main power hold rely is working properly and its circuit connections are inline with Circuit schematics. Check fuse connected to main relay and ensure its working properly. Replace if found faulty. 3. Check and ensure whether the battery terminal's are connected properly and they are tight. 4. Check the charging circuit; Rectify the charging circuit if faulty. 5. Check ECU pin no 6,2 & 4 are getting ground connection and 1,3 & 5 are connected to battery positive – 12 V supply. Check the resistance between the vehicle chassis ground and ECU ground. If the resistance is too high then fix the ecu ground. 6. Remove the Actuator, Check the resistance across the actuator positive and negative terminals, if the resistance is not in design specified range then replace EGR actuator. 7. Replace EGR actuator if problem still persists. 8. Check ECU; Replace ECU if problem still persists. 9. Confirmatory check after rectification Check battery voltage in diagnostic tool. A) Reading should be close to 12 V if alternator is not charging.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				B) Reading should be close to 14 V if alternator is charging	
P0402	EGR "A" Flow Excessive Detected	22	1. This DTC gets logged if the difference between the EGR demand and the EGR feedback is higher than a calibrated error threshold.	1. Check the electrical continuity between the EMS ecu pins A83 and A84 to the EGR valve DC motor connector. Rectify if any wiring harness connectivity issues are found. 2. Check for rust/dirt on the connector and clean it if any rust/dirt found. 3. Check whether EMS ecu pins A83 & A84 are either short circuited to vbatt/ground/short circuited across. If so, then rectify the wiring harness connections. 4. Check the continuity between the EMS ecu pins A65, A16,A20 and the motorized EGR actuator connector pins 3, 5 & 4. Rectify if any issues found. Check for any reference voltage supply 3 faults (P0697), if so then follow the rectification procedure of those faults. 5. Check whether the EMS ecu feedback sensor signal pin A16 is short circuited to battery supply/Ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 6. Check sensor for oxidation, rust etc, if observed clean deposit. 7. Check for rust/dirt accumulated on the sensor connector, if found clean the connector and refit it. 8. Check the air inlet circuit and air filter, if they are clogged then clean them. 9. If still problem persists then replace the motorized EGR actuator. 10. If still problem persists then replace the EMS ecu. 11. Ensure whether the EGR demand and feedback parameters are matching before handing the vehicle to customer.	
P0401	EGR "A" Flow Insufficient Detected	21	1. This DTC gets logged if the difference between the EGR demand and the EGR feedback is lower than a calibrated error threshold.	1. Check the electrical continuity between the EMS ecu pins A83 and A84 to the EGR valve DC motor connector. Rectify if any wiring harness connectivity issues are found. 2. Check for rust/dirt on the connector and clean it if any rust/dirt found. 3. Check whether EMS ecu pins A83 & A84 are either short circuited to vbatt/ground/short circuited across. If so, then rectify the wiring harness connections. 4. Check the continuity between the EMS ecu pins A65, A16,A20 and the motorized EGR actuator connector pins 3, 5 & 4. Rectify if any issues found. Check for any reference voltage supply 3 faults (P0697), if so then follow the rectification procedure of those faults. 5. Check whether the EMS ecu feedback sensor signal pin A16 is short circuited to battery supply/Ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 6. Check sensor for oxidation, rust etc, if observed clean deposit. 7. Check for rust/dirt accumulated on the sensor connector, if found clean the connector and refit it. 8. Check the air inlet circuit and air filter, if they are clogged then clean them. 9. If still problem persists then replace the motorized EGR actuator. 10. If still problem persists then replace the EMS ecu. 11. Ensure whether the EGR demand and feedback parameters are matching before handing the vehicle to customer.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0406	EGR Sensor "A" Circuit High	12	ECU detects Exhaust Gas Recirculation Sensor “A” Circuit High fault if the EGR Feedback position information signal is crossed the maximum valid raw EGR sensor value due to the sensor signal pin of EMS ecu is short circuited to battery supply.	1. Check the continuity between the EMS ecu pins A65, A16,A20 and the motorized EGR actuator connector pins 3, 5 & 4. Rectify if any issues found. Check for any reference voltage supply 3 faults (P0697), if so then follow the rectification procedure of those faults. 2. Check whether the EMS ecu feedback sensor signal pin A16 is short circuited to battery supply due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check sensor for oxidation, rust etc, if observed clean deposit. 4. Check for rust/dirt accumulated on the sensor connector, if found clean the connector and refit it. 5. If still problem persists then replace the motorized EGR actuator. 6. If still problem persists then replace the EMS ecu. 7. Ensure whether the EGR demand and feedback parameters are matching before handing the vehicle to customer.	
P0405	EGR Sensor "A" Circuit Low	14	ECU detects Exhaust Gas Recirculation Sensor “A” Circuit Low fault if the EGR Feedback position information signal is crossed the minimum valid raw EGR sensor value due to the sensor signal pin of EMS ecu is short circuited to ground/open circuited from wiring harness connections.	1. Check the continuity between the EMS ecu pins A65, A16,A20 and the motorized EGR actuator connector pins 3, 5 & 4. Rectify if any issues found. Check for any reference voltage supply 3 faults (P0697), if so then follow the rectification procedure of those faults. 2. Check whether the EMS ecu feedback sensor signal pin A16 is short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check sensor for oxidation, rust etc, if observed clean deposit. 4. Check for rust/dirt accumulated on the sensor connector, if found clean the connector and refit it. 5. If still problem persists then replace the motorized EGR actuator. 6. If still problem persists then replace the EMS ecu. 7. Ensure whether the EGR demand and feedback parameters are matching before handing the vehicle to customer.	
P0403	EGR "A" Control Circuit/Open	00	1. This fault is a grouping fault for all EGR H bridge drive related faults - P0489-19,P0403-4B, P0403-2B, P0489-11,P048A-12, P0487-16.	1. As this fault logged along with any of the following faults - P0489-19, P0403-4B, P0403-2B, P0489-11, P048A-12, and P0487-16. 2. Follow the rectification procedure of any of the above mentioned faults for solving this fault.	
P049D	EGR "A" Control Position Exceeded Learning Limit	54	1. This fault gets logged if the fault learning of the motorized EGR actuator is either wrongly done / not done.	1. Relearn the Motorized EGR actuator. 2. If the problem still persists then replace Motorized EGR actuator. 3. If the problem still persists then replace EMS ecu.	
P049D	EGR "A" Control Position Exceeded Learning Limit	62	1. This fault gets logged if the deviation between the current learning and the first learning for closed position of EGR actuator is greater than a maximum calibrated threshold.	1. Relearn the Motorized EGR actuator. 2. If the problem still persists then replace Motorized EGR actuator. 3. If the problem still persists then replace EMS ecu.	
P049D	EGR "A" Control Position Exceeded Learning Limit	62	1. This fault gets logged if the deviation between the current learning and the previous learning for closed position of EGR actuator is greater than a maximum calibrated threshold.	1. Relearn the Motorized EGR actuator. 2. If the problem still persists then replace Motorized EGR actuator. 3. If the problem still persists then replace EMS ecu.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P046C	EGR Sensor "A" Circuit Range/Performance	92	This fault gets logged if difference between 'Corrected EGR valve position demand' and 'EGR valve position corrected with the "zero position" offset' is over a threshold during a calibratable time.	1. Check the electrical continuity between the EMS ecu pins A83 and A84 to the EGR valve DC motor connector. Rectify if any wiring harness connectivity issues are found. 2. Check for rust/dirt on the connector and clean it if any rust/dirt found. 3. Check whether EMS ecu pins A83 & A84 are either short circuited to vbatt/ground/short circuited across. If so, then rectify the wiring harness connections. 4. Check the continuity between the EMS ecu pins A65, A16,A20 and the motorized EGR actuator connector pins 3, 5 & 4. Rectify if any issues found. Check for any reference voltage supply 3 faults (P0697), if so then follow the rectification procedure of those faults. 5. Check whether the EMS ecu feedback sensor signal pin is short circuited to battery supply/Ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 6. Check sensor for oxidation, rust etc, if observed clean deposit. 7. Check for rust/dirt accumulated on the sensor connector, if found clean the connector and refit it. 8. If still problem persists then replace the motorized EGR actuator. 9. If still problem persists then replace the EMS ecu. 10. Ensure whether the EGR demand and feedback parameters are matching before handing the vehicle to customer.	
P042E	EGR "A" Control Stuck Open	72	This fault gets logged if EMS ecu detects that the EGR valve is stuck open	1. Check EGR valve for mechanical stuck issues 2. Visually check the device for mechanical damage. Report the observations on mechanical damage. 3. Replace the EGR actuator valve. 4. Replace the EMS ecu if the problem still persists.	
P2100	Throttle Actuator "A" Control Motor Circuit/Open	00	This fault is a grouping fault for all Throttle actuator drive faults: P2100-19,P2100-18,P2100-13,P2100-4B,P2100-2B,P4100-11,P2100-12,P061F-16	1. As this fault logs along with any of the following faults: P2100-19, P2100-18, P2100-13, P2100-4B, P2100-2B, P4100-11, P2100-12, and P061F-16. 2. Follow the rectification procedure of any of the above mentioned faults with which this fault appeared for rectifying this fault.	
P2100	Throttle Actuator "A" Control Motor Circuit/Open	19	This fault gets logged if the EMS ecu applies Current limitation on throttle actuator drive	1. Check the electrical continuity between the EMS ecu pins A92,A93 to the throttle actuator connector pins 5 & 4. Rectify if any issues like open circuits/short circuit to Ground/Battery of throttle actuator drive pins A92,A93 are found. 2. Ensure that there is no dirt/rust is deposited on the connector. 3. Check whether the wiring harness connections between the EMS ecu and the throttle actuator connector are as per circuit schematics. Remove if any splices are found which are not mentioned in circuit schematics. 4. Check the throttle actuator for any mechanical stuck issues or mechanical blockage issues. 5. If any blockage is found then clear the blockages in actuator. 6. If problem still persists then replace throttle actuator. 7.If problem still persists then replace the EMS ecu 8. Ensure the throttle actuator demand and feedback parameters are matching before handing the vehicle to customer.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P2100	Throttle Actuator "A" Control Motor Circuit/Open	13	1. This fault gets logged if the Throttle actuator drive circuit is open.	1. Check the electrical continuity between the EMS ecu pins A92,A93 to the throttle actuator connector pins 5 & 4. Rectify if any issues like open circuits/short circuits of throttle actuator drive pins A92,A93 are found. 2. Ensure that there is no dirt/rust is deposited on the connector. 3. Check whether the wiring harness connections between the EMS ecu and the throttle actuator connector are as per circuit schematics. Remove if any splices are found which are not mentioned in circuit schematics. 4. If problem still persists then replace throttle actuator. 5.If problem still persists then replace the EMS ecu 6. Ensure the throttle actuator demand and feedback parameters are matching before handing the vehicle to customer	
P2100	Throttle Actuator "A" Control Motor Circuit/Open	4B	EMS ECU detects Throttle valve faults if any of the following conditions are true: - 1: Over temperature fault on the actuator drive is set.	1. Check the throttle actuator for any mechanical stuck issues or mechanical blockage issues. 2. If any blockage is found then clear the blockages in actuator. 3. If the problem still persists then replace throttle actuator. 4.If the problem still persists	
P2100	Throttle Actuator "A" Control Motor Circuit/Open	2B	1.This fault gets logged if the Throttle actuator drive pins are short circuited across	1. Check the electrical continuity between the EMS ecu pins A92, A93 to the throttle actuator connector pins 5 & 4. Rectify if any issues like open circuits/short circuits of throttle actuator drive pins A92, A93 are found. 2. Ensure that there is no dirt/rust is deposited on the connector. 3. Check whether the wiring harness connections between the EMS ecu and the throttle actuator connector are as per circuit schematics. Remove if any splices are found which are not mentioned in circuit schematics. 4. If problem still persists then replace throttle actuator. 5.If problem still persists then replace the EMS ecu 6. Ensure the throttle actuator demand and feedback parameters are matching before handing the vehicle to customer	
P2100	Throttle Actuator "A" Control Motor Circuit/Open	11	EMS ECU detects this fault if the following condition is true: - 1: Any of Throttle actuator H bridge drive pins of EMS ecu are short circuited to Ground.	1. Check the electrical continuity between the EMS ecu pins A92, A93 to the throttle actuator connector pins 5 & 4. Rectify if any issues like open circuits/short circuits of throttle actuator drive pins A92, A93 are found. 2. Ensure that there is no dirt/rust is deposited on the connector. 3. Check whether the wiring harness connections between the EMS ecu and the throttle actuator connector are as per circuit schematics. Remove if any splices are found which are not mentioned in circuit schematics. 4. If problem still persists then replace throttle actuator. 5.If problem still persists then replace the EMS ecu 6. Ensure the throttle actuator demand and feedback parameters are matching before handing the vehicle to customer	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P2100	Throttle Actuator "A" Control Motor Circuit/Open	12	EMS ECU detects this fault if the following condition is true: - 1: Any of Throttle actuator H bridge drive pins of EMS ecu are short circuited to battery.	1. Check the electrical continuity between the EMS ecu pins A92,A93 to the throttle actuator connector pins 5 & 4. Rectify if any issues like open circuits/short circuits of throttle actuator drive pins A92,A93 are found. 2. Ensure that there is no dirt/rust is deposited on the connector. 3. Check whether the wiring harness connections between the EMS ecu and the throttle actuator connector are as per circuit schematics. Remove if any splices are found which are not mentioned in circuit schematics. 4. If problem still persists then replace throttle actuator. 5.If problem still persists then replace the EMS ecu 6. Ensure the throttle actuator demand and feedback parameters are matching before handing the vehicle to customer	
P061F	Internal Control Module Throttle Actuator Controller Performance	16	EMS ECU detects Throttle valve faults if any of the following conditions are true: - 1: Over temperature fault on the actuator drive is set. 2: Under voltage fault on the actuator drive is set	1. Check if the correct battery is fitted 2. Check & ensure main power hold rely is working properly. 3. Check and ensure whether the battery terminal's are connected properly and they are tight. 4. Check the charging circuit; Rectify the charging circuit if faulty. 5. Check ECU pin no 6,2 & 4 are getting ground connection and 1,3 & 5 are connected to battery positive – 12 V supply. 6. If fault still persists then replace Throttle actuator. 7. Check ECU; Replace ECU if problem still persists. 8. Confirmatory check after rectification Check battery voltage in diagnostic tool. A). Reading should be close to 12 V if alternator is not charging. B). Reading should be close to 14 V if alternator is charging	
PA608	Internal Control Module Torque Performance	49	This fault gets logged due to EMS ecu internal electronic failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
PA65F	Internal Control Module Monitoring Processor Performance	49	this fault gets logged due to EMS ecu internal control module monitoring processor failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P1696	Internal Control Module Cruise Control Regulation - Signal Plausibility Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P1697	Internal Control Module Cruise Control Switch Input - Signal Plausibility Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P1698	Internal Control Module Cruise Control Torque - Signal Plausibility Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
PA60B	Internal Control Module Engine RPM Performance - Signal Calculation Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P1	Internal Control Module Engine RPM Performance - Event Information	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P163F	Fuel Injection System Fault - Forced Engine Shutdown - Deactivated	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
PA60C	Internal Control Module High Pressure Fuel Pump Unlocked - No Subtype Information	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
PA66A	Control Module Processor - Special Memory Failure	49	This fault gets logged due to EMS ecu internal control module memory failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
PA66B	Control Module Processor - Data Memory Failure	49	This fault gets logged due to EMS ecu internal control module data memory failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
PA66C	Control Module Processor - Program Memory Failure	49	This fault gets logged due to EMS ecu internal control module Random Access memory failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
PA60E	Internal Control Module fuel Injector Control - Program Memory Failure	49	This fault gets logged due to EMS ecu internal control module memory failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P161A	Internal Control Module Memory Reset - Program Memory Failure	49	This fault gets logged due to EMS ecu internal control module memory failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
PA60F	Internal Control Module Memory Trip - Program Memory Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P1699	Internal Control Module Torque Calculation Performance - Program Memory Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
PA66D	Internal Control Module Accelerator Pedal Position Performance - Program Memory Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P161B	Internal Control Module Pulse Check - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P161C	Internal Control Module Pulse Check Bank Data - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P161D	Internal Control Module Pulse Check C2L Data - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P161F	Internal Control Module Pulse Check Injector Number Data - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P162A	Internal Control Module Pulse Check Fuel Quantity - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P162D	Internal Control Module Pulse Check Injection “OFF” Time - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P162C	Internal Control Module Pulse Check Injection “ON” Time - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P162E	Internal Control Module Pulse Check Tooth Data - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P162F	Internal Control Module Pulse Check Injection Type Data - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P163A	Internal Control Module Supply Pulse Check - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P163B	Internal Control Module Supply Pulse Count Check - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P163C	Internal Control Module Injection Supply “OFF” - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P163E	Internal Control Module Supply Reset - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
PA64A	Internal Control Module QADC_MUX Supply - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
PA64B	Internal Control Module QADC Slope High Supply - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
PA64C	Internal Control Module QADC Slope Low Supply - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
PA64D	Internal Control Module Start-up Response Timing - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
PA64E	Internal Control Module Reduced Torque Calculation - General Checksum Failure	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P0480	Fan 1 Control Circuit -	00	This fault is a grouping fault for all Fan 1 related faults: P0480-13, P0480-12, and P0480-11.	1. As this fault is a grouping fault for the following faults: P0480-13, P0480-12, and P0480-11. 2. Follow the rectification procedure of any of the above mentioned faults with which this fault code is appearing for resolving this fault.	
P0480	Fan 1 Control Circuit	13	This fault gets logged if the Fan 1 relay drive pin of EMS ecu is open circuited	1. Check fuse connected to power supply and EMS power relay is not blown off. Replace the fuse if found faulty. 2. Check the fan 1 control relay connection; Perform necessary repairs if connection is faulty. 3. Check whether supply is available to relay contact 1 at ignition on condition. 4. Check electrical continuity between ECU to Fan 1 Relay connector as per circuit schematic; Replace relay if problem persists. And perform actuator test. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Replace main relay if it's contacts are stuck open 6. Check ECU, Replace ECU; if problem persists. 7. Confirmatory check after rectification Perform Actuator test for fan and visually check that fan is operating. Also ensure fan 1 in rotating is right direction.	
P0480	Fan 1 Control Circuit	12	1. This fault gets logged if the Fan 1 relay drive pin in EMS ecu is Short circuited to supply. 2. This fault will be logged only if Ignition is ON at the instant of fault detection by EMS ecu.	1. Check fuse connected to power supply and EMS power relay is not blown off. Replace the fuse if found faulty. 2. Check the fan 1 control relay connection; Perform necessary repairs if connection is faulty. 3. Check whether supply is available to relay contact 1 at ignition on condition. 4. Check electrical continuity between ECU to Fan 1 Relay connector as per circuit schematic; Replace relay if problem persists. And perform actuator test.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether the EMS ecu fan 1 relay drive pin is short circuited to battery; if so then rectify the wiring harness connections according to circuit schematics. 6. Replace main relay if it's contacts are stuck closed 7. Check ECU, Replace ECU; if problem persists. 8. Confirmatory check after rectification Perform Actuator test for fan and visually check that fan is operating. Also ensure fan 1 is rotating in right direction.	
P0480	Fan 1 Control Circuit	11	1. This fault gets logged if the Fan 1 relay drive pin in EMS ecu is Short circuited to Ground. 2. This fault will be logged only if Ignition is ON at the instant of fault detection by EMS ecu.	1. Check fuse connected to power supply and EMS power relay is not blown off. Replace the fuse if found faulty. 2. Check the fan 1 control relay connection; Perform necessary repairs if connection is faulty. 3. Check whether supply is available to relay contact 1 at ignition on condition. 4. Check electrical continuity between ECU to Fan 1 Relay connector as per circuit schematic; Replace relay if problem persists. And perform actuator test. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether the EMS ecu fan 1 relay drive pin is short circuited to ground, if so then rectify the wiring harness connections according to circuit schematics. 6. Check ECU, Replace ECU; if problem persists. 7. Confirmatory check after rectification Perform Actuator test for fan and visually check that fan is operating. Also ensure fan 1 is rotating in right direction.	
P0481	Fan 2 Control Circuit	00	This fault is a grouping fault for all Fan 1 related faults: P0481-13, P0481-12, and P0481-11.	1. As this fault is a grouping fault for the following faults: P0481-13, P0481-12, and P0481-11. 2. Follow the rectification procedure of any of the above mentioned faults with which this fault code is appearing for resolving this fault.	
P0481	Fan 2 Control Circuit	13	This fault gets logged if the Fan 2 relay drive pin of EMS ecu is open circuited	1. Check fuse connected to power supply and EMS power relay is not blown off. Replace the fuse if found faulty. 2. Check the fan 2 control relay connection; Perform necessary repairs if connection is faulty. 3. Check whether supply is available to relay contact 1 at ignition on condition. 4. Check electrical continuity between ECU to Fan 2 Relay connector as per circuit schematic; Replace relay if problem persists. And perform actuator test. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Replace main relay if it's contacts are stuck open 6. Check ECU, Replace ECU; if problem persists. 7. Confirmatory check after rectification Perform Actuator test for fan and visually check that fan is operating. Also ensure fan 2 is rotating in right direction.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0481	Fan 2 Control Circuit	12	1. This fault gets logged if the Fan 2 relay drive pin in EMS ecu is Short circuited to supply. 2. This fault will be logged only if Ignition is ON at the instant of fault detection by EMS ecu.	1. Check fuse connected to power supply and EMS power relay is not blown off. Replace the fuse if found faulty 2. Check the fan 2 control relay connection; Perform necessary repairs if connection is faulty. 3. Check whether supply is available to relay contact 1 at ignition on condition. 4. Check electrical continuity between ECU to Fan 2 Relay connector as per circuit schematic; Replace relay if problem persists. And perform actuator test. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether the EMS ecu fan 2 relay drive pin is short circuited to battery; if so then rectify the wiring harness connections according to circuit schematics. 6. Replace main relay if it's contacts are stuck closed 7. Check ECU, Replace ECU; if problem persists. 8. Confirmatory check after rectification Perform Actuator test for fan and visually check that fan is operating. Also ensure fan 2 is rotating is right direction.	
P0481	Fan 2 Control Circuit	11	1. This fault gets logged if the Fan 2 relay drive pin in EMS ecu is Short circuited to Ground. 2. This fault will be logged only if Ignition is ON at the instant of fault detection by EMS ecu.	1. Check fuse connected to power supply and EMS power relay is not blown off. Replace the fuse if found faulty. 2. Check the fan 2 control relay connection; Perform necessary repairs if connection is faulty. 3. Check whether supply is available to relay contact 1 at ignition on condition. 4. Check electrical continuity between ECU to Fan 2 Relay connector as per circuit schematic; Replace relay if problem persists. And perform actuator test. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 5. Check whether the EMS ecu fan 2 relay drive pin is short circuited to ground, if so then rectify the wiring harness connections according to circuit schematics. 6. Check ECU, Replace ECU; if problem persists. 7. Confirmatory check after rectification Perform Actuator test for fan and visually check that fan is operating. Also ensure fan 2 is rotating in right direction.	
PB147	Fuel Injector Group "A" Supply Voltage Circuit Low	11	1. this fault will gets logged if either HSD of injectors in cylinders 1 & 2 are Short circuited to GND.	1 Check Injector Connection; Switch ignition off and wait for ten seconds. Remove injector connector; clean and reconnect properly. 2 Check Injector electrical continuity between ECU and Injector connector as per circuit schematic; if required correct or replace the harness. Check whether the EMS ecu pins A27 & A50 (HSD's of injector cylinder 1 & 2) pins are short circuited to ground, If so then replace the wiring harness connections. 3. Check continuity using a multi meter across injector pins. Replace injector if found faulty. 4. Check ecu pins and connector pins for damage. 5. Check ECU; replace ECU, if problem still persists. 6. After rectification ensure the following before handing over to customer. a) Please fit the injector with its connector on wiring harness and remove ECU connector and check for continuity between injector and the ECU connector. b) Perform actuator test for the injectors.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P2A50	Fuel Injector Group "B" Supply Voltage Circuit Low	11	1. This fault will gets logged if either HSD of injectors in cylinders 3 & 4 are Short circuited to GND.	1 Check Injector Connection; Switch ignition off and wait for ten seconds. Remove injector connector; clean and reconnect properly. 2 Check Injector electrical continuity between ECU and Injector connector as per circuit schematic; if required correct or replace the harness. Check whether the EMS ecu pins A51 & A03 (HSD's of injector cylinder 3 & 4) pins are short circuited to ground, If so then replace the wiring harness connections. 3. Check continuity using a multi meter across injector pins. Replace injector if found faulty. 4. Check ecu pins and connector pins for damage. 5. Check ECU; replace ECU, if problem still persists. 6. After rectification ensure the following before handing over to customer. a) Please fit the injector with its connector on wiring harness and remove ECU connector and check for continuity between injector and the ECU connector. b) Perform actuator test for the injectors.	
PB148	Fuel Injector Group "A" Supply Voltage Circuit High	12	1. This fault will gets logged if either HSD of injectors in cylinders 1 & 2 are Short circuited to VBATT.	1 Check Injector Connection; Switch ignition off and wait for ten seconds. Remove injector connector; clean and reconnect properly. 2 Check Injector electrical continuity between ECU and Injector connector as per circuit schematic; if required correct or replace the harness. Check whether the EMS ecu pins A27 & A50 (HSD's of injector cylinder 1 & 2) pins are short circuited to ground, If so then replace the wiring harness connections. 3. Check continuity using a multi meter across injector pins. Replace injector if found faulty. 4. Check ecu pins and connector pins for damage. 5. Check ECU; replace ECU, if problem still persists. 6. After rectification ensure the following before handing over to customer. a) Please fit the injector with its connector on wiring harness and remove ECU connector and check for continuity between injector and the ECU connector. b) Perform actuator test for the injectors.	
P2A51	Fuel Injector Group "B" Supply Voltage Circuit High	12	1. This fault will gets logged if either HSD of injectors in cylinders 3 & 4 are Short circuited to Battery.	1 Check Injector Connection; Switch ignition off and wait for ten seconds. Remove injector connector; clean and reconnect properly. 2 Check Injector electrical continuity between ECU and Injector connector as per circuit schematic; if required correct or replace the harness. Check whether the EMS ecu pins A51 & A03 (HSD's of injector cylinder 3 & 4) pins are short circuited to ground, If so then replace the wiring harness connections. 3. Check continuity using a multi meter across injector pins. Replace injector if found faulty. 4. Check ecu pins and connector pins for damage. 5. Check ECU; replace ECU, if problem still persists. 6. After rectification ensure the following before handing over to customer. a) Please fit the injector with its connector on wiring harness and remove ECU connector and check for continuity between injector and the ECU connector. b) Perform actuator test for the injectors.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0263	Cylinder 1 Contribution/Balance	92	1. This DTC gets logged due to the mechanical failure of the injector of cylinder 1 or Cylinder 1 or any MDP (minimum drive pulse) related issue of Injector of cylinder 1	1. Check the cylinder for leaks; if noticed Perform necessary action/repair work to arrest the cylinder leaks. 2. Ensure Cylinder 1 Injector connector connected to the Injector. 3 Check the inlet ducts for blockages if any; clean the duct and check for EGR operation. 4. Check tappet condition & valve setting; perform the necessary repairs in case of any problem. 5. Check whether the injector is functioning properly or not by performing Injector I/O control test; 6. Check for Injector Related faults - P0201 or PB147 or PB148. If present then follow the rectification procedure of the respective DTC's for resolving this issue. 7. Check whether the C2I values written into EMS ecu for injector cylinder 1 are correct and corresponding to Injector of cylinder 1. 8. Check for any glow plug related faults - P0380-12, P0380-11, P0380-13, and P0380-14. If present then follow the rectification procedure of the respective DTC's for resolving this issue. 9. Perform Compression test, if test reports a weakness of one of engine cylinders then make necessary repairs for that cylinder, 10. Swap the Injector of cylinder 1 & 2, Swap their C2I values also and perform driving cycle. Check if P0263 disappears and P0266 appears because of swapping, then it is confirmed that there is a problem with Injector Cylinder 1 ; Replace the Injector of cylinder 1 & Rewrite the C2I values 11. If problem persists, replace the ECU. 12.Final check after rectification Run the engine at idle for some time and check this DTC is not re-appearing	
P0269	Cylinder 3 Contribution/Balance	92	1. This DTC gets logged due to the mechanical failure of the injector of cylinder 3 or Cylinder 3 or MDP (minimum drive pulse) related issue of Injector of cylinder 3	1. Check the 3rd cylinder for leaks; if noticed Perform necessary action/repair work to arrest the cylinder leaks. 2. Ensure Cylinder 3 Injector connector connected to the Injector. 3. Check the inlet ducts for blockages if any; clean the duct and check for EGR operation. 4. Check tappet condition & valve setting; perform the necessary repairs in case of any problem. 5. Check whether the injector is functioning properly or not by performing Injector I/O control test; 6. Check for Injector Related faults - P0203 or P2A50 or P2A51. If present then follow the rectification procedure of the respective DTC's for resolving this issue. 7. Check whether the C2I values written into EMS ecu for injector cylinder 3 are correct and corresponding to Injector of cylinder 3. 8. Check for any glow plug related faults - P0380-12, P0380-11, P0380-13, and P0380-14. If present then follow the rectification procedure of the respective DTC's for resolving this issue. 9. Perform Compression test, if test reports a weakness of one of engine cylinders then make necessary repairs for that cylinder, 10. Swap the Injector of cylinder 3 & 2, Swap their C2I values also and perform driving cycle. Check if P0269 disappears and P0266 appears because of swapping, then it is confirmed that there is a problem with Injector Cylinder 3; Replace Injector of cylinder 3 & Rewrite the C2I values 11. If problem persists, replace the ECU.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				12. Final check after rectification Run the engine at idle for some time and check this DTC is not re-appearing	
P0272	Cylinder 4 Contribution/Balance	92	1. This DTC gets logged due to the mechanical failure of the injector of cylinder 4 or Cylinder 4 or MDP (minimum drive pulse) related issue of Injector of cylinder 4	1. Check the cylinder for leaks; if noticed Perform necessary action/repair work to arrest the cylinder leaks. 2. Ensure Cylinder 4 Injector connector connected to the Injector. 3. Check the inlet ducts for blockages if any; clean the duct and check for EGR operation. 4. Check tappet condition & valve setting; perform the necessary repairs in case of any problem. 5. Check whether the injector is functioning properly or not by performing Injector I/O control test; Replace Injector if faulty. 6. Check for Injector Related faults - P0204 or P2A50 or P2A51. If present then follow the rectification procedure of the respective DTC's for resolving this issue. 7. Check whether the C2I values written into EMS ecu for injector cylinder 4 are correct and corresponding to Injector of cylinder 4. 8. Check for any glow plug related faults - P0380-12, P0380-11, P0380-13, and P0380-14. If present then follow the rectification procedure of the respective DTC's for resolving this issue. 9. Perform Compression test, if test reports a weakness of one of engine cylinders then make necessary repairs for that cylinder, 10. Swap the Injector of cylinder 4 & 2, Swap their C2I values also and perform driving cycle. Check if P0272 disappears and P0266 appears because of swapping, then it is confirmed that there is a problem with Injector Cylinder 4; Then replace Injector of cylinder 4 & Rewrite the C2I values of injectors of all cylinders. 11. If problem persists, replace the ECU. 12. Final check after rectification Run the engine at idle for some time and check this DTC is not re-appearing	
P0266	Cylinder 2 Contribution/Balance	92	1. This DTC gets logged due to the mechanical failure of the injector of cylinder 2 or Cylinder 2 or MDP (minimum drive pulse) related issue of Injector of cylinder 2	1. Check the cylinder for leaks; if noticed Perform necessary action/repair work to arrest the cylinder leaks. 2. Ensure Cylinder 2 Injector connector connected to the Injector. 3. Check the inlet ducts for blockages if any; clean the duct and check for EGR operation. 4. Check tappet condition & valve setting; perform the necessary repairs in case of any problem. 5. Check whether the injector is functioning properly or not by performing Injector I/O control test; Replace Injector if faulty. 6. Check for Injector Related faults - P0202 or PB147 or PB148. If present then follow the rectification procedure of the respective DTC's for resolving this issue. 7. Check whether the C2I values written into EMS ecu for injector cylinder 2 are correct and corresponding to Injector of cylinder 2. 8. Check for any glow plug related faults - P0380-12, P0380-11, P0380-13, and P0380-14. If present then follow the rectification procedure of the respective DTC's for resolving this issue. 9. Perform Compression test, if test reports a weakness of one of engine cylinders then make necessary repairs for that cylinder, 10. Swap the Injector of cylinder 2 & 1, Swap their C2I values also and	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				perform driving cycle. Check if P0266 disappears and P0263 appears because of swapping, then it is confirmed that there is a problem with Injector Cylinder 2; Replace the injector of cylinder 2 & Rewrite the C2I values of all injectors. 11. If problem persists, replace the ECU. 12. Final check after rectification Run the engine at idle for some time and check this DTC is not re-appearing	
P0201	Injector Circuit/Open - Cylinder 1	13	1. This fault gets logged if the Cylinder 1 injector's LSD pin is open circuited	1. Check Injector Connection; Switch ignition off and wait for ten seconds. Remove injector connector; clean and reconnect properly. 2. Perform Injector cylinder 1 buzzing test using I/O Control command. IF buzzing test fails then check step 3 thoroughly. 3. Check Injector electrical continuity between EMS ECU pins A26, A27 and Injector cylinder 1 connector pins 2, 1 respectively as per circuit schematic; if any issue is found then correct the wiring harness connections. 4. Remove injector, Check continuity and resistance using a multi meter across injector pins. Solenoid resistance 1 ohm and piezo resistance 1 mega ohm, piezo resistance settles after some time (10 seconds)). If the resistance is infinite or settling to 1000000 ohm then replace injector. 5. Swap the Injectors of cylinders 1 and 2, If problem P0201 disappears then it is confirmed that Injector of Cylinder 1 is faulty and replace the injector of cylinder 1. 6. Replace injector if problem still persists. 7. Check ECU pins for physical damage; replace ECU, if problem still persists. 8. After rectification ensure the following before handing over to customer. a) Please fit the injector with its connector on wiring harness and remove ECU connector and check for continuity between injector and the ECU connector. b) Perform actuator test for the injectors.	
P0203	Injector Circuit/Open - Cylinder 3	13	1. This fault gets logged if the Cylinder 3 injector's LSD pin is open circuited	1. Check Injector Connection; Switch ignition off and wait for ten seconds. Remove injector connector; clean and reconnect properly. 2. Perform Injector cylinder 3 buzzing test using I/O Control command. IF buzzing test fails then check step 3 thoroughly. 3. Check Injector electrical continuity between EMS ECU pins A75, A51 and Injector cylinder 3 connector pins 2, 1 respectively as per circuit schematic; if any issue is found then correct the wiring harness connections. 4. Remove injector, Check continuity and resistance using a multi meter across injector pins. (Solenoid resistance 1 ohm and piezo resistance 1 mega ohm, piezo resistance settles after some time (10 seconds)). If the resistance is infinite or settling to 1000000 ohm then replace injector. 5. Swap the Injectors of cylinders 3 and 2, If problem P0203 disappears then it is confirmed that Injector of Cylinder 3 is faulty and replace the injector of cylinder 3. 6. Replace injector if problem still persists. 7. Check ECU pins for physical damage; replace ECU, if problem still persists. 8. After rectification ensure the following before handing over to customer. a) Please fit the injector with its connector on wiring harness and remove ECU connector and check for continuity between injector and the ECU connector. b) Perform actuator test for the injectors.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0204	Injector Circuit/Open - Cylinder 4	13	1. This fault gets logged if the Cylinder 4 injector's LSD pin is open circuited	1. Check Injector Connection; Switch ignition off and wait for ten seconds. Remove injector connector; clean and reconnect properly. 2. Perform Injector cylinder 4 buzzing test using I/O Control command. If buzzing test fails (inaudible) then check step 3 thoroughly. 3. Check Injector electrical continuity between EMS ECU pins A25, A03 and Injector cylinder 4 connector pins 2, 1 respectively as per circuit schematic; if any issue is found then correct the wiring harness connections. 4. Remove injector, Check continuity and resistance using a multi meter across injector pins. (Solenoid resistance 1 ohm and piezo resistance 1 mega ohm, piezo resistance settles after some time (10 seconds)). If the resistance is infinite or settling to 1000000 ohm then replace injector. 5. Swap the Injectors of cylinders 4 and 2, If problem P0204 disappears then it is confirmed that Injector of Cylinder 4 is faulty and replace the injector of cylinder 4. 6. Replace injector if problem still persists. 7. Check ECU pins for physical damage; replace ECU, if problem still persists. 8. After rectification ensure the following before handing over to customer. a) Please fit the injector with its connector on wiring harness and remove ECU connector and check for continuity between injector and the ECU connector. b) Perform actuator test for the injectors.	
P0202	Injector Circuit/Open - Cylinder 2	13	1. This fault gets logged if the Cylinder 2 injector's LSD pin is open circuited	1. Check Injector Connection; Switch ignition off and wait for ten seconds. Remove injector connector; clean and reconnect properly. 2. Perform Injector cylinder 2 buzzing test using I/O Control command. IF buzzing test fails then check step 3 thoroughly. 3. Check Injector electrical continuity between EMS ECU pins A74, A50 and Injector cylinder 2 connector pins 2, 1 respectively as per circuit schematic; if any issue is found then correct the wiring harness connections. 4. Remove injector, Check continuity and resistance using a multi meter across injector pins. (Solenoid resistance 1 ohm and piezo resistance 1 mega ohm, piezo resistance settles after some time (10 seconds)). If the resistance is infinite or settling to 1000000 ohm then replace injector. 5. Swap the Injectors of cylinders 2 and 3, If problem P0202 disappears then it is confirmed that Injector of Cylinder 2 is faulty and replace the injector of cylinder 2. 6. Replace injector if problem still persists. 7. Check ECU pins for physical damage; replace ECU, if problem still persists. 8. After rectification ensure the following before handing over to customer. a) Please fit the injector with its connector on wiring harness and remove ECU connector and check for continuity between injector and the ECU connector. b) Perform actuator test for the injectors.	
P0201	Injector Circuit/Open - Cylinder 1	2B	This fault gets logged if the Injector-Cylinder 1 HSD and LSD pins of EMS ecu are short circuited across	1. Check Injector Connection; Switch ignition off and wait for ten seconds. Remove injector connector; clean and reconnect properly. 2. Check Injector electrical continuity between ECU pins A26 & A27 and Injector - Cylinder 1 connector as per circuit schematic; if required correct or replace the harness. Check whether Cylinder 1 injector's HSD and LSD pins A26 & A27 are short circuited due to wrong wiring harness connections. If so then rectify the wiring harness connections according to circuit schematics. 3. Disconnect injector & check if fault disappear. If disappear, injector is faulty, replace injector.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				4. Remove injector, Check continuity and resistance using a multi meter across injector pins. (Solenoid resistance 1 ohm and piezo resistance 1 mega ohm, piezo resistance settles after some time (10 seconds)). If the resistance is infinite or settling to 1000000 ohm then replace injector. 5. Check ECU pins for physical damage; replace ECU, if problem still persists. 6. After rectification ensure the following before handing over to customer. a) Please fit the injector with its connector on wiring harness and remove ECU connector and check for continuity between injector and the ECU connector. b) Perform actuator test for the injectors.	
P0203	Injector Circuit/Open - Cylinder 3	2B	This fault gets logged if the Injector-Cylinder 3 HSD and LSD pins of EMS ecu are short circuited across	1. Check Injector Connection; Switch ignition off and wait for ten seconds. Remove injector connector; clean and reconnect properly. 2. Check Injector electrical continuity between ECU pins A75 & A51 and Injector - Cylinder 3 connector as per circuit schematic; if required correct or replace the harness. Check whether Cylinder 3 injector's HSD and LSD pins A75 & A51 are short circuited due to wrong wiring harness connections. If so then rectify the wiring harness connections according to circuit schematics. 3. Disconnect injector & check if fault disappear. If disappear, injector is faulty, replace injector. 4. Remove injector, Check continuity and resistance using a multi meter across injector pins. (Solenoid resistance 1 ohm and piezo resistance 1 mega ohm, piezo resistance settles after some time (10 seconds)). If the resistance is infinite or settling to 1000000 ohm then replace injector. 5. Check ECU pins for physical damage; replace ECU, if problem still persists. 6. After rectification ensure the following before handing over to customer. a) Please fit the injector with its connector on wiring harness and remove ECU connector and check for continuity between injector and the ECU connector. b) Perform actuator test for the injectors.	
P0204	Injector Circuit/Open - Cylinder 4	2B	This fault gets logged if the Injector-Cylinder 4 HSD and LSD pins of EMS ecu are short circuited across	1. Check Injector Connection; Switch ignition off and wait for ten seconds. Remove injector connector; clean and reconnect properly. 2. Check Injector electrical continuity between ECU pins A03 & A25 and Injector - Cylinder 4 connector as per circuit schematic; if required correct or replace the harness. Check whether Cylinder 4 injector's HSD and LSD pins A03 & A25 are short circuited due to wrong wiring harness connections. If so then rectify the wiring harness connections according to circuit schematics. 3. Disconnect injector & check if fault disappear. If disappear, injector is faulty, replace injector. 4. Remove injector, Check continuity and resistance using a multi meter across injector pins. (Solenoid resistance 1 ohm and piezo resistance 1 mega ohm, piezo resistance settles after some time (10 seconds)). If the resistance is infinite or settling to 1000000 ohm then replace injector. 5. Check ECU pins for physical damage; replace ECU, if problem still persists. 6. After rectification ensure the following before handing over to customer. a) Please fit the injector with its connector on wiring harness and remove ECU connector and check for continuity between injector and the ECU connector. b) Perform actuator test for the injectors.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0202	Injector Circuit/Open - Cylinder 2	2B	This fault gets logged if the Injector-Cylinder 2 HSD and LSD pins of EMS ecu are short circuited across	1. Check Injector Connection; Switch ignition off and wait for ten seconds. Remove injector connector; clean and reconnect properly. 2. Check Injector electrical continuity between ECU pins A74 & A50 and Injector - Cylinder 2 connector as per circuit schematic; if required correct or replace the harness. Check whether Cylinder 2 injector's HSD and LSD pins A74 & A50 are short circuited due to wrong wiring harness connections. If so then rectify the wiring harness connections according to circuit schematics. 3. Disconnect injector & check if fault disappear. If disappear, injector is faulty, replace injector. 4. Remove injector, Check continuity and resistance using a multi meter across injector pins. (Solenoid resistance 1 ohm and piezo resistance 1 mega ohm, piezo resistance settles after some time (10 seconds)). If the resistance is infinite or settling to 1000000 ohm then replace injector. 5. Check ECU pins for physical damage; replace ECU, if problem still persists. 6. After rectification ensure the following before handing over to customer. a) Please fit the injector with its connector on wiring harness and remove ECU connector and check for continuity between injector and the ECU connector. b) Perform actuator test for the injectors.	
P062D	Fuel Injector Driver Circuit Performance - Bank 1	49	This fault gets logged due to Injector - Cylinder 1 & 2 High side driver internal hardware failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P062E	Fuel Injector Driver Circuit Performance - Bank 2	49	This fault gets logged due to Injector - Cylinder 3 & 4 High side driver internal hardware failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0180	Fuel Temperature Sensor "A" Circuit	15	This DTC gets logged if the fuel temperature input from sensor is greater than maximum fuel temperature threshold value calibrated in EMS ecu. Primary reason for this fault is fuel temperature signal pin in EMS ecu is short circuited to Vbatt/Open circuit	1. Check sensor connections for rust dirt etc; clean the sensor connections and ensure proper fitment. 2. Check sensor characteristics (measure voltage and resistance at sensor terminals); Sensor voltage should be 5 V and resistance as given is specifications, replace sensor if found faulty. 3. Check Electrical continuity between ECU pin A10 and fuel temperature sensor connector as per circuit schematic; Follow Electrical continuity check procedure. Replace/ Rectify Harness if required. Check whether Fuel temperature sensor signal pin A10 of EMS ecu is short circuited to battery; If so replace the wiring harness connections. 4. Check ECU; if problem still persists replace the ECU. 5. After rectification if possible carry out following check Soak the vehicle for more than 12 hrs (preferably over night) Then check if all the system temperature values (coolant, fuel, inlet air) are close to each other.	
P0180	Fuel Temperature Sensor "A" Circuit	11	This DTC gets logged if the fuel temperature input from sensor is less than minimum fuel temperature threshold value calibrated in EMS ecu. Primary reason for this fault is fuel temperature signal pin in EMS ecu is short circuited to ground.	1. Check sensor connections for rust dirt etc; clean the sensor connections and ensure proper fitment. 2. Check sensor characteristics (measure voltage and resistance at sensor terminals); Sensor voltage should be 5 V and resistance as given is specifications, replace sensor if found faulty. 3. Check Electrical continuity between ECU pin A10 and fuel temperature sensor connector as per circuit schematic; Follow Electrical continuity check procedure. Replace/ Rectify Harness if required. Check whether Fuel temperature sensor signal pin A10 of EMS ecu is short circuited to ground; If so replace the wiring harness connections. 4. Check ECU; if problem still persists replace the ECU. 5. After rectification if possible carry out following check Soak the vehicle for more than 12 hrs (preferably over night) Then check if all the system temperature values (coolant, fuel, inlet air) are close to each other.	
P0380	Glow Plug/Heater Circuit "A"	14	This fault gets logged under the following conditions: 1. Glow plug is driven by ECU but feedback is saying that glow plugs are off.	1. Check the fuse of glow plug relay, replace if they are blown off. Check the fuse of EMS ecu main power relay, replace if it is blown off. 2. Check continuity between the glow plug drive pin A17 in EMS ecu to the glow plugs 3 & 4 (as per circuit schematics).Rectify wiring harness connections incase of lack of continuity. 3. Check whether the Glow feedback pin A17 of EMS ecu is short circuited to Battery. If so, then rectify the wiring harness connections according to circuit schematics. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 4. Check whether the Glow plug drive pin of EMS ecu A85 is short circuited to Ground. If so, then rectify the wiring harness connections according to circuit schematics 5: Check whether the resistance of glow plugs is according to specifications, if not replace the glow plugs. 6. Replace ECU if problem still persists	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0380	Glow Plug/Heater Circuit "A"	12	This fault gets logged under the following conditions: 1. Glow plug is not driven by ecu but feedback is saying that glow plugs are on	1. Check the fuse of glow plug relay, replace if they are blown off. Check the fuse of EMS ecu main power relay, replace if it is blown off. 2. Check continuity between the glow plug drive pin A17 in EMS ecu to the glow plugs 3 & 4 (as per circuit schematics).Rectify wiring harness connections incase of lack of continuity. 3. Check whether the Glow feedback pin A17 of EMS ecu is short circuited to Ground. If so, then rectify the wiring harness connections according to circuit schematics. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 4. Check whether the Glow plug drive pin of EMS ecu A85 is short circuited to Battery/open circuited. If so, then rectify the wiring harness connections according to circuit schematics 5. Check whether the resistance of glow plugs is according to specifications, if not replace the glow plugs. 6. Replace ECU if problem still persists	
P0380	Glow Plug/Heater Circuit "A"	13	1. This fault gets logged if the glow plug drive pin in EMS ecu is open circuit	1. Check continuity between the glow plug drive pin A85 in EMS ecu to the glow plugs. Rectify wiring harness if any issues like open circuits are found in the connection circuit of glow plugs. 2. Check electrical connections of glow plug relays, if any issues are found then rectify them according to the circuit schematics. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 3: Check glow plugs resistance and replace them resistance is not according to design specifications. 4:replace ECU if problem still persists	
P0380	Glow Plug/Heater Circuit "A"	11	1.This fault gets logged if the glow plug drive pin in EMS ecu is short circuited to GND	1. Check continuity between the glow plug drive pin A85 in EMS ecu to the glow plugs. Rectify wiring harness if any issues like short circuits to ground of glow plugs drive pin A85 are found. 2. Check electrical connections of glow plug relays, if any issues are found then rectify them according to the circuit schematics. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. Case of rust then clean them and refit the connector. 3. Check glow plugs resistance and replace them resistance is not according to design specifications. 4: Replace ECU if problem still persists	
PA65B	Internal Control Module Ground Track 02	49	This fault gets logged due to EMS ecu internal electronic failure	1. Check, if the Brake lights are on even when no brake pedal is pressed. 2. Check whether the accelerator pedal is free to move; Ensure free movement of the pedal; replace pedal if pedal movement is not free or very hard. 3. Check the brake switch setting; If the problem is with the brake setting performs the necessary repairs. 4. Check Electrical continuity between ECU to Accelerator pedal connector as per circuit schmatics;Check whether the accelerator pedal input pins of EMS ecu B24,B25,B29 & B13 are Short circuited to battery/ground and ECU pins B26 & B14 are Short circuited to battery supply due to wiring harness wrong connections. If so then rectify the wiring harness connections to make them inline with circuit schematics.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				5. Check Electrical continuity between ECU pins B32 & B30 to Brake pedal connector. If any issues are found then make connections inline with circuit schematics. Check whether the brake input pins of EMS ecu B32 & 2 re Short circuited to battery/ground due to wiring harness wrong connections. If so then rectify the wiring harness connections to make them inline with circuit schematics. 6. Check whether the pedal potentiometer sensors 1 &2 parameter values in diagnostic tool are varying inline with pedal pressing condition. If not check steps 4 & 5 thoroughly, any issue found then rectify it by modifying wiring harness connections else replace faulty pedal potentiometer sensor. 6. Check and replace ECU if still problem persists. 7. After rectification ensure the following checks before handing over the vehicle to customer. A) When pedal is not pressed - Pedal position in tata diagnostic tool should be less than 5%. B) When the pedal is fully pressed - Pedal position in tata diagnostic tool should be more than 95 %. C) Ensure break light is not glowing when the brake pedal is not pressed.	
P0001	Fuel Volume Regulator Control Circuit/Open	22	This fault gets logged if the IMV resistance estimation is upper than IMV Maximum resistance value calibrated.	1. Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Ensure IMV connector is properly connected to the IMV. 3. There is no mud, dirt, foreign particle accumulation on the connector 4. Check electrical continuity of wiring harness between ECU and IMV as per circuit schematics. Correct if necessary. 5. Check whether the IMV control pin of EMS A77 is short circuited to ground/Battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 6. Check wiring harness resistance between IMV and ECU and check whether it is according to the design specifications. 7. Check for IMV actuator stuck issues, Replace IMV if any mechanical stuck issues are found. 8. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees). Replace IMV if the resistance is not according to specifications. 9. Perform IMV buzzing test using I/O Control Command, if IMV is not buzzing then replace IMV 10. Replace ECU if problem persists 11. After rectification perform actuator test for IMV and ensure the result is positive	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0001	Fuel Volume Regulator Control Circuit/Open	21	This fault gets logged if the IMV resistance estimation is lower than IMV Minimum resistance value calibrated.	1.-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Ensure IMV connector is properly connected to the IMV. 3. There is no mud, dirt, foreign particle accumulation on the connector 4. Check electrical continuity of wiring harness between ECU and IMV as per circuit schematics. Correct if necessary. 5. Check whether the IMV control pin of EMS A77 is short circuited to ground/Battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 6. Check wiring harness resistance between IMV and ECU and check whether it is according to the design specifications (xx to xx ohms). 7. Check for IMV actuator stuck issues, Replace IMV if any mechanical stuck issues are found. 8. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees). Replace IMV if the resistance is not according to specifications. 9. Perform IMV buzzing test using I/O Control Command, if IMV is not buzzing then replace IMV 10. Replace ECU if problem persists 11. After rectification perform actuator test for IMV and ensure the result is positive.	
P0252	Injection Pump Fuel Metering Control "A" Range/Performance (Cam/Rotor/Injector)	19	This fault gets logged if the IMV current feedback received by EMS ecu is greater than a Maximum current threshold calibrated for IMV.	1. Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Ensure IMV connector is properly connected to the IMV. 3. There is no mud, dirt, foreign particle accumulation on the connector 4. Check electrical continuity of wiring harness between ECU and IMV as per circuit schematics. Correct if necessary. 5. Check whether the IMV control pin of EMS A77 is short circuited to Battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 6. Check wiring harness resistance between IMV and ECU and check whether it is according to the design specifications. 7. Check IMV internal resistance whether it is according to the design specifications .Replace IMV if the resistance is not according to specifications. 8. Perform IMV buzzing test using I/O Control Command, if IMV is not buzzing then replace IMV 9. Perform IMV buzzing test using I/O Control Command, if IMV is not buzzing then replace IMV 10. Replace ECU if problem persists 11. After rectification perform actuator test for IMV and ensure the result is positive.	
P0001	Fuel Volume Regulator Control Circuit/Open	18	This fault gets logged if the IMV current feedback received by EMS ecu is less than a Minimum current threshold calibrated for IMV.	1. Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Ensure IMV connector is properly connected to the IMV. 3. There is no mud, dirt, foreign particle accumulation on the connector 4. Check electrical continuity of wiring harness between ECU and IMV as per circuit schematics. Correct if necessary. 5. Check whether the IMV control pin of EMS A77 is short circuited to Ground because of wrong wiring harness connections. If so rectify the wrong	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				connections to make the connections inline with circuit schematics. 6. Check wiring harness resistance between IMV and ECU and check whether it is according to the design specifications. 7. Check IMV internal resistance whether it is according to the design specifications. Replace IMV if the resistance is not according to specifications. 8. Perform IMV buzzing test using I/O Control Command, if IMV is not buzzing then replace IMV 9. Replace ECU if problem persists 10. After rectification perform actuator test for IMV and ensure the result is positive.	
P0001	Fuel Volume Regulator Control Circuit/Open	35	This fault gets logged if the Duty cycle of the IMV PWM input is greater than a maximum calibrated duty cycle threshold of IMV PWM input.	1. Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Ensure IMV connector is properly connected to the IMV. 3. There is no mud, dirt, foreign particle accumulation on the connector 4. Check electrical continuity of wiring harness between ECU and IMV as per circuit schematics. Correct if necessary. 5. Check whether the IMV control pin of EMS A77 is short circuited to ground/Battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 6. Check wiring harness resistance between IMV and ECU and check whether it is according to the design specifications. 7. Check for IMV actuator stuck issues, Replace IMV if any mechanical stuck issues are found. 8. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 deg C). Replace IMV if the resistance is not according to specifications. 9. Perform IMV buzzing test using I/O Control Command, if IMV is not buzzing then replace IMV 10. Replace ECU if problem persists 11. After rectification perform actuator test for IMV and ensure the result is positive.	
P026D	Fuel Injection Quantity Higher Than Expected	92	1. This DTC gets logged under the following conditions - fault of the rail pressure control by the IMV at high fuel delivery for high (positive) current trim	1. Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required. 2. Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P026D	Fuel Injection Quantity Higher Than Expected	92	1. This DTC gets logged under the following conditions - fault of the rail pressure control by the IMV at high fuel delivery for low (negative) current trim	1. Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P026D	Fuel Injection Quantity Lower Than Expected -	92	1. This DTC gets logged under the following conditions - fault of the rail pressure control by the IMV at low fuel delivery for high (positive) current trim	1. Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. Check fuse connected to EMS power relay and ensure it's not short or malfunctioning. Replace if required. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P026D	Fuel Injection Quantity Lower Than Expected -	92	1. This DTC gets logged under the following conditions - fault of the rail pressure control by the IMV at low fuel delivery for low (negative) current trim	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P0251	Injection Pump Fuel Metering Control "A" (Cam/Rotor/Injector)	13	Fault arises when the current feedback (for a rail pressure demand) is not within the calibrated threshold range due to IMV control pin in EMS ecu is open circuited.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Ensure IMV connector is properly connected to the IMV. 3. There is no mud, dirt, foreign particle accumulation on the connector 4. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. If any open circuit is found then rectify the wiring harness connections to make them inline with circuit schematics. Check fuse connected to EMS power relay and ensure it's not short or malfunctioning. Replace if required. 5. Check wiring harness resistance 6. Check IMV internal resistance, it should not exceed 5.3 (at 20 deg C) ohm. 7. Replace ECU if problem persists 8. After rectification perform actuator test for IMV and ensure the result is positive	
P0253	Injection Pump Fuel Metering Control "A" Low (Cam/Rotor/Injector)	11	1. This DTC gets logged if the IMV drive pin of EMS ecu is short circuited to ground	1. Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Ensure IMV connector is properly connected to the IMV. 3. There is no mud, dirt, foreign particle accumulation on the connector 4. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2& Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. Check fuse connected to EMS power relay and ensure it's not short or malfunctioning. Replace if required. 5. Check whether the IMV control pin of EMS A77 is short circuited to ground because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 6. Check wiring harness resistance between IMV and ECU and check whether it is according to the specifications. 7. Check IMV internal resistance whether it is according to the specifications. 8. Replace ECU if problem persists 9. After rectification perform actuator test for IMV and ensure the result is	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				positive	
P0254	Injection Pump Fuel Metering Control "A" High (Cam/Rotor/Injector)	12	1. This DTC gets logged if the IMV drive pin of EMS ecu is short circuited to battery	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Ensure IMV connector is properly connected to the IMV. 3. There is no mud, dirt, foreign particle accumulation on the connector 4. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. Check fuse connected to EMS power relay and ensure it's not short or malfunctioning. Replace if required. 5. Check whether the IMV control pin of EMS A77 is short circuited to battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 6. Check wiring harness resistance between IMV and ECU and check whether it is according to the specifications. 7. Check IMV internal resistance whether it is according to the specifications. 8. Replace ECU if problem persists 9. After rectification perform actuator test for IMV and ensure the result is positive	
P00C6	Fuel Rail Pressure Too Low - Engine Cranking	16	This fault gets logged when feedback rail pressure is below the minimum required for injection during running.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. Check fuse connected to EMS power relay and ensure it's not short or malfunctioning. Replace if required. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check adequate fuel level is available in the tank. 6. Check high pressure fuel lines for leakage 7. Check fuel filter is not clogged. 8. Check low pressure fuel lines for air entry 9. Check & ensure connector for proper fitment 10. Check sensor for oxidation, rust etc, if observed clean deposit. 11. Check harness for damages; Replace / Repair if harness is damaged. 12. Check ECU pins and connector, Replace if found defective. 13. Please check if any injector back leak is abnormally high compared to the injectors. 14. Check whether High pressure pump is functioning properly else replace high pressure pump. 15 Check whether IMV is Stuck closed, if so replace the IMV. 16. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P060B	Internal Control Module A/D Processing Performance	49	1. This fault gets logged due to EMS ecu internal analog digital converter failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance	27	1. This fault gets logged if the rate of change of Intake air temperature sensor signal is greater than a maximum calibrated threshold for intake temperature.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check whether the Air mass flow sensor is getting ignition supply voltage. If not rectify the wiring harness according to the circuit schematics. 3. Check sensor connector for rust dirt etc., if noticed clean the sensor connector and ensure proper fitment. 4. Check sensor characteristics (measure voltage and resistance at sensor terminals); Sensor voltage should be 5 V and resistance as given is specifications. Replace sensor if found faulty 5. Check Electrical continuity between ECU and AMF sensor connector as per circuit schematic; Follow Electrical continuity check procedure. Replace/ Rectify Harness if required. 6. Check whether the EMS ecu inlet temperature pin A04 is short circuited to battery/Ground because of wrong connections of wiring harness; if so rectify the wiring harness connections to make them inline with circuit schematics 7. Check ECU; Replace ECU; if problem still persists 8. After rectification ensure the following checks before handing over the vehicle to customer. a) AMF sensor reads xx mg/st at key on condition. b) When the engine is at idle AMF sensor reads < xx mg/st. c) when the engine is at fly-up AMF sensor reads > xx mg/st. 9. After rectification if possible carry out following check Soak the vehicle for more than 12 hrs (preferably over night) Then check if all the system temperature values (coolant, fuel, inlet air) are close to each other.	
P0A13	Intake Air Temperature Sensor 1 Circuit High	15	This fault gets logged if the Intake air temperature sensor signal pin of EMS ecu is short circuited to battery or open circuited	1. Check whether the Air mass flow sensor is getting ignition supply voltage. If not rectify the wiring harness according to the circuit schematics. 2. Check sensor connector for rust dirt etc., if noticed clean the sensor connector and ensure proper fitment. 3. Check sensor characteristics (measure voltage and resistance at sensor terminals); Sensor voltage should be 5 V and resistance as given is specifications. Replace sensor if found faulty 4. Check Electrical continuity between ECU and AMF sensor connector as per circuit schematic; Follow Electrical continuity check procedure. Replace/ Rectify Harness if required. 5. Check whether the EMS ecu inlet temperature pin A04 is short circuited to battery because of wrong connections of wiring harness; if so rectify the wiring harness connections to make them inline with circuit schematics	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				6. Check ECU; Replace ECU; if problem still persists 7. After rectification ensure the following checks before handing over the vehicle to customer. a) AMF sensor reads xx mg/st at key on condition. b) When the engine is at idle AMF sensor reads < xx mg/st. c) when the engine is at fly-up AMF sensor reads > xx mg/st. 8. After rectification if possible carry out following check Soak the vehicle for more than 12 hrs (preferably over night) Then check if all the system temperature values (coolant, fuel, inlet air) are close to each other.	
P0112	Intake Air Temperature Sensor 1 Circuit Low	11	This fault gets logged if the Intake air temperature sensor signal pin of EMS ecu is short circuited to ground	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check whether the Air mass flow sensor is getting ignition supply voltage. If not rectify the wiring harness according to the circuit schematics. 3. Check sensor connector for rust dirt etc., if noticed clean the sensor connector and ensure proper fitment. 4. Check sensor characteristics (measure voltage and resistance at sensor terminals); Sensor voltage should be 5 V and resistance as given is specifications. Replace sensor if found faulty 5. Check Electrical continuity between ECU and AMF sensor connector as per circuit schematic; Follow Electrical continuity check procedure. Replace/ Rectify Harness if required. 6. Check whether the EMS ecu inlet temperature pin A04 is short circuited to ground because of wrong connections of wiring harness; if so rectify the wiring harness connections to make them inline with circuit schematics 7. Check ECU; Replace ECU; if problem still persists 8. After rectification ensure the following checks before handing over the vehicle to customer. a) AMF sensor reads xx mg/st at key on condition. b) When the engine is at idle AMF sensor reads < xx mg/st. c) when the engine is at fly-up AMF sensor reads > xx mg/st. 9. After rectification if possible carry out following check Soak the vehicle for more than 12 hrs (preferably over night) Then check if all the system temperature values (coolant, fuel, inlet air) are close to each other.	
P0A10	Intake Air Temperature Sensor 1 Circuit	00	This fault is a grouping fault for all Intake temperature sensor related faults: P0111-27, P0A13-15, and P0112-11.	1. As this fault gets logged with any of the following faults- P0111-27, P0A13-15, and P0112-11. 2. Follow the rectification procedure of any of the above mentioned faults associated with this fault for resolution.	
P0601	Internal Control Module Memory Checksum Error	45	This fault gets logged due to EMS ecu Internal control module program memory failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0601	Internal Control Module Memory Checksum Error	44	This fault gets logged due to EMS ecu Internal control module data memory failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P0604	Internal Control Module Random Access Memory (RAM) Error	42	This fault gets logged due to EMS ecu Internal control module RAM failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P0601	Internal Control Module Memory Checksum Error	41	This fault gets logged due to EMS ecu Internal control module General checksum failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
PA64F	Internal Control Module MSR integrity	64	This fault gets logged due to EMS ecu Internal control module MSR integrity failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P0088	Fuel Rail/System Pressure - Too High	22	This fault gets logged if rail pressure is too high in IMV control state	1. Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P0088	Fuel Rail/System Pressure - Too High	2A	This fault gets logged if rail pressure is too high in Undefined control state	1. Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 2. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 3. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 4. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 5. Check whether adequate fuel level is available in the tank. 6. Check high pressure fuel lines for leakage 7. Check fuel filter is not clogged. 8. Check low pressure fuel lines for air entry 9. Check & ensure IMV and rail pressure sensor connectors for proper fitment 10. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 11. Check harness for damages; Replace / Repair if harness is damaged. 12. Check ECU pins and connector, Replace if found defective.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				13. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 14. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 16. If vehicle is able to start then start the vehicle and perform ''Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 17. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 18. Check whether IMV is Stuck closed, if so replace the IMV. 19. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P06B8	Internal Control Module Non-Volatile Random Access Memory (NVRAM) Error	45	This fault gets logged due to EMS ecu Internal control module NVM failure	Replace the EMS ecu if this fault appears	
PBA35	Throttle/Pedal Position Sensor / Switch "A"/"B" Voltage Correlation	62	1. This fault appears when EMS ecu finds lack of correlation between Accelerator pedal switch 1 & 2 inputs.	1. Check for any faults related to accelerator pedal track 1 and track 2; if noticed Rectify the concerned faults by following their rectification procedure. 2. Check Electrical continuity between ECU pins B25,B24 & B26 to Pedal connector pins 4,2 & 3 && ECU pins B13,B29, & B14 to pedal connector pins 6,1 & 5 as per circuit schematics; Follow Electrical continuity check procedure. Replace/ Rectify if any faults found. 3. After rectification ensure the following checks before handing over the vehicle to customer. A) When pedal is not pressed - Pedal position in tata diagnostic tool should be less than 5%. B) When the pedal is fully pressed - Pedal position in tata diagnostic tool should be more than 95 %.	
P060D	Internal Control Module Accelerator Pedal Position Performance	96	This fault gets logged when pedal track 1 and pedal track 2 failures are confirmed.	1. Check for any faults related to accelerator pedal track 1 and track 2: P0A23-12, P0A22-14, P0223-12, and P0222-14 && reference voltage faults: P0641, P0651; if noticed Rectify the concerned faults by following their rectification procedure. 2. Check Electrical continuity between ECU pins B25,B24 & B26 to Pedal connector pins 4,2 & 3 && ECU pins B13,B29, & B14 to pedal connector pins 6,1 & 5 as per circuit schematics; Follow Electrical continuity check procedure. Replace/ Rectify if any faults found. 3. After rectification ensure the following checks before handing over the vehicle to customer. A) When pedal is not pressed - Pedal position in tata diagnostic tool should be less than 5%. B) When the pedal is fully pressed - Pedal position in tata diagnostic tool should be more than 95 %.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
PB299	Brake Pedal Position / Accelerator Pedal Position Incompatible	2A	This fault gets logged by ECU if the following condition takes place:- 1. If the vehicle speed is greater than an upper threshold limit even when the brake pedal is pressed. ECU will logs this fault only if the following conditions are satisfied: - Engine speed above a threshold - Vehicle speed is above a threshold - P_L_Pedal_position in stable position - P_L_Pedal_position above a minimum value - No brake pedal information fault In order to avoid wrong failure detection, pedal stuck fault is frozen(frozen means - soft fault will be logged but it will not be shown in diagnostic tool. in case if fault is shown in diagnostic tool then it will be resettled) following cases : - during accelerator pedal track 2 to ground test - If an external torque is detected - If a soft or rec failure is detected on both pedal tracks.	1. Check, if the Brake lights are on even when no brake pedal is pressed. 2. Check whether the accelerator pedal is free to move; Ensure free movement of the pedal; replace pedal if pedal movement is not free or very hard. 3. Check the brake switch setting; If the problem is with the brake setting performs the necessary repairs. 4. Check Electrical continuity between ECU to Accelerator pedal connector as per circuit schmatics;Check whether the accelerator pedal input pins of EMS ecu B24,B25,B29 & B13 are Short circuited to battery/ground and ECU pins B26 & B14 are Short circuited to battery supply due to wiring harness wrong connections. If so then rectify the wiring harness connections to make them inline with circuit schematics. 5. Check Electrical continuity between ECU pins B32 & B30 to Brake pedal connector. If any issues are found then make connections inline with circuit schematics. Check whether the brake input pins of EMS ecu B32 & 2 re Short circuited to battery/ground due to wiring harness wrong connections. If so then rectify the wiring harness connections to make them inline with circuit schematics. 6. Check whether the pedal potentiometer sensors 1 &2 parameter values in diagnostic tool are varying inline with pedal pressing condition. If not check steps 4 & 5 thoroughly, any issue found then rectify it by modifying wiring harness connections else replace faulty pedal potentiometer sensor. 6. Check and replace ECU still problem persists. 7. After rectification ensure the following checks before handing over the vehicle to customer. A) When pedal is not pressed - Pedal position in tata diagnostic tool should be less than 5%. B) When the pedal is fully pressed - Pedal position in tata diagnostic tool should be more than 95 %. C) Ensure break light is not glowing when the brake pedal is not pressed.	
P0A23	Throttle / Pedal Position Sensor/Switch "A" Circuit High	12	This fault gets logged if the Accelerator pedal sensor 1 signal pin of EMS ecu is short circuited to battery	1. Check for Sensor reference voltage fault: P0641. If found then rectify it by following its rectification procedure for solving this fault 2. Check Electrical continuity between ECU pins B25,B24 & B26 to Pedal connector pins 4, 2 & 3; Replace/ Rectify if any faults found. 3. Check whether Accelerators pedal switch 1 signal pin B25 is short circuited to battery, if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Replace accelerator pedal switch 1 if the problem still persists. 5. Replace EMS ecu if the problem still persists. 6. After rectification ensure the following checks before handing over the vehicle to customer. A) When pedal is not pressed - Pedal position in tata diagnostic tool should be less than 5%. B) When the pedal is fully pressed - Pedal position in tata diagnostic tool should be more than 95 %.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0A22	Throttle / Pedal Position Sensor/Switch "A" Circuit Low	14	This fault gets logged if the Accelerator pedal sensor 1 signal pin of EMS ecu is short circuited to ground/open	1. Check for Sensor reference voltage fault: P0641. If found then rectify it by following its rectification procedure for solving this fault 2. Check Electrical continuity between ECU pins B25,B24 & B26 to Pedal connector pins 4, 2 & 3; Replace/ Rectify if any faults found. 3. Check whether Accelerator pedal switch 1 signal pin B25 is short circuited to ground, if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Replace accelerator pedal switch 1 if the problem still persists. 5. Replace EMS ecu if the problem still persists. 6. After rectification ensure the following checks before handing over the vehicle to customer. A) When pedal is not pressed - Pedal position in tata diagnostic tool should be less than 5%. B) When the pedal is fully pressed - Pedal position in tata diagnostic tool should be more than 95 %.	
P0223	Throttle / Pedal Position Sensor/Switch "B" Circuit High	12	This fault gets logged if the Accelerator pedal sensor 2 signal pin of EMS ecu is short circuited to battery	1. Check for Sensor reference voltage fault: P0651. If found then rectify it by following its rectification procedure for solving this fault 2. Check Electrical continuity between ECU pins B13,B29 & B14 to Pedal connector pins 6, 1 & 5; Replace/ Rectify if any faults found. 3. Check whether Accelerator pedal switch 2 signal pin B13 is short circuited to battery, if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Replace accelerator pedal sensor 2 if the problem still persists. 5. Replace EMS ecu if the problem still persists. 6. After rectification ensure the following checks before handing over the vehicle to customer. A) When pedal is not pressed - Pedal position in tata diagnostic tool should be less than 5%. B) When the pedal is fully pressed - Pedal position in tata diagnostic tool should be more than 95 %.	
P0222	Throttle / Pedal Position Sensor/Switch "B" Circuit Low	14	This fault gets logged if the Accelerator pedal sensor 2 signal pin of EMS ecu is short circuited to ground/open	1. Check for Sensor reference voltage fault: P0651. If found then rectify it by following its rectification procedure for solving this fault 2. Check Electrical continuity between ECU pins B13,B29 & B14 to Pedal connector pins 6, 1 & 5; Replace/ Rectify if any faults found. 3. Check whether Accelerator pedal switch 2 signal pin B13 is short circuited to ground, if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Replace accelerator pedal sensor 2 if the problem still persists. 5. Replace EMS ecu if the problem still persists. 6. After rectification ensure the following checks before handing over the vehicle to customer. A) When pedal is not pressed - Pedal position in tata diagnostic tool should be less than 5%. B) When the pedal is fully pressed - Pedal position in tata diagnostic tool should be more than 95 %.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0093	Fuel System Leak Detected - Large Leak	7A	This fault gets logged if EMS ecu detects a heavy drop in rail pressure due to large leaks	1. Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. 2. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 3. Check whether the IMV control pin of EMS A77 is short circuited to ground because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics... 4. Check adequate fuel level is available in the tank. 5. Check high pressure fuel lines for leakage 6. Check fuel filter is not clogged. 7. Check low pressure fuel lines for air entry 8. Check & ensure connector for proper fitment 9. Check sensor for oxidation, rust etc, if observed clean deposit. 10. Check harness for damages; Replace / Repair if harness is damaged. 11. Check ECU pins and connector, Replace if found defective. 12. Please check if any injector back leak is abnormally high compared to the injectors. 13. Check whether High pressure pump is functioning properly else replace high pressure pump. 14 Check whether IMV is Stuck closed, if so replace the IMV. 15. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P0191	Fuel Rail Pressure Sensor "A" Circuit Range/Performance	27	1. This fault gets logged if the rate of change of rail pressure sensor input is greater than a maximum calibrated rail pressure threshold.	1. Check fuel level in the tank is above minimum level (fuel level gauge) 2. Check for Reference voltage supply 1 fault - P0641; if noticed follow Reference voltage check and rectification Procedure of P0641. 3. Check High pressure circuit for fuel leakages; Rectify leakages by proper fitment/replacement of component. 4. Check sensor connections for rust dirt etc; clean the sensor connections and ensure proper fitment. 5. Visually check sensor for damages; Follow Electrical continuity check procedure; Replace/ Rectify Harness if required. 6. Check Electrical continuity between ECU and rail pressure sensor connector as per circuit schematic; establish the continuity if problem. If any reference voltage supply 1 faults are found then rectify them for rectifying this fault. Check whether the ECU pins A38,A35 are short circuited to battery/ground and A19 pin is Short circuited to battery supply/Ground due to wrong wiring harness connections, if so rectify the wiring harness connections to make them inline with circuit schematics. 7. Check for damages of the sensor; replace sensor-rail assembly if damaged or problem persists. 8. Check ECU; if problem still persists replace the ECU. 9. After rectification ensure the following before handing over to customer.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows rail pressure value of XX bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.	
P0A93	Fuel Rail Pressure Sensor "A" Circuit High	15	1. This fault gets logged if the rail pressure sensor signal pin of EMS ecu is short circuited to Battery/open.	1. Check fuel level in the tank is above minimum level (fuel level gauge) 2. Check for Reference voltage supply 1 fault - P0641; if noticed follow Reference voltage check and rectification Procedure of P0641. 3. Check High pressure circuit for fuel leakages; Rectify leakages by proper fitment/replacement of component. 4. Check sensor connections for rust dirt etc; clean the sensor connections and ensure proper fitment. 5. Visually check sensor for damages; Follow Electrical continuity check procedure; Replace/ Rectify Harness if required. 6. Check Electrical continuity between ECU and rail pressure sensor connector as per circuit schematic; establish the continuity if problem. If any reference voltage supply 1 faults are found then rectify them for rectifying this fault. Check whether the ECU pins A38,A35 are short circuited to battery/ground and A19 pin is Short circuited to battery supply due to wrong wiring harness connections, if so rectify the wiring harness connections to make them inline with circuit schematics. 7. Check for damages of the sensor; replace sensor-rail assembly if damaged or problem persists. 8. Check ECU; if problem still persists replace the ECU. 9. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows rail pressure value of XX bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.	
P0A92	Fuel Rail Pressure Sensor "A" Circuit Low	11	1. This fault gets logged if the rail pressure sensor signal pin of EMS ecu is short circuited to Ground.	1. Check fuel level in the tank is above minimum level (fuel level gauge) 2. Check for Reference voltage supply 1 fault - P0641; if noticed follow Reference voltage check and rectification Procedure of P0641. 3. Check High pressure circuit for fuel leakages; Rectify leakages by proper fitment/replacement of component. 4. Check sensor connections for rust dirt etc; clean the sensor connections and ensure proper fitment. 5. Visually check sensor for damages; Follow Electrical continuity check procedure; Replace/ Rectify Harness if required. 6. Check Electrical continuity between ECU and rail pressure sensor connector as per circuit schematic; establish the continuity if problem. If any reference voltage supply 1 faults are found then rectify them for rectifying this fault. Check whether the ECU pins A38,A35 are short circuited to battery/ground and A19 pin is Short circuited to battery supply due to wrong wiring harness connections, if so rectify the wiring harness connections to make them inline with circuit schematics. 7. Check for damages of the sensor; replace sensor-rail assembly if damaged	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				or problem persists. 8. Check ECU; if problem still persists replace the ECU. 9. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows rail pressure value of XX bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.	
P0191	Fuel Rail Pressure Sensor "A" Circuit Range/Performance	67	This fault gets logged when the rail pressure after Ignition on is much greater than rail pressure memorized when powering OFF the system and engine stopped.(previous power off)	1. Check whether the vehicle has been pushed for some time; if so then erase the DTC and handover the vehicle back to the customer. 2. Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the Rail pressure sensor signal pin A35 is either shorted to battery/Ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check for P0641 fault, if found then rectify the fault by following its rectification procedure. 6. If the problem still persists then replace Rail + Rail pressure sensor. 7. Check EMS ecu pins for physical damage, if so replace EMS ecu 8. If problem still persists then replace EMS ecu.	
P0191	Fuel Rail Pressure Sensor "A" Circuit Range/Performance	67	This fault gets logged when the rail pressure after Ignition on is much less than rail pressure memorized when powering OFF the system and engine stopped.(previous power off)	1. Check whether the vehicle has been pushed for some time; if so then erase the DTC and handover the vehicle back to the customer. 2. Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the Rail pressure sensor signal pin A35 is either shorted to battery/Ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check for P0641 fault, if found then rectify the fault by following its rectification procedure. 6. If the problem still persists then replace Rail + Rail pressure sensor. 7. Check EMS ecu pins for physical damage, if so replace EMS ecu 8. If problem still persists then replace EMS ecu.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0191	Fuel Rail Pressure Sensor "A" Circuit Range/Performance	67	This fault gets logged if EMS ecu finds the rail pressure after Ignition on is much greater than rail pressure memorized when powering OFF the system and engine stopped (previous power off) for some ignition On Off cycles	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check whether the vehicle has been pushed for some time; if so then erase the DTC and handover the vehicle back to the customer. 3. Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the Rail pressure sensor signal pin A35 is either shorted to battery/Ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 5. Check whether the IMV control pin of EMS A77 is short circuited to ground because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 6. Check for P0641 fault, if found then rectify the fault by following its rectification procedure. 7. If the problem still persists then replace Rail + Rail pressure sensor. 8. Check EMS ecu pins for physical damage, if so replace EMS ecu 9. If problem still persists then replace EMS ecu.	
P0627	Fuel Pump "A" Control Circuit/Open	92	This fault gets logged if the rail pressure is not building after Ignition on when the fuel tank level is low	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P0627	Fuel Pump "A" Control Circuit/Open	92	This fault gets logged if the rail pressure is not building after Ignition on when the fuel tank level is Normal	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P0191	Fuel Rail Pressure Sensor "A" Circuit Range/Performance	84	This fault gets logged If the difference between the rail pressure demand and the rail pressure feedback is less than a calibrated minimum threshold for rail pressure.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P0191	Fuel Rail Pressure Sensor "A" Circuit Range/Performance	85	This fault gets logged If the difference between the rail pressure demand and the rail pressure feedback is greater than a calibrated maximum threshold for rail pressure.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P0003	Fuel Volume Regulator Control Circuit Low	84	This fault gets logged If the difference between the rail pressure demand and the rail pressure feedback is less than a calibrated minimum threshold for rail pressure in IMV mode.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar,	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P0004	Fuel Volume Regulator Control Circuit High	85	This fault gets logged If the difference between the rail pressure demand and the rail pressure feedback is greater than a calibrated maximum threshold for rail pressure in IMV mode.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0088	Fuel Rail/System Pressure – Too High	84	This fault gets logged If the difference between the rail pressure demand and the rail pressure feedback is less than a calibrated minimum threshold for rail pressure when the fuel level in the tank is low.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. Check fuse connected to EMS power relay and ensure it's not short or malfunctioning. Replace if required. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0087	Fuel Rail/System Pressure – Too Low	85	This fault gets logged If the difference between the rail pressure demand and the rail pressure feedback is greater than a calibrated maximum threshold for rail pressure when the fuel level in the tank is low.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. Check fuse connected to EMS power relay and ensure it's not short or malfunctioning. Replace if required. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0091	Fuel Pressure Regulator 1 Control Circuit Low	84	This fault gets logged If the difference between the rail pressure demand and the rail pressure feedback is less than a calibrated minimum threshold for rail pressure in Rail discharge mode.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. Check fuse connected to EMS power relay and ensure it's not short or malfunctioning. Replace if required. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0092	Fuel Pressure Regulator 1 Control Circuit High	85	This fault gets logged If the difference between the rail pressure demand and the rail pressure feedback is greater than a calibrated maximum threshold for rail pressure in rail discharge mode.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform ''Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P0088	Fuel Rail/System Pressure – Too High	67	This fault gets logged if the time spent under over rail pressure condition is greater than a maximum calibrated time out threshold	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. Check fuse connected to EMS power relay and ensure it's not short or malfunctioning. Replace if required. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P0093	Fuel System Leak Detected - Large Leak	7A	This fault gets logged if the Interpolated value used to calculate the torque limitation by the VLC strategy is over a threshold or clamped	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				Rectify wiring harness connections in case of any issue. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics... 5. Check adequate fuel level is available in the tank. 6. Check high pressure fuel lines for leakage 7. Check fuel filter is not clogged. 8. Check low pressure fuel lines for air entry 9. Check & ensure connector for proper fitment 10. Check rail pressure sensor for oxidation, rust etc, if observed clean deposit. 11. Check harness for damages; Replace / Repair if harness is damaged. 12. Check ECU pins and connector for damage, Replace if found defective. 13. Please check if any injector back leak is abnormally high compared to other injectors. 14. Check whether High pressure pump is functioning properly else replace high pressure pump. 15 Check whether IMV is Stuck closed, if so replace the IMV. 16. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P0094	Fuel System Leak Detected – Small Leak	7A	This fault gets logged if the Interpolated value used to calculate the torque limitation by the VLC strategy is over a threshold or abnormally high	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check electrical continuity between ECU pin no A38, A35 A19 to Rail pressure sensor connector no 3, 1, 2. Check whether the rail pressure sensor signal pin A35 is either shorted to battery/ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check electrical continuity of wiring harness between ECU pin A77 and IMV connector pin 2 & Ignition key switch supply and IMV connector pin 1. Rectify wiring harness connections in case of any issue. Check fuse connected to EMS power relay and ensure it's not short or malfunctioning. Replace if required. 4. Check whether the IMV control pin of EMS A77 is short circuited to ground/battery because of wrong wiring harness connections. If so rectify the wrong connections to make the connections inline with circuit schematics. 5. Check IMV internal resistance whether it is according to the design specifications (5.3 ohms at 20 degrees C). Replace IMV if the resistance is not according to specifications. 6. Check whether adequate fuel level is available in the tank. 7. Check high pressure fuel lines for leakage 8. Check fuel filter is not clogged. 9. Check low pressure fuel lines for air entry. 10. Check & ensure IMV and rail pressure sensor connectors for proper fitment 11. Check rail pressure sensor for oxidation, rust etc, if observed clean	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				deposit. 12. Check harness for damages; Replace / Repair if harness is damaged. 13. Check ECU pins and connector, Replace if found defective. 14. If vehicle is unable to start the perform 'Static injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 15. If vehicle is able to start then start the vehicle and perform 'Dynamic IMV test' - If test result shows IMV is faulty then replace IMV. 16. If vehicle is able to start then start the vehicle and perform 'Dynamic injector back leak test', Please check if any injector back leak is abnormally high compared to other injectors, then replace corresponding injectors. 17. If vehicle is able to start then start the vehicle and perform "Pump pressure build capacity test' - If test result shows not ok then replace HP pump. 18. Check whether High pressure pump is functioning properly/able to build pressure else replace high pressure pump. 19. Check whether IMV is Stuck closed, if so replace the IMV. 20. After rectification ensure the following before handing over to customer. a) Rail pressure at ignition key on is < 10 bar, b) By removing the rail pressure sensor connector shows a very rail pressure value in bar, c) High pressure leak detection test can be carried out. d) Please drive the vehicle on road, check and ensure rail pressure feed-back follows the demand continuously.(feedback and demand parameters can be monitored by using diagnostic tool)	
P0685	ECM/PCM Power Relay Control Circuit/Open	73	ECU detects ECM/PCM power relay control circuit open fault if following condition takes place - 1: If the relay is detected as stucked too many times the stuck cu relay fault is raised. 2: If the ECU is not external power supplied and have been shut off by the Monitoring Module or the Main relay but ecu is getting supply, and then there maybe a stucked relay and fault will be raised.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the Main relay contacts; If any contact weld is found then Replace Main relay. 3. Check electrical continuity between ECU to main power hold rely connector as per circuit schematics; Follow electrical continuity check procedure. Replace/rectify harness if required. Check ecu pins and connector pins for damage/rust. In case of rust then clean them and refit the connector. 4. Check whether the main relay control pin 245 of EMS ecu is short circuited to ground. In case any short circuits are found then rectify wiring harness connections to make wiring harness connections inline with circuit schematics. 5. Check & replace the ECU if the problem persists.	
P0095	Intake Air Temperature Sensor 2 Circuit	15	This fault gets logged if the boost temperature sensor signal pin of EMS ecu is short circuited to battery/open circuited.	1. Check for reference voltage supply 2 faults- P0651. Rectify this fault by following its rectification procedure. 2. Check electrical continuity between the EMS ecu pin A34 and the boost pressure and temperature sensor connector. Rectify if any harness issues are found. 3. Check whether the Boost temperature signal pin A34 is short circuited to battery. If so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check for any physical damage of Boost pressure and temperature sensor or its connector. Replace sensor/connector if damages are found. 5. Check for any rust/dirt on the sensor connector. If so then clean the connector and refit it. 6. If the problem still persists then replace the boost pressure and temperature	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				sensor. 7. IF the problem still persists then replace the EMS ecu.	
P0095	Intake Air Temperature Sensor 2 Circuit	11	This fault gets logged if the boost temperature sensor signal pin of EMS ecu is short circuited to ground.	1. Check for reference voltage supply 2 faults- P0651. Rectify this fault by following its rectification procedure. 2. Check electrical continuity between the EMS ecu pin A34 and the boost pressure and temperature sensor connector. Rectify if any harness issues are found. 3. Check whether the Boost temperature signal pin A34 is short circuited to ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check for any physical damage of Boost pressure and temperature sensor or its connector. Replace sensor/connector if damages are found. 5. Check for any rust/dirt on the sensor connector. If so then clean the connector and refit it. 6. If the problem still persists then replace the boost pressure and temperature sensor. 7. IF the problem still persists then replace the EMS ecu.	
P060B	Internal Control Module A/D Processing Performance	49	This fault gets logged due to EMS ecu internal ADC converter failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P0544	Exhaust Gas Temperature Sensor Circuit	00	This fault is a grouping fault for all Exhaust gas temperatures sensor 2 faults: P2080-64, P0545-11, P2080-2F, and P0544-92.	1. Follow the rectification procedure of P2080-64/P0545-11/P2080-2F/P0544-92 associated with this fault for rectifying this fault.	
P0546	Exhaust Gas Temperature Sensor Circuit High	15	1. This fault gets logged if the Exhaust gas temperature sensor 2 signal pin is short circuited to battery/open	1. Check electrical continuity between the EMS ecu pins A05 & A22 and the Exhaust gas temperatures sensor 2 connector. Rectify if any harness issues are found. 3. Check whether the exhaust gas temperature signal pin A05 is short circuited to battery. If so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check for any physical damage of exhaust gas temperature sensor 2 or its connector. Replace sensor/connector if damages are found. 5. Check for any rust/dirt on the sensor connector. If so then clean the connector and refit it. 6. If the problem still persists then replace the boost pressure and temperature sensor. 7. IF the problem still persists then replace the EMS ecu.	
P2080	Exhaust Gas Temperature Sensor Circuit Range/Performance	64	1. This fault gets logged if the Exhaust gas temperature sensor input value is not plausible.	1. Check electrical continuity between the EMS ecu pins A05 & A22 and the Exhaust gas temperatures sensor 2 connector. Rectify if any harness issues are found. 3. Check whether the exhaust gas temperature signal pin A05 is short circuited to battery/Ground. If so then rectify the wiring harness connections to make them inline with circuit schematics.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				4. Check for any physical damage of exhaust gas temperature sensor 2 or its connector. Replace sensor/connector if damages are found. 5. Check for any rust/dirt on the sensor connector. If so then clean the connector and refit it. 6. If the problem still persists then replace the boost pressure and temperature sensor. 7. IF the problem still persists then replace the EMS ecu.	
P0545	Exhaust Gas Temperature Sensor Circuit Low	11	1. This fault gets logged if the Exhaust gas temperature sensor 2 signal pin is short circuited to ground	1. Check electrical continuity between the EMS ecu pins A05 & A22 and the Exhaust gas temperatures sensor 2 connector. Rectify if any harness issues are found. 3. Check whether the exhaust gas temperature signal pin A05 is short circuited to ground. If so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check for any physical damage of exhaust gas temperature sensor 2 or its connector. Replace sensor/connector if damages are found. 5. Check for any rust/dirt on the sensor connector. If so then clean the connector and refit it. 6. If the problem still persists then replace the boost pressure and temperature sensor. 7. IF the problem still persists then replace the EMS ecu.	
P2080	Exhaust Gas Temperature Sensor Circuit Range/Performance	2F	1. This fault gets logged if the Exhaust gas temperature sensor input value is not plausible.	1. Check electrical continuity between the EMS ecu pins A05 & A22 and the Exhaust gas temperature Sensor 2 connector. Rectify if any harness issues are found. 3. Check whether the exhaust gas temperature signal pin A05 is short circuited to battery. If so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check for any physical damage of exhaust gas temperature sensor 2 or its connector. Replace sensor/connector if damages are found. 5. Check for any rust/dirt on the sensor connector. If so then clean the connector and refit it. 6. If the problem still persists then replace the boost pressure and temperature sensor. 7. IF the problem still persists then replace the EMS ecu.	
P0544	Exhaust Gas Temperature Sensor Circuit	92	1. This fault gets logged if the Exhaust gas temperature sensor 2 input response is too slow.	1. Check electrical continuity between the EMS ecu pins A05 & A22 and the Exhaust gas temperature Sensor 2 connector. Rectify if any harness issues are found. 3. Check whether the exhaust gas temperature signal pin A05 is short circuited to battery. If so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check for any physical damage of exhaust gas temperature sensor 2 or its connector. Replace sensor/connector if damages are found. 5. Check for any rust/dirt on the sensor connector. If so then clean the connector and refit it. 6. If the problem still persists then replace the boost pressure and temperature sensor. 7. IF the problem still persists then replace the EMS ecu.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P2620	Throttle Position Output Circuit/Open	15	1. EMS ecu sets a range (with the help of min and max calibratable thresholds) for the throttle feedback input. 2. If the throttle feedback position input from Motorizes throttle actuator input is greater than the max calibrated threshold for throttle feedback	1. Check the continuity between the EMS ecu pins A64, A15,A72 and the motorized throttle actuator connector pins 1, 2 &3. Rectify if any issues found. Check for any reference voltage supply 3 faults (P0697), if so then follow the rectification procedure of those faults. 2. Check whether the EMS ecu feedback sensor signal pin is short circuited to battery supply due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check sensor for oxidation, rust etc, if observed clean deposit. 4. Check for rust/dirt accumulated on the sensor connector, if found clean the connector and refit it. 5. Check whether the wiring harness connections between the motorized throttle actuator and EMS ecu are according to the circuit schematics. Modify the wiring harness connections if any issues found. 6. If still problem persists then replace the motorized throttle body. 7. If still problem persists then replace the EMS ecu. 8. Ensure whether the Throttle demand and feedback parameters are matching before handing the vehicle to customer.	
P2620	Throttle Position Output Circuit/Open	11	1. EMS ecu sets a range (with the help of min and max calibratable thresholds) for the throttle feedback input. 2. If the throttle feedback position input from Motorized throttle actuator input is less than the min calibrated threshold for throttle feedback	1. Check the continuity between the EMS ecu pins A64, A15, A72 and the motorized throttle actuator connector pins 1, 2 &3. Rectify if any issues found. Check for any reference voltage supply 3 faults (P0697), if so then follow the rectification procedure of those faults. 2. Check whether the EMS ecu feedback sensor signal pin is short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check sensor for oxidation, rust etc, if observed clean deposit. 4. Check for rust/dirt accumulated on the sensor connector, if found clean the connector and refit it. 5. Check whether the wiring harness connections between the motorized throttle actuator and EMS ecu are according to the circuit schematics. Modify the wiring harness connections if any issues found. 6. If still problem persists then replace the motorized throttle body. 7. If still problem persists then replace the EMS ecu. 8. Ensure whether the Throttle demand and feedback parameters are matching before handing the vehicle to customer.	
P2A09	Throttle/Pedal Position Sensor "A" Minimum Stop Performance	71	1. This DTC gets logged if the Throttle actuator is stucked.	1. Check for any mechanical blockages of throttle actuator. If so then clean the actuator and refit it. 2. Replace throttle actuator if the problem still persists. 3. Replace the EMS ecu if the problem still persists	
P101B	Throttle Actuator Control System - Close Position Not learned	62	1. This fault gets logged if EMS ecu finds a deviation between the current throttle actuator closed position learning value and its first closed position learning value.	1. Relearn the closed position of throttle actuator as per specifications. 2. If the problem still persists then replace Throttle actuator. 3. If the problem still persists then replace EMS ecu.	
P101D	Throttle Actuator Control System - Close Position Learning Plausibility	62	1. This fault gets logged if EMS ecu finds the average value of actuator closed position learnt values(previous learning's and current learning) exceeds a maximum calibrated threshold	1. Relearn the closed position of throttle actuator as per specifications. 2. If the problem still persists then replace Throttle actuator. 3. If the problem still persists then replace EMS ecu.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P101D	Throttle Actuator Control System - Close Position Learning Plausibility	62	1. This fault gets logged if EMS ecu finds the average value of actuator closed position learnt values(previous learning's and current learning) less than a minimum calibrated threshold	1. Relearn the closed position of throttle actuator as per specifications. 2. If the problem still persists then replace Throttle actuator. 3. If the problem still persists then replace EMS ecu.	
P101B	Throttle Actuator Control System - Close Position Not learned	62	1. This fault gets logged if EMS ecu finds a deviation between the current throttle actuator closed position learning value and its previous closed position learning value.	1. Relearn the closed position of throttle actuator as per specifications. 2. If the problem still persists then replace Throttle actuator. 3. If the problem still persists then replace EMS ecu.	
P101A	Throttle Actuator Control System - Open Position Not learned	62	1. This fault gets logged if EMS ecu finds a deviation between the current throttle actuator open position learning value and its first open position learning value.	1. Relearn the open position of throttle actuator as per specifications. 2. If the problem still persists then replace Throttle actuator. 3. If the problem still persists then replace EMS ecu.	
P101C	Throttle Actuator Control System - Open Position Learning Plausibility	62	1. This fault gets logged if EMS ecu finds the average value of actuator open position learnt values(previous learning's and current learning) less than a minimum calibrated threshold	1. Relearn the open position of throttle actuator as per specifications. 2. If the problem still persists then replace Throttle actuator. 3. If the problem still persists then replace EMS ecu.	
P0638	Throttle Actuator Control Range/ Performance	19	1. This fault gets logged if the PWM signal is too high (or too low) during a too long delay, an over current fault is raised in order to protect the actuator.	1. Check the electrical continuity between the EMS ecu pins A92,A93 to the throttle actuator connector pins 5 & 4. Rectify if any issues like open circuits/short circuit to Ground/Battery of throttle actuator drive pins A92,A93 are found. 2. Ensure that there is no dirt/rust is deposited on the connector. 3. Check whether the wiring harness connections between the EMS ecu and the throttle actuator connector are as per circuit schematics. Remove if any splices are found which are not mentioned in circuit schematics. 4. Check the throttle actuator for any mechanical stuck issues or mechanical blockage issues. 5. If any blockage is found then clear the blockages in actuator. 6. If problem still persists then replace throttle actuator. 7. If problem still persists then replace the EMS ecu 8. Ensure the throttle actuator demand and feedback parameters are matching before handing the vehicle to customer.	
P101A	Throttle Actuator Valve Spring	07	This fault gets logged due to the mechanical failure of throttle spring.	1. Replace the throttle actuator if this fault appears. 2. Replace the EMS ecu if the problem still persists.	
P060B	Internal Control Module A/D Processing Performance	49	1. This fault gets logged due to EMS ecu internal analog digital converter failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	
P0641	Sensor Reference Voltage "A" Circuit/Open	00	This fault is a grouping fault for reference voltage 1 faults: P06A6-1C, P0642-98.	Follow the rectification procedure of P06A6-1C/P0642-98 with which this fault appeared for resolution	
P06A6	Sensor Reference Voltage "A" Circuit Range/Performance	1C	This DTC gets logged under the following conditions - if the voltage supplied by the EMS ecu voltage supply 1 is out of range. Generally it needs to be 5V.	1. This fault will lead to the faults of rail pressure sensor and pedal position sensor 1. As both the sensors are supplied by EMS ecu voltage supply 1. 2. Check the continuity between the EMS ecu pin A38 (rail pressure sensor supply pin) to the EMS ecu and rectify if any issues found in wiring harness	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				connections. Check whether the EMS ecu pin A38 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check the continuity between the EMS ecu pin B24 (pedal position sensor 1 supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections.Check whether the EMS ecu pin B24 is short circuited to battery/ground due to wrong wiring harness connections, if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. If the problem still persists then replace EMS ecu.	
P0642	Sensor Reference Voltage "A" Circuit Low	98	This DTC gets logged under the following conditions - if the EMS ecu voltage supply 2 is thermally shutdown due to over temperature.	1. This fault will lead to the faults of rail pressure sensor and pedal position sensor 1. As both the sensors are supplied by EMS ecu voltage supply 1. 2. Check the continuity between the EMS ecu pin A38 (rail pressure sensor supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A38 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check the continuity between the EMS ecu pin B24 (pedal position sensor 1 supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin B24 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. If the problem still persists then replace EMS ecu.	
P0651	Sensor Reference Voltage "B" Circuit/Open	00	This fault is a grouping fault for reference voltage 1 faults: P06A7-1C, P0652-98.	Follow the rectification procedure of P06A7-1C,P0652-98 with which this fault appeared for resolution	
P06A7	Sensor Reference Voltage "B" Circuit Range/Performance	1C	This DTC gets logged under the following conditions - if the voltage supplied by the EMS ecu voltage supply 2 is out of range. Generally it needs to be 5V.	1. This fault will lead to the faults of boost pressure sensor, cruise control, differential pressure sensor, pedal position sensor. As all these sensors are supplied by EMS ecu voltage supply 2. 2. Check the continuity between the EMS ecu pin A42 (Boost pressure sensor supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A42 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check the continuity between the EMS ecu pin A43 (cruise control supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A43 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the EMS ecu pin A66 (DPF sensor supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A66 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 5. Check the continuity between the EMS ecu pin B29 (pedal position sensor 2 supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin B29 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 6. If the problem still persists then replace EMS ecu.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0652	Sensor Reference Voltage "B" Circuit Low	98	This DTC gets logged under the following conditions - if the EMS ecu voltage supply 2 is thermally shutdown due to over temperature.	1. This fault will lead to the faults of boost pressure sensor, cruise control, differential pressure sensor, pedal position sensor. As all these sensors are supplied by EMS ecu voltage supply 2. 2. Check the continuity between the EMS ecu pin A42 (Boost pressure sensor supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A42 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check the continuity between the EMS ecu pin A43 (cruise control supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A43 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the EMS ecu pin A66 (DPF sensor supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A66 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 5. Check the continuity between the EMS ecu pin B29 (pedal position sensor 2 supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin B29 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 6. If the problem still persists then replace EMS ecu.	
P0697	Sensor Reference Voltage "C" Circuit/Open	00	This fault is a grouping fault for reference voltage 1 faults: P06A8-1C, P0698-98.	Follow the rectification procedure of P06A8-1C/P0698-98 with which this fault appeared for resolution	
P06A8	Sensor Reference Voltage "C" Circuit Range/Performance	1C	This DTC gets logged under the following conditions - if the voltage supplied by the EMS ecu voltage supply 3 is out of range. Generally it needs to be 5V.	1. This fault will lead to the faults of throttle feedback sensor and the EGR feedback sensors. As both the sensors are supplied by EMS ecu voltage supply 3. 2. Check the continuity between the EMS ecu pin A64 (throttle feedback sensor supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A64 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check the continuity between the EMS ecu pin A65 (EGR feedback sensor supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A65 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. If the problem still persists then replace EMS ecu.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0698	Sensor Reference Voltage "C" Circuit Low	98	This DTC gets logged under the following conditions - if the EMS ecu voltage supply 3 is thermally shutdown due to over temperature.	1. This fault will lead to the faults of throttle feedback sensor and the EGR feedback sensors. As both the sensors are supplied by EMS ecu voltage supply 3. 2. Check the continuity between the EMS ecu pin A64 (throttle feedback sensor supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A64 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 3. Check the continuity between the EMS ecu pin A65 (EGR feedback sensor supply pin) to the EMS ecu and rectify if any issues found in wiring harness connections. Check whether the EMS ecu pin A65 is short circuited to battery/ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. If the problem still persists then replace EMS ecu.	
P0234	Turbocharger/Supercharger "A" Over boost Condition	85	1. If the difference between the boost pressure demand (VGT valve opening is dependant on Boost pressure demand) and the boost pressure raw value from sensor is greater than maximum threshold then this fault is logged.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the EMS ecu pin A68,A42 & A13 and the boost pressure and temperature sensor connector. Rectify if any issues found. Check for reference voltage 1 fault P0641; if so rectify that fault by following its rectification procedure. 3. Check whether the Boost pressure sensor signal pin A13 is short circuited to battery supply due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check Boost pressure sensor for oxidation, rust etc, if observed clean deposit. 5. Check harness for damages; Replace / Repair if harness is damaged. 6. Check whether VGT actuator is stuck open/mechanical damage to VGT actuator. 7. Check the continuity between the EMS ecu pin A89 to the VGT actuator connector pin 4 && Main relay power supply to Actuator connector pin 1 and rectify if any issues found. 8. Check whether the VGT actuator connector pin 2 is connected to ground and Connector pins 3 & 5 are connected to CAN H and CAN L lines. 9. Check whether the VGT actuator control pin A89 is either short circuited to ground/battery. If so the rectify the wiring harness connections to make them inline with circuit schematics. 10. Check ECU pins and connector, Replace if found defective. 11 if still problem persists then replace Boost pressure sensor with new one. 12. If problem still persists then replace VGT actuator with new one. 13 If problem still persists then replace EMS ECU.	
P0299	Turbocharger/Supercharger "A" Under boost Condition	84	1. If the difference between the boost pressure demand (VGT valve opening is dependant on Boost pressure demand) and the boost pressure raw value from sensor is less than minimum threshold then this fault is logged.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the EMS ecu pin A68,A42 & A13 and the boost pressure and temperature sensor connector. Rectify if any issues found. Check for reference voltage 1 fault P0641; if so rectify that fault by following its rectification procedure. 3. Check whether the Boost pressure sensor signal pin A13 is short circuited to battery supply due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				4. Check Boost pressure sensor for oxidation, rust etc, if observed clean deposit. 5. Check harness for damages; Replace / Repair if harness is damaged. 6. Check whether VGT actuator is stuck open/mechanical damage to VGT actuator. 7. Check the continuity between the EMS ecu pin A89 to the VGT actuator connector pin 4 && Main relay power supply to Actuator connector pin 1 and rectify if any issues found. 8. Check whether the VGT actuator control pin A89 is either short circuited to ground/battery. If so the rectify the wiring harness connections to make them inline with circuit schematics. 9. Check ECU pins and connector, Replace if found defective. 10. If still problem persists then replace Boost pressure sensor with new one. 11. If problem still persists then replace VGT actuator with new one. 12. If problem still persists then replace EMS ECU.	
P0046	Turbocharger/Supercharger Boost Control "A" Circuit Range/Performance	35	This fault gets logged if incorrect VGT Actuator position is demanded by EMS ecu	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check whether VGT actuator is stuck open/mechanical damage to VGT actuator. In case of severe damage replace VGT actuator. 3. Check the continuity between the EMS ecu pin A89 to the VGT actuator connector pin 4 && Main relay power supply to Actuator connector pin 1 and rectify if any wiring harness issues are found. 4. Check whether the VGT actuator control pin A89 is either short circuited to ground/battery. If so the rectify the wiring harness connections to make them inline with circuit schematics. 5. Check ECU pins and connector, Replace if found defective. 6. If still problem persists then replace VGT actuator with new one. 7. If problem still persists then replace EMS ECU.	
P0046	Turbocharger/Supercharger Boost Control "A" Circuit Range/Performance	35	1. This fault gets logged if Incorrect PWM signal is applied to VGT actuator by EMS ecu.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check whether VGT actuator is stuck open/mechanical damage to VGT actuator. In case of severe damage replace VGT actuator. 3. Check the continuity between the EMS ecu pin A89 to the VGT actuator connector pin 4 && Main relay power supply to Actuator connector pin 1 and rectify if any wiring harness issues are found. 5. Check whether the VGT actuator control pin A89 is either short circuited to ground/battery. If so the rectify the wiring harness connections to make them inline with circuit schematics. 6. Check ECU pins and connector, Replace if found defective. 7. If still problem persists then replace VGT actuator with new one. 8. If problem still persists then replace EMS ECU.	
P00AF	Turbocharger/Supercharger Boost Control "A" Module Performance	96	1. This fault gets logged due to VGT actuator internal failures.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Replace the VGT valve if this fault appears. 3. Replace EMS ecu if problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0045	Turbocharger/Supercharger Boost Control "A" Circuit/Open	13	This fault gets logged if the VGT actuator drive pin of EMS ecu is open circuited	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check whether VGT actuator is stuck open/mechanical damage to VGT actuator. In case of severe damage replace VGT actuator. 3. Check the continuity between the EMS ecu pin A89 to the VGT actuator connector pin 4 && Main relay power supply to Actuator connector pin 1 and rectify if any wiring harness issues are found. 5. Check ECU pins and connector, Replace if found defective. 6. If still problem persists then replace VGT actuator with new one. 7. If problem still persists then replace EMS ECU. 8:-Check fuse connected to EMS power relay is functioning properly. Replace if found faulty	
P0048	Turbocharger/Supercharger Boost Control "A" Circuit High	12	This fault gets logged if the VGT actuator drive pin of EMS ecu is short circuited to battery	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check whether VGT actuator is stuck open/mechanical damage to VGT actuator. In case of severe damage replace VGT actuator. 3. Check the continuity between the EMS ecu pin A89 to the VGT actuator connector pin 4 && Main relay power supply to Actuator connector pin 1 and rectify if any wiring harness issues are found. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 5. Check whether the VGT actuator control pin A89 is either short circuited to battery. If so the rectify the wiring harness connections to make them inline with circuit schematics. 6. Check ECU pins and connector, Replace if found defective. 7. If still problem persists then replace VGT actuator with new one. 8. If problem still persists then replace EMS ECU.	
P0047	Turbocharger/Supercharger Boost Control "A" Circuit Low	11	This fault gets logged if the VGT actuator drive pin of EMS ecu is short circuited to ground	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check whether VGT actuator is stuck open/mechanical damage to VGT actuator. In case of severe damage replace VGT actuator. 3. Check the continuity between the EMS ecu pin A89 to the VGT actuator connector pin 4 && Main relay power supply to Actuator connector pin 1 and rectify if any wiring harness issues are found. 5. Check whether the VGT actuator control pin A89 is either short circuited to ground. If so the rectify the wiring harness connections to make them inline with circuit schematics. 6. Check ECU pins and connector, Replace if found defective. 7. If still problem persists then replace VGT actuator with new one. 8. If problem still persists then replace EMS ECU.	
P006E	Turbocharger/Supercharger Boost Control "A" Module Performance	1C	This fault gets logged if the VGT actuator gets Invalid/Improper Power supply.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2.Check the continuity between the EMS ecu VGT actuator control pin A89 to the VGT actuator connector pin 4 && Main relay power supply (12V) to Actuator connector pin 1 and rectify if any wiring harness issues are found. 3. Check if the correct battery is fitted 4. Check & ensure main power hold rely is working properly. 5. Check and ensure whether the battery terminal's are connected properly and they are tight.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				6. Check the charging circuit; Rectify the charging circuit if faulty. 7. Check ECU pin no 6,2 & 4 are getting ground connection and 1,3 & 5 are connected to battery positive – 12 V supply. 8. If fault still persists then replace VGT actuator. 9. Check ECU; Replace ECU if problem still persists. 10. Confirmatory check after rectification Check battery voltage in diagnostic tool. A) Reading should be close to 12 V if alternator is not charging. B) Reading should be close to 14 V if alternator is charging.	
PB269	Water in Fuel Condition	68	1. This fault will gets logged if water is found in fuel and water in fuel lamp will be lightened.	1. Take Drain Sedimenter contents in a bowl and check for water presence in diesel; If water is present; drain complete fuel from sedimenter and fuel filter. 2. Check electrical short circuit in wiring from water sensor to ECU; Rectify short circuit or replace harness if required. 3. Check Electrical continuity between ECU to water sedimentor connector; Still If problem persists replace water sedimentor. 4. Check and replace ECU if still problem persists.	
P0133	O2 Sensor Circuit Slow Response	1C	This fault gets logged under the following conditions: - if exhaust gas is not pure in fuel supply cutoff condition. - if oxygen sensor response is very slow	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity if any issues found in wiring harness. 4. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 5. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 6. Replace the O2 sensor if problem still persists. 7. Replace the EMS ecu if problem still persists.	
P0030	HO2S Heater Control Circuit	13	This fault gets logged if the EMS ecu heater control pin is open circuited	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pin A82 and the O2 sensor connector pin 3. Establish the continuity if any issues are found. 3. Check whether the ems ecu pin A82 is short circuited to ground/battery due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity if any issues found in wiring harness. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8. Replace the EMS ecu if problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P2626	O2 Sensor Pumping Current Trim Circuit/Open	13	This fault gets logged if the IA input pin of EMS ecu is open circuited	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground/Battery due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8.Replace the EMS ecu if problem still persist	
P2237	O2 Sensor Positive Current Control Circuit/Open	13	This fault gets logged if the IP input pin of EMS ecu is open circuited	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground/Battery due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8.Replace the EMS ecu if problem still persist	
PB243	O2 Sensor Reference Voltage Circuit/Open	13	This fault gets logged if the UN input pin of EMS ecu is open circuited	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground/Battery due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8.Replace the EMS ecu if problem still persist	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
PB243	O2 Sensor Reference Voltage Circuit/Open	13	This fault gets logged if the UN input pin of EMS ecu is open circuited in ramp condition	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8.Replace the EMS ecu if problem still persist	
PB251	O2 Sensor Negative Current Control Circuit/Open	13	This fault gets logged when open circuit (which occurs during active state) failure found on Vm pin of EMS ecu.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground/Battery due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8.Replace the EMS ecu if problem still persist	
PB251	O2 Sensor Negative Current Control Circuit/Open	13	This fault gets logged when open circuit (which occurs before init state) failure found on Vm of EMS ecu	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8.Replace the EMS ecu if problem still persist	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0133	O2 Sensor Circuit Slow Response -	92	It compares the sensor signal to the delayed and filtered (with the same time constant as a new sensor) commanded air / fuel. These two signals should ideally be identical. Here, the dynamics of the signals are compared.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground/battery due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8.Replace the EMS ecu if problem still persist	
P0030	HO2S Heater Control Circuit	12	This fault gets logged when short circuit to battery failure found on heater control pin of EMS ecu.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pin A82 and the O2 sensor connector pin 3. Establish the continuity if any issues are found. 3. Check whether the ems ecu pin A82 is short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity if any issues found in wiring harness. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8. Replace the EMS ecu if problem still persists.	
P2626	O2 Sensor Pumping Current Trim Circuit/Open	12	This fault gets logged when short circuit to battery failure found on Ia or Ip pins of EMS ecu.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground/Battery due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8. Replace the EMS ecu if problem still persist	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
PB243	O2 Sensor Reference Voltage Circuit/Open	12	This fault gets logged when short circuit to battery failure found on Un pin of EMS ecu	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8. Replace the EMS ecu if problem still persist	
PB251	O2 Sensor Negative Current Control Circuit/Open	12	This fault gets logged when short circuit to battery failure found on Vm pin of EMS ecu	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground/Battery due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8. Replace the EMS ecu if problem still persist.	
P0030	HO2S Heater Control Circuit	11	This fault gets logged when short circuit to ground failure found on heater control pin of EMS ecu.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				8. Replace the EMS ecu if problem still persists.	
P2626	O2 Sensor Pumping Current Trim Circuit/Open	11	This fault gets logged when short circuit to ground failure found on Ia or Ip pins of EMS ecu	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground/Battery due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8.Replace the EMS ecu if problem still persist	
PB243	O2 Sensor Reference Voltage Circuit/Open	11	This fault gets logged when short circuit to ground failure found on Un pin of EMS ecu	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground/Battery due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8. Replace the EMS ecu if problem still persist.	
PB251	O2 Sensor Negative Current Control Circuit/Open	11	This fault gets logged when short circuit to ground failure found on Vm pin of EMS ecu	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground/Battery due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8. Replace the EMS ecu if problem still persist.	
P2A00	O2 Sensor Circuit Range/Performance	56	A flag to indicate a soft fault on Wraf sens air val: Fault indicating a pure air value deviation during learning.	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Relearn the oxygen sensor. 3. If the problem still persists then replace oxygen sensor. 4. If the problem still persists then replace EMS ecu	
P00D1	HO2S Heater Control Circuit Range/Performance	00	This fault is a grouping fault for all Heater control related faults of Oxygen sensor: P0030-11, P0030-12, and P0030-13.	1. As this fault gets logged along with any of the following faults: P0030-11, P0030-12, and P0030-13. Follow the rectification procedure of any of the above faults associated with it for rectifying this fault	
P0130	O2 Sensor Circuit	00	This fault is a grouping fault for all Oxygen sensor related faults.	1. Follow the rectification procedure of any of the oxygen sensor faults associated with it for resolving this fault.	
P2A00	O2 Sensor Circuit Range/Performance	64	This fault gets logged if the oxygen sensor input signal is implausible	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8.Replace the EMS ecu if problem still persist	
P2100	Throttle Actuator "A" Control Motor Circuit/Open	18	This fault gets logged if the EMS ecu finds Current redundancy on throttle actuator drive	1. Check the electrical continuity between the EMS ecu pins A92,A93 to the throttle actuator connector pins 5 & 4. Rectify if any issues like open circuits/short circuit to Ground/Battery of throttle actuator drive pins A92,A93 are found. 2. Ensure that there is no dirt/rust is deposited on the connector. 3. Check whether the wiring harness connections between the EMS ecu and the throttle actuator connector are as per circuit schematics. Remove if any splices are found which are not mentioned in circuit schematics. 4. Check the throttle actuator for any mechanical stuck issues or mechanical blockage issues. 5. If any blockage is found then clear the blockages in actuator. 6. If problem still persists then replace throttle actuator. 7. If problem still persists then replace the EMS ecu	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				8. Ensure the throttle actuator demand and feedback parameters are matching before handing the vehicle to customer.	
P2A00	O2 Sensor Circuit Range/Performance	19	This fault indicating a sensor signal out of range (too high)	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. Check fuse connected to EMS power relay is functioning properly. Replace if found faulty 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8.Replace the EMS ecu if problem still persist	
P2A00	O2 Sensor Circuit Range/Performance	18	This fault indicating a sensor signal out of range (too low)	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8. Replace the EMS ecu if problem still persist.	
U0001	High Speed CAN Communication Bus	13	1. This fault gets logged if either CAN High line or Low Line is open circuited.	1. Check proper connectivity of CAN High (Pin No.B48) and CAN Low (Pin No.B47) lines in EMS ECU connector to the CAN Network. Establish continuity if any wiring harnesses discontinuity is found. 2.If the problem still persists then replace EMS ecu	
P2227	Barometric Pressure Sensor "A" Circuit Range/Performance	00	ECU Barometric Pressure Sensor Fault	replace the EMS ecu	
P2B30	Barometric Pressure Sensor "A" Circuit Intermittent/Erratic	92	ECU Barometric Pressure Sensor Fault	replace the EMS ecu	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0219	Engine Over speed Condition	00	This fault gets logged if the EMS ecu detects engine speed greater than 4600 RPM for some calibrated amount of time	1.Check for ECU calibration is proper 2 .If the problem still persists then replace EMS ecu	
P0420	Catalyst System Efficiency Below Threshold	00	1. This DTC gets logged if the DOC is functioning with less efficiency.	1. Check for any physical damages of DPF, which is leading to DPF leaking. 2. Check for any fault corresponding to Intake air or rail pressure system. If present then rectify them by following its rectification procedure. 3. If possible, seal the DPF leak area else replace with a new DPF (Leak before the filter or on the filter itself). 4. Try to perform filter regeneration: warm engine (5min) then launch regeneration cycle and drive necessary time 5. Replace DPF if problem still persists. Replace the EMS ecu if the problem still persists.	
P0A72	System Too Lean	68	This fault gets logged if the oxygen content in the Exhaust gas is too high	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8. Replace the EMS ecu if problem still persist.	
P0A71	System Too Rich	68	This fault gets logged if the oxygen content in the exhaust gas is too low	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8. Replace the EMS ecu if problem still persist.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
P0487	EGR Throttle Control Circuit "A" /Open	18	This fault gets logged if Exhaust Gas Recirculation Throttle Position Control Circuit out of Range/Performance	1. Check the electrical continuity between the EMS ecu pins A83 and A84 to the EGR valve DC motor connector. Rectify if any wiring harness connectivity issues are found. 2. Check for rust/dirt on the connector and clean it if any rust/dirt found. 3. Check whether EMS ecu pins A83 & A84 are either short circuited to vbatt/ground/short circuited across. If so, then rectify the wiring harness connections to make them inline with circuit schematics. 4. Remove the Actuator, Check the resistance across the actuator positive and negative terminals, if the resistance is not in design specified range then replace EGR actuator. 5. Check ECU pins for any damage. 6. If problem still persists then change Motorized EGR valve. 7. If problem still persists then replace ECU.	
P0500	Vehicle Speed Sensor "A"	29	1. This fault gets logged if the Vehicle distance from ABS ecu to EMS ecu via CAN is either not available or incorrectly available.	1. Check Vehicle Speed sensor connection. 2. Check for EMS and Instrument Cluster connection for VSS. 3. Check for intermittent contact. 4.If problem still persists then replace VSS /IC	
P0500	Vehicle Speed Sensor "A"	29	1. This fault gets logged if the Vehicle speed form ABS ecu to EMS ecu via CAN is either not available or incorrectly available.	1. Check Vehicle Speed sensor connection. 2. Check for EMS and Instrument Cluster connection for VSS. 3. Check for intermittent contact. 4. If problem still persists then replace VSS /IC	
P140A	O2 Sensor Pumping Current Performance Failure	92	This fault gets logged if the pumping current input of oxygen sensor is not in the range of Pumping current max and min thresholds calibrated in EMS ecu	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off. Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground due to wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found. 5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8. Replace the EMS ecu if problem still persist.	
PB244	O2 Sensor Reference Voltage Performance	92	This fault gets logged if the sensor reference voltage is not in the range of calibrated max and min thresholds in EMS ecu	1:-Check fuse connected to EMS power relay and battery (+ve) power supply is not blown off . Replace if required 2. Check the continuity between the O2 sensor EMS ecu pins A82, A56, A54,A55, & A57 and the O2 sensor connector pins 3,4,1,2 & 6 respectively. Establish the continuity if any issues found in wiring harness. 3. Check whether the ems ecu pins A56,A54,A55 & A57 are short circuited to ground harness wrong wiring harness connections; if so then rectify the wiring harness connections to make them inline with circuit schematics. 4. Check the continuity between the O2 sensor connector pin 5 and the ignition supply. Establish the continuity incase of any issues found.	

DTC CODE	DTC DESCRIPTION	FTB NUMBER	CAUSES	REMEDIES	COMMENTS
				5. Check for Rust/Dirt on the O2 sensor connector. Clean the connector and refit it if any rust/dirt found. 6. Check whether the O2 sensor connector is loose; refit it tightly if any issues are found. 7. Replace the O2 sensor if problem still persists. 8. Replace the EMS ecu if problem still persist.	
PA60A	ECU Internal Fault	49	This fault gets logged due to EMS ecu internal control module failure	1. Check for any physical damage of EMS ecu pins, if found then replace EMS ecu. 2. Check for proper ground connection of EMS ecu; if any issue is found then rectify wiring harness connection. 3. Check whether the software flashed in the vehicle is latest one or not; Reflash the EMS ecu with the latest software. 4. Replace the EMS ecu if problem still persists.	

2. BODY CONTROL MODULE (*BCM*):

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B2389	Roof Lamp output short to Battery/ Open Load.	When roof lamp is made on then only this fault can be logged.	In case of short to Battery fault Roof lamp will remain continuously ON. And in case of Open load detection by BCM Roof lamp can not be made on by BCM.	1) Turn off ignition and unplug BCM X1 connector. Remove the shorted wires from output load OR Connect open wires in case of open load fault. Then plug BCM X1 connector. 2) Make output ON through BCM. 3) Clear DTC. 4) Read DTC.	1) Remove the shorted wires from output load in case of short to Battery. 2) Connect open wires in case of open load fault.
B2388	Roof Lamp output short to Ground	Roof lamp output wire is short to ground.	Roof Lamp will remain continuously OFF when roof lamp switch is in door position.	1) Turn off ignition and unplug BCM X1 connector. Put all two roof lamps is in door position then Check continuity between pin no X1.M4 and vehicle ground if continuity found correct the wiring harness. Then plug BCM X1 connector. 2) Roof Lamp gets faulty. 3) Put all two roof lamp in door position. 4) Clear DTC. 5) Again close and open the any door. 6) Read DTC.	1) If there is continuity correct the wiring harness (remove the wiring harness short to GND). 2) Replace the Roof lamp with new one.
B1103	Turn Left Indicator Output Open	1) Turn indicator output wire from BCM is open circuit. 2) Both front and rear lamps indicator are open connections. 3) Both front and rear turn indicator bulb get blow.	Turn left Indicator outputs will remain continuously OFF if ignition is ON & combination switch in turn left position.	1) Check the physical connection of the BCM connector. 2) Check the physical connection of the front left head lamp & rear left tail lamp mating connector. 3) Turn off ignition and unplug BCM X1 connector. Check continuity between BCM connector pin no X1.M1 to front left head lamp mating connector pin no 6 & between BCM connector pin no X1.M1 to tail Lamp mating connector pin no 2. If the continuity has not found then Refer corrective action 3.Then plug BCM X1 connector. 4) Switch On the ignition & Clear DTC. 5) Turn OFF the left indicator then turn ON the left indicator. 6) Read DTC.	1) Connect the BCM mating connector firmly. 2) Connect the head lamp & tail lamp connector firmly. 3) Check the BCM left Head lamp & left tail Lamp mating connector wiring insertion. If there is no continuity correct the wiring harness.

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1104	Turn Left Indicator Output short to Battery	BCM output pin number X1.M1 is short to Battery.	Turn left Indicator output will remain continuously ON (with out blinking) with out operating the combination stalk in turn left position.	1) Turn off ignition and unplug BCM X1 connector. Check if any 12 V supply is seen across pins X1.M1.If 12 V found across pins X1.M1 correct the wiring harness. Refer corrective action 1 Then plug BCM X1 connector. 2) Switch On the ignition & Clear DTC. 3) Turn OFF the left indicator then turn ON the left indicator. 4) Read DTC.	If any 12 V supply is seen across pins X1.M1correct the wiring harness (remove the wiring harness short to battery).
B1105	Turn Left Indicator Output short to Ground	Turn indicator output wire from BCM is short to ground.	Turn left Indicator outputs will remain continuously OFF if ignition is ON & combination switch in turn left position.	1) Check the physical connection of the BCM connector. 2) Check the physical connection of the front left head lamp & rear left tail lamp mating connector. 3) Turn off ignition and unplug BCM X1 connector. Check continuity between pin no X1.M1 and vehicle ground if continuity found correct the wiring harness. Then plug BCM X1 connector. 4) Switch On the ignition & Clear DTC 5) Turn OFF the left indicator then turn ON the left indicator. 6) Read DTC.	If there is a continuity correct the wiring harness (remove the wiring harness short to GND)
B1106	Turn Right Indicator Output Open	1) Turn indicator output wire from BCM is open circuit. 2) Both front and rear lamps indicator open connections. 3) Both front and rear turn indicator bulb get blow.	Turn Right Indicator outputs will remain continuously OFF if ignition is ON & combination switch in turn Right position.	1) Check the physical connection of the BCM connector. 2) Check the physical connection of the front right head lamp & rear right tail lamp mating connector. 3) Turn off ignition and unplug BCM X1 connector. Check continuity between BCM connector pin no X1.M2 to front right head lamp mating connector pin no 6 & between BCM connector pin no X1.M2 to tail right Lamp mating connector pin no 2.If the continuity has not found then Refer corrective action 3.Then plug BCM X1 connector. 4) Switch On the ignition & Clear DTC. 5) Turn OFF the right indicator then turn ON the right indicator. 6) Read DTC.	1) Connect the BCM mating connector firmly. 2) Connect the right head lamp & right tail lamp connector firmly. 3) Check the BCM right Head lamp & right tail Lamp mating connector wiring insertion. If there is no continuity correct the wiring harness.

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1107	Turn Right Indicator Output short to Battery	BCM Turn right indicator output pin number X1.M2 is short to Battery.	Turn right Indicator output will remain continuously ON (with out blinking) with out combination stalk in turn left position.	1) Turn off ignition and unplug BCM X1 connector. Check if any 12 V supply is seen across pins X1.M2.If 12 V found across pins X1.M1 correct the wiring harness. Refer corrective action 1.Then plug BCM X1 connector. 2) Switch On the ignition & Clear DTC. 3) Turn OFF the right indicator then turn ON the right indicator. 4) Read DTC.	If any 12 V supply is seen across pins X1.M2 correct the wiring harness (remove the wiring harness short to battery).
B1108	Turn Right Indicator Output short to Ground	1) Turn indicator output wire from BCM is short to ground.	Turn left Indicator outputs will remain continuously OFF if ignition is ON & combination switch in turn right position.	1) Check the physical connection of the BCM connector. 2) Check the physical connection of the front right head lamp & rear right tail lamp mating connector. 3) Turn off ignition and unplug BCM X1 connector. Check continuity between pin no X1.M2 and vehicle ground if continuity found correct the wiring harness. Then plug BCM X1 connector. 4) Switch On the ignition & Clear DTC. 5) Turn OFF the right indicator then turn ON the right indicator. 6) Read DTC.	If there is a continuity correct the wiring harness (remove the wiring harness short to GND)
B1109	Front Fog Lamp output Short to Battery/Open	1) Front fog lamp relay is not connected firmly on its mounting base. 2) Relay used for front fog lamp is faulty. 3) No continuity between BCM front fog lamp output to relay. 4) BCM front fog lamp output is short to Battery.	In case of Short to Battery Front Fog Lamp output will remain continuously ON with out Head lamp rotary switch in front fog lamp ON position. In case of Open Front Fog Lamp output will remain continuously OFF even if Head lamp rotary switch is in front fog lamp ON position & ignition is ON.	1) Check the physical connection of the BCM connector & Front fog lamp relay. 2) Turn off ignition and unplug BCM X1 connector. Check continuity between BCM connector pin no X1.K4 to front fog lamp relay coil terminal connector pin. If there is no continuity refer corrective action 4.Then plug BCM X1 connector. 3) Turn off ignition and unplug BCM X1 connector. Check if any 12 V supply is seen across pins X1.K4. If 12 V found across pins X1.K4 correct the wiring harness. Refer corrective action 5.Then plug BCM X1 connector. 4) Check the continuity between the two terminals of relay coil. If the continuity not found then refer point number 6. 5) Turn on ignition & Clear DTC. 6) Turn OFF the front fog lamp then turns ON the front fog lamp. 7) Read DTC.	1) Connect the BCM connector firmly. 2) Properly fit the relay on relay mounting base. 3) Check the relay terminals insertions & BCM wiring insertion. 4) If there is no continuity correct the wiring harness. 5) If any 12 V supply is seen across pins X1) K4 correct the wiring harness (remove the wiring harness short to battery). 6) Replace the relay with new one.

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B110A	Front Fog Lamp output Short to Ground	Front fog lamp relay output is short to ground.	Front Fog Lamp will remain continuously OFF even if turn on the front fog lamp switch & ignition is ON.	1) Turn off ignition and unplug BCM X1 connector. Check continuity between pin no X1.K4 and vehicle ground if continuity found correct the wiring harness. Then plug BCM X1 connector. 2) Switch On the ignition & Clear DTC. 3) Turn OFF the front fog lamp then turns ON the front fog lamp. 4) Read DTC.	If there is a continuity correct the wiring harness (remove the wiring harness short to GND)
B110B	Rear Fog lamp output short to Battery / Open	1) Rear fog lamp relay connector is not connected firmly. 2) Relay used for Rear fog lamp is faulty. 3) No continuity between BCM rear fog lamp output to relay. 4) BCM Rear fog lamp output is short to Battery.	In case of Short to Battery Rear Fog Lamp output will remain continuously ON with out Head lamp rotary switch in Rear fog lamp ON position. In case of Open rear Fog Lamp output will remain continuously OFF even if Head lamp rotary switch is in Rear fog lamp ON position & ignition is ON.	1) Check the physical connection of the BCM connector & Rear fog lamp relay. 2) Turn off ignition and unplug BCM X2 connector. Check continuity between BCM connector pin no X2.H4 to Rear fog lamp relay coil terminal pin. Connector. If there is no continuity refer corrective action 4.Then plug BCM X2 connector. 3) Turn off ignition and unplug BCM X2 connector. Check if any 12 V supply is seen across pins X2.H4. If 12 V found across pins X2.H4 correct the wiring harness. Refer corrective action 5.Then plug BCM X2 connector. 4) Check the continuity between the two terminals of relay coil. If the continuity not found then refer point number 6. 5) Turn ON the ignition & Clear DTC. 6) Turn OFF the Rear fog lamp then turn ON the Rear fog lamp. 7) Read DTC.	1) Connect the BCM connector firmly. 2) Properly fit the rear fog lamp relay on relay mounting base. 3) Check the relay terminals insertions & BCM wiring insertion. 4) If there is no continuity correct the wiring harness. 5) If any 12 V supply is seen across pins X2.H4 correct the wiring harness (remove the wiring harness short to battery). 6) Replace the relay with new one.
B110C	Rear Fog lamp output short to Ground	Rear fog lamp output is short to ground.	Rear Fog Lamp will remain continuously OFF even if turn on the Rear fog lamp switch & ignition is ON.	1) Turn off ignition and unplug BCM X2 connector. Check continuity between pin no X2.H4 and vehicle ground if continuity found correct the wiring harness. Then plug BCM X2 connector. 2) Switch On the ignition & Clear DTC. 3) Turn OFF the Rear fog lamp then turn ON the Rear fog lamp. 4) Read DTC.	If there is a continuity correct the wiring harness (remove the wiring harness short to GND)

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B110D	Head Lamp low beam or DIP Beam Relay short to Battery / Open.	1) Head lamp relay low beam & BCM connector is not connected firmly. 2) Head lamp low beam relay is faulty. 3) No continuity between BCM low beam output pin to Head lamp low beam ON relay. 4) BCM low beam output is short to Battery.	In case of Short to Battery Head lamp low beam will remain continuously ON with out Head lamp rotary switch in head lamp ON position & combination switch in low beam position. In case of Open Head Lamp low beam output will remain continuously OFF even if Head lamp rotary switch is in head lamp ON position combination switch in low beam position & ignition is ON.	1) Check the physical connection of the BCM connector & Head lamp low beam relay. 2) Turn off ignition and unplug BCM X2 connector. Check continuity between BCM connector pin no X2.H3 to Head Lamp low beam relay coil connector pin. If there is no continuity refer corrective action 4.Then plug BCM X2 connector. 3) Turn off ignition and unplug BCM X2 connector. Check if any 12 V supply is seen across pins X2.H3. If 12 V found across pins X2.H4 correct the wiring harness. Refer corrective action 5.Then plug BCM X2 connector. 4) Check the continuity between the two terminals of relay coil. If the continuity not found then refer point number 6. 5) Switch On the ignition & Clear DTC. 6) Turn OFF the Head Lamp low beam then turns ON the Head Lamp low beam. 7) Read DTC.	1) Connect the BCM connector firmly. 2) Properly fit the relay on relay mounting base. 3) Check the relay terminals insertions & BCM wiring insertion. 4) If there is no continuity correct the wiring harness. 5) If any 12 V supply is seen across pins X2.H3 correct the wiring harness (remove the wiring harness short to battery). 6) Replace the relay with new one.
B110E	Head Lamp low beam or DIP Beam Really Output short to Ground	Head lamp low beam output is short to ground.	Head lamp Low beam will remain continuously OFF even if Head lamp rotary switch is in head lamp ON position combination switch in low beam position & ignition is ON.	1) Turn off ignition and unplug BCM X2 connector. Check continuity between pin no X2.H3 and vehicle ground if continuity found correct the wiring harness. Then plug BCM X2 connector. 2) Switch On the ignition & Clear DTC. 3) Turn OFF the Head Lamp low beam then turns ON the Head Lamp low beam. 4) Read DTC.	If there is a continuity correct the wiring harness (remove the wiring harness short to GND)

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1115	Head lamp high Beam Relay output Short to Battery/Open	1) Head lamp relay high beam & BCM connector is not connected firmly. 2) Head lamp relay high beam is faulty. 3) No continuity between BCM Head lamp high Beam output pin to High beam ON relay. 4) BCM Head lamp high beam output is short to Battery.	In case of Short to Battery Head lamp high beam will remain continuously ON with out master light switch Head lamp position & combination switch high beam position. In case of Open Head Lamp High beam output will remain continuously OFF even if Head lamp rotary switch is in head lamp position & combination switch high beam position.	1) Check the physical connection of the BCM connector & Head lamp high beam relay. 2) Turn off ignition and unplug BCM X1 connector. Check continuity between BCM connector pin no X1.A4 to Head Lamp high beam relay coil terminal connector pin. If there is no continuity refer corrective action 4.Then plug BCM X1 connector. 3) Turn off ignition and unplug BCM X1 connector. Check if any 12 V supply is seen across pins X1.A4. If 12 V found across pins X1.A4 correct the wiring harness. Refer corrective action 5.Then plug BCM X1 connector. 4) Check the continuity between the two terminals of relay coil. If the continuity not found then refer point number 6. 5) Switch ON the ignition & Clear DTC. 6) Turn OFF the Head Lamp high beam then turns ON the Head Lamp high beam. 7) Read DTC.	1) Connect the BCM connector firmly. 2) Properly fit the relay on relay mounting base. 3) Check the relay terminals insertions & BCM wiring insertion. 4) If there is no continuity correct the wiring harness. 5) If any 12 V supply is seen across pins X1.A4 correct the wiring harness (remove the wiring harness short to battery). 6) Replace the relay with new one.
B1116	High Beam Relay output Short to Ground	Head lamp High beam output is short to ground.	Head lamp high beam will remain continuously OFF even if Head lamp rotary switch is in head lamp position combination switch is in high beam position & ignition is ON.	1) Turn off ignition and unplug BCM X1 connector. Check continuity between pin no X1.A4 and vehicle ground if continuity found correct the wiring harness. Then plug BCM X1 connector. 2) Switch On the ignition Clear DTC. 3) Turn OFF the Head Lamp high beam then turns ON the Head Lamp high beam. 4) Read DTC.	If there is a continuity correct the wiring harness (remove the wiring harness short to GND)

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B11A4	Key Ring Illumination output short to Battery/Open	1) Key Ring Illumination output is short to Battery. 2) Open Circuit between BCM & ignition switch. 3) Ignition switch key hole illumination LED get open circuit or faulty.	In case of Short to Battery Key Ring Illumination output will remain continuously ON. In case of Open Key Ring Illumination output will remain continuously OFF.	1) Check the physical connection of the BCM connector & ignition switch mating connectors. 2) Check the wiring insertion of BCM (i.e. all wires are properly inserted in mating connector).There should be no terminal blackout. 3) Turn off ignition and unplug BCM X1 connector. Check continuity between BCM connector pin no X1.C4 to ignition switch mating connector pin number 11. If continuity not found then Refer corrective action. 4) Then plug BCM X1 connector. 5) Turn off ignition and unplug BCM X1 connector. Check if any 12 V supply is seen across pins X1.C4. If 12 V found across pins X1.C4 correct the wiring harness. Refer corrective action 4. Then plug BCM X1 connector. 6) Check whether the Ignition switch key hole illumination LED is faulty or not. 7) Switch On the ignition and Clear DTC. 8) Key is out from the ignition switch close & opens the driver door. 9) Switch On the ignition & Read DTC.	1) Connect the BCM connector & ignition switch mating connector firmly. 2) Check the wire X1.C4 on BCM mating connector is properly inserted (no terminal back out). 3) If there is no continuity correct the wiring harness. 4) If any 12 V supply is seen across pins X1.C4 correct the wiring harness (remove the wiring harness short to battery). 5) If Ignition switch key hole illumination LED is faulty then replace with new one.
B11A5	Key Ring Illumination output short to Ground.	Key Ring Illumination output is short to Ground.	Key Ring Illumination output will remain continuously OFF.	1) Turn off ignition and unplug BCM X1 connector. Check continuity between pin no X1.C4 and vehicle ground if continuity found correct the wiring harness. Then plug BCM X1 connector. 2) Switch On the ignition and Clear DTC. 3) Key is out from the ignition switch close & opens the driver door. 4) Switch On the ignition & Read DTC.	1) If there is a continuity correct the wiring harness (remove the wiring harness short to GND)

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1202	Front Intermittent Wipe Relay Output short to Ground / Open.	1) Front wiper INT Relay is short to ground. 2) Open circuit between BCM & Front wiper relay. 3) BCM mating connector is not connected firmly. 4) Front Wiper relay is faulty.	In case of short to ground front wiper relay will remain Continuously operated (when ignition is ON) and During open circuit the front wiper relay will remain Continuously OFF (Front wiper INT operation is not working).	1) Check the physical connection of the BCM connector & the front wiper INT or ON/OFF relay on its mounting relay. 2) Turn off ignition and unplug BCM X2 connector. Check continuity between BCM connector pin no X2.F1 to front wiper relay coil terminal connector pin. If continuity not found then refer corrective action 2.Then plug BCM X2 connector. 3) Turn off ignition and unplug BCM X2 connector. Check for continuity between BCM pin no X2.F1 with Vehicle ground. If continuity found correct the wiring harness. Refer corrective action 3.Then plug BCM X2 connector. 4) Check the continuity between the two terminals of relay coil (relay terminals mating with pin number 10 & 2) .If the continuity not found then refer point number 5. 5) Check the terminal insertion for BCM connector & front wiper INT relay wire insertion. 6) Switch On the ignition and Clear DTC. 7) Put the front wiper INT is in OFF and then ON position. 8) Read DTC.	1) Connect the BCM connector firmly & properly fit the battery saver relay on relay mounting base. 2) If there is no continuity correct the wiring harness. 3) If there is continuity correct the wiring harness (remove the wiring harness short to Ground). 4) Replace the relay with new one. ~5) Check the relay terminals insertions & BCM wiring insertion.
B1201	Front Intermittent Wipe Relay Output short to Battery	1) Front Wiper INT relay is short to Battery. 2) Front wiper INT relay is faulty.	Front Wiper INT relay will remain Continuously OFF. (Front wiper system will not operate at any position of combination switch).	1) Turn off ignition and unplug BCM X2 connector. Check if any 12 V supply is seen across pins X2.F1. If 12 V found across pins X2.F1 correct the wiring harness. 2) Refer corrective action. Then plug BCM X2 connector. 3) Switch On the ignition and Clear DTC. 4) Put the front wiper INT is in OFF and then ON position. 5) Read DTC.	Correct the wiring harness (remove the BCM pin X2.F1 short to vehicle battery).

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1204	Front wash Motor output short to Battery/Open.	1) Front Wash Motor is short to Battery. 2) Front wash motor output is open circuit.	In case of Short to Battery Front Wash Motor output will remain continuously ON and in case of Open Front Wash Motor output will remain continuously OFF.	1). Check the physical connection of the BCM connector & the front washer motor mating connector. 2) Check the terminal insertion for BCM connector & front washer motor. 3) Turn off ignition and unplug BCM X2 connector. Check continuity between BCM connector pin no X2.H1 to washer motor mating connector (FR Washer motor) pin no 2. If continuity not found then refer corrective action 2. Then plug BCM X2 connector. 4) Turn off ignition and unplug BCM X2 connector. Check if any 12 V supply is seen across pins X2.H1. If 12 V found across pins X2.H1 correct the wiring harness. Refer corrective action 3.Then plug BCM X2 connector. 5) Switch On the ignition & Clear DTC. 6) Turn OFF the washer motor then turns ON the washer motor. 7) Read DTC.	1). Connect the BCM mating connector & front washer motor mating connector firmly. 2) Correct the wiring harness. 3) Correct the wiring harness (Remove the BCM pin X2.H1 short to battery). 4) Check the front washer motor mating connector wire insertion & BCM wiring insertion.
B1205	Front wash Motor output short to Ground	Front washer motor output is short to ground.	Front Wash Motor output will remain continuously OFF.	1. Turn off ignition and unplug BCM X2 connector. Check for continuity between BCM pin no X2.H1 with Vehicle ground. If continuity found correct the wiring harness. Refer corrective action. Then plug BCM X2 connector. 2) Check the washer motor is faulty. 3) Switch On the ignition. Clear the existing DTC. 4) Turn OFF the washer motor then turns ON the washer motor. 5) Read DTC.	1) Correct the wiring harness (remove the BCM output to short to ground). 2) Replace the front washer motor with new motor.

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1300	All Door Lock Relay output short to Ground/Open.	1) All door Lock relay output is short to ground. 2) Open circuit between BCM & All door lock relay. 3) BCM mating connector is not connected firmly. 4) All door lock relay is faulty.	In case of short to ground All door relay will remain Continuously operated(All doors actuators are in lock position) and During open circuit the all door lock relay will remain Continuously OFF(No central locking function will be activated)	1) Check the physical connection of the BCM connector & the All door lock relay on its mounting relay. 2) Turn off ignition and unplug BCM X2 connector. Check continuity between BCM connector pin no X2.A1 to all door lock relay coil terminal connector pin. If continuity not found then refer corrective action 2.Then plug BCM X2 connector. 3) Turn off ignition and unplug BCM X2 connector. Check for continuity between BCM pin no X2.A1 with Vehicle ground. If continuity found correct the wiring harness. Refer corrective action 3. Then plug BCM X2 connector. 4) Check the continuity between the two terminals of relay coil. If the continuity not found then refer point number 4. 5) Check the terminal insertion for BCM connector & all doors lock relay. 6) Switch On the ignition & Clear DTC. 7) Turn OFF the All Door Lock Relay then turns ON the All Door Lock Relay. 8) Read DTC.	1) Connect the BCM connector firmly & properly fit the Lock relay on relay mounting base. 2) If there is no continuity correct the wiring harness. 3) If there is continuity correct the wiring harness (remove the wiring harness short to Ground). 4) Replace the relay with new one. 5) Check the relay terminals insertions & BCM wiring insertion.
B1301	All Door Lock Relay output short to Battery	1) All door Lock relay is short to Battery. 2) All door Lock relay is faulty.	All door Lock relay will remain Continuously OFF. (Central locking system will not operate).	1) Turn off ignition and unplug BCM X2 connector. Check if any 12 V supply is seen across pins X2.A1. If 12 V found across pins X2.A1 correct the wiring harness. Refer corrective action. Then plug BCM X2 connector. 2) Switch On the ignition & Clear DTC. 3) Turn OFF the All Door Lock Relay then turns ON the All Door Lock Relay. 4) Read DTC.	1) Correct the wiring harness(remove the BCM pin X2.A1 short to vehicle battery).

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1302	Driver Door Unlock Relay Short to Ground/Open	1) Driver door unlock relay output is short to ground. 2) Open circuit between BCM & driver door unlock relay. 3) BCM mating connector is not connected firmly. 4) Driver door unlock relay is faulty.	In case of short to ground driver door Unlock relay will remain Continuously operated (driver door actuator is always in unlock position) and During open circuit the driver door unlock relay will remain Continuously OFF (Driver door unlocking is not possible by remote & mechanical key).	1) Check the physical connection of the BCM connector & driver door unlock relay on its mounting relay. 2) Turn off ignition and unplug BCM X2 connector. Check continuity between BCM connector pin no X2.B1 to driver door unlock relay coil terminal connector pin. If continuity not found then refer corrective action 2. 3) Turn off ignition and unplug BCM X2 connector. Check for continuity between BCM pin no X2.B1 with Vehicle ground. If continuity found correct the wiring harness. Refer corrective action 3. Then plug BCM X2 connector. 4) Check the continuity between the two terminals of relay coil .If the continuity not found then refers corrective action 4. 5) Check the terminal insertion for BCM connector & driver door unlock relay. 6) Switch On the ignition & Clear DTC. 7) Turn OFF the Driver Door Unlock Relay then turns ON the Driver Door Unlock Relay. 8) Read DTC.	1) Connect the BCM connector firmly & properly fit the first stage Unlock relay on relay mounting base. 2) If there is no continuity correct the wiring harness.3) If there is continuity correct the wiring harness (remove the wiring harness short to Ground). 4) Replace the relay with new one. 5) Check the relay terminals insertions & BCM wiring insertion.
B1303	Driver Door Unlock Relay Short to Battery	1) Driver door unlock relay is short to battery. 2) Driver door unlock relay is faulty.	Driver door unlock relay will remain Continuously OFF. (Driver door unlocking is not possible by remote or mechanical key).	1) Turn off ignition and unplug BCM X2 connector. Check if any 12 V supply is seen across pins X2.B1 If 12 V found across pins X2.B1 correct the wiring harness. Refer corrective action. Then plug BCM X2 connector. 2) Switch On the ignition & Clear DTC. 3) Turn OFF the Driver Door Unlock Relay then turns ON the Driver Door Unlock Relay. 4) Read DTC.	Correct the wiring harness (remove the BCM pin X2.B1 short to vehicle battery).

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1304	Other Doors Unlock Relay Output short to Ground/Open	1) Other Doors Unlock Relay unlock relay output is short to ground. 2) Open circuit between BCM & Other Doors Unlock Relay. 3) BCM mating connector is not connected firmly. Other Doors Unlock Relay is faulty.	In case of short to ground Other Doors Unlock Relay will remain Continuously operated (Co driver & all rear door actuators are always in unlock position) and During open circuit the Other Doors Unlock Relay will remain Continuously OFF (second stage unlocking is not possible by remote & mechanical key).	1) Check the physical connection of the BCM connector & Other Doors Unlock Relay on its mounting relay. 2) Turn off ignition and unplug BCM X2 connector. Check continuity between BCM connector pin no X2.C1 to driver door unlock relay coil terminal connector pin. If continuity not found then refer corrective action 2.Then plug BCM X2 connector. 3) Turn off ignition and unplug BCM X2 connector. Check for continuity between BCM pin no X2.C1 with Vehicle ground. If continuity found correct the wiring harness. Refer corrective action 3. Then plug BCM X2 connector. 4) Check the continuity between the two terminals of relay coil. If the continuity not found then refer the corrective action 4. 5) Check the terminal insertion for BCM connector & driver door unlock relay. 6) Switch On the ignition & Clear DTC. 7) Turn OFF the Other Doors Unlock Relay then turns ON the Other Doors Unlock Relay. 8) Read DTC.	1) Connect the BCM connector firmly & properly fit the second stage unlock relay on relay mounting base. 2) If there is no continuity correct the wiring harness. 3) If there is continuity correct the wiring harness (remove the wiring harness short to Ground). 4) Replace the relay with new one. 5) Check the relay terminals insertions & BCM wiring insertion.
B1305	Other Doors Unlock Relay Output short to Battery	1) Other Doors Unlock Relay is short to battery. 2) Other Doors Unlock Relay is faulty.	Other Doors Unlock Relay will remain Continuously OFF. (Co driver & all rear door actuator unlocking are not possible by remote or mechanical key).	1) Turn off ignition and unplug BCM X2 connector. Check if any 12 V supply is seen across pins X2.C1 If 12 V found across pins X2.C1 correct the wiring harness. Refer corrective action. Then plug BCM X2 connector. 2) Switch On the ignition & Clear DTC. 3) Turn OFF the Other Doors Unlock Relay then turns ON the Other Doors Unlock Relay. 4) Read DTC.	Correct the wiring harness (remove the BCM pin X2.C1 short to vehicle battery).

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1309	Horn Relay Short to Ground/Open	1) Horn Relay output is short to ground. 2) Open circuit between BCM & Horn relay. 3) BCM mating connector is not connected firmly. Horn relay is faulty.	In case of short to ground Horn relay will remain Continuously operated (Horn will cont. operated with out pressing the horn pad) and During open circuit the horn relay will remain Continuously OFF.	1) Check the physical connection of the BCM connector & the Horn relay on its mounting relay. 2) Turn off ignition and unplug BCM X2 connector. Check continuity between BCM connector pin no X2.D1 to horn relay coil terminal connector pin. If continuity not found then refer corrective action 2.Then plug BCM X2 connector. 3) Turn off ignition and unplug BCM X2 connector. Check for continuity between BCM pin no X2.D1 with Vehicle ground. If continuity found correct the wiring harness. Refer corrective action 3. 4) Check the continuity between the two terminals of relay coil. If the continuity not found then refer the corrective action 4. 5) Check the terminal insertion for BCM connector & Horn relay wire insertion. 6) Switch On the ignition & Clear DTC. 7) Turn OFF the Horn Relay then turns ON the Horn Relay. 8) Read DTC.	1) Connect the BCM connector firmly & properly fit the Horn Relay on relay mounting base. 2) If there is no continuity correct the wiring harness. 3) If there is continuity correct the wiring harness (remove the wiring harness short to Ground). 4) Replace the relay with new one. 5) Check the relay terminals insertions & BCM wiring insertion.
B1308	Horn Relay Short to Battery	1) Horn relay is short to Battery. 2) Horn relay is faulty.	Horn relay will remain Continuously OFF.	1) Turn off ignition and unplug BCM X2 connector. Check if any 12 V supply is seen across pins X2.D1 If 12 V found across pins X2.D1 correct the wiring harness. Refer corrective action. Then plug BCM X2 connector. 2) Switch On the ignition & Clear DTC. 3) Turn OFF the Horn Relay then turns ON the Horn Relay. 4) Read DTC.	Correct the wiring harness (remove the BCM pin X2.D1 short to vehicle battery).

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1404	Buzzer output Short to Ground/Open	1) Buzzer output is short to ground. 2) Open circuit between BCM Buzzer output & Buzzer. 3) BCM mating connector is not connected firmly. 4) Buzzer faulty.	In case of short to ground Buzzer will remain Continuously operated and During open circuit the Buzzer will remain Continuously OFF.	1) Check the physical connection of the BCM connector & Buzzer connector. 2) Turn off ignition and unplug BCM X1 connector. Check continuity between BCM connector pin no X1.E4 to Buzzer connector pin number 4. If continuity not found then refer corrective action 2.Then plug BCM X1 connector. 3) Turn off ignition and unplug BCM X1 connector. Check for continuity between BCM pin no X1.E4 with Vehicle ground. If continuity found correct the wiring harness. Refer corrective action 3. 4) Check the continuity between the two terminals of buzzer. If the continuity not found then refer the corrective action 4. 5) Check the terminal insertion for BCM connector & Buzzer connector. 6) Switch On the ignition & Clear DTC. 7) Switch OFF the buzzer then switch ON the buzzer output. 8) Read DTC.	1) Connect the BCM connector firmly & Buzzer connector firmly. 2) If there is no continuity correct the wiring harness. 3) If there is continuity correct the wiring harness (remove the wiring harness short to Ground). 4) Replace the Buzzer with new one.~5) Check the Buzzer terminals insertions & BCM wiring insertion.
B1403	Buzzer output Short to Battery	1) Buzzer output is short to Battery. 2) Buzzer relay is faulty.	Buzzer output will remain Continuously OFF.	1) Turn off ignition and unplug BCM X1 connector. Check if any 12 V supply is seen across pins X1.E4. If 12 V found across pins X1.E4 correct the wiring harness. Refer corrective action. Then plug BCM X1 connector. 2) Switch On the ignition & Clear DTC. 3) Switch OFF the buzzer then switch ON the buzzer output. 4) Read DTC.	Correct the wiring harness (remove the BCM pin X1.E4 short to vehicle battery).

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1405	HRW Coil Relay Short to Battery/Open	1) HRW Coil Relay is not connected firmly on its mounting base. 2) BCM mating connector is not connected firmly. 3) HRW Coil Relay is faulty. 4) No continuity between BCM to HRW Coil Relay. 5) BCM HRW Coil Relay output is short to Battery.	In case of Short to Battery HRW Relay will remain continuously ON with out HRW switch in ON position. In case of Open HRW Relay will remain continuously OFF even if HRW switch is in ON position.	1) Check the physical connection of the BCM connector & HRW Relay. 2) Turn off ignition and unplug BCM X2 connector. Check continuity between BCM connector pin no X2.A2 to HRW Relay coil terminal connector pin. If there is no continuity refer corrective action 4.Then plug BCM X2 connector. 3) Turn off ignition and unplug BCM X2 connector. Check if any 12 V supply is seen across pins X2.A2. If 12 V found across pins X2.A2 correct the wiring harness. Refer corrective action 5.Then plug BCM X2 connector. 4) Check the continuity between the two terminals of relay coil. If the continuity not found then refer point number 6. 5). Turn on ignition & Clear DTC. 6). Turn OFF the HRW Relay then turn ON the HRW Relay. 7). Read DTC.	1) Connect the BCM connector firmly. 2) Properly fit the relay on relay mounting base. 3) Check the relay terminals insertions & BCM wiring insertion. 4) If there is no continuity correct the wiring harness. 5) If any 12 V supply is seen across pins X2.A2 correct the wiring harness (remove the wiring harness short to battery). 6) Replace the relay with new one.
B1406	HRW Coil Relay Short to Ground	HRW Coil Relay output is short to ground.	HRW Relay will remain continuously OFF even if HRW switch is in ON position.	1) Turn off ignition and unplug BCM X2 connector. Check continuity between pin no X2.A2 and vehicle ground if continuity found correct the wiring harness. Then plug BCM X2 connector. 2) Switch On the ignition & Clear DTC. 3) Turn OFF the HRW Relay then turns ON the HRW Relay. 4) Read DTC.	If there is a continuity correct the wiring harness (remove the wiring harness short to GND)
B1409	Tick Tock Relay Short to Battery/Open	1) Tick Tock Coil Relay is not connected firmly on its mounting base. 2) BCM mating connector is not connected firmly. 3) Tick Tock Coil Relay is faulty. 4) No continuity between BCM to Tick Tock Coil Relay. 5) BCM Tick Tock Relay output is short to Battery.	In case of Short to Battery Tick Tock Relay will remain continuously ON with out turn indicator or hazard switch in ON position. In case of Open Tick Tock Relay will remain continuously OFF even if turn indicator or hazard switch is in ON position.	1) Check the physical connection of the BCM connector & Tick Tock Relay. 2) Turn off ignition and unplug BCM X1 connector. Check continuity between BCM connector pin no X1.A3 to Tick Tock Relay coil terminal connector pin. If there is no continuity refer corrective action 4.Then plug BCM X1 connector. 3) Turn off ignition and unplug BCM X1 connector. Check if any 12 V supply is seen across pins X1.A3. If 12 V found across pins X1.A3 correct the wiring harness. Refer corrective action 5.Then plug BCM X1 connector. 4) Check the continuity between the two terminals of relay coil. If the continuity not found then refer point number 6. 5) Turn on ignition & Clear DTC. 6) Turn OFF the Tick Tock Relay then turns ON the Tick Tock Relay. 7). Read DTC.	1) Connect the BCM connector firmly. 2) Properly fit the relay on relay mounting base. 3) Check the relay terminals insertions & BCM wiring insertion. 4) If there is no continuity correct the wiring harness. 5) If any 12 V supply is seen across pins X1.A3 correct the wiring harness (remove the wiring harness short to battery). 6) Replace the relay with new one.

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B140A	Tick Tock Coil Relay Short to Ground.	BCM Tick Tock Relay output is short to ground.	Tick Tock Relay will remain continuously OFF even if turn indicator or hazard switch is in ON position.	1) Turn off ignition and unplug BCM X1 connector. Check continuity between pin no X1.A3 and vehicle ground if continuity found correct the wiring harness. Then plug BCM X1 connector. 2) Switch On the ignition & Clear DTC. 3) Turn OFF the Tick Tock Relay then turns ON the Tick Tock Relay. 4) Read DTC.	If there is a continuity correct the wiring harness (remove the wiring harness short to GND)
B1424	Door Open LED Short to Ground/Open	1) BCM Door Open LED output is short to ground. 2) Open circuit between BCM Door Open LED output & Instrument Cluster Door Open LED input. 3) BCM mating connector is not connected firmly. 4) Instrument Cluster mating connector is not connected firmly. 5) Instrument Cluster Door Open LED faulty.	In case of short to ground Door Open LED will remain Continuously operated and During open circuit the Door Open LED will remain Continuously OFF.	1) Check the physical connection of the BCM connector & Instrument Cluster connector. 2) Turn off ignition and unplug BCM X2 connector. Check continuity between BCM connector pin no X2.E1 to Instrument Cluster Door Open LED pin number 18. If continuity not found then refer corrective action 2.Then plug BCM X2 connector. 3) Turn off ignition and unplug BCM X2 connector. Check for continuity between BCM pin no X2.E1 with Vehicle ground. If continuity found correct the wiring harness. Refer corrective action 3. 4) Check the terminal insertion for BCM connector & Instrument Cluster connector. 5) Switch On the ignition & Clear DTC. 6) Switch OFF Door Open LED then switches ON the Door Open LED. 7) Read DTC.	1) Connect the BCM connector firmly & Instrument Cluster connector firmly. 2) If there is no continuity correct the wiring harness. 3) If there is continuity correct the wiring harness (remove the wiring harness short to Ground). 4) Check the Instrument Cluster terminals insertions & BCM wiring insertion.
B1423	Door Open LED output Short to Battery	1) BCM Door Open LED output is short to Battery. 2) Instrument Cluster Door Open LED faulty.	Door Open LED will remain Continuously OFF.	1) Turn off ignition and unplug BCM X2 connector. Check if any 12 V supply is seen across pins X2.E1 If 12 V found across pins X2.E1 correct the wiring harness. Refer corrective action. Then plug BCM X2 connector. 2) Switch On the ignition & Clear DTC. 3) Switch OFF Door Open LED then switches ON the Door Open LED. 4) Read DTC.	Correct the wiring harness (remove the BCM pin X2.E1 short to vehicle battery).

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1427	Seat Belt not Fastened Warning LED output Short to Ground/Open	1) BCM Seat Belt not Fastened Warning LED output is short to ground. 2) Open circuit between BCM Seat Belt not Fastened Warning LED output & Instrument Cluster Seat Belt not Fastened Warning LED input. 3) BCM mating connector is not connected firmly. 4) Instrument Cluster mating connector is not connected firmly. 5) Instrument Cluster Seat Belt not Fastened Warning LED faulty.	In case of short to ground Seat Belt not Fastened Warning LED will remain Continuously operated and during open circuit the Seat Belt not Fastened Warning LED will remain Continuously OFF.	1) Check the physical connection of the BCM connector & Instrument Cluster connector. 2) Turn off ignition and unplug BCM X2 connector. Check continuity between BCM connector pin no X2.F4 to Instrument Cluster Seat Belt not Fastened Warning LED pin number 11. If continuity not found then refer corrective action 2.Then plug BCM X2 connector. 3) Turn off ignition and unplug BCM X2 connector. Check for continuity between BCM pin no X2.F4 with Vehicle ground. If continuity found correct the wiring harness. Refer corrective action 3. 4) Check the terminal insertion for BCM connector & Instrument Cluster connector. 5) Switch On the ignition & Clear DTC. 6) Switch OFF Seat Belt LED then switches ON the Seat Belt LED. 7) Read DTC.	1) Connect the BCM connector firmly & Instrument Cluster connector firmly. 2) If there is no continuity correct the wiring harness. 3) If there is continuity correct the wiring harness (remove the wiring harness short to Ground). 4) Check the Instrument Cluster terminals insertions & BCM wiring insertion.
B1426	Seat Belt not Fastened Warning LED output Short to Battery	1) BCM Seat Belt not Fastened Warning LED output is short to Battery. 2) Instrument Cluster Door Open LED faulty.	Seat Belt not Fastened Warning LED will remain Continuously OFF.	1) Turn off ignition and unplug BCM X2 connector. Check if any 12 V supply is seen across pins X2.F4. If 12 V found across pins X2.F4 correct the wiring harness. Refer corrective action. Then plug BCM X2 connector. 2) Switch On the ignition & Clear DTC. 3) Switch OFF Seat Belt LED then switches ON the Seat Belt LED. 4) Read DTC.	Correct the wiring harness (remove the BCM pin X2.F4 short to vehicle battery).
B14FF	Memory Read Error	NA	NA	NA	1) If the DTC is with Memorized status, Clear DTC. 2) If the DTC is with Current status, clear DTC and once again check if the DTC is with Current status then replace BCM.
B14FE	Memory Write Error	NA	NA	NA	1) If the DTC is with Memorized status, Clear DTC. 2) If the DTC is with Current status, clear DTC and once again check if the DTC is with Current status then replace BCM.
B14F6	Front Wash Switch Stuck	If Front wash switch stuck more than 1 min then Front wash switch stuck DTC will set		Clear DTC	

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1749	Trailer Electric Left Lamp short to Battery/Open	1) Trailer Electric Left Lamp wire from BCM is open circuit. 2) Trailer Electric Left Lamp get blow. 3) BCM Trailer Electric Left Lamp output is short to Battery.	In case of Short to Battery Trailer Electric Left Lamp will remain continuously ON. And in case of Open Trailer Electric Left Lamp will remain continuously OFF.	1) Check the physical connection of the BCM connector & trailer lamp mating connector. 2) Check the terminal insertion for BCM connector & trailer lamp mating connector. 3) Turn off ignition and unplug BCM X2 connector. Check continuity between BCM connector pin no X2.H2 to trailer lamp mating connector pin no 6. If continuity not found then refer corrective action 2. Then plug BCM X2 connector. 4) Turn off ignition and unplug BCM X2 connector. Check if any 12 V supply is seen across pins X2.H2. If 12 V found across pins X2.H2 correct the wiring harness. Refer corrective action 3 Then plug BCM X2 connector. 5) Switch On the ignition & Clear DTC. 6) Turn OFF the left indicator then turns ON left indicator. 7) Read DTC.	1) Connect the BCM mating connector & trailer lamp mating connector. 2) Correct the wiring harness. 3) Correct the wiring harness (Remove the BCM pin X2.H2 short to battery). 4) Check trailer lamp mating connector wire insertion & BCM wiring insertion. 5) If Trailer Electric Left Lamp get blow replace with new one.
B1784	Trailer Electric Left Lamp short to Ground	Trailer Electric Left Lamp output is short to ground.	Trailer Electric Left Lamp will remain continuously OFF.	1) Turn off ignition and unplug BCM X2 connector. Check for continuity between BCM pin no X2.H2 with Vehicle ground. If continuity found correct the wiring harness. Refer corrective action. Then plug BCM X2 connector. 2) Switch On the ignition. Clear the existing DTC. 3) Turn OFF the left indicator then turns ON left indicator. 4) Read DTC.	Correct the wiring harness (remove the BCM output to short to ground).

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1748	Trailer Electric Right Lamp short to Battery/Open	1) Trailer Electric Right Lamp wire from BCM is open circuit. 2) Trailer Electric Right Lamp get blow. 3) BCM Trailer Electric Right Lamp output is short to Battery.	In case of Short to Battery Trailer Electric Right Lamp will remain continuously ON. And in case of Open Trailer Electric Right Lamp will remain continuously OFF.	1) Check the physical connection of the BCM connector & trailer lamp mating connector. 2) Check the terminal insertion for BCM connector & trailer lamp mating connector. 3) Turn off ignition and unplug BCM X1 connector. Check continuity between BCM connector pin no X1.M3 to trailer lamp mating connector pin no 5. If continuity not found then refer corrective action 2. Then plug BCM X1 connector. 4) Turn off ignition and unplug BCM X1 connector. Check if any 12 V supply is seen across pins X1.M3. If 12 V found across pins X1.M3 correct the wiring harness. Refer corrective action 3.Then plug BCM X1 connector. 5) Switch On the ignition & Clear DTC. 6) Turn OFF the right indicator then turn ON right indicator. 7) Read DTC.	1) Connect the BCM mating connector & trailer lamp mating connector. 2) Correct the wiring harness. 3) Correct the wiring harness (Remove the BCM pin X1.M3 short to battery). 4) Check trailer lamp mating connector wire insertion & BCM wiring insertion. 5) If Trailer Electric Right Lamp get blow replace with new one.
B1785	Trailer Electric Right Lamp short to Ground	Trailer Electric Right Lamp output is short to ground.	Trailer Electric Right Lamp will remain continuously OFF.	1) Turn off ignition and unplug BCM X1 connector. Check for continuity between BCM pin no X1.M3 with Vehicle ground. If continuity found correct the wiring harness. Refer corrective action. Then plug BCM X1 connector. 2) Switch On the ignition. Clear the existing DTC. 3) Turn OFF the right indicator then turn ON right indicator. 4) Read DTC.	Correct the wiring harness (remove the BCM output to short to ground).

DTC	DESCRIPTION	CAUSES	EFFECT	CHECK POINTS	CORRECTIVE ACTION
B1767	Daytime Running Lamps short to Battery/Open	1) Daytime Running Lamps wire from BCM is open circuit. 2) Both Left & Right Daytime Running Lamps are open connections. 3) Both Left & Right Daytime Running Lamps get blow. 4) BCM Daytime Running Lamps output is short to Battery.	In case of Short to Battery Daytime Running Lamps will remain continuously ON. And in case of Open Daytime Running Lamps will remain continuously OFF.	1) Check the physical connection of the BCM connector & Daytime Running Lamps mating connector. 2) Check the terminal insertion for BCM connector & Daytime Running Lamps mating connector. 3) Turn off ignition and unplug BCM X1 connector. Check continuity between BCM connector pin no X1.F4 to Daytime Running Lamps mating connector. If continuity not found then refer corrective action 2. Then plug BCM X1 connector. 4) Turn off ignition and unplug BCM X1 connector. Check if any 12 V supply is seen across pins X1.F4. If 12 V found across pins X1.F4 correct the wiring harness. Refer corrective action 3.Then plug BCM X1 connector. 5) Switch On the ignition & Clear DTC. 6) Turn OFF the Daytime Running Lamps then turns ON the Daytime Running Lamps. 7) Read DTC.	1) Connect the BCM mating connector & Daytime Running Lamps mating connector. 2) Correct the wiring harness. 3) Correct the wiring harness (Remove the BCM pin X1.F4 short to battery). 4) Check Daytime Running Lamps mating connector & BCM wiring insertion. 5) If Daytime Running Lamps get blow replace with new one.
B14A0	HRW Switch Stuck	If Front wash switch stuck more than 1 min then Front wash switch stuck DTC will set		1) Clear DTC	
B1768	Daytime Running Lamps short to Ground	Daytime Running Lamps output is short to ground.	Daytime Running Lamps will remain continuously OFF.	1) Turn off ignition and unplug BCM X1 connector. Check for continuity between BCM pin no X1.F4 with Vehicle ground. If continuity found correct the wiring harness. Refer corrective action. Then plug BCM X1 connector. 2) Switch On the ignition. Clear the existing DTC. 3) Turn OFF the Daytime Running Lamps then turns ON the Daytime Running Lamps. 4) Read DTC.	Correct the wiring harness (remove the BCM output to short to ground).

3. IMMOBILIZER:

DTC	DESCRIPTION	CAUSE	EFFECT	DIAGNOSTIC LAMP		CORRECTIVE ACTION	COMMENTS
				MIL( )	IMMO( )		
B1340	Hardware Error - Base Station IC error	1) Immobilizer internal Base Station IC error.	1) Key cannot be recognized. 2) Engine will not start.	OFF	ON	1) Confirm whether the DTC is permanent. If yes change Immobilizer & key.	-
B1341	Immobilizer antenna error	1) Mounting [loose] of antenna is incorrect Or Antenna damaged.	1) Engine may or may not start.	OFF	ON/OFF	1) Check whether the antenna & Immobilizer ECU are mounted firmly on key barrel If found loose tight the mounting screws and recheck for DTC. 2) Check for physical damage if found change the Immobilizer.	Lamp will ON only if engine is not started
B1342	Communication failure with key	1) Wrong or Not learned key.	1) Engine will not start.	OFF	ON	1) Use correct Immobilizer key learned for this immobilizer. 2) Erase the DTC.	-
B1343	No answer from key	1) Mechanical key.	1) Engine will not start.	OFF	ON	1) Use correct Immobilizer key learned for this immobilizer. 2) Erase the DTC.	-
P0513	Incorrect Immobilizer Key	1) Wrong or Not learned key.	1) Engine will not start.	OFF	ON	1) Use correct Immobilizer key learned for this immobilizer. 2) Erase the DTC.	
P0560	System Voltage error	1) Low or High Battery voltage less than 9V & greater than 15V.	1) Immobilizer will work normally.	OFF	OFF	1) Check battery 2)Confirm if Alternator Regulator failure	-
P0562	System Voltage Low	1) Low Battery voltage less than 8V.	1) Immobilizer may or may not work.	OFF	OFF	1) Switch Off the Ignition Switch. 2) Measure the battery voltage it should be above 10 V if not charge the battery 3) Check if the 5A (H215) fuse of ICU is blown out replace the blown out fuse. 4) Remove the ICU Connector. 5) Using multimeter measure the voltage between Immobilizer pin 6 w.r.t GND it should be Vbat. 6) Connect ICU connector. Turn ignition On & clear the error through diagnostic switch off ignition & wait for some time. Turn ignition On & crank the engine. 7) Check error again through diagnostic whether it is permanent	-

DTC	DESCRIPTION	CAUSE	EFFECT	DIAGNOSTIC LAMP		CORRECTIVE ACTION	COMMENTS
				MIL( )	IMMO( )		
P0563	System Voltage High	1) High Battery voltage greater than 16V.	1) Immobilizer may or may not work.	OFF	OFF	1) Switch Off the Ignition Switch. 2) Check if the 5A (H215) fuse of ICU is blown out replace the blown out fuse. 3) Remove the ICU Connector. 4) Check the alternator for any malfunction 5) Using multimeter measure the voltage between Immobilizer pin 6 w.r.t GND it should be Vbat. 6) Connect ICU connector. Turn ignition On & clear the error through diagnostic switch off ignition & wait for some time. 7) Check error the error again through diagnostic whether it is permanent	-
P0601	Hardware Error - EEPROM Check Sum Error	1) Immobilizer internal EEPROM Check Sum error.	1) Engine may or may not start.	OFF	ON/OFF	1) Confirm whether the DTC is permanent. If yes change Immobilizer & key.	Lamp will ON only if engine is not started
P0604	Hardware Error - RAM Error	1) Immobilizer internal RAM error.	1) Engine may or may not start.	OFF	ON/OFF	1) Confirm whether the DTC is permanent. If yes change Immobilizer & key.	Lamp will ON only if engine is not started
P0605	Hardware Error - ROM Error	1) Immobilizer internal ROM error.	1) Engine may or may not start.	OFF	ON/OFF	1) Confirm whether the DTC is permanent. If yes change Immobilizer & key.	Lamp will ON only if engine is not started
P062F	Hardware Error - EEPROM error	1) Immobilizer internal EEPROM error.	1) Engine may or may not start.	OFF	ON/OFF	1) Confirm whether the DTC is permanent. If yes change Immobilizer & key.	Lamp will ON only if engine is not started
P0633	Immobilizer Key Not Programmed ECM/PCM	1) Immobilizer is not learned with any key.	1) Engine will not start.	OFF	ON	1) Confirm whether the DTC is permanent. If yes change Immobilizer & key.	

DTC	DESCRIPTION	CAUSE	EFFECT	DIAGNOSTIC LAMP		CORRECTIVE ACTION	COMMENTS
				MIL( )	IMMO( )		
U0073	IMMO Communication Bus-Off	1) CAN w/h faulty Or May be EMS ECU/ ICU faulty.	1) Engine will not start. 2) Check engine will glow.	OFF	ON	1) Check CAN wiring harness for short circuit failure. 2) Measure resistance between CAN High [3 pole connector pin no 3] and CAN Low [3 pole connector pin no 1] lines to detect short circuit failure. 3) Measure resistance between CAN High [3 pole connector pin no 3] and Battery lines [EMS Pin No B1or B3 or B5] to detect short circuit failure. 4) Measure resistance between CAN Low [3 pole connector pin no 1] and Battery lines [EMS Pin No B1or B3 or B5] to detect short circuit failure. 5) Measure resistance between CAN High [3 pole connector pin no 3] and Ground lines [3 pole connector pin no 2] to detect short circuit failure. 6) Measure resistance between CAN Low [3 pole connector pin no 1] and Ground lines [3 pole connector pin no 2] to detect short circuit failure. 7) If the above remedies fail to rectify the failure then replace IMMO ECU.	
U0100	Lost Communication With ECM/PCM A	1) No Feedback from Immobilizer to EMS is possible.	1) Engine will not start.	OFF	ON	1) Check the continuity between Immobilizer pin5 - EMS pin 54 & Immobilizer pin 3 - EMS Pin 53	
U0401	Invalid Data Received From ECM/PCM A	1) Pairing of EMS and Immobilizer is not done.	1) Engine will not start.	OFF	ON*	1) Do Pairing as per recommended procedure	

4. ABS:

DTC	DESCRIPTION	CAUSES	REMEDIES	COMMENTS
C1101	ECU voltage supply: high voltage	ECU supply voltage is too high	Disconnect external voltage supply point from supply voltage. Repair vehicle power supply system.	The proper function of valves and return pump is not guaranteed.
C1102	ECU voltage supply: low voltage	ECU supply voltage is too low	Charge battery or Replace battery OR Eliminate voltage drop. Improve ground connection.	The proper function of valves and return pump is not guaranteed.
C1200	Wheel-speed sensor; front left; open/short	The wheel speed sensor is disconnected (line interruption at the sense signal of power supply) short to Ubatt or gnd at the sense signal or a short to ground at the power supply of the wheel speed sensor. Signal drops of a WSS during sensor supply low voltage.	Possibly replace Wheel speed sensor FL.	No correct WSS Signal can be generated. Control of the corresponding wheel is no longer possible. If a sensor fault occurs on a front wheel; pressure is increased; on a rear wheel; pressure is decreased (until switch off).
C1201	Wheel-speed sensor; front left: range; performance; intermittent	Noise (special signal pattern) via single WSS line single or defective HET channel	1) Possibly replace Wheel speed sensor FL OR 2) Possibly replace control unit.	Due to faulty wheel speed information the control of the corresponding wheel is no longer possible. Reaction of the controller: If a sensor fault occurs on a front wheel; pressure is increased; on a rear wheel; pressure is decreased (until switch off).
C1202	Wheel-speed sensor; front left: invalid/no signal	1.) Open circuit in the WSS line 2.) Short circuit to UZ in the WSS line 3.) Short circuit to GND in WSS line 4.) WSS dislodging from bracket 5.) Input amplifier in ECU faulty 6.) Tooth wheel missing 7.) WSS not installed. 8.) Too great air gap	1) Secure Wheel speed sensor FL. Eliminate interruption or Clean Pulse wheel FL OR 2) Possibly replace Wheel speed sensor FL.	Due to faulty wheel speed information the control of the corresponding wheel is no longer possible. Reaction of the controller: If a sensor fault occurs on a front wheel; pressure is increased; on a rear wheel; pressure is decreased (until switch off).
C1203	Wheel-speed sensor; front right: open/short	The wheel speed sensor is disconnected (line interruption at the sense signal of power supply) short to Ubatt or gnd at the sense signal or a short to ground at the power supply of the wheel speed sensor. Signal drops of a WSS during sensor supply low voltage.	Replace Wheel speed sensor FR.	No correct WSS Signal can be generated. Control of the corresponding wheel is no longer possible. If a sensor fault occurs on a front wheel; pressure is increased; on a rear wheel; pressure is decreased (until switch off).
C1204	Wheel-speed sensor; front right: range; performance; intermittent	Noise (special signal pattern) via single WSS line single or defective HET channel	1) Possibly replace Wheel speed sensor FR OR 2) Possibly replace control unit.	Due to faulty wheel speed information the control of the corresponding wheel is no longer possible. Reaction of the controller: If a sensor fault occurs on a front wheel; pressure is increased; on a rear wheel; pressure is decreased (until switch off).
C1205	Wheel-speed sensor; front right: invalid/no signal	1.) Open circuit in the WSS line 2.) Short circuit to UZ in the WSS line 3.) Short circuit to GND in WSS line 4.) WSS dislodging from bracket 5.) Input amplifier in ECU faulty 6.) Tooth wheel missing 7.) WSS not installed. 8.) Too great air gap	1)Secure Wheel speed sensor FR. Eliminate interruption or Clean Pulse wheel FR OR 2)Possibly replace Wheel speed sensor FR.	Due to faulty wheel speed information the control of the corresponding wheel is no longer possible. Reaction of the controller: If a sensor fault occurs on a front wheel; pressure is increased; on a rear wheel; pressure is decreased (until switch off).

DTC	DESCRIPTION	CAUSES	REMEDIES	COMMENTS
C1206	Wheel-speed sensor; rear left: open/short	The wheel speed sensor is disconnected (line interruption at the sense signal of power supply) short to Ubatt or gnd at the sense signal or a short to ground at the power supply of the wheel speed sensor. Signal drops of a WSS during sensor supply low voltage.	Replace Wheel speed sensor RL.	No correct WSS Signal can be generated. Control of the corresponding wheel is no longer possible. If a sensor fault occurs on a front wheel; pressure is increased; on a rear wheel; pressure is decreased (until switch off).
C1207	Wheel-speed sensor; rear left: range; performance; intermittent	Noise (special signal pattern) via single WSS line single or defective HET channel	1) Possibly replace Wheel speed sensor RL OR 2) Possibly replace control unit.	Due to faulty wheel speed information the control of the corresponding wheel is no longer possible. Reaction of the controller: If a sensor fault occurs on a front wheel; pressure is increased; on a rear wheel; pressure is decreased (until switch off).
C1208	Wheel-speed sensor; rear left: invalid/no signal	1.) Open circuit in the WSS line 2.) Short circuit to UZ in the WSS line 3.) Short circuit to GND in WSS line 4.) WSS dislodging from bracket 5.) Input amplifier in ECU faulty 6.) Tooth wheel missing 7.) WSS not installed. 8.) Too great air gap	1) Secure Wheel speed sensor RL. Eliminate interruption or Clean Pulse wheel RL OR 2) Possibly replace Wheel speed sensor RL.	Due to faulty wheel speed information the control of the corresponding wheel is no longer possible. Reaction of the controller: If a sensor fault occurs on a front wheel; pressure is increased; on a rear wheel; pressure is decreased (until switch off).
C1209	Wheel-speed sensor; rear right: open/short	The wheel speed sensor is disconnected (line interruption at the sense signal of power supply) short to Ubatt or gnd at the sense signal or a short to ground at the power supply of the wheel speed sensor Signal drops of a WSS during sensor supply low voltage.	Replace Wheel speed sensor RR.	No correct WSS Signal can be generated. Control of the corresponding wheel is no longer possible. If a sensor fault occurs on a front wheel; pressure is increased; on a rear wheel; pressure is decreased (until switch off).
C1210	Wheel-speed sensor; rear right: range; performance; intermittent	Noise (special signal pattern) via single WSS line single or defective HET channel	1) Possibly replace Wheel speed sensor RR OR 2) Possibly replace control unit.	Due to faulty wheel speed information the control of the corresponding wheel is no longer possible. Reaction of the controller: If a sensor fault occurs on a front wheel; pressure is increased; on a rear wheel; pressure is decreased (until switch off).
C1211	Wheel-speed sensor; rear right: invalid/no signal	1.) Open circuit in the WSS line 2.) Short circuit to UZ in the WSS line 3.) Short circuit to GND in WSS line 4.) WSS dislodging from bracket 5.) Input amplifier in ECU faulty 6.) Tooth wheel missing 7.) WSS not installed. 8.) Too great air gap	1) Secure Wheel speed sensor RR. Eliminate interruption or Clean Pulse wheel RR OR 2) Possibly replace Wheel speed sensor RR.	Due to faulty wheel speed information the control of the corresponding wheel is no longer possible. Reaction of the controller: If a sensor fault occurs on a front wheel; pressure is increased; on a rear wheel; pressure is decreased (until switch off).
C1213	Wheel-speed sensor frequency error	Short cut between the WSS supply and the UZ.	1) Examine Pulse wheel or Multi-pole wheel. Replace if defective. OR 2) Lines to Wheel speed sensors defective. EMC influence. Eliminate ground or positive contact. OR 3) Examine tires. If tires not approved replace rims and casings as per approval.	WSS signals are not reliable.

DTC	DESCRIPTION	CAUSES	REMEDIES	COMMENTS
C1235	Pressure sensor fault: electrical	1) Sensor supply voltage is continuous monitored (except power on). 2) Pressure sensor zero position faulty.	Replace hydraulic unit or Pressure sensor.	Pressure values not available
C1237	Pressure sensor fault: other	Pressure sensor supply line signal	Replace hydraulic unit or Pressure sensor.	Pressure values not available
C1260	Steering angle sensor: signal	faulty steering angle signal	1) Examine fuse (if existing) and plug connection Or 2).Examine installation position of sensor. Or 3) Calibrate sensor. OR 4) Replace Steering angle sensor.	Reduced controller function caused by faulty LWS signal.
C1261	Steering angle sensor: not calibrated	Sensor not being calibrated	1) Calibrate sensor OR 2) Clear fault code memory. Switch ignition off and back on again. Read fault code memory. If the fault still exists calibrate sensor. Repeat test cycle. Or 3) If the fault still exists replace Steering angle sensor.	Reduced controller function caused by faulty LWS signal.
C1283	Lateral G sensor / yaw rate sensor: signal	The measured and offset compensated yaw rate signal is compared to the reference yaw rate signal calculated from DRS; AYS; LWS and WSS.	1) Examine fuse (if existing) and plug connection/installation of cables. 2) Eliminate interruptions (ground or positive contact). 3) Examine installation position of sensor. 4) Replace Lateral acceleration sensor.	Reduced controller function caused by faulty DRS signal
C1503	TCS/ESP switch error (hand bag logic)	Switch stuck; pressed too long or operated to frequently	1) ESP control switch no longer pressed. Or 2) Replace switch.	Reduced function of the VDC-System.
C1513	Brake light switch error (plausibility)	1) Brake light switches adjustment. 2) Brake light switches line connection. 3) Plausibility of Pressure sensor signal to Brake light switch status (pPre > 10 bar).	1) Reset switching threshold for Brake light switch. Or 2) Remove connection to battery positive or Connect Brake light switch correctly. OR 3) Replace Pressure sensor.	Reduced function caused by a faulty brake light switch / Reduced function of the VDC-System.
C1604	ECU hardware error	Internal control unit failures of the µC's and peripheral integrated circuits will be continues monitored for proper function.	Replace control unit OR hydraulic unit	No control is available.
C1601	ECU RAM check error	Control unit defective (RAM 'Addressing test' in the algorithm server incorrectly).	Replace control unit OR hydraulic unit	Hydraulic unit is not functional or Control unit defective
C1605	CAN hardware error ABS/ESP	Monitoring whether the initialization software has write access to the configuration registers of the CAN-controller module. Faults are detected immediate	Micro controller is defective; Replace the ECU	CAN-Controller is not initialized correctly. Possibly no reception or transmission of messages
C1616	CAN bus off ABS/ESP	Monitoring includes line short to ground; line short to supply voltage and mutual line short.	Problem with CAN bus; check the CAN connections for open connections	CAN messages can not be processed.
C1617	CAN error passive ABS/ESP	CAN lines are open	Problem with CAN bus; check the CAN connections for open connections	CAN messages can not be processed.
C1611	EMS CAN message timeout	EMS message Timeout	Problem with EMS ECU	No control is available.
C1612	FAT CAN message timeout	FAT message Timeout	Problem with FAT ECU	No control is available.

DTC	DESCRIPTION	CAUSES	REMEDIES	COMMENTS
C1623	SAS CAN message timeout	SAS message Timeout	Problem with SAS ECU	No control is available.
C1625	CAN timeout ESP/ABS	ESP message Timeout	Problem with CAN bus/hardware	No control is available.
C1626	Implausible Control	Under normal conditions; the inlet valves of all four wheels are not closed during control for longer than 1; 28s. If the controller requests pressure-hold or pressure-decrease for longer than 1; 28s; a fault is stored.	Replace control unit OR hydraulic unit	Reduced function as all wheel valves will remain in pressure build-up position.
C1627	CAN timeout TCC	TCC message Timeout	Problem with TCC ECU	No control is available.
C1643	YRS CAN message timeout	YRS message Timeout	Problem with YRS ECU	No control is available.
C1644	EMS missing message	EMS message Missing	Problem with EMS ECU	No control is available.
C1645	FAT missing message	FAT message Missing	Problem with FAT ECU	No control is available.
C1646	SAS missing message	SAS message Missing	Problem with SAS ECU	No control is available.
C1647	TCC missing message	TCC message Missing	Problem with TCC ECU	No control is available.
C1648	YRS missing message	YRS message Missing	Problem with YRS ECU	No control is available.
C1702	Variant Coding	Variant code in EEPROM is wrong	Write correct variant code in to EEPRM	No control is available.
C2112	Valve relay error	VR function is tested during startup. Reason could be short to GND or UZ; interrupted lines or a defective output stage etc.	1) Correct tester programming: Do not carry out excessively long actuation of valves. 2) Examine fuse. 3) Charge battery. 4) Replace control unit	No valve actuation possible.
C2308	Valve fault; inlet valve FL	Malfunctions of electrical valve actuation and valve relay are detected.	1) Change incorrect solenoid valve actuations. OR 2) Improve solenoid valve power supply. OR 3) Replace control unit/hydraulic unit	Valve cannot be actuated or valve is incorrectly actuated. This may result in locked wheels or wheels without pressure
C2312	Valve fault; outlet valve FL	Malfunctions of electrical valve actuation and valve relay are detected.	1) Change incorrect solenoid valve actuations. OR 2) Improve solenoid valve power supply. OR 3) Replace control unit/hydraulic unit	Valve cannot be actuated or valve is incorrectly actuated. This may result in locked wheels or wheels without pressure
C2316	Valve fault; inlet valve FR	Malfunctions of electrical valve actuation and valve relay are detected.	1) Change incorrect solenoid valve actuations. OR 2) Improve solenoid valve power supply. OR 3) Replace control unit/hydraulic unit	Valve cannot be actuated or valve is incorrectly actuated. This may result in locked wheels or wheels without pressure
C2320	Valve fault; outlet valve FR	Malfunctions of electrical valve actuation and valve relay are detected.	1) Change incorrect solenoid valve actuations. OR 2) Improve solenoid valve power supply. OR 3) Replace control unit/hydraulic unit	Valve cannot be actuated or valve is incorrectly actuated. This may result in locked wheels or wheels without pressure
C2324	Valve fault; inlet valve RL	Malfunctions of electrical valve actuation and valve relay are detected.	1) Change incorrect solenoid valve actuations. OR 2) Improve solenoid valve power supply. OR 3) Replace control unit/hydraulic unit	Valve cannot be actuated or valve is incorrectly actuated. This may result in locked wheels or wheels without pressure

DTC	DESCRIPTION	CAUSES	REMEDIES	COMMENTS
C2328	Valve fault; outlet valve RL	Malfunctions of electrical valve actuation and valve relay are detected.	1) Change incorrect solenoid valve actuations. OR 2) Improve solenoid valve power supply. OR 3) Replace control unit/hydraulic unit	Valve cannot be actuated or valve is incorrectly actuated. This may result in locked wheels or wheels without pressure
C2332	Valve fault; inlet valve RR	Malfunctions of electrical valve actuation and valve relay are detected.	1) Change incorrect solenoid valve actuations. OR 2) Improve solenoid valve power supply. OR 3) Replace control unit/hydraulic unit	Valve cannot be actuated or valve is incorrectly actuated. This may result in locked wheels or wheels without pressure
C2336	Valve fault; outlet valve RR	Malfunctions of electrical valve actuation and valve relay are detected.	1) Change incorrect solenoid valve actuations. OR 2) Improve solenoid valve power supply. OR 3) Replace control unit/hydraulic unit	Valve cannot be actuated or valve is incorrectly actuated. This may result in locked wheels or wheels without pressure
C2366	Valve fault; USV1	Malfunctions of electrical valve actuation and valve relay are detected.	1) Change incorrect solenoid valve actuations. OR 2) Improve solenoid valve power supply. OR 3) Replace control unit/hydraulic unit	Valve cannot be actuated or valve is incorrectly actuated. This may result in locked wheels or wheels without pressure
C2370	Valve fault; USV2	Malfunctions of electrical valve actuation and valve relay are detected.	1) Change incorrect solenoid valve actuations. OR 2) Improve solenoid valve power supply. OR 3) Replace control unit/hydraulic unit	Valve cannot be actuated or valve is incorrectly actuated. This may result in locked wheels or wheels without pressure
C2372	Valve fault; HSV1	Malfunctions of electrical valve actuation and valve relay are detected.	1) Change incorrect solenoid valve actuations. OR 2) Improve solenoid valve power supply. OR 3) Replace control unit/hydraulic unit	Valve cannot be actuated or valve is incorrectly actuated. This may result in locked wheels or wheels without pressure
C2374	Valve fault; HSV2	Malfunctions of electrical valve actuation and valve relay are detected.	1) Change incorrect solenoid valve actuations. OR 2) Improve solenoid valve power supply. OR 3) Replace control unit/hydraulic unit	Valve cannot be actuated or valve is incorrectly actuated. This may result in locked wheels or wheels without pressure
C2402	Return pump fault (motor electrical)	Stop monitor detects short to Ubatt; GND loss and FET continuous on.	1) Examine fuse. OR 2) Charge battery. Replace battery. OR 3) Examine ground cable. Improve (clean) contact point. OR 4) Replace hydraulic unit	The return pump does not work correct
C 1703	ABS; ESP Variant mismatch	Wrong variant of ECU	Reinitialize the Auto Variant code into the ECU.	No control is available.

5. AIRBAG:

DTC	DTC Description	CAUSES	EFFECT	DIAGNOSTIC LAMP( )	CHECK POINTS	CORRECTIVE ACTIONS
B1012	Internal Module Fault	ACU has internal hardware component faults or failures.	1. Module still has deployment capability except for certain internal faults. 2.No effect on the performance of the system	ON	No	Replace ACU
B1013	ECU Reuse exceeded	Module has already made deployment in a crash event or near crash circumstance. (Deployment Counter Exceeds One Event.)	1. Module still has deployment capability 2.No effect on the performance of the system	ON	No	Replace ACU
B1014	Crash stored in memory	Module has already made deployment in a crash event or circumstance. (Crash Memory is Locked)	1. Module still has deployment capability (new event will not be recorded). 2.No effect on the performance of the system	ON	No	Replace ACU
B1015	Event Data Recording incomplete	EDR data incomplete	1.Module still has deployment capability (new event will not be recorded) 2.No effect on the performance of the system	ON	No	Replace ACU
B1018	No VIN Number	1. No successful writing VIN. 2. No valid VIN stored.	1.Vehicle could not be traced Module still has deployment capability 2.No effect on the performance of the system	In plant mode with only no VIN fault RIL will blink. In Plant mode with faults RIL will continuously ON. In Normal mode with VIN data missing RIL will be ON.	No	Write VIN correctly.
B1097	Vbatt too high	1. Ignition Voltage too High. 2. Defected battery or alternator, Regulator of the alternator defective.	1. Disable Crash Algorithm. 2. Disable All other Diagnostics. 3.Airbags might not be deployed	ON	1) Switch Off the Ignition. 2) Remove the ECU 50 pin connector 3) Start the engine. 4) Using multimeter measure the voltage between Pin 30 & Pin 6, Confirm the voltage is above 9-16V, if not refer to corrective action. 5) After rectifying refer the step 4. 6) Switch off Ignition. 7) Connect the ECU 50 pin connector	1) If the voltage is more than 16V check the alternator for any faults. 2) Rectify the faults in alternator if any.
B1098	Vbatt too low	1. Ignition Voltage too Low. 2.Voltage Low battery, Excessive or short circuit load on alternator, wire open , Ig switch defective	1. Disable Crash Algorithm. 2. Disable All other Diagnostics. 3.Airbags might not be deployed	ON	1) Switch Off the Ignition. 2) Remove the ECU 50 pin connector 3) Start the engine. 4) Using multimeter measure the voltage between Pin 30 & Pin 6, Confirm the voltage is above 9-16V, if not refer to corrective action. 5) After rectifying refer the step 4. 6) Switch off Ignition. 7) Connect the ECU 50 pin connector	Adjust battery voltage into workable range (9V< Vign <16V).
B1017	Squib-to-squib short.	Squib-to-Squib wiring harness connection short.	Deployment Will Still Be Attempted If Initiated.	ON	Check all the airbags/pretensioners' wiring harness and connections	Remove short connections among airbags/pretensioners.
B1021	Front Airbag Driver (Loop 1) resistance too high	1. Open failure of the loop line. 2. Open circuit due to wiring problem or connector contact failure. - Squib resistance is higher than 6 ohms.	Driver Airbag might not be deployed	ON	1) Check the all the interconnectors from ECU to Drive airbag are connected. 2) Check the resistance of the driver air bag at ECU 50 pin connector pin no between 2 and 1Resistance value should be between 1.2-6 Ohms If the value is out of range refer the corrective action no 1. 3) If the resistance is within range confirm the continuity from driver air bag to ECU is correct as per the airbag circuit schematic	1) Check the resistance of the driver air bag module The resistance should be between 2 +/- 0.2 ohms if the resistance is out of range replace the Driver air bag module.

DTC	DTC Description	CAUSES	EFFECT	DIAGNOSTIC LAMP( )	CHECK POINTS	CORRECTIVE ACTIONS
B1022	Front Airbag Driver (Loop 1) resistance too low	Driver air bag Squib resistance is lower than 1.2 Ohms	Driver Airbag might not be deployed	ON	1) Check the all the interconnectors from ECU to Drive airbag are connected. 2) Check the resistance of the driver air bag at ECU 50 pin connector pin no between 2 and 1Resistance value should be between 1.2-6 Ohms If the value is out of range refer the corrective action no 1. 3) If the resistance is within range confirm the continuity from driver air bag to ECU is correct as per the airbag circuit schematic	1) Check the resistance of the driver air bag module The resistance should be between 2 +/- 0.2 ohms if the resistance is out of range replace the Driver air bag module.
B1023	Front Airbag Driver (Loop 1) short to GND	Leakage resistance between passenger air bag squib and GND is less than 1kohms.	Driver Airbag might not be deployed	ON	1) Check the resistance of the Driver airbag at ECU 50 pin connector pin no between 1 and Chassis ground Resistance value should be more than 1 Kilo ohms If the value is less refer the corrective action no 1. 2) Check the resistance of the Driver airbag at ECU 50 pin connector pin no between 1and Chassis ground Resistance value should be more than 1 Kilo ohms If the value is less refer the corrective action no 1.	1) Correct the wiring harness continuity from Driver Airbag to ECU is there as per the circuit schematic. 2) Remove the short to ground between ECU pin no 2 and 1 with ground.
B1024	Front Airbag Driver (Loop 1) short to Vbatt	Leakage resistance between drive air bag squib and battery is less than 1kohms.	Driver Airbag might not be deployed	ON	1) Check the resistance of the Driver airbag at ECU 50 pin connector pin no between 1 and battery positive line, value should be more than 1 Kilo ohms If the value is less refer the corrective action no 1. 2) Check the resistance of the Driver airbag at ECU 50 pin connector pin no between 1and battery positive line value should be more than 1 Kilo ohms, If the value is less refer the corrective action no 1.	1) Correct the wiring harness continuity from Driver Airbag to ECU is there as per the circuit schematic. 2) Remove the short to ground between ECU pin no 2 and 1 with battery.
B1029	Pretensioner Driver (Loop 3) resistance too high	1. Open failure of the loop line. 2. Open circuit due to wiring problem or connector contact failure. - Squib resistance is higher than 5 ohms.	Driver pretesnioner might not be deployed	ON	1) Check the all the interconnectors from ECU to Drive pretensioner are connected. 2) Check the resistance of the driver air bag at ECU 50 pin connector pin no between 17 and 16 Resistance value should be between 1-5 Ohms If the value is out of range refer the corrective action no 1. 3) If the resistance is within range confirm the continuity from driver pretensioner to ECU is correct as per the airbag circuit schematic	1) Check the resistance of the driver pretensioner module The resistance should be between 2.05+/- 0.25 ohms if the resistance is out of range replace the Driver pretesnioner module.
B102A	Pretensioner Driver (Loop 3) resistance too low	Driver air bag Squib resistance is lower than 1 Ohm.	Driver pretesnioner might not be deployed	ON	1) Check the all the interconnectors from ECU to Drive pretensioner are connected. 2) Check the resistance of the driver air bag at ECU 50 pin connector pin no between 17 and 16 Resistance value should be between 1-5 Ohms If the value is out of range refer the corrective action no 1. 3) If the resistance is within range confirm the continuity from driver air bag to ECU is correct as per the airbag circuit schematic	1) Check the resistance of the driver air bag module The resistance should be between 2.05 +/- 0.25 ohms if the resistance is out of range replace the Driver pretensioner module.
B102B	Pretensioner Driver (Loop 3) short to GND	Leakage resistance between passenger air bag squib and GND is less than 1kohms.	Driver pretesnioner might not be deployed	ON	1) Check the resistance of the Driver pretesnioner at ECU 50 pin connector pin no between 16 and Chassis ground Resistance value should be more than 1 Kilo ohms If the value is less refer the corrective action no 1. 2) Check the resistance of the Driver pretensioner at ECU 50 pin connector pin no between 17 and Chassis ground Resistance value should be more than 1 Kilo ohms If the value is less refer the corrective action no 1.	1) Correct the wiring harness continuity from Driver pretensioner to ECU is there as per the circuit schematic. 2) Remove the short to ground between ECU pin no 17 and 16 with ground.
B102C	Pretensioner Driver (Loop 3) short to Vbatt	Leakage resistance between drive air bag squib and battery is less than 1kohms.	Driver pretesnioner might not be deployed	ON	1) Check the resistance of the Driver Pretensioner at ECU 50 pin connector pin no between 16 and battery positive line, value should be more than 1 Kilo ohms If the value is less refer the corrective action no 1. 2) Check the resistance of the Driver pretensioner at ECU 50 pin connector pin no between 17 and battery positive line value should be more than 1 Kilo ohms, If the value is less refer the corrective action no 1.	1) Correct the wiring harness continuity from Driver pretensioner to ECU is there as per the circuit schematic. 2) Remove the short to battery between ECU pin no 17 and 16 with battery.
B1031	Front Airbag Passenger (Loop 2) resistance too high	1. Open failure of the loop line. 2. Open circuit due to wiring problem or connector contact failure. - Squib resistance is higher than 5 ohms.	Passenger Airbag might not be deployed	ON	1) Check the all the interconnectors from ECU to passenger airbag are connected. 2) Check the resistance of the driver air bag at ECU 50 pin connector pin no between 3 and 4 Resistance value should be between 1-5 Ohms If the value is out of range refer the corrective action no 1. 3) If the resistance is within range confirm the continuity from passenger air bag to ECU is correct as per the airbag circuit schematic	1) Check the resistance of the passenger air bag module The resistance should be between 2 +/- 0.2 ohms if the resistance is out of range replace the passenger air bag module.

DTC	DTC Description	CAUSES	EFFECT	DIAGNOSTIC LAMP( )	CHECK POINTS	CORRECTIVE ACTIONS
B1032	Front Airbag Passenger (Loop 2) resistance too low	Driver air bag Squib resistance is lower than 1Ohms	Passenger Airbag might not be deployed	ON	1) Check the all the interconnectors from ECU to passenger airbag are connected. 2) Check the resistance of the driver air bag at ECU 50 pin connector pin no between 3 and 4 Resistance value should be between 1-5 Ohms If the value is out of range refer the corrective action no 1. 3) If the resistance is within range confirm the continuity from passenger air bag to ECU is correct as per the airbag circuit schematic	1) Check the resistance of the passenger air bag module The resistance should be between 2 +/- 0.2 ohms if the resistance is out of range replace the passenger air bag module.
B1033	Front Airbag Passenger (Loop 2) short to GND	Leakage resistance between passenger air bag squib and GND is less than 1kohms.	Passenger Airbag might not be deployed	ON	1) Check the resistance of the Passenger airbag at ECU 50 pin connector pin no between 4 and Chassis ground Resistance value should be more than 1 Kilo ohms If the value is less refer the corrective action no 1. 2) Check the resistance of the passenger airbag at ECU 50 pin connector pin no between 3 and Chassis ground Resistance value should be more than 1 Kilo ohms If the value is less refer the corrective action no 1.	1) Correct the wiring harness continuity from passenger Airbag to ECU is there as per the circuit schematic.2) Remove the short to ground between ECU pin no 3 and 4 with ground.
B1034	Front Airbag Passenger (Loop 2) short to Vbatt	Leakage resistance between drive air bag squib and battery is less than 1kohms.	Passenger Airbag might not be deployed	ON	1) Check the resistance of the Passenger airbag at ECU 50 pin connector pin no between 4 and battery positive line, value should be more than 1 Kilo ohms If the value is less refer the corrective action no 1. 2) Check the resistance of the Passenger airbag at ECU 50 pin connector pin no between 3 and battery positive line value should be more than 1 Kilo ohms, If the value is less refer the corrective action no 1.	1) Correct the wiring harness continuity from passenger Airbag to ECU is there as per the circuit schematic. 2) Remove the short to battery between ECU pin no 3 and 4 with battery.
B1039	Pretensioner Passenger (Loop 4) resistance too high	1. Open failure of the loop line. 2. Open circuit due to wiring problem or connector contact failure. - Squib resistance is higher than 5 ohms.	Passenger pretesnioner might not be deployed	ON	1) Check the all the interconnectors from ECU to passenger pretensioner are connected. 2) Check the resistance of the passenger pretensioner at ECU 50 pin connector pin no between 18 and 19 Resistance value should be between 1-5 Ohms If the value is out of range refer the corrective action no 1. 3) If the resistance is within range confirm the continuity from driver air bag to ECU is correct as per the airbag circuit schematic	1) Check the resistance of the passenger pretensioner module The resistance should be between 2.05 +/- 0.25 ohms if the resistance is out of range replace the passenger pretensioner module.
B103A	Pretensioner Passenger (Loop 4) resistance too low	Driver air bag Squib resistance is lower than 1 Ohms	Passenger pretesnioner might not be deployed	ON	1) Check the all the interconnectors from ECU to passenger pretensioner are connected. 2) Check the resistance of the passenger pretensioner at ECU 50 pin connector pin no between 18 and 19 Resistance value should be between 1-5 Ohms If the value is out of range refer the corrective action no 1. 3) If the resistance is within range confirm the continuity from driver air bag to ECU is correct as per the airbag circuit schematic	1) Check the resistance of the passenger pretenioner bag module The resistance should be between 2.05 +/- 0.25 ohms if the resistance is out of range replace the passenger pretensioner module.
B103B	Pretensioner Passenger (Loop 4) short to GND	Leakage resistance between passenger air bag squib and GND is less than 1kohms.	Passenger pretesnioner might not be deployed	ON	1) Check the resistance of the Passenger pretensioner at ECU 50 pin connector pin no between 19 and Chassis ground Resistance value should be more than 1 Kilo ohms If the value is less refer the corrective action no 1. 2) Check the resistance of the passenger pretensioner at ECU 50 pin connector pin no between 18 and Chassis ground Resistance value should be more than 1 Kilo ohms If the value is less refer the corrective action no 1.	1) Correct the wiring harness continuity from passenger pretenioner to ECU is there as per the circuit schematic. 2) Remove the short to ground between ECU pin no 18 and 19 with ground.
B103C	Pretensioner Passenger (Loop 4) short to Vbatt	Leakage resistance between drive air bag squib and battery is less than 1kohms.	Passenger pretesnioner might not be deployed	ON	1) Check the resistance of the Passenger pretensioner at ECU 50 pin connector pin no between 19 and battery positive line, value should be more than 1 Kilo ohms If the value is less refer the corrective action no 1. 2) Check the resistance of the Passenger pretensioner at ECU 50 pin connector pin no between 18 and battery positive line value should be more than 1 Kilo ohms, If the value is less refer the corrective action no 1.	1) Correct the wiring harness continuity from Passenger pretensioner to ECU is there as per the circuit schematic. 2) Remove the short to battery between ECU pin no 18 and 19 with battery.
B1051	Front Satellite Driver – short to GND	Driver Front Satellite Sensor open or short to GND.	Crash Test Performance may get affected. The airbag deployment may be affected	ON	1) Check all the interconnections are connected from ECU to Driver Front Satellite. 2) Check the continuity from Sensor connector pin no 1 to ECU 36 pin connector pin no 15 and pin no 2 to ECU pin no 40. If there is no continuity refer the corrective action no 1. 3) Check the resistance between ECU connector pin no 15, 40 with Chassis ground. The resistance should be more than 1 Kilo ohms, if less refer the corrective action no 2.	1) Correct the wiring harness continuity from Sensor to ECU is there as per the circuit schematic. 2) Remove the short to ground between ECU pin no 15, 40.

DTC	DTC Description	CAUSES	EFFECT	DIAGNOSTIC LAMP( )	CHECK POINTS	CORRECTIVE ACTIONS
B1053	Front Satellite Driver – internal fault	Driver Front Satellite Sensor has internal hardware component faults or failures.	Crash Test Performance may get affected. The airbag deployment may be affected	ON	No	Replace Sensor.
B1054	Front Satellite Driver – no communication	ACU can't receive data from driver front satellite sensor due to short to Batt/GND or open failure of the communication line.	Crash Test Performance may get affected. The airbag deployment may be affected	ON	1) Check all the interconnections are connected from ECU to Driver Front Satellite. 2) Check the continuity from Sensor connector pin no 1 to ECU 36 pin connector pin no 15 and pin no 2 to ECU pin no 40. If there is no continuity refer the corrective action no 1. 3) Check the resistance between ECU connector pin no 15, 40 with Chassis ground. The resistance should be more than 1 Kilo ohms, if less refer the corrective action no 2. 4) Check the resistance between ECU connector pin no 15, 40 with battery positive line. The resistance should be more than 1 Kilo ohms, if less refer the corrective action no 3.	1) Correct the wiring harness continuity from Sensor to ECU is there as per the circuit schematic. 2) Remove the short to ground between ECU pin no 15, 40. 3) Remove the short to battery between ECU pin no 15, 40.
B1055	Front Satellite Driver - Communication Error	ACU can't receive data from driver front satellite sensor due to short to Batt/GND or open failure of the communication line.	Crash Test Performance may get affected. The airbag deployment may be affected	ON	1) Check all the interconnections are connected from ECU to Driver Front Satellite. 2) Check the continuity from Sensor connector pin no 1 to ECU 36 pin connector pin no 15 and pin no 2 to ECU pin no 40. If there is no continuity refer the corrective action no 1. 3) Check the resistance between ECU connector pin no 15, 40 with Chassis ground. The resistance should be more than 1 Kilo ohms, if less refer the corrective action no 2. 4) Check the resistance between ECU connector pin no 15, 40 with battery positive line. The resistance should be more than 1 Kilo ohms, if less refer the corrective action no 3.	1) Correct the wiring harness continuity from Sensor to ECU is there as per the circuit schematic. 2) Remove the short to ground between ECU pin no 15, 40. 3) Remove the short to battery between ECU pin no 15, 40.
B1061	Front Satellite Passenger – short to GND	Passenger Front Satellite Sensor open or short to GND.	Crash Test Performance may get affected. The airbag deployment may be affected	ON	1) Check all the interconnections are connected from ECU to Passenger Front Satellite sensor. 2) Check the continuity from Sensor connector pin no 1 to ECU 36 pin connector pin no 12 and pin no 2 to ECU pin no 37. If there is no continuity refer the corrective action no 1. 3) Check the resistance between ECU connector pin no 12, 37 with Chassis ground. The resistance should be more than 1 Kilo ohms, if less refer the corrective action no 2.	1) Correct the wiring harness continuity from Sensor to ECU is there as per the circuit schematic. 2) Remove the short to ground between ECU pin no 12, 37.
B1063	Front Satellite Passenger – internal fault	Passenger Front Satellite Sensor has internal hardware component faults or failures.	Crash Test Performance may get affected. The airbag deployment may be affected	ON	No	Replace ACU
B1064	Front Satellite Passenger – no communication	ACU can't receive data from passenger front satellite sensor due to short to Batt/GND or open failure of the communication line.	Crash Test Performance may get affected. The airbag deployment may be affected	ON	1) Check all the interconnections are connected from ECU to Passenger Front Satellite sensor. 2) Check the continuity from Sensor connector pin no 1 to ECU 36 pin connector pin no 12 and pin no 2 to ECU pin no 37. If there is no continuity refer the corrective action no 1. 3) Check the resistance between ECU connector pin no 12, 37 with Chassis ground. The resistance should be more than 1 Kilo ohms, if less refer the corrective action no 2. 4) Check the resistance between ECU connector pin no 12, 37 with battery positive line. The resistance should be more than 1 Kilo ohms, if less refer the corrective action no 3.	1) Correct the wiring harness continuity from Sensor to ECU is there as per the circuit schematic. 2) Remove the short to ground between ECU pin no 12, 37. 3) Remove the short to battery between ECU pin no 12, 37.
B1065	Front Satellite Passenger - Communication Error	ACU can't receive data from passenger front satellite sensor due to short to Batt/GND or open failure of the communication line.	Crash Test Performance may get affected. The airbag deployment may be affected	ON	1) Check all the interconnections are connected from ECU to Passenger Front Satellite sensor. 2) Check the continuity from Sensor connector pin no 1 to ECU 36 pin connector pin no 12 and pin no 2 to ECU pin no 37. If there is no continuity refer the corrective action no 1. 3) Check the resistance between ECU connector pin no 12, 37 with Chassis ground. The resistance should be more than 1 Kilo ohms, if less refer the corrective action no 2. 4) Check the resistance between ECU connector pin no 12, 37 with battery positive line. The resistance should be more than 1 Kilo ohms, if less refer the corrective action no 3.	1) Correct the wiring harness continuity from Sensor to ECU is there as per the circuit schematic. 2) Remove the short to ground between ECU pin no 12, 37. 3) Remove the short to battery between ECU pin no 12, 37.

DTC	DTC Description	CAUSES	EFFECT	DIAGNOSTIC LAMP( )	CHECK POINTS	CORRECTIVE ACTIONS
B101A	Passenger Airbag Cutoff Switch (IN3) Open/short to GND	ACS open or short to GND	Module is Still Functional. ACS to last known or default state.	ON	Check all the interconnections are connected from ECU to ACS.	1) Correct the wiring harness continuity from ACS to ECU is there as per the circuit schematic. 2) Remove the short to GND ECU pin no 48 of connector.
B101B	Passenger Airbag Cutoff Switch (IN3) Short to Vbatt	ACS short to Battery	Module is Still Functional. ACS to last known or default state.	ON	Check all the interconnections are connected from ECU to ACS.	1) Correct the wiring harness continuity from ACS to ECU is there as per the circuit schematic. 2) Remove the short to battery ECU pin no 48 of connector.
B1091	Fault lamp - RIL (OUT1) short to Vbatt	RIL short to Battery	No Effect on system	ON	1) Switch Off the Ignition Switch. 2) Disconnect the ECU connector. 3) Check for continuity between SRS telltale pin no 28 in instrument cluster and Airbag ECU connector pin 49. Ensure better connections. 4) Check the SRS telltale control line is not short circuited to any other pin or battery.	1) Correct the wiring harness continuity from RIL lamp to ECU is there as per the circuit schematic. 2) Remove the short to battery ECU pin no 49 of connector.
B1092	Fault lamp - RIL (OUT1) Open/Short to ground	RIL Open of short to GND.	No Effect on system	ON	1) Switch Off the Ignition Switch. 2) Disconnect the ECU connector. 3) Check for continuity between SRS telltale pin no 28 in instrument cluster and Airbag ECU connector pin 49. Ensure better connections. 4) Check the SRS telltale control line is not short circuited to any other pin or ground.	1) Correct the wiring harness continuity from RIL lamp to ECU is there as per the circuit schematic. 2) Remove the short to GND ECU pin no 49 of connector.
B1096	ENS (OUT2) short to Vat	ENS short to Battery	No Effect on system	ON	1) Switch Off the Ignition Switch. 2) Disconnect the ECU connector. 3) Check for continuity between and Airbag ECU connector pin 25 and BCM connector(x1) connector J2 and EMS connector (C017B) pin no 40. Ensure better connections. 4) Check the ENS line is not short circuited to any other pin or battery.	1) Correct the wiring harness continuity from ENS receiving module to ECU is there as per the circuit schematic. 2) Remove the short to battery ECU pin no 25 of connector.
B1095	ENS (OUT2) Open/Short to ground	ENS Open of short to GND.	No Effect on system	ON	1) Switch Off the Ignition Switch. 2) Disconnect the ECU connector. 3) Check for continuity between and Airbag ECU connector pin 25 and BCM connector(x1) connector J2 and EMS connector (C017B) pin no 40. Ensure better connections. 4) Check the ENS line is not short circuited to any other pin or ground	1) Correct the wiring harness continuity from PAD lamp to ECU is there as per the circuit schematic. 2) Remove the short to GND ECU pin no 25 of connector.
B1093	Airbag-disabled lamp - PADI (OUT3) short to Vbatt	Passenger Airbag Deactivation Lamp short to Battery	No Effect on system	ON	1) Switch Off the Ignition Switch. 2) Disconnect the ECU connector. 3) Check for continuity between SRS telltale pin no 7 in DIS unit and Airbag ECU connector pin 50. Ensure better connections. 4) Check the PADI telltale control line is not short circuited to any other pin or battery.	1) Correct the wiring harness continuity from PAD lamp to ECU is there as per the circuit schematic. 2) Remove the short to battery ECU pin no 50 of connector.
B1094	Airbag-disabled lamp - PADI (OUT3) Open/Short to ground	Passenger Airbag Deactivation Lamp short to GND or open	No Effect on system	ON	1) Switch Off the Ignition Switch. 2) Disconnect the ECU connector. 3) Check for continuity between SRS telltale pin no 7 in DIS unit and Airbag ECU connector pin 50. Ensure better connections. 4) Check the PADI telltale control line is not short circuited to any other pin or ground.	1) Correct the wiring harness continuity from PAD lamp to ECU is there as per the circuit schematic. 2) Remove the short to GND ECU pin no 50 of connector.