ANDHRA PRADESH STATE ROAD TRANSPORT CORPORATION

O/o the VC & MD,
Mushirabad, Hyderabad-20

No. OP2/462(10)/2007-MED

CIRCULAR No: 16/2007-MED, Dt 23-07-2007.

Sub : MAINTENANCE – Maintenance of Electrical Wiring Harness on Tata BS-II vehicles – Certain instructions issued – Regarding.

Electrical system is one of the vital systems in a vehicle which if neglected will hamper the performance of the vehicle besides resulting in breakdown.

All the Electrical devices of a vehicle are interconnected in the form of a wiring harness which is normally partitioned into segments. Each segment includes a number of individual conductors and connectors. The conductors of different sizes (gauge) with different rated capacities are provided to suit the application. As a safety measure, fuses of pre-defined amperage are provided to safeguard the wiring in the event of overloading or short circuiting.

Improperly connected or non-connected connectors result in partial or complete failure of the electrical devices connected to the electrical system.

Of late, the vehicle manufacturers have made several improvements in the electrical system of the vehicles to comply with the CMVR rules. M/s Tata Motors Ltd have introduced certain new devices like Electrical Feed pump, KSB, Engine stop solenoid etc in the fuel system of the vehicles which are electrically operated. It is also obligatory to maintain various electrical components like Head lights, signaling devices, horn, wiper, etc in good working condition as per the prescribed standards in view of strict enforcement of Central Motor Vehicle Rules and APMV Rules by the statutory bodies.

Instances of certain wrong practices with the wiring harness of vehicles have come to the light at the time of Body Building and at Depots during regular maintenance. As the wiring harness plays important role in proper functioning electrical devices of the vehicle there is every need to educate our maintenance staff on this area.

Accordingly, series of training programmes have been organized by the Service representatives of M/s Tata Motors Ltd on the maintenance of electrical system and precautions to be taken in wiring harness at all Depots.

In the light of the above, it is felt necessary to reiterate the important precautions to be taken on the wiring harness of the vehicles at our depots.

1. **CABLES** – The cables of different sizes are provided based on the power supply requirement of each cable for different application. Hence, proper care shall be taken while tapping the electrical supply through cables for different devices. The following precautions are needed to be taken.

    - The Automotive cables as per the prescribed **DIN-FLRYB, BIS or JIS** standards shall only be used.

    - Never use non-automotive cables for repair of wiring harness or tapping additional connections.

    - Use only **standard colour coded wires** for easy identification of cable routing.

    - Use **proper terminals & connectors** for any repair or tapping. Never twist the cables and never use adhesive tape.

    - Never connect the circuits with twists & knots.

    - FOUR extra tapping points are provided for taking additional power connections besides TWO connections for fog lamp. Among these, TWO terminals are directly taken from battery which can be used without starting the vehicle. The other TWO terminals are taken from the ignition connection, which can be used only when the engine is in running condition. A maximum of 10 AMP (240watts) load can be taken from these connectors. Always take additional power connection (Battery power supply) from the specified tapping point only with proper connector. Never tap the power from circuit by peeling of the other cables.

    - **Proper clamps/ clips** shall be provided to the cables to avoid damage due to vibration.

    - The dirt and debris on the chassis earth connections shall be cleaned regularly.

2. **FUSES** - In order to protect the wiring harness from damage in case of short circuit and overloads, fuses of **glass cartridges as per IS 2577** are provided in a transperant fuse box. The particulars of consumers served by each fuse are printed on the fuse box. The following precautions shall be shall necessarily be taken at Depots.

    - Ensure that the details of fuses printed on the fuse box cover are clearly visible so that it will be easy to check the respective fuse in the case of fault in the electrical system. Proper care shall be taken while painting to avoid paint marks on the fuse box cover.

    - While fitting the fuse box cover, ensure that the cover knob rests in the slot provided inside the fuse box.

    - Replace the fuses with fuse cartridges of **designated rating** only. Never attempt to tamper the fuses and never use over rated fuses. Tampered fuses will not protect the wiring in the event of overloading/ short circuit. The ampere ratings of the fuses are given on the fuse box cover. The fuses of different ratings are easily available in the market and the cost of these fuses is very less.

- Also, the manufacturer provides TWO extra fuses in the fuse box.

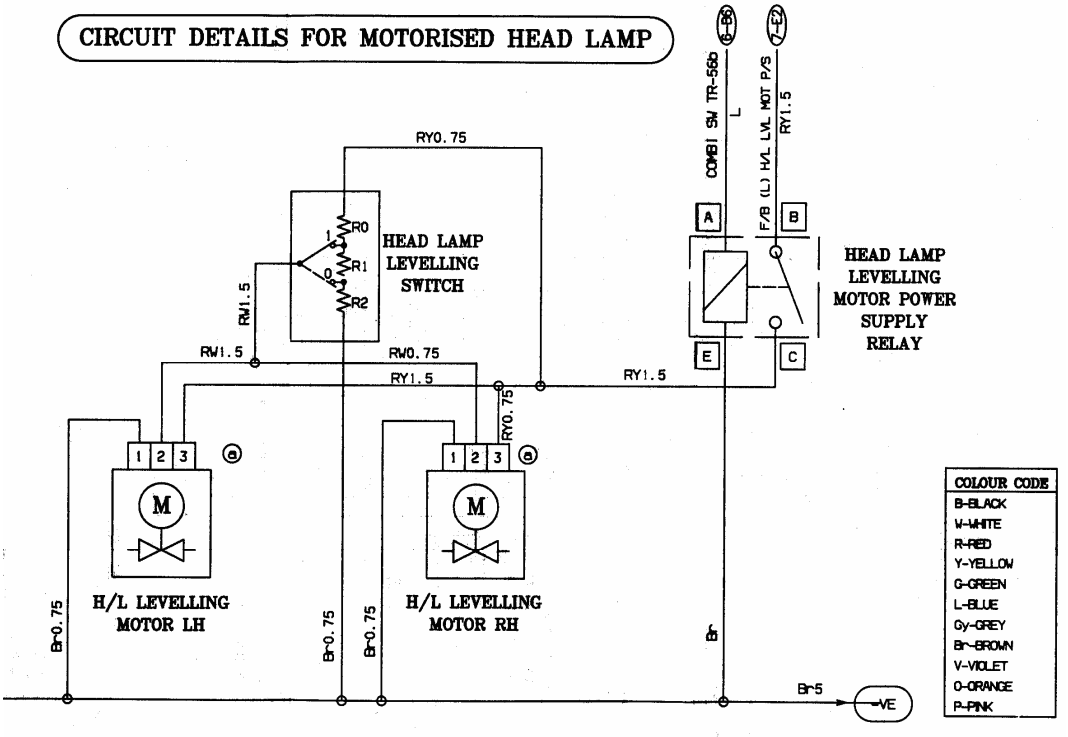
- The fuse links can be identified for amperage by colour codes; Light brown-5 Amps, Red-10 Amps, Blue-15 Amps and Yellow-20 Amps.

FUSE BOX

5A Wiper Motor	**5A** Gauges	**10A** Reverse Stop	**5A** Flasher	**10A** Horn Engine	DIODE D-1	DIODE D-2
5A Low Beam LH	**5A** Low Beam RH	**5A** High Beam LH	**5A** High Beam RH	**5A** Head Light Levelling Motor	**5A** Parking Light	**5A** Parking Light

Note : If the Engine Stop Solenoid fuse blows off, the vehicle will come to halt immediately and if the Feed pump fuse blows off, the vehicle will run for 4 to 5 kms with the fuel available in the filters & fuel lines. But the vehicle gets jerks in this condition.

3. **<u>MOTORIZED HEAD LAMPS</u>** – Motorized Head Lamps have been provided on all new vehicles to meet the CMVR requirements. This is a **12 volts motor with switch control** on the Dash board. The power supply to the Motor is tapped from 12V supply line. The leveling motor is used to tilt the dipped beam downwards/ upwards operated by the switch from dashboard. The leveling switch has three positions marked on it '1' , '2' and '3'. The lateral adjustment can be done by adjusting screw at the other end of bottom.

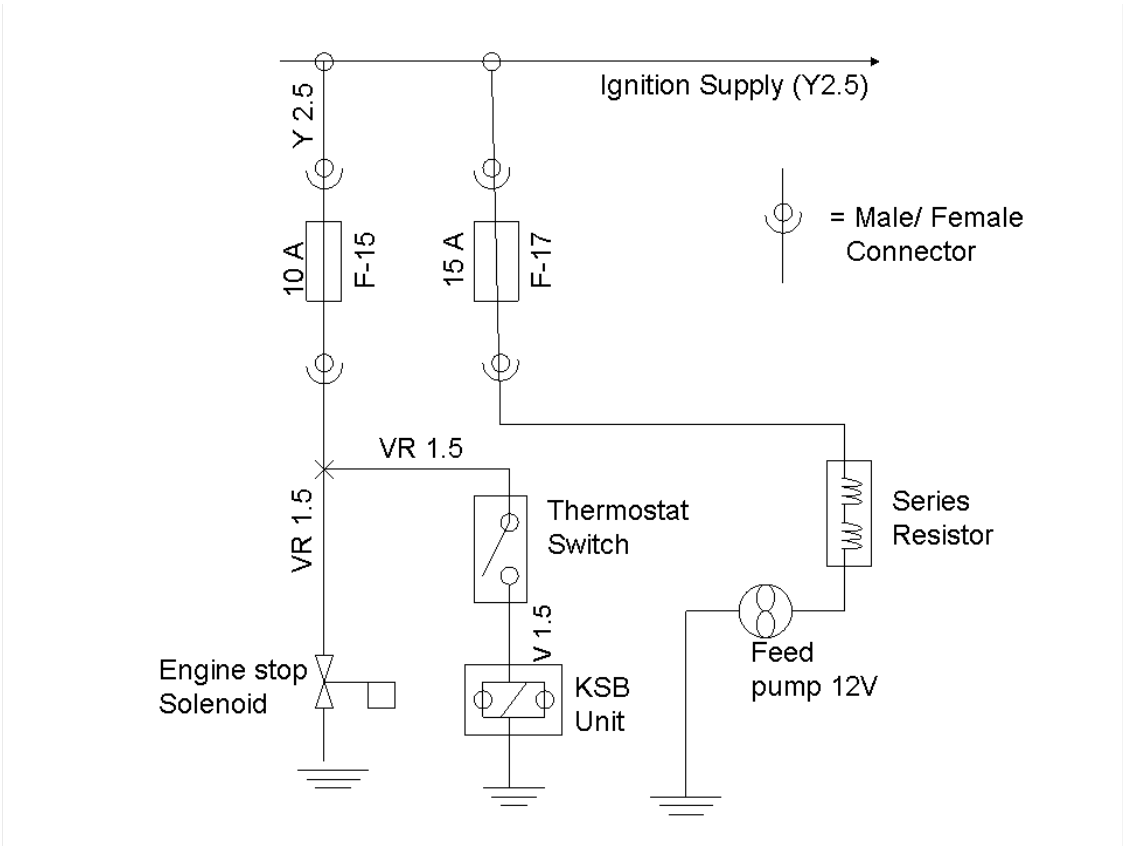


4. **ELECTRICAL FEED PUMP** – The electrical feed pump provided on Tata BS-II vehicles supplies the fuel from the HSD tank to the FIP. The **feed pump works with 12 volts supply**. The electrical connection to the Feed pump is tapped from 24 volts ignition supply line which is stepped down to **12 volts by a SERIES RESISTOR** (Located in the left side chassis long member). Any attempt to bypass the resistor and connect the feed pump with 24 volts, the system will not function and the motor may burn out.

5. **KSB UNIT ON FUEL INJECTION PUMP** : The function of KSB Unit (Cold starting device) is to advance the injection timing in the Rotary FIE in extreme cold conditions by sensing the temperature from a thermostat switch. The unit works with electrical power. The power connection is tapped from the **Ignition supply with 10A fuse**.

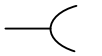
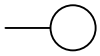
6. **ENGINE STOP SOLENOID** : The function of Engine Stop Solenoid is to interrupt the fuel supply to the FIP whenever the engine is stopped. The unit works with 24 V electrical power. The power connection is tapped from the **Ignition supply with 10A fuse**.

CIRCUIT DIAGRAM FOR ENGINE STOP SOLENOID, KSB & FEED PUMP



The important schematic circuit diagrams for Power Distribution, Self Starter, Alternator, Headlights, tail lights, fog lamps, blinkers, Reverse Light, Additional Blinker Relay, Exhaust Brake, Stop lamp, Combi switch, Engine Lamp, Wiper, Hand brake switch, Low Oil Pressure switch, Low Air pressure switch, Fuel Tank Unit, High Temp, Buzzer unit, Temperature Transducer, Instrument cluster, etc., are enclosed herewith for reference.

The examples for reading the Key Codes used in the Circuits are shown below.

Symbol		DESCRIPTION
RW1.5	=	Main Cable is Red & subsidiary colour is White with wire cross section of 1.5 sq.mm
4-A2	=	Represents – For all other details refer Sheet No.4, Zone-2.
2	=	Represents Terminal -2
	=	Represents Female Connection
	=	Represents Male Connection
GND	=	Represents Battery Negative/ Ground
	=	Represents Chassis Ground.

Unspecified Cross section of Wire is 0.50 Sq.mm

COLOUR CODES

B	BLACK
W	WHITE
R	RED
Y	YELLOW
G	GREEN
L	BLUE
Gy	GREY
Br	BROWN
V	VOILET
O	ORANGE
P	PINK

All the Depot Managers are advised to ensure proper care and maintenance to the electrical system of the vehicles as indicated above by educating the Supervisors & maintenance staff at their Depots.

All the Dy.CMEs are advised to ensure proper working of all electrical systems of the vehicle including signaling devices. It should also be ensured that the essential spares like cross connectors, fuses of different ratings, recommended cables etc are made available at Depots.

EXECUTIVE DIRECTOR (E&IT)

To
All Depot Managers.

Enclosures : Circuit diagrams

Copy to: Director (Vig. & security), ED (MIS), ED (A), ED (O), FA, CAO & ED (HRD) for information
Copy to: All ED(Zones) for favour of information and necessary action.
Copy to: CCOS, CME(C&B) & CE(IT) for necessary action.
Copy to: All Regional Managers for necessary action.
Copy to: All Dy.CMEs/WMs/COSs for necessary action
Copy to: All Dy.CAOs & AOs for information.
Copy to : Dy.CME(C&B), Dy,CME(IEU), Dy.CME(P) for necessary action.
Copy to: Principal, TA/HPT, & all ZSTCs.
Copy to : Manual section, H.O.
Copy to : All Maintenance incharges of TATA area for necessary action.