

***Procurement Technical  
specification of Armored Driver's  
Cabin (Flat type-RHD) for BEML  
High Mobility Vehicle 8x8  
- MGS Project***



**BEML LTD**

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Cabin (Flat type-RHD) for BEML  
High Mobility Vehicle 8x8  
- MGS Project***

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GAT-1

### Revision Details:

Rev. No.	Page	Details	Date
01	5,8,13,16	Vendor scope of accessories changed in cabin interiors, cabin fitment & accessories & in other fitments	03-09-2020
	77	Updated APPENDIX-E added work scope matrix	03-09-2020

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## 1. GENERAL DESCRIPTION:

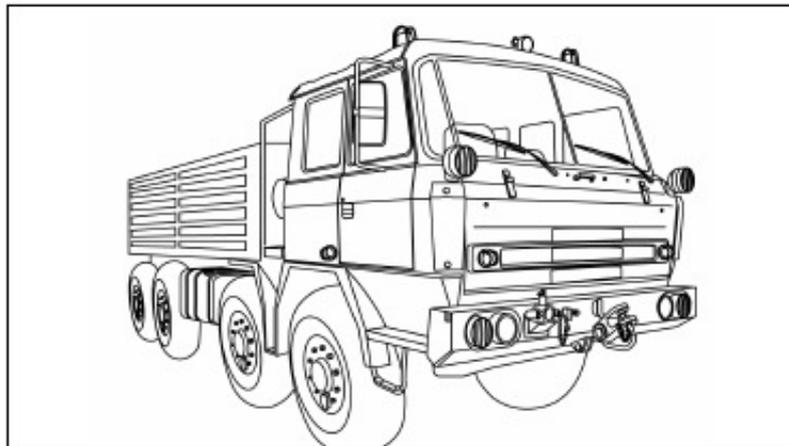
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Armored Cabin is required for sustaining the blast pressures upto STANAG Level I.

This cabin will be integrated on BEML High Mobility Vehicle 8x8. The requirement of the cabin includes Right Hand Drive, Co-Driver and 2 crew members. The windshields used on the cabin must be blast proof to STANAG Level I standard. The Cabin structure is made out of tubular square and rectangle tubes to resist the blast pressure, dynamic loads. The Armored plates are welded over the structure to form a cabin.

The vehicle has four axle rows with constant drive of all axles. When overcoming difficult terrain you can use a system which enables, during the driving, to alter (according to terrain character) the tyre inflation pressures.

The unique conception of a four-axle vehicle with a central back-bone tube and independently sprung half-axles and air-cooled engine allows driving in the rough terrains and various climatic zones; with a temperature ranging from – 40 °C up to + 55 °C.



**Figure 1 BEML High Mobility Vehicle 8x8**

The vehicle body consists of:

- Cabin for driver, Co Driver, 2 nos. emergency seats and 2 berth type seats ,one over the other behind Driver & Co driver seat.
- Vehicle platform body

Refer Appendix C for installation dimensions.

To the front frame there is attached an all-metal two-door tilting cabin for driver and crew. In the cabin roof there is a tilting rectangular hatch / manhole. The cabin is locked in the

driving position by a system of levers controlled from the LH side of the vehicle. The tipping of the cabin (after unlocking) is done with the help of a hydraulic cylinder and hand pump located on the LH side behind the driver's cabin. The driver and co-driver's seats are adjustable. There are two emergency seats for two persons and this seat is fitted with lap belts. Cabin should be provided with HVAC (Heating ventilation air conditioning system) and vaporization vents on the FRP dash boards.

During the driving all crew including driver and Co driver must be tied with safety belts. On the instrument panel, firmly connected to the cabin front wall, there are check instruments and elements serving for the vehicle control.

## **2. SCOPE OF WORK:**

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Development of Armored Driver's cabin for BEML High Mobility Vehicle 8x8, Fabrication, Pre-treatment, CED dip paint & top coat, Furnishing of cabin aggregates with BEML supplied Free issue materials, Interior ABS Trims, Installation and internal testing. Details for scope ref. Appendix-E

## **3. CABIN STRUCTURE:**

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The cabin shall have all driving controls on right hand side, made from hollow structural steel with Tubes and Hat cross section, drop down cab type with two doors and on front wind shield partitioned in the centre. Driver cabin should be equipped with Armored glass for the following places:

- a) Driver Cabin Front Windshield ( LH and RH)
- b) Driver / Co Driver Door Fixed Window glass - single piece each

Technical requirements of armored glass is enclosed in Appendix B.

Front structure, Side structure LH & RH & Roof structure of the cabin should be provided with provision for cladding the outer surface with armored steel sheets so as to withstand blast pressure upto STANAG Level 1. Supplier has to obtain confirmation from BEML finalizing the technical details of armored steel plates to be used on the cabin shell for cladding. Strengthened cabin to withstand blast pressure & Temperature of exhaust gases from Muzzle of BARREL.

Cabin structure should be covered with armored sheet of 6 mm\* (approx) on all surfaces (Front, rear, side wall, top, doors). Cabin floor structure and

engine tunnel should be covered using Galvanized carbon steel with extra deep draw of cold rolled /hot rolled sheets of 3 mm (approx) thick.

The cabin is sealed against entry of dust and is to be waterproof, with shower test, as per IS:11865-2006.

The cabin should be tested to withstand 1000 hours salt spray life as per ASTM: B117

The detailed arrangement is as shown in Dwg No: 459 CA 02014

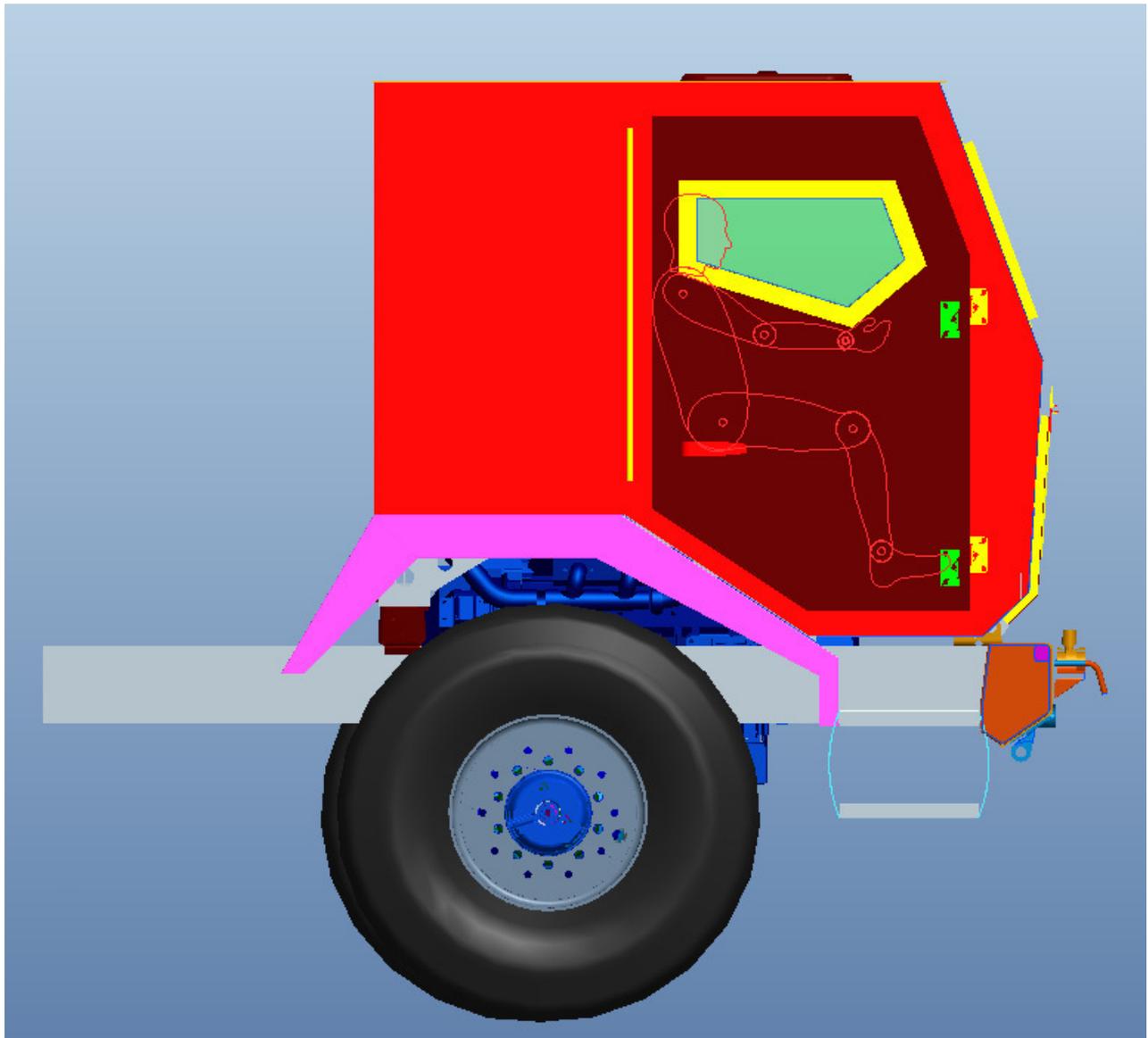


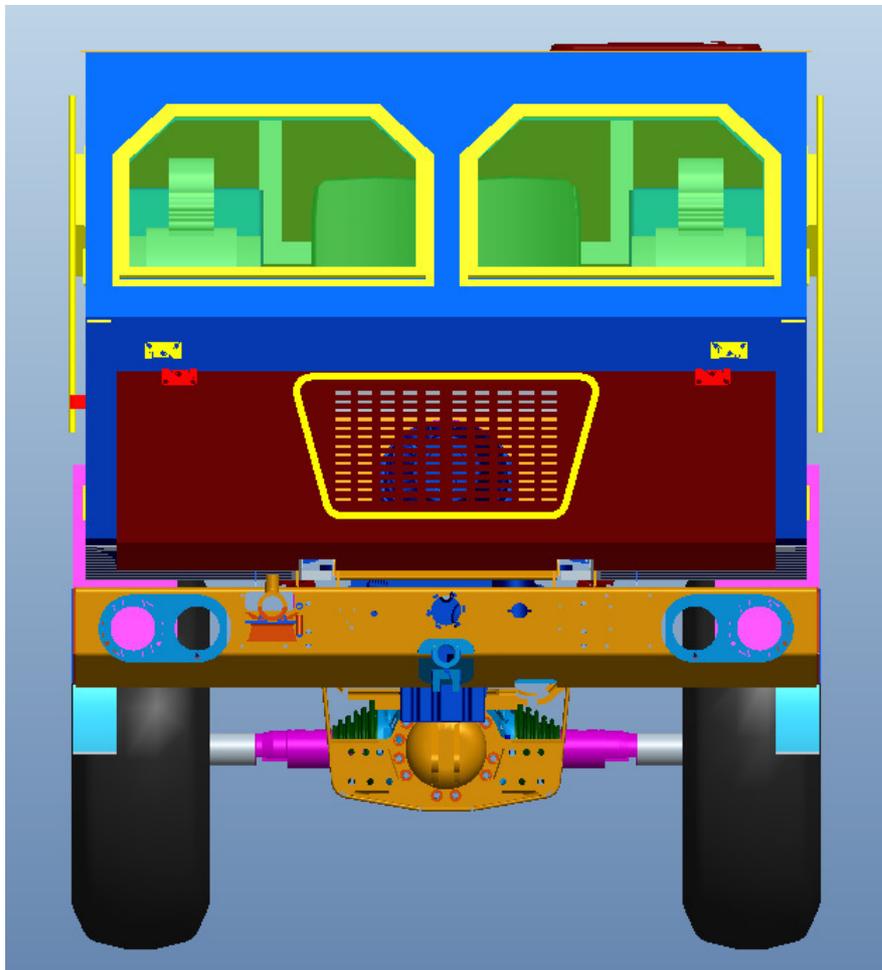
Figure 2 Side View of Cabin

Drivers Cabin should be provided with 2 doors for the entry and egress of following members

- A. Driver
- B. Co Driver

Each Door should be equipped with major items having following features

- Armoured glass
- Suitable door locking mechanism as per CMVR requirements
- Handles on the door for Firm Holding
- Door Hinges as per CMVR requirements
- Suitable sealing on the door panel to prevent water ingress, dust ingress
- Inner surface of the door to be provided with ABS trims and suitable sound / vibration damping materials.



**Figure 3 Front View of Cabin**

The corner fastenings of the front glass are protected with strips against possible damage due to branches of trees. The cabin is sealed against entry of dust and water. There are two hinged sun visor screens on top of the front glass for screening against sunlight.

There is a manhole in the roof which could be closed. The lid of the manhole is held against a spring stop in the open position and clamped by a bolt in the closed position.

#### 4. CABIN MOUNTING:

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- a) Mounting of the swing cabin onto the frame is done using sleeves in the front and prismatic rubber at the rear. Clamping of the cabin in the running condition is done by a control mechanism from the left side.
- b) The detailed front mounting as shown in Dwg No: 459 CA 02014
- c) The cab lock release mechanism has to be of mechanical linkages arrangement (Tie-rod & Lever to secure the Cabin). Hydraulic system for tilting mechanism of the cabin and Cabin mountings with lock arrangement to be provided.

#### 5. CABIN INTERIORS:

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- a) FRP Dash board - Supplier to manufacture FRP dash board with HVAC vents  
Supplier to make the necessary cut-outs in FRP dash board to mount the accessories. BEML will provide reference 3D Model of dashboard during design stage.



**Figure 4 FRP Dash board**

- b) Engine tunnel profile and dimensions of the existing arrangement is to be provided as given in fig shown below. Detailed rear cutout for engine profile as shown in Dwg No: 459 CA 02022.
- c) The tunnel bottom is to be covered with thermal insulation of 40 mm thick placed between external & internal panels. The stowage provision to be provided below sleeper berth.
- d) The Gear Shift Lever (GSL) - (BEML Free issue item) is to be mounted on the engine tunnel as shown in fig below.



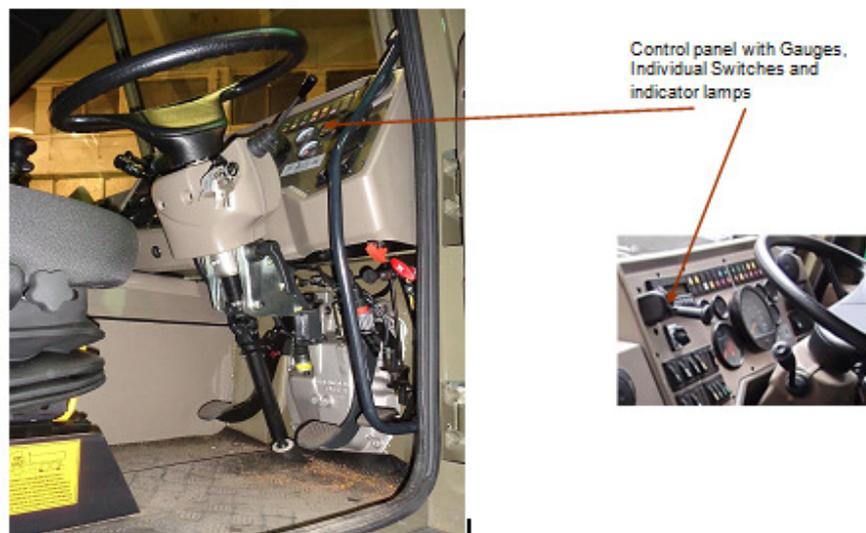
**Figure 5 Gear Shift Lever (GSL)**

- e) The cut out details for GSL on engine tunnel as shown in Dwg No: 459 CA 02022
- f) High & low speed gear pre selector (BEML Free issue item) switch should be fitted on the dashboard suitable cut out and mounting arrangement to be provided by supplier.
- g) The parking brake and controls (BEML Free issue item) for drive selection has to be placed on the tunnel (driver side) as shown in fig below: suitable cut out and mounting arrangement to be provided by supplier.



**Figure 6 Parking brake and controls for drive selection**

- h) Individual switches (BEML Free issue item) have to be provided in dashboard for drive selection as shown in fig below. suitable cut out and mounting arrangement to be provided by supplier.



**Figure 7 Dashboard with control panel**

- i) The sleeper berth with minimum cushion., one over the other behind driver & co - driver to be provided. Positioning of berths will be finalized by BEML & supplier in the detail design stage.
- j) HVAC system requirement : The cabin should be capable of reducing the temperature by at least 15°C from the ambient temperature of 40-45°C and

increasing by at least 15°C from the ambient temperature 0-15°C up to a minimum period of three hours

- k) Integrated pedal unit with pendantal type to be provided by supplier as per CMVR norms



**Figure 8 Controls of various systems**

- l) Supplier to provide Wind screen washer tank (5 ltrs capacity) , which shall be mounted on the LH side floor panel (near co-driver leg room).
- m) Provision to be made for storing of first aid box, fire extinguisher bottle inside the cabin

#### **Front Cowl:**

- n) Covering front bonnet cover with Meshing cut for cooling air of engine.
- o) Mechanical linkage with release handle above accelerator pedal shall be provided for bonnet / hood release mechanism.
- p) The systems & accessories mounted inside the front cowl are shown in pictures below:



**Figure 9 System & accessories mounted inside the front cowl**

- q) Oil heating equipment (BEML Free issue material) ,supplier to provide mounting provision..
- r) Hinged front cowl to be provided with mechanical stay to facilitate working on the front mounted equipments

**Roof hatch:**

- s) The roof hatch has to be of rectangular in shape placed above co-driver seat as shown in fig below: (Shape can be finalized during detailed design)



**Figure 10 Roof hatch**

- t) The detailed roof hatch cutout details as shown in Dwg No: 459 CA 02022
- u) Tubular Structure with cladding sheets to be provided.
- v) Hard board with 6mm thick / ABS trims to be provided.

- w) Roof hatch to be provided with spring loaded pull type lock for closed condition..
- x) A handle to be provided for roof hatch open & close operation.

## **6. DRIVER'S SEAT :**

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The driver's seat (BEML Free issue Material) as shown in fig. below, is of adjustable according to the driver's requirement and is adjustable in forward - Reverse, Top - Bottom directions. Driver's seat is capable of being adjusted in height (+/- 100 mm) as well as horizontally (+/- 100 mm) as per leg length of the driver. Supplier to provide suitable mounting provision in the cabin to assemble Driver & Co -driver seat. Two seater crew seats (BEML Free issue Material) with leather upholstery with safety belts are to be fitted over engine cover.

Supplier to make the mounting provisions for assembling crew seats.

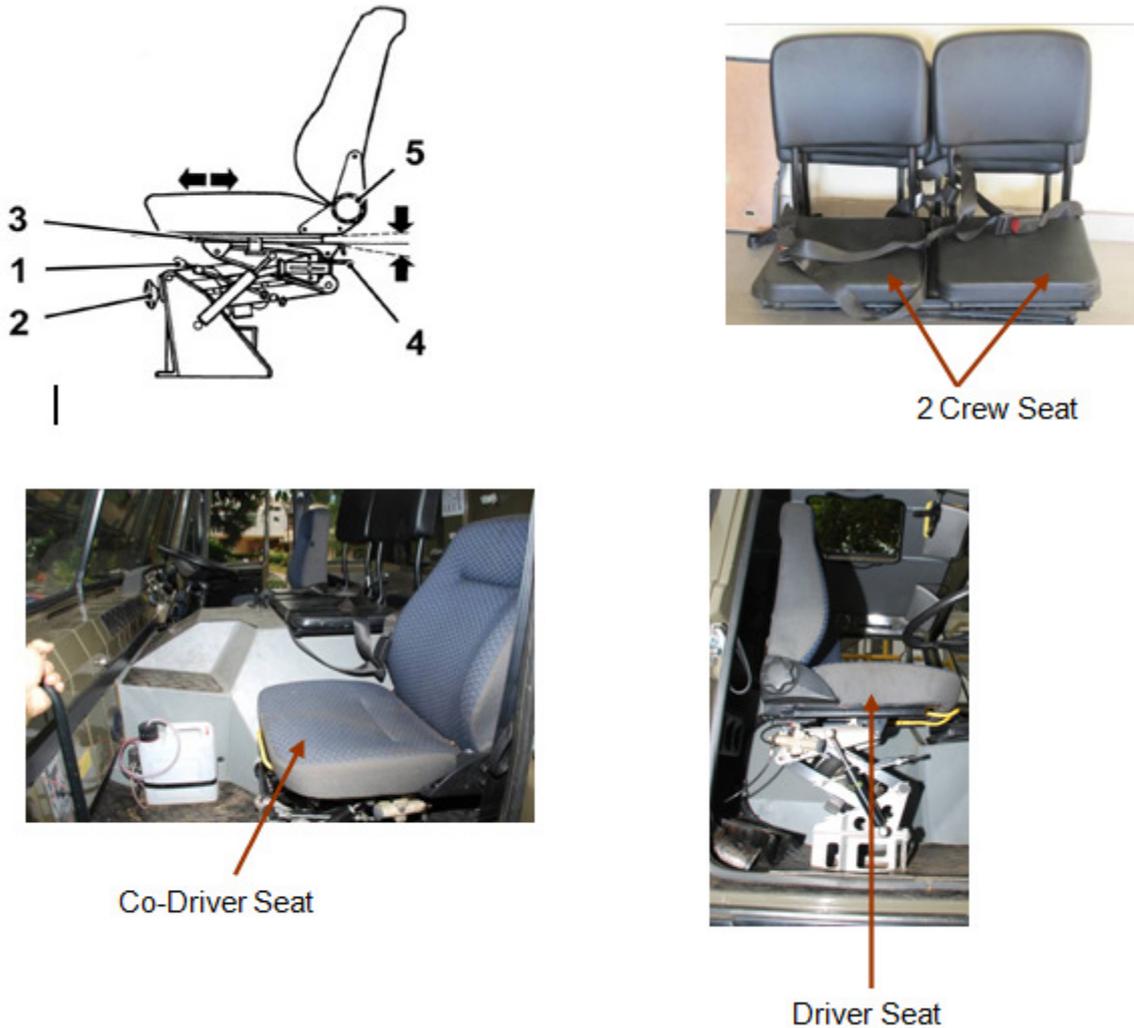


Figure 11 Seats

## 7. CABIN FITMENTS & ACCESSORIES:

### LH/RH Side Fitments:

- Rigid type handles shall be provided on "A" & "B" pillars for ingress driver & crew members, meeting the CMVR requirements.
- A suitable insulation shall be added between outer skin & interior ABS trim.

### Bulk head & Front Panel Fitments:

- Engine idle speed and engine shut off lever (BEML Free issue material) has to be fitted on the dashboard. Supplier to make suitable cutout & mounting arrangement.

- d) The steering column assy (BEML Free issue material) - Supplier to make suitable cutout & mounting arrangement.
- e) The column is to be fitted with a steering wheel (BEML Free issue material) of diameter 500 mm.
- f) Single Lever combination switches(BEML Free issue material) to be used as shown in fig below:



**Figure 12 Steering Wheel and Single Lever combination switches**

- g) Two numbers of windshield wipers with two speed controls & linkages shall be provided to suit armour glass.
- h) Two handles to be provided on cabin front end for windshield cleaning.
- i) Engine oil temperature dependent heater (BEML Free issue material) to be used - Mounting provision to be provided by supplier.

### **Roof Fitments:**

- j) A search light (BEML Free issue material) has to be fitted on the roof of cabin - supplier to provide mounting provision.



**Figure 13 Search light fitted on cabin roof**

- k) Two beacon lamps (BEML Free issue material) with metal guards to be provided diagonally at RH front corner & LH rear corner. supplier to provide mounting provision



**Figure 14 Beacon lamps with metal guards fitted on cabin roof**

- l) Two handles are to be provided inside the cabin on the roof for use by the crew members seated on the Co Driver seat.



**Figure 15 Handle location inside the cabin roof**

- m) Bracket to be provided for air intake mounting - BEML will provide the requisite details during manufacturing stage.
- n) Stopper (rubber & strip) to be provide to lock hatch during fully open condition.
- o) LMG Gun Mount provision to be provided on top of roof near the hatch- Reference drawing will be shared by BEML during fabrication.

#### **8. OTHER FITMENTS:**

- a) Roof lighting (BEML Free issue material) to be placed on top of right door. Supplier to provide mounting provisions



**Figure 16 Roof lamp**

- b) LH & RH direction indicators (BEML Free issue material), two on the sides and two on the front hinged cowl to be provided meeting CMVR norms



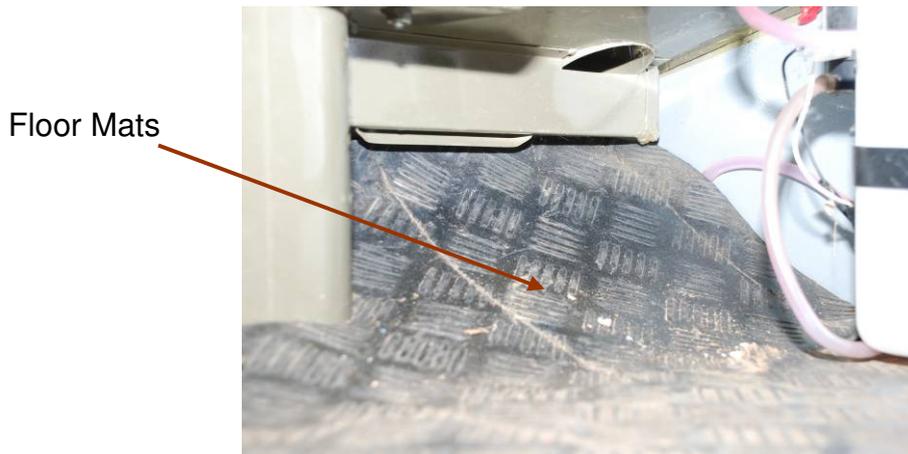
**Figure 17 Direction indicators**

- c) Control Unit with knobs (BEML Free issue material), for the operation of centralized tyre inflation system (CTIS) should be provided on the panel to LH side of Driver, for the inflation/deflation of tyres from the driver cabin.- Supplier to make suitable cutout & mounting arrangement
- d) Adjustable rear view mirrors to be provided on both sides.
- e) Control Unit with knobs for the operation / engagement of Axle differential lock and Inter-axle Differential Lock (BEML Free issue material)to be provided on the panel to LH side of Driver. Supplier to make suitable cutout & mounting arrangement
- f) Exhaust Brake engagement lever (BEML Free issue material)should be provided near the driver's seat. Supplier to make suitable cutout & mounting arrangement
- g) Electric horn, Head lamp with leveller, side direction indicators, Wide angle & proximity mirror (BEML Free issue material) etc., should be fitted. Supplier to make suitable cutout & mounting arrangement.

## **9. CABIN INSULATION:**

The floor of the cabin is plain and made of steel plate with internal anti-vibration isolation, and rubber matting. External surface of the floor is also provided with anti-vibration coating. Holes for draining of any water that may enter are provided on the front part of the floor along with rubber plugs for closing the same.

Parts of the floor of the driver's cab form the cover for the engine. On the outer surface of the cover away from the engine thermal and sound insulation is stuck—on, in the front portion and is held in position by punched plate.



**Figure 18 Floor Insulation**

The floor mats are of 3 piece construction to be provided with 10 mm thick insulation. Regin to be used with paste to fix the floor mat on the tunnel surface. Also, rubber sheets with anti skid surface have to be pasted in emergency seat leg room.

## **10. DIMENSIONS OF CABIN:**

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Main dimensions and weight for cabin are indicated below for ref.

Length	:	2410 mm
Width	:	2400 mm
Height	:	1800 mm
Weight	:	1650 ± 5% kg

The dimensional details of cabin as shown in Dwg No: 459 CA 02014

### **a) ELECTRICAL AND ELECTRONIC SYSTEMS:**

Details are enclosed in APPENDIX - D.

### **b) PAINT DETAILS:**

Pre treatment CED painting and top coat painting as per CSN 5450 KHAKI.

Colour Type: AKRYL LV EM 020 - SYMPO, Minimum thickness 55 microns.

**c) SHOWER TEST:**

Shower test for Cabin to be conducted as per IS: 11865-2006.

**d) PACKING & FORWARDING:**

The cabin assy. shall be packed to withstand transit damages.

**e) CAUTION ON STORAGE:**

Cabins must be stored in covered areas or alternatively by tarpaulin covers on the product. In the storage area, there must not be any large storage of acids or other harmful materials which cause corrosion.

**11. ACCEPTANCE CRITERIA:**

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The stage inspection & acceptance of Cabin assembly will be carried out in two stages as per mutually agreed ATP as indicated below:

- a) Stage inspection: Cabin structure will be inspected as per the approved drawing. Welding checks, Inspection measuring fixtures and DPT Test report to be submitted.
- b) BEML team & Inspection agency will participate and witness the Factory Acceptance Test (FAT) at Supplier premises, before dispatch.
- c) Cabin will be integrated on 8x8 truck chassis at BEML premises. The inspection checks & performance evaluation by road trials will be carried out.
- d) Developed Driver's Cabin will be checked by jointly by BEML Team as per Provisional Acceptance Test Plan Doc No. **BEML/GAT/RD/MGS/A-CAB/ATP/003**, **Rev 01 dt: 25.04.2020**. During inspection if any failure occurs, supplier should carry out Rectifications / Modifications to address the failure and meet the technical requirements.

## 12. WARRANTY:

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The supplier shall be responsible for any defect or failure of components of cabin due to defective design, material or workmanship for a period of 24 months from the date of acceptance of the cabin.

The repair and/or replacement of failed components and equipment and installation of repaired/replaced components/equipment shall be taken by the supplier on his own charge at the Site.

The supplier shall bear custom duty, freight charges and all other expenses involved in collection of defective components and equipment from the Site, and transportation to the manufacturer's works in India and its return to site after repairs.

Further, should any design modification be required to any components or equipment as a consequence of failure analysis, the period of 24 months shall recommence from the date when the modified part is commissioned into service and modification shall be carried out free of charge.

The supplier shall carry out all replacement and repairs under the warranty promptly and satisfactorily on notification of the defect by BEML.

## 13. SCOPE OF SUPPLY:

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- a) Supplier has to quote for
  1. Furnished cabin (with BEML supplied FIM & supplier sourced accessories ) **with** armored sheets.
  2. Furnished cabin (with BEML supplied FIM & supplier sourced accessories ) **without** armored sheets.
- b) On receipt of PO, Supplier has to acknowledge and come out with an action plan for execution of the work involved with timeline.
- c) BEML will provide the conceptual design of Cabin structure in 3D model format in STEP / IGES with GA drawing in AUTOCAD / PDF format.
- d) BEML will provide most of the accessories as free issue material (FIM). However there are some accessories ,which supplier needs to be procured. These accessories should meet CMVR norms / test report / test approval certificate /Conformity of Production (CoP) ,and before procurement BEML approval should

be taken. The details of BEML supplied FIM & supplier sourced accessories are listed in work scope matrix APPENDIX - E

- e) Supplier has to provide work status report covering the development aspects, manufacturing activities on monthly basis.
- f) Firm has to execute detailed design (finalizing design of front structure, rear structure, side structure, cabin floor structure, roof structure) based on the conceptual model in 3D CAD in neutral format provided by BEML. At the end of the design, Firm has to provide finalized.
  - General arrangement drawings with details of Cabin structure with BOM
  - Details of Armored steel to be used on the Cabin structure
  - Details of hollow / square / rectangular structural steel tubes with cladding of armored sheet to be used on the Cabin welded structure
- g) BEML will review the drawings and provide feedbacks & clearance for manufacturing.
- h) Supplier has to integrate the Cabin aggregates on the cabin structure and will be responsible for functional demonstration of cabin functionality.
- i) One no. Driver's Cabin (with interior seating, accessories etc) will be installed on BEML HMV 8x8 vehicle. Functionality to be demonstrated.

#### 14. PROJECT SCHEDULE:

The delivery of cabin should complete within **SIX** months from the date of release of PO: The activities to be completed in three phases as given below.

	Details of activities	Duration
Phase 1	Design stage <ul style="list-style-type: none"> <li>• Completion of Manufacturing drawings and vetting with BEML</li> </ul>	1 Month

	<ul style="list-style-type: none"> <li>• Procurement details of accessories and submission to BEML for approval</li> </ul>	
Phase 2	Fabrication stage <ul style="list-style-type: none"> <li>• Assembly of frame structure</li> <li>• Cladding of armored material</li> </ul>	Four Months
Phase 3	Integration & Inspection stage <ul style="list-style-type: none"> <li>• Integration of accessories (BEML supplied FIM &amp; supplier sourced) in the cabin.</li> <li>• Factory Acceptance Test</li> </ul>	1 Month

**15. PROJECT DELIVERABLES FROM SUPPLIER:**

- a) Cabin assembly, qty as indicated in the SO.
- b) Inspection & testing of cabin to be carryout at supplier premises.
- c) Reports of the Factory Acceptance Test (FAT) and check sheets to be provided along with the supply.
- d) Material Certification and amoured glass documents to be provided along with the supply.
- e) COC for HVAC system.
- f) One set of soft copy and hard copy of all above documents to be provided.

Sl No.	BEML P/N	Description
1	459 CA 02014	Assy Armored Driver Cabin for BEML HMV 8x8 (RHD) for MGS project

# APPENDIX - A

## **TECHNICAL INFORMATIVE DATA ON BEML HIGH MOBILITY VEHICLE 8X8**

### **a. Cabin Dimensional Data:**

#### 1. Main dimensions and weight for Cabin:

- a. Length - 2410 mm
- b. Width - 2400 mm
- c. Height - 1800 mm
- d. Weight of outfitted cabin - 1650 kg  $\pm$  5%

### **b. Technical data on Bulbs & Fuses of Electrical system:**

Details enclosed in APPENDIX - D

# APPENDIX - B

## Technical Requirements of Armored Glass

1. Driver cabin should be equipped with Armored glass for the following places:
  - a) Driver Cabin Front Split Windshield ( LH and RH)
  - b) Driver, Co Driver Door Fixed Window glass - single piece
  - c) Side and Rear Wall Fixed Window glass
2. Before finalization of glass requirements supplier has to take drawing approval from BEML.
  - a. The blast resistant glass shall meet clause D3 with DIN standard 52290 PART 3 / equivalent IS.14443.1997. meeting STANG Level 1
  - b. The approx. overall size of glass should be 755 x 565 x 25 thk (mm)
  - c. The safety glass as per IS:2553 PART 2
  - d. Edge grinding as per SAE J6738 TYPE 4
  - e. Test reports as per above glass standard
3. Proper sealant to be used to fix the glass to frame ensuring water leak proof & vibration resistant.
4. The detail specification of the sealant TERSON PU 8590 UHV-MT,
  - a. Colour - black
  - b. Density - 1.27 g/cm<sup>3</sup>
  - c. Shore hardness - approx. 60
  - d. Tensile strength - approx. 7 MPa
  - e. Elongation at break - approx. 350%
  - f. Shear modulus g<sub>10</sub> - approx. 1.5 MPa
  - g. Shear strength - approx. 5 mpa
  - h. Recommended application temperature : -15° C to 45° C

# APPENDIX - C

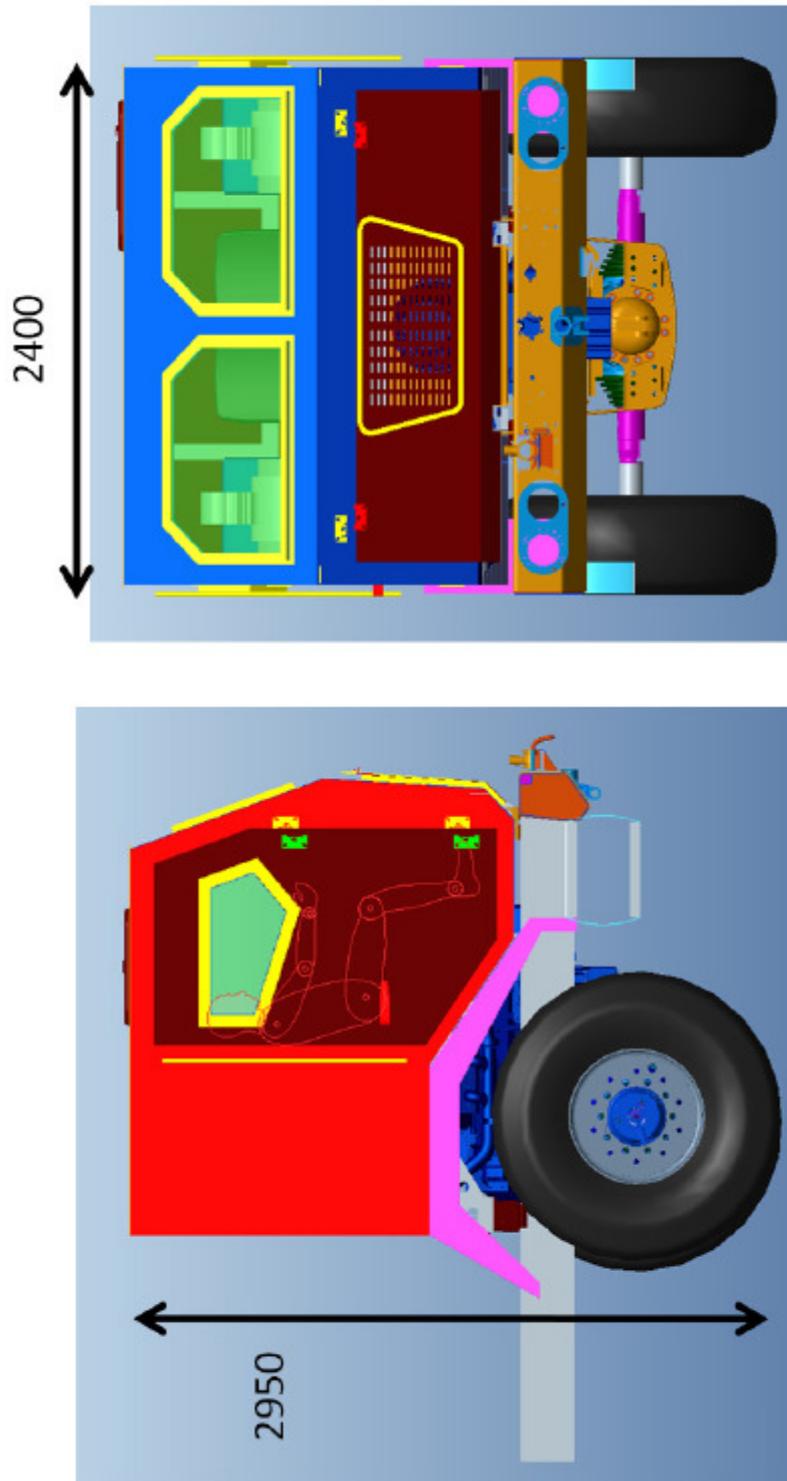


Figure 19 General Arrangement of Armored Drivers Cabin

# APPENDIX - D

## Electrical and Electronics system:

### Electric equipment

#### Parameters of electrical equipment

Nominal voltage	24 V
Battery ground	negative pin
Electromagnetic interference	ECE R10
Batteries	two 12 V, connected collaterally, 180Ah
Alternator	28 V/120 A
Battery disconnect switch	at battery + pole

#### Mains outlets and sockets:

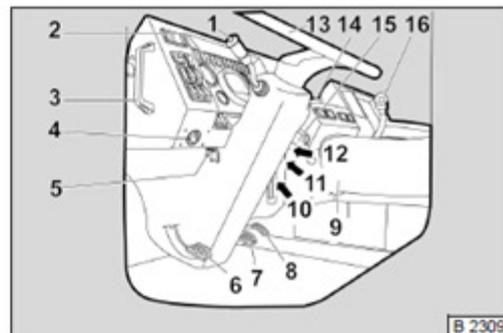
- 7-pin 24V electric socket, VG 96923, NATO at front one & rear two pieces
- Slave-start socket ZAB under bonnet
- Cigarette lighter 24V in cab
- Remote battery master switch at the dashboard.
- 2-speed wipers with interval mode
- Standard lights with front and rear fog lights
- Grid protection of main headlights and turn indicators on cab
- Two beacons and search light on cab roof
- Electrical speedometer
- Instrument panel of instruments illuminated, switches and indicators according to the chassis functionality.

## Driver's cab

### Driver's cab interior

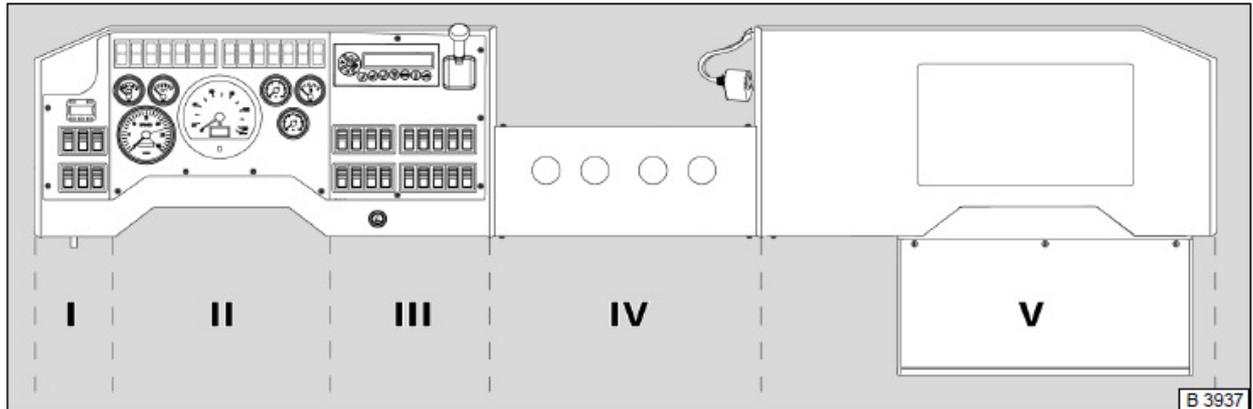
For layout of basic controls in the cab see the figure:

- 1 - combined switch
- 2 - instrument panel
- 3 - handle
- 4 - not occupied
- 5 - battery disconnecter for vehicle
- 6 - clutch pedal
- 7 - service brake pedal
- 8 - accelerator pedal
- 9 - seat
- 10 - steering wheel height setting handle
- 11 - tie-rod to stop the engine manually,
- 12 - handle to adjust the engine idle speed
- 13 - steering wheel
- 14 - exhaust brake control lever
- 15 - emergency and parking brake lever
- 16 - gearshift panel - gearshift lever



Driver's cab interior

## Instrument panel



Instrument panel

The instrument panel shown on the figure is in full outfit including all instruments, controllers, switches and indicator lamps and for that reason the instrument panel in your vehicle may be different from that.

### The instrument panel is divided in five parts:

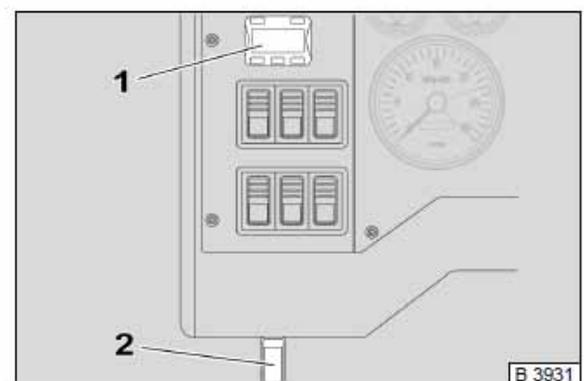
- I. Left part of main instrument panel - controllers and switches
- II. Main instrument panel - instruments, controllers and indicator lamps
- III. Right part of main instrument panel - instruments, controllers, indicator lamps, sockets and parking brake
- IV. Central part instrument panel - map reading lamp
- V. Right part of instrument panel - fuse box and power unit panel

### Left part of instrument panel - controllers (part I)

- 1 - Independent diesel heater timer
- 2 - Battery disconnecter for vehicle

#### Note:

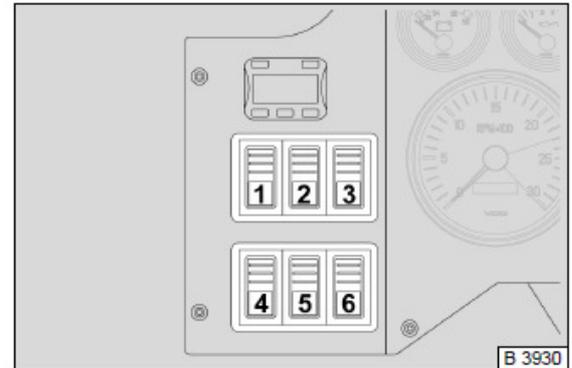
Separate Operating Instructions for the independent heater are attached to the vehicle documentation in the cab.



Left part of instrument panel  
- controllers (part I)

**Left part of instrument panel - switches (part I)**

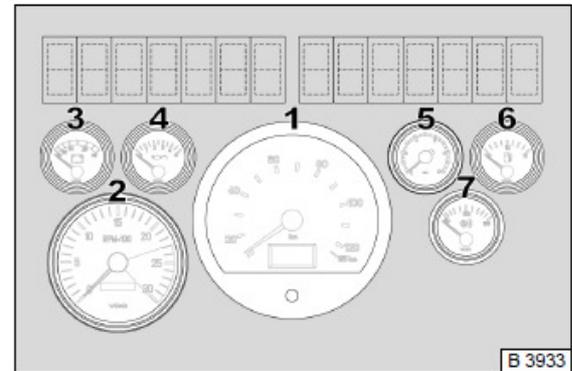
1.  Not occupied
2.  Not occupied
3.  Front fog headlamp c/w indicator lamp (green)  
Can be switched ON with the headlamps ON only.
4.  Master lighting switch (green)  
Position 0 - OFF  
Position I - parking lights  
Position II - main headlamps
5.  Upper (front auxiliary) headlamps c/w indicator lamp (yellow)  
Illuminates when the switch 4  is ON.
6.  Convoy lamps switch c/w indicator lamp (green)  
Position 0 - Normal lights ON (civil - legislative lights ON).  
Position I - Military lights ON (all civil lights OFF).



Left part of instrument panel - switches (part I)

**Main instrument panel - instruments and controllers (part II)**

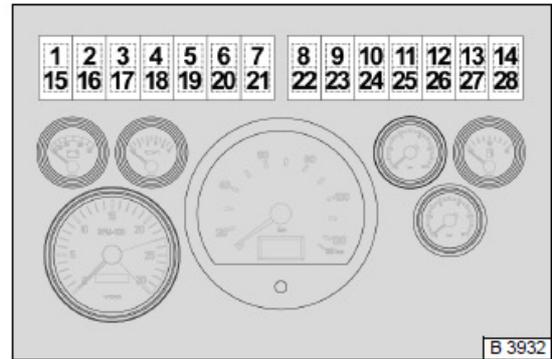
- 1 - **Speedometer**  
Indicates vehicle travelling speed and total kilometres travelled on vehicle
- 2 - **Tachometer**  
Indicates engine operating speed (rpmx100) and total operating time (hours)
- 3 - **Voltmeter**  
Indicates state of charge of batteries and voltage level in 24 volt system.  
Operating voltage is between 24V and 30V.
- 4 - **Engine oil pressure gauge**  
Indicates engine oil pressure.  
Engine oil pressure gauge with signal lamp to indicate minimum oil pressure
- 5 - **Vehicle double air pressure gauge**  
Indicates the air overpressure in the brake system  
The red pointer indicates the air overpressure in the circuit of rear axles while the white pointer indicates the air overpressure in the circuit of the front axle
- 6 - **Fuel gauge**  
Indicates amount of fuel in fuel tank
- 7 - **Tire inflation pressure gauge**  
The pressure gauge for inflation front and rear axles tires.



Main instrument panel - instruments and controllers (part II)

Main instrument panel - indicator lamps (part II)

1.  Not occupied
2.  Not occupied
3.  Not occupied
4.  Not occupied
5.  Not occupied
6.  High beams (blue)
7.  Vehicle direction indicators (green)
8.  Trailer direction indicators (green)



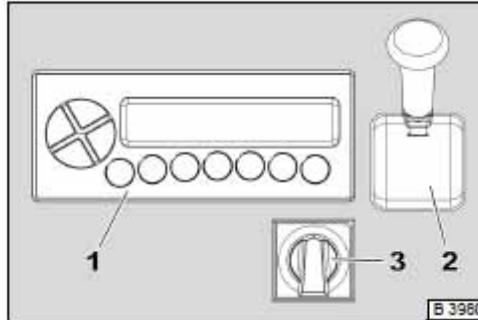
Main instrument panel - indicator lamps (part II)

9.  Axle differential lock (green)
10.  Front axle drive and inter-axle differential lock (green)
11.  Not occupied
12.  Not occupied
13.  Not occupied
14.  Not occupied
15.  Not occupied
16.  Not occupied
17.  Air cleaner (white)
18.  Engine pre-heating (yellow)  
Engine pre-heating is activated.
19.  Charging - failure (red)
20.  Engine lubrication (red)  
Insufficient engine lubrication.
21.  Engine overheating (red)
22.  Engine failure (red)
23.  Minimum fuel level (yellow)
24.  Cab tilting (red)  
Cab not fully in driving position - partially tilted. Cab is not ensured.
25.  Low air pressure in both service brake circuits (red)
26.  Low air pressure in the emergency brake circuit (red)
27.  Parking brake - activated (red)

28.  Not occupied

Right part of main instrument panel (part III) - instruments and controllers

- 1 - Climate control panel
- 2 - Parking brake
- 3 - Winch switch



Right part of main instrument panel - instruments and controllers (part III)

Central part instrument panel (part III) - sockets

- 1 - 24V/10A socket - cigarette lighter   
 For use e.g. for cigarette lighter or portable beacon.



Central part instrument panel (part IV)

Right part of main instrument panel (part III) - switches and indicator lamps



Right part of main instrument panel - switches and indicator lamps (part III)

1.  Front and rear axles tires inflation, underinflation (yellow)  
 Lower position - tire inflation  
 Upper position - tire underinflation
2.  Not occupied
3.  Not occupied
4.  Rear working lamp c/w indicator lamp (yellow)  
 Position 0 - OFF  
 Position I - lights ON  
 Illuminates when the switch 4  is ON (position I).
5.  Service brake indicator lamp bulb 25 check button (green)  
 a) Test of minimum pressure in brake system indicator lamp - the TEST switch to check the bulb in the indicator lamp 25  check button (green)
6.  Low range switch in transfer case (green)  
 The switch has three positions.  
**WARNING! Engage in a chassis at rest only, with parking brake engaged.**  
 Position I - quick gear (hare)  
 Position N - neutral  
 Position II - slow gear (turtle)
7.  Electric fuel delivery pump c/w indicator lamp (white)
8.  Fuel pre-heating c/w indicator lamp (green)
9.  Ceiling light (green)  
 Position 0 - Off  
 Position I - On with door open  
 Position II - On with door closed
10.  Axle differential lock (green)

- 11.  Front drive and inter-axle differential lock control switch (green)
- 12.  Not occupied
- 13.  Not occupied
- 14.  Not occupied
- 15.  Not occupied
- 16.  Exhaust brake (green)  
Exhaust brake switch depending on the service brake.
- 17.  Beacon c/w indicator lamp (yellow)
- 18.  Warning lights c/w indicator lamp (red)

**Right part of instrument panel (part V)**

- 1 - Fuse box cover
- 2 - Power unit cover

**Fuse box**

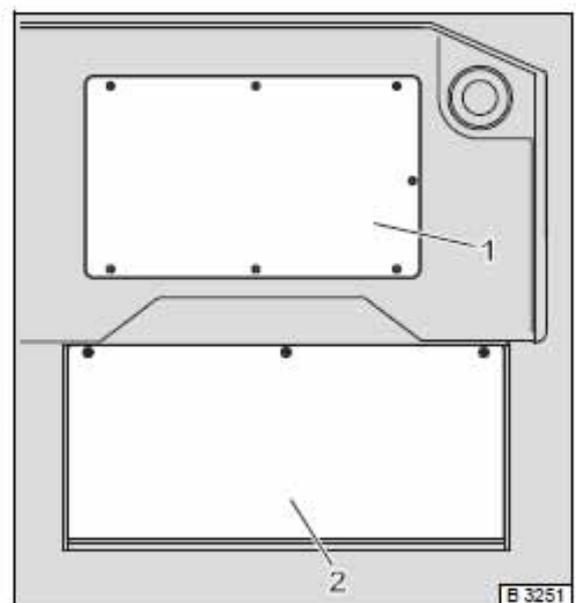
The electric circuits of the vehicle are secured with fuses, relays and diodes located on the fuse box under the fuse box cover 1.

The fuse box 1 is accessible after unscrewing four screws.

**Power unit**

The following is located in front of the passenger seat, at the instrument panel bottom under the cover of the power unit 2.

The on-vehicle power unit is accessible after unscrewing three bolts.



Right part of instrument panel (part V)

#### Push switch with a lock button

Some functions use push switch with a lock button, which need to be unlocked both in order to activate switch.

Legend for Fig. 5-25:

1 - blocking button

2 - switch

A, B - position of the switch

#### Switch activation

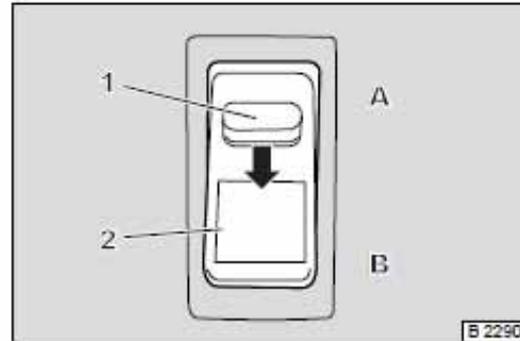
- Press blocking button 1 down and press switch part B.

#### Switch deactivation

- Press switch part A only. Press switch 2 in position A and the switch returns to the home position.

#### WARNING!

Unless these instructions are followed, the switch will be destroyed.



Push switch with a lock button

#### Battery disconnecter

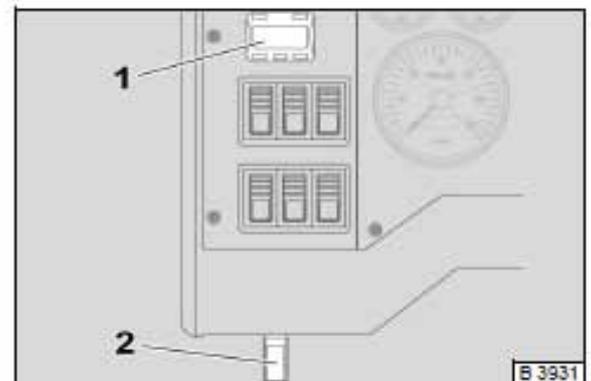
The battery disconnecter is a device designed to disconnect the batteries from the electrical system when putting the vehicle out of operation.

Battery disconnector is located in the cab under the instrument panel, to the left from the steering wheel shaft. Switch ON-OFF the battery disconnector.

It serves for battery disconnect when driver leaves the vehicle for long time to prevent battery discharge by some equipment forgotten switched on, or when repair at electric installation is carried out.

When the battery disconnector is turned off, the independent hot-air heater control panel remains energized and tachograph.

Battery disconnect should not be performed prior to 80 seconds following a key-off (engine stop).



Location of battery disconnecter

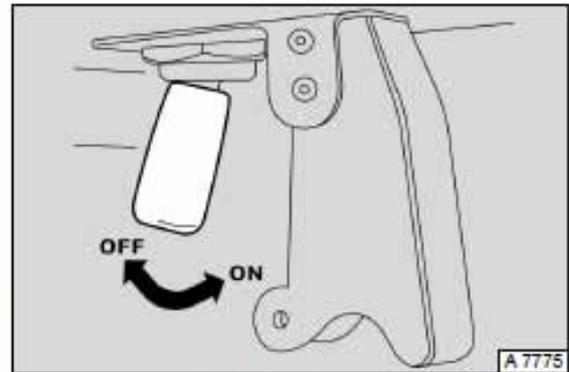
**WARNING!**

While towing the vehicle, never leave the ignition key in the STOP position!

**WARNING!**

Never disconnect the batteries while the engine is running.

Always switch off the batteries when repairing or replacing some part of the electrical equipment. This will prevent a contingent short circuit in electric line during the assembly operations.



Battery disconnecter

**Fuses, relays and diodes**

Electric circuits are protected with fuses, diodes and relays.

**WARNING!**

The fuse box may only be fitted with specified fuses, diodes and relays. The manufacturer assumes no responsibility for defects caused due to a failure to fit elements or observe fitting of elements of specified values.

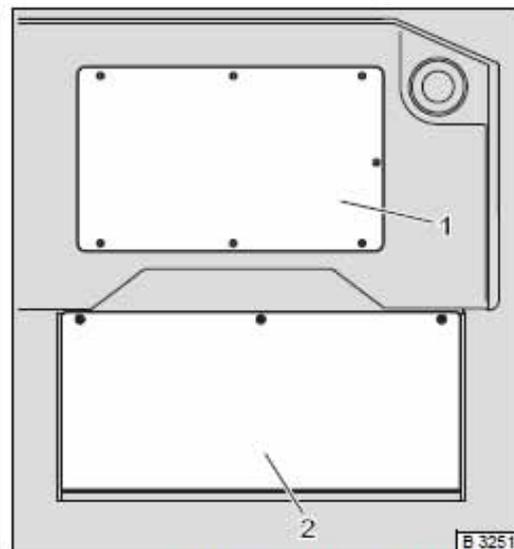
Possible malfunction of electric installation is indicated by a respective fuse (when blown). Replace a blown fuse after failure removal only with a fuse of the same current value as per the illustration located on the fuse box lid.

**Group of fuses, relays and diodes**

**Fuse box**

The group of fuses, relays and diodes is located in the fuse box 1 before the passenger instrument panel. The fuse box is accessible after unscrewing four screws.

For population of fuses, diodes and relays see the fuse box lid inside.



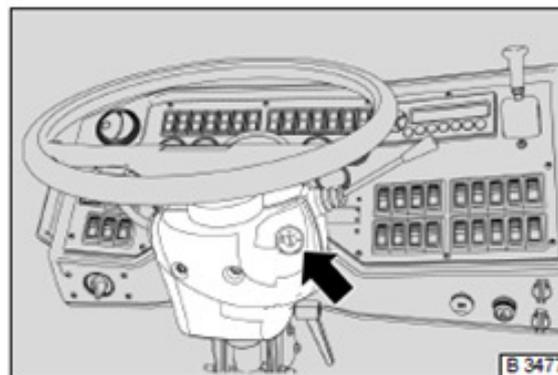
Right part of instrument panel (part V)

**Color marking of knife-blade-contact fuses**

Color	Value (A)
light brown	5 A
brown	7.5 A
red	10 A
blue	15 A
yellow	20 A
white	25 A
green	30 A

## Ignition box

- STOP** - Key take-out position and steering lock function.  
 The steering wheel is locked after removing the key.  
 The following is active in this position: vehicle illumination, warning lights, oil heater, brake lights and radio (where fitted).
- 0** - The steering lock cannot be open in this position.  
 If the key cannot be turned to this position, turn steering wheel slightly till the pawl is released.
- I** - Other electric circuits are ON
- II** - Engine start



Ignition box

Turning the key from position I to position 0 to stop the engine.

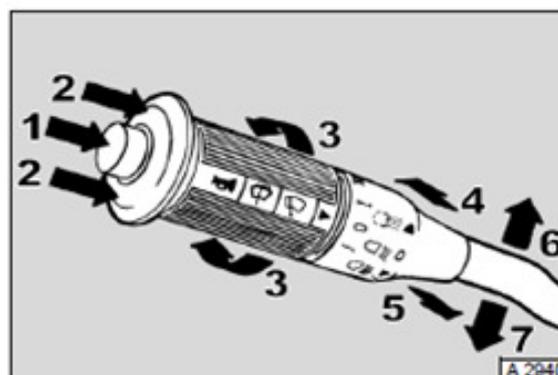
### WARNING!

When towing, never have the ignition key in STOP position! Locking of steering wheel may result in accident vehicle.

## Description of instruments and controls

### Combined switch

- 1 - Horn button** 
- 2 - Windshield washer button**   
 Push to turn the windshield washer pump ON.  
 Having been sprayed, the windshield will be wiped off by wiper blades automatically (in two cycles).  
 In order to ensure proper operation of this equipment even in winter, it is necessary to keep the spray nozzles free of snow or remove adhering ice with de-icing spray.
- 3 - Wiper switch**   
 Before operating the wipers in freezing weather for the first time, make sure the rubber wiper blades are not frozen to the windshield.
- 0 - OFF
  - I - low speed
  - II - high speed
  - J - wiper cycle control



Combination switch description

The intermittent wiping within the interval range from 0.5 to 60 second can be preset. Required wiping interval is achieved first by setting the switch to position J, the windshield will be wiped off once, then move the switch to position 0 immediately. Required wiper interval will correspond to the time that passed during moving the wipers switch to position J again.

- 4 - Change-over switch between high and low beam. Headlights are on after depressing the three-position switch 4 .

- 5 - Headlamp flasher 

By pushing the combined switch lever towards the steering wheel. Blue indicator lamp 6 is on. The switch lever shall return to the original position after releasing.

- 6 - Right direction indicator 

Permanent blinking to the right. Push the switch lever through the pressure point upwards into position 6. Green indicator lamp 7 is blinking.

When with trailer, green control lamp 8 is blinking as well. The switch lever shall return automatically into the original position after driving in straight direction.

- 7 - Left direction indicator 

Permanent blinking to the left. Push the switch lever through the pressure point downwards into position 7. Green indicator lamp 7 is blinking. When with trailer, green control lamp 8 is blinking as well.

The switch lever shall return automatically into the original position after driving in straight direction.



Left part of instrument panel - switches (part I)

#### Short blinking in the right/left

Push the switch lever in the required direction until the pressure point and hold.

Green indicator lamp 7 is blinking. When with trailer, green control lamp 8 is blinking as well.

After releasing the lever, it shall return to the basic position.

#### Control of main headlamp

##### Switch of main vehicle headlamps

By pushing the three-position switch 4  are turned on:

- Position 0 - OFF
- Position I - parking lights;
- Position II - main headlamps.

Then use the combined switch lever to switch over between the low and high beam lights.

In position II of switch 4 , you can switch between high and low beams using the combined switch lever (position 4).



Left part of instrument panel - switches (part I)

#### Control of upper (front auxiliary) lamps

##### Switch of upper (front auxiliary) lamps

Turn the switch 4  to position II. Press switch 5  to turn on the upper headlamps.

The indicator lamp located directly in the switch indicates the lamps switched ON.

### Control of front fog lamps

#### Switch of front fog headlamps

They are lighting when side marker lights are turned on and are switched on by the rocker switch 3 . The indicator lamp located directly in the switch indicates the front fog headlamps switched on.

### Turning the rear working lamp ON

The rear working lamp is designed to illuminate the area behind the vehicle.

To turn on the rear working lamp, push the switch 4  when the vehicle's external lighting switch 4  (position I - parking lights) is switched ON.

### Tachometer

With the engine running, the tachometer indicates the engine operating speed (RPM x100) and counts the total engine time (Hours). It contains colour zones that show the regime in which the engine works:

- A - economic mode - idle to covered engine speed 600 + 2.100 rpm.
- B - RED ZONE - overrun range - BE CAREFUL TO AVOID ENTERING THIS RANGE!
- C - Permissible speed range in which the engine brake can be applied: 850 + 2.100 rpm.

The engine can be operated at high idle without danger, but the engine should not be allowed to overspeed.

The engine can overspeed by downshifting or by going downhill. An overspeed can result in serious damage to the engine.

#### WARNING!

Correct gearshifting, brake application and driving should always be performed to keep the engine speed within the range so that speedometer hand never reaches the red zone to avoid overspeeding and subsequent damage to the engine.

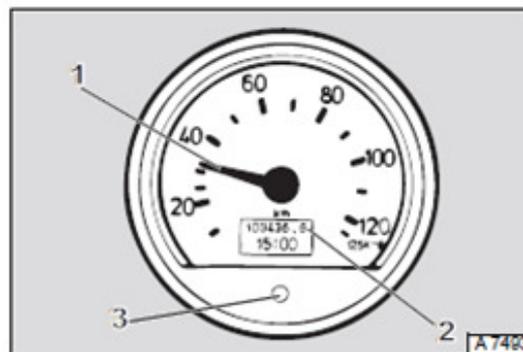


Tachometer

### Speedometer

Speedometer is a combined device recording the total and daily distance covered in kilometers and instantaneous speed in relation to time.

- 1 - Speed indication in km/h.
- 2 - Odometer  
 Numerical display shows total vehicle distance covered.  
 The first six numbers indicates kilometers, last number indicates hundreds of meters.  
 Either time or daily kilometers covered are shown in the lower part.
- 3 - Setting knob  
 With this knob you may do the following:
  - switch from the time mode to daily traveled kilometers;
  - set the time and day;
  - reset the trip computer.



Speedometer

### Activation of electronic indicator

The electronic indicator is active immediately after ignition turning-on:

- total kilometer reading appears on the display 2;
- total daily kilometer reading appears on the display 2;
- odometer 2 and speedometer 1 will illuminate when headlamps are turned on.

Press adjustment knob 3 momentarily to switch from the time mode to trip computer mode (daily kilometers covered).

The display goes out shortly after the ignition is turned off.

If the setting knob 3 is depressed briefly when ignition is off, information on kilometers covered will appear on the display in about 2 seconds.

### Time setting (e.g. 21:45)

1. Turn on the ignition.  
 The last selected option will appear in the second line of the display:  
 time mode or daily kilometer reading.
2. Switch to the time display mode by brief pressing the setting knob 3, if needed.
3. When time is shown, keep the setting knob 3 depressed for more than 2 seconds.

100436.8
374.7

100436.8
15:00

100436.8
15:00

4. To set time, press and hold the knob 3 until required hour digit appears.

100436.8  
21:00

5. Press again and minute digits will blink.

100436.8  
15:00

6. Set current minutes by pressing and holding the setting knob 3 until desired digit appears.

100436.8  
15:45

7. Press the setting knob 3 briefly to confirm the time set.

**Note:**

If the button has not been used for more than one minute in the course of setting, the procedure will be interrupted.

100436.8  
21:45

**Resetting of daily traveled kilometer reading**

1. Turn on the ignition.

The last selected option will appear in the second line of the display:  
time mode or daily kilometer reading.

100436.8  
15:00

2. Pressing the setting knob 3 momentarily to switch to daily kilometers covered, if needed.

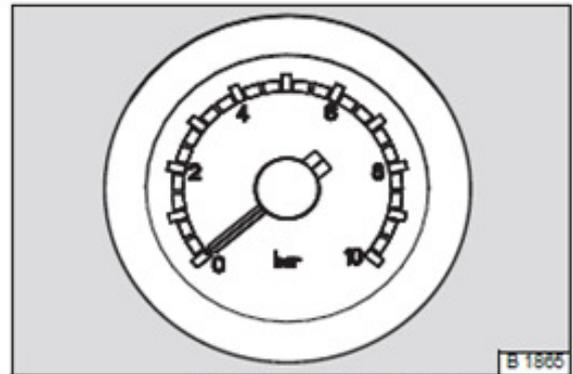
100436.8  
374.7

3. When daily kilometers appear, press and hold the knob 3 longer than 2 seconds. Daily trip computer number resets and indicates zero.

100436.8  
0.0

### Double air pressure gauge

It indicates the air overpressure in the brake system.  
The red pointer shows the air overpressure in the circuit of rear axles.  
The white pointer shows the air overpressure in the circuit of front axles.



Double air pressure gauge

### Engine oil pressure gauge

It indicates the engine oil pressure. It ranges from 3 to 5 bars (300 and 500 kPa) with the engine operating temperature.  
The oil pressure makes 1 bar (100 kPa) with the engine running at idle.



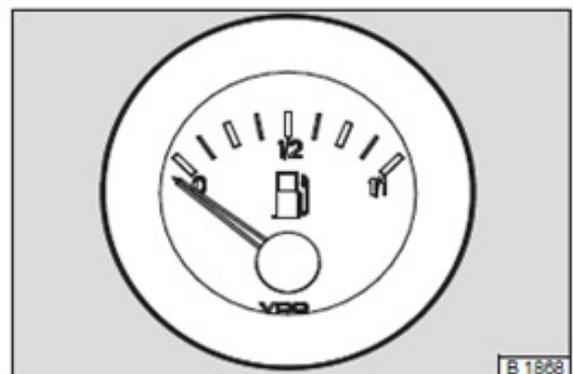
Oil pressure gauge

### Fuel gauge

Fuel gauge indicates fuel quantity in the fuel tank.

If the indicator lamp 23  lights permanently, refuel the tank as soon as possible.

The fuel gauge indicates the fuel quantity in the tank only when the key in the ignition box is in the I position.



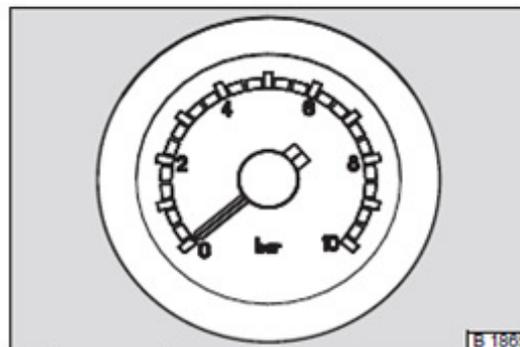
Fuel gauge

### Tire inflation pressure gauge

Indicates the value of air pressure in the of front and rear tires.

The red pointer indicates the pressure in the front and rear axle tires.

The white pointer has no function.



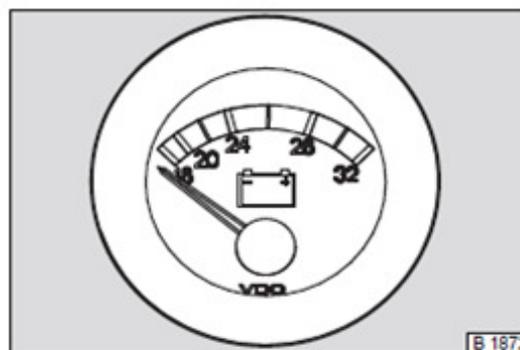
Tire inflation pressure gauge

### Voltmeter

It informs about battery charging status and voltage while driving. Operating voltage is 24V to 30V.

Use the voltmeter located on the instrument panel to check the batteries (for vehicle) a good condition and the source system for a correct regulated voltage.

The voltmeter scale is divided in individual coloured fields, which indicate the boosting of batteries and correct and/or incorrect function of the source set.



Voltmeter

The coloured fields of the voltmeter are of the following meaning:

<b>red field</b> (18V – 20.5 V)	If the voltmeter pointer is in this red field after putting the ignition switch key to position I, this means that the batteries are <b>charged insufficiently</b> . It is necessary to charge or to replace the batteries.
<b>hatched green field</b> (20.5 V – 24 V)	If the voltmeter pointer is in the hatched green field after putting the ignition switch key to position I, this means that the batteries are <b>not charged properly</b> . In addition, if the pointer is in this field with the engine running, it indicates an incorrect function of the source seat.
<b>green field</b> (24 V – 29.5 V)	If the voltmeter pointer is in the green field after putting the ignition switch key to position I, this means that the batteries are <b>charged correctly</b> . With the engine running and thus at a function of the source set, the pointer indicates the state of regulated voltage of the set. During the driving and with a good function of the source set, pointer must show the value 28 V approximately.
<b>red field</b> (29.5 V – 32 V)	If the pointer is in this field on the move, it indicates a <b>poor function</b> of the source set.

## Convoy lamps switch

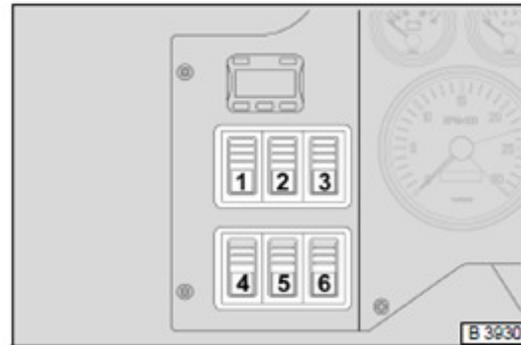
Convoy light switch 6  is located on the left side instrument panel.

The convoy lamps substitutes the vehicle headlamps and tail lamp under combat conditions.

To be used in conjunction with the blackout adapters of the main headlamps.

### WARNING!

Do not use the convoy lamps when driving on public roads. This might result in hazard to yourselves and other road users. A failure to follow this instruction may result in property damage, injury or death of persons.



Left part of instrument panel  
- switches (part I)

The convoy lamp switch has two positions.

### Position 0 - NORMAL LIGHT

Civil (legislative) lights.

Basic position during operation, legislation lamp is ON. The vehicle tactical lighting is not in operation.

### Position I - TACTICAL LIGHTS "ON"

Military lights ON. All lights (civil) "OFF".

When the light switch 4  (Fig. 5-54) is turned on, only tactical lights, A/C control panel, independent diesel heating control panel, control and metering instruments on the instrument panel are activated. The side markers, additional side markers, left tail light, licence plate light, front fog lights, working headlamp, direction indicators, and reversing light with acoustic signalling do not work.

### WARNING!

Do not use the blackout lamps when driving on public roads. This might result in hazard to yourselves and other road users. A failure to follow this instruction may result in property damage, injury or death of persons.

## **The heater and A/C system**

The driver's cab interior can be heated using the following system:

1. **Engine-dependent (oil) heating** uses engine oil temperature and its thermal efficiency during the ride or with the engine running in the vehicle at rest depends on oil temperature.  
The ventilation, dependent heater and cooling system is working with the engine running and the fan turned on only.

## **Ventilation, dependent heater and cooling system**

### **WARNING!**

The ventilation and dependent heater is working with the engine running and the fan turned on only.

It controls optimum cab's interior temperature all the year round.

The system of ventilation and dependent heater, the required temperature and the air moisture can be achieved under any ambient conditions.

Especially in winter period, when the heating is used to achieve the required temperature to dry the air, you will see a great advantage of this system.

In this way you avoid the window glasses defogging inside the driver's cab.

To assure proper function and full output of air-conditioning, it is necessary to put it shortly into operation once a week at least, even in winter.

At low ambient temperatures (round 0°C and less), it is necessary to warm the engine before A/C activation. With the air-conditioning on, one vent hole at least into the cab's interior must be open to avoid the defrosting of the evaporator.

### **Practical advice on using the air-conditioning system**

There is no need for special maintenance when using the system.

Check regularly whether the system condenser is clean.

Water outflow under the vehicle is a common effect and shows the right system adjustment and operation of the air-conditioning.

The water appears during the process of dehumidifying the air and the greater amount of water is particularly visible at high temperatures and great humidity of air.

**If in doubt that your heating and air-conditioning system does not achieve the optimum output, do not operate the vehicle any more and approach some authorized TATRA TRUCKS service dealer to locate a cause of the defect as soon as possible. They have got the genuine spare parts and the needful equipment for repair at disposal. Never attempt to correct the malfunctions by yourself.**

### Dust and pollen filter in the of the ventilation and dependent heater system

The ventilation, engine-dependent heating and cooling systems (i.e. the climate control system) use pollen and dust filter.

Pollen and dust filter is located in the intake channel under the front tilting bonnet

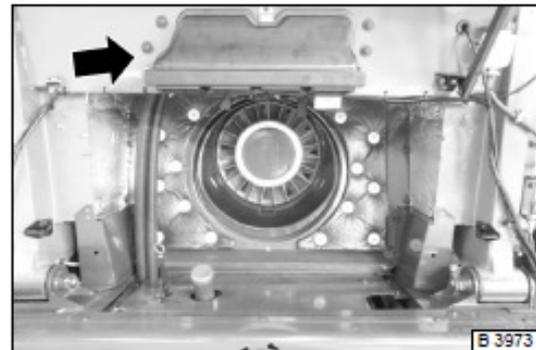
#### Dust and pollen filter

The dust and pollen filter of the ventilation and heating system (climat control) is situated in the intake duct under the front hood.

Filter in the intake duct prevents dirt and dust from entering the distribution box and the driver's cab, protects the components located in the box against contamination or clogging.

- Keep the filter clean.
- Remove dirt, if any.

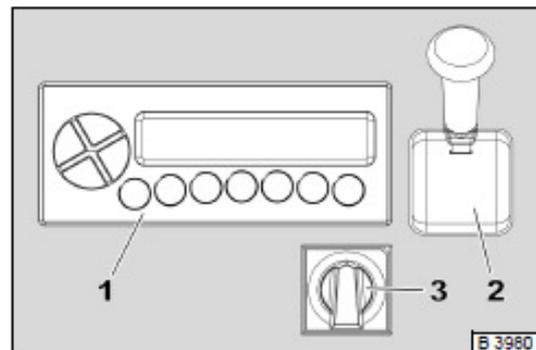
For details on inspection, cleaning and replacement of the external dust and pollen filter see the chapter "Maintenance".



Air intake channel

### Control panel of the ventilation and dependent heater system

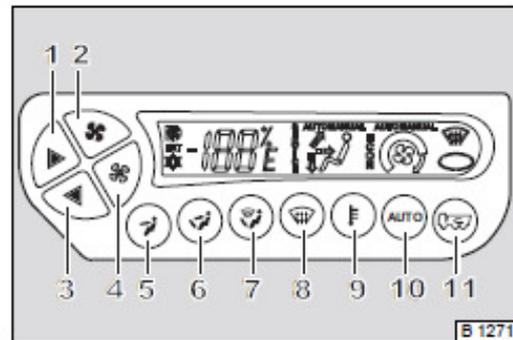
Climate control panel 1 is located on the right of main instrument panel and it is used to control the ventilation, engine-dependent heating and cooling (climate system). It also allows you to diagnose certain faults.



Right part of main instrument panel - instruments and controllers (part III)

**Description of controls/buttons on the control panel**

- 1 - temperature control up
- 2 - fan speed up button
- 3 - temperature control down button
- 4 - fan speed down button
- 5 - air distribution - face
- 6 - air distribution - face and feet
- 7 - air distribution - windshield and feet
- 8 - air distribution - windshield/defrosting windshield
- 9 - outside temperature display button\*
- 10 - "ON" button for the automatic mode/the "ECON" regime turning on button\*
- 11 - inside air circulation turning "ON/OFF" button



Description of controls/buttons on the control panel

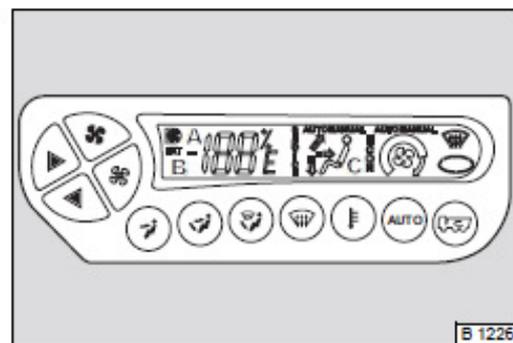
**Control description**

When the ignition key is turned in position "I" , the display indicates the last set values being stored.

If the vehicle position (side-marker) lights are turned off, the display brightness is the greatest. After turning on the position (side-marker) lights, the brightness of the display is reduced to a half and the control push buttons light up simultaneously.

*Legend for*

- A - desired temperature;
- B - warning indicator;
- C - display with system functions and current settings.

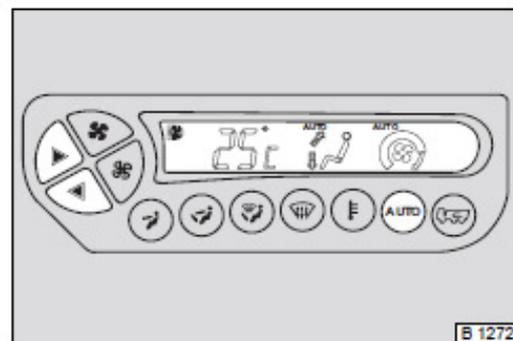


Control panel

**Automatic mode**

Press the "AUTO" button. Display will show "AUTO" over air distribution icon as well as over blower icon.

Choose the temperature by pressing the temperature adjustment buttons; they will appear on the display. The system automatically sets the air distribution, fan speed, switches on the compressor as needed and sets the recirculation lid, so that the desired temperature is reached in the shortest time possible. After reaching the temperature needed the system will maintain the set temperature until new temperature adjustment is made.



Automatic mode

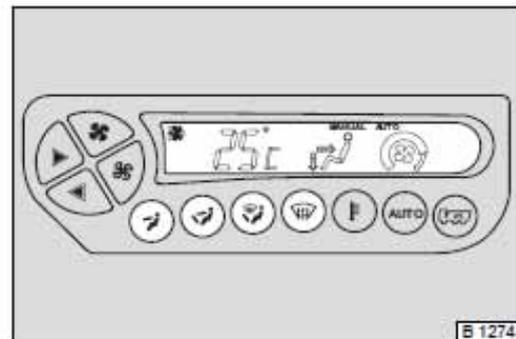
#### Manual air distribution setting

If the automatic air distribution does not suit you, press the button for choosing the type of air distribution which suits you best.

This will switch the system to manual air distribution adjustment mode.

This adjustment will be kept until another change is made. Display will show "MANUAL" over air distribution icon while "AUTO" will remain over blower icon.

Maintaining the adjusted temperature and fan speed will further be controlled automatically.



Manual air distribution setting

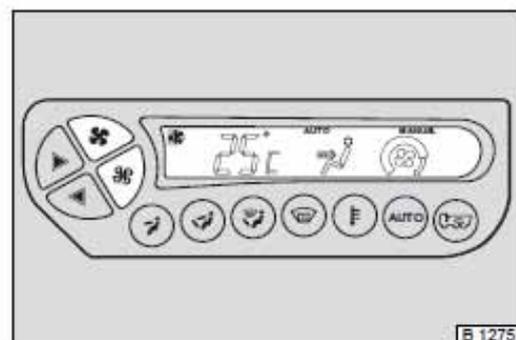
#### Fan speed manual adjustment

If the automatic set fan speed does not suit you, move the fan speed button up or down and set the most suitable fan speed.

This will switch the system to manual fan speed adjustment mode, which will be set until another change is made.

Display will show "AUTO" over air distribution icon and "MANUAL" over blower icon.

Maintaining the adjusted temperature and fan speed will further be controlled automatically.



Fan speed manual adjustment

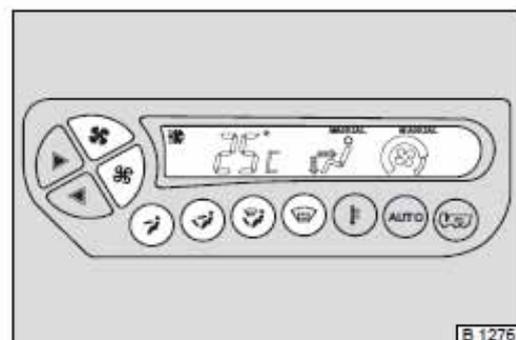
#### Air distribution and fan speed manual adjustment

If the automatic air distribution and fan speed does not suit you, press the button for choosing the type of air distribution which suits you best and move the fan speed button up or down and set the most suitable fan speed.

This will switch the system to manual air distribution and fan speed adjustment mode, which will be set until another change is made.

Display will show "MANUAL" over air distribution icon and "MANUAL" over blower icon.

Maintaining the adjusted temperature will further be controlled automatically.

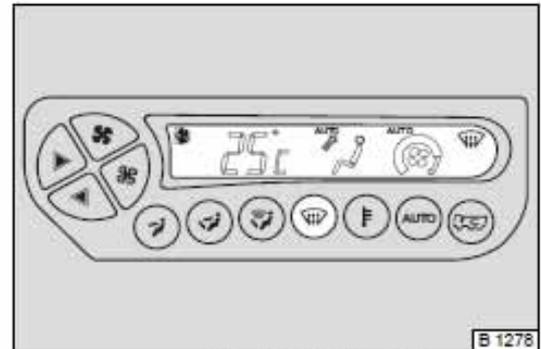


Air distribution and fan speed manual adjustment

If you wish to return to fully automatic mode, press the "AUTO" button. The "AUTO" "AUTO" sign will appear on the display.

### Windshield demisting

Activate the automatic windshield demisting by pressing the air distribution button "windshield" for 5 seconds. The windshield demisting sign will appear on the display. The system sets the air distribution onto the windshield, the highest heating temperature, turns the air-conditioning compressor on and switches the recirculation lid to outside air suction mode. After 2 minutes the system will automatically switch to the originally set values.



Windshield demisting

### Recirculation lid adjustment

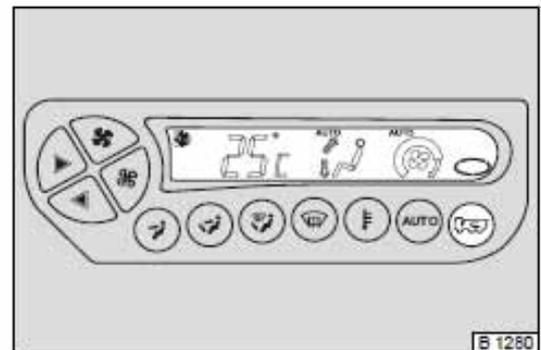
The recirculation lid switches automatically to the inner circuit under these conditions:

1. The outside temperature is above 25°C.
2. The temperature inside the cab is lower than the outside temperature.
3. The compressor must be on.

After 30 minutes of the closed inner circuit the system automatically switches to outside air suction so that the circulation of air in the cab is ensured.

If you need a manual inner air suction adjustment, press the air recirculation button.

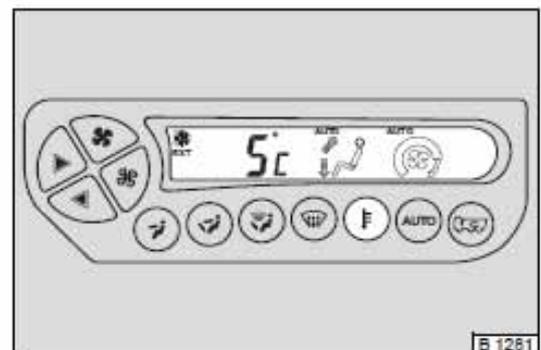
The recirculation symbol will appear on the display.



Recirculation lid adjustment

### Outside temperature display

Press the outside temperature button and the outside temperature in °C and the "EXT" symbol will be displayed for 4 seconds.



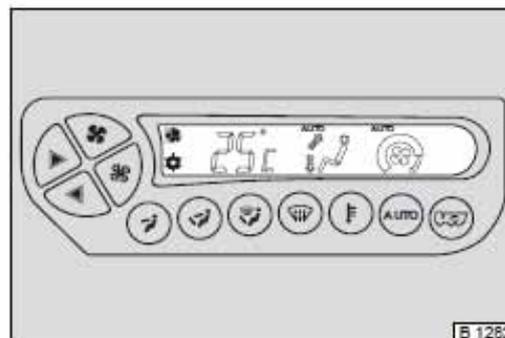
Outside temperature display

#### Black ice warning

If the outside temperature is reaching zero, the icing symbol will be displayed , which warns you of possible black ice.

#### WARNING!

Drive according to the road conditions. Accidents will be prevented.



Black ice warning

#### Air-conditioning compressor switch OFF\*

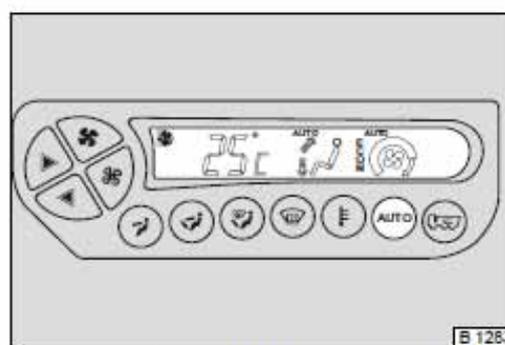
The system automatically controls the compressor switching on and off according to need.

If you wish the compressor not to be on, press the "AUTO" button until the "ECON" sign appears, which means that the compressor is off.

The system maintains the inner temperature only with the outside air sucked in, which can lead to inefficient cab cooling (especially in the summer).

That is why we recommend that you keep the system in "AUTO" mode (with the compressor on).

When the compressor is off (ECON), every 30 minutes the system automatically switches on the compressor for a few seconds to lubricate the whole system. You may switch the compressor on again pressing the "AUTO" button.



Air-conditioning compressor switch OFF

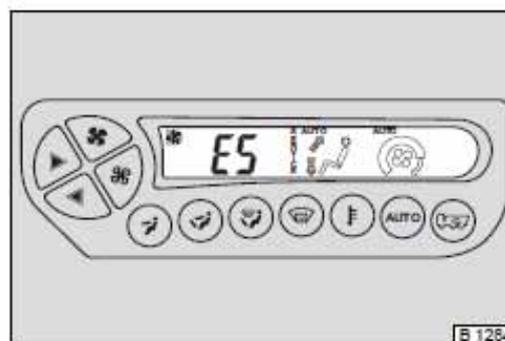
#### Alarm indication\*

If the system recognizes any fault, this is signaled by a flashing fault code and the "SERVICE" sign.

Some system functions may be limited, therefore contact an authorized service as soon as possible and have the air conditioning system checked and faults removed.

#### Note:

In case of malfunction of any temperature sensor, it is recommended to switch from the automatic mode (AUTO) to manual control of the A/C system.



Alarm indication

## BREEZE IV independent diesel heater

Independent diesel heating is placed inside the cab behind the driver's seat and serves mainly to rapidly heat up the cab before driving.

Independent diesel oil heating system operates independently of the engine thermal regime and with the battery disconnecter turned on.

### WARNING!

The engine independent oil heater must not be operated where flammable fumes or dust may create, e.g. in the vicinity of fuel, coal or wood stores.

Keep the heating system clean thoroughly.

### WARNING!

The engine independent oil heater must not be operated where flammable fumes or dust may create, e.g. in the vicinity of fuel, coal or wood stores.

Never operate the heater in enclosed spaces such as in garages or in the underground car parks.

Poisoning hazard!

Exhaust gases containing toxic ingredients are produced by each combustion.

### ALWAYS TURN THE HEATER OFF WHEN REFUELLING!!

The timer/switch clock is located on the left side of instrument panel.

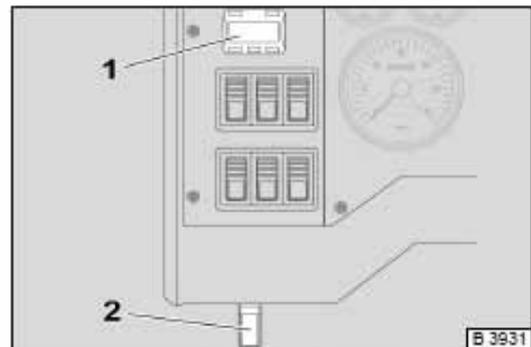
## The timer/clock switch

### 1. Features

The timer/switch clock air heater 1 is used to turn on / off the heating and ventilation. In the heating mode, controls can be used to change the heating power or desired temperature, in the ventilation mode the fan speed can be changed.

The heater can operate in the following modes:

- Power based heating
- Temperature based heating
- Ventilation
- Combustion chamber burning
- MENU user
- MENU service



Location of the timer/clock switch

## 2. Signaling and controls

### 2.1 Description of the keys

- 1 - Turning the ventilation on or off,  
 - Confirm and exit MENU when moving in the MENU  
 - Cancel timer - push and hold
- 2 - Turning the heating ON or OFF – push  
 - Combustion chamber burning – push and hold
- 3 - Shift to the left or decrease the value
- 4 - "ENTER" -push and hold to enter the MENU;  
 - pushing the key displays the temperature of the external sensor;  
 - in timer mode the timer length can be set;  
 - in MENU mode confirm your selection and move to the next item in the menu.



Timer/clock switch

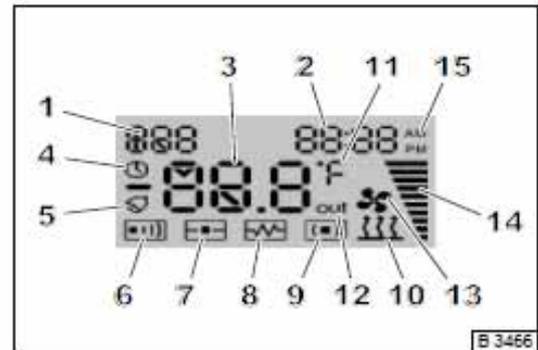
- 5 - Shift to the left or increasing the value

Error message is cancelled by pressing of any key.

### 2.2 Display description

Meanings of the symbols visible on the display of the timer/clock switch.

- 1 - The day of the week (in Czech: Po, Ut, St, Ct, Pa, So, Ne or in English: Mo, Tu, We, Th, Fr, Sa, Su) - in sleep mode  
 - The T/P symbol shows whether the heater is in temperature or power mode - while burning  
 - It is also used to preset values and display certain symbols in the MENU
- 2 - Current time can be set in the 12-hour (along with time display AM / PM) or 24-hour format  
 - Symbol t:30 shows the remaining time to turn off the heating when the sleep timer is active  
 - Also used when setting alarms and displaying certain symbols in the MENU
- 3 - Central alphanumeric symbols (including the symbol minus - ).  
 - used to display the current temperature with accuracy to one decimal place °C, °F (when the temperature is displayed the corresponding unit symbol - °C, °F - is lit)  
 - Displaying the external sensor temperature together with the OUT symbol  
 - Displaying selected parameters (M01 – M23)  
 - Particular pre-selections (PR 1-7; PRA)  
 - Displaying possible errors (E 00-99)



Display of the timer/clock switch

- 4  - The symbol of pre-selections - is lit when at least one pre-selection is activated
- 5  - The symbol of the alarm clock - is lit when the alarm clock is activated
- 6  - The external key symbol, Radio module or GSM module - is lit when the heater is turned on using the external key, Radio module or GSM module
- 7  - The temperature sensor in the timer symbol of activation
- 8  - The glow symbol - is lit during start, cooling down and combustion chamber burning
- 9  - The activation of the external temperature sensor symbol
- 10  - The symbol of heating - flashes while the heater is turned on and during generating (when burning at T), it is lit when the heater is turned on successfully
- 11  - The symbol °C (Celsius) or the symbol °F (Fahrenheit)  
- Together with the OUT symbol it displays the temperature of the external sensor, when the operator presses the  key and the sensor is connected. When no external sensor is connected, - - - is displayed
- 12  - The symbol OUT - is lit together with the temperature data of the external sensor, when the operator presses the  key and the sensor is connected. When no external sensor is connected, - - - is displayed. If the timer is active, it cannot be displayed the temperature of the external sensor
- 13  - The symbol of the ventilation - is lit during ventilation and ventilation of the combustion chamber, it flashes during the cooling down cycle of the heater
- 14  - Bar graph  
- in the power based heating or ventilation mode, shows the set heating power or that of the ventilator in 10 steps (minimum power is displayed by a single dash, while at maximum power all the dashes are displayed)  
- in the temperature based heating mode, the bar graph shows the relative value in 10 steps from 1 °C to 30 °C (33.8 °F to 86 °F,) the exact temperature will be displayed when the desired temperature is set.
- 15  - The symbol appears if the time is set to the 12-hour format

### 2.3 Sound signaling

Pressing any key on the timer will activate a short beep to confirm it has been carried out successfully. While exiting the MENU and pressing the  key a long intermittent beep is activated to confirm the operation has been carried out successfully.

## 3 Heating

### 3.1 Switching the heater ON

The heater can be started only if inactive or in the sleep mode by pressing the  key. Heating in operation is always indicated.

If the  symbol is flashing, the heater is in the start or generating mode (when operating in the "temperature" mode).

If the  symbol is displayed, the heater is functioning to the set capacity power or temperature. The heater can be turned on via the preset option, please see the description in the MENU. The heater can be turned on by an external button connected to the connector at the timer.

### 3.2 Heating in the power mode

Setting the heating power is carried out by  and  keys. When the heater starts (flashing ) and after successful ignition, the heater is automatically set to full power and cannot be controlled. If the symbol is always on (after about 3 min.) the heater is working in the set power. The power can be adjusted at the start and during burning. Switching the Power / Temperature modes is done in the MENU.

### 3.3 Heating in the temperature mode

The desired temperature is set by  and  keys, while the display briefly shows the set temperature and the bar graph is set to approximately the level required. The heater starts only if the required (set) temperature is higher than the temperature of the selected temperature sensor, otherwise it remains in the generating mode i.e., the fan rotates slightly and evaluates the temperature of the selected temperature sensor. The temperature can be set to 1 °C to 30 °C incrementally by 1°C (33.8 °F to 86 °F). When the required temperature is higher, the heater turns on. After a successful start the heating power gradually adjusts to the set temperature. If the current temperature reaches the desired temperature, the heat power will reduce automatically and if exceeded, burning will turn off and the heater goes in to generating mode. After a decline in real temperature below the set value, the heater automatically switches on and starts to heat (indicated by the lit  symbol). In the menu, it is possible to select the following temperature sensors:

T1-temperature of the heated air taken in, T2-temperature gauge in the timer, T3-external temperature sensor. In case the external sensor (T3) is unconnected or is defective, it cannot be selected. When it is faulty, it sensor switches automatically to another sensor. The T-3 sensor can also be placed outside the vehicle, serving as an outdoor temperature sensor (it may not however be selected for regulation).

In the temperature mode, the heater tends to consume more energy, due to more frequent starts, resulting in shorter battery life.

Switching the Power / Temperature modes is done in the MENU.

### 3.3 Switching on the heater

The heater is switched off by pressing the  key, while it enters the cooling down mode. It is signaled by flashing  symbol. After ventilation, the heater turns inactive.

The heater is switched off after the time set on the timer, if activated.

The heater is switched off when the preset time has elapsed, see the description in the MENU.

The heater can be switched off by an external button connected to the connector at the timer.

### 4 Ventilation

If the heater is inactive, ventilation is started by pressing  key (indicated by the lit  symbol).

Intensity of ventilation can be adjusted using the  ,  keys.

If the ventilation symbol is flashing, the device is in the cooling down mode.

By pressing the  key, the heater becomes inactive.

### 5. Combustion chamber burning

Triggered by pushing and holding the  key while inactive, burning is signaled by the flashing   symbols. It is used when heating fails to start, i.e. glows and ventilates moderately without further fuel supply. When the burner is ignited successfully, MC settings will be used. The process can be turned off by pressing the  key again and is time limited.

### 6 Timer

The timer is used to restrict the required time period of heating when the key in the ignition is turned off. The time is adjusted to 30 minutes and can be changed. When the heater is started, the timer mode is indicated by the t: xx display where the current time is usually shown. The letter "t" indicates the timer mode and the following figure indicates the number of minutes until the heating shuts down automatically. This value can vary from 5-99 min. by pressing the  and the  ,  keys. After setting the desired value and pressing the  key again the settings will be saved. If no key is pressed during set up for 5 seconds the timer saves the current data and returns to the initial state. After this time, the heater shuts down automatically. Turning on the ignition key cancels any restrictions to burning and heating may continue. The timer can be shut down by turning the ignition key off or by pressing the  key for approx. 2 seconds. If the heater is on, the timer is always activated by turning the ignition key off. When activated the timer, it is not possible to display the temperature sensor T3 by pressing the  .

The ventilation mode is restricted by the timer for up to 6 hours and cannot be shut down.

## 7. User menu

Via the MENU, the timer is used to adjust the heating characteristics to suit customer requirements.

The MENU is accessed by pushing and holding the  key (approx. 2 seconds). The letter "M" and the MENU number are shown in the center of the screen. The   keys are used to select the desired MENU. It is possible to enter the MENU during heating or ventilation.

By pressing the  key again, the selected MENU is activated. Functions M05, M10, M12 can be set only when the heater is inactive.

By pressing the  key again, the individual parameters of the selected MENU can be set. Settings of the flashing variable can be changed by using the  and  keys. The  key is used to confirm the set MENU and the key to exit the MENU.

### The MENU structure:

- Setting up heating preferences for delayed start. The Preferences are only active with the temperature mode
- M01** PRA ..... one setting for all days of the week  
PR1-7 .....seven different settings for each day of the week  
RES ..... cancel all presets
- M02** Setting an alarm
- M03** Setting the current time, day of the week and 12/24 hour formats
- Selecting the temperature sensor whose temperature will be shown on the display and which will be active when the heating is in the temperature mode.
- M04** Functional sensors displayed:  
T1 sensor in the heater  
T2 sensor in the timer (factory settings T2)  
T3 is displayed and can be selected only if connected to the LIN-bus
- M05** Selecting the heating mode P/T (factory settings P)
- M06** Defining the character set En/CS (factory settings En)
- M07** Setting the temperature unit °F/°C (factory settings °C)
- M08** Checking the power supply

#### Setting backlight intensity

Backlight of the keys (symbol bL) can be set from 0 to 9 by using the  and  keys (factory settings bL4, r9, G9, b9)

M09

LCD backlight can be set from 0 to 9 by using the  and  keys for each colour separately (red - symbol "r", green - symbol "G", blue - symbol "b"). To confirm and switch to another submenu press the  key (factory settings bL4, r9, G9, b9)

#### Reset to factory settings

M10

Presets and alarm settings are canceled while the polarity of the network and time settings are not changed. Clocks revert to the 24 hour format. Reset can only be done when the heater is inactive.

### 8. Service menu

Entering the MENU is not possible if an error is reported.

Enter the service MENU:

Go to the M11 (PIN) position only from position M10 by using the  key. When using the  key in the MENU, the M11 position is skipped (i.e. going from M01 to M10).

By pressing  0-0-0 appears on the display.

Enter the PIN using the   keys and confirm your selection .

After the PIN is entered successfully next menu items spanning from M11 to M23 will appear.

#### Polarity of inputs (POL)

M11 Changing the polarity of inputs (i.e. when Light and Ignition inputs respond to + or - polarity)

#### Pump (Pu)

Starts the pump in the time set (default: 150 second.)

M12 Pumping time can be adjusted incrementally by 10s using the   keys to max. 600 seconds.

Turning the pump ON/ OFF is possible at any time using the  key

#### The serial number of the main unit (CU)

M13 The CU serial number („Control Unit“) can be displayed by using the   keys

#### The serial number of the heater (MU)

M14 The heater serial number („Main Unit“) can be displayed by using the   keys

#### The motor speed (Mot)

M15 The main display shows the current motor speed  
Only 3 digits are displayed, the figure is given in revolutions per minute (x10 / 1min)

#### Pump frequency (PFR)

M16 The main display shows the pump frequency  
The figure is shown in Hz with accuracy to one decimal place (max. 99.9 Hz)

- Voltage on the plug (UGL)**  
**M17** The main display shows the voltage on the plug  
 The figure is shown in V with accuracy to one decimal place (max. 99.9 V)
- Intake air temperature (T-1)**  
**M18** The main display shows the temperature measured by the sensor of the control unit – T1  
 The figure is shown with accuracy to one decimal place °C/°F
- Temperature of the combustion chamber (T-0)**  
**M19** The main display shows the (absolute) temperature measured by the sensor of the combustion chamber  
 The figure is shown with accuracy to one decimal place °C/°F
- Error frequency list - Histogram (Err)**  
 The error code is displayed on the top left (Exx)
- M20** Select the error code by pressing the   keys  
 The main display shows the recorded number of the current errors  
 Statistics is read from the data stored in CU
- List of the last 100 errors (LEr)**  
 The serial number of errors 0-99 is displayed on the top left
- M21** Select the error code by pressing the   keys  
 The main display shows the current error code  
 Statistics is read from the data stored in CU
- Peripheral cycle times (tPE)**  
 The symbol of the currently selected peripheral is displayed on the top left (Mot – motor, GLo – glow plug, Pu – pump)
- M22** Change the display of the individual peripherals by pressing the   keys  
 The times are shown as follows: ten hour units are on the main display, one hour units and the h symbol on the top right corner  
 Maximum displayed time is 9999 h.
- Correction of crystal clock (Cor)**  
 It can be set in the range of -127 to +127  
**M23** One step represents a deceleration / acceleration the clock speed by 0.176 seconds / 24h  
 This function is not reset when reverting back to the factory settings (M10 - RES)

## 9. Error report

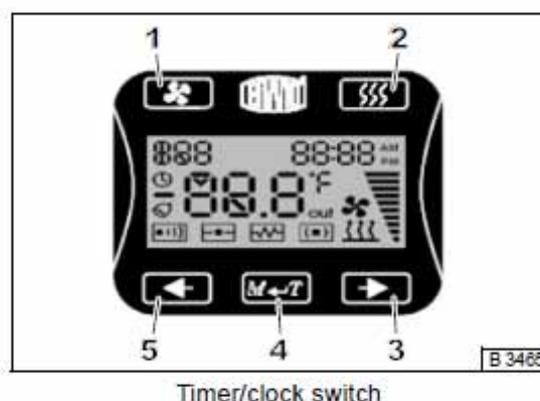
In case of malfunction

If the heater overheats and/or in case of the malfunction, check the warm aier vents for clogging. Switch heater off/on.

Switch the heating off and on repeatedly. If the heater fails to start, a new start follows automatically. When the second attempt fails too, the emergency shutdown follows.

The emergency shutdown can be cancelled by turning off and on again.

Make sure that fuse 16  and 17  of the



Timer/clock switch

independent heater in the fuse box have not been blown and approach a authorized service TATRA TRUCKS to detect a cause of the defect.

Heating errors are evaluated by the control unit of the heater. The error code is displayed in the middle of the display in Exx format, where xx is the numeric error code. A red light is flashing. By pressing the  key the current error is deleted and the timer will return to its initial state. Until the error is confirmed by pressing the  key the error code is still displayed and a red light is flashing. If the error persists it cannot be removed. If the heater announces an error message, first check the causes listed in the table. If the error persists, please contact the nearest authorized TATRA TRUCKS service dealer.

#### **WARNING!**

Before starting any work on the heating, turn off the heater and allow for venting (cooling down), or turn the fan off completely. Heater operation or run-out must not be interrupted prematurely by disconnecting from the power supply e.g. through the battery disconnecter or fuse removal. Blown fuses must only be replaced with fuses of specified amperage.

Should the fuel system show leaks or exhaust gases scent the cab, turn off the heater immediately, vent the cab and turn off the heating immediately and have the heater repaired by an authorized TATRA TRUCKS service dealer as soon as possible.

By unprofessional repairs of the heater out of the network of the authorized TATRA TRUCKS service dealer. The heater, the vehicle the heater is installed in or the health of people near the heater can be damaged.

The producer renounces the responsibility for the installation of the heater or repairs of the heater out of the network of the authorized TATRA TRUCKS service dealer. So far the heater is in the warranty period, this will invalid the warranty.

## **10. Other functions**

### **The first connection**

During the first connection to the power supply it is appropriate to set the time and day of the week - see user MENU.

### **Storing data in memory**

When the menu settings are changed all values will be stored in memory. When a power failure occurs, communication is re-established and the control unit is inactive, the timer loads the variables from the memory.

It is necessary to re-set the current time and the day of the week. The activation of the presets and alarm settings are canceled.

### **The parameters saved in memory of the timer:**

- the setup of the pre-selections (be reset)
- the setup of the alarm clock (be reset)
- the heating mode (remain in memory even after reset)
- the language version (remain in memory even after reset)

The current temperature sensor is saved in the memory of CU.

### **The function of the backlight**

If the lug of the flat connector is connected to the switch of the parking lights and the lights are on, the backlight is always on. When the parking lights are off, press any key to light the backlight for a time period of 7 seconds.

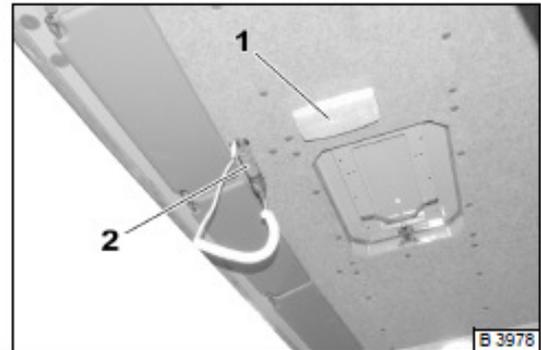
## Vehicle lighting

### Cab interior lamp

The following cab interior lamp is installed for the cab interior illumination:

#### 1 - Cab interior lighting in peacetime conditions

Ceiling lights 1, operable by the switch 9  located on the right side instrument panel.

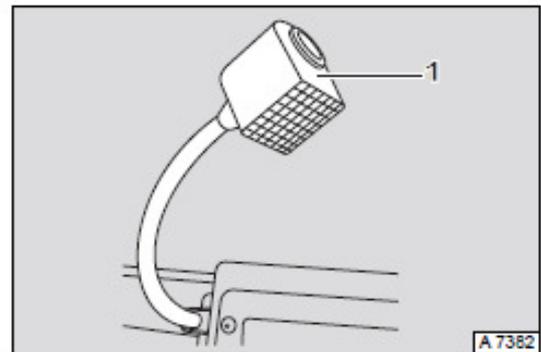


Cab interior lamp

### Map lamp

The map lamp is located in front of the passenger seat on a flexible holder.

- Use switch 1 on the map lamp body to switch the lamp on/off.

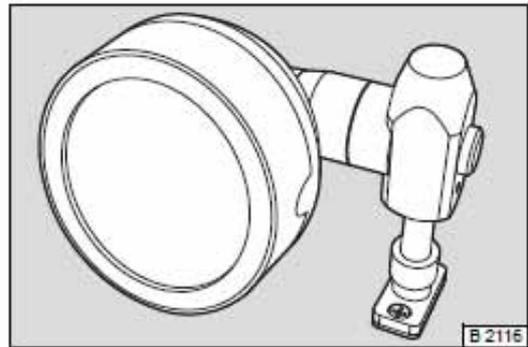


Map lamp

### Lighting on the cab roof

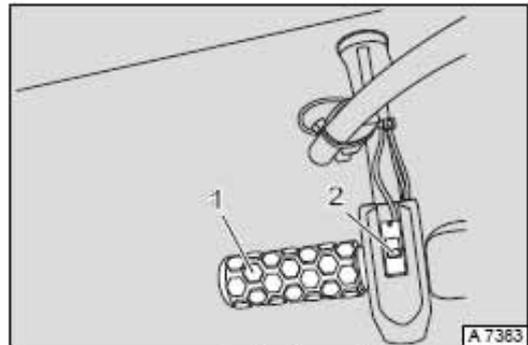
#### Search lamp

It is located in the roof in front of the driver and it is used for spatial orientation around the vehicle.



Search lamp

- It is controllable using rotary knob 1 and switchable using switch 2.

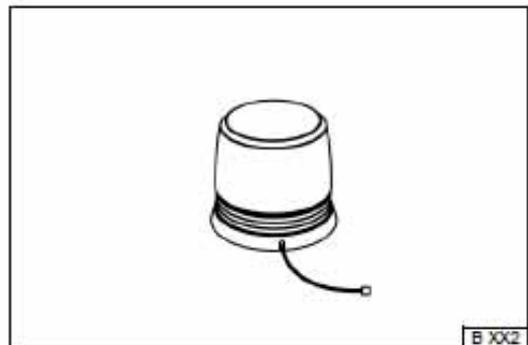


Control search lamp

#### Beacons

Two beacons with covers are located on the cab roof.

- Turn on the switch 17  located on the right side instrument panel. The indicator lamp located directly in the switch indicates the lamps switched ON.



Roof ramp

# APPENDIX - E

## **Development of one no Armour cabin shell with Fabrication, Pre-treatment & CED painting with for MGS.**

### **Scope of work (Fabrication+Pre-treatment+CED+Furnishing)**

#### **BEML Scope:**

1. BEML shall provide kit for cabin furnishing as free issue material to supplier.
2. Technical assistance will be provided by sharing 3D model of cabin & furnishing of aggregates by BEML along with Technical specification/sample piece.

#### **Supplier scope:**

1. Shell Fabrication of Cabin by utilizing the fixtures made by the supplying firm on their own.
2. Stage wise integration and final shell assembly has to be carried out with suitable fixtures and offered for BEML for inspection and clearance.
3. Pre-treatment, CED (Cathode electrode deposition) dip coating, top coat paint & baking has to be carried out as per Technical specification / process.
4. Furnishing of the Cabin with BEML supplied FIM & supplier sourced accessories. Supplier to make necessary cutouts & mounting arrangements in the cabin to assemble all the accessories.
5. The firm shall provide QAP, Dimensional check sheets and obtain welding process & welders qualification from BEML.
6. The final inspection with shower test and clearance to be obtained from BEML before dispatch.
7. The firm should make a fixture to ascertain mounting, lock and unlock, and clearance of the equipped Cabin for final clearance.
8. HVAC system with accessories shall be provided by supplier.

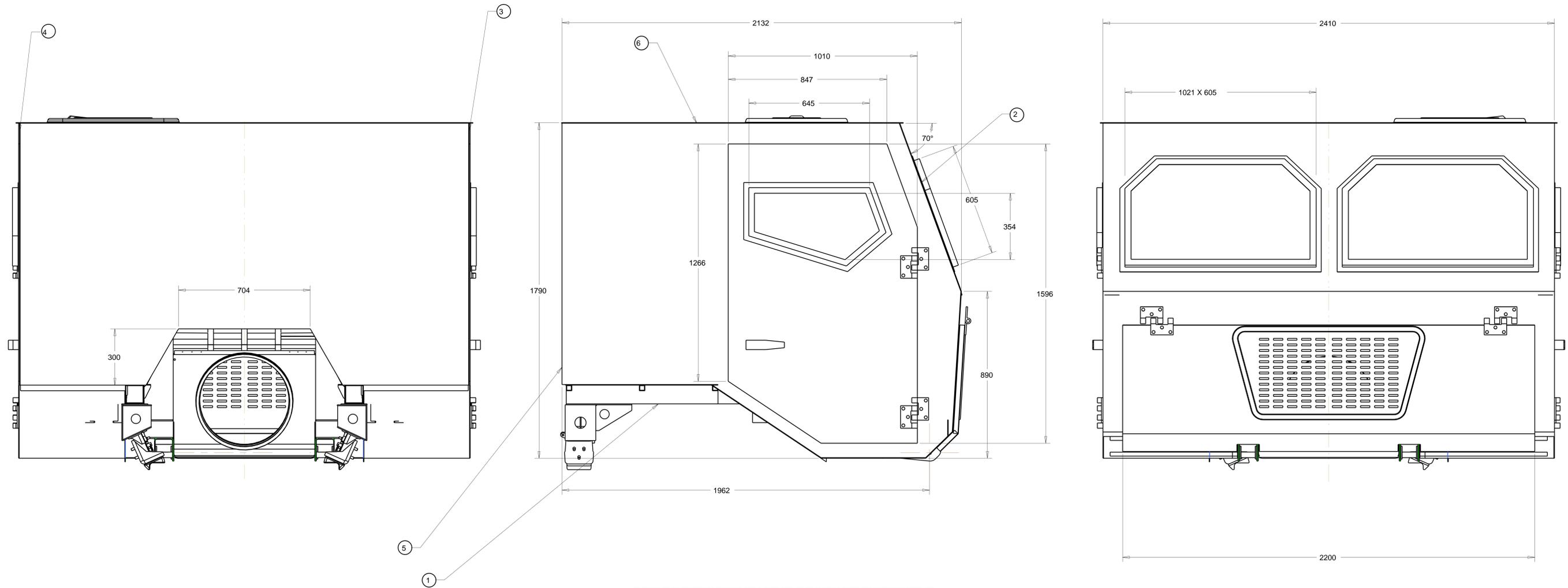
Work Scope Matrix					
SI No	Scope Details Description of aggregates	BEML Free issue material	Supplier Procured item	Provisioning of Cut outs & mounting arrangements	PTS Reference No
1	Cabin structure cladded with armoured sheets, doors & blast proof glasses	✘	✓	✓	3
2	Cabin tilting mechanism	✘	✓	✓	4
3	FRP Dashboard	✘	✓	✓	5a)
3	Engine tunnel profile	✘	✓	✓	5b)
4	Gear Shift lever	✓	✘	✓	5d)
5	High & low speed gear pre selector	✓	✘	✓	5f)
6	Parking brake and controls	✓	✘	✓	5g)
7	Individual switches in dash board	✓	✘	✓	5h)
8	Rear berths	✘	✓	✓	5i)
9	HVAC System	✘	✓	✓	5j)
10	Integrated Pedal unit	✘	✓	✓	5k)
11	Wind screen washer tank	✘	✓	✓	5l)
12	Provision for storing first aid box & fire extinguisher bottle	✘	✓	✓	5m)
13	Front bonnet cover	✘	✓	✓	5n)
14	Mechanical linkage with release handle for	✘	✓	✓	5o)

Work Scope Matrix					
SI No	Scope Details Description of aggregates	BEML Free issue material	Supplier Procured item	Provisioning of Cut outs & mounting arrangements	PTS Reference No
	bonnet release				
15	Oil heating equipment	✓	✗	✓	5q)
16	Mechanical stay hinged to front bonnet	✗	✓	✓	5r)
17	Roof hatch	✗	✓	✓	5s)
18	Rigid type handles on "A" & "B" pillars	✗	✓	✓	5x)
19	Driver & Co driver seats	✓	✗	✓	6
20	Engine idle speed and engine shut off lever	✓	✗	✓	7c)
21	Steering column assy	✓	✗	✓	7d)
22	steering wheel	✓	✗	✓	7e)
23	Single Lever combination switches	✓	✗	✓	7f)
24	Windshield wipers	✗	✓	✓	7 g)
25	Handles on cabin front end for windshield cleaning	✗	✓	✓	7h)
26	Engine oil temperature dependent heater	✓	✗	✓	7i)
27	Search light	✓	✗	✓	7 j)
28	Beacon lamps	✓	✗	✓	7k)
29	Bracket for air intake mounting	✗	✓	✓	7m)
30	Stopper (rubber & strip) to lock hatch during fully open condition	✗	✓	✓	7n)

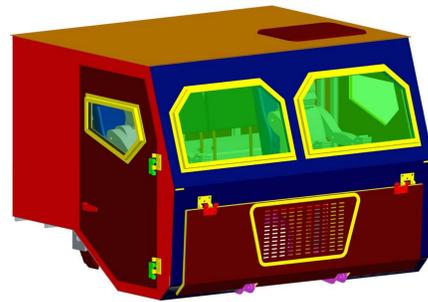
Work Scope Matrix					
SI No	Scope Details Description of aggregates	BEML Free issue material	Supplier Procured item	Provisioning of Cut outs & mounting arrangements	PTS Reference No
31	LMG Gun Mount	✗	✓	✓	7o)
32	Roof lighting	✓	✗	✓	8a)
33	LH & RH direction indicators	✓	✗	✓	8b)
34	Control Unit with knobs	✓	✗	✓	8c)
35	Adjustable rear view mirrors	✗	✓	✓	8d)
36	Control Unit with knobs	✓	✗	✓	8e)
37	Exhaust Brake engagement lever	✓	✗	✓	8f)
38	Electric horn, Head lamp with leveller, side direction indicators, Wide angle & proximity mirror	✓	✗	✓	8g)
39	Cabin Insulation	✗	✓	✓	9

STATUS OF THE DESIGN	MACHINING DEVIATIONS FOR LINEAR DIMENSIONS						
	6	30	120	315	1000	2000	4000
VALUE	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±3

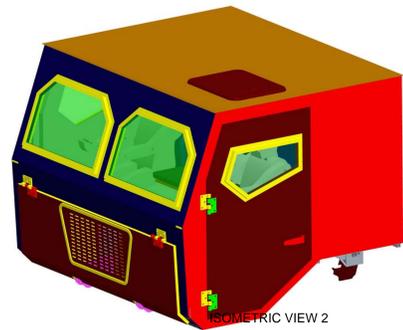
THIS DRAWING IS PROVISIONAL



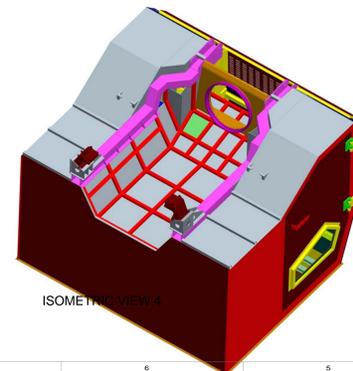
ISOMETRIC VIEW 1



ISOMETRIC VIEW 3



ISOMETRIC VIEW 2



ISOMETRIC VIEW 4

SL. NO.	DRG/STD NO.	DESCRIPTION	QTY.	MATERIAL	SPECIFICATION	TOTAL WT IN KG	LOC.
6		CABIN ROOF STRUCTURE	1				
5		CABIN REAR WALL STRUCTURE 1	1				
4		CABIN LH SIDE WALL STRUCTURE	1				
3		CABIN RH SIDE WALL STRUCTURE	1				
2		CABIN FRONT WALL STRUCTURE	1				
1		CABIN FLOOR BOTTOM STRUCTURE	1				

SL. NO.	DRG/STD NO.	DESCRIPTION	QTY.	MATERIAL	SPECIFICATION	TOTAL WT IN KG	LOC.
PRODUCT: BEML HIGH MOBILITY VEHICLE 8X8							
NEXT ASSY NO. USED ON QTY. MATL:							
H.T. SCALE: 1:650.000							
S.T. SCALE: 0.043							

AMEND. NO.	NAME	DATE	TITLE	SHEET NO.
01	ADARSH	09.04.2020	GENERAL ASSEMBLY DRAWING OF RHD CABIN	1
02	RAGHU	09.04.2020		2

DRG. NO. 459 CA 02014

