

**SPECIFICATION FOR AUDIO VISUAL WARNING
DEVICE**

Preamble

It has been noted that most engine failures in BMP vehicle are attributed to either failure of engine lubrication system or failure of engine cooling system. With a view to monitor these two systems and give timely warning to driver about failure of these systems the subject Audio-Visual Warning Device (AVWD) is designed. This device gives an audio and visual alarm for two basic parameters noted below which are critical for health of Engine of BMP.

01. Temperature of engine coolant
02. Engine lubricating oil pressure.

System Description

The general arrangement of system is given in General Arrangement drawing enclosed. The system essentially consists of a control unit (1) to which pressure sensor (6) and temperature sensor (9) are connected. The control unit is mounted on the BMP vehicle with a base plate (2) which is required for mounting it at the specific location in BMP vehicle. The control unit is housed in driver compartment while the pressure and temperature sensors are located in Engine compartment. Three cable assemblies are used for electrical connections. One cable assembly is required for connection of unit to power supply (5). Since the sensors and control unit are located in different compartments two cable assemblies are required one in driver compartment for connection from control unit to compartment separation wall (4) and another in Engine compartment from compartment separation wall to both sensors (3). The additional fitment harness includes Male to Male connector (13) to be mounted on compartment separation wall, 4-way connector block (7) for connection of Pressure sensor, Pipe piece for mounting of temperature sensor (10) and sundry items like blinding plug, washers, nuts and screws (9), (11), (12) & (14). All these items { sl no (1) to (14) } are in the scope of supply of Firm.

The General arrangement drawing also shows Existing drivers dash board (wherefrom the power supply is to be tapped), existing coolant pipe (where temperature sensing unit will be fitted), existing pressure sending unit (where pressure switch will be fitted) and existing partition plate (where male to male connector will be fitted). These items are NOT in the scope of supply of firm.

- f) A PT 100 type RTD sensor should be used for sensing the temperature. Details of sensor are given in respective drawing.
- g) The actual temperature of coolant should be displayed on a 3 digit numeric display. Same RTD sensor is to be used for this display and Alarm noted above.
- g) Setting and Calibration facility should be provided inside the control unit (not accessible from out side) for calibration of temperature display and setting of 2 set points.
- h) PCB should be coated with suitable medium to ensure proper functioning in cases of dust, humidity, water deposition etc.
- i) It is necessary that the connection of RTD sensor to pipe is leak proof and withstands high temperature and vibration, jolts and jerks of engine and vehicle running. Therefore, proper care is to be ensured while manufacturing of pipe piece, asbestos-copper washer and RTD sensor.

03. The pressure alarm is required when engine lubricating oil pressure falls below a certain limit.

- a) The alarm should actuate when engine pressure falls below 4.5 Kg/ Cm² (+0.25 - 0).
- b) A pressure switch to be used for sensing same giving potential free change over contact.
- c) The differential of pressure switch (if settable) to be factory set within above range (see drawing).
- d) The alarm to actuate if pressure is continuously less then 4.5 Kg/Cm² for 30 sec or more.
- e) The mechanical fitment harness is also to be supplied by firm (see BOM & relevant drawings for detail).
- f) It is to be ensured that fitment harness of pressure switch is of very good quality ensuring no leakage even in case of harsh environmental conditions, heavy vibrations and jolts which occur during running of BMP Vehicle.

04. Control panel should have alarm indications of annunciator type consisting of 3 windows having suitable markings (for details see relevant figure). The controls and indicators essentially required are as below :-

(1) Controls

- i. Selector switch for selection of type of coolant in use - Water or Antifreeze.

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Scope of Supply

The firm's scope of supply is limited to design and supply of complete system consisting of all these 14 items noted above. (For list refer Annexure - I). Firm is also required to supply detailed drawings and manuals of item supplied. The drawings and manuals must cover all information detailed in inspection criteria clause 15. Procedure for calibration of temperature display and setting of two set points for Water / Antifreeze solution must be given. Similarly procedure for adjustment / checking of pressure switch setting - if any - should also be given.

The fitment of these items in BMP vehicle however is NOT in the scope of supply of firm.

NOTE :- The drawings of individual components enclosed are for guidance purpose only indicating the general arrangements required. The supplier has to ensure compliance to the functional requirements given below which are mandatory. In case certain minor modifications to drawings of individual components are felt necessary by supplier to suit his design, the same may be incorporated by him but only after approval of OFMK.

Functional requirements

The basic functional requirements of system are as detailed below:-

01. There are two types of coolants used in engine cooling system viz. Water and antifreeze solution.
 - a) In case water is used as a cooling medium the alarm is required to actuate at 115°C (-3°C).
 - b) In case anti freeze solution is used as a cooling medium then alarm should actuate at 105°C (-3°C).
 - c) A selector switch is required on front panel of control unit to select as to which coolant is in use as the set point for both are different.
 - d) Two separate Alarm Annunciation windows are required one for high temperature of water and another for high temperature of antifreeze solution.

The respective window shall blink in case temperature exceeds the respective set temperature as noted at (a) and (b) above.
 - e) The selection of water/Antifreeze solution by selector switch will be done manually by driver depending on cooling medium actually in use.

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- ii. Push button for stopping the buzzer sound for 60 sec.

(2) Indications

- i. Power ON LED indication.
 - ii. One Alarm Annunciation window for Water temp High.
 - iii. One Alarm Annunciation window for Antifreeze solution temp High.
 - iv. One Alarm Annunciation window for Engine Lube Oil Pressure Low.
 - v. One 3 digit display for display of actual temperature of Coolant.
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- a) When selector switch is in " Water" position, the set point should be 115°C and window "Water temperature high" should actuate.
 - b) When selector switch is in "Antifreeze" position, the set point should be 105°C and window "Water temperature high" should actuate.
 - c) The pressure alarm should actuate when pressure is continuously less than 4.5 Kg/Cm² for 30 sec or more.
 - d) The annunciator window colour should be RED.
 - e) In case of alarm the window should start blinking and buzzer also should start sounding. When the fault gets cleared the blinking and sound should stop automatically.
 - f) Each window must have at least eight or more super bright LED's giving sufficient light output for clear visibility.
 - g) The blinking rate should be between 0.5 to 2 Hz.
 - h) Buzzer used for sound alarm should give 120 db sound output at 1 ft distance.
 - i) The system should be capable of working at the voltage of 27 ± 10% VDC unregulated when supply is from alternator and at 24 VDC when supply is coming through battery. The system should automatically adjust itself for above change in voltage. The system should not load the supply by a load more than 500 mA.
 - j) In case of alarm, the Push button for buzzer stop (sound stop) will be pressed by driver to stop the sound. However, the sound should stop for 60 ± 5 sec only and if the fault is persisting the sound should start coming again after above time.

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During above 60 seconds period the window should keep blinking.

Inspection Criteria

The test procedure shall be as per QAI requirements enclosed {CQA(ICV)/QAI/519/A (Revised) }. The unit is required to be designed in such a fashion so as to withstand all these requirements of tests.

(Copy of CQA(ICV)/QAI/519/A (REVISED) WITH OFMC NO. I26111 IS ENCLOSED).

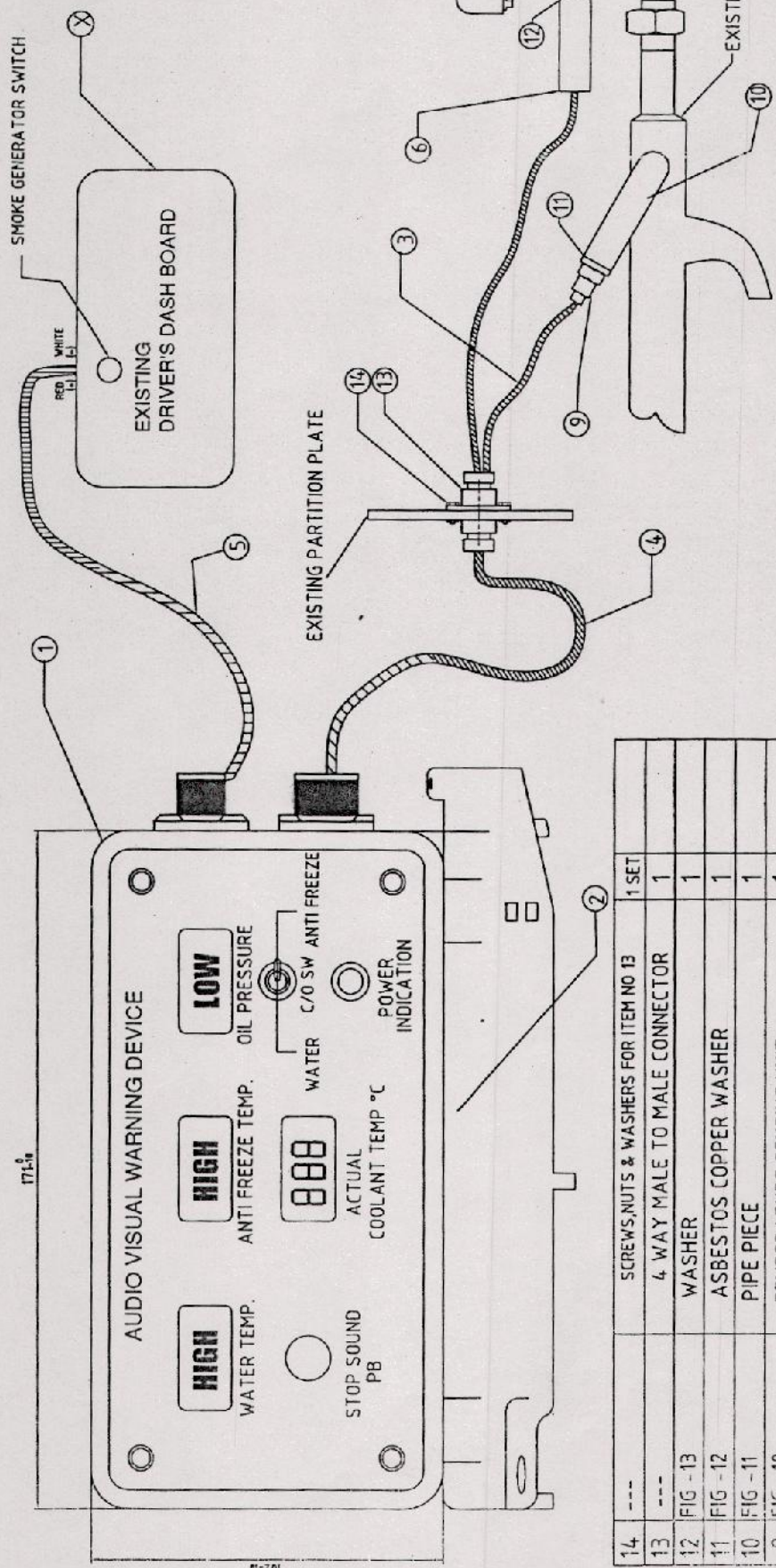
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Annexure - I

Sl No	Drawing No	Description	Qty	Remarks
1	Fig 2	Control Unit	1	
2	Fig 3	Mounting bracket	1	
3	Fig 4	Sensor cable Assy	1	
4	Fig 5	Control Panel Cable Assy	1	
5	Fig 6	Power supply Cable Assy	1	
6	Fig 7	Pressure switch	1	
7	Fig 8	4-way connector block for Pressure Transducer	1	
8	Fig 9	Blinding plug	1	
9	Fig 10	Temperature Sensing Unit	1	
10	Fig 11	Pipe Piece	1	
11	Fig 12	Asbestos Copper Washer	1	
12	Fig 13	Washer	1	
13	----	Standard Russian Male to Male connector to suit cables at sl 3 & 4 above	1	
14	----	Fixing screws, washers and nuts for connector at sl 13 above	1 lot	

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NO	REFERENCE	DESCRIPTION	QTY	REMARKS
14	---	SCREWS, NUTS & WASHERS FOR ITEM NO 13	1 SET	
13	---	4 WAY MALE TO MALE CONNECTOR	1	
12	FIG - 13	WASHER	1	
11	FIG - 12	ASBESTOS COPPER WASHER	1	
10	FIG - 11	PIPE PIECE	1	
9	FIG - 10	TEMPERATURE SENSING UNIT	1	
8	FIG - 9	BLINDING PLUG	1	
7	FIG - 8	4 - WAY CONNECTOR FOR PRESSURE TRANSDUCER	1	
6	FIG - 7	PRESSURE SWITCH	1	
5	FIG - 6	POWER SUPPLY CABLE ASSY	1	
4	FIG - 5	CONTROL PANEL CABLE ASSY	1	
3	FIG - 4	SENSOR CABLE ASSY	1	
2	FIG - 3	MOUNTING BRACKET	1	
1	FIG - 2	CONTROL UNIT	1	
NO	REFERENCE	DESCRIPTION	QTY	REMARKS

NOTE: -
FOR DETAILS OF FUNCTIONAL REQUIREMENTS REFER RELEVANT SPECIFICATION

FIG.1 -- GENERAL ASSY. OF AUDIO VISUAL WARNING DEVICE

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Fig 14. View of Control Unit with Mounting Bracket

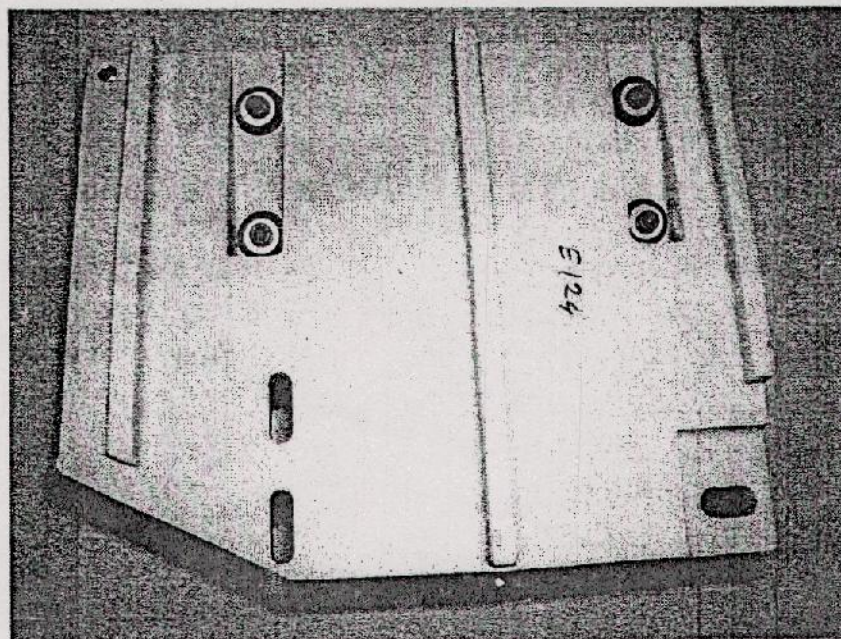


Fig. 15. Rear view of Bracket assembled with Control Unit
With fasteners and rubber washers

Note: Control Unit and Mounting Bracket to be supplied in assembled condition with suitable fasteners and rubber washers. The fixing arrangement to be such that the unit shall be capable to operate successfully in heavy jolt, bump and vibrations encountered in running of BMP vehicle. These requirements are as given in Inspection Criteria in Specification.

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