

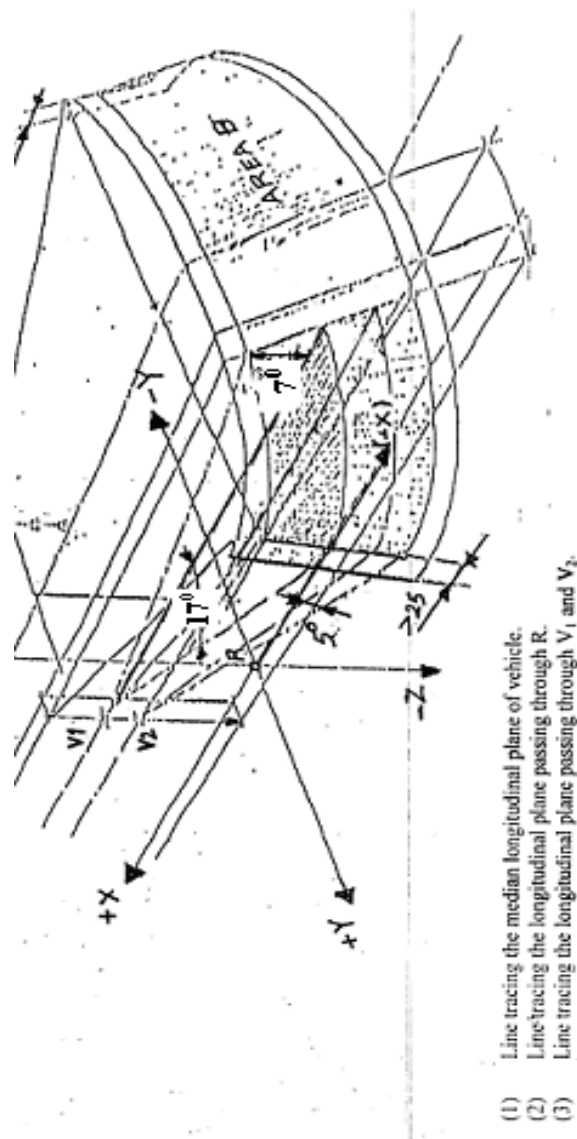
AMENDMENT NO. 1
TO
AIS – 019 / 2001
Automotive Vehicles -Windscreen Wiping and Washing System
for M1 Category of Vehicles

1.0 Page No. 20 , Annexure II, Figure 2

Substitute enclosed Figure 2 for existing Figure2.

ANNEXURE II

Figure : 2



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THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA
P. B. NO. 832, PUNE 411 004

ON BEHALF OF
AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE

UNDER
CENTRAL MOTOR VEHICLE RULES - TECHNICAL STANDING COMMITTEE

SET-UP BY
MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)

GOVERNMENT OF INDIA

February 2007

2/2

AIS - 019/2001

AUTOMOTIVE INDUSTRY STANDARD

**Automotive Vehicles –
Windscreen Wiping and Washing
System for M1 Category of Vehicles**

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GOVERNMENT OF INDIA

June 2001

Status chart of the Standard to be used by the purchaser
for updating the record

Sr. No.	Corr-igenda.	Amend-ment	Revision	Date	Remark	Misc.

General remarks :

Introduction

The Government of India felt the need for a permanent agency to expedite the publication of standards and development of test facilities in parallel when the work on the preparation of the standards is going on, as the development of improved safety critical parts can be undertaken only after the publication of the standard and commissioning of test facilities. To this end, the Ministry of Surface Transport (MOST) has constituted a permanent Automotive Industry Standard Committee (AISC) vide order No. RT-11028/11/97-MVL dated September 15, 1997. The standards prepared by AISC will be approved by the permanent CMVR Technical Standing Committee (CTSC). After approval, the Automotive Research Association of India, (ARAI), Pune, being the secretariat of the AIS Committee, has published this standard. For better dissemination of this information ARAI may publish this document on their Web site.

In the process of harmonizing the Indian Standards with the EEC/ECE Standards the requirements of the windscreen wiping system were deliberated.

There is no ECE regulation as such hence; the AIS:019 is based on 78/318/EEC. The Ozone Resistance Test for the wiper blade has been additionally put as a check on the rubber quality used in the blades. Similarly considering the Indian Environmental conditions the cold test temperature has been changed from -18° to -10°C .

The Committee responsible for preparation of this standard is given in Annexure-V.

Automotive Vehicles - Windscreen Wiping And Washing System for M1 Category of Vehicles

1.0 SCOPE

1.1.1 This standard is applicable for Windscreen Wiping and Washing Systems for M₁ Class of vehicles.

1.2 Its purpose is to ensure good visibility under adverse weather conditions by specifying the requirements for the windscreen-wiper and windscreen-washer systems of category M₁ vehicles.

1.2.1 The requirements of this Standard are so worded as to apply to category M₁ vehicles in which the driver is on the right.

2.0 DEFINITIONS

2.1 Vehicle type with regard to its windscreen-wiper and windscreen-washer systems.

Vehicle type with regard to its windscreen – wiper and windscreen – washer system means vehicles, which do not differ in such essential respects as;

2.1.1 The external and internal forms and arrangements within the area which may affect visibility;

2.1.2 The shape, dimensions and characteristics of the windscreen and its mounting; where these are likely to affect the vision areas covered by Annex. -II

2.1.3 The characteristics of the windscreen-wiper and windscreen-washer systems.

2.2 Three-dimensional reference grid

‘Three-dimensional reference grid’ means a reference system which consists of a vertical longitudinal plane X-Z, a horizontal plane X-Y and a vertical transverse plane Y-Z (see Figure 2 of Annex. I). The grid is used to determine the dimensional relationships between the positions of design points on drawings and their position on the actual vehicle. The procedure for situating the vehicle relative to the grid is specified in Annex. I; all coordinates referred to ground zero shall be based on a vehicle in running order plus one front-seat passenger, the mass of the passenger being 75 kg ± 1%.

2.2.1 Vehicles fitted with suspension enabling their ground clearance to be adjusted shall be tested under the normal conditions of use specified by the manufacturer.

2.3 Primary reference marks

‘Primary reference marks’ means holes, surfaces, marks and identification signs on the vehicle body. The type of reference mark used and the position of each mark relative to X, Y and Z co-ordinates of the three-dimensional reference grid and to a design ground plane shall be specified by the vehicle manufacturer. These marks may be the control points used for body assembly purposes.

2.4 Actual torso angle

‘Actual torso angle’ means the angle measured between a vertical line through the “H” point and the torso line using the back angle quadrant on the 3 DH machine. The actual torso angle corresponds theoretically to the design torso angle.

2.5 Design torso angle

“Design torso angle” means the angle measured between a vertical line through the “R” point and the torso line in a position which corresponds to the design position of the seat-back established by the vehicle manufacturer;

2.6 ‘V’ points

‘V’ points means points whose position in the passenger compartment is determined by vertical longitudinal planes passing through the centres of the outermost designated seating positions on the front seat and in relation to the R point and the design angle of the seat back, which points are used for verifying compliance with the field of vision requirements (See Annex. II).

2.7 ‘R’ point or seating reference point

‘R’ point, or ‘seating reference point’ means a design point defined by the vehicle manufacturer for each seating position and established with respect to the three –dimensional reference system

2.8 ‘H’ point

‘H’ point means the pivot center of the torso and thigh of the 3 DH machine installed in the vehicle seat in accordance with Paragraph 7 below.

2.9 Windscreen datum points

‘Windscreen datum points’ means points situated at the intersection with the windscreen of lines radiating forward from the V points to the outer surface of the windscreen.

- 2.10 Transparent area of a windscreen
- ‘Transparent area of a windscreen’ means that area of a vehicle windscreen or other glazed surface whose light transmittance, measured at right angles to the surface is not less than 70%.
- 2.11 Horizontal seat-adjustment range
- ‘Horizontal seat-adjustment range’ means the range of normal driving positions designated by the vehicle manufacturer for the adjustment of the driver’s seat in the direction of the X axis (See 2.3).
- 2.12 Extended seat-adjustment range
- ‘Extended seat-adjustment range’ means the range designated by the vehicle manufacturer for the adjustment of the seat in the direction of X axis (See 2.3) beyond the range of normal driving positions and used for converting seats into beds or facilitating entry into the vehicle.
- 2.13 Windscreen-wiper system
- ‘Windscreen-wiper system’ means the system consisting of a device for wiping the outer face of the windscreen, together with the accessories and control necessary for starting and stopping the device.
- 2.14 Windscreen-wiper field
- ‘Windscreen-wiper field’ means the area of the outer face of a wet windscreen that is swept by the windscreen wiper.
- 2.15 Windscreen-washer system
- ‘Windscreen-washer system’ means the system consisting of a device for storing a fluid and applying it to the outer face of the windscreen, together with the controls necessary for starting and stopping the device.
- 2.16 Windscreen-washer control
- ‘Windscreen-washer control means a device or accessory for starting and stopping the windscreen washer systems. Starting and stopping may be co-ordinated with the operation of the windscreen wiper or be totally independent of it.
- 2.17 Windscreen-washer pump
- ‘Windscreen-washer pump’ means a device for transferring the windscreen-washer fluid from the reservoir to the outer face of the windscreen.

2.18 Nozzle
`Nozzle' means a device which serves to direct the windscreen-washer fluid to the windscreen.

2.19 Performance of a windscreen-washer system
`Performance of a windscreen-washer system' means the ability of a windscreen-washer system to apply fluid to the target area of the windscreen without leakage or disconnection of a tube of the washer system occurring when the system is used normally.

3.0 APPLICATIONS FOR CMVR TYPE-APPROVAL

3.1 Application for CMVR type-approval for a vehicle type in respect of its windscreen-wiper and windscreen-washer systems.

3.1.1 The application for CMVR type-approval of a vehicle type with regard to its windscreen wiper and windscreen-washer systems must be submitted by the vehicle manufacturer or by his authorized representative.

3.1.2 It must be accompanied by the following documents containing the information specified below:

3.1.2.1 A description of the vehicle referring to the criteria mentioned in 2.2, together with dimensional drawings and either a photograph or an exploded view of the passenger compartment.

3.1.2.2 Particulars of the primary reference marks in sufficient detail to enable them to be readily identified and the position of each in relation to the others and to the 'R' point to be verified;

3.1.2.3 A technical description of the windscreen-wiper and windscreen-washer systems together with relevant data in sufficient detail.

3.1.2.4 A vehicle representative of the vehicle type to be approved must be submitted to the technical service conducting the type-approval tests.

4.0 APPLICATION FOR CMVR TYPE-APPROVAL FOR A TYPE OF WINDSCREEN-WASHER SYSTEM AS A SEPARATE TECHNICAL UNIT.

4.1 The applications for CMVR type-approval for a type of windscreen-washer system as a separate technical unit must be submitted by the vehicle manufacturer or by the manufacturer of the windscreen-washer system.

4.2 For each type of windscreen-washer system the application shall be accompanied by;

4.2.1 Documents giving a description of the system and of its technical characteristics;

4.2.2 One specimen of the type of the system. The competent authorities may, if they deem it necessary, request a further specimen. The specimens must bear in a clearly legible and indelible manner the applicant's trade name or mark and an identification of the type.

5.0 SPECIFICATIONS

5.1 Windscreen-wiper system.

5.1.1 Every vehicle must be equipped with at least one automatic windscreen-wiper system, i.e; a system which when the vehicle's engine is running is able to function without any action by the driver other than that needed for starting and stopping the windscreen wiper.

5.1.2 The windscreen wiper field must cover not less than 80% of vision area B as a defined in 2.3 of Annex. II.

5.1.2.1 In addition the windscreen wiper field must cover not less than 98% of vision area A as defined in 2.2 of Annex II.

5.1.3 The windscreen wiper must have at least two sweep frequencies:

5.1.3.1 One of not less than 45 cycles/minute (a cycle being the forward and return movement of the windscreen wiper);

5.1.3.2 One of not less than 10 and not more than 55 cycles/minute.

5.1.3.3 The difference between the highest and at least one of the lower sweep frequencies must be at least 15 cycles/minute.

- 5.1.4 The sweep frequencies prescribed in 5.1.3 must be achieved as indicated in 6.1.1 to 6.1.6 and 6.1.8
- 5.1.5 Intermittent operation windscreen-wiper system may be used for the purposes of complying with the requirements 5.1.3 provided that one of the frequencies complies with the requirements of 5.1.3.1 and that one of the other frequencies obtained when the main frequency is interrupted is not less than 10 cycles/minute.
- 5.1.6 When the windscreen-wiper system is stopped by the use of the windscreen-wiper control, the blades must return automatically to their position of rest.
- 5.1.7 The system must be capable of withstanding stalling for 15 seconds. The use of automatic circuit protection device is allowed, provided that for possible resetting no action is required on controls other than the windscreen wiper control. The test procedure and conditions are set out in 6.1.7.
- 5.1.8 The windscreen wiper field must meet the minimum requirements of 5.1.2 when the wipers are tested at a sweep frequency conforming to the provisions of 5.1.3.2. under the conditions set out in 6.1.10.
- 5.1.9 The aerodynamic effects associated with the windscreen's size and shape, and the efficiency of the windscreen-wiper system, must be determined under the following conditions:
- 5.1.9.1 When subjected to a relative air speed equal to 80% of the vehicle's maximum speed but not exceeding 160 km/h, the windscreen-wiper systems, operating at maximum frequency, must continue to sweep a field as specified in 5.1.2.1, with the same efficiency and under the same conditions as set out in item 6.1.10.2
- 5.1.10 The wiper-arm mounting must enable the wiper arm to be displaced from its position on the windscreen so as to allow the windscreen to be manually cleaned. This requirement does not apply to devices which, when parked, are in an area of the windscreen which is hidden from view by parts to the vehicle (such as the bonnet, instrument panel etc.)
- 5.1.11 The windscreen-wiper system must be capable of operating for two minutes on a dry windscreen with the outside temperature at -10 ± 2 °C under the conditions specified in 6.1.11.
- 5.2 Windscreen-washer system
- 5.2.1 Every vehicle must be fitted with a windscreen-washer system which is capable of withstanding the loads produced when the nozzles are plugged and the system is actuated in accordance with the procedure set out in 6.2.1 and 6.2.2.

- 5.2.2 The performance of the windscreen-washer system shall not be adversely affected by exposure to the temperature cycles laid down in points 6.2.3 and 6.2.4.
- 5.2.3 The windscreen-washer system must be capable of delivering sufficient liquid to clear 60% of the area defined in 2.2 of Annex II under the conditions described in 6.2.5
- 5.2.4 The capacity of the reservoir containing the liquid must not be less than one litre.
- 5.2.5 Test Procedure and Test Requirements for Windscreen Wiper Blade are given in Annex - IV.

6.0 TEST PROCEDURE

- 6.1 Windscreen – wiper system
 - 6.1.1 The tests described below must be carried out under the following conditions, unless otherwise specified;
 - 6.1.2 The ambient temperature must not be less than 10°C and more than 40 °C;
 - 6.1.3 The windscreen must be kept constantly wet;
 - 6.1.4 In the case of an electric windscreen-wiper system the following additional conditions must be met;
 - 6.1.4.1 The battery must be fully charged;
 - 6.1.4.2 The engine must be running at 30% of the speed at which it develops maximum power;
 - 6.1.4.3 The dipped – beam headlamps must be switched on;
 - 6.1.4.4 The heating and/or ventilation systems, if fitted, must be operating at maximum electrical consumption.
 - 6.1.4.5 The defrosting and demisting systems, if fitted, must be operating at maximum electrical consumption.
 - 6.1.5 Compressed air operated or vacuum operated windscreen-wiper systems must be able to function continuously at the prescribed sweep frequencies whatever the engine speed or engine load.
 - 6.1.6 The sweep frequencies of windscreen-wiper systems must comply with the requirements of 5.1.3 after a preliminary operating time of 20 minutes on a wet surface.

- 6.1.7 The requirements of 5.1.7 shall be satisfied when the wiper arms are restrained in their vertical position for a period of 15 seconds with the windscreen-wiper control set at the maximum sweep frequency.
- 6.1.8 The outer face of the windscreen shall be thoroughly degreased by means of methylated spirit or an equivalent degreasing agent. After drying, a solution of ammonia of not less than 3% and not more than 10% shall be applied. The surface shall be allowed to dry again and shall then be wiped with a dry cotton cloth.
- 6.1.9 A coating of the test mixture (see Annex III) shall be applied uniformly to the outer surface of the windscreen and allowed to dry.
- 6.1.10 For the purpose of measuring the field of the windscreen-wiper system, prescribed in 5.1.2 and 5.1.2.1, the outer face of the windscreen shall be treated as indicated in 6.1.8 and 6.1.9 or by some other equivalent method.
- 6.1.10.1 A trace of the windscreen-wiper field shall be made and compared with a trace of the vision areas specified in 5.1.2 and 5.1.2.1 in order to verify that the requirements are met.
- 6.1.10.2 Where the outer face of the windscreen has been prepared as described in items 6.1.8 and 6.1.9 the windscreen washer may be used in all of the tests.
- 6.1.11 The requirements of 5.1.11 shall be met after the vehicle has been in an ambient temperature of -10 ± 2 °C for a minimum of four hours. The windscreen-wiper system is to set to operate under the conditions set out in 6.1.4 with the control at the position of maximum frequency. There are no requirements regarding the field swept.
- 6.2 Windscreen-washer system
Test conditions
- 6.2.1 Test No. 1
- 6.2.1.1 The windscreen-washer system shall be filled with water, fully primed, and placed in an ambient temperature of 25 ± 10 °C for a minimum of four hours. All the nozzles shall be plugged and the windscreen-washer control actuated six times in one minute, each time for at least three seconds. If the system is powered by the muscular energy of the driver, the force applied shall be that shown in the following table:

Type of Pump	Force to be applied
Hand	11 to 13.5 daN
Foot	40 to 44.5 daN

- 6.2.1.2 For electric pumps, the test voltage must be no less than the rated voltage without exceeding it by more than two volts.
- 6.2.1.3 The performance of the windscreen-washer system at the end of the test must be as defined in 5.2.1
- 6.2.2 Test No. 2
The windscreen-washer system shall be filled with water, fully primed, and placed in an ambient temperature of $-10 \pm 2^{\circ}\text{C}$ for a minimum of four hours. The windscreen washer control shall be activated six times in one minute, each time for at least three seconds using the force prescribed in 6.2.1. The system shall then be placed in an ambient temperature of $25 \pm 10^{\circ}\text{C}$ until the ice has completely thawed but in any case no longer than four hours. The performance of the windscreen-washer system shall then be verified by actuating it as prescribed in 6.2.1.
- 6.2.3 Test No. 3 (Low temperature exposure test)
- 6.2.3.1 The windscreen-washer system shall be filled with water, fully primed, and placed in an ambient temperature of $-10 \pm 2^{\circ}\text{C}$ for a minimum of four hours so that the total mass of the water in the washer system is frozen. The system shall then be placed in an ambient temperature of $25 \pm 10^{\circ}\text{C}$ until the ice has completely thawed but in any case no longer than 4 Hrs. This freeze/thaw cycle shall be repeated six times. The performance of the windscreen-washer system shall then be verified by actuating it as prescribed in 6.2.1.
- 6.2.3.2 The windscreen-washer system shall be filled and fully primed with a low-temperature windscreen-washer fluid consisting of a 50% solution of methanol, or alternatively isopropyl alcohol in water of hardness not greater than 205 gm/tonne.
- 6.2.3.2.1 The system shall be placed in an ambient temperature of $-10 \pm 2^{\circ}\text{C}$ for a minimum of four hours. The performance of the windscreen-washer system shall be verified by actuating it as prescribed in 6.2.1.
- 6.2.4 Test no. 4 (High – temperature exposure test)
- 6.2.4.1 The windscreen-washer system shall be filled with water, fully primed, and placed in an ambient temperature of $80 \pm 3^{\circ}\text{C}$ for a minimum of eight hours and then in an ambient temperature of $25 \pm 10^{\circ}\text{C}$. When the temperature has stabilised, the performance of the windscreen-washer system shall be verified by actuating it as prescribed in 6.2.1
- 6.2.4.2 If part of the windscreen-washer system is situated in the engine compartment, the system shall be filled with water, fully primed, and placed in an ambient temperature of $80 \pm 3^{\circ}\text{C}$ for a minimum of eight hours. The performance of the windscreen-washer system shall be verified by actuating it as prescribed in 6.2.1.

- 6.2.4.3 If no part of the windscreen-washer system is situated in the engine compartment, the system shall be filled with water, fully primed, and placed in an ambient temperature of 60 ± 3 ° C for a minimum of eight hours. The performance of the windscreen washer system shall be verified by actuating it as prescribed in 6.2.1.
- 6.2.5 Test No. 5 (Windscreen-washer system capability test prescribed in 5.2.3).
- 6.2.5.1 The windscreen-washer system shall be filled with water and fully primed. With the vehicle stationary and no significant wind effect, the washer nozzle or nozzles shall be pointed towards the target area of the outer face of the windscreen. If the system is powered by the muscular energy of the driver the force required to do this shall not exceed that specified in 6.2.1.1. If the system is powered by an electric pump the requirements of 6.1.4 shall apply.
- 6.2.5.2 The outer face of the windscreen shall be treated as prescribed in 6.1.8 and 6.1.9.
- 6.2.5.3 The windscreen-washer system shall then be actuated in the manner indicated by the manufacturer for 10 cycles of automatic operation of the windscreen-wiper system at maximum frequency and the proportion of the vision area defined in 2.2 of Annex II that is cleaned shall then be measured.
- 6.3 All the windscreen-washer tests described in 6.2.1 to 6.2.4 shall be carried out on one and the same windscreen-washer system, either attached to a vehicle of a type for which CMVR type-approval has been sought, or not attached to a vehicle, in the case of a system for which CMVR type-approval as a separate technical unit has been requested.

7.0 PROCEDURE FOR DETERMINING THE H POINT AND THE ACTUAL SEAT - BACK ANGLE AND FOR VERIFYING THE RELATIVE POSITIONS OF THE 'R' AND 'H' POINTS AND THE RELATIONSHIP BETWEEN THE DESIGN SEAT-BACK ANGLE AND THE ACTUAL SEAT - BACK ANGLE

- 7.1 The vehicle shall be preconditioned at the manufacturer's discretion, at a temperature of 25 ± 10 °C to ensure that the seat material reaches room temperature. If the seat to be checked has never been sat upon, a 70 to 80 kg person or device shall sit on the seat twice for one minute to flex the cushion and back. At the manufacturer's request all seat assemblies shall remain unloaded for a minimum period of 30 minutes prior to installation of the 3 DH machine.

- 7.2 The vehicle attitude is kept as per the co-ordinates of “Fiducial marks” (holes, surfaces, marks or indentations on the vehicle body as defined by the manufacturer) in the three-dimensional reference system.
- 7.3 The seat, if it is adjustable, shall be adjusted first to the rearmost normal driving or riding position, as indicated by the vehicle manufacturer, taking into consideration only the longitudinal adjustment of the seat, excluding seat travel used for purpose other than normal driving or riding positions. Where other modes of seat adjustment exists (vertical, angular, seat-Back, etc.) these will be then adjusted to the position specified by the vehicle manufacturer. For suspension seats, the vertical position shall be rigidly fixed corresponding to a normal driving position as specified by the manufacturer.
- 7.4 Place the seat and back assembly of the 3 DH machine so that the centre plane of the occupant (C/LO) coincides with the centreplane of the 3DH machine. At the manufacturer’s request, the 3DH machine may be moved inboard with respect to the C/LO if the 3DH machine is located so far outboard that the seat edge will not permit leveling of the 3 DH machine.
- 7.5 Attach the foot and lower leg assemblies to the seat pan assembly, either individually or by using the T-bar and lower leg assembly. A line through the “H” point sight buttons shall be parallel to the ground and perpendicular to the longitudinal centreplane of the seat.
- 7.6 Adjust the feet and leg positions of the 3 DH machine as follows
- 7.6.1 Designated seating position; driver and outside front passenger.
- 7.6.1.1 Both feet and leg assemblies shall be moved forward in such a way that the feet take up natural positions on the floor, between the operating pedals if necessary. Where possible the left foot shall be located approximately the same distance to the left of the centreplane of the 3 DH machine as the right foot is to the right. The spirit level verifying the transverse orientation of the 3 DH machine is brought to the horizontal by readjustment of the seat pan if necessary or by adjusting the leg and foot assemblies towards the rear. The line passing through the “H” point sight button shall be maintained perpendicular to the longitudinal centreplane of the seat.
- 7.6.1.2 If the left leg cannot be kept parallel to the right leg and the left foot cannot be supported by the structure move the left foot until it is supported. The alignment of the sight button shall be maintained.
- 7.7 Apply lower leg and thigh weights and level the 3 DH machine
- 7.8 Tilt the back pan forward against the forward stop and draw the 3 DH machine away from the seat-back using the T-bar . Reposition the 3 DH machine on the seat by one of the following methods

- 7.8.1 If the 3 DH machine tends to slide rearward, use the following procedure. Allow the 3 DH machine to slide rearward until a forward horizontal restraining load on the T-bar is no longer required i.e. until the seat pan contacts the seat-back. If necessary, reposition the lower leg.
- 7.8.2 If the 3 DH machine does not tend to slide rearward, use the following procedure. Slide the 3 DH machine rearward by applying a horizontal rearward load to the T-bar until the seat pan contacts the seat-back.
- 7.9 Apply a 100 ± 10 N load to the back and pan assembly of the 3 DH machine at the intersection of the hip angle quadrant and the T-bar housing. The direction of the load application shall be maintained along a line passing by the above intersection to a point just above the thigh bar housing. Then carefully return the back pan to the seat-back. Care must be exercised throughout the remainder of the procedure to prevent the 3 DH machine from sliding forward.
- 7.10 Install the right and left buttock weights and then, alternately, the eight torso weights. Maintain the 3 DH machine level.
- 7.11 Take all measurements
- 7.11.1 The co-ordinates of the “H” point are measured with respect to the three-dimensional reference system.
- 7.11.2 The actual torso angle is read on the back angle quadrant of the 3 DH machine with the probe in its fully rearward position.
- 7.12 If a re-run of the installation of the 3 DH machine is desired, the seat assembly should remain unloaded for a minimum period of 30 minutes prior to the re-run. The 3 DH machine should not be left loaded on the seat assembly longer than the time required to perform the test.
- 7.13 If the seats in the same row can be regarded as similar (bench seat, identical seats, etc.) only one “H” point and one “actual torso angle” shall be determined for each row of seats.
- 7.13.1 In the case of the front row, the driver’s seat
- 7.13.2 In the case of the rear row or rows an outer seat.

8.0 CONFORMITY OF PRODUCTION

Whole vehicle COP procedure laid down by the Ministry of Road Transport and Highways shall be applicable.

ANNEXURE - I**METHOD FOR DETERMINING THE DIMENSIONAL RELATIONSHIP BETWEEN THE VEHICLES'S PRIMARY REFERENCE MARKS AND THE THREE DIMENSIONAL REFERENCE GRID****1.0 RELATIONSHIP BETWEEN REFERENCE GRID AND VEHICLE'S PRIMARY REFERENCE MARKS**

To verify specific dimensions on or within a vehicle submitted for type approval in accordance with this standard, the relationship between the coordinates of the three-dimensional reference grid defined in 2.3 of this standard have been laid out at the initial vehicle-design stage, and the positions of the primary reference marks defined in 2.4 of this standard must be established accurately so that specific points on the vehicle manufacturer's drawings can be located on an actual vehicle produced from those drawings.

2.0 METHOD FOR ESTABLISHING RELATIONSHIP OF REFERENCE GRID TO REFERENCE MARKS

For this purpose, a ground reference plane shall be constructed, which is marked with the X-X measurement and the Y-Y measurement. The method of achieving this is set out in Figure 3 of this Annex, the reference plane being a hard, flat, level surface on which the vehicle stands, and which has two measuring scales firmly fixed to its surface; these shall be graduated in millimeters, the X-X scale being not less than 8 m long, and the Y-Y scale not less than 4 m long. The two scales must be set at right angles to each other as shown in Figure 3 of this Annex. The intersection of the scales is ground zero.

3.0 EXAMINATION OF THE REFERENCE PLANE

In order to provide for minor variations in the level of the reference plane or test area, it is necessary to measure the deviations from ground zero along both the X and Y scales at intervals of 250 mm and to record the readings obtained so that corrections can be made when checking the vehicle.

4.0 ACTUAL TEST ATTITUDE

In order to provide for minor changes in suspension height, etc. it is necessary to have available a means of bringing the primary reference marks to the correct coordinate positions relative to the design attitude before further measurements are taken. In addition, it must be possible to make minor lateral and/or longitudinal adjustments to the vehicle's position so as to place it correctly in relation to the reference grid.

5. RESULTS

The vehicle having been correctly placed relative to the reference grid and in its design attitude, the site of the necessary points for studying the forward visibility requirements can be readily determined. Test methods to determine these requirements may include the use of theodolites, light sources or shadow devices, or any other method which can be shown to give equivalent results.

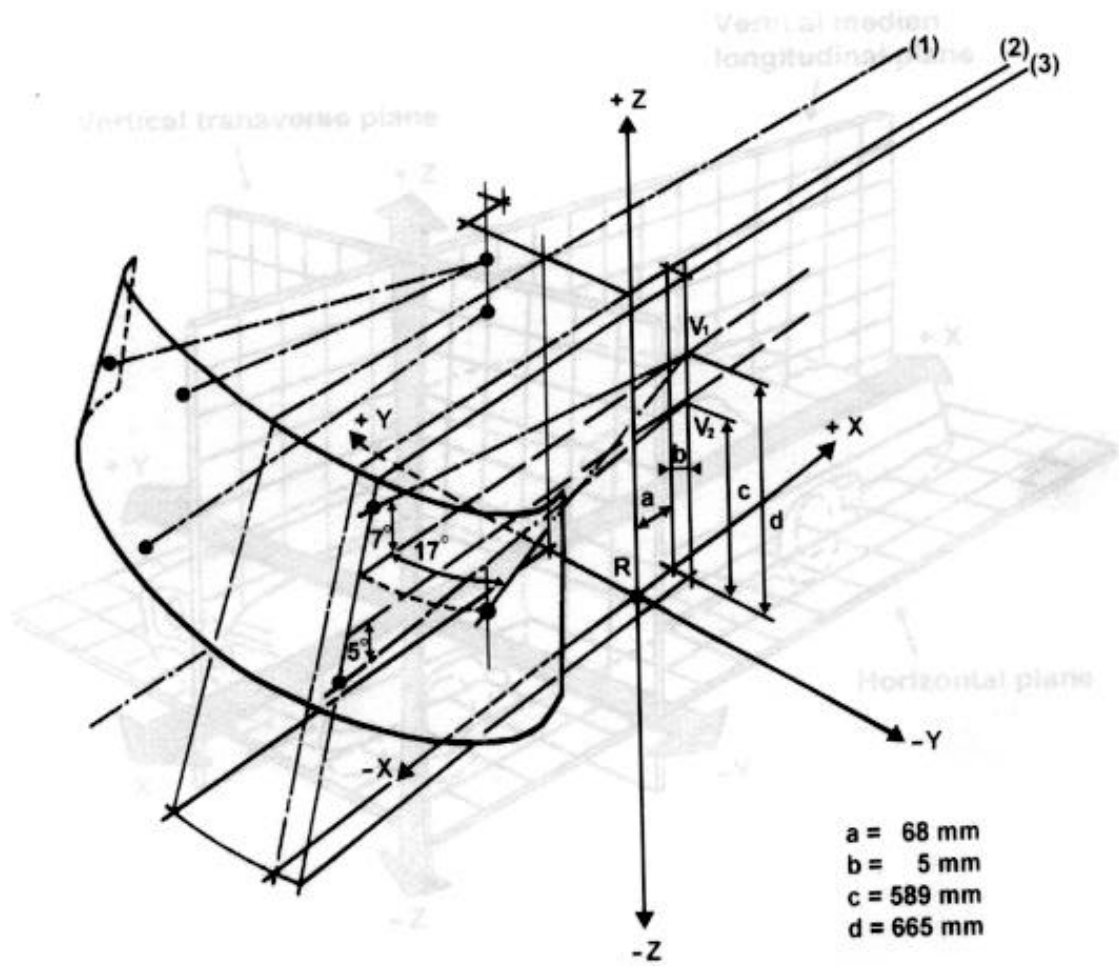


Figure 2

- (1) Line tracing the median longitudinal plane of the vehicle.
- (2) Line tracing the vertical plane passing through R.
- (3) Line tracing the vertical plane passing through V_1 and V_2 .

Figure 1

Determination Of 'V' Points

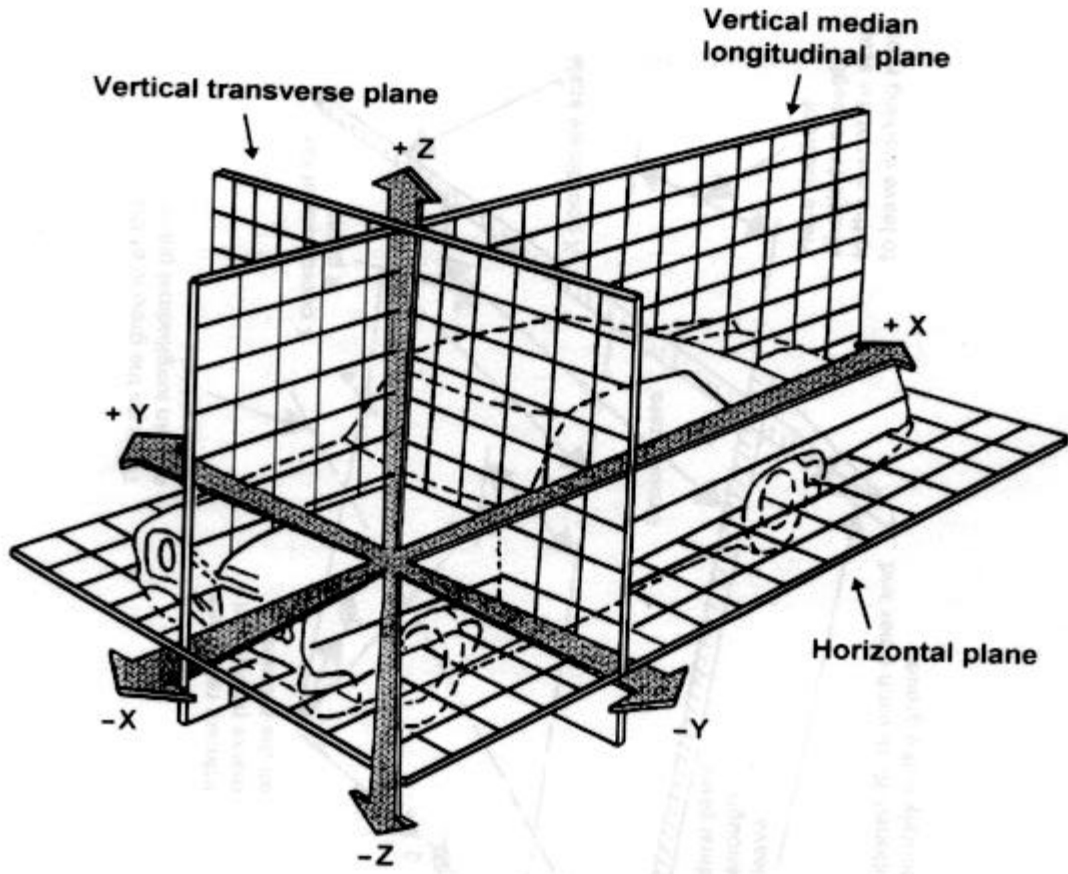


Figure 2

Three-dimensional reference grid

ANNEX IV

PROCEDURE FOR DETERMINING VISION AREAS ON WINDSCREENS OF VEHICLES IN RELATION TO THE V POINT

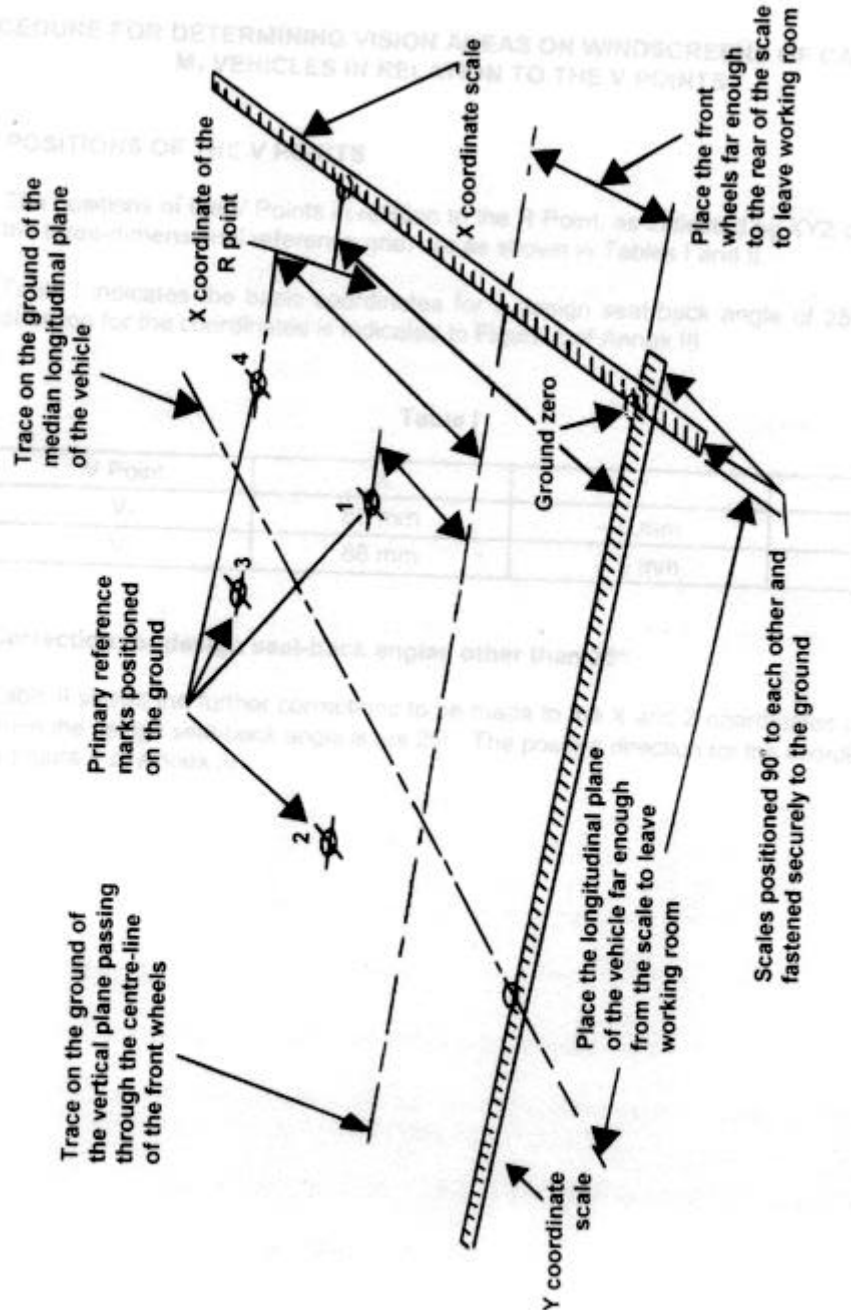


Figure 3

Level work space

ANNEXURE - II

PROCEDURE FOR DETERMINING VISION AREAS ON WINDSCREENS OF CATEGORY M₁ VEHICLES IN RELATION TO THE 'V' POINTS

1.0 POSITIONS OF THE 'V' POINTS

1.1 The positions of the 'V' points in relation to the R point, as indicated by XYZ coordinates from the three-dimensional reference grid, are as shown in Tables I and II.

1.2 Table I indicates the basic coordinates for a design seat-back angle of 25°. The positive direction for the coordinates is indicated in Figure I of Annex. I.

TABLE I

'V' point	X	Y	Z
V ₁	68 mm.	+ 5 mm.	665 mm.
V ₂	68 mm.	+ 5 mm.	589 mm.

1.3 Correction for design seat-back angles other than 25°.

1.3.1 Table II shows the further corrections to be made to the X and z coordinates of each V point when the design seat-back angle is not 25°. The positive direction for the coordinates is shown in Figure 1 of Annex. I.

TABLE II

Seat-back angle (in °)	Horizontal coordinates Δ X	Vertical coordinates Δ Z	Seat-back angle (in °)	Horizontal coordinates Δ X	Vertical coordinates Δ Z
5	- 186 mm	28 mm	23	- 18 mm	5 mm
6	- 177 mm	27 mm	24	- 9 mm	3 mm
7	- 167 mm	27 mm	25	0 mm	0 mm
8	- 157 mm	27 mm	26	9 mm	- 3 mm
9	- 147 mm	26 mm	27	17 mm	- 5 mm
10	- 137 mm	25 mm	28	26 mm	- 8 mm
11	- 128 mm	24 mm	29	34 mm	- 11 mm
12	- 118 mm	23 mm	30	43 mm	- 14 mm
13	- 109 mm	22 mm	31	51 mm	- 18 mm
14	- 99 mm	21 mm	32	59 mm	- 21 mm
15	- 90 mm	20 mm	33	67 mm	- 24 mm
16	- 81 mm	18 mm	34	76 mm	- 28 mm
17	- 72 mm	17 mm	35	84 mm	- 32 mm
18	- 62 mm	15 mm	36	92 mm	- 35 mm
19	- 53 mm	13 mm	37	100 mm	- 39 mm
20	- 44 mm	11 mm	38	108 mm	- 43 mm
21	- 35 mm	9 mm	39	115 mm	- 48 mm
22	- 26 mm	7 mm	40	123 mm	- 52 mm

2.0 VISION AREAS

2.1 Two vision areas shall be determined from the V points.

2.2 Vision area A is the area on the outer surface of the windscreen bounded by the following four planes extending forward from the V point (see Figure 1)

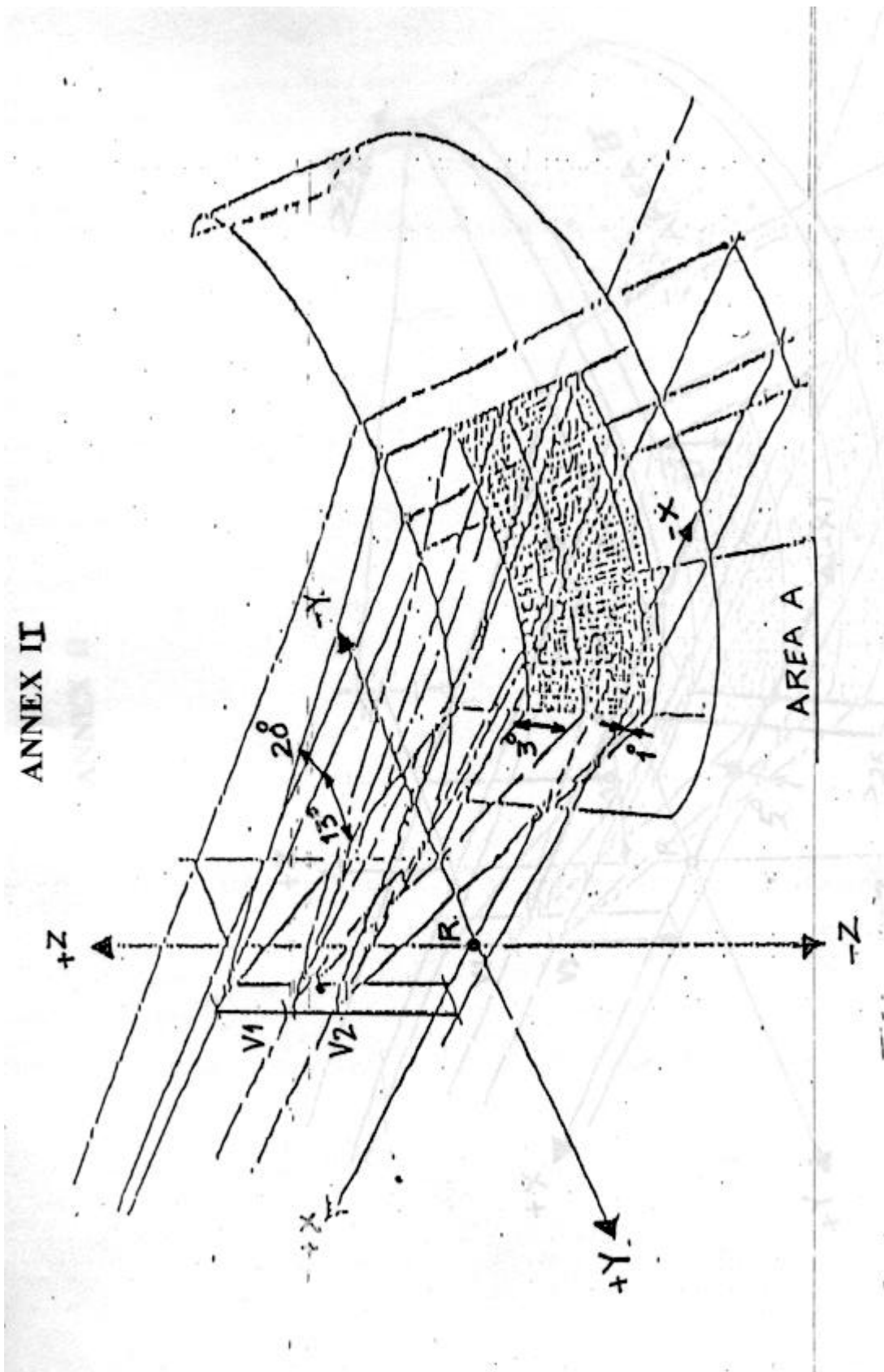
- A vertical plane passing through V_1 and V_2 and at an angle of 13° to the left of the X axis;
- A plane parallel to the Y axis, passing through V_1 and at an upward angle of 3° from the X axis;
- A plane parallel to the Y axis, passing through V_2 and at a downward angle of 1° from the X axis;
- A vertical plane passing through V_1 and V_2 and at an angle of 20° to the right of the X axis;
- A plane symmetrical to the former plane in relation to the median longitudinal plane of the vehicle.

2.3 Vision area B is the area of the outer surface of the Windscreen, which is more than 25 mm from the outer edge of the transparent area and is bounded by the intersection of the following four planes with the outer surface of the windscreen (see fig. 2)

- A plane parallel to the Y axis, passing through V_1 and at an upward angle of 7° from the X axis;
- A plane parallel to the Y axis, passing through V_2 and at a downward angle of 5° from the X axis;
- A vertical plane passing through V_1 and V_2 and at an angle of 17° to the left of the X axis;
- A plane symmetrical to the former plane in relation to the median longitudinal plane of the vehicle.

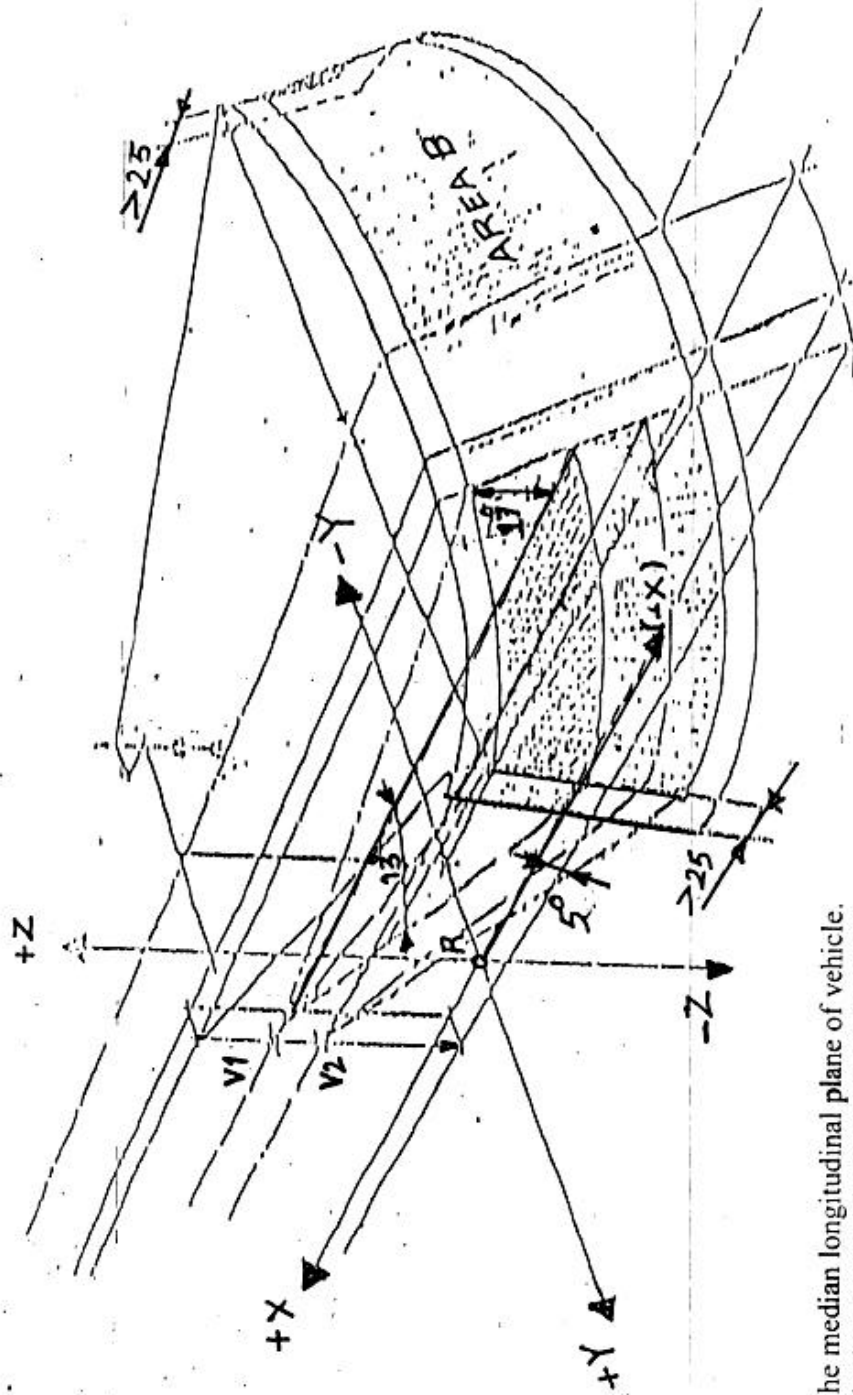
ANNEXURE-II

Figure - 1



ANNEXURE-II

Figure - 2



- (1) Line tracing the median longitudinal plane of vehicle.
- (2) Line tracing the longitudinal plane passing through R.
- (3) Line tracing the longitudinal plane passing through V₁ and V₂.

ANNEXURE - III**TEST – MIXTURE SPECIFICATION FOR WINDSCREEN WIPER SYSTEM AND WINDSCREEN – WASHER SYSTEM TESTS**

The test mixture referred to in 6.1.9 of this standard shall consider of the following (by volume): 92.5% water (with a hardness of less than 205 g/tonne after evaporation) 5% aqueous saturated salt (sodium chloride) solution and 2.5 % dust constituted in accordance with tables I and II.

TABLE I
Analysis of test dust

Constitute	% mass
SiO ₂	67 to 69
Fe ₂ O ₃	3 to 5
Al ₂ O ₃	15 to 17
CaO	2 to 4
MgO	0.5 to 1.5
Alkalis	3 to 5
Ignition loss	2 to 3

TABLE II
Particle – size distribution of coarse- grade dust

Particle size (in μ m)	Particle size distribution (%)
0 to 5	12 ± 2
5 to 10	12 ± 3
10 to 20	14 ± 3
20 to 40	23 ± 3
40 to 80	30 ± 3
80 to 200	9 ± 3

ANNEXURE - IV

WINDSCREEN WIPER BLADE

1.0 Aging Test

The wiper blade element of the Wiper blade assembly shall withstand the ozone test.

1.1 Preparation of wiper blade element

A 150 mm specimen of the wiper blade element assembly is to be installed in a suitable clamping fixture, in which it is to be stretched so as to cause an extension of 15% measured between gauge marks that are 100 mm apart. The mounted specimens are then to be exposed for 48 hours in an ozone-free atmosphere.

1.2 Procedure

Test specimens are to be placed in the ozone test chamber for a period of 72 hours. The test chamber is to be operated at a temperature of 40 ± 30 ° C and at a concentration of 50 pphm, by volume.

1.3 Specimens shall be examined for signs of cracks and shall not show cracks under "7x" magnification.

2.0 CHEMICAL RESISTANCE

A section of the wiper blade element when placed in a 50% solution of either methyl or isopropyl alcohol for a period of 24 hours shall not exceed by more than 2 % weight change.

ANNEXURE - V
(see Introduction)

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