TP-201U-02

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U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE

FOR

FMVSS No. 201U

Occupant Protection in Interior Impact
-Upper Interior Head Impact Protection-

ENFORCEMENT
Office of Vehicle Safety Compliance
Mail Code: NEF-240
1200 New Jersey Ave., SE
Washington, DC 20590

OVSC LABORATORY TEST PROCEDURE NO. 201U
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1. PURPOSE AND APPLICATION

This document is a laboratory test procedure provided by the National Highway Traffic Safety Administration (NHTSA), Office of Vehicle Safety Compliance (OVSC) for the purpose of presenting guidelines for a uniform testing data and information recording format, and providing suggestions for the use of specific equipment and procedures for contracted testing laboratories. The data correspond to specific requirements of the Federal Motor Vehicle Safety Standard(s) (FMVSS). The OVSC test procedures include requirements that are general in scope to provide flexibility for contracted laboratories to perform compliance testing and are not intended to limit or restrain a contractor from developing or utilizing any testing techniques or equipment which will assist in procuring the required compliance test data. These test procedures do not constitute an endorsement or recommendation for use of any particular product or testing method.

Prior to conducting compliance testing, contracted laboratories are required to submit a detailed test procedure to the Contracting Officer's Representative (COR) to demonstrate concurrence with the OVSC laboratory test procedure and the applicable FMVSS. If any contractor views any part of an OVSC laboratory test procedure to be in conflict with a FMVSS or observes deficiencies in a laboratory test procedure, the contractor is required to advise the COR and resolve the discrepancy prior to the start of compliance testing or as soon as practicable. The contractor's test procedure must include a step-by-step description of the methodology and detailed check-off sheets. Detailed check-off sheets shall also be provided for the testing instrumentation including a complete listing of the test equipment with make and model numbers. The list of test equipment shall include instrument accuracy and calibration dates. All equipment shall be calibrated in accordance with the manufacturer's instructions. There shall be no contradictions between the laboratory test procedure and the contractor's in-house test procedure. Written approval of the in-house test procedures shall be obtained from the COR before initiating the compliance test program.

NOTE: The OVSC Laboratory Test Procedures, prepared for the limited purpose of use by independent laboratories under contract to conduct compliance tests for the OVSC, are not rules, regulations or NHTSA interpretations regarding the meaning of a FMVSS. The laboratory test procedures are not intended to limit the requirements of the applicable FMVSS(s). In some cases, the OVSC laboratory test procedures do not include all of the various FMVSS minimum performance requirements. Recognizing applicable test tolerances, the laboratory test procedures may specify test conditions that are less severe than the minimum requirements of the standard. In addition, the laboratory test procedures may be modified by the OVSC at any time without notice, and the COR may direct or authorize contractors to deviate from these procedures, as long as the tests are performed in a manner consistent with the standard itself and within the scope of the contract. Laboratory test procedures may not be relied upon to create any right or benefit in any person. Therefore, compliance of a vehicle or item of motor vehicle equipment is not necessarily guaranteed if the manufacturer limits its certification tests to those described in the OVSC laboratory test procedures.

2. GENERAL REQUIREMENTS

Federal Motor Vehicle Safety Standard (FMVSS) No. 201, *Occupant Protection in Interior impact,* requires passenger cars, and trucks, buses and multipurpose passenger vehicles (MPVs) with a gross vehicle weight rating (GVWR) of 4,536 kilograms or less to afford impact protection for occupants.

This test procedure provides guidance to conduct compliance tests in accordance with S6, *Requirements for upper interior components*.

FMVSS 201, S6 REQUIREMENTS DO NOT APPLY TO:

A. Buses with a GVWR of 3,860 kilograms or more.

B. Any target that cannot be located following FMVSS No. 201, S10

C. Any target located on a convertible roof frame or a convertible roof linkage mechanism.

D. Any target located rearward of a vertical plane 600 mm behind (relative to the vehicle orientation) the seating reference point of the rearmost designated seating position.

E. Any target located rearward of a vertical plane 600 mm behind (relative to the vehicle orientation) the seating reference point of the driver's seating position in an ambulance or a motor home.

F. Any target in a walk-in van-type vehicle

PERFORMANCE REQUIREMENTS (S6)

Vehicle manufacturers shall select one of two available compliance options listed below

Option S6.2(a) - FMH Impact Speed - 24 km/h (15 mph)

Each vehicle when tested shall comply with the requirements in S7 (see Performance Criterion) at all target locations when impacted by the Free Motion Headform (FMH) at any speed up to and including 24 km/h (15 mph). If the vehicle is equipped with a dynamically deployed upper interior head protection system, it shall comply with requirements under S6 with the system un-deployed.

Option S6.2(b) - Reduced FMH Impact Speed 19 km/h (12 mph) [1]

Each vehicle equipped with a dynamically deployed upper interior head protection system shall comply with the requirements of S7 at target locations that meet the Reduced FMH Impact Speed Criteria when impacted by the FMH at any speed up to and including 19 km/h (12 mph) with the system un-deployed. Target locations that do not meet the criteria are impacted at any speed up to and including 24 km/h (15 mph) with the system un-deployed.

[1] Option S6.2(b) is only available to a manufacturer if the vehicle is equipped with a dynamically deployed upper interior head protection system.

Reduced FMH Impact Speed Criteria – Any target over any point inside the area measured along the contour of the vehicle interior within 50 mm (2.0 inch) of the periphery of the stowed system projected perpendicularly onto the vehicle interior surface including mounting and inflation components, but exclusive of any cover or covers.

PERFORMANCE CRITERION (S7):

HIC(d) shall not exceed 1000 when calculated in accordance with the following formula:

$$HIC(d) = 0.75446\ (\text{Free Motion Headform HIC}) + 166.4$$

The Free Motion Headform HIC is calculated in accordance with the following formula:

$$HIC = \left[\frac{1}{t_2 - t_1} \int_{t_1}^{t_2} A_r \, dt \right]^{2.5} (t_2 - t_1)$$

where $A_R = [A_x^2 + A_y^2 + A_z^2]^{½}$ is the resultant acceleration magnitude in g units at the dummy head CG, and t_1 and t_2 are any two points in time during the impact event which are separated by not more than a 36 millisecond time interval.

3. SECURITY

The contractor shall provide appropriate security measures to protect the OVSC test vehicles and Government Furnished Property (GFP) from unauthorized personnel during the entire compliance testing program. The contractor is financially responsible for any acts of theft and/or vandalism which occur during the storage of test vehicles and GFP. Any security problems which arise shall be reported by telephone to the Industrial Property Manager (IPM), Office of Acquisition Management, within two working days after the incident. A letter containing specific details of the security problem shall be sent to the IPM (with copy to the COR) within 48 hours.

The contractor shall protect and segregate the data that evolves from compliance testing before and after each vehicle test. No information concerning the vehicle safety compliance testing program shall be released to anyone except the COR, unless specifically authorized by the COR or the COR's Division Chief.

NOTE: No individuals, other than contractor personnel directly involved in the compliance testing program or OVSC personnel, shall be allowed to witness any vehicle or equipment item compliance test or test dummy calibration unless specifically authorized by the COR.

4. GOOD HOUSEKEEPING

Contractors shall maintain the entire vehicle compliance testing area, test fixtures and instrumentation in a neat, clean and painted condition with test instruments arranged in an orderly manner consistent with good test laboratory housekeeping practices.

5. TEST SCHEDULING AND MONITORING

The contractor shall submit a test schedule to the COR prior to conducting the first compliance test. Tests shall be completed at intervals as required in the contract. If not specified, the first test shall be conducted within 6 weeks after receiving the first delivered unit. Subsequent tests shall be completed in no longer than 1 week intervals unless otherwise specified by the COR.

Test schedules may be adjusted to permit vehicles to be tested to other FMVSSs. All compliance testing shall be coordinated with the COR in order to allow observation by the COR, other OVSC or NHTSA personnel and vehicle manufacturer's representatives.

The contractor shall submit a monthly status report to the COR as required in the contract. A sample monthly status report is provided in Section 15.

6. TEST DATA DISPOSITION

The Contractor shall make all preliminary compliance test data available to the COR on location within 30 minutes after the test. Final test data, including digital printouts and computer generated plots (if applicable) shall be available to the COR in accordance with the contract schedule or if not specified within two working days. Additionally, the Contractor shall analyze the preliminary test results as directed by the COR.

All backup data sheets, strip charts, recordings, plots, technicians' notes, etc., shall be either sent to the COR or destroyed at the conclusion of each delivery order, purchase order, etc.

TEST DATA LOSS

A. Invalid Test Description

An invalid compliance test is one that does not conform precisely to all requirements/specifications of the OVSC Laboratory Test Procedure and Statement of Work applicable to the contract.

B. Invalid Test Notification

The Contractor shall notify NHTSA of any test not meeting all requirements and specifications of the OVSC Laboratory Test Procedure and Statement of Work applicable to the test, by telephone, within 24 hours of the test and send written notice to the COR within 48 hours or the test completion.

C. Retest Notification

The Contracting Officer of NHTSA is the only NHTSA official authorized to notify the Contractor that a retest is required. The retest shall be completed within 2 weeks after receipt of notification by the Contracting Officer that a retest is required.

D. Waiver of Retest

NHTSA, in its sole discretion, reserves the right to waive the retest requirement. This provision shall not constitute a basis for dispute over the NHTSA's waiving or not waiving any requirement.

7. GOVERNMENT FURNISHED PROPERTY (GFP)

GFP consist of test vehicles, test equipment and instrumentation. The GFP is authorized by contractual agreement. The contractor is responsible for the following.

A. Acceptance of Test Vehicles

The contractor has the responsibility of accepting each GFP test vehicle whether delivered by a new vehicle dealership or another vehicle transporter. In both instances, the contractor acts on behalf of the OVSC when signing an acceptance of the GFP test vehicle delivery order. When a GFP vehicle is delivered, the contractor must verify:

1. All options listed on the "window sticker" are present on the test vehicle.
2. Tires and wheel rims are new and the same as listed.
3. There are no dents or other interior or exterior flaws in the vehicle body.
4. The vehicle has been properly prepared and is in running condition.
5. The glove box contains an owner's manual, warranty document, consumer information, and extra set of keys.
6. Proper fuel filler cap is supplied on the test vehicle.
7. Spare tire, jack, lug wrench and tool kit (if applicable) is located in the vehicle cargo area.
8. The VIN (vehicle identification number) on the vehicle condition report matches the VIN on the vehicle.
9. The vehicle is equipped as specified by the COR.

A Vehicle Condition form will be supplied to the contractor by the COR when the test vehicle is transferred from a new vehicle dealership or between test contracts. The upper half of the form is used to describe the vehicle as initially accepted. The lower half of the Vehicle Condition form provides space for a detailed description of the post-test condition. The contractor must complete a Vehicle Condition form for each vehicle and deliver it to the COR with the Final Test Report or the report will NOT be accepted for payment.

If the test vehicle is delivered by a government contracted transporter, the contractor shall check for damage which may have occurred during transit. GFP vehicle(s) shall not be driven by the contractor on public roadways unless authorized by the COR.

B. Notification of COR

The COR must be notified within 24 hours after a vehicle (and/or equipment item) has been delivered. In addition, if any discrepancy or damage is found at the time of delivery, a copy of the Vehicle Condition form shall be sent to the COR immediately.

8. CALIBRATION OF TEST INSTRUMENTS

Before the contractor initiates the safety compliance test program, a test instrumentation calibration system will be implemented and maintained in accordance with established calibration practices. The calibration system shall include the following as a minimum:

A. Standards for calibrating the measuring and test equipment shall be stored and used under appropriate environmental conditions to assure their accuracy and stability.

B. All measuring instruments and standards shall be calibrated by the Contractor, or a commercial facility, against a higher order standard at periodic intervals not exceeding 12 months for instruments and 12 months for the calibration standards except for static types of measuring devices such as rulers, weights, etc., which shall be calibrated at periodic intervals not to exceed two years. Records, showing the calibration traceability to the National Institute of Standards and Technology (NIST), shall be maintained for all measuring and test equipment.

C. Inertial sensing systems shall be calibrated every twelve months or after a test failure or after any indication from calibration checks that there may be a problem with the inertial sensing systems whichever occurs sooner.

D. All measuring and test equipment and measuring standards shall be labeled with the following information:

1. Date of calibration
2. Date of next scheduled calibration
3. Name of the technician who calibrated the equipment

E. A written calibration procedure shall be provided by the Contractor, which includes as a minimum the following information for all measurement and test equipment:

1. Type of equipment, manufacturer, model number, etc.
2. Measurement range
3. Accuracy
4. Calibration interval
5. Type of standard used to calibrate the equipment (calibration traceability of the standard must be evident).
6. The actual procedures and forms used to perform the calibrations.

F. Records of calibration for all test instrumentation shall be kept by the Contractor in a manner that assures the maintenance of established calibration schedules.

G. All such records shall be readily available for inspection when requested by the COR. The calibration system shall need the acceptance of the COR before vehicle safety compliance testing commences.

H. Test equipment shall receive a system functional check out using a known test input immediately before and after the test. This check shall be recorded by the test technician(s) and submitted with the final report.

I. The Contractor may be directed by NHTSA to evaluate its data acquisition system.

Further guidance is provided in the International Standard ISO 10012-1, “Quality Assurance Requirements for Measuring Equipment” and American National Standard ANSI/NCSL Z540-1, “Calibration Laboratories and Measuring and Test Equipment - General Requirements.”

NOTE: In the event of a failure to meet the standard’s minimum performance requirements, additional calibration checks of some critically sensitive test equipment and instrumentation may be required for verification of accuracy. The necessity for the calibration will be at the COR’s discretion and will be performed without additional cost.

9. PHOTOGRAPHIC DOCUMENTATION

9.1 HIGH SPEED DIGITAL VIDEO

Capture video footage of each FMH impact test with at least one (1) high speed digital camera operating at a minimum of 1000 frames per second. The high speed camera(s) shall have a minimum resolution of 1536 CMOS sensors per every two rows of pixels and 80% of the horizontal distance of the two rows covered by effective light sensors with a minimum of 1024 rows of sensors.

Position cameras relative to the plane of motion of the FMH free flight and impact with the target to capture a full view of the impact event. Reduce glare and filter light sources so that video footage is clear, visible and useable for digital motion analyses.

9.2 VIDEO IDENTIFICATION STAMPS OR PLACARDS

Each FMH impact test video footage shall be identified with the following information either by digital stamp or placard(s) placed in the field of view;

1. MY, Make & Model
2. The words “FMVSS 201U"
3. Target Identification & approach angle
4. Test Date

9.3 TARGET CIRCLE FOR IMPACT LOCATIONS

The areas of the vehicle to be impacted by the FMH are marked with a solid 12.7 mm diameter circle centered on the targets. Any transferable opaque medium that identifies contact with the forehead impact zone is acceptable.

9.4 REFERENCE PHOTOGRAPHIC TARGETS

Reference targets are placed on each side of the FMH at its CG location in the X- Z plane (see Figure below).

9.5 DIGITAL PHOTOGRAPHS

Digital color photographs shall be taken with a minimum resolution of 1,600 x 1,200 pixels. The digital photographs are converted to JPG format. Ensure clear images by minimizing glare or light from any illuminated or reflective surface while taking photographs. A tag, label or placard identifying the test vehicle, NHTSA number and date shall appear in each photograph and be legible. This information can be digitally stamped or imprinted on each photograph.

As a minimum, the following photographs shall be included in final report:

1. Pretest Left Side View of Test Vehicle
2. Pretest Right Side View of Test Vehicle
3. Pretest Front View of Test Vehicle
4. Pretest Rear View of Test Vehicle
5. Close-up View of the Vehicle's Certification Label(s)
6. Close-up View of the Vehicle's Tire Placard Label(s)
7. Pretest Upper Interior Views – 1st Seated Row (un-targeted)
8. Pretest Upper Interior Views – 1st Seated Row (targeted)
9. Pretest Upper Interior Views – 2nd Seated Row (un-targeted)
10. Pretest Upper Interior Views – 2nd Seated Row (targeted)
11. Pretest - Side View of FMH installed on impactor at H/V approach angle
12. Pretest - Close-up view of upper interior target
13. Posttest - Close-up view of upper interior target
14. Posttest - View of damaged or permanently deformed upper interior components

10. DEFINITIONS

A-PILLAR

Any pillar entirely forward of a transverse vertical plane passing through the seating reference point (SgRP) of the driver's seat.

AMBULANCE

A motor vehicle designed exclusively for the purpose of emergency medical care, as evidenced by the presence of a passenger compartment to accommodate emergency medical personnel, one or more patients on litters or cots, and equipment and supplies for emergency care at a location or during transport.

B-PILLAR

The forward most pillar on each side of the vehicle that is, in whole or part, rearward of a transverse vertical plane passing through the SgRP of the driver's seat, unless there is only one pillar rearward of that plane and it is also a rearmost pillar.

BRACE

A fixed diagonal structural member in an open body vehicle used to brace the roll bar and connect the roll-bar to the main vehicle body structure.

CONVERTIBLE

A vehicle with A-pillars that are not joined with the B-pillars (or rearmost pillars) by a fixed, rigid structural member.

CONVERTIBLE ROOF FRAME

The frame of a convertible roof.

CONVERTABLE ROOF FRAME LINKAGE

Any anchorage, fastener, or device necessary to deploy a convertible roof frame.

DAYLIGHT OPENING (DLO)

For openings on the side of the vehicle, other than a door opening, the locus of all points where a horizontal line, perpendicular to the vehicle longitudinal centerline, is tangent to the periphery of the opening. For openings on the front and rear of the vehicle, other than a door opening, daylight opening means the locus of all points where a horizontal line, parallel to the vehicle longitudinal centerline is tangent to the periphery of the opening.

If a horizontal line is tangent to the periphery at more than one point at any location, the most inboard point is used to determine the daylight opening.

DESIGNATED SEATING POSITION (DSP)

A seat location that has a seating surface width, as described in 49 CFR 571.10 (c), of at least 300 mm (13 inches). The number of designated seating positions at a seat location is determined according to the procedure set forth in 49 CFR 571.10 (b).

DOOR OPENING

For door openings on the side of the vehicle, the locus of all points where a horizontal line, perpendicular to the vehicle longitudinal centerline, is tangent to the periphery of the side door opening.

For door openings on the back end of the vehicle, door opening means the locus of all points where a horizontal line, parallel to the vehicle longitudinal centerline, is tangent to the periphery of the back door opening.

If a horizontal line is tangent to the periphery at more than one point at any location, the most inboard point is the door opening.

FOREHEAD IMPACT ZONE

The part of the Free Motion Headform surface area determined in accordance with the procedure set forth in 49 CFR 571.201,S8.10.

FREE MOTION HEADFORM (FMH)

A test device conforming to the specifications of Part 572, Subpart L (P572L). The P572L performance calibration procedure is included in Appendix A.

MIDSAGITTAL PLANE OF A DUMMY

A longitudinal vertical plane passing through the seating reference point (SgRP) of a designated seating position (DSP).

MOTOR HOME

A motor vehicle with motive power designed to provide temporary residential accommodations, as evidenced by the presence of at least four of the following facilities: cooking; refrigeration or ice box; self-contained toilet; heating and/or air conditioning; a potable water supply including a faucet and a sink; and a separate 110 -125 volt electrical power supply and/or an LP gas supply.

OTHER PILLAR

Any pillar that is not an A-pillar, a B-pillar, or a rearmost pillar.

PILLAR

Means any structure, excluding glazing and the vertical portion of door window frames, but including accompanying molding, attached components such as safety belt anchorages and coat hooks, that (1) supports either a roof or any other structure (such as a roll-bar) above the driver's head or (2) is located along a side edge of a window.

ROLL-BAR

A fixed overhead structural member, including its vertical support structure, that extends from the left to the right side of the passenger compartment of any open body vehicles and convertibles. It does not include a header.

SEAT BELT ANCHORAGE

Any component involved in transferring seat belt loads to the vehicle structure, including, but not limited to, the attachment hardware, but excluding webbing or straps, seat frames, seat pedestals, and the vehicle structure itself, whose failure causes separation of the belt from the vehicle structure.

SEATING REFERENCE POINT (SgRP)

Means the unique design H-point, as defined in SAE J1100 (June 1984), which:

A. Establishes the rearmost normal design driving or riding position of each designated seating position, which includes consideration of all modes of adjustment, horizontal, vertical, and tilt, in a vehicle;

B. Has X, Y, and Z coordinates, as defined in SAE J1100 (June 1984), established relative to the designed vehicle structure;

C. Simulates the position of the pivot center of the human torso and thigh; and

D. Is the reference point employed to position the two-dimensional drafting template with the 95th percentile leg described in SAE J826 (May 1987), or, if the drafting template with the 95th percentile leg cannot be positioned in the seating position, is located with the seat in its most rearward adjustment position.

SLIDING DOOR TRACK

A track structure along the upper edge of a side door opening that secures the door in the closed position and guides the door when moving to and from the open position.

STIFFENER

A fixed overhead structural member that connects one roll-bar to another roll-bar or to a header of any open body vehicle or convertible.

UNLOADED VEHICLE WEIGHT (UVW)

The weight of a vehicle with maximum capacity of all fluids necessary for operation of the vehicle, but without cargo, occupants, or accessories that are ordinarily removed from the vehicle when they are not in use.

UPPER ROOF

The area of the vehicle interior that is determined in accordance with the procedure set forth in S8.15, Upper Roof.

WINDSHIELD TRIM

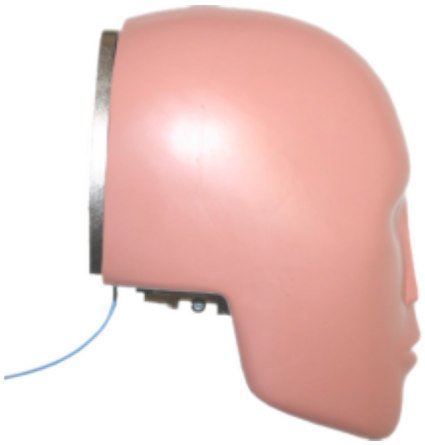
Molding of any material between the windshield glazing and the exterior roof surface, including material that covers a part of either the windshield glazing or exterior roof surface.

11. PRETEST REQUIREMENTS

A. Free Motion Headform (PART 572, SUBPART L)

The Free Motion Headform(s) used for testing must conform to the specifications of Part 572, Subpart L and drawing package (see Appendix C). Before each test, the FMH shall be qualified as meeting the calibration requirements of the head drop test specified in Part 572, Subpart L (see OVSC TP-572L-00).

The contractor shall provide and install three (3) Endevco 7264-2000 accelerometers with 1% transverse sensitivity in the FMH head cavity to measure orthogonal accelerations (Ax, Ay, and Az) at the CG of the head assembly. The three accelerometers shall be mounted in an orthogonal array, and the intersection of the planes containing the sensitive axis of the 3 sensors will be the origin of the array.



Free Motion Headform Impactor

B. Free Motion Headform Impactor

The impactor is capable of propelling the FMH at the specified impact speed of 23.7 kph ± 0.3 kph, or 18.7 kph ± 0.3 kph while maintaining the midsagittal plane of the FMH vertical and upright throughout launch to the instant of free-flight. The FMH impactor is equipped with a compact launcher capable of propelling the FMH at any specified target and approach angle located within the test vehicle's occupant space. The impactor's propulsion system is capable of producing highly accurate and repeatable FMH impacts.

C. Temperature Controlled Test Areas

The test areas for calibration testing and vehicle component tests are temperature controlled and capable of maintaining ambient air between 19°C and 26°C at any relative humidity level ranging from 10 to 70%.

D. Data Acquisition System (DAS)

The contractor shall furnish data recording equipment having a sufficient number of channels available for recording the necessary time histories. Each data channel will be comprised of a sensor, signal conditioner, data acquisition device, and all interconnecting cables, and must conform to the requirements of SAE Recommended Practice J211, MAR 95 with data Class 1000 for head acceleration data.

The contractor shall provide the necessary equipment to record and display the data. Data plots shall be included in the final test report and on the data tape/diskette.

An instrument calibration system capable of performing individual tests on all data channels used in acquiring the acceleration data shall conform to the appropriate section of SAE J211 dated March 1995.

A precision time system compatible with the test equipment shall be used to provide a time reference for all recorded data. A system/method that identifies the precise instant of headform contact will be incorporated with the time reference signal.

An instrumentation self-checking system that simultaneously monitors all data channels and displays, on a single indicator, will provide the status of the sensor system.

E. Co-ordinate Measuring Machine (CMM)

A CMM and accompanying software capable of accurately locating targets throughout the test vehicle.

F Weighing Scales

Weighing Scales capable of weighing individual wheel loads up to 3,000 lb (or axle loads up to 6,000 lb) with an accuracy of ± 1% at full range.

12. COMPLIANCE TEST EXECUTION

12.1 TEST VEHICLE PREPARATION

A. Record Vehicle Specifications

(1) Record vehicle specifications, tire data, standard and optional equipment as indicated on the dealer's sticker label, tire placard, Part 567 certification label and tire sidewalls.

(2) Measure and record the front seats fore-aft travel distances.

B. Test Weight and Attitude

(1) With the test vehicle as received at the test site, achieve unloaded vehicle weight (UVW) by filling all fluids to capacity and inflating all tires to the manufacturer's specifications indicated on the vehicle's tire information label or placard.

(2) Weigh the test vehicle and record the weight as the UVW.

(3) With the test vehicle at UVW, add ballast equivalent to the Rated Cargo Luggage Weight (RCLW) or 136 kg, whichever is less. Secure the ballast in the luggage area, centered over the longitudinal centerline of the vehicle.

RCLW is calculated as follows;

(i) For passenger cars, RCLW = VCW - (68 kg x DSC), where VCW is the Vehicle Capacity Weight

(ii) For multipurpose passenger vehicles (MPVs), trucks and buses, where the VCW is not provided on the label, VCW = GVW – UVW and RCLW = VCW - (68 kg x DSC)

(4) Weigh the test vehicle and record the weight as the “Fully Loaded” weight.

(5) Place the vehicle on a flat and level, horizontal surface to measure its attitude. Exercise the suspension, pushing up and down on all four corners of the vehicle at least 5 times in an interval not to exceed 40 seconds. Directly above each wheel opening, locate and mark for reference a point on the test vehicle’s body. Measure the vertical distance between a level surface and each reference point on the test vehicle’s body. Record each vertical distance measurement.

(6) Drain all fluids from the test vehicle. Remove seats, windows, other components, etc. necessary to facilitate targeting and placement of the FMH impactor. Weigh the test vehicle and record the weight as the “As Tested” weight. Adjust ballast to achieve an “As Tested” weight equivalent to the “Fully Loaded” test weight, -4 kg to -9 kg.

C. Support the Vehicle off of its suspension

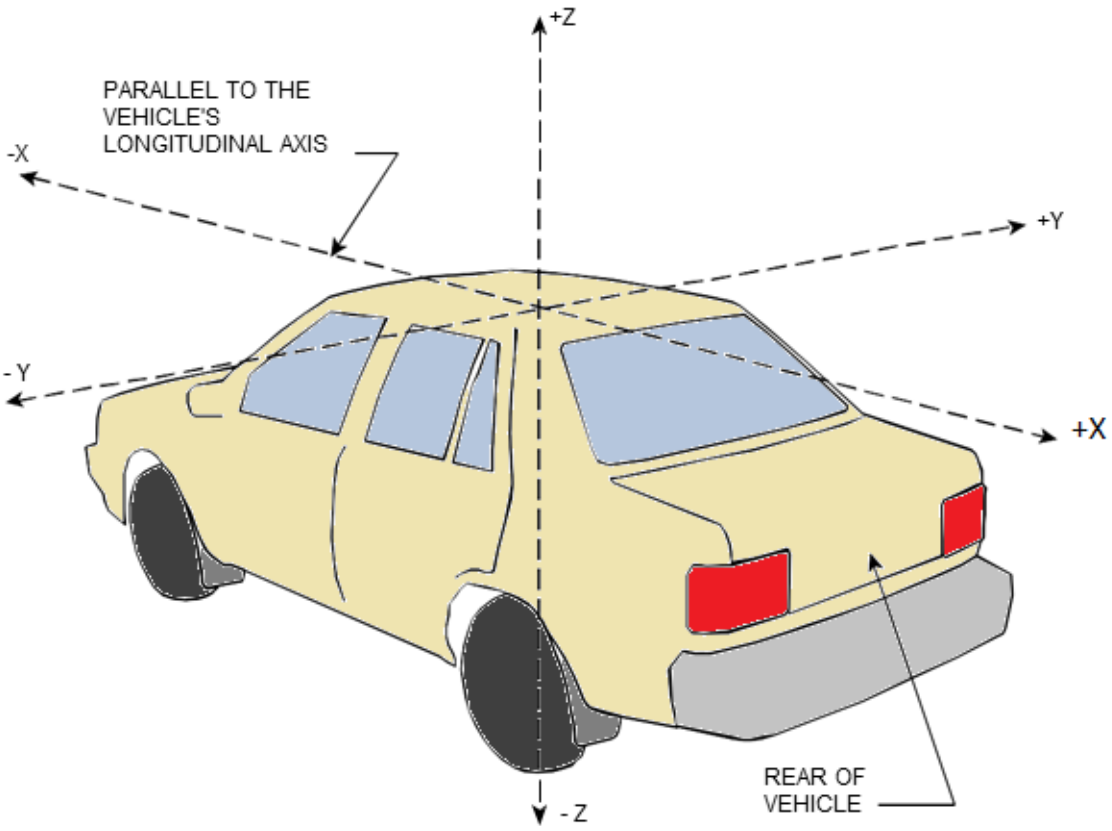
(1) Support the vehicle off of its suspension on a flat and level, horizontal surface in a manner that does not significantly alter its attitude. Secure the vehicle to prevent shifting or movement so that the vehicle's coordinate system remains fixed while upper interior targets are located, approach angles measured and impact tests conducted.

(2) With the vehicle supported off its suspension in the “As Tested” condition, determine the attitude by measuring the vertical distances between a level surface and same reference points on the vehicle’s test body used in B(5) above. Record each vertical distance measurement. Verify that each “As Tested” vertical distance measurement is within ± 5mm of the corresponding “Fully Loaded” vertical distance measurement.

12.2 ORTHOGONAL REFERENCE SYSTEM

Use a CMM to construct an orthogonal reference system consisting of a longitudinal X-axis and a transverse Y- axis in the same horizontal plane and a vertical Z-axis through the intersection of X and Y to define the headform' s horizontal direction of approach (see figure below). The X-Z plane is the vertical longitudinal zero plane and is parallel to the vehicle's longitudinal centerline. The X-Y plane is the horizontal zero plane parallel to the ground. The Y-Z plane is the vertical transverse zero plane that is perpendicular to the X-Y and X-Z planes. The X coordinate is negative forward of the Y-Z plane and positive to the rear. The Y coordinate is negative to the left of the X-Z plane and positive to the right. The Z coordinate is negative below the X-Y plane and positive above it.

FMH APPROACH ANGLE COORDINATE SYSTEM



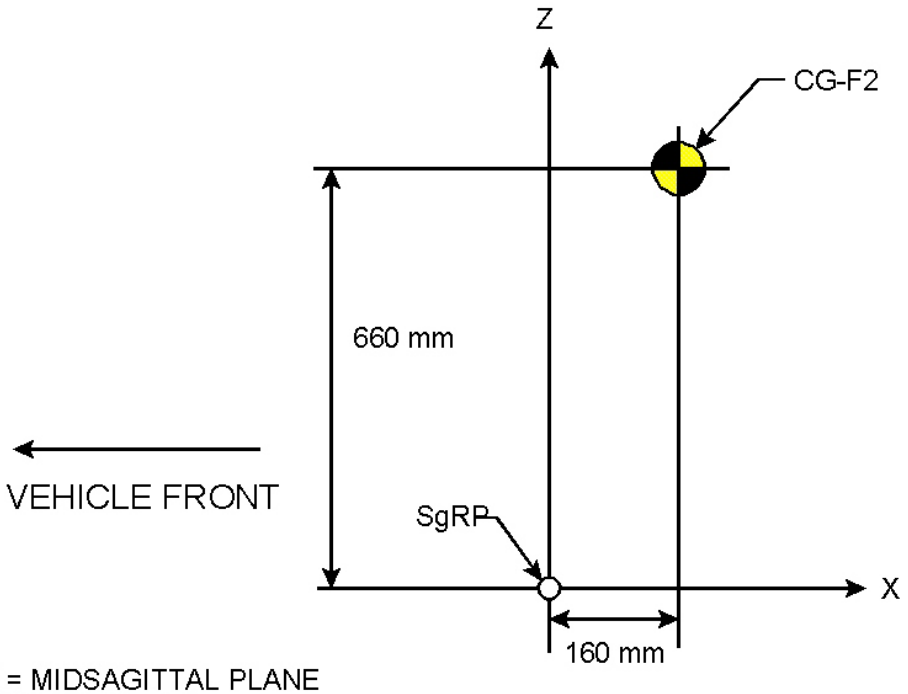
12.3 DETERMINE HEAD CG REFERENCE POINTS (S8.13)

A. Locate the Seating Reference Points (SgRP) by determining its co-ordinates using the manufacturer's data supplied by the COR.

B. Using the co-ordinates of the SgRP, determine the co-ordinates for head C.G. of the forward front seat position (CG-F1), the aft front seat position (CG-F2) and rear seat position (CG-R) on both driver and passenger sides of the test vehicle as follows;

(1) CG-F2 is located at a point 660 mm upward and 160 mm rearward from the SgRP (see figure below).

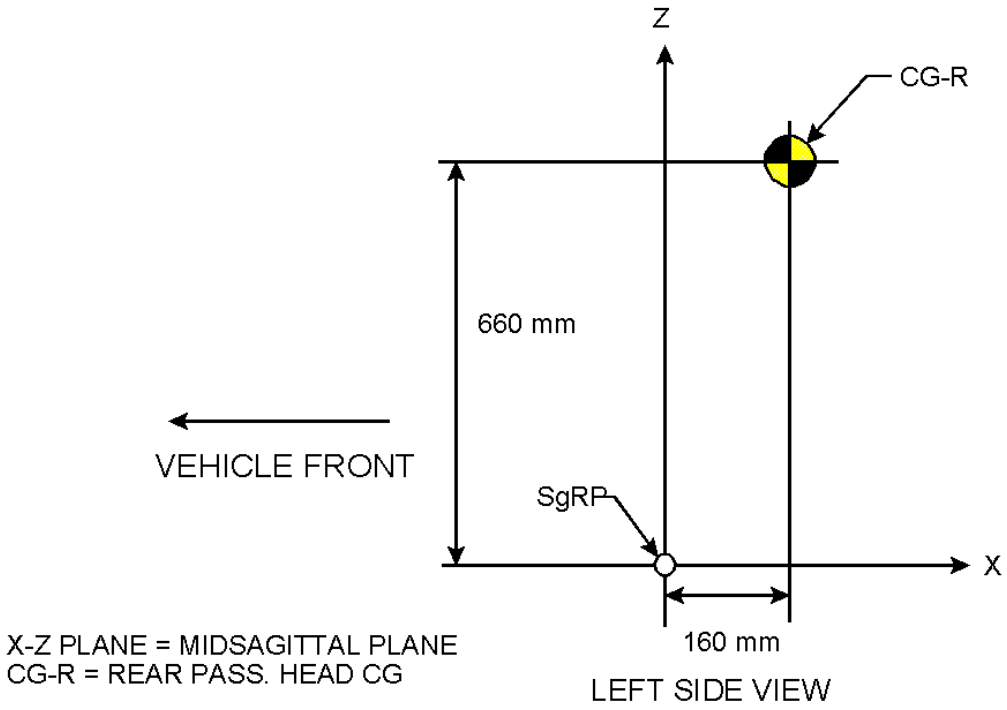
(2) CG-F1 is established by moving the distance M horizontally forward of CG-F2, where M is the horizontal seat travel distance.



X-Z PLANE = MIDSAGITTAL PLANE
CG-F = DRIVER HEAD CG

LEFT SIDE VIEW

(3) CG-R is located 660 mm upward and 160 mm rearward of the SgRP of the rear DSP. (see figure below)



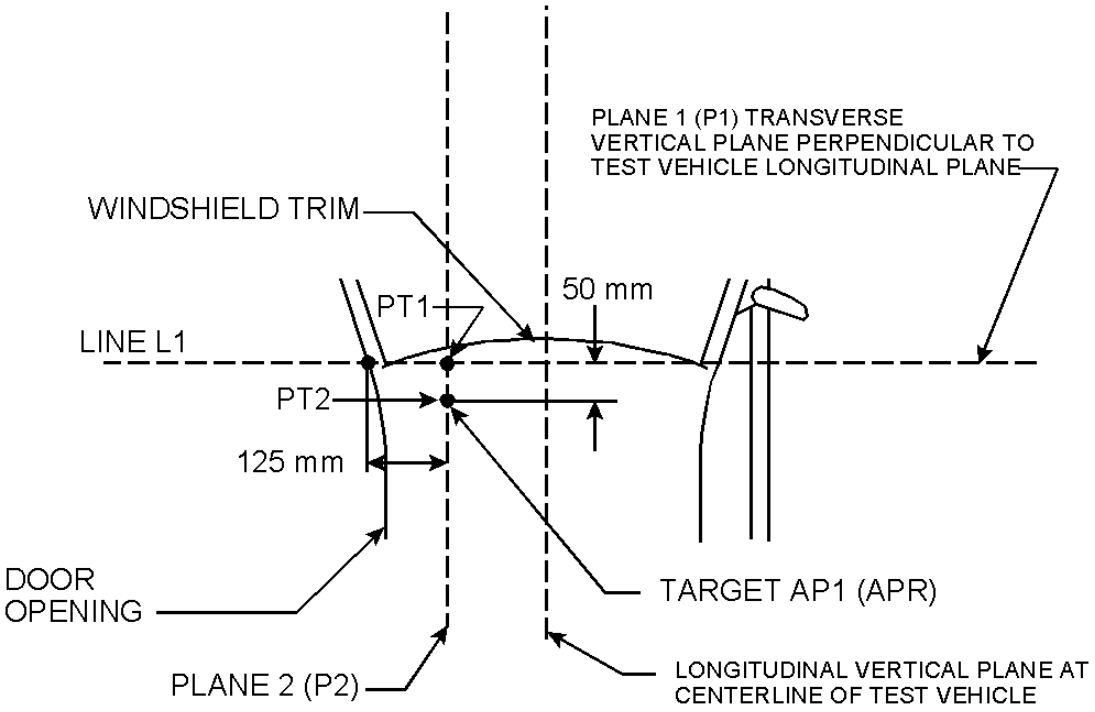
X-Z PLANE = MIDSAGITTAL PLANE
CG-R = REAR PASS. HEAD CG

12.4 TARGETING

TARGET LOCATIONS

UPPER INTERIOR COMPONENTS	TARGET(S)
A-PILLARS	AP1, AP2, AP3
B-PILLARS	BP1, BP2, BP3, BP4
OTHER PILLARS	OP1, OP2
REARMOST PILLARS	RP1, RP2
FRONT HEADER	FH1, FH2
SIDE RAIL (FRONT)	SR1, SR2
OTHER SIDE RAIL	SR3
REAR HEADER	RH
UPPER ROOF	UR
SLIDING DOOR TRACK	SD
ROLL-BAR	RB1, RB2
STIFFENER/BRACE	ST1, ST2 / BT

12.4.1 A-PILLAR TARGETS – AP1,AP2 AND AP3



A. A-Pillar Reference Point (APR) and Target AP1

(1) On the vehicle exterior, locate a transverse vertical plane, Plane 1 that contacts the rearmost points of the windshield trim. The intersection of Plane 1 (P1) and the vehicle exterior surface is Line 1 (see figure).

(2) From the intersection of Line 1 and the outermost edge of the roof, with the door open, measure along the nominal vehicle exterior surface 125 mm inboard - mark Point 1 (PT1).

The outermost edge of the roof is determined with the door open and includes uncompressed weather stripping, trim or rain gutter, if applicable. The linear measurements are to be made with a flexible steel tape (metric graduation) following the nominal vehicle surface (as opposed to following each convolution of weather stripping, rain gutters, or trim components).

(3) Measure 50 mm from Point 1, along the vehicle exterior surface in a longitudinal vertical plane, Plane 2 (P2) that passes through Point 1 (PT1), mark Point 2 (PT2).

(4) The A-pillar reference point (APR) is located at the intersection of the interior roof surface and a line perpendicular to the vehicle exterior surface at Point 2(PT2).

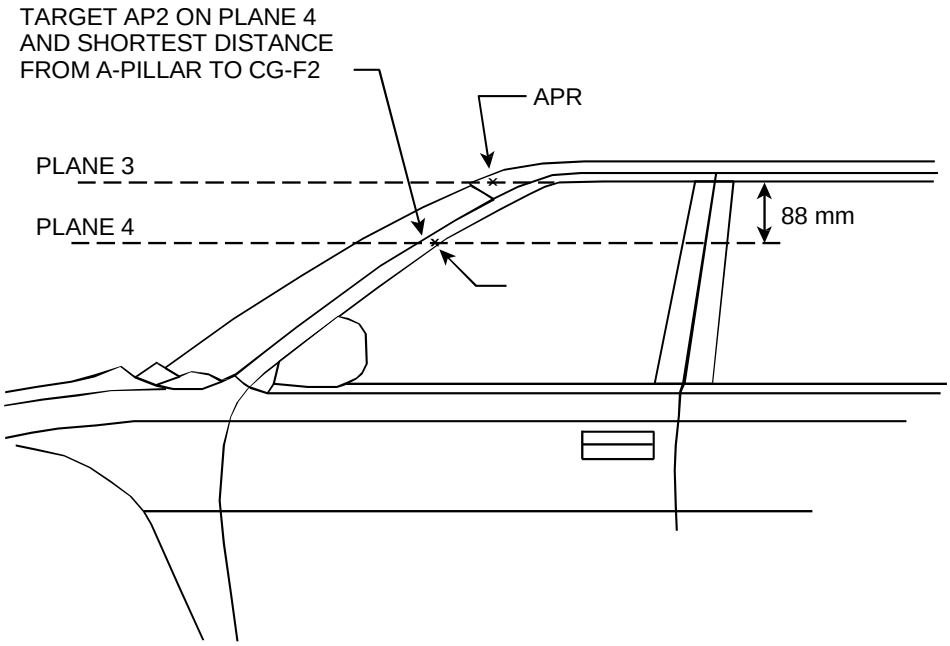
PT2 must be transferred to the interior of the vehicle to establish APR.

Target AP1, the first A-pillar target, is located at APR.

NOTE: "Each sun visor shall be placed in any position where one side of the visor is in contact with the test vehicle interior surface (windshield, side rail, front header, roof, etc.)" (S8.5). Select the sun visor position that allows for the "worst" case impact.

B. Target AP2

(1) Locate the horizontal plane, Plane 3, intersecting point APR. (see figure below)

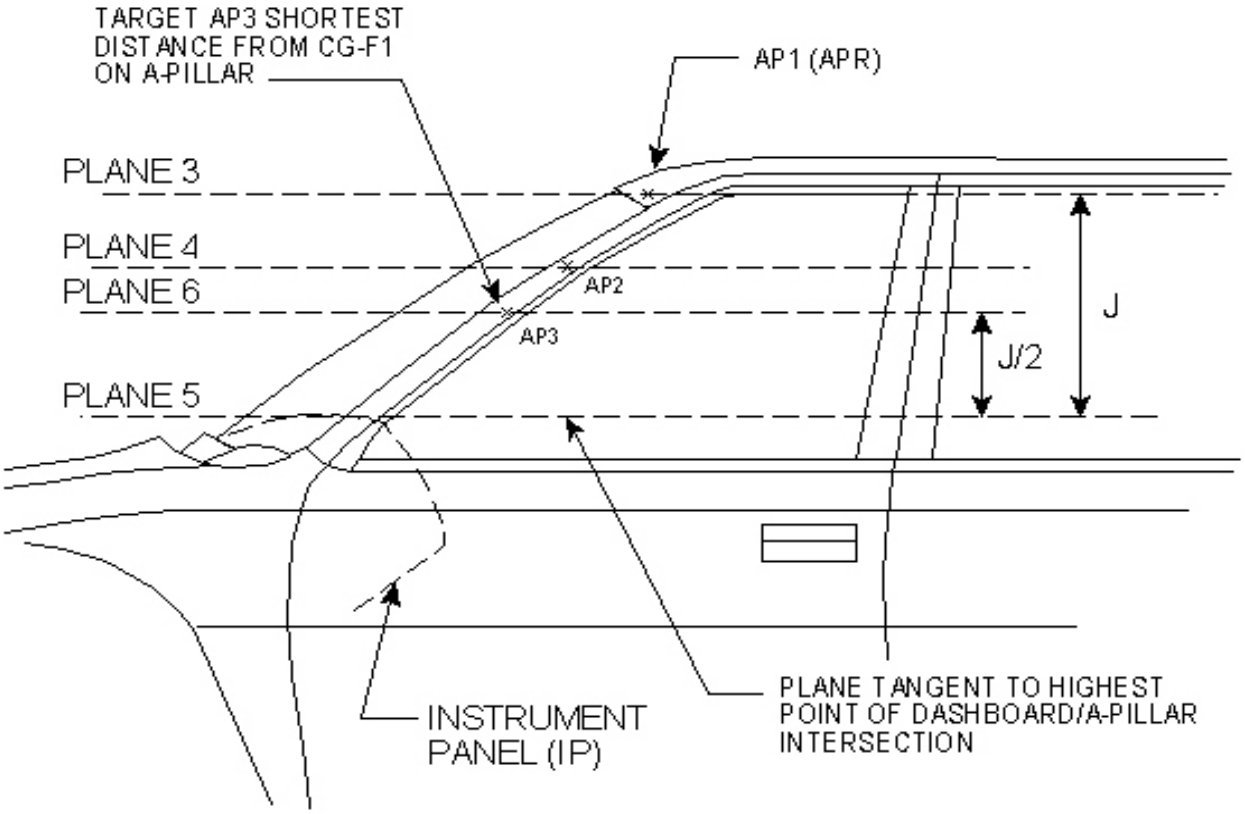


(2) Locate the horizontal plane, Plane 4, 88 mm below Plane 3.

(3) Target AP2 is the point on the interior surface of the A-pillar located at the intersection of Plane 4 and the point closest to CG-F2 for the nearest DSP.

NOTE: Attachments, if applicable, to the A-pillar surface must be considered in determining the target location.

C. Target AP3



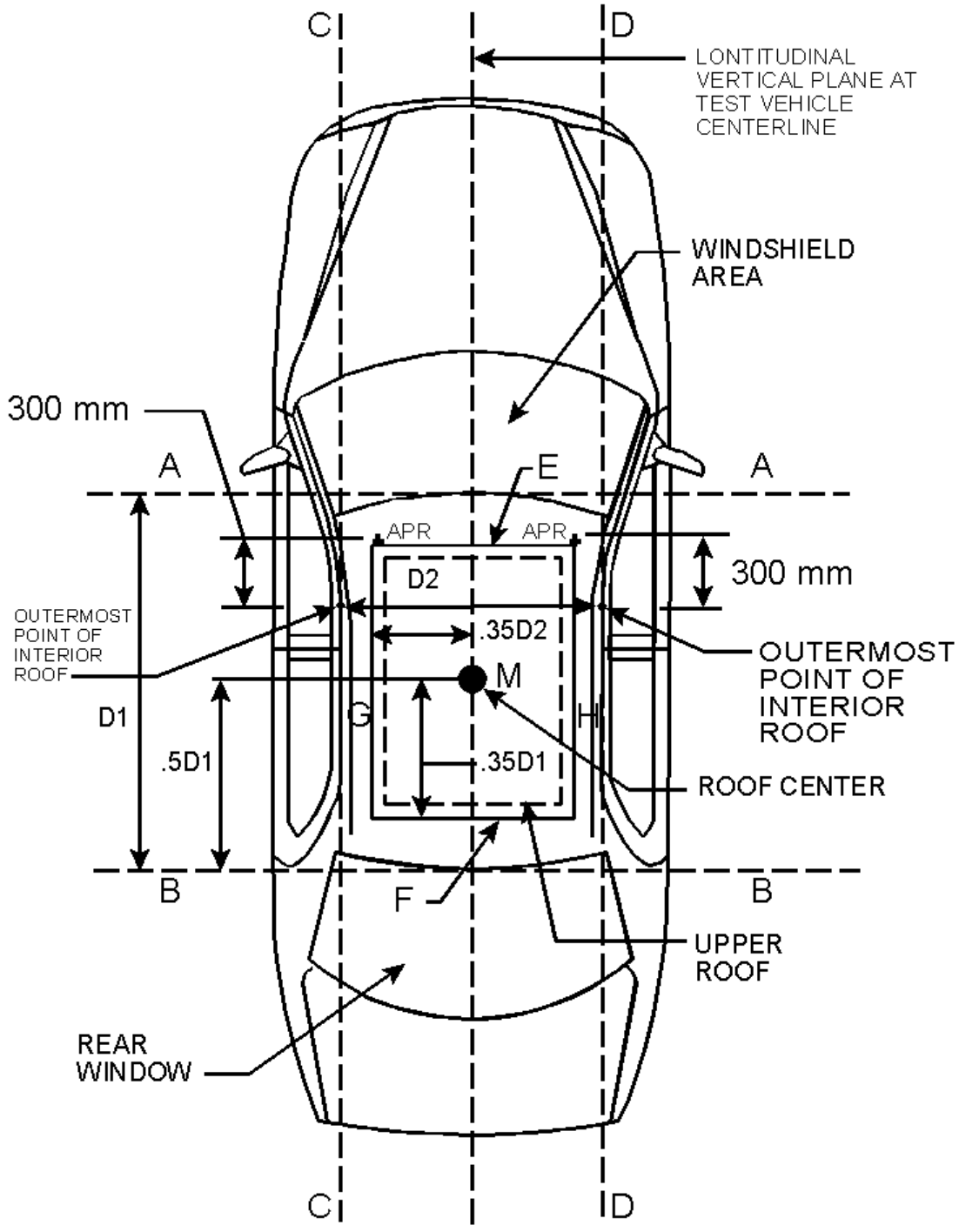
(1) Locate the horizontal plane, Plane 5, containing the highest point at the intersection of the instrument panel and the A-pillar. (see figure below).

NOTE: In establishing the highest point at the intersection of the instrument panel and the A-pillar, measure along the nominal surface as there may be a small gap or depression between the components.

(2) Measure the vertical distance, J, from Plane 3 to Plane 5. Locate the horizontal plane, Plane 6, half the distance (J/2) between Plane 3 and Plane 5.

(3) From CG-F1 for the nearest DSP, establish the point that is the shortest distance to the A-pillar (considering pillar attachments, if applicable) at Plane 6. Mark AP3.

12.4.2 UPPER ROOF



A. Locate the transverse vertical plane, A, at the forwardmost point where it contacts the interior roof (including trim but not attachments such as the rearview mirror or center high-mounted stop lamp [CHMSL]) at the vehicle centerline. Figure 10 illustrates the referenced locations.

B. Locate the transverse vertical plane, B, at the rearmost point where it contacts the interior roof (including trim but not attachments such as the rearview mirror or CHMSL) at the vehicle centerline.

C. Measure the horizontal distance, D1, between Plane A and Plane B.

D. Locate the vertical longitudinal plane, C, at the leftmost point at which a vertical transverse plane, located 300 mm rearward of the A-pillar reference point (as determined in section 12.4.1, A-Pillar Targets), contacts the interior roof (including trim).

Plane C is tangent to the outermost point(s) on the interior roof (including trim). The outermost point of the interior roof shall be determined by closing the door and marking where the door components (with weather stripping, if applicable) intersects the roof components (with weather stripping, if applicable) at a horizontal distance 300 mm rearward of APR.

E. Locate the vertical longitudinal plane, D, at the rightmost point at which a vertical transverse plane, located 300 mm rearward of the A-pillar reference point, contacts the interior roof (including trim).

Plane D is tangent to the outermost point(s) on the interior roof (including trim). The outermost point of the interior roof shall be determined by closing the door and marking where the door parts (with weather stripping, if applicable) intersects the roof parts (with weather stripping, if applicable) at a horizontal distance 300 mm rearward of APR.

F. Measure the horizontal distance, D2, between Plane C and Plane D.

G. Locate a point, Point M, on the interior roof surface, midway between Plane A and Plane B along the vehicle longitudinal centerline.

H. The upper roof zone is the area of the vehicle upper interior surface area bounded by the four planes, E, F, G, and H, determined as follows:

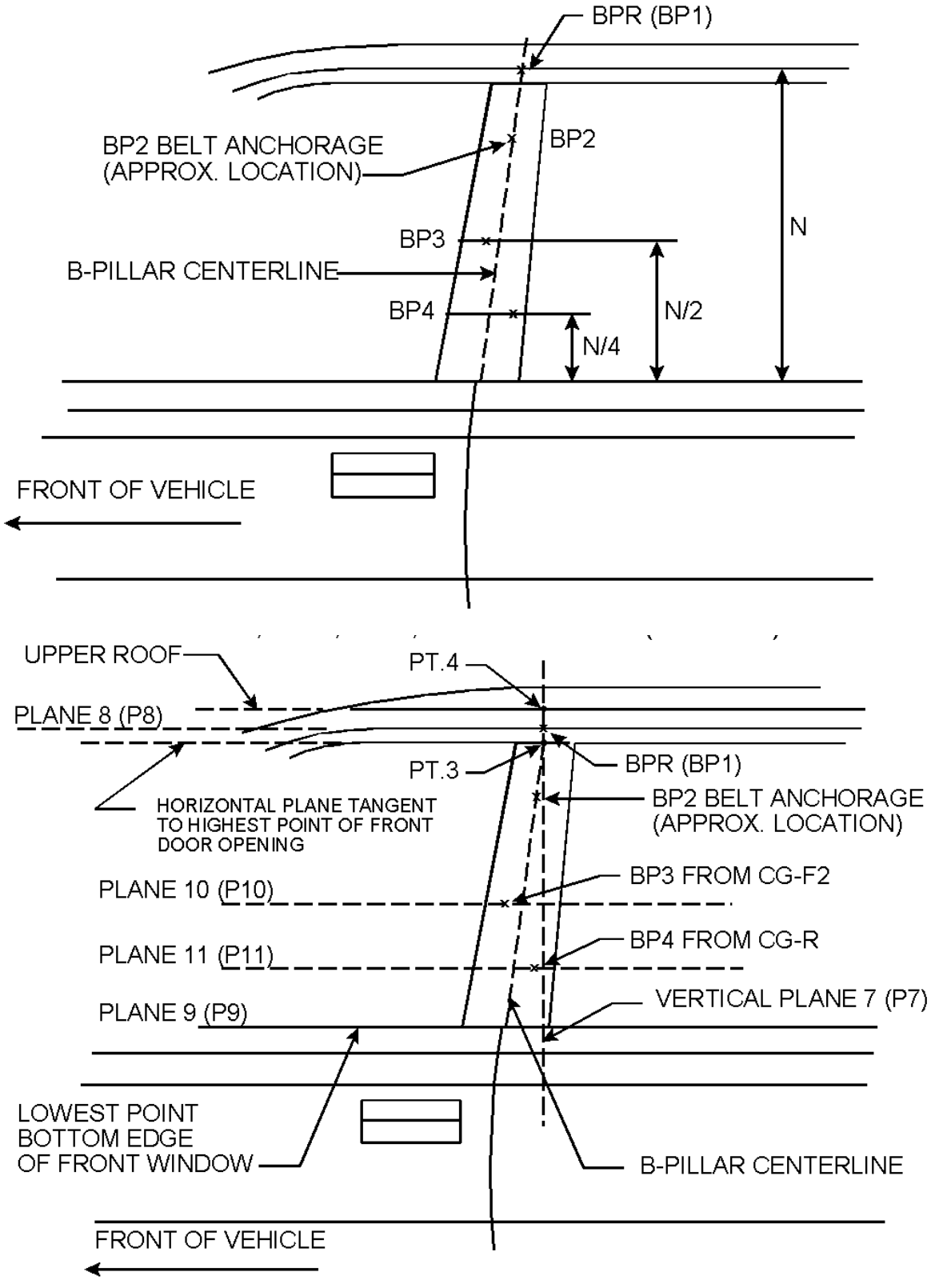
(1) A transverse vertical plane, E, located a distance of 0.35D1 forward of Point M, measured horizontally

(2) A transverse vertical plane, F, located at a distance of 0.35D1 rearward of Point M, measured horizontally

(3) A longitudinal vertical plane, G, located a distance of 0.35D2 to the left of Point M, measured horizontally

(4) A longitudinal vertical plane, H, located at a distance of 0.35D2 to the right of Point M, measured horizontally.

12.4.3 B-PILLAR TARGETS – BP1, BP2, BP3 and BP4



A. B-Pillar Reference Point (BPR) and Target BP1

(1) Establish the horizontal plane passing through the highest point of the forwardmost door opening. (see figures)

As viewed laterally from the vehicle interior, establish the centerline of the width of the B-pillar (B-pillar centerline).

Point 3 (PT3) is located on the horizontal plane at the centerline of the B-pillar.

(2) Locate a transverse vertical plane, Plane 7 that passes through Point 3.

(3) At the intersection of Plane 7 and the nearest longitudinal edge of the upper roof, mark Point 4.

(4) Measure the distance, along the vehicle interior surface, from Point 3 to Point 4.

The B-pillar reference point, BPR, is located at the middle of the line from Point 3 to Point 4.

Target BP1 is located at BPR.

B. Target BP2

If a seat belt anchorage is located on the B-pillar, Target BP2 is located at any point on the anchorage.

For adjustable anchorages, position the anchorage midway between the two extreme adjustment positions. If the anchorage has distinct adjustment positions, none of which is midway between the two extreme positions, adjust the anchorage to the nearest position above the midpoint.

NOTE: The COR will provide a manufacturer's drawing(s) identifying the location of the anchorage components.

C. Target BP3

(1) Locate a horizontal plane, Plane 8, passing through Point BPR.

(2) Locate a horizontal plane, Plane 9, passing through the lowest point of the daylight opening forward of the pillar.

(3) Measure the distance, N, between Plane 8 and Plane 9.

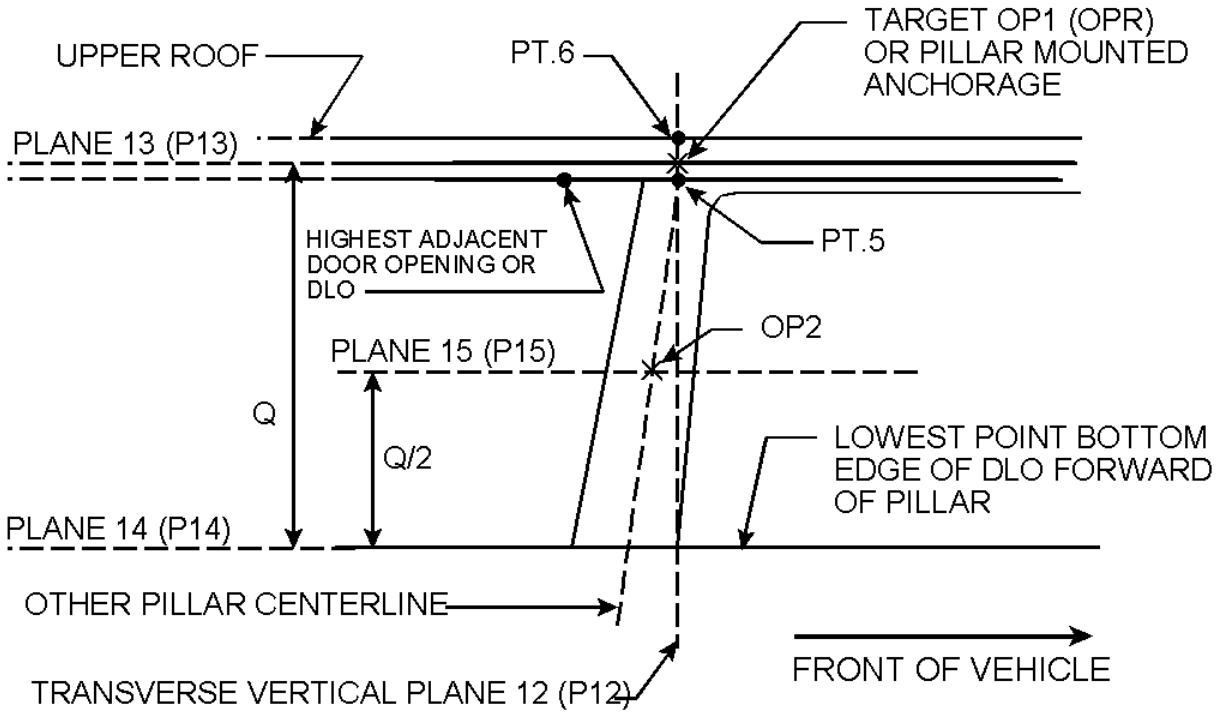
(4) Locate a horizontal plane, Plane 10, half the distance, N/2, between Plane 8 and Plane 9.

(5) From CG-F2 for the nearest DSP, establish the closest point on the B- pillar at Plane 10. Mark BP3.

D. Target BP4

(1) Locate a horizontal plane, Plane 11, half the distance, N/4, between Plane 9 and Plane 10.

(2) From CG-R for the nearest DSP, establish the closet point on the B-Pillar at Plane 11. Mark BP4.



12.4.4 OTHER PILLAR TARGETS - OP1, OP2

A. Target OP1

If a seat belt anchorage is located on the pillar, Target OP1 is any point on the anchorage. For adjustable anchorages, position the anchorage midway between the two extreme adjustment positions. If the anchorage has distinct adjustment positions, none of which is midway between the two extreme positions, adjust the anchorage to the nearest position above the midpoint.

If a seat belt anchorage is NOT located on the pillar, establish Target OP1 as follows:

(1) Establish a horizontal plane through the highest point of the highest adjacent door opening. If there is no adjacent door opening, establish a horizontal plane through the highest point of the highest adjacent daylight opening. Figure 13 illustrates the referenced locations.

(2) Establish the centerline of the width of the pillar, as viewed laterally from the

(3) Locate Point 5, on the vehicle interior, at the intersection of the plane established in item 1 above and the pillar centerline.

(4) Locate a transverse vertical plane, Plane 12, through Point 5.

(5) Locate Point 6, on the vehicle interior, at the intersection of Plane 12 and the plane defining the nearest longitudinal edge of the upper roof (Plane G or H, as appropriate).

(6) Determine the distance, measured along the vehicle interior surface, between Point 5 and Point 6 in Plane 12.

The other pillar reference point (OPR) is located at the middle of the line between Point 5 and Point 6.

Target OP1 is located at point OPR.

B. Target OP2

(1) Locate the horizontal plane, Plane 13, intersecting Point OPR.

(2) Locate a horizontal plane, Plane 14, passing through the lowest point of the daylight opening forward of the pillar.

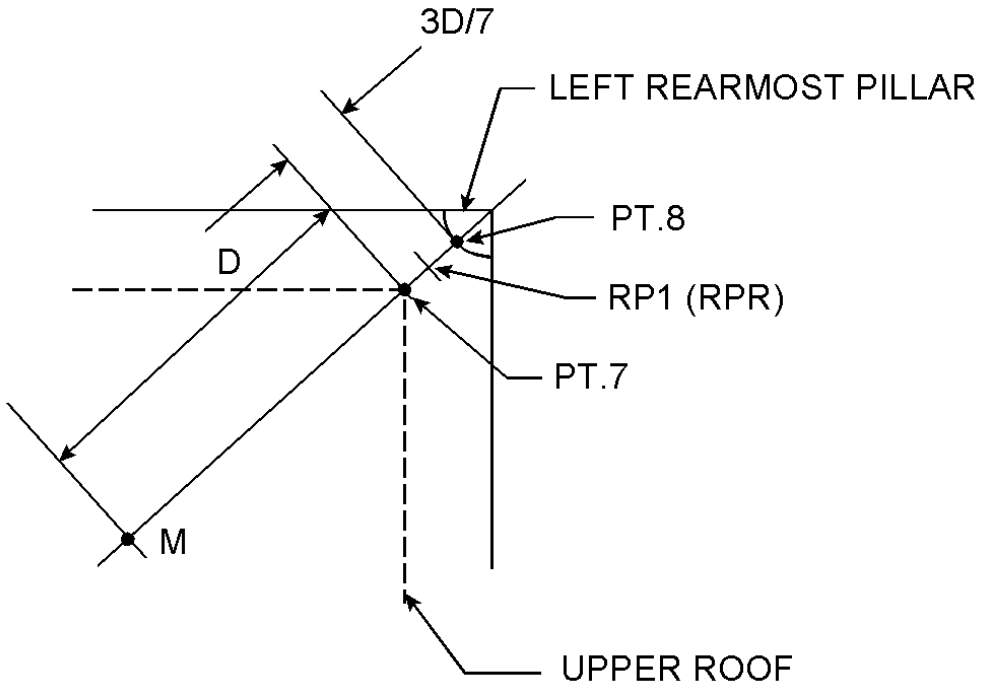
(3) Locate a horizontal plane, Plane 15, half the distance between Plane 13 and Plane 14.

Target OP2 is located on Plane 15 at the centerline of the pillar.

NOTE: Identify the specified other pillar targets (OP1, OP2) for each other pillar.

12.4.5 REARMOST PILLAR TARGETS - RP1, RP2

A. Rearmost Pillar Reference Point and Target RP1



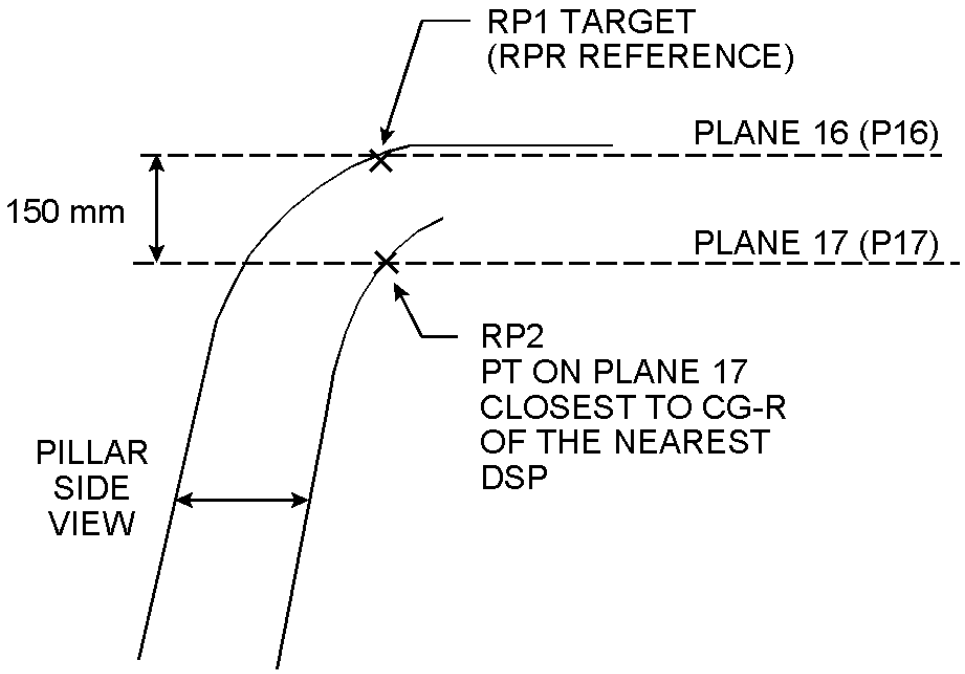
(1) Locate the point, Point 7, at the corner of the upper roof (intersection of the rear lateral and the longitudinal upper roof boundary) nearest to the pillar. (see figure)

(2) Measure the distance, D, between Point 7 and the roof center, Point M, along the vehicle interior surface.

(3) Point 8 is established by extending the line from Point M to Point 7, along the vehicle interior surface in the same vertical plane, by 3D/7 beyond Point 7 or until the edge of a daylight opening, whichever comes first.

(4) The rearmost pillar reference point, Point RPR, is located at the midpoint of the line between Point 7 and Point 8, measured along the vehicle interior surface. Target RP1 is located at Point RPR.

B. Target RP2



(1) If a seat belt anchorage is located on the pillar, Target RP2 is any point on the anchorage. For adjustable anchorages, position the anchorage midway between the two extreme adjustment positions. If the anchorage has distinct adjustment positions, none of which is midway between the two extreme positions, adjust the anchorage to the nearest position above the midpoint.

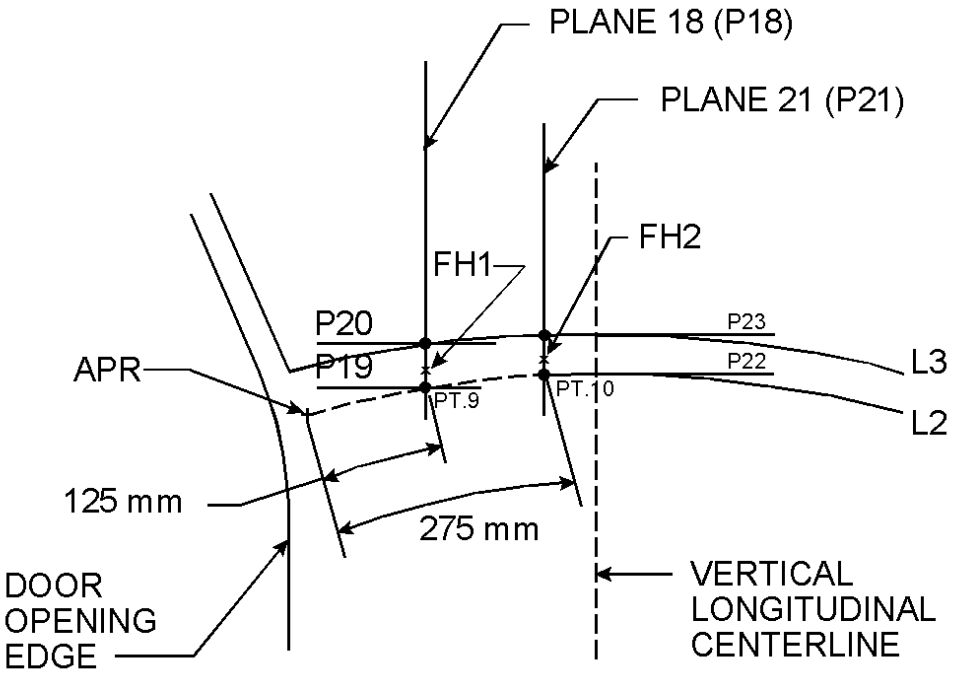
(2) If a seat belt anchorage is NOT located on the pillar, establish Target RP2 as follows:

i. Locate the horizontal plane, Plane 16, through Point RPR. (see figure)

ii. Locate the horizontal plane, Plane 17, 150 mm below Plane 16.

iii. Target RP2 is located in Plane 17 at the rearmost pillar location closet to CG-R for the nearest DSP.

12.4.6 FRONT HEADER TARGETS - FH1, FH2



The test shall be conducted with the sun visor in contact with the vehicle's interior surface (windshield, side rail, front header, roof, etc.). Select the sun visor position that allows for the "worst" case impact.

A. Target FH1

(1) Contour line, Line 3, is established by the upper edge of the windshield on the vehicle interior (see figure).

(2) Establish contour line on the vehicle interior trim, Line 2, parallel to Line 3 and passing through the A-pillar reference point APR.

(3) Locate a point, Point 9, on Line 2 and 125 mm inboard of the Point APR. Measure the distance along the contour of the interior trim.

(4) Locate a vertical longitudinal plane, Plane 18, passing through Point 9.

(5) Locate a transverse vertical plane, Plane 19, through Point 9 through the intersection of Plane 18 and Line 2.

(6) Locate a transverse vertical plane, Plane 20, through the intersection of Plane 18 and Line 3.

(7) Target FH1 is located at the intersection of Plane 18 and the upper vehicle interior, half the distance between Plane 19 and Plane 20.

B. Target FH2

(1) If a sun roof opening is located forward of the transverse vertical plane defining the front edge of the upper roof, Target FH2 is located as specified in Section 12.4.7, Sun Roof Opening.

(2) If a sun roof opening is NOT located forward of the front lateral edge of the upper roof, establish FH2 as follows:

i. Locate a point, Point 10, 275 mm inboard of Point APR along Line

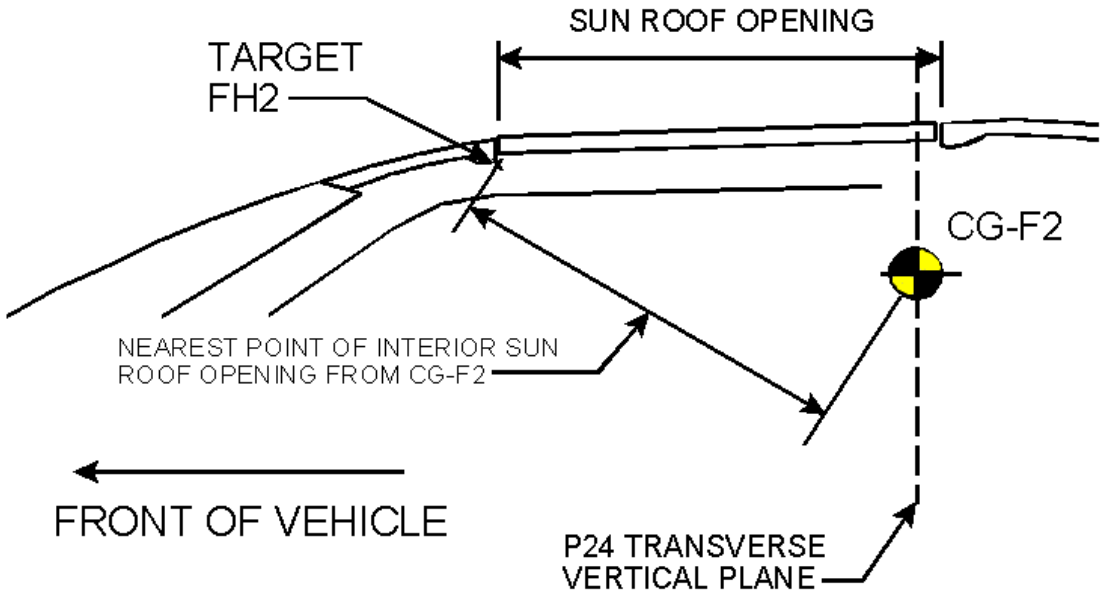
ii. Locate a longitudinal vertical plane, Plane 21, through Point 10.

iii. Locate a transverse vertical plane, Plane 22, through Point 10 through the intersection of Plane 21 and Line 2.

iv. Locate a transverse vertical plane, Plane 23, through the intersection of Plane 21 and Line 3.

v. Target FH2 is located at the intersection of Plane 21 and the upper vehicle interior, half the distance between Plane 22 and Plane 23.

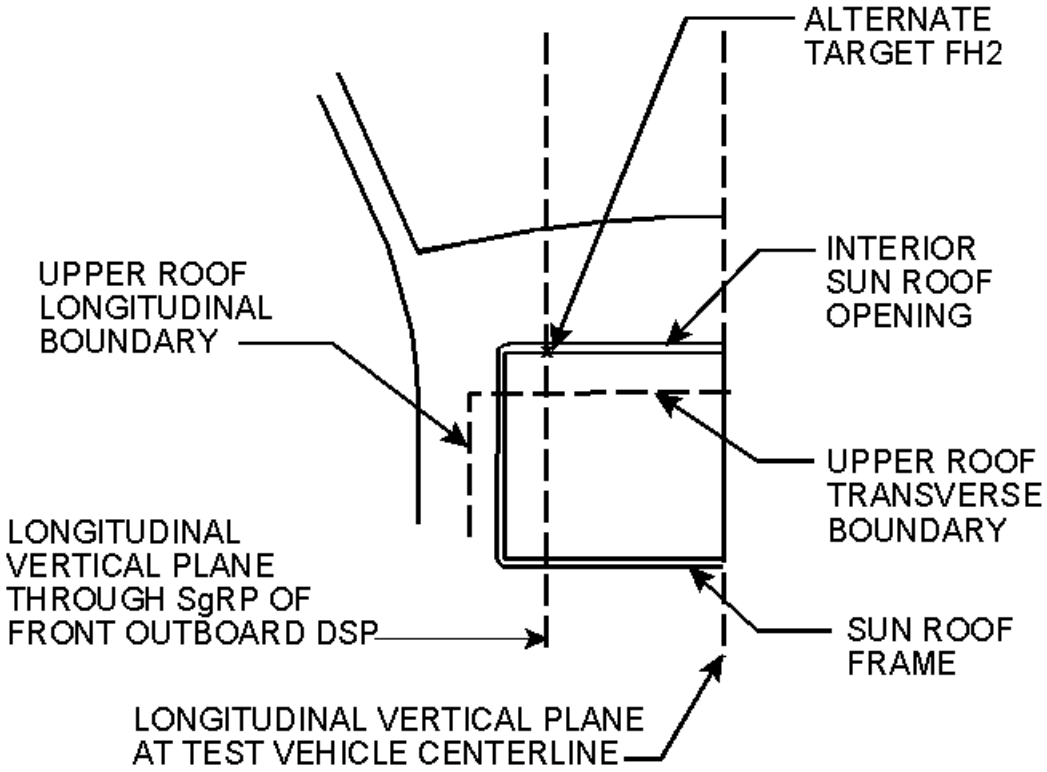
12.4.7 SUN ROOF OPENING - FH2



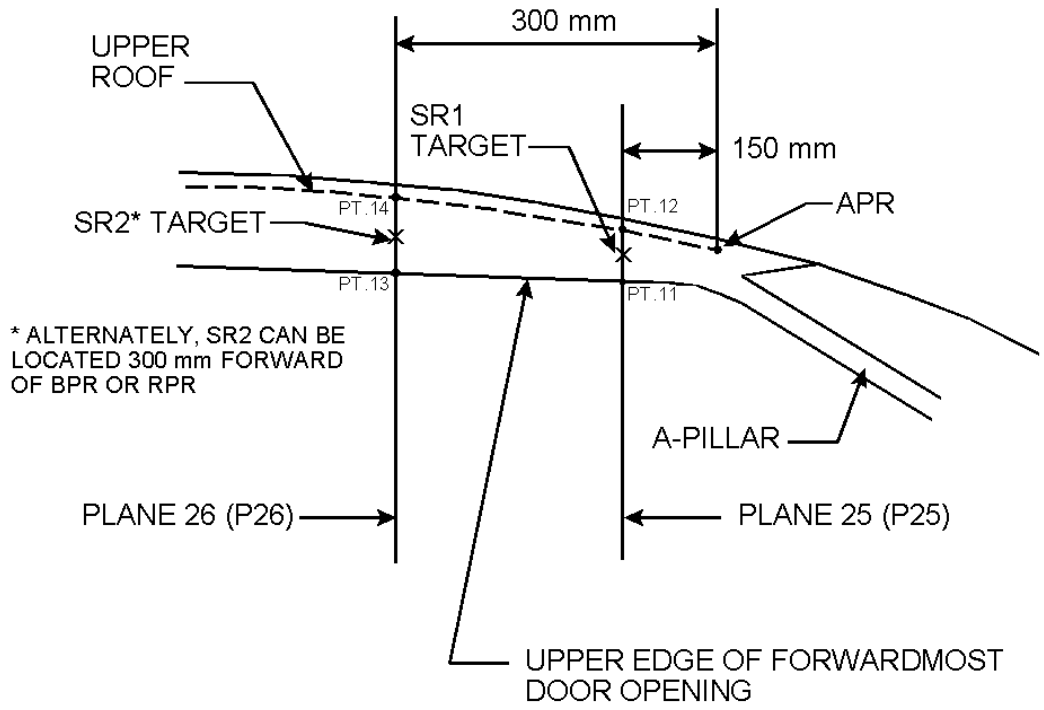
If a sun roof's interior opening is located forward of the front transverse edge of the upper roof and intersects the longitudinal vertical plane passing through the SgRP of either front outboard DSP, Target FH2 is the nearest point on the interior sun roof opening forward of CG-F2 and in the longitudinal vertical plane through the SgRP.

The target, FH2, shall be tested with the sun roof and shade in the fully open position, if movable.

If the sun roof cannot be opened and is made of a glass/glazed material, proceed with locating and marking the target location. Prior to conducting any FMH impact test of a target on glazing contact the COR.



12.4.8 TARGETS ON THE SIDE RAIL BETWEEN THE A-PILLAR AND THE B-PILLAR (or REARMOST PILLAR) -SR1, SR2



The test can be conducted with the sun visor in contact with the vehicle's interior surface (windshield, side rail, front header, roof, etc.) The COR will provide instructions as to the sun visor's position.

A. Target SR1

(1) Locate a transverse vertical plane, Plane 25, 150 mm rearward of the A- pillar reference point, Point APR.

(2) Locate the point, Point 11, at the intersection of Plane 25 and the upper edge of the forwardmost door opening.

(3) Locate the point, Point 12, at the intersection of Plane 25 and the plane defining the nearest longitudinal edge of the upper roof at the surface of the vehicle ceiling.

(4) Target SR1 is located at the middle of the line between Point 11 and Point 12 in Plane 25, measured along the vehicle interior.

B. Target SR2

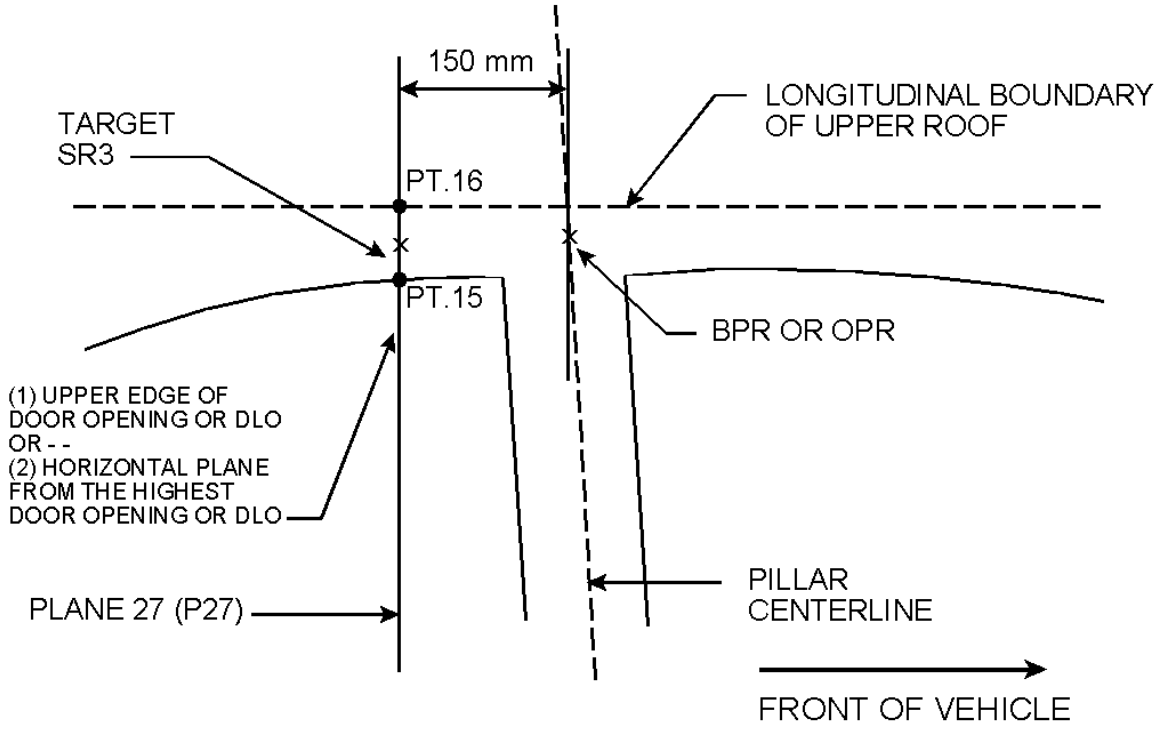
(1) Locate a transverse vertical plane, Plane 26, 300 mm rearward of APR or 300 mm forward of the BPR (or RPR if the B-pillar is also the rearmost pillar – e.g., pickup trucks).

(2) Locate the point, Point 13, at the intersection of Plane 26 and the upper edge of the forwardmost door opening.

(3) Locate the point, Point 14, at the intersection of Plane 26 and the nearest longitudinal edge of the upper roof at the interior roof surface.

(4) Target SR2 is located at the middle of the line between Point 13 and Point 14 in Plane 26, measured along the vehicle interior.

12.4.9 OTHER SIDE RAIL TARGET - SR3



If a seat belt anchorage is located on the side rail, Target SR3 is located at any point on the anchorage. For adjustable anchorages, position the anchorage midway between the two extreme adjustment positions. If the anchorage has distinct adjustment positions, none of which is midway between the two extreme positions, adjust the anchorage to the nearest position above the midpoint.

If a seat belt anchorage is NOT located on the side rail and a grab-handle is located on the side rail, Target SR3 is located on the anchorage of the grab-handle. Folding grab- handles are in their stowed position for testing.

If neither a seat belt anchorage nor a grab-handle is located on the side rail, establish Target SR3 as follows:

(1) Locate a transverse vertical plane, Plane 27, 150 mm rearward of BPR, B-pillar reference point, or OPR, Other pillar reference point (see Figure).

(2) Locate the point, Point 16, at the intersection of Plane 27 and the plane defining the nearest longitudinal edge of the upper roof at the vehicle ceiling surface.

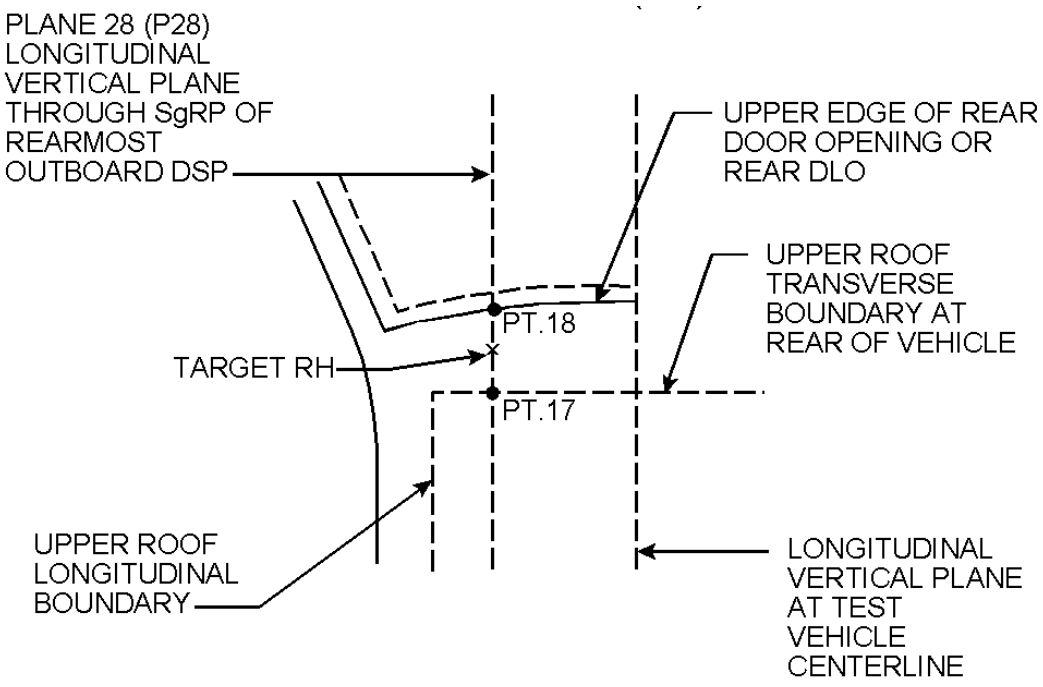
i. If Plane 27 intersects a door or daylight opening, Point 15 is located at the intersection of Plane 27 and the upper edge of the door opening or daylight opening.

ii. If Plane 27 does not intersect a door or daylight opening, Point 15 is located on the vehicle interior at the intersection of Plane 27 and the horizontal plane through the highest point of the nearest door or daylight opening.

iii. If the adjacent door(s) or daylight opening(s) are equidistant to Plane 27, Point 15 is located on the vehicle interior at the intersection of Plane 27 and either horizontal plane through the highest point of the respective door or daylight opening.

(3) Target SR3 is located at the middle of the line between Point 15 and Point 16 in Plane 27, measured along the vehicle interior.

12.4.10 REAR HEADER TARGET - RH



TOP VIEW

A. Locate the point, Point 17, at the intersection of the surface of the upper vehicle interior, the longitudinal vertical plane, Plane 28, through the SgRP for the rearmost outboard DSP and the transverse vertical plane defining the rear edge of the upper roof (see figure).

(1) If Plane 28 intersects a rear door opening or daylight opening, Point 18 is located at the intersection of Plane 28 and the upper edge of the door opening or the daylight opening if no door opening.

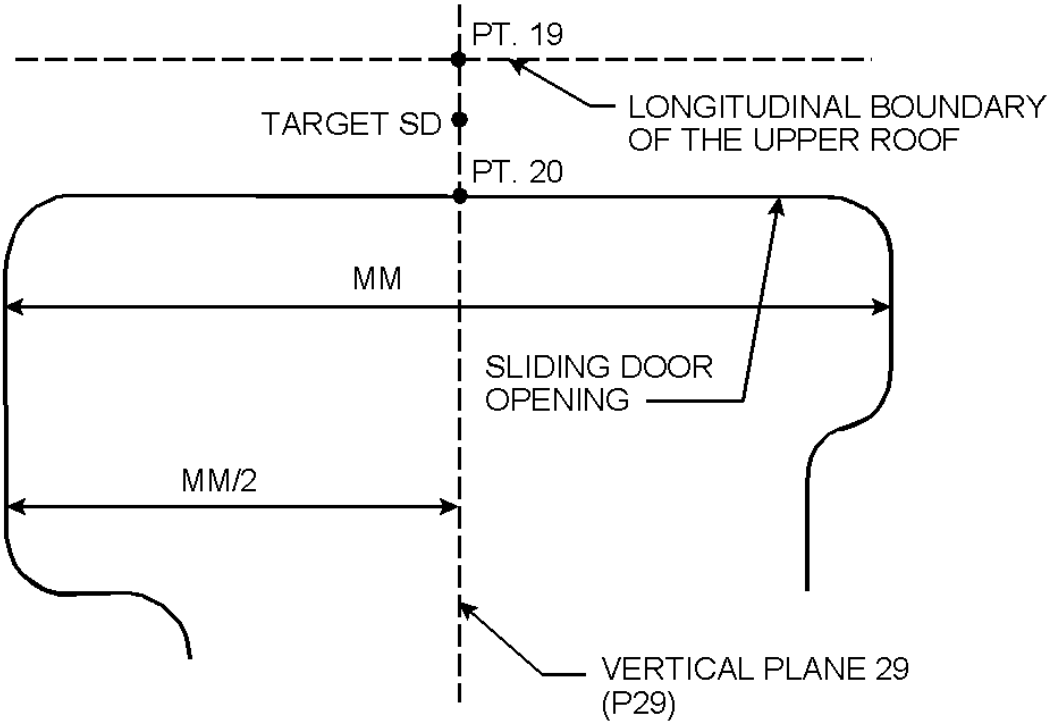
(2) If Plane 28 does NOT intersect a rear door opening or daylight opening, Point 18 is located on the vehicle interior at the intersection of Plane 28 and a horizontal plane through the highest point of the door or daylight opening nearest to Plane 28.

(3) If the adjacent door(s) or daylight opening(s) are equidistant to Plane 28, Point 18 is located on the vehicle interior at the intersection of Plane 28 and either horizontal plane through the highest point of each door or daylight opening.

B. Target RH is located at the middle of the line between Point 17 and Point 18, in Plane 28, measured along the vehicle interior.

C. If Target RH is more than 112 mm from Point 18 on the line between Point 17 and Point 18 and is in Plane 28, Target RH is the point on that line 112 mm from Point 18.

12.4.11 SLIDING DOOR TRACK TARGET - SD



A. Determine the distance, MM, at the widest opening of the sliding door. The distance is measured horizontally and parallel to the vehicle longitudinal centerline. The figure above illustrates the sliding door track target location.

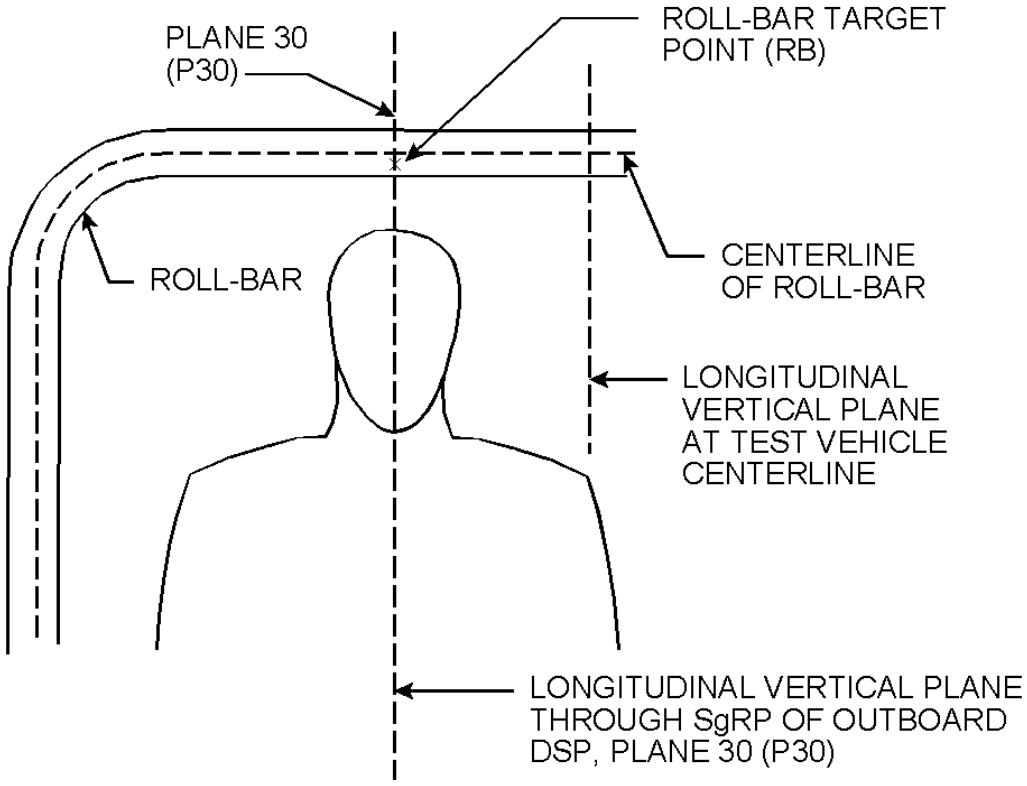
B. Locate the transverse vertical plane, Plane 29, passing through the middle of the widest opening of the sliding door (MM/2).

C. Locate the point, Point 19, at the intersection of the surface of the upper vehicle interior, Plane 29, and the plane defining the nearest longitudinal edge of the upper roof.

D. Locate the point, Point 20, at the intersection of Plane 29 and the upper edge of the sliding door opening.

E. Target SD is located at the middle of the line between Point 19 and Point 20 in Plane 29, measured along the vehicle interior.

12.4.12 ROLL-BAR TARGET - RB1, RB2



A. Locate a longitudinal vertical plane, Plane 30, through the SgRP of the outboard DSP. The figure illustrates the roll-bar target location.

B. Target RB1 is located on the roll-bar and in Plane 30 at the location closest to CG-F2 (front outboard DSP) or CG-R (rear outboard DSP), as appropriate.

If a seat belt anchorage is located on the roll-bar, Target RB2 is any point on the anchorage. For adjustable anchorages, position the anchorage midway between the two extreme adjustment positions. If the anchorage has distinct adjustment positions, none of which is midway between the two extreme positions, adjust the anchorage to the nearest position above the midpoint.

The definition of roll-bar does not include deployable roll-bars. There are no targets on a deployable roll-bar.

12.4.13 STIFFENER TARGET - ST1, ST2

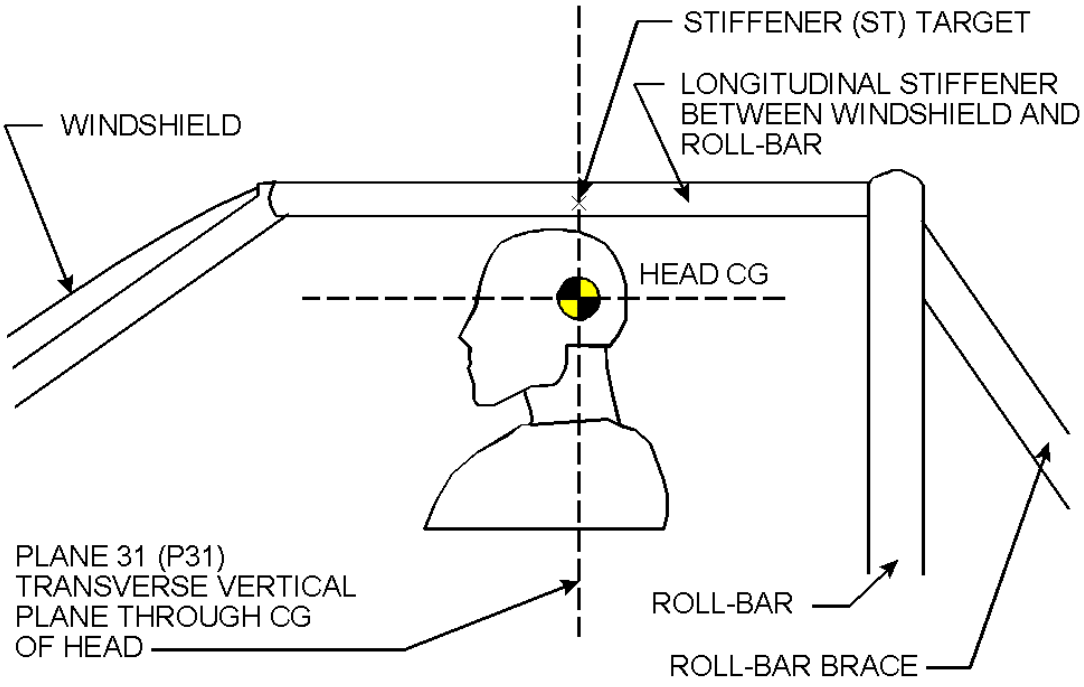
Establish Target ST1 as follows:

A. Locate a transverse vertical plane, Plane 31, containing CG-F2 or CG-R, as appropriate, for any outboard designated seating position. Figure 23 illustrates the stiffener target location.

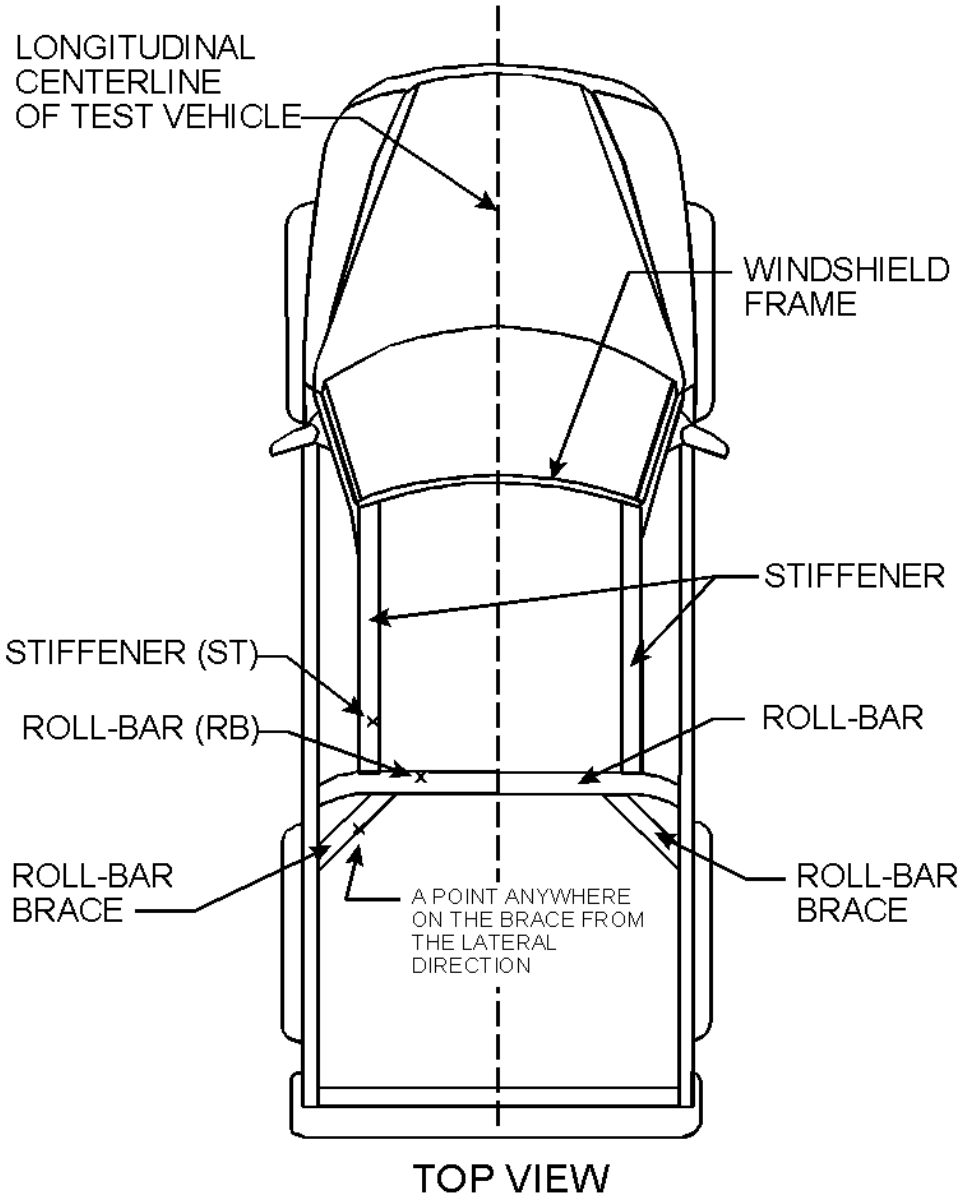
B. Target ST is located on the stiffener in Plane 31 at the location closest to CG-F2 or CG-R, as appropriate.

If a seat belt anchorage is located on the stiffener, Target ST2 is any point on the anchorage. For adjustable anchorages, position the anchorage midway between the two extreme adjustment positions. If the anchorage has distinct adjustment positions, none of which is midway between the two extreme positions, adjust the anchorage to the nearest position above/beyond the midpoint.

STIFFENER TARGET (ST)



12.4.14 BRACE TARGET - BT

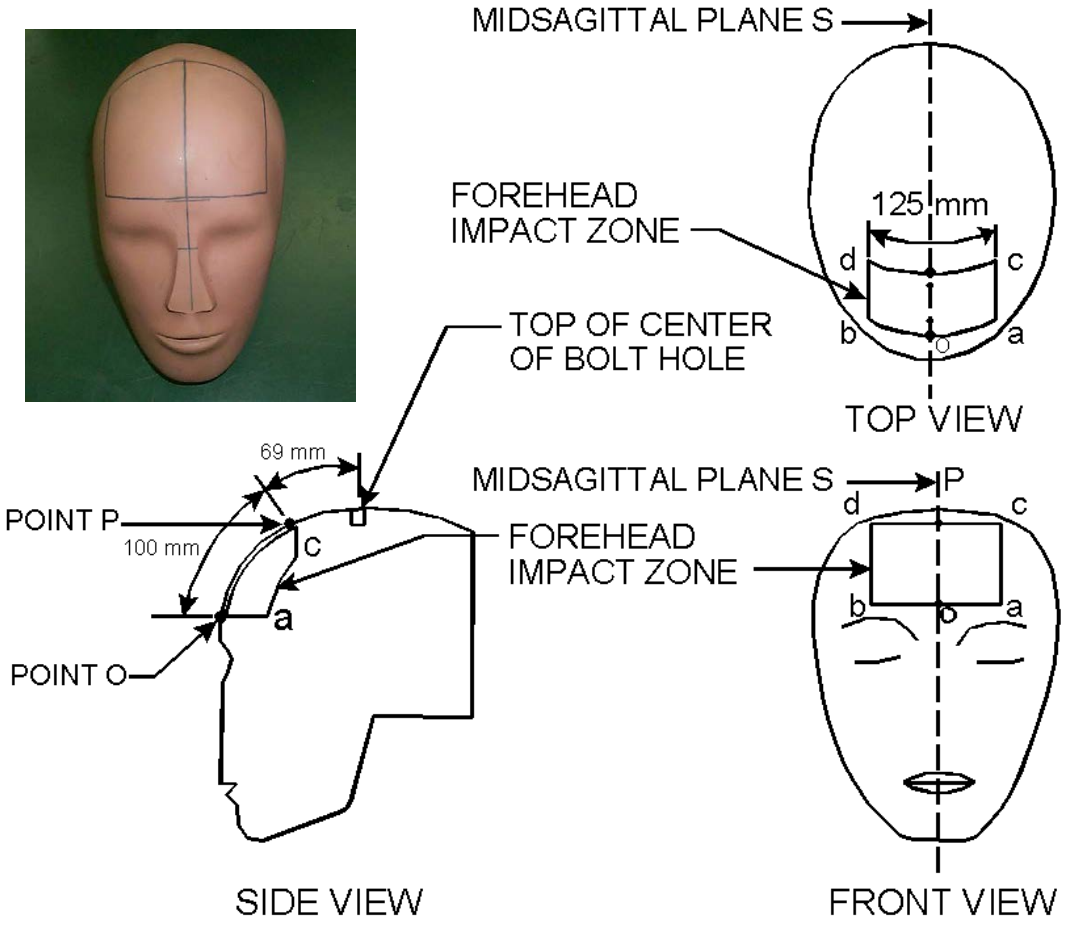


Target BT is any point on the width of the brace as viewed laterally from inside the passenger compartment.

12.5 IDENTIFY TARGETS FOR REDUCED SPEED FMH IMPACT-19 KM/H (12 mph)
(Vehicles equipped with a dynamically deployed upper interior head protection system)

If the test vehicle is equipped with a dynamically deployed upper interior head protection system (i.e. side rail curtain), refer to the manufacturer's test set up reference data supplied by the COR to identify targets, if any, which meet the Reduced Speed FMH Impact Criteria (see Section 2 - General Requirements). If manufacturer's data is not available or the data does not indicate which targets should be tested at the reduced FMH impact speed, consult with the COR to determine the appropriate FMH impact speeds.

12.6 DETERMINE THE FMH FOREHEAD IMPACT ZONE



Determine and mark for reference the forehead impact zone of the FMH in accordance with the following procedure (S8.10):

A. Position the headform so that the baseplate of the skull is horizontal. The midsagittal plane of the headform is designated as Plane S (see figure).

B. From the center of the threaded hole on top of the headform, draw a 69 mm line forward toward the forehead, coincident with Plane S, along the contour of the outer skin of the headform. The front end of the line is designated as Point P.

From Point P, draw a 100 mm line forward toward the forehead, coincident with Plane S, along the contour of the outer skin of the headform. The front end of the line is designated as Point O.

C. Draw a 125 mm line coincident with a horizontal plane along the contour of the outer skin of the forehead from left to right through Point O so that the line is bisected at Point O.

The end of the line on the left side of the headform is designated as Point a and the end of the right as Point b.

D. Draw another 125 mm line, coincident with a vertical plane, along the contour of the outer skin of the forehead through Point P so that the line is bisected at Point P.

The end of the line on the left side of the headform is designated as Point c and the end on the right as Point d.

E. Draw a line from Point a to Point c along the contour of the outer skin using a flexible steel tape. Using the same method, draw a line from Point b to Point d.

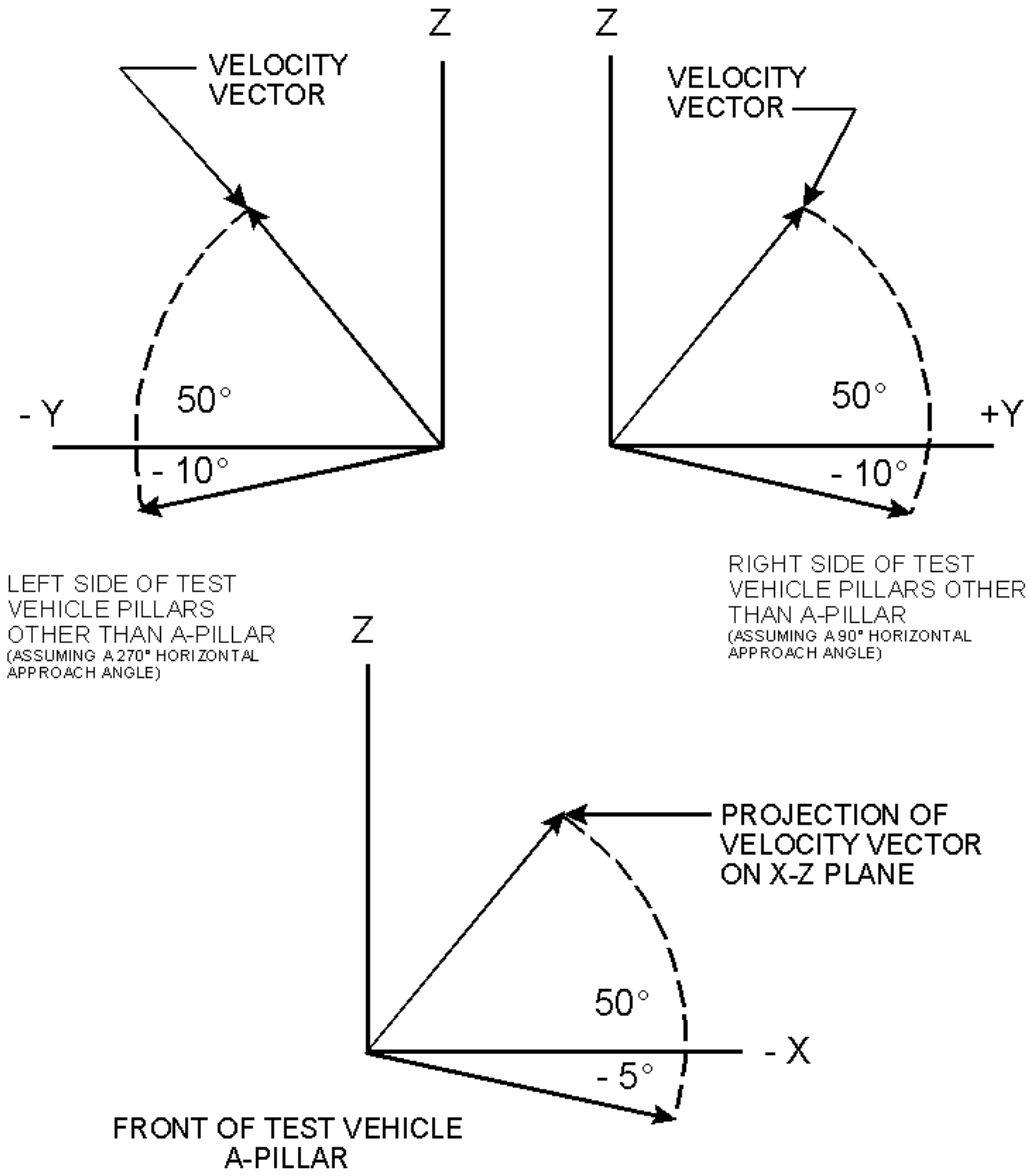
F. The forehead impact zone is the surface area on the FMH forehead bounded by lines a-O-b and c-P-d, and a-c and b-d.

12.7 DETERMINE FMH APPROACH ANGLES

Table 1 - APPROACH ANGLE LIMITS

IMPACT ZONES	HORIZONTAL ANGLE	VERTICAL ANGLE
FRONT HEADER	180º	0º to 50º
REAR HEADER	0º OR 360º	0º to 50º
LEFT SIDE RAIL	270º	0º to 50º
RIGHT SIDE RAIL	90º	0º to 50º
LEFT SLIDING DOOR TRACK	270º	0º to 50º
RIGHT SLIDING DOOR TRACK	90º	0º to 50º
LEFT A-PILLAR	195º to 255º	-5º to 50º
RIGHT A-PILLAR	105º to 165º	-5º to 50º
LEFT B-PILLAR	195º to 345º	-10º to 50º
RIGHT B-PILLAR	15º to 165º	-10º to 50º
OTHER LEFT PILLARS	270º	-10º to 50º
OTHER RIGHT PILLARS	90º	-10º to 50º
LEFT REARMOST PILLAR	270º to 345º	-10º to 50º
RIGHT REARMOST PILLAR	15º to 90º	-10º to 50º
UPPER ROOF	ANY	0º to 50º
OVERHEAD ROLLBAR	0º or 180º	0º to 50º
BRACE/STIFFENER	90º or 270º	0º to 50º
SEAT BELT ANCHORAGES	ANY	0º to 50º

12.7.1 VERTICAL APPROACH ANGLES



A. A-Pillars

(1) Minimum Vertical Approach Angle

The minimum vertical approach angle for A-pillars is -5º.

(2) Maximum Vertical Approach Angle

Determine the maximum vertical approach angle as follows:

i. Position the forehead impact zone in contact with the selected A-pillar target at the prescribed horizontal approach angle. If a range of horizontal approach angles is prescribed, position the forehead impact

zone in contact with the selected target at any horizontal approach angle within the range.

ii. Keeping the forehead impact zone in contact with the A-pillar target, rotate the FMH upward until the lip, chin or other part of the FMH contacts the component or other portion of the vehicle interior.

iii. Keeping the forehead impact zone in contact with the target, rotate the FMH downward by 5º to determine the maximum vertical angle.

iv. The maximum vertical approach angle is the resultant angle within the established range in Table 1, Approach Angle Limits. The maximum vertical approach angle specified in Table 1 is 50º.

v. If the FMH forehead impact zone **cannot** contact the target within the combination of horizontal and vertical angles:

(a) Move the target center to any location within a 25 mm radius of the original target center.

(b) Increase the radius of the original target center in increments of 25 mm until at least one point can be contacted by the FMH forehead impact zone at one or more combination of angles.

vi. Record the maximum vertical approach angle.

B. B-Pillars, Other Pillars and Rearmost Pillars

(1) Minimum Vertical Approach Angle

The minimum vertical approach angle for B-pillars, other pillars and rearmost pillars is - 10º.

(2) Maximum Vertical Approach Angle

Determine the maximum vertical approach angle as follows:

i. Position the forehead impact zone in contact with the selected pillar target at the prescribed horizontal approach angle. If a range of horizontal approach angles is prescribed, position the forehead impact zone in contact with the selected target at any horizontal approach angle within the range.

ii. Keeping the forehead impact zone in contact with the pillar target, rotate the FMH upward until the lip, chin or other part of the FMH contacts the component or other portion of the vehicle interior.

iii. Keeping the forehead impact zone in contact with the target, rotate the FMH downward by 10° to determine the maximum vertical angle.

iv. The maximum vertical angle is the resultant angle within the established

range in Table 1. The maximum vertical approach specified in Table 1 is 50°.

v. If the FMH forehead impact zone **cannot** contact the target within the combination of horizontal and vertical angles:

(a) Move the target center to any location within a 25 mm until radius of the original target center measuring.

(b) Increase the radius in increments of 25 mm until at least one point can be contacted by the FMH forehead impact zone at one or more combination of angles.

vi. Record maximum vertical approach angle.

C. Other Components (Headers, Side Rails, Roof, Brace, Stiffener and Seat Belt Anchorages)

(1) Minimum Vertical Approach Angle

The minimum vertical approach angle for B-pillars, other pillars and rearmost pillars is 0º.

(2) Maximum Vertical Approach Angle

Determine the maximum vertical approach angle as follows:

i. Position the forehead impact zone in contact with the selected target at the prescribed horizontal approach angle. If a range of horizontal approach angles is prescribed, position the forehead impact zone in contact with the selected target at any horizontal approach angle within the range.

ii. Keeping the forehead impact zone in contact with the target, rotate the FMH upward until the lip, chin or other part of the FMH contacts the component or other portion of the vehicle interior.

iii. Keeping the forehead impact zone in contact with the target, rotate the FMH downward by 5º to determine the maximum vertical angle.

iv. The maximum vertical angle is the resultant angle within the established range in Table 1. The maximum vertical approach specified in Table 1 is 50°.

v. If the FMH forehead impact zone **cannot** contact the target within the combination of horizontal and vertical angles:

(a) Move the target center to any location within a 25 mm until radius of the original target center measuring.

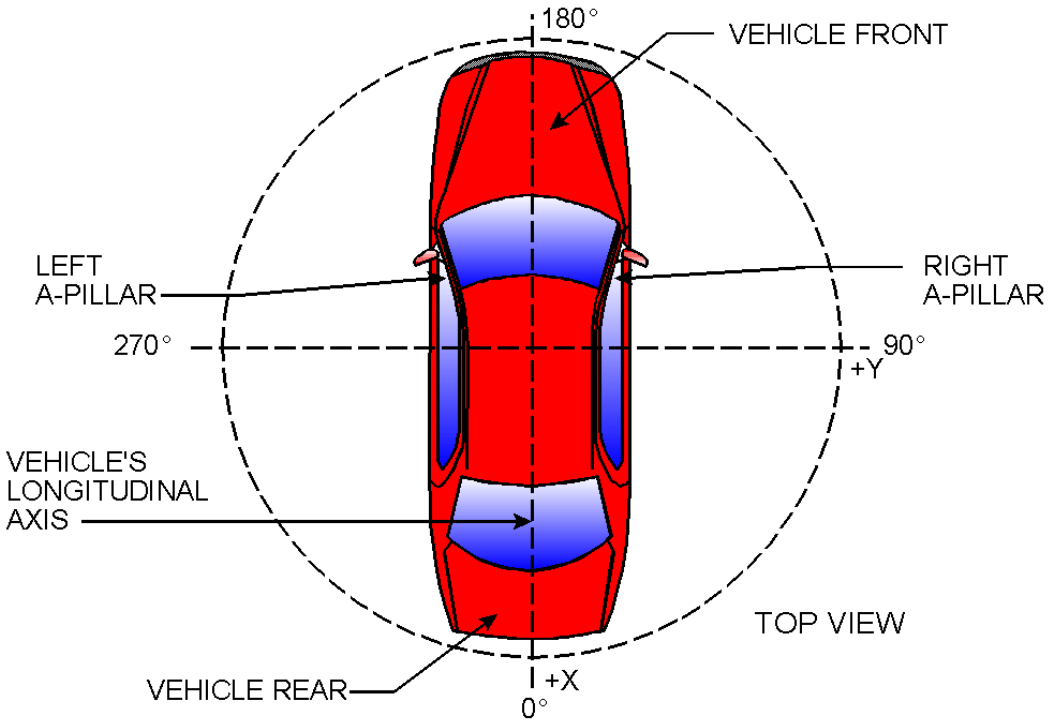
(b) Increase the radius in increments of 25 mm until at least one

point can be contacted by the FMH forehead impact zone at one or more combination of angles.

vi. Record maximum vertical approach angle.

12.7.2 HORIZONTAL APPROACH ANGLES

FMH HORIZONTAL APPROACH ANGLE PLANE



A. Left A-pillar

(1) Maximum Horizontal Approach Angle

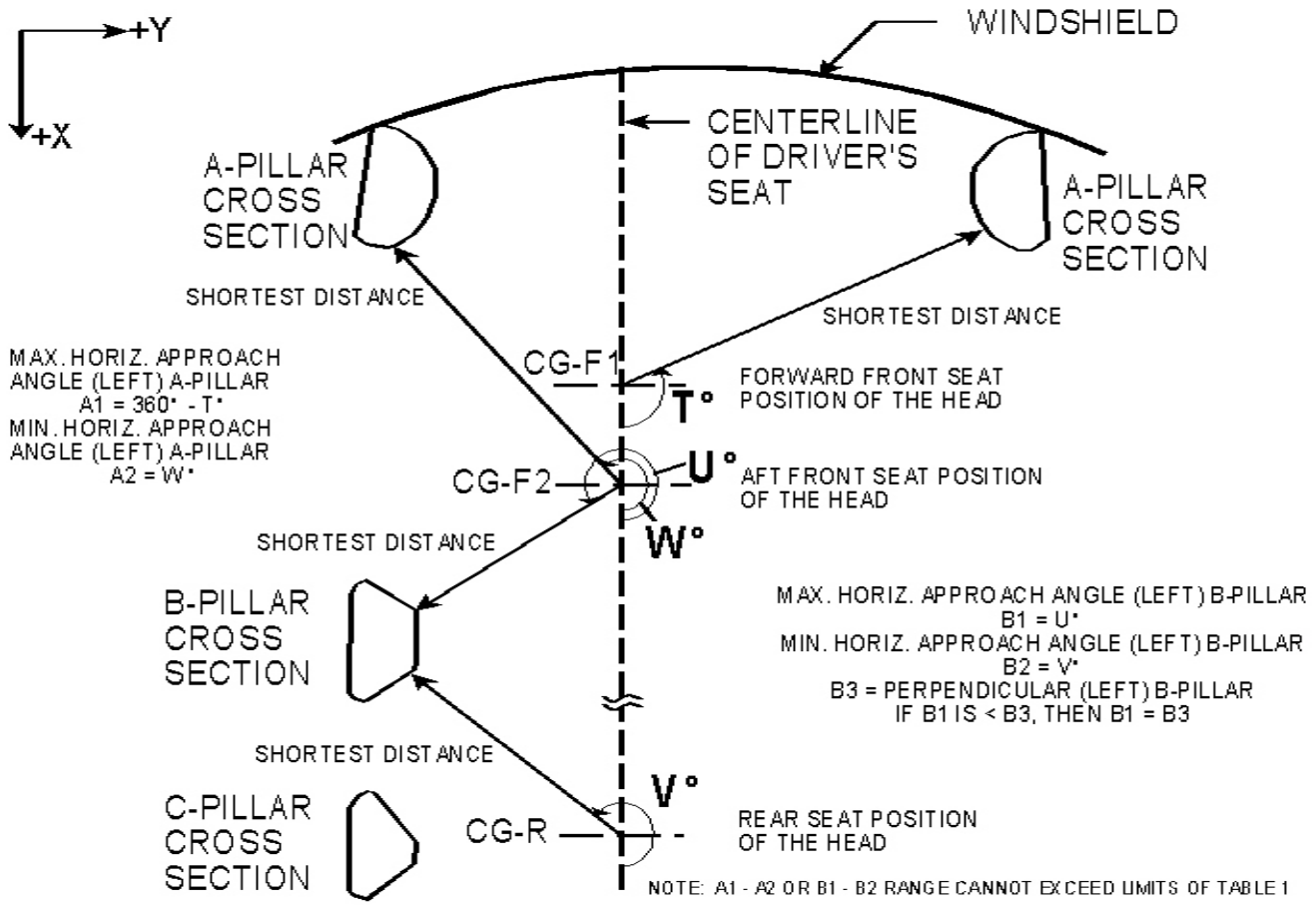
i. Locate a line formed by the shortest horizontal distance between CG-F1 (head CG forward left front seat, determined in Section 12.4) for the LEFT seat and the RIGHT A-pillar (see figure 6).

ii. Measure the horizontal angle in the counterclockwise direction formed by the line and the X-axis of the vehicle, Tº.

iii. The maximum horizontal approach angle for the left A-pillar, A1, equals 360º minus Tº.

$$A1 = 360º - Tº$$

iv. If A1 > 255º then the maximum horizontal approach angle for the left A-pillar, A1, equals 255º.



(2) Minimum Horizontal Approach Angle Left A-Pillar

i. Locate a line formed by the shortest horizontal distance between CG-F2 for the LEFT seat and the LEFT A-pillar.

ii. Measure the horizontal angle in the counterclockwise direction formed by the line and the X-axis of the vehicle, Wº.

iii. The minimum horizontal approach angle for the left A-pillar, A2, equals Wº. A2 = Wº

iv. If A2 < 195º then the minimum horizontal approach angle for the left A-pillar, A2, equals 195º.

B. Left B-Pillar

(1) Maximum Horizontal Approach Angle

i. Locate a line formed by the shortest horizontal distance between CG-F2 for the LEFT seat and the LEFT B-pillar.

ii. Measure the horizontal angle in the counterclockwise direction formed

by the line and the X-axis of the vehicle, U^o.

iii. The maximum horizontal approach angle for the left B-pillar, B1, equals U^o.

iv. If B1 < 270º then the maximum horizontal approach angle for the left B-pillar, B1, equals 270º.

v. If B1 > 345º then the maximum horizontal approach angle for the left B-pillar, B1, equals 345º.

(2) Minimum Horizontal Approach Angle Left B-Pillar

i. Locate a line formed by the shortest horizontal distance between CG-R for the LEFT seat and the LEFT B-pillar.

ii. Measure the horizontal angle in the counterclockwise direction formed by the line and the X-axis of the vehicle, V^o.

iii. The minimum horizontal approach angle for the left B-pillar, B2, equals V^o.

iv. If B2 < 195º then the minimum horizontal approach angle for the left B-pillar, B2, equals 195º.

C. Right A-Pillar

(1) Maximum Horizontal Approach Angle

i. Locate a line formed by the shortest horizontal distance between CG-F2 for the RIGHT seat and the RIGHT A-pillar.

ii. Measure the horizontal angle in the counterclockwise direction formed by the line and the X-axis of the vehicle, $W_{right}{}^o$.

iii. The maximum horizontal approach angle for the right A-pillar, A1right, equals $W_{right}{}^o$.

$A1_{right} = W_{right}{}^o$

iv. If $A1_{right}$ > 165º then the maximum horizontal approach angle for the right A-pillar, $A1_{right}$, equals 165º.

(2) Minimum Horizontal Approach Angle

i. Locate a line formed by the shortest horizontal distance between CG-F1 for the RIGHT seat and the LEFT A-pillar.

ii. Measure the horizontal angle in the counterclockwise direction formed by the line and the X-axis of the vehicle, $T_{right}{}^o$

iii. The minimum horizontal approach angle for the right A-pillar, $A2_{right}$, equals 360º minus T_{right}º.

$$A2_{right} = 360º - T_{right}º$$

iv. If $A2_{right}$ < 105º then the minimum horizontal approach angle for the right A-pillar, $A2_{right}$, equals 105º.

D. Right B-Pillar

(1). Maximum Horizontal Approach Angle Right B-Pillar

i. Locate a line formed by the shortest horizontal distance between CG-R for the RIGHT seat and the RIGHT B-pillar.

ii. Measure the horizontal angle in the counterclockwise direction formed by the line and the X-axis of the vehicle, V_{right}º.

iii. The maximum horizontal approach angle for the right B-pillar, B1right, equals V_{right}º.

$$B1_{right} = V_{right}º$$

iv. If $B1_{right}$ > 165º then the maximum horizontal approach angle for the right B-pillar, $B1_{right}$, equals 165º.

(2) Minimum Horizontal Approach Angle Right B-Pillar

i. Locate a line formed by the shortest horizontal distance between CG-F2 for the RIGHT seat and the RIGHT B-pillar.

ii. Measure the horizontal angle in the counterclockwise direction formed by the line and the X-axis of the vehicle, U_{right}º

iii. The minimum horizontal approach angle for the right B-pillar, $B2_{right}$, equals U_{right}º.

$$B2_{right} = U_{right}º$$

iv. If $B2_{right}$ > 90º then the minimum horizontal approach angle, $B2_{right}$, equals 90º.

If $B2_{right}$ < 15º then the minimum horizontal approach angle, $B2_{right}$, equals 15º.

12.8 FMH IMPACT TEST EXECUTION

12.8.1 PRE-IMPACT CONDITIONS

A. Movable vehicle windows are placed in the fully open position for targeting and testing. If a window is designed to open only part way, that is its' fully open position. (S8.2)

B. The top, if any, of convertibles and open-body type vehicles is in the closed passenger compartment configuration for targeting and testing. (S8.3)

C. Any side door on the opposite side of the vehicle longitudinal centerline from the target may be open or removed during testing. Any rear hatchback or tailgate may be open or removed for testing any target except targets on the rear header, rearmost pillars, or the rearmost other side rail (on either side of the vehicle) for testing. Any other doors are fully closed and latched but not locked during testing. (S8.4)

D. Each sun visor is placed in any position where one side of the visor is in contact with the vehicle interior surface (windshield, side rail, front header, roof, etc.) Select the sun visor position that allows for the "worst" case impact. (S8.5)

E. The steering wheel may be placed in any position intended for use while the vehicle is in motion during targeting. The steering wheel may be removed from the vehicle for testing. (S8.6)

F. The seats may be placed in any position intended for use while the vehicle is in motion during targeting. The seats may be removed from the vehicle after target points are identified and relocated, where necessary, for testing. (S8.6)

G. Seat belt anchorages (S8.7):

(1) If a target is on a seat belt anchorage (i.e., BP2, OP1, RP2, SR3, RB2, ST2) and if the seat belt anchorage is adjustable, tests are conducted with the anchorage adjusted to a point midway between the two extreme adjustment positions.

(2) If a target is on a seat belt anchorage and the anchorage has distinct adjustment positions, none of which is midway between the two extreme positions, tests are conducted with the anchorage adjusted to the nearest position above/beyond the midpoint of the two extreme positions.

(3) If the seat belt anchorage is not a specified target, the seat belt anchorage may be adjusted in any position to target or test the component.

H. The ambient temperature for a period not less than four hours is between 19ºC and 26ºC at any relative humidity between 10% and 70%.

12.8.2 IMPACT TESTS

A. Position the FMH impactor so that the FMH forehead impact zone contacts the target at the predetermined horizontal and vertical impact angle appropriate for the component with the midsagittal plane of the FMH vertical and the FMH upright.

B. Take pretest photographs.

C. Record the temperature and humidity immediately prior to conducting the impact test.

D. Conduct a pretest instrumentation and digital high speed video camera check.

E. Impact each target at the specified FMH impact speed (23.5 kph ± 0.4 kph or 18.5 kph ± 0.4 kph)

F. Record and process the acceleration time data.

G. Process digital high speed video.

H. Visually inspect the FMH forehead impact zone to determine the location of FMH contact with the target circle. Measure and record the location of FMH contact. Verify that initial contact occurred within the forehead impact zone

I. After each impact test, visually inspect the tested vehicle component for visible damage. Document the condition of the damaged area with photography and a written description.

J. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Document the damaged area with photography and a posttest calibration test before replacement or repairs are made.

12.8.3 MULTIPLE IMPACT TEST CONDITIONS

A test vehicle component may be impacted multiple times subject to the following:

A. Impacts within 300 mm may not occur less than 30 minutes apart.

B. No impacts within 150 mm of any other impact.

C. The distance between impacts is measured from the center of the target circles and along the vehicle interior.

13. POST TEST REQUIREMENTS

13.1 TEST DATA ACQUISITION AND REDUCTION

The data is pre-filtered (Class 1000) and digitized at a minimum rate of 10,000 samples per second. The data is then placed into permanent storage on a magnetic disk or tape after application of appropriate calibration scale factors.

As the data is recalled for integration or plotting, the appropriate filter is applied. The filters are in accordance with SAE Recommended Practice J211 dated March 1995, "Instrumentation for Impact Tests." Velocity and displacement data is plotted after application of an SAE Class 180 filter.

Before plotting, the contractor shall determine the "time zero" which is verified with the trigger signal. When a velocity or displacement trace is to be plotted, integration for the appropriate acceleration signal is performed digitally.

The Contractor must have the ability to produce deliverables that conform to the latest version of the NHTSA “Data Tape Reference Guide”. The latest version of NHTSA’s “Data Tape Reference Guide” is available from the agency’s web site www.nhtsa.dot.gov

A file containing the most recent algorithms used to calculate HIC can also be obtained from the agency’s website. Any questions pertaining to the algorithms or requests for the algorithms should be directed to the following organization:

U.S. Department of Transportation
National Highway Traffic Safety Administration
Office of Vehicle Safety Research
1200 New Jersey Ave, SE, Room W46-312
Washington, DC 20590
Telephone No.: 202-366-4712

The filter cut-off frequencies are as follows:

CLASS	CUT-OFF FREQUENCY
60	100
180	300
600	1000
1000	1650

14. REPORTS

14.1 MONTHLY STATUS REPORT

The contractor shall submit a Monthly Status Report to the COR that includes all information contained in the sample report found in Section 15, Report Forms.

14.2 NOTICE OF TEST FAILURE

Any indication of a test failure shall be communicated by telephone to the COR within 24 hours with written notification mailed within 48 hours (Saturdays and Sundays excluded). A Notice of Test Failure report form with a copy of preliminary test data plot(s) shall be included. In the event of a test failure, a post test calibration check of some critically sensitive test equipment and instrumentation may be required for verification of accuracy. The necessity for the calibration shall be at the COR's discretion and shall be performed without additional costs to the OVSC.

14.3 FINAL TEST REPORTS

14.3.1 COPIES

In the case of an apparent test failure, two (2) paper copies and three (3) electronic copies in pdf formats of the Final Test Report shall be submitted to the COR for acceptance within three weeks of test completion. The Final Test Report format to be used by all contractors can be found in the "Report Section".

Where there has been no indication of an apparent noncompliance, one (1) paper copy and two (2) electronic copies in pdf formats of each Final Test Report shall be submitted to the COR for acceptance within three weeks of test completion. No payment of contractor's invoices for conducting compliance tests will be made prior to the Final Test Report acceptance by the COR. Contractors are requested to NOT submit invoices before the COR is provided with copies of the Final Test Report.

Contractors are required to submit the first Final Test Report in draft form within one week after the compliance test is conducted. The contractor and the COR will then be able to discuss the details of both test conduct and report content early in the compliance test program.

Contractors are required to PROOF READ all Final Test Reports before submittal to the COR. The OVSC will not act as a report quality control office for contractors. Reports containing a significant number of errors will be returned to the contractor for correction, and a "hold" will be placed on invoice payment for the particular test.

14.3.2 REQUIREMENTS

Each final report must be a complete document capable of standing by itself. The contractor should use DETAILED descriptions of all compliance test events. Any events that are not directly associated with the standard but are of technical interest should also be included. The contractor should include as much DETAIL as possible in the report.

14.3.3 FIRST THREE PAGES

A. FRONT COVER

A heavy paperback cover (or transparency) shall be provided for the protection of the final report. The information required on the cover is as follows:

(1) Final Report Number such as 201-ABC-XX-001, where –

201 is the FMVSS tested
ABC are the initials for the laboratory
XX is the last two numbers of the Fiscal Year of the test program
001 is the Group Number (001 for the 1st test, 002 for the 2nd test, etc.)

(2) Final Report Title and Subtitle such as;

SAFETY COMPLIANCE TESTING FOR FMVSS FMVSS No. 201U
Occupant Protection in Interior Impact
Upper Interior Head Impact Protection

ABC Motor Company
20XX SafeRider XLS
NHTSA No. C20XXXXXX

(3) The words “Prepared by:” followed by the Contractor's Name and Address;

123 TESTING LABORATORIES, INC.
4335 West Dearborn St.
Detroit, Michigan 48090-1234

(4) Place the following DOT symbol, centered on the page;

(5) Date of Final Report completion

(6) The words "FINAL REPORT"

(7) The words “Prepared for” followed by;

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration Enforcement
Office of Vehicle Safety Compliance
Mail Code: NEF-240
1200 New Jersey Avenue, SE
Washington, DC 20590

B. FIRST PAGE AFTER FRONT COVER

When a contract test laboratory is reporting, a disclaimer statement and an acceptance signature block for the COR shall be provided as follows:

This publication is distributed by the National Highway Traffic Safety Administration in the interest of information exchange. Opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof.

If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement.

Prepared By:_____

Approved By:_____

Approval Date: _____

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By:_____

Acceptance Date:_____

C. SECOND PAGE AFTER FRONT COVER

The second page is the Technical Report Documentation Page (Form DOT F1700.7) completed as follows; (A copy of the form is provided in Section 15);

Block 1 — REPORT NUMBER – (e.g., 201-ABC-XX-001)

Block 2 — GOVERNMENT ACCESSION NUMBER - Leave blank

Block 3 — RECIPIENT'S CATALOG NUMBER - Leave blank

Block 4 — TITLE AND SUBTITLE

Final Report of FMVSS 201U Compliance Testing
of a 20XX SafeRider XLS,, NHTSA No. C20XXXXXX

Block 5 — REPORT DATE – Month, Day, Year

Block 6 — PERFORMING ORGANIZATION CODE -

Block 7 — AUTHOR(S)

John Smith, Project Manager
Bill Doe, Project Engineer

Block 8 — PERFORMING ORGANIZATION REPORT NUMBER

(e.g., ABC-DOT-XXX-001)

Block 9 — PERFORMING ORGANIZATION NAME AND ADDRESS

123 TESTING LABORATORIES, INC.
4335 West Dearborn St.
Detroit, Michigan 48090-1234123 Laboratories

Block 10 — WORK UNIT NUMBER Leave blank

Block 11 — CONTRACT OR GRANT NUMBER

(e.g., DTNH22-XX-D-12345)

Block 12 — SPONSORING AGENCY NAME AND ADDRESS

United States Department of Transportation
National Highway Traffic Safety Administration
Office of Vehicle Safety Compliance, Mail Code: NEF-240
1200 New Jersey Avenue, SE Washington, DC 20590

Block 13 — TYPE OF REPORT AND PERIOD COVERED

Final Test Report
Month Day to Month Day, 20XX

Block 14 — SPONSORING AGENCY CODE NEF-220

Block 15 — SUPPLEMENTARY NOTES Leave Blank

Block 16 — ABSTRACT

Compliance tests were conducted on a 20XX SafeRider XLS in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-201U-0X. The tests were conducted November XX through November XX, 20XX. The test results indicate the following;

Block 17 — KEY WORDS Compliance Testing

Occupant Protection
FMVSS No. 201U

Block 18 — DISTRIBUTION STATEMENT

Copies of this report are available from;
National Highway Traffic Safety Administration
Technical Information Services Division, NPO-411
1200 New Jersey Avenue SE (Room E12-100)
Washington DC 20590
e-mail: tis@nhtsa.dot.gov
FAX: 202-493-2833

Block 19 — SECURITY CLASSIFICATION OF REPORT Unclassified

Block 20 — SECURITY CLASSIFICATION OF PAGE Unclassified

Block 21 — NUMBER OF PAGES

Add appropriate number

Block 22 — PRICE Leave blank

D. REPORT FORMAT

The final test report consists of a table of contents, Section 1, Section 2 and Appendices as follows;

TABLE OF CONTENTS

SECTION 1
PURPOSE AND SUMMARY OF THE COMPLIANCE TEST

NOTE: This section should be double-spaced and requires an entire separate page.

PURPOSE

This section briefly outlines the purpose for conducting the compliance test and states the appropriate test procedure(s) followed during the test. The following is provided as an example;

This compliance test is part of the FY__ FMVSS 201U Compliance Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract No. _____. The purpose of this test is to generate data that will assist NHTSA in determining whether the test vehicle meets the performance requirements of FMVSS No. 201. The compliance test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-201U-0X, dated _____, 20XX).

SUMMARY

Free motion headform (FMH) impact tests were performed on a 20XX SafeRider XLS manufactured by ABC Motor Company on December XX, 20XX. A total of 12 impacts were performed on targets located throughout the interior of the test vehicle. The tests were conducted at 123 Test Laboratories in Detroit, MI using a CMM to determine target locations and a FMH impactor to propel the Part 572, Subpart L configured FMHs into vehicle upper interior components.

SECTION 2
TEST DATA SUMMARY

NOTE: This section includes all data sheets.

APPENDIX I
PHOTOGRAPHS

At a minimum, the following photographs shall be included in this appendix;

TABLE OF PHOTOGRAPHS

APPENDIX II
TEST DATA PLOTS

At a minimum, the following data plots for each FMH impact test shall be included in this appendix:

TABLE OF DATA PLOTS
FILTERED DATA

APPENDIX III
FMH CALIBRATION DATA

FMH calibrations are conducted in accordance with TP-572L-00. This appendix includes pre and post-test calibration data (i.e., Table L1, Head Drop Test, acceleration plots and Check Sheet No. L2, FMH Damage Inspection) for each FMH used to conduct the FMVSS No. 201U impact tests. In addition, on the first page, include a written summary which describes the results of the calibration tests and a summary table of data results (see example below).

FMH CALIBRATION SUMMARY

FMH Serial #		Cal. Date	Wgt (kg)	Temp (°C)	Humidity (%)	Peak Res Accel (G's)	Peak Lat Accel (G's)	Unimodal (Y/N)
001	Pre							
001	Post							
002	Pre							
002	Post							
003	Pre							
003	Post							

Each FMH soaked in an environment of 66ºF to 78ºF (19ºC to 26ºC) at 10% to 70% relative humidity for a period of at least four hours prior to the head drop calibration test.

Each FMH met the qualification requirements under Part 572L for pre and post-test calibrations. The FMHs weighed between 4.49 and 4.59 kg. The peak resultant acceleration was between 225 and 275 G's and the peak lateral acceleration was less than 15 G's. The pulse was determined to be unimodal.

15. FORMS

A. The following is sample form used to report an apparent test failure to the OVSC COR.

LABORATORY NOTICE OF APPARENT TEST FAILURE TO OVSC

FMVSS NO. 214 TEST DATE: _____

LABORATORY: _____

CONTRACT NO.: _____ DELIV. ORDER NO.: _____

LABORATORY PROJECT ENGINEER'S NAME: _____

TEST SPECIMEN DESCRIPTION: _____
_____

VEHICLE NHTSA NO.: _____ VIN: _____

MFR: _____

APPARENT TEST FAILURE DESCRIPTION: _____
_____
_____
_____
_____

FMVSS REQUIREMENT, PARAGRAPH S___:
_____
_____
_____

NOTIFICATION TO NHTSA (COR): _____

DATE: _____ BY: _____

REMARKS:
_____
_____
_____

B. The following is a sample monthly status report.

MONTHLY STATUS REPORT
FMVSS No. 201U

Contract Number:_____ Fiscal Year:_____ Laboratory: _____ Report Date:_____

No.	NHTSA No.	Date Of Delivery	Initial Odometer Reading	Test Dates	Pass Or Fail	Date of Final Report	Invoice No.	Invoice Date	Final Odometer Reading	Date Vehicle Is Disposed
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

C. The following is a reproduction of Form DOT F 1700.7 (8-72).

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle		5. Report Date
		6. Performing Organ. Code
7. Author(s)		8. Performing Organ. Rep#
9. Performing Organization Name and Address		10. Work Unit No. (TRAIS) N/A
		11. Contract or Grant No.
12. Sponsoring Agency Name and Address		13. Type of Report and Period
		14. Sponsoring Agency Code
15. Supplementary Notes		
16. Abstract		
17. Key Words	18. Distribution Statement Copies of this report are available from NHTSA Technical Information Services (TIS) Room W45-212 (NPO-411) 1200 New Jersey Ave., S.E. Washington, DC 20590 Telephone No. (202) 366-4947	
19. Security Classif. (of this report) UNCLASSIFIED	21. No. of Pages 75	22. Price
20. Security Classif. (of this page) UNCLASSIFIED		

Form DOT F 1700.7 (8-72)

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