TP-207-09
June 18, 1992

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE

FOR

FMVSS 207

Seating Systems

SAFETY ASSURANCE
Office of Vehicle Safety Compliance
Room 6115, NSA-30
400 Seventh Street, SW
Washington, DC 20590

OVSC LABORATORY TEST PROCEDURE NO. 207
TABLE OF CONTENTS

1. PURPOSE AND APPLICATION

The Office of Vehicle Safety Compliance (OVSC) provides contracted laboratories with Laboratory Test Procedures (TPs) which serve as guidelines for obtaining compliance test data. The data are used to determine if a specific vehicle or item of motor vehicle equipment meets the minimum performance requirements of the subject Federal Motor Vehicle Safety Standard (FMVSS). The purpose of the OVSC Laboratory Test Procedures is to present a uniform testing and data recording format, and provide suggestions for the use of specific equipment and procedures. Any contractor interpreting any part of an OVSC Laboratory Test Procedure to be in conflict with a Federal Motor Vehicle Safety Standard or observing any deficiencies in a Laboratory Test Procedure is required to advise the Contracting Officer's Technical Representative (COTR) and resolve the discrepancy prior to the start of compliance testing.

Contractors are required to submit a detailed test procedure to the COTR before initiating the compliance test program. The procedure must include a step-by-step description of the methodology to be used.

The OVSC Laboratory Test Procedures 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.

NOTE:

The OVSC Laboratory Test Procedures, prepared for use by independent laboratories under contract to conduct compliance tests for the OVSC, 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. Sometimes, recognizing applicable test tolerances, the Test Procedures specify test conditions which are less severe than the minimum requirements of the standards themselves. Therefore, compliance of a vehicle or item of motor vehicle equipment is not necessarily guaranteed if the manufacturer limits certification tests to those described in the OVSC Laboratory Test Procedures.

2. GENERAL REQUIREMENTS

Federal Motor Vehicle Safety Standard (FMVSS) No. 207, "Seating Systems," establishes requirements for seats, their attachment assemblies, and their installation, to minimize the possibility of failure as a result of forces on the seat in a vehicle impact. The standard applies to passenger cars, multipurpose passenger vehicles (MPVs), trucks and buses.

Each occupant seat, other than a side facing seat, or a passenger seat on a bus, shall withstand the following forces.

A. In any position to which it can be adjusted - 20 times the weight of the seat applied in a forward longitudinal direction

B. In any position to which it can be adjusted - 20 times the weight of the seat applied in a rearward longitudinal direction

C. For a seat belt assembly attached to the seat the force specified in paragraph (a) above, if it is a forward facing seat, or paragraph (b), if it is a rearward facing seat, in each case applied simultaneously with the forces imposed on the seat by the seat belt assembly when it is loaded in accordance with S4.2 of S210

D. In its rearmost position - a force that produces a 3,300 in-lb moment about the seating reference point for each designated seating position that the seat provides, applied to the upper crossmember of the seat back or the upper seat back in a rearward longitudinal direction for forward-facing seats and in a forward longitudinal direction for rearward-facing seats

Seats should remain in its adjusted position during the application of each force. Seats that fold should be equipped with a self locking device for restraining the seat or seat back. If there are any DSP's behind the seat which require the restraining device to be operated to exit from the vehicle, it should be easily accessible.

3. SECURITY

The contractor shall provide appropriate security measures to protect the OVSC test vehicles 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. Any security problems which arise shall be reported by telephone to the Industrial Property Manager (IPM), Office of Contracts and Procurement, within two working days after the incident. A letter containing specific details of the security problem will be sent to the IPM (with copy to the COTR) 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 COTR, unless specifically authorized by the COTR or the COTR's Branch Chief or Division Chief.

NO INDIVIDUALS, OTHER THAN CONTRACTOR PERSONNEL DIRECTLY INVOLVED IN THE COMPLIANCE TESTING PROGRAM, SHALL BE ALLOWED TO WITNESS ANY VEHICLE COMPLIANCE TEST UNLESS SPECIFICALLY AUTHORIZED BY THE COTR.

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 vehicle test schedule to the COTR prior to conducting the first compliance test. Tests shall be completed as required in the contract. Scheduling shall be adjusted to permit vehicles to be tested to other FMVSSs as may be required by the OVSC. All compliance testing shall be coordinated with the COTR in order to allow monitoring by the COTR or other OVSC personnel.

6. TEST DATA DISPOSITION

The contractor shall make all preliminary compliance test data available to OVSC within four hours after the test, if requested. Final test data, including digital printouts and computer generated plots (if applicable), shall be furnished to the COTR within 5 working days. Additionally, the contractor shall analyze the preliminary test results as directed by the COTR. All backup data sheets, strip charts, recordings, plots, technician's notes etc., shall be either sent to the COTR or destroyed at the conclusion of each delivery order, purchase order, etc. Calibration information shall not be destroyed.

7. GOVERNMENT FURNISHED PROPERTY (GFP)

ACCEPTANCE OF VEHICLE

The Contractor has the responsibility of accepting the test vehicle from either a new car dealer or a vehicle transporter. In both instances, the contractor acts in the OVSC's behalf when signing an acceptance of the test vehicle. If the vehicle is delivered by a dealer, the engineer must check to verify the following:

A. All options listed on the "window sticker" are present on the test vehicle.

B. Tires and wheel rims are new and the same as listed.

C. There are no dents or other interior or exterior flaws.

D. The vehicle has been properly prepared and is in running condition.

E. The glove box contains an owner's manual, warranty document, consumer information, and extra set of keys.

F. Proper fuel filler cap is supplied on the test vehicle.

If the test vehicle is delivered by a government contracted transporter, the contractor's test engineer shall check for damage which may have occurred during transit.

A "Report Of Vehicle Condition At The Completion Of Testing" form (Data Sheet No. 1) will be supplied to the contractor by the COTR when the test vehicle is transferred from the new car dealer or between test contracts. The upper half of the form describes the vehicle in detail, and the lower half provides space for a detailed description of the post test condition. This form must be returned to the COTR with the copies of the Final Test Report or the reports will NOT be accepted.

NOTIFICATION OF COTR

The COTR must be notified within 24 hours after a test vehicle has been delivered.

8. CALIBRATION OF TEST INSTRUMENTS

Before the contractor initiates the safety compliance test program, a test instrumentation calibration system shall be implemented and maintained in accordance with established calibration practices. Guidelines for setting up and maintaining such calibration systems are described in MIL-C-45662A, "Calibration System Requirements". The calibration system shall be set up and maintained as follows:

A. Standards for calibrating the measuring and test equipment will 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 TO EXCEED SIX (6) MONTHS! Records, showing the calibration traceability to the National Institute of Standards and Technology (NIST), shall be maintained for all measuring and test equipment.

C. All measuring and test equipment and measuring standards will be labeled with the following information:

(1) Date of calibration
(2) Date of next scheduled calibration
(3) Name of company performing calibration service (if different than contractor)
(4) Name and employer of the technician who calibrated the equipment

D. 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--see next page
(3) Accuracy--see next page
(4) Calibration interval
(5) Type of standard used to calibrate the equipment (calibration traceability of the standard must be evident)

E. Records of calibration for all test instrumentation shall be kept by the contractor in a manner which assures the maintenance of established calibration schedules. All such records shall be readily available for inspection when requested by the COTR. The calibration system shall need the acceptance of the COTR before the test program commences.

8. CALIBRATION OF TEST INSTRUMENTS....Continued

TEST EQUIPMENT ACCURACY

EQUIPMENT	RANGE	ACCURACY
Hydraulic Rams (5 Reqd)	0-120% of Specified Load	N/A
Load Cells (5 Reqd)	0-120% of Readout Capability	± 0.5%
Strip Chart Recorder	Readout Capability of 3% of Maximum Load	± 1.0%
Hydraulic Pump	Approx. 3.8 gpm	N/A
DC Power Supply	Adequate for Load Cells Used	Line Reg. of 0.05% (105 to 125 v) Load Reg. of 0.05% (0 to Full) Ripple: 5 mv P/P Stability: 0.1%
Digital Voltmeter or Equivalent Used to Monitor Load Cell Outputs	4 Digit Readout	± 0.1%
Signal Conditioning and Calibration Units	Adequate for Load Cells Used	± 0.5%
H-Point Machine	N/A	N/A
Steel Scale	36" Minimum	± 0.1"

F. Test equipment will receive a calibration check immediately prior to and after the test. This check will be recorded by the test technician(s) and included in the final report.

NOTE: In the event of a failure to the standard's minimum performance requirements, 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 will be at the COTR's discretion and will be performed without additional cost.

9. PHOTOGRAPHIC COVERAGE

Photographs, if required, shall be glossy black and white, 8 x 10 inches, and properly focused for clear images. A tag, label or placard identifying the test vehicle model, NHTSA number and date or item of equipment part number and date shall appear in each photograph and must be legible. Each photograph shall be labeled as to the subject matter.

As a minimum the following photographs shall be included in each vehicle final test report:

A. Test vehicle certification label

B. Test vehicle tire information label

C. The label on any seat that is not designated for occupancy while the vehicle is in motion

D. 3/4 frontal left side view of test vehicle

E. 3/4 rear right side view of test vehicle

F. Vehicle tie down at each tie down location.

G. Pretest view of each seat.

H. Pretest views of each seat anchorage in the vehicle.

I. The control for the front seat back release (if applicable)

J. Pretest equipment set up at each seat.

K. Post test condition of each seat.

L. Post test condition of seat anchorages.

M. If S210 testing is required because the seat belt assembly is attached to the seat, include the photographs required in the 210 test procedure.

N. Any test failure condition which requires special detail.

10. DEFINITIONS

H-POINT

The pivot center of a manikin torso and thigh as measured with a three dimensional H-point machine (Ref. SAE J826).

TORSO LINE

A line connecting the H-point and the Shoulder Reference Point (SRP) as defined in SAE Recommended Practice J383, "Motor Vehicle Seat Belt Anchorage".

SEATING REFERENCE POINT (SRP)

The manufacturer's design reference point which:

A. Establishes the rearmost normal design driving or riding position of each designated seating position in a vehicle

B. Has coordinates established relative to the designed vehicle structure

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

D. Is the reference point employed to position the two dimensional templates described in SAE Recommended Practice J826, "Manikins For Use In Defining Vehicle Seating Accommodation".

TEST SPECIMEN

A test specimen shall consist of each occupant seat installation contained in the NHTSA test vehicle. This is further defined as one complete seating system including front, rear, and intermediate seats. Seats that are adjustable shall include any track, link, or power actuating assemblies necessary to adjust the longitudinal or vertical position of the seat. In, addition, the test specimen shall include all necessary hardware for mounting to the vehicle floorpan and any seat trim that contributes to the structural strength of the seat and adjuster system.

TYPE 1 LAP (PELVIC) BELT RESTRAINT

A seat belt assembly or portion thereof intended to restrain movement of the pelvis.

TYPE 2 LAP & SHOULDER (PELVIC & UPPER TORSO) BELT RESTRAINT

A combination of lap and shoulder restraints intended to restrain movement of the pelvis, chest, and shoulder regions.

10. DEFINITIONS.....Continued

TYPE 2A SHOULDER BELT RESTRAINT

A seat belt intended to restrain the forward movement of the occupants upper torso. This belt can only be used in conjunction with a lap belt to form a Type 2 seat belt assembly.

VEHICLE CURB WEIGHT

The weight of a motor vehicle with standard equipment; maximum capacity of engine fuel, oil and coolant; and, if so equipped, air conditioning and additional weight optional engine.

DESIGNATED SEATING POSITION (DSP)

Any plan view lateral location intended by the manufacturer to provide seating accommodation for a person at least as large as a 5th percentile adult female, except auxiliary seating accommodations such as temporary or folding seats.

DESIGNATED SEATING CAPACITY (DSC)

The number of DSPs provided in the vehicle and indicated on the vehicle's Tire Information Label.

NONADJUSTABLE SEAT

A passenger seat which does not have a seat adjuster. This also includes seats capable of movement for stowing the seat.

VEHICLE SEAT SYSTEM

A structure engineered to seat the driver and/or passengers including all cotton and foam rubber padding material, seat trim material, decorative metal trim parts, and seat adjusters and supporting components.

SEAT BACK RELEASE CONTROL

A mechanism designed to release the restraining device of hinged or folding seat.

SEAT ADJUSTERS

Devices anchored to the vehicle floorpan which support the seat frame and provides for seat assembly fore and aft adjustment. This includes any track, link, or power actuating assemblies necessary to adjust the position of the seat (longitudinal and vertical adjustment).

10. DEFINITIONS.....Continued

SEAT FRAME AND SEAT BACK RESTRAINING DEVICE

A device designed to restrict the longitudinal movement of a hinged or folding seat frame or seat back.

SEAT BACK FRAME UPPER CROSSBAR

The uppermost horizontal structural member of a seat back frame.

SEAT BELT ATTACHMENT HARDWARE

Any or all hardware designed for securing the seat belt assembly to a seating system or a vehicle structure.

SEAT FRAME

The structural portion of a seat assembly. It may be of tubular, stamped steel, wood, fiber board, etc., construction.

SEATING SYSTEM ATTACHMENT HARDWARE

Any or all hardware designed for securing the seat assembly to the vehicle floorpan or vehicle structure.

11. PRETEST REQUIREMENTS

Prior to conducting any compliance tests, contractors are required to submit a detailed in-house compliance test procedure to the COTR which includes:

A. A step-by-step description of the methodology to be used

B. A written quality control (QC) procedure which shall include calibrations, the data review process, report review, and the people assigned to perform QC on each task

C. A complete listing of test equipment which shall include instrument accuracy and calibration dates

D. Detailed checkoff lists to be used during the test and during data review.

There shall be no contradiction between the OVSC Laboratory Test Procedure and the contractor's in-house test procedure. The procedures shall cover all aspects of testing from vehicle receipt to submission of the Final Report. Written approval must be obtained from the COTR before initiating the compliance test program so that all parties are in agreement.

A compliance test is not to be conducted unless all of the various test conditions specified in the applicable OVSC Laboratory Test Procedure have been met. Failure of a contractor to obtain the required test data and to maintain acceptable limits on test parameters in the manner outlined in the applicable OVSC Laboratory Test Procedure shall require a retest at the expense of the contractor. The retest costs will include the cost of the replacement vehicle or item of motor vehicle equipment and the service costs for conducting the retest. The original GFP will become the property of the contractor after the retest has been successfully conducted.

RECEIVING INSPECTION OF TEST VEHICLES

A. A clean and secure test vehicle storage area shall be maintained by the contractor. The test vehicle shall be protected from theft of equipment.

B. Upon receipt of the test vehicle, it shall be identified by the contractor with a NHTSA number previously furnished by the COTR.

C. The test vehicle's seats and restraint systems shall be subjected to a visual inspection to ascertain that the seat belt assembly anchorage systems are complete and the seats and seat belt assemblies are functional. Any damage that could influence the test results shall be recorded on the Vehicle Condition sheet, and any unusual condition shall be reported to the COTR before initiation of testing. The COTR must approve the testing of any unusual test specimen.

11. PRETEST REQUIREMENTS.....Continued

D. The operation of all adjustable seating systems will be checked to ascertain that the systems operate correctly. The results of this inspection shall be recorded on the Receiving-Inspection sheet.

TEST DATA LOSS

A compliance test is not to be conducted unless all of the various test conditions specified in the applicable OVSC Laboratory Test Procedure have been met. Failure of a contractor to obtain the required test data and to maintain acceptable limits on test parameters in the manner outlined in the applicable OVSC Laboratory Test Procedure may require a retest at the expense of the contractor. The retest costs will include the cost of the replacement vehicle (with the same equipment as the original vehicle) and all costs associated with conducting the retest. The original test specimen (vehicle) used for the invalid test shall remain the property of OVSC, and the retest specimen shall remain the property of the contractor. If there is a test failure, the contractor shall retain the retest specimen for a period not exceeding 180 days. If there is no test failure, the Contractor may dispose of the test specimen upon notification from the COTR that the final test report has been accepted.

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 two (2) weeks after receipt of notification by the Contracting Officer that a retest is required. If a retest is conducted, no test report is required for the original test.

12. COMPLIANCE TEST EXECUTION

GENERAL STATEMENT OF REQUIREMENTS

Standard 207 establishes requirements for seats, their attachment assemblies, and their installation. Those requirements, which are for each occupant seat as designated by the manufacturer, are listed below.

A. Occupant seats without a seat belt assembly attached to the seat must with stand the following forces:

(1) In any position to which the seat can be adjusted - 20 times the weight of the seat applied at the seat's center of gravity in a forward longitudinal direction. (S207, paragraph 4.2(a))

(2) In any position to which the seat can be adjusted - 20 times the weight of the seat applied at the seat's center of gravity (CG) in a rearward longitudinal direction. (S207, paragraph 4.2(b))

(3) In its rearmost position - a 3,300 inch-pound moment about the seating reference point for each designated seating position (DSP) that the seat provides. (S207, paragraph 4.2(d))

(4) During the application of forces in 1.a, 1.b, and 1.c the seat shall remain in its adjusted position. (S207, paragraph 4.2.1)

(5) For hinged or folding forward facing seats, the restraining device shall not fail or release with a forward longitudinal force equal to 20 times the weight of the hinged or folding portion of the seat applied at the CG of that portion of the seat. For hinged or folding rearward facing seats, the force is 8 times the weight of the hinged or folding portion of the seat applied in a rearward longitudinal direction at the center of gravity of that portion of the seat. In addition, the restraining device shall not fail when the seat is subjected to an acceleration of 20 g. in the longitudinal direction opposite to that in which the seat folds. (S207, paragraphs 4.3.2.1 and 4.3.2.2)

B. Occupant seats with a seat belt assembly attached to the seat must with stand the following forces.

(1) All the forces described above plus the forces described in S210, Seat Belt Assembly Anchorages. These additional forces are applied simultaneously with the force in 1.a if it is a forward facing seat or the forces of 1.b if it is a rearward facing seat. (S207, paragraph 4.2(c))

12. COMPLIANCE TEST EXECUTION.....Continued

TEST EQUIPMENT DESCRIPTION

A. A static loading apparatus capable of applying the required loads to a front bench seat with 3 designated seating positions (DSPs).

B. Suitable load cells and instrumentation for measuring and permanently recording loads.

C. Seat assembly pull test stand. The stand shall be sturdy enough to adequately withstand the loads applied.

D. Restraining device or fixture to completely tie-down and immobilize the S207 test vehicle when applying the required loads.

E. System to raise and hold the test vehicle at least 1 inch above the floor level.

F. A camera to provide pertinent still photographs, which as a minimum, should include the photographs listed in this test procedure.

G. A control panel containing pressure gauges, directional valves, pressure regulating valves, and isolation valves.

H. A test loading monitoring and control system consisting of load cells and multi channel strip chart recorders with built in time base and event. Force control is derived from a full servo system directed by a closed loop programmable force generator. The loading system shall be capable of applying load at a constant rate. In addition, if any seat or cables used fail during the test, the rate of loading on the remaining seats shall not be affected. The system must also record the unloading of the seats at the end of the holding period. If all hydraulic actuators are not connected to the same pressure source, the application rate difference shall not exceed five percent. Likewise, the maximum force, maintained for the time interval specified, shall not exceed the standard's specified maximum value. Target values for application rate and maximum force shall be based on a worst case error analysis to be prepared and submitted by the contractor, including all potential measurement variables, and shall be approved by the COTR prior to commencing compliance testing.

I. See OVSC Laboratory Test Procedure No. 210 for seat belt assembly anchorage test equipment needed for those seats with the seat belt assembly attached to the seat.

12. COMPLIANCE TEST EXECUTION.....Continued

SEQUENCE FOR SEAT BELT ASSEMBLY ANCHORAGE TESTS

The test vehicles shall be subjected to the tests in the following order:

A. Receiving inspection of test vehicle

B. Static load testing of seating systems

RECEIVING INSPECTION OF TEST VEHICLE

A. A clean and secure test vehicle storage area shall be maintained by the contractor. The test vehicle shall be protected from theft of equipment.

B. Upon receipt of the test vehicle, it shall be identified by the contractor with a NHTSA number previously furnished by the COTR. The "Report of Vehicle Condition at Completion of Testing" inspection sheet (data sheet 1) shall be completed by the contractor and added to the final test report.

C. The test vehicle's seating systems restraint systems shall be subjected to a visual inspection to ascertain that the anchorage systems are complete and the seats are functional. Any damage that could influence the test results shall be recorded on the "Test Vehicle Receiving Inspection" sheet (Data Sheet No. 2), and any abnormal condition shall be reported to the COTR before initiation of testing. The COTR must approve the testing of any abnormal test specimen.

D. The operation of all adjustable seating systems will be checked to ascertain that the systems operate correctly. The results of this inspection shall be recorded on the inspection sheet in Data Sheet No. 2.

STATIC LOAD TESTING OF SEATING SYSTEMS

The three groupings of seat configurations are shown in Figure 1. A description of the test requirements for different types of vehicle seating systems with forward facing seats is also shown in Figure 2. Further details for the five different tests are shown on Figure 3.

Specific details for each test are shown as follows:

Figure 4 Forward Load on Folding Seat Back Restraining Device

Figure 5A Forward and Aft Loads on Seat Frame And Seat Adjusters where Seat Belts are Attached to Seat and Procedure in Figure 6A is Not Applicable

12. COMPLIANCE TEST EXECUTION.....Continued

Figure 5B Forward and Aft Loads on Seat Frame and Seat Adjusters where Procedure in Figure 6B is Not Applicable

Figure 6A Forward and Aft Loads on Seat Frame with Seat Belts Attached to Seat and C.G. of Seat in a Plane Horizontally Above, On, or Below the Seat Adjuster

Figure 6B Forward and Aft Loads on Seat Frame for Seats with C.G. of Seat in a Plane Horizontally Above, On, or Below the Seat Adjuster

Figure 7 Aft Moment Load On Seat Back Upper Frame

12. COMPLIANCE TEST EXECUTION.....Continued

SEAT CONFIGURATIONS

(Left Side Views Shown)

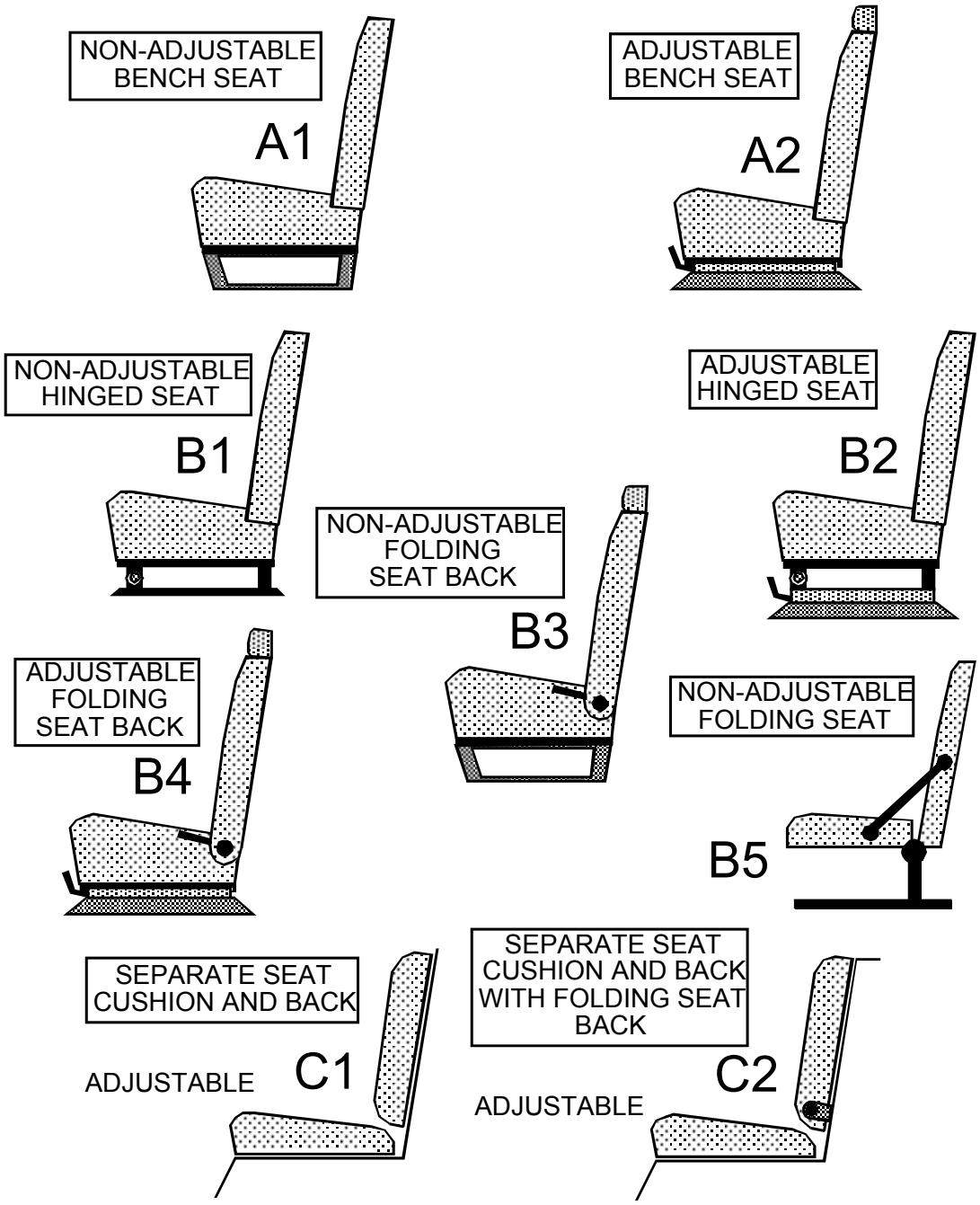


FIGURE 1

12. COMPLIANCE TEST EXECUTION....Continued

FIGURE 2 (GROUPS A & C)

TEST REQUIREMENTS	SEAT FORE/ AFT POSIT.	GROUP `A'		GROUP `C'	
		BENCH SEAT		SEP. BACK/CUSHION FRAMES	
		Non-Adjust.	With Adjust.	Fixed Back	Folding Back
		A1	A2	C1	C2
#1. FOLDING BACK RESTRAINING DEVICE - - Fwd Load = 20 x Wb*	Fore				X
#2. SEAT FRAMES AND ADJUSTERS - - Fwd & Aft Loads = 20 x Wa*	Mid	X	X		
#3. SEAT FRAMES WITH BELT ANCHORAGES - - Fwd Load = 20 x Wa + 4950# (Lap)	Mid	X	X		
Aft Load = 20 x Wa	Mid	X	X		
#4. SEAT BACK UPPER FRAME MOMENT - - Aft Moment = 3275 in-lbs/occupant	Aft	X	X		X
#5. REAR SEAT BACK & CUSHION FRAMES - -					
A. Fwd Back Load = 20 x Wb	N/A			X	X
A. Aft Back Load = 20 x Wb (if reqd)	N/A			X	X
#5. REAR SEAT BACK & CUSHION FRAMES - -					
B. Fwd Cush Load = 20 x Wc*	N/A			X	X
B. Aft Cush Load = 20 x Wc (if reqd)	N/A			X	X

* Wa = Weight of the Seat ASSEMBLY
Wb = Weight of the Seat BACK
Wc = Weight of the Seat CUSHION

12. COMPLIANCE TEST EXECUTION....Continued

FIGURE 2 (GROUP B)

TEST REQUIREMENTS	SEAT FORE/ AFT POSIT.	GROUP `B'				
		HINGED SEAT		FOLDING BACK		FOLDING SEAT/ NON-ADJUST.
		Non-Adjust.	With Adjust.	Non-Adjust.	With Adjust.	
		B1	B2	B3	B4	B5
#1. FOLDING BACK RESTRAINING DEVICE - - Fwd Load = 20 x Wb*	Fore			X	X	X
#2. SEAT FRAMES AND ADJUSTERS - - Fwd & Aft Loads = 20 x Wa*	Mid	X	X	X	X	X
#3. SEAT FRAMES WITH BELT ANCHORAGES - - Fwd Load = 20 x Wa + 4950# (Lap)	Mid	X	X	X	X	X
Aft Load = 20 x Wa	Mid	X	X	X	X	X
#4. SEAT BACK UPPER FRAME MOMENT - - Aft Moment = 3275 in-lbs/occupant	Aft	X	X	X	X	X
#5. REAR SEAT BACK & CUSHION FRAMES - -						
A. Fwd Back Load = 20 x Wb	N/A					
A. Aft Back Load = 20 x Wb (if reqd)	N/A					
#5. REAR SEAT BACK & CUSHION FRAMES - -						
B. Fwd Cush Load = 20 x Wc*	N/A					
B. Aft Cush Load = 20 x Wc (if reqd)	N/A					

* Wa = Weight of the Seat ASSEMBLY
Wb = Weight of the Seat BACK
Wc = Weight of the Seat CUSHION

12. COMPLIANCE TEST EXECUTION....Continued

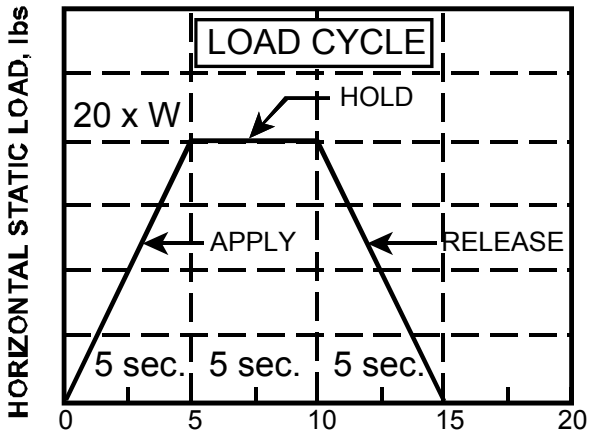
FORWARD LOAD ON FOLDING SEAT BACK RESTRAINING DEVICE

NOT on seats having adjustable backs for occupant comfort only.

FRONT SEAT(S) FULL FORWARD

Attach Load/Deflection Fixture to point through the c.g. of the seat back assembly using crossbar brace on seat back.

FORWARD HORIZONTAL STATIC LOAD = 20 x Wb



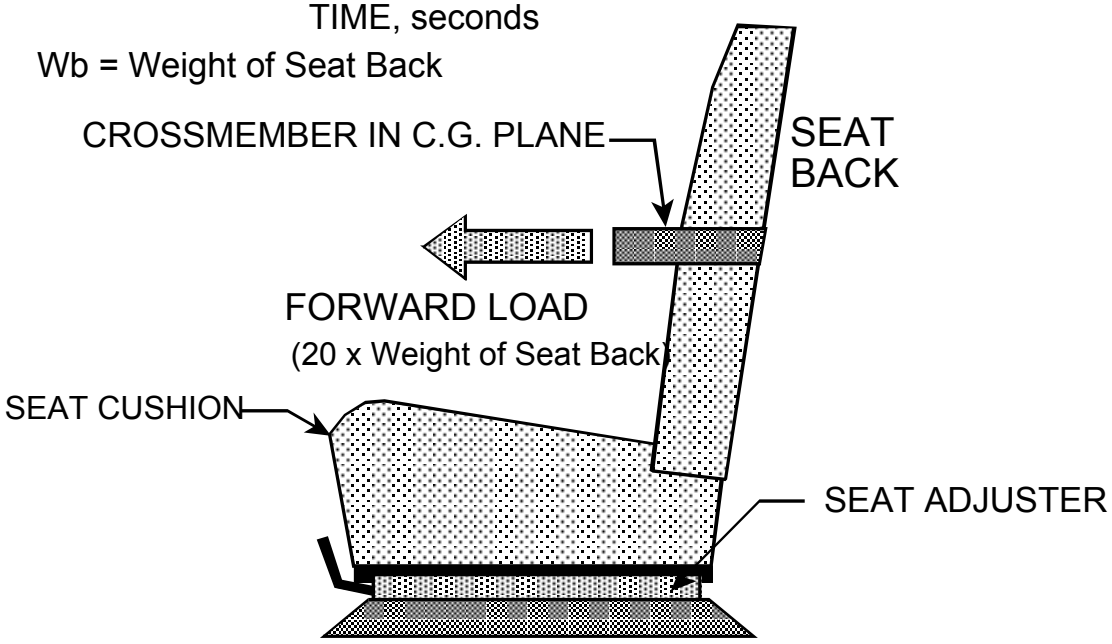
VALUES OF "W":

Wa = Weight of seat assembly

Wb = Weight of seat back

Wc = Weight of seat cushion

Wb = Weight of Seat Back



LEFT SIDE VIEW

FIGURE 3A

12. COMPLIANCE TEST EXECUTION....Continued

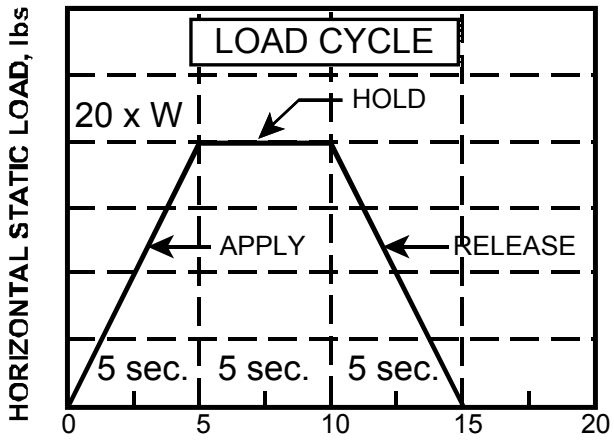
FORWARD AND AFT LOADS ON SEAT FRAME AND SEAT ADJUSTERS

FRONT SEAT(S) AT MID-POINT OF HORIZ. & VERTICAL TRAVEL

Attach diagonal struts at outboard edges of seat frame with rigid crossmember between them in plane of seat assembly c.g.

FORWARD HORIZONTAL STATIC LOAD = 20 x Wa

AFT HORIZONTAL STATIC LOAD = 20 x Wa

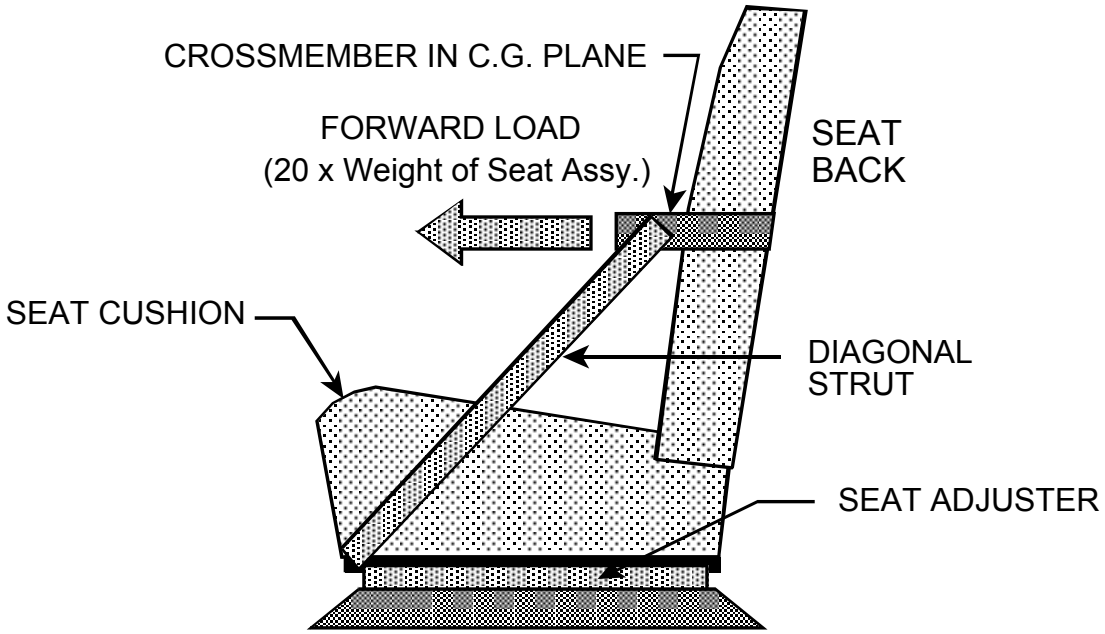


VALUES OF "W":

Wa = Weight of seat assembly

Wb = Weight of seat back

Wc = Weight of seat cushion



LEFT SIDE VIEW

FIGURE 3B

12. COMPLIANCE TEST EXECUTION....Continued

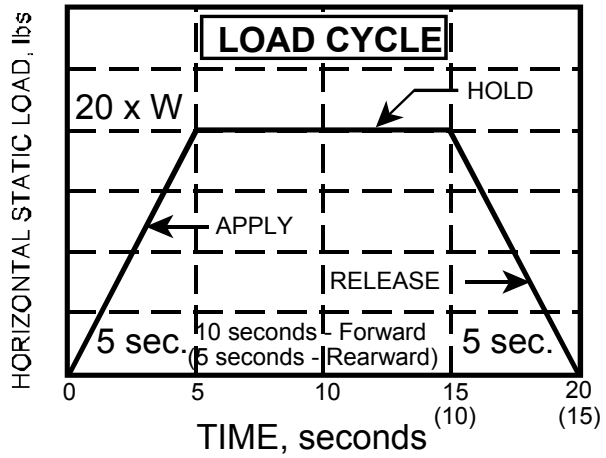
FORWARD AND AFT LOADS ON SEAT FRAME WHEN BELTS ARE ATTACHED TO SEATING SYSTEM

FRONT SEAT(S) AT MOST **REARWARD** HORIZONTAL ADJUSTMENT POSITION AND **HIGHEST** VERTICAL ADJUSTMENT POSITION

Attach diagonal struts at outboard edges of seat frame with rigid crossmember between them in plane of seat assembly c.g.

TOTAL FWD. HORIZ. LOAD = Belt Load (2500#/anchor. point for lap belts = 5000# PLUS Fwd. Horiz. Static Load of 20 x Wa

AFT HORIZONTAL STATIC LOAD = 20 x Wa



VALUES OF "W":

Wa = Weight of seat assembly

Wb = Weight of seat back

Wc = Weight of seat cushion

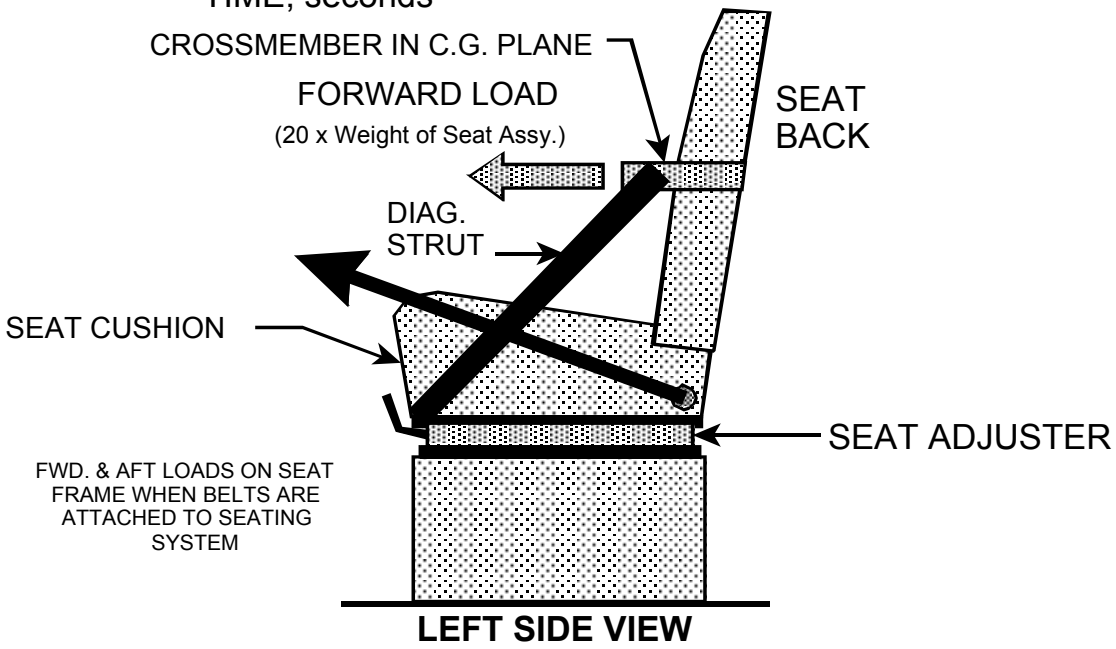


FIGURE 3C

12. COMPLIANCE TEST EXECUTION....Continued

AFT MOMENT LOAD ON SEAT BACK UPPER FRAME

FRONT SEAT(S) FULL AFT

Attach Load/Deflection Fixture to uppermost crossmember on seat back assembly.

AFT HORIZONTAL MOMENT ABOUT SRP = 3275 in-lbs/occupant

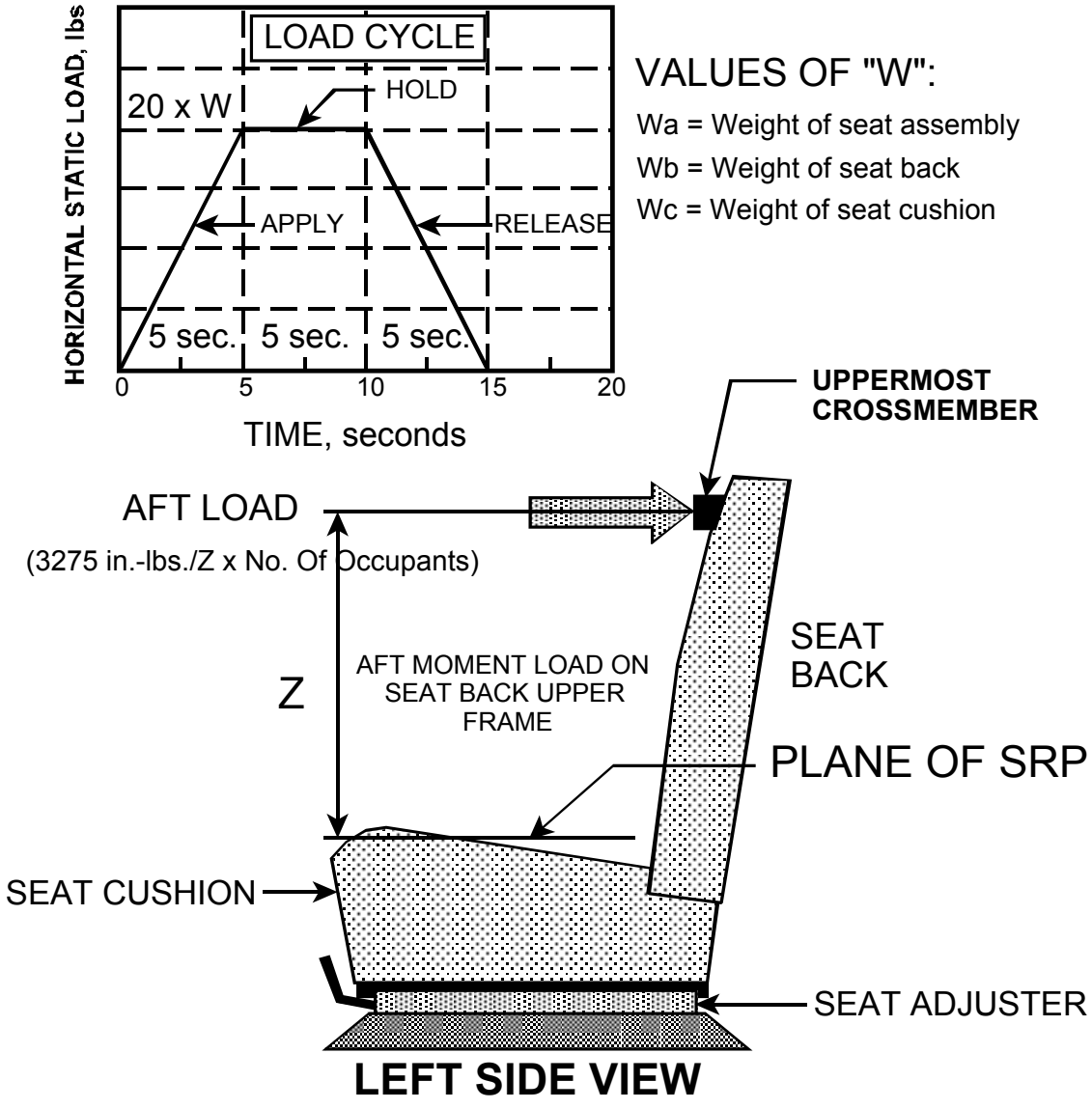


FIGURE 3D

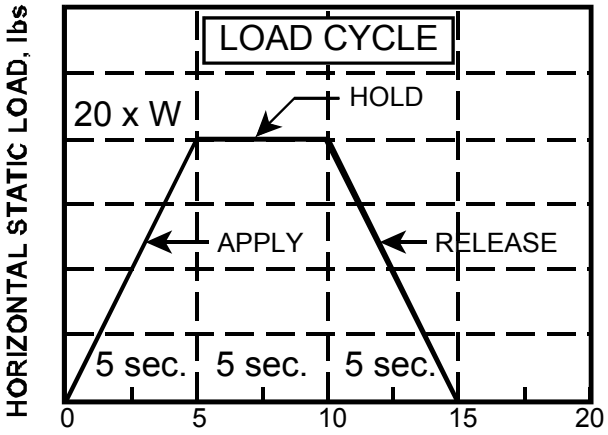
12. COMPLIANCE TEST EXECUTION....Continued

FORWARD LOADS ON REAR SEAT BACK AND CUSHION FRAMES

REAR SEAT BACK AND CUSHION POSITIONS FIXED
Attach fixture through point of c.g. on seat back or seat cushion

SEAT BACK ASSY - FWD. HORIZ. LOAD = 20 x Wb

SEAT CUSHION ASSY. - FWD. HORIZ. LOAD = 20 x Wc and AFT HORIZ. LOAD = 20 x Wc

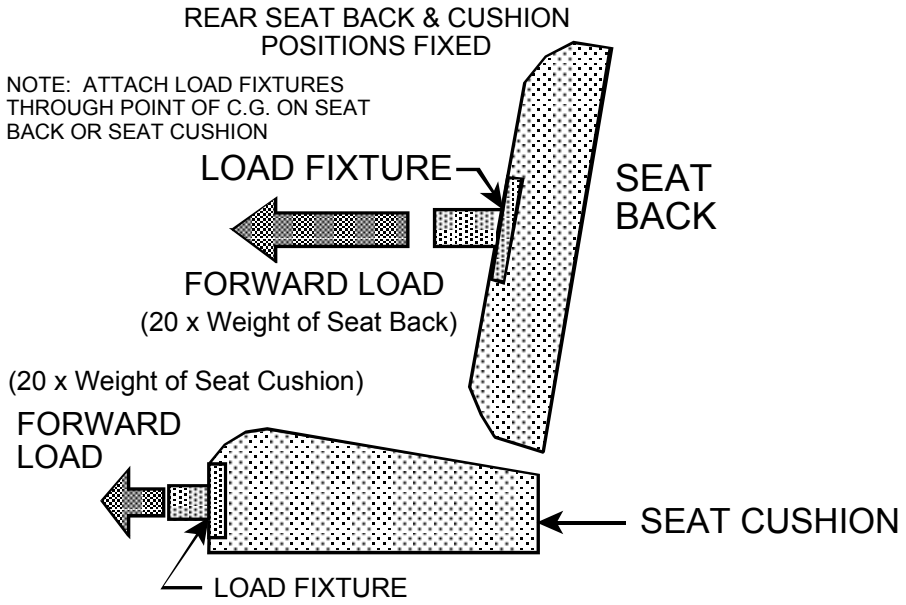


VALUES OF "W":

Wa = Weight of seat assembly

Wb = Weight of seat back

Wc = Weight of seat cushion

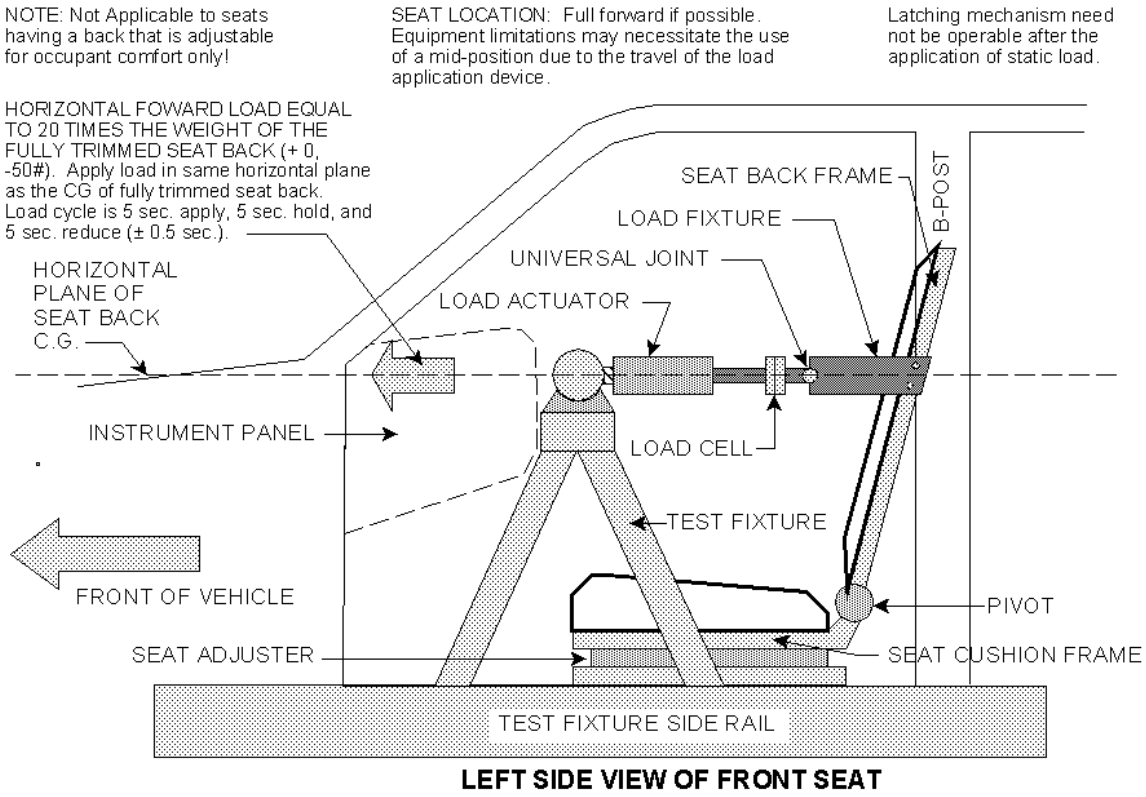


LEFT SIDE VIEW

FIGURE 3E

12. COMPLIANCE TEST EXECUTION.....Continued

FORWARD LOAD ON FOLDING SEAT BACK RESTRAINING DEVICE



LEFT SIDE VIEW OF FRONT SEAT

FIGURE 4

12. COMPLIANCE TEST EXECUTION.....Continued

FORWARD AND AFT LOADS ON SEAT FRAME AND SEAT ADJUSTERS WHERE PROCEDURE IN FIGURE 6 IS NOT APPLICABLE

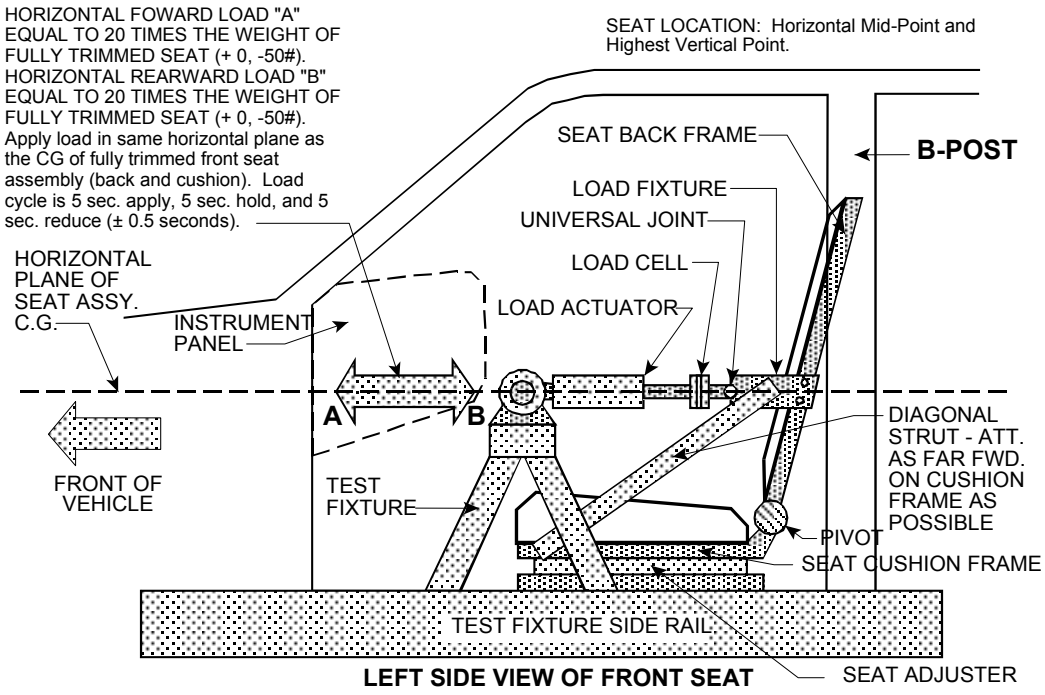


FIGURE 5A

FIGURE 5B

FORWARD AND AFT LOADS ON SEAT FRAME AND SEAT ADJUSTERS WHERE SEAT BELTS ARE ATTACHED TO SEAT AND PROCEDURE IN FIGURE 6 IS NOT APPLICABLE

HORIZONTAL FOWARD LOAD "A"

SEAT LOCATION:
Most Rearward Horizontal Adjustment and

12. COMPLIANCE TEST EXECUTION.....Continued

FORWARD AND AFT LOADS ON SEAT FRAME WITH SEAT BELTS ATTACHED TO SEAT AND C.G. OF SEAT IN A PLANE HORIZONTALLY ABOVE, ON, OR BELOW THE SEAT ADJUSTER

Horizontal Forward Load "A" Equal to 20 Times the Weight of Fully Trimmed Seat (+ 0, -50#) for portion of seat weight above lowest surface of the seat adjuster.
Horizontal Rearward Load "B" Equal to 20 Times the Weight of Fully Trimmed Seat (+ 0, -50#) for portion of seat weight above the lowest surface of the seat adjuster.
Load cycle is 5 sec. apply, 10 seconds forward and/or 5 seconds rearward, and 5 sec. reduce (± 0.5 seconds).

Horizontal Forward Load "D" Equal to 20 Times the Weight of Fully Trimmed Seat (+ 0, -50#) for portion of seat weight below seat adjuster.
Horizontal Rearward Load "E" Equal to 20 Times the Weight of Fully Trimmed Seat (+ 0, -50#) for portion of seat weight below the seat adjuster.
Load cycle is 5 seconds apply, 10 seconds forward and/or 5 seconds rearward, and 5 sec. reduce (± 0.5 seconds).

Forward Seat Belt Anchorage Load "C" Pulled at an Angle of 5 E to 15E above the Vehicle Horizontal Reference Line (+ 0, -50#).
Pulled simultaneously (LOADS A, C & E).
LOAD = 5000# - lap belt anchorages on seat frame above seat adjuster. Use 3000# load for shoulder belt anchorages on frame.

CG1 = Center of Gravity of the portion of the seat above lowest surface of seat adjuster.

CG2 = Center of Gravity of the portion of the seat below the seat adjuster.

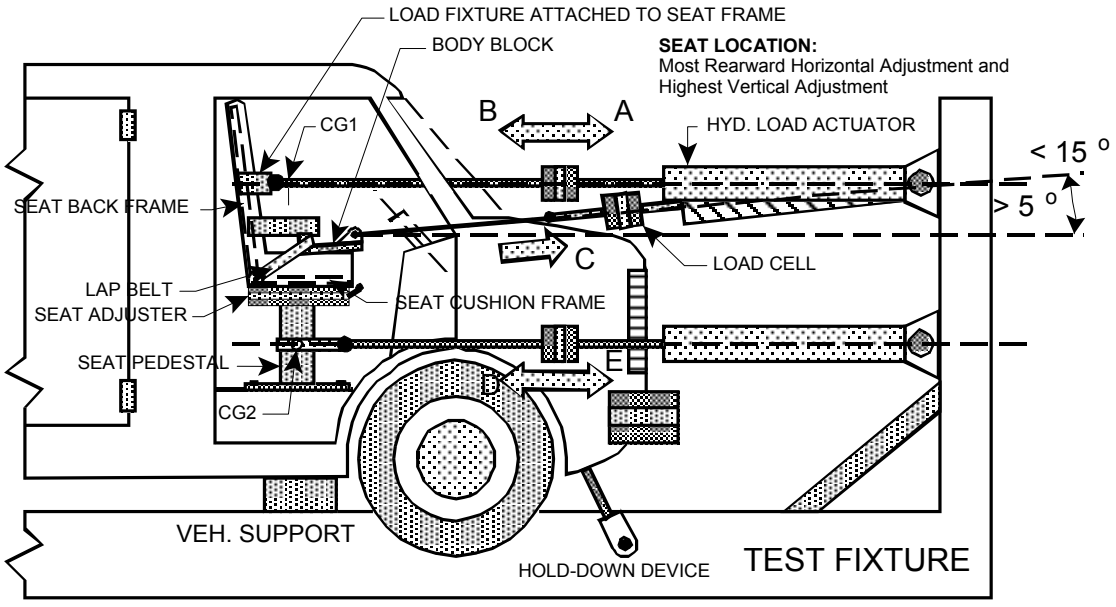


FIGURE 6A

12. COMPLIANCE TEST EXECUTION.....Continued

FORWARD AND AFT LOADS ON SEAT FRAME FOR SEATS WITH C.G. OF SEAT IN A PLANE HORIZONTALLY ABOVE, ON, OR BELOW THE SEAT ADJUSTER

Horizontal Forward Load "A" Equal to 20 Times the Weight of Fully Trimmed Seat (+ 0, -50#) for portion of seat weight above lowest surface of the seat adjuster.
Horizontal Rearward Load "B" Equal to 20 Times the Weight of Fully Trimmed Seat (+ 0, -50#) for portion of seat weight above the lowest surface of the seat adjuster.
Load cycle is 5 seconds apply, 5 seconds forward and/or 5 seconds rearward, and 5 seconds reduce (± 0.5 seconds).

Horizontal Forward Load "D" Equal to 20 Times the Weight of Fully Trimmed Seat (+ 0, -50#) for portion of seat weight below seat adjuster.
Horizontal Rearward Load "E" Equal to 20 Times the Weight of Fully Trimmed Seat (+ 0, -50#) for portion of seat weight below the seat adjuster.
Load cycle is 5 seconds apply, 5 seconds forward and/or rearward, hold, and 5 seconds reduce (± 0.5 seconds).

CG1 = Center of Gravity of the portion of the seat above lowest surface of seat adjuster.

CG2 = Center of Gravity of the portion of the seat below the seat adjuster.

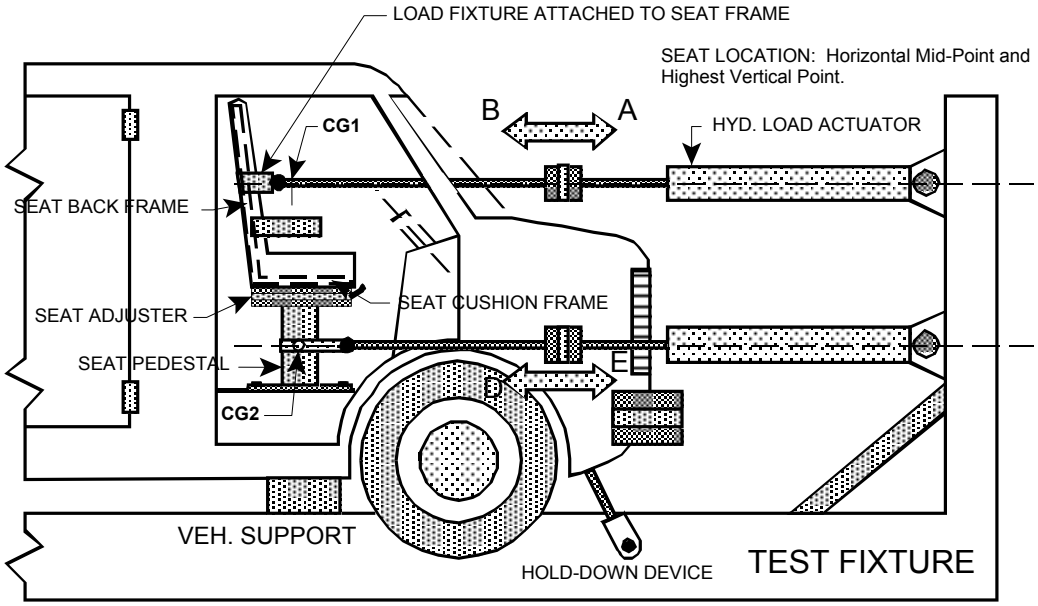
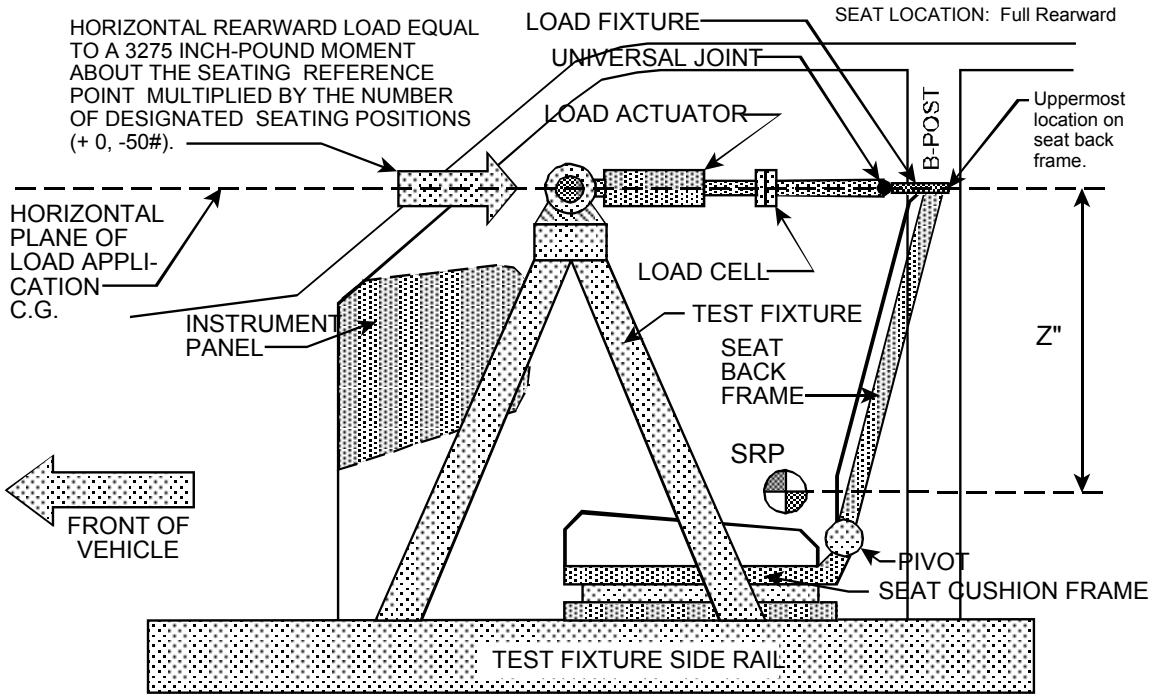


FIGURE 6B

12. COMPLIANCE TEST EXECUTION.....Continued

AFT MOMENT LOAD ON SEAT BACK UPPER FRAME

HORIZ. LOAD = 3275/Z" x No. of Occupants



LEFT SIDE VIEW OF FRONT SEAT

FIGURE 7

12. COMPLIANCE TEST EXECUTION.....Continued

Figure 8 Forward Load On Rear Seat Back Frame

Figure 9 Forward Load On Folding Seat Back Restraining Device

Figure 10 Forward Load On Rear Seat Cushion Frame

Figure 11 Alternate Loading Method For Rear Seat Cushion Frame

Methods for determining seating system center of gravity (CG) locations are shown on Figure 12.

The vehicle test fixture is shown on Figure 13.

Eight possible noncompliances are shown on Figure 14.

12. COMPLIANCE TEST EXECUTION.....Continued

FORWARD LOAD ON REAR SEAT BACK FRAME

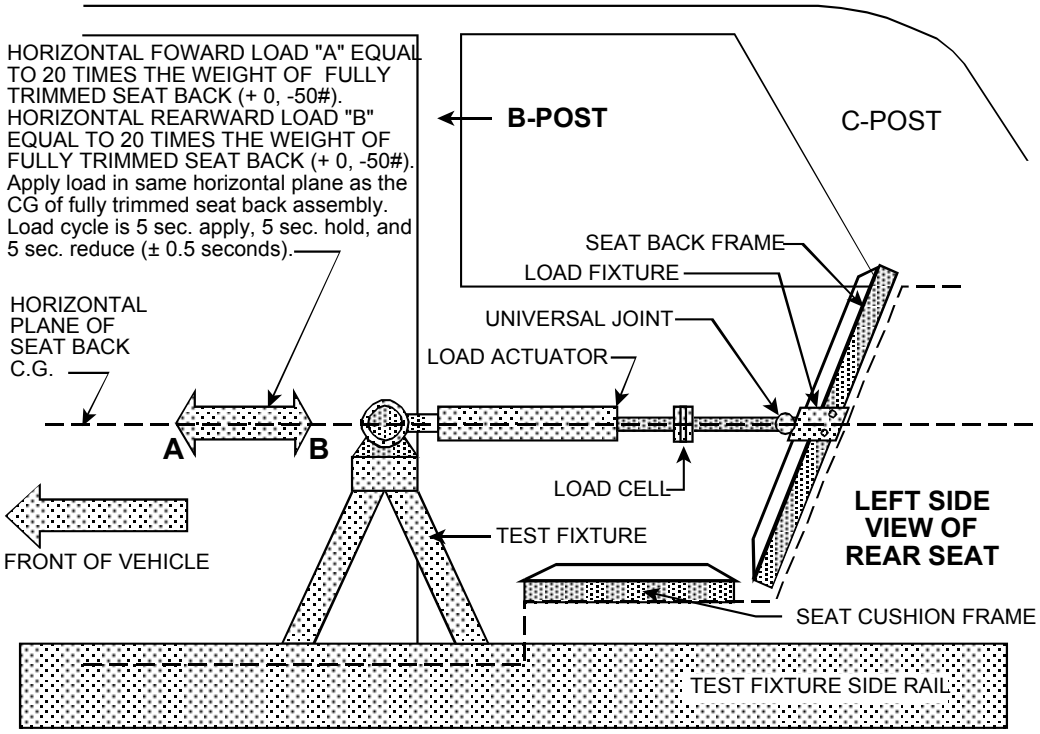
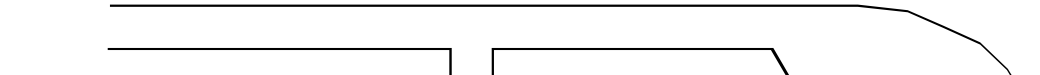


FIGURE 8

FIGURE 9

FORWARD LOAD ON REAR FOLDING SEAT BACK RESTRAINING DEVICE



12. COMPLIANCE TEST EXECUTION.....Continued
FORWARD LOAD ON REAR SEAT CUSHION FRAME

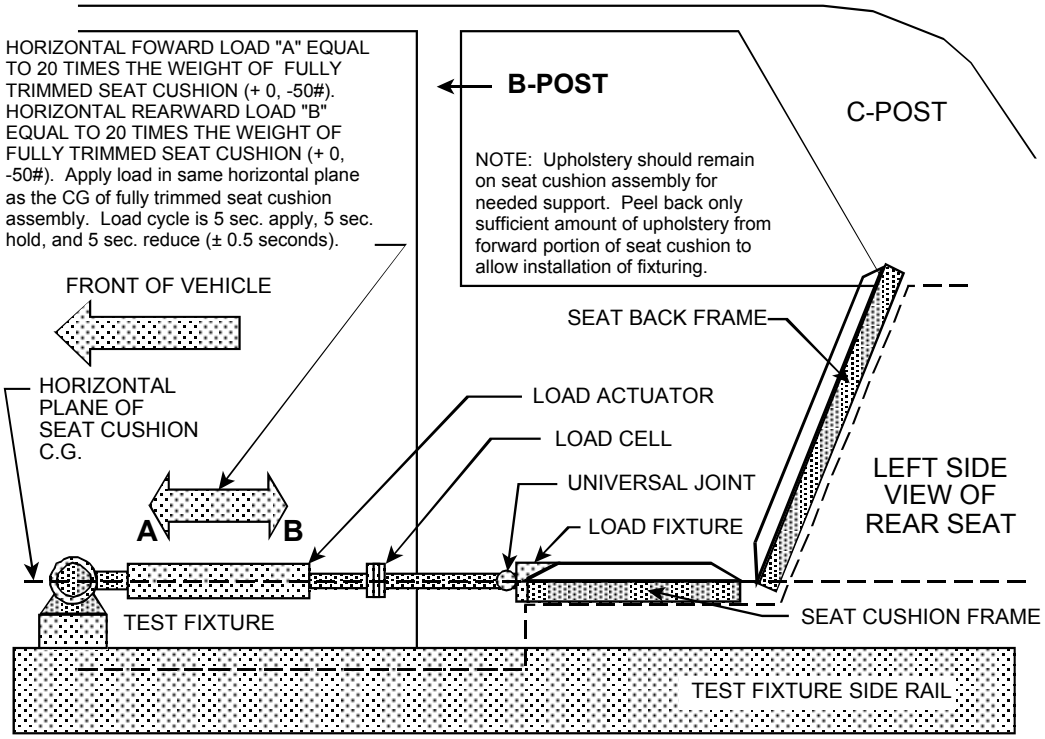


FIGURE 10

ALTERNATE SETUP - FORWARD LOAD ON REAR SEAT CUSHION FRAME

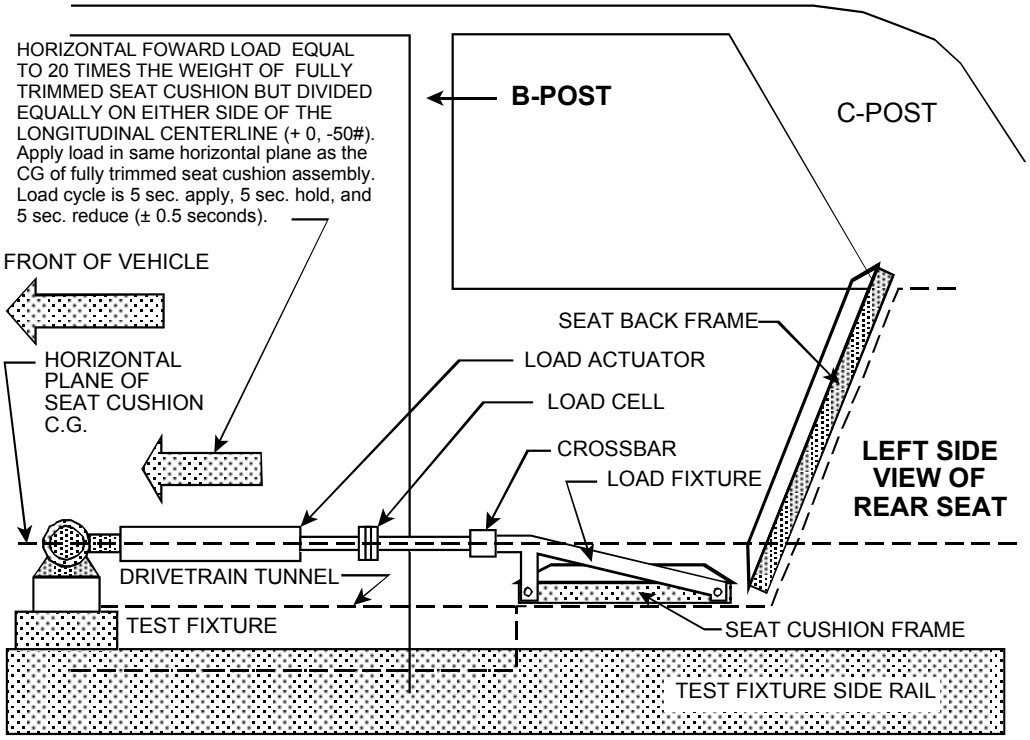
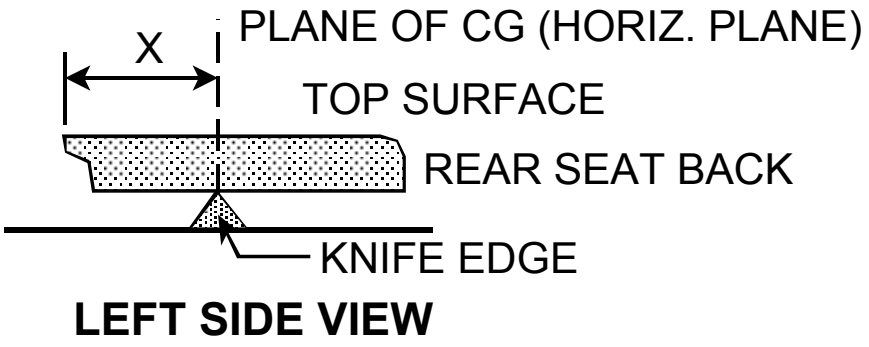
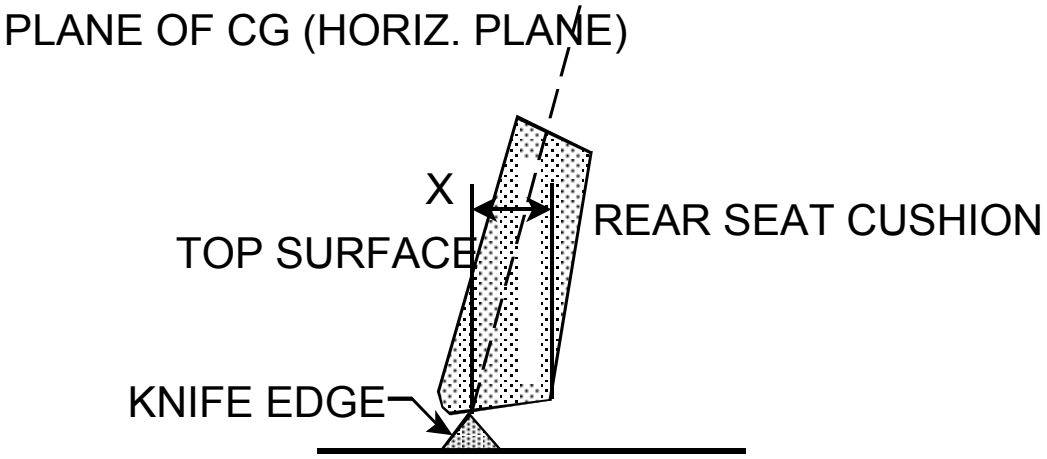


FIGURE 11

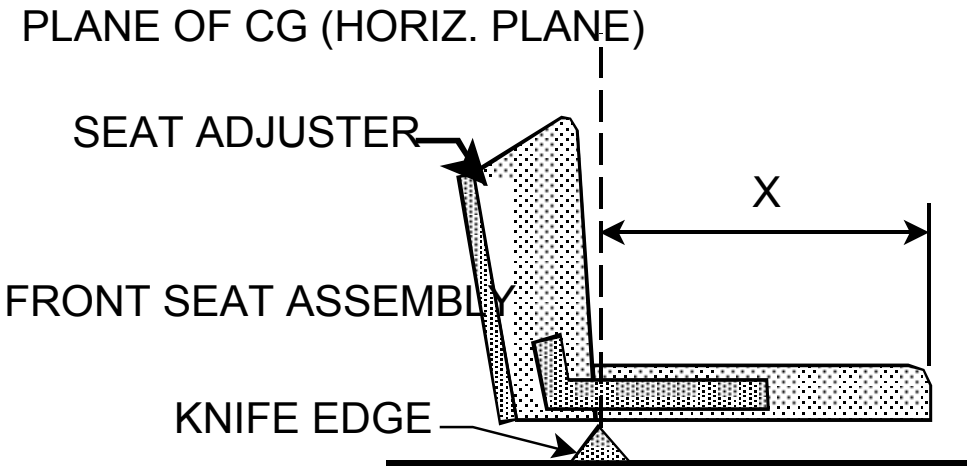
12. COMPLIANCE TEST EXECUTION.....Continued



LEFT SIDE VIEW



LEFT SIDE VIEW

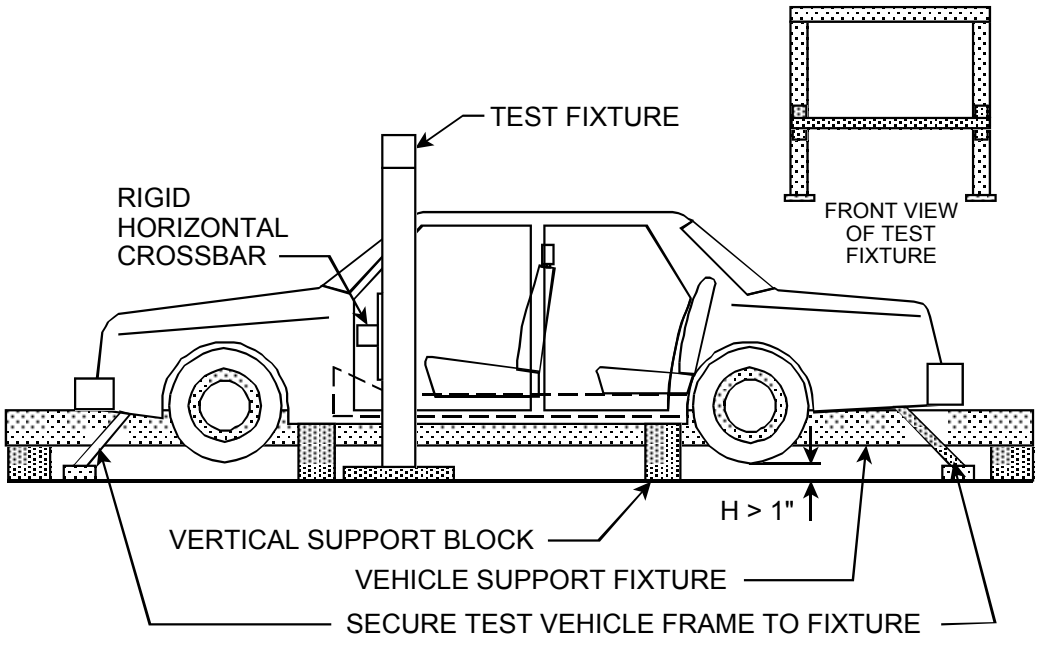


LEFT SIDE VIEW

FIGURE 12

12. COMPLIANCE TEST EXECUTION.....Continued

S207 VEHICLE TEST SETUP



POSITION VEHICLE BODY AT ITS NORMAL CURB WEIGHT ATTITUDE

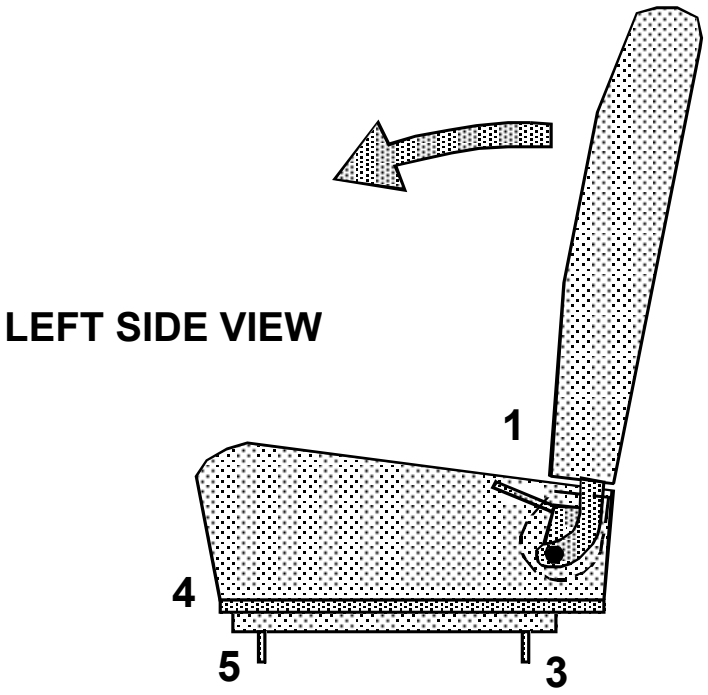
LEFT SIDE VIEW

FIGURE 13

COMPLIANCE TEST EXECUTION.....Continued

S207, SEATING SYSTEMS, POSSIBLE NONCOMPLIANCES

1. **Folding Seat Back Restraining Device releases from its preset position during application of forward load.**
2. **Seat Frame releases from its adjusted position during the application of a forward or rearward load.**
3. **Seat Frame or Seat Adjusters detach from the test vehicle floorpan during the application of a forward or rearward load.**
4. **Seat Frame detaches from the Seat Adjuster mechanism during the application of a forward or rearward load.**
5. **Seat Adjuster mechanism separates during the application of a forward or rearward load.**
6. **Hinged Seat Restraining Device detaches from the Seat Frame during the application of a forward or rearward load.**
7. **Hinged Seat Restraining Device disengages during the application of a forward or rearward load.**
8. **Rear Seat Back or Cushion Frame detaches from the test vehicle structure during the application of the specified load.**



13. POST TEST REQUIREMENTS

Contractor shall re-verify all instrumentation and check data sheets.

14. REPORTS

14.1. Monthly Status Reports

The contractor shall submit a monthly Test Status Report and a Vehicle or Equipment Status Report to the COTR. The Vehicle or Equipment Status Report shall be submitted until all vehicles or items of equipment are disposed of. See Section 16 "Forms" for samples of the required Monthly Status Reports.

14.2 Apparent Test Failure

Any indication of a test failure shall be communicated by telephone to the COTR within 24 hours with written notification mailed within 48 hours (Saturday and Sunday hours excluded). A Notice of Test Failure (see Section 16) with a copy of the particular compliance test data sheet(s) and preliminary 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 COTR'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 a test failure, **seven** copies of the Final Test Report shall be submitted to the COTR for acceptance within three weeks of test completion. The Final Test Report format to be used by all contractors can be found in this section.

Where there has been no indication of a test failure, **three** copies of each Final Test Report shall be submitted to the COTR for acceptance within three weeks of test completion. Payment of contractor's invoices for completed compliance tests may be withheld until Final Test Report acceptance by the COTR. Contractors are requested to NOT submit invoices before the COTR is provided with copies of the Final Test Report.

Contractors are required to submit the first Final Test Report in draft form within two weeks after the compliance test is conducted. The contractor and the COTR 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 COTR. 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. REPORTS....Continued

14.3.2 REQUIREMENTS

The Final Test Report, associated documentation (including photographs) are relied upon as the chronicle of the compliance test. The Final Test Report will be released to the public domain after review and acceptance by the COTR. For these reasons, each final report must be a complete document capable of standing by itself and containing all data sheets.

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.

Instructions for the preparation of the first three pages of the final test report are provided for standardization.

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:

Final Report Number such as 207-ABC-9X-001 where - -

207	is the FMVSS tested
ABC	are the initials for the laboratory
9X	is the Fiscal Year of the test program
001	is the Group Number (001 for the 1st test, 002 for the 2nd test, etc.)

Final Report Title And Subtitle such as

SAFETY COMPLIANCE TESTING FOR FMVSS 207
Seating Systems
* * * * * * * * * * * * * * * *
Name of Vehicle Manufacturer
Model Year, Make/Model, Body Style
NHTSA Number Test Vehicle

Contractor's Name and Address such as

COMPLIANCE TESTING LABORATORIES, INC.
4335 West Dearborn Street
Detroit, Michigan 48090

14. REPORTS....Continued

NOTE: DOT SYMBOL WILL BE PLACED BETWEEN ITEMS (3) AND (4)

Date of Final Report Completion such as "March 15, 199X"

The words "FINAL REPORT"

The sponsoring agency's name and address as follows - -

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Safety Assurance
Office of Vehicle Safety Compliance
400 Seventh Street, SW
Room 6115 (NSA-30)
Washington, DC 20590

14. REPORTS....Continued

B. **First Page After Front Cover**

A disclaimer statement and an acceptance signature block for the COTR shall be provided as follows:

This publication is distributed by the U. S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The 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. The United States Government does not endorse products or manufacturers.

Prepared By: _____

Approved By: _____

Approval Date: _____

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: _____

Acceptance Date: _____

14. REPORTS....Continued

C. **Second Page After Front Cover**
A completed Technical Report Documentation Page (Form DOT F1700.7) shall be completed for those items that are applicable with the other spaces left blank. Sample data for the applicable block numbers of the title page follows:

Block 1 — REPORT NUMBER

207-ABC-9X-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 207 Compliance Testing of 199X Ace Super 2-door Coupe, NHTSA No. CX0401

Block 5 — REPORT DATE

March 15, 199X

Block 6 — PERFORMING ORGANIZATION CODE

ABC

Block 7 — AUTHOR(S)

John Smith, Project Manager / Bill Doe, Project Engineer

Block 8 — PERFORMING ORGANIZATION REPORT NUMBER

ABC-DOT-XXX-001

Block 9 — PERFORMING ORGANIZATION NAME AND ADDRESS

ABC Laboratories
405 Main Street
Detroit, MI 48070

14. REPORTS....Continued

Block 10 — WORK UNIT NUMBER

Leave blank

Block 11 — CONTRACT OR GRANT NUMBER

DTNH22-9X-D-12345

Block 12 — SPONSORING AGENCY NAME AND ADDRESS

US Department of Transportation
National Highway Traffic Safety Administration
Office of Vehicle Safety Compliance
Mail Code: NEF-30
400 7th St, SW, Room 6115
Washington, DC 20590

Block 13 — TYPE OF REPORT AND PERIOD COVERED

Final Test Report
Feb. 15 to Mar. 15, 199X

Block 14 — SPONSORING AGENCY CODE

NEF-30

Block 15 — SUPPLEMENTARY NOTES

Leave blank

Block 16 — ABSTRACT

Compliance tests were conducted on the subject 199X Ace Super 2-door coupe in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-207-0X for the determination of FMVSS 207 compliance. Test failures identified were as follows:

None

Note: Above wording must be shown with appropriate changes made for a particular compliance test. Any questions should be resolved with the COTR.

14. REPORTS....Continued

Block 17 — KEY WORDS

Compliance Testing
Safety Engineering
FMVSS 207

Block 18 — DISTRIBUTION STATEMENT

Copies of this report are available from - -

NHTSA Technical Reference Division
Room 5108 (NAD-52)
400 Seventh St., SW
Washington, DC 20590
Telephone No.: 202-366-4946

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

14. REPORTS....Continued

14.3.4 Table of Contents

Final test report Table of Contents shall include the following:

Section 1 — Purpose of Compliance Test

Section 2 — Compliance Test Data Summary

Section 3 — Compliance Test Data

Section 4 — Noncompliance Data (if applicable)

Section 5 — Photographs

15. DATA SHEETS

DATA SHEET 1
TEST VEHICLE RECEIVING-INSPECTION

VEH. MOD YR/MAKE/MODEL/BODY: _____

VEH. NHTSA NO.: _____ ; VIN: _____

VEH. BUILD DATE: _____ ; TEST DATE: _____

TEST LABORATORY: _____

OBSERVERS: _____

1. First compliance test by laboratory for this vehicle is S210 test.

   ___ Yes ___ No (Go to item 2)

   ___ 1.1 Label test vehicle with NHTSA Number

   ___ 1.2 Verify all options on the "window sticker" are present on the vehicle

   ___ 1.3 Verify tires and wheel rims are new and the same as listed

   ___ 1.4 Verify there are no dents or other interior or exterior flaws

   ___ 1.5 Verify the glove box contains an owner's manual, warranty document, consumer information, and extra keys

   ___ 1.6 Verify the vehicle is equipped with the proper fuel filler cap

   ___ 1.7 If the vehicle has been delivered from the dealer, verify the vehicle has been properly prepared and is in running condition

2. Verify seat adjusters are working

   ___ Yes ___ No

3. Verify there is a seat belt at each seating position

   ___ Yes ___ No

(Continued on next page)

15. DATA SHEETS....Continued

4. Without disturbing the integrity of each seat belt and anchorage, verify that each seat belt is attached to the anchorage. For seat belts that are attached to the seat, also verify the seats are attached to the seat anchors and the seat anchors are attached to the vehicle.

___ Yes ___ No

COMMENTS: (Explain any problems here)

RECORDED BY: _____ DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

DATA SHEET 2
SEATING SYSTEM TEST RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: _____

VEH. NHTSA NO.: _____ ; VIN: _____

VEH. BUILD DATE: _____ ; TEST DATE: _____

TEST LABORATORY: _____

OBSERVERS: _____

SEAT CONFIGURATION: (See Figure 1) _____

FOR FRONT BENCH SEAT —

LEGEND: Wa - Weight of Seat Assembly
Wb - Weight of Seat Back
Wc - Weight of Seat Cushion
Z - Distance from Seat SRP to Uppermost Crossmember = ____ "

COMPONENT	LOAD DIRECTION	COMPONENT WEIGHT (lbs)	REQUIRED LOAD (lbs)	ACTUAL LOAD (lbs)	PEAK DEFLECT. (inches)	ATTACHMENT (PASS/FAIL)
Seat Back	Forward	Wb =	20 x Wb =			
Seat Assy.	Forward	Wa =	20 x Wa =			
	Rearward	Wa =	20 x Wa =			
Seat Back Moment	Rearward	N/A	3275 in-lb/Z x # of occupants			

FOR FRONT BUCKET SEATS - - <u>LEFT SIDE</u>

COMPONENT	LOAD DIRECTION	COMPONENT WEIGHT (lbs)	REQUIRED LOAD (lbs)	ACTUAL LOAD (lbs)	PEAK DEFLECT. (inches)	ATTACHMENT (PASS/FAIL)
Seat Back	Forward	Wb =	20 x Wb =			
Seat Assy.	Forward	Wa =	20 x Wa =			
	Rearward	Wa =	20 x Wa =			
Seat Back Moment	Rearward	N/A	3275 in-lb/Z			

15. DATA SHEETS....Continued

FOR FRONT BUCKET SEATS - - RIGHT SIDE

COMPONENT	LOAD DIRECTION	COMPONENT WEIGHT (lbs)	REQUIRED LOAD (lbs)	ACTUAL LOAD (lbs)	PEAK DEFLECT. (inches)	ATTACHMENT (PASS/FAIL)
Seat Back	Forward	Wb =	20 x Wb =			
Seat Assy.	Forward	Wa =	20 x Wa =			
	Rearward	Wa =	20 x Wa =			
Seat Back Moment	Rearward	N/A	3275 in-lb/Z			

FOR REAR SEATS - -

COMPONENT	LOAD DIRECTION	COMPONENT WEIGHT (lbs)	REQUIRED LOAD (lbs)	ACTUAL LOAD (lbs)	PEAK DEFLECT. (inches)	ATTACHMENT (PASS/FAIL)
Cushion	Forward	Wc =	20 x Wc =			
Back	Forward	Wb =	20 x Wb =			

COMMENTS:

RECORDED BY: _____ DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

DATA SHEET 3
CALIBRATION DATA

VEH. MOD YR/MAKE/MODEL/BODY: _____

VEH. NHTSA NO.: _____ ; VIN: _____

VEH. BUILD DATE: _____ ; TEST DATE: _____

TEST LABORATORY: _____

INSTRUMENT/ EQUIP. ITEM	MFR.	FULL-SCALE CAPACITY	FULL-SCALE OUTPUT	ACCURACY	LAST CAL. DATE
Load Cell					
Oscillograph					
X-Y Plotter					
Steel Rule					
String Potentiometer					
Servo Controller					
Platform Scale					
Torque Wrench					
Other					

COMMENTS:

RECORDED BY: _____ DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

DATA SHEET 4
REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

CONTRACT NO.: DTNH22-_____ DATE: _____

FROM: _____

TO: _____

The following vehicle has been subjected to compliance testing for FMVSS No. _____

The vehicle was inspected upon arrival at the laboratory for the test and found to contain all of the equipment listed below. All variances have been reported within 2 working days of vehicle arrival, by letter, to the NHTSA Industrial Property Manager (NAD-30), with a copy to the OVSC COTR. The vehicle is again inspected, after the above test has been conducted, and all changes are noted below. The final condition of the vehicle is also noted in detail.

MODEL YEAR/MAKE/MODEL/BODY STYLE: _____

NHTSA NO.: _____ BODY COLOR: _____ VIN: _____

ODOMETER READINGS: ARRIVAL - _____ miles DATE - _____

COMPLETION - _____ miles DATE - _____

PURCHASE PRICE: $_____ DEALER'S NAME: _____

ENGINE DATA: ____ Cylinders ____ Liters ____ Cubic Inches

TRANSMISSION DATA: ____ Automatic ____ Manual ____ No. of Speeds

FINAL DRIVE DATA: ____ Rear Drive ____ Front Drive ____ 4 Wheel Drive

TIRE DATA: Size - _____ Mfr. - _____

CHECK APPROPRIATE BOXES FOR VEHICLE EQUIPMENT:

	Air Conditioning		Traction Control		Clock
	Tinted Glass		All Wheel Drive		Roof Rack
	Power Steering		Speed Control		Console
	Power Windows		Rear Window Defroster		Driver Air Bag
	Power Door Locks		Sun Roof or T-Top		Passenger Air Bag
	Power Seat(s)		Tachometer		Front Disc Brakes
	Power Brakes		Tilt Steering Wheel		Rear Disc Brakes
	Antilock Brake System		AM/FM/Cassette Radio		Other-

LIST OTHER PERTINENT OPTIONAL EQUIPMENT ON NEXT PAGE (REMARKS SECTION)

15. DATA SHEETS....Continued

REMARKS:

_____

_____

_____

Equipment that is no longer on the test vehicle as noted on previous page:

_____

_____

_____

Explanation for equipment removal:

_____

_____

_____

Test Vehicle Condition:

_____

_____

_____

_____

_____

RECORDED BY: _____ DATE: _____

APPROVED BY: _____

16. FORMS

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS NO.: 207 TEST DATE: _____

LABORATORY: _____

CONTRACT NO.: DTNH22-_____; DELV. ORDER NO: _____

LABORATORY PROJECT ENGINEER'S NAME: _____

TEST VEHICLE MAKE/MODEL/BODY STYLE: _____

_____

VEHICLE NHTSA NO.: _____; VIN: _____

VEHICLE MODEL YEAR: _____; BUILD DATE: _____

TEST FAILURE DESCRIPTION: _____

_____

_____

_____

S210 REQUIREMENT, PARAGRAPH ____ : _____

_____

_____

_____

NOTIFICATION TO NHTSA (COTR): _____

DATE: _____ BY: _____

REMARKS: _____

_____

16. FORMS....Continued

MONTHLY TEST STATUS REPORT

FMVSS 207

DATE OF REPORT: _____

No.	VEHICLE NHTSA No., MAKE & MODEL	COMPLIANCE TEST DATE	PASS/ FAIL	DATE REPORT SUBMITTED	DATE INVOICE SUBMITTED	INVOICE PAYMENT DATE
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

16. REPORT FORMS....Continued

MONTHLY VEHICLE STATUS REPORT

FMVSS 207

DATE OF REPORT: _____

No.	VEHICLE NHTSA No., MAKE & MODEL	DATE OF DELIVERY	TEST COMPLETE DATE	VEHICLE SHIPMENT DATE	CONDITION OF VEHICLE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

APPENDIX A
MOTOR VEHICLE SAFETY STANDARD NO. 207
Seating Systems — Passenger Cars, Multipurpose Passenger Vehicles (MPVs), Trucks and Buses
(Docket No. 2-12; Notice No. 3)

S1. PURPOSE AND SCOPE

This standard establishes requirements for seats, their attachment assemblies, and their installation to minimize the possibility of their failure by forces acting on them as a result of vehicle impact.

S2. APPLICATION

This standard applies to passenger cars, multipurpose passenger vehicles, trucks and buses.

S3. DEFINITION

OCCUPANT SEAT

A seat that provides at least one designated seating position (DSP).

S4. REQUIREMENTS

S4.1 DRIVER SEAT

Each vehicle shall have an occupant seat for the driver.

S4.2 GENERAL PERFORMANCE REQUIREMENTS

When tested in accordance with S5, each occupant seat, other than a side-facing seat or a passenger seat on a bus, shall withstand the following forces:

(a) In any position to which it can be adjusted — 20 times the weight of the seat applied in a forward longitudinal direction;

(b) In any position to which it can be adjusted — 20 times the weight of the seat applied in a rearward longitudinal direction;

(c) For a seat belt assembly attached to the seat — the force specified in subparagraph (a), if it is a forward facing seat, or subparagraph (b), if it is a rearward facing seat, in each case applied simultaneously with the forces imposed on the seat by the seat belt assembly when it is loaded in accordance with section S4.2 of Federal Motor Vehicle Safety Standard No. 210; and

APPENDIX A....Continued

(d) In its rearmost position — a force that produces a 3,300 inch-pound moment about the seating reference point (SRP) for each designated seating position (DSP) that the seat provides, applied to the upper cross-member of the seat back or the upper seat back, in a rearward longitudinal direction for forward-facing seats and in a forward longitudinal direction for rearward-facing seats.

S4.2.1 SEAT ADJUSTMENT

Except for vertical movement of nonlocking suspension type occupant seats in trucks or buses, the seat shall remain in its adjusted position during the application of each force specified in S4.2.

S4.3 RESTRAINING DEVICE FOR HINGED OR FOLDING SEATS OR SEAT BACKS

Except for a passenger seat in a bus or a seat having a back that is adjustable only for the comfort of its occupants, a hinged or folding occupant seat or occupant seat back shall —

(a) be equipped with a self-locking device for restraining the hinged or folding seat or seat back, and

(b) if there are any designated seating positions (DSPs) or auxiliary seating accommodations behind the seat, either immediately to the rear or to the sides, be equipped with a control for releasing that restraining device.

S4.3.1 ACCESSIBILITY OF RELEASE CONTROL

If there is a designated seating position (DSP) immediately behind a seat equipped with a restraining device, the control for releasing the device shall be readily accessible to the occupant of the seat equipped with the device and, if access to the control is required in order to exit from the vehicle, to the occupant of the designated seating position (DSP) immediately behind the seat.

S4.3.2 PERFORMANCE OF RESTRAINING DEVICE

S4.3.2.1 STATIC FORCE

(a) Once engaged, the restraining device for forward-facing seat shall not release or fail when a forward longitudinal force equal to 20 times the weight of the hinged or folding portion of the seat is applied through the center of gravity (CG) of that portion of the seat.

(b) Once engaged, the restraining device for a rearward facing seat shall not

APPENDIX A....Continued

release or fail when a rearward longitudinal force equal to 8 times the weight of the hinged or folding portion of the seat is applied to the center of gravity (CG) of that portion of the seat.

S4.3.2.2 ACCELERATION

Once engaged, the restraining device shall not release or fail when the device is subjected to an acceleration of 20 g in the longitudinal direction opposite to that in which the seat folds.

S4.4 LABELING

Seats not designated for occupancy while the vehicle is in motion shall be conspicuously labeled to that effect.

S5. TEST PROCEDURES

S5.1 Apply the forces specified in S4.2(a) and S4.2(b) as follows:

S5.1.1 If the seat back and the seat bench are attached to the vehicle by the same attachments, secure a strut on each side of the seat from a point on the outside of the seat frame in the horizontal plane of the seat's center of gravity (CG) to a point on the frame as far forward as possible of the seat anchorages. Between the upper ends of the struts place a rigid cross-member, in front of the seat back frame for rearward loading and behind the seat back frame for forward loading. Apply the force specified by S4.2(a) or S4.2(b) horizontally through the rigid cross-member as shown in Figure 1 on the next page.

S5.1.2 If the seat back and the seat bench are attached to the vehicle by different attachments, attach to each component a fixture capable of transmitting a force to that component. Apply forces equal to 20 times the weight of the seat back horizontally through the center of gravity (CG) of the seat back, as shown in Figure 2, and apply forces equal to 20 times the weight of the seat bench horizontally through the center of gravity (CG) of the seat bench, as shown in Figure 3.

S5.2 Develop the moment specified in S4.2(d) as shown in Figure 4.

S5.3 Apply the forces specified in S4.3.2.1 (a) and (b) to a hinged or folding seat as shown in Figure 1 and to a hinged or folding seat back as shown in Figure 5.

APPENDIX A....Continued

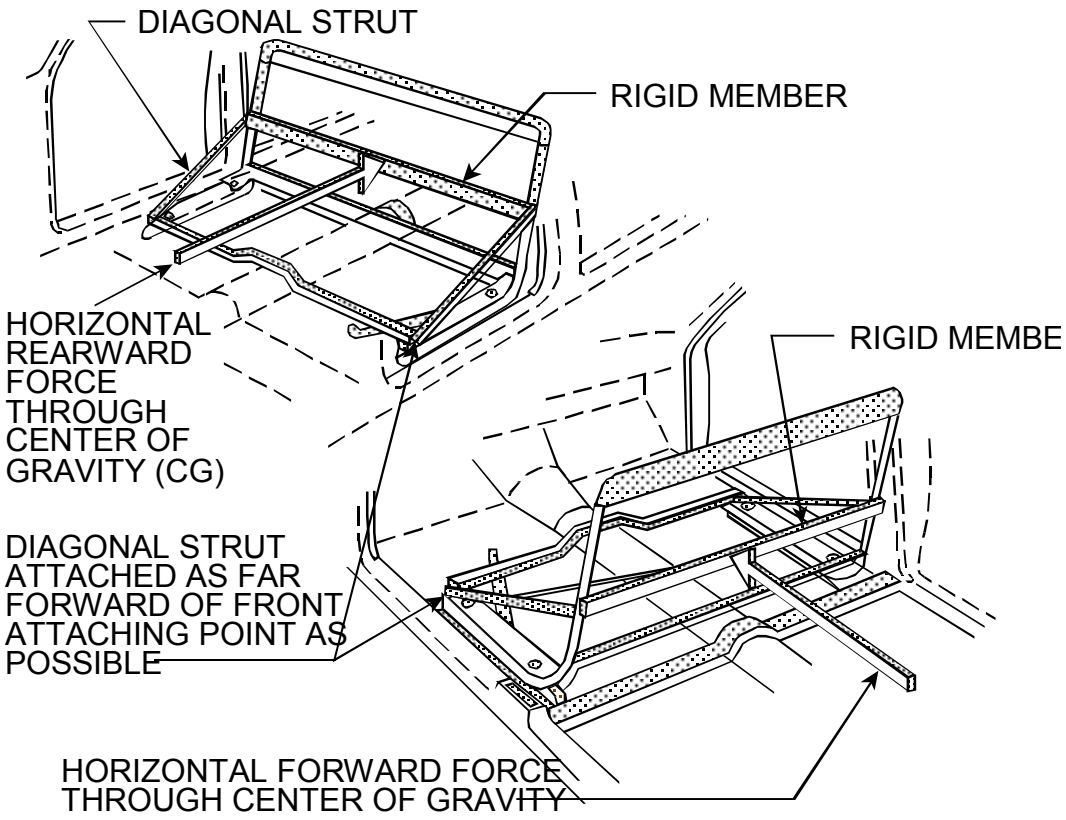


FIGURE 1

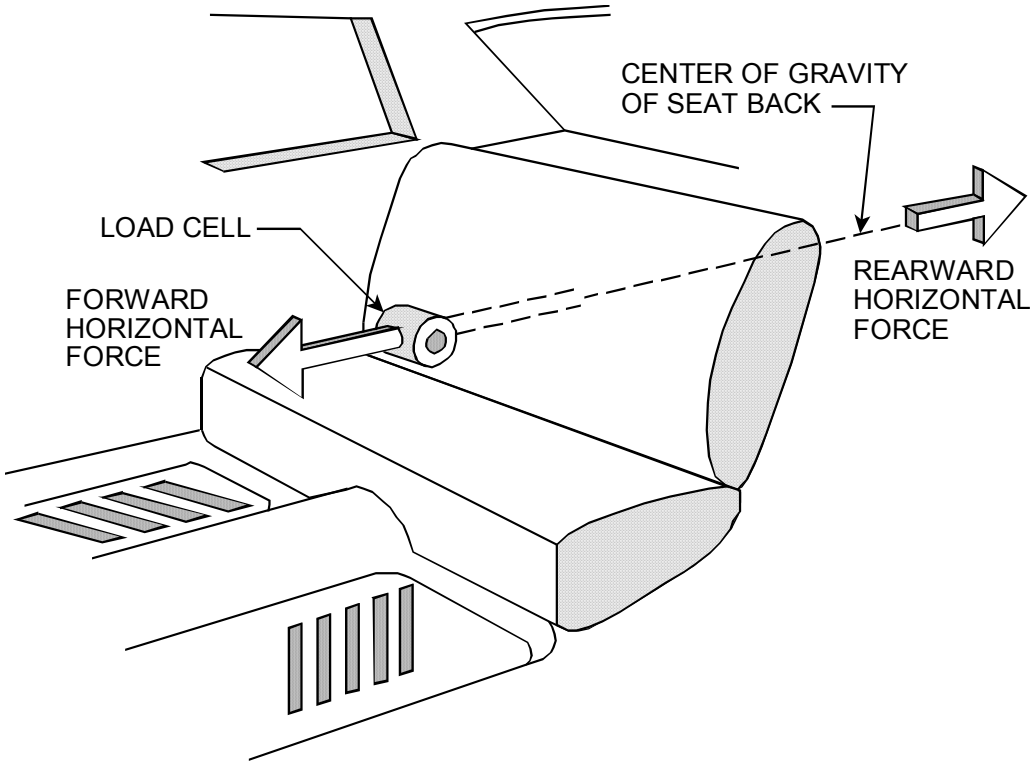


FIGURE 2

APPENDIX A....Continued

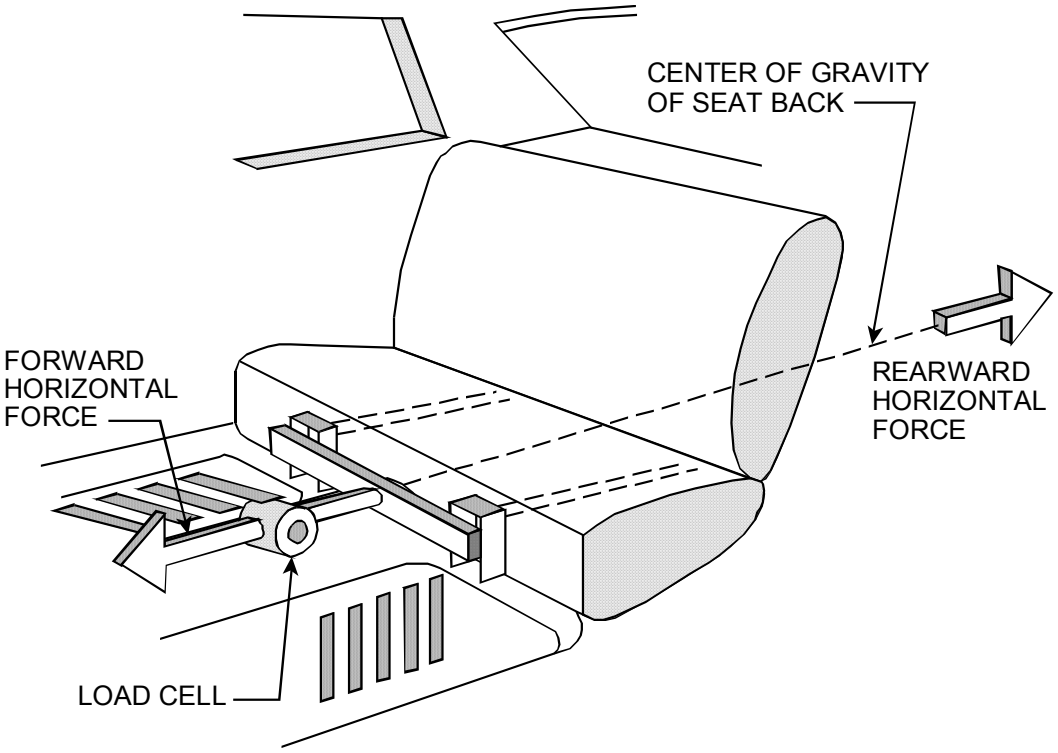


FIGURE 3

MOMENT (P x D) COMPUTED ABOUT THE SEATING REFERENCE POINT (SRP)

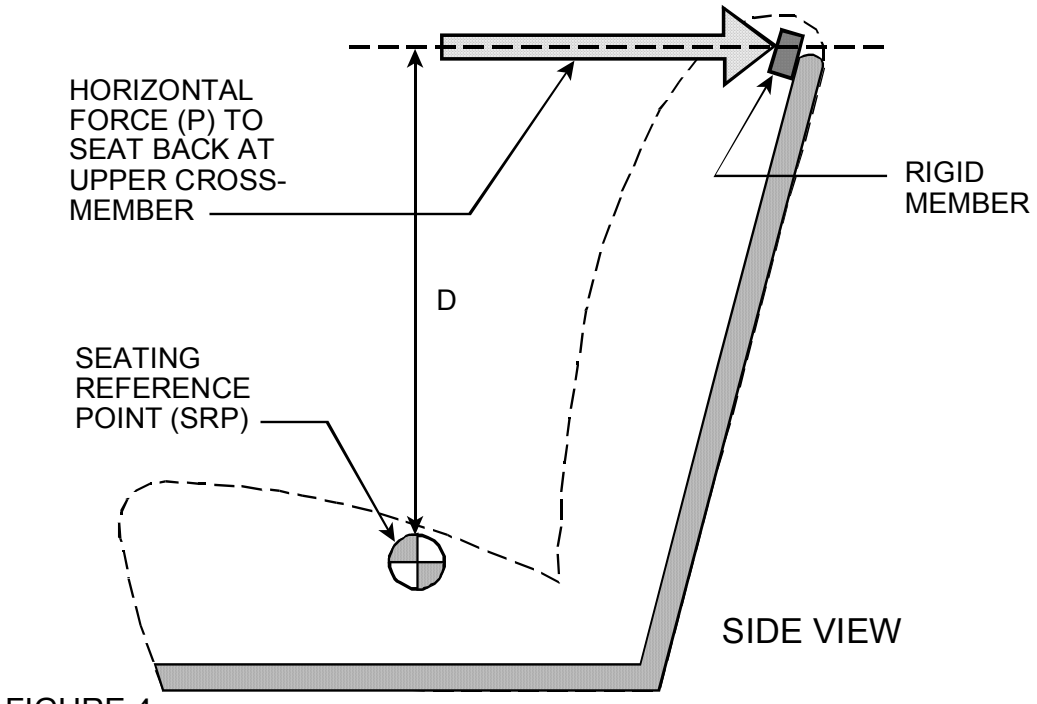


FIGURE 4

APPENDIX A....Continued

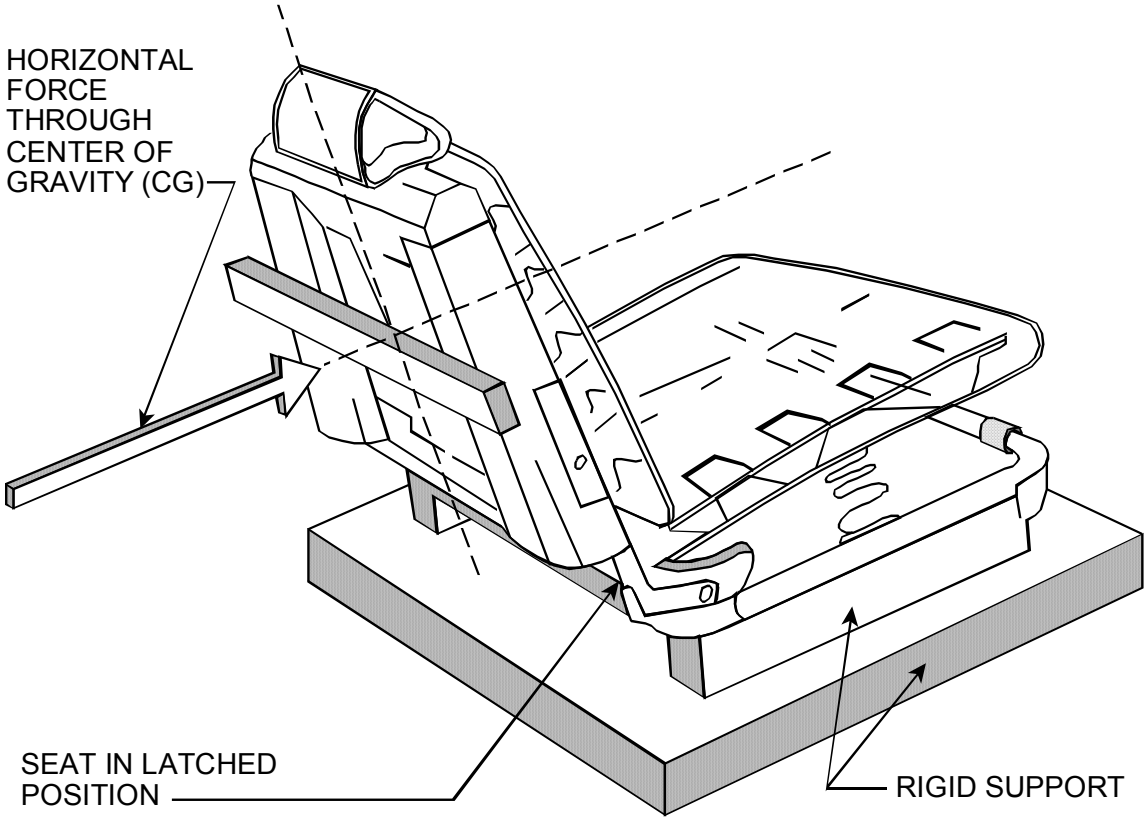


FIGURE 5

S5.4 Determine the center of gravity (CG) of a seat or seat component with all cushions and upholstery in place and with the head restraint in its fully extended design position.

APPENDIX B
DEVICES FOR USE IN DEFINING AND MEASURING VEHICLE SEATING ACCOMMODATION
SAE J826 JUN92

1. SCOPE

The devices of this SAE Standard provide the means by which passenger compartment dimensions can be obtained using a deflected seat rather than a free seat contour as a reference for defining seating space. All definitions and dimensions used in conjunction with this document are described in SAE J1100. The devices described in this document are intended for applications concerning seated driver side or center occupant accommodation spaces only and are not to be construed as instruments which measure or indicate occupant capabilities or comfort. This document covers only one H-point machine installed on a seat during each test. Certified H-point templates and machines can be purchased from:

Society of Automotive Engineers, Inc.
400 Commonwealth Drive
Warrendale, PA 15096-0001

1.1 PURPOSE

This document specifies two-dimensional H-point template and three-dimensional H-point machine devices for use in defining and measuring vehicle seating accommodations.

2. REFERENCES

2.1 APPLICABLE DOCUMENTS

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS

Available from the following:

SAE
400 Commonwealth Drive
Warrendale, PA 15096-0001

SAE J182 - Motor Vehicle Fiducial Marks
SAE J1100 - Motor Vehicle Dimensions
S.P.Geoffrey, "A 2-D Manikin - The Inside Story." Paper 267A presented at SAE Automotive Engineering Congress, Detroit, Michigan, January 1961.

APPENDIX B....Continued

3. H-POINT TEMPLATE - DESCRIPTION, APPLICATION, AND POSITIONING PROCEDURE

3.1 DESCRIPTION

A template (Figure 1) constructed to represent in profile an adult male wearing shoes and corresponds to the profile of the deflected seating contour of the H-point machine. Individual torso, thigh, lower leg, and foot segments are provided with locking pivot joints which can be used to fix the angular relationships of the segments. A seatback angle reference bar is included to orient the template in relation to the vertical.

3.2 APPLICATION - AID IN DISPLAYING

3.2.1 Passenger compartment space and seating attitude during conception, engineering, and development stages of any new vehicle.

3.2.2 Passenger compartment space and seating attitude for comparison and reporting purposes.

3.2.3 Data obtained from checks made with the H-point machine. (See Section 4.)

3.3 POSITIONING PROCEDURE

3.3.1 Torso positioning for any specified Seating Reference Point (SRP) and back angle.

3.3.1.1 Position the H-point of the H-point template on the Seating Reference Point (SRP) location on the layout.

3.3.1.2 Set seatback angle reference bar quadrant scribe line marked on torso back angle quadrant to the specified back angle. Lock this quadrant in place.

3.3.1.3 Position the vertical reference scribe lines on the seatback angle reference bar parallel to the body grid lines on the layout drawing.

3.3.2 FRONT SEAT - DRIVER POSITION

Leg and foot positioning for any specified accelerator heel point location.

3.3.2.1 Holding the torso portion of the template in position as outlined in 3.3.1.1 to 3.3.1.3, position the heel point of the template at the specified heel point location. This point on the layout is located on top of the heel pad or the depressed floor covering surface at the Y plane centerline of the accelerator pedal.

APPENDIX B....Continued

H-POINT TEMPLATE

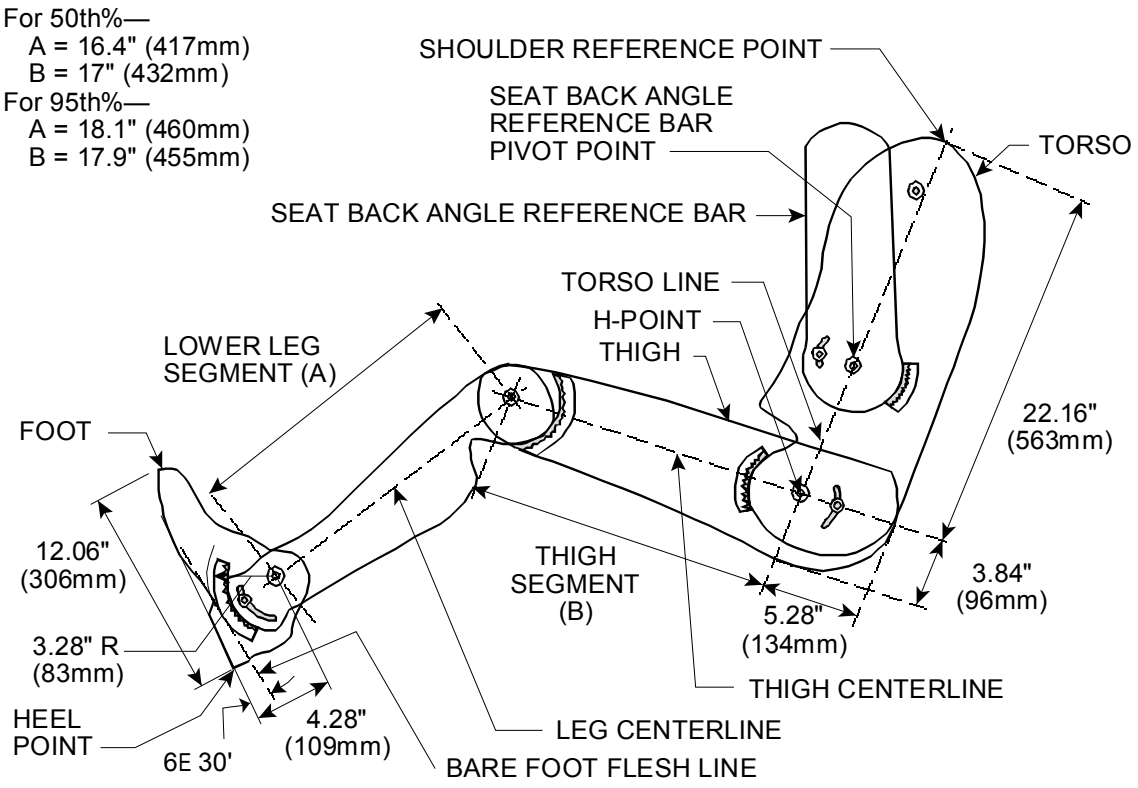


FIGURE 1

3.3.2.2 Holding the heel point at the specified location, rotate the foot forward until the ball of the foot contacts the undepressed accelerator pedal without infringing upon the 87 degrees minimum foot angle.

3.3.2.3 The undepressed accelerator pedal (point of contact with ball of foot) may be determined by locating the heel point as described above and presetting and locking the foot angle to 87 degrees.

3.3.2.4 Draw in the template outline and pivot centers.

3.3.3 FRONT SEAT - DRIVER POSITION

Leg and foot positioning for any specified undepressed accelerator pedal location.

3.3.3.1 Holding the torso portion of the template in position as outlined in 3.3.1.1 to 3.3.1.3, position the ball of the foot on the specified undepressed accelerator pedal with the sole of the foot on the pedal and the heel as far forward as allowable. However, the foot angle is never less than 87 degrees. Lock foot angle quadrant.

APPENDIX B....Continued

3.3.3.2 Draw in the template outline and pivot centers.

3.3.4 FRONT SEAT - DRIVER POSITION

Leg and foot positioning for any specified leg room and SRP-front to heel.

3.3.4.1 Holding the torso portion of the template in position, as outlined in 3.3.1.1 to 3.3.1.3, position the heel point of the template at the specified height. SRP-front to heel, and the foot angle locked at 87 degrees.

3.3.4.2 Move the foot forward along the heel point line until the distance between the angle pivot point and the SRP is equal to the specified leg room less 254 mm (10 inches).

3.3.4.3 Draw in the template outline and pivot centers.

3.3.5 SECOND SEAT - LEFT SIDE OCCUPANT POSITION

Leg and foot positioning with the front seat in its rearmost normal driving and riding position.

3.3.5.1 Holding the torso portion of the template in position as outlined in 3.3.1.1 to 3.3.1.3 but on the SRP second, place the foot (heel and ball) on the depressed floor covering line. The foot is to be placed on the Y plane centerline of the occupant or up to 127 mm (5 inches) on either side of the Y plane centerline on the floor pan section.

NOTE: Locating the foot either side of the Y plane centerline of the occupant position will make the foot location compatible to the foot location in the existing H-point machine installation procedure.

3.3.5.2 Move the foot forward along the depressed floor covering line to the nearest interference of the toe, instep, lower leg, or knee with the front seat. The foot angle is to be restricted to a maximum of 130 degrees.

3.3.5.3 Draw in the template outline and pivot centers.

3.3.6 THIRD SEAT - LEFT SIDE OCCUPANT POSITION

3.3.6.1 Follow the procedure as outlined for the second seat, left side occupant position except that the template is positioned in the third seat compartment.

APPENDIX B....Continued

3.3.7 THIRD SEAT - LEFT SIDE OCCUPANT POSITION

3.3.7.1 Follow the same procedure as outlined for the third seat -side occupant position - forward facing except that the foot is positioned in the footwell to the interference with the rear end or closure.

3.3.8 H-point template layout using data obtained during H-point machine installation.

3.3.8.1 Position the H-point pivot of the template at the measured H-point location on a layout drawing or grid system.

3.3.8.2 Follow the procedure as outlined in 3.3.1.1 to 3.3.1.3 using the measured back angle instead of the design back angle.

3.3.8.3 Holding the torso portion of the template in position as outlined above, move the upper leg segment to measured hip angle shown on the hip angle quadrant.

3.3.8.4 Lock this quadrant in place.

3.3.8.5 Position and lock the foot angle quadrant to the measured foot angle.

3.3.8.6 Allowing the knee angle to vary as necessary, position the ankle pivot center on an arc from the hip pivot center equal to the measured effective leg room less 254 mm (10 inches).

4. H-POINT MACHINE - DESCRIPTION, APPLICATION, AND INSTALLATION PROCEDURE

4.1 DESCRIPTION

A machine (Figures 2) with back and seat pan representations of deflected seat contours of adult males. Constructed of reinforced plastic and metal, these separate back and seat pans simulate the human torso and thigh and are mechanically hinged at the H-point. A graduated sliding probe is hinged from the H-point to measure the headroom in the compartment. A quadrant is fastened to the probe to measure the back angle. An adjustable thigh bar, attached to the seat pan, establishes the thigh centerline and serves as a baseline for the hip angle quadrant. Lower leg segments, also adjustable in length, are connected to the seat pan assembly at the knee joining T-bar, which is a lateral extension of the adjustable thigh bar. Quadrants are incorporated in the lower leg segments to measure knee angles. Shoe and foot assemblies are calibrated to measure the angular relation to the lower leg segment. Positive stops are provided in the thigh and lower leg segments for the 10th, 50th, and 95th percentile of adult male

APPENDIX B....Continued

dimensions (Table 1). Two spirit levels orient the device in space. Body segment weights are placed at the center of gravity (CG) locations to provide seat penetration equivalent to a 76 kg (167 lb) male. The adult male dimensions were in part taken from the 50th percentile data as acquired by Geoffrey (See Table 1, Note 1). The remaining dimensions were developed from U. S. Department of Health, Education, and Welfare data by the Design Devices Subcommittee of the SAE Human Factors Engineering Committee, March, 1969.

The lower leg and thigh segments are available in 10th, 50th, and 95th percentile lengths. (See Table 1.)

TABLE 1 - LEG SEGMENT LENGTH

	10th Percentile[1] mm	**50th Percentile[1] mm**	**95th Percentile[1] mm**
Lower leg segment (A)	390.4	417.5	459.1
Thigh segment (B)	407.7	431.5	456.0
Source	[1]	[1]	[2]

[1] S.P. Geoffrey, "A 2-D Manikin - The Inside Story." Paper 267A presented at SAE Automotive Engineering Congress, Detroit, Michigan, January 1961.

[2] Values for the 95th percentile leg lengths were developed on the basis of best judgement of available data by the Design Devices Subcommittee of the SAE Human Factors Engineering Committee at the July 1968 and March 1969 meetings.

4.2 APPLICATION

4.2.1 Aid in the design and development of seats and seat materials.

4.2.2 Check vehicle seating compartments for conformance to design specifications, that is, relationship of H-point to body structures, seats, controls, etc.

4.3 INSTALLATION PROCEDURE

4.3.1 Dimensions are measured relative to the X and Z body zero planes by setting up the vehicle relative to the front and rear fiducial mark (see SAE J182a) height (H163 and H164). Curb and gross weight rating loads require different fiducial mark heights (See SAE J1100). All interior dimensions are measured with the front seat in the rearmost normal driving and riding position as specified by the

APPENDIX B....Continued

manufacturer. When the seatback has an angular adjustment separate from the seat cushion, the normal driving or riding seatback angle is specified by the manufacturer (L40). Use 25 degrees if not specified. The tilt adjustment, if available, should be in the design position.

4.3.2 Sufficient time shall be allowed to ensure that the seat material reaches room temperature to avoid extreme temperate variations. If the seat to be checked has never been sat upon, a 68 to 79 kg (150 to 175 lb) person shall sit on the seat twice for 1 minute to flex the cushion and back. All seat assemblies are to remain unloaded for a minimum period of 1/2 hour (1 hour preferred) prior to the H-point machine installation.

4.3.3 Place a piece of muslin cotton cloth over the seat area to be checked. The muslin cloth should be 910 mm (36 inches) square and be of a quality comparable to a grade described as a weave of 48 threads/in² and density of 2.85 yd/lb. The muslin should be tucked in a sufficient amount to prevent hammocking of the material. If the test is run in a buck, suitable floor covering sections, or equivalent, are to be placed under the H-point machine's feet.

4.3.4 Place seat and back assembly of the H-point machine at the centerline of occupant (C/LO). C/LO is also the centerline of H-point machine and is 381 mm (15 inches) outboard from the vehicle centerline on the driver's side, unless otherwise specified by the manufacturer. The C/LO is moved inboard from the 381 mm (15 inches) line when the H-point machine is sitting far enough outboard that the seat edge will not permit leveling of the H-point machine. It is moved inboard the necessary distance to permit leveling of the H-point machine and the new dimension from centerline of vehicle to C/LO noted in recording measurements. In vehicles with bucket front seats or individual auxiliary seats, the centerline of the seat is the basis for interior dimensions relating to these seats.

4.3.5 Use 95th percentile leg and thigh segments specified in Table 1.

4.3.6 Attach foot and lower leg assemblies to the seat pan assembly, either individually at the knee joint or by using the T-bar lateral segment and lower leg assembly.

The T-bar lateral segment should be parallel to the ground and perpendicular to the Y plane of the vehicle unless otherwise specified by the manufacturer.

4.3.7 The feet and leg positions of the H-point machine for the various individual seat positions to be checked are as follows:

APPENDIX B....Continued

4.3.7.1 FRONT SEAT - DRIVER POSITION

The right foot and leg assembly is placed on the undepressed (blocked or mechanically restrained) accelerator pedal with the sole of the foot on the pedal and the heel as far forward as allowable. The heel may not be placed on the toeboard. However, the foot angle is never less than 87 degrees. The 87 degree limit can be fixed by inserting the pin into the foot assembly.

The left foot is positioned on the floor or toe pan and located approximately the same distance to the left of the H-point machine centerline as the right foot is to the right. The T-bar should be maintained parallel to the ground.

4.3.7.2 FRONT SEAT - OCCUPANT IN VEHICLE CENTERLINE POSITION

The H-point machine is installed in the front seat vehicle centerline position with both legs extended at the specified percentile, one on either side of the tunnel. The left foot is placed on the undepressed accelerator pedal and the right foot is located to the right of the tunnel, approximately opposite and symmetrical in a manner that levels the knee joint T-bar. A T-bar extension may be required to straddle the knee segments on either side of tie tunnel. In vehicles having no tunnel, the feet are set approximately 254 mm (10 inches) apart. The leg comfort angles are determined from the H-point machine's left leg.

4.3.7.3 SECOND SEAT - SIDE OCCUPANT POSITION

The H-point machine is installed in the second seat outboard occupant position 381 mm (15 inches) outboard from the vehicle centerline, unless otherwise specified by the manufacturer. (Check applicable seating arrangement drawing for specified location.) The two feet are placed together and positioned to the nearest interference of the toe, instep, or lower leg with the front seat, unless otherwise specified by the manufacturer. In instances where one foot reaches interference before the other, the one with the nearest interference will be used for dimensioning purposes. For additional H-point machine leg location conditions and restrictions, see Sections 5 and 6 for H-point machine installation in long- and short-coupled vehicle.

4.3.7.4 SECOND SEAT - OCCUPANT IN VEHICLE CENTERLINE POSITION

The H-point machine is installed in the second seat vehicle centerline position with both the foot and lower leg assemblies placed astride the tunnel on the normal floor. Both leg assemblies are extended to the nearest interference of the toe, instep, or lower leg with the front seat.

APPENDIX B....Continued

If necessary, in order to clear lateral obstructions, such as seat be it anchors, tunnel width, etc., the T-bar may be extended. In vehicles with no tunnel, set the H-point machine's feet approximately 254 mm (10 inches) apart.

4.3.8 Apply lower leg and thigh weights and level the H-point machine.

4.3.9 Tilt the back pan forward against the forward stop and draw the H-point machine away from the seatback using the T-bar. Reposition the H-point machine on the seat by one of the following methods:

4.3.9.1 If the H-point machine tends to slide rearward, use the following procedure:

Allow the H-point machine to slide rearward until a forward horizontal restraining load on the T-bar is no longer required due to the seat pan contacting the seatback.

4.3.9.2 If the H-point machine does not tend to slide rearward, use the following procedure:

Slide the H-point machine rearward by a horizontal rearward load applied at the T-bar until the seat pan contacts the seatback.

4.3.10 Apply a 10 kg (22 lb) load twice to the back and pan assembly positioned at the intersection of the hip angle quadrant and the T-bar housing (Figure 2). The direction of load application should be maintained along a line from the above intersection to a point just above the thigh bar housing. Then carefully return the back pan to the seatback. Care must be exercised through the remainder of the procedure to prevent the H-point machine from sliding forward.

4.3.11 Install the right and left buttock weights and then alternately the eight torso weights. Maintain H-point machine level.

4.3.12 Tilt the back pan forward until the stop is contacted. Rock the H-point machine from side to side over a 10 degree arc (5 degrees to each side of the vertical centerline) for three complete cycles to release any accumulated friction between the H-point machine and the seat. During the rocking, the T-bar of the H-point machine may tend to change from the specified horizontal and vertical alignment; therefore, the T-bar must be restrained and properly aligned by applying an appropriate lateral load during the rocking motions. Care shall be exercised in holding the T-bar and rocking the H-point machine to minimize inadvertent exterior loads applied in a vertical or fore-and-aft direction. The H-point machine's feet are not to be restrained or held during this step, and if the feet change position, they

APPENDIX B....Continued

should be allowed to remain in that attitude at this time. Due to the movement of the feet during the H-point machine rocking operation, the feet are repositioned as follows:

a. FRONT SEAT

Alternately lift each foot off the floor the minimum necessary amount until no additional forward foot movement is obtained. During this lifting, the feet are to be free to rotate and no forward or lateral loads are to be applied. When each foot is placed back in the down position, the heel is to be in contact with the floor and the ball (sole) of the foot is to be in contact with the floor, toeboard, or undepressed accelerator pedal.

b. SECOND SEAT

Alternately move each foot forward by applying a forward load to the heel of the foot, sliding the feet forward until the feet or leg interfere with the rear of the front seatback. This operation releases any accumulated foot friction and movement incurred during the lateral rocking step.

APPENDIX B....Continued

H-POINT MACHINE

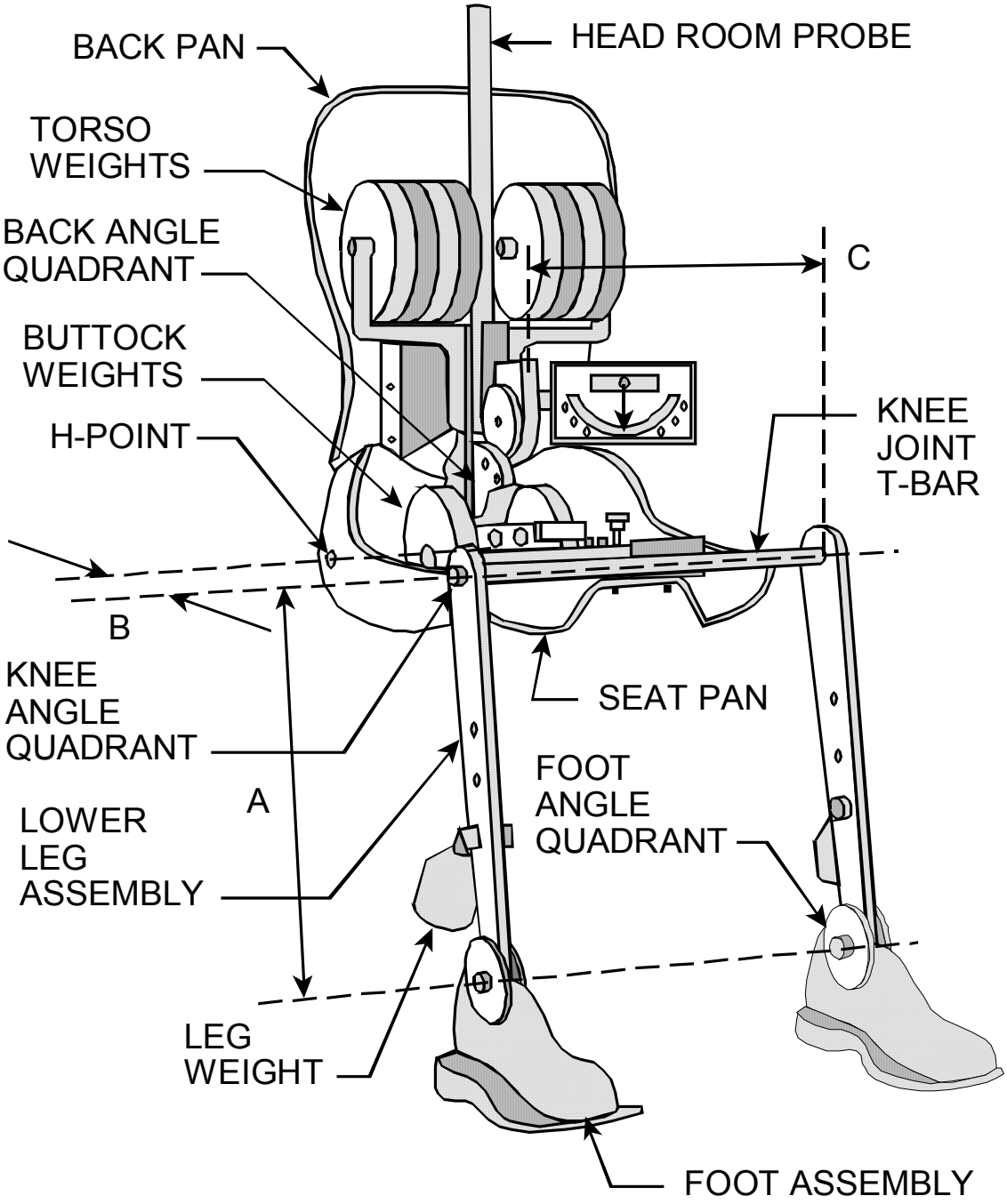


FIGURE 2

APPENDIX B....Continued

If the seat pan is not level at the completion of this step, apply a sufficient lateral load to the top of the seatback pan to level the H-point machine seat pan on the seat.

4.3.13 Holding the T-bar to prevent the H-point machine from sliding forward on the scat cushion, proceed as follows:

a. Return the back pan to the seatback.
b. Apply a rearward force perpendicular to the back angle bar just above the torso weights using either one of the following methods:

1. Sufficient force to increase the hip angle by 3 degrees, or
2. Increasing the hip angle up to 3 degrees by increasing the applied force up to a maximum of 66 N (15 lb).

Alternately apply and release this force until the hip angle readout indicates that the back pan has reached a stable position after the applied force has been released, that is, repeated identical hip angle readouts. Care shall be exercised to minimize exterior downward or side forces applied to the H-point machine. If an H-point machine level adjustment is necessary, rotate the back pan forward, relevel, and repeat the H-point machine back rocking.

4.3.14 If a rerun of the H-point machine installation is desired, the seat assembly should remain unloaded for a minimum period of 1/2 hour prior to the rerun. The loaded H-point machine should not be left on the assembly longer than the time required to perform the test.

5. SECOND SEAT INSTALLATION PROCEDURE FOR SHORT-COUPLED VEHICLES

If the H-point couple distance is such that the H-point machine with 95th percentile leg will not fit into the second seat with the front seat in the rearmost normal driving and riding position (that is, the leg interferes with the front seatback), install the machine in the second seat in accordance with either of the methods (A or B) shown in Appendix A.

6. H-POINT MACHINE SECOND SEAT INSTALLATION FOR LONG-COUPLED VEHICLES

In large vehicles where the ankle or foot does not normally touch the nearest interference with the front seat, the sole of the H-point machine's foot is placed on the foot support and the heel is located as indicated on the seating arrangement drawing. All angles are measured with the H-point machine in this position. If foot support does not exist, extend the H-point machine legs to the full limit of the seat deflection with both feet flat on the floor.

APPENDIX B....Continued

The foot angle should not exceed 130 degrees.

7. H-POINT MACHINE AND TEMPLATE FABRICATION

Fabrication of the H-point machine and the H-point template must conform to design as specified in the Society of Automotive Engineers Standard SAE J826 specifications.

7.1 Each H-point machine must have a permanently attached identification plate showing the following information:

Three-Dimension H-Point Machine
No.

This measuring device is constructed in full accordance with the Society of Automotive Engineers Standard SAE J826 specifications.

7.2 Three H-point template leg segments are available duplicating 10th, 50th, and 95th percentile leg lengths of the H-point machine.

APPENDIX B....Continued

SAE J826 - APPENDIX A
SECOND SEAT INSTALLATION PROCEDURE FOR SHORT-COUPLED VEHICLES

A.1 Either Method A or B may be used to install the H-point machine in the second seat of short-coupled vehicles. These procedures are both currently in use, and while they will not necessarily produce the same seating dimensions, there is no strong technical basis that exists thus far to favor one method over the other.

A.1.1 METHOD A

a. Follow the installation procedure through 4.3.5.

b. Detach one of the lower leg-foot assemblies of the H-point machine and place it on the second seat floor covering in as close to an expected second seat passenger foot position as possible.

c. Slide the lower leg and foot forward on the floor until it is obstructed by the front seat cushion structure and mark a lateral line at the rear of the heel point. Move the front seat forward out of the way.

d. Resume the general installation procedures except when positioning the feet on the floor in 4.3.7.3. The shoe should be located with the rearmost point on the heel at the lateral line drawn on the floor in the above Section 3.

e. Determine L48, minimum knee clearance, as the distance from the knee joint less 51 mm (2 inches) to the back of the front seat in its rearmost position. In most cases, it is necessary to determine this graphically.

f. Determine L51, minimum effective leg room, by measuring the diagonal distance from the ankle pivot center to the H-point plus a constant of 254 mm (10 inches).

g. Other second seat compartment dimensions are recorded directly with the H-point machine as positioned in A.1.1 "a" through "d", except that L50, SRP couple distance, is determined using the front seat in its normal driving and riding position.

A.1.2 METHOD B

a. Follow the general installation procedure through 4.3.5.

b. Move the front seat forward as indicated on the seating arrangement drawing; or the amount required to clear the foot and leg assembly.

APPENDIX B....Continued

c. Tilt the front seatback forward out of the way to facilitate H-point machine installation and loading.

d. Resume the general installation procedure except when rocking the H-point machine as outlined in 4.3.12.

e. Restrict the rearward movement of the feet during the rocking motion to prevent jackknifing of the legs which causes forward movement of the seat pan on the seat cushion.

f. Upon completion of the rocking motion and repositioning the H-point machine's feet under the seat, move the front seat back to its normal riding position. Check for front seatback to H-point machine's knee and/or leg clearance. If an interference does exist, move the front seat forward as much as may be necessary (one seat adjuster position at a time) repositioning the feet under the front seat cushion frame.

g. Resume the general installation procedure, 4.3.13.

h. Determine L48, minimum knee clearance, as the distance from the knee joint less 51 mm (2 inches) and less the longitudinal movement of the front seat at a tangent to the top of the rear cushion.

i. Determine L51, minimum effective leg room, by measuring the diagonal distance from the ankle point center to the H-point plus a constant of 254 mm (10 inches) less the longitudinal movement of the front seat at a height tangent to the top of the rear seat cushion.

j. Other rear compartment dimensions are recorded directly with the H-point machine positioned as outlined in steps A.1.2 "a" through "g" except that the L50 dimension, H-point couple distance, is determined using the rearmost normal driving and riding front seat position. Comfort angles are not adjusted.

APPENDIX C
MOTOR VEHICLE SEAT BELT ANCHORAGES — DESIGN RECOMMENDATIONS
SAE J383 APR86
SAE Recommended Practice

1. SCOPE

This SAE Recommended Practice specifies design recommendations for location of seat belt assembly anchorages. It applies to seat belt anchorages attached to vehicle structure or installed to seat assemblies in the vehicle (this SAE Recommended Practice supersedes the Design Section of SAE J787b). Test Procedures and Performance Requirements are specified in SAE J384, Motor Vehicle Seat Belt Anchorages — Test Procedure, and SAE J385, Motor Vehicle Seat Belt Anchorages — Performance Requirements, respectively.

2. DEFINITIONS

2.1 ANCHORAGE

The final point of attachment for transferring seat belt assembly loads to the vehicle structure.

2.2 SEATING REFERENCE POINT (SRP)

The Design H-Point with the seat in the rearmost, lowest normal design position. (The "Design H-Point" has coordinates relative to the design vehicle structure. It is located at the H-Point of the two-dimensional drafting template placed in any designated seating position (DSP).)

2.3 SHOULDER REFERENCE POINT (SRP)

A point 22.16 inches (563 mm) above the "H" Point along the torso centerline of the two-dimensional drafting template described in SAE J826. This dimension added to the dimension of 3.84 inches (97.5 mm) from the "H" Point to the buttocks fleshline and an angular relationship of 90 degrees between the torso and thigh segment of the two-dimensional drafting template has been indicated to represent 99 percent of the male driver population.

2.4 ATTACHMENT HARDWARE

Any or all hardware designed for securing a seat belt assembly to the anchorage(s) in a motor vehicle.

2.5 SEAT BELT ASSEMBLY

Any strap, webbing, or similar device designed to secure a person in a motor vehicle with the intention of minimizing the risk of bodily harm in an accident,

APPENDIX C....Continued

including all buckles, adjusting mechanism, fasteners, and related hardware. This SAE Recommended Practice covers anchorages for the following types of assemblies:

Type 1 — Pelvic restrain belt (lap belt).
Type 2 — Combination of pelvic (lap) and upper torso (shoulder) restraints belts.
Type 2a — Upper torso (shoulder) restraint for use only in conjunction with a pelvic restraint (lap) belt as a Type 2 seat belt assembly.

2.6 BELT CONTACT POINT

The point where the seat belt webbing's longitudinal centerline would make contact with the load bearing member of the seat structure, body structure, retractor hardware (or webbing wound on the spool of a retractor), or attachment hardware such as a swivel plate which may be bolted to the seat belt anchorage. The components on which belt contact point is located must be capable of sustaining a load that might be imposed by the webbing of a seat belt assembly.

2.7 BELT ANGLE REFERENCE POINT

The point 2.50 inches (63.5 mm) forward of and 0.375 inches (9.5 mm) above the seating reference point (SRP).

3. GENERAL

3.1 INSTALLATION AND REPLACEMENT

Anchorages shall permit seat belt assemblies to be readily installed or replaced, and shall comply with the strength requirements of SAE J385.

3.2 COMMON ANCHORAGE(S)

A common anchorage point may be used for more than one belt end, provided it meets the pertinent requirements of paragraph 4.4 and SAE J385. The location of the lower anchorage(s) of the upper torso restraint may be common with the pelvic restraint anchorage(s).

4. LOCATION OF PELVIC RESTRAINT ANCHORAGES

4.1 PELVIC RESTRAINT ANGLE GUIDELINES

Many factors affect the preferred more vertical pelvic restraint belt angle which is basically intended to prevent the lap belt from sliding over the illiac crest during the forward and downward movement of the restrained individual.

APPENDIX C....Continued

Ideally, component tests, sled tests or vehicle crash tests should be run, utilizing a test device containing a humanlike illium with appropriate "soft tissue" damping in relation to the spine and femur along with humanlike abdominal contents, to determine the preferred pelvic restraint belt angle which is influenced by any or all of the following factors:

(a) Seat cushion compression and/or seat deflection

(b) Seat cushion angle and seat back angle

(c) Proximity of "hard" vehicle structures in front of the restrained occupant

(d) Initial length and elongation characteristics of belt webbing

(e) Type of restraint system

(f) Presence or absence of upper torso restraint belt

(g) Placement of upper torso restraint anchorage

(h) Stiffness of components or structures on which are found the belt contact points

In the absence of component tests, sled tests or vehicle crash tests, a more vertical pelvic restraint belt angle is preferred and should be selected within the range of 20 to 75 degrees from the horizontal.

4.2 ANCHORAGES ON VEHICLE STRUCTURE FOR PELVIC RESTRAINT BELTS

4.2.1 MOVABLE SEATS

The location of anchorages for occupants of seats which are adjustable or movable in the fore and aft direction and in which the belt passes outside of the seat or through the seat cushions shall be as follows:

A line from the belt contact point to the belt angle reference point 2.50 inches (63.5 mm) forward of and 0.375 inches (9.5 mm) above the seating reference point (SRP) will form an angle as determined from the guidelines in paragraph 4.1 and as shown in Figure 1.

4.2.2 FIXED SEATS

The location of anchorages for occupants of fixed seats in which the belt passes outside the seat or through the seat springs shall be as follows:

APPENDIX C....Continued

A line from the belt contact point to the seating reference point (SRP) will form an angle as determined from the guidelines in paragraph 4.1 and as shown in Figure 2.

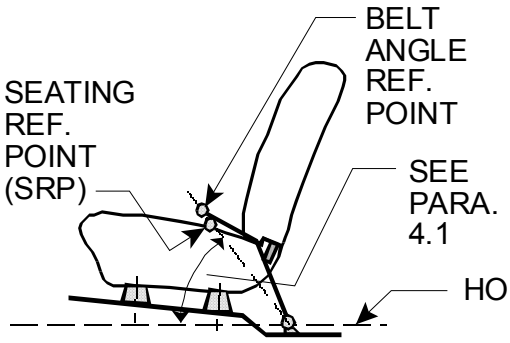


FIG. 1 - BELT OUTSIDE SEAT OR THROUGH SEAT SPRINGS SEAT CROSS BAR

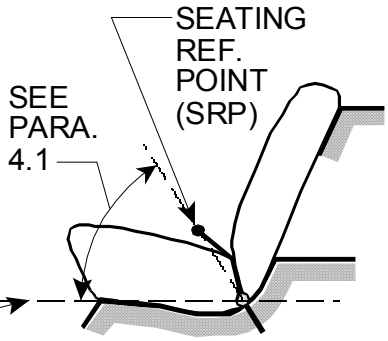


FIG. 2 - REAR SEAT BELT INSTALLATION

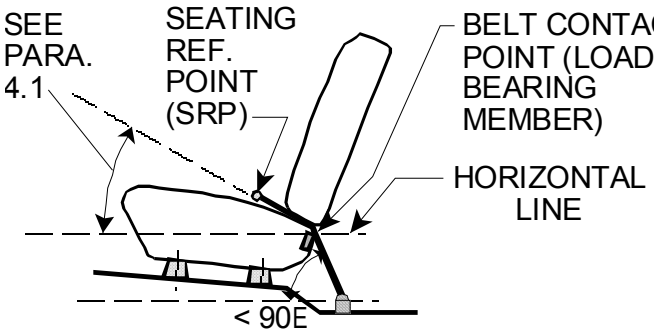


FIG. 3 - BELT OVER SEAT CROSS BAR

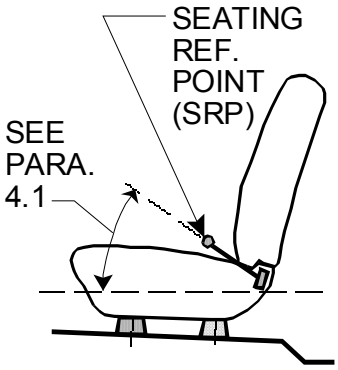


FIG. 4 - BELT ATTACHED TO SEAT FRAME

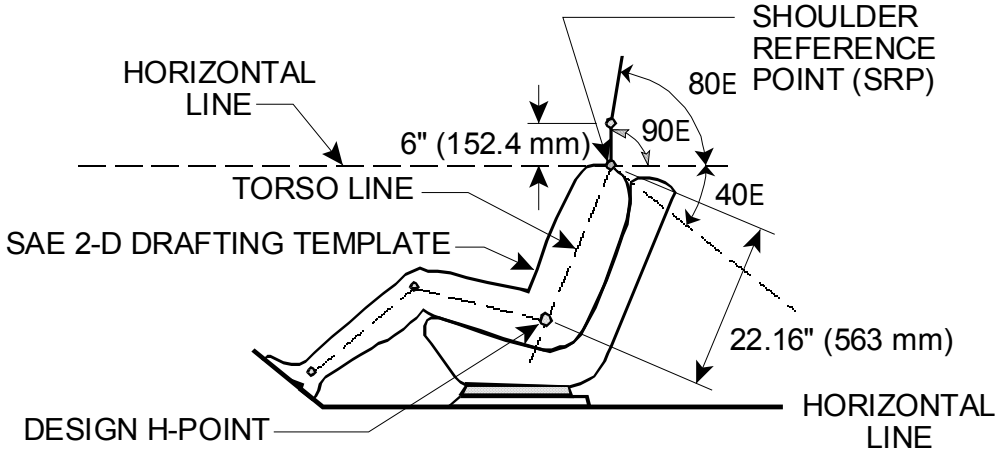


FIG. 5 - UPPER TORSO RESTRAINT

APPENDIX C....Continued

4.2.3 SEAT BELT ROUTING TO ANCHORAGE

In the side view where a direct belt routing is interrupted by intervening load bearing member (refer to Belt Contact Point definition in paragraph 2.6) the anchorage shall not be located forward of the rearmost point at which the webbing passes over that intervening member. Movable seats should be measured in the rearmost normal position. See Figure 3.

4.3 ANCHORAGES ON SEAT STRUCTURE FOR PELVIC RESTRAINT BELTS

The location of anchorages for occupants of seats in which the belts are anchored to seat structure shall be as follows:

A line from the belt contact point to the seating reference point (SRP) will form an angle as determined from the guidelines in paragraph 4.1 and as shown in Figure 4.

4.4 LATERAL LOCATION FOR ALL PELVIC RESTRAINT BELTS

Anchorages for any individual pelvic restraint belt assembly shall be located at least 6.5 inches (165.1 mm) apart and preferably shall be placed equidistant from the longitudinal centerline of the designated seating position (DSP) unless intervening load bearing members provide the spacing desired.

5. LOCATION OF UPPER TORSO RESTRAINT ANCHORAGES

5.1 SIDE VIEW LOCATION

With the seat in its full rearward and downward position and the seatback in its most upright design position, the upper anchorage(s) shall be longitudinally in line with, or rearward of, a line extending 6 inches (152.4 mm) vertically above the shoulder reference point (SRP) and then extending rearward at an angle of 80 degrees above the horizontal (see Figure 5). If there is a downward angle of the belt, passing from the shoulder reference point (SRP) to an anchorage or over suitable structure to an anchorage, this anchorage shall be (on or) above a line extending rearward and 40 degrees below the horizontal.

5.2 FRONT VIEW LOCATION

The upper torso restraint anchorage shall be positioned to minimize contact of the seat belt assembly with the neck and avoid it sliding off the shoulder of the occupant in a reasonably erect position.

APPENDIX C....Continued

6. CORROSION PROTECTION

Design consideration shall be given to providing protection from corrosion for the seat belt anchorage(s) and the adjacent body structure. Special consideration shall be given to that portion or portions of the structure which must sustain the anchorage test loads. The degree or type of protection required will be determined by the location of the anchorage(s) in the vehicle structure, the amount of exposure to corrosive elements, the configuration of the structure (if configuration may tend to induce corrosion). and the thickness of the supportive structure.