

**U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION**

**LABORATORY TEST PROCEDURE**

**FOR**

**FMVSS 208, Occupant Crash Protection  
Sled Tests**



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

**OVSC LABORATORY TEST PROCEDURE NO. 208S  
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## 1. PURPOSE AND APPLICATION

The Office of Vehicle Safety Compliance (OVSC) provides contractor laboratories with Laboratory Test Procedures 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. If any contractor views any part of an OVSC Laboratory Test Procedure to be in conflict with a Federal Motor Vehicle Safety Standard (FMVSS) or observes deficiencies in a Laboratory Test Procedure, the contractor is required to advise the Contracting Officer's Technical Representative (COTR) and resolve the discrepancy prior to the start of compliance testing.

Every contractor is 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 contractor's test procedure shall contain a complete listing of test equipment with make and model number and a detailed check-off sheet. The list of test equipment shall include instrument accuracy and calibration dates. All equipment shall be calibrated in accordance with the manufacturer's instructions. There shall be no contradictions between the Laboratory Test Procedure and the contractor's in-house test procedure. Written approval of the in-house test procedures shall be obtained from the COTR before initiating the compliance test program. 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. These Laboratory Test Procedures do not constitute an endorsement or recommendation for use of any product or method. However, the application of any such testing technique or equipment is subject to prior approval of the COTR.

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

## 2. GENERAL REQUIREMENTS

### 2.1 FMVSS 208

This laboratory test procedure is to be used to determine whether a vehicle equipped with restraint systems for front outboard occupants meets the conditions, requirements, and injury criteria specified in S4 and S13 of FMVSS 208. Seat belt systems are required to meet the applicable requirements of the following:

- S7.1 — Adjustment
- S7.2 — Latch Mechanism
- S7.3 — Warning System
- S7.4 — Seat Belt Comfort and Convenience

**TABLE 1**

#### **FMVSS 208, OCCUPANT CRASH PROTECTION**

OCCUPANT CRASH PROTECTION requirements specified in terms of head and chest accelerations, upper leg axial forces, and neck forces and moments measured on laboratory calibrated Part 572 Subpart E dummies in sled tests.

Passenger cars will have frontal protection with no action by the front outboard seat occupants and lap/shoulder belts. Lap/shoulder belts are required in each rear outboard seating position. Lap belts meet the minimum requirement for the front and rear center seating positions. (S4.1.5)

Trucks and multipurpose passenger vehicles, with GVWR of 8,500 pounds or less and an unloaded vehicle weight of 5,500 pounds or less, and manufactured on or after September 1, 1997 (S4.2.6) will have frontal automatic protection with no action by the front outboard seat occupants. (S4.1.5.1)

2. GENERAL REQUIREMENTS....Continued

**TABLE 2**  
**FMVSS 208 INJURY CRITERIA**

S6. INJURY CRITERIA

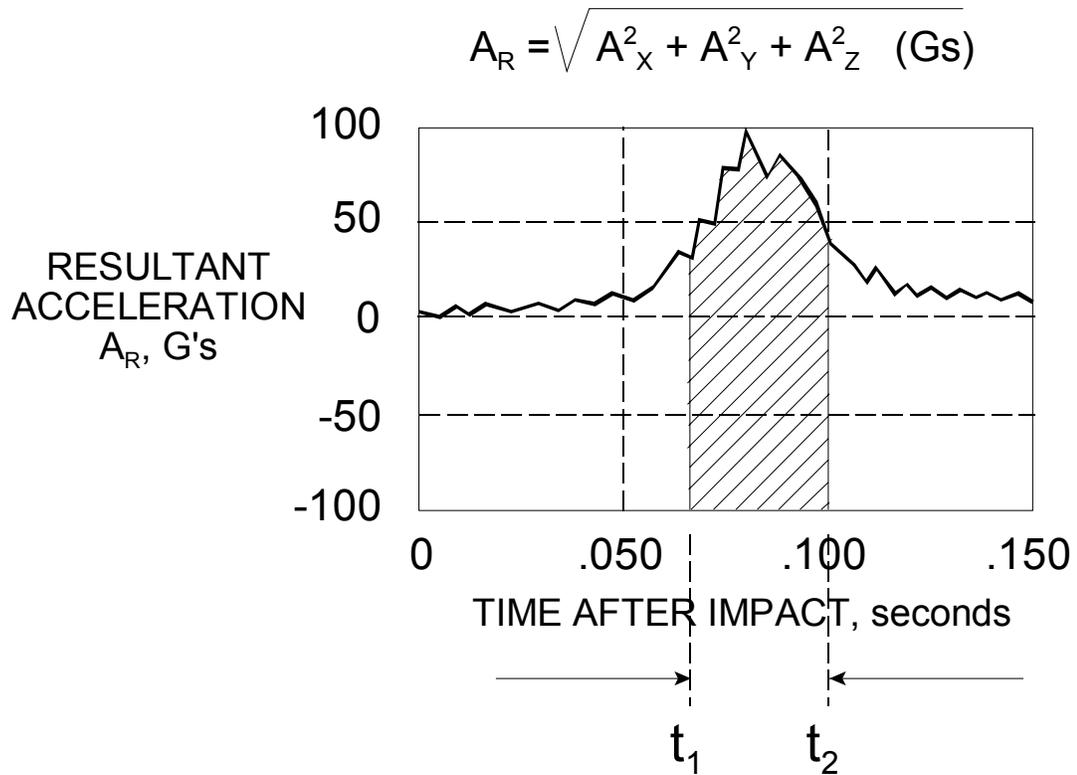
S6.1 — All portions of the Part 572 Subpart E dummies shall be contained within the test vehicle passenger compartment.

S6.2 — Head Injury Criterion (HIC) —

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

where  $A_R = [A_x^2 + A_y^2 + A_z^2]^{1/2}$  Resultant Acceleration magnitude in g units at the dummy head c.g. as shown in Figures 1 and 2

$t_1$  and  $t_2$  are any two points in time during the impact event which are separated by not more than a 36 millisecond time.



## 2. GENERAL REQUIREMENTS....Continued

### S6.3 and S6.4 — Chest Criteria:

The maximum peak acceleration shall not exceed 60 g's for more than a cumulative duration of 3 milliseconds.

Chest deflection for a Part 572 Subpart E dummy shall not exceed 3 inches.

### S6.5 — Femur Force Criterion:

The compressive force transmitted axially through each upper leg shall not exceed 2,250 pounds.

### S13.2 — Neck Injury Criteria

The maximum peak flexion bending moment about the occipital condyle shall not exceed 190 Nm.

The maximum peak extension bending moment about the occipital condyle shall not exceed 57 Nm.

The maximum peak axial tension shall not exceed 3300 N.

The maximum peak axial compression shall not exceed 4000 N.

The maximum peak fore and aft shear shall not exceed 3100 N.

The neck moments are calculated from the following formula:

$M_{OCY} = MY - FX(0.01778m)$ , where:

$M_{OCY}$  = moment y about occipital condyle

$MY$  = measured moment from load cell

$FX$  = measured force from load cell

2. GENERAL REQUIREMENTS....Continued

# SIGN CONVENTIONS FOR PART 572 SUBPART E TEST DUMMIES

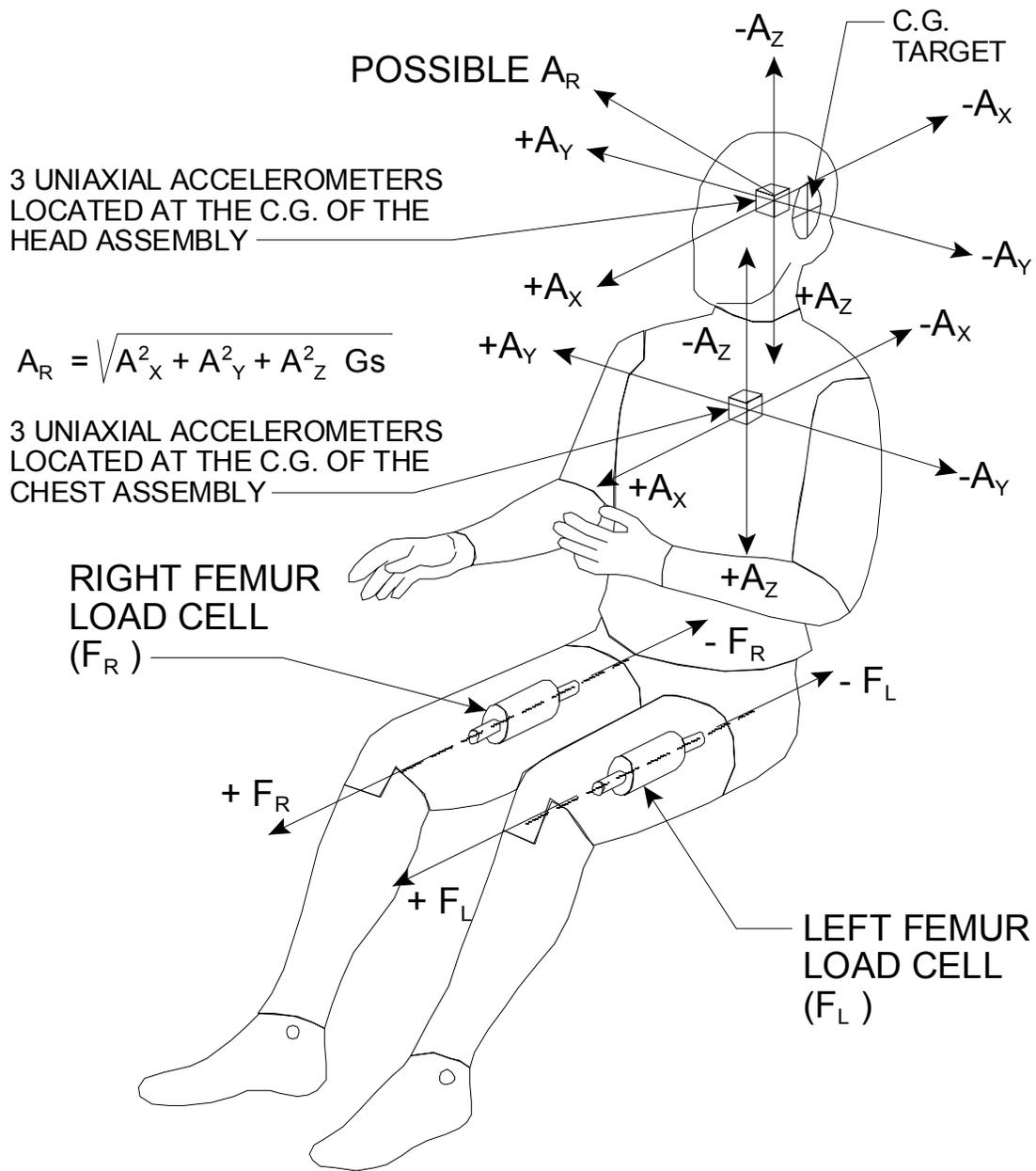


FIGURE 1

2. GENERAL REQUIREMENTS...Continued

# HEAD INJURY CRITERION

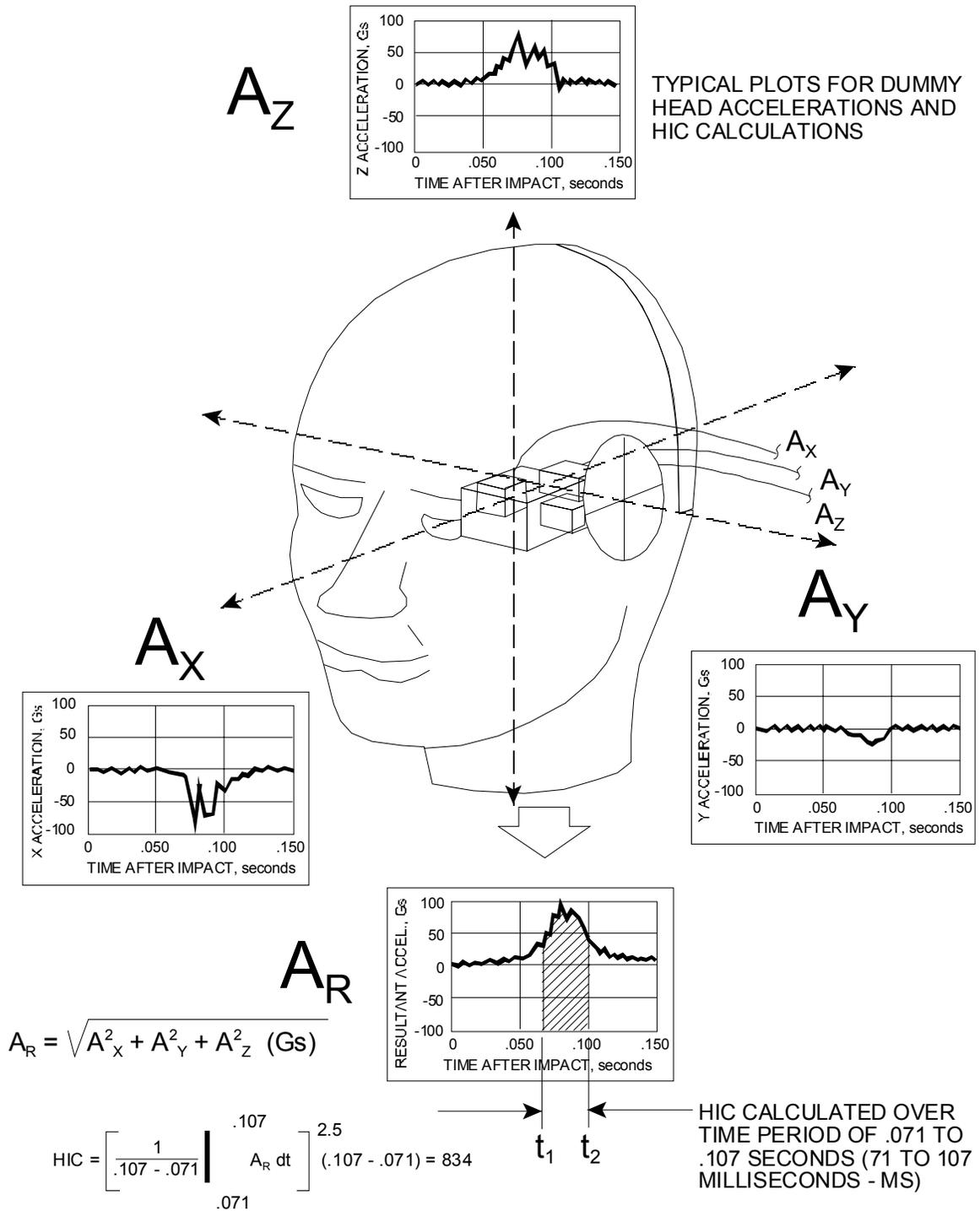


FIGURE 2

## 2. GENERAL REQUIREMENTS....Continued

### TABLE 3

#### S7. SEAT BELT ASSEMBLY REQUIREMENTS

##### S7.1 — Adjustment as shown in Figure 3

LAP BELT FIT	RANGE OF DUMMIES	ADJUSTMENT*
Left Front (Driver)	5% Female to 95% Male (S7.1.1.1)	Emergency Locking Retractor (S7.1.1.3)
Center Front	50% 6-Year-Old Child to 95% Male (S7.1.1)	Emergency or Automatic Locking Retractor or Manual Adjusting Device Lap belt shall be lockable for child seat (S7.1.1, S7.1.1.2(a), & S7.1.1.5)
Right Front (Passenger)	50% 6-Year-Old Child to 95% Male (S7.1.1)	Emergency Locking Retractor Lap belt shall be lockable for child seat (S7.1.1.3)
Left Rear	50% 6-Year-Old Child to 95% Male (S7.1.1)	Emergency Locking Retractor Lap belt shall be lockable for child seat (S7.1.1.3 & S7.1.1.5)
Center Rear	50% 6-Year-Old Child to 95% Male (S7.1.1)	Emergency or Automatic Locking Retractor or Manual Adjusting Device Lap belt shall be lockable for child seat (S7.1.1 & S7.1.1.2(a))
Right Rear	50% 6-Year-Old Child to 95% Male (S7.1.1)	Emergency Locking Retractor Lap belt shall be lockable for child seat (S7.1.1.3 & S7.1.1.5)
SHOULDER BELT FIT	RANGE OF DUMMIES	ADJUSTMENT
Left Front (Driver)	5% Female to 95% Male (S7.1.1.1)	Emergency Locking Retractor or Manual Adjusting Device (S7.1.1)
Center Front Type 2 Belt Optional	5% Female to 95% Male (S7.1.1.1)	Emergency Locking Retractor or Manual Adjusting Device (S7.1.1)
Right Front (Passenger)	5% Female to 95% Male (S7.1.1.1)	Emergency Locking Retractor or Manual Adjusting Device (S7.1.1)
Left Rear	5% Female to 95% Male (S7.1.1.1)	Emergency Locking Retractor or Manual Adjusting Device (S7.1.1)
Center Rear Type 2 Belt Optional	5% Female to 95% Male (S7.1.1.1)	Emergency Locking Retractor or Manual Adjusting Device (S7.1.1)
Right Rear	5% Female to 95% Male (S7.1.1.1)	Emergency Locking Retractor or Manual Adjusting Device (S7.1.1)

**NOTE:** Front seat belt fit data will be obtained with the seat in both the forward most and rearward most positions and the seat back in the manufacturers nominal design riding position.

\*Movable anchorages are required for outboard designated seating positions with Type 2 seat belts. (S7.1.2)

**2. GENERAL REQUIREMENTS....Continued**

S7.3(a) Warning system for seat belt assembly provided at Driver's position,  
EITHER —

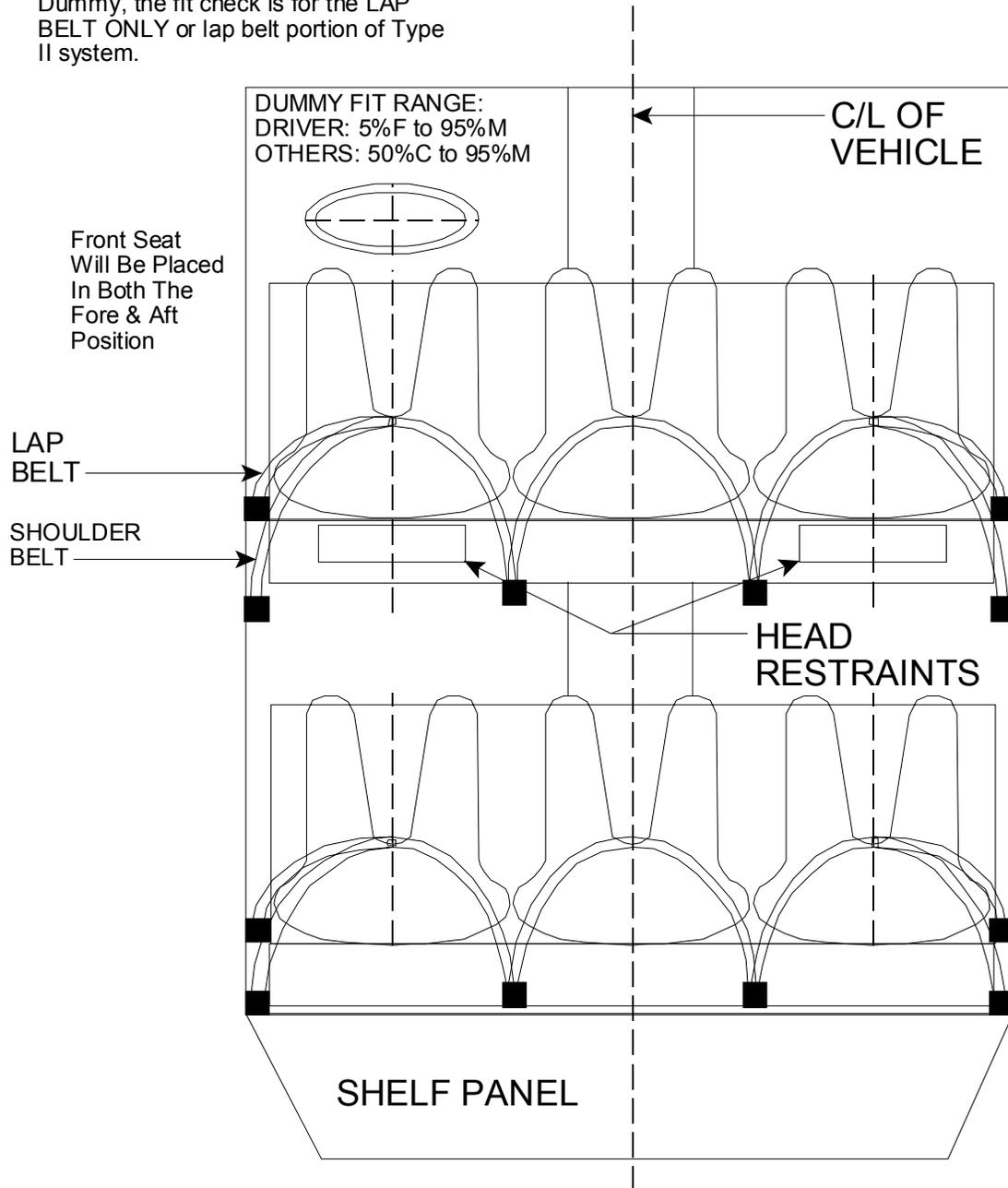
- A. Continuous or intermittent audible signal **AND** continuous or flashing warning light visible to the driver consisting of the symbol for the seat belt telltale. The audible signal is activated for NOT LESS THAN 4 seconds and NOT MORE THAN 8 seconds and the visible signal is activated for 60 OR MORE seconds when the ignition switch is moved to the "ON" or "START" position and the driver's belt is NOT IN USE (\*). Instead of the continuous or flashing warning light, the manufacturer, if permitted by FMVSS 101, may display the words "FASTEN SEAT BELTS" or "FASTEN BELTS,".
  
- B. Continuous or flashing warning light visible to the driver consisting of the symbol for the seat belt telltale or, at the option of the manufacturer if permitted by FMVSS 101, displaying the words "FASTEN SEAT BELTS" or "FASTEN BELTS," for NOT LESS THAN 4 seconds and NOT MORE THAN 8 seconds when the ignition switch is moved to the "ON" or "START" position **AND** a continuous or intermittent audible signal when the ignition switch is moved to the "ON" or "START" position and the driver's belt in NOT IN USE(\*).

At the option of the manufacturer, the driver's belt NOT IN USE is defined as either the belt latch mechanism not fastened or the belt not extended at least 4 inches from the stowed position.

## 2. GENERAL REQUIREMENTS...Continued

### TYPICAL ARRANGEMENT OF "ACTIVE" SEAT BELTS

NOTE: For 50%C (6-year old child) Dummy, the fit check is for the LAP BELT ONLY or lap belt portion of Type II system.



TOP VIEW OF VEHICLE INTERIOR

FIGURE 3

### 3. SECURITY

The Contractor shall provide appropriate security measures to protect the OVSC test vehicles and other Government Furnished Property (GFP) from unauthorized personnel during the entire compliance testing program. The Contractor is financially responsible for any acts of theft and/or vandalism which occur during the storage of test vehicles and GFP. Any security problems which arise shall be reported by telephone to the Industrial Property Manager (IPM), Office of 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 or Division Chief.

**NOTE:** 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, dummy calibration laboratory, test fixtures and instrumentation in a neat, clean and painted condition with test instruments arranged in an orderly manner consistent with good test laboratory housekeeping practices.

### 5. TEST SCHEDULING AND MONITORING

The Contractor shall submit a test schedule to the COTR prior to testing. Tests shall be completed as required in the contract. Scheduling shall be adjusted to permit sample motor vehicles to be tested to other FMVSS as may be required by the OVSC. All testing shall be coordinated to allow monitoring by the COTR.

### 6. TEST DATA DISPOSITION

The Contractor shall make all vehicle preliminary compliance test data available to the COTR on location within one hours after the test. Final test data, including digital printouts and computer generated plots shall be available to the COTR within two working days. Additionally, the Contractor shall analyze the preliminary test results as directed by the COTR.

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

## **6. TEST DATA DISPOSITION....Continued**

### **TEST DATA LOSS**

#### **A. INVALID TEST DESCRIPTION**

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

#### **B. INVALID TEST NOTIFICATION**

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

#### **C. RETEST NOTIFICATION**

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

#### **D. WAIVER OF RETEST**

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

#### **E. TEST VEHICLE**

NHTSA shall furnish only one vehicle for each test ordered. The Contractor shall furnish the test vehicle required for the retest. The retest vehicle shall be equipped as the original vehicle. The original vehicle used in the invalid test shall remain the property of NHTSA, and the retest vehicle shall remain the property of the Contractor. The Contractor shall retain the retest vehicle for a period not exceeding 180 days if it fails the test. If the retest vehicle passes the test, the Contractor may dispose of it upon notification from the COTR that the test report has been accepted.

#### **F. TEST REPORT**

No test report is required for any test which is determined to be invalid unless NHTSA specifically decides, in writing, to require the Contractor to submit such report. The test data from the invalid test must be safeguarded until the data from the retest has been accepted by the COTR. The report and other required deliverables for the retest vehicle are required to be submitted to the COTR within 3 weeks after completion of the retest.

## **6. TEST DATA DISPOSITION....Continued**

### **G. DEFAULT**

The Contractor is subject to the default and subsequent reprocurement costs for non-delivery of valid or conforming test (pursuant to the Termination For Default clause in the contract).

### **H. NHTSA'S RIGHTS**

None of the requirements herein stated shall diminish or modify the rights of NHTSA to determine that any test submitted by the Contractor does not conform precisely to all requirements/specifications of the OVSC Laboratory Test Procedure and Statement of Work applicable to the test.

## **7. GOVERNMENT FURNISHED PROPERTY (GFP)**

### **ACCEPTANCE OF TEST VEHICLES**

The Contractor has the responsibility of accepting test vehicles from either new car dealers or vehicle transporters. In both instances, the Contractor acts in the OVSC's behalf when signing an acceptance of test vehicles. The Contractor 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 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.

The Contractor shall check for damage which may have occurred during transit.

A "Vehicle Condition" form 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. Vehicle Condition forms must be returned to the COTR with the copies of the Final Test Report or the reports will NOT be accepted. Also refer to the Data Sheet Section of this test procedure.

## 7. GOVERNMENT FURNISHED PROPERTY (GFP)...Continued

### NOTIFICATION OF COTR

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

### TEST DUMMIES

Part 572 Subpart E test dummies will be furnished to the contract laboratory by the OVSC. The dummies shall be stored in an upright sitting position with the weight supported by the internal structure of the pelvis. The dummy's head shall be held upright without supporting the weight of the dummy by using an eye bolt that can be secured in the top of the head. These dummies shall be stored in a secured room which is kept between 55°F and 85°F. The Contractor will check the dummy components for damage after each sled test and complete a Dummy Damage Checklist (Table 4) that will be included with the post test dummy calibration. The COTR will be kept informed of the dummies condition in order that replacement parts can be provided. These dummies will be calibrated by the Contractor before every usage and the calibration checked after every test.

## 8. CALIBRATION AND TEST INSTRUMENTATION

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

- A. Standards for calibrating the measuring and test equipment 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 exceeding **6 months for instruments and 12 months for the calibration standards**. Records, showing the calibration traceability to the National Institute of Standards and Technology (NIST), shall be maintained for all measuring and test equipment.

Accelerometers shall be calibrated every six months or every four tests or after a vehicle fails to meet the FMVSS 208 performance requirements whichever occurs sooner.

- 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

## 8. CALIBRATION AND TEST INSTRUMENTATION...Continued

- (3) Name 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
  - (3) Accuracy
  - (4) Calibration interval
  - (5) Type of standard used to calibrate the equipment (calibration traceability of the standard must be evident)
  - (6) The actual procedures and forms used to perform the calibrations.
- 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 will need the acceptance of the COTR before vehicle safety compliance testing commences.
- F. Test equipment shall receive a calibration adjustment immediately prior to a test and a calibration check after the test. This check shall be recorded by the test technician(s) and submitted with the final report.
- G. Anthropomorphic test devices shall be calibrated before each test and the calibration checked after each test. The calibrations and calibration check shall be submitted with the final report.
- H. The Contractor may be directed by NHTSA to evaluate its data acquisition system. If so directed, the Contractor shall follow the procedures outlined in Appendix E.

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

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

8. CALIBRATION AND TEST INSTRUMENTATION...Continued

**TABLE 4**  
**DUMMY DAMAGE CHECKLIST - HYBRID III DUMMY**

Dummy Serial No. \_\_\_\_\_ Project No. \_\_\_\_\_

<b>OK</b>	<b>DAMAGED</b> (Begin with general cleaning)
_____	_____ Outer skin on entire dummy (gashes, rips, etc.)
_____	_____ Head - Check that ballast is secure
_____	_____ Gashes, rips, general appearance, etc.
_____	_____ Neck - Broken or cracks in rubber
_____	_____ Check that upper neck bracket is firmly attached to lower neck bracket
_____	_____ Check for looseness at the condyle joint
_____	_____ Nodding blocks -- cracked or out of position
_____	_____ Spine - Broken or cracks in rubber
_____	_____ Ribs - Check all ribs and rib supports for damage (bent or broken)
_____	_____ Check damping material or separation or cracks
_____	_____ Three rubber bumpers in place
_____	_____ Chest displacement assembly -
_____	_____ Bent shaft
_____	_____ Slider arm riding correctly in track
_____	_____ Transducer Leads -
_____	_____ Torn cables
_____	_____ Accelerometer Mountings (head, thorax, pelvis) -
_____	_____ Check for secure mounting
_____	_____ Knees - Check outer skin, insert and casting (without removing insert)
_____	_____ Limbs - Check for normal movement and adjustment
_____	_____ Knee sliders -
_____	_____ Wires intact
_____	_____ Rubber returned to "at rest" position

**8. CALIBRATION AND TEST INSTRUMENTATION...Continued**

<b>OK</b>	<b>DAMAGED</b>		
_____	_____	Pelvis -	Inspect for breakage, esp. at iliac crest
_____	_____	Ankle -	Inspect ankle blocks for breakage
_____	_____	Other -	_____
			_____
			_____

If upon visual examination, damage is apparent in any of these areas, the appropriate engineer or engineering technician is to be consulted for a decision on repair or replacement of parts.

Repair or Replacement approved by:

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Comments on repair or replacement of parts:

Checked by:

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## 9. PHOTOGRAPHIC DOCUMENTATION

Each sled test shall be documented on 16 millimeter (mm) color movie film at a minimum speed of 1,000 frames-per-second (fps) except for the 24 fps real-time cameras. Glare or lights showing on any glass area (closed windows or vents) must be minimized so that views of the dummies during the test are visible for film analysis.

**A timing mark must be registered on the film edge a minimum of every 10 milliseconds (ms) and a time zero (0.5 g on sled) impact mark must be registered on the film in order to permit test analysis on a film analyzer.** The Contractor shall report all camera locations along with camera speeds and lens focal lengths on the appropriate final report data sheets. Camera locations will be referenced to the front of the sled, sled centerline, top surface of the sled with the X, Y, and Z coordinates of the film surface recorded for each camera.

### 9.1 CAMERAS REQUIRED

- CAMERA 1** Real-time (24 fps) camera to document pretest and post test conditions of the vehicle and the dummy.
- CAMERA 2** High-speed left side view camera positioned adjacent to the vehicle's left front door to document the driver dummy's movement during the test. The centerline of the camera shall be perpendicular to the longitudinal centerline of the vehicle. It shall be attached to the sled or sled interface frame.
- CAMERA 3** High-speed left side view camera positioned to view over the driver's left shoulder during the test. It shall be attached to the sled interface frame. At the COTR's option the camera shall be positioned adjacent to the vehicle's A-post to document the driver dummy's head movement in the windshield area during the impact test.
- CAMERA 4** High-speed right side view camera positioned adjacent to the vehicle's right front door to document the passenger dummy's movement during the test. The centerline of the camera shall be perpendicular to the longitudinal centerline of the vehicle. It shall be attached to the sled or sled interface frame.
- CAMERA 5** High-speed left side view camera positioned to view over the passenger's right shoulder during the test. It shall be attached to the sled interface frame. At the COTR's option the camera shall be positioned adjacent to the vehicle's A-post to document the passenger dummy's head movement in the windshield area during the test.
- CAMERA 6** High-speed front view camera, mounted on the sled or sled interface frame, to document the movement of the driver dummy during the test.

## 9. PHOTOGRAPHIC DOCUMENTATION....Continued

**CAMERA 7** High-speed front view camera, mounted on the sled or sled interface frame, to document the movement of the passenger dummy during the test.

### 9.2 COLORING REQUIREMENTS FOR PHOTOGRAPHIC PURPOSES

- A. Vehicle interior surfaces such as the instrument panel, A-post trim panels, door trim panels, console, etc., shall be painted with flat white paint.
- B. Parts of the driver and passenger dummies shall be coated with colored chalk/water solutions to show contact points with the vehicle's interior, with their own components (such as head to knee contact), and with each other. The chalk/water solution shall be applied after final dummy positioning.

#### CHALK COLORS TO BE USED ON TEST DUMMIES

DUMMY PART	DRIVER	PASSENGER
Nose	Red	Yellow
Lips	Red	Yellow
Face	Blue	Red
Top of Head	Yellow	Blue
Back of Head	Red	Yellow
Left Knee	Red	Yellow
Right Knee	Blue	Red
Lower Steering Wheel Rim	Red	

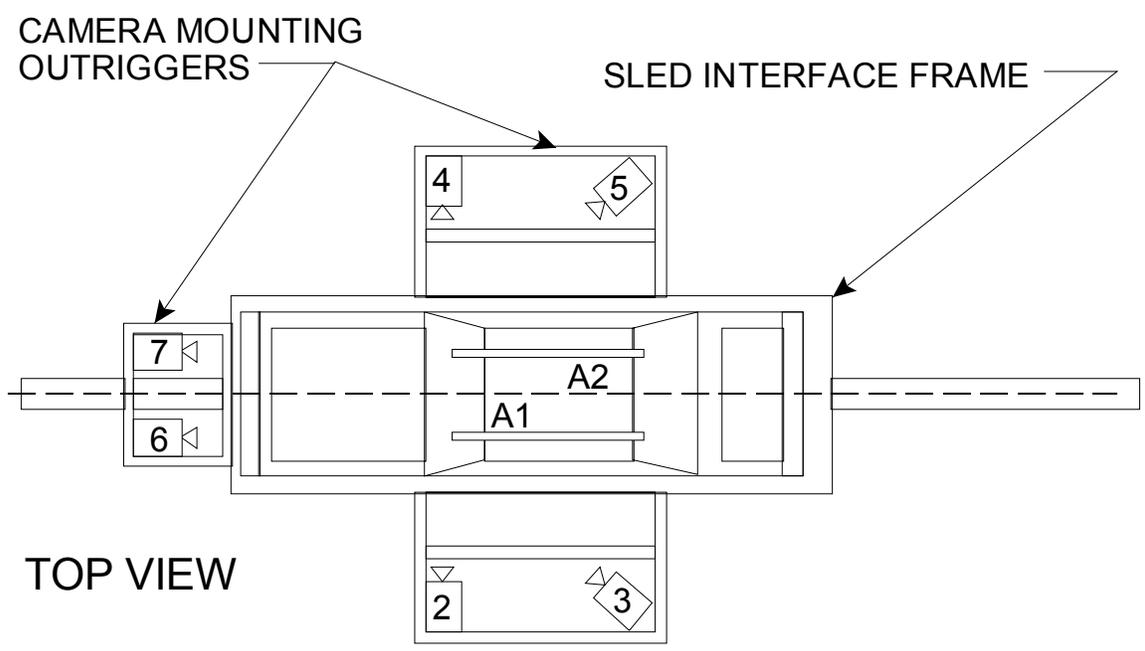
- C. The driver dummy and passenger dummy clothes shall be contrasting colors so that the motion of each dummy can be identified during film analysis.

### 9.3 VEHICLE AND DUMMY PHOTOGRAPHIC COVERAGE

The real-time camera (24 fps) shall be used to document the pretest and post test condition of the test vehicle in addition to the pretest and post test positions of both test dummies (including marks showing the fore and aft seat position).

9. PHOTOGRAPHIC DOCUMENTATION...Continued

# CAMERA POSITIONS FOR SLED TEST



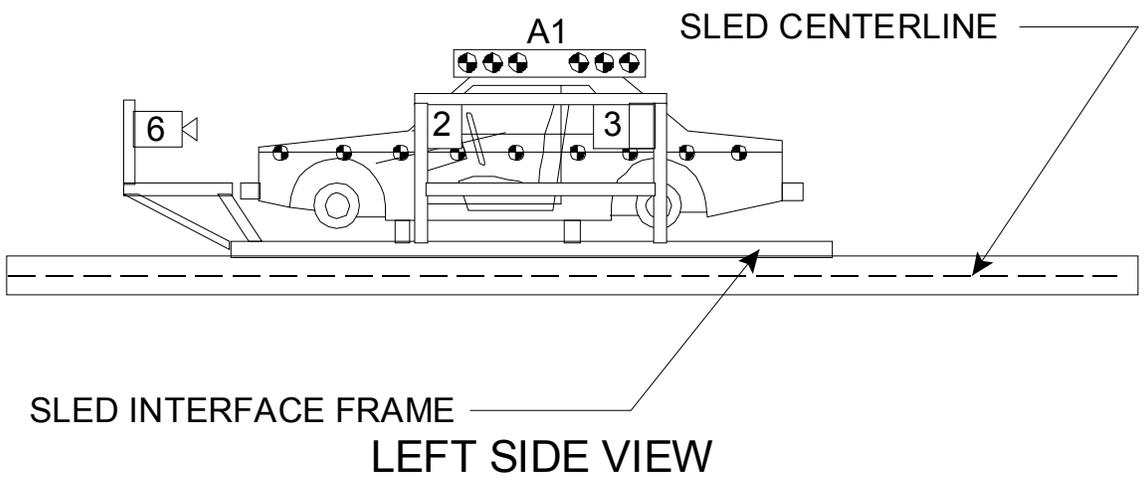
TOP VIEW

CAMERA FRAME RATES:

#1 = 24 fps

All Others = 1,000 fps

1 REAL TIME CAMERA



LEFT SIDE VIEW

FIGURE 4

## **9. PHOTOGRAPHIC DOCUMENTATION....Continued**

### **9.4 IMPACT EVENT MARKER**

All 6 high speed cameras shall have film markers to mark "time zero" (0.5 g) for the sled acceleration pulse. Time zero shall be taken from an accelerometer on the sled.

### **9.5 REFERENCE TARGETS**

9.5.1 Reference photographic targets shall be rigidly mounted on the test vehicle. The primary moving reference targets A1 and A2 MUST BE firmly fixed to a structure of the vehicle that remains undisturbed by the sled pulse, such as the vehicle roof (Figures 4 and 5). One panel must be mounted in the same plane of motion as the driver dummy and one in the same plane of motion as the passenger dummy. The angle of the panel within the motion plane is unimportant. Backup moving reference targets C1 and C2 shall also be attached to the driver and passenger doors within the view of the high speed cameras. Tape with 1 inch squares (the squares having alternating colors like black and yellow) shall be placed between targets C1 and C2.

9.5.2 The dummies shall have targets on each side of the head with the center of the target as close as possible to the center of gravity of the head in the x and z direction (relative to the measuring directions of the accelerometers). Targets shall be placed on the outboard shoulder of each dummy. Cut away a section of the sleeve (do not remove the sleeve) of the dummy and place the target as high up on the arm as possible at the intersection of the arm and the shoulder.

9.5.3 The top portion of the steering wheel shall have tape with 1 inch squares (the squares having alternating colors like black and yellow) placed on it.

### **9.6 INFORMATIONAL PLACARDS**

Vehicle identification placards shall be positioned so that at least 1 placard will be visible in the field-of-view for each of the 7 cameras. The following information will be shown:

- A. Vehicle's NHTSA Number
- B. The words "FMVSS 208 SLED TEST"
- C. Date of test
- D. Name of contract laboratory
- E. Vehicle year, make and model

9. PHOTOGRAPHIC DOCUMENTATION....Continued

9.7 CRASH FILM TITLE AND ENDING

The 16 mm crash test movie film shall include the following title frames:

- A. "The following FMVSS 208 sled test was conducted under contract with the National Highway Traffic Safety Administration by **(name and location of test laboratory)**"
- B. FMVSS 208 SLED TEST  
 TEST VEHICLE MODEL YEAR, MAKE AND MODEL  
 NHTSA No. CXXXXX  
 DATE CONDUCTED  
 CONTRACT NO.: DTNH22-9X-X-XXXXX
- C. The ending frame shall state "THE END"

REFERENCE PHOTO TARGETS

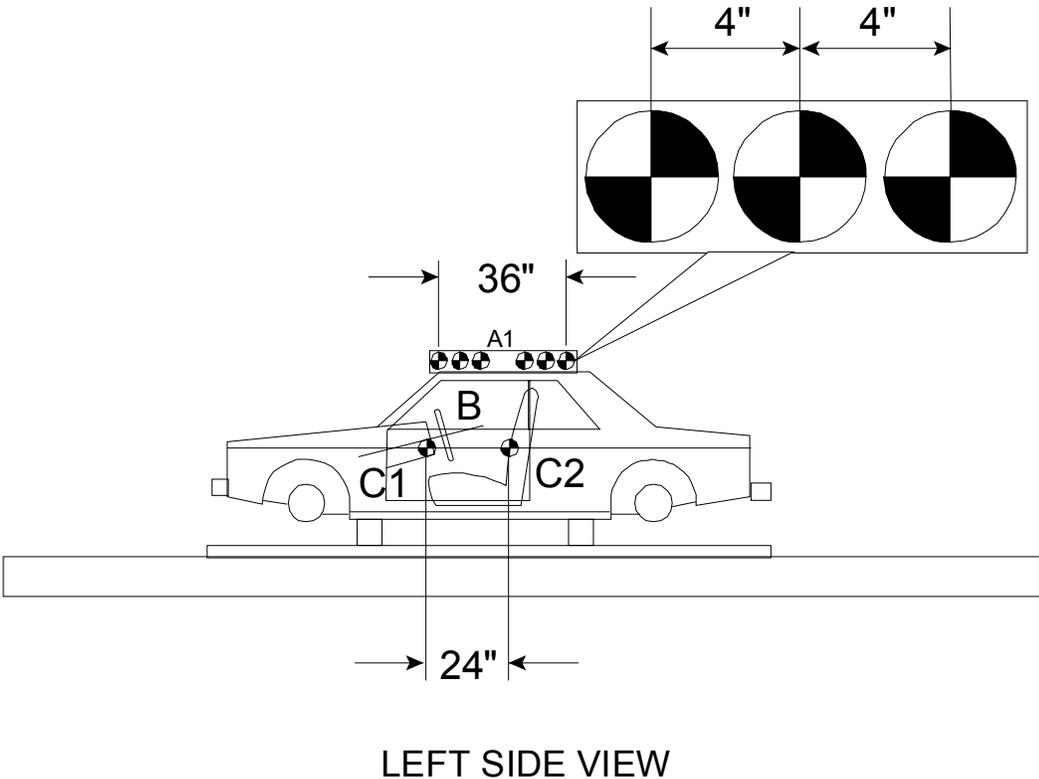


FIGURE 5

## **9. PHOTOGRAPHIC DOCUMENTATION....Continued**

### **9.8 FILM EDITING**

The film shall be edited in the following sequence:

- A. Title
- B. Pretest Coverage
- C. Real Time Pan Coverage
- D. All high speed coverage in numerical order as shown in figure 4.
- E. Post test Coverage
- F. "The End"

### **9.9 STILL PHOTOGRAPHS**

Provide still photographs (8 x 10 or 8½ x 11 inch color prints properly focused for clear images) of pretest and post test condition of the entire vehicle and details which pertain to the tested standards. Photographs of all areas of the test vehicle that may be of importance to the sled test should be taken in excess and developed only if the need arises.

The following still photographs are required for the OVSC Standards Enforcement report.

- A. Pretest frontal view of test vehicle mounted on the sled.
- B. Pretest left side view of test vehicle mounted on the sled
- C. Pretest right side view of test vehicle mounted on the sled
- D. Pretest and post test windshield view
- E. Pretest and post test driver dummy position with the door open and with the camera perpendicular to the longitudinal centerline of the vehicle and in line with the markings showing the fore-aft position of the seat.
- F. Frontal pretest and post test driver dummy position with the camera in the same plane as the longitudinal centerline of the dummy.
- G. Pretest and post test passenger dummy position with the door open and with the camera perpendicular to the longitudinal centerline of the vehicle and in line with the markings showing the fore-aft position of the seat.

**9. PHOTOGRAPHIC DOCUMENTATION....Continued**

- H. Frontal pretest and post test passenger dummy position view with the camera in the same plane as the longitudinal centerline of the dummy.
- I. Dummy contact point(s)( vehicle and dummy)
- J. Pretest and post test view of the knee bolsters.
- K. Pretest and post test view of the steering column shear capsule if any part of it is visible. Do NOT disassemble any parts to take these photographs.
- L. Pretest and post test under hood view of the steering column intersecting the fire wall. Take the best photograph possible without removing any parts.
- M. Photograph of certification label.
- N. Photograph of FMVSS 110 label and FMVSS 120 label (if a separated label).

**10. DEFINITIONS**

None

**11. PRETEST REQUIREMENTS****11.1 DETAILED TEST AND QUALITY CONTROL PROCEDURES REQUIRED**

Prior to conducting any compliance test, 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. These lists shall include all test procedure requirements and FMVSS requirements pertaining to the safety standard for which testing is being performed. Each separate checkoff sheet shall identify the lab, test date, vehicle and test technicians. These check sheets shall be used to document that all requirements and procedures have been complied with. These sheets shall be submitted with the test report.

## 11. PRETEST REQUIREMENTS....Continued

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 of the procedures must be obtained from the COTR before initiating the compliance test program.

### 11.2 INSTRUMENTATION TO BE INSTALLED IN THE TEST DUMMIES

The Contractor shall provide and install the following instrumentation in the GFP dummies. Typical instrument locations are shown in Figures 1 and 2.

- A. Three accelerometers (Endevco 7231C-750 accelerometers with 1% transverse sensitivity) shall be in the head cavity to measure orthogonal accelerations ( $A_x$ ,  $A_y$  and  $A_z$ ) at the center-of-gravity (CG) of the head assembly. The 3 accelerometers shall be mounted in an orthogonal array, and the intersection of the planes containing the sensitive axis of the 3 sensors will be the origin of the array. Detailed information concerning the locations for the sensors can be found in Appendix A.
- B. Three accelerometers (Endevco 7231C-750 accelerometers with 1% transverse sensitivity) shall be installed in the chest cavity to measure orthogonal accelerations ( $A_x$ ,  $A_y$  and  $A_z$ ) at the C.G. of the chest assembly. Location information can be found in Appendix A.
- C. Two load cells (GSE Inc. Model 2430 load cells (Dwg. 78051-265)) shall be required for each dummy and shall be installed in each upper leg to measure the axial force transmitted from the dummy's knee to the upper leg or femur. Mounting instructions can be found in Appendix A.
- D. A calibrated six axis neck load cell in each dummy and the necessary equipment to record the data from this load cell ( $F_x$ ,  $F_y$ ,  $F_z$ ,  $M_x$ ,  $M_y$ ,  $M_z$ ) and include the data in the final test report and data tape/diskette.
- E. Temperature sensors to measure the stabilized temperature of the dummy (see Section 12.7).

The Contractor shall furnish data recording equipment having a sufficient number of channels available for recording the necessary time histories of the head and chest acceleration, neck forces, neck moments and the right and left femur axial loads for each 572E test dummy placed in the test vehicle. Since each dummy will provide 15 channels of data (3 head accelerations, 6 neck force and moments, 3 chest accelerations, 1 chest displacement and 2 femur loads), 30 channels will be necessary for a test vehicle with 2 dummies plus 1 time reference channel for a total of 31 channels. Each data channel will be comprised of a sensor (accelerometer or load

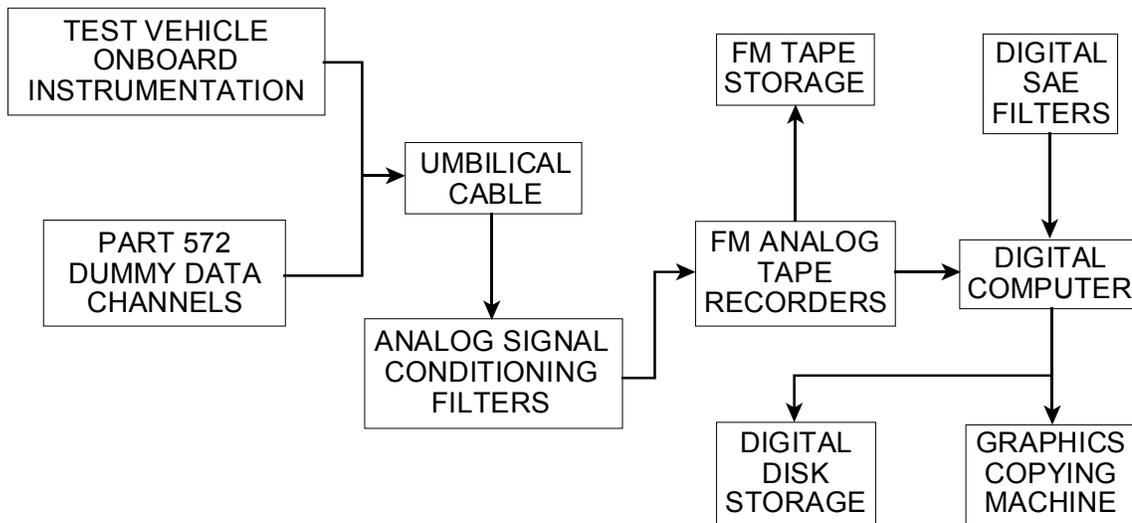
**11. PRETEST REQUIREMENTS....Continued**

cell), signal conditioner, data acquisition device, and all interconnecting cables, and must conform to the requirements of SAE Recommended Practice J211/1 MAR95, for Part 572E dummies with data classes as follows:

- A. Head Acceleration Data ..... Class 1000
- B. Chest Acceleration..... Class 180
- C. t Compression Data ..... Class 600
- D. Femur Force Data..... Class 600
- E. Neck Forces..... Class 1000
- F. Neck Moments..... Class 600

An instrument calibration system capable of performing individual tests on all data channels used in acquiring the acceleration and force data shall conform to the appropriate section of SAE J211/1 MAR95. A schematic of the test setup is shown in Figure 6

**TYPICAL VEHICLE AND OCCUPANT TEST DATA ACQUISITION SYSTEM**



**FIGURE 6**

## **11. PRETEST REQUIREMENTS....Continued**

A precision time system compatible with the test equipment shall be used to provide a time reference for all recorded data. A system that identifies sled time zero (0.5 g) will be incorporated with the time reference signal. The method for determining time zero shall be detailed in writing and provided to the COTR. No testing shall be performed until the method for time zero determination is approved.

### **11.3 OTHER INSTRUMENTATION**

The Contractor shall provide and install two x-direction accelerometers on the sled, the vehicle frame (if applicable), and vehicle body. The Contractor shall provide and install one x-direction accelerometer on the vehicle engine, and the vehicle rear axle. The sled accelerometer used to determine when the sled acceleration reaches 0.5g shall be filtered at channel class 60. The location of the accelerometers shall be recorded and included in the final test report. The Contractor shall provide the necessary equipment to record and display the data. The data shall be included in the final test report and on the data tape/diskette.

The contractor shall provide equipment to fire the air bag between 18 and 22 ms after the sled acceleration reaches 0.5g. The actual bag fire time (electrical signal to air bags or equivalent) shall be recorded and plotted separately. In addition, the bag fire time will be reported in the body of the test report or on a data sheet.

### **11.4 VEHICLE PREPARATION BUILDING**

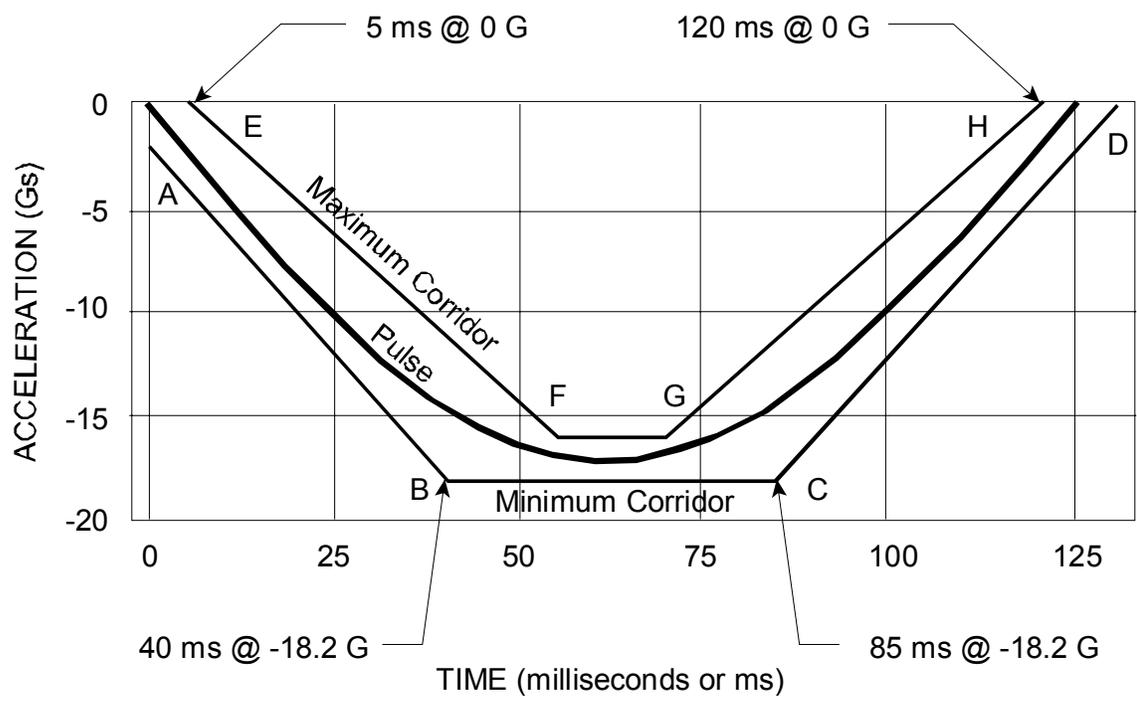
Vehicle preparation shall be performed in a building which is large enough to house the test vehicle and allow for government, vehicle manufacturer, and laboratory personnel to move around the test vehicle.

### **11.5 SLED SYSTEM**

The Contractor shall have the sled in a temperature controlled building which is large enough to house the test vehicle and allow for government, vehicle manufacturer, and laboratory personnel to move around the test vehicle. The building climate control must be capable of maintaining the ambient air temperature between 69°F and 72°F.

The sled system must be capable of ensuring that a test vehicle, with a maximum weight of 5850 lb, is subjected to the crash pulse in Figure 6 and has a delta V of 28 to 30 mph.

## SLED PULSE WITH MAXIMUM AND MINIMUM CORRIDORS



**FIGURE 7**

**11. PRETEST REQUIREMENTS...Continued**

Sled pulse acceleration, expressed in G's =  $17.2 \sin(\pi t/125)$   
 for Delta V = 30(+0,-2) mph

### SLED PULSE AND COORDINATES

REFERENCE POINT	t (ms)	ACCELERATION (G)
A	0	-2
B	40	-18.2
C	85	-18.2
D	130	0
E	5	0
F	55	-16
G	70	-16
H	120	0.00

## **11. PRETEST REQUIREMENTS....Continued**

### **11.6 ELECTROMAGNETIC INTERFERENCE**

The laboratory shall take all necessary precautions to assure electromagnetic interference with the test data does not occur. The following procedures shall be included in those adopted by the laboratory:

- A. Ground the head, thorax, and both femurs of the anthropomorphic test devices. This is accomplished by connecting the four components with a wire. A single wire then exits the dummy and is attached to a grounding block on the vehicle. Connect the grounding block to earth ground. The actual wire size and connections are left to the laboratory based on the system it uses.
- B. Use a static electricity elimination spray on the dummies and the interior of the vehicle.
- C. Disconnect and remove the vehicle battery.

### **11.7 TEST DATA ACQUISITION AND REDUCTION**

Prior to the vehicle test, onboard instrumentation is installed, and a null reference and a shunt calibration adjustment is performed to set all analog data devices including FM magnetic tape recorders. Immediately following the test, a post impact null reference and shunt calibration check will be performed. The pretest adjustment and post test check will be recorded and the data submitted with the report.

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

As the data is recalled for integration or plotting, the appropriate filter is applied. These filters are in accordance with SAE Recommended Practice J211/1 MAR95, "Instrumentation for Impact Tests." Vehicle acceleration data is plotted after the application of an SAE Class 60 filter, and velocity and displacement data is plotted after the application of an SAE Class 180 filter. When a velocity or displacement trace is to be plotted, integration for the appropriate acceleration signal is performed digitally. Before plotting, the Contractor's program manager or engineer shall determine the "time zero", which is verified with the trigger signal.

### **11.8 FILTERING REQUIREMENTS**

- A. Class 1000 for dummy head data and neck forces
- B. Class 600 for dummy femur data and neck moments

## 11. PRETEST REQUIREMENTS....Continued

- C. Class 600 for dummy chest displacement
- D. Class 180 for dummy chest acceleration
- E. Class 60 for vehicle and sled accelerometer.

As stated previously, the minimum sampling rate requirement is 10,000 samples per second per channel. The Contractor must meet all the requirements in the NHTSA "Data Tape Reference Guide" which is available from the following organization or the NHTSA web site [www.nhtsa.dot.gov](http://www.nhtsa.dot.gov) (Look for Safety Systems Engineering Analysis under the Research and Development heading):

Office of Crashworthiness Research  
 Safety Systems Engineering and analysis Division, NRD-11  
 400 Seventh Street, SW  
 Washington, DC 20590  
 Telephone No.: 202-366-4850

### 11.9 ALGORITHMS USED TO CALCULATE THE HEAD INJURY CRITERION (HIC), TO DIGITALLY FILTER THE CLASS 1000 DATA, AND CALCULATE THE THREE MILLISECOND CLIPS OF A WAVEFORM.

Information for four (4) FORTRAN algorithms that are used to calculate the HIC, to digitally filter the Class 1000 data collected from the tests, and to calculate the 3 millisecond clips of a waveform are available from the NHTSA web site [www.nhtsa.dot.gov](http://www.nhtsa.dot.gov) (Look for Safety Systems Engineering Analysis under the Research and Development heading).

For the various filter classes, the following cut-off frequencies shall be required:

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

## **11. PRETEST REQUIREMENTS....Continued**

Any questions pertaining to the algorithms or requests for the algorithms should be directed to the following organization:

National Highway Traffic Safety Administration  
Office of Crashworthiness Research  
Safety Systems Engineering and Analysis Division  
400 Seventh Street, SW  
Mail Code: NRD-11  
Washington, DC 20590  
Telephone No.: 202-366-4850

If a Contractor is not presently certified as defined by the "Data Tape Reference Guide," the same organization should be contacted. A Contractor is not considered qualified for test work described herein without this certification.

## **12. COMPLIANCE TEST EXECUTION**

### **12.1 SEAT BELT COMFORT AND CONVENIENCE, SEAT BELT WARNING SYSTEM, LABELING, AIR BAG READINESS INDICATOR, SEAT BELT LOCKABILITY, AND OWNERS MANUAL INFORMATION**

Complete and include in the test report the information on the appropriate data sheets in this test procedure and the checks specified in Appendix C.

### **12.2 VEHICLE WEIGHT**

The GVWR of a truck, bus, or MPV must be 8500 lb or less, and the unloaded vehicle weight must be 5500 lb or less in order to be dynamically tested for FMVSS 208. The unloaded vehicle weight is the weight of a vehicle with maximum capacity of all fluids necessary for operation of the vehicle, but without cargo, occupants, or accessories that are ordinarily removed from the vehicle when they are not in use.

### **12.3 VEHICLE ATTITUDE**

Pitch Angle

When the vehicle is in its "as delivered" condition measure the angle of the driver's door sill. Mark where the angle is taken on the door sill. When the vehicle is in its "fully loaded" condition, measure the angle of the driver's door sill at the same place the "as delivered" angle was measured. The vehicle attitude on the sled, determined by the door sill angle, should be between the "as delivered" and the "fully loaded" condition.

## 12. COMPLIANCE TEST EXECUTION....Continued

### Roll Angle

Mark a point on the left and right side of each vehicle 24 inches from a level surface when the vehicle is in the as received or fully loaded condition. When the vehicle is mounted on the sled, determine the distance between the top surface of the sled and each of the two points. The two measured distances shall be within 1 inch of each other.

### AS DELIVERED CONDITION

The "as delivered" condition is the vehicle as received at the test site, with 100 percent of all fluid capacities and all tires inflated to the manufacturer's specifications as listed on the vehicle's tire placard.

### PASSENGER CAR FULLY LOADED CONDITION

A passenger car shall be loaded to its unloaded vehicle weight (UVW) plus its rated cargo and luggage capacity weight (RCLW) in the luggage area, plus two 50th-percentile adult male test dummies located at the front outboard designated seating positions. (S8.1.1(a))

FMVSS 110 requires that the vehicle capacity weight (VCW) and the designated seating capacity (DSC) be recorded on the tire information placard. (Check the number of restraints provided in the vehicle against the DSC. Inform the COTR immediately if they do not match.) This information can be used to determine the "rated cargo and luggage weight" (RCLW) as follows:

$$\text{RCLW} = \text{VCW} - (150 \text{ lb} \times \text{DSC})$$

### MULTIPURPOSE PASSENGER VEHICLES, TRUCKS AND BUSES FULLY LOADED CONDITION

A multipurpose passenger vehicle (MPV), truck or bus is loaded to its UVW, plus 300 pounds or its RCLW, whichever is less, plus two 50th-percentile adult male test dummies located at the front outboard designated seating positions. (S8.1.1.(b))

Where the VCW is not provided on a label similar to the FMVSS 110 label, it can be calculated by the following formula:

$$\begin{aligned} \text{VCW} &= \text{GVW} - \text{UVW} \quad (\text{maximum UVW is 5,500 pounds}) \\ \text{RCLW} &= \text{VCW} - (150 \text{ lb}/\text{DSC} \times \text{DSC}) \end{aligned}$$

## **12. COMPLIANCE TEST EXECUTION....Continued**

### **12.4 VEHICLE FLUIDS**

Drain the fuel system and operate the engine until the fuel system is dry. Drain all other fluids from the test vehicle.

### **12.5 VEHICLE PREPARATION**

12.5.1 Disconnect the air bags without cutting the wires .

12.5.2 Remove wheels from the vehicle.

12.5.3 Rigidly attach the vehicle to the sled interface frame or sled so that movement between the base of the vehicle and the test platform is prevented. (In other words, the acceleration pulse of the vehicle body is within the corridors of the sled pulse.) Mount the vehicle as low as possible on the sled in order to keep the center of gravity as low as possible.

12.5.4 Rigidly attach the engine, transmission, axles, and exhaust system to either the vehicle body, vehicle frame, interface frame, or sled. If the vehicle has a frame, rigidly attach the body to the frame.

12.5.5 If the vehicle is not attached directly to the sled, rigidly attach the vehicle/interface frame unit to the sled.

12.5.6 Seat the dummies according to the procedures in Appendix B.

12.5.7 Verify the door sill angle is within or equal to the unloaded delivered condition or the fully loaded condition.

12.5.8 Attach air bag firing controls according to instructions received from the vehicle manufacturer as provided by the COTR.

12.5.9 Remove the battery if vehicle electrical functions are no longer needed. (Make sure the battery is not needed during the test to keep the seat position or for other test related functions.)

12.5.10 Perform the sled test so that the sled pulse is within the corridors of figure 7 and has a delta V between 28 and 30 mph. (See section 13)

### **12.7 TEST TEMPERATURE CONDITIONS**

The Contractor must verify that the dummy temperature is in the specified temperature range (69°F to 72°F) by either of the following two methods:

- A. The dummy must be soaked in an ambient air environment in the specified range as shown above for 16 hours prior to the test and any time after that until just before the movement of the vehicle in the sled test. The ambient air

## 12. COMPLIANCE TEST EXECUTION....Continued

temperature must be monitored and continuously recorded within 36 inches of the dummies. If at any time the ambient air temperature is not in the specified range, as shown above, the dummy part temperature measurement of Method B must be used prior to the test to verify a stabilized dummy temperature.

- B. The dummy must be soaked in an ambient air environment in the specified range (69°F to 72°F) for 16 hours prior to the test. The ambient temperature must be monitored and continuously recorded until just before the movement of the vehicle in the sled test. The temperature of the following dummy parts must be monitored and continuously recorded at least 30 minutes prior to the test.
- (1) The outside surface temperature of the forehead. (remove this sensor immediately prior to the test)
  - (2) The surface temperature of the spine box. (this is in the internal portion of the dummy)
  - (3) The outside surface temperature of the neck. (remove this sensor immediately prior to the test)
  - (4) The outside surface temperature of the one knee. (remove this sensor immediately prior to the test)

The chalk coating may be put on the face and knee around the sensor. The sensors shall be taped into place on the outer surfaces of the dummy and secured to the spine box for the internal sensor. When the temperature of these four components has reached the applicable temperature range as listed above, and has remained in that range for 30 continuous minutes, the impact test may be performed. It is not the intent of Method B to have the dummy outside the ambient air temperature range that corresponds to the specified dummy temperature range listed above. However, the purpose is to confirm that the dummy is still at the proper stabilized temperature even if there are short fluctuations of ambient air temperature outside the range specified for the dummy temperature. Therefore, if there is an ambient air temperature excursion outside the specified dummy temperature range, the Contractor must work quickly to bring the ambient air temperature back into that range.

The temperature sensors for both methods shall be accurate at least to within  $\pm 0.5^\circ\text{F}$ . The Contractor shall mark the ambient air temperature recording with the date, time and technician name at the beginning of the 16 hour soak and when the vehicle begins to move for the test. The dummy part temperature recordings shall also be marked at the beginning and end with the date, time, and technician's name. Any excursions from the specified temperature must be noted on the recording along with the reason for the excursion. Temperature recordings shall be supplied to the COTR with final test reports. The windshield mounting material and all vehicle components in direct contact with the mounting material must be at a temperature between 15°F and 110°F. This temperature measurement must be made within 15 minutes of the test.

## 12. COMPLIANCE TEST EXECUTION....Continued

### 12.8 ADDITIONAL PRETEST INSTRUCTIONS

- A. Adjustable seats are in the adjustment position midway between the forward most and rearmost positions, and if separately adjustable in a vertical direction, are at the lowest position. If an adjustment position does not exist midway between the forward most and rearmost positions, the next closest adjustment position to the rear of the midpoint is used. (S8.1.2)
- B. Place adjustable seat backs in the manufacturer's nominal design riding position in the manner specified by the manufacturer. Place any adjustable anchorages at the manufacturer's nominal design position for a 50th percentile adult male (50M) occupant. This information will be furnished by the COTR. Place each adjustable head restraint in its highest adjustment position. Adjustable lumbar supports are positioned so that the lumbar support is in its lowest adjustment position. (S8.1.3)
- C. Adjustable steering controls are adjusted so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. (S8.1.4)
- D. Movable vehicle windows and vents are, at the manufacturer's option, placed in the fully closed position. (S8.1.5)
- E. Convertibles and open-body type vehicles have the top, if any, in place in the closed passenger compartment configuration. (S8.1.6)
- F. Check to assure that the instrumentation and wires do not affect the motion of the dummies during the impact event.
- G. Doors are fully closed and latched but not locked. (S8.1.7)
- H. The hood, hood latches, and any other hood retention components are engaged.
- I. With the correct pin installed, set the sled gun pressures and volumes to achieve the sled test pulse in figure 7.
- J. Set equipment to fire air bag 18 to 22 ms after the sled acceleration reaches 0.5 g.

## **12. COMPLIANCE TEST EXECUTION....Continued**

### **12.9 TEST DUMMIES**

A Part 572 Subpart E test dummy shall be placed at the left and right front outboard seating positions. Each test dummy shall be clothed in form fitting cotton stretch garments with short sleeves and above-the-knee length pants. The weight of the shirt and pants shall not exceed 0.25 pounds each. The driver and passenger dummies' clothes shall be contrasting colors so the motion of each can be tracked on the high speed film during film analysis. Each foot of the dummy shall be equipped with a size 11XW shoe which meets the configuration, size, sole, and heel thickness specifications of MIL-S-13192 change P and weighs 1.05 pounds to 1.45 pounds. (S8.1.8.2)

The dummy calibration procedures are attached as Appendix A for Part 572 Subpart E dummy calibration. The calibration data for each dummy used shall be shown on the appropriate data sheets as provided in the calibration procedures.

Dummy positioning procedures are detailed in Appendix B. Positioning of the dummies shall be performed in the presence of the NHTSA and vehicle manufacturer's representatives. The manufacturer's representatives will also be afforded the opportunity to take measurements of the dummies' positions after the dummy positioning procedures are complete and before dummy measurements are recorded by the Contractor. Any deviation from this procedure must be approved by the COTR.

The dummies shall be alternated in the driver's and passenger's seat. For example, if three dummies are prepared for each test, the driver dummy from the previous test will become the spare, the passenger dummy from the previous test will be the driver, and the spare from the previous test will be the passenger.

## **13. POST TEST REQUIREMENTS**

Delta V shall be determined from the integration of the entire acceleration versus time plot for the sled. It shall include the period of time in which the sled is accelerating to 0.5 g.

All points on the acceleration versus time plot at or beyond 0.5 g must be contained within or on the corridors defined in figure 7. In order to adjust for different sled systems, the curve may be shifted with respect to time to obtain this result. If the curve is shifted, report the specific time shift.

## 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 (both reports shown in this section). The Vehicle Status Report shall be submitted until all vehicles or items of equipment are disposed of.

### 14.2 APPARENT TEST FAILURE

Any indication of an apparent test failure shall be communicated by telephone to the COTR within 24 hours with written notification mailed within 48 hours (Saturdays and Sundays excluded). A Notice of Apparent Test Failure, shown in this section, with a copy of the particular compliance test data sheet(s) and preliminary data plot(s) shall be included. In the event of an apparent 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 REPORT

#### 14.3.1 COPIES

In the case of a test failure or retest (another test of a vehicle that exceeded the FMVSS 208 performance requirements), **7** copies of the Final Test Report, **4** copies of the test film, **1** copy of the dummy calibrations, **2** copies of the data tape, and **1** copy of the test check sheets 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, **5** copies of each Final Test Report, **3** copies of the test film, **1** copy of the dummy calibrations, **1** copy of the data tape and **1** copy of the test check sheets shall be submitted to the COTR within three weeks of test completion. Payment of Contractor's invoices for completed compliance tests may be withheld until the Final Test Report is accepted by the COTR. Contractors are requested to NOT submit invoices before the COTR is provided 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.**

**NOTE:** 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.

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 below for the purpose of standardization.

### 14.3.3 FIRST THREE PAGES

#### 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:

- A. Final Report Number such as 208S-ABC-9X-001, where —

208S is the FMVSS tested (S = Sled)  
 ABC are the initials for the laboratory  
 9X is the Fiscal Year of the test program (or 0X after 1999)  
 001 is the Group Number (001 for the 1st test, 002 for the 2nd test, 003 for the 3rd test, etc.)

- B. Final Report Title And Subtitle such as

SAFETY COMPLIANCE SLED TESTING FOR FMVSS 208S  
 Occupant Crash Protection – Sled Test

\*\*\*\*\*

World Motors Corporation  
 199X XYZ 4-door sedan  
 NHTSA No. CX0401

**14. REPORTS...Continued**

MONTHLY TEST STATUS REPORT  
FMVSS 208S

DATE OF REPORT: \_\_\_\_\_

<b>NO.</b>	<b>VEHICLE NHTSA NO., MAKE &amp; MODEL</b>	<b>COMPLIANCE TEST DATE</b>	<b>PASS/ FAIL</b>	<b>DATE REPORT SUBMITTED</b>	<b>DATE INVOICE SUBMITTED</b>	<b>INVOICE PAYMENT DATE</b>
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

**14. REPORTS...Continued**

**MONTHLY VEHICLE STATUS REPORT  
FMVSS 208S**

DATE OF REPORT: \_\_\_\_\_

<b>NO.</b>	<b>VEHICLE NHTSA NO., MAKE &amp; MODEL</b>	<b>DATE OF DELIVERY</b>	<b>ODOMETER READING</b>	<b>TEST COMPLETE DATE</b>	<b>VEHICLE SHIPMENT DATE</b>	<b>ODOM. READING</b>
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

**14. REPORTS...Continued**

LABORATORY NOTICE OF APPARENT TEST FAILURE TO OVSC

FMVSS NO.: 208S (Sled Test) TEST DATE: \_\_\_\_\_

LABORATORY: \_\_\_\_\_

CONTRACT NO.: \_\_\_\_\_ DELV. ORDER NO: \_\_\_\_\_

LABORATORY PROJECT ENGINEER'S NAME: \_\_\_\_\_

TEST SPECIMEN DESCRIPTION: \_\_\_\_\_  
\_\_\_\_\_

VEHICLE NHTSA NO.: \_\_\_\_\_ VIN: \_\_\_\_\_

MFR: \_\_\_\_\_

APPARENT TEST FAILURE DESCRIPTION: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

FMVSS REQUIREMENT, PARAGRAPH S\_\_\_ : \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NOTIFICATION TO NHTSA (COTR) : \_\_\_\_\_

DATE: \_\_\_\_\_ BY: \_\_\_\_\_

REMARKS:

**14. REPORTS....Continued**

C. Contractor's Name and Address such as

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

**NOTE:** DOT SYMBOL WILL BE PLACED BETWEEN ITEMS (C) AND (D)

D. Date of Final Report completion

E. The words "FINAL REPORT"

F. 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  
Mail Code: NSA-30  
400 Seventh Street, SW, Room 6115  
Washington, DC 20590

**14. REPORTS....Continued**

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Prepared By: \_\_\_\_\_

Approved By: \_\_\_\_\_

Approval Date: \_\_\_\_\_

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Accepted By: \_\_\_\_\_

Acceptance Date: \_\_\_\_\_

**14. REPORTS....Continued**

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208S-ABC-9X-001

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Leave blank

## Block 3 — RECIPIENT'S CATALOG NUMBER

Leave blank

## Block 4 — TITLE AND SUBTITLE

Final Report of FMVSS 208S Compliance Sled Testing  
of a 199X World XYZ Deluxe 4-door sedan  
NHTSA No. CX0401

## Block 5 — REPORT DATE

March 1, 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

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Office of Vehicle Safety Compliance  
Mail Code: NSA-30  
400 Seventh Street, SW, Room 6115  
Washington, DC 20590

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Final Test Report  
Feb. 15 to Mar. 15, 199X (or 200X after 1999)

## Block 14 — SPONSORING AGENCY CODE

NSA-30

## Block 15 — SUPPLEMENTARY NOTES

Leave blank

## Block 16 — ABSTRACT

Compliance tests were conducted on the subject 199X World XYZ 4-door sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP208S-0X for the determination of FMVSS 208S (Sled Test) compliance. Test failures identified were as follows:

None

## Block 17 — KEY WORDS

Compliance Testing  
Safety Engineering  
FMVSS 208S (Sled Test)

**14. REPORTS...Continued**

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## **14. REPORTS....Continued**

### 14.3.4 TABLE OF CONTENTS

Sample Test Report Table of Contents:

Section 1 — Purpose of Compliance Test

Section 2 — Compliance Data Summary

Section 3 — Test Data (including acceleration and load plots)

Section 4 — Test Equipment List and Calibration Information

Section 5 — Photographs

Section 6 — Notice of Test Failure (if applicable)

## 14. REPORTS....Continued

### 14.3.5 SAMPLE TEST REPORT INFORMATION

#### LIST OF FIGURES (Sample)

FIGURE	DESCRIPTION	PAGE
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2	Dummy and Seat Positioning	
3	Dummy Positioning in Vehicle	
4	Seat Belt Positioning Data	
5	Vehicle Accelerometer Location and Data Summary	
6	Camera Positions for Sled Tests	

#### LIST OF TABLES (Sample)

TABLE	DESCRIPTION	PAGE
1	Sled Test Summary	
2	General Test and Vehicle Parameter Data	
3	Post Sled Test Data	
4	Acceleration Data Plots	
5	Test Vehicle Noncompliance Notice	
6	Camera Locations	

**14. REPORTS....Continued****PURPOSE AND SUMMARY OF TEST CX0101**

**PURPOSE** The purpose of this FMVSS 208S compliance sled test was to determine whether the subject vehicle, a 199X Ajax Optima 4-door sedan, meets the performance requirements of FMVSS 208, "Occupant Crash Protection". The compliance test was conducted using the requirements found in the OVSC Laboratory Test Procedure No. TP208S-0X dated \_\_\_\_\_, 199X (or 200X)

**SUMMARY** The 199X (or 200X) Ajax Optima 4-door sedan was equipped with a 5.0 liter V-8 engine, 4-speed automatic transmission with overdrive, power brakes and steering and air conditioning. The total test weight of the vehicle with two (2) Part 572 dummies and cargo ballast weight was 3,580 pounds. The test vehicle appeared to comply with the performance requirements of FMVSS's 208, 212, 219, and 301. The HIC measured using the Part 572 (Hybrid III) dummies in both the driver and right passenger seating positions was below 1000, the resultant acceleration of the thorax did not exceed 60 g's except for intervals less than 3 milliseconds and the compressive force transmitted through the upper legs did not exceed 2,250 pounds.