TP-572-R-00
January 23, 2014

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

CALIBRATION TEST PROCEDURE
for
Part 572 Subpart R, CRABI 12-Month-Old
Child Test Dummy

ENFORCEMENT
Office of Vehicle Safety Compliance
Mail Code: NVS-220, W43-481
1200 New Jersey Avenue, SE
Washington, DC 20590

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1. PURPOSE AND APPLICATION

The purpose of this laboratory procedure is to provide dummy users (independent testing laboratories under contract with the Office of Vehicle Safety Compliance (OVSC)) with standard test procedures for performing receiving-inspection and performance calibration tests on the Part 572, Subpart R dummy so that repetitive and correlative test results can be obtained. The following tests have been developed to establish a uniform calibration procedure for all users as the means of verifying the performance of the dummy.

A. EXTERNAL DIMENSIONS (PADI)

B. HEAD DROP TEST (572.152)

C. NECK FLEXION TEST (572.153(b)(1))

D. NECK EXTENSION TEST 572.153(b)(2)

E. THORAX IMPACT TEST ((572.154)

National Highway Traffic Safety Administration (NHTSA) contract laboratories performing FMVSS 213 testing, and other testing as required, for the Office of Vehicle Safety Compliance (OVSC) must use this laboratory procedure for the calibration of Part 572, Subpart R dummies.

2. GENERAL REQUIREMENTS

The Code of Federal Regulations (49CFR), Parts 571 and 572, was amended to adopt the Hybrid III, CRABI 12-Month-Old Dummy as the means of determining a Child Restraint System's (CRS's) conformance to the performance requirements of FMVSS 213. Each Part 572, Subpart R dummy used in a compliance test must meet the specifications and performance criteria of Part 572 before each CRS test in order to be an acceptable compliance test tool. The COTR will determine when posttest calibrations are necessary

The Part 572, Subpart R Hybrid III, CRABI 12-Month-Old Dummy consists of components and assemblies specified in the drawing and specifications package which is available from www.regulations.gov (search Docket No. NHTSA-2000-7052) which contains the following materials:

(1) Technical drawings and specifications package 921022-00 (see Table 1 for details)

(2) A manual entitled "Procedures for Assembly, Disassembly and Inspection (PADI), Subpart R, CRABI 12-Month-Old Infant Crash Test Dummy, (CRABI-12, Alpha version) August 2001."

TABLE 1. DRAWING PACKAGE INDEX

Component assembly	Drawing No.
(i) Head Assembly	921022-001
(ii) Neck Assembly (Complete)	921022-041
(iii) Torso Assembly	921022-060
(iv) Leg Assembly	921022-055 R&L
(v) Arm Assembly	921022-054 R&L

3. SECURITY

All NHTSA Part 572, Subpart R test dummies delivered to the contract laboratory as Government Furnished Property (GFP) will be stored in a safe and secure area such as the dummy calibration laboratory. The contractor is financially responsible for any acts of theft and/or vandalism that occur during the storage of GFP. Any security problems 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 is responsible for maintaining the NHTSA test dummies in good working order, and shall protect and segregate the data that evolves from conducting Part 572, Subpart R dummy calibration tests before and after each compliance test.

No information concerning the Part 572, Subpart R dummy calibration data 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 dummy calibration test program, shall be allowed to witness dummy calibration tests unless specifically authorized by the COTR.

4. GOOD HOUSEKEEPING

Contractors shall maintain the entire 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 Part 572, Subpart R dummies are being calibrated as test tools to be used in determining CRS compliance with the requirements of FMVSS 213. The schedule for these performance calibration tests must be correlated with that of the CRS tests. All testing shall be coordinated to allow monitoring by the COTR.

6. TEST DATA DISPOSITION

The contractor shall make all dummy calibration data available to the COTR for review and analysis as required.

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.

7. GOVERNMENT FURNISHED PROPERTY (GFP)

Part 572, Subpart R test dummies will be furnished to the contract laboratory by the OVSC. The dummies shall be stored in a hanging position using the bracket and positioning shown in Figures 1 and 2.

DUMMY HANGER PLATE

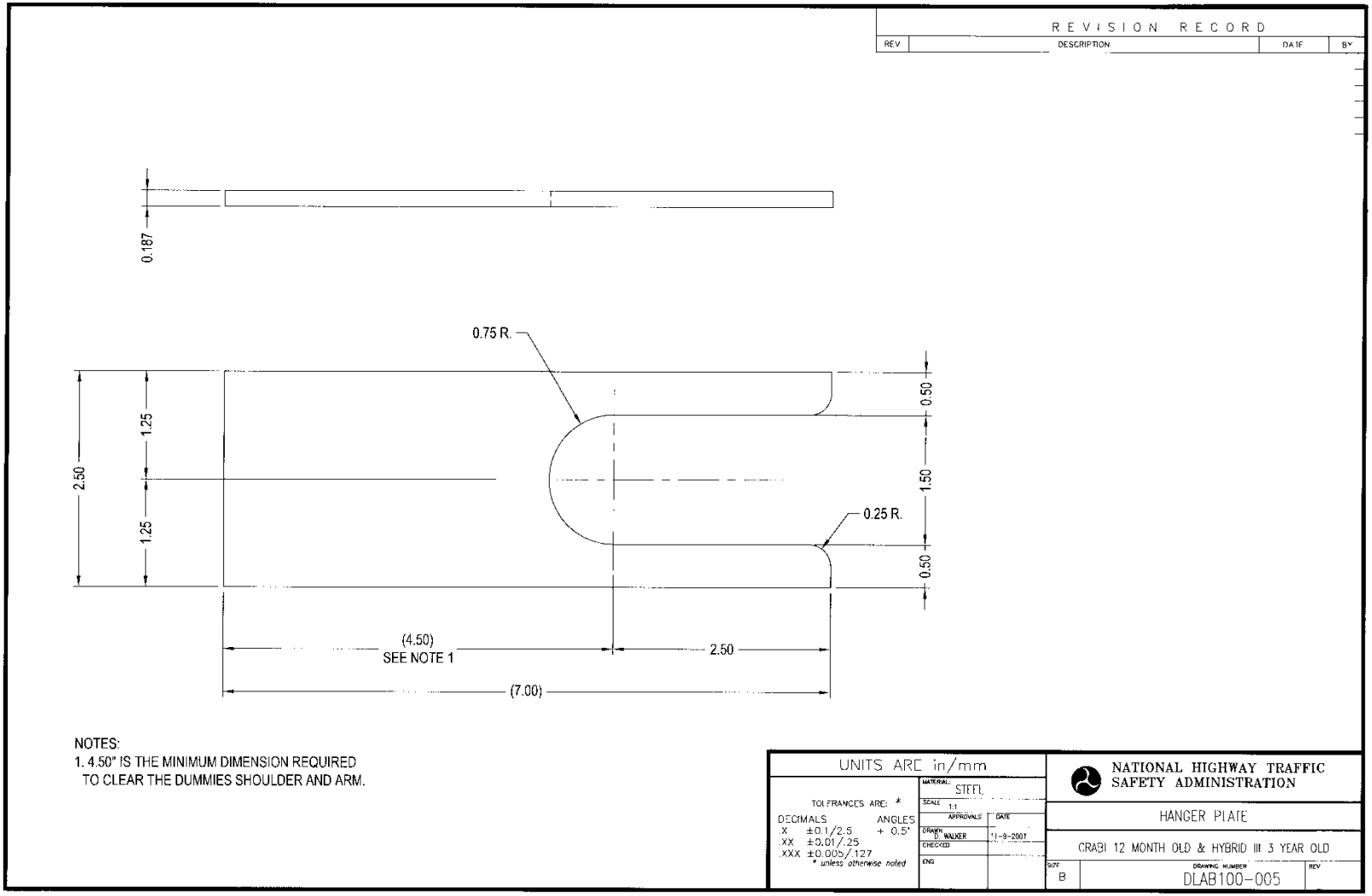


FIGURE 1

DUMMY HANGER

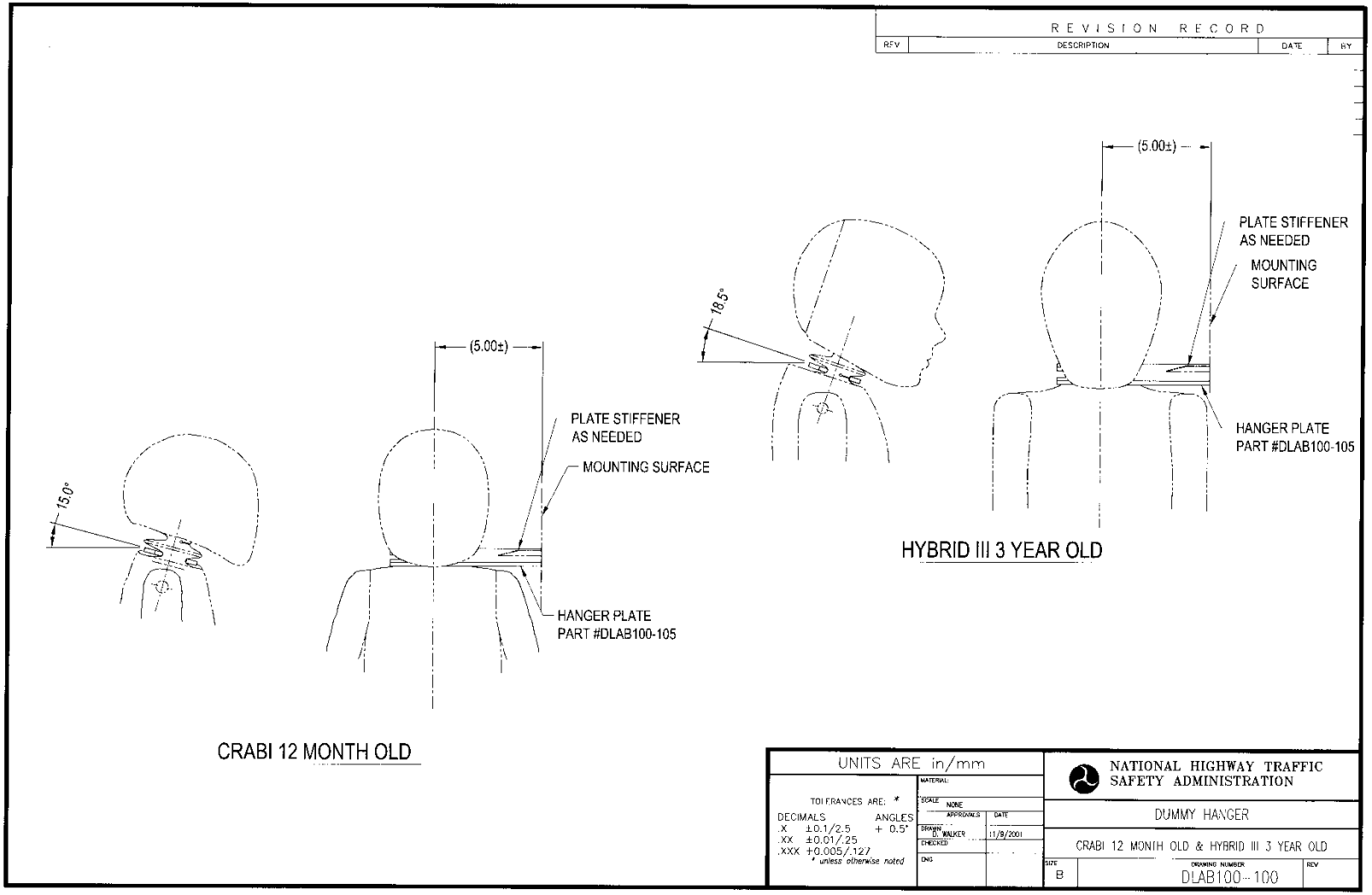


FIGURE 2

These dummies shall be stored in a secured room that is kept between 55ºF and 85ºF. The contractor will check dummy components for damage after each test and complete a dummy damage checklist that will be included with the posttest dummy calibration. The COTR will be kept informed of the dummies condition in order that replacement parts can be provided.

8. CALIBRATION AND TEST INSTRUMENTATION

Before the contractor initiates the dummy performance calibration test program, a test instrumentation calibration system must be implemented and maintained in accordance with established calibration practices. The calibration system shall be set up and maintained as follows:

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

B. All measuring instruments and standards shall be calibrated by the contractor, or a commercial facility, against a higher order standard at periodic intervals not exceeding 6 months for instruments and 12 months for 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.

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

(1) Date of calibration

(2) Date of next scheduled calibration

(3) Name of the technician who calibrated the equipment

D. The contractor shall provide a written calibration procedure that 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 calibrations.

E. The contractor shall keep records of calibrations for all test instrumentation in a manner that 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 written acceptance of the COTR before testing begins.

F. Test equipment shall receive a calibration check immediately prior to each test. This check shall be recorded by the test technician(s) and made available if requested by the COTR.

9. DEFINITIONS

PADI: Procedures for Assembly, Disassembly, and Inspection

10. PRETEST REQUIREMENTS

10.1 INSTRUMENTATION REQUIRED FOR QUALIFICATION TESTS (572.155)

The contractor shall provide and install the following instrumentation to the GFP dummies for qualification testing and if required, for compliance testing. The instrumentation used during the compliance tests shall be those installed during qualification testing.

A. HEAD – The head accelerometers shall have dimensions, response characteristics and sensitive mass locations specified in drawing SA572-S4 and be mounted in the head as shown in drawing 921022-000. (572.155(b))

Three accelerometers shall be mounted in the head cavity to measure orthogonal accelerations (Ax, Ay, Az) at the center of gravity (CG) of the head assembly.

B. NECK – The neck force-moment transducer shall have the dimensions, response characteristics, and sensitive axis locations specified in drawing SA572-S23 and shall be mounted as shown in drawing 921022-000. Also refer to Figures 5 and 6. (572.155(c))

C. TEST FIXTURE – The neck pendulum, and thorax accelerometers shall have the dimensions and characteristics of drawing SA572-S4.

10.2 OTHER TRANSDUCERS (S572.146)

The following transducers are required only when needed for specific test programs as directed by the COTR.

A. The chest accelerometers shall have the dimensions, response characteristics, and sensitive mass locations specified in drawing SA572-S4 and be mounted in the torso assembly in traxial configuration at the T4 location as shown drawing 921022-000. The chest accelerometers are required for FMVSS 213 CRS testing. (572.155(e))

B. The shoulder force transducers shall have the dimensions and response characteristics specified in drawing SA572-S25 and are allowed to be mounted as optional instrumentation in place of part No. 921022-022 in the torso assembly as shown in drawing 921022-000.

C. The lumbar spine and lower neck force/moment transducer shall have the dimensions and response characteristics specified in drawing SA572-S23 and are allowed to be mounted as optional instrumentation in the torso assembly in place of part No. 910420-003 as shown in drawing 921022-000.

D. The pelvis accelerometers shall have the dimensions, response characteristics, and sensitive mass locations specified in drawing SA572-S4 and are allowed to be mounted as optional instrumentation in the pelvis in triaxial configuration as shown in drawing 921022-000.

E. The pubic force transducer shall have the dimensions and response characteristics specified in drawing SA572-S24 and is allowed to be mounted as optional instrumentation in place of part No. 921022-050 in the torso assembly as shown in drawing 921022-000.

10.2 TRANSDUCER CONDITIONS

A. TRANSDUCER MOUNTS – The mountings for sensing devices shall have no resonance frequency less than 3 times the frequency range of the applicable channel class. (572.155(k))

B. TRANSDUCER SIGN CONVENTION - The sign convention for outputs of transducers mounted within the dummy that measure head and chest accelerations, chest deflection and neck loads are located in Figure 3 and Table 1. For other transducers see SAE J1733DEC94. (572.155(j))

C. TRANSDUCER OUTPUTS and FILTERING- The outputs of acceleration and force-sensing devices installed in the dummy and in the test apparatus specified by this part are recorded with individual data channels. Each data channel will be comprised of a sensor, signal

conditioner, data acquisition device, and all interconnecting cables, and must conform to the requirements of SAE Recommended Practice J211/1 MAR95, "Instrumentation for Impact Test," with channel classes as follows: (572.155(i))

(1)	Head acceleration	Class 1000	(572.155(i)(1))
(2)	Neck force	Class 1000	(572.155(i)(2)(i))
(3)	Neck moment	Class 600	(572.155(i)(2)(ii))
(4)	Neck pendulum acceleration	Class 180	(572.155(i)(2)(iii))
(5)	Neck rotation transducers	Class 60	(572.155(i)(2)(iv))
(6)	Thorax spine acceleration	Class 180	(572.155(i)(3)(i))
(7)	Thorax pendulum acceleration	Class 180	(572.155(i)(3)(i))
(8)	Shoulder force	Class 600	(572.155(i)(3)(ii))
(9)	Lumbar force	Class 1000	(572.155(i)(4)(i))
(10)	Lumbar moment	Class 600	(572.155(i)(4)(ii))
(11)	Pelvis acceleration	Class 1000	(572.155(i)(5)(i))
(12)	Public force	Class 1000	(572.155(i)(5)(ii))

All filter classes should be of the "phaseless" type to be compatible with the "time" dependent test parameters.

10.3 THORAX IMPACTOR PROBE (572.155(a))

A. The test probe for thoracic impacts shall be of rigid metallic construction, concentric about its longitudinal axis.

B. It shall have a mass of 2.86 $\pm$ 0.02 kg (6.3 $\pm$ 0.05 lbs). 1/3 of the weight of the suspension cables and any attachments to the impact probe must be included in the calculation of mass, and such components may not exceed 5 percent of the total weight of the test probe.

C. It shall have a minimum mass moment of inertia of 164 kg-cm^2 (0.145 lbs-in-sec^2) in yaw and pitch about the center of gravity.

D. The impacting end of the probe is perpendicular to and concentric with the longitudinal axis. The face has a diameter of 101.6 $\pm$ 0.25 mm (4.00 $\pm$ 0.01 in), a maximum edge radius of 7.6 to 12.7 mm (0.3 to 0.5 in) and is flat, continuous and non-deformable.

E. A 101-103 mm diameter cylinder surface extends at least 12.5 mm to the rear of the impact face.

F. The probe’s end opposite to the impact face must have provisions for mounting of an accelerometer with its sensitive axis collinear with the longitudinal axis of the probe.

G. The impact probe shall have a free air resonant frequency of not less than 1000 Hz measured in line with the longitudinal axis of the impactor.

SIGN CONVENTION FOR PART 572 TEST DUMMIES

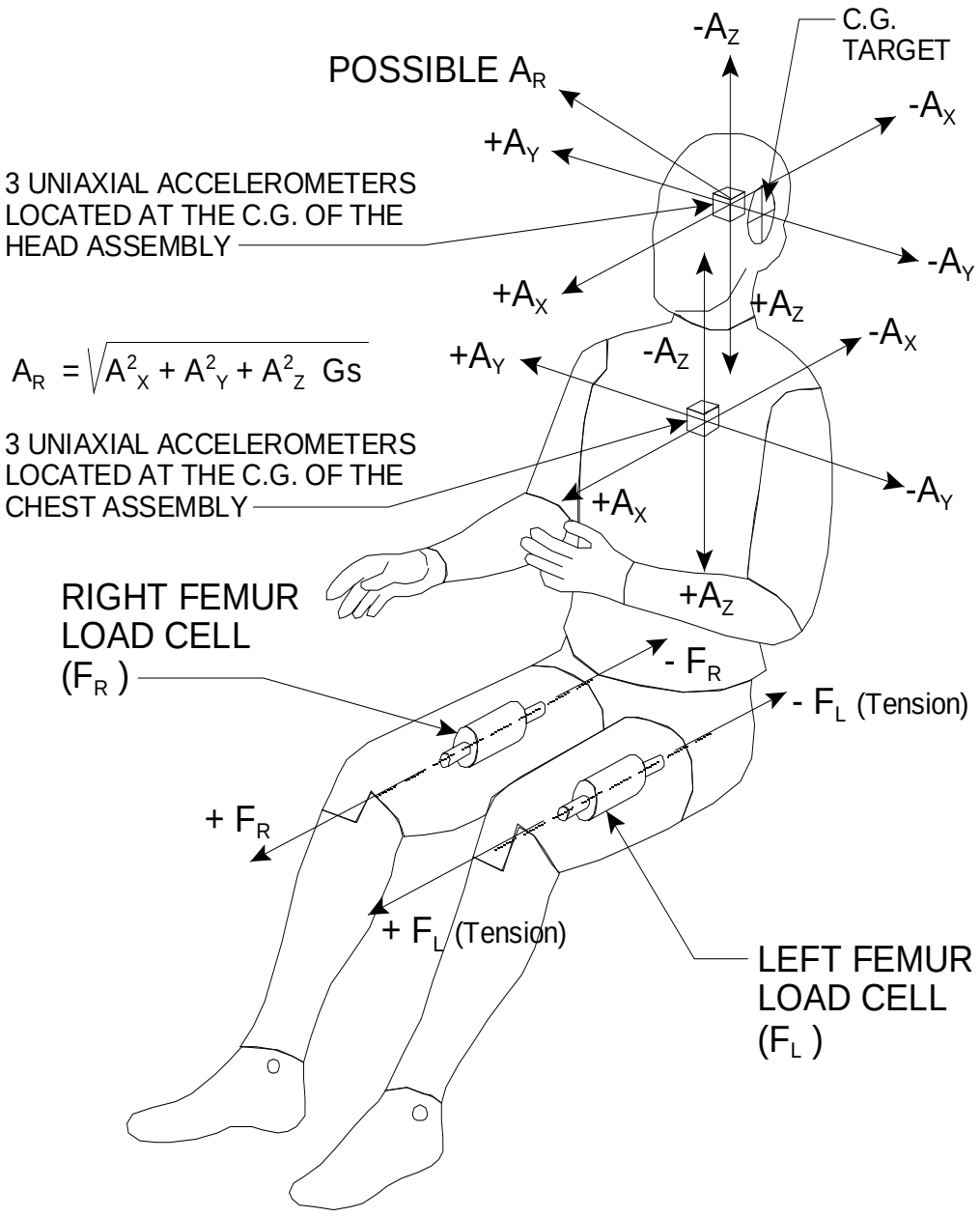


FIGURE 3

TABLE 2. SIGN CONVENTION FOR HYBRID III TRANSDUCER OUTPUTS

BODY SEGMENT — MEASURED FORCE	**POSITIVE OUTPUT DIRECTION**
NECK	
FX SHEAR	HEAD REARWARD OR CHEST FORWARD
FY SHEAR	HEAD LEFTWARD, CHEST RIGHTWARD
FZ AXIAL	HEAD UPWARD, CHEST DOWNWARD
MX MOMENT (ROLL)	LEFT EAR TOWARD LEFT SHOULDER
MY MOMENT (PITCH)	CHIN TOWARD STERNUM
MZ MOMENT (YAW)	CHIN TOWARD LEFT SHOULDER
LEFT SHOULDER	
FX	LEFT ARM/SHOULDER FORWARD, CHEST REARWARD
FZ	LEFT ARM/SHOULDER DOWNWARD, CHEST UPWARD
RIGHT SHOULDER	
FX	RIGHT ARM/SHOULDER FORWARD, CHEST REARWARD
FZ	RIGHT ARM/SHOULDER DOWNWARD, CHEST UPWARD
LUMBAR SPINE	
FX	CHEST REARWARD, PELVIS FORWARD
FY	CHEST LEFTWARD, PELVIS RIGHTWARD
FZ	CHEST UPWARD, PELVIS DOWNWARD
MX MOMENT	LEFT SHOULDER TOWARD LEFT HIP
MY MOMENT	STERNUM TOWARD FRONT OF LEGS
MZ MOMENT	RIGHT SHOULDER FORWARD, LEFT SHOULDER REARWARD
PUBIC	
FX SHEAR	PUBIC REARWARD, CHEST FORWARD
FZ AXIAL	PUBIC UPWARD, CHEST DOWNWARD

NOTE: DIRECTIONS ARE DEFINED IN RELATION TO A SEATED DUMMY

10.4 GENERAL TEST CONDITIONS

A. Surfaces of dummy components are not painted unless otherwise specified. (572.155(n))

B. Dummy performance tests of the same component, segment, assembly, or fully assembled dummy are separated in time by a period of not less than 30 minutes unless otherwise specified. (572.155(m))

C. The dummy head performance tests are conducted at any temperature from 18.9°C (66°F) to 25.6°C (78°F) and at any relative humidity from 10% to 70% after exposure of the dummy to these conditions for a period of not less than 4 hours. For the neck-headform assembly and thorax assembly, the temperature range is 20.6°C (69°F) to 22.2°C (72°F) and at any relative humidity from 10% to 70% after exposure of the dummy to these conditions for a period of not less than 4 hours.

D. Dummy limb joints are set at 1g, barely restraining the weight of the limb when it is extended horizontally. The force required to move a limb segment does not exceed 2g throughout the range of limb motion. (572.155(l))

E. Dummies will be clothed for the thorax calibration tests with a form fitting cotton-polyester-based tight-fitting sweat shirt with long sleeves and ankle length pants. The total weight of the shirt and pants shall not exceed 0.25 kg (0.55 lb). (572.154(c)(2))

11. CALIBRATION TEST EXECUTION

When conducting calibration tests, complete the data sheets in section 14.

11.1 HEAD CALIBRATION (572.152)

A. Head Assembly

The head assembly for this test consists of the assembly (drawing 921022-001), triaxial mount block (SA572-80), and 3 accelerometers (drawing SA572-S4).

B. Requirements

(1) When the head assembly is dropped from a height of 376.0 ±1.0 mm (14.8 ±0.04 in), the peak resultant acceleration measured at the head CG shall not be less than 100 g or more than 120 g. The resultant acceleration vs. time history curve shall be unimodal, and the oscillations occurring after the main pulse shall be less than 17 percent

of the peak resultant acceleration. The lateral acceleration shall not exceed ±15 g's.

(2) When the head assembly is dropped from a height of 376.0 ±1.0 mm (14.8 ±0.04 in), the peak resultant acceleration measured at the head CG shall be not less than 55 g and not more than 71 g. The resultant acceleration vs. time history curve shall be unimodal, and the oscillations occurring after the main pulse shall be less than 17 percent of the peak resultant acceleration. The lateral acceleration shall not exceed ±15 g's.

C. Test Procedure

(1) Soak the head assembly in a controlled environment at any temperature between 18.9 and 25.6 °C (66 and 78 °F) and at any relative humidity between 10 and 70 percent for at least four hours prior to a test. These temperature and humidity levels shall be maintained throughout the entire testing period specified in this section.

(2) Clean the impact surface of the head skin and the steel impact plate surface with isopropyl alcohol, trichlorethane, or an equivalent. Both impact surfaces shall be clean and dry for testing.

(3) For a frontal impact test, suspend the head assembly with its midsagittal plane in vertical orientation as shown in Figure 5 of this subpart. The lowest point on the forehead is 376.0 ±1.0 mm (14.8 ±0.04 in) from the impact surface. The 3.30 mm (0.13 in) diameter holes located on either side of the dummy's head are used to ensure that the head is level with respect to the impact surface. The angle between the lower surface plane of the neck transducer mass simulator (drawing 910420-003) and the plane of the impact surface is 45 ±1 degrees.

(4) For a rear impact test, suspend the head assembly with its midsagittal plane in vertical orientation as shown in Figure 6 of this subpart. The lowest point on the back of the head is 376.0 ±1.0 mm (14.8 ±0.04 in) from the impact surface. The 3.30 mm (0.13 in) diameter holes located on either side of the dummy's head are used to ensure that the head is level with respect to the impact surface. The angle between the lower surface plane of the neck transducer structural replacement (drawing 910420-003) and the impact surface is 90 ±1 degrees.

(5) Drop the head assembly from the specified height by a means that ensures a smooth, instant release onto a rigidly supported flat horizontal steel plate which is 50.8 mm (2 in) thick and 610 mm (24 in)

square. The impact surface shall be clean, dry and have a micro finish of not less than 203.2×10^{-6} mm (8 micro inches) (RMS) and not more than 2032.0×10^{-6} mm (80 micro inches) (RMS).

(6) Allow at least 2 hours between successive tests of the head assembly at the same impact point. For head impacts on the opposite side of the head, the 30-minute waiting period specified in §572.155(m) does not apply.

11.2 NECK CALIBRATION (572.153)

A. Neck Assembly

The neck and headform assembly (refer to §§572.150(a)(1)(ii) and 572.150(a)(1)(iii)) for the purposes of this test consists of parts shown in CRABI neck test assembly (drawing TE-3200-100);

B. Requirements

When the neck and headform assembly, as defined in §572.153(a), is tested according to the test procedure in §572.153(c), it shall have the following characteristics:

(1) *Flexion.*

(i) Plane D referenced in Figure 8 of this subpart shall rotate in the direction of pre-impact flight with respect to the pendulum's longitudinal centerline not less than 75 degrees and not more than 86 degrees. Within this specified rotation corridor, the peak positive moment about the occipital condyles shall be not less than 36 N-m (26.6 ft-lbf) and not more than 45 N-m (33.2 ft-lbf).

(ii) The positive moment about the occipital condyles shall decay for the first time to 5 N-m (3.7 ft-lbf) between 60 ms and 80 ms after time zero.

(iii) The moment about the occipital condyles shall be calculated by the following formula: Moment (N-m) = My − (0.005842m) × (Fx), where My is the moment about the y-axis, Fx is the shear force measured by the neck transducer (drawing SA572 -S23) and 0.005842m is the distance from the point at which the load cell measures the force to the occipital condyle.

(2) *Extension.*

(i) Plane D referenced in Figure 9 of this subpart shall rotate in the direction of preimpact flight with respect to the pendulum's longitudinal

centerline not less than 80 degrees and not more than 92 degrees. Within the specified rotation corridor, the peak negative moment about the occipital condyles shall be not more than −12 Nm (−8.9 ft-lbf) and not less than −23 N-m (−17.0 ft-lbf) within the minimum and maximum rotation interval.

(ii) The negative moment about the occipital condyles shall decay for the first time to −5 Nm (−3.7 lbf-ft) between 76 ms and 90 ms after time zero.

(iii) The moment about the occipital condyles shall be calculated by the following formula: Moment (N-m) = My − (0.005842m) × (Fx), where My is the moment about the y-axis, Fx is the shear force measured by the neck transducer (drawing SA572 -S23) and 0.005842m is the distance from the point at which the load cell measures the force to the occipital condyle.

C. Test Procedure

(1) Soak the neck assembly in a controlled environment at any temperature between 20.6 and 22.2 °C (69 and 72 °F) and at any relative humidity between 10 and 70 percent for at least four hours prior to a test. These temperature and humidity levels shall be maintained throughout the testing period specified in this section.

(2) Torque the jam nut (drawing 9001336) on the neck cable (drawing ATD-6206) to 0.2 to 0.3 Nm (2-3 in-lbf).

(3) Mount the neck-headform assembly, defined in paragraph (b) of this section, on the pendulum so the midsagittal plane of the headform is vertical and coincides with the plane of motion of the pendulum as shown in Figure R3 for flexion and Figure R4 for extension tests.

(i) The moment and rotation data channels are defined to be zero when the longitudinal centerline of the neck and pendulum are parallel.

(ii) The test shall be conducted without inducing any torsion of the neck.

(4) Release the pendulum and allow it to fall freely to achieve an impact velocity of 5.2 ±0.1 m/s (17.1 ±0.3 ft/s) for flexion and 2.5 ±0.1 m/s (8.2 ±0.3 ft/s) for extension measured at the center of the pendulum accelerometer at the instant of contact with the honeycomb.

(i) Time-zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. The pendulum data channel shall be defined to be zero at this time.

(ii) Stop the pendulum from the initial velocity with an acceleration vs. time pulse which meets the velocity change as specified in the following table. Integrate the pendulum acceleration data channel to obtain the velocity vs. time curve as indicated in Table B:

TABLE B—PENDULUM PULSE

Time	Flexion		Time	Extension	
m/s	m/s	ft/s	ms	m/s	ft/s
10	1.6-2.3	5.2-7.5	6	0.8-1.2	2.6-3.9
20	3.4-4.2	11.2-13.8	10	1.5-2.1	4.9-6.9
25	4.3-5.2	14.1-17.1	14	2.2-2.9	7.2-9.5

11.3 THORAX CALIBRATION (572.154)

A. Thorax Assembly

The thorax assembly consists of the part of the torso assembly shown in drawing 921022-060.

B. Requirements

When the thorax of a completely assembled dummy (drawing 921022-000) is impacted by a test probe conforming to §572.155(a) at 5.0 ±0.1m/s (16.5 ±0.3 ft/s) according to the test procedure in paragraph (c) of this section, the peak force, measured by the impact probe in accordance with paragraph §572.155(a), shall be not less than 1514 N (340.7 lbf) and not more than 1796 N (404.1 lbf).

C. Test procedure.

(1) Soak the dummy in a controlled environment at any temperature between 20.6 and 22.2 °C (69 and 72 °F) and at any relative humidity between 10 and 70 percent for at least four hours prior to a test. These temperature and humidity levels shall be maintained throughout the entire testing period.

(2) Clothe the test dummy in a cotton-polyester based tight fitting sweat shirt with long sleeves and ankle long pants whose combined weight is not more than 0.25 kg (.55 lbs).

(3) Seat and orient the dummy on a level seating surface without back support as shown in Figure 10 of this subpart, with the lower limbs extended forward, parallel to the midsagittal plane and the arms 0 to 5 degrees forward of vertical. The dummy's midsagittal plane is vertical within ± 1 degree and the posterior surface of the upper spine box is

aligned at 90 ± 1 degrees from the horizontal. (Shim material may be used under the upper legs to maintain the dummy's specified spine box surface alignment).

(4) Establish the impact point at the chest midsagittal plane so that the impact point of the longitudinal centerline of the probe coincides with the dummy's midsagittal plane, is centered on the torso 196 ± 2.5 mm (7.7 ± 0.1 in) vertically from the plane of the seating surface, and is within 0.5 degree of a horizontal plane.

(5) Impact the thorax with the test probe so that at the moment of contact the probe's longitudinal center line falls within 2 degrees of a horizontal line in the dummy's midsagittal plane.

(6) Guide the test probe during impact so that there is no significant lateral, vertical or rotational movement.

(7) No suspension hardware, suspension cables, or any other attachments to the probe, including the velocity vane, shall make contact with the dummy during the test.

12. POST TEST REQUIREMENTS

The contractor shall verify all instrumentation and check data sheets and photographs. Make sure data is recorded in all data blocks on every performance calibration test data sheet.

13. REPORTS

13.1 APPARENT NONCONFORMANCE

During the posttest calibration verification, any indication of apparent nonconformance to the requirements of Regulation P572 shall be communicated by telephone to the COTR within 24 hours with written notification mailed within 48 hours (Saturdays and Sundays excluded). Written notification shall be submitted with a copy of the particular test data sheet(s) and preliminary data plot(s).

In the event of an apparent nonconformance, a posttest 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.

13.2 FINAL PERFORMANCE CALIBRATION REPORTS

A report containing the pre-test calibration and posttest calibration verification data for each Part 572, Subpart P dummy used in the CRS test shall be submitted with the compliance final test report if requested by the COTR.

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.

13.2.1 REQUIREMENTS

Performance calibration report Table of Contents shall include the following:

A. Section 1 — Purpose of Calibration Test

B. Section 2 — Calibration Data Summary

C. Section 3 — Test Data

D. Section 4 — Test Equipment List and Calibration Information

E. Section 5 — Photographs (if applicable)

The test data for each dummy will be presented in separate sections. Each section shall contain a title page, test results summary and the test data. The title page shall include the dummy's serial number and the manufacturer's name. It will also indicate whether the calibration data is pre or posttest. The test results sheets will provide a summary of each test and describe any damage, failures and/or corrective action taken. The test data shall include the pass/fail data sheets, the time histories for each data channel used to determine the pass or fail status, and instrumentation calibration data sheets.

13.2.2 REPORT COVER FORMAT

The information required on the cover follows:

A. Final Report Title And Subtitle such as

12-MONTH-OLD DUMMY CALIBRATION
IN SUPPORT OF
FMVSS 213 CHILD RESTRAINT SYSTEM DYNAMIC TESTS

B. DOT symbol, placed between items B and C

B. Contractor's Name and Address such as

ABC TESTING LABORATORIES, INC.
405 Main Street
Detroit, Michigan 48070

C. Date of Final Performance Calibration Report completion

D. The sponsoring agency's name and address as follows

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
Mail Code: NVS-220, W43-481
1200 New Jersey Avenue, SE
Washington, DC 20590

14. DATA SHEETS

DATA SHEET 1
DUMMY DAMAGE CHECKLIST

Dummy Serial Number _____ Test Date _____

Technician _____

This check sheet is completed as part of the posttest calibration verification.

Indicate NA in the OK column for any components not applicable to this size dummy.

__Perform general cleaning.

Dummy Item	Inspect for	Comments	Damaged	OK
Outer skin	Gashes, rips, cracks			
Head	Ballast secure			
	General appearance			
Neck	Broken or cracked rubber			
	Upper neck bracket firmly attached to the lower neck bracket			
	Looseness at the condyle joint			
	Nodding blocks cracked or out of position			
Spine	Broken or cracks in rubber.			
Ribs	Broken or bent ribs			
	Broken or bent rib supports			
	Damping material separated or cracked			
	Rubber bumpers in place			
Chest Displacement Assembly	Bent shaft			
	Slider arm riding in track			
Transducer leads	Torn cables			

Dummy Item	Inspect for	Comments	Damaged	OK
Accelerometer Mountings	Head mounting secure			
	Chest mounting secure			
Knees	Skin condition			
	Insert (do not remove)			
	Casting			
Limbs	Normal movement and adjustment			
Knee Sliders	Wires intact			
	Rubber returned to “at rest” position			
Pelvis	Broken			
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

Describe the repair or replacement of parts:

Checked by

_____ _____
Signature Date

DATA SHEET 2
EXTERNAL MEASUREMENTS

Dummy Serial Number _____ Test Date _____

Technician _____

__Pretest calibration
__Posttest calibration verification

__1. Seat the dummy on a flat, rigid, smooth, clean, dry, horizontal surface. The seating surface is at least 406 mm (16 in) wide and 221 mm (8 11/16 in) in depth with a vertical section at least 406 mm (16 in) wide and 610 mm (24 in) high attached to the rear of the seating fixture. The dummy's midsagittal plane is vertical and centered on the test surface.
__2. Secure the dummy to the test fixture so that the upper torso and buttocks are tangent to the rear vertical surface of the fixture (as tangent as possible).
__3. Push the dummy's forehead rearward and secure the head (at the forehead) against the seat back surface.
__4. Place the centerlines of the upper arms vertical.
__5. Place the centerlines of the lower arms horizontal.
__6. Position the upper legs so that they are parallel to one another.
__7. Position the lower legs so that they are perpendicular to the upper legs and the bottom of the foot is horizontal.
__8. Record the dimensions listed in following table, except for dimension Q (reference figure 4).
__9. Place the dummy in supine position on the measurement surface. Place a block that is perpendicular to the table at both the head and feet of the dummy. Position the blocks perpendicular to the midsaggital plane of the dummy. Position the blocks so they are in contact with the head and the heels of the dummy. Measure the distance between the blocks for Q.

_____ _____
Signature Date

EXTERNAL DIMENSIONS

HYBRID III, PART 572, SUBPART O EXTERNAL DIMENSIONS				
DIMENSION	**DESCRIPTION**	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head with head pulled back to touch vertical surface of fixture.	456-471.2	
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	276.6-291.8	
C	HIP PIVOT HEIGHT	Centerline of hip pivot bolt to seat surface	27.9-38.1	
D	HIP PIVOT FROM BACKLINE	Centerline of hip pivot bolt to vertical surface of seat	40.1-50.3	
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder pivot bolt to the fixture's rear vertical surface.	50.3-60.5	
F	THIGH CLEARANCE	Fixture's seat surface to highest point on the upper femur segment	63.0-73.2	
G	ELBOW PIVOT TO FINGERTIP	Elbow pivot to the finger tip, in line with the elbow and wrist centerlines	176.6-191.8	
I	SHOULDER PIVOT TO-ELBOW PIVOT	Shoulder pivot bolt to elbow pivot bolt	99.1-114.3	
J	ELBOW REST HEIGHT	Seat surface to bottom of lower arm	150.1-165.3	
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the fixture's rear vertical surface	202.7-217.9	
L	POPLITEAL HEIGHT	Seat surface to the horizontal plane of the bottom of the feet.	138.7-153.9	
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	165.1-180.3	
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of buttocks used for dimension K	144.8-160	

HYBRID III, SUBPART R EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITH JACKET	Measured 261.6 ± 5.1 mm above seat surface	107.5-122.7	
P	FOOT LENGTH	Tip of toe to rear of heal	92.4-102.6	
Q	STATURE	Place the dummy in supine position on the measurement surface. Place a block that is perpendicular to the table at both the head and feet of the dummy. Position the blocks perpendicular to the midsaggital plane of the dummy. Position the blocks so they are in contact with the head and the heels of the dummy. Measure the distance between the blocks.	727.7-753.1	N/A
R	BUTTOCK TO KNEE PIVOT LENGTH	Knee pivot bolt to the fixture's rear vertical surface.	178.5-188.7	
S	HEAD BREADTH	Distance across the head at its widest point	124.4-134.6	
T	HEAD DEPTH	Distance from the forward most surface of the head to the rearmost surface of the head, in line with the midsgittal plane.	149.9-165.1	
U	HIP BREADTH	Distance across the width of the hip at the widest point of the jacket	158.5-173.7	
V	SHOULDER BREADTH	Distance between the outside edges of the shoulder flesh, in line with the shoulder pivot bolts	200.7-215.9	
W	FOOT BREADTH	The widest part of the foot	39.1-49.3	
Y	CHEST CIRCUMFERENCE WITH JACKET	Distance around chest at reference location AA, with jacket on. Measured 261.6 ± 5.1 mm above the seat surface.	452.4-477.8	
Z	WAIST CIRCUMFERENCE	Distance around waist at reference location BB, with jacket on. Measured 111.8 ± 5.1 mm above the seat surface.	447-472.4	
AA	REFERENCE LOCATION FOR DIMENSION Y & O	Reference: 261.6 ± 5.1 mm above the seat surface	256.5-266.7	

HYBRID III, SUBPART R EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
BB	REFERENCE LOCATION FOR DIMENSION Z	Reference: 111.8 ± 5.1 mm above seat surface	106.7-116.9	
CC	SHOULDER HEIGHT	Top of arm to seat surface	299.7-314.9	
DD	CHIN HEIGHT	Bottom of chin to seat surface	289.6-304.8	

EXTERNAL DIMENSIONS

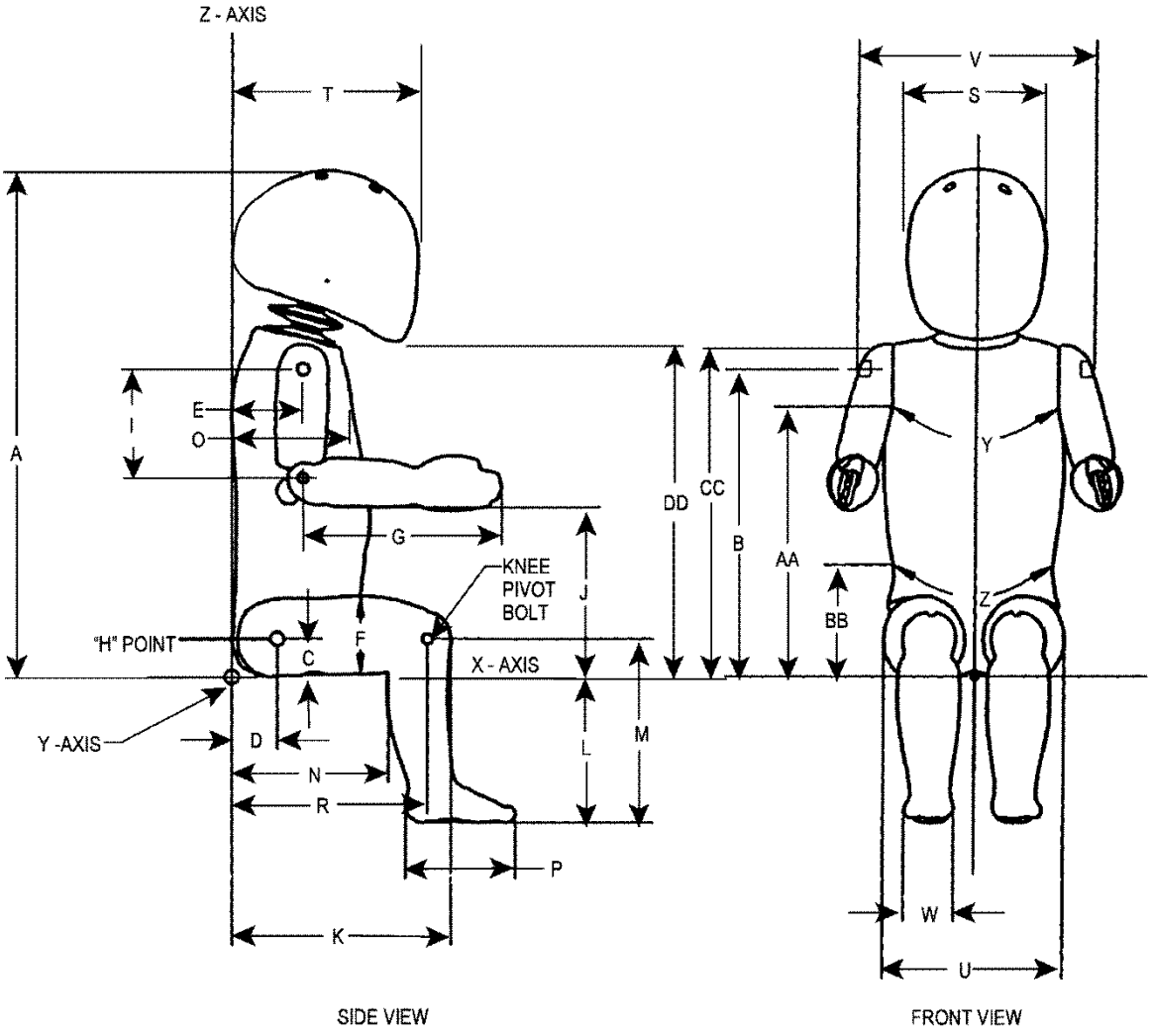


FIGURE 4

DATA SHEET 3
FRONTAL HEAD DROP TEST (572.152)

Dummy Serial Number _____ Test Date _____

Technician _____

__Pretest calibration
__Posttest calibration verification

Test attempt no. ____ (when successive head drops are necessary)

__1. It has been at least 2 hours since a prior frontal head drop. (572.152(c)(5))
__ N/A, ONLY one head drop performed

__2. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head if the damaged area is more than superficial. Note: If the damage resulted from the CRS test in which the dummy was an occupant, the damaged area is to be documented with photography and the posttest calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: _____
_____
_____
_____
_____

__3. The head assembly consists of the head (921022-001), triaxial accelerometer mounting block (SA572-S80), and three (3) accelerometers (SA572-S4). (572.152(a))

__4. Accelerometers and their respective mounts are smooth and clean.

__5. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.155(i))

__6. Soak the head assembly at a temperature between 18.9^{o}C (66^{o}F) and 25.6^{o}C (78^{o}F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.152(c)(1))
Record the maximum temperature _____
Record the minimum temperature _____
Record the maximum humidity _____
Record the minimum humidity _____

__7. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.152(c)(2))

__8. Suspend and orient the head assembly as shown in Figure 5. The lowest point on the forehead is 376.0 ± 1.0 mm (14.8±0.04 inch) from the impact surface. (572.152(c)(3)(i))
Record the actual distance _____

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

__9. The 3.3 mm (0.13 inch) diameter holes located on either side of the dummy's head are equidistant within 2 mm from the impact surface. (572.152(c)(3)(i))
Record the right side distance _____
Record the left side distance _____

__10. The angle between the lower surface plane of the neck transducer mass simulator (910420-003) and the plane of the impact surface is 45 ± 1 degrees. (572.152(c)(3)(i))
Record the angle _____

__11. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.152(c)(4))
Record actual micro finish _____

__12. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (572.152(c)(4))
Record thickness _____
Record width _____
Record length _____

__13. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 ± 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.152(b) & 572.152(c)(4))

__14. Complete the following table. (572.152(b)):

Parameter	Specification	Result
Peak resultant acceleration	100 g ≤ x ≤ 120 g	
Resultant versus time history curve	Unimodal	
Oscillations after the main pulse	Less than 17% of the peak resultant acceleration	
Lateral acceleration	y-axis acceleration ≤ ±15 g	

__15. Plots of the x, y, z, and resultant acceleration data follow this sheet.

_____ _____
Signature Date

FRONTAL HEAD DROP TEST SET-UP SPECIFICATIONS

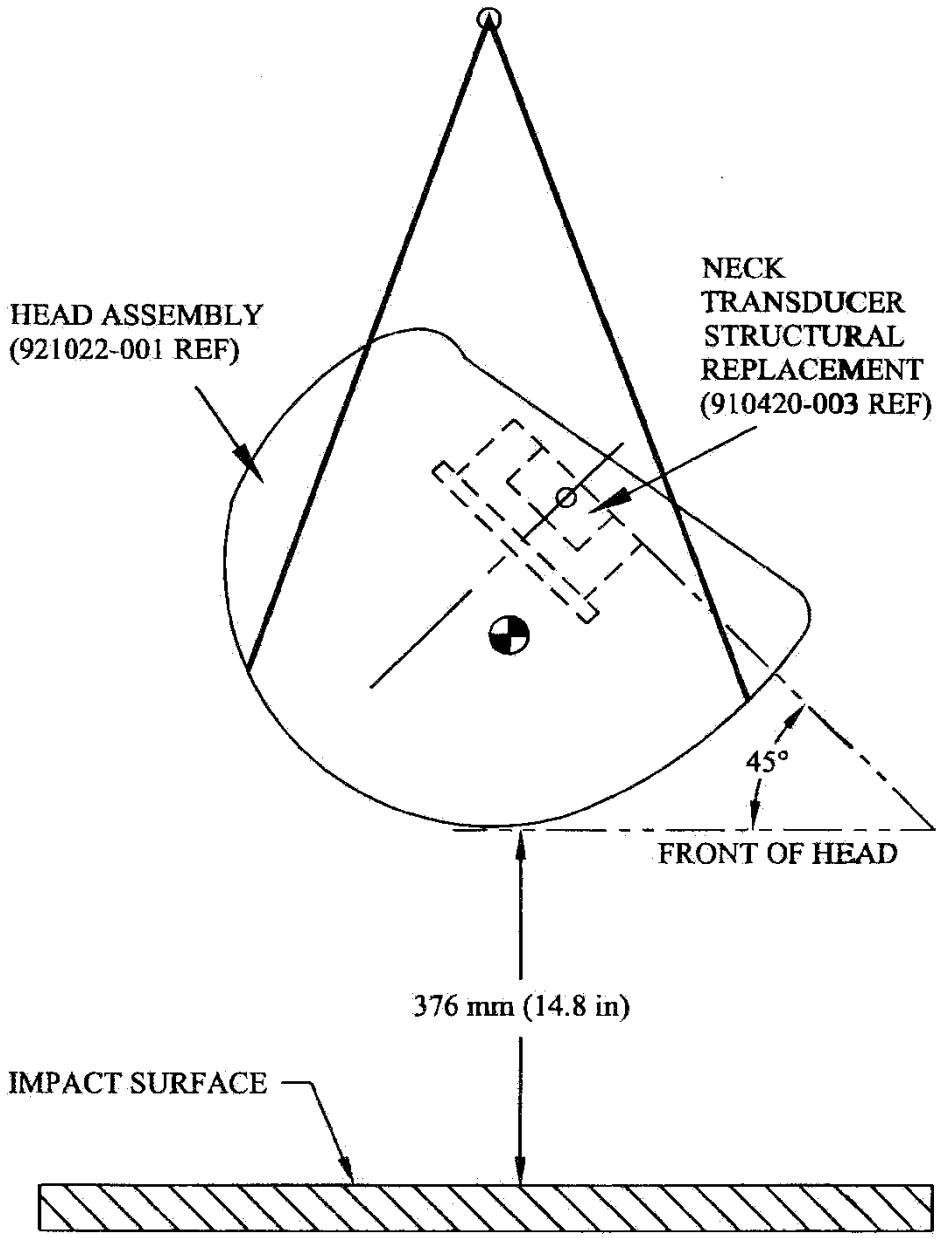


FIGURE 5

DATA SHEET 4
REAR HEAD DROP TEST (572.152)

Dummy Serial Number _____ Test Date _____

Technician _____

__Pretest calibration
__Posttest calibration verification

Test attempt no. ____ (when successive head drops are necessary)

__1. It has been at least 2 hours since a prior rear head drop. (572.152(c)(5))
__ N/A, ONLY one head drop performed

__2. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head if the damaged area is more than superficial. Note: If the damage resulted from the CRS test in which the dummy was an occupant, the damaged area is to be documented with photography and the posttest calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: _____
_____
_____
_____
_____

__3. The head assembly consists of the head (921022-001), triaxial accelerometer mounting block (SA572-S80), and three (3) accelerometers (SA572-S4). (572.152(a))

__4. Accelerometers and their respective mounts are smooth and clean.

__5. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.155(i))

__6. Soak the head assembly at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.152(c)(1))
Record the maximum temperature _____
Record the minimum temperature _____
Record the maximum humidity _____
Record the minimum humidity _____

__7. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.152(c)(2))

__8. Suspend and orient the head assembly as shown in Figure 6. The lowest point on the back of the head is 376.0 ± 1.0 mm (14.8±0.04 inch) from the impact surface. (572.152(c)(3)(ii))
Record the actual distance _____

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

__9. The 3.3 mm (0.13 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. (572.152(c)(3)(ii))
Record the right side distance _____
Record the left side distance _____

__10. The angle between the lower surface plane of the neck transducer mass simulator (910420-003) and the plane of the impact surface is 90 ± 1 degrees. (572.152(c)(3)(ii))
Record the angle _____

__11. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.152(c)(4))
Record actual micro finish _____

__12. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (572.152(c)(4))
Record thickness _____
Record width _____
Record length _____

__13. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches ± 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.152(b) & (572.152(c)(4))

__14. Complete the following table. (572.152(b)):

Parameter	Specification	Result
Peak resultant acceleration	55 g ≤ x ≤ 71 g	
Resultant versus time history curve	Unimodal	
Oscillations after the main pulse	Less than 17% of the peak resultant acceleration	
Lateral acceleration	y-axis acceleration ≤ ±15 g	

__15. Plots of the x, y, z, and resultant acceleration data follow this sheet.

_____ _____
Signature Date

REAR HEAD DROP TEST SET-UP SPECIFICATIONS

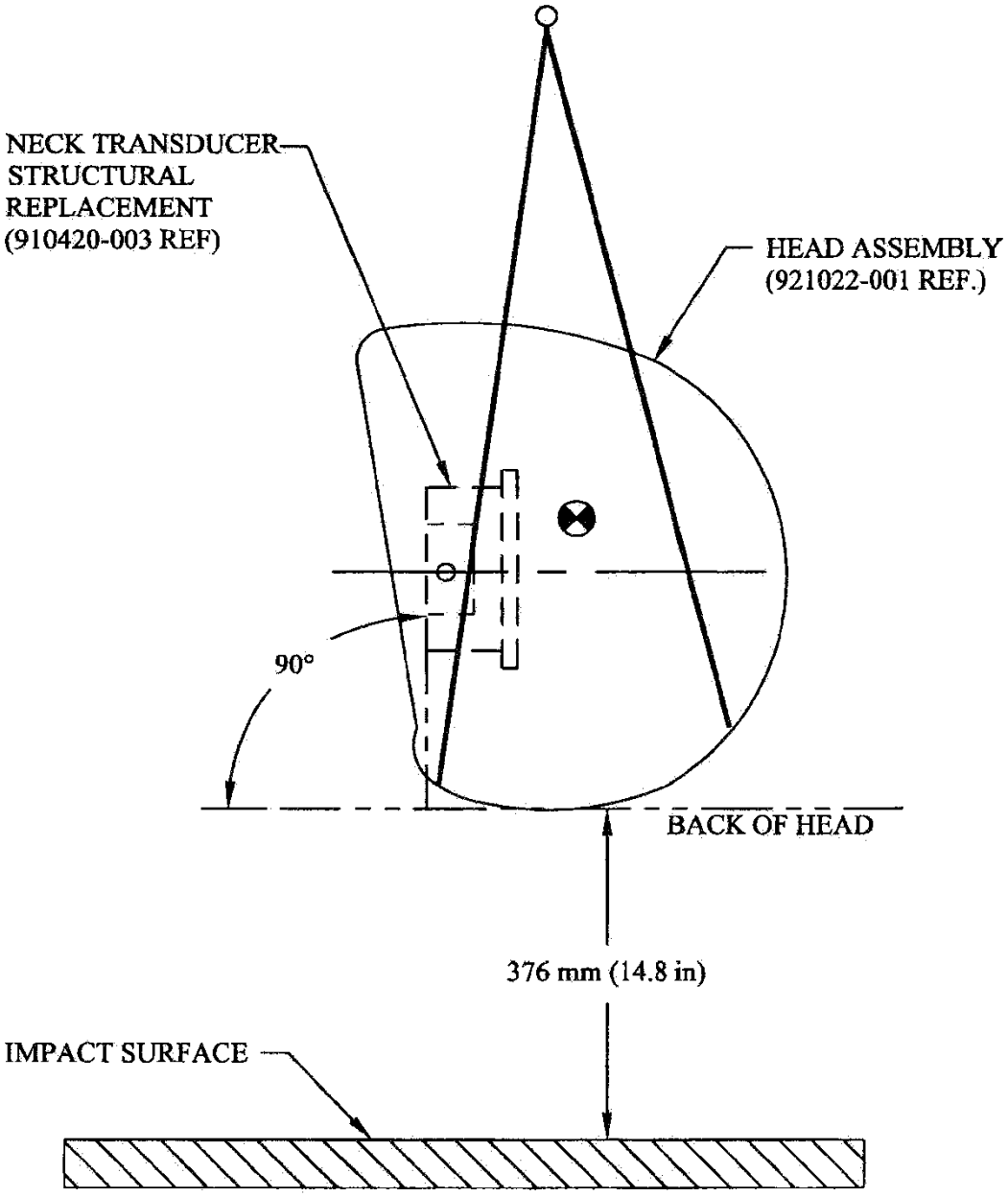


FIGURE 6

DATA SHEET 5
NECK FLEXION TEST (572.153)

Dummy Serial Number _____ Test Date _____

Technician _____

__Pretest calibration
__Posttest calibration verification

Test attempt no. ____ (when successive flexion tests are necessary)

__1. It has been at least 30 minutes since the last neck test. (572.155(m))
__ N/A, this is the first neck test performed

__2. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the CRS test, the damaged area is to be documented with photography and the posttest calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: _____
_____
_____
_____
_____

__3. The components required for the neck tests include the neck assembly (921022-041), and headform (TE-3200-160). (572.153(a))

__4. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.153(c)(1))
Record the maximum temperature _____
Record the minimum temperature _____
Record the maximum humidity _____
Record the minimum humidity _____

__5. Torque the jam nut (9001336) on the neck cable (ATD-6206) between 0.2 Nm and 0.3 Nm. (572.153(c)(2)

__6. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.155(i))

__7. The test fixture pendulum conforms to the specifications in Figure 7.

__8. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the headform is vertical and coincides with the plane of motion of the pendulum as shown in Figure 8E for the flexion test. (572.153(c)(3))

__9. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the top horizontal surface of the neck load cell. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly and not induce neck torsion. (572.153(c)(3)(ii))

__10. Plane D is perpendicular ± 1 degree to the centerline of the pendulum.
__11. Set the instrumentation so that the moment and rotation are defined to be zero when the longitudinal centerline of the neck and pendulum are parallel. (572.153(c)(3)(i))
__12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 5.1 m/s to 5.3 m/s as measured at the center of the pendulum accelerometer at the instant of contact with the honeycomb. (572.153(c)(4))
__13. Complete the following table:

Neck Flexion Test Results (572.153(b)(1) & (572.153(c)(4)(ii)

Parameter		Specification	Result
Pendulum impact speed		5.1 m/s ≤ speed ≤ 5.3 m/s	
Pendulum ΔV with respect to impact speed	@ 10ms	1.6 m/s ≤ ΔV ≤ 2.3 m/s	
	@ 20 ms	3.4 m/s ≤ ΔV ≤ 4.2 m/s	
	@25ms	4.3 m/s ≤ ΔV ≤ 5.2 m/s	
Plane D Rotation		Peak moment* 36 Nm ≤ moment ≤ 45 Nm during the following rotation range 75^o ≤ angle ≤ 86^o	____Nm @ ___degrees
Positive Moment Decay** (Flexion)		Time to decay to 5Nm 60 ms ≤ time ≤ 80ms	

*Moment about the occipital condyle = M_y – (0.005842 m x F_x) (572.153(b)(1)(iii)
My = Moment in Nm measured by the transducer
Fx = Force, in N measured by the transducer
**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.153(c)(4)(i))

__14. Plots of pendulum acceleration, pendulum velocity, neck y-axis moment, and neck rotation about the y-axis follow this sheet.

_____ _____
Signature Date

DATA SHEET 6
NECK EXTENSION TEST (572.153)

Dummy Serial Number _____ Test Date _____

Technician _____

__Pretest calibration
__Posttest calibration verification

Test attempt no. ____ (when successive flexion tests are necessary)

__1. It has been at least 30 minutes since the last neck test. (572.155(m))
__ N/A, this is the first neck test performed
__2. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the CRS test, the damaged area is to be documented with photography and the posttest calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: _____
_____
_____
_____
_____
__3. The components required for the neck tests include the neck assembly (921022-041), and headform (TE-3200-160). (572.153(a))
__4. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.153(c)(1))
Record the maximum temperature _____
Record the minimum temperature _____
Record the maximum humidity _____
Record the minimum humidity _____
__5. Torque the jam nut (9001336) on the neck cable (ATD-6206) between 0.2 Nm and 0.3 Nm. (572.153(c)(2)
__6. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.155(i))
__7. The test fixture pendulum conforms to the specifications in Figure 7.
__8. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the headform is vertical and coincides with the plane of motion of the pendulum as shown in Figure 9E for the flexion test. (572.153(c)(3))
__9. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the top horizontal surface of the neck load cell. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly and not induce neck torsion. (572.153(c)(3)(ii))
__10. Plane D is perpendicular ± 1° to the centerline of the pendulum.

__11. Set the instrumentation so that the moment and rotation are defined to be zero when the longitudinal centerline of the neck and pendulum are parallel. (572.153(c)(3)(i))

__12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 2.4 m/s to 2.6 m/s as measured at the center of the pendulum accelerometer at the instant of contact with the honeycomb. (572.153(c)(4))

__13. Complete the following table:

Neck Extension Results (572.153(b)(2) & (572.153(c)(4)(ii)

Parameter		Specification	Result
Pendulum impact speed		2.4 m/s ≤ speed ≤ 2.6 m/s	
Pendulum ΔV with respect to impact speed	@ 6 ms	0.8 m/s ≤ ΔV ≤ 1.2 m/s	
	@ 10 ms	1.5 m/s ≤ ΔV ≤ 2.1 m/s	
	@ 14 ms	2.2 m/s ≤ ΔV ≤ 2.9 m/s	
Plane D Rotation		Peak moment* -12 Nm $\geq$ moment $\geq$ -23 Nm during the following rotation range $80^o \leq$ angle $\leq 92^o$	____Nm @ ___degrees
Negative Moment Decay** (Extension)		Time to decay to -5Nm 76 ms ≤ time ≤ 90ms	

*Moment about the occipital condyle = $M_y - (0.005842\ m \times F_x)$ (572.153(b)(2)(iii)

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.153(c)(4)(i))

__14. Plots of pendulum acceleration, pendulum velocity, neck y-axis moment, and neck rotation about the y-axis follow this sheet.

_____ _____

Signature Date

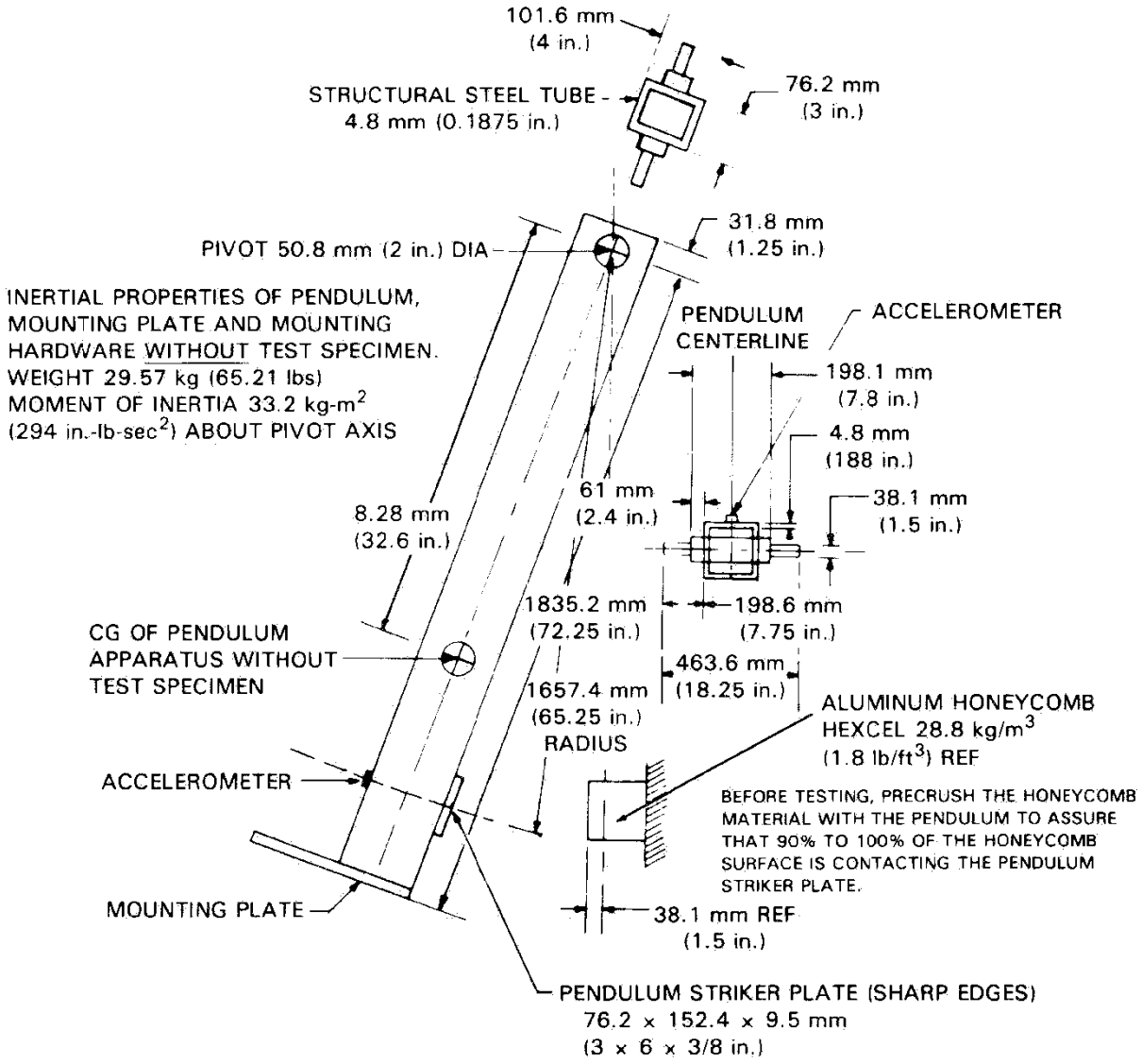
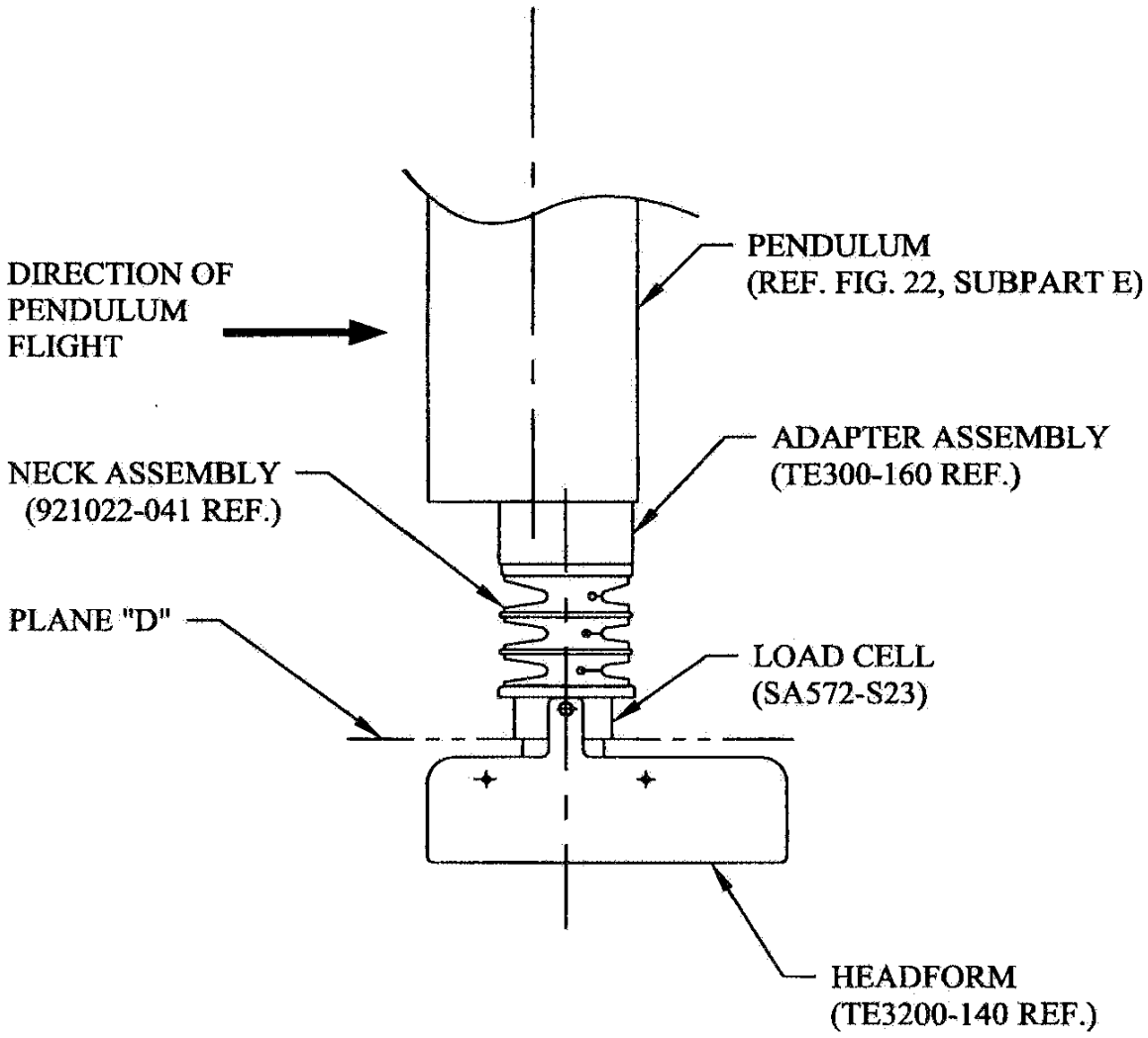
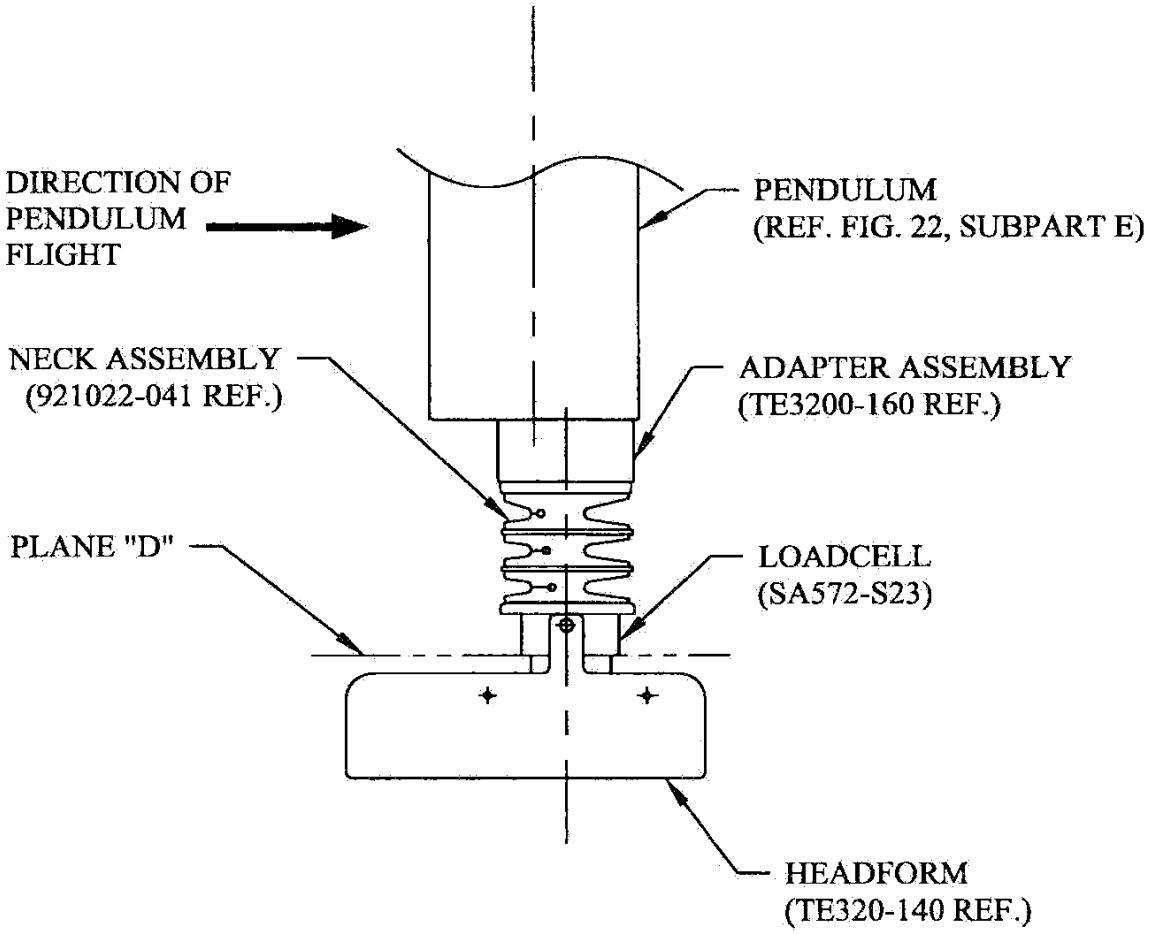

101.6 mm
(4 in.)
STRUCTURAL STEEL TUBE -
4.8 mm (0.1875 in.)
76.2 mm
(3 in.)
31.8 mm
(1.25 in.)
PIVOT 50.8 mm (2 in.) DIA
INERTIAL PROPERTIES OF PENDULUM, MOUNTING PLATE AND MOUNTING HARDWARE WITHOUT TEST SPECIMEN.
WEIGHT 29.57 kg (65.21 lbs)
MOMENT OF INERTIA 33.2 kg-m^2
(294 in.-lb-sec^2) ABOUT PIVOT AXIS
PENDULUM CENTERLINE
ACCELEROMETER
198.1 mm
(7.8 in.)
4.8 mm
(188 in.)
61 mm
(2.4 in.)
38.1 mm
(1.5 in.)
8.28 mm
(32.6 in.)
1835.2 mm
(72.25 in.)
198.6 mm
(7.75 in.)
CG OF PENDULUM APPARATUS WITHOUT TEST SPECIMEN
463.6 mm
(18.25 in.)
1657.4 mm
(65.25 in.)
RADIUS
ALUMINUM HONEYCOMB
HEXCEL 28.8 kg/m^3
(1.8 lb/ft^3) REF
ACCELEROMETER
BEFORE TESTING, PRECRUSH THE HONEYCOMB MATERIAL WITH THE PENDULUM TO ASSURE THAT 90% TO 100% OF THE HONEYCOMB SURFACE IS CONTACTING THE PENDULUM STRIKER PLATE.
MOUNTING PLATE
38.1 mm REF
(1.5 in.)
PENDULUM STRIKER PLATE (SHARP EDGES)
76.2 x 152.4 x 9.5 mm
(3 x 6 x 3/8 in.)

FIGURE 7



NOTE: MOUNT NECK AT LEADING EDGE OF PENDULUM TO AVOID INTERFERENCE.

FIGURE 8



NOTE: MOUNT NECK AT LEADING EDGE OF PENDULUM TO AVOID INTERFERENCE.

FIGURE 9

DATA SHEET 7
THORAX IMPACT TEST (572.154)

Dummy Serial Number _____ Test Date _____

Technician _____

__Pretest calibration
__Posttest calibration verification

Test attempt no. ____ (when successive thorax impact tests are necessary)

__1. It has been at least 30 minutes since the last thorax impact test. (572.155(m))
__ N/A, ONLY one thorax impact test performed
__2. The test fixture conforms to the specifications in Figure 10.
__3. The complete assembled dummy (921022-000) is used (572.154(b)) and is dressed in cotton-polyester-based tight-fitting long-sleeved sweat shirt and ankle length pants. The weight of the shirt and pants shall not exceed 0.25 kg. (572.154(c)(2))
__4. The dummy assembly soaked at a temperature between 20.6°C (69ºF) and 22.2°C (72ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.154(c)(1))
Record the maximum temperature _____
Record the minimum temperature _____
Record the maximum humidity _____
Record the minimum humidity _____
__5. Seat the dummy, without back support on the test fixture surface as shown in Figure 10E. The legs are extended forward, parallel to the midsagittal plane. The surface must be long enough to support the pelvis and outstretched legs. (572.154(c)(3))
__6. The midsagittal plane of the dummy is vertical within ± 1º. (572.154(c)(3))
__7. The posterior surface of the upper spine box is 90° ± 1° from the horizontal. Shim material may be used under the upper legs to maintain the dummy's specified spine box surface alignment. (572.154(c)(3))
__8. Place the upper arms parallel to the torso. Place the lower arms 0º to 5º forward of vertical. (572.154(c)(3))
__9. The longitudinal centerline of the test probe is centered within ±2.5 mm of the midsagittal plane, 196 ± 2.5 mm vertically from the plane of the seating surface and is within ±0.5º of a horizontal line in the dummy's midsagittal plane. (572.154(c)(4))
__10. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.155(i)).
__11. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2º of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.154(c)(5)) The velocity of the test probe at the time of impact is between 4.9 m/s and 5.1 m/s. (572.154(b)) The probe is

guided so there is no significant lateral, vertical or rotational movement during the impact. (572.154(c)(6) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, shall make contact with the dummy during the test. (572.154(c)(7)

__12. Complete the following table:

Thorax Impact Results (572.154(b))

Parameter*	Specification	Result
Test Probe Speed	4.9 m/s ≤ speed ≤ 5.1 m/s	
Peak force**	1514 N ≤ peak force ≤ 1796 N	

*Time zero is defined as the time of initial contact between the test probe and the chest skin.

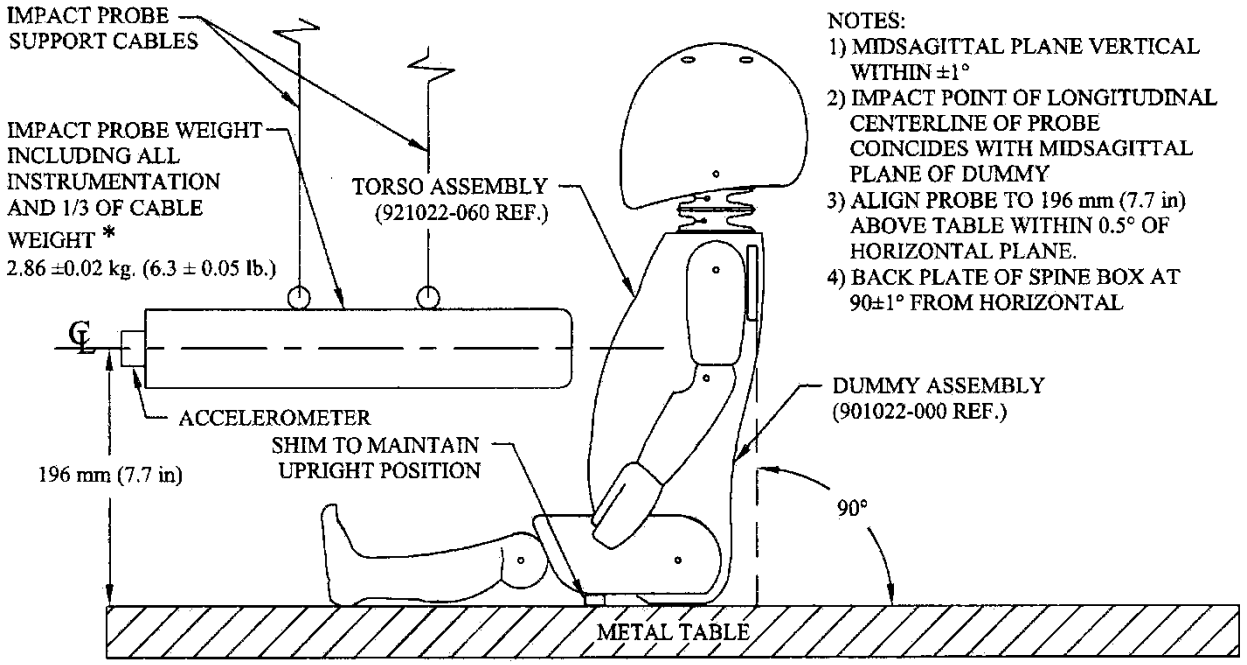
**Force = impactor mass x acceleration

__13. Plots of pendulum acceleration, and pendulum force, follow this sheet.

_____ _____

Signature Date

THORAX IMPACT TEST SET-UP SPECIFICATIONS



* 1/3 OF CABLE WEIGHT NOT TO EXCEED 5% OF THE TOTAL IMPACT PROBE WEIGHT.

Probe specifications:

1. Rigid metallic construction and concentric about its longitudinal axis.
2. A mass of 2.86 ± 0.02 kg (6.3 ± 0.05 lb). 1/3 of the weight of the suspension cables and their attachments to the impact probe are included in the calculation of mass, and such components may not exceed 5 percent of the total weight of the test probe.
3. Minimum mass moment of inertia of 164 kg-cm^2 (0.145 lb-in-sec^2) in yaw and pitch about the center of gravity.
4. The impacting end of the probe is perpendicular to and concentric with the longitudinal axis. It has a flat, continuous, and non-deformable face with diameter of 101.6 ± 0.25 mm (4.00 ± 0.01 in) and an edge radius of 7.6 to 12.7 mm (0.3 to 0.5 in.).
5. A 101-103 mm (4.0-4.1 in) diameter cylinder surface extends at least 12.5 mm to the rear of the impact face.
6. The probe's end opposite to the impact face must have provisions for mounting of an accelerometer with its sensitive axis collinear with the longitudinal axis of the probe.
7. The impact probe shall have a free air resonant frequency of not less than 1000 Hz in line with the longitudinal axis of the impactor.

FIGURE 10

DATA SHEET 8
PART 572 INSTRUMENTATION CALIBRATION INFORMATION

I.D. NO.	MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF LAST CALIBRATION	DATE OF NEXT CALIBRATION
DUMMY INSTRUMENTATION					
HEAD ACCELEROMETERS					
(1) LONGITUDINAL					
(2) LATERAL					
(3) VERTICAL					
NECK TRANSDUCER					
CHEST ACCELEROMETERS					
(1) LONGITUDINAL					
(2) LATERAL					
(3) VERTICAL					
CHEST POTENTIOMETER					
FEMUR LOAD CELLS					
(1) RIGHT FEMUR					
(2) LEFT FEMUR					
LABORATORY INSTRUMENTATION					
NECK PENDULUM ACCELEROMETER					
THORAX PENDULUM ACCELEROMETER					
KNEE PENDULUM ACCELEROMETER					
NECK ROTATION TRANSDUCER 1 (OPTIONAL)					
NECK ROTATION TRANSDUCER 2 (OPTIONAL)					

LABORATORY TECHNICIAN: _____