

APPENDIX A
PART 572E DUMMY PERFORMANCE CALIBRATION
TEST PROCEDURE

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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) with standard test procedures for performing receiving-inspection and performance calibration tests on the Part 572E 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
- B. HEAD DROP TEST
- C. NECK FLEXION TEST
- D. NECK EXTENSION TEST
- E. THORAX IMPACT TEST
- F. FEMUR IMPACT TESTS
- G. HIP JOINT-FEMUR FLEXION

This laboratory procedure for the calibration of Part 572E dummies must be used by National Highway Traffic Safety Administration (NHTSA) contract laboratories performing FMVSS 208 testing for the Office of Vehicle Safety Compliance (OVSC).

2. GENERAL REQUIREMENTS

The Code of Federal Regulations (49CFR), Parts 571 and 572, was amended to adopt the Hybrid III, 50th Percentile Dummy as the means of determining a vehicle's conformance to the performance requirements of FMVSS 208. Each Part 572E dummy used in a compliance test must meet the specifications and performance criteria of Part 572 before and after each vehicle test in order to be an acceptable compliance test tool.

The Part 572E Hybrid III 50th Percentile Dummy consists of components and assemblies specified in the drawing and specifications package which is available from Reprographics Technologies, 9000 Virginia Manor, Beltsville, MD 20705, telephone - (301) 419-5069.

2. GENERAL REQUIREMENTS....Continued

PART 572E TEST DUMMY

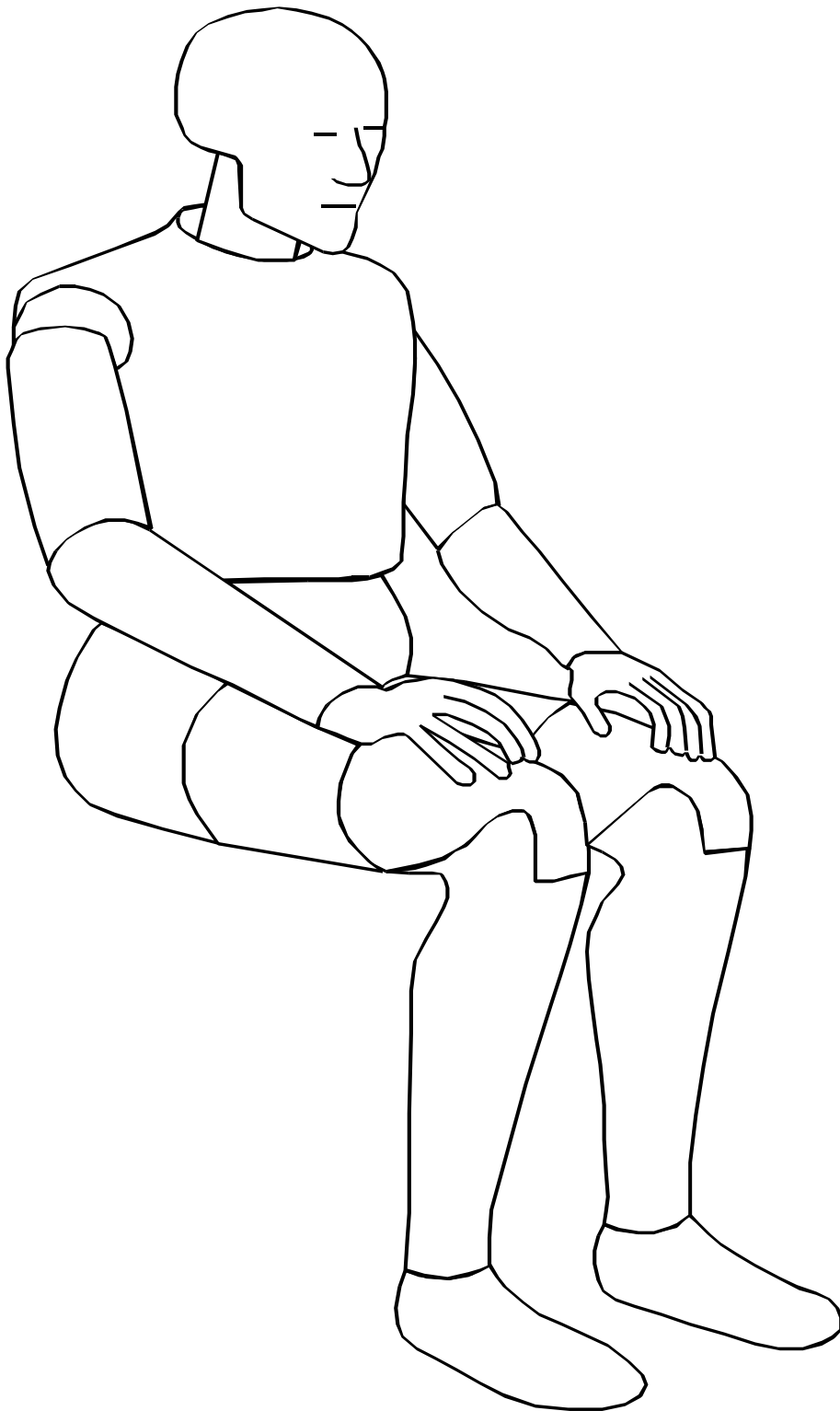


FIGURE 1A

3. SECURITY

All NHTSA Part 572E 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 which 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 572E dummy calibration tests before and after each vehicle crash usage.

No Information concerning the Part 572E 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 572E dummies are being calibrated as test tools to be used in a vehicle test to determine compliance with the requirements of FMVSS 208. The schedule for these performance calibration tests must be correlated with that of the vehicle 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 calibration test data for each particular Part 572E dummy will be sent to the COTR with each test report.

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)

P572 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 dummies 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 dummy components for damage after each crash test and complete a dummy damage checklist (Section 15, Data Sheets) 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. The dummies shall be calibrated by the contractor before and after every vehicle barrier impact usage.

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. Guidelines for setting up and maintaining such calibration systems are described in MIL-C-45662A, "Calibration System Requirements". The calibration system shall be set up and maintained as follows:

- A. Standards for calibrating the measuring and test equipment 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. 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

8. CALIBRATION AND TEST INSTRUMENTATION...Continued

- (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. Records of calibrations for all test instrumentation shall be kept by the contractor 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 and after each 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 and after each test. These calibrations shall be submitted with the final report.

9. PHOTOGRAPHIC DOCUMENTATION

Provide still photographs (8 x 10 inch glossy color prints properly focused for clear images) of post test calibration damage resulting from the vehicle crash test.

10. DEFINITIONS

NONE

11. PRETEST REQUIREMENTS**11.1 TRANSDUCER REQUIREMENTS**

The contractor shall provide (excluding chest displacement transducer) and install the following instrumentation to the GFP dummies.

- A. HEAD – The head accelerometers shall have dimensions, response characteristics and sensitive mass locations specified in drawing 78051-136, revision A and be mounted in the head as shown in drawing 78051-61X, March 28, 1997, and in the assembly shown in drawing 78051-218, revision T.

Three Endevco 7231C-750 accelerometers with 1% Transverse Sensitivity shall be mounted in the head cavity to measure orthogonal accelerations (Ax, Ay, Az) at the center of gravity (CG) of the head assembly.

11. PRETEST REQUIREMENTS....Continued

- B. NECK – The neck transducer shall have the dimensions, response characteristics, and sensitive axis locations specified in drawing 83-5001-008 or C-1709 and be mounted for testing as shown in drawing 79051-63, revision W, and in the assembly shown in drawing 78051-218, revision T.
- C. CHEST – The chest accelerometers shall have the dimensions, response characteristics, and sensitive mass locations specified in drawing 78051-136, revision A and be mounted as shown with adaptor assembly 78051-116, revision D for assembly into 78051-218, revision T. The chest accelerometers are not required for dummy calibration testing but are required for FMVSS 208 testing. Three Endevco 7231C-750 accelerometers with 1% Transverse Sensitivity shall be mounted in the chest cavity to measure orthogonal accelerations (A_x , A_y , A_z) at the CG of the chest assembly.

The chest deflection transducer shall have the dimensions and response characteristics specified in drawing 78051-342, revision A (Bourns Potentiometer Model 6638S-432-102, or alternate Vernitech Potentiometer Model 81422A) and be mounted in the chest deflection transducer assembly 78051-317, revision A for assembly into 78051-218, revision T.

- D. LEGS -- The femur load cells shall have the dimensions, response characteristics, and sensitive axis locations specified in drawing 78051-265 (GSE Model 2430) and be mounted in assemblies 78051-46 and -47 for assembly into 78051-218, revision T. The femur transducers are not required for calibration of the dummy but are required for FMVSS 208 testing.
- E. TEST FIXTURE – The neck pendulum, thorax and knee probe accelerometers shall have the dimensions and characteristics of Endevco Model 7231C.

The sign convention for outputs of transducers mounted within the Hybrid III that measure head and chest accelerations, chest deflection and femur loads are located in Figure 2A. For other transducers see SAE J1733DEC94 (Appendix F).

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:

- A. Head acceleration – Class 1000
- B. Neck force – Class 60
- C. Neck pendulum acceleration – Class 60
- D. Neck rotation transducers -- Class 60

11. PRETEST REQUIREMENTS....Continued

- E. Thorax and thorax pendulum acceleration – Class 180
- F. Thorax deflection -- Class 600
- G. Knee pendulum acceleration – Class 600
- H. Femur force – Class 600

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

11. PRETEST REQUIREMENTS....Continued

SIGN CONVENTIONS FOR PART 572 SUBPART E TEST DUMMIES

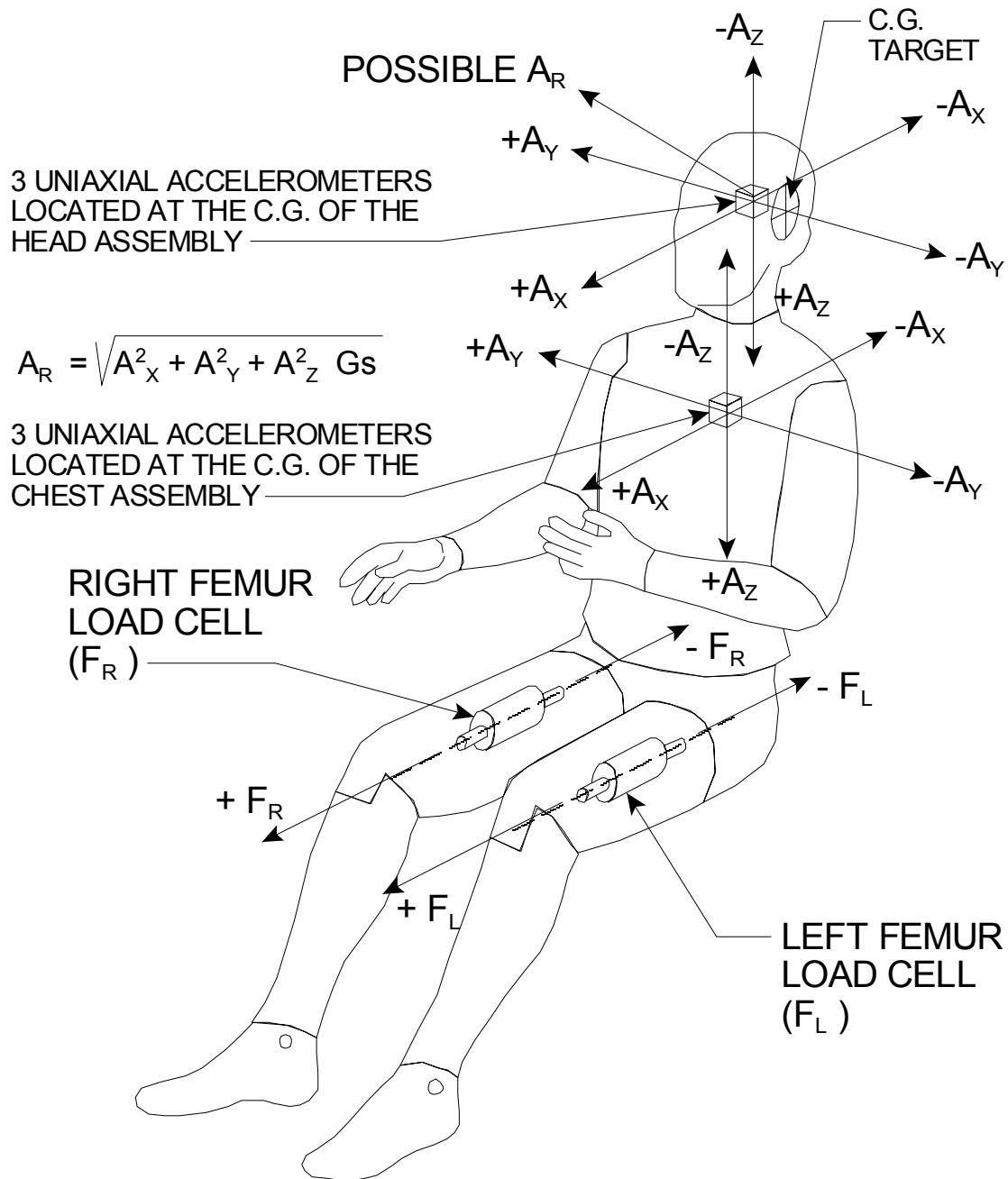


FIGURE 2A

11. PRETEST REQUIREMENTS....Continued

TABLE 1A

SIGN CONVENTION FOR HYBRID III TRANSDUCER OUTPUTS	
BODY SEGMENT — MEASURED FORCE	POSITIVE OUTPUT DIRECTION
NECK FX SHEAR FY SHEAR FZ AXIAL MX MOMENT (ROLL) MY MOMENT (PITCH) MZ MOMENT (YAW)	HEAD REARWARD OR CHEST FORWARD HEAD LEFTWARD, CHEST RIGHTWARD HEAD UPWARD, CHEST DOWNWARD LEFT EAR TOWARD LEFT SHOULDER CHIN TOWARD STERNUM CHIN TOWARD LEFT SHOULDER
FEMUR FX SHEAR FY SHEAR FZ AXIAL MX MOMENT (ROLL) MY MOMENT (PITCH) MZ MOMENT (YAW)	KNEE UPWARD, UPPER FEMUR DOWNWARD KNEE RIGHTWARD, UPPER FEMUR LEFTWARD KNEE FORWARD (TENSION), PELVIS REARWARD KNEE LEFTWARD, HOLD UPPER FEMUR IN PLACE KNEE UPWARD, HOLD UPPER FEMUR IN PLACE KNEE ROTATED CCW WHEN FACING FRONT OF DUMMY
KNEE CLEVIS - FZ AXIAL	TIBIA DOWNWARD (TENSION), FEMUR UPWARD
UPPER TIBIA MX MOMENT MY MOMENT	ANKLE LEFTWARD, HOLD KNEE IN PLACE ANKLE FORWARD, BOTTOM OF KNEE CLEVIS REARWARD
LOWER TIBIA FX SHEAR FY SHEAR FZ AXIAL MX MOMENT MY MOMENT	ANKLE FORWARD, KNEE REARWARD ANKLE RIGHTWARD, KNEE LEFTWARD ANKLE DOWNWARD (TENSION), KNEE UPWARD ANKLE LEFTWARD, HOLD KNEE IN PLACE ANKLE FORWARD, BOTTOM OF KNEE CLEVIS REARWARD
CHEST DISPLACEMENT	CHEST COMPRESSED - NEGATIVE
KNEE SHEAR DISPLACEMENT	PUSH ON FRONT OF TIBIA - NEGATIVE

NOTE: DIRECTIONS ARE DEFINED IN RELATION TO A SEATED DUMMY

11. PRETEST REQUIREMENTS....Continued

11.2 GENERAL TEST CONDITIONS

- A. Surfaces of dummy components are not painted unless otherwise specified.
- 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.
- C. Dummy performance tests are conducted at any temperature from 69°F to 72°F unless otherwise specified 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 1 G, barely restraining the weight of the limb when it is extended horizontally. The force required to move a limb segment does not exceed 2 Gs throughout the range of limb motion.
- E. Dummies will be clothed for the thorax calibration tests with the exception of the shoes being removed.

12. CALIBRATION TEST EXECUTION

12.1 EXTERNAL MEASUREMENTS

- A. Place the dummy on a flat, rigid, smooth, clean, dry, horizontal surface as shown in Figure 3A. The seating surface is at least 16 inches wide and 16 inches in depth with a vertical section at least 16 inches wide and 36 inches high attached to the rear of the seating fixture. The dummy's midsagittal plane is vertical and centered on the test surface.
- B. The dummy is secured to the test fixture so the rear surfaces of the upper thorax and buttock are tangent or as near tangent as possible to the rear vertical surface of the fixture and the dummy's midsagittal plane is vertical, Figures 4A and 5A.
- C. Position the H point on each side of the dummy so it is located 3.4 ± 0.1 inches above the seat surface and 5.4 ± 0.1 inches forward of the rear vertical surface of the fixture. (The H point is located 1.83 inches forward and 2.57 inches downward from the center of the pelvic angle reference hole in the lumbar-pelvic adaptor).

Record the following measurements on the data sheet in Section 15, "External Dimensions."

- D. Mark a point (AA) on the dummy's chest 17 ± 0.1 inches above the test surface. Measure and record the chest circumference (Y) at this location.

12. COMPLIANCE TEST EXECUTION....Continued

- E. Mark a point (BB) on the dummy's pelvis 9 ± 0.1 inches above the test surface. Measure and record the waist circumference (Z) at this location.
- F. Remove the dummy's chest skin and abdominal insert.
- G. Measure and record the chest depth (0). Measurement is made at the No. 3 rib location.
- H. Remove the four (4) socket head cap screws which attach the lumbar spine to the thoracic spine. Check the torque on the two (2) spine cables to be 10 lbf-in.

NOTE: At this point the thorax is to be inspected for damage. The thorax displacement transducer may be removed for calibration if required (pretest calibration only). Extreme caution to be used so as not to damage the instrumentation cables.

- I. Reassemble the lumbar spine to the thoracic spine.
- J. Reposition the dummy as specified in steps a thru c, above.
- K. Position the upper and lower legs parallel to the midsagittal plane so the lines between the midpoint of the knee and ankle pivots are vertical.
- L. Position the feet parallel to the midsagittal plane of the dummy with the bottoms horizontal and parallel to the seating surface.
- M. Position and secure the dummy's head so the occiput (back of the skull) is 1.7 ± 0.1 inches forward of the test fixture rear vertical surface. This requires some extension of the neck and also requires the upper thorax to be secured to hold the dummy in position.
- N. Position the upper arms so the lines between the midpoint of the shoulder and elbow pivots are vertical.
- O. Position the lower arms so the lines between the midpoint of the elbow and wrist pivots are horizontal.
- P. Record the following dimensions. (The symbols and description for each measurement are indicated.)
 - C "H" point height above seat-surface (Reference)
 - D "H" point from seat rear vertical surface (Reference)
 - H Skull cap skin to seat rear vertical surface (Reference)
 - A Total Sitting Height -
Seat surface to highest point on top of the head.
 - F Thigh Clearance -
Measured at the highest point on the upper femur segment.

12. COMPLIANCE TEST EXECUTION....Continued

- K Buttock to Knee Length -
The forward most part of the knee flesh to the rear vertical surface of the fixture.
- N Buttock Popliteal Length -
The rearmost part of the lower leg to the rear vertical surface of the fixture.
- L Popliteal Height -
Seat surface to the plane of the horizontal plane of the bottom of the feet.
- M Knee Pivot Height -
Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.
- P Foot Length -
Tip of toe to rear of heel.
- W Foot Breadth -
Measure at the widest part of the foot.
- E Shoulder Pivot from Backline -
Center of the shoulder clevis to the rear vertical surface of the fixture.
- V Shoulder Breadth -
Measure between outside edges of shoulder clevises in line with the shoulder pivot bolt.
- B Shoulder Pivot Height -
Centerline of shoulder pivot bolt to the seat surface.
- J Elbow Rest Height -
Measure from the flesh below the elbow pivot bolt to the seat surface.
- I Shoulder - Elbow Length -
Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.
- G Back of Elbow to Wrist Pivot -
Measure from the back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots.

12. COMPLIANCE TEST EXECUTION....Continued

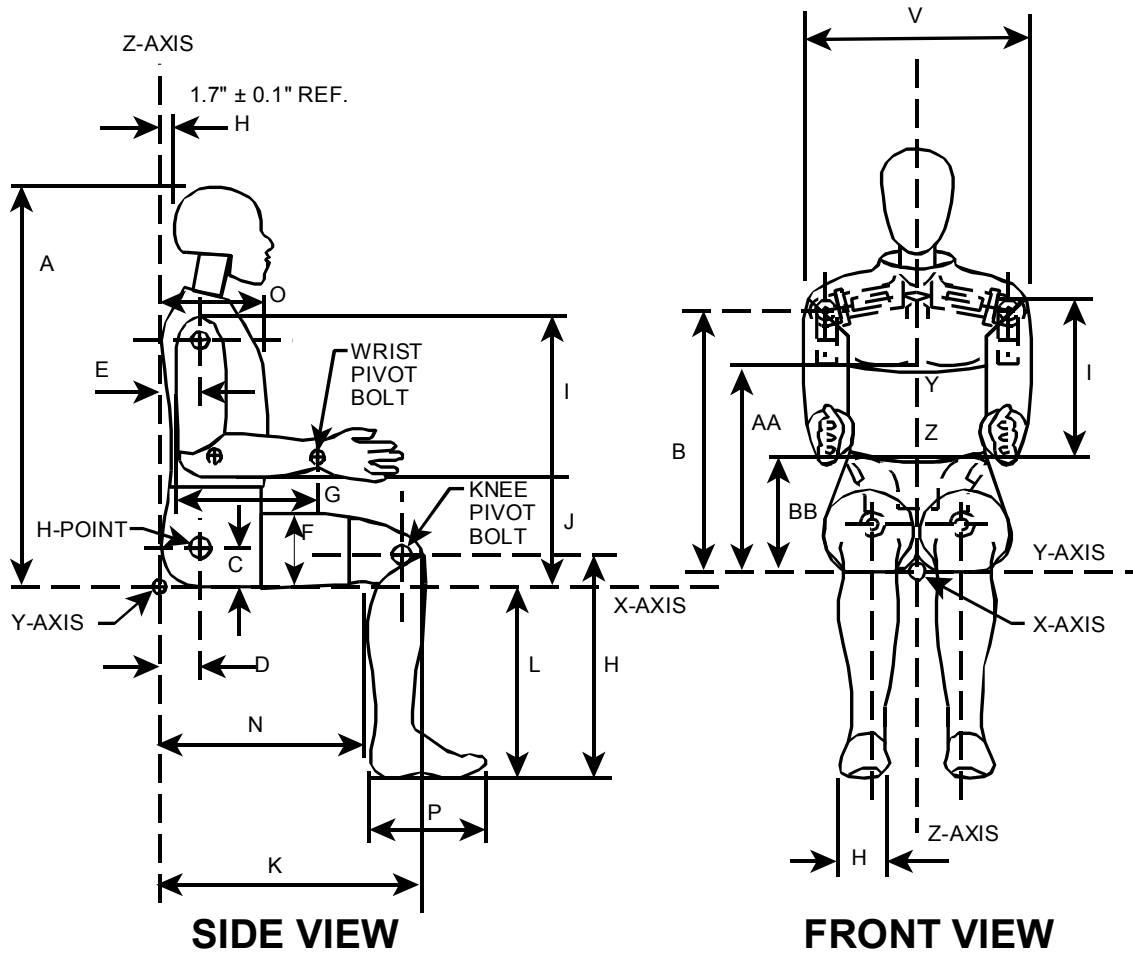
TABLE 2A

HYBRID III EXTERIOR DIMENSIONS		
DIMENSIONAL SYMBOL	DESCRIPTION	ASSEMBLY DIMENSION
A	SITTING HEIGHT	34.8" ± 0.2"
B	SHOULDER PIVOT HEIGHT	20.2" ± 0.3"
C	H-POINT HEIGHT	3.4" REF ± 0.1"
D	H-POINT LOCATION FROM BACKLINE	5.4" REF ± 0.1"
E	SHOULDER PIVOT LOCATION FROM BACKLINE	3.5" ± 0.2"
F	THIGH CLEARANCE	5.8" ± 0.3"
G	BACK OF ELBOW TO WRIST PIVOT	11.7" ± 0.3"
H	SKULL CAP TO BACKLINE	1.7" ± 0.1"
I	SHOULDER - ELBOW LENGTH	13.3" ± 0.3"
J	ELBOW REST HEIGHT	7.9" ± 0.4"
K	BUTTOCK KNEE LENGTH	23.3" ± 0.5"
L	POPLITEAL HEIGHT	17.4" ± 0.5"
M	KNEE PIVOT HEIGHT	19.4" ± 0.3"
N	BUTTOCK POPLITEAL LENGTH	18.3" ± 0.5"
O	CHEST DEPTH	8.7" ± 0.3"
P	FOOT LENGTH	10.2" ± 0.3"
V	SHOULDER BREADTH	16.9" ± 0.3"
W	FOOT BREADTH	3.9" ± 0.3"
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	38.8" ± 0.6"
Z	WAIST CIRCUMFERENCE	33.5" ± 0.6"
AA	LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	17.0" ± 0.1"
BB	LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	9.0" ± 0.1"

NOTE: THE H-POINT IS LOCATED 1.83 INCHES FORWARD AND 2.57 INCHES DOWN FROM THE CENTER OF THE PELVIS ANGLE REFERENCE HOLE.

12. COMPLIANCE TEST EXECUTION....Continued

EXTERNAL DIMENSIONS SPECIFICATIONS



NOTE: Figure is referenced to the erect seated position. The curved lumbar does not allow the Hybrid III to be positioned in a perfect erect attitude. (REF: S572.31(A)(6))

FIGURE 3A

12. COMPLIANCE TEST EXECUTION....Continued

EXTERNAL DIMENSIONS TEST SETUP

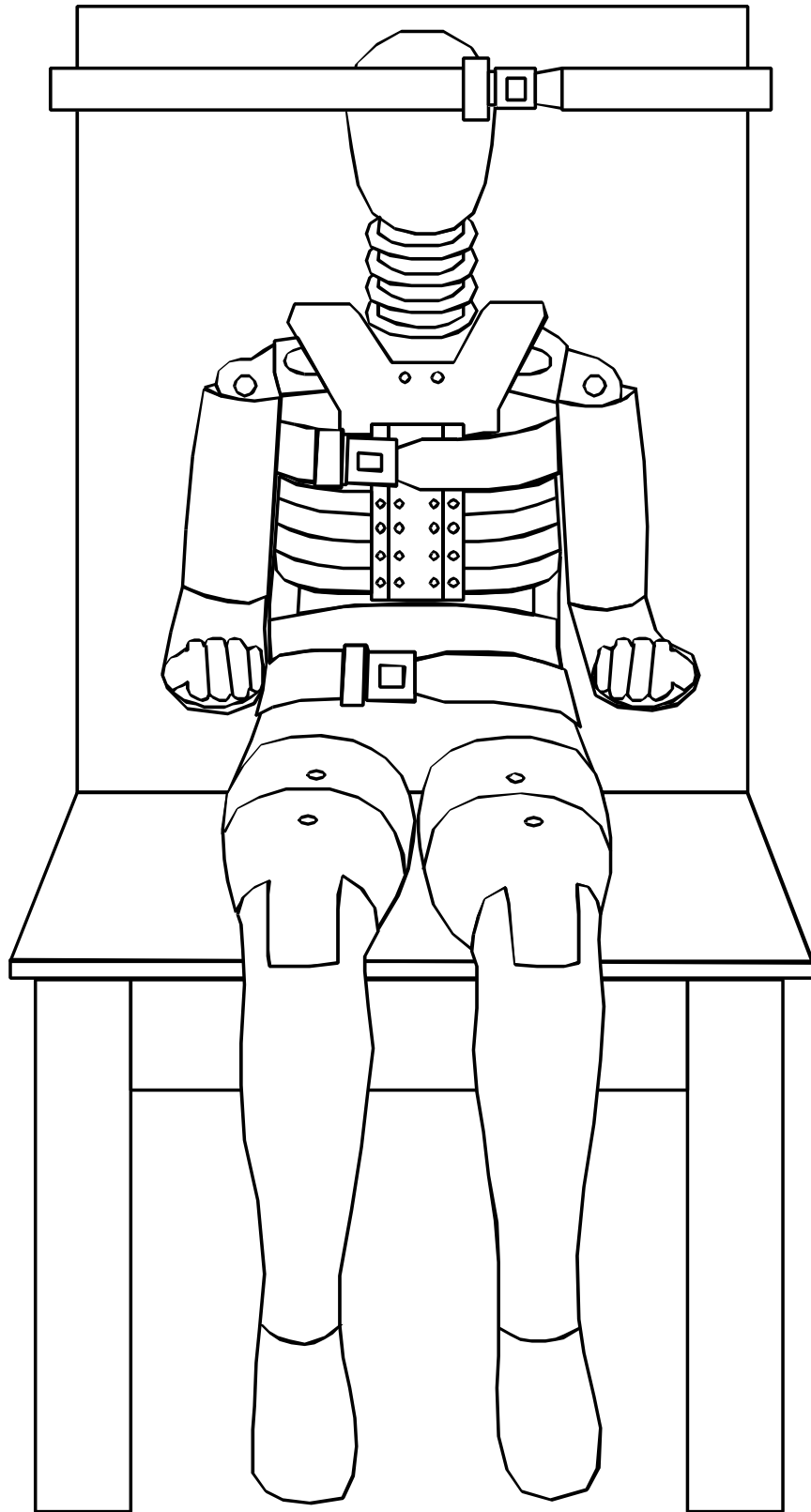


FIGURE 4A

EXTERNAL DIMENSIONS TEST SETUP

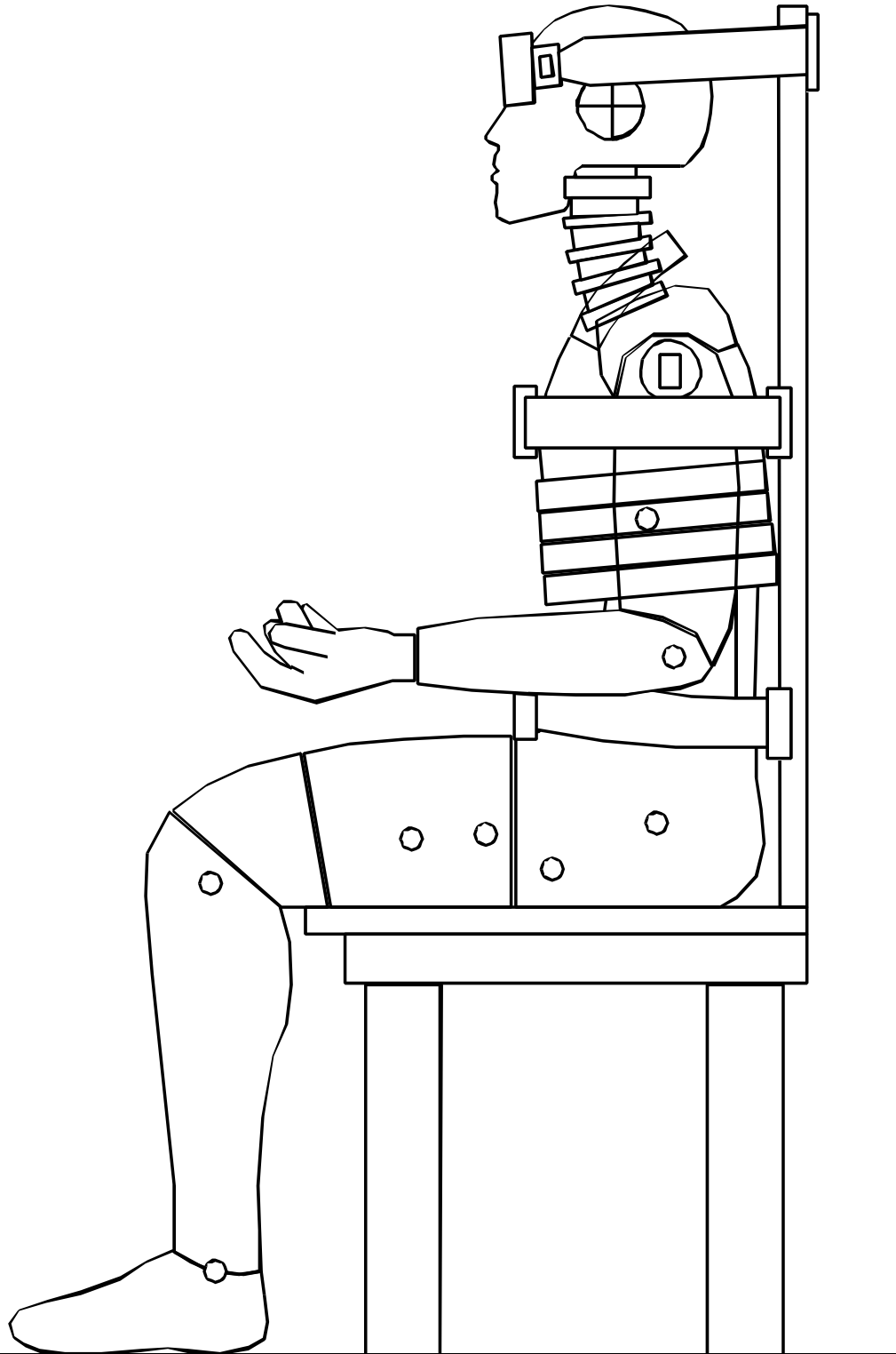


FIGURE 5A

12. COMPLIANCE TEST EXECUTION....Continued

12.2 HEAD DROP TEST

- A. The head assembly consists of the head (78051-61X), the neck transducer or neck transducer structural replacement (78051-383X revision P) or (C-1797), the head to neck pivot pin (78051-339), and three (3) accelerometers for measuring the test parameters.
- B. The weight of the head assembly is 10 pounds \pm 0.1 pound.
- C. The skull cap screws (1/4-20) should be torqued to 160 lbf-in.
- D. Accelerometers and their respective mounts should be inspected to ensure the mounting surfaces are smooth and clean and provide a good mechanical interface. Mounting screws should be torqued to their proper value.
- E. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (Appendix G) for Channel Class 1000.

12.2.1 TEST PROCEDURE

- A. Soak the head assembly in a test environment at any temperature between 66°F and 78°F and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test.
- B. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration testing completed before any replacement or repairs are made.
- C. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test.
- D. Suspend the head assembly in a manner similar to that shown in Figure 6A. The lowest point on the forehead is 0.5 ± 0.04 inch below the lowest point on the dummy's nose when the midsagittal plane is vertical. The 0.062 inch diameter holes located on either side of the dummy's head are used to ensure the head is level with respect to the impact surface. A typical test setup is shown in Figure 7A.
- E. Drop the head assembly from a height of 14.8 inches \pm 0.04 inches by a means that ensures a smooth, instant release onto a rigidly supported flat, horizontal steel plate with dimensions of 2 feet by 2 feet by 2 inches thick. The impact surface is to be clean and dry and have a micro finish in the range of 8 micro inches to 80 micro inches (rms).

12. COMPLIANCE TEST EXECUTION....Continued

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.

- F. Allow a period of at least 3 hours between successive tests on the same head assembly.

12.2.2 PERFORMANCE SPECIFICATIONS (S572.32 (b))

- A. The peak resultant acceleration shall not be less than 225 Gs and not more than 275 Gs.
- B. The resultant acceleration vs. time history curve shall be unimodal to the extent that oscillations occurring after the main pulse shall not exceed 10% of the peak resultant acceleration.
- C. The lateral acceleration shall not exceed 15 Gs.

12. COMPLIANCE TEST EXECUTION....Continued

HEAD DROP TEST SETUP SPECIFICATIONS

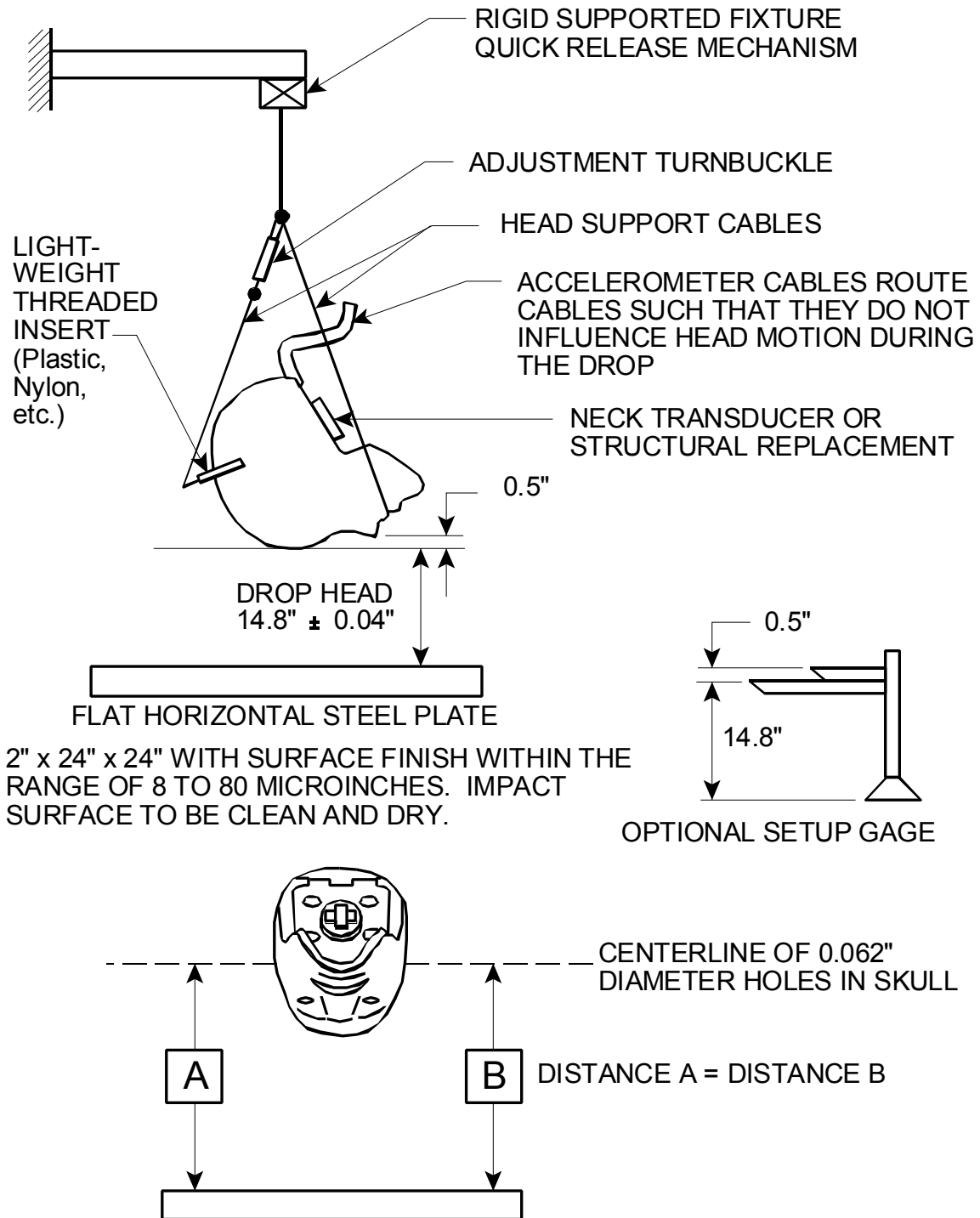


FIGURE 6A

12. COMPLIANCE TEST EXECUTION....Continued

HEAD DROP TEST SETUP

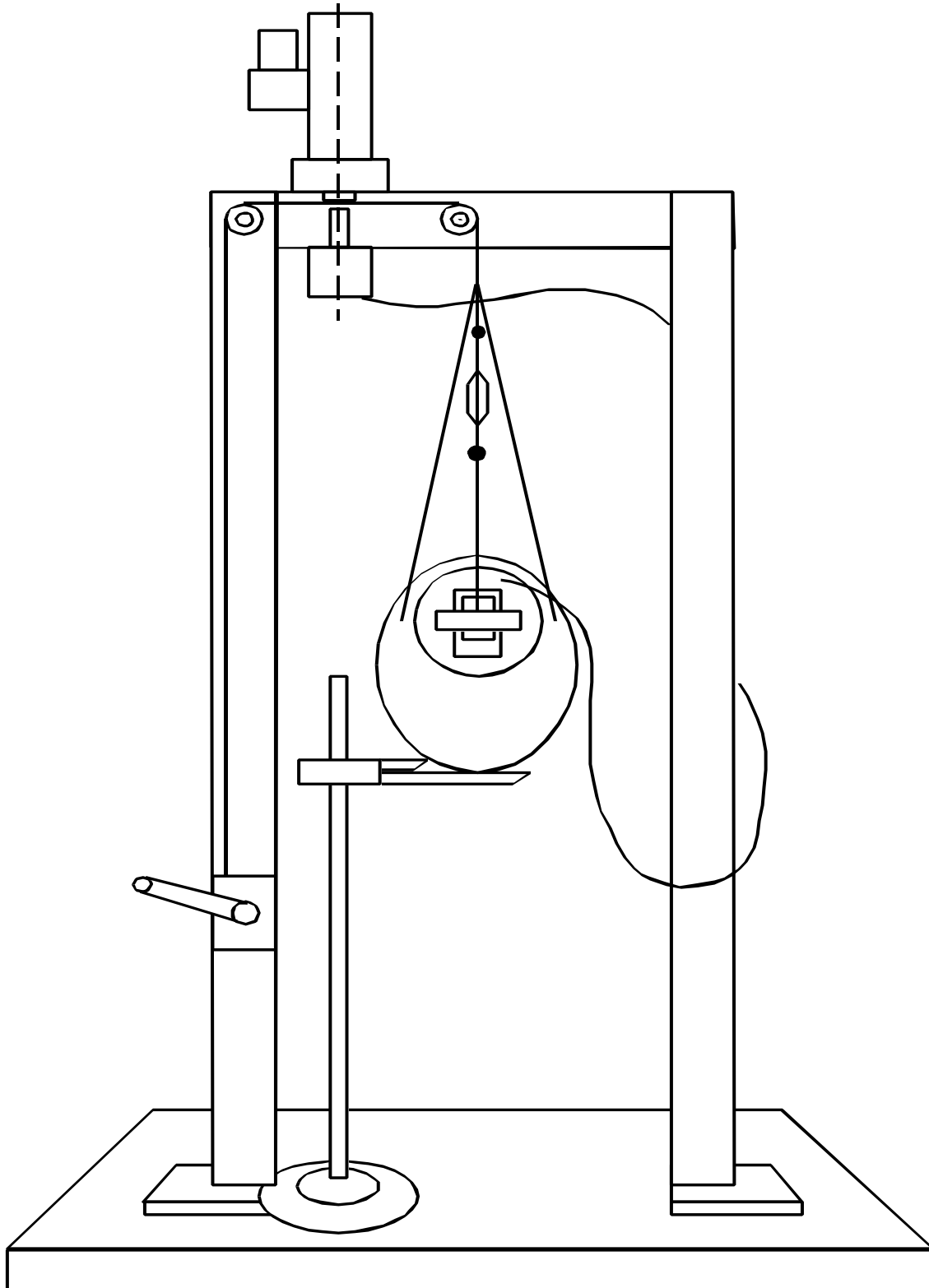


FIGURE 7A

12. COMPLIANCE TEST EXECUTION....Continued

12.3 NECK TESTS

- A. The components required for the neck tests include the head assembly (78051-61X revision C), neck assembly (78051-90 revision A), bib simulator (78051-84), upper neck adjusting bracket (78051-307 revision X) and the lower neck adjusting bracket (78051-303 revision E). Actual or simulated accelerometers may be used in the head to maintain the proper weight and center of gravity location. Data from the accelerometers are not required. A neck transducer for measuring the "X" axis force and "Y" moment data channels is required.
- B. The test fixture specifications are shown in Figure 8A. The aluminum honeycomb material is commercial grade, 1.8 lb cu ft with 0.75 inch diameter cells. The accelerometer is mounted with its sensitive axis aligned with the arc formed at a radius 65.25 inches from the pivot point.
- C. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (Appendix H).

The pendulum, neck transducer and neck rotation data channels are processed using an SAE Class 60 filter.

12.3.1 TEST PROCEDURE

- A. Soak the neck assembly in a test environment at any temperature between 69°F and 72°F and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to the test.
- B. Inspect the neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration testing completed before any replacement or repairs are made.
- C. Inspect the nodding blocks (78051-351) for any deterioration and replace (pre-crash test calibration only) as necessary. At the initiation of a test series check the durometer to be 80 to 90 Shore A. Ensure the nodding blocks are installed correctly as shown on drawing 78051-90, revision A.
- D. Inspect the nodding joint washers 78051-253 for the proper interference fit. Adjust or replace as required.
- E. Mount the head-neck assembly on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9A for the flexion test and Figure 10A for the extension test.

12. COMPLIANCE TEST EXECUTION....Continued

- F. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 11A.
- G. Torque the jam nut (78051-64) on the neck cable (78051-301 revision E) to 1.0 ± 0.2 lbf-ft before each test on the same neck by loosening the jam nut and relaxing the neck cable before torquing.
- H. The number of cells in the honeycomb material which are required to produce the pendulum deceleration pulse may be different for the flexion and extension tests. The number of cells required may also vary for each sheet and/or batch of material. Prior to the test the honeycomb material may require a pre-crushing by impacting it lightly with the pendulum until the desired honeycomb surface is contacting the pendulum striker plate.
- I. With the pendulum resting against the honeycomb material, adjust the neck bracket until the longitudinal centerline of the pendulum is perpendicular ± 1 degree to plane "D" on the dummy's head.
- J. Allow a period of at least thirty (30) minutes between successive tests on the same neck.

12.3.2 PERFORMANCE SPECIFICATIONS - NECK FLEXION (S572.33 (b)(1))

- A. Release the pendulum and allow it to fall freely from a height to achieve an impact velocity of 22.6 to 23.4 ft/sec measured at the center of the pendulum accelerometer.
- B. Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material.
- C. The pendulum deceleration vs. time curve must conform to the following specifications:

12. COMPLIANCE TEST EXECUTION....Continued

NECK FLEXION	
TIME	DECELERATION LEVEL
10 ms	22.50 Gs - 27.50 Gs
20 ms	17.60 Gs - 22.60 Gs
30 ms	12.50 Gs - 18.50 Gs
Above 30 ms	29.0 Gs Maximum

- D. The decaying deceleration vs. time curve shall first cross the 5 Gs level between 34 and 42 milliseconds (ms) after time-zero.
- E. The maximum rotation of plane "D" shall be 64° to 78° and occur between 57 and 64 milliseconds after time zero. The decaying rotation vs. time curve shall cross the zero angle between 113 ms and 128 ms after time-zero.
- F. The moment about the "Y" axis of the head, measured with respect to the occipital condyles, shall have a maximum value between 65 and 80 lbf-ft and occur between 47 ms and 58 ms. The decaying positive moment vs. time curve shall first cross the zero moment between 97 ms and 107 ms after time-zero.

With the six (6) axis neck transducer, the moment is calculated using the formula:

$$\text{Moment lbf-ft} = [M_y \text{ (lbf-ft)}] - [0.05833 \text{ ft}] [F_x \text{ (lbf)}]$$

Where —

- M_y = Moment in lbf-ft measured by the transducer
- F_x = Force, in lbs measured by the transducer

12.3.3 PERFORMANCE SPECIFICATIONS - NECK EXTENSION (S572.33(b)(2))

- A. Release the pendulum and allow it to fall freely from a height to achieve an impact velocity of 19.5 to 20.3 ft/sec measured at the center of the pendulum accelerometer.
- B. Time-zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material.
- C. The pendulum deceleration vs. time curve must conform to the following specifications:

12. COMPLIANCE TEST EXECUTION....Continued

NECK EXTENSION	
TIME	DECELERATION LEVEL
10 ms	17.20 Gs - 21.20 Gs
20 ms	14.00 Gs - 19.00 Gs
30 ms	11.00 Gs - 16.00 Gs
Above 30 ms	22.0 Gs Maximum

- D. The decaying deceleration vs. time curve shall first cross the 5 Gs level between 38 ms and 46 ms after time-zero.
- E. The maximum rotation of plane "D" shall be 81° to 106° and occur between 72 ms and 82 ms after time-zero. The decaying rotation vs. time curve shall cross the zero angle between 147 ms and 174 ms after time-zero.
- F. The moment about the "Y" axis of the head measured with respect to the occipital condyles shall have a minimum value between -39 lbf-ft and -59 lbf-ft and occur between 65 ms and 79 ms after time-zero. The decaying negative moment shall first cross the zero level between 120 ms and 148 ms after time-zero.

With the six (6) axis neck transducer, the moment is calculated using the formula:

$$\text{Moment lbf-ft} = [M_y \text{ (lbf-ft)}] - [0.05833 \text{ ft}] [F_x \text{ (lbf)}]$$

Where —

- M_y = Moment in lbf-ft measured by the transducer
- F_x = Force, in lbs measured by the transducer

12. COMPLIANCE TEST EXECUTION....Continued

NECK PENDULUM SPECIFICATIONS

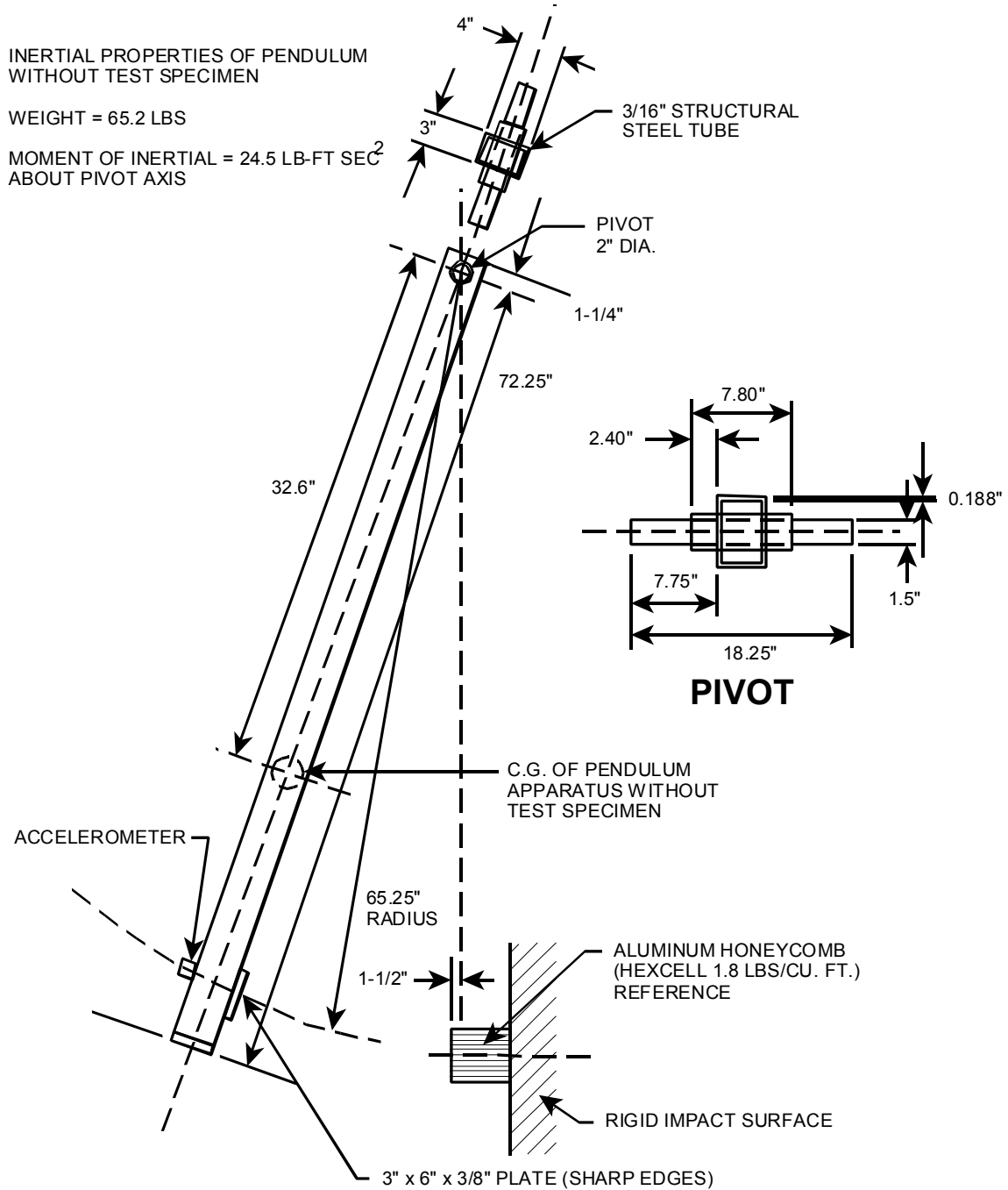


FIGURE 8A

12. COMPLIANCE TEST EXECUTION....Continued

NECK FLEXION TEST SETUP SPECIFICATIONS

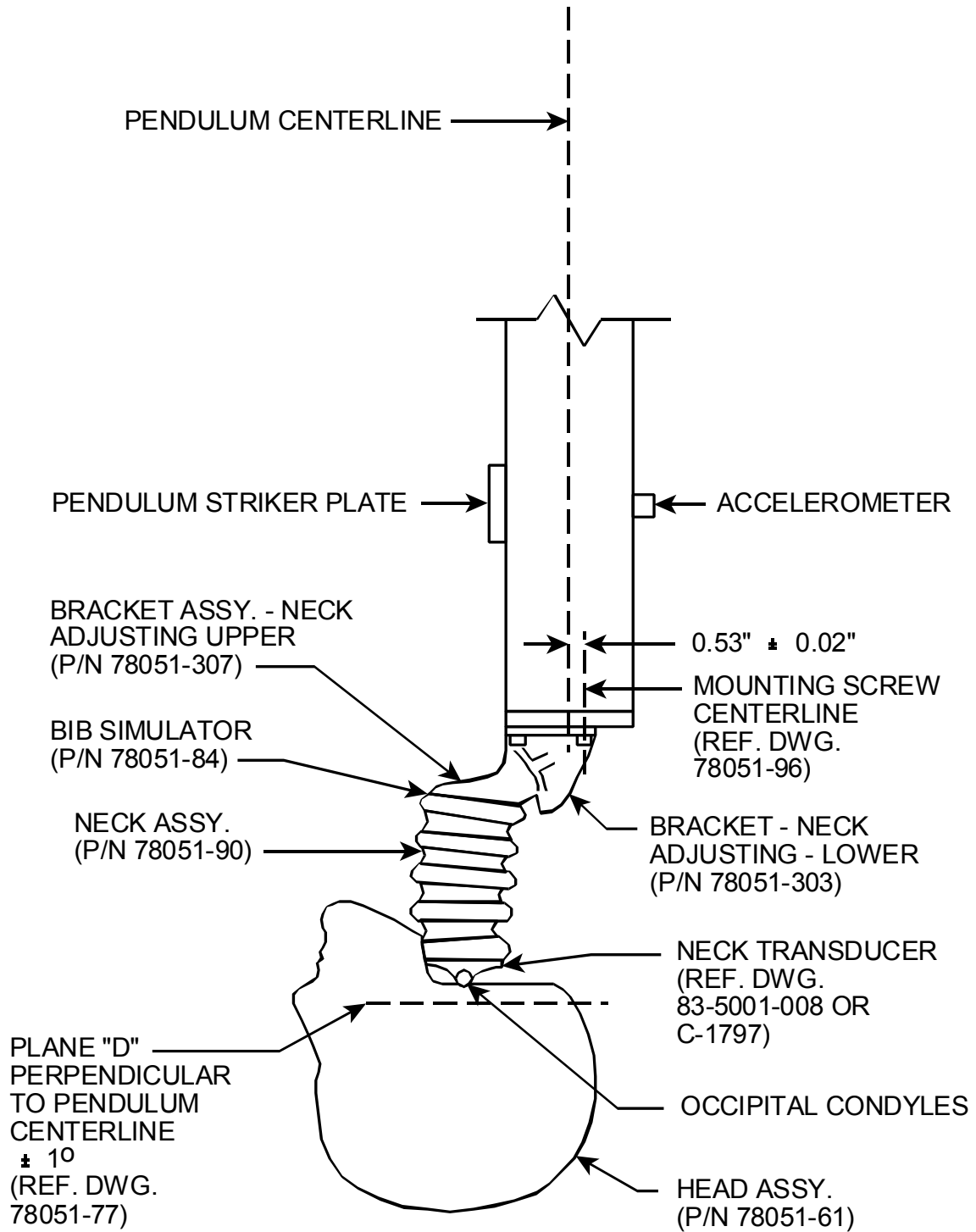


FIGURE 9A

12. COMPLIANCE TEST EXECUTION....Continued

NECK EXTENSION TEST SETUP SPECIFICATION

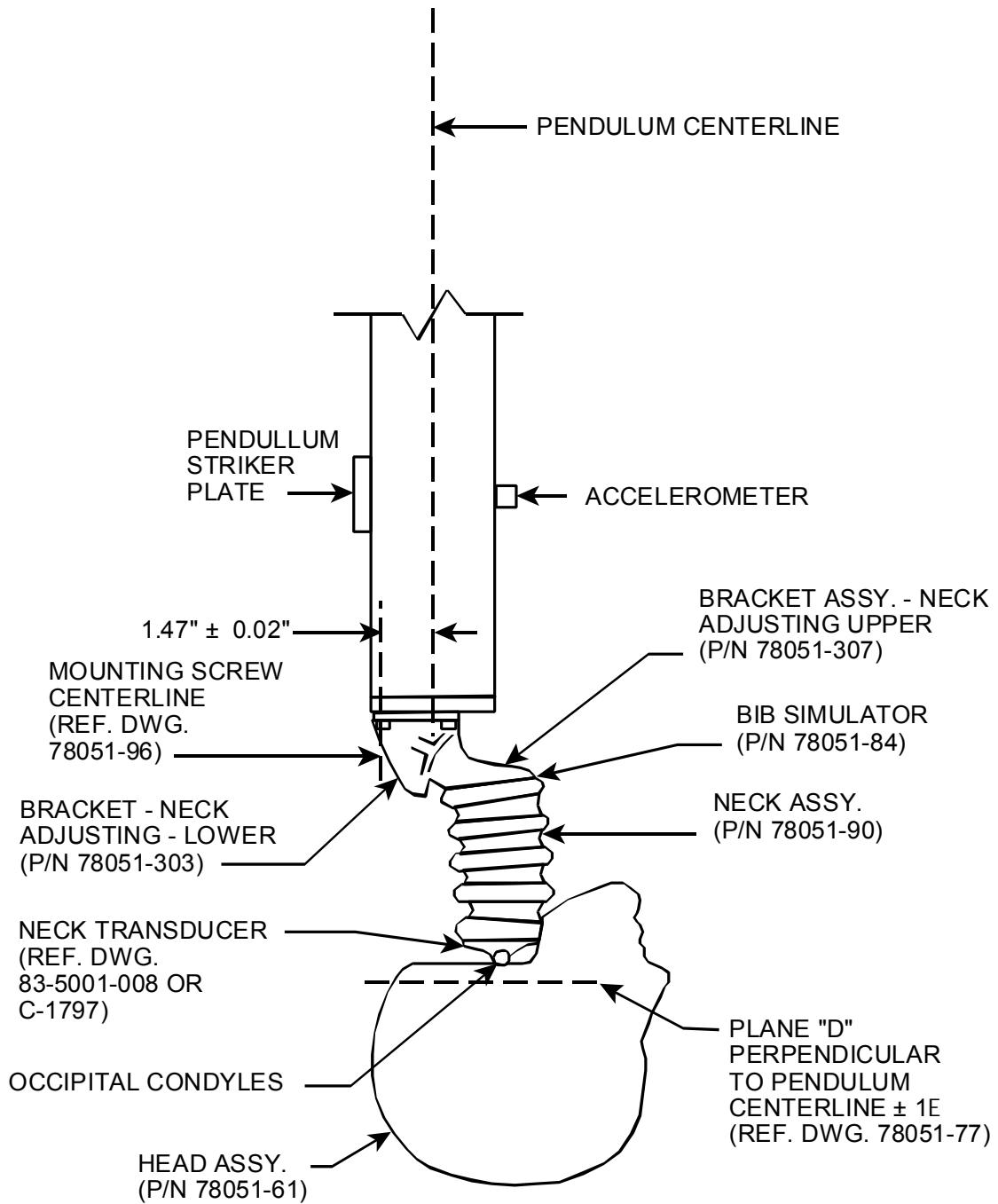
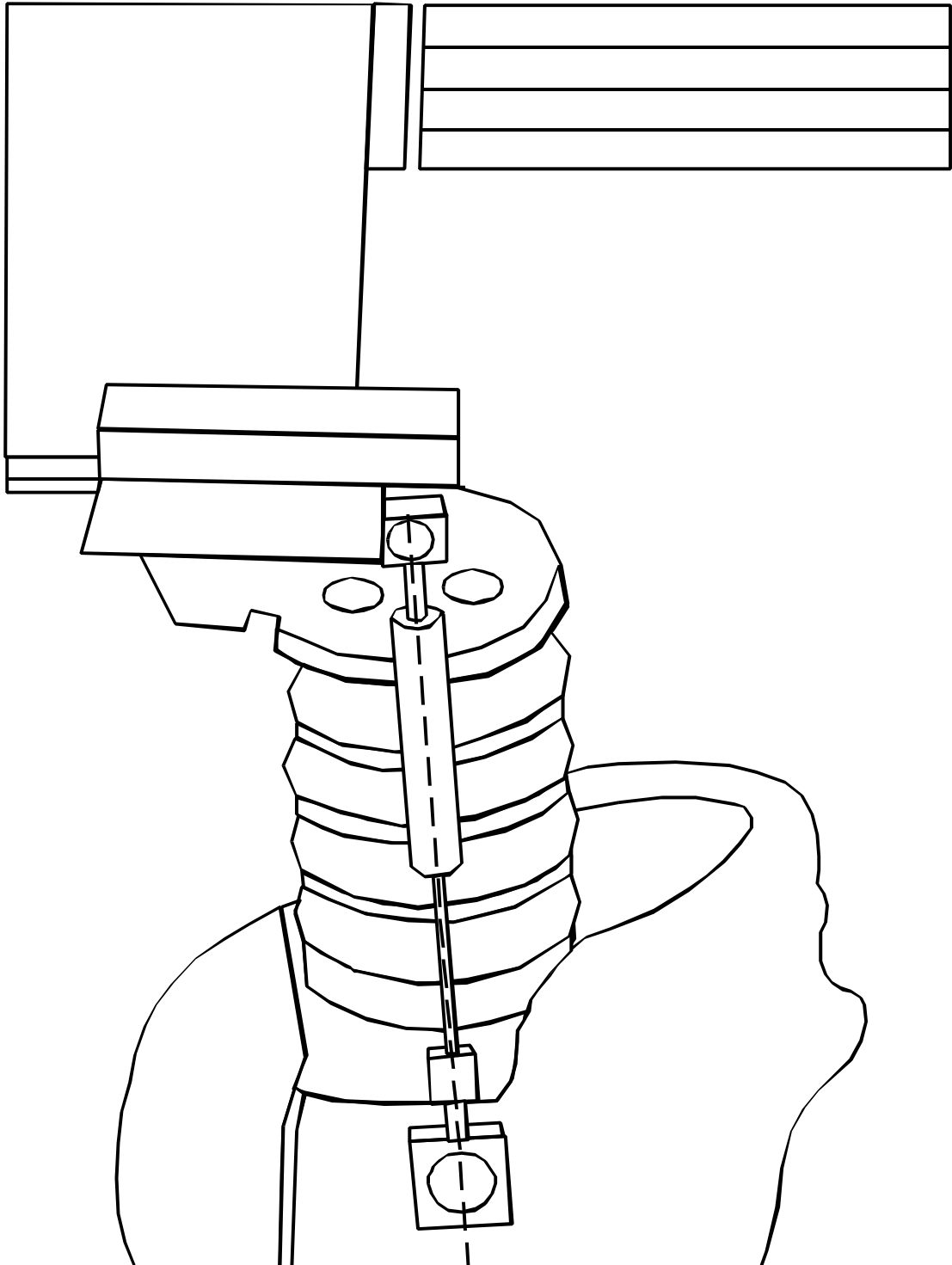


FIGURE 10A

12. COMPLIANCE TEST EXECUTION....Continued

ROTATION TRANSDUCER ASSEMBLY



12. COMPLIANCE TEST EXECUTION....Continued

12.4 FEMUR IMPACT TEST

- A. The components required for the knee impact test include the leg assemblies (86-5001-001, revision A) left and (86-5001-002, revision A) right with the upper leg assemblies, (78051-46) left and (78051-47) right removed.
- B. The test fixture, Figure 12A, consists of a rigid test probe and a method of rigidly supporting the knee and lower leg assembly. The probe mass is 11 lbs \pm 0.02 lbs including instrumentation. The diameter of the impacting face is 3 inches \pm 0.01 inches with an edge radius of 0.02 inch. An accelerometer is mounted on the end opposite from the impacting face with its sensitive axis collinear to the longitudinal centerline of the test probe.
- C. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (Appendix H) for Channel Class 600.

12.4.1 TEST PROCEDURE

- A. Inspect the knee assembly for cracks, cuts, abrasions, etc. Repair or replace damaged components. NOTE: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged areas are to be documented with photography and the post-test calibration testing completed before any repairs or replacements are made.
- B. Soak the test material in an environment at any temperature between 66°F and 78°F and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to its application in a test.
- C. Mount the knee/lower leg assembly to the fixture using the load cell simulator (78051-319 revision A). Torque the load cell simulator bolts to 30 lbf-ft to ensure there is no slippage of the assembly during the impact. Adjust the lower leg so the line between the knee and ankle pivots is at an angle of 24° rearward of vertical. No contact is permitted between the foot and any exterior surface.
- D. Align the longitudinal centerline of the test probe so it is collinear within 2 degrees with the longitudinal centerline of the femur load cell simulator at the time of impact.
- E. Guide the probe so there is no significant lateral, vertical or rotational movement at time-zero.
- F. Time-zero is defined as the time of initial contact between the test probe face and the knee skin.
- G. Impact the knee so the longitudinal centerline of the test probe is within 0.5° of a horizontal line parallel to the load cell simulator at time-zero.

12. COMPLIANCE TEST EXECUTION....Continued

H. The velocity of the test probe at the time of impact is $6.9 \text{ ft/sec} \pm 0.1 \text{ ft/sec}$.

12.4.2 PERFORMANCE SPECIFICATIONS (S572.35 (b))

The peak impact force, defined as the product of the test probe mass and the deceleration, shall be between 1060 and 1300 lbs.

12. COMPLIANCE TEST EXECUTION....Continued

KNEE IMPACT TEST SETUP SPECIFICATIONS

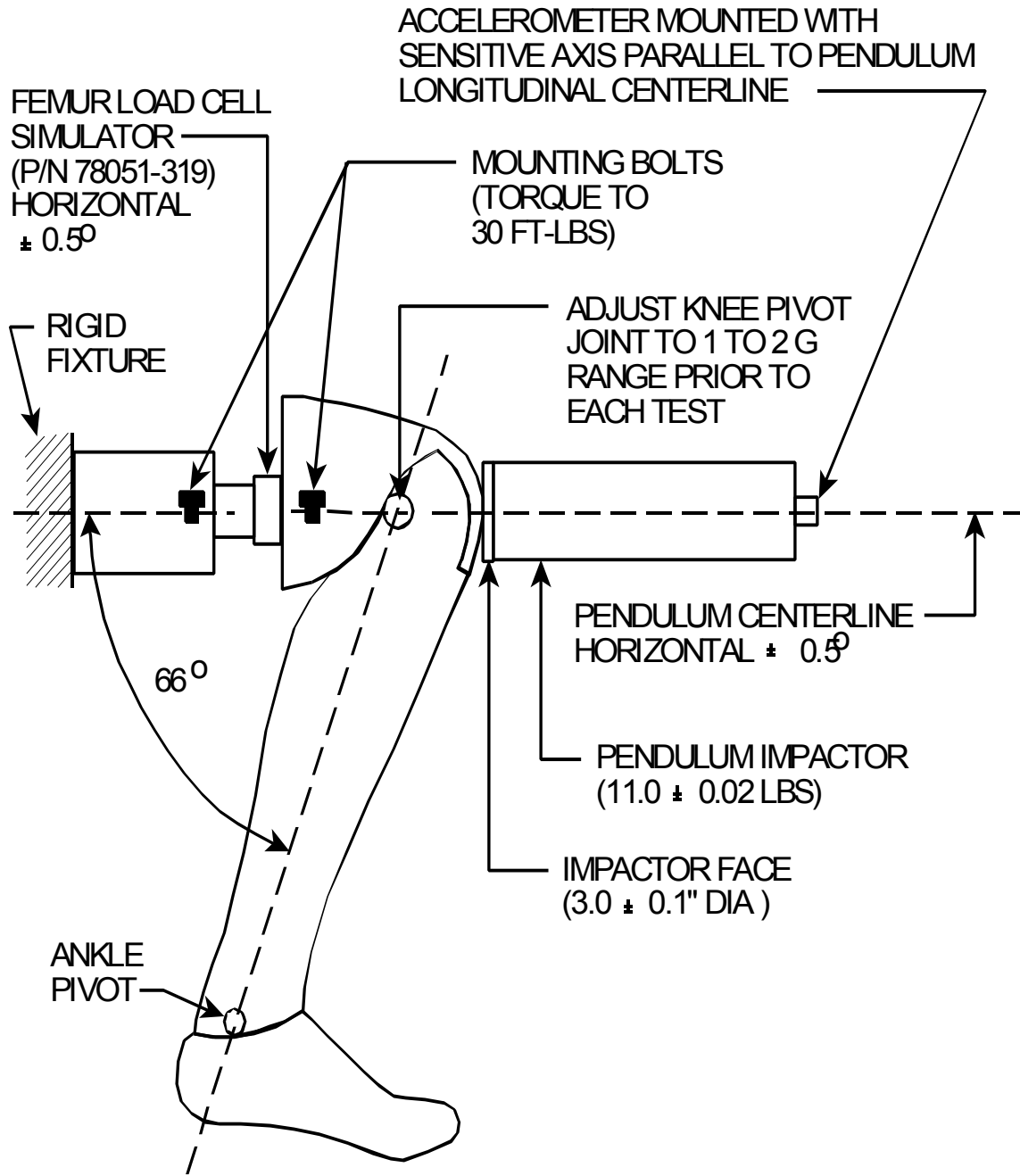


FIGURE 12A

12. COMPLIANCE TEST EXECUTION....Continued

12.5 THORAX IMPACT TEST

- A. The complete assembled dummy (78051-218 revision T) is required including the clothing (vest (78051-292) and panty (78051-293)) but without the shoes, (78051-294) left and (78051-295) right.
- B. The test setup specifications are shown in Figure 13A. The fixture consists of a smooth, clean, dry, steel seating surface and a test probe. The test probe is a 6 inches \pm 0.01 inch diameter rigid cylinder with a mass of 51.5 lbs \pm 0.05 lbs including instrumentation. The impacting surface has a flat, right angle, face with an edge radius of 0.5 inch. An accelerometer is mounted on the end opposite from the impacting end with its sensitive axis collinear to the longitudinal centerline of the test probe. A test setup is shown in Figure 14A.
- C. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (Appendix H) Class 180.

12.5.1 TEST PROCEDURE

- A. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material (78051-17 thru 78051-22), chest displacement transducer assembly (78051-317) and the rear rib supports (78051-304). Inspect for rib deformation using the chest depth gage (83-5006-007). If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration testing completed before any repairs or replacements are made.
- B. Soak the test dummy in an environment with a relative humidity from 10% to 70% for at least four (4) hours and until the temperature of the ribs have stabilized at a temperature between 69°F to 72°F. The temperature as measured on the surface of the ribs and also the ambient within the laboratory are recorded.
- C. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture surface as shown in Figure 13A. The surface must be sufficiently long enough to support the pelvis and outstretched legs.
- D. Align the adjustable neck bracket 78051-303, revision E, and 78051-307, revision X, index marks to the "zero" position.

12. COMPLIANCE TEST EXECUTION....Continued

- E. Place the arm assemblies horizontal $\pm 2^\circ$ and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut (78051-251) which holds the arm yoke to the clavicle assembly (78051-141). Level the ribs both longitudinally and laterally $\pm 0.5^\circ$ and adjust the pelvis angle to $13^\circ \pm 2^\circ$. (A special tool is required which inserts into the pelvic structure and extends outward beyond the pelvic skin surface.) The tool permits the use of an angle measurement device to determine the pelvis angle. The midsagittal plane of the dummy is vertical $\pm 2^\circ$ of being perpendicular to the centerline of the test probe. The longitudinal centerline of the test probe is centered on the midsagittal plane of the dummy centerline is 0.5 inch \pm 0.04 inch below the horizontal centerline of the No. 3 rib and is within 0.5° of a horizontal line in the dummy's midsagittal plane. After the initial locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference measurements are recorded from locations such as the rear surfaces of the thoracic spine and the lower neck bracket. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.
- F. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.
- G. Impact the thorax with the test probe so the longitudinal centerline of the probe is 2° of a horizontal line in the dummy's midsagittal plane at the moment of impact.
- H. Guide the probe so there is no significant lateral, vertical or rotational movement during the impact.
- I. The velocity of the test probe at the time of impact is 22 ft/sec \pm 0.4 ft/sec.
- J. Time zero is defined as the time of initial contact between the test probe and the chest skin.
- K. Allow a period of at least thirty (30) minutes between successive tests on the same thorax.

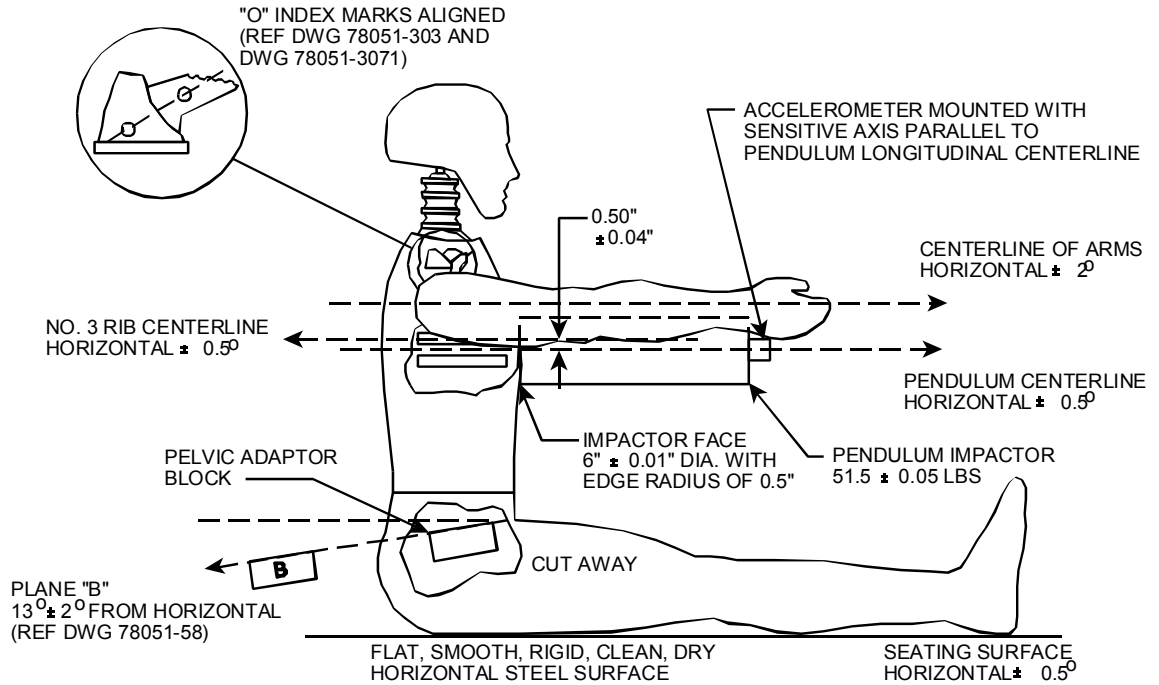
12.5.2 PERFORMANCE SPECIFICATIONS (S572.34)

- A. The resistive forces of the thorax as measured by the test probe shall be between 1160 lbs and 1325 lbs. The resistive force is the product of the test probe deceleration and mass.
- B. The sternum displacement as measured by the chest displacement transducer shall be between 2.50 inches and 2.86 inches.

12. COMPLIANCE TEST EXECUTION....Continued

- C. The internal hysteresis shall be more than 69% but less than 85%. The hysteresis is determined from the force vs deflection curve and is the ratio of the area between the loading and unloading portions of the curve to the area under the loading portion of the curve as shown in Figure 15A.

THORAX IMPACT TEST SETUP SPECIFICATIONS



- NOTE:
 (A) NO EXTERNAL SUPPORT IS REQUIRED ON THE DUMMY TO MEET SETUP SPECIFICATIONS
 (B) THE MIDSAGITTAL PLANE OF THE DUMMY IS VERTICAL \pm (°1) AND WITHIN \pm 2° OF PENDULUM CENTERLINE
 (C) THE MIDSAGITTAL PLANE OF THE DUMMY IS CENTERED ON THE PENDULUM CENTERLINE WITHIN 0.12"

12. COMPLIANCE TEST EXECUTION....Continued

THORAX IMPACT TEST SETUP

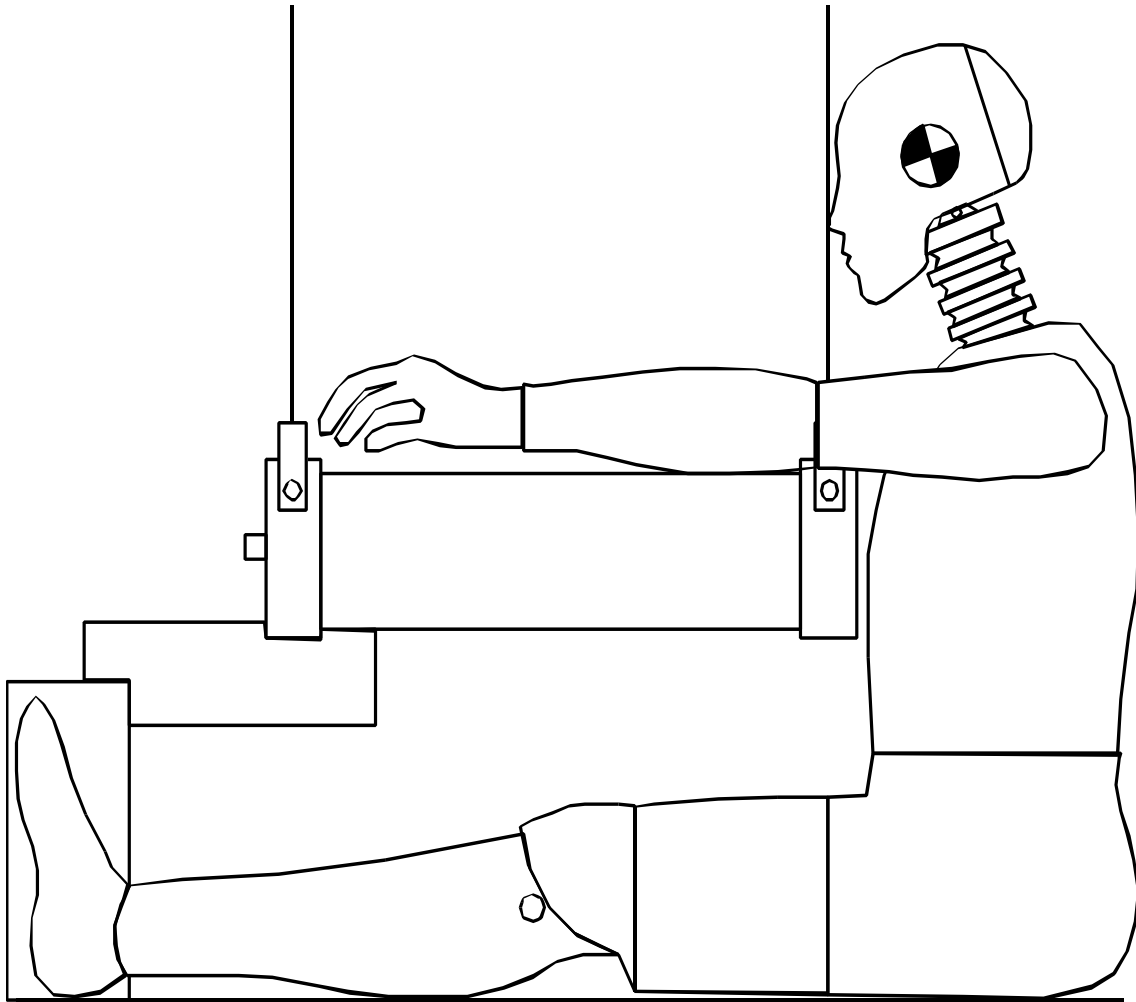


FIGURE 14A

12. COMPLIANCE TEST EXECUTION....Continued

PART 572E HYBRID III THORAX CALIBRATION - HYSTERESIS

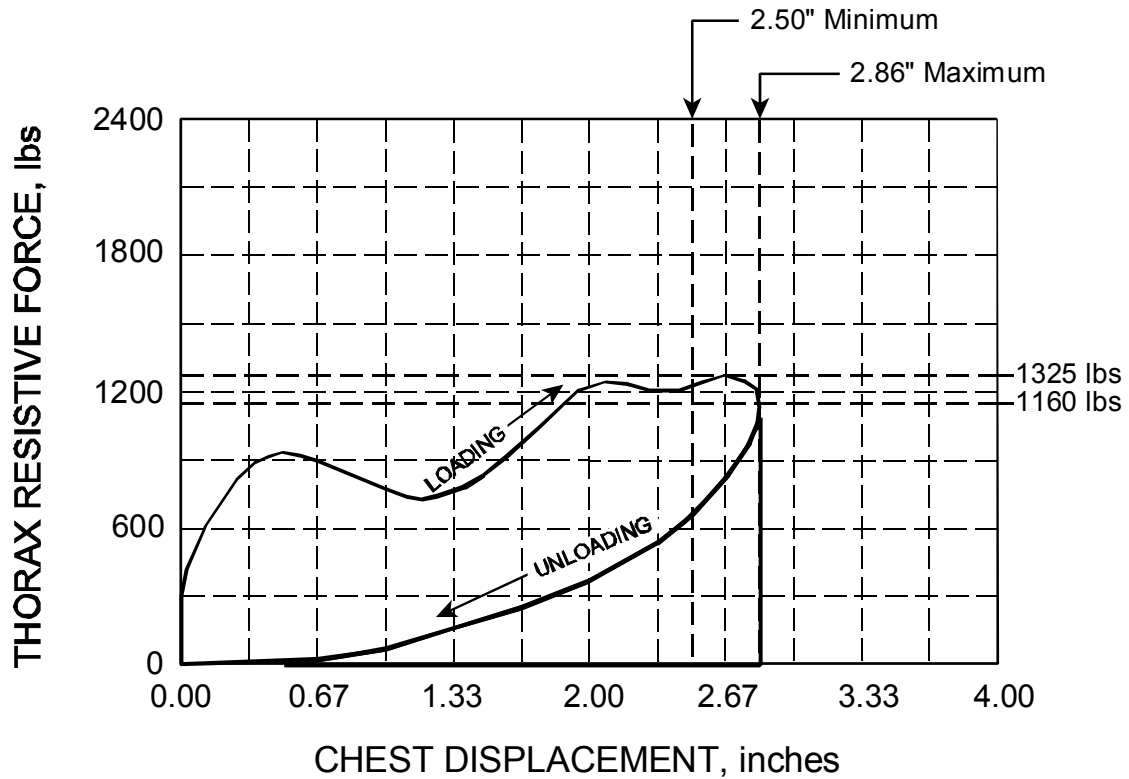


FIGURE 15A

12. COMPLIANCE TEST EXECUTION....Continued

12.6 HIP JOINT FEMUR FLEXION TEST

The complete assembled dummy (78051-218 revision S) is used except that (1) leg assemblies (86-5001-001 and 86-5001-002) are separated from the dummy by removing the 3/8-16 Socket Head Cap Screw (SCHS)(78051-99) but retaining the structural assembly of the upper legs (78051-43 and 78051-44), (2) the abdominal insert (78051-52) is removed and (3) the instrument cover plate (78051-13) in the pelvic bone is replaced by a firmly secured rigid pelvic bone stabilizer (Figure 16A).

12.6.1 TEST PROCEDURE

- A. Soak the test material in an environment at any temperature between 66°F and 78°F and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to its application in a test.
- B. Seat the dummy on a rigid seat fixture (Figure 17A) and firmly secure it to the seat back by bolting the stabilizer insert and the rigid support device (Figure 18A) to the seat back of the test fixture (Figure 19A and 20A) while maintaining the pelvis (78051-58) "B" plane horizontal.
- C. Insert a lever arm into the femur shaft opening of the upper leg structure assembly (78051-43/44) and firmly secure it using the 3/8-16 socket head cap screws.
- D. Lift the lever arm parallel to the midsagittal plane at a rotation rate of 5 to 10 degrees per second while maintaining the 1/2 in. shoulder bolt longitudinal centerline horizontal throughout the range of motion until the 150 ft-lbf torque level is reached. Record the torque and angle of rotation of the femur.
- E. Test right and left hip joint femur flexion.

12.6.2 PERFORMANCE SPECIFICATIONS

- A. The femur torque at 30 degrees rotation from its initial horizontal orientation will not be more than 70 ft-lbf.
- B. Femur rotation at 150 ft-lbf of torque will not be less than 40 degrees nor more than 50 degrees from its initial horizontal orientation.

12. COMPLIANCE TEST EXECUTION...Continued

PELVIC BONE STABILIZER INSERT

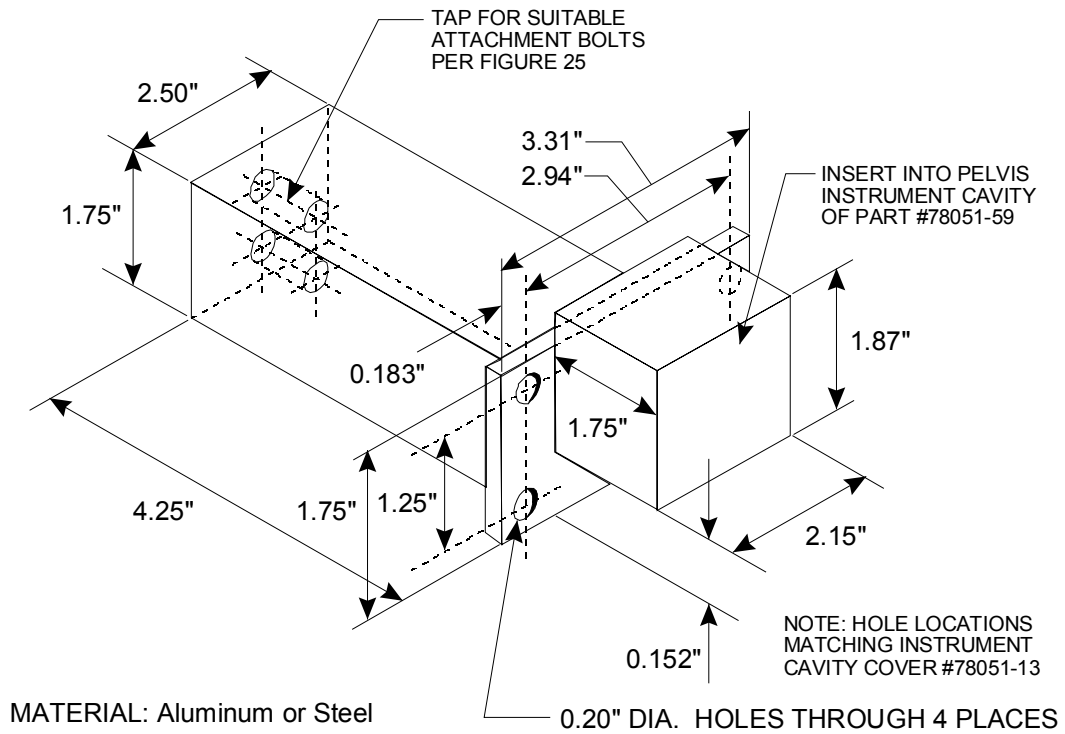
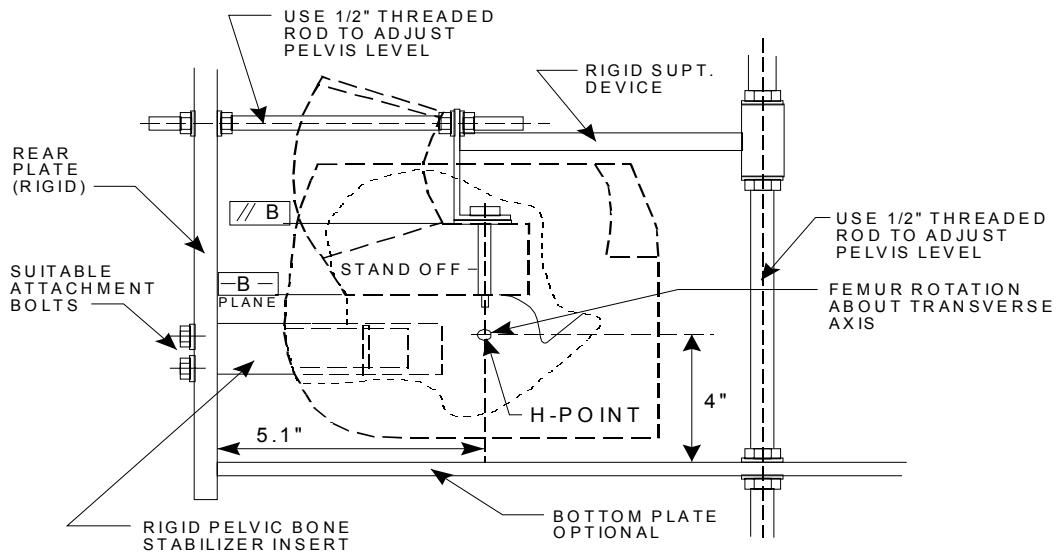


FIGURE 16A

HIP-JOINT TEST FIXTURE ASSEMBLY



12. COMPLIANCE TEST EXECUTION...Continued

PELVIS UPPER SUPPORT DEVICE

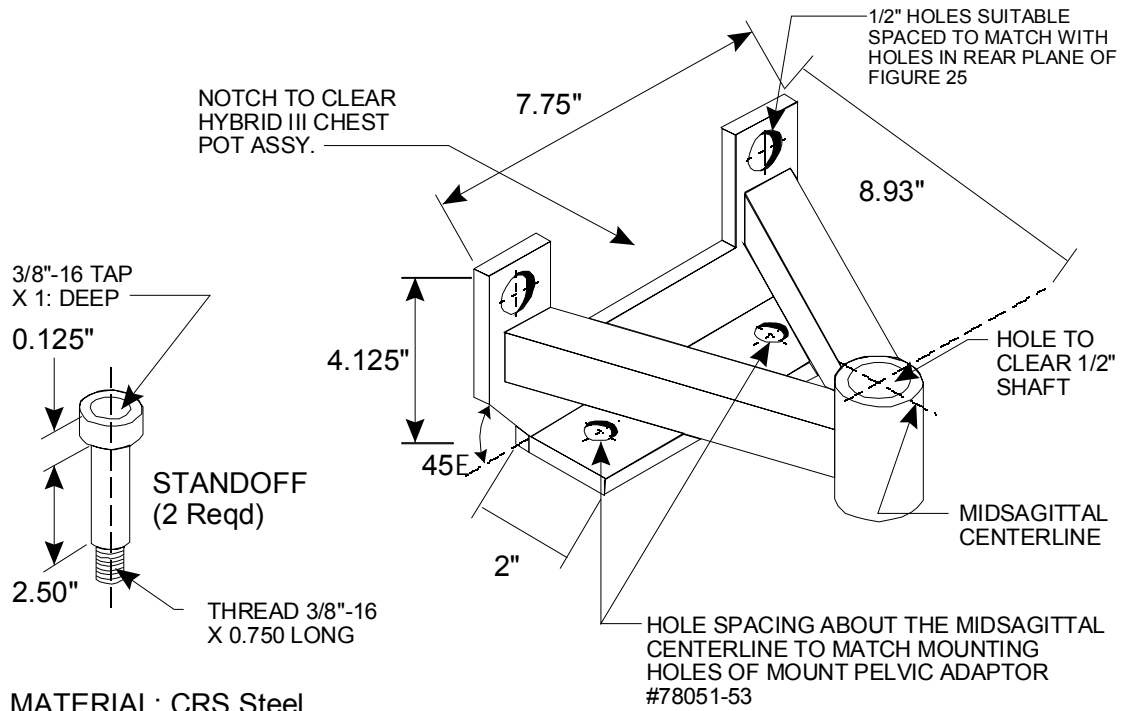


FIGURE 18A

12. COMPLIANCE TEST EXECUTION....Continued

HIP JOINT TEST FIXTURE AND TORSO ASSEMBLY

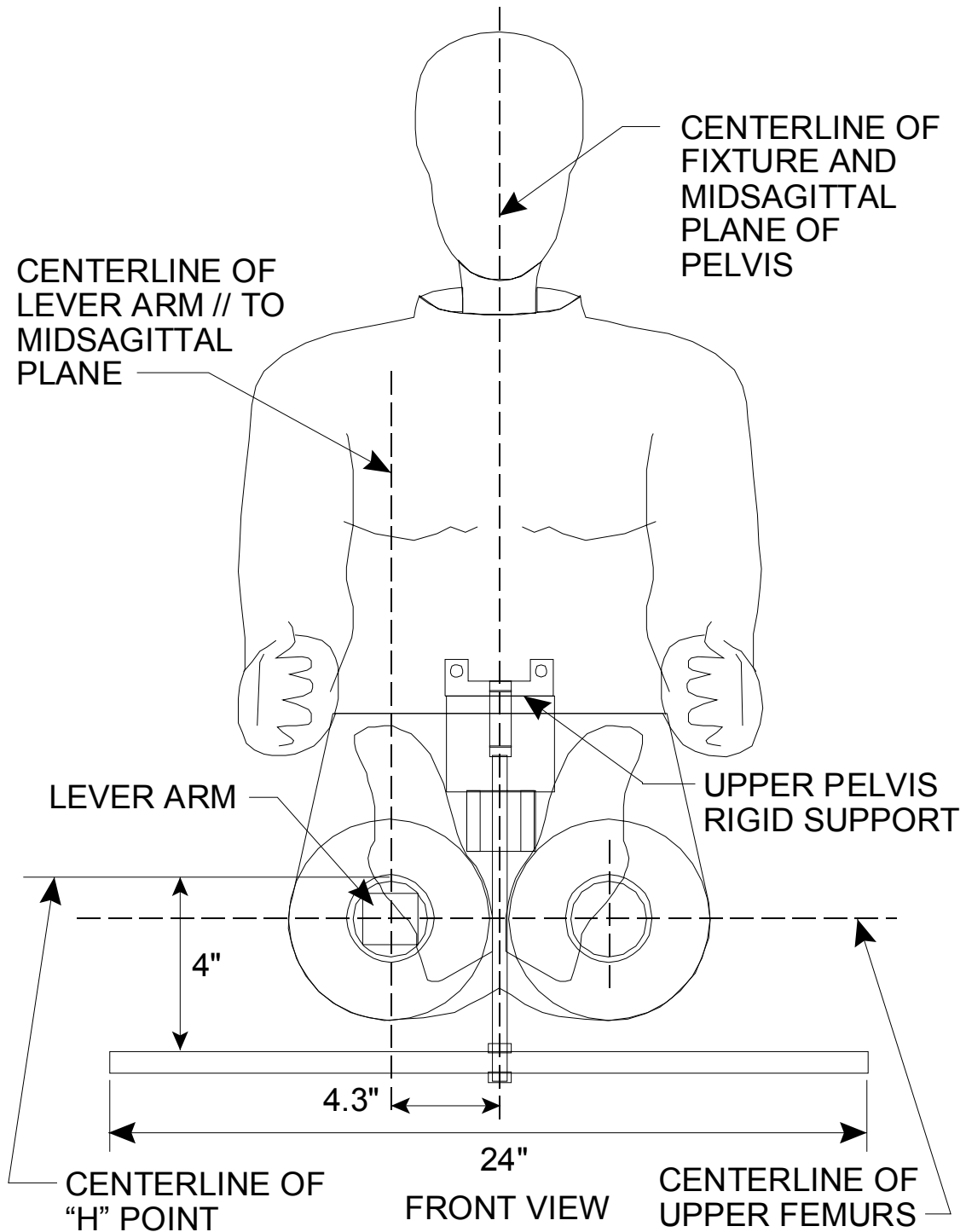
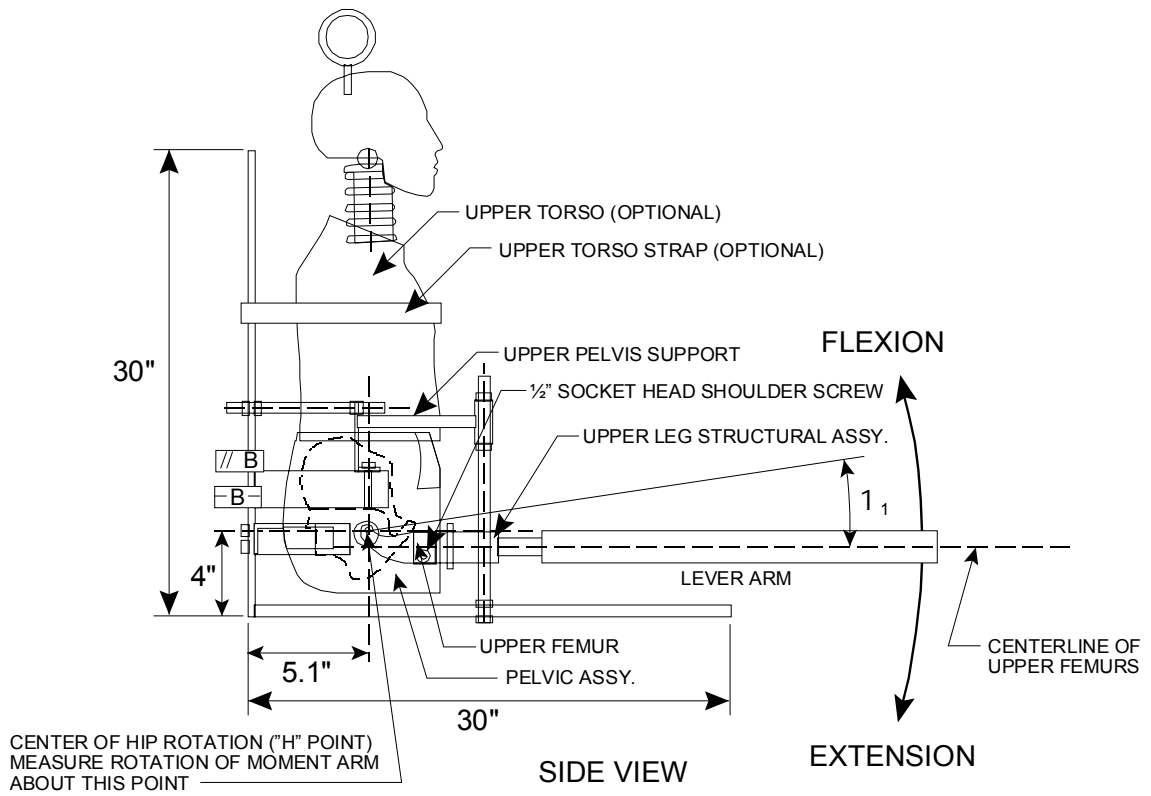


FIGURE 19A

12. COMPLIANCE TEST EXECUTION...Continued

HIP JOINT TEST FIXTURE AND TORSO ASSEMBLY



13. 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.

14. REPORTS

14.1 APPARENT NONCONFORMANCE

During the post test calibration, 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 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.

14.2 FINAL PERFORMANCE CALIBRATION REPORTS

14.2.1 COPIES

A report containing the pre and post test calibration data for each Part 572E dummy used in the vehicle compliance test shall be submitted with FMVSS 208 final test report for the vehicle tested.

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.

14.2.2 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)

14. REPORTS...Continued

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 post test. 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.

14.2.3 FIRST PAGE

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 Title And Subtitle such as

DUMMY PERFORMANCE CALIBRATION
IN SUPPORT OF
VEHICLE SAFETY COMPLIANCE TESTING
FOR OCCUPANT CRASH PROTECTION

- B. Contractor's Name and Address such as

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

NOTE: DOT SYMBOL WILL BE PLACED BETWEEN ITEMS B AND C

- 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
Safety Assurance
Office of Vehicle Safety Compliance
400 Seventh Street, SW
Room 6115 (NSA-30)
Washington, DC 20590

15. DATA SHEETS (EXAMPLES)

PART 572E EXTERNAL DIMENSIONS

MANUFACTURER/ID NO.			
CALIBRATION DATE			
TEST PARAMETER		SPECIFICATION	TEST RESULT
TEMPERATURE			72.0°F
RELATIVE HUMIDITY			27.0%
LOCATION FOR CHEST CIRCUMFERENCE	AA	16.9" - 17.1"	17.0"
LOCATION FOR WAIST CIRCUMFERENCE	BB	8.9" - 9.1"	9.0"
CHEST CIRCUMFERENCE (WITH JACKET)	Y	38.2" - 39.4"	38.6"
WAIST CIRCUMFERENCE	Z	32.9" - 34.1"	33.7"
CHEST DEPTH	O	8.4" - 9.0"	8.7"
H-POINT HEIGHT	C	3.3" - 3.5"	3.4"
H-POINT FROM BACKLINE	D	5.3" - 5.5"	5.4"
SKULL CAP TO BACKLINE	H	1.6" - 1.8"	1.7"
TOTAL SITTING HEIGHT	A	34.6" - 35.0"	34.6"
THIGH CLEARANCE	F	5.5" - 6.1"	6.0"
BUTTOCK KNEE LENGTH	K	22.8" - 23.8"	23.1"
BUTTOCK POPLITEAL LENGTH	N	17.8" - 18.8"	18.6"
POPLITEAL HEIGHT	L	16.9" - 17.9"	17.4"
KNEE PIVOT HEIGHT	M	19.1" - 19.7"	19.6"
FOOT LENGTH	P	9.9" - 10.5"	10.1"
FOOT BREADTH	W	3.6" - 4.2"	4.1"
SHOULDER PIVOT FROM BACKLINE	E	3.3" - 3.7"	3.4"
SHOULDER BREADTH	V	16.6" - 17.2"	16.8"
SHOULDER PIVOT HEIGHT	B	19.9" - 20.5"	20.1"
ELBOW REST HEIGHT	J	7.5" - 8.3"	8.1"
SHOULDER - ELBOW LENGTH	I	13.0" - 13.6"	13.5"
BACK OF ELBOW TO WRIST PIVOT	G	11.4" - 12.0"	11.4"

LABORATORY TECHNICIAN: _____

15. DATA SHEETS (EXAMPLES)....Continued

PART 572E HEAD DROP TEST

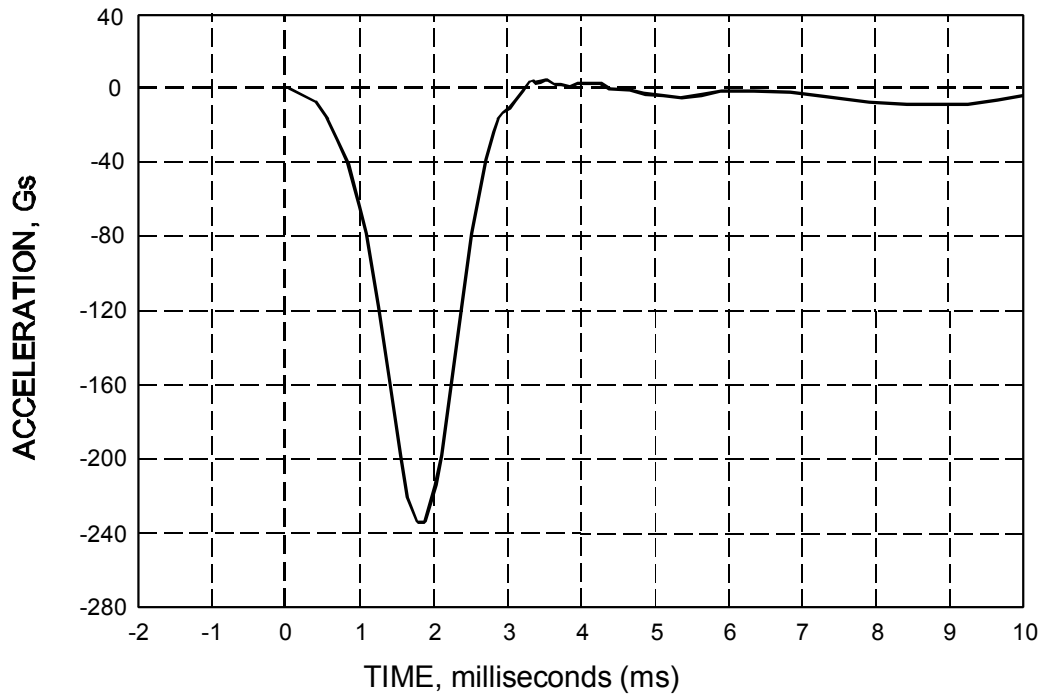
MANUFACTURER/ID NO.		
CALIBRATION DATE		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66°F - 78°F	72°F
RELATIVE HUMIDITY	10% - 70%	27%
PEAK RESULTANT ACCELERATION	225 Gs - 275 Gs	270.63 Gs
PEAK LATERAL ACCELERATION	15 Gs Maximum	-7.43 Gs
IS ACCELERATION CURVE UNIMODAL?	YES	YES

REMARKS:

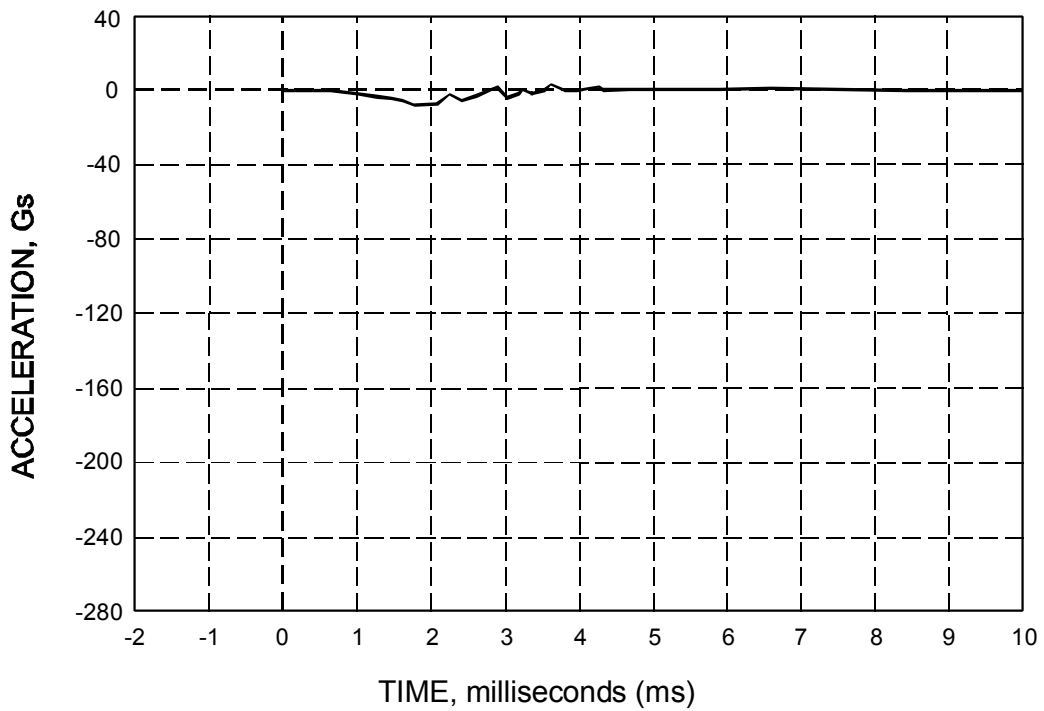
LABORATORY TECHNICIAN: _____

15. DATA SHEETS (EXAMPLES)....Continued

PART 572-E HYBRID III HEAD CALIBRATION - HEAD ACCELERATION X AXIS

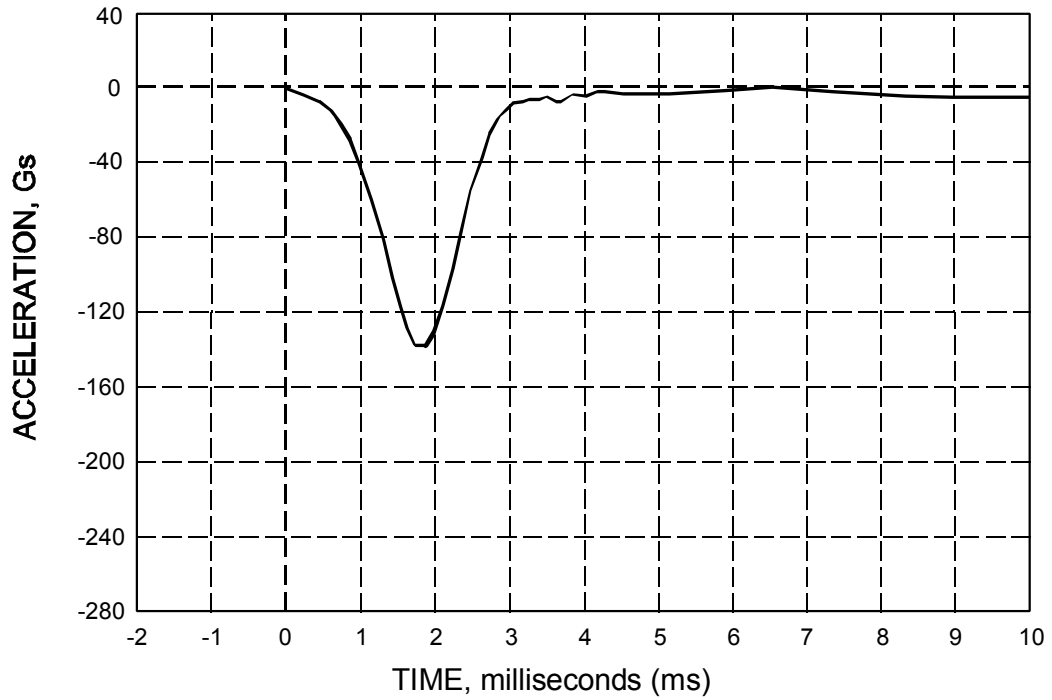


PART 572-E HYBRID III HEAD CALIBRATION - HEAD ACCELERATION Y AXIS

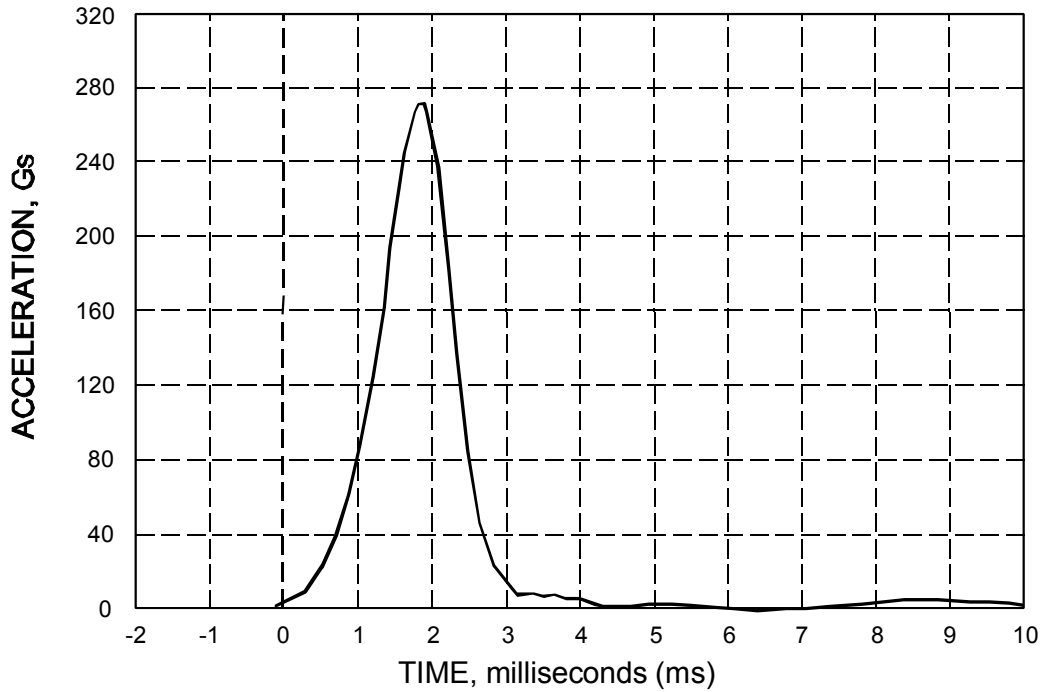


15. DATA SHEETS (EXAMPLES)....Continued

PART 572-E HYBRID III HEAD CALIBRATION - HEAD ACCELERATION Z AXIS



PART 572-E HYBRID III HEAD CALIBRATION - HEAD RESULTANT ACCELERATION



15. DATA SHEETS (EXAMPLES)....Continued

PART 572E NECK FLEXION TEST

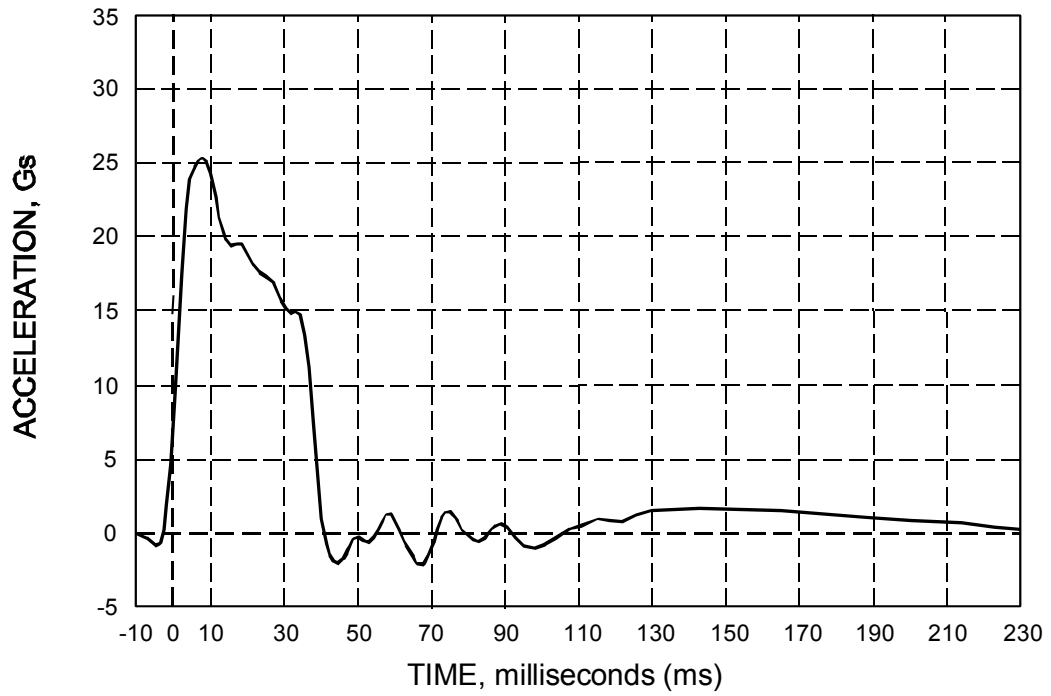
MANUFACTURER/ID NO.		
CALIBRATION DATE		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69°F - 72°F	72°F
RELATIVE HUMIDITY	10% - 70%	49%
IMPACT VELOCITY	22.6 - 23.4 ft/sec	23.30 ft/sec
PENDULUM DECELERATION	10 ms	22.50 Gs - 27.50 Gs
	20 ms	17.60 Gs - 22.60 Gs
	30 ms	12.50 Gs - 18.50 Gs
MAX PENDULUM G ABOVE 30 MS	29 Gs	14.99 Gs
DECELERATION - TIME CURVE DECAY TIME TO 5 Gs	34 ms - 42 ms	38.13 ms
D PLANE ROTATION	64°F - 78°F Maximum	71.46°F
	TIME: 57 ms - 64 ms	60.13 ms
MOMENT ABOUT OCCIPITAL CONDYLE	65 - 80 ft-lbs Maximum	76.32 ft-lbs
	TIME: 47 ms - 58 ms	52.88 ms
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	113 ms - 128 ms	115.75 ms
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	97 ms - 107 ms	100.25 ms

REMARKS:

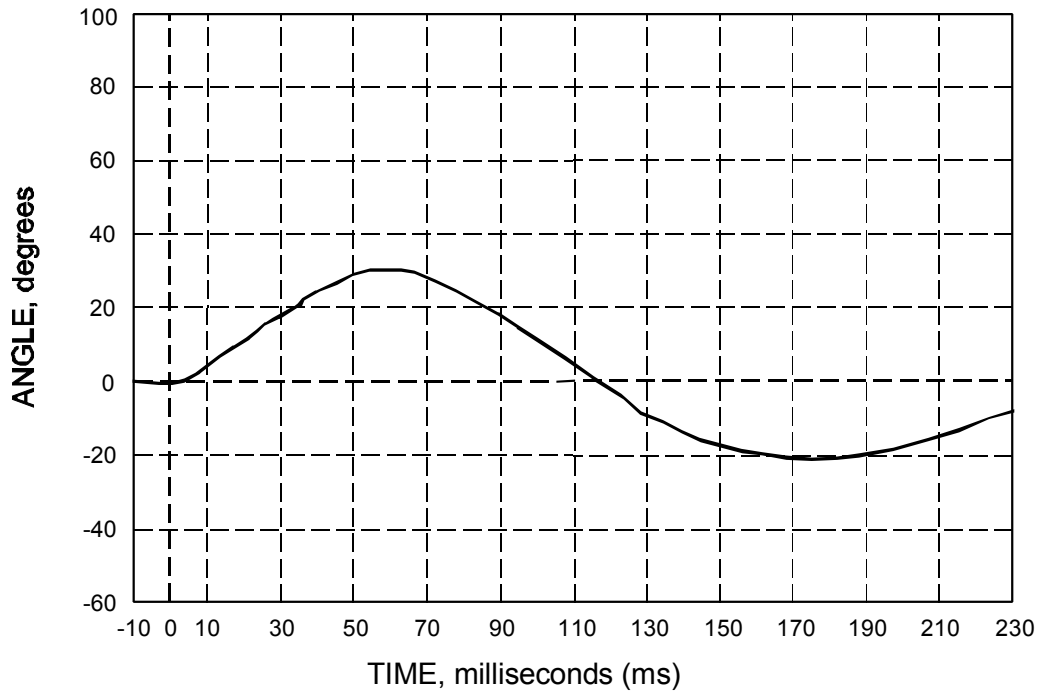
LABORATORY TECHNICIAN: _____

15. DATA SHEETS (EXAMPLES)....Continued

PART 572-E HYBRID III NECK FLEXION CALIBRATION - PENDULUM DECELERATION

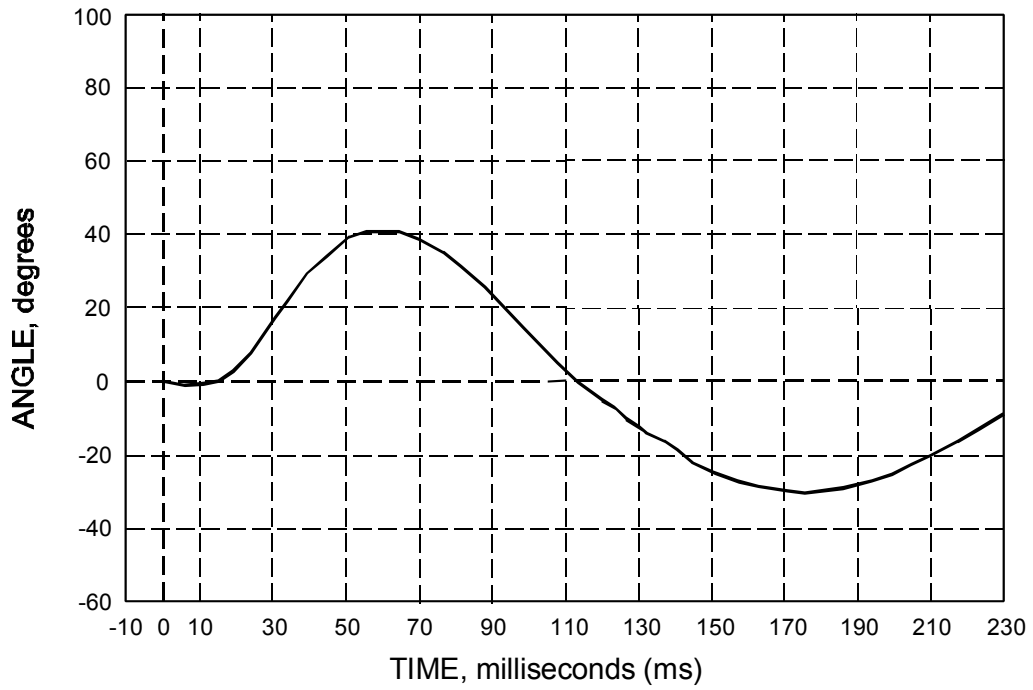


P572-E HYBRID III NECK FLEXION CALIBRATION - ROTATION ABOUT BASE OF NECK

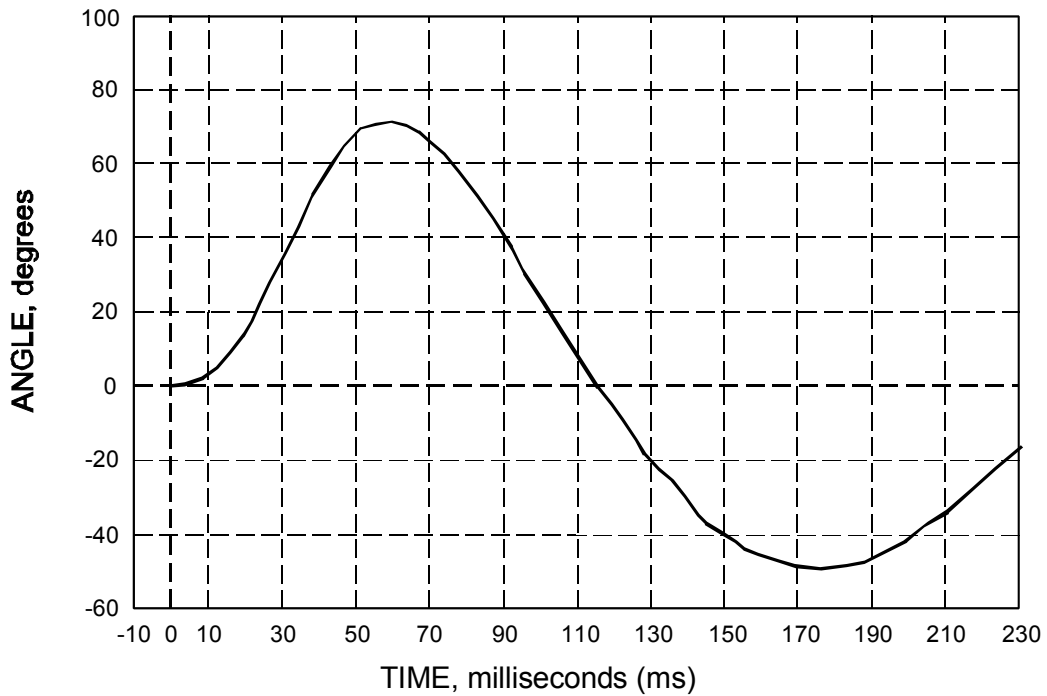


15. DATA SHEETS (EXAMPLES)....Continued

P572-E HYBRID III NECK FLEXION CALIBRATION - ROTATION ABOUT OCCIPITAL CONDYLE

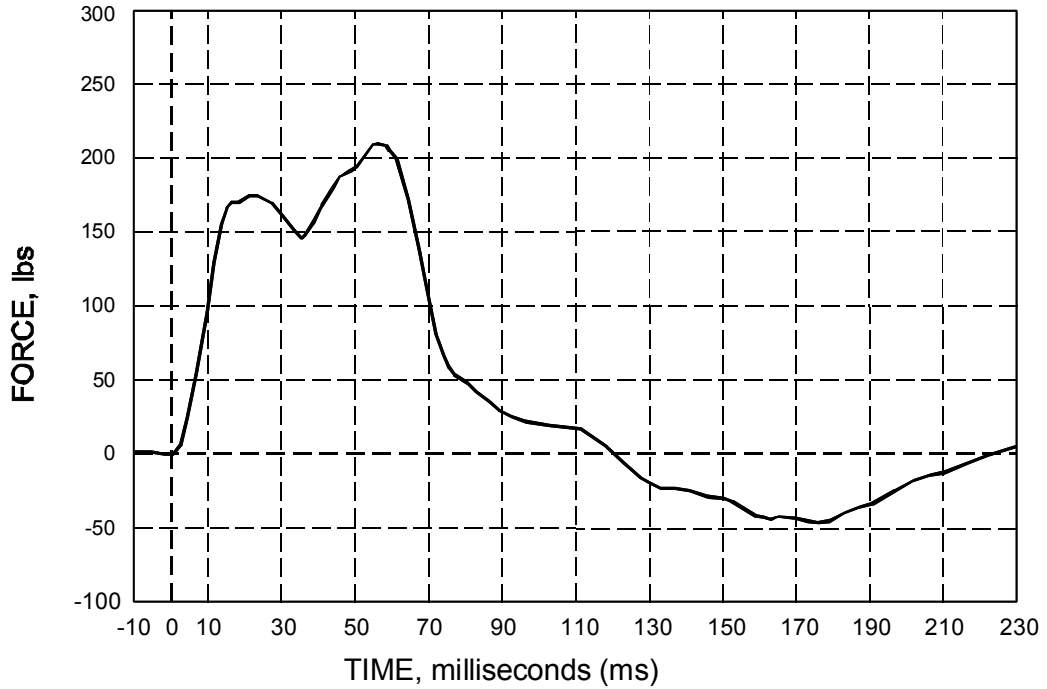


P572-E HYBRID III NECK FLEXION CALIBRATION - TOTAL ROTATION

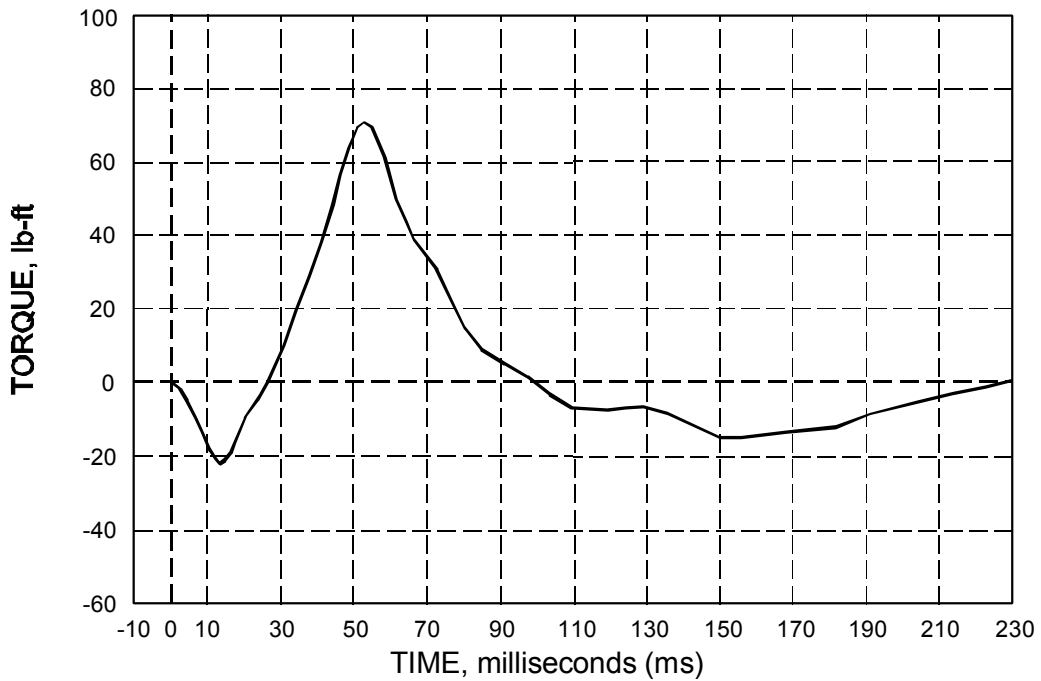


15. DATA SHEETS (EXAMPLES)....Continued

P572-E HYBRID III NECK FLEXION CALIBRATION - NECK FORCE X AXIS

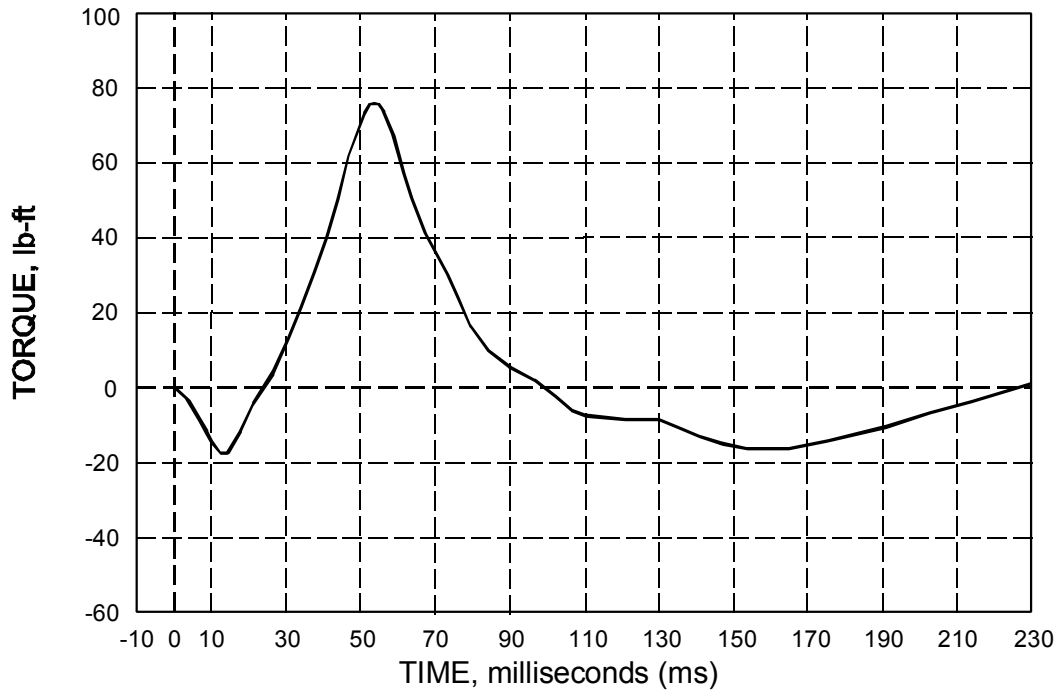


P572-E HYBRID III NECK FLEXION CALIBRATION - NECK MOMENT Y AXIS



15. DATA SHEETS (EXAMPLES)....Continued

P572-E HYBRID III NECK FLEXION CALIBRATION - TOTAL MOMENT ABOUT OCCIPITAL CONDYLE



15. DATA SHEETS (EXAMPLES)....Continued

PART 572E NECK EXTENSION TEST

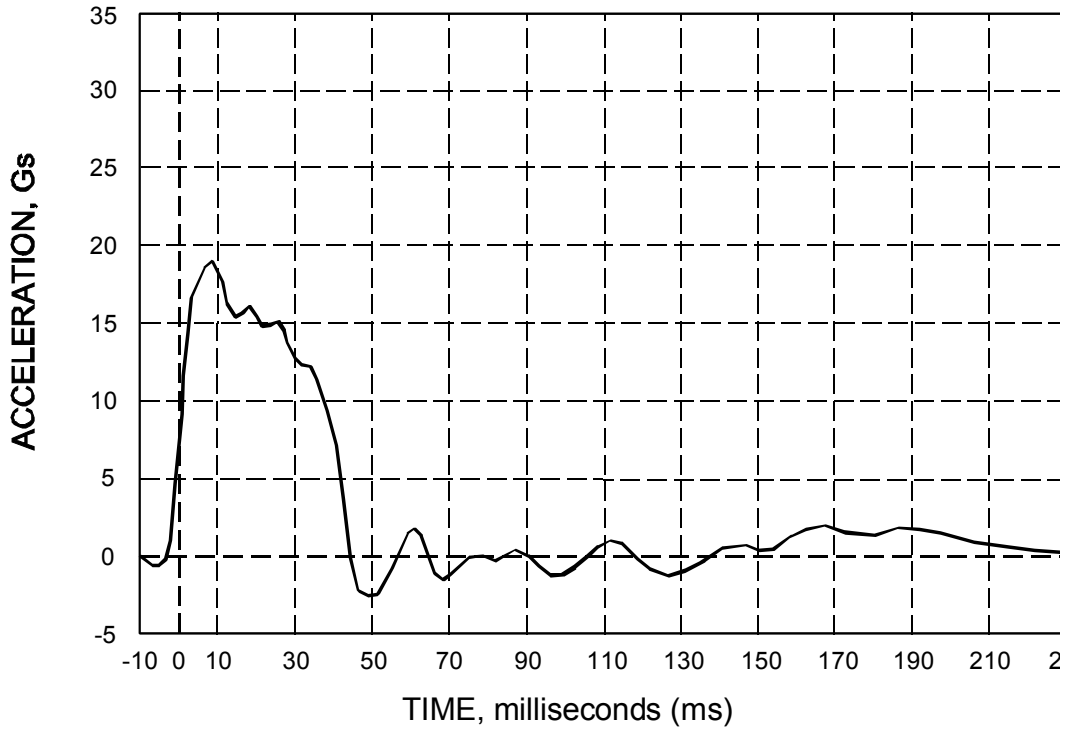
MANUFACTURER/ID NO.		
CALIBRATION DATE		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69°F - 72°F	72°F
RELATIVE HUMIDITY	10% - 70%	49%
IMPACT VELOCITY	19.50 - 20.30 ft/sec	19.67 ft/sec
PENDULUM DECELERATION	10 ms	17.20 Gs - 21.20 Gs
	20 ms	14.00 Gs - 19.00 Gs
	30 ms	11.00 Gs - 16.00 Gs
MAX PENDULUM G ABOVE 30 MS	22 Gs	12.61 Gs
DECELERATION - TIME CURVE DECAY TIME TO 5 G's	38 ms - 46 ms	41.50 ms
D PLANE ROTATION	81°F - 106°F Maximum	90.54°F
	TIME: 72 ms - 82 ms	77.75 ms
MOMENT ABOUT OCCIPITAL CONDYLE	-59.0 - 39.0 ft-lbs Max.	-52.41 ft-lbs
	TIME: 65 ms - 79 ms	71.25 ms
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	147 ms - 174 ms	152.75 ms
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	120 ms - 148 ms	134.00 ms

REMARKS:

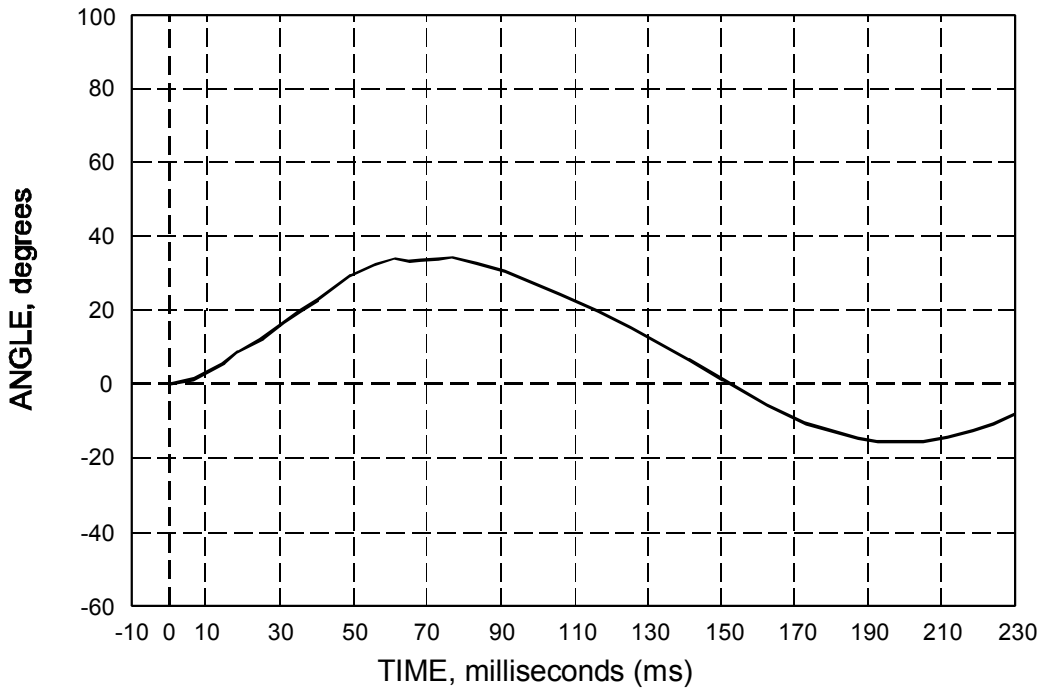
LABORATORY TECHNICIAN: _____

15. DATA SHEETS (EXAMPLES)....Continued

P572-E HYBRID III NECK EXTENSION CALIBRATION - PENDULUM DECELERATION

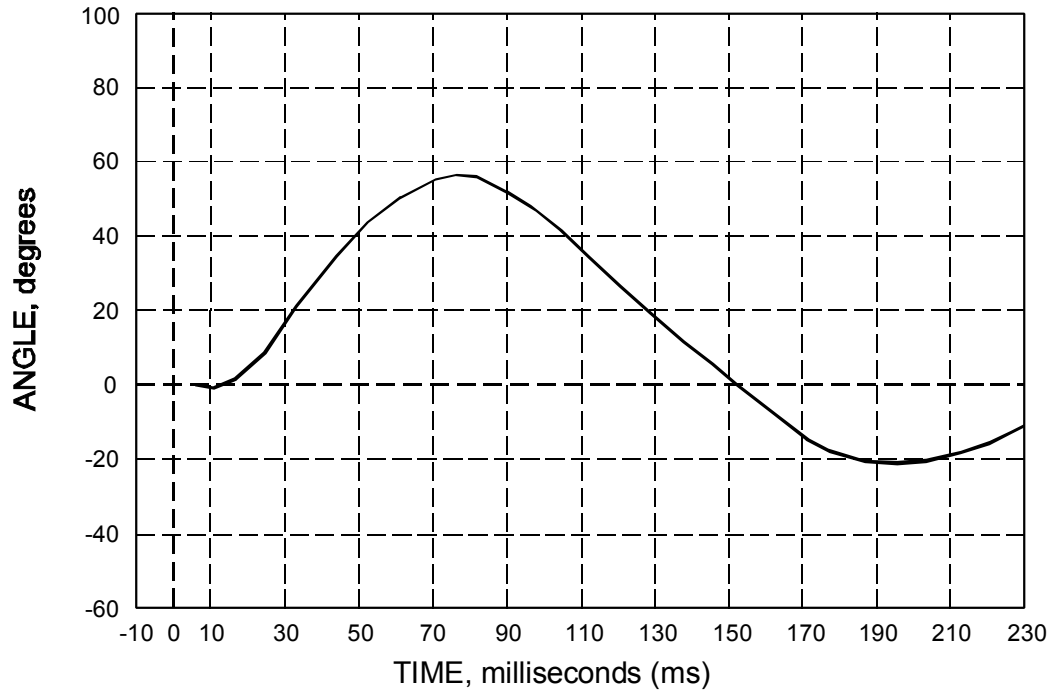


P572-E HYBRID III NECK EXTENSION CALIBRATION - ROTATION ABOUT BASE OF NECK

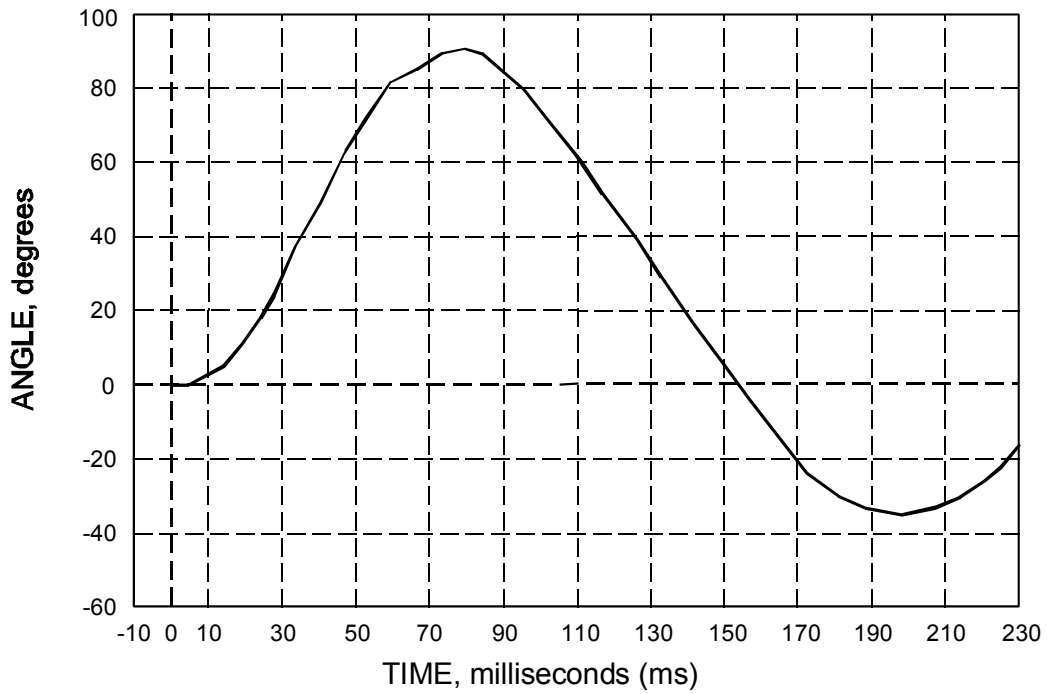


15. DATA SHEETS (EXAMPLES)....Continued

P572-E HYBRID III NECK EXTENSION CALIBRATION - ROTATION ABOUT OCCIPITAL CONDYLE

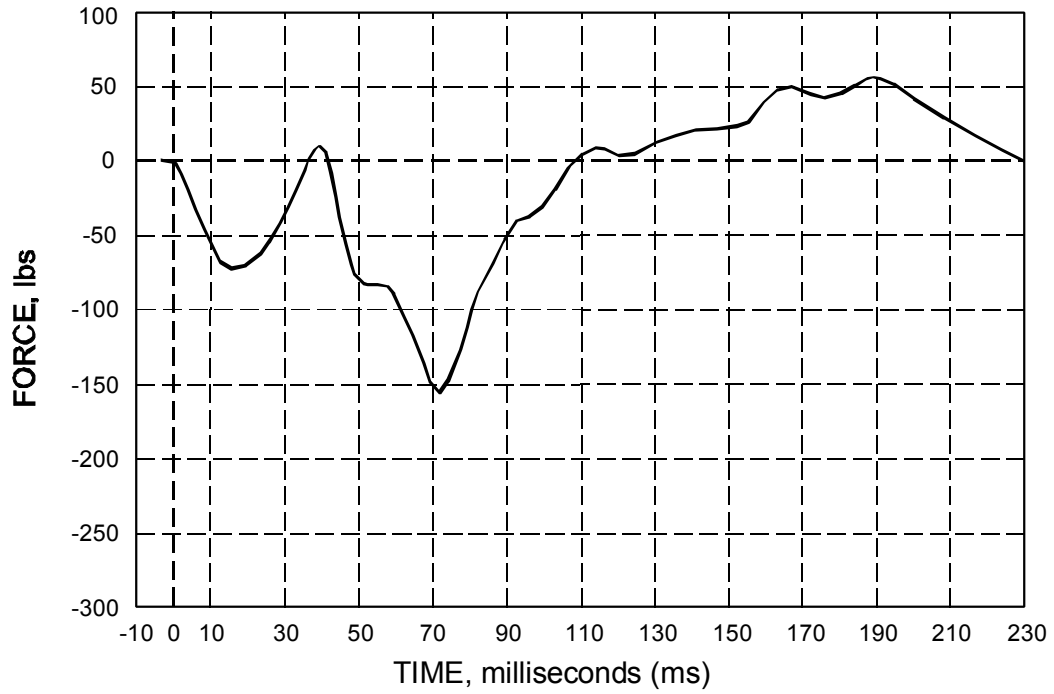


P572-E HYBRID III NECK EXTENSION CALIBRATION - TOTAL ROTATION

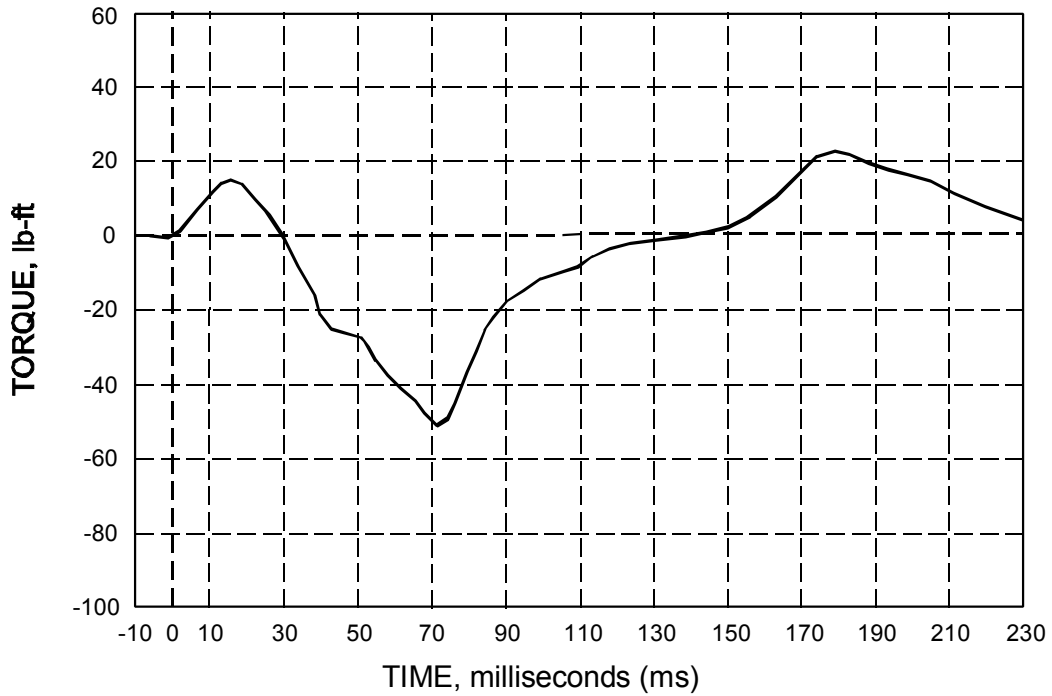


15. DATA SHEETS (EXAMPLES)....Continued

P572-E HYBRID III NECK EXTENSION CALIBRATION - NECK FORCE X AXIS

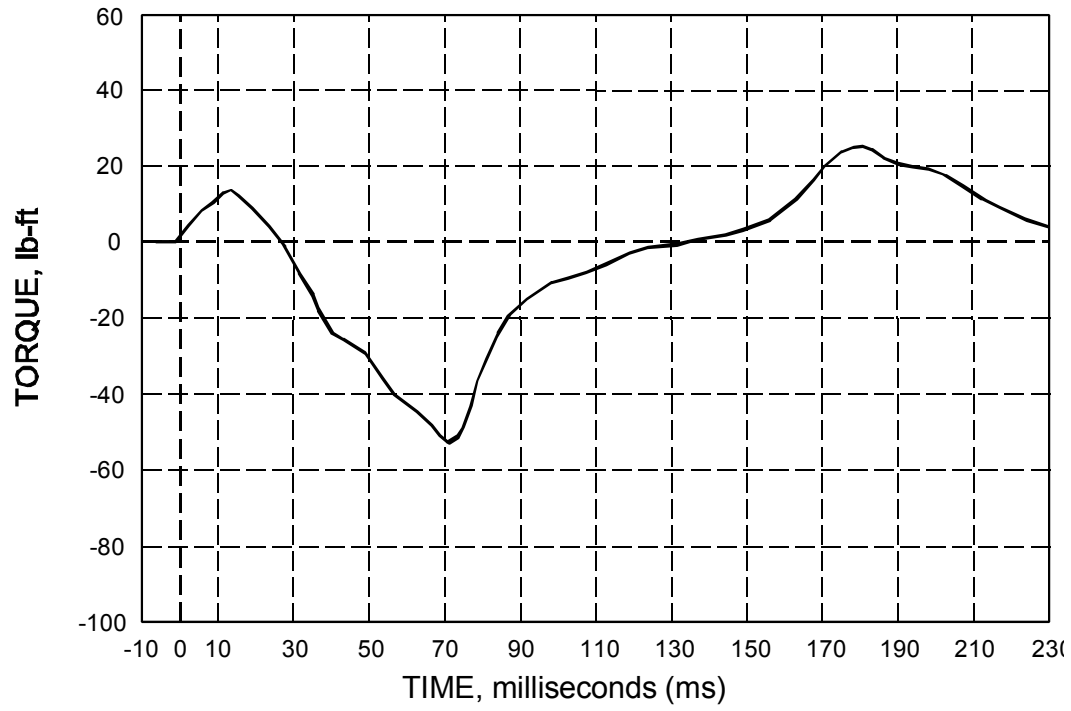


P572-E HYBRID III NECK EXTENSION CALIBRATION - NECK MOMENT Y AXIS



15. DATA SHEETS (EXAMPLES)....Continued

P572-E HYBRID III NECK EXTENSION CALIBRATION - TOTAL MOMENT ABOUT OCCIPITAL CONDYLE



15. DATA SHEETS (EXAMPLES)....Continued

PART 572E LEFT KNEE IMPACT TEST

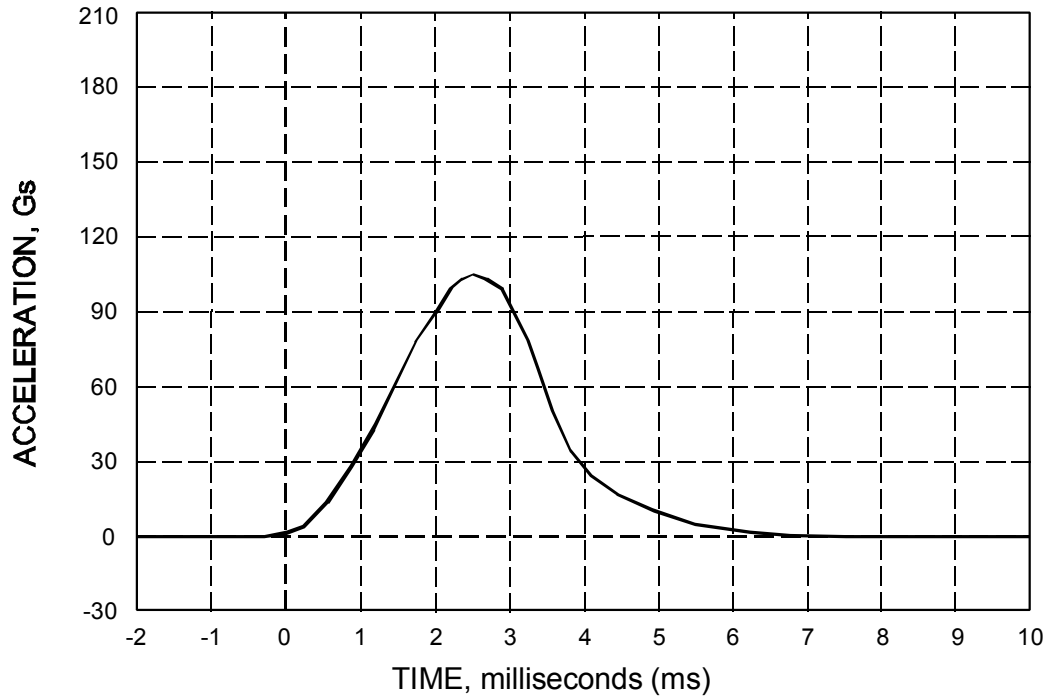
MANUFACTURER/ID NO.		
CALIBRATION DATE		
TEST PARAMETER	SPECIFICATION	TEST RESULT
TEMPERATURE	66°F - 78°F	72°F
RELATIVE HUMIDITY	10% - 70%	27%
PROBE VELOCITY	6.8 - 7.0 ft/sec	6.91 ft/sec
PEAK KNEE IMPACT FORCE	1060 lbs - 1300 lbs	1156.55 lbs
PROBE WEIGHT	11.0 lbs	

REMARKS:

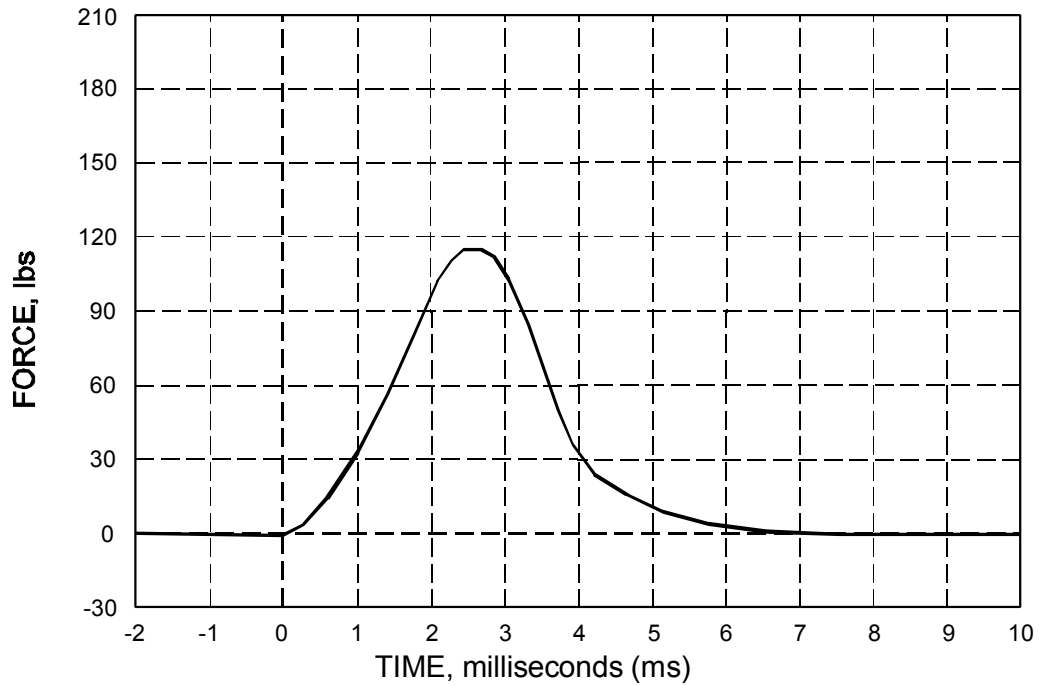
LABORATORY TECHNICIAN: _____

15. DATA SHEETS (EXAMPLES)....Continued

P572-E HYBRID III LEFT KNEE CALIBRATION - PENDULUM DECELERATION (11 LB PEND.)



P572-E HYBRID III LEFT KNEE CALIBRATION - PENDULUM FORCE (11 LB PEND.)



15. DATA SHEETS (EXAMPLES)....Continued

PART 572E RIGHT KNEE IMPACT TEST

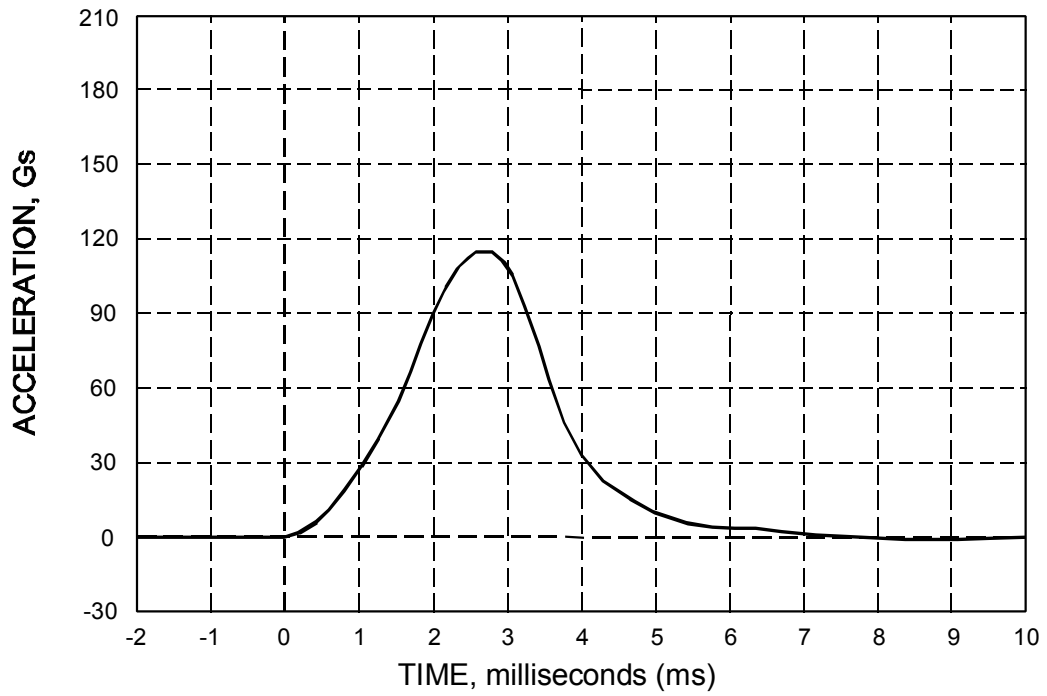
MANUFACTURER/ID NO.		
CALIBRATION DATE		
TEST PARAMETER	SPECIFICATION	TEST RESULT
TEMPERATURE	66°F - 78°F	70°F
RELATIVE HUMIDITY	10% - 70%	34%
PROBE VELOCITY	6.8 - 7.0 ft/sec	6.84 ft/sec
PEAK KNEE IMPACT FORCE	1060 lbs - 1300 lbs	1258.57 lbs
PROBE WEIGHT	11.0 lbs	

REMARKS:

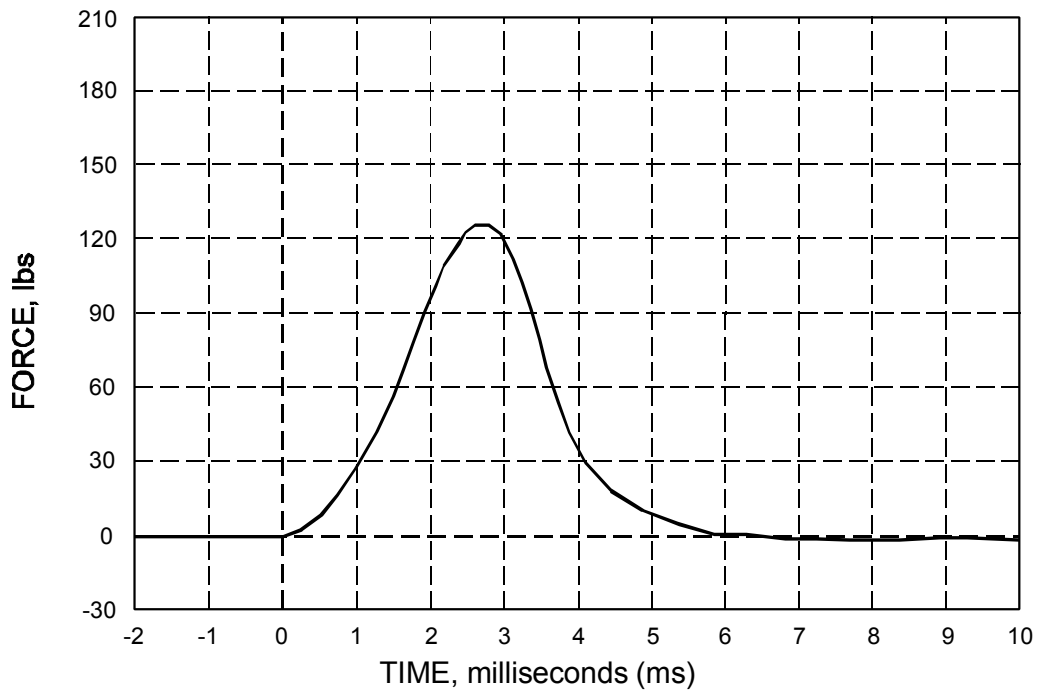
LABORATORY TECHNICIAN: _____

15. DATA SHEETS (EXAMPLES)....Continued

P572-E HYBRID III RIGHT KNEE CALIBRATION - PENDULUM DECELERATION (11 LB PEND.)



P572-E HYBRID III RIGHT KNEE CALIBRATION - PENDULUM FORCE (11 LB PEND.)



15. DATA SHEETS (EXAMPLES)....Continued

PART 572E THORAX IMPACT TEST

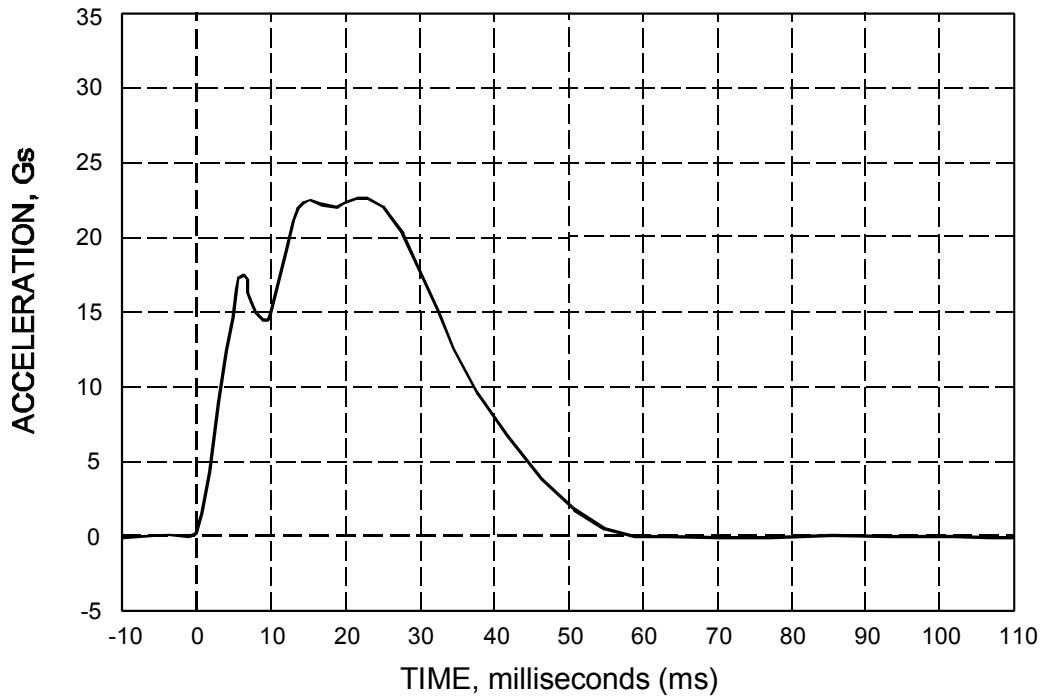
MANUFACTURER/ID NO.		
CALIBRATION DATE		
TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	69°F - 72°F	72°F
RELATIVE HUMIDITY	10% - 70%	48%
PENDULUM VELOCITY	21.6 - 22.4 ft/sec	21.77 ft/sec
MAXIMUM DEFLECTION	2.50 in - 2.86 in	2.80 in
MAXIMUM RESISTIVE FORCE	1160 lbs - 1325 lbs	1168.0 lbs
INTERNAL HYSTERESIS	69% - 85%	72.00%

REMARKS:

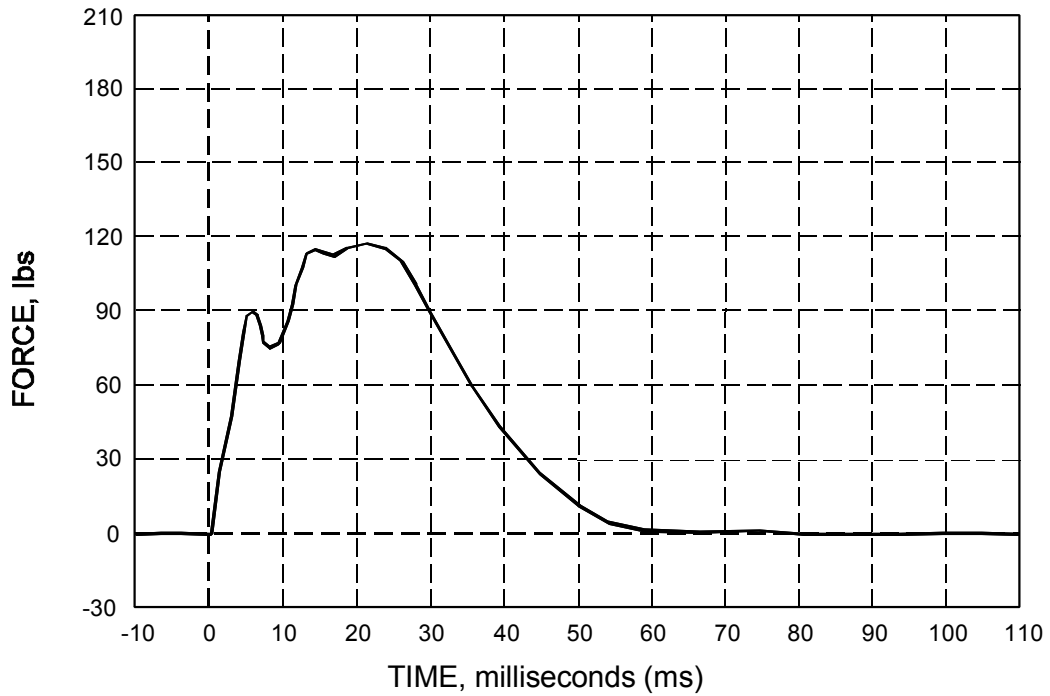
LABORATORY TECHNICIAN: _____

15. DATA SHEETS (EXAMPLES)....Continued

P572-E HYBRID III THORAX CALIBRATION - PENDULUM DECELERATION

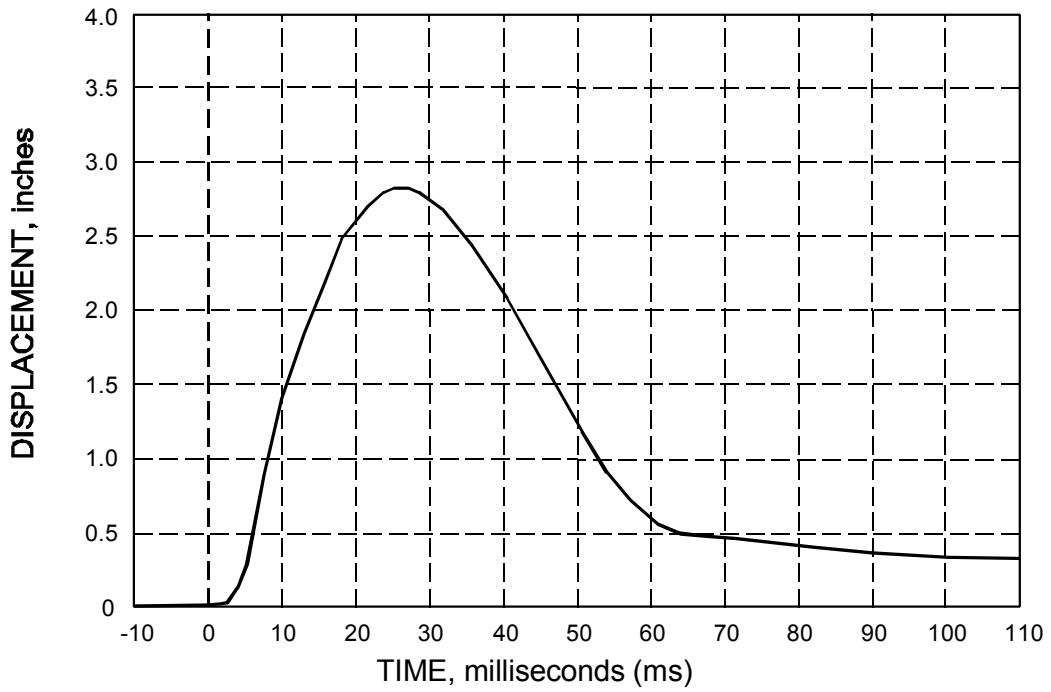


P572-E HYBRID III THORAX CALIBRATION - PENDULUM FORCE

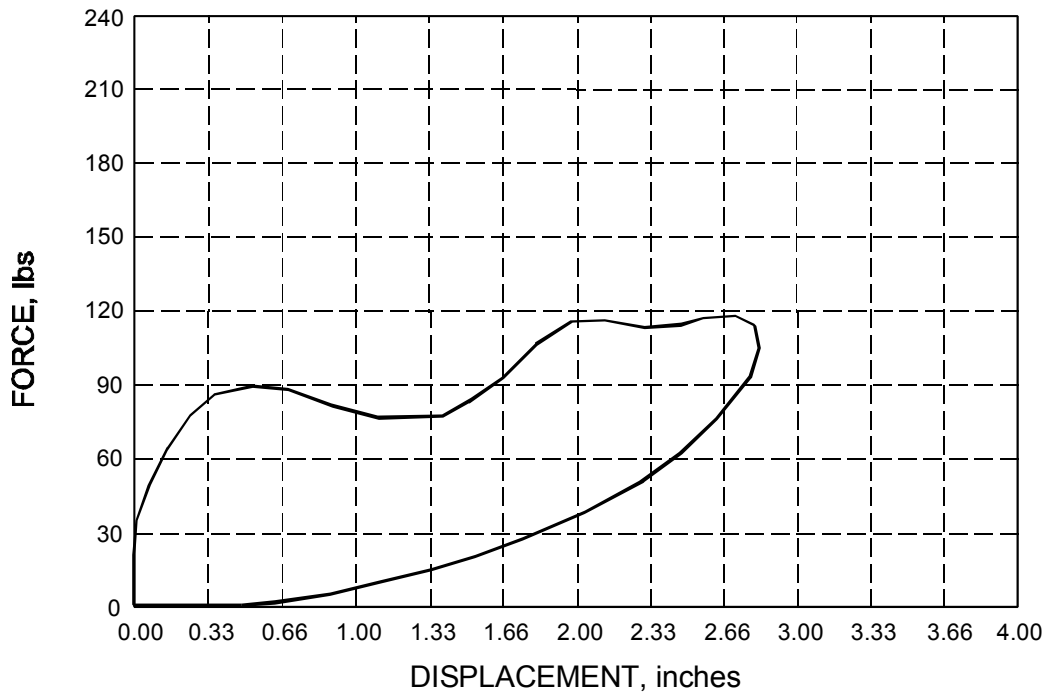


15. DATA SHEETS (EXAMPLES)....Continued

P572-E HYBRID III THORAX CALIBRATION - STERNUM DISPLACEMENT



P572-E HYBRID III THORAX CALIBRATION - CHEST DISPLACEMENT VS PENDULUM FORCE



15. DATA SHEETS (EXAMPLES)....Continued

PART 572E HIP JOINT-FEMUR FLEXION TEST

TEST PARAMETER	TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	66° - 78° F	
RELATIVE HUMIDITY	10% to 70%	
ROTATION RATE	5-10 deg./sec.	YES/NO
30 DEGREE ROTATION	70 ft-lbf	
150 FT-LBF	40 to 50 degree rotation	

PART 572 HYBRID III CALIBRATION - HIP JOINT-FEMUR FLEXION

15. DATA SHEETS (EXAMPLES)....Continued

PART 572E DUMMY DAMAGE CHECKLIST

Dummy Serial No.: _____;

Project No. _____

OK	DAMAGED	(Begin with general cleaning)
_____	_____	Outer skin on entire dummy - Check for 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
_____	_____	Pelvis - Inspect for breakage, esp. at iliac crest

15. DATA SHEETS (EXAMPLES)....Continued

_____ 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

15. DATA SHEETS (EXAMPLES)....Continued

PART 572E SAMPLE 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	ENDEVCO	7231C-750	CG21		
(2) LATERAL	ENDEVCO	7231C-750	CD74		
(3) VERTICAL	ENDEVCO	7231C-750	CE23		
NECK TRANSDUCER	GSE	186007-0100	182		
CHEST ACCELEROMETERS					
(1) LONGITUDINAL	ENDEVCO	7231C-750			
(2) LATERAL	ENDEVCO	7231C-750			
(3) VERTICAL	ENDEVCO	7231C-750			
CHEST POTENTIOMETER	VERNITECH	81422	85427-29		
FEMUR LOAD CELLS					
(1) RIGHT FEMUR	GSE	2430			
(2) LEFT FEMUR	GSE	2430			
LABORATORY INSTRUMENTATION					
NECK PENDULUM ACCELEROMETER	ENDEVCO	7232C-750	CC59		
THORAX PENDULUM ACCELEROMETER	ENDEVCO	7231C-750	CG83		
KNEE PENDULUM ACCELEROMETER	ENDEVCO	7264-2000	CH15H		
NECK ROTATION TRANSDUCER 1 (OPTIONAL)	BOURNS	35435-001-102			
NECK ROTATION TRANSDUCER 2 (OPTIONAL)	BOURNS	35435-001-102			

LABORATORY TECHNICIAN: _____