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)

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
14. REPORTS....Continued

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
### DATA SHEETS (EXAMPLES)

#### PART 572E EXTERNAL DIMENSIONS

<table>
<thead>
<tr>
<th>TEST PARAMETER</th>
<th>SPECIFICATION</th>
<th>TEST RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPERATURE</td>
<td></td>
<td>72.0°F</td>
</tr>
<tr>
<td>RELATIVE HUMIDITY</td>
<td></td>
<td>27.0%</td>
</tr>
<tr>
<td>LOCATION FOR CHEST CIRCUMFERENCE</td>
<td>AA</td>
<td>16.9&quot; - 17.1&quot;</td>
</tr>
<tr>
<td>LOCATION FOR WAIST CIRCUMFERENCE</td>
<td>BB</td>
<td>8.9&quot; - 9.1&quot;</td>
</tr>
<tr>
<td>CHEST CIRCUMFERENCE (WITH JACKET)</td>
<td>Y</td>
<td>38.2&quot; - 39.4&quot;</td>
</tr>
<tr>
<td>WAIST CIRCUMFERENCE</td>
<td>Z</td>
<td>32.9&quot; - 34.1&quot;</td>
</tr>
<tr>
<td>CHEST DEPTH</td>
<td>O</td>
<td>8.4&quot; - 9.0&quot;</td>
</tr>
<tr>
<td>H-POINT HEIGHT</td>
<td>C</td>
<td>3.3&quot; - 3.5&quot;</td>
</tr>
<tr>
<td>H-POINT FROM BACKLINE</td>
<td>D</td>
<td>5.3&quot; - 5.5&quot;</td>
</tr>
<tr>
<td>SKULL CAP TO BACKLINE</td>
<td>H</td>
<td>1.6&quot; - 1.8&quot;</td>
</tr>
<tr>
<td>TOTAL SITTING HEIGHT</td>
<td>A</td>
<td>34.6&quot; - 35.0&quot;</td>
</tr>
<tr>
<td>THIGH CLEARANCE</td>
<td>F</td>
<td>5.5&quot; - 6.1&quot;</td>
</tr>
<tr>
<td>BUTTOCK KNEE LENGTH</td>
<td>K</td>
<td>22.8&quot; - 23.8&quot;</td>
</tr>
<tr>
<td>BUTTOCK POPLITEAL LENGTH</td>
<td>N</td>
<td>17.8&quot; - 18.8&quot;</td>
</tr>
<tr>
<td>POPPLITEAL HEIGHT</td>
<td>L</td>
<td>16.9&quot; - 17.9&quot;</td>
</tr>
<tr>
<td>KNEE PIVOT HEIGHT</td>
<td>M</td>
<td>19.1&quot; - 19.7&quot;</td>
</tr>
<tr>
<td>FOOT LENGTH</td>
<td>P</td>
<td>9.9&quot; - 10.5&quot;</td>
</tr>
<tr>
<td>FOOT BREADTH</td>
<td>W</td>
<td>3.6&quot; - 4.2&quot;</td>
</tr>
<tr>
<td>SHOULDER PIVOT FROM BACKLINE</td>
<td>E</td>
<td>3.3&quot; - 3.7&quot;</td>
</tr>
<tr>
<td>SHOULDER BREADTH</td>
<td>V</td>
<td>16.6&quot; - 17.2&quot;</td>
</tr>
<tr>
<td>SHOULDER PIVOT HEIGHT</td>
<td>B</td>
<td>19.9&quot; - 20.5&quot;</td>
</tr>
<tr>
<td>ELBOW REST HEIGHT</td>
<td>J</td>
<td>7.5&quot; - 8.3&quot;</td>
</tr>
<tr>
<td>SHOULDER - ELBOW LENGTH</td>
<td>I</td>
<td>13.0&quot; - 13.6&quot;</td>
</tr>
<tr>
<td>BACK OF ELBOW TO WRIST PIVOT</td>
<td>G</td>
<td>11.4&quot; - 12.0&quot;</td>
</tr>
</tbody>
</table>

LABORATORY TECHNICIAN: ____________________________
### PART 572E
#### HEAD DROP TEST

<table>
<thead>
<tr>
<th>MANUFACTURER/ID NO.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CALIBRATION DATE</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST PARAMETER</th>
<th>SPECIFICATION</th>
<th>TEST RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPERATURE</td>
<td>66°F - 78°F</td>
<td>72°F</td>
</tr>
<tr>
<td>RELATIVE HUMIDITY</td>
<td>10% - 70%</td>
<td>27%</td>
</tr>
<tr>
<td>PEAK RESULTANT ACCELERATION</td>
<td>225 Gs - 275 Gs</td>
<td>270.63 Gs</td>
</tr>
<tr>
<td>PEAK LATERAL ACCELERATION</td>
<td>15 Gs Maximum</td>
<td>-7.43 Gs</td>
</tr>
<tr>
<td>IS ACCELERATION CURVE UNIMODAL?</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

REMARKS:

LABORATORY TECHNICIAN: ________________________________
### MANUFACTURER/ID NO.

### PART 572E
**NECK FLEXION TEST**

<table>
<thead>
<tr>
<th>CALIBRATION DATE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST PARAMETER</th>
<th>SPECIFICATION</th>
<th>TEST RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPERATURE</td>
<td>69ºF - 72ºF</td>
<td>72ºF</td>
</tr>
<tr>
<td>RELATIVE HUMIDITY</td>
<td>10% - 70%</td>
<td>49%</td>
</tr>
<tr>
<td>IMPACT VELOCITY</td>
<td>22.6 - 23.4 ft/sec</td>
<td>23.30 ft/sec</td>
</tr>
<tr>
<td>PENDULUM DECELERATION 10 ms</td>
<td>22.50 Gs - 27.50 Gs</td>
<td>23.51 Gs</td>
</tr>
<tr>
<td></td>
<td>17.60 Gs - 22.60 Gs</td>
<td>18.57 Gs</td>
</tr>
<tr>
<td></td>
<td>12.50 Gs - 18.50 Gs</td>
<td>15.03 Gs</td>
</tr>
<tr>
<td>MAX PENDULUM G ABOVE 30 MS</td>
<td>29 Gs</td>
<td>14.99 Gs</td>
</tr>
<tr>
<td>DECELERATION - TIME CURVE DECAY TIME TO 5 Gs</td>
<td>34 ms - 42 ms</td>
<td>38.13 ms</td>
</tr>
<tr>
<td>D PLANE ROTATION</td>
<td>64ºF - 78ºF Maximum</td>
<td>71.46ºF</td>
</tr>
<tr>
<td></td>
<td>TIME: 57 ms - 64 ms</td>
<td>60.13 ms</td>
</tr>
<tr>
<td>MOMENT ABOUT OCCIPITAL CONDYLE</td>
<td>65 - 80 ft-lbs Maximum</td>
<td>76.32 ft-lbs</td>
</tr>
<tr>
<td></td>
<td>TIME: 47 ms - 58 ms</td>
<td>52.88 ms</td>
</tr>
<tr>
<td>ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO</td>
<td>113 ms - 128 ms</td>
<td>115.75 ms</td>
</tr>
<tr>
<td>POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO</td>
<td>97 ms - 107 ms</td>
<td>100.25 ms</td>
</tr>
</tbody>
</table>

**REMARKS:**

LABORATORY TECHNICIAN: ____________________________
15. DATA SHEETS (EXAMPLES)....Continued

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

TIME, milliseconds (ms)

ACCELERATION, Gs

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

TIME, milliseconds (ms)

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

![Graph of rotation about occipital condyle](image)

P572-E HYBRID III NECK FLEXION CALIBRATION - TOTAL ROTATION

![Graph of total rotation](image)
P572-E HYBRID III NECK FLEXION CALIBRATION - TOTAL MOMENT ABOUT OCCIPITAL CONDYLE
### MANUFACTURER/ID NO.

<table>
<thead>
<tr>
<th>CALIBRATION DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEST PARAMETER</td>
</tr>
<tr>
<td>TEMPERATURE</td>
</tr>
<tr>
<td>RELATIVE HUMIDITY</td>
</tr>
<tr>
<td>IMPACT VELOCITY</td>
</tr>
<tr>
<td>PENDULUM DECELERATION</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>MAX PENDULUM G ABOVE 30 MS</td>
</tr>
<tr>
<td>DECELERATION - TIME CURVE DECAY TIME TO 5 G's</td>
</tr>
<tr>
<td>D PLANE ROTATION</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>MOMENT ABOUT OCCIPITAL CONDYLE</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO</td>
</tr>
<tr>
<td>POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO</td>
</tr>
</tbody>
</table>

**REMARKS:**

LABORATORY TECHNICIAN: ________________________________
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
P572-E HYBRID III NECK EXTENSION CALIBRATION - TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TIME, milliseconds (ms)

TORQUE, lb-ft
### PART 572E
#### LEFT KNEE IMPACT TEST

<table>
<thead>
<tr>
<th>MANUFACTURER/ID NO.</th>
<th>CALIBRATION DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST PARAMETER</th>
<th>SPECIFICATION</th>
<th>TEST RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPERATURE</td>
<td>66°F - 78°F</td>
<td>72°F</td>
</tr>
<tr>
<td>RELATIVE HUMIDITY</td>
<td>10% - 70%</td>
<td>27%</td>
</tr>
<tr>
<td>PROBE VELOCITY</td>
<td>6.8 - 7.0 ft/sec</td>
<td>6.91 ft/sec</td>
</tr>
<tr>
<td>PEAK KNEE IMPACT FORCE</td>
<td>1060 lbs - 1300 lbs</td>
<td>1156.55 lbs</td>
</tr>
<tr>
<td>PROBE WEIGHT</td>
<td>11.0 lbs</td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS:**

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

ACCELERATION, Gs

TIME, milliseconds (ms)

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

FORCE, lbs

TIME, milliseconds (ms)
### PART 572E
RIGHT KNEE IMPACT TEST

<table>
<thead>
<tr>
<th>MANUFACTURER/ID NO.</th>
<th>CALIBRATION DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST PARAMETER</th>
<th>SPECIFICATION</th>
<th>TEST RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPERATURE</td>
<td>66ºF - 78ºF</td>
<td>70ºF</td>
</tr>
<tr>
<td>RELATIVE HUMIDITY</td>
<td>10% - 70%</td>
<td>34%</td>
</tr>
<tr>
<td>PROBE VELOCITY</td>
<td>6.8 - 7.0 ft/sec</td>
<td>6.84 ft/sec</td>
</tr>
<tr>
<td>PEAK KNEE IMPACT FORCE</td>
<td>1060 lbs - 1300 lbs</td>
<td>1258.57 lbs</td>
</tr>
<tr>
<td>PROBE WEIGHT</td>
<td>11.0 lbs</td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS:**

LABORATORY TECHNICIAN: ________________________________________
### PART 572E
**THORAX IMPACT TEST**

<table>
<thead>
<tr>
<th>TEST PARAMETER</th>
<th>HIGH SPEED TEST SPECIFICATION</th>
<th>TEST RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPERATURE</td>
<td>69°F - 72°F</td>
<td>72°F</td>
</tr>
<tr>
<td>RELATIVE HUMIDITY</td>
<td>10% - 70%</td>
<td>48%</td>
</tr>
<tr>
<td>PENDULUM VELOCITY</td>
<td>21.6 - 22.4 ft/sec</td>
<td>21.77 ft/sec</td>
</tr>
<tr>
<td>MAXIMUM DEFLECTION</td>
<td>2.50 in - 2.86 in</td>
<td>2.80 in</td>
</tr>
<tr>
<td>MAXIMUM RESISTIVE FORCE</td>
<td>1160 lbs - 1325 lbs</td>
<td>1168.0 lbs</td>
</tr>
<tr>
<td>INTERNAL HYSTERESIS</td>
<td>69% - 85%</td>
<td>72.00%</td>
</tr>
</tbody>
</table>

**REMARKS:**

LABORATORY TECHNICIAN: ___________________________________________
P572-E HYBRID III THORAX CALIBRATION - PENDULUM DECELERATION

P572-E HYBRID III THORAX CALIBRATION - PENDULUM FORCE
### PART 572E
HIP JOINT-FEMUR FLEXION TEST

<table>
<thead>
<tr>
<th>Test Parameter</th>
<th>Test Specification</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>$66^\circ - 78^\circ$ F</td>
<td></td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>10% to 70%</td>
<td></td>
</tr>
<tr>
<td>Rotation Rate</td>
<td>5-10 deg./sec.</td>
<td>Yes/No</td>
</tr>
<tr>
<td>30 degree rotation</td>
<td>70 ft-lbf</td>
<td></td>
</tr>
<tr>
<td>150 ft-lbf</td>
<td>40 to 50 degree rotation</td>
<td></td>
</tr>
</tbody>
</table>

PART 572 HYBRID III CALIBRATION - HIP JOINT-FEMUR FLEXION
## PART 572E
### DUMMY DAMAGE CHECKLIST

<table>
<thead>
<tr>
<th>Dummy Serial No.:</th>
<th>Project No.:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>OK</strong></th>
<th><strong>DAMAGED</strong></th>
<th>(Begin with general cleaning)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Outer skin on entire dummy -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check for gashes, rips, etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Head - Check that ballast is secure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gashes, rips, general appearance, etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neck - Broken or cracks in rubber</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check that upper neck bracket is firmly attached to lower neck bracket</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check for looseness at the condyle joint</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nodding blocks - cracked or out of position</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spine - Broken or cracks in rubber</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ribs - Check all ribs and rib supports for damage (bent or broken)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check damping material or separation or cracks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Three rubber bumpers in place</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chest displacement assembly -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bent shaft - slider arm riding correctly in track</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transducer Leads -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Torn cables</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accelerometer Mountings (head, thorax, pelvis) -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check for secure mounting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Knees - Check outer skin, insert and casting (without removing insert)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Limbs - Check for normal movement and adjustment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Knee sliders -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wires intact - rubber returned to &quot;at rest&quot; position</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pelvis - Inspect for breakage, esp. at iliac crest</td>
</tr>
</tbody>
</table>
### DATA SHEETS (EXAMPLES)....Continued

<table>
<thead>
<tr>
<th>OK</th>
<th>DAMAGED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Ankle -</td>
<td>Inspect ankle blocks for breakage</td>
</tr>
<tr>
<td></td>
<td>Other -</td>
</tr>
</tbody>
</table>

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: ___________________________  Date: ___________________________
## PART 572E
### SAMPLE INSTRUMENTATION CALIBRATION INFORMATION

<table>
<thead>
<tr>
<th>I.D. NO.</th>
<th>MANUFACTURER</th>
<th>MODEL NO.</th>
<th>SERIAL NO.</th>
<th>DATE OF LAST CALIBRATION</th>
<th>DATE OF NEXT CALIBRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DUMMY INSTRUMENTATION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HEAD ACCELEROMETERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) LONGITUDINAL</td>
<td>ENDEVCO</td>
<td>7231C-750</td>
<td>CG21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) LATERAL</td>
<td>ENDEVCO</td>
<td>7231C-750</td>
<td>CD74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) VERTICAL</td>
<td>ENDEVCO</td>
<td>7231C-750</td>
<td>CE23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NECK TRANSDUCER</td>
<td>GSE</td>
<td>186007-0100</td>
<td>182</td>
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<td><strong>CHEST ACCELEROMETERS</strong></td>
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<td>(1) LONGITUDINAL</td>
<td>ENDEVCO</td>
<td>7231C-750</td>
<td></td>
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<tr>
<td>(2) LATERAL</td>
<td>ENDEVCO</td>
<td>7231C-750</td>
<td></td>
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<td>(3) VERTICAL</td>
<td>ENDEVCO</td>
<td>7231C-750</td>
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<td>85427-29</td>
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<tr>
<td>(1) RIGHT FEMUR</td>
<td>GSE</td>
<td>2430</td>
<td></td>
<td></td>
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<tr>
<td>(2) LEFT FEMUR</td>
<td>GSE</td>
<td>2430</td>
<td></td>
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<td>NECK PENDULUM ACCELEROMETER</td>
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<td>7232C-750</td>
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<td>7231C-750</td>
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<td>KNEE PENDULUM ACCELEROMETER</td>
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<td>7264-2000</td>
<td>CH15H</td>
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<tr>
<td>NECK ROTATION TRANSDUCER 1 (OPTIONAL)</td>
<td>BOURNS</td>
<td>35435-001-102</td>
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<tr>
<td>NECK ROTATION TRANSDUCER 2 (OPTIONAL)</td>
<td>BOURNS</td>
<td>35435-001-102</td>
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</tr>
</tbody>
</table>

LABORATORY TECHNICIAN: _______________________________________________
DUMMY PLACEMENT

1. HEAD

The transverse instrumentation platform of the head shall be horizontal within 0.5°. To level the head of the test dummy, the following sequences must be followed. First adjust the position of the H-point within the limits set forth in Section 4.B(1). If the transverse instrumentation platform of the head is still not level, then adjust the pelvic angle of the test dummy within the limits provided in Section 4.B(2). If the transverse instrumentation platform of the head is still not level, adjust the neck bracket of the test dummy the minimum amount necessary from the non-adjusted "0" setting to ensure that the transverse instrumentation platform of the head is horizontal within 0.5°. The test dummy shall remain within the limits specified for the H-point and pelvic angle after any adjustment of the neck bracket. (S10.1)

2. ARMS

A. Driver

The driver's upper arms shall be adjacent to the torso with the centerlines as close to a vertical plane as possible. (S10.2.1)

B. Passenger

The passenger's upper arms shall be in contact with the seat back and the sides of the torso. (S10.2.2)

3. HANDS

A. Driver

The palms of the driver test dummy shall be in contact with the outer part of the steering wheel rim at the rim's horizontal centerline. The thumbs shall be over the steering wheel rim and shall be lightly taped to the steering rim so that if the hand of the test dummy is pushed upward by a force of not less than 2 pounds and not more than 5 pounds, the tape shall release the hand from the steering wheel rim. (S10.3.1)

B. Passenger

The palms of the passenger test dummy shall be in contact with the outside of the thigh. The little finger shall be in contact with the seat cushion. (S10.3.2)
DUMMY PLACEMENT....Continued

4. TORSO

A. Upper Torso

(1) Bench Seats

In vehicles equipped with bench seats, the upper torso of the driver and passenger test dummies shall rest against the seat back. The midsagittal plane of the driver dummy shall be vertical and parallel to the vehicle's longitudinal centerline, and pass through the center of the steering wheel rim. The midsagittal plane of the passenger dummy shall be vertical and parallel to the vehicle's longitudinal centerline and the same distance from the vehicle's longitudinal centerline as the midsagittal plane of the driver dummy. (S10.4.1.1)

(2) Bucket Seats

In vehicles equipped with bucket seats, the upper torso of the driver and passenger test dummies shall rest against the seat back. The midsagittal plane of the driver and the passenger dummy shall be vertical and shall coincide with the longitudinal centerline of the bucket seat. (S10.4.1.2)

(3) Split Bench Seats

In vehicles equipped with split bench seats, the dummies will be placed as specified by the vehicle manufacturer.

B. Lower Torso

(1) H-Point. The H-point of the driver and passenger test dummies shall coincide within 0.5 inch in the vertical dimension and 0.5 inch in the horizontal dimension of a point 0.25 inch below the position of the H point determined by using the equipment and procedures specified in SAE J826 (Apr 80) except that the length of the lower leg and thigh segments of the H-point machine shall be adjusted to 16.3 and 15.8 inches respectively, instead of the 50th percentile values specified in Table 1 of SAE J826. (S10.4.2.1)

(2) Pelvic Angle. As determined using the pelvic angle gage (GM drawing 78051-532 incorporated by reference in Part 572, Subpart E) which is inserted into the H-point gaging hole of the dummy, the angle measured from the horizontal on the 3 inch flat surface of the gage shall be 22.5 degrees ± 2.50 degrees. (S10.4.2.2)
5. LEGS

The upper legs of the driver and passenger test dummies shall rest against the seat cushion to the extent permitted by placement of the feet. The initial distance between the outboard knee clevis flange surfaces shall be 10.6 inches. To the extent practicable, the left leg of the driver dummy and both legs of the passenger dummy shall be in vertical longitudinal planes. To the extent practicable, the right leg of the driver dummy shall be in a vertical plane. Final adjustment to accommodate placement of feet in accordance with Section 6 for various passenger compartment configurations is permitted. (S10.5.2)

6. FEET

A. Driver Feet Placement

Rest the right foot of the test dummy on the undepressed accelerator pedal with the rearmost point of the heel on the floor pan in the plane of the pedal. If the foot cannot be placed on the accelerator pedal, set it initially perpendicular to the lower leg and place it as far forward as possible in the direction of the pedal centerline with the rearmost point of the heel resting on the floor pan. (S10.6.1.1)

Place the left foot on the toeboard with the rearmost point of the heel resting on the floor pan as close as possible to the point of intersection of the planes described by the toeboard and the floor pan and not on the wheelwell projection. If the foot cannot be positioned on the toeboard, set it initially perpendicular to the lower leg and place it as far forward as possible with the heel resting on the floor pan. If necessary to avoid contact with the vehicle's brake or clutch pedal, rotate the test dummy's left foot about the lower leg. If there is still pedal interference, rotate the left leg outboard about the hip the minimum distance necessary to avoid the pedal interference. For vehicles with a foot rest that does not elevate the left foot above the level of the right foot, place the left foot on the foot rest so that the upper and lower leg centerlines fall in a vertical plane. (S10.6.1.2)

B. Passenger Feet Placement

(1) Flat floor pan/toeboard:

Place the right and left feet on the vehicle's toeboard with the heels resting on the floor pan as close as possible to the intersection point with the toeboard. If the feet cannot be placed flat on the toeboard, set them perpendicular to the lower leg centerlines and place them as far forward as possible with the heels resting on the floor pan. (S10.6.2.1)
(2) Wheelhouse projections:

Place the right and left feet in the well of the floor pan/toeboard and not on the wheelhouse projection. If the feet cannot be placed flat on the toeboard, initially set them perpendicular to the lower leg centerlines and then place them as far forward as possible with the heels resting on the floor pan. (S10.6.2.2)
<table>
<thead>
<tr>
<th></th>
<th>DRIVER DSP</th>
<th>PASSENGER DSP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UPPER TORSO</strong></td>
<td>BENCH SEAT: Placed against seat back. Midsagittal plane is vertical &amp; parallel to vehicle C/L passing thru center of steering wheel rim.</td>
<td>BENCH SEAT: Placed against seat back. Midsagittal plane is vertical and longitudinal located the same distance from the vehicle longitudinal C/L as the midsagittal plane of the driver dummy.</td>
</tr>
<tr>
<td></td>
<td>NOTE: Split bench seat - as in manufacturer's certification test(s).</td>
<td>NOTE: Split bench seat - as in manufacturer's certification test(s).</td>
</tr>
<tr>
<td></td>
<td>BUCKET SEAT: Placed against seat back. Midsagittal plane is vertical and parallel to C/L of the seat cushion.</td>
<td>BUCKET SEAT: Placed against seat back. Midsagittal plane is vertical and parallel to C/L of the seat cushion.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UPPER ARMS</strong></td>
<td>Initially placed against seat back &amp; tangent to side of upper torso. Push arms rearward into the seat back with bending at elbows.</td>
<td>Initially placed against seat back &amp; tangent to side of upper torso. Push arms rearward into seat back with bending at elbows. Remains tangent.</td>
</tr>
<tr>
<td><strong>LOWER ARMS</strong></td>
<td>Initially placed against the outside of the thighs. C/L as close as possible in a vertical plane.</td>
<td>Initially placed against the outside of the thighs. C/L as close as possible in a vertical plane.</td>
</tr>
<tr>
<td><strong>HAND PALMS</strong></td>
<td>Palms contact outer part of steering wheel rim at horizontal C/L.</td>
<td>Palms contact the outside of the thighs.</td>
</tr>
<tr>
<td><strong>HAND THUMBS</strong></td>
<td>Placed over steering wheel rim</td>
<td>Barely in contact with the seat cushion.</td>
</tr>
<tr>
<td><strong>HAND LITTLE FINGERS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LOWER TORSO</strong></td>
<td>H-point shall coincide within 0.50 inch in the vertical and horizontal dimension of a point 0.25 inch below the position established by the SAE J826 (APR 80) with thigh/leg segments adjusted to 16.3/15.8 inches. Pelvic angle shall be 22.50 ± 0.50 degrees.</td>
<td>H-point shall coincide within 0.50 inch in the vertical and horizontal dimension of a point 0.25 inch below the position established by the SAE J826 (APR 80) with thigh/leg segments adjusted to 16.3/15.8 inches. Pelvic angle shall be 22.50 ± 0.50 degrees.</td>
</tr>
<tr>
<td><strong>UPPER LEGS</strong></td>
<td>Placed against seat cushion. Plane defined by femur &amp; tibia C/Ls is as close as possible to vertical.</td>
<td>Placed against seat cushion. Located so that plane defined by femur &amp; tibia C/Ls is as close as possible to vertical/longitudinal for left leg, vertical for right leg.</td>
</tr>
<tr>
<td><strong>KNEES</strong></td>
<td>Initially set 10.6 inches apart between outboard knee clevis flange.</td>
<td>Initially set 10.6 inches apart between outboard knee clevis flange.</td>
</tr>
<tr>
<td><strong>LOWER LEGS</strong></td>
<td>Plane defined by upper and lower leg C/Ls as close as possible to vertical plane.</td>
<td>Plane defined by upper and lower leg C/Ls is as close as possible to vertical, longitudinal plane.</td>
</tr>
<tr>
<td><strong>RIGHT FOOT</strong></td>
<td>Placed on undepressed accelerator pedal. Rearmost point of heel on floorpan in plane of pedal.</td>
<td>Place on toeboard rearmost point of heel on floorpan as close as possible to intersection of toeboard &amp; floor pan.</td>
</tr>
<tr>
<td><strong>LEFT FOOT</strong></td>
<td>Placed on toeboard. Rearmost point of heel on floorpan as close as possible to intersection of toeboard &amp; floor pan.</td>
<td>Place on toeboard rearmost point of heel on floorpan as close as possible to intersection of toeboard &amp; floor pan.</td>
</tr>
</tbody>
</table>
7. TEST DUMMY POSITIONING FOR LATCHPLATE ACCESS

Position the test dummy in the driver's seat or passenger's seat in its forwardmost adjustment position. Attach the lines for the inboard and outboard arms to the test dummy as described in Appendix D. Extend each line backward and outboard to generate the compliance arcs of the outboard reach envelope of the test dummy's arms. (S10.7)

8. TEST DUMMY POSITIONING FOR BELT CONTACT FORCE

The seats shall be positioned as specified for the impact test (TP208-09 Section 12). Position the test dummy in the vehicle in accordance with the requirements specified in Section 1 through Section 6, above, in its designated seating position. Pull the belt webbing three inches from the test dummy's chest and release until the webbing is within 1 inch of the test dummy's chest and measure the belt contact force. (S10.8) Except for seat belt assemblies that incorporate a webbing tension-relieving device, the upper torso webbing of any seat belt assembly shall not exert more than 0.7 pounds of contact force when measured normal to and one inch from the chest of the dummy at the point where the centerline of the torso belt crosses the midsagittal line on the dummy's chest. (S7.4.3)

9. MANUAL BELT ADJUSTMENT FOR DYNAMIC TESTING

The seats shall be positioned as specified for the impact test (TP208S-01 Section 12). Position the test dummy in the vehicle in accordance with the requirements specified in Section 1 through Section 6, above, in its designated seating position.

Place the Type 2 manual belt around the test dummy and fasten the latch. Remove all slack from the lap belt. Pull the upper torso webbing out of the retractor and allow it to retract; repeat this operation four times. Apply a 2 pound to 4 pound tension load to the lap belt. If the belt system is equipped with a tension-relieving device introduce the maximum amount of slack into the upper torso belt that is recommended by the manufacturer for normal use in the owners manual for the vehicle. If the belt system is not equipped with a tension-relieving device, allow the excess webbing in the shoulder belt to be retracted by the retractive force of the retractor. (S10.9)
APPENDIX C
FMVSS 208 SEAT BELT COMFORT AND CONVENIENCE TESTS

1. BELT CONTACT FORCE (S7.4.3)

Test Vehicle NHTSA No.: _____________________
Veh. Model Year/Make/Model/Body Style: ________________________________
Designated Seating Position Tested: ________________________________
Date of Comfort/Convenience Check: _________________________
Technician Performing Check: _______________________________
GVWR: ______________________

Test all Type 2 seat belts other than those in walk-in van-type vehicles and those at front
outboard designated seating positions in passenger cars. Complete a form for each applicable
seat belt.

1.1 Does the vehicle incorporate a webbing tension-relieving device?

___Yes - go to latchplate access
___No - continue with this check sheet

1.2 Adjustable seats are in the adjustment position midway between the forward most and
rearmost positions. If an adjustment position does not exist midway between the
forward most and rearmost positions, the next closest adjustment position to the rear of
the midpoint is used. (S8.1.2)

[ ] - CHECK
[ ] - N/A

1.3 If separately adjustable in a vertical direction, the seats are at the lowest position.

[ ] - CHECK
[ ] - N/A

1.4 Place adjustable seat backs in the manufacturer's nominal design riding position in the
manner specified by the manufacturer.

[ ] - CHECK
[ ] - N/A

1.5 Place any adjustable anchorages at the manufacturer's nominal design position for a
50th percentile adult male (50M) occupant. This information will be furnished by the
COTR.

[ ] - CHECK
[ ] - N/A
1. **BELT CONTACT. . . .continued**

1.6 Place each adjustable head restraint in its highest adjustment position.

[ ] - CHECK

[ ] - N/A

1.7 Adjustable lumbar supports are positioned so that the lumbar support is in its lowest adjustment position. (S8.1.3)

[ ] - CHECK

[ ] - N/A

1.8 Position the test dummies according to dummy position placement instructions in Appendix B.

[ ] - CHECK

1.9 Fasten the seat belt latch. Pull either 12 inches of belt webbing or the maximum available amount of belt webbing, whichever is less, from the retractor and then release it, allowing the belt webbing to return to the dummy's chest. Locate the point where the centerline of the upper torso belt webbing crosses the midsagittal line on the dummy's chest. At that point pull the belt webbing out 3 inches from the dummy's chest and release until it is within one inch from the dummy's chest. (S10.8) Measure the contact force exerted by the belt webbing on the dummy's chest. Contact the COTR if the contact force exceeds 0.7 pounds.

Contact force ___________lb.  ___0.0 to 0.7 pounds - Pass

___ greater than 0.7 pounds - FAIL*

* If the seat belts are voluntarily installed by the manufacturer they do not have to comply.

REMARKS:
2. LATCHPLATE ACCESS (S7.4.4)

Test Vehicle NHTSA No.: __________________________
Veh. Model Year/Make/Model/Body Style: __________________________
Designated Seating Position Tested: __________________________
Date of Comfort/Convenience Check: ________________________
Technician Performing Check: ______________________________
GVWR: __________________________

Test all front outboard seat belts other than those in walk-in van-type vehicles and those at
front outboard designated seating positions in passenger cars. Complete a form for each
applicable seat belt.

2.1 Position the seat in its forward most adjustment position. [ ] - CHECK

2.2 Position the test dummy using the procedures in Appendix B. (Some modifications to
the positioning procedure may need to be made because the seat is in its forward most
position.) [ ] - CHECK

2.3 Position the adjustable seat belt anchorage in the manufacturer’s nominal design
position for a 50th percentile adult male occupant. [ ] – CHECK

2.4 Attach the inboard and outboard reach string following the instructions on Figure 1C.
[ ] – CHECK

2.5 Place the latch plate in the stowed position. [ ] - CHECK

2.6 Extend each line backward and outboard to generate arcs of the reach envelope of the
test dummy’s arms. Is the latch plate within the reach envelope?
___Yes - Pass
___NO - FAIL

2.7 Using the clearance test block, specified in Figure 2C, is there sufficient clearance
between the vehicle seat and the side of vehicle interior to allow the test block to move
unhindered to the latch plate or buckle?
___Yes - Pass
___NO - FAIL
3. RETRACTION (S7.4.5)

Test Vehicle NHTSA No: ________________________
Veh. Model Year/Make/Model/Body Style: _______________________________
Designated Seating Position Tested: ________________________________
Date of Comfort/Convenience Check: _________________________________
Technician Performing Check: _________________________________
GVWR: ________________________

Test all front outboard seat belts, except those in walk-in van-type vehicles and those at front outboard designated seating positions in passenger cars. Complete a form for each applicable seat belt.

3.1 Is the vehicle a passenger car or walk-in van-type vehicle?
   ___Yes   ___No

If yes, go to seat belt guides and hardware.

3.2 Adjustable seats are in the adjustment position midway between the forward most and rearmost positions. If an adjustment position does not exist midway between the forward most and rearmost positions, the next closest adjustment position to the rear of the midpoint is used. (S8.1.2)

   [___] – CHECK

3.3 If separately adjustable in a vertical direction, the seats are at the lowest position.

   [___] – CHECK

3.3 Place adjustable seat backs in the manufacturer's nominal design riding position in the manner specified by the manufacturer.

   [___] - CHECK

3.4 Place any adjustable anchorages at the manufacturer's nominal design position for a 50th percentile adult male (50M) occupant. This information will be furnished by the COTR.

   [___] - CHECK

3.5 Place each adjustable head restraint in its highest adjustment position.

   [___] - CHECK

3.6 Adjustable lumbar supports are positioned so that the lumbar support is in its lowest adjustment position. (S8.1.3)

   [___] - CHECK
3. RETRACTION....Continued

3.4 Use anthropomorphic test dummies whose arms have been removed and position the
dummies in the front outboard designated seating positions according to instructions in
Appendix B.

[□] - CHECK

3.5 Restrain the dummies using the belt systems for the position being tested.

[□] - CHECK

3.6 Stow outboard armrests which are capable of being stowed.

[□] - CHECK

3.7 Check the statement that applies to this test vehicle:

A. The torso and lap belt webbing of the seat belt system automatically retracts to a
stowed position when the adjacent vehicle door is in an open position and the
seat belt latch plate is released.

[□] - Pass

B. The torso and lap belt webbing of the seat belt system automatically retracts
when the seat belt latch plate is released.

[□] - Pass

C. Neither A or B apply.

___FAIL

3.7 With the webbing and hardware in the stowed position are the webbing and hardware
prevented from being pinched when the door is closed?

___Yes - Pass ___NO - FAIL

3.8 If this test vehicle has an open body (without doors) and has a belt system with a
tension-relieving device, does the belt system fully retract when the tension-relieving
device is deactivated?

___N/A

___Yes - Pass ___NO - FAIL
4. SEAT BELT GUIDES AND HARDWARE (S7.4.6)

Test Vehicle NHTSA No.: _______________________
Veh. Model Year/Make/Model/Body Style: _______________________________
Designated Seating Position Tested: _________________________________
Date of Comfort/Convenience Check: _________________________________
Technician Performing Check: _________________________________
GVWR: _____________________

Test seat belts except those in walk-in van-type vehicles and those at front outboard
designated seating positions in passenger cars. Complete a form for each applicable seat
belt.

The requirements for accessibility DO NOT APPLY to:

A. Seats whose seat cushions are movable so that the seat back serves a function
other than seating (S7.4.6.1(b))

B. Seats which are removable

C. Seats which are movable so that the space formerly occupied by the seat can be
used for a secondary function

If the seats in this vehicle are different than the criteria above determine the following:

4.1 Is the webbing designed to pass through the seat cushion or between the seat cushion
and seat back?
    ___Yes: go to 4.2 ___No: this form is complete.

4.2. Does one of the following three parts, the seat belt latch plate, the buckle, or the seat
belt webbing, stay on top of or above the seat cushion under normal conditions (i.e.,
conditions other than when belt hardware is intentionally pushed behind the seat by a
vehicle occupant)?
    ___Yes - Pass ___NO - FAIL

4.3. Are the remaining two seat belt parts accessible under normal conditions?
    ___Yes - Pass ___NO - FAIL

4.4. The buckle and latch plate do not pass through the guides or conduits provided and fall
behind the seat when the following events occur in order:
4. **SEAT BELT GUIDES AND HARDWARE....Continued**

A. The belt is completely retracted or, if the belt is nonretractable, the belt is unlatched.  
   
   [ ] - CHECK

B. The seat is moved to any position to which it is designed to be adjusted.  
   
   [ ] - CHECK

C. The seat back, if foldable, is folded forward as far as possible and then moved backward into position.  
   
   [ ] - CHECK

   ___Yes - Pass ___NO - FAIL

4.5. Is the inboard receptacle end of the seat belt assembly, installed in the outboard designated seating position, accessible with the center arm rest in any position to which it can be adjusted (without moving the armrest)?  

   ___Yes - Pass ___NO - FAIL
APPENDIX C . . . Continued

LOCATION OF ANCHORING POINTS FOR LATCHPLATE REACH LIMITING CHAINS OR STRINGS TO TEST FOR LATCHPLATE ACCESSIBILITY

PART 572E DUMMY

50TH PERCENTILE DUMMY SEATED IN FOREMOST SEAT ADJUSTMENT POSITION

ATTACH THE INBOARD REACH STRING (19.125" LONG) AT THE BASE OF THE HEAD ON CENTERLINE

ATTACH THE OUTBOARD REACH STRING (29" LONG) AT THIS POINT ON THE TORSO SHEATH

A - USING FLEXIBLE TAPE, MEASURE 8" FROM BACK CENTERLINE 10.250" FROM FRONT CENTERLINE TO FIND ANCHOR POINT BELOW ARM PIT ON TORSO SHEATH

SEAT PLANE IS 90 DEGREES TO THE TORSO LINE

REAR VIEW

FIGURE 1C
APPENDIX C...Continued

USE OF CLEARANCE TEST BLOCK TO DETERMINE HAND/ARM ACCESS

NOTE: CORNERS ARE ROUNDED OFF TO REDUCE SNAGGING.

CLEARANCE TEST BLOCK

0.5" R. TYP.

TYPICAL ARM REST

FRONT VIEW OF VEHICLE

FIGURE 2C
APPENDIX D
EVALUATION OF DATA ACQUISITION SYSTEM USING
A SIGNAL WAVE GENERATOR

1. REFERENCES


C. Attachment 1 - Data Tape Header Codes For Tests Using The SWG.

D. SAE J211/1 MAR95 - Instrumentation for Impact Test

2. DEFINITIONS

ATD Anthropomorphic Test Device

Channel Entire data path from sensor output interface, through the signal conditioner, the umbilical cable, and the DAS, to the digital data recorded on magnetic tape

Contractor Owner(s) and operating personnel of the vehicle crash test facility

DAS Data Acquisition System

DOT United States Department of Transportation

NHTSA National Highway Traffic Safety Administration

SWG Signal Waveform Generator

TTM Task Technical Monitor

3. OBJECTIVE

The purpose of this task is to evaluate all of the data acquisition channels used for recording signals in vehicle crash and sled tests conducted at contractor test facilities for the U.S. Department of Transportation, including signals from ATD and vehicle sensors. The primary and redundant channels used for the sensors are to be evaluated by injecting standard signals from a SWG furnished by the government into the sensor input interface of each channel and recording these signals on magnetic
3. OBJECTIVE....Continued

tape. The data recorded on magnetic tape will be analyzed by government personnel at a government facility.

The evaluation testing shall be performed as directed by NHTSA (It is intended that this be performed every six months or at the beginning and the end of a test program.) at the contractor's test facilities, normally before a series of tests that are scheduled to be conducted (Please see Section 6, below). The evaluation testing shall also be performed on an as needed basis if a question regarding the performance of the DAS at the contractor's facilities arises during a series or part of a series of scheduled tests.

4. GOVERNMENT FURNISHED EQUIPMENT

One SWG, with three cable connectors that mate with the output jacks of the SWG, and one copy of Reference A, will be furnished to the Contractor.

5. ITEMS OF WORK

5.1 PREPARATION FOR TESTING

5.1.1 SHIPPING

After unpacking the SWG and inspecting the instrument for possible shipping damage, the SWG shipping container and its foam packing should be retained in dry storage for future shipping use. When the SWG is next shipped, the Contractor shall be responsible for packing and shipping the SWG so that likelihood of damage in shipment is minimized. To accomplish this, the SWG shall be repacked in air bubble plastic wrap and polystyrene packing peanuts as it was when shipped to the contractor. Outer package labels shall specify correct orientation, "FRAGILE", and "DO NOT DROP". The use of shipping damage indicators, such as "Drop(N)Tell", is required.

5.1.2 CABLE PREPARATION

After receiving the SWG, the Contractor shall assemble the cabling necessary to connect the SWG outputs to the sensor output/signal conditioner input interfaces. The Contractor shall supply the connectors that mate with the Contractor's signal conditioner inputs (or umbilical cable, as appropriate) and the wire or cable necessary to transmit signals from the SWG to the signal conditioner inputs. The Contractor shall verify that the SWG input power marking is appropriate for the available local power.

5.1.3 SWG PERFORMANCE CHECK-OUT

The Contractor shall check-out the SWG performance by displaying each waveform and time reference output on a storage oscilloscope (of which the amplitude display has been calibrated to ± 3%) and comparing the displayed waveform with Figure 5-1 in
5. ITEMS OF WORK...Continued

Reference A. If significant differences such as loss of signal output from one or more channels, differences between positive and negative amplitude peaks greater than ± 5%, or irregularities where straight lines are shown in Figure 5-1 are observed, the Contractor shall call the TTM.

The Contractor shall notify the TTM of the test schedule at least two weeks prior to start of test in case the Government desires to witness the test.

5.2 TESTING

5.2.1 OPERATING ENVIRONMENT

The SWG shall not be operated outside the environmental limits of -10ºC to 50ºC and relative humidity of 0% to 94%. The SWG shall not be in contact with water, ice, or snow.

5.2.2 SWG to DAS CONNECTIONS

The ±100 mV output level ("piezo resistive" setting) signals from the SWG shall be connected to the facility instrumentation and DAS so that these signals pass through both the signal conditioning electronics and the crash or sled test umbilical cable, in the same sequence as is used in vehicle crash or sled testing. If the signal conditioners on any channel are designed to handle only lower level signals, resistive shunts shall be installed at the instrumentation interface to reduce the SWG signal voltage level to the full input range of the channel under test. The SWG output impedance is 348 Ohms.

In cases where the signals from two or more channels are combined during later processing, such as driver head x, y, and z accelerations, the channels used to collect these data shall be tested simultaneously. The channel used for the x-axis signal shall receive a "Group 1 waveform" input (SWG channels 1, 2, 3, 4, 9, 10, 11, and 12). The channel used for the z-axis signal shall receive a "Group 2 waveform" input (SWG channels 5, 6, 7, 8, 13, 14, 15, and 16). The channel used for the y-axis signal may be tested with either waveform input.

Each time waveform data is recorded, one channel of time synchronization data shall be recorded. The channel used for the time synchronization data shall be capable of accepting and recording a "TTL" pulse (0 to +5V), 10 milliseconds wide. It is expected that this would be the channel or channels used by the Contractor to record "time zero" signals during vehicle crash and sled testing.

The Contractor shall set up to test as many channels simultaneously as is practical, up to the limit of 16 set by the SWG. The Contractor shall record the identity of each DAS input channel connected to each SWG output channel.
5. ITEMS OF WORK....Continued

5.2.3 SIGNAL CONDITIONERS

For each data channel to be tested, the signal conditioner used with that channel for crash or sled testing shall be set up. Setup and calibration of each signal conditioner shall be performed exactly as is done for a DOT contracted vehicle crash or sled test in accordance with SAE J211/1 MAR95 - Instrumentation for Impact Test (Reference D).

5.2.4 SWG POWER

The SWG furnished for use in the United States is wired to accept 120 VAC 60 Hz electrical power. The acceptable tolerances on 120 volt input power are 120 VAC, +10%, -13%, and frequency variation from 47Hz to 63 Hz. The SWG furnished for use in Europe is wired to accept 230 VAC, 50 Hz electrical power. The acceptable tolerances on 230 volt input power are 230 VAC, +15%, -10%, and frequency variation from 47 to 63 Hz. Each SWG will be marked with a label, located over the AC power input connector, that identifies the input power setting for that unit. For use with input voltage levels outside the marked range, the SWG power input transformer must be re-connected in accordance with Appendix B of Reference A.

The contractor shall apply power to SWG, signal conditioners, and DAS; and allow the SWG self-test to complete as described in Section 3 of Reference A. If a failure is indicated, the Contractor shall call the TTM.

5.2.5 TEST

The Contractor shall start the DAS recording mechanism, press and release the "RECORD" switch, and one-half to one second after the "RECORDING" light turns "OFF", press the calibration switch for approximately one-half second or more. If it is not possible to record waveform data and calibration data in the sequence described in the previous sentence, the calibration data and the waveform data shall be recorded in as close time proximity as possible by the facility. If more than five minutes separates recording of the waveforms and calibration signals, please contact the TTM.

The Contractor shall repeat steps 5.2.2 through 5.2.5 until all data acquisition channels have been tested. After each test run, the Contractor shall check the recorded data for anomalies, to assure that valid waveform data has been recorded for each channel.

The Contractor shall record SWG ambient temperature at the start and at the end of testing.
5. ITEMS OF WORK....Continued

5.3 DATA TAPE REQUIREMENTS

The Contractor shall provide the digitized data on a magnetic tape written in the format specified for vehicle crash test data in References B and C. Digitizing of the data that has been recorded on analog magnetic tape shall be performed in exactly the same manner as in a DOT contracted vehicle crash or sled test. If it is possible, the digitizing process shall be initiated by the "pretime zero" pulse in the SWG time synchronization output.

During each run when waveform data are digitized, the corresponding SWG time synchronization output shall also be digitized. This time channel shall be the first in the sequence of channels to be digitized. Channels of signals that will be combined during later processing, such as driver head x, y, and z accelerations, shall be digitized during the same run. The digital data files corresponding to the time synchronization channel and each of the waveform channels shall be identified. Waveform outputs shall be scaled so that ± full scale corresponds to ± 200.

In creating the data tape, the Contractor shall provide the information required for the GENERAL TEST INFORMATION and the INSTRUMENTATION INFORMATION tape headers. The exceptions to the header code assignments of Reference B, given in Reference C, shall govern.

5.4 REPORT

A letter report on the DAS testing performed under this TTD shall be prepared. The report for this test shall include the date and time of the test, the names of the test performers and the responsible supervisor, the environmental conditions during the test a complete description of the test set-up, including a list identifying each SWG output channel connected to each DAS input channel, and a list of equipment used in the data acquisition channels tested (e.g. signal conditioners, filters, digitizing hardware).

The report shall also include plots of data from all channels tested, a description of anything that occurred during the test that might affect the data or the results of the test, and a description of any data processing algorithms (such as zero offset removal, detrending, scaling) used on the data from the digitizing through to the final recording process.
6. DELIVERABLES AND SCHEDULE

All deliverables shall be delivered to:
U.S. Department of Transportation
National Highway Traffic Safety Administration
Mail Code: NRD-11
400 Seventh Street, S.W.
Washington, DC  20590
Attn: Ms. Randa Radwan Samaha

A. Evaluation test completion:
   As directed by NHTSA.

B. Digital data tape written in NHTSA vehicle crash test format:
   within 1 week after the evaluation test.

C. Test report:
   Three copies of final report two weeks after the evaluation test.

Attachment:

Data Tape Header Codes For Tests Using The SWG
DATA TAPE HEADER CODES FOR TESTS USING THE SWG

NOTE: Where any of these header code assignments differ from those presented in Reference B, the assignments of this attachment shall govern.

VERSION NO. S2

TSTREF DDMMYYxxxx

DDMMYY Test date where - -

DD - - 2 digit day
MM - - 2 digit month
YY - - 2 digit year
xxxx - 4 characters for contractor's reference use

TSTTYP SWG Signal Waveform Generator test of the DAS

CURNO 001 Channel 1 of DAS
002 Channel 2 of DAS
nnn Channel nnn of DAS

SENLOC 01 Driver side (Code already exists)
02 Passenger side (Code already exists)

SENATT The four character code for SENATT from Reference B that designates the location of the sensor to which the channel under test would normally be connected. When a sensor is not assigned to the channel under test, the SWG channel connected to this channel shall be identified here using the code shown under INSCOM (below).

AXIS XL Sensitive axis of sensor that would be connected to DAS channel under test is X axis.

YL Sensitive axis of sensor that would be connected to DAS channel under test is Y axis.

ZL Sensitive axis of sensor that would be connected to DAS channel under test is Z axis.

INSMAN Serial number of SWG used for the test
DATA TAPE HEADER CODES FOR TESTS USING THE SWG....Continued

CALDAT  Last calibration date for instrumentation used in data acquisition channel tested.

INSCOM  Commentary field. The Contractor shall identify the SWG channel connected to the DAS channel under test. The code listed below may be used to identify the SWG channel. In addition, such information as run number, amplifier, tape recorder, tape recorder channel, or anything else required to uniquely identify the DAS channel equipment shall be included. There are only 70 characters available. Do the best that you can!

SWG01  Channel 1 of signal waveform generator
SWG02  Channel 2 of signal waveform generator
SWG16  Channel 16 of signal waveform generator
SWGH1  High level signal of Group 1 waveform
SWGH2  High level signal of Group 2 waveform
SWGE1  Event time indicator (Time zero)
SWGE2  Event time indicator (Delayed time zero)
SWGI1  Event time indicator (Inverted time zero)
SWGI2  Event time indicator (Inverted delayed time zero)