HR-5-5

U.S. Human Factors Non-Use Position Study

Head Restraint Informal Working Group GTR Meeting
Cologne, Germany
January 23-26, 2006

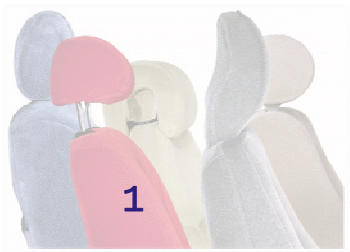
Draft

NHTSA

Objective

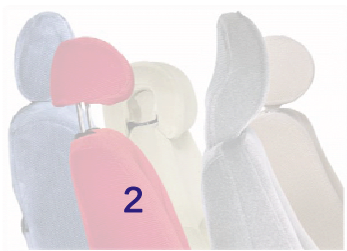
- **Examine response to visible and physical cues that a head restraint is in a non-use position**

- **Torso Angle Change**
  - Determine the minimum torso angle change of the J826 manikin that would give an occupant a physical cue that the head restraint is not in position.
- **Label**
  - Assess label effectiveness to indicate to the occupant that the head restraint should be raised.



Vehicle Approach

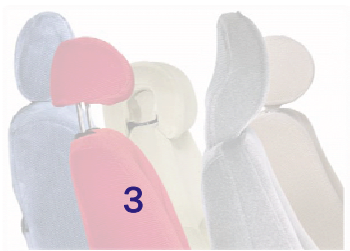
- **Vehicle Seat: 2005 Chrysler Town and Country minivan – Stow n' Go rear seat**
- **Testing**
  - Nominal Torso Angle Change
    - 5 degree - OEM position
    - 10 degree – modified head restraint
    - 15 degree – modified head restraint
  - Label
    - Modified 2005 Volvo SC90 label from rear center head restraint



Human Approach

- Testing was conducted in a static setting, but using a ruse that led participants to believe that they would be driving a vehicle as part of the test.

- Participants were asked to sit in the subject seat and fasten the seatbelt in preparation for watching a brief instructional video and then being driven to another location.



Data Collection

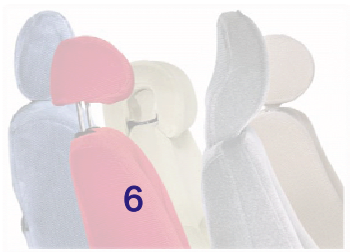
- **Data collected included:**
  - Participant's response to the stowed head restraint
    - I.e. whether or not the person adjusted the head restraint
  - Participant standing height,
  - Sitting shoulder height,
    - measured inside and outside of the vehicle
  - and Questionnaire responses.

Torso Angle Method
Test Preparation

- Measurements were taken using an J826 manikin to determine the backset distances needed to obtain 10 and 15-degree changes in torso angle.
- Head restraint posts were modified to create the desired change in torso angle.
- Height of the fully raised head restraints were approximately 760 mm

Head Restraint Measurement Values

Condition	Torso Angle (deg)	Measured Torso Angle Change (between OE head restraint up, in deg)
OE head restraint up	25.5	N/A
OE head restraint stowed (5 degree torso angle change)	19.1	6.4
10 degree torso angle change (stowed)	14.2	11.3
15 degree torso angle change (stowed)	9.1	16.4



Head Restraint Modification
Side View

Head Restraint Modification
Top View

Head Restraint Modifications
Side View – Stowed and Deployed

5 degrees | 10 degrees | 15 degrees

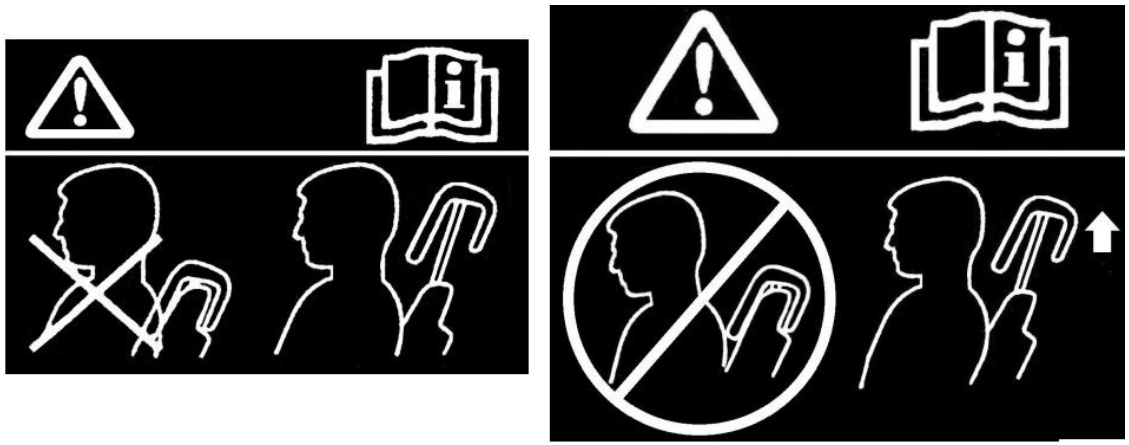
Head Restraint Modifications
Side View – Stowed and Deployed with Occupant

5 degrees | 10 degrees | 15 degrees

Label Condition Design
Test Preparation

- **Warning label was developed based on a Volvo label**
- **Modifications were made to improve the clarity of the symbol**
  - Changing the “x” to a “no” (circle with diagonal slash) symbol
  - Rotating the image of the person to show him bending forward due to the stowed head restraint, and
  - Adding an arrow to indicate that the head restraint as pictured on the right side of the image had been raised to a proper position.
- **For testing, this label was paired with the 5-degree torso angle condition.**

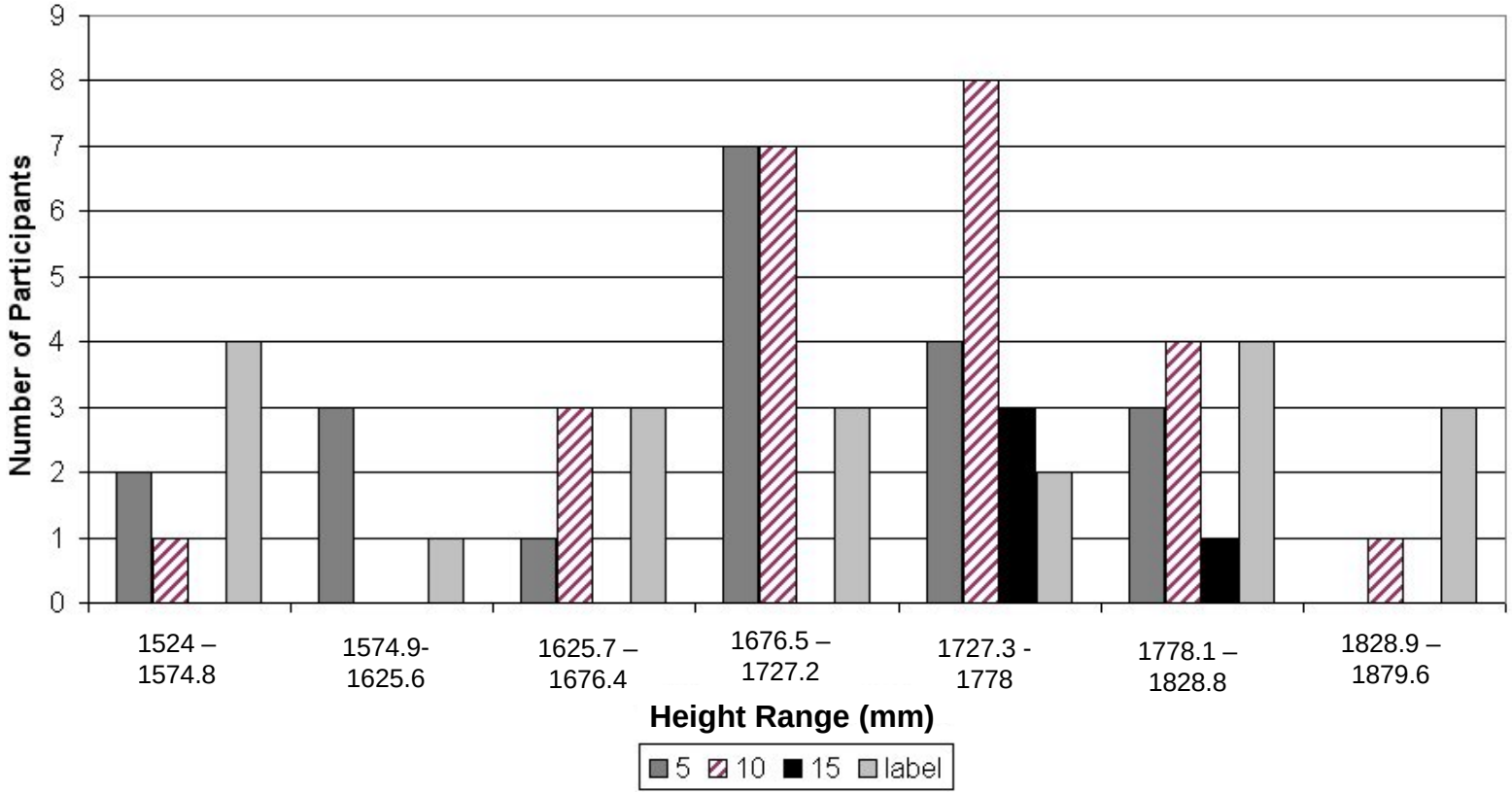
Detail of Label



Volvo Label Modified Label

Modified label was printed to be similar in size to the OEM Volvo label

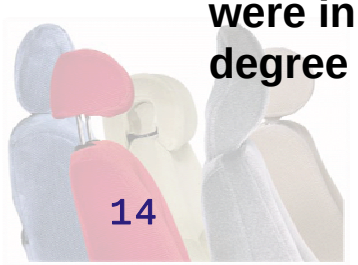
Distribution of Participant Heights by Testing Condition



Number of Participants Who Adjusted the Head Restraint by Condition

Condition	Number of Participants Who Adjusted	Number of Participants (n)	Percent Who Adjusted
5 degree torso angle change (Chrysler OEM)	3	20	15%
10 degree torso angle change	19	24	79%
15 degree torso angle change	4	4	100%
Label	0	20	0%
Total	26	68	38%

- In addition to the head restraint adjustments shown in the table, there were 3 participants who adjusted the seat back angle in this study. All 3 were in the 5 degree or label conditions. One of those three (in the 5 degree condition) also adjusted the head restraint. (Bullet revised - 2/2/05)



Label Content Comprehension

- **No participants who received the label condition treatment adjusted the head restraint.**
- **Questionnaire responses**
  - 33 of 68 (49%) correctly interpreted the label
  - 16 of 68 (24%) thought the label informed the occupant that the head restraint was adjustable
    - They read it as being informative rather than instructive
  - 19 of 68 (26%) stated they did not understand the label

Conclusions

- **A 5 degree torso angle change is unlikely to cause an occupant to adjust the head restraint from the non-use position.**
- **A 10 degree torso angle change was successful in causing a majority of occupants to adjust the head restraint.**