# Measurement and Evaluation of Head Restraints in 1997 Vehicles: Procedures and Detailed Results

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**ABSTRACT**

Head restraints, intended to reduce the risk of neck injury in rear impacts, have been required by Federal Motor Vehicle Safety Standard 202 in new passenger cars since the 1969 model year and in light trucks since the 1992 model year. This standard specifies minimum geometric criteria for head restraint height and width, but actual head restraints vary greatly in terms of height, adjustability, and proximity to the backs of people's heads. To reduce the likelihood of whiplash injury, a head restraint should be behind and close to the back of an occupant's head to provide support in a rear impact. Head restraints in 247 different 1997 model year passenger vehicles were measured to evaluate their likely proximity to the head of an average-size male occupant. Seven vehicles (3 percent) were rated as having good head restraint geometry, whereas 156 vehicles (62 percent) only offer seats with poor head restraints. Thirty-eight percent of the vehicles offer seats with marginal or better head restraints. Results of this evaluation highlight the inadequacy of the present standard's geometric criteria and the need for improved head restraint designs.

## INTRODUCTION

Whiplash injuries are among the most frequent in crashes, and because of this frequency, their total cost is among the highest. In the United States, 59-66 percent of insurance claims for occupant injuries include neck sprains, and one-quarter of all injury claim dollars are paid for claims in which the most serious injury is neck sprain (Insurance Research Council, 1994). Head restraints, intended to reduce the likelihood of these injuries in rear impacts, have been required for drivers and right front passengers in all passenger cars since the 1969 model year and in light trucks since the 1992 model year (49 *CFR* § 571.202).

Although many factors can influence an occupant's risk of neck injury in a rear impact — including structure and deformation of the rear end of the vehicle, seat characteristics, and seat belt use — head restraints are considered to be the principal countermeasure. Head restraints have been proven to reduce neck injury risk (Bourbeau et al., 1993; Kahane, 1982; Ollson et al., 1990; O'Neill et al., 1972; Svensson et al., 1993), but little is known about the optimum vehicle structure, seat, and head restraint characteristics needed to minimize neck injury risk. What is known, however, is that an effective head restraint must be located behind and close to the back of an occupant's head to support it in a rear impact. This geometric relationship of the occupant to the head restraint is necessary but, by itself, may not be sufficient to ensure effective protection (Svensson et al., 1993).

To assess head restraint designs, geometric measurements were taken of seating packages available in 247 different 1997 model year passenger cars and light trucks for sale in the United States. Measurements relative to the head of a seated average-size male were obtained using a specially designed head form mounted on a standard H-point machine. Measurements were made at new car dealerships located in Virginia. Occasionally, the same seat was found in more than one vehicle. The average was calculated when similar seats were measured in different vehicles.

Head restraint geometry was evaluated based on two criteria: height and backset. Height is the distance down from the top of an average-size male's head to the top of the restraint. A head restraint should be at least as high as the head's center of gravity, or no more than 9 cm below the top (University of Michigan Transportation Research Institute, 1983). Backset is the distance from the back of an average-size male's head to the front of the restraint. This distance should be small — the smaller the better. Backsets of more than 10 cm have been associated with increased symptoms of neck injury in crashes (Ollson et al., 1990). Each restraint was classified into one of four geometric zones, as defined by its height and backset (Figure 1).

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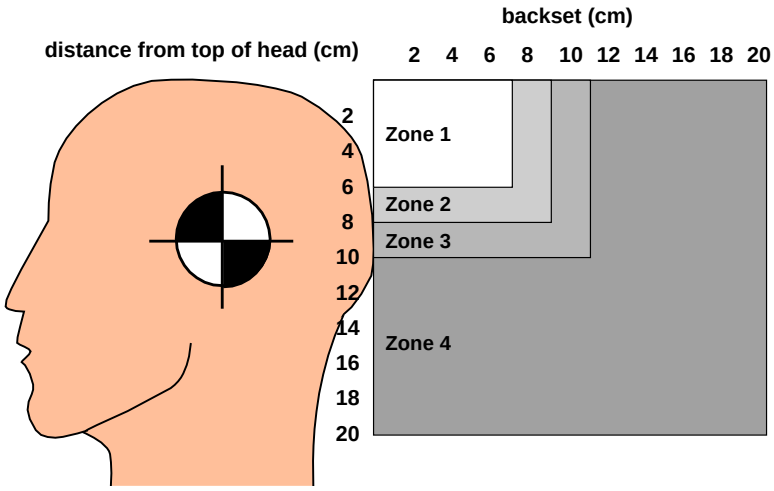
**Figure 1**
**Head Restraint Geometric Zones**




Head restraint protection was rated as good, acceptable, marginal, or poor, based on the zone in which the restraint fell. The rating for a fixed restraint was straightforward — the zone into which the height and backset placed it also defined its rating: zone 1, good; zone 2, acceptable; zone 3, marginal; zone 4, poor.

The rating for an adjustable head restraint depended on whether height and/or backset adjustments locked into position. If the adjustments did not lock, the restraint's rating was defined by the zone for height and backset with the restraint in the down and/or rear position. If the adjustments did lock, height and backset were measured with the restraint in two positions: down and the most favorable locked position. The restraint's final rating was the better of these, except that if the adjusted rating was used, the restraint was downgraded one category because so few occupants adjust their restraints (Viano and Gargan, 1995).

Some BMW and Mercedes car models have electrically powered head restraints that adjust automatically with changes in seat position. These restraints were evaluated with the seats adjusted to positions appropriate for an average-size male, and their ratings were not downgraded for adjustability because the adjustments were automatic.

## MEASUREMENT METHOD

Head restraint height and backset measurements were made with a standard H-point machine fitted with a special device representing the head of an average-size male (Figure 2). The head, developed under sponsorship of the Insurance Corporation of British Columbia (ICBC), includes probes to aid in the measurements of backset (Figure 3) and height (Figure 4) relative to the head.

Measurements were made according to the procedures specified in the Instruction Manual for the Head Restraint Measuring Device (ICBC, 1995) with three modifications. First, the legs of the H-point machine were configured in accordance with Federal Motor Vehicle Safety Standard (FMVSS) 208 requirements to approximate the Hybrid III 50th percentile male dummy dimensions (49 CFR § 571.208.11.4.3.1).[1] Second, height and backset measurements were made with the seat back positioned to achieve a torso angle of 25 ± 1 degrees from vertical on the H-point machine with the ICBC head installed.[2,3] Third, if leg room was insufficient to allow the lower legs to extend forward and the feet to be lifted off the floor when the seat was adjusted to its midtrack position, the seat was moved rearward until the upper legs rested on the seat cushion and the feet could be raised unencumbered. Detailed descriptions of the measurement procedures follow.

**Figure 2**
**H-Point Machine with ICBC Head Restraint Measurement Device**

[1] The length of the lower leg and thigh segments of the H-point machine were adjusted to 16.3 inches and 15.8 inches, respectively, instead of the 95th percentile values specified in Table 1 of SAE J826.

[2] The manual-specified measurements were to be made with the seat back positioned to achieve a torso angle of 25 ± 2 degrees from vertical prior to mounting the head on the H-point machine. These instructions were followed by Estep et al. (1995) in their evaluation of head restraints in 1995 model year vehicles but were altered as indicated in the present study to reduce occupant position variability.

[3] The torso angle corresponds to the preferred seated position of volunteers tested by the University of Michigan Transportation Research Institute as part of the development of the average-size male dummy (Schneider et al., 1983). Volunteers' torso angles were measured while seated in a special seat designed to represent the average seat design for four different car models set to the manufacturer's recommended seat back angle. This is the angle to which the Hybrid III 50th percentile male dummy is designed.

**Figure 3**
**Head Restraint Backset Measurement**

**Figure 4**
**Head Restraint Height Measurement**

**Vehicle and seat preparation:** The vehicle was positioned on level ground. To confirm the vehicle attitude, the door sill (front to rear level) and center trunk (side to side level) were used as reference points. Loose floormats in the passenger seating area were removed. If the seat was equipped with a movable arm rest, it was raised or placed in its stored position; adjustable lumbar supports were fully retracted, and adjustable lateral back supports or lateral thigh supports were set open or as wide as possible. If there were other adjustable seat components, they were set to neutral positions and the positions were recorded on the data sheet. The seat was adjusted to its midtrack position, which was defined as the location between the extreme forward and rearward positions along the seat track. If there were an even number of positions in which the seat could be located, the midtrack position was defined as the most rearward of the middle two positions.

**H-point machine setup and installation:** After the vehicle and seat had been positioned, the seat was covered with a cotton cloth. The cloth was tucked into the seat joint with a sufficient amount to prevent *hammocking* of the material. All weights were removed from the H-point machine. The lower legs were adjusted to the 50th percentile leg length setting, and the upper legs were adjusted to the 10th percentile leg length setting; these were the H-point machine settings closest to FMVSS 208 requirements. The legs were attached to the H-point machine and set to the fifth position (number 5) on the knee joint T-bar, which placed the centers of the knees 25 cm apart. With the legs attached and the back pan folded forward, the H-point machine was placed in the centerline of the passenger seat. The back pan was straightened to the vehicle seat back.

The feet were placed as far forward as possible, with the heels on the floor and the soles of the feet resting on the floor, toe board, or firewall. If necessary, leg spacing was changed to clear obstructions (e.g., instrument panel fixtures, tunnel width, seat tracks); changes in leg spacing for proper feet positioning were recorded. If leg room was insufficient when the seat was adjusted to its midtrack position, the seat was moved rearward until the upper legs rested on the seat cushion; changes to seat track position were recorded. Lower leg and thigh weights were attached, and the H-point machine was leveled. The back pan was tilted forward, and the H-point machine assembly was pushed rearward until the seat pan contacted the vehicle seat back. While tilting the back pan forward, a horizontal rearward load of 10 kg was applied by compressing the plunger on the T-bar. The load application was repeated, and while keeping the spring compressed, the back pan was returned to the vehicle seat back; the spring then was released. The H-point machine was level, facing directly forward, and located in the centerline of the seat.

Due to the variability of cushion stiffness and seat back contour among vehicles, there was no consistent reference for seat back angle. The seat back was adjusted to provide a consistent occupant

posture for each vehicle seat. Head restraint measurements were made with the seat adjusted such that the H-point torso was reclined 25 ± 1 degrees from vertical with the head mounted on the machine.

The H-point machine torso angle was measured by placing an inclinometer on the lower brace of the torso weight hanger. As a rough estimate of seat back position, the seat back was placed such that the torso angle was about 21 degrees before the buttocks and chest weights were added. This angle was varied according to the subjective estimate of seat cushion stiffness. After estimating the seat back position, the right and left buttock weights were installed and then alternately the six chest weights. The two larger chest weights were attached last, flat side down.

Tilting the back pan forward to a vertical position, the assembly was rocked from side to side over a 10 degree arc — 5 degrees in each direction. This rocking was repeated twice while preventing any horizontal translation of the seat pan. The back pan was returned to the seat back, and the H-point machine was leveled again. The feet were repositioned as follows: Each foot alternately was lifted off the floor, via the instep, until no additional forward foot movement was obtained. When each foot was placed back in the down position, the heel was to be in contact with the floor, and the sole of the foot was to be in contact with the floor, toe board, or firewall. If the seat pan was not level after the feet were repositioned, a sufficient lateral load was applied to the top of the seat pan to level the H-point machine seat pan on the vehicle seat.

**Installation of head form:** The head form is equipped with two probes to measure head restraint height and backset. The height probe projects horizontally, level with the top of the head, to provide a reference line for the vertical measurement from the top of the restraint height. The backset probe simulates the rear profile of the head and neck and projects horizontally from the back of the head to provide the horizontal measurement to the restraint. The backset probe was installed and pushed flush against the head form. The height probe was removed from the head form, and the knob, used to level the head form, was confirmed as finger tight. The head form was lowered into position on the torso weight hangers and on the top edge of the channel between the hangers. The height probe was reinstalled with the bottom of the rear tip level with the top of the head form. The head form was leveled by loosening the rear knob and repositioning the head using the head form bubble level; the knob then was retightened by hand. The H-point machine was leveled, and the torso angle was measured. If the measured angle was not 25 ± 1 degrees, the chest and buttocks weights were removed, the seat back was readjusted, and the steps to position the H-point machine were repeated beginning with tilting the back pan forward and pushing the H-point machine rearward. The torso angle was recorded when it fell within the allowed range.

**Head restraint measurements:** The head restraint was adjusted to its lowest position. If the restraint had a tilt option, the restraint was adjusted in its most rearward position and the tilt option was noted. If the restraint was fixed, it was noted. The height probe was pushed rearward until it was positioned directly over the top of the restraint. A tape measure was used to measure the vertical distance to the nearest half-centimeter between the top of the restraint and the lower surface of the probe tip. The backset probe was pushed rearward until the head/neck profile touched the restraint. The horizontal distance was measured in centimeters using the scale located on the probe at the center of the head form. If the restraint was too low to be contacted by the backset probe, the distance was recorded as "missed." If the restraint height was adjustable, the process was repeated for the highest, most rearward position. If the restraint tilted forward, the process was repeated for the lowest and highest, most forward positions.

**Head restraint locking mechanism procedure:** Some manufacturers provide adjustable head restraints that manually lock in each of the higher positions. Other manufacturers do not, apparently relying on dynamic forces of the crash to keep an adjusted restraint in position. In their evaluation of head restraints in 1995 model year vehicles, Estep et al. (1995) attempted to assess the reliability of such locking mechanisms. However, subsequent research has shown great variability in the outcome of the assessment procedure. Therefore, head restraints in 1997 model year vehicles were considered locking only when there was a positive, manual lock procedure. Note that power head restraint adjustments were treated as locking.

**Automatically adjusting head restraints:** Two manufacturers, Mercedes and BMW, provide electrically powered head restraints that adjust automatically when seat positions are changed. The rating for this type of head restraint was, like for a fixed restraint, defined by the zone into which its height and backset placed it. The measurement position for each seat was determined individually as a position appropriate for a 50th percentile male. The Mercedes E-class head restraint lowers as the seat is positioned forward in the seat track for shorter occupants and rises as the seat is positioned rearward in the seat track for taller occupants. The Mercedes head restraint was measured with the seat placed at the center of the extreme forward and rearward seat positions along the track. The BMW head restraint is positioned by adjusting the height of the seat cushion, which moves independently of the seat back. Raising the seat cushion for shorter occupants effectively lowers the head restraint, and lowering the seat cushion for taller occupants raises the restraint. The BMW 8-series head restraint was measured with the seat set along the track according to the protocol described above and with the seat cushion adjusted to both the extreme up and down positions. The height and backset for 75 percent of the highest head

restraint adjustment was used for evaluation. This was chosen because the height of the 50th percentile male is as tall or taller than approximately 75 percent of the adult population.

**RESULTS**

Detailed results of the evaluation of 255 head restraints in 247 different 1997 model year passenger vehicles are listed by nameplate in the table. Major findings of this study are summarized as follows.

Only 7 vehicles (3 percent) offer head restraints that received a good rating: Honda Civic Del Sol, Mercedes-Benz E class auto adjust, Toyota Supra, Volvo 850 four-door and station wagon, and Volvo 960 four-door and station wagon. Sixty-two percent of the vehicles only offer head restraints that received a poor rating. Eighty-two percent of the head restraints rated were marginal or poor.

One-third (78) of the vehicles offer seats with fixed head restraints. Among these vehicles, 65 percent have poor geometry for the average-size male (backset greater than 11 cm or height greater than 10 cm). About three-quarters (179) of the vehicles offer seats with adjustable head restraints. Two of these vehicles offer head restraints that rise and lower automatically when the seat is adjusted. Among vehicles that offer adjustable head restraints, more than half (52 percent) were not equipped with positive, manual locking mechanisms.

**Head Restraint Evaluations — 1997 Model Year Passenger Cars, Pickup Trucks, Utility Vehicles, and Large Vans**

| | | | | | Head Restraint Down | | | | Head Restraint Up | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Tilted Back | | Tilted Forward | | Tilted Back | | Tilted Forward | |
| Make | Model/Seat | Overall Evaluation | Height Lock | Tilt Lock | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) |
| **Passenger Cars** | | | | | | | | | | | | |
| Acura | CL | Poor | Locking | No tilt | 8.5 | 13.0 | -- | -- | 7.5 | 9.0 | -- | -- |
| Acura | Integra | Acceptable | Locking | No tilt | 8.0 | 8.0 | -- | -- | 8.0 | 6.0 | -- | -- |
| Acura | RL | Marginal | Locking | No lock | 7.5 | 15.0 | 4.0 | 15.0 | 5.0 | 8.0 | 2.0 | 8.0 |
| Acura | TL | Poor | Locking | No tilt | 7.2 | 14.0 | -- | -- | 6.2 | 10.0 | -- | -- |
| Audi | A4, comfort seat | Poor | No lock | No lock | 10.0 | 12.8 | 4.2 | 15.0 | 8.8 | 5.2 | 3.0 | 7.0 |
| Audi | A4, sport seat | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Audi | A6 | Poor | No lock | No lock | 14.5 | 14.0 | 12.8 | 13.8 | 11.5 | 5.5 | 8.5 | 6.0 |
| Audi | A8 | Poor | Locking | No lock | 12.5 | 11.5 | 7.0 | 13.0 | 11.0 | 3.5 | 6.5 | 5.5 |
| Audi | Cabriolet, comfort seat | Poor | No lock | No lock | 11.0 | 14.0 | 9.0 | 14.0 | 7.5 | 5.5 | 4.5 | 6.0 |
| Audi | Cabriolet, GIS sport seat | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| BMW | 3 series | Poor | No lock | No lock | 8.3 | 14.3 | 4.5 | 14.5 | 9.2 | 6.0 | 4.8 | 9.3 |
| BMW | 3 series | Poor | No lock | No lock | 10.0 | 12.5 | 5.5 | 13.7 | 11.5 | 4.5 | 6.2 | 8.2 |
| BMW | 5 series | Marginal | Locking | No lock | 6.5 | 9.0 | 2.5 | 12.0 | 7.5 | 1.5 | 3.5 | 5.0 |
| BMW | 5 series, midback adjustment | Acceptable | Locking | No lock | 11.0 | 14.8 | 2.8 | 11.5 | 0.1 | 0.1 | 0.1 | 0.1 |
| BMW | 7 series, midback adjustment | Acceptable | Locking | No lock | 11.0 | 14.8 | 2.8 | 11.5 | 0.1 | 0.1 | 0.1 | 0.1 |
| BMW | 8 series, auto adjust[1] | Marginal | Locking | No lock | 9.3 | 6.3 | -- | -- | -- | -- | -- | -- |
| BMW | Z3 | Poor | Fixed | No tilt | 6.5 | 11.5 | -- | -- | -- | -- | -- | -- |
| Buick | Century | Poor | No lock | No tilt | 7.0 | 11.0 | -- | -- | 4.5 | 5.0 | -- | -- |
| Buick | LeSabre | Poor | No lock | No tilt | 18.0 | 20.0 | -- | -- | 9.5 | 15.0 | -- | -- |
| Buick | Park Avenue, 55/45 split bench seat | Poor | Locking | No lock | 13.5 | 12.5 | 9.0 | 11.5 | 13.0 | 7.0 | 9.0 | 6.0 |
| Buick | Park Avenue, bucket seat | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Buick | Riviera, 55/45 split bench seat | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Buick | Riviera, bucket seat | Poor | No lock | No tilt | 8.5 | 14.5 | -- | -- | 6.0 | 9.5 | -- | -- |
| Buick | Skylark, 55/45 split bench seat | Poor | No lock | No tilt | 13.0 | 16.5 | -- | -- | 11.5 | 14.0 | -- | -- |
| Buick | Skylark, bucket seat | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadillac | Catera | Acceptable | No lock | No lock | 7.0 | 8.0 | 2.0 | 8.5 | 5.5 | 2.5 | 1.0 | 3.5 |
| Cadillac | Deville | Poor | No lock | No lock | 11.3 | 11.3 | 5.8 | 12.8 | 10.7 | 6.3 | 5.3 | 8.0 |
| Cadillac | Eldorado | Poor | No lock | No lock | 10.3 | 14.7 | 3.0 | 14.5 | 9.3 | 10.3 | 2.3 | 10.7 |
| Cadillac | Seville | Poor | No lock | No lock | 10.3 | 14.7 | 3.0 | 14.5 | 9.3 | 10.3 | 2.3 | 10.7 |
| Chevrolet | Astro, adjustable head restraint | Poor | No lock | No tilt | 8.8 | 14.5 | -- | -- | 6.5 | 8.2 | -- | -- |
| Chevrolet | Astro, fixed head restraint | Marginal | Fixed | No tilt | 6.0 | 9.5 | -- | -- | -- | -- | -- | -- |

**Head Restraint Evaluations — 1997 Model Year Passenger Cars, Pickup Trucks, Utility Vehicles, and Large Vans**

| | | | | | Head Restraint Down | | | | Head Restraint Up | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Tilted Back | | Tilted Forward | | Tilted Back | | Tilted Forward | |
| Make | Model/Seat | Overall Evaluation | Height Lock | Tilt Lock | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) |
| Chevrolet | Camaro | Poor | Fixed | No tilt | 11.0 | 16.5 | -- | -- | -- | -- | -- | -- |
| Chevrolet | Cavalier | Poor | No lock | No tilt | 10.5 | 13.0 | -- | -- | 10.0 | 9.5 | -- | -- |
| Chevrolet | Lumina sedan | Poor | No lock | No tilt | 7.0 | 13.0 | -- | -- | 6.5 | 6.0 | -- | -- |
| Chevrolet | Malibu | Marginal | No lock | No tilt | 5.0 | 10.0 | -- | -- | 4.0 | 4.0 | -- | -- |
| Chevrolet | Monte Carlo | Poor | No lock | No tilt | 8.7 | 12.8 | -- | -- | 8.0 | 6.7 | -- | -- |
| Chevrolet | Venture | Poor | Fixed | No tilt | 10.5 | 10.5 | -- | -- | -- | -- | -- | -- |
| Chevrolet-Geo | Metro | Poor | Fixed | No tilt | 2.5 | 11.0 | -- | -- | -- | -- | -- | -- |
| Chevrolet-Geo | Prism | Acceptable | Locking | No tilt | 7.0 | 13.0 | -- | -- | 7.0 | 6.0 | -- | -- |
| Chrysler | Cirrus | Poor | No lock | No tilt | 12.5 | 16.0 | -- | -- | 11.0 | 9.5 | -- | -- |
| Chrysler | Concorde | Poor | No lock | No tilt | 18.0 | 18.2 | -- | -- | 8.3 | 9.3 | -- | -- |
| Chrysler | LHS, 50/50 split bench seat | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chrysler | LHS, bucket seat | Poor | No lock | No tilt | 18.0 | 18.5 | -- | -- | 10.5 | 10.0 | -- | -- |
| Chrysler | Sebring coupe | Poor | Locking | No tilt | 12.5 | 16.0 | -- | -- | 10.5 | 5.0 | -- | -- |
| Chrysler | Town and Country | Poor | No lock | No tilt | 8.5 | 13.5 | -- | -- | 7.5 | 8.5 | -- | -- |
| Chrysler | Sebring convertible | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dodge | Avenger | Marginal | Locking | No tilt | 10.5 | 14.5 | -- | -- | 8.0 | 4.5 | -- | -- |
| Dodge | Caravan/Grand Caravan, adjustable head restraint | Poor | No lock | No tilt | 8.5 | 13.5 | -- | -- | 7.5 | 8.5 | -- | -- |
| Dodge | Caravan/Grand Caravan, fixed head restraint | Poor | Fixed | No tilt | 6.6 | 10.6 | -- | -- | -- | -- | -- | -- |
| Dodge | Intrepid | Poor | No lock | No tilt | 18.0 | 18.3 | -- | -- | 9.0 | 9.3 | -- | -- |
| Dodge | Neon, adjustable head restraint | Poor | No lock | No tilt | 13.9 | 17.1 | -- | -- | 7.4 | 7.9 | -- | -- |
| Dodge | Neon, fixed head restraint | Poor | Fixed | No tilt | 11.7 | 14.2 | -- | -- | -- | -- | -- | -- |
| Dodge | Stratus | Poor | No lock | No tilt | 18.0 | 20.3 | -- | -- | 9.0 | 8.7 | -- | -- |
| Eagle | Talon | Marginal | Locking | No tilt | 10.8 | 14.8 | -- | -- | 8.5 | 4.2 | -- | -- |
| Eagle | Vision Esi | Poor | No lock | No tilt | 18.0 | 19.0 | -- | -- | 10.0 | 11.0 | -- | -- |
| Eagle | Vision Tsi | Poor | No lock | No tilt | 18.0 | 18.2 | -- | -- | 8.3 | 9.3 | -- | -- |
| Ford | Aerostar | Poor | Fixed | No tilt | 11.0 | 11.0 | -- | -- | -- | -- | -- | -- |
| Ford | Aspire | Poor | Fixed | No tilt | 8.5 | 14.5 | -- | -- | -- | -- | -- | -- |
| Ford | Contour, bucket seat | Marginal | Locking | No lock | 6.2 | 12.4 | 4.4 | 15.1 | 5.8 | 6.8 | 3.9 | 11.8 |
| Ford | Contour, sport bucket seat | Poor | No lock | No lock | 5.0 | 11.5 | 3.0 | 12.5 | 4.5 | 5.5 | 2.5 | 8.5 |
| Ford | Crown Victoria | Poor | No lock | No tilt | 11.0 | 16.5 | -- | -- | 7.8 | 12.0 | -- | -- |
| Ford | Escort | Poor | Locking | No tilt | 9.5 | 14.9 | -- | -- | 9.0 | 9.4 | -- | -- |
| Ford | Escort, sport seat | Poor | Locking | No tilt | 8.5 | 14.5 | -- | -- | 8.0 | 9.0 | -- | -- |

**Head Restraint Evaluations — 1997 Model Year Passenger Cars, Pickup Trucks, Utility Vehicles, and Large Vans**

| | | | | | Head Restraint Down | | | | Head Restraint Up | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Tilted Back | | Tilted Forward | | Tilted Back | | Tilted Forward | |
| Make | Model/Seat | Overall Evaluation | Height Lock | Tilt Lock | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) |
| Ford | Mustang, reclining bucket seat | Poor | No lock | No tilt | 18.0 | 18.2 | -- | -- | 11.8 | 15.8 | -- | -- |
| Ford | Mustang, sport bucket seat | Poor | No lock | No tilt | 16.3 | 17.8 | -- | -- | 13.2 | 15.2 | -- | -- |
| Ford | Probe | Poor | Fixed | No tilt | 9.0 | 11.5 | -- | -- | -- | -- | -- | -- |
| Ford | Taurus | Poor | No lock | No lock | 11.0 | 15.9 | 8.9 | 15.0 | 8.5 | 11.8 | 7.9 | 10.6 |
| Ford | Taurus SHO | Poor | No lock | No tilt | 15.0 | 17.0 | -- | -- | 12.0 | 14.5 | -- | -- |
| Ford | Thunderbird | Poor | No lock | No lock | 18.0 | 18.8 | 11.0 | 17.0 | 8.5 | 13.5 | 7.0 | 12.0 |
| Ford | Windstar, adjustable head restraint | Poor | No lock | No tilt | 6.5 | 13.5 | -- | -- | 3.5 | 6.0 | -- | -- |
| Ford | Windstar, fixed head restraint | Poor | Fixed | No tilt | 5.5 | 11.5 | -- | -- | -- | -- | -- | -- |
| GMC | Safari | Marginal | Fixed | No tilt | 6.0 | 9.5 | -- | -- | -- | -- | -- | -- |
| Honda | Accord, cloth seat | Poor | Locking | No tilt | 8.3 | 12.8 | -- | -- | 7.0 | 8.5 | -- | -- |
| Honda | Accord, leather seat | Marginal | Locking | No tilt | 10.0 | 13.0 | -- | -- | 9.0 | 8.0 | -- | -- |
| Honda | Civic | Marginal | Locking | No tilt | 9.4 | 12.8 | -- | -- | 8.2 | 7.9 | -- | -- |
| Honda | Civic Del Sol | Good | Fixed | No tilt | 7.0 | 5.0 | -- | -- | -- | -- | -- | -- |
| Honda | Odyssey | Marginal | Locking | No tilt | 9.5 | 14.5 | -- | -- | 7.0 | 7.0 | -- | -- |
| Honda | Prelude | Marginal | Locking | No tilt | 8.5 | 11.0 | -- | -- | 8.0 | 5.5 | -- | -- |
| Hyundai | Accent | Poor | No lock | No tilt | 8.5 | 13.0 | -- | -- | 6.0 | 8.0 | -- | -- |
| Hyundai | Elantra | Poor | No lock | No tilt | 7.2 | 13.2 | -- | -- | 5.3 | 7.2 | -- | -- |
| Hyundai | Sonata | Poor | No lock | No tilt | 7.0 | 11.0 | -- | -- | 4.5 | 4.5 | -- | -- |
| Hyundai | Tiburon | Poor | No lock | No tilt | 10.5 | 14.0 | -- | -- | 8.5 | 7.5 | -- | -- |
| Infiniti | I30 | Marginal | Locking | No lock | 7.5 | 15.0 | 2.0 | 14.5 | 5.0 | 7.0 | -- | 6.5 |
| Infiniti | J30 | Poor | Locking | No lock | 8.5 | 14.5 | 3.0 | 13.5 | 6.0 | 8.5 | 1.5 | 7.5 |
| Infiniti | Q45[2] | Marginal | Locking | No lock | 10.5 | 14.8 | 6.5 | 15.0 | 9.2 | 6.8 | 5.8 | 6.8 |
| Jaguar | VDP | Acceptable | Locking | No lock | 6.0 | 10.0 | 3.0 | 12.0 | 6.0 | 5.0 | 2.5 | 6.5 |
| Jaguar | XJ6 | Marginal | Locking | No lock | 7.5 | 10.0 | 4.0 | 11.5 | 8.0 | 4.0 | 4.0 | 6.0 |
| Jaguar | XJR | Acceptable | Locking | No lock | 6.0 | 9.5 | 2.5 | 11.0 | 6.5 | 3.5 | 2.5 | 5.5 |
| Jaguar | XK8 | Poor | Fixed | No tilt | 6.2 | 11.5 | -- | -- | -- | -- | -- | -- |
| Kia | Sephia | Poor | Locking | No tilt | 7.0 | 14.0 | -- | -- | 6.5 | 8.5 | -- | -- |
| Lexus | ES 300 | Acceptable | Locking | No lock | 9.5 | 10.0 | 2.0 | 12.0 | 6.0 | 4.5 | 2.5 | 6.0 |
| Lexus | LS 400 | Marginal | Locking | No lock | 7.5 | 12.0 | 4.5 | 13.0 | 6.5 | 7.5 | 4.0 | 8.5 |
| Lexus | SC 300 | Poor | Locking | Locking | 8.5 | 13.0 | 6.0 | 13.5 | 7.5 | 9.5 | 7.5 | 9.0 |
| Lincoln | Continental | Poor | No lock | No lock | 13.3 | 16.0 | 6.8 | 13.5 | 10.7 | 11.2 | 6.2 | 10.7 |
| Lincoln | Mark VIII | Poor | No lock | No lock | 10.5 | 14.5 | 2.5 | 11.5 | 8.5 | 8.5 | 1.5 | 7.0 |

**Head Restraint Evaluations — 1997 Model Year Passenger Cars, Pickup Trucks, Utility Vehicles, and Large Vans**

| | | | | | Head Restraint Down | | | | Head Restraint Up | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Tilted Back | | Tilted Forward | | Tilted Back | | Tilted Forward | |
| Make | Model/Seat | Overall Evaluation | Height Lock | Tilt Lock | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) |
| Lincoln | Town Car | Poor | No lock | No tilt | 10.5 | 17.0 | -- | -- | 7.5 | 12.5 | -- | -- |
| Mazda | 626 | Poor | Locking | No tilt | 9.2 | 16.8 | -- | -- | 9.0 | 11.5 | -- | -- |
| Mazda | Millenia, manual seat | Acceptable | Locking | No tilt | 7.0 | 10.5 | -- | -- | 7.0 | 4.5 | -- | -- |
| Mazda | Millenia, power seat | Marginal | Locking | No tilt | 8.5 | 12.5 | -- | -- | 7.5 | 4.5 | -- | -- |
| Mazda | MPV | Poor | Locking | No tilt | 13.5 | 17.5 | -- | -- | 9.5 | 6.0 | -- | -- |
| Mazda | MX-5 Miata | Poor | Fixed | No tilt | 6.5 | 12.0 | -- | -- | -- | -- | -- | -- |
| Mazda | Protege | Poor | Locking | No tilt | 10.5 | 16.5 | -- | -- | 9.2 | 10.3 | -- | -- |
| Mercedes-Benz | C class, leather seat | Marginal | Locking | No lock | 8.0 | 10.0 | 4.0 | 13.0 | 8.5 | 2.5 | 4.0 | 5.0 |
| Mercedes-Benz | C class, multicontour seat | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Mercedes-Benz | C class, vinyl (MB-Tex upholstery) | Marginal | Locking | No lock | 8.0 | 8.5 | 3.5 | 11.0 | 9.0 | 0.5 | 4.5 | 3.0 |
| Mercedes-Benz | E class, auto adjust[1,3] | Good | Locking | No lock | 7.1 | 3.0 | 2.5 | 6.5 | -- | -- | -- | -- |
| Mercedes-Benz | E class, multicontour seat | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Mercedes-Benz | S class | Acceptable | Locking | No lock | 9.0 | 11.0 | 4.5 | 13.5 | 6.0 | 2.5 | 2.0 | 6.0 |
| Mercedes-Benz | S class, multicontour seat | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Mercedes-Benz | SL class | Acceptable | Locking | No lock | 7.5 | 10.5 | 0.5 | 13.0 | 7.0 | 5.5 | -- | 10.0 |
| Mercury | Cougar XR7, electric seat | Poor | No lock | No tilt | 12.0 | 16.5 | -- | -- | 8.5 | 12.5 | -- | -- |
| Mercury | Cougar XR7, manual seat | Poor | No lock | No lock | 18.0 | 17.5 | 10.5 | 16.5 | 7.5 | 12.5 | 7.0 | 11.0 |
| Mercury | Grand Marquis | Poor | No lock | No tilt | 11.0 | 16.5 | -- | -- | 7.8 | 12.0 | -- | -- |
| Mercury | Mystique | Marginal | Locking | No lock | 6.2 | 12.4 | 4.4 | 15.1 | 5.8 | 6.8 | 3.9 | 11.8 |
| Mercury | Sable, bucket seat with console | Poor | No lock | No tilt | 9.0 | 14.0 | -- | -- | 7.5 | 11.0 | -- | -- |
| Mercury | Sable, cloth/leather bucket seat | Poor | No lock | No lock | 11.5 | 15.5 | 9.5 | 14.5 | 10.0 | 13.0 | 9.0 | 11.5 |
| Mercury | Tracer | Poor | Locking | No tilt | 8.5 | 14.5 | -- | -- | 8.0 | 9.0 | -- | -- |
| Mercury | Villager | Marginal | Locking | No tilt | 7.8 | 14.2 | -- | -- | 6.8 | 8.2 | -- | -- |
| Mitsubishi | 3000GT | Marginal | Locking | No tilt | 9.0 | 14.0 | -- | -- | 6.5 | 7.5 | -- | -- |
| Mitsubishi | Diamante | Marginal | Locking | Locking | 9.0 | 13.0 | 6.5 | 12.5 | 7.0 | 7.5 | 4.5 | 7.0 |
| Mitsubishi | Eclipse | Acceptable | Locking | No tilt | 8.5 | 14.0 | -- | -- | 6.5 | 3.5 | -- | -- |
| Mitsubishi | Eclipse, spyder seat | Marginal | Locking | No tilt | 10.8 | 14.8 | -- | -- | 8.5 | 4.2 | -- | -- |
| Mitsubishi | Galant | Acceptable | Locking | No tilt | 9.0 | 14.5 | -- | -- | 7.0 | 4.0 | -- | -- |
| Mitsubishi | Mirage, adjustable head restraint | Acceptable | Locking | No tilt | 6.7 | 12.7 | -- | -- | 4.0 | 4.3 | -- | -- |
| Mitsubishi | Mirage, fixed head restraint | Marginal | Fixed | No tilt | 8.0 | 9.0 | -- | -- | -- | -- | -- | -- |
| Nissan | 200SX | Acceptable | Locking | No tilt | 8.0 | 14.0 | -- | -- | 7.0 | 6.0 | -- | -- |
| Nissan | 240SX | Marginal | Locking | No tilt | 6.5 | 9.5 | -- | -- | 6.0 | 7.5 | -- | -- |

**Head Restraint Evaluations — 1997 Model Year Passenger Cars, Pickup Trucks, Utility Vehicles, and Large Vans**

| | | | | | Head Restraint Down | | | | Head Restraint Up | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Tilted Back | | Tilted Forward | | Tilted Back | | Tilted Forward | |
| Make | Model/Seat | Overall Evaluation | Height Lock | Tilt Lock | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) |
| Nissan | Altima | Marginal | Locking | No tilt | 6.0 | 14.5 | — | — | 5.5 | 7.0 | — | — |
| Nissan | Altima, sport bucket seat | Marginal | Locking | No tilt | 6.5 | 13.5 | — | — | 6.0 | 6.5 | — | — |
| Nissan | Maxima | Marginal | Locking | No tilt | 8.0 | 15.0 | — | — | 6.5 | 7.0 | — | — |
| Nissan | Quest | Marginal | Locking | No tilt | 7.8 | 14.2 | — | — | 6.8 | 8.2 | — | — |
| Nissan | Sentra | Marginal | Locking | No tilt | 7.5 | 15.0 | — | — | 6.0 | 7.0 | — | — |
| Oldsmobile | Achieva | Poor | No lock | No tilt | 8.0 | 13.5 | — | — | 4.5 | 8.5 | — | — |
| Oldsmobile | Aurora | Poor | No lock | Locking | 18.0 | 19.0 | 11.8 | 17.5 | 8.2 | 12.0 | 4.5 | 12.5 |
| Oldsmobile | Cultass Supreme, bucket seat | Poor | No lock | No tilt | 8.5 | 12.0 | — | — | 5.5 | 6.5 | — | — |
| Oldsmobile | Cutlass | Poor | No lock | No tilt | 5.5 | 10.5 | — | — | 4.0 | 4.5 | — | — |
| Oldsmobile | Cutlass Supreme, 55/45 split bench seat | Poor | No lock | No tilt | 10.0 | 16.0 | — | — | 8.5 | 11.5 | — | — |
| Oldsmobile | Eighty-Eight | Poor | No lock | No tilt | 18.0 | 20.5 | — | — | 7.5 | 15.5 | — | — |
| Oldsmobile | LSS | Poor | No lock | Locking | 18.0 | 19.0 | 11.8 | 17.5 | 8.2 | 12.0 | 4.5 | 12.5 |
| Oldsmobile | Regency | Poor | No lock | No tilt | 18.0 | 19.5 | — | — | 9.0 | 14.0 | — | — |
| Oldsmobile | Silhouette | Marginal | No lock | No tilt | 5.0 | 10.0 | — | — | 5.5 | 3.0 | — | — |
| Plymouth | Breeze | Poor | No lock | No tilt | 18.0 | 20.3 | — | — | 9.0 | 8.7 | — | — |
| Plymouth | Neon, adjustable head restraint | Poor | No lock | No tilt | 13.9 | 17.1 | — | — | 7.4 | 7.9 | — | — |
| Plymouth | Neon, fixed head restraint | Poor | Fixed | No tilt | 11.7 | 14.2 | — | — | — | — | — | — |
| Plymouth | Voyager/Grand Voyager | Poor | Fixed | No tilt | 6.6 | 10.6 | — | — | — | — | — | — |
| Pontiac | Bonneville, power bucket seat | Poor | No lock | No lock | 9.0 | 15.0 | 5.0 | 16.5 | 7.0 | 10.0 | 2.0 | 10.0 |
| Pontiac | Bonneville, 45/55 split bench seat | Poor | No lock | No tilt | 8.0 | 11.5 | — | — | 9.0 | 6.5 | — | — |
| Pontiac | Bonneville, manual bucket seat | Poor | No lock | No tilt | 9.0 | 14.0 | — | — | 7.5 | 9.0 | — | — |
| Pontiac | Firebird | Poor | No lock | No lock | 6.5 | 14.0 | 3.5 | 10.5 | 5.0 | 9.0 | 2.5 | 6.5 |
| Pontiac | Grand Am | Not measured | — | — | — | — | — | — | — | — | — | — |
| Pontiac | Grand Am, “uplevel seat design” | Poor | No lock | No tilt | 8.5 | 15.5 | — | — | 5.0 | 9.5 | — | — |
| Pontiac | Grand Prix, 45/55 split bench seat | Not measured | — | — | — | — | — | — | — | — | — | — |
| Pontiac | Grand Prix, sport bucket seat | Marginal | No lock | No tilt | 6.8 | 10.2 | — | — | 6.5 | 4.2 | — | — |
| Pontiac | Sunfire | Poor | No lock | No tilt | 12.0 | 12.2 | — | — | 11.8 | 9.5 | — | — |
| Pontiac | Trans Sport | Marginal | No lock | No tilt | 6.0 | 9.0 | — | — | 8.0 | 3.5 | — | — |
| Porsche | 911 Carera | Acceptable | Fixed | No tilt | 5.0 | 7.0 | — | — | — | — | — | — |
| Porsche | 911, sport bucket seat | Not measured | — | — | — | — | — | — | — | — | — | — |
| Porsche | Boxster | Acceptable | Fixed | No tilt | 6.5 | 6.5 | — | — | — | — | — | — |
| Saab | 900 | Acceptable | Locking | No tilt | 5.0 | 14.0 | — | — | 2.0 | 6.0 | — | — |

**Head Restraint Evaluations — 1997 Model Year Passenger Cars, Pickup Trucks, Utility Vehicles, and Large Vans**

| | | | | | Head Restraint Down | | | | Head Restraint Up | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Tilted Back | | Tilted Forward | | Tilted Back | | Tilted Forward | |
| Make | Model/Seat | Overall Evaluation | Height Lock | Tilt Lock | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) |
| Saab | 9000 Aero and CSE | Poor | No lock | No tilt | 4.0 | 11.5 | -- | -- | 2.5 | 7.5 | -- | -- |
| Saab | 9000 CS | Poor | No lock | No tilt | 5.0 | 13.5 | -- | -- | 3.5 | 9.5 | -- | -- |
| Saturn | Coupe SC1 | Poor | Fixed | No tilt | 8.8 | 10.8 | -- | -- | -- | -- | -- | -- |
| Saturn | Coupe SC2 | Poor | No lock | No lock | 11.5 | 15.0 | 6.5 | 15.5 | 10.5 | 11.0 | 5.5 | 11.5 |
| Saturn | Sedan SL1 | Poor | Fixed | No tilt | 9.2 | 11.5 | -- | -- | -- | -- | -- | -- |
| Saturn | Sedan SL2 | Poor | No lock | No lock | 9.5 | 13.7 | 3.7 | 14.2 | 8.0 | 9.5 | 2.7 | 10.3 |
| Saturn | Wagon SW1 | Poor | Fixed | No tilt | 8.8 | 10.8 | -- | -- | -- | -- | -- | -- |
| Saturn | Wagon SW2 | Poor | No lock | No lock | 9.5 | 13.7 | 3.7 | 14.2 | 8.0 | 9.5 | 2.7 | 10.3 |
| Subaru | Impreza coupe | Poor | Locking | No tilt | 12.5 | 15.5 | -- | -- | 9.0 | 8.5 | -- | -- |
| Subaru | Impreza Outback | Marginal | Locking | No tilt | 11.5 | 15.0 | -- | -- | 8.5 | 8.2 | -- | -- |
| Subaru | Legacy | Marginal | Locking | No tilt | 6.0 | 13.2 | -- | -- | 3.5 | 7.8 | -- | -- |
| Subaru | Legacy Outback | Marginal | Locking | No tilt | 7.5 | 14.0 | -- | -- | 4.5 | 8.0 | -- | -- |
| Toyota | Avalon | Poor | Locking | No lock | 11.0 | 14.2 | 7.5 | 14.5 | 10.0 | 7.5 | 6.8 | 9.0 |
| Toyota | Camry | Acceptable | Locking | No lock | 6.2 | 11.3 | 3.0 | 12.5 | 5.8 | 5.2 | 3.0 | 6.3 |
| Toyota | Celica | Marginal | Locking | No tilt | 5.5 | 13.0 | -- | -- | 4.5 | 7.0 | -- | -- |
| Toyota | Celica, sport seat | Marginal | Locking | No lock | 7.0 | 13.0 | 3.5 | 12.5 | 6.5 | 8.0 | 3.5 | 7.5 |
| Toyota | Corolla | Poor | Locking | No tilt | 8.0 | 16.0 | -- | -- | 7.0 | 9.0 | -- | -- |
| Toyota | Paseo | Marginal | Fixed | No tilt | 5.5 | 9.0 | -- | -- | -- | -- | -- | -- |
| Toyota | Previa, cloth bucket seat | Acceptable | Locking | No lock | 8.5 | 14.0 | 4.5 | 15.0 | 6.0 | 4.5 | 3.0 | 6.0 |
| Toyota | Previa, leather captain's chairs | Marginal | Locking | No lock | 11.0 | 15.5 | 8.5 | 15.0 | 8.5 | 5.5 | 6.5 | 6.0 |
| Toyota | Supra | Good | Fixed | No tilt | 5.0 | 5.5 | -- | -- | -- | -- | -- | -- |
| Toyota | Tercel | Poor | Fixed | No tilt | 5.5 | 10.5 | -- | -- | -- | -- | -- | -- |
| Volkswagen | Cabrio | Poor | No lock | No lock | 12.0 | 16.0 | 10.0 | 16.0 | 9.0 | 10.0 | 7.5 | 10.0 |
| Volkswagen | Golf | Poor | No lock | No lock | 11.1 | 15.1 | 9.2 | 15.4 | 7.8 | 8.9 | 5.8 | 9.5 |
| Volkswagen | Golf, sport bucket seat | Poor | No lock | No lock | 12.0 | 15.0 | 10.5 | 15.0 | 9.5 | 9.0 | 8.0 | 9.0 |
| Volkswagen | Jetta | Poor | No lock | No lock | 11.1 | 15.1 | 9.2 | 15.4 | 7.8 | 8.9 | 5.8 | 9.5 |
| Volkswagen | Jetta, sport bucket seat | Poor | No lock | No lock | 12.0 | 15.8 | 10.2 | 15.8 | 7.5 | 8.2 | 6.0 | 8.8 |
| Volkswagen | Passat | Poor | No lock | No lock | 9.0 | 11.5 | 7.0 | 11.5 | 5.5 | 4.5 | 3.5 | 5.5 |
| Volkswagen | Passat, comfort seat | Poor | No lock | No lock | 9.5 | 14.5 | 7.5 | 15.0 | 5.0 | 6.0 | 3.0 | 7.0 |
| Volvo | 850 | Good | Fixed | No tilt | 4.9 | 4.7 | -- | -- | -- | -- | -- | -- |
| Volvo | 960 | Good | Fixed | No tilt | 1.5 | 5.3 | -- | -- | -- | -- | -- | -- |

**Head Restraint Evaluations — 1997 Model Year Passenger Cars, Pickup Trucks, Utility Vehicles, and Large Vans**

| | | | | | Head Restraint Down | | | | Head Restraint Up | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Tilted Back | | Tilted Forward | | Tilted Back | | Tilted Forward | |
| Make | Model/Seat | Overall Evaluation | Height Lock | Tilt Lock | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) |
| **Pickup Trucks** | | | | | | | | | | | | |
| Chevrolet | C/K pickup Cheyenne, adjustable seatback | Poor | No lock | No tilt | 6.2 | 14.8 | — | — | 1.8 | 5.2 | — | — |
| Chevrolet | C/K pickup Cheyenne, fixed seatback | Poor | No lock | No tilt | 7.2 | 15.2 | — | — | 2.7 | 6.2 | — | — |
| Chevrolet | C/K pickup Silverado | Poor | No lock | No tilt | 8.2 | 14.2 | — | — | 4.2 | 4.8 | — | — |
| Chevrolet | S-series pickup, bucket and 60/40 split bench seat | Poor | Fixed | No tilt | 7.2 | 15.8 | — | — | — | — | — | — |
| Chevrolet | S-series pickup, straight bench seat | Poor | Fixed | No tilt | 6.2 | 13.5 | — | — | — | — | — | — |
| Dodge | Dakota pickup, bucket or split bench seat | Acceptable | Fixed | No tilt | 4.8 | 6.9 | — | — | — | — | — | — |
| Dodge | Dakota, bench seat | Acceptable | Fixed | No tilt | 4.5 | 6.5 | — | — | — | — | — | — |
| Dodge | Ram pickup, 40/20/20 split bench seat | Poor | Fixed | No tilt | 12.0 | 16.5 | — | — | — | — | — | — |
| Dodge | Ram pickup, straight bench seat | Poor | Fixed | No tilt | 8.5 | 14.5 | — | — | — | — | — | — |
| Ford | F-series, 60/40 split bench seat | Poor | Fixed | No tilt | 10.0 | 11.5 | — | — | — | — | — | — |
| Ford | F-series, three-passenger bench seat | Poor | Fixed | No tilt | 5.0 | 15.5 | — | — | — | — | — | — |
| Ford | F-series, three-passenger flight bench seat | Poor | Fixed | No tilt | 1.5 | 12.5 | — | — | — | — | — | — |
| Ford | F-series, three-passenger straight bench seat | Poor | Fixed | No tilt | 3.5 | 13.0 | — | — | — | — | — | — |
| Ford | F-series, 40/20/40 split bench seat | Poor | Fixed | No tilt | 5.0 | 13.2 | — | — | — | — | — | — |
| Ford | F-series, bucket seat | Poor | Fixed | No tilt | 8.5 | 11.0 | — | — | — | — | — | — |
| Ford | F-series, split back bench seat | Poor | Fixed | No tilt | 6.5 | 10.5 | — | — | — | — | — | — |
| Ford | Ranger, sport buckets | Poor | Fixed | No tilt | 11.2 | 13.7 | — | — | — | — | — | — |
| Ford | Ranger, straight bench seat | Marginal | Fixed | No tilt | 6.0 | 10.0 | — | — | — | — | — | — |
| Ford | Ranger, 60/40 split bench seat | Poor | Fixed | No tilt | 5.2 | 13.3 | — | — | — | — | — | — |
| GMC | Sierra, 60/40 split bench seat | Poor | No lock | No tilt | 6.2 | 14.8 | — | — | 1.8 | 5.2 | — | — |
| GMC | Sierra, bucket seat | Poor | No lock | No tilt | 8.2 | 14.2 | — | — | 4.2 | 4.8 | — | — |
| GMC | Sierra, cloth straight bench seat and fixed seatback | Poor | No lock | No tilt | 7.2 | 15.2 | — | — | 2.7 | 6.2 | — | — |
| GMC | Sierra, vinyl straight bench seat and fixed seatback | Poor | No lock | No tilt | 8.5 | 15.0 | — | — | 5.0 | 5.0 | — | — |
| GMC | Sonoma, bench seat | Poor | Fixed | No tilt | 6.2 | 13.5 | — | — | — | — | — | — |
| GMC | Sonoma, bucket seat or 60/40 split bench seat | Poor | Fixed | No tilt | 8.0 | 15.2 | — | — | — | — | — | — |
| Mazda | B-series, 60/40 split bench seat[3] | Poor | Fixed | No tilt | 5.0 | 13.5 | — | — | — | — | — | — |
| Mazda | B-series, sport bucket seat | Not measured | — | — | — | — | — | — | — | — | — | — |
| Mazda | B-series, straight bench seat | Marginal | Fixed | No tilt | 2.8 | 9.0 | — | — | — | — | — | — |
| Nissan | Pickup, straight bench seat | Poor | Fixed | No tilt | 5.5 | 12.5 | — | — | — | — | — | — |
| Nissan | SE pickup, bucket seat | Marginal | Locking | No tilt | 5.0 | 14.5 | — | — | 3.0 | 6.5 | — | — |
| Nissan | SE pickup, sport bucket seat | Acceptable | Locking | No tilt | 7.0 | 14.0 | — | — | 5.0 | 5.5 | — | — |

**Head Restraint Evaluations — 1997 Model Year Passenger Cars, Pickup Trucks, Utility Vehicles, and Large Vans**

| | | | | | Head Restraint Down | | | | Head Restraint Up | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Tilted Back | | Tilted Forward | | Tilted Back | | Tilted Forward | |
| Make | Model/Seat | Overall Evaluation | Height Lock | Tilt Lock | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) |
| Nissan | XE pickup, bucket seat | Acceptable | Locking | No tilt | 6.0 | 13.5 | — | — | 4.0 | 6.0 | — | — |
| Toyota | T100, three-passenger bench seat | Not measured | — | — | — | — | — | — | — | — | — | — |
| Toyota | T100, 60/40 split bench seat | Poor | Locking | No tilt | 10.5 | 13.5 | — | — | 9.5 | 10.0 | — | — |
| Toyota | T100, sport seat | Marginal | Locking | No lock | 9.0 | 13.6 | 5.2 | 14.8 | 8.1 | 7.6 | 4.8 | 8.6 |
| Toyota | Tacoma, bench seat | Poor | Fixed | No tilt | 6.5 | 11.5 | — | — | — | — | — | — |
| Toyota | Tacoma, bucket seat or 60/40 split bench seat | Acceptable | Locking | No tilt | 4.5 | 8.8 | — | — | 4.0 | 5.8 | — | — |
| Toyota | Tacoma, sport bucket seat | Marginal | Locking | No lock | 9.0 | 13.6 | 5.2 | 14.8 | 8.1 | 7.6 | 4.8 | 8.6 |
| **Utility Vehicles** | | | | | | | | | | | | |
| Chevrolet | Blazer | Poor | Fixed | No tilt | 7.2 | 15.8 | — | — | — | — | — | — |
| Chevrolet | Suburban, 60/40 split bench seat | Not measured | — | — | — | — | — | — | — | — | — | — |
| Chevrolet | Suburban, bucket seat | Poor | No lock | No tilt | 9.4 | 15.0 | — | — | 5.2 | 5.9 | — | — |
| Chevrolet | Suburban, straight bench seat | Not measured | — | — | — | — | — | — | — | — | — | — |
| Chevrolet | Tahoe, 60/40 split bench seat | Not measured | — | — | — | — | — | — | — | — | — | — |
| Chevrolet | Tahoe, high-back bucket seat | Poor | No lock | No tilt | 8.2 | 14.2 | — | — | 4.2 | 4.8 | — | — |
| Chevrolet | Tahoe, low-back bucket seat | Not measured | — | — | — | — | — | — | — | — | — | — |
| Chevrolet-Geo | Tracker | Poor | Fixed | No tilt | 11.0 | 14.0 | — | — | — | — | — | — |
| Ford | Expedition | Marginal | Fixed | No tilt | 4.5 | 9.0 | — | — | — | — | — | — |
| Ford | Expedition, Eddie Bauer seat | Marginal | Fixed | No tilt | 9.0 | 10.0 | — | — | — | — | — | — |
| Ford | Explorer, captains chairs and 60/40 split bench seat | Poor | Fixed | No tilt | 5.2 | 13.3 | — | — | — | — | — | — |
| Ford | Explorer, sport bucket seat | Poor | Fixed | No tilt | 11.2 | 13.7 | — | — | — | — | — | — |
| GMC | Jimmy, bench seat | Not measured | — | — | — | — | — | — | — | — | — | — |
| GMC | Jimmy, bucket seat | Poor | No lock | No lock | 7.5 | 13.0 | 1.0 | 12.5 | 5.5 | 7.0 | — | 9.5 |
| GMC | Suburban, 60/40 split bench or bucket seat | Poor | No lock | No tilt | 9.4 | 15.0 | — | — | 5.2 | 5.9 | — | — |
| GMC | Suburban, straight bench seat | Not measured | — | — | — | — | — | — | — | — | — | — |
| GMC | Yukon, 60/40 split bench seat | Not measured | — | — | — | — | — | — | — | — | — | — |
| GMC | Yukon, bucket seat | Poor | No lock | No tilt | 9.4 | 15.0 | — | — | 5.2 | 5.9 | — | — |
| GMC | Yukon, lowback bucket seat | Not measured | — | — | — | — | — | — | — | — | — | — |
| Honda | CR-V | Acceptable | Locking | No tilt | 8.0 | 7.5 | — | — | 7.5 | 4.0 | — | — |
| Honda | Passport | Poor | Locking | No tilt | 7.0 | 13.8 | — | — | 5.7 | 10.3 | — | — |
| Infiniti | QX4 | Poor | Locking | No tilt | 10.0 | 14.5 | — | — | 9.0 | 8.5 | — | — |
| Isuzu | Rodeo | Poor | Locking | No tilt | 7.0 | 13.8 | — | — | 5.7 | 10.3 | — | — |

**Head Restraint Evaluations — 1997 Model Year Passenger Cars, Pickup Trucks, Utility Vehicles, and Large Vans**

| | | | | | Head Restraint Down | | | | Head Restraint Up | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Tilted Back | | Tilted Forward | | Tilted Back | | Tilted Forward | |
| Make | Model/Seat | Overall Evaluation | Height Lock | Tilt Lock | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) |
| Isuzu | Trooper | Marginal | Locking | No tilt | 8.0 | 10.0 | -- | -- | 7.5 | 6.5 | -- | -- |
| Jeep | Cherokee, adjustable head restraint | Poor | No lock | No tilt | 4.5 | 12.0 | -- | -- | 3.5 | 2.5 | -- | -- |
| Jeep | Cherokee, fixed head restraint | Poor | Fixed | No tilt | 3.5 | 11.5 | -- | -- | -- | -- | -- | -- |
| Jeep | Grand Cherokee, electric seat | Poor | No lock | No tilt | 18.0 | 19.5 | -- | -- | 4.5 | 9.5 | -- | -- |
| Jeep | Grand Cherokee, manual seat | Poor | No lock | No tilt | 18.0 | 18.0 | -- | -- | 5.5 | 7.0 | -- | -- |
| Jeep | Wrangler | Marginal | Fixed | No tilt | 4.0 | 9.0 | -- | -- | -- | -- | -- | -- |
| Kia | Sportage | Acceptable | Locking | No tilt | 4.5 | 12.0 | -- | -- | 3.5 | 6.0 | -- | -- |
| Land Rover | Discovery, adjustable head restraint | Poor | No lock | No lock | 6.0 | 13.0 | 1.0 | 14.5 | 4.0 | 7.0 | -- | 8.0 |
| Land Rover | Discovery, fixed head restraint[2] | Marginal | Fixed | No tilt | 4.0 | 9.0 | -- | -- | -- | -- | -- | -- |
| Land Rover | Range Rover | Acceptable | Locking | No lock | 8.5 | 7.5 | 4.0 | 8.5 | 9.0 | 2.0 | 4.0 | 3.0 |
| Lexus | LX 450 | Poor | Locking | Locking | 9.5 | 14.0 | 7.0 | 17.0 | 5.0 | 8.5 | 3.0 | 8.5 |
| Mercury | Mountaineer | Poor | Fixed | No tilt | 5.2 | 13.3 | -- | -- | -- | -- | -- | -- |
| Mercury | Mountaineer, sport seat | Poor | Fixed | No tilt | 11.0 | 15.0 | -- | -- | -- | -- | -- | -- |
| Mitsubishi | Montero | Acceptable | Fixed | Locking | 7.5 | 4.5 | 2.5 | 5.0 | -- | -- | -- | -- |
| Mitsubishi | Montero Sport | Marginal | Locking | No tilt | 10.0 | 14.5 | -- | -- | 7.5 | 5.5 | -- | -- |
| Nissan | Pathfinder, manual seat | Poor | Locking | No tilt | 6.2 | 15.0 | -- | -- | 5.2 | 8.3 | -- | -- |
| Nissan | Pathfinder, power seat | Poor | Locking | No tilt | 6.5 | 14.5 | -- | -- | 5.5 | 8.5 | -- | -- |
| Oldsmobile | Bravada | Poor | No lock | No lock | 9.0 | 13.5 | 3.5 | 13.5 | 6.5 | 8.5 | 2.0 | 9.5 |
| Suzuki | Sidekick | Marginal | Locking | No tilt | 7.2 | 10.2 | -- | -- | 7.0 | 6.8 | -- | -- |
| Suzuki | Sidekick, sport bucket seat | Acceptable | Locking | No tilt | 3.5 | 10.5 | -- | -- | 3.0 | 4.5 | -- | -- |
| Suzuki | X-90 | Marginal | Locking | No tilt | 7.2 | 10.2 | -- | -- | 7.0 | 6.8 | -- | -- |
| Toyota | 4Runner | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toyota | 4Runner, sport bucket seat | Marginal | Locking | No lock | 9.0 | 13.6 | 5.2 | 14.8 | 8.1 | 7.6 | 4.8 | 8.6 |
| Toyota | Land Cruiser | Marginal | Locking | Locking | 8.5 | 16.5 | 5.5 | 15.5 | 4.5 | 8.5 | 2.0 | 7.5 |
| Toyota | RAV4 | Acceptable | Locking | No tilt | 3.5 | 12.0 | -- | -- | 4.5 | 5.5 | -- | -- |
| **Large Vans** | | | | | | | | | | | | |
| Chevrolet | Chevy Van (cargo) | Acceptable | Fixed | No tilt | 5.5 | 7.0 | -- | -- | -- | -- | -- | -- |
| Chevrolet | Express, deluxe buckets[3] | Acceptable | Fixed | No tilt | 4.0 | 6.8 | -- | -- | -- | -- | -- | -- |
| Chevrolet | Express, highback buckets | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dodge | Ram Van, fixed head restraint | Poor | Fixed | No tilt | 9.5 | 15.2 | -- | -- | -- | -- | -- | -- |
| Ford | Econoline cargo | Poor | Fixed | No tilt | 4.5 | 12.5 | -- | -- | -- | -- | -- | -- |

**Head Restraint Evaluations — 1997 Model Year Passenger Cars, Pickup Trucks, Utility Vehicles, and Large Vans**

| | | | | | Head Restraint Down | | | | Head Restraint Up | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Tilted Back | | Tilted Forward | | Tilted Back | | Tilted Forward | |
| Make | Model/Seat | Overall Evaluation | Height Lock | Tilt Lock | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) | Horizontal Distance from Head (cm) | Vertical Distance from Head (cm) |
| Ford | Econoline Chateau | Poor | Fixed | No tilt | 5.0 | 12.0 | -- | -- | -- | -- | -- | -- |
| Ford | Econoline XLT | Poor | Fixed | No tilt | 5.5 | 12.8 | -- | -- | -- | -- | -- | -- |
| GMC | Savana cargo van | Acceptable | Fixed | No tilt | 4.0 | 6.8 | -- | -- | -- | -- | -- | -- |
| GMC | Savana passenger van | Not measured | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

[1] Automatically adjusting head restraint

[2] Additional measurements included since April 12, 1997 issue of *Status Report* (Insurance Institute for Highway Safety, 1997)

[3] Vehicle identification numbers indicate 1996 vehicle measured

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