

SAE J383 APR86

**Motor Vehicle Seat
Belt Anchorages —
Design
Recommendations**

**SAE Recommended Practice
Reaffirmed April 1986**

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**Submitted for Recognition as
an American National Standard**



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MOTOR VEHICLE SEAT BELT ANCHORAGES--DESIGN RECOMMENDATIONS

1. **SCOPE:** This SAE Recommended Practice specifies design recommendations for location of seat belt assembly anchorages. It applies to seat belt anchorages attached to vehicle structure or installed to seat assemblies in the vehicle. (This SAE Recommended Practice supersedes the Design Section of SAE J787b.) Test Procedures and Performance Requirements are specified in SAE J384, Motor Vehicle Seat Belt Anchorages--Test Procedure, and SAE J385, Motor Vehicle Seat Belt Anchorages--Performance Requirements, respectively.
2. **DEFINITIONS:**
 - 2.1 **Anchorage:** The final point of attachment for transferring seat belt assembly loads to the vehicle structure.
 - 2.2 **Seating Reference Point¹:** The Design H-Point with the seat in the rearmost, lowest normal design position. (The "Design H-Point" has coordinates relative to the design vehicle structure. It is located at the H-Point of the two-dimensional drafting template placed in any designated seating position.)
 - 2.3 **Shoulder Reference Point:** A point 22.16 in (563 mm) above the "H" Point along the torso centerline of the two dimensional drafting template described in SAE J826. This dimension added to the dimension of 3.84 in (97.5 mm) from the "H" Point to the buttocks fleshline and an angular relationship of 90 deg between the torso and thigh segment of the two dimensional drafting template has been indicated to represent 99% of the male driver population.
 - 2.4 **Attachment Hardware:** Any or all hardware designed for securing a seat belt assembly to the anchorage(s) in a motor vehicle.

¹Taken from the proposed SAE Standard J1100, Passenger Car Measuring Procedure.

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- 2.5 Seat Belt Assembly: Any strap, webbing, or similar device designed to secure a person in a motor vehicle with the intention of minimizing the risk of bodily harm in an accident, including all buckles, adjusting mechanism, fasteners, and related hardware. This SAE Recommended Practice covers anchorages for the following types of assemblies:

Type 1 - Pelvic restraint belt (lap belt).

Type 2 - Combination of pelvic (lap) and upper torso (shoulder) restraint belts.

Type 2a - Upper torso (shoulder) restraint for use only in conjunction with a pelvic restraint (lap) belt as a Type 2 seat belt assembly.

- 2.6 Belt Contact Point: The point where the seat belt webbing's longitudinal centerline would make contact with the load bearing member of the seat structure, body structure, retractor hardware (or webbing wound on the spool of a retractor), or attachment hardware such as a swivel plate which may be bolted to the seat belt anchorage. The components on which belt contact point is located must be capable of sustaining a load that might be imposed by the webbing of a seat belt assembly.

- 2.7 Belt Angle Reference Point: The point 2.50 in (63.5 mm) forward of and 0.375 in (9.5 mm) above the seating reference point.

3. GENERAL:

- 3.1 Installation and Replacement: Anchorages shall permit seat belt assemblies to be readily installed or replaced, and shall comply with the strength requirements of SAE J385.
- 3.2 Common Anchorage(s): A common anchorage point may be used for more than one belt end, provided it meets the pertinent requirements of paragraph 4.4 and SAE J385. The location of the lower anchorage(s) of the upper torso restraint may be common with the pelvic restraint anchorage(s).

4. LOCATION OF PELVIC RESTRAINT ANCHORAGES:

- 4.1 Pelvic Restraining Angle Guidelines: Many factors affect the preferred more vertical pelvic restraint belt angle which is basically intended to prevent the lap belt from sliding over the iliac crest during the forward and downward movement of the restrained individual.

Ideally, component tests, sled tests or vehicle crash tests should be run, utilizing a test device containing a humanlike illium with appropriate "soft tissue" damping in relation to the spine and femur along with humanlike abdominal contents, to determine the preferred pelvic restraint belt angle which is influenced by any or all of the following factors:

- (a) Seat cushion compression and/or seat deflection
- (b) Seat cushion angle and seat back angle
- (c) Proximity of "hard" vehicle structures in front of the restrained occupant
- (d) Initial length and elongation characteristics of belt webbing
- (e) Type of restraint system

4.1 (Continued):

- (f) Presence or absence of upper torso restraint belt
- (g) Placement of upper torso restraint anchorage
- (h) Stiffness of components or structures on which are found the belt contact points

In the absence of component tests, sled tests or vehicle crash tests, a more vertical pelvic restraint belt angle is preferred and should be selected within the range of 20-75 deg from the horizontal.

4.2 Anchorage on Vehicle Structure for Pelvic Restraint Belts:

- 4.2.1 Movable Seats: The location of anchorages for occupants of seats which are adjustable or movable in the fore and aft direction and in which the belt passes outside of the seat or through the seat cushions shall be as follows: A line from the belt contact point to the belt angle reference point 2.50 in (63.5 mm) forward of and 0.375 in (9.5 mm) above the seating reference point will form an angle as determined from the guidelines in paragraph 4.1 and as shown in Fig. 1.
- 4.2.2 Fixed Seats: The location of anchorages for occupants of fixed seats in which the belt passes outside the seat or through the seat springs shall be as follows: A line from the belt contact point to the seating reference point will form an angle as determined from the guidelines in paragraph 4.1 and as shown in Fig. 2.
- 4.2.3 Seat Belt Routing to Anchorage: In the side view where a direct belt routing is interrupted by intervening load bearing member (refer to Belt Contact Point definition in paragraph 2.6) the anchorage shall not be located forward of the rearmost point at which the webbing passes over the intervening member. Movable seats should be measured in the rearmost normal position. See Fig. 3.
- 4.3 Anchorage on Seat Structure for Pelvic Restraint Belts: The location of anchorages for occupants of seats in which the belts are anchored to seat structure shall be as follows: A line from the belt contact point to the seating reference point will form an angle as determined from the guidelines in paragraph 4.1 and as shown in Fig. 4.
- 4.4 Lateral Location for all Pelvic Restraint Belts: Anchorages for any individual pelvic restraint belt assembly shall be located at least 6.5 in (165.1 mm) apart and preferably shall be placed equidistant from the longitudinal centerline of the designated seating position unless intervening load bearing members provide the spacing desired.

5. LOCATION OF UPPER TORSO RESTRAINT ANCHORAGES:

- 5.1 Side View Location: With the seat in its full rearward and downward position and the seatback in its most upright design position, the upper anchorage(s) shall be longitudinally in line with, or rearward of, a line extending 6 in (152.4 mm) vertically above the shoulder reference point and then extending rearward at an angle of 80 deg above the horizontal (see Fig. 5). If there is a downward angle of the belt, passing from the shoulder reference point to an anchorage or over suitable structure to an anchorage, this anchorage shall be (on or) above a line extending rearward and 40 deg below the horizontal.
- 5.2 Front View Location: The upper torso restraint anchorage shall be positioned to minimize contact of the seat belt assembly with the neck and avoid it sliding off the shoulder of the occupant in a reasonably erect position.
6. CORROSION PROTECTION: Design consideration shall be given to providing protection from corrosion for the seat belt anchorage(s) and the adjacent body structure. Special consideration shall be given to that portion or portions of the structure which must sustain the anchorage test loads. The degree or type of protection required will be determined by the location of the anchorage(s) in the vehicle structure, the amount of exposure to corrosive elements, the configuration of the structure (if configuration may tend to induce corrosion), and the thickness of the supportive structure.

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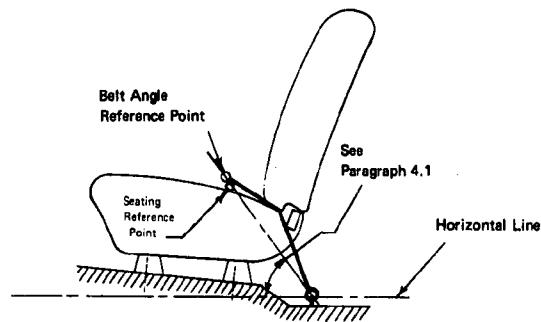


FIG. 1--BELT OUTSIDE SEAT OR THROUGH SEAT SPRINGS

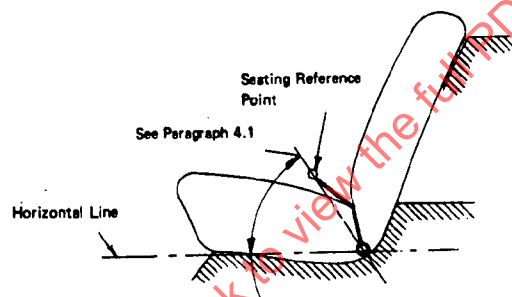


FIG. 2--REAR SEAT BELT INSTALLATION

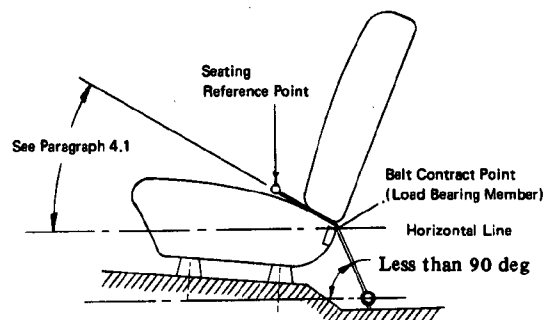


FIG. 3--BELT OVER SEAT CROSS BAR

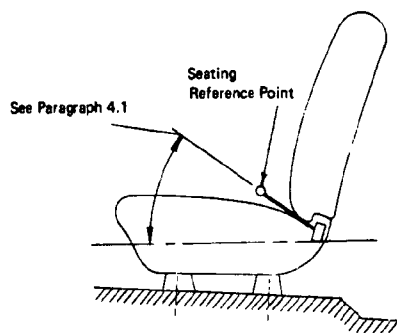


FIG. 4--BELT ATTACHED TO SEAT FRAME

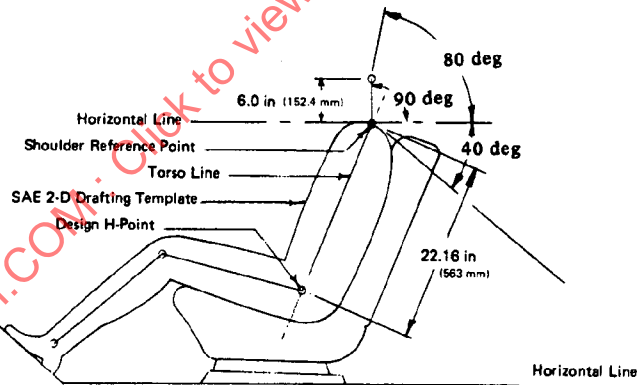


FIG. 5--UPPER TORSO RESTRAINT