



## Rear Shelf Speaker Aperture Modification

### Background

#### **Problems currently being experienced:**

The latest In-Service inspection (Warrant of Fitness) Vehicle Inspection Requirements Manual (VIRM) revision to the Modification Threshold Schedule does not allow modifications to speaker cut-outs closer than 300mm from a seatbelt anchorage. This change was made by Land Transport NZ to align with their distance requirements for rust. Unfortunately, this is causing numerous WoF failures and referrals to LVV Certifiers where the speaker aperture modification would have no effect on the vehicle structure surrounding the seatbelt anchorages, usually because the seatbelt anchorage is attached to the vehicles' C-pillar or wheel arch, and the rear shelf contributes little if any support to that part of the vehicle structure.

#### **Most rear shelves are not structural:**

Most modern vehicles have sedan/station wagon/hatch-back variants of a given model, and the station wagon and hatch-backs models don't even have a rear shelf. Vehicle manufacturers generally use similar tooling for vehicle production lines, and the strengthened components for seatbelt anchorages would usually be common between the different model variants. If a station wagon or hatchback structure has sufficient strength for an upper seatbelt anchorage it is unlikely that a manufacturer would alter the tooling to utilise the rear shelf as part of the strength for the sedan model.

Typically, only sedans have a rear shelf structure, which is there to support the rear window, separate the passenger compartment from the boot space, allow attachment of the boot hinges, and fill the gap between the rear of the seat and the window. It is a convenient place for the manufacturer to fit speaker apertures.

#### **Results of vehicles examined:**

A number of common late-model vehicles were examined to determine whether speaker aperture modifications would be likely to affect the strength of the structure surrounding the nearest upper seatbelt anchorages. There were three main outcomes:

1. The first outcome was that in most modern vehicles, it was established that the rear shelves do not contribute any significant strength to the vehicle structure; and
2. The second outcome was that in most modern vehicles, it was established that a modification to a rear shelf to fit larger speakers would not reduce the strength of the structure to which the seatbelt anchorages are attached; and
3. The third outcome was that most rear upper seatbelt anchorages are not actually attached to the rear shelf, but to either the C-pillar, the rear wheel arches, or the rear panel that runs between the C-pillars.

As a result of this, Land Transport New Zealand have agreed that, in principle, unless the upper seatbelt anchorage is actually attached directly to the rear shelf itself, referral for LVV certification is not required. The reference to a specific measurement has been deleted also.

To follow are some photographs and notes of some common vehicle types that were examined.

### **Examples of vehicles that do *not* require LVV certification:**

#### **3-door Ford Laser**

An example of a 3-door Ford Laser hatch (looking through the right side window aperture, rearward toward the tailgate) shows how the seatbelt anchorage is attached to the vehicle's C-pillar. The speaker structure around the seatbelt retractor is bolt-on, of flimsy construction, and plays no part of the seatbelt anchorage's strength.



#### **Ford Fairmont**

To follow is an example of a seatbelt anchorage which is attached into the C-pillar of the vehicle, but which also has a substantial rear shelf.

This anchorage is from a Ford Fairmont, which has a strong rear shelf/rear of seat structure attached to the bodywork near the retractor anchorage. However, the relative positioning between the anchorage and the speaker aperture is such that a minor modification to the rear shelf would have no effect on the strength of the part of the vehicle structure to which the seatbelt retractor anchorage attaches, which is pulling upwards towards the running loop.



### Nissan Skyline

This 2-door sedan Nissan Skyline has an enlarged speaker aperture already, but as can be seen when viewed from within the boot looking forward, the retractor anchorage bolt (can be seen 'arrowed') is attached to a part of the rear structure, which is unrelated to the rear shelf. This speaker aperture modification would not affect the strength of the vehicle structure to which the seatbelt anchorage attaches.



### **Early Nissan Bluebird**

This Nissan Bluebird static anchorage would pull forwards on the C-pillar and inwards during an impact. The sheet metal structure forming the rear of the seat would still provide support to the C-pillar's inward loading, even if the rear shelf speaker aperture were to be enlarged.



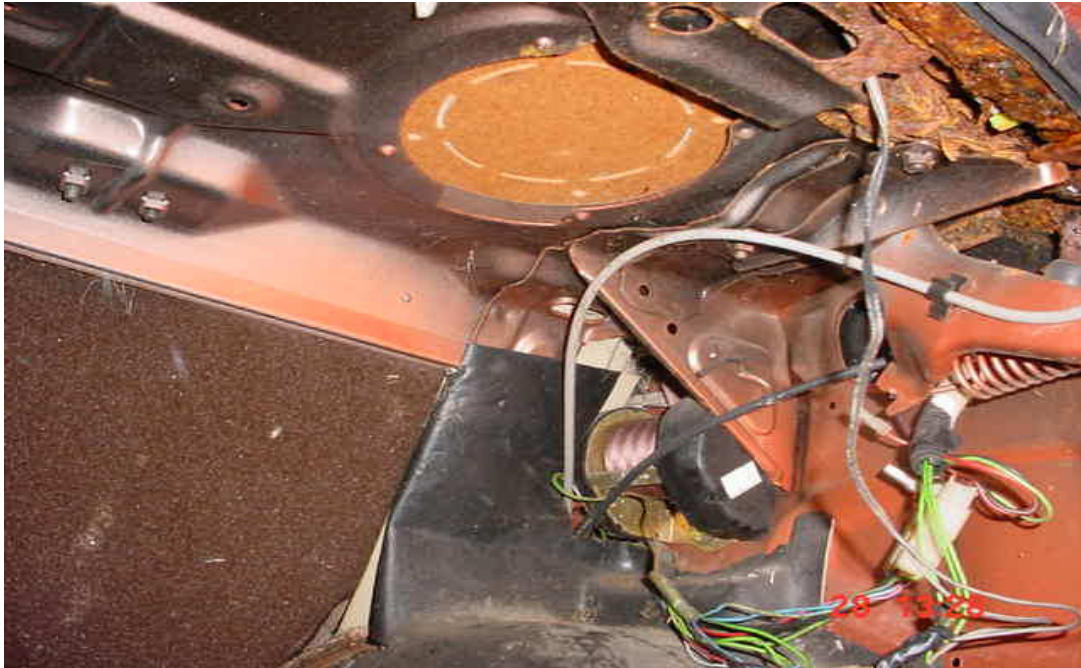
### **Hyundai sedan**

This Hyundai 4-door sedan also has a running loop in the C-pillar. The pull on the retractor will be vertical, and the removal of some material on the rear shelf speaker aperture will not affect the strength of the vehicle structure supporting the seatbelt retractor mount or the running loop.



### **Mitsubishi Mirage Geneva**

Again, the retractor and running loop are attached to the C-pillar, so the rear shelf is contributing little to the strength of the structure where the seatbelt anchorage attaches, provided the aperture was increased inwards toward the centre of the vehicle's longitudinal centreline, and the angled stiffener beside the retractor mount was not modified or removed.



### **Mitsubishi Mirage 2-door**

A Mitsubishi Mirage 2-door sedan: the retractor and the running loop both pull vertically against each other, with no inward load component at the retractor anchorage point.



### **Ford Telstar**

This Ford Telstar has a running loop in the C-pillar (as most of them have). In this vehicle, if the C-pillar were to be supported by anything, it would be from the much more robust section further back that supports the boot hinges, and not from the rear shelf where the speaker apertures are.



### **Examples of vehicles that *do* require LVV certification:**

#### **Nissan Bluebird**

This Nissan Bluebird sedan (this photo and next page) has a static upper seatbelt anchorage attached directly to the rear shelf. This is typical of a rear shelf that should never have its speaker aperture increased in size without having the vehicle LVV certified.





### **Conclusion:**

Unless the seatbelt anchorage is attached directly into the rear shelf, a modification to a rear shelf for enlarged speaker apertures will have minimal, if any, effect on the vehicle structure to which the seatbelt anchorage is attached.

A rear shelf which has an upper seatbelt anchorage attached directly into the shelf, and has an enlarged speaker aperture (or any other structural modification for that matter) must be referred to a LVV certifier, who will ensure that any strength lost to the shelf as a result of the modification will be reinstated by some suitable method.

A distinction between an anchorage attached directly into a rear shelf and one attached directly into another part of the vehicle structure needs to be made, and guidance on that basis provided to the AVICs.

The wording in the Modification Threshold Schedule will be altered to:

**Stereo equipment and speakers (to go into both '7-7 interior impact', and '3-1 structure'):**

**LVV Certification is not required provided that:**

*Replace the existing wording (as below):*

- ~~no material has been removed from within 300mm of a seatbelt mounting; and~~
- ~~any such removal is minimal and has not weakened the body structure; and~~
- ~~in the case of a rear shelf, no center upper seatbelt mounting is present.~~

**With:**

- the removal of any material from the rear shelf is unlikely to have weakened the body structure to which a seatbelt anchorage is attached; and
- in the case of a rear shelf, no upper seatbelt anchorage is directly attached to the shelf, or any shelf support bracket; and
- in the case of a top tether point for a child seat attached to a rear shelf, the top tether point is not located within 150 mm of a modification to the rear shelf.

Note that it may take some time for this change to be made to the VIRM, and be distributed to the AVICs.

If you have any queries or require any further clarification relating to this Information Sheet, please feel free to contact Kendall Bradley at the LVVTA office on (09) 268-9550.

Tony Johnson  
Chief Executive Officer  
**Low Volume Vehicle Technical Association, Inc**

---