CHAPTER 5

OCCUPANT PROTECTION

158. Evidence received on improving the protection of occupants in both heavy vehicles and lighter vehicles was concerned primarily with crash structures and the restraint of occupants.

159. The function of the crash structure, which is that portion of a vehicle which deforms and absorbs energy, is to absorb (dissipate) the crash energy of vehicles in such a way that the integrity of the passenger compartment is preserved and the system employed in occupant restraint may serve its purpose. Significant items relating to crash structure which were raised in evidence and which are discussed below are under-run barriers and bumper bars, truck cabin crashworthiness and the structural design of buses.

Under-run Barriers

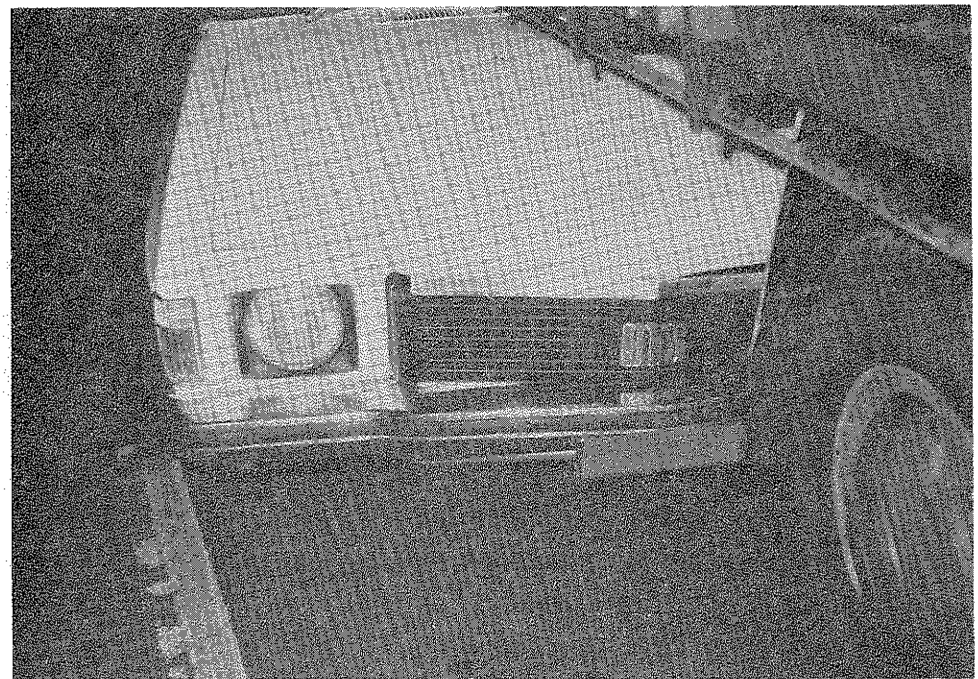
160. The configuration of many heavy vehicles is such that light vehicles in the event of their collision with a heavy vehicle are able to enter underneath the heavy vehicle. Such accidents are more prevalent with trucks and trailers than with buses. The high load carrying tray of these vehicles coupled with the considerable mass of the vehicle acts as a highly rigid barrier to an impacting motor car and often the first impact occurs between the tray and the car windscreen. Such impacts do not utilise the energy absorbing potential in the crushable forebody of the car and often have disastrous consequences for the car passengers. These energy absorbing characteristics have been developed at substantial cost to manufacturers and purchasers of these vehicles and it is regrettable that their purpose can be so easily defeated. The problem occurs both for side and rear-end impacts. In the case of buses, ground clearance height is much closer to that

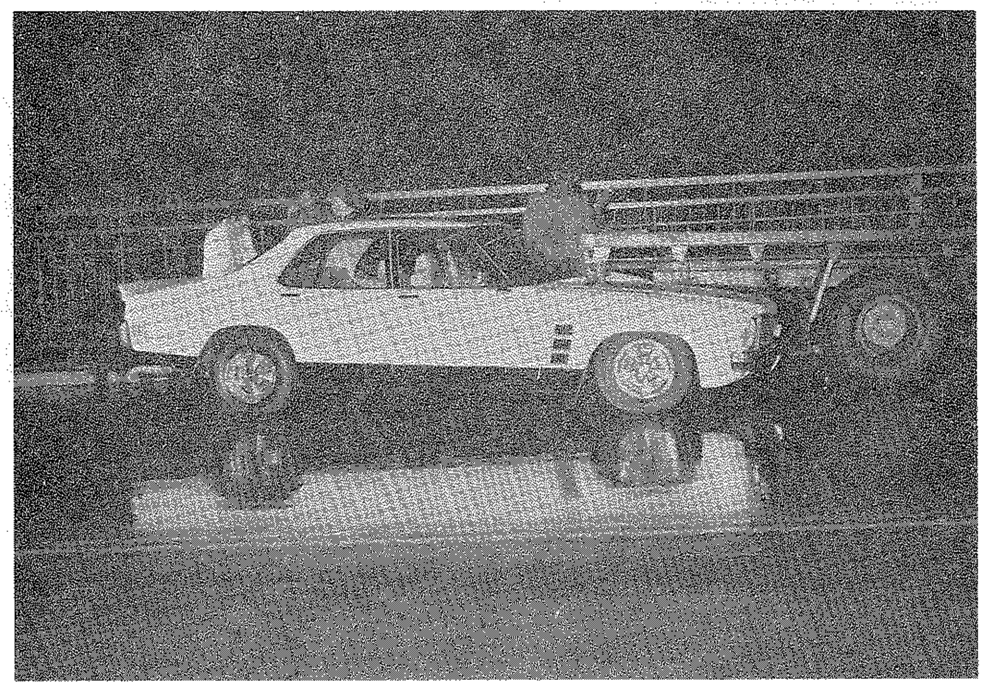
of the car. Impact of a car with a bus is similar to a front-end impact for the car because of the panelled sides of a bus.

161. Opinion as to the merits of under-run barriers is divided. Many people closely associated with road safety consider them beneficial in reducing the severity of injuries suffered by the occupants of impacting light vehicles. Others in the transport industry are more sceptical and as is the case with many safety innovations require proof of the need for such innovations before they are implemented.

162. A number of countries have considered the need for regulations requiring under-run barriers to be fitted. In recent years Sweden, West Germany and France have introduced a requirement for rear under-run protection on all newly registered trucks and trailers. The effectiveness of these requirements will require careful evaluation over the next few years to determine their usefulness.

163. Other countries such as the United States of America have examined their own needs for regulation in this area and determined that an under-run barrier requirement could not be justified. In the case of the United States of America a regulation was proposed but was withdrawn after detailed investigation and research. The studies conducted found that imposition of the standard would have added substantially to the cost and weight of the vehicle and required alterations to many loading facilities and ramps. Following consideration of these factors together with the incidence of cars under-running trucks it was held that the projected safety benefits were insufficient to outweigh the costs involved.



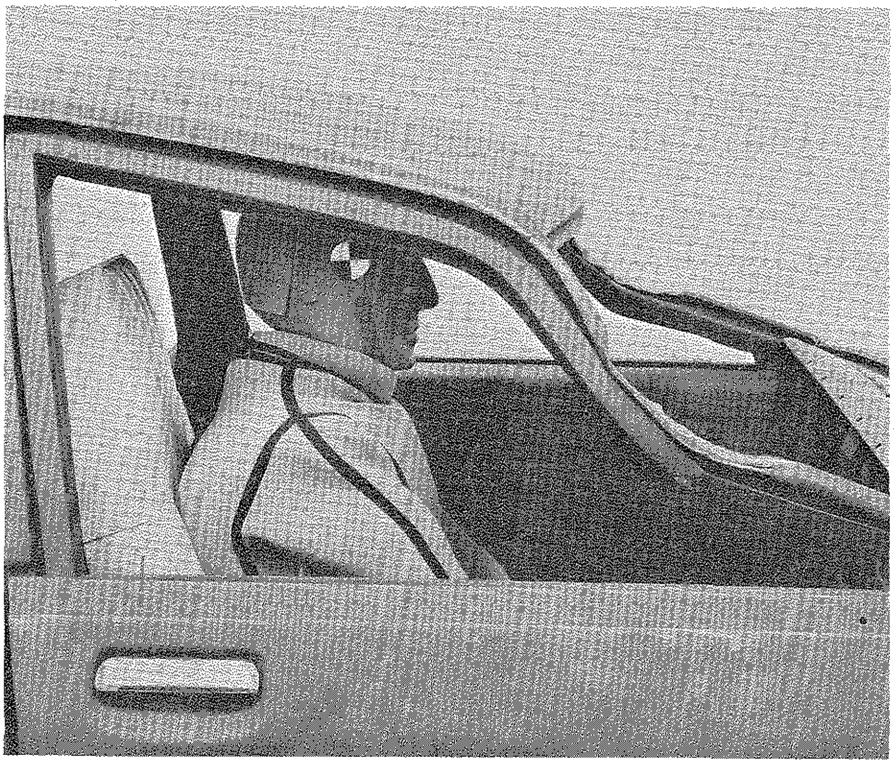


Under-run protection testing
by Volvo in Sweden
under laboratory conditions

164. In Australia the need for a design rule on under-run barriers has been considered and rejected by ASCVD on cost benefit grounds, as in the United States of America. The costs involved relate not only to the initial cost of materials and manufacture of the barrier which are not inconsiderable due to the strength required, but also to the continuing payload penalty involved because of the additional weight of the barrier. Such barriers would also restrict the manoeuvrability and operating efficiency of rigid vehicles with a long overhang from the rear-most axle to the end of the tray.

165. Evidence was received which casts doubt on the actual effectiveness of the barrier. The height of the barrier at the rear of a vehicle will vary according to the type of vehicle (light, medium, heavy) and whether the vehicle is unladen or fully laden. The difference in height at the rear due to its loaded condition could be as much as 20 cm. Also if a car is braking heavily at the time of impact, its nose will be considerably lower as well, and if the bonnet slopes to the front as do many designs, then the capacity to become wedged under the vehicle is greater. The impact speed of the lighter vehicle is also important. Some witnesses claimed that it is only at very low speeds that barriers can be really effective.

166. On the other hand a study currently being conducted by TARU on the de-lethalisation of truck trays (see paragraph 137) has indicated that under-run barriers would be effective in the reduction of most unnecessary injury in low speed crashes. The study has found in laboratory crash tests that "A"-pillars surrounding the windscreens of cars are breaking away at impact speeds with simulated truck trays of 16 km/hr. The Committee was told that under-run barriers to withstand low speed impacts of this order would be considerably less expensive and could significantly affect cost effectiveness calculations. Costs vary considerably according to the impact speed barriers are designed to withstand.



This photograph illustrates the results of a staged 10 mph (15 km/hr) crash condition in which the car's windscreen pillars impacted a simulated truck tray. The dummy was not in the car during the crash but was seated in the passenger compartment afterwards, in a normal posture, to demonstrate the reduced headroom. The seat-belted dummy could be expected to move forward in a crash and a head impact is considered to be unavoidable.

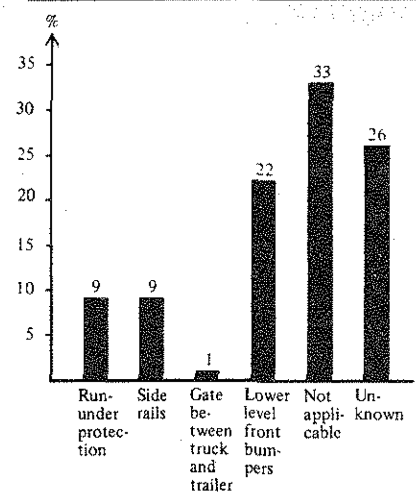
167. The Committee has considered this evidence carefully and concluded that despite doubts cast on the cost effectiveness of under-run barriers, such barriers must contribute significantly to the reduction of injury to passengers in lighter vehicles. The Committee believes this to be a matter of commonsense and notes that a Draft Regulation already exists which provides for rear-end barriers on semi-trailers. Western Australia and Queensland have taken up this regulation and require these barriers to be fitted. Other States do not require barriers to be fitted. The Draft Regulation is shown at Appendix 12.

168. The Committee recommends that the Advisory Committee on Vehicle Performance extend the Draft Regulation on under-run barriers to cover all trucks where the load carrying tray overhangs the rear suspension. The Committee further recommends that all States and Territories should adopt the revised Draft Regulation on under-run barriers. The Committee also recommends that the Advisory Committee on Safety in Vehicle Design prepare a Design Rule on under-run barriers.

169. The Committee has noted that at least one manufacturer provides optional side barriers of a relatively light construction which are designed to prevent pedestrians and motorcyclists entering under the sides of a heavy vehicle. The Committee sees some merit in the use of side barriers particularly on heavy vehicles operating in densely populated areas.

170. The relative height of heavy vehicles and lighter vehicles also allows lighter vehicles to under-run on impact at the front of heavy vehicles. One study[29] conducted in Sweden by Volvo has indicated that lower level bumper bars on trucks could have reduced the consequences of accidents in 22 per cent of the cases. The following graph indicates the results of this study.

APPRAISAL OF CERTAIN MEASURES TO REDUCE THE EFFECTS OF ACCIDENTS

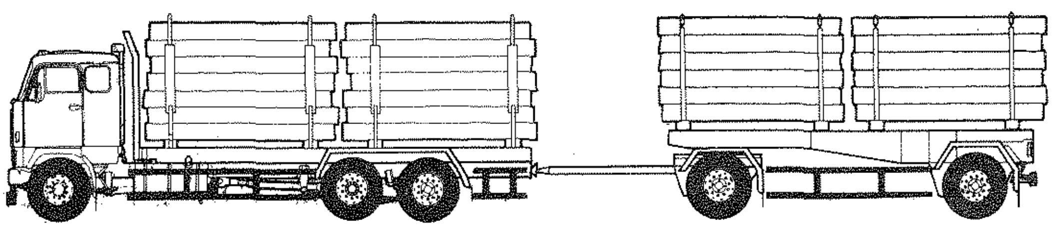


[29] Evidence, p. 1126.

171. The Committee raised with witnesses the desirability of standardising bumper bar heights for vehicles on the road. The Committee was told that the proposal had been considered by ACVP and rejected because it would be both difficult to arrange and extremely costly. The Committee nevertheless believes however that overseas developments should be closely monitored with a view to early implementation of any workable solution and considers that in the meantime advances towards standardisation of bumper bar heights for motorcars would be a satisfactory first step.

172. Figure 4 illustrates the lower level front bumper, side barriers and rear under-run barriers which the study[30] by Volvo indicated could make trucks safer.

Figure 4: Under-Run Protection



173. A matter related to the function of a front bumper bar which was brought to the attention of the Committee is the danger of bull-bars which are being fitted to heavy vehicles in increasing numbers. As the name suggests bull-bars serve to protect the front of heavy vehicles from damage caused when animals are struck, particularly in outback areas, or in minor accidents where severe damage could be caused to headlights and radiators, the latter being a particularly expensive item.

30 Evidence, p. 1133.

The Committee however while acknowledging the need for such a barrier in outback areas is concerned that there are no regulations concerning the design and fitting of these devices. It is not known how bull-bars perform in head-on crashes with other vehicles or crashes involving fixed objects such as trees. It is also not known whether these barriers could impair the specific design of the vehicle. In urban areas there is a further concern with bull-bars which could increase the likelihood that a pedestrian involved with a heavy vehicle will receive severe or fatal head or chest injuries directly from impact with such bull-bars. The Committee therefore recommends that the Advisory Committees on Safety in Vehicle Design and Vehicle Performance investigate the safety aspects of bull-bars.

Body Design and Structural Strength

174. Truck cabins and bus bodies should be designed and built to maintain their structural integrity in all but the most severe of accidents. As the needs of buses and trucks differ they will now be treated separately.

175. Until recent times both urban and inter-urban type buses have been built by taking truck chassis derivatives[31] and attaching a coach body to it. Axle load limits on buses have dictated that bodies are based on a light weight structure which is usually of an integrally welded steel fabrication. The Committee was told that the coach building industry in Australia consists of twenty-five to thirty organisations who employ their own individual designs and techniques in bodywork construction.

176. Evidence received indicated that the standards of coachwork vary significantly. The Department of the Capital Territory commented that:

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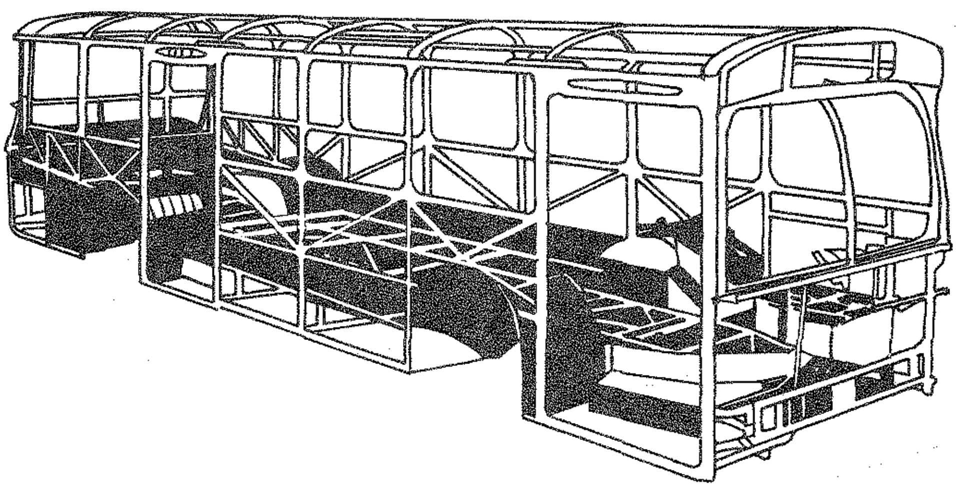
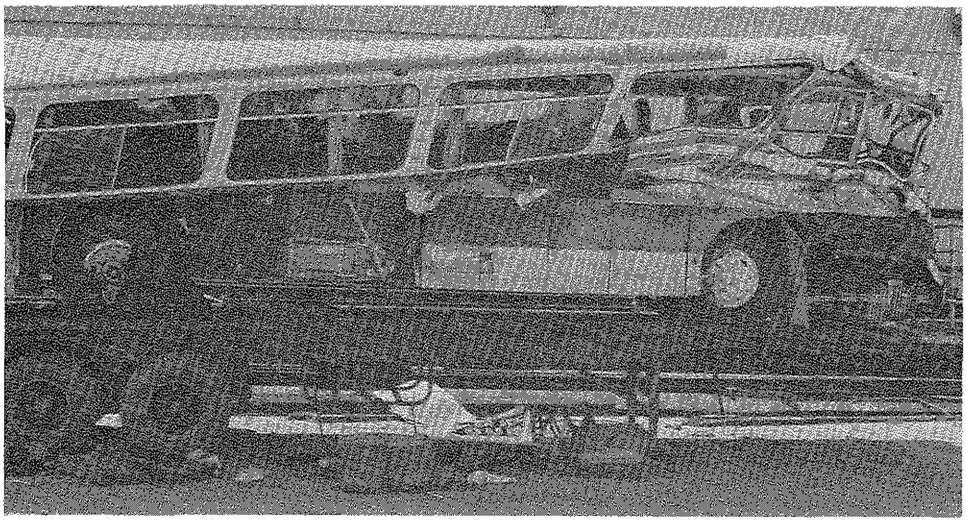
31 In paragraph 97 the Committee has commented on the undesirable consequences of using truck chassis in buses.

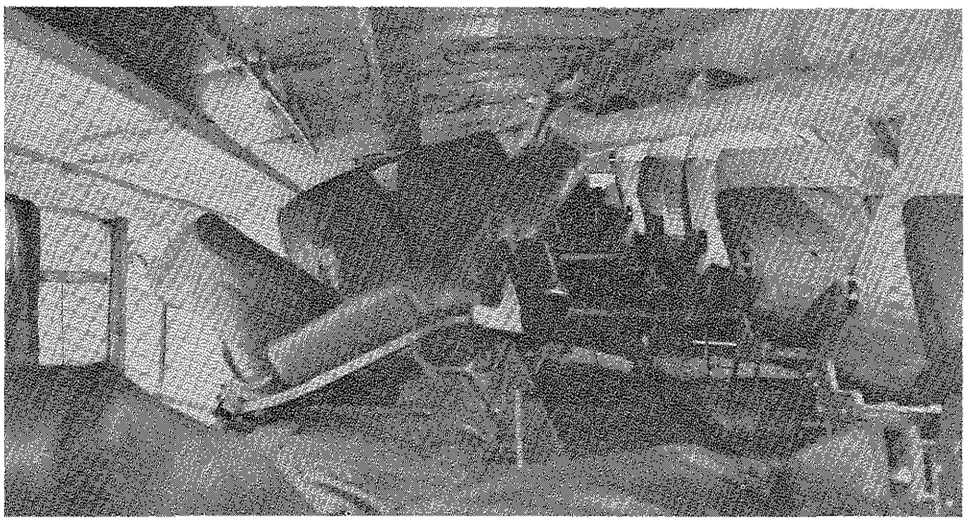
> ... often it was found that the attachment of the body to the chassis was inadequate. While the Department of the Capital Territory has no record of accident to a vehicle built on this basis which has caused major injury engineers have reported on the possibility of the body breaking completely away from the chassis. (Evidence, p. 919).

A number of other witnesses were critical of the poor structural designs employed by some coach-builders. A particularly weak area of construction is the roof structure. The Committee was told however that some coach-builders have employed competent engineering designs to maximise strength of the body structure.



177. Industry concern over the inadequate structural strength of coachwork has led overseas bus producers in the United Kingdom and Germany to develop monocoque designs. Buses built to the monocoque design utilise a special chassis designed for buses together with the whole of the bus body to provide structural strength. Leyland National buses and MAN buses which are available in Australia employ this design.





The above tourist bus was involved in an accident with a semi-trailer. The crash occurred at night as the bus approached a slight left-hand curve on a country highway. The vehicles collided head-on but slightly offset from each other. The bus rolled over and came to rest on its roof. The semi-trailer driver was ejected from his vehicle and killed. Two of the twenty-seven bus passengers were killed, twelve were admitted to hospital, twelve were treated at hospital but allowed to leave. The bus driver received eye injuries.

178. Notwithstanding such industry approaches to improve the structural integrity of buses the Committee is deeply concerned that there are no standards or codes of practice in Australia to ensure that bus frames are built with adequate strength. A similar situation appears to exist overseas. The only relevant standard overseas of which the Committee is aware is one in the United States of America requiring a non-destructive roof test on school buses.

179. While the Committee considers that there is an urgent need for standards of construction to be determined in this area it realises that there would be particular problems in requiring compliance with such a standard by approval testing. *Approval testing would not be economically feasible because of* the large number of bus body builders producing a small number of buses of a particular design on a variety of chassis. Notwithstanding the difficulties of establishing compliance it is considered highly desirable that consideration be given to a design strength standard. The Committee therefore recommends that the Advisory Committee on Safety in Vehicle Design prepare an Australian Design Rule specifying frame strength and design standards for buses. Such an ADR could incorporate provision for non-destructive roof load testing to ensure sufficient roll-over strength in the bus and side intrusion bars in buses.

180. This and other safety features could be incorporated more easily if a "standard" bus could be produced for use in Australia. The Committee has been told that such a bus has been under examination by a number of authorities including the Federal Department of Transport.

181. The main contingencies which the structural integrity of truck cabins must provide for are serious collisions with other vehicles, collisions with solid objects, roll-overs, and situations in which there is a forward movement of the payload.

182. At present ADRs do not provide for any particular cabin strength criteria. The Committee considers, as did a number of witnesses in the Inquiry, that there is a need to set minimum standards of strength for truck cabins and that cabins should be tested to ensure that they meet these standards. Regulations on cabin strength have been prepared by the ECE and the Committee was told that the ACSVD is currently considering these regulations with a view to preparing a design rule for Australia.

183. A number of countries have adopted ECE Regulation 29 relating to cabin strength and therefore a number of trucks imported into Australia meet the strength requirements. The Committee considers however that there is a need to impose a uniform minimum cabin strength requirement on all new trucks used in Australia and therefore recommends that the Advisory Committee on Safety in Vehicle Design prepare an Australian Design Rule on truck cabin strength.

184. A matter related to truck cabins which was referred to in a number of submissions was the lack of any standard or regulation on the retaining catches for tilting, or cab-over-engine, cabins. While no evidence was received to indicate that there is a problem in this area the Committee was concerned that such catches should not be located in a position where they could be tampered with and that they should be of an adequate standard for reasons of safety. The Committee was told that Japan has developed a standard on retaining clips for cab-over-engine vehicles. The Committee recommends that the Advisory Committee on Safety in Vehicle Design when preparing a design rule on truck cabin strength also specify a standard for retaining clips on cab-over-engine vehicles.

Occupant Restraint

185. As a means of providing occupant protection in passenger motor vehicles seat belts have proved to be a most effective breakthrough in reducing vehicle occupant fatalities and injuries. Seat belts however are not in wide use in either trucks or buses although there will shortly be a requirement that they be fitted to new vehicles.

186. Australian Design Rule 32 will require that belts be fitted for the driver and front outboard position in trucks and buses over 4.5 tonnes. This design rule becomes effective in July 1977. A number of heavy vehicles already have seat belts fitted or else have mountings available to enable belts to be fitted. While seat belts have been fitted, it has often been left to the discretion of the individual driver as to whether or not the seat belt is worn. Generally however there is a strong reluctance by drivers to use them.

187. Reference has been made previously to the attitude of drivers in this matter and to studies by TARU (see paragraph 64) which provided convincing evidence of the need for drivers of heavy vehicles to remain within the cabin in the event of a collision. The Committee is strongly of the opinion that not only should truck drivers and passengers remain in the cabin, but they should also be required to wear seat belts when they are provided.

188. The arguments used against such a measure are fairly standard and basically concern the amount of discomfort seat belts would cause a driver, and the lower levels of deceleration of heavy vehicles when in collision with light vehicles. Both arguments have some merit, but in the Committee's opinion not enough to dismiss the proposal. For those drivers of vehicles where the seat belt is mounted on the cab chassis, and where the seat is generously sprung, the Committee acknowledges that the vibration and movement of the vehicle would possibly cause

the seat belt to chafe the driver. Whether this would be the case with retractable belts is not certain, but it is a possibility which should be considered. The alternative would be to install lap belts only, but some of the same problems apply.

189. The second argument is that due to the lower levels of deceleration experienced by heavy vehicles, occupants may not be thrown about the cabin and that with mandatory burst proof door locks (ADR 2) the danger of them being ejected from the vehicle is fairly low. The Committee in acknowledging that there is some truth in this assertion still believes there is a need to restrain occupants within their seats so that the driver can be in a position to avert possible second collisions, and that possible injuries may be minimised.

190. A considerable amount of work has been done on seat belts for heavy vehicles and has resulted in the development overseas of seats which have sufficient structural strength and which are mounted in the cab so securely, that it is possible for seat belts to be mounted directly to them rather than to the chassis of the cab. This development has obvious merit for it means that the driver, seat, and seat belt are an integrated unit free to move independently of the vehicle. Provided that such seats are properly designed and constructed the Committee considers this to be an admirable solution to the problem of chafing encountered by drivers.

191. A requirement that seat belts be fitted in buses for passengers has been the subject of considerable research and discussion and the general conclusion that emerges is that in many instances it is not practicable. The practical difficulties of fitting seat belts are numerous and apply in different ways to urban buses, school buses and inter-urban buses. The installation of any kind of seat belt in urban buses is questionable, largely on the grounds of inconvenience and cost/benefit. These passengers are not seated for long

and indeed may have to stand in the aisle if seats are not available. They may also be encumbered by parcels, bags and prams, and need to disembark as easily as possible.

192. For school buses the problems are similar to those of urban buses with the complication that the passengers carried are smaller and more numerous. For passengers on long distance inter-urban coaches the above problems are not so relevant, and given the higher speed of coaches and the more severe results of crashes a better case exists for the provision of safety belts in these vehicles. There would be problems however in determining those buses required to have seat belts fitted. Many urban buses are occasionally used for long distance trips however the Committee considers that there would be a clearly defined group of buses used only for long distance travelling.

193. There are also other problems which need to be considered. Because of the long life of buses, retro-fitting of seat belts would be necessary. Only lap-belts could be used in many of the buses due to the lack of suitable side wall anchorages. The cost of providing suitably strong anchorage points for seat belts and the implications of the extra weight involved suggests that the costs involved could be significant.

194. As well as the structural problems, bus proprietors also face difficulties of a practical nature for unless the seat belts are of a retracting type, they could become tangled and make cleaning of buses more difficult. They would be an item subject to vandalism and would require constant service and cleaning. There would also be difficulties for any driver trying to ensure that all passengers had their seat belts fastened.

195. As mentioned above, the difficulties with lap-sash belts are the availability of strong anchorage points and the requirement that belts should fit passengers of all sizes.

The wearing of a sash belt by children, of course, could be quite harmful if the sash passed across a child's throat. Lap belts also have disadvantages in that they allow the upper torso to move freely, especially in moments of sudden deceleration when passengers can be flung forward into the seat in front. This can be particularly harmful if the seats are not of the high backed type and the tops are of an unyielding nature.

196. The provision of passenger restraints to buses has been extensively reviewed by Professor Joubert[32] and while he saw seat belts as being important, he saw the seats themselves and the passenger compartment being even more so. He stressed the importance of buses being fitted with high backed seats of a padded nature and foresaw their possible combination with the seat belts of either type.

197. The Committee has considered Professor Joubert's findings and together with the evidence it has taken, has concluded that while bus seats should definitely be padded and that fixtures of the bus should not be injurious, high backed seats would only be practicable for inter-urban coaches. In addition to this the Committee considers that the accident rate amongst bus passengers is insufficient in urban or school buses to warrant provision of seat belts at this stage. The Committee does believe however, that seat belts in newly built inter-urban coaches should be compulsorily fitted in conjunction with well padded, high backed seats.

198. The wearing of seat belts is particularly important for the front passengers on the off-side of buses who do not have a seat in front of them. Some form of protection is needed such as a well padded modesty panel, as well as seat belts at least of the lap type.

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[32] P.N. Joubert, pp. 82-97.

199. For the driver of buses, ADR 32 due to come into effect in July 1977, requires that a seat belt be fitted for his use. This is a contentious issue for bus drivers, particularly those of urban buses, though some inter-urban coach drivers are already compelled to wear seat belts by their employers. The basis of this requirement is that in case of an accident the driver should be retained in his position at the controls and so be able to take additional action should it be possible to avoid a secondary collision.

200. Drivers consider that seat belts would inhibit them in collecting fares and assisting passengers and argue that statistics do not support the need for seat belts on urban buses. Table 10 supplied by the Melbourne and Metropolitan Tramways Board (MMTB)[33] shows that of 2,578 accidents involving MMTB buses from 1 January 1971 to 1 March 1976, only twenty-four bus drivers were injured and in only three of those instances would seat belts have minimised the injury.

TABLE 10

MELBOURNE AND METROPOLITAN TRAMWAYS BOARD BUS ACCIDENTS
1 JANUARY 1971 TO 1 MARCH 1976

1.	Bus kilometres travelled	61 million
2.	Accidents involving buses	2,578
3.	Number of bus drivers injured in collisions	24
4.	Minor injuries included in 3.	14
5.	Lost time injuries included in 3.	10
6.	Analysis of all injuries:	
	(a) Whiplash - bus struck in rear	13
	(b) Hand injuries - wheel spinning after impact	3
	(c) Bruising and/or shock	5
	(d) Chest injury - thrown against steering wheel	1
	(e) Injury to shoulder or leg - thrown from seat	2

33 Evidence, p. 642.

201. On the basis of the accident statistics in this Table MMTB told the Committee that it does not favour the use of seat belts for drivers of urban buses. It was also stated that it was anomalous to enforce the wearing of seat belts by drivers when standing passengers in urban buses are much less protected than a person sitting. The MMTB stated that some other States had similar reservations and would not require the use of seat belts in buses used for route service in urban areas.

202. Notwithstanding the weight of argument against the use of seat belts by drivers of urban buses the Committee considers that there is obvious merit in the proposition that a driver be retained in his seat to maintain control of the vehicle in an emergency situation and therefore recommends that relevant authorities ensure that with the introduction of Australian Design Rule 32 occupants be required to use the seat belts provided.

203. The Committee further recommends that an Australian Design Rule be prepared requiring inter-urban buses to fit passenger seat belts in conjunction with well padded, high backed seats. For other buses the Committee believes that the provision of a less potentially injurious passenger compartment is more important and that the need for seat belts has not yet been justified.

Bus Interiors

204. As was mentioned previously, few fatalities result from bus accidents, but there are many minor injuries, especially on urban and school buses. These stem mainly from the fact that passengers have to move about the bus whilst it is in motion and have to stand if no seats are available. Entry and exit is often difficult with narrow stairs, narrow doorways, protruding railings, and varying heights from kerbs and pavements.

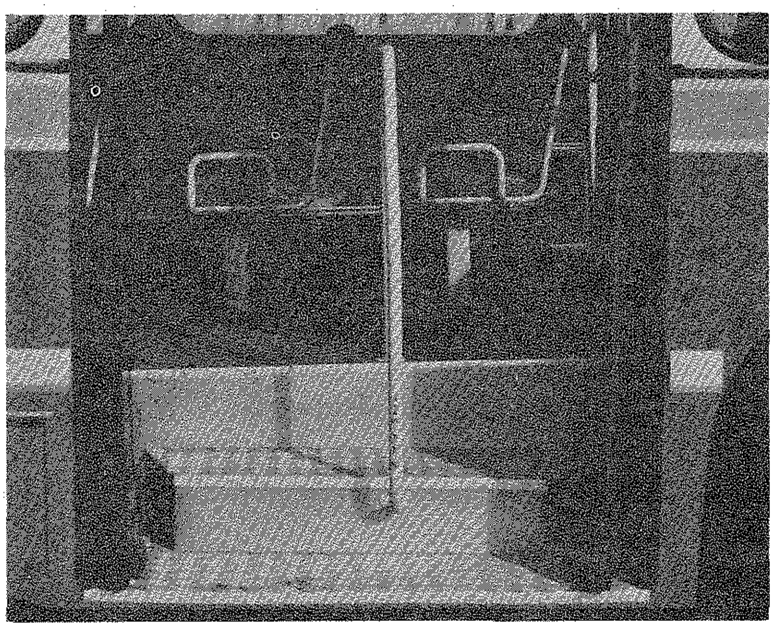
205. For all buses, regardless of their use, many improvements can be made to render the interiors less damaging to passengers should they be involved in an accident. Inter-urban buses which are frequently built with a higher standard of comfort for passengers in comparison to urban buses, have additional equipment such as ashtrays, arm rests and baggage racks which unless properly designed and properly padded can cause injury in an accident situation. Urban buses on the other hand have in place of these items, a great number of tubular steel stanchions, tubular steel seat frames, steel handgrips and window frames and latches which are equally unyielding.

206. All these defects and more have been referred to by Professor Joubert in his previously mentioned review and it is worth canvassing some of the suggested remedies in this report. Broadly they are aimed at "de-lethalizing" the passenger environment and involve the padding of all exposed surfaces, the removal of all sharp protrusions, the improvement of bus windows, and of course the strengthening of the seats themselves. The extent to which these improvements can be made however, is limited in that some means must be provided for passengers on urban buses to move up the aisle. Steel stanchions, hand rails and handgrips on the corner of seats, are going to be difficult to remove completely, so the emphasis will have to be on rendering them less injurious to occupants.

207. In relation to the requirement that seats be of adequate strength the Committee was told that ACSVD has the matter under consideration. Preliminary work in this area has included the design and development of a new bus seat that is able to withstand loads of deceleration between 12 g and 15 g. Important matters to be considered in this proposal will be the cost and whether the design is sufficiently practical to be implemented as a requirement.

208. The Committee was alarmed when it was told of a practice by which some bus seats are secured to the plywood floor with bolts which would pull out at a load of about 180 Kg. In a minor front end accident all the seats would pull out from the floor in such a bus. The importance of anchoring seats into the body structure of the bus is self-evident and this example of deficiency in design gives further support to the Committee's firm belief that the whole structure of a bus should be properly designed. Any requirements for improved seating arising out of ACSVD's work on bus seating will of course be dependent on such seats being anchored in an approved structurally sound manner.

209. Certain design changes have resulted in improvements for passengers in the operational safety of modern buses. These changes have included the monocoque design and the re-location of engine and transmission to the rear. These changes have enabled the elimination of some of the stairs at the entry doors and enables much easier entry and exit. Tables 7 and 8 show how high the injury rate on alighting is and the Committee considers this development to be extremely beneficial.



210. A further development in bus design which should contribute to increased safety in operation is the provision of door interlocks on modern buses. These interlocks hold the vehicle's brakes on and render the accelerator inoperable while the doors are open. The doors also serve to prevent passengers from attempting to alight while the vehicle is still moving.

211. Fire risk in buses is probably much the same as for trucks except that in buses passengers can be responsible for its ignition. The Committee durings its Inquiry was informed of one case in Queensland where nail polish remover ignited and resulted in the bus being gutted by fire. This fire was aided considerably by the type of material used in the bus fittings such as synthetic curtains and seat covers which proved to be highly combustible. This is a deplorable situation and the Committee has no hesitation in recommending that <u>materials used in furnishing buses be fireproof and of a material which does not produce toxic gases when subject to heat</u>.

212. In regard to fire or some other emergency with a bus it is essential that passengers be provided with emergency exits. These exits are usually in the form of a door or "kick-out" windows.

213. A number of witnesses were concerned that these windows were not tested because of the replacement difficulty. While Draft Regulations provide that the force to remove the window shall be between 150 lbs (68 Kg) and 100 lbs (45 Kg), the fact that windows are not tested means that the window will tend to become fixed for practical purposes as the rubber mounting surrounding the window hardens with age. The Committee was told by the Tasmanian Transport Commission that there have been cases of fire where it was found impossible to remove the emergency window. A solution for this problem has not been proposed to the Committee. However, it seems to be a problem

which could be overcome by designing an alternative form of release for emergency exits and the Committee suggests that the problem should be investigated by ACSVD.

214. In the case of door type emergency exits the Committee agrees with the recommendation of Dr Hoffman[34] that high strength emergency exits be fitted to the sides and roofs of passenger buses used in inter-urban or charter services. The need for such exits is evident in the case of roll-over of such buses.

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[34] E.R. Hoffman, p. 50.

CHAPTER 6

ROADWORTHINESS

215. Normal usage of vehicles can lead to a deterioration of running gear and components which if unchecked can render a vehicle unsafe. The greater distances travelled and the arduous conditions under which heavy vehicles frequently operate mean that these vehicles are subject to higher rates of wear and tear than most other road vehicles. There is therefore a most important responsibility on the owners and operators of heavy vehicles to maintain their vehicles in a roadworthy condition.

216. Evidence received by the Committee indicates however that in many cases heavy vehicles do not comply with accepted standards of roadworthiness. Studies have indicated that mechanical faults have been attributed as the cause in more than 9 per cent of accidents (see paragraphs 43 and 50).

Maintenance

217. A minimum of repair and maintenance requirements should be a basic aim during the design and construction of a vehicle. Furthermore those vehicle components which are essential for safe operation should be able to be checked with a minimum of effort. These are basic criteria which, the Committee was told, heavy vehicle manufacturers have in mind when producing their vehicles. Manufacturers also prescribe maintenance intervals to assist vehicle purchasers. In some cases these intervals are based on the time of operation and in others on the distance travelled.

218. Lack of maintenance usually occurs where insufficient staff is engaged in the maintenance of a fleet of vehicles and consequently much of the maintenance staff's time is spent

attending to breakdowns rather than on routine servicing. This situation could deteriorate because with more time spent on attention to breakdowns, less time is available for regular maintenance until even basic servicing is neglected.

219. Operators of heavy vehicles should have sufficient competent staff available to keep a preventative maintenance scheme in operation. Such a scheme would include programming of basic servicing, periodic inspection of relevant components and systems, with repairs being carried out as necessary.

220. The Committee has found that large operators because of the scope of their business are generally able to maintain and exercise close control over their vehicles. Smaller operators however, who can not afford the overhead expense and who must compete with the larger transport operations, are frequently forced to cut corners. The Committee is concerned that one of these corners is maintenance.

221. Economic considerations influence the extent of maintenance and while most heavy vehicle owners are prepared to service the engines of their vehicles because engine longevity is vital to running costs, other items such as brakes, tyres and suspensions are more readily ignored. The tendency may often be to pay insufficient attention to the vehicle's tyres and to ignore steering and suspensions except perhaps for some greasing, and to service brakes only when malfunction occurs. There is also the added pressure of time lost, for good maintenance is time consuming and for the owner/driver this is valuable time.

222. This pressure also means that the small operator tends to do much of the maintenance himself for mechanics qualified to work on heavy vehicles are difficult to find and create an overhead that he can not afford. The Committee is concerned that as heavy vehicles become more sophisticated in

their design, especially in areas such as braking, it is going to become increasingly more difficult for the owner/driver to service his own vehicle adequately. It is possible that designed safety improvements could be nullified by such persons.

223. The Committee considers that repairs and maintenance should be carried out or supervised by properly trained and experienced mechanics. This view was supported by a number of the witnesses who appeared before the Committee as the industry itself realises how crucial proper maintenance is to the safe and economic operation of heavy vehicles.

224. A number of witnesses did not however support the need for mechanics specialising solely in areas such as brakes or steering. It was considered that there were few problems in maintaining such items provided the manufacturer supplied a manual for the guidance of maintenance staff. In cases where repairs were required manufacturers of the original equipment invariably provided this service. It would also not be a reasonable line of demarcation for the maintenance tasks involved, as mechanics would be required to service areas other than that in which they were specialised.

225. Other witnesses considered that the problem of ensuring adequate servicing of critical safety components should be approached through the provision of better instruction and attention to other aspects of a mechanic's continuing education. The Committee was told that within the Swedish Volvo organisation mechanics were encouraged to attend additional courses and receive diplomas in particular areas of their trade such as brakes and steering.

226. Other witnesses saw merit in having mechanics licensed as specialists in particular areas but saw difficulties in implementing such a scheme because of the shortage of qualified mechanics and lack of appropriate training courses and facilities. The Committee was therefore pleased when informed that there are plans by the Retail Motor Industry Training Committee[35] to establish a specialised trade of brake specialist and that consideration is currently being given to the proposal by State industrial training commissions. Where a commission could not gain agreement and proclaim the trade of brake mechanic, course electives would be arranged through technical education systems to cater for deficient areas of training at least at the theoretical level.

Inspections

227. Regulatory authorities in Australia are concerned to ensure that heavy vehicles are kept in a roadworthy condition. These authorities employ various forms and degrees of compulsory vehicle inspection. Table 11 briefly summarises the various modes of vehicle inspection employed.

228. Table 11 indicates that heavy vehicles are subject to regular inspections in most parts of Australia. In Victoria and South Australia where this is not so in respect of trucks, proposals are being examined to increase the level of inspection to include compulsory annual inspections. In Western Australia the need to introduce periodic vehicle inspection is under review.

229. The Committee believes that minimum inspection requirements for heavy vehicles should be an inspection prior to initial registration and annually thereafter. All States and Territories exceed this basic requirement in respect of buses. Unfortunately not all States have the necessary inspection facilities and staff to embark on such inspection of goods vehicles.

35 *Evidence*, p. 1653.

TABLE 11

INSPECTION OF HEAVY VEHICLES

	NSW	QLD	TAS	VIC	SA	WA	NT	ACT
Trucks:								
Regular Inspections	12 mth	6 mth	12 mth				12 mth	12 mth
Road-side Inspection Stations	(1)	(2)						
Other Road-side Inspections	(3)		(4)			(4)		
Other				(5)	(6)	(7)		
Buses:								
Regular Inspections	(8)	6 mth	6 mth	12 mth	6mth	(9)	6 mth	6 mth
Other						(7)		(10)

(1) A proportion of trucks are inspected at the Berowra and Marulan Checking Stations.

(2) Weighbridges at Burpengary, Gailes and Coomera have inspection pits.

(3) Police inspect trucks as part of their normal on-road random vehicle inspection.

(4) Inspectors conduct road-side inspections of a vehicle's load, mechanical condition and weight.

(5) Police check for basic compliance with regulatory requirements, but do not conduct a roadworthiness inspection for initial registration. On transfer of registration or re-registration of a previously de-registered vehicle a Roadworthy Certificate is required before vehicle is registered.

(6) No inspection required. Inspection may be conducted if vehicle has been defected by a police officer or involved in an accident.

(7) Inspected for initial registration and on re-registration should registration lapse.

(8) Frequency of inspection is as follows:

2 months - Sydney, Newcastle

3 months - Wollongong

6 months - elsewhere in New South Wales

(9) Buses servicing Government Schools are inspected three times each year.

(10) Urban commuter type buses operated by the Department of the Capital Territory are inspected at 2000 mile intervals.

Source: Evidence.

230. Ideally such inspections should be carried out in fully equipped testing stations by qualified inspectors. While such testing stations are used in the Australian Capital Territory the difficulties and capital expense of doing this in less densely populated areas however are quite prohibitive. The New South Wales system whereby garages are licensed as Authorised Inspection Stations by the Department of Motor Transport to conduct inspections appears to be one solution to the problem that the Committee believes other States should consider.

231. The Committee was told that basic inspection guides applicable to all vehicles have been prepared with special requirements for buses. In February 1975 ATAC endorsed a suggestion to implement an agreed bus inspection scheme from 1 January 1976. Under the scheme inspections of inter-city coach type buses could be carried out at six monthly intervals in any State or Territory and would be recognised by authorities in the State or Territory of registration. A triangular sticker would indicate the month and year when the bus would require inspection. This scheme has so far been implemented by Queensland, South Australia, Tasmania, Australian Capital Territory and the Northern Territory. The Committee urges remaining States to do likewise as soon as possible. Such a scheme relies on the participation of all registering authorities.

232. The Committee was told that Draft Regulations prepared by ACVP have recently been revised to include new inspection requirements for all heavy vehicles with particular emphasis on maintenance of items covered by ADRs.

233. Vehicle inspection records indicate however that even where regular inspections are made many heavy vehicles do not receive the maintenance attention they require. In evidence given to the House of Representatives Standing

Committee on Road Safety in the Twenty-ninth Parliament in May 1975, the Department of the Capital Territory indicated that about 50 per cent of trucks inspected for registration were initially rejected. The predominant reasons for rejection were faults in safety components such as brakes, tyres, head-lights, steering and suspension. Similarly, in Victoria the Transport Regulation Board's records show that for the year to June 1975, 83 per cent of buses inspected had an average of six defects per vehicle requiring attention, while 9.6 per cent of the buses had one or more defects which were required to be rectified before the bus was returned to service. The other 17 per cent of vehicles inspected had no defects. In nearly all cases, the operator was given prior notice of the inspection.

234. Such evidence tends to support the view of some witnesses that at least for some heavy vehicle operators there is a tendency to ignore faults until immediately prior to inspection time. To overcome this problem a number of States have implemented supplementary systems of random road-side inspections and road-side inspection stations located in country areas. The Committee considers that spot checking in this way appears to be necessary and should assist in ensuring that vehicles are maintained in a roadworthy condition. To be effective however policemen and others conducting random inspections should be trained to ensure that they can adequately check the various factors affecting the safe operation of heavy vehicles.

235. An alternative method of supervising heavy vehicle safety which has been employed in the United Kingdom with some success entails the licensing of heavy vehicle operators. The licence is dependent upon proper maintenance being carried out and if unroadworthy vehicles are detected in random checks by the authorities, that licence is jeopardised. Those wishing to hold an operator's licence must have suitable maintenance

facilities and staff, or should have a tangible agreement with a suitable garage or repair shop. For those States which do not have any regular inspection system for checking heavy vehicles this system could prove effective, provided of course that checking was carried out and that operators were disciplined in accordance with the scheme.

236. The Committee sees some merit in these schemes but considers a regular inspection scheme supplemented by random inspections by police and weighing inspectors to be more suited to Australian requirements. The system as operated in the United Kingdom relies heavily upon operators being conscientious. It would necessarily require supervision and use of qualified inspectors to examine premises and vehicles and investigate complaints. The Committee does not believe that in Australia with the problems of isolation and distance that the supervision necessary to make such a scheme operate effectively would be possible.

237. The Committee therefore recommends that all States implement the "Uniform Inspection Standard for Omnibuses" as a matter of urgency and that an annual inspection scheme for other heavy vehicles, supplemented by a system of random checking, be implemented as soon as possible.

Vehicle Modifications

238. As mentioned earlier in this report very little control exists over those second manufacturers who provide bodies and trailers to convert the basic truck into a completed vehicle. Many new vehicles are altered extensively, or have bodies and operational features added that significantly change the basic vehicle as supplied by the initial manufacturer. Equally there is little effective control in a number of States over those owners who then wish to further modify the vehicle. While most States require certification of all modifications it appears that inadequate inspection allows this requirement to be easily avoided.

239. In the case of South Australia the Committee was told that non-notification of modifications affecting the load carrying capacity of heavy vehicles had resulted in a loss of road maintenance[36] income of over one million dollars each year.

240. The most common modification is the addition of an extra axle to enable a heavier load to be carried. These alterations and additions may include work to the basic chassis systems such as brakes, steering, suspension and power transmission. Such modifications should take into account the design limitations of other parts of the vehicle. The Committee was told however that the initial manufacturer was infrequently consulted on these alterations and that there are varying degrees of competence amongst those who design and implement the alterations.

241. Registering authorities require approval to be sought before vehicles may be modified. In some States detailed plans and specifications of the proposed modification must be submitted and approved before the modification can be made. In others, requirements are not so strict but approval must still be sought. Draft Regulation 120(4) provides suggested legislation for States wishing to prohibit modifications to heavy vehicles. This regulation is shown at Appendix 13.

242. Modifications may become necessary when owners wish to change the vehicle to suit differing work demands. The Committee sees no objection to the practice provided that it is done correctly and with certified approval. Manufacturers are able and willing to provide information to assist with

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36 *The Road Maintenance (Contribution) Act*, 1963-1975, imposes a charge on the owners of motor vehicles (together with any trailer) having a load capacity in excess of 8.15 tonnes as a contribution to the maintenance of public roads in South Australia. The current charge is 0.17 cents per tonne per kilometre.

these requirements, especially as to a vehicle's safety capacity. It is critical that use be made of this information for ADRs are increasingly being applied to heavy vehicles and it is essential that subsequent additions and modifications should not defeat the purpose of the ADRs. There is no point in raising standards if they can be rendered less effective or useless by subsequent modifications and changes. The Committee therefore recommends that <u>all States and Territories adopt Draft Regulation 120(4) relating to the modification of trucks and other commercial vehicles</u>. The Committee considers that if this is done, then together with the standardisation of vehicle dimensions and weights, and the application of improved standards of inspection, the practice of unsafe modifications may be substantially eradicated.

CHAPTER 7

THE DRIVER

243. The driver and matters bearing on driver performance is an area which has not been covered in any depth in this Inquiry. As mentioned previously, the human element in the area of road safety is a matter which the Committee intends investigating in a subsequent Inquiry. Notwithstanding the more detailed coverage to be given in that Inquiry the Committee wishes to discuss certain aspects of heavy vehicle driver performance. In particular the Committee considered the importance of training and the physical well-being of the driver.

244. Heavy vehicle driver licences are issued under various classifications following practical driving tests which demonstrate a required level of competence. These tests are designed to ensure that minimum standards of skill and fitness are met. There is however little evidence of the relationship between the level of driving skill demonstrated at the time of issue of a licence and subsequent offences and accidents and therefore it is an open question as to whether stricter licence tests should be applied. The Committee was concerned that these licence tests do not include a test involving a loaded vehicle or require knowledge of heavy vehicle handling characteristics to be demonstrated. Evidence indicates that there are few training courses available to prospective drivers where such knowledge could be obtained and that attendance at courses which are available is not a requirement to receive a licence.

245. The need for suitable training both prior to and subsequent to receiving a licence is however receiving attention from those within the transport industry.

246. An Australia-wide survey[37] covering approximately 1000 organisations in both the private and public sectors revealed that about 35 per cent of employers responding to a questionnaire conduct some form of road safety scheme for their employees. These schemes included defensive driving courses, advanced skill courses and the provision of manuals and related safety brochures. The survey indicated that organisations which have introduced such road safety schemes on the average have much larger vehicle fleets.

247. The Committee was pleased to find that the efforts of private employers in this area are being evaluated in an overall assessment of the industry's manpower training needs by the National Road Transport Industry Training Committee (NRTITC). This Committee which first met in September 1972 has the aim of systematically improving training at all levels of employment within the industry.

248. So far the NRTITC with the aid of subsidiary Committees set up in each State, has commenced an evaluation of the training needs of the industry and a review of training schemes presently available. Some attention has also been given to developing a range of courses which include defensive driving, driver education, employee induction and a course which may form the basis for a uniform national driver training and certification program within the industry. These courses are comprehensive and cover everything from initial induction and aptitudes analysis, through to advance driving techniques, loading skills and mechanical appreciation.

249. Training under some courses has already begun. Instructor training courses have been conducted in Victoria, Western Australia, South Australia and Tasmania. The NRTITC is also giving consideration to the establishment of driving schools.

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37 Evidence, p. 25.

250. While the Committee is pleased to see such courses developed, it sees as a desirable outcome of these developments the introduction of an apprenticeship system whereby drivers can enter the profession by undertaking courses and satisfying established standards. This is in fact the practice in West Germany where heavy vehicle driving has been recognised as a trade since November 1973. Stringent requirements are laid down in this apprenticeship course for the training of drivers with separate training courses being prescribed for drivers of goods vehicles and buses. After a training period of two years, the driver is required to undergo an examination following which certification is made. The courses include subjects such as technical aspects of heavy vehicles, road laws, traffic safety and driving techniques, behaviour at the scene of an accident, pollution caused by motor vehicles, and the transport of goods and passengers.

251. The Committee considers the West German scheme to be an admirable one and one which might be emulated in Australia eventually. Clearly it is not something which could be introduced in the short-term for a lot of basic work such as that being done by NRTITC is required and facilities would have to be established.

252. An important aspect of this basic work to which the Committee would like to draw attention is the need to evaluate the effectiveness of such training in reducing accidents. Most of the courses aimed at driver education and training are in fact based on an assumption that the driver is at fault in most accidents, a proposition which appears to be supported by some studies.[38] Few attempts have been made however to scientifically evaluate the effectiveness of such programs in

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38 Table 9 of this report indicates that 48.3 per cent of truck accidents involving articulated vehicles in Queensland in 1970 were held to be caused by drivers.

accident reduction[39] and more research is needed. Existing programs are based on an imcomplete understanding of the nature of driver behaviour which leads to accidents. Training programs will be more effective if more is known of the relative importance of manipulative skills, judgment, knowledge and attitudes.

253. There are various requirements which drivers of heavy vehicles must meet to ensure that they are fit and well for their task and that they operate the heavy vehicle in safety. Some of these requirements are imposed by regulating authorities and others by employers.

254. Physical screening of drivers seeking a licence is indirect, the onus being on applicants to declare factors likely to affect medical fitness. Visual acuity is tested by all States but is not an item subject to retesting.

255. There are difficulties for regulatory authorities in retesting drivers for vision and driving skills. For instance, in New South Wales there are 2.5 million drivers of all kinds and the Committee was told that it is not administratively possible to retest them all on a regular basis. There is also no appropriate criteria to select those that should be retested. In Victoria this problem has been overcome by requiring heavy vehicle drivers to supply a certificate from a medical practitioner and an eyesight report on application for the appropriate licence. A certificate is required every three years on renewal of the licence. If a driver is over 60 years of age a certificate is required each year.

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39 The Road Accident Situation in Australia in 1975, A Report to the Australian Minister for Transport by the Expert Group on Road Safety, October 1975, p. 50.

256. The failure of authorities to retest and ensure the physical condition of heavy vehicle drivers has been a source of concern to a number of bodies. A number of government and private transport organisations informed the Committee that they require their drivers to receive a full medical examination at regular intervals. Another effort to ensure that drivers are not unfit for their task has involved legislation in South Australia which was introduced in 1973 requiring medical practitioners and other qualified persons to inform the Registrar of Motor Vehicles of any illness, disability or deficiency of their patients. The Committee was told that this legislation has produced generally favourable results. Quite a large number of people who were medically unfit came to notice by this means and appropriate action was taken. While some doctors objected to this legislation others welcomed it as it enables them to report disabilities which they previously felt the ethics of their profession and possibility of legal action prevented them from doing. Section 148(1) of the Motor Vehicles Act 1959-1976 which sets out this requirement is shown at Appendix 14.

257. In view of the danger that persons found medically unfit for driving would pose to the public should they continue to drive a vehicle, the Committee has no hesitation in commending this initiative to the attention of other States.

258. Most States have legislation regarding log books and hours of driving which have been introduced solely as a road safety measure. The requirements attempt to ensure that long distance drivers have proper rest periods and do not drive to the point where fatigue could result in loss of control of their vehicles. Policing of the requirement is difficult and was the subject of criticism by some drivers. Notwithstanding the difficulties of enforcement, and suggestions made to the Committee that this requirement along with other legal

requirements on drivers relating to speed, weight and vehicle identification,[40] are in general poorly obeyed, authorities do prosecute a large number of drivers. In Victoria in 1974-75, 476 cases were prosecuted for failure to produce a log book and 106 cases for other breaches relating to hours of driving.

259. A number of large transport organisations whose vehicles are mainly involved in inter-state travel told the Committee that they endeavour to ensure that their drivers operate vehicles within the various legal requirements of each State. These matters are impressed upon drivers in training courses and legal requirements are set out in booklets for drivers. Some organisations also employ a device known as a tachograph which as a type of "in flight" recorder, can provide supervisors with essential information about a vehicle's performance. Tachographs record engine speed, vehicle speed, and time and therefore enable a close watch to be kept on the way a vehicle has been driven. In Western Australia tachographs are required to be fitted in road trains. This requirement is not being policed however as evidence from the tachograph is not admissible in a court of law.

260. Tachographs are unpopular with some drivers and there is some resentment at being supervised so closely. Several witnesses told the Committee that tachographs are subject to driver interference. Despite this the Committee considers them to be extremely useful and in many cases could, if they were accepted as evidence by courts of law, prove to be of great use in ensuring that speed limits in particular are obeyed. Similarly they could be used by the truck driver in his defence to charges of speeding, or of driving excessive hours.

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40 Evidence, p. 147.

CHAPTER 8

CONCLUSION

261. In examining the various problems associated with improving heavy vehicle safety in this Inquiry, the Committee was pleased to find that many significant areas for improvement have been identified and are under active consideration by heavy vehicle manufacturers and relevant road safety regulatory authorities.

262. The Committee received evidence which demonstrated the continuing concern of heavy vehicle manufacturers to improve the safety of the vehicles they produce. Safety-oriented research conducted both in Australia and overseas by vehicle manufacturers has resulted in continuing attention being given to various safety aspects in vehicle design. Many of these improvements are in areas where there are no present regulatory requirements.

263. Regulatory authorities are giving attention to the need for further regulation over heavy vehicles. Australian Design Rules are increasingly being extended to heavy vehicles and intensive accident studies are being conducted to assist in determining the causes of heavy vehicle accidents.

264. A basic problem faced by both regulatory authorities and vehicle manufacturers in attempting to make rational decisions on the effectiveness of various safety measures is the lack of adequate accident data. Detailed data on the suspected causal factors in accidents would increase the likelihood of developing suitable counter-measures and current intensive investigations of relevant accidents involving heavy vehicles should partly meet this need.

265. The Committee continues to be deeply concerned however with the lack of uniformity in the collection of accident data. Extensive comment was made on this problem in Chapter 14 of the Committee's previous report on Passenger Motor Vehicle Safety. The Committee believes that the need to implement a uniform accident report form throughout Australia is of major importance and that the lack of such basic data is hampering analysis of road safety problems in Australia.

266. Comprehensive accident data collected on a uniform basis would enable authorities to determine the benefits of existing safety measures and areas deserving priority attention in the future more accurately than is possible at present. The Committee therefore urges that relevant data collecting authorities co-operate in a complete rationalisation of accident data collection.

267. In considering the need for standards to be applied in certain areas of heavy vehicle safety the Committee is aware of the need to justify each proposed safety standard before it becomes mandatory. Three important criteria to be considered in this assessment are firstly the need for such a standard, the possibility of design and production of a particular system so determined and lastly the benefit cost relationship of the proposed standard. These criteria have been considered by the Committee in respect of the various recommendations made in the areas of primary and secondary safety. The Committee is confident that if the various matters raised in these areas of this report can be satisfactorily resolved then the vehicle aspect of heavy vehicle safety can be vastly improved. The Committee therefore urges all those directly involved to maintain their effort.

268. The Committee is also aware that concentration on the manufacture of the vehicle as an object of regulation can result in only a limited return in the reduction of collisions, injury to persons and damage to property. Analysis of accident data emphasises the importance of the driver and the road environment. While the latter factor has been the subject of a report by a former Select Committee on Road Safety, the Committee in the present Inquiry paid some attention to the need to improve the working environment of a heavy vehicle driver, to ensure his physical well-being and to improve the level of training received. The Committee intends covering the human element of road safety more deeply in a subsequent Inquiry.

269. The Committee wishes to thank all those who made a submission and those who appeared before it at public hearings.

Parliament House
April 1977

R.C. Katter
Chairman

LIST OF WITNESSES

ADAMS, C.E.	Chief Engineer, Kenworth Trucks Pty Ltd, Victoria.
ANDERSEN, T.P.	Deputy Commissioner of Transport, Queensland Department of Transport.
BARLING, R.J.W.	Chairman, Advisory Committee on Vehicle Performance, Department of Transport, Melbourne.
BISHOP, R.M.	Executive Engineer, Road Traffic Board, South Australia.
BRAMWELL, I.L.	Sales Manager, Fleet and Government Sales, Truck Division, Volvo Australia Pty Ltd, New South Wales.
BROOKS, D.G.	Honorary Secretary, Institute of Road Transport Engineers, Victoria.
BROWN, J.H.	Supervising Inspector of Motor Vehicles, Department of Labour Relations and Consumer Affairs, Queensland.
CALLAWAY, A.B.	Manager, Commercial Vehicles Division, Ansair, Victoria.
CLARK, D.G.	Engineering Manager, Ansett Freight Express Pty Ltd, Victoria.
CLARK, W.L.	Engineering Manager, Fruehauf Trailers (A'Asia) Pty Ltd, Victoria.
COOMBS, W.D.	Division Engineer (Planning and Design), Public Works Department, Tasmania.
DARKE, B.	Assistant Secretary, Transport Branch, Department of the Capital Territory, Canberra.
DAVIES, R.W.B.	First Assistant Secretary, Department of Administrative Services, Canberra.
DEWEY, G.	President, Bus Proprietors Association of New South Wales.
DIGNUM, D.K.	Secretary, National Road Transport Industry Training Committee, Department of Employment and Industrial Relations, Melbourne.

EATON, T.O.	Executive Engineer, Road Transport, Transport Commission, Tasmania.
ENKELMAN, A.	Engineering Manager, Transpec Ltd, Victoria.
FARRELL, M.H.	Managing Director, Leader Trucks Australia Pty Ltd, Queensland.
FERRARI, R.M.	Chairman, Advisory Committee on Safety in Vehicle Design, Department of Transport, Melbourne.
FREELAND, C.W.M.	First Assistant Secretary, Land Transport Policy Division, Department of Transport, Canberra.
GIBBS, A.G.	Chairman, Victorian Railways Board, Melbourne.
GLEDHILL, R.E.	Chairman, Technical Committee, Bus Proprietors Association of New South Wales.
GOEHRING, E.	Director, Truck and Bus Test Division, Daimler-Benz, Stuttgart, West Germany.
HALL, K.T.	Mechanical Engineer, Melbourne and Metropolitan Tramways Board, Victoria.
HARRIS, W.	Australian Institute of Petroleum Ltd, Victoria.
HENDERSON, Dr J.M.	Executive Director of Traffic Safety, New South Wales Department of Motor Transport.
HOFFMAN, Dr E.R.	Senior Lecturer, Mechanical Engineering, University of Melbourne, Victoria.
HOEGSTROEM, K.	Manager, Road Safety Department, Truck Division, AB Volvo, Gothenburg, Sweden.
HOLT, J.L.	Senior Project Officer, Transport Planning Branch, Department of the Northern Territory.
HUNT, R.N.	Technical Adviser, Australian Road Transport Federation, New South Wales.
IBLE, D.G.	Chairman, Technical Committee, Australian Tyre Manufacturers' Association, Canberra.

IMBERGER, K.	Manager of Engineering, International Harvester Australia Limited, Victoria.
JACKSON, G.H.D.	Acting Director, Technical, Department of Administrative Services, Canberra.
JOHNSON, P.R.	Building Contractor, Mornington, Tasmania.
JOHNSTON, I.R.	Road Safety Research Section, Department of Transport, Melbourne.
JOUBERT, P.N.	Professor of Mechanical Engineering, University of Melbourne, Victoria.
KELLY, T.O.	Director of Road Safety, Tasmania Police, Tasmania.
LAY, Dr M.G.	Executive Director, Australian Road Research Board, Victoria
LOCK, J.B.	Traffic Service Engineer, Public Works Department, Tasmania.
McKENZIE, C.A.	Manager, Truck Product Planning, Ford Motor Company of Australia Ltd, Victoria.
McLEAN, Dr A.J.	Director of Road Accident Research Unit, University of Adelaide, South Australia.
MIDDLEHURST, J.S.	Engineer, Vehicle Safety and Design, Transport Regulation Board, Victoria.
MIDDLETON, G.	Engineer (Traffic Planning), Department of Main Roads, Queensland.
NAIRN, W.W.	Product Engineer, International Harvester Australia Limited, Victoria.
NEWELL, D.J.	Transport Operator, Cambridge, Tasmania.
OLDING, J.G.	Member, Commercial Vehicle Industry Association of Australia, New South Wales.
PALMER, B.H.	Palmer Searoad Pty Ltd, Moonah, Tasmania.
PAWLE, R.F.	Heavy Transport Officer, Department of Administrative Services, Canberra.
POCKNEE, G.C.	Committee Member, Australian Institute of Petroleum Ltd, Victoria.

POLLARD, R.J.C.	Australian Road Transport Federation Passenger Division, New South Wales.
PRENDERGAST, K.A.	Assistant Secretary, Transport and Storage Division, Department of Administrative Services, Canberra.
ROBERTS, P.E.	Engineer in Charge, Examination and Technical Services Division, Road Traffic Authority, Western Australia.
ROLEFF, P.	Development Engineer, Mercedes-Benz (Australia) Pty Ltd, Victoria.
RUSSELL, S.I.	Director, Engineering Services, Transport Branch, Department of the Capital Territory, Canberra.
SHEGOG, W.J.	National Driving Supervisor, Ansett Freight Express Pty Ltd, Victoria.
SMITH, K.F.	Manager, Truck Operations, Ford Motor Company of Australia Ltd, Victoria.
SPARKS, R.J.	Officer-in-Charge, Heavy Haulage Section, Western Australia Police Road Traffic Patrol, Western Australia.
STRIFLER, Dr P.	Daimler-Benz, Stuttgart, West Germany.
WIGAN, Dr M.R.	Head, Transport and Traffic Division, Australian Research Board, Victoria.
WORRALL, A.G.	Plant Engineer, Department of the Northern Territory, Canberra.
YOUDS, L.A.	Manager, Vehicle Safety and Environmental Control, Chrysler Australia Limited, South Australia.
YULE, G.P.	Mechanical Engineer, Department of Main Roads, Queensland.

APPLICATION OF AUSTRALIAN DESIGN RULES TO HEAVY VEHICLES BY VEHICLE CATEGORY AND DATE

Rule No.	Description	Vehicle Under 4.5 Tonne	Vehicle Over 4.5 Tonne	Omnibuses	Requirement
1	Reversing Signal Lamps	July 73	July 75	July 73 (less than 4.5 tonne G.V.W.) July 75 (exceeding 4.5 tonne G.V.W.)	One or more amber or white rear lamps 50-700 cd intensity. On only in reverse with ignition on.
2	Door Latches and Hinges	July 74	July 75	-	Primary and secondary latch positions, lockable from inside vehicle. Latches and hinges must meet specified loads.
3	Seat Anchorages	July 74	-	-	Anchorages must sustain a load of 20 times the seat weight forward and rearward. Also 370 Nm moment on seat back. Seats must sustain belt anchorage loads if anchorages are fixed to seats.
3A	Seat Anchorages	-	-	-	Extension of A.D.R. 3 requiring the addition of the child restraint load.

Rule No.	Description	Vehicle Under 4.5 Tonne	Vehicle Over 4.5 Tonne	Omnibuses	Requirement
4	Seat Belts Front seats Rear seats	 Jan 70* Jan 71	-	-	Specifies lap/sash for all out outboard seats, lap for others. Belts to comply with AS. E35.
4A	Seat Belts	July 74*	-	-	Specifies lap/sash for all outboard seats, lap for others. Limits buckle location and requires dynamic assembly test.
4B	Seat Belts	July 75	-	-	Minimum of inertia reel driver only, retractor front passenger outboard. Adjustment, buckle and stowage requirements.
4C	Seat Belts	July 76	-	-	Extension of A.D.R. 4B requiring dual sensitivity for inertia reel retractor.
5A	Seat Belt Anchorages	Jan 71*	-	-	Requires two floor anchorages for all seating positions and upper anchorage for outboard positions.
5B	Seat Belt Anchorages	July 75	-	-	Extension of A.D.R. 5A. Anchorage location areas are more restrictive.

*Superseded

Rule No.	Description	Vehicle Under 4.5 Tonne	Vehicle Over 4.5 Tonne	Omnibuses	Requirement
6	Direction Turn Signal Lamps	July 73[2]	July 73[2]	July 73	Specifies required photometrics and amber colour for front, rear and side repeater lamps.
7	Hydraulic Brake Hoses	Jan 70	Jan 70	Jan 70	Requirements for constriction, expansion, bursting and tensile strength, resistance to cold, ozone, salt, pressure test.
8	Safety Glass	July 71	July 71	July 71	Requires optical transmission greater than 85% for windscreen. Permits laminated and heat treated glass, tinted area limited.
9	Standard Controls for Automatic Transmissions	Jan 72	Jan 72	Jan 72	Not mandatory after January 1976.
11	Internal Sun Visors	July 73	July 73	July 73	Impacted with 6.8 kg head form at 3.5 m/s against a rigid anvil, deceleration not to exceed 80 kg for more than 3 ms.
12	Glare Reduction in Field of View	July 73	July 73	July 73	Specular gloss of bright metal components in the driver's field of view not to exceed 40 units measured by ASTM 20° method.

[2] Increased minimum intensity July 74

Rule No.	Description	Vehicle Under 4.5 Tonne	Vehicle Over 4.5 Tonne	Omnibuses	Requirement
15	Demisters	July 73	July 76	-	Critical areas A and B of the windscreen must be 90% and 95% clear 10 minutes after start at -1° ambient.
17	Fuel Systems	-	July 75	-	Specifies location restriction, min. fill rate 66 litres/min., and, for side mounted tanks, 9m drop test.
28	Motor Vehicle Noise	July 74[3] July 75[4]	July 74[3] July 75[4]	July 74[3] July 75[4]	Specifies maximum vehicle noise 84 to 92 dB(A) dependent on vehicle category.
28A	Motor Vehicle Noise	July 79	July 79	July 79	Specifies reduced maximum noise 81 to 89 dB(A) dependent on vehicle category.
30	Diesel Exhaust Smoke Emission	July 76 - for all diesel engined vehicles except specially constructed			Limits opacity of exhaust smoke. Accepts engines approved to British, European or U.S.A. 1974 standards.
32	Seat Belts for Trucks and Buses	-	July 77	July 77	At least lap belt for driver and front outboard position. Body block test load 9 kN.

[3] Petrol engined vehicles

[4] Other than Petrol engined vehicles

Rule No.	Description	Vehicle Under 4.5 Tonne	Vehicle Over 4.5 Tonne	Omnibuses	Requirement
35	Commercial Vehicle Brake System	Jan 78	July 79	Jan 78	Specifies service brake effectiveness for unladen and fully laden vehicles with requirements after partial failure, fade, water and spike stop tests. Actuation time test and park brake hold on 18% grade. Separate park brake ON and brake failure warning lamps.
36	Exhaust Emission Control for Heavy Duty Vehicle	July 78	July 79	July 78	Specifies limits on exhaust emission of hydrocarbons and carbon monoxide from heavy duty petrol engined vehicles, based on the U.S. EPA 9 mode engine dynomometer test, as follows:- Exhaust HC - 180 ppm* Exhaust CO - 1% * Non-dispersive infra-red hexane equivalent. The standards are the same as the California 1972 Heavy Duty Petrol Engine requirements.

CHRYSLER AUSTRALIA LIMITED

MANUFACTURING COSTS & COST TO CONSUMER OF CURRENT SAFETY RELATED AUSTRALIAN DESIGN RULES AS THEY AFFECT DODGE D5N 2 SERIES COMMERCIAL VEHICLES

ADR NO.	TITLE	Manuf. Cost Per Vehicle (Including Tool Amort.)	PROFIT		FED. GOVT. SALES TAX	EFFECT AT RECOMMENDED RETAIL PRICE
			Cal	Dealer		
-	Compliance Plate	0.45	0.00	0.10	0.08	0.63
1	Reversing Signal Lamps	1.33	0.00	0.30	0.25	1.88
2	Door Latches & Hinges	22.16	0.00	4.99	4.16	31.31
3	Seats & Seat Anchorages	0.00	0.00	0.00	0.00	0.00
4C	Safety Belts	18.71	0.00	4.11	0.00	22.82
5B	Safety Belt Anchorages	0.00	0.00	0.00	0.00	0.00
6	Direction Turn Signal Lamps	0.00	0.00	0.00	0.00	0.00
7	Hydraulic Brake Hoses	0.00	0.00	0.00	0.00	0.00
8	Safety Glass	1.09	0.00	0.24	0.20	1.53
11	Internal Sunvisors	1.37	0.00	0.30	0.25	1.92
12	Glare Reduction in Field of View	0.00	0.00	0.00	0.00	0.00
15	Demisting of Windscreen	46.20	5.19	11.28	7.33	70.00
		91.31	5.19	21.32	12.27	130.09

Source: Evidence, p. 1980.

CHRYSLER AUSTRALIA LIMITED

MANUFACTURING COSTS & COST TO CONSUMER OF CURRENT SAFETY RELATED AUSTRALIAN DESIGN RULES AS THEY AFFECT DODGE D5N 4 SERIES COMMERCIAL VEHICLES

ADR NO.	TITLE	Manuf. Cost Per Vehicle (Including Tool Amort.)	PROFIT		FED. GOVT. SALES TAX	EFFECT AT RECOMMENDED RETAIL PRICE
			Cal	Dealer		
-	Compliance Plate	0.37	0.00	0.08	0.07	0.52
1	Reversing Signal Lamps	2.26	0.00	0.51	0.42	3.19
2	Door Latches and Hinges	22.16	0.00	4.99	4.16	31.31
6	Direction Turn Signal Lamps	0.00	0.00	0.00	0.00	0.00
7	Hydraulic Brake Hoses	0.00	0.00	0.00	0.00	0.00
8	Safety Glass	1.09	0.00	0.24	0.20	1.53
12	Glare Reduction in Field of View	0.00	0.00	0.00	0.00	0.00
15	Demisting of Windscreens	57.08	27.92	18.50	11.49	114.99
17	Fuel Systems for Goods Vehicles	12.96	0.00	2.92	2.43	18.31
		95.92	27.92	27.24	18.57	169.85

Source: Evidence, p. 1981.

CHRYSLER AUSTRALIA LIMITED

MANUFACTURING COSTS & COST TO CONSUMER OF CURRENT SAFETY RELATED AUSTRALIAN DESIGN RULES AS THEY AFFECT DODGE D5N 7D SERIES COMMERCIAL VEHICLES

ADR NO.	TITLE	Manuf. Cost Per Vehicle (Including Tool Amort.)	PROFIT		FED. GOVT. SALES TAX	EFFECT AT RECOMMENDED RETAIL PRICE
			Cal	Dealer		
-	Compliance Plate	0.38	0.00	0.09	0.07	0.54
1	Reversing Signal Lamps	2.26	0.00	0.51	0.42	3.19
2	Door Latches and Hinges	22.16	0.00	4.99	4.16	31.31
6	Direction Turn Signals	0.00	0.00	0.00	0.00	0.00
7	Hydraulic Brake Hoses	0.00	0.00	0.00	0.00	0.00
8	Safety Glass	1.09	0.00	0.24	0.20	1.53
12	Glare Reduction in Field of View	0.00	0.00	0.00	0.00	0.00
15	Demisting of Windscreens	82.62	2.38	18.50	11.49	114.99
17	Fuel Systems for Goods Vehicles	124.14	0.00	27.93	23.28	175.35
		232.65	2.38	52.26	39.42	326.91

Source: Evidence, p. 1982.

INTERNATIONAL HARVESTER AUST. LTD

PRICE EFFECT OF A.D.R.s

ACCO-A MOTOR TRUCKS OVER 4.5 t

A.D.R. No.	Description	Manufacturing Cost $ Per Unit	Comment
1	Reversing Signal Lamps	5.56	Price varies as it is dependent on transmission type
2	Door Latches & Hinges	0	Designed into vehicle
6	Direction Turn Signal	3.00	Dependent on type of rear lamp. Front lamp complied
7	Hydraulic Brake Hoses	0	Original spec. complied
8	Safety Glass	0	Original spec. complied
9	Standard Controls - Auto Trans.	0	Original spec. complied
11	Internal Sun Visors	0	No longer applicable to over 4.5 t but retained
12	Glare Reduction in Field of View	0	Original spec. complied
15	Demisting of Windscreens	126.00	
17	Fuel Systems for Goods Vehicle	3.20	Original spec. in the main complied
28	Motor Vehicle Noise		
	Typical Petrol	8.45	
	Medium Diesel	61.46	
	Heavy Diesel	206.00	
30	Diesel Smoke	0.76	Original diesel engine spec. complied. Label cost only
	TOTAL: Petrol	146.21	
	Medium Diesel	199.98	
	Heavy Diesel	344.53	

KENWORTH TRUCKS PTY LTD

MANUFACTURING COST OF SAFETY RELATED AUSTRALIAN DESIGN RULES

A.D.R. No.	Description	Manufacturing Cost Per Vehicle
4C	Seat Belts	$90 approx.
17	Fuel Systems	$20 - $50
28	Motor Vehicle Noise	$100 - $300
35	Commercial Vehicle Brake System	$200 - $300

Source: Evidence, p. 968.

SUMMARY OF DIMENSIONAL LIMITS RELATING TO BASIC VEHICLE TYPES (CURRENT AT JANUARY 1975)

State or Territory	Length (metres)				Width (metres)	Height (metres)	
	Omnibus	Truck	Articulated Vehicle	Truck plus Trailer	All Vehicles	All Vehicles	Double Deck Omnibus
Australian Transport Advisory Council	11.0 (a) 12.2 (b) 12.8 (c)	11.0	15.3 (a)	15.3 16.8 (d)	2.5	4.3	4.4
New South Wales	12.2	11.0 (a)	15.3 (a)	16.8 (d)	2.5	4.3	4.4
Victoria	11.0 (a)	11.0 (a)	14.5 15.3 (a) (e)	16.8 (d)	2.5	4.0	(f)
Queensland	10.668 11.278 (b)	9.448	13.716 (a) 14.326 (a)	15.24 15.764 (b)	2.5019	4.2672	4.4196
South Australia	20.117	20.117	20.117	20.117	2.5	4.3	(f)
Western Australia	11.0 11.3 (b) 12.8 (c)	11.0 (a)	13.8 15.3 (a)	15.3 16.8 (d)	2.5	4.3	4.4
Tasmania	11.0 (a) 12.8 (c)	11.0 (a)	14.4 15.3 (a)	15.3 16.8 (d)	2.5	4.3	(f)
Northern Territory	12.2	12.2	16.5 (g) 30.5 (h)	45.0 (j)	2.5	4.4	(f)
Australian Capital Territory	(f)	(f)	(f)	(k)	2.5	(f)	(f)

NOTES:
(a) Subject to control on specific dimensions.
(b) On approved routes.
(c) On approved routes - omnibus with tandem rear axles and two steering axles.
(d) If trailer drawbar does not exceed 4.9 m (5 m in Victoria, 4.8763 m in Queensland).
(e) Permits readily available for dimension given.
(f) No express provision.
(g) No component part to exceed 12.2 m.
(h) Articulated vehicle plus one (1) trailer.
(j) Truck plus three (3) trailers.
(k) Combination units not permitted in ACT.

Source: The Australian Road Transport Federation Yearbook 1976.

MAXIMUM LENGTH OF LARGE COMBINATION UNITS UNDER PERMIT IN DEFINED AREAS

State or Territory	Maximum Length (m) of Large Combination Units (excluding Truck Trailers) permitted to operate under Permit in Defined Areas
N.S.W.	Combination units with maximum lengths up to approx. 30 m operate under permit for the cartage of livestock only in the western division of the State.
Vic.	Combination units are not permitted to operate in any part of the State.
Qld.	Combination units with maximum lengths of 28.96m and 44.20 m operate under police permit on roads declared under the "Main Roads Act, 1920-1965", for the use of road trains, for the transportation of livestock only. These routes are in geographically defined areas away from the main population centres.
S.A.	Combination units with maximum lengths of up to 20.117 m can operate throughout the State, whilst units up to a maximum length of 45 m operate under permit on defined routes in the northern part of the State.
W.A.	Combination units with maximum lengths of 27 m, 31 m and up to 45 m operate under permit on defined routes within specific areas of the State and generally these are remote areas.
Tas.	Combination units are not permitted to operate in any part of the State.
N.T.	Combination units with maximum length of up to 45 m operate throughout the Northern Territory.
A.C.T.	Combination units are not permitted to operate in any part of the Australian Capital Territory.

Source: NAASRA Study Report R1, p. 16.

COMMERCIAL VEHICLE SPEED LIMITS (KM/H)

State/ Territory	URBAN	RURAL
ATAC	60	Trucks over 4.5 t 80 Buses 90
N.S.W.	60	Trucks over 4.5 t 80 Buses 90
Vic.	60 Truck-trailers over 3 t 50	Under 3 t 70 Over 3 t 65
Qld.	60	100
S.A.	60	Trucks over 4 t 80 Buses 90
W.A.	7 t and under 60 Over 7 t 50	Trucks 3 t and under 100 Trucks 3 t to 7 t 80 Trucks over 7 t 70 Buses 80
Tas.	60	Trucks over 4.5 t 80 Buses 90
N.T.	60	No prescribed limit
A.C.T.	3 t and under 60 3 t to 7 t 50 Over 7 t 40	3 t to 7 t 80 7 t to 13 t 60 Over 13 t 50

Source: NAASRA Study Report R3, p. 13.

SUMMARY OF WEIGHT LIMITS RELATING TO MAXIMUM GROSS WEIGHT AND AXLE GROUP LOADING (CURRENT AT JANUARY 1975)

Distance (metres)	ATAC (b)	NEW SOUTH WALES No. of Axles 2	3	4	5	6	VIC	QUEENSLAND No. of Axles 2	3	4	5	6	SOUTH AUSTRALIA	WESTERN AUSTRALIA Distance (metres) (a)	No. of Axles 2	3	4	5	6	TASMANIA No. of Axles 2	3	4	5	6	NORTHERN TERRITORY Distance (metres) (a)	Load	Distance (metres) (a)	Load	ACT
below 1.0	8.20																												
1.0- 2.4	13.30	14.0	17.7				13.30		16.6					1.0- 1.5	13.2						(c)				1.0- 3.0	16.00	24.0-24.5	68.30	
2.4- 2.7	15.30	15.7	18.0				15.30	15.3	16.9					1.5- 2.0	15.2	17.2				15.7	18.0				3.0- 3.5	19.40	24.5-25.0	69.45	
2.7- 3.0	15.81	16.1	18.3				15.81	15.8	17.1					2.0- 2.5	16.0	17.8				16.1	18.3				3.5- 4.0	21.00	25.0-25.5	70.60	
3.0- 3.3	16.32	16.4	18.6				16.32	16.3	17.4					2.5- 3.0		18.3				16.4	18.6				4.0- 4.5	22.30	25.5-26.0	71.75	
3.3- 3.6	16.83	16.7	19.0	21.3			16.83	16.8	17.8	19.9				3.0- 3.5		18.9	21.2				19.0	21.3			4.5- 5.0	23.45	26.0-26.5	72.90	
3.6- 3.9	17.34		19.3	21.6			17.34		18.1	20.1				3.5- 4.0		19.4	21.7				19.3	21.6			5.0- 5.5	24.60	26.5-27.0	74.05	
3.9- 4.2	17.85		19.7	21.9			17.85		18.4	20.4				4.0- 4.5		20.0	22.2	24.6			19.7	21.9			5.5- 6.0	25.75	27.0-27.5	75.20	
4.2- 4.5	18.36		20.0	22.2			18.36		18.7	20.7			No Table — Maximum load on all axles behind foremost axle not to exceed 32.8 t	4.5- 5.0		20.5	22.7	25.1			20.0	22.2			6.0- 6.5	26.90	27.5-28.0	76.35	
4.5- 4.8	18.87		20.3	22.5	24.9	24.9	18.87		19.0	21.0	23.1	23.1		5.0- 5.5		21.1	23.1	25.5	28.0		20.3	22.5	24.9	24.9	6.5- 7.0	28.05	28.0-28.5	77.50	
4.8- 5.1	19.38		20.6	22.8	25.1	25.1	19.38		19.2	21.2	23.3	23.3		5.5- 6.0		21.7	23.6	26.0	28.5		20.6	22.8	25.1	25.1	7.0- 7.5	29.20	28.5-29.0	78.65	
5.1- 5.4	19.89		21.0	23.1	25.4	25.4	19.80		19.6	21.5	23.6	23.6		6.0- 6.5		22.2	24.1	26.5	28.9		21.0	23.1	25.4	25.4	7.5- 8.0	30.35	29.0-29.5	79.80	
5.4- 5.7	20.40		21.3	23.4	25.7	25.7	20.40		19.9	21.8	23.9	23.9		6.5- 7.0		22.8	24.6	26.9	29.4		21.3	23.4	25.7	25.7	8.0- 8.5	31.50	29.5-30.0	80.95	
5.7- 6.0	20.91		21.6	23.7	26.0	26.0	20.91		20.1	22.1	24.1	24.1		7.0- 7.5		23.3	25.1	27.4	29.8		21.6	23.7	26.0	26.0	8.5 9.0	32.67	30.0-30.5	82.10	
6.0- 6.3	21.42		21.9	24.0	26.3	26.3	21.42		20.4	22.3	24.4	24.4		7.5- 8.0			25.6	27.9	30.3		21.9	24.0	26.3	26.3	9.0- 9.5	33.80	30.5-31.0	83.25	
6.3- 6.6	21.93		22.3	24.3	26.6	26.6	21.93		20.8	22.6	24.7	24.7		8.0- 8.5			26.1	28.3	30.7		22.3	24.3	26.6	26.6	9.5-10.0	34.95	31.0-31.5	84.40	No express provisions
6.6- 6.9	22.44		22.6	24.6	26.8	26.8	22.44		21.2	22.9	24.9	24.9		8.5- 9.0			26.6	28.8	31.2		22.6	24.6	26.8	26.8	10.0-10.5	36.10	31.5-32.0	85.55	
6.9- 7.2	22.95		23.0	24.9	27.1	27.1	22.95		21.6	23.1	25.1	25.1		9.0- 9.5			27.1	29.2	31.6		23.0	24.9	27.1	27.1	10.5-11.0	37.25	32.0-32.5	86.70	
7.2- 7.5	23.46		23.3	25.2	27.4	27.4	23.46		22.0	23.4	25.4	25.4		9.5-10.0			27.6	29.7	32.1		23.3	25.2	27.4	27.4	11.0-11.5	38.40	32.5-33.0	87.85	
7.5- 7.8	23.97		23.6	25.6	27.7	27.7	23.97		22.4	23.8	25.7	25.7		10.0-10.5			28.1	30.2	32.5		23.6	25.6	27.7	27.7	11.5-12.0	39.55	33.0-33.5	89.00	
7.8- 8.1	24.48			25.9	27.9	27.9	24.48			24.1	25.9	25.9		10.5-11.0			28.6	30.6	33.0			25.9	27.9	27.9	12.0-12.5	40.70	33.5-34.0	90.15	
8.1- 8.4	24.99			26.2	28.2	28.2	24.99			24.3	26.1	26.1		11.0-11.5			29.1	31.1	33.4			26.2	28.2	28.2	12.5-13.0	41.85	34.0-34.5	91.30	
8.4- 8.7	25.50			26.5	28.5	28.5	25.50			24.6	26.4	26.4		11.5-12.0			29.6	31.6	33.8			26.5	28.5	28.5	13.0-13.5	43.00	34.5-35.0	92.45	
8.7- 9.0	26.01			26.8	28.8	28.8	26.01			24.9	26.7	26.7		12.0-12.5			30.1	32.0	34.3			26.8	28.8	28.8	13.5-14.0	44.15	35.0-35.5	93.60	
9.0- 9.3	26.52			27.1	29.1	31.5	26.52			25.1	27.0	29.1		12.5-13.0			30.6	32.5	34.7			27.1	29.1	31.5	14.0-14.5	45.30	35.5-36.0	94.75	
9.3- 9.6	27.03			27.4	29.4	31.8	27.03			25.4	27.2	29.4		13.0-13.5			31.1	33.0	35.2			27.4	29.4	31.8	14.5-15.0	46.45	36.0-36.5	95.90	
9.6- 9.9	27.54			27.7	29.6	32.1	27.54			25.7	27.4	29.7		13.5-14.0			31.6	33.4	35.6			27.7	29.6	32.1	15.0-15.5	47.60	36.5-37.0	97.05	
9.9-10.2	28.05			28.0	29.9	32.3	28.05			26.0	27.7	29.9		14.0-14.5				33.9	36.1			28.0	29.9	32.3	15.5-16.0	48.75	37.0-37.5	98.20	
10.2-10.5	28.56			28.3	30.2	32.6	28.56			26.2	28.0	30.1										28.3	30.2	32.6	16.0-16.5	49.90	37.5-38.0	99.35	
10.5-10.8	29.07			28.6	30.5	32.9	29.07			26.5	28.2	30.4										28.6	30.5	32.9	16.5-17.0	51.05	38.0-38.5	100.50	
10.8-11.1	29.58			28.9	30.7	33.1	29.58			26.8	28.4	30.6										28.9	30.7	33.1	17.0-17.5	52.20	38.5-39.0	101.65	
11.1-11.4	30.09			29.2	31.0	33.4	30.09			27.1	28.7	30.9										29.2	31.0	33.4	17.5-18.0	53.35	39.0-39.5	102.80	
11.4-11.7	30.60			29.5	31.3	33.7	30.60			27.3	29.0	31.1										29.5	31.3	33.7	18.0-18.5	54.50	39.5-40.0	103.95	
11.7-12.0	31.11			29.8	31.6	33.9	31.11			27.6	29.2	31.3										29.8	31.6	33.9	18.5-19.0	55.65	40.0-40.5	105.10	
12.0-12.3	31.62			30.1	31.9	34.2	31.62			28.0	29.5	31.6										30.1	31.9	34.2	19.0-19.5	56.80	40.5-41.0	106.25	
12.3-12.6	32.13			30.4	32.2	34.5	32.13			28.3	29.8	31.9										30.4	32.2	34.5	19.5-20.0	57.95	41.0-41.5	107.40	
12.6-12.9	32.64			30.7	32.4	34.7	32.64			28.7	30.0	32.1										30.7	32.4	34.7	20.0-20.5	59.10	41.5-42.0	108.55	
12.9-13.2	33.15				32.7	35.1	33.15				30.2	32.4											32.7	35.1	20.5-21.0	60.25	42.0-42.5	109.70	
13.2-13.5	33.66				33.0	35.3	33.66				30.5	32.6											33.0	35.3	21.0-21.5	61.40	42.5-43.0	110.85	
13.5-13.8	34.17				33.3	35.6	34.17				30.8	32.9											33.3	35.6	21.5-22.0	62.55	43.0-43.5	112.00	
13.8-14.1	34.68				33.5	35.9	34.68				31.0	33.1											33.5	35.9	22.0-22.5	63.70	43.5-44.0	113.15	
14.1-14.4	35.19				33.8	36.1	35.19				31.2	33.3											33.8	36.1	22.5-23.0	64.85	44.0-44.5	114.30	
14.4-14.7	35.70				34.1	36.4	35.70				31.5	33.6											34.1	36.4	23.0-23.5	66.00	44.5-45.0	115.45	
14.7-15.0	36.21				34.4	36.7	36.21				31.8	33.9											34.4	36.7	23.5-24.0	67.15			
15.0-15.3	36.72				34.7	36.9	36.72				32.1	34.1											34.7	36.9					
15.3-15.6					35.0	37.2					32.3	34.3											35.0	37.2					
15.6-15.9					35.3	37.5					32.6	34.6											35.3	37.5					
15.9-16.2					35.5	37.7					32.8	34.8											35.5	37.7					
16.2-16.5					35.8	38.0					33.1	35.1											35.8	38.0					

(a) These measurements are applied as follows:
- New South Wales - distance between extreme axles of vehicle or between internal axles or group of axles.
- Western Australia - distance between extreme axles.
- Victoria, Queensland and Northern Territory - distance between extreme axles of vehicle or groups of axles.

(b) Australian Transport Advisory Council.

(c) 17.7 t for triaxle, i.e. when distance between extreme axle centres does not exceed 2.4 m.

Source: The Australian Road Transport Federation Yearbook 1976.

APPENDIX 5

BASIC VEHICLE OPTIONS MANUFACTURED BY INTERNATIONAL HARVESTER LTD

Axle Combinations	No. of Vehicles
4 x 2* with 2 to 4 tonne pay load	13
4 x 2 with 4 to 8 tonne pay load	36
4 x 2 with 8 to 10 tonne pay load	11
6 x 4 combinations through to 17.5 tonne Gross Vehicle Mass (G.V.M.)	11
8 x 4 to 22 tonne G.V.M.	18
Total	89
Engine options for the above with an average of two engine options	89
Wheel base variations with two speed rear axle versions	170
TOTAL BASIC VEHICLE CONFIGURATIONS	348

* Digits represent points of contact of the vehicle to the ground. These points of contact may be either single or dual wheels. The first digit indicates the total number of points of contact and the second digit the number of driven points of contact.

TABLE 1

ESTIMATED FREIGHT CONSIGNMENT [1] - AUSTRALIA

Year ended 30 June	Sea	Air	Road	Rail			TOTAL
				Public	Private [2]	Total	
			million tonnes				
1970	32.5	0.1	700	75.5	37.2	112.7	845.3
1971	39.9	0.1	750	79.0	49.7	128.7	918.7
1972	43.8 [3]	0.1	800	81.6	55.2	136.8	980.7
1973	p42.0	0.1	850	83.8	78.1	161.9	1054.0
1974	p44.0	0.1	910	85.3	93.7	179.0	1133.1
1975	p42.0	p0.1	p950	p87.0	p104.4	p191.4	1183.5
Average Annual Growth Rate 1970 to 1975	n.a.	n.a.	6.3%	2.9%	22.9%	11.2%	7.0%

(1) Includes all consignments by the transport modes specified.

(2) Includes only iron ore railways (S.A. and W.A.) and Emu Bay Railway (Tas).

(3) New series commencing 1971/72; not strictly comparable with previous years' estimates.

p Provisional estimates.

Source: Evidence, p. 27.

TABLE 2

ESTIMATED FREIGHT TASK - AUSTRALIA

Year ended 30 June	Sea	Air	Road	Rail			TOTAL
				Public	Private	Total	
	thousand million tonne-kilometres						
1970	66	0.1	26	24	9	33	125.1
1971	72	0.1	28	25	13	38	138.1
1972	77	0.1	29	25	16	41	147.1
1973	p74	0.1	31	27	18	45	150.1
1974	p77	0.1	32	28	23	51	160.1
1975	p74	p0.1	p33	p29	p26	p55	p162.1
Average Annual Growth Rate 1970 to 1975	n.a.	n.a.	4.9%	3.9%	23.6%	10.8%	5.3%

Footnotes as per Table 1

Source: Evidence, p. 28.

TABLE 3

ESTIMATED LAND PASSENGER TRANSPORT TASK - AUSTRALIA

Year ended 30 June	Cars and Station Wagons	Road Public Transport	Rail
	million passenger-kilometres		
1970	120900	3500	9800
1971	123400	3500	10000
1972	135000	3400	8800
1973	142800	3400	8500
1974	153800	3400	9700
Average Annual Growth Rate 1970 to 1974	6.2%	1.7%	0.3%

Note: Road Public Transport includes publicly owned road transport. New series developed 1971/72.

Source: Evidence, p. 29.

MOTOR VEHICLE INVOLVEMENT IN 15,023 CASUALTY ACCIDENTS IN VICTORIA, 1971

	Semi-trailers	Other trucks	Private & light comm.	Buses	Motor cycles
Vehicles involved	355	891	20,444	94	1,333
Vehicles registered*	9,400	84,000	1,280,000	5,200	30,800
Veh. inv./10^4 veh. reg.	378	106	160	181	433

MOTOR VEHICLE INVOLVEMENT IN 5,178 CASUALTY ACCIDENTS IN WESTERN AUSTRALIA, 1971

	Semi-trailers	Other trucks	Private & light comm.	Buses	Motor cycles
Vehicles involved	61	292	5,431	63	478
Vehicles registered*	44,400		393,000	2,600	13,100
Veh. inv./10^4 veh. reg.	79.5		138	242	365

MOTOR VEHICLE INVOLVEMENT IN 7,386 CASUALTY ACCIDENTS IN SOUTH AUSTRALIA, 1971

	Semi-trailers	Other trucks	Private & light comm.	Buses	Motor cycles
Vehicles involved ¤	66	159	5,482	35	493
Vehicles registered*	3,000	42,000	445,000	2,700	18,100
Veh. resp./10^4 veh. reg.	220	37.9	123	130	272

* Vehicles on Register at December 1971, tabled to 3 significant figures.

¤ Only vehicles judged responsible for accidents.

Source: H.T. Wood and J.E. Cowley, Pilot Study of Australian Truck Accidents, Report No. 28, Australian Road Research Board, p. 5-6.

SUMMARY TABLE OF CLASSES OF VEHICLES RESPONSIBLE, BY NUMBER REGISTERED, ACCIDENTS, FATALITIES AND INJURIES, SOUTH AUSTRALIA, 1972

Vehicle Type	Number* Registered ('000)	Vehicle Type Responsible for				Fatal x 100 Injury
		All Accidents	Casualty Accidents	Persons Killed	Persons Injured	
Motor cars	427.5	25,840	5,326	185	7,740	2.4
Panel Vans and Utes	45.0	2,406	498	20	700	2.9
Trucks	40.7	1,377	199	7	251	2.8
Semi-Trailers	3.2	362	55	5	78	6.4
Omni-buses	2.8	271	48	-	69	-
Other Vehicles	27.8	1,784	756	22	879	2.5
TOTAL	547.1	32,040	6,882	239	9,717	2.5

* These are as at June 1973.
Source: NAASRA, Technical Report T7, p. 4.

SUMMARY TABLE OF CLASSES OF VEHICLES INVOLVED, BY NUMBER REGISTERED, ACCIDENTS, FATALITIES, AND INJURIES, VICTORIA, 1972

Vehicle Type	Number Registered ('000)	Vehicle Type Involved in *				Fatal x 100 Injury
		All Accidents	Casualty Accidents	Persons Killed	Persons Injured	
Motor cars	1,227.8	17,782	12,897	589	13,887	4.2
Panel Vans and Utes	144.4	1,618	1,348	90	2,086	4.3
Trucks	84.5	927	901	73	1,212	6.0
Semi-Trailers	10.0	321	313	50	391	12.8
Omni-buses	5.8	124	124	5	173	2.9
Other Vehicles	44.4	2,021	2,674	75	2,027	3.7
TOTAL	1,516.6					

* The figures are for numbers of accidents in which a particular vehicle type was involved. It is not appropriate therefore to derive totals.

Source: NAASRA, Technical Report T7, p. 5.

SUMMARY TABLE OF CLASSES OF VEHICLES INVOLVED, BY NUMBER REGISTERED, ACCIDENTS, FATALITIES AND INJURIES, WESTERN AUSTRALIA, 1972

Vehicle Type	Number Registered ('000)	Vehicle Type Involved in *			Fatal x 100 / Injury
		Casualty Accidents	Persons Killed	Persons Injured	
Motor cars	364.2	7,317	391	10,235	3.8
Panel Vans and Utes	59.9	1,434	80	2,019	4.0
Trucks	42.6	429	34	562	6.1
Semi-Trailers	2.5	85	7	113	6.2
Omni-buses	2.8	112	13	150	8.7
Other Vehicles	29.1	1,364	57	1,562	3.7
TOTAL	501.1				

* The figures are for numbers of accidents in which a particular vehicle was involved. It is not appropriate therefore to derive totals.

Source: *NAASRA, Technical Report T7*, p. 5.

TABLE 1

SOUTH AUSTRALIAN ACCIDENTS INVOLVING TRUCKS IN 1974

TYPE OF ACCIDENT	LOCATION	CASUALTIES		NO. UNITS INVOLVED				
		In Trucks	In other Vehicles	Fatal	Personal Injury	Property Damage	Total Accidents	Percentage
HEAD ON	City	0	1	0	1	2	3	
	Metro	2	18	4	10	31	45	
	Rural	6	13	3	6	5	14	
	State	8	32	7	17	38	62	1.8
REAR-END	City	1	7	0	8	148	156	
	Metro	12	118	5	98	910	1013	
	Rural	2	32	1	17	99	117	
	State	15	157	6	123	1157	1286	36.2
SIDE-SWIPE (Same direction)	City	0	1	0	1	164	165	
	Metro	1	17	0	16	619	635	
	Rural	2	14	0	13	66	79	
	State	3	32	0	30	849	879	24.8
SIDE-SWIPE (Opposite direction)	City	0	0	0	0	9	9	
	Metro	8	23	0	13	91	104	
	Rural	6	18	4	11	40	55	
	State	14	41	4	24	140	168	4.7
RIGHT ANGLE	City	0	14	0	14	96	110	
	Metro	13	139	5	117	546	668	
	Rural	7	46	3	29	127	159	
	State	20	199	8	160	769	937	26.4
OTHERS (Including Single Vehicle)	City	2	6	0	7	3	10	
	Metro	12	15	2	23	72	97	
	Rural	30	4	1	27	84	112	
	State	44	25	3	57	159	219	6.1
TOTAL		104	486	28	411	3112	3551	100.0

Source: Road Traffic Accidents 1974, Road Traffic Board of South Australia.

TABLE 2

SOUTH AUSTRALIAN ACCIDENTS INVOLVING SEMI-TRAILERS IN 1974

TYPE OF ACCIDENT	LOCATION	CASUALTIES		NO. UNITS INVOLVED				
		In semi-trailers	In other Vehicles	Fatal	Personal Injury	Property Damage	Total Accidents	Percentage
HEAD-ON	City	0	0	0	0	0	0	
	Metro	2	1	1	0	2	3	
	Rural	3	21	5	9	1	15	
	State	5	22	6	9	3	18	2.0
REAR-END	City	0	1	0	1	8	9	
	Metro	3	57	1	40	117	158	
	Rural	0	22	1	11	55	67	
	State	3	80	2	52	180	234	25.9
SIDE-SWIPE (Same direction)	City	0	1	0	1	20	21	
	Metro	0	8	0	6	209	215	
	Rural	0	12	1	7	53	61	
	State	0	21	1	14	282	297	32.9
SIDE-SWIPE (Opposite direction)	City	0	0	0	0	2	2	
	Metro	0	7	0	5	17	22	
	Rural	3	30	5	11	32	48	
	State	3	37	5	16	51	72	8.0
RIGHT ANGLE	City	1	1	0	1	5	6	
	Metro	1	31	1	27	71	99	
	Rural	4	15	2	11	24	37	
	State	6	47	3	39	100	142	15.7
OTHERS (Including Single Vehicle)	City	0	2	1	1	1	3	
	Metro	2	7	0	8	37	45	
	Rural	24	4	4	20	68	92	
	State	26	13	5	29	106	140	15.5
TOTAL		43	220	22	159	722	903	100.0

Source: Road Traffic Accidents 1974, Road Traffic Board of South Australia

TABLE 3

SOUTH AUSTRALIAN ACCIDENTS INVOLVING BUSES IN 1974

TYPE OF ACCIDENT	LOCATION	CASUALTIES		NO. UNITS INVOLVED				
		In Buses	In other Vehicle	Fatal	Personal Injury	Property Damage	Total Accidents	Percentage
HEAD ON	City	0	1	0	1	0	1	
	Metro	0	5	1	2	4	7	
	Rural	1	3	1	0	1	2	
	State	1	9	2	3	5	10	1.1
REAR-END	City	8	8	0	6	62	68	
	Metro	3	21	0	20	148	168	
	Rural	0	5	0	4	13	17	
	State	11	34	0	30	223	253	29.1
SIDE-SWIPE (Same direction)	City	1	2	0	3	120	123	
	Metro	0	6	0	6	183	189	
	Rural	1	2	0	3	14	17	
	State	2	10	0	12	317	329	37.8
SIDE-SWIPE (Opposite direction)	City	0	0	0	0	3	3	
	Metro	0	2	0	2	17	19	
	Rural	3	0	1	0	11	12	
	State	3	2	1	2	31	34	3.9
RIGHT ANGLE	City	0	5	0	4	48	52	
	Metro	8	15	1	12	121	134	
	Rural	3	5	0	4	22	26	
	State	11	25	1	20	191	212	24.4
OTHERS (Including Single Vehicle)	City	3	3	0	6	0	6	
	Metro	5	10	0	15	2	17	
	Rural	2	0	0	2	7	9	
	State	10	13	0	23	9	32	3.7
TOTAL		38	93	4	90	776	870	100.0

Source: Road Traffic Accidents 1974, Road Traffic Board of South Australia

MECHANICAL FAILURE - COMPONENT AGAINST ACCIDENT TYPE

Accident Type	Mechanical Component. (The Failure of Which Contributed to the Accident.)							Total	Percentage of Total Sample of Truck Accidents of this Accident Type
	Tyres	Wheels	Suspension	Steering	Brakes	Couplings	Other		
Rear-end Heavy Commercial Into Other					6		2	8	(6)
Head-on				1	1			2	(6)
Opposite Direction Sideswipe	1				1	1		3	(4)
Ran Off Road	8	2	2	6	8	2	1	29	(23)
Overturned	7	2	3	2	3	4	3	24	(22)
Pedestrian			1					1	(11)
Other		2	1		2	4		9	(14)
TOTAL No.	16	6	7	9	21	11	6	76	
TOTAL (%)	(21)	(8)	(9)	(12)	(28)	(14)	(8)	(100)	(9)

Source: NAASRA, Technical Report T7, p. 25.

MECHANICAL FAILURE - ACCIDENT SEVERITY

Mechanical Component	Severity			Severity Rate No. Casualty/ No. of Property Damage Accidents
	Fatal	Injury	Property Damage	
Tyres		5	11	0.5
Wheels		1	5	0.2
Suspension	1	2	4	0.8
Steering		6	3	2.0
Brakes	1	6	14	0.5
Couplings		3	8	0.4
Other		5		
Truck Total	2	28	45	0.7
All Accidents to all vehicles	30	189	661	0.3

Source: NAASRA, Technical Report T7, p. 26.

APPENDIX 10

STATISTICS ON ROLL-OVER OR JACK-KNIFE ACCIDENTS
OIL COMPANY OWNED AND OPERATED EQUIPMENT
JULY 1975 TO NOVEMBER 1976

QUEENSLAND	8 accidents 5 lost product - all roll over 3 were empty
NEW SOUTH WALES	4 accidents 2 lost product - 1 roll over 1 retained all product 1 was empty
VICTORIA	5 accidents 4 lost product - 2 roll over 1 was empty
SOUTH AUSTRALIA	4 accidents 3 lost product - 1 in Northern Territory and 1 roll over 1 was empty
WESTERN AUSTRALIA	1 accident retained all product
TASMANIA	2 accidents both empty
	24

SUMMARY: Roll over	9	
Jack-knife	14	Semi-trailer tankers
Other	1	Rigid tanker

Source: Petroleum Marketing Engineers Advisory Committee, Transport Sub-Committee PME 4, Australian Institute of Petroleum Ltd.

DRAFT REGULATIONS DEFINING VEHICLE CONSTRUCTION, EQUIPMENT AND PERFORMANCE STANDARDS FOR ROAD VEHICLES

410 Rear Marking Plates

(1) Rear markings if fitted to motor vehicles the unladen weight of which exceeds 3Mg or to trailers the unladen weight of which exceeds 1 Mg, shall be in accordance with the following sub paragraphs:

(a) Rear markings shall be fitted at the rear of the vehicle.

(b) Rear markings shall be securely attached to the vehicle so that no part of the marking projects beyond the outermost part of the vehicle on either side.

(c) The lower edge of every rear marking shall be horizontal and at a height of not more than 1.7m nor less than 400mm above the ground, whether the vehicle is laden or unladen, and in the case of the rear marking type 2, 3 or 5 the lower edge of each half of the marking shall be at the same height above the ground.

(d) Every part of a rear marking shall lie within 20 degrees of a transverse vertical plane at right angles to the vertical plane through the longitudinal axis of the vehicle so that -

(i) in the case of rear markings type 1 or 4, the vertical centre line of the marking lies on that vertical plane through the longitudinal axis of that vehicle, and

(ii) in the case of rear markings type 2, 3 or 5, each half of the marking lies in the same vertical plane and the innermost vertical edges of each half of the marking are equidistant from the vertical plane through the longitudinal axis of the vehicle.

(e) Rear markings type 2, 3 or 5 shall lie so that each half of the marking is as near as is practicable to the outermost edge of the vehicle on the side thereof on which it is fitted.

(f) Every rear marking shall be so fitted that every part thereof is clearly visible to other persons using the road within a reasonable distance to the rear of the vehicle at all times, except while the vehicle is being loaded or unloaded if the vehicle is so constructed at the rear that it is impracticable for the marking to be so fitted, without undue expense or risk of damage to the marking.

(g) Every rear marking shall be maintained in a clean and efficient condition while the vehicle is on a road.

(2) Rear markings shall be of type 1 or 2 as shown in Figure 1 if fitted to

(a) motor vehicles, the overall length of which does not exceed 13 metres or

(b) trailers, if part of a combination of vehicles the overall length of which does not exceed 11 metres except that where any such motor vehicle or trailer is so constructed at the rear that it is impracticable for that marking to be fitted in accordance with the provisions of sub regulation (1) a rear marking type 3 may instead be fitted.

(3) Rear markings shall be of type 1, 2, 4 or 5 as shown in Figure 1 if fitted to a trailer forming part of a combination of vehicles the overall length of which is greater than 11 metres but not greater than 13 metres except that where any such trailer is so constructed at the rear that it is impracticable for a rear marking numbered 1 or 2 to be fitted in accordance with the provisions of sub regulation (1) a rear marking type 3 may instead be fitted.

(4) Rear markings shall be of type 4 or 5 as shown in Figure 1 if fitted to

(i) motor vehicles the overall length of which exceeds 13 metres or

(ii) trailers, if part of a combination of vehicle, the overall length of which exceeds 13 metres.

(5) (a) Rear markings fitted to vehicles in accordance with sub regulations (1), (2) and (3) shall be of the size and colour shown in the diagram relating to the marking set out in Figure 1 subject to the following provisions:

(i) Any variation in a dimension (other than as to the height of a letter) specified in any of the diagrams in Figure 1 shall be treated as permitted for the purposes of these Regulations if the variation:

in the case of a dimension so specified as 250mm or as over 250mm does not exceed $2\frac{1}{2}\%$ of that dimension;

in the case of a dimension so specified as 40mm or as over 40mm but as under 250mm, does not exceed 5% of that dimension; or in the case of a dimension so specified as under 40mm, does not exceed 10% of that dimension

(ii) Any variation in a dimension as to the height of a letter specified in any of the said diagrams shall be treated as permitted for the purposes of these Regulations if the variation:

in the case of a dimension so specified as 105mm, does not exceed 2½% of that dimension; or

in the case of a dimension so specified as 70mm, does not exceed 5% of that dimension.

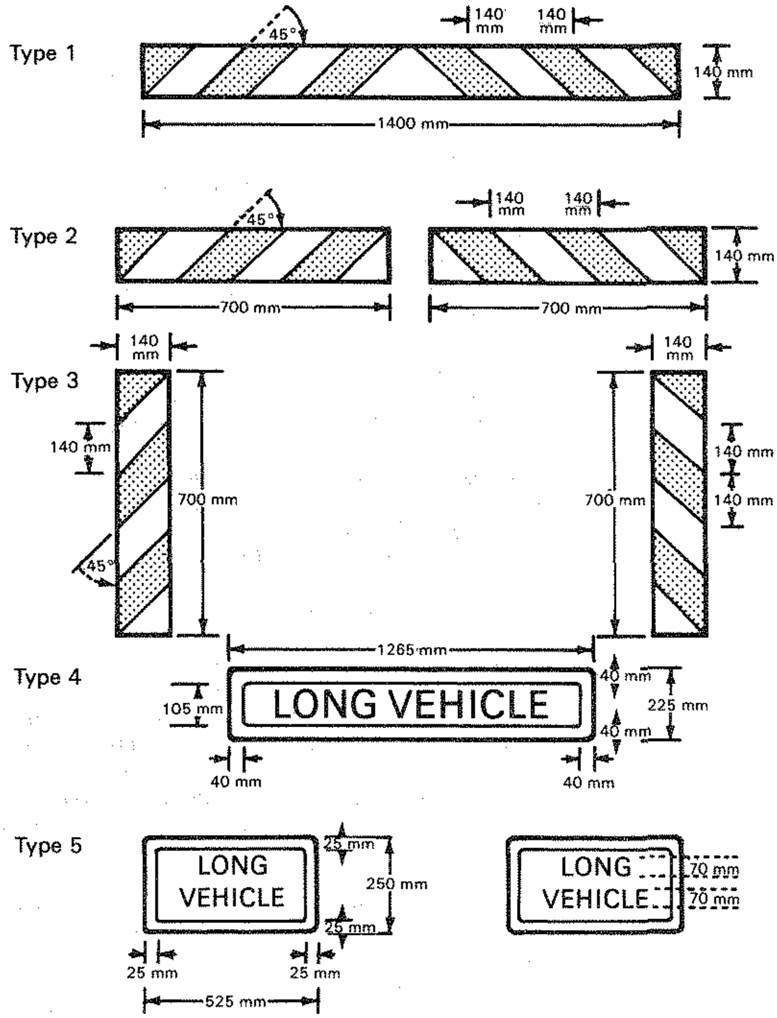
(iii) Any variation in a dimension as to the angle of hatching specified in any of the said type diagrams shall be treated as permitted for the purposes of these Regulations if the variation does not exceed 5 degrees.

(iv) Every rear marking shall be illuminated by the use of red fluorescent material in the stippled areas shown in any of the said diagrams and by the use of yellow reflex reflecting material in any of the areas so shown, being areas not stipplied and not constituting a letter.

(v) Every rear marking type 1 or 4 shall be constructed in the form of a single plate, and every rear marking type 2, 3 or 5 shall be constructed in the form of two plates of equal size and shape, and every such plate shall comply with the requirements of British Standard AU152:1970 'Rear Marking Plates for Vehicles'.

(vi) All letters incorporated in any rear marking shall be coloured black.

Figure 1 Size, colour and type of rear markings



NOTE: The height of each half of the marking shown in type 3 may be reduced to a minimum of 140mm provided the width is increased so that each half of the marking has a minimum area of 950 square centimetres.

DRAFT REGULATIONS DEFINING VEHICLE CONSTRUCTION, EQUIPMENT AND PERFORMANCE STANDARDS FOR ROAD VEHICLES

1710 Rear-End Protection

(1) Every semi-trailer manufactured on and after 1 January 1971 shall be provided with an approved continuous rear bumper which shall be so constructed and located that:

(a) with the vehicle unladen, the contact surface of the bumper is not more than 24 inches from the ground;

(b) the bumper contact surface is located not more than 24 inches forward of the rear of the vehicle and is painted white;

(c) the ends of the bumper extend to within 12 inches of each side of the vehicle, unless the rear-most point of the tyres is within 24 inches of the rear of the vehicle, in which case the tyres shall be considered as meeting the requirements over their width;

(d) the member which is, or directly supports, the bumper contact surface is of material having no less strength than steel tubing of 4 " outside diameter and 5/16" wall thickness;

(e) the structure supporting the member prescribed in (d) can transmit no less force than that member can sustain, and provides a continuous force path to vehicle members of a strength consistent with the forces to be sustained.

Provided that this Regulation shall not apply to semi-trailers so constructed that:

(a) cargo access doors, tailgates or other such structures when closed afford comparable protection;

(b) A vertical plane tangential to the rear-most surface of the rear wheels is 6" or less from a parallel vertical plane containing the rear-most point of the semi-trailer.

Note to Administering Authorities

As a guide to the type of structure which may be expected to perform satisfactorily as a rear barrier for semi-trailers, the following table is given:

Cross Member	Vertical Supports
4" square tube 1/4" wall thickness	7" x $3\frac{1}{2}$" I beam
4" outside diameter tube 5/16" wall thickness	8" x 3" channel
5" outside diameter tube 3/16" wall thickness	6" x 4" tube $\frac{3}{8}$" wall thickness
5" x $2\frac{1}{2}$" I beam or channel major dimensions horizontal	All fitted with major dimensions along axis of chassis members

A rear cross member supported at about 3 ft centres by two vertical supports attached to the trailer chassis can be considered a typical design. The vertical supports must be securely attached by welding or bolting at least to both the upper and lower extremities of each chassis member.

APPENDIX 13

DRAFT REGULATIONS DEFINING VEHICLE CONSTRUCTION, EQUIPMENT AND PERFORMANCE STANDARDS FOR ROAD VEHICLES

120. Limitations on Alterations to Motor Vehicles

(4) For vehicles other than passenger cars or derivatives thereof, alterations in regard to the following items shall only be made in accordance with the vehicle manufacturers' recommendations or, in the absence of such recommendations, with the approval of the Administering Authority:

(a) Any alteration affecting the wheelbase;

(b) Alteration to the number of axles fitted;

(c) Alteration affecting any steering components or the steering geometry;

(d) Alteration to the braking systems;

(e) Fitting of tyres other than those appropriate to the wheel rim fitted as specified in the Tyre and Rim Standards Manual issued by the Tyre and Rim Association.

APPENDIX 14

SECTION 148 OF THE SOUTH AUSTRALIAN MOTOR VEHICLES ACT 1959-1976

148. (1) Where a legally qualified medical practitioner, a registered optician, or a registered physiotherapist has reasonable cause to believe that -

(a) a person whom he has examined holds a driver's licence or a learner's permit;

and

(b) that person is suffering from a physical or mental illness, disability or deficiency such that, if he drove a motor vehicle, he would be likely to endanger the public,

the medical practitioner, registered optician or registered physiotherapist is under a duty to inform the Registrar in writing of the name and address of that person, and of the nature of the illness, disability or deficiency from which he is believed to be suffering.

(2) Where a medical practitioner, registered optician, or registered physiotherapist furnishes information to the Registrar in pursuance of subsection (1) of this section, he must notify the person to whom the information relates of that fact and of the nature of the information furnished.

(3) A person incurs no civil or criminal liability in carrying out his duty under subsection (1) of this section.