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VEHICLE OCCUPANT PROTECTION IN AUSTRALIA

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Abstract

Four important features were pre-requisites for the success of compulsory restraint wearing in Australia. They were a detailed specification for design, construction and installation of restraints; a multi-layered system of quality control and inspection: enforcement: and education and publicity to increase awareness of the benefits of restraint wearing.

Significant developments have occurred since the introduction of compulsory restraint wearing, and these have been consolidated to provide a readily accessible source of the development and evaluation of the benefits of mandatory restraint use.

Keywords
Seat belts, child restraints, Australian Design Rules, Australian Standards, infant restraints, surveys, publicity, enforcement, legislation.

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VEHICLE OCCUPANT PROTECTION

IN

AUSTRALIA

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CANBERRA
AUSTRALIA

MARCH 1988

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EXECUTIVE SUMMARY

The history of compulsory usage of vehicle occupant restraints in Australia can be traced back to the development of Australian Standards for seat belts in 1961 and the introduction of Australian Design Rules for motor vehicle safety in 1967. The first design rules for seat belts and seat belt anchorage points, ADRs 4 and 5A respectively, resulted in a steady increase in the proportion of vehicles fitted with belts, which contributed significantly to the success of the mandatory seat belt legislation. In December 1970 the Victorian Government was the first in the world to introduce legislation making it compulsory to wear seat belts that were fitted in a vehicle, and from 1 January 1971 all new cars had to have seat belts fitted to all seating positions. By early 1972 all other States and Territories had adopted similar legislation.

As is characteristic of the situation in Australia, there are four important features necessary for the success of compulsory restraint wearing. They are a detailed specification for design, construction and installation of restraints; a multi-layered system of quality control and inspection: enforcement; and education and publicity to increase awareness of the benefits of restraint wearing.

In Victoria studies revealed that the number of vehicle occupant fatalities declined by 18% during the first year of the law, whilst in New South Wales a 25% reduction in vehicle occupant fatalities in the first year was estimated. Wearing rates were not particularly high initially, but increased later and in recent years range from 50% (rear passengers) to 95% (drivers). There is still room for improvement in wearing rates for particular groups. As well as significant declines in road crash fatalities as a result of the compulsory seat belt wearing law, it was evident that the frequency and severity of injuries from involvement in road crashes also declined.

With regard to any disadvantages of seat belt wearing there is little evidence that seat belts, if worn properly, cause serious injury per se. However, Henderson and Wyllie (1973). and Herbert, Wyllie and Corben (1975) found that incorrectly adjusted belts contributed to abdominal injuries in vehicle occupants. Other studies showed that loose adjustment of seat belts was a contributing factor to the causation of injury.

Most State road safety authorities conduct regular surveys to monitor seat belt wearing rates and to assist with the targetting of publicity to promote awareness of seat belt wearing. These surveys have pinpointed the problems of low wearing rates for rear seat passengers (particularly young males travelling at night), and incorrect adjustment of static seat belts, where these were worn. Surveys also found that wearing rates for children and young adults are much lower than for the older age groups.

From 1974 onwards legislative requirements for the use of child restraints were introduced around the country. It is mandatory for all children to use a "suitable" restraint where fitted in passenger vehicles. The definition of "suitable" is a specifically designed Standards Association of Australia (SAA) approved child restraint, or for children one year of age and older an adult seat belt. During 1988 four jurisdictions (New South Wales, Victoria. South Australia and the Northern Territory) have introduced legislation requiring the use of SAA approved restraints for children under one year of age. Other jurisdictions are waiting until the availability of infant restraints for the less than 6 months age group has substantially increased through infant restraint loan schemes.

Additional groups to benefit from restraint use are the occupants of trucks, buses and forward control vehicles as well as wheelchair users. The Road Traffic Authority of Victoria has developed an A Frame wheelchair restraint which meets the Australian Draft Standards for wheelchair restraints. Whilst other systems have been in use for some time, the A frame wheelchair and occupant restraint system has been shown to offer greater protection and comfort for the user than the other systems.

Although seat belts protect many vehicle occupants from death and severe injury, the present design has some deficiencies which need to be reviewed. From arguments proposed in the literature it is apparent that the potential exists for seat belts to offer more protection to the vehicle occupant involved in a road crash, if particular design deficiencies can be eliminated. Whilst seat belts have changed from the lap type, to the lap/sash combination and finally the emergency locking retractor type, the challenge lies ahead for researchers to adopt a fresh approach to rectifying the existing problems of current seat belt systems. The problem of head injuries still occurring despite seat belt usage needs to be addressed. Improvements in seat belt design could prevent travel of an occupant's head in a crash, and improvements in vehicle design could reduce the impact force on the head and other parts of the body. The knowledge that more lives could be saved and the number of severe injuries, including head injuries, reduced, is a worthy justification for a concerted research effort to improve seat belt systems even further. The Federal Office of Road Safety has met this challenge by initiating research to assess developments in recent years for both seat belt and alternative protective systems, including vehicle design.

To both educate and re-educate road users of the safety benefits of wearing correctly adjusted seat belts and child restraints, numerous publicity campaigns have been conducted over the years. Whilst these campaigns have proved to be successful in influencing attitudes and behavioural change, they also established a need for periodic publicity to reinforce the appropriate messages as people tend to re-adopt old habits. For maximum effectiveness, these communications need to be co-ordinated with regular and highly visible police enforcement of the restraint wearing laws.

1. INTRODUCTION

Australia could be considered to be the forerunner in the implementation of mandatory seat belt wearing in the world. The Australian experience may, therefore, serve as a guide for other countries involved in the evaluation of the benefits of introducing mandatory seat belt usage. and the associated use of child restraints.

Important issues relating to the introduction and use of vehicle occupant restraints (seat belts and child restraints) in Australia, were originally documented in P.W. Milne's report on the "Fitting and Wearing of Seat Belts in Australia: The history of a successful countermeasure" (1979).

Significant developments have occurred since then. and these have been consolidated to provide a readily accessible source of the development and evaluation of the benefits of introducing mandatory restraint usage.

In Australia, the strategem pursued by road safety administrators has concentrated on developing the use of active restraints, rather than passive ones, such as air bags. The effectiveness of such passive devices is therefore not addressed.

The life saving benefits of seat belts were recognised .as early as 1903 by Leveau, and the advantages of their use in cars proven through the work of Bohlin (1967). in addition to that of other authorities in the road safety field (Joubert, 1979; Milne 1979). In his statistical analysis of 28,000 accident cases in Sweden carried out from March 1965 to March 1966, Bohlin found that the average injury reducing effect of the 3-point safety harness varied between 40 and 90% depending on crash speed or type of injury. Non-belted occupants were killed regardless of crash speed, whereas none of the belted occupants were killed at crash speeds below 100 km/h.

He concluded that "the 3-point combined lap and diagonal shoulder harness with slip-joint

a) reduces the frequency of injury of all kinds substantially and the frequency of certain injuries (particularly concerned to head and upper torso) very substantially

b) offers effective protection against ejection

c) does not cause any serious injury to the wearer, but in some severe accidents slight injuries such as cracks in single rib, bruises etc."

The first reported Australian experience of compulsory seat belt usage was McCausland and Herbert (1963). During the twenty year construction period of the Snowy Mountains hydro-electric scheme from 1961. all the Snowy Mountains Authority road vehicles were fitted with seat belts and their usage was compulsory. Despite some major crashes, there were no deaths or serious injuries to any of the vehicle occupants during the three year period from 1960 to 1963 (McCausland and Herbert. 1963).

From local examples of the benefits of seat belt wearing (eg in the Snowy Mountains), lobbying by the Royal Australasian College of Surgeons and the media, and other evidence from overseas, the case for compulsory wearing of seat belts by the general community was perceived to be strong enough to prompt the Victorian Government to introduce an appropriate law in December 1970. This piece of legislation led to the nationwide adoption of one of the most successful road safety countermeasures in Australia to-date.

Australia now has over 17 years experience with mandatory seat belt wearing legislation.

2. HISTORY OF SEAT BELT AND CHILD RESTRAINT INTRODUCTION INTO AUSTRALIA

Four important features characterise seat belt and child restraint wearing in Australia. Any country intending to achieve similar or even greater benefits from occupant restraints as has been gained in this country should heed all four. These are:

- a detailed specification for design. construction and installation (as stipulated by the Australian Design Rules).
- a multi-layered system of quality control and inspection (includes the Standards Association of Australia (SAA) approval scheme, the certification scheme operated by the Australian Motor Vehicle Certification Board and internal checks by car manufacturers on belts produced for them by accessory manufacturers).
- enforcement of restraint wearing.
- education and publicity to increase awareness of the benefits of restraint wearing .

2.1 Development of Australian Standards for seat belts and child restralnts

2.1.1 Australian Standard for seat belts

The first reference to seat belts in vehicles in Australia comes from 1955. when the then Australian Motor Vehicle Standards Committee (AMVSC) agreed on the need for an Australian specification for automobile seat belts. This followed a request by the then Australian Road Safety Council for AMVSC to report on the possibilities of introducing in-built safety features into new vehicles. The AMVSC referred the issue to the Standards Association of Australia *(SAA)* and on 28 April 1961 the SAA approved Australian Standard (AS) E35 for "safety belts and harness assemblies for motor vehicles". (See Appendix I for a description of AS E35 and other SAA standards relating to restraint design and instal lation).

The Council and the Standards Committee had been established by the Australian Transport Advisory Council (ATAC) in 1947. ATAC is the national body responsible for co-ordinating matters relating to transport. including road safety. and comprises Commonwealth, State and Territory Ministers responsible for transport.

The vast majority of seat belts in use have been domestically produced, with only a minimal quantity being produced overseas and imported into Australia. Seat belt production in Australia, as given in Table 1, peaked in the early 1970's for a number of reasons. Whilst the Australian Design Rules (ADRs) required the fitting of seat belts in new cars from 1969, some States also required fitting of belts in pre-ADR vehicles (ie. retro-fitting). Also, with the introduction of bucket seats in the front of motor cars in association with the demise of front bench seats, only five seating positions required belts rather than six. Consequently. the demand for seat belts declined slightly and this would have been reflected in the decreasing production figures after 1971172.

Initially the *SAA* tested two prototypes of each seat belt model submitted by the manufacturer, and published regular lists of those makes and models which conformed to the specifications of the Standard. However. because of public complaints regarding the lack of ease of accessibility to these lists and the fact that production belts did not always comply with the Standard, the SAA changed the procedure in 1966. A unique certification mark, the "kite mark" was registered by the SAA and provided to manufacturers to indicate on their product that it met the Australian Standard. Conditions for using the certification mark included SAA inspection of the manufactured item and testing it in accordance with the procedures laid down in the Standard, to ensure that the requirements of E35 were met. This unique certification mark provided a yardstick for the public when purchasing seat belts.

Standard E35 did not include any technical specifications for the installation of belts and harness assemblies in vehicles. This area was addressed with the development of Standard Dll for "seat belt anchorage points" in 1967. Since then a range of other Standards pertaining to static belt assemblies, retractors, webbing and child restraints have been adopted. Generally, the purpose of the Standards has been to ensure that safety is maintained, as well as guiding administrators in the legislative process. For example, the Federal Government under the Trade Practices Act, and a number of States have made the sale of unapproved seat belts and child restraints illegal. When a product does not comply with the Australian Standards produced by the SAA it is termed 'unapproved'.

2.1.2 Australian Standard for child restraints

In the late sixties manufacturers began producing special chairs, for use by children in vehicles, which were designed for the child's comfort rather than protection against crashes. This deficiency in such devices led to the introduction of the first Australian Standard AS E46 for child restraints in 1970. Design restrictions and performance goals for devices suitable for children aged from 1 to 11 years were specified.

The year 1975 witnessed a complete rewriting of AS E46 resulting in AS 1754. The primary technical amendments to the standard included a range of dynamic tests and requirements for easier adjustment of all straps. All existing designs of child restraint had to be upgraded in order to comply with the new requirements.

TABLE 1 - Seat belt production in Australia ('000)

Year of manufacture	Type of belt			
	Lap	Sash	Com-bination (lap/sash)	*Other
1963-64	61	27	234	6
1964-65	83	34	316	5
1965-66	70	12	338	7
1966-67	180	48	560	7
1967-68	259		690	14
1968-69	325		671	15
1969-70	263		867	n.p
1970-71	n.a.		n.a	
1971-72	706	-	+3 020	
1972-73	562	-	+2 577	
1973-74	557	-	+2 440	
1974-75	525	-	+2 484	
1975-76	427	-	+1 766	
1976-77	459	-	+1 670	
1977-78	380	-	+1 225	
1978-79	n.p	-	+1 501	
1979-80	n.p	-	+1 406	
1980-81	n.p	-	+1 391	
1981-82	n.p	-	+2 750	
1982-83	n.p	-	+2 648	
1983-84	n.p	-	+2 776	
1984-85	n.p	-	+2 846	

Notes: n.a means figures are "not available" due to data not being collected.
n.p means "not for publication". due to the confidential nature of the data.
+ means all 3 point combination lap/sash belts plus all other types
• other refers to full harnesses of the racing type, netting and child restraints including child seats.
- means nil or insignificant production reported.

Source: Australian Bureau of Statistics, Manufacturing Commodities Bulletin-Principal Articles Produced Cat. No. 8303.0

The following summary is an abbreviated key to the different child restraint types defined in AS 1754.

Type A: Age range birth upwards (usually limited to 6 months) Includes infant carriers and restrained bassinets.

Type B: For toddlers (usually 6 months to 4 years). Refers only to forward-facing chairs with full harnesses.

Type C: Primarily for older children (usually 3 years to 8 years but some are approved For children over 12 months). Refers only to full-harnesses to be used on original car seats or booster devices (Type G).

Type D: For toddlers. Forward-facing enclosures, guards and barrier type devices.

Type E: For toddlers. Rear-facing enclosures, guards and barrier type devices.

Type F: For toddlers. Rear-facing chairs with harnesses and head-restraints.

Type G: Primarily for older children. Anchored booster cushions and self-anchored chaises, for use with lap/sash belts provided for adults. Can also be used with Type C harnesses.

2.2 The Australian Design Rule system

Requiring seat belts to be fitted to vehicles was a separate issue to ensuring that seat belts, anchorages, etc were manufactured to specified standards. Again via ATAC, recommendations were being considered for production of safer road vehicles.

These recommendations became known as the 'Australian Design Rules for Motor Vehicle Safety' (ADRs) once they had been endorsed by ATAC. Design rules for seat anchorages and seat belts were among the first ADRs approved in 1967.

From 1969, the outer front seating positions of new cars in Australia were fitted with 3 point combination lap/sash belts; from 1976 these incorporated emergency locking retractors. In 1969 a lap belt was only required for a centre seating position if the car had a bench seat exceeding 122 cm (48 inches) width. Cars with bench seats less than this width were included in 1975.

Seat belts in rear seats were only required from 1971; lap/sash In outer positions and lap belts in centre seating positions If seat exceeded width of 122 cm (48 inches) with a similar change to front seats in 1975. Emergency locking retractors were not incorporated in the outer rear seating positions until 1984.

Relevant ADRs are summarised in Appendix II including their application to vehicles other than cars.

3. LEGISLATION FOR THE MANDATORY FITTING AND USE OF OCCUPANT RESTRAINTS IN AUSTRALIA

3.1 Legislation for the mandatory fitting and use of seat belts

In December 1967 an Act was passed by the Victorian Parliament establishing a Joint Select Committee on Road Safety, to report on vehicle roadworthiness, points demerit systems and the desirability of compulsory fitting and wearing of seat belts in motor vehicles. Supporters of the latter included Professor P.N. Joubert of the University of Melbourne, the Royal Australasian College of Surgeons, the Australian Medical Association, the Victorian Police Surgeon and the Royal Automobile Club of Victoria. The positive arguments in the published local and overseas literature on seat belt effectiveness, as well as the significant results of a study undertaken by the Victorian Traffic Commission, in terms of the reduced probability of death in a road crash, all contributed to the favourable climate for seat belt legislation. Consequently, in September 1969 the Committee recommended the compulsory fitting of seat belts in motor vehicles, as well as the compulsory wearing of seat belts within a maximum period of two years (Milne, 1979).

On the 22 December 1970 Victoria introduced legislation making it compulsory to wear seat belts that were fitted in a vehicle. By 1 January 1972 all other States and Territories had adopted similar legislation. A chronological summary of the various provisions for each State and Territory is presented in Table 1 of Appendix III. Various exemptions to the legislation were permitted, such as children under 8 years old, and milk and bread delivery men. Many of these have now been removed. The current requirements for seat belt usage and the circumstances under which exemptions are permissible are sumnarised in Table 2 of Appendix III.

3.2 Legislation for the fitting and use of child restraints

The development of legislation stipulating compulsory *use* of a restraint system for children did not progress at the same rate as that for seat belts.

As mentioned earlier (Section 3.1), the original seat belt legislation stipulated exemptions for certain groups of people. including children under 8 years of age. There are two reasons for the exemption of the latter group from the legislation: principally because children under 8 were not legally responsible for their actions, and secondly because belts fitted in older vehicles had a minimum design standard to fit a 50th percentile 6 year old child according to specified dimensions in the ADR.

In January 1976 the Victorian Government redressed the situation by introducing legislation requiring the compulsory restraint of children less than 8 years travelling in front seats of cars. Following Victoria's lead, other jurisdictions adopted legislation to provide protection for children under 8 years of age. The legislation pertaining to infant and child restraints is sumnarised in Table 1 of Appendix III.

Other child safety related developments since that time have been the introduction in November 1978 of a Consumer Product Safety Standard. which prohibited the sale of child seats and child harnesses not approved by the Standards Association of Australia; the development, subsequent availability and SAA approval of the booster seat/seat belt combination for the older child: and post-legislation publicity campaigns (Boughton, 1980).

Federal legislation is currently being prepared in order to change the Consumer Product Safety Standard under the Trade Practices Act to make it illegal to sell bassinet restraints (ie. the webbing which covers baby bassinets used in cars) which do not conform to AS 1754. The objective is to legally ensure that only those infant restraints complying with the Australian Standards can be sold. To some extent, this amendment has been overtaken by legislation requiring compulsory use of Type A restraints (baby capsules) meeting the Australian Standard. New South Wales, Victoria, South Australia and the Northern Territory have implemented such legislation this year, as part of their new requirement that children under the age of one year be restrained.

3.3 Penalties for non-compliance with the legislation

Penalties for failing to wear seat belts are usually prescribed in the legislation specifying the requirements for seat belt usage. The various State Police Forces are empowered to impose on the spot fines with the issue of Traffic Infringement Notices and in some States the penalty of demerit points is also imposed. Table 2 summarises the penalties in each State and Territory. In cases where offenders have been charged with more serious offences, they may also be booked for failing to wear a seat belt and taken to court.

3.4 Enforcement of the legislation

The maintenance of high seat belt wearing rates is dependent on periodic educational programs and publicity campaigns, as well as a continuing enforcement effort by the Police.

In mid-1976 the South Australian Police initiated extensive enforcement of seat belt wearing in that State, which appeared to correspond with a four fold increase in the proportion of offences related to seat belts. In 1974/75 seat belt offences represented 0.5% of all offences, compared to 2% in 1975/76 and 3.3% in 1976/77. The increase in enforcement was accompanied by a significant increase in drivers' wearing rates (Boughton and Milne, 1978).

The level of enforcement of the seat belt legislation can be gauged by considering the number of Traffic Infringement Notices (TINs) issued by police. Table 3 presents these statistics since 1983/84 for each State and Territory. These statistics include unrestrained drivers, and adult and child passengers, as there are no breakdowns of these different groups.

TABLE 2 -State and Territory penalties for failing to wear a seat belt as at August 1987

	New South Wales	Victoria	Queensland	Western Australia	South Australia	Tasmania	Northern Territory	Australian Capital Territory
Penalty for failing to wear a seat belt	$50 or up to $500 &/or 6 months prison if found guilty by a court	$135 or 5500 (5 penalty points) if found guilty by a court.	$40 & 2 demerit points	$40 & 2-demerit points	$30 or $1000 if found guilty by a court.	$60/pass $60 & 2 demerit points/ driver	$20 or $200 or 6 months prison if found guilty by a court.	$40 or max. of $80 if found guilty by a court.
Legislative source of penalties	Reg. 110F of the Motor Traffic Act	Motor Car Act 1958 S 31 b(1)	Reg 140 of the Traffic Regulations 1962 and Schedule for Offences listed under Reg 108C of the Traffic Regulations 1962 respectively	Road Traffic Driver Licences Regulations 1975	Road Traffic Act	Traffic & General Local Regs	Regs 104-119 of the Traffic Act	Sect 180A schedule 6 Item 3 of the Mator Traffic Ordinance 1986 and Sect 1648 of Motor Traffic Ordinance 1986 respectively

* *It* is proposed that the on the *spot* fine in the Northern Territory will be upgraded to $50 from 1st Oct 1987. New regulations are to be introduced in 1988 which will increase the general penalty provision to $1000 &/or 6 months Imprisonment if found guilty by a court.

Reference: State and Territory Transport Authorities.

TABLE 3 - The Number of TINs issued for failing to wear a seat belt by State and Territory from 1983/84 to 1986/87, compared with population statistics as at June 30, 1987

Year	NSW	Vic	Qld	WA	SA	Tas	NT	ACT
1983/84	26,719	N.A	30,253	N.A*	5,588	5,729	2,072	N.A
1984/85	25,678	27,401	33,231	11,684	6,013	4,976	1,687	N.A
1985/86	26,421	20,736	39,714	12,025	3,341+	5,367	2,789	36
1986/87	31,547 —	27,112	34,673	N.A	N.A	N.A	2,771 —	430
Population**	5,605	4,208	2,675	1,496	1,394	449	158	263
Issue rate/ 100,000 pop.	563	644	1.296	N.A	N.A	N.A	1,754	163

NA Refers to non-availability of the data.

* Problems with the accuracy of data in 1983/84 in Western Australia explains the non-availability of this figure.

** In 000's as at 30.6.87

\+ As a result of the Australian Grand Prix in 1985 and the State Jubilee in 1986 police duties were directed away from traffic matters.

This figure is an estimate based on 200-300 TINs/month. The actual YTO May figure was 2521.

+++ This figure is an estimate based on an average of 2629 TINs/month. The actual YTO May figure was 28,918.

Reference: State and Territory transport authorities and Australian Bureau of Statistics.

As suggested by Table 3, the level of enforcement activity varies from State to State. According to State authority representatives in NSW and Victoria, seat belt wearing is actively policed and there are regular blitzes as well as special targetting efforts in both the metropolitan and country areas. However, in Queensland the Police tend to concentrate on booking people for other offences and then issue separate fines if the offenders are not wearing seat belts. In addition, it should be noted that in a number of cases offenders are given cautions only.

Another factor influencing enforcement has been the difficulty associated with children over the age of responsibility but under the licensing age. In South Australia in 1986 the Road Traffic Act Amendment Act (No 4) sought to overcome the problem by including regulations applicable to the groups of children between 10 and 16 years, and over 16 years, which specified whether the responsibility for the wearing of seat belts by these groups, lay with the driver or the passenger. Under the new regulations which came into effect on 1 March 1988 in Victoria, it is the driver's responsibility to ensure that a child under 18 years of age is properly restrained.

Whilst enforcement plays an integral part in the maintenance of seat belt wearing rates the nature of the relationship between both needs to be more clearly understood. More research into the effects of enforcement on seat belt wearing is needed before any meaningful strategic planning can occur.

4. SURVEYS OF RESTRAINT FITTING AND USAGE

Surveys are conducted at regular intervals by road safety authorities and other motoring organisations within each State/Territory to monitor restraint fitting and wearing rates and to assist with the targetting of publicity to promote awareness of seat belt and child restraint *use.* A variety of organisations have been monitoring restraint wearing and different methodologies and samples have been used in surveys. Such differences appear to contribute to the variations in wearing rates.

4.1 Adults

Results of fitting rates for drivers are presented in Appendix IV for various Australian capital city and country locations and a summary of seat belt wearing rates for drivers since 1970, is presented in Appendix V. Care should be taken when comparing results of various cities due to the different survey methodologies employed. The data shows the gradual improvement in seat belt wearing rates for drivers since the early seventies.

Discussion of the results of more recent surveys follows.

New South Wales

Both the Traffic Authority of NSW (previously the Traffic Accident Research Unit (TARU)) and the National Roads and Motorists' Association (NRMA) have been conducting surveys of restraint use over a number of years. Annual surveys of restraint usage by occupants of passenger cars and passenger car derivatives have been undertaken by the Traffic Authority of NSW since August 1970.

An interesting finding of these surveys is that wearing rates increased rapidly just before and immediately following the introduction of compulsory seat belt wearing in October 1971, however the rates have decreased slightly since 1976 (Schnerring, 1983). The wearing rates for rear occupants are significantly lower than those for front occupants. and whilst inertia reel belts are usually worn correctly, a large proportion of static lap/sash belts are worn incorrectly.

Rural areas of New South Wales have lower wearing rates than the Sydney Metropolitan area, and taxis also had low wearing rates.

Prior to 1975 up to five locations in the metropolitan area were used for each annual survey as well as two rural centres in December 1973. However, from 1975 to 1981 the sample was expanded to include nineteen metropolitan sites.

The wearing rates from these surveys are sumnarised in Table 4.

TABLE 4 - Seat belt wearing rates by occupant position for the Sydney Metropolitan Area

		OCCUPANTS' WEARING RATE(%)		
		DRIVER	FRONT LEFT	REAR PASSENGER**
Aug.	1970	19.1		
April	1971	29.7		
June	1971	31.2		
Sept.	1971	50.4	*44.7	
Oct.	1971	59.5	54.5	
Nov.	1971	75.8	69.2	
Dec.	1972	89.2	82.0	
Dec.	1973	90.8	80.7	
Jan.	1975	89.9	82.1	
July	1975	91.1	84.8	
Dec.	1975	93.9	85.8	
July	1976	94.0	88.6	
Jan.	1977	86.7	78.6	
July	1977	90.7	84.6	+35.1
July	1978	89.3	82.4	36.3
July	1979	88.5	82.0	34.6
July	1980	85.3	80.9	36.9
July	1981	83.9	75.2	26.4
Aug.	1982	87.1	82.5	42.1
Aug.	1983	89.2	84.8	35.2
Aug.	1984	89.2	87.1	38.1
Jul/Aug	1985	92.5	89.3	46.2
Jul/Aug	1986	90.3	87.2	49.3

* Data for front passengers were not collected prior to Sept. 1971.
\+ Data for rear passengers were not collected prior to July 1977.
** Rear left and rear right seating positions.

Reference: Schnerring, 1983.

TABLE 5 - Overall wearing rates - Sydney

survey	% of Adults Adequately Protected
1974	47.1
1976	59.8
1978	63.3
1980	72.6
1982	79.9
1984	82.9
1986	83.9

Reference: National Roads and Motorists' Association surveys (Booth, 1986)

In Interpreting these rates, it should be borne in mind that the number of occupants observed varied from one year to the next. Also, the survey methodology, including the number of sites surveyed. is not consistent across surveys. From 1982, the procedures for conducting the surveys were modified to eliminate these problems and provide comparable results. The revised methodology involved two observers at each given location sampling from different vehicles, for both seat belt and child restraint usage. Only cars and car derivatives were surveyed in two hour sessions during the day and one hour sessions at night. For the metropolitan surveys, observations were carried out at traffic signs or stop signs to capture stationary vehicles. Country surveys were also to be conducted at traffic lights or stop signs, wherever possible.

On three lane roads one observer recorded data from vehicles in the lane next to the median strip, whilst the second observer surveyed the lane closest to the kerb. Vehicles were observed sequentially beginning with the second one to stop at a red light unless the first car was at least 100 metres from the lights when they turned red (Job, 1983).

In November 1986 the National Roads and Motorists' Association conducted the eighth in their series of small scale surveys (8 sites as opposed to 28 sites for the post-1982 Traffic Authority surveys) to assess the availability, wearing and adjustment of seat belts. The survey was conducted at shopping centres and was generally confined to the middle of the day. Passenger vehicles, such as cars, vans and recreation vehicles were observed by 2 people from vantage points where very low vehicle speeds contributed to the accuracy of the observations. A pattern of results similar to the TARU surveys emerged with respect to seat belt wearing rates. The total metropolitan wearing rates were 84% for front occupants and SO% for rear occupants in 1986, compared with 84% and 35% respectively in 1984. The NRMA survey also identified that less than half the available static seat belts worn by occupants were correctly adjusted.

Table S shows the trends in the proportions of adults adequately protected since 1974. The term "adequate protection" refers to a situation where an adult is restrained by a seat belt, approved by the Standards Association of Australia, properly adjusted on the adult and securely fastened to the vehicle.

Victoria

In November 1982 a survey of seat belt wearing rates was conducted by the Road Safety and Traffic Authority (later to become the Road Traffic Authority) at eight sites in Melbourne, to gain information about rates in all seating positions of cars and car derivatives. Data was collected at sites which had signalised Intersections on arterial roads with central medians, heavy traffic flows and good street lighting to ensure the safety of the observers. At each site there were two observers to record the relevant data. One person collected restraint data from all the front seat occupants in the first vehicle in the queue, whilst the second person collected rear seat restraint data from the first vehicle in the queue having any rear seat occupants. This technique was utilised so as to maximise the rear seat sample.

Almost all drivers and outer front passengers had lap/sash belts fitted, with 68% being the inertia reel type. In the rear seats, over 90% had a seat belt available. In only 2.2% of cases did survey participants not have a belt available.

Wearing rates, presented in Table 6, are based on the sample in which seat belts were fitted in vehicles as opposed to the total sample which included some vehicles not fitted with belts.

TABLE 6 - Usage by seating position and type of seat belt, 1982 - Victoria (%)

Seating Position	Inertia lap/sash	Static lap/sash	Other Adult	Child Restraint	Total
Driver	96.1	94.0	*	-	95.2
Front Centre	-	-	*	*	31.2
Front Left	92.6	88.7	*	*	91.1
Rear Right	77.8	76.0	*	97.4	74.1
Rear Centre	-	-	35.7	97.4	75.3
Rear Left	75.0	73.6	*	96.3	71.3
Total	95.0	85.5	33.4	96.8	88.6

Note: - Restraint not applicable to position
• Less than 15 observations

Reference: Manders, 1983

Information was also collected according to sex and age, type of trip, use by time of day and day of week and the type of vehicle (ie. sedans, station wagons and taxis). The groups with the lowest wearing rates were taxi passengers, the young (up to 18 years), rear seat occupants and those making urban recreational trips, especially at night.

In March 1984 the Road Traffic Authority of Victoria conducted a similar survey to that conducted in 1982, based on 14 metropolitan sites and 3 rural sites, and additional observation sessions. The results showing usage by seating position and type of seat belt (where fitted) are sumnarised in Table 7.

A comparison of the 1982 and 1984 surveys shows consistent results in the wearing rates for drivers and front left passengers (95.2 versus 95.9%. and 91.1 versus 92.1% respectively). On the other hand there was a significant decrease in wearing rates in the rear outer seating positions, with the rate in the rear right position falling from 74.1 to 58.5% and in the rear left position from 71.3 to 58.2%.

The lower rates in the rear occupant positions were attributed to the fact that little promotional activity occurred in Victoria in 1983 and early 1984 to encourage rear seat belt usage.

In April/May 1985 the Road Traffic Authority of Victoria conducted another occupant restraint survey, however on this occasion it was designed to include the collection of data on kilometres travelled (occupant exposure)

in order to develop wearing rates adjusted for the exposure of vehicle occupants. Approximately 23,000 vehicles were surveyed at a sample of signalised intersections in 38 Local Government Areas in the Melbourne metropolitan area at different times of the week and in different traffic conditions.

The ffndings of the survey are presented in Table 8 and compare the results for both methods, that is, the unadjusted and adjusted wearing rates for distance travelled by vehicle occupants.

The higher wearing rates when corrected for distance travelled could be explained by either regional restraint use differences or by existing vehicle occupant travel characteristics. It appears that unrestrained occupants travel disproportionately shorter distances than restrained occupants, possibly due to the fact that drivers are less likely to wear a seat belt on shorter trips. Evidence from a survey carried out in Great Britain supports the latter point (Martin, 1985).

Further Australian support can be seen from earlier surveys by Freedman, Champion and Henderson (1971). on community wearing habits and attitudes towards seat belts which revealed that many people associated long trips with higher accident risk and vice versa. Hence, they felt that the benefits of wearing seat belts on short trips were minimal.

Other results from the 1985 survey included a restraint usage rate of less than 40% among 18-25 year old and 26-29 year old rear seat passengers, and a 52% wearing rate adjusted for distance, for male rear seat passengers travelling on weekend nights, compared with the corresponding figure of 65% for females. These findings indicate that special educational programs need to be directed at young people (males making night time trips in particular) occupying rear seat positions in order to return the rear seat wearing rates to the higher 1982 levels.

South Australia.

A major restraint survey was conducted by the Road Safety Division of the SA Department of Transport in mid-1987. The objectives of the study were to determine the patterns of restraint use in passenger vehicles in metropolitan Adelaide; to provide benchmark wearing rates for comparison with results of previous and future studies, as well as those of interstate studies, and finally to target problem areas.

Observations were made at signalised intersections in the Adelaide metropolitan area, where the levels of traffic density were quite high, during May/June. Both day and night time surveying was carried out and no observations were made on Sundays. In all 8,158 vehicles were surveyed, resulting in 20,704 observations of restraint use.

Of all vehicle occupants 14% were unrestrained during the day, comprising 12% of drivers, 15% of front seat passengers and 42% of backseat passengers. The night time results reflected a lower level of restraint use, with 19% of all vehicle occupants being unrestrained. Of the total occupants surveyed at night, 15% of drivers, 17% of front seat passengers and 55% of backseat passengers were unrestrained (Cam Rungie and Associates Pty Ltd, 1987).

TABLE 7 - Usage by seating position and type of seat belt (where fitted). 1984 - Victoria (%)

	Inertia lap/sash	Static lap/sash	Lap Only	Child Restraints	Total
Driver	96.2	94.8	*	-	95.9
Front Centre	-	-	*	*	20.0
Front Left	93.1	87.5	*	•	92.1
**Front Extra	-	-	•	*	0.0
Rear Right	65.4	55.2	*	94.9	58.5
Rear Centre	-	-	38.0	97.3	79.1
Rear Left	66.2	55.5	*	95.6	58.2
**Rear Extra	*	*	*	*	66.7
3rd Row/ +Tailgate	•	•	*	*	28.6
Total	92.7	76.0	32.8	95.8	85.3

Note: - Indicates restraint not applicable to position
* Indicates less than 15 observations
** Extra refers to occupants not accommodated in normal seating positions, including infants being nursed, fourth passengers in rear and front bench seats, and third passengers in the front seats of vehicles equipped with front bucket seats.
\+ Refers to occupants in the tailgate area of station wagons and to occupants in the third row of seats in passenger vans.
Reference: Manders, 1984

TABLE 8 - Restraint use by vehicle occupant position, Victoria, 1985

Seating Position	Unadjusted restraint use rates (%)	Restraint use rates by distance travelled (%)
Driver	93.0	94.1
Front left	88.1	89.8
Front centre	21.0	24.1
Rear right	56.4	62.2
Rear centre	43.1	50.6
Rear left	59.7	66.0
Rear extra	22.0	29.3
Total rear	54.8	60.9

Reference: Cave, 1986

Table 9 compares the daytime results mentioned above, with results of the 1982 Road Traffic Board survey, being the last survey before 1987. Whilst slight improvements have occurred in the wearing rates for front and rear passengers, restraint *use* by drivers has declined marginally.

The purpose of the 1982 survey was to evaluate the effectiveness of an advertising campaign, ('Buckle Up in the Back Seat') and comprised before and after surveys conducted at ten signalised intersection sites in the Adelaide Metropolitan Area. Results revealed a statistically significant increase in both front passenger seat belt use (from 79 to 85%, or 82% adjusted for non-fitting of seat belts) and rear passenger seat belt use (from 40 to 61%, or 54% adjusted for non-fitting of seat belts). Driver seat belt use remained at 91% (or 89% after adjustment for non-fitting of seat belts) in the after survey. Bearing in mind that the effects of publicity generally diminish over time, it is likely that the after wearing rates overstate the present levels of restraint usage in South Australia. This premise is reinforced by the Victorian experience, where there was a significant decrease in wearing rates in rear seating positions and this was attributed to the fact that little promotional activity occurred during the period between the 1982 and 1984 surveys.

The results were understandable because the campaign targetted the rear seat and also because the potential for gains was greater given the lower initial rates.

4.2 Children

Over the years surveys of the availability of restraints by children have been undertaken in most capital cities. A summary of the results of these surveys highlightlng the availability of restraints by type. the survey description and source of data is presented in Appendix VI. It is evident from the table in Appendix VI that for the cities in which a number of surveys were conducted, child restraint availability has continued to rise since the mid seventies. Apart from the 1977 and 979 New South Wales surveys, availability of restraints relates only to the position occupied by a child (Boughton, 1980).

Following the introduction of mandatory legislation compelling chlldren (over 1 year of age) to be restrained if a suitable restraint was fitted. several authorities and other organisations initiated surveys to monitor the wearing rates of children. Appendix VII presents a history of surveys of restraint usage by children since the mid seventies. In those States where a number of surveys have been undertaken over a number of years, the proportion of children unrestrained has continued to decline.

TABLE 9 - Restraint use by seating position - daytime sample*

Restraint Use+	Driver		Front Passenger		Rear Passenger	
	1982	1987	1982	1987	1982	1987
Worn	2,486	1,775	557	423	172	1,705
	(89%)	(88%)	(82%)	(85%)	(54%)	(58%)
Not worn	308	242	125	75	148	1,245
	(11%)	(12%)	(18%)	(15%)	(46%)	(42%)
TOTAL	2,794	2,017	682	498	320	2,950
	(100%)	(100%)	(100%)	(100%)	(100%)	(100%)
Standard Error	0.6%	0.7%	1.5%	1.6%	2.8%	0.9%

* Figures for the driver and front seat passengers are taken from the random sample, which comprised all eligible vehicles at a red traffic light in a single lane of traffic, starting from the second vehicle back from the intersection. Figures for the rear passengers are taken from all vehicles sampled with at least one backseat passenger. Results for 1982 are taken from the Road Traffic Board of South Australia survey of seatbelt use August-November 1982, and have been adjusted to take into account non-fitting of seat belts, since the survey only considered wearing rates where belts were available.

+ Total sample includes seating positions with and without restraints fitted.

Reference: Cam Rungie and Associates Pty Ltd, 1987.

New South Wales

The most recent survey was conducted by the Traffic Authority of NSW in 1985. Less than 2% of all devices observed were unapproved but over one third of all the child restraints observed were incorrectly fitted. Booster cushions accounted for one third of all devices observed. An analysis of the trends from 1977 to 1985 showed that the fitting of unapproved restraints decreased from 21% to 1.6% of the sample. The proportion of child seats and child harnesses also decreased, but was offset by an increase in the number of booster cushions and infant restraints observed. It should be noted that whilst this survey concentrated on the fitting of various child restraints there is normally a high correlation between fitting and usage of such restraints. Figures 1 and 2 highlight the trends in fitting of the various types of restraints from 1977 to 1985 based on the NSW surveys.

South Australia

During August 1987 the Royal Automobile Association of South Australia conducted its fourth survey on the use of child restraints and seat belts by children in motor vehicles. The survey was conducted to determine the effects of a legislative change on 1 January 1987, when it became mandatory for children aged 1 year and over (but under 10 years), to be restrained by either a child restraint or seat belt, if there was an

available seating position and the vehicle was manufactured after 1 July, 1976. Prior to 1987 children under 8 years of age were not required to wear a seat belt, and only required to use a child restraint if one was available in the motor vehicle.

Observations accounted for 1,000 vehicles containing 1,138 children aged between 6 months and 8 years. and 77 babies, and were taken at five regional shopping centres.

A similar survey was undertaken in June 1986 prior to the legislative change.

The chief findings of the study were as follows:

- 69% (49% in 1986) of the infants observed had approved baby restraints available to them.
- 52% (35% in 1986) of babies were considered to be adequately protected
- 17% of baby restraints were not used correctly (no comparative data available for 1986).
- More than 80% of the observed children travelled in the rear seat (no comparative data available for 1986).
- Child restraints were available to 65% of children (an increase in availability of 5% since 1986).
- 93% of available child restraints were used (compared with 88% in 1986).
- Approximately 43% (39% in 1986) of children were considered to be adequately protected by a child restraint and 8% (5% in 1986) by a seat belt.

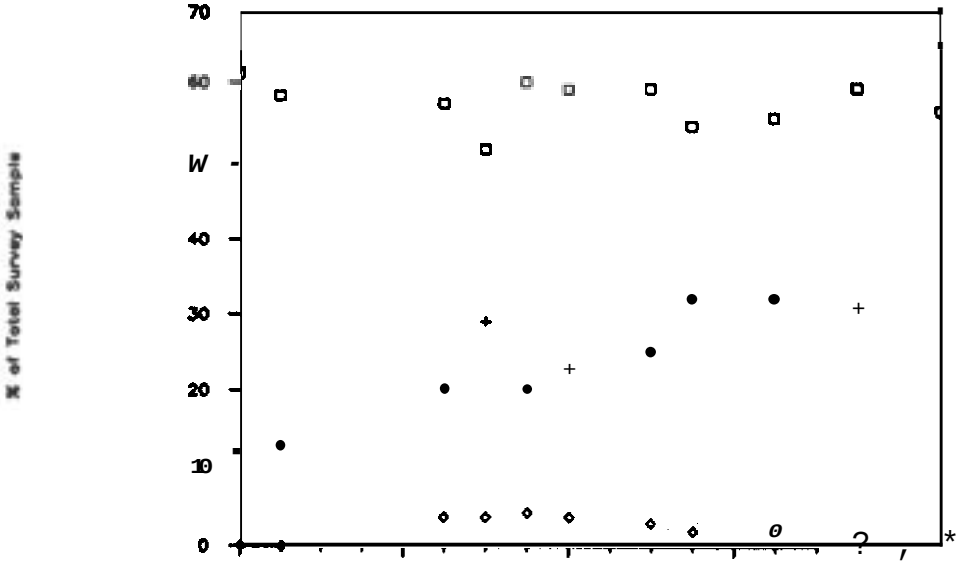
Table 10 highlights the proportion of children adequately protected by various types of child restraints in the 1987 survey compared with the results of three earlier surveys.

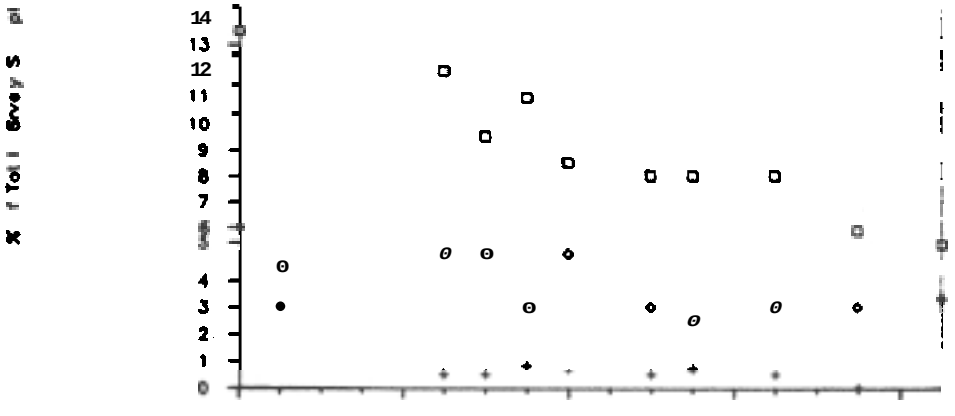
TABLE 10 - Children adequately restrained by a child restraint

Shopping Centre Locations	Total *Sample	Child Seat	Child Harness	Booster Cushion	Children Adequately Protected	
					Number	%
Kilkenny	230	56	-	20	76	33.0
Firle	233	76	1	20	97	41.6
Edwardstown	224	85	5	23	113	50.4
Salisbury	232	78	2	17	97	41.8
Marion	219	73	2	27	102	46.6
TOTAL 1987	1138	368	10	107	485	42.6
TOTAL 1986	1187	357	6	97	460	38.8
TOTAL 1984	1182	406	13	119	538	45.5
TOTAL 1982	1149	314	6	62	382	33.2

*Note: 1987 sample consists of 1138 children aged from 6 months to 8 years.
Reference: Royal Automobile Association of South Australia Inc.. 1987

FIGURE 1 - Devices observed for each survey (A)





Queensland

The Royal Automobile Club of Queensland has been responsible for conducting a number of surveys of occupant restraint usage by motorists, including children, in its State. Observations were made at shopping centre car park entrances, pedestrian crossings in main streets of smaller towns (where traffic moved slowly) and areas around schools where children congregated (Hartwig, 1985).

Results showed that 57% of children observed in the Brisbane metropolitan area were correctly restrained in the September 1985 survey, 60% were correctly restrained in the March 1986 survey and 52% in the April 1987 survey. Hartwig (1985) asserted that the findings of these surveys confirmed that because of the low usage rates of restraints by children, there is potential for greatly increasing child restraint usage by the initiation of publicity campaigns concentrating on the dangers facing unrestrained children in the case of a road crash. A further recommendation by the Royal Automobile Club of Queensland was to increase enforcement activity by police patrols by issuing more strict warnings or traffic infringement notices.

4.3 Federal Office of Road Safety Study, 1986

Following awareness of the problem of low restraint usage in rural areas, the Federal Office of Road Safety commissioned Cameron McNamara Consultants to conduct a survey in Queensland. South Australia and Western Australia in 1986. The objectives of the study were to obtain comparable information on seat belt wearing rates, and the characteristics of people not wearing seat belts throughout urban and rural Australia. Observations and interviews were conducted at service stations at nine centres, including capital cities, provincial and rural towns.

The results included the following findings:-

- of the 21,000 vehicle occupants observed, 79% were found to be wearing seat belts:
- seat belt wearing averaged 85% in the capital cities, 78% in the country towns and 73% in the provincial towns:
- seat belt wearing varied considerably according to the occupant's position in the vehicle; 84% for drivers, 80% for front seat passengers, and 63% for rear seat passengers *(see* Table 11 for more detailed results);
- seat belt wearing appeared to increase generally with age. and ranged from 67% in the 1 - 7 years group to 89% in the 30 - 49 years group;
- seat belt wearing generally increased with the length of travel on the trip prior to interview, being lowest for a distance of 1 kilometre (73%) and highest for trips of 15 kilometres and over (82%). This finding is similar to that in the Victorian April/May 1985 survey, which also showed higher wearing rates for longer distances travelled:

- a sample of vehicle occupants was asked to nominate reasons why they were not or occasionally might not wear a seat belt. Approximately three quarters of respondents nominated the following reasons: "short distance", 'uncomfortable". "couldn't be bothered" and "forgets belt".

The 1986 study provides specific information on restraint usage by children (Cameron McNamara, 1987). Overall 66% of all observed children between 1 and 8 years of age were restrained, with marginal variation between the sexes, and 82% of infants less than 1 year of age were restrained. Tables 12 and 13 show restraint usage by children for each State surveyed and by the type of restraint fitted, respectively.

TABLE 11 - Seat belt wearing: State, town, position in car (%)

STATE	TOWN	Driver	Front Passenger	Rear Passenger	ALL
Queensland	Brisbane	89	78	64	82
	Townsville	82	74	40	72
	Longreach	76	70	54	71
	ALL	84	75	50	75
South Australia	Adelaide	89	86	65	84
	Port Pirie	60	55	36	56
	Clare	64	66	65	64
	ALL	76	75	61	73
Western Australia	Perth	94	90	73	89
	Albany	95	94	93	95
	Merredin	97	93	89	94
	ALL	95	92	82	92
ALL THREE STATES		84	80	63	79

Reference: Cameron McNamara, 1987.

TABLE 12 - Proportion of children restrained by age, sex and State (%)

	Queensland			South Australia			Western Australia			ALL		
	M*	F*	ALL	M	F	ALL	M	F	ALL	M	F	ALL
Age (yrs)												
<1	74	83	80	85	74	79	86	89	87	82	81	82
1-7	48	57	53	65	58	62	82	81	82	66	67	66

Note: * M = male F = female
Reference: Cameron McNamara, 1987

TABLE 13 - Proportion of children restrained by age and type of restraint (%)

AGE (Years)	Seat belt			
	Inertia reel	Static	Other (a)	ALL
< 1	63	60	94	89
1 - 7	65	55	95	73

(a) Includes child's seats, harnesses, booster seats, infant restraints (type A) and other types of restraint.

Reference: Cameron McNamara, 1987.

4.4 *Summary*

From regular restraint usage surveys individual jurisdictions found that seat belt wearing rates vary according to the seating position of vehicle occupants, their age group, their sex, time of day, distance of travel and geographical location. By continuously monitoring seat belt wearing rates, the appropriate authorities can pinpoint the areas requiring attention and tailor strategies around these target groups.

Whilst the trend has been towards increasing availability of child restraints since the mid seventies, it is quite evident from results of the various surveys conducted, that a significant proportion of children still remain unrestrained. Depending on the particular jurisdiction, this proportion ranges from about 30-50%. To improve this situation, the increased and correct usage of child restraints needs to be fostered. The promotion of adult seat belt usage by periodic publicity campaigns and increased enforcement activity has shown that greater seat belt usage can be achieved. Accordingly, greater effort to encourage child restraint usage could enhance the protection provided for children travelling in vehicles.

5. EFFECTIVENESS OF SEAT BELT WEARING

There are three main principles which contribute to the effectiveness of seat belts in a crash. These are

reduction of the second collision by

- minimising contact with the vehicle's interior.
- protecting occupants from being thrown out of the vehicle.

increasing the time taken for an occupant to come to a halt.

. spreading the force of impact over a larger portion of the body.

Because seat belts are capable of performing these tasks they are instrumental in both reducing the number of road deaths and the severity of injuries that would otherwise occur if seat belts were not worn.

5.1 Reduction in casualties and severity of injuries

In Victoria wearing rates for seat belts were between 20% and 25% prior to the introduction of compulsory seat belt wearing in December 1970, however the rates increased to around 50% during the first year of the new law. In that same period, there was an 18% reduction in vehicle occupant fatalities. By the end of 1975 front seat belt wearing rates had progressively increased to 79%, whilst there was a corresponding 26% reduction in the number of vehicle occupant fatalities from the expected trend (refer to Figs 3 and 4). Whilst most of this reduction in fatalities was attributable to increases in seat belt fitting and usage, the adoption of other road safety countermeasures could have affected the result (Vulcan and Cave, 1986).

The impact of the introduction of compulsory seat belt wearing in Victoria is further illustrated by Figures 5 and 6 which compare the significant decline in fatalities and injuries (around 12%) for vehicle occupants with the unchanged pattern of fatalities and injuries for other road users, such as motorcyclists, pedestrians and bicyclists (Milne, 1980).

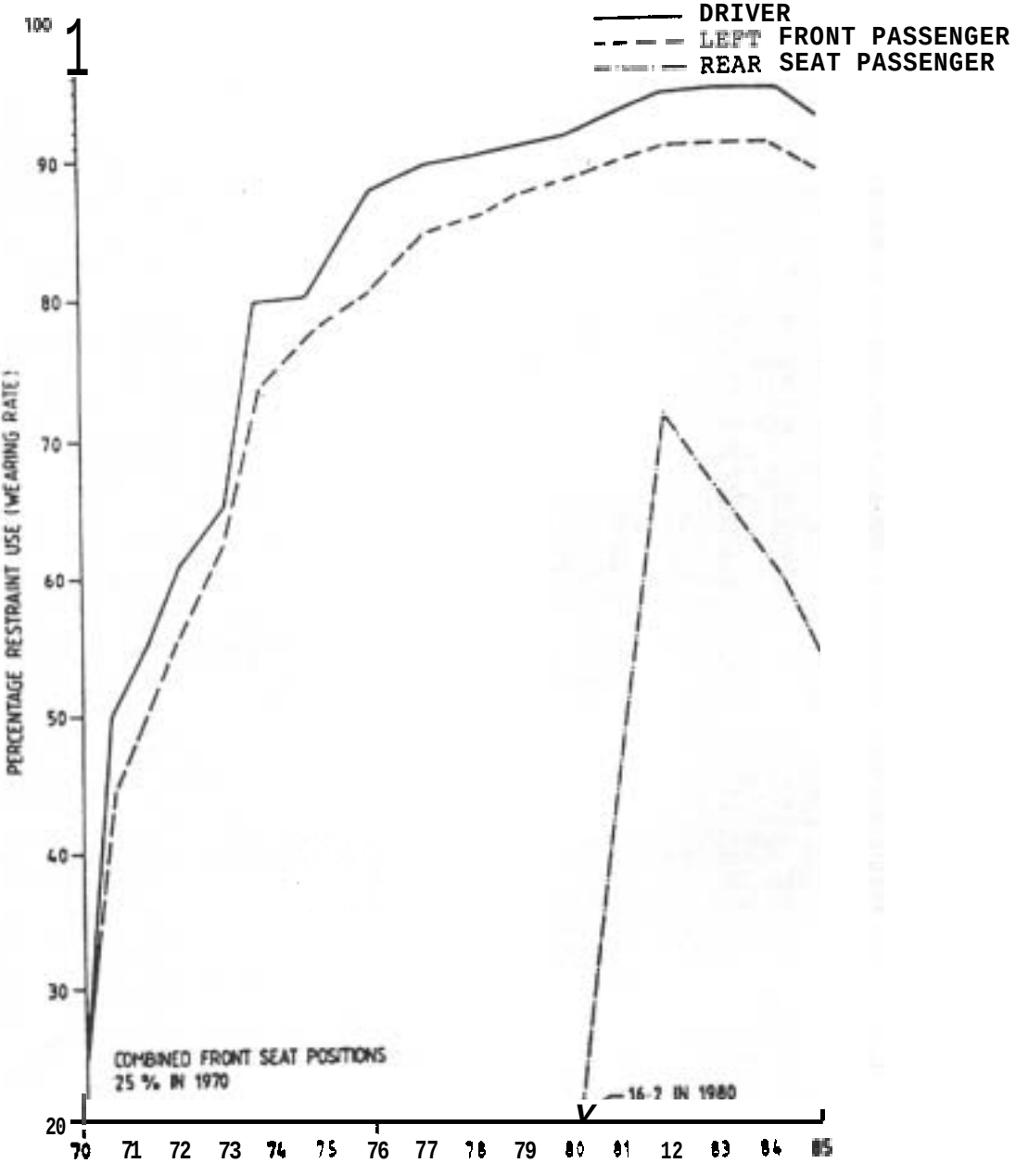
Care should be taken with the intepretation of these graphs. Because there is a paucity of data on the seat belt wearing rates of the crash population, surrogate measures based on the wearing rates of the travelling population observed in restraint surveys have had to be employed in the above-mentioned analysis. Whether seat belt wearing by the crash population increased in a similar manner to that of the travelling population, after introduction of the compulsory seat belt wearing legislation, cannot be established.

According to Milne (1980), the use of a straight line to predict the expected increase in fatalities and casualties is justified since predictors of road crashes such as population, numbers of registered vehicles, fuel consumption and distance travelled per vehicle, have also shown straight line increases over the same period. Therefore, the assumption that casualties have declined due to reduced exposure can be dismissed.

In New South Wales compulsory seat belt wearing came into effect at the end of 1971 and was associated with a reduction of vehicle occupant fatalities of 25% in the first year. Table 14 compares the actual number of fatalities with the forecast number, based on the continuation of the existing trend at the time if seat belts were not compulsory (Herbert, 1980).

Whilst the figures in Table 14 show that the difference between the number of actual fatalities from 1972 to 1979 and those predicted has been quite significant, the savings in lives could have been greater If the proportion of available belts worn had kept pace with the increase in their availability. The availability of seat belts was increasing throughout the period of, at least, the NSW study, so that by the end of the seventies the majority of vehicle occupants had belts available to them.

FIGURE 3

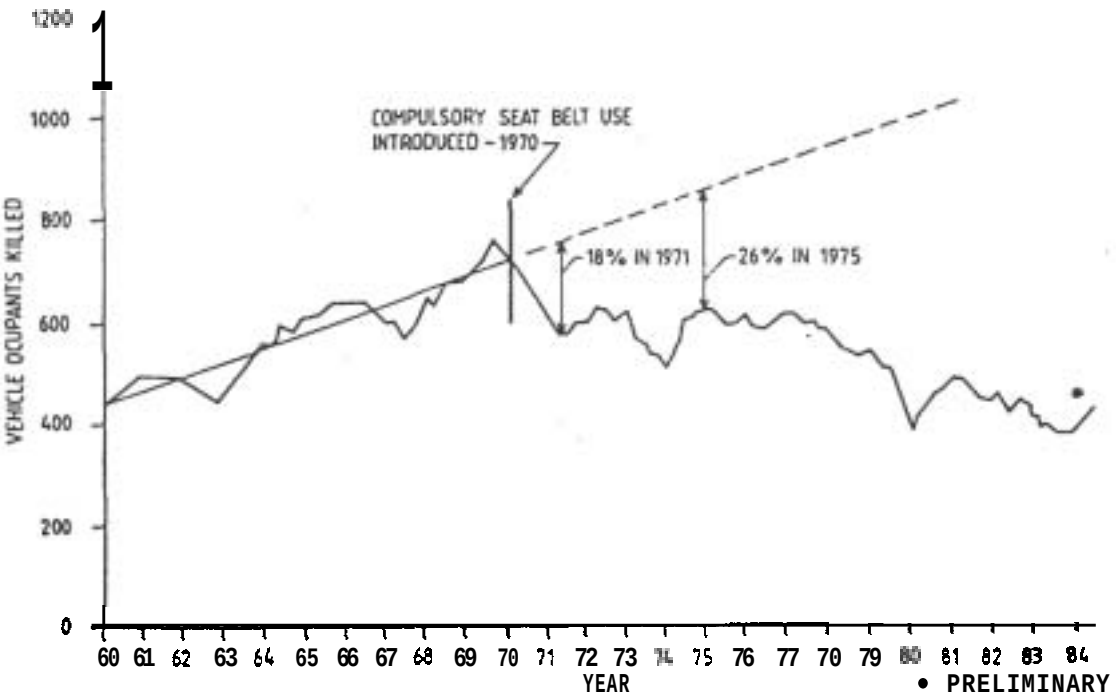


SEAT BELT WEARING RATES - VICTORIA

BY SEATING POSITION

Reference: Vulcan and Cave, 1986

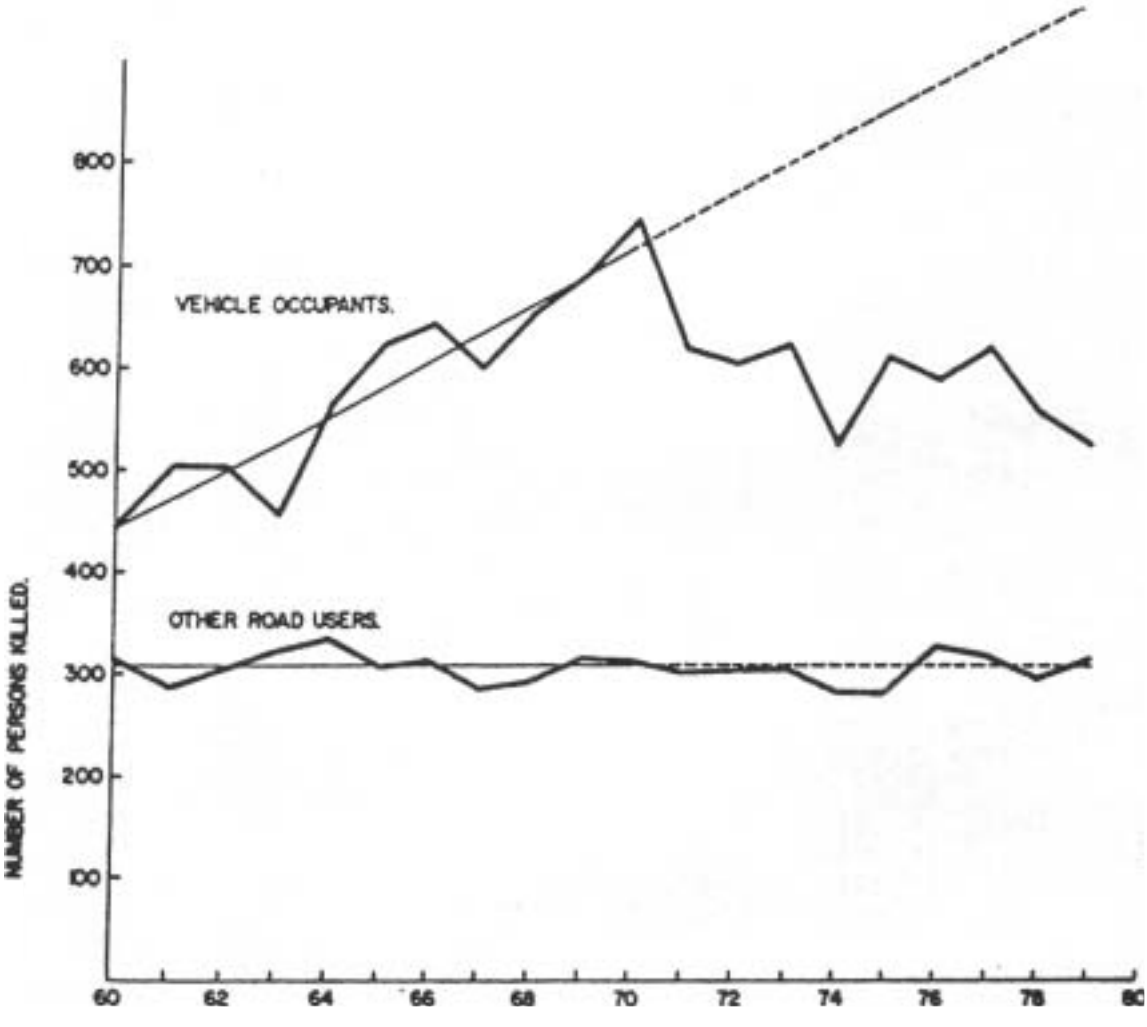
FIGURE 4



VEHICLE OCCUPANTS KILLED (12 MONTHS MOVING TOTALS) -
PROJECTED INCREASE COMPARED WITH DECLINE AFTER
INTRODUCTION OF COMPULSORY USE OF SEAT BELTS
- VICTORIA

Reference: Vulcan and Cave, 1986

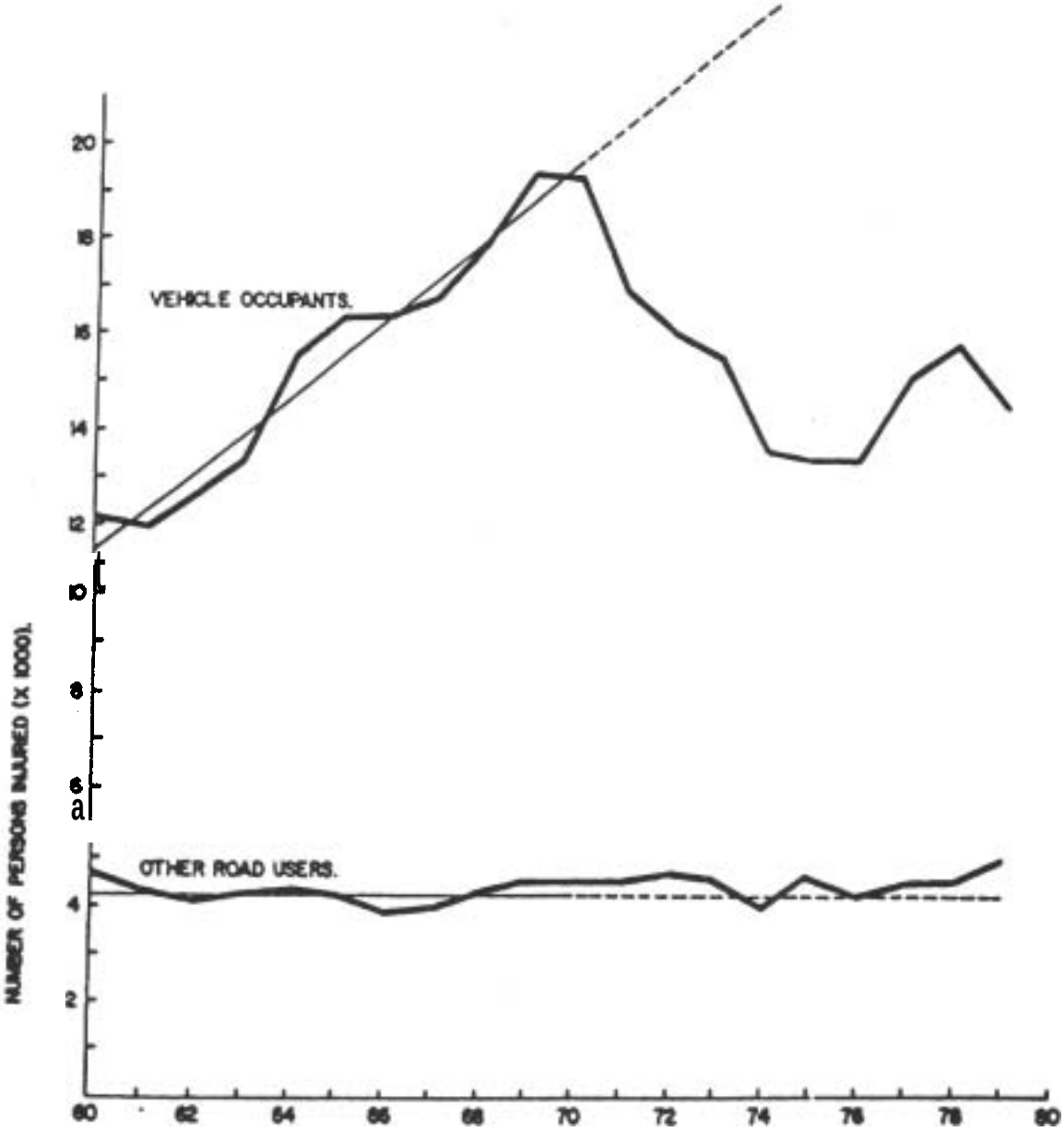
FIGURE 5



NUMBER OF VEHICLE OCCUPANTS/OTHER ROAD USERS KILLED - VICTORIA

Reference: Milne, 1980

FIGURE 6



NUMBER OF VEHICLE OCCUPANTS/OTHER ROAD USERS INJURED - VICTORIA

Reference: Milne, 1980

TABLE 14 - Vehicle occupant fatalities per annum in NSW

Year	Actual Fatalities	Predicted Fatalities	Lives Saved	
			Number	Percent
1972	701	940	239	25.4
1973	784	978	194	19.8
1974	797	1017	220	21.6
1975	843	1056	213	20.2
1976	825	1095	270	24.7
1977	836	1134	298	26.3
1978	933	1172	239	20.4
1979	877	1211	334	27.6
Total	6596	8603	2007	23.3

Reference: Herbert, 1980.

There have been arguments against the effectiveness of compulsory seat belt wearing in reducing vehicle occupant fatalities, given that internationally there was a downward trend in fatalities during the 1970's. Adams (Hamer, 1985) used a statistical model in 1981 to compare road crashes in countries with seat belt laws, with the trend in a control group of countries without these laws. He concluded that seat belt laws had not produced any reduction in casualties. He further postulated that there would be an increase in the number of pedestrians and bicyclists involved in crashes because car drivers, feeling safer by wearing seat belts, would drive more dangerously. His theory was refuted by casualty statistics produced by the British Department of Transport (Hamer, 1985). Milne (1980) showed that Australian data also refuted Adam's claims with regard to the unchanged pattern of fatalities and injuries for motorcyclists, pedestrians and bicyclists.

Cowley and Cameron (1976) attempted to quantify the effect of the compulsory seat belt wearing legislation in Australia by developing a model for the predicted reduction in occupant fatalities, resulting from a large increase in seat belt wearing rates. The model relied on Victorian injury-pattern and seat belt wearing data and employed regression techniques, which were applied to actual post-legislation fatality data in Victoria.

Whilst being reasonably successful, the calibration of the model revealed the need for more detailed fatality data and continuous measurements or estimates of seat belt wearing rates in the crash population as well as the travelling population. The study also concluded that further research was required to ascertain model parameters and post-legislation fatality trends in all States and Territories, and equivalent model parameters for casualties (as opposed to fatalities).

Evidence supporting reduced injury severity as a result of seat belt usage includes that found by the Royal Australasian College of Surgeons in their survey of Victorian road crash casualties (35.000 injured and 1,700 killed) from 1971-1973 (Trinca, 1980). When compared to occupants not wearing seat belts, restrained occupants had:

- injuries of a lower average severity, despite the direction of impact:
- lower probability of severe injury to the head;
- lower probability of injury to the face and chest;
- lower probability of being ejected from the vehicle:
- fewer major or fatal injuries to the head, neck, chest, abdomen and arms.

The survey also revealed that seat belts had altered the relative frequencies with which different objects within the vehicle caused injuries (see Table 15).

TABLE 15 - Pattern of injury survey, Royal Australasian College of Surgeons contributing causes of injuries to driver and front passengers (%)

	Driver		Front Seat Passenger	
	With belt	Without belt	With belt	Without belt
Windscreen	10.7	29.7	9.9	19.2
Steering Column	17.5	29.5	1.3	2.4
Dashboard	11.5	17.5	20.7	27.4
Ejected	1.0	10.4	1.9	10.8

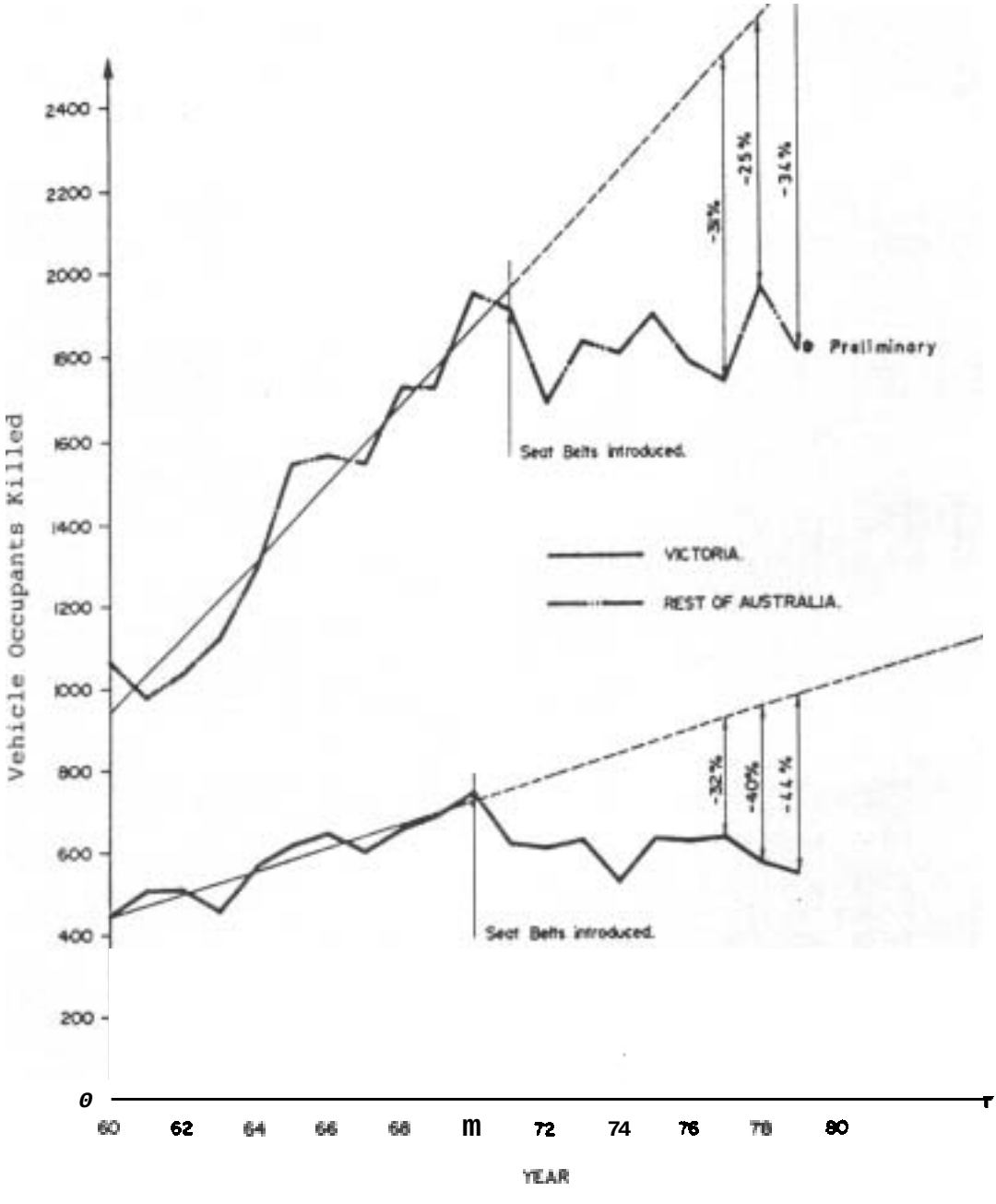
Reference: Trinca, 1980

In 1975 reports from Victorian hospitals found that 5 years after the introduction of seat belt legislation and with continuing high wearing rates there had been an 87% reduction in major eye injuries in road crash victims, a 50% reduction in facial and major chest injuries, a 40% reduction in knee cap and hip injuries and a 27% reduction in the incidence of spinal cord injuries (Trinca, 1980).

A report by the Victorian Consultative Council on Road Accident Mortality in December 1978 stated that in fatal crashes drivers and front seat passengers not wearing seat belts were injured more often and more severely than those wearing belts (Trinca, 1980).

In conclusion, the introduction of compulsory seat belt wearing laws and the consequent increase in seat belt wearing rates have been associated with a sustained reduction in the incidence of road crash fatalities and injuries of vehicle occupants. Figure 7 shows the sustained downward trend in vehicle occupants killed in both Victoria and the rest of Australia (Milne, 1980). The severity of injuries has also reduced as a result of seat belt usage. Marked and statistically significant decreases occurred throughout the country in both driver and passenger fatality and injury rates (numbers per 10.000 registered vehicles) (McDermott and Hough, 1979). These occurred in addition to the downward trend in fatality and injury rates since World War II, which arose as a result of the increased level of motorisation.

FIGURE 7



VEHICLE OCCUPANTS KILLED, VICTORIA AND REST OF AUSTRALIA

Reference: Milne, 1980

5.2 Dangers associated with incorrectly adjusted and loosely worn static belts

As evidenced by the NRMA survey of availability, wearing and adjustment of seat belts in NSW (Booth, 1986), static 3 point lap/sash belts are sometimes worn either too loosely or incorrectly adjusted. The following findings emerged:

- only 244 (45%) of the 540 static seat belts available for use were being worn correctly adjusted.
- more than 90% of adults observed with inertia reel belts available were wearing them correctly adjusted.
- 192 (almost 5%) adults were observed wearing static seat belts loosely adjusted. Another 6 adults were found to be wearing the shoulder strap of the seat belt under the arm instead of across the shoulder.
- 540 adults or 13% of the total sample had static lap/sash belts available to them compared with almost 87% of the sample having inertia reel belts available (99.5% of the total sample had a seat belt available to them).

Whilst the proportion of vehicle occupants with only static belts available to them is relatively small and declining (as the older cars disappear from the car population in Australia), 13% in the case of the above survey, the problem warrants discussion. To ensure maximum protection by a seat belt, a vehicle occupant should check for the following :-

- the belt should be done up firmly so that both lap and sash sections hold the occupant securely.
- the belt should lie flat and untwisted across the occupant's body.
- the lap section of the belt should lie across the occupant's hips and not his/her abdomen.
- the buckle should be at the occupant's side and not across his/her body.

A loose belt makes it possible for the force of the impact in a crash to eject an occupant from under the belt (known as submarining). This effect can cause abdominal injuries, as observed by Henderson and Wyllie (1973), and Herbert, Wyllie and Corben (1975). It also increases the chance of head contact with the vehicle frame, the steering column, windscreen and dashboard because of excessive movement of the occupant. Resting one's neck against the sash component exposes the occupant to carotid artery injury. Inertia reel belts, which are a feature of post-1975 vehicles, largely overcome these problems by way of their retractor mechanisms.

If a seat belt is twisted across the occupant's body. the forces resulting from a crash will not be spread over as large an area and the chances of the belt snapping will increase.

A high riding lap component of a seat belt will increase the chances of serious intra-abdominal injury (ruptured viscera) in a severe crash (Federal Office of Road Safety, 1985).

Holt and Stott (1976) considered the positioning problem of the lap strap across the pelvis. Their findings showed the shallow lap strap angles were unsatisfactory and they commented that seat mounted lap strap anchorages would improve pelvic restraint.

Chest injuries, which may also occur, are mainly a result of high belt forces and elderly people are particularly susceptible to them in the more severe crashes because of their more brittle bone structure (Vazey and Holt 1976). However, Gloyns et al. (1973) and Searle (1973) found that chest, as well as head and facial injuries were also occurring from impacts with the steering wheel. Their findings led them to criticise the axial collapse type of energy absorbing steering column and the various organisations' test requirements (Garth and Herbert, 1980).

The importance of vehicle seats as part of an occupant restraint system should not be overlooked (refer to Australian Design Rule 3 for safety requirements for seat anchorages). Problems in front seats with seat back collapse or release of the longitudinal adjuster, can leave an occupant unrestrained or subject to higher seat belt forces. Garth (1978) and Vazey and Holt (1976) found that unrestrained rear occupants or objects were dangerous to occupants in the front seats.

5.3 Injuries sustained in crashes which are attributed to the use of Seat belts

Vehicle occupants wearing seat belts are killed and injured if: they are subject to loads above the injury threshold; there is excessive movement of the belt; or there is intrusion into the occupant space. There is little evidence however, that seat belts, if properly worn, cause serious injury per se (Trinca, 1980).

Injuries induced by seat belts themselves are rare. When they do occur, the injuries commonly affect elderly people in the chest and abdominal region (i.e. damaged livers and spleens). More minor injuries which may occur from the belt forces applied to the torso during a crash. are abrasions and bruising to the chest and abdomen (Trinca, 1980).

Summary

Whilst significant benefits are to be derived from the usage of seat belts, and these far outweigh the disadvantages, there are certain pitfalls associated with their use, which should be borne in mind prior to implementing legislation mandating their use.

On the positive side, evidence from a multitude of studies shows that the number of occupant fatalities is reduced significantly following introduction of compulsory seat belt wearing, and that this reduction tends to be sustained over a period of time, provided high seat belt wearing rates are maintained. The results of any post-legislation evaluation of compulsory seat belt wearing should be treated cautiously in the early years following the legislation, since availability of seat

belts to vehicle occupants may not reach its peak for some time. Evidence also confirms the benefits of seat belt wearing in reducing the frequency and severity of injuries.

The pitfalls of seat belt wearing, which can be avoided simply, lie in the actual manner of wearing the belt. It is imperative that belts, whether of the static or inertia reel type be correctly worn and adjusted, firstly to optimise the protection which can be gained in the case of a crash, and secondly, to prevent the type of injuries which can be caused by incorrect adjustment or positioning of belts across the torso. In severe crashes, it is possible for the belt forces applied to the torso during a crash to cause chest and abdominal injuries, particularly to elderly people: however these cases are rare.

It should be recognised that the benefits vary according to whether static or inertia reel seat belts are used. This is due to the different nature of the two types of installations, since there is more potential for adjustment problems in static versus inertia reel belts.

6. EVALUATION OF PUBLICITY CAMPAIGNS PROMOTING THE USE OF OCCUPANT RESTRAINTS

In Section 2 one of the four prerequisites identified for the achievement of high seat belt wearing rates was the promotion of public awareness of the benefits of their use. Commensurate with the implementation of publicity campaigns it has been usual practice by some jurisdictions and the Federal Office of Road Safety to conduct evaluations of campaigns, to determine their effectiveness in terms of increasing wearing rates.

Federal Office of Road Safety

In 1973 and 1974 the Federal Office of Road Safety conducted a television based publicity campaign aimed at informing adults about how to correctly adjust and wear seat belts (Johnston and Cameron, 1979). It was established that the potential for both an effective campaign and its controlled evaluation existed, due to the presence of the following features in the problem of maladjustment of seat belts:-

- the basic behaviour (seat belt wearing) was widespread, publicly accepted and its safety value widely acknowledged:
- optimal seat belt adjustment was relatively low allowing considerable scope for change;
- the assumption that this low incidence was due to public ignorance was reasonably well-founded;
- the target behaviour was quite specific and able to be clearly demonstrated;
- the target behaviour could be performed at minimal cost by the target group;
- the target behaviour could be objectively measured;
- the target behaviour was known to be directly related to injury.

The communication strategy used a message source of high credibility and status (a surgeon), mild fear setting as a motivating factor and a specific, concrete demonstration of the target behaviours. Three experiments were conducted in three disparate capital cities at three different points in time, using different intensities and durations of exposure to the publicity.

The results proved the success of the television publicity in bringing about behavioural changes with respect to correct seat belt wearing. The study also showed that until the fitting of inertia reel belts spread through the vehicle population, repetitions of the publicity program in short, intense bursts would be justified with the expectation of favourable behaviour change. Another conclusion drawn from the results reinforced the proposition that it was valid to use a limited range of communication principles in campaign design. They also concluded that research evaluating the effects in the "real world" of a full-scale publicity program can be successfully conducted (Johnston and Cameron, 1979).

Work by Freedman and Lukin (1977) found that parents, particularly mothers, lacked knowledge of restraint protection for young children. Issues which needed to be addressed included the concept of "approved restraint" and the Standards Association of Australia symbol; appropriate restraints for children of particular ages or height and weight; the minimum age at which a child was compelled by law to use an available seat belt: the need for use of correctly adjusted restraints; the risks involved in nursing children, especially in front seats; and the belief that an occupant is safer in the rear than in the front of a vehicle.

The Federal Office of Road Safety conducted a press and radio publicity campaign in April 1978 aimed at achieving the following objectives:

- increasing the fitting and *use* of child restraints.
- increasing the *use* of seat belts where a more suitable restraint was not available.
- increasing the incidence of children being carried in rear seats, especially where restraints were not available, and
- evaluating the relative effectiveness of using radio alone, compared with press and radio (Boughton and Johnston, 1979).

The communications used featured a press advertisement. a 12 page supplement to a weekly magazine for women and four radio advertisements. They were specifically directed at identifying the appropriate restraint for children of different ages, whilst simultaneously recommending the *use* of a seat belt, if a more suitable restraint was unavailable. The choice of radio as a medium was selected since no Australian evaluation of the suitability of this medium for publicising restraint usage was available, and because the advertising consultants who developed the campaign wanted to maximise people's exposure to the message at the time the advice would be most valuable, that is when driving or just prior to driving.

The message employed in the communication program was based on an appeal from children involved in accidents, and relied on a pathos approach to adults, suggesting that if the safety advice was ignored the child would be threatened with unfortunate consequences. The fear appeal was tempered by presenting the alternative of using a seat belt as being better than no restraint at all.

To measure the effectiveness of the publicity campaign before and after roadside surveys of fitting and wearing of restraints by children were conducted in Melbourne, Adelaide and Perth. Results of the surveys revealed that the campaign was not effective in achieving the desired behavioural changes. However, the surveys provided valuable data on the carriage of children in cars and emphasised differences between States with or without child restraint legislation.

It was concluded that in conducting any future publicity campaigns the frequency, intensity and duration aspects would need to be carefully considered, in terms of the costs and benefits of more intense or prolonged campaigns (Boughton and Johnston, 1979).

New South Wales

In 1979 the NSW Department of Motor Transport launched a mass media campaign to promote the use of child restraints. There were three reasons for the implementation of the campaign. Firstly, compulsory use of available restraints for under eight year olds enacted in 1977 had only a temporary positive effect on restraint use. Secondly, motivational research had discovered important obstacles to child restraint use which could be eliminated by appropriate educational material designed to both inform and change attitudes. Finally, the booster cushion had been recently developed to overcome problems parents faced when restraining their children in harnesses or adult seat belts (Freedman and Lukin. 1981).

Wearing rates for children under 8 years rose from 40% before the campaign commenced, to 55% two months after it finished.

From this study the following conclusions were made with respect to the prerequisites for an effective mass media campaign to increase child restraint usage:-

- the need for adequate motivational research to determine the patterns of child restraint usage in a community. and the particular obstacles to usage, such as ignorance, negative attitudes or practical difficulties .
- the need for a good product offering adequate crash protection whilst satisfying the child's comfort needs and the parents' economy and practicality needs. Research has shown that the promotion of safety factors alone is not enough when the perceived risk of crashing is low.
- ensuring that the communications strategy attracts and sustains attention without producing defensive reactions.

As a result of declining seat belt usage, particularly by adults in rear seats. vehicle occupants in the country and children, the Traffic Authority of New South Wales launched a major road safety promotion called the "Click Clack Front-N-Back" campaign. The rationale for the promotional activity was to develop a highly visible campaign which involved a concerted effort to raise community awareness of an unexciting issue, as well as obtaining enforcement support from the Police.

The campaign was pilot tested in 1982 in a rural town in New South Wales and was devised to utilise publicity as effectively as possible (Traffic Authority of NSW, 1987). The publicity was co-ordinated with police enforcement activity in the trial rural town, whilst another rural town was trialled for enforcement activity alone and a third rural town was used as a control. The pilot scheme proved highly successful in the country with increased wearing rates evident and sustained police enforcement activity in the town where the trial involved co-ordination of publicity and police activity. In August 1984, February 1985 and May 1986 the campaign was run on a statewide basis using publicity material packaged by an advertising agency commissioned by the Traffic Authority of New South Wales. New messages were created for radio and press, as well as for poster support. However existing material was utilised for television communications.

The results of the campaign showed increases in restraint usage generally and particularly in the target groups, with variations in the different categories in the country areas surveyed. The positive effects of the campaign were maintained for six months in the country, following the intensive advertising activity. It is now the Authority's intention to conduct some restraint promotion annually to maintain the rates already achieved, as well as to improve wearing rates in the problem groups identified (Traffic Authority of NSW, 1987).

Victoria

Between October 1981 and February 1982 the Road Traffic Authority in Victoria ran a major publicity campaign aimed at increasing seat belt usage by rear seat passengers. The 'Buckle Up in the Back' campaign stressed the dangers of riding unrestrained in the rear seat and reinforced the legality of using seat belts (where fitted) in the rear. In addition. a separate campaign directed specifically at the under 8 age group commenced early in December and continued until mid-February 1982. Restraint surveys were conducted before, during and after the campaigns. Television, radio and print were used as the advertising media whilst various press conferences were held, including one at a major metropolitan hospital. From the enforcement point of view, Police co-operated in the campaign by intensifying activity on rear seat belt violations and distributing a specially produced explanatory leaflet or fining offenders.

The results (sumnarised in Table 16) reveal that over the duration of the publicity campaign restraint usage rates increased statistically significantly ($p<.001$) in every age group. Overall, there was a significant increase in rear seat belt usage from 39.5% to 67.8%.

TABLE 16 - Restraint use: Age by phase (rear seat)

Age Group	Phase 1	2	3	4	Change in % between phases 1 and 4	Nov '82 in %
<7	65.2	70.4	76.5	86.0	20.8	90.9
8-13	31.0	42.1	54.4	63.3	32.3	80.5
14-17	28.4	37.2	52.3	52.5	24.1	69.7
18-29	24.0	32.5	51.9	51.9	27.9	68.4
30-49	26.5	40.8	52.8	61.8	35.3	74.9
50+	43.0	55.7	60.0	72.1	29.1	83.2

Reference: Lane, Milne and Wood, 1984

Phase 1 was the 'before' stage of the survey and was carried out in the first week of October 1981. It was completed as close as possible to the date of campaign launch (8 October), so as to gain a true picture of rear seat restraint usage prior to the start of the publicity.

Phase 2 was a mini-survey conducted at the end of October to monitor the initial progress of the campaign.

Phase 3 occurred in the last week of November and first week of December. It was the final survey to collect information on child and rear seat restraint use before new legislation requiring use of restraints (where available) for children under 8 years old travelling in the rear seat came into force on 20 December 1981.

Phase 4 was conducted during the third and fourth week of March 1982 and collected information on rear seat restraint usage five months after the commencement of the publicity campaign and one month after the main publicity campaign had ceased.

In November 1982 a replication of the survey was carried out to assess the long term effect of the campaign.

An analysis of the results of all phases of the survey establishes the success of the "Buckle Up in the Back" campaign in its aim to encourage rear seat passengers to use restraints. The 9.5% increase in usage of rear seat restraints for children aged under 8 years between the third and fourth phases suggests that the campaign in conjunction with the new child restraint legislation was also effective.

The usage rates derived from the November 1982 survey indicated that the improvement had not only been maintained but actually increased, presumably due to a variety of low level promotions undertaken during the year.

The campaign is considered to have contributed to an overall reduction in rear seat casualties in the first six months of 1982 compared to the corresponding period in 1981, from 1207 to 1099. A statistically significant reduction was detected in the 17 and over age group.

An evaluation of the campaign found that its success was due to the following factors:-

- the publicity's purpose was to modify a behaviour perceived by road users as being relevant to the prevention of injury and death.
- the target behaviour to be modified was illegal, observable and enforceable in the intense campaign conducted by the Police.
- the monitoring of changes in behaviour in the early stages of the publicity campaign allowed early assessment of the advertising so that appropriate refinements could be made.
- the use of a broad range of media ensured maximum exposure to a wide cross section of the community (Lane, Milne and Wood, 1984).

South Australia

As mentioned in Section 4 the Road Traffic Board conducts an on-going program of surveys of seat belt usage on a semi-regular basis. The last major promotional effort occurred in August 1982 when an advertising campaign was launched with the aim of increasing seat belt wearing rates for both children and rear seat passengers.

The selection of the campaign theme and strategy was based on a research finding that the bulk of the reductions in casualties which occurred after the introduction of compulsory seat belt wearing legislation occurred primarily amongst front seat occupants. There was little change with respect to rear seat occupants, particularly children. The specific campaign objectives were as follows:

- to change attitudes about the dangers of travelling unrestrained in the rear seat of motor vehicles, particularly for children
- to increase awareness of the law regarding seat belt wearing in the rear seat
- to imply that the law will be enforced.

The target group was defined as the community in general. The creative strategy for the campaign included the following elements:

- highlighting what happens to the unrestrained rear seat passenger in the event of a crash or sudden braking
- providing an incentive to the driver to insist that rear Seat passengers be restrained (that is, by demonstrating how he/she could be hit and injured by an unrestrained rear seat passenger)
- informing and reminding people that the law provided for a fine for failure to wear a restraint, and emphasising that the law was enforced .

The creative strategy was based on a mild use of fear - both of injury and risk of apprehension - and on provision of information not widely known. The campaign included advertising in all media as well as the distribution of a seat belt leaflet inserted in a school children's publication.

To assess the effect of the "Buckle Up in the Back Seat" campaign "before - after" surveys were conducted during August and November 1982, respectively. Table 17 highlights the fact that whilst driver seat belt usage remained unchanged at 91% for both the before and after surveys, there was a statistically significant increase in front passenger ($p<0.01$) and rear passenger ($p<0.001$) wearing rates in the after survey period (Road Traffic Board of South Australia, 1982).

From Table 18 it can be seen that for all children (under 8 years of age) observed with access to a suitable restraint, wearing rates rose from 48% to 63%.

These statistically significant changes in wearing rates suggest that the publicity campaign had achieved its objective of increasing seat belt usage in the target audience, that is children and rear seat passengers. Some unexpected benefits were achieved with front seat passengers also. Because the evaluation did not include the use of a control group it can only be suggested and not proved, that the publicity campaign was the sole contributing factor to the observed increases in restraint use (Road Traffic Board of South Australia, 1982).

TABLE 17 - Usage by seating position and restraint type (where fitted)

Restraint Type	Driver		Front Passenger		Rear Passenger	
	Before	After	Before	After	Before	After
Static Lap	6 (75%)	7 (78%)	5 (56%)	3 (33%)	1 (4%)	6 (38%)
Static Lap sash	617 (88%)	749 (88%)	123 (71%)	167 (81%)	68 (37%)	97 (53%)
Inertia Reel	1331 (93%)	1730 (93%)	319 (83%)	387 (88%)	8 (47%)	16 (76%)
Child Restraint	- -	- -	1 *	0 *	32 (71%)	53 (90%)
TOTAL	1954 (91%)	2486 (91%)	448 (79%)	557 (85%)	109 (40%)	172 (61%)

Reference: Road Traffic Board of South Australia. 1982

TABLE 18 - Children 0-7 years: usage by restraint type and seating position (where fitted)

Restraint Type	Front		Rear		Total	
	Before	After	Before	After	Before	After
Static Lap	- -	- -	1 (7%)	2 (18%)	1 (7%)	2 (15%)
Static Lap sash	1 *	4 (57%)	17 (39%)	18 (42%)	18 (40%)	22 (44%)
Inertia Reel	4 (50%)	6 (75%)	1 (17%)	2 (33%)	5 (38%)	8 (57%)
Child Seat	1 *	- -	32 (87%)	50 (94%)	33 (86%)	50 (94%)
Safety Harness	- -	- -	- -	2 -	- -	2 -
Bassinett	- -	- -	- -	1 (25%)	- -	1 (25%)
TOTAL	6 (60%)	10 (59%)	51 (46%)	75 (63%)	57 (48%)	85 (63%)

Reference: Road Traffic Board of South Australia, 1982

Notes:

1) Restraint *use* is unknown for 1 child in the front and 2 in the rear in the before survey, and 2 children in the rear in the after survey. These children have been omitted from this table.
2) Adult seat belts are considered suitable for children aged one year or older.
3) A bassinet is not considered a suitable restraint.
4) - Indicates no occupants observed.
5) * Indicates sample too small to calculate percentage.

Summary

In developing an effective publicity campaign to improve restraint usage certain issues need to be considered if the objectives of the campaign are to be achieved. These are as follows:-

- the target behaviour to be modified must be observable:
- the target group should be readily identifiable;
- the choice of media mix for presentation of the message should be carefully designed so as to reach the target audience:.
- where possible motivational research should be conducted to establish existing patterns of restraint usage and any particular obstacles (attitudinal or practical) to usage: and
- the need for a good product offering adequate crash protection, since research has shown that the promotion of safety factors alone is not enough when the perceived risk of crashing is low.

The various campaigns described in this section were devised to incorporate most, if not all, of the above principles. As a result the majority were considered to be effective in that the objectives they sought to achieve, were met.

Promotion of restraint use for adults. children and infants should be on-going, as reinforcement of safety messages is necessary to remind people of the importance and benefits of using the available protection systems. This strategy needs to be co-ordinated with regular police activity to deter non-compliance of restraint belt wearing laws.

7. EXTENDING THE USE OF RESTRAINTS

Previous sections have concentrated on restraint systems for able bodied adults and children over 1 year of age travelling in cars and their derivatives. Protective devices are also available for infants, disabled people and the occupants of trucks, buses and forward control vehicles.

Overcoming the technical problems identified with fitting child restraints to vehicles is another way of extending restraint *use.*

7.1 Child and infant restraints

An in-depth study, known as IMPACT 7, was conducted by the Traffic Accident Research Unit in NSW in 1977/1978 to evaluate the crash protection of SAA approved child restraints (Corben and Herbert, 1981). The findings from observations of 231 crashes on NSW roads revealed that the restraints afforded very good crash protection in often severe crashes when they were installed correctly, and not loaded directly by other parts of the vehicle, for example boot luggage.

However, a more recent study (Booth, 1986) has revealed problems with the ability to properly install child restraints in vehicles, due to the incompatibility in design of the two, resulting in'reduced safety benefits for children.

7.1.1 Problems with compatibility of vehicle design with child restraints

The NRMA Traffic and Safety Department in conjunction with the Traffic Authority of NSW regularly conducts seat belt inspections on new model cars. The prime purpose of these is to provide a comfort rating for adult seat belts and to determine the compatibility of existing child restraints approved to AS 1754 with seat belts approved to AS E35 in motor vehicles complying with the appropriate Australian Design Rules (ADR's). Examination of the compliance of seat belt and child restraint anchorages with the relevant ADR's is also carried out.

Inspections carried out in 1986 on 34 vehicles manufactured in 1984, 1985 and 1986 discovered a number of compatibility problems between child restraints and vehicles, which reduce the safety benefits (Booth. 1986). These include the following:-

- unavailability of child restraint anchorages, mainly in light vehicles designed for carrying passengers. for example four wheel drive vehicles, (evident in 18% of the vehicles tested).
- inability of child seats to be securely fastened to a vehicle seat using a seat belt, (evident in 18% of the vehicles tested).
- inadequate angles between the child restraint tether strap and the child restraint anchorage, (refer to ADR5 in the third edition of Australian Design Rules for the anchorage requirements). This problem was evident in 24% of the vehicles tested.

- recessed child restraint anchorages leading to difficulties with the tightening of anchorage bolts, (evident in 53% of the vehicles tested).

- vehicle hardware, such as a locking pin for a folding rear seat squab, damaging a child restraint tether strap. (evident in 6% of the vehicles tested).

- inappropriate location of child restraint anchorages, for example under the carpet or insulating material, (evident in 6% of the vehicles tested).

- lack of space for some restraints in smaller vehicles, (evident in 6% of the vehicles tested).

- necessity of extension tether straps to enable installation of child restraints, (evident in 38% of the vehicles tested).

Some of these difficulties can be addressed by educating the general public about the range of ancillary hardware (eg. extension straps etc), which complete the occupant restraint system. Others require amendment to the Australian Design Rule for child restraint anchorages (ADR 34A). Currently it is proposed to amend ADR 34A to require the fitting of child restraint anchorages in more vehicles, specifically light vehicles designed for carrying passengers, including off-road passenger vehicles.

Inspections of new vehicles to confirm compliance with the design rules also address some of the above problems. but there are cases where it is up to the child restraint manufacturer or the car manufacturer to consider the problem.

In recent years the Traffic Authority of NSW has developed a manual, providing advice to their child restraint fitting stations. on the correct fitting of child restraints, including infant restraints, in vehicles. A national edition of such a manual is being jointly produced by the Authority and the Federal Office of Road Safety.

7.1.2 Infant restraint loan schemes

In 1980 the Road Traffic Authority of Victoria conducted a survey of restraint usage by infants up to 1 year of age. The results revealed that only 12% of this group were restrained in bassinets. The limited usage was largely due to the high cost of purchasing bassinet restraints and the short period of time for which they could be utilised.

Two years later the Victorian Government introduced a bassinet restraint loan scheme on a pilot basis in an outer suburb of Melbourne. The scheme was administered by the Infant Welfare Centre network and restraints were hired at a nominal fee of up to $10 per loan period. An evaluation of the pilot scheme in 1984 concluded that the scheme operated efficiently and was worthy of full scale implementation (Addicoat, 1987).

A statewide loan scheme was introduced in January 1985. At the end of November 1986, 201 out of 210 municipalities in Victoria had agreed to operate a loan scheme and 197 had received their allocation of restraints. In the period between the trial and the commencement of the statewide scheme, specially designed infant restraints approved by the SAA became available. All the restraints provided in the statewide scheme were SAA approved: hence, no bassinet restraints were made available in the extended loan scheme.

Funding for the scheme has been provided by both the Ministry of Transport and Ford Australia, with the former providing for the purchase and delivery of SAA approved safety infant restraints, publicity, salaries and delivery of tether straps, and the latter also providing for the purchase of approved bassinets as well as a vehicle for training sessions. By November 1986 the total funding of the scheme by the Ministry of Transport was $825,000.

The latest evaluation of the program has been divided into two major forms; a process evaluation of the scheme operation and an impact evaluation on road safety (Addicoat, 1987). The process evaluation highlighted the success of the scheme with more than half of the scheme co-ordinators requesting additional infant restraints. Problems relating to the operation of the scheme have been insignificant.

The impact evaluation is relying on an accumulation of data and hence will extend over several years. This evaluation will examine the impact of the scheme on road crash severity with regard to deaths and injuries to children from birth to six months of age. The process of matching the files of crashes recorded in the infant restraint loan scheme with the Authority's crash data has commenced. During 1988 a decision is to be made on whether the program should be continued and to what extent (Addicoat, 1987).

Prompted by the success of a trial Baby Restraint Rental Plan implemented in co-operation with a Sydney hospital, the New South Wales Government introduced a full scale infant restraint loan scheme in April 1986. Only restraints approved by the Standards Association of Australia and the Traffic Authority of New South Wales are used in the scheme. The information and experience gained from the pilot scheme enabled the Traffic Authority of New South Wales to offer detailed guidelines for the establishment and operation of other rental plans.

Hospitals, municipal councils and community service organisations serve as outlets for the hiring of equipment and are assisted financially by the Government Insurance Office in the form of low interest rates, if finance is desired. The advantages of the financial assistance are that the local plans are financially viable and the rental costs are reduced to around one third of the purchase price of a restraint. Due to the high demand for equipment in some areas, there have been problems of availability. It is hoped that the supply problems will be rectified prior to the introduction of mandatory restraints for infants in 1988.

In Perth, the Western Australian Division of the Child Accident Prevention Foundation of Australia (CAPFA) is conducting a hire scheme called the Bassinet Loan Service. The scheme commenced in November 1984 with sixty infant restraints. Twenty five per cent of the restraints are loaned to holders of health care cards for a nominal deposit. Others wishing to hire a restraint pay a deposit as well as a weekly rental fee. When the restraint is returned in good condition, the deposit is refunded. Each restraint is loaned with a set of manufacturer's instructions and these are reviewed with each lessee.

The Child Accident Prevention Foundation of Australia also operates a loan scheme in the Australian Capital Territory under the sponsorship of the National Roads and Motorists' Association Insurance Limited. Based in an outer suburb of Canberra the scheme has been running for almost 2 years with positive community acceptance and support.

During 1985/86 the Road Safety Council of the Northern Territory conducted a pilot programme in the Gove Peninsula for the hiring of infant restraints to parents of children under 6 months, which was financially supported by the Territory Insurance Office. The pilot scheme received such extensive community support that the Council extended the scheme to include Darwin, the capital of Northern Territory (Road Safety Council of the Northern Territory, 1986). Whilst the programme is supported and advertised by the Road Safety Council, the Automobile Association of Northern Territory administers the service.

Similar infant restraint loan schemes are also operating successfully in Queensland, South Australia and Tasmania.

In the establishment of any such infant restraint loan schemes, the issue of liability in the case of injury to an infant, is a prime consideration which needs to be researched thoroughly before implementing the scheme. In organising their operations the Child Accident Prevention Foundation has handled the problem in the following way.

In the case where a baby restrained in a hired infant restraint which is damaged, dies as a result of a road crash, the manufacturer of the restraint is covered by public liability insurance. However, in the case where a baby dies in a road crash as a result of being restrained in an incorrectly fitted restraint that has been hired, the national office of the Child Accident Prevention Foundation is protected by insurance cover.

The establishment of infant restraint loan schemes has proved an important factor in the implementation of legislation mandating the use of restraints for children less than one year of age. Loan schemes are seen as a practical means of ensuring low income earners have access to restraints at a reasonable cost.

.2 Wheelchair restraints for the disabled

A nationwide survey to obtain informatfon about the nature and extent of various disabilities and handicaps in the Australian community was conducted from February to May 1981 (Key, 1982). The results revealed that 13.2% of Australians at that time were disabled and of these approximately 33% (1,264,000) were handicapped. A definition of disablement is the "loss or reduction of functional ability", whilst handicap is defined as the "disadvantage or restriction of ability caused by disability". Mobility problems constitute the largest area of handicap, with 72.6% (917,664 of the number handicapped) thus affected.

The Australian Bureau of Statistics (ABS) defines 'mobility handicap' as - "difficulties in using public transport, moving around a person's own home, moving around unfamiliar places, walking 200 metres, walking up and down stairs". (ABS 1981).

Due to a paucity of information on the number of disabled people travelling either in family cars, taxis, public transport or small buses (provided by health establishments which they may attend), it is impossible to estimate crash involvement, let alone crash risk. Because many incidents, such as failure of restraints causing free movement of passengers or equipment inside a vehicle, largely remain unreported, the issue of occupant restraint for the disabled has been somewhat neglected (Key, 1982). Needless to say there should be no discrimination against any group of people afforded occupant protection within vehicles.

A 1981 study of overseas literature (Key, 1982) on wheelchair restraints identified the following obstacles:-

- the standardisation problem in relation to the size of the wheelchair itself and the concomitant implications for restraint design.
- the structural strength of the vehicle to which the device is to be secured.
- the question of whether restraints should be secured to the wheelchair frame or to the wheels.
- method of securement of the wheelchair passenger, that is to the wheelchair restraint or vehicle structure.
- the question of whether wheelchairs should be side, forward or rear facing.
- the question of whether or not wheelchairs should be used as vehicle seats at all.

A number of wheelchair restraint systems are currently in use around Australia (Road Traffic Authority of Victoria, 1986). They include one where the wheelchair is tied to the vehicle's interior with leather straps. This system is inadequate due to the stretching and drying out of the leather and hence its tendency to break during sudden braking or in the case of a collision.

Special purpose vans in Victoria called maxi-taxis use two clamps to secure the wheelchair to the vehicle floor. However, the wheelchair frames and wheels are weak and can easily buckle. Once again this system is not sufficiently secure enough to prevent the wheelchair from breaking free.

Other systems incorporate occupant lap belts secured to the frame of the wheelchair at each end by tying or by a single screw. Under sudden braking the occupant is thrust forward against the belt, stressing the attachment to the wheelchair and its frame. These attachments and wheelchair frames tend to fail under such loadings.

The Road Traffic Authority of Victoria is currently refining an A Frame wheelchair restraint so it can be fitted in a wider range of vehicles. The wheelchair restraint complies with the Australian Standard for such devices. The Road Safety Vehicle Regulations passed on 1 March 1988, make it mandatory for all people in wheelchairs to be restrained by a system approved by the Road Traffic Authority of Victoria. The Australian standard will be specified as the approved system, however dispensation will be given in cases where it is unreasonable to meet the Australian standard.

During laboratory tests the A Frame wheelchair and occupant restraint system out-performed alternative systems in simulated crash conditions. The system uses wheelchair attachment brackets to help the wheelchair withstand the load created by both the passenger and its own weight. The A Frame unit is mounted on a keyhole slotted steel channel built into the floor of the vehicle. The wheelchair is then "reversed" into the A Frame and the anchorage brackets of the wheelchair engage with the anchorage points.

The occupant is restrained by the lap/sash retractor type seat belt, which is permanently attached to the A Frame. In case of an emergency both the occupant and wheelchair can be quickly released.

With respect to special child restraints/seats for disabled children, an Australian company called Safe-n-Sound manufactures a special purpose child safety seat for disabled or handicapped children (which is a copy of the British Britax seat). The objective is to provide a child seat to suit children with a wide variety of special travel needs. and which can be fitted in all types of motor vehicles including sedans, station wagons, and mini-buses. The product is not approved by the Standards Associatfon of Australia but is the only such product for disabled children on the Australian market.

7.3 Seat belts for forward control vehicles. omnibuses and medium and heavy goods vehicles

Table 19 indicates seat belt requirements presented in the third edition of the Australian Design Rules (AORs), which are to come into effect progressively from 1 July 1988. The requirements of the second edition of the ADRs have been broadly carried over to the new edition, therefore the table reflects the present situation. The identification of each of the vehicle categories shown in Table 19 is given in the Table 20. It should be noted that forward control passenger vehicles (category MC) are vehicles which carry up to 9 persons including the driver. Other vehicles, such as omnibuses and light goods vehicles, can also be of forward control configuration.

As a result of a desire to improve seat belt installation and wearing in heavy vehicles, proposals are being considered by the relevant ATAC committee to extend the ADR seat belt requirements to omnibuses, and medium and heavy goods vehicles. These proposals include the following: -

- the fitting of belts to "exposed seats" in omnibuses. Protected seats in omnibuses are those which have seats in front of them. whereas exposed seats do not.
- the fitting of emergency locking retractor belts to driver's seats in goods vehicles over 4.5 tonnes and omnibuses over 3.5 tonnes.
- the fitting of belts to the driver's seat where suspension seats are used in both goods vehicles over 4.5 tonnes and omnibuses over 3.5 tonnes.
- the fitting of emergency locking retractor belts to left hand front outboard seats in goods vehicles over 4.5 tonnes and omnibuses over 3.5 tonnes.

These proposals would involve amendments to the present ADRs and would be incorporated in the third edition of the ADRs.

Because the ADR system only specifies requirements for fitting of seat belts, and the State and Territory transport authorities are responsible for legislation requiring compulsory wearing of seat belts where fitted in vehicles, the enforcement of the proposed improvements to seat belt installations for drivers of omnibuses, and medium and heavy goods vehicles, will be in the hands of the States and Territories, once they come into effect.

TABLE 19 - Types of seat belt and 'anchorages' required (3)

Vehicle Category	MA*	MB	MC	MD1	MD2	MD3	MD4	ME	NA	NB1	NB2	NC
Front Row 'Seats'												
Driver	R	R	R	R	R	L1	L1	L1	R	R	L1	L1
Passenger	R	R	R	R	R	-	-	-	R	R	L1	L1
Centre	L	L	L	L	L	-	-	-	L	L	-	-
2nd Row 'Seats'												
Outboard(1)	R	R	L/S	R	-	-	-	-	R	R	-	-
Centre	L	L	L	L	-	-	-	-	L	L	-	-
3rd etc Row 'Seats'												
Outboard(2)	L/S	R	L/S	R	-	-	-	-	L/S	L/S	-	-
Centre	L	L	L	L	-	-	-	-	L	L	-	-

Where:
L = Lap 'Anchorage'
L/S = Lap/Sash = Lap + Upper torso
- = no requirement
L1 = At least lap 'Anchorage'
R = Lap/Sash with Retractor
* See Table 17 for key to vehicle categories

Notes:
(1) If no 'Permanent Structure', then lap 'Anchorages' are acceptable.
(2) If 'Seat' is adjustable for conversion of occupant space to luggage or goods space and is not an outboard 'Seat' in the front or second row of 'Seats' then lap 'Anchorages' are acceptable.
(3) Upper torso restraint 'Anchorages' shall not be provided for side facing 'Seats' (see Clause 5.2.4.4)

TABLE 20 - Key to vehicle categories in Table 19

Key to headings

VEHICLE CATEGORY (As defined in Part 1) of "ADR Definitions")	Vehicle Category Code
Passenger Car	MA
Forward-control Passenger Vehicle	MB
Off-road Passenger Vehicle	MC
Light Omnibus	MD
MD1 up to 3.5 tonnes 'GVM', up to 12 seats	
MD2 up to 3.5 tonnes 'GVM'. over 12 seats	
MD3 over 3.5 tonnes, up to 4.5 tonnes 'GVM'	
MD4 over 4.5 tonnes. up to 5 tonnes 'GVM'	
Heavy Omnibus	ME
Light Goods Vehicle	NA
Medium Goods Vehicle	NB
NB1 over 3.5 tonnes, up to 4.5 tonnes 'GVM'	
NB2 over 4.5 tonnes. up to 12 tonnes 'GVM'	
Heavy Goods Vehicle	NC

Reference: Australian Design Rules for Motor Vehicles and Trailers. Federal Department of Transport and Communications, 1988

Summary

The benefits of restraint wearing have principally been evidenced in relation to occupants of passenger cars and derivatives. Further benefits are expected with the extension of availability of restraints to disabled people and the occupants of trucks, buses and forward control vehicles.

8. FUTURE DIRECTIONS FOR POLICY AND RESEARCH

8.1 Improvements in seat belt design

Complaints by users to motorists' associations, governments and manufacturers about the discomfort and difficulties associated with seat belts, resulted in a sustained effort throughout the seventies to improve the design and installation of seat belts.

Despite these improvements, problems were considered to still exist with seat belt design. Specifically in relation to passenger vehicles and their derivatives, Garth and Herbert (1980) suggested the following aspects required investigation:-

- modifications to the seat belt geometry involving the attachment of the belts to the seat rather than to the body of the vehicle, to prevent submarining and the consequent abdominal and lower spine injuries.
- the use of belt force limiters (particularly in the shoulder strap).
- the use of adjustable sash guides or variable top position attachment points for the sash part of the belt, and belt tension reducers. to improve wearer comfort
- the use of seat belt pretensioners to remove all slack from the belt system and belt clamps to reduce excursion of the occupant in a crash.

To achieve maximum effectiveness of the seat belt system, so that the incidence and severity of head injuries (as well as other injuries) can be reduced, improvements should be considered in conjunction with the vehicle's internal environment. An additional improvement which would enhance the effectiveness of the seat belt system would require investigations into the use of energy absorbing padding In seats and stiffer suspension for seats, to restrict submarining and help restrain the pelvis (Garth and Herbert, 1980).

The incidence and severity of head injuries are important since, although significant reductions in such injuries followed the introduction of seat belt wearing (Trinca, 1980), head injuries are still occurring despite seat belt usage. Improving seat belt design to prevent travel of an occupant's head in a crash, and Improving vehicle design to reduce the impact force on the head are obvious avenues for further investigation.

Road safety policy in Australia, with respect to occupant protection. has focussed on the integration of safety devices (eg. seat belts) with vehicle design (through the development of the Australian Design Rules). More rigorous and technologically advanced research concentrating on performance criteria of seat belts and other occupant restraint systems, such as airbags, has occurred in Europe and the United States. It is, therefore, essential that Australia keeps abreast of these developments.

As an initial step, the Federal Office of Road Safety research previously mentioned is to assess developments in recent years for both seat belts and alternative protective systems, including vehicle design.

8.2 Restraint wearing for infants

Recent policy initiatives have resulted in new legislation in 1988 in some jurisdictions, requiring the compulsory restraint of infants under one year of age by suitable devices. This move essentially brings about compulsory restraint wearing for all vehicle occupants in those States which have introduced the new legislation.

With the establishment of infant restraint loan schemes, increasing availability of approved infant restraints on the market and the ADR requirement for child restraint anchorages in new cars, it was timely to mandate restraint wearing for infants under one year of age.

Because seat belts have been designed to adequately fit a 50th percentile six year old child, the new legislation points to the need for research to attempt to develop belts suitable for a wider range of children. A need also exists for better anthropometric data which could indirectly benefit seat belt design for children. A feasibility study is presently being carried out by the Federal Office of Road Safety, to determine whether the current equipment used to classify anthropometric data can provide data useful for occupant protection surveys and vehicle design.

8.3 Role of publicity and enforcement

As evidence by the results of surveys of restraint use, publicity and enforcement activity play a significant role in the maintenance of wearing rates. Both activities should be combined to ensure compliance of the law, and to maximise the effectiveness of any publicity campaign. Publicity alone is not sufficient to maintain wearing rates over long periods of time. Enforcement activity is required so that vehicle occupants perceive the risk of detection as being high enough to warrant the wearing of restraints, and to reinforce the value of restraint wearing.

Communications regarding the benefits of restraint use need to be publicised on a regular basis, to reinforce the reasons for adopting safe restraint wearing behaviour.

9. CONCLUSION

Following the introduction of mandatory wearing of seat belts the number of fatalities as a result of road crashes declined by 18% and 25% in Victoria and New South Wales, respectively, in the first year of the law. The incidence of severe injuries also decreased. Whilst it could not be statistically proven that the reduction in fatalities and severe injuries was due to the compulsory use of seat belts alone, the two factors were highly correlated.

From regular restraint usage surveys individual jurisdictions found that seat belt wearing rates were high in the first few years subsequent to the introduction of seat belt legislation. In recent years wearing rates range from 50% (rear passengers) to 95% (drivers). Despite the mandating of seat belt wearing in both front and rear seating positions, the general public has held the perception that travelling in the rear seat is relatively safe and hence rear seat belt usage has continued to be considerably lower than front seat belt usage. The lack of continuous enforcement may also contribute to the lower seat belt usage in rear seats. There is still room for improvement in wearing rates for particular groups, to gain further benefits from restraint use by both adults and children.

A means of increasing seat belt wearing rates is by addressing the comfort and adjustment problems in some belt systems.. With an increasing proportion of the vehicle populatlon having inertia reel belts, some of these problems associated with static belts will be significantly reduced in the future. Several changes to the design of seat belts, such as the use of pretensioners and sash guides, need to be considered in the context of generating a three-fold effect of increasing wearing rates and hence reducing fatalities and eliminating injuries caused by incorrectly adjusted belts.

The continuing occurrence of head injuries, despite seat belt usage, needs to be considered when investigating changes to seat belt systems. Improvements in vehicle design to reduce the impact force on the head in a crash, should also be considered. Such changes would need to be subject to cost/benefit analyses to ensure that the costs involved in the design and production, and administration of the changes are justified in terms of the extent of the benefits anticipated.

To both educate and re-educate road users of the safety benefits of wearing correctly adjusted seat belts and child restraints, numerous publicity campaigns have been conducted over the years. Whilst these campaigns have proved to be successful in influencing attitudes and behavioural change, they also established a need for periodic publicity to reinforce the appropriate messages as people tend to re-adopt old habits. For maximum effectivenss, these communications need to be co-ordinated with regular and highly visible police enforcement of the restraint wearing laws.

The success of compulsory restraint wearing in Australia has been characterised by the presence of four important features. These are a detailed specification for design, construction and installation of restraints; a multi-layered system of quality control and inspection; enforcement: and education and publicity to increase awareness of the benefits of restraint wearing.

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APPENDIX I

SPA Standards relating to restraint design and installation

Name of Standard	Endorsement date	Comnent	Responsible SAA Committee
Seat belts			
E35-1961 Safety belts and harness assemblies for motor vehicles	28 April 1961	1. Strength requirements largely based on British Standard BS3254:1960 2. Did not specify installation reauirement 3. No dynamic test requirement	SF/15, Car Seat Belts
E35-1965 Seat belt assemblies for mtor vehicles	15 July 1965	1 Increased test requirements and included a sunlight degradation test 2. Included more detailed requirements for belt fitting and use 3. In June 1967 standard amended to include requirements relating to the certification mark scheme	SF/15, Car Seat Belts
E35, Part 1-1970 Seat belt assemblies for mtor vehicles	Created by an amendment dated March 1971	1. Upgraded test requirements and imvroved ease of-adjustment and buckle location' 2. Removed all references to diagonal belts	SF/15, Car Seat Belts
E35, Part 11-1970 Seat belt assemblies (including retractors) for tmtor vehicles	24 June 1970	1 Was the first Australian standard for retractors	SF/15, Cat Seat Belts
Seat belt anchorages			
D11-1967 Seat belt anchorage points	3 May 1967	1. Established technical requirements far the location, dimensions and strength of belt anchorage points	SF/15, Car Seat Belts
Webbing			
E47-1968 Webbing for restraining devices for occupants of tmtor vehicles		1. Information in this standard was originally included in E35-1965 2. Rewritten as a separate standard to include requirements for child restraints	

Name of Standard	Endorsement date	Comment	Responsible *SAA* Committee
€47-1971 Webbing for restraining devices for occupants of mtor vehicles	25 June 1971	1. Introduced three new classes of webbing and amended test requirements	AU/8 Motor Vehicle Restraints
AS1753-1975 Webbing for restraining devices for occupants of motor vehicles-metric units	14 March 1975	1. Introduced two new classes of webbing and abrasion requirements 2. Metricated E47-1971	AU/23 Webbing for Seat Belts
Chlld restraints E46-1970 Child restraining devices for passenger cars	6 February 1970	1. Included requirements for construction, design and testing, and instructions for installation, use and marking 2. Also included requirements for restraining devices for car seat squabs and cushions	SF/15, Car Seat Belts
AS1754-1975 Child restraints for passenger cars and derivatives	17 March 1975	1. Included many additional requirements such as dynamic testing, easier adjustment and installation, and additional energy absorbing materia1s 2. Scope of standard widened to include net-type enclosing restraints for use with bassinets, a rearward facing chair with harness and reclining child restraints	AU/22 Child Restraints

Reference: Milne, 1979.

APPSNDIX II

$plication of Design Rules by vehicle category and date

ADR No.		Passenger cars: Forward control passenger vehicles up to 8 seats (a) 9 seats (b)	Passenger cars: Passenger cars (includes station wagons)	Passenger cars: Passenger car derivatives (includes panel vans, utilities)	Passenger cars: Multi-purpose passenger cars	Omnibuses: up to 3.5 tonnes GVM up to 12 seats (c) over 12 seats (d)	Omnibuses: 3.5 tonnes GVM and over	Other vehicles up to 4.5 tonnes GVW	Other vehicles exceeding 4.5 tonnes GVW
4	Seat belts								
	Front seats	..	Jan 1969	Jan 1969	Jan 1970	..	..	Jan 1970	..
	Rear seats	..	Jan 1971	Jan 1971	Jan 1971	..	..	Jan 1971	..
4A	Seat belts	..	Jan 1974	Jan 1974	Jan 1974	..	..	July 1974	..
4B	Seat belts	..	Jan 1975	Jan 1975	Jan 1975	..	..	July 1975	..
4C	Seat belts	Jan 1985(a) Jan 1985(b)	Jan 1976	Jan 1976	Jan 1976	*July 1983(c) *July 1983(d)	.. ..	July 1976	..
4D	Seat belts	Jan 1986(a) Jan 1986(b)	Jan 1984	..		Jan 1987(c) ..(d)	.. ..	..	..
5A	Seat belt anchorage points-								
	Front seats	..	Jan 1969	Jan 1969	Jan 1971	..	..	Jan 1971	..
	Rear seats	..	Jan 1971	Jan 1971	Jan 1971	..	..	Jan 1971	..
5B	Seat belt anchorages	Jan 1985(a) *Jan 1985(b)	Jan 1975	Jan 1975	Jan 1975	'July 1983(c) 'July 1983(d)	.. ..	July 1975	..

Application of Design Rules by vehicle category and date

ADR No.		Passenger cars: Forward control passenger vehicles up to 8 seats (a) 9 seats (b)	Passenger cars: Passenger cars (includes station wagons)	Passenger cars: Passenger car derivatives (includes panel vans, utilities)	Passenger cars: Multi-purpose passenger cars	Omnibuses: up to 3.5 tonnes GVM up to 12 seats (c)	Omnibuses: over 12 seats (d)	Omnibuses: 3.5 tonnes GVM and over	Other vehicles up to 4.5 tonnes GVW	Other vehicles exceeding 4.5 tonnes GVW
32	Seat belts for heavy vehicles	..	..	..	..	..	..	..	..	July 1977
32A	Seat belts for heavy vehicles	..	..	..	..	..	..	..	..	July 1980
34	Child restraint anchorages	..	+July 1976	..	..	..	..	..	..	..
34A	Child restraint anchorages	@Jan 1986(a) @Jan 1986(b)	Jan 1985	..	..	@Jan 1987(c)	.. (d)	..	..	..

+ Rear seats only
* Front seats only (including the driver's seating position)
@ Applicable to three rear seating positions only

Reference: Milne, 1979 (updated version, 1985)

APPENDIX III

Table 1

History of restraint legislation in Australia

YEAR	NEW SOUTH WALES	VICTORIA	SOUTH AUSTRALIA	QUEENSLAND	WESTERN AUSTRALIA	TASMANIA	AUSTRALIM CAPITAL TERRITORY	NORTHERN TERRITORY
1964		.From 1 Oct 1964 seat belt anchorages were required to be fitted to front outer seating positions of cars manufactured on or after this date						
1967			.Cars first registered on or after 1 Jan. 1967 but manufactured prior to 1 Jan. 1970 were required to have seat belts in both the driver's and one other front seating position.					
1969	From 1 Jan. 1969 all new cars had to be fitted with belts in all front seating positions.	. From 1 Jan 1969 3 point lap/sash belts were to be fitted to front outer seats Of cars first registered on or after that date.		.From 1 Jan. 1969 all new cars had to be fitted with belts in all front seating positions.	.Cars manufactured on or after 1 Jan. 1969 were required to have seat belts fitted to front seating positions.			
1970		.From 22 Dec 1970 it was compulsory to wear seat belts when fitted (no age exemptions were stipulated in the legislation).	cars manufactured and first registered on or after 1 Jan. 1970 were required to have seat belts fitted to Ill front seating positions.	F m 1 Jan. 1970 all vehicles except motor cycles, omnibuses (seating more than 8 persons) and vehicles exceeding 4.5 tonne gross had to be fitted with belts in all front seat positions.	. Other vehicles manufactured on or after 1 Jan. 1970 mere gross mass did not exceed 4.5 tonnes were required to hare seat belts fitted to front seating positions.	From 4 Mar. 1970 seat belts and anchorages were to be fitted to each front seat Of vehicles registered between 4 Mar. 1970 and 1 Jan. 1971. Frm 4 Mar. 1970 seat belts and anchorages were to be fitted for every seating position in vehicles first		

YEAR	NEW SOUTH UALES	VICTORIA	SOUTH AUSTRALIA	WEENSLAND	WESTERN AUSTRALIA	TASMANIA	AUSTRALIAN CAPITAL TERRITORY	NORTHERN TERRITORY
						registered on or after I Jan. 1971. and seat belts were to be of the lap/sash type.		
1971	. F r m 1 Jan. 1971 all new cars had to have seat belts fitted in all seating positions. . From 1 Oct. 1971 it vas compulsory for persons 14 years of age or over to wear seat belts when fitted in cars.	F r m 1 Jan. 1971 all new cars had to have seat belts fitted to all seating positions. From 1 July 1971 all vehicles first registered between 1 Jan. 1951 and 30 Sep. 1964 had to be fitted with seat belts in the front outer seating positions.	. Cars manufact-ured and first registered on or after 1 Feb. 1971 were required to have seat belts fitted in all seating positions. . From 29 Nov. 1971 it was compulsory to wear seat-beits where fitted in accordance with the above requirements. Applied to passengers from 8 years up to 70 years of age. Over 70's exempt (exemption removed 1/5/04).	. From 1 Jan. 1971 all vehicles except those listed above had to be fitted with seat belts in all rear seating positions.	. Cars and Vehicles (as specified above) manufact-ured on or after I Jan. 1971 were required to have seat belts fitted to rear seating positions.	. From 15 Sep. 1971 it was compulsory to wear all seat belts provided (with some exceptions) adjusted and securely fastened.		
1972				. From 1 Jan. 1972 it was compulsory to wear seat belt5 when fitted to vehicles.			From 1 Jan. 1972 it was compulsory to wear seat belts where fitted.	. Fro. 1 Jan. 1972 it was compulsory for each seat to have a seat belt; for bench seats the length divided by 400mm indicated the number of seat-ing positions. . From 1 Jan. 1972 a person had to wear a seat belt when sitting in a seat fitted with a belt.

YEAR	NEW SOUTH WALES	VICTORIA	SOUTH AUSTRALIA	WEENSLAND	WESTERN AUSTRALIA	TASMANIA	AUSTRALIAN CAPITAL TERRITORY	NORTHERN TERRITORY
1973	. From 1 April 1971 all cars first registered after 1 Jan. 1965 and before 1 Jan. 1969 were required to have Seat belts fitted in front outside seating positions.							
1971		. F m 18 Feb. 1974 all vehicles manufactured between 1 Oct. 1964 and 31 Dec. 1968 had to be fitted with belts in the front outer seating positions.						
1976		. F m 17 Jan 1976 children less than 8 years hid to use SAA* approved child restraint, child restraint approved by Chief Commissioner of Police. or SAA* approved seat belt if in front seating position of a passenger car. No requirement if in rear.	F m 22 Oct. 1976 it was compulsory to wear Seat belts where fitted (regardless Of the date of manufacture or first registration of the vehicle).					

YEAR	NEW SOUTH WALES	VICTORIA	SOUTH AUSTRALIA	QUEENSLAND	WESTERN AUSTRALIA	TASMANIA	AUSTRALIAN CAPITAL TERRITORY	NORTHERN TERRITORY
1977	. From 1 March 1977 children less than 8 years had to use an available SAA* approved child restraint or seat belt if children were aged one or more, in passenger cars and their derivatives. Could be unrestrained in front only if all suitable restraints in front seating positions were in use. Unrestrained in rear only if all (front and rear) suitable restraints were in use.				. From 25 Mar. 1977 it was the driver's responsibility to ensure that children between the age of five and eight years, who occupied a seat position in passenger cars, their derivatives or goods vehicles with gross weight not exceeding 4.5 tonnes, where seat belts were fitted should wear them properly adjusted and securely fastened. An approved child restraint was acceptable. Could be unrestrained in front or rear only if all (front and rear) suitable restraints were in use.	. From 22 Nov 1977 children less than 8 years had to use SAA* approved child restraint if in front of passenger cars. No requirement if in rear.		
1979				. From 3 Nov 1979 children less than 8 years had to use available SAA* approved child restraint, or seat belt if children aged one or more in passenger cars, their derivatives or multipurpose passenger cars. Could be unrestrained in front only if all rear seating positions were occupied and all suitable restraints in front seating positions were in use. Unrestrained in rear only if all	From 2 Feb. 1979 the "child" passenger's age was amended to "of or over the age of five years and under the ages of fourteen years".		. From Oct. 1979 it was the driver's responsibility to ensure that a child (person over 1 year but under 8 years) used either a seat belt or a child restraint where provided in all vehicles except motorcycles, motor omnibuses and vehicles over 4.5 tonnes Gross Vehicle Mass. Unrestrained in front only if all rear seating positions were occupied and all suitable restraints in front seating positions were in use. Unrestrained	

YEAR	NEW SOUTH WALES	VICTORIA	SOUTH AUSTRALIA	QUEENSLAND	WESTERN AUSTRALIA	TASMANIA	AUSTRALIAN CAPITAL TERRITORY	NORTHERN TERRITORY
				(front and rear) suitable restraints were in use.			in rear only if all suitable restraints in rear seating positions were [illegible].	
1980			From 1 Jun 1980 children less than 8 years had to use available SAA approved child restraint or other device to limit forward movement of child in all motor vehicles. Could be unrestrained in front only if all rear seating positions were occupied by children and all suitable restraints in front seating positions were in use by children. Unrestrained in rear only if all (front and rear) suitable restraints were in use by children.					
1981					From 29 May 1981 children less than 8 years must be restrained by SAA* approved child restraints or seat belts if child is aged one or more. Can be unrestrained in front only if all (front and rear) seat belts are in use and all rear seat positions not fitted with seat belts are occupied. Unrestrained in rear only if all rear seat belts are in use			From 1981 a person must sit with a belt where possible and wear it. Children and young persons under 14 must do the same (driver onus). There must be no more persons in front seat of vehicle with front and rear seats than there are seat belts.

YEAR	NEW SOUTH WALES	VICTORIA	SOUTH AUSTRALIA	QUEENSLAND	WESTERN AUSTRALIA	TASMANIA	AUSTRALIAN CAPITAL TERRITORY	NORTHERN TERRITORY
					. Other vehicles of gross vehicle mass exceeding 4.5 tonnes manufactured on or after 1 Jul. 1981, are required to have seat belts fitted.			
1982	. From 1982 children less than 14 years are required to be restrained.							
1984						. From 1984 a prescribed vehicle became any vehicle other than - a motor cycle - a vehicle constructed for the carriage of more than 8 adult persons - a commercial goods vehicle or an articulated vehicle within the meaning of the Motor Vehicles Taxation Act 1981 - a work vehicle within the meaning of the Act - a vehicle licensed as a cab or hire car under Part III of the Act. . From Aug 1984 children less than 8 years can be unrestrained in front of passenger cars only if no other restraints (SAA approved child restraints		

YEAR	NEY SOUTH WALES	VICTORIA	SOUTH AUSTRALIA	QUEENSLAND	WESTERN AUSTRALIA	TASMANIA	AUSTRALIAN CAPITAL TERRITORY	NORTHERN TERRITORY
						or seat belts if Child over I year of age) are available and the back seat is full. They must use suitable restraints if available. when seated in rear.		
1986				.From Jul 1986 children less thin 10 years Of age must use available suitable restraint In front and rear.				
1987			.From 1 Jan. 1987 it is the driver's responsibility to ensure that passengers from 1 year of age and under 16 years of age wears their seat belts.					
1988	From 1 Mar. 1988 children under one year of age must be restrained by a suitable SAA* approved child restraint.	.From 1 Mar 1988 it is the driver's responsibility to ensure that a child under one year of age is properly restrained by a suitable Child restraint.	.From 1 Jan. 1988 it is the driver's responsibility to ensure that a child under one year of age wears a child restraint in passenger car type mtor vehicles manufactured on or after 1 Jul. 1976.					.It is anticipated that changes to the Traffic Act will require children under m e year of age to be restrained by an available suitable restraint. from April 1988.

YEAR	NEW SOUTH WALES	VICTORIA	SOUTH AUSTRALIA	QUEENSLAND	WESTERN AUSTRALIA	TASMANIA	AUSTRALIAN CAPITAL TERRITORY	NORTHERN TERRITORY
Source of Legislation	Regulation 110F2 and 3(a) of the Motor Traffic Act	Motor Car Act 1958, 53Ib(1) and Road Safety Act 1986. Traffic Regulations.	Section 162ab of Road Traffic Act.	Regulation 90B(1) and (2)(a) and (b) of the Traffic Act.	Regulation 1621(3) (4)(5)(a) and (b) of the Road Traffic Code 1975.	Traffic Regulations Miscellaneous, Section 75.	Motor Traffic Ordinance 1936.	Part IIA Section 33A-33H of the Traffic Act.

'Note: Amendments to the legislation are being prepared relating to requirements for passengers aged 16 years or over. 10 years and over but under 16 years. and one year and over but under 10 years. These passengers will be required to occupy a seat fitted with a seat belt if such a seat is available. Currently they must occupy a seat fitted with a seat belt if such a seat is available in the same row of seats.

* Standards Association of Australia.

References: Thomson (1982) and Boughton (1980) updated with information provided by State and Territory Transport Authorities.

APPENDIX III

Table 2

Legislative requirements for seat belt wearing and exemptions at December 1987

Basic requirement	Exemptions: Reversing	Medical	Min Age	Max Age	Local deliveries	Other	Penalty	Retrofitting requirement
New South Wales							$50	From April 1973 belts have to be fitted in the front seats of cars and derivatives first registered on or after 1 January 1965.
'No person shall. while occupying a seat position in a motor car to which a seat belt has been fitted for the seat position, drive or travel upon a public street. In that motor car unless rearing that belt and the belt is properly adjusted and securely fastened' Regulation under the Motor Traffic Act.	x[6]	X	1[1]	70[4]	X	(i) Taxi drivers. (ii) Front seat occupants Of taxis if no retractor belt fitted. (iii) Certificate from Commissioner of Motor Transport.		
Victoria								
'A person shall not be seated in a motor car. that is in motion. in a seat for which a safety belt is provided unless he is rearing the safety belt and it is properly adjusted and securely fastened.' - Motor Car Act	16	X	2		X	(i) Certificate from Commissioner of Police	1135	From July 1971 belts have to be fitted to the front seats of all cars (first registered on or after 1 Jan. 1951). prior to the issue of a road-worthiness certificate (which is required on change of ownership). From Feb. 1974 belts have to be fitted in the front seats of all cars manufactured after 1 Oct. 1964.
Queensland								
'A person. when occupying in a motor vehicle a seat position to which a seat belt has been fitted, shall not drive or travel. upon a road. in such motor vehicle unless he is wearing such seat belt properly adjusted and securely fastened' - Regulation under the Traffic Act.	x[6]	X	1		X	(i) Certificate from Commissioner for Transport. (ii) Taxi drivers.	150 and 2 demerit points (no points for passenger offences)	
Western Australia								
'A person shall not. while occupying a seat position in a motor vehicle to which a seat belt has been fitted for that seat position. drive or travel upon a road unless he is wearing that seat belt and the Seat belt is properly adjusted and securely fastened' - Road Traffic Code.	I	X	1	70[4]	X	(i) Persons under the age of 8 years wearing a child restraint device.	$40 and 2 demerit points. *Max.* penalty is $400, first offence and $800 subsequent offence.	

Legislative requirements for seat belt wearing and exemptions at December 1987

Basic requirement	Exemptions: Reversing	Medical	Min Age	Max Age	Local deliveries		Other	Penalty	Retrofitting requirement
South Australia									
'A perron who is in a motor vehicle that is in motion shall not OCCUPY a seating position that is equipped with a seat belt, unless he or she is wearing the seat belt and it is properly adjusted and securely fastened' - Road Traffic Act.		X			X	(i) (ii)	Passenger in emergency vehicle. Certificate from Minister of Transport.	Up to $1000[3]	From 1 January 1967 seat belts were required in the two front seats of all new passenger vehicles.
Tasmania									
'No person shall be seated in a motor vehicle that is in notion, in a seat for which a seat belt is provided. unless - (a) that person is wearing a seat belt; and (b) that seat belt is properly adjusted and securely fastened' - Regulations under the Traffic Act.	X[6]	X	1[9]		X	(i)	Certificate from Registrar Of Motor Vehicles.	Max $200[3]	
Australian Capital Territory									
'If at any time while a prescribed vehicle the driving position of which is fitted with a seat belt is being driven forward, or has its engine running. on a public street, the person occupying the driving position[5] of that prescribed vehicle does not hare that seat belt securely fastened around him or. having it fastened around him, does not have it appropriately adjusted. that person is guilty of an offence' - Motor Traffic Ordinance.	X[6]	X	11	70[4]	X	(i) (ii)	certificate from Registrar of *Motor* Vehicles or from any other appropriate jurisdiction in Australia. Defendant can also establish that failure to comply was not unreasonable.	$80	
Northern Territory									
'Where a motor vehicle, the driving seat of which is fitted with a seat belt, is being driven forward on a public street or in a public place and the person occupying the driving seat[5] of the motor vehicle does not have that seat belt securely fastened around him. or having it fastened around him. does not have it appropriately fastened. that person is guilty of an offence' Traffic Ordinance.	X[8]	X[8]	1		8	(i)	Certificate from Registrar of Motor Vehicles.	$200[10] or 6 months imprisonment.[3]	

Notes:

1. All children under 8 (14 in NSW) riding In passenger cars and derivatives must

   - wear a suitable child restraint or adult seat belt where available
   - or where none is available the child must ride in the back seat
   - the driver of the vehicle is responsible for seeing that chlldren 12 months to 13 years of age are correctly restrained (ACT. *NSY* - under 12 months to 13 years if a suitable restraint is available. NT), 12 months to 17 years in Victoria. 12 months to 10 years in Queensland, and 12 months to 7 years in the other States.

   An adult seat belt is considered suitable if the child is older than 12 months. From 1/3/1988 a suitable restraint must be made available for a child under 1 year of age in NSW.

2. Children under 8 can ride only in the front seat of passenger cars and station wagons if they are properly restrained by a child restraint or safety belt.

3. The Traffic Infringement Notice or on-the-spot fine is $135 in Victoria. $30 in SA, $50 in *NT,* and $60 plus 2 demerit Points in Tasmania. New regulations expected to commence in the NT in Feb. '88 will increase the penalty to $2000 or 6 months imprisonment.

4. Passengers only.

5. A similar requirement applies to passengers.

6. Drivers only.

7. Children under 8 can only ride in the front seat of a passenger car or derivative if they are properly restrained by an approved child restraint.

8. The Registrar of Motor Vehicles issues exemptions for medical reasons and also to persons engaged in local deliveries (the latter doer not apply in NT). In addition it is understood that police do not enforce wearing when a vehicle is reversing (this docs not apply in the NT, as the belt is only required to be worn while the vehicle is being driven forward.

Reference: Milne. 1979 (updated version. 1985)

APPENDIX IV

Seat belt fitting rates - driver only(a)

Location	Type of belt	Fitting rate %	Source reference
Melbourne			
May 1971	Lap-sash	66	15
February 1972		77	15
February 1973		81	15
Mav 1973		82	7
February 1974		88	15
February 1975		90	15
December 1975		94	7
February 1976		95	15
December 1976		95	7
February 1977		96	15
February 1978		98	15
March 1978		96	7
July 1978		97	7
February 1979		98	44
February 1980		98	44
September 1980		99	44
November 1982		97	39
March 1984		100	39
Rural Victorian cities			
May 1971		62	15
February 1972		68	15
February 1973		75	15
February 1974		86	15
February 1975		90	15
February 1976		93	15
February 1977		95	15
February 1978		97	15
February 1979		97	44
February 1980		98	44
September 1980		99	44
Sydney			
June-July 1972		80	17
May 1974		92	7
October 1974		93	17
November 1975	All	97	29
November 1976	Lap-sash	97	18
July 1977		97	54
November 1978		98	19
November 1980		100	4
August 1982		100	55
August 1983		100	56
November 1984		100	4
Jul/August 1985		100	46
Jul/August 1986		100	45

Location	Type of belt	Fitting rate %	Source reference
Brisbane			
May 1974	"	82	7
Perth			
May 1974	"	79	
March 1978	"	91	
July 1978	"	91	
Adelaide			
October 1971	All	67	48
October 1972		69	48
May 1973	Lap-sash	80	7
October 1973	All	74	48
October 1974		78	48
October 1975		82	48
October 1976		85	48
December 1977		95	48
March 1978	Lap-sash	91	7
July 1978		91	7
Hobart			
May 1973		74	7
Newcastle			
May 1974	"	88	7
August 1986	"	100	45
Wollongong			
May 1974		88	7
August 1986		100	45
Canberra			
December 1975		93	7
December 1976		96	7
March 1978		97	7

(a) For ease of presentation, these data refer to the driver position only. Fitting rates for other seating positions are known to be lower than for the driver position. A comprehensive analysis of fitting data is contained in reference 6.

Reference: Milne, 1979

APPENDIX V

Seat belt wearing rates - driver only[a]

Location	Type of belt	Wearing rate** %	Source reference
Melbourne			
May 1971	Lap-sash	75	15
February 1972		79	15
February 1973		82	15
May 1973		83	7
February 1974		91	15
February 1975		89	15
December 1975		85	7
February 1976		93	15
December 1976		85	7
February 1977		93	15
February 1978		92	15
March 1978		84	7
July 1978		85	7
February 1979		93	44
February 1980		93	44
September 1980		91	44
November 1982		95	39
March 1984		96	39
May 1985		93	12
May 1986		94	d
Rural Victorian cities			
May 1971		60	15
February 1972		73	15
February 1973		76	15
February 1974		85	15
February 1975		86	15
February 1976		83	15
February 1977		84	15
February 1978		87	15
February 1979 (a)		88	44
February 1980 (a)		88	44
September 1980 (b)		87	44
March 1984 (c)		90	39

Location	Type of belt	Wearing rate** %	Source reference
Sydney			
August 1970	All	19	Derived from Ref. 62
April 1971		30	
June 1971		32	
September 1971		50	
October 1971		60	
November 1971		76	"
February 1972		75	
June-July 1972	Lap-sash	86 (incl. LHF)	17
December 1972	All	89	Derived from Ref. 62
February-March 1973		94	
November-December 1973		91	"
May 1974	Lap-sash	85	7
October 1974		83 (incl. LHF)	17
November 1975	All	94	29
November 1976	Lap-sash	84 (incl. LHF)	18
January 1977		87	54
July 1977		91	54
July 1978		89	54
July 1979		89	54
July 1980		85	54
July 1981		84	54
August 1982	All	87	55
August 1983		89	56
July-August 1984		89	46
July-August 1985		93	46
July-August 1986		90	45
Brisbane			
May 1974	Lap-sash	84	7
Jun-July 1976		66	35
Jun-July 1979		65[x]	35
Jun-July 1980		73[x]	35
Adelaide			
October 1971	All	37	48
October 1972		81	48
May 1973	Lap-sash	65	7
October 1973	All	78	48
October 1974		72	48
October 1975		70	48
October 1976		90	48
December 1977		91	48
March 1978	Lap-sash	84	7
July 1978		82	7

Location	Type of belt	Wearing rate** %	Source reference
November 1982	All	91	36
*May-June 1987		88	51
Perth			
May 1974	Lap-sash	86	7
March 1978		87	7
July 1978		87	7
May 1979	Lap-sash	96	8
Hobart			
May 1973	"	69	7
Newcastle			
May 1974	"	84	7
August 1986	All	87	45
Wollongong			
May 1974	Lap-sash	81	7
August 1986	All	92	45
Canberra			
December 1975	Lap-sash	83	7
December 1976		84	7
March 1978	"	83	7

(a) For ease of presentation, these data refer to the driver only. Driver wearing rates are known to be higher than those of other occupants. A comprehensive analysis of wearing data is contained in reference 6.

d Extracted from "Road Safety Initiatives and Countermeasures". Road Traffic Authority of Victoria, March 1987.

* Results of daytime sample only. 85% of drivers In night sample were restrained.

x Includes both school and non-school samples ie weekdays plus Saturday mornings.

** Figures reflect wearing rates where seat belts have been fitted.

Reference: Milne. 1979

APPENDIX VI

Availability of restraints to children observed in cars (per cent)

Survey Date	Seat Belt	Child restr-aint	Restr-ained Bass-inet	All restr-aints	Children Observed	Survey Description: Age of Children	Vehicles	Locations	Day of Week	Time of Day	Time of Year	Reference
Adelaide												
March 1978	33	21	[illegible]	55	456	Less than 8 years	Cars and derivatives	Signalised intersections	Thursday to Sunday	6 am to midnight	School term	Boughton & Johnston (1979)
July 1978	35	21	2	58	411							
Jun/Aug 1982	40	47	Not specified	87	1191			Shopping centres	Not specified	Not specified	Not specified	Royal Automobile Association of South Australia Inc., 1987
Jun/Sep 1984	35	56	"	91	1221						"	
Jun/Sep 1986	33	57	3	93	1261						"	
August 1987	30	61	4	95	1215						"	
Brisbane												
August 1976	38	16	Not observed	54	1683	6 mnths to 8 yrs (est)	Cars, but not hire cars	Shopping centres	Weekdays	Not specified	School term & vacation	King (1977)
	38	20	"	58	539			Signalised intersections	Weekdays and on Saturday			
April 1979	46	29	"	76	1401			Shopping centres			School term	King (1979)
July 1980	Not specified			85	1433							King (1980)

Survey Date	Seat Belt	Child restr-aint	Restr-ained Bass-inet	All restr-aints	Children Observed	Age of Children	Vehicles	Locations	Survey Description Oay of Week	Time of Day	Time of Year	Reference
Canberra												
Dec 1975	30	28	Not observed	57	632	Less than 8 years	Cars and derivatives	Signalised intersections	Thursday to Sunday	6 am to midnight	School term	Johnston (1976)
Dec 1976	37	27	1	65	742	"	"	"	"	"	"	Boughton and Milne (1978)
	55	15	Nil	70	365			Schools, pre-schools	Weekdays	Before and after school	"	Unpublished
	44	26	*	70	763			Shopping centres, swimming pools, etc.	Weekdays & weekends	Daylight	"	DoT survey results
March 1978	37	28	•	65	403			Signalised intersections	Thursday to Sunday	6 am to midnight		"
Oct 1979	Not specified			93	1635	Not specified		Schools, shopping centres, food outlets, swimming pools	Not specified			Department of Capital Territory (1980)
Feb 1980				91	2623			Schools				"
				88	3986			Shopping centres, etc.				"

Survey Date	Seat Belt	Child restr-aint	Restr-ained Bass-inet	All restr-aints	Children Observed	Age of Children	Vehicles	Locations	Survey Description Day of Week	Time of Day	Time of Year	Reference
Melbourne												
Dec 1975	32	26	Not Observed	57	660	Less than 8 years	Cars and derivatives	Signalised intersections	Thursday to Sunday	6 am to midnight	School term	Johnston (1976)
Dec 1976	33	26	2	61	456	"	"	"	"	"	"	Boughton and Milne (1978)
	48	21	Nil	68	73	"	"	"	Thursday to Friday	9 am-noon 1 pm-4 pm	"	Unpublished DoT survey results
	57	20	Nil	77	170	"	"	Schools, pre-schools	Weekdays	Before and after school	"	"
	33	29	1	63	263	"	"	Shopping Centres, swimming pools, etc.	Weekdays & weekends	Daylight	"	"
	Not specified			58	924	Less than 8 years (est)	"	Shopping centres	Weekdays	9 am-noon 1 pm-4 pm	"	Randall (1977)
				49	423			Signalised intersections			"	"
March 1978	41	24	•	66	417	Less than 8 years	"		Thursday to Sunday	6 am to midnight	"	Boughton & Johnston (1979)
July 1978	37	26	2	65	385	"	"				"	
June 1979	42	30[b]	Not specified	72	404	"	"			7 am-7 pm	"	Wood (1980)

Survey Date	Seat Belt	Child restr-aint	Restr-ained Bass-inet	All restr-aints	Children Observed	Age of Children	Vehicles	Locations	Survey Description: Day of Week	Time of Day	Time of Year	Reference
Melbourne cont.												
Oct 1979	40	33[b]	Not specified	74	479	Less than 8 years	Cars and derivatives	Signalised intersections	Thursday to Sunday	7 am-7 pm	School term	
Sept 1980[d]	43	28	"	75[c]	1098	"	"	"	"	8 am-2 am	"	Unpublished RoSTA survey results
Perth												
March 1978	35	20	"	56	456	Less than 8 years	Cars and derivatives	Signalised intersections	Thursday to Sunday	6 am to midnight	School term	Boughton & Johnston (1979)
July 1978	44	17	1	62	372							
Sydney												
Nov 1976	26	42	*	68		Less than 8 years (est)	Cars	Shopping centres	Weekdays	School hours	School term	Fleming (1976)
feb 1977	40	25	Not observed	65	3534	6 months to 7 years (est)	"	Shopping traffic	Weekdays & weekends	During and after school hours		Traffic Accident Research Unit (1978)
Nov 1977	36[e]	47	*	84[e]		Less than 8 years (est)	"	Shopping centres	Weekdays	School hours		Fleming (1977)
Nov/Dec 1977	46	25	Not observed	70	4110	6 months to 7 years (est)	"	Recreational traffic	Weekdays & weekends	During and after school hours		Traffic Accident Research Unit (1978)

Survey Date	Seat Belt	Chlld restr-aint	Restr-ained Bass-inet	All restr-aints	Chlldren Observed	Age of Children	Vehicles	Locations	Survey Description Day of Week	Time of Day	Time of Year	Reference
Nov 1979	39	48	•	89[c]		Less than 8 years (est)	Cars	Shopping centres	Weekdays	School hours	School term	Fleming (1979)
Feb 1980			Not specified	90[c]	4109	6 mnths to 7 years (est)	"	Not soecified			"	Traffic Accident Research Unit (1980)
Aug 1983				86[c]	1854	Less than 8 years	"	Signalised intersections	Weekdays & weekends	During and after school hours	"	Traffic Accident Research Unit (1986)
Jul/Aug 1985				93[c]	2236						"	Traffic Authority of New South Wales (1986)
Jul/Aug 1986				91[c]	2262				"		"	Traffic Authority of New South Hales (1987)

a Less than one per cent

b Approved chlld restralnts only

c Includes booster cushions

d Preliminary results for availability are for Melbourne, Ballarat. Bendigo and Shepparton combined

e Availability of seat belts in the 1977 and later surveys by Fleming was changed to include any unoccupied seat belt in vehicle

Reference: Boughton. 1980

APPENDIX VII

Proportion of children unrestrained in roadside surveys (per cent)

City and Survey Date*		Survey Location	Proportion Unrestrained	Reference
Adelaide				
March 1978	B*	Arterial Roads	70	Boughton and Johnston (1979)
July 1978	B		68	
Jun/Aug 1982	A	Shopping Centres	50 [b]	Royal Automobile Association of South Australia Inc. (1987)
Jun/Sep 1984	A		38 [b]	
Jun/Sep 1986	B		39 [b]	
August 1987	A		29 [b]	
Brisbane				
August 1976	B	Shopping Centres	77	King (1977)
April 1979	B		73	King (1979)
November 1979	B	Shopping centres, schools & kindergartens	69	Wadley and Cantemessa (1980)
June 1980	A	Shopping centres, schools & kindergartens	54	Wadley and Cantemessa (1980)
July 1980	A	Shopping centres	63	King (1980)
Canberra				
December 1975	B	Arterial roads	65	Boughton. Lancashire and Johnston (1977)
December 1976	B		65	
	B	Schools	82	Unpublished DoT survey results
	B	Shopping centres	70	
October 1979	B	Schools	79	Department of the Capital Territory (1980)
		Shopping centres	63	
February 1980	A	Schools	62	
		Shopping centres	55	
March 1987	A	Shopping centres	20	National Roads & Motorists' Association (1987)

Proportion of children unrestrained in roadside surveys (per cent)

City and Survey Date*		Survey Location	Proportion Unrestrained	Reference
Hobart				
July 1978	A	Shopping strip	73	Transport Commission (1979)
		Shopping centre	75	
		Primary school	90	
July 1980	A	Shopping strip	63	Hardy (1980)
		Shopping centre	69	
		Primary school	86	
Melbourne				
December 1975	B	Arterial roads	62	Boughton, Lancashire and Johnston (1977)
December 1976	A		68	
	A	Schools	63	Unpublished DoT survey results
	A	Shopping centres	64	
	A		57	Randall (1977)
	A	Arterial roads	64	
March 1978	A		62	Boughton and Johnston (1979)
July 1978	A			
June 1979	A		59 **	Wood (1980)
October 1979	A		58 **	
September 1980	A		61	Road Safety and Traffic Authority (1980)
November 1982	A		14	Manders (1983)
March 1984	A		18	Manders (1984)
May 1985	A		31	Cave (1986)

Proportion of children unrestrained in roadside surveys (per cent)

City and Survey Date*		Survey Location	Proportion Unrestrained		Reference
Perth					
March 1978	A	Arterial roads	74	)	Boughton and
July 1978	A		73	)	Johnston (1979)
May 1981	B	Shopping centres	45 [a]		Western Australian Police Department (1982)
June 1981	A	Shopping centres	40 [a]		Western Australian Police Department (1982)
March 1982	A	Shopping centres	43 [a]		Western Australian Police Department (1982)
September 1986	A	Shopping centres	32 [a]		Western Australian Police Department (1982)
October 1987	A	Shopping centres	26 [a]		Western Australian Police Department (1987)
Sydney					
November 1976	B	Shopping centres	57		Fleming (1979)
February 1977	B	Shopping and recreational traffic	64		Traffic Accident Research Unit (1978)
November 1977	A	Shopping centres	52		Fleming (1979)
Nov/Dec. 1977	A	Shopping and recreational traffic	65		Traffic Accident Research Unit (1978)
November 1979	A	Shopping centres	47		Fleming (1979)
February 1980	A	Not specified	43		Traffic Accident Research Unit (1980)
November 1981	A	Shopping centres	34		Fleming (1981)
August 1982	A	Arterial roads	42		Traffic Accident Research Unit (1986)
August 1983	A	Arterial roads	32		Traffic Accident Research Unit (1984)

Proportion of children unrestrained in roadside surveys (per cent)

City and Survey Date*		Survey Location	Proportion Unrestrained	Reference
Sydney (con't)				
Jul/Aug 1985	A	Arterial roads	24	Traffic Authority of NSW (1986)
Jul/Aug 1986	A	Arterial roads	25	Traffic Authority of NSW (1987)

*A = post-legislation B = pre-legislation
** Includes 'could not observe' and unapproved child restraints even if in use.
a Non-usage of restraint rates For 1-4 year olds.
b Excludes babies under 6 mnths oF age.

Reference: Boughton, 1980