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Restraint System Usage in the Traffic Population

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16. Abstract

This study continued to monitor the use of occupant restraint systems and motorcycle/moped helmet usage in 19 U.S. cities during 1987. A total of 272,857 observations of automobile drivers indicated an overall driver safety belt usage rate of 42.3 percent. The driver safety belt usage rate in areas that have mandatory use laws was 49.8 percent compared to a 29.8 percent usage in areas with no use laws.

Observations of 97,448 passengers indicated that 36.3 percent of the sub-teens, 25.1 percent of the teens and 41.7 percent of the adults were restrained. Child safety seats were observed being used for 77.6 percent of the infant and 80.4 percent of the toddler passengers. Correct infant seat usage was 66.4 percent while 66.5 percent of toddlers, observed in toddler seats, were properly harnessed and/or shielded. In areas with motorcycle helmet use laws 92.0 percent of the drivers and 80.5 percent of the passengers used helmets. Helmet use in areas with no helmet use laws was 42.2 for drivers and 29.0 for passengers.

Automobiles equipped with automatic belt systems had an overall driver belt use rate of 91.6 percent. The motorized shoulder belt system that could not be disconnected displayed the highest use rate of 99.1 percent. The lowest automatic system use rate of 77.1 percent was observed from the combination lap and shoulder belt combination with disconnect.

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SUMMARY

Four observational studies for various segments of the traffic population were continued in 19 cities throughout the nation. Data obtained through daytime observations at approximately 30 traffic intersections and 3 major shopping centers in each city were used to: (1) determine the extent to which drivers and front-outboard passengers of automobiles used safety belts and incorrectly used (misused) shoulder belts; (2) determine the use of safety belts and child safety seats by passengers of automobiles; (3) determine correctness of safety seat installation; (4) determine the extent to which helmets are used by operators and passengers of motorcycles and mopeds; and 5) determine the effectiveness of automatic seat belt systems in increasing restraint usage.

This report documents the procedures used to conduct the observational studies and the study findings for 1987.

Driver Observation Findings: Safety Belt Use

The following major findings, associated with driver safety belt usage, are based on a total of 272,857 observations of drivers stopped for traffic signals

- Driver safety belt usage increased to 42.3 percent during 1987 (Figure 1).
- Female driver safety belt usage was consistently higher than male driver safety belt usage (49.0 percent versus 37.9 percent).
- Drivers of imported vehicles were observed to have a higher safety belt usage rate than drivers of domestic vehicles (54.1 percent versus 38.9 percent).
- Driver safety belt usage was observed to be highest among the 25 to 49 year age group (44.2 percent).
- Driver safety belt usage was observed to be higher in the smaller sized vehicles.

Driver Observation Findings: Shoulder Belt Misuse*

The following major findings are based on a total of 71,220 observations of drivers utilizing shoulder belts in 1987.

- Approximately 3 percent of drivers utilizing shoulder belts misused them.
- Female driver shoulder belt misuse was higher than male driver shoulder belt misuse (4.0 percent versus 2.9 percent). This was mainly due to more female drivers wearing the shoulder belt under the arm than male drivers (1.3 percent versus 0.7 percent).

* Under the arm, behind the back, or loose.

- More drivers of domestic vehicles wore their shoulder belts with excessive slack (i.e., too loose) than drivers of imported vehicles (2.5 percent for domestic versus 0.6 percent for imports).

- Driver shoulder belt misuse was observed to be highest among the 50 or over age group (4.4 percent).

Passenger Observation Findings

A total of 97,448 passengers were observed at shopping mall entrances/exits during 1987. Figure 1 presents the upward trend for use of child safety seats during 1987, with usage increasing to 80.1 percent. During 1987, 77.6 percent of infants and 80.4 percent of toddlers were observed travelling in a child safety seat. Figure 2 displays the upward trend in proper use of safety seats. For example, in 1987 71.9 percent of infants were harnessed, facing toward the rear and the car belt was securing the child seat. Also, in 1987 88.5 percent of toddlers observed in safety seats were using their harness and/or shield. Passenger safety belt use during 1987 was observed to be 4.1 percent for toddlers, 36.3 percent for subteens, 25.1 percent for teens, and 41.7 percent for adults.

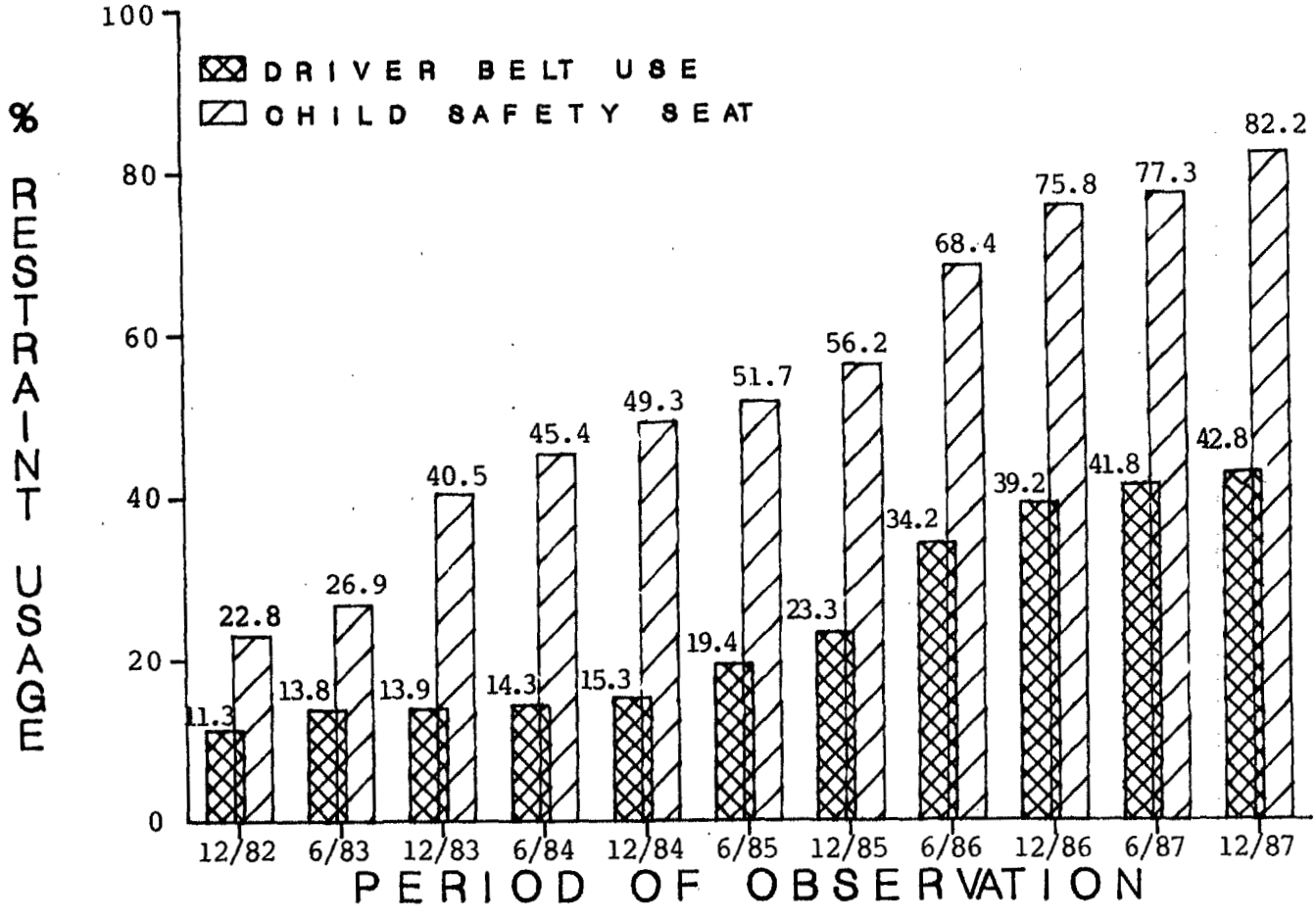


Figure 1. Driver safety belt and child safety seat use.

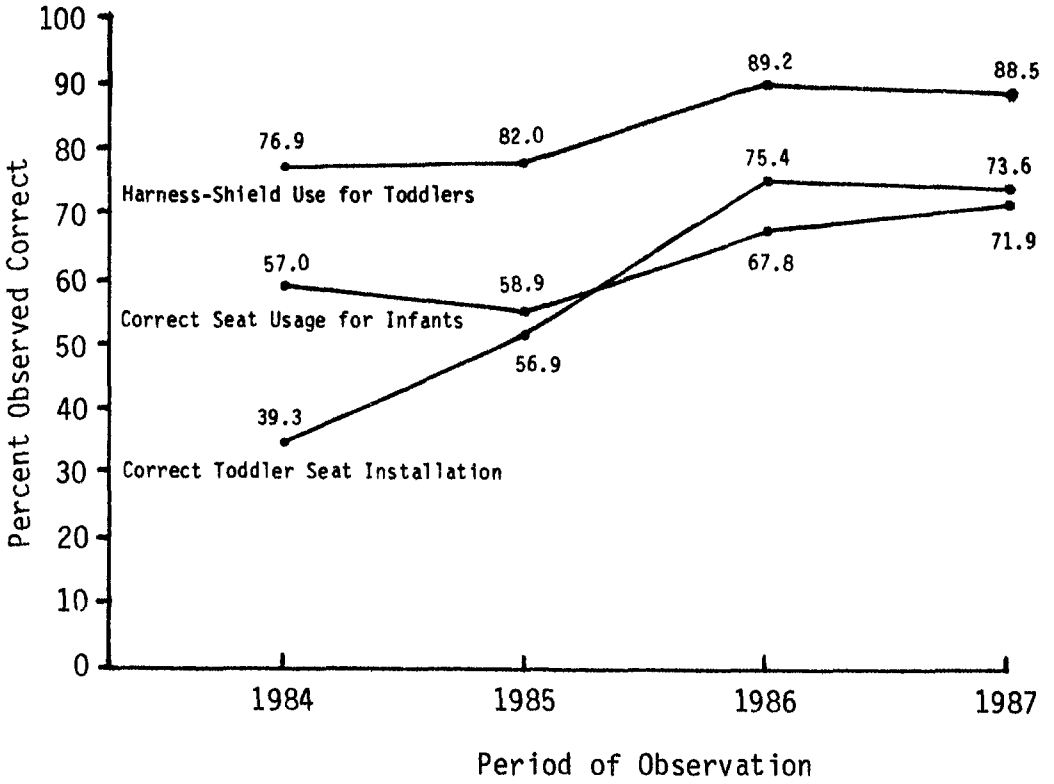


Figure 2. Correct use and installation of safety seats by year.

Safety Seat Installation Findings

A total of 3,679 safety seats were observed in vehicles parked at shopping malls. Seats installed in the infant mode were observed in 295 of the observations while 3,163 seats were observed in the toddler mode. The remaining 221 observations involved booster seats. For toddler seats that require installation using only the vehicle safety belt, 80.7 percent appeared to be installed properly and seat belts were used incorrectly in 16.5 percent of the observations. For toddler seats that require belting and tethering, only 12.0 percent were observed to be correctly installed. Tethers were not used or used incorrectly in 86.7 percent of the observations, while incorrect belting was observed for 29.8 percent of the seats. Figure 2 displays correct toddler seat installation increasing over time, and becoming relatively steady at approximately 75 percent.

Helmet Study Findings

Of the 18,484 motorcycle observations, driver and passenger helmet use were observed to be 53.6 and 44.3 percent, respectively. In cities with mandatory helmet use laws, helmet use was observed to be 92.0 percent for drivers and 80.5 percent for passengers. Helmet use in cities with no or limited helmet use laws was observed to be 42.2 percent for drivers and 29.0 percent for passengers. Helmet use for drivers and passengers of 1,904 moped observations was observed to be 28.9 and 19.9 percent, respectively.

Observations on Automatic Seat Belts

Over 4,233 vehicles with automatic seat belts were observed in 1987. Automatic seat belt systems resulted in 91.6 percent of the drivers being restrained as opposed to 56.5 percent for 1987 model cars equipped with manual systems. The usage rate for motorized systems with no disconnect was the highest of the automatic designs with a 99.1 percent use rate. The lowest automatic system design use rate was 77.1 percent for the non-motorized, combination lap and shoulder belt system.

INTRODUCTION

This report documents the 1987 results of a project sponsored by the National Highway Traffic Safety Administration on vehicle restraint and motorcycle helmet usage. The results are based on field observations conducted in 19 cities across the nation. Included in the data base are observations on drivers and passengers of 272,857 passenger vehicles and helmet usage for the operators and passengers of over 20,388 motorcycles and mopeds.

Project Objective

The objective of this study was to observe, record, and report the use of occupant restraints and motorcycle helmets in 19 cities throughout the country.

Project Description

The project consists of a two-year data collection effort that has been formulated into two separate studies. Study 1 consists of collecting data on; 1) driver and front outboard passenger safety belt use and shoulder belt misuse; 2) passenger safety belt and child safety seat use; 3) correct installation of child safety seats; and 4) helmet use by operators and passengers of motorcycles and mopeds. Study 2 concentrated on obtaining driver safety belt use from those vehicles that were equipped with automatic belt systems. Study 2 also obtained data on motorcycle and moped helmet use. Each study is described below.

Traffic Population Observations

The purpose of this study aspect was to monitor the use of safety belts by drivers and front outboard passengers of privately-owned passenger cars at designated intersections and freeway exit locations. A random sampling procedure was used to select vehicles for study 1 observations. Study 2 vehicle selection required the observers to identify cars equipped with automatic belt systems and to prioritize those vehicles for observation. The data collected for each vehicle and driver were:

- The presence of automatic safety belts
- License plate number
- Make/model of car
- Estimated age of driver and passengers
- Driver gender
- Observed driver safety belt usage
- Observed driver shoulder belt misuse
- Seating position of passengers
- Safety belt use of front outboard passengers.

Shopping Center Observations

The purpose of this study aspect was to monitor the use of occupant restraint systems by passengers of private passenger cars at exits/entrances of selected shopping malls. The passenger observations were a component of only study 1 and were not, therefore, conducted during study 2. Special emphasis was placed on observing child safety seat use by infants (less than 1 year of age) and toddlers (ages 1 to 4). The data collected for each passenger were:

- Estimated age.
- Seating position.
- Occupant restraint system used by each passenger.
- Safety seat usage characteristics for infants and toddlers.

Parking Lot Observations

The parking lot observations were only a component of study 1. Observation requirements consisted of observing infant, toddler and booster safety seats in parked cars located in the same shopping centers as above to obtain detailed information on the installation of child safety seats in automobiles. The data collected on child safety seat installation were:

- Position of safety seat in vehicle.
- Tether usage (for toddler seats that require the use of tethers).
- Belt usage (for toddler seats that require that the lap belt be attached to the undercarriage of the toddler seat).
- Shield requirement on toddler seats (if the seat is a shield-type toddler seat).
- Identification of model.
- Type of safety seat (infant, toddler or booster).

Motorcycle/Moped Helmet Observations

The purpose of this study aspect was to monitor the use of helmets by operators and passengers of motorcycles and mopeds observed on the roadways. Helmet observations were conducted as a part of both study 1 and study 2.

Project Methodology

This project is a continuation of studies sponsored by the National Highway Traffic Safety Administration (NHTSA) to determine restraint system use in the traffic population. The current project differs from the previous projects in that an increased level of effort was made to observe cars equipped with automatic safety belt systems.

The major elements of the study methodology are listed below and described in the following sections.

- Develop observation and training procedures.
- Train observers and supervisors.
- Collect data.
- Analyze data.

Data Collection Sites

The cities, data collection sites and data collection procedures that were used in the previous projects were adopted for use in the current project. This served to provide the maximum possible consistency between the results of the current and prior projects. Any changes in data collection sites necessitated by construction, or other uncontrollable events, were accomplished by obtaining data in the same immediate area. The 19 cities selected for this project are from each geographical region of the country and provide a variety of climate and driving conditions. They were purposely selected to provide long term, cost-effective trend data. The same cities and sites within each city have been used since 1974 in successive observations.

The cities and corresponding data collection regions are listed below and presented geographically in Figure 3.

New England Region

Boston, MA
Providence, RI

Mid-Atlantic Region

New York, NY
Baltimore, MD
Pittsburgh, PA

Southeast Region

Atlanta, GA
Miami, FL
Birmingham, AL
New Orleans, LA

Southwest Region

Houston, TX
Dallas, TX

Northcentral Region

Minneapolis-St. Paul, MN
Chicago, IL
Fargo, ND-Moorhead, MN

West Region

Seattle, WA
San Francisco, CA
San Diego, CA
Phoenix, AZ
Los Angeles, CA

Data Collection Scenario

The sites used for data collection in the driver study were primary road intersections and freeway exits. The sites were selected to be representative of the land use and socio-economic compositive of the city; within self-imposed constraints. The sites were originally selected in an earlier study by a process that involved subdividing each city area (the corporate city, along with the contiguous suburban area) into a series of grids.[1] The grids were classified as being one of three groups: 1) grids in open country areas containing few or no primary road intersections; 2) grids containing one or more freeway exits; and 3) grids containing primary roads but no freeway exit.

Those squares in group 1 were not selected for sampling purposes. The squares in groups 2 and 3 were used to randomly select 22 primary road squares and 11 freeway squares. This stratification process was used to

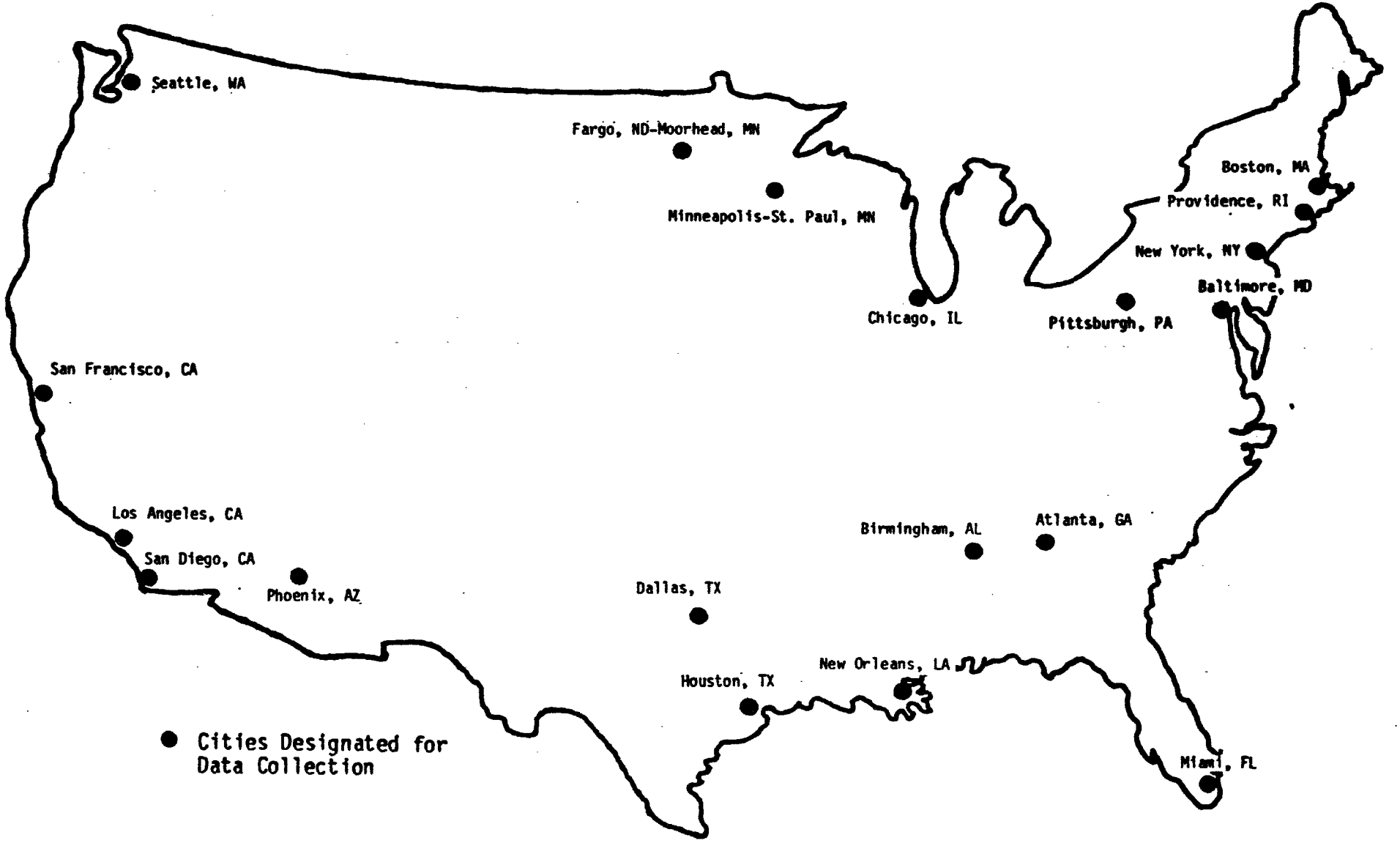


Figure 3 Location of the 19 cities for restraint usage observation.

ensure that two different types of traffic would be sampled (i.e., high speed freeway traffic and slower speed arterial traffic).

A list of 10 randomly selected, controlled intersection sites for each of the selected 22 primary and 11 freeway grids were given to an observer. On the first trip to the city, the observer visited the first site listed within his pre-assigned grid. If the site was suitable for safety belt observation (i.e., roadway curbs, sufficient traffic, observer safety, no construction, etc.) then the site was selected to represent the grid. If the first site was not acceptable then the observer inspected the next site on the list and repeated the process until an acceptable site was found.

Study 1 and study 2 required 30 sites for the driver study (70 percent arterial and 30 percent freeway exit) in each city. In addition, study 1 required 3 passenger study locations (shopping malls) within each city. The malls for the passenger study were selected so as to simultaneously provide a mix of socio-economic levels, sufficient traffic flow and good vantage points for conducting observations.

Study 1 required 13.5 days of data collection, for each city, consisting of approximately 7.5 days for the of driver study and 6 days of passenger study. Helmet study observations were recorded throughout the data collection stay as motorcycles and mopeds were observed. Study 2 required 15 days of driver observation with the observer recording motorcyle and moped data when they occurred in the traffic stream.

A typical observation day consisted of a minimum of six hours of data collection. The driver observations of study 1 required 1.5 hours at each of 4 sites per day. Passenger observations required 6 hours per day at a single shopping center during hours of operation. The driver observation was usually conducted on Monday through Thursday and the passenger observation on Friday through Sunday. The driver observation of study 2 required 3 hours at two sites per day.

Data Forms and Procedures

The data collection forms and instructions for their completion are provided in Appendix C.

Whenever possible, data collectors were deployed to a given site on the same day and during the same time period each time the city was visited. Only privately-owned passenger cars and station wagons with in-state license plates were eligible for the driver observation. Trucks, taxi cabs, and marked company-owned cars (i.e., those used for commercial purposes) were not eligible.

The target observation at signalized intersections of study 1 was the second car that stopped at the traffic signal in the near lane (curb lane). If time permited, additional observations were made (i.e., the third and fourth stopped cars). However, if only one car stopped then

that vehicle was observed. Any vehicle that stopped at a stop sign controlled location was eligible for observation. The target observations for study 2 consisted of vehicles that were equipped with automatic restraint systems as the priority observation. If no automatic restraint vehicles were present then the driver observation procedures of study 1 were followed. Observers did not go on the roadway and were only responsible for observing the cars in the curb lane.

Passenger observation procedures required six hours per data collection day . Data were collected on Fridays, Saturdays and Sundays during the peak hours of traffic movement in and out of the shopping mall. This maximized the chance of obtaining observations on infants and toddlers. A total of six passenger observation days were conducted in each city for study 1.

Only non-commercial passenger cars and station wagons were eligible for the passenger study. The primary target observations were vehicles with infants and toddlers. When primary target vehicles were not available for observation, safety belt usage for all passengers in the order of vehicles stopped was recorded. Data collectors were positioned at curbside, at a stop sign or signal controlled exit from the shopping center with the greatest flow of traffic. Observers did not go on the roadway and were only responsible for observing the cars in the curb lane.

Procedures for observations of child safety seat installation required inspection of parked vehicles containing one or more safety seats (i.e., infant, toddler or booster safety seats) in all of the shopping center parking lots. The observations were conducted for approximately two hours per week during the days scheduled for the passenger restraint observations. Data were obtained during peak parking demand.

Helmet observations were obtained as a "second priority" activity during all other observations. Target vehicles were any motorcycle, moped or motorized bike observed on the highway or freeway during data collection periods. Observations regarding helmet use were recorded for both drivers and passengers.

Training Procedures

Training procedures were developed during the initial phases of the study and approved by NHTSA prior to conducting training activities. All procedures were developed around those used in the previous projects to maximize consistency between the project efforts. Training included the study of an observer's manual, class room instruction and in-field training. Prior to deployment, observers received 3 to 5 days of training either in Detroit or at field locations. Additional training of up to a week was conducted by the supervisor in the region assigned to a particular observer. All observer training was conducted by the supervisor and/or senior staff members. Follow-up supervisor field visits were made at least twice per year and more frequently when the need arose.

Quality Control

The supervisor was stationed in Detroit and was responsible for scheduling observer activities, supervising data entry and conducting data quality control activities at field locations. Supervisory visits to each region were made on a routine basis or when the data collector or supervisor believed such a visit was warranted. During 1987, 10 days of supervisor visits were conducted. During these visits, field activities and observation techniques were monitored, procedural questions were answered, and observer accuracy and productivity were reviewed. Accuracy checks consisted of the supervisor and observer collecting data independently on the same vehicles for both the driver and passenger study. Discrepancies were identified and discussed during the accuracy review.

At the end of each week, data forms were submitted by the observers for review and analysis. Data summaries were generated on a monthly basis and submitted to NHTSA. Additional information and analyses were also provided to NHTSA upon request.

Analysis of 1987 Results

The data contained in the remainder of this annual report incorporates the 1987 results with the results obtained from the prior projects. The 1987 data was obtained by conducting two cycles of data collection for both study 1 and study 2. The first cycle of data was obtained from each city during the first half of 1987. Cronologically the data collection scheme consisted of completing study 1 in all of the 19 cities followed by the completion of study 2 in the same cities. The completed sequence of study 1 and study 2 was followed by another sequence of studies 1 and 2 in the latter half of 1987. Any exhibited differences between the appropriate first and second half data bases represent variations due to the time of the year in which collection activities occurred. The data collection procedures and locations at which the data were obtained were identical for the first and second half.

Data summaries which refer to a "base" represent the total number of observations. The "percent restrained" refers to the percentage of the total base observations that were recorded as using the appropriate safety restraint device. For the driver observations use of either the lap and shoulder belt or lap belt only were recorded as "restrained". The percent restrained figures represent usage rates for the combined 19-city base, with each observation receiving equal weight. This procedure was employed in previous NHTSA studies and thus allows for consistency in the comparison of results.

SUMMARY OF 1987 DRIVER OBSERVATION FINDINGS

Safety Belt Usage Trends

Annual driver safety belt usage rates from previous NHTSA projects show a clear upward trend beginning in 1984 (see figure 1, page 2). This trend continued during 1987 which exhibited the highest driver usage rate (42.3 percent) of any year. This driver safety belt usage rate of 42.3 percent consisted of 41.3 percent for combined lap/shoulder belt use, 0.3 percent for lap belt only use, and 0.7 percent for shoulder only use. The shoulder only category increased progressively each quarter do largely to an increase of vehicles equipped with automatic restraint system.

Safety Belt Use by City and Observation Period

Driver safety belt usage rates by city and observation period, during 1987, are presented in table 1. Annual usage rates ranged from a high of 65.6 percent in Dallas to a low of 16.1 percent in Fargo/Moorhead. The rank ordering of city usage rates presented in table 1 are different from those obtained in any of the prior projects [1], [2], [3], [4] or [5]. This variation is primarily due to the impact of mandatory restraint usage laws (MUL). Table 1 also indicates the surveyed jurisdictions that had a MUL in effect during the 1987 data collection period. The majority of jurisdictions with effective 1987 belt use laws also had the belt use laws effective during 1986.

Safety belt usage was also recorded for front-outboard passengers during the driver observation (presented in table 2, page 14) by city and observation period. The annual usage rate for front-outboard passengers over one year of age (i.e., excluding infants) was 37.9 percent, which is 4.4 percent lower than the annual driver usage rate. Safety belt usage rates for front-outboard passengers continues to be lower in each city than for drivers in the same city (table 2 versus table 1).

Safety Belt Use by Existence of a Safety Belt Use Law

Driver safety belt usage rates, based on whether or not a mandatory safety belt use law was in effect at the time of data collection, are presented in table 3. This table indicates that driver usage rates in jurisdictions with usage laws were much higher than those jurisdictions without a law (49.8 percent versus 29.8 percent for the entire year).

Table 1. Driver safety belt usage by city and observation period for 1987.

	First Half				Second Half				Total 1987	
	Study 1		Study 2		Study 1		Study 2			
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
Dallas*	2,132	60.9	3,498	67.5	2,708	64.2	3,416	67.6	11,754	65.6
Houston*	1,802	51.8	5,261	64.0	2,946	67.0	5,442	68.9	15,451	64.9
Seattle*	2,709	62.6	5,525	60.0	2,832	59.9	5,777	61.0	16,843	60.8
Miami*	2,637	71.0	2,769	66.0	2,538	64.1	3,398	40.6	11,342	59.1
San Diego*	2,672	56.0	5,419	55.6	2,738	56.0	5,687	54.3	16,516	55.3
San Francisco*	2,708	52.6	5,361	52.0	2,846	50.8	5,785	52.9	16,700	52.2
Minn./St. Paul*	2,823	51.7	5,562	50.3	2,962	49.8	5,686	46.9	17,033	49.3
Baltimore*	2,214	54.5	3,013	47.1	2,486	47.0	4,333	41.5	12,046	46.4
Los Angeles*	2,694	44.4	5,441	43.0	2,838	47.3	2,898	47.3	13,871	45.0
Phoenix	2,893	40.1	5,766	38.9	3,043	39.7	5,749	39.6	17,451	39.5
New Orleans*	1,115	30.3	4,288	40.7	2,964	37.6	4,710	36.6	13,077	37.6
Atlanta	2,450	36.8	2,059	42.0	2,971	34.4	5,799	35.2	13,279	36.4
Birmingham	2,892	23.5	5,049	33.3	2,709	32.9	5,798	39.9	16,448	33.8
Chicago*	3,132	36.7	4,841	31.4	2,591	33.0	3,897	23.4	14,461	30.7
Pittsburgh	2,871	25.5	5,662	29.2	2,921	30.5	5,509	31.5	16,963	29.5
New York*	2,182	24.3	3,276	29.4	2,306	21.9	4,027	24.1	11,791	25.2
Boston	2,251	24.9	3,900	25.9	2,386	25.1	4,467	22.3	13,004	24.4
Fargo/Moorhead	1,909	19.1	4,450	23.8	2,320	26.0	3,811	23.6	12,490	23.4
Providence	2,248	15.0	3,444	20.8	2,790	18.1	3,855	11.9	12,337	16.1
Total	46,334	41.8	84,584	43.4	51,895	42.8	90,044	41.4	272,857	42.3

*Denotes mandatory safety belt usage law (MUL) in effect.

Table 2. Front-outboard passenger safety belt usage by city and observation period for 1987.

	First Half				Second Half				Total 1987	
	Study 1		Study 2		Study 1		Study 2			
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
Dallas*	591	55.5	813	66.0	509	62.9	706	61.9	2,619	61.6
Houston*	535	42.2	1,685	61.7	889	61.3	1,757	66.8	4,866	61.3
Seattle*	579	54.2	1,599	53.4	576	52.8	1,322	57.6	4,076	54.8
Miami*	665	62.9	597	60.5	626	53.5	551	32.7	2,439	53.1
San Diego*	597	49.4	1,320	46.6	695	45.6	1,492	50.2	4,104	47.5
San Francisco*	678	40.1	1,570	46.3	686	41.4	1,435	48.0	4,369	45.1
Minn./St. Paul*	611	45.0	1,493	44.4	702	43.7	1,424	39.3	4,230	42.7
Baltimore*	472	48.9	483	45.1	487	45.2	1,008	36.9	2,450	42.5
Los Angeles*	606	32.8	1,393	31.9	622	34.2	478	36.4	3,099	33.3
Phoenix	651	29.0	1,729	33.0	677	32.5	1,672	35.8	4,729	33.4
New Orleans*	391	24.4	1,290	38.1	723	33.2	808	29.5	3,212	33.1
Atlanta	491	31.8	341	33.7	670	28.1	1,231	29.4	2,733	30.0
Birmingham	557	22.8	1,456	31.2	751	27.4	1,603	39.5	4,367	32.6
Chicago*	731	29.7	915	27.3	575	33.6	711	14.5	2,932	26.0
Pittsburgh	714	17.6	1,943	26.9	913	24.3	1,550	30.1	5,120	26.1
New York*	557	25.7	678	28.8	462	13.0	720	21.8	2,417	23.0
Boston	378	19.8	609	25.9	304	20.4	708	16.1	1,999	20.5
Fargo/Moorhead	468	17.9	1,270	23.5	574	21.4	1,043	21.2	3,355	21.7
Providence	510	15.7	727	17.6	807	18.8	778	8.7	2,822	15.0
Total	10,782	35.7	21,911	39.5	12,248	36.7	20,997	38.2	65,938	37.9

*Denotes mandatory safety belt usage law (MUL) in effect.

Table 3. Driver safety belt usage by existence of a safety belt use law.

Belt Law Existence	First Half		Second Half		Total	
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
Study 1						
Yes	28,820	50.7	32,755	50.3	61,575	50.5
No	17,514	27.1	19,140	29.9	36,654	28.6
Study 2						
Yes	54,254	50.6	55,056	48.2	109,310	49.4
No	30,330	30.4	34,988	30.6	65,318	30.6
Combined						
Yes	83,074	50.6	87,811	49.0	170,885	49.8
No	47,844	29.2	54,128	30.4	101,972	29.8
Total	130,918	42.8	141,939	41.9	272,857	42.3

Safety Belt Use by Vehicle Model Year

License plate numbers, recorded as part of the driver observations for the first half of 1987 of both study 1 and 2, were submitted to the various State departments of motor vehicles (DMV's) for the purpose of obtaining vehicle information. A total of 82,484 license plate numbers were submitted to 15 states DMV's. The DMV's returned 72,761 vehicle records which were processed with the "Vindicator" program by the Highway Loss Data Institute of Washington, D.C.[6]. Valid vehicle information for 71,220 vehicles (including vehicle make, model, model year, and size) were obtained for the model years 1967-1988 (pre-1967 vehicles were observed but could not be processed by the Vindicator program).

Table 4 presents driver safety belt usage rates for the 1987 data on vehicles verified by the State DMV's. Overall, 43.5 percent of drivers in this data subset were observed using safety belts. The data indicates that drivers of newer model cars, beginning in 1978, are more likely to wear safety belts than their counterparts in older model cars. Driver safety belt usage by manufacturer's division for model years 1979-1988 is presented in Appendix A.

Table 4. Driver safety belt usage by verified vehicle model year.

Model Year	Base	Percent Restrained
1967	169	10.1
1968	226	19.5
1969	275	14.5
1970	377	21.0
1971	487	18.9
1972	773	18.4
1973	1,082	18.6
1974	1,318	25.5
1975	1,374	26.6
1976	2,364	29.1
1977	3,686	30.8
1978	4,395	33.4
1979	5,183	34.4
1980	4,513	40.2
1981	4,463	41.4
1982	4,686	46.2
1983	5,107	47.3
1984	7,539	50.4
1985	8,118	53.1
1986	8,967	53.5
1987	5,884	56.5
Total	70,986	43.5

Safety Belt Use by Driver Gender

Observed safety belt use stratified by driver gender are presented in table 5. This table indicates that female drivers were more likely to wear safety belts than male drivers, both with and without mandatory use laws in effect. The 1986 results also indicated that females were more likely than males to wear safety belts.

Table 5. Driver safety belt usage by driver gender.

Driver Gender	Without MUL		With MUL		Total	
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
Male	58,027	25.3	105,256	44.8	163,283	37.9
Female	43,945	35.8	65,629	57.8	109,574	49.0
Total	101,972	29.8	170,885	49.8	272,857	42.3

Safety Belt Use by Driver Age

Table 6 indicates that overall safety belt usage was highest among the 25 to 49, and lowest for the under 20, age groups. Belt usage in areas with belt use laws was highest for the 50 and over age group while the 25 to 49 age group displayed the highest usage rate in areas without the laws. The younger drivers are more than 10 percent lower in overall belt usage than any of the other age groups. The relative rankings between age groups are similar to those obtained from the 1986 study.

Table 6. Driver safety belt usage by age group.

	Without MUL		With MUL		Total	
Age Group	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
Under 20	6,604	23.2	4,620	37.6	11,224	29.1
20-24	12,461	27.8	20,876	46.3	33,337	39.4
25-49	57,365	32.6	105,752	50.5	163,117	44.2
50 or over	25,542	26.3	39,637	51.1	65,179	41.4
Total	101,972	29.8	170,885	49.8	272,857	42.3

Safety Belt Use by Vehicle Make (Domestic Versus Import) and Vehicle Size

The Vindicator program permitted stratification of driver safety belt usage by vehicle size as presented in tables 7 and 8. The four vehicle size categories presented in these tables correspond to the following wheelbase measurements:

Subcompact - wheelbase less than 101 inches
Compact - wheelbase 101-111 inches
Intermediate - wheelbase 112-120 inches
Full size - wheelbase greater than 120 inches

Table 7 presents the relationship between safety belt usage, vehicle make and vehicle size for all verified vehicle model years. This table indicates that drivers of smaller size vehicles (i.e., subcompacts and compacts) were more likely to wear safety belts than drivers in larger vehicles. In addition, drivers of imported vehicles were observed to be more likely to wear safety belts than their domestic vehicle counterparts. Further investigation of table 7 reveals that 78.4 percent of the imported vehicles observed were subcompacts. In fact, imported subcompacts accounted for over 23 percent of all observations. This finding, along with the relatively high usage rate (51.9 percent) associated with these vehicles demonstrates the impact that imported subcompacts have on driver usage rates. Table 8 indicates that, when only newer model cars (1979-1988) were considered, similar but slightly higher usage rates than the all model year results were observed.

Table 7. Driver safety belt usage by verified vehicle make and size for all model years.

Vehicle Size	Vehicle Make		Total
	Domestic	Import	
Subcompact	43.2% (12,878)	51.9% (16,666)	48.1% (29,544)
Compact	41.7% (20,815)	62.9% (4,195)	45.3% (25,010)
Intermediate	33.2% (12,323)	51.9% (341)	33.7% (12,664)
Full Size	28.5% (3,933)	55.1% (69)	29.0% (4,002)
Total	38.9% (49,949)	54.1% (21,271)	43.5% (71,220)

Note: Percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Table 8. Driver safety belt usage by verified vehicle make and size for 1979-1988 model years.

Vehicle Size	Vehicle Make		Total
	Domestic	Import	
Subcompact	44.3% (11,936)	54.6% (13,938)	49.9% (25,874)
Compact	45.7% (16,766)	64.9% (3,746)	49.3% (20,512)
Intermediate	39.2% (6,958)	56.4% (277)	39.9% (7,235)
Full Size	41.2% (1,004)	55.1% (69)	42.1% (1,073)
Total	44.0% (36,664)	56.8% (18,030)	48.2% (54,694)

Note: Percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Safety Belt Use by Vehicle Manufacturer

Driver safety belt use by vehicle manufacturer for all model years (based on data from the Vindicator program) is presented in table 9. Drivers of Toyota vehicles were observed wearing safety belts in 58.9 percent of the observations; the highest of any manufacturer. Drivers of vehicles by the domestic manufacturers experienced relatively equal usage rates, ranging from 27.9 to 43.0 percent.

Table 9. Driver safety belt usage by verified vehicle manufacturer for all model years.

Vehicle Manufacturer	Base	Percent Restrained
AMC/Eagle	484	27.9
Chrysler	5,113	37.9
Ford	12,003	38.4
GM	32,040	39.5
VW	2,094	50.5
Toyota	5,107	58.9
Datsun/Nissan	3,448	46.2
Honda	3,502	57.4
Jeep	302	43.0
Other Imports	7,127	53.9
Total	71,220	43.5

When the older model vehicles were removed from the data summaries, Toyota displayed the highest driver usage rate (table 10).

Table 10. Driver safety belt usage by verified vehicle manufacturer for 1979 - 1988 model years.

Vehicle Manufacturer	Base	Percent Restrained
AMC/Eagle	241	29.5
Chrysler	3,698	42.8
Ford	8,690	44.1
GM	23,762	44.2
VW	1,252	56.9
Toyota	4,387	62.0
Datsun/Nissan	2,927	49.4
Honda	3,193	58.3
Jeep	266	45.5
Other Imports	6,278	55.7
Total	54,694	48.2

Since the three largest domestic manufacturers (GM, Ford and Chrysler) have a number of divisions under them (i.e., Dodge, Chrysler and Plymouth are divisions of Chrysler Corporation), driver safety belt usage was recorded for each division. Tables 11 and 12 illustrate driver safety belt usage rates for all model years (based on the Vindicator program outputs) and for newer model years (1979-1988), respectively. Table 11 indicates that the Oldsmobile, Buick and Cadillac divisions of General Motors Corporation had the highest usage rates while the Plymouth division of Chrysler Corporation had the lowest; among the three largest domestic manufacturers. Table 12 presents similar usage rates for the subset of newer model years from 1979 to 1988. The newer models of all divisions exhibited higher usage rates ranging from 3.4 to 6.2 percent than that exhibited by all model years. Driver safety belt usage by manufacturer's division and model year (1979-1988) are provided in Appendix A and safety belt usage by car series is presented in Appendix B.

Table 11. Driver safety belt usage by manufacturer's division for all verified model years.

Manufacturer's Division	Base	Percent Restrained
• Chrysler		
Chrysler	1,352	39.7
Dodge	1,938	37.0
Plymouth	1,823	36.6
• Ford		
Ford	8,745	38.2
Lincoln	864	40.4
Mercury	2,394	38.5
• GM		
Buick	5,870	41.0
Cadillac	3,129	41.4
Chevrolet	11,908	37.9
Oldsmobile	6,912	41.6
Pontiac	4,221	36.7

Table 12. Driver safety belt usage by manufacturer's division for 1979 - 1988 verified model years.

Manufacturer's Division	Base	Percent Restrained
• Chrysler		
Chrysler	1,082	45.6
Dodge	1,384	40.9
Plymouth	1,232	42.4
• Ford		
Ford	6,203	44.4
Lincoln	688	44.0
Mercury	1,799	43.0
• GM		
Buick	4,578	45.3
Cadillac	2,221	44.8
Chevrolet	8,312	43.3
Oldsmobile	5,383	46.0
Pontiac	3,268	41.4

Note: Manufacturer's division for which fewer than 20 vehicles were observed, are not reported in this table.

Safety Belt Use By Time of Day

Table 13 presents 1986 and 1987 usage rates stratified by the four daily data collection periods. Usage rates among the four time periods during 1987 are within one standard deviation (sd = 2.1) of the mean (42.6) with the exception of the late evening observations. This is a departure from the 1986 results which displayed more consistency between time periods.

Table 13. Driver safety belt usage by time period.

	1986		1987	
	Base	Percent Restrained	Base	Percent Restrained
7 - 10 a.m.	25,675	37.6	73,912	41.4
10 a.m. - 1 p.m.	25,976	36.4	70,057	43.2
1 - 4 p.m.	27,575	35.4	77,938	40.5
4 - 7 p.m.	22,671	37.7	50,950	45.2
Total	101,897	36.7	272,857	42.3

Safety Belt Use By Site Characteristics

Driver safety belt usage rates stratified by site type and area type, are presented in tables 14 and 15, respectively. Table 14 indicates that driver safety belt usage was higher on freeways than on non-freeway facilities. This characteristic was also present in the 1986 study.

Table 14. Driver safety belt usage by site type.

Site Type	Base	Percent Restrained
Primary Road	200,203	41.1
Freeway Exit	72,654	45.7
Total	272,857	42.3

Safety belt use in city versus suburban areas is presented in table 15. City areas are characterized as central business district areas while suburban areas include commercial, industrial or residential areas outside of the central city area. The 1987 rates indicate that drivers tend to use safety belts more in city areas than in suburban areas. Study findings in 1986 displayed a similar difference in rates between city and suburban areas.

Table 15. Driver safety belt usage by area type.

Area Type	Base	Percent Restrained
City	192,898	42.6
Suburb	79,959	41.7
Total	272,857	42.3

Vehicle Occupancy

Safety belt use observations were only recorded for drivers and front-outboard passengers during the driver observations. However, information was also recorded on the number and age of passengers in each vehicle for which a driver observation was made. The data of table 16 indicate that 74.6 percent of the 272,857 vehicles observed were occupied by only the driver.

Table 16. Occupancy for vehicles observed during the driver observation.

Passenger Occupancy Per Vehicle	Observed	Percent of Total
0	203,614	74.6
1	57,659	21.1
2	8,283	3.0
3	2,624	1.0
4 or more	677	0.2
Total	272,857	100.0

Table 17 indicates the age distribution of passengers as recorded during the driver observations. Of the 272,857 vehicles observed, less than one percent had an infant passenger. The percentage of cars with passengers in the four other age categories were: toddlers 1.5 percent; subteens 3.5 percent; teens 3.5 percent; and adults 22.3 percent. These percentages represent the distribution of passengers in the traffic population and differ from the passenger distribution obtained during the passenger observations where observers were instructed to concentrate primarily on vehicles with toddlers and infants at shopping centers. In the driver observations, the observers sampled from the second car stopped for a traffic signal.

Table 17. Percent of cars with passengers by age group during the driver observation.

Age Group	Percent of Vehicles	
	Study 1	Study 1 & 2
Infants (less than 1 year)	0.2	0.2
Toddlers (1-4 years)	1.5	1.5
Subteens (5-12 years)	2.3	3.5
Teens (13-19 years)	3.2	3.5
Adults (20 and older)	21.9	22.3

Table 18 presents the occupancy rate for each seating position by age group. In 58.8 percent of the vehicles observed the driver was categorized in the 25-49 year age group. This age group also occupied the front-outboard position most often (9.7 percent).

Table 18. Occupancy by seat position and age group for vehicles in the driver study 1.

Age Group	Front Driver		Front Center		Front Outboard		Back Driver		Back Center		Back Outboard	
	No.	Percent of Total	No.	Percent of Total	No.	Percent of Total	No.	Percent of Total	No.	Percent of Total	No.	Percent of Total
Infant	0	--	31	0.0	75	0.1	27	0.0	19	0.0	28	0.0
Toddler	0	--	121	0.1	295	0.3	351	0.4	381	0.4	344	0.4
Subteen	0	--	70	0.1	1,250	1.3	477	0.5	459	0.5	658	0.7
Teen	3,901	4.0	45	0.0	2,148	2.2	280	0.3	131	0.1	501	0.5
Adult 20-24	12,508	12.7	29	0.0	2,740	2.8	118	0.1	31	0.0	231	0.2
Adult 25-49	57,752	58.8	39	0.0	9,571	9.7	319	0.3	62	0.1	629	0.6
Adult 50 or over	24,076	24.5	17	0.0	6,980	7.1	242	0.2	19	0.0	527	0.5
Empty	0	--	97,877	99.6	75,170	76.5	96,414	98.1	97,127	98.9	95,311	97.0
Total	98,237	100.0	98,229	100.0	98,229	100.0	98,229	100.0	98,229	100.0	98,229	100.0

Shoulder Belt Misuse

The following data summaries illustrate the total number of drivers observed, those observed wearing the shoulder belt and the percentage of shoulder belt misuse. The misuse percentage is based on only those drivers that were observed wearing the shoulder belt. Observers classified shoulder belt misuse by one of three categories; under the arm (i.e., under the driver's left arm), behind the back (i.e., positioned behind the right side of the driver's body, resulting in no restraint of the upper torso), and loose (i.e., having a fist width or more as slack near chest area or excessive slack in belt behind driver). Those drivers that were wearing only lap belts in vehicles equipped with separate lap/shoulder systems and those drivers not utilizing any part of the combination lap/shoulder systems were excluded from the following analyses.

Shoulder Belt Misuse by Verified Vehicle Model Year

The Vindicator program generated data on a total of 71,220 drivers, 30,793 of which were observed to be utilizing the shoulder belt during 1987. Table 19 gives shoulder belt misuse rates by verified vehicle model year for drivers that were observed to be wearing shoulder belts. Overall, 7.7 percent of drivers utilizing shoulder belts misused them.

Table 19. Driver shoulder belt misuse by verified vehicle model year.

Model Year	Vindicator Observations	Shoulder Belt Base	Percent Misused			Total Percent Misused
			Under Arm	Behind Back	Loose	
1967	169	3	0.0	0.0	0.0	0.0
1968	226	32	6.3	3.1	0.0	9.4
1969	275	31	3.2	6.5	3.2	12.9
1970	377	66	0.0	3.0	1.5	4.5
1971	487	82	3.7	1.2	7.3	12.2
1972	773	126	2.4	1.6	7.9	11.9
1973	1,082	180	3.9	1.7	11.1	16.7
1974	1,318	326	4.3	2.8	5.2	12.3
1975	1,374	359	4.2	2.2	3.6	10.0
1976	2,364	673	4.2	3.3	4.6	12.1
1977	3,686	1,124	3.1	1.7	5.1	9.9
1978	4,395	1,467	2.3	1.5	6.6	10.4
1979	5,183	1,775	2.8	2.2	5.2	10.2
1980	4,513	1,801	2.3	1.5	4.5	8.3
1981	4,463	1,846	2.3	0.6	4.1	7.0
1982	4,686	2,164	2.1	1.2	4.0	7.3
1983	5,107	2,413	2.0	0.6	5.4	8.0
1984	7,539	3,796	1.8	0.7	5.0	7.5
1985	8,118	4,308	2.2	0.6	4.4	7.2
1986	8,967	4,798	1.8	0.4	4.3	6.5
1987/88	6,118	3,417	1.4	0.7	3.1	5.2
Total	71,220	30,793	2.2	1.0	4.5	7.7

Shoulder Belt Misuse by Driver Gender

Observed shoulder belt misuse by driver gender, based on verified vehicle data of drivers observed utilizing the shoulder belt in 1987, are presented in table 20. This table reveals shoulder belt misuse to be higher for females than males (8.1 percent versus 7.3 percent), due primarily to the difference in "Under Arm" misuse.

Table 20. Driver shoulder belt misuse by driver gender for all verified vehicle model data.

Driver Gender	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Male	16,909	1.8	1.0	4.5	7.3
Female	13,884	2.6	1.0	4.5	8.1
Total	30,793	2.2	1.0	4.5	7.7

When only newer verified model year cars (1985-1988) are considered, similar but slightly lower misuse rates were observed, as presented in table 21.

Table 21. Driver shoulder belt misuse by driver gender for 1985-1988 verified vehicle model years.

Driver Gender	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Male	7,055	1.4	0.5	4.2	6.1
Female	5,468	2.3	0.6	3.8	6.7
Total	12,523	1.8	0.5	4.0	6.3

Shoulder Belt Misuse by Driver Age

Table 22, based on all verified vehicle models with drivers observed utilizing the shoulder belt in 1987, indicates that shoulder belt misuse was the highest among the 50 or over age group (10.3 percent). This age group was the only "above average" group and were seen more often wearing the shoulder belt loose.

Table 22. Driver shoulder belt misuse by age group for all verified vehicle models.

Age Group	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Under 20	904	3.1	0.7	3.8	7.6
20-24	3,726	1.9	0.8	4.7	7.4
25-49	18,891	2.1	0.9	3.7	6.7
50 or over	7,272	2.4	1.3	6.6	10.3
Total	30,793	2.2	1.0	4.5	7.7

Shoulder belt misuse was slightly less when only newer verified model year cars (1985-1988) are considered, as indicated by table 23.

Table 23. Driver shoulder belt misuse by age group for 1985-1988 verified vehicle model years.

Age Group	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Under 20	249	3.6	0.4	4.0	8.0
20-24	1,384	2.2	0.4	3.7	6.3
25-49	7,997	1.6	0.5	3.4	5.5
50 or over	2,893	2.0	0.8	6.0	8.8
Total	12,523	1.8	0.5	4.0	6.3

Shoulder Belt Misuse by Vehicle Make (Domestic Versus Import)

Table 24 presents driver shoulder belt misuse, by vehicle make for all model years, based on data generated by the Vindicator program for drivers utilizing the shoulder belt. Drivers of domestic vehicles were much more likely to wear the shoulder belts "loose" than drivers of imported vehicles. This is probably due to the "Window Shade" design, used by domestic manufacturers, to remove shoulder belt tension.

Table 24. Driver shoulder belt misuse by verified vehicle make for all model years.

Vehicle Make	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Domestic	19,309	2.4	1.3	6.5	10.2
Import	11,484	1.8	0.4	1.1	3.4
Total	30,793	2.2	1.0	4.5	7.7

Table 25 displays the misuse rates by vehicle make for recent model year vehicles (1985-1988) verified by the Vindicator program. The large difference between domestics and imports for shoulder belts observed as "loose" is similar to that difference exhibited by table 24.

Table 25. Driver shoulder belt misuse by vehicle make (domestic versus import) for 1985-1988 verified vehicle model years.

Vehicle Make	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Domestic	7,586	2.1	0.6	6.1	8.8
Import	4,937	1.4	0.4	0.9	2.7
Total	12,523	1.8	0.5	4.0	6.3

Shoulder Belt Misuse by Vehicle Size

The relationship between shoulder belt misuse and vehicle size, based on all verified model years, is presented in table 26. Shoulder belt misuse is the lowest for subcompact vehicles and may be due to the large proportion of imported cars in this classification.

Table 26. Driver shoulder belt misuse by verified vehicle size for all model years.

Vehicle Size	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Subcompact	14,181	2.2	0.5	2.8	5.5
Compact	11,279	2.0	1.0	5.6	8.6
Intermediate	4,213	2.4	1.8	6.4	10.6
Full Size	1,120	2.9	3.5	8.7	15.1
Total	30,793	2.2	1.0	4.5	7.7

When newer verified model year cars (1985-1988) were considered, no definite trends are evident. Shoulder belt misuse was lower in subcompact and full size than the compact and intermediate sizes, as presented in table 27. Therefore, a relationship between shoulder belt misuse and vehicle size may not exist.

Table 27. Driver shoulder belt misuse by verified vehicle size for 1985-1988 model years.

Vehicle Size	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Subcompact	6,212	1.8	0.5	2.5	4.8
Compact	5,397	1.8	0.6	5.3	7.7
Intermediate	824	1.9	0.7	7.3	9.9
Full Size	90	0.0	1.1	4.4	5.5
Total	12,523	1.8	0.5	4.0	6.3

Shoulder Belt Misuse by Vehicle Manufacturer

Driver shoulder belt misuse by vehicle manufacturer for all model years, based on data from the Vindicator program for those drivers observed utilizing shoulder belts, is presented in table 28. Drivers of AMC/Eagle and GM products experienced the highest shoulder belt misuse rate among the domestic manufacturers.

Table 28. Driver shoulder belt misuse by vehicle manufacturer for verified all model years.

Vehicle Manufacturer	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
AMC/Eagle	132	3.8	0.0	6.8	10.6
Chrysler	1,911	1.9	0.6	5.8	8.3
Ford	4,576	2.6	1.2	5.8	9.6
GM	12,563	2.3	1.5	6.9	10.7
Jeep	123	3.3	0.0	2.4	5.7
VW	1,049	2.1	0.8	0.4	3.3
Toyota	3,006	1.4	0.5	1.5	3.4
Datsun/Nissan	1,589	2.0	0.4	1.3	3.7
Honda	2,009	2.1	0.5	0.8	3.4
Other Imports	3,835	1.8	0.2	1.2	3.2
Total	30,793	2.2	1.0	4.5	7.7

When only recent model year verified vehicles (1985-1988) are included in the data summaries, Ford and General Motors displayed the highest shoulder belt misuse rate (table 29).

Table 29. Driver shoulder belt misuse by vehicle manufacturer for 1985-1988 verified vehicle model years.

Vehicle Manufacturer	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
AMC	6	0.0	0.0	0.0	0.0
Chrysler	796	2.0	0.1	4.9	7.0
Ford	1,963	2.3	0.9	6.7	9.9
GM	4,744	2.0	0.6	6.1	8.7
Jeep	77	2.6	0.0	1.3	3.9
VW	269	1.5	0.7	0.0	2.2
Toyota	1,257	0.8	0.6	1.4	2.8
Datsun/Nissan	682	1.5	0.3	0.4	2.2
Honda	916	1.7	0.5	0.8	2.9
Other Imports	1,813	1.6	0.3	0.9	2.8
Total	12,523	1.8	0.5	4.0	6.3

Tables 30 and 31 illustrate driver shoulder belt misuse rates by verified manufacturer's division for all model years and newer model years (1985-1988), respectively.

Table 30. Driver shoulder belt misuse by manufacturer's division for all verified vehicle model years.

Manufacturer's Division	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
• Chrysler					
Chysler	548	0.9	0.5	7.8	9.2
Dodge	707	3.1	0.8	4.1	8.0
Plymouth	656	1.4	0.5	5.8	7.7
• Ford					
Ford	3,313	2.6	1.1	5.7	9.4
Lincoln	349	2.3	1.7	4.0	8.0
Mercury	914	3.0	1.3	6.9	11.2
• GM					
Buick	2,395	2.6	1.6	7.4	11.6
Cadillac	1,291	2.6	2.2	7.4	12.2
Chevrolet	4,471	2.1	1.3	6.4	9.8
Oldsmobile	2,863	2.3	1.6	7.1	11.0
Pontiac	1,543	2.6	1.1	7.0	10.7

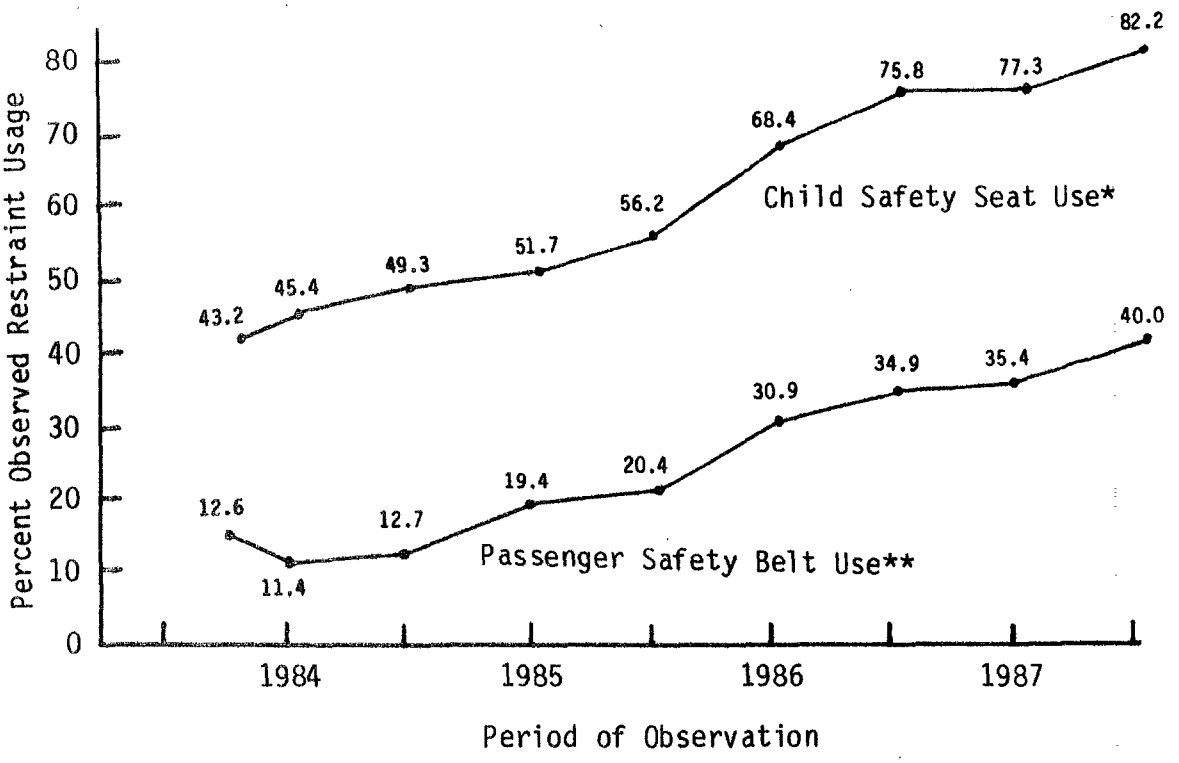
Table 31. Driver shoulder belt misuse by manufacturer's division for 1985-1988 verified vehicle model years.

Manufacturer's Division	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
• Chrysler					
Chysler	270	1.1	0.0	5.9	7.0
Dodge	276	2.2	0.4	3.3	6.9
Plymouth	250	2.8	0.0	5.6	8.4
• Ford					
Ford	1,411	2.3	0.9	6.5	9.7
Lincoln	152	3.3	0.7	2.6	6.6
Mercury	400	2.0	0.8	9.0	11.8
• GM					
Buick	860	2.7	0.3	6.5	9.5
Cadillac	452	2.9	1.3	7.1	11.3
Chevrolet	1,660	1.4	0.5	4.8	6.7
Oldsmobile	1,046	2.0	0.6	7.6	9.2
Pontiac	726	2.1	0.7	5.5	8.3

Note: Manufacturer's division for which fewer than 20 vehicles were observed are not reported in this table.

PASSENGER OBSERVATION FINDINGS

A total of 97,448 passengers were observed during 1987. The data collection effort recognized three specific age groups within the "child" population: infants under one year old; toddlers from ages 1 to 4; and subteens from ages 5 to 12. Observers categorized children within one of these groups to the best of their ability. However, since this observation is relatively difficult, classification of children may not be accurate for all observations. Other age categories included teens (13-19 years old) and adults (20 years and older). Passenger safety belt and child safety seat use (children age 4 and under) are presented bi-annually for 1985 through 1987 in figure 4. The percentages contained in figure 4 represent the appropriate age categories combined (with each observation receiving equal weight) from the summaries presented in Appendix D. The highest child safety seat usage rate, 82.2 percent was observed in the second half of 1987, based on 4,900 observations. The first half of 1987 child safety seat usage rate was 77.3 percent (4,001 observations). Passenger safety belt use in the second half of 1987 was observed to be 40.0 percent based on 49,582 observations of passengers over four years of age. It should be understood that mandatory safety belt laws were in effect in the majority of cities for both data collection periods in 1987. Therefore, the 19-city passenger safety belt use summaries presented in this chapter include data collected in numerous cities with mandatory safety belt laws.



*Comprised of children age 4 and under (i.e., toddlers and infants) with each observation receiving equal weight.

**Comprised of passengers over 4 years of age (i.e., excluding infants and toddlers) with each observation receiving equal weight.

Figure 4. Observed use of passenger restraint system over time.

Table 32 summarizes 1987 passenger restraint system use for various age groups. Observed safety belt use for subteens was 36.3 percent in 1987, compared to 28.5 percent in 1986. Safety seat usage for toddlers was observed to be 80.5 percent in 1987, approximately 8 percent higher than in 1986 (72.3 percent).

Table 32. Passenger restraint system use (1987) by age group.

Age Group	Base	Safety Seat	Safety Belt	Total
Infant	1,164	77.6	1.5	79.1
Toddler	7,742	80.5	4.1	84.5
Subteen	13,139	1.0	36.3	37.3
Teen	15,842	N/A	25.1	25.1
Adult	59,561	N/A	41.7	41.7

The total passenger restraint use (safety seat and safety belt) by age group for the years 1985, 1986, and 1987 are presented in table 33. This table indicates that restraint use for each age group has increased over the past two years, with the most dramatic increases noted in the toddler, subteen, and adult age categories. Detailed summaries of the passenger study observations are provided in the next sections for each age group.

Table 33. Passenger restraint use by age group and year.

	1985		1986		1987	
Age Group	Base	Percent	Base	Percent	Base	Percent
Infant	1,173	67.7	723	71.7	1,164	79.1
Toddler	11,615	61.9	9,851	78.2	8,530	84.5
Subteen	11,740	24.7	15,294	30.2	13,139	37.3
Teen	11,428	12.7	14,461	19.1	15,842	25.1
Adult	50,544	20.8	66,601	36.9	59,561	41.7

Infants (Under 1 Year)

Infant observations consisted of recording the seating position and type of restraint for children esti ated to be younger than 1 year of age. Possible observations for infant restraint type include:

- Safety belt
- Infant/convertible safety seat
- Unsafe seat (home/feeder seat)
- No restraint

A total of 1,164 infants were observed during the passenger observation. Of this total, 77.6 percent were observed in approved safety seats, up from 70.0 percent in 1986. In addition, 20.0 percent of all infants observed were held on passengers' laps. Unsafe (unapproved) seats were observed in 0.1 percent of the observations. Table 34 summarizes the infant observations.

Table 34. Methods of restraining infants.

Type of Restraint	Number	Percent
Infant/Convertible Seat	903	77.6
Safety Belt	18	1.5
None or Unsafe Seats	261	20.9
On Lap	233	20.0
Unrestrained	13	0.8
Unsafe Seat	15	0.1
Total	1,164	100.0

If an infant was observed in an infant-only safety seat, use of the safety seat harness and car belt to secure the safety seat in the vehicle was recorded. The assessment of correct/incorrect belt use could be made accurately for most observations involving an infant-only seat since the car belt crosses in front of the infant to secure the child seat. If the infant was observed to be properly harnessed and the seat appeared to be belted and facing toward the rear of the vehicle, the restraint condition was classified as "Appears Correct". If either improper harnessing, belting or positioning was observed, the condition was classified as "Obviously Incorrect". If an infant was observed in a convertible safety seat, use of the harness was recorded. However, use of the car belt to secure the safety seat in the vehicle could not be recorded due to the difficulty in ascertaining proper fastening.

Table 35 presents infant safety seat usage by city. Overall 55.8 percent of all infants were observed to be correctly harnessed in an approved safety seat in 1987, as compared to 47.7 percent in 1986.

Table 35. Infants observed in safety seats by city.

City	Base	Percent In Safety Seat	Percent Appears Correct
Birmingham	35	100.0	73.2
Atlanta	47	97.9	36.5
San Diego	43	93.0	69.8
Dallas	212	90.1	74.5
Seattle	45	88.9	82.2
Boston	30	86.7	76.7
Chicago	35	85.7	38.2
Miami	42	85.7	58.4
Baltimore	44	84.1	75.0
Minneapolis/St. Paul	77	80.5	36.4
Providence	65	80.0	72.3
New York	38	76.3	68.4
Pittsburgh	39	69.2	23.1
Fargo/Moorhead	35	68.6	28.6
Phoenix	40	67.5	25.0
Houston	98	67.3	51.0
Los Angeles	47	61.7	53.2
New Orleans	139	55.4	46.8
San Francisco	53	54.7	43.4
Total	1,164	77.6	55.8

Table 36 presents the characteristics of infants observed in safety seats. For the 903 infants observed in safety seats, 71.9 percent were observed to be correctly harnessed (and belted for infant-only seats) as compared to 67.8 percent in 1986. The harness was not used in 14.1 percent of the observations, while nonuse of the car belt was observed 5.6 percent of the time. In addition, 12.0 percent of the safety seats were observed forward facing during 1987, as compared to 8.9 percent forward facing during 1986. These findings indicate that many parents/guardians do not understand the importance of securing the child seat to face rearward. Table 37 presents apparent correct usage of infant safety seats by year (1985 through 1987).

Table 36. Characteristics of infants observed in safety seats.

Safety Seat Usage	Number	Percent
Correctly Used	649	71.9
No Harness	94	10.4
No Belt	17	1.9
No Harness or Belt	33	3.7
Forward Facing	109	12.0
Unsure	1	0.1
Total	903	100.0

Table 37. Correct safety seat usage by year for infants observed in safety seats.

Year	Percent Appears Correct
1985	58.9
1986	67.8
1987	66.4

Table 38 indicates that infants were more commonly transported in the front seat, with the front seat outboard position being the most frequent placement. Table 38 also indicates that an infant in the back seat was more likely to be in an approved safety seat and properly transported in that seat than infants observed in the front seat. This phenomenon was also found in 1986.

Table 38. Safety seat usage for infants by seat position.

Seat Position	Base	Percent Observed in Safety Seat	Percent Appears Correct
Front Seat - Center	139	94.2	29.5
Front Seat - Outboard	565	64.4	53.3
Total Front Seat	704	70.3	48.6
Back Seat - Driver	154	89.6	76.0
Back Seat - Center	123	93.5	64.2
Back Seat - Outboard	172	86.6	63.4
Total Back Seat	449	89.5	67.9
Rear (for station wagons & hatchbacks)	11	54.5	18.2
Total	1,164	77.6	55.8

Toddlers (Ages 1 to 4 Years)

Toddler observations consisted of recording the same type of data as collected for infants. However, the correct usage of toddler safety seats could not include an assessment for the belting of the seat to the vehicle, due to the difficulty in ascertaining proper fastening by the seat belt. Correct usage of toddler seats, therefore, was based solely on the use of the harness and shield (for seats requiring shields). In addition, some children who were classified as toddlers, were observed in booster seats. Booster seat observations were recorded as correct when either a harness/lap belt, shoulder/lap belt, or shield/belt system was properly used.

A total of 7,742 toddlers were observed during the passenger study. Of these, 6,225 (80.4 percent) were observed in either a toddler seat or booster seat. A comparison of these findings with those of 1986 indicates an increase in the percentage of toddlers in safety seats. Safety seat usage increased from 72.3 percent during 1986 to 80.4 percent during 1987. Table 39 summarizes the toddler observations.

Table 39. Methods of restraining toddlers.

Type of Restraint	Number	Percent
Toddler Seat	5,726	74.0
Booster Seat	499	6.4
Safety Belt	319	4.1
None or Unsafe Seat Total	1,198	15.5
On Lap	522	6.8
Unrestrained	660	8.5
Unsafe Seats	16	0.2
Total	7,742	100.0

Table 40 presents the type of restraint usage by toddlers and the percentage of usage by city. Overall, 63.1 percent of observed toddlers were harnessed and shielded (for seats requiring shields) in a child safety seat.

Table 41 presents additional observations for toddlers placed in toddler safety seats. Factors such as insufficient time or too many children affect the ability to make a positive identification of harness or shield use. These observations were reported as "unsure" and were not included in determining the percent restrained. Overall, harness/shield use was observed to be 90.2 percent in 1987 for toddlers observed in toddler safety seats. Table 42, which presents harness/shield use by year, indicates a slight decrease in correct usage compared to 1986 results.

Table 40. Restraint usage by city for toddlers.

City	Base	Percent Observed Using Safety Belt	Percent Observed In Toddler Seats	Percent Harnessed/ Shielded In Toddler Seats	Percent Observed In Booster Seats	Percent Appears Correct In Booster Seats	Percent Observed In Safety Seats
Miami	228	0.0	86.4	62.3	7.5	0.9	93.9
Birmingham	249	0.4	89.6	70.7	3.6	2.4	93.2
Providence	538	2.4	81.8	76.2	7.6	5.9	89.4
Baltimore	385	1.6	90.1	81.6	0.0	--	90.1
Atlanta	233	0.4	85.4	59.7	4.7	1.7	90.1
Seattle	676	5.0	79.3	78.4	5.9	5.6	85.2
Boston	436	2.1	87.4	78.4	0.0	--	87.4
New York	469	2.6	84.2	76.3	0.0	--	84.2
San Francisco	734	4.1	77.8	77.0	3.1	2.9	80.9
San Diego	605	5.1	72.1	69.8	6.4	6.3	78.5
Dallas	232	2.6	72.4	64.6	16.8	12.9	89.2
Los Angeles	607	5.0	74.0	72.2	2.6	2.5	76.6
Minneapolis/St.Paul	534	9.6	56.4	47.6	14.4	9.9	70.8
Chicago	237	2.1	68.8	55.3	5.5	2.1	74.3
Phoenix	402	4.2	60.9	49.5	10.0	5.0	70.9
Pittsburgh	395	5.8	55.7	46.1	11.1	5.3	66.8
Houston	163	9.8	64.4	56.4	11.7	9.2	76.1
New Orleans	239	8.8	61.5	59.4	14.2	11.3	75.7
Fargo/Moorhead	380	3.4	53.4	43.2	9.7	5.2	63.1
Total	7,742	4.1	74.0	66.5	6.4	4.5	80.4

*Toddler data removed from base for the 1st study 1.

Table 41. Characteristics of toddlers observed in toddler safety seats.

Toddler Seat Usage	Number	Percent
Harness/Shield	5,150	90.2
No Harness or Shield	562	9.8
Total	5,712	100.0

Table 42. Harness/shield use by year for toddlers observed in toddler seats.

Year	Base	Percent Harness/Shield
1985	5,741	81.3
1986	6,652	91.2
1987	5,712	90.2

Table 43 summarizes the observations of toddlers in booster seats. Of the 499 toddlers observed in booster seats, 69.7 percent were recorded as correct. This compares to 51.9 percent in 1986. Much of this increase can be attributed to the increasing number of booster safety seats requiring shields and their corresponding high correct usage rate. Of the 267 booster safety seats requiring shields, 264 (98.9 percent) were correctly used, while only 84 of the 232 booster seats not requiring a shield were correctly used (36.2 percent).

Table 43. Characteristics of toddlers observed in booster seats.

Booster Seat Usage	Number	Percent
Correctly Used	348	69.7
Harness/Lap Belt	15	3.0
Shoulder/Lap Belt	69	13.8
Shield/Belt	264	52.9
Lap Belt Only	122	24.5
No Harness/Belt	26	5.2
No Shield/Belt	3	0.6
Total	499	100.0

Overall, 87.4 percent of the toddlers observed in toddler and/or booster seats were restrained with the use of a harness or shield.

Table 44. Safety seat/belt usage by seat position for toddlers.

Seat Position	Base	Percent Observed Using Safety Belt	Percent Observed In Toddler Seats	Percent Harnessed/ Shielded In Toddler Seats	Percent Observed In Booster Seats	Percent Appears Correct In Booster Seats	Percent Observed In Safety Seats
Front Seat - Center	291	11.0	28.9	22.3	5.8	2.1	34.7
Front Seat - Outboard*	1,681	7.6	52.5	44.5	9.5	7.1	61.9
Total Front Seat	1,972	8.1	49.0	41.2	8.9	6.3	57.9
Back Seat - Driver	1,861	4.5	81.2	75.9	6.3	4.9	88.0
Back Seat - Center	1,321	1.7	81.5	74.9	4.4	3.1	85.9
Back Seat - Outboard	2,541	2.1	84.8	75.7	5.7	3.6	90.5
Total Back Seat	5,723	2.7	83.1	75.6	5.6	3.9	88.6
Rear (i.e., station wagons* and hatch-backs)	47	8.5	34.0	25.5	4.3	0.0	38.3
Total	7,742	4.1	74.0	66.5	6.4	4.5	80.4

*Seat belt usage in front seat outboard position includes 5.2 percent lap/shoulder belt and 2.4 percent lap belt only observations.

Note: The percentages shown in a particular row reflect the corresponding base in that row.

The relationship between seating position and safety belt/seat use is summarized in table 44 (see page 40). Toddlers were observed transported in the back seat in 73.9 percent of the 7,742 observations. As was the case for infants, toddlers in safety seats are more likely to be observed in the back seat than in the front; 88.6 percent in the back seat compared to 57.9 percent in the front seat.

Subteens (Ages 5 to 12 Years)

Table 45 indicates that a total of 13,139 subteens were observed in the 19 cities during the passenger study. Overall, safety belt use for this age group was found to be 36.3 percent in 1987 compared to 28.5 percent in 1986.

Table 45. Passenger safety belt usage by city for subteens.

City	Base	Percent Restrained
Dallas	578	54.8
Houston	1,031	52.5
Minneapolis/St. Paul	882	44.7
Baltimore	255	43.9
Seattle	779	43.8
Providence	623	40.3
Boston	364	39.0
Chicago	430	38.4
New Orleans	776	37.2
Miami	576	35.4
San Diego	985	33.4
Phoenix	817	32.8
New York	341	30.5
Birmingham	412	29.6
Los Angeles	1,187	29.6
Pittsburgh	970	29.4
San Francisco	949	28.2
Atlanta	522	26.2
Fargo/Moorhead	662	21.9
Total	13,139	36.3

Table 46 presents subteen safety belt usage by seating position. The current study indicates that the majority of subteens were observed in back seat positions similar to the 1986 findings. The highest usage rate was experienced in the front-outboard position. The usage rate for this position was observed to be 60.4 percent in 1987 compared to 50.6 percent in 1986, an increase of approximately 10 percent.

Table 46. Passenger safety belt usage for subteens by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	650	11.7
Front Seat - Outboard	4,490	60.4
Total Front Seat	5,140	54.2
Back Seat - Driver	2,594	32.3
Back Seat - Center	1,924	7.0
Back Seat - Outboard	3,185	31.1
Total Back Seat	7,703	25.5
Rear (i.e., station wagons & hatchbacks)	296	4.7
Total	13,139	36.3

Teens (Ages 13 to 19 Years)

Teens, with the exception of children 4 years of age and younger, were observed to have the lowest rate of safety belt usage. Of a total of 15,842 teens, only 25.1 percent were observed using safety belts. However, in 1986 only 19.1 percent of 14,461 teens were observed using safety belts. Table 47 presents teen safety belt usage by city for each of the 19 cities. The percentage of use ranged from a high of 41.4 percent in Houston to a low of 10.0 percent in New York.

Safety belt use by seating position (table 48) indicates that teens in front seat positions were approximately five times more likely to be observed wearing safety belts than those in back seat positions. Also, the majority of teens were observed in the front-outboard position. Safety belt usage for teens in the front-outboard position increased from 29.1 percent in 1986 to 39.1 percent in 1987.

Table 47. Passenger safety belt usage for teens by city.

City	Base	Percent Restrained
Houston	967	41.4
Miami	969	41.0
Dallas	525	37.3
Seattle	694	34.6
Atlanta	1,285	31.7
Minneapolis/St. Paul	1,273	30.9
San Diego	715	30.8
Birmingham	1,288	27.2
Baltimore	460	23.9
Los Angeles	548	23.4
San Francisco	643	23.2
Chicago	853	21.3
Providence	590	17.3
Phoenix	1,114	17.1
Pittsburgh	1,027	15.5
New Orleans	849	14.5
Fargo/Moorhead	1,032	12.8
Boston	542	10.9
New York	468	10.0
Total	15,842	25.1

Table 48. Passenger safety belt usage for teens by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	717	2.1
Front Seat - Outboard	8,900	39.1
Total Front Seat	9,617	36.4
Back Seat - Driver	1,780	6.9
Back Seat - Center	942	0.4
Back Seat - Outboard	3,458	10.2
Total Back Seat	6,180	7.8
Rear (i.e., station wagon & hatchbacks)	45	8.9
Total	15,842	25.1

Adults (20 Years and Older)

Adult passengers were observed wearing safety belts in 40.0 percent of 59,561 observations. This compares with 36.9 percent for the 1986 study. Table 49 presents the number of observations and percent safety belt usage for each of the 19 cities. The highest safety belt usage was observed in Miami (64.2 percent) and the lowest was observed in Providence (20.3 percent).

Table 49. Passenger safety belt usage for adults by city.

City	Base	Percent Restrained
Miami	1,954	64.2
Houston	3,163	58.2
Seattle	3,806	57.8
Dallas	3,748	55.0
Chicago	1,881	50.7
San Diego	3,650	49.4
San Francisco	3,571	47.9
Minneapolis/St. Paul	2,846	47.2
Baltimore	3,456	44.8
Los Angeles	3,119	43.5
Atlanta	2,413	39.1
Birmingham	3,063	35.6
New Orleans	3,547	32.4
Phoenix	3,007	32.3
New York	3,584	25.1
Boston	3,427	23.2
Pittsburgh	2,970	22.7
Fargo/Moorhead	2,812	22.6
Providence	3,544	20.3
Total	59,561	40.0

Front seat adults were observed to use safety belts in 44.2 percent of the observations while only 10.1 percent safety belt usage was observed for back seat adult passengers (table 50). All seating positions displayed an increase in safety belt usage for adults during 1987. The largest increase in adult safety belt usage between 1986 and 1987 was 9.7 percent for the back seat outboard position.

Table 50. Passenger safety belt usage for adults by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	607	4.1
Front Seat - Outboard	51,711	44.7
Total Front Seat	52,318	44.2
Back Seat - Driver	2,182	5.8
Back Seat - Center	408	0.0
Back Seat - Outboard	4,610	13.0
Total Back Seat	7,200	10.1
Rear (i.e., station wagons and hatchbacks)	43	11.6
Total	59,561	40.0

Overall Safety Belt Usage by Seat Position

Overall safety belt usage by seat position is shown in table 51. The number of observations (base) and percent restrained for the driver and front-outboard positions were taken directly from Tables 1 and 2, respectively. The number of observations for the remaining positions were also obtained from the driver study (table 18) and the corresponding percent restrained calculated by weighting these number of observations with observed safety belt use recorded in the passenger study for each age category. As presented in table 51, total front seat safety belt usage was 41.4 percent while total back seat safety belt usage was 12.3 percent.

Table 51. Overall safety belt usage by seat position.

Seat Position	First Half		Second Half		Total	
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
Front Seat - Driver	46,334	41.7	51,895	42.8	98,237	42.3
Front Seat - Center	168	10.7	184	7.7	352	7.8
Front Seat - Outboard	10,782	35.7	12,248	36.7	23,030	36.2
Total Front Seat	57,284	40.5	64,327	41.5	121,619	41.4
Back Seat - Driver	816	11.6	1,002	13.6	1,818	12.7
Back Seat - Center	544	3.7	559	4.1	1,103	3.8
Back Seat - Outboard	1,167	14.7	1,752	15.6	2,919	15.3
Total Back Seat	2,527	11.4	3,313	13.0	5,840	12.3
Total	59,811	39.3	67,640	40.1	127,451	39.7

OBSERVATIONS OF CHILD SAFETY SEAT INSTALLATION

Passenger observations were made from curb locations near the exit points of selected shopping malls. Due to the limited amount of observation time available for each vehicle, the assessment of several aspects of child safety seats are difficult or impossible to obtain. For example, difficulty is encountered in observing safety seat manufacturer, and correct vehicle safety belt tether use during the passenger observations. As a result, the primary toddler safety seat observation in the passenger study is that of observing if the child is harnessed in the safety seat and whether a shield is used (for those safety seats designed with shields). The child safety seat observation was designed to provide information on safety seat installation that could not be obtained as part of the passenger observation.

During this study, 3,679 safety seats were observed in parked vehicles at the same shopping malls used for the passenger observations. The type of safety seat and the observed mode of use are presented in table 52. Of the 295 seats observed in an infant mode (rearward facing), 202 (68.5 percent) were of the "infant-only" (non-convertible) variety. This style seat cannot be converted between infant and toddler modes. The most popular models of the "infant only" seat were the INFANT LOVE and DYN-O-MITE seats. The most prominent "convertible" seat, observed in the infant mode was the STROLEE seat. STROLEE was also the most frequently observed seat in the toddler mode, while CENTURY seats were the most frequently observed booster seats.

Table 53 presents the types of toddler safety seats by model observed during this study. As previously discussed, STROLEE seats (including the 500 and 600 Series) were observed more frequently in the toddler mode than any other manufacturer. However, in looking at individual models the One Step, manufactured by Evenflo, was the most frequently observed seat (21.2 percent).

Within the toddler seat category, two types of systems are available for securing the safety seat to the vehicle seat; (1) securing with the safety belt only, and (2) securing with the safety belt and a tether. Of the 3,163 toddler seats, 2,838 (89.7 percent) of the belt only and 325 (10.3 percent) of the belt and tether systems were observed, as presented in Table 54. This table also indicates that safety seats secured by the safety belt only were observed to be correctly installed 80.7 percent of the time, whereas, those that require a tether were much less likely to be installed correctly (i.e., 12.0 percent). Overall, 73.6 percent of the toddler seats observed were properly secured.

Table 52. Types of child safety seats installed (percentage of safety seat observations by mode are shown parenthetically).

Name/ Manufacturer	Observed Mode			All Safety Seats
	Infant	Toddler	Booster	
Babyhood Ind.	0(0.0)	2(0.1)	0(0.0)	2(0.1)
Bobby-Mac	3(1.0)	85(2.7)	0(0.0)	88(2.4)
Century	111(37.6)	760(24.0)	50(22.6)	921(25.0)
[Infant Love Seat]	91(30.8)	N/A	N/A	91(25.0)
[Model 570]	2(0.7)	N/A	N/A	2(0.1)
[Model 580]	4(1.4)	N/A	N/A	4(0.1)
Other	14(4.7)	760(24.0)	50(22.6)	824(22.4)
Collier-Keyworth	12(4.1)	73(2.3)	52(23.5)	137(3.7)
[Cuddle-Shuttle]	8(2.7)	N/A	N/A	8(0.2)
Other	4(1.4)	73(2.3)	52(23.5)	129(3.5)
Cosco	29(9.8)	219(6.9)	26(11.8)	274(7.4)
[First Ride]	13(4.4)	N/A	N/A	13(0.3)
[TLC]	5(1.7)	N/A	N/A	5(0.1)
Other	11(3.7)	219(6.9)	26(11.8)	256(7.0)
Evenflo	82(27.8)	672(21.2)	23(10.4)	777(21.1)
[Dyn-O-Mite]	58(19.7)	N/A	N/A	58(1.5)
[Infant Seat]	2(0.7)	N/A	N/A	2(0.1)
Other	22(7.4)	672(21.2)	23(10.4)	717(19.5)
Fisher Price	11(3.8)	274(8.7)	0(0.0)	285(7.8)
Ford	0(0.0)	3(0.1)	0(0.0)	3(0.1)
Gerry	1(0.3)	26(0.8)	0(0.0)	27(0.7)
Graco	0(0.0)	5(0.2)	0(0.0)	5(0.1)
International Man	2(0.7)	80(2.5)	24(10.9)	106(2.9)
Kolcraft	22(7.5)	88(2.8)	38(17.2)	148(4.0)
[Rock-N-Ride]	17(5.8)	N/A	N/A	17(0.5)
Other	5(1.7)	88(2.8)	38(17.2)	131(3.6)
Nissan	0(0.0)	9(0.3)	0(0.0)	9(0.3)
Pride Trimble	0(0.0)	24(0.8)	0(0.0)	24(0.7)
Questor (Kantwet)	1(0.3)	18(0.6)	0(0.0)	19(0.5)
Strolee	21(7.1)	814(25.7)	6(2.7)	841(22.9)
[Rock-It]	2(0.7)	N/A	N/A	2(0.1)
Other	19(6.4)	814(25.7)	6(2.7)	839(22.8)
Welsh	0(0.0)	8(0.2)	0(0.0)	8(0.2)
Other Infant Seat	0(0.0)	3(0.1)	2(0.9)	5(0.1)
Total	295(100.0)	3,163(100.0)	221(100.0)	3,679(100.0)

[ ] = Infant only seats.

Table 53. Types of toddler safety seats installed by model.

Manufacturer/Model	Base	Percent of Grand Total
Babyhood Industries		
Wonda Chair	(2)	(0.1)
Bobby-Mac	(85)	(2.7)
Deluxe	10	0.3
Deluxe II	25	0.8
Champion	47	1.5
Other	3	0.1
Century	(760)	(24.0)
100	158	5.0
200	258	8.1
300	235	7.4
Child Love	38	1.2
400 XL	46	1.5
1000 STE	4	0.1
2000 STE	12	0.4
2500 STE	4	0.1
3000 STE	5	0.2
Collier-Keyworth	(73)	(2.3)
Safe & Sound	68	2.1
Roundtripper	4	0.1
Sprint Convertible	1	0.0
Cosco	(219)	(6.9)
Commuter	28	0.9
Commuter 5 PT	3	0.1
Safe-T-Seat	42	1.3
Safe-T-Shield	43	1.3
Safe & Snug	69	2.2
Safe & Easy	28	0.9
Other	6	0.2
Evenflo	(672)	(21.2)
One Step	671	21.1
7-Year Car Seat	1	0.0
Fisher Price		
Car Seat	(274)	(8.7)
Ford		
Tot Guard	(3)	(0.1)
Gerry		
Guardian	(26)	(0.8)

( ) Refers to category subtotals.

Table 53. Types of toddler safety seats installed by model (con't).

Manufacturer/Model	Base	Percent of Grand Total
Graco	(5)	(0.2)
GT 1000	2	0.1
Little Traveler	2	0.1
Unknown	1	0.0
International Manufacturing		
Teddy-Tot Astroseat	(80)	(2.5)
Kolcraft	(88)	(2.8)
Hi-Rider	12	0.4
Redi-Rider	20	0.6
Quick Step	30	1.0
Ultra Ride	26	0.8
Nissan		
Child Safety Seat	(9)	(0.3)
Pride Trimble		
Pride Ride	(24)	(0.7)
Questor	(18)	(0.6)
Kantwet Care Seat	9	0.3
Kantwet Safeguard	5	0.2
Other	4	0.1
Strolee	(814)	(25.7)
500 Series	282	8.9
600 Series	521	16.5
GT 2000	3	0.1
GT 3000	7	0.2
Model 61	1	0.0
Welsh		
Travel Tot	(8)	(0.3)
Other	(3)	(0.1)
Grand Total	3,163	100.0

( ) Refers to category subtotals.

Table 54. Correct installation of toddler safety seats by method of fastening the seat.

Method of Fastening Seat	Base	Percent Correct Installation
Secured by Car Safety Belt Only	2,838	80.7
Secured by Tether and Car Safety Belt	325	12.0
Total	3,163	73.6

Figure 5 (page 52) presents the percentage of belt-only and belt and tether type toddler seats observed since 1984. This figure illustrates a continual increase in the percentage of the use of belt-only seats accompanied by a decline the use of belt and tether seats. The disparity of 28.4 percent in 1984 between the two types of seats has increased to 79.4 percent in 1987. Figure 6 (page 52) indicates that the 80.7 percent rate of correctly installed belt-only seats is a substantial increase over 1984 correct usage. Inspecting figures 5 and 6 simultaneously reveals that the increasing correct installation of toddler safety seats corresponds with the increasing use of belt-only seats. Part of this increase in correct installation is believed to be attributed to the clearly marked, correct car belt routing stickers on many of the newer seats.

The installation characteristics of the 2,838 toddler seats observed in 1987, that require securing with safety belts only, are displayed in figure 7. In 80.7 percent of the observations, the safety belt was properly used to secure the belt-only toddler seat types. The safety belt was observed not to be used with this seat type 2.8 percent of the time and improperly used 16.5 percent of the time. Table 55 presents installation characteristics by manufacturer for toddler seats that require securing by only the vehicle safety belt.

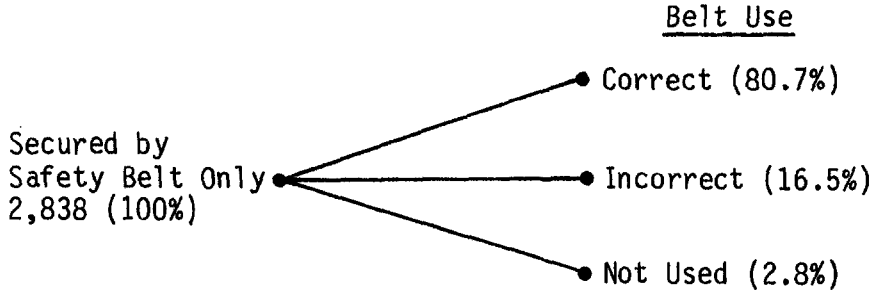


Figure 7. Installation characteristics of toddler seats that require securing by the safety belt only.

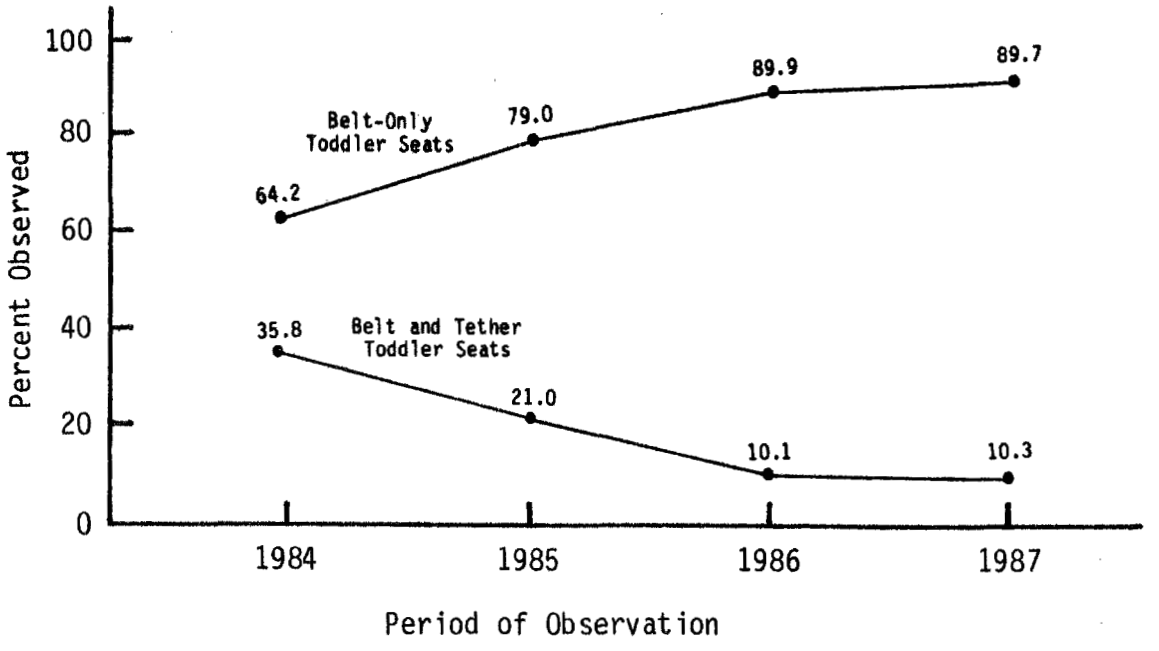


Figure 5. Percent of toddler safety seats observed over time by type of system.

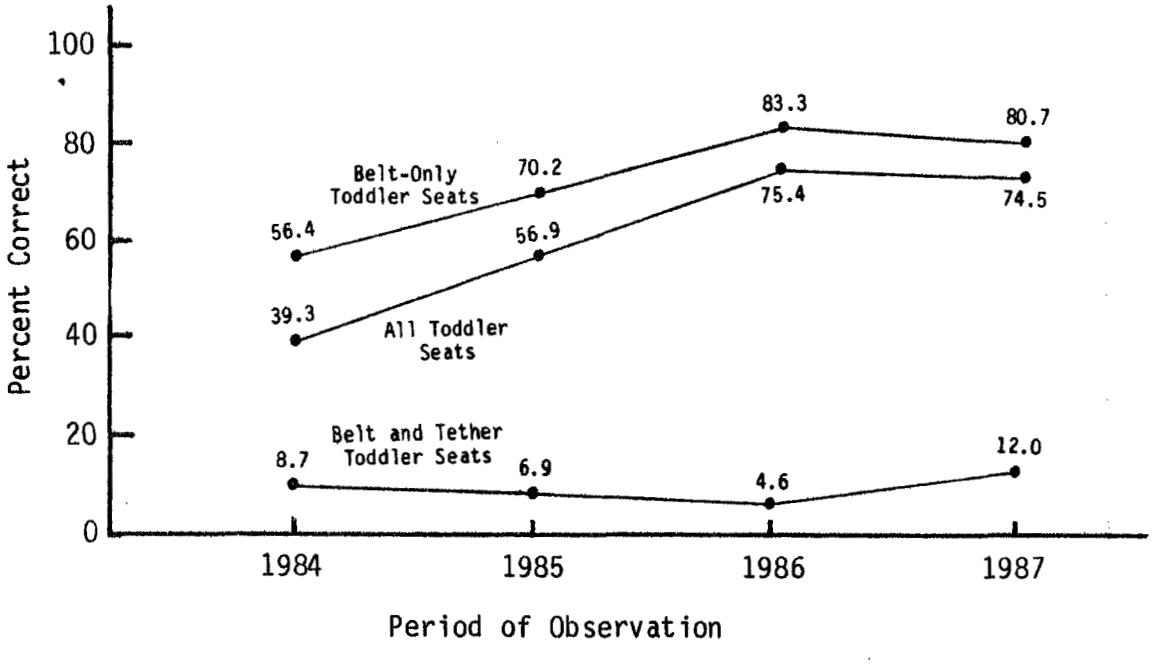


Figure 6. Correct installation of toddler safety seats over time by type of system.

Table 55. Percent correct and incorrect fastening of child safety seats (toddler seats) by manufacturer.

Manufacturer	Base	Percent Correct* Use	Percent Car Belt Not Used	Percent Car Belt Used Incorrectly
Babyhood Ind.	2	2(100.0)	0(0.0)	0(0.0)
Bobby-Mac	85	73(85.9)	6(7.1)	6(7.1)
Century	722	563(78.0)	13(1.8)	146(20.2)
Collier-Keyworth	73	66(90.4)	3(4.1)	4(5.5)
Cosco	219	176(80.4)	11(5.1)	32(14.6)
Evenflo	672	531(79.0)	14(2.1)	127(18.9)
Fisher Price	274	236(86.1)	8(2.9)	30(11.0)
Ford	3	3(100.0)	0(0.0)	0(0.0)
Gerry	26	24(92.3)	1(3.8)	1(3.8)
Graco	5	4(80.0)	1(20.0)	0(0.0)
International Mfg.	80	57(71.3)	6(7.5)	17(21.3)
Kolcraft	88	72(81.8)	2(2.3)	14(15.9)
Nissan	9	8(88.9)	0(0.0)	1(11.1)
Pride Trimble	24	15(62.5)	0(0.0)	9(37.5)
Questor (Kantwet)	14	13(92.9)	1(7.1)	0(0.0)
Strolee	532	437(82.1)	15(2.8)	80(16.0)
Welch	8	8(100.0)	0(0.0)	0(0.0)
Other	2	2(100.0)	0(0.0)	0(0.0)
Total	2,838	2,290(80.7)	81(2.9)	467(16.5)

*Seats that require fastening around the child and shield (and are unfastened) are coded as correctly belted.

For toddler seats that require securing by the safety belt and tether, there exists the possibility that more than one misuse may be present. Figure 8 illustrates the correct/incorrect installation characteristics for the 325 toddler seats observed that require securing by the safety belt and tether. This figure shows that only 12.0 percent of the seats observed were properly tethered and belted. Failure to tether the seat was the most prominent type of misuse observed (81.8 percent) with the tether used incorrectly in 4.9 percent of the observations. The most frequently observed multiple misuse was not using the tether and incorrectly belting the seat to the vehicle (27.1 percent). This table also shows that only 6.4 percent of the toddler seats were not belted (by summing the "Not Used" percentages in the belt use column) and in 29.3 percent of the observations, the safety belt was incorrectly attached to the toddler seat (by summing the "Incorrect" percentages in the belt use column). Table 56 shows installation characteristics by manufacturer for toddler seats that require securing by the safety belt and tether strap.

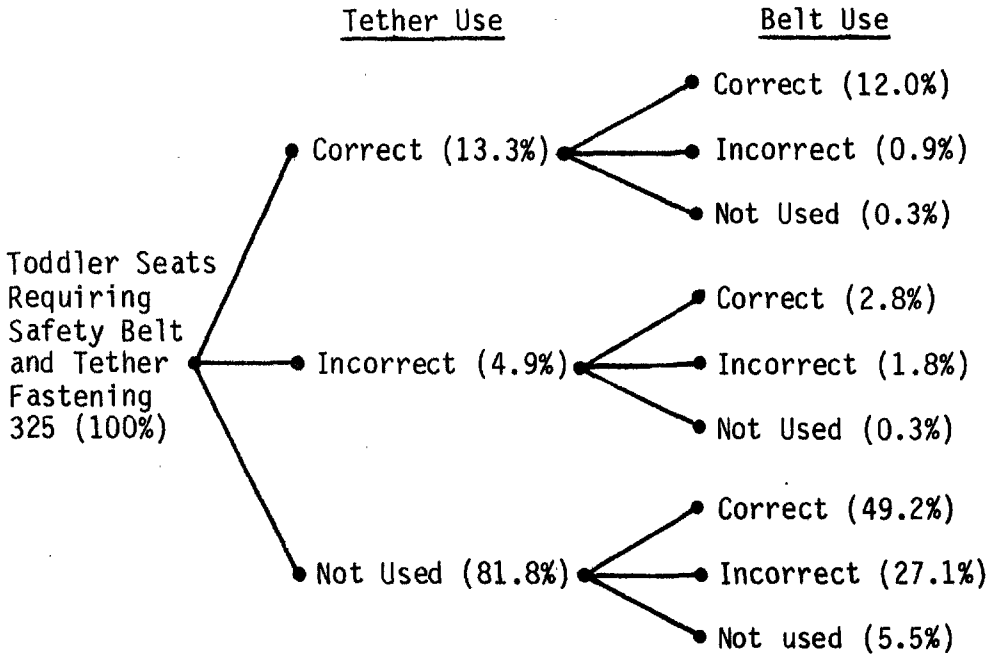


Figure 8. Installation characteristics of toddler seats that require securing by the safety belt and tether.

Table 56. Toddler seat installation characteristics by manufacturer (for toddler seats that require the vehicle safety belt and tether strap).

Manufacturer	Base	Percent Appears Correct	Percent Tether Not Used	Percent Tether Used Incorrectly	Percent Belt Not Used	Percent Car Belt Used Incorrectly
Century (Child Love)	38	15.8	73.7	19.0	0.0	5.3
Questor	4	50.0	25.0	0.0	0.0	25.0
Strolee	282	11.0	49.3	2.1	6.7	32.6
Total	324	13.8	51.9	2.8	5.9	29.3

MOTORCYCLE/MOPED OBSERVATION FINDINGS

During 1987, observations were made of helmet use by operators and passengers of 20,388 motorcycles and mopeds. Table 57 presents helmet usage rates in each city for drivers and passengers of motorcycles. Of 18,484 motorcycle drivers, 53.6 percent were observed wearing helmets compared to 44.3 percent of the 2,111 passengers.

Table 57. Helmet use for motorcycle operators and passengers.

City	Driver Base	Percent Helmet On	Passenger Base	Percent Helmet On
Boston	379	99.5	31	100.0
Providence	514	36.0	53	66.0
New York	309	99.4	25	100.0
Baltimore	338	36.1	25	32.0
Pittsburgh	407	99.5	62	100.0
Minneapolis/St.Paul	1,392	38.9	151	24.5
Fargo/Moorhead	731	39.1	80	26.2
Phoenix	2,262	40.0	256	17.2
Chicago	472	43.2	79	20.3
Atlanta	837	84.5	105	61.9
Miami	862	86.3	128	65.6
Birmingham	719	93.7	150	84.0
Seattle	1,097	54.1	88	45.4
San Francisco	1,826	34.7	138	23.9
Los Angeles	2,333	41.2	221	30.3
San Diego	1,743	49.3	202	34.6
Houston	765	47.3	82	25.6
Dallas	790	47.0	109	36.7
New Orleans	708	94.8	126	88.9
Total	18,484	53.6	2,111	44.3

Driver and passenger helmet usage rates by year (1984 through 1987) are displayed in figure 9. This figure indicates that driver and passenger helmet usage are decreasing over time.

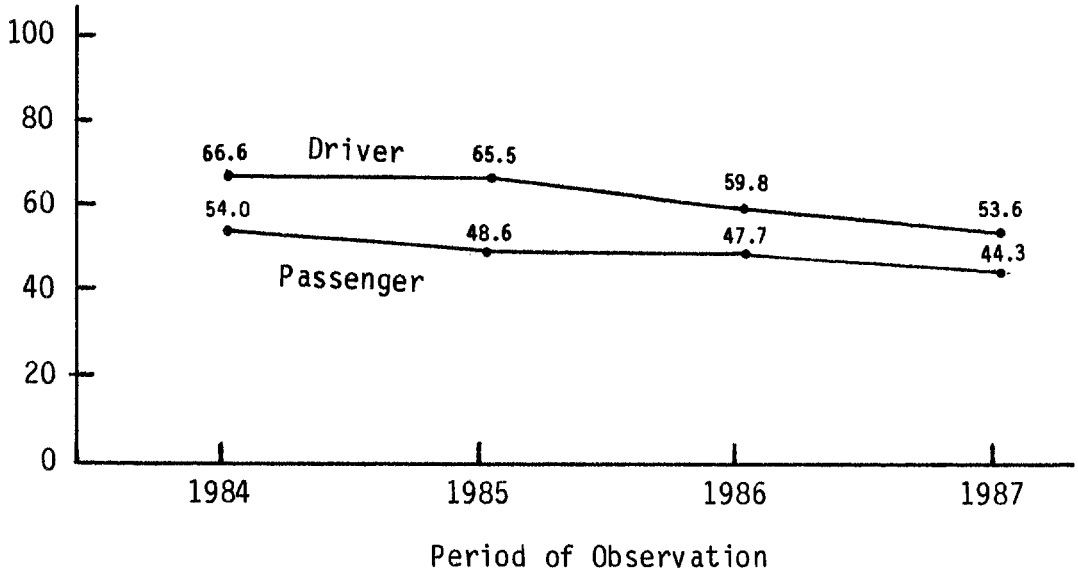


Figure 9. Motorcycle helmet use trends for operators and passengers.

Table 58 presents helmet usage rates in each city for drivers and passengers of mopeds (motorized bicycles). Comparing the results of this table (28.9 percent for drivers and 19.9 percent for passengers) to table 57 reveals that, overall, drivers and passengers of mopeds were less likely to be wearing helmets than their counterparts on motorcycles.

Table 58. Helmet use for moped operators and passengers.

City	Driver Base	Percent Helmet On	Passenger Base	Percent Helmet On
Boston	11	9.1	3	0.0
Providence	13	15.4	0	--
New York	7	28.6	2	0.0
Baltimore	7	14.3	2	0.0
Pittsburgh	14	85.7	1	100.0
Minneapolis/St.Paul	62	24.2	8	0.0
Fargo/Moorhead	13	46.2	0	--
Phoenix	209	19.6	26	3.8
Seattle	133	34.6	11	27.3
San Francisco	328	25.3	40	15.0
Los Angeles	286	24.1	47	10.6
San Diego	276	26.8	40	17.5
Chicago	62	32.3	1	0.0
Atlanta	100	4.0	0	--
Miami	84	17.9	0	--
Birmingham	70	47.1	7	100.0
Houston	56	28.6	4	25.0
Dallas	63	31.7	4	0.0
New Orleans	110	81.8	10	100.0
Total	1,904	28.9	206	19.9

In order to examine differences in helmet use in conjunction with mandatory helmet use laws, motorcycle usage rates were stratified into two groups: with and without or limited helmet laws. Table 59 lists the seven cities in which mandatory helmet laws exist. Helmet use for both drivers and passengers were recorded to be 80.5 percent. Table 60 lists the twelve cities with no or limited helmet use law. Driver and passenger helmet use rates for these cities were observed to be 42.2 and 29.0 percent, respectively.

Table 59. Motorcycle helmet use in cities with mandatory helmet use laws.

City	Driver Base	Percent Helmet On	Passenger Base	Percent Helmet On
Boston	379	99.5	31	100.0
New York	309	99.4	25	100.0
Pittsburgh	407	99.5	62	100.0
Atlanta	837	84.5	105	61.9
Miami	862	86.3	128	65.6
Birmingham	719	93.7	150	84.0
New Orleans	708	94.8	126	28.6
Total	4,221	92.0	627	80.5

Table 60. Motorcycle helmet use in cities with no or limited helmet use laws.

City	Driver Base	Percent Helmet On	Passenger Base	Percent Helmet On
Providence	514	36.0	53	66.0
Baltimore	338	36.1	25	32.0
Minneapolis/St.Paul	1,392	38.9	151	24.5
Fargo/Moorhead	731	39.1	80	26.2
Chicago	472	43.2	79	20.3
Seattle	1,097	54.1	88	45.4
San Francisco	1,826	34.7	138	23.9
Los Angeles	2,333	41.2	221	30.3
San Diego	1,743	49.3	202	34.6
Houston	765	47.3	82	25.6
Dallas	790	47.0	109	36.7
Phoenix	2,262	40.0	256	17.2
Total	14,263	42.2	1,484	29.0

Figure 10 illustrates the trend of driver and passenger helmet use on motorcycles, in cities with mandatory helmet laws and cities with no or limited helmet use laws. This figure shows a slight decline in helmet use among drivers and passengers in cities both with and without helmet use laws during 1987.

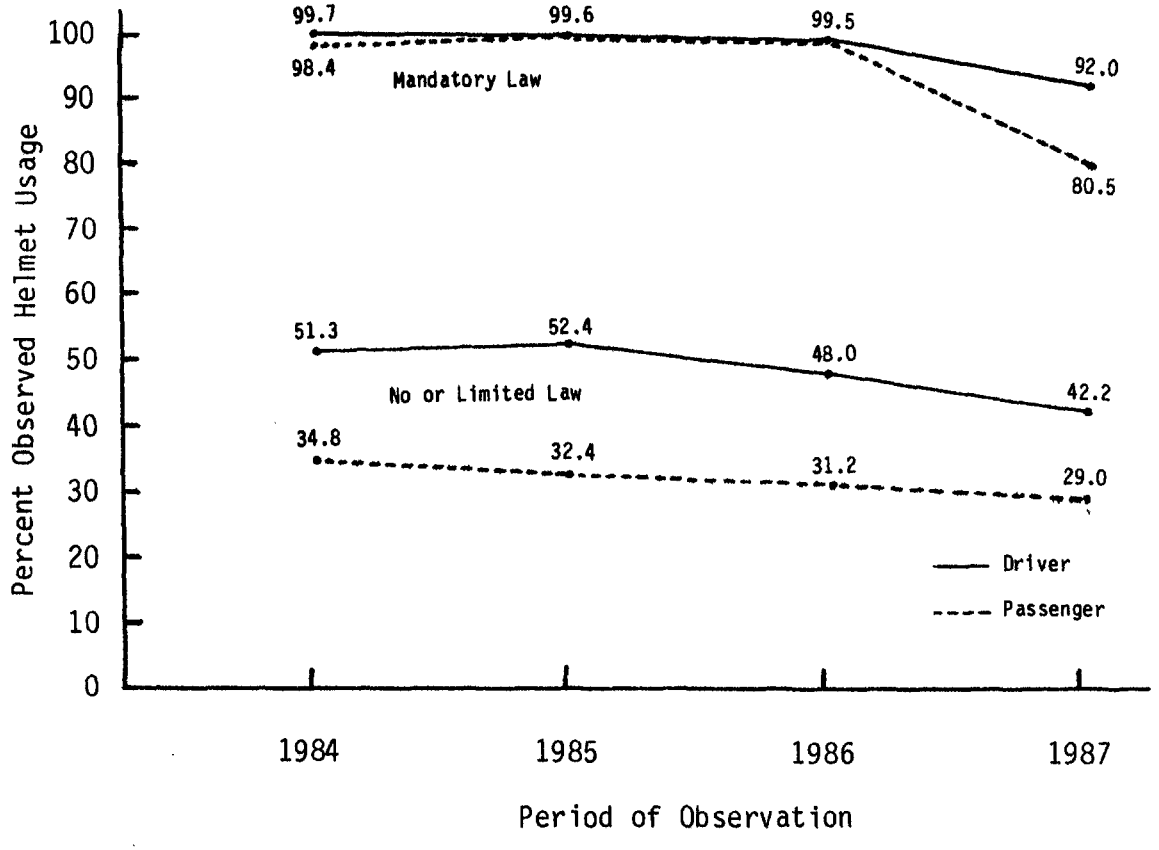


Figure 10. Motorcycle helmet use trends for operators and passengers by the existence of mandatory helmet use laws.

OBSERVATIONS ON CARS WITH AUTOMATIC SAFETY BELTS

Beginning with 1987 models, the automobile manufacturers are required to equip 10 percent of their passenger cars with automatic restraints. This percentage "phase-in" increases each year with 25 percent for 1988 models, 40 percent for 1989 models and 100 percent for the 1990 models. Most of the manufacturers are providing automatic safety belts and some are providing air bag restraint systems to meet these new Federal requirements. There are three basic designs for the automatic safety belt systems: motorized shoulder belts with a knee bolster, non-motorized shoulder belts with a knee bolster and the third design is a combination lap and shoulder belt. A manually operated lap belt is provided by most of the manufacturers of the automatic shoulder belt systems.

Because the frequency of these automatic safety belts is so low in the vehicle population (only about 1 percent of all cars on the road at the end of 1987), special efforts were undertaken to observe cars equipped with these new systems. This special study is labeled in this report as study 2. At each of the 30 traffic sites in the 19 cities, observers spent 3 hours collecting safety belt use data and the procedures used were described earlier in this report in more detail under Project Methodology. Observers were carefully trained to identify automatic safety belt systems as opposed to manual belt systems when looking into the interior of the car. Automatic systems are relatively easy to spot because of their protruding upper shoulder belt connector. In addition, the observers were further trained to identify the particular model cars that incorporated these automatic belt systems. The procedures used to select the car for observation in study 2 were somewhat different than study 1. For the automatic belt study (study 2) observers were told to wait for all the cars to stop at a stoplight and then to "spot" any cars that were equipped with automatic belts and record data from those cars first. Once observations were completed of any automatic belt equipped cars, the observer would return to the second car in line at the traffic signal and conduct observations the same as done in study 1. As will be seen by the number of cars observed with automatic belt systems, it was not until the end of 1987 that a fair number of automatic belt were observed and even then only an average of 1.3 automatic equipped cars were observed for each hour of observation.

Observations by Automatic System Type

Overall use of automatic safety belts was 91.6 percent based on 4,233 observations during 1987 (see table 61). Figure 11 presents a graphical display of automatic safety belt use by type of system. The most frequently observed automatic belt system during 1987 were the motorized shoulder belt systems that could not be disconnected by unbuckling produced by Ford and Toyota. There were 2,237 of these systems observed and belt use was 99.1 percent. For the 415 cars observed with the motorized shoulder belt but with a disconnect feature, use was 95 percent. For the 820 systems observed with non-motorized shoulder belt (mostly VW with 614 observations) use was 83 percent. For the 759 combination lap and shoulder belt

Table 61. Driver belt usage by automatic system type.

All Studies 1987										
	First Half				Second Half				Total	
	Study 1 Base	Belted(%)	Study 2 Base	Belted(%)	Study 1 Base	Belted(%)	Study 2 Base	Belted(%)	Base	Belted(%)
Total Non-Motorized Three Point (Lap/Shoulder) Automatic Belt System									759,	(77.1)
American Motors Alliance	2	(100.0)	1	(100.0)	0	(--)	1	(100.0)	4	(100.0)
Buick Total	1	(100.0)	17	(82.3)	17	(76.5)	84	(82.1)	119	(81.5)
Oldsmobile Total	0	(--)	29	(82.8)	23	(65.2)	152	(73.7)	204	(74.0)
Pontiac Total	0	(--)	29	(69.0)	43	(69.8)	242	(74.8)	314	(73.6)
Honda Total	1	(100.0)	4	(100.0)	6	(100.0)	107	(85.0)	118	(86.4)
Total Automatic Non-Motorized Shoulder Belt									820	(83.0)
Chrysler LaBaron Coupe	0	(--)	7	(57.1)	14	(64.3)	55	(74.5)	76	(71.8)
Dodge Daytona	0	(--)	2	(0.0)	1	(0.0)	32	(75.0)	35	(68.6)
Hyundai Excel	0	(--)	10	(90.0)	12	(75.0)	66	(75.8)	88	(77.3)
Peugeot 505	0	(--)	0	(--)	0	(--)	5	(80.0)	5	(80.0)
Volkswagon Total	71	(94.4)	184	(84.8)	115	(81.7)	224	(94.6)	614	(86.2)
Yogo GV/GUX	0	(--)	0	(--)	0	(--)	2	(100.0)	2	(100.0)
Automatic Motorized Shoulder Belt With Disconnect									417	(95.0)
Automatic Motorized Shoulder Belt Without Disconnect									2237	(99.1)
Total Automatic Motorized Shoulder Belt									2654	(98.4)
Chrysler Conquest	0	(--)	0	(--)	0	(--)	2	(100.0)	2	(100.0)
Ford Total	6	(100.0)	121	(100.0)	92	(97.8)	348	(98.0)	567	(98.4)
Isuzu Impulse	2	(100.0)	0	(--)	0	(--)	11	(100.0)	13	(100.0)
Jaguar	0	(--)	0	(--)	0	(--)	7	(85.7)	7	(85.7)
Mazda 626	2	(50.0)	6	(100.0)	3	(100.0)	50	(98.0)	61	(96.7)
Mercury Total	1	(100.0)	5	(100.0)	4	(50.0)	36	(100.0)	46	(95.7)
Mitsubishi Starion	1	(100.0)	0	(--)	0	(--)	6	(100.0)	7	(100.0)
Nissan Maxima	18	(100.0)	67	(97.0)	56	(91.1)	181	(93.9)	322	(94.4)
Saab 900S	2	(100.0)	0	(--)	0	(--)	6	(100.0)	8	(100.0)
Subaru XT Coupe	1	(100.0)	0	(--)	0	(--)	9	(100.0)	10	(100.0)
Toyota Total	170	(98.8)	523	(98.9)	269	(99.6)	649	(99.8)	1611	(99.4)
Total All Automatic Belt Systems (19 Cities)									4233	(91.6)

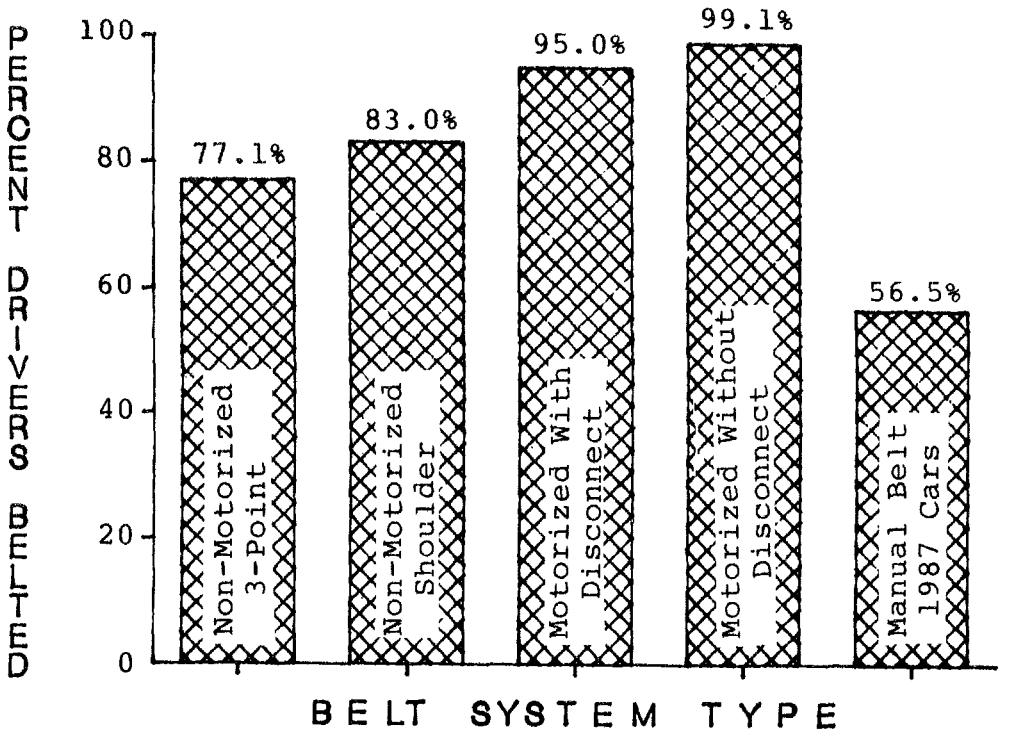


Figure 11. Comparison of driver belt use percentage for different types of automatic and manual belt systems.

systems observed (mostly General Motors with 637 observations), use was 77.1 percent. These use rates were all much higher than the 56.5 percent use of manual belts in 1987 cars. Figure 11 indicates that the systems which achieve the highest driver usage are the motorized systems. The lowest usage rate of the automatic systems are the three-point automatic. The majority of the three-point systems are provided with an easy disconnect. All of the automatic systems, however, were higher than the manual usage rate for comparable 1987 model vehicles of 56.5 percent.

Automatic Safety Belt Use by Manufacturer

A summary of driver automatic belt usage by manufacturer and vehicle model is presented in table 62. The usage rates on many of the model categorizes should be interpreted with care since the number of observations in many instances are too small to provide reliable estimates. The driver usage rates by those manufacturers with total observations exceeding 100 are presented in figure 12. The lowest usage rate for manufacturers is 70.8 percent for Chrysler Corporation with Toyota Motors being the highest at 99.4 percent.

Table 62. Driver automatic belt usage by vehicle manufacturer.

All Studies 1987										
	First Half				Second Half					
	Study 1 Base,Belted(%)		Study 2 Base,Belted(%)		Study 1 Base,Belted(%)		Study 2 Base,Belted(%)		Total Base,Belted(%)	
American Motors Alliance	2	(100.0)	1	(100.0)	0	(--)	1	(100.0)	4	(100.0)
Chrysler Total	0	(--)	7	(57.1)	14	(64.3	57	(75.4)	78	(71.8)
LeBaron Coupe	0	(--)	7	(57.1)	14	(64.3)	55	(74.5)	76	(71.1)
Conquest	0	(--)	0	(--)	0	(--)	2	(100.0)	2	(100.0)
Dodge Daytona	0	(--)	2	(0.0)	1	(0.0)	32	(75.0)	35	(68.6)
Ford Total	6	(100.0)	121	(100.0)	92	(97.8)	348	1(98.0)	567	(98.4)
Unknown	0	(--)	1	(100.0)	3	(66.7)	16	(93.8)	20	(90.0)
Escort	6	(100.0)	120	(100.0)	89	(98.9)	296	(98.0)	511	(98.6)
Tempo	0	(--)	0	(--)	0	(--)	36	(100.0)	36	(100.0)
Mercury Total	1	(100.0)	5	(100.0)	4	(50.0)	36	(100.0)	46	(95.7)
Lynx	1	(100.0)	5	(100.0)	4	(50.0)	27	(100.0)	37	(100.0)
Topaz	0	(--)	0	(--)	0	(--)	9	(100.0)	9	(100.0)
Buick Total	1	(100.0)	17	(82.4)	17	(76.5)	84	(82.1)	119	(81.5)
Unknown	1	(100.0)	1	(0.0)	1	(100.0)	5	(80.0)	8	(87.5)
Somerset	0	(--)	2	(100.0)	3	(100.0)	12	(75.0)	17	(82.4)
Skylark	0	(--)	1	(100.0)	2	(50.0)	8	(100.0)	11	(90.9)
LeSabre	0	(--)	13	(76.9)	11	(72.7)	59	(81.4)	83	(79.5)
Oldsmobile Total	0	(--)	29	(82.8)	23	(65.2)	152	(73.7)	204	(74.0)
Unknown	0	(--)	0	(--)	3	(100.0)	6	(50.0)	9	(66.7)
Calais	0	(--)	10	(100.0)	8	(50.0)	39	(89.7)	57	(86.0)
Delta 88	0	(--)	19	(73.7)	12	(66.7)	93	(73.1)	124	(72.6)
Cutlass Supreme	0	(--)	0	(--)	0	(--)	14	(42.9)	14	(42.9)

Table 62. Driver automatic belt usage by vehicle manufacturer (continued).

All Studies 1987										
	First Half				Second Half					
	Study 1 Base,Belted(%)		Study 2 Base,Belted(%)		Study 1 Base,Belted(%)		Study 2 Base,Belted(%)		Total Base,Belted(%)	
Pontiac Total	0	(--)	29	(69.0)	43	(69.8)	242	(74.8)	314	(73.6)
Unknown	0	(--)	0	(--)	4	(50.0)	8	(75.0)	12	(66.7)
Grand Am	0	(--)	18	(77.8)	25	(72.0)	163	(74.8)	206	(74.8)
Bonneville	0	(--)	11	(54.5)	14	(71.4)	71	(74.6)	96	(71.9)
Other Domestic	0	(--)	0	(--)	0	(--)	4	(75.0)	4	(75.0)
Volkswagon Total	71	(94.4)	184	(84.8)	115	(81.7)	244	(86.9)	614	(86.2)
Unknown	70	(94.3)	3	(100.0)	7	(71.4)	5	(100.0)	85	(92.9)
Rabbit	1	(100.0)	150	(82.0)	87	(79.3)	166	(80.7)	404	(80.9)
Gulf	0	(--)	2	(100.0)	3	(66.7)	13	(100.0)	18	(94.4)
Jetta	0	(--)	29	(99.4)	18	(100.0)	60	(100.0)	107	(99.1)
Nissan Maxima	18	(100.0)	67	(97.0)	56	(91.1)	181	(93.9)	322	(94.4)
Honda Total	1	(100.0)	4	(100.0)	6	(100.0)	107	(85.0)	118	(86.4)
Unknown	1	(100.0)	0	(--)	0	(--)	3	(66.7)	4	(75.0)
Accord	0	(--)	4	(100.0)	6	(100.0)	90	(86.7)	100	(88.0)
Prelude	0	(--)	0	(--)	0	(--)	14	(78.6)	14	(78.6)
Isuzu Impulse	2	(100.0)	0	(--)	0	(--)	11	(100.0)	13	(100.0)
Jaguar	0	(--)	0	(--)	0	(--)	7	(85.7)	7	(85.7)
Mazda 626	2	(50.0)	6	(100.0)	3	(100.0)	50	(98.0)	61	(96.7)
Peugeot 505	0	(--)	0	(--)	0	(--)	5	(80.0)	5	(80.0)

Table 62. Driver automatic belt usage by vehicle manufacturer (continued).

All Studies 1987										
	First Half				Second Half					
	Study 1 Base,Belted(%)		Study 2 Base,Belted(%)		Study 1 Base,Belted(%)		Study 2 Base,Belted(%)		Total Base,Belted(%)	
Saab 900S	2	(100.0)	0	(--)	0	(--)	6	(100.0)	8	(100.0)
Subaru XT Coupe	1	(100.0)	0	(--)	0	(--)	9	(100.0)	10	(100.0)
Toyota Total	170	(98.8)	523	(98.9)	269	(99.6)	649	(99.8)	1611	(99.4)
Unknown	169	(98.8)	17	(94.1)	11	(100.0)	13	(100.0)	210	(98.6)
Cressida	1	(100.0)	318	(99.4)	160	(100.0)	312	(99.7)	791	(99.6)
Camry	0	(--)	188	(98.4)	98	(99.0)	324	(100.0)	610	(99.3)
Hyundai Excel GL	0	(--)	10	(90.0)	12	(90.0)	66	(75.8)	88	(77.3)
Mitsubishi Starion	1	(100.0)	0	(--)	0	(--)	6	(100.0)	7	(100.0)
Yugo GV/GUX	0	(--)	0	(--)	0	(--)	2	(100.0)	2	(100.0)
Accura	1	(100.0)	0	(--)	0	(--)	0	(--)	1	(100.0)

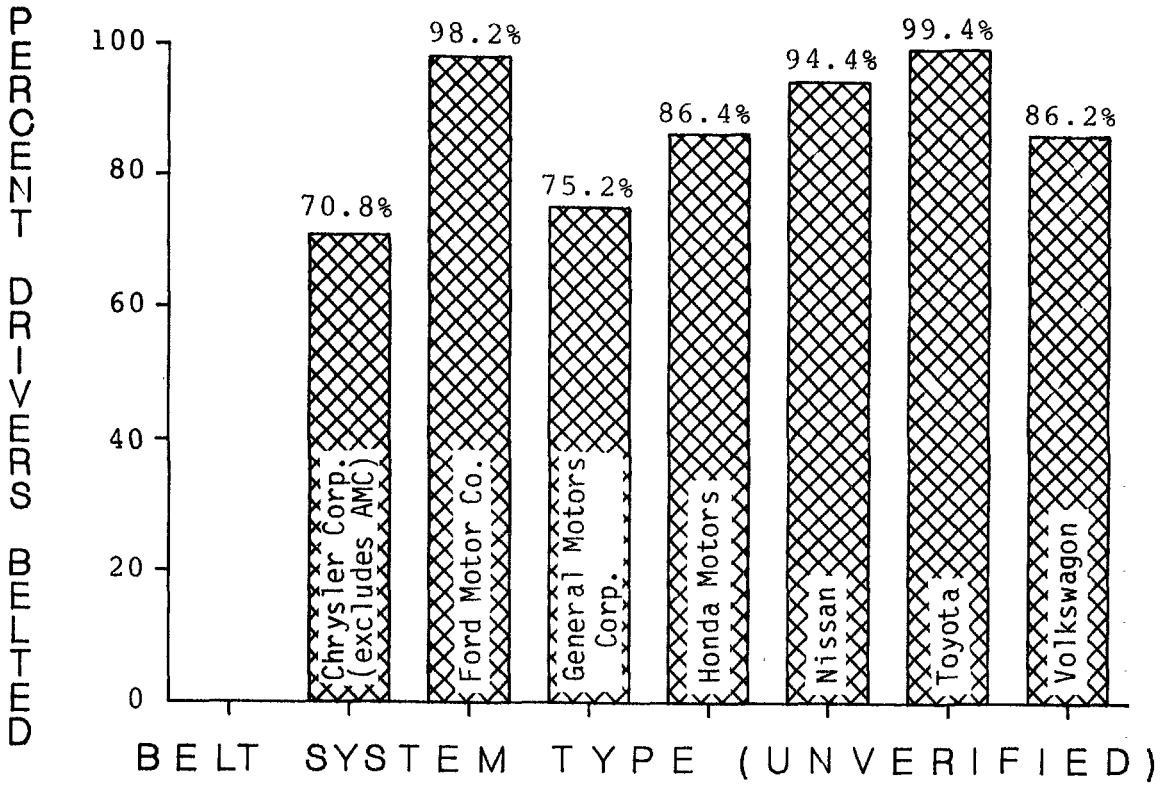


Figure 12. Comparison of unverified driver belt usage by vehicle manufacturer for automatic belt systems.

(Note: manufacturer totals not exceeding 100 observations are excluded from figure).

Automatic Belt Use by Manufacturers for Verified Data*

Model Comparisons With and Without Automatic Safety Belt Systems

The majority of the vehicle manufacturers did not introduce their automatic belt systems until late in the model year. This affords the opportunity to investigate driver belt usage rates for the same vehicle type with and without automatic belt systems, as presented in table 63. The sample size for many of the observations on individual vehicle models is too small to formulate reliable conclusions. Inspecting the totals for specific models by manufacturer indicates that seat belt use is consistently higher for automatic belt systems. Figure 13 displays the magnitude of the automatic and manual belt use difference. The largest difference in driver belt usage is 34.0 percent resulting from the import vehicle population.

*See page 15 for information on verified data.

Table 63. Safety belt use comparison of automatic belt vs. manual belt systems for verified vehicle types.

(Based on analysis of 1987 model cars unless noted otherwise.)

Manufacturer of 1987	Automatic Belt Use		Manual Belt Use	
	Base	Percent Belt Use	Base	Percent Belt Use
Chrysler Motors				
Dodge Daytona	6	66.7	17	35.3*
Chrysler LeBaron Coupe	13	61.5	24	75.0
Chrysler Totals	19	63.2	41	58.5
Ford Motor Company				
Ford Tempo	3	33.3	321	50.5*
Ford Escord	148	83.1	406	44.6*
Mercury Lynx	8	100.0	42	59.5*
Ford Totals	159	83.0	769	47.9*
General Motors				
H Line:				
Bonneville	24	33.3	33	42.4
Delta 88	33	51.5	52	38.5
LeSabre	30	56.7	45	48.9
Total H Line	87	48.3	130	43.1
N Line:				
Grand Am	40	57.5	106	53.8
Cutlass Calais	24	66.7	37	67.6
Skylark	4	75.0	15	46.7
Sommerset	3	66.7	12	41.7
Total N Line	71	62.0	170	55.3
Total H & N Line	158	54.4	300	50.0

*1986 models included.

Table 63. Safety belt use comparison of automatic belt vs. manual belt systems for verified vehicle types (continued).

(Based on analysis of 1987 model cars unless noted otherwise.)

Manufacturer of 1987	Automatic Belt Use		Manual Belt Use	
	Base	Percent Belt Use	Base	Percent Belt Use
Imported Cars				
Honda Prelude	4	50.0	48	54.2
Honda Accord	7	85.7	20	60.0
Honda Totals	11	72.7	68	55.9
Hyundai	13	76.9	110	46.4
Mazda 626	6	66.7	32	65.6
Nissan Maxima	55	85.5	61	65.6*
Saab 900S	1	0.0	8	37.5
Suburu XT Coupe	2	50.0	3	66.7
Toyota Cressida	30	96.7	N/A	N/A
Toyota Camry	117	95.7	N/A	N/A
Toyota Celica	-	-	78	56.4
Toyota Totals	147	95.9	78	56.4
VW Jetta	7	85.7	34	61.8
VW Golf	7	100.0	13	61.5
VW Totals	14	92.9	47	61.7

*1986 models included.

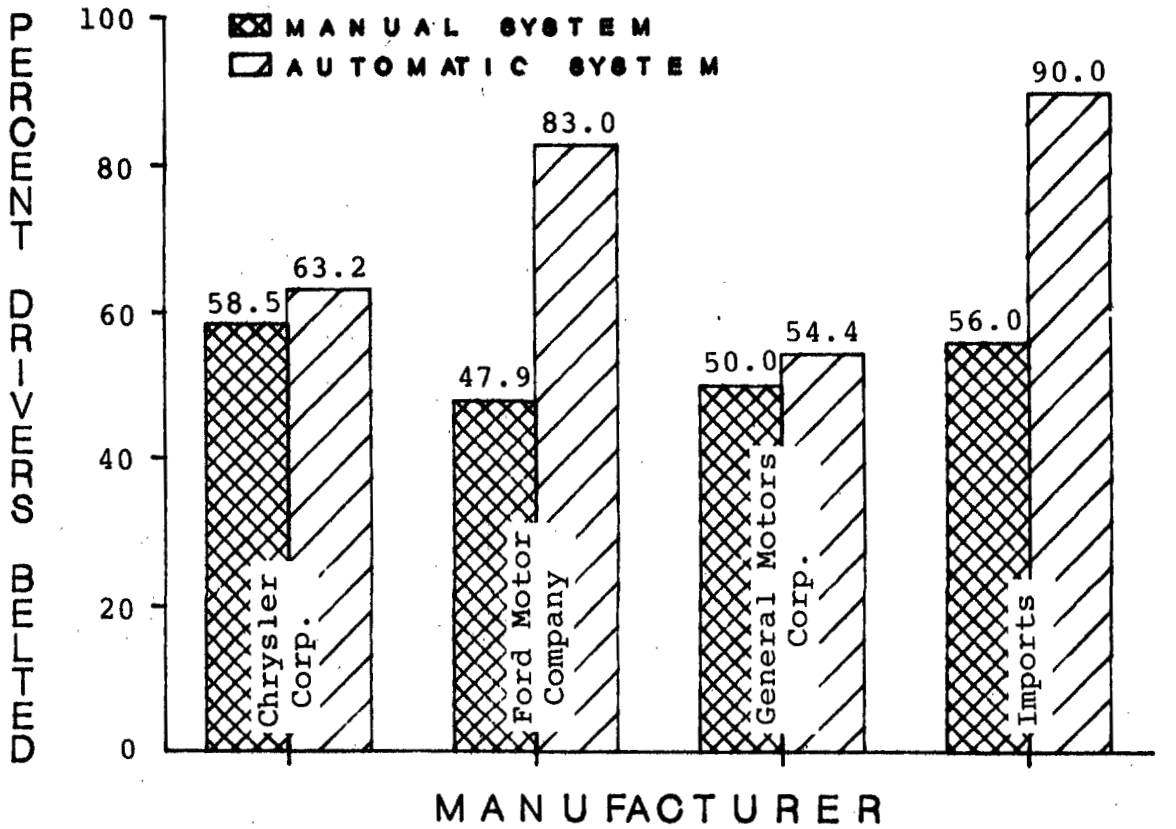


Figure 13. presents the driver usage rates for the different types of belt systems, that were verified by the VINDICATOR program, as existing in selected 1986 and 1987 model years. The relative ranking of the different belt systems exhibited by the unverified data of figure 11 also exists in the verified data of figure 14. All of the automatic systems exhibited a higher usage rate than manual systems.

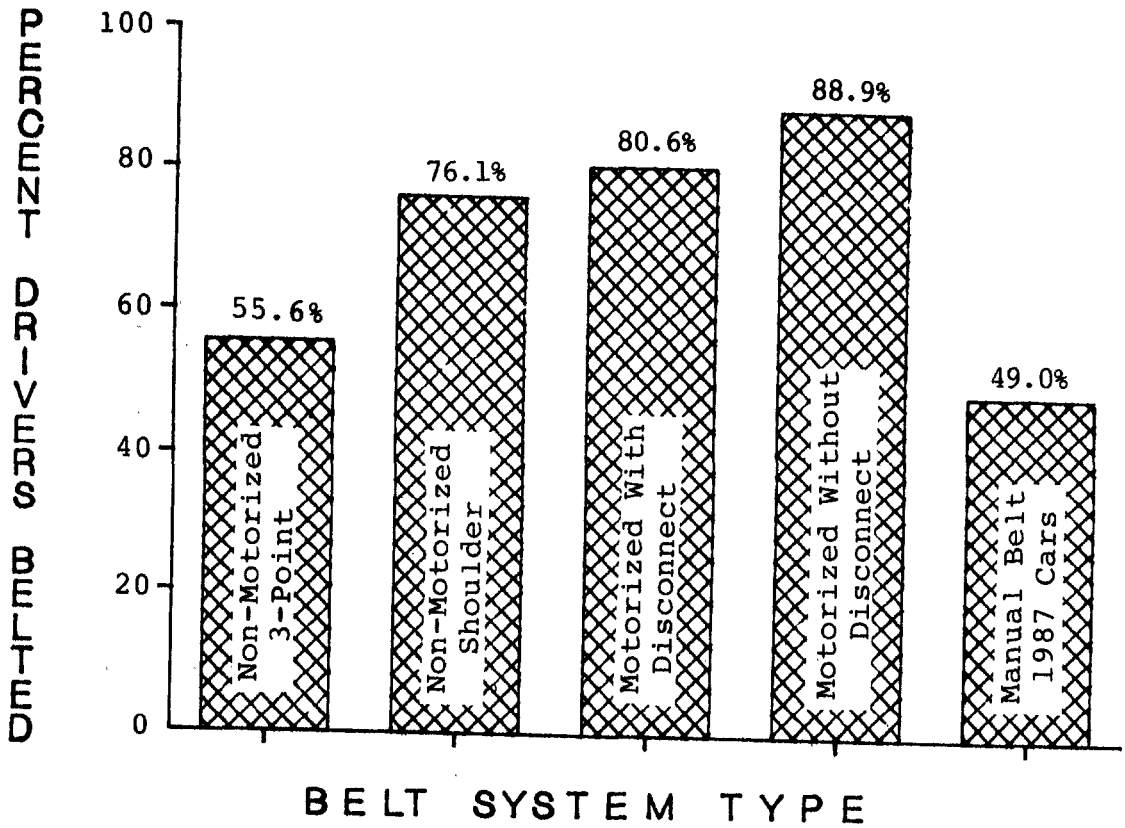


Figure 14. Comparison of driver belt use percentage for different types of automatic and manual belt systems obtained from verified vehicle type analysis.

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APPENDIX A - DRIVER SAFETY BELT USAGE BY MANUFACTURER'S DIVISION AND MODEL YEAR (1979-1988)

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Table 64. Driver safety belt usage for AMC/Eagle by model year.

Model Year	Base	Percent Belted
1979	50	20.0
1980	54	22.2
1981	46	39.1
1982	43	23.3
1983	26	42.3
1984	8	50.0
1985	6	50.0
1986	6	50.0
1987/88	2	0.0
Total	241	29.5

Table 65. Driver safety belt usage for Jeep by model year.

Model Year	Base	Percent Belted
1979	16	18.8
1980	8	37.5
1981	7	57.1
1982	12	0.0
1983	11	54.5
1984	63	44.4
1985	58	62.1
1986	51	47.1
1987/88	40	42.5
Total	266	45.5

Table 66. Driver safety belt usage for Plymouth by model year.

Model Year	Base	Percent Belted
1979	87	43.7
1980	74	35.1
1981	137	35.8
1982	95	41.1
1983	102	42.2
1984	180	42.8
1985	183	42.6
1986	140	40.0
1987/88	234	49.6
Total	1,232	42.4

Table 67. Driver safety belt usage for Dodge by model year.

Model Year	Base	Percent Belted
1979	124	35.5
1980	84	34.5
1981	127	39.4
1982	83	34.9
1983	142	41.5
1984	189	41.8
1985	230	44.3
1986	190	30.5
1987/88	215	54.0
Total	1,384	40.9

Table 68. Driver safety belt usage for Chrysler by model year.

Model Year	Base	Percent Belted
1979	110	31.8
1980	49	28.6
1981	21	28.6
1982	78	38.5
1983	124	46.0
1984	177	45.8
1985	214	48.1
1986	199	52.8
1987/88	110	56.4
Total	1,082	45.6

Table 69. Driver safety belt usage for Buick by model year.

Model Year	Base	Percent Belted
1979	380	31.1
1980	423	39.5
1981	443	38.4
1982	514	44.2
1983	533	44.1
1984	644	46.0
1985	711	48.9
1986	609	56.3
1987/88	321	53.0
Total	4,578	45.3

Table 70. Driver safety belt usage for Chevrolet by model year.

Model Year	Base	Percent Belted
1979	1,044	32.3
1980	840	36.7
1981	778	37.7
1982	666	41.9
1983	649	42.1
1984	1,036	43.5
1985	1,117	49.3
1986	1,326	52.0
1987/88	856	49.2
Total	8,312	43.3

Table 71. Driver safety belt usage for Cadillac by model year.

Model Year	Base	Percent Belted
1979	334	34.1
1980	178	33.1
1981	148	37.2
1982	184	45.1
1983	252	42.1
1984	264	47.7
1985	384	51.0
1986	285	55.4
1987/88	192	51.0
Total	2,221	44.8

Table 72. Driver safety belt usage for Oldsmobile by model year.

Model Year	Base	Percent Belted
1979	590	35.4
1980	479	35.9
1981	454	41.2
1982	451	46.3
1983	574	48.6
1984	764	49.3
1985	781	50.2
1986	848	52.0
1987/88	442	70.8
Total	5,383	46.0

Table 73. Driver safety belt usage for Pontiac by model year.

Model Year	Base	Percent Belted
1979	293	27.3
1980	260	29.6
1981	235	28.5
1982	284	42.3
1983	223	41.3
1984	461	41.9
1985	492	48.0
1986	619	47.5
1987/88	401	48.9
Total	3,268	41.5

Table 74. Driver safety belt usage for Ford by model year.

Model Year	Base	Percent Belted
1979	710	31.5
1980	405	39.3
1981	433	40.0
1982	509	40.3
1983	497	34.2
1984	909	45.7
1985	918	49.2
1986	1,063	47.0
1987/88	759	60.5
Total	6,203	44.4

Table 75. Driver safety belt usage for Mercury by model year.

Model Year	Base	Percent Belted
1979	229	30.1
1980	88	27.3
1981	117	35.0
1982	148	31.1
1983	156	37.8
1984	296	45.6
1985	278	50.7
1986	300	47.0
1987/88	187	73.8
Total	1,799	43.0

Table 76. Driver safety belt usage for Lincoln by model year.

Model Year	Base	Percent Belted
1979	80	43.8
1980	57	38.6
1981	36	38.9
1982	53	45.3
1983	51	35.3
1984	83	45.8
1985	98	46.9
1986	112	46.4
1987/88	118	45.8
Total	688	44.0

Table 77. Driver safety belt usage for Volkswagen by model year.

Model Year	Base	Percent Belted
1979	136	41.2
1980	193	61.7
1981	128	59.4
1982	116	62.1
1983	53	47.2
1984	173	55.5
1985	170	57.1
1986	196	58.2
1987/88	58	66.7
Total	1,252	56.9

Table 78. Driver safety belt usage for Toyota by model year.

Model Year	Base	Percent Belted
1979	268	42.9
1980	444	46.8
1981	418	50.7
1982	397	61.5
1983	475	63.6
1984	566	67.8
1985	620	68.2
1986	736	67.5
1987/88	463	72.8
Total	4,387	62.0

Table 79. Driver safety belt usage for Datsun/Nissan by model year.

Model Year	Base	Percent Belted
1979	211	27.0
1980	291	44.0
1981	244	42.6
1982	319	43.6
1983	288	50.0
1984	368	51.6
1985	391	58.1
1986	348	57.5
1987/88	467	55.2
Total	2,927	49.4

Table 80. Driver safety belt usage for Honda by model year.

Model Year	Base	Percent Belted
1979	191	47.1
1980	195	54.4
1981	241	52.3
1982	252	60.3
1983	333	58.6
1984	444	62.2
1985	528	58.7
1986	573	60.7
1987/88	436	59.2
Total	3,193	58.3

Table 81. Driver safety belt usage for other imports by model year.

Model Year	Base	Percent Belted
1979	330	44.5
1980	391	46.5
1981	449	45.2
1982	482	53.5
1983	611	55.3
1984	913	60.1
1985	936	60.8
1986	1,365	56.9
1987/88	788	59.3
Total	6,265	55.8

APPENDIX B - DRIVER SAFETY BELT USAGE BY CAR SERIES BY MANUFACTURER'S DIVISION

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The tables in Appendix B show driver safety belt usage for 1979-1988 model years by car series for each manufacturer. Only those models that have 20 or more observations are presented.

Manufacturer/Series	Base	Percent Belted
American Motors		
Concord	110	36.4
Eagle	83	27.7
Spirit	43	18.6
Jeep		
Cherokee	138	52.2
CJ-7	33	39.4
Wagoneer	74	40.5
Plymouth		
Caravelle	57	54.4
Grand Fury	43	37.2
Horizon	478	39.5
Reliant	546	43.6
Sundance	26	80.8
Volare	72	37.5
Dodge		
Aries	442	41.6
Aspen	61	36.1
Daytona	73	42.5
Diplomat	90	35.6
Lancer	83	54.2
Omni	400	38.0
400	27	33.3
600	128	39.1
Shadow	46	63.0
Chrysler		
Cordoba	43	44.2
E Class	33	48.5
Laser	57	43.9
LeBaron	460	46.5
Newport	26	30.8
New Yorker	461	45.6

Manufacturer/Series	Base	Percent Belted
Buick		
Century	1,037	51.1
Electra	520	46.9
Le Sabre	692	44.1
Regal	976	41.0
Riviera	267	40.1
Skyhawk	336	49.4
Skylark	608	41.9
Somerset	121	49.6
Chevrolet		
Beretta	28	60.7
Camaro	782	42.6
Caprice	975	39.9
Cavalier	1,239	48.7
Celebrity	1,307	49.8
Chevette (Regular)	956	34.2
Citation	626	42.3
Corsica	38	65.8
Corvette	121	38.0
Impala	327	38.8
Malibu	580	40.3
Monte Carlo	623	33.9
Monza	74	31.1
Nova	350	45.4
Spectrum	153	54.9
Sprint	106	64.2

Manufacturer/Series	Base	Percent Belted
Cadillac		
Brougham	337	39.5
Cimarron	121	57.9
Deville	1,060	47.5
Eldorado	416	39.4
Fleetwood	67	49.3
Seville	220	41.4
Oldsmobile		
Calais	261	60.9
Custom Cruiser	112	51.8
Cutlass	1,925	43.9
Delta 88	1,029	45.9
Firenza	165	46.1
Ninety-Eight	556	44.4
Omega	194	39.7
Toronado	171	36.8
Ciera	971	49.4
Pontiac		
Bonneville	403	35.5
Catalina	34	38.2
Fiero	183	43.7
Firebird	390	38.2
Grand Am	380	50.5
Grand Prix	344	33.4
Grand Le Mans	50	34.0
J 2000/2000	414	46.9
Lemans	53	24.5
Parisienne	123	31.7
Phoenix	140	35.0
Sunbird	66	30.3
T 1000/1000	102	35.3
6000	574	51.4

Manufacturer/Series	Base	Percent Belted
Ford		
Escort	863	42.3
Escort (New)	685	53.7
EXP	97	46.4
Fairmont	448	41.1
Fiesta	48	33.3
Ford Wagon	50	36.0
Granada	209	34.9
LTD	993	43.1
Mustang	905	39.7
Pinto	102	31.4
Taurus	407	58.2
Tempo	779	48.8
Thunderbird	596	41.1
Mercury		
Capri	124	35.5
Cougar	396	41.2
Lynx	168	32.7
Lynx (New)	71	60.6
Marquis	544	42.1
Monarch	41	12.2
Sable	138	60.1
Topaz	170	53.5
Zephyr	115	40.9
Lincoln		
Continental	494	44.1
Mark Series	146	54.1

Foreign Models

Accura	89	70.8
Audi	426	58.5
BMW	568	53.9
Chry/Plym/Mits	96	46.9
Datsun/Nissan	2,927	49.4
Dodge/Mitsubishi	252	55.2
Fiat/Bertone	30	13.3
Honda	3,193	58.3
Hyundai	309	55.3
Jaguar	113	51.3
Mazda	1,139	56.0
Mercedes Benz	481	53.8
Mitsubishi	228	61.4
Opel/Isuzu	184	54.9
Peugeot	113	61.9
Porsche	96	44.8
Renault/Eagle	113	61.9
Saab	186	60.8
Subaru	656	49.5
Suzuki	78	57.7
Toyota	4,387	62.0
Volkswagen	1,253	56.9
Volvo	777	66.8
Yugo	42	33.3

APPENDIX C - DATA FORMS AND INSTRUCTIONS

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Driver Study Data Form

Printed data forms entitled "Driver Restraint Observation: Form #1" will be used in the study 1 and study 2 (Figure 15). Fifty observations can be recorded on the front and back of the form. Use as many forms as necessary but always use a new form when you change to a new site. Send all completed forms to Goodell-Grivas, Inc. using the addressed envelopes provided at the end of each week.

General Information

The top portion of each form provides a description of observer, location, date and environmental conditions. This information is very important to the study and should be completed prior to each collection period at a location.

1. **Observer:** Write in your last name.
2. **City:** Write in the city.
3. **Day:** Circle the appropriate day of the week.
4. **Date:** Write in the month, date, and year. For example write in 11/15/87 for November 15, 1987.
5. **Area Type:** Circle the appropriate description of the area.
   City - Downtown, central city area
   Suburban - Heavy commercial, industrial or highly residential area outside the central city area. (Usually color highlighted)
6. **Location No:** Record the number shown on your site listing or map.
7. **Site:** Circle the appropriate description of primary road or freeway exit.
8. **Location:** Write in the street name on which data are collected and the direction (north, east, south, west) and name of the nearest cross-street.
9. **Roadway Conditions:** Circle the condition with best describes the road condition at the time of observation.
10. **Start Time:** Specify the hour and minutes, and circle AM or PM for the start of the collection period.
11. **End Time:** Specify the hour and minutes, and circle AM or PM for the ending of the collection period.

DRIVER RESTRAINT OBSERVATION: FORM #1

1. Observer: _____ 2. City: _____

3. Day: Su M Tu W Th F Sa 4. Date: ___ / ___ / ___

5. Area Type: City Suburb 6. Location No.: _____

7. Site: Primary Road Freeway Exit

8. Location: On _____ N E S W Of _____

9. Road Conditions: Dry Wet Snow/Ice

10. Start Time: _____ AM PM 11. End Time _____ AM PM

No.	License Number	Make (Model)	Model Code	Driver Sex 1 M 2 F	Driver Belt 1 Both 2 Lap 3 None 4 Shldr 5 * 6 **	Misuse 1 Under arm 2 Behind back 3 Loose	Auto-matic Belt 1 Yes 2 No	Driver and Passenger Position by Age Group Driver Center Outboard			Pass. Sex 1 M 2 F	Pass. Belt 1 Both 2 Lap 3 None 4 Shldr. 5 CRD	Rear Sta. Wagon Htchbk No. of Chldrn.
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													
14.													
15.													
16.													
17.													
18.													
19.													
20.													

* (Shoulder belt on, lap belt unknown)
** (Shoulder belt not on, lap belt unknown)
} Used in second lane situations when lap belt use can not be determined.

Age Group: 1-Infant (Under 1 yr) 2-Toddler (1-4 yrs) 3-Subteen (5-12) 4-Teenager (13-19) 5-Adult (20-24) 6-Adult (25-49) 7-Adult (50 or over)

Figure 15. Driver study data form.

Observation Data

Complete one line on the form for each vehicle observed. In Study 1, start with the second car stopped for the traffic light. Obtain an additional observation during the red light if time permits. If only one car stops at the light, observe that car. In Study 2, first priority is 1987-1988 model year vehicle with automatic safety belt system and second priority is identical to study 1 procedure of starting at second vehicle and working back as time permits.

1. **License Number:** The license numbers of the cars you observe are a very important part of the information you collect. By comparing the license numbers with records of the Department of Motor Vehicles (DMV's), we will be able to ascertain model year and obtain other needed information about the car observed.

Be sure to print the license number so it is both accurate and legible. Print in bold letters and numbers, i.e., DXU 613. Be careful when printing "U" and "V" and "Z", "5" and "S", "6" and "G".

2. **Make (Model):** We are interested in the general make categories. For example, under the make of Chevrolet, there are several specific models such as: Caprice, Impala, BelAir, Chevelle, Nova, Vega, Camaro, Monte Carlo, and Corvette. All of these should be listed as Chevrolet. Other makes like Ford, AMC, etc., have similar categories. Models within a given make category differ in size as well as name. They may also differ in type of safety belt installation. These differences are important. If the vehicle is an automatic belt vehicle, include the model name.

Most cars carry the model identification on the car. For these cars, you will be able to obtain the make identification by simply reading it off the car. If the make is not readily apparent, as is possible on some older or damaged cars, you will have to settle for the general car make (domestic or foreign). Where possible, we prefer a specific make category. However, if the rest of the data is good, an observation with general car model, is still usable information.

3. **Model Code:** At the end of the observation period or day, for each make name recorded, insert the appropriate two-digit code in the space provided. You will be provided with a list of model names and codes to assist you in the coding task. If the model name that you have recorded is not on the list, use code 29 for other domestic make and code 59 for other import make.

4. **Driver Gender:** Write in the code to describe the gender of the driver.

5. **Observed Driver Restraint System Usage:** There are four possible code categories for describing the drivers use of shoulder harness and lap belts. These are:

Both On (Code 1)

This means that a positive observation has been made that the lap belt is across the driver's waist or lap and that the shoulder harness is over the driver's left shoulder. If drivers in cars with one-piece harness and belt systems are wearing the shoulder harness under the arm or too loose you must still record Code 1 in this column.

Lap Belt Only (Harness Off) (Code 2)

The driver has the lap belt across the waist or lap but does not have the shoulder harness over the left shoulder. In cars that have a one-piece harness and belt, drivers who are buckled up but are not wearing the shoulder harness over the left shoulder may have the harness behind the back. This is not the proper way to wear the harness, and if it is in this position, you should record Code 2.

In cars that have a two-piece harness and belt, the shoulder harness is a separate strap that is stored in a clip attached to the car's headliner or simply left dangling if it is not stored properly. If you observe that the shoulder harness is not being worn or not being worn properly, but that the lap belt has been buckled, you should record Code 2.

NOTE: In older model cars that have only a lap belt, record Code 2 if the driver is belted and record Code 3 if the driver is not belted. You will never use Code 1 if the car contains only a lap belt.

None (Code 3)

If the driver is not wearing either the lap belt or shoulder harness, record Code 3.

Shoulder Harness Only (Code 4)

If the driver is only wearing the shoulder harness and not the manual lap belt in cars with an automatic safety belt system record Code 4.

Code 5

If an automatic vehicle is seen in the second lane where lap belt use cannot be determined, use code 5 when shoulder belt is used.

Code 6

If an automatic vehicle is seen in the second lane where lap belt use cannot be determined use code 6 when shoulder belt is not used.

6. Driver Safety Belt Misuse: There are three possible misuse categories, all pertaining to the shoulder harness. These misuse categories are:

Under Arm (Code 1)

This means that the shoulder harness is under the left arm of the driver instead of over the left shoulder.

Behind Back (Code 2)

This means that the shoulder harness is entirely behind the back of the driver. Make sure that belt use is also recorded as Code 2 since only the lap belt is being used.

Loose (Code 3)

The distance between the shoulder belt and the driver's chest should not be much more than the width of a normal fist, as a general rule. If the shoulder belt is excessively loose or falling off the shoulder, record as Code 3. Watch for slack in the belt behind the back of the front seat on older large 2 door vehicles.

7. Automatic Restraint System: Automatic safety belt systems will be found in various 1987 and 1988 model year cars including; Oldsmobile 88 and Calais, Pontiac Grand Am, Buick LeSabre, Somerset and Sklark, Toyota Cressida and Camry, Nissan Maxima, Volkswagon Golf and Jetta, and Mitsubish/Chrysler Starion and Conquest. Ford, Chrysler, AMC and Mazda will also have new cars out with automatic

safety belts in the near future. The automatic safety belt system will also be found in pre-1987 Volkswagon Rabbits and Jettas, Chevrolet Chevettes, and Toyota Cressidas. When observing these makes, you will have to determine whether the belt system is an "automatic" system (Code 1) or a regular lap and shoulder combination system (Code 2). Observations made on these older model vehicle are not as important to us as on the newer vehicles, but should still be included. The automatic belt is designed to fit across the drive and front seat passenger each time he/she enters the car and closes the door. Each time he/she leaves the car by opening the door, the belt is designed to let the driver or passenger exit without unbuckling. When observing the type of belt system, particularly in Rabbits, Jettas, Chevettes, and Toyotas, if you see that the safety belt is attached to the door or there is a buckle on the door with no belt attached to it, you can be fairly certain that the car has an automatic belt system.

An automatic shoulder harness is and always has been standard equipment in the Toyota Cressida. This vehicle also is equipped with a separate lap belt which has to be manually fastened. Automatic safety belts are also found in the diesel VW Rabbit and Jetta models but were discontinued as an option in the Chevrolet Chevette in 1981. Although it has been discontinued there are still some Chevettes with automatic safety belts in the traffic population.

8. Driver and Passenger Position by Age Group: Record the age group code shown at bottom of the form in one of the six seat position boxes on the observation form. The six boxes are intended to illustrate the six seat positions of the passenger car with the driver side on the left, and the outboard on the right as indicated on the form.

Examples:

Adult driver (age 20-24) and adult passenger (age 25-49) on front seat:

5		6

(Front)

(Back)

The age groups codes for the driver and/or passengers are:

1 = Infant (under 1 yr.)	2 = Toddler (1-4 yrs.)	3 = Subteen (5-12 yrs.)	4 = Teen (13-19 yrs.)
5 = Adult (20-24 yrs.)	6 = Adult (25-49 yrs.)	7 = Adult (50 or over)	

9. Front-Outboard Passenger Gender: Write in the code to describe the gender of the front-outboard passenger.

10. Front-Outboard Passenger Restraint System Usage: There are five front-outboard passenger restraint codes. The first four (both on, lap belt only, none, and shoulder harness only, are identical to those codes used for driver restraint. Code 5 is recorded when a child is observed in a child safety seat.

11. Rear of Station Wagon or Hatchback: Record number of children who are riding behind the back seat of a station wagon or hatchback.

Passenger Study Data Form (Study 1)

Printed data forms entitled "Passenger Restraint Observation: Form #2" will be used in this study (Figure 16). Fifty passenger observations can be recorded on the front and back of the form. Use as many forms as necessary for a study period but begin each collection period with a new form. For example, if you collect data for a two-hour period and then take a break, use a new data form to show the start and end time for the next collection period. Send all completed forms to Goodell-Grivas, Inc. as specified on your schedule.

General Information

The top portion of each form provides a description of observer, location, date and environmental conditions. This information is very important to the study and should be completed prior to each collection period at a location.

The general information needed is similar to that required for the Driver Study form. The exceptions are items 7 and 8. For item 7, write in the name of the shopping center shown on your list of locations. For item 8, write in the street name onto which the vehicles are exiting. If you change locations, begin a new data form.

Observation Data

Complete one line on the form for each passenger (not including the driver) observed. For example, if an observed vehicle has a driver and three passengers, three lines will be coded for the observation.

1. **Total Passengers:** Write total number of passengers in the car. Do not count the driver. This is only recorded once for each vehicle when recording data for the first passenger in the vehicle.
2. **Age Group:** Write in the age group code for each passenger. Refer to bottom of the form for a description of the age range for each group.
3. **Seat:** Write in the seat code number 1 for front seat, 2 for back seat, and 3 for the rear of station wagons or hatchbacks, for each passenger.

PASSENGER RESTRAINT OBSERVATION: FORM #2

1. Observer: _____ 2. City: _____

3. Day: Su M Tu W Th F Sa 4. Date: ___/___/___

5. Area Type: City Suburb 6. Location No.: _____

7. Shopping Center: _____

8. Exit To: _____
(Street Name)

9. Road Conditons: Dry Wet Snow/Ice

10. Start Time: _____ AM PM 11. End Time: _____ AM PM

No.	Total Passengers	Age Group*	Seat 1 Front 2 Back 3 Rear	Position 1 Driver Side 2 Center 3 Outboard	Passenger Restraint 1 L/S Belt 2 Lap Belt 3 Infant Seat 4 Toddler Seat 5 Booster Seat 6 Unsafe Seat 7 None 8 On Lap	Infant Seat 1 Harness/Car Belt 2 Harness Only 3 Car Belt Only 4 No Harness/Car Belt 5 - 6 - 7 Facing Wrong Dir. 8 - 9 Unused Seat	Toddler Seat 1 Harness/Shield 2 - 3 - 4 No Harness/Shield 5 - 6 - 7 Other/Unsafe 8 - 9 Unused Seat	Booster Seat 1 Harness/Lap Belt 2 Shoulder/Lap Belt 3 Shield/Belt 4 Lap Belt Only 5 No Harness/Car Belt 6 No Shield/Car Belt 7 Other/Unsafe 8 - 9 Unused Seat
1.								
2.								
3.								
4.								
5.								
6.								
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20.								

*Age Group: 1 - Infant (Under 1 yr) 2 - Toddler (1-4 yrs) 3 - Subteen (5-12) 4 - Teenager (13-19) 5 - Adult (20-24) 6 - Adult (25-49) 7 - Adult (50 or over)

Figure 16. Passenger study data form.

4. **Position:** Write in the position code number 1, if passenger is located on the driver side, 2 for center, or 3 for outboard seat for each passenger.

5. **Passenger Restraint:** Write in the code number showing the restraint system observed for each passenger.

Lap/Shoulder Belt (Code 1)

This means that a positive observation has been made that the lap belt is across the passengers waist or lap and that the shoulder harness is over the passengers shoulder.

Lap Belt Only (Shoulder Harness Off) (Code 2)

The passenger has the lap belt across the waist or lap but does not have the shoulder harness over the shoulder.

In cars that have a one-piece harness and belt, passengers who are buckled up but are not wearing the shoulder harness over the shoulder may either have the harness under the arm or behind the back. This is not the proper way to wear the harness, and if it is in either of these positions, you should record Code 2.

If you observe that the shoulder harness is not being worn or not being worn properly, but that the lap belt has been buckled, you should record Code 2.

NOTE: In older model cars that have only a lap belt, you record Code 2 if the passenger is belted and record Code 7 if the passenger is not belted. You will never use Code 1 if the car contains only a lap belt.

Infant-Only Safety Seat (Code 3)

Infant-only safety seats are generally designed for infants less than 1 year old, and are designed to face the rear of the vehicle. This position allows the back of the infant to absorb the force of a crash. Infant-only safety seats are equipped with a five-point harness (straps) to secure the infant to the safety seat and have provisions for using the auto safety belt system to secure the seat to the car. The principle for the 5-point

system in an infant-only safety seat is the same. The 5-point system includes a pair of straps that over the infants shoulders, lap belts and a crotch strap. Note that no infant-only safety seats are designed to face forward. Consult the list of infant seats to determine if the safety seat is approved by NHTSA. You are not responsible for identifying the specific type (brand) of safety seat but you should be able to distinguish between a NHTSA approved safety seat and an unapproved seat which is referred to as an unsafe seat (refer to Code 6).

Toddler/Convertible Safety Seats (Code 4)

Toddler safety seats are generally designed for small children between the ages of 1-4 years old. Toddler seats face forward and some have a five-point harness system (straps) to secure the toddler to the seat. Most models use a shield or a combination of a harness system and shield to secure the child. All models have provisions for securing the safety seat to the car through auto safety belts. Some early models have a tether strap which is to be attached to the rear safety belt or deck lid to prevent pivoting (tipping forward). There are also convertible safety seats which can be used for toddlers or can be used in the infant position (rearward facing). If an infant is observed in a convertible safety seat, record Code 4. Also consult the list of NHTSA approved toddler safety seats provided to you. Again, you are not responsible for identifying the exact type of safety seat in this particular study, but you should be aware of the models that have tether straps and shields.

Booster Seats (Code 5)

Boosters are strong, firm seats which usually have no back. Booster seats designed for use in a vehicle have a device to secure an auto lap belt. Many seats must be used with a lap belt and some type of upper-body harness. This can be either the auto lap/shoulder safety belt or the auto lap belt used with the two-strap harness sold with the booster seat, which is fastened with a tether strap. Many newer models utilize a shield which must be secured to the car with the vehicle safety belt.

Unsafe Seat (Flimsy Seat) (Code 6)

There are several types of seats that are erroneously considered as safety seats for infants and small children. These seats are intended for use in the home and do not provide occupant protection in the event of an accident. The seats are usually made of thin plastic and are usually equipped with thin plastic straps. They have no provisions for attachment to the car using safety belts. The seats are not designed to withstand the stresses and impacts associated with an accident and are not NHTSA approved for use as safety seats in autos. There are also some older type infant/toddler seats originally designed to be used in the car which may still be used, but are not dynamically tested nor provide ample protection in the event of a collision. Any child seat with "hooks" that are designed to hang over the car seat or child seats that have attachments that fit between the car seat cushion and back should be considered an unsafe seat. Devices such as car beds Are alSO not acceptaBlE aS a child safety seat and should be given a Code 6.

None (Code 7)

If the passenger is not wearing either the lap belt or shoulder harness, not placed in a safety seat, record Code 7.

Child on Lap (Code 8)

If an infant, toddler or subteen is observed being held in the arms of another passenger use a code 8 signifying child on lap. Do not use a code 8 for the adult holding the child, instead use code 1, 2 or 7 depending on the adults restraint usage.

6. Child Safety Seat Use: Indicate the code that describes the way in which the infant, toddler or booster safety seat is used. Provide a code in the column specifically related to whatever type device being observed only when Passenger Restraint observation (Item 6) indicates that an infant or child is being transported in a NHTSA approved infant-only (Code 3), toddler/convertible (Code 4), or booster (Code 5) safety seat. Since the codes vary based on the restraint system used, each will be described separately.

Infant-Only Seat

This column should only be used when an infant-only safety seat is being used (Code 3 for Passenger restraint) or when an unused infant safety seat is observed.

Harness/Car Belt (Code 1)

Use this code if the infant is in an approved infant-only safety seat, and is restraind by a 5-point harness (straps), the auto safety belt is properly used, and the seat is rearward facing.

Harness Only (Code 2)

Use this code if the infant is properly restrained in the seat by a 5-point system but the safety seat is not secured by the auto safety belt.

Car Belt Only (Code 3)

Use this code if the infant safety seat is secured by the auto safety belt, but the infant is not restrained by the harness on the safety seat.

No Harness/Car Belt (Code 4)

Use this code if the infant is in an approved infant safety seat, but the seat is not secured by an auto safety belt and the infant is not restrained by the harness on the safety seat.

Facing Wrong Direction (Code 7)

Use this code if the infant safety seat is observed being used facing forward or sideways.

Unused Seat (Code 9)

If there is an infant in the vehicle not using a safety seat and the car also contains an unused infant-only seat, use a code 9.

Toddler/Convertible Seat

This column should only be used when a toddler/convertible seat is being used (Code 4 for Passenger Restraint) or when an unused toddler safety seat is observed. When observing toddler/convertible safety seats, you need not assess the use of the auto safety belt to secure the seat to the car. Therefore, the only possible toddler/convertible seat codes are 1, 4, 7, 8 and 9.

Harness/Shield (Code 1)

Use this code if any child (infant, toddler or subteen) is in an approved toddler/convertible safety seat and is restrained by a 5-point harness or shield (if applicable). Some toddler/convertible safety seats come equipped with an arm rest. The use of an arm rest does not provide any additional protection to the child, and does not replace the use of the harness.

No Harness/Shield (Code 4)

Use this code if the child (infant, toddler or subteen) is in an approved toddler/convertible safety seat, but is not restrained by the harness or shield.

Wrong Direction/Other (Code 7)

Use this code if an unsafe use of a toddler/convertible safety seat is observed (with exception of the auto safety belt). For infants this usually means that the seat is facing forward while for toddlers and subteens this predominately pertains to the tether strap not being used for a seat requiring a tether strap (i.e., Child Love Seat).

Unused Seat (Code 9)

If there is a child in the vehicle not using a safety seat and the car also contains an unused toddler/convertible seat, use a Code 9.

Booster Seat

This column should only be used when a booster seat is being used (Code 5 for Passenger Restraint) or an unused booster seat is observed.

Harness/Lap Belt (Code 1)

If a toddler/subteen is observed in a booster seat and the seat is secured by the auto lap belt and the child is using a two-strap harness, fastened by a tether strap, then use this code.

Shouder/Lap Belt (Code 2)

If a toddler/subteen is observed in a booster seat and the seat and child is secured by a combination lap and shoulder harness, use Code 2. If the shoulder harness on an one piece safety belt system is placed behind the child and only the lap belt restrains the seat use Code 4.

Shield/Belt (Code 3)

Use this code if the child is observed in an approved "shield" type booster seat secured by the auto safety belt. Most of these seats require the auto belt be secured over the shield.

Lap Belt Only (Code 4)

Use this code if the child is in an approved booster seat that is secured by the auto safety belt, but is not restrained by a shoulder belt or a harness/tether device.

No Harness/Car Belt (Code 5)

Use this code if the child is in an approved booster seat, but the seat is not restrained by a lap belt and is not restrained by a shoulder harness or a harness/tether device.

No Shield/Car Belt (Code 6)

Use this code if the child is in an approved "shield" type booster seat with either the auto belt unsecure or the shield not in the proper position.

Other/Unsafe (Code 7)

Use this code if an other unsafe use of a booster seat is observed. Please indicate what the unsafe usage was.

Unused Seat (Code 9)

If there is a toddler or subteen (up to age 8) in the vehicle not in a safety seat, and the car also contains an unused booster seat, use this code.

Comments

You are encouraged to briefly describe any unsafe safety seat usage or explain difficulty in viewing the usage of the safety seat. This is particularly important if a code 7 or 8 is used to describe the use of a child safety seat. This information will not be coded but will be used to verify coding of unusual or confusing observations.

Special Study Data Form (Study 1)

Printed data forms entitled "Special Study - Child Safety Seats - Form A" will be used in study 1 (Figure 17). Fifty observations can be recorded on the front and back of the form. Use as many forms as necessary during each hour of observation. Send all completed forms to Goodell-Grivas, Inc. using the addressed envelopes provided at the end of each week.

General Information

The top portion of the form provides a description of observer, location, date, and environmental conditions. The general information is identical to the Passenger Restraint Observation Form except that Number 8, "Exit To", has been deleted since you will be observing parked cars in the lot. Begin a new sheet for each Special Study period. Use more than one sheet if necessary.

Observation Data

Complete one line on the form for each infant, toddler or booster safety seat observed. If a vehicle has two child safety seats in it, two lines of data will be coded for the observation.

1. **Seat:** Write in the vehicle seat code number 1 for front seat, 2 for back seat, and 3 for the rear of station wagons or hatchbacks, for the location of each child safety seat.

2. **Position:** Write in the position code number 1 if the safety seat is located on the driver side, 2 for center, or 3 for outboard position. If a seat is located in the rear of a station wagon or a hatchback, do not code in the position.

3. **Tether:** (Code for Toddler Seats Only), write in the code describing the tether requirement and its use. The codes are as follows:

SPECIAL STUDY - CHILD SAFETY SEATS: FORM A

1. Observer:_____ 2. City:_____

3. Day: Su M Tu W Th F Sa 4. Date:___/___/___

5. Area Type: City Suburb 6. Location No.:_____

7. Shopping Center:_____

8. Road Conditons: Dry Wet Snow/Ice

9. Start Time:_____ AM PM 10. End Time:_____ AM PM

No.	Seat 1 Front 2 Back 3 Rear	Position 1 Driver side 2 Center 3 Outboard	Tether 1 Tether required properly used 2 Tether required improperly used 3 Tether required but not used 4 Tether not required	Belting Attached to Seat 1 Proper 2 Improper 3 No 4 Not required	Shield Required 1 Yes 2 No	Infant, Toddler or Booster Model/Comments
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
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19.						
20.						

Figure 17. Child safety seat study data form.

Tether Required, Properly Used (Code 1)

This means that the toddler seat has been positively identified as one that requires the use of a tether and that the tether is properly secured. Proper use of a tether is as follows; if the toddler seat is in the front seat the tether strap must be attached to the back seat lap belt; if the toddler seat is in the back seat the tether must be bolted to the rear deck lid or bolted to the rear of a station wagon or hatchback at a proper angle (approximately 45 degrees or greater).

Tether Required, (and used but) Improperly Used (Code 2)

This means that a positive identification has been made as to the need for a tether but that there is something improper about the use of the tether (this code implies that the tether is secured in some way but that the securing is improper). Please explain the improper use whenever the Code 2 is used.

Tether Required But Not Used (Code 3)

This means that a toddler seat has been positively identified as requiring a tether but that the tether is not used at all. For example the Child Love Seat requires a tether. If this seat model was observed without the tether strap used it would receive a Code 3.

Not Required (Code 4)

This means that a toddler seat has been positively identified as a seat that does not require a tether strap.

4. **Belting Attached to Seat:** Write in the code describing the belting of the safety seat to the vehicle seat. The codes are as follows:

Proper (Code 1)

This indicates that the safety seat has been positively identified as one in which the vehicle's belt (lap or lap/shoulder combination) should be wrapped around the undercarriage of the safety seat or through the molded plastic frame in order to hold the seat in-place. This is in contrast to seats that use the vehicle's belt system (that goes around the child) to hold the child and the seat in place. The coding for this type of seat will be explained later in the section.

Improper (Code 2)

This means that a safety seat has been positively identified as one that requires the vehicles belt system to be attached to the undercarriage of the seat or through the molded plastic frame to hold it in place, but there is something improper about the usage of the vehicle belt system. The most common misusage will probably be misplacement of the vehicle belt. Use the illustrations in the manual to note where and how the belting system should be attached.

No (Code 3)

This means that a safety seat has been positively identified as one that requires the vehicles belt system to be attached to the undercarriage or through the molded plastic frame but that the belting is not used, i.e., the safety seat is not restrained and is simply setting on the vehicle seat or is laying in the rear of a station wagon or hatchback. This observation would receive a Code 3.

Not Required (Code 4)

This code deals with child safety seats in which the child must first be placed in the seat and then the safety belt is belted around the child (or sometimes the child and shield) and attached to the vehicle seat. Examples of this type of

safety seat are: Bobby Mac Champion and Deluxe II, Century (GM) Child Love Seat and Infant Love Seat.

5. **Shield Required:** (Code for Toddler/Convertible or Booster Seats) Write in the code to describe whether or not a shield is required for proper use of the safety seat. Code a 1 for yes or a 2 for no. Refer to the manual for illustrations of the safety seats that require a shield. The Ford Tot Guard is an example of a seat which has a shield which is permanently attached to the seat and would always receive a Code 1. The Bobby-Mac Deluxe II toddler seat requires a shield and would be coded as a 1. Note: The shield may or may not be in the car so be certain about the type of safety seat. Don't assume that the safety seat is not a shield-type seat just because you do not see a shield.

6. **Model:** Write in the brand name and model of the observed toddler, infant or booster seat. The model names can be found in your manual along with the illustrations of the seats. You may be able to read the name directly off the seat. Be sure to indicate if the seat is a toddler, infant or booster seat. If a convertible seat is being used as an infant seat, code it as an infant seat.

When identifying a seat, please try to be as specific as possible. For example when you identify a Bobby Mac Deluxe II seat, do not simply write down "Bobby Mac", but also include the model description (Deluxe II) or model code number (i.e., Strolee 599). This information will assist us in checking if the seat requires a tether or shield.

Helmet Study Data Form (Study 1)

Printed data forms entitled "Motorcycle/Moped Observation: Form #3" will be used in this study (Figure 18). Fifty-five observations can be recorded on tHE front and back of the form.

General Information

Complete the top portion of the form to indicate the city, day and date and your name. The other general information is not applicable since you will be conducting this study throughout the course of the day. Use as many forms as necessary but start with a new form at the beginning of each day.

Observation Data

Complete one line on the form for each motorcycle/moped observation.

1. **Driver:** Code 1 if driver is wearing helmet.
   Code 2 if driver is not wearing helmet.

2. **Passenger:** Code 1 if passenger is wearing helmet.
   Code 2 if passenger is not wearing helmet.
   (If no passenger, don't enter any code number.)

3. **Type of Cycle:** Leave third column blank if observing a motorcycle.
   Code 1 if observing a moped or motorbike.

MOTORCYCLE - MOPED OBSERVATION: FORM #3

1. Observer:_____ 2. City:_____

3. Day: Su M Tu W Th F Sa 4. Date:___/___/___

No.	Driver 1 - Helmet On 2 - Helmet Off	Passenger 1 - Helmet On 2 - Helmet Off (If no Passenger, Leave Blank)	Type of Cycle 1 - Moped or Motorbike (If Motorcycle Leave Blank)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
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22.			
23.			
24.			
25.			

Figure 18. Helmet study data form.

APPENDIX D - SUMMARY OF BI-ANNUAL OBSERVATIONS

PERCENT OF INFANTS OBSERVED IN CHILD SAFETY SEATS

March - June 1987

	Base	Percent
Total (19 Cities)	600	74.2
Boston	17	88.3
Providence	22	72.7
New York	22	72.7
Baltimore	23	78.2
Pittsburgh	18	61.1
Minneapolis/St. Paul	46	80.5
Fargo/Moorhead	17	82.3
Phoenix	14	71.5
Seattle	16	75.0
San Francisco	29	41.3
Los Angeles	23	56.5
San Diego	10	100.0
Chicago	5	100.0
Atlanta	14	100.0
Miami	12	75.0
Birmingham	10	100.0
Houston	54	59.2
Dallas	158	91.8
New Orleans	90	51.1
Avg. Percent Per City		73.5

PERCENT OF TODDLERS OBSERVED IN CHILD SAFETY SEATS

March - June 1987

	Base	Percent
Total (19 Cities)	3,401	77.9
Boston	243	86.8
Providence	255	85.9
New York	236	83.5
Baltimore	191	86.9
Pittsburgh	219	64.8
Minneapolis/St. Paul	256	68.0
Fargo/Moorhead	195	64.1
Phoenix	200	66.5
Seattle	310	80.3
San Francisco	328	76.2
Los Angeles	301	73.7
San Diego	261	82.4
Chicago	121	76.0
Atlanta	93	86.0
Miami	95	91.6
Birmingham	97	88.6
Houston	--	--
Dallas	--	--
New Orleans	--	--
Avg. Percent Per City		78.8

PASSENGER SAFETY BELT USE BY AGE GROUP AND CITY

March - June, 1987

	TODDLER		SUBTEEN		TEEN		ADULT	
	Base	Percent Belted	Base	Percent Belted	Base	Percent Belted	Base	Percent Belted
Total Passengers (19 Cities)	4,190	8.2	5,744	37.0	6,947	23.0	26,269	36.7
Boston	243	2.5	193	43.0	287	8.7	1,709	21.9
Providence	255	2.4	121	34.7	194	11.9	1,708	20.0
New York	236	3.4	168	27.4	209	5.3	1,715	23.5
Baltimore	191	2.6	120	40.0	241	20.3	1,425	41.1
Pittsburgh	219	5.9	468	30.8	477	13.6	1,481	21.2
Minneapolis/St.Paul	256	10.9	458	46.1	638	28.8	1,310	45.1
Fargo/Moorhead	195	3.1	332	20.2	527	11.4	1,435	19.5
Phoenix	200	5.0	427	32.1	551	16.7	1,501	31.8
Seattle	309	7.1	331	41.4	298	33.6	1,445	57.6
San Francisco	328	7.3	395	30.9	289	21.5	1,359	48.3
Los Angeles	300	6.7	525	31.8	240	22.1	1,311	42.0
San Diego	261	5.0	383	39.7	292	30.5	1,454	50.0
Chicago	121	2.5	158	42.4	367	23.4	786	47.8
Atlanta	91	0.0	175	32.6	365	29.6	703	33.4
Miami	95	0.0	260	46.5	335	47.3	598	46.4
Birmingham	96	1.0	214	31.8	624	20.0	953	16.0
Houston	251	17.5	333	48.3	327	44.6	1,689	55.5
Dallas	280	31.4	342	58.8	293	36.5	1,915	54.0
New Orleans	262	17.6	341	27.6	373	11.8	1,772	28.6

PERCENT OF INFANTS OBSERVED IN CHILD SAFETY SEATS

August - October 1987

	Base	Percent
Total (19 Cities)	564	80.5
Boston	13	84.6
New York	16	81.3
Baltimore	21	90.5
Pittsburgh	21	76.2
Minneapolis/St. Paul	31	80.6
Fargo/Moorhead	18	55.6
Phoenix	26	57.7
Seattle	29	96.5
San Francisco	24	70.8
Los Angeles	24	66.7
San Diego	33	90.9
Chicago	30	83.3
Atlanta	33	94.0
Miami	30	90.0
Birmingham	25	96.0
Houston	44	77.3
Dallas	54	85.2
New Orleans	49	63.3
Providence	43	83.7
Avg. Percent Per City		80.2

PERCENT OF TODDLERS OBSERVED IN CHILD SAFETY SEATS

August - October 1987

	Base	Percent
Total (19 Cities)	4,341	82.5
Boston	193	88.1
New York	233	85.0
Baltimore	194	93.3
Pittsburgh	176	69.3
Minneapolis/St. Paul	278	73.4
Fargo/Moorhead	185	62.2
Phoenix	202	75.3
Seattle	366	89.4
San Francisco	406	84.7
Los Angeles	306	79.4
San Diego	344	75.6
Chicago	116	72.4
Atlanta	140	92.9
Miami	133	95.5
Birmingham	152	96.0
Houston	163	76.1
Dallas	232	89.2
New Orleans	239	76.9
Providence	283	92.6
Avg. Percent Per City		82.6

PASSENGER SAFETY BELT USE BY AGE GROUP AND CITY

August - October, 1987

	TODDLER		SUBTEEN		TEEN		ADULT	
	Base	Percent Belted	Base	Percent Belted	Base	Percent Belted	Base	Percent Belted
Total Passengers (19 Cities)	4,336	3.6	7,395	35.7	8,895	26.8	33,292	42.7
Boston	193	1.6	171	34.5	255	13.3	1,718	24.4
New York	233	1.7	173	33.5	259	13.9	1,869	26.5
Baltimore	194	0.5	135	47.4	219	27.9	2,031	47.5
Pittsburgh	176	5.7	502	28.1	550	17.1	1,489	24.2
Minneapolis/St.Paul	278	8.3	424	43.2	635	32.9	1,536	48.9
Fargo/Moorhead	185	3.8	330	23.6	505	14.3	1,377	25.9
Phoenix	202	3.5	390	33.6	563	17.4	1,506	32.9
Seattle	366	3.3	448	45.5	396	35.4	2,361	57.9
San Francisco	406	1.5	554	26.4	354	24.6	2,212	47.7
Los Angeles	306	3.3	662	27.8	308	24.4	1,808	44.6
San Diego	344	5.2	602	29.4	423	31.0	2,196	49.0
Chicago	116	1.7	272	36.0	486	19.8	1,095	52.8
Atlanta	140	0.7	347	23.1	920	32.5	1,710	46.5
Miami	133	0.0	316	26.3	614	37.3	1,356	45.7
Birmingham	152	0.0	198	27.3	664	33.9	2,110	52.8
Houston	163	9.8	698	54.4	640	39.7	1,474	61.2
Dallas	232	2.6	236	49.2	232	38.4	1,833	56.1
New Orleans	234	9.0	435	44.8	476	16.6	1,775	36.3
Providence	283	2.5	502	41.6	396	19.9	1,836	20.5