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Restraint System Usage in the Traffic Population

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| 16. Abstract This report presents findings from four independent studies on occupant restraint use for various segments of the traffic population. Field observations, collected in 19 U.S. cities from January through December, 1986, are the basis for this report. The four studies and their findings are as follows: 1. Driver Safety Belt Use and Shoulder Belt Misuse: A total of 101,897 drivers stopped for traffic signals were observed during the 12 month period. 39.2 percent were observed to wear safety belts during the second data collection period (July to December). Approximately 3 percent of drivers wearing shoulder belts in 1986 were incorrectly using them. 2. Passenger Safety Belt and Child Safety Seat Use: Based on 106,930 passengers observed at shopping mall entrances and exits, child safety seat usage (for infants and toddlers) increased throughout 1986, reaching a high in the second half (July to December) of 75.8 percent. The percent of toddlers, subteens, teens, and adults wearing safety belts during the second half were observed to be 4.7, 29.6, 21.7, and 38.4 percent, respectively. 3. Safety Seat Installation Characteristics: Observations of 3,746 child safety seats in vehicles parked at shopping malls revealed that 75.4 percent of all toddler seat types were correctly installed. Toddler seats that require securing by only the safety belt had a correct usage rate of 83.3 percent. Only 4.6 percent of toddler seats that require both the safety belt and tether were used correctly. 4. Helmet Use by Operators and Passengers of Motorcycles and Mopeds: Driver and passenger helmet use were observed to be 59.8 and 47.7 percent, respectively, for 8,604 motorcycle observations. Helmet use for both drivers and passengers in cities with mandatory helmet use laws was observed to be 99.5 percent, while helmet use in cities with no or limited helmet use laws was observed to be 48.0 percent for drivers and 31.2 percent for passengers. | | | |
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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; and (4) determine the extent to which helmets are used by operators and passengers of motorcycles and mopeds.

This report documents the procedures used to conduct the observational studies and the study findings for the period January through December, 1986.

1. Driver Study Findings: Safety Belt Use

The following major findings, associated with driver safety belt usage, are based on a total of 101,897 observations of drivers stopped for traffic signals:

- Driver safety belt usage increased to 39.2 percent during the second half of calendar year 1986 (Figure 1).
- Female driver safety belt usage was consistently higher than male driver safety belt usage (42.8 percent versus 33.1 percent).
- Drivers of imported vehicles were observed to have a higher safety belt usage rate than drivers of domestic vehicles (47.2 percent versus 29.2 percent).
- Driver safety belt usage was observed to be highest among the 25 to 49 year age group.
- Driver safety belt usage increased as vehicle size decreased.
- Driver safety belt usage increased with vehicle model year.

2. Driver Study Findings: Shoulder Belt Misuse*

The following major findings are based on a total of 37,193 observations of drivers utilizing shoulder belts in 1986.

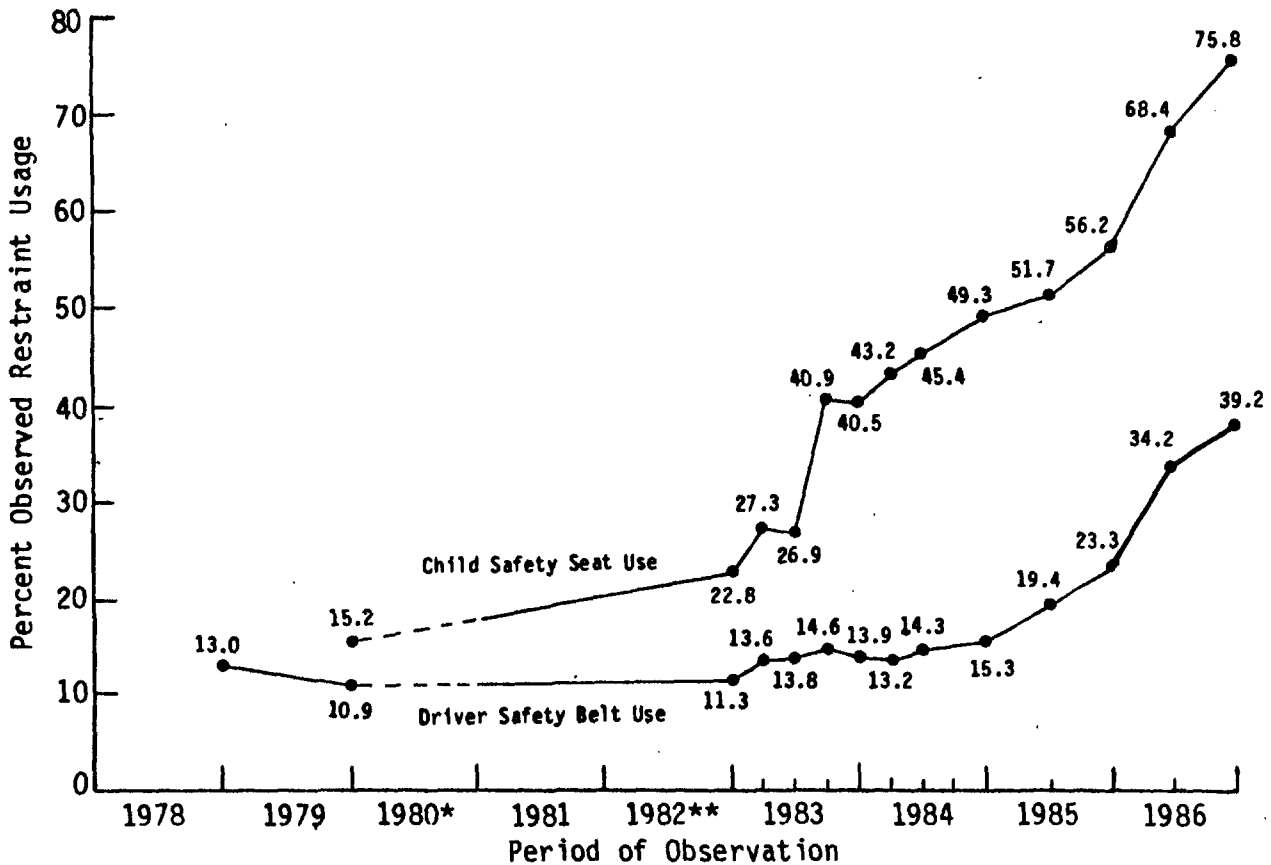
- Approximately 3 percent of drivers utilizing shoulder belts misused them.
- Female driver shoulder belt misuse was higher than male driver shoulder belt misuse (3.6 percent versus 2.5 percent). This was mainly due to more female drivers wearing the shoulder belt under the arm than male drivers (2.1 percent versus 1.2 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 (1.1 percent versus 0.1 percent).
- Driver shoulder belt misuse was observed to be highest among the 50 or over age group.
- Shoulder belt misuse was lower for drivers of newer model vehicles.

3. Passenger Study Findings

A total of 106,930 passengers were observed at shopping mall entrances/exits during the study period. Figure 1 shows the upward trend for use of child safety seats during 1986, with usage increasing to 75.8 percent. By the end of 1986, 77.5 percent of infants and 75.7 percent of toddlers were observed travelling in a child safety seat. Figure 2 shows the upward trend in correct use of safety seats (infants and toddlers observed in safety seats). In 1986, correct infant safety seat usage was 67.8 percent while 91.2 percent of toddlers, observed in toddler seats, were harnessed and shielded (for those seats requiring shields). Passenger safety belt use during the second half (July to December) was observed to be 4.7 percent for toddlers, 29.6 percent for subteens, 21.7 percent for teens, and 38.4 percent for adults.



*Data not collected in 1980.
 **Represents data collected in 1981 and 1982.

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

4. Safety Seat Installation Findings

A total of 3,746 safety seats were observed in vehicles parked at shopping malls. Seats installed in the infant mode were observed in 169 of the observations while 3,440 seats were observed in the toddler mode. The remaining 137 observations involved booster seats. For toddler seats that require installation using only the vehicle safety belt, 83.3 percent appeared to be installed properly and seat belts were used incorrectly in 15.0 percent of the observations. For toddler seats that require belting and tethering, only 4.6 percent were observed to be correctly installed. Tethers were not used or used incorrectly in 93.9 percent of the observations, while incorrect belting was observed for 41.4 percent of the seats. Figure 2 shows correct toddler seat installation increasing over time, with 75.4 percent of toddler seats installed correctly in 1986.

5. Helmet Study Findings

Of the 8,604 motorcycle observations, driver and passenger helmet use were observed to be 59.8 and 47.7 percent, respectively. In cities with mandatory helmet use laws, driver and passenger helmet use was observed to be 99.5 percent. Helmet use in cities with no or limited helmet use laws was observed to be 48.0 percent for drivers and 31.2 percent for passengers. Helmet use for drivers and passengers of 586 moped observations was observed to be 38.6 and 25.0 percent, respectively.

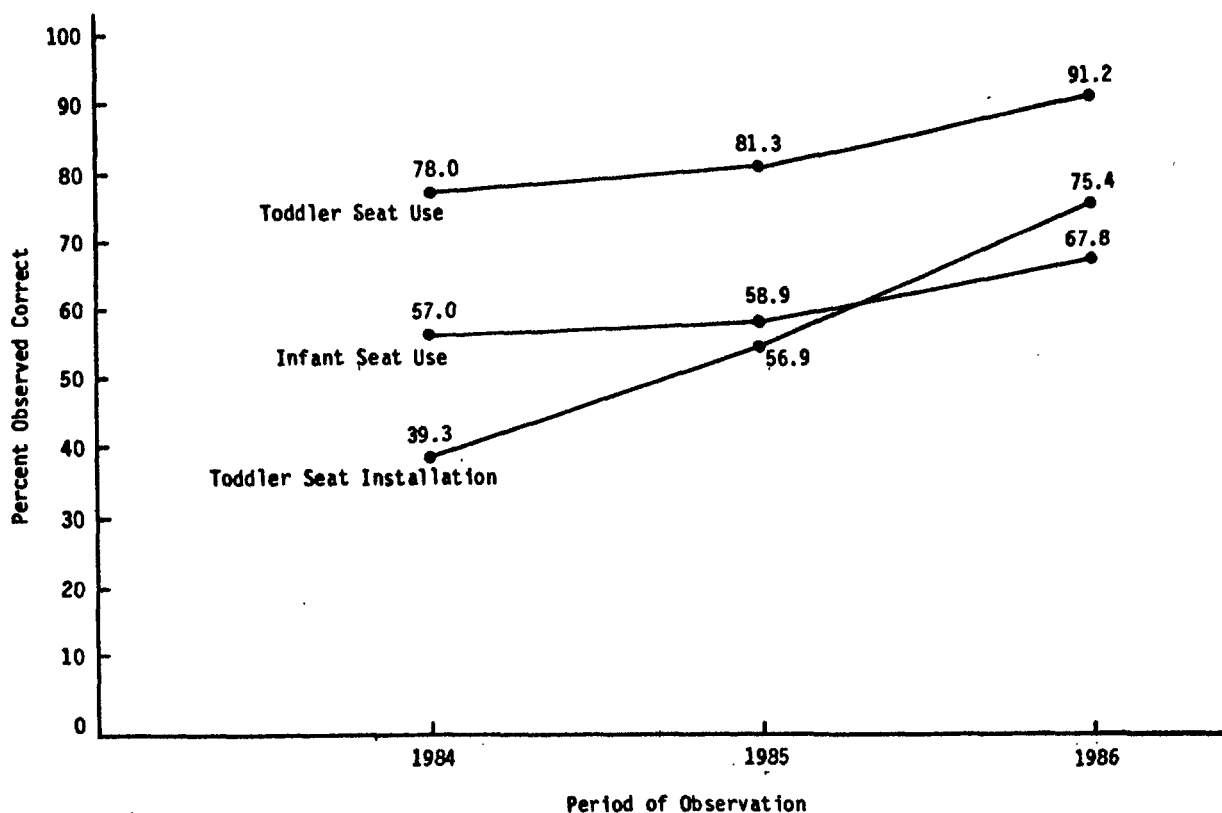


Figure 2. Correct use and installation of safety seats by year.

INTRODUCTION

This report presents the annual findings based on field observations collected over a 12-month period from January through December, 1986. During this period the use of occupant restraints including both safety belts and child safety seats were observed for over 208,000 drivers and passengers in over 180,000 passenger vehicles in 19 cities across the nation. Also during this time, helmet usage was recorded for operators and passengers of over 8,500 motorcycles.

1. Study 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.

2. Study Description

The study consisted of conducting four independent studies on occupant restraint use for various segments of the traffic population. The studies were: (1) driver safety belt use and shoulder belt misuse; (2) passenger safety belt and child safety seat use; (3) installation characteristics of child safety seats; and (4) helmet use by operators and passengers of motorcycles and mopeds. Each observational study is described below.

a. Drivers in the Traffic Population (Driver Study)

The purpose of this study was to monitor the use of safety belts by drivers of privately-owned passenger cars at designated intersection and freeway exit locations. The data collected for each vehicle and driver were:

- 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
- The presence of automatic safety belts
- Seating position of passengers

b. Passengers in the Traffic Population (Passenger Study)

The purpose of this study was to monitor the use of occupant restraint systems by passengers of private passenger cars at exits/entrances of selected shopping malls. 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.

c. Installation Characteristics of Child Safety Seats (Parking Lot Study)

This study consisted of observing infant, toddler and booster safety seats in parked cars located in shopping centers to obtain detailed information on the installation of child safety seats in automobiles. The data collected in this study element 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).

d. Motorcycle/Moped Operators in the Traffic Population (Helmet Study)

The purpose of this study element was to monitor the use of helmets by operators and passengers of motorcycles and mopeds observed on the roadways.

METHODOLOGY

This study was a continuation of earlier studies conducted for the National Highway Traffic Safety Administration (NHTSA). In this study, data were to be collected over a 26-month period from November, 1984 through December, 1986 in the same 19 cities previously surveyed [1,2,3].

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.

1. Observation and Training Procedures

At the outset of the study, plans were established for implementing the 26-month data collection effort. This involved the development of a data collection plan and training procedure for field personnel.

a. Data Collection Plan

The primary objective of the data collection plan was to achieve maximum consistency between the current and previous study. Therefore, the cities, data collection sites, and data collection procedures that were used in the previous study were adopted in the current effort.

Data Collection Sites

The 19 cities in which data were collected are identical to those used in the previous study. The cities and corresponding data collection regions are listed below and shown 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

The 19 cities selected for this study are from each geographical region of the country and provide a variety of climate and driving conditions. These cities are not considered a nationally representative sample of all U.S. cities. 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.

Data Collection Schedule

Initially, data collection schedules were established in strict conformance to the previous NHTSA studies. However, changes were made in response to new data reporting requirements.

This schedule was based on the requirement to complete data collection activities at all sites in all cities during a 6-month period. Each city required approximately 13.5 days of data collection for completion,

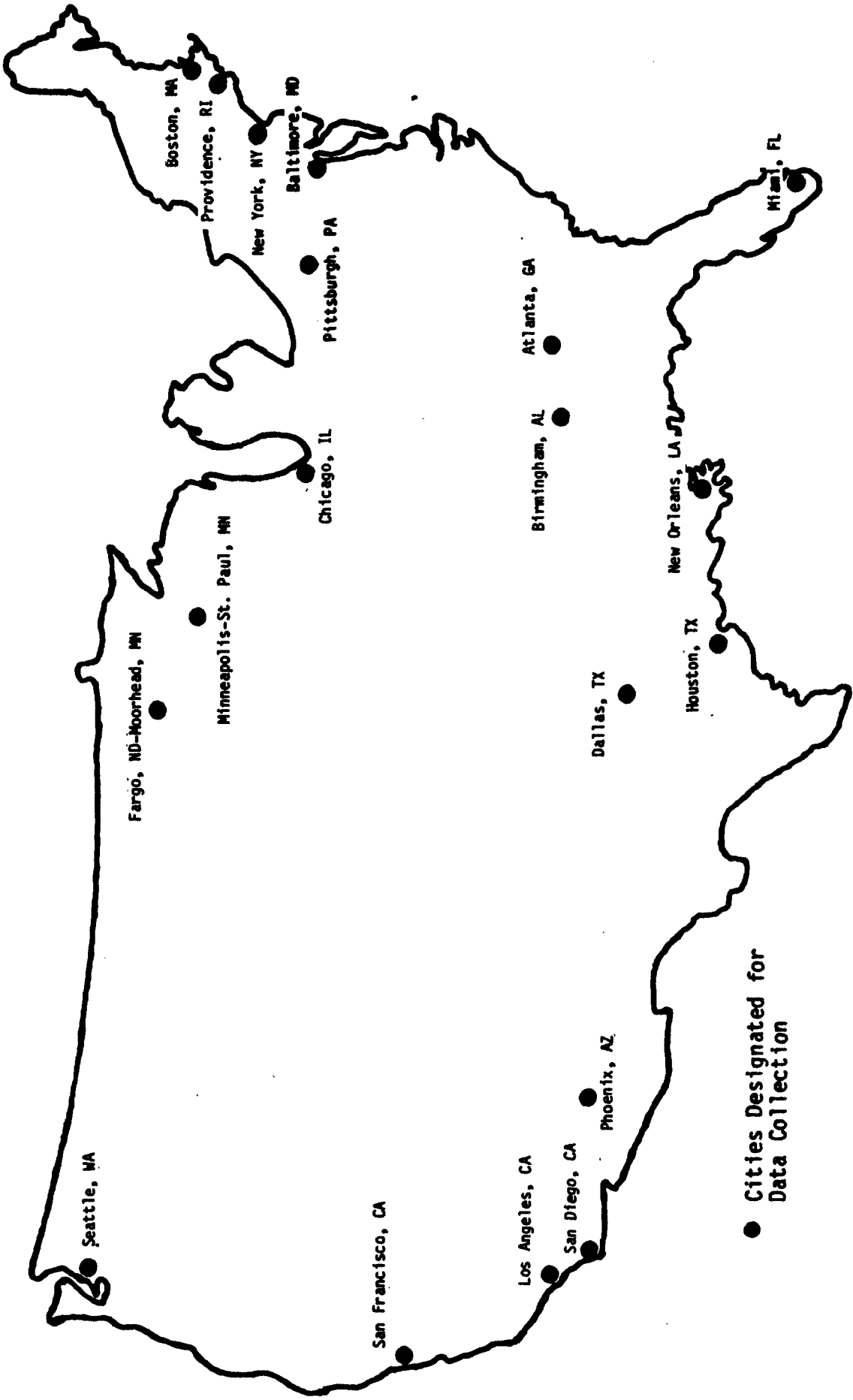


Figure 3 Location of the 19 cities for restraint usage observation.

consisting of approximately 7.5 days 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.

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 a city as practically possible within self-imposed constraints. The sites were originally selected by Opinion Research Corporation in an earlier study by a selection process that involved subdividing each city area (the corporate city, along with the contiguous suburban area) into a series of grids.^[1] The square grids were classified as being one of three groups: (1) squares in open country areas containing few or no primary road intersections; (2) squares containing one or more freeway exits; and (3) squares containing primary roads but no freeway exits.

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 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.

In this study, data were collected at 30 driver study sites (70 percent arterial and 30 percent freeway exit) in each city. In addition, 3 passenger study locations (shopping malls) were used within each city. Many of these malls were originally selected by Opinion Research Corporation to simultaneously provide a mix of socio-economic levels, sufficient traffic flow and good vantage points for conducting observations.

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

Data Forms and Procedures

The data collection forms and procedures used in this study were similar to those used in the previous study. The data forms and instructions for their completion are provided in Appendix C.

Driver study procedures required data observers to collect data for a minimum of six hours per day; 1.5 hours at each of four sites. Collection site assignments were made by supervisory staff and consisted of a specific date and time of day for each location. Time of day assignments corresponded to one of the following time periods:

7:00 a.m. - 10:00 a.m.
10:00 a.m. - 1:00 p.m.
1:00 p.m. - 4:00 p.m.
4:00 p.m. - 7:00 p.m.

To the extent practical, 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 study. Trucks, taxi cabs, and marked company-owned cars (i.e., those used for commercial purposes) were not eligible.

The target observation at signalized intersections was the second car that stopped at the traffic signal in the near lane (curb lane). If time permitted, 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. Observers did not go on the roadway and were only responsible for observing the cars in the curb lane.

Passenger study procedures required data observers to conduct six hours of data collection for each day of the passenger study. Data were collected on Fridays, Saturdays and Sundays when stores at the shopping centers were open for business and during six consecutive hours of the greatest traffic movement in and out of the malls. This maximized the chance of obtaining observations on infants and toddlers. For each six-month data collection period, six passenger study days were conducted in each city.

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 a particular vehicle were 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 the study of child safety seat installation required observation of parked vehicles containing one or more safety seats (i.e., infant, toddler or booster safety seats) in shopping center parking lots. The study was conducted for approximately two hours per week on the normally scheduled days of the passenger restraint study. Observations were

recorded during peak store hours when the parking lots were generally full. Upon completion of this study, the passenger study was conducted for the remainder of the day. This study did not change the daily, weekly or monthly data collection schedule.

The helmet study was conducted as a "second priority" activity during all other studies. Target vehicles were any motorcycle, moped or motorized bike observed on the highway or freeway during driver and passenger study data collection periods. Observations regarding helmet use were recorded for both drivers and passengers.

b. Development of 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 study to maximize consistency between the study efforts. Training included the study of an observer's manual, class room instruction and in-field training. The total training program consisted of a 3 to 5 day training session, culminating in the certification of the observer for data collection activities.

2. Observer and Supervisor Training

Field personnel consisted of three field data observers and one supervisor. Prior to deployment, observers and the supervisor received the 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.

3. Data Collection

One data collection cycle (i.e., data collected at all sites in all 19 cities) was completed every six months. Each observer collected data in 6 to 7 cities during each data collection cycle.

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 1986, 12 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.

4. Data Analysis

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.

ANNUAL FINDINGS

The findings presented in this chapter are based on an analysis of data collected during the period of January through December, 1986.

1. Driver Study Findings: Safety Belt Use

The following data summaries illustrate the total number of drivers observed (referred to as "Base") and the percentage of the total base observed using either lap and shoulder belt or lap belt only (referred to as "Percent 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.

It should be understood that many mandatory safety belt use laws went into effect in 1986. The following summaries, therefore, include data collected in cities with such laws.

a. Safety Belt Usage Trends

Annual driver safety belt usage rates from previous NHTSA studies show a clear upward trend beginning in 1984 (see Figure 1). The highest annual rate (36.7 percent) was observed in 1986. This driver safety belt usage rate of 36.7 percent consisted of 36.3 percent for lap and shoulder belt use and 0.4 percent for lap belt use only.

b. Safety Belt Use by City and Observation Period

In 1986, driver safety belt usage for the 19 cities was 36.7 percent. Driver safety belt usage rates by city and observation period are shown in Table 1. Annual usage rates ranged from a high of 69.0 percent in Dallas to a low of 13.9 percent in Fargo/Moorhead (Table 1). The rank ordering of city usage rates shown in Table 1 are different from those obtained in the 1981-82 study [1], 1983 study [2], 1984 study [3], and 1985 study [4] due to the numerous cities impacted by mandatory safety belt use laws in 1986.

Safety belt usage was also recorded for front-outboard passengers in the driver study, as shown in Table 2, by city and observation period. The annual usage rate for front-outboard passengers over one year of age (i.e., excluding infants) was 30.2 percent, which is 6.5 percent lower than the annual driver usage rate. Safety belt usage rates for front-outboard passengers were lower in each city than for drivers in the same city (Table 2 versus Table 1).

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

| City | First Half | | | Second Half | | | Total | |
|----------------|------------|--------|--------------------|-------------|--------|--------------------|---------|--------------------|
| | Month | Base | Percent Restrained | Month | Base | Percent Restrained | Base | Percent Restrained |
| Dallas | Jan.* | 2,966 | 70.9 | July* | 2,940 | 67.1 | 5,906 | 69.0 |
| Houston | Feb.* | 2,924 | 70.1 | Aug.* | 2,937 | 63.9 | 5,861 | 67.0 |
| San Francisco | June* | 2,955 | 52.6 | Nov.* | 2,551 | 52.6 | 5,506 | 52.6 |
| San Diego | May* | 2,999 | 50.9 | Dec.* | 2,549 | 52.1 | 5,548 | 51.4 |
| Baltimore | May | 2,369 | 28.5 | Oct.* | 2,559 | 60.8 | 4,928 | 45.3 |
| Los Angeles | May* | 2,840 | 45.2 | Nov.* | 2,892 | 39.1 | 5,732 | 42.1 |
| Seattle | April | 2,993 | 35.2 | Oct.* | 2,706 | 46.5 | 5,699 | 40.6 |
| Boston | April* | 2,130 | 42.3 | Sept.* | 2,416 | 36.1 | 4,546 | 39.0 |
| Minn./St. Paul | March | 2,858 | 24.6 | Aug.* | 2,878 | 49.7 | 5,736 | 37.2 |
| Phoenix | April | 2,993 | 28.7 | Sept. | 2,790 | 33.7 | 5,783 | 31.1 |
| New York | Feb.* | 2,177 | 25.8 | July* | 2,339 | 35.2 | 4,516 | 30.6 |
| New Orleans | June | 2,749 | 18.5 | Nov.* | 2,774 | 38.7 | 5,523 | 28.7 |
| Miami | June | 2,287 | 23.7 | Dec.* | 2,851 | 28.8 | 5,138 | 26.5 |
| Chicago | Jan.* | 3,005 | 26.8 | July* | 2,930 | 25.7 | 5,935 | 26.2 |
| Pittsburgh | April | 2,855 | 22.7 | Oct. | 2,797 | 26.2 | 5,652 | 24.4 |
| Birmingham | March | 2,797 | 21.1 | Aug. | 2,763 | 24.0 | 5,560 | 22.5 |
| Atlanta | Feb. | 2,799 | 19.7 | Sept. | 2,819 | 23.8 | 5,618 | 21.8 |
| Providence | March | 2,014 | 11.8 | Aug. | 2,320 | 17.2 | 4,334 | 14.7 |
| Fargo/Moorhead | Jan. | 2,103 | 11.8 | July | 2,273 | 15.9 | 4,376 | 13.9 |
| Total | | 50,813 | 34.2 | | 51,084 | 39.2 | 101,897 | 36.7 |

* Denotes mandatory safety belt use law in effect.

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

| City | First Half | | | Second Half | | | Total | |
|----------------|------------|--------|--------------------|-------------|--------|--------------------|--------|--------------------|
| | Month | Base | Percent Restrained | Month | Base | Percent Restrained | Base | Percent Restrained |
| Dallas | Jan.* | 480 | 71.7 | July* | 652 | 60.7 | 1,132 | 65.4 |
| Houston | Feb.* | 457 | 69.5 | Aug.* | 692 | 59.1 | 1,149 | 63.3 |
| San Francisco | June* | 551 | 46.8 | Nov.* | 480 | 43.8 | 1,031 | 45.4 |
| San Diego | May* | 493 | 42.4 | Dec.* | 547 | 47.2 | 1,040 | 44.9 |
| Baltimore | May | 547 | 20.7 | Oct.* | 533 | 57.0 | 1,080 | 38.6 |
| Seattle | April | 417 | 33.6 | Oct.* | 508 | 36.6 | 925 | 35.2 |
| Boston | April* | 524 | 36.8 | Sept.* | 505 | 32.7 | 1,029 | 34.8 |
| Minn./St. Paul | March | 585 | 18.6 | Aug.* | 726 | 47.0 | 1,311 | 34.3 |
| Los Angeles | May* | 651 | 34.8 | Nov.* | 717 | 28.3 | 1,368 | 31.4 |
| New York | Feb.* | 675 | 25.0 | July* | 684 | 31.9 | 1,359 | 28.5 |
| Phoenix | April | 383 | 26.9 | Sept. | 414 | 25.6 | 797 | 26.2 |
| New Orleans | June | 886 | 16.1 | Nov.* | 829 | 34.1 | 1,715 | 24.8 |
| Chicago | Jan.* | 765 | 20.1 | July* | 779 | 21.1 | 1,544 | 20.6 |
| Pittsburgh | April | 712 | 17.7 | Oct. | 668 | 20.7 | 1,380 | 19.1 |
| Miami | June | 500 | 16.6 | Dec.* | 688 | 20.6 | 1,188 | 18.9 |
| Birmingham | March | 445 | 16.4 | Aug. | 560 | 17.9 | 1,005 | 17.2 |
| Atlanta | Feb. | 594 | 13.8 | Sept. | 620 | 15.2 | 1,214 | 14.5 |
| Fargo/Moorhead | Jan. | 618 | 11.5 | July | 802 | 15.1 | 1,420 | 13.5 |
| Providence | March | 545 | 8.6 | Aug. | 613 | 16.3 | 1,158 | 12.7 |
| Total | | 10,828 | 27.3 | | 12,017 | 32.8 | 22,845 | 30.2 |

* Denotes mandatory safety belt use law in effect.

c. Safety Belt Use by Existence of Mandatory Use Law (MUL)

Driver safety belt usage rates, based on whether or not a mandatory safety belt use law (MUL) was in effect at the time of data collection, are shown in Table 3. As shown in this table, driver usage rates associated with MUL were much higher than those without MUL (47.1 percent versus 23.3 percent for the entire year).

Table 3. Driver safety belt usage by existence of mandatory use law (MUL).

| MUL Existence | First Half | | Second Half | | Total | |
|---------------|------------|--------------------|-------------|--------------------|---------|--------------------|
| | Base | Percent Restrained | Base | Percent Restrained | Base | Percent Restrained |
| Yes | 21,996 | 49.0 | 35,322 | 46.0 | 57,318 | 47.1 |
| No | 28,817 | 23.0 | 15,762 | 23.9 | 44,579 | 23.3 |
| Total | 50,813 | 34.2 | 51,084 | 39.2 | 101,897 | 36.7 |

d. Safety Belt Use by Vehicle Model Year

License plate numbers recorded during the driver study for the period January through June, 1986 were submitted to the various state departments of motor vehicles (DMV's) for the purpose of obtaining vehicle information. A total of 48,014 license plate numbers were submitted to 15 states DMV's. The DMV's returned 42,459 vehicle records which were processed with the "Vindicator" program by the Highway Loss Data Institute of Washington, D.C.(5). Valid vehicle information for 34,989 vehicles (including vehicle make, model, model year, and size) were obtained for the model years 1967-1987 (pre-1967 vehicles were observed but could not be processed by the Vindicator program). A more thorough discussion of this process can be found in the section, "Analysis of Key Variables" on page 26.

Table 4 gives driver safety belt usage rates for vehicles observed between January, 1986 and June, 1986 and verified by the State DMV's. Overall, 39.1 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 1978-1987 is presented in Appendix A.

Table 4. Driver safety belt usage by model year.

| Model Year | Base | Percent Restrained |
|------------|--------|--------------------|
| 1967 | 118 | 2.5 |
| 1968 | 169 | 5.3 |
| 1969 | 244 | 10.7 |
| 1970 | 278 | 10.4 |
| 1971 | 325 | 13.2 |
| 1972 | 548 | 10.6 |
| 1973 | 765 | 11.6 |
| 1974 | 895 | 15.1 |
| 1975 | 912 | 20.6 |
| 1976 | 1,464 | 17.8 |
| 1977 | 2,062 | 20.9 |
| 1978 | 2,299 | 24.4 |
| 1979 | 2,717 | 25.9 |
| 1980 | 2,359 | 30.5 |
| 1981 | 2,607 | 39.4 |
| 1982 | 2,694 | 42.8 |
| 1983 | 3,108 | 44.6 |
| 1984 | 4,637 | 43.1 |
| 1985 | 4,807 | 46.3 |
| 1986/87 | 1,981 | 44.3 |
| Total | 34,989 | 34.1 |

e. Safety Belt Use By Restraint System Type

Observed safety belt usage, stratified by type of safety belt system is shown in Table 5. Passive (automatic) safety belt systems comprised less than 1 percent of all driver observations and resulted in a usage rate of 91.7 percent. Manual system usage varied from 10.5 percent for separate systems to 35.6 percent for combination systems. The 1986 usage rates for all of these systems increased from 1985. Due to model year limitations of the Vindicator program, rates for pre-1967 model years, which have only lap belt restraints, could not be determined.

Table 5. Driver safety belt usage by safety belt system type.

| Safety Belt System Type | Base | Percent Restrained |
|--|--------|--------------------|
| Automatic (Passive) Safety Belt | 145 | 91.7 |
| Lap/Shoulder Combination with Inflatable Bags | 31 | 29.0 |
| Lap/Shoulder Combination (Model Years 1974-1987) | 32,366 | 35.6 |
| Lap/Shoulder Separate (Model Years 1967-1973) | 2,447 | 10.5 |

Table 6 summarizes data obtained on specific vehicle types that offer passive seat belt systems as an option. These data are presented for all unverified driver data collected in 1986 and verified driver data for model years 1978-1987. Toyota experienced a passive safety belt usage rate of 94.3 percent while the VW Rabbit/Jetta had a rate of 84.6 percent. Although passive safety belt systems are also an option on the Chevrolet Chevette, no Chevetttes with such a system were part of the verified data base.

Table 6. Driver safety belt usage for vehicles with passive safety belt systems.

| Vehicles Make/System Type | Unverified | | Verified | |
|-----------------------------|------------|--------------------|----------|--------------------|
| | Base | Percent Restrained | Base | Percent Restrained |
| VW Rabbit/Jetta - Automatic | 303 | 89.4 | 39 | 84.6 |
| VW Rabbit/Jetta - Manual | 861 | 42.5 | 377 | 53.1 |
| Toyota - Automatic | 272 | 97.1 | 106 | 94.3 |
| Toyota - Manual | 5,997 | 49.4 | 1,926 | 50.6 |

f. Safety Belt Use by Driver Gender

Observed safety belt use stratified by driver gender are presented in Table 7. 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 1985 study also indicated that females are more likely than males to wear safety belts.

Table 7. Driver safety belt usage by driver gender.

| Driver Gender | Without MUL | | With MUL | | Total | |
|---------------|-------------|--------------------|----------|--------------------|---------|--------------------|
| | Base | Percent Restrained | Base | Percent Restrained | Base | Percent Restrained |
| Male | 27,454 | 20.0 | 36,686 | 43.0 | 64,140 | 33.1 |
| Female | 17,125 | 28.5 | 20,632 | 54.6 | 37,757 | 42.8 |
| Total | 44,579 | 23.3 | 57,318 | 47.1 | 101,897 | 36.7 |

g. Safety Belt Use by Driver Age

Table 8 shows that safety belt usage was highest among the 25 to 49 year age group both with and without mandatory use laws in effect. This age group was the only "above average" group. The relative rankings between age groups are similar to those obtained from the 1985 study.

Table 8. Driver safety belt usage by age group.

| Age Group | Without MUL | | With MUL | | Total | |
|------------|-------------|--------------------|----------|--------------------|---------|--------------------|
| | Base | Percent Restrained | Base | Percent Restrained | Base | Percent Restrained |
| Under 20 | 2,323 | 13.7 | 1,699 | 30.3 | 4,022 | 20.7 |
| 20-24 | 5,623 | 22.6 | 6,404 | 41.6 | 12,027 | 32.7 |
| 25-49 | 25,633 | 25.3 | 36,411 | 49.2 | 62,044 | 39.3 |
| 50 or over | 11,000 | 21.0 | 12,804 | 46.5 | 23,804 | 34.7 |
| Total | 44,579 | 23.3 | 57,318 | 47.1 | 101,897 | 36.7 |

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

Using data generated from the Vindicator program, driver safety belt usage was stratified by vehicle make and vehicle size as shown in Tables 9 and 10. 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 9 presents the relationship between safety belt usage, vehicle make and vehicle size when all model years were included. This table shows 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. However, the difference in driver safety belt usage between imported and domestic vehicles was affected by model year (refer to Table 23, page 30). Further investigation of Table 9 reveals that approximately 80 percent of the imported vehicles observed were subcompacts. In fact, imported subcompacts accounted for over 20 percent of all observations. This finding, along with the high usage rate (45.5 percent) associated with these vehicles, as compared to other vehicles, demonstrates the impact that imported subcompacts have on driver usage rates. When only newer model cars (1978-1987) were considered, similar but slightly higher usage rates were observed. This is shown in Table 10.

Table 9. Driver safety belt usage by vehicle make and vehicle size for all model years.

| Vehicle Size | Vehicle Make | | Total |
|--------------|-------------------|------------------|-------------------|
| | Domestic | Import | |
| Subcompact | 35.8% (5,941) | 45.5% (7,452) | 41.2% (13,393) |
| Compact | 31.6% (10,017) | 54.8% (1,715) | 35.0% (11,732) |
| Intermediate | 24.4% (7,145) | 47.1% (223) | 25.1% (7,368) |
| Full Size | 17.8% (2,473) | 34.8% (23) | 18.0% (2,496) |
| Total | 29.2% (25,576) | 47.2% (9,413) | 34.1% (34,989) |

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

Table 10. Driver safety belt usage by vehicle make and vehicle size for 1978-1987 model years.

| Vehicle Size | Vehicle Make | | Total |
|--------------|-------------------|------------------|-------------------|
| | Domestic | Import | |
| Subcompact | 37.3% (5,487) | 49.0% (6,214) | 43.5% (11,701) |
| Compact | 35.0% (8,348) | 56.2% (1,555) | 38.3% (9,903) |
| Intermediate | 31.3% (4,478) | 46.8% (218) | 32.0% (4,696) |
| Full Size | 28.7% (886) | 34.8% (23) | 28.8% (909) |
| Total | 34.5% (19,199) | 50.3% (8,010) | 39.2% (27,209) |

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

i. 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 shown in Table 11. Drivers of Honda vehicles were observed wearing safety belts in 53.8 percent of the observations; the highest of any manufacturer. Drivers of General Motors products experienced the highest usage rates of the domestic vehicle manufacturers.

When the older model vehicles were removed from the data summaries, Honda and GM again displayed the highest driver usage rates for import and domestic manufacturers, respectively (Table 12).

Table 11. Driver safety belt usage by vehicle manufacturer for all model years.

| Vehicle Manufacturer | Base | Percent Restrained |
|----------------------|--------|--------------------|
| AMC | 518 | 26.3 |
| Chrysler | 2,836 | 27.5 |
| Ford | 6,331 | 29.1 |
| GM | 15,891 | 29.7 |
| VW | 1,135 | 40.9 |
| Toyota | 2,315 | 49.8 |
| Datsun/Nissan | 1,746 | 41.0 |
| Honda | 1,417 | 53.8 |
| Other Imports | 2,800 | 48.3 |
| Total | 34,989 | 34.1 |

Table 12. Driver safety belt usage by vehicle manufacturer for 1978 - 1987 model years.

| Vehicle Manufacturer | Base | Percent Restrained |
|----------------------|--------|--------------------|
| AMC | 359 | 30.4 |
| Chrysler | 1,996 | 33.3 |
| Ford | 4,708 | 34.3 |
| GM | 12,136 | 34.9 |
| VW | 593 | 54.5 |
| Toyota | 2,032 | 52.9 |
| Datsun/Nissan | 1,484 | 43.3 |
| Honda | 1,338 | 54.6 |
| Other Imports | 2,563 | 48.9 |
| Total | 27,209 | 39.1 |

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 13 and 14 illustrate driver safety belt usage rates for all model years (based on the Vindicator program outputs) and for newer model years (1978 - 1987), respectively. Table 13 shows that the Oldsmobile and Buick divisions of General Motors Corporation had the highest usage rates while the Dodge division of Chrysler Corporation had the lowest among the three largest domestic manufacturers. Table 13 shows similar usage rates for the subset of newer model years from 1978 to 1987. All divisions showed between four and eight percent higher usage rates for newer models as compared to all models. Driver safety belt usage by manufacturer's division and model year (1978-1987) are provided in Appendix A and safety belt usage by car series is presented in Appendix B.

Table 13. Driver safety belt usage by manufacturer's division for all model years.

| Manufacturer's Division | Base | Percent Restrained |
|-------------------------|-------|--------------------|
| ● Chrysler | | |
| Chrysler | 649 | 29.1 |
| Dodge | 1,024 | 25.4 |
| Plymouth | 955 | 26.4 |
| ● Ford | | |
| Ford | 4,271 | 28.2 |
| Lincoln | 440 | 26.8 |
| Mercury | 1,208 | 30.3 |
| ● GM | | |
| Buick | 2,734 | 31.7 |
| Cadillac | 1,512 | 31.3 |
| Chevrolet | 5,844 | 27.8 |
| Oldsmobile | 3,244 | 31.9 |
| Pontiac | 1,916 | 26.4 |

Table 14. Driver safety belt usage by manufacturer's division for 1978 - 1987 model years.

| Manufacturer's Division | Base | Percent Restrained |
|-------------------------|-------|--------------------|
| ● Chrysler | | |
| Chrysler | 528 | 33.5 |
| Dodge | 690 | 30.7 |
| Plymouth | 574 | 34.3 |
| ● Ford | | |
| Ford | 3,037 | 34.0 |
| Lincoln | 346 | 31.8 |
| Mercury | 913 | 35.3 |
| ● GM | | |
| Buick | 2,177 | 36.8 |
| Cadillac | 1,144 | 36.0 |
| Chevrolet | 4,156 | 33.6 |
| Oldsmobile | 2,607 | 36.6 |
| Pontiac | 1,454 | 31.9 |

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

j. Safety Belt Use By Time of Day

Table 15 compares 1985 and 1986 usage rates stratified by the four daily data collection periods. It can be seen that in 1986, usage rates among the four time periods were similar. This finding is consistent with the results of the 1985 study.

Table 15. Driver safety belt usage by time period.

| Time Period | 1985 | | 1986 | |
|------------------|--------|--------------------|---------|--------------------|
| | Base | Percent Restrained | Base | Percent Restrained |
| 7 - 10 a.m. | 26,461 | 21.2 | 25,675 | 37.6 |
| 10 a.m. - 1 p.m. | 23,821 | 22.2 | 25,976 | 36.4 |
| 1 - 4 p.m. | 32,603 | 21.0 | 27,575 | 35.4 |
| 4 - 7 p.m. | 13,486 | 21.1 | 22,671 | 37.7 |
| Total | 96,371 | 21.4 | 101,897 | 36.7 |

k. Safety Belt Use By Site Characteristics

Driver safety belt usage rates stratified by site type and area type, are shown in Tables 16 and 17, respectively. Table 16 indicates that driver safety belt usage was higher on freeways than on non-freeway facilities. This characteristic was also present in the 1985 study.

Table 16. Driver safety belt usage by site type.

| Site Type | Base | Percent Restrained |
|--------------|---------|--------------------|
| Primary Road | 73,723 | 35.1 |
| Freeway Exit | 28,174 | 41.0 |
| Total | 101,897 | 36.7 |

Safety belt use in city areas versus suburbs is shown in Table 17. City areas are characterized as central business district areas while suburb areas include commercial, industrial or residential areas outside of the central city area. The current rates show that drivers were only slightly more likely to use safety belts in the city. Study findings in 1985 displayed a similar difference in rates between city and suburb areas.

Table 17. Driver safety belt usage by area type.

| Area Type | Base | Percent Restrained |
|-----------|---------|--------------------|
| City | 68,397 | 37.4 |
| Suburb | 33,500 | 35.3 |
| Total | 101,897 | 36.7 |

1. Vehicle Occupancy

Safety belt use observations were only recorded for drivers and front-outboard passengers in the driver study. However, information was recorded on the number of passengers in each vehicle for which a driver observation was made. Results show that 76.1 percent of the 101,897 vehicles observed were occupied by only the driver. Table 18 shows the passenger occupancy rates for all observed vehicles.

Table 18. Occupancy for vehicles observed in the driver study.

| Passenger Occupancy Per Vehicle | Observed | Percent of Total |
|---------------------------------|----------|------------------|
| 0 | 77,578 | 76.1 |
| 1 | 20,446 | 20.1 |
| 2 | 2,761 | 2.7 |
| 3 | 862 | 0.8 |
| 4 or more | 250 | 0.2 |
| Total | 101,897 | 100.0 |

Table 19 shows the age distribution of passengers as observed in the driver study. Of the 101,897 vehicles observed, less than one percent had an infant passenger. The percentage of cars with passengers in the four other age categories were: toddlers 1.1 percent; subteens 2.5 percent; teens 2.4 percent; and adults 19.4 percent. These percentages represent the distribution of passengers in the traffic population as opposed to passenger distribution obtained in the passenger study, where observers were instructed to concentrate primarily on vehicles with toddlers and infants at shopping centers. In the driver study, the observers sampled from the second car stopped for a traffic signal.

Table 19. Percent of cars with passengers by age group in the driver study.

| Age Group | Percent of Vehicles |
|----------------------------|---------------------|
| Infants (less than 1 year) | 0.1 |
| Toddlers (1-4 years) | 1.1 |
| Subteens (5-12 years) | 2.5 |
| Teens (13-19 years) | 2.4 |
| Adults (20 and older) | 19.4 |

Table 20 shows the occupancy rate for each seating position by age group. In 60.9 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 (9.8 percent).

Table 20. Occupancy by seat position and age group for vehicles in the driver study.

| 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 | -- | 10 | 0.0 | 36 | 0.0 | 7 | 0.0 | 11 | 0.0 | 4 | 0.0 |
| Toddler | 0 | -- | 140 | 0.3 | 182 | 0.2 | 287 | 0.3 | 332 | 0.3 | 290 | 0.3 |
| Subteen | 0 | -- | 184 | 0.2 | 1,380 | 1.4 | 599 | 0.6 | 439 | 0.4 | 640 | 0.6 |
| Teen | 4,022 | 3.9 | 93 | 0.1 | 2,030 | 2.0 | 296 | 0.3 | 103 | 0.1 | 491 | 0.5 |
| Adult 20-24 | 12,027 | 11.8 | 66 | 0.1 | 2,566 | 2.5 | 104 | 0.1 | 25 | 0.0 | 215 | 0.2 |
| Adult 25-49 | 62,044 | 60.9 | 116 | 0.1 | 10,012 | 9.8 | 434 | 0.4 | 65 | 0.1 | 594 | 0.6 |
| Adult 50 or over | 23,804 | 23.4 | 37 | 0.0 | 6,857 | 6.7 | 285 | 0.3 | 41 | 0.0 | 520 | 0.5 |
| Two occupants | 0 | -- | 0 | -- | 5 | 0.0 | 1 | 0.0 | 0 | -- | 0 | -- |
| Empty | 0 | -- | 101,251 | 99.4 | 78,829 | 77.5 | 99,884 | 98.0 | 100,881 | 99.0 | 99,143 | 97.3 |
| Total | 101,897 | 100.0 | 101,897 | 100.0 | 101,897 | 100.0 | 101,897 | 100.0 | 101,897 | 100.0 | 101,897 | 100.0 |

m. Analysis of Key Variables

During the six-month period from January through June, 1986 a total of 50,813 driver observations were recorded. The license plate data from 48,014 of these records were forwarded to 15 of the 16 State Department of Motor Vehicles (DMV). This was the first step in a process to obtain a "verified" subset of driver safety belt usage data. License plate data were not sent to the State of Georgia due to the absence of the necessary program to analyze the data. Data received from the various DMV's were sent to the Highway Loss Data Institute where they were analyzed with the Vindicator program.[5] The Vindicator program output allowed an analysis of driver study information with vehicle information such as model year of vehicle, make of the vehicle and vehicle size (based on wheelbase length).

The resultant verified data base consisted of 34,989 observations recorded over the six-month period. The 34,989 verified observations represent 72.9 percent of the 48,014 observations made in 18 of the 19 cities (i.e., excluding Atlanta). The remaining 27.1 percent could not be verified for a number of reasons. These reasons included data collector errors in recording vehicle license plate numbers, inaccuracies/inconsistencies in state DMV data base, and inconsistencies between observed vehicle characteristics and vehicle characteristics contained in the DMV data bases.

The previous studies identified a number of key variables as "predictors" of driver safety belt usage.[1,2,3,4] These variables were:

- Model year of car (1976 and newer).
- Make of car (i.e., domestic or foreign).
- Size of car.
- Driver gender.
- Driver age.
- Data collection region.

To allow a basis for comparison between the 1985 study and the current study, the above variables (excluding data collection region due to the presence or absence of mandatory use laws) are presented as pairwise summaries in Tables 21 through 30. The major findings of these summaries, with the exception of data collection region, support the predictability of these key variables. These summaries do not reflect the entire verified data base of 34,989 observations, since this base includes data on pre-1978 model year vehicles. The summaries are based on a total of 27,209 verified observations for vehicle model years 1978-1987. The driver safety belt usage rate for this data base was 39.1 percent compared to 36.7 percent for the 101,897 observations that represent the entire 1986 driver study data base.

Driver Safety Belt Usage by Model Year and Driver Gender (Table 21)

- Driver safety belt usage increased consistently among each gender as model year increased.
- Safety belt usage for female drivers of 1978-1987 model year cars is consistently higher than male driver safety belt usage for the equivalent model years.
- The findings of this comparison are similar to the findings from the 1985 study.

Driver Safety Belt Usage by Model Year and Driver Age (Table 22)

- Driver safety belt usage increases were relatively consistent among each age group as vehicle model year increased.
- Drivers aged 25 to 49 years generally have a higher safety belt usage than any other age group for each model year.
- The findings of this comparison are similar to the findings of the 1985 study.

Driver Safety Belt Usage by Model Year and Make (Table 23)

- Driver safety belt usage generally increased as model year increased for each make of vehicle (domestic or imported).
- Driver safety belt usage for imports was higher than safety belt usage for domestic cars during the same model year.
- The findings of this comparison are similar to the findings from the 1985 study.

Driver Safety Belt Usage by Model Year and Vehicle Size (Table 24)

- Driver safety belt usage generally increased as model year increased for all vehicle sizes.
- Driver safety belt usage generally increased as vehicle size decreased for each model year.
- The findings of this comparison are similar to the findings of the 1985 study.

Table 21. Driver safety belt usage by model year (1978-1987) and driver gender.

| Driver Gender | Model Year | | | | | | | | | Total |
|---------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986/87 | |
| Male | 21.2% (1,439) | 22.6% (1,683) | 26.5% (1,392) | 35.6% (1,545) | 38.9% (1,563) | 41.1% (1,864) | 39.1% (2,830) | 42.8% (2,936) | 41.3% (1,300) | 35.5% (16,552) |
| Female | 29.7% (860) | 31.3% (1,034) | 36.3% (967) | 45.0% (1,062) | 48.1% (1,131) | 49.8% (1,244) | 49.4% (1,807) | 51.8% (1,871) | 49.5% (681) | 44.8% (10,657) |
| Total | 24.4% (2,299) | 25.9% (2,717) | 30.5% (2,359) | 39.4% (2,607) | 42.8% (2,694) | 44.6% (3,108) | 43.1% (4,637) | 46.3% (4,807) | 44.1% (1,981) | 41.1% (27,209) |

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

Table 22. Driver safety belt usage by model year (1978-1987) and driver age.

| Driver Age | Model Year | | | | | | | | | Total |
|-------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986/87 | |
| 19 or under | 14.6% (103) | 17.0% (141) | 23.7% (97) | 23.5% (98) | 24.4% (86) | 28.2% (78) | 22.6% (102) | 23.7% (93) | 40.7% (27) | 22.3% (825) |
| 20-24 | 21.1% (266) | 27.0% (355) | 29.1% (330) | 35.1% (276) | 41.9% (291) | 39.6% (303) | 42.5% (473) | 41.7% (436) | 37.9% (206) | 35.7% (2,936) |
| 25-49 | 25.6% (1,349) | 26.0% (1,581) | 31.7% (1,363) | 42.9% (1,620) | 45.8% (1,667) | 47.8% (1,966) | 46.7% (2,944) | 49.5% (3,190) | 46.7% (1,294) | 42.1% (16,974) |
| 50 or over | 24.8% (581) | 27.0% (640) | 29.7% (569) | 34.8% (613) | 37.9% (650) | 40.0% (761) | 35.7% (1,118) | 40.6% (1,088) | 39.9% (454) | 35.1% (6,474) |
| Total | 24.4% (2,299) | 25.9% (2,717) | 30.5% (2,359) | 39.4% (2,607) | 42.8% (2,694) | 44.6% (3,108) | 43.1% (4,637) | 46.3% (4,807) | 44.1% (1,981) | 38.8% (27,209) |

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

Table 23. Driver safety belt usage by model year (1978-1987) and make.

| Make | Model Year | | | | | | | | | Total |
|----------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986/87 | |
| Domestic | 20.1% (1,840) | 21.6% (2,105) | 25.4% (1,641) | 34.1% (1,790) | 38.9% (1,819) | 40.3% (2,084) | 39.3% (3,218) | 42.2% (3,324) | 40.5% (1,378) | 34.5% (19,199) |
| Import | 41.6% (459) | 40.9% (612) | 42.3% (718) | 51.2% (817) | 50.7% (875) | 53.3% (1,024) | 51.7% (1,419) | 55.6% (1,483) | 52.4% (603) | 50.3% (8,010) |
| Total | 24.4% (2,299) | 25.9% (2,717) | 30.5% (2,359) | 39.4% (2,607) | 42.8% (2,694) | 44.6% (3,108) | 43.1% (4,637) | 46.3% (4,807) | 44.1% (1,981) | (27,209) |

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

Table 24. Driver safety belt usage by model year (1978-1987) and vehicle size.

| Vehicle Size | Model Year | | | | | | | | | Total |
|--------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986/87 | |
| Subcompact | 36.6% (612) | 36.5% (817) | 37.5% (988) | 43.9% (1,101) | 45.9% (1,299) | 46.0% (1,386) | 43.0% (2,266) | 47.3% (2,324) | 44.7% (908) | 43.5% (11,701) |
| Compact | 19.2% (879) | 23.0% (1,003) | 27.1% (952) | 37.9% (1,025) | 40.6% (844) | 44.9% (1,073) | 46.8% (1,505) | 46.9% (1,769) | 45.6% (853) | 38.3% (9,903) |
| Intermediate | 20.4% (618) | 20.5% (756) | 22.6% (350) | 32.8% (396) | 37.7% (459) | 41.7% (542) | 37.0% (740) | 41.9% (642) | 36.3% (193) | 32.0% (4,696) |
| Full Size | 21.6% (190) | 14.2% (141) | 18.8% (69) | 31.8% (85) | 43.5% (92) | 36.5% (107) | 34.9% (126) | 40.3% (72) | 33.3% (27) | 28.8% (909) |
| Total | 24.4% (2,299) | 25.9% (2,717) | 30.5% (2,359) | 39.4% (2,607) | 42.8% (2,694) | 44.6% (3,108) | 43.1% (4,637) | 46.3% (4,807) | 44.1% (1,981) | 38.3% (27,209) |

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

Driver Safety Usage by Vehicle Make and Driver Gender (Table 25)

- Driver safety belt usage among imports was higher than safety belt usage among domestic cars for each gender.
- Safety belt usage among female drivers was higher than male driver safety belt usage for both domestic and imported cars.
- The findings of this comparison are similar to the findings from the 1985 study.

Driver Safety Belt Usage by Vehicle Make and Driver Age (Table 26)

- Driver safety belt usage among imports was higher than restraint usage among domestic cars for each age group.
- The age group of 25 to 49 experienced the highest driver safety belt usage for both domestic and imported cars.
- The findings of this comparison are similar to the findings from the 1985 study.

Driver Safety Belt Usage by Vehicle Make and Vehicle Size (Table 27)

- Driver safety belt usage among imports was higher than safety belt usage for drivers of domestic cars for each vehicle size.
- Driver safety belt usage increased as vehicle size decreased for domestic vehicles. This finding was not consistent for imported vehicles.
- The findings of this comparison are similar to the findings from the 1985 study.

Table 25. Driver safety belt usage by vehicle make and driver gender.
(1978-1987 model years)

| Driver Gender | Vehicle Make | | Total |
|---------------|-------------------|------------------|-------------------|
| | Domestic | Import | |
| Male | 31.7% (11,942) | 45.3% (4,610) | 35.5% (16,552) |
| Female | 39.0% (7,257) | 57.1% (3,400) | 44.8% (10,657) |
| Total | 34.5% (19,199) | 50.3% (8,010) | (27,209) |

Table 26. Driver safety belt usage by vehicle make and driver age.
(1978-1987 model years)

| Driver Age | Vehicle Make | | Total |
|-------------|-------------------|------------------|-------------------|
| | Domestic | Import | |
| 19 or under | 14.5% (477) | 33.1% (348) | 22.3% (825) |
| 20-24 | 28.0% (1,735) | 46.9% (1,201) | 35.7% (2,936) |
| 25-49 | 36.8% (11,457) | 53.0% (5,517) | 42.1% (16,974) |
| 50 or over | 33.4% (5,530) | 45.0% (944) | 35.1% (6,474) |
| Total | 34.5% (19,199) | 50.3% (8,010) | (27,209) |

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

Table 27. Driver safety belt usage by vehicle make and vehicle size.

(1978-1987 model years)

| Vehicle Size | Vehicle Make | | Total |
|--------------|-------------------|------------------|-------------------|
| | Domestic | Import | |
| Subcompact | 37.3% (5,487) | 49.0% (6,214) | 43.5% (11,701) |
| Compact | 35.0% (8,348) | 56.2% (1,555) | 38.3% (9,903) |
| Intermediate | 31.3% (4,478) | 46.8% (218) | 32.0% (4,696) |
| Full Size | 28.7% (886) | 34.8 (23) | 28.8% (909) |
| Total | 34.5% (19,199) | 50.3% (8,010) | (27,209) |

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

Driver Safety Belt Usage by Vehicle Size and Driver Gender (Table 28)

- Driver safety belt usage for each gender decreased as vehicle size increased.
- Safety belt usage among female drivers was consistently higher than male driver safety belt usage for each vehicle size.
- The findings of this comparison are similar to the findings from the 1985 study.

Driver Safety Belt Usage by Vehicle Size and Driver Age (Table 29)

- Driver safety belt usage for each age group decreased as vehicle size increased.
- Drivers aged 25 to 49 years have a higher safety belt usage than any other age group for each vehicle size.
- The findings of this comparison are similar to the findings from the 1985 study.

Driver Safety Belt Usage by Driver Gender and Driver Age (Table 30)

- Driver safety belt usage among females was higher than male driver safety belt usage for each age group.
- Driver safety belt usage for those 25 to 49 years old was higher than any other age group for each gender.
- The findings of this comparison are similar to the findings from the 1985 study.

In summary, the variables presented in this section, independent of each other, have consistently proven to be true "predictors" of driver safety belt usage.

Table 28. Driver safety belt usage by vehicle size and driver gender.
(1978-1987 model years)

| Driver Gender | Vehicle Size | | | | Total |
|---------------|-------------------|------------------|------------------|----------------|-------------------|
| | Subcompact | Compact | Intermediate | Full Size | |
| Male | 39.8% (6,609) | 34.8% (6,084) | 29.6% (3,198) | 27.4% (661) | 35.5% (16,552) |
| Female | 48.3% (5,092) | 43.9% (3,819) | 37.1% (1,498) | 32.7% (248) | 44.8% (10,657) |
| Total | 43.5% (11,701) | 38.3% (9,903) | 32.0% (4,696) | 28.8% (909) | (27,209) |

Table 29. Driver safety belt usage by vehicle size and driver age.
(1978-1987 model years)

| Driver Age | Vehicle Size | | | | Total |
|-------------|-------------------|------------------|------------------|----------------|-------------------|
| | Subcompact | Compact | Intermediate | Full Size | |
| 19 or under | 26.1% (574) | 15.5% (194) | 7.6% (53) | 0.0% (4) | 22.3% (825) |
| 20-24 | 40.4% (1,842) | 28.8% (826) | 26.1% (234) | 14.7% (34) | 35.7% (2,936) |
| 25-49 | 46.4% (7,640) | 41.3% (6,171) | 33.5% (2,658) | 32.5% (505) | 42.1% (16,974) |
| 50 or over | 39.6% (1,645) | 36.1% (2,712) | 31.2% (1,751) | 25.4% (366) | 35.1% (6,474) |
| Total | 43.5% (11,701) | 38.3% (9,903) | 32.0% (4,696) | 28.8% (909) | (27,209) |

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

Table 30. Driver safety belt usage by driver gender and driver age.
(1978-1987 model years)

| Driver Age | Driver Gender | | Total |
|-------------|-------------------|-------------------|-------------------|
| | Male | Female | |
| 19 or under | 20.4% (460) | 24.7% (365) | 22.3% (825) |
| 20-24 | 33.3% (1,718) | 39.1% (1,218) | 35.7% (2,936) |
| 25-49 | 37.6% (9,874) | 48.3% (7,100) | 42.1% (16,974) |
| 50 or over | 33.2% (4,500) | 39.3% (1,974) | 35.1% (6,474) |
| Total | 35.5% (16,552) | 44.8% (10,657) | (27,209) |

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

2. Driver Study Findings: Shoulder Belt Misuse

The following data summaries illustrate the total number of drivers observed wearing the shoulder belt (referred to as "Base") and the percentage of the total base observed misusing the shoulder belt (referred to as "Percent Misused"). 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., obviously excessive slack). The following summaries present shoulder belt misuse by each of these categories and also by the sum of these categories (referred to as "Total Percent Misused"), based solely on those drivers observed wearing shoulder belts. 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.

a. Shoulder Belt Misuse by Vehicle Model Year

The Vindicator program generated data on 34,989 vehicles observed between January and June, 1986. Drivers in 11,528 of these vehicles were observed utilizing the shoulder belt. Table 31 gives shoulder belt misuse rates by vehicle model year for drivers of these vehicles. Overall, 2.9 percent of drivers utilizing shoulder belts misused them. It can be seen that shoulder belt misuse in recent model year cars, starting with 1980, appears to be less than in early model years.

Table 31. Driver shoulder belt misuse by model year.

| Model Year | Base | Percent Misused | | | Total Percent Misused |
|------------|--------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| 1967 | 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1968 | 7 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1969 | 25 | 4.0 | 8.0 | 0.0 | 12.0 |
| 1970 | 26 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1971 | 38 | 5.3 | 2.6 | 0.0 | 7.9 |
| 1972 | 56 | 1.8 | 1.8 | 3.6 | 7.2 |
| 1973 | 81 | 3.7 | 0.0 | 1.2 | 4.9 |
| 1974 | 131 | 3.1 | 1.5 | 0.0 | 4.6 |
| 1975 | 186 | 4.3 | 0.0 | 2.2 | 6.5 |
| 1976 | 259 | 4.2 | 0.8 | 0.4 | 5.4 |
| 1977 | 431 | 4.6 | 1.6 | 0.5 | 6.7 |
| 1978 | 556 | 1.6 | 0.9 | 0.5 | 3.0 |
| 1979 | 701 | 3.0 | 0.1 | 1.7 | 4.8 |
| 1980 | 718 | 1.9 | 0.3 | 0.6 | 2.8 |
| 1981 | 1,028 | 1.6 | 0.4 | 0.7 | 2.7 |
| 1982 | 1,151 | 1.1 | 0.7 | 0.8 | 2.6 |
| 1983 | 1,383 | 1.0 | 0.6 | 0.9 | 2.5 |
| 1984 | 1,995 | 1.1 | 0.2 | 0.6 | 1.9 |
| 1985 | 2,225 | 1.0 | 0.2 | 0.9 | 2.1 |
| 1986/87 | 873 | 1.3 | 0.3 | 1.0 | 2.6 |
| Total | 11,528 | 1.6 | 0.5 | 0.8 | 2.9 |

b. Shoulder Belt Misuse by Driver Gender

Observed shoulder belt misuse by driver gender, based on all drivers observed utilizing the shoulder belt in 1986, are presented in Table 32. This table reveals shoulder belt misuse to be higher for females than males (3.6 percent versus 2.5 percent), due mainly to the difference in "Under Arm" misuse.

Table 32. Driver shoulder belt misuse by driver gender.

| Driver Gender | Base | Percent Misused | | | Total Percent Misused |
|---------------|--------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| Male | 21,115 | 1.2 | 0.5 | 0.8 | 2.5 |
| Female | 16,078 | 2.1 | 0.6 | 0.9 | 3.6 |
| Total | 37,193 | 1.6 | 0.6 | 0.8 | 3.0 |

When only newer model year cars (1984-1987) are considered, similar but slightly lower misuse rates were observed. This is shown in Table 33.

Table 33. Driver shoulder belt misuse by driver gender for 1984-1987 model years.

| Driver Gender | Base | Percent Misused | | | Total Percent Misused |
|---------------|-------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| Male | 2,895 | 0.7 | 0.1 | 0.7 | 1.5 |
| Female | 2,198 | 1.6 | 0.3 | 0.9 | 2.8 |
| Total | 5,093 | 1.1 | 0.2 | 0.8 | 2.1 |

c. Shoulder Belt Misuse by Driver Age

Table 34, based on all drivers observed utilizing the shoulder belt in 1986, indicates that shoulder belt misuse was the highest among the 50 or over age group (4.9 percent). This age group was the only "above average" group and were seen more often wearing the shoulder belt under the arm.

Table 34. Driver shoulder belt misuse by age group.

| Age Group | Base | Percent Misused | | | Total Percent Misused |
|------------|--------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| Under 20 | 812 | 1.8 | 0.5 | 0.6 | 2.9 |
| 20-24 | 3,894 | 1.5 | 0.4 | 0.7 | 2.6 |
| 25-49 | 24,294 | 1.3 | 0.5 | 0.7 | 2.5 |
| 50 or over | 8,193 | 2.7 | 0.9 | 1.3 | 4.9 |
| Total | 37,193 | 1.6 | 0.6 | 0.8 | 3.0 |

Shoulder belt misuse was slightly less when only newer model year cars (1984-1987) are considered, as shown in Table 35.

Table 35. Driver shoulder belt misuse by age group for 1984-1987 model years.

| Age Group | Base | Percent Misused | | | Total Percent Misused |
|------------|-------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| Under 20 | 55 | 3.6 | 0.0 | 0.0 | 3.6 |
| 20-24 | 460 | 0.9 | 0.0 | 0.7 | 1.6 |
| 25-49 | 3,556 | 1.0 | 0.2 | 0.5 | 1.7 |
| 50 or over | 1,022 | 1.6 | 0.3 | 2.0 | 3.9 |
| Total | 5,093 | 1.1 | 0.2 | 0.8 | 2.1 |

d. Shoulder Belt Misuse by Vehicle Make (Domestic Versus Import)

Table 36 shows 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 loosely than drivers of imported vehicles. This is probably due to the "Window Shade" design, used by domestic manufacturers, to remove shoulder belt tension.

Table 36. Driver shoulder belt misuse by vehicle make for all model years.

| Vehicle Make | Base | Percent Misused | | | Total Percent Misused |
|--------------|--------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| Domestic | 7,431 | 1.8 | 0.6 | 1.3 | 3.7 |
| Import | 4,441 | 1.3 | 0.2 | 0.1 | 1.6 |
| Total | 11,872 | 1.6 | 0.5 | 0.8 | 2.9 |

Table 37 shows slightly lower misuse rates by make for recent model year vehicles (1984-1987). However, the large difference between domestics and imports for shoulder belts observed as loose still exists.

Table 37. Driver shoulder belt misuse by vehicle make (domestic versus import) for 1984-1987 model years.

| Vehicle Make | Base | Percent Misused | | | Total Percent Misused |
|--------------|-------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| Domestic | 3,220 | 1.2 | 0.2 | 1.2 | 2.6 |
| Import | 1,873 | 1.0 | 0.2 | 0.1 | 1.3 |
| Total | 5,093 | 1.1 | 0.2 | 0.8 | 2.1 |

e. Shoulder Belt Misuse by Vehicle Size

The relationship between shoulder belt misuse and vehicle size, based on all model years, is shown in Table 38. It can be seen that shoulder belt misuse increases as vehicle size increases for each of the three misuse categories.

Table 38. Driver shoulder belt misuse by vehicle size for all model years.

| Vehicle Size | Base | Percent Misused | | | Total Percent Misused |
|--------------|--------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| Subcompact | 5,503 | 1.5 | 0.3 | 0.4 | 2.2 |
| Compact | 4,095 | 1.7 | 0.4 | 1.0 | 3.1 |
| Intermediate | 1,834 | 1.8 | 0.6 | 1.4 | 3.8 |
| Full Size | 440 | 2.5 | 1.4 | 1.4 | 5.3 |
| Total | 11,872 | 1.6 | 0.5 | 0.8 | 2.9 |

When newer model year cars (1984-1987) were considered, the trend was reversed. That is, shoulder belt misuse was higher for smaller vehicles (i.e., subcompact and compact), as shown in Table 39. Therefore, a relationship between shoulder belt misuse and vehicle size may not exist.

Table 39. Driver shoulder belt misuse by vehicle size for 1984-1987 model years.

| Vehicle Size | Base | Percent Misused | | | Total Percent Misused |
|--------------|-------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| Subcompact | 2,475 | 1.3 | 0.2 | 0.5 | 2.0 |
| Compact | 1,923 | 1.2 | 0.3 | 1.1 | 2.6 |
| Intermediate | 613 | 0.3 | 0.8 | 0.0 | 1.1 |
| Full Size | 82 | 0.0 | 0.0 | 1.2 | 1.2 |
| Total | 5,093 | 1.1 | 0.2 | 0.8 | 2.1 |

f. 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 shown in Table 40. Drivers of Ford and Volkswagen products experienced the highest misuse rates among the domestic and import manufacturers, respectively.

Table 40. Driver shoulder belt misuse by vehicle manufacturer for all model years.

| Vehicle Manufacturer | Base | Percent Misused | | | Total Percent Misused |
|----------------------|--------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| AMC | 122 | 1.6 | 0.0 | 0.0 | 1.6 |
| Chrysler | 774 | 2.2 | 0.3 | 0.6 | 3.1 |
| Ford | 1,838 | 1.9 | 0.6 | 1.8 | 4.3 |
| GM | 4,697 | 1.7 | 0.6 | 1.2 | 3.5 |
| VW | 462 | 2.4 | 0.6 | 0.0 | 3.0 |
| Toyota | 1,151 | 1.7 | 0.4 | 0.1 | 2.2 |
| Datsun/Nissan | 714 | 0.6 | 0.1 | 0.1 | 0.8 |
| Honda | 762 | 1.1 | 0.0 | 0.1 | 1.2 |
| Other Imports | 1,352 | 1.1 | 0.1 | 0.1 | 1.3 |
| Total | 11,872 | 1.6 | 0.5 | 0.8 | 2.9 |

When only recent model year vehicles (1984-1987) were included in the data summaries, Volkswagen showed the highest shoulder belt misuse rate for import manufacturers, while the three largest domestic manufacturers showed similar rates (Table 41).

Table 41. Driver shoulder belt misuse by vehicle manufacturer for 1984-1987 model years.

| Vehicle Manufacturer | Base | Percent Misused | | | Total Percent Misused |
|----------------------|-------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| AMC | 48 | 0.0 | 0.0 | 0.0 | 0.0 |
| Chrysler | 354 | 1.7 | 0.0 | 1.1 | 2.8 |
| Ford | 799 | 1.0 | 0.1 | 1.5 | 2.6 |
| GM | 2,019 | 1.2 | 0.3 | 1.1 | 2.6 |
| VW | 88 | 2.3 | 1.1 | 0.0 | 3.4 |
| Toyota | 496 | 1.2 | 0.4 | 0.0 | 1.6 |
| Datsun/Nissan | 281 | 0.4 | 0.0 | 0.4 | 0.8 |
| Honda | 338 | 0.3 | 0.0 | 0.0 | 0.3 |
| Other Imports | 670 | 1.2 | 0.0 | 0.1 | 1.3 |
| Total | 5,093 | 1.1 | 0.2 | 0.8 | 2.1 |

Tables 42 and 43 illustrate driver shoulder belt misuse rates by manufacturer's division for all model years and newer model years (1984-1987), respectively. Table 42 shows that the Cadillac division of General Motors and the Plymouth division of Chrysler Corporation experienced the highest misuse rates when all model years were included. These divisions also experienced the highest misuse rates when only newer model years (1984-1987) were considered (Table 43). However, most divisions experienced lower misuse rates for newer vehicles.

3. Passenger Study Findings

A total of 106,930 passengers were observed in 78,710 vehicles during 1986. 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 shown by quarter year for 1984 and by half year for 1985 and 1986 in Figure 4. The 1986 percentages contained in Figure 4 were obtained for all age categories (with each observation receiving equal weight) from the bi-annual

Table 42. Driver shoulder belt misuse by manufacturer's division for all model years.

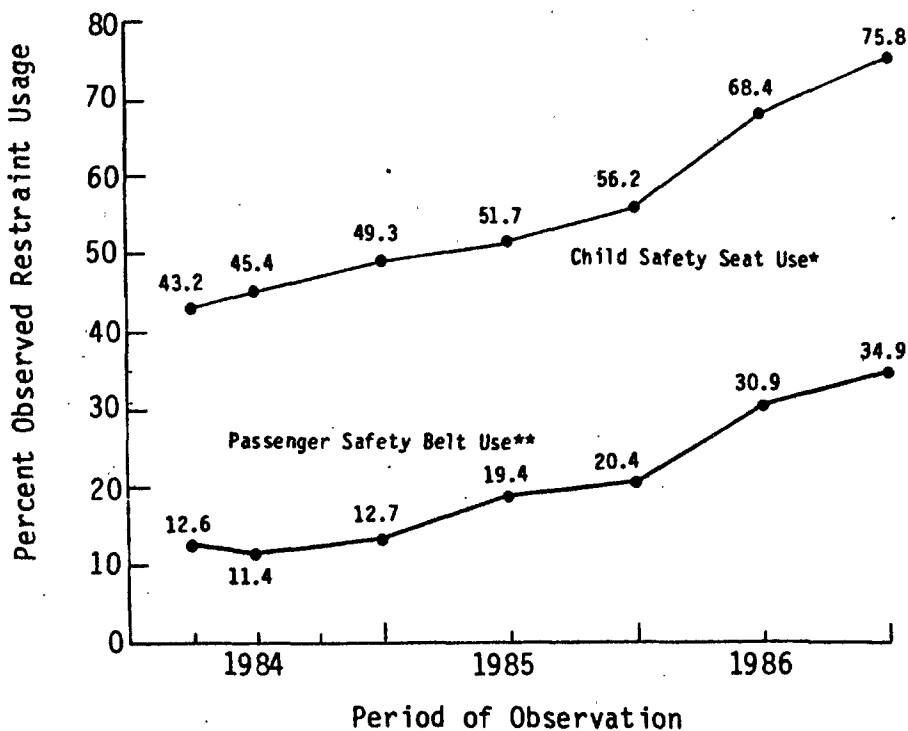
| Manufacturer's Division | Base | Percent Misused | | | Total Percent Misused |
|-------------------------|-------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| ● Chrysler | | | | | |
| Chrysler | 188 | 1.1 | 0.0 | 1.1 | 2.2 |
| Dodge | 257 | 2.3 | 0.0 | 0.4 | 2.7 |
| Plymouth | 249 | 3.6 | 0.8 | 0.8 | 5.2 |
| ● Ford | | | | | |
| Ford | 1,204 | 2.1 | 0.7 | 1.7 | 4.5 |
| Lincoln | 117 | 0.9 | 0.0 | 2.6 | 3.5 |
| Mercury | 365 | 1.9 | 0.5 | 2.7 | 5.1 |
| ● GM | | | | | |
| Buick | 863 | 2.2 | 0.7 | 1.3 | 4.2 |
| Cadillac | 472 | 1.7 | 1.1 | 2.5 | 5.3 |
| Chevrolet | 1,620 | 1.4 | 0.6 | 0.9 | 2.9 |
| Oldsmobile | 1,029 | 2.0 | 0.8 | 1.2 | 4.0 |
| Pontiac | 504 | 1.2 | 0.4 | 0.8 | 2.4 |

Table 43. Driver shoulder belt misuse by manufacturer's division for 1984-1987 model years.

| Manufacturer's Division | Base | Percent Misused | | | Total Percent Misused |
|-------------------------|------|-----------------|-------------|-------|-----------------------|
| | | Under Arm | Behind Back | Loose | |
| ● Chrysler | | | | | |
| Chrysler | 105 | 1.9 | 0.0 | 1.9 | 3.8 |
| Dodge | 94 | 0.0 | 0.0 | 1.1 | 1.1 |
| Plymouth | 89 | 4.5 | 0.0 | 1.1 | 5.6 |
| ● Ford | | | | | |
| Ford | 512 | 1.0 | 0.2 | 1.8 | 3.0 |
| Lincoln | 70 | 0.0 | 0.0 | 1.4 | 1.4 |
| Mercury | 149 | 1.3 | 0.0 | 1.3 | 2.6 |
| ● GM | | | | | |
| Buick | 359 | 1.9 | 0.3 | 1.1 | 3.3 |
| Cadillac | 185 | 1.6 | 0.5 | 3.8 | 5.9 |
| Chevrolet | 650 | 0.6 | 0.5 | 0.8 | 1.9 |
| Oldsmobile | 484 | 1.0 | 0.2 | 0.6 | 1.8 |
| Pontiac | 238 | 1.3 | 0.0 | 1.3 | 2.6 |

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

summaries presented in Appendix D. The highest child safety seat usage rate, 75.8 percent was observed in the second half (July through December) of 1986, based on 5,423 observations. The second half child safety seat usage rate was 77.5 percent for infants (324 observations) and 75.7 percent for toddlers (5,099 observations). Passenger safety belt use in the second half of 1986 was observed to be 34.9 percent based on 47,616 observations of passengers over four years of age. It should be understood that mandatory safety belt laws were in effect in eight cities for both data collection periods in 1986 and were also in effect in another five cities during the second half of 1986. 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).
 **Comprised of passengers over 4 years of age (i.e., excluding infants and toddlers).

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

Table 44 summarizes 1986 passenger restraint system use for the various age groups. Observed safety belt use for toddlers was 5.9 percent in 1986, compared to 9.3 percent in 1985. However, safety seat usage for toddlers was observed to be 72.3 percent in 1986, approximately 20 percent higher than in 1985 (52.6 percent).

Table 44. Passenger restraint system use (1986) by age group.

| Age Group | Base | Safety Seat | Safety Belt | Total |
|-----------|--------|-------------|-------------|-------|
| Infant | 723 | 70.0 | 1.7 | 71.7 |
| Toddler | 9,851 | 72.3 | 5.9 | 78.2 |
| Subteen | 15,294 | 1.7 | 28.5 | 30.2 |
| Teen | 14,461 | N/A | 19.1 | 19.1 |
| Adult | 66,601 | N/A | 36.9 | 36.9 |

The total passenger restraint use (safety seat and safety belt) by age group for the years 1984, 1985, and 1986 are presented in Table 45. This table shows 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 observation are provided in the next sections for each age group.

Table 45. Passenger restraint use by age group and year.

| Age Group | 1984 | | 1985 | | 1986 | |
|-----------|--------|---------|--------|---------|--------|---------|
| | Base | Percent | Base | Percent | Base | Percent |
| Infant | 1,493 | 66.9 | 1,173 | 67.7 | 723 | 71.7 |
| Toddler | 16,873 | 51.7 | 11,615 | 61.9 | 9,851 | 78.2 |
| Subteen | 14,346 | 14.7 | 11,740 | 24.7 | 15,294 | 30.2 |
| Teen | 13,575 | 7.2 | 11,428 | 12.7 | 14,461 | 19.1 |
| Adult | 61,789 | 13.0 | 50,544 | 20.8 | 66,601 | 36.9 |

a. Infants (Under 1 Year)

Infant observations consisted of recording the seating position and type of restraint for children estimated 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 723 infants were observed in the passenger study. Of this total, 70.0 percent were observed in approved safety seats, up from 66.4 percent in 1985. Of the 217 infants not observed in safety seats, unused safety seats were observed in 48 (22.1 percent) of the observations. In addition, 25.9 percent of all infants observed were held on passengers' laps. Unsafe (unapproved) seats were observed in 0.3 percent of the observations. Table 46 summarizes infant observations.

Table 46. Methods of restraining infants.

| Type of Restraint | Number | Percent |
|-------------------------|--------|---------|
| Infant/Convertible Seat | 506 | 70.0 |
| Safety Belt | 12 | 1.7 |
| None or Unsafe Seats | 205 | 28.4 |
| On Lap | 187 | 25.9 |
| Unrestrained | 16 | 2.2 |
| Unsafe Seat | 2 | 0.3 |
| Total | 723 | 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 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 difficult nature of this observation.

Table 47 shows infant safety seat usage by city. Overall 47.7 percent of all infants were observed to be correctly harnessed in an approved safety seat in 1986, as compared to 39.1 percent in 1985.

Table 47. Infant safety seat usage by city.

| City | Base | Percent In Safety Seat | Percent Appears Correct |
|----------------------|------|------------------------|-------------------------|
| Baltimore | 27 | 88.9 | 51.9 |
| Seattle | 33 | 84.8 | 69.7 |
| Chicago | 42 | 81.0 | 33.3 |
| San Francisco | 39 | 76.9 | 56.4 |
| Pittsburgh | 30 | 76.7 | 36.7 |
| Minneapolis/St. Paul | 56 | 75.0 | 32.1 |
| San Diego | 59 | 74.6 | 61.0 |
| Atlanta | 38 | 73.7 | 31.6 |
| Boston | 49 | 73.5 | 59.2 |
| New York | 43 | 72.1 | 67.4 |
| Birmingham | 32 | 71.9 | 65.6 |
| Providence | 45 | 71.1 | 64.4 |
| Miami | 26 | 65.4 | 46.2 |
| Los Angeles | 38 | 60.5 | 31.6 |
| Dallas | 30 | 60.0 | 53.3 |
| Phoenix | 33 | 57.6 | 39.4 |
| New Orleans | 32 | 56.3 | 25.0 |
| Houston | 43 | 51.2 | 39.5 |
| Fargo/Moorhead | 28 | 50.0 | 25.0 |
| Total | 723 | 70.0 | 47.7 |

Table 48 shows the characteristics of infants observed in safety seats. For the 506 infants observed in safety seats, 67.8 percent were observed to be correctly harnessed (and belted for infant-only seats) as compared to 58.9 percent in 1985. The harness was not used in 22.1 percent of the observations, while nonuse of the car belt was observed 9.1 percent of the time. In addition, 8.9 percent of the safety seats were observed forward facing. These findings support the conclusion that parents/guardians seem to understand the importance of securing the child seat or facing the seat rearward more so than using the harness. This was also found in the 1985 study, however, if referencing the 1985 study, those observations reported as not harnessed and those reported as not belted in table 34 (page 39) should be reversed.[4] Table 49 shows the correct usage of infants observed in safety seats by year (1984 through 1986).

Table 48. Characteristics of infants observed in safety seats.

| Safety Seat Usage | Number | Percent |
|--------------------|--------|---------|
| Correctly Used | 343 | 67.8 |
| No Harness | 70 | 13.8 |
| No Belt | 4 | 0.8 |
| No Harness or Belt | 42 | 8.3 |
| Forward Facing | 45 | 8.9 |
| Unsure | 2 | 0.4 |
| Total | 506 | 100.0 |

Table 49. Correct safety seat usage by year for infants observed in safety seats.

| Year | Percent Appears Correct |
|------|-------------------------|
| 1984 | 57.0 |
| 1985 | 58.9 |
| 1986 | 67.8 |

Table 50 shows that infants were more commonly transported in the front seat, with the front seat outboard position being the most likely position. Table 50 also shows that an infant in the back seat was more likely to be in an approved safety seat and properly transported in the seat than infants observed in the front seat. This phenomenon was also found in 1985.

Table 50. Safety seat usage for infants by seat position.

| Seat Position | Base | Percent Observed in Safety Seat | Percent Appears Correct |
|--|------|---------------------------------|-------------------------|
| Front Seat - Center | 54 | 85.2 | 33.3 |
| Front Seat - Outboard | 405 | 61.7 | 47.9 |
| Total Front Seat | 459 | 64.5 | 46.2 |
| Back Seat - Driver | 90 | 75.6 | 51.1 |
| Back Seat - Center | 61 | 85.2 | 44.3 |
| Back Seat - Outboard | 104 | 84.6 | 54.8 |
| Total Back Seat | 255 | 81.6 | 51.0 |
| Rear (for station wagons & hatchbacks) | 9 | 22.2 | 11.1 |
| Total | 723 | 70.0 | 47.7 |

b. Toddlers (Ages 1 to 4 Years)

Toddler observations consisted of recording the same types 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 difficult nature of this observation. Correct usage of toddler seats 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 9,851 toddlers were observed during the passenger study. Of these, 7,126 (72.3 percent) were observed in either a toddler seat or booster seat. Of the 2,725 toddlers that were not in safety seats, unused safety seats were observed in 11.5 percent of the vehicles. Table 51 summarizes the toddler observations.

Table 51. Methods of restraining toddlers.

| Type of Restraint | Number | Percent |
|----------------------|--------|---------|
| Toddler Seat | 6,652 | 67.5 |
| Booster Seat | 474 | 4.8 |
| Safety Belt | 584 | 5.9 |
| None or Unsafe Seats | 2,141 | 21.7 |
| On Lap | 919 | 9.3 |
| Unrestrained | 1,222 | 12.4 |
| Unsafe Seats | 0 | -- |
| Total | 9,851 | 100.0 |

A comparison of the above findings with those of 1985 indicates an increase in the percentage of toddlers in safety seats. Safety seat usage increased from 52.6 to 72.3 percent.

Table 52 shows the type of restraint usage by toddlers and the percentage of usage by city. Overall, 64.1 percent of observed toddlers were harnessed and shielded (for seats requiring shields) in a child safety seat.

Table 52. 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 |
|---------------------|-------|------------------------------------|-----------------------------------|--|-----------------------------------|--|----------------------------------|
| Baltimore | 531 | 4.5 | 84.9 | 77.2 | 0.9 | 0.9 | 85.8 |
| Boston | 451 | 5.3 | 84.3 | 72.7 | 0.2 | 0.0 | 84.5 |
| San Diego | 765 | 7.1 | 75.2 | 73.1 | 6.1 | 4.4 | 81.3 |
| Seattle | 653 | 5.8 | 75.3 | 72.9 | 4.7 | 1.5 | 80.0 |
| Providence | 395 | 2.5 | 79.7 | 71.9 | 0.0 | - - | 79.7 |
| Miami | 424 | 1.7 | 75.9 | 68.9 | 3.1 | 1.4 | 79.0 |
| San Francisco | 768 | 6.1 | 73.8 | 71.2 | 2.9 | 2.2 | 76.7 |
| Birmingham | 561 | 1.8 | 70.2 | 66.7 | 0.7 | 0.2 | 70.9 |
| Phoenix | 505 | 3.2 | 68.1 | 66.9 | 2.4 | 0.6 | 70.5 |
| Minneapolis/St.Paul | 513 | 10.3 | 60.6 | 50.7 | 9.0 | 4.9 | 69.6 |
| Houston | 577 | 8.5 | 66.4 | 64.3 | 2.9 | 1.9 | 69.3 |
| New York | 551 | 6.7 | 68.6 | 62.6 | 0.2 | 0.0 | 68.8 |
| Dallas | 593 | 6.4 | 61.6 | 60.4 | 6.2 | 4.4 | 67.8 |
| Pittsburgh | 424 | 8.0 | 59.0 | 52.1 | 8.7 | 2.4 | 67.7 |
| Los Angeles | 454 | 7.5 | 57.0 | 46.7 | 8.4 | 3.3 | 65.4 |
| Chicago | 497 | 8.5 | 53.3 | 43.5 | 11.7 | 7.8 | 65.0 |
| New Orleans | 444 | 5.6 | 55.4 | 44.8 | 7.4 | 3.2 | 62.8 |
| Atlanta | 384 | 7.8 | 52.6 | 40.4 | 8.9 | 3.9 | 61.5 |
| Fargo/Moorhead | 361 | 3.3 | 42.4 | 33.2 | 10.5 | 4.2 | 52.9 |
| Total | 9,851 | 5.9 | 67.5 | 61.6 | 4.8 | 2.5 | 72.3 |

Table 53 shows the result of the other observation categories for toddlers observed in toddler safety seats. Factors such as insufficient time or too many children affect the ability to make a positive observation regarding harnessing or shielding. These observations are reported as "unsure". Overall, harness/shield use was observed to be 91.2 percent in 1986 for toddlers observed in toddler safety seats. Table 54, which presents harness/shield use by year, shows an increase in correct usage by approximately 10 percent over 1985.

Table 53. Characteristics of toddlers observed in toddler safety seats.

| Toddler Seat Usage | Number | Percent |
|----------------------|--------|---------|
| Harness/Shield | 6,065 | 91.2 |
| No Harness or Shield | 539 | 8.1 |
| Unsure | 48 | 0.7 |
| Total | 6,652 | 100.0 |

Table 54. Correct toddler seat usage by year for toddlers observed in toddler seats.

| Year | Base | Percent Harness/Shield |
|------|-------|------------------------|
| 1984 | 7,060 | 78.0 |
| 1985 | 5,741 | 81.3 |
| 1983 | 6,652 | 91.2 |

Table 55 summarizes the observations of toddlers in booster seats. Of the 474 toddlers observed in booster seats, 51.9 percent were recorded as correct. This compares to 39.3 percent in 1985. 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 152 booster safety seats requiring shields, 149 (98.0 percent) were correctly used, while only 97 of the 317 booster seats not requiring a shield were correctly used (30.6 percent).

Table 55. Characteristics of toddlers observed in booster seats.

| Booster Seat Usage | Number | Percent |
|--------------------|--------|---------|
| Correctly Used | 246 | 51.9 |
| Harness/Lap Belt | 29 | 6.1 |
| Shoulder/Lap Belt | 68 | 14.3 |
| Shield/Belt | 149 | 31.4 |
| Lap Belt Only | 172 | 36.3 |
| No Harness/Belt | 48 | 10.1 |
| No Shield/Belt | 3 | 0.6 |
| Unsure | 5 | 1.1 |
| Total | 474 | 100.0 |

The relationship between seating position and safety belt/seat use is summarized in Table 56 (see page 54). Toddlers were observed transported in the back seat in three-quarters of the 9,851 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; 79.2 percent in back compared to 31.0 percent in the front seat. Similarly, correct usage was higher for toddlers positioned in the back seat. This phenomenon was also reported in 1985.

c. Subteens (Ages 5 to 12 Years)

A total of 15,294 subteens were observed in the 19 cities during the passenger study. Use of the booster seats were observed in approximately 1.7 percent of the cases. Safety belt use for this age group was found to be 28.5 percent. This compares to 23.3 percent in 1985. Table 57 shows safety belt usage by city for the subteen age group.

Table 57. Passenger safety belt usage by city for subteens.

| City | Base | Percent Restrained |
|----------------------|--------|--------------------|
| Boston | 341 | 44.6 |
| Minneapolis/St. Paul | 1,001 | 36.9 |
| New York | 445 | 35.7 |
| Dallas | 1,058 | 35.3 |
| San Diego | 827 | 34.1 |
| Los Angeles | 855 | 32.3 |
| Baltimore | 591 | 32.2 |
| Seattle | 900 | 30.2 |
| Houston | 1,131 | 29.8 |
| Pittsburgh | 821 | 29.5 |
| San Francisco | 1,010 | 29.2 |
| New Orleans | 974 | 28.1 |
| Providence | 321 | 27.7 |
| Chicago | 857 | 26.6 |
| Miami | 460 | 26.3 |
| Atlanta | 703 | 25.3 |
| Phoenix | 1,012 | 18.2 |
| Fargo/Moorhead | 789 | 17.6 |
| Birmingham | 1,198 | 16.4 |
| Total | 15,294 | 28.5 |

Table 56. 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 | 468 | 8.8 | 26.3 | 20.7 | 3.8 | 0.6 | 30.1 |
| Front Seat - Outboard | 1,871 | 12.5 | 32.2 | 28.9 | 5.9 | 4.1 | 38.1 |
| Total Front Seat | 2,339 | 11.8 | 31.0 | 27.2 | 5.5 | 3.4 | 36.5 |
| Back Seat - Driver | 2,453 | 5.3 | 79.8 | 73.5 | 5.7 | 2.9 | 85.5 |
| Back Seat - Center | 1,980 | 2.6 | 76.1 | 69.1 | 3.0 | 1.2 | 79.1 |
| Back Seat - Outboard | 3,002 | 4.0 | 80.7 | 74.0 | 4.7 | 2.2 | 85.4 |
| Total Back Seat | 7,435 | 4.1 | 79.2 | 72.5 | 4.6 | 2.2 | 83.8 |
| Rear (i.e., station wagons* and hatchbacks) | 77 | 6.5 | 49.4 | 46.8 | 9.1 | 5.2 | 58.5 |
| Total | 9,851 | 5.9 | 67.5 | 61.6 | 4.8 | 2.5 | 72.3 |

*Includes nine (9) passenger station wagons with folding rear seats.

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

Table 58 shows subteen safety belt usage by seating position. The current study indicates that the majority of subteens were observed in back seat positions. The 1985 study reported the same finding. However, the highest usage rate was experienced in the front-outboard position. The usage rate for this position was observed to be 50.6 percent in 1986 compared to 34.9 percent in 1985, an increase of over 15 percent. No other seat position varied more than one percent between 1985 and 1986.

Table 58. Passenger safety belt usage for subteens by seat position.

| Seat Position | Base | Percent Restrained |
|--|--------|--------------------|
| Front Seat - Center | 760 | 6.4 |
| Front Seat - Outboard | 5,229 | 50.6 |
| Total Front Seat | 5,989 | 45.0 |
| Back Seat - Driver | 3,305 | 23.3 |
| Back Seat - Center | 2,136 | 6.2 |
| Back Seat - Outboard | 3,442 | 21.5 |
| Total Back Seat | 8,883 | 18.5 |
| Rear (i.e., station wagons & hatchbacks) | 422 | 4.7 |
| Total | 15,294 | 28.5 |

d. Teens (Ages 13 to 19 Years)

Teens, with the exclusion of children 4 years of age and younger, were observed to have the lowest safety belt usage. Of a total of 14,461 teens, only 19.1 percent were observed using safety belts. However, in 1985 only 12.7 percent of 11,428 teens were observed using safety belts. Table 59 shows teen safety belt usage by city for each of the 19 cities. The percentage of use ranged from a high of 33.9 percent in Dallas to a low of 7.1 percent in Fargo/Moorhead.

Safety belt use by seating position (Table 60) indicates that teens in front seat positions were over 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 17.3 percent in 1985 to 29.1 percent in 1986. This was the only position to show a substantial increase.

Table 59. Passenger safety belt usage for teens by city.

| City | Base | Percent Restrained |
|----------------------|--------|--------------------|
| Dallas | 657 | 33.9 |
| San Diego | 702 | 30.8 |
| San Francisco | 588 | 28.1 |
| Houston | 631 | 26.9 |
| Minneapolis/St. Paul | 1,649 | 25.5 |
| Baltimore | 396 | 25.0 |
| Seattle | 693 | 24.0 |
| Los Angeles | 891 | 21.3 |
| Chicago | 803 | 21.2 |
| Boston | 284 | 17.6 |
| Miami | 746 | 15.7 |
| New York | 481 | 15.6 |
| Pittsburgh | 1,090 | 15.0 |
| Atlanta | 1,058 | 14.7 |
| New Orleans | 919 | 14.7 |
| Phoenix | 572 | 12.2 |
| Birmingham | 595 | 9.2 |
| Providence | 515 | 7.6 |
| Fargo/Moorhead | 1,191 | 7.1 |
| Total | 14,461 | 19.1 |

Table 60. Passenger safety belt usage for teens by seat position.

| Seat Position | Base | Percent Restrained |
|---|--------|--------------------|
| Front Seat - Center | 516 | 1.0 |
| Front Seat - Outboard | 8,478 | 29.1 |
| Total Front Seat | 8,994 | 27.4 |
| Back Seat - Driver | 1,909 | 7.5 |
| Back Seat - Center | 708 | 2.3 |
| Back Seat - Outboard | 2,771 | 4.9 |
| Total Back Seat | 5,388 | 5.5 |
| Rear (i.e., station wagon & hatchbacks) | 79 | 1.3 |
| Total | 14,461 | 19.1 |

e. Adults (20 Years and Older)

Adult passengers were observed wearing safety belts in 36.9 percent of 66,601 observations. This compares with 20.8 percent for the 1985 study. Table 61 shows the number of observations and percent safety belt usage for each of the 19 cities. The highest safety belt usage was observed in Houston (57.7 percent) and the lowest was observed in Fargo/Moorhead (14.0 percent).

Table 61. Passenger safety belt usage for adults by city.

| City | Base | Percent Restrained |
|----------------------|--------|--------------------|
| Houston | 4,619 | 57.7 |
| Dallas | 4,467 | 56.8 |
| Baltimore | 3,555 | 51.1 |
| San Diego | 4,247 | 50.4 |
| San Francisco | 4,195 | 47.0 |
| Seattle | 4,321 | 42.3 |
| Boston | 3,125 | 41.7 |
| Minneapolis/St. Paul | 2,920 | 37.5 |
| Los Angeles | 2,856 | 35.5 |
| New York | 2,855 | 34.4 |
| Chicago | 3,019 | 31.1 |
| Miami | 3,206 | 28.8 |
| Phoenix | 4,476 | 28.4 |
| New Orleans | 2,641 | 26.8 |
| Pittsburgh | 3,398 | 24.0 |
| Birmingham | 4,114 | 23.7 |
| Atlanta | 3,033 | 23.4 |
| Providence | 2,874 | 16.9 |
| Fargo/Moorhead | 2,680 | 14.0 |
| Total | 66,601 | 36.9 |

Adults observed in the front seat were observed to use safety belts in 40.9 percent of the observations while only 3.5 percent safety belt usage was observed for back seat adult passengers (Table 62). The front-outboard position was the only position to show a significant increase in safety belt usage for adults (as was the case for subteens and teens). Adult safety belt usage in this position was observed to be 41.4 percent in 1986 compared to 23.1 percent in 1985.

Table 62. Passenger safety belt usage for adults by seat position.

| Seat Position | Base | Percent Restrained |
|--|--------|--------------------|
| Front Seat - Center | 750 | 2.3 |
| Front Seat - Outboard | 58,659 | 41.4 |
| Total Front Seat | 59,409 | 40.9 |
| Back Seat - Driver | 2,319 | 4.5 |
| Back Seat - Center | 531 | 0.6 |
| Back Seat - Outboard | 4,305 | 3.3 |
| Total Back Seat | 7,155 | 3.5 |
| Rear (i.e., station wagons and hatchbacks) | 37 | 0.0 |
| Total | 66,601 | 36.9 |

f. Overall Safety Belt Usage by Seat Position

Overall safety belt usage by seat position is shown in table 63. 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 20) 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 shown in Table 63, total front seat safety belt usage was 35.4 percent while total back seat safety belt usage was 9.0 percent.

4. Study of Child Safety Seat Installation

Passenger study 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 study. 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 study was designed to provide information on safety seat installation that could not be obtained as part of the passenger study.

Table 63. 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 | 50,813 | 34.2 | 51,084 | 39.2 | 101,897 | 36.7 |
| Front Seat - Center | 202 | 2.0 | 294 | 5.2 | 496 | 3.8 |
| Front Seat - Outboard | 10,749 | 27.3 | 12,096 | 32.8 | 22,845 | 30.2 |
| Total Front Seat | 61,764 | 32.9 | 63,474 | 37.8 | 125,238 | 35.4 |
| Back Seat - Driver | 584 | 10.6 | 1,134 | 12.2 | 1,718 | 11.6 |
| Back Seat - Center | 233 | 4.1 | 440 | 4.8 | 673 | 4.6 |
| Back Seat - Outboard | 966 | 7.7 | 1,494 | 8.8 | 2,460 | 8.3 |
| Total Back Seat | 1,783 | 8.2 | 3,068 | 9.5 | 4,851 | 9.0 |
| Total | 63,547 | 32.2 | 66,542 | 36.5 | 130,089 | 34.4 |

During this study, 3,746 safety seats were observed in parked vehicles at the same shopping malls used in the passenger study. The type of safety seat and the observed mode of use are shown in Table 64. Of the 169 seats observed in an infant mode (rearward facing), 102 (60.4 percent) were of the "infant-only" (non-convertible) variety. That is, the seats cannot be converted between infant and toddler modes. For these seats, relatively similar numbers of the INFANT LOVE SEAT and DYN-O-MITE seats were observed. 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. Overall, STROLEE safety seats were observed most often (28.1 percent).

Table 64. Types of child safety seats installed (percentage of safety seat observations by mode is shown parenthetically).

| Name/ Manufacturer | Observed Mode | | | All Safety Seats |
|-----------------------|---------------|--------------|------------|------------------|
| | Infant | Toddler | Booster | |
| Infant Love Seat | 38(22.5) | N/A | N/A | 38(1.0) |
| Dyn-0-Mite | 53(31.4) | N/A | N/A | 53(1.4) |
| Other Infant Seat | 11(6.5) | N/A | N/A | 11(0.3) |
| Bobby-Mac | 3(1.8) | 50(1.5) | 12(8.8) | 65(1.7) |
| Century | 10(5.9) | 794(23.1) | 48(35.0) | 852(22.7) |
| Collier-Keyworth | 4(2.4) | 145(4.2) | 15(10.9) | 164(4.4) |
| Cosco | 0(0.0) | 192(5.6) | 27(19.7) | 219(5.8) |
| Fisher Price | 5(3.0) | 78(2.3) | 0(0.0) | 83(2.2) |
| Kolcraft | 0(0.0) | 38(1.1) | 26(19.0) | 64(1.7) |
| Questor (Kantwet) | 17(10.0) | 985(28.6) | 0(0.0) | 1,002(26.8) |
| Strolee | 26(15.4) | 1,026(29.8) | 1(0.7) | 1,053(28.1) |
| Teddytot (Astroseat) | 2(1.2) | 132(3.8) | 8(5.8) | 142(3.8) |
| Total | 169(100.0) | 3,440(100.0) | 137(100.0) | 3,746(100.0) |

Table 65 shows the types of toddler safety seats by model observed during the special 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 Kantwet One Step, manufactured by QUESTOR, was the most frequently observed seat (28.4 percent).

Table 65. Types of toddler safety seats installed by model.

| Manufacturer/Model | Base | Percent of Total |
|--------------------|-------|------------------|
| Bobby-Mac | 50 | 1.5 |
| Deluxe II | 18 | 0.5 |
| Champion | 30 | 0.9 |
| Other | 2 | 0.1 |
| Century | 794 | 23.1 |
| 100 | 113 | 3.3 |
| 200 | 345 | 10.0 |
| 300 | 274 | 8.0 |
| 400 XL | 21 | 0.6 |
| Child Love | 39 | 1.1 |
| Other | 2 | 0.1 |
| Collier-Keyworth | 145 | 4.2 |
| Safe & Sound | 143 | 4.1 |
| Roundtripper | 2 | 0.1 |
| Cosco | 192 | 5.6 |
| Commuter | 17 | 0.5 |
| Safe-T-Seat | 10 | 0.3 |
| Safe-T-Shield | 35 | 1.0 |
| Safe & Snug | 105 | 3.0 |
| Safe & Easy | 19 | 0.6 |
| Other | 6 | 0.2 |
| Fisher Price | 78 | 2.3 |
| Car Seat | 78 | 2.3 |
| Kolcraft | 38 | 1.1 |
| Hi-Rider | 20 | 0.6 |
| Redi-Rider | 15 | 0.4 |
| Quick Step | 3 | 0.1 |
| Questor | 985 | 28.6 |
| Kantwet One Step | 977 | 28.4 |
| Kantwet Care Seat | 8 | 0.2 |
| Strolee | 1,026 | 29.8 |
| 500 Series | 308 | 8.9 |
| 600 Series | 718 | 20.9 |
| Teddy Tot | 132 | 3.8 |
| Astroseat | 132 | 3.8 |
| Total | 3,440 | 100.0 |

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 3,440 toddler seats, 3,094 (89.9 percent) of the belt only and 346 (10.1 percent) of the belt and tether systems were observed, as shown in Table 66. This table also shows that safety seats that secure by the safety belt only were observed to be correctly installed 83.3 percent of the time, whereas, those that require a tether were much less likely to be installed correctly (i.e., 4.6 percent). Overall, 75.4 percent of the toddler seats observed were properly secured.

Table 66. 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 | 3,094 | 83.3 |
| Secured by Tether and Car Safety Belt | 346 | 4.6 |
| Total | 3,440 | 75.4 |

Figure 5 shows the percentage of belt-only and belt and tether type toddler seats observed since 1984. This figure illustrates the steady increase in the percentage of belt-only seats observed and, likewise, the reciprocal decline of belt and tether seats. What was once only a 28.4 percent difference between the two types of seats has increased to 79.8 percent in 1986. Figure 6 shows that the 83.3 percent rate of correctly installed belt-only seats is a significant increase over the previous two years. By studying both figures, it can be seen that the increasing correct installation of toddler safety seats as a whole, over the past two years, is a function of the increasing percentage of belt-only seats in the population combined with the increasing correct installation of these 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 3,094 toddler seats observed in 1986, that require securing with safety belts only, are shown in Figure 7. In 83.3 percent of the observations, the safety belt was properly used to secure the toddler seat. The safety belt was observed not to be in use in 1.7 percent of the observations and improperly used 15.0 percent of the time. Table 67 shows installation characteristics by manufacturer for toddler seats that require securing by only the vehicle safety belt.

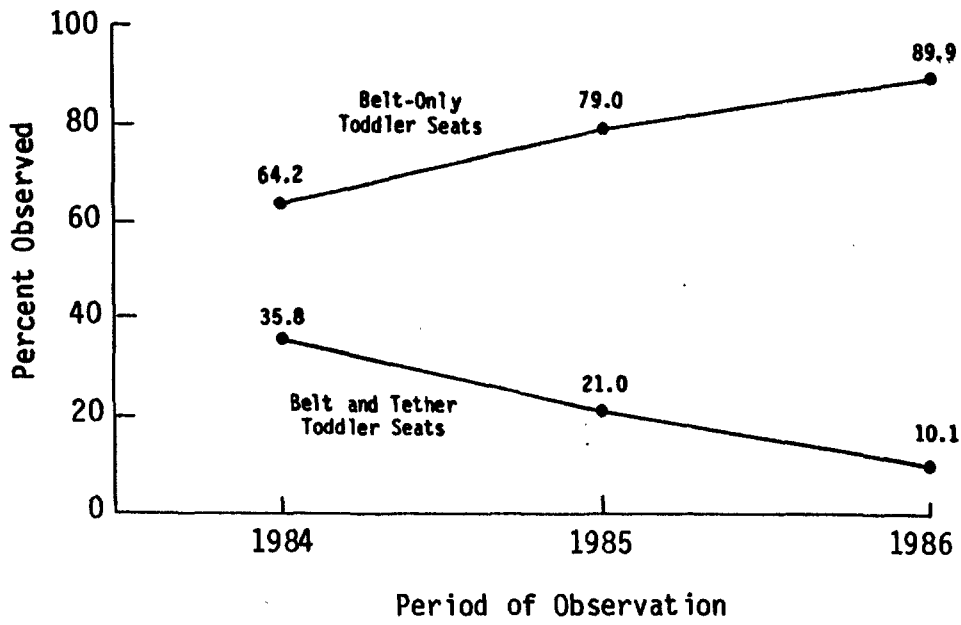


Figure 5. Percent of toddler safety seats observed over time by type of system.

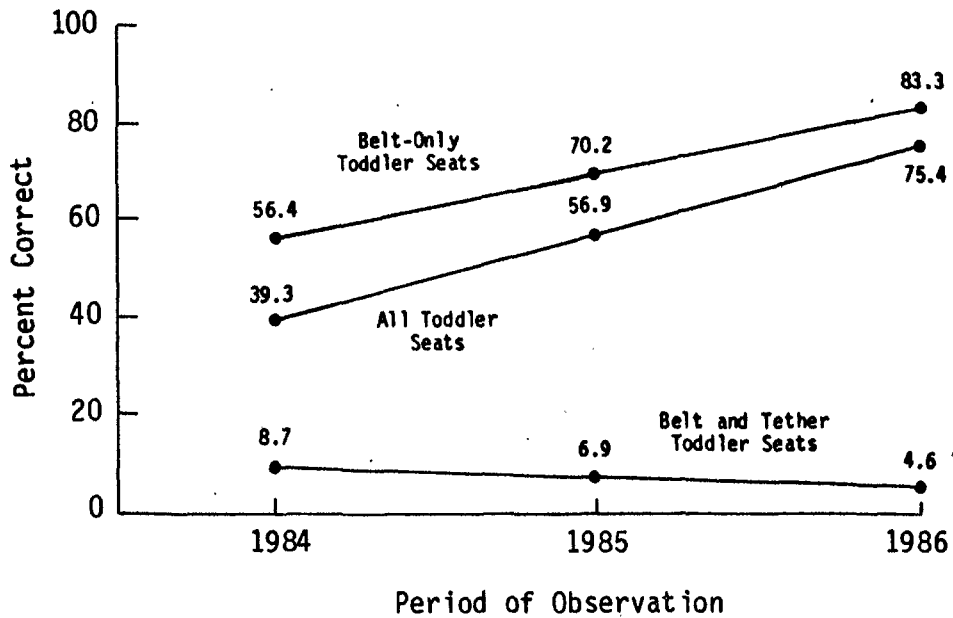


Figure 6. Correct installation of toddler safety seats over time by type of system.

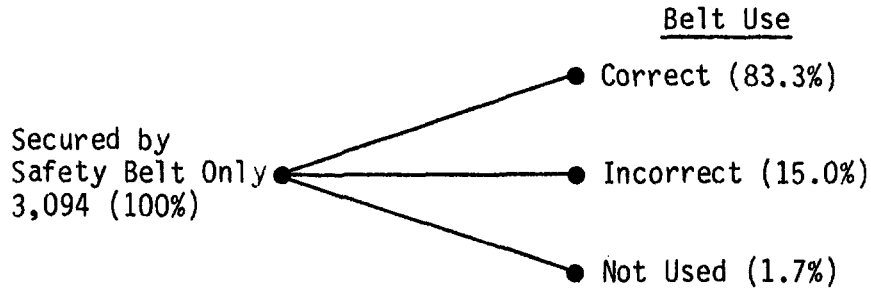


Figure 7. Installation characteristics of toddler seats that require securing by the safety belt only.

Table 67. Toddler seat installation characteristics by manufacturer (for toddler seats that require securing by only the vehicle safety belt).

| Manufacturer | Base | Percent Appears Correct | Percent Car Belt Not Used | Percent Car Belt Used Incorrectly |
|----------------------|-------|-------------------------|---------------------------|-----------------------------------|
| Bobby-Mac | 50 | 90.0* | 2.0 | 8.0 |
| Century | 759 | 79.7* | 1.5 | 18.8 |
| Collier-Keyworth | 145 | 95.2 | 2.1 | 2.7 |
| Cosco | 192 | 88.5 | 1.6 | 9.9 |
| Fisher Price | 78 | 97.4 | 1.3 | 1.3 |
| Kolcraft | 38 | 81.6 | 10.5 | 7.9 |
| Questor (Kantwet) | 985 | 80.8 | 1.6 | 17.6 |
| Strolee | 715 | 85.5 | 1.5 | 13.0 |
| Teddytot (Astroseat) | 132 | 79.6 | 3.0 | 17.4 |
| Total | 3,094 | 83.3 | 1.7 | 15.0 |

* Some safety seats (Century Child Love Seat, Bobby-Mac Champion, and Bobby-Mac Deluxe II) require safety belt attachment around the child as opposed to direct attachment to the safety seat. These seats were coded as "Appears Correct".

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 346 toddler seats observed that require securing by the safety belt and tether. This figure shows that only 4.6 percent of the seats observed were properly tethered and belted. Failure to tether the seat was the most prominent type of misuse observed (93.3 percent). However, a tether was used incorrectly in only 0.6 percent of the observations. The most frequently observed multiple misuse was not using the

tether and incorrectly belting the seat to the vehicle (39.9 percent). This table also shows that only 4.3 percent of the toddler seats were not belted (by summing the "Not Used" percentages in the belt use column) and in 41.4 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 68 shows installation characteristics by manufacturer for toddler seats that require securing by the safety belt and tether strap.

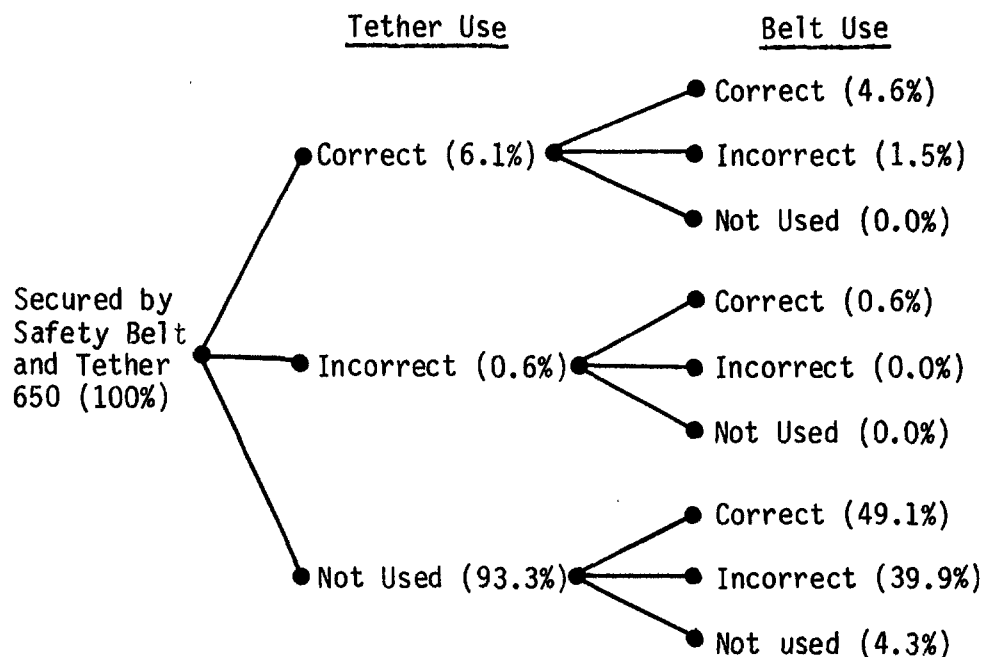


Figure 8. Installation characteristics of toddler seats that require securing by the safety belt and tether.

Table 68. 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) | 35 | 5.7 | 94.3 | 0.0 | 2.9 | 0.0 |
| Strolee | 311 | 4.5 | 93.2 | 0.6 | 4.5 | 46.0 |
| Total | 346 | 4.6 | 93.3 | 0.6 | 4.3 | 41.4 |

5. Helmet Study Findings

During the period January to December, 1986, 10,147 observations were made of helmet use by operators and passengers of motorcycles and mopeds. Table 69 shows helmet usage rates in each city for drivers and passengers of motorcycles. Of 8,604 motorcycle drivers, 59.8 percent were observed wearing helmets compared to 47.7 percent of the 905 passengers.

Table 69. Helmet use for motorcycle operators and passengers.

| City | Driver Base | Percent Helmet On | Passenger Base | Percent Helmet On |
|---------------------|-------------|-------------------|----------------|-------------------|
| Boston | 167 | 99.4 | 7 | 100.0 |
| Providence | 276 | 27.2 | 29 | 100.0 |
| New York | 159 | 98.1 | 23 | 100.0 |
| Baltimore | 148 | 54.7 | 13 | 53.8 |
| Pittsburgh | 210 | 100.0 | 22 | 100.0 |
| Chicago | 350 | 22.0 | 49 | 12.2 |
| Minneapolis/St.Paul | 439 | 38.5 | 45 | 31.1 |
| Fargo/Moorhead | 395 | 38.0 | 52 | 26.9 |
| Miami | 322 | 98.8 | 44 | 100.0 |
| Atlanta | 200 | 100.0 | 14 | 100.0 |
| Birmingham | 562 | 100.0 | 65 | 100.0 |
| New Orleans | 351 | 99.4 | 44 | 97.7 |
| Seattle | 580 | 73.3 | 38 | 50.0 |
| San Francisco | 735 | 56.2 | 74 | 32.4 |
| San Diego | 794 | 49.2 | 60 | 23.3 |
| Los Angeles | 907 | 43.7 | 104 | 21.2 |
| Phoenix | 1,011 | 48.6 | 109 | 25.7 |
| Houston | 455 | 45.9 | 63 | 34.9 |
| Dallas | 543 | 56.7 | 50 | 30.0 |
| Total | 8,604 | 59.8 | 905 | 47.7 |

Driver and passenger helmet usage rates by year (1984 through 1986) are shown in Figure 9. This figure shows that driver and passenger helmet usage is decreasing over time.

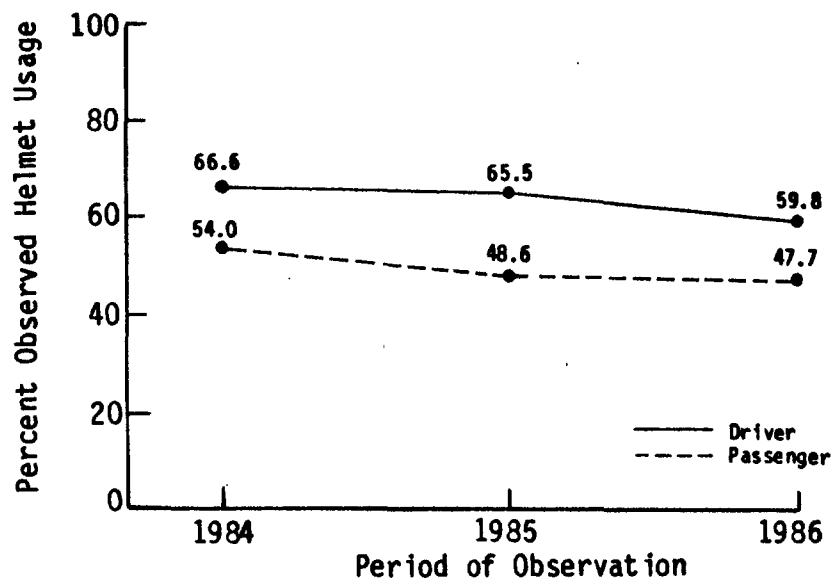


Figure 9. Motorcycle helmet use trends for operators and passengers.

Table 70 shows helmet usage rates in each city for drivers and passengers of mopeds (motorized bicycles). Comparing the results of this table (38.6 percent for drivers and 25.0 percent for passengers) to Table 69 reveals that, overall, drivers and passengers of mopeds were less likely to be wearing helmets than their counterparts on motorcycles.

Table 70. Helmet use for moped operators and passengers.

| City | Driver Base | Percent Helmet On | Passenger Base | Percent Helmet On |
|----------------------|-------------|-------------------|----------------|-------------------|
| Boston | 7 | 14.3 | 1 | 0.0 |
| Providence | 13 | 0.0 | 0 | -- |
| New York | 1 | 100.0 | 1 | 100.0 |
| Baltimore | 7 | 57.1 | 0 | -- |
| Pittsburgh | 1 | 0.0 | 0 | -- |
| Chicago | 4 | 0.0 | 3 | 0.0 |
| Minneapolis/St. Paul | 9 | 0.0 | 1 | 0.0 |
| Fargo/Moorhead | 2 | 0.0 | 0 | -- |
| Miami | 3 | 0.0 | 0 | -- |
| Atlanta | 0 | -- | 0 | -- |
| Birmingham | 33 | 100.0 | 4 | 100.0 |
| New Orleans | 13 | 92.3 | 2 | 100.0 |
| Seattle | 43 | 53.5 | 2 | 0.0 |
| San Francisco | 123 | 35.8 | 14 | 14.3 |
| San Diego | 146 | 38.4 | 6 | 16.7 |
| Los Angeles | 33 | 33.3 | 1 | 0.0 |
| Phoenix | 91 | 24.2 | 12 | 16.7 |
| Houston | 28 | 25.0 | 4 | 25.0 |
| Dallas | 29 | 41.4 | 1 | 0.0 |
| Total | 586 | 38.6 | 52 | 25.0 |

In order to examine differences in helmet use, given the existence of mandatory helmet use laws, motorcycle usage rates were stratified into a group with mandatory helmet use laws and a group with no or limited helmet laws. Table 71 shows the seven cities in which mandatory helmet laws exist. Helmet use for both drivers and passengers were recorded to be 99.5 percent. Table 72 lists the twelve cities with no or limited laws. Driver and passenger helmet use rates for these cities were observed to be 48.0 and 31.2 percent, respectively.

Table 71. Motorcycle helmet use in cities with mandatory helmet use laws.

| City | Driver Base | Percent Helmet On | Passenger Base | Percent Helmet On |
|-------------|-------------|-------------------|----------------|-------------------|
| Boston | 167 | 99.4 | 7 | 100.0 |
| New York | 159 | 98.1 | 23 | 100.0 |
| Pittsburgh | 210 | 100.0 | 22 | 100.0 |
| Miami | 322 | 98.8 | 44 | 100.0 |
| Atlanta | 200 | 100.0 | 14 | 100.0 |
| Birmingham | 562 | 100.0 | 65 | 100.0 |
| New Orleans | 351 | 99.4 | 44 | 97.7 |
| Total | 1,971 | 99.5 | 219 | 99.5 |

Table 72. Motorcycle helmet use in cities with no or limited helmet use laws.

| City | Driver Base | Helmet On | Passenger Base | Helmet On |
|----------------------|-------------|-----------|----------------|-----------|
| Providence | 276 | 27.2 | 29 | 100.0 |
| Baltimore | 148 | 54.7 | 13 | 53.8 |
| Chicago | 350 | 22.0 | 49 | 12.2 |
| Minneapolis/St. Paul | 439 | 38.5 | 45 | 31.1 |
| Fargo/Moorhead | 395 | 38.0 | 52 | 26.9 |
| Seattle | 580 | 73.3 | 38 | 50.0 |
| San Francisco | 735 | 56.2 | 74 | 32.4 |
| San Diego | 794 | 49.2 | 60 | 23.3 |
| Los Angeles | 907 | 43.7 | 104 | 21.2 |
| Phoenix | 1,011 | 48.6 | 109 | 25.7 |
| Houston | 455 | 45.9 | 63 | 34.9 |
| Dallas | 543 | 56.7 | 50 | 30.0 |
| Total | 6,633 | 48.0 | 686 | 31.2 |

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 with no or limited helmet use laws, while helmet use in those cities with mandatory laws remains constant.

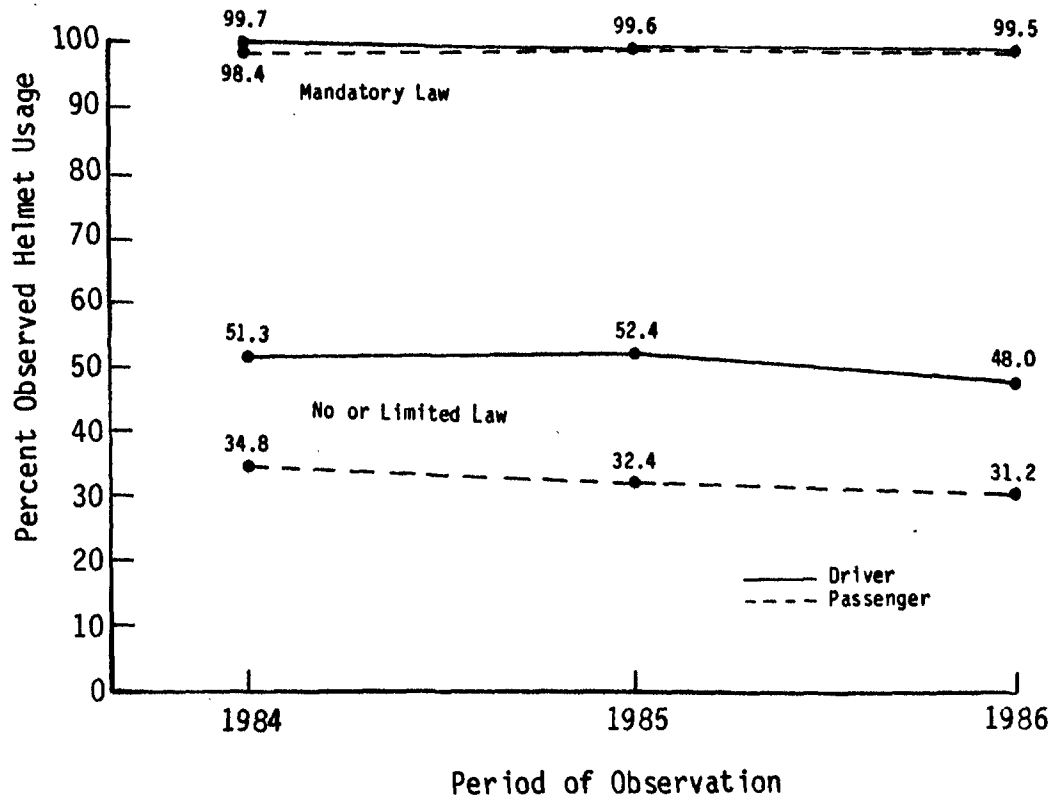


Figure 10. Motorcycle helmet use trends for operators and passengers by the existence of mandatory helmet use laws.

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APPENDIX A - DRIVER SAFETY BELT USAGE BY MANUFACTURER'S DIVISION AND
MODEL YEAR (1978-1987)

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Table A.1. Driver safety belt usage for American Motors by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 29 | 24.1 |
| 1979 | 31 | 12.9 |
| 1980 | 40 | 27.5 |
| 1981 | 37 | 21.6 |
| 1982 | 26 | 26.9 |
| 1983 | 8 | 25.0 |
| 1984 | 4 | 0.0 |
| 1985 | 6 | 50.0 |
| 1986/87 | <u>1</u> | <u>0.0</u> |
| Total | 182 | 23.1 |

Table A.2. Driver safety belt usage for Jeep by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 11 | 36.4 |
| 1979 | 10 | 30.0 |
| 1980 | 12 | 33.3 |
| 1981 | 7 | 14.3 |
| 1982 | 4 | 25.0 |
| 1983 | 15 | 33.3 |
| 1984 | 31 | 38.7 |
| 1985 | 58 | 36.2 |
| 1986/87 | <u>29</u> | <u>55.2</u> |
| Total | 177 | 37.9 |

Table A.3. Driver safety belt usage for Plymouth by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 64 | 26.6 |
| 1979 | 43 | 41.9 |
| 1980 | 57 | 22.8 |
| 1981 | 72 | 30.6 |
| 1982 | 53 | 39.6 |
| 1983 | 49 | 34.7 |
| 1984 | 92 | 35.9 |
| 1985 | 105 | 35.2 |
| 1986/87 | <u>39</u> | <u>48.7</u> |
| Total | 574 | 34.3 |

Table A.4. Driver safety belt usage for Dodge by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 61 | 19.7 |
| 1979 | 72 | 22.2 |
| 1980 | 49 | 14.3 |
| 1981 | 70 | 37.1 |
| 1982 | 58 | 29.3 |
| 1983 | 95 | 42.1 |
| 1984 | 115 | 29.6 |
| 1985 | 131 | 35.1 |
| 1986/87 | <u>39</u> | <u>35.9</u> |
| Total | 690 | 30.7 |

Table A.5. Driver safety belt usage for Chrysler by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 47 | 23.4 |
| 1979 | 43 | 20.9 |
| 1980 | 23 | 39.1 |
| 1981 | 10 | 30.0 |
| 1982 | 55 | 27.3 |
| 1983 | 79 | 31.7 |
| 1984 | 100 | 35.0 |
| 1985 | 118 | 42.4 |
| 1986/87 | <u>53</u> | <u>37.7</u> |
| Total | 528 | 33.5 |

Table A.6. Driver safety belt usage for Buick by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 171 | 24.0 |
| 1979 | 178 | 21.4 |
| 1980 | 204 | 25.0 |
| 1981 | 235 | 38.7 |
| 1982 | 259 | 39.4 |
| 1983 | 276 | 42.8 |
| 1984 | 357 | 40.6 |
| 1985 | 372 | 39.8 |
| 1986/87 | <u>125</u> | <u>52.8</u> |
| Total | 2,177 | 36.8 |

Table A.7. Driver safety belt usage for Chevrolet by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 475 | 16.4 |
| 1979 | 500 | 21.6 |
| 1980 | 464 | 25.0 |
| 1981 | 438 | 34.3 |
| 1982 | 337 | 38.9 |
| 1983 | 393 | 41.5 |
| 1984 | 652 | 41.9 |
| 1985 | 607 | 46.1 |
| 1986/87 | <u>290</u> | <u>33.5</u> |
| Total | 4,156 | 33.6 |

Table A.8. Driver safety belt usage for Cadillac by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 128 | 31.3 |
| 1979 | 152 | 17.8 |
| 1980 | 93 | 26.9 |
| 1981 | 108 | 32.4 |
| 1982 | 104 | 48.1 |
| 1983 | 136 | 36.8 |
| 1984 | 168 | 39.3 |
| 1985 | 185 | 51.4 |
| 1986/87 | <u>70</u> | <u>34.3</u> |
| Total | 1,144 | 36.0 |

Table A.9. Driver safety belt usage for Oldsmobile by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 215 | 17.2 |
| 1979 | 296 | 18.9 |
| 1980 | 237 | 24.9 |
| 1981 | 242 | 38.4 |
| 1982 | 249 | 39.4 |
| 1983 | 306 | 41.8 |
| 1984 | 462 | 44.8 |
| 1985 | 412 | 47.1 |
| 1986/87 | <u>188</u> | <u>44.2</u> |
| Total | 2,607 | 36.6 |

Table A.10. Driver safety belt usage for Pontiac by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 146 | 13.0 |
| 1979 | 166 | 22.9 |
| 1980 | 126 | 22.2 |
| 1981 | 121 | 30.6 |
| 1982 | 147 | 47.6 |
| 1983 | 116 | 29.3 |
| 1984 | 241 | 34.4 |
| 1985 | 254 | 40.6 |
| 1986/87 | <u>137</u> | <u>38.0</u> |
| Total | 1,454 | 31.9 |

Table A.11. Driver safety belt usage for Ford by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 349 | 22.9 |
| 1979 | 354 | 23.7 |
| 1980 | 222 | 28.8 |
| 1981 | 237 | 30.4 |
| 1982 | 290 | 34.8 |
| 1983 | 287 | 41.5 |
| 1984 | 532 | 38.5 |
| 1985 | 550 | 39.1 |
| 1986/87 | <u>216</u> | <u>42.6</u> |
| Total | 3,037 | 34.0 |

Table A.12. Driver safety belt usage for Mercury by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 94 | 21.3 |
| 1979 | 115 | 29.6 |
| 1980 | 53 | 35.9 |
| 1981 | 87 | 36.8 |
| 1982 | 72 | 43.1 |
| 1983 | 86 | 43.0 |
| 1984 | 174 | 36.8 |
| 1985 | 176 | 39.2 |
| 1986/87 | <u>56</u> | <u>28.6</u> |
| Total | 913 | 35.3 |

Table A.13. Driver safety belt usage for Lincoln by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 37 | 5.4 |
| 1979 | 35 | 22.9 |
| 1980 | 13 | 7.7 |
| 1981 | 23 | 21.7 |
| 1982 | 19 | 36.8 |
| 1983 | 45 | 37.8 |
| 1984 | 68 | 42.7 |
| 1985 | 68 | 42.7 |
| 1986/87 | <u>38</u> | <u>31.6</u> |
| Total | 346 | 31.8 |

Table A.14. Driver safety belt usage for Volkswagen by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 64 | 50.0 |
| 1979 | 94 | 53.2 |
| 1980 | 91 | 53.9 |
| 1981 | 86 | 66.3 |
| 1982 | 56 | 55.4 |
| 1983 | 38 | 42.1 |
| 1984 | 67 | 50.8 |
| 1985 | 77 | 55.8 |
| 1986/87 | <u>20</u> | <u>55.0</u> |
| Total | 593 | 54.5 |

Table A.15. Driver safety belt usage for Toyota by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 124 | 41.1 |
| 1979 | 152 | 36.8 |
| 1980 | 210 | 39.5 |
| 1981 | 234 | 52.6 |
| 1982 | 218 | 55.5 |
| 1983 | 260 | 55.8 |
| 1984 | 332 | 58.1 |
| 1985 | 348 | 60.6 |
| 1986/87 | <u>154</u> | <u>59.7</u> |
| Total | 2,032 | 52.9 |

Table A.16. Driver safety belt usage for Datsun/Nissan by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 92 | 30.4 |
| 1979 | 129 | 31.0 |
| 1980 | 158 | 32.3 |
| 1981 | 146 | 41.8 |
| 1982 | 171 | 46.8 |
| 1983 | 199 | 51.3 |
| 1984 | 240 | 45.8 |
| 1985 | 238 | 52.1 |
| 1986/87 | <u>111</u> | <u>42.3</u> |
| Total | 1,484 | 43.3 |

Table A.17. Driver safety belt usage for Honda by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 75 | 46.7 |
| 1979 | 99 | 48.5 |
| 1980 | 111 | 48.7 |
| 1981 | 130 | 53.9 |
| 1982 | 148 | 53.4 |
| 1983 | 168 | 63.7 |
| 1984 | 243 | 55.1 |
| 1985 | 254 | 58.3 |
| 1986/87 | <u>110</u> | <u>50.9</u> |
| Total | 1,338 | 54.6 |

Table A.18. Driver safety belt usage for other imports by model year.

| <u>Model Year</u> | <u>Base</u> | <u>Percent Belted</u> |
|-------------------|-------------|-----------------------|
| 1978 | 104 | 43.3 |
| 1979 | 138 | 40.6 |
| 1980 | 148 | 45.3 |
| 1981 | 221 | 48.4 |
| 1982 | 282 | 47.2 |
| 1983 | 359 | 49.0 |
| 1984 | 537 | 48.8 |
| 1985 | 566 | 52.7 |
| 1986/87 | <u>208</u> | <u>52.9</u> |
| Total | 2,563 | 48.9 |

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 1978-1987 model years by car series for each manufacturer. Only those models that have 20 or more observations are presented.

| <u>Manufacturer/Series</u> | <u>Base</u> | <u>Percent Belted</u> |
|----------------------------|-------------|-----------------------|
| <u>American Motors</u> | | |
| Concord | 108 | 23.1 |
| Eagle | 40 | 22.5 |
| Spirit | 27 | 25.9 |
| <u>Jeep</u> | | |
| Cherokee | 75 | 41.3 |
| CJ-7 | 33 | 51.5 |
| Wagoneer | 61 | 27.9 |
| <u>Plymouth</u> | | |
| Caravelle | 23 | 26.1 |
| Horizon | 211 | 34.6 |
| Reliant | 232 | 39.2 |
| Volare | 88 | 23.9 |
| <u>Dodge</u> | | |
| Aries | 213 | 38.5 |
| Aspen | 69 | 14.5 |
| Daytona | 28 | 39.3 |
| Diplomat | 52 | 13.5 |
| Omni | 189 | 31.2 |
| 400 | 25 | 44.0 |
| 600 | 68 | 29.4 |
| <u>Chrysler</u> | | |
| Cordoba | 34 | 32.4 |
| Laser | 31 | 35.5 |
| LeBaron | 247 | 37.2 |
| New Yorker | 186 | 28.5 |

| <u>Manufacturer/Series</u> | <u>Base</u> | <u>Percent Belted</u> |
|----------------------------|-------------|-----------------------|
| <u>Buick</u> | | |
| Century | 433 | 39.0 |
| Electra | 241 | 36.9 |
| Le Sabre | 307 | 36.2 |
| Regal | 594 | 34.2 |
| Riviera | 101 | 36.6 |
| Skyhawk | 137 | 38.7 |
| Skylark | 317 | 38.2 |
| Somerset | 31 | 35.1 |
| <u>Chevrolet</u> | | |
| Camaro | 409 | 35.9 |
| Caprice | 523 | 29.4 |
| Cavalier | 523 | 45.3 |
| Celebrity | 475 | 43.6 |
| Chevette (Regular) | 503 | 33.2 |
| Citation | 356 | 35.4 |
| Corvette | 58 | 19.0 |
| El Camino | 22 | 18.2 |
| Impala | 243 | 24.7 |
| Malibu | 419 | 28.6 |
| Monte Carlo | 402 | 25.9 |
| Monza | 63 | 17.5 |
| Nova | 113 | 23.9 |
| Spectrum | 22 | 45.5 |
| Sprint | 25 | 44.0 |

| <u>Manufacturer/Series</u> | <u>Base</u> | <u>Percent Belted</u> |
|----------------------------|-------------|-----------------------|
| <u>Cadillac</u> | | |
| Brougham | 156 | 29.5 |
| Cimarron | 33 | 54.6 |
| Deville | 571 | 36.1 |
| Eldorado | 206 | 37.9 |
| Fleetwood | 27 | 48.1 |
| Seville | 151 | 33.8 |
| <u>Oldsmobile</u> | | |
| Calais | 79 | 45.6 |
| Custom Cruiser | 58 | 37.9 |
| Cutlass | 1,139 | 31.8 |
| Delta 88 | 467 | 38.1 |
| Firenza | 67 | 55.2 |
| Ninety-Eight | 253 | 34.8 |
| Omega | 117 | 35.0 |
| Toronado | 74 | 33.8 |
| Ciera | 348 | 47.7 |
| <u>Pontiac</u> | | |
| Bonneville | 173 | 29.5 |
| Fiero | 61 | 42.6 |
| Firebird | 231 | 29.4 |
| Grand Am | 79 | 43.0 |
| Grand Prix | 240 | 21.3 |
| Grand Le Mans | 31 | 16.1 |
| J 2000/2000 | 164 | 41.5 |
| Le Mans | 45 | 28.9 |
| Parisienne | 49 | 22.4 |
| Phoenix | 76 | 26.3 |
| Sunbird | 53 | 26.4 |
| T 1000/1000 | 50 | 28.0 |
| 6000 | 188 | 45.2 |

| <u>Manufacturer/Series</u> | <u>Base</u> | <u>Percent Belted</u> |
|----------------------------|-------------|-----------------------|
| <u>Ford</u> | | |
| Escort | 617 | 35.8 |
| EXP | 42 | 33.3 |
| Fairmont | 355 | 35.2 |
| Fiesta | 49 | 26.5 |
| Ford Wagon | 32 | 34.4 |
| Granada | 169 | 26.6 |
| LTD | 541 | 35.5 |
| LTD II | 27 | 3.7 |
| Mustang | 454 | 33.7 |
| Pinto | 73 | 24.7 |
| Tempo | 289 | 39.4 |
| Thunderbird | 355 | 32.1 |
| <u>Mercury</u> | | |
| Capri | 64 | 45.3 |
| Cougar | 211 | 28.4 |
| Lynx | 102 | 39.2 |
| Marquis | 307 | 34.9 |
| Monarch | 40 | 27.5 |
| Topaz | 64 | 37.5 |
| Zephyr | 91 | 41.8 |
| <u>Lincoln</u> | | |
| Continental | 238 | 33.2 |
| Mark Series | 102 | 30.4 |

Foreign Models

| | | |
|-------------------|-------|------|
| Audi | 174 | 42.5 |
| BMW | 201 | 52.2 |
| Datsun/Nissan | 1,484 | 43.3 |
| Honda | 1,338 | 54.6 |
| Jaguar | 57 | 38.6 |
| Mazda | 552 | 46.7 |
| Mercedes Benz | 201 | 39.8 |
| Mitsubishi | 298 | 49.7 |
| Opel/Isuzu | 39 | 51.3 |
| Peugeot | 56 | 46.4 |
| Porsche | 49 | 40.8 |
| Renault | 154 | 44.8 |
| Saab | 63 | 66.7 |
| Subaru | 285 | 44.9 |
| Toyota | 2,032 | 52.9 |
| Volkswagen Rabbit | 340 | 55.0 |
| Volkswagen Other | 253 | 53.8 |
| Volvo | 405 | 63.7 |

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 (Figure C.1). 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 11/15/82 for November 15, 1982.
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.
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 which 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 _____
 (Street Name) (Nearest X-Street)
 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 | Adult Belt 1 Both 2 Lap 3 None | Misuse 1 Under arm 2 Behind back 3 Loose | Automatic Restraint System 1 Yes 2 No | Driver and Passenger Position by Age Group | | | Rear of Sta. Wagon Matchback Number of Children |
|-----|----------------|--------------|------------|--------------------------|---|---|---|--|--------|----------|--|
| | | | | | | | | Driver | Center | Outboard | |
| 1. | | | | | | | | | | | |
| 2. | | | | | | | | | | | |
| 3. | | | | | | | | | | | |
| 4. | | | | | | | | | | | |
| 5. | | | | | | | | | | | |
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| 13. | | | | | | | | | | | |
| 14. | | | | | | | | | | | |
| 15. | | | | | | | | | | | |
| 16. | | | | | | | | | | | |
| 17. | | | | | | | | | | | |
| 18. | | | | | | | | | | | |
| 19. | | | | | | | | | | | |
| 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) 8-Child on Lap

Figure C.1. Driver study data form.

Observation Data

Complete one line on the form for each vehicle observed. 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.

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".

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.

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 Sex: Write in the code to describe the sex 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.

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.

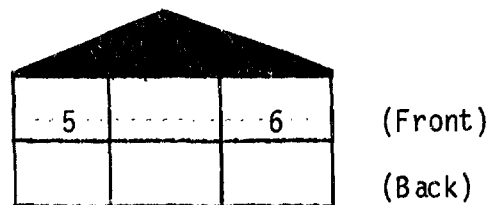
7. Automatic Restraint System: The automatic safety belt systems will be found mainly in newer Volkswagon Rabbits and Jettas, Chevrolet Chevettes, and Toyota Cressidas. When observing these three makes, you will have to determine whether the belt system is an "automatic" system (Code 1) or a regular lap and shoulder combination system (Code 2). The automatic belt is designed to fit across the driver 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.

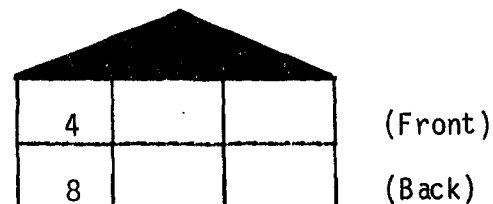
8. Driver and Passenger Position by Age Group: Record the age group code shown at bottom of the form in one of the six seat position boxes on the observation form. The six boxes are intended to illustrate the six seat positions of the passenger car with the driver side on the left, and the outboard on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

Examples:

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



Teen driver and adult passenger with infant on lap in back seat on driver's side:



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) | 8 = Child on Lap |

9. 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

Printed data forms entitled "Passenger Restraint Observation: Form #2" will be used in this study (Figure C.2). 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 Conditions: Dry Wet Snow/Ice
 10. Start Time: _____ AM PM 11. End Time: _____ AM PM

| No. | Total Passengers | Age Group* | Seat | | Position | Passenger Restraint | Infant Seat | Toddler Seat | Booster Seat |
|-----|------------------|------------|-----------------------------|------------------------------------|----------|---------------------|-------------|--------------|--------------|
| | | | 1 Front 2 Back 3 Rear | 1 Driver 2 Center 3 Outboard | | | | | |
| 1. | | | | | | | | | |
| 2. | | | | | | | | | |
| 3. | | | | | | | | | |
| 4. | | | | | | | | | |
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| 19. | | | | | | | | | |
| 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 C.2. 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 Safety Seat (Code 3)

Infant 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 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 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 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 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 most have a five-point harness system (straps) to secure the toddler to the seat. Some 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 models have a tether strap which is to be attached to the rear safety belt or deck lid to prevent pivoting (tipping forward). 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 (Code 3), toddler (Code 4), or booster (Code 5) safety seat. Since the codes vary based on the restraint system used, each will be described separately.

Infant Seat

This column should only be used when an infant 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 safety seat, and is restrained 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.

Unsure (Code 8)

If you can not make a position verification on the use of the safety seat, use code 8.

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 Seat

This column should only be used when a toddler seat is being used (Code 4 for Passenger Restraint) or when an unused toddler safety seat is observed. When observing toddler 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 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 safety seat and is restrained by a 5-point harness or shield (if applicable). Some toddler 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 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 safety seat is observed (with exception of the auto safety belt). This predominately pertains to the tether strap not being used for a seat requiring a tether strap (i.e., Child Love Seat).

Unsure (Code 8)

If you can not make a positive verification on the use of the harness system or shield, use Code 8.

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 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.

Unsure (Code 8)

If you can not make a positive verification on the use of the safety device, use Code 8.

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

Printed data forms entitled "Special Study - Child Safety Seats - Form A" will be used in this study (Figure C.3). 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 out-board 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 Conditions: Dry Wet Snow/Ice
 9. Start Time: _____ AM PM 10. End Time: _____ AM PM

| No. | Seat | Position | Tether | Belting Attached to Seat | Shield Required | Infant, Toddler or Booster Model/Comments |
|-----|-----------------------------|---|---|--|-----------------|---|
| | 1 Front 2 Back 3 Rear | 1 Driven side 2 Center 3 Outboard | 1 Tether required properly used 2 Tether required improperly used 3 Tether required but not used 4 Tether not required | 1 Proper 2 Improper 3 No 4 Not required | 1 Yes 2 No | |
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |
| 5. | | | | | | |
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| 18. | | | | | | |
| 19. | | | | | | |
| 20. | | | | | | |

Figure C.3. 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 misuseage 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 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

Printed data forms entitled "Motorcycle/Moped Observation: Form #3" will be used in this study (Figure C.4). 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 mopad 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. | | | |
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| 24. | | | |
| 25. | | | |

Figure C.4. Helmet study data form.

APPENDIX D - SUMMARY OF BI-ANNUAL OBSERVATIONS

PERCENT OF INFANTS OBSERVED IN CHILD SAFETY SEATS

January - June, 1986

| | <u>Base</u> | <u>Percent</u> |
|-----------------------|-------------|----------------|
| Total (19 Cities) | 399 | 63.7 |
| Boston | 25 | 80.0 |
| Providence | 29 | 69.0 |
| New York | 30 | 70.0 |
| *Baltimore | 9 | 77.8 |
| Pittsburgh | 11 | 54.5 |
| Chicago | 22 | 68.2 |
| Minneapolis/St. Paul | 32 | 59.4 |
| Fargo/Moorhead | 13 | 30.8 |
| *Miami | 13 | 69.2 |
| Atlanta | 15 | 60.0 |
| Birmingham | 19 | 73.7 |
| *New Orleans | 21 | 61.9 |
| Seattle | 22 | 86.4 |
| *San Francisco | 22 | 72.7 |
| San Diego | 30 | 66.7 |
| Los Angeles | 20 | 50.0 |
| Phoenix | 18 | 44.4 |
| Houston | 30 | 46.7 |
| Dallas | 18 | 55.6 |
| Avg. Percent Per City | | 63.0 |

*Reported in June, 1986

PERCENT OF TODDLERS OBSERVED IN CHILD SAFETY SEATS

January - June, 1986

| | <u>Base</u> | <u>Percent</u> |
|-----------------------|-------------|----------------|
| Total (19 Cities) | 4,752 | 68.8 |
| Boston | 217 | 91.2 |
| Providence | 178 | 84.8 |
| New York | 270 | 64.1 |
| *Baltimore | 258 | 83.7 |
| Pittsburgh | 216 | 63.0 |
| Chicago | 258 | 64.3 |
| Minneapolis/St. Paul | 280 | 63.2 |
| Fargo/Moorhead | 145 | 51.7 |
| *Miami | 244 | 84.4 |
| Atlanta | 172 | 60.5 |
| Birmingham | 200 | 56.5 |
| *New Orleans | 237 | 56.5 |
| Seattle | 311 | 73.0 |
| *San Francisco | 400 | 76.0 |
| San Diego | 408 | 77.0 |
| Los Angeles | 255 | 58.4 |
| Phoenix | 189 | 57.7 |
| Houston | 221 | 59.7 |
| Dallas | 293 | 62.5 |
| Avg. Percent Per City | | 67.8 |

*Reported in June, 1986

PERCENT OBSERVED SAFETY BELT USE BY PASSENGERS

January - June, 1986

| | <u>Toddler</u> | | <u>Sub-Teen</u> | | <u>Teen</u> | | <u>Adult</u> | |
|-----------------------|----------------|----------------|-----------------|----------------|-------------|----------------|--------------|----------------|
| | <u>Base</u> | <u>Percent</u> | <u>Base</u> | <u>Percent</u> | <u>Base</u> | <u>Percent</u> | <u>Base</u> | <u>Percent</u> |
| Total (19 Cities) | 4,752 | 7.4 | 6,937 | 28.0 | 6,884 | 16.1 | 34,919 | 34.3 |
| Boston | 217 | 4.1 | 90 | 53.3 | 46 | 30.4 | 1,522 | 48.6 |
| Providence | 178 | 1.7 | 81 | 19.8 | 236 | 7.6 | 1,326 | 16.3 |
| New York | 270 | 6.7 | 245 | 34.3 | 220 | 14.1 | 1,309 | 34.2 |
| *Baltimore | 258 | 5.8 | 97 | 50.5 | 110 | 18.2 | 1,626 | 44.6 |
| Pittsburgh | 216 | 11.1 | 399 | 29.6 | 629 | 13.7 | 1,795 | 21.1 |
| Chicago | 258 | 8.9 | 331 | 27.5 | 307 | 14.7 | 1,605 | 31.0 |
| Minneapolis/St. Paul | 280 | 10.7 | 386 | 31.3 | 760 | 18.4 | 1,555 | 27.8 |
| Fargo/Moorhead | 145 | 0.0 | 225 | 16.9 | 548 | 5.7 | 1,295 | 10.6 |
| *Miami | 244 | 1.2 | 95 | 27.4 | 160 | 11.9 | 1,588 | 26.3 |
| Atlanta | 172 | 10.5 | 320 | 25.9 | 568 | 12.3 | 1,595 | 20.0 |
| Birmingham | 200 | 1.0 | 647 | 10.0 | 293 | 4.8 | 2,341 | 15.7 |
| *New Orleans | 237 | 5.9 | 529 | 22.3 | 584 | 8.6 | 1,280 | 16.1 |
| Seattle | 311 | 9.3 | 503 | 29.4 | 415 | 21.2 | 2,349 | 37.2 |
| *San Francisco | 400 | 8.0 | 504 | 30.4 | 342 | 29.8 | 2,332 | 48.9 |
| San Diego | 408 | 10.5 | 401 | 35.2 | 373 | 27.6 | 2,388 | 49.6 |
| Los Angeles | 255 | 10.2 | 448 | 32.4 | 433 | 22.9 | 1,431 | 36.4 |
| Phoenix | 189 | 5.8 | 533 | 17.3 | 305 | 9.5 | 2,553 | 23.4 |
| Houston | 221 | 14.0 | 557 | 32.0 | 271 | 19.9 | 2,522 | 55.8 |
| Dallas | 293 | 7.2 | 546 | 41.8 | 284 | 32.4 | 2,507 | 55.4 |
| Avg. Percent Per City | | 7.0 | | 29.9 | | 17.0 | | 32.6 |

*Reported in June, 1986

PERCENT OF INFANTS OBSERVED IN CHILD SAFETY SEATS

July - December 1986

| | <u>Base</u> | <u>Percent</u> |
|-----------------------|-------------|----------------|
| Total (19 Cities) | 324 | 77.5 |
| Boston | 24 | 66.7 |
| Providence | 16 | 75.0 |
| New York | 13 | 76.9 |
| Baltimore | 18 | 94.4 |
| Pittsburgh | 19 | 89.5 |
| Chicago | 20 | 95.0 |
| Minneapolis/St. Paul | 24 | 95.8 |
| Fargo/Moorhead | 15 | 66.7 |
| *Miami | 13 | 61.5 |
| Atlanta | 23 | 78.3 |
| Birmingham | 13 | 69.2 |
| New Orleans | 11 | 45.5 |
| Seattle | 11 | 81.8 |
| San Francisco | 17 | 82.4 |
| *San Diego | 29 | 82.8 |
| Los Angeles | 18 | 72.2 |
| Phoenix | 15 | 73.3 |
| Houston | 13 | 61.5 |
| Dallas | 12 | 66.7 |
| Avg. Percent Per City | | 75.5 |

*Reported in December 1986

PERCENT OF TODDLERS OBSERVED IN CHILD SAFETY SEATS

July - December 1986

| | <u>Base</u> | <u>Percent</u> |
|-----------------------|-------------|----------------|
| Total (19 Cities) | 5,099 | 75.7 |
| Boston | 234 | 78.2 |
| Providence | 217 | 75.6 |
| New York | 281 | 73.3 |
| Baltimore | 273 | 87.9 |
| Pittsburgh | 208 | 72.6 |
| Chicago | 239 | 65.7 |
| Minneapolis/St. Paul | 233 | 77.3 |
| Fargo/Moorhead | 216 | 53.7 |
| *Miami | 180 | 71.7 |
| Atlanta | 212 | 62.3 |
| Birmingham | 361 | 78.9 |
| New Orleans | 207 | 70.0 |
| Seattle | 342 | 86.5 |
| San Francisco | 368 | 77.4 |
| *San Diego | 357 | 86.3 |
| Los Angeles | 199 | 74.4 |
| Phoenix | 316 | 78.2 |
| Houston | 356 | 75.3 |
| Dallas | 300 | 73.0 |
| Avg. Percent Per City | | 74.6 |

*Reported in December 1986

PERCENT OBSERVED SAFETY BELT USE BY PASSENGERS

July - December 1986

| | <u>Toddler</u> | | <u>Sub-Teen</u> | | <u>Teen</u> | | <u>Adult</u> | |
|-----------------------|----------------|----------------|-----------------|----------------|-------------|----------------|--------------|----------------|
| | <u>Base</u> | <u>Percent</u> | <u>Base</u> | <u>Percent</u> | <u>Base</u> | <u>Percent</u> | <u>Base</u> | <u>Percent</u> |
| Total (19 Cities) | 5,099 | 4.5 | 8,357 | 28.9 | 7,577 | 21.9 | 31,682 | 39.7 |
| Boston | 234 | 6.4 | 251 | 41.4 | 238 | 15.1 | 1,603 | 35.2 |
| Providence | 217 | 3.2 | 240 | 30.4 | 279 | 7.5 | 1,548 | 17.4 |
| New York | 281 | 6.8 | 200 | 37.5 | 261 | 16.9 | 1,546 | 34.5 |
| Baltimore | 273 | 3.3 | 494 | 28.7 | 286 | 27.6 | 1,929 | 56.5 |
| Pittsburgh | 208 | 4.8 | 422 | 29.4 | 461 | 16.9 | 1,603 | 27.3 |
| Chicago | 239 | 7.9 | 526 | 26.0 | 496 | 25.2 | 1,414 | 31.3 |
| Minneapolis/St. Paul | 233 | 9.9 | 615 | 40.5 | 889 | 31.4 | 1,365 | 48.5 |
| Fargo/Moorhead | 216 | 5.6 | 564 | 17.9 | 643 | 8.2 | 1,385 | 17.3 |
| *Miami | 180 | 2.2 | 365 | 26.0 | 586 | 16.7 | 1,618 | 31.3 |
| Atlanta | 212 | 5.7 | 383 | 24.8 | 490 | 17.3 | 1,438 | 27.3 |
| Birmingham | 361 | 2.2 | 551 | 24.0 | 302 | 13.6 | 1,773 | 34.3 |
| New Orleans | 207 | 5.3 | 445 | 35.1 | 335 | 25.4 | 1,361 | 36.9 |
| Seattle | 342 | 2.6 | 397 | 31.2 | 278 | 28.1 | 1,972 | 48.4 |
| San Francisco | 368 | 4.1 | 506 | 28.1 | 246 | 25.6 | 1,863 | 44.5 |
| *San Diego | 357 | 3.1 | 426 | 33.1 | 329 | 34.3 | 1,859 | 51.5 |
| Los Angeles | 199 | 4.0 | 407 | 32.2 | 458 | 19.9 | 1,425 | 34.7 |
| Phoenix | 316 | 1.6 | 479 | 19.4 | 267 | 15.4 | 1,923 | 35.0 |
| Houston | 356 | 5.1 | 574 | 27.7 | 360 | 32.2 | 2,097 | 60.1 |
| Dallas | 300 | 5.7 | 512 | 28.5 | 373 | 35.1 | 1,960 | 58.5 |
| Avg. Percent Per City | | 4.7 | | 29.6 | | 21.7 | | 38.4 |

*Reported in December 1986