



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

Auto Theft and Recovery Effects of the Motor Vehicle Theft Law Enforcement Act of 1984

**Report to the Congress
March 1991**

Appendix 1

Auto Theft and Recovery

*Effects of the Motor Vehicle Theft
Law Enforcement Act of 1984*

Appendix 1



U. S. Department of Transportation
National Highway Traffic Safety Administration

Table of Contents for Appendix 1

Introduction to Appendix 1	1-1
- The 1984 Theft Act.	1-1
- The Standards	1-2
- The 5-Year Report to Congress	1-2
- Information Sources and Data	1-4
Part A -- Procedures for Collecting and Disseminating Information on Thefts and Recoveries	A-1
- How Motor Vehicle Thefts and Recoveries are Reported	A-2
- Data Systems by Organization	A-5
- Uniform Crime Reporting Program (UCR)	A-5
- National Crime Information Center (NCIC).	A-10
- National Automobile Theft Bureau	A-13
- Highway Loss Data Institute (HLDI).	A-15
- Survey of State and Local Organizations	A-17
- SUMMARY: Procedures for Collecting, Compiling and Dissemination Information of Thefts and Recoveries . .	A-21
Part B -- Motor Vehicle Thefts, Recoveries and the Impact of Parts Marking	B-1
-Thefts and Theft Rates	B-4
- Total Annual Thefts by Type	B-4
- Theft Rates by Type of Motor Vehicle	B-6
- The Effect of Parts Marking	B-9
- Thefts of Marked and Unmarked Cars.	B-10
- Theft Rates of Marked and Unmarked Cars	B-11
- The Effectiveness of Parts Marking	B-13
- Method for Determining Effectiveness	B-15
- Adjustment for Pre-Existing Trends	B-16
- Results of Effectiveness Analysis	B-17
- Recovery of Stolen Motor Vehicles	B-18
- Recovery Rates by Type of Motor Vehicles	B-20

- The Effect of Parts Marking on Recoveries	B-22
- Effects of Antitheft Devices on Vehicle Thefts and Recoveries	B-24
- Does the Age of A Car Affect Its Theft or Recovery.	B-28
- SUMMARY: Motor Vehicle Thefts, Recoveries, and the Impact of Parts Marking	B-30
 Parts C & D -- Market for Stolen Parts and Exports	 CD-1
- Motives for Motor Vehicle Thefts	CD-2
- Need for Major Parts - the Demand	CD-4
- Crashes	CD-4
- Estimates of the Number of Crash-Damaged Cars that are Repaired	CD-4
- Estimates of the Number of Parts that are Replaced	CD-5
- Other Demands for parts	CD-6
- Estimates of the Value of Parts that are Replaced	CD-7
- Motor Vehicle Thefts - the Supply	CD-12
- SUMMARY: Market for Stolen Parts and Exports	CD-20
 Part E -- The Cost of Marking Major Parts of Passenger Cars	 E-1
- What the Standard Requires	E-1
- How Auto Manufacturers Met the Standard	E-3
- How Much Does Parts Marking Cost?	E-4
- How Can These Costs be Translated Into Savings?	E-5
- Can Adhesive Labels and "Footprints" Be Removed?	E-5
- SUMMARY: The Cost of Parts Marking	E-7
 Part F -- Arrest and Prosecution of Car Thieves.	 F-1
- The Trend of Vehicle Theft Arrests Nationwide	F-2
- Nationwide Case Disposition	F-2
- Federal Caseload Statistics	F-4
- Statewide Arrest and Disposition Trends	F-8
- The Effect of Parts Markings on Arrests and Prosecution of Motor Vehicle Thieves	F-11
- Case 1	F-14
- Case 2	F-14
- Case 3	F-14
- Case 4	F-15
- Case 5	F-15
- Case 6	F-15
- Case 7	F-16
- Case 8	F-16
- A Survey of Enforcement Agencies	F-16
- Monitoring and Inspection of Auto Parts Businesses.	F-17

- Motor Vehicle Theft Investigation Experience	F-18
- Enforcement Resources	F-19
- Penalties	F-20
- Effects of Parts Marking on the Prosecution, Conviction and Sentencing of Car Thieves	F-23
- SUMMARY: Arrest and Prosecution of Car Thieves	F-24

Part G -- Comprehensive Insurance Premiums and Payouts for
for Vehicle Theft G-1

- Comprehensive Insurance Coverage and Its Relationship to Other Insurance	G-3
- How Rates are Determined for Comprehensive Premiums	G-5
- Insurance Claim Payments for Auto Theft	G-9
- Method for Determining Charge in Theft Loss Payments	G-11
- Analysis of Theft Loss Payments	G-12
- General Trends in Theft Claims Payments	G-14
- Insurer Theft Losses Before and After Marking Program Inception	G-15
- Results of Analysis of Theft Rates Based Insurance Theft Loss Claims	G-15
- Effectiveness of Parts Marking on Auto Theft Claims	G-17
- Effect of Parts Marking on Vehicle Recovery Rates and Recovery Condition	G-22
- Change in Claims Costs for Recovered Vehicles Before and After the Inception of Parts Marking	G-23
- Change in Claims Costs Based on Vehicle Condition Upon Recovery Before and After Parts Marking Inception	G-26
- Effect of Parts Marking on Premiums for Comprehensive Coverage	G-29
- Description of Data and Method of Analysis	G-30
- Premium Trends	G-31
- Actions Taken by Insurers to Reduce Premiums or Theft Losses	G-34
- Actions Taken by Insurers to Encourage Reductions in Vehicle Thefts	G-34

SUMMARY: Comprehensive Insurance Premiums and Payouts for Vehicle Theft	G-36
- Insurance Ratemaking Process	G-36
- Comprehensive Insurance Premiums	G-37
- Insurance Claims Losses	G-38
- Analysis of Claims for Recovered Vehicles	G-38

Part H -- Adequacy of Laws and Parts Marking Systems.	H-1
- State Motor Vehicle Theft and Related Laws.	H-2
- Systems Available for Tracing Parts	
Interviews with Auto Theft Investigators.	H-5
- Is Parts Marking a Deterrent to Auto Theft for Parts?	H-5
- How Effective is Parts - Marking in Deterring Other Car Theft Motives?	H-6
- Have Motives for Auto Theft Changed?	H-7
- Are There Benefits to Parts Marking?	H-8
- Are the Parts Marking Standard and Methods Adequate?	H-09
- What Other Measures Could Deter Auto Theft for Parts.	H-09
- SUMMARY: Adequacy and Effectiveness of Laws and Systems.	H-11
 Part I -- An Assessment of Extending Parts Marking to Other Types of Motor Vehicles	 I-1
- Thefts and Recoveries of Other Motor Vehicles	I-1
- Would Parts Identification Benefit Other Types of Motor Vehicles	I-3
 References	 R-1

Tables for Appendix 1:

A-1	Summary of National Systems for Compiling and Disseminating Information Concerning the Theft and Recovery of Motor Vehicles	A-22,23
B-1	Motor Vehicle Thefts	B-04
B-2	Motor Vehicle Theft Rates by Type.	B-08
B-3	Stolen Passenger Cars with Marked Parts and Unmarked Parts	B-11
B-4	Theft Rates for Passenger Cars with Marked Parts, and Unmarked Parts	B-12
B-5	Motor Vehicle Recoveries	B-19
B-6	Recoveries by Motor Vehicle Type	B-22
B-7	Recovery Rates for Passenger Cars.	B-23
B-8	Sample of Passenger Cars Equipped with Antitheft Devices Registrations, Thefts and Recoveries	B-25
C-1	Distribution of Recovered Motor Vehicles As Classified by Condition	CD-6
C-2	A Sample of Prices for Original Equipment and Aftermarket Parts.	CD-8
C-3a	Estimated Number and Value of Selected Replacement Parts	CD-9
C-3b	Estimated Market Share of Selected Replacement Parts	CD-10
C-4	Estimated Passenger Cars in Use by Age	CD-11
C-5	Recovered Vehicles with Missing Major Body Parts and/or Engines.	CD-13
C-6	Estimated Distribution, Number and Value of Passenger Cars Stolen, by Motive.	CD-15
C-7	Percent of Motor Vehicles Recovered by Vehicle Type	CD-16

Tables for Appendix 1 (continued):

C-8	Range of Estimated Number and Value of Stolen Unrecovered Passenger Cars by Motivation for Theft in 1988	CD-19
E-1	Parts Marking Costs for High Theft Lines	E-04
F-1	Motor Vehicle Theft Cases Prosecuted by U. S. Attorney's Under Sections Enacted by 1984 Theft Act	F-06
F-2	Motor Vehicle Theft Cases Prosecuted by U. S. Attorney's Under Sections Enacted Prior to 1984 Theft Act	F-07
F-3	Thefts, Arrests and Convictions for Selected States	F-10
F-4	Penalties Distribution in Percent	F-12
F-5	Comparison of Maximum and Actual Penalties	F-22
G-1	Average Annual Payment for Theft Claims Current Model Year Vehicles	G-12
G-2	Theft Rates for Passenger Cars with Marked and Unmarked Parts	G-16
G-3	Expected Costs for Insured Vehicles by Theft Year and Relative Age of Vehicle.	G-20
G-4	Claim Costs of Current Model Year Cars by Recovery Condition Before and After Implement of the Marking Program	G-27
G-5	Index of change in Comprehensive Premiums between 1983 and 1988	G-32
H-1	Theft Classification and Maximum Penalties Among a Sample of States	H-03

Figures for Appendix 1:

A-1	How Information on Vehicle Thefts and Recoveries is Reported	A-6
B-1	Motor Vehicle Thefts	B-03
B-2	Motor Vehicle Thefts by Type	B-05
B-3	Theft Rates by Type of Motor Vehicles.	B-07
B-4	Theft Rates Marked and Unmarked Passenger Cars	B-14
B-5	Motor Vehicle Thefts and Recoveries	B-21
B-6	Motor Vehicle Recovery Rates	B-21
B-7	Theft Rates Sample of Passenger Cars Equipped with Antitheft Devices.	B-27
B-8	Recovered Stolen Passenger Cars Equipped with Antitheft Devices.	B-27
B-9	Age Effect on Theft Rates	B-29
B-10	Age Effect on Recovery Rates	B-29
F-1	Arrests for Motor Vehicle Theft.	F-03
F-2	Arrests per 1000 Motor Vehicle Thefts.	F-03
G-1	Average Payment for Theft Claims Current Model Year Vehicles	G-13
G-2	Theft Rates - Insurance Data Marked and Unmarked Passsenger Cars - Current Model Year.	G-18
G-3	Theft Rates - Insurance Data Marked and Unmarked Passsenger Cars - One Year Old Models	G-18
G-4	Distribution of Theft Claim Values Current Model Year 1988 Vehicles	G-24

INTRODUCTION TO APPENDIX 1

The 1984 Theft Act

The Motor Vehicle Theft Law Enforcement Act of 1984 (the Theft Act) amended the Motor Vehicle Information and Cost Savings Act (15 USC 1901) by adding a new Title VI. Title VI, entitled 'Theft Prevention,' is designed to reduce the incidence of motor vehicle thefts by facilitating the tracing and recovery of parts from stolen vehicles. Title VI requires the Secretary of Transportation to issue a standard which obligates manufacturers to inscribe or affix numbers or symbols on major parts of new high-theft passenger cars for identification purposes. The standard also applies to the replacements of such major parts. Manufacturers have the opportunity to request an exemption from the parts marking requirements if their high-theft car lines have standard equipment anti-theft devices which conform to certain criteria. The Act also includes enforcement provisions as well as reporting requirements by subject insurance companies, rental and leasing companies, and the Department of Transportation.

Under Section 614 of the Act, the Department is required to submit two reports to the Congress regarding motor vehicle theft. The first of these reports was issued in October 1987. This, is Appendix 1 to the second of the two reports being submitted as mandated, 5 years after the promulgation of the standards. The Secretary, in compliance with Title VI, issued 49 CFR Parts 541-542 by October 1985. 49 CFR Part 543 was issued in January 1986 covering the 1987 model year. Part 544 was issued in January 1987, and Part 543 - Final Rule was issued in September 1987. The standard became effective for 81 designated

high-theft car lines in Model Year 1987. For the 1988, 1989, and 1990 Model Years, 89, 96, and 103 car lines, respectively, were designated high-theft.

The Standards

Part 541, the Federal Motor Vehicle Theft Prevention Standard, requires each passenger car subject to the standard, to have its vehicle identification number (VIN) or an eight digit derivative, affixed or inscribed on each of the following parts: engine, transmission, fenders, hood, doors, bumpers, quarter panel, decklid, tailgate, and hatchback. Manufacturers can meet the affixation requirement with indelibly marked labels which cannot be removed without becoming torn or rendering the number on the label illegible. The labels must also leave a residual mark on the the part after they are unglued.

Five-Year Report to Congress

The Theft Act, in Sections 614(b)(2)(A)-(J) required that the Secretary include the following information in his 5 year report.

- "(A) information about the methods and procedures used by public and private entities for collecting, compiling and disseminating information concerning the theft and recovery of motor vehicles, including classes thereof, and about the reliability, accuracy, and timeliness of such information, and how such information can be improved;
- "(B) data on the number of motor vehicles stolen and recovered annually, compiled by the class of vehicle, model, make, and line for all such motor vehicles distributed for sale in interstate commerce;
- "(C) information on the extent to which motor vehicles stolen annually are dismantled to recover parts or are exported;
- "(D) a description of the market for such stolen parts;

- "(E) information concerning the costs to manufacturers, as well as to purchasers of passenger motor vehicles in complying with the standard promulgated under this title, as well as the identification of the beneficial impacts of the standard and the monetary value of any such impacts, and the extent to which such monetary value is greater than the costs;
- "(F) information concerning the experience of Federal, State, and local officials in making arrests and successfully prosecuting persons for violations of the provisions of law set forth in titles II and III of the Motor Vehicle Theft Law Enforcement Act of 1984, in preventing or reducing the number, and rate of, thefts of motor vehicles that are dismantled for parts subject to this title, and in preventing or reducing the availability of used parts that are stolen from motor vehicles subject to this title;
- "(G) information concerning the premiums charged by insurers of comprehensive insurance coverage of motor vehicles subject to this title, including an increase in such premiums charged because a motor vehicle is a likely candidate for theft, and the extent to which such insurers have reduced for the benefit of consumers such premiums as a result of this title or have foregone premium increases as a result of this title;
- "(H) information concerning the adequacy and effectiveness of Federal and State laws aimed at preventing the distribution and sale of used parts that have been removed from stolen motor vehicles and the adequacy of systems available to enforcement personnel for tracing parts to determine if they have been stolen from a motor vehicle;
- "(I) an assessment of whether the identification of parts of other classes of motor vehicles is likely to have (i) a beneficial impact in decreasing the rate of theft of such vehicles; (ii) improve the recovery rate of such vehicles; (iii) decrease the trafficking in stolen parts of such vehicles; (iv) stem the export and import of such stolen vehicles, parts, or components or (v) benefits which exceed the costs of such identification; and

- "(J) other pertinent and reliable information available to the Secretary concerning the impact, including the beneficial impact, of this title and titles II and III of the Motor Vehicle Theft Law Enforcement Act of 1984 on law enforcement, consumers, and manufacturers.

While all the information for Sections A through J are addressed, the report seeks to focus on national theft data in an attempt to provide a preliminary view of the effect of the Theft Prevention Standard.

Information Sources and Data

Information from many sources was used in the preparation of the report. Thus, the scope and accuracy of the data varied. Theft and criminal data were obtained from the Departments of Justice and Treasury, local law enforcement and administrative agencies, insurance companies, and private groups such as the National Automobile Theft Bureau; market data were obtained from retailers, trade associations, and the Department of Commerce; label costs from label and motor vehicle manufacturers; insurance data from insurance companies and trade associations; exposure data necessary for the determination of rates, from the Department of Transportation and the R. L. Polk Company.

Both quantitative and qualitative data are used in order to address all the concerns of Congress. Some of the data were estimated from samples of quantitative and qualitative data. Because data are not available to count thefts by their motives, analysis of the effectiveness of the Theft Act had to be made using data measuring only total thefts.

This Appendix is organized into Parts, each coincident with (A) through (I) of Section 614(b)(2) of the Act. References indicating supporting information sources are made in the text and shown as numbers enclosed in parentheses. A correspondingly numbered reference list is provided.

APPENDIX 1

PART A

PROCEDURES FOR COLLECTING, COMPILING AND DISSEMINATING INFORMATION ON THEFTS AND RECOVERIES

"[(A)] information about the methods and procedures used by public and private entities for collecting, compiling and disseminating information concerning the theft and recovery of motor vehicles, including classes thereof, and about the reliability, accuracy, and timeliness of such information, and how such information can be improved.

1984 Theft Act

This Part contains a review of private and public organizations that collect information on motor vehicle thefts, how they collect and use the data, and how accurate the data is. The institutions discussed serve a variety of users and supply information in different forms. For example, the Highway Loss Data Institute publishes statistics that rank various models according to how often they are stolen and how much the theft claims cost. They also maintain a computer file of theft claims reported by their participating insurers. The former is useful to consumers, the latter is useful to underwriters for analyzing insurance losses. This review focuses on sources and data that are most useful in defining the theft problem, the consequences of motor vehicle theft, and on sources that describe any change in the motor vehicle theft problem over time.

The organizations discussed in this Part collect theft and recovery information on all kinds of vehicles. The Five-Year Report concerns only some kinds, specifically, passenger cars, light trucks, vans, multipurpose passenger vehicles, heavy trucks and motorcycles. In order to determine the effectiveness of the parts marking standard mandated under the 1984 Act, data must provide some means for determining what type of vehicle is involved, and whether it is subject to the standard or exempt from the standard. The kinds of vehicles included in each data source are discussed, as well as the methods available for classifying vehicles according to their type.

The data collected by each source may include different kinds of theft crimes, including attempted thefts, theft of vehicle contents, or insurance fraud. The kinds of theft offenses included in each data source, and the methods for distinguishing among the types are provided. It should be remembered that while it may be possible to distinguish between theft of contents, and whole-vehicle theft, it is generally not possible to distinguish thefts motivated by profit from other thefts. Since the theft prevention standard focused on thefts for profit, there are inherent limitations in these data which cannot be classified into thefts for profit or other thefts.

How Motor Vehicle Thefts and Recoveries are Reported

The first report of a motor vehicle theft typically is received at a police department. Most police departments keep a count of the numbers of crimes reported, including motor vehicle thefts, and forward these tabulations to a state agency on a monthly basis. Unless the police make a record of the event, an incident will probably never be counted as a theft. These tabulations, gathered by most states from their local police departments, are forwarded to the FBI and become the basis for the Uniform Crime Report (UCR). The FBI maintains no information on individual crimes

with this system. UCR classifies the reported information according to the population density where the crimes occur, and in the case of motor vehicle thefts, according to the type of vehicle stolen (passenger car, trucks and buses, and other) [33].

If the vehicle is not recovered immediately, and the police are reasonably confident that the vehicle was stolen (not borrowed), the police department will likely enter the vehicle's identifying information (such as description, color and vehicle identification number) in the National Crime Information Center (NCIC), also operated by the FBI. The NCIC maintains a national register of vehicles that have been reported stolen [31]. Accepted entries will be available on a national basis very rapidly, usually within minutes. Other agencies use the information in order to investigate suspected crimes, or identify stolen vehicles. These agencies include the National Automobile Theft Bureau (NATB), Customs offices, and the FBI.

Investigators may check NCIC for an active record when they suspect that a vehicle is stolen. If the inquiry results in a 'hit', further investigation must be performed before the investigator takes action. The presence of an entry in NCIC is not sufficient grounds for arrest.

The vehicle owner, having filed the required police report for the automobile theft, may then file a comprehensive claim with their insurance company for loss due to theft. Insurance regulations differ from state to state, but typically, the insurer must pay the claim within 30 days. Most insurance companies file a theft claim report with the NATB, providing vehicle identifying information and particulars for the crime, including location, police agency and report number, and owner identification [21].

Participating insurance companies send their loss and damage claims data to the Highway Loss Data Institute (HLDI). HLDI analyzes the claims and publishes information that ranks models according to how often they are stolen and how much they cost to repair or replace [13]. More details on HLDI will be discussed later.

The National Automobile Theft Bureau is primarily a clearinghouse for information on motor vehicle thefts and is financially supported by the insurance industry. They also provide assistance to law enforcement agencies and information to consumers and other interested parties.

State Motor Vehicle Administrations (MVAs) also participate in identifying stolen vehicles, although procedures vary. MVAs receive information from law enforcement agencies, the NCIC network, and from the NATB. MVAs may also receive data from the NATB on salvaged vehicles. The information is used to identify suspicious salvage operations or cases of VIN switching.

MVAs also maintain information on vehicle recoveries including the owner's name and address, vehicle description, date, time and location of recovery, and condition of the vehicle. This information is forwarded to the registered owner, insurance company and registered lienholder. Not all MVAs perform all of these activities, and the amount of information collected and maintained varies. Most MVAs do not share recovery information with other agencies [8].

When a stolen vehicle is recovered, the law enforcement agency that filed the original report is responsible for clearing the NCIC entry, indicating that the vehicle is no longer missing [31]. The reporting agency must also notify the registered owner, insurer and registered lienholder.

If an arrest is made, the original reporting agency records a clearance for the crime report. The crime clearances are tabulated and reported monthly for use in UCR. The motive is not recorded, so it is not possible to distinguish thefts motivated by profit from those motivated by transportation needs, joyriding, etc.

In addition to the numbers of theft crimes and arrests, UCR collects some information on the value of property stolen and recovered. This information is not related directly to the crimes, except that it is tabulated by the same agency that reported the thefts [33].

Once an arrest is made and recorded as a crime clearance for UCR purposes, the records system based on police collected and reported information has completed its cycle. The flow of information among the various agencies is summarized in Figure A-1. Further information concerning the disposition of the arrest, conviction rates and sentencing is maintained by local court systems.

Data Systems by Organization

Several organizations that collect data useful for assessing the number of vehicle thefts in the United States have been identified. This Part discusses the methods used to collect, maintain, and distribute the information in these data systems. The Uniform Crime Reporting Section (UCR) and the National Crime Information Center (NCIC), both administered by the FBI, provide data on the number of vehicle thefts occurring by year. The National Automobile Theft Bureau (NATB) is a private agency supported by insurance companies that provides vehicle theft data to law enforcement agencies, participating insurance companies and the public. The Highway Loss Data Institute (HLDI), part of the Insurance Institute for Highway Safety, collects and disseminates data on theft insurance claims, and other claims data, gathered from insurance companies. These organizations collect data nationwide.

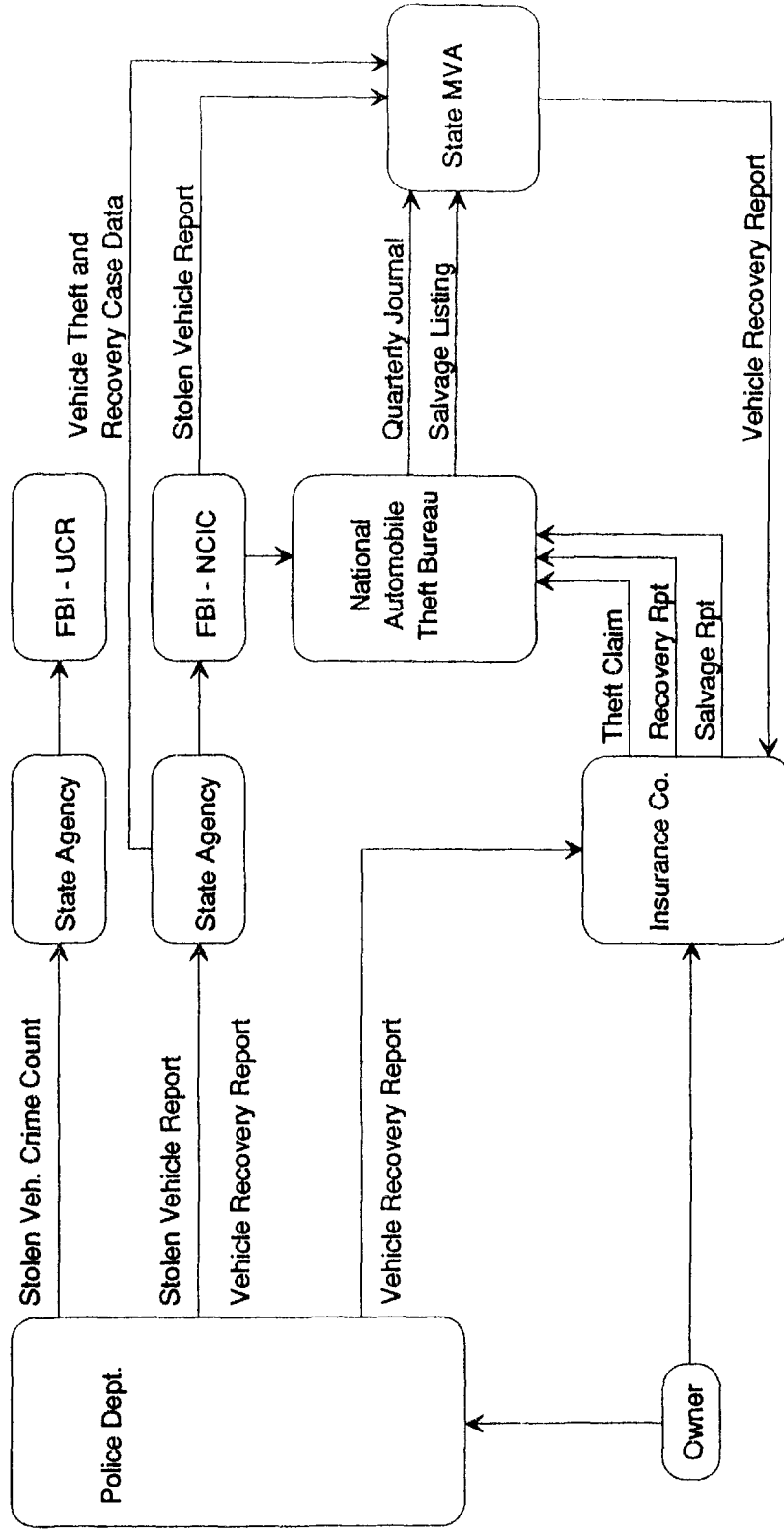
Uniform Crime Reporting Section (UCR)

The Uniform Crime Reports present tabulations of reported crimes in the United States, summarized according to the type of crime and the population density of the areas where they occur. The program's primary objective is to generate a reliable set of criminal statistics for use in law enforcement administration, operation, and management.

UCR reports provide a variety of analyses. They include, for example, data on trends for particular crimes, seasonal variations, number of

How Information on Vehicle Thefts and Recoveries is Reported

FIGURE A-1



offenses relative to other types of crimes, crime rates relative to population, and arrest trends. The UCR Section also collects and reports information on the number of law enforcement personnel, and officers killed and assaulted.

In addition to tabulating the number of crimes reported, UCR statistics provide other relevant information concerning the number of arrests and, (in the case of property crimes), the value and disposition of stolen property.

- o UCR reports the percentage of vehicle thefts by vehicle type (automobile, trucks and buses, and other). UCR does not provide a definition of these categories, and agencies may use their state or local definitions as they choose.
- o UCR summarizes offenses cleared by arrest. One arrest may clear numerous crimes and a single crime may result in several arrests. Independently, the UCR Section collects information on the number of arrests that take place by offense charged. These arrests cannot be correlated to the reported offenses.
- o A supplement to the monthly submissions reports the number of vehicles recovered by several location categories. UCR Section does not provide this information in the annual report.
- o The value of stolen and recovered property is reported, and is normally an estimate provided by the owner. By definition, the value of recovered property should reflect the condition of vehicles at the time they are recovered. This amount is not necessarily accurate. The condition of the vehicle, if found, is not reported.

About 16,000 local and state law enforcement agencies voluntarily contribute statistics on the numbers of crimes that have been reported to them. The UCR

program relies on monthly reports submitted by a central office in each of 41 states and by local jurisdictions in the other states. The FBI then tabulates the number of occurrences of various crime types called Crime Index offenses. The data reported by the states and local jurisdictions are simple counts by type, of the numbers of offenses and arrests that have occurred.

State reporting organizations must meet several UCR quality control requirements. These requirements are concerned with data uniformity, reporting timeliness, and an agency's capability to audit individual jurisdiction reports and institute quality control procedures. In addition to the quality control measures practiced by state reporting agencies, the FBI reviews and edits reports for completeness and consistency.

Data in states that do not meet these criteria or that elect not to participate on a centralized basis, are collected from individual jurisdictions. In the remaining 10+ states and territories that do not participate in centralized reporting, it is not known whether all jurisdictions report, however the FBI indicates they cover 97 percent of the national population. According to the FBI, estimates are computed for states that do not provide complete data. The estimates are derived by assigning the same proportional crime volumes from other similar areas within the state to nonreporting agencies. The 1988 UCR indicates that data are not reported for Florida or Kentucky. Estimates were developed by applying percentage changes in crime occurrences from other similar population groups in the same region [29].

The FBI produces the annual report, "Crime in the United States," [29] and publishes crime index trend releases throughout the year. They also produce special analyses for use by the FBI, and publish some of these results that are of particular interest to law enforcement. Volume, rate and trend are the basic crime indicators used by the program to report crime statistics. Volume is an indicator of the frequency of known criminal activity. Rates are indicators standardized by population. UCR provides rates for known offenses per 100,000 population, arrests per 100,000 inhabitants (independent of the number of crimes), and the percentage of known offenses cleared by arrest (clearances). Crime trends represent the percentage change in crime based on

data reported in a prior time period. UCR reports both volume trends and rate trends. Depending on the crime, UCR reports other indicators based on population at risk. For example, the motor vehicle theft rate is reported based on the number of thefts per 100,000 registered motor vehicles.

Law enforcement agencies may use these statistics for planning, budget formulation, resource allocation, performance assessment, and program evaluation. For the purpose of analyzing motor vehicle thefts, UCR statistics are very limited in their ability to define the population at risk. There is no method for determining the characteristics of motor vehicles stolen outside of a broad description of vehicle type. No information is maintained on vehicle age or model. Recovery information is collected independently of theft data.

The data is reported on a monthly basis when the crime occurs, and is therefore, a current indicator of thefts and arrests within the last 60 days or so. The FBI releases quarterly and semiannual summaries of trends in addition to their annual report, but does not provide a complete analysis more often than once a year.

The FBI plans call for a redesign of the UCR reporting system that would provide more data relative to each criminal incident and arrest [32]. This new incident-based reporting system will link information on clearances and property to the their associated reported incidents. For stolen vehicles, the number, description and value of stolen and recovered vehicles will be reported. This information will be linked to the crime report, as will the arrest (if any) information. The incident reports will also indicate whether the crime was an attempt or was completed. These improvements will provide more useful information in determining the frequency of automotive theft (by segregating attempts from completed actions). They will also provide information on vehicle recoveries not available with the current UCR system. Finally, the value of property stolen and recovered will be retrievable as part of the incident report, allowing some analyses of the costs of vehicle theft crimes that are not currently possible

At this time, and for the next several years however, the data reported by each state is a monthly tabulation of incidents occurring in that state. Specific details that would uniquely identify the crime, its motives and consequences are not available from the UCR system. Consequently, analysis that attempts to determine the effectiveness of theft deterrent systems in one set of vehicle models against another unprotected control group, is not feasible with this data source.

National Crime Information Center (NCIC)

The National Crime Information Center (NCIC) is a nationwide computerized information system established as a service to all criminal justice agencies -- local, state and Federal. The goal of NCIC is to help the criminal justice community perform its duties by providing and maintaining a computerized filing system of information readily available to as many agencies as possible. The system includes information on wanted persons, stolen property, criminal histories, information compiled in the course of investigation of crimes, and on certain individuals compiled in an effort to prevent or monitor possible criminal activity [31].

NCIC contains only current data on crimes under investigation. The program is a voluntary computerized communications system designed for rapid exchange of data between agencies. NCIC claims to serve about 23,000 agencies in the 50 states, US territories and Canada. The FBI could not provide information on how many jurisdictions do not participate or what percentage of all US jurisdictions report information to NCIC.

Information in the NCIC is organized into twelve files by type of information, e.g., wanted or missing persons, property, etc. Within each type there are different key elements that can be searched for. Motor vehicles, a kind of stolen property, are identified primarily by their Vehicle Identification Number (VIN), but may also be identified by registration information including the license plate [30]. NCIC does not analyze the relative contribution of motor vehicle thefts to all the crime activities reported.

NCIC collects motor vehicle theft data based on individual reported incidents that meet minimum reporting requirements. A report must have either an accurate, verifiable VIN or complete state registration information in order to be successfully entered by the reporting agency.

Thefts where the vehicle is recovered before NCIC is notified are not reported. Vehicles where insufficient data are available are likewise, not entered (e.g., missing VIN or registration, missing year or missing date of theft). NCIC allows the entry of stolen vehicle records with unknown VINs, but they are purged after 90 days unless a VIN is added subsequent to the initial report, or unless complete state registration data are entered.

The FBI maintains stolen motor vehicle reports in NCIC until they are at least four years old. Records that are older than four years are purged during the first few days of January. The FBI also retains records that are cleared or cancelled throughout the year, although they are not available on-line to law enforcement agencies. The FBI retains information for prior years on tape. Tapes containing 1984 through 1988 NCIC vehicle theft records including cancelled and cleared records were obtained for analysis presented in the next part of this report [20].

While the NCIC files indicate if and when a stolen vehicle is recovered, they do not show the vehicle condition. Furthermore, the data cannot be used to determine motive for the theft.

Stolen vehicle reports where subsequent investigation shows the report unfounded may be cancelled, cleared, or ignored by the reporting agency. The last possibility is unlikely, according to FBI sources. There is however, little meaning in the data element for clearance with respect to vehicle recovery vs. unfounded report. According to the FBI, cancelled and cleared have the same meaning -- the report has been resolved. They believe most cases that are cancelled or cleared are resolved by vehicle recovery. They feel that few unfounded reports are entered in the system to begin with, although they do not maintain statistics on these occurrences.

There is a related problem with NCIC data for some reports that are corrected after they are entered. Some agencies cancel or clear reports that contain inaccurate or incomplete data and then re-enter the report. This causes some duplication, and, for those cases where the VIN was incorrectly or incompletely entered, cannot be corrected by removing records with duplicate VINs. The procedure to re-enter incorrect records does not affect the mission of the NCIC, and therefore is not of critical importance in the FBI's quality control measures. This factor, and the potential for unfounded reports tend to inflate the number of reported thefts [38].

The data was found to be useful in studying the effect of the theft prevention standard. Some assumptions were made about the data that is contained in NCIC. It was not possible to determine the number of records affected by some factors that are inherent in the current NCIC system. These factors concern the methods used by agencies for correcting information that has already been entered and for clearing reports.

In the analysis for this report, records were removed that contained duplicate VINs and were reported within seven days of the original entry. Still, some vehicles may have been stolen more than once, yet only one entry appears in the modified database. Likewise, some stolen vehicle reports may be duplicate entries of the same crime. Procedures for analyzing the NCIC tapes for this study were more likely to eliminate records than retain duplicate records, and it was assumed that the data used contains no duplicate records for the same theft. An analysis of the tapes finds that 2 to 3 percent of the records have duplicate VINs. The percentage has been declining steadily over time since 1985 and NCIC may have improved compliance with reporting procedures.

The GAO states that about 93 percent of stolen vehicle reports that meet the NCIC requirements are entered into the data base. Overall, 89 percent of reported vehicle thefts were entered into NCIC. Those not entered included vehicles recovered before NCIC entry would normally occur, stolen vehicles where insufficient data were available (did not meet NCIC requirements) and reports that were not true vehicle thefts [38].

It was assumed that agencies enter accurate VINs, but not necessarily accurate model codes. Despite the VIN check digit program used by NCIC, not all records passed the routine used to decode the VINs for determining vehicle make, model, and model year. While no statistics are maintained on the number or percentage of records found to contain erroneous vehicle type, manufacturer, model or model year data, it is believed that the VIN is the only accurate indicator of these data elements in the NCIC.

If the theft involved only the contents of the vehicle, or involved an unsuccessful attempt, an NCIC stolen vehicle report would not be entered (although a stolen property or suspect entry could be made). Likewise, if the theft involved only vehicle parts but the vehicle was not taken, an NCIC vehicle theft record would not be entered [31]. Consequently, law enforcement agencies can match marked vehicle parts to stolen vehicle reports (by VIN) but cannot identify or match an unreported vehicle to stolen parts by using this file.

There are some requirements for quality control among the NCIC participants. These are administered by the State agencies. Some states may be more restrictive than the FBI requirements, and some states or agencies may have additional data requirements. The FBI does not maintain statistics on erroneously reported or unreported thefts, or on incorrectly reported thefts.

National Automobile Theft Bureau

The National Automobile Theft Bureau (NATB) was established in 1912 and is supported by over 600 insurance companies throughout the U.S. Among insurance companies and law enforcement agencies, they act as a clearinghouse of information related to motor vehicle thefts and stolen vehicles.

The NATB:

- o provides assistance in investigating cases involving stolen vehicles, arson and insurance fraud,
- o collects theft claim and vehicle salvage data from insurers,
- o offers training programs to law enforcement and insurance personnel,
- o provides public education services,
- o acts as an agent to some states for mandated reporting of vehicle salvage information,
- o and acts as an agent to insurers for mandated reporting of theft and recovery information to the Secretary of Transportation.

Their data collection activities include insurer reports of motor vehicle thefts, recoveries, and salvage operations. The organization works with local law enforcement agencies and insurers to identify vehicles and investigate cases involving stolen vehicles and insurance fraud. NATB matches the vehicle identification information from salvage and theft reports to their data base, and looks for instances where a vehicle theft has been claimed from more than one insurer. They also look for cases where a salvaged vehicle has been reported stolen. These cases may involve a stolen vehicle that has had its identification plate and frame switched with a salvage vehicle, and then has been retitled. There are also cases where the theft claim is for an amount substantially more than the value of the vehicle, indicating a junked vehicle is being claimed as though it were fully repaired [21].

As a consequence of the Motor Vehicle Theft Law Enforcement Act of 1984, subject insurance companies and rental and leasing companies with 20 or more motor vehicles that are self-insured are required to report information concerning the number of vehicle thefts, and the number and condition of recovered vehicles. Other insurers and self-insured businesses with less than 20 vehicles are exempted from the requirements. A majority of the subject insurance companies have designated NATB as their agent to file required reports. These reports contain information on reported theft claims, theft

recoveries, vehicle condition upon recovery, and claims amounts [35]. The NATB database contains only thefts reported by member insurance companies, about 28% of reported thefts nationally.

In a 1985 review, the General Accounting Office found that about 85 percent of cases that should have been entered into the NATB database were entered [38]. Since the GAO study was completed, NATB has changed their procedures to require insurance companies to report all thefts, regardless of their recovery date or condition. As a consequence of these changes, the NATB database can be expected to contain a greater percentage of theft reports filed with member insurance companies.

The GAO study found that the NATB database is about as accurate as NCIC in recording VINs and that the procedures used to verify VINs work well for 1981 and newer model vehicles. GAO also found that the vehicle year was accurate for 99 percent of cases examined and the date of theft was accurate about for 90 percent of the cases [38].

NATB computer operators review and enter data that trace vehicles from the manufacturer through to the owner. Operators can detect and correct inaccurate information using the system's on-line edits. NATB does not perform any audits of reported data.

Highway Loss Data Institute

The Highway Loss Data Institute (HLDI) is a nonprofit, public service organization that gathers, processes, and publishes insurance data concerned with human and economic losses resulting from owning and operating motor vehicles -- especially concerning the ways such losses vary among different kinds of vehicles. HLDI collects insurance claims data from about thirteen insurance companies that participate in HLDI programs. HLDI is part of the Insurance Institute for Highway Safety, an organization funded by insurance companies and dedicated to reducing the losses -- deaths, injuries and property damage -- resulting from crashes on the nation's highways.

In May 1989, HLDI published the "Insurance Theft Report," a description of variations in both the frequency and size of insurance theft losses involving 1986, 1987 and 1988 model year passenger vehicles, vans, pickups, and utility vehicles [13]. The institute has published similar reports in prior years, However, they do not pertain to any model years later than 1984, and therefore, were not directly comparable to the data received from other sources used in this study [12].

The report describes the theft loss experience for comprehensive coverage claims supplied by these thirteen large insurers. The results comprise losses including theft of items from the vehicle and theft of the vehicle itself. There are exceptions however; certain electronic items such as CB radios, tape players, etc., are not included under this type of coverage, so thefts involving only the removal or loss of these items would not be reported. Damage resulting from an attempt to steal a vehicle however, would be reported as long as the deductible amount was smaller than the claim amount.

The report presents findings on the average loss payments and claim frequencies for various models and types of vehicles. The results are standardized to minimize differences that might be attributed to variations in the mix of deductible amounts and operator age groups among different vehicles, according to HLDI. The institute claims that variations occur in both the frequency and average size of insurance theft losses due to the age group of the operators, but they do not describe these differences. All results are presented in relative terms, (100 represents the average of all passenger vehicles in a model year); the raw data is not presented for further analysis.

The HLDI summary also reports some model series at a level of detail not produced in other data sources. For example, Corvette and Corvette Convertible models are reported separately. As expected, the claims experience of the two series are different. However, since the data are

reported in relative terms, it is not possible to combine separate model entries and make a comparison to data in NCIC or to registration or production reports filed with the DOT.

As HLDI points out in their summary, models with low average loss payments per theft claim relative to other models may have a large number of incidents involving theft of components -- particularly radios. For example, in 1986 and 1987, the Volkswagen GTI had the highest reported theft claim frequency, but an average payment per claim substantially less than the average for all passenger vehicles.

Despite the limitations in comparing the data to other sources and the restrictions in defining exposure (e.g., vehicles must be covered by comprehensive insurance through one of thirteen insurance companies in order to be represented in the study), the HLDI "Insurance Theft Report" provides some clear insight into the nature of theft losses, and confirms some observations found in other data sources.

HLDI supplied raw claims data for another related contract in support of this study. In addition to claims for loss occurring from whole vehicle theft and claims for damage occurring from theft attempts, the HLDI data includes indistinguishable claims for the theft of vehicle contents. HLDI staff stated that there was no methodology for determining claims involving whole vehicles, components of vehicles, or vehicle contents. It is not possible therefore, to correlate the claims data received by HLDI to either the NCIC data base, which contains only whole vehicle thefts, or to the UCR system, which contains only thefts or attempted thefts of whole vehicles. There is no indication in the HLDI data that could be used to determine theft motive.

Survey of State and Local Organizations

In 1989, a survey of local law enforcement officers and state Motor Vehicle Administration officials was conducted for this report [8]. These officials reported that they maintain information on motor vehicle thefts and recoveries

in varying detail. With few exceptions, they did not report any changes in their methods during the 1983 to 1988 time period. The exceptions included offices that started using local stolen vehicle data bases and agencies that added more information on the theft report.

The basic information collected by law enforcement officials for motor vehicle thefts and recoveries is standard throughout most agencies. Theft information includes the owner's name and address, description of the vehicle, license information, Vehicle Identification Number, date and location of theft, suspect information and case identification. Recovery information includes date, time and location of recovery in addition to the items on the theft report. Nearly all of the officers surveyed reported no change in the content of information collected.

The survey found that about 60 percent of the officers maintain a local stolen vehicle database used to collect information before forwarding it to the State Crime Information Center. Almost 20 percent implemented an office database in the last two years. Nearly one quarter of law enforcement agencies manually record specific information, such as date and location of theft, victim's name and address, description of the vehicle, into a ledger or log. Recovery information is recorded on a report designed for motor vehicle thefts for about one quarter of those surveyed. The remainder use narrative descriptions on either a supplement or on a standard incident/offense report used to report all crimes.

In those jurisdictions that maintain motor vehicle theft data independently of NCIC or state files, their locally maintained data may be used to determine high theft areas, or patterns that may indicate criminal activity such as dismantling or export of stolen vehicles. Nearly one quarter of those surveyed distribute a crime pattern bulletin to an auto theft unit. These reports show trends related to location, date and time of thefts or recoveries within a specific geographical area. Three local law enforcement databases were used as part of this study because they contained information on the condition of recovered vehicles.

Other internal reports of vehicle theft and recovery information include, a bulletin or Hot Sheet, an auto theft report, and UCR statistics summaries. Hot Sheets listing vehicles stolen within 24 hours, one week or one month are produced by one third of the respondents. An auto theft report listing cases within the auto theft unit and showing whether the case was cleared by arrest are produced by 15 percent of the respondents. UCR statistics compiled by law enforcement agencies include monthly statistics from UCR reports (used by 70 percent of those surveyed) and comparative monthly UCR statistics showing current data and previous years (used by 20 percent of respondents). Ten percent of surveyed agencies have no form of internal reporting.

Law enforcement agencies share information with other local, State and Federal agencies in several ways. Almost all of the officers surveyed contact NCIC and state law enforcement agencies via on-line computer. Half of the officers contact other agencies via radio, telephone and teletype, and through informal meetings held monthly or quarterly. Almost 20 percent share Hot Sheets and daily bulletins.

Motor Vehicle Administration officials do not collect their own data as much as they use data from other sources. These officials are concerned primarily with registration and licensing procedures and methods for deterring the registration of stolen vehicles. These issues concern only a portion of motor vehicles stolen. None of the respondents reported any changes in the information collected or reported during 1987-1988.

MVA officials use the information in several ways. NATB data is used to classify high theft automobiles, identify possible VIN switches and target cars prone to chop shop activity by over 35 percent of the respondents. NATB salvage information is used to identify possible stolen vehicles, or candidates for vehicle inspection by another 35 percent. Data is compiled for UCR purposes by state MVA headquarters in nearly 40 percent of the survey responses. Over 10 percent of the survey responses indicate an increase in effort to report raw vehicle recovery information to state MVA headquarters.

The American Association of Motor Vehicle Administrators (AAMVA) formed a Theft Subcommittee in 1986 to explore methods for reducing the vehicle theft problem. The goals set by the committee were to provide information to motor vehicle administrators on current trends, and to develop some guidelines for uniform legislation and regulations concerning vehicle documents. As part of their mission, they conducted a survey of state and provincial police departments and motor vehicle administrations [3].

The survey covered a variety of topics concerning enforcement issues including the numbers of reported thefts and some questions on reasons for thefts; whether businesses could be inspected for stolen property; whether vehicle inspections were required and under what conditions. Information collected included the number of reported thefts, value of property stolen and recovered, and the number cleared by arrest. Review of the AAMVA information shows about 23,000 theft reports for 1987, which reflects about 2 percent of reported thefts. The source of the reported information appears to be UCR reports.

Agencies responding to the AAMVA survey recommended that the Canadian Police Information Center (CPIC) and the NCIC files be merged for the purpose of checking stolen vehicles. Based on the responses to their survey, AAMVA also recommended that each MVA office check all VINS through NCIC stolen vehicle file prior to issuing a title. Finally, AAMVA recommended that a uniform titling system and file format be adopted by all jurisdictions.

SUMMARY: PROCEDURES FOR COLLECTING, COMPILING AND DISSEMINATING INFORMATION ON THEFTS AND RECOVERIES

The primary national repositories of motor vehicle theft information are: The Uniform Crime Reports, the National Crime Information Center, the National Automobile Theft Bureau, and the Highway Loss Data Institute. Each has a different mission, so the information they collect and disseminate takes on different characteristics that affect the timeliness, accuracy and reliability of the data as well as what data are actually collected. For their stated mission, each organization has developed a system that seems to adequately serve their purposes.

For purposes of measuring the effects of theft prevention measures, the NCIC data appears to offer the greatest amount of data with adequate detail. To assess the overall severity of the problem, UCR appears to offer the most accurate data, but with little detail. For purposes of measuring insurance claims costs associated with thefts, HLDI appears to offer the most complete data, but with some limitations that affect the reliability of the data. NATB can be used to cross-check and verify HLDI data (or NCIC data), based on the vehicle's identification number. These sources of theft data are summarized in Table A-1.

While these sources provide substantial information on the numbers of thefts occurring and the costs associated with automobile theft, they do not provide a means for determining the motives for theft. Since the theft prevention standard was designed to affect thefts motivated by profit, including chop-shop, export and fraud, directly measuring changes in thefts for this subset of crimes is not possible. Some conclusions may be inferred from data indicating recovery condition, but analysis of changes in theft rates will also measure changes in other motives including joyriding and transportation. Consequently, a change in theft rates over a period of years may be caused by an intervention such as the theft prevention standard and/or may be caused by other factors such as a decrease in the number of males between the ages of 15 and 20. It is not possible to isolate these factors in the theft data, nor to assess their interaction.

Table A-1
Summary of National Systems for
Compiling and Disseminating Information Concerning the
Theft and Recovery of Motor Vehicles

System and Agency:

Uniform Crime Reports

FBI

- Purpose: To generate reliable criminal statistics for use in law enforcement administration, operation, and management.
- Source of Data: Participating state and local law enforcement agencies.
- Contents: National tabulations on the numbers of crimes by type of offense. Tabulations on the numbers of arrests.
- Organization: Data is categorized according to the population density where the crimes occur. Arrests are counted independently according to type of offense. Vehicle thefts are categorized by type of vehicle; passenger car, trucks and buses, and other.
- Frequency: Data is compiled monthly. Complete tabulations are reported annually with semiannual updates.

National Crime Information Center

FBI

- Purpose: Provide a computerized filing system of information and communications designed for rapid exchange of data between agencies to aid criminal justice community.
- Source of Data: Participating Federal, regional, state and local law enforcement agencies.
- Contents: Register of currently stolen motor vehicles, vehicle identification and registration data, location, date and time of theft. Data is purged after four years.
- Organization: Data is indexed according to vehicle identification (VIN or registration). Recovery data is available on tape.
- Frequency: Data is submitted as thefts are reported and is available within minutes. Data is copied to tape annually.

Table A-1 Continued
 Summary of National Systems for
 Compiling and Disseminating Information Concerning the
 Theft and Recovery of Motor Vehicles

**North American Theft Information System
 NATB**

Purpose: Identify and locate stolen vehicles, and detect fraud.

Source of Data: Approximately 660 property-casualty insurers.

Contents: Insurance claims data for stolen motor vehicles, recovery data including location, date and condition, and salvage sales data.

Organization: Several files organized by vehicle identification, owner identification, and insurer identification.

Frequency: Information is generally reported to NATB within days, and is available within minutes through computerized communications.

**Highway Loss Data Institute
 Insurance Institute for Highway Safety**

Purpose: Gather, process and publish information concerning the losses that result from owning and operating various motor vehicles.

Source of Data: Thirteen large automotive insurance companies.

Contents: Insurance claim payment data for motor vehicle theft claims, including theft of contents. Other claims for comprehensive, collision and liability are also collected.

Organization: Claim payment amounts according to cause of loss, vehicle make and model, and driver/owner demographics.

Frequency: Data is available annually, and the Institute publishes reports periodically on a variety of subjects.

Although insurance claims data provides a more direct measure of consequences, at least in terms of cost, of the theft problem, there are only limited data that indicate motive. Claims costs are also affected by a variety of factors, e.g., the recovery rate, average time before recovery, cost of repairs, and deductible amounts. Insurance claims data that indicates recovery condition are not available except for 1986-1988. This is a very short time in which to determine trends. Finally, the information on recovered cars is not likely to be comparable to unrecovered cars. Vehicles that are not recovered probably represent a much higher percentage of theft crimes motivated by profit. They also represent a larger proportion of the monetary losses.

At the state or local level, information related to motor vehicle theft is maintained in varying detail. Most states maintain systems that collect NCIC and UCR information from law enforcement agencies. This information may be augmented and can be used by the motor vehicle administration as well as law enforcement agencies. Many local law enforcement agencies maintain computerized information systems to collect information and forward it to the state. Some of these systems contain more detailed information than the nationwide systems.

In those jurisdictions that maintain motor vehicle theft data independently of NCIC or state files, the local data may be used to determine high theft areas, or patterns that indicate criminal activity such as dismantling or export of stolen vehicles. Some agencies prepare reports that show trends related to location, date and time of thefts or recoveries within a specific geographical area. Other internal reports of vehicle theft and recovery information include a bulletin or Hot Sheet, an auto theft report, and UCR statistics summaries.

Motor Vehicle Administration officials do not collect their own data as much as they use data from other sources. MVA officials use theft information in several ways. NATB data is used to classify high theft automobiles, identify possible VIN switches and target cars prone to chop shop activity. NATB

salvage information is used to identify possible stolen vehicles, or candidates for vehicle inspection. Three fourths of the MVA officials surveyed do not practice information sharing techniques other than through participation in NATB, NCIC and UCR reporting procedures.

APPENDIX 1

PART B

Motor Vehicle Thefts, Recoveries and the Impact of Parts Marking

"(B) data on the number of motor vehicles stolen and recovered annually, compiled by the class of vehicle, model, make and line for all such motor vehicles distributed for sale in interstate commerce;

1984 Theft Act

Since the early nineteen eighties, motor vehicle thefts have risen substantially. The increases have generally outdistanced motor vehicle registrations so that theft rates - the number of thefts per 100,000 registrations - are on an upward trend. In this Part, motor vehicle thefts, theft rates, and motor vehicle recovery data are presented. Since the 1984 Theft Act is designed to reduce motor vehicle thefts and facilitate the recovery of parts from stolen "high theft" car lines, the analysis showing the effects of parts marking in this Part is the key objective. Motives for stealing cars in high theft lines may differ from those leading to thefts in low theft lines. As a result of this, available theft data, which are not broken down by motives provides an imperfect basis on which to draw conclusions on the effectiveness of the Theft Act. This is true because the marking required by the Act is far more likely to affect thefts for profit than other types of theft. Nevertheless national theft data, which do not show motive, are the only source of data available for year to year analysis. Data are shown separately for passenger cars, light trucks (including vans and multipurpose vehicles), heavy trucks and motorcycles.

The primary data source is the theft and recovery registry maintained by the FBI's National Crime Information Center (NCIC) which yielded over 5 million theft and recovery records for the years 1984 through 1988.

Each record contains information on the make, line, theft and recovery date of stolen motor vehicles - all necessary to perform the analyses. The yearly totals do, however, differ from the statistics published in the Uniform Crime Report (UCR) also prepared by the FBI. The latter includes attempted thefts and vehicle types such as motor scooters, that could not be extracted from the totals. A plot of thefts from both sources is shown in Figure B-1.

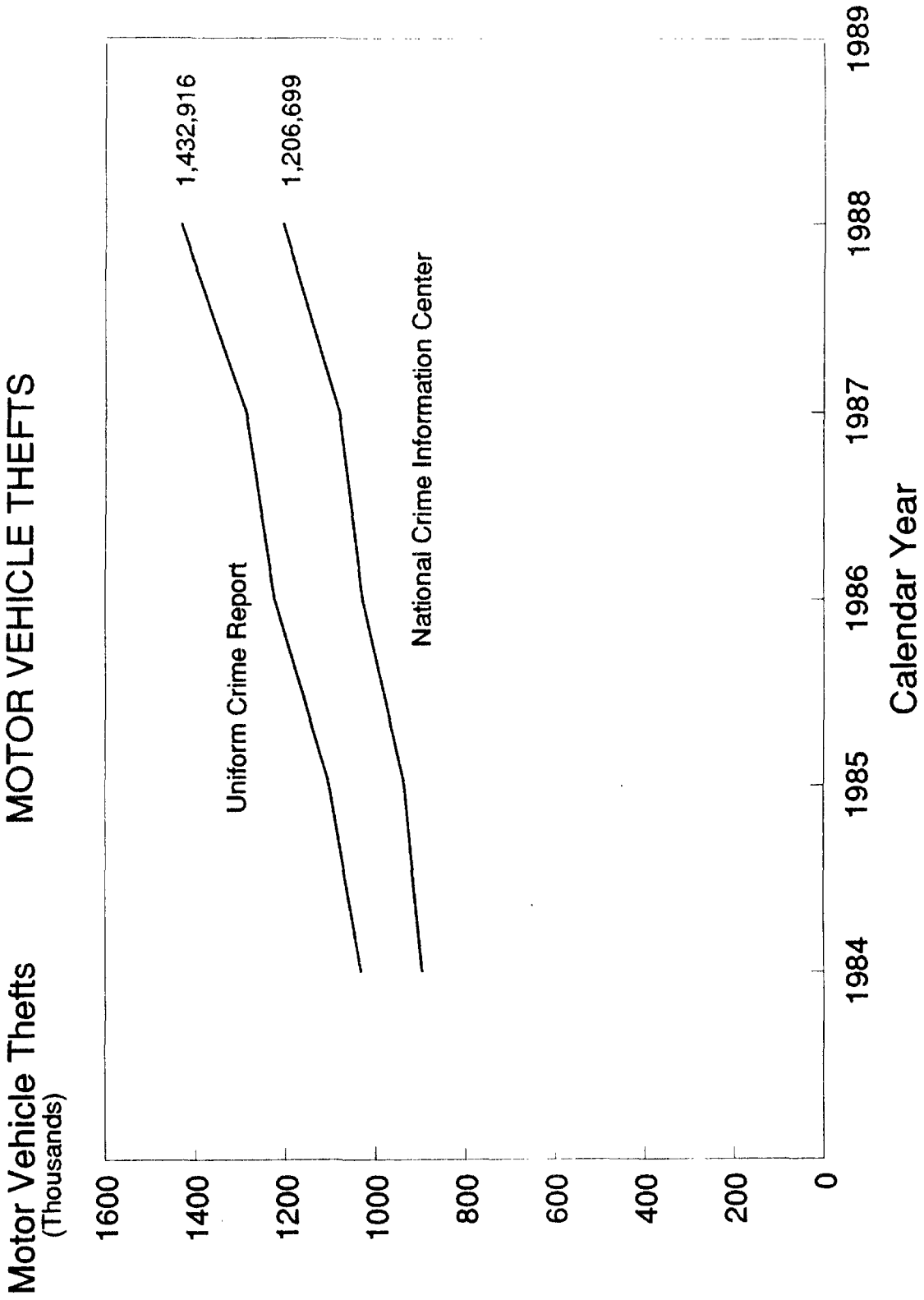
UCR and NCIC data gathering and reporting have already been described in Part A, therefore no further description of the primary data is presented here, except to point out that, while the absolute number for NCIC thefts are 15 percent lower than the UCR reports, their trends are essentially the same.

Vehicle registrations were obtained from two sources -- the Federal Highway Administration (FHWA) [37], and the R. L. Polk Company (Polk) [24]. FHWA data includes registrations for vehicle types not found in R. L. Polk, but are not broken down by make and line. Data from Polk's state files are more detailed and can be individually matched using the VIN:

Polk compiles data sometime in mid-calendar year for the then still running model year (approximately 9 months). Consequently, registrations for current model year vehicles are under-reported. For example, the registrations collected for 1988 represent less than the full model year of 1988. While this primarily affects the most current model year (CMY), it yields theft rates which are unrealistically high for that year: a complete year's worth of thefts divided by less than a year's worth of registrations. This problem does not affect a comparative analysis of two data sets since each series has the same CMY pattern.

Annual FHWA registration data represent totals for each type of vehicle and can be used to calculate theft rates for each vehicle type, including passenger cars, but cannot be used to separate marked, unmarked and anti-theft-device equipped passenger cars. The FHWA registration data for the most current year include estimates to represent the full calendar year.

FIGURE B-1
MOTOR VEHICLE THEFTS



Sources: Federal Bureau of Investigation
Uniform Crime Report, National Crime Information Center

Thefts and Theft Rates

In 1988, over 1.2 million motor vehicles were stolen, and 932,000 were recovered by the end of that year. Put another way, for every 100,000 motor vehicles registered, 644 were stolen in 1988. The statistics were provided in tape format by the National Crime Information Center (NCIC) and cover the calendar years 1984 through 1988.

Total Annual Thefts by Type

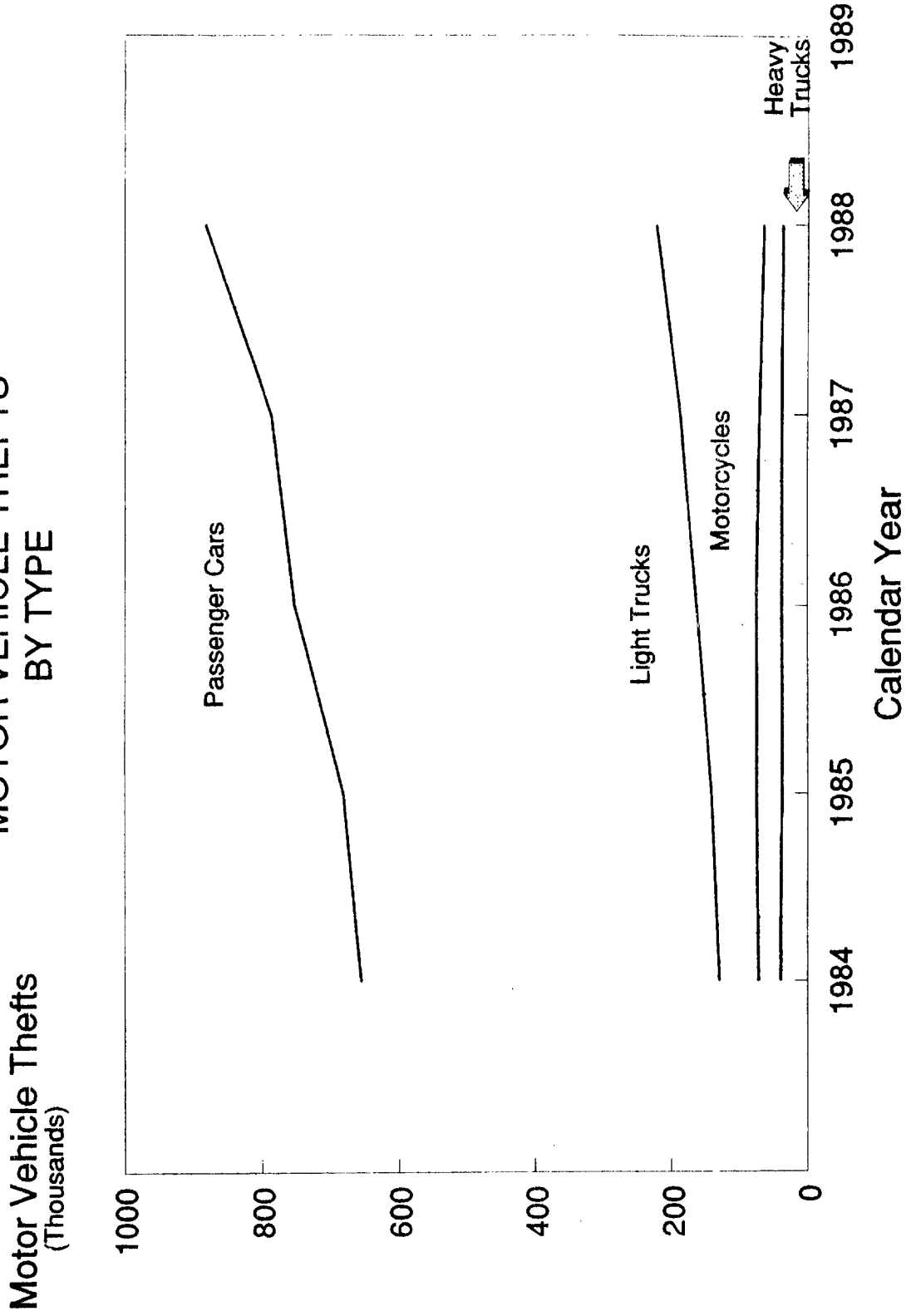
The number of motor vehicle thefts by type are shown in Table B-1. Figure B-2 illustrates the magnitude and trend of these thefts.

TABLE B-1
MOTOR VEHICLE THEFTS

<u>Motor Vehicle Type</u>	<u>Calendar Year in Which Thefts Took Place</u>				
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Passenger Cars	655,225	681,507	752,690	786,641	882,676
Light Trucks, Vans, Multi- Purpose Vehicles	129,475	141,326	162,889	186,577	222,273
Motorcycles	72,030	75,356	75,414	70,746	64,801
Heavy Trucks and Buses	39,651	37,753	37,649	37,671	36,949
TOTAL	896,381	935,942	1,028,642	1,081,635	1,206,699

Source: Federal Bureau of Investigation
National Crime Information Center

FIGURE B-2
MOTOR VEHICLE THEFTS
BY TYPE



Sources: Federal Bureau Of Investigation
National Crime Information Center

The increasing number of thefts partially reflects the increasing number of registered vehicles on the road, except for motorcycles which have been declining in number in recent years. The main theft problem is obviously with passenger cars, but light truck thefts have also been on the increase.

A better view of the theft problem is provided by analyzing the rate of motor vehicle thefts and its trend for each of the motor vehicle types.

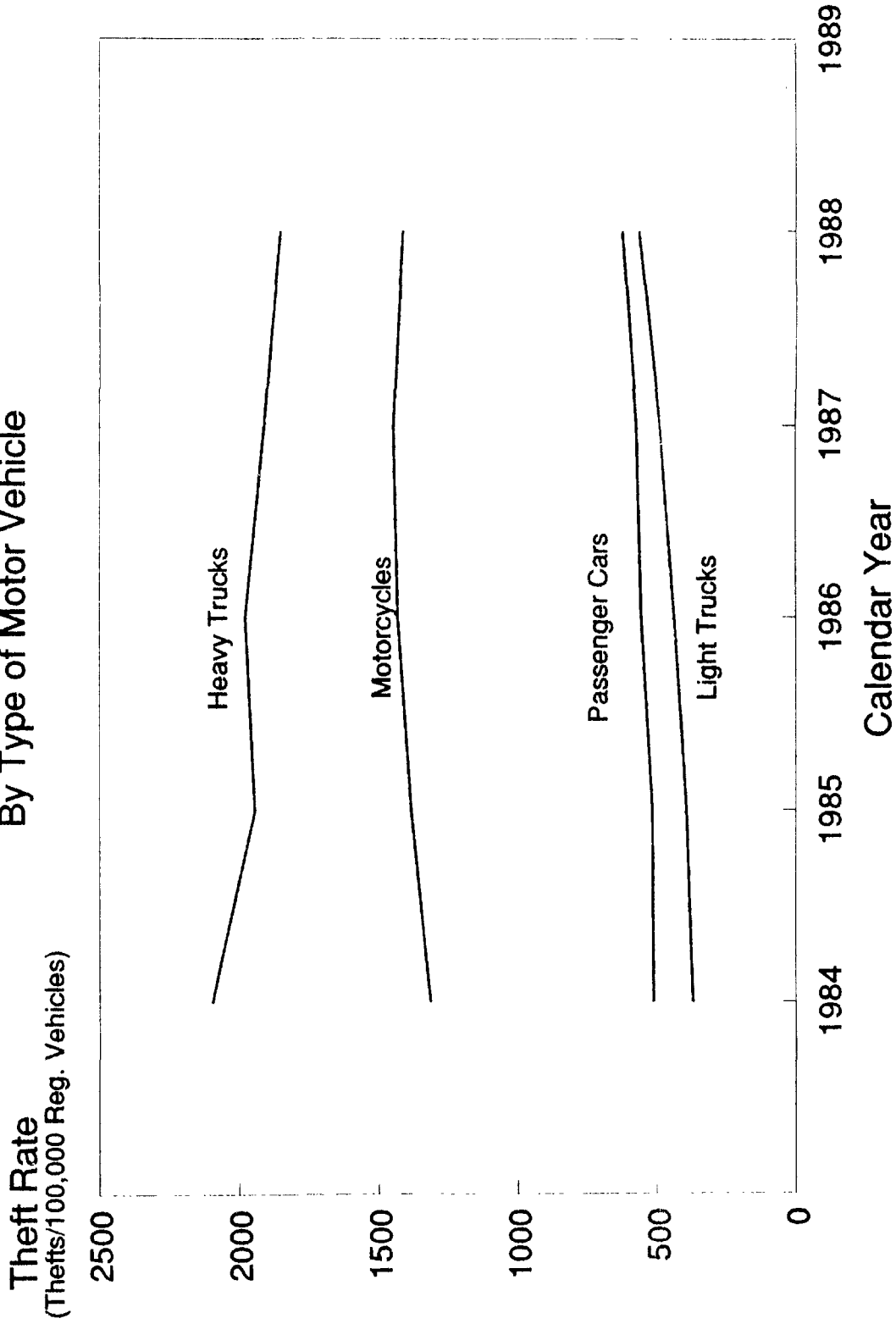
Theft Rates by Type of Motor Vehicle

Theft rates – the number of thefts per 100,000 registrations – provide a view of the theft problem that is not overshadowed by annual changes in the number of registered vehicles. The Federal Highway Administration (FHWA) collects annual vehicle registration data from the States and presents the data in a uniform manner to show registrations on a calendar year basis for automobiles, buses, trucks, and motorcycles. The truck category includes light trucks. Some states provide separate light truck data and the Federal Highway Administration uses other data sources to provide separate estimates of light truck registrations, which generally include vehicles of 10,000 pounds or less gross vehicle weight.

The R. L. Polk registration data does not include heavy truck and motorcycle registrations. All the theft rates shown in Table B-2 are based on FHWA registration data to assure uniformity for comparison purposes.

Figure B-3, illustrates theft rates by vehicle type which take on a decidedly different form when compared to motor vehicle thefts. In contrast to thefts, theft rates by vehicle type show both heavy trucks and motorcycles with the highest rates, although the heavy truck theft rate seems to have declined since 1984.

FIGURE B-3
THEFT RATES
By Type of Motor Vehicle



Sources: Federal Bureau of Investigation, Federal National Crime Information Center, Highway Administration

Both passenger cars and light trucks (and Vans, MPV's) show a steady rise in theft rates over the five year period. While light truck theft rates are below those of passenger cars, they have been increasing somewhat more

Table B-2
Motor Vehicle Theft Rates
by Type

<u>Motor Vehicle Type</u>	<u>The Number of Vehicles Stolen for Every 100,000 Vehicles Registered</u>				
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Passenger Cars	512	516	556	573	625
Light Trucks, Vans, MPVs	370	393	438	489	564
Motorcycles	1,314	1,384	1,433	1,448	1,414
Heavy Trucks and Buses	2,097	1,945	1,980	1,913	1,853

Sources: Thefts - Federal Bureau of Investigation,
National Crime Information Center
Registrations - Federal Highway Administration,
"Highway Statistics"

rapidly. As light trucks, vans and multi-purpose vehicles are used more and more frequently for passenger transportation, and are equipped with power steering, air conditioning, and other options, their theft rate will very likely approach that of passenger cars.

The Effect of Parts Marking

According to survey results (presented in APPENDIX 1, Part C-D), between 23 and 71 percent of motor vehicles are stolen for profit. Between 10 and 16 percent are stolen for chop-shop operations. Vehicles stolen for insurance fraud or export purposes may also end up in chop shops. In addition, vehicles are stolen for "retagging". Thefts for profit are the target of the parts marking standard.

The data on thefts and recoveries of passenger cars was analyzed to determine if there are any changes since the standard took effect. The theft and recovery data do not indicate the motive for the crime. So any changes observed in the statistics can not be directly related to any particular motive. However, it was hypothesized that a substantial change in the theft rate for cars with marked parts relative to unmarked cars would most likely indicate that parts marking was a successful deterrent for those thefts motivated by profit.

Recognizing that a variety of social and demographic factors, for example a change in the number of males between the ages of 15 and 20, or a change in the supply or demand for automotive parts (either sheet metal or seats and radios), would affect theft rates, it is not possible to attribute changes in theft rates according to theft motives. It is possible, therefore, that a small change in theft rates is actually the product of a large reduction in theft crimes motivated by profit, but cancelled by a large increase in another factor (such as theft crimes related to drug trafficking) or vice versa.

While a statistically significant change in theft rates for marked cars compared to unmarked cars might be indicative of a successful intervention, a non-significant result would not be a conclusive finding.

Since the Theft Prevention Standard went into effect beginning with 1987 model year cars, and since the most recent data are for 1988, the comparative analyses are limited to current and one year old models for the years 1984 through 1988. Comparisons of theft rates between cars with marked parts and their predecessors are made with unmarked cars and their predecessors.

The 1987 and 1988 car lines were grouped according to the requirements of the Theft Prevention Standard [35], into those: required to have marked parts; exempted because they have antitheft devices; and those not subject to the standard (without marked parts). The 1984-1986 car lines were grouped in the same manner and are referred to as predecessors. Theft and recovery data for these groups are the basis for analysis. The data by model, make and line for passenger cars and other vehicle types are available in various tape or disk formats [20].

Thefts of Marked and Unmarked Cars

In 1987, the first year in which the parts marking standard was in effect, 21,347 marked cars were stolen. By the end of 1988 such thefts amounted to 71,928 passenger cars. Table B-3 shows the number of new (current year) and one year old cars that were stolen during each calendar year, from 1984 through 1988.

Fewer high theft (marked) cars were stolen in 1987 and 1988 compared to prior years in contrast to the experience of unmarked cars. A clearer view of this difference will be gained when analyzing theft rates - which are covered in the next section.

Table B-3
Stolen Passenger Cars
With Marked Parts, and With Unmarked Parts

	<u>Calendar Years in Which Cars Were Stolen</u>				
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Cars with Marked Parts					
Current Yr Models	31,261	28,047	30,178	21,347*	23,364*
One Yr Old Models	26,977	37,072	36,223	35,838	27,217*
Unmarked Cars					
Current Yr Models	16,625	19,072	23,209	27,148	32,037
One Yr Old Models	13,777	20,212	25,239	28,613	36,706

* Stolen cars with marked parts; stolen cars for other years are predecessors.

Source: Federal Bureau of Investigation
National Crime Information Center.

Theft Rates of Marked and Unmarked Cars

Identification of the specific cars that have marked parts, antitheft devices, and their respective predecessors, requires data that include VIN (Vehicle Identification Number). The NCIC theft cases contain the VIN for each stolen vehicle. Registrations are extracted by matching VINS from the NCIC cases with the R. L. Polk data.

As was mentioned previously, theft rates for current year models using NCIC thefts and R.L. Polk registrations will be unrealistically high because the denominator is based on nine months worth of registrations of current model year cars. However, current model year (CMY) theft rates in one calendar year can be compared with current model year theft rates in another calendar year.

For one year old cars, both the number of stolen cars from the NCIC and the number of registered cars from R. L. Polk & Co. include the entire model year (e.g., all 1987 models stolen in 1988, and all 1987 models registered by midyear 1988).

Theft rates (the number of thefts divided by the number of registrations) for current and one year old model passenger cars grouped by those with marked parts and those that are unmarked and their respective predecessors in 1984 - 1986, are shown in Table B-4.

Table B-4
Theft Rates for Passenger Cars
With Marked Parts and Unmarked Parts
(Thefts per 100,000 Registered Vehicles)

	<u>Calendar Year in Which Cars Were Stolen</u>				
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Cars With Marked Parts					
Current Yr. Models	1,109	1,147	1,224	1,211*	1,098*
One Yr. Old Models	851	873	918	911	1,017*
Unmarked Cars					
Current Yr. Models	484	516	588	647	752
One Yr. Old Models	358	371	436	478	601

* Stolen cars with marked parts; stolen cars for other years are predecessors.

Source: Federal Bureau of Investigation
National Crime Information Center and R. L. Polk & Co. data.

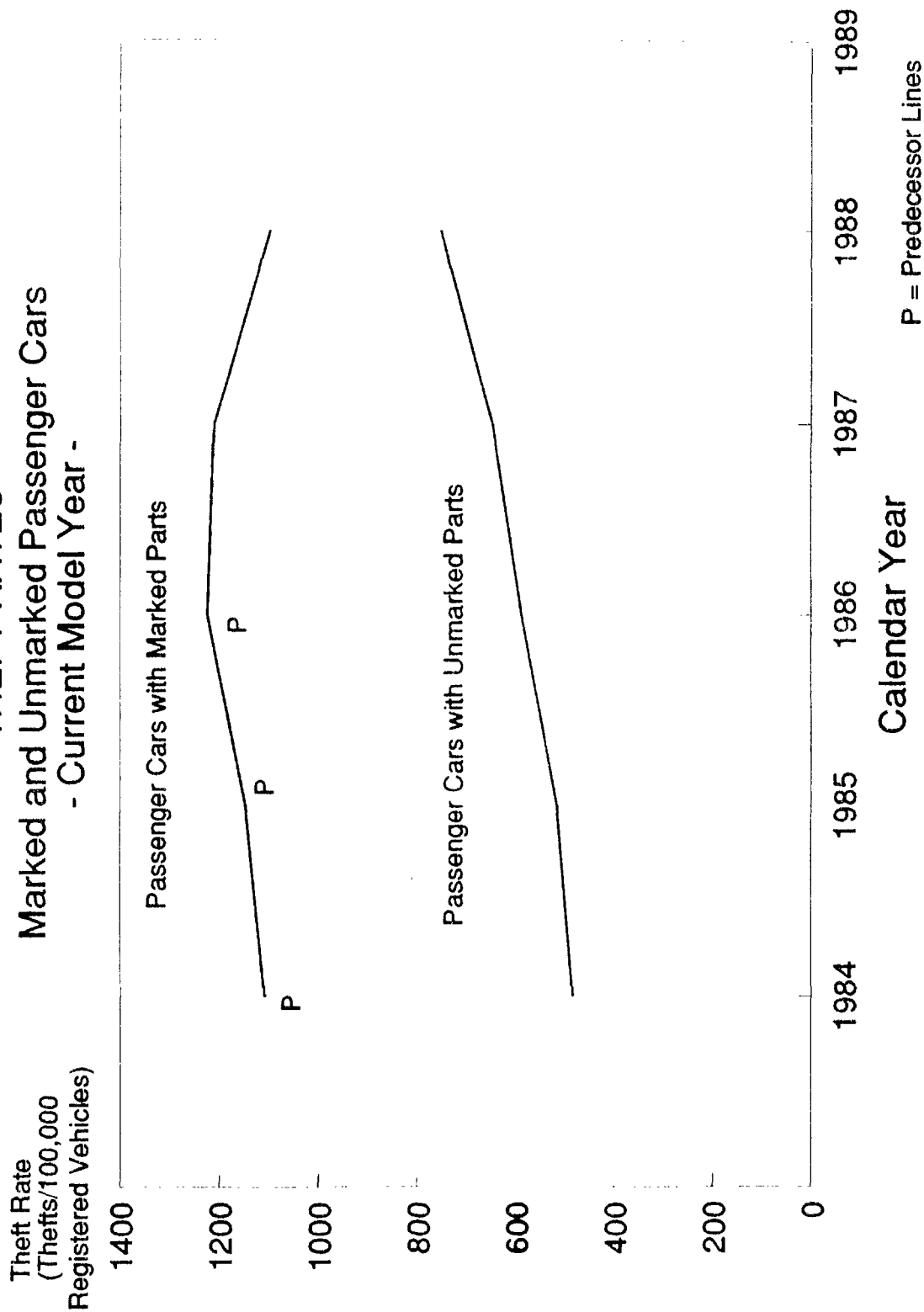
A comparison of unmarked and marked cars stolen when they were quite new in their respective model years (Figure B-4) shows some decline in theft rates of cars with marked parts, while unmarked cars continued to be stolen at an increasing rate. However, given that the car lines selected for marking were being stolen at more than double the rate of cars not selected for marking, the decline may reflect shifts in what thieves are interested in, and even a slight change in theft popularity could cause the shift. Data for one year old cars are not shown since those with marked parts are found only in 1988.

The Effectiveness of Parts Marking

One of the selection criteria of cars for parts marking is based on the likelihood of the designated car lines having a high theft rate rather than for a possible assessment of the effectiveness of parts marking in reducing theft rates and increasing recovery rates. In a controlled experiment, car lines would be selected randomly for parts marking and theft rates would not be the selection criteria. Car lines across the spectrum of theft rates would have an equal opportunity to contain marked or unmarked parts.

Given that passenger cars with high theft rates are selected for parts marking, an inherent difference between marked and unmarked car populations is established. The group being tested and the unaffected group are not homogeneous. The intervention being tested, and other factors as mentioned previously affecting the measurements, cannot be said to affect the two groups in an equivalent manner. One of the problems that may occur when car lines are not randomly chosen is that any pre-existing trends may mask the actual effect of an intervention.

FIGURE B-4
THEFT RATES
Marked and Unmarked Passenger Cars
- Current Model Year -



Sources: Federal Bureau of Investigation
National Crime Information Center and R. L. Polk & Co.

P = Predecessor Lines

That is, even if no measures were taken, over time, differences between the theft rates of very-high and very-low theft car lines may diminish. It was hypothesized that a pre-existing trend would be present and affect predecessors of car lines with both marked and unmarked parts. A statistically significant reduction in the theft rate of high theft car lines beyond any pre-existing trend, would be needed to show effectiveness.

Method for Determining Effectiveness

The difference between theft rates of marked and unmarked cars is determined by using the diagram below:

Car Model Years	MARKED	UNMARKED
1987/1988	A	B
	Predecessors to Above	
1985/1986	A'	B'

For purposes of the analysis, the term "relative difference" is used, which is defined as:

$$\text{Relative Difference} = (1 - M/U) \times 100$$

Where M is the ratio of the theft rate of marked cars (A) with the theft rate of predecessors of marked cars (A'). U is the corresponding ratio of theft rates for unmarked cars and their predecessors. In other words, $M = A/A'$ and $U = B/B'$.

To determine if the Relative Difference above is statistically significant, the confidence bounds of M/U have to be calculated. This is done by recognizing that M/U is a ratio of ratios $(A/A')/(B/B')$ and that

each item A, A', B, B' is approximately a Poisson variate [34]. The probability of a car being stolen in any year is approximately a binomial, and the limit of a binomial is a Poisson distribution (the fraction or theft rate is small and the population -- registered vehicles -- is very large).

The Relative Difference is significant if it is larger than the positive confidence bound for M/U. Any value within the confidence bounds indicates that the relative difference is not significant.

Adjustment for Pre-Existing Trends

In order to adjust the Relative Difference discussed in the previous section, pre-existing trends of changes in theft rates between years prior to parts marking must be determined. Since data were available for 1984 through 1986 calendar years, and for the respective current year and one year old models, year to year changes could be determined. For the predecessors of marked cars the average ratio (M) of the theft rates for current 1985 and 1986 and one year old 1986 models to their respective current and one year old 1984 models is 1.077. Unmarked cars have a ratio (U) of 1.194. Both ratios show increases, but the theft rate change was somewhat smaller for predecessors of marked cars than for unmarked cars.

It is important to realize that the adjustment factor for pre-existing trends is based on two measurements, the change between 1984 and 1985 and the change between 1985 and 1986. The confidence bounds in these two measurements can be determined, and their values are accurate within \pm one percent (a high degree of accuracy). The number of measurements, however, is small, and casts some doubt on the trend thereby established. While it can be said that the trend reflects the effect and interaction of factors other than parts marking, these factors are not known, and neither can it be said that their effect(s) on theft rates is constant based on two measurements. More years of data prior to 1987 may or may not have provided a more reliable measure of the pre-existing trend. Since more

data are not available, the answer to this question will remain unknown. The correction factor for pre-existing trends is based on the best information available.

The next step is to determine the Relative Difference - which will be the adjustment. The theft rate ratio for marked cars 1.077 is substituted for M in the model described previously, and the theft rate ratio for unmarked cars 1.194 is substituted for U. The adjustment factor works out to 9.8 percent, and will be used in the next section to determine the net Relative Difference.

Results of Effectiveness Analysis

Using the effectiveness model described,

A =The theft rate for CMY 1987, CMY 1988 and one year old 1988 car lines with marked parts = 1095

A' =The theft rate for CMY 1985, or CMY 1986 and one year old 1986 car lines that are predecessors to car lines with marked parts = 1066.

M =A/A' = 1.027

B =The theft rate for CMY 1987, CMY 1988 and one year old 1988 car lines with unmarked parts = 630.

B' =The theft rate for CMY 1985, CMY 1986 and one year old 1986 car lines that are predecessors to car lines with unmarked parts = 551.

U B/B' = 1.143

E =(1 - M/U) *100 = 10.1 percent.

The confidence bound is calculated as follows, again using the poisson distribution:

$$S = \text{Standard Error} = \frac{1}{n_A} + \frac{1}{n_{A'}} + \frac{1}{n_B} + \frac{1}{n_{B'}}$$

$$\text{confidence bound} = 1.645(S)$$

where n = number of stolen vehicles.

After making the adjustment for pre-existing trends (9.8 percent), it was found that the Relative Difference of theft rate changes between marked and unmarked cars is 0.3 percent, which is not statistically significant at the 95 percent level (the confidence bound is + or - 1.17 percent). In other words, based on national data from all motives, parts marking, at least in 1987 and 1988, has not had a measurable effect beyond what could be expected by chance. However, the lack of a measurable consequence does not imply that the theft prevention standard is ineffective.

Recovery of Stolen Motor Vehicles

A sizeable number of stolen motor vehicles are recovered. Nearly 85 percent of stolen motor vehicles are eventually recovered; about 80 percent are recovered within one year, but it may take several years to find some of the stolen vehicles, or what is left of them. About 16 percent of stolen vehicles are never recovered. Recovery data were obtained from the NCIC case files. When the NCIC is notified that a stolen vehicle has been located, the date of recovery is entered in the theft record; this entry "expires" the record. Records also "expire" when they are over four years old. To determine the number of stolen vehicles which are recovered, the theft entry and recovery expiration dates in each record are compared. If the difference in time is less than four years, it indicates the stolen vehicle has been recovered.

While thefts can be counted by calendar year, their recovery spills over into the next several calendar years. Therefore, the calendar year cut off for counting recoveries of vehicles stolen that calendar year is a short count -- it is understated. This will be seen in trends of recovery rates for various vehicle categories, where the latest available year's recovery rate is certain to be lower than the preceding year. When comparing two trends -- such as the recovery rate trends of passenger cars with marked parts, and unmarked passenger cars, it was assumed that the recovery lag applied equally to cars with and without marked parts.

The number of motor vehicles recovered, the number stolen and the recovery rates for the calendar years 1984 through 1988 are shown in Table B-5:

Table B-5
Motor Vehicle Recoveries

<u>Calendar</u> <u>Year*</u>	<u>No of Motor Vehicles</u>		<u>Recovery Rate</u>
	<u>Recovered</u>	<u>Stolen</u>	<u>- Percent -</u>
1984	671,111	830,743	81
1985	724,537	874,719	83
1986	812,718	966,721	84
1987	858,832	1,022,519	84
1988	931,639	1,193,032	78

Source: Federal Bureau of Investigation
National Crime Information Center

* Calendar year of the theft, not model year.

There are two things to note here. The first is the recovery rate of 78 percent in 1988. Because of the recovery lag, this value is expected to increase based on FBI experience with data of prior years. The other is that the number of vehicles stolen are slightly lower than vehicle theft statistics shown earlier in this Part. A recovery is established by first matching VINS to assure that it is in fact the stolen vehicle that was recovered. This process creates dropouts not only of vehicles reported stolen, but also of vehicles recovered. There are a number of "no VIN match" situations, although the number of such cases is declining from 6 percent in 1984 to 1 percent in 1988.

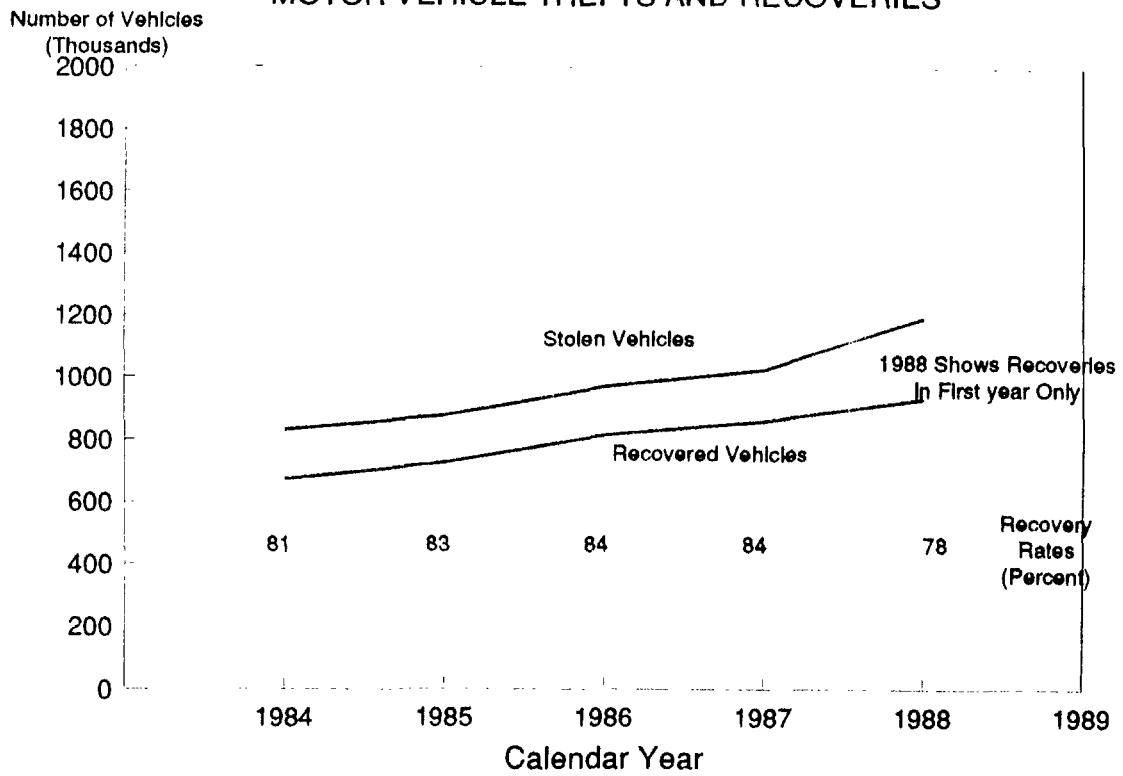
Thefts and recoveries are shown graphically in Figure B-5 to illustrate the continuing upward trend in both, and the problem of recovery lag for the most current calendar year.

Recovery Rates by Type of Motor Vehicle

The recovery rate, using NCIC data is defined as the number of vehicles recovered divided by the number of vehicles stolen. Recoveries and rates by type of vehicle are as shown in Table B-6. Recovery rates are shown graphically in Figure B-6.

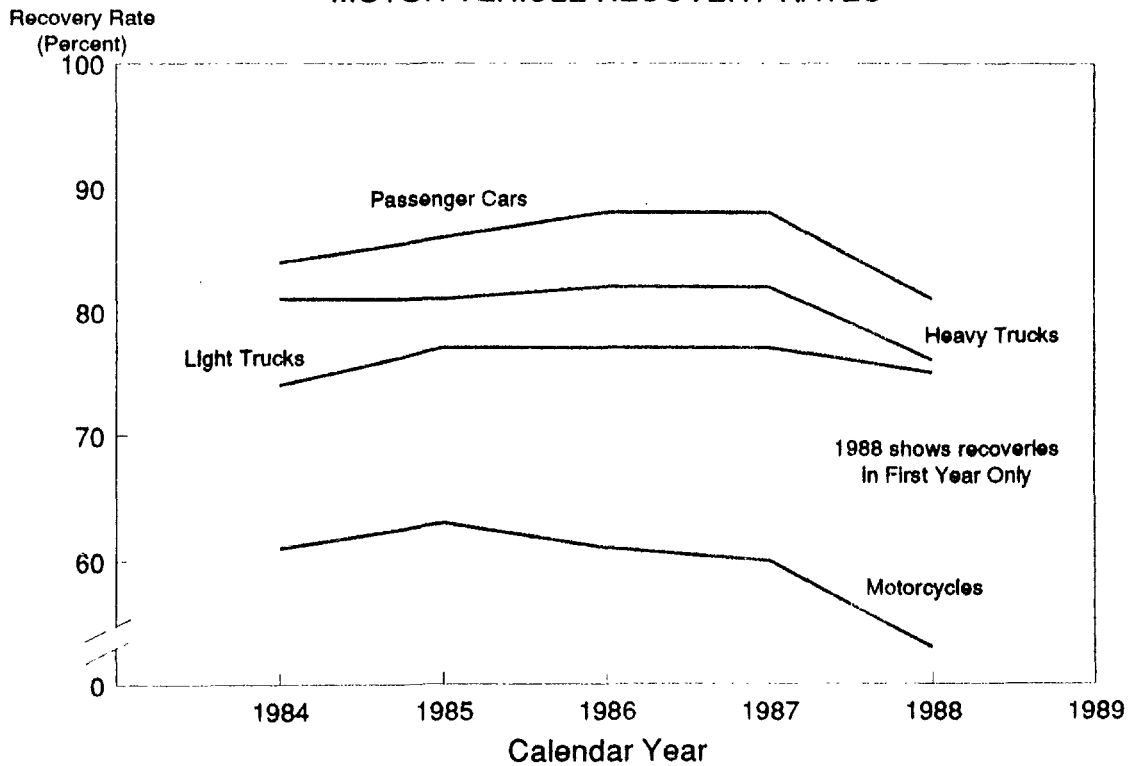
Through 1987, the last relatively complete year for recovery data, recovery rates remained about the same for all motor vehicles except for motorcycles. Model year 1988 recoveries are understated for the reasons previously discussed.

**FIGURE B-5
MOTOR VEHICLE THEFTS AND RECOVERIES**



Source: Federal Bureau of Investigation
National Crime Information Center

**FIGURE B-6
MOTOR VEHICLE RECOVERY RATES**



Source: Federal Bureau of Investigation
National Crime Information Center

Table B-6
Recoveries by Motor Vehicle Type

<u>Vehicle Type</u>	<u>Calendar Year in which Vehicle is Stolen</u>				
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Passenger Cars	592,939	623,676	694,525	733,567	877,192
Rate - Percent	84	86	88	88	81
Light Trucks, Vans	99,061	108,356	125,481	142,410	164,793
Rate - Percent	74	77	77	77	75
Heavy Trucks/Buses	67,083	67,562	71,453	76,045	87,638
Rate - Percent	81	81	82	82	76
Motorcycles	71,660	75,125	75,262	70,497	64,635
Rate - Percent	61	63	61	60	53

Source: Federal Bureau of Investigation
National Crime Information Center and R. L. Polk and Co. data.

The Effect of Parts Marking on Recoveries

One of the objectives of the parts marking standard is to enhance the recovery of stolen passenger cars. Recovery data from NCIC are broken down into two groups: Cars with marked parts and cars with unmarked parts. And as with the theft data, only the current model year (CMY) and one year old cars are compared over the span of the five calendar years for which data are available.

Recovery rates for these cars are shown in Table B-7.

Table B-7
 Recovery Rates for Passenger Cars
 (Percent)

	<u>Calendar Year in Which Thefts took Place</u>				
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u> ^{1/}
Cars With Marked Parts					
Current Yr Models	90	91	92	91*	82*
One Yr Old Models	86	89	90	89	84*
Unmarked Cars					
Current Yr Models	93	92	93	92	84
One Yr Old Models	89	90	90	91	85

^{1/} Rates are based on recoveries in 1988 only

* Stolen cars with marked parts; stolen cars for other years are predecessors.

Source: Federal Bureau of Investigation
 National Crime Information Center

Recovery rates are relatively high and stable, except for the latest year, again for the reason discussed previously. Unmarked cars have an almost identical recovery rate as cars with marked parts.

As with theft rates, the effect of parts marking was tested to see if any of the recovery rates for such carlines (and their predecessors) were significantly different from recovery rates of unmarked cars. The recovery rates for marked and unmarked cars are nearly identical before the standard took effect, so pre-existing trends were not a consideration. No statistically significant difference in recovery rates was found between marked and unmarked cars after the standard took effect.

The Effects of Antitheft Devices on Vehicle Thefts and Recoveries

The Theft Prevention Standard provides for the exemption of passenger cars from parts marking if the high theft carlines have factory installed antitheft devices. An analysis of the effect of these antitheft devices in reducing thefts or increasing stolen vehicle recoveries was performed. The analysis was limited to cars exempted from parts marking in 1987 and 1988 and those of their predecessors which did not have any type of antitheft device in 1984-1986. This compartmentalization of data was done because of the limited data available (1984-1988). Models have been equipped with anti-theft devices prior to 1987, however, no data are available to establish a performance record prior to their appearance with such devices. The availability of data, therefore, established what models could be studied.

As with the analysis of cars with marked parts, data on cars equipped with antitheft devices is confined to current and one year old models. Both the theft and recovery data for the sample of such cars are shown in Table B-8.

Table B-8
 Sample of Passenger Cars
 Equipped with Antitheft Devices
 Registrations, Thefts and Recoveries

	<u>Calendar Years in Which Thefts Took Place</u>				
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
<u>Current Year Models</u>					
Registrations	228,665	114,819	236,644	194,150	187,182
Thefts	2,919	1,644	2,050	1,945*	1,633*
Theft Rates [Thefts/100,000 Registrations]	1,277	1,432	866	1,002*	872*
Recoveries	2,533	1,458	1,825	1,697	1,216*
Recovery Rates [Percent]	87	89	89	87	74*
<u>One Year Old Models</u>					
Registrations	262,358	187,547	361,047	283,302	337,838
Thefts	3,256	2,405	4,392	2,343	2,458*
Theft Rates [Thefts/100,000 Registrations]	1,241	1,282	1,216	827	728*
Recoveries	2,791	2,074	3,822	2,029	1,835*
Recovery Rates [Percent]	86	86	87	87	75*

* Stolen or recovered cars with antitheft devices; stolen or recovered cars for other years are predecessors.

Sources: Federal Bureau of Investigation
 National Crime Information Center and R. L. Polk & Co. data.

Both the theft and recovery data on cars equipped with antitheft devices show that these cars are stolen more frequently but recovered less often than cars with marked or unmarked parts. Such cars tend to be attractive theft targets for export, for parts, for insurance fraud and other reasons. Because of their antitheft devices, these cars may take more effort and experience to steal. They are more likely stolen by professional thieves.

Figure B-7 shows the theft rates for current model year antitheft device equipped passenger cars, and their unequipped predecessors. Year to year theft rates for these cars are erratic, but they do not show a significant difference from the rates for marked cars. The number of car lines represented by the data are very small.

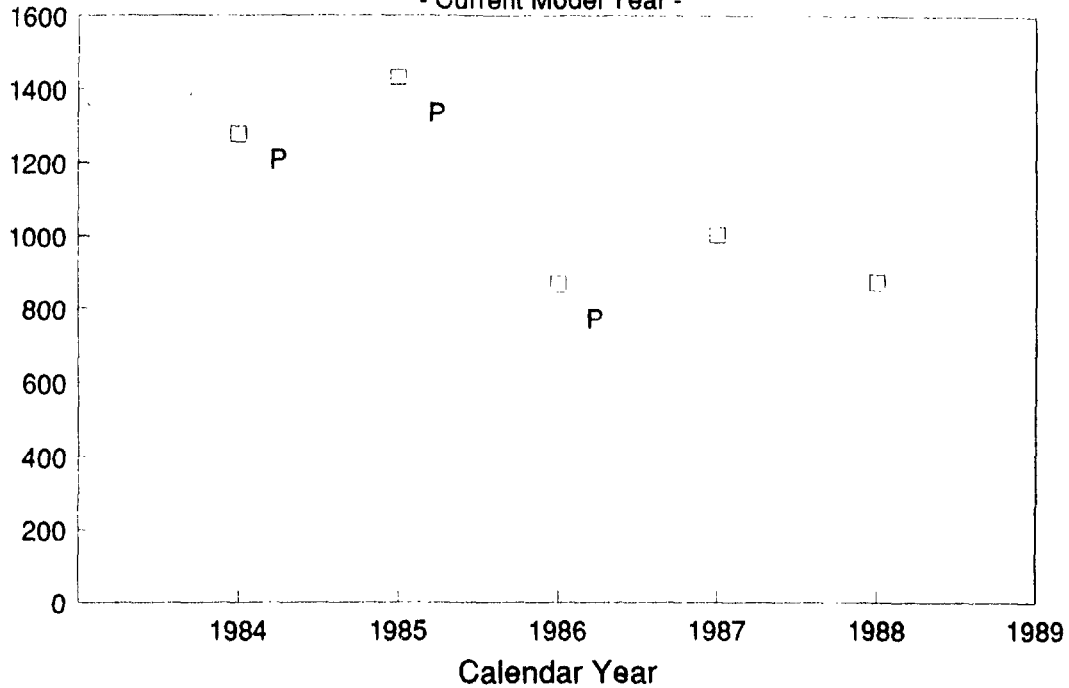
Figure B-8 shows the recovery rates for current model year passenger cars with antitheft devices and their predecessors. The apparent decline in 1988 recoveries results from the same data collection problem previously discussed, only vehicles recovered in 1988 were reported and recoveries occur over several years.

The recovery rates for antitheft device-equipped cars are slightly lower than the rates for marked and unmarked cars. Antitheft devices, unlike parts marking do not enhance recoveries - they are not designed for that purpose.

**FIGURE B-7
THEFT RATES**

**Sample of Passenger Cars Equipped
with Antitheft Devices
- Current Model Year -**

**Theft Rate
(Thefts/100,000
Registered Vehicles)**



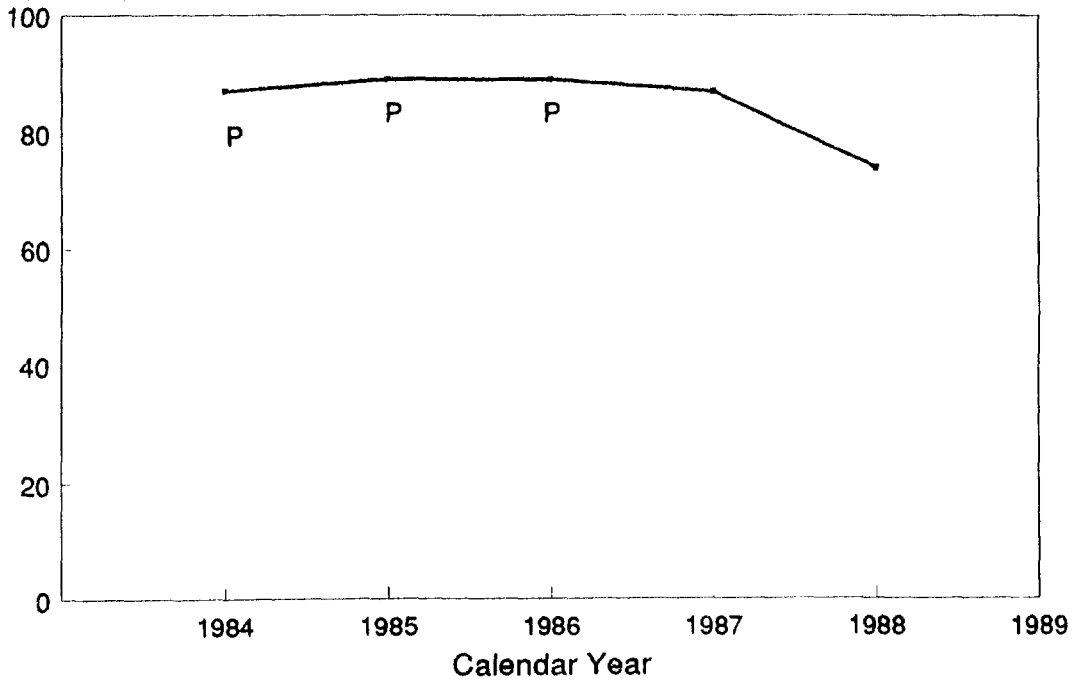
Source: Federal Bureau of Investigation
National Crime Information Center

P = Predecessor

FIGURE B-8

**Recovered Stolen Passenger Cars
Equipped with Antitheft Devices
- Current Model Year -**

**Recovery Rate
(Percent)**



Source: Federal Bureau of Investigation
National Crime Information Center

P = Predecessor

Does the Age of A Car Affect Its Theft Or Recovery?

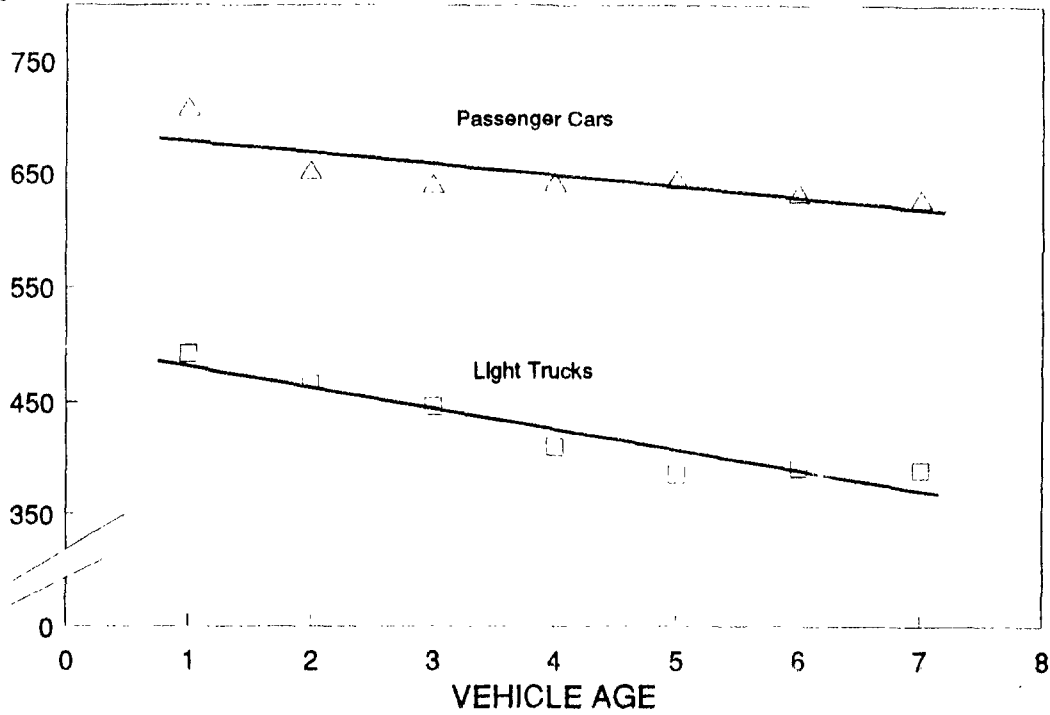
One question that often arises is when cars are stolen for parts, are older vehicles more vulnerable because the stolen parts supply the crash repair industry? There is no direct way to obtain data on the age of a stolen vehicle by theft motive (or any other vehicle data by theft motive) since the unrecovered cars fall into at least three motive groups: chop shop operations, export, and fraud (including retagging). It is not entirely clear whether each of these motives necessarily dictates the age of a car most desirable for theft.

An overview of the age/theft relationship can be obtained by analyzing the theft rates by vehicle age – as is done in Figure B-9. Since R. L. Polk & Co. data are the basis for the theft rates, only passenger car and light truck trends are shown. A linear regression indicates passenger car theft rates declined nine percent over a seven year age span or an average of 1.3 percent a year, although more than that in years when the car was new. Light trucks follow a similar pattern, where theft rates decline more rapidly after the first two years, for a total of 25 percent over a seven year span. The trends are not statistically significant in that vehicle age does not appear to be a factor in the frequency that vehicles are stolen. In other words, age appears to be a constant, and not a predictor of the likelihood of theft.

Age has no statistically significant effect on motor vehicle recoveries. Figure B-10 shows the age effect by vehicle type. The recovery rate changes only slightly over a period of seven years. Overall, age does not appear to contribute to the likelihood of motor vehicle recovery.

FIGURE B-9
AGE EFFECT ON THEFT RATES

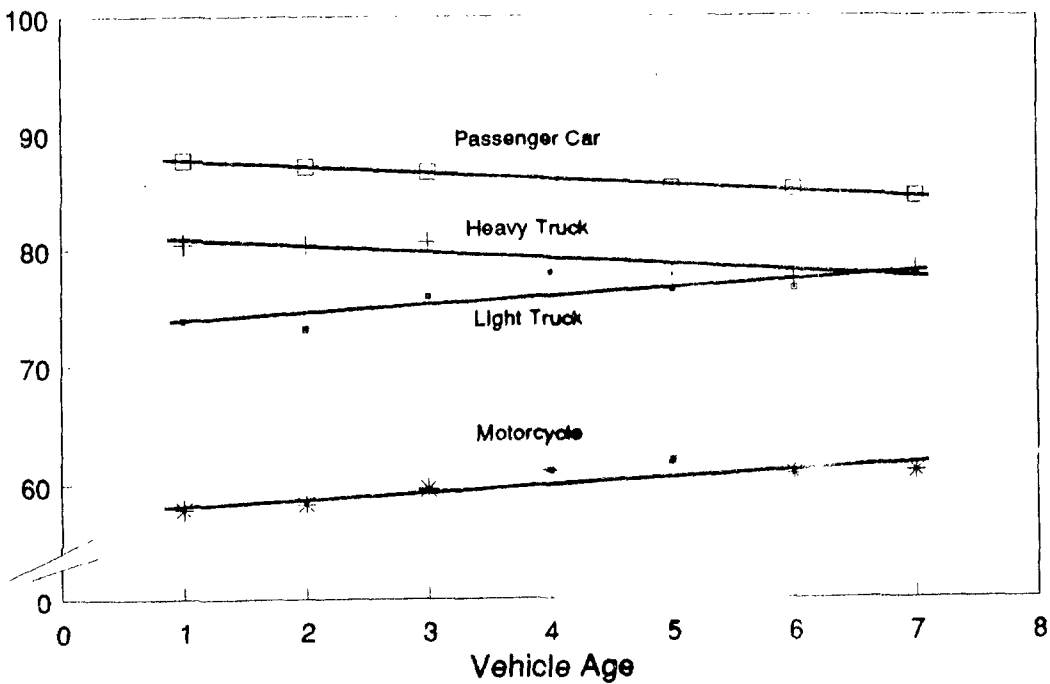
Theft Rate
(Thefts/100,000
Registered Vehicles)



Source: Federal Bureau of Investigation
National Crime Information Center and R. L. Polk & Co.

FIGURE B-10
AGE EFFECT ON RECOVERY RATES
by Vehicle Type

Recovery Rate
(Percent)



Source: Federal Bureau of Investigation
National Crime Information Center

SUMMARY: Motor Vehicle Thefts, Recoveries and the Impact of Parts Marking

The objective of this Part is to present statistics on thefts and recoveries for all types of motor vehicles and to assess the impact of parts marking on both thefts and recoveries of high theft passenger cars.

Several data bases from as many sources were obtained, processed and analyzed. Some 5 million theft and recovery records came from NCIC. Registrations gathered by the R. L. Polk Company and summary registrations assembled by FHWA provided the necessary exposure data.

The 1984 Theft Act requires a five year report covering at least four years after promulgation of the Theft Prevention Standard. Given typical data collection and dissemination lag time and the need to assemble all necessary statistics to meet this report's submission date, the latest available data are from 1988. This means that two years of experience with cars containing marked parts - as required by the Federal regulation - can be analyzed.

In 1988, the number of motor vehicles stolen according to NCIC files was 1,206,699 - up by 35 percent over 1984, and by almost 12 percent over the previous year. Passenger cars constitute 73 percent of all motor vehicle thefts; light trucks, vans and multipurpose vehicles account for 18 percent - a number that has risen from 14 percent in 1984. The remaining 9 percent represent thefts of heavy trucks, buses and motorcycles.

When looking at the theft situation from the standpoint of rates - thefts in relation to registrations - the theft problem has worsened. The rate for passenger cars has increased by 22 percent since 1984 and the rate for light trucks has doubled - indicating a serious problem. The rate for

motorcycles increased by 8 percent over 5 years and the heavy truck theft rate actually declined by 12 percent since 1984.

The recovery of motor vehicles has continued to improve - except for motorcycles. There is a problem with using NCIC recovery data for the latest year available (1988) since recoveries continue to be made beyond the cut off date for 1988 statistics, and the 1988 recovery rate is expected to eventually increase.

Passenger cars have the highest recovery rate, 88 percent in 1987, followed by heavy trucks (82 percent). Fewer light trucks, vans, etc., are recovered (77 percent) and only 60 percent of motorcycles are recovered. Over 200,000 motor vehicles stolen each year are never seen again.

Marking 12 to 14 parts of a high theft passenger car was designed to deter thieves from stealing the car for its parts, and to make it risky to sell, or even possess a marked part since it can be traced back to the stolen car from which the part was taken. Putting VIN labels on many parts can potentially help in recovering stolen cars and parts - another purpose of the standard.

Based on survey responses, between 23 and 71 percent of motor vehicles are stolen for profit. Theft for profit is the target of the parts marking standard.

The theft and recovery data do not indicate the motive for the crime. So any changes observed in the statistics cannot be directly related to changes in any particular motive. Recognizing that a variety of social and demographic factors would affect theft and recovery rates, it is not therefore, possible to attribute a change in a rate to a change in theft motives. A small change in theft rates might actually be the product of a large reduction in theft crimes motivated by profit, but cancelled by a large increase in another factor (such as theft crimes related to drug trafficking) or vice versa.

While a statistically significant change in theft rates for marked cars compared to unmarked cars might be indicative of a successful intervention, a non-significant result would not be a conclusive finding.

Little is known about the target population in this study (theft crimes motivated by profit) and available data does not provide much insight. It is difficult to attribute observed changes in theft and recovery data to the target group or to other motivations.

The fact that passenger cars with high theft rates were selected for parts marking resulted in a non-random experimental design for evaluating the Theft Prevention Standard. The group with marked parts and the unaffected group are not homogenous. The intervention being tested, and other factors affecting the measurements cannot be said to affect the two groups in an equivalent manner. A pre-existing trend for predecessors of cars with marked parts, and unmarked cars, was found to exist prior to the implementation of the Standard and, therefore, affected the measurement of effectiveness. The adjustment factor used to adjust for this trend is based on three years of data and may not be consistent with years prior to 1984. Although no statistically significant measurements were found, it cannot be concluded that the standard was ineffective. To show statistically significant results, there would have to be an improvement of over one percent in the theft rate change after applying the adjustment factor.

By the end of 1988, 72,000 passenger cars with marked parts had been stolen. Nearly 62,000 were recovered. All of these cars were 1987 and 1988 models, usually less than two years old. For the equivalent unmarked fleet nearly 96,000 cars were stolen and almost 83,000 were recovered by the end of 1988.

There is no statistically significant improvement in the recovery rates of 1987 and 1988 marked cars compared to the unmarked group. Current

recovery rates for passenger cars are already over 90 percent (91 percent in 1987).

Manufacturers may be granted an exemption from parts marking for cars equipped with antitheft devices. Their effectiveness was not observed to be significantly different from that of marked cars. The number of cars equipped with antitheft devices used in the analysis (just over 6000) was relatively small and the year-to-year theft rates for such cars, particularly their unequipped predecessors, were erratic. Recovery rates of antitheft device equipped cars were lower than those of marked cars, probably indicating a greater proportion of thefts by professional thieves.

The age of a passenger car was found to have no statistically significant relationship to its theft rate. Age does not appear to be a factor in the rate at which cars are stolen nor in the recovery of a motor vehicle.

The prospects for evaluating standards effectiveness due to parts marking, using the current method of assigning car lines, are unlikely. It is not clear whether the absence of any evidence that the standard reduced theft was caused by the fact that the regulation was not an effective deterrent to theft or that the application of the standard to high theft car lines, as required by the Theft Act, makes the data analysis difficult.

There appear to be other sizeable factors that relate to auto theft whose year to year variation can easily overshadow the effect of marking parts.

If it is crucial to more definitively evaluate the standard, there are ways to implement a parts marking standard which would yield more definitive results, although such approaches would require statutory action to allow such flexibility [27]. The first approach is to randomly assign passenger car lines for parts marking. The range of high to low theft rates would be equally represented in the marked and unmarked groups. The second approach would require extending parts marking to

light trucks -- if that is a desirable extension of the parts marking standard. The random assignment of light truck lines for marking would follow the same process.

APPENDIX 1

PARTS C & D

MARKET FOR STOLEN PARTS AND EXPORTS

"(C) on the extent to which motor vehicles stolen annually are dismantled to recover parts or are exported;

"(D) a description of the market for such stolen parts;

1984 Theft Act

The potential market for parts of stolen dismantled vehicles is very large. In 1988, of the approximately 187.2 million motor vehicles registered in the United States, about 141.3 million were passenger cars [37]. These motor vehicles require parts as a result of accidents, normal wear, theft, and for upgrade or other reasons; and replacement parts are very expensive. A passenger car built of replacement parts can cost as much as three times that of the original car [1].

Each motor vehicle is simultaneously a possible source as well as a possible consumer of stolen parts. Because of the high prices for original equipment (OE) parts and the lack of perfect fit or minimum standards sometimes encountered with new parts manufactured for many vehicle models (aftermarket parts), used and rebuilt parts often become attractive to motor vehicle owners, particularly if they own vehicles which are no longer new.

Precise information on the extent to which motor vehicles are dismantled to recover parts, or are exported, and a description of the market for such parts

are not readily available. Estimates have been made based on partial information from many sources including the Departments of Justice, Commerce, and Transportation, contracted surveys, a few police jurisdictions, insurance companies, and publications. Gaps in information have been filled by assuming that conditions which prevail in known situations are identical to those which exist in unknown situations. These assumptions are admittedly problematic. Whenever possible, attempts were made to procure the same kinds of data from at least three sources, and to establish reasonable bounds for estimates. Still, much of the data which follow are general impressions based on the experiences of knowledgeable professionals plus analyses of proxy measures.

The remainder of this Part concerns motivations for theft and the estimated number and value of passenger cars that were stolen for purposes of dismantlement and resale of parts and also export. The market for stolen parts is described in terms of the demand and supply of passenger cars that appear to have been stolen for their parts.

Motives for Motor Vehicle Thefts

Many motor vehicles are stolen in the United States causing tremendous economic losses and inconvenience to the victims of these thefts. In 1988, approximately 1.2 million motor vehicles, or about 0.7 percent of all registered vehicles were reported stolen [20]. Of these vehicles, about 931,800 were recovered in various states of repair. Some were recovered intact or with only minor parts missing; others were burned, wrecked, and/or had major parts missing. The value of all stolen vehicles is estimated to be in the neighborhood of \$5.4 billion based on an average of FBI and National Safety Council (NSC) estimations of \$5,117 and \$6,519 per vehicle respectively [23,29].

Thieves differ in their motives for stealing motor vehicles. According to a survey of officials at 23 law enforcement agencies [8], approximately 10 percent of all thefts occur in order that parts be removed and sold for profit (chop shop operations). Single parts are also stolen to order.

Motives other than chop shop operations and their estimated frequencies were:

- o to use as a means of travel - 30%,
- o to use for a few hours (joy riding) - 24%,
- o to take from an acquaintance such as a friend or relative - 14%,
- o to use in other crime - 13%,
- o to use to defraud insurance companies - 9%.

Stealing for the purposes of export or resale of intact vehicles domestically were not noted by the respondents.

A survey conducted in 1989 by the American Association of Motor Vehicle Administrators (AAMVA) among law enforcement agencies in 46 states, five Canadian provinces, six counties, and two cities, yielded a different distribution of motives [3]. The percent of motor vehicles stolen by motive were as follows:

- o chop shop operations - 16%,
- o joy riding and transport related to robberies and theft - 38%,
- o insurance fraud - 23%,
- o salvage switch (retag for resale) - 15%,
- o export - 4%,
- o other - 4%.

The United States Customs Service estimates that approximately 200,000 of all stolen motor vehicles, are exported annually.

Gauging the magnitude of the problem relating to vehicles stolen for export is particularly difficult. Because stolen exported vehicles are rarely recovered, local law enforcement agencies are prevented from making projections based on real data. Furthermore, wide regional disparities in the number of thefts-for-export probably exist around the country, with more instances occurring in coastal and border jurisdictions than elsewhere. In addition, some portion of fraud thefts are thought to encompass exported motor vehicles.

Need for Major Parts - The Demand

Major parts, as defined by the NHTSA standard, comprise the engine, transmission, and sheet metal parts, i.e., bumpers, hoods, fenders, doors, and quarter panels. The need for replacement sheet metal parts arises most frequently because of crashes. Other much less frequent causes are thefts, regular maintenance, customizing and upgrading.

Crashes

In order to estimate the need for replacement parts, it is necessary to know the number of crashes that occur in a given year, the number of crash-damaged cars that are repaired, and the number of each part likely to be damaged and replaced.

It is estimated that the number of lifetime accidents for a typical car is 2.45, 'lifetime' being defined as ten years [36]. Therefore, approximately 34.6 million passenger cars were involved in accidents during 1988. The National Safety Council estimated 36.2 million motor vehicles were involved in accidents during 1988; the Insurance Information Institute estimated 33.9 million motor vehicles were involved in accidents during 1987.

Estimates of the Number of Crash-Damaged Cars that are Repaired

Not all crash-damaged vehicles involved in accidents were repaired. Some cars continued to be driven in their damaged states; others were sold for salvage or scrap. An estimate of the total number of cars that were repaired was made by calculating the percent of cars for which repairs were paid, based on information from insurance companies operating nationwide. Estimates based on insurance data must be used with caution because not all cars are insured; not all accidents involving insured cars that are repaired are reported to insurance companies; not all cars for

which insurance companies make restitution are repaired. As some of these circumstances increase estimates of repair frequencies and others decrease them, it is assumed that the unknowns cancel each other.

It is estimated that insurance companies sell as salvage on average between eight and nine percent of the automobiles for which accident claims are made. Therefore, major parts were probably replaced in as many as 31.9 million passenger cars during 1988.

Estimates of Number of Parts that are Replaced

Crashes vary as to the points or areas of impact on motor vehicles and the intensities of the impacts. The impact area determines the specific parts having to be replaced. In most accidents, frontal crashes can involve the front bumper, hood, and fenders; rear crashes, the rear bumper and quarter panels; side crashes, the doors, fenders, quarter panels, front and rear bumpers, and hood. The intensity may also affect the number of such parts. For instance, a frontal crash can damage just one bumper or one bumper, a hood, and one or both fenders. To determine approximate frequencies of different kinds of crashes, the distribution of damaged areas was calculated for a sample of police-reported accidents during the year 1988 [9]. The percent of passenger cars involved in front, side, and rear-end crashes was as follows:

<u>Damaged Area</u>	<u>Percent of Passenger Cars Involved in a Sample of Police-Reported Accidents</u>
Front	32.7
Rear	13.6
Side	31.8
Other	10.1
No Damage	2.3
Unknown	9.4
Total	99.9

Other Demands for Parts

The number of passenger cars for which major parts are purchased for reasons other than crashes is not known. Estimates were made using information about stolen motor vehicles that were recovered. According to officials at 23 law enforcement agencies and police data from three jurisdictions (a western state, a northeastern city, a midwestern suburb), in 1988 between 10 and 15 percent of recovered motor vehicles had one or more major parts missing. See Table C-1. The total number of such recovered vehicles in the United States, and the particular major parts most likely to be replaced, are unknown. The number and types of parts purchased to replace worn or unwanted parts is also unknown. A conservative estimate of the number of cars for which major parts are purchased for reasons other than crashes is 200,000 (estimate of reparable recovered motor vehicles plus a small number).

Table C-1
Distribution of Recovered Motor Vehicles
As Classified by Condition
-Percent-

<u>Jurisdiction</u>	<u>Intact</u>	<u>Major Strip</u>	<u>Burned</u>	<u>Wrecked</u>	<u>Minor Strip</u>	<u>Unknown</u>	<u>Total</u>
Western State	62	11	17	11	0	0	100
Northeastern City	38*	10	5	34	14	0	100
Midwestern Suburbs	56	15	2	16	**	10	99

* Includes unknown

** Included in Intact, Burned and Wrecked

Estimates of Values of Parts that are Replaced

The price of parts can vary widely. Parts can be original equipment (OE), aftermarket, used or rebuilt. Original equipment parts manufactured for specific vehicles are usually the most expensive. According to a survey of nine auto body shops located in several states, aftermarket parts, manufactured to fit a variety of vehicles, are generally priced about 65 percent of the OE parts price range [11]. A review of a catalogue of aftermarket motor vehicle components revealed that four sheet metal parts for one car model ranged between 67 percent and 86 percent of OE prices [25]. The nine body shop representatives reported that they priced used parts around 52 percent of OE parts. The Automotive Parts Rebuilders Association (personal communication), estimated that the prices of used/rebuilt parts normally fall between 50 percent and 70 percent of OE prices.

Another complicating factor when valuing equipment is that the charges for OE parts differ dramatically among car models. For example, the front fenders of two automobile models manufactured by the same company were \$92 for a compact car and almost \$513 for a luxury car [6]. See Table C-2.

The relative market shares of OE, aftermarket and used/rebuilt parts are estimated to be approximately 80 percent, 10 percent, and 10 percent respectively [11]. Therefore, total replacement sheet metal parts of the kinds targeted for labeling, sold in the United States during 1988 for about \$28.6 billion. The market share of used/rebuilt parts was about \$1.6 billion. See Tables C-3a and C-3b.

Table C-2

A Sample of Prices for Original
Equipment and Aftermarket Parts
(Two Passenger Cars, Same Manufacturer)

Parts	Original Equipment (OE)		Aftermarket	
	1985-88 Compact Car ^{1/} \$	1980-89 Luxury Car ^{2/} \$	1985-89 Compact Car ^{3/} \$	Percent of OE Price %
Bumper				
Front	170	605	114	67.1
Rear	245	605	164	66.9
Hood	285	536	246	86.3
Front Fender	92	513	74	80.4
Doors				
Front	530	770	n/a	
Rear	335	671	n/a	
Quarter Panel	380	344	n/a	

^{1/} "Crash Estimating Guide," 1989, Vol. 21, No. 12, published by Hearst

^{2/} "Crash Estimating Guide," 1989, Vol. 21, No. 13, published by Hearst

^{3/} "Keystone Crash Parts Digest," Effective September 11, 1989

Table C-3a

Estimated Number and Value of Selected Replacement Parts
All Passenger Cars 1988

Damaged Area	Motor Vehicles Involved in Accidents Percent ^{1/}	Estimated No of Pass Cars Repaired ^{2/} (Millions)	Price per Part (Dollars)				
			OEM (Low) ^{3/}	OEM (High) ^{4/}	OEM (Avg)	After Market (65% OE) ^{5/}	Used - Rebuilt (52% OE) ^{5/}
Front	32.7	10.37	547	1,654	1,101	715	572
Bumper			170	605	388	252	202
Hood			285	536	411	267	213
Fender			92	513	302	197	157
Rear	13.6	4.31	625	950	787	512	409
Bumper			245	605	425	276	221
Qrtr Panel			344	380	362	235	188
Side	31.8	10.08	977	2,232	1,605	1,043	834
Door			335	770	552	359	287
Fender			92	513	302	197	157
Qrtr Panel			344	380	362	235	188
Bumper (F)			170	605	388	252	202
Other	10.1						
No Damage	2.3						
Unknown	9.4						
Subtotals		31.70					
Other Motor Vehicles		.20					
Totals		31.90					

1/ General Estimate System (GES) administered by NHTSA.

2/ 34.6 million crashes, "Final Regulatory Impact Analysis Part 581 Bumper Standard," NHTSA, May 1982. The number of accidents for a typical car over a 10 year period is estimated to be 2.45. 91.5% of accidents are repaired, Insurance Company data; assumed the distribution of damaged areas of motor vehicles involved in a sample of police-reported accidents is the same as for the entire population of motor vehicles involved in accidents.

3/ "Crash Estimating Guide," 1989, Vol. 21, No. 12, Published by Hearst.

4/ "Crash Estimating Guide," 1989, Vol. 21, No. 13, Published by Hearst.

5/ "Body Repair Shop Survey,"

Table C-3b

Estimated Market Share of Selected Replacement Parts
 All Passenger Cars 1988
 (\$-Millions)

Damaged Area	Market Share ^{1/}			Estimated Totals
	OEM (80%)	After Market (10%)	Used - Rebuilt (10%)	
Front Bumper Hood Fender	9,128	742	593	10,463
Rear Bumper Qrtr Panel	2,716	221	177	3,113
Side Door Fender Qrtr Panel Bumper (F & R)	12,941	1,051	841	14,834
Subtotals	24,785	2,014	1,611	28,410
Other Motor Vehicles	188	15	12	216
Totals	24,973	2,029	1,623	28,625

^{1/} Body Repair Shop Survey

NOTE: Totals may not add correctly due to rounding.

The replacement parts market is relatively inelastic. As long as motor vehicles are involved in accidents, replacement sheet metal parts will be needed. Factors affecting the quantity of needed parts are the quality of the parts and their ability to withstand crashes and other environmental stressors.

The price of parts and the state of the economy also influence the market for parts. New car owners are apt to seek OE vehicle components. Owners of cars five to 10 years old tend to seek less costly parts. As vehicles get still older, their parts become scarcer and the used parts become more expensive again [2]. If the economy is weak, people keep their cars longer periods of time and the desire for used parts increases. See Table C-4 for the approximate number of passenger cars in use by age.

Table C-4
Estimated^{1/} Passenger Cars^{2/} in Use by Age
(Millions)

<u>Age in Years</u>	<u>YEAR</u>			
	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Under 1 ^{3/}	12.1	12.4	11.3	11.8
1 - 5 ^{4/}	46.6	48.4	51.1	55.0
6 - 10 ^{4/}	44.3	45.7	44.8	42.4
11 & older ^{4/}	29.0	28.5	29.9	32.1
Registrations ^{5/}	132.0	135.0	137.1	141.3

^{1/} Estimations based on percent of passenger cars in use by age multiplied by registrations.

^{2/} MVM data does not include passenger vans; FHWA data includes vans having windows.

^{3/} "1989 Ward's Automotive Yearbook".

^{4/} "MVMA Motor Vehicles Facts and Figures '88," pp. 26-27, (FY 7/1-6/30).

^{5/} "Highway Statistics" (CY) published by FHWA.

The demand for used major parts is substantial. Major parts were replaced in approximately 31.9 million passenger cars during calendar year 1988 at an estimated cost of \$28.6 billion, almost \$900 per car. The used/rebuilt portion of this market is believed to be in the neighborhood of \$1.6 billion or between 4 and 5 percent of the total value of replaced major parts. Some percentage of the used part market consists of stolen items.

Motor Vehicle Thefts - The Supply

The percent of motor vehicles believed to have been stolen for dismantling and resale purposes is remarkably similar among jurisdictions. The respondents to two surveys indicated that 10 percent [8] and 16 percent [3] of all motor vehicle thefts are for chop shop operations. Counts of retrieved dismantled vehicles from three jurisdictions were 10 percent (northeastern city), 11 percent (western state), and 15 percent (midwestern suburb), respectively. See Table C-5. If these percentages are projected for the whole country, then the numbers of such vehicles stolen in 1988 ranged from 121,000 to 193,000. About 73 percent of all motor vehicles stolen in 1988 were passenger cars [20]. If motives for stealing passenger cars and the totality of motor vehicles are identical, then between 88,300 and 140,900 passenger cars were stolen for chop shop operations. The FBI estimated the average value of a motor vehicle stolen in 1988 to be \$5,117; the National Safety Council estimate was \$6,519. On these bases, the values of passenger cars lie between \$451.8 million and \$918.5 million. The estimated number and value of passenger cars stolen for chop shop operations in 1988 are shown in Table C-6.

Fraud may comprise a substantial portion of motor vehicle thefts. Insurance fraud occurs when policy holders submit claims for theft of vehicles or vehicle components which have not been stolen, but have been abandoned, exported, or retagged using VINs from salvage yard wrecks. The

Table C-5

Recovered Vehicles with Missing
Major Body Parts and/or Engines ^{1/}
(1988)

<u>Data Source</u>	<u>Major Parts Engines Missing</u>		<u>Condition Unknown</u>		<u>Total Recovered</u>
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	
Northeastern City ^{2/}	586	10	736	12	6,128
Midwestern Suburb ^{3/}	128	15	73	9	845
Western State ^{4/}	18,590	11	0	0	175,420
Survey ^{5/} (ESTIMATED)					
Northeast	n/a	12	n/a	n/a	n/a
Urban	n/a	10	n/a	n/a	n/a
Most Representative	n/a	16	n/a	n/a	n/a
AAMVA ^{6/}	n/a	16	n/a	n/a	n/a
Insurance Data ^{7/}	12,059	58	n/a	n/a	20,663

-
- ^{1/} These vehicles are presumed to have been stolen for chop shops.
- ^{2/} Unknown includes vehicles whose condition is unknown when recovered plus undamaged vehicles.
- ^{3/} Unknown as to whether major parts were stolen.
- ^{4/} Report period: January 1988 to September 1988.
- ^{5/} "State and Local Survey on Auto Theft Arrests and Outcomes and On Theft Reporting/Recovery Procedures," prepared for U.S. DOT/NHTSA by Price Waterhouse.
- ^{6/} "AAMVA Vehicle Theft: A Report Presented to the American Association of Motor Vehicle Administrators International Police Traffic Services Committee, 1989 International Conference," New Orleans, Louisiana, September 1989.
- ^{7/} Data are for current model year vehicles which were stolen in 1987 and 1988. The vehicles were recovered 'in part.' 'In part' includes vehicles with one or more major parts missing, wrecked vehicles, burned vehicles, vehicles stripped of other parts, etc.

insurance company then reimburses the claimant for the missing vehicle or parts. Retagging fraud occurs when a stolen vehicle's VIN is replaced by a VIN from a legally salvaged vehicle and then sold to an unsuspecting customer. A wide disparity exists among law enforcement officials about the prevalence of fraud. Respondents to one survey estimated that 9 percent of all thefts were fraudulent [8]; respondents to a second survey estimated that 38 percent of all thefts were fraudulent [3]. NATB estimated that 15 percent of all thefts country-wide were fraudulent, while an official with the Chicago police department thought 25 percent of thefts in Chicago involved fraud. See Table C-6.

A sizable proportion of stolen motor vehicles are eventually recovered. Approximately 84 percent of stolen vehicles are retrieved within five years after the theft. However, the percent of motor vehicles recovered differs for the various motor vehicle types. The highest recovery rates have been for passenger cars; the lowest for motorcycles. See Table C-7. The comparatively low rates of retrieval for the year 1988 are due to insufficient time having elapsed between the theft and the recovery of vehicles and the recording of recovery statistics.

The number of motor vehicles stolen for export is particularly difficult to estimate because once exported, they are rarely repossessed. Only 154 stolen motor vehicles, 83 of which were automobiles, were seized by the U.S. Customs Service during export attempts throughout fiscal years 1988 and 1989. An additional 1,679 stolen vehicles, 1,209 of which were cars, were seized during reentry attempts from Mexico and Canada during the same time period [39b].

In the past, it was almost impossible to interdict stolen vehicles being sent abroad because they were not adequately identified and notification of shipment was not required in a timely manner. Shippers had up to three days after a vessel had sailed to report the shipment to the U.S. Customs

Table C-6

Estimated Distribution, Number and Value
of Passenger Cars Stolen, by Motive
(Various Sources of Information, 1988)

<u>Motives</u>	<u>Distribution Percent</u>	<u>Number^{1/} (000)</u>	<u>Value</u> Millions of Dollars (\$)	
			<u>FBI^{2/}</u>	<u>NSC^{3/}</u>
Chop Shop Operations				
Survey; and Northeastern City	10	88	450	574
Western State	11	97	496	632
Midwestern Sub.	15	132	675	861
AAMVA	16	141	721	919
Insurance Fraud				
Survey	9	79	404	515
NATB	15	132	675	861
AAMVA	23	203	1,039	1,323
Police- Midwestern City	25	221	1,131	1,441
Retagging Fraud				
AAMVA	15	132	675	861
TOTALS		883	4,518	5,756

^{1/} NCIC.

^{2/} "Uniform Crime Reports 1988," Department of Justice, FBI, 1989 (based on an average value of \$5,117 per vehicle).

^{3/} "Accident Facts 1989," National Safety Council (based on an average of \$6,519 per vehicle)

Table C-7
Percent of Motor Vehicles Recovered by Vehicle Type*

Vehicle Type	Y E A R			
	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Passenger Car	86	88	88	81
Light Trucks/Vans	77	77	77	75
Trucks/Buses	81	82	82	76
Motorcycles	63	61	60	53

* SOURCE: NCIC.

Service, and the other modes of transportation were allowed even longer periods of time in which to comply. Air carriers under bond were allowed to report to Customs seven days after vehicles were transported and rail carriers were allowed 15 days.

Sending stolen vehicles out of the country may be more difficult in the future. On May 18, 1989, the U.S. Customs Service implemented new regulations related to the exportation of used self-propelled vehicles. [39a]. The new regulations require a potential exporter to present the vehicle and documentation of lawful ownership at the port of exportation three days prior to lading when the vehicle is to be transported by vessel or aircraft, or three days prior to exportation when the vehicle is to be transported by rail.

According to NATB, another means of exporting vehicle components is through the use of shipping containers, especially prepackaged containers. Two hundred fifty Customs employees inspect between 8 and 10 million containers to be exported each year [39b]; sealed containers are seldom challenged by authorities.

Some stolen motor vehicles are never recovered. In order to approximate the number of unrecovered vehicles stolen for chop shop purposes and export, it is necessary to assume that the distributions of motivations are similar for recovered and unrecovered vehicles.

Estimations of what became of unrecovered passenger cars in 1988 have been deduced from a variety of sources. About 168,000 passenger cars that were stolen during 1988 have not yet been recovered. It is assumed that the vast majority of these vehicles were either dismantled for parts, fraudulently disposed of, or exported. If the aforementioned estimates for disassembly and fraud are correct, then between 99,000 and 137,000 passenger cars were exported during 1988.

Exported vehicles are generally not recovered. Therefore, if AAMVA estimates for exports are calculated for all stolen motor vehicles in 1988, then

4 percent of 1.2 million motor vehicles, or approximately 48,000 motor vehicles were exported. About 73 percent of all motor vehicles stolen in 1988 were passenger cars (NCIC). If the proportion of passenger cars stolen for export was the same as their proportion stolen in general, then somewhere in the neighborhood of 35,000 passenger cars were exported. Using the same logic applied to the U.S. Customs estimate of 200,000 stolen motor vehicles being sent abroad, then the number of passenger cars stolen for export can be as high as 146,000. The possible values of exported cars stretch between \$179 million and \$952 million. See Table C-8.

To summarize, between 88,000 and 141,000 passenger cars, valued from \$.5 billion to \$1.0 billion, are believed to have been stolen for chop shop operations during 1988. Between 79,000 and 353,000 passenger cars, valued from \$.4 billion to \$1.3 billion, are believed to have been stolen for purposes of fraud. Approximately 81 percent of passenger cars stolen during 1988 have been recovered. If past trends continue, more cars are expected to be recovered in the future. Using proxy measures, it is estimated that between 35,000 and 146,000 of the almost 170,000 unrecovered passenger cars were exported with a valuation between \$.2 billion and \$1.0 billion.

Table C-8
Range of Estimated Number
and Value of Stolen Unrecovered Passenger Cars
by Motivation for Theft in 1988

Motivation	Number ^{1/}	Value (Millions of Dollars)	
		FBI ^{2/}	NSC ^{3/}
Chop Shop			
Contract Study;			
Northeastern City (10%)	16,877	86.4	110.0
Western State (11%)	18,565	95.0	121.0
Midwestern Suburb (15%)	25,316	129.5	165.0
AAMVA (16%)	27,003	138.2	176.0
Fraud			
Contract Study (9%)	15,189	77.7	99.0
Chicago Police (25%)	42,193	215.9	275.1
AAMVA (38%)	64,133	328.2	418.1
Export Estimates based on Fraud and Chop Shop Estimates^{4/}			
Low Estimate (46%)	77,602	397.1	505.9
High Estimate (81%)	136,704	699.5	891.2
Export Estimates based on Judgments by:			
AAMVA (4%) ^{5/}	35,040	179.3	228.4
U.S. Customs (200,000 Motor Vehicles) ^{6/}	146,000	747.1	951.8
TOTALS	168,700	863.6	1,100.2

^{1/} NCIC; 168,700 passenger cars were stolen and not recovered in 1988.

^{2/} Based on the FBI estimate of \$5,117 per stolen vehicle.

^{3/} Based on the NSC estimate of \$6,519 per stolen vehicle.

^{4/} Lowest and highest estimates are subtracted from the total.

^{5/} As exported vehicles are not recovered, this number is based on 73% of 4% of total passenger car thefts.

^{6/} This number is based on .73 of 200,000.

SUMMARY: Market for Stolen Parts and Exports

The data necessary to determine the extent to which stolen motor vehicles are dismantled for their parts or are exported and a description of the market for such stolen parts, are not available. Consequently, estimates were made based on partial information and proxy measures.

It is believed that the potential market for stolen parts is very large. During 1988, major parts valued at about \$28.6 billion, were probably replaced in about 31.9 million passenger cars; the used/rebuilt portion of this market is thought to be in the neighborhood of \$1.6 billion. Between 88,000 and 141,000 passenger cars are presumed to have been stolen for chop shop operations; 35,000 to 146,000 are believed to have been stolen for export, and 79,000 to 353,000 are thought to have been stolen for purposes of fraud.

APPENDIX 1

PART E

THE COST OF MARKING MAJOR PARTS OF PASSENGER CARS

"(E) Information concerning the costs to manufacturers, as well as to purchasers of passenger motor vehicles, in complying with the standard promulgated under this title, as well as the identification of the beneficial impacts of the standard and the monetary value of any such impacts, and the extent to which such monetary value is greater than the costs;

1984 Theft Act

This part includes estimates of what the parts marking standard costs manufacturers and consumers, cost benefit thresholds necessary for the standard to show cost effectiveness, and a brief discussion of adhesive label removal tests.

What the Standard Requires

To impede auto theft, Congress enacted the Motor Vehicle Theft Law Enforcement Act in 1984 which called for the Secretary of Transportation to promulgate a standard which requires auto manufacturers and replacement part manufacturers to mark certain car parts with identifying numbers or symbols.

The parts to be marked are on cars designated as high theft lines beginning with the 1987 model year. No more than fourteen parts are required to be marked, and include the following - if present on the car:

- | | |
|------------------------|---------------------------------------|
| (1) Engine | (8) Right rear door |
| (2) Transmission | (9) Left rear door |
| (3) Right front fender | (10) Front bumper |
| (4) Left front fender | (11) Rear bumper |
| (5) Hood | (12) Right rear quarter panel |
| (6) Right front door | (13) Left rear quarter panel |
| (7) Left front door | (14) Deck lid, tailgate, or hatchback |

The standard requires that the Vehicle Identification Number (VIN) be used for part marking unless manufacturers were marking engines and/or transmissions with a VIN derivative - the last eight characters of the VIN - on October 24, 1984 [35]. In that case the manufacturers can continue this practice, but only on engines and transmissions. When labels are used, the VIN must be printed indelibly, and the label permanently affixed to the part. The marking, as far as practicable, is to be on interior surfaces of installed parts so that the number will not be damaged by tools used to install, adjust or remove the parts, or adjoining parts. Moreover, the location of the number is to be on a portion of the part that is not likely to be damaged in a collision, nor will be damaged or obscured during normal dealer preparation work. The number is to be visible without further disassembly of the part and must be placed entirely within a "target area" which is described by a procedure defined in the theft prevention standard.

If the label is removed it must self-destruct by tearing or making the number on the label illegible. Removing the label must also alter the appearance of the area where the label was affixed, so as to leave evidence that a label was originally present.

Attempted alterations of the number on a label must leave traces of the original number or otherwise alter the appearance of the label material. Moreover, the label and number shall be resistant to counterfeiting. A manufacturer's logo or other unique identifier must be placed in the label material so that its alteration or removal visibly alters the appearance of the label.

Other methods of part identification -- that is other than labels -- can be used, but must meet the same placement, removal and alteration detection requirements as for labels.

Replacement parts on high theft car lines must generally follow the requirements for original equipment parts with the exception that, since they

have no VIN, the registered trademark or other unique identifier of the part manufacturer, and the letter "R" must be affixed or inscribed on the replacement part. The symbol "DOT" must also be put on the replacement part to constitute the manufacturers certification that the part conforms to the theft prevention standard.

Additionally, as required by 49CFR Part 567, a certification label is affixed to the subject high theft vehicle informing the reader that the vehicle conforms to the Federal Motor Vehicle Safety Standards and Federal Theft Prevention Standards.

How Auto Manufacturers Met the Standard

The Motor Vehicle Theft Law Enforcement Act says that manufacturers shall not be required to conform to any identification system for engines and transmissions that would impose greater costs on the manufacturer than the system under use by the manufacturer on the effective date of the standard. Therefore, the Theft Prevention Standard allowed manufacturers who were identifying engines and transmissions with a VIN derivative as of October 24, 1984 to continue to do so (e.g. Ford and Chrysler use eight digit, and GM nine digit VIN derivatives).

The other 10 or 12 parts of designated high-theft lines are marked with adhesive backed labels which auto manufacturers generally purchase from three suppliers. Based on the examination of domestic and import high theft lines, the 3M Corporation supplies labels to the Ford Motor Company and to most manufacturers of imported cars. General Motors and Chrysler buy labels from the Avery Corporation and BMW uses German made labels (Beiersdorff).

Each adhesive label which measures from 5/8" to 3/4" by 2 to 2 7/8", is applied to the part during the car assembly process or at some point after the part is produced.

Since engine and transmission marking was in place before the part identification required by the Act, its cost is not taken into account in calculating the auto manufacturer's cost for anti-theft marking in accordance with Section 604(b)(1) of the Act.

How Much Does Parts Marking Cost?

Using a detailed production analysis process and factors to estimate the consumer price [7], the highest cost for a manufacturer is \$3.35 per passenger car, which in turn works out to an estimated \$5.49 for the purchaser (consumer). These values are in 1988 dollars.

The act stipulates that a manufacturer's cost may not exceed \$15 (1984 dollars) per car, which when adjusted by the Consumer Price Index as specified in Sect.604(c)(2)(B) of the Act comes to \$17.09 in 1988 dollars. Even the highest estimate of \$3.35 is well within the Act's limitation.

Average manufacturer's and consumer's costs estimated for domestic and imported 2 and 4 door passenger cars are:

Table E-1

Parts Marking Costs for High Theft Lines (in 1988 dollars per car)

<u>Type of Car</u>	<u>Manufacturer</u>	<u>Consumer</u>
Domestic 4 door	\$ 2.61	\$ 4.28
Domestic 2 door	\$ 2.19	\$ 3.59
Import 4 door	\$ 3.29	\$ 5.39
Import 2 door	\$ 2.56	\$ 4.20
Overall Sales Weighted Average	\$ 2.53	\$ 4.14

NOTE: 4 door cars have 12 sticker type labels and 2 door cars have 10 such labels. Both have stamped VIN markings on engines and transmissions, the cost of which is not included above.

Source: Evaluation of Methods and Costs to Mark Vehicle Parts for Theft Prevention. Pioneer Engineering and Manufacturing under NHTSA. Contract DTNH 22-87-C-06001.

There were 3,731,402 marked domestic passenger cars produced and imports sold in the 1988 model year. At an average of \$4.14 per car, the annual cost of parts marking to consumers is \$15,400,000.

How Can These Costs be Translated Into Savings?

Although the benefits of parts marking so far have not been measurable, the minimum monetary threshold value necessary for cost effectiveness has been estimated.

The previous section discussed the overall sales weighted average cost to the consumer for parts marking which was found to be \$4.14 per marked car in 1988 dollars. Based on the number of 1988 model cars which were required to be marked, this translates into about \$15 million in cost to the consumer annually.

In APPENDIX 1, PART C-D the average value of a stolen vehicle in 1988 was estimated to be about \$5,000. From a sample of 1988 car lines required to have marked parts, the average price of a new marked car is estimated at about \$15,000.

The required reduction in thefts necessary to achieve cost effectiveness, given the cost values per car shown above, is between 1,000 and 3,000 cars annually ($\$15 \text{ million} / \$15,000 = 1,000 \text{ cars}$; $\$15 \text{ million} / \$5,000 = 3,000 \text{ cars}$). The data available so far as discussed in APPENDIX 1, PART B do not provide statistically significant results -- the findings are inconclusive at this time. A measurable reduction in thefts is not indicated.

Can Adhesive Labels Be Removed?

Given the importance of tracing a recovered part so that it can be used as evidence of car theft requires that such a part be marked with the VIN number

of a car reported stolen. This means that the VIN marking must remain intact, or in at least a condition where the VIN is legible.

Removal or obliteration of the label would break the link between part and car, but can still point to part theft. A completely clean surface on a part which required marking could easily lead to the part being by-passed by investigators, particularly if the parts are mingled with other similar parts not required to have labels. "Clean" parts are certainly easier to sell and carry little risk of apprehension and prosecution.

During the course of gathering data and information from police theft squads it became clear from their investigation of chop shop and related operations that various methods were being used to attempt the removal of existing VIN labels.

A series of label removal tests were conducted on samples [7] made by the two leading label manufacturers. While the tests did not include every possible chemical and/or physical removal process, they did verify that applying common chemicals such as alcohol, toluene, lacquer thinner, and mineral spirits did not affect the labels.

Scraping and undercutting with a knife were successful in removing the labels but an ultraviolet scan (365NM) showed an imprint or discoloration of the area where the label had been. Abrasion tests with a stiff wire brush damaged the painted surface around the labels but had no effect on either its edges or surface. While the tests did not include every possible chemical and/or removal process, in one test it was possible to completely remove each sample label and the adhesive. These tests may have been conducted on early, since improved, labels and this potential problem is currently being studied to determine if regulatory or statutory changes are necessary.

SUMMARY: The Cost of Parts Marking

The maximum cost of parts marking to manufacturers is \$3.35 per car in 1988 dollars or one-fifth of what the 1984 Theft Act set as a limit. The maximum cost to car purchasers is \$5.49. Adhesive labels from three suppliers are used by auto manufacturers.

Between 1,000 and 3,000 fewer cars with marked parts must be stolen for the standard to be cost effective.

The labels cannot be removed by some common chemical solvents, but physical means such as scraping or undercutting will remove and destroy the label, leaving the required "footprint". One test showed that it was possible to completely remove both the label and the adhesive. This problem is currently being examined to determine if regulatory or statutory changes are necessary..

APPENDIX I

PART F

ARREST AND PROSECUTION OF CAR THIEVES

"(F) information concerning the experience of Federal, State and local officials in making arrests and successfully prosecuting persons for violation of the law set forth in Title II and III of the Motor Vehicle Theft Law Enforcement Act of 1984, in preventing or reducing the number, and rate of, thefts of motor vehicles that are dismantled for parts subject to this title, and in preventing or reducing the availability of used parts that are stolen from motor vehicles subject to this title;"

1984 Theft Act

The number of the arrests and convictions which are the direct result of the parts marking standard is difficult to measure at this time since there are only a limited number of cases that are complete. In 1988, slightly over 52,000 passenger cars with marked parts were stolen. In the past, on the average, an arrest was made in 15 percent of the theft cases. That means about 8,000 arrests are to be expected in cases involving marked cars if marking had no effect. Many of the convictions in 1987 and 1988 are likely to be the outcome of arrests made in prior years.

The following sections deal with nationwide motor vehicle arrest trends and Federal case dispositions based on prosecutions under the 1984 Theft Act. Selected Statewide arrest and disposition data are presented next. In addition, the views and experiences of judicial officials in seven "high vehicle theft" cities are discussed. Several cases are cited. Officials at enforcement agencies, motor vehicle administrations and district attorneys nationwide, were surveyed to obtain information about arrests and prosecuting car thieves, and on the extent to which parts marking played a role.

The Trend of Vehicle Theft Arrests Nationwide

Uniform Crime Reports (UCR) provide nationwide statistics on arrests for motor vehicle theft [29]. An arrest is counted every time someone is "taken into custody, notified, or cited." The number of arrests do not reflect the number of individuals arrested because a person can be arrested on several occasions in the course of a year for similar or other offenses.

In 1988, there were 208,400 arrests for motor vehicle theft, continuing a steep increase observed since 1984. As can be seen from Figure F-1, the trend over the past 17 years is not definitive, with a dropoff in the early to mid 1980's after relatively higher arrest levels in the decade of the 1970's. The onslaught of drug abuse is a contributing factor since resources had to be shifted to mobilize enforcement and confront the growing drug problem.

Another perspective is to view arrests in relation to theft. The number of arrests for every 1,000 motor vehicles stolen, using UCR statistics for total thefts is shown in Figure F-2. Arrest rates have climbed steadily since 1984 with a healthy jump from 1987 to 1988.

Law enforcement organizations use the term "cleared" when referring to an offense where at least one person is arrested, charged and turned over for prosecution. Over the past 10 years, between 14 and 15 percent of all motor vehicle thefts were cleared. By way of comparison, the overall property crime clearance rate was 18 percent in 1988. The violent crime clearance rate was 46 percent in 1988, reflecting the more intensive efforts associated with such crimes plus the availability of witnesses. Only burglary has a lower clearance rate (13.5 percent in 1988) than motor vehicle theft.

Nationwide Case Disposition

There are no nationwide conviction data; these are not collected and assembled like national motor vehicle thefts and arrests. While certain studies of

FIGURE F-1
ARRESTS FOR MOTOR VEHICLE THEFT

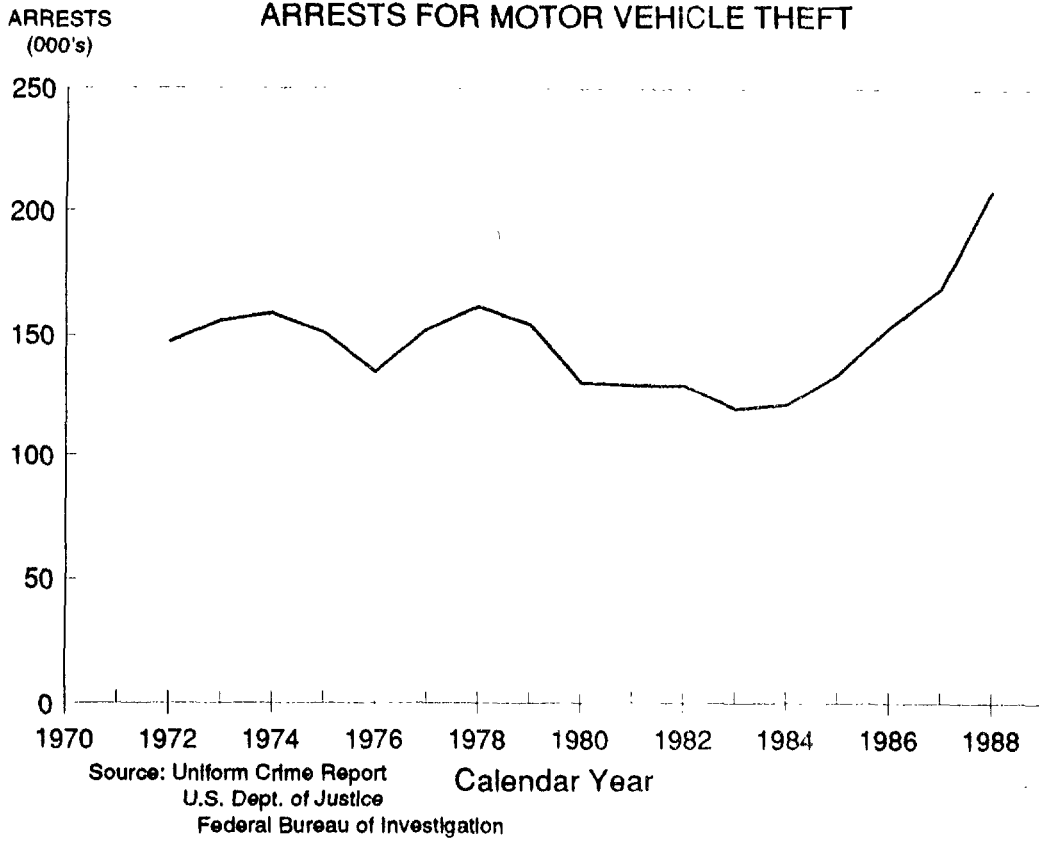
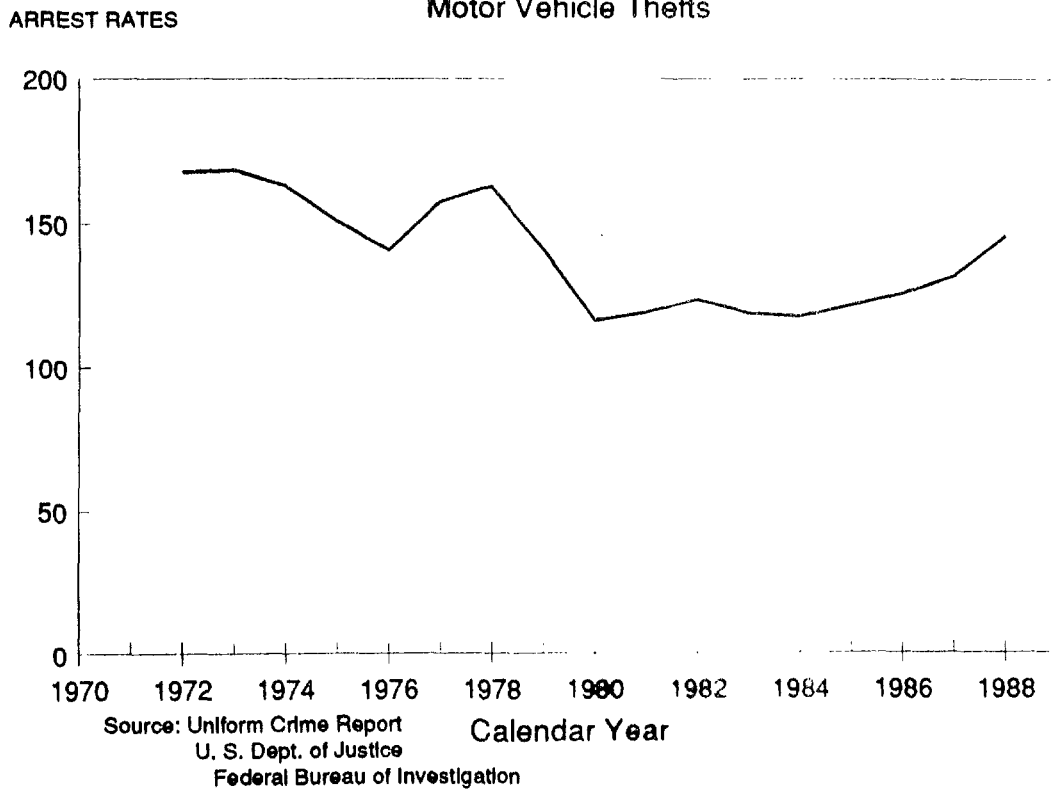


FIGURE F-2
ARRESTS per 1000
Motor Vehicle Thefts



criminal case dispositions have been made by the Justice Department, auto theft has usually been included under larceny. The studies have focused on a particular year and are therefore not useful for even short term trend analysis.

Federal case statistics are available. They are collected and computerized by the Executive Office for United States Attorneys and include motor vehicle theft case dispositions from all districts.

Federal Caseload Statistics

Titles II and III of the 1984 Theft Act established several new sections, and amendments to existing sections of Title 18, United States Code (USC). The new sections are:

- o Chapter 25 of title 18, USC.
Sect. 511. Altering or removing motor vehicle identification numbers. An existing Sect. 511 was redesignated Sect. 513 by P.L. 99-646, November 10, 1986.

Sect. 512. Forfeiture of certain motor vehicles and motor vehicle parts.
- o Chapter 113 of title 18, USC
Sect. 2320. Trafficking in certain motor vehicles or motor vehicle parts. This section was redesignated as Sect. 2321 by P.L. 99-646, November 10, 1986.
- o Chapter 27 of title 18, USC
Sect. 553. Importation or exportation of stolen motor vehicles, off-highway mobile equipment, vessels, or aircraft.
- o Part V of title IV of the Tariff Act of 1930 (19USC 1581 et seq.).
Section 1627(a)

Sect. 627. Unlawful importation or exportation of certain vehicles and equipment: inspections.

The amended sections are:

- o Section 2311 of title 18, USC. Addition of valid or blank motor vehicle title.
- o Section 2313 of title 18, USC. Insertion of clarifying language in sale or receipt of stolen vehicles.
- o Section 1961(1) of title 18, USC. Insertion of references to sections 2312, 2313, and 2320 under to definition of racketeering activity.

A computer search of case statistics for the motor vehicle theft related sections was requested from the Executive Office for United States Attorneys covering fiscal years 1985 through 1989 [43]. Since the data request was made shortly after the close of Fiscal Year 1989, that year may not be complete and the number of cases are likely to increase over the following fiscal year.

Typical Federal motor vehicle theft cases emerge from sting operations, significant theft ring investigations that involve interstate movements, export and import of stolen motor vehicles and motor vehicle parts. Most case investigations are handled by the FBI. The Customs Service is also involved, having seized 687 and 1145 stolen vehicles in FY 1987 and 1988 respectively. Most of the stolen motor vehicles were seized coming in from Mexico.

Tables F-1 and F-2 show the number of cases filed and terminated, and the number of convictions resulting from both guilty pleas and guilty verdicts under each Section for which data were available. The defendant count is also shown. Table F-1 contains the "new" Sections and Table F-2 represents motor vehicle theft sections that existed prior to the 1984 Theft Act, although Sect. 2313 was amended by the Act. The previously existing sections are:

Sect. 2312. Transportation of stolen vehicles.

Sect. 2313. Sale or receipt of stolen vehicles (which was amended by the 1984 Theft Act).

Table F-1

Motor Vehicle Theft Cases

Prosecuted by U.S. Attorneys
Under Sections Enacted by 1984 Theft Act

	Number of Cases					TOTAL :	Number of Defendants					Total	
	Fiscal Year: 1985	1986	1987	1988	1989 ^{1/}		1985	1986	1987	1988	1989 ^{1/}		
Cases Filed													
SECT. 511	8	22	42	43	33	148	:	11	32	52	70	43	208
SECT. 512	1	1				2	:	1	1				2
SECT. 553	1	1	1	7	16	26	:	2	1	1	9	32	45
SECT. 2321			1	3		4	:			1	4		5
						180	:						258
							:						
							:						
Cases Terminated													
SECT. 511	4	16	29	46	29	124	:	6	25	35	74	36	176
SECT. 512						0	:						0
SECT. 553			2	2	6	10	:			2	3	7	12
SECT. 2321						0	:						0
						134	:						188
							:						
							:						
Convictions													
SECT. 511	2	16	23	40	26	107	:	4	20	28	66	32	150
SECT. 512						0	:						0
SECT. 553			2	1	4	7	:			2	2	5	9
SECT. 2321						0	:						0
						114	:						159
							:						
							:						

^{1/} FY89 cases recorded through October 1989. Additional entries into system expected through 1990; FY89 totals not complete.

SOURCE: U.S. Department of Justice
Executive Office for United States Attorneys

Table F-2

Motor Vehicle Theft Cases

Prosecuted by U.S. Attorneys
Under Sections Enacted Prior to 1984 Theft Act

	Number of Cases						Number of Defendants							
	Fiscal Year:	1985	1986	1987	1988	1989 ^{1/}	TOTAL :	1985	1986	1987	1988	1989 ^{1/}	Total	
Cases Filed														
SECT. 2312		179	214	142	168	136	839	:	250	328	240	318	231	1367
SECT. 2313		66	69	45	49	43	272	:	101	93	60	57	62	373
							1111	:						1740
								:						
								:						
Cases Terminated														
SECT. 2312		188	212	156	163	147	866	:	269	334	230	310	275	1418
SECT. 2313		73	66	58	47	41	285	:	99	95	77	61	60	392
							1151	:						1810
								:						
								:						
Convictions														
SECT. 2312		151	179	134	119	120	703	:	227	280	193	199	218	1117
SECT. 2313		47	52	48	38	39	224	:	67	74	63	50	57	311
							927	:						1428
								:						
								:						

^{1/} FY89 cases recorded through October 1989. Additional entries into system expected through 1990; FY89 totals not complete.

SOURCE: U.S. Department of Justice
Executive Office for United States Attorneys

As can be seen, most of the cases filed were prosecuted under Sections 2312 and 2313 of Title 18, USC. Over 1000 cases were filed since 1985, and 1428 defendants were convicted.

The motor vehicle theft cases prosecuted under the sections enacted by the 1984 Act totaled 180 since 1985, and 159 defendants were convicted. Most of the cases were prosecuted under Section 511 - altering or removing motor vehicle identification numbers.

While cases filed under the sections enacted by the 1984 Act are relatively few, these have been increasing each year since 1985.

State Theft Case Disposition Trends

Several States maintain data systems that record statistics on motor vehicle theft case dispositions. Each system is unique, operating under rules and limitations of the State's respective reporting practice. In order to obtain some measure of the trend in motor vehicle theft case dispositions, data from several States are presented [4,10,14,16,17,18,26]. The data are summary statistics and it is not possible to tell whether or not parts marking played a role in prosecuting cases.

Motor vehicle thefts, arrests and convictions for each of four States are shown in Table F-3. Only a few States collect and compile case disposition data on motor vehicle theft cases. The fact that many States do not have specific motor vehicle theft statutes is one reason for this. The theft and arrest data in Table F-3 are from Uniform Crime Reports; convictions were obtained directly from state agencies. Each State has a procedure for collecting, classifying, compiling and tabulating case conviction statistics. The percentage of court jurisdictions, within each State that regularly report to the responsible State agency, also varies

among States. Conviction statistics are usually a count of the most severe sentences handed down in a case; not all guilty defendants are included. Therefore, no comparisons of arrests, convictions and their respective rates, can be made between States.

The arrest and conviction rates shown in Table F-3 were calculated on the assumption that a consistent reporting procedure exists within each State. It is not certain that this is a valid assumption, and no percentage rate changes were calculated.

The motor vehicle crime index provides an indication of the motor vehicle theft problem and its changes. It relates thefts to population. In three States the crime index increased considerably, but arrests for motor vehicle theft have generally kept pace. Rapid and significant motor vehicle theft increases are bound to create a lag in convictions for arrested offenders, because it takes a year or even longer to bring a case to trial.

The four States represent 27 percent of all motor vehicle thefts (including attempted thefts) and over 25 percent of all arrests. A very rough estimate is that there are probably no more than 35,000 cases each year in which at least one defendant is convicted of motor vehicle theft. Based on the ratio of convicted defendants to case convictions shown in Table F-1 and F-2, it is estimated that there are no more than 50,000 defendants who are convicted for motor vehicle theft each year.

Within each State's theft statutes there is a range of penalties that can be used for sentencing convicted car thieves. Information on the most common types of penalties is shown in Table F-4. A prison sentence means one or more years in a State penitentiary. For penalties of less than a year, the term "jail" is used and usually means detention in a county or city facility. States may grant probation on the condition that at least a term in jail is served, and some of the statistics that were received

Table F-3
Thefts, Arrests and Convictions for
Selected States

	<u>1983</u>	<u>1988</u>	<u>Percent Changes</u>
California			
MV Thefts ^{1/}	158,904	265,975	67.4
Arrests ^{1/}	23,753	43,771	84.3
Arrests/1000 Thefts	149.5	164.6	
Convictions ^{2/}	3,995	6,417	60.6
Convictions/1000 Arrests	168.2	146.6	
MV Crime Index	631.1	944.0	49.6
Georgia			
MV Thefts ^{1/}	16,050	35,502	121.2
Arrests ^{1/}	1,842	3,393	84.2
Arrests/1000 Thefts	114.8	95.6	
Convictions ^{3/}	221	260 (1987)	17.6 (1987)
Convictions/1000 Arrests	120.0	190.3 (1987)	
MV Crime Index	280.0	554.6	98.1
Michigan			
MV Thefts ^{1/}	66,894	68,920	3.0
Arrests ^{1/}	3,579	3,847	7.5
Arrests/1000 Thefts	53.5	55.8	
Convictions ^{4/}	1,211	1,409	16.4
Convictions/1000 Arrests	338.4	366.2	
MV Crime Index	737.6	741.1	0.5
Minnesota			
MV Thefts ^{1/}	8,663	14,609	68.6
Arrests ^{1/}	1,180	1,941	64.5
Arrests/1000 Thefts	136.2	132.9	
Convictions ^{5/}	364	626	72.0
Convictions/1000 Arrests	308.5	322.5	
MV Crime Index	209.0	339.3	62.3

^{1/} Uniform Crime Reports - 1983 and 1988.

Federal Bureau of Investigation

^{2/} Bureau of Criminal Statistics, California Department of Justice.

^{3/} Georgia Crime Information Center, Georgia Bureau of Investigation.

^{4/} Michigan Department of Corrections Annual Report.

^{5/} Statistical Analysis Center, Minnesota Department of Criminal Justice.

use the classification "probation with jail". The same caution applied to data in Table F-3 applies to Table F-4: comparisons between States are not possible because definitions of penalties and the way statistics are compiled vary from State-to-State.

There are only relatively small changes in the proportion of types of penalties for convicted car thieves. A somewhat larger number of defendants were sentenced to prison in 1988 compared to 1982. The other penalty categories are difficult to interpret because probation may or may not include a short jail term.

On the average, it appears that one in four penalties are for a prison term of a year or more. That means about 12,000 out of the estimated 50,000 convicted defendants serve time in prison. Since one in four arrested offenders are convicted, the chances of serving one or more years are 1 in 16. When stealing or attempting to steal a motor vehicle the odds are one in a hundred for going to prison for a year or more.

The Effect of Parts Marking on Arrests and Prosecution of Motor Vehicle Thieves

At the end of 1988 there were still only a relatively small number (slightly more than 4 percent) of motor vehicles on the road that had marked parts. Tracing arrest and disposition data involving such parts as case evidence proved to be extremely difficult. Collecting sample data by following arrest cases through the circuitous judicial processing route would have taken enormous resources and time if the objective was to collect a sufficient sample for statistical analysis [8].

Table F-4

Penalties
Distribution in Percent

	<u>1983</u>	<u>1988</u>	<u>Change</u>
California ^{1/}			
Prison - 1 yr or more	14.7	18.2	+3.5
Jail - under 1 yr	11.7	7.9	-3.8
Probation w/Jail	62.0	67.9	+5.9
Probation only	9.8	5.1	-4.7
Georgia ^{1/}			
Confinement	37.4	31.0 (1987)	-6.4
Probation	42.1	45.4 (1987)	+3.3
Fines	20.2	22.3 (1987)	+2.1
Michigan ^{1/}			
Prison	19.6	28.7	+9.1
Jail	18.7	13.8	-4.9
Probation	52.8	45.6	-7.2
Minnesota ^{1/}			
Prison	12.9	24.6	+11.7
Jail	57.4	58.5	+1.1
Probation	25.8	15.8	-10.0

Number of Incarcerations

Illinois ^{2/}	208	801	^{5/}
Massachusetts ^{3/}	277	322 (1987)	+16.2 (1987)
Ohio (Fiscal Year) ^{4/}	379	385	+1.6

^{1/} Ibid, Table F-3^{2/} Illinois Department of Corrections^{3/} Committee on Criminal Justice, The Commonwealth of Massachusetts.^{4/} Department of Rehabilitation and Correction, State of Ohio.^{5/} In 1984 Motor Vehicle Theft was changed from a Class 3 to a Class 2 felony. This increased the number of prison sentences significantly beginning in 1986.

After trying other approaches, an attempt was made to collect case data through site visits to seven "high" motor vehicle theft cities -- Boston, Chicago, Houston, Los Angeles, Miami, New York and Philadelphia. These seven cities account for 25 percent of the nation's motor vehicle thefts. The purposes were to see what data on convictions could be gathered and to try to identify and describe actual cases where marked parts had been used as evidence in making arrests and in obtaining convictions.

The procedures used to sample arrest and court files varied from city to city. Arrest records are typically cross-referenced and stored by crime, allowing motor vehicle theft records to be identified. Court cases are not cross-referenced, and not stored by charge. The approach taken was to record names of arrestees, as well as characteristics of the stolen vehicle such as model year, make and model. Names of the arrestees were then given to court clerks who pulled cases from storage. For many cases, disposition information was not available because some cases were still pending, court actions were transferred to another State, or charges were dropped. In most of the arrest cases, however, final dispositions were eventually found. Unfortunately out of a total of 326 arrest cases in all seven cities, there were only two convictions for thefts of marked cars. Moreover, it was not clear whether parts marking was the evidentiary basis for prosecution and conviction.

This approach clearly did not yield much. It is probably too soon to expect sufficient cases involving marked parts to appear as completed cases since it often takes over a year before offenders move through the busy court systems -- particularly in large cities.

There were, however, cases where investigators have used parts marking to identify stolen cars and make arrests. Eight such cases that were pulled from police department arrest files in the seven high-theft cities are

described below:

Case 1

Investigators conducted an investigation of a chop-shop based on the unusually large number of abandoned vehicles in the area. When they conducted a search of the establishment, they discovered several 1987 and 1988 General Motors parts (Camaro, Cutlass, Firebird) and a 1987 Toyota Camry part with the labels intact. Using the labels, they were able to identify several of the original stolen vehicles. Investigators then used fingerprints to link the parts to the garage owners. They were arrested, prosecuted, and convicted after pleading guilty. Two defendants received prison terms and the third was put on probation.

Case 2

Investigators successfully used the labels in an inspection of a body parts establishment. They discovered two matching doors in the yard that had their labels intact. The officers believed that the thief had overlooked these labels because of their hard-to-find location beneath the door. Using the labels, they identified the parts as having come from a stolen vehicle, and arrested the owner of the shop.

Case 3

Detectives conducted a long term investigation of a thief known to specialize in luxury automobiles. During a search, officers discovered a Mercedes 560SL in his garage. The Mercedes had all visible means of identification removed from it. Finally, they checked for a label in a location often overlooked by thieves. They discovered a label, and based on this alone, were able to identify the vehicle as stolen. After further investigation, the subject was charged with 35 count of receiving stolen vehicles, and was sentenced to 6 years and 3 months in prison.

Case 4

During a repair of his 1988 Oldsmobile Delta 88, the owner painted over the label on the front fender. The vehicle was later stolen by a thief who removed all visible means of identification. The vehicle was partially stripped and abandoned. When they recovered the vehicle, police were initially unable to identify the ownership because there were no visible VINs. However, an experienced auto theft investigator realized that the fender had been painted. He scraped off the paint on the fender to find the label. The vehicle's origin and ownership were identified.

Case 5

Detectives used the lack of labels in an investigation of an attempted fraud involving a BMW 325i. The owner of the vehicle stripped the car himself, abandoned the hull, and reported it stolen in order to collect on the insurance policy. The car was insured for \$32,000. Later, he repurchased the salvaged hull and rebuilt the car. He then took the car for servicing to the dealership where he originally purchased it. The police received an anonymous tip that the labels were missing from the parts of the BMW. Detectives conducted an investigation, and although the labels were removed, they were able to match paint samples from the caulking where the front fender was originally removed to prove that the parts on the car were the original manufacturer's parts. The subject was arrested and charged with attempted fraud.

Case 6

An undercover police officer was posing as an illegal tow operator. In this operation, thieves would hire the undercover officer to steal cars by towing them away. In one case, the officer observed a thief scraping off

a label of a 1987 Lincoln Continental. When asked what he was doing, the thief responded "I don't want a felony". The thief was subsequently arrested for auto theft and VIN tampering.

Case 7

Police obtained a warrant to search a junk yard. Inspection of premises uncovered a 1988 Cadillac DeVille with the VINs removed. Upon closer inspection of the vehicle, police found a label on the left side of the front bumper. Two subjects were arrested and charged with multiple counts of possession of stolen property.

Case 8

While conducting an inspection of a junk yard, investigators discovered that the owner did not have a license to operate the business as required by State law. While checking the premises, investigators found several stolen vehicles (identified by public VIN). They also found two doors where the Federal EPA stickers had been removed. However, investigators were able to make an identification based on the labels that were left intact on the bottom of the doors. The doors belonged to a 1987 Chrysler LeBaron that had been reported stolen six months earlier.

A Survey of Enforcement Agencies

Auto theft investigators, motor vehicle administration officials, and district attorneys were surveyed about procedures related to information collection, arrests, and prosecutions, convictions and sentences, of motor vehicle thieves.

The survey was designed so that estimates could be made of nationwide motor vehicle theft, arrest, and conviction patterns during the years

1984-1988. In all, 11 States and 31 counties were chosen for inclusion. The States selected were: California, Texas, New York, Connecticut, Florida, Arizona, Colorado, North Carolina, Georgia, Nevada, and Virginia. More details on the sampling procedure counties and how the survey was conducted are described in [8].

Since this was a telephone and mail survey, every effort was made to elicit responses from individuals working on motor vehicle theft such as investigators in auto theft squads. Respondents from motor vehicle administrations were mainly administrative officials, one third of whom were involved in auto theft investigations.

An important fact that must be taken into account when reviewing the survey results, is that State and local agencies operate under laws different from each other and from federal law. References to the "1984 Theft Act" in the survey and this section refer to the parts marking requirement mandated under the Act.

The following topics cover typical practice and experience in day-to-day motor vehicle theft prevention operations.

Monitoring and Inspection of Auto Parts Businesses

Three quarters of the law enforcement agencies surveyed do not routinely monitor body shops, dismantlers, salvage yards, wrecking yards or automobile dealers due to lack of personnel. In most agencies, one or two detectives work on all the auto theft cases. The large volume of auto theft and the low number of police investigators explain the low arrest and conviction rates. The problem is predominantly in urban areas where auto thefts are rising rapidly.

The other respondents (24 percent) report performing random on-site inspections of body shops. State statutes that allow inspections are

rarely utilized fully. Ten percent of the agencies say they monitor salvage yards in addition to body shops. Five percent monitor abandoned vehicle reports and tow logs. Again the lack of personnel is cited as the main reason for not conducting a more extensive inspection program.

Detectives working on auto theft are well informed about parts marking and which parts are required to be marked. Those units which conduct random inspections report having received specialized training detailing the location of VIN labels and detecting whether labels had been removed. Enforcement agencies report that they have also received literature and assistance from either the National Automobile Theft Bureau (NATB) or specific manufacturers describing the location of VIN labels.

State Motor Vehicle Administrations (MVA's) are also involved in monitoring business premises primarily to check for compliance with licensing requirements. Half of the MVA's reported that they conduct random on-site inspections and one fourth of the respondents - mostly field investigation units - use auto theft reports and other information to identify stolen vehicles and parts when they monitor dismantling operations.

No changes in monitoring operations have taken place during the past 5 years.

Motor Vehicle Theft Investigation Experience

Nearly half the respondents (43 percent) reported a "significant" increase in the number of motor vehicle thefts within the past 2 to 3 years (1987-1989). Moreover, nearly 20 percent of the law enforcement agencies reported that their top twenty high theft vehicles are consistently different from the high theft cars identified nationally. Older model passenger car lines along with popular light trucks and 4-wheel drives are frequent targets of thieves. Recovery and arrest trends were not addressed by respondents.

The number of juveniles participating in motor vehicle thefts increased in 24 percent of the surveyed jurisdictions.

Thirty eight percent of the law enforcement officers surveyed expressed a strong, favorable reaction to labeling parts because the additional information labels provide to the investigator. With a VIN label an investigator can determine the vehicle or part origin and assess whether or not these were stolen. The footprints left by a removed label were thought by respondents, to signal the need for further investigation.

Fourteen percent would prefer "imprinted" VINs - stamped, or etched, rather than adhesive labels. A similar percentage foresee the Act having an impact if all passenger car lines were required to have marked component parts. Five percent of the respondents were unaware of parts marking. The remaining law enforcement officers did not express any views on the standard.

All respondent investigators from Motor Vehicle Administration field units stated that labels increased their latitude in tracing the origin and ownership of stolen motor vehicles. One fourth of these investigators attributed an increase in the number of recovered cars to parts marking. They also stated that auto thieves appear to be shying away from vehicles with marked component parts. A few respondents (12.5 percent) believe labels have deterred car thieves from disassembling motor vehicles and reselling parts and feel that while parts labelling have not yet benefited MVA's, there is the potential to do so within the next few years.

Enforcement Resources

A recurring theme in law enforcement and other public agencies is the shortage of resources. The survey responses were no exception, but an attempt was made to obtain estimates of investigative strengths in the sample jurisdictions.

Investigators Allocated to Motor Vehicle Theft

	<u>Average No of Auto Theft Investigators</u>	<u>Average Total No. of Crime Investigators</u>	<u>Percent Assigned to Auto Theft*</u>
Total	2	38	4
Urban	3	46	6
Suburban	0.25	28	4
Rural	0	11	0

* Weighted average across all jurisdictions

All respondents said that no analysts work exclusively in the auto theft area; 30 percent reported the assistance of a clerk, investigative aide or cadet.

Nearly 40 percent of the sampled jurisdictions have either a special unit or task force that handles auto theft cases and 10 percent of the jurisdictions allocate special funds or purchase special equipment to prevent motor vehicle theft.

One quarter of the respondents conduct "sting" operations periodically to apprehend violators. On the opposite side of this response is that a quarter of the counties surveyed maintain that auto theft is not a priority within their agencies -- most in urban areas and that the main reasons for this is lack of funds, personnel and a lack of interest since police resources are directed to fight other crimes such as drug use and distribution.

Penalties

In order to get information on the extent penalties are actually imposed for motor vehicle theft convictions, site visits were made to several

"high theft" cities. From a sample of cases in each city the sentence given to each convicted offender was obtained. As expected, penalties are relatively light. In three of the cities the convicted offender will not serve any time in jail. In the other four cities jail terms range from one to two years. A comparison of actual to maximum allowable penalties was made for four of the cities.

For all four cities, the actual penalties were substantially lighter than the maximum allowable. This is an expected result since the maximum sentence is normally reserved for multiple or repeat offenders. Many persons arrested for motor vehicle theft are first or second time offenders and draw lesser penalties and in other cases there is the frequent practice of plea bargaining to speed motor vehicle theft cases through the court system.

Comparison of Maximum and Actual Penalties

<u>City</u>	<u>Auto Theft Charge (1)</u>	<u>Maximum Penalty (2)</u>	<u>Most Common Actual Charge (3)</u>	<u>Actual Penalty (4)</u>
A	Theft	10 yrs. prison \$500 fine	Theft	3 yrs. prison
B	Larceny	7 yr. prison	Criminal Possession of Stolen Property	1 yr. prison and 2 yrs. probation
C	Grand Auto Theft	3 yrs. prison	Receiving stolen Stolen Property	3 yrs. probation
D	Grand Theft	5 yrs. prison	Grand Theft	1 yr. probation

- (1) From Statute - Official charge used against individual caught stealing a motor vehicle.
- (2) From Statute - Maximum penalty for persons convicted of official charge.
- (3) From Court Records - Of all charges reviewed in motor vehicle theft court records, this was the most frequent.
- (4) From Court Records - Of the penalties imposed for the most common charge, this was the most frequent.

Effects of Parts Marking on the Prosecution, Conviction and Sentencing of Car Thieves

Nearly all of the district attorneys (96 percent) surveyed either did not comment upon, or recorded no change in the prosecution, conviction and sentencing of violators due to parts marking requirements. One district attorney described a case in which a labeled component part was used as evidence to convict an auto thief. In the case, an engine part with a label was stolen from one car and installed in another. The label was used as evidence to convict the subject of a misdemeanor offense.

Sixty five percent of the district attorneys surveyed stated that first time offenders are given either a suspended sentence, fine, or probation, while only subsequent offenders are given jail terms, confirming the findings from court data discussed in the previous section.

Nearly 40 percent of the district attorney's surveyed were unfamiliar with the 1984 Act and 26 percent stated that because of the nature of their rural jurisdictions, there were few arrests for auto theft and hence few prosecutions. Seventeen percent of the district attorneys reported that most auto theft cases which they prosecuted concerned joyriding.

SUMMARY: Arrest and Prosecution of Car Thieves

The number of persons arrested for motor vehicle theft has risen dramatically since 1984. More than 208,000 arrests were made, nationwide, for the theft or attempted theft of a motor vehicle in 1988. The rate of arrest - arrests for every 1,000 vehicles stolen - has also risen since 1984, but has not quite reached the level displayed in the seventies.

The 180 federal cases which were prosecuted under the new sections of the 1984 Theft Act, involved 258 defendants and resulted in 159 convicted defendants. There were 1,111 cases (1,740 defendants) filed under existing U. S. motor vehicle theft related sections, which resulted in 927 convictions and 1,428 convicted defendants over fiscal years 1985 through 1989. These cases are primarily brought after major FBI investigations.

No other national prosecution data are available on cases involving the parts marking standard. Based on statistics from several states it is estimated there are no more than 35,000 motor vehicle theft cases each year resulting in convictions and 50,000 convicted defendants. One fourth of these serve a year or more in prison. Overall, it is estimated that the chances of drawing such a sentence is 1 in 17 when arrested for auto theft.

Even though no statistical analyses are possible so far, a number of cases were cited where marked parts helped to apprehend car thieves. Investigators have been able to use labels in chop shop cases, inspections of salvage yards, steal to order operations, and insurance fraud.

A survey of State and local enforcement and motor vehicle administration (MVA) investigators, and district attorneys found that while investigators are well informed about the parts marking requirement, there are not enough people to inspect salvage yards, dismantlers, wrecking yards, body shops and car dealers. Training in what to look for and where to look is provided by respective departments, police academies and the NATB. Even

MVA investigators only conduct random on-site inspections to monitor compliance with licensing requirements.

Most of the investigators have their hands full processing motor vehicle theft cases. Some of them reported that what are considered "high theft" vehicles nationally do not match their own area's top twenty - identifying older cars, light trucks and 4-wheel drives as frequent targets.

There is, generally, a very positive response to the parts marking requirement. Many believe VIN markings on parts help the investigator trace stolen cars and improve the recovery rate. Some would, however, prefer that the VIN be engraved, etched, or stamped on a part.

Despite the relatively broad support for marking parts, the lack of a sufficient number of auto theft investigators is a recurring theme. While most urban areas have auto theft investigators organized into special units or as part of auto theft task forces, there are many jurisdictions which consider auto theft a low priority because the drug crisis and violent crime are consuming most of their resources.

APPENDIX 1

PART G

COMPREHENSIVE INSURANCE PREMIUMS AND PAYOUTS FOR VEHICLE THEFT

"(G) information concerning the premiums charged by insurers of comprehensive insurance coverage of motor vehicles subject to this title, including any increase in such premiums charged because a motor vehicle is a likely candidate for theft, and the extent to which such insurers have reduced for the benefit of consumers such premiums as a result of this title or have foregone premium increases as a result of this title;"

Comprehensive insurance coverage pays for physical damage or loss when a car is stolen or damaged by fire, floods or other perils. One of the objectives of the Motor Vehicle Theft Law Enforcement Act of 1984 is to reduce comprehensive insurance premiums by reducing the cost of theft claims. This Part includes a description of comprehensive insurance coverage; how comprehensive insurance rates are set and their relationship to theft claim payments; analyses of the effect the Act has had on auto theft claim payments; trends observed in comprehensive premiums; and what actions insurers have taken to reduce premiums due to a reduction in thefts of motor vehicles.

Since one of the purposes of the Theft Act is to stimulate lower consumer costs for automobile comprehensive coverage, it is important to understand what this type of insurance includes, how it relates to other kinds of insurance, and how vehicle theft claims may influence these rates. The first section of this Part provides an overview of the methods insurance

companies use to categorize their overall insurance risk and how these procedures would be affected by variations in auto theft claims. The next section discusses how these methods may form a basis for setting rates and for changing these rates based on claims loss experience.

When an insurance company experiences a substantial increase in comprehensive claims payments, an increase in the premiums charged for the insurance will be required to cover the additional expenses. To examine how comprehensive insurance premium costs might be expected to change when theft claim losses change, the results of analyses on actual theft claims, representing theft loss experience before and after the parts marking requirements became effective, are presented. Changes in the frequency or amount of theft claims can be expected to affect insurance premiums in two ways, either by changing the loss experience and thereby reducing comprehensive insurance costs "across the board," or by changing the risks associated with individual car lines, and therefore, their risk classification.

The analyses presented explore changes observed in actual claims payments for marked vehicles and a control group before and after parts marking began. Average claims payments were analyzed to determine if vehicles with marked parts showed any changes. These loss payments are related to insurance premium costs to determine whether the requirement for marking parts produced any changes beyond what would have otherwise been expected. Vehicle recovery and condition were examined to determine the effect on claims losses.

Finally, the last two sections examine comprehensive insurance premium trends and changes observed among various companies, vehicles, geographic areas, and states. Actions that insurance companies have taken to reduce premiums or theft losses are also reviewed.

Comprehensive Insurance Coverage and Its Relationship to Other Insurance

As part of the information gathering activities performed for this report, a study was conducted [42] to analyze insurance ratemaking processes and comprehensive premiums over the 1983-1986 period. The study examined the submissions that insurance companies make to states to support their rates (rate filings) and that were provided to NHTSA under the Insurer Reporting Requirements Standards promulgated in accordance with the Theft Act. Findings based on the information assembled in the study are discussed in this section.

Policies insuring only against vehicle theft are not generally written for private passenger cars. Vehicle theft is covered as part of the automobile's comprehensive policy. This type of policy includes coverage for a number of other perils such as floods, fires, malicious mischief, vandalism, and glass damage. These events are not related to motor vehicle collisions.

Most insurers establish rates for comprehensive coverage on a statewide basis by considering the total loss experience for comprehensive claims. Losses due to specific causes, such as vehicle theft, are not usually considered.

An individual insurer's own theft loss experience may be insufficient to determine adjustments in that company's comprehensive rates. In fact, an insurer's total loss experience may be insufficient as a basis for comprehensive rates. These insurers may rely on aggregate loss experience of many companies as compiled by rating organizations such as the Insurance Services Office (ISO).

Because comprehensive losses entering the ratemaking formulas are not differentiated by the cause of loss, the ratemaking formulas are also not differentiated. Therefore, no empirical basis could be devised for allocating comprehensive premium costs by the type of loss, such as motor vehicle theft. Consequently, it is difficult, if not impossible, to segregate the actual portion of the comprehensive premium due to vehicle theft.

For most companies, the best estimate of the proportion of the comprehensive premium cost to provide theft coverage is the proportion of vehicle theft losses to total comprehensive losses. Based on information supplied by insurers in response to the Insurer Reporting Requirements Standards promulgated in accordance with the Theft Act, the proportion of comprehensive dollar losses due to motor vehicle theft was 38 percent in 1985 and 40 percent in 1986. These are only rough estimates.

Insurance premiums vary considerably from state to state depending on how insurance is regulated, marketing strategies and other factors. For the State of Maryland, the portion covering the comprehensive insurance is about 15 percent of the total premium amount for auto insurance. Applying the estimate for the portion of comprehensive losses that results from theft (about 40 percent) suggests that expenditures for thefts represent about six percent of the total consumer cost for auto insurance ($.40 \times .15 = .06$). The other components of auto insurance include collision damage to the insured vehicle and liability for damage to other property and vehicles, and injuries, plus other coverages like medical expenses and uninsured motorists that may be optional or required by only some states.

In establishing rates for specific models, insurance companies consider several factors including the price (or replacement value) of the vehicle, its damageability, relative cost to repair, and any high performance features. Damageability and relative cost to repair compared with other vehicles is usually determined by examining costs for collision claims. Consequently, the rate charged for comprehensive insurance for a particular model may be based in part on the claims experience for another type of insurance -- collision, which does not have any implicit or explicit relationship to the cost of claims for theft.

In the same manner, factors such as driver age, sex and driving record, how many miles driven and the like, are used to adjust the rates charged for a particular policy. These factors also have little or no

relationship to the cost of claims for thefts, since they are determined by examining the claims experience for collision and liability as well as those for comprehensive coverage. The other two types of coverage represent a much larger share of overall insurance losses than theft claims or even comprehensive claims.

How Rates are Determined for Comprehensive Premiums

The discussion following represents an overview of ratemaking procedures as summarized in the study [42] mentioned previously. The rate filings obtained from five insurance companies were used for an actuarial analysis. The results of this analysis (discussed in the following section) do not necessarily represent each insurer's approach. While individual insurance companies can be expected to vary their procedures, the following represents the results of the study and would apply to a substantial number of comprehensive policies, given the size of the insurance companies that were studied.

Ratemaking techniques vary across the country because of differing state regulations. It is not surprising to find that rates are significantly different among states for the same vehicle, driven in the same situations by the same types of drivers.

Some states allow open competition, only requiring rate justifications to be filed for information purposes. Rates and rating factors generally must be submitted, but no formal approval is required before using the rates. In these states, complete freedom is allowed in setting prices.

Other states restrict the prerogatives insurers have to set rates and use a prior approval system for ratesetting. Rates must be filed with full supporting documentation and must be approved before they can be used. In certain states not only the rate levels but also the ratemaking methodology is controlled.

In the most restrictive states, an Insurance Commissioner sets the rates. There is no approval process since the rates are prescribed by the Commissioner. Insurance companies may elect to offer coverage or to discontinue insurance in these states but otherwise have few, if any, options for deviation.

In addition to the differences in state regulations that affect ratemaking, there are differences in the way insurers calculate their rates. Some companies use ratemaking factors established by ISO and adjust these factors to their own anticipated loss experience. Other insurers have their own factors that they independently derive. Even when companies use the same rating organization, premiums may vary because of differences in anticipated losses or expense needs.

Regardless of the specific methodology employed, the first step in the ratemaking process is to determine the overall state average premium change that is required. This determines how much the rates will change on a statewide basis. To establish these rates, a needed premium revenue based on prior years' experience is compared with actual earned premiums brought to the present rate level. Both losses and expenses which make up the needed premium revenue are adjusted to reflect the level of costs projected to be in effect when the new rates are to be enforced.

Within this process, there is normally no differentiation of the loss experience according to the cause (such as theft, vandalism, flood, etc.). The only exception would be catastrophic losses, where a great number of vehicles were damaged in a single incident, such as a hurricane. In such instances, losses in excess of a certain amount may be excluded.

Statewide rates are generally established for a number of "rating symbols." A rating symbol is a designation which principally reflects the

vehicle's original cost and possibly its damageability and repairability. Individual models are assigned rating symbols. The symbol assigned to a specific model may be adjusted to reflect the vehicle's combined collision and comprehensive loss experience on a statewide basis. Since the major cost of the combined experience comes from collision damage, rating symbols often correlate more closely to that coverage as opposed to the theft experience represented in the comprehensive losses.

Next, the statewide rates are adjusted on the basis of loss experience in different geographic areas which include urban, suburban and rural territories. This process determines the relative loss experience of each territory based usually on aggregated collision and comprehensive claims. When a change in premium income is required, the change is distributed to all territories and balanced so that the desired statewide change is achieved. This process does not necessarily take into account any shifts in losses due to territorial factors, although these shifts would affect the underlying data. The distribution of claims losses according to territory is determined independently of other factors such as cause of loss, vehicle characteristics, or driver characteristics. The major objective is to distribute the rates so that the earned premiums will be sufficient to cover losses and expenses. Theft experience is recognized only to the extent that it is implicit in the underlying data.

Comprehensive insurance rates in most cases, are higher in urban territories than in rural ones. It could not be determined from rate filings submitted by insurance companies how much of this difference was attributable to thefts. However, theft losses, as represented in comprehensive insurance claims payments, do affect this difference to the extent that theft claims are greater in urban areas. The greater magnitude of the theft problem and its costs in urban areas will therefore, be implicitly reflected in the claims loss data that is used in setting rates. Similarly, any difference in buying patterns, or other factors that may effect the mixture of car lines among territories, will also be reflected in the claims loss data.

Thus, throughout various stages of the ratemaking process; at the state level, territory level or vehicle (symbol) level, there is seldom an analysis of the cause of the specific loss elements of the experience. If such a study is done, it is normally for internal company use, as opposed to rate filing purposes.

Very few of the insurance companies submitting Insurer Reports under Section 612 of the Theft Act assess any surcharge or premium penalty to high theft vehicles. Even when such charges are applied, they are not based specifically and solely on actual theft loss experience, but rather on such things as: potential for high comprehensive coverage losses of all kinds; vehicle performance and design characteristics, and production levels; availability of replacement parts and associated repair costs.

The method most commonly cited by insurers to assess premium penalties for lines with large loss experience is the ISO Vehicle Series Rating (VSR) procedure. This procedure is used to raise or lower a vehicle's rating symbol based upon observed loss experience. However, this procedure is based upon a number of factors influencing loss potential and is not tied solely to the likelihood of theft. Thus, the procedure can not be used to develop discounts or penalties which specifically recognize a vehicle's theft loss potential.

Theft losses represent less than half of the comprehensive coverage claims losses. When collision claims losses are added, the share of these aggregated claims caused by theft is less than 20 percent, since collision claims represent a larger loss than comprehensive losses. Changes in theft losses may only affect about one fifth of the basis used to calculate rates for the insurance to cover those losses. These changes would probably result in only small differences in the aggregated claims. A ten percent change in theft losses might produce only a two percent change in aggregated claims losses. Furthermore, any benefits obtained from parts labeling in reducing insurer theft losses might be dispersed to

provide lower insurance premiums for other lines as well. The benefits achieved could well apply to rates for unmarked vehicles as well as the rates for those vehicles that were responsible for the benefit. This dispersion of potential effects would reduce the relative size of the benefit, making it much harder to detect.

Any reductions in premiums could only be expected to occur to the extent that reductions in theft losses are not offset by increases in other losses insured under comprehensive coverage. When comprehensive insurance rates are determined, the losses occurring from theft claims in most cases are not distinguished from losses due to other calamities or risks. Theft losses represent about 40 percent of comprehensive claims payments and probably less than 20 percent of the aggregated comprehensive and collision claims payments used to formulate rates. Picking out the changes in comprehensive rates related only to thefts from all the other factors that affect insurance rates, is tentative at best. Therefore, analyzing insurance rates alone is not likely to produce a reliable measure of effectiveness.

Because the ratemaking process for comprehensive premiums is largely based on loss experience for all vehicles of a specific type such as passenger cars, it will take some time before rates are affected and even then, it may be difficult to assess the impact of theft loss changes on the overall experience. One approach to determine if a change can potentially be expected in future rates is to analyze the trend or change in insurance claims payments made for auto thefts.

Insurance Claim Payments for Auto Theft

Since the Theft Prevention Standard was intended to help reduce automobile comprehensive premiums, it is important to ascertain whether the Standard contributed to a reduction in insurance loss payments for vehicle theft. If there is no measurable reduction, loss experience will not be affected and there will be no expectation that comprehensive premiums will be

lowered or will not rise as rapidly as in the past. To determine what the potential impact of the Theft Prevention Standard might be on insurance premiums, the experience of insurers in processing actual claims payments was analyzed. The analysis determines how much money the insurance companies pay out on the average, for each theft claim.

If cars with marked parts are stolen less often for parts or are recovered more often, it may be possible to measure the effect of the standard. To analyze these trends, a sample of records of insurance claim payments with sufficient information to determine the vehicle data (make, model, model year) and claim data (claim payment and policy deductible amount) was required. Data were needed for cars that had marked parts and their predecessor models, and for cars that were not marked. The time periods represented in the data included 1983-1986 prior to the inception of required marking, and 1987-1988 after the standard took effect.

Insurance claims data were obtained from the Highway Loss Data Institute (HLDI), which maintains records of actual claim payments resulting from the loss of motor vehicles or their contents. A nationwide sample of these records in the 1983-1988 time period was obtained for a group of insurance companies. Because the HLDI records reflect actual insurance claim payments, theft claims valued below the policy deductible are excluded. These claims might represent instances in which a stolen vehicle was recovered intact or with damage that could be repaired for less than the policy deductible amount.

Only claims in which the vehicle was physically removed were considered for analysis. Thefts of contents or components (which are usually not major parts) were removed from the data set because these thefts were not considered to be within the scope of the theft prevention standard. This was accomplished by matching the VINs in HLDI loss payment records with those in NATB vehicle theft records to identify the payments for stolen vehicles.

Method for Determining Change in Theft Loss Payments

The loss payments were determined for cars with marked parts and their predecessors and compared with loss payments for cars without marked parts and their predecessors.

Payouts for theft claims include cases in which:

- o The vehicle is not recovered and the insured is paid the market value of the vehicle less the policy deductible amount.
- o The vehicle is recovered and the insured is paid the cost to repair damage and for missing parts including the cost to put these parts on the car.
- o The vehicle is recovered after the insured is paid the market value of the vehicle less the policy deductible amount.

Cases not included in this analysis are theft claims in which the vehicle is recovered and the amount for damage or missing parts is less than the deductible. These cases would be represented implicitly in any reduction that occurs in the theft rate.

Because information on the vehicles stolen after the Theft Prevention Standard began include only 1987 and 1988 years, there are no claims data that are comparable to claims for 1987 model year cars stolen in 1988. Observations indicate that the experience for one year old cars is different than that for current model year (CMY) cars. Therefore, theft loss payments in this study were confined to current model year vehicles - these are models where the model year equals the calendar year of theft.

Analysis of Theft Loss Payments

Table G-1 following illustrates the variation in average annual loss payments per claim for current model year cars stolen during 1983-1988. The data are shown for cars grouped by those with marked parts, those without marked parts, those exempted from the standard because they are equipped with anti-theft devices, and for cars in total. For years prior to the standard, cars are grouped in the same manner using predecessor models for classification.

Because the data represent vehicles of the same age, it is possible to make comparisons from year to year. The measurement of the change or difference is of interest, as well as the amount of increase or decrease. The actual value of the average insurance claim payment is not the focus of this analysis.

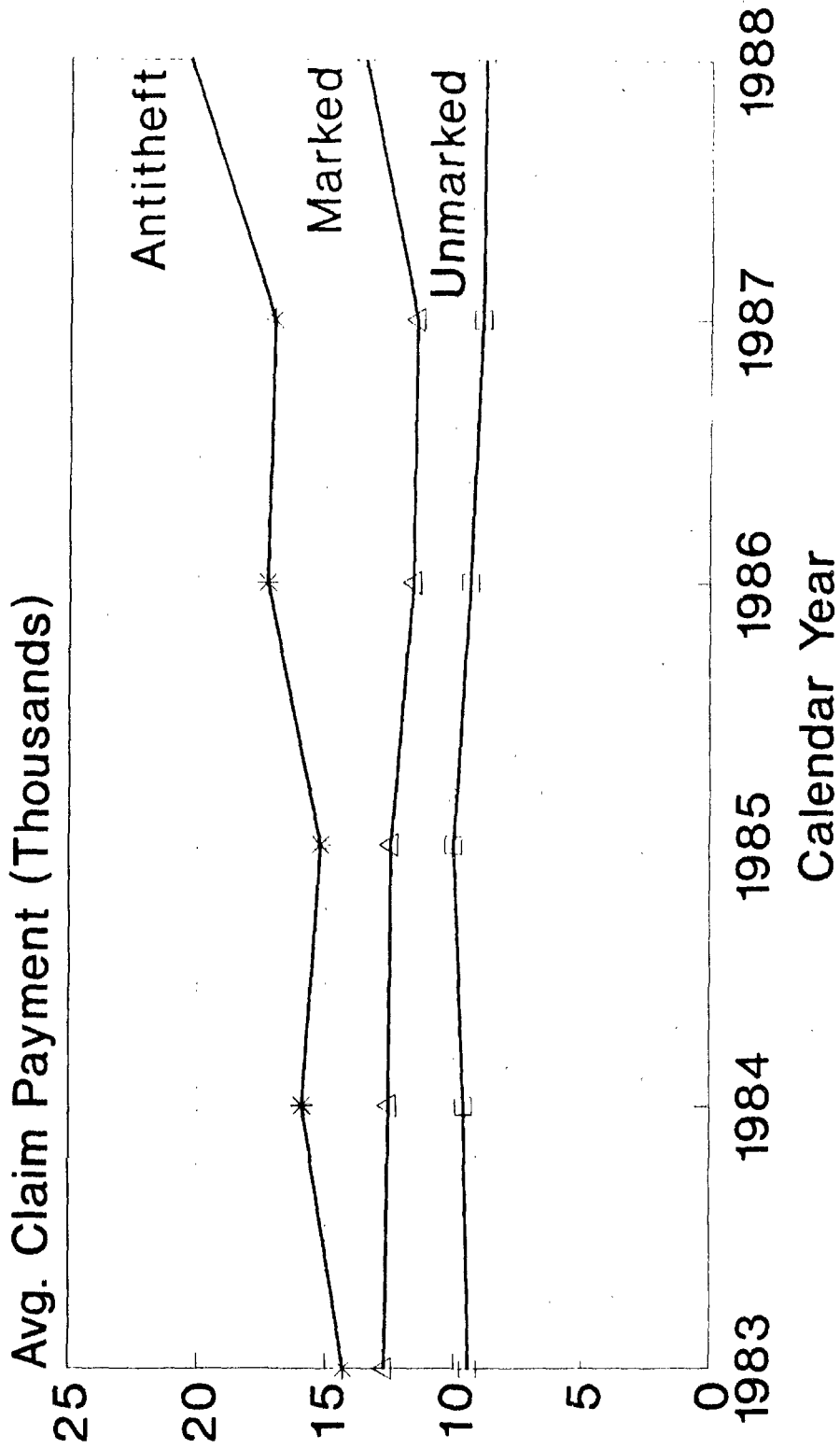
Table G-1
 AVERAGE THEFT CLAIM PAYMENT
 CURRENT MODEL YEAR VEHICLES
 (Based on a HLDI sample of five insurance companies)

<u>Vehicle Group</u>	1988 Dollars					
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
All Cars	\$12,316	\$12,359	\$12,252	\$11,369	\$10,750	\$11,435
Marked Cars	\$12,705	\$12,547	\$12,472	\$11,602	\$11,491	\$13,524
Unmarked Cars	\$ 9,429	\$ 9,617	\$10,017	\$ 9,374	\$ 8,929	\$ 8,848
AntiTheft Cars	\$14,310	\$15,923	\$15,210	\$17,298	\$17,047	\$20,338

The above table is also shown in graph form below so that the trends will be more apparent.

Figure G-1

Average Payment for Theft Claims Current Model Year Vehicles



Source: Based on HLDI Sample
of Five Insurance Companies

General Trends in Theft Claims Payments

For all current model year cars, the average theft claim payment was about the same from 1983 through 1985. From 1986 through 1987 claim payments decreased about \$1,500 or 12 percent. During this same time period, the recovery rate for insured stolen cars increased from 64 percent to 78 percent or 14 percentage points (see the section on vehicle recoveries following). The improvement in the recovery rate undoubtedly contributed to the lower average payment.

Between 1987 and 1988, average claim payments for all cars increased by six percent. During this same time period recovery rates remained level, only increasing by one percent. The increase in the average claim payment was caused by instances where recovered vehicles had either more damage or where unmarked parts (such as seats) were removed - both resulting in higher repair costs as shown in the section on vehicle recoveries.

The data also show that the proportion of vehicles recovered prior to settlement decreased between 1987 and 1988. A decrease in recoveries prior to settlement results in higher average claim payments.

As the graph shows, the average claim payment for cars equipped with antitheft devices is consistently higher than for other passenger cars. This is expected since it was found that these cars are less likely to be recovered and that they are generally more expensive to replace.

Similarly, average payments were consistently higher for marked cars than for unmarked cars. This reflects the fact that cars designated as "high theft" and required to have marked parts are typically more expensive to replace or repair than unmarked cars.

Insurer Theft Losses Before and After Marking Program Inception

In 1987, the first year cars were required to have marked parts, average claim payments for marked cars remained about the same as for their predecessors in 1986. However, between 1987 and 1988, average payments for current model year (CMY) marked vehicles increased by 17 percent while payments for unmarked CMY cars decreased by about 6 percent.

During the same 1987-1988 time period, the recovery rate for marked cars dropped by only 2.6 percent although the average claim payment increased. Data on recovered vehicles showed more damage and more missing parts on recovered 1988 cars with marked parts relative to cars without marked parts.

In the detailed data obtained from one insurance company, the percentage of current model year cars recovered within 30 days of the theft dropped from 50 percent in 1987 to 35 percent in 1988. This change could be expected to result in an increase in claims payments, as has been observed. It may also indicate that thieves, while they may continue to steal cars for parts, are being more thorough about hiding or otherwise disposing of the car.

Based solely on a comparison of average claim costs for stolen cars that have marked parts relative to cars with unmarked parts, there does not appear to be any evidence that the Theft Prevention Standard has reduced claim costs, at least for current model year cars.

Results of Analysis of Theft Rates Based on Insurance Theft Loss Claims

In APPENDIX 1, PART B, theft rates were analyzed based on the total number of stolen passenger cars in the U.S. and reported to the FBI. The exposure measure was the total U.S. passenger car registration data collected by R.L. Polk & Co. To determine the effectiveness of parts

marking as it affects insurance claim payments. Theft rates together with average claim payments must be analyzed. But the theft rates must be in terms of insurance claims. The data for these theft rates comes from insurance claims for auto theft under the comprehensive coverage portion of a policy. The exposure, or number of cars at risk for theft, are the number of insured vehicle years (IVY). One car insured for one month equals only policy month. IVY equals the total of the policy months divided by twelve.

The insurance claims data used is a sample of seven insurance companies who have reported their theft claims to both the Highway Loss Data Institute and the National Automobile Theft Bureau. The claims represent thefts of vehicles insured by these companies throughout the U.S., and are representative of the nation to the extent that these companies write insurance in the various states. The theft rates for current and one year old passenger car models, grouped by those with marked parts and with unmarked parts, and their respective predecessors are shown in Table G-2.

TABLE G-2

Theft Rates for Passenger Cars
With Marked Parts and Unmarked Parts
(Thefts per 100,000 Insured Vehicle Years)

	<u>Calendar Years in Which Cars Were Stolen</u>				
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Cars With Marked Parts					
Current Year Models	367	360	476	606*	521*
One Year Old Models	314	370	439	601	618*
Unmarked Cars					
Current Year Models	133	161	225	370	384
One Year Old Models	128	136	195	349	418

* Stolen cars with marked parts; stolen cars for other years are predecessors.

Source: Theft claims -- National Automobile Theft Bureau.
Insured Vehicle Years -- Highway Loss Data Institute

The theft rates based on insurance data are shown in Figures G-2 and G-3 for current and one year old models respectively. The graphs show that the theft rates for CMY 1987 car lines with marked parts continues to increase over 1986 while 1988 CMY car lines had a slightly lower theft rate than the 1987 car lines. The one year old car lines show increased theft rates for both marked and unmarked cars throughout the five year time period.

The fluctuations in theft rates based on insurance data are similar to what was found in APPENDIX 1, Part B with the national data. Since the effectiveness of parts marking was analyzed in Part B using national data, it will not be repeated here. Furthermore, the effectiveness of parts marking on insurance losses will be analyzed in the next section in terms of expected cost which includes theft rates.

Effectiveness of Parts Marking on Auto Theft Claims

To estimate how insurer's total vehicle theft losses changed after the introduction of the marking requirements, a cost-effectiveness measure was developed. This measure represents an expected cost to the insurer for providing annual theft coverage per vehicle exclusive of profit, administrative and other expenses. Expected cost is defined as:

$$\begin{array}{rcl} \text{Theft Claims per} & & \text{Average Cost} & & \text{Expected Cost of} \\ \text{Insured Vehicle} & \times & \text{per Theft Claim} & = & \text{Theft to Insurers} \\ \text{Year (IVY)} & & & & \text{per Insured Veh. Yr.} \end{array}$$

One car insured for one month equals one policy month. Insured Vehicle Years (IVY) = the total of the policy months divided by twelve.

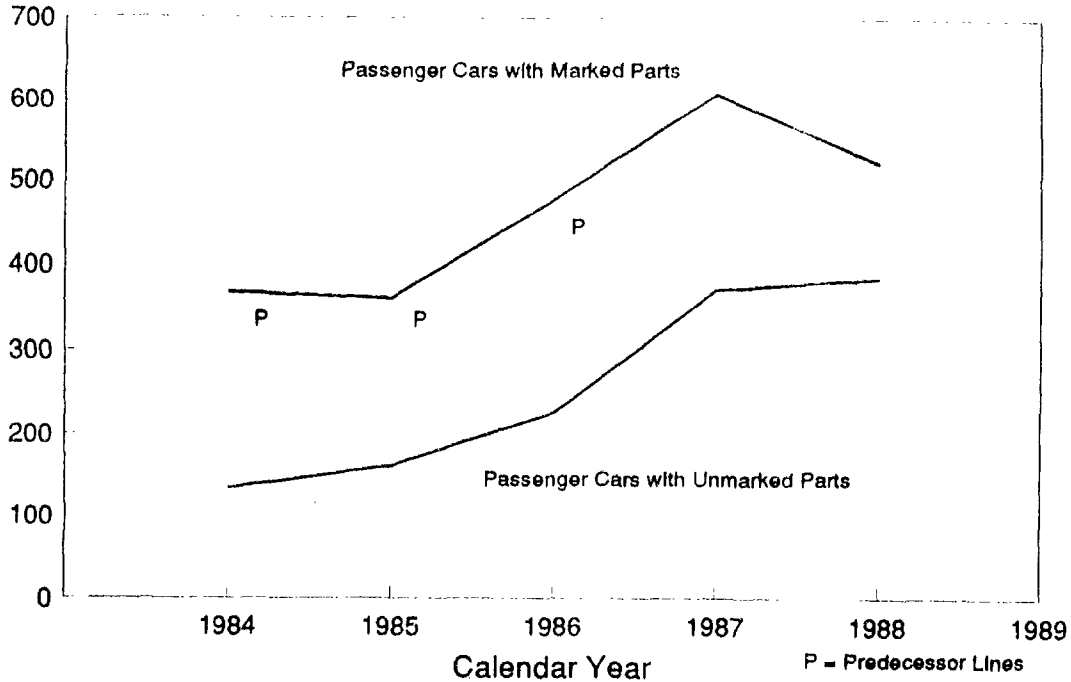
Average Cost = Average claim amount less deductible for theft of a car.

The expected cost is measured in 1988 dollars.

FIGURE G-2

THEFT RATES - INSURANCE DATA
Marked and Unmarked Passenger Cars
- Current Model Year

Theft Rate
(Theft Claims/
100,000 Insured
Vehicle Years)

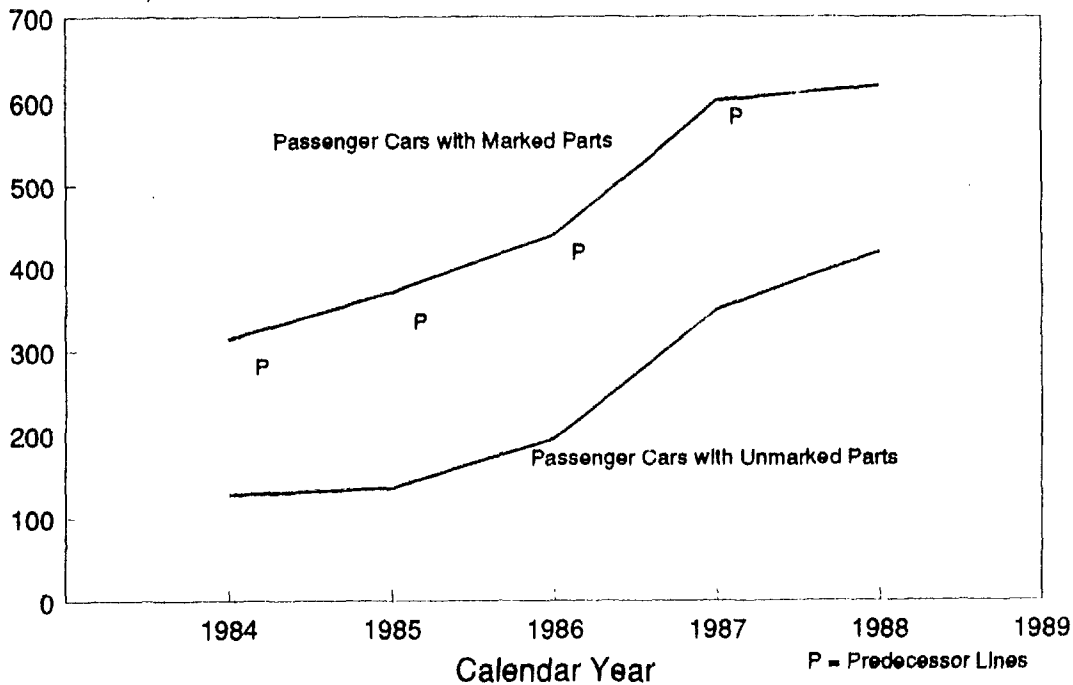


Sources: Highway Loss Data Institute and
National Automobile Theft Bureau

FIGURE G-3

THEFT RATES - INSURANCE DATA
Marked and Unmarked Passenger Cars
- One Year Old Models -

Theft Rate
(Theft Claims/
100,000 Insured
Vehicle Years)



Sources: Highway Loss Data Institute and
National Automobile Theft Bureau

Table G-3 contains the average claim payment, thefts per insured vehicle year, and the resulting expected cost of theft for 1984 through 1988 models. The table includes values for current model year and selected one year old models with marked parts and their predecessors, as well as models without marked parts of the same theft years and model years. The expected costs computed for cars with marked parts and their predecessor models prior to 1987, and cars without marked parts and their predecessor models prior to 1987, are summarized below:

Expected Costs for Insured Passenger Cars
Before and After Marking Program Inception

Vehicle Group	Pre-Standard				Post-Standard		Percent Increase	
	1983	1984	1985	1986	1987	1988	86-87	86-88
Current Model Year								
Marked Cars	\$53	\$46	\$45	\$55	\$70	\$70	26	28
Unmarked Cars	14	13	16	21	33	34	57	61
One Year Old								
Marked Cars	n/a	n/a	38	44	-	65	-	47
Unmarked Cars	n/a	n/a	11	15	-	33	-	112

Note: Expected Cost = cost of theft to insurers per insured vehicle year. The expected cost for 1987 CMY Unmarked Models, as an example, is calculated by multiplying the average claim payment (\$8,929) by the number of thefts per insured vehicle year (.0370) resulting in \$33.04.

Changes in the value of expected cost indicate whether insurance claims payments for vehicle theft are increasing or decreasing. The expected cost per insured car can vary because either the theft rate or the average claim payment changes. For example, if the number of cars with marked parts that are stolen decreases in relation to the number of marked cars that are insured, the expected cost will decrease for those cars. If marked cars are recovered with fewer missing parts, with less expensive parts missing, or with less damage, the average claim payment will be less and so the expected cost will also decrease. Similarly, if more marked

Table G-3

Expected Costs for Insured Vehicles
by Theft Year and Relative Age of Vehicle

	<u>Average Claim Payment</u>	<u>Thefts Per 1000 I-V-Y</u>	<u>Expected Cost 1988 Dollars</u>	
Marked Cars and Predecessor Models				
1983 CMY	\$ 12,705	419	\$ 53.23	<u>Pre-Standard</u>
1984 CMY	\$ 12,547	367	\$ 46.05	
1985 CMY	12,472	360	44.90	
1985 1 year old	10,386	370	38.43	
1986 CMY	11,602	476	55.23	
1986 1 year old	10,009	439	43.94	
<hr/>				
1987 CMY	11,491	606	69.64	Post-Standard
1988 CMY	13,524	521	70.46	
1988 1 year old	10,453	618	64.60	
<hr/>				
Unmarked Cars and Predecessor Models				
1983 CMY	\$ 9,429	146	\$ 13.77	<u>Pre-Standard</u>
1984 CMY	\$ 9,617	133	\$ 12.79	
1985 CMY	10,017	161	16.13	
1985 1 year old	8,068	136	10.97	
1986 CMY	9,374	225	21.09	
1986 1 year old	7,946	195	15.49	
<hr/>				
1987 CMY	8,929	370	33.04	Post-Standard
1988 CMY	8,848	384	33.98	
1988 1 year old	7,854	418	32.83	

cars are recovered before a claim is settled, the expected cost for those claims will lower. The expected cost for vehicle theft increased after the Theft Prevention Standard began.

Using the same methods for determining effectiveness estimates explained in APPENDIX 1, PART B, comparisons were made between the two post-standard years (1987 and 1988) and two pre-standard years (1985-1986). Within each set (pre-standard and post-standard), expected costs for unmarked and for marked cars are obtained.

During 1984-1986, a comparison of the data indicates an improvement in expected costs for predecessors of marked cars when compared to unmarked cars. Clearly, parts marking is not responsible for this decrease. Regardless of the cause of this improvement, it must be removed from comparisons on post-standard data in order to uncover the effects that resulted from the standard. The average year-to-year change in expected cost observed between 1984 and 1986 (15.6 percent) was subtracted from the difference in expected cost in 1987-1988.

The relative difference estimates were obtained using the same methodology described in APPENDIX 1, PART B to estimate effectiveness in theft rate trends. After removing the effects of other factors on expected claims costs, no statistically significant change was found; effectiveness was -10%. This result means that any observations concerning the change in expected costs could be occurring by chance, rather than attributable to the parts marking standard.

The analysis of effectiveness did not find that expected costs exhibited any downward trend. A more definitive "change in direction" for cars with marked parts would be a better indication that the standard was producing some beneficial results that could lead to reductions in insurance premiums. Based on these results, a reduction in premiums is unlikely, since claim costs continue to increase for both marked and unmarked cars.

Effect of Parts Marking on Vehicle Recovery Rates and Recovery Condition

Insurance claims payments for recovered vehicles were also examined. As noted earlier, recovered cars with marked parts showed an increase in average claims payments between 1987 and 1988, while average claims payments for cars without marked parts decreased during the same time period. Claims payments for current model year cars were compared with payments for two year old cars to determine if there was a shift in theft activity.

Claims payment for cars with and without marked parts were examined according to the condition of the car upon recovery. Claim payments for cars with marked parts were compared to two other groups -- cars of the same model year but without marked parts, and predecessor models of prior model years. Changing patterns may reveal any consequences that may be attributable to the marking program.

It is important to note that the data obtained from HLDI does not include claims where the amount of damage is less than the deductible amount of the comprehensive policy. A study of theft claims for one insurance company was also completed. This data included thefts where the insurance company did not issue a payment, unlike the HLDI sample. The claims from a single company that were examined also did not include cases involving the theft of contents.

The proportion of HLDI theft claim payments under \$500 was less than five percent. For the single insurance company, the proportion of claims where the damage was less \$500 (regardless of the payment) was about 20 percent. These distributions are shown in Figure G-4, and are quite different in the single company compared to the HLDI claims. The claim payment category with the largest proportion of claims in the HLDI sample was \$12-16,000. In contrast, the largest proportion of claims filed with the single company were valued under \$500 and probably less than the deductible amount.

Claims with values of less than \$500 very likely do not involve missing parts or substantial damage. On the other hand, claims in the range of \$12-16,000 are likely to include cars with stolen parts. Consequently, an analysis of the HLDI data should focus on changed claims costs or recovery condition, rather than the actual claims values which are quite high, or actual recovery rates that are determined.

Change in Claims Costs for Recovered Vehicles Before and After the Inception of Parts Marking

Differences in average theft claim payments for recovered cars were compared for cars with marked parts and for cars without marked parts both before and after the marking program was initiated. The analysis used the test of relative difference explained in Part B. The results of the analysis follow:

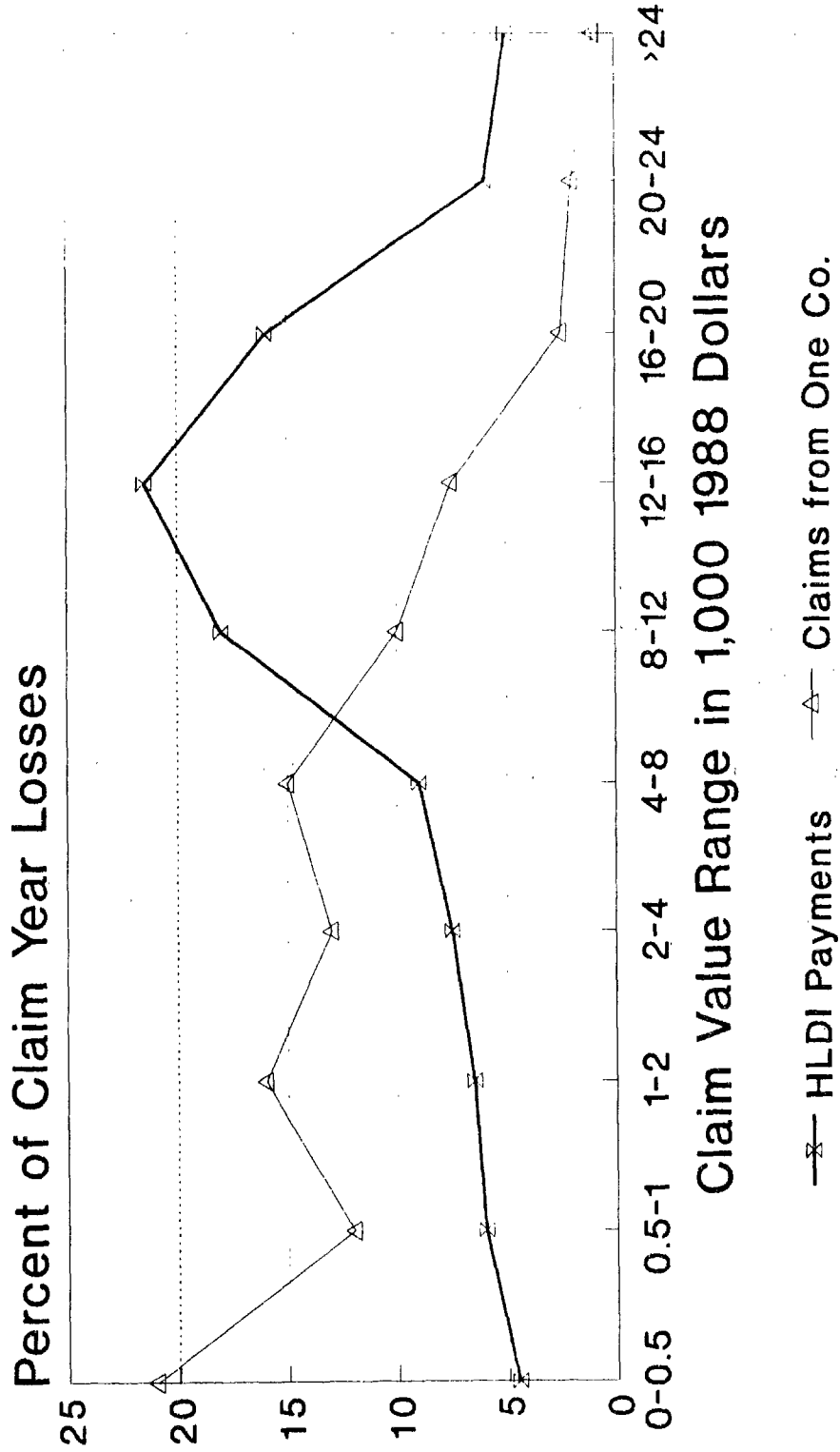
Average Theft Claim Payments for Recovered CMY Passenger Cars
with and without Marked Parts

<u>Vehicle Group</u>	<u>1983-1986</u>		<u>1987-1988</u>		<u>Difference</u>	
	<u>Avg.Claim Payment</u>	<u>No. of Paid Claims</u>	<u>Avg.Claim Payment</u>	<u>No. of Paid Claims</u>	<u>in Avg Claim Paymnt</u>	<u>Pct.</u>
Marked Cars	\$ 9,696	1,941	\$ 9,053	1,194	-\$643	-7%
Unmarked Cars	\$ 7,687	985	\$ 6,710	1,575	- 977	-13%

If the Theft Prevention Standard was successful in reducing the proportion of thefts by professional thieves thereby increasing the proportion of thefts for joyriding or other causes, it might be expected that the average theft claim cost for recovered marked vehicles would decrease, independent of other factors. While average theft claim costs for recovered CMY marked vehicles did decrease by 7 percent (\$643) after the marking program began, claim costs for unmarked vehicles were reduced even further, decreasing by 13 percent (\$977).

FIGURE G-4

Distribution of Theft Claim Values CMY 1988 Vehicles



1988 Pmts. by Six Cos. from HLDI
1988 Paid & Unpaid Claims from One Co.

If the marking program was responsible for the decrease, it might be expected that marked vehicles would exhibit a more pronounced change than unmarked vehicles assuming that thieves were aware of which lines were marked. This was not found to be the case, however, since average claim costs for unmarked cars were reduced even further than those for cars with marked parts. The relative difference comparing the change in claim payments for marked cars to the change for unmarked cars is not statistically significant. There is a significant reduction in claim costs for cars after implementation of the standard, but the cause of the reduction is affecting cars with and without marked parts about equally.

However, if thieves reacted to the standard but were not aware of which specific lines had marked parts, it could be argued that the reduction in costs for cars with and without marked parts might be attributable to the marking program. Thieves might be avoiding all cars manufactured after the standard and may be more inclined to steal older cars rather than newer ones.

In this case, it might be expected that two year old cars, none of which would have marked parts, would not exhibit the same reductions in claims costs as CMY cars. However, after the marking program began, two year old cars were found to exhibit decreases similar to those of CMY cars. These decreases were \$793 for predecessors of unmarked cars and \$686 for predecessors of marked cars.

Although there was a desirable reduction in average theft claim payments for recovered cars after 1987, it does not appear as though the marking program was responsible for the improvement.

Change in Claims Cost Based on Vehicle Condition Upon Recovery Before and After Parts Marking Inception

The insurance reporting requirements of Standard required that the condition of recovered vehicles be classified into the following three categories:

- o intact - no major parts missing; no apparent damage to the vehicle other than that caused when the thieves entered and operated the vehicle; ordinary wear and tear,
- o in-whole - no major parts missing; apparent damage to the vehicle such as being stripped of other than major parts, and/or wrecked, and/or burnt, etc.,
- o in-part - one or more major parts missing irrespective of other damage.

Claim costs for vehicles recovered intact, in-whole and in-part were examined to determine if there were any changes or shifts occurring after the inception of the marking program. Changes in claim payments for cars with marked parts were compared to changes in cars without marked parts in each category of recovery condition. Comparisons were also made for cars with marked parts to determine if there was a change or shift in the proportion of cars in each category. For example, the ratio of cars with marked parts recovered in-whole or intact after the inception of the program was compared to predecessors of these cars.

Average claim costs for vehicles recovered intact, in-whole and in-part were determined for cars with and without marked parts for two pre- and two post-standard years. The models chosen to represent the pre-standard period were current model year (CMY) 1986 lines including predecessor models to those having marked parts and models that do not have marked parts. The models chosen to represent the post-standard period were CMY

1987 and 1988 lines including models with and without marked parts. Data prior to 1986 were not available. The results of the analysis of claim costs by recovery condition are presented in Table G-4.

Table G-4

Claim Costs of Current Model Year Cars By Recovery Condition
Before and After Implementation of the Marking Program

Model and Recovery Status	1986 CMY Pre-standard		1987-1988 CMY Post-standard		Difference	
	Pct. of Claims	Average Payment	Pct. of Claims	Average Payment	Avg. Pmt.	Percent Change
C Marked/In-part	28	\$12,340	18	\$13,217	\$ 877	7%
A Marked/Intact	13	8,343	7	7,307	-1,036	-12%
B Marked/In-whole	59	7,831	75	8,233	402	5%
TOTAL	100		100			
Unmarked/In-part	92/22	9,939	155/12	10,347	408	
Unmarked/Intact	65/16	6,770	166/12	5,850	- 920	
Unmarked/In-whole	260/62	6,999	1,010/76	6,232	- 767	
TOTAL	/100		/100			

It was shown earlier that cars with marked parts experienced an increase in theft claim costs. If parts marking were effective, it might be expected that the claim costs for cars recovered in-part might be reduced (because marking of parts might deter their removal from a stolen car) or that the ratio of these recoveries to other recoveries might be reduced. No statistically significant changes in claim payments were observed for marked cars recovered in-part once the marking program began.

Given that marked cars are high theft car lines, there might have been a change in the demand for and subsequent number of parts removed from high

theft car lines prior to the effective date of the standard. An analysis of pre-existing trends might uncover a change in the demand for parts taken from stolen cars, if it did exist. Since data for only one year (1986) prior to the standards effective date were available, it was not possible to measure any trend.

The proportion of cars with marked parts recovered in-part did drop substantially (ten percent) after the standard was implemented. But, the proportion of unmarked cars recovered in-part dropped by the same rate. It appears, then, that the reduction in the percentage of cars recovered with major parts missing was not due to the fact that their parts were marked. Furthermore, the average claim payments were not lower when major parts were removed.

The proportion of both marked and unmarked cars recovered in-whole increased substantially after the standard was implemented. One explanation of this observation would be that thieves are stealing cars for parts other than those that must have markings, and that they are not targeting the same models that they were previously (the group with high theft rates that became subject to the marking requirements). While the proportion of cars recovered in-whole (but with missing parts other than those subject to the marking requirements) increased after the implementation of the standard, the average claim payments were different between the two groups. Claims payments for cars recovered in-whole increased when the car had marked parts, and decreased when the car was not subject to the standard. This would seem to indicate that thefts of cars with marked parts are continuing, but that thieves are not removing marked parts in as many cases as they used to before the standard was implemented. This result also suggests that relative to unmarked vehicles, the marked vehicles experienced an increase in damage and/or thefts of non-marked parts.

Regardless of the underlying causes for these potential changes in trends, the claims payments for cars with marked parts did not decrease. On the contrary, payments for recovered marked cars are increasing at a greater rate than for unmarked cars. Premiums are not likely to decline when claims costs increase.

Effect of Parts Marking on Premiums for Comprehensive Coverage

The procedures followed by most insurers may not currently be aimed at changing comprehensive rates for a given car line based on a determination that the theft rate for that line has changed. Lower rates for all passenger cars in a rating territory can be expected when total comprehensive losses or combined comprehensive and collision losses for the territory are reduced. It is expected that insurers' responses to any benefits of the Theft Act will be reflected through their normal ratemaking process, discussed earlier in this Part.

Thus, unless special consideration is taken by the insurers, it appears that any benefits of parts labeling in reducing insurer theft losses for affected lines, would be dispersed to provide lower insurance premiums for other lines as well. These reductions in premiums could only be expected to occur to the extent that reductions in theft losses are not offset by changes in other losses insured under comprehensive coverage.

Based on the analyses presented in this Part, theft losses have risen since the inception of the marking program. Even if there had been a significant reduction in insurance claims payments for cars with marked parts, it is unlikely that these changes would be reflected in 1987 and 1988 rates. Since the marking requirements had only been in effect for two years at the time of this study, their effects are not yet significantly represented in the insurers data bases. For example, 1989 rates would generally be based on experience for 1988 and prior years. It is improbable that the marking program has influenced any reduction in 1987-1988 comprehensive rates, or that rate increases have been curtailed as a consequence.

To measure any future shift in comprehensive premiums that may result as more vehicles are marked, an analysis was performed to estimate the

general trend in rates over the 1983-1988 period. This analysis also served to demonstrate the variability of rates over time between companies, states, rural and urban areas, and high and low cost vehicles. The variability or consistency of "base" comprehensive insurance rates found through this analysis represent the overall environment, rather than any specific consequences of the marking program. This section describes the environment in which any future changes in rates as a consequence of the Theft Act will have to be discovered.

The analysis sought to examine the following questions:

- o How have automobile comprehensive premiums changed over the 1983-1988 period?
- o Are these changes consistent between states and companies?
- o Are premium trends for low cost vehicles different from those of expensive vehicles?
- o Are premium trends in dense metropolitan areas with generally high theft rates similar to trends in low density rural areas with lower theft rates?

Description of Data and Method of Analysis

To examine these issues, base levels of automobile comprehensive premiums charged during 1983-1988 were analyzed. These base premiums reflect the characteristics of the passenger car and its garaging location. Base premiums exclude factors related to driver characteristics and other costs such as taxes, profits, etc.

Based on the reported premiums for each year, trend lines were determined for the 1983-1988 period to identify whether rates were generally increasing or decreasing over the period. The slope of each line also identified the annual rate of change of premiums for the trend.

Trend lines were computed separately by state, company, territory and rating symbol. Five states were considered including: California, Florida, Michigan, Ohio, and Washington. The first three states had higher than average theft rates while Washington had the lowest theft rates in the group [29].

Insurance rates are different depending on the territory where the vehicle is garaged. Territory assignments are based primarily on population density; high density territories correspond to urban areas and low density corresponds to rural areas. Rate trends in high and low density areas were computed separately for two different insurance companies. One company used ISO rating factors and procedures while the other used its own loss experience and procedures to establish rates.

Insurance rates also vary according to the symbol class assigned to the model that is being insured. As discussed earlier, the symbol class is based primarily on the cost of the vehicle. Rate trends for low cost and high cost vehicles were considered separately. Low cost vehicles were defined as vehicles valued between \$10,000 and \$12,500 while high cost vehicles were valued between \$28,000 and \$33,000. For this analysis, it was not possible to isolate cars that had marked parts and their predecessors from other cars. The symbol class defined as high cost vehicles is a proxy for cars that may be subject to the marking requirements of the standard, but includes models without marked parts as well as models equipped with antitheft devices.

Premium Trends

The results of the analysis of premium trends is presented in Table G-5. The table shows an index of the changes in base premium rates between 1983 and 1988, with the 1983 premiums set at 100. These index values are the relative change in base premium rates for each area, symbol class and company between the two years. The index values may be treated as percents. For example, in low density (rural) areas of California, the

base premium charged by Company "1" for a high cost vehicle in 1988 is 92 percent of the premium charged in 1983.

As the table indicates, considerable variation was found in the rates between states and insurance companies. There were cases where rates increased substantially, decreased substantially and where rates stayed about the same. The absolute differences in rates ranged from a decrease of \$58.02 to an increase of \$175.71. The premiums in both cases were for high cost vehicles in low density areas, but for different insurance companies and states.

Table G-5
Index of Change in Comprehensive Premiums
Between 1983 and 1988
1983 = 100

State	Co.	<u>RURAL (LOW DENSITY) AREAS</u>		<u>URBAN (HIGH DENSITY) AREAS</u>	
		<u>Low Cost Vehicles</u>	<u>High Cost Vehicles</u>	<u>Low Cost Vehicles</u>	<u>High Cost Vehicles</u>
CA	1	88	92	104	110
	2	101	117	101	116
FL	1	103	101	95	94
	2	97	101	92	94
OH	1	88	88	97	97
	2	100	103	103	106
MI	1	106	107	135	133
	2	141	150	121	128
WA	1	103	102	102	101
	2	97	96	99	99
AVERAGE		100	to 103	105	to 107
Overall Average = 105					

A comparison of the change in premiums for low cost and high cost cars reveals that with one exception, there was little difference. The cost of the car therefore, does not appear to be a large factor in determining premium rate changes. Urban areas on the average experienced premium increases four to five percentage points higher than rural areas over a five year period. Premium rates went up more in urban areas than in rural areas about as often as the obverse. There were also cases when the urban rates decreased while the rural rates increased (Florida) and one case where the opposite occurred (California, Company 1). Population density does not appear to be a consistent factor in base premium rates based on these observations.

The standard deviation for the rural areas are rather large compared to the average 1983 base premium rate. This pattern appears for both high and low cost cars. This indicates that the trends for rural areas are not representative of the base premium rates. Consequently, a comparison between urban and rural areas is of limited value, since the data for rural areas is erratic. There was some consistency between low cost vehicles and high cost vehicles. If the rates for low costs vehicles went down, so did the rates for high costs vehicles; if one went up, so did the other. The change in rates for low cost and high cost vehicles in one geographic area was about the same as the changes in the other geographic area, with several exceptions. These observations seem to indicate that no factor is operating on one class of vehicle much different than on the other. Likewise, one geographic area seems to respond to factors influencing rates much the same as the other.

If the marking program is effective in reducing the insurance costs associated with theft claims, some reduction in the premiums in high-density areas where more thefts for parts are thought to occur, might be expected in the future.

There are other factors that may overshadow the effect of increased theft losses on comprehensive insurance rates, such as changes in state insurance regulations, competition and underwriting practices.

Actions Taken by Insurers to Reduce Premiums or Theft Losses

As explained earlier in this Part, most of the insurers indicate that they do not employ rating procedures specifically aimed at reducing comprehensive rates for a given motor vehicle line based on a determination that the theft rate for the line has been reduced. They indicate that their existing rating procedures would generate lower rates for all passenger cars in a rating territory when comprehensive losses or combined comprehensive and collision losses for the territory are reduced. One company indicated that while the theft portion of its comprehensive premium is based upon the actual experience of each make and model, it is possible that the theft rate may decrease while the overall comprehensive rate increases due to other losses and changes in the relative value of the vehicle.

About two-thirds of the insurance companies reporting under the requirements of the Act indicated that they employ credits or comprehensive premium discounts for passenger cars equipped with some form of theft deterrent (antitheft) device. Most of the companies offering credits did so only in specific states. The discounts varied anywhere from 5 percent to 20 percent based on the state and type of device. Available information for 1986 indicates that approximately 781,000 policyholders insuring 1.5 million vehicles received premium reductions during that year. Ninety percent of these policyholders were insured with one company. Several of the insurers indicated that these reductions were not voluntary and were offered only in states where they were required by law. Most companies offered discounts in five to ten states.

Actions Taken by Insurers to Encourage Reductions in Vehicle Thefts

Actions cited by insurance companies to deter or reduce thefts include:

- 1) Supporting organizations such as the National Automobile Theft Bureau (NATB) and the Insurance Crime Prevention Institute. This includes financial support and the exchange of information on stolen vehicles.

- 2) Cooperating with state and local law enforcement agencies. Some insurers require policyholders to promptly report all theft claims to the police. Other cooperation includes assistance in investigations of suspected fraudulent claims, providing financial support for local "sting" operations and providing vehicles to state and local police for undercover operations.
- 3) Developing special investigation units to perform detailed investigations of motor vehicle theft claims. These units deter repeated fraud claims by enabling the insurer to contest questionable circumstances. These units also share information to assist local police efforts to recover stolen vehicles and identify the individuals responsible. Insurers have developed reinspection units to assure the legitimacy of vehicle repairs.
- 4) Providing incentives to policyholders to promote use of theft deterrent techniques to reduce vehicle theft. These incentives include rate reductions for antitheft devices and programs providing free VIN etching on glass and other parts.
- 5) Providing and advertising cash reward programs for information which leads to the arrest and conviction of motor vehicle thieves. This policy has been found by one insurer to be particularly effective in rural areas.
- 6) Perform activities to raise public awareness of the problem of automobile theft. These activities include press releases and corporate publications of articles concerning antitheft measures with recommendations to deter theft, frequent notice to policyholders of corporate incentive programs to reduce theft (antitheft device credits, for example), providing financial and other support for public awareness campaigns and to local or regional groups.
- 7) Promote development of devices and techniques to reduce automotive theft. To this end, insurers maintain corporate relations with antitheft system installers, government agencies, trade associations, other insurers, domestic and foreign automakers and inventors.
- 8) Engage in political activities to promote antitheft measures such as lobbying efforts to promote antitheft legislation, and participation in hearings for allocating funds to autotheft programs, education programs or law enforcement agencies.

SUMMARY: COMPREHENSIVE INSURANCE PREMIUMS AND PAYOUTS FOR VEHICLE THEFT**Insurance Ratemaking Process**

Comprehensive insurance covers a variety of perils including automotive theft, natural calamities such as hurricanes, and vandalism. Before establishing the premium rates for comprehensive coverage, most insurance companies determine how much is needed on a statewide basis to cover their anticipated claims payments, expenses and profit. Then they distribute the difference between what they collect currently and what they need to collect among policies in the state based on population density territories.

The procedures followed by most insurers are not currently aimed at changing comprehensive rates for a given vehicle line based upon a determination that the theft rate for the line has changed. Unless special consideration is taken by insurers, it is expected that any benefits of parts labeling in reducing insurer losses would not normally be targeted to reduce rates only for marked cars, but would reduce rates for other cars as well.

Some companies offer premium discounts when certain approved antitheft devices are installed by the owner. These discounts may be voluntary or may be required by individual states. Insurance companies generally do not offer the same discounts in all states. They may also penalize certain models because they have particularly costly claims experience. The claims experience may be a reflection of the repair costs for the model, or an abnormally high incidence of claims, rather than a specific kind of loss (such as theft) covered under comprehensive insurance.

Throughout the various stages of the ratemaking process, insurance companies apparently seldom analyze the specific causes of their comprehensive insurance losses. If such a study is done, it is normally

for internal company use, rather than for rate filing purposes. Factors affecting the likelihood of theft, such as the garaging location (urban, rural) or vehicle characteristics (high risk), are recognized implicitly in the ratemaking process, since they do contribute to the magnitude of the problem.

Comprehensive Insurance Premiums

Because theft losses have not diminished as a result of the marking program, it is not surprising that comprehensive premiums were not found to decrease. However, an examination of premium trends during the 1983-1988 period suggests a correlation between the likelihood of theft and the rate of premium increase. On average, lower cost vehicles in rural areas exhibited virtually no change in comprehensive premiums over the six year period, while high cost vehicles in dense metropolitan areas exhibited annual increases averaging \$41 a year. Thus, if the theft prevention Standard is effective, and as more vehicles are marked, the rate of change in premium increases for expensive vehicles in high density areas could diminish independent of other factors.

Substantial variation was found in comprehensive insurance premiums over the six year period examined, and the data could not be viewed as a trend. Other factors influence, and may overshadow, the effect of theft losses on premium rates. These factors include state insurance regulations and other market factors such as competition and underwriting practices. Apart from any effects of the marking program, theft rates increased about ten percent annually between 1983 and 1988. The cost per theft, however, decreased by about seven percent. The net effect on insurance premiums as a consequence of thefts could be expected to be something less than ten percent because of the reduced average claims cost. The increase in comprehensive premiums seems to follow the apparent net increase in theft losses.

Given the currently available volume of claim data for any particular make and model, it is reasonable to expect that a broader span of experience is

necessary before any effects of the marking program can be reflected in insurance rates. It is probably not reasonable to expect effects of the Theft Act (if any) to noticeably influence premiums for several more years.

Insurance Claims Losses

For most companies, the best estimation of the proportion of comprehensive premium cost necessary to provide for theft coverage is the proportion of total comprehensive losses which are due to vehicle theft. Based on information supplied by insurers under the Insurer Reporting Requirements of the Theft Act, it has been estimated that the proportion of comprehensive dollar losses due to the theft of motor vehicles was 38 percent in 1985 and 40 percent in 1986. Analysis of insurer claims payments may provide a better indication of the effectiveness of the parts marking requirements in reducing the costs for providing theft coverage, and therefore, reducing the basis used to determine premium rates.

Insurer losses for cars with marked parts continued to increase after the marking program began. Between 1983-1986 and 1987-1988, theft costs per insured vehicle year increased \$20.40 for marked cars, \$17.47 for unmarked cars and only \$11.44 for vehicles with antitheft devices. This appeared to result from the fact that average theft claim costs for stolen marked vehicles increased by \$128 (or 17 percent) while average theft claim costs for unmarked vehicles decreased by \$709 (or nearly six percent) after the start of the marking program.

Nonetheless, there is no apparent evidence that the marking program provided any reduction in average claim costs for marked vehicles, as might occur independent of other factors, if the marking program had induced a smaller proportion of stolen vehicles to be exported or severely dismantled.

Analysis of Claims for Recovered Vehicles

The proportion of both marked and unmarked cars recovered in-whole increased substantially after the Standard was implemented. Average claim

payments for these cars were different between the two groups. Claims payments for marked cars recovered in-whole increased, while claims payments for unmarked cars decreased. This would seem to indicate that thefts of cars with marked parts are continuing, but that thieves are not removing marked parts in as many cases as they used to before the standard was implemented. This result also suggests that relative to unmarked vehicles, the marked vehicles showed an increase in damage and/or thefts of non-marked parts.

Regardless of the underlying causes for these changes, the claims payments for cars with marked parts do not decline. Claims payments for recovered cars with marked parts are increasing, and at a greater rate than payments for unmarked cars. Premium costs are not likely to decline unless claims costs are reduced.

APPENDIX 1

PART H

ADEQUACY OF LAWS AND PARTS MARKING SYSTEMS

“(H) information concerning the adequacy and effectiveness of Federal and State laws aimed at preventing the distribution and sale of used parts that have been removed from stolen motor vehicles and the adequacy of systems available to enforcement personnel for tracing parts to determine if they have been stolen from a motor vehicle;

1984 Theft Act

Case statistics at the Federal level were presented in APPENDIX 1, PART F. Under Title II of the Motor Vehicle Theft Law Enforcement Act of 1984, the antifencing measures, Sections 511, 512, and 2321 were the basis for 154 cases (and 107 case convictions) over a five year period. If the estimate for nationwide motor vehicle theft case convictions (35,000) is accepted, then there were probably less than 2,000 convictions in cases involving marked cars, based on the ratio of stolen marked vehicles to total stolen motor vehicles in 1988.

How many of these cases were brought under State statutes that were similar to the Federal antifencing measures is not known. That kind of

information will take both more time and considerable resources to obtain [8]. In this Part, a brief review of a sample of State laws on motor vehicle theft and related laws is provided to illustrate the diversity of existing auto theft laws. This is followed by the results of nine on-site, in-depth interviews with auto theft investigators in eight major cities and one State police agency to provide the background for the status and assessment of systems available to enforcement personnel.

State Motor Vehicle Theft and Related Laws

Every State has a statutory provision making it unlawful to alter, obliterate, remove or deface automobile serial and/or identification numbers. Penalties vary from State to State.

There are important differences among State laws. For example, six of the eleven States in the survey conducted for this report [8], have statutes where the theft of a motor vehicle is a general theft or larceny. Five of the eleven surveyed States have statutes specifically relating to motor vehicle theft.

Offense classifications and maximum penalties for these States are shown in Table H-1. In those States with statutes for motor vehicle theft, felony classifications and penalties are often based on the value of a stolen vehicle. The higher the value, the tougher the maximum sentence.

In 10 of the 11 surveyed States, the theft of a motor vehicle part falls under the general theft or larceny statutes. The value of the stolen part(s) dictates the severity of the maximum sentence. In the one other State, Colorado, the theft of motor vehicle parts is specifically addressed by a statute (42-5-104).

VIN tampering is addressed by statute in five of the surveyed States. Penalties range from a one year maximum jail term under a misdemeanor charge to a two year prison sentence for a felony conviction.

Table H-1
Theft Classification and Maximum Penalties
Among a Sample of States

<u>State</u>	<u>Statute</u>	<u>Classification of Offense</u>	<u>Maximum Penalty (Prison)</u>
Arizona	13-1802	Theft, Class 3 Felony	5 years
Florida	812.014	Theft, 2nd Degree Felony	5 years
N. Carolina	14-70	Larceny, Class H Felony	10 years
New York	155.30	Larceny, Class D Felony	7 years
Texas	31.03	Theft, 3rd Degree Felony	10 years and/or \$5000 fine
Virginia	18.2-95	Larceny, Class 5 Felony	20 years

California	487(3)	Grand Theft Automobile Felony	3 years
Connecticut	53a-122	Motor Vehicle Theft Class B Felony Class C Felony Class D Felony	20 years 10 years 5 years
Colorado	18-4-409	Motor Vehicle Theft Class 3 Felony Class 4 Felony	16 years 8 years
Georgia	16-8-2	Motor Vehicle Theft Felony	20 years
Nevada	205.222	Grand Larceny Automobile Felony	10 years and/or \$10,000 fine

Several States have enacted anti-chop shop laws, including Texas, South Dakota, and Florida; and at least four States have adopted more comprehensive statutes relating to the fencing of stolen motor vehicles and motor vehicle parts: Alabama, Florida, Michigan and Oklahoma.

The Joint Industry Task Force on Automotive Theft and Fraud (JITFAT) has developed a "Model Motor Vehicle Chop Shop Stolen and Altered Property Act" which the States of Oklahoma and South Carolina have enacted. Alabama and Michigan have adopted somewhat different versions of this model law. This law according to background information provided by the NATB, would:

". . . add new and increased criminal sanctions against persons owning, operating, or conducting chop shops, provide for forfeiture of tools and equipment used in chop shops, and provide for civil remedies which include treble damages and injunctive relief for any person aggrieved by a chop shop operation."

As can be seen, States operate under a variety of laws relating to motor vehicle and parts theft, chop shop operations, VIN tampering, salvage and junk titling, and respective inspections. For example, the NATB reports [21] that 41 States have salvage title laws, and twenty-nine States have junk title laws. Titles are branded as salvage in 26 States. There are States which do not require visual inspections to check if the VIN(s) on the vehicle matches that on the title.

There are good reasons to seek uniformity among State statutes. According to a AAMVA survey [3] uniform titling statutes would prevent titling of vehicles stolen in a State which requires branded titles by taking them to another State which does not.

It is not a simple matter to make judgements about the adequacy of State statutes to curb the distribution and sale of stolen car parts. The number of convictions involving such offenses in each State are still small and, as was stated in Part F, difficult to obtain. It appears that

States and interested public and private organizations are making significant efforts to strengthen and augment State laws for motor vehicle theft.

Systems Available for Tracing Parts – Interviews with Auto Theft Investigators

The recovery of stolen cars and parts depends on the ability to identify such cars and parts. Identification is normally done by matching VIN numbers on parts with those of reported stolen vehicles. The parts marking requirement was designed to make this matchup possible. While engines and transmissions have been marked for some time, the sheet metal parts of high theft passenger cars are marked with adhesive labels that destruct and leave a footprint when removed. As discussed previously, there are ways to eradicate the footprint.

What is actually happening when cars with marked parts are stolen? Are thieves deterred by the marking system? What is the operational experience of auto theft investigators so far? To answer these questions, on site interviews with auto theft investigators were conducted in eight large cities: Boston, Chicago, Denver, Detroit, Houston, Memphis, Miami, and San Diego; and with the State Police in Louisiana [15]. The interviews were conducted by a senior police officer under a special program arrangement between the Department's National Highway Traffic Safety Administration and the International Association of Chiefs of Police.

Is Parts Marking a Deterrent to Auto Theft for Parts?

Although only 4 percent of the passenger cars on the road by the end of 1988 had marked parts, local auto theft investigators said that professional thieves, while more cautious, would steal such cars as long as there is a demand for parts. A part is simply removed at a convenient

location and quickly delivered to where the repair takes place and installed on the damaged vehicle. The whole process is accomplished in a very short time and there is little need for removing the VIN label since the repaired car will be back on the road shortly, and detection by law enforcement officers unlikely.

The larger theft and chop shop operations which employ car thieves who deliver the vehicle for dismantling appear to be approaching the theft and processing of marked cars with more caution. There are reports of parts that are discovered with VIN labels removed, leaving the "footprint" and there are cases where the label and footprint have been removed and the part surface painted over. Police believe that marked parts are being hidden on or off the premises of dealers known to traffic in stolen parts. Such parts are often interspersed with similar but unmarked parts which makes it difficult for investigators to detect the stolen ones when labels have been removed. As a result there have been very few cases where stolen parts were found in the possession of salvage or parts dealers. The general awareness of parts marking (and consequent caution), the use of specific parts "ordering", and also the lack of sufficient manpower to inspect the very large quantity of parts in the typical salvage yard, are more reasons for not finding stolen parts.

So far the consensus among auto theft investigators is that the standard has not been effective in reducing the number of cars stolen in order to remove parts for sale.

How Effective is Parts Marking in Deterring Car Thefts for Other Motives?

All auto theft investigators listed joyriding, transportation, fraud, export, as the other motives for auto theft. The extent of each motive differed among the cities.

The typical joyrider or the thief who uses the car to commit other crimes is not interested in the marked parts and may be completely unaware of the VIN labeling system. Such stolen cars are usually abandoned, or seized in connection with another crime, and many are recovered.

Although difficult to quantify, the exportation of sizable numbers of stolen cars is suspected in some areas. Interdiction is difficult since stolen cars are frequently shipped in containers or crates, or in the case of land borders, the cars are just driven across (according to Customs sources their inspection effort is concentrated on imports, to interdict drugs). Local auto theft investigators say that only when information from informants, or only when timely and complete shipping documents are available for checking against stolen vehicle reports, would they have reasons to open containers to inspect the vehicle or parts cargoes.

Fraud, which can take many forms, is considered a significant problem by local auto theft investigators because it is easy to dump cars, to buy and export such cars and to retittle them after switching VINs with identical models found in salvage yards. In some cities, investigators estimate fraud to be 25 to 35 percent of car thefts. They stated that making arrests and prosecuting offenders has been difficult, but they also pointed out that older cars are often the object of fraud.

In the more than two years that parts marking on high theft car lines has been in effect, there has not been any evidence of counterfeiting adhesive VIN labels (one case has been reported when a crude attempt was made to make labels).

Have Motives for Auto Theft Changed?

In an earlier Part the market for stolen cars and parts was explored to at least identify and roughly quantify the distribution of auto theft by motive. Given that this distribution was expressed in ranges, changes are

not easy to detect. With the increasing drug problem, local auto theft investigators are finding that while many stolen vehicles are recovered, a large number are either damaged, or are missing unmarked items such as radios, wheels and tires, seats, roof "t-tops", batteries, telephones, and upholstery. The theft of vehicles for the removal of such "gourmet" items is thought to be done by criminals who need money to support a drug habit. The removal of such items is often also the final act of the theft of a car for joyriding. This type of theft pattern has become more evident over the last three years. Thieves appear to view thefts like these to be low risk since there is only a small chance they will be apprehended - and an even lesser chance of being convicted.

Whether this theft motive is displacing other motives is not clear, it does appear to be a mounting problem.

Are There Benefits to Parts Marking?

The parts marking standard has assisted enforcement officers in detecting and recovering stolen parts and cars. This ability to trace and link a marked part to a stolen vehicle is a definite benefit. Even when a label is removed, if a footprint is left, then at least it is clear that the part came from a high theft car line and the removal of the label is grounds for further investigation since this is a good indicator that the part was stolen. Police feel that as more marked vehicles enter the fleet, the value of the marking systems will improve for identifying stolen vehicles and parts. While auto theft investigators do not believe parts marking will deter auto theft, they do believe the marking system will improve the chances of successfully prosecuting offenders who deal in stolen parts.

Are the Parts Marking Standard and Methods Adequate?

Auto theft investigators view the standard as a useful step since it has the potential for identifying and recovering stolen parts and cars. There is a common concern that adhesive labels are not adequate since they can be removed. The footprint or trace can then be easily removed with solvent or be painted over. They strongly recommend marking be done by etching, stamping, or other more permanent methods.

With the apparent increasing theft rate of light pick-up trucks, vans, and multipurpose vehicles and the rising theft of items such as radios, seats, wheels, "t-tops" and similar items, investigators would like to see the standard extended to those vehicles and parts.

Other than parts markings, investigators endorse the use of anti-theft devices that incorporate fuel cut-off switches and ignition "kill" switches, which they feel are an effective theft deterrent if used properly.

What Other Measures Could Deter Auto Theft for Parts?

Many of the auto theft investigators mentioned the lack of uniform titling statutes to be a drawback in their operations.

Inspection of the VINs for retitling vary from State to State, ranging from no requirement for inspection, to inspection of all vehicles to be retitled. The lack of uniformity in titling laws allows the car thief to go to a less restrictive State and obtain a title for a stolen car. Some jurisdictions make it relatively easy to title a stolen car because they do not require an inspection. Strict inspection requirements in other States have proven to be a deterrent.

Some police officers feel that VIN labels required by the standard have been of some benefit in inspecting vehicles for retitling. The labels have provided an additional verification to the standard public VIN. Other police officers feel the markings have little effect on deterring the acquisition of fraudulent titles because current laws in their jurisdictions either do not require an inspection, or the inspection is not thorough.

The procedure for handling salvage titles also varies from State to State. Problems are encountered in many States because there is no statute regulating the disposition of vehicles which have been determined to be unrepairable. For example, a vehicle is classified as a "total loss" by an insurance company, a salvage dealer buys it and takes the title. If no inspection of the vehicle is required, or is not made because of time and manpower constraints, the salvage dealer could apply for and obtain a new title with relative ease. A vehicle of the same model year would then be located and stolen. The VIN from the "totaled" vehicle would be removed and installed in place of the stolen vehicle's number.

Investigators feel that titling laws which require an inspection by trained police officers are effective in reducing the number of stolen vehicles that are retitled.

The interviews again brought out the issue of enforcement resources. Each of the eight city and the State auto theft units was asked how many sworn officers there were in their agency and how many were assigned to vehicle theft investigations. The result was that one percent of the police agency's sworn complement was assigned to auto theft. The numbers ranged from 5 to 100 investigators. There are no nationwide numbers for auto theft investigators and no one has so far ventured an estimate. Given the city information and data from the survey conducted for this report there are probably less than 3,000 auto theft investigators nationwide.

SUMMARY: Adequacy and Effectiveness of Laws and Systems

It is difficult, or at least premature, to make definitive statements about the adequacy and effectiveness of Federal and State laws that are designed to prevent the distribution of used parts removed from stolen motor vehicles.

Clearly the 50 or so cases that were filed each year under the sections created by Title II - Antifencing Measures, of the 1984 Theft Act are not having much of an impact. Even if the cases filed under previously enacted legislation (sections 2312 and 2313 of title 18, USC) are included, the annual total is 250 Federal cases yielding slightly over 200 case convictions. The State and local burden is considerably greater -- it is here where the battle against motor vehicle thefts and stolen parts sales is joined.

The efforts by the various State and local government associations, privately funded organizations, legislators, police agencies and insurance companies and others in the private sector have made substantial progress in creating laws and statutes dealing with titling, inspections and licensing of vehicle and parts businesses. They are also trying to achieve uniformity among statutes.

The view of motor vehicle theft investigators who "operate" the systems available for tracing parts is critical to any assessment of adequacy. They say that while the professional thieves appear more cautious when confronting the cars with marked parts, they will steal them anyway and will either hide them, intersperse them among other parts and/or eradicate the label and footprint. So far investigators say the standard has not been effective in reducing the number of cars stolen in order to remove parts for sale.

A growing motive for auto theft is to obtain specialty items such as radios, wheels, seats, "t-tops", and other high value, quick sale accessories to fund drug habits, but it is not clear whether this problem is displacing the chop shop operation.

Investigators believe parts marking is useful and will become even more so in detecting and recovering stolen cars and parts, and improve chances of successfully prosecuting offenders. They do not think it will deter auto theft.

There is a common concern that adhesive labels are not adequate since they allegedly can be removed by peeling, scraping and heat applications. A label footprint can allegedly be removed with solvent, or painted over. They strongly recommend etching, stamping or other more permanent methods. They would like to see the standard extended to light trucks, vans, and multipurpose vehicles and to items such as entertainment electronics, seats, wheels and similar quick sell accessories.

The investigators want uniform and better titling laws; laws that require an inspection by trained police officers. The growing auto theft problem, particularly in urbanized areas, again brought out the issue of very limited enforcement resources - due mainly to other priorities. On the basis of responses from the eight large cities, and statistics from the survey of a national sample of jurisdictions, it is estimated that there are probably less than 3,000 officers doing auto theft investigative work nationwide. This equals six-tenth of a percent of the nearly half million sworn police officers nationwide.

APPENDIX 1

PART I

An Assessment of Parts Marking for Other Types of Motor Vehicles

"(i) an assessment of whether the identification of parts of other classes of motor vehicles is likely to have (i) a beneficial impact in decreasing the rate of theft of such vehicles; (ii) improve the recovery rate of such vehicles; (iii) decrease the trafficking in stolen parts of such vehicles; (iv) stem the export and import of such stolen vehicles, parts, or components; or (v) benefits which exceed the costs of such identification;

1984 Theft Act

This assessment is going to briefly cover the problem of thefts and recoveries of other than passenger cars - the focus being on the size of the problem, its relative urgency and whether the current standard (parts marking), if subsequently found successful, could be applied.

Thefts and Recoveries of Other Motor Vehicles

Heavy trucks have the highest theft rate, but represent only one percent of motor vehicle registrations. Over 80 percent are recovered each year. Light trucks (including vans and MPV's) have the lowest theft rate among all motor vehicles, but it is rising at a pace destined to match, and probably exceed the theft rate of passenger cars.

Distributions of thefts, registrations and recoveries, by vehicle type, using 1988 statistics are [20]:

	<u>Distribution in Percent</u>		
	<u>Thefts</u>	<u>Registrations</u>	<u>Recoveries</u>
Passenger Cars	73.2	75.4	75.9
Light Trucks, Vans	18.4	21.0	13.3
Heavy Trucks/Buses	3.1	2.4	7.2
Motorcycles	5.4	1.1	3.7

Light trucks are underrepresented in recoveries, but are, so far, stolen less often in proportion to their number in the motor vehicle fleet. Heavy trucks tend to be recovered in larger numbers relative to other types of motor vehicles, and motorcycles are stolen in numbers way out of proportion to their representation in the fleet.

Clearly, the largest theft and recovery problem, after passenger cars, are light trucks, vans and multi-purpose vehicles. This is based on statistics alone without considering the value of stolen motor vehicles.

The average value of a stolen vehicle was used in APPENDIX 1, PARTS C and D in discussing the market for stolen cars, but there are no reliable data by type of stolen motor vehicle, particularly heavy trucks. On the basis of the distributions for thefts listed above, the average value of a stolen heavy truck would have to be six times as high as a similar value for a light truck to constitute an equivalent theft loss value; a distinct possibility.

Heavy trucks are often stolen for their contents, rather than for parts or export. No data are available on the distribution of theft motives for heavy trucks. Moreover, no information on the condition of recovered heavy trucks was obtained for this report.

A motorcycle's loss value would have to be three times that of a light truck - quite unlikely for the average motorcycle. In other words, the theft of trucks is next as a theft problem, and motorcycles are at the bottom in priority.

Would Parts Identification Benefit Other Types of Motor Vehicles?

It is obvious this question cannot be answered at this time. A great deal depends on the following factors:

- o A definitive benefit from marking parts of high theft passenger cars, both as a deterrent to theft and as an aid to increased recoveries.
- o Whether currently marked parts continue to be a growing object of car theft - or are other parts and accessories displacing them in terms of demand.
- o Experience with adhesive labels; whether they contribute to deterrence and vehicle recovery. Enforcement officials have voiced their concerns and would prefer more permanent identification markings. There are cost implications in such a change.
- o Consideration of theft motives and actual experience data for heavy trucks, buses and motorcycles. The appropriateness of the current parts marking requirement and methods used for these vehicles are not necessarily clear.

References

- [1] Alliance of American Insurers, Chicago IL. Interview, 1989.
- [2] Automotive Parts Rebuilders Association McLean, VA. Interview, Nov. 15, 1989.
- [3] Burkett, Bobby R. "Vehicle Theft", 1989 International Conference American Association of Motor Vehicle Administrators. New Orleans, LA.: AAMVA (Sept. 1989).
- [4] California Department of Justice. Adult and Juvenile Arrests. Sex and Law Enforcement Dispositions by Specific Offense Statewide, 1979-1988. Sacramento, CA.: Bureau of Criminal Statistics (1980-1989).
- [5] Carrol, John C., Vice President and Corporate Counsel National Automobile Theft Bureau. Letter to National Highway Traffic Safety Administration, December 13, 1989.
- [6] Crash Estimating Guide. Vol. 21. New York, NY: Hearst (1989)
- [7] DeBrabant, H.R., et. al. Evaluation of Methods and Costs to Mark Vehicle Parts for Theft Prevention. Warren, MI.: Pioneer Engineering & Manufacturing Co. under NHTSA Contract DTNH22-87-C-06001. [1988].
- [8] Galfond, Glenn, et. al.. State and Local Survey on Auto Theft Arrests and Outcomes and on Theft Reporting/Recovery Procedures. Washington, D.C.: Price Waterhouse under NHTSA Contract DTNH22-88-C-06032, [1989].
- [9] "General Estimating System." Computer Database. Washington, D.C.: National Highway Traffic Safety Administration, 1989.
- [10] Gerstenberger, Neil. Georgia Bureau of Investigation. Letter to National Highway Traffic Safety Administration, December 6, 1989.
- [11] Godley, Carol and Jordan, William. Body/Repair Shop Visits to Determine Distribution of Replacement Parts Sources. Oxon Hill, MD.: Associated Management Services, Inc. under NHTSA Contract DTNH22-89-C-06015. [1989].
- [12] Highway Loss Data Institute. Insurance Loss, Theft Coverages, HLDI T83-1. Washington, D.C.: HLDI (May 1984).
- [13] Highway Loss Data Institute. Insurance Theft, Report, HLDI T88-1. Arlington, VA.: HLDI (May 1989).

- [14] Holmes, William M., Director, Statistical Analysis Center, Massachusetts Committee on Criminal Justice. Letter to National Highway Traffic Safety Administration, December 15, 1989.
- [15] International Association of Chiefs of Police. Interviews with local auto theft investigators under NHTSA Grant DTNH22-872-05141 (1989).
- [16] Jones, Alice. Illinois Criminal Justice Information Resource Center. Letter to National Highway Traffic Safety Administration, December 12, 1989.
- [17] Light, Gail R. (Ed.). Michigan Department of Corrections 1988 Annual Report. Detroit, MI. (Fall 1989).
- [18] Minnesota Department of Criminal Justice. Letter to National Highway Traffic Safety Administration, November 20, 1989.
- [19] Motor Vehicle Manufacturers Association. Facts and Figures 1988. Detroit, MI.: MVMA (1989).
- [20] "Motor Vehicle Thefts in U.S. in 1984-1988". Computer Magnetic Tapes - 5. Washington, D.C.: National Crime Information Center, 1989.
- [21] National Automobile Theft Bureau. Annual Reports 1987 and 1988. Palos Hills, IL.: NATB (1988, 1989).
- [22] National Automobile Theft Bureau. NATB Journal, Winter 1987-88 and Summer 1988. Palos Hills, IL.: NATB (1988).
- [23] National Safety Council. Accident Facts. Chicago, IL.: NSC, 1989.
- [24] "Passenger Car and Light Truck Registrations in the U.S. in 1984-1988". Computer Magnetic Tapes - 10. Washington, D.C.: R. L. Polk & Co., 1989.
- [25] "Price Guide Effective September 11," Keystone Crash Parts Digest. No. 1025-10. Pomona, CA.: Keystone (1989).
- [26] Simms, Brian. Ohio Governor's Office of Criminal justice Services. Letter to National Highway Traffic Safety Administration, January 10, 1990.
- [27] Tarrant, William and Veigal, C. Harding, Ed's. The Evaluation of Highway Traffic Safety Programs. Washington, D.C.: NHTSA [1977], pp. 40-44, 223-224, 255.
- [28] U. S. Congress, House. Motor Vehicle Theft Law Enforcement Act of 1984. Pub. Law 98-547, 98th Congress, 2nd Session., 1984. HR 6257.
- [29] U. S. Department of Justice. Crime in the United States, Issues 1984-1988. Washington, D.C.: FBI (1985-1989).

- [30] U. S. Department of Justice. National Crime Information Center Code Manual. Washington, D.C.: FBI (Nov. 1987).
- [31] U. S. Department of Justice. National Crime Information Center Operating Manual. Washington, D.C.: FBI (Nov. 1986).
- [32] U. S. Department of Justice. National Incident - Based Reporting System, Vol. 3. Washington, D.C.: FBI (July 1, 1988).
- [33] U. S. Department of Justice. Uniform Crime Reporting Handbook. Washington, D.C.: FBI (1984).
- [34] U. S. Department of Transportation. Evaluation Plan for Federal Motor Vehicle Safety Standard 208 - Occupant Crash Protection. DOT HS-805 066 [October 1979], pp. 92-104.
- [35] U. S. Department of Transportation. Federal Motor Vehicle Theft Prevention Standard, 49 CFR Part 541. Washington, D.C.: NHTSA, Oct. 24, 1985. 50FR43190.
- [36] U. S. Department of Transportation. Final Regulatory Impact Analysis - Part 581 Bumper Standard. Washington, D.C.: NHTSA (May 1982).
- [37] U. S. Department of Transportation. Highway Statistics, 1984 - 1988. Washington, D.C.: Government Printing Office, 1985 - 1989.
- [38] U. S. General Accounting Office. Vehicle Theft - Data Bases for Implementing and Assessing the 1984 Vehicle Theft Act, GAO/GGD 87-59BR. Washington, D.C. GAO [May 1987].
- [39a] U. S. Customs. Customs Bulletin and Decisions, Vol. 23, No. 17. 19CFR Parts 192 and 178. Washington, D.C.: U. S. Customs, April 26, 1989.
- [39b] U. S. Treasury Department, Washington, D.C. Meeting with Smuggling Division, U. S. Customs Service, May 16, 1989 (and follow-up contacts).
- [40] Wards Communications, Inc. Wards Automotive Yearbook 1989. Detroit, MI.: Wards Comm. Inc. (1990).
- [41] Yedlin, Mark. Analysis of Insurer Reports Received Pursuant to Section 612 of the Motor Vehicle Theft Law Enforcement Act of 1984. Huntington Station, N.Y.: KLD Associates, Inc. under NHTSA Contract DTNH22-88-C-02024 [1989].
- [42] Yedlin, Mark, et. al. Analysis of Insurance Premiums and Payouts for 1987-1988 Designated High Theft Rate Passenger Cars. Huntington Station, N.Y.: KLD Associates under NHTSA Contract DTNH22-88-C-06000. [1989].

- [43] Zint, Kenneth, Chief Caseload Systems Section, U. S. Department of Justice, Executive Office for U.S. Attorneys. Letter to National Highway Traffic Safety Administration, November 20, 1989.