
Acurex Environmental Final Report 97-1050

UPDATE OF FLEET CHARACTERIZATION DATA FOR USE IN MOBILE6

May 16, 1997

EPA Contract No. 68-C6-0068
Work Assignment No. 0-01
Acurex Environmental Project No. 7251

Prepared For

U.S. Environmental Protection Agency
Office of Mobile Sources
2565 Plymouth Road
Ann Arbor, MI 48105

By

Acurex Environmental Corporation
555 Clyde Avenue
P.O. Box 7044
Mountain View, California 94039

Acurex
Environmental

C O R P O R A T I O N
A Geraghty & Miller Company

FOREWORD

This report and the information and data described herein have been funded by the USEPA under Contract 68-C6-0068, Work Assignment 0-01. It is being released for information purposes only. It may not reflect the views and positions of the USEPA on the topics and issues discussed, and no official endorsement by USEPA of the report or its conclusions should be inferred.

This report has not been peer or administratively reviewed. .

This report was authored by Louis Browning, Doug Coleman and Charlotte Pera of Acurex Environmental Corporation. Dr. Louis Browning was the Acurex Environmental Corporation Project Manager. Ms. Tracie Jackson was the USEPA Work Assignment Manager. Mr. Terry Newell was the USEPA Project Officer.

TABLE OF CONTENTS

SECTION 1	INTRODUCTION	1-1
SECTION 2	REVIEW OF DATA SOURCES	2-1
2.1	SECONDARY DATA SOURCES	2-1
2.2	PRIMARY DATA SOURCES	2-3
SECTION 3	DATA ANALYSIS METHODOLOGIES	3-1
3.1	VEHICLE REGISTRATIONS	3-1
3.1.1	R.L. Polk & Company Database	3-1
3.1.2	Federal Transit Administration Database	3-2
3.2	ANNUAL MILEAGE ACCUMULATION	3-3
3.2.1	Truck Inventory and Use Survey	3-3
3.2.2	Nationwide Personal Transportation Survey	3-6
3.2.3	Federal Transit Administration Database	3-7
SECTION 4	RESULTS	4-1
4.1	REGISTRATIONS	4-2
4.1.1	LDVs	4-2
4.1.2	LDTs	4-3
4.1.3	Heavy-Duty Trucks and School Buses	4-3
4.1.4	Transit Buses	4-3
4.1.5	Aggregated Classes	4-3
4.2	ANNUAL MILEAGE	4-3
4.2.1	LDVs	4-3
4.2.2	LDTs	4-4
4.2.3	HDGVs	4-4
4.2.4	HDGBs	4-4
4.2.5	HDDVs	4-4
4.2.6	HDDBs	4-5
4.3	TABLES	4-5
	APPENDIX	A-1

LIST OF ILLUSTRATIONS

Figure 4-1	Registration Comparison by Model Year LDV	4-6
Figure 4-2	Registration Comparison by Model Year LDGT1	4-7
Figure 4-3	Registration Comparison by Model Year LDGT2	4-8
Figure 4-4	Registration Comparison by Model Year LDDT1	4-9
Figure 4-5	Registration Comparison by Model Year LDDT2	4-10
Figure 4-6	Registrations by Model Year HDGV1	4-11
Figure 4-7	Registrations by Model Year HDGV2	4-12
Figure 4-8	Registrations by Model Year HDGB School	4-13
Figure 4-9	Registrations by Model Year HDGB Transit	4-14
Figure 4-10	Registrations by Model Year HDDV(2B)	4-15
Figure 4-11	Registrations by Model Year HDDV(3)	4-16
Figure 4-12	Registrations by Model Year HDDV(4-5)	4-17
Figure 4-13	Registrations by Model Year HDDV(6-7)	4-18
Figure 4-14	Registrations by Model Year HDDV(8A)	4-19
Figure 4-15	Registrations by Model Year HDDV(8B)	4-20
Figure 4-16	Registrations by Model Year HDDB School	4-21
Figure 4-17	Registrations by Model Year HDDBTransit	4-22
Figure 4-18	Registrations by Model Year Aggregated LDGT	4-23
Figure 4-19	Registrations by Model Year Aggregated LDDT	4-24
Figure 4-20	Registrations by Model Year Aggregated LDT	4-25
Figure 4-21	Registrations by Model Year Aggregated HDGV	4-26
Figure 4-22	Registrations by Model Year Aggregated HDGB	4-27
Figure 4-23	Registrations by Model Year Aggregated HDDV(3-5)	4-28

LIST OF ILLUSTRATIONS (CONTINUED)

Figure 4-24	Registrations by Model Year Aggregated HDDV(8)	4-29
Figure 4-25	Registrations by Model Year Aggregated HDDV All	4-30
Figure 4-26	Registrations by Model Year Aggregated HDDB	4-31
Figure 4-27	Annual Miles by Age LDV	4-32
Figure 4-28	Annual Miles by Age LDGT1	4-33
Figure 4-29	Annual Miles by Age LDGT2	4-34
Figure 4-30	Annual Miles by Age LDDT1	4-35
Figure 4-31	Annual Miles by Age LDDT2	4-36
Figure 4-32	Annual Miles by Age HDGV1	4-37
Figure 4-33	Annual Miles by Age HDGV2	4-38
Figure 4-34	Annual Miles by Age HDGB School	4-39
Figure 4-35	Annual Miles by Age HDGB Transit	4-40
Figure 4-36	Annual Miles by Age HDDV(2B)	4-41
Figure 4-37	Annual Miles by Age HDDV(3)	4-42
Figure 4-38	Annual Miles by Age HDDV(4-5)	4-43
Figure 4-39	Annual Miles by Age HDDV(6-7)	4-44
Figure 4-40	Annual Miles by Age HDDV(8A)	4-45
Figure 4-41	Annual Miles by Age HDDV(8B)	4-46
Figure 4-42	Annual Miles by Age HDDB School	4-47
Figure 4-43	Annual Miles by Age HDDB Transit	4-48

LIST OF TABLES

Table 1-1	Vehicle Types	1-2
Table 2-1	Data Sources and Base Years	2-3
Table 3-1	BUSDATA.DBF Data Structure	3-2
Table 3-2	Vehicle Type Codes Used in the Analysis	3-2
Table 3-3	TIUSDAT.DBF Data Structure	3-4
Table 3-4	Additional Fields in TIUSDAT.DBF	3-4
Table 3-5	LDVS3.DBF Data Structure	3-6
Table 4-1	Total VMT, Registrations, and Annual Mileage	4-2
Table 4-2	Vehicles in Operation as of July 1996	4-49
Table 4-3	Annual Mileage Raw Data	4-51
Table 4-4	Annual Mileage Curve Fit Data	4-53
Table 4-5	Vehicles in Operation as Percent of Class as of July 1996	4-55
Table 4-6	Vehicles in Operation, Aggregated Classes as of July 1996	4-57
Table 4-7	Vehicles in Operation, as Percent of Aggregated Classes as of July 1995	4-58
Table 4-8	Gasoline/Diesel Sales Fraction	4-59

SECTION 1

INTRODUCTION

The USEPA's highway emissions factor model, MOBILE, is the primary model used by state and local agencies to simulate mobile source emissions generated in their areas. In order to model emissions from motor vehicles, MOBILE must incorporate data characterizing the fleet of vehicles in use in the United States. The vehicle population is characterized by the total number of vehicles in operation within certain vehicle weight categories, the age distribution and fuel type (gasoline or diesel) within each weight category, and the mileage accumulation rates specific to vehicle age, fuel type, and weight category. The characterization for a given calendar year is based on a July 1 "snapshot".

Due to changes in economic and demographic conditions in recent years, there have been significant changes in the age distribution, vehicle-type distribution, and mileage accumulation rates for the current national motor vehicle fleet since the last version of the model (MOBILE5a) was released in March 1993. As such, the fleet characterization data currently used in MOBILE must be updated to reflect these changes.

This study utilized the latest available data to update the characterization of the national fleet of vehicles used in the MOBILE5a model. The results of this study may be used in MOBILE6, currently under development. Acurex Environmental Corporation reviewed potential sources of information and analyzed the most relevant and useful data sources. The results of this study, as well as a description of the data and methodologies used to obtain the results, are presented in this document.

Table 1-1 lists the individual vehicle type categories included in the study. Registrations and average annual mileage as functions of vehicle age were developed for each of these categories. Registrations were also summed for the entire set of vehicles and certain subsets.

With respect to registrations, Acurex attempted to use 1996 as the base year for the characterization. Transit bus registrations are the exception, for which the base year is 1994. Similarly, it was not possible to use 1996 as the base year for annual mileage accumulation rates, since sources of these data were developed prior to 1996. The base year for each of these data sources will be identified in the relevant subsections in Section 3, below.

Table 1-1. Vehicle Types

Designation	Description	Gross Vehicle Weight (lb)
LDGV	Light-duty gasoline vehicles	0 - 8,500
LDDV	Light-duty diesel vehicles	0 - 8,500
LDGT1	Light-duty gasoline trucks	<6,000
LDGT2	Light-duty gasoline trucks	6,001-8,500
LDDT1	Light-duty diesel trucks	<6,000
LDDT2	Light-duty diesel trucks	6,001-8,500
HDGV (classes 2B-3)	Heavy-duty gasoline vehicles	8,501-14,000
HDGV (classes 4-8)	Heavy-duty gasoline vehicles	>14,000
HDDV (class 2B)	Light heavy-duty diesel trucks	8,501-10,000
HDDV (class 3)	Light heavy-duty diesel trucks	10,001-14,000
HDDV (classes 4-5)	Light heavy-duty diesel trucks	14,001-19,500
HDDV (classes 6-7)	Medium heavy-duty diesel trucks	19,501-33,000
HDDV (class 8A)	Heavy heavy-duty diesel trucks	33,001-60,000
HDDV (class 8B)	Heavy heavy-duty diesel trucks	>60,000
HDGB (school)	Heavy-duty gasoline school buses	all
HDGB (transit)	Heavy-duty gasoline transit buses	all
HDDB (school)	Heavy-duty diesel school buses	all
HDDB (transit)	Heavy-duty diesel transit buses	all

SECTION 2

REVIEW OF DATA SOURCES

To develop a fleet characterization, Acurex reviewed numerous data sources for relevant and accurate content. In this section, both the data sets analyzed, and those that were reviewed but not used (or used minimally), are described. A description of the data sources reviewed but not used is found in Section 2.1. A description of the data sources used for this study is found in Section 2.2. Analysis methodologies are described in Section 3. Results of the analyses are found in Section 4.

2.1 SECONDARY DATA SOURCES

Most of the sources used minimally by Acurex were tables and charts listed in popular industry publications. In most cases, Acurex found that either pertinent data from these sources was missing or provided in a format that could not be translated into the weight class/age/fuel type breakdowns required for this study. For example, often vehicles were tabulated according to location instead of weight or age. In these cases, we used total vehicle data from these sources only to verify the final results obtained from other data sources. These sources have been called “secondary data sources”.

The Gallup Organization Final Report for the Motor Vehicle Manufacturers Association, 1993

The Gallup Organization study was conducted to determine private light-duty vehicle driving patterns to help make estimations of emissions and fuel economy. It consisted of two samples, one taken by telephone and the other by mail. The total number of respondents to both surveys was approximately 8,300. The data recorded includes a number of different items such as driver profile, vehicle make and model, cargo carried, the number and purpose of trips, and the type of road utilized.

Vehicle age and mileage were recorded, but the results were not published in a cross-correlated fashion. In other words, it is not possible to associate the vehicle’s age with the miles it drove. Further, to define a vehicle’s classification, Gallup used their own definitions that generally were not consistent with the vehicle categories required for this study. For example, Gallup divided vehicles into either passenger cars or vans/trucks, with no reference to weight. Finally, the resultant data was not expanded to national levels, but instead reported in percentages of the overall sample. Given these limitations, Acurex felt that such data were not applicable for use in the present study.

1995 Motor Vehicles Facts & Figures (American Automobile Manufacturers Association)

The *1995 Motor Vehicles Facts & Figures* by the American Automobile Manufacturers Association (AAMA) is a compendium of tables and graphs sorted into several categories, such as production, retail sales, registrations, ownership, travel trends, and automobile related fatalities. It has a wealth of information pertaining to the motor vehicle industry, and was used by Acurex as a point of departure for exploring other potential sources. It was not used for raw data itself because it breaks

vehicles out into categories that are different from those used in this study. One table does categorize passenger cars by model year, but it does so only for LDVs, and only back to model year 1979. The data on vehicle registrations presented in this publication was derived from data maintained by R.L Polk & Company (which was used extensively in this study). Acurex used the AAMA publication to verify total numbers of vehicles on the road.

Automotive Fleet 1994 Fact Book (Bobit Publication)

In this annual publication, a number of quantitative tables characterizing the various vehicle fleets in the United States are presented. Information about truck market share, yearly model registrations, operating costs, and fleet size is provided, but few data referring to fleet age or mileage are included. Acurex did not use information from this source.

School Bus Fleet 1997 Fact Book Issue (Bobit Publication)

The Fact Book Issue of the magazine *School Bus Fleet* presents statistical data regarding the United States school bus fleet, including total registrations, annual mileage, students transported, and fatalities. This issue was used for one important statistic: average school bus annual mileage. Since annual mileage data by model year were unavailable from other sources, this value (9,939 miles per year) was used as the mileage for every model year.

1995 Highway Statistics (Federal Highway Administration)

The *1995 Highway Statistics* book is a compilation of statistics in several categories, with most data items in the areas of highway finance and road characteristics. The Federal Highway Administration (FHWA) records this information from various state and local administrative agencies and publishes the *Highway Statistics* annually. While the document does contain some substantial registration information according to vehicle type, data is not specified by vehicle age. Further, the statistics contain no information regarding fuel type. Thus, in most cases, Acurex was not able to use these data for this study. However, information on total vehicle miles traveled in the United States was used to verify the numbers generated using more detailed. Also, certain statistics indicated that the number of government owned vehicles are insignificant compared to the total number of vehicles on the road. This supported the application of private vehicle annual mileage rates (provided in the NPTS database - see Section 2.2) to both public and private vehicles as sufficiently accurate for this study.

1995 Transit Passenger Vehicle Fleet Inventory (American Public Transit Association)

This American Public Transit Association (APTA) inventory categorizes and lists passenger vehicles according to the fleet in which they are operated. It provides counts of vehicles in a variety of categories, namely manufacturer, city of construction, specification, cost, ownership, and seating capacity. The book also includes a section listing transit buses by age but not by fuel type. Since data from the Federal Transit Administration (see Section 2.2) did contain both model year and fuel type, it was chosen to provide data for this study over that presented in the APTA document. Acurex used this publication mainly to verify the registration data obtained from the Federal Transit Administration.

The 100-Year Almanac and 1996 Market Data Book (The Automotive News)

The 100-Year Almanac provides a historical representation of the automotive industry since the turn of the century by highlighting key events and following manufacturer sales on a yearly basis. The

1996 Market Data section of the magazine compiles statistics related to production, sales, and new registrations for the year. The data contained in this source is extensive with respect to vehicle make, model, and fuel type, but has very limited data categorizing vehicles by weight or model year. Therefore, Acurex was unable to incorporate this source of data into the study results.

2.2 PRIMARY DATA SOURCES

The following data sources were used extensively in this study and are referred to as “primary data sources.” The data sources found most useful were contained in electronic databases from the R.L. Polk & Company (Polk), the 1992 Truck Inventory and Use Survey (TIUS), the 1995 Nationwide Personal Transportation Survey (NPTS), and in databases from the Federal Transit Administration (FTA).

Primary data sources used for each vehicle type registration and annual mileage accumulation are listed below in Table 2-1 and described below.

Table 2-1. Data Sources and Base Years

Vehicle Type	Vehicle Registrations		Annual Mileage Accumulation	
	Source	Base Year	Source	Base Year
Light Duty Vehicle	Polk	1996	NPTS	1990
Light & Heavy Duty Truck	Polk	1996	TIUS	1992
School Buses	Polk	1996	Bobit	1996
Transit Buses	FTA	1994	FTA	1994

R.L. Polk & Company

The only centralized source of nationwide vehicle registration data of the type needed for this study is assembled by R.L. Polk & Company. Polk compiles Department of Motor Vehicle registration information from each state into their database on a quarterly basis. These data include, for each vehicle, information describing make, model year, fuel type, and gross vehicle weight.

Data from two databases at Polk were required for this study. The first database records light-duty vehicles and truck registrations according to make, model year, fuel type, and gross vehicle weight. Information was available from this database as of July 1, 1996.

The second database contains heavy-duty trucks and school buses, again recording make, model year, fuel type, and gross vehicle weight. Acurex received two sets of heavy-duty vehicle data from Polk: Oct 1, 1996 and Jan 1, 1997. In Section 3, the methodology used to convert data from these dates to a July 1, 1996 snapshot is described.

For consistency, Acurex defined Age 1 vehicles to be model year 1996 for all Polk registrations. Mileage accumulation rates were not acquired from this source.

Truck Inventory and Use Survey

The Truck Inventory and Use Survey was conducted during the 1992-1993 timeframe by the U.S. Bureau of the Census. The database, which was supplied to Acurex on CD-ROM, compiles a statistically significant sample of on-road light-duty and heavy-duty trucks. Each record is the equivalent of one vehicle. Data for each record is extensive, and includes the required attributes of age, gross vehicle weight, and fuel type. Most importantly, the database records miles driven in calendar year 1992 by these vehicles. This data was used to determine mileage accumulation for light-duty and heavy-duty trucks.

Model year 1992 was designated as Age 1 vehicles for the TIUS data.

Nationwide Personal Transportation Survey

Data recorded in the Nationwide Personal Transportation Survey was developed by a consortium of Department of Transportation agencies to characterize the nature of personal travel (as opposed to commercial and institutional travel). The 1990 survey, the fourth in the NPTS series, consists of 47,499 individual telephone interviews. The survey asked interviewees about their travel habits, including trip length, number and purpose of trips, and time of day. Also, information related to the subjects' personal background and vehicle characteristics was recorded during the study. Of relevance to the Acurex study, the NPTS contains data regarding light-duty vehicle age and annual mileage. However, it does not contain data recording fuel type. Like the TIUS data, Acurex received the NPTS data on CD-ROM.

Age 1 vehicles in the NPTS data are defined as model year 1990 vehicles. Data from a new NPTS study conducted in 1995 will become available in August 1997. This might have an impact on the light-duty vehicle mileage accumulation rates reported here. In addition, due to the current popularity of using light-duty trucks (light pick-up trucks and sports utility vehicles) in passenger car applications, mileage accumulation rates for light-duty trucks might also be affected.

Federal Transportation Administration

The Federal Transit Administration supplied transit bus inventory data to Acurex in electronic form. The FTA helps fund transit districts across the nation; as part of this program, funded agencies are required to submit revenue and vehicle inventory forms to the FTA on a yearly basis. Included among the data recorded on these forms (Form 408) is the vehicle mileage traveled during the previous year and the model year of the bus. This allowed calculation of transit bus mileage by age in addition to total vehicle counts.

The latest available version of this data was recorded in 1994. Thus Age 1 is defined as model year 1994 for this data set.

SECTION 3

DATA ANALYSIS METHODOLOGIES

Acurex performed analyses of both vehicle registrations and annual mileage data sources. The following subsections describe the methodologies used to determine the values for these tasks. The data sources and methodologies used for registration purposes are described in Section 3.1, those used to characterize annual mileage data are described in Section 3.2. Results of these analyses can be found in Section 4.

3.1 VEHICLE REGISTRATIONS

As required under Work Assignment Tasks 1, 2, and 3, Acurex determined total vehicle registrations and vehicle registrations as a function of age for all vehicle types listed in Table 1-1. The primary source of this data was the Polk database, while information on transit bus registrations was taken from the FTA database.

3.1.1 R.L. Polk & Company Database

Several manipulations were required to the data provided by Polk in tabular, electronic form as an EXCEL spreadsheet.

First, Acurex divided Class 8 heavy-duty diesel vehicle registrations in the Polk database into Class 8A and Class 8B subclasses, since these breakdowns were not available from Polk. Using registration data from the TIUS database, the percent of Class 8 vehicles below 60,000 pounds GVW for each model year was calculated. These percentages were then applied to the Polk data for Class 8 trucks to estimate total registrations of Class 8A and Class 8B vehicles. For model years not included in the TIUS data (1993 - 1996), Acurex assumed 26.5% of Class 8 vehicles are Class 8A. This value represents the average percentage of all vehicles in model years 1983 to 1992.

After splitting the data in this fashion, Acurex translated the heavy-duty vehicle October 1, 1996, and January 1, 1997 data to July 1, 1996. The two data sets allowed calculation of attrition rates of registered vehicles between October 1, 1996 and January 1, 1997 specific to each model year, for all heavy trucks combined, but not for individual weight classes. Acurex used these attrition rates to “backcast” estimated registrations as of July 1, 1996, using linear extrapolation (Linear extrapolation of attrition rates is a reasonable approximation considering the difficulty of obtaining and analyzing attrition data on monthly or shorter periods, and is consistent with EPA’s treatment and use of attrition information in MOBILE5a and earlier versions of the model). The same attrition rate calculated for all heavy trucks of each model year was applied to each weight class for that model year. Note that the number of model year 1995 and 1994 trucks registered increased in the fourth quarter of 1996. This, according to Polk personnel, is not unusual and reflects stored inventory of one- and two-year old vehicles continuing to be sold through 1996.

For model year 1996 heavy-duty vehicles, Acurex performed a different procedure to include new registrations. The values used for the July 1, 1996 snapshot for the 1996 model year are one-half of the values provided originally from Polk as of January 1, 1997. These are the number of vehicles sold halfway through the year, assuming an even introduction throughout the year (For the same reason as described in the previous paragraph regarding attrition rates, use of linear extrapolation for sales data is appropriate in the MOBILE model series).

Once the manipulations of the data were complete, the resulting tabular data was transferred to new spreadsheets and graphs were created. Where data was available from other sources like MOBILE5a, these data were plotted along side the Polk data for comparison purposes. The results of these comparisons are described in Section 4.

3.1.2 Federal Transit Administration Database

Transit bus registration data for urban buses was obtained from the Federal Transit Administration as an EXCEL spreadsheet. It was saved as a dBASE file for processing. The structure of the dBASE data file is shown in Table 3-1 below:

Table 3-1. BUSDATA.DBF Data Structure

Field Name	Description
NUMVEH	Number of buses in fleet
TYPE	Bus type code
MY	Bus Model Year
NUMACTVEH	Number of active buses in fleet
FUELTYPE	Bus fuel type
SEATING	Seating capacity of the bus
ANNMILES	Total Fleet annual mileage

Registration information for urban transit buses was determined from this data. Only vehicle type codes listed in Table 3-2 were used in the analysis.

Table 3-2. Vehicle Type Codes Used in the Analysis

Code	Bus Type
AB	Articulated motor bus
BA	Motor bus with > 35 seats
BB	Motor bus with 25-35 seats
BC	Motor bus with < 25 seats
DB	Double-decker bus

Vehicle types codes other than those listed in Table 3-2 refer to non-bus transit vehicles, and these records were eliminated from the database. As an urban bus is defined in the Code of Federal Regulations (§86.093-2) as “a passenger carrying vehicle powered by a heavy heavy-duty diesel engine, or of a type normally powered by a heavy heavy-duty diesel engine, with a load capacity of fifteen or more passengers ...”, records which indicated that a bus had less than a 15 seat capacity were eliminated from the database. Buses designated as inactive in the FTA database were, however, included in this calculation as they still exist within the inventory. (Inactive buses accounted for approximately 4% of the inventory.) Even though gasoline-powered buses are not technically designated urban buses, the dataset also contained a set of gasoline-powered buses that carried 15 or more passengers. For consistency, gasoline-powered urban bus registrations were also documented in this report. No attempt was made to translate the 1994 FTA data to the 1996 baseline.

The program BUSES.PRG, used to calculate bus registrations and mileage accumulation, is listed in Appendix A. Bus registrations and comparisons to other data sets are discussed in Section 4. Discussion of the calculation of mileage accumulation rates for transit buses can be found in Section 3.2.3.

3.2 ANNUAL MILEAGE ACCUMULATION

Acurex acquired and analyzed information regarding the annual mileage accumulation of all vehicle types by age as stated in Work Assignment Task 5. The methodologies applied to each of these source are described in the subsections below.

3.2.1 Truck Inventory and Use Survey

To provide the best analysis of the TIUS data for the purposes needed by this work assignment, Acurex manipulated the TIUS data on a record-by-record basis. To do this, pertinent data from the TIUS data file TI92MDF.DAT was converted into a comma-delimited file using the C program TIUSCONV.C listed in the appendices. The comma-delimited file was then read into a dBASE file following the structure presented in Table 3-3.

Two additional fields were added to TIUSDAT.DBF to further help in the manipulation of the data for this work assignment. They are listed in Table 3-4.

Of the 247,282 records that comprised the original data set and were appended from TI92MDF.DAT to TIUSDAT.DBF, 1,612 were deleted because they had no model year designation and 3,694 records were deleted because they designated fuels other than gasoline or diesel (liquefied gas or other). This left 241,976 records.

Each TIUS data record (representing one truck from the survey) had several different weight and weight class fields. MAXWT represented the maximum gross weight at which the vehicle or vehicle/trailer combination was operated. TIUGVW represented the gross vehicle weight of the vehicle based on the average weight and is recoded to TIUS specifications. While this is based on average weight, it is probably a good indication of the gross vehicle weight (GVW) of large trucks. PKGVW represents the GVW class based upon the vehicle’s vehicle identification number (VIN) and is obtained from the manufacturer. PKRWGT represents the gross vehicle registered weight which comes from state registration data. The PKGVW and PKRWGT are the same values used by Polk to determine weight classes.

Table 3-3. TIUSDAT.DBF Data Structure

Field Name	Description
EXPANF	Expansion Factor
MDLYR	Model Year
ACQMON	Acquired Month
ACQYR	Acquired Year
OBTAIN	How was vehicle obtained?
DISPOZ	Was the vehicle disposed of?
DISMON	Month the vehicle was disposed
DISYR	Year the vehicle was disposed
HOWRID	How was the vehicle disposed?
MAXWT	Maximum Gross Weight
ENGTYP	Fuel Type
ANNMIL	Annual Mileage during 1992
LTMIL	Lifetime Mileage
TIUGVW	TIUS Gross Vehicle Weight Class
PKG VW	Polk Gross Vehicle Weight Class
PKRWGT	Polk Registered Weight
VEHSZE	Vehicle Size

Table 3-4. Additional Fields in TIUSDAT.DBF

Field Name	Description
VEHTYPE	Vehicle Class Description
FUELTYPE	Fuel Type

In reviewing the data, inconsistencies between the various weight class designations and weights were found. For example, a single record (1 truck) could list a registered weight (PKRWGT) of 4,000 pounds GVWR but also list a gross vehicle weight class (PKG VW) of 8, indicating a registered weight of 33,000 pounds or greater. Discussions with Census Bureau staff provided an explanation for these inconsistencies. The two types of weights, PKGVW and PKRWGT, are based on truck registrations, and are often entered into databases based on the VIN. Prior to 1983, VIN coding was not uniform, and, as a result, incorrect interpretations of gross vehicle weight may have occurred during data entry. Therefore,

discrepancies between the PKRWGT and PKGVW data fields should be more prevalent for trucks older than model year 1983. The recommendation of Census Bureau staff was to use the PKRWGT and PKGVW for comparison to TIUGVW as a check for this parameter's accuracy. TIUGVW gives an average gross weight value rather than the manufacturers gross vehicle weight, but Census Bureau staff felt that the TIUGVW data was of high quality and, for large trucks especially, would be a good indication of the gross vehicle weight rating. While Acurex did not find that post-1983 data was necessarily more consistent than pre-1983 data, the methodology recommended by the Census Bureau staff was applied to determine which records were valid for use in this study. Only data records which met one of the following criteria were retained:

- Records where the Polk class (PKGVW) and weight (PKRWGT) were consistent
- Records where the TIUS class (TIUGVW) and the Polk Weight (PKRWGT) were consistent
- Records where the TIUS class (TIUGVW) and Polk Class (PKGVW) were consistent

This resulted in 220,544 records for the analysis, approximately 90% of the original data set.

These records were used to characterize average annual mileage accumulation as a function of vehicle age and weight class. The TIUS data was not used to characterize vehicle registrations; instead, Polk data was used as was described in Section 3.1. TIUS data could not be used to characterize registrations because records were for survey responses only. The database does incorporate an "expansion factor" (EXPANF) which is used as a multiplier on the survey response records to expand the data to be representative of the entire national truck fleet. However, the expansion factors are specific only to each of five vehicle strata within each state: pickups, vans, single-unit light (26,000 pounds GVW or less), single unit heavy, and truck tractor. Because the expansion factors are not intended to, and the trucks surveyed were not selected to, correctly represent a model year- and weight class-specific breakdown of the national truck fleet, the TIUS data could not be used to characterize national truck registrations by model year and weight class. Census Bureau staff agreed that it would be inappropriate to use the expansion factors in this way.

Acurex calculated average annual mileage accumulations by averaging the ANNMIL data for each weight class and model year. (The expansion factors were not applied to the data records in the calculation of average annual mileage accumulation, since this calculation is also specific by model year and weight class.)

To compensate for trucks used less than 12 months in the year due to acquisition or disposal during 1992, months of operation for each record were determined. It was assumed that the acquisition or disposal happened mid month. Thus a truck purchased in June of 1992 (ACQYR = 92 and ACQMON = 6) was assumed to operate for 6.5 months in 1992, while a truck disposed of in June of 1992 (DISYR = 92 and DISMON = 6) was assumed to have operated for 5.5 months prior to disposal. Months of operation were then averaged for each model year and class and the annual mileage accumulation for that case was then adjusted to 12 months of operation.

The TIUS data model year designations are only given for vehicles with model years of 1983 or newer. Vehicles 11 years of age and older are categorized together as model year 11. To characterize mileage accumulation for vehicles 11 years of age and older, records with model year 11 and OBTAIN = 1 (purchased new) were placed in a separate database (TIUS11.DBF) with the same structure as TIUSDAT.DBF. In those cases, model year was assumed to be the same as acquired year (ACQYR) and

average mileage was determined for each of the classes for all acquired years 1982 and earlier. Data records for trucks of model year 11 purchased as used vehicles could not be incorporated into the analysis because there was no data to indicate the specific model year of the truck.

Curve fits were made through the first set of data (model years 1983 through 1992). Only points in the second set (model years earlier than 1983) that did not change the shape of the curve generated by the first set of data more than 5% were used to produce the curve fits. Two different curve fits were applied, exponential and 2nd order polynomial. The one that produced the best fit was chosen.

No adjustments were made to translate the 1992 TIUS data to the 1996 baseline year for this study. This is because total VMT calculated from the 1992 TIUS mileage estimates and the Polk 1996 registrations closely approximated other data sources (see Section 3.1).

The program PKTI.PRG, used to calculate mileage accumulation, is listed in the appendices. Results of these analyses are given in Section 4.

3.2.2 Nationwide Personal Transportation Survey

The data on CD-ROM from the Nationwide Personal Transportation Survey was converted to a dBASE file using the Statistical Export and Tabulation System (SETS), a software program developed by the National Center for Health Statistics and provided with the NPTS database. The program allows data querying and tabulating, as well as exporting to dBASE files. The dBASE file structure for the data file is shown in Table 3-5.

Table 3-5. LDVS3.DBF Data Structure

Field Name	Description
ANNMILES	Annualized Miles
MILELIMIT	ANNMILES capped at 115,000
VEH12MNT	Vehicle was received in last 12 months
VEHMILES	Vehicle mileage reported in last 12 months
VEHMONTH	Months owned if less than 12
VEHTYPE	Type of Vehicle
VEHYEAR	Model Year of vehicle
WTHHFIN	Registrations per record

In discussions with NPTS, it was decided that the mileage (VEHMILES) should be averaged using the expansion factor (WTHHFIN) for each vehicle class (VEHTYPE) and model year (VEHYEAR). The expansion factor, which is specific to each record, is a multiplier applied to expand the survey responses to represent the national fleet. The expansion factors are based on several attributes of the survey respondent and help eliminate geographic bias in the data (since much more data comes from some states than others). NPTS staff strongly recommended that the expansion factors be applied

as part of the calculations. Annual miles for vehicles that were operated less than 12 months were adjusted to 12 months by multiplying VEHMILES by 12 and dividing by months owned (VEHMONTH). Since this data did not differentiate between gasoline and diesel, the same mileage accumulation curve was generated for both¹. The data was then curve fit using the best fit between a 2nd order polynomial and an exponential curve. This data was only used for determining mileage accumulation for light-duty automobiles because the TIUS data, which includes light-duty trucks, was 2 years more recent than the NPTS data and provided information of the type of fuel used by each vehicle.

The program LDVS.PRG to calculate mileage accumulation is listed in Appendix A. Results of these analyses are given in Section 4.

3.2.3 Federal Transit Administration Database

Mileage accumulation data for urban buses was calculated using the program BUSES.PRG as discussed in Section 3.1.2. For each fuel type and model year, annual fleet mileage was summed and divided by the total number of buses. Buses designated as inactive in the FTA database were included in the denominator for this calculation. This results in a lower average annual miles per bus than if only active buses were counted, but because inactive buses are part of the inventory, this method represents the average mileage of the urban bus fleet in existence in the United States.

The program BUSES.PRG to calculate mileage accumulation is listed in Appendix A. Results from these calculations are given in Section 4.

¹ According to EPA, light-duty vehicles, whether gas or diesel, are generally used as personal transportation and so are typically driven in patterns (annual mileage, trip frequencies, etc.) that are determined by parameters other than fuel type.

SECTION 4

RESULTS

Work Assignment Task 6 specifies that the results of this study be compared to the previous data derived during development of MOBILE5a. The results of this study are presented herein as graphs and tables. In all cases, data from Polk and FTA are utilized for *registration* counts, and TIUS, NPTS, FTA and Bobit data are used for *mileage* accumulation by age. Table 2-1 in Section 2.2 indicates which data source is used for each vehicle type. On some of the graphs at the end of this section, additional data series from other sources are presented for comparative purposes only.

The Polk registration data presented in the following graphs does not perfectly coincide with the previous characterization performed during the development of MOBILE5a. Absolute values for vehicle counts almost always differ by some discrete amount, as is to be expected when comparing data sources developed with different methodologies. In most cases, it is extremely difficult to find explanations that would account for the differences. In light of this, the following discussion attempts to point out where the two (or more) data series either coincide or diverge in terms of relative *trends* (peaks and valleys), rather than absolute difference. An attempt was made, however, to point out where absolute values significantly differ and the possible reasons for these discrepancies.

The same attempt has been made with the annual mileage accumulation graphs. Here, however, a curve fit was placed through the related data set. This has been done to smooth the results generated from data sets that, especially within certain weight classes, do not contain enough data points to avoid some dramatic model year variation in the averaged results. Acurex believes that while the graphs sometimes indicate highly erratic mileage differences from one model year to the next (for the raw data), the curve fits are generally of the appropriate magnitude. This is confirmed by two other sources. First, Acurex multiplied the vehicle registrations from each weight class and model year with the respective curve fit mileage, and then summed the products to obtain the total vehicle miles traveled (VMT) for the entire U.S. fleet in 1996. This VMT figure (2.369 trillion miles) was cross-checked with an independent number generated by the *1995 Highway Statistics* (see Section 2). It was found that less than a 2% difference existed between the two values. This comparison indicates that the mileages estimated in this study adequately represent the activity of the national vehicle fleet. Table 4-1 below shows the comparison of the *Highway Statistics* and the results from this study. The second confirmation of this estimate is input provided to the USEPA by State air agencies and other air planning organizations that mileage rates in MOBILE5a were generally too low. The smoothed results presented here, which show higher mileage accumulation rates, are consistent with this input.

Of particular note is the significantly higher number of heavy-duty registrations found under this study as compared to the *1995 Highway Statistics*, but the lower annual mileage recorded for these vehicles (see Table 4-1). Conversely, the *Highway Statistics* show slightly higher number of registrations and slightly lower annual mileage for light-duty vehicles. Note that *Highway Statistics* vehicle categories do not perfectly coincide with the weight classes used in this study. For instance, the *1995 Highway*

Statistics define light-duty trucks to include GVWs up to 10,000 lbs. while this study defines light-duty trucks to include GVWs only up to 8,500 lbs. Furthermore, the bus category in the *1995 Highway Statistics* probably includes buses in addition to school and transit buses. Buses other than school or transit buses were treated as heavy-duty trucks in this study. These and other inconsistencies may account for the higher heavy-duty registrations and lower light-duty and bus registrations. Also, Polk school bus registration data tracked quite well with other sources, such as the *1997 School Bus Fleet Fact Book* and transit bus registrations from FTA tracked very closely with information from the *1995 Transit Passenger Vehicle Fleet Inventory*.

Table 4-1. Total VMT, Registrations, and Annual Mileage

TOTAL VMT			
	US Highway Statistics 95	Current Study	% Difference
LDVs and LDTs	2,228,435,000,000	2,162,120,290,487	-2.98%
HDVs	178,160,000,000	201,702,481,456	13.21%
Buses	6,383,000,000	5,914,610,445	-7.34%
Total	2,412,978,000,000	2,369,737,382,388	-1.79%
REGISTRATIONS			
	US Highway Statistics 95	Current Study	% Difference
LDVs and LDTs	193,967,443	182,520,247	-5.90%
HDVs	6,881,074	8,905,444	29.42%
Buses	685,504	469,689	-31.48%
Total	201,534,021	191,895,379	-4.78%
ANNUAL MILEAGE			
	US Highway Statistics 95	Current Study	% Difference
LDVs and LDTs	11,489	11,846	3.11%
HDVs	25,891	22,649	-12.52%
Buses	9,311	12,593	35.24%
Average	11,973	12,349	3.14%

The differences between data obtained under this study and other sources for each weight class are discussed below for both registrations and annual mileage accumulations.

4.1 REGISTRATIONS

4.1.1 LDVs

Light-duty registration data obtained from Polk (Figure 4-1) appear to follow the same trend as the other sources of available registration data. In general, NPTS counts are higher than the Polk data, which is attributable to scrapping of these vehicles between 1990 and 1996. MOBILE5a data indicates slightly higher counts than Polk in the late 1980's model years, but fewer vehicles in the early 1980's model years. Previous to 1979, all three data sets closely track together, with Polk generally being the lower than the other two.

4.1.2 LDTs

Light-duty gasoline trucks (Figures 4-2 and 4-3) also appear to follow relatively similar patterns. The major difference lies in model years 1976-1982, where peaks in the MOBILE5a data either do not appear or do not coincide with the Polk data. Since LDDTs were not separated into classes 1 and 2 during development of MOBILE5a, discussion of this vehicle type is described below under Aggregated Classes in subsection 4.1.5.

4.1.3 Heavy-Duty Trucks and School Buses

Comparison data could not be found in other sources for these vehicle classes (Figures 4-4 to 4-16). In the heavy duty classes, TIUS data was found to be inconclusive for purposes of registration counts, as was discussed above. Also, MOBILE5a contains no easily reproduced block data for the heavy-duty truck fleet. Thus, only the Polk data is provided in the charts for these vehicles types.

4.1.4 Transit Buses

The data provided by the FTA (Figure 4-17) very closely follows the comparison APTA data. This further supports the suggestion mentioned above that the apparent large discrepancy between bus registrations in Table 4-1 is questionable.

4.1.5 Aggregated Classes

Certain aggregations of vehicle classes have been included here upon request of the USEPA. Aggregated classes are: LDGTs (Figure 4-18) which include LDGT1 and LDGT2, LDDTs (Figure 4-19) which include LDDT1 and LDDT2, LDTs (Figure 4-20) which include LDGT1, LDGT2, LDDT1 and LDDT2, HDGVs (Figure 4-21) which include HDGV1 and HDGV2, HDGB (Figure 4-22) which includes gasoline transit and school buses, HDDVs(3-5) (Figure 4-23) which includes HDDV(3) and HDDVs(4-5), HDDVs(8) (Figure 4-24) which includes HDDV(8A) and HDDV(8B), HDDVs (Figure 4-25) which includes HDDV(2B), HDDV(3), HDDV(4-5), HDDV(6-7), HDDV(8A) and HDDV(8B), and HDDBs (Figure 4-26) which include diesel transit and school buses. The registration data presented in these charts is simply the sum of the registrations in the classes indicated in the chart's title. Of particular note is the comparison between data sources of LDDTs (Figure 4-19). As mentioned above, MOBILE5a did not discriminate between LDDT1s and LDDT2s. For all LDDTs, MOBILE5a shows a peak in model years 1981, with registrations tapering off thereafter. The Polk data shows significantly more LDDTs in the 1980s and 1990s, as well as a smaller peak in 1974. The reason for the discrepancy between these two sources is unknown.

4.2 ANNUAL MILEAGE

4.2.1 LDVs

As shown in Figure 4-27, the annual mileage accumulation data provided from the NPTS shows perhaps the most consistent data series of all the weight classes. Deviation of the data points from the curve fit is generally small. The graph shows that mileage accumulation rates developed in this study from 1990 NPTS data are higher than the rates incorporated into MOBILE5a, which was based on the 1983 NPTS study. This is consistent with recent trends indicating that people drive more miles each year than they used to.

4.2.2 LDTs

Light-duty truck mileage provided by the TIUS fairly closely tracks MOBILE5a data (Figures 4-28 to 4-31). TIUS data for LDGTs indicates somewhat higher accumulation rates for the newer vehicles and lower rates for older vehicles. For LDDTs, the data indicates that mileage accumulation is somewhat higher than previously modeled for all vehicle ages, especially in the younger vehicles.

4.2.3 HDGVs

Heavy-duty gasoline trucks follow the same pattern as LDTs. However, the TIUS data indicates that the older, heavier HDGV2s acquire fewer annual miles than MOBILE5a indicates (Figures 4-32 and 4-33)

4.2.4 HDGBs

Acurex could not obtain suitable annual mileage rates for the gasoline transit buses on an age basis. The *1997 School Bus Fleet Fact Book Issue* provides information placing *average* school bus accumulation rates at 9,939 miles per year (for both gasoline and diesel school buses).

4.2.5 HDDVs

For the lighter heavy-duty diesel classes (2B and 3), the TIUS data indicates the same trends as both LDTs and HDGVs (Figures 4-36 and 4-37) However, the relative difference compared to MOBILE5a is greater for these vehicle classes than the others, up to as much as 50% greater than the previously used value.

Classes 4 and 5 (Figure 4-38) show an altogether different pattern. Here, TIUS annual accumulation rates are significantly greater than previous MOBILE values for all vehicle ages. This is especially true at about Age 10, where there is about a 100% increase in mileage. One possible reason may partly explain this occurrence. Note that the MOBILE5a curve is the same for both Figures 4-37 and 4-38. This is because, in MOBILE5a, mileage rates were accumulated for Classes 3 through 5 as an aggregate sum. Since there are nearly twice as many vehicles in Class 3 as there are in both 4 and 5 combined, the average mileage accumulation rate would tend to be lower, closer to the individual Class 3 average. Thus the MOBILE5a curve plotted here for Classes 4 and 5 is probably too low to properly characterize these weight classes.

Classes 6 and 7 (Figure 4-39) indicate the opposite; TIUS mileage values are slightly less than older MOBILE5a values.

Classes 8A and 8B (Figures 4-40 and 4-41) mileage rates developed in this study are slightly lower and higher, respectively, than MOBILE5a. This is due partly to the same reason as explained for Classes 4 and 5. MOBILE5a only tracked Class 8 mileage accumulation rates. That curve, which appears on both these figures, lies in between the two TIUS data sets, since it is the average accumulation rate for all the vehicles in both sets (although weighted about 3 to 1 toward the 8B class, since there are about 3 times as many 8B vehicles as there are 8A trucks.)

4.2.6 HDDBs

Like gasoline school buses, diesel school buses have an *average* mileage accumulation for all vehicles of 9,939 miles per year. Heavy-duty diesel transit bus mileages have been derived from an analysis of the FTA Form 408 data set (Figure 4-42). Comparison data from other sources is not available for this class.

4.3 TABLES

Additional information is provided in Tables 4-2 to 4-8 at the end of this report. Each is categorized by weight class, fuel type and model year. Table 4-2 shows the total registrations received from Polk and modified by Acurex as described above. Table 4-3 shows the raw annual mileage data available from the various sources listed above, while Table 4-4 is the annual mileage curve fit for each weight class. In Table 4-5, the percentage of vehicles in each model year as a fraction of the total vehicles in the weight class is shown. Both total vehicles and percentages are also displayed for aggregated weight classes in Tables 4-6 and 4-7. Finally, Table 4-8 is the gasoline/diesel sales fraction of light-duty vehicles and trucks from 1985 to 1996, as requested in Work Assignment Task 4.

Figure 4-1. Registration Comparison by Model Year
LDV

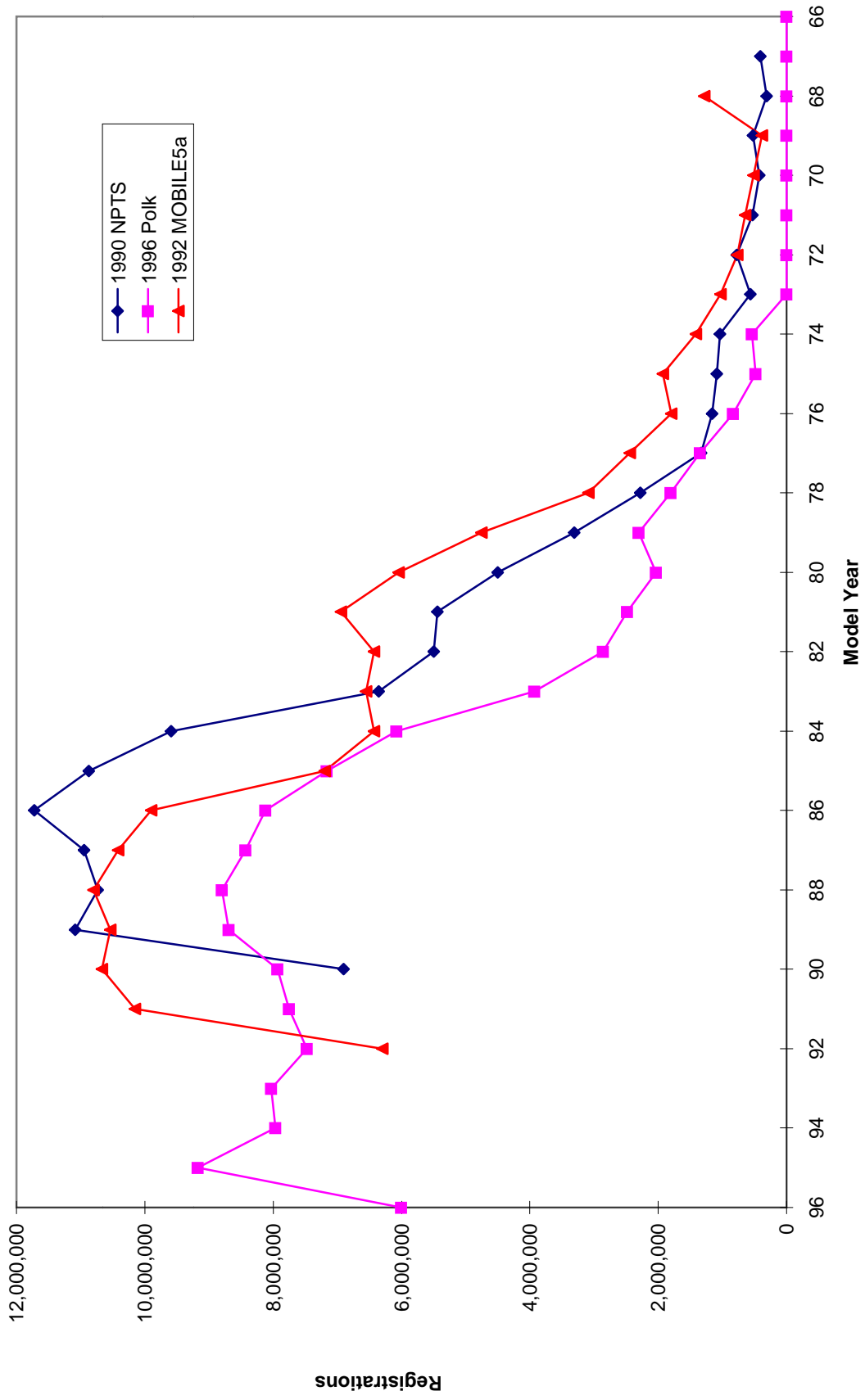


Figure 4-2. Registration Comparison by Model Year
LDGT1

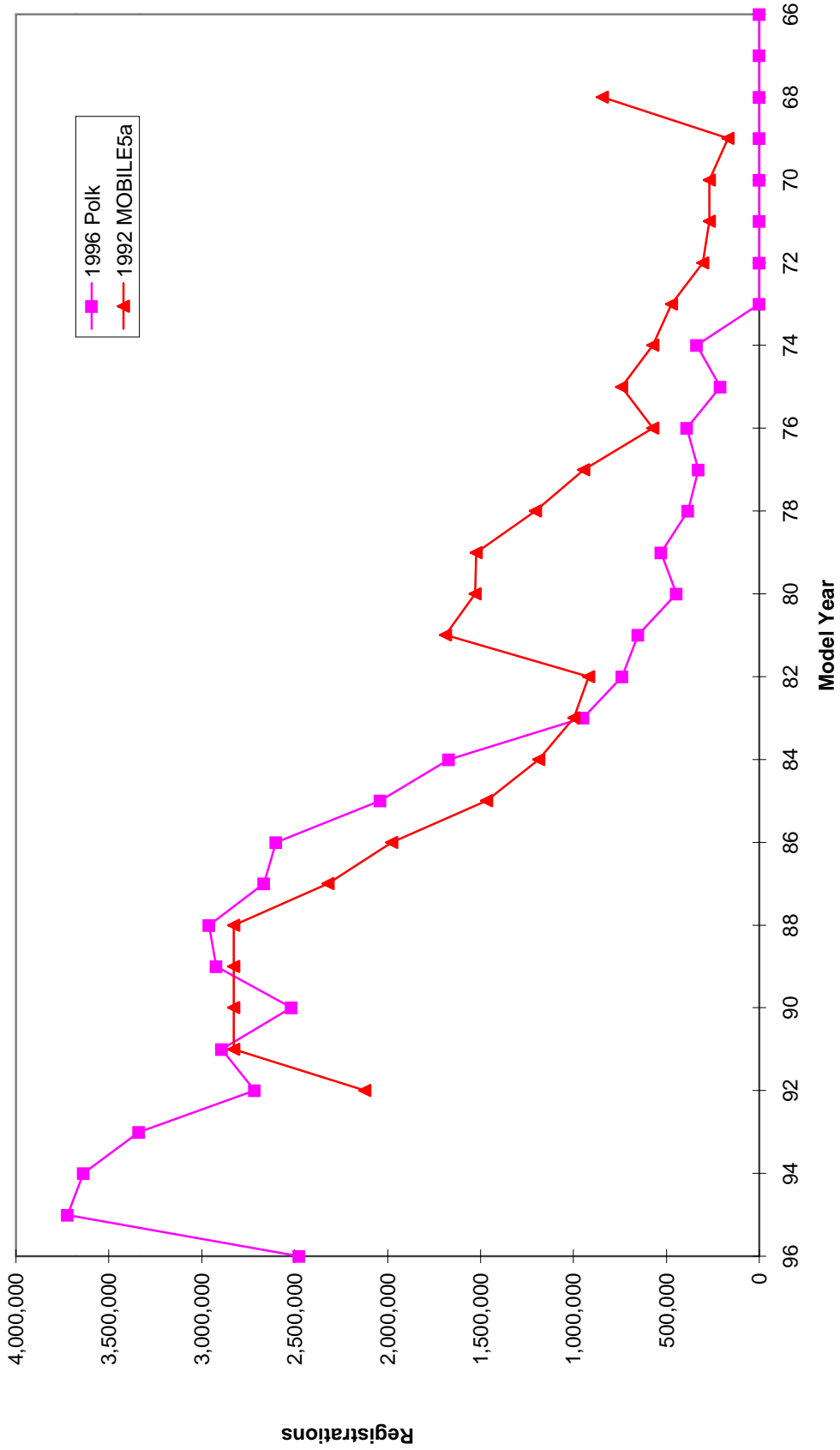


Figure 4-3. Registration Comparison by Model Year
LDGT2

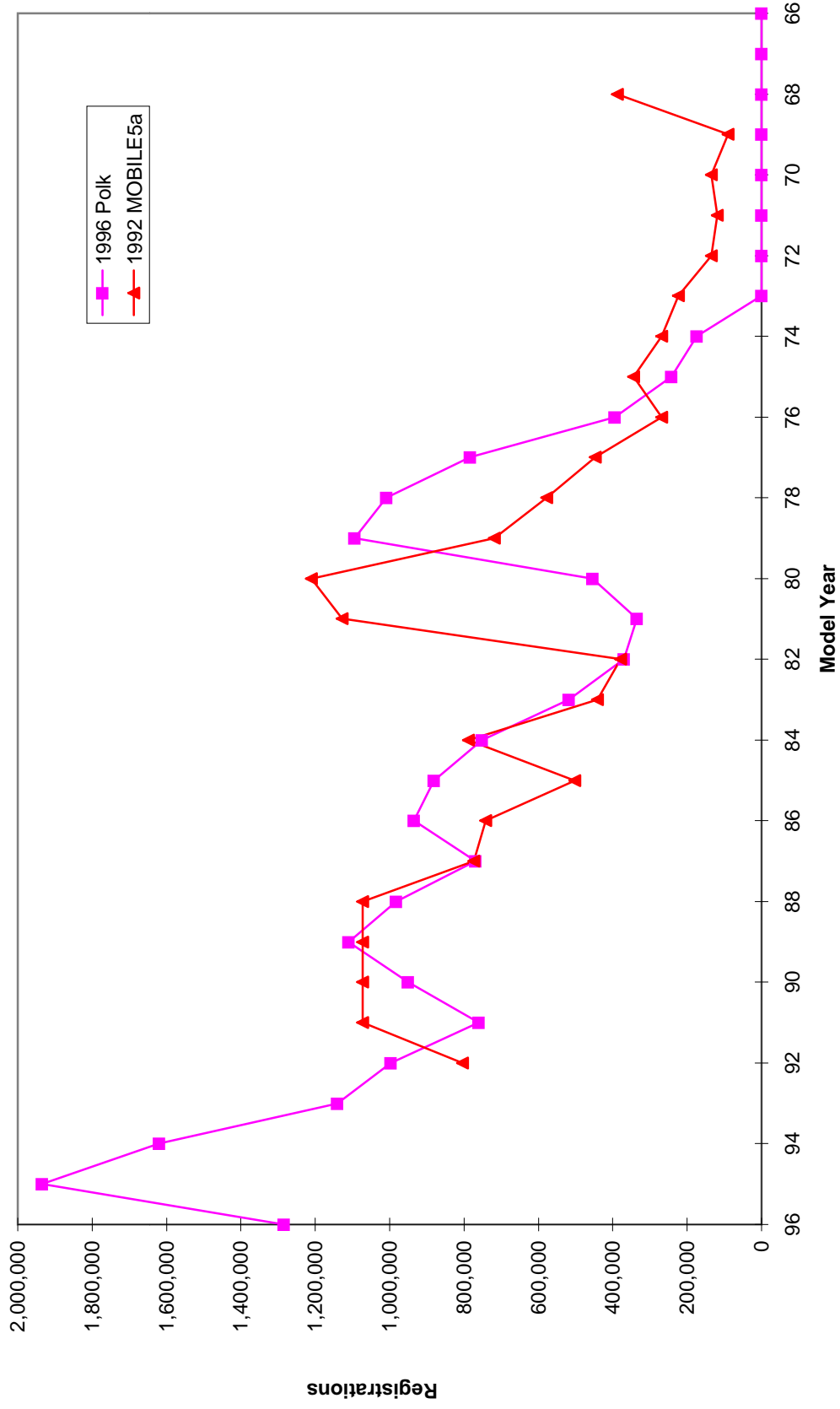


Figure 4-4. Registration Comparison by Model Year
LDDT1

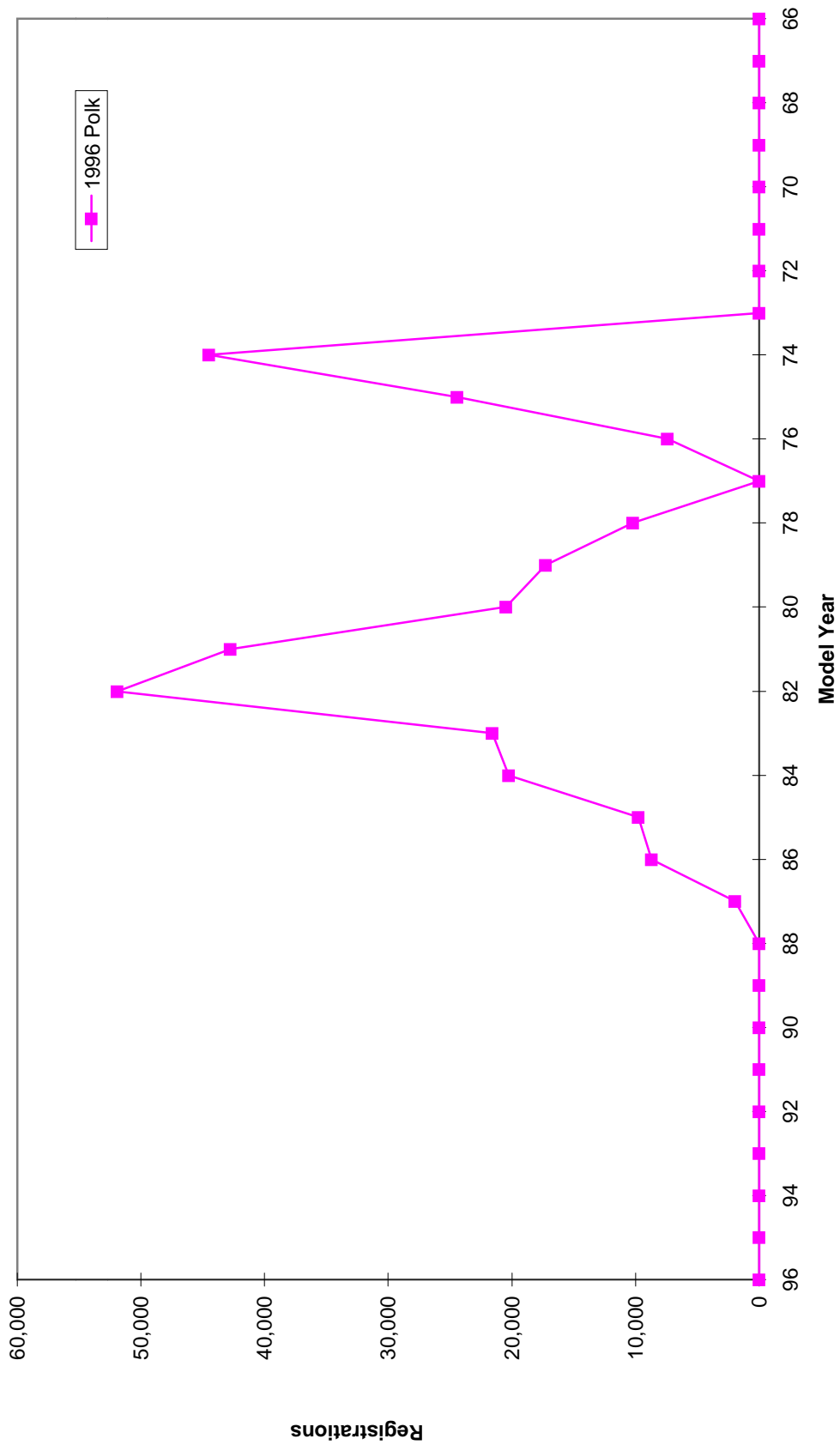


Figure 4-5. Registration Comparison by Model Year
LDDT2

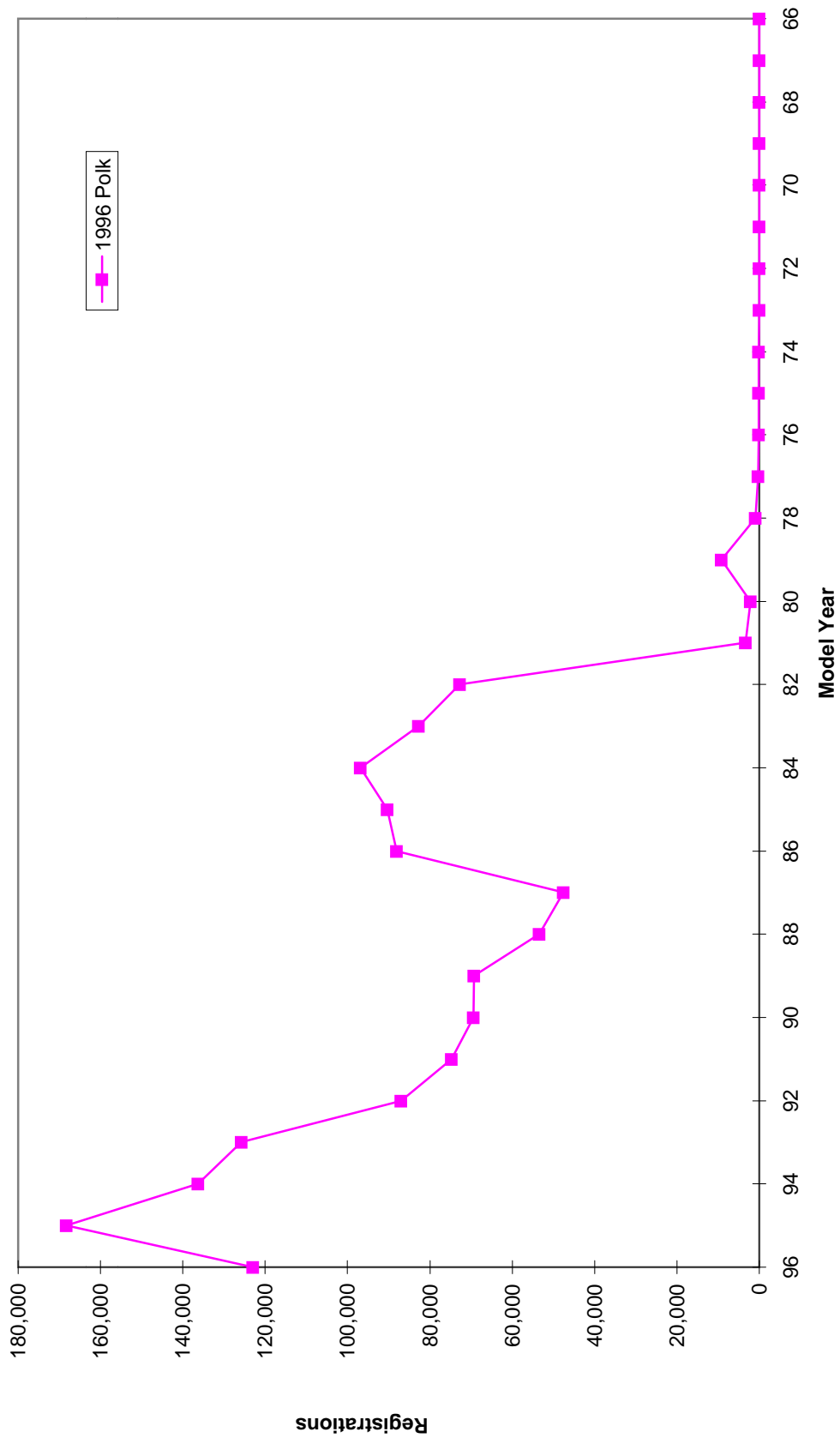


Figure 4-6. Registrations by Model Year
HDGV1

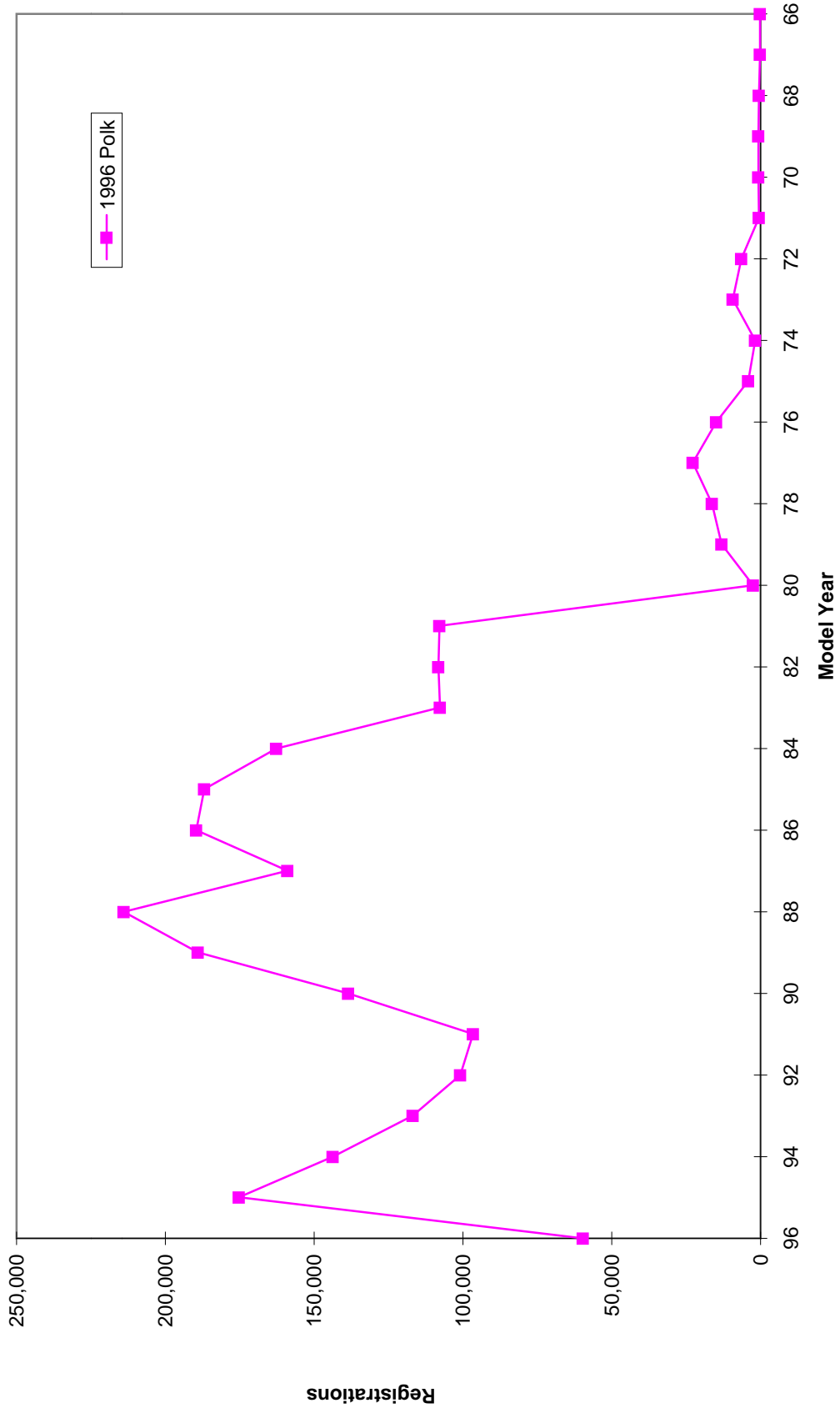


Figure 4-7. Registrations by Model Year
HDGV2

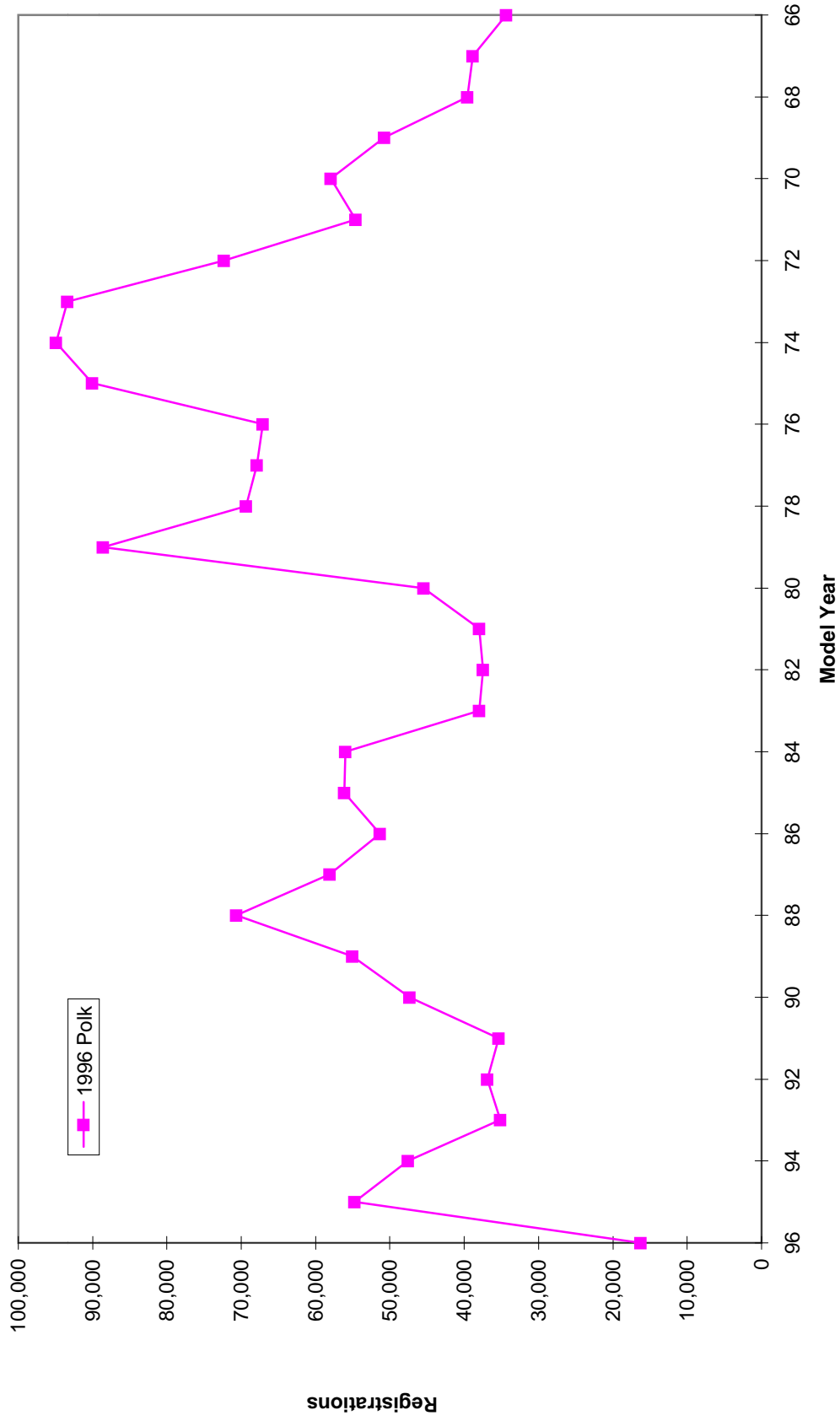


Figure 4-8. Registrations by Model Year
HDGB School

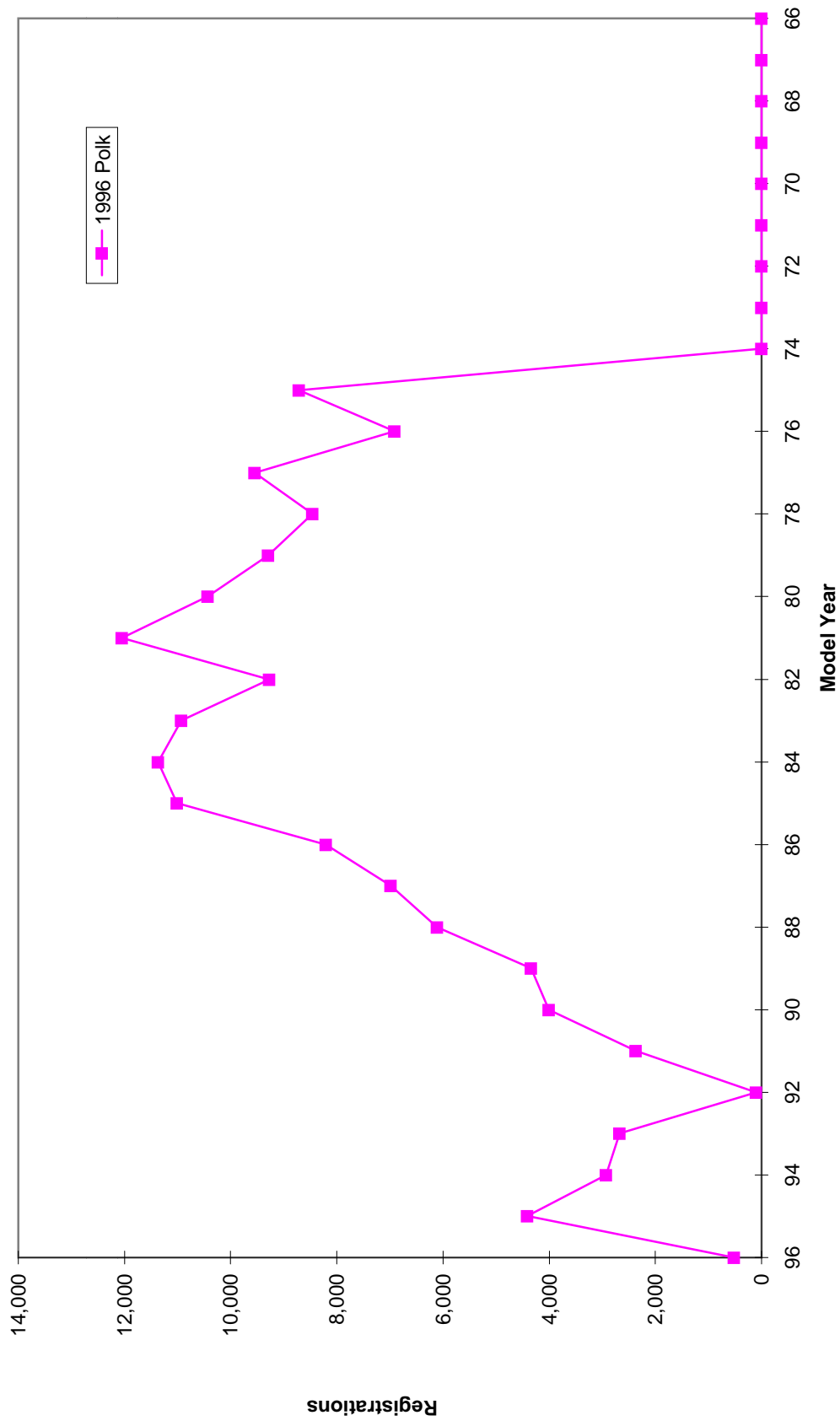


Figure 4-9. Registrations by Model Year
HDGB Transit

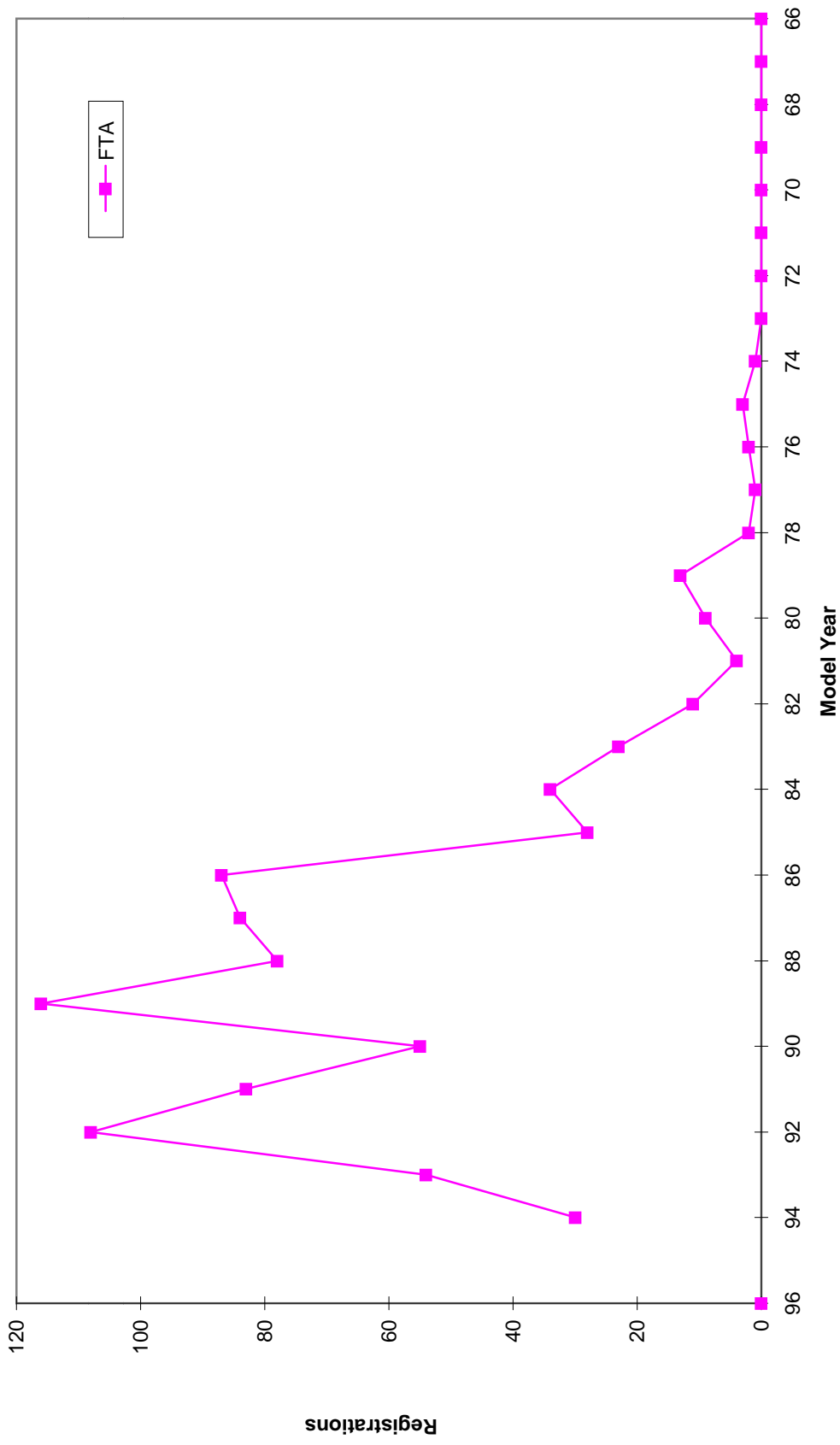


Figure 4-10. Registrations by Model Year
HDDV(2B)

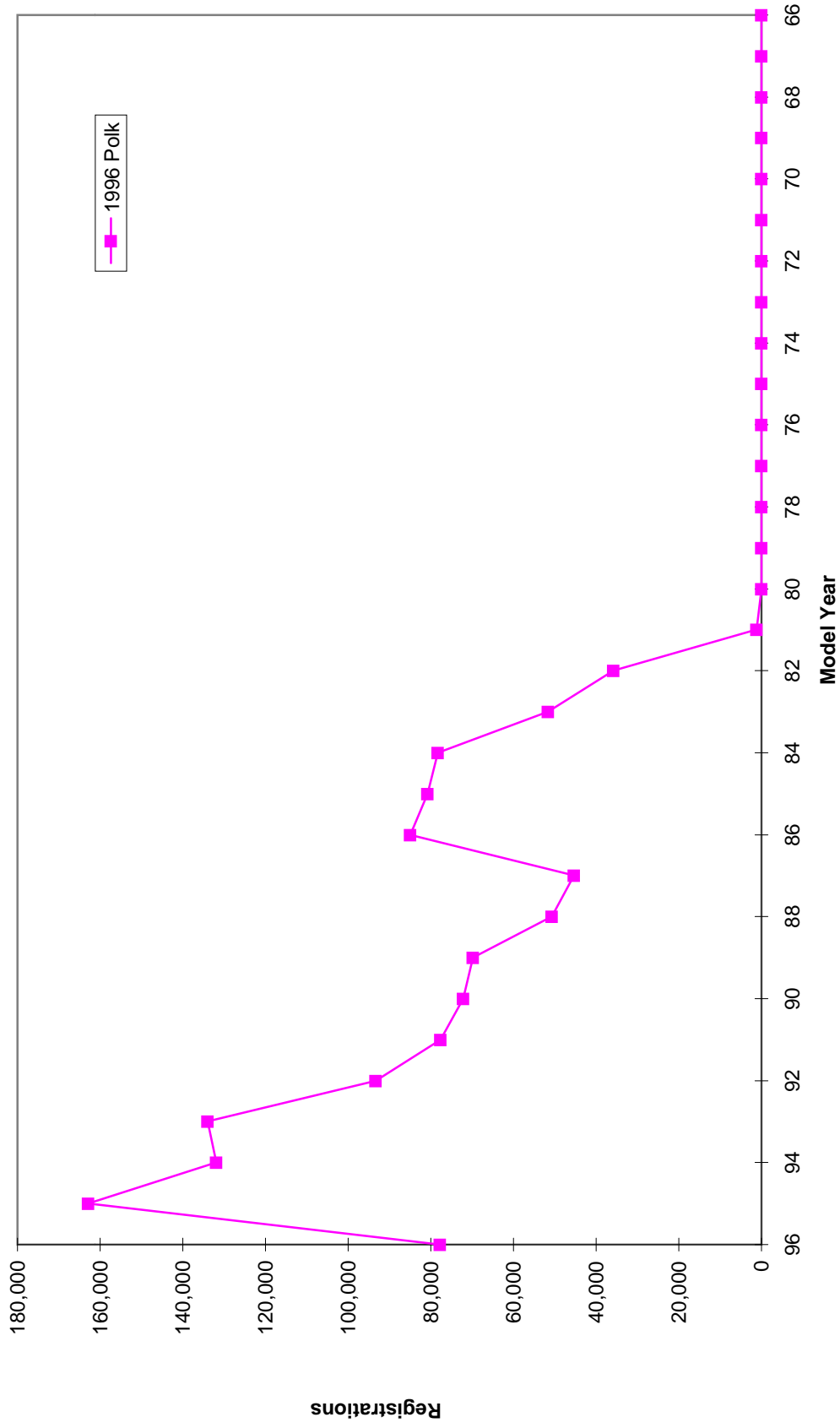


Figure 4-11. Registrations by Model Year
HDDV(3)

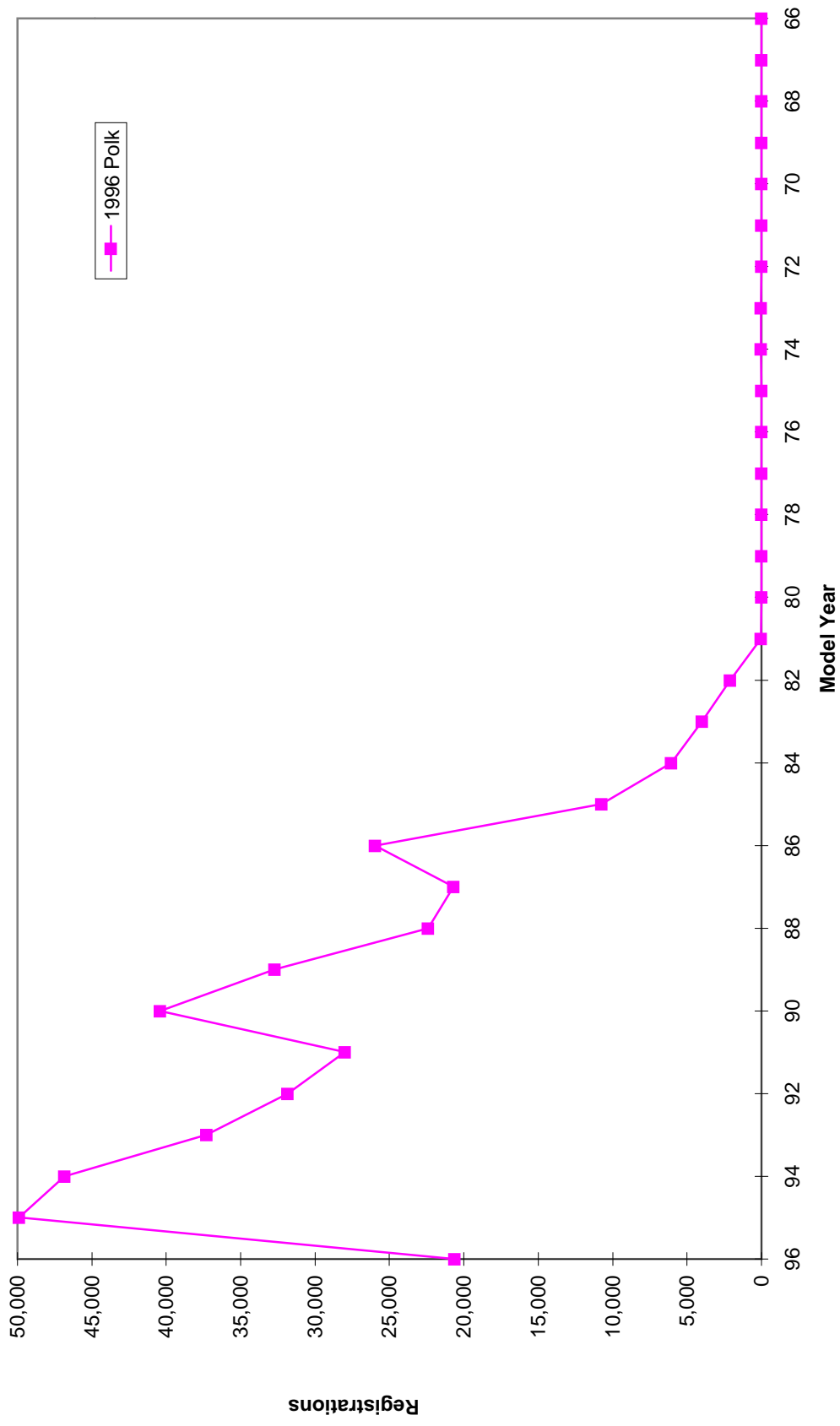


Figure 4-12. Registrations by Model Year
HDDV(4-5)

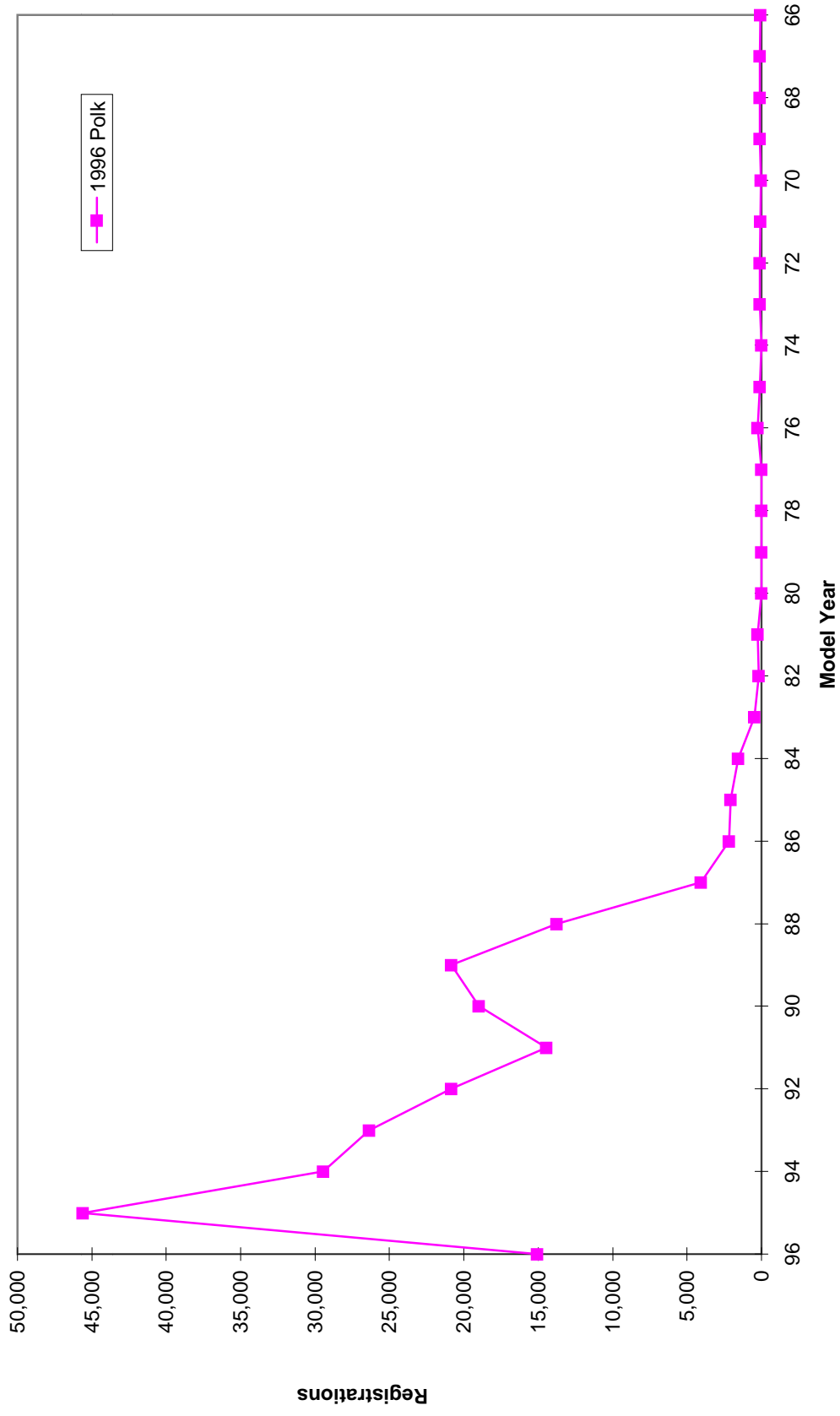


Figure 4-13. Registrations by Model Year
HDDV(6-7)

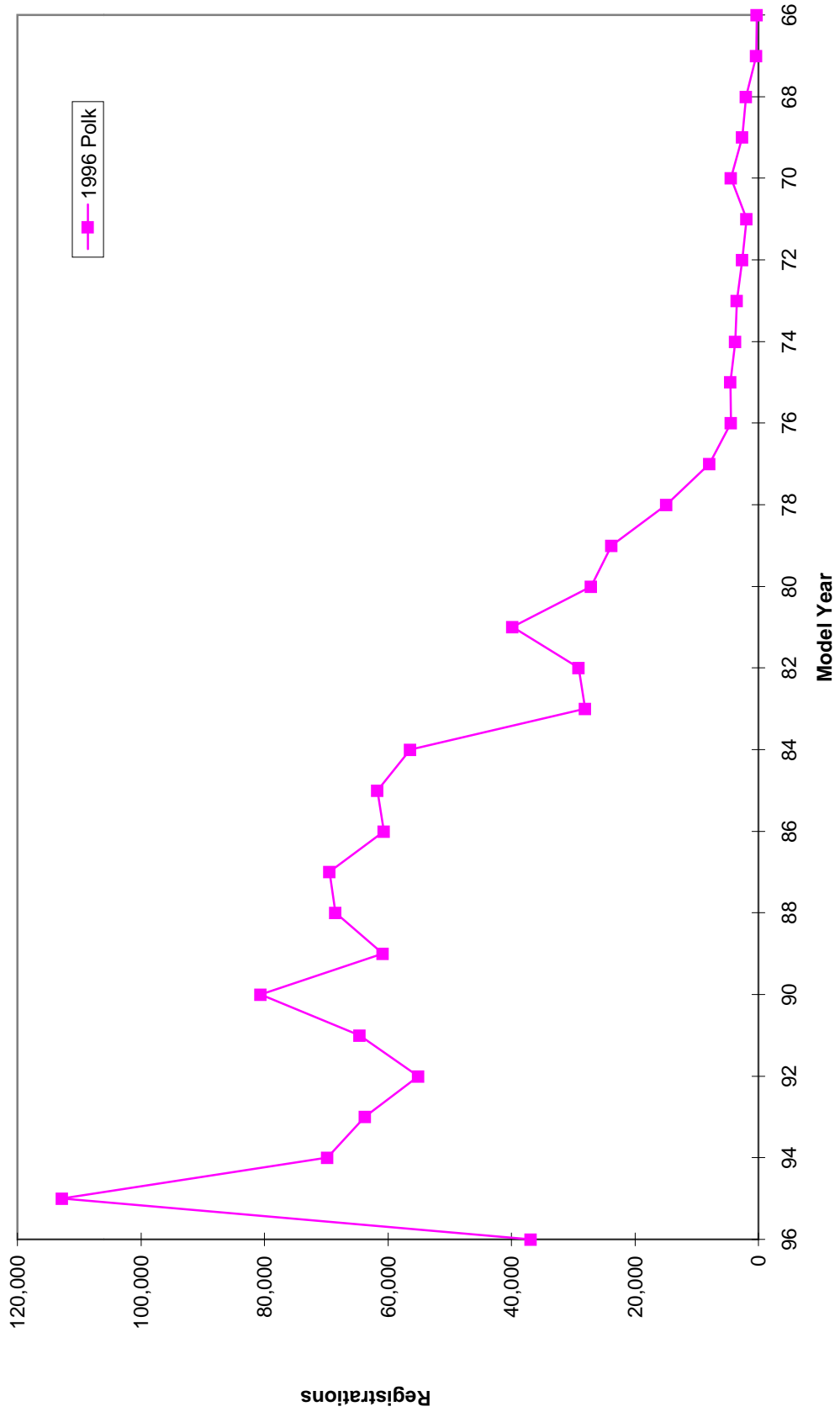


Figure 4-15. Registrations by Model Year
HDDV(8B)

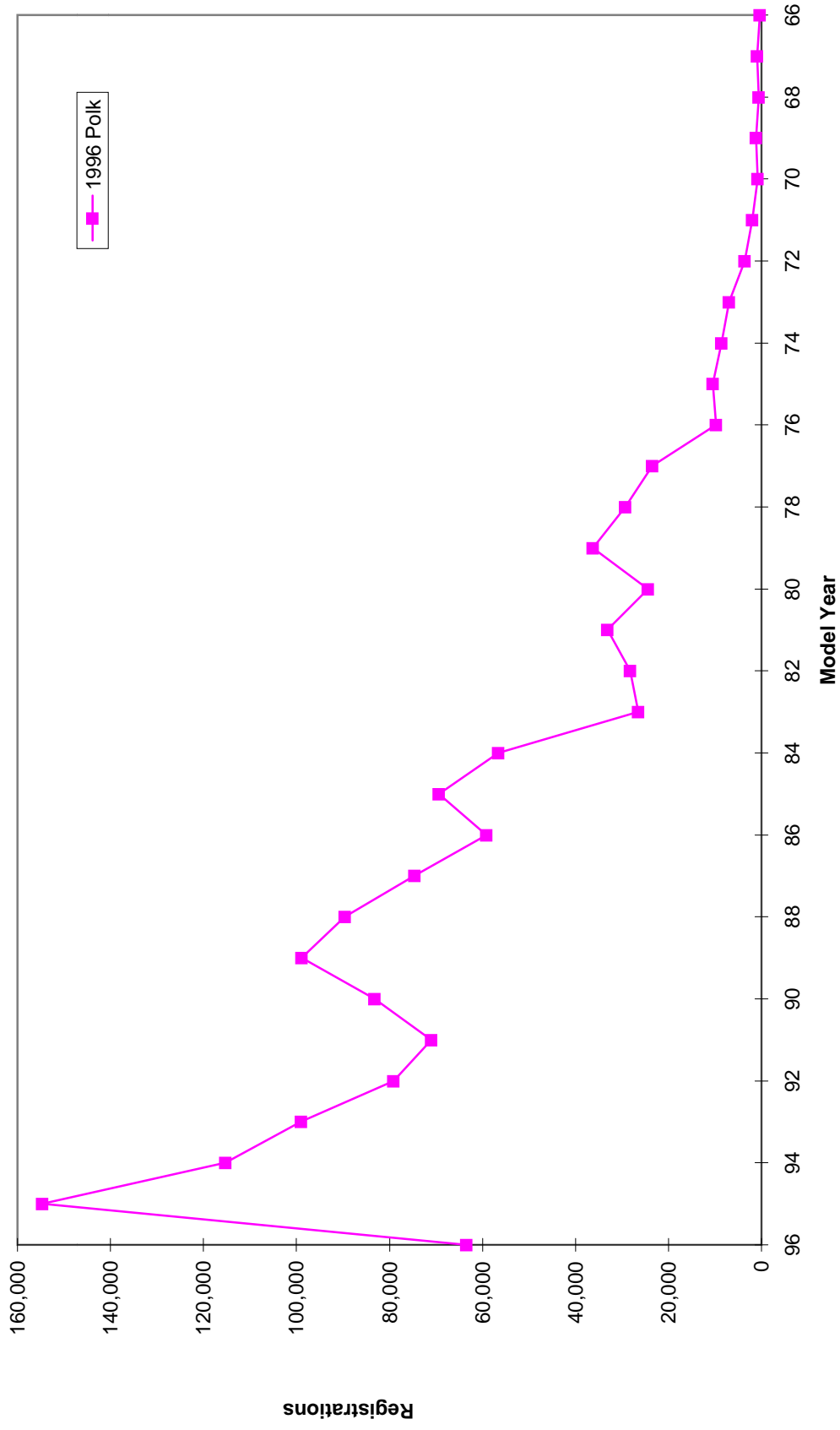


Figure 4-16. Registrations by Model Year
 HDDB School

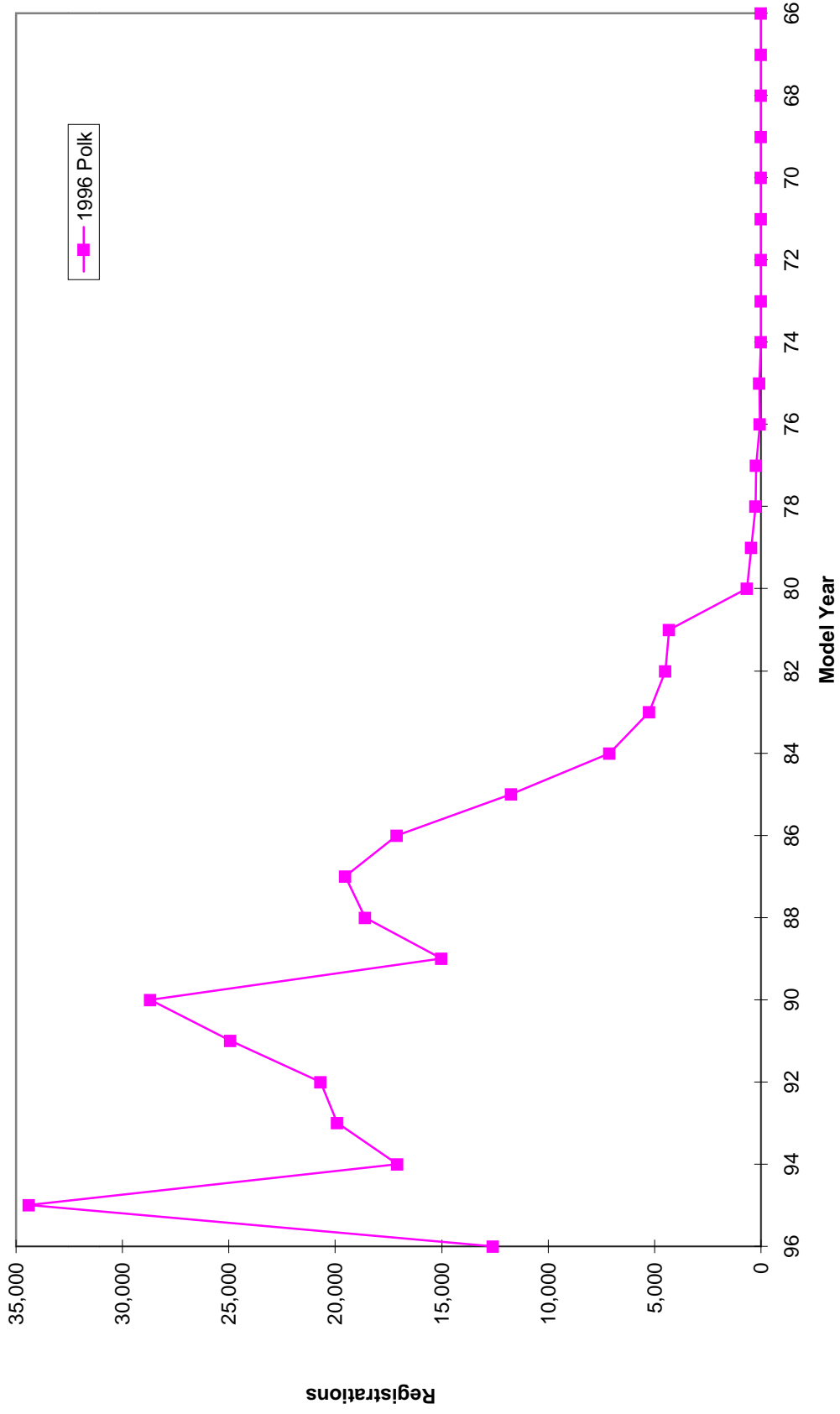


Figure 4-17. Registrations by Model Year
 HDDB Transit

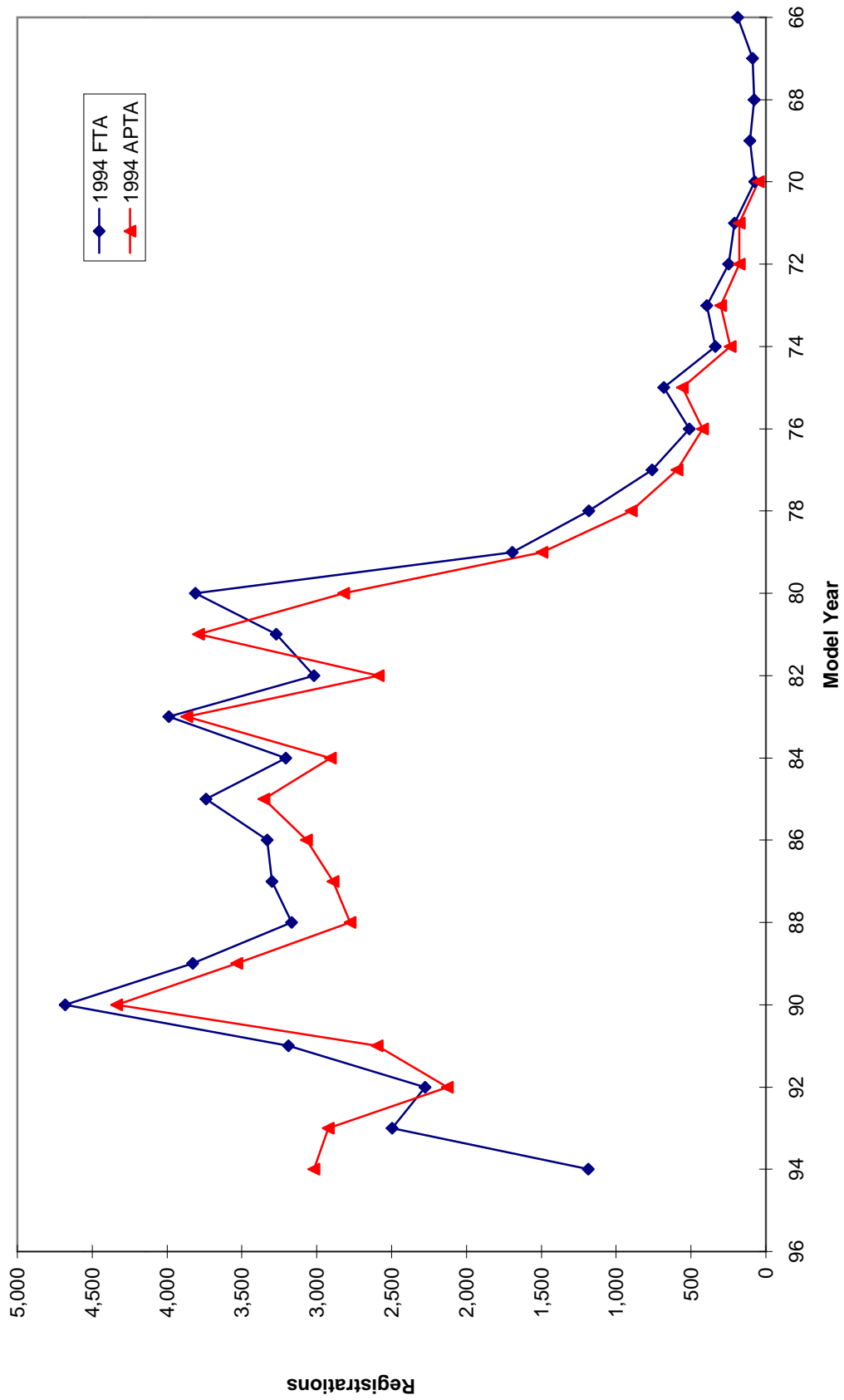


Figure 4-18. Registrations by Model Year
Aggregated LDGT

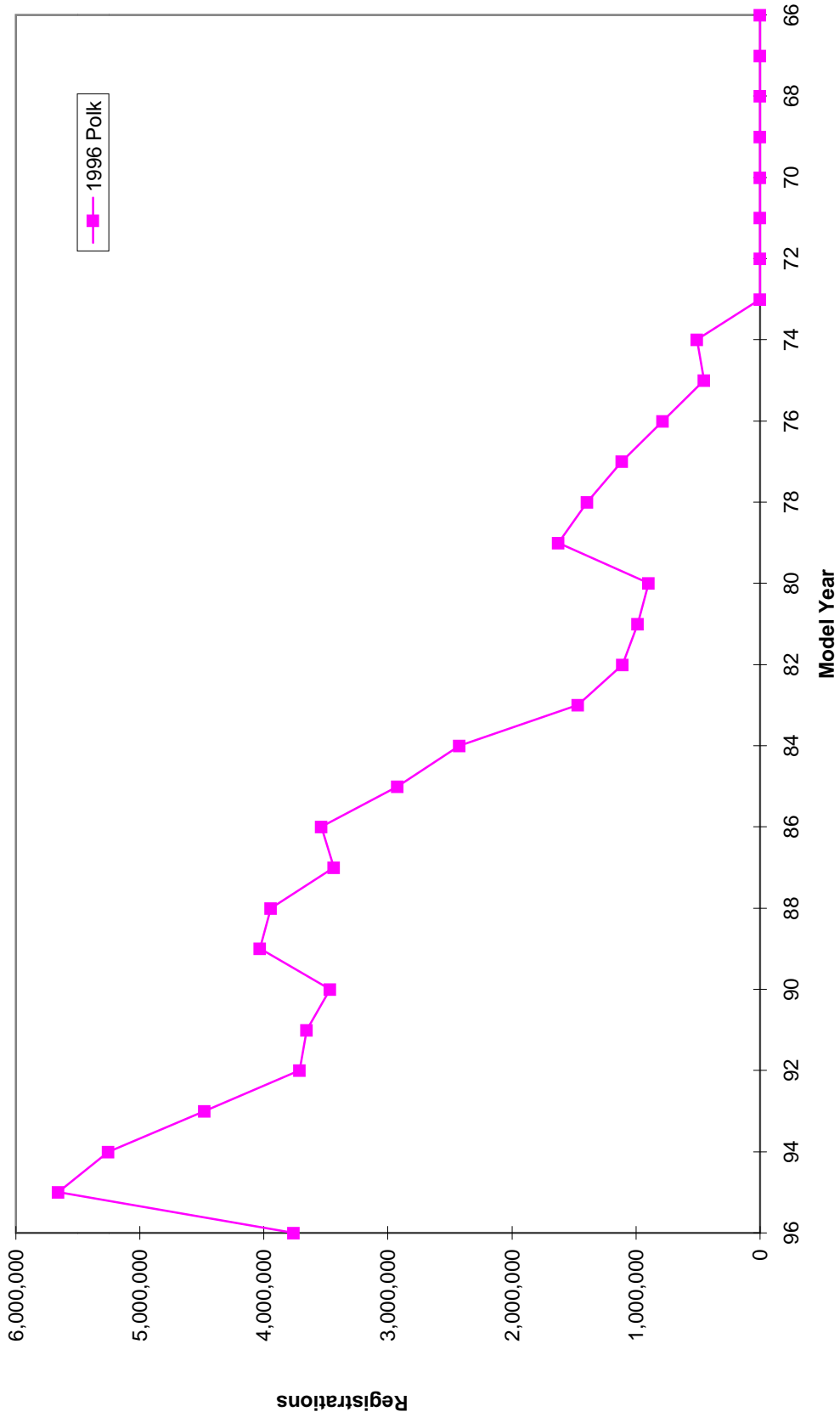


Figure 4-19. Registrations by Model Year
Aggregated LDDT

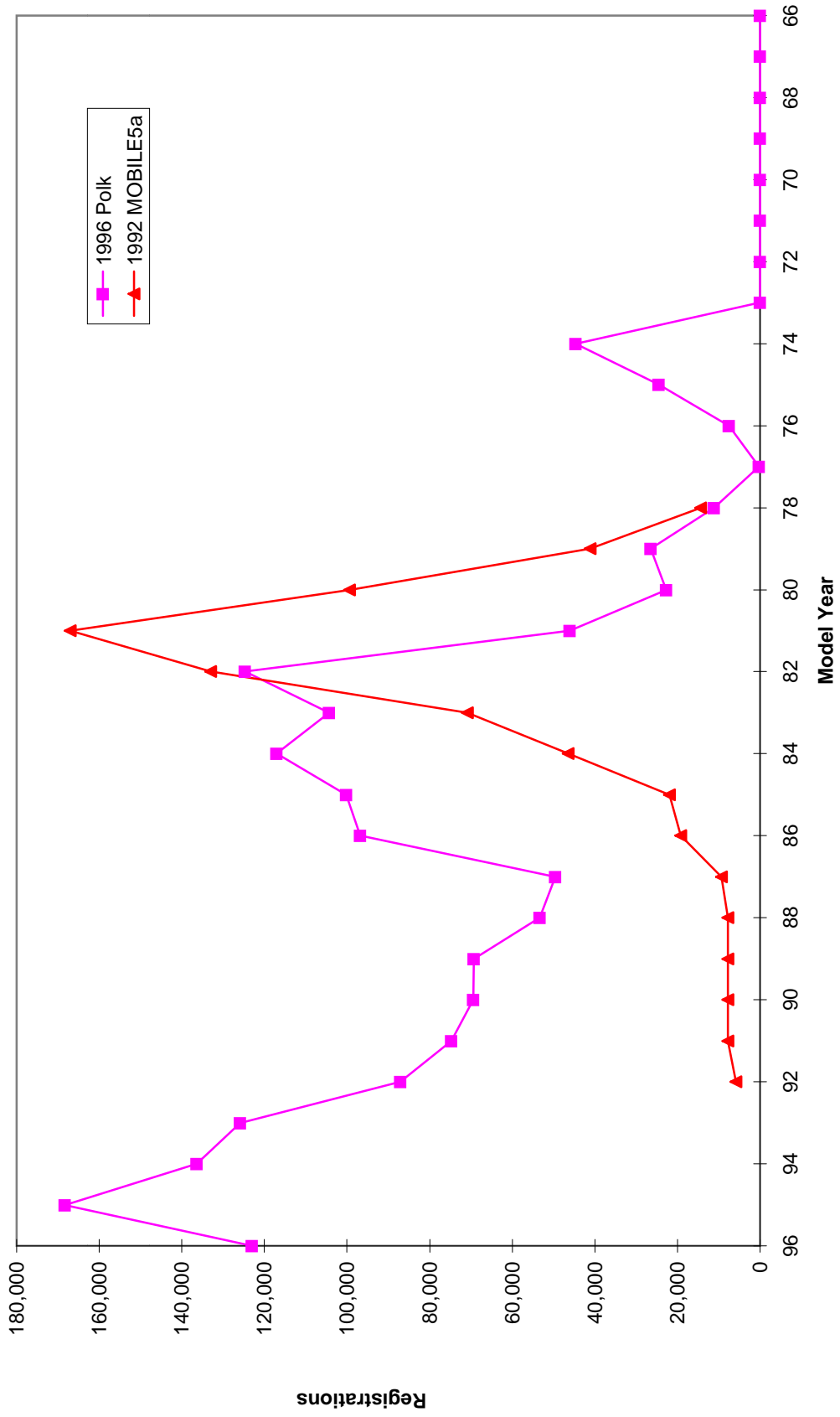


Figure 4-20. Registrations by Model Year
Aggregated LDT

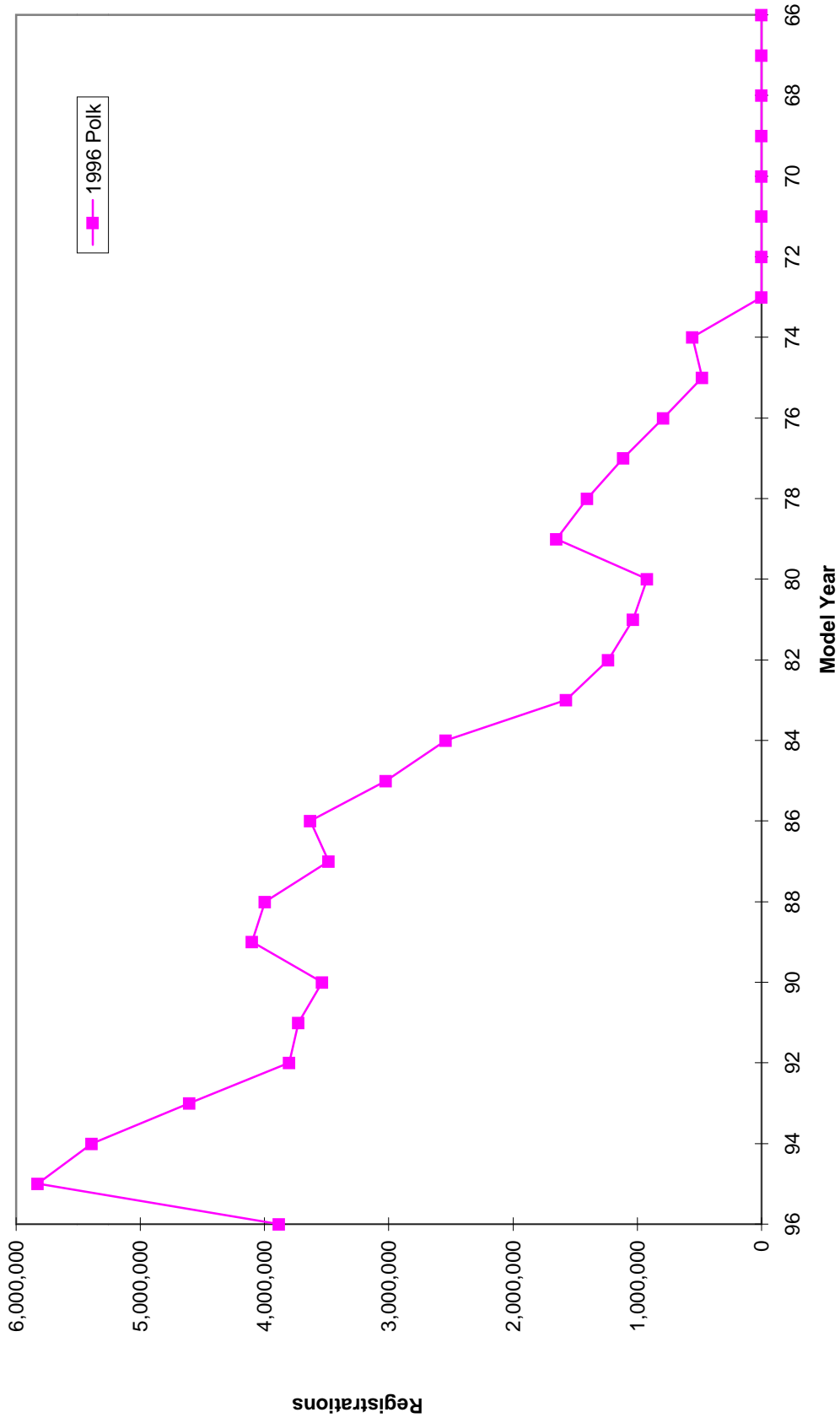


Figure 4-21. Registrations by Model Year
Aggregated HDGV

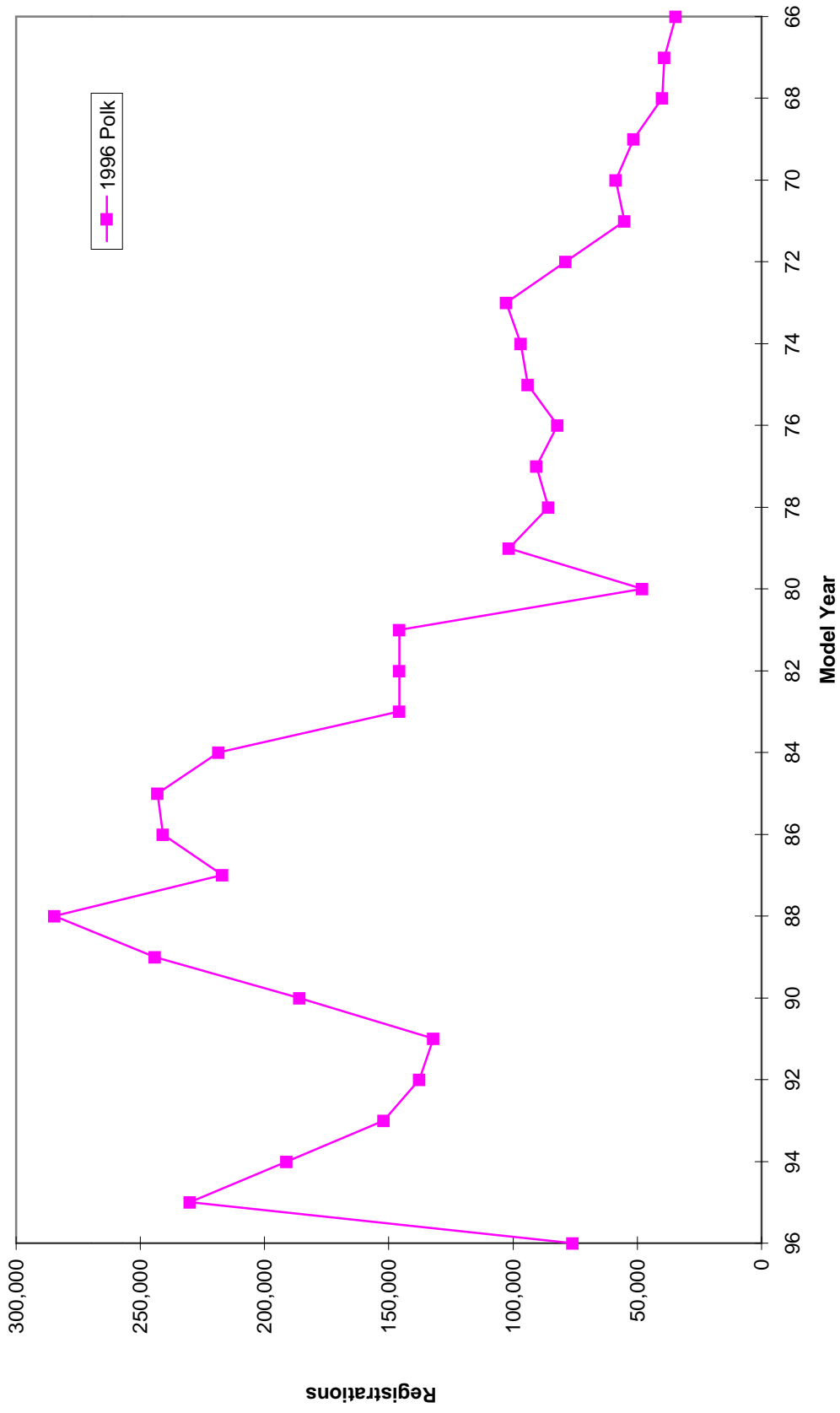


Figure 4-22. Registrations by Model Year
Aggregated HDGB

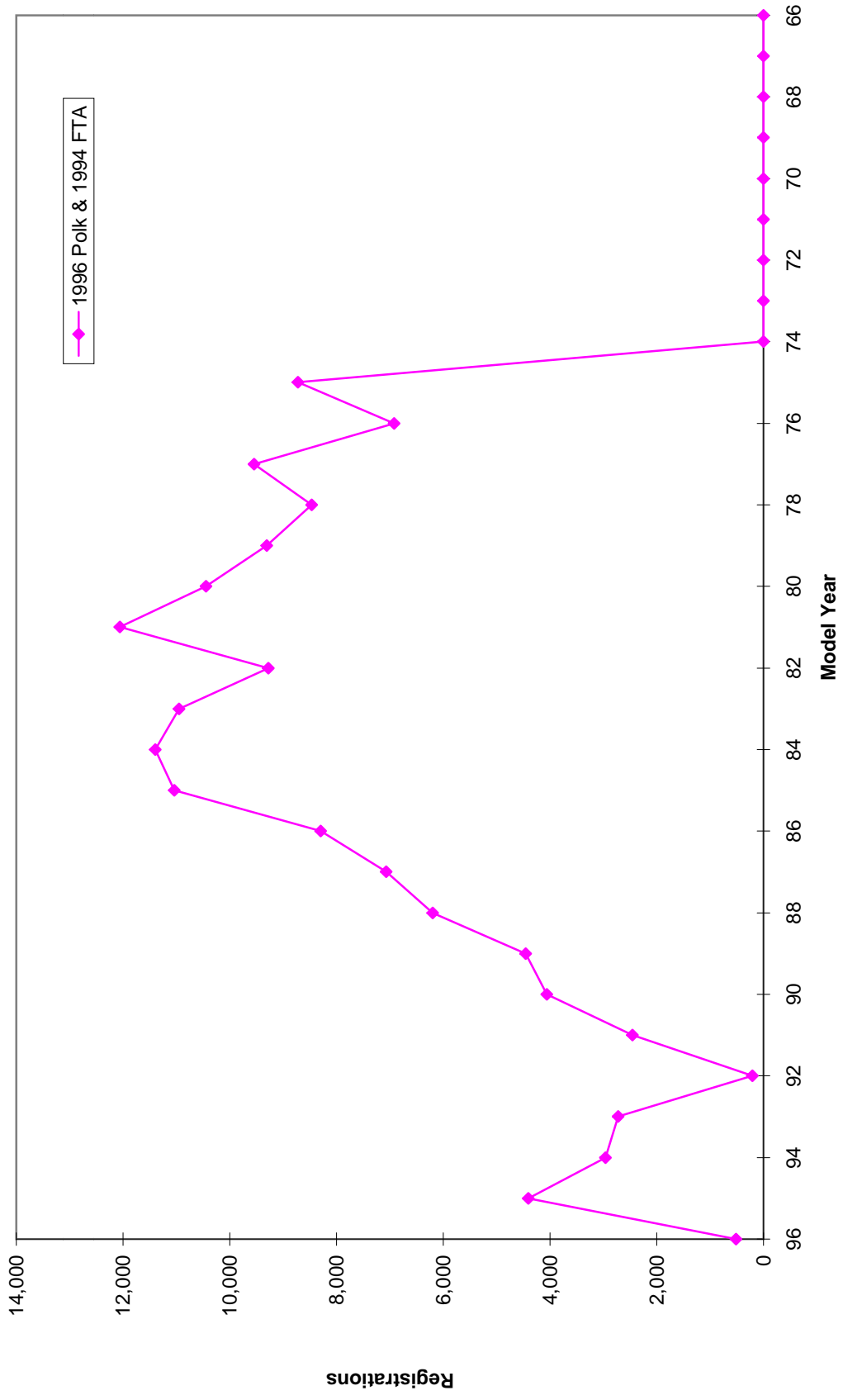


Figure 4-23. Registrations by Model Year
Aggregated HDDV(3-5)

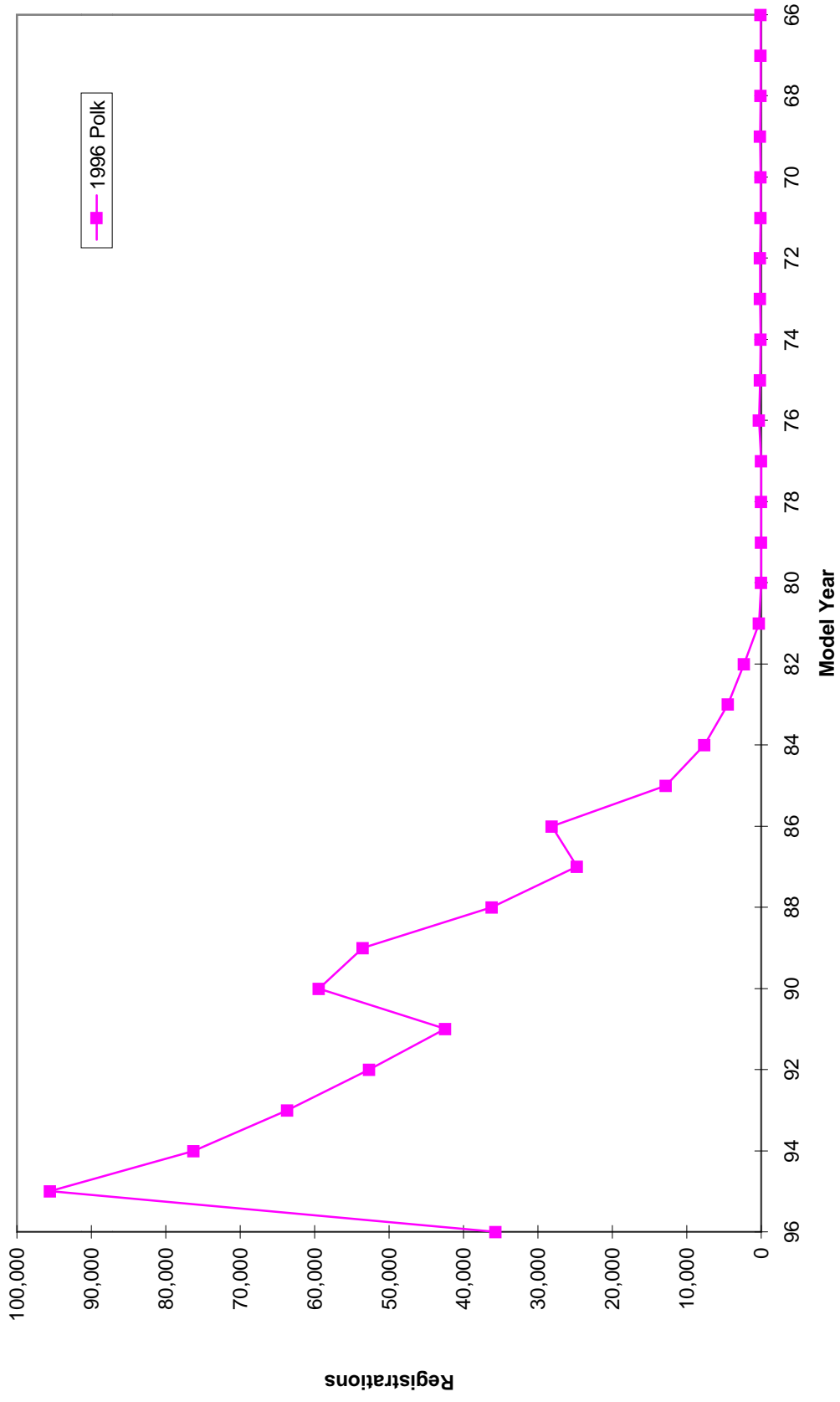


Figure 4-24. Registrations by Model Year
Aggregated HDDV(8)

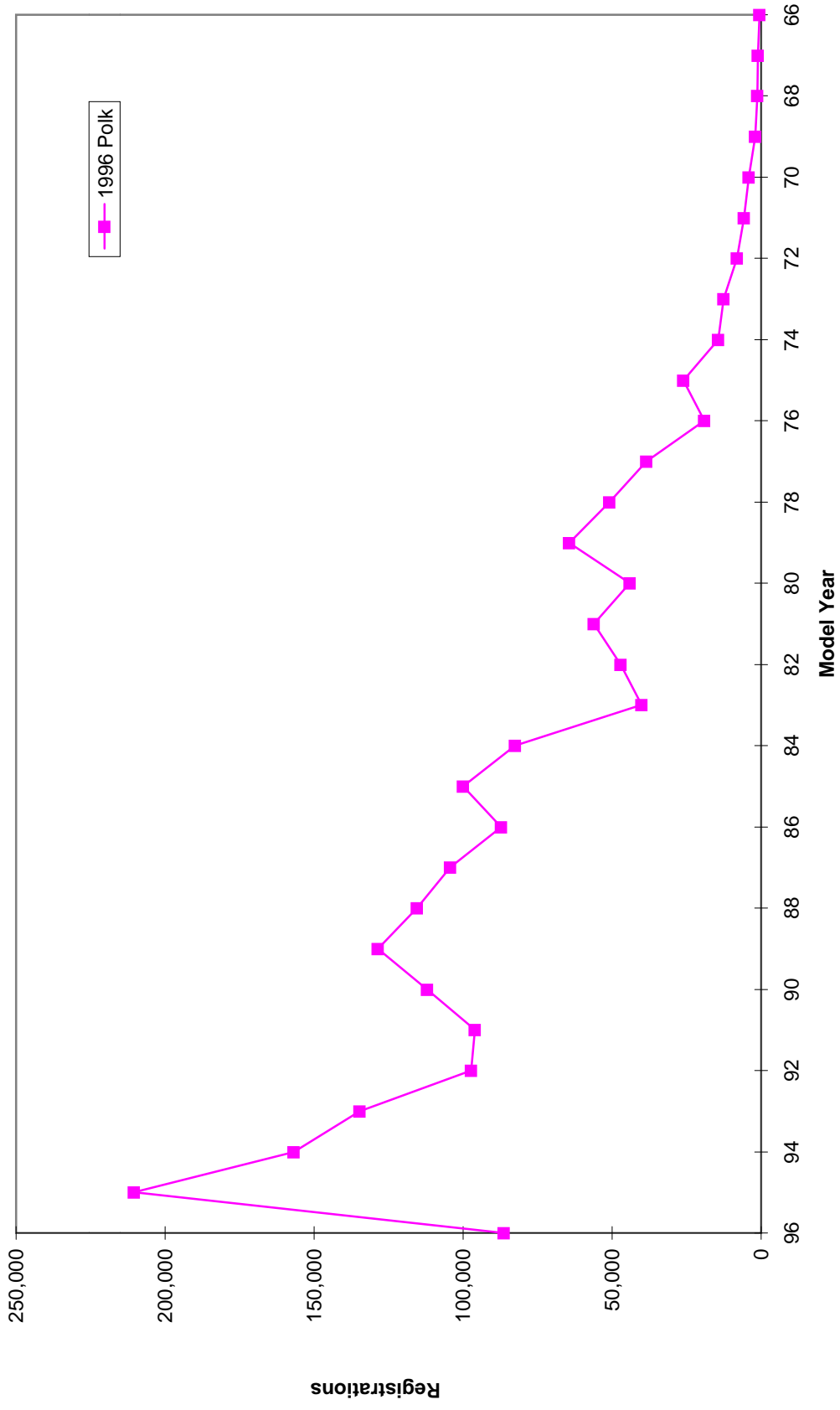


Figure 4-25. Registrations by Model Year
Aggregated HDDV All

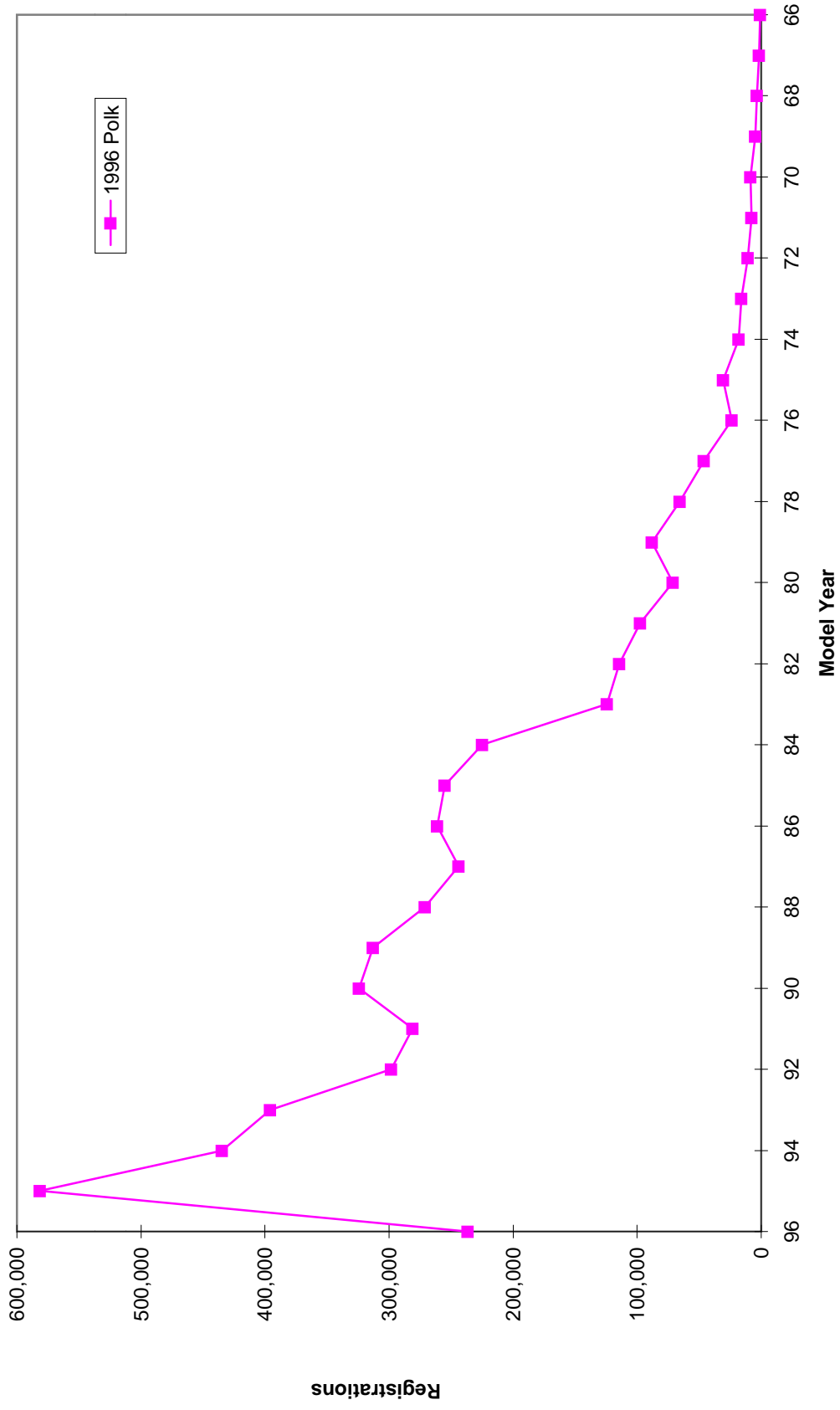


Figure 4-26. Registrations by Model Year
Aggregated HDDB

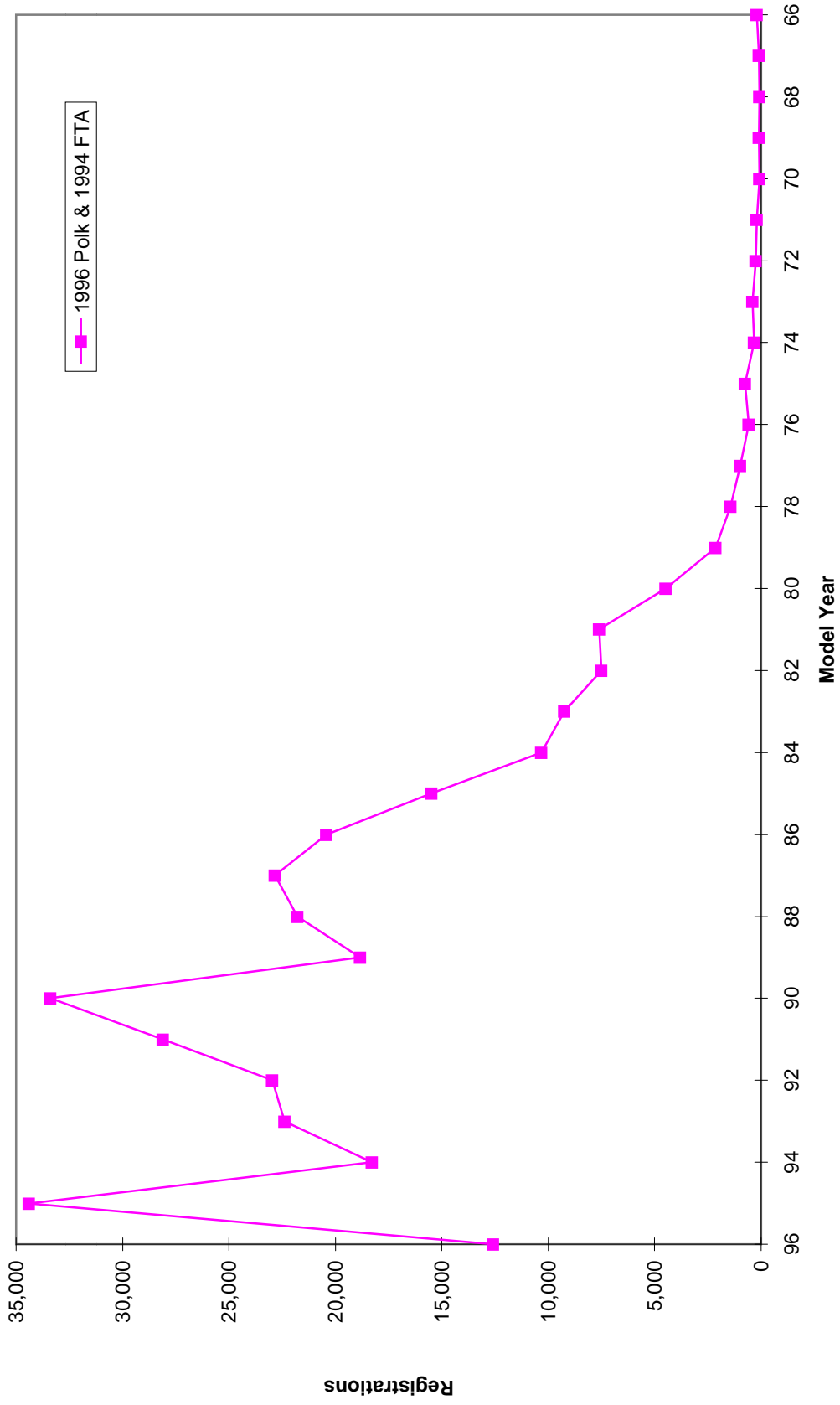


Figure 4-27. Annual Miles by Age LDV

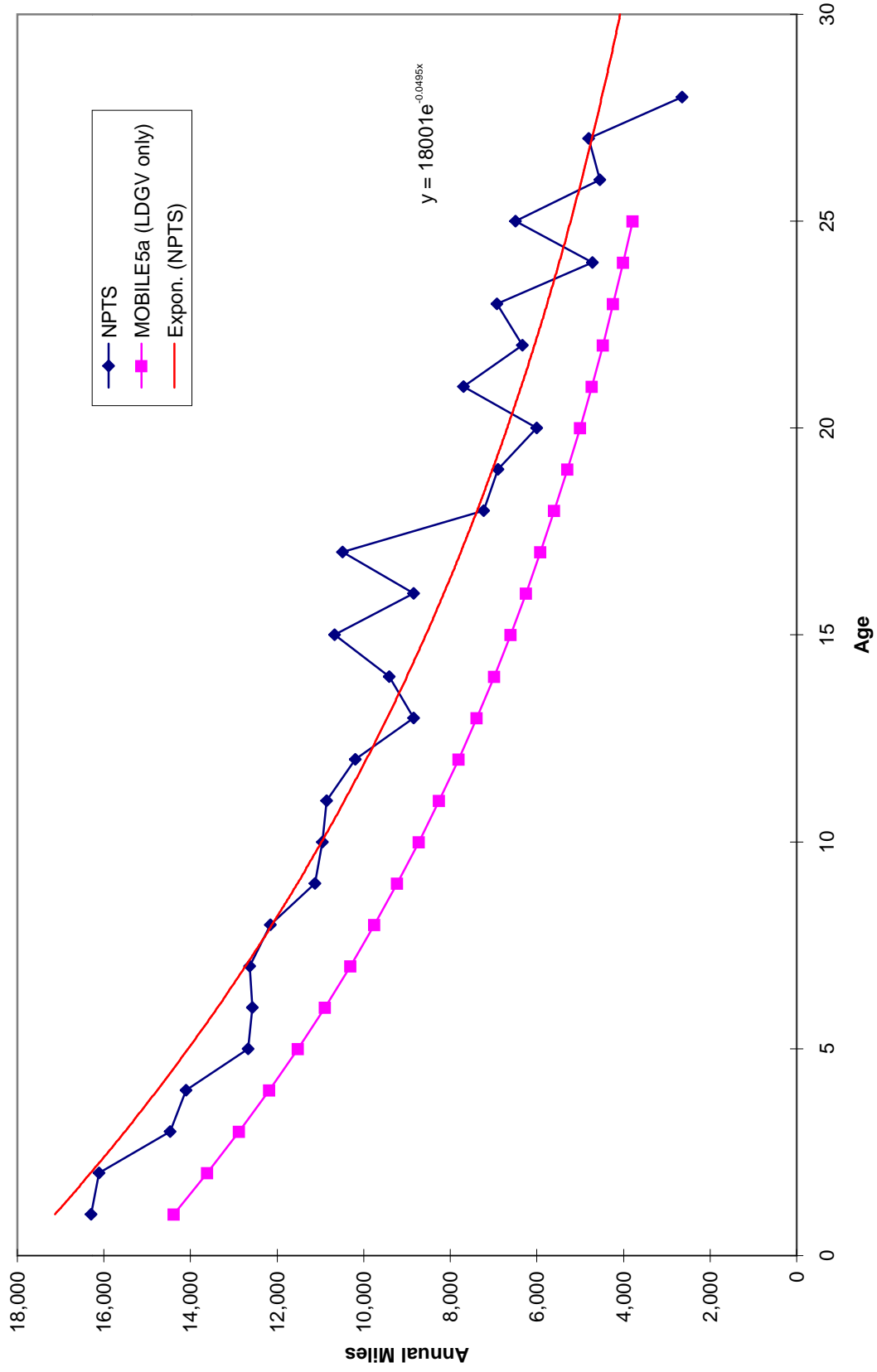


Figure 4-28. Annual Miles by Age
LDGT1

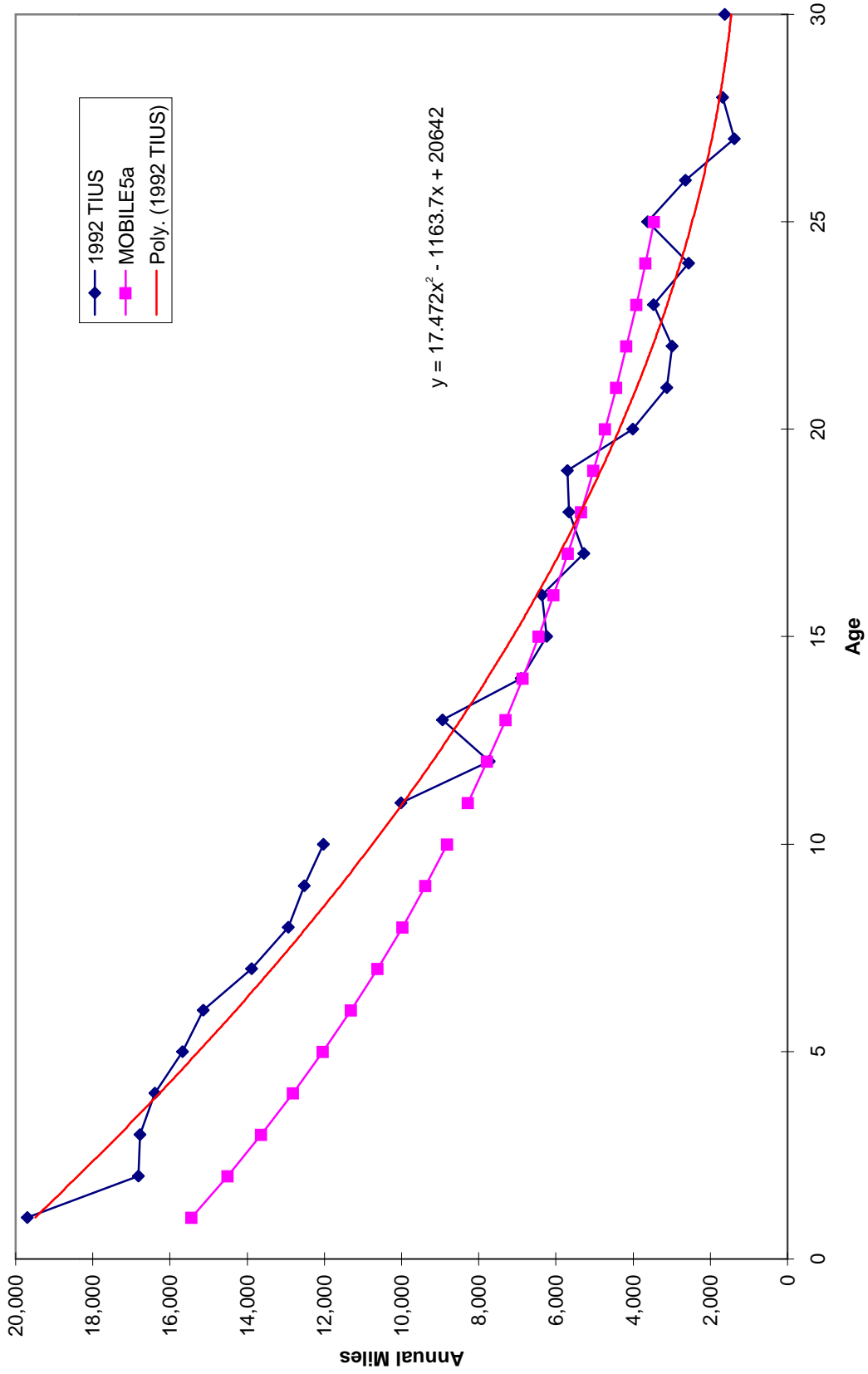


Figure 4-29. Annual Miles by Age
LDGT2

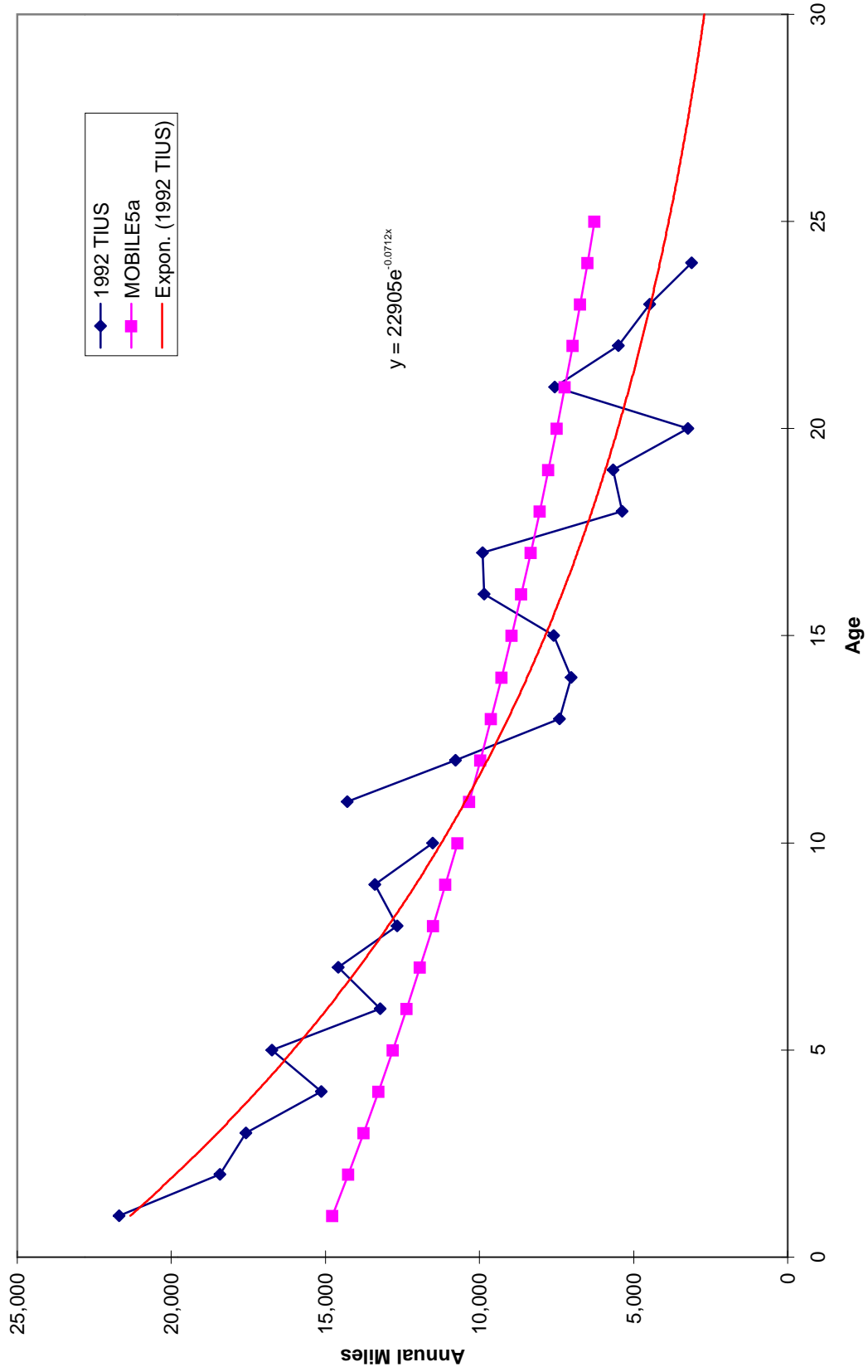


Figure 4-30. Annual Miles by Age LDDT1

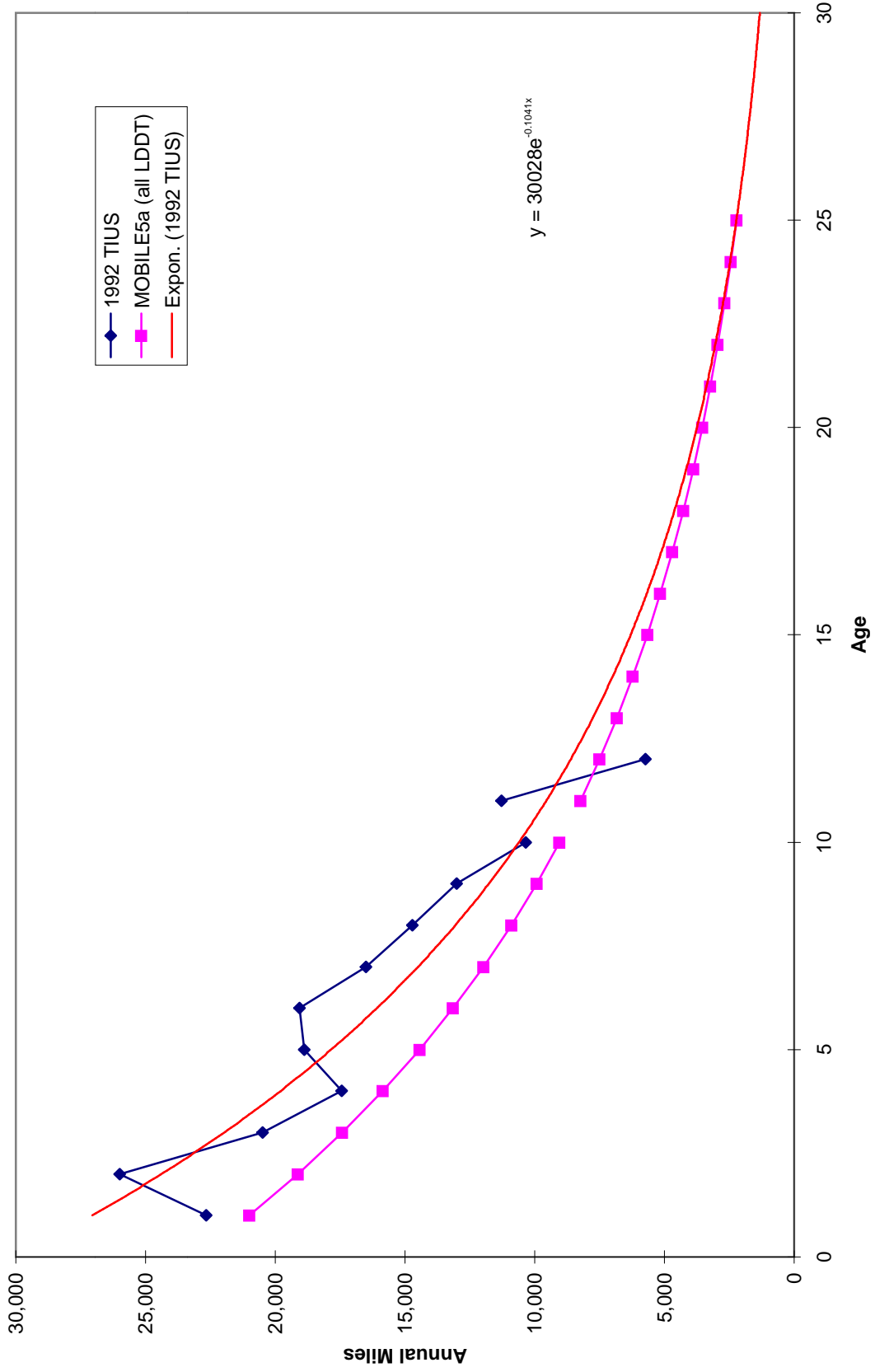


Figure 4-31. Annual Miles by Age LDDT2

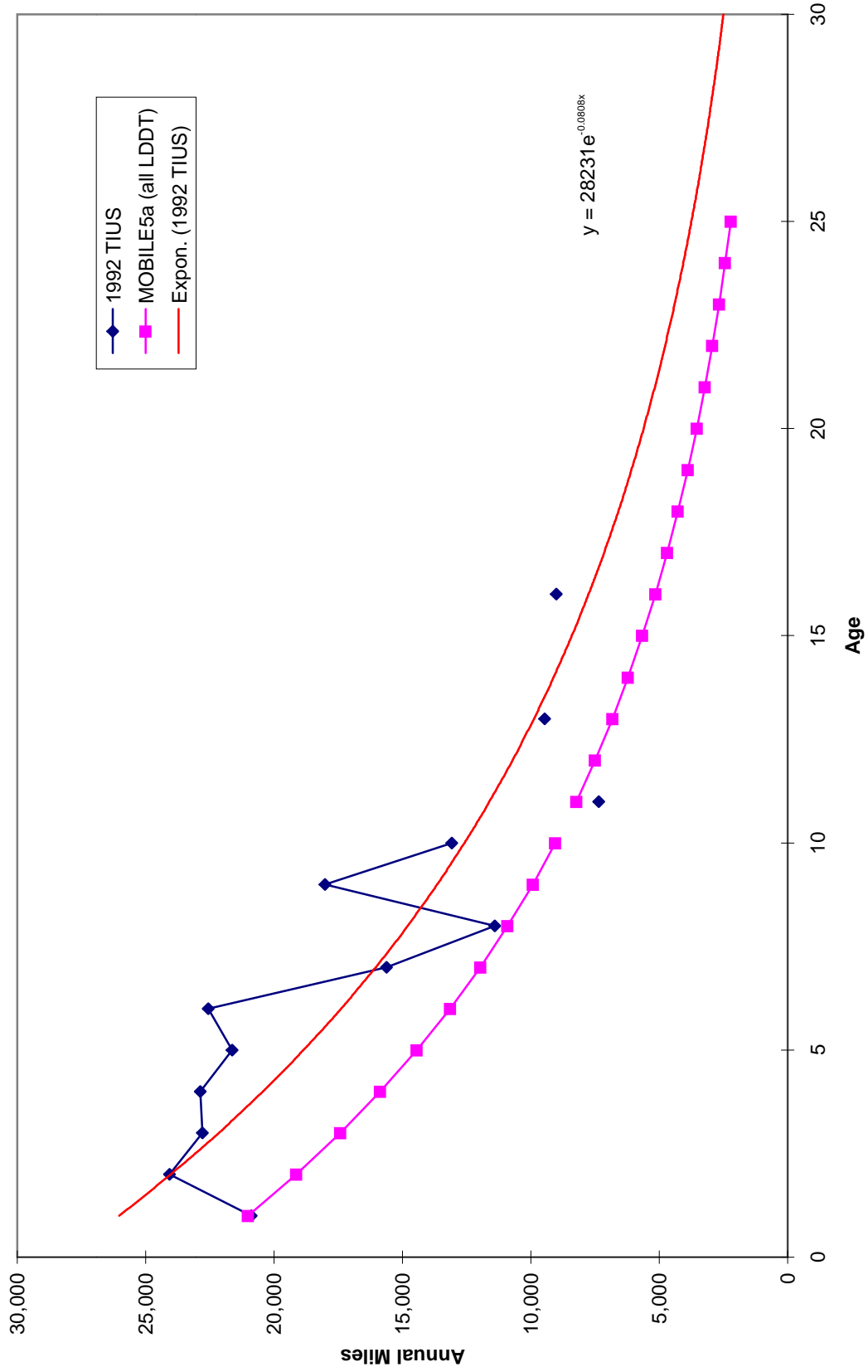


Figure 4-32. Annual Miles by Age HDGV1

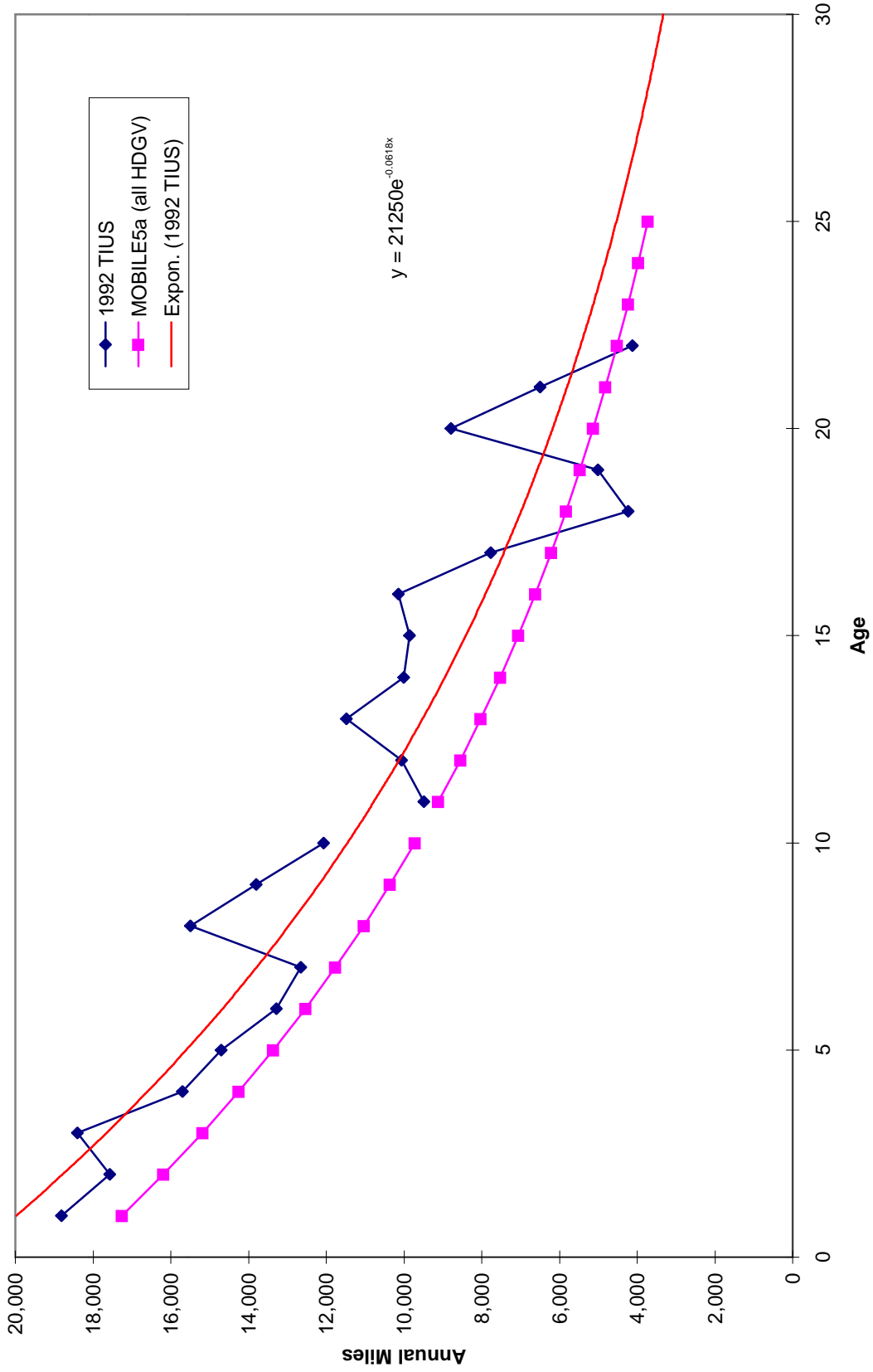
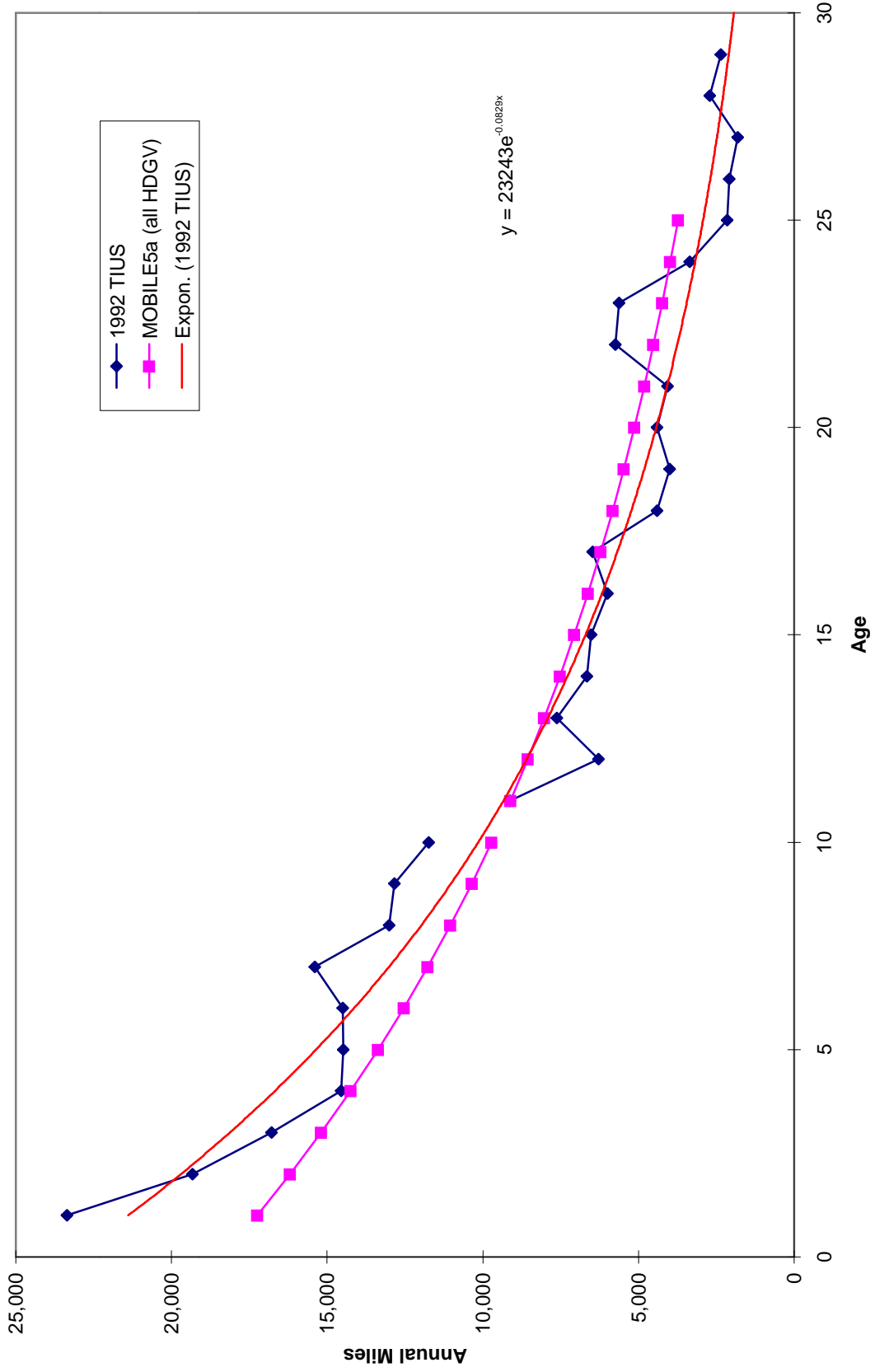


Figure 4-33. Annual Miles by Age HDGV2



**Figure 4-34. Annual Miles by Age
HDGB School**

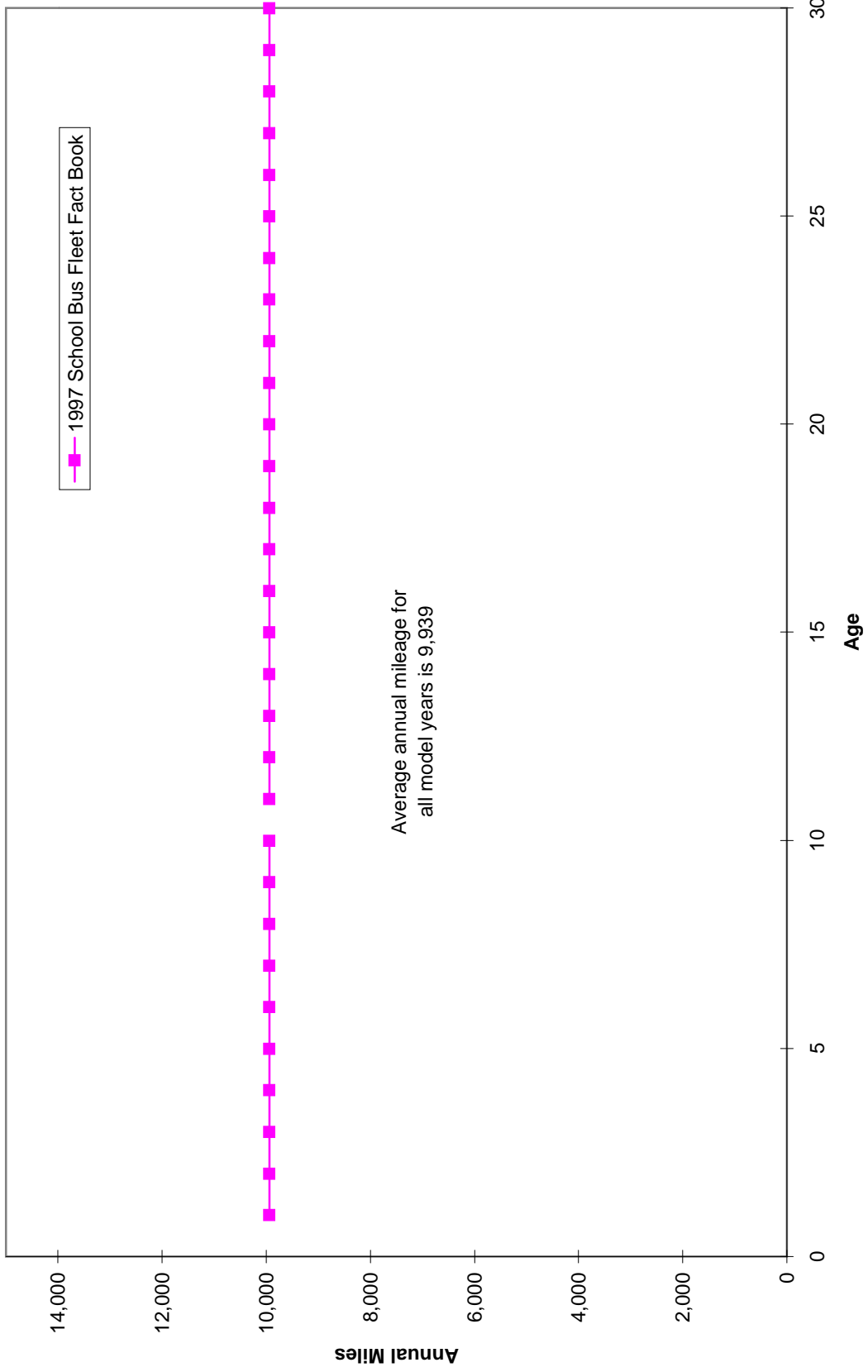


Figure 4-35. Annual Miles by Age
HDGB Transit

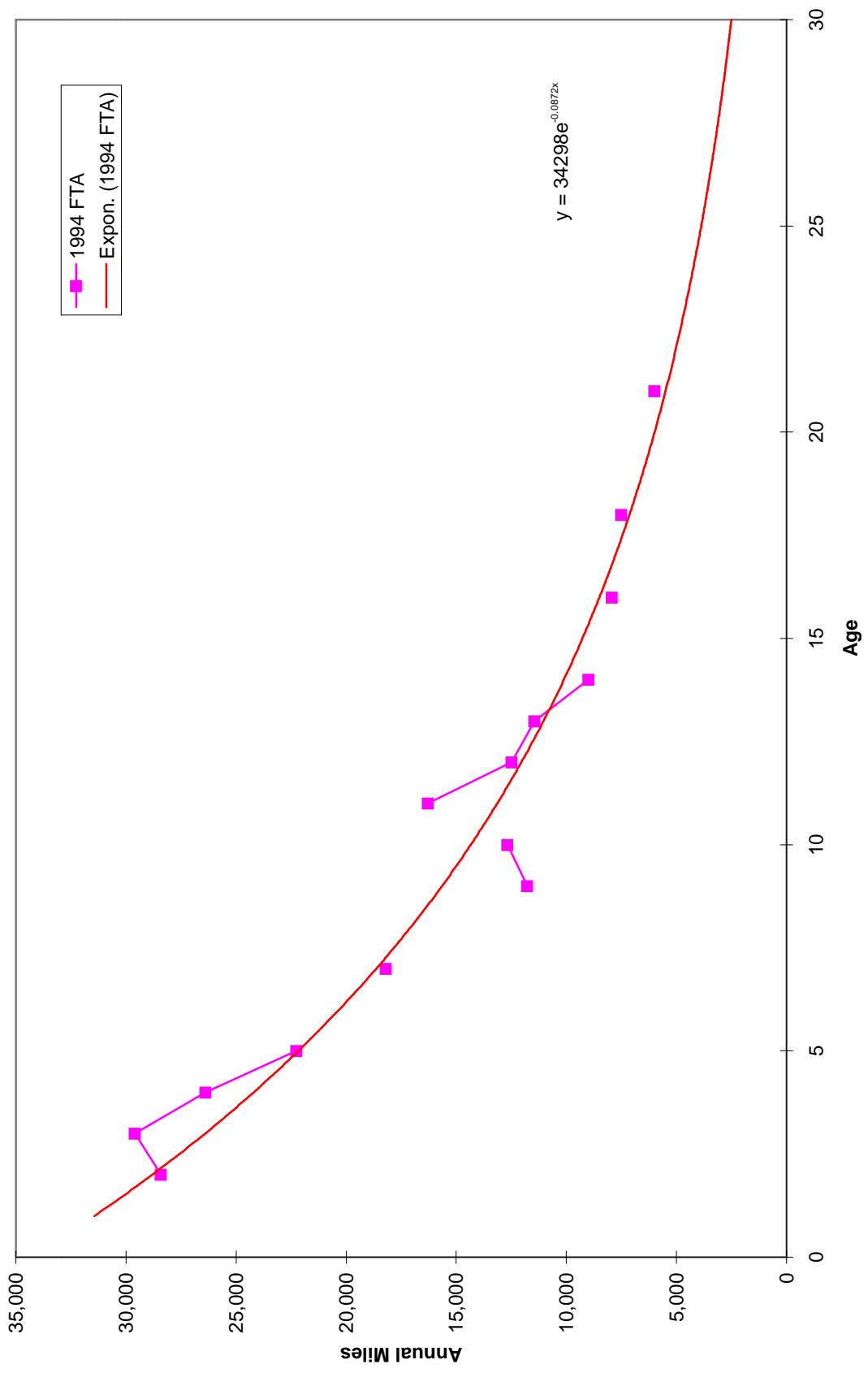


Figure 4-36. Annual Miles by Age
HDDV(2B)

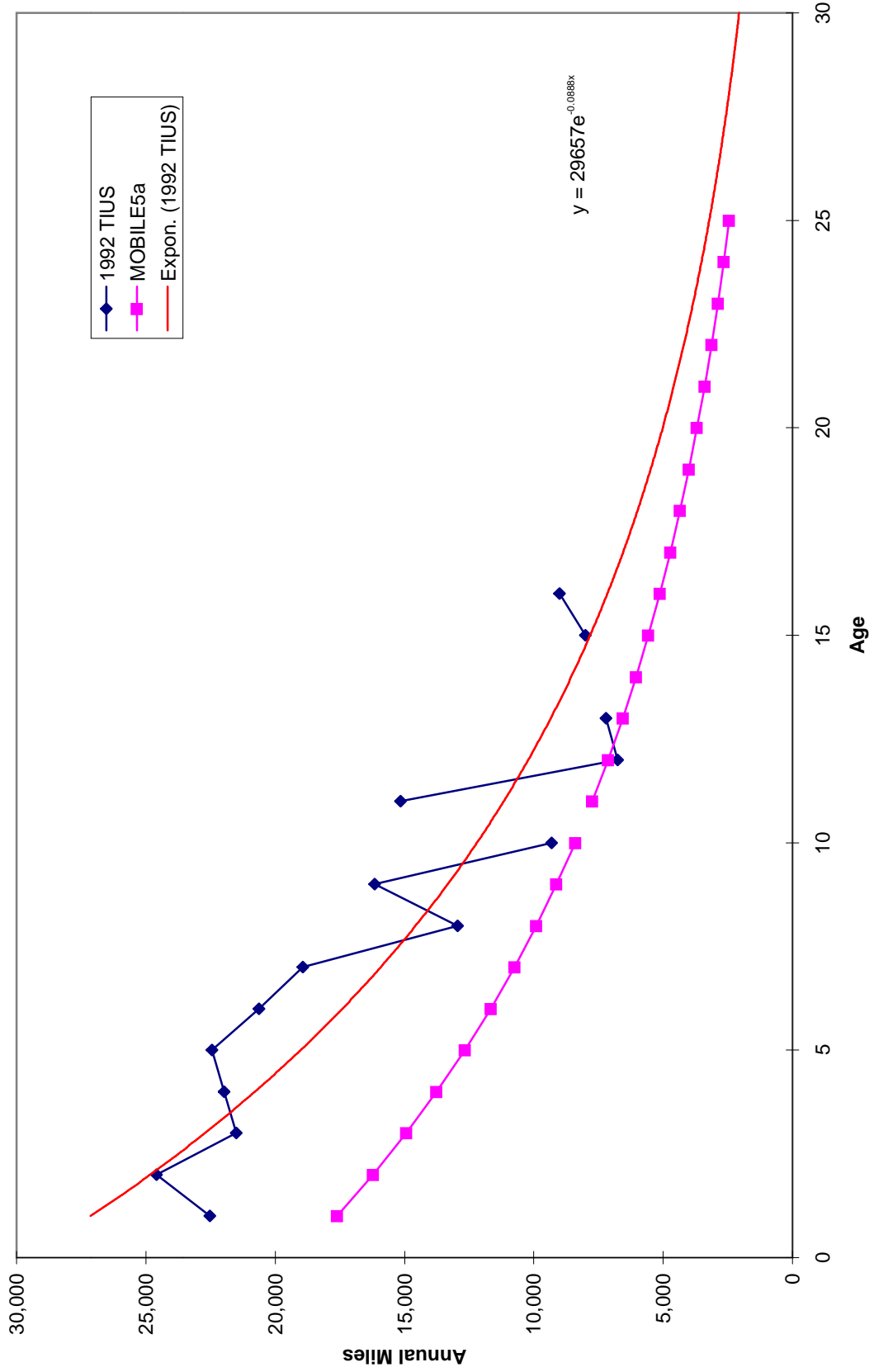


Figure 4-37. Annual Miles by Age
HDDV(3)

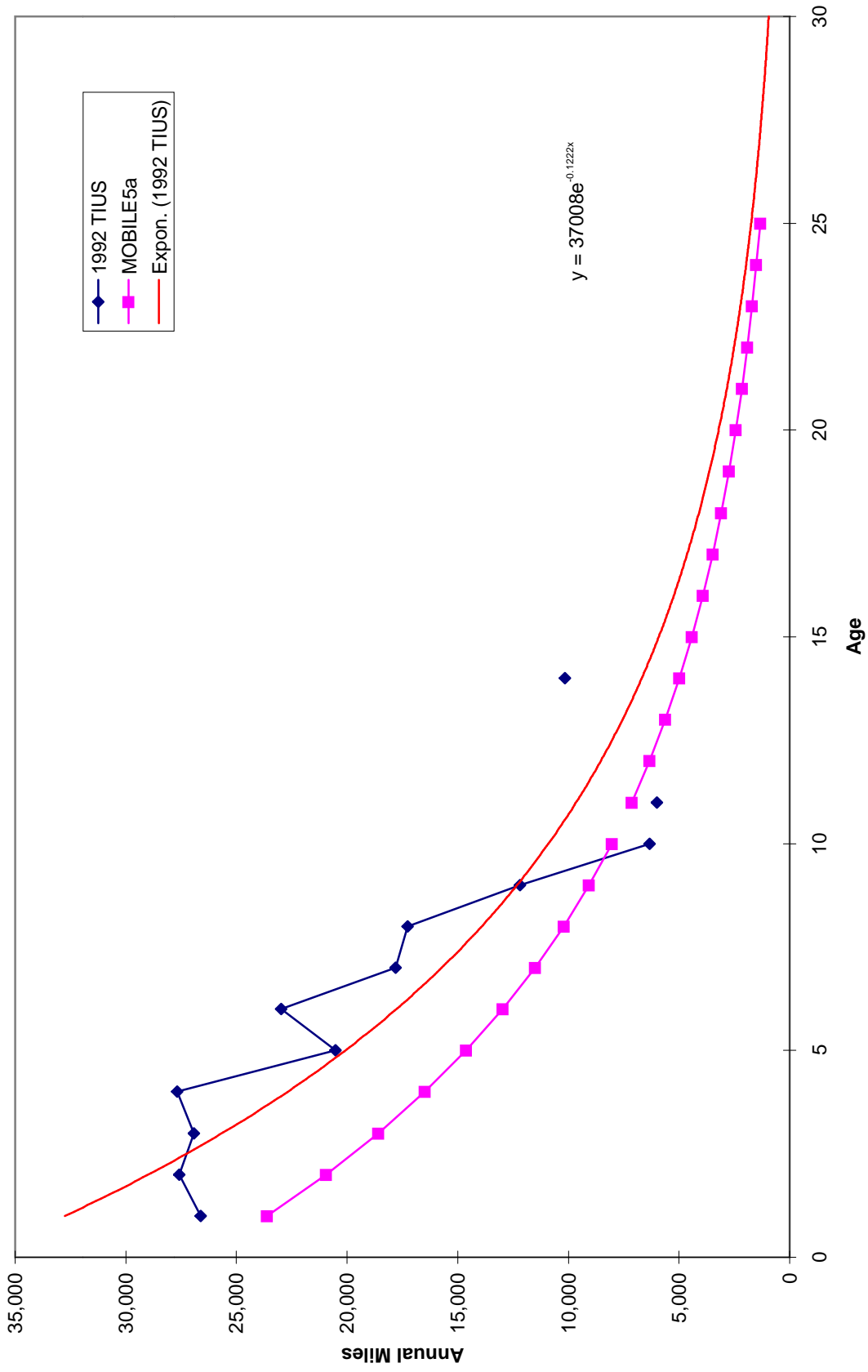


Figure 4-38. Annual Miles by Age
HDDV(4-5)

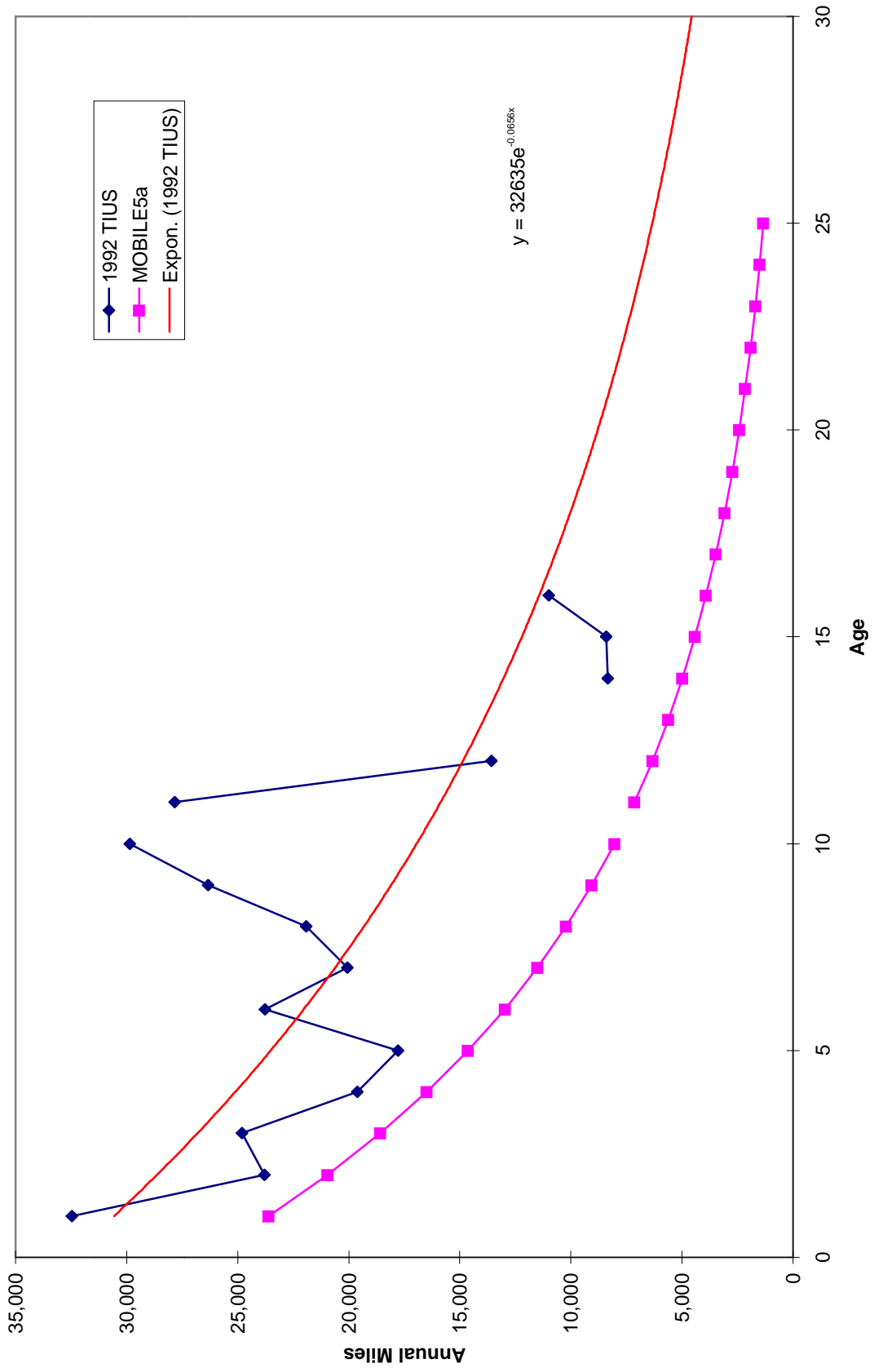


Figure 4-39. Annual Miles by Age
HDDV(6-7)

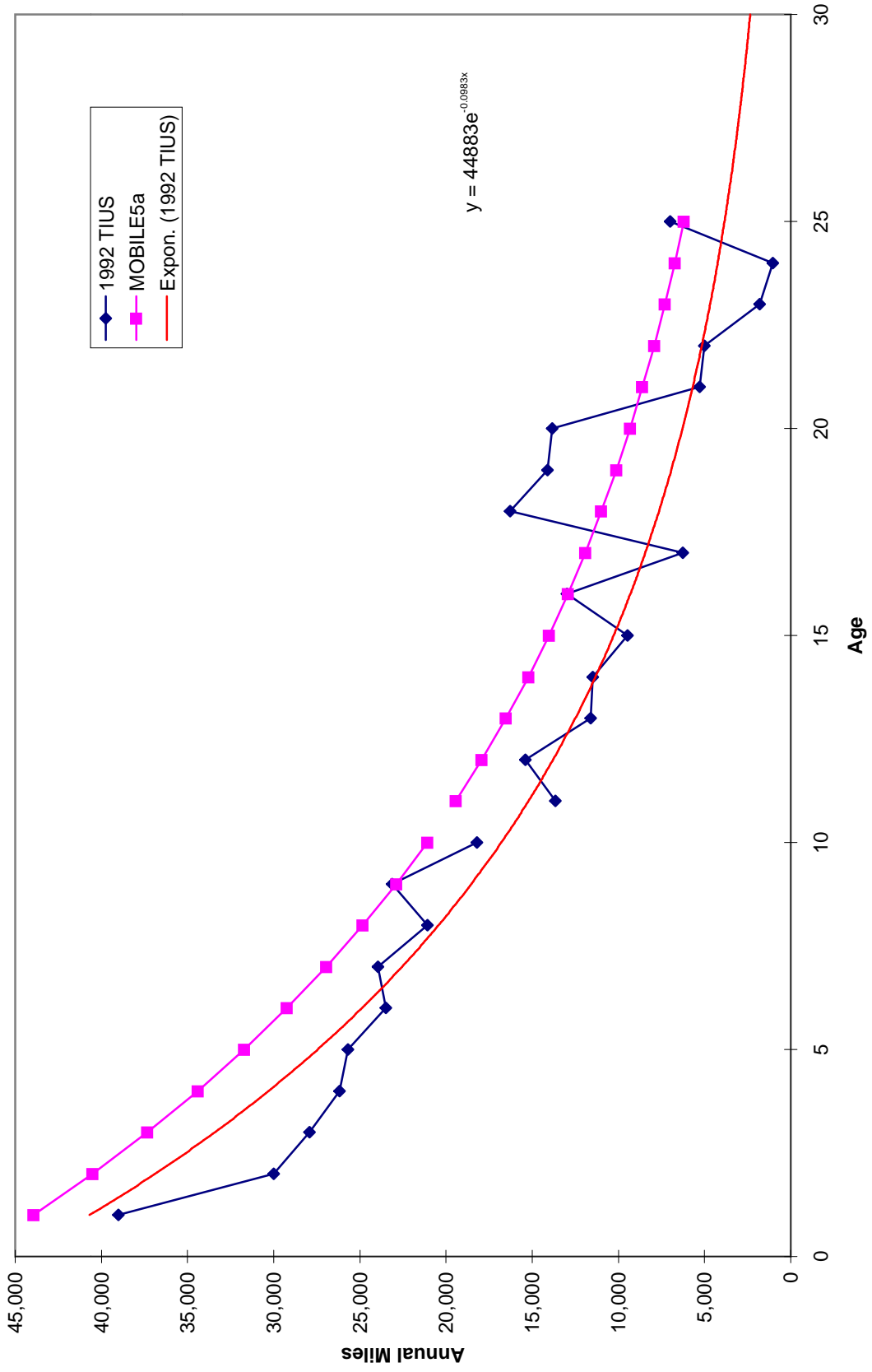


Figure 4-40. Annual Miles by Age
HDDV(8A)

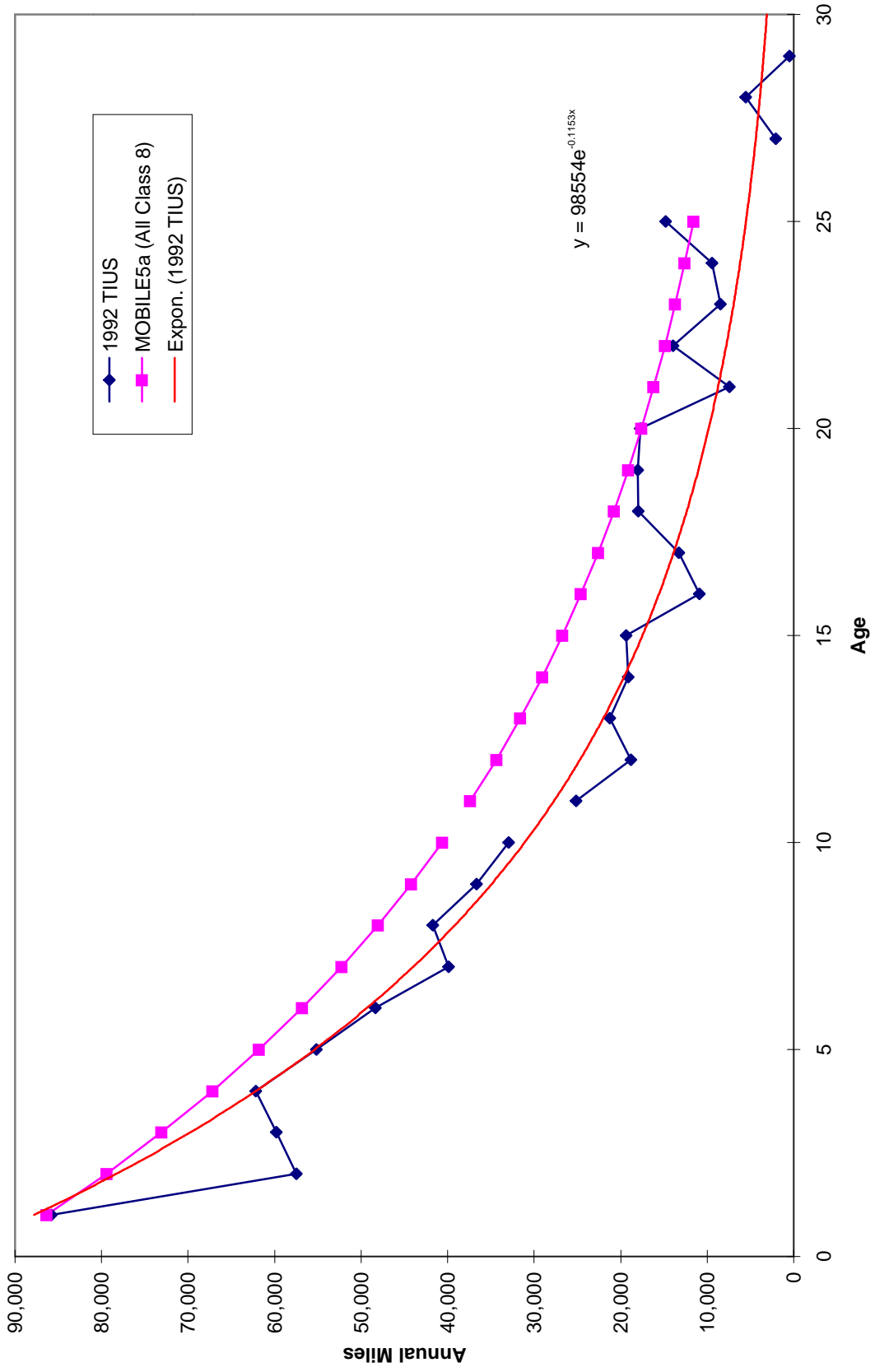
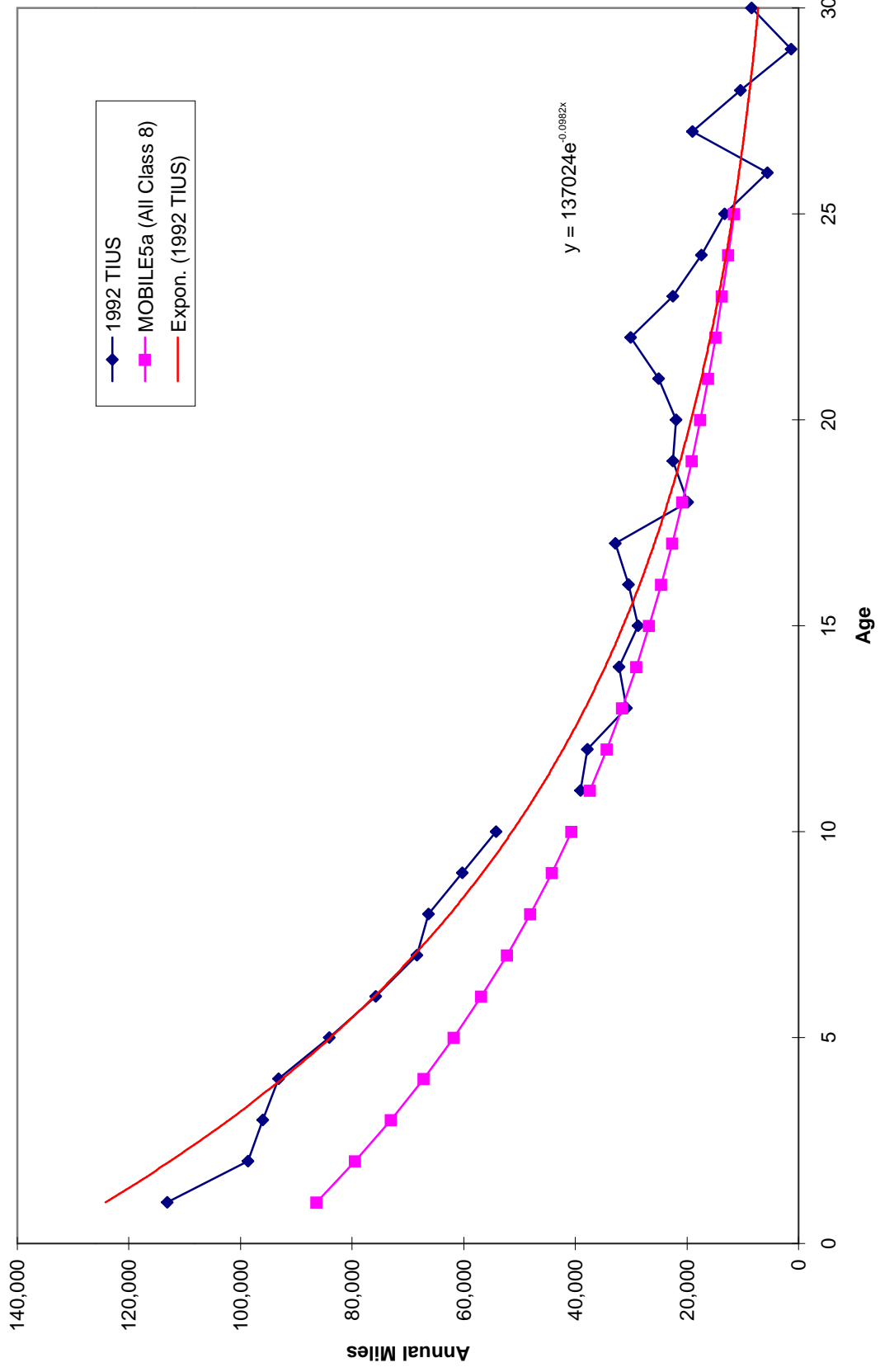


Figure 4-41. Annual Miles by Age
HDDV(8B)



**Figure 4-42. Annual Miles by Age
HDDB School**

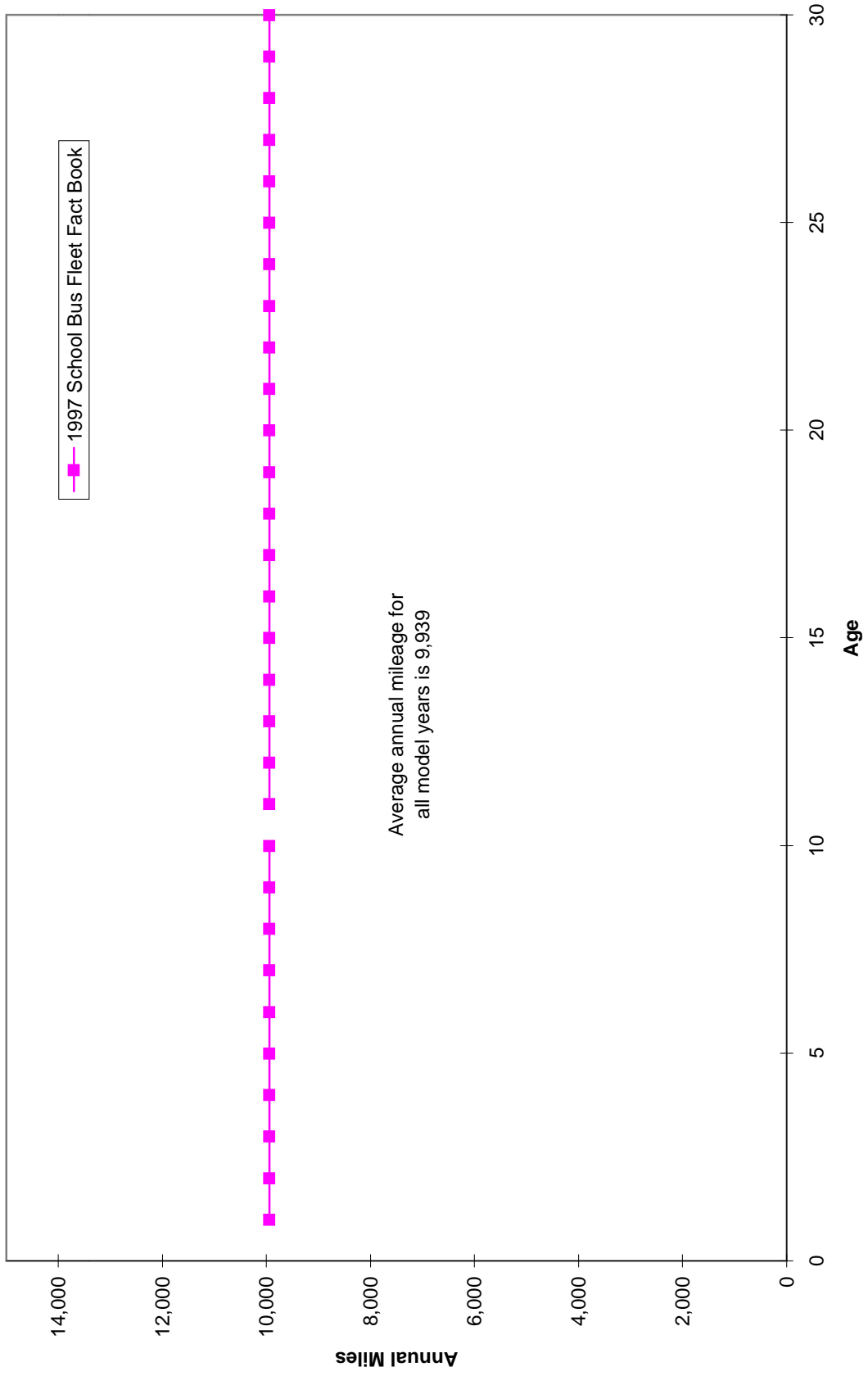
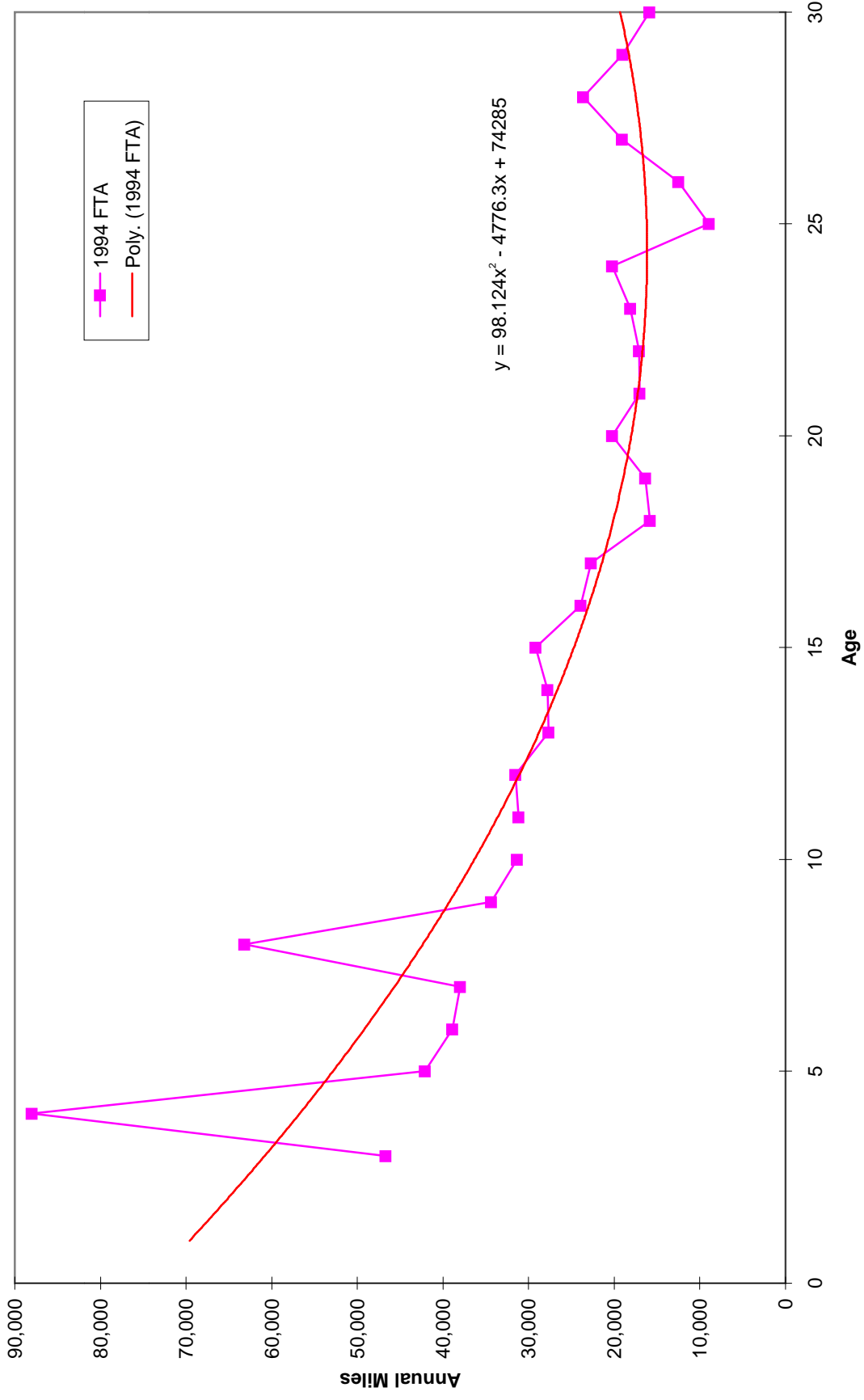


Figure 4-43. Annual Miles by Age
HDDB Transit



**TABLE 4-2
VEHICLES IN OPERATION
AS OF JULY 1996
GVW'S 2B-8
US LEVEL**

CLASS WEIGHT	LDV		LDGT		LDDT		HDGV		HDGB	
	LDGV	LDDV	LDGT1 <6000	LDGT2 6001-8500	LDDT1 <6000	LDDT2 6001-8500	2B-3 8501-14000	4-8 >14000	S.BUS ANY WGT.	T.BUS ANY WGT.
MODEL YEAR										
96	5999331	5330	2475332	1284821	0	122978	59765	16273	516	0
95	9166694	5425	3723979	1934425	0	168267	175347	54732	4408	0
94	7966182	630	3636380	1619437	1	136341	143661	47587	2926	30
93	8027524	2715	3338741	1141083	0	125823	116903	35154	2673	54
92	7468105	4432	2716821	997465	0	87028	100818	36885	102	108
91	7742072	9746	2893672	761139	0	74807	96635	35345	2368	83
90	7927068	3280	2517145	950590	0	69433	138614	47336	4009	55
89	8687143	3676	2922994	1110782	0	69338	189073	55083	4342	116
88	8800821	568	2961942	983087	0	53380	213938	70682	6115	78
87	8403556	23000	2666470	769231	1937	47597	158977	58113	6980	84
86	8093892	26380	2600147	934988	8701	88076	189611	51373	8209	87
85	7090963	69659	2040755	881557	9754	90383	186958	56147	11009	28
84	5978688	98664	1670540	752107	20230	96798	162650	55959	11363	34
83	3831635	94461	948999	517502	21601	82710	107726	37983	10931	23
82	2710825	145689	739107	369455	51916	72792	108250	37446	9270	11
81	2305351	175194	651163	335649	42762	3290	107871	37952	12053	4
80	1953647	79200	446378	453864	20482	2168	2423	45494	10434	9
79	2237823	61862	529703	1094112	17283	9172	13030	88619	9290	13
78	1785913	20597	384720	1009111	10222	934	16356	69373	8459	2
77	1335445	12593	328772	783213	0	212	22684	67918	9547	1
76	824579	11453	389724	394108	7408	116	14930	67102	6915	2
75	477882	7505	210964	242551	24441	77	4034	90069	8715	3
74	532240	3599	335900	173548	44505	74	1870	94921	0	1
73	0	0	0	0	0	0	9385	93372	0	0
72	0	0	0	0	0	0	6475	72328	0	0
71	0	0	0	0	0	0	532	54597	0	0
70	0	0	0	0	0	0	653	57955	0	0
69	0	0	0	0	0	0	675	50761	0	0
68	0	0	0	0	0	0	491	39588	0	0
67	0	0	0	0	0	0	193	38887	0	0
66	0	0	0	0	0	0	204	34371	0	0
TOTAL	119347379	865658	41130348	19493825	281243	1401794	2350728	1699401	150634	826

* = in MY 93-96, assumed 26.5% of Class 8 vehicles are Class 8A; for all other MY, percentage based upon 1993 TIUS data
 ** = transit bus registrations are from FTA data

- LDV Light duty vehicle
- LDGV Light duty gasoline vehicle
- LDDV Light duty diesel vehicle
- LDGT Light duty gasoline truck
- LDDT Light duty diesel truck
- HDGV Heavy duty gasoline vehicle
- HDGB Heavy duty gasoline bus
- HDDV Heavy duty diesel vehicle
- HDDB Heavy duty diesel bus

TABLE 4-2 (continued)
VEHICLES IN OPERATION
AS OF JULY 1996
GVW'S 2B-8
US LEVEL

CLASS WEIGHT	HDDV						8B* >60000	HDDB		ALL VEHICLES TOTAL
	2B 8501-10000	3 10001-14000	4-5 14001-19500	6-7 19501-33000	8A* 33001-60000	S.BUS ANY WGT.		T.BUS** ANY WGT.		
MODEL YEAR	20611	20611	15084	36848	22858	63398	12592			
96	77760	20611	15084	36848	22858	63398	12592			10213590
95	162857	49894	45619	112777	55767	154674	34395			15849355
94	131869	46825	29457	69815	41561	115272	17088		1186	14006341
93	133923	37278	26359	63675	35682	98966	19899		2496	13209040
92	93290	31827	20855	55070	18191	79092	20696		2278	11733154
91	77685	28002	14467	64578	25051	71036	24920		3188	11924885
90	72117	40421	18977	80650	28786	83175	28698		4682	12015126
89	69774	32708	20834	60814	29759	98894	15007		3829	13374255
88	50752	22387	13770	68499	25953	89567	18602		3167	13383397
87	45383	20704	4064	69454	29736	74622	19539		3299	12402833
86	84934	25966	2184	60684	28204	59103	17097		3330	12283051
85	80761	10736	2066	61696	30539	69423	11743		3741	10708003
84	78286	6075	1565	56347	25970	56621	7120		3206	9082308
83	51681	4005	454	28033	13613	26483	5245		3989	5787158
82	35845	2110	198	29110	18921	28273	4488		3017	4366805
81	1135	21	246	39861	23076	33078	4324		3270	3776379
80	0	0	2	27106	19685	24454	659		3811	3089895
79	0	0	0	23784	28160	36212	448		1695	4151285
78	0	1	0	14891	21616	29266	253		1182	3372974
77	0	2	0	7938	14940	23464	235		760	2607798
76	0	3	268	4459	9327	9767	60		510	1740808
75	0	5	106	4534	15695	10430	77		682	1097845
74	0	34	6	3740	5779	8590	0		338	1205219
73	0	20	127	3497	5492	7013	0		393	119372
72	0	0	118	2601	4445	3650	0		247	89936
71	0	0	60	1905	3799	1980	0		211	63155
70	0	0	38	4447	3386	791	0		73	67414
69	0	0	116	2618	850	1205	0		106	56399
68	0	0	95	2007	655	605	0		78	43587
67	0	0	94	321	186	946	0		90	40783
66	0	4	71	261	277	298	0		189	35741
TOTAL	1248050	379639	217303	1062021	587955	1360346	263185	55043	191897890	

TABLE 4-3
ANNUAL MILEAGE RAW DATA
GVW'S 2B-8
US LEVEL

CLASS WEIGHT MODEL YEAR	LDV		LDGT		LDDT		HDGV		HDGB	
	LDGV	LDDV	LDGT1 <6000	LDGT2 6001-8500	LDDT1 <6000	LDDT2 6001-8500	2B-3 8501-14000	4-8 >14000	S.BUS ANY WGT.	T.BUS ANY WGT.
1	16299	16299	19698	21694	22653	20882	18815	23355	(a)	(b)
2	16113	16113	16825	18416	25994	24072	17574	19328		28426
3	14472	14472	16770	17576	20482	22784	18405	16790		29593
4	14100	14100	16386	15141	17448	22879	15697	14549		26386
5	12672	12672	15677	16733	18890	21633	14700	14475		22255
6	12570	12570	15132	13229	19068	22558	13281	14502		(b)
7	12631	12631	13883	14587	16500	15628	12662	15391		18205
8	12151	12151	12938	12677	14710	11402	15497	13001		(b)
9	11127	11127	12522	13392	13016	18014	13804	12847		11782
10	10956	10956	12026	11527	10347	13072	12067	11745		12679
11	10862	10862	10008	14292	11272	7357	9484	9122		16294
12	10196	10196	7726	10784	5738		10058	6287		12478
13	8851	8851	8940	7411		9470	11476	7621		11455
14	9415	9415	6904	7026			10011	6662		9000
15	10677	10677	6238	7597			9862	6519		(b)
16	8841	8841	6365	9852		9000	10138	5997		7923
17	10492	10492	5278	9895			7763	6464		(b)
18	7225	7225	5662	5365			4234	4397		7500
19	6900	6900	5704	5660			5009	3999		(b)
20	6009	6009	4011	3239			8798	4412		(b)
21	7693	7693	3127	7557			6501	4062		6000
22	6341	6341	2994	5500			4122	5736		
23	6926	6926	3465	4471				5628		
24	4717	4717	2556	3124				3356		
25	6496	6496	3616					2149		
26	4552	4552	2639					2091		
27	4798	4798	1382					1820		
28	2652	2652	1685					2714		
29								2356		
30			1622							

LDV Light duty vehicle
LDGV Light duty gasoline vehicle
LDDV Light duty diesel vehicle
LDGT Light duty gasoline truck
LDDT Light duty diesel truck
HDGV Heavy duty gasoline vehicle
HDGB Heavy duty gasoline bus
HDDV Heavy duty diesel vehicle
HDDB Heavy duty diesel bus

(a) Average school bus mileage for all ages = 9,939
(b) Indicates data point was removed as an abnormality
(c) Insufficient data to obtain a reasonable curve fit

TABLE 4-3 (continued)
ANNUAL MILEAGE RAW DATA
GVW'S 2B-8
US LEVEL

CLASS WEIGHT	HDDV										HDDB	
	2B 8501-10000	3 10001-14000	4-5 14001-19500	6-7 19501-33000	8A 33001-60000	8B >60000	S.BUS ANY WGT.	T.BUS ANY WGT.				
MODEL YEAR											(a)	(b)
1	22533	26616	32471	39017	85794	113141						
2	24591	27581	23791	30011	57498	98673						
3	21502	26920	24800	27931	59784	95977						46680
4	21973	27678	19624	26190	62189	93147						88017
5	22448	20526	17776	25680	55199	84050						42076
6	20624	22980	23767	23481	48350	75736						38879
7	18932	17816	20066	23955	39863	68358						37977
8	12949	17268	21918	21071	41742	66294						63179
9	16151	12186	26337	23124	36635	60231						34370
10	9320	6333	29844	18216	32963	54245						31376
11	15151	6000	27830	13646	25153	39068						31157
12	6750		13571	15412	18800	37879						31534
13	7200			11618	21244	30798						27648
14		10159	8341	11487	19149	32119						27777
15	8000		8400	9458	19386	28777						29191
16	9000		11000	12977	10912	30416						23939
17				6269	13256	32813						22707
18				16296	17975	19820						15845
19				14115	18036	22471						16339
20				13844	17712	21928						20258
21				5297	7459	25033						17038
22				5000	13934	30084						17117
23				1805	8493	22559						18150
24				1053	9452	17363						20265
25				7000	14818	13278						8945
26						5538						12491
27					2088	19040						19064
28					5533	10417						23633
29					502	1350						19053
30						8443						15880

TABLE 4-4
ANNUAL MILEAGE CURVE FIT DATA
GVW'S 2B-8
US LEVEL

CLASS WEIGHT MODEL YEAR	LDV		LDGT		LDDT		HDGV		HDGB	
	LDGV	LDDV	LDGT1 <6000	LDGT2 6001-8500	LDDT1 <6000	LDDT2 6001-8500	2B-3 8501-14000	4-8 >14000	S.BUS ANY WGT.	T.BUS ANY WGT.
1	17132	17132	19496	21331	27059	26040	19977	21394	(a)	31434
2	16304	16304	18384	19865	24384	24018	18779	19692		28809
3	15517	15517	17308	18500	21973	21544	17654	18125		26403
4	14767	14767	16267	17228	19801	20434	16586	16883		24198
5	14054	14054	15260	16044	17843	18848	15601	15356		22178
6	13376	13376	14289	14942	16079	17385	14666	14134		20326
7	12730	12730	13352	13915	14490	16036	13787	13010		18628
8	12115	12115	12451	12959	13057	14791	12961	11975		17073
9	11530	11530	11584	12068	11766	13643	12184	11022		15647
10	10973	10973	10752	11239	10603	12584	11454	10145		14340
11	10443	10443	9955	10466	9555	11607	10768	9338		13143
12	9939	9939	9194	9747	8610	10706	10122	8595		12045
13	9459	9459	8467	9077	7759	9875	9516	7911		11040
14	9002	9002	7775	8453	6992	9109	8946	7282		10118
15	8567	8567	7118	7872	6301	8402	8409	6703		9273
16	8153	8153	6496	7331	5678	7749	7905	6169		8498
17	7760	7760	5909	6827	5116	7148	7432	5679		7789
18	7385	7385	5356	6358	4610	6593	6986	5227		7138
19	7028	7028	4839	5921	4155	6081	6568	4811		6542
20	6689	6689	4357	5514	3744	5609	6174	4428		5996
21	6366	6366	3909	5135	3374	5174	5804	4076		5495
22	6058	6058	3497	4782	3040	4772	5456	3752		5036
23	5766	5766	3120	4454	2740	4402	5129	3453		4616
24	5487	5487	2777	4148	2469	4060	4822	3178		4230
25	5222	5222	2470	3863	2225	3745	4533	2926		3877
26	4970	4970	2197	3597	2005	3454	4261	2693		3553
27	4730	4730	1959	3350	1807	3186	4006	2479		3257
28	4502	4502	1756	3120	1628	2939	3766	2281		2985
29	4284	4284	1589	2905	1467	2711	3540	2100		2736
30	4077	4077	1456	2706	1322	2500	3328	1933		2507
Equation:	$y = 18001e-0.0495x$	$y = 18001e-0.0495x$	$y = 17.472x^2 - 1163.7x + 20642$	$y = 22905e-0.0712x$	$y = 30028e-0.1041x$	$y = 28231e-0.0808x$	$y = 21250e-0.0618x$	$y = 23243e-0.0829x$		$y = 34298e-0.0872x$

LDV Light duty vehicle
LDGV Light duty gasoline vehicle
LDDV Light duty diesel vehicle
LDGT Light duty gasoline truck
LDDT Light duty diesel truck

HDGV Heavy duty gasoline vehicle
HDGB Heavy duty gasoline bus
HDDV Heavy duty diesel vehicle
HDDB Heavy duty diesel bus

(a) Average school bus mileage for all ages = 9,939
(b) Indicates data point was removed as an abnormality

TABLE 4-4 (continued)
ANNUAL MILEAGE CURVE FIT DATA
GVW'S 2B-8
US LEVEL

CLASS WEIGHT MODEL YEAR	HDDV					HDDB		
	2B 8501-10000	3 10001-14000	4-5 14001-19500	6-7 19501-33000	8A 33001-60000	8B >60000	S.BUS ANY WGT. (a)	T.BUS ANY WGT.
1	27137	32751	30563	40681	87821	124208		69607
2	24831	28984	28622	36872	78257	112590		65125
3	22721	25650	26805	33420	69735	102060		60839
4	20791	22699	25103	30291	62141	92514		56750
5	19024	20088	23509	27455	55374	83861		52857
6	17407	17778	22016	24885	49343	76017		49160
7	15928	15733	20618	22555	43970	68907		45659
8	14575	13923	19309	20443	39181	62462		42355
9	13336	12321	18083	18529	34915	56620		39246
10	12203	10904	16935	16795	31112	51324		36334
11	11166	9650	15860	15222	27724	46523		33619
12	10217	8540	14853	13797	24705	42172		31099
13	9349	7557	13910	12505	22015	38228		28776
14	8555	6688	13026	11335	19617	34652		26649
15	7828	5919	12199	10273	17481	31411		24718
16	7163	5238	11425	9312	15577	28473		22984
17	6554	4635	10699	8440	13881	25810		21446
18	5997	4102	10020	7650	12369	23396		20104
19	5488	3630	9384	6933	11022	21208		18958
20	5021	3213	8788	6284	9822	19224		18009
21	4595	2843	8230	5696	8752	17426		17255
22	4204	2516	7707	5163	7799	15796		16698
23	3847	2227	7218	4679	6950	14319		16338
24	3520	1971	6760	4241	6193	12979		16173
25	3221	1744	6331	3844	5518	11765		16205
26	2947	1543	5929	3484	4918	10665		16433
27	2697	1366	5552	3158	4382	9667		16857
28	2468	1209	5200	2862	3905	8763		17478
29	2258	1070	4869	2594	3480	7944		18295
30	2066	947	4560	2352	3101	7201		19308
Equation:	$y = 29657e-0.0888x$	$y = 37008e-0.1222x$	$y = 32635e-0.0656x$	$y = 44883e-0.0983x$	$y = 98554e-0.1153x$	$y = 137024e-0.0982x$		$y = 98.124x^2 - 4776.3x + 74285$

**TABLE 4-5
VEHICLES IN OPERATION AS PERCENT OF CLASS
AS OF JULY 1996
GVW'S 2B-8
US LEVEL**

CLASS WEIGHT	LDV		LDGT		LDDT		HDGV		HDGB	
	LDGV	LDDV	LDGT1 <6000	LDGT2 6001-8500	LDDT1 <6000	LDDT2 6001-8500	2B-3 8501-14000	4-8 >14000	S.BUS ANY WGT.	T.BUS ANY WGT.
MODEL YEAR										
96	5.03%	0.62%	6.02%	6.59%	0.00%	8.77%	2.54%	0.96%	0.34%	0.00%
95	7.68%	0.63%	9.05%	9.92%	0.00%	12.00%	7.46%	3.22%	2.93%	1.28%
94	6.67%	0.07%	8.84%	8.31%	0.00%	9.73%	6.11%	2.80%	1.94%	9.72%
93	6.73%	0.31%	8.12%	5.85%	0.00%	8.98%	4.97%	2.07%	1.77%	20.54%
92	6.26%	0.51%	6.61%	5.12%	0.00%	6.21%	4.29%	2.17%	0.07%	52.19%
91	6.49%	1.13%	7.04%	3.90%	0.00%	5.34%	4.11%	2.08%	1.57%	13.10%
90	6.64%	0.38%	6.12%	4.88%	0.00%	4.95%	5.90%	2.79%	2.66%	3.17%
89	7.28%	0.42%	7.11%	5.70%	0.00%	4.95%	8.04%	3.24%	2.88%	0.00%
88	7.37%	0.07%	7.20%	5.04%	0.00%	3.81%	9.10%	4.16%	4.06%	0.00%
87	7.04%	2.66%	6.48%	3.95%	0.69%	3.40%	6.76%	3.42%	4.63%	0.00%
86	6.78%	3.05%	6.32%	4.80%	3.09%	6.28%	8.07%	3.02%	5.45%	0.00%
85	5.94%	8.05%	4.96%	4.52%	3.47%	6.45%	7.95%	3.30%	7.31%	0.00%
84	5.01%	11.40%	4.06%	3.86%	7.19%	6.91%	6.92%	3.29%	7.54%	0.00%
83	3.21%	10.91%	2.31%	2.65%	7.68%	5.90%	4.58%	2.24%	7.26%	0.00%
82	2.27%	16.83%	1.80%	1.90%	18.46%	5.19%	4.60%	2.20%	6.15%	0.00%
81	1.93%	20.24%	1.58%	1.72%	15.20%	2.23%	4.59%	2.23%	8.00%	0.00%
80	1.64%	9.15%	1.09%	2.33%	7.28%	0.15%	0.10%	2.68%	6.93%	0.00%
79	1.88%	7.15%	1.29%	5.61%	6.15%	0.65%	0.55%	5.21%	6.17%	0.00%
78	1.50%	2.38%	0.94%	5.18%	3.63%	0.07%	0.70%	4.08%	5.62%	0.00%
77	1.12%	1.45%	0.80%	4.02%	0.00%	0.02%	0.96%	4.00%	6.34%	0.00%
76	0.69%	1.32%	0.95%	2.02%	2.63%	0.01%	0.64%	3.95%	4.59%	0.00%
75	0.40%	0.87%	0.51%	1.24%	8.69%	0.01%	0.17%	5.30%	5.79%	0.00%
74	0.45%	0.42%	0.82%	0.89%	15.82%	0.01%	0.08%	5.59%	0.00%	0.00%
73	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.40%	5.49%	0.00%	0.00%
72	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.28%	4.26%	0.00%	0.00%
71	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	3.21%	0.00%	0.00%
70	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	3.41%	0.00%	0.00%
69	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	2.99%	0.00%	0.00%
68	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	2.33%	0.00%	0.00%
67	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	2.29%	0.00%	0.00%
66	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	2.02%	0.00%	0.00%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

* = in MY 93-96, assumed 26.5% of Class 8 vehicles are Class 8A; for all other MY, percentage based upon 1993 TIUS data
 ** = transit bus registrations are from FTA data

- LDV Light duty vehicle
- LDGV Light duty gasoline vehicle
- LDDV Light duty diesel vehicle
- LDGT Light duty gasoline truck
- LDDT Light duty diesel truck
- HDGV Heavy duty gasoline vehicle
- HDGB Heavy duty gasoline bus
- HDDV Heavy duty diesel vehicle
- HDDB Heavy duty diesel bus

**TABLE 4-6
VEHICLES IN OPERATION, AGGREGATED CLASSES
AS OF JULY 1996
US LEVEL**

CLASS WEIGHT	LDV all	LDGT all <8500	LDDT all <8500	LDT all <8500	HDGV all >8500	HDDV 3 to 5 10001-19500	HDDV 8 >33000	HDDV all >8501	HDDB all any
96	6004661	3760153	122978	3883131	76037	35695	86256	236558	12592
95	9172119	5658404	168267	5826671	230079	95514	210440	581588	34395
94	7966812	5255817	136342	5392159	191248	76282	156833	434799	18379
93	8030239	4479824	125823	4605647	152057	63637	134648	395882	22564
92	7472537	3714286	87028	3801314	137703	52681	97282	298324	23045
91	7751818	3654811	74807	3729618	131980	42469	96087	280820	28260
90	7930348	3467735	69433	3537168	185949	59398	111961	324127	33482
89	8690819	4033776	69338	4103114	244156	53542	128653	312783	18928
88	8801389	3945029	53380	3998409	284619	36157	115520	270929	21819
87	8426556	3435701	49534	3485235	217089	24768	104358	243963	22866
86	8120272	3535135	96777	3631912	240983	28150	87306	261075	20433
85	7160622	2922312	100137	3022449	243105	12802	99962	255220	15510
84	6077352	2422647	117028	2539675	218609	7640	82591	224864	10343
83	3926096	1466501	104311	1570812	145709	4460	40096	124269	9246
82	2856514	1108562	124708	1233270	145696	2308	47194	114457	7505
81	2480545	986812	46052	1032864	145823	267	56154	97416	7596
80	2032847	900242	22650	922892	47916	2	44139	71247	4471
79	2299685	1623815	26455	1650270	101649	0	64371	88155	2143
78	1806510	1393831	11156	1404987	85729	1	50883	65775	1435
77	1348038	1111985	212	1112197	90601	2	38403	46343	998
76	836032	783832	7524	791356	82032	272	19095	23825	570
75	485387	453515	24518	478033	94103	111	26125	30770	759
74	535839	509448	44579	554027	96791	40	14369	18149	338
73	0	0	0	0	102757	147	12504	16149	393
72	0	0	0	0	78803	118	8095	10814	247
71	0	0	0	0	55129	60	5778	7744	211
70	0	0	0	0	58608	38	4177	8663	73
69	0	0	0	0	51435	116	2054	4789	106
68	0	0	0	0	40079	95	1260	3362	78
67	0	0	0	0	39079	94	1132	1547	90
66	0	0	0	0	34575	75	575	911	189
TOTAL	120213037	60624173	1683037	62307210	4050129	596942	1948301	4855315	319064

- LDV
- LDGV Light duty vehicle
- LDGT Light duty gasoline vehicle
- LDDT Light duty diesel vehicle
- LDGT Light duty gasoline truck
- LDDT Light duty diesel truck
- HDDV Heavy duty gasoline vehicle
- HDGB Heavy duty gasoline bus
- HDDV Heavy duty diesel vehicle
- HDDB Heavy duty diesel bus

**TABLE 4-7
VEHICLES IN OPERATION, AS PERCENT OF AGGREGATED CLASSES
AS OF JULY 1996
US LEVEL**

CLASS WEIGHT	LDV all	LDGT all <8500	LDDT all <8500	LDT all <8500	HDGV all >8500	HDDV 3 to 5 10001-19500	HDDV 8 >33000	HDDV all >8501	HDDB all any
96	5.00%	6.20%	7.31%	6.23%	1.88%	5.98%	4.43%	4.87%	3.95%
95	7.63%	9.33%	10.00%	9.35%	5.68%	16.00%	10.80%	11.98%	10.78%
94	6.63%	8.67%	8.10%	8.65%	4.72%	12.78%	8.05%	8.96%	5.76%
93	6.68%	7.39%	7.48%	7.39%	3.75%	10.66%	6.91%	8.15%	7.07%
92	6.22%	6.13%	5.17%	6.10%	3.40%	8.83%	4.99%	6.14%	7.22%
91	6.45%	6.03%	4.44%	5.99%	3.26%	7.11%	4.93%	5.78%	8.86%
90	6.60%	5.72%	4.13%	5.68%	4.59%	9.95%	5.75%	6.68%	10.49%
89	7.23%	6.65%	4.12%	6.59%	6.03%	8.97%	6.60%	6.44%	5.93%
88	7.32%	6.51%	3.17%	6.42%	7.03%	6.06%	5.93%	5.58%	6.84%
87	7.01%	5.67%	2.94%	5.59%	5.36%	4.15%	5.36%	5.02%	7.17%
86	6.75%	5.83%	5.75%	5.83%	5.95%	4.72%	4.48%	5.38%	6.40%
85	5.96%	4.82%	5.95%	4.85%	6.00%	2.14%	5.13%	5.26%	4.86%
84	5.06%	4.00%	6.95%	4.08%	5.40%	1.28%	4.24%	4.63%	3.24%
83	3.27%	2.42%	6.20%	2.52%	3.60%	0.75%	2.06%	2.56%	2.90%
82	2.38%	1.83%	7.41%	1.98%	3.60%	0.39%	2.42%	2.36%	2.35%
81	2.06%	1.63%	2.74%	1.66%	3.60%	0.04%	2.88%	2.01%	2.38%
80	1.69%	1.48%	1.35%	1.48%	1.18%	0.00%	2.27%	1.47%	1.40%
79	1.91%	2.68%	1.57%	2.65%	2.51%	0.00%	3.30%	1.82%	0.67%
78	1.50%	2.30%	0.66%	2.25%	2.12%	0.00%	2.61%	1.35%	0.45%
77	1.12%	1.83%	0.01%	1.79%	2.24%	0.00%	1.97%	0.95%	0.31%
76	0.70%	1.29%	0.45%	1.27%	2.03%	0.05%	0.98%	0.49%	0.18%
75	0.40%	0.75%	1.46%	0.77%	2.32%	0.02%	1.34%	0.63%	0.24%
74	0.45%	0.84%	2.65%	0.89%	2.39%	0.01%	0.74%	0.37%	0.11%
73	0.00%	0.00%	0.00%	0.00%	2.54%	0.02%	0.64%	0.33%	0.12%
72	0.00%	0.00%	0.00%	0.00%	1.95%	0.02%	0.42%	0.22%	0.08%
71	0.00%	0.00%	0.00%	0.00%	1.36%	0.01%	0.30%	0.16%	0.07%
70	0.00%	0.00%	0.00%	0.00%	1.45%	0.01%	0.21%	0.18%	0.02%
69	0.00%	0.00%	0.00%	0.00%	1.27%	0.02%	0.11%	0.10%	0.03%
68	0.00%	0.00%	0.00%	0.00%	0.99%	0.02%	0.06%	0.07%	0.02%
67	0.00%	0.00%	0.00%	0.00%	0.96%	0.02%	0.06%	0.03%	0.03%
66	0.00%	0.00%	0.00%	0.00%	0.85%	0.01%	0.03%	0.02%	0.06%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%

- LDV Light duty vehicle
- LDGV Light duty gasoline vehicle
- LDDV Light duty diesel vehicle
- LDGT Light duty gasoline truck
- LDDT Light duty diesel truck
- HDGV Heavy duty gasoline vehicle
- HDGB Heavy duty gasoline bus
- HDDV Heavy duty diesel vehicle
- HDDB Heavy duty diesel bus

**TABLE 4-8
GASOLINE/DIESEL SALES FRACTION***

CLASS	LDV		LDT	
	LDGV	LDDV	LDGT	LDDT
MODEL YEAR				
96	99.91%	0.09%	96.83%	3.17%
95	99.94%	0.06%	97.11%	2.89%
94	99.99%	0.01%	97.47%	2.53%
93	99.97%	0.03%	97.27%	2.73%
92	99.94%	0.06%	97.71%	2.29%
91	99.87%	0.13%	97.99%	2.01%
90	99.96%	0.04%	98.04%	1.96%
89	99.96%	0.04%	98.31%	1.69%
88	99.99%	0.01%	98.66%	1.34%
87	99.73%	0.27%	98.58%	1.42%
86	99.68%	0.32%	97.34%	2.66%
85	99.03%	0.97%	96.69%	3.31%

* = assumes that scappage rates are equivalent for diesel and gasoline vehicles