DOCUMENTATION FOR THE NEW HIGHWAY FUEL CONSUMPTION MODEL

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1. INTRODUCTION

1.1 BACKGROUND

Over the past four years, the U.S. Department of Energy and its predecessor agencies have developed data and analytical tools to evaluate trends in the fuel consumption of the nation's vehicle fleet. Early phases of this work centered largely on the influence of public programs and policies. Issues of concern at that time included the setting of mandatory Corporate Average Fuel Economy standards and the analysis of conservation proposals, e.g., to accelerate the retirement of older, less efficient cars from the vehicle fleet. Under the stimulus of higher fuel prices, marketplace forces have had progressively greater influence on all components of fuel consumption, including automotive technology, fleet fuel economy, and vehicle travel. More recent phases of the DOE analysis have focused on tracking and evaluating the public and industry responses to these forces.

The Highway Fuel Consumption (HFC) model is a primary analytical tool in this work, since it provides DOE the capability to evaluate the impacts of private and governmental actions on trends in total highway fuel demand. Originally developed for DOE as a light-duty vehicle fuel consumption model,[1/] HFC was extended in previous work to include a medium- and heavy-duty truck component. More recent modifications incorporated new analyses of technological variation in fuel economy shortfall and periodically have updated the model's data files on sales, fuel economy, and miles of travel. The fleet fuel consumption model has become a frequently used and updated analytical tool whose forecasts are circulated to over 70 organizations through the DOE "Quarterly Reports."[2-4/]

As a result of the progressive change in DOE analysis efforts and the continued growth of model capabilities, the HFC programming structure had become cumbersome, inefficient, and unresponsive to new objectives. Therefore,

a part of the work effort under Task 13 was allocated to the restructuring of the HFC model.

The new Highway Fuel Consumption model, documented in this report, utilizes a programming framework which achieves two primary design goals:

- To make efficient use of both computer system and user/analyst resources
- To allow flexibility for model updating which may be required to support future DOE work.

New capabilities also have been added to the revised HFC model, including a recent analysis relating passenger car scrappage to new car sales volumes and an option to calibrate base year vehicle stock and fuel consumption to published totals.

1.2 ORGANIZATION OF REPORT

An attempt was made during the programming of the new HFC model to provide complete internal documentation of the program code, and it is likely that user/programmers will find the model easy to understand. Therefore, the emphasis of this external documentation is to assist the user/analyst in understanding what the model does in forecasting fuel consumption and how to operate it.

Section 2 (HFC Model Structure) presents a detailed narrative of program and data file structures. Section 2.1 provides an overview of the new model's framework and capabilities. Section 2.2 describes the FORTRAN source code, the communication of information within the model, the variables and parameters which control the scenario forecast, and the location and contents of the data files. Section 2.3 specifies the mathematical algorithms employed in the model's calculations and defines the forecast options available to the user.

Section 3 demonstrates the interactive execution of the HFC model under the TSO operating system on the DOE/EIA IBM 3033 computer. Several TSO command language procedures have been written to assist in maintaining the program code. While not intended as a manual on the TSO system, the discussion in this section provides general guidelines on manipulating the model and its files.

2. HFC MODEL STRUCTURE

2.1 OVERVIEW

This section describes the structure and methodology of the new Highway Fuel Consumption Model. The overriding design principle was to develop a programming structure which simulates the dynamics of the highway vehicle fleet. In doing so, the existing program code was completely revised and the HFC data files reorganized. Other changes were introduced, including new methods of data file storage to simplify the periodic updating of the information, and new interactive command procedures to permit easier and more efficient maintenance of the program code.

As a result of these extensive changes, the new HFC model bears little resemblance to the computer program previously used. The user will notice few of these changes, however. The interactive portion of program execution asks many of the questions of the old HFC model, and the format of the fuel consumption output table is unchanged. Most importantly, given a consistent selection of base case scenario options, the old and new models produce identical forecasts.

2.1.1 Revised Framework

The new HFC model treats fleet fuel consumption in a system dynamics framework, i.e., it initializes the state variables describing the highway fleet to base year values and then explicitly simulates year-to-year changes in each. The variables defining fuel consumption (the system state) are:

- Stock -- number of vehicles in operation
- Efficiency -- on-road fuel economy
- Utilization -- miles of travel per vehicle.

Two additional state variables are required to complete the fleet profiles produced by HFC:

- EPA efficiency -- EPA fuel economy ratings
- Gasoline type -- unleaded versus leaded gasoline shares.

The first four state variables are disaggregated according to vehicle class,* fuel type (gas or diesel), and vintage (age), while the fifth is disaggregated only by vehicle class and vintage.

The old HFC model was designed to construct the fleet's state variables independently for each year within a forecast scenario. This methodology meant that no information was carried forward year-to-year and that fleet parameters always were calculated from original model year data. For example, the calculation of vehicles in operation applied net survival-by-vintage probabilities to original (new vehicle) registrations. The number of vehicles on the road declined with age for each model year because the net survival curves declined. However, the old model did not explicitly determine how many vehicles survived from one year to the next. Other fleet descriptors (fuel economy, diesel penetration, etc.) also were independently (re)constructed each year without carry-forward of information.

The new HFC differs significantly from its predecessor in the method of representing year-to-year changes in the fleet, particularly with regard to vehicle stock: state variables are updated annually to account for year-to-year changes in the fleet, and the stored tables of model year data (fuel economy, registrations, etc.) are accessed only for new vehicles. This

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*Domestic passenger car.
Import passenger car.
Domestic light-duty truck, 0-6000 lbs GVW.
Import light-duty truck, 0-6000 lbs GVW.
Light duty truck, 6001-8500 lbs GVW.
Light truck, 8501-10,000 lbs GVW.
Medium-duty truck, 10,001-19,500 lbs GVW.
Light-heavy duty truck, 19,501-26,000 lbs GVW.
Heavy-heavy duty truck, >26,000 lbs GVW.

methodology therefore makes maximum use of information carry-forward and is a more natural structure for simulating the forces which influence the vehicle fleet.

For example, the gradual turnover of vehicle stock through scrappage and new registrations is simulated in the new model by applying marginal survival rates to the vintage years within the fleet. Age i vehicles become fewer age i+1 vehicles in the following year, and other fleet descriptors of age i vehicles are shifted to describe age i+1 vehicles. When the marginal survival curves are calculated by differentiating the old model's net survival curves, the two methodologies are numerically equivalent and produce the same fleet sizes. However, the new model's methodology offers much greater flexibility in representing the fleet dynamics of vehicle aging and scrappage.

2.1.2 Model Capabilities

The goals for the new model originally included maintaining existing analytical capabilities. During the course of model design, however, two existing options (accelerated scrappage and fuel economy retrofit) were dropped in favor of extending the capabilities in new areas.

The accelerated scrappage and retrofit options simulated potential federal programs to increase fleet fuel efficiency by: (1) accelerating the retirement of old, less efficient passenger cars; and (2) stimulating the market penetration of improved tires and oils in passenger cars. The fuel savings generated by these two programs have been analyzed in previous work efforts, and the analytical capabilities were judged to be of reduced priority in the current DOE agenda.

The additional capabilities incorporated in the new HFC model are:

- An option to modify fixed survival probabilities based on a new relationship between sales and scrappage
- An option to calibrate base (first) year vehicle stock and fuel consumption to published totals

- The full integration of the technology-specific shortfall analysis with three alternative methods of estimating model year fleet average EPA fuel economy.

As in the previous model, the user maintains control over basic parameters of each scenario, such as its length in years, the frequency of output, the vehicle class coverage of the fuel consumption table, the methodology of estimating EPA and on-road fuel economy, the growth in VMT per vehicle, and the method of calculating vehicle stock.

In addition to changes in the program code, the input data files have been reorganized to rational, internally-documented formats. The new structures incorporate the data used for the DOE Fourth Quarterly Report and provide additional flexibility for extending the technology-specific information on fuel economy and shortfall. Therefore, the revised data files maintain the current level of model sophistication, while facilitating future modifications.

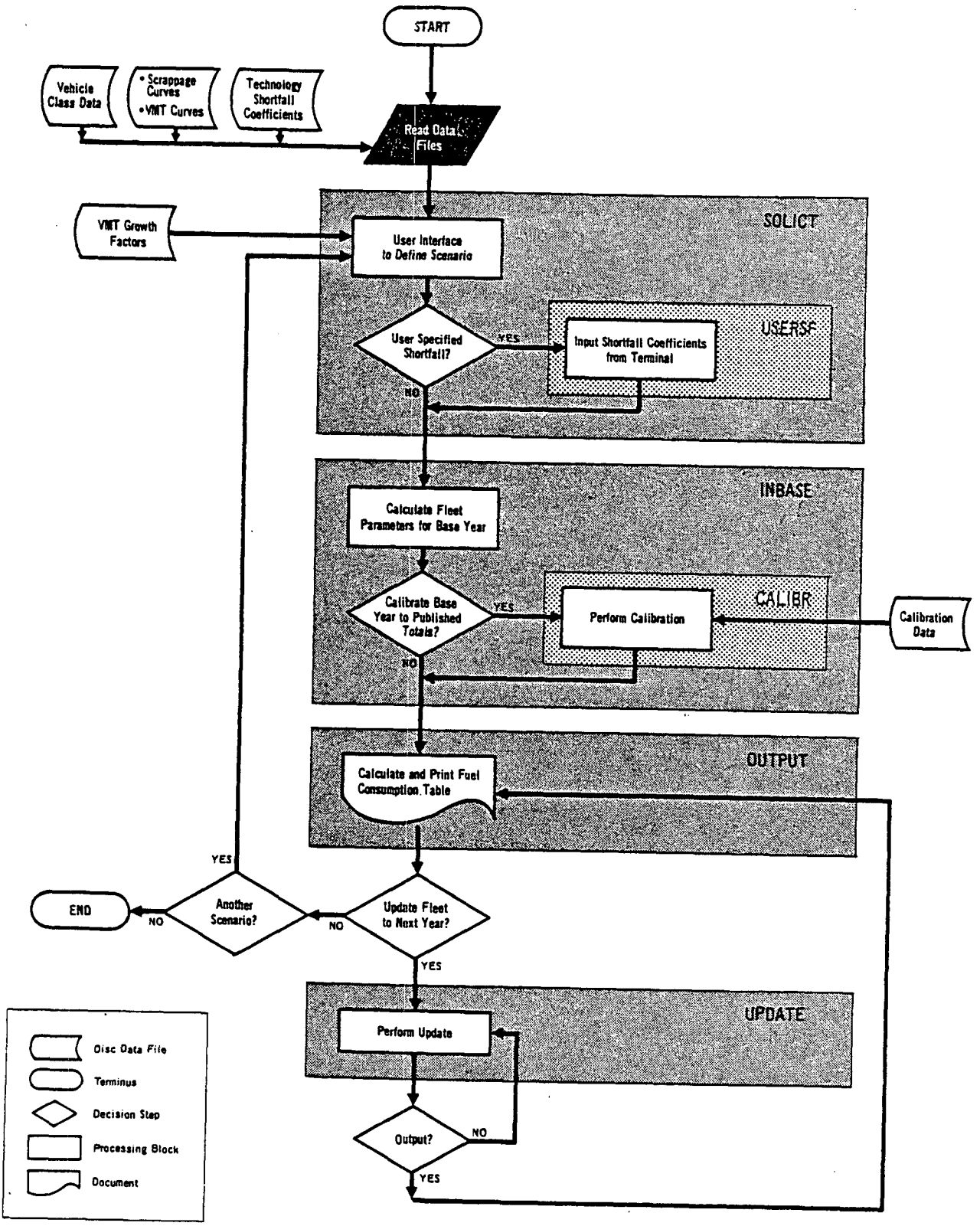
2.2 PROGRAM STRUCTURE

Techniques of structured programming were employed in developing the new HFC model, which uses four major subroutines linked by common blocks to accomplish its basic functions:

- Defining scenario parameters interactively
- Establishing base year fleet parameters
- Calculating fuel consumption and printing the output table
- Updating the fleet parameters annually.

As shown in Figure 2-1, two of the major subroutines also may call additional subroutines, depending on user options. Within this framework, the main program controls the sequential calling of major subroutines but does not perform substantive calculations related to the fuel consumption forecast.

FIGURE 2–1
OVERVIEW OF HIGHWAY FUEL CONSUMPTION MODEL



2.2.1 Source Code Description

The HFC program code is written in FORTRAN for the level G or H compilers. The code is contained in the partitioned data set (PDS):

```
DSN = CN6824.RD1.HFC.FORTH
DSORG = PO
RECFM = FB
LRECL = 80
BLKSIZE = 6160
UNIT = DASD
VOL=SER = FEA025
```

and is listed in Appendix A of this report. Each member of the PDS is a separate program entity -- FORTRAN main program or subroutine -- which performs one of the model functions. The members are described below in more detail.

MAIN -- The HFC main program which loads disk data files and controls the sequence of subroutine calls. This member also contains a block data subprogram which establishes and initializes the HFC COMMON blocks.

MAIN reads the basic HFC data on vehicle class sales, fuel economy, and technology, the data describing technology-specific shortfall, and the vintage curves for net survival and VMT per vehicle. These data files are read once per program execution.

MAIN controls model execution through the sequence of subroutine calls. It does not participate in the definition or execution of a scenario and does not interact with the user.

SOLICT -- The major subroutine which provides the user interface for interactive definition of scenario parameters. SOLICT will call subroutine USERSF to input shortfall coefficients from the terminal, if the user-specified option is selected. SOLICT also reads a VMT growth file, if the user chooses to grow VMT per vehicle.

SOLICT directs all terminal output to FORTRAN (FTN) unit number 6, and expects terminal input from unit 5. VMT growth files are allocated to units 22, 23, and 24 as noted on the interactive prompt. SOLICT is buffered to reject user responses which fall outside the range of valid options and to repeat the interactive prompt.

USERSF -- A minor (dependent) subroutine called from SOLICT when the user-specified shortfall option is selected. The interface accepts shortfall coefficients for four aggregate vehicle groups (gas/diesel passenger cars/light trucks) over the time period 1946 to 2000. USERSF echoes user input to permit correction of keystroke errors.

INBASE -- The major subroutine which initializes state variables to their values in the user-selected base year. The algorithms of INBASE are described in Section 2.3.1. INBASE performs no input/output but may optionally invoke CALIBR to perform base year calibration.

CALIBR -- A minor subroutine called from INBASE to execute the calibration algorithm. When invoked during program execution, CALIBR reads the calibration data file on FTN unit 1. The calibration procedure is described in Section 2.3.2.

OUTPUT -- The major subroutine which calculates fuel consumption and writes the HFC output table. OUTPUT is called from the main program for the base year and last year of each scenario, and at annual increments determined interactively. OUTPUT directs its output to FTN unit 8 which normally is allocated to the terminal. Scenario output can be directed to a disk file by allocating unit 8 to a data set with DCB attribute LRECL=133.

UPDATE -- The major subroutine which updates state variables annually, accounting for vehicle retirement and new registrations. This subroutine performs no input/output. Its update algorithms are described in Section 2.3.3.

PAGE -- A minor utility subroutine which writes hex character ØC to cause form feeding on most ASCII terminals. This function provides aesthetic paging of output tables.

2.2.2 COMMON BLOCK Communication

The values of input data, the scenario parameters, and the state variables are communicated to the major subroutines in labeled COMMON blocks CBØ1 through CBØ5. With the exception of PAGE (which is passed the output device FTN number), the subroutines do not pass argument lists.

Contents of the COMMON blocks are described below in functional terms. Since these storage areas are shared by the major subroutines, they contain all of the information available for use by the HFC model.

CBØ1 -- The values of the basic input data on new registrations, fuel economy, technology penetration, shortfall, scrappage, VMT, and gasoline fuel type for the nine vehicle classes.

CBØ2 -- The state variables specifying fleet fuel consumption and the variables for marginal survival probability and VMT growth.

CBØ3 -- The parameters defining the scenario options specified by the user.

CBØ4 -- Alphanumeric headings used for the output table.

CBØ5 -- The matrix of user-specified shortfall coefficients and the parameter defining the regression space used in shortfall calculations.

COMMON blocks CBØ2 and CBØ3 are central to the operation of the HFC model and are described below in detail. The variables of blocks CBØ1 and CBØ5, which hold input data read from disk files or the terminal, are described briefly in Section 2.2.4 (Data Files).

2.2.3 State Variables and Scenario Parameters

The new HFC model uses seven multi-dimensional arrays to hold the values of the current system state and its rate of change. These are single-precision, floating point (REAL*4) arrays defining fleet characteristics for 30 vintage years (i = 1,...,30), two fuel types (j = 1 or 2, representing gas and diesel), and nine vehicle classes (k = 1,...,9):

VEH (30,2,9): Vehicles in operation in units of millions of vehicles.

LEADED (30,9): Leaded gasoline use (fractional market shares).

VMT (30,2,9): Vehicle miles of travel in units of thousands of miles per year. The current model's data files provide distinct VMT curves for the following groups:

- Passenger cars (k = 1,2)
- Light-duty trucks (k = 3,...,6)
- Gasoline medium- and heavy-duty trucks (j = 1; k = 7,8,9)
- Diesel medium- and heavy-duty trucks (j = 2; k = 7,8,9)

However, the model structure is designed to accommodate different curves for each class and fuel type.

EPA (30,2,9): EPA fuel economy rating in miles per gallon. Classes k = 6,7,8,9 do not have a standardized rating; the array is equated to on-road fuel economy for these non-EPA classes.

RMPG (30,2,9): On-road fuel economy in miles per gallon.

MSURV (30,2,9): Marginal survival probability. The current model's data files provide distinct survival curves for the following groups:

- Passenger cars (k = 1,2)
- Light trucks (k = 3,...,6)
- Medium- and heavy-duty trucks (k = 7,8,9).

VMTGRO (26,9): VMT growth factors for the 26 scenario years from 1975 through 2000. The entries for 1975 are absolute scale factors to calibrate total VMT to FHWA data, while entries for subsequent years are marginal (year-to-year) scale factors.

The base year values for these variables are established in subroutine INBASE, as described in Section 2.3.1. New vehicles are characterized as i=1, and the oldest vehicles in any vehicle class as i=30. Updating the state variables is performed by shifting entries for each i to the position for i+1, after accounting for aging processes such as scrappage. The oldest vehicles are dropped from the fleet, and new vehicles are entered at i=1. Following each update, the variables in CBØ2 contain complete descriptions of the next year's vehicle fleet.

Ten variables are required to define the scenario options selected by the user. These variables are used by the subroutines to control execution of the program code and are available to all major subroutines through COMMON block CBØ3:

BEGYR: Integer variable defining the oldest (or beginning) model year present in the current fleet. Years 1946 through 2000 are numbered as 1,2,3,...,55.

ENDYR: Integer variable defining the most recent model year in the fleet.

MPGOPT: Integer variable defining the user's selected option for determining EPA mpg.

RODOPT: Integer variable defining the selected option for calculating on-road mpg.

ADVANT: Real variable containing the diesel fuel economy advantage for option 1 in determining EPA mpg, e.g., 1.30 for a 30 percent advantage.

SHORT: Logical variable with value .TRUE. if the user selects the short-form output (passenger cars and light trucks only).

PAFRAC: Logical variable with value .TRUE. if user selects the stock calculation relating total scrappage and new vehicle registrations.

CALIB: Logical variable with value .TRUE. if user selects optional base year calibration.

GROW: Logical variable with value .TRUE. if user chooses to grow VMT per vehicle.

PIND: Logical array of length 26 with elemental value .TRUE. if the fuel consumption output is required for the associated year (in the range 1975 through 2000).

2.2.4 Data Files

The variables in COMMON blocks CBØ1 and CBØ5 store the input data of the HFC model. These data are derived from resident disk data files (for CBØ1) or from terminal I/O (for CBØ5). Users familiar with the previous HFC recognize that the forecasting methodology largely is driven by its input data, which, therefore, are central to successful operation of the model. Revisions to the HFC model included reorganizing the data files, providing internal file documentation, and placing associated files into generic PDS's.

2.2.4.1 Vehicle Class Data

The first category of input data is the compilation of annual new vehicle registrations, fuel economy estimates, and technology penetrations by vehicle class. The new HFC model organizes all such vehicle class data into members of the following PDS:

```
DSN = CN6824.RD1.HFC.VEHCLS.DATA
DSORG = PO
RECFM = FB
LRECL = 132
BLKSIZE = 1320
UNIT = DASD
VOL=SER = FEA025

MEMBERS:  DOMESTIC      (k=1)
          IMPORT        (k=2)
          DOMTRUCK      (k=3)
          IMPTRUCK      (k=4)
          TRK6TO85      (k=5)
          TRK85TEN      (k=6)
          MEDTRUCK      (k=7)
          LTHVYTRK      (k=8)
          HVHVYTRK      (k=9)
```

These data files are listed in Tables 2-1 through 2-9. The light-duty vehicle classes (passenger cars and light-duty trucks below 8500 lbs GVW) have been characterized by extensive compilations of technology penetration and fuel economy data. Less information is available on technology penetration in the heavier classes, which have a slightly different file format.

Table 2-1
IIFC.VEHCLS.DATA (Domestic)

VEHICLE CLASS: DOMESTIC CAR

YEAR	SALES 10 X 6	EPA GAS MPG	DIESL MPG	DIESL MARKT PENTR	LEAD MARKT PENTR	GAS ADJUST FACTOR	CONVN AUTO MPG	CONVN MAN PRCNT	CONVN MAN MPG	FWD BASE PRCNT	FWD BASE MPG	FWD ALT PRCNT	FWD ALT MPG	DIESEL ADJUST FACTOR	DIESL RWD MPG	DIESL FWD PRCNT	DIESL FWD MPG	DIESL ALT PRCNT	DIESL ALT MPG
	XX.XX	XX.XX	XX.XX	.XXXX	X.XXX	XX.XXX	XX.XX	X.XXX	XX.XX	X.XXX	XX.X	X.XXX	XX.XX	XX.XXX	XX.XX	X.XXX	XX.XX	X.XXX	XX.XX
1946	0.00	16.0		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1947	0.00	16.0		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1948	0.00	16.0		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1949	0.00	16.0		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1950	0.00	16.0		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1951	5.71	16.0		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1952	5.71	16.0		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1953	5.71	16.0		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1954	5.50	16.0		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1955	7.11	16.0		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1956	5.86	15.9		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1957	5.78	15.8		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1958	4.28	15.7		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1959	5.42	15.6		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1960	6.08	15.5		.0000	1.	-0.012	14.30	.286	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1961	5.48	15.4		.0000	1.	-0.018	14.30	.259	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1962	6.60	15.4		.0000	1.	-0.018	14.30	.256	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1963	7.17	15.4		.0000	1.	-0.020	14.30	.237	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1964	7.59	15.4		.0000	1.	-0.022	14.30	.223	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1965	8.74	15.4		.0000	1.	-0.025	14.30	.194	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1966	8.35	15.0		.0000	1.	-0.034	14.30	.165	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1967	7.58	14.6		.0000	1.	-0.044	14.30	.133	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1968	8.42	14.2		.0000	1.	-0.051	14.30	.110	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1969	8.46	14.1		.0000	1.	-0.047	14.30	.098	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1970	7.22	14.1		.0000	1.	-0.048	14.30	.087	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1971	8.46	13.7		.0000	1.	-0.061	14.30	.089	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1972	9.06	13.6		.0000	1.	-0.061	14.30	.095	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1973	9.74	13.3		.0000	1.	-0.069	14.30	.066	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1974	7.41	12.8		.0000	1.	-0.072	14.30	.102	21.20	.010	12.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1975	6.79	14.8		.0000	0.003	-0.045	14.30	.084	21.20	.010	13.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1976	8.30	16.5		.0000	0.012	0.000	15.50	.086	23.30	.012	14.0	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1977	8.85	17.20		.0000	0.	0.000	16.80	.048	25.50	.011	14.8	0.	1.	0.00	24.2	.000	1.0	0.0	1.0
1978	9.00	18.69		.0064	0.	0.000	18.00	.069	27.60	.021	27.2	0.	1.	0.00	24.2	.000	45.70	0.0	1.0
1979	8.4	19.09		.0163	0.	0.000	18.70	.103	28.50	.133	27.6	0.	1.	0.00	24.2	.003	45.70	0.0	1.0
1980	6.46	20.97		.0460	0.	0.000	19.40	.154	29.40	.227	28.0	0.	1.	0.00	24.2	.029	45.70	0.0	1.0
1981	7.1	23.31		.0623	0.	0.000	20.00	.167	30.30	.373	28.4	0.	1.	0.00	25.2	.028	45.70	0.0	1.0
1982	8.2	24.55		.0950	0.	0.000	22.00	.167	31.20	.470	29.5	0.	1.	0.00	25.2	.063	35.00	0.0	1.0
1983	8.1	26.29		.1290	0.	0.000	24.00	.191	31.20	.574	29.5	0.	1.	0.00	25.2	.100	35.00	0.0	1.0
1984	8.5	27.86		.1700	0.	0.000	23.00	.250	32.60	.711	30.0	0.	1.	0.00	28.0	.145	35.00	0.0	1.0
1985	9.1	29.64		.1900	0.	0.000	23.00	.250	33.00	.753	33.0	0.	1.	0.00	30.0	.165	37.00	0.0	1.0
1986	9.4	30.68		.2300	0.	0.000	23.00	.231	28.00	.831	33.2	0.	1.	0.00	32.0	.215	39.00	0.0	1.0
1987	9.3	31.85		.2500	0.	0.000	24.00	.200	29.00	.867	33.4	0.	1.	0.00	32.0	.240	41.00	0.0	1.0
1988	9.3	33.01		.2700	0.	0.000	28.00	.400	30.00	.932	33.5	0.	1.	0.00	32.0	.270	42.60	0.0	1.0
1989	9.3	34.15		.2900	0.	0.000	29.00	.400	31.00	.930	34.8	0.	1.	0.00	32.0	.290	44.10	0.0	1.0
1990	9.2	35.28		.3100	0.	0.000	30.00	.200	32.00	.928	36.0	0.	1.	0.00	32.0	.310	45.40	0.0	1.0
1991	9.5	35.28		.3100	0.	0.000	30.00	.200	32.00	.928	36.0	0.	1.	0.00	32.0	.310	45.40	0.0	1.0
1992	9.7	35.28		.3100	0.	0.000	30.00	.200	32.00	.928	36.0	0.	1.	0.00	32.0	.310	45.40	0.0	1.0
1993	9.6	35.28		.3100	0.	0.000	30.00	.200	32.00	.928	36.0	0.	1.	0.00	32.0	.310	45.40	0.0	1.0
1994	9.6	35.28		.3100	0.	0.000	30.00	.200	32.00	.928	36.0	0.	1.	0.00	32.0	.310	45.40	0.0	1.0
1995	9.8	35.28		.3100	0.	0.000	30.00	.200	32.00	.928	36.0	0.	1.	0.00	32.0	.310	45.40	0.0	1.0
1996	10.0	35.28		.3100	0.	0.000	30.00	.200	32.00	.928	36.0	0.	1.	0.00	32.0	.310	45.40	0.0	1.0
1997	10.1	35.28		.3100	0.	0.000	30.00	.200	32.00	.928	36.0	0.	1.	0.00	32.0	.310	45.40	0.0	1.0
1998	10.1	35.28		.3100	0.	0.000	30.00	.200	32.00	.928	36.0	0.	1.	0.00	32.0	.310	45.40	0.0	1.0
1999	10.0	35.28		.3100	0.	0.000	30.00	.200	32.00	.928	36.0	0.	1.	0.00	32.0	.310	45.40	0.0	1.0
2000	10.0	35.28		.3100	0.	0.000	30.00	.200	32.00	.928	36.0	0.	1.	0.00	32.0	.310	45.40	0.0	1.0

Table 2-2
HFC.VEHCLS.DATA (Import)
VEHICLE CLASS: IMPORT CAR

YEAR	SALES 10 X 6	EPA GAS MPG	DIESL MPG	DIESL MARKT PENTR	LEAD MARKT PENTR	GAS ADJUST FACTOR	CONVN AUTO MPG	CONVN MAN PRCNT	CONVN MAN MPG	FWD BASE PRCNT	FWD BASE MPG	FWD ALT PRCNT	FWD ALT MPG	DIESEL ADJUST FACTOR	DIESL RWD MPG	DIESL FWD PRCNT	DIESL FWD MPG	DIESL ALT PRCNT	DIESL ALT MPG
	XX.XX	XX.XX	XX.XX	.XXXX	X.XXX	XX.XXX	XX.XX	X.XXX	XX.XX	X.XXX	XX.X	X.XXX	XX.XX	XX.XXX	XX.XX	X.XXX	XX.XX	X.XXX	XX.XX
1946	0.00	37.0		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1947	0.00	37.0		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1948	0.00	37.0		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1949	0.00	37.0		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1950	0.00	37.0		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1951	0.03	37.0		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1952	0.03	37.0		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1953	0.03	37.0		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1954	0.03	37.0		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1955	0.06	37.0		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1956	0.10	35.6		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1957	0.21	34.3		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1958	0.38	33.0		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1959	0.61	31.7		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1960	0.50	30.4		.0000	1.	0.309	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1961	0.38	30.7		.0000	1.	0.313	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1962	0.34	30.9		.0000	1.	0.317	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1963	0.39	31.3		.0000	1.	0.326	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1964	0.48	31.7		.0000	1.	0.329	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1965	0.57	32.1		.0000	1.	0.335	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1966	0.66	30.8		.0000	1.	0.315	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1967	0.78	29.6		.0000	1.	0.296	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1968	1.00	28.4		.0000	1.	0.276	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1969	1.07	27.9		.0000	1.	0.268	21.70	.800	23.00	.028	27.40	0.	1.	0.00	1.0	.000	1.0	0.	1.
1970	1.24	27.2		.004	1.	0.258	21.70	.800	23.00	.028	27.40	0.	1.	0.00	26.0	.000	1.0	0.	1.
1971	1.50	24.0		.003	1.	0.207	21.70	.807	23.00	.045	27.40	0.	1.	0.00	26.0	.000	1.0	0.	1.
1972	1.55	22.5		.004	1.	0.176	21.70	.813	23.00	.063	27.40	0.	1.	0.00	26.0	.000	1.0	0.	1.
1973	1.74	22.6		.005	1.	0.192	21.70	.820	23.00	.080	27.40	0.	1.	0.00	26.0	.000	1.0	0.	1.
1974	1.38	21.5		.008	1.	0.182	21.70	.849	23.00	.122	27.40	0.	1.	0.00	26.0	.000	1.0	0.	1.
1975	1.41	23.3		.01	.73	0.219	21.70	.877	23.00	.164	27.40	0.	1.	0.00	26.0	.000	1.0	0.	1.
1976	1.45	25.39		.013	.83	0.000	22.30	.734	23.80	.206	28.40	0.	1.	0.00	27.1	.000	1.0	0.	1.
1977	1.97	27.59		.013	.871	0.000	22.90	.724	24.50	.320	29.30	0.	1.	0.00	28.2	.006	44.20	0.	1.
1978	1.95	26.57		.0370	.712	0.000	23.50	.724	25.30	.360	30.30	0.	1.	0.00	29.3	.023	44.20	0.	1.
1979	2.3	26.16		.0511	.464	0.000	23.80	.730	26.90	.370	30.50	0.	1.	0.00	29.3	.027	44.20	0.	1.
1980	2.3	28.05		.0319	0.	0.000	24.10	.733	28.50	.441	30.70	0.	1.	0.00	27.8	.010	40.60	0.	1.
1981	2.5	29.77		.0278	0.	0.000	24.50	.703	30.10	.473	31.00	0.	1.	0.00	28.0	.016	40.60	0.	1.
1982	2.4	31.13		.0450	0.	0.000	25.20	.716	31.30	.503	32.40	0.	1.	0.00	29.0	.020	41.70	0.	1.
1983	2.4	32.60		.0660	0.	0.000	25.90	.712	32.50	.525	33.80	0.	1.	0.00	30.0	.035	42.30	0.	1.
1984	2.5	34.21		.0730	0.	0.000	26.60	.684	33.60	.539	35.20	0.	1.	0.00	31.0	.035	43.80	0.	1.
1985	2.6	34.81		.0840	0.	0.000	27.30	.679	34.80	.568	36.60	0.	1.	0.00	32.0	.040	44.90	0.	1.
1986	2.7	35.28		.1050	0.	0.000	28.00	.690	36.00	.603	38.00	0.	1.	0.00	33.0	.055	46.00	0.	1.
1987	2.7	36.21		.1180	0.	0.000	28.50	.680	36.50	.635	39.00	0.	1.	0.00	34.2	.070	47.00	0.	1.
1988	2.7	37.10		.1250	0.	0.000	29.00	.651	37.00	.640	40.00	0.	1.	0.00	35.5	.080	48.00	0.	1.
1989	2.7	38.14		.1420	0.	0.000	29.50	.643	37.50	.699	41.00	0.	1.	0.00	36.8	.100	49.00	0.	1.
1990	2.7	39.20		.1600	0.	0.000	30.00	.636	38.00	.738	42.00	0.	1.	0.00	38.0	.120	50.00	0.	1.
1991	2.7	39.20		.1600	0.	0.000	30.00	.636	38.00	.738	42.00	0.	1.	0.00	38.0	.120	50.00	0.	1.
1992	2.7	39.20		.1600	0.	0.000	30.00	.636	38.00	.738	42.00	0.	1.	0.00	38.0	.120	50.00	0.	1.
1993	2.7	39.20		.1600	0.	0.000	30.00	.636	38.00	.738	42.00	0.	1.	0.00	38.0	.120	50.00	0.	1.
1994	2.8	39.20		.1600	0.	0.000	30.00	.636	38.00	.738	42.00	0.	1.	0.00	38.0	.120	50.00	0.	1.
1995	2.8	39.20		.1600	0.	0.000	30.00	.636	38.00	.738	42.00	0.	1.	0.00	38.0	.120	50.00	0.	1.
1996	2.8	39.20		.1600	0.	0.000	30.00	.636	38.00	.738	42.00	0.	1.	0.00	38.0	.120	50.00	0.	1.
1997	2.8	39.20		.1600	0.	0.000	30.00	.636	38.00	.738	42.00	0.	1.	0.00	38.0	.120	50.00	0.	1.
1998	2.8	39.20		.1600	0.	0.000	30.00	.636	38.00	.738	42.00	0.	1.	0.00	38.0	.120	50.00	0.	1.
1999	2.9	39.20		.1600	0.	0.000	30.00	.636	38.00	.738	42.00	0.	1.	0.00	38.0	.120	50.00	0.	1.
2000	2.9	39.20		.1600	0.	0.000	30.00	.636	38.00	.738	42.00	0.	1.	0.00	38.0	.120	50.00	0.	1.

Table 2-3
HFC.VEHCLS.DATA (DOMTRUCK)
VEHICLE CLASS: DOMESTIC TRUCK

YEAR	SALES 10 X 6	EPA GAS MPG	DIESL MPG	DIESL MARKT PENTR	LEAD MARKT PENTR	GAS ADJUST FACTOR	CONVN AUTO MPG	CONVN MAN PRCNT	CONVN MAN MPG	FWD BASE PRCNT	FWD BASE MPG	FWD ALT PRCNT	FWD ALT MPG	DIESEL ADJUST FACTOR	DIESL RWD MPG	DIESL FWD PRCNT	DIESL FWD MPG	DIESL ALT PRCNT	DIESL ALT MPG
	XX.XX	XX.XX	XX.XX	.XXXX	X.XXX	XX.XXX	XX.XX	X.XXX	XX.XX	X.XXX	XX.X	X.XXX	XX.XX	XX.XXX	XX.XX	X.XXX	XX.XX	X.XXX	XX.XX
1946	0.00	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1947	0.00	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1948	0.00	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1949	0.00	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1950	0.00	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1951	0.44	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1952	0.44	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1953	0.44	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1954	0.41	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1955	0.50	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1956	0.49	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1957	0.45	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1958	0.38	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1959	0.50	14.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1960	0.52	14.0		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1961	0.54	14.0		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1962	0.62	14.0		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1963	0.74	14.0		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1964	0.84	14.0		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1965	0.93	14.0		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1966	0.95	14.0		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1967	0.90	13.3		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1968	1.05	12.9		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1969	1.09	12.9		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1970	0.98	12.7		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1971	1.13	12.4		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1972	1.32	11.9		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1973	1.60	11.2		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1974	1.43	11.0		.0000	1.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1975	0.97	13.1		.0000	0.	0.000	14.00	.200	15.80	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1976	1.30	14.5		.0000	0.	0.000	14.90	.210	16.50	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1977	.88	14.10		.0000	0.	0.000	15.70	.220	17.30	.000	1.0	0.0	1.0	0.00	1.0	.000	1.	0.	1.
1978	.80	14.38		.0256	0.	0.000	16.60	.237	18.00	.000	1.0	0.0	1.0	0.00	18.8	.000	1.	0.	1.
1979	.79	14.71		.0513	0.	0.000	15.60	.230	17.00	.000	1.0	0.0	1.0	0.00	19.3	.000	1.	0.	1.
1980	.61	17.04		.0900	0.	0.000	17.00	.371	19.00	.014	28.00	0.0	1.0	0.00	22.0	.013	42.	0.	1.
1981	.872	17.86		.1040	0.	0.000	18.50	.417	21.00	.020	28.00	0.0	1.0	0.00	22.8	.018	42.	0.	1.
1982	1.232	18.96		.1180	0.	0.000	19.40	.463	22.50	.060	29.00	0.0	1.0	0.00	23.6	.022	42.	0.	1.
1983	1.505	20.17		.1320	0.	0.000	20.20	.508	24.00	.070	30.00	0.0	1.0	0.00	24.4	.026	42.	0.	1.
1984	1.766	21.45		.1460	0.	0.000	21.10	.554	25.50	.090	31.00	0.0	1.0	0.00	25.2	.031	42.	0.	1.
1985	2.048	22.63		.1600	0.	0.000	22.00	.600	27.00	.100	32.00	0.0	1.0	0.00	26.0	.036	42.	0.	1.
1986	2.125	23.40		.1780	0.	0.000	22.40	.600	27.80	.100	33.00	0.0	1.0	0.00	27.0	.038	43.20	0.	1.
1987	2.120	24.16		.1960	0.	0.000	22.80	.600	28.60	.100	34.00	0.0	1.0	0.00	28.0	.041	44.40	0.	1.
1988	2.119	24.91		.2140	0.	0.000	23.20	.600	29.40	.100	35.00	0.0	1.0	0.00	29.0	.044	45.60	0.	1.
1989	2.106	25.65		.2320	0.	0.000	23.60	.600	30.20	.100	36.00	0.0	1.0	0.00	30.0	.047	48.00	0.	1.
1990	2.061	26.38		.2500	0.	0.000	24.00	.600	31.00	.100	37.00	0.0	1.0	0.00	31.0	.050	48.	0.	1.
1991	2.152	26.38		.2500	0.	0.000	24.00	.600	31.00	.100	37.00	0.0	1.0	0.00	31.0	.050	48.00	0.	1.
1992	2.281	26.38		.2500	0.	0.000	24.00	.600	31.00	.100	37.00	0.0	1.0	0.00	31.0	.050	48.00	0.	1.
1993	2.312	26.38		.2500	0.	0.000	24.00	.600	31.00	.100	37.00	0.0	1.0	0.00	31.0	.050	48.00	0.	1.
1994	2.358	26.38		.2500	0.	0.000	24.00	.600	31.00	.100	37.00	0.0	1.0	0.00	31.0	.050	48.00	0.	1.
1995	2.460	26.38		.2500	0.	0.000	24.00	.600	31.00	.100	37.00	0.0	1.0	0.00	31.0	.050	48.00	0.	1.
1996	2.540	26.38		.2500	0.	0.000	24.00	.600	31.00	.100	37.00	0.0	1.0	0.00	31.0	.050	48.00	0.	1.
1997	2.603	26.38		.2500	0.	0.000	24.00	.600	31.00	.100	37.00	0.0	1.0	0.00	31.0	.050	48.00	0.	1.
1998	2.678	26.38		.2500	0.	0.000	24.00	.600	31.00	.100	37.00	0.0	1.0	0.00	31.0	.050	48.00	0.	1.
1999	2.667	26.38		.2500	0.	0.000	24.00	.600	31.00	.100	37.00	0.0	1.0	0.00	31.0	.050	48.00	0.	1.
2000	2.731	26.38		.2500	0.	0.000	24.00	.600	31.00	.100	37.00	0.0	1.0	0.00	31.0	.050	48.00	0.	1.

Table 2-4
IIFC.VEHICLS.DATA (IMPTRUCK)
VEHICLE CLASS: IMPORTED TRUCK

YEAR	SALES 10 X 6	EPA GAS MPG	DIESL MPG	DIESL MARKT PENTR	LEAD MARKT PENTR	GAS ADJUST FACTOR	CONVN AUTO MPG	CONVN MAN PRCNT	CONVN MAN MPG	FWD BASE PRCNT	FWD BASE MPG	FWD ALT PRCNT	FWD ALT MPG	DIESEL ADJUST FACTOR	DIESL RWD MPG	DIESL FWD PRCNT	DIESL FWD MPG	DIESL ALT PRCNT	DIESL ALT MPG
	XX.XX	XX.XX	XX.XX	.XXXX	X.XXX	XX.XXX	XX.XX	X.XXX	XX.XX	X.XXX	XX.X	X.XXX	XX.XX	XX.XXX	XX.XX	X.XXX	XX.XX	X.XXX	XX.XX
1946	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1947	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1948	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1949	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1950	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1951	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1952	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1953	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1954	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1955	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1956	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1957	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1958	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1959	0.01	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1960	0.01	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1961	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1962	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1963	0.00	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1964	0.01	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1965	0.01	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1966	0.02	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1967	0.02	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1968	0.02	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1969	0.03	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1970	0.07	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1971	0.09	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1972	0.15	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1973	0.25	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1974	0.19	18.0		.0000	1.	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1975	0.24	21.0		.0000	.95	0.000	18.00	.800	21.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1976	0.17	22.2		.0000	.76	0.000	19.70	.820	22.40	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1977	.31	24.20		.0000	.147	0.000	21.30	.918	23.80	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1978	.34	24.00		.0000	.089	0.000	23.00	.881	25.20	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1979	.48	24.00		.0000	.081	0.000	22.00	.871	24.10	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1980	.52	23.49		.0000	.047	0.000	21.00	.893	23.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1981	.452	23.71		.1220	.063	0.000	23.00	.900	26.00	.000	1.0	0.	1.	0.00	33.9	.000	1.0	0.	1.
1982	.480	23.96		.0249	.075	0.000	23.20	.900	26.80	.000	1.0	0.	1.	0.00	34.3	.000	1.0	0.	1.
1983	.321	24.21		.0332	.091	0.000	23.50	.900	27.50	.000	1.0	0.	1.	0.00	34.7	.000	1.0	0.	1.
1984	.276	24.46		.0415	0.	0.000	23.80	.900	28.20	.000	1.0	0.	1.	0.00	35.2	.000	1.0	0.	1.
1985	.291	24.71		.0500	0.	0.000	24.00	.900	29.00	.000	1.0	0.	1.	0.00	36.0	.000	1.0	0.	1.
1986	.298	25.62		.0800	0.	0.000	24.40	.900	29.60	.000	1.0	0.	1.	0.00	36.8	.000	1.0	0.	1.
1987	.299	26.61		.1100	0.	0.000	24.80	.900	30.20	.000	1.0	0.	1.	0.00	37.6	.000	1.0	0.	1.
1988	.298	27.63		.1400	0.	0.000	25.20	.900	30.80	.000	1.0	0.	1.	0.00	38.4	.000	1.0	0.	1.
1989	.302	28.82		.1700	0.	0.000	25.60	.900	31.40	.000	1.0	0.	1.	0.00	39.2	.000	1.0	0.	1.
1990	.294	29.95		.2000	0.	0.000	25.60	.900	31.40	.000	1.0	0.	1.	0.00	39.2	.000	1.0	0.	1.
1991	.305	29.95		.2000	0.	0.000	25.60	.900	31.40	.000	1.0	0.	1.	0.00	39.2	.000	1.0	0.	1.
1992	.323	29.95		.2000	0.	0.000	25.60	.900	31.40	.000	1.0	0.	1.	0.00	39.2	.000	1.0	0.	1.
1993	.327	29.95		.2000	0.	0.000	25.60	.900	31.40	.000	1.0	0.	1.	0.00	39.2	.000	1.0	0.	1.
1994	.334	29.95		.2000	0.	0.000	25.60	.900	31.40	.000	1.0	0.	1.	0.00	39.2	.000	1.0	0.	1.
1995	.349	29.95		.2000	0.	0.000	25.60	.900	31.40	.000	1.0	0.	1.	0.00	39.2	.000	1.0	0.	1.
1996	.361	29.95		.2000	0.	0.000	25.60	.900	31.40	.000	1.0	0.	1.	0.00	39.2	.000	1.0	0.	1.
1997	.368	29.95		.2000	0.	0.000	25.60	.900	31.40	.000	1.0	0.	1.	0.00	39.2	.000	1.0	0.	1.
1998	.380	29.95		.2000	0.	0.000	25.60	.900	31.40	.000	1.0	0.	1.	0.00	39.2	.000	1.0	0.	1.
1999	.379	29.95		.2000	0.	0.000	25.60	.900	31.40	.000	1.0	0.	1.	0.00	39.2	.000	1.0	0.	1.
2000	.387	29.95		.2000	0.	0.000	25.60	.900	31.40	.000	1.0	0.	1.	0.00	39.2	.000	1.0	0.	1.

TABLE 2-5
HFC.VEHCLS.DATA (TRK6 TO 85)

VEHICLE CLASS: TRUCK 6 TO 8.5 THOUS. LBS.

YEAR	SALES 10 X 6	EPA GAS MPG	DIESL MPG	DIESL MARKT PENTR	LEAD MARKT PENTR	GAS ADJUST FACTOR	CONVN AUTO MPG	CONVN MAN PRCNT	CONVN MAN MPG	FWD BASE PRCNT	FWD BASE MPG	FWD ALT PRCNT	FWD ALT MPG	DIESEL ADJUST FACTOR	DIESL RWD MPG	DIESL FWD PRCNT	DIESL FWD MPG	DIESL ALT PRCNT	DIESL ALT MPG
	XX.XX	XX.XX	XX.XX	.XXXX	X.XXX	XX.XXX	XX.XX	X.XXX	XX.XX	X.XXX	XX.X	X.XXX	XX.XX	XX.XXX	XX.XX	X.XXX	XX.XX	X.XXX	XX.XX
1946	0.00	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1947	0.00	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1948	0.00	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1949	0.00	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1950	0.00	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1951	.098	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1952	0.107	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1953	0.107	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1954	.107	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1955	0.107	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1956	0.107	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1957	0.116	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1958	0.089	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1959	.116	11.3		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1960	0.125	10.8		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1961	0.116	10.8		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1962	.143	10.8		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1963	.169	10.8		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1964	0.187	10.8		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1965	0.223	10.8		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1966	0.250	10.8		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1967	.250	10.2		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1968	.348	9.9		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1969	0.372	9.9		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1970	.373	9.8		.0000	1.	0.000	9.60	.250	10.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1971	.407	9.5		.0000	1.	0.000	9.30	.250	10.30	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1972	.503	9.2		.0000	1.	0.000	9.00	.250	10.00	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1973	.634	8.6		.0000	1.	0.000	8.40	.250	9.40	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1974	.563	8.5		.0000	1.	0.000	8.30	.250	9.30	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1975	.810	10.8		.0000	1.	0.000	10.60	.250	11.60	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1976	1.329	11.9		.0000	1.	0.000	11.30	.250	12.30	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1977	1.600	11.60		.0000	1.	0.000	11.40	.250	12.40	.000	1.0	0.	1.	0.00	1.0	.000	1.0	0.	1.
1978	2.120	11.80		.0052	1.	0.000	12.20	.244	13.20	.000	1.0	0.	1.	0.00	15.3	.000	1.0	0.	1.
1979	1.520	12.11		.0050	0.	0.000	13.10	.308	14.10	.000	1.0	0.	1.	0.00	15.7	.000	1.0	0.	1.
1980	0.860	14.18		.0050	1.	0.000	13.90	.292	14.90	.000	1.0	0.	1.	0.00	18.5	.000	1.0	0.	1.
1981	0.851	14.97		.0030	1.	0.000	14.70	.354	15.70	.000	1.0	0.	1.	0.00	19.4	.000	1.0	0.	1.
1982	.884	15.84		.0430	1.	0.000	15.40	.415	16.40	.000	1.0	0.	1.	0.00	20.5	.000	1.0	0.	1.
1983	.732	16.66		.0620	1.	0.000	16.20	.477	17.20	.000	1.0	0.	1.	0.00	21.7	.000	1.0	0.	1.
1984	.670	17.47		.0810	0.	0.000	16.90	.538	17.90	.000	1.0	0.	1.	0.00	22.8	.000	1.0	0.	1.
1985	.563	18.27		.1000	0.	0.000	17.70	.600	18.70	.000	1.0	0.	1.	0.00	23.8	.000	1.0	0.	1.
1986	.586	18.86		.1200	0.	0.000	18.00	.600	18.70	.000	1.0	0.	1.	0.00	24.6	.000	1.0	0.	1.
1987	.588	19.35		.1400	0.	0.000	18.40	.600	19.40	.000	1.0	0.	1.	0.00	25.2	.000	1.0	0.	1.
1988	.577	19.94		.1600	0.	0.000	18.70	.600	19.70	.000	1.0	0.	1.	0.00	25.9	.000	1.0	0.	1.
1989	.586	20.42		.1800	0.	0.000	19.10	.600	20.10	.000	1.0	0.	1.	0.00	26.5	.000	1.0	0.	1.
1990	.571	20.98		.2000	0.	0.000	19.40	.600	20.40	.000	1.0	0.	1.	0.00	27.3	.000	1.0	0.	1.
1991	.597	20.98		.2000	0.	0.000	19.40	.600	20.40	.000	1.0	0.	1.	0.00	27.3	.000	1.0	0.	1.
1992	.624	20.98		.2000	0.	0.000	19.40	.600	20.40	.000	1.0	0.	1.	0.00	27.3	.000	1.0	0.	1.
1993	.636	20.98		.2000	0.	0.000	19.40	.600	20.40	.000	1.0	0.	1.	0.00	27.3	.000	1.0	0.	1.
1994	.652	20.98		.2000	0.	0.000	19.40	.600	20.40	.000	1.0	0.	1.	0.00	27.3	.000	1.0	0.	1.
1995	.674	20.98		.2000	0.	0.000	19.40	.600	20.40	.000	1.0	0.	1.	0.00	27.3	.000	1.0	0.	1.
1996	.699	20.98		.2000	0.	0.000	19.40	.600	20.40	.000	1.0	0.	1.	0.00	27.3	.000	1.0	0.	1.
1997	.718	20.98		.2000	0.	0.000	19.40	.600	20.40	.000	1.0	0.	1.	0.00	27.3	.000	1.0	0.	1.
1998	.739	20.98		.2000	0.	0.000	19.40	.600	20.40	.000	1.0	0.	1.	0.00	27.3	.000	1.0	0.	1.
1999	.736	20.98		.2000	0.	0.000	19.40	.600	20.40	.000	1.0	0.	1.	0.00	27.3	.000	1.0	0.	1.
2000	.754	20.98		.2000	0.	0.000	19.40	.600	20.40	.000	1.0	0.	1.	0.00	27.3	.000	1.0	0.	1.

Table 2-6
IIFC.VEHCLS.DATA (TRK85TEN)
VEHICLE CLASS: TRUCK 8.5 TO 10 THOUS. LBS.

YEAR	SALES 10 X 6	EPA GAS MPG	DIESL MPG	DIESL MARKT PENTR	LEAD MARKT PENTR
	XX.XX	XX.XX	XX.XX	.XXXX	X.XXX
1946	.00	8.6	8.6	.0000	1.
1947	.00	8.6	8.6	.0000	1.
1948	.00	8.6	8.6	.0000	1.
1949	.00	8.6	8.6	.0000	1.
1950	.00	8.6	8.6	.0000	1.
1951	.012	8.6	8.6	.0000	1.
1952	.013	8.6	8.6	.0000	1.
1953	.013	8.6	8.6	.0000	1.
1954	.013	8.6	8.6	.0000	1.
1955	.013	8.6	8.6	.0000	1.
1956	.013	8.6	8.6	.0000	1.
1957	.014	8.6	8.6	.0000	1.
1958	.011	8.6	8.6	.0000	1.
1959	.014	8.6	8.6	.0000	1.
1960	.015	8.3	8.3	.0000	1.
1961	.014	8.3	8.3	.0000	1.
1962	.017	8.3	8.3	.0000	1.
1963	.021	8.3	8.3	.0000	1.
1964	.023	8.3	8.3	.0000	1.
1965	.027	8.3	8.3	.0000	1.
1966	.030	8.3	8.3	.0000	1.
1967	.030	8.0	8.0	.0000	1.
1968	.032	7.8	7.8	.0000	1.
1969	.038	7.8	7.8	.0000	1.
1970	.037	7.7	7.7	.0000	1.
1971	.043	7.6	7.6	.0000	1.
1972	.037	7.4	7.4	.0000	1.
1973	.036	7.0	7.0	.0000	1.
1974	.077	6.9	6.9	.0000	1.
1975	.090	8.3	8.3	.0000	1.
1976	.111	8.9	8.9	.0000	1.
1977	.280	8.80	8.80	.0000	1.
1978	.290	8.90	8.90	.0000	1.
1979	.280	8.90	8.90	.0000	1.
1980	.220	10.00	10.00	.0000	1.
1981	.223	10.50	10.50	.0000	1.
1982	.273	10.97	14.26	.0500	1.
1983	.242	11.23	14.60	.1000	1.
1984	.293	11.49	14.94	.1500	0.
1985	.310	11.73	15.25	.2000	0.
1986	.327	12.00	15.60	.2400	0.
1987	.336	12.07	15.69	.2800	0.
1988	.325	12.22	15.89	.3200	0.
1989	.321	12.48	16.22	.3600	0.
1990	.321	12.62	16.41	.4000	0.
1991	.323	12.62	16.41	.4000	0.
1992	.341	12.62	16.41	.4000	0.
1993	.347	12.62	16.41	.4000	0.
1994	.354	12.62	16.41	.4000	0.
1995	.371	12.62	16.41	.4000	0.
1996	.384	12.62	16.41	.4000	0.
1997	.395	12.62	16.41	.4000	0.
1998	.386	12.62	16.41	.4000	0.
1999	.401	12.62	16.41	.4000	0.
2000	.411	12.62	16.41	.4000	0.

Table 2-7
HFC.VEHICLS.DATA (MEDTRUCK)
VEHICLE CLASS: MEDIUM TRUCK

YEAR	SALES 10 X 6	EPA GAS MPG	DIESL MPG	DIESL MARKT PENTR	LEAD MARKT PENTR
	XX.XX	XX.XX	XX.XX	.XXXX	X.XXX
1946	.338	7.00	7.00	.000	1.
1947	.430	7.00	7.00	.000	1.
1948	.432	7.00	7.00	.000	1.
1949	.255	7.00	7.00	.000	1.
1950	.299	7.00	7.00	.000	1.
1951	.338	7.00	7.00	.000	1.
1952	.249	7.00	7.00	.004	1.
1953	.228	7.00	7.00	.001	1.
1954	.289	7.00	7.00	.001	1.
1955	.264	7.00	7.00	.000	1.
1956	.236	7.00	7.00	.000	1.
1957	.196	7.00	7.00	.000	1.
1958	.147	7.00	7.00	.000	1.
1959	.202	7.00	7.00	.000	1.
1960	.172	7.00	7.00	.002	1.
1961	.141	7.00	7.00	.002	1.
1962	.149	7.00	7.00	.005	1.
1963	.153	6.50	6.50	.004	1.
1964	.143	7.30	7.30	.016	1.
1965	.153	6.40	6.40	.020	1.
1966	.134	6.70	6.70	.021	1.
1967	.096	7.30	7.30	.012	1.
1968	.086	7.00	7.00	.006	1.
1969	.086	7.30	7.30	.008	1.
1970	.067	7.40	7.40	.003	1.
1971	.082	6.90	6.90	.005	1.
1972	.077	7.30	7.30	.003	1.
1973	.066	7.20	7.20	.005	1.
1974	.022	7.20	7.20	.002	1.
1975	.020	7.20	7.20	.008	1.
1976	.030	7.40	7.40	.000	1.
1977	.026	7.50	11.20	.000	1.
1978	.082	7.60	11.30	.000	1.
1979	.023	7.70	11.30	.000	1.
1980	.010	7.70	11.30	.000	1.
1981	.031	7.80	11.50	.08	1.
1982	.032	7.90	11.60	.16	1.
1983	.034	8.00	11.70	.24	1.
1984	.035	8.10	11.90	.32	1.
1985	.036	8.10	11.90	.40	1.
1986	.036	8.10	11.90	.40	1.
1987	.035	8.10	11.90	.40	1.
1988	.035	8.10	11.90	.40	1.
1989	.036	8.10	11.90	.40	1.
1990	.031	8.10	11.90	.40	1.
1991	.032	8.10	11.90	.40	1.
1992	.032	8.10	11.90	.40	1.
1993	.032	8.10	11.90	.40	1.
1994	.031	8.10	11.90	.40	1.
1995	.031	8.10	11.90	.40	1.
1996	.030	8.10	11.90	.40	1.
1997	.031	8.10	11.90	.40	1.
1998	.032	8.10	11.90	.40	1.
1999	.031	8.10	11.90	.40	1.
2000	.031	8.10	11.90	.40	1.

Table 2-8
HFC.VEHCLS.DATA (LTHVYTRK)
VEHICLE CLASS: LIGHT-HEAVY TRUCK

YEAR	SALES 10 X 6	EPA GAS MPG	DIESL MPG	DIESL MARKT PENTR	LEAD MARKT PENTR
	XX.XX	XX.XX	XX.XX	.XXXX	X.XXX
1946	.023	6.00	8.90	.000	1.
1947	.037	6.00	8.90	.000	1.
1948	.045	6.00	8.90	.000	1.
1949	.020	6.00	8.90	.000	1.
1950	.043	6.00	8.90	.000	1.
1951	.072	6.00	8.90	.059	1.
1952	.098	6.00	8.90	.008	1.
1953	.080	6.00	8.90	.004	1.
1954	.042	6.00	8.90	.003	1.
1955	.038	6.00	8.90	.006	1.
1956	.047	6.00	8.90	.013	1.
1957	.044	6.00	8.90	.008	1.
1958	.043	6.00	8.90	.001	1.
1959	.056	6.00	8.90	.001	1.
1960	.054	6.00	8.90	.002	1.
1961	.058	6.00	8.90	.006	1.
1962	.086	5.70	8.50	.029	1.
1963	.098	6.60	9.80	.037	1.
1964	.093	6.20	9.20	.068	1.
1965	.098	6.10	9.10	.063	1.
1966	.111	6.20	9.20	.049	1.
1967	.108	6.00	8.90	.044	1.
1968	.123	6.00	8.90	.035	1.
1969	.126	6.10	9.10	.035	1.
1970	.103	5.70	8.50	.031	1.
1971	.111	5.60	8.30	.027	1.
1972	.163	5.80	8.60	.020	1.
1973	.180	5.60	8.30	.018	1.
1974	.197	5.40	8.00	.014	1.
1975	.140	5.60	8.30	.038	1.
1976	.135	5.50	8.20	.050	1.
1977	.149	5.60	8.30	.084	1.
1978	.150	5.70	8.40	.092	1.
1979	.135	5.70	8.60	.118	1.
1980	.064	5.70	8.70	.199	1.
1981	.078	5.80	8.80	.280	1.
1982	.074	5.80	8.80	.347	1.
1983	.068	5.90	9.00	.396	1.
1984	.063	6.00	9.10	.419	1.
1985	.068	6.10	9.20	.520	1.
1986	.068	6.10	9.20	.52	1.
1987	.067	6.10	9.20	.52	1.
1988	.064	6.10	9.20	.52	1.
1989	.067	6.10	9.20	.52	1.
1990	.058	6.10	9.20	.52	1.
1991	.058	6.10	9.20	.52	1.
1992	.061	6.10	9.20	.52	1.
1993	.062	6.10	9.20	.52	1.
1994	.058	6.10	9.20	.52	1.
1995	.057	6.10	9.20	.52	1.
1996	.056	6.10	9.20	.52	1.
1997	.058	6.10	9.20	.52	1.
1998	.059	6.10	9.20	.52	1.
1999	.058	6.10	9.20	.52	1.
2000	.058	6.10	9.20	.52	1.

Table 2-9
HFC.VEHICLS.DATA (HVHVYTRK)
VEHICLE CLASS: HEAVY-HEAVY TRUCK

YEAR	SALES 10 X 6	EPA GAS MPG	DIESL MPG	DIESL MARKT PENTR	LEAD MARKT PENTR
	XX.XX	XX.XX	XX.XX	.XXXX	X.XXX
1946	.013	4.90	4.90	.000	1.
1947	.024	4.90	4.90	.000	1.
1948	.020	4.90	4.90	.000	1.
1949	.016	4.90	4.90	.000	1.
1950	.028	4.90	4.90	.000	1.
1951	.039	4.90	4.90	.251	1.
1952	.043	4.90	4.90	.200	1.
1953	.046	4.90	4.90	.182	1.
1954	.028	4.90	4.90	.305	1.
1955	.059	4.90	4.90	.247	1.
1956	.070	4.90	4.90	.292	1.
1957	.064	4.90	4.90	.326	1.
1958	.054	4.90	4.90	.426	1.
1959	.076	4.90	4.90	.429	1.
1960	.062	4.90	4.90	.449	1.
1961	.057	4.90	4.90	.427	1.
1962	.074	4.90	4.90	.476	1.
1963	.086	4.90	4.90	.496	1.
1964	.087	4.70	4.70	.546	1.
1965	.107	4.90	4.90	.585	1.
1966	.126	4.70	4.70	.612	1.
1967	.105	4.80	4.80	.611	1.
1968	.120	4.70	4.70	.647	1.
1969	.137	4.70	4.70	.700	1.
1970	.126	4.70	4.70	.699	1.
1971	.133	4.70	4.70	.735	1.
1972	.165	4.60	4.60	.765	1.
1973	.187	4.60	4.60	.794	1.
1974	.180	4.50	4.50	.789	1.
1975	.092	4.60	4.60	.751	1.
1976	.119	4.70	4.70	.843	1.
1977	.169	5.00	5.20	.893	1.
1978	.196	5.10	5.30	.879	1.
1979	.208	5.20	5.40	.868	1.
1980	.193	5.30	5.50	.890	1.
1981	.175	5.40	5.80	.912	1.
1982	.215	5.50	6.10	.934	1.
1983	.229	5.60	6.40	.956	1.
1984	.239	5.70	6.70	.978	1.
1985	.253	5.80	7.00	1.000	1.
1986	.276	5.80	7.00	1.0000	1.
1987	.286	5.80	7.00	1.0000	1.
1988	.285	5.80	7.00	1.0000	1.
1989	.274	5.80	7.00	1.0000	1.
1990	.344	5.80	7.00	1.0000	1.
1991	.269	5.80	7.00	1.0000	1.
1992	.268	5.80	7.00	1.0000	1.
1993	.269	5.80	7.00	1.0000	1.
1994	.279	5.80	7.00	1.0000	1.
1995	.290	5.80	7.00	1.0000	1.
1996	.305	5.80	7.00	1.0000	1.
1997	.323	5.80	7.00	1.0000	1.
1998	.342	5.80	7.00	1.0000	1.
1999	.344	5.80	7.00	1.0000	1.
2000	.344	5.80	7.00	1.0000	1.

The vehicle class data files are structured with six header lines documenting file contents and column headings. The sixth header line marks the field specifications (column position and length) in the FORTRAN FORMAT statements used for data input. These column alignments must be observed in editing or updating the files. As labeled in the left-most column, each data file line represents one model year in the HFC's 55-year span.

Information in the first five data columns is common to all vehicle classes, and is loaded into REAL arrays of dimension 55x9 (year by class):

SALES -- New vehicle registrations.

GASMPG -- EPA fuel economy for gasoline vehicles.

DSLMPG -- EPA fuel economy for diesel vehicles.*

DSLPEN -- Diesel penetration (sales fraction).

LEDPEN -- Leaded gasoline penetration (sales fraction of gasoline vehicles).

The light-duty classes (k = 1,...,5) additionally are characterized by detailed technology penetration and fuel economy estimates for gasoline and diesel vehicles. These data originally were developed for the analysis of technology-specific shortfall but optionally may be used to estimate fleet-wide EPA fuel economy ratings. Data from the right-most 14 columns are loaded into REAL arrays of dimension 55x5 (year x light-duty class):

GASADJ -- Adjustment factor for gasoline shortfall expressed as an additive offset in gpm-ratio space.

AUTMPG -- EPA fuel economy for conventional (rear-wheel drive) gasoline vehicles with automatic transmission.

MANPCT -- Market penetration for conventional manuals expressed as fraction of conventional gasoline vehicle sales.

MANMPG -- EPA fuel economy for conventional manuals.

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*Average diesel EPA MPG currently is not compiled for the light-duty classes. The model and data file structures provide for this future modification.

BASPCT -- Market penetration for front-wheel drive gasoline vehicles, as a fraction of total gasoline sales.

BASMPG -- EPA fuel economy for front-wheel drive gasoline vehicles.

ALTPCT -- Market penetration of additional alternative gasoline technology as fraction of total gasoline sales (provided for future expansion).

ALTMPG -- EPA fuel economy of alternative gasoline technology.

DSLADJ -- Adjustment factor for diesel shortfall.

DRWMPG -- EPA fuel economy of rear-wheel drive diesels.

DFWPCT -- Market penetration of front-wheel drive diesels, expressed as fraction of total diesel sales.

DFWMPG -- EPA fuel economy of front-wheel drive diesels.

DALPCT -- Market penetration of alternative diesel technology as fraction of total diesel sales (provided for future expansion).

DALMPG -- EPA fuel economy of alternative diesel technology.

2.2.4.2 Technology Shortfall Data

A second generic PDS compiles the GPM-ratio shortfall coefficients by vehicle technology for the five light-duty classes:

```
DSN = CN6824.RD1.HFC.TECHSF.DATA
DSORG = PO
RECFM = FB
LRECL = 132
BLKSIZE = 1320
UNIT = DASD
VOL=SER = FEA025

MEMBERS:  DOMCAR      (k=1)
          IMPCAR      (k=2)
          DOMTRK      (k=3)
          IMPTRK      (k=4)
          TRK685      (k=5)
```

These data files are listed in Tables 2-10 through 2-14.

Table 2-10
HFC.TECHSF.DATA (DOMCAR)

VEHICLE CLASS DOMESTIC CARS
FUEL TYPE J=1 GAS

YEAR	A1	X	B1	A2	B2	A3	B3	A4	B4
1975	1.0220		.0098	.8630	.0100	1.1000	.0000	1.0000	.0000
1976	1.0220		.0098	.8630	.0100	1.1000	.0000	1.0000	.0000
1977	1.0220		.0098	.8630	.0100	1.1000	.0000	1.0000	.0000
1978	1.0220		.0098	.8630	.0100	1.1000	.0000	1.0000	.0000
1979	.8870		.0121	.7140	.0141	1.1000	.0000	1.0000	.0000
1980	.8870		.0121	.7140	.0141	1.1000	.0000	1.0000	.0000
1981	.8870		.0121	.7140	.0141	1.1000	.0000	1.0000	.0000
1982	.8870		.0121	.7140	.0141	1.1000	.0000	1.0000	.0000
1983	.8870		.0121	.7140	.0141	1.1000	.0000	1.0000	.0000
1984	.8870		.0121	.7140	.0141	1.1000	.0000	1.0000	.0000
1985	.8870		.0121	.7140	.0141	1.1000	.0000	1.0000	.0000

VEHICLE CLASS DOMESTIC CARS
FUEL TYPE J=2 DIESEL

YEAR	A1	Y	B1	A2	B2	A3	B3	A4	B4
1975	1.1870		-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1976	1.1870		-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1977	1.1870		-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1978	1.1870		-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1979	1.1870		-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1980	1.1870		-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1981	1.1870		-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1982	1.1870		-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1983	1.1870		-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1984	1.1870		-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1985	1.1870		-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000

Table 2-11
HFC.TECHSF.DATA (IMPCAR)

VEHICLE CLASS IMPORTED CARS
FUEL TYPE J=1 GAS

YEAR	A1	B1	A2	B2	A3	B3	A4	B4
1975	1.0220	.0098	.8630	.0100	1.1000	.0000	1.0000	.0000
1976	1.0220	.0098	.8630	.0100	1.1000	.0000	1.0000	.0000
1977	1.0220	.0098	.8630	.0100	1.1000	.0000	1.0000	.0000
1978	1.0220	.0098	.8630	.0100	1.1000	.0000	1.0000	.0000
1979	.8870	.0121	.7140	.0141	1.1000	.0000	1.0000	.0000
1980	.8870	.0121	.7140	.0141	1.1000	.0000	1.0000	.0000
1981	.8870	.0121	.7140	.0141	1.1000	.0000	1.0000	.0000
1982	.8870	.0121	.7140	.0141	1.1000	.0000	1.0000	.0000
1983	.8870	.0121	.7140	.0141	1.1000	.0000	1.0000	.0000
1984	.8870	.0121	.7140	.0141	1.1000	.0000	1.0000	.0000
1985	.8870	.0121	.7140	.0141	1.1000	.0000	1.0000	.0000

VEHICLE CLASS IMPORTED CARS
FUEL TYPE J=2 DIESEL

YEAR	A1	B1	A2	B2	A3	B3	A4	B4
1975	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1976	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1977	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1978	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1979	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1980	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1981	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1982	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1983	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1984	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1985	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000

Table 2-12
HFC.TECHSF.DATA (DOMTRK)

VEHICLE CLASS DOMESTIC TRUCKS
FUEL TYPE J=1 GAS

YEAR	A1	B1	A2	B2	A3	B3	A4	B4
1975	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1976	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1977	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1978	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1979	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1980	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1981	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1982	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1983	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1984	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1985	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000

VEHICLE CLASS DOMESTIC TRUCKS
FUEL TYPE J=2 DIESEL

YEAR	A1	B1	A2	B2	A3	B3	A4	B4
1975	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1976	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1977	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1978	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1979	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1980	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1981	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1982	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1983	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1984	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1985	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000

Table 2-13
HFC.TECHSF.DATA (IMPTRK)

VEHICLE CLASS IMPORTED TRUCKS
FUEL TYPE J=1 GAS

YEAR	A1	B1	A2	B2	A3	B3	A4	B4
1975	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1976	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1977	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1978	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1979	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1980	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1981	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1982	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1983	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1984	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1985	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000

VEHICLE CLASS IMPORTED TRUCKS
FUEL TYPE J=2 DIESEL

YEAR	A1	B1	A2	B2	A3	B3	A4	B4
1975	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1976	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1977	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1978	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1979	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1980	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1981	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1982	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1983	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1984	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1985	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000

Table 2-14
IIFC.TECHSF.DATA (TRK685)

VEHICLE CLASS 6-8.5 THOUS. LBS. TRUCKS
FUEL TYPE J=1 GAS

YEAR	A1	B1	A2	B2	A3	B3	A4	B4
1975	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1976	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1977	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1978	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1979	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1980	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1981	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1982	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1983	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1984	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000
1985	1.2000	.0000	1.2000	.0000	1.1000	.0000	1.0000	.0000

VEHICLE CLASS 6-8.5 THOUS. LBS. TRUCKS
FUEL TYPE J=2 DIESEL

YEAR	A1	B1	A2	B2	A3	B3	A4	B4
1975	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1976	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1977	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1978	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1979	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1980	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1981	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1982	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1983	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1984	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000
1985	1.1870	-.0030	1.1870	-.0030	1.0000	.0000	.0000	.0000

The technology shortfall files are structured in dual blocks, one each for gasoline and diesel vehicles. Coefficients A (intercept) and B (slope) of the gpm-ratio regressions are specified for the 11 model years from 1975 through 1985. Pre-1975 shortfall is characterized by the 1975 coefficients and post-1985 shortfall by the 1985 coefficients.

Numbered technologies are associated with those of the vehicle class data files as follows:

Gasoline Technology

1	Conventional automatics
2	Conventional manuals
3	Front-wheel drive
4	Alternative gasoline

Diesel Technology

1	Rear-wheel drive
2	Front-wheel drive
3	Alternative diesel
4	(not used)

As seen in the tables, this format provides currently unused capacity for year-by-year specification of individual technology shortfall trends. The HFC model loads these data files into the following coefficient arrays of dimension 11x2x5 (year x fuel type x light-duty class):

COEFA1	COEFB1
COEFA2	COEFB2
COEFA3	COEFB3
COEFA4	COEFB4

2.2.4.3 Vehicle Stock and Travel Data

The third generic PDS contains input data on vehicle retirement, VMT, VMT growth rates, and optional base year calibration totals:

```
DSN = CN6824.RD1.HFC.DATA
DSORG = PO
RECFM = FB
LRECL = 130
BLKSIZE = 1300
UNIT = DASD
VOL=SER = FEA025

MEMBERS:  SCRAP
          VMT
          VMTGROW
          VMTGROWA
          VMTGROWB
          CALIB
```

Tables 2-15 through 2-18 list these data files. (VMTGROWA and B are provided for alternative scenarios of VMT growth. Currently, these files are duplicates of the default growth file VMTGROW and are not listed.)

Survival and VMT vintage curves are specified by aggregate vehicle class (passenger cars, light-duty trucks, and gasoline/diesel medium- and heavy-duty trucks) and loaded into arrays:

SCRLDV (30,2)	net survival curve	(k=1,2)
SCRLDT (30,4)		(k=3,...,6)
SCRMHD (30,2,3)		(k=7,8,9)
VMTLDV (30,2)	vintage VMT curves	(k=1,2)
VMTLDT (30,4)		(k=3,...,6)
VMTMHD (30,2,3)		(k=7,8,9)

Note that the input data for medium- and heavy-duty truck classes are disaggregated by fuel type, while data for other classes are independent of fuel type.

VMT growth rates (Table 2-17), applied as scale factors to the VMT vintage curves, are specified independently for each vehicle class for the period 1975 through 2000. The 1975 entries serve to calibrate VMT totals to FHWA statistics, while the factors for subsequent years are annual (marginal) growth rates. This data file is loaded into array VMTGRO (26,9) and is applied to both gasoline and diesel VMT curves in each vehicle class.

Table 2-15
HFC.DATA (SCRAP)

SURVIVAL RATES BY VEHICLE CLASS

AGE	DOM CAR	IMP CAR	DOM TRK	IMP TRK	TRK 6-8.5	TRK 8.5-10	MED-TRUCK G	MED-TRUCK D	LT-HVY-TRUCK G	LT-HVY-TRUCK D	HVY-HVY-TRUCK G	HVY-HVY-TRUCK D
30	0.0	0.0	0.0	0.0	0.0	0.0	0.007	0.007	0.007	0.007	0.007	0.007
29	0.0	0.0	0.0	0.0	0.0	0.0	0.010	0.010	0.010	0.010	0.010	0.010
28	0.0	0.0	0.0	0.0	0.0	0.0	0.017	0.017	0.017	0.017	0.017	0.017
27	0.0	0.0	0.0	0.0	0.0	0.0	0.027	0.027	0.027	0.027	0.027	0.027
26	0.0	0.0	0.0	0.0	0.0	0.0	0.040	0.040	0.040	0.040	0.040	0.040
25	0.0	0.0	0.010	0.010	0.010	0.010	0.050	0.050	0.050	0.050	0.050	0.050
24	0.0	0.0	0.020	0.020	0.020	0.020	0.060	0.060	0.060	0.060	0.060	0.060
23	0.0	0.0	0.030	0.030	0.030	0.030	0.075	0.075	0.075	0.075	0.075	0.075
22	0.0	0.0	0.050	0.050	0.050	0.050	0.090	0.090	0.090	0.090	0.090	0.090
21	0.0	0.0	0.080	0.080	0.080	0.080	0.110	0.110	0.110	0.110	0.110	0.110
20	0.0	0.0	0.140	0.140	0.140	0.140	0.130	0.130	0.130	0.130	0.130	0.130
19	0.0	0.0	0.200	0.200	0.200	0.200	0.160	0.160	0.160	0.160	0.160	0.160
18	0.0	0.0	0.260	0.260	0.260	0.260	0.200	0.200	0.200	0.200	0.200	0.200
17	0.058	0.058	0.320	0.320	0.320	0.320	0.240	0.240	0.240	0.240	0.240	0.240
16	0.095	0.095	0.380	0.380	0.380	0.380	0.280	0.280	0.280	0.280	0.280	0.280
15	0.164	0.164	0.441	0.441	0.441	0.441	0.340	0.340	0.340	0.340	0.340	0.340
14	0.199	0.199	0.502	0.502	0.502	0.502	0.420	0.420	0.420	0.420	0.420	0.420
13	0.273	0.273	0.573	0.573	0.573	0.573	0.500	0.500	0.500	0.500	0.500	0.500
12	0.366	0.366	0.645	0.645	0.645	0.645	0.570	0.570	0.570	0.570	0.570	0.570
11	0.465	0.465	0.710	0.710	0.710	0.710	0.640	0.640	0.640	0.640	0.640	0.640
10	0.587	0.587	0.771	0.771	0.771	0.771	0.700	0.700	0.700	0.700	0.700	0.700
9	0.712	0.712	0.825	0.825	0.825	0.825	0.750	0.750	0.750	0.750	0.750	0.750
8	0.821	0.821	0.862	0.862	0.862	0.862	0.795	0.795	0.795	0.795	0.795	0.795
7	0.910	0.910	0.897	0.897	0.897	0.897	0.830	0.830	0.830	0.830	0.830	0.830
6	0.970	0.970	0.925	0.925	0.925	0.925	0.880	0.880	0.880	0.880	0.880	0.880
5	0.990	0.990	0.946	0.946	0.946	0.946	0.920	0.920	0.920	0.920	0.920	0.920
4	0.992	0.992	0.966	0.966	0.966	0.966	0.950	0.950	0.950	0.950	0.950	0.950
3	0.995	0.995	0.988	0.988	0.988	0.988	0.979	0.979	0.979	0.979	0.979	0.979
2	0.998	0.998	0.999	0.999	0.999	0.999	0.990	0.990	0.990	0.990	0.990	0.990
1	0.999	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 2-16
HFC.DATA (VMT)

VINTAGE VMT BY VEHICLE CLASS

AGE	DOM CAR	IMP CAR	DOM TRK	IMP TRK	TRK 6-8.5	TRK 8.5-10	MED-TRUCK G	MED-TRUCK D	LT-HVY-TRUCK G	LT-HVY-TRUCK D	HVY-HVY-TRUCK G	HVY-HVY-TRUCK D
30	0.0	0.0	0.0	0.0	0.0	0.0	0.880	1.480	0.880	1.480	1.270	3.710
29	0.0	0.0	0.0	0.0	0.0	0.0	0.980	1.480	0.980	1.480	1.390	4.120
28	0.0	0.0	0.0	0.0	0.0	0.0	1.090	1.640	1.090	1.640	1.530	4.570
27	0.0	0.0	0.0	0.0	0.0	0.0	1.210	1.720	1.210	1.720	1.680	5.060
26	0.0	0.0	0.0	0.0	0.0	0.0	1.340	1.800	1.340	1.800	1.840	5.610
25	3.300	3.300	1.900	1.900	1.900	1.900	1.490	1.970	1.490	1.970	2.020	6.220
24	3.300	3.300	2.400	2.400	2.400	2.400	1.660	2.210	1.660	2.210	2.220	6.900
23	3.300	3.300	3.100	3.100	3.100	3.100	1.840	2.460	1.840	2.460	2.440	7.640
22	3.300	3.300	3.600	3.600	3.600	3.600	2.040	2.620	2.040	2.620	2.680	8.470
21	3.300	3.300	3.900	3.900	3.900	3.900	2.260	2.950	2.260	2.950	2.940	9.390
20	3.300	3.300	4.100	4.100	4.100	4.100	2.510	3.200	2.510	3.200	3.230	10.400
19	3.300	3.300	4.500	4.500	4.500	4.500	2.790	3.530	2.790	3.530	3.550	11.540
18	3.300	3.300	4.900	4.900	4.900	4.900	3.090	3.770	3.090	3.770	3.890	12.800
17	5.900	5.900	5.500	5.500	5.500	5.500	3.430	4.100	3.430	4.100	4.270	14.180
16	5.900	5.900	4.800	4.800	4.800	4.800	3.800	5.080	3.800	5.080	4.700	15.710
15	5.900	5.900	5.100	5.100	5.100	5.100	4.220	5.820	4.220	5.820	5.160	17.420
14	6.700	6.700	5.800	5.800	5.800	5.800	4.680	6.560	4.680	6.560	5.660	19.310
13	6.700	6.700	5.800	5.800	5.800	5.800	5.200	7.540	5.200	7.540	6.220	21.400
12	6.000	6.000	6.700	6.700	6.700	6.700	5.760	8.860	5.760	8.860	6.820	23.700
11	7.000	7.000	7.100	7.100	7.100	7.100	6.400	10.660	6.400	10.660	7.490	26.300
10	7.000	7.000	7.400	7.400	7.400	7.400	7.100	12.960	7.100	12.960	8.220	29.150
9	10.000	10.000	7.800	7.800	7.800	7.800	7.880	15.740	7.880	15.740	9.030	32.310
8	9.900	9.900	8.500	8.500	8.500	8.500	8.740	18.530	8.740	18.530	9.910	35.830
7	12.400	12.400	9.000	9.000	9.000	9.000	9.700	20.600	9.700	20.600	10.880	39.710
6	10.500	10.500	9.600	9.600	9.600	9.600	10.770	22.300	10.770	22.300	11.950	44.020
5	11.300	11.300	10.800	10.800	10.800	10.800	11.950	23.620	11.950	23.620	13.120	48.790
4	12.000	12.000	11.800	11.800	11.800	11.800	13.250	24.760	13.250	24.760	14.400	54.090
3	12.200	12.200	13.500	13.500	13.500	13.500	14.710	25.340	14.710	25.340	15.810	59.900
2	13.500	13.500	14.300	14.300	14.300	14.300	16.320	25.750	16.320	25.750	17.360	60.700
1	16.200	16.200	13.800	13.800	13.800	13.800	18.100	26.240	18.100	26.240	19.060	61.500

Table 2-17
HFC.DATA (VMTGROW)

VMT GROWTH RATE TABLE

K =	1	2	3	4	5	6	7	8	9
1975	.9749	.9749	.9321	.9321	.9321	.9321	1.0667	1.0667	1.0667
1976	1.0307	1.0307	1.0621	1.0621	1.0621	1.0621	1.0311	1.0311	1.0311
1977	1.0115	1.0115	1.0082	1.0082	1.0082	1.0082	.9359	.9359	.9359
1978	1.0247	1.0247	.9535	.9535	.9535	.9535	.9915	.9915	.9915
1979	.9383	.9383	.9640	.9640	.9640	.9640	.9787	.9787	.9787
1980	.9848	.9848	1.0019	1.0019	1.0019	1.0019	.9694	.9694	.9694
1981	1.0016	1.0016	1.0102	1.0102	1.0102	1.0102	.9946	.9946	.9946
1982	1.0080	1.0080	1.0120	1.0120	1.0120	1.0120	.9820	.9820	.9820
1983	1.0051	1.0051	1.0132	1.0132	1.0132	1.0132	.9789	.9789	.9789
1984	1.0060	1.0060	1.0140	1.0140	1.0140	1.0140	.9770	.9770	.9770
1985	1.0081	1.0081	1.0137	1.0137	1.0137	1.0137	.9730	.9730	.9730
1986	1.0094	1.0094	1.0130	1.0130	1.0130	1.0130	.9719	.9719	.9719
1987	1.0100	1.0100	1.0129	1.0129	1.0129	1.0129	.9791	.9791	.9791
1988	1.0082	1.0082	1.0100	1.0100	1.0100	1.0100	.9852	.9852	.9852
1989	1.0081	1.0081	1.0130	1.0130	1.0130	1.0130	.9942	.9942	.9942
1990	1.0084	1.0084	1.0108	1.0108	1.0108	1.0108	.9853	.9853	.9853
1991	1.0088	1.0088	1.0102	1.0102	1.0102	1.0102	1.0066	1.0066	1.0066
1992	1.0084	1.0084	1.0085	1.0085	1.0085	1.0085	1.0101	1.0101	1.0101
1993	1.0081	1.0081	1.0081	1.0081	1.0081	1.0081	1.0150	1.0150	1.0150
1994	1.0080	1.0080	1.0069	1.0069	1.0069	1.0069	1.0155	1.0155	1.0155
1995	1.0078	1.0078	1.0066	1.0066	1.0066	1.0066	1.0130	1.0130	1.0130
1996	1.0080	1.0080	1.0059	1.0059	1.0059	1.0059	1.0110	1.0110	1.0110
1997	1.0080	1.0080	1.0052	1.0052	1.0052	1.0052	1.0113	1.0113	1.0113
1998	1.0079	1.0079	1.0047	1.0047	1.0047	1.0047	1.0081	1.0081	1.0081
1999	1.0081	1.0081	1.0047	1.0047	1.0047	1.0047	1.0103	1.0103	1.0103
2000	1.0081	1.0081	1.0043	1.0043	1.0043	1.0043	1.0113	1.0113	1.0113

Table 2-18
HFC.DATA (CALIB)

```
 H I G H W A Y  F U E L  C O N S U M P T I O N  M O D E L
            BASE YEAR CALIBRATION DATA

BASE YEAR: 1975
VEHICLES IN OPERATION (X10**6)
     PASSENGER CARS: 95.241
      TOTAL TRUCKS : 24.813
FUEL CONSUMED (X10**9 GALLONS)
       CARS (K=1-2): 76.010
     TRUCKS (K=3-9): 31.632
       TOTAL DIESEL: 9.084
END OF DATA
```

The base year calibration data file (Table 2-18) is read by subroutine CALIBR, if the user chooses to calibrate base year vehicle stock and fuel consumption. The calibration algorithm is described in Section 2.3.2.

2.2.4.4 User-Specified Shortfall

The HFC model provides the option to load shortfall coefficients at time of execution. The user may choose either mpg- or gpm-space (1/mpg) coefficients and will be asked to input coefficient pairs (slope and intercept) for four aggregate vehicle groups:

- Gasoline passenger cars (k=1,2)
- Diesel passenger cars (k=1,2)
- Gasoline light-duty trucks (k=3,4,5)
- Diesel light-duty trucks (k=3,4,5).

These coefficients are stored in array USERCF (2,55,2,5) which, with the control variable GPM, comprises COMMON block CBØ5. The array dimensions correspond to intercept/slope x year x fuel type x light-duty class.

2.3 MODEL ALGORITHMS

The HFC's fuel consumption forecasts are influenced by user decisions that determine the methods of calculating state variables. The user/analyst gains flexibility in the conduct of analysis, but at the same time becomes responsible for choosing the appropriate methodologies and understanding their performance. This section details the model algorithms employed in calculating and updating state variables.

In general, the specification of methodologies uses a notation which combines the FORTRAN variable names found in the HFC program code with the following subscript conventions:

- i denotes vehicle vintage
- I denotes model year associated with vintage i vehicles

- j denotes fuel type
- k denotes vehicle class.

Parentheses are used in a FORTRAN-like manner to denote subscripting, while brackets and true subscripts are used occasionally to indicate association in a simpler manner. This notation conveys the mathematics of model methodologies but does not attempt to specify the actual implementation of the program code.

2.3.1 Base Year Initialization

The base year chosen by the user at time of execution determines the first year for which fuel consumption calculations are performed. While the model will accept base year values within the range 1975 through 1985, it currently is configured for the 1975 base year of the previous HFC. Selection of other base years generally will produce different forecasts of fleet stock, total VMT, and fuel consumption; the user must carefully validate the model forecasts when changing this parameter.

2.3.1.1 Vehicle Stock

Fleet size and the age distribution of the vehicle stock are calculated in the base year using the net survival curves read from HFC.DATA(SCRAP). This methodology is identical to the approach used by the previous model for all years:

$$VEH(i,j=1,k) = SALES\ (I,k) \times (1 - DSLPEN(I,k)) \times SURV[i,k]$$

$$VEH(i,j=2,k) = SALES(I,k) \times DSLPEN(I,k) \times SURV[i,k]$$

where the survival probability SURV is taken from:

SCRLDV(i,k)
SCRLDT(i,k)
SCRMHD(i,j,k)

depending on vehicle class.

The marginal survival rates also are calculated during base year initialization for use in later updating:

$$MSURV(i=1,j,k) = 1.000$$

$$MSURV(i>1,j,k) = SURV[i,k]/SURV[i-1,k]$$

If the user selects the optional base year calibration, the arrays VEH and MSURV will be reset before fuel consumption is calculated. This algorithm is described in the following section.

2.3.1.2 EPA Fuel Economy

The new HFC provides three options for computing EPA fuel economy ratings for the light-duty classes (k = 1,...,5). Option 1 is the diesel advantage methodology used in the previous model, in which gasoline EPA ratings are read from the data files and diesel economy calculated at a fixed advantage:

$$EPA(i,j=1,k) = GASMPG(I,k)$$

$$EPA(i,j=2,k) = ADVANT \times EPA(i,j=1,k)$$

Option 2 allows both gasoline and diesel economies to be read from the data files:

$$EPA(i,j=1,k) = GASMPG(I,k)$$

$$EPA(i,j=2,k) = DSLMPG(I,k)$$

While the programming structure is in place for this option, the technical analysis of aggregate diesel mpg has not been conducted. The option currently is not operative pending completion of the light-duty data files.

Option 3 utilizes the detailed projections of technology penetration and fuel economy to calculate fleetwide aggregate gasoline and diesel economies. The methodology is a harmonic average across technologies within fuel type. Market penetrations as fractions of gasoline/diesel vehicle sales are calculated as follows:

Gasoline:

1. Conventional automatics:

$$g_1 = [1 - MANPCT(I,k)] \times [1 - BASPCT(I,k) - ALTPCT(I,k)]$$

2. Conventional manuals:

$$g_2 = MANPCT(I,k) \times [1 - BASPCT(I,k) - ALTPCT(I,k)]$$

3. Base FWD technology:

$$g_3 = BASPCT(I,k)$$

4. Alternative FWD technology:

$$g_4 = ALTPCT(I,k)$$

Diesel:

1. RWD diesel:

$$d_1 = 1 - DFWPCT(I,k) - DALPCT(I,k)$$

2. FWD diesel:

$$d_2 = DFWPCT(I,k)$$

3. Alternative diesel:

$$d_3 = DALPCT(I,k)$$

The nonconventional (FWD) technology market shares are defined explicitly in the data files, while conventional shares are calculated by remainder. Conventional automatic and manual transmission shares for gasoline vehicles are specified in the data as shares within the total conventional penetration. If G_i and D_i are technology-specific gasoline and diesel fuel economies, then the harmonic averages are:

$$EPA(i,j=1,k) = 1.0/(\Sigma g_i/G_i)$$

$$EPA(i,j=2,k) = 1.0/(\Sigma d_i/D_i)$$

The fuel economy of non-EPA vehicle classes (k = 6,7,8,9) is characterized by the separate estimates for gasoline and diesel vehicles contained in the vehicle class data files. The HFC model always determines the EPA and on-road fuel economy variables from these projections:

EPA(i,j=1,k) = GASMPG(I,k)

EPA(i,j=2,k) = DSLMPG(I,k)

2.3.1.3 On-Road Fuel Economy

The new HFC model similarly provides the user with three options for computing the on-road fuel economy of the light-duty classes. Each option is a methodology for evaluating the shortfall relationship between EPA and on-road fuel economy and can be combined with any of the EPA options described above. The user is responsible for employing this latitude in a consistent and meaningful manner.

Option 1 is the technology-specific shortfall methodology developed for the previous model. It uses the market penetration and fuel economy data of the detailed technology projections to evaluate a weighted shortfall relationship. Using the notation (g_i,G_i,d_i,D_i) from above and denoting the associated shortfall coefficients as (a_i,b_i), the on-road fuel consumption of any one technology is:

$$1/RMPG_i = a_i/EPA_i + b_i$$

Forming the technology-weighted harmonic averages gives:

$$\Sigma w_i/RMPG_i = \Sigma w_i a_i/EPA_i + \Sigma w_i b_i$$

which defines aggregate coefficients:

$$A = \frac{\Sigma w_i a_i/EPA_i}{\Sigma w_i/EPA_i}$$

$$B = \Sigma w_i b_i$$

satisfying the fleetwide relationship:

$$1/RMPG_f = A/EPA_f + B$$

The technology-specific option determines the aggregate coefficients (A,B) for each vehicle class, year, and fuel type and applies these to calculating on-road fuel economy from the EPA value:

$$RMPG(i,j=1,k) = EPA(i,j=1,k)/(GASADJ(I,k) + A[i,j,k] + B[i,j,k] \times EPA(i,j=1,k))$$

$$RMPG(i,j=2,k) = EPA(i,j=2,k)/(DSLADJ(I,k) + A[i,j,k] + B[i,j,k] \times EPA(i,j=2,k))$$

The shortfall adjustment factors GASADJ and DSLADJ, contained in the vehicle class data files, may be used to calibrate technology-specific shortfall to historical trends. These degrees of freedom are provided to account for the unavoidable imprecisions of the detailed technology penetration and fuel economy estimates employed. Note that the aggregate shortfall relationships may be evaluated at different EPA ratings from those predicted by the weighted technology data, depending upon the chosen EPA option.

Option 2 allows the use of "user-specified" shortfall coefficients that are input at the start of program execution. The user may select either mpg- or gpm-space relationships, which result in different evaluations of on-road fuel economy:

(MPG-space) $RMPG = A + BxEPA$

(GPM-space) $RMPG = EPA/(A + BxEPA)$

The coefficients (A,B) are stored in array USERCF as follows:

$$A[i,j,k] = USERCF(1,I,j,k)$$

$$B[i,j,k] = USERCF(2,I,j,k)$$

These coefficients are specific to gasoline/diesel passenger cars and light trucks, so that classes k=1,2 and classes k=3,4,5 share common shortfall parameters.

Option 3 specifies "no shortfall" for the light-duty classes. This results in:

$$RMPG(i,j,k) = EPA(i,j,k)$$

which also is the identity used by convention for the heavier (non-EPA) vehicle classes k=6,...,9.

2.3.1.4 Vehicle Miles of Travel

The base year initialization also provides two methods for determining the vintage VMT curves. Option 1 differs from Option 2 in scaling the base (input) VMT curves by growth factors contained in the HFC.DATA(VMTGROW) files.

The base curves for Option 2 are loaded as follows:

$$VMT(i,j,k) = VMTxxx[i,j,k]$$

where the VMTxxx arrays depend upon vehicle class. Passenger car VMT curves are stored in VMTLDV(30,2), light truck (k=3,...,6) curves in VMTLDT(30,4), and medium- and heavy-duty truck (k=7,8,9) curves in VMTMHD(30,2,3). Note that the HFC input data currently specify different VMT curves for gasoline and diesel MHD trucks.

The growth factors of HFC.DATA(VMTGROW) have been specified to calibrate VMT per vehicle to FHWA totals. The factor for 1975 is the absolute scale factor needed to achieve this calibration and is stored in VMTGRO(1,k). Under Option 1, the vintage VMT curves for base year 1975 are calculated as:

$$VMT(i,j,k) = VMTGRO(1,k) \times VMTxxx[i,j,k]$$

For later base years, the algorithm cumulates the annual growth from 1975 levels to maintain the historical base year VMT calibration.

Selection of Option 1 for the EPA, on-road, and VMT methodologies will produce vehicle stock, fuel economy, and travel estimates consistent with the BASE CASE scenario of the previous HFC model. Other selections generally will not reproduce previous model runs. In addition, the user now may choose to perform a base year calibration, which modifies the arrays VEH, VMT, and MSURV as described below.

2.3.2 Base Year Calibration

The HFC originally was designed to be a policy analysis tool and not a forecasting model in the strictest sense. With increased sophistication of the

model's fleet simulation, it is appropriate to implement an optional step which calibrates base year values of vehicle stock and fuel consumption to published (FHWA) totals. The calibration algorithm iteratively adjusts vehicles in operation and the vintage VMT curves until five constraints are met:

- Total passenger car fleet size
- Total truck fleet size
- Total fuel consumption by passenger cars
- Total fuel consumption by trucks
- Total diesel fuel consumption.

The 1975 calibration values for these five parameters are contained in data file HFC.DATA(CALIB).

2.3.2.1 Stock Calibration

Net survival curves usually are estimated by comparing R.L. Polk data on vehicles in operation to original new vehicle registrations. The curves are associated with fleet size during specific years and may not precisely replicate fleet size in the model's base year. The base year stock calibration is performed by iteratively adjusting total model year scrappage from time of original (new vehicle) registration until the stock calibration total is met.

Let N_i and S_i be, respectively, the number of vintage i vehicles on the road and the number originally sold. Then, N_i is related to total vehicles dropped from the fleet through net scrappage, D_i, by:

$$N_i = S_i - D_i$$

The true (unknown) numbers of vehicles in operation and total scrappage are:

$$\bar{N}_i = S_i - \bar{D}_i$$

with corresponding fleet sizes $N=\Sigma N_i$ and $\bar{N}=\Sigma\bar{N}_i$. The error in fleet prediction is:

$$\Delta N = N - \bar{N} = \Sigma\bar{D}_i - \Sigma D_i$$

which is redistributed by age in proportion to net model year scrappage.

The methodology derives a scale factor Ω such that ΩD_i estimates $\bar{D}_i$ under the constraint $\bar{N} = \Sigma S_i - \Omega\Sigma D_i$. Substituting ΩD_i into the equation for ΔN and rearranging terms gives:

$$\Omega = 1 + \Delta N/\Sigma D_i$$

Note that this approach assumes that errors in vehicles in operation are greater for older vehicles and that the error or uncertainty in model year scrappage is proportional to the net model year scrappage.

When fleet size is under-predicted, the scale factor gives an exact (one-step) correction for the reduced scrappage. Conversely, when scrappage must increase to correct for over-prediction, the scale factor may cause greater scrappage than original sales. In these circumstances, vehicles in operation is constrained to $D_i \leq S_i$ and a new fleet size prediction is calculated. The calibration algorithm will iterate until the fleet size error is less than 100 vehicles or until five iterations are made.

Testing of the algorithm has demonstrated convergence of the fleet size prediction and generally shows (small) changes in net survival probabilities that are consistent with the expected accuracy of the curves. As implemented in the new HFC, passenger car stock (k=1,2) is calibrated as described above, and the new marginal survival rates implied by vehicles in operation are recalculated.

The truck stock calibration total includes both light-duty and heavier trucks. There is no public data source which disaggregates light-duty versus medium- and heavy-duty trucks in operation using the classification employed by the

HFC model. The model's base year estimate of MHD trucks is calculated using survival rates which are drawn from relatively more recent data than those used in the estimation of the LDT fleet. Therefore, the calibration algorithm accepts the HFC's base year estimate of MHD trucks in operation. The total truck calibration figure is reduced by the MHD truck estimate and light-duty trucks are calibrated as described above to meet the adjusted total. LDT marginal survival rates are recalculated; however, no modifications are made to MHD trucks as a result of the calibration.

2.3.2.2 Fuel Consumption Calibration

The HFC predictions for fuel consumption are calibrated by linearly scaling the vintage VMT curves to meet the three specified fuel consumption constraints. Although an exact analytical expression can be developed for the scale factor satisfying each constraint, the calibration must iteratively adjust the VMT curves to satisfy all three simultaneously.

The HFC model employs four distinct VMT curves:

- All passenger cars (k=1,2)
- All light-duty trucks (k=3,...,6)
- Gasoline MHD trucks (k=7,8,9)
- Diesel MHD trucks (k=7,8,9).

A fourth constraint is therefore needed; this is supplied by assuming that gasoline and diesel MHD curves are in error by equal percentages. The rationale for this choice is that the curves have been derived from a common source and can be expected to share similar biases. In fact, VMT by age of vehicle is difficult to measure in absolute terms, particularly for these classes.

Fuel consumption for an aggregate vehicle group (k=1,2; k=3,...,6; k=7,8,9) is:

$$FC = \Sigma_i \Sigma_j \Sigma_k \frac{VEH(i,j,k) \times VMT(i,j,k)}{RMPG(i,j,k)}$$

and the appropriate VMT scale factor is:

$$\Omega = \text{Calibration total/FC}$$

resulting in new vintage VMT curves:

$$VMT(i,j,k) = \Omega VMT(i,j,k)$$

The iterative calculation proceeds in the following steps:

1. Correct the diesel calibration total for diesel use in classes k = 1,...,6.

2. Scale MHD truck VMT for j=1 and 2 according to the Ω estimated from the corrected diesel total.

3. Correct the truck calibration total for fuel use by classes k=7,8,9, using the new VMT curves of Step 2.

4. Scale LDT VMT for j=1 and 2 according to the Ω estimated from the corrected total.

5. Scale passenger car VMT for j=1 and 2 according to the Ω estimated from the passenger car calibration total.

6. Repeat steps 1 through 5 until VMT curves change by less than 0.01 percent in each group or until five iterations have been made.

This calibration procedure has converged rapidly to specified totals during model validation. In general, the resulting shifts in passenger car VMT are relatively small, while the changes introduced in truck VMT are larger. This finding is in agreement with the expected accuracy of the vintage VMT data.

Note that the calibration procedure does not modify the fuel economy array. In combination with the several possible methodologies for estimating on-road fuel economy, the fuel consumption calibration will generate different VMT curves satisfying the imposed aggregate constraints. Again, the user remains responsible for selecting the model options in appropriate combinations.

2.3.3 Updating State Variables

Subroutine UPDATE performs three types of updating in simulating the year-to-year changes in the fleet:

- Vehicle stock calculation based on marginal survival rates and new registrations
- Shifting of fuel economy and leaded gasoline penetration arrays
- Growth of the VMT array, if the growth option is selected by the user.

Option 1 of the vehicle stock calculation uses a relationship between passenger car scrappage and new registrations to modify the marginal survival curve for classes k=1,2. Option 2 uses fixed marginal survival curves established in the base year (and modified by the base year calibration, if selected).

The relationship for passenger car scrappage based on sales reflects the deferral of vehicle retirement during periods of reduced sales and the corresponding increase in scrappage during times of high sales. Let PATOTL be the passenger car fleet size predicted by current survival rates, SALES be new passenger car registrations, and PASCRP be the predicted annual car scrappage. Then, the expected scrappage is:

$$PASCRP' = 0.483 \times SALES + 0.027 \times PATOTL$$

and the predicted scrappage is in error by:

$$\Omega = PASCRP'/PASCRP$$

The Ω factor is used to correct the marginal survival curves by scaling the probability of scrappage:

$$MSURV(i,j,k) = 1 - \Omega[1 - MSURV(i,j,k)]$$

Given the survival curves for all classes, annual updating is specified as:

$$VEH(i,j,k) = MSURV(i,j,k) \times VEH(i-1,j,k)$$

with vehicles older than 30 years dropped from the fleet. VEH(i=1,j,k) is calculated from sales and diesel penetration data as in the base year initialization.

The vehicle retirement/new registrations calculation simulates one process of vehicle aging which is important in the HFC's fuel consumption forecasts. It also is thought that on-road fuel economy may decline with vehicle age, and that consumer fuel purchasing behavior may alter the leaded/unleaded gasoline shares. These processes can be simulated in the update process but are not implemented at this time pending development of the technical analysis. Therefore, updating of the arrays EPA, RMPG, and LEADED is a simple two-step process:

- Shift values for age i vehicles to the positions for age i+1, dropping vehicles more than 30 years of age
- Replenish the array values in position i=1 with new model year data, using the algorithms described under the base year initialization.

Finally, depending on user options, the update process will apply annual growth factors to the VMT array. The factors are drawn from the VMTGRO array and used to scale the vintage VMT curve by vehicle class:

$$VMT(i,j,k) = VMT(i,j,k) \times VMTGRO(ii,k)$$

where ii = 1,...,26, corresponding to the years 1975,...,2000.

When base year calibration is not employed, the growth factors are specified to calibrate total VMT to FHWA statistics for historical years. Different VMT levels will occur in combination with the calibration option, but year-to-year VMT trends will remain consistent.

3. OPERATION AND MAINTENANCE

3.1 MODEL OPERATION

3.1.1 Executing the Model

The Highway Fuel Consumption Model is installed on the DOE computer system under account 6824, USERID RD1. The HFC is an interactive model designed to operate under TSO.

To access the model, the user must type EXEC HFC.MODEL. This command executes a CLIST which allocates the several input data files and calls an executable version of the program. A copy of the CLIST is shown in Table 3-1. Nine of the data files in the CLIST contain information on sales, EPA fuel economy, and technology market penetration by calendar year for each of nine individual vehicle categories. These files are denoted by HFC.VEHCLS.DATA (vehicle type). Five data files, denoted by HFC.TECHSF.DATA (vehicle type) contain information on the model year and technology-specific fuel economy shortfall coefficients for two categories of passenger cars and three classes of light-duty trucks. An additional six files, denoted by HFC.DATA, incorporate information on vehicle scrappage by age, calibration data, annual VMT per vehicle by age, and future trends in the growth of annual VMT per vehicle.

3.1.2 Interactive Input

When a session is initiated on TSO, the user must answer a series of questions to specify the options selected for a particular model run. The user responds to each question (?) with a numeric answer, followed by a carriage return (CR). The discussion which follows presents each question to be answered by the user, the alternative entries which can be made, and the effect of each option on the model run. A sample run is presented at the end of this section.

TABLE 3-1

HFC.MODEL.CLIST

```
TERMINAL LINESIZE(133)
FREEALL
ALLOC DSN(HFC.DATA(CALIB78))                FILE(FTØ1FØØ1)
ALLOC DSN(*) FILE(FTØ5FØØ1)
ALLOC DSN(*) FILE(FTØ6FØØ1)
ALLOC DSN(*) FILE(FTØ8FØØ1)
ALLOC DSN(HFC.VEHCLS.DATA(DOMESTIC))  FILE(FT11FØØ1)
ALLOC DSN(HFC.VEHCLS.DATA(IMPORT))    FILE(FT12FØØ1)
ALLOC DSN(HFC.VEHCLS.DATA(DOMTRUCK))  FILE(FT13FØØ1)
ALLOC DSN(HFC.VEHCLS.DATA(IMPTRUCK))  FILE(FT14FØØ1)
ALLOC DSN(HFC.VEHCLS.DATA(TRK6TO85))  FILE(FT15FØØ1)
ALLOC DSN(HFC.VEHCLS.DATA(TRK85TEN))  FILE(FT16FØØ1)
ALLOC DSN(HFC.VEHCLS.DATA(MEDTRUCK))  FILE(FT17FØØ1)
ALLOC DSN(HFC.VEHCLS.DATA(LTHVYTRK))  FILE(FT18FØØ1)
ALLOC DSN(HFC.VEHCLS.DATA(HVHVYTRK))  FILE(FT19FØØ1)
ALLOC DSN(HFC.DATA(SCRAP))            FILE(FT2ØFØØ1)
ALLOC DSN(HFC.DATA(VMT))              FILE(FT21FØØ1)
ALLOC DSN(HFC.DATA(VMTGROW))          FILE(FT22FØØ1)
ALLOC DSN(HFC.DATA(VMTGROWA))         FILE(FT23FØØ1)
ALLOC DSN(HFC.DATA(VMTGROWB))         FILE(FT24FØØ1)
ALLOC DSN(HFC.TECHSF.DATA(DOMCAR))    FILE(FT31FØØ1)
ALLOC DSN(HFC.TECHSF.DATA(IMPCAR))    FILE(FT32FØØ1)
ALLOC DSN(HFC.TECHSF.DATA(DOMTRK))    FILE(FT33FØØ1)
ALLOC DSN(HFC.TECHSF.DATA(IMPTRK))    FILE(FT34FØØ1)
ALLOC DSN(HFC.TECHSF.DATA(TRK685))    FILE(FT35FØØ1)
CALL 'CN6824.RD1.HFC.LOADLIB(HFC)'
```

SAMPLE RUN

```
SELECT REPORT TYPE
     1 - LIGHT DUTY VEHICLES ONLY
     2 - LIGHT AND HEAVY DUTY VEHICLES
?
Response: "1" produces model output data restricted to the two categories
               of passenger cars and the four categories of light-duty trucks
          "2" produces model output data for the six categories of cars and
               light-duty trucks and the three categories of medium- and
               heavy-duty vehicles


ENTER BASE YEAR AS 4-DIGIT NUMBER
?
Response: i.e., "1975."  This is the first year of output data printed by
               the model


SELECT REPORTING CHRONOLOGICAL OPTION
     1 - BASE YEAR TO 2000 BY 5 YEAR INCREMENTS
     2 - STARTING IN BASE YEAR AND USING ENDING AND INCREMENTATION VALUES
         OF YOUR CHOICE
?
Response: "1" initializes the model run with the base year and produces out-
               put through the year 2000 for each intervening year divisible
               by 5
          "2" allows the user to vary the chronological reporting output of
               the model.  If option "2" is selected, the user is subsequently
               prompted for his/her desired ending year of output and incre-
               menting value


SELECT ONE OF THE FOLLOWING METHODS FOR COMPUTING EPA MPG
     1 - EPA ESTIMATES FROM DATA INPUT FILES WITH A DIESEL ADVANTAGE FACTOR
     2 - EPA ESTIMATES FROM DATA INPUT FILES FOR BOTH GAS AND DIESEL
     3 - HARMONIC AVERAGE OF TECHNOLOGY SPECIFIC FUEL ECONOMY ESTIMATES
?
Response: "1" computes new vehicle average EPA mpg by using estimates of diesel
               penetration and the EPA fuel economy of the gasoline-fueled
               cars in conjunction with an estimate of the EPA fuel economy
               advantage of diesels vis-a-vis spark ignition engines.  If this
               option is selected, the user is then prompted for a value of the
               diesel advantage factor
          "2" computes new vehicle average EPA mpg using estimates of the EPA
               fuel economy of the gasoline new car fleet, diesel penetration,
               and the average EPA mpg of the diesel fleet.  This option is
               currently not operational since the data for new vehicle aver-
```

age diesel vs. gasoline EPA mpg have not yet been input in the data files

"3" computes new vehicle EPA mpg by calculating the harmonic average of the EPA fuel economy estimates for the 5 specific technologies identified in the input data (e.g., diesel FWD, carbureted automatic RWD, carbureted manual RWD, diesel RWD, carbureted FWD)

SELECT ONE OF THE FOLLOWING OPTIONS FOR DETERMINING ONROAD MPG

1 - HARMONIC AVERAGE OF TECHNOLOGY SPECIFIC FUEL ECONOMIES AND SHORTFALL COEFFICIENTS

2 - HARMONIC AVERAGE OF TECHNOLOGY SPECIFIC FUEL ECON. AND "USER SUPPLIED" SHORTFALL COEFFICIENTS

3 - NO FUEL ECONOMY SHORTFALL, I.E., EPA MPG = ONROAD MPG

?

Response: "1" onroad mpg computed using technology-specific mpg's and shortfall coefficients contained in the input data files

"2" allows the user to override the shortfall coefficients in the model with his/her own values. If this option is employed, the user is then queried for the fuel economy shortfall regression space: 1-MPG (fuel economy space) or 2-GPM (fuel consumption space). Subsequently, the user is asked to specify the time period and shortfall coefficients separately for gasoline- and diesel-fueled passenger cars and light-duty trucks. The model echoes the user-specified values for each time period and vehicle category and allows the user to correct his entries before proceeding to the next step

"3" sets the on-road fuel economies equal to the EPA mpg values

DO YOU WISH TO GROW ANNUAL VMT PER VEHICLE?

1 - YES

2 - NO

?

Response: "1" allows the user to increase the values of annual VMT/vehicle by age by a specified annual percentage growth from 1975 to 2000. If option 1 is selected, the user is then prompted to select one of three sets of annual VMT/vehicle growth rates which are contained in the input data files

"2" calculates total VMT using input data on annual VMT/vehicle by age which remain constant over the forecast period

DO YOU WISH TO PERFORM BASE YEAR CALIBRATION?

1 - YES

2 - NO

?

Response: "1" calibrates the model to actual data on fuel demand and cars and trucks in operation in the base year

"2" computes output for the base and subsequent years without reference to actual data

SELECT METHOD OF VEHICLE STOCK CALCULATION
1 - SCRAPPAGE BASED ON SALES
2 - SCRAPPAGE ONLY
?
Response: "1" calculates passenger car stock with the use of marginal survival rates which are sensitive to shifts in new car registrations
"2" calculates passenger car stock with the use of marginal survival rates which remain fixed at base year values throughout the forecast period

DO YOU WANT TO CHANGE SCENARIO PARAMETERS?
1 - YES
2 - NO
?
Response: "1" allows the user to repeat entries for each of the scenario parameters from the beginning without having to re-execute the program
"2" the program accepts all of the entries for each of the scenario parameters listed above and proceeds to print out the model output data

An example terminal session and model forecast are presented on following pages.

```
exec hfc.model
```

SAMPLE TERMINAL SESSION

```
WELCOME TO THE HIGHWAY FUEL CONSUMPTION MODEL
ALL RESPONSES MAY BE ENTERED IN FREE FORMAT FOLLOWING THE PROMPT
NOTE: OPTIONS APPEARING WITH A "*" SHOULD NOT BE SELECTED



SELECT REPORT TYPE
   1 - LIGHT DUTY VEHICLES ONLY
   2 - LIGHT AND HEAVY DUTY VEHICLES
?
2

ENTER BASE YEAR AS 4-DIGIT NUMBER
?
1975

SELECT REPORTING CHRONOLOGICAL OPTION
   1 - 1975 TO 2000 BY 5 YEAR INCREMENTS
   2 - STARTING IN 1975 AND USING ENDING YEAR AND INCREMENTATION VALUES OF YOUR CHOICE
?
2

ENTER 4-DIGIT ENDING YEAR
?
1978

ENTER INCREMENT YEAR FACTOR AS INTEGER VALUE
?
1

SELECT ONE OF THE FOLLOWING METHODS FOR COMPUTING EPA MPG
   1 - EPA ESTIMATES FROM DATA INPUT FILES WITH A DIESEL ADVANTAGE FACTOR
   2 * EPA ESTIMATES FROM DATA INPUT FILES FOR BOTH GAS & DIESEL
   3 - HARMONIC AVERAGE OF TECHNOLOGY SPECIFIC FUEL ECONOMY ESTIMATES
?
1

ENTER DIESEL ADVANTAGE FACTOR, E.G., 1.30
?
1.3

SELECT ONE OF THE FOLLOWING METHODS FOR DETERMINING ONROAD MPG
   1 - HARMONIC AVERAGE OF TECHNOLOGY SPECIFIC FUEL ECONOMIES & SHORTFALL COEFFICIENTS
   2 - HARMONIC AVERAGE OF TECH. SPECIFIC FUEL ECON. & "USER SUPPLIED" SHORTFALL COEFFICIENTS
   3 - NO FUEL ECONOMY SHORTFALL, I.E., EPA MPG = ONROAD MPG
?
1

DO YOU WISH TO GROW ANNUAL VMT PER VEHICLE?
   1 - YES
   2 - NO
?
1

SELECT VMT GROWTH FILE
   1 - DEFAULT (UNIT=22)
   2 - ALTERNATE A (UNIT=23)
   3 - ALTERNATE B (UNIT=24)
```

```
DO YOU WANT TO PERFORM BASE YEAR CALIBRATION?
   1 - YES
   2 - NO
?
1

SELECT METHOD OF VEHICLE STOCK CALCULATION
   1 - SCRAPPAGE BASED UPON SALES
   2 - SCRAPPAGE ONLY
?
2


DO YOU WANT TO CHANGE SCENARIO PARAMETERS?
   1 - YES
   2 - NO
?
2


*** SCENARIO COMPLETE: STANDBY TO RECEIVE OUTPUT ***
```

* 1975 *

	NEW				FLEET									
	EPA MPG	ROAD MPG	REGISTRATIONS (IN MILLIONS)		EPA MPG	ROAD MPG	REGISTRATIONS (IN MILLIONS)		VMT (IN BILLIONS)	FUEL CONSUMPTION (IN BILLIONS OF GALLONS)				IN MILLIONS OF BARRELS/DAY
			GAS	DSL			GAS	DSL		DSL	LEAD	UNLD	TOTAL	
PA DOM	14.80	13.30	6.783	0.0	13.97	12.77	83.148	0.0	874.99	0.0	60.670	7.826	68.496	4.47
PA IMP	23.35	17.62	1.394	0.014	24.31	18.05	12.044	0.049	135.66	0.023	7.161	0.330	7.515	0.49
TOTAL PA	15.79	13.89	8.177	0.014	14.81	13.30	95.192	0.049	1010.65	0.023	67.831	8.156	76.010	4.96
TRUCK DOM 0-6	13.10	10.92	0.970	0.0	12.34	10.28	13.832	0.0	112.66	0.0	9.949	1.008	10.957	0.71
TRUCK IMP 0-6	21.00	17.50	0.240	0.0	18.66	15.55	1.071	0.0	11.01	0.0	0.700	0.008	0.708	0.05
TRUCK 6-8.5	10.80	9.00	0.810	0.0	9.59	7.99	5.002	0.0	44.29	0.0	5.544	0.0	5.544	0.36
TOT LITETRUCK	12.59	10.49	2.020	0.0	11.71	9.76	19.905	0.0	167.96	0.0	16.194	1.016	17.209	1.12
TOTAL LDV	15.20	13.23	10.197	0.014	14.27	12.64	115.097	0.049	1178.62	0.023	84.025	9.172	93.219	6.08
TRUCK 8.5-10.0	8.30	8.30	0.090	0.0	7.57	7.57	0.564	0.0	5.03	0.0	0.665	0.0	0.665	0.04
MED TRUCKS	7.20	7.20	0.020	0.000	7.04	7.04	1.302	0.009	8.42	0.016	1.180	0.0	1.196	0.08
LITEHVY TRUCKS	5.70	5.70	0.135	0.005	5.80	5.80	1.472	0.045	15.29	0.085	2.550	0.0	2.635	0.17
HVY HVY TRUCKS	4.60	4.60	0.023	0.069	4.64	4.64	0.488	1.028	46.04	8.959	0.968	0.0	9.927	0.65
TOT M&H TRUCKS	5.01	5.01	0.177	0.075	5.07	5.07	3.262	1.082	69.75	9.060	4.698	0.0	13.758	0.90
TOTAL TOTAL	13.92	12.32	10.465	0.089	12.92	11.64	118.923	1.131	1253.40	9.083	89.387	9.172	107.642	7.02

* 1976 *

	NEW				FLEET									
	EPA MPG	ROAD MPG	REGISTRATIONS (IN MILLIONS)		EPA MPG	ROAD MPG	REGISTRATIONS (IN MILLIONS)		VMT (IN BILLIONS)	FUEL CONSUMPTION (IN BILLIONS OF GALLONS)				IN MILLIONS OF BARRELS/DAY
			GAS	DSL			GAS	DSL		DSL	LEAD	UNLD	TOTAL	
PA DOM	16.50	14.06	8.300	0.0	14.23	12.91	83.787	0.0	909.40	0.0	54.474	15.972	70.445	4.60
PA IMP	25.47	22.31	1.431	0.019	24.35	18.56	12.748	0.068	146.92	0.031	7.429	0.457	7.917	0.52
TOTAL PA	17.41	14.87	9.731	0.019	15.10	13.48	96.536	0.068	1056.32	0.031	61.903	16.428	70.363	5.11
TRUCK DOM 0-6	14.50	12.08	1.300	0.0	12.57	10.47	14.415	0.0	123.04	0.0	9.343	2.404	11.747	0.77
TRUCK IMP 0-6	22.20	18.50	0.170	0.0	19.22	16.01	1.221	0.0	12.89	0.0	0.770	0.035	0.805	0.05
TRUCK 6-8.5	11.90	9.92	1.329	0.0	10.14	8.45	6.135	0.0	59.15	0.0	7.000	0.0	7.000	0.46
TOT LITETRUCK	13.39	11.16	2.799	0.0	11.97	9.98	21.772	0.0	195.08	0.0	17.113	2.439	19.552	1.28
TOTAL LDV	16.52	14.04	12.530	0.019	14.51	12.78	118.307	0.068	1251.40	0.031	79.016	18.868	97.915	6.39
TRUCK 8.5-10.0	8.90	8.90	0.111	0.0	7.83	7.83	0.652	0.0	6.23	0.0	0.796	0.0	0.796	0.05
MED TRUCKS	7.40	7.40	0.030	0.0	7.07	7.07	1.185	0.008	7.71	0.013	1.077	0.0	1.091	0.07
LITEHVY TRUCKS	5.63	5.63	0.128	0.007	5.77	5.77	1.513	0.049	15.90	0.097	2.659	0.0	2.755	0.18
HVY HVY TRUCKS	4.70	4.70	0.019	0.100	4.64	4.64	0.468	1.074	47.97	9.409	0.928	0.0	10.337	0.67
TOT M&H TRUCKS	5.02	5.02	0.177	0.107	5.05	5.05	3.165	1.132	71.59	9.519	4.663	0.0	14.183	0.93
TOTAL TOTAL	14.94	12.97	12.818	0.126	13.13	11.77	122.125	1.199	1329.21	9.551	84.475	18.868	112.893	7.36

* 1977 *

	NEW				FLEET									
	EPA MPG	ROAD MPG	REGISTRATIONS (IN MILLIONS)		EPA MPG	ROAD MPG	REGISTRATIONS (IN MILLIONS)		VMT (IN BILLIONS)	FUEL CONSUMPTION (IN BILLIONS OF GALLONS)				IN MILLIONS OF BARRELS/DAY
			GAS	DSL			GAS	DSL		DSL	LEAD	UNLD	TOTAL	
PA DOM	17.20	14.52	8.850	0.0	14.55	13.09	84.800	0.0	935.00	0.0	47.718	23.697	71.415	4.66
PA IMP	27.67	24.10	1.944	0.026	24.73	19.31	13.864	0.092	162.64	0.041	7.809	0.572	8.422	0.55
TOTAL PA	18.47	15.65	10.794	0.026	15.49	13.75	98.664	0.092	1097.64	0.041	55.527	24.269	79.837	5.21
TRUCK DOM 0-6	14.10	11.75	0.880	0.0	12.72	10.60	14.542	0.0	122.27	0.0	8.232	3.306	11.538	0.75
TRUCK IMP 0-6	24.20	20.17	0.310	0.0	20.29	16.91	1.505	0.0	15.69	0.0	0.733	0.195	0.928	0.06
TRUCK 6-8.5	11.60	9.67	1.600	0.0	10.54	8.78	7.517	0.0	74.84	0.0	8.521	0.0	8.521	0.56
TOT LITETRUCK	13.09	10.91	2.790	0.0	12.17	10.14	23.564	0.0	212.80	0.0	17.486	3.501	20.987	1.37
TOTAL LDV	17.31	14.61	13.584	0.026	14.83	13.00	122.228	0.092	1310.44	0.041	73.013	27.770	100.824	6.58
TRUCK 8.5-10.0	8.80	8.80	0.280	0.0	8.19	8.19	0.907	0.0	9.18	0.0	1.121	0.0	1.121	0.07
MED TRUCKS	7.50	7.50	0.026	0.0	7.11	7.11	1.072	0.008	6.39	0.010	0.888	0.0	0.898	0.06
LITEHVY TRUCKS	5.82	5.82	0.136	0.013	5.78	5.78	1.555	0.058	15.22	0.114	2.522	0.0	2.636	0.17
HVY HVY TRUCKS	5.19	5.19	0.018	0.151	4.73	4.73	0.447	1.165	47.63	9.278	0.802	0.0	10.080	0.66
TOT M&H TRUCKS	5.38	5.38	0.181	0.163	5.09	5.09	3.074	1.231	69.24	9.402	4.213	0.0	13.615	0.89
TOTAL TOTAL	15.40	13.35	14.045	0.189	13.47	12.02	126.209	1.323	1388.86	9.443	78.347	27.770	115.560	7.54

* 1978 *

	NEW				FLEET									
	EPA MPG	ROAD MPG	REGISTRATIONS (IN MILLIONS)		EPA MPG	ROAD MPG	REGISTRATIONS (IN MILLIONS)		VMT (IN BILLIONS)	FUEL CONSUMPTION (IN BILLIONS OF GALLONS)				IN MILLIONS OF BARRELS/DAY
			GAS	DSL			GAS	DSL		DSL	LEAD	UNLD	TOTAL	
PA DOM	18.72	15.66	8.942	0.058	15.03	13.41	85.707	0.058	970.53	0.043	41.236	31.096	72.376	4.72
PA IMP	26.80	23.57	1.878	0.072	24.90	19.86	14.796	0.163	177.65	0.075	7.950	0.918	8.944	0.58
TOTAL PA	19.78	16.66	10.820	0.130	16.01	14.12	100.502	0.220	1148.18	0.118	49.187	32.014	81.319	5.30
TRUCK DOM 0-6	14.47	12.07	0.780	0.020	12.85	10.71	14.529	0.020	113.75	0.014	6.895	3.708	10.617	0.69
TRUCK IMP 0-6	24.00	20.00	0.340	0.0	21.12	17.60	1.813	0.0	17.76	0.0	0.641	0.368	1.009	0.07
TRUCK 6-8.5	11.81	9.85	2.109	0.011	10.89	9.08	9.377	0.011	90.90	0.009	10.003	0.0	10.012	0.65
TOT LITETRUCK	13.10	10.92	3.228	0.032	12.33	10.28	25.719	0.032	222.40	0.024	17.539	4.076	21.638	1.41
TOTAL LDV	18.17	15.27	14.049	0.161	15.27	13.31	126.222	0.252	1370.58	0.142	66.726	36.090	102.958	6.72
TRUCK 8.5-10.0	8.90	8.90	0.290	0.0	8.41	8.41	1.169	0.0	11.61	0.0	1.380	0.0	1.380	0.09
MED TRUCKS	7.60	7.60	0.082	0.0	7.21	7.21	1.026	0.007	6.49	0.008	0.892	0.0	0.900	0.06
LITEHVY TRUCKS	5.94	5.94	0.136	0.014	5.80	5.80	1.591	0.069	15.41	0.139	2.519	0.0	2.658	0.17
HVY HVY TRUCKS	5.29	5.29	0.024	0.172	4.83	4.83	0.432	1.272	51.13	9.841	0.754	0.0	10.595	0.69
TOT M&H TRUCKS	5.57	5.57	0.242	0.186	5.16	5.16	3.049	1.347	73.03	9.988	4.165	0.0	14.153	0.92
TOTAL TOTAL	15.94	13.80	14.581	0.347	13.82	12.28	130.440	1.599	1455.22	10.130	72.271	36.090	118.491	7.73

3.2 PROGRAM MAINTENANCE

The new HFC model makes extensive use of partitioned data sets (PDS's), which offer two primary advantages:

- The user can group related programs or data files into a single dataset
- PDS's make more efficient use of disk storage space than many independent sequential data sets.

Because PDS's may be unfamiliar to HFC users, this section presents a brief description of how to perform common program editing and maintenance functions.

3.2.1 Program Editing

The TSO editor may be used to modify HFC source code by referencing the HFC.FORTH member with its fully qualified name. In the example shown below, user commands are typed in lower case, while system responses are in capital letters.

```
READY
edit 'cn6824.rd1.hfc.forth(calibr)'
ENTER DATA SET TYPE-
fortg
EDIT

     [editing commands]

save
EDIT
end
READY
```

The source code members are stored in line numbered TSO format and may be listed or modified using standard editor commands.

3.2.2 Program Compilation

The HFC model uses the following PDS libraries to store object code and load modules:

```
DSN = CN6824.RD1.HFC.OBMOD
DSORG = PO
RECFM = FB
LRECL = 80
BLKSIZE = 80
UNIT = DASD
VOL=SER=FEA025

MEMBERS:  MAIN
          SOLICT
          USERSF
          INBASE
          CALIBR
          OUTPUT
          UPDATE
          PAGE

DSN = CN6824.RD1.HFC.LOADLIB
DSORG = PO
RECFM = U
LRECL = 0
BLKSIZE = 4000
UNIT = DASD
VOL=SER=FEA025

MEMBERS:  HFC
          SOLICT
          USERSF
          INBASE
          CALIBR
          OUTPUT
          UPDATE
          PAGE
```

The library structure allows the independent compilation of any HFC subprogram, its link-editing with dependent subroutines, and regeneration of the executable HFC model with minimum redundant processing. Three TSO command procedures are available to assist the user in updating these libraries.

Procedure HFC.COMP.CLIST invokes the FORTRAN G compiler to recompile a source member and replace its entry in the object library with the updated version:

```
exec hfc.comp
ENTER POSITIONAL PARAMETER PGM
calibr
     [FORTRAN COMPILER MESSAGES]
READY
```

The positional parameter specifies the HFC.FORTH member name to be compiled. Assuming that compilation is successful, the user must re-link the new object module with any dependent subroutines and create a new load module. This function is performed by procedure HFC.LOAD.CLIST:

```
exec hfc.load
ENTER POSITIONAL PARAMETER PGM -
calibr
     [LINK EDITOR MESSAGES]
READY
```

Successful operation of the link editor step is denoted by the message: (member name) NOW REPLACED IN DATA SET -- AUTHORIZATION CODE IS Ø.

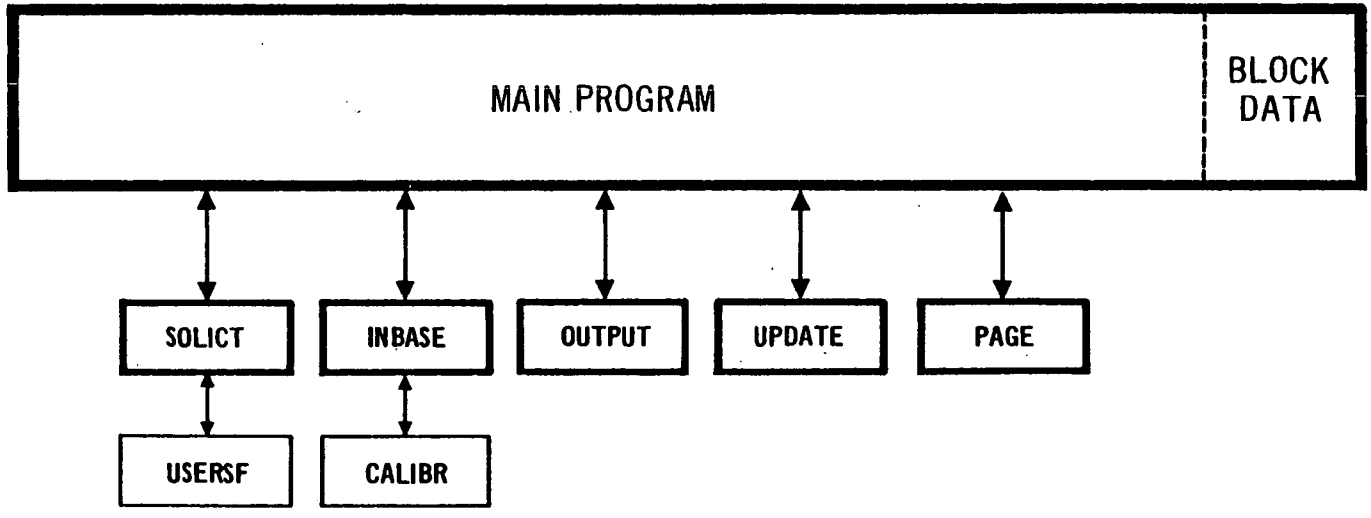
In the above example, subroutine CALIBR is a dependent subroutine of INBASE. As a result of the compile/link edit steps, the editing changes in CALIBR are reflected in the CALIBR load module. However, these changes are not incorporated in the load module for INBASE, which was generated at an earlier time using the old version of CALIBR. The changes are propagated in the subroutine hierarchy by re-executing the LOAD procedure for INBASE:

```
exec hfc.load
ENTER POSITIONAL PARAMETER PGM -
inbase
     [LINK EDITOR MESSAGES]
READY
```

Figure 3-1 diagrams the hierarchy of program dependencies. Editing of the lowest level of program code (USERSF or CALIBR) requires link-editing of the modified program and the (major) subroutine above it. Modification of a major subroutine requires only one link-edit step, which automatically re-incorporates the current versions of dependent subroutines.

Regeneration of the executable model code is accomplished by the command procedure HFC.LINK.CLIST. This procedure is similar to HFC.LOAD but is written to link the current object module for the MAIN program with all subroutines and place executable member HFC in the load library:

FIGURE 3-1
SUBROUTINE COMMUNICATIONS



```
exec hfc.link
     [LINK EDITOR MESSAGES]
READY
```

Note that this procedure does not prompt the user for a program name (positional parameter).

3.2.3 PDS Compression

The user normally will not be concerned with the contents of the object code and load module libraries. However, PDS's require periodic compression to free the unused space which can be caused by frequent updating of members. Dataset HFC.COMPRSS contains a JCL stream which invokes the IBM utility IEBCOPY to compress the PDS libraries used by HFC. This program can be executed under SUPERWYLBUR by the command: RUN UNN FET FROM HFC.COMPRSS or submitted to the batch machine under TSO by the command: SUBMIT HFC.COMPRSS.

PDS compression is a routine maintenance task which should be performed daily during periods of intensive program or data file editing. Failure to compress PDS's periodically can lead to inadequate free space, which will block the user's attempt to save an edited program or data file until the compression is performed.

3.3 DATA FILE EDITING

The editing of data files for the HFC model is commonly performed on the TSO system. To edit a data file on TSO, the user must type EDIT, followed by the fully qualified name of the data file, e.g.:

```
edit hfc.vehcls.data(domestic)
```

The computer then will respond with:

```
DATA SET HFC.VEHCLS.DATA(DOMESTIC) NOT LINE NUMBERED,
USING NONUM
EDIT
```

Each line in a data file is prefixed either with a calendar year or a vehicle age. Thus, even though the data files are not line-numbered, the data in each line can be identified and edited easily. To edit a line(s), the user should first type VERIFY. This commands the computer to print the entire line in which a given data entry is changed. Once in the VERIFY mode, the user then types FIND/year or age/. The computer then will print out the line of data specific to the year or age requested, e.g.:

```
find /1980/
1980     6.46     20.97     .0494     0.     0.000     19.40     ...
```

The CHANGE command is used to alter a value in a given line:

```
change /6.46/5.30/
```

where 6.46 = existing value

5.30 = new value

The computer then will verify that the change has been made by printing the line in question, e.g.:

```
1980     5.30     20.97     .0494     0.     0.000     19.40     ...
```

Upon completion of the data file editing, the user saves the updated file by typing SAVE. The computer will prompt the user with EDIT, which should be followed by the command END to terminate the editing session.

The user must exercise caution to ensure that the spacing between columns in the data file is undisturbed during the editing process. Since the program operates on data which are in a fixed format, any disturbance of the spacing between columns in a data file will result in nonsensical output.

REFERENCES

1. Energy and Environmental Analysis, Inc. "Light Duty Vehicle Fuel Consumption Model: 1975-1986." Prepared for the U.S. Department of Energy. April 28, 1978.

2. Energy and Evironmental Analysis, Inc. "The Highway Fuel Consumption Model: Third Quarterly Report." Prepared for the U.S. Department of Energy. January 27, 1981.

3. Energy and Environmental Analysis, Inc. "The Highway Fuel Consumption Model: Fourth Quarterly Report." Prepared for the U.S. Department of Energy. July 1, 1981.

4. Energy and Environmental Analysis, Inc. "The Highway Fuel Consumption Model: Fifth Quarterly Report." Prepared for the U.S. Department of Energy. November 30, 1981.

APPENDIX A

FORTRAN SOURCE CODE FOR THE NEW HIGHWAY FUEL CONSUMPTION MODEL

```
&RD1.HFC.FORTH:MAIN - DEFAULT

   FROM &RD1.HFC.FORTH:MAIN  ON CATALOG
   CARD
   1/184  184 LINES  CURRENT=184

    1.      C                                                                       00001000
    2.      C     HIGHWAY FUEL CONSUMPTION MODEL: DECEMBER 1981                     00002000
    3.      C     ENERGY AND ENVIRONMENTAL ANALYSIS, INC.                           00003000
    4.      C     PROGRAMMER: MIKE MOCHAN                                           00004000
    5.      C     DOE CONTRACT: DE-AC01-79PE-70032, TASK 13                         00005000
    6.      C                                                                       00006000
    7.      C      MAIN PROGRAM FOLLOWS                                             00007000
    8.            REAL SALES(55,9),GASMPG(55,9),DSLMPG(55,9),DSLPEN(55,9),         00008000
    9.           &     LEDPEN(55,9),GASADJ(55,5),AUTMPG(55,5),MANPCT(55,5),       00009000
   10.           &     MANMPG(55,5),BASPCT(55,5),BASMPG(55,5),ALTPCT(55,5),       00010000
   11.           &     ALTMPG(55,5),DSLADJ(55,5),DRWMPG(55,5),DFWPCT(55,5),       00011000
   12.           &     DFWMPG(55,5),DALPCT(55,5),DALMPG(55,5),SCRLDV(30,2),       00012000
   13.           &     SCRLDT(30,4),SCRMHD(30,2,3),VMTLDV(30,2),VMTLDT(30,4),     00013000
   14.           &     VMTMHD(30,2,3),COEFA1(11,2,5),COEFB1(11,2,5),              00014000
   15.           &     COEFA2(11,2,5),COEFB2(11,2,5),COEFA3(11,2,5),              00015000
   16.           &     COEFB3(11,2,5),COEFA4(11,2,5),COEFB4(11,2,5),              00016000
   17.           &     VEH(30,2,9),LEADED(30,9),VMT(30,2,9),EPA(30,2,9),          00017000
   18.           &     RMPG(30,2,9),MSURV(30,2,9),VMTGRO(26,9),ADVANT,            00018000
   19.           &     USERCF(2,55,2,5)                                           00019000
   20.            INTEGER I,J,K,L,R,UNIT,BEGYR,ENDYR,VYR,FYR,LYR,                 00020000
   21.           &        MPGOPT,RODOPT,YRIND(100),GPM                            00021000
   22.            LOGICAL PIND(26),SHORT,PAFRAC,CALIB,GROW                        00022000
   23.            COMMON /CB01/ SALES,GASMPG,DSLMPG,DSLPEN,                       00023000
   24.           &       LEDPEN,GASADJ,AUTMPG,MANPCT,                             00024000
   25.           &       MANMPG,BASPCT,BASMPG,ALTPCT,                             00025000
   26.           &       ALTMPG,DSLADJ,DRWMPG,DFWPCT,                             00026000
   27.           &       DFWMPG,DALPCT,DALMPG,SCRLDV,                             00027000
   28.           &       SCRLDT,SCRMHD,VMTLDV,VMTLDT,                             00028000
   29.           &       VMTMHD,COEFA1,COEFB1,                                    00029000
   30.           &       COEFA2,COEFB2,COEFA3,                                    00030000
   31.           &       COEFB3,COEFA4,COEFB4                                     00031000
   32.            COMMON /CB02/ VEH,LEADED,VMT,EPA,RMPG,MSURV,VMTGRO              00032000
   33.            COMMON /CB03/ BEGYR,ENDYR,VYR,FYR,LYR,MPGOPT,RODOPT,YRIND,ADVANT 00033000
   34.           & ,SHORT,PAFRAC,CALIB,GROW,PIND                                  00034000
   35.            LOGICAL FIRST,SKIP                                              00035000
   36.            COMMON /CB04/ HD1(4,9),HD2(4,5)                                 00036000
   37.            COMMON /CB05/ USERCF,GPM                                        00037000
   38.            DATA FIRST /.TRUE./, SKIP/.TRUE./                               00038000
   39.      C                                                                     00039000
   40.            J = 0                                                           00040000
   41.            DO 0010 I = 1946,2000,1                                         00041000
   42.            J = J + 1                                                       00042000
   43.            YRIND(J) = I                                                    00043000
   44.       0010 CONTINUE                                                        00044000
   45.      C                                                                     00045000
   46.      C     READ ALL INITIALIZATION DATA INTO COMMON ARRAYS                 00046000
   47.      C                                                                     00047000
   48.      C     READ AND STORE LIGHT-DUTY VEHICLE DATA FIRST.                   00048000
   49.      C     WHERE: UNIT=11=DOMCAR, 12=IMPCAR, 13=DOMTRK, 14=IMPTRK,         00049000
   50.      C              15=6-8.5TRK, 16=8.5-10TRK                              00050000
   51.      C                                                                     00051000
   52.            DO 1010 K = 1,5                                                 00052000
   53.            UNIT = K + 10                                                   00053000
   54.            READ(UNIT,1000)(SALES(J,K),GASMPG(J,K),DSLMPG(J,K),DSLPEN(J,K), 00054000
   55.           &LEDPEN(J,K),GASADJ(J,K),AUTMPG(J,K),MANPCT(J,K),MANMPG(J,K),    00055000
   56.           &BASPCT(J,K),BASMPG(J,K),ALTPCT(J,K),ALTMPG(J,K),DSLADJ(J,K),    00056000
   57.           &DRWMPG(J,K),DFWPCT(J,K),DFWMPG(J,K),DALPCT(J,K),DALMPG(J,K),    00057000
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58.           &J=1,55)                                                          00058000
59.      1000 FORMAT(5(/),55(/,5X,F6.3,2(1X,F5.2),1X,F6.4,1X,F5.3,1X,F7.4,3(1X, 00059000
60.           &F5.2,1X,F5.3),1X,F5.2,1X,F7.4,2(1X,F5.2,1X,F5.3),1X,F5.2))       00060000
61.      1010 CONTINUE                                                          00061000
62.      C                                                                      00062000
63.      C     READ AND STORE HEAVY DUTY TRUCK VEHICLE DATA NEXT.               00063000
64.      C     WHERE: UNIT=17=LITE-HVY-TRK, 18=MED-HVY-TRK, 19=HVY-HVY-TRK      00064000
65.      C                                                                      00065000
66.           DO 1030 K = 6,9                                                   00066000
67.           UNIT = K + 10                                                     00067000
68.           READ(UNIT,1020)(SALES(J,K),GASMPG(J,K),DSLMPG(J,K),DSLPEN(J,K),   00068000
69.           &LEDPEN(J,K),J=1,55)                                              00069000
70.      1020 FORMAT(5(/),55(/,5X,F6.3,2(1X,F5.2),1X,F6.4,1X,F5.3))             00070000
71.      1030 CONTINUE                                                          00071000
72.      C                                                                      00072000
73.      C     READ AND STORE SCRAPPAGE AND VMT DATA NEXT.                      00073000
74.      C     WHERE: UNIT=20=SCRAP, UNIT=21=VMT                                00074000
75.      C                                                                      00075000
76.           READ(20,1035)                                                     00076000
77.           READ(21,1035)                                                     00077000
78.      1035 FORMAT(///)                                                       00078000
79.           DO 1050 J = 1,30                                                  00079000
80.           READ(20,1040) SCRLDV(J,1),SCRLDV(J,2),SCRLDT(J,1),SCRLDT(J,2),    00080000
81.           &SCRLDT(J,3),SCRLDT(J,4),(SCRMHD(J,1,K),SCRMHD(J,2,K),K=1,3)      00081000
82.      1040 FORMAT(3X,12F10.3)                                                00082000
83.           READ(21,1040) VMTLDV(J,1),VMTLDV(J,2),VMTLDT(J,1),VMTLDT(J,2),    00083000
84.           &VMTLDT(J,3),VMTLDT(J,4),(VMTMHD(J,1,K),VMTMHD(J,2,K),K=1,3)      00084000
85.      1050 CONTINUE                                                          00085000
86.      C                                                                      00086000
87.      C     READ AND STORE TECH SHORTFALL COEFFICIENTS FOR CLASSES 1-5       00087000
88.      C     WHERE:  UNIT=31=DOMCAR, 32=IMPCAR, 33=DOMTRK, 34=IMPTRK,         00088000
89.      C             35=6-8.5TRK                                              00089000
90.      C                                                                      00090000
91.           DO 1070 K = 1,5                                                   00091000
92.           UNIT = K + 30                                                     00092000
93.           READ(UNIT,1060)((COEFA1(I,J,K),COEFB1(I,J,K),COEFA2(I,J,K),       00093000
94.           &COEFB2(I,J,K),COEFA3(I,J,K),COEFB3(I,J,K),COEFA4(I,J,K),         00094000
95.           &COEFB4(I,J,K),I=1,11),J=1,2)                                     00095000
96.      1060 FORMAT(3(/),11(/,4X,8F9.4),5(/),11(/,4X,8F9.4))                   00096000
97.      1070 CONTINUE                                                          00097000
98.      C                                                                      00098000
99.      C     INITIALIZE FOR FIRST TIME THROUGH                                00099000
100.     C                                                                      00100000
101.     1080 CONTINUE                                                          00101000
102.     C                                                                      00102000
103.     C     CALL SUB TO SOLICIT INFO AND GENERATE SCENARIO                   00103000
104.     C                                                                      00104000
105.          CALL SOLICT(FIRST,&9999)                                          00105000
106.          FIRST = .FALSE.                                                   00106000
107.          SKIP = .TRUE.                                                     00107000
108.     C                                                                      00108000
109.     C     INITIALIZE FOR THE SELECTED BASE YEAR                            00109000
110.     C                                                                      00110000
111.          CALL INBASE                                                       00111000
112.     C                                                                      00112000
113.     C     IF INDICATED CALL SUB TO CALCULATE AND PRINT                     00113000
114.     C                                                                      00114000
115.          DO 1110 I = 1,26                                                  00115000
116.          IF (.NOT.PIND(I)) GO TO 1085                                      00116000
117.     C                                                                      00117000
118.          IF(SKIP) CALL PAGE(8)                                             00118000
119.          SKIP = .NOT.SKIP                                                  00119000
120.          CALL OUTPUT                                                       00120000
121.     C                                                                      00122000
122.     C     30 YEAR ARRAY UPDATE FOLLOWS, IT IS CALLED ONLY IF               00123000
123.     C     THERE ARE REMAINING YEARS TO BE PRINTED                          00124000
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C                                                                       00125000
 1085 DO 1090 J = I,26                                                  00126000
      IF (PIND(J)) GOTO 1100                                            00127000
 1090 CONTINUE                                                          00128000
C                                                                       00129000
C     NOTE IF THE FOLLOWING STATEMENT IS REACHED THERE ARE              00130000
C     NO MORE YEARS REMAINING TO BE PRINTED                             00131000
C                                                                       00132000
      GOTO 1120                                                         00133000
 1100 IF (I.NE.26) CALL UPDATE                                          00134000
 1110 CONTINUE                                                          00135000
C                                                                       00136000
C     THE FOLLOWING STATEMENT LOOPS CONTROL BACK TO THE                 00137000
C     SUB FOR SOLICITING INFO.  BASED UPON THE USER'S                   00138000
C     RESPONSE, A NEW SENARIO IS STARTED OR CONTROL GOES TO             00139000
C     STATEMENT 9999 WHERE THE PROGRAM TERMINATES. NOTE: THIS           00140000
C     CONVENTION MUST BE MAINTAINED TO AVOID AN INFINITE LOOP           00141000
C                                                                       00142000
 1120 GOTO 1080                                                         00143000
 9999 STOP                                                              00144000
      END                                                               00145000
      BLOCK DATA                                                        00146000
C                                                                       00147000
      REAL SALES(55,9),GASMPG(55,9),DSLMPG(55,9),DSLPEN(55,9),          00148000
     &     LEDPEN(55,9),GASADJ(55,5),AUTMPG(55,5),MANPCT(55,5),         00149000
     &     MANMPG(55,5),BASPCT(55,5),BASMPG(55,5),ALTPCT(55,5),         00150000
     &     ALTMPG(55,5),DSLADJ(55,5),DRWMPG(55,5),DFWPCT(55,5),         00151000
     &     DFWMPG(55,5),DALPCT(55,5),DALMPG(55,5),SCRLDV(30,2),         00152000
     &     SCRLDT(30,4),SCRMHD(30,2,3),VMTLDV(30,2),VMTLDT(30,4),       00153000
     &     VMTMHD(30,2,3),COEFA1(11,2,5),COEFB1(11,2,5),                00154000
     &     COEFA2(11,2,5),COEFB2(11,2,5),COEFA3(11,2,5),                00155000
     &     COEFB3(11,2,5),COEFA4(11,2,5),COEFB4(11,2,5),                00156000
     &     VEH(30,2,9),LEADED(30,9),VMT(30,2,9),EPA(30,2,9),            00157000
     &     RMPG(30,2,9),MSURV(30,2,9),VMTGRO(26,9),ADVANT,              00158000
     &     USERCF(2,55,2,5)                                             00159000
      INTEGER I,J,K,L,UNIT,BEGYR,ENDYR,VYR,FYR,LYR,                     00160000
     &        MPGOPT,RODOPT,YRIND(100),GPM                              00161000
      LOGICAL PIND(26),SHORT,PAFRAC,CALIB,GROW                          00162000
      COMMON /CB01/ SALES,GASMPG,DSLMPG,DSLPEN,                         00163000
     &       LEDPEN,GASADJ,AUTMPG,MANPCT,                               00164000
     &       MANMPG,BASPCT,BASMPG,ALTPCT,                               00165000
     &       ALTMPG,DSLADJ,DRWMPG,DFWPCT,                               00166000
     &       DFWMPG,DALPCT,DALMPG,SCRLDV,                               00167000
     &       SCRLDT,SCRMHD,VMTLDV,VMTLDT,                               00168000
     &       VMTMHD,COEFA1,COEFB1,                                      00169000
     &       COEFA2,COEFB2,COEFA3,                                      00170000
     &       COEFB3,COEFA4,COEFB4                                       00171000
      COMMON /CB02/ VEH,LEADED,VMT,EPA,RMPG,MSURV,VMTGRO                00172000
      COMMON /CB03/ BEGYR,ENDYR,VYR,FYR,LYR,MPGOPT,RODOPT,YRIND,ADVANT  00173000
     & ,SHORT,PAFRAC,CALIB,GROW,PIND                                    00174000
      COMMON /CB04/ HD1(4,9),HD2(4,5)                                   00175000
      COMMON /CB05/ USERCF,GPM                                          00176000
      DATA HD1 /'PA D','OM  ','    ','    ','PA I','MP  ','    ','    ',00177000
     &          'TRUC','K DO','M 0-','6   ','TRUC','K IM','P 0-','6   ',00178000
     &          'TRUC','K 6-','8.5 ','    ','TRUC','K 8.','5-10','.0  ',00179000
     &          'MED ','TRUC','KS  ','    ','LITE','HVY ','TRUC','KS  ',00180000
     &          'HVY ','HVY ','TRUC','KS  '/,                            00181000
     &     HD2 /'TOTA','L PA','    ','    ','TOT ','LITE','TRUC','K   ',00182000
     &          'TOTA','L LD','V   ','    ','TOT ','M&H ','TRUC','KS  ',00183000
     &          'TOTA','L TO','TAL ','    '/                            00184000
      END                                                               00185000
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&RD1.HFC.FORTH:SOLICT - DEFAULT

   FROM &RD1.HFC.FORTH:SOLICT  ON CATALOG
   CARD
   1/276  276 LINES  CURRENT=276

    1.      C                                                                       00001000
    2.      C     HIGHWAY FUEL CONSUMPTION MODEL: DECEMBER 1981                     00002000
    3.      C     ENERGY AND ENVIRONMENTAL ANALYSIS, INC.                           00003000
    4.      C     PROGRAMMER: MIKE MOCHAN                                           00004000
    5.      C     DOE CONTRACT: DE-AC01-79PE-70032, TASK 13                         00005000
    6.      C                                                                       00006000
    7.            SUBROUTINE SOLICT(FIRST,*)                                        00007000
    8.            REAL SALES(55,9),GASMPG(55,9),DSLMPG(55,9),DSLPEN(55,9),          00008000
    9.           &     LEDPEN(55,9),GASADJ(55,5),AUTMPG(55,5),MANPCT(55,5),         00009000
   10.           &     MANMPG(55,5),BASPCT(55,5),BASMPG(55,5),ALTPCT(55,5),         00010000
   11.           &     ALTMPG(55,5),DSLADJ(55,5),DRWMPG(55,5),DFWPCT(55,5),         00011000
   12.           &     DFWMPG(55,5),DALPCT(55,5),DALMPG(55,5),SCRLDV(30,2),         00012000
   13.           &     SCRLDT(30,4),SCRMHD(30,2,3),VMTLDV(30,2),VMTLDT(30,4),       00013000
   14.           &     VMTMHD(30,2,3),COEFA1(11,2,5),COEFB1(11,2,5),                00014000
   15.           &     COEFA2(11,2,5),COEFB2(11,2,5),COEFA3(11,2,5),                00015000
   16.           &     COEFB3(11,2,5),COEFA4(11,2,5),COEFB4(11,2,5),                00016000
   17.           &     VEH(30,2,9),LEADED(30,9),VMT(30,2,9),EPA(30,2,9),            00017000
   18.           &     RMPG(30,2,9),MSURV(30,2,9),VMTGRO(26,9),ADVANT,              00018000
   19.           &     USERCF(2,55,2,5)                                             00019000
   20.            INTEGER I,J,K,L,R,UNIT,BEGYR,ENDYR,VYR,FYR,LYR,                   00020000
   21.           &        MPGOPT,RODOPT,YRIND(100),GPM                              00021000
   22.            INTEGER VMTSET                                                   00022000
   23.            LOGICAL PIND(26),SHORT,PAFRAC,CALIB,GROW,FIRST,LINE(133)         00023000
   24.            COMMON /CB01/ SALES,GASMPG,DSLMPG,DSLPEN,                        00024000
   25.           &       LEDPEN,GASADJ,AUTMPG,MANPCT,                              00025000
   26.           &       MANMPG,BASPCT,BASMPG,ALTPCT,                              00026000
   27.           &       ALTMPG,DSLADJ,DRWMPG,DFWPCT,                              00027000
   28.           &       DFWMPG,DALPCT,DALMPG,SCRLDV,                              00028000
   29.           &       SCRLDT,SCRMHD,VMTLDV,VMTLDT,                              00029000
   30.           &       VMTMHD,COEFA1,COEFB1,                                     00030000
   31.           &       COEFA2,COEFB2,COEFA3,                                     00031000
   32.           &       COEFB3,COEFA4,COEFB4                                      00032000
   33.            COMMON /CB02/ VEH,LEADED,VMT,EPA,RMPG,MSURV,VMTGRO               00033000
   34.            COMMON /CB03/ BEGYR,ENDYR,VYR,FYR,LYR,MPGOPT,RODOPT,YRIND,ADVANT 00034000
   35.           & ,SHORT,PAFRAC,CALIB,GROW,PIND                                   00035000
   36.            COMMON /CB05/ USERCF,GPM                                         00036000
   37.      C                                                                       00037000
   38.      C     DETERMINE WHETHER THIS IS THE FIRST INVOKATION                    00038000
   39.      C                                                                       00039000
   40.            IF (.NOT.FIRST) GOTO 0015                                        00040000
   41.            REWIND 50                                                        00041000
   42.            REWIND 50                                                        00042000
   43.      C                                                                       00043000
   44.      C     PRINT SESSION INITIALIZATION INFORMATION                          00044000
   45.      C                                                                       00045000
   46.            WRITE(6,0010)                                                    00046000
   47.       0010 FORMAT(///,1X,'WELCOME TO THE HIGHWAY FUEL CONSUMPTION MODEL',   00047000
   48.           & /,1X,'ALL RESPONSES MAY BE ENTERED IN FREE FORMAT FOLLOWING THE P00048000
   49.           &ROMPT',/,1X,'NOTE: OPTIONS APPEARING WITH A "*" SHOULD NOT BE SELE00049000
   50.           &CTED',///)                                                       00050000
   51.            GOTO 0060                                                        00051000
   52.      C                                                                       00052000
   53.      C     THE FOLLOWING SECTION IS FOR SUBSEQUENT SCENARIOS                 00053000
   54.      C                                                                       00054000
   55.       0015 CONTINUE                                                        00055000
   56.      C                                                                       00056000
   57.      C     DETERMINE IF THE USER DESIRES ANOTHER SCENARIO                    00053000
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C                                                                       00059000
 0020 CALL PAGE(8)                                                      00060000
 0029 WRITE(6,0030)                                                     00079000
 0030 FORMAT(///,1X,'DO YOU WANT TO RUN ANOTHER SCENARIO?',/,4X,        00080000
     &'1 - YES',/,4X,'2 - NO')                                          00081000
      READ(5,*,ERR=0040) INPUT                                          00082000
      IF (INPUT.EQ.1.OR.INPUT.EQ.2) GOTO 0050                           00083000
 0040 WRITE(6,0080)                                                     00084000
      GOTO 0029                                                         00085000
 0050 CONTINUE                                                          00086000
C                                                                       00087000
C     BASED UPON THE ABOVE RESPONSE, INFORMATION WILL BE SOLICITED AND  00088000
C     AND A NEW SESSION STARTED OR CONTROL WILL RETURN TO THE MAIN      00089000
C     PROGRAM AT A POINT RESULTING IN ITS TERMINATION                   00090000
C                                                                       00091000
      IF (INPUT.EQ.1) GOTO 0060                                         00092000
      IF (INPUT.EQ.2) RETURN 1                                          00093000
C                                                                       00094000
C     INITIALIZE THE ARRAY CONTROLLING PRINTED OUTPUT                   00095000
C                                                                       00096000
 0060 DO 0070 I = 1,26                                                  00097000
      PIND(I) = .FALSE.                                                 00098000
 0070 CONTINUE                                                          00099000
 0080 FORMAT(/,1X,'*** INVALID RESPONSE ***')                           00100000
C                                                                       00101000
C     DETERMINE IF THE SHORT OR LONG TABLE IS TO BE PRINTED             00102000
C                                                                       00103000
 1000 WRITE(6,1010)                                                     00104000
 1010 FORMAT(/,1X,'SELECT REPORT TYPE',/,4X,'1 - LIGHT DUTY VEHICLES',  00105000
     & ' ONLY',/,4X,'2 - LIGHT AND HEAVY DUTY VEHICLES')                00106000
      READ(5,*,ERR=1020) INPUT                                          00107000
      IF (INPUT.EQ.1.OR.INPUT.EQ.2) GOTO 1030                           00108000
 1020 WRITE(6,0080)                                                     00109000
      GOTO 1000                                                         00110000
 1030 IF (INPUT.EQ.1) SHORT = .TRUE.                                    00111000
      IF (INPUT.EQ.2) SHORT = .FALSE.                                   00112000
C                                                                       00113000
C     SOLICIT FOR BASE YEAR OF MODEL RUN                                00114000
C                                                                       00115000
 1040 WRITE(6,1050)                                                     00116000
 1050 FORMAT(/,1X,'ENTER BASE YEAR AS 4-DIGIT NUMBER')                  00117000
      READ(5,*,ERR=1060) IBY                                            00118000
      IF (IBY.GE.1975.AND.IBY.LE.1980) GOTO 1070                        00119000
 1060 WRITE(6,0080)                                                     00120000
      GOTO 1040                                                         00121000
 1070 BEGYR = (IBY - 1975) + 1                                          00122000
      ENDYR = BEGYR + 29                                                00123000
C                                                                       00124000
C     SOLICIT FOR  REPORT YEARS                                         00125000
C                                                                       00126000
 1080 WRITE(6,1090) IBY,IBY                                             00127000
 1090 FORMAT(/,1X,'SELECT REPORTING CHRONOLOGICAL OPTION',/,4X,         00128000
     & '1 - ',I4,' TO 2000 BY 5 YEAR INCREMENTS',/,4X,'2 - STARTING',   00129000
     & ' IN ',I4,' AND USING ENDING YEAR AND INCREMENTATION',           00130000
     & ' VALUES OF YOUR CHOICE')                                        00131000
      READ(5,*,ERR=1100) INPUT                                          00132000
      IF (INPUT.EQ.1.OR.INPUT.EQ.2) GOTO 1110                           00133000
 1100 WRITE(6,0080)                                                     00134000
      GOTO 1080                                                         00135000
 1110 IF (INPUT.EQ.2) GOTO 1130                                         00136000
C                                                                       00137000
C     5-YEAR INCR. FROM BASE YR HAS BEEN SELECTED                       00138000
C                                                                       00139000
      J = (1980-IBY)-4                                                  00140000
      PIND(1) = .TRUE.                                                  00141000
      DO 1120 I = IBY,2000,5                                            00142000
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124.           J = J + 5                                                        00143000
125.           PIND(J) = .TRUE.                                                 00144000
126.      1120 CONTINUE                                                         00145000
127.           PIND((2000-IBY)+1) = .TRUE.                                      00146000
128.           GOTO 1210                                                        00147000
129.      C                                                                     00148000
130.      C     USER SPECIFIED OUTPUT YEARS ARE SET BELOW                       00149000
131.      C                                                                     00150000
132.      1130 WRITE(6,1140)                                                    00151000
133.      1140 FORMAT(/,1X,'ENTER 4-DIGIT ENDING YEAR')                         00152000
134.           READ(5,*,ERR=1150) IEND                                          00153000
135.           IF (IEND.GE.IBY.AND.IEND.LE.2000) GOTO 1160                      00154000
136.      1150 WRITE(6,0080)                                                    00155000
137.           GOTO 1130                                                        00156000
138.      1160 WRITE(6,1170)                                                    00157000
139.      1170 FORMAT(/,1X,'ENTER INCREMENT YEAR FACTOR AS INTEGER VALUE')      00158000
140.           READ(5,*,ERR=1180) INC                                           00159000
141.           IF (INC.GE.1.AND.INC.LE.(2000-IBY)) GOTO 1190                    00160000
142.      1180 WRITE(6,0080)                                                    00161000
143.           GOTO 1160                                                        00162000
144.      1190 PIND(1) = .TRUE.                                                 00163000
145.           J = 1                                                            00164000
146.           IFST = IBY + INC
147.           IF(IFST.GT.IEND) GO TO 1201
148.           DO 1200 I = IFST,IEND,INC                                         0016500
149.           J = J + INC                                                      00166000
150.           PIND(J) = .TRUE.                                                 00167000
151.      1200 CONTINUE                                                         00168000
152.      1201 PIND((IEND-IBY)+1) = .TRUE.                                      00169000
153.      C                                                                     00170000
154.      C     SOLICITATION FOR FUEL ECONOMY CREATION FOLLOWS                  00171000
155.      C                                                                     00172000
156.      1210 CONTINUE                                                         00173000
157.      1220 WRITE(6,1230)                                                    00174000
158.      1230 FORMAT(/,1X,'SELECT ONE OF THE FOLLOWING METHODS FOR COMPUTING EPA00175000
159.          & MPG',/,4X,'1 - EPA ESTIMATES FROM DATA INPUT FILES WITH A DIESEL 00176000
160.          &ADVANTAGE FACTOR',/,4X,'2 * EPA ESTIMATES FROM DATA INPUT FILES F00177000
161.          &R BOTH GAS & DIESEL',/,4X,'3 - HARMONIC AVERAGE OF TECHNOLOGY SPEC00178000
162.          &IFIC FUEL ECONOMY ESTIMATES')                                   00179000
163.           READ(5,*,ERR=1240) MPGOPT                                       00180000
164.           IF (MPGOPT.GE.1.AND.MPGOPT.LE.3) GOTO 1250                      00181000
165.      1240 WRITE(6,0080)                                                    00182000
166.           GOTO 1220                                                       00183000
167.      1250 IF (MPGOPT.NE.1) GOTO 1290                                       00184000
168.      C                                                                     00185000
169.      C     ADVANTAGE FACTOR IS SOLICITED NEXT                              00186000
170.      C                                                                     00187000
171.      1260 WRITE(6,1270)                                                    00188000
172.      1270 FORMAT(/,1X,'ENTER DIESEL ADVANTAGE FACTOR, E.G., 1.30')         00189000
173.           READ(5,*,ERR=1280) ADVANT                                       00190000
174.           GOTO 1290                                                       00191000
175.      1280 WRITE(6,0080)                                                    00192000
176.           GOTO 1260                                                       00193000
177.      C                                                                     00194000
178.      C     SOLICIT ONROAD FUEL ECONOMY INFO NEXT                           00195000
179.      C                                                                     00196000
180.      1290 WRITE(6,1300)                                                    00197000
181.      1300 FORMAT(/,1X,'SELECT ONE OF THE FOLLOWING METHODS FOR DETERMINING 00198000
182.          &NROAD MPG',/,4X,'1 - HARMONIC AVERAGE OF TECHNOLOGY SPECIFIC FUEL 00199000
183.          &ECONOMIES & SHORTFALL COEFFICIENTS',/,4X,'2 - HARMONIC AVERAGE OF 00200000
184.          &TECH. SPECIFIC FUEL ECON. & "USER SUPPLIED" SHORTFALL COEFFICIENTS00201000
185.          &',/,4X,'3 - NO FUEL ECONOMY SHORTFALL, I.E., EPA MPG = ONROAD MPG'00202000
186.          &)                                                               00203000
187.           READ(5,*,ERR=1310) RODOPT                                       00204000
188.           IF (RODOPT.GE.1.AND.RODOPT.LE.3) GOTO 1315                      00205000
189.      1310 WRITE(6,0080)                                                   00206000
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190.           GOTO 1290                                                        00207000
191.      1315 IF(RODOPT.NE.2) GOTO 1320                                        00208000
192.      1316 WRITE(6,1317)                                                    00209000
193.      1317 FORMAT(/1X,'SELECT REGRESSION SPACE',/4X,'1 - MPG',/,4X,'2 - GPM')00210000
194.     C                                                                      00211000
195.           READ(5,*,ERR=1318) GPM                                           00212000
196.           IF(GPM.GE.1 .AND. GPM.LE.2) GO TO 1319                           00213000
197.      1318 WRITE(6,0080)                                                    00214000
198.           GOTO 1316                                                        00215000
199.      1319 GPM = GPM - 1                                                    00216000
200.           CALL USERSF                                                      00217000
201.     C                                                                      00218000
202.     C     SOLICIT VMT GROWTH OPTION NEXT                                   00219000
203.     C                                                                      00220000
204.      1320 WRITE(6,1330)                                                    00221000
205.      1330 FORMAT(/,1X,'DO YOU WISH TO GROW ANNUAL VMT PER VEHICLE?',/,4X,  00222000
206.          &'1 - YES',/,4X,'2 - NO')                                         00223000
207.           READ(5,*,ERR=1340) INPUT                                         00224000
208.           IF (INPUT.EQ.1.OR.INPUT.EQ.2) GOTO 1350                          00225000
209.      1340 WRITE(6,0080)                                                    00226000
210.           GOTO 1320                                                        00227000
211.      1350 IF (INPUT.EQ.1) GROW = .TRUE.                                    00228000
212.           IF (INPUT.EQ.2) GROW = .FALSE.                                   00229000
213.           IF(.NOT.GROW) GO TO 1400                                         00230000
214.     C                                                                      00231000
215.      1355 WRITE(6,1360)                                                    00232000
216.      1360 FORMAT(/,1X,'SELECT VMT GROWTH FILE',                            00233000
217.          &  /,4X,'1 - DEFAULT (UNIT=22)',                                  00234000
218.          &  /,4X,'2 - ALTERNATE A (UNIT=23)',                              00235000
219.          &  /,4X,'3 - ALTERNATE B (UNIT=24)' )                             00236000
220.           READ(5,*,END=1365,ERR=1365) VMTSET                               00237000
221.           IF( (1.LE.VMTSET .AND. VMTSET.LE.3) ) GO TO 1370                 00238000
222.      1365 WRITE(6,0080)                                                    00239000
223.           GO TO 1355                                                       00240000
224.      1370 VMTSET = 21 + VMTSET                                             00241000
225.     C                                                                      00242000
226.     C     READ AND STORE VMT GROWTH RATES                                  00243000
227.     C                                                                      00244000
228.           REWIND VMTSET                                                    00245000
229.           READ(VMTSET,1371)                                                00246000
230.      1371 FORMAT(///)                                                      00247000
231.           DO 1375 I = 1,26                                                 00248000
232.           READ(VMTSET,1372)(VMTGRO(I,K), K=1,9)                            00249000
233.      1372 FORMAT(4X,9(3X,F6.4))                                            00250000
234.      1375 CONTINUE                                                         00251000
235.     C                                                                      00252000
236.     C     BASE YEAR CALIBRATION SOLICITATION FOLLOWS                       00253000
237.     C                                                                      00254000
238.      1400 WRITE(6,1410)                                                    00255000
239.      1410 FORMAT(/,1X,'DO YOU WANT TO PERFORM BASE YEAR CALIBRATION?',     00256000
240.          &/,4X,'1 - YES',/,4X,'2 - NO')                                    00257000
241.           READ(5,*,ERR=1420) INPUT                                         00258000
242.           IF (INPUT.EQ.1.OR.INPUT.EQ.2) GOTO 1430                          00259000
243.      1420 WRITE(6,0080)                                                    00260000
244.           GOTO 1400                                                        00261000
245.      1430 IF (INPUT.EQ.1) CALIB = .TRUE.                                   00262000
246.           IF (INPUT.EQ.2) CALIB = .FALSE.                                  00263000
247.     C                                                                      00264000
248.     C     DETERMINE HOW NUMBER OF VEHICLES IN FLEET ARE TO BE COMPUTED     00265000
249.     C                                                                      00266000
250.      1440 WRITE(6,1450)                                                    00267000
251.      1450 FORMAT(/,1X,'SELECT METHOD OF VEHICLE STOCK CALCULATION',/,4X,   00268000
252.          &'1 - SCRAPPAGE BASED UPON SALES',/,4X,'2 - SCRAPPAGE ONLY')      00269000
253.           READ(5,*,ERR=1460) INPUT                                         00270000
254.           IF (INPUT.EQ.1.OR.INPUT.EQ.2) GOTO 1470                          00271000
255.      1460 WRITE(6,0080)                                                    00272000
```

```
      GOTO 1440                                                         00273000
 1470 IF (INPUT.EQ.1) PAFRAC = .TRUE.                                   00274000
      IF (INPUT.EQ.2) PAFRAC = .FALSE.                                  00275000
C                                                                       00276000
C     ALL NECESSARY INFORMATION OBTAINED, QUERY USER AND PROCEED        00277000
C                                                                       00278000
 1474 CONTINUE                                                          00279000
      WRITE(6,1475)                                                     00280000
 1475 FORMAT(//,1X,'DO YOU WANT TO CHANGE SCENARIO PARAMETERS?',        00281000
     &        /,4X,'1 - YES',/,4X,'2 - NO')                             00282000
      READ(6,*,ERR=1478) ICHANG                                         00283000
      IF(0.LT.ICHANG .AND. ICHANG.LT.3) GO TO 1479                      00284000
 1478 WRITE(6,0080)                                                     00285000
      GO TO 1474                                                        00286000
 1479 CONTINUE                                                          00287000
      IF(ICHANG.EQ.1) GO TO 0029                                        00288000
      WRITE(6,1480)                                                     00289000
 1480 FORMAT(///,1X,'*** SCENARIO COMPLETE: STANDBY TO RECEIVE OUTPUT **00290000
     &*')                                                               00291000
      RETURN                                                            00292000
      END                                                               00293000
```

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&RD1.HFC.FORTH:USERSF - DEFAULT

   FROM &RD1.HFC.FORTH:USERSF  ON CATALOG
   CARD
   1/120  120 LINES  CURRENT=120

    1.      C                                                                       00001000
    2.      C     HIGHWAY FUEL CONSUMPTION MODEL: DECEMBER 1981                     00002000
    3.      C     ENERGY AND ENVIRONMENTAL ANALYSIS, INC.                           00003000
    4.      C     PROGRAMMER: ROBERT CRAWFORD                                       00004000
    5.      C     DOE CONTRACT: DE-AC01-79PE-70032, TASK 13                         00005000
    6.      C                                                                       00006000
    7.            SUBROUTINE USERSF                                                 00007000
    8.      C                                                                       00008000
    9.            INTEGER GO,GOTEST/2HGO/                                           00009000
   10.            INTEGER GPM                                                       00010000
   11.            LOGICAL FIRST/.TRUE./                                             00011000
   12.            REAL*4 SFHD2(2) /4HLDV:, 4HLDT:/, USERCF(2,55,2,5)                00012000
   13.            REAL*8 SFHD1(4,2) /8HMPG SPAC, 8HE:  MPG=,                        00013000
   14.           &                   8H A + B*E, 8HPA      ,                      00014000
   15.           &                   8HGPM SPAC, 8HE:  MPG=,                       00015000
   16.           &                   8H EPA/(A+, 8HB*EPA)  /,                      00016000
   17.           &       SFHD3(2)   /8HGASOLINE, 8HDIESEL  /                       00017000
   18.            COMMON /CB05/ USERCF,GPM                                          00018000
   19.      C                                                                       00019000
   20.            IF(FIRST) GO TO 1                                                 00020000
   21.            IF(.NOT.FIRST) GO TO 9000                                         00021000
   22.      C                                                                       00022000
   23.      C (A) INITIALIZE COEFFICIENT ARRAY TO NO SHORTFALL                      00023000
   24.      C                                                                       00024000
   25.          1 FIRST = .FALSE.                                                   00025000
   26.            DO 030 I = 1, 55                                                  00026000
   27.             DO 020 J = 1, 2                                                  00027000
   28.              DO 010 K = 1, 5                                                 00028000
   29.            USERCF(1,I,J,K) = GPM                                             00029000
   30.            USERCF(2,I,J,K) = 1.0 - GPM                                       00030000
   31.          010 CONTINUE                                                        00031000
   32.          020 CONTINUE                                                        00032000
   33.          030 CONTINUE                                                        00033000
   34.      C                                                                       00034000
   35.      C (B) WRITE HEADING & INSTRUCTIONS                                      00035000
   36.      C                                                                       00036000
   37.            WRITE(6,100) (SFHD1(I,1+GPM),I=1,4)                               00037000
   38.          100 FORMAT( (//),1X,'USER-SPECIFIED SHORTFALL INTERFACE',           00038000
   39.           &        (//),1X,4A8,                                             00039000
   40.           &        (//),1X,'ENTER TIME PERIOD AND COEFFICIENTS (A,B)',      00040000
   41.           &        ( /),1X,' IN RESPONSE TO PROMPT (?), E.G., ',            00041000
   42.           &        ( /),5X,'1946 1975 1.00 0.85  (FREE FORMAT)',            00042000
   43.           &        ( /),1X,'IN RESPONSE TO ECHO, ENTER:',                   00043000
   44.           &        ( /),1X,'   GO  -- TO COMPLETE ENTRY',                   00044000
   45.           &        ( /),1X,'  NOGO -- TO REPEAT INPUT'           )          00045000
   46.      C                                                                       00046000
   47.      C (C)  INTERFACE SUPPORTS TWO AGGREGATE VEHICLE CLASSES (LDV.LDT)       00047000
   48.      C      AND GAS/DSL FUEL TYPES.                                          00048000
   49.      C                                                                       00049000
   50.            DO 5020 IK = 1, 2                                                 00050000
   51.             DO 5010 J = 1, 2                                                 00051000
   52.            WRITE(6,1010) SFHD2(IK),SFHD3(J)                                  00052000
   53.           1010 FORMAT( (/),5X,1A4,1X,1A8)                                   00053000
   54.            WRITE(6,1011)                                                     00054000
   55.           1011 FORMAT(/)                                                     00055000
   56.      C                                                                       00056000
   57.      C      USER I/O AND ECHO BUFFER                                         00057000
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C                                                                       00058000
 2000 CONTINUE                                                          00059000
C                                                                       00060000
C                                                                       00061000
      READ(5,*) IYRF,IYRL,A,B                                           00062000
        IF(IYRF.LT.1946) IYRF = 1946                                    00063000
        IF(IYRL.GT.2000) IYRL = 2000                                    00064000
        IF(IYRF.GT.IYRL) GO TO 2050                                     00065000
C                                                                       00066000
      WRITE(6,2020) IYRF,IYRL,A,B                                       00067000
 2020 FORMAT(1X,'ECHO: ',2I5,2F10.2,' ?')                               00068000
C                                                                       00069000
      READ(5,2030,END=3000,ERR=3000) GO                                 00070000
 2030 FORMAT(A2)                                                        00071000
      IF(GO.EQ.GOTEST) GO TO 3000                                       00072000
C                                                                       00073000
 2050 CONTINUE                                                          00074000
      WRITE(6,2051)                                                     00075000
 2051 FORMAT(1X,'ENTRY NOT ACCEPTED: REPEAT')                           00076000
      GO TO 2000                                                        00077000
C                                                                       00078000
C     STORE IN MASTER COEFFICIENT ARRAY                                 00079000
C                                                                       00080000
 3000 IF(IK.EQ.1) KF = 1                                                00081000
      IF(IK.EQ.1) KL = 2                                                00082000
      IF(IK.EQ.2) KF = 3                                                00083000
      IF(IK.EQ.2) KL = 5                                                00084000
C                                                                       00085000
      DO 4010 IY = IYRF, IYRL                                           00086000
      I = IY - 1945                                                     00087000
C                                                                       00088000
        DO 4000 K = KF, KL                                              00089000
      USERCF(1,I,J,K) = A                                               00090000
      USERCF(2,I,J,K) = B                                               00091000
C                                                                       00092000
 4000 CONTINUE                                                          00093000
 4010 CONTINUE                                                          00094000
C                                                                       00095000
      IF(IY.LT.2000) GO TO 2000                                         00096000
C                                                                       00097000
C (D) TERMINATE CONTROL LOOPS ON FUEL TYPE AND AGGREGATE CLASSES        00098000
C                                                                       00099000
 5010 CONTINUE                                                          00100000
C                                                                       00101000
 5020 CONTINUE                                                          00102000
C                                                                       00103000
C                                                                       00104000
      GPMLST = GPM                                                      00105000
      GO TO 10000                                                       00106000
C                                                                       00107000
C (E) ALLOW USER TO RETAIN COEFFICIENTS FOR SECOND AND LATER            00108000
C     SCENARIOS                                                         00109000
C                                                                       00110000
 9000 IF(GPMLST.NE.GPM) GO TO 1                                         00111000
      WRITE(6,9010)                                                     00112000
 9010 FORMAT(('//),1X,'DO YOU WISH TO MODIFY PREVIOUS COEFFICIENTS?',   00113000
     &       ( /),5X,'1 - YES',(/),5X,'2 - NO')                         00114000
      READ(5,*,ERR=9000,END=9000) USROPT                                00115000
C                                                                       00116000
      IF(USROPT.EQ.1) GO TO 1                                           00117000
C                                                                       00118000
10000 RETURN                                                            00119000
      END                                                               00120000
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&RD1.HFC.FORTH:INBASE - DEFAULT

   FROM &RD1.HFC.FORTH:INBASE  ON CATALOG
   CARD
   1/482  482 LINES  CURRENT=482

    1.      C                                                                       00001000
    2.      C     HIGHWAY FUEL CONSUMPTION MODEL: DECEMBER 1981                     00002000
    3.      C     ENERGY AND ENVIRONMENTAL ANALYSIS, INC.                           00003000
    4.      C     PROGRAMMER: MIKE MOCHAN                                           00004000
    5.      C     DOE CONTRACT: DE-AC01-79PE-70032, TASK 13                         00005000
    6.      C                                                                       00006000
    7.            SUBROUTINE INBASE                                                 00007000
    8.            REAL SALES(55,9),GASMPG(55,9),DSLMPG(55,9),DSLPEN(55,9),          00008000
    9.           &     LEDPEN(55,9),GASADJ(55,5),AUTMPG(55,5),MANPCT(55,5),         00009000
   10.           &     MANMPG(55,5),BASPCT(55,5),BASMPG(55,5),ALTPCT(55,5),         00010000
   11.           &     ALTMPG(55,5),DSLADJ(55,5),DRWMPG(55,5),DFWPCT(55,5),         00011000
   12.           &     DFWMPG(55,5),DALPCT(55,5),DALMPG(55,5),SCRLDV(30,2),         00012000
   13.           &     SCRLDT(30,4),SCRMHD(30,2,3),VMTLDV(30,2),VMTLDT(30,4),       00013000
   14.           &     VMTMHD(30,2,3),COEFA1(11,2,5),COEFB1(11,2,5),                00014000
   15.           &     COEFA2(11,2,5),COEFB2(11,2,5),COEFA3(11,2,5),                00015000
   16.           &     COEFB3(11,2,5),COEFA4(11,2,5),COEFB4(11,2,5),                00016000
   17.           &     VEH(30,2,9),LEADED(30,9),VMT(30,2,9),EPA(30,2,9),            00017000
   18.           &     RMPG(30,2,9),MSURV(30,2,9),VMTGRO(26,9),ADVANT,              00018000
   19.           &     USERCF(2,55,2,5)                                             00019000
   20.            INTEGER I,J,K,L,R,UNIT,BEGYR,ENDYR,VYR,FYR,LYR,                   00020000
   21.           &        MPGOPT,RODOPT,YRIND(100),GPM                              00021000
   22.            LOGICAL PIND(26),SHORT,PAFRAC,CALIB,GROW                         00022000
   23.            COMMON /CB01/ SALES,GASMPG,DSLMPG,DSLPEN,                        00023000
   24.           &       LEDPEN,GASADJ,AUTMPG,MANPCT,                              00024000
   25.           &       MANMPG,BASPCT,BASMPG,ALTPCT,                              00025000
   26.           &       ALTMPG,DSLADJ,DRWMPG,DFWPCT,                              00026000
   27.           &       DFWMPG,DALPCT,DALMPG,SCRLDV,                              00027000
   28.           &       SCRLDT,SCRMHD,VMTLDV,VMTLDT,                              00028000
   29.           &       VMTMHD,COEFA1,COEFB1,                                     00029000
   30.           &       COEFA2,COEFB2,COEFA3,                                     00030000
   31.           &       COEFB3,COEFA4,COEFB4                                      00031000
   32.            COMMON /CB02/ VEH,LEADED,VMT,EPA,RMPG,MSURV,VMTGRO               00032000
   33.            COMMON /CB03/ BEGYR,ENDYR,VYR,FYR,LYR,MPGOPT,RODOPT,YRIND,ADVANT 00033000
   34.           & ,SHORT,PAFRAC,CALIB,GROW,PIND                                   00034000
   35.            COMMON /CB05/ USERCF,GPM                                         00035000
   36.      C                                                                       00036000
   37.      C     CALCULATE THE NUMBER OF VEHICLES IN THE FLEET BY VEH CLASS AND BY 00037000
   38.      C     FUEL TYPE (GAS/DSL) FOR EACH YEAR WITHIN THE PRESCRIBED 30 YEAR   00038000
   39.      C     PERIOD.                                                           00039000
   40.      C                                                                       00040000
   41.            L = 0                                                             00041000
   42.            R = 31                                                            00042000
   43.            DO 1020 I = BEGYR,ENDYR                                           00043000
   44.      C                                                                       00044000
   45.      C     DETERMINE THE RELATIVE POSITION OF THE ITH YR IN THE 30 YEAR ARRAY00045000
   46.      C     NOTE: SCRAPPAGE ALWAYS MOVES FROM YR 1 TO 30, REPRESENTED BY L    00046000
   47.      C                                                                       00047000
   48.            L = L + 1                                                         00048000
   49.            R = R - 1                                                         00049000
   50.      C                                                                       00050000
   51.      C     GAS IS HANDLED FIRST (J=1), FOLLOWED BY DSL (J=2).                00051000
   52.      C                                                                       00052000
   53.            DO 1010 J = 1,2                                                   00053000
   54.      C                                                                       00054000
   55.      C     NOTE THAT GAS FLEET SHARE  IS 1 MINUS DSL SHARE                   00055000
   56.      C                                                                       00056000
   57.            IF (J.EQ.1) FACTOR = -1                                           00057000
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      IF (J.EQ.2) FACTOR =  0                                                   00058000
C                                                                               00059000
C     LOOP THRU ALL CLASSES WITH THE NEXT LOOP.                                 00060000
C                                                                               00061000
      DO 1000 K = 1,9                                                           00062000
C                                                                               00063000
C     THE APPROPRIATE SCRAPPAGE FACTOR IS SELECTED NEXT BASED UPON THE          00064000
C     VEH CLASS. FOR HEAVY TRUCKS, A GAS/DSL DISTINCTION IS ALSO MADE.          00065000
C                                                                               00066000
      IF (K.LE.2)             SCRAP = SCRLDV(L,K)                               00067000
      IF (K.GT.2.AND.K.LE.6) SCRAP = SCRLDT(L,(K-2))                            00068000
      IF (K.GT.6)             SCRAP = SCRMHD(L,J,(K-6))                         00069000
C                                                                               00070000
C     COMPUTE NUMBER OF VEHICLES FOR RELATIVE YEAR "R".                         00071000
C                                                                               00072000
      VEH(R,J,K) = SALES(I,K) * SCRAP * ABS(FACTOR + DSLPEN(I,K))               00073000
C                                                                               00074000
 1000 CONTINUE                                                                  00075000
 1010 CONTINUE                                                                  00076000
 1020 CONTINUE                                                                  00077000
C                                                                               00078000
C     SET LEAD PENETRATION FOR 30 YEAR ARRAY.                                   00079000
C                                                                               00080000
      L = 0                                                                     00081000
      R = 31                                                                    00082000
      DO 1040 I = BEGYR,ENDYR                                                   00083000
      R = R - 1                                                                 00084000
      L = L + 1                                                                 00085000
      DO 1030 J = 1,9                                                           00086000
      LEADED(R,J) = LEDPEN(I,J)                                                 00087000
 1030 CONTINUE                                                                  00088000
 1040 CONTINUE                                                                  00089000
C                                                                               00090000
C     THE VMT 30 YEAR ARRAY WILL BE LOADED NEXT.                                00091000
C                                                                               00092000
      L = 0                                                                     00093000
      R = 31                                                                    00094000
      DO 1070 I = BEGYR,ENDYR                                                   00095000
      R = R - 1                                                                 00096000
      L = L + 1                                                                 00097000
      DO 1060 J = 1,2                                                           00098000
      DO 1050 K = 1,9                                                           00099000
C                                                                               00100000
C    SELECT APPROPRIATE CLASS ARRAY FROM ARRAYS HOLDING INPUT VMT               00101000
C                                                                               00102000
      IF (K.LE.2)             VMT(R,J,K) = VMTLDV(L,K)                          00103000
      IF (K.GT.2.AND.K.LE.6) VMT(R,J,K) = VMTLDT(L,(K-2))                       00104000
      IF (K.GT.6)             VMT(R,J,K) = VMTMHD(L,J,(K-6))                    00105000
 1050 CONTINUE                                                                  00106000
 1060 CONTINUE                                                                  00107000
 1070 CONTINUE                                                                  00108000
C                                                                               00109000
C     CALIBRATE BASE YEAR VMT, FIRST SET BASE YR VMT POINTER                    00110000
C                                                                               00111000
      IF(.NOT.GROW) GO TO 1078                                                  00112000
      VYR = ENDYR - 29                                                          00113000
      DO 1077 I = 1,30                                                          00114000
      DO 1076 J = 1,2                                                           00115000
      DO 1075 K = 1,9                                                           00116000
      DO 1074 IVYR = 1, VYR                                                     00117000
      VMT(I,J,K) = VMT(I,J,K) * VMTGRO(IVYR,K)                                  00118000
 1074 CONTINUE                                                                  00119000
 1075 CONTINUE                                                                  00120000
 1076 CONTINUE                                                                  00121000
 1077 CONTINUE                                                                  00122000
C                                                                               00123000
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C     INITIALIZE THE EPA FUEL ECONOMY ARRAYS FOR CLASSES 1 THRU 5.      00124000
C     THREE OPTIONS ARE OPEN TO THE USER, MPGOPT CONTAINS SELECTED OPT# 00125000
C     WHERE: OPT#1 = STRAIGHT EPA PLUS DSL ADVANTAGE,                   00126000
C            OPT#2 = DIRECTLY OFF THE DATA FILES VIA COMMON BLK ARRAYS,  00127000
C            OPT#3 = USE TECH PENETRATION & FUEL ECONOMY EST.           00128000
C                                                                       00129000
 1078 GO TO (1080,1110,1140),MPGOPT                                     00130000
C                                                                       00131000
C     OPT#1 FOLLOWS.                                                    00132000
C                                                                       00133000
 1080 CONTINUE                                                          00134000
      IDUMP = 1                                                         00135000
      R = 31                                                            00136000
      DO 1100 I = BEGYR,ENDYR                                           00137000
      R = R -1                                                          00138000
      DO 1090 J = 1,5                                                   00139000
C                                                                       00140000
C     SET GAS MPG.                                                      00141000
C                                                                       00142000
      EPA(R,1,J) = GASMPG(I,J)                                          00143000
C                                                                       00144000
C     CALCULATE DIESEL MPG BY APPLYING ADVANTAGE FACTOR.                00145000
C                                                                       00146000
      EPA(R,2,J) = EPA(R,1,J) * ADVANT                                  00147000
C                                                                       00148000
 1090 CONTINUE                                                          00149000
 1100 CONTINUE                                                          00150000
C                                                                       00151000
C     END OF THE MPG COMP FOR CLASSES 1-5, JUMP TO 6-9 NEXT.            00152000
C                                                                       00153000
      GOTO 1230                                                         00154000
C                                                                       00155000
C     OPT#2 FOLLOWS.                                                    00156000
C                                                                       00157000
 1110 CONTINUE                                                          00158000
      R = 31                                                            00159000
      DO 1130 I = BEGYR,ENDYR                                           00160000
      R = R - 1                                                         00161000
      DO 1120 J = 1,5                                                   00162000
C                                                                       00163000
C     SET MPG FOR GAS THEN FOR DSL.                                     00164000
C                                                                       00165000
      EPA(R,1,J) = GASMPG(I,J)                                          00166000
      EPA(R,1,J) = DSLMPG(I,J)                                          00167000
C                                                                       00168000
 1120 CONTINUE                                                          00169000
 1130 CONTINUE                                                          00170000
C                                                                       00171000
C     END OF THE MPG COMP. FOR CLASSES 1-5, JUMP TO 6-9 NEXT.           00172000
C                                                                       00173000
      GOTO 1230                                                         00174000
C                                                                       00175000
C     OPT#3 FOLLOWS.                                                    00176000
C                                                                       00177000
 1140 CONTINUE                                                          00178000
      IDUMP = 2                                                         00179000
      R = 31                                                            00180000
      DO 1180 I = BEGYR,ENDYR                                           00181000
      R = R - 1                                                         00182000
      DO 1170 J = 1,5                                                   00183000
C                                                                       00184000
C     CHECK TO ENSURE THAT THE MARKET SHARES FOR CONVENTIONAL TECHS     00185000
C     ARE REASONABLE.  IF NOT, PRINT A MSG TO DESIGNATED MSG FILE.      00186000
C                                                                       00187000
      IF ((1-(BASPCT(I,J)+ALTPCT(I,J))).LT.0)                           00188000
     *WRITE(50,1150)YRIND(I),J                                          00189000
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 1150 FORMAT(1X,'ERROR: CONV GAS PENTR < 0 IN ',I4,' IN VEH CLASS ',I1) 00190000
      IF ((1-(BASPCT(I,J)+ALTPCT(I,J))).GE.0.AND.(1-(BASPCT(I,J)+       00191000
     &ALTPCT(I,J))).LT.(0.001))                                         00192000
     &WRITE(50,1160)YRIND(I),J                                          00193000
 1160 FORMAT(1X,'WARNING: CONV GAS PENTR = 0 IN ',I4,' IN VEH CLASS ',  00194000
     &I1)                                                               00195000
C                                                                       00196000
C     A HARMONIC AVG WILL BE COMPUTED NEXT FOR GAS.                     00197000
C                                                                       00198000
      EPA(R,1,J) = 1.0/((MANPCT(I,J)*(1-(BASPCT(I,J)+ALTPCT(I,J)))      00199000
     &           /MANMPG(I,J))                                          00200000
     &           + ((1-MANPCT(I,J))*(1-(BASPCT(I,J)+ALTPCT(I,J)))       00201000
     &           /AUTMPG(I,J))                                          00202000
     &           + (BASPCT(I,J)/BASMPG(I,J))                            00203000
     &           + (ALTPCT(I,J)/ALTMPG(I,J)))                           00204000
 1170 CONTINUE                                                          00205000
 1180 CONTINUE                                                          00206000
C                                                                       00207000
C     A HARMONIC AVG WILL BE COMPUTED NEXT FOR DIESEL.                  00208000
C                                                                       00209000
      R = 31                                                            00210000
      DO 1220 I = BEGYR,ENDYR                                           00211000
      R = R - 1                                                         00212000
      DO 1210 J = 1,5                                                   00213000
C                                                                       00214000
C     CHECK TO ENSURE THAT THE MARKET SHARES FOR CONVENTIONAL TECHS     00215000
C     ARE REASONABLE .  IF NOT, PRINT A MSG TO DESIGNATED MSG FILE.     00216000
C                                                                       00217000
      IF ((1-(DFWPCT(I,J)+DALPCT(I,J))).LT.0)                           00218000
     &WRITE(50,1190)YRIND(I),J                                          00219000
 1190 FORMAT(1X,'ERROR: CONV DIESEL PENTR < 0 IN ',I4,' IN VEH CLASS ', 00220000
     &I1)                                                               00221000
      IF ((1-(DFWPCT(I,J)+DALPCT(I,J))).GE.0.AND.(1-(DFWPCT(I,J)+       00222000
     &DALPCT(I,J))).LT.(0.001))                                         00223000
     &WRITE(50,1200)YRIND(I),J                                          00224000
 1200 FORMAT(1X,'WARNING: CONV DIESEL  PENTR = 0 IN ',I4, ' IN VEH CLAS 00225000
     &S ',I1)                                                           00226000
      EPA(R,2,J) = 1.0/((1-(DFWPCT(I,J)+DALPCT(I,J)))/DRWMPG(I,J))      00227000
     &           + (DFWPCT(I,J)/DFWMPG(I,J))                            00228000
     &           + (DALPCT(I,J)/DALMPG(I,J)))                           00229000
C                                                                       00230000
 1210 CONTINUE                                                          00231000
 1220 CONTINUE                                                          00232000
C                                                                       00233000
C                                                                       00234000
C     MPG COMPUTATIONS FOR VEH CLASSES 6-9 FOLLOW.                      00235000
C                                                                       00236000
 1230 CONTINUE                                                          00237000
      R = 31                                                            00238000
      DO 1250 I = BEGYR,ENDYR                                           00239000
      R = R - 1                                                         00240000
      DO 1240 J = 6,9                                                   00241000
C                                                                       00242000
C     SET GAS MPG FIRST THEN DSL                                        00243000
C                                                                       00244000
      EPA(R,1,J) = GASMPG(I,J)                                          00245000
      EPA(R,2,J) = DSLMPG(I,J)                                          00246000
C                                                                       00247000
 1240 CONTINUE                                                          00248000
 1250 CONTINUE                                                          00249000
 1260 CONTINUE                                                          00250000
C                                                                       00251000
C     COMPUTE ONROAD FUEL ECONOMY NEXT.                                 00252000
C     FIRST, DETERMINE WHICH OF THREE OPTIONS HAS BEEN CHOSEN.          00253000
C     WHERE: OPT#1 = TECH SPECIFIC BASED ON COEF HELD IN ARRAY,         00254000
C            OPT#2 = USER DEFINED COEF READ AT RUNTIME.                 00255000
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C            OPT#3 = NO DISCOUNTING OF EPA MPG.                                 00256000
C                                                                               00257000
      GO TO (1270,1320,1330), RODOPT                                            00258000
C                                                                               00259000
C     OPT#1 FOLLOWS.                                                            00260000
C                                                                               00261000
 1270 CONTINUE                                                                  00262000
      R = 31                                                                    00263000
      DO 1290 I = BEGYR,ENDYR                                                   00264000
      R = R - 1                                                                 00265000
C                                                                               00266000
C     CREATE ONROAD MPG FOR GAS.  NOTE 1975 SF COEFS ARE USED                   00267000
C     FOR ALL YEARS PRIOR TO 1975 AND 1985 VALUES ARE USED FOR ALL              00268000
C     YEARS BEYOND 1985. THUS, YEARS ARE CONTROLLED BY VARIABLE 'L'.            00269000
C                                                                               00270000
      IF (I.GE.30.AND.I.LE.40) L = (I-30) + 1                                   00271000
      IF (I.LT.30)             L = 1                                            00272000
      IF (I.GT.40)             L = 11                                           00273000
      DO 1280 K = 1,5                                                           00274000
C                                                                               00275000
C     GAS SF MPG'S BY TECHNOLOGY ARE COMPUTED BASED ON COEFFICIENTS.            00276000
C                                                                               00277000
      SFA1 = COEFA1(L,1,K)/AUTMPG(I,K)                                          00278000
      SFA2 = COEFA2(L,1,K)/MANMPG(I,K)                                          00279000
      SFA3 = COEFA3(L,1,K)/BASMPG(I,K)                                          00280000
      SFA4 = COEFA4(L,1,K)/ALTMPG(I,K)                                          00281000
C                                                                               00282000
      SFA =((1-MANPCT(I,K))*(1-(BASPCT(I,K)+ALTPCT(I,K)))*SFA1)                 00283000
     &    + (MANPCT(I,K)*(1-(BASPCT(I,K)+ALTPCT(I,K)))*SFA2)                    00284000
     &    + (BASPCT(I,K)*SFA3)                                                  00285000
     &    + (ALTPCT(I,K)*SFA4)                                                  00286000
C                                                                               00287000
      SFB =((1-MANPCT(I,K))*(1-(BASPCT(I,K)+ALTPCT(I,K)))*COEFB1(L,1,K))       00288000
     &    + (MANPCT(I,K)*(1-(BASPCT(I,K)+ALTPCT(I,K)))*COEFB2(L,1,K))           00289000
     &    + (BASPCT(I,K)*COEFB3(L,1,K))                                         00290000
     &    + (ALTPCT(I,K)*COEFB4(L,1,K))                                         00291000
C                                                                               00292000
C     TECH SPECIFIC EPA MPG IS REQUIRED TO COMPLETE COMPUTATION                 00293000
C                                                                               00294000
      IF (MPGOPT.EQ.3) GOTO  1271                                               00295000
      EPAFLT = 1.0/((MANPCT(I,K)*(1-(BASPCT(I,K)+ALTPCT(I,K)))                  00296000
     &           /MANMPG(I,K))                                                  00297000
     &           + ((1-MANPCT(I,K))*(1-(BASPCT(I,K)+ALTPCT(I,K)))               00298000
     &           /AUTMPG(I,K))                                                  00299000
     &           + (BASPCT(I,K)/BASMPG(I,K))                                    00300000
     &           + (ALTPCT(I,K)/ALTMPG(I,K)))                                   00301000
      GOTO 1272                                                                 00302000
 1271 CONTINUE                                                                  00303000
      EPAFLT = EPA(R,1,K)                                                       00304000
 1272 CONTINUE                                                                  00305000
C                                                                               00306000
      SFA = SFA*EPAFLT                                                          00307000
      RMPG(R,1,K) = EPA(R,1,K)/(SFA+(SFB*EPA(R,1,K))+GASADJ(I,K))               00308000
C                                                                               00309000
 1280 CONTINUE                                                                  00310000
 1290 CONTINUE                                                                  00311000
C                                                                               00312000
C     ONROAD DSL MPG CALCULATIONS FOLLOW                                        00313000
C                                                                               00314000
      R = 31                                                                    00315000
      DO 1310 I = BEGYR,ENDYR                                                   00316000
      R = R - 1                                                                 00317000
      IF (I.GE.30.AND.I.LE.40) L = (I-30) + 1                                   00318000
      IF (I.LT.30)             L = 1                                            00319000
      IF (I.GT.40)             L = 11                                           00320000
      DO 1300 K = 1,5                                                           00321000
```

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C                                                                       00322000
C     DSL SF MPG'S BY TECHNOLOGY ARE COMPUTED BASED ON COEFFICIENTS.    00323000
C                                                                       00324000
      SFA1 = COEFA1(L,2,K)/DRWMPG(I,K)                                  00325000
      SFA2 = COEFA2(L,2,K)/DFWMPG(I,K)                                  00326000
      SFA3 = COEFA3(L,2,K)/DALMPG(I,K)                                  00327000
C                                                                       00328000
      SFA = ((1-(DFWPCT(I,K)+DALPCT(I,K)))*SFA1)                        00329000
     &    + (DFWPCT(I,K)*SFA2)                                         00330000
     &    + (DALPCT(I,K)*SFA3)                                         00331000
C                                                                       00332000
      SFB = ((1-(DFWPCT(I,K)+DALPCT(I,K)))*COEFB1(L,2,K))               00333000
     &    + (DFWPCT(I,K)*COEFB2(L,2,K))                                00334000
     &    + (DALPCT(I,K)*COEFB3(L,2,K))                                00335000
C                                                                       00336000
C     TECH SPECIFIC EPA DSL MPG IS REQUIRED TO COMPLETE COMP            00337000
C                                                                       00338000
      IF (MPGOPT.EQ.3) GOTO 1291                                        00339000
      EPAFLT = 1.0/(((1-(DFWPCT(I,K)+DALPCT(I,K)))/DRWMPG(I,K))         00340000
     &           + (DFWPCT(I,K)/DFWMPG(I,K))                          00341000
     &           + (DALPCT(I,K)/DALMPG(I,K)))                         00342000
      GOTO 1292                                                         00343000
 1291 CONTINUE                                                          00344000
      EPAFLT = EPA(R,2,K)                                               00345000
 1292 CONTINUE                                                          00346000
C                                                                       00347000
      SFA = SFA*EPAFLT                                                  00348000
      RMPG(R,2,K) = EPA(R,2,K)/(SFA+(SFB*EPA(R,2,K))+DSLADJ(I,K))       00349000
C                                                                       00350000
 1300 CONTINUE                                                          00351000
 1310 CONTINUE                                                          00352000
C                                                                       00353000
C     ONROAD MPG COMPLETE FOR CLASS 1-5, GOTO CALC FOR 6-9              00354000
C                                                                       00355000
      GOTO 1370                                                         00356000
C                                                                       00357000
C     OPT#2 FOLLOWS.                                                    00358000
C                                                                       00359000
 1320 CONTINUE                                                          00360000
C                                                                       00361000
      R = 31                                                            00362000
      DO 1328 I = BEGYR, ENDYR                                          00363000
      R = R - 1                                                         00364000
      DO 1326 J = 1, 2                                                  00365000
      DO 1324 K = 1,5                                                   00366000
C                                                                       00367000
      SFA = USERCF(1,I,J,K)                                             00368000
      SFB = USERCF(2,I,J,K)                                             00369000
C                                                                       00370000
      IF(GPM.EQ.0) RMPG(R,J,K) = SFA + SFB*EPA(R,J,K)                   00371000
      IF(GPM.EQ.1) RMPG(R,J,K) = EPA(R,J,K)/(SFA+SFB*EPA(R,J,K))        00372000
C                                                                       00373000
 1324 CONTINUE                                                          00374000
 1326 CONTINUE                                                          00375000
 1328 CONTINUE                                                          00376000
C                                                                       00377000
C                                                                       00378000
C     ONROAD MPG COMPLETE FOR CLASS 1-5, GOTO CALC FOR 6-9              00379000
C                                                                       00380000
      GOTO 1370                                                         00381000
C                                                                       00382000
C     OPT#3 FOLLOWS                                                     00383000
C                                                                       00384000
 1330 CONTINUE                                                          00385000
      R = 31                                                            00386000
      DO 1340 I = BEGYR,ENDYR                                           00387000
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388.           R = R - 1                                                    00388000
389.           DO 1350 J = 1,2                                              00389000
390.           DO 1340 K = 1,9                                              00390000
391.           RMPG(R,J,K) = EPA(R,J,K)                                     00391000
392.      1340 CONTINUE                                                     00392000
393.      1350 CONTINUE                                                     00393000
394.      1360 CONTINUE                                                     00394000
395.      C                                                                 00395000
396.      C      ONROAD MPG COMPLETE FOR CLASS 1-5, GOTO CALC FOR 6-9       00396000
397.      C                                                                 00397000
398.      C      CALC OF ONROAD MPG FOR CLASS 6-9 FOLLOWS                   00398000
399.      C                                                                 00399000
400.      1370 CONTINUE                                                     00400000
401.           R = 31                                                       00401000
402.           DO 1400 I = BEGYR,ENDYR                                      00402000
403.           R = R - 1                                                    00403000
404.           DO 1390 J = 1,2                                              00404000
405.           DO 1380 K = 6,9                                              00405000
406.           RMPG(R,J,K) = EPA(R,J,K)                                     00406000
407.      1380 CONTINUE                                                     00407000
408.      1390 CONTINUE                                                     00408000
409.      1400 CONTINUE                                                     00409000
410.      C                                                                 00410000
411.      C     OPTIONAL BASE YEAR CALIBRATION STEP FOLLOWS..               00411000
412.      C                                                                 00412000
413.           IF (.NOT.CALIB) GO TO 1405                                   00413000
414.      C                                                                 00414000
415.           CALL CALIBR                                                  00415000
416.      C                                                                 00416000
417.      C                                                                 00417000
418.      C      MARGINAL SURVIVAL CALCULATIONS FOLLOW.                     00418000
419.      C                                                                 00419000
420.      C      SET  YEAR  ONE TO 1.0 FIRST FOR ALL CLASSES.               00420000
421.      C                                                                 00421000
422.      1405 DO 1410 K = 1,9                                              00422000
423.           MSURV(1,1,K) = 1.0                                           00423000
424.           MSURV(1,2,K) = 1.0                                           00424000
425.      1410 CONTINUE                                                     00425000
426.      C                                                                 00426000
427.      C      LOOP THRU REMAINING 29 YEARS FOR ALL CLASSES.              00427000
428.      C                                                                 00428000
429.           R = 31                                                       00429000
430.           LSTYR = ENDYR - 1                                            00430000
431.           DO 1440 I = BEGYR,LSTYR                                      00431000
432.           R = R - 1                                                    00432000
433.           DO 1420 IK = 1,3                                             00433000
434.      C                                                                 00434000
435.      C      AGGREGATE INDIVIDUAL CLASSES INTO LDV, LDT, MHD            00435000
436.      C                                                                 00436000
437.           IF(IK.EQ.1) KF = 1                                           00437000
438.           IF(IK.EQ.1) KL = 2                                           00438000
439.           IF(IK.EQ.2) KF = 3                                           00439000
440.           IF(IK.EQ.2) KL = 6                                           00440000
441.           IF(IK.EQ.3) KF = 7                                           00441000
442.           IF(IK.EQ.3) KL = 9                                           00442000
443.      C                                                                 00443000
444.           VEHL = 0.0                                                   00444000
445.           VEHP = 0.0                                                   00445000
446.           SALEL = 0.0                                                  00446000
447.           SALEP = 0.0                                                  00447000
448.      C                                                                 00448000
449.           DO 1416 K = KF, KL                                           00449000
450.           SALEL = SALEL + SALES(I+1,K)                                 00450000
451.           SALEP = SALEP + SALES(I,K)                                   00451000
452.            DO 1414 J = 1, 2                                            00452000
453.           VEHL = VEHL + VEH(R-1,J,K)                                   00453000
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454.            VEHP = VEHP + VEH(R,J,K)                                    00454000
455.         1414 CONTINUE                                                  00455000
456.         1416 CONTINUE                                                  00456000
457.        C                                                               00457000
458.        C       SURV REMAINS AT ZERO UNLESS ONE OF THE FOLLOWING CONDITIONS 00458000
459.        C       IS MET.                                                 00459000
460.        C                                                               00460000
461.            SURV = 0.0                                                  00461000
462.            IF(SALEL.LT.0.0001) GO TO 1417                              00462000
463.            TERM1 = VEHL/SALEL                                          00463000
464.            IF(SALEP.LT.0.0001) GO TO 1417                              00464000
465.            TERM2 = VEHP/SALEP                                          00465000
466.        C                                                               00466000
467.            IF(TERM1.LT.0.0001) GO TO 1417                              00467000
468.              SURV = TERM2/TERM1                                        00468000
469.        C                                                               00469000
470.        C       RESTORE MARGINAL SURVIVAL RATE                          00470000
471.        C                                                               00471000
472.         1417 DO 1419 K = KF, KL                                        00472000
473.               DO 1418 J = 1, 2                                         00473000
474.            MSURV(R,J,K) = SURV                                         00474000
475.         1418 CONTINUE                                                  00475000
476.         1419 CONTINUE                                                  00476000
477.        C                                                               00477000
478.        C                                                               00478000
479.         1420 CONTINUE                                                  00479000
480.         1440 CONTINUE                                                  00480000
481.            RETURN                                                      00481000
482.            END                                                         00482000
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&RD1.HFC.FORTH:CALIBR - DEFAULT

   FROM &RD1.HFC.FORTH:CALIBR  ON CATALOG
   CARD
   1/316  316 LINES  CURRENT=316

    1.      C                                                                       00001000
    2.      C     HIGHWAY FUEL CONSUMPTION MODEL: DECEMBER 1981                     00002000
    3.      C     ENERGY AND ENVIRONMENTAL ANALYSIS, INC.                           00003000
    4.      C     PROGRAMMER: ROBERT CRAWFORD                                       00004000
    5.      C     DOE CONTRACT: DE-AC01-79PE-70032, TASK 13                         00005000
    6.      C                                                                       00006000
    7.            SUBROUTINE CALIBR                                                 00007000
    8.            REAL LDVTOT,LDTTOT,LDDSL,MHDTOT,MHDDSL,MHDSTK                     00008000
    9.            REAL SALES(55,9),GASMPG(55,9),DSLMPG(55,9),DSLPEN(55,9),          00009000
   10.           &     LEDPEN(55,9),GASADJ(55,5),AUTMPG(55,5),MANPCT(55,5),        00010000
   11.           &     MANMPG(55,5),BASPCT(55,5),BASMPG(55,5),ALTPCT(55,5),        00011000
   12.           &     ALTMPG(55,5),DSLADJ(55,5),DRWMPG(55,5),DFWPCT(55,5),        00012000
   13.           &     DFWMPG(55,5),DALPCT(55,5),DALMPG(55,5),SCRLDV(30,2),        00013000
   14.           &     SCRLDT(30,4),SCRMHD(30,2,3),VMTLDV(30,2),VMTLDT(30,4),      00014000
   15.           &     VMTMHD(30,2,3),COEFA1(11,2,5),COEFB1(11,2,5),               00015000
   16.           &     COEFA2(11,2,5),COEFB2(11,2,5),COEFA3(11,2,5),               00016000
   17.           &     COEFB3(11,2,5),COEFA4(11,2,5),COEFB4(11,2,5),               00017000
   18.           &     VEH(30,2,9),LEADED(30,9),VMT(30,2,9),EPA(30,2,9),           00018000
   19.           &     RMPG(30,2,9),MSURV(30,2,9),VMTGRO(26,9),ADVANT,             00019000
   20.           &     USERCF(2,55,2,5)                                            00020000
   21.            INTEGER I,J,K,L,R,UNIT,BEGYR,ENDYR,VYR,FYR,LYR,                  00021000
   22.           &       MPGOPT,RODOPT,YRIND(100),GPM                              00022000
   23.            INTEGER BASEYR, STEP                                             00023000
   24.            LOGICAL PIND(26),SHORT,PAFRAC,CALIB,GROW                         00024000
   25.            LOGICAL LDV,LDT,MHD,FIRST/.TRUE./                                00025000
   26.            COMMON /CB01/ SALES,GASMPG,DSLMPG,DSLPEN,                        00026000
   27.           &       LEDPEN,GASADJ,AUTMPG,MANPCT,                              00027000
   28.           &       MANMPG,BASPCT,BASMPG,ALTPCT,                              00028000
   29.           &       ALTMPG,DSLADJ,DRWMPG,DFWPCT,                              00029000
   30.           &       DFWMPG,DALPCT,DALMPG,SCRLDV,                              00030000
   31.           &       SCRLDT,SCRMHD,VMTLDV,VMTLDT,                              00031000
   32.           &       VMTMHD,COEFA1,COEFB1,                                     00032000
   33.           &       COEFA2,COEFB2,COEFA3,                                     00033000
   34.           &       COEFB3,COEFA4,COEFB4                                      00034000
   35.            COMMON /CB02/ VEH,LEADED,VMT,EPA,RMPG,MSURV,VMTGRO               00035000
   36.            COMMON /CB03/ BEGYR,ENDYR,VYR,FYR,LYR,MPGOPT,RODOPT,YRIND,ADVANT 00036000
   37.           & ,SHORT,PAFRAC,CALIB,GROW,PIND                                   00037000
   38.            COMMON /CB05/ USERCF,GPM                                         00038000
   39.      C                                                                       00039000
   40.      C       B A S E  Y E A R  C A L I B R A T I O N                         00040000
   41.      C                                                                       00041000
   42.            IF (.NOT.FIRST) GO TO 500                                        00042000
   43.            FIRST = .FALSE.                                                  00043000
   44.      C                                                                       00044000
   45.      C (A) READ CALIBRATION DATA FILE                                        00045000
   46.      C                                                                       00046000
   47.            READ(1,100) BASEYR,PASTK,TRKSTK,PACAL,TRKCAL,DIESEL              00047000
   48.        100 FORMAT(3(/),10X,I10,(//),2(20X,F10.3,/),(/),3(20X,F10.3,/))      00048000
   49.      C                                                                       00049000
   50.      C ********************************************************************* 00050000
   51.      C                                                                       00051000
   52.      C (B) PASSENGER CAR FLEET SIZE                                          00052000
   53.      C                                                                       00053000
   54.      C     (B.1) CALCULATE TOTAL PA FLEET SIZE PREDICTED BY HFC              00054000
   55.      C                                                                       00055000
   56.        500 STEP = 0                                                        00056000
   57.            CALFLT = PASTK                                                  00057000
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C                                                                       00058000
 1000 TOTFLT = 0.0                                                      00059000
C                                                                       00060000
      DO 1030 R = 1, 25                                                 00061000
       DO 1020 J = 1, 2                                                 00062000
        DO 1010 K = 1, 2                                                00063000
      IF(VEH(R,J,K).LT.0.0001) VEH(R,J,K) = 0.0                         00064000
      TOTFLT = TOTFLT + VEH(R,J,K)                                      00065000
 1010 CONTINUE                                                          00066000
 1020 CONTINUE                                                          00067000
 1030 CONTINUE                                                          00068000
C                                                                       00069000
C     (B.2) DETERMINE NEEDED CHANGE IN FLEET SIZE                       00070000
C                                                                       00071000
      DELFLT = CALFLT - TOTFLT                                          00072000
C                                                                       00073000
      IF(ABS(DELFLT).LT.0.0001) GO TO 2000                              00074000
C                                                                       00075000
C     (B.3) DETERMINE TOTAL SCRAPPAGE AND SCALE FACTOR                  00076000
C                                                                       00077000
      R = 31                                                            00078000
      DTOT = 0.0                                                        00079000
      DOTOT = 0.0                                                       00080000
      DO 1130 I = BEGYR, ENDYR                                          00081000
      R = R - 1                                                         00082000
      IF(R.GT.25) GO TO 1130                                            00083000
        DO 1110 K = 1, 2                                                00084000
      VSUM = VEH(R,1,K) + VEH(R,2,K)                                    00085000
      DVEH = SALES(I,K) - VSUM                                          00086000
      DTOT = DTOT + DVEH                                                00087000
      IF(VSUM.GT.0.0001) DOTOT = DOTOT + DVEH                           00088000
 1110 CONTINUE                                                          00089000
 1130 CONTINUE                                                          00090000
C                                                                       00091000
      IF(DELFLT.GE.0) ALPHA = 1 - DELFLT/DTOT                           00092000
      IF(DELFLT.LT.0.0001) ALPHA = 1. - 1.0010*DELFLT/DOTOT             00093000
C                                                                       00094000
C     (B.4) ADJUST VEHICLES IN OPERATION AND RETURN FOR ITERATION       00095000
C                                                                       00096000
      R = 31                                                            00097000
      DO 1230 I = BEGYR, ENDYR                                          00098000
      R = R - 1                                                         00099000
      IF(R.GT.25) GO TO 1230                                            00100000
       DO 1220 K = 1, 2                                                 00101000
       SCRCAL = ALPHA*( SALES(I,K) - (VEH(R,1,K)+VEH(R,2,K)) )          00102000
       IF(SCRCAL.GT.SALES(I,K)) SCRCAL = SALES(I,K)                     00103000
       DSLPCT = DSLPEN(I,K)                                             00104000
      VEH(R,1,K) = (1.0-DSLPCT)*(SALES(I,K) - SCRCAL)                   00105000
      VEH(R,2,K) = DSLPCT*(SALES(I,K) - SCRCAL)                         00106000
 1220 CONTINUE                                                          00107000
 1230 CONTINUE                                                          00108000
C                                                                       00109000
C                                                                       00110000
      STEP = STEP + 1                                                   00111000
      IF(STEP.LT.5) GO TO 1000                                          00112000
C                                                                       00113000
C ---------------------------------------------------------------------- 00114000
C (C) TRUCK FLEET SIZE                                                  00115000
C                                                                       00116000
C     THE MHD TRUCK FLEET IS ASSUMED CORRECT.  LDT FLEET IS             00117000
C     ADJUSTED UNTIL CALIBRATION TOTAL IS MET.                          00118000
C                                                                       00119000
 2000 STEP = 0                                                          00120000
      CALFLT = TRKSTK                                                   00121000
      MHDSTK = 0.0                                                      00122000
C                                                                       00123000
```

```
124.           DO 2030 R = 1, 30                                                00124000
125.            DO 2020 J = 1, 2                                                00125000
126.             DO 2010 K = 7, 9                                               00126000
127.           MHDSTK = MHDSTK + VEH(R,J,K)                                     00127000
128.      2010 CONTINUE                                                         00128000
129.      2020 CONTINUE                                                         00129000
130.      2030 CONTINUE                                                         00130000
131.      C                                                                     00131000
132.           CALFLT = CALFLT - MHDSTK                                         00132000
133.      C                                                                     00133000
134.      C     (C.1) CALCULATE TOTAL LDT FLEET SIZE PREDICTED BY HFC           00134000
135.      C                                                                     00135000
136.      C                                                                     00136000
137.      2100 TOTFLT = 0.0                                                     00137000
138.      C                                                                     00138000
139.           DO 2130 R = 1, 25                                                00139000
140.            DO 2120 J = 1, 2                                                00140000
141.             DO 2110 K = 3, 6                                               00141000
142.           IF(VEH(R,J,K).LT.0.0001) VEH(R,J,K) = 0.0                        00142000
143.           TOTFLT = TOTFLT + VEH(R,J,K)                                     00143000
144.      2110 CONTINUE                                                         00144000
145.      2120 CONTINUE                                                         00145000
146.      2130 CONTINUE                                                         00146000
147.      C                                                                     00147000
148.      C     (C.2) DETERMINE NEEDED CHANGE IN FLEET SIZE                     00148000
149.      C                                                                     00149000
150.           DELFLT = CALFLT - TOTFLT                                         00150000
151.      C                                                                     00151000
152.           IF(ABS(DELFLT).LT.0.0001) GO TO 5000                             00152000
153.      C                                                                     00153000
154.      C     (C.3) DETERMINE TOTAL SCRAPPAGE AND SCALE FACTOR                00154000
155.      C                                                                     00155000
156.           R = 31                                                           00156000
157.           DTOT = 0.0                                                       00157000
158.           DOTOT = 0.0                                                      00158000
159.           DO 2230 I = BEGYR, ENDYR                                         00159000
160.           R = R - 1                                                        00160000
161.           IF(R.GT.25) GO TO 2230                                           00161000
162.             DO 2210 K = 3, 6                                               00162000
163.           VSUM = VEH(R,1,K) + VEH(R,2,K)                                   00163000
164.           DVEH = SALES(I,K) - VSUM                                         00164000
165.           DTOT = DTOT + DVEH                                               00165000
166.           IF(VSUM.GT.0.0001) DOTOT = DOTOT + DVEH                          00166000
167.      2210 CONTINUE                                                         00167000
168.      2230 CONTINUE                                                         00168000
169.      C                                                                     00169000
170.           IF(DELFLT.GE.0) ALPHA = 1 - DELFLT/DTOT                          00170000
171.           IF(DELFLT.LT.0) ALPHA = 1. - 1.0010*DELFLT/DOTOT                 00171000
172.      C                                                                     00172000
173.      C     (C.4) ADJUST VEHICLES IN OPERATION AND RETURN FOR ITERATION     00173000
174.      C                                                                     00174000
175.           R = 31                                                           00175000
176.           DO 2330 I = BEGYR, ENDYR                                         00176000
177.           R = R - 1                                                        00177000
178.           IF(R.GT.25) GO TO 2330                                           00178000
179.            DO 2320 K = 3, 6                                                00179000
180.            SCRCAL = ALPHA*( SALES(I,K) - (VEH(R,1,K)+VEH(R,2,K)) )         00180000
181.            IF(SCRCAL.GT.SALES(I,K)) SCRCAL = SALES(I,K)                    00181000
182.            DSLPCT = DSLPEN(I,K)                                            00182000
183.           VEH(R,1,K) = (1.0-DSLPCT)*(SALES(I,K) - SCRCAL)                  00183000
184.           VEH(R,2,K) = DSLPCT*(SALES(I,K) - SCRCAL)                        00184000
185.      2320 CONTINUE                                                         00185000
186.      2330 CONTINUE                                                         00186000
187.      C                                                                     00187000
188.      C                                                                     00188000
189.           STEP = STEP + 1                                                  00189000
```

```
      IF(STEP.LT.5) GO TO 2100                                          00190000
C                                                                       00191000
C ********************************************************************* 00192000
C                                                                       00193000
C (D) CALIBRATE TO FUEL DEMAND TOTALS                                   00194000
C                                                                       00195000
C     (D.1) TOTAL DIESEL DEMAND IS CALIBRATED BY ADJUSTING              00196000
C           MHD TRUCK VMT CURVES                                        00197000
C                                                                       00198000
 5000 MHD = .FALSE.                                                     00199000
      LDT = .FALSE.                                                     00200000
      LDV = .FALSE.                                                     00201000
      LDDSL = 0.0                                                       00202000
C                                                                       00203000
      DO 5020 R = 1, 30                                                 00204000
       DO 5010 K = 1, 6                                                 00205000
        IF(RMPG(R,2,K).LT.0.01) GO TO 5010                              00206000
        LDDSL = LDDSL + VMT(R,2,K)*VEH(R,2,K)/RMPG(R,2,K)               00207000
 5010 CONTINUE                                                          00208000
 5020 CONTINUE                                                          00209000
C                                                                       00210000
      CALDSL = DIESEL - LDDSL                                           00211000
      MHDDSL = 0.0                                                      00212000
C                                                                       00213000
      DO 5120 R = 1, 30                                                 00214000
       DO 5110 K = 7, 9                                                 00215000
      IF(RMPG(R,2,K).LT.0.01) GO TO 5110                                00216000
      MHDDSL = MHDDSL + VMT(R,2,K)*VEH(R,2,K)/RMPG(R,2,K)               00217000
 5110 CONTINUE                                                          00218000
 5120 CONTINUE                                                          00219000
C                                                                       00220000
      ALPHA = CALDSL/MHDDSL                                             00221000
      IF(ABS(ALPHA-1.0).GT.0.0001) GO TO 5200                           00222000
         MHD = .TRUE.                                                   00223000
         GO TO 6000                                                     00224000
C                                                                       00225000
 5200 CONTINUE                                                          00226000
C                                                                       00227000
      DO 5230 R = 1, 30                                                 00228000
       DO 5220 J = 1, 2                                                 00229000
        DO 5210 K = 7, 9                                                00230000
      VMT(R,J,K) = ALPHA*VMT(R,J,K)                                     00231000
 5210 CONTINUE                                                          00232000
 5220 CONTINUE                                                          00233000
 5230 CONTINUE                                                          00234000
C                                                                       00235000
C                                                                       00236000
C     (D.2) TOTAL TRUCK FUEL DEMAND IS CALIBRATED BY                    00237000
C           ADJUSTING LDT VMT CURVES                                    00238000
C                                                                       00239000
 6000 MHDTOT = 0.0                                                      00240000
C                                                                       00241000
      DO 6020 R = 1, 30                                                 00242000
       DO 6010 K = 7, 9                                                 00243000
        DO 6005 J = 1, 2                                                00244000
      IF(RMPG(R,J,K).LT.0.01) GO TO 6005                                00245000
      MHDTOT = MHDTOT + VMT(R,J,K)*VEH(R,J,K)/RMPG(R,J,K)               00246000
 6005 CONTINUE                                                          00247000
 6010 CONTINUE                                                          00248000
 6020 CONTINUE                                                          00249000
C                                                                       00250000
      CALTOT = TRKCAL - MHDTOT                                          00251000
      LDTTOT = 0.0                                                      00252000
C                                                                       00253000
      DO 6120 R = 1, 30                                                 00254000
       DO 6110 K = 3, 6                                                 00255000
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256.            DO 6105 J = 1, 2                                        00256000
257.           IF(RMPG(R,J,K).LT.0.01) GO TO 6105                       00257000
258.           LDTTOT = LDTTOT + VMT(R,J,K)*VEH(R,J,K)/RMPG(R,J,K)      00258000
259.      6105 CONTINUE                                                 00259000
260.      6110 CONTINUE                                                 00260000
261.      6120 CONTINUE                                                 00261000
262.      C                                                             00262000
263.           ALPHA = CALTOT/LDTTOT                                    00263000
264.           IF(ABS(ALPHA-1.0).GT.0.0001) GO TO 6200                  00264000
265.              LDT = .TRUE.                                          00265000
266.              GO TO 7000                                            00266000
267.      C                                                             00267000
268.      6200 CONTINUE                                                 00268000
269.      C                                                             00269000
270.           DO 6230 R = 1, 30                                        00270000
271.            DO 6220 J = 1, 2                                        00271000
272.              DO 6210 K = 3, 6                                      00272000
273.           VMT(R,J,K) = ALPHA*VMT(R,J,K)                            00273000
274.      6210 CONTINUE                                                 00274000
275.      6220 CONTINUE                                                 00275000
276.      6230 CONTINUE                                                 00276000
277.      C                                                             00277000
278.      C     (D.3) LDV FUEL DEMAND IS CALIBRATED INDEPENDENTLY       00278000
279.      C           FROM TRUCK CLASSES                                00279000
280.      C                                                             00280000
281.      7000 CALTOT = PACAL                                           00281000
282.           LDVTOT = 0.0                                             00282000
283.      C                                                             00283000
284.           DO 7120 R = 1, 30                                        00284000
285.            DO 7110 K = 1, 2                                        00285000
286.             DO 7105 J = 1, 2                                       00286000
287.           IF(RMPG(R,J,K).LT.0.01) GO TO 7105                       00287000
288.           LDVTOT = LDVTOT + VMT(R,J,K)*VEH(R,J,K)/RMPG(R,J,K)      00288000
289.      7105 CONTINUE                                                 00289000
290.      7110 CONTINUE                                                 00290000
291.      7120 CONTINUE                                                 00291000
292.      C                                                             00292000
293.           ALPHA = CALTOT/LDVTOT                                    00293000
294.           IF( ABS(ALPHA-1.0).GT.0.0001) GO TO 7200                 00294000
295.              LDV = .TRUE.                                          00295000
296.              GO TO 8000                                            00296000
297.      C                                                             00297000
298.      7200 CONTINUE                                                 00298000
299.      C                                                             00299000
300.           DO 7230 R = 1, 30                                        00300000
301.            DO 7220 J = 1, 2                                        00301000
302.              DO 7210 K = 1, 2                                      00302000
303.           VMT(R,J,K) = ALPHA*VMT(R,J,K)                            00303000
304.      7210 CONTINUE                                                 00304000
305.      7220 CONTINUE                                                 00305000
306.      7230 CONTINUE                                                 00306000
307.      C                                                             00307000
308.      C                                                             00308000
309.      8000 STEP = STEP + 1                                          00309000
310.           IF(MHD.AND.LDT.AND.LDV) GO TO 9000                       00310000
311.      C                                                             00311000
312.           IF(STEP.LT.5) GO TO 5000                                 00312000
313.      C                                                             00313000
314.      C                                                             00314000
315.      9000 RETURN                                                   00315000
316.           END                                                      00316000
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&RD1.HFC.FORTH:OUTPUT - DEFAULT

   FROM &RD1.HFC.FORTH:OUTPUT  ON CATALOG
   CARD
   1/319  319 LINES  CURRENT=319

    1.     C                                                                      00001000
    2.     C     HIGHWAY FUEL CONSUMPTION MODEL: DECEMBER 1981                    00002000
    3.     C     ENERGY AND ENVIRONMENTAL ANALYSIS, INC.                          00003000
    4.     C     PROGRAMMER: MIKE MOCHAN                                          00004000
    5.     C     DOE CONTRACT: DE-AC01-79PE-70032, TASK 13                        00005000
    6.     C                                                                      00006000
    7.           SUBROUTINE OUTPUT                                                00007000
    8.           REAL SALES(55,9),GASMPG(55,9),DSLMPG(55,9),DSLPEN(55,9),         00008000
    9.          &     LEDPEN(55,9),GASADJ(55,5),AUTMPG(55,5),MANPCT(55,5),       00009000
   10.          &     MANMPG(55,5),BASPCT(55,5),BASMPG(55,5),ALTPCT(55,5),       00010000
   11.          &     ALTMPG(55,5),DSLADJ(55,5),DRWMPG(55,5),DFWPCT(55,5),       00011000
   12.          &     DFWMPG(55,5),DALPCT(55,5),DALMPG(55,5),SCRLDV(30,2),       00012000
   13.          &     SCRLDT(30,4),SCRMHD(30,2,3),VMTLDV(30,2),VMTLDT(30,4),     00013000
   14.          &     VMTMHD(30,2,3),COEFA1(11,2,5),COEFB1(11,2,5),              00014000
   15.          &     COEFA2(11,2,5),COEFB2(11,2,5),COEFA3(11,2,5),              00015000
   16.          &     COEFB3(11,2,5),COEFA4(11,2,5),COEFB4(11,2,5),              00016000
   17.          &     VEH(30,2,9),LEADED(30,9),VMT(30,2,9),EPA(30,2,9),          00017000
   18.          &     RMPG(30,2,9),MSURV(30,2,9),VMTGRO(26,9),ADVANT,            00018000
   19.          &     USERCF(2,55,2,5)                                           00019000
   20.           INTEGER I,J,K,L,R,UNIT,BEGYR,ENDYR,VYR,FYR,LYR,                 00020000
   21.          &        MPGOPT,RODOPT,YRIND(100),GPM                            00021000
   22.           LOGICAL PIND(26),SHORT,PAFRAC,CALIB,GROW                       00022000
   23.           COMMON /CB01/ SALES,GASMPG,DSLMPG,DSLPEN,                      00023000
   24.          &       LEDPEN,GASADJ,AUTMPG,MANPCT,                            00024000
   25.          &       MANMPG,BASPCT,BASMPG,ALTPCT,                            00025000
   26.          &       ALTMPG,DSLADJ,DRWMPG,DFWPCT,                            00026000
   27.          &       DFWMPG,DALPCT,DALMPG,SCRLDV,                            00027000
   28.          &       SCRLDT,SCRMHD,VMTLDV,VMTLDT,                            00028000
   29.          &       VMTMHD,COEFA1,COEFB1,                                   00029000
   30.          &       COEFA2,COEFB2,COEFA3,                                   00030000
   31.          &       COEFB3,COEFA4,COEFB4                                    00031000
   32.           COMMON /CB02/ VEH,LEADED,VMT,EPA,RMPG,MSURV,VMTGRO             00032000
   33.           COMMON /CB03/ BEGYR,ENDYR,VYR,FYR,LYR,MPGOPT,RODOPT,YRIND,ADVANT 00033000
   34.          & ,SHORT,PAFRAC,CALIB,GROW,PIND                                 00034000
   35.           COMMON /CB04/ HD1(4,9),HD2(4,5)                                00035000
   36.           COMMON /CB05/ USERCF,GPM                                       00036000
   37.           REAL NSBVMT(5),SUBVMT(5),NEWEFD(9),FLTEFD(9),NEWRFD(9),        00037000
   38.          &     FLTRFD(2,9),LEDRFD(9),UNLRFD(9),GDRFD(9),NSBRFD(9),       00038000
   39.          &     BBLDAY(9),SUBRFD(5,5),NSBEFD(5),SUBEFD(5),NEWEPG(9),      00039000
   40.          &     NEWRPG(9),FLTEPG(9),FLTRPG(9),NSBEPG(5),NSBRPG(5),        00040000
   41.          &     SUBEPG(5),SUBRPG(5),NEWREG(2,9),FLTREG(2,9),              00041000
   42.          &     NSBREG(2,5),SUBREG(2,5),NEWVMT(9),FLTVMT(9)               00042000
   43.     C                                                                      00043000
   44.     C     INITIALIZE VARIABLES                                             00044000
   45.     C                                                                      00045000
   46.           DO 600 I = 1,5                                                   00046000
   47.           NSBVMT(I) = 0.0                                                  00047000
   48.           SUBVMT(I) = 0.0                                                  00048000
   49.         600 CONTINUE                                                       00049000
   50.           DO 700 I = 1,9                                                   00050000
   51.           NEWVMT(I) = 0.0                                                  00051000
   52.           FLTVMT(I) = 0.0                                                  00052000
   53.           NEWEFD(I) = 0.0                                                  00053000
   54.           NEWRFD(I) = 0.0                                                  00054000
   55.           LEDRFD(I) = 0.0                                                  00055000
   56.           FLTEFD(I) = 0.0                                                  00056000
   57.         700 CONTINUE                                                       00057000
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      DO 900 I = 1,2                                                    00058000
      DO 800 J = 1,9                                                    00059000
      NEWREG(I,J) = 0.0                                                 00060000
      FLTREG(I,J) = 0.0                                                 00061000
      FLTRFD(I,J) = 0.0                                                 00062000
  800 CONTINUE                                                          00063000
  900 CONTINUE                                                          00064000
C                                                                       00065000
C     FIRST DETERMINE PROPER VMT GHD1TH RATE                            00066000
C                                                                       00067000
C                                                                       00068000
C     CALCULATE VMT FOR ALL CLASSES WITHIN THE FLEET                    00069000
C                                                                       00070000
      DO 1020 I = 1,30                                                  00071000
      DO 1010 J = 1,2                                                   00072000
      DO 1000 K = 1,9                                                   00073000
C                                                                       00074000
C     CALCULATE NEW REGISTRATION VMT  FIRST                             00075000
C                                                                       00076000
      IF (I.EQ.1)                                                       00077000
     &NEWVMT(K) = NEWVMT(K) + VEH(1,J,K) * VMT(1,J,K)                   00078000
      FLTVMT(K) = FLTVMT(K) + VEH(I,J,K) * VMT(I,J,K)                   00079000
 1000 CONTINUE                                                          00080000
 1010 CONTINUE                                                          00081000
 1020 CONTINUE                                                          00082000
C                                                                       00083000
C     CALCULATIONS FOR VMT SUBTOTALS & TOTAL FOLLOWS                    00084000
C                                                                       00085000
      NSBVMT(1) = NEWVMT(1) + NEWVMT(2)                                 00086000
      NSBVMT(2) = NEWVMT(3) + NEWVMT(4) + NEWVMT(5)                     00087000
      NSBVMT(3) = NSBVMT(1) + NSBVMT(2)                                 00088000
      NSBVMT(4) = NEWVMT(7) + NEWVMT(8) + NEWVMT(9)                     00089000
      NSBVMT(5) = NEWVMT(6) + NSBVMT(3) + NSBVMT(4)                     00090000
      SUBVMT(1) = FLTVMT(1) + FLTVMT(2)                                 00091000
      SUBVMT(2) = FLTVMT(3) + FLTVMT(4) + FLTVMT(5)                     00092000
      SUBVMT(3) = SUBVMT(1) + SUBVMT(2)                                 00093000
      SUBVMT(4) = FLTVMT(7) + FLTVMT(8) + FLTVMT(9)                     00094000
      SUBVMT(5) = FLTVMT(6) + SUBVMT(3) + SUBVMT(4)                     00095000
C                                                                       00096000
C     FLEET WIDE FUEL DEMAND CALCULATIONS FOLLOW                        00097000
C                                                                       00098000
      DO 1050 I = 1,30                                                  00099000
      DO 1040 J = 1,2                                                   00100000
      DO 1030 K = 1,9                                                   00101000
C                                                                       00102000
C     CALCULATE NEW REGISTRATION FUEL DEMAND FIRST                      00103000
C                                                                       00104000
      IF (I.EQ.1) NEWEFD(K) = NEWEFD(K) +                               00105000
     &          (VEH(1,J,K)*VMT(1,J,K))/EPA(1,J,K)                      00106000
      IF (I.EQ.1) NEWRFD(K) = NEWRFD(K) +                               00107000
     &          (VEH(1,J,K)*VMT(1,J,K))/RMPG(1,J,K)                     00108000
      FLTEFD(K) = FLTEFD(K) + (VEH(I,J,K)*VMT(I,J,K))                   00109000
     &            /EPA(I,J,K)                                           00110000
      FLTRFD(J,K) = FLTRFD(J,K) + (VEH(I,J,K)*VMT(I,J,K))               00111000
     &            /RMPG(I,J,K)                                          00112000
C                                                                       00113000
C     LEADED  FUEL DEMAND IS BROKEN OUT NEXT FOR GASOLINE               00114000
C                                                                       00115000
      IF (J.EQ.1) LEDRFD(K) = LEDRFD(K) + (LEADED(I,K) *                00116000
     &            (VEH(I,J,K)*VMT(I,J,K))/RMPG(I,J,K))                  00117000
 1030 CONTINUE                                                          00118000
 1040 CONTINUE                                                          00119000
 1050 CONTINUE                                                          00120000
C                                                                       00121000
C     CALCULATE UNLEADED FUEL DEMAND & TOTAL DEMAND IN BBL/DAY          00122000
C                                                                       00123000
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124.           DO 1060 K = 1,9                                                  00124000
125.           UNLRFD(K) = FLTRFD(1,K) - LEDRFD(K)                              00125000
126.           GDRFD(K) = FLTRFD(1,K) + FLTRFD(2,K)                             00126000
127.           BBLDAY(K) = GDRFD(K) * 0.06523                                   00127000
128.      1060 CONTINUE                                                         00128000
129.      C                                                                     00129000
130.      C    CALCULATE ONROAD FUEL DEMAND SUBTOTALS NEXT                      00130000
131.      C                                                                     00131000
132.      C    NEW REGISTRATION ONROAD FUEL DEMAND FOLLOWS                      00132000
133.      C                                                                     00133000
134.           NSBRFD(1) = NEWRFD(1) + NEWRFD(2)                                00134000
135.           NSBRFD(2) = NEWRFD(3) + NEWRFD(4) + NEWRFD(5)                    00135000
136.           NSBRFD(3) = NSBRFD(1) + NSBRFD(2)                                00136000
137.           NSBRFD(4) = NEWRFD(7) + NEWRFD(8) + NEWRFD(9)                    00137000
138.           NSBRFD(5) = NEWRFD(6) + NSBRFD(3) + NSBRFD(4)                    00138000
139.      C                                                                     00139000
140.      C    FLEET WIDE SUBTOTALS FRO ONROAD FUEL DEMAND FOLLOW               00140000
141.      C                                                                     00141000
142.           SUBRFD(1,1) = FLTRFD(2,1) + FLTRFD(2,2)                          00142000
143.           SUBRFD(1,2) = FLTRFD(2,3) + FLTRFD(2,4) + FLTRFD(2,5)            00143000
144.           SUBRFD(1,3) = SUBRFD(1,1) + SUBRFD(1,2)                          00144000
145.           SUBRFD(1,4) = FLTRFD(2,7) + FLTRFD(2,8) + FLTRFD(2,9)            00145000
146.           SUBRFD(1,5) = FLTRFD(2,6) + SUBRFD(1,3) + SUBRFD(1,4)            00146000
147.           SUBRFD(2,1) = LEDRFD(1) + LEDRFD(2)                              00147000
148.           SUBRFD(2,2) = LEDRFD(3) + LEDRFD(4) + LEDRFD(5)                  00148000
149.           SUBRFD(2,3) = SUBRFD(2,1) + SUBRFD(2,2)                          00149000
150.           SUBRFD(2,4) = LEDRFD(7) + LEDRFD(8) + LEDRFD(9)                  00150000
151.           SUBRFD(2,5) = LEDRFD(6) + SUBRFD(2,3) + SUBRFD(2,4)              00151000
152.           SUBRFD(3,1) = UNLRFD(1) + UNLRFD(2)                              00152000
153.           SUBRFD(3,2) = UNLRFD(3) + UNLRFD(4) + UNLRFD(5)                  00153000
154.           SUBRFD(3,3) = SUBRFD(3,1) + SUBRFD(3,2)                          00154000
155.           SUBRFD(3,4) = UNLRFD(7) + UNLRFD(8) + UNLRFD(9)                  00155000
156.           SUBRFD(3,5) = UNLRFD(6) + SUBRFD(3,3) + SUBRFD(3,4)              00156000
157.           SUBRFD(4,1) = GDRFD(1) + GDRFD(2)                                00157000
158.           SUBRFD(4,2) = GDRFD(3) + GDRFD(4) + GDRFD(5)                     00158000
159.           SUBRFD(4,3) = SUBRFD(4,1) + SUBRFD(4,2)                          00159000
160.           SUBRFD(4,4) = GDRFD(7) + GDRFD(8) + GDRFD(9)                     00160000
161.           SUBRFD(4,5) = GDRFD(6) + SUBRFD(4,3) + SUBRFD(4,4)               00161000
162.           SUBRFD(5,1) = BBLDAY(1) + BBLDAY(2)                              00162000
163.           SUBRFD(5,2) = BBLDAY(3) + BBLDAY(4) + BBLDAY(5)                  00163000
164.           SUBRFD(5,3) = SUBRFD(5,1) + SUBRFD(5,2)                          00164000
165.           SUBRFD(5,4) = BBLDAY(7) + BBLDAY(8) + BBLDAY(9)                  00165000
166.           SUBRFD(5,5) = BBLDAY(6) + SUBRFD(5,3) + SUBRFD(5,4)              00166000
167.      C                                                                     00167000
168.      C    CALCULATE EPA FUEL DEMAND SUBTOTALS NEXT                         00168000
169.      C                                                                     00169000
170.      C    NEW REGISTRATIONS EPA FUEL DEMAND IS DONE FIRST                  00170000
171.      C                                                                     00171000
172.           NSBEFD(1) = NEWEFD(1) + NEWEFD(2)                                00172000
173.           NSBEFD(2) = NEWEFD(3) + NEWEFD(4) + NEWEFD(5)                    00173000
174.           NSBEFD(3) = NSBEFD(1) + NSBEFD(2)                                00174000
175.           NSBEFD(4) = NEWEFD(7) + NEWEFD(8) + NEWEFD(9)                    00175000
176.           NSBEFD(5) = NEWEFD(6) + NSBEFD(3) + NSBEFD(4)                    00176000
177.      C                                                                     00177000
178.      C    FLEET WIDE EPA SUBTOTALS FOLLOW NEXT                             00178000
179.      C    NOTE GAS & DSL ARE LUMPED TOGETHER.                              00179000
180.      C                                                                     00180000
181.           SUBEFD(1) = FLTEFD(1) + FLTEFD(2)                                00181000
182.           SUBEFD(2) = FLTEFD(3) + FLTEFD(4) + FLTEFD(5)                    00182000
183.           SUBEFD(3) = SUBEFD(1) + SUBEFD(2)                                00183000
184.           SUBEFD(4) = FLTEFD(7) + FLTEFD(8) + FLTEFD(9)                    00184000
185.           SUBEFD(5) = FLTEFD(6) + SUBEFD(3) + SUBEFD(4)                    00185000
186.      C                                                                     00186000
187.      C    CALCULATE EPA & ONROAD MPG FOR ALL CLASSES                       00187000
188.      C                                                                     00188000
189.           DO 1070 K = 1,9                                                  00189000
```

```
      NEWEPG(K) = NEWVMT(K)/NEWEFD(K)                                   00190000
      NEWRPG(K) = NEWVMT(K)/NEWRFD(K)                                   00191000
      FLTEPG(K) = FLTVMT(K)/FLTEFD(K)                                   00192000
      FLTRPG(K) = FLTVMT(K)/GDRFD(K)                                    00193000
 1070 CONTINUE                                                          00194000
C                                                                       00195000
C     COMPUTE THE SUBTOTALS FOR EPA & ONROAD MPG                        00196000
C                                                                       00197000
      NSBEPG(1) = (NEWVMT(1)+NEWVMT(2))/(NEWEFD(1)+NEWEFD(2))           00198000
      NSBRPG(1) = (NEWVMT(1)+NEWVMT(2))/(NEWRFD(1)+NEWRFD(2))           00199000
      NSBEPG(2) = (NEWVMT(3)+NEWVMT(4)+NEWVMT(5))                       00200000
     &          / (NEWEFD(3)+NEWEFD(4)+NEWEFD(5))                       00201000
      NSBRPG(2) = (NEWVMT(3)+NEWVMT(4)+NEWVMT(5))                       00202000
     &          / (NEWRFD(3)+NEWRFD(4)+NEWRFD(5))                       00203000
      NSBEPG(3) = (NEWVMT(1)+NEWVMT(2)+NEWVMT(3)+NEWVMT(4)+NEWVMT(5))   00204000
     &          / (NEWEFD(1)+NEWEFD(2)+NEWEFD(3)+NEWEFD(4)+NEWEFD(5))   00205000
      NSBRPG(3) = (NEWVMT(1)+NEWVMT(2)+NEWVMT(3)+NEWVMT(4)+NEWVMT(5))   00206000
     &          / (NEWRFD(1)+NEWRFD(2)+NEWRFD(3)+NEWRFD(4)+NEWRFD(5))   00207000
      NSBEPG(4) = (NEWVMT(7)+NEWVMT(8)+NEWVMT(9))                       00208000
     &          / (NEWEFD(7)+NEWEFD(8)+NEWEFD(9))                       00209000
      NSBRPG(4) = (NEWVMT(7)+NEWVMT(8)+NEWVMT(9))                       00210000
     &          / (NEWRFD(7)+NEWRFD(8)+NEWRFD(9))                       00211000
      NSBEPG(5) = (NEWVMT(1)+NEWVMT(2)+NEWVMT(3)+NEWVMT(4)+NEWVMT(5)+   00212000
     &            NEWVMT(6)+NEWVMT(7)+NEWVMT(8)+NEWVMT(9))              00213000
     &          / (NEWEFD(1)+NEWEFD(2)+NEWEFD(3)+NEWEFD(4)+NEWEFD(5)+   00214000
     &            NEWEFD(6)+NEWEFD(7)+NEWEFD(8)+NEWEFD(9))              00215000
      NSBRPG(5) = (NEWVMT(1)+NEWVMT(2)+NEWVMT(3)+NEWVMT(4)+NEWVMT(5)+   00216000
     &            NEWVMT(6)+NEWVMT(7)+NEWVMT(8)+NEWVMT(9))              00217000
     &          / (NEWRFD(1)+NEWRFD(2)+NEWRFD(3)+NEWRFD(4)+NEWRFD(5)+   00218000
     &            NEWRFD(6)+NEWRFD(7)+NEWRFD(8)+NEWRFD(9))              00219000
C                                                                       00220000
C     FLEET WIDE TOTALS ARE COMPUTED NEXT FOR EPA & ONROAD MPG          00221000
C                                                                       00222000
      SUBEPG(1) = (FLTVMT(1)+FLTVMT(2))/(FLTEFD(1)+FLTEFD(2))           00223000
      SUBRPG(1) = (FLTVMT(1)+FLTVMT(2))/(GDRFD(1)+GDRFD(2))             00224000
      SUBEPG(2) = (FLTVMT(3)+FLTVMT(4)+FLTVMT(5))                       00225000
     &          / (FLTEFD(3)+FLTEFD(4)+FLTEFD(5))                       00226000
      SUBRPG(2) = (FLTVMT(3)+FLTVMT(4)+FLTVMT(5))                       00227000
     &          / (GDRFD(3)+GDRFD(4)+GDRFD(5))                          00228000
      SUBEPG(3) = (FLTVMT(1)+FLTVMT(2)+FLTVMT(3)+FLTVMT(4)+FLTVMT(5))   00229000
     &          / (FLTEFD(1)+FLTEFD(2)+FLTEFD(3)+FLTEFD(4)+FLTEFD(5))   00230000
      SUBRPG(3) = (FLTVMT(1)+FLTVMT(2)+FLTVMT(3)+FLTVMT(4)+FLTVMT(5))   00231000
     &          / (GDRFD(1)+GDRFD(2)+GDRFD(3)+GDRFD(4)+GDRFD(5))        00232000
      SUBEPG(4) = (FLTVMT(7)+FLTVMT(8)+FLTVMT(9))                       00233000
     &          / (FLTEFD(7)+FLTEFD(8)+FLTEFD(9))                       00234000
      SUBRPG(4) = (FLTVMT(7)+FLTVMT(8)+FLTVMT(9))                       00235000
     &          / (GDRFD(7)+GDRFD(8)+GDRFD(9))                          00236000
      SUBEPG(5) = (FLTVMT(1)+FLTVMT(2)+FLTVMT(3)+FLTVMT(4)+FLTVMT(5)+   00237000
     &            FLTVMT(6)+FLTVMT(7)+FLTVMT(8)+FLTVMT(9))              00238000
     &          / (FLTEFD(1)+FLTEFD(2)+FLTEFD(3)+FLTEFD(4)+FLTEFD(5)+   00239000
     &            FLTEFD(6)+FLTEFD(7)+FLTEFD(8)+FLTEFD(9))              00240000
      SUBRPG(5) = (FLTVMT(1)+FLTVMT(2)+FLTVMT(3)+FLTVMT(4)+FLTVMT(5)+   00241000
     &            FLTVMT(6)+FLTVMT(7)+FLTVMT(8)+FLTVMT(9))              00242000
     &          / (GDRFD(1)+GDRFD(2)+GDRFD(3)+GDRFD(4)+GDRFD(5)+        00243000
     &            GDRFD(6)+GDRFD(7)+GDRFD(8)+GDRFD(9))                  00244000
C                                                                       00245000
C     REGISTRATIONS FOR NEW VEHICLES AND THE FLEET ARE COMPUTED NEXT    00246000
C                                                                       00247000
      DO 1100 I = 1,30                                                  00248000
      DO 1090 J = 1,2                                                   00249000
      DO 1080 K = 1,9                                                   00250000
      IF (I.EQ.1) NEWREG(J,K) = NEWREG(J,K) + VEH(1,J,K)                00251000
      FLTREG(J,K) = FLTREG(J,K) + VEH(I,J,K)                            00252000
 1080 CONTINUE                                                          00253000
 1090 CONTINUE                                                          00254000
 1100 CONTINUE                                                          00255000
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C                                                                       00256000
C     CALCULATE TOTALS FOR NEW AND FLEET REGISTRATIONS                  00257000
C                                                                       00258000
      DO 1110 J = 1,2                                                   00259000
      NSBREG(J,1) = NEWREG(J,1) + NEWREG(J,2)                           00260000
      NSBREG(J,2) = NEWREG(J,3) + NEWREG(J,4) + NEWREG(J,5)             00261000
      NSBREG(J,3) = NSBREG(J,1) + NSBREG(J,2)                           00262000
      NSBREG(J,4) = NEWREG(J,7) + NEWREG(J,8) + NEWREG(J,9)             00263000
      NSBREG(J,5) = NEWREG(J,6) + NSBREG(J,3) + NSBREG(J,4)             00264000
      SUBREG(J,1) = FLTREG(J,1) + FLTREG(J,2)                           00265000
      SUBREG(J,2) = FLTREG(J,3) + FLTREG(J,4) + FLTREG(J,5)             00266000
      SUBREG(J,3) = SUBREG(J,1) + SUBREG(J,2)                           00267000
      SUBREG(J,4) = FLTREG(J,7) + FLTREG(J,8) + FLTREG(J,9)             00268000
      SUBREG(J,5) = FLTREG(J,6) + SUBREG(J,3) + SUBREG(J,4)             00269000
 1110 CONTINUE                                                          00270000
C                                                                       00271000
C     PRINT OUT TABLE                                                   00272000
C                                                                       00273000
      WRITE(8,1120)YRIND(ENDYR)                                         00274000
 1120 FORMAT(2(/),60X,'* ',I4,' *',/,29X,'NEW',56X,'FLEET',/,           00275000
     & 18X,28('-'),3X,84('-'),/,18X,'EPA',4X,'ROAD ',3X,'REGISTRATIONS',00276000
     & 4X,'EPA',4X,'ROAD',4X,'REGISTRATIONS',6X,'VMT',5X,14('-'),'FUEL',00277000
     & ' CONSUMPTION',10('-'),/,18X,'MPG',5X,'MPG',4X,'(IN MILLIONS)',  00278000
     & 4X,'MPG',5X,'MPG',5X,'(IN MILLIONS)',1X,'(IN BILLIONS)',2X,      00279000
     & '(IN BILLIONS OF GALLONS)',3X,'IN MILLIONS',/,33X,13('-'),       00280000
     & 14X,28('-'),40X,'OF',/,34X,'GAS',5X,'DSL',22X,'GAS',5X,'DSL',15X,00281000
     & 'DSL',5X,'LEAD',4X,'UNLD',3X,'TOTAL',1X,'BARRELS/DAY'/)          00282000
      IEND = 9                                                          00283000
      IF (SHORT) IEND = 6                                               00284000
      J = 0                                                             00285000
      DO 1160 K = 1,IEND                                                00286000
      I = I + 1                                                         00287000
      IF (K.EQ.2.OR.K.EQ.5.OR.K.EQ.9) J = J  + 1                        00288000
      WRITE(8,1130) (HD1(L,K),L=1,4),NEWEPG(K),NEWRPG(K),NEWREG(1,K),   00289000
     &NEWREG(2,K), FLTEPG(K),FLTRPG(K),FLTREG(1,K),FLTREG(2,K),FLTVMT(K)00290000
     &,FLTRFD(2,K),LEDRFD(K),UNLRFD(K),GDRFD(K),BBLDAY(K)               00291000
 1130 FORMAT(1X,3A4,A3,F6.2,2X,F6.2,3X,F6.3,2X,F6.3,1X,F6.2,2X,F6.2,    00292000
     & 3X,F7.3,1X,F6.3,2X,F7.2,3X,4(F7.3,1X),F6.2)                      00293000
C                                                                       00294000
C     THE FOLLOWING BRANCH HANDLES THE "TOT LITE TRUCK" LINE            00295000
C                                                                       00296000
      IF (K.NE.5) GOTO 1140                                             00297000
      WRITE(8,1130)(HD2(L,J),L=1,4),NSBEPG(J),NSBRPG(J),                00298000
     & NSBREG(1,J),NSBREG(2,J),SUBEPG(J),SUBRPG(J),                     00299000
     & SUBREG(1,J),SUBREG(2,J),SUBVMT(J),(SUBRFD(L,J),L=1,5)            00300000
      J = J + 1                                                         00301000
 1140 CONTINUE                                                          00302000
      IF (.NOT.(K.EQ.2.OR.K.EQ.5.OR.K.EQ.9)) GOTO 1160                  00303000
 1150 FORMAT(1X,132('-'))                                               00304000
      WRITE(8,1150)                                                     00305000
      WRITE(8,1130)(HD2(L,J),L=1,4),NSBEPG(J),NSBRPG(J),                00306000
     & NSBREG(1,J),NSBREG(2,J),SUBEPG(J),SUBRPG(J),                     00307000
     & SUBREG(1,J),SUBREG(2,J),SUBVMT(J),(SUBRFD(L,J),L=1,5)            00308000
      WRITE(8,1150)                                                     00309000
 1160 CONTINUE                                                          00310000
      IF (.NOT.SHORT)                                                   00311000
     &WRITE(8,1130)(HD2(L,5),L=1,4),NSBEPG(5),NSBRPG(5),                00312000
     & NSBREG(1,5),NSBREG(2,5),SUBEPG(5),SUBRPG(5),                     00313000
     & SUBREG(1,5),SUBREG(2,5),SUBVMT(5),(SUBRFD(L,5),L=1,5)            00314000
      K = 1                                                             00315000
      DO  3000 I = 1,30                                                 00316000
 3000 CONTINUE                                                          00317000
      RETURN                                                            00318000
      END                                                               00319000
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&RD1.HFC.FORTH:UPDATE - DEFAULT

   FROM &RD1.HFC.FORTH:UPDATE  ON CATALOG
   CARD
   1/305  305 LINES  CURRENT=305

    1.      C                                                                       00001000
    2.      C     HIGHWAY FUEL CONSUMPTION MODEL: DECEMBER 1981                     00002000
    3.      C     ENERGY AND ENVIRONMENTAL ANALYSIS, INC.                           00003000
    4.      C     PROGRAMMER: MIKE MOCHAN                                           00004000
    5.      C     DOE CONTRACT: DE-AC01-79PE-70032, TASK 13                         00005000
    6.      C                                                                       00006000
    7.            SUBROUTINE UPDATE                                                 00007000
    8.            REAL SALES(55,9),GASMPG(55,9),DSLMPG(55,9),DSLPEN(55,9),          00008000
    9.           &     LEDPEN(55,9),GASADJ(55,5),AUTMPG(55,5),MANPCT(55,5),         00009000
   10.           &     MANMPG(55,5),BASPCT(55,5),BASMPG(55,5),ALTPCT(55,5),         00010000
   11.           &     ALTMPG(55,5),DSLADJ(55,5),DRWMPG(55,5),DFWPCT(55,5),         00011000
   12.           &     DFWMPG(55,5),DALPCT(55,5),DALMPG(55,5),SCRLDV(30,2),         00012000
   13.           &     SCRLDT(30,4),SCRMHD(30,2,3),VMTLDV(30,2),VMTLDT(30,4),       00013000
   14.           &     VMTMHD(30,2,3),COEFA1(11,2,5),COEFB1(11,2,5),                00014000
   15.           &     COEFA2(11,2,5),COEFB2(11,2,5),COEFA3(11,2,5),                00015000
   16.           &     COEFB3(11,2,5),COEFA4(11,2,5),COEFB4(11,2,5),                00016000
   17.           &     VEH(30,2,9),LEADED(30,9),VMT(30,2,9),EPA(30,2,9),            00017000
   18.           &     RMPG(30,2,9),MSURV(30,2,9),VMTGRO(26,9),ADVANT,              00018000
   19.           &     USERCF(2,55,2,5)                                             00019000
   20.            INTEGER I,J,K,L,R,UNIT,BEGYR,ENDYR,VYR,FYR,LYR,                   00020000
   21.           &        MPGOPT,RODOPT,YRIND(100),GPM                              00021000
   22.            LOGICAL PIND(26),SHORT,PAFRAC,CALIB,GROW                         00022000
   23.            COMMON /CB01/ SALES,GASMPG,DSLMPG,DSLPEN,                        00023000
   24.           &       LEDPEN,GASADJ,AUTMPG,MANPCT,                              00024000
   25.           &       MANMPG,BASPCT,BASMPG,ALTPCT,                              00025000
   26.           &       ALTMPG,DSLADJ,DRWMPG,DFWPCT,                              00026000
   27.           &       DFWMPG,DALPCT,DALMPG,SCRLDV,                              00027000
   28.           &       SCRLDT,SCRMHD,VMTLDV,VMTLDT,                              00028000
   29.           &       VMTMHD,COEFA1,COEFB1,                                     00029000
   30.           &       COEFA2,COEFB2,COEFA3,                                     00030000
   31.           &       COEFB3,COEFA4,COEFB4                                      00031000
   32.            COMMON /CB02/ VEH,LEADED,VMT,EPA,RMPG,MSURV,VMTGRO               00032000
   33.            COMMON /CB03/ BEGYR,ENDYR,VYR,FYR,LYR,MPGOPT,RODOPT,YRIND,ADVANT 00033000
   34.           & ,SHORT,PAFRAC,CALIB,GROW,PIND                                   00034000
   35.            COMMON /CB05/ USERCF,GPM                                         00035000
   36.      C                                                                       00036000
   37.      C     INITIALIZE VARIABLES                                              00037000
   38.      C                                                                       00038000
   39.            DELTA = 1.0                                                      00039000
   40.      C                                                                       00040000
   41.      C     INCREMENT THE ENDING YEAR BY 1                                    00041000
   42.      C                                                                       00042000
   43.            ENDYR = ENDYR + 1                                                00043000
   44.            VYR = VYR + 1                                                    00044000
   45.      C                                                                       00045000
   46.      C     CALCULATE NEW DISTRIBUTION OF VEHICLES WITHIN THE FLEET           00046000
   47.      C                                                                       00047000
   48.      C     MARGINAL SCRAPPAGE RATES MUST BE USED FOR YEARS 2 THRU 30.        00048000
   49.      C     DETERMINE IF PASSENGER CARS (CLASSES 1 & 2) ARE TO BE MODIFIED    00049000
   50.      C     AS A FRACTION OF NEW SALES OR IF STRAIGHT MARGINAL SCRAPPAGE      00050000
   51.      C     RATES ARE TO BE EMPLOYED.                                         00051000
   52.      C                                                                       00052000
   53.            IF (.NOT.PAFRAC) GOTO 1040                                       00053000
   54.      C                                                                       00054000
   55.      C     CALCULATE TOTAL PASSENGER CARS SCRAPPED                           00055000
   56.      C                                                                       00056000
   57.            PATOTL = SALES(ENDYR,1) + SALES(ENDYR,2)                         00057000
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      PASCRP = 0.0                                                      00058000
      DO 1030 R = 2,30                                                  00059000
      DO 1020 J = 1,2                                                   00060000
      DO 1010 K = 1,2                                                   00061000
      PATOTL = PATOTL + VEH((R-1),J,K) * MSURV(R,J,K)                   00062000
      PASCRP = PASCRP + VEH((R-1),J,K)*(1.0-MSURV(R,J,K))               00063000
 1010 CONTINUE                                                          00064000
 1020 CONTINUE                                                          00065000
 1030 CONTINUE                                                          00066000
C                                                                       00067000
C     CALCULATE ACTUAL SCRAPPAGE BASED UPON FRACTION                    00068000
C                                                                       00069000
      ACTUAL = 0.483 * (SALES(ENDYR,1) + SALES(ENDYR,2))                00070000
     &       + .027*PATOTL                                              00071000
      DELTA = ACTUAL/PASCRP                                             00072000
C                                                                       00073000
C     NOTE: DELTA HAS BEEN INITIALIZED TO ONE, AND RETAINS THIS         00074000
C     VALUE UNLESS THE ABOVE SEQUENCE OF CODE HAS BEEN EXECUTED.        00075000
C                                                                       00076000
 1040 CONTINUE                                                          00077000
      R = 31                                                            00078000
      DO 1070 I = 2,30                                                  00079000
      R = R - 1                                                         00080000
      DO 1060 J = 1,2                                                   00081000
      DO 1050 K = 1,9                                                   00082000
      IF(K.LE.2) MSURV(R,J,K) = 1.0 - DELTA*(1.0-MSURV(R,J,K))          00083000
      IF(MSURV(R,J,K).LT.0.0) MSURV(R,J,K) = 0.0                        00084000
      VEH(R,J,K) = VEH((R-1),J,K) * MSURV(R,J,K)                        00085000
      IF(K.LE.2 .AND. VEH(R,1,1).LT.0.0001) MSURV(R,J,K) = 0.0          00086000
 1050 CONTINUE                                                          00087000
 1060 CONTINUE                                                          00088000
 1070 CONTINUE                                                          00089000
C                                                                       00090000
C     CALCULATE CURRENT YEAR VEHICLES FOR ALL CLASSES.                  00091000
C                                                                       00092000
      DO 1080 K = 1,9                                                   00093000
      VEH(1,1,K) = SALES(ENDYR,K) * (1-DSLPEN(ENDYR,K))                 00094000
      VEH(1,2,K) = SALES(ENDYR,K) * DSLPEN(ENDYR,K)                     00095000
 1080 CONTINUE                                                          00096000
C                                                                       00097000
C     UPDATE LEAD FUEL PERCENTAGE ARRAY                                 00098000
C                                                                       00099000
      R = 31                                                            00100000
      DO 2000 I = 2,30                                                  00101000
      R = R - 1                                                         00102000
      DO 1090 K = 1,9                                                   00103000
      LEADED(R,K) = LEADED((R-1),K)                                     00104000
 1090 CONTINUE                                                          00105000
 2000 CONTINUE                                                          00106000
C                                                                       00107000
C     CALCULATE CURRENT YEAR LEADED PERCENTAGE.                         00108000
C                                                                       00109000
      DO 2010 K = 1,9                                                   00110000
      LEADED(1,K) = LEDPEN(ENDYR,K)                                     00111000
 2010 CONTINUE                                                          00112000
C                                                                       00113000
C     UPDATE EPA MPG ESTIMATES NEXT                                     00114000
C                                                                       00115000
      R = 31                                                            00116000
      DO 2030 I = 2,30                                                  00117000
      R = R - 1                                                         00118000
      DO 2020 K = 1,9                                                   00119000
      EPA(R,1,K) = EPA((R-1),1,K)                                       00120000
      EPA(R,2,K) = EPA((R-1),2,K)                                       00121000
 2020 CONTINUE                                                          00122000
 2030 CONTINUE                                                          00123000
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C                                                                       00124000
C     CALCULATE CURRENT YEAR EPA ESTIMATES NEXT USING                   00125000
C     SAME OPTION AS IN THE BASE CASE INITIALIZATION.                   00126000
C     CLASSES 1 THRU 5 ARE DONE NEXT.                                   00127000
C                                                                       00128000
      DO 2070 K = 1,5                                                   00129000
      GO TO (2040,2050,2060),MPGOPT                                     00130000
 2040 CONTINUE                                                          00131000
C                                                                       00132000
C     OPT=1=STRAIGHT EPA PLUS DSL ADVANTAGE FACTOR                      00133000
C                                                                       00134000
      EPA(1,1,K) = GASMPG(ENDYR,K)                                      00135000
      EPA(1,2,K) = EPA(1,1,K) * ADVANT                                  00136000
      GOTO 2070                                                         00137000
 2050 CONTINUE                                                          00138000
C                                                                       00139000
C     OPT=2=DIRECTLY OFF DATA FILES VIA COMMON ARRAYS                   00140000
C                                                                       00141000
      EPA(1,1,K) = GASMPG(ENDYR,K)                                      00142000
      EPA(1,2,K) = DSLMPG(ENDYR,K)                                      00143000
      GOTO 2070                                                         00144000
 2060 CONTINUE                                                          00145000
C                                                                       00146000
C     OPT=3=USE TECH PENTR. AND FUEL ECON EST.                          00147000
C                                                                       00148000
      I = ENDYR                                                         00149000
      EPA(1,1,K) = 1.0/((MANPCT(I,K)*(1-(BASPCT(I,K)+ALTPCT(I,K)))      00150000
     &           /MANMPG(I,K))                                          00151000
     &           + ((1-MANPCT(I,K))*(1-(BASPCT(I,K)+ALTPCT(I,K)))       00152000
     &           /AUTMPG(I,K))                                          00153000
     &           + (BASPCT(I,K)/BASMPG(I,K))                            00154000
     &           + (ALTPCT(I,K)/ALTMPG(I,K)))                           00155000
      EPA(1,2,K) = 1.0/(((1-(DFWPCT(I,K)+DALPCT(I,K)))/DRWMPG(I,K))     00156000
     &           + (DFWPCT(I,K)/DFWMPG(I,K))                            00157000
     &           + (DALPCT(I,K)/DALMPG(I,K)))                           00158000
 2070 CONTINUE                                                          00159000
C                                                                       00160000
C     CALCULATE CURRENT YEAR EPA MPG FOR CLASSES 6 TO 9                 00161000
C                                                                       00162000
      DO 2080 K = 6,9                                                   00163000
      EPA(1,1,K) = GASMPG(ENDYR,K)                                      00164000
      EPA(1,2,K) = DSLMPG(ENDYR,K)                                      00165000
 2080 CONTINUE                                                          00166000
C                                                                       00167000
C     CALCULATE ONROAD MPG FOR YEARS 2 THRU 30 FOR  CLASSES 1-9         00168000
C                                                                       00169000
      R = 31                                                            00170000
      DO 3000 I = 2,30                                                  00171000
      R = R - 1                                                         00172000
      DO 2090 K = 1,9                                                   00173000
      RMPG(R,1,K) = RMPG((R-1),1,K)                                     00174000
      RMPG(R,2,K) = RMPG((R-1),2,K)                                     00175000
 2090 CONTINUE                                                          00176000
 3000 CONTINUE                                                          00177000
C                                                                       00178000
C     CALCULATE CURRENT YEAR ONROAD MPG ESTIMATES USING THE             00179000
C     SAME OPTION SELECTED IN THE BASE CASE INITIALIZATION              00180000
C     SUBROUTINE.  CLASSES 1 THRU 5 ARE DONE NEXT.                      00181000
C                                                                       00182000
      DO 3040 K = 1,5                                                   00183000
      GO TO (3010,3020,3030),RODOPT                                     00184000
 3010 CONTINUE                                                          00185000
C                                                                       00186000
C     OPT=1=TECH SPECIFIC BASED ON COEF HELD IN ARRAY                   00187000
C                                                                       00188000
      I = ENDYR                                                         00189000
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      IF (I.GE.30.AND.I.LE.40) L = (I-30) + 1                           00190000
      IF (I.LT.30)             L = 1                                    00191000
      IF (I.GT.40)             L = 11                                   00192000
C                                                                       00193000
C     GAS SF MPG'S BY TECHNOLOGY ARE COMPUTED BASED ON COEFFICIENTS.    00194000
C                                                                       00195000
      SFA1 = COEFA1(L,1,K)/AUTMPG(I,K)                                  00196000
      SFA2 = COEFA2(L,1,K)/MANMPG(I,K)                                  00197000
      SFA3 = COEFA3(L,1,K)/BASMPG(I,K)                                  00198000
      SFA4 = COEFA4(L,1,K)/ALTMPG(I,K)                                  00199000
C                                                                       00200000
      SFA =((1-MANPCT(I,K))*(1-(BASPCT(I,K)+ALTPCT(I,K)))*SFA1)         00201000
     &    + (MANPCT(I,K)*(1-(BASPCT(I,K)+ALTPCT(I,K)))*SFA2)            00202000
     &    + (BASPCT(I,K)*SFA3)                                          00203000
     &    + (ALTPCT(I,K)*SFA4)                                          00204000
C                                                                       00205000
      SFB =((1-MANPCT(I,K))*(1-(BASPCT(I,K)+ALTPCT(I,K)))*COEFB1(L,1,K))00206000
     &    + (MANPCT(I,K)*(1-(BASPCT(I,K)+ALTPCT(I,K)))*COEFB2(L,1,K))   00207000
     &    + (BASPCT(I,K)*COEFB3(L,1,K))                                 00208000
     &    + (ALTPCT(I,K)*COEFB4(L,1,K))                                 00209000
C                                                                       00210000
C     TECH SPECIFIC EPA MPG IS REQUIRED TO COMPLETE COMPUTATION         00211000
C                                                                       00212000
      IF (MPGOPT.EQ.3) GOTO  1311                                       00213000
      EPAFLT = 1.0/((MANPCT(I,K)*(1-(BASPCT(I,K)+ALTPCT(I,K)))          00214000
     &           /MANMPG(I,K))                                          00215000
     &           + ((1-MANPCT(I,K))*(1-(BASPCT(I,K)+ALTPCT(I,K)))       00216000
     &           /AUTMPG(I,K))                                          00217000
     &           + (BASPCT(I,K)/BASMPG(I,K))                            00218000
     &           + (ALTPCT(I,K)/ALTMPG(I,K)))                           00219000
      GOTO 1312                                                         00220000
 1311 CONTINUE                                                          00221000
      EPAFLT = EPA(1,1,K)                                               00222000
 1312 CONTINUE                                                          00223000
C                                                                       00224000
      SFA = SFA*EPAFLT                                                  00225000
      RMPG(1,1,K) = EPA(1,1,K)/(SFA+(SFB*EPA(1,1,K))+GASADJ(I,K))       00226000
 1290 CONTINUE                                                          00227000
C                                                                       00228000
C     ONROAD DSL MPG CALCULATIONS FOLLOW                                00229000
C                                                                       00230000
C     DSL SF MPG'S BY TECHNOLOGY ARE COMPUTED BASED ON COEFFICIENTS.    00231000
C                                                                       00232000
      SFA1 = COEFA1(L,2,K)/DRWMPG(I,K)                                  00233000
      SFA2 = COEFA2(L,2,K)/DFWMPG(I,K)                                  00234000
      SFA3 = COEFA3(L,2,K)/DALMPG(I,K)                                  00235000
C                                                                       00236000
      SFA = ((1-(DFWPCT(I,K)+DALPCT(I,K)))*SFA1)                        00237000
     &    + (DFWPCT(I,K)*SFA2)                                          00238000
     &    + (DALPCT(I,K)*SFA3)                                          00239000
C                                                                       00240000
      SFB = ((1-(DFWPCT(I,K)+DALPCT(I,K)))*COEFB1(L,2,K))               00241000
     &    + (DFWPCT(I,K)*COEFB2(L,2,K))                                 00242000
     &    + (DALPCT(I,K)*COEFB3(L,2,K))                                 00243000
C                                                                       00244000
C     TECH SPECIFIC EPA DSL MPG IS REQUIRED TO COMPLETE COMP            00245000
C                                                                       00246000
      IF (MPGOPT.EQ.3) GOTO 1313                                        00247000
      EPAFLT = 1.0/(((1-(DFWPCT(I,K)+DALPCT(I,K)))/DRWMPG(I,K))         00248000
     &           + (DFWPCT(I,K)/DFWMPG(I,K))                            00249000
     &           + (DALPCT(I,K)/DALMPG(I,K)))                           00250000
      GOTO 1314                                                         00251000
 1313 CONTINUE                                                          00252000
      EPAFLT = EPA(1,2,K)                                               00253000
 1314 CONTINUE                                                          00254000
C                                                                       00255000
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256.           SFA = SFA*EPAFLT                                                  00256000
257.           RMPG(1,2,K) = EPA(1,2,K)/(SFA+(SFB*EPA(1,2,K))+DSLADJ(I,K))       00257000
258.      C                                                                      00258000
259.           GOTO 3040                                                         00259000
260.       3020 CONTINUE                                                        00260000
261.      C                                                                      00261000
262.      C    OPT=2=USER-SPECIFIED SHORTFALL COEFFICIENTS                       00262000
263.      C                                                                      00263000
264.      C                                                                      00264000
265.           DO 3026 J = 1, 2                                                  00265000
266.           DO 3024 K = 1,5                                                   00266000
267.      C                                                                      00267000
268.           SFA = USERCF(1,ENDYR,J,K)                                         00268000
269.           SFB = USERCF(2,ENDYR,J,K)                                         00269000
270.      C                                                                      00270000
271.           IF(GPM.EQ.0) RMPG(1,J,K) = SFA + SFB*EPA(1,J,K)                   00271000
272.           IF(GPM.EQ.1) RMPG(1,J,K) = EPA(1,J,K)/(SFA+SFB*EPA(1,J,K))        00272000
273.      C                                                                      00273000
274.       3024 CONTINUE                                                        00274000
275.       3026 CONTINUE                                                        00275000
276.           GOTO 3040                                                         00276000
277.      C                                                                      00277000
278.       3030 CONTINUE                                                        00278000
279.      C                                                                      00279000
280.      C    OPT=3=NO DISCOUNTING OF EPA MPG ESTIMATES                         00280000
281.      C                                                                      00281000
282.           RMPG(1,1,K) = EPA(1,1,K)                                          00282000
283.           RMPG(1,2,K) = EPA(1,2,K)                                          00283000
284.       3040 CONTINUE                                                        00284000
285.      C                                                                      00285000
286.      C    CALCULATE CURRENT YEAR ONROAD MPG FOR CLASSES 6-9                 00286000
287.      C                                                                      00287000
288.           DO 3050 K = 6,9                                                   00288000
289.           RMPG(1,1,K) = GASMPG(ENDYR,K)                                     00289000
290.           RMPG(1,2,K) = DSLMPG(ENDYR,K)                                     00290000
291.       3050 CONTINUE                                                        00291000
292.      C                                                                      00292000
293.      C    UPDATE VMT ARRAY, NOTE: GROWTH IS USED ONLY IF SPECIFIED          00293000
294.      C                                                                      00294000
295.           FACTOR = 1.0                                                      00295000
296.           DO 3080 I = 1,30                                                  00296000
297.           DO 3070 J = 1,2                                                   00297000
298.           DO 3060 K = 1,9                                                   00298000
299.           IF (GROW) FACTOR = VMTGRO(VYR,K)                                  00299000
300.           VMT(I,J,K) = VMT(I,J,K) * FACTOR                                  00300000
301.       3060 CONTINUE                                                        00301000
302.       3070 CONTINUE                                                        00302000
303.       3080 CONTINUE                                                        00303000
304.           RETURN                                                            00304000
305.           END                                                               00305000
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&RD1.HFC.FORTH:PAGE - DEFAULT

   FROM &RD1.HFC.FORTH:PAGE  ON CATALOG
   CARD
   1/10  10 LINES  CURRENT=10

    1.           SUBROUTINE PAGE(UNIT)                                  00001000
    2.           INTEGER UNIT                                           00002000
    3.           LOGICAL*1 FF                                           00003000
    4.           DATA FF/Z0C/                                           00004000
    5.      C                                                           00005000
    6.           WRITE(UNIT,100) FF                                     00006000
    7.         100 FORMAT(1A1)                                          00007000
    8.      C                                                           00008000
    9.           RETURN                                                 00009000
   10.           END                                                    00010000
?
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