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FLEET-CAR MARKET **PENETRATION SIMULATOR: "CPEN" USER'S GUIDE**

RICHARD WEIL

MASTER

August 1980

**NATIONAL CENTER FOR ANALYSIS OF ENERGY SYSTEMS
DEPARTMENT OF ENERGY AND ENVIRONMENT**

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UPTON, NEW YORK 11973**

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**ECONOMIC AND SYSTEMS ANALYSIS DIVISION
NATIONAL CENTER FOR ANALYSIS OF ENERGY SYSTEMS
DEPARTMENT OF ENERGY AND ENVIRONMENT
BROOKHAVEN NATIONAL LABORATORY
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ABSTRACT

The purpose of this manual is to assist prospective users in the understanding and execution of Fleet-Car Market PENetration Simulator (CPEN). CPEN is an interactive FORTRAN program whose purpose is to produce estimates of fleet market penetration rates of alternative passenger cars that can be described in terms of specific physical and economic attributes. The data were derived from questionnaires distributed to fleet operators affiliated with National Association of Fleet Administrators (NAFA). Besides the NAFA data, CPEN uses 48 variables that are interactively inserted. Complete data input descriptions are included in the manual along with algorithm and application flowcharts. Examples of 'complete' successful simulator runs are included for alternative program paths. A listing of the computer program and a glossary for CPEN are included.

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SCOPE

Fleet-Car Market PENetration Simulator (CPEN) is a FORTRAN program written for use on Brookhaven National Laboratory's CDC 6600 computer. It is an interactive program operable from remote (including non-BNL) terminals. The purpose of the program is to initially test the market applicability of two hypothetical electric or hybrid vehicles (EHV), termed EHV1 and EHV2, for the fleet industry.^{F1} If an EHV has physical attributes that make it suitable for use in the market (i.e., if the EHV is applicable), then CPEN can be used to perform an economic comparison of the EHV and a comparable internal-combustion-engine (ICE) car, and determine which vehicle the respondent would purchase to minimize costs. All CPEN dollar amounts are stated in March 1979 dollars.

The program uses data from an "Electric Car Survey" comprised of information collected from 142 Fleet operators. The survey was designed under the guidance of Brookhaven National Laboratory (BNL) and was administered through the National Association of Fleet Administrators, Inc. (NAFA). Each fleet operator (respondent) was asked to indicate a preference for a base car^{F2} described in the questionnaire, or, alternatively, create up to three additional respondent-described "optional cars." He was then asked to indicate maximum prices he would be willing to pay for various physical attributes of the described cars and the percentage of his fleet that could function using each optional car (including the base car). These respondent-described cars, or optional cars, were then compared to hypothetical EHV's to determine applicability rates for the hypothetical EHV's.

NAFA DATA

The survey was administered to members of NAFA, who are located throughout the U. S. (see Appendix A for sample questionnaire). Each respondent is classified by his main business activity or market sector. There are four market sectors. Of the 142 usable questionnaires that were returned, 111 were from respondents in the business sector, 7 were in utilities (e.g., gas and sanitary), 7 in police, and 17 in state and local government. The questionnaires sent to the business sector were divided into thirds, one third specifying base prices (Appendix A) of \$2,000, the second third specifying \$4,000, and the last third \$6,000.

Table 1
NAFA Data

NAME	MIX #	CASE NUMBERS	TOTAL CASES	BASE CASE
Business	1	1-30	30	\$ 2,000
Business	2	31-76	46	4,000
Business	3	77-107	31	6,000
Communications	4	108-111	4	2,000
Utilities	5	112-118	7	2,000
Police	6	119-125	7	2,000
State & Local Gov't.	7	126-142	17	2,000

*Mix 1 to 4 combined as Total Business with 111 cases in all.

All the other cases have a base price of \$2,000 (see Table 1).

The simulator was initiated by the design of an SPSS (Statistical Package for the Social Sciences) data file. From this file, frequency tables were executed for all variables testing the data for mistaken values. The default value "-9" was designated as the term for missing data. For example, many respondents did not request a third optional car, so the variables indicating the attributes and maximum price values were read in as "-9". Although SPSS proved to be a good starting block, it lacked the sophistication necessary to build a complex simulator. Fortran Extended Version 4, with its interactive and formatting capabilities, was found appropriate for the simulation. Since Fortran can be compiled (absolute binary form) and then executed on INTERCOM,^{F3} the actual time required to complete a run is substantially less than for other computer languages.

DATA FILE (MATRIX2)

An SPSS program including the raw data was constructed from the questionnaire results. By deleting the SPSS control and language statements, only the raw data were left. A Fortran program was then created that extracted the necessary car data and cataloged (saved) it on a separate tape. Since the data are in the design of a matrix (array), the data tape was given the name 'MATRIX2'. For each of the 142 cases processed, there are 24 variables (see Table 2), for each of as many as four optional cars (counting the base car). The data matrix has dimensions 142 by 24 by 4 which correspond respectively to the case, variable, and optional car number, with the 4th position representing the base car. For CPEN's internal usage, the data array is called CAR. CAR (I), where I = 1,2,...,24, acts as a dummy 1 x 24 matrix that is overwritten each time a new respondent or new optional car is processed in the program. Table 2 lists the 24 variables in the exact order that they are stored in the CAR array.

COMPUTER PROGRAM ABSTRACT

As previously mentioned, CPEN is an interactive Fortran program used on Brookhaven National Laboratory's CDC 6600 computer. CPEN can also run on BNL's CDC 7600. Although the CDC 7600 does not possess the interactive capabilities of the CDC 6600, the input data can be read in as a separate tape. This would defeat the purpose of an interactive program but it could be used to test programming logic. The CDC 7600 is also a convenient alternative if the CDC 6600 is inoperable.

The terminals typically used at BNL for CPEN executions are the DASI 360 and the DASI 735 (Data Access Systems Inc.). The DASI 360 has a carriage width of 136 characters and can properly print all CPEN output, whereas the DASI 735 carriage is not wide enough for Table B, and consequently the last column gets "wrapped-around" the front.

CPEN is cataloged at BNL by the name 'CPEN1' and is also stored in the compiled version 'CPEN1ABS'. The program can successfully run using either the compiled or the noncompiled version. The advantage of using the compiled version is that it is not necessary to compile the program

Table 2
CAR Data Structure for CPEN

VARIABLE LIST (ORDERED)	BASE CAR VALUES (.,.,4)
1. Seating Option	2
2. Trunk Space Option	5
3. Performance Option (Y/N)	0
4. Recharge Hours Option	8
5. Range	30
6. Heater (Y/N)	0
7. A/C (Y/N)	0
8. P/S (Y/N)	0
9. P/B (Y/N)	0
10. Reliability Option	20
11. Utilization Rate	0
12. Maximum Price for Seating Option	0
13. Maximum Price for Trunk Option	0
14. Maximum Price for Performance Option	0
15. Maximum Price for Recharge Option	0
16. Maximum Price for Range Option	0
17. Maximum Price for Heater Option	0
18. Maximum Price for A/C Option	0
19. Maximum Price for P/S Option	0
20. Maximum Price for P/B Option	0
21. Maximum Price for Reliability Option	0
22. Total Cars in Fleet	Total Cars
23. Base Percentage	Base %
24. MIX Number	MIX #

at every LOGIN, which saves money, time, and space on the computer. A common name for such a compiled version is the absolute binary of a program. Attaching the letters ABS at the end of a program's name indicates that the program is in the absolute binary. The following job was batched to store the compiled CPEN version of CPEN1ABS.

```
100 = WEIL, STMFA, T37,P2.
110 = ACCOUNT(WEIL, 1074)
120 = ROUTE(OUTPUT,TID=AI,DC-PR,DEF)
130 = ATTACH(SR,CPEN1,ID=WAGNER,MR=1)
140 = FTN,I=SR,R=3.
150 = REQUEST,ABS,*PF.
160 = LOAD(LGO)
170 = NOGO(ABS)
180 = CATALOG, ABS, CPEN1ABS, ID=WAGNER,AC=1074,RP=999.
..S,Q,N
..BATCH,Q,INPUT
```

The CPEN model uses approximately 1.005 cp seconds and 67500B CM storage units. The compilation time of CPEN1 is approximately 8.643 cp seconds.

USER INPUT DESCRIPTION

In CPEN, there are 48 variables that are input interactively by the user. The inputs consist of variables describing EHV1, EHV2, and three ICE cars (small, medium, and large).^{F4} Appendix B indicates the actual input sequence of the variables.

The input variables are divided into two sets. The first set contains the physical attributes of EHV1 and EHV2. The variable names are self-explanatory, except for the reliability option which is the allowable annual number of unscheduled days the car has to spend in a repair shop. (Note that this value for the base car is 20 days.)

The second set describes the economic attributes of EHV1, EHV2, and typical ICEs. Appendix B lists the actual variable input names to be

used on the terminal. Refer to the Appendix B footnotes for explanation of input names. The ICE variables contain the price of liquid fuel (\$/gal), price of electricity (\$/kWh), ICE fuel consumption (mpg), and ICE prices (dollars). These values should all be converted into March 1979 dollars.^{F5}

PROGRAMMING INFORMATION

A. CPEN Background

A companion BNL report describing the objectives and theory underlying CPEN will assist the user in the reasoning and formulation of a test problem. A simplified flowchart of CPEN's algorithm is listed in Figure 1.^{F6}

B. Output Information

The CPEN simulation simultaneously analyzes two types of electric and/or hybrid vehicles, identified as EHV1 and EHV2. Four output tables are produced that indicate the degree of success expected for the EHV1 and EHV2 in the four fleet market sectors covered by the NAFA sample. No time dimension is associated with the estimates. That is, the estimates are not for any given year. Above all they are not a prediction of what will happen, but rather an indication of what would happen if:

- 1) The NAFA sample were representative or, stated differently, the overall market sectors displayed the same preferences as the fleet operators in the NAFA sample.
- 2) Choice of vehicles were limited to EHV1, EHV2, and the ICEs described in the input data.
- 3) Vehicle production capacity were capable of meeting demand.
- 4) The fleet market were operating under steady state conditions with respect to preferences and total sales.

Figure 1. Simplified CPEN Flowchart for (Algorithm)

FOOTNOTES FOR (FIGURE 1) FLOWCHART

A. The BUYPRICE MAKER takes the base price of each respondent's optional car and adds it to the sum of the maximum price values for all the attributes to give a final price of each optional car. Because of survey weaknesses, it was felt that some respondent's, price values were not credible. Final price values were raised if they were thought to be unrealistically low. For a small-sized car (4 or fewer seats) the price was raised to a minimum of \$5,000, \$6,000 for a medium-sized car (5 seats), and \$6,900 for a large-sized car (6 or more seats).

B. X - 1,...,5 and each value represents:

- 1 - BUSINESS SECTOR
- 2 - UTILITIES SECTOR
- 3 - POLICE SECTOR
- 4 - GOV'T SECTOR
- 5 - ALL SECTORS

The first output table shows EHV applicability rates generated by comparing the physical attributes of EHV1 and EHV2 to the required physical capabilities specified for cars operated by individual NAFA respondents. Note specifically that price is not a factor in applicability.

The generalized format of this table is presented in Table A. The particular values in Table A indicate that EHV1 is physically capable of substituting for 19 percent of the cars in the business sector, whereas EHV2 could substitute for 13 percent in the same sector. If a given car could be replaced by either EHV1 or EHV2, the amount will show up in the column called OVERLAP. Figure 2 is a Venn diagram of Table A. In order to determine the combined applicability for both EHV1 and EHV2, add the first and second columns and then subtract the overlap. The bottom row of Table A shows the weighted average applicability rates for all sectors. The weighting is based on the stock of cars in each sector (see Table 3).

Table A
Applicability Rates (Percent)

SECTOR	EHV1	EHV2	OVERLAP	TOTAL EHV
BUSINESS	19.	13.	8.	24.
UTILITIES	49.	43.	33.	59.
POLICE	5.	1.	1.	5.
GOV'T	25.	28.	24.	29.
TOTAL	22.	18.	12.	28.

Table B
Fleet Car Penetration Rates (Percent)

***** EHV ***** ***** ICE *****							
SECTOR	EHV1	EHV2	TOTAL	NON-		TOTAL	GRAND TOTAL
				APPLICABLE	APPLICABLE		
BUSINESS	.0	6.1	6.2	3.7	90.1	93.8	100.0
UTILITIES	0.0	31.4	31.4	0.0	68.6	68.6	100.0
POLICE	0.0	.3	.3	.3	99.5	99.7	100.0
GOV'T	0.0	28.5	28.5	8.6	63.0	71.5	100.0
TOTAL	.0	11.7	11.8	3.8	84.5	88.2	100.0

Table C
Fleet Car Annual Sales (Thousands)

SECTOR	***** EHV *****			ADJUSTMENTS FOR PRICE-INDUCED DEMAND REDUCTION *****			
	EHV1	EHV2	TOTAL	ICE	TOTAL	DEMAND REDUCTION	ORIGINAL DEMAND
BUSINESS	0.	24.	24.	360.	384.	511.	895.
UTILITIES	0.	3.	3.	7.	10.	46.	56.
POLICE	0.	0.	0.	66.	66.	21.	87.
GOV'T	0.	6.	6.	14.	20.	79.	99.
TOTAL	0.	33.	33.	448.	480.	657.	1137.

Figure 2. Illustration of Applicability Overlap
Between EHVI and EHV2

Table 3
Sampling Rates and Sectoral
Distribution of Cars^a

Sector	U.S. cars in Fleets of 10 or more (000s)			NAFA sample		
	Annual Sales (1979)			Number of fleets	Number of cars	Sampling rate, %
	Stock	Turnover method	Modified Bobit estimate			
BUSINESS	3174	1440	895	111	64717	2.0
UTILITIES	529	90	56	7	1028	0.2
POLICE	291	140	87	7	5068	1.7
GOV'T	645	160	99	17	13746	2.1
TOTAL	4639	1830	1137	142	84559	1.8
TAXI, RENTAL, FEDERAL	768	380	236			
GRAND TOTAL	5407	2210	1373			

^aF6.

The second output table contains the fleet market penetration rates for the competing technologies. The values in Table B are arrived at by examining the instances in which the EHV's were applicable to a particular respondent and in those instances calculating the present value of life-cycle costs for the EHV's and comparable ICEs. The respondent is then assumed to purchase the vehicle whose life-cycle costs have the lowest present value, except in cases where vehicle purchase prices exceed limits determined by the respondent. Note that the total EHV penetration is completely divided between EHV1 and EHV2, with no overlap permitted. In situations where the EHV's overlap in terms of applicability, and in which their costs are identical and lower than those of comparable ICEs, the market portion is arbitrarily assumed to be split evenly between EHV1 and EHV2. The market share won by ICEs is subdivided into a portion for which EHV's were applicable but too costly and a portion for which EHV's were nonapplicable.

Note that a sector with non-zero entries in the ICE applicable column (4th column) should have a Table D of interest.

The third output table translates the market penetration rates into annual sales figures, under the assumption that fleet sales are equal to the modified Bobit estimate for 1979 (Table 3). The format for sales output is shown in Table C. The logic for calculating the demand reduction is covered in BNL 51312.^{F6}

The final set of CPEN outputs show the present value of the discounted life-cycle costs perceived by fleet operators for whom EHV1 or EHV2 was applicable but too expensive. The purpose of the output is to assist the CPEN user in identifying the cost components that prevent an EHV from penetrating the market to the full extent permitted by its applicability. This in turn permits the CPEN user to more quickly devise subsidy programs and other policy initiatives that would change the relative cost of an EHV, and thereby change EHV penetration. The output format is shown in Table D.1. One such table is produced for each market sector and one for all four sectors combined. In the event that EHV1 is purchased in every instance where it is applicable, the two columns on the left would be irrelevant and only zeros would be displayed. The same is true for EHV2 with respect to the two columns on the right. The battery cost for a particular EHV could show up as *****. This would indicate that the car has either a very short range and the battery is being overworked, or that the car has a small battery lifecycle. Usually, a combination of both factors is responsible.

C. Program Constants

Looking at the complete program listing of CPEN, one recognizes numerous constant terms that assist in output calculations. The derivations of the constants are discussed in BNL 51312.^{F6}

APPLICATION INFORMATION

At a teletype terminal, the user can dial into the computer and connect the phone to an acoustic coupler. A high-pitched tone indicates that the line between the terminal and the computer is free for use, although it does not necessarily mean that the computer software programs are in operation. At BNL, to achieve proper communications between a terminal and the computer, one must establish software communications

.. Table D.1 .. (Business Sector)

Present value of life-cycle costs, as perceived by ICE buyers who could have purchased an EHV (that is, EHV was applicable but either its purchase price or its discounted life-cycle costs were too high)

MARCH 1979 DOLLARS				

	ICE BUYERS WHO COULD HAVE PURCHASED EHV1	ICE BUYERS WHO COULD HAVE PURCHASED EHV2		
	*****	*****		
	EHV1	ICE	EHV2	ICE
VEHICLE				
COST (W/O SUBSIDY)	8000.	5975.	0.	0.
RESALE VALUE	2534.	1895.	0.	0.
NET DEPRECIATION	5466.	4080.	0.	0.
BATTERY				
COST (W/O SUBSIDY)	1300.	0.	0.	0.
SALVAGE	411.	0.	0.	0.
NET DEPRECIATION	889.	0.	0.	0.
TOTAL VEH. & BAT.	6355.	4080.	0.	0.
OPERATING & MAINTENANCE				
FUEL	8.	2462.	0.	0.
ROAD TAX	276.	0.	0.	0.
OTHER FIXED	828.	828.	0.	0.
OTHER, VARIABLE	626.	783.	0.	0.
TOTAL O & M	1738.	4073.	0.	0.
GROSS	8093.	8153.	0.	0.
LESS: SUBSIDY	0.	0.	0.	0.
LESS: WARRANTY	1513.	0.	0.	0.
NET DISCOUNTED LIFE-CYCLE COSTS	6580.	8153.	0.	0.

with INTERCOM by entering a LOGIN command. The job-stream analysis will vary with other systems, and the user must make the proper adjustments in order to run successfully on his own system. (See Figure 3, Flowchart of Application.) LOGIN follows the pattern: LOGIN, USERNAME, PASSWORD, ACCOUNT NUMBER. A typical example is as follows:

```
PLEASE LOGIN
LOGIN,WEIL,DALLAS,XXXX,SUPF7
```

After a successful LOGIN, the word COMMAND is displayed. The user is now ready to enter the EDITOR mode of INTERCOM by typing EDITOR, that is, the computer and user would have together produced:

```
COMMAND - EDITOR
```

Editor calls facilities that create and edit files. Once in editor (two dots indicate that the user is in the editor mode), the user can indicate that he or she is using a wide-carriage terminal by typing the command SCREEN, 132 (this can be called on the DASI 360 interactive terminal deck writer, but not on the small screen DASI 735), e.g.,

```
..SCREEN,132
```

More computer time can be requested by typing ETL 500, which will give the maximum time limit, e.g.,

```
..ETL,500
```

The wide-screen and extra-time requests will depend upon the terminal, account, and system used.

At this point the user is ready to attach the NAFA data tape (MATRIX2). The permanent filename of MATRIX2 is arbitrary, but to establish proper linkage with CPEN the local filename must be entered as TAPE2. The syntax to attach any file at BNL is: ATTACH,LOCAL filename, PERMANENT filename,ID=NAME. We attach MATRIX2 by:

```
..ATTACH,TAPE2,MATRIX2,ID=WAGNER
```

If proper attachment of a file has been made, the following will appear (the cycle number could vary):

```
PF CYCLE NO. = 001
```

Figure 3. Flowchart of Application (Compiled Version)

The already compiled CPEN program (absolute binary) must be attached by the command:

```
..ATTACH,ABS,CPEN1ABS,ID=WAGNER
```

Again, PF CYCLE NO. = 001 must appear. In CPEN, TAPE5 is the input tape which is read interactively. In order for the program to access the data, CONNECT,INPUT must be entered. Similarly, TAPE3, the output tape, must also be connected to the terminal by typing CONNECT,OUTPUT. Then, by typing the local filename CPEN1ABS (which is ABS) and returning the carriage, the program will begin to execute, e.g.,

```
BROOKHAVEN INTERCOM 4.5  
DATE 07/16/80  
TIME 13.15.05.
```

```
PLEASE LOGIN  
LOGIN,WEIL,DALLAS,1074,SUP
```

```
P1 NMWEIL                      PN001074  
COMMAND - EDITOR
```

```
..SCREEN,132
```

```
..ETL,500
```

```
..ATTACH,TAPE2,MATRIX2,ID=WAGNER
```

```
PF CYCLE NO. = 001  
..ATTACH,ABS,CPEN1ABS, ID=WAGNER
```

```
PF CYCLE NO. = 001  
..CONNECT,INPUT
```

```
..CONNECT,OUTPUT
```

```
..ABS
```

When a program change is necessary, the user will want to execute the noncompiled version as a test run. The same procedure is used up to the point where CPEN is attached. For example:

```
DATE 07/24/80  
TIME 14.31.14
```

```
PLEASE LOGIN  
LOGIN,WEIL,DALLAS,1074,SUP
```

```

P1 NMWEIL PNO01074
COMMAND-
..SCREEN,132

..ETL,500

..ATTACH,TAPE2,MATRIX2,ID=WAGNER

PF CYCLE NO. = 001
..ATTACH,X,CPEN1,ID=WAGNER

PF CYCLE NO. = 001.
..FTN(I=X)

8.610 CP SECOND COMPILATION TIME
..CONNECT,INPUT

..CONNECT,OUTPUT

..LGO

```

After 'CPEN1' is attached (the noncompiled version), the user must compile the program by typing FTN (I = X), where X is the local filename of CPEN1. Then the input and output files need to be connected. Finally, execute the program by the command LGO.

The execution begins with the following statement:

```

THIS IS THE FORTRAN DUAL SIMULATOR FOR CARS USING THE
DATA COLLECTED FROM NAFA, YOU WILL INTERACTIVELY PUT
IN THE ATTRIBUTES FOR TWO CARS AND THEY WILL BE RUN
THROUGH THE SIMULATOR. IF YOU ARE CAPABLE OF PUTTING
IN THE USER INPUTS IN A STRING OF NUMBER WITHOUT THE
QUESTIONS, TYPE (1) IF YOU WANT THE QUESTIONS TEL-
LING YOU WHAT ATTRIBUTES TO PUT IN, TYPE (2).

```

Immediately, the program offers two alternative paths. One path allows the user to input 10 variables simultaneously (TYPE 1). The second path asks questions for each variable entered (TYPE 2). Type 1 is faster although the user must know the sequence of data inputs. (See Appendix B.) After typing 1, the following statement appears:

```

PLEASE PUT IN THE FIRST SET OF VARIABLES FOR THE
FIRST CAR (EHV1) 10 ATTRIBUTES.

```

The user would then type in his physical attribute data and return the carriage: e.g., 4,16,1,4,200,1,1,1,1,13^{F8}

The next statement is for EHV2:

```

PLEASE PUT IN THE FIRST SET OF VARIABLES FOR THE
SECOND CAR (EHV2) 10 ATTRIBUTES.

```

The user then types in his data: e.g., 5,20,1,4,500,1,0,1,1,0

A display of the 20 variables appears and the user can check for incorrect values in the first set of data (see Table 4). The program then asks the following:

IF YOU ARE SATISFIED WITH THE VARIABLES AND WANT TO
CONTINUE TYPE (1)
IF YOU WANT TO CHANGE ANY ONE OR ALL OF THE VARIABLES
TYPE (2)

Typing 2 returns the user to the beginning of the program where the first set of inputs were entered. The whole set of data will need to be re-typed. Typing 1 sets up the program for the insertion of the second set of data. The next statement is then:

PLEASE PUT IN THE SECOND SET OF VARIABLES FOR "EHV1",
10 ATTRIBUTES

The user would then type in his data for EHV1: e.g.,
1,8000,0,1,.8,100000,500,900,200,1300^{F8}

And for EHV2:

PLEASE PUT IN THE SECOND SET OF VARIABLES FOR "EHV2",
10 ATTRIBUTES.

For example, 1,200,0,0,.8,1000000,450,800,500,1500

The following statement then appears:

PLEASE PUT IN THE FUEL PRICE AND ICE VARIABLES, '8'
VARIABLES

The user now types in the fuel prices, the ICE mpg, and the ICE prices for his cases: e.g., 1.53,.05,25,20,17,5500,6000,6500^{F8}

A display of the last 28 variables input is printed (Table 5) and the user is asked to type 1 if the values are correct and to type 2 if any one or all of the values are incorrect. Typing 2 allows the user to retype the whole second set of data. Typing 1 will then print out Tables A, B, and C. Appendix D contains a complete execution of this Type 1 method (path) of variable entry.

IF YOU ARE SATISFIED WITH THE USER INPUT DATA, AND
WANT TO GENERATE THE I.C.E. COMPARISON TABLES, THEN
TYPE (1) IF YOU WANT TO CHANGE ANY ONE OR ALL OF THE
VARIABLES TYPE (2) 1

The second path asks the user a question for each variable entered, (Type 2 at first pause in program.)

Table 4
Physical Attributes
The Following are the Data for the Two Cars' Attributes.

	FIRST CAR	SECOND CAR
SEATING OPTION	4	5
TRUNK SPACE	16	20
PERFORMANCE OPTION	1	1
RECHARGE	4	4
RANGE	200	500
HEATER	1	1
AIR CONDITIONER	1	0
POWER STEERING	1	1
POWER BRAKES	1	1
RELIABILITY OPTION	13	0

Table 5
Economic Attributes

THE FOLLOWING IS THE USER INPUT DATA FOR EHV1 AND EHV2

GASP 1.53
EPRICE .05
SMPG 25.0
MMPG 20.0
LMPG 17.0
SPRI 5500
MPRI 6000
LPRI 6500

	EHV1	EHV2
FUEL	1	1
EBBAS	8000	200
SUB	0	0
WAR	1	0
EDM	.80	.80
DESMIV	100000	100000
LIFCY1	500.	450.
LIFCY2	900.	800.
BATRNG	200	.500
BATBAS	1300	1500.

IF YOU ARE SATISFIED WITH THE USER INPUT DATA, AND WANT TO GENERATE THE I.C.E. COMPARISON TABLES, THEN TYPE (1).

IF YOU WANT TO CHANGE ANY ONE OR ALL OF THE VARIABLES TYPE (2).

PUT IN THE FIRST CARS ATTRIBUTES.

1. SEATING OPTION IS? 4
2. WHAT IS THE TRUNK CAPACITY, (IN CU. FT.)? 15
3. DOES IT HAVE A PERFORMANCE OPTION?
TYPE (0) FOR NO OR TYPE (1) FOR YES 1
4. HOW MANY HOURS OF RECHARGE IS NEEDED? 8
5. WHAT IS THE VEHICLES RANGE CAPACITY? 100
6. DOES THE VEHICLE HAVE A HEATER?
TYPE (0) FOR NO OR TYPE (1) FOR YES 1
7. DOES THE VEHICLE HAVE AN AIR CONDITIONER?
TYPE (0) FOR NO OR TYPE (1) FOR YES 1
8. DOES THE VEHICLE HAVE POWER STEERING?
TYPE (0) FOR NO OR TYPE (1) FOR YES 1
9. DOES THE VEHICLE HAVE POWER BRAKES?
TYPE (0) FOR NO OR TYPE (1) FOR YES 1
10. HOW MANY DAYS PER YEAR CAN THE CAR BE INCAPACITATED?
RELIABILITY 2

PUT IN THE SECOND CARS ATTRIBUTES

1. SEATING OPTION IS?
ETC...

The variables are entered in the same order as the first path (See Appendix B). After the first 20 variables are inserted, the program will print Table 2. The user then types 1 if all the values are correct, and 2 if any corrections need to be made.

Typing 1 will print the following:

- PLEASE INSERT USER INPUT DATA FOR TEST VEHICLES TO BE USED IN THE TABULATIONS FOR THE I.C.E. COMPARISON STUDY
- IF YOU WANT THE USER INPUT VARIABLE LIBRARY WHICH HAS A DESCRIPTION OF EACH
- TYPE (0) FOR NO OR TYPE (1) FOR YES

The variable library is not currently completed. Either by typing 1 or 0 the program will continue although the only difference in typing 1 is that a line will appear saying, TO BE CONTINUED... At some point in the future a variable library can be added for the user's benefit.

As with the first path, after the last 28 variables are entered the user is asked to check the values before executing the output. Appendix E illustrates a complete execution of the second path.

After Tables A, B, and C are printed (whether for the 1st or 2nd path), the user is asked if he would like Table D.X (X = 1,...,5) printed. There is one table for each market sector and one table for all sectors combined. The following will appear next:

```
DO YOU WANT TO PRINT THE FOLLOWING TABLES?
..TABLE D.1..(BUSINESS SECTOR)
TYPE (0) FOR NO OR TYPE (1) FOR YES
```

Typing 1 will result in a print out of Table D.1.^{F9} The simulator will then ask the user if Table D for the other should be printed. The message STOP indicates the end of the execution and will return the terminal into the editor mode.

```
DO YOU WANT TO PRINT THE FOLLOWING TABLES?
..TABLE D.2 .. (UTILITIES SECTOR)
TYPE (0) FOR NO OR TYPE (1) FOR YES 0
DO YOU WANT TO PRINT THE FOLLOWING TABLES?
..TABLE D.3 .. (POLICE SECTOR)
TYPE (0) FOR NO OR TYPE (1) FOR YES 0
DO YOU WANT TO PRINT THE FOLLOWING TABLES?
..TABLE D.4 .. (GOV'T SECTOR)
TYPE (0) FOR NO OR TYPE (1) FOR YES 0
DO YOU WANT TO PRINT THE FOLLOWING TABLES?
..TABLE D.5 .. (ALL SECTORS)
TYPE (0) FOR NO OR TYPE (1) FOR YES 0
STOP
1.682 CP SECONDS EXECUTION TIME
```

Once the user is back in the editor mode, he is ready to return the simulator. There are two different restart procedures: one is for the compiled version (ABS) and the other is for the noncompiled version. In the compiled version TAPE2 and ABS^{F10} must be rewound. For example,

```
..REWIND, TAPE2,ABS
```

Now the user is ready for execution. Typing ABS will restart the simulator:

```
..ABS
```

In the noncompiled version, the user must rewind TAPE2 and LGO by the command:

```
..REWIND, TAPE2,LGO
```

and then execute it by typing LGO:

```
..LGO
```

If the user has finished running the simulator, he must type BYE. This exits the user from editor, and the COMMAND sign should appear. Typing in LOGOUT will then disconnect INTERCOM from the terminal.

PROGRAM LISTING

After any execution is made, batching the output file will result in the printing out of the entire CPEN program to the remote/batch station requested.

USER ABORT

If for any reason the user decides to abort the execution, he must do so by depressing the control button (on the terminal) and typing a Z while the carriage is in motion. Then enter %A and return the carriage. If the execution continues, repeat the process until it works. This procedure will return the user to the editor mode.

PROBLEMS & DIAGNOSIS

1. Problem in LOGIN:
 - a) Check if coupler is properly attached
 - b) Check if system is operating
 - c) Check switches on terminal
 - d) Make sure account is valid
2. Insufficient Field Length:
 - a) Request more computer storage space
3. CP Time Limit Exceeded:
 - a) Check for infinite loop
 - b) Request more time (ETL,500)
4. If the User Has Received Ambiguous/Wrong Results:
 - a) Check carefully to see if input data were correct
 - b) Make sure the proper data file (tape) was attached
 - c) Sometimes possible noise/interference on the telephone line creates an error, especially if the terminal is hooked up to the computer system from a distant location.
5. If an Arithmetic Error Appears:
 - a) Check to see if data tape is properly attached or rewound if already in use.
 - b) Check program to make sure that each array is staying within confines of its dimension.
 - c) Make sure no values are being divided by a zero value.

6. If <ERROR, RETYPE AT THIS FIELD appears:

- a) Try to find where you made the typing error in the data.
- b) If you cannot find the error point, just type in 1 values until you reach a point where you can retype in the variables for that set.

BIBLIOGRAPHY

Wagner, Joseph R., A Method for Estimating Technological Penetration Rates in Commercial Automobile Fleets, National Center for Analysis of Energy Systems, Brookhaven National Laboratory, BNL 51312, May 1980.

Control Data Corporation.

Intercom Version 4 Interactive Guide for Users for Fortran Extended, U.S. Publication No. 6049500, 1978.

Scope 2.1 User's Guide, U.S. Publication No. 60372600, 1975.

ANS 10 Subcommittee of the American Nuclear Society's Standards Committee, National Standard Guidelines for the Documentation of Digital Computer Programs, RSIC Computer Code Collection, August 1973.

REFERENCES

- F1 - It should be emphasized, however, that there is nothing inherent in the structure of CPEN that limits it to analysis of EHV's. It can just as readily be used to examine market prospects for cars powered by small-displacement diesels, or for that matter, by rubber bands. All that is required is that the technology in question be characterized in terms of its physical capabilities and costs.
- F2 - The base car has the following attributes: 2 seats, 5-ft³ trunk space, 8-hr. recharge, 30-mile range, 20-day reliability and no performance, heater, A/C, P/B, or P/S options.
- F3 - INTERCOM is the job control language (JCL) used to interactively access the computer (CDC 6600) at BNL.
- F4 - Small, Medium, and Large cars are defined as follows:
- small $\leq$ 4 seats
 - medium = 5 seats
 - large $\geq$ 6 seats
- F5 - Conversion Table
- Dollar Amounts are in March 1979 dollars. Use the following price index to convert from other year dollars:
<u>YEAR</u>	<u>INDEX</u>
1972	100
1977	141.7
1978	152.1
1979	161.4
- F6 - Wagner, Joseph R., A Method for Estimating Technological Penetration Rates in Commercial Automobile Fleets, BNL 51312, May 1980.
- F7 - At BNL, "sup" tells the system to suppress long system messages upon LOGIN.
- F8 - The user must separate input values with either a comma or a space. The data used in the example are in Appendix C.
- F9 - The purpose of the output is to assist the CPEN user in identifying the cost components that prevent an EHV from penetrating the market to the full extent permitted by its applicability. The table will be of use when a non-zero entry is in the 4th column of Table B for a particular sector.

REFERENCES Contd

F10- ABS is the local filename attached to the compiled CPEN version. It is also a coding method that tells a typical programmer that the program is already compiled (e.g., CPEN1ABS is name of compiled CPEN).

APPENDIX A

NATIONAL ASSOCIATION OF *Fleet Administrators, Inc.*

255 Madison Avenue, New York, New York 10017 Telephone (212) 689-3200

●To: All NAFA Members
From: R.L. Breault, President
Re: ELECTRIC VEHICLE SURVEY

Once popular, now scorned, will electric cars return to the American highway?

In view of the ever-rising price of gasoline, the unreliability of imported supplies, the impact of emission controls, a great deal of research is being devoted to a possible rebirth of the electric car and light truck as a potential vehicle of the future.

NAFA Members -- as professional, rational car and truck buyers and lessees -- can make an important contribution to this research in one very specific area:

HOW LARGE IS THE POTENTIAL MARKET FOR ELECTRIC VEHICLES?

The enclosed survey is designed to develop answers to that question. We urge your cooperation in carefully studying the options offered, comparing them with your transportation needs and then completing the questionnaire.

In addition, we are taking this opportunity to gather information about NAFA members in a previously unknown area -- where your cars and light trucks are located. The first sheet of the survey asks you to specify the state in which your vehicles are registered.

This information will be of great help to us in developing additional data about the impact of fleets on the total vehicle market, an area much overlooked by many research organizations.

As always, your cooperation and assistance are greatly appreciated.

Dedicated to Professional Fleet Management

NUMBER OF VEHICLES PER STATE

(If a given vehicle operates in more than one state, assign it only to the state which serves as the vehicle's base of operations.)

	Cars	Light Trucks (GVW of 10,000 lbs. or less)	
		Vans	Other
Alabama			
Alaska			
Arizona			
Arkansas			
California			
Colorado			
Connecticut			
Delaware			
District of Columbia			
Florida			
Georgia			
Hawaii			
Idaho			
Illinois			
Indiana			
Iowa			
Kansas			
Kentucky			
Louisiana			
Maine			
Maryland			
Massachusetts			
Michigan			
Minnesota			
Mississippi			
Missouri			
Montana			
Nebraska			
Nevada			
New Hampshire			
New Jersey			
New Mexico			
New York			
North Carolina			
North Dakota			
Ohio			
Oklahoma			
Oregon			
Pennsylvania			
Rhode Island			
South Carolina			
South Dakota			
Tennessee			
Texas			
Utah			
Vermont			
Virginia			
Washington			
West Virginia			
Wisconsin			
Wyoming			
Total			

Form #1

NATIONAL ASSOCIATION OF FLEET ADMINISTRATORS, INC.

295 Madison Avenue, New York, NY 10017

Name _____

Title _____

Company _____

ELECTRIC CAR SURVEY

Suppose that you must replace your cars and that the only replacements you can obtain are electric cars. The basic electric car available to you has a delivered price of \$6000. Options are available to increase the capabilities of this vehicle. All of the cars ordered do not have to have the same options. In fact, you may order as many as three different types of optional vehicles. In the table below please specify the type(s) of optional car(s) you would order and

the price you would be willing to pay for each option. Aside from the optional characteristics shown in the table, assume that the electric car is identical to the average car you now operate. In the event that you prefer to lease vehicles, fill out the form with purchase price data and assume that your lease payments would reflect selling prices in the same manner as at present.

	Base Car	Optional Car #1	Optional Car #2	Optional Car #3
1. Seating Option: Seating capacity desired (fill in number, including driver)	2 adults	_____ adults	_____ adults	_____ adults
Maximum price you would be willing to pay for this option.		\$	\$	\$
2. Trunk Option: Trunk space desired	5 cubic feet	_____ cubic feet	_____ cubic feet	_____ cubic feet
Maximum price you would be willing to pay for this option.		\$	\$	\$
3. Performance Option: Speed & acceleration sufficient to use limited-access roads (i.e., interstates, expressways) (Yes or No)	No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Maximum price you would be willing to pay for this option.		\$	\$	\$

	Base Car	Optional Car #1	Optional Car #2	Optional Car #3
4. Fast Recharge Option: Time needed to "refuel"	8 hours	_____ hours	_____ hours	_____ hours
Maximum price you would be willing to pay for this option.		\$	\$	\$
5. Range Option: Range desired be- tween "refuelings"	30 miles	_____ miles	_____ miles	_____ miles
Maximum price you would be willing to pay for this option.		\$	\$	\$
6. Passenger Compart- ment Heater: (Yes or No)	No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Maximum price you would be willing to pay for this option.		\$	\$	\$
7. Air Conditioning: (Yes or No)	No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Maximum price you would be willing to pay for this option.		\$	\$	\$
8. Power Steering: (Yes or No)	No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Maximum price you would be willing to pay for this option.		\$	\$	\$
9. Power Brakes: (Yes or No)	No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Maximum price you would be willing to pay for this option.		\$	\$	\$
10. Reliability Option: Allowable annual number of unsched- uled days in shop	20 days	_____ days	_____ days	_____ days
Maximum price you would be willing to pay for this option.		\$	\$	\$
11. What percentage of your car fleet would use each type of car? (Total of this line must equal 100%)	_____ %	_____ %	_____ %	_____ %

NATIONAL ASSOCIATION OF FLEET ADMINISTRATORS, INC.

295 Madison Avenue, New York, NY 10017

Name _____

Title _____

Company _____

ELECTRIC TRUCK SURVEY

Suppose that you must replace your light trucks (GVW of 10,000 lbs. or less) and that the only replacements you can obtain are electric trucks. The basic electric truck available to you has a delivered price of \$6000. Options are available to increase the capabilities of this vehicle. All of the trucks ordered do not have to have the same options. In fact, you may order as many as three different types of optional vehicles. In the table below please specify the type(s) of optional

truck(s) you would order and the price you would be willing to pay for each option. Aside from the optional characteristics shown in the table, assume that the electric truck is identical to the average truck you now operate. In the event that you prefer to lease vehicles, fill out the form with purchase price data and assume that your lease payments would reflect selling prices in the same manner as at present.

	Base Truck	Optional Truck #1	Optional Truck #2	Optional Truck #3
1. Seating Option: Seating capacity desired (fill in number, including driver)	2 adults	_____ adults	_____ adults	_____ adults
Maximum price you would be willing to pay for this option.		\$ _____	\$ _____	\$ _____
2. Cargo Space Option: Desired full-enclosed cargo space capacity	5 cubic feet	_____ cubic feet	_____ cubic feet	_____ cubic feet
Maximum price you would be willing to pay for this option.		\$ _____	\$ _____	\$ _____
3. Payload Option: Desired cargo weight capacity (including driver & passengers)	500 Lbs.	_____ Lbs.	_____ Lbs.	_____ Lbs.
Maximum price you would be willing to pay for this option.		\$ _____	\$ _____	\$ _____

	Base Truck	Optional Truck #1	Optional Truck #2	Optional Truck #3
4. Performance Option: Speed and acceleration sufficient to use limited-access roads (i.e., interstates, expressways) (Yes or No)	No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Maximum price you would be willing to pay for this option.		\$	\$	\$
5. Fast Recharge Option: Time needed to "refuel"	8 hours	_____ hours	_____ hours	_____ hours
Maximum price you would be willing to pay for this option.		\$	\$	\$
6. Range Option: Range desired between "refuelings"	30 miles	_____ miles	_____ miles	_____ miles
Maximum price you would be willing to pay for this option.		\$	\$	\$
7. Passenger Compartment Heater: (Yes or No)	No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Maximum price you would be willing to pay for this option.		\$	\$	\$
8. Air Conditioning: (Yes or No)	No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Maximum price you would be willing to pay for this option.		\$	\$	\$
9. Power Steering: (Yes or No)	No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Maximum price you would be willing to pay for this option.		\$	\$	\$
10. Power Brakes (Yes or No)	No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Maximum price you would be willing to pay for this option.		\$	\$	\$
11. Reliability Option: - Allowable annual number of unscheduled days in shop	20 days	_____ days	_____ days	_____ days
Maximum price you would be willing to pay for this option.		\$	\$	\$
12. What percentage of your truck fleet would use each type of truck? (Total of this line must equal 100%)	_____ %	_____ %	_____ %	_____ %

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APPENDIX B

CPEN User Inputs

Name of Scenario: _____

CODE: _____

First Set

	<u>EHV1</u>	<u>EHV2</u>
Seats (including driver)	1	11
Trunk (in cubic feet)	2	12
Performance Option (Y or N) ¹	3	13
Recharge Time (hrs.)	4	14
Range (miles)	5	15
Heater (Y or N)	6	16
Air Conditioning (Y or N)	7	17
Power Steering (Y or N)	8	18
Power Brakes (Y or N)	9	19
Reliability (days)	10	20

Second Set

	<u>EHV1</u>	<u>EHV2</u>
FUEL (0,1, OR 2) ²	21	31
EHBAS ³	22	32
SUR ⁴	23	33
WAR ^{1,5}	24	34
EOM ⁶	25	35
DESMIV ⁷	26	36
LIFCY1 ⁸	27	37
LIFCY2 ⁹	28	38
BATRNG ¹⁰	29	39
BATBAS ¹¹	30	40

Fuel Price - GASP, (liquid fuel;\$/gal) 41 EPRICE(electricity;\$/kWh) 42

ICE fuel consumption (mpg):

SMPG(Small) 43 MMPG(medium) 44 LMPG(large) 45

ICE prices (dollars):

SPRI(small) 46 MPRI(medium) 47 LPRI(large) 48

Footnotes for CPEN User Inputs

1. Yes is denoted by a 1, and No is denoted by a 0.
2. (0,1, or 2) respectively corresponds to (liquid, electric, or hybrid) fuel.
3. Base price (ignoring subsidy) of EHV vehicle, exclusive of battery.
4. The purchase subsidy on EHV.
5. Indicates whether EHV carries a special 3-year warranty covering: collision and liability insurance, maintenance and repairs, and a free loaner vehicle.
6. Electric vehicle monthly variable nonfuel operating and maintenance costs, as a decimal fraction of comparable ICE costs. Cost items consist of oil, tires, repair (less recoveries), maintenance, washing, and miscellaneous incidental expenses.
7. The design mileage of the EHV vehicle (i.e., vehicle lifetime in (miles), exclusive of battery lifetime.
8. The lifetime of the EHV battery, assuming that the battery is fully discharged on each cycles. Recharge cycles.
9. The lifetime of the EHV battery, assuming that the batter's average death of discharge is 65%. Recharge cycles.
10. EHV range when operating on batteries only. Miles per recharge.
11. Base price (ignoring subsidy) of EHV battery.

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APPENDIX C

CPEN User Inputs

Name of Scenario: EXAMPLE CODE:

First Set

	<u>EHV1</u>	<u>EHV2</u>
Seats (including driver)	<u>4</u>	<u>5</u>
Trunk (in cubic feet)	<u>16</u>	<u>20</u>
Performance Option (Y or N) ¹	<u>y (1)</u>	<u>y (1)</u>
Recharge Time (hrs.)	<u>4</u>	<u>4</u>
Range (miles)	<u>200</u>	<u>500</u>
Heater (Y or N)	<u>y (1)</u>	<u>y (1)</u>
Air Conditioning (Y or N)	<u>y (1)</u>	<u>n (1)</u>
Power Steering (Y or N)	<u>y (1)</u>	<u>y (1)</u>
Power Brakes (Y or N)	<u>y (1)</u>	<u>y (1)</u>
Reliability (days)	<u>13</u>	<u>0</u>

Second Set

	<u>EHV1</u>	<u>EHV2</u>
FUEL (0,1, OR 2) ²	<u>1</u>	<u>1</u>
EHBAS ³	<u>8000</u>	<u>200</u>
SUB ⁴	<u>0</u>	<u>0</u>
WAR ^{1, 5}	<u>1</u>	<u>0</u>
EOM ⁶	<u>.8</u>	<u>.8</u>
DECMIV ⁷	<u>100000</u>	<u>100000</u>
LIFCY1 ⁸	<u>500</u>	<u>450</u>
LIFCY2 ⁹	<u>900</u>	<u>800</u>
BATRNG ¹⁰	<u>200</u>	<u>500</u>
BATBAS ¹¹	<u>1300</u>	<u>1500</u>

Fuel Price-GASP, (liquid fuel;\$/gal) 1.53 EPRICE(electricity;\$/kWh) .05

ICE fuel consumption (mpg):

SMPG(Small) 25 MMPG(medium) 20 LMPG(large) 17

ICE prices (dollars):

SPRI(small) 5500 MPRI(medium) 6000 LPRI(large) 6500

APPENDIX D

EXAMPLE RUN
(Short Path)

BROOKHAVEN INTERCOM 4.5

DATE 09/10/80

TIME 11.13.29

PLEASE LOGIN

LOGIN, WEIL, DALLAS, 1074, SUP

SUP UPDATED 09/08/80 TODAY IS 09/10/80

F1 NMWEIL

PN001074

COMMAND-EDITOR

..SCREEN, 132

..ETL, 500

..ATTACH, TAPE2, MATRIX2, ID=WAGNER

PF CYCLE NO. = 001

..ATTACH, ABS.CPEN1ABS, ID=WAGNER

PF CYCLE NO. = 001

..CONNECT, INPUT, OUTPUT

..ABS

THIS IS THE FORTRAN DUEL SIMULATOR FOR CARS USING THE DATA COLLECTED FROM NAFA, YOU WILL INTERACTIVELY PUT IN THE ATTRIBUTES FOR TWO CARS AND THEY WILL BE RUN THROUGH THE SIMULATOR. IF YOU ARE CAPABLE OF PUTTING IN THE USER INPUTS IN A STRING OF NUMBERS WITHOUT THE QUESTIONS, TYPE (1) IF YOU

WANT THE QUESTIONS TELLING YOU WHAT ATTRIBUTES TO PUT IN, TYPE (2) 1
 PLEASE PUT IN THE FIRST SET OF VARIABLES FOR THE FIRST CAR (EHV1) '10'
 ATTRIBUTES 4,16,1,4,200,1,1,1,1,13

PLEASE PUT IN THE FIRST SET OF VARIABLES FOR THE SECOND CAR (EHV2) '10'
 ATTRIBUTES 5,20,1,4,500,1,0,1,1,0

THE FOLLOWING IS THE DATA FOR THE TWO CARS ATTRIBUTES

	FIRST CAR	SECOND CAR
SEATING OPTION	4	5
TRUNK SPACE	16	20
PERFORMANCE OPTION	1	1
RECHARGE	4	4
RANGE	200	500
HEATER	1	1
AIR CONDITIONER	1	0
POWER STEERING	1	1
POWER BRAKES	1	1
RELIABILITY OPTION	13	0

IF YOU ARE SATISFIED WITH THE VARIABLES AND WANT TO CONTINUE TYPE (1)
 IF YOU WANT TO CHANGE ANY ONE OR ALL OF THE VARIABLES TYPE (2) 1

PLEASE PUT IN THE SECOND SET OF VARIABLES FOR "EHV1", '10' ATTRIBUTES
 1,8000,0,1,.8,100000,500,900,200,1300

PLEASE PUT IN THE SECOND SET OF VARIABLES FOR "EHV2", '10' ATTRIBUTES
 1,200,00,00.8,100000,450,800,500,1500

PLEASE PUT IN THE FUEL PRICE AND ICE VARIABLES, '8' VARIABLES
 1.53,.05,25,20,17,.5500,6000,6500

THE FOLLOWING IS THE USER INPUT DATA FOR EHV1 AND EHV2

GASP	1.53
EPRICE	.05
SMPG	25.0
MMPG	20.0
LMPG	17.0
SPRI	5500
MPRI	6000
LPRI	6500

	EHV1	EHV2
FUEL	1	1
ELIBAS	8000	7000
SUB	0	0
WAR	1	0
EOM	.80	.80
DESMIV	100000	100000
LIFCY1	500.	450.
LIFCY2	900.	800.
BATRNG	200	500
BATBAS	1300	1500

IF YOU ARE SATISFIED WITH THE USER INPUT DATA, AND WANT TO GENERATE THE
I.C.E. COMPARISON TABLES, THEN TYPE (1)

IF YOU WANT TO CHANGE ANY ONE OR ALL OF THE VARIABLES TYPE (2) 1

APPENDIX E

EXAMPLE RUN

(Long Path)

...REWIND,TAPE2,ABS

...ABS

THIS IS THE FORTRAN DUEL SIMULATOR FOR CARS USING THE DATA COLLECTED FROM NAFA, YOU WILL INTERACTIVELY PUT IN THE ATTRIBUTES FOR TWO CARS AND THEY WILL BE RUN THROUGH THE SIMULATOR. IF YOU ARE CAPABLE OF PUTTING IN THE USER INPUTS IN A STRING OF NUMBERS WITHOUT THE QUESTION, TYPE (1)

IF YOU WANT THE QUESTIONS TELLING YOU WHAT ATTRIBUTES TO PUT IN TYPE (2)

2

PUT IN THE FIRST CARS ATTRIBUTES

1. SEATING OPTION IS? 4

2. WHAT IS THE TRUNK CAPACITY, (IN CU.FT.) 16

3. DOES IT HAVE A PERFORMANCE OPTION?

TYPE (0) FOR NO OR TYPE (1) FOR YES 1

4. HOW MANY HOURS OF RECHARGE IS NEEDED? 4

5. WHAT IS THE VEHICLES RANGE CAPACITY? 200

6. DOES THE VEHICLE HAVE A HEATER?

TYPE (0) FOR NO OR TYPE (1) FOR YES 1

7. DOES THE VEHICLE HAVE A AIR CONDITIONER?

TYPE (0) FOR NO OR TYPE (1) FOR YES 1

8. DOES THE VEHICLE HAVE POWER STEERING?

TYPE (0) FOR NO OR TYPE (1) FOR YES 1

9. DOES THE VEHICLE HAVE POWER BRAKES?

TYPE (0) FOR NO OR TYPE (1) FOR YES 1

10. HOW MANY DAYS PER YEAR CAN THE CAR BE INCAPACITATED? RELIABILITY 13

PUT IN THE SECOND CARS ATTRIBUTES

1. SEATING OPTION IS? 5

2. WHAT IS THE TRUNK CAPACITY, (IN CU.FT.) 20

3. DOES IT HAVE A PERFORMANCE OPTION?

TYPE (0) FOR NO OR TYPE (1) FOR YES 1

4. HOW MANY HOURS OF RECHARGE IS NEEDED? 4

5. WHAT IS THE VEHICLES RANGE CAPACITY? 500

6. DOES THE VEHICLE HAVE A HEATER?

TYPE (0) FOR NO OR TYPE (1) FOR YES 1

7. DOES THE VEHICLE HAVE A AIR CONDITIONER?

TYPE (0) FOR NO OR TYPE (1) FOR YES 0

8. DOES THE VEHICLE HAVE POWER STEERING?

TYPE (0) FOR NO OR TYPE (1) FOR YES 1

9. DOES THE VEHICLE HAVE POWER BRAKES?

TYPE (0) FOR NO OR TYPE (1) FOR YES 1

10. HOW MANY DAYS PER YEAR CAN THE CAR BE INCAPACITATED? RELIABILITY 0

THE FOLLOWING IS THE DATA FOR THE TWO CARS ATTRIBUTES

	FIRST CAR	SECOND CAR
SEATING OPTION	4	5
TRUNK SPACE	16	20
PERFORMANCE OPTION	1	1
RECHARGE	4	4
RANGE	200	500
HEATER	1	1
AIR CONDITIONER	1	0
POWER STEERING	1	1
POWER BRAKES	1	1
RELIABILITY OPTION	13	0

IF YOU ARE SATISFIED WITH THE VARIABLES AND WANT TO CONTINUE TYPE (1)

IF YOU WANT TO CHANGE ANY ONE OR ALL OF THE VARIABLES TYPE (2) 1

PLEASE INSERT USER INPUT DATA FOR TEST VEHICLES TO BE USED IN THE TABULATIONS FOR THE I.C.E. COMPARISON STUDY IF YOU WANT THE USER INPUT VARIABLE LIBRARY WHICH HAS A DESCRIPTION OF EACH VARIABLE
TYPE (0) FOR NO OR TYPE (1) FOR YES 0

PUT IN EHVI'S USER INPUT DATA

WHAT IS THE

1. FUEL, EITHER 0,1, OR 2 1
2. EHBAS ? 8000
3. SUB ? 0
4. WAR ? 1
5. EOM ? .8
6. DESMIV ? 100000
- 7A. LIFCY1 ? 500
- 7R. LIFCY2 ? 900
8. BATRING ? 200
9. BATBAS ? 1300

PUT IN EHV2'S USER INPUT DATA

WHAT IS THE

1. FUEL, EITHER 0,1, OR 2 1
2. EHBAS ? 200
3. SUB ? 0
4. WAR ? 0
5. EOM ? .8
6. DESMIV ? 100000
- 7A. LIFCY1 ? 450
- 7B. LIFCY2 ? 800
8. BATRNG ? 500
9. BATBAS ? 1500

NOW PUT IN THE VARIABLES THAT ARE SIMILAR TO EHVI AND EHV2

WHAT IS THE

1. CASP ? 1.53
2. EPRICE ? .05
3. SMPG ? 25
4. MMPG ? 20
5. LMPG ? 17
6. SPRI ? 5500
7. MPRI ? 600
8. LPRI ? 6500

THE FOLLOWING IS THE USER INPUT DATA FOR EHV1 AND EHV2

GASP	1.53
EPRICE	.05
SMPG	25.0
MPG	20.0
LMPG	17.0
SPRI	5500
MPRI	6000
LPRI	6500

	EHV1	EHV2
FUEL	1	1
EBAS	8000	200
SUB	0	0
WAR	1	0
EOM	.80	.80
DESMIV	100000	100000
LIFCY 1	500.	450.
LIFCY2	900.	800.
BATRNG	200	500
BATBAS	1300	1500

IF YOU ARE SATISFIED WITH THE USER INPUT DATA, AND WANT TO GENERATE THE
I.C.E. COMPARISON TABLES, THEN TYPE (1)

IF YOU WANT TO CHANGE ANY ONE OR ALL OF THE VARIABLES TYPE (2) 1

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APPENDIX F

TABLE A
Applicability Rates (Percent)

SECTOR	EHV1	EHV2	OVERLAP	TOTAL EHV
BUSINESS	19.	13.	8.	24.
UTILITIES	49.	43.	33.	59.
POLICE	5.	1.	1.	5.
GOV'T	25.	28.	24.	29.
TOTAL	22.	18.	12.	28.

TABLE B
Fleet Car Penetration Rates (Percent)

SECTOR	***** EHV1	EHV2	***** TOTAL	***** APPLICABLE	***** ICE NON- APPLICABLE	***** TOTAL	***** TOTAL
BUSINESS	.0%	6.1%	6.2%	3.7%	90.1%	93.8%	100.0%
UTILITIES	0.0%	31.4%	31.4%	0.0%	68.6%	68.6%	100.0%
POLICE	0.0%	.3%	.3%	.3%	99.5%	99.7%	100.0%
GOV'T	0.0%	28.5%	28.5%	8.6%	63.0%	71.5%	100.0%
TOTAL	.0%	11.7%	11.8%	3.8%	84.5%	88.2%	100.0

TABLE C
Fleet Car Annual Sales (Thousands)

SECTOR	***** EHV1	EHV2	***** TOTAL	ICE	TOTAL	ADJUSTMENTS FOR PRICE- INDUCED DEMAND REDUCTION ***** DEMAND REDUCTION	ORIGINAL DEMAND
BUSINESS	0.	24.	24.	360.	384.	511.	895.
UTILITIES	0.	3.	3.	7.	10.	46.	56.
POLICE	0.	0.	0.	66.	66.	21.	87.
GOV'T	0.	6.	6.	14.	20.	79.	99.
TOTAL	0.	33.	33.	448.	480.	657.	1137.

DO YOU WANT TO PRINT THE FOLLOWING TABLES?

..TABLE D.1..(BUSINESS SECTOR)

TYPE (0) FOR NO OR TYPE (1) FOR YES I

..TABLE D.1..(BUSINESS SECTOR)

PRESENT VALUE OF LIVE-CYCLE COSTS, AS PERCEIVED BY ICE BUYERS WHO COULD HAVE PURCHASED AN EHV (THAT IS, EHV WAS APPLICABLE BUT EITHER ITS PURCHASE PRICE WAS TOO HIGH OR IT'S DISCOUNTED LIFE-CYCLE COSTS WERE TOO HIGH)

MARCH 1979 DOLLARS				

ICE BUYERS WHO COULD HAVE PURCHASED EHV1 *****		ICE BUYERS WHO COULD HAVE PURCHASED EHV2 *****		
EHV1	ICE	EHV2	ICE	
VEHICLE				
COST (W/O SUBSIDY)	8000.	5975.	0.	0.
RESALE VALUE	2534.	4080.	0.	0.
NET DEPRECIATION	5466.	4080.	0.	0.
BATTERY				
COST (W/O SUBSIDY)	1300.	0.	0.	0.
SALVAGE	411.	0.	0.	0.
NET DEPRECIATION	889.	0.	0.	0.
TOTAL VEH. AND BAT.	6355.	4080.	0.	0.
OPERATING AND MAINTENANCE				
FUEL	8.	2462.	0.	0.
ROAD TAX	276.	0.	0.	0.
OTHER, FIXED	828.	828.	0.	0.
OTHER, VARIABLE	626.	783.	0.	0.
TOTAL O AND M	1738.	4073.	0.	0.
GROSS	8093.	8153.	0.	0.
LESS: SUBSIDY	0.	0.	0.	0.
LESS: WARRANTY	1513.	0.	0.	0.
NET DISCOUNTED LIFE-CYCLE COSTS	6580.	8153.	0.	0.

DO YOU WANT TO PRINT THE FOLLOWING TABLES?

..TABLE D.2..(UTILITIES SECTOR)

TYPE (0) FOR NO OR TYPE (1) FOR YES 0

DO YOU WANT TO PRINT THE FOLLOWING TABLES?

..TABLE D.3..(POLICE SECTOR)

TYPE (0) FOR NO OR TYPE (1) FOR YES 0

DO YOU WANT TO PRINT THE FOLLOWING TABPES?

..TABLE D.4..(GOVT SECTOR)

TYPE (0) FOR NO OR TYPE (1) FOR YES 0

DO YOU WANT TO PRINT THE FOLLOWING TABLE3?

..TABLE D.5..(ALL SECTORS)

TYPE (0) FOR NO OR TYPE (1) FOR YES 0

STOP

1.745 CP SECONDS EXECUTION TIME

APPENDIX G

A. Background to Glossary

CPEN (Fleet-Car Market PENetration Simulator) is a FORTRAN program written for use on Brookhaven National Laboratory's CDC 6600 computer. It is an interactive program operable from remote (including non-BNL) terminals. It uses a data base comprised of information collected from 142 Fleet operators. Each fleet operator, or respondent, could indicate a preference for a base car described in the questionnaire, or alternatively, for as many as three respondent-described "optional cars." The CPEN user enters data to describe two hypothetical vehicles, termed EHV1 and EHV2, whose physical attributes are compared to those needed by the base vehicle and by the optional cars. If an EHV has physical attributes that make it suitable for use as the base vehicle or as an optional car, it is considered "applicable" for such use. CPEN then performs an economic comparison of the EHV and a comparable internal-combustion-engine (ICE) car, and determines which vehicle the respondent would purchase to minimize costs. All CPEN dollar amounts are stated in March 1979 dollars.

The respondents are classified by their main business activity, or market sector. The market sectors are: business, utilities, police, and state & local governments. For internal computations, CPEN segregates cars into small, medium, and large on the basis of seating capacity, with small cars having fewer than 5 seats, medium cars having 5 seats, and large cars having 6 or more seats.

In the CPEN computer coding certain subscripts are reserved for special uses. The subscript J indicates market sector. When J equals 5, the subscripted variable in question is usually a sum or average of all sectors. The subscript K indicates EHV1 or EHV2, and the subscript L indicates which of the respondent's vehicles is being dealt with. That is, K values of 1 or 2 respectively indicate EHV1 and EHV2, and L values of 1, 2, and 3 respectively indicate optional cars 1, 2, and 3. An L value of 4 indicates the base car.

B. Glossary

ADU	Average daily usage of the typical car within a market sector. Days on which vehicle is idle are not used to compute average. Miles per day.
AIR(L)	A dummy variable indicating whether the respondent needs air conditioning on optional car L. AIR(L) values of 1 or 0 indicate respectively whether car does or does not need air conditioning.
AVCAP1(I,J,K)	Average capitalized costs of acquiring EHV1 or EHV2, as perceived by a respondent who rejected EHV1 or EHV2 on basis of cost only (i.e., they were applicable). I denotes cost category, J denotes market sector, and K denotes EHV1 (K=1) or EHV2 (K=2).
AVCAP2(I,J,K)	Average capitalized costs of acquiring an ICE, where K denotes which EHV the ICE is designed to compete with. See AVCAP1(I,J,K).
BATBAS(K)	Base price (ignoring subsidy) of EHV battery.
BATMO	The lifetime of an EHV battery, given the average depth of discharge (i.e., DEPTH) that a specific EHV battery would experience when used in a particular optional car. Months.
BATRNG(K)	EHV range when operating on batteries only. Miles per recharge.
BP	Business sector weighting factor (3174).
BUYEV(I,J,K)	Number of EHV's purchased, after eliminating EHV1 and EHV2 overlap (see Figure 3 in text).

BUYPR(I,J,K)

The Buy Price maker takes the base price of each respondent optional car and adds it to the sum of the max. Procedure for all the attributes to give a final price value of each optional car. In the task of making the prices more realistic if a car with 4 seats or less has a price under \$5000, then it is raised to that amount. If a car with 5 seats has a price under \$6000, then it is raised to 6000, and for a car with 6 seats or more is not at least \$6900 then the price is raised to \$6900.

CAR(M)

The NAFA survey data, where CAR indicates the attributes of the optional car being tested at a particular time in the program and M denotes questionnaire items as follows:

<u>M</u>	<u>VARIABLE</u>
1.	Seating Option
2.	Trunk Space Option
3.	Performance Option (Y/N)
4.	Recharge Hours Option
5.	Range
6.	Heater (Y/N)
7.	A/C (Y/N)
8.	P/S (Y/N)
9.	P/B (Y/N)
10.	Reliability Option
11.	Utilization Rate
12.	Maximum Price for Seating Option
13.	Maximum Price for Trunk Option
14.	Maximum Price for Performance Option
15.	Maximum Price for Recharge Option
16.	Maximum Price for Range Option
17.	Maximum Price for Heater Option
18.	Maximum Price for A/C Option
19.	Maximum Price for P/S Option
20.	Maximum Price for P/B Option

	21. Maximum Price for Reliability Option
	22. Total Cars in Fleet
	23. Base Percentage
	24. MIX Number
CARS	The total number of a respondent's cars that need the capabilities dictated by the respondent.
CYCLES	The lifetime of an EHV battery, given the average depth of discharge (i.e., DEPTH) that a specific EHV battery would experience when used in a particular optional car. Recharge cycles.
DAYMO	The market sector average monthly number of days that a car is operated (as opposed to standing idle).
DEPTH	The EHV battery's average depth of discharge, as a percent of full charge.
DESMIV(K)	The design mileage of the EHV vehicle (i.e., vehicle lifetime in miles), exclusive of battery lifetime.
DU	Average daily usage of a respondent-described optional car. Days on which vehicle is idle are not used to compute average. Miles per day.
ECAR(I,J,K)	Number of EHV's purchased, but contains EHV1 and EHV2 overlap (see Figure 3 in text).
ECARP(I,J,K)	Base prices (including battery and subsidy) of EHV's in ECAR(I,J,K).
ECARPV(I,J,K)	The capitalized costs of cars in ECAR(I,J,K).
EBBAS(K)	Base price (ignoring subsidy) of EHV vehicle, exclusive of battery.
EBBUY(J,K)	The estimated number of EHV's that would be purchased by the respondents.

EHCAP	The estimated capitalized cost of acquiring a specific EHV for use as a particular optional car.
EHPRI	Base price (including battery and subsidy) of an EHV acquired for use as a particular optional car.
EHSKIP(J,K)	The estimated number of ICEs purchased by respondents in instances where they could have purchased an EHV.
EHVAPP(I,J,K)	The number of ICEs purchased in cases where an EHV was applicable.
EOM	Electric vehicle monthly variable nonfuel operating and maintenance costs, as a decimal fraction of comparable ICE costs. Cost items consist of oil, tires, repair (less recoveries), maintenance, washing, and miscellaneous incidental expenses.
EPRICE	The price of electricity purchased for recharging EHV batteries. Dollars per kilowatt-hour.
ESHARE	The estimated decimal fraction of vehicle mileage for which a given hybrid vehicle would be propelled by batteries alone.
FIXOML	The market sector monthly average costs for large car fixed operating and maintenance expenses. Cost items consist of license, taxes (other than fuel taxes), parking, tolls, and insurance.
FIXOMM	The market sector monthly average costs for medium car fixed operating and maintenance expenses. See FIXOML.
FIXOMS	The market sector monthly average costs for small car fixed operating and maintenance expenses. See FIXOML.

FUEL(K)	A dummy variable indicating the fuel type of an EHV. FUEL(K) values of 0,1, and 2 respectively denote vehicles that use liquid fuels exclusively, electricity exclusively, and some combination of liquids and electricity.
GASP	The price of gasoline or other liquid fuel purchased to refuel ICEs and hybrid vehicles. Dollars per gallon.
GP	Government sector weighting factor (645).
HOLDMO	The market sector average number of months that a car is held by the original owner.
ICEBUY(J)	The estimated number of ICEs purchased by respondents in instances where they could have purchased an EHV. Related to EHSKIP(J,K) but does not distinguish which EHV the ICE purchaser could have bought.
ICECAP	The estimated capitalized cost of acquiring an ICE for use as a particular optional car.
ICEPRI	The price of an ICE acquired for use as a particular optional car. Includes automatic transmission. Also includes air conditioning, power steering, and power brakes if a competing EHV is so equipped.
INSURE	The monthly per vehicle cost of collision and liability insurance.
INT	The sectoral average monthly discount rate.
LIFCY1(K)	The lifetime of the EHV battery, assuming that the battery is fully discharged on each cycle. Recharge cycles.
LIFCY2(K)	The lifetime of the EHV battey, assuming that the battery's average depth of discharge is 65%. Recharge cycles.

LMPG(K)	Fuel consumption of a large ICE with automatic transmission. Miles per gallon.
LPRI	Base price of large ICE, exclusive of all options except automatic transmission.
MPG	Fuel consumption of medium ICE with automatic transmission. Miles per gallon.
MPRI	Base price of medium ICE, exclusive of all options except automatic transmission.
MPRICE(L)	The maximum price a respondent was willing to pay for optional car L. The maximum price is equal to the electric car base price appearing on the respondent's questionnaire form, plus the prices the respondent entered next to each of the ten optional car attributes.
MSHARE(J,N)	The estimated decimal fraction of the market sector sample that would buy EHV1 (designated by N=1), buy EHV2 (N=2), buy either EHV1 or EHV2 (N=3), buy an ICE (N=4), buy either an EHV or an ICE (N=5), or buy no car (N=6).
NETAPP(M)	The market sector number of ICEs purchased in instances where EHV's were applicable, after eliminating overlap between EHV1 and EHV2.
NONAPP(J)	The number of market sector sample cars for which both EHV1 and EHV2 are nonapplicable. That is, neither has physical capabilities sufficient to be considered for purchase, regardless of their price.
PAPPV(J,L)	Market sector applicability rates for EHV1 (L=1) and EHV2 (L=2). PAPPV(J,3) shows EHV1 and EHV2 applicability overlap (see Figure 3 in text) and PAPPV(J,4) is the total applicability of both EHV1 and EHV2, with overlap eliminated.

PBRAKE(L)	A dummy variable indicating whether the respondent needs power brakes on optional car L. PBRAKE(L) values of 1 or 0 indicate respectively whether car does or does not need power brakes.
PC(I,J,K)	Indicates whether EHV1 (K=1) and EHV2 (K=2) are applicable to respondent's optional car. EHV is applicable if PC(I,J,K) = 10.
PP	Police sector weighting factor (291).
PSTEER(L)	A dummy variable indicating whether the respondent needs power steering on optional car L. PSTEER(L) values of 1 or 0 indicate respectively whether car does or does not need power steering.
PVBBUY	The present value of the series of batteries purchased in order to use a specific EHV as a particular optional car.
PVBSA1	The present value of the salvage value of the first battery worn out by a specific EHV, when the EHV is used as a particular optional car.
PVBSA2	Same as PVBSA1, but for <u>second</u> battery worn out.
PVBSA3	Same as PVBSA1, but for <u>third</u> battery worn out.
PVBSAL	The present value of the salvage values of all the batteries purchased for a specific EHV, when the EHV is used as a particular optional car.
PVBUY2	The present value of the second battery purchased (as a replacement for the first battery) for a specific EHV used as a particular optional car.
PVBUY3	Same as PVBUY2, but for <u>third</u> battery.

PVBUY4	Same as PVBUY2, but for <u>fourth</u> battery.
PVC	The market sector present value coefficient. Shows the present value of a series of one dollar payments (or receipts) occurring at the end of each month that a vehicle is held by the original owner.
PVEL	The present value of the electricity purchased for a specific EHV, during the period the EHV is used as a particular optional car.
PVEVAR	The present value of the "other, variable" component of a specific EHV's operating and maintenance costs, for the period the EHV is used as a particular optional car. See PVICEV for cost items included.
PVEVSE	The present value of a specific EHV (exclusive of battery) at vehicle trade-in, when the EHV is used as a particular optional car.
PVFIXM	The present value of the "other, fixed" component of a specific EHV's operating and maintenance costs, for the period the EHV is used as a particular optional car. See FIXOML for cost items included.
PVCASE	The present value of the gasoline or other liquid fuel purchased to refuel a specific hybrid car, for the period the vehicle is used as a particular optional car.
PVGASI	The present value of the gasoline or other liquid fuel purchased to refuel a specific ICE, for the period the vehicle is used as a particular optional car.
PVICEF	The present value of the "other, fixed" component of a specific ICE's operating and maintenance costs, for the period the ICE is used as

	a particular optional car. See FIXOML for cost items included.
PVICEV	The present value of the "other, variable" component of a specific ICE's operating and maintenance costs, for the period the ICE is used as a particular optional car. Cost items include oil, tires, repairs (less recoveries), maintenance, washing, and miscellaneous incidental expenses.
PVICSE	The present value of a specific ICE at vehicle trade-in, when the ICE is used as a particular optional car.
PVLAST	The present value of the salvage value of the last battery purchased for a specific EHV, when the EHV is used as a particular optional car.
PVTAX	The present value of a specific EHV's road tax, when the EHV is used as a particular optional car.
PVTRAD	The market sector present value of one dollar received at vehicle trade in.
PVWAR	The present value of a 3-year warranty covering a vehicle's collision and liability insurance, maintenance and repairs, and a free loaner while repairs are being made.
RANGE(L)	The range specified by the respondent for optional car L. Miles.
RELY(K)	The EHV unscheduled annual number of days in shop.
SALES(J,M)	The estimated annual number of cars sold in a market sector, where M=1 denotes EHV1 sales, M=2 denotes EHV2 sales, M=3 denotes total EHV sales, M=4 denotes ICE sales, M=5 denotes total sales, M=6 denotes sales lost due to high

prices of cars, and M=7 denotes total sales that would have occurred without price-induced sales loss.

SEATS(L) The number of seats specified by the respondent for optional car L.

SECTOR A dummy variable indicating the respondent's market sector, with values of 1,2,3,4 and 5 respectively denoting business sector, utilities sector, police sector, government sector, and all sectors.

SHARE(J,M) The estimated market sector percent of cars "purchased" that are EHV1 (M=1), EHV2 (M=2), either EHV1 or EHV2 (M=3), ICEs for which an EHV was applicable but too costly (M=4), ICEs for which an EHV was not applicable (M=5), ICEs (M=6), and ICEs or EHV2s (M=7). SHARE(J,7) should always equal 100.

SHRINK1(J) The estimated market sector number of sample cars for which neither EHV1 or EHV2 is applicable, and that would have been "purchased" except that user-specified ICE prices exceeded the maximum prices specified by respondents.

SHRINK2(J) The estimated market sector number of sample cars for which either EHV1 or EHV2 is applicable, and that would be "purchased" except that user-specified ICE and/or EHV prices exceeded the maximum prices specified by respondents.

SLOPE

For a particular EHV, the slope of the line:

SMPG

Fuel consumption of small ICE with automatic transmission. Miles per gallon.

SPRI

Base price of small ICE, exclusive of all options except automatic transmission.

SUB(K)

The purchase subsidy on EHV K.

SUMCAP(I,J,K)

The capitalized costs of all EHV's that were applicable, but were rejected on the basis of cost. I denotes cost category, J denotes market sector, and K denotes EHV1 or EHV2.

SUMICE(I,J,K)

The capitalized costs of all ICEs "purchased" by respondents in situations where an EHV was applicable. I denotes cost category, J denotes market sector, and K denotes which EHV the ICE is designed to compete with.

See SUMCAP(I,J,K).

TOTBUY(J)

The estimated number of cars (both EHV's and ICEs) "purchased" by respondents in situations where either EHV1 or EHV2 was applicable. Will equal number of cars in sample if SHRINK1(J), SHRINK2(J), and NONAPP(J) are all equal to zero.

TP

Total of sectoral weighting factors (4639).

UP

Utility sector weighting factor (529).

VTRADE	The decimal fraction of vehicle (exclusive of battery) lifetime remaining at vehicle trade-in.
WAR(K)	A dummy variable indicating whether an EHV carries a special 3-year warranty covering: collision and liability insurance, maintenance and repairs, and a free loaner vehicle. WAR(K) values of 1 and 0 indicate respectively whether EHV does or does not have warranty.
WARICV	The present value of the variable operating and maintenance costs that would be covered under a special 3-year warranty (see WAR(K)), assuming a vehicle has variable operating and maintenance costs equal to that of an ICE. See PCICEV for list of variable O&M cost items.
WARPVC	The market sector present value coefficient used for discounting a special 3-year warranty (see WAR(K)). Shows the present value of a series of one dollar payments (or receipts) occurring at the end of each month that the vehicle is both under warranty and owned by the original owner.

APPENDIX H

```

PROGRAM CPEN(INPUT,OUTPUT,TAPE2,TAPE5=INPUT,TAPE3=OUTPUT)
REAL CAR,DUM,BOTH,NEITHER,ONLY1,ONLY2,TOTMIX,ZZ,RELY,
+SHRINK1,SHRINK2,NONAPP,EOM,EPRICE,GASP,SMPG,MMPG,LMPG,LIFCY1,LIFCY
+2,EHBUY,ICEBUY,AVCAP1,AVCAP2,CARSAL,MSHARE,SALES,EHSKIP,SHARE,SUMC
+AP,SUMICE,TOTBUY,INT,ICECAP,ICEPRI,DROP,EHVAPP,ECAR,ECARP,ECARPV,
+BUYEV,DEPRES,NETAPP,TOTMKT,APPV,PAPPV,TOTEHV,NONA
INTEGER F,POINT,PC,M,N,BUYPR,L,
+FUEL,WAR,SPRI,MPRI,LPRI,DESMIV,EHBAS,SUB,BATRNG,BATBAS
DIMENSION F(2,10),BUYPR(142,4),
+BOTH(4),NEITHER(4),ONLY1(4),ONLY2(4),TOTMIX(4),TOTEHV(4),
+APPV(4,4),PAPPV(4,4),DEPRE(142,2),NONA(142,2),
+SHRINK1(5),SHRINK2(5),NONAPP(5),FUEL(2),EHBAS(2),SUB(2),WAR(2),
+EOM(2),LIFCY1(2),LIFCY2(2),DESMIV(2),BATRNG(2),BATBAS(2),
+AVCAP1(16,5,2),AVCAP2(16,5,2),EHBUY(5,2),EHSKIP(5,2),CARSAL(5),
+ICEBUY(5),MSHARE(5,7),SALES(5,7),SHARE(5,7),TOTBUY(5),
+SUMCAP(9,5,2),SUMICE(6,5,2),RELY(2),TOTMKT(5),DROP(142),NETAPP(5)
LEVEL 2,CAR,PC,EHVAPP,ECAR,ECARP,ECARPV,BUYEV,DEPRES
COMMON/HELP/ CAR(24),PC(142,3,2),EHVAPP(142,4,2),ECAR(142,4,2),
+ECARP(142,4,2),ECARPV(142,4,2),BUYEV(142,4,2),DEPRES(142,4,2)

```

C
C
C

FIRST AND SECOND CAR ATTRIBUTES READ IN INTERACTIVELY

```

WRITE(3,97)
WRITE(3,96)
WRITE(3,120)
WRITE(3,121)
READ(5,*) POINTG
2 IF (POINTG.EQ.1) GO TO 7
3 I=1
WRITE(3,98)
GO TO 6
5 WRITE(3,99)
6 WRITE(3,100)
READ(5,*) F(1,1)
WRITE(3,101)
READ(5,*) F(1,2)
WRITE(3,102)
WRITE(3,103)
READ(5,*) F(1,3)
WRITE(3,104)
READ(5,*) F(1,4)
WRITE(3,105)
READ(5,*) F(1,5)
WRITE(3,106)
WRITE(3,103)
READ(5,*) F(1,6)
WRITE(3,107)
WRITE(3,103)
READ(5,*) F(1,7)
WRITE(3,108)
WRITE(3,103)
READ(5,*) F(1,8)
WRITE(3,109)
WRITE(3,103)
READ(5,*) F(1,9)
WRITE(3,110)
READ(5,*) F(1,10)
IF (1.EQ.2) GO TO 10
IF (1.EQ.1) I=2
IF (1.EQ.2) GO TO 5
10 WRITE(3,200)
WRITE(3,201)
WRITE(3,202) (F(1,1),I=1,2)
WRITE(3,203) (F(1,2),I=1,2)
WRITE(3,204) (F(1,3),I=1,2)
WRITE(3,205) (F(1,4),I=1,2)
WRITE(3,206) (F(1,5),I=1,2)
WRITE(3,207) (F(1,6),I=1,2)

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```

        WRITE (3,1002)
        READ (5,*) POINT1
        IF (POINT1.EQ.1) WRITE (3,999)
995    WRITE (3,1003)
        I=1
1100   WRITE (3,1004)
        WRITE (3,1005)
        READ (5,*) FUEL(1)
        WRITE (3,1006)
        READ (5,*) EHBAS(1)
        WRITE (3,1007)
        READ (5,*) SUB(1)
        WRITE (3,1008)
        READ (5,*) WAR(1)
        WRITE (3,1009)
        READ (5,*) EOM(1)
        WRITE (3,1010)
        READ (5,*) DESMIV(1)
        WRITE (3,1011)
        READ (5,*) LIFCY1(1)
        WRITE (3,1043)
        READ (5,*) LIFCY2(1)
        WRITE (3,1012)
        READ (5,*) BATRNG(1)
        WRITE (3,1013)
        READ (5,*) BATBAS(1)
        IF (1.EQ.2) GO TO 1101
        IF (1.EQ.1) I=2
        WRITE (3,1014)
        GO TO 1100
1101   WRITE (3,1015)
        WRITE (3,1004)
        WRITE (3,1016)
        READ (5,*) GASP
        WRITE (3,1017)
        READ (5,*) EPRICE
        WRITE (3,1018)
        READ (5,*) SMPG
        WRITE (3,1019)
        READ (5,*) MMPG
        WRITE (3,1020)
        READ (5,*) LMPG
        WRITE (3,1021)
        READ (5,*) SPRI
        WRITE (3,1022)
        READ (5,*) MPRI
        WRITE (3,1023)
        READ (5,*) LPRI
12    WRITE (3,1024)
        WRITE (3,1025) GASP
        WRITE (3,1029) EPRICE
        WRITE (3,1026) SMPG
        WRITE (3,1027) MMPG
        WRITE (3,1028) LMPG
        WRITE (3,1030) SPRI
        WRITE (3,1031) MPRI
        WRITE (3,1032) LPRI
        WRITE (3,1033)
        WRITE (3,1034) (FUEL(1),I=1,2)
        WRITE (3,1035) (FHRAS(1),I=1,2)
        WRITE (3,1036) (SUB(1),I=1,2)
        WRITE (3,1037) (WAR(1),I=1,2)
        WRITE (3,1038) (EOM(1),I=1,2)
        WRITE (3,1039) (DESMIV(1),I=1,2)
        WRITE (3,1040) (LIFCY1(1),I=1,2)
        WRITE (3,1044) (LIFCY2(1),I=1,2)
        WRITE (3,1041) (BATRNG(1),I=1,2)
        WRITE (3,1042) (BATBAS(1),I=1,2)
        WRITE (3,402)

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        WRITE (3,1050)
        WRITE (3,214)
        READ (5,*) POINT2
        IF (POINT2.EQ.1) GO TO 13
        IF (POINT2.EQ.0) GO TO 86
        IF (POINT2.EQ.2) 995,555
13      IF (POINT2.EQ.0) GO TO 86
        IF (POINT2.EQ.2) 8,555
C
C      GENERATE TABLES
C
999    FORMAT (* VARIABLE LIBRARY .....> TO BE CONTINUE *)
1000   FORMAT (* PLEASE INSERT USER INPUT DATA FOR TEST VEHICLES TO BE US
+ED IN THE TABULATIONS FOR THE I.C.E. COMPARISON STUDY *)
1001   FORMAT (* IF YOU WANT THE USER INPUT VARIABLE LIBRARY WHICH HAS A
+DESCRIPTION OF EACH VARIABLE *)
1002   FORMAT (* TYPE (0) FOR NO OR TYPE (1) FOR YES *)
1003   FORMAT (* PUT IN EHV1'S USER INPUT DATA *)
1004   FORMAT (* WHAT IS THE *)
1005   FORMAT (* 1. FUEL, EITHER 0.1. OR 2 *)
1006   FORMAT (* 2. EHBAS 1 *)
1007   FORMAT (* 3. SUB 1 *)
1008   FORMAT (* 4. WAR 1 *)
1009   FORMAT (* 5. EOM 1 *)
1010   FORMAT (* 6. DESMIV 1 *)
1011   FORMAT (* 7A. LIFCY1 1 *)
1012   FORMAT (* 7B. LIFCY2 1 *)
1013   FORMAT (* 8. BATRNG 1 *)
1014   FORMAT (* 9. BATBAS 1 *)
1015   FORMAT (* PUT IN EHV2'S USER INPUT DATA *)
1016   FORMAT (* NOW PUT IN THE VARIABLES THAT ARE SIMILAR TO EHV1 AND EH
+V2 *)
1017   FORMAT (* 1. GASP 1 *)
1018   FORMAT (* 3. SMPG 1 *)
1019   FORMAT (* 4. MMPG 1 *)
1020   FORMAT (* 5. LMPG 1 *)
1021   FORMAT (* 2. EPRICE 1 *)
1022   FORMAT (* 6. SPR1 1 *)
1023   FORMAT (* 7. MPRI 1 *)
1024   FORMAT (* 8. LPRI 1 *)
1025   FORMAT (/,* THE FOLLOWING IS THE USER INPUT DATA FOR EHV1 AND EHV
+2*)
1026   FORMAT (* GASP      *,F5.2)
1027   FORMAT (* SMPG      *,F5.1)
1028   FORMAT (* MMPG      *,F5.1)
1029   FORMAT (* LMPG      *,F5.1)
1030   FORMAT (* EPRICE    *,F5.2)
1031   FORMAT (* SPR1      *,15)
1032   FORMAT (* MPRI      *,15)
1033   FORMAT (* LPRI      *,15)
1034   FORMAT (/,*          EHV1          EHV2 *)
1035   FORMAT (* FUEL      *,16,5X,16)
1036   FORMAT (* EHBAS     *,16,5X,16)
1037   FORMAT (* SUB       *,16,5X,16)
1038   FORMAT (* WAR       *,16,5X,16)
1039   FORMAT (* EOM       *,F6.2,5X,F6.2)
1040   FORMAT (* DESMIV     *,16,5X,16)
1041   FORMAT (* LIFCY1     *,F6.0,5X,F6.0)
1042   FORMAT (* LIFCY2     *,F6.0,5X,F6.0)
1043   FORMAT (* BATRNG     *,16,5X,16)
1044   FORMAT (* BATBAS     *,16,5X,16)
1050   FORMAT (* IF YOU ARE SATISFIED WITH THE USER INPUT DATA, AND WANT
+TO GENERATE THE I.C.E. COMPARISON TABLES, THEN TYPE (1) *)
1051   FORMAT (* IF YOU DO NOT WANT TO GENERATE THE TABLES AND WANT THE P
+ROGRAM TO END TYPE (0) *)
120    FORMAT(* IF YOU ARE CAPABLE OF PUTTING IN THE USER INPUTS IN A STR
+ING OF NUMBERS WITHOUT THE QUESTIONS, TYPE (1) *)
121    FORMAT(* IF YOU WANT THE QUESTIONS TELLING YOU WHAT ATTRIBUTES TO
+PUT IN, TYPE (2) *)

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WRITE(3,208) (F(1,7),I=1,2)
WRITE(3,209) (F(1,8),I=1,2)
WRITE(3,210) (F(1,9),I=1,2)
WRITE(3,211) (F(1,10),I=1,2)
WRITE(3,213)
WRITE(3,214)
READ(5,*) POINT
IF (POINT.EQ.2) GO TO 2
IF (POINT6.EQ.1) 8,14
97 FORMAT(* THIS IS THE FORTRAN DUEL SIMULATOR FOR CARS USING THE DAT
+A COLLECTED FROM NAFA, *)
96 FORMAT(* YOU WILL INTERACTIVELY PUT IN THE ATTRIBUTES FOR TWO CARS
+ AND THEY WILL BE RUN THROUGH THE SIMULATOR.*)
99 FORMAT(* PUT IN THE SECOND CARS ATTRIBUTES*)
98 FORMAT(* PUT IN THE FIRST CARS ATTRIBUTES*)
100 FORMAT(* 1. SEATING OPTION IS: *)
101 FORMAT(* 2. WHAT IS THE TRUNK CAPACITY, (IN CU.FT.):*)
102 FORMAT(* 3. DOES IT HAVE A PERFORMANCE OPTION: *)
103 FORMAT(* TYPE (0) FOR NO OR TYPE (1) FOR YES *)
104 FORMAT(* 4. HOW MANY HOURS OF RECHARGE IS NEEDED: *)
105 FORMAT(* 5. WHAT IS THE VEHICLES RANGE CAPACITY: *)
106 FORMAT(* 6. DOES THE VEHICLE HAVE A HEATER: *)
107 FORMAT(* 7. DOES THE VEHICLE HAVE A AIR CONDITIONER: *)
108 FORMAT(* 8. DOES THE VEHICLE HAVE POWER STEERING: *)
109 FORMAT(* 9. DOES THE VEHICLE HAVE POWER BRAKES: *)
110 FORMAT(* 10. HOW MANY DAYS PER YEAR CAN THE CAR BE INCAPACITATED:
+ RELIABILITY *)
200 FORMAT(* THE FOLLOWING IS THE DATA FOR THE TWO CARS ATTRIBUTES*)
201 FORMAT(* FIRST CAR SECOND CAR*)
202 FORMAT(* SEATING OPTION *,19,5X,110)
203 FORMAT(* TRUNK SPACE *,19,5X,110)
204 FORMAT(* PERFORMANCE OPTION *,19,5X,110)
205 FORMAT(* RECHARGE *,19,5X,110)
206 FORMAT(* RANGE *,19,5X,110)
207 FORMAT(* HEATER *,19,5X,110)
208 FORMAT(* AIR CONDITIONER *,19,5X,110)
209 FORMAT(* POWER STEERING *,19,5X,110)
210 FORMAT(* POWER BRAKES *,19,5X,110)
211 FORMAT(* RELIABILITY OPTION *,19,5X,110)
213 FORMAT(/,* IF YOU ARE SATISFIED WITH THE VARIABLES AND WANT TO CON
+TINUE TYPE (1) *)
214 FORMAT(* IF YOU WANT TO CHANGE ANY ONE OR ALL OF THE VARIABLES TYP
+E (2) *)
7 WRITE(3,122)
READ(5,*) (F(1,J),J=1,10)
WRITE(3,123)
READ(5,*) (F(2,J),J=1,10)
GO TO 10

C
8 I=1
WRITE(3,1400)
9 READ(5,*) FUEL(1),EHBAS(1),SUB(1),WAR(1),EOM(1),DESMIV(1),LIFCY1(1
+),LIFCY2(1),BATRNG(1),BATBAS(1)
IF (1.EQ.2) GO TO 11
WRITE(3,1401)
I=2
GO TO 9
11 WRITE(3,1402)
READ(5,*) GASP,EPRICE,SMPG,MMPG,LMPG,SPRI,MPRI,LPRI
GO TO 12

C
C INTERACTIVE INPUT USERS DATA FOR EHV1 AND EHV2
C
C
14 WRITE(3,402)
WRITE(3,402)
WRITE(3,402)
80 WRITE (3,1000)
WRITE (3,1001)

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122  FORMAT(* PLEASE PUT IN THE FIRST SET OF VARIABLES FOR THE FIRST CA
+R (EHV1) '10' ATTRIBUTES *)
123  FORMAT(* PLEASE PUT IN THE FIRST SET OF VARIABLES FOR THE SECOND C
+AR (EHV2) '10' ATTRIBUTES *)
C
1400 FORMAT(* PLEASE PUT IN THE SECOND SET OF VARIABLES FOR "EHV1", '10
+1 ATTRIBUTES *)
1401 FORMAT(* PLEASE PUT IN THE SECOND SET OF VARIABLES FOR "EHV2", '10
+1 ATTRIBUTES *)
1402 FORMAT(* PLEASE PUT IN THE FUEL PRICE AND ICE VARIABLES, '8' VARIA
+BLES *)
C
C  PUT IN BUYPRICE MAKER
C
555 DO 26 J=1,4
DO 26 I=1,30
BUYPR(I,J)=2000
26 CONTINUE
DO 27 J=1,4
DO 27 I=31,76
BUYPR(I,J)=4000
27 CONTINUE
DO 28 J=1,4
DO 28 I=77,107
BUYPR(I,J)=6000
28 CONTINUE
DO 29 J=1,4
DO 29 I=108,142
BUYPR(I,J)=2000
29 CONTINUE
DO 40 I=1,142
DO 40 K=1,4
READ(2) (CAR(N),N=1,24)
DO 40 J=12,21
IF (K.EQ.4) GO TO 40
DUM=CAR(J)
IF (DUM.LE.0) GO TO 40
BUYPR(I,K)=BUYPR(I,K)+DUM
40 CONTINUE
DO 20 I=1,142
DO 20 J=1,3
DO 20 K=1,2
PC(I,J,K)=0
20 CONTINUE
C
DO 48 L=1,4
BOTH(L)=0
NEITHER(L)=0
ONLY1(L)=0
ONLY2(L)=0
DO 48 J=1,4
APPV(I,J)=0
48 CONTINUE
REWIND 2
L=1
DO 30 I=1,142
DO 30 J=1,4
READ(2) (CAR(K),K=1,24)
DO 30 M=1,2
IF (J.EQ.4) GO TO 35
DO 31 N=1,3
IF (F(M,N).GE.CAR(N)) PC(I,J,M)=PC(I,J,M)+1
31 CONTINUE
IF (F(M,4).LE.CAR(4)) PC(I,J,M)=PC(I,J,M)+1
DO 32 N=5,9
IF (F(M,N).GE.CAR(N)) PC(I,J,M)=PC(I,J,M)+1
32 CONTINUE
IF (F(M,10).LE.CAR(10)) PC(I,J,M)=PC(I,J,M)+1
GO TO 30

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402 FORMAT(1X)
401 FORMAT(19X,* ..TABLE A.. *)
403 FORMAT(12X,* APPLICABILITY RATES (PERCENT)*)
404 FORMAT(/,40X,* TOTAL*)
405 FORMAT(* SECTOR      EHV1      EHV2      OVERLAP      EHV*)
406 FORMAT(/,* BUSINESS      *,F4.0,F10.0,F10.0,F9.0)
407 FORMAT(/,* UTILITIES      *,F4.0,F10.0,F10.0,F9.0)
408 FORMAT(/,* POLICE      *,F4.0,F10.0,F10.0,F9.0)
409 FORMAT(/,* GOV'T      *,F4.0,F10.0,F10.0,F9.0)
410 FORMAT(/,* TOTAL      *,F4.0,F10.0,F10.0,F9.0)
      DO 660 M=1,5
      DO 660 N=1,2
      DO 661 I=1,16
      AVCAP1(I,M,N)=0
      AVCAP2(I,M,N)=0
661 CONTINUE
      DO 662 I=1,9
      SUMCAP(I,M,N)=0
662 CONTINUE
      DO 663 I=1,6
      SUMICE(I,M,N)=0
663 CONTINUE
      EHBUY(M,N)=0
      EHSKIP(M,N)=.0001
660 CONTINUE
      DO 664 I=1,142
      DROP(I)=0
      DO 664 J=1,4
      DO 664 N=1,2
      EHVAPP(I,J,N)=0
      ECAR(I,J,N)=0
      ECARP(I,J,N)=999999
      ECARPV(I,J,N)=999999
      DEPRE(I,N)=0
      NONA(I,N)=0
      BUYEV(I,J,N)=0
      DEPRES(I,J,N)=0
664 CONTINUE
      DO 665 M=1,5
      NETAPP(M)=0
      ICEBUY(M)=0
      CARSAL(M)=0
      SHRINK1(M)=0
      SHRINK2(M)=0
      NONAPP(M)=0
      TOTBUY(M)=0
      DO 666 N=1,6
      MSHARE(M,N)=0
666 CONTINUE
      DO 667 N=1,7
      SALES(M,N)=0
      SHARE(M,N)=0
667 CONTINUE
665 CONTINUE
      RELY(1) = F(1,10)
      RELY(2) = F(2,10)
      DO 9999 K=1,2
      REWIND 2
      MIX = 1
      DO 9999 I=1,142
      DO 9999 J=1,4
      READ(2) (CAR(N),N=1,24)
      IF (J.EQ.4) GO TO 2000
      IF (CAR(11).EQ.-9) 9999,2010
2000 CARS = CAR(22)*CAR(23)
      IF (CAR(23).EQ.-9) 9999,7999
2010 CARS = CAR(22)*CAR(11)
      SEATS = CAR(1)
      RANGE = CAR(5)

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      IF (I.EQ.112) MIX = 2
      IF (I.EQ.119) MIX = 3
      IF (I.EQ.126) MIX = 4
      IF (PC(I,J,K).EQ.10) GO TO 799
      IF (SEATS.LE.4) GO TO 700
      IF (SEATS.LE.5) GO TO 701
      IF (SEATS.EQ.6) GO TO 702
700  ICEPRI = SPRI+(CAR(7)*430)+(CAR(8)*120)+(CAR(9)*60)
      IF (BUYPR(I,J).LT.5000) BUYPR(I,J)=5000
      IF (ICEPRI.GT.BUYPR(I,J)) 704,705
701  ICEPRI = MPRI+(CAR(7)*460)+(CAR(8)*125)+(CAR(9)*65)
      IF (BUYPR(I,J).LT.6000) BUYPR(I,J)=6000
      IF (ICEPRI.GT.BUYPR(I,J)) 704,705
702  ICEPRI = LPRI+(CAR(7)*480)+(CAR(8)*130)+(CAR(9)*70)
      IF (BUYPR(I,J).LT.6900) BUYPR(I,J)=6900
      IF (ICEPRI.GT.BUYPR(I,J)) 704,705
704  DEPRE(I,K)=DEPRE(I,K) +CARS
      GO TO 9999
705  NONA(I,K) = NONA(I,K) + CARS
      GO TO 9999
799  IF (MIX.EQ.2) GO TO 801
      IF (MIX.EQ.3) GO TO 802
      IF (MIX.EQ.4) GO TO 803
      FIXOMS = 40
      FIXOMM = 43
      FIXOML = 45
      DAYMO = 20.8
      PVC = 20.4251
      WARPVC = 20.4252
      ADU = 108
      PVTRAD = 0.617
      HOLDMO = 26
      INT=0.018769
      GO TO 805
801  FIXOMS = 40
      FIXOMM = 43
      FIXOML = 45
      DAYMO = 20.8
      PVC=43.4438
      WARPVC = 27.5189
      ADU = 48
      PVTRAD = 0.335
      HOLDMO = 72
      INT=0.015309
      GO TO 805
802  FIXOMS=18
      FIXOMM=20
      FIXOML=22
      DAYMO=30.4
      PVC=22.8022
      WARPVC=22.8022
      ADU=90
      PVTRAD=0.836
      HOLDMO=25
      INT=0.007207
      GO TO 805
803  FIXOMS=18
      FIXOMM=20
      FIXOML=22
      DAYMO=20.8
      PVC=41.1587
      WARPVC=31.6092
      ADU=60
      PVTRAD=0.703
      HOLDMO=119
      INT=0.007207
805  DU=ADU
      IF (RANGE.LT.150) DU=(.8)*RANGE
      IF (FUEL(K).EQ.0) ESHARE=0.0

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      IF (WAR(K).EQ.1) PVWAR=(WARPVC*INSURE)+(WARICV*((EOM(K)*ESHARE)+(1-E
+SHARE)))+(RELY(K)-(HOLDMO/12))*20)
      PVEVSE=PVTRAD*(EHBAS(K)*VTRADE)
      PVICSE=PVTRAD*(ICEPRI*((100000-(DAYMO*DU*HOLDMO))/100000))
      PVICEF=PVFIXM
      PVGASE=PVGASI*(1-ESHARE)
      EHPRI=EHBAS(K)+BATBAS(K)-SUB(K)
      EHCAP=EHBAS(K)+PVBBUY-SUB(K)-PVWAR-PVEVSE+PVEL+PVGASE+PVTAX+PVF
+IXM+PVEVAR-PVBSAL
      ICECAP=ICEPRI-PVICSE+PVGASI+PVICEF+PVICLV
      IF (EHCAP.GT.ICECAP) GO TO 825
      IF (EHPRI.GT.BUYPR(1,J)) GO TO 830
C
C
835 ECAR(1,J,K)=CARS
      ECARP(1,J,K)=EHPRI
      ECARPV(1,J,K)=EHCAP
      GO TO 9999
825 IF (ICEPRI.GT.BUYPR(1,J)) GO TO 840
      GO TO 850
840 IF (EHPRI.LE.BUYPR(1,J)) GO TO 835
841 DEPRES(1,J,K)=CARS
      GO TO 9999
830 IF (ICEPRI.GT.BUYPR(1,J)) GO TO 841
C      INSERT
850. M=MIX
      EHSKIP(M,K)=EHSKIP(11,K)+CARS
      EHSKIP(5,K)=EHSKIP(5,K)+CARS
      EHVAPP(1,J,K)=CARS
      SUMICE(1,M,K)=SUMICE(1,M,K)+(ICEPRI*CARS)
      SUMICE(1,5,K)=SUMICE(1,5,K)+(ICEPRI*CARS)
      SUMCAP(1,M,K)=SUMCAP(1,M,K)+(PVEVSE*CARS)
      SUMCAP(1,5,K)=SUMCAP(1,5,K)+(PVEVSE*CARS)
      SUMCAP(2,M,K)=SUMCAP(2,M,K)+(PVBBUY*CARS)
      SUMCAP(2,5,K)=SUMCAP(2,5,K)+(PVBBUY*CARS)
      SUMICE(2,M,K)=SUMICE(2,M,K)+(PVICSE*CARS)
      SUMICE(2,5,K)=SUMICE(2,5,K)+(PVICSE*CARS)
      SUMCAP(3,M,K)=SUMCAP(3,M,K)+(PVBSAL*CARS)
      SUMCAP(3,5,K)=SUMCAP(3,5,K)+(PVBSAL*CARS)
      SUMCAP(4,M,K)=SUMCAP(4,M,K)+((PVGASE+PVEL)*CARS)
      SUMCAP(4,5,K)=SUMCAP(4,5,K)+((PVGASE+PVEL)*CARS)
      SUMICE(3,M,K)=SUMICE(3,M,K)+(PVGASI*CARS)
      SUMICE(3,5,K)=SUMICE(3,5,K)+(PVGASI*CARS)
      SUMCAP(5,M,K)=SUMCAP(5,M,K)+(PVTAX*CARS)
      SUMCAP(5,5,K)=SUMCAP(5,5,K)+(PVTAX*CARS)
      SUMCAP(6,M,K)=SUMCAP(6,M,K)+(PVFIXM*CARS)
      SUMCAP(6,5,K)=SUMCAP(6,5,K)+(PVFIXM*CARS)
      SUMICE(4,M,K)=SUMICE(4,M,K)+(PVFIXM*CARS)
      SUMICE(4,5,K)=SUMICE(4,5,K)+(PVFIXM*CARS)
      SUMCAP(7,M,K)=SUMCAP(7,M,K)+(PVEVAR*CARS)
      SUMCAP(7,5,K)=SUMCAP(7,5,K)+(PVEVAR*CARS)
      SUMICE(5,M,K)=SUMICE(5,M,K)+(PVICEV*CARS)
      SUMICE(5,5,K)=SUMICE(5,5,K)+(PVICEV*CARS)
      SUMCAP(8,M,K)=SUMCAP(8,M,K)+(PVWAR*CARS)
      SUMCAP(8,5,K)=SUMCAP(8,5,K)+(PVWAR*CARS)
      SUMCAP(9,M,K)=SUMCAP(9,M,K)+(EHCAP*CARS)
      SUMCAP(9,5,K)=SUMCAP(9,5,K)+(EHCAP*CARS)
      SUMICE(6,M,K)=SUMICE(6,M,K)+(ICECAP*CARS)
      SUMICE(6,5,K)=SUMICE(6,5,K)+(ICECAP*CARS)
      AVCAP1(1,M,K)=EHBAS(K)
      AVCAP2(1,M,K)=SUMICE(1,M,K)/EHSKIP(M,K)
      AVCAP1(2,M,K)=SUMCAP(1,M,K)/EHSKIP(M,K)
      AVCAP2(2,M,K)=SUMICE(2,M,K)/EHSKIP(M,K)
      AVCAP1(4,M,K)=SUMCAP(2,M,K)/EHSKIP(M,K)
      AVCAP2(4,M,K)=0.0
      AVCAP1(5,M,K)=SUMCAP(3,M,K)/EHSKIP(M,K)
      AVCAP2(5,M,K)=0.0
      AVCAP1(8,M,K)=SUMCAP(4,M,K)/EHSKIP(M,K)
      AVCAP2(8,M,K)=SUMICE(3,M,K)/EHSKIP(M,K)

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      IF (FUEL(K).EQ.1) ESHARE=1.0
      IF (FUEL(K).EQ.2) ESHARE=0.65*BATRNG(K)/DU
      IF (ESHARE.GT.1.0) ESHARE=1.0
      VTRADE=(DESMIV(K)-(DU*DAYMO*HOLDMO))/DESMIV(K)
      IF (VTRADE.LE..05) VTRADE=.05
      IF (SEATS.LE.4) GO TO 811
      IF (SEATS.EQ.5) GO TO 812
      IF (SEATS.GE.6) GO TO 813
811  PVTAX=PVC*(DAYMO*DU*0.0071*ESHARE)
      IF (BUYPR(1,J).LT.5000) BUYPR(1,J)=5000
      PVGAS1=PVC*DAYMO*DU*(GASP/5MPC)
      PVFIXM=PVC*FIXOMS
      ICEPRI=SPRI+(CAR(7)*430)+(CAR(8)*120)+(CAR(9)*60)
      PVEL=PVC*DAYMO*DU*ESHARE*(EPRICE/100)*((BATRNG(K)*.00099)+.22)
      PVICEV=PVC*DAYMO*DU*.020
      INSURE=18
      WARICV=WARPVC*DAYMO*DU*.020
      GO TO 815
812  PVTAX=PVC*(DAYMO*DU*.0076*ESHARE)
      IF (BUYPR(1,J).LT.5000) BUYPR(1,J)=5000
      PVGAS1=PVC*DAYMO*DU*(GASP/MMPG)
      PVFIXM=PVC*FIXOMM
      ICEPRI=MPRI+(CAR(7)*460)+(CAR(8)*125)+(CAR(9)*65)
      PVEL=PVC*DAYMO*DU*ESHARE*(EPRICE/100)*((BATRNG(K)*.00099)+.22)*1.1
      PVICEV=PVC*DAYMO*DU*.024
      INSURE=20
      WARICV=WARPVC*DAYMO*DU*.024
      GO TO 815
813  PVTAX=PVC*(DAYMO*DU*.0081*ESHARE)
      IF (BUYPR(1,J).LT.6900) BUYPR(1,J)=6900
      PVGAS1=PVC*DAYMO*DU*(GASP/LMPG)
      PVFIXM=PVC*FIXOML
      ICEPRI=LPRI+(CAR(7)*480)+(CAR(8)*130)+(CAR(9)*70)
      PVEL=PVC*DAYMO*DU*ESHARE*(EPRICE/100)*((BATRNG(K)*.00099)+.22)*1.2
      PVICEV=PVC*DAYMO*DU*.024
      INSURE=22
      WARICV=WARPVC*DAYMO*DU*.024
815  SLOPE=(LIFCY2(K)-LIFCY1(K))/35
      DEPTH=100-((DU/BATRNG(K))*100)
      CYCLES=(SLOPE*DEPTH)+LIFCY1(K)
      IF (FUEL(K).EQ.3) CYCLES=LIFCY2(K)
      PVBUY2=0.0
      PVBUY3=0
      PVBUY4=0
      PVBSA1=0
      PVBSA2=0
      PVBSA3=0
      BATMO=CYCLES/DAYMO
      NUMBAT=1
      IF (HOLDMO.LT.BATMO) GO TO 777
      NUMBAT=NUMBAT+1
      PVBUY2=BATBAS(K)/((1.0+INT)**BATMO)
      PVBSA1=0.1*PVBUY2
      IF (HOLDMO.LT.(2.0*BATMO)) GO TO 777
      NUMBAT=NUMBAT+1
      PVBUY3=BATBAS(K)/((1.0+INT)**(2.0*BATMO))
      PVBSA2=0.1*PVBUY3
      IF (HOLDMO.LT.(3.0*BATMO)) GO TO 777
      NUMBAT=NUMBAT+1
      PVBUY4=BATBAS(K)/((1.0+INT)**(3.0*BATMO))
      PVBSA3=0.1*PVBUY4
      IF (HOLDMO.LT.(4.0*BATMO)) GO TO 777
      PVBUY4=999999999
777  PVLAST=BATBAS(K)*(((NUMBAT*BATMO)-HOLDMO)/BATMO)*PVTRAD
      PVBBUY=BATBAS(K)+PVBUY2+PVBUY3+PVBUY4
      PVBSAL=PVBSA1+PVBSA2+PVBSA3+PVLAST
      PVEVAR=PVICEV*(EOM(K)*ESHARE)+(1-ESHARE))
C    *****INSERT (6)*****
      PVWAR=0.0

```

```

AVCAP1(9,M,K)=SUMCAP(5,M,K)/EHSKIP(M,K)
AVCAP2(9,M,K)=0.0
AVCAP1(10,M,K)=SUMCAP(6,M,K)/EHSKIP(M,K)
AVCAP2(10,M,K)=SUMICE(4,M,K)/EHSKIP(M,K)
AVCAP1(11,M,K)=SUMCAP(7,M,K)/EHSKIP(M,K)
AVCAP2(11,M,K)=SUMICE(5,M,K)/EHSKIP(M,K)
AVCAP1(14,M,K)=SUB(K)
AVCAP2(14,M,K)=0.0
AVCAP1(15,M,K)=SUMCAP(8,M,K)/EHSKIP(M,K)
AVCAP2(15,M,K)=0.0
AVCAP1(16,M,K)=SUMCAP(9,M,K)/EHSKIP(M,K)
AVCAP2(16,M,K)=SUMICE(6,M,K)/EHSKIP(M,K)
AVCAP1(3,M,K)=AVCAP1(1,M,K)-AVCAP1(2,M,K)
AVCAP1(6,M,K)=AVCAP1(4,M,K)-AVCAP1(5,M,K)
AVCAP1(7,M,K)=AVCAP1(3,M,K)+AVCAP1(6,M,K)
AVCAP1(12,M,K)=AVCAP1(8,M,K)+AVCAP1(9,M,K)+AVCAP1(10,M,K)+AVCAP1(11,M,K)
AVCAP1(13,M,K)=AVCAP1(7,M,K)+AVCAP1(12,M,K)
AVCAP2(3,M,K)=AVCAP2(1,M,K)-AVCAP2(2,M,K)
AVCAP2(6,M,K)=AVCAP2(4,M,K)-AVCAP2(5,M,K)
AVCAP2(7,M,K)=AVCAP2(3,M,K)+AVCAP2(6,M,K)
AVCAP2(12,M,K)=AVCAP2(8,M,K)+AVCAP2(9,M,K)+AVCAP2(10,M,K)+AVCAP2(11,M,K)
AVCAP2(13,M,K)=AVCAP2(7,M,K)+AVCAP2(12,M,K)
9999 CONTINUE
C      ...      END OF BIG LOOP
DO 730 K=1,2
AVCAP1(1,5,K)=EHBAS(K)
AVCAP2(1,5,K)=SUMICE(1,5,K)/EHSKIP(5,K)
AVCAP1(2,5,K)=SUMCAP(1,5,K)/EHSKIP(5,K)
AVCAP2(2,5,K)=SUMICE(2,5,K)/EHSKIP(5,K)
AVCAP1(4,5,K)=SUMCAP(2,5,K)/EHSKIP(5,K)
AVCAP2(4,5,K)=0.0
AVCAP1(5,5,K)=SUMCAP(3,5,K)/EHSKIP(5,K)
AVCAP2(5,5,K)=0.0
AVCAP1(8,5,K)=SUMCAP(4,5,K)/EHSKIP(5,K)
AVCAP2(8,5,K)=SUMICE(3,5,K)/EHSKIP(5,K)
AVCAP1(9,5,K)=SUMCAP(5,5,K)/EHSKIP(5,K)
AVCAP2(9,5,K)=0.0
AVCAP1(10,5,K)=SUMCAP(6,5,K)/EHSKIP(5,K)
AVCAP2(10,5,K)=SUMICE(4,5,K)/EHSKIP(5,K)
AVCAP1(11,5,K)=SUMCAP(7,5,K)/EHSKIP(5,K)
AVCAP2(11,5,K)=SUMICE(5,5,K)/EHSKIP(5,K)
AVCAP1(14,5,K)=SUB(K)
AVCAP2(14,5,K)=0.0
AVCAP1(15,5,K)=SUMCAP(8,5,K)/EHSKIP(5,K)
AVCAP2(15,5,K)=0.0
AVCAP1(16,5,K)=SUMCAP(9,5,K)/EHSKIP(5,K)
AVCAP2(16,5,K)=SUMICE(6,5,K)/EHSKIP(5,K)
AVCAP1(3,5,K)=AVCAP1(1,5,K)-AVCAP1(2,5,K)
AVCAP1(6,5,K)=AVCAP1(4,5,K)-AVCAP1(5,5,K)
AVCAP1(7,5,K)=AVCAP1(3,5,K)+AVCAP1(6,5,K)
AVCAP1(12,5,K)=AVCAP1(8,5,K)+AVCAP1(9,5,K)+AVCAP1(10,5,K)+AVCAP1(11,5,K)
AVCAP1(13,5,K)=AVCAP1(7,5,K)+AVCAP1(12,5,K)
AVCAP2(3,5,K)=AVCAP2(1,5,K)-AVCAP2(2,5,K)
AVCAP2(6,5,K)=AVCAP2(4,5,K)-AVCAP2(5,5,K)
AVCAP2(7,5,K)=AVCAP2(3,5,K)+AVCAP2(6,5,K)
AVCAP2(12,5,K)=AVCAP2(8,5,K)+AVCAP2(9,5,K)+AVCAP2(10,5,K)+AVCAP2(11,5,K)
AVCAP2(13,5,K)=AVCAP2(7,5,K)+AVCAP2(12,5,K)
730 CONTINUE
MIX=1
DO 740 I=1,142
DO 740 J=1,4
IF (1.EQ.112) MIX=2
IF (1.EQ.119) MIX=3
IF (1.EQ.126) MIX=4
EI=EHVAPP(I,J,1)

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      E2=EHVAPP(I,J,2)
      IF (E1.EQ.0) GO TO 736
      IF (E2.EQ.0) GO TO 736
      IF (E1.EQ.E2) E2=0
736  NETAPP(MIX)=NETAPP(MIX)+E1+E2
      D1=DEPRE(I,1)
      D2=DEPRE(I,2)
      IF (D1.EQ.0) GO TO 737
      IF (D2.EQ.0) GO TO 737
      IF (D1.EQ.D2) D2=0
737  SHRINK1(MIX)=SHRINK1(MIX)+D1+D2
      A1=NONA(I,1)
      A2=NONA(I,2)
      IF (A1.EQ.0) GO TO 738
      IF (A2.EQ.0) GO TO 738
      IF (A1.EQ.A2) A2=0
738  NONAPP(MIX)=NONAPP(MIX)+A1+A2
740  CONTINUE
      NETAPP(5)=NETAPP(1)+NETAPP(2)+NETAPP(3)+NETAPP(4)
      SHRINK1(5)=SHRINK1(1)+SHRINK1(2)+SHRINK1(3)+SHRINK1(4)
      NONAPP(5)=NONAPP(1)+NONAPP(2)+NONAPP(3)+NONAPP(4)
      DO 2355 I=1,142
      UU 2355 J=1,4
      IF (DEPRES(I,J,1).EQ.DEPRES(I,J,2)) DROP(I)=DROP(I)+DEPRES(I,J,1)
      IF (DEPRES(I,J,1).NE.DEPRES(I,J,2)) DROP(I)=DROP(I)+DEPRES(I,J,1)*D
      +EPRES(I,J,2)
      IF (ECARPV(I,J,1).NE.ECARPV(I,J,2)) GO TO 2343
      BUYEV(I,J,1)=BUYEV(I,J,1)+(ECAR(I,J,1)/2)
      BUYEV(I,J,2)=BUYEV(I,J,2)+(ECAR(I,J,2)/2)
      GO TO 2355
2343 IF (ECARPV(I,J,1).LT.ECARPV(I,J,2)) 350,351
350  BUYEV(I,J,1)=BUYEV(I,J,1)+ECAR(I,J,1)
      GO TO 2355
351  BUYEV(I,J,2)=BUYEV(I,J,2)+ECAR(I,J,2)
2355 CONTINUE
      MIX=1
      DO 2455 I=1,142
      IF (I.EQ.112) MIX=2
      IF (I.EQ.119) MIX=3
      IF (I.EQ.126) MIX=4
      M=MIX
      SHRINK2(5)=SHRINK2(5)+DROP(I)
      DO 2455 K=1,2
      DO 2455 J=1,4
      EHBUY(5,K)=EHBUY(5,K)+BUYEV(I,J,K)
      EHBUY(M,K)=EHBUY(M,K)+BUYEV(I,J,K)
      SHRINK2(M)=SHRINK2(M)+DROP(I)
2455 CONTINUE
      DO 2555 K=1,2
2555 EHBUY(5,K)=EHBUY(1,K)+EHBUY(2,K)+EHBUY(3,K)+EHBUY(4,K)
      DO 2655 N=1,5
2655 CARSAL(N)=NETAPP(N)+NONAPP(N)+EHBUY(N,1)+EHBUY(N,2)
      DO 882 N=1,4
      SHARE(N,1)=(EHBUY(N,1)/CARSAL(N))*100
      SHARE(N,2)=(EHBUY(N,2)/CARSAL(N))*100
      SHARE(N,3)=SHARE(N,1)+SHARE(N,2)
      SHARE(N,4)=(NETAPP(N)/CARSAL(N))*100
      SHARE(N,5)=(NONAPP(N)/CARSAL(N))*100
      SHARE(N,6)=SHARE(N,4)+SHARE(N,5)
      SHARE(N,7)=SHARE(N,3)+SHARE(N,6)
      TOTMKT(N)=CARSAL(N)+SHRINK1(N)+SHRINK2(N)
      MSHARE(N,1)=EHBUY(N,1)/TOTMKT(N)
      MSHARE(N,2)=EHBUY(N,2)/TOTMKT(N)
      MSHARE(N,3)=MSHARE(N,1)+MSHARE(N,2)
      MSHARE(N,4)=(NETAPP(N)+NONAPP(N))/TOTMKT(N)
      MSHARE(N,5)=MSHARE(N,3)+MSHARE(N,4)
      MSHARE(N,6)=(SHRINK1(N)+SHRINK2(N))/TOTMKT(N)
      MSHARE(N,7)=MSHARE(N,5)+MSHARE(N,6)
882  CONTINUE

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DO 884 N=1,7
SALES(1,N)=MSHARE(1,N)*895
SALES(2,N)=MSHARE(2,N)*56
SALES(3,N)=MSHARE(3,N)*87
SALES(4,N)=MSHARE(4,N)*99
SALES(5,N)=SALES(1,N)+SALES(2,N)+SALES(3,N)+SALES(4,N)
SHARE(5,N)=(BP*SHARE(1,N)+UP*SHARE(2,N)+PP*SHARE(3,N)+GP*SHARE(4,N
+))/TP
884 CONTINUE
C
C      ...FORMATS FOR TABLES...
C
WRITE(3,402)
WRITE(3,402)
WRITE(3,402)
WRITE(3,402)
WRITE(3,402)
WRITE(3,1200)
WRITE(3,1201)
WRITE(3,1202)
WRITE(3,1203)
WRITE(3,1204)
WRITE(3,1205) (SHARE(1,1),I=1,7)
WRITE(3,1206) (SHARE(2,1),I=1,7)
WRITE(3,1207) (SHARE(3,1),I=1,7)
WRITE(3,1208) (SHARE(4,1),I=1,7)
WRITE(3,402)
WRITE(3,1209) (SHARE(5,1),I=1,7)
DO 17 J=1,10
WRITE(3,402)
17 CONTINUE
WRITE(3,1210)
WRITE(3,1211)
WRITE(3,402)
WRITE(3,1212)
WRITE(3,1213)
WRITE(3,1214)
WRITE(3,1215)
WRITE(3,1216)
WRITE(3,1217)
WRITE(3,1218) (SALES(1,K),K=1,7)
WRITE(3,1219) (SALES(2,K),K=1,7)
WRITE(3,1220) (SALES(3,K),K=1,7)
WRITE(3,1221) (SALES(4,K),K=1,7)
WRITE(3,402)
WRITE(3,1222) (SALES(5,K),K=1,7)
DO 18 J=1,10
WRITE(3,402)
18 CONTINUE
FLAG=U
K=0
900 K=K+1
IF(K.EQ.6) GO TO 86
WRITE(3,1260)
GO TO 901
902 WRITE(3,103)
READ(5,*) POINT3
IF (POINT3.EQ.0) GO TO 900
FLAG=I
901 IF(K.EQ.1) WRITE(3,1223)
IF(K.EQ.2) WRITE(3,1224)
IF(K.EQ.3) WRITE(3,1225)
IF(K.EQ.4) WRITE(3,1226)
IF(K.EQ.5) WRITE(3,1227)
IF(FLAG.EQ.0) GO TO 902
WRITE(3,1228)
WRITE(3,1229)
WRITE(3,1262)
WRITE(3,1230)

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WRITE(3,1270)
WRITE(3,1231)
WRITE(3,1232)
WRITE(3,1233)
WRITE(3,1271)
WRITE(3,1234)
WRITE(3,1235)
WRITE(3,1236)AVCAP1(1,K,1),AVCAP2(1,K,1),AVCAP1(1,K,2),AVCAP2(1,
+K,2)
WRITE(3,1237)AVCAP1(2,K,1),AVCAP2(2,K,1),AVCAP1(2,K,2),AVCAP2(2,K,
+2)
WRITE(3,1238)AVCAP1(3,K,1),AVCAP2(3,K,1),AVCAP1(3,K,2),AVCAP2(3,K,
+2)
WRITE(3,1239)
WRITE(3,1236)AVCAP1(4,K,1),AVCAP2(4,K,1),AVCAP1(4,K,2),AVCAP2(4,K,
+2)
WRITE(3,1240)AVCAP1(5,K,1),AVCAP2(5,K,1),AVCAP1(5,K,2),AVCAP2(5,K,
+2)
WRITE(3,1238)AVCAP1(6,K,1),AVCAP2(6,K,1),AVCAP1(6,K,2),AVCAP2(6,K,
+2)
WRITE(3,1241)AVCAP1(7,K,1),AVCAP2(7,K,1),AVCAP1(7,K,2),AVCAP2(7,K,
+2)
WRITE(3,1242)
WRITE(3,1243)AVCAP1(8,K,1),AVCAP2(8,K,1),AVCAP1(8,K,2),AVCAP2(8,K,
+2)
WRITE(3,1244)AVCAP1(9,K,1),AVCAP2(9,K,1),AVCAP1(9,K,2),AVCAP2(9,K,
+2)
WRITE(3,1245)AVCAP1(10,K,1),AVCAP2(10,K,1),AVCAP1(10,K,2),AVCAP2(1
+0,K,2)
WRITE(3,1246)AVCAP1(11,K,1),AVCAP2(11,K,1),AVCAP1(11,K,2),AVCAP2(1
+0,K,2)
WRITE(3,1247)AVCAP1(12,K,1),AVCAP2(12,K,1),AVCAP1(12,K,2),AVCAP2(1
+2,K,2)
WRITE(3,1248)AVCAP1(13,K,1),AVCAP2(13,K,1),AVCAP1(13,K,2),AVCAP2(1
+3,K,2)
WRITE(3,1249)AVCAP1(14,K,1),AVCAP2(14,K,1),AVCAP1(14,K,2),AVCAP2(1
+4,K,2)
WRITE(3,1250)AVCAP1(15,K,1),AVCAP2(15,K,1),AVCAP1(15,K,2),AVCAP2(1
+5,K,2)
WRITE(3,1251)
WRITE(3,1252)AVCAP1(16,K,1),AVCAP2(16,K,1),AVCAP1(16,K,2),AVCAP2(1
+6,K,2)
FLAG=0
GO TO 900
1200 FORMAT(/,29X,* .. TABLE B ..*)
1201 FORMAT(19X,* FLEET CAR PENETRATION RATES (PERCENT)*)
1202 FORMAT(/,11X,* ..... EHV .....*,4X,*..... ICE .....
+.....*)
1203 FORMAT(50X,* NON-*,16X,* GRAND*)
1204 FORMAT(* SECTOR EHV1 EHV2 TOTAL APPLICABLE APPLIC
+ABLE TOTAL TOTAL*)
1205 FORMAT(/,* BUSINESS *,F5.1,*,F7.1,*,F8.1,*,F11.1,*,F12.1
+,,F10.1,*,F8.1,*)
1206 FORMAT(/,* UTILITIES *,F5.1,*,F7.1,*,F8.1,*,F11.1,*,F12.1
+,,F10.1,*,F8.1,*)
1207 FORMAT(/,* POLICE *,F5.1,*,F7.1,*,F8.1,*,F11.1,*,F12.1
+,,F10.1,*,F8.1,*)
1208 FORMAT(/,* GOVT *,F5.1,*,F7.1,*,F8.1,*,F11.1,*,F12.1
+,,F10.1,*,F8.1,*)
1209 FORMAT(/,* TOTAL *,F5.1,*,F7.1,*,F8.1,*,F11.1,*,F12.1
+,,F10.1,*,F8.1,*)
1210 FORMAT(29X,* .. TABLE C ..*)
1211 FORMAT(19X,* FLEET CAR ANNUAL SALES (THOUSANDS)*)
1212 FORMAT(/,51X,* ADJUSTMENTS FOR*)
1213 FORMAT(51X,* PRICE-INDUCED*)
1214 FORMAT(51X,* DEMAND REDUCTION*)
1215 FORMAT(12X,* ..... EHV .....*,19X,*.....*)
1216 FORMAT(51X,* DEMAND ORIGINAL*)
1217 FORMAT(* SECTOR EHV1 EHV2 TOTAL ICE TOTAL REDUC

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+TION DEMAND*)
1218 FORMAT(/,* BUSINESS *,F5.0,F8.0,F8.0,F8.0,F10.0,F10.0,F10.0)
1219 FORMAT(/,* UTILITIES *,F5.0,F8.0,F8.0,F8.0,F10.0,F10.0,F10.0)
1220 FORMAT(/,* POLICE *,F5.0,F8.0,F8.0,F8.0,F10.0,F10.0,F10.0)
1221 FORMAT(/,* GOVT *,F5.0,F8.0,F8.0,F8.0,F10.0,F10.0,F10.0)
1222 FORMAT(/,* TOTAL *,F5.0,F8.0,F8.0,F8.0,F10.0,F10.0,F10.0)
1223 FORMAT(28X,* .. TABLE D.1 ..*,* (BUSINESS SECTOR)* )
1224 FORMAT(28X,* .. TABLE D.2 ..*,* (UTILITIES SECTOR)* )
1225 FORMAT(28X,* .. TABLE D.3 ..*,* (POLICE SECTOR)* )
1226 FORMAT(28X,* .. TABLE D.4 .. (GOVT SECTOR)* )
1227 FORMAT(28X,* .. TABLE D.5 .. (ALL SECTORS)* )
1228 FORMAT(/,* PRESENT VALUE OF LIFE-CYCLE COSTS, AS PERCEIVED BY ICE
+BUYERS WHO COULD HAVE*)
1229 FORMAT(* PURCHASED AN EHV (THAT IS, EHV WAS APPLICABLE BUT EITHER
+ ITS PURCHASE*)
1262 FORMAT(* PRICE WAS TOO HIGH OR IT'S DISCOUNTED LIFE-CYCLE COSTS W
+ERE TOO HIGH)* )
1230 FORMAT(/,34X,* MARCH 1979 DOLLARS*)
1231 FORMAT(27X,* ICE BUYERS WHO ICE BUYERS WHO*)
1232 FORMAT(27X,* COULD HAVE COULD HAVE*)
1233 FORMAT(27X,* PURCHASED EHV1 PURCHASED EHV2*)
1270 FORMAT(27X,* .....*)
1271 FORMAT(27X,* .....*)
1234 FORMAT(27X,* EHV1 ICE EHV2 ICE*)
1235 FORMAT(* VEHICLE *)
1236 FORMAT(* COST (W/O SUBSIDY) *,F5.0,F10.0,F10.0,F9.0)
1237 FORMAT(* RESALE VALUE *,F5.0,F10.0,F10.0,F9.0)
1238 FORMAT(* NET DEPRECIATION *,F5.0,F10.0,F10.0,F9.0)
1239 FORMAT(/,* BATTERY*)
1240 FORMAT(* SALVAGE*,17X,F5.0,F10.0,F10.0,F9.0)
1241 FORMAT(/,* TOTAL VEH. ✓ BAT. *,F5.0,F10.0,F10.0,F9.0)
1242 FORMAT(/,* OPERATING ✓ MAINTENANCE*)
1243 FORMAT(* FUEL*,20X,F5.0,F10.0,F10.0,F9.0)
1244 FORMAT(* ROAD TAX*,16X,F5.0,F10.0,F10.0,F9.0)
1245 FORMAT(* OTHER, FIXED*,12X,F5.0,F10.0,F10.0,F9.0)
1246 FORMAT(* OTHER, VARIABLE*,9X,F5.0,F10.0,F10.0,F9.0)
1247 FORMAT(* TOTAL O ✓ M*,7X,F7.0,F10.0,F10.0,F9.0)
1248 FORMAT(/,* GROSS*,9X,F7.0,F10.0,F10.0,F9.0)
1249 FORMAT(/,* LESS: SUBSIDY*,5X,F5.0,F10.0,F10.0,F9.0)
1250 FORMAT(/,* LESS: WARRANTY*,4X,F5.0,F10.0,F10.0,F9.0)
1251 FORMAT(/,5X,* NET DISCOUNTED*)
1252 FORMAT(5X,* LIFE-CYCLE COSTS *,F7.0,F10.0,F10.0,F9.0)
1260 FORMAT(/,25X,* DO YOU WANT TO PRINT THE FOLLOWING TABLES: *)
86 STOP
END

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