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Augmenting In-Use Fuel Economy Data Bases With Topographic, Demographic and Climatic Data

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AUGMENTING IN-USE FUEL ECONOMY DATA BASES WITH TOPOGRAPHIC, DEMOGRAPHIC AND CLIMATIC DATA

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1. INTRODUCTION

The Control Technology Assessment and Characterization Branch (CTAB) of the Environmental Protection Agency (EPA) has asked Technology Service Corporation (TSC) to augment several in-use fuel economy (FE) data files with information on the climatic, topographic, and demographic conditions under which the in-use data were collected. This report describes the type of variables and data sources added to the in-use data* (Chapter 2); the method for augmenting specific in-use data files (Chapter 3); and how the appended data were analyzed to determine vehicle exposure regions (Chapter 4).

The remainder of this chapter describes the task goals (Section 1.1); the problems encountered (Section 1.2); what this task accomplished (Section 1.3); and recommendations for data use and enhancement (Section 1.4).

1.1 GOALS OF THE TASK

This task had three goals, the major one being to assemble an augmentation data base keyed to ZIP code and date. The parameters contained in the augmentation data base are temperature, relative humidity, elevation, local relief (surface landform), name of location, population count, population density, and climatological data source.

The second goal was to provide CTAB with software that reads ZIP code and date from a standard-format in-use file, fetches data from the augmentation file, and adds the data to the in-use file. Augmentation of seven files supplied by the CTAB was also to be performed.

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*In-depth information about the in-use fuel economy data is not provided in this report.

The third goal was to analyze the augmentation data base and determine a small set of regions of common vehicle exposure, using topography and winter and summer climatology as the key parameters.

1.2 PROBLEMS ENCOUNTERED

Although data were found for all augmentation parameters, the following problems were encountered in incorporating the different in-use data bases into one augmented data base:

- Augmentation data formats. Most of the data used for augmentation were not in a form that was machine-readable. Except for temperature data, keypunching into the computer was required.
- In-use data format. The data base provided by J. D. Power was in column-binary format--a most inconvenient method of data coding that requires special computer handling.
- Unwieldy data size. All required meteorological and population data, and most topographical data, are on computer tapes, but so numerous--4,500 tapes--that the computer processing would have been prohibitively costly.
- Data base limits. The FORD data base offered only telephone area code as a location parameter, one found too gross for determining population, climate, or topography. ZIP-code data for the 10,630 subject vehicles in the J.D.POWER data base were obtained from the mailing labels for the questionnaires.

1.3 ACCOMPLISHMENTS

By making simplifying assumptions, TSC collected and compiled sufficient data for the data base augmentation, without having to perform undue computer processing. A portable FORTRAN computer language subroutine called GTDATI was developed to extract data from the file on the basis of the ZIP code or telephone area code, and month provided. These data, along with fuel economy information and vehicle description, are written in a uniform format to a file, using a subroutine called DATOUT. A program called AUGMENT reads data from a standard format and uses GTDATI and DATOUT to create a standard output file.

Reformatting the different data bases (GM75, GM76, FORD79, FE.EF79, FE.HS79, FE.LA80 and J.D.POWER) involved the writing of six different computer subroutines (FE.HS79 and FE.EF79 have the same format) and use of the GTDATI routine to create a single data file of augmented, in-use fuel economy, in a standard format.

The J.D.POWER data base was converted to be readable by most computers. From the mailing labels, ZIP codes were determined and merged with J. D. Power data. Department of Energy (DOE) motor vehicle codes were appended to the J. D. Power data, thus providing ready access by the DOE in-use fuel economy system.

The 872 different ZIP codes were reduced to 24 vehicle exposure regions that are parameterized by topography and winter and summer climatology.

1.4 RECOMMENDATIONS

The augmentation data base can be improved by adding 1980 census data, either by aggregating over ZIP code or by copying data from city and county demographic data books. Also, certain sections of the country, including parts of Wyoming and Montana, are underrepresented with meteorological data.

The vehicle exposure regions provide mainly descriptions that might not adequately explain statistical differences in in-use fuel economy. A complete statistical discriminant analysis or decision-tree analysis should be performed on the fully augmented data bases to determine whether the meteorological and topographical parameters help explain differences in fuel economy that cannot be explained by vehicle characteristics or driving habits alone.

The augmentation data describe the average exposure conditions observed during in-use fuel economy data collection. Since the actual meteorological conditions under which the fuel economy data were collected cannot be determined easily, data should be used only in comparison with similar data taken from the augmentation files.

It is strongly suggested that every effort be made to get the ZIP code for the vehicle owner in future in-use fuel economy surveys. This will allow the best possible use of the augmentation data base.

2. CONSTRUCTION OF THE TOPOGRAPHICAL AND METEOROLOGICAL FILES

After discussions with the CTAB staff about the use of the augmented data to be provided to them, TSC made some simplifying assumptions regarding the augmentation. The major assumption is that the data provided are typical of the population centers in that area covered by the first three digits of a ZIP code. Using this assumption, elevation data at city hall were selected if a city was completely contained within one ZIP code (e.g., Los Angeles, 900). The second assumption is that the monthly average observed meteorological conditions are adequate for describing a vehicle's exposure to the climate, an assumption that allows predictions about future-year fuel economy as well as adequately relating to information from a fuel economy survey.

As will become apparent in the following sections, these assumptions allowed us to derive adequately accurate data, using summary information usually available on maps or in publications. To summarize the huge amount of information contained in the basic data would have required at least 50 times more time and money.

2.1 KEYING THE DATA BY MONTH, ZIP CODE, AND TELEPHONE AREA CODE

There are 872 three-digit ZIP codes (the first three numbers in the five-digit code) excluding American Samoa and the military or government ZIP codes. The area covered by the three-digit ZIP code of a vehicle owner's address would likely cover the local vehicle-exposure conditions. Exceptions could occur with vehicles commonly driven outside the owner's ZIP-code area. The three-digit ZIP code thus becomes our primary index. The location names (i.e., city names) corresponding to three-digit ZIP codes were determined from the U.S. Postal Service 1979 ZIP Code Directory.

When the ZIP code was not in a fuel economy data base, a telephone area code usually was. Since 110 area codes are currently in use (as opposed to 872 ZIP codes), the area code is of insufficient resolution for accurately locating topographical or meteorological data. TSC has assigned each area code a single associated ZIP code, selected by population weighting alone. Thus, the most populated three-digit ZIP code in a telephone area code will be assigned to a vehicle record that has only an area code as an index. For example, the entire state of Utah has a single area code, 801, so that any vehicle with an area code of 801 would be given a ZIP code of 840 for Salt Lake City. By necessity, this ignores a rural/urban split (i.e., average of Utah is not Salt Lake City).

The month has been designated the secondary, temporal index. It is used to locate the specific average meteorological variables. The meteorological data comprise 30-year averages for 254 meteorological sites. Each ZIP code has been assigned a meteorological site according to that site's location either in the ZIP code or in a bordering ZIP code. Two ZIP codes, one in southwestern Oregon and one in the Mojave Desert of California, had two meteorological sites. In each area, one site was in the mountains and the other in an urban area. The urban site was used for the augmentation. Los Angeles (900) has two meteorological sites, one downtown and the other at International Airport, which is on the coast. The downtown site was used for ZIP 900; the airport site was used for the coastal ZIP codes in its vicinity.

2.2 POPULATION DATA

Two types of population data were required for the augmentation data base--population count and population density (population count per square mile). The source of these data is the 1970 U.S. census adjusted for 1975.

Population data by city and county are available from the Census Bureau in summary form in Population Data, PHC Series 1. The Census Bureau has also compiled, for each state, demographic data for each ZIP code, on 250 computer tapes. The cost of purchasing and processing so many tapes was beyond the scope of this task.

TSC used population data for each city with unique three-digit ZIP codes. When this technique was not feasible, we aggregated population data from all those counties contained in a three-digit ZIP code. This method of obtaining the population data yields only approximations of the population for the ZIP codes, since the three-digit codes and most small towns, small cities, and counties do not have the same borders. (ZIP codes and census tracts are derived using separate political and geographical considerations and cannot be expected to have congruent boundaries.) The amount of time and money allocated to gathering population data was not adequate to do as thorough a job as we desired. Although the population data are meant to be representative of the three-digit ZIP code, aggregation of ZIP-code population data presented in the data base should be made cautiously. A variable indicating how the population data were obtained is included in the augmentation data set.

As another caution, we point out that the EPA-furnished fuel economy surveys were taken in the late 1970s and no attempt has been made to account for population changes since the 1975 approximations made by the Census Bureau. Population data of a ZIP code, therefore, should be used carefully and only with relation to other ZIP codes in the data base.

2.3 TOPOGRAPHIC DATA

Two types of topographic data were required for the augmentation data base: elevation and surface landform (defined below), both of which were chosen to be typical of the population center rather than a maximum, minimum, or average of the general area for the three-digit code. For example, the area for a three-digit code might encompass Mount Whitney, which is both unpopulated and extremely different in both elevation and landform from the surrounding population centers, and hence would not offer representative values for either data type.

By concentrating on population centers we were able to obtain approximate topographical data. The primary source of topographic data is the United States Geological Survey. Besides paper maps, they offer 64-square-mile digitized maps on computer tape for two-thirds of the 48 contiguous states. This data base of approximately 3,000 tapes, 10 maps per tape, will give accurate elevation profile data. By applying appropriate algorithms and a great amount of computer time, a better estimate of surface landform and elevation could be derived for each three-digit ZIP code. It was decided, however, that this method costs much more than the contract funds would allow.

Elevation is reported in feet and is usually the elevation of city hall or a meteorological station (usually an airport) within the area covered by the three-digit ZIP code. A few elevations had to be taken from United States Geological Survey maps.

Surface landform is a measure of local surface character, e.g., hilly, flat, rather than elevation. These data were derived from Edwin H. Hammond's maps in the U.S. Geological Survey's National Atlas of the United States of America, sheets 61 and 62. If multiple surface landforms appeared in the area covered by a three-digit ZIP code, the single most prevalent surface landform in the area of a population center was chosen. Table 2.1 gives the breakdown of each of the three-digit alphanumeric codes used in the data base. Table 2.2 lists the most common combinations.

2.4 METEOROLOGICAL DATA

Two types of meteorological data are given in the data base: temperature and humidity. Both types are monthly averages taken over 30 years of observations. Temperature, in degrees Fahrenheit, is given as three different values: average maximum temperature, average minimum temperature, and average temperature. These values are described by the National Weather Service as climatic normals.

Two values of humidity are given as average percent relative humidity: morning and afternoon. Relative humidity is expressed as a percentage measure of the amount of moisture in the air compared with the maximum amount of moisture the air can hold at the same temperature. The maximum values for relative humidity usually occur during early-morning hours; the minimum values, in the afternoon.

TABLE 2.1 SCHEME OF SURFACE LANDFORM CLASSIFICATION*

Slope (first Letter)	
A	More than 80% area gently sloping (8% slope or less)
B	50%-80% of area gently sloping
C	20%-50% of area gently sloping
D	Less than 20% of area gently sloping
Local Relief (numeral)	
1	0-100 foot difference**
2	100-300 foot difference
3	300-500 foot difference
4	500-1000 foot difference
5	1000-3000 foot difference
6	Over 3000 foot difference
Profile Type (second letter)	
A	More than 75% of gentle slope is in lowland
B	50%-75% of gentle slope is in lowland
C	50%-75% of gentle slope is on upland
D	More than 75% of gentle slope is on upland

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*Taken from sheet 62 of the U.S. Geological Survey's National Atlas of the United States of America, published in 1978.

**Difference refers to the number of feet between minimum elevation and maximum elevation.

TABLE 2.2 CLASSES OF SURFACE LANDFORM*

Class	Description
A1	Flat plains
A2	Smooth plains
B1	Irregular plains, slight relief
B2	Irregular plains
B3C, B3D	Tablelands, moderate relief
B4C, B4D	Tablelands, considerable relief
B5C, B5D	Tablelands, high relief
B6C, B6D	Tablelands, very high relief
A3A, A3B, B3A, B3B	Plains with hills
B4A, B4B	Plains with high hills
B5A, B5B	Plains with low mountains
B6A, B6B	Plains with high mountains
C2	Open low hills
C3	Open hills
C4	Open high hills
C5	Open low mountains
C6	Open high mountains
D3	Hills
D4	High hills
D5	Low mountains
D6	High mountains

*Descriptions are those listed in the "Classes of Land-Surface Form" legend on sheet 62 of the U.S. Geological Survey's National Atlas of the United States of America, published in 1978.

The source of the meteorological data is Comparative Climatic Data, published by the Department of Commerce. The 254 meteorological sites include all the major population centers. ZIP codes that could not be matched exactly with a meteorological site were matched with the nearest meteorological site. A six-digit site code is given with each ZIP code.

More detailed data, namely, hourly observations, can be obtained from the National Climatic Center on tape for approximately 1,000 sites from 1948 to 1978. Because averages were deemed sufficient for this project, we concluded that only marginally better information would be obtained by purchasing and processing extra meteorological tapes.

3. AUGMENTING IN-USE FUEL ECONOMY DATA BASES

This chapter describes the two FORTRAN subroutines, GTDATI and DATOUT, used to fetch augmentation data from the meteorological and topographical data bases, and how these routines were used to augment seven in-use fuel economy data bases and create a single, augmented data file. The program AUGMENT, which creates an augmented file from a standard input format, is also described, in Section 3.2.

3.1 AUGMENTATION SUBROUTINES

As part of the deliverables for this contract, TSC developed two FORTRAN subroutines to read the to-be-augmented FE files and the augmentation data files and to write an output file with a single format. The subroutine called GTDATI is used to read two augmentation files, MET.FILE and TOPO.FILE. The format of these files is given in Appendix A. MET.FILE contains the twelve monthly averages of the five meteorological parameters discussed in Section 2.4 for each of the 254 meteorological sites. TOPO.FILE gives the location, elevation, surface landform, population, population density, meteorological site, and vehicle exposure region for each of the ZIP codes and telephone area codes.

GTDATI takes ZIP code or area code and month from the calling routine and returns the appropriate meteorological and topographical data to the calling routine; more details can be derived from the subroutine listing in Appendix B. The GTDATI subroutine reads the two computer files MET.FILE and TOPO.FILE into the program memory the first time this subroutine is called; the validity of the ZIP code or area code and the month is determined; and the appropriate data are returned to the calling program.

A sample main program called FETCH has been provided with GTDATI. This program queries the terminal user for ZIP code, area code, and month, and prints out the appropriate augmentation data. It allows manual look-up of augmentation data for general use rather than mechanized augmentation of large data bases.

DATOUT takes the vehicle and fuel economy information from the in-use fuel economy data file, and the augmentation data, and writes the combined information to an augmented file in a single format. The source listing of DATOUT is given in Appendix B; the output format is given in Appendix C. DATOUT is a simple subroutine that only writes data.

3.2 MAIN AUGMENTATION PROGRAM

TSC was required to deliver an augmentation program that takes ZIP code and month from a standard input format and creates an augmented file having a standard output format. The program, AUGMENT, is listed in Appendix B. The standard input format is given in Appendix C.

This program simply reads an input file that is in standard format, uses GTDATI to obtain the augmentation data, and uses DATOUT to write the augmented output file in a standard format. The input format is almost identical to similar areas of the output format.

Since each of the data files that TSC was to augment had different input formats, we used a program other than AUGMENT. That program, XFORM, is listed in Appendix D. It contains examples of how both GTDATI and DATOUT are used.

3.3 IN-USE FUEL ECONOMY DATA BASES

CTAB supplied TSC with seven in-use fuel economy data bases: GM75, GM76, FORD79, FE.EF79, FE.HS79, FE.LA80, and J.D.POWER. Appendix E contains formats for the seven data bases.

With the exception of the J. D. Power data, the data files offered only minor problems to the augmentation process. The most serious problem was the incompleteness of the data files with respect to the required variables in the output file. TSC filled in as much of the missing data as possible and feasible within contractual obligations and time limits.

The J. D. Power data were furnished TSC in column-binary format, which required extensive preprocessing before data augmentation could be done. ZIP-code information had to be purchased separately from J. D. Power before any data augmentation could be performed. A modified version of the J. D. Power data in standard computer format is provided as a separate file on the computer tape delivered to CTAB; the changes in format are given in Appendix F. The J.D.POWER format was compiled by Energy and Environmental Analysis, Inc. (EEA) for CTAB, under a previous contract and is too lengthy to be included in this report.

3.4 THE AUGMENTED IN-USE FUEL ECONOMY DATA BASE

The result of augmenting the seven files discussed in the previous sections is an output file of 27,454 records. The breakdown of that number by separate file is given in Table 3.1. The record format of the output file is given in Appendix C.

TABLE 3.1 NUMBER OF IN-USE FUEL ECONOMY DATA RECORDS IN THE AUGMENTED DATA BASE

Source File	Number of Records	File Number
GM75	2,600	3
GM76	2,123	1
FORD79	11,655	4
FE.EF79	222	5
FE.HS79	158	2
FE.LA80	66	6
J.D.POWER	10,630	7
OUTPUT	27,454	

The available data for each vehicle have been translated into a single set of codes used by CTAB (i.e., manufacturer codes in the different files have been translated into standard Certification Division manufacturer codes). When data could not be obtained from an input record, a missing-value code was entered in the appropriate area of the output record. The translation codes or algorithms are listed with the file formats in Appendix E.

4. VEHICLE EXPOSURE REGIONS

The following sections detail the process of using topographic and meteorological data parametrically to form 24 distinct regions of similar vehicle exposure. The EPA allowed TSC the discretion of breaking states into smaller regions, since the political boundaries of the states tend to occur at major geographical features (e.g., the Ohio River), even though the topography and climate can be the same on both sides of those features. Twenty-four regions were considered to give a reasonable compromise of details for describing the vast and varied topography and climate found in the United States. A smaller number of regions could be made by combining some of these 24 regions, but the meteorological and topographical information would be lost.

4.1 PARAMETERS AND METHODOLOGY

The parameters used to determine the vehicle exposure regions were surface landform, elevation, average summer temperature, average winter temperature, average summer-morning humidity, average summer-afternoon humidity, average winter-morning humidity, and average winter-afternoon humidity. Summer values are averages of the June, July, and August monthly averages, and winter values are the averages of the December, January, and February monthly averages.

All data were taken from the topographical and meteorological data base for each ZIP code. Governmental and military ZIP codes were not used in the analysis. Since the data for each ZIP code were determined with respect to the most likely occurrence at population centers within the geographical bounds of that ZIP code, aggregation of exposure regions did not take into account topographic extremes (e.g., Death Valley), unless they were population centers.

To determine the best way to group ZIP codes into similar topographic and climatic regions, standard statistical techniques, i.e., frequency distributions and cross tabulations, were used, together with judgments made by the author. The specific step-by-step procedure is outlined in the following paragraphs. In general, each of the parameters listed at the beginning of this section was broken down into small cells having similar characteristics and equal frequencies of occurrence; the cells were then combined into three "super-parameters": topography, temperature, and humidity. Each of these super-parameters was in turn broken into small cells having similar characteristics. Vehicle exposure regions were determined from the combinations of these super-parameters, with judgment and geography employed to merge regions with low frequencies of occurrence or physically remote occurrences with other regions.

Elevation data were broken into the nine cells shown in Table 4.1. Surface landform was also broken down into the same nine cells. (NOTE: Open plains with hills includes all the varieties of open plains with low hills and open plains with high hills.) The possible 81 combinations of elevation and surface landform were joined into a single super-parameter called topography, which has the seven cells described in Table 4.1.

A similar process was performed to create the temperature and humidity super-parameters. Temperature has five cells; humidity, three. The cells for each are also listed in Table 4.1.

TABLE 4.1 DESCRIPTION OF THE SUPER-PARAMETERS

SURFACE LANDFORM

Elevation, in feet

	0-250	251-500	501-750	751-1000	1001-1250	1251-1500	1501-2500	2501-5000	>5000
Smooth plains	1	1	1	1	3	3	3	3	3
Irregular plains	2	2	2	2	3	3	3	3	3
Irregular plains with relief	2	2	2	2	3	3	3	3	3
Tablelands	4	4	4	4	5	5	5	5	5
Plains with hills	6	6	6	6	7	7	7	7	7
Plains with mountains	6	6	6	6	7	7	7	7	7
Open hills	6	6	6	6	7	7	7	7	7
Open mountains	6	6	6	6	7	7	7	7	7
Hills and mountains	6	6	6	6	7	7	7	7	7

TOPOGRAPHY

Cell Number	Description
1	Smooth plains ≤1000 feet
2	Irregular plains ≤1000 feet
3	Plains >1000 feet
4	Tablelands ≤1000 feet
5	Tablelands >1000 feet
6	Hills and mountains with associated elevation ≤1000 feet
7	Hills and mountains with associated elevation >1000 feet

TEMPERATURE

Description	Definition
Cool summer, freezing winter	Average summer temperature <70°F Average winter temperature <33°F
Cool summer, nonfreezing winter	Average summer temperature <70°F Average winter temperature >32°F
Moderate summer, freezing winter	Average summer temperature ≥70°≤80°F Average winter temperature <33°F
Moderate summer, nonfreezing winter	Average summer temperature ≥70°≤80°F Average winter temperature >32°F
Hot summer, nonfreezing winter	Average summer temperature >80°F Average winter temperature >32°F

HUMIDITY

Description	Definition
Low humidity	At least three average humidities in lower quartile range
High humidity	At least three average humidities in higher quartile range
Mixed humidity	All the remaining combinations

Out of a possible 105 combinations, 79 resulted from the grouping of the three super-parameters. Many of these combinations contained less than six three-digit ZIP codes. These "unique" combinations were merged with combinations that had a larger number of ZIP codes but were judged to be "close enough" in geographical location and similarity of parameters. Such a judgment was made for each ZIP code that fell into "unique" combinations. The final result was the 24 regions of similar vehicle exposure, vehicle exposure regions, described in the following section.

4.2 DESCRIPTIONS OF THE 24 VEHICLE EXPOSURE REGIONS

Regions 1 through 23 completely cover the 48 contiguous states and Alaska; region 24 contains Hawaii, Puerto Rico, and the Virgin Islands. Tables 4.2 through 4.25 contain statistical information (mean, standard deviation, minimum, median, and maximum) on the elevation, temperature, and humidity of each of the vehicle exposure regions. Tables 4.2 through 4.24 include a figure with points indicating the geographical placement of the ZIP codes within each region.

Each table lists the variety and frequency of each surface landform considered in the region, as well as how many of a state's ZIP codes are listed in each region. The surface landform description on each table gives the most frequent surface landform or the most frequent combination of surface landforms in the region. Twelve separate states or territories are completely encompassed by a single region. Three states, Virginia, Missouri, and New York, are broken into seven regions. Most of the states are divided into as many as three separate regions.

TABLE 4.2 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION Ø1

SURFACE LAND FORM A2B 3, B2B 15
IRREGULAR PLAINS, SLIGHT RELIEF

STATE AK 3, MA 4, ME 6, NH 1, NY 4

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	167.167	166.751	12.ØØØ	78.ØØØ	453.ØØØ
AVERAGE SUMMER TEMP.	65.222	4.453	56.ØØØ	65.5ØØ	69.ØØØ
AVERAGE WINTER TEMP.	21.444	8.597	-7.ØØØ	23.333	29.ØØØ
SUM. MORN. HUMIDITY	79.389	4.692	67.ØØØ	8Ø.864	89.ØØØ
WIN. MORN. HUMIDITY	75.333	3.325	65.ØØØ	76.5ØØ	78.ØØØ
SUM. AFTN. HUMIDITY	57.222	2.981	47.ØØØ	57.833	6Ø.ØØØ
WIN. AFTN. HUMIDITY	63.944	4.7Ø9	57.ØØØ	61.75Ø	71.ØØØ

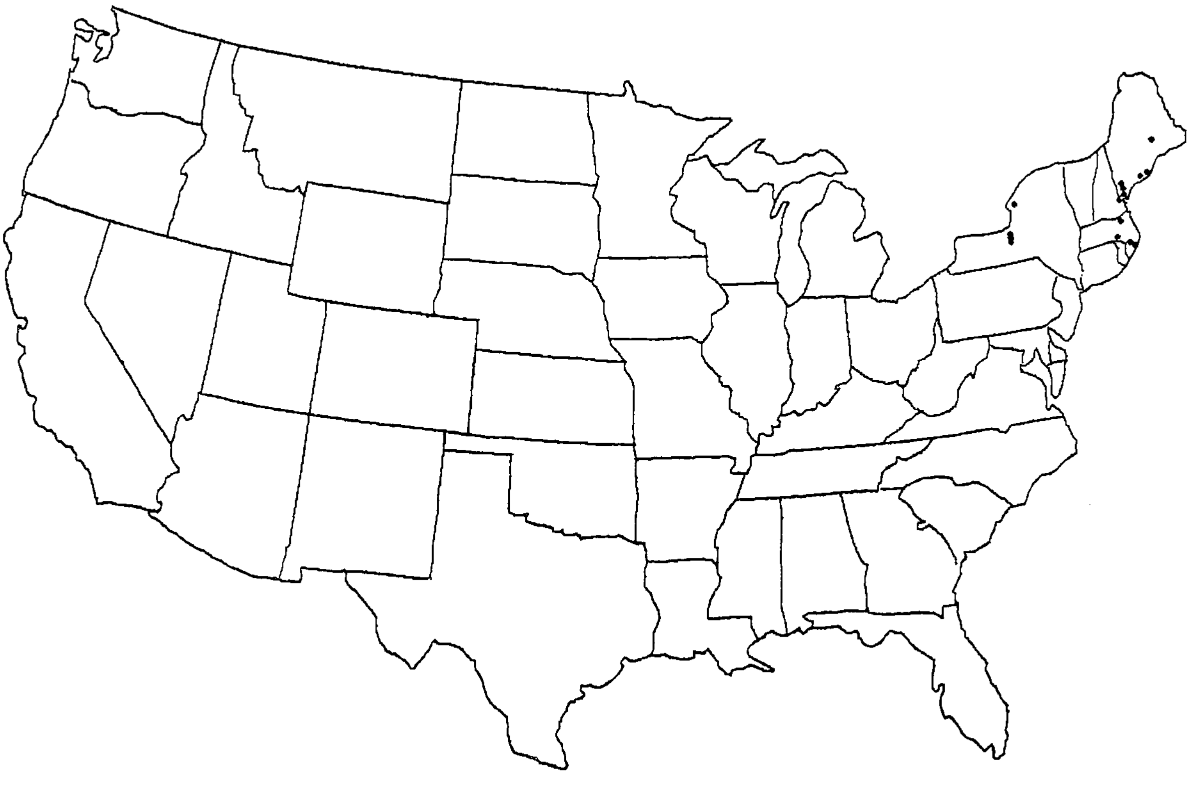

TABLE 4.3 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 02

SURFACE LAND FORM A2B 11. B2B 6. B2C 6. A1- 7
SMOOTH PLAINS

STATE MA 5. MD 8. NJ 11. NY 6

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	57.767	40.756	6.000	44.000	152.000
AVERAGE SUMMER TEMP.	73.333	1.516	70.000	73.600	74.000
AVERAGE WINTER TEMP.	32.367	1.351	30.000	32.333	34.000
SUM. MORN. HUMIDITY	74.733	3.912	72.000	72.765	81.000
WIN. MORN. HUMIDITY	70.567	3.081	65.000	72.125	73.000
SUM. AFTN. HUMIDITY	53.267	1.760	52.000	52.731	57.000
WIN. AFTN. HUMIDITY	57.567	0.504	57.000	57.618	58.000

TABLE 4.4 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION Ø3

SURFACE LAND FORM A2C 1. B1C 1. B2C 19. A1- 18
PLAINS

STATE CA 1Ø. DC 1. IL 1. KY 3. MD 1. MO 1. NC 8. TN 1. VA 13

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	183.154	171.Ø33	1Ø.ØØØ	79.75Ø	493.ØØØ
AVERAGE SUMMER TEMP.	76.128	2.821	64.ØØØ	76.176	81.ØØØ
AVERAGE WINTER TEMP.	41.359	4.258	33.ØØØ	4Ø.75Ø	49.ØØØ
SUM. MORN. HUMIDITY	73.897	2Ø.268	33.ØØØ	84.125	9Ø.ØØØ
WIN. MORN. HUMIDITY	77.538	5.139	57.ØØØ	79.Ø83	84.ØØØ
SUM. AFTN. HUMIDITY	49.974	14.366	21.ØØØ	57.25Ø	69.ØØØ
WIN. AFTN. HUMIDITY	58.487	5.581	47.ØØØ	57.583	67.ØØØ

TABLE 4.5 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION Ø4

SURFACE LAND FORM A2B 2. B2B 19. B4B 1. C2B 1. B2C 16. C2C 2. A1- 6Ø
FLAT PLAINS

STATE AL 8. AR 7. FL 18. GA 12. LA 13. MS 12. SC 6. TN 3. TX 22

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	168.95Ø	137.845	2.ØØØ	15Ø.ØØØ	469.ØØØ
AVERAGE SUMMER TEMP.	8Ø.931	1.313	78.ØØØ	8Ø.568	84.ØØØ
AVERAGE WINTER TEMP.	51.218	6.246	41.ØØØ	49.375	67.ØØØ
SUM. MORN. HUMIDITY	88.782	3.348	8Ø.ØØØ	89.6Ø9	95.ØØØ
WIN. MORN. HUMIDITY	83.733	2.891	78.ØØØ	83.386	9Ø.ØØØ
SUM. AFTN. HUMIDITY	58.733	3.789	5Ø.ØØØ	58.321	73.ØØØ
WIN. AFTN. HUMIDITY	59.723	3.94Ø	53.ØØØ	59.938	76.ØØØ

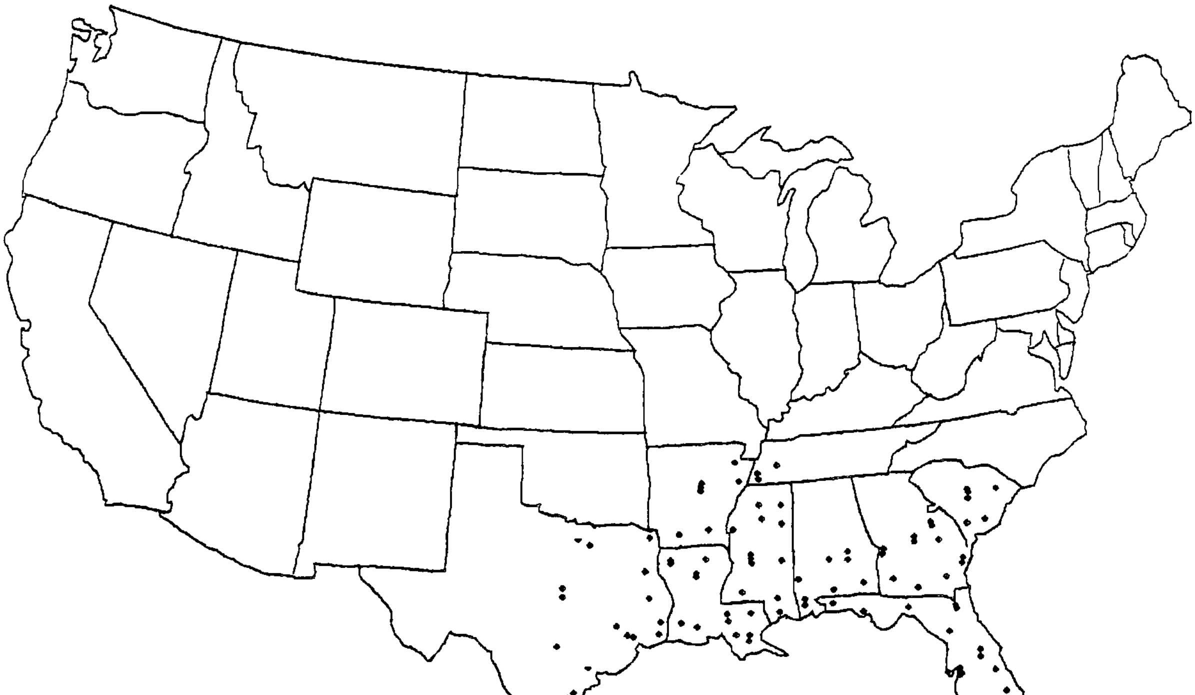

TABLE 4.6 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION Ø5

SURFACE LAND FORM A2B 4, B2B 4, C3B 1. B2C 1Ø. A1- 12
PLAINS

STATE DE 3, IL 1. IN 3, KY 4. MO 4. NJ 7. NY 7. PA 2

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	214.Ø32	214.391	13.ØØØ	88.ØØØ	745.ØØØ
AVERAGE SUMMER TEMP.	74.161	1.864	72.ØØØ	73.6ØØ	78.ØØØ
AVERAGE WINTER TEMP.	33.387	1.476	3Ø.ØØØ	33.231	39.ØØØ
SUM. MORN. HUMIDITY	81.935	4.8Ø2	75.ØØØ	84.583	9Ø.ØØØ
WIN. MORN. HUMIDITY	75.452	4.249	68.ØØØ	75.778	82.ØØØ
SUM. AFTN. HUMIDITY	57.29Ø	2.466	54.ØØØ	56.667	61.ØØØ
WIN. AFTN. HUMIDITY	6Ø.71Ø	3.268	57.ØØØ	59.231	69.ØØØ

TABLE 4.7 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION Ø6

SURFACE LAND FORM B2B 2. A2C 14. B2C 13. C2C 1. A1- 4
PLAINS

STATE IA 6. IL 13. IN 1Ø. MO 1. OH 4

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	664.029	136.Ø21	47Ø.ØØØ	63Ø.5ØØ	975.ØØØ
AVERAGE SUMMER TEMP.	72.618	1.371	7Ø.ØØØ	73.ØØØ	74.ØØØ
AVERAGE WINTER TEMP.	27.382	2.57Ø	19.ØØØ	26.5ØØ	3Ø.ØØØ
SUM. MORN. HUMIDITY	84.5ØØ	1.237	83.ØØØ	84.5ØØ	87.ØØØ
WIN. MORN. HUMIDITY	79.912	Ø.83Ø	76.ØØØ	8Ø.Ø17	81.ØØØ
SUM. AFTN. HUMIDITY	57.176	1.732	55.ØØØ	57.333	59.ØØØ
WIN. AFTN. HUMIDITY	68.941	1.254	67.ØØØ	68.833	73.ØØØ

TABLE 4.8 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION Ø7

SURFACE LAND FORM A2B 1, B2B 2, B2C 22, A1- 1
IRREGULAR PLAINS

STATE AL 1, GA 6, NC 8, OK 6, SC 4, VA 1

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	983.385	334.536	490.000	835.500	2094.000
AVERAGE SUMMER TEMP.	77.231	1.632	74.000	77.200	80.000
AVERAGE WINTER TEMP.	41.462	2.502	37.000	41.700	48.000
SUM. MORN. HUMIDITY	86.923	3.058	82.000	87.500	90.000
WIN. MORN. HUMIDITY	78.654	2.190	72.000	78.269	84.000
SUM. AFTN. HUMIDITY	56.962	3.304	52.000	57.750	61.000
WIN. AFTN. HUMIDITY	56.038	1.800	52.000	55.500	58.000

TABLE 4.9 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION Ø8

SURFACE LAND FORM A2B 4. B2B 13. A2C 4. B2C 5
IRREGULAR PLAINS

STATE AR 1. OK 7. TX 18

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	915.346	560.271	500.000	676.000	2858.000
AVERAGE SUMMER TEMP.	82.692	1.543	80.000	83.214	84.000
AVERAGE WINTER TEMP.	46.385	4.109	39.000	46.786	53.000
SUM. MORN. HUMIDITY	82.423	4.139	73.000	83.071	87.000
WIN. MORN. HUMIDITY	78.269	2.933	71.000	79.000	81.000
SUM. AFTN. HUMIDITY	50.962	3.831	40.000	52.300	56.000
WIN. AFTN. HUMIDITY	56.577	3.890	44.000	57.875	62.000

TABLE 4.10 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION Ø9

SURFACE LAND FORM A2B 1Ø. B2B 33. B2C 2. A1- 5. B3B 1
IRREGULAR PLAINS

STATE MI 13. MN 8. ND 3. NY 7. OH 6. PA 2. WI 12

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	712.8Ø4	132.493	513.ØØØ	672.5ØØ	1Ø43.ØØØ
AVERAGE SUMMER TEMP.	67.98Ø	1.827	63.ØØØ	68.353	69.ØØØ
AVERAGE WINTER TEMP.	21.137	5.284	1Ø.ØØØ	23.6ØØ	28.ØØØ
SUM. MORN. HUMIDITY	83.216	1.792	8Ø.ØØØ	83.Ø94	87.ØØØ
WIN. MORN. HUMIDITY	77.725	2.417	73.ØØØ	77.667	83.ØØØ
SUM. AFTN. HUMIDITY	56.8Ø4	2.757	54.ØØØ	56.125	65.ØØØ
WIN. AFTN. HUMIDITY	69.922	1.917	67.ØØØ	69.464	73.ØØØ

TABLE 4.11 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 1Ø

SURFACE LAND FORM A2B 7, B2B 2, A2C 8, B2C 27, A1- 7
IRREGULAR PLAINS

STATE IA 9, IL 12, IN 5, KS 8, KY 4, MI 3, MO 3, OH 7

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	743.216	127.5Ø6	5ØØ.ØØØ	747.ØØØ	988.ØØØ
AVERAGE SUMMER TEMP.	73.216	2.2Ø3	7Ø.ØØØ	72.969	79.ØØØ
AVERAGE WINTER TEMP.	27.314	4.429	19.ØØØ	27.2ØØ	34.ØØØ
SUM. MORN. HUMIDITY	82.392	3.125	76.ØØØ	83.333	86.ØØØ
WIN. MORN. HUMIDITY	77.255	1.988	74.ØØØ	77.789	82.ØØØ
SUM. AFTN. HUMIDITY	55.6Ø8	1.767	5Ø.ØØØ	55.941	58.ØØØ
WIN. AFTN. HUMIDITY	66.412	2.137	61.ØØØ	66.542	7Ø.ØØØ

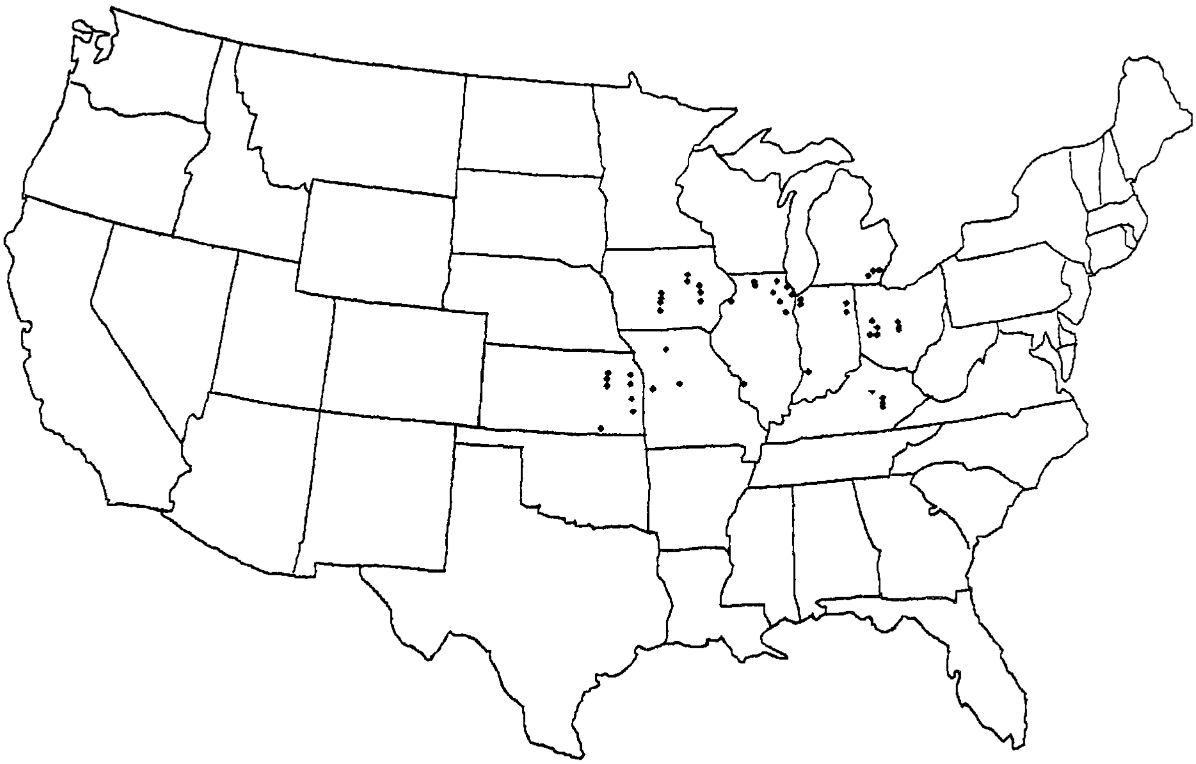

TABLE 4.12 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 11

SURFACE LAND FORM A2B 2, B2B 6, A2C 4, B2C 1, A1 3
IRREGULAR PLAINS

STATE MI 3, MN 6, ND 3, SD 1, WI 3

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	1308.500	163.832	1038.000	1346.000	1557.000
AVERAGE SUMMER TEMP.	66.125	2.473	62.000	67.167	69.000
AVERAGE WINTER TEMP.	13.375	4.161	6.000	12.000	20.000
SUM. MORN. HUMIDITY	83.688	3.114	77.000	84.667	88.000
WIN. MORN. HUMIDITY	75.625	2.579	73.000	75.250	83.000
SUM. AFTN. HUMIDITY	56.750	4.328	47.000	55.500	63.000
WIN. AFTN. HUMIDITY	69.875	2.187	67.000	69.500	75.000

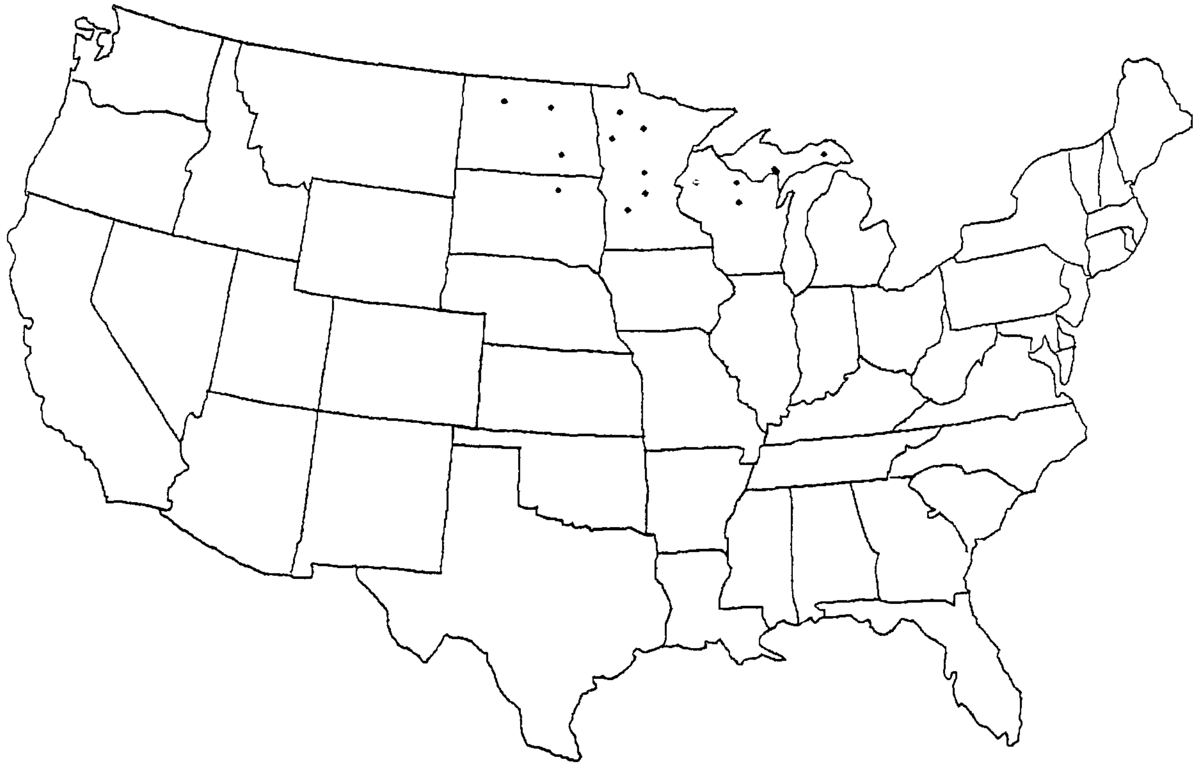

TABLE 4.13 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 12

SURFACE LAND FORM A2B 6. B2B 3. A2C 2. B2C 12. A1- 3. A2- 1
IRREGULAR PLAINS

STATE IA 7. KS 6. MN 1. NE 9. SD 4

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	1333.037	237.643	1023.000	1301.667	1932.000
AVERAGE SUMMER TEMP.	74.222	2.736	71.000	73.438	79.000
AVERAGE WINTER TEMP.	23.889	5.528	16.000	22.375	33.000
SUM. MORN. HUMIDITY	82.481	2.101	80.000	82.286	86.000
WIN. MORN. HUMIDITY	78.333	1.441	76.000	78.188	81.000
SUM. AFTN. HUMIDITY	52.852	3.219	49.000	52.000	58.000
WIN. AFTN. HUMIDITY	65.481	2.860	61.000	66.750	69.000

TABLE 4.14 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 13

SURFACE LAND FORM B4A 2. C5A 4. B3B 11. B4B 5. C4B 1. C5B 3. B4C 3.
C3C 2. C4C 6. C5C 1. D4- 1. D5- 3. D6- 1
PLAINS WITH HILLS

STATE AK 2. MA 7. ME 5. NH 8. NY 10. RI 2. VT 6. WV 3

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	400.372	292.246	23.000	369.000	945.000
AVERAGE SUMMER TEMP.	65.860	4.068	47.000	66.900	69.000
AVERAGE WINTER TEMP.	23.488	5.101	6.000	23.250	35.000
SUM. MORN. HUMIDITY	83.442	5.509	75.000	82.286	94.000
WIN. MORN. HUMIDITY	76.419	3.194	72.000	76.111	83.000
SUM. AFTN. HUMIDITY	58.372	5.665	54.000	57.063	86.000
WIN. AFTN. HUMIDITY	64.721	5.857	57.000	61.375	83.000

TABLE 4.15 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 14

SURFACE LAND FORM B3A 5, B4A 4, B5A 1, C5A 15, C3B 1, B3C 9, D5- 1, D6- 2
LOW MOUNTAINS AND TABLELANDS

STATE CA 25, OR 6, WA 7

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	195.553	373.163	3.000	92.167	1900.000
AVERAGE SUMMER TEMP.	63.500	3.152	57.000	62.500	69.000
AVERAGE WINTER TEMP.	47.000	6.555	36.000	49.167	56.000
SUM. MORN. HUMIDITY	66.474	6.829	43.000	67.100	75.000
WIN. MORN. HUMIDITY	72.789	10.395	54.000	76.045	88.000
SUM. AFTN. HUMIDITY	58.684	11.060	29.000	60.500	73.000
WIN. AFTN. HUMIDITY	67.684	6.882	56.000	66.500	82.000

TABLE 4.16 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 15

SURFACE LAND FORM B4A 3, B5A 2, B6A 4, C3A 2, C5A 4, B5B 2, B4C 3, B3D 1, D4- 3, D5- 1, D6- 1, A3A 1, A2B 1, A2C 6
HILLS AND MOUNTAINS

STATE CA 5, KY 3, NC 4, NM 12, OK 1, TN 2, TX 4, VA 3

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	3263.853	1793.931	1050.000	3116.500	6976.000
AVERAGE SUMMER TEMP.	75.647	2.509	71.000	76.750	79.000
AVERAGE WINTER TEMP.	40.412	5.641	37.000	38.333	57.000
SUM. MORN. HUMIDITY	61.912	26.370	18.000	56.500	96.000
WIN. MORN. HUMIDITY	62.206	15.684	43.000	68.500	85.000
SUM. AFTN. HUMIDITY	42.588	16.104	13.000	44.500	62.000
WIN. AFTN. HUMIDITY	47.618	10.594	31.000	57.300	63.000

TABLE 4.17 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 16

SURFACE LAND FORM B4A 5. C5A 8. B3B 16. B4B 1. C2B 4. C3B 6. C4B 3. B3C 16. B2C 2. B4C 5. C2C 1. C3C 3. C4C 2. C5C 3. C3D 2. D3- 8. D4- 12. D5- 4 HILLS

STATE CT 10. IN 2. KY 13. MA 1. MD 4. MO 9. NJ 1. NY 13. OH 10. PA 29. VT 2. WV 7

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	491.465	290.812	10.000	558.000	979.000
AVERAGE SUMMER TEMP.	72.505	2.077	70.000	73.000	77.000
AVERAGE WINTER TEMP.	30.218	3.565	23.000	30.821	35.000
SUM. MORN. HUMIDITY	81.881	3.345	72.000	82.875	89.000
WIN. MORN. HUMIDITY	75.386	3.010	65.000	76.143	82.000
SUM. AFTN. HUMIDITY	55.455	2.076	52.000	55.258	61.000
WIN. AFTN. HUMIDITY	62.178	3.048	57.000	62.406	68.000

TABLE 4.18 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 17

SURFACE LAND FORM B4A 1. C5A 2. C3B 2. B2C 1. B3C 3. C3C 1. D4- 3
TABLELANDS AND HILLS

STATE MN 1. VA 5. WI 3. WV 4

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	588.308	284.006	80.000	567.000	1112.000
AVERAGE SUMMER TEMP.	71.923	1.801	68.000	72.778	73.000
AVERAGE WINTER TEMP.	28.846	7.669	16.000	32.833	35.000
SUM. MORN. HUMIDITY	87.154	2.794	81.000	87.917	90.000
WIN. MORN. HUMIDITY	78.615	1.660	75.000	79.000	80.000
SUM. AFTN. HUMIDITY	57.538	1.450	54.000	57.571	59.000
WIN. AFTN. HUMIDITY	62.846	5.080	58.000	64.333	73.000

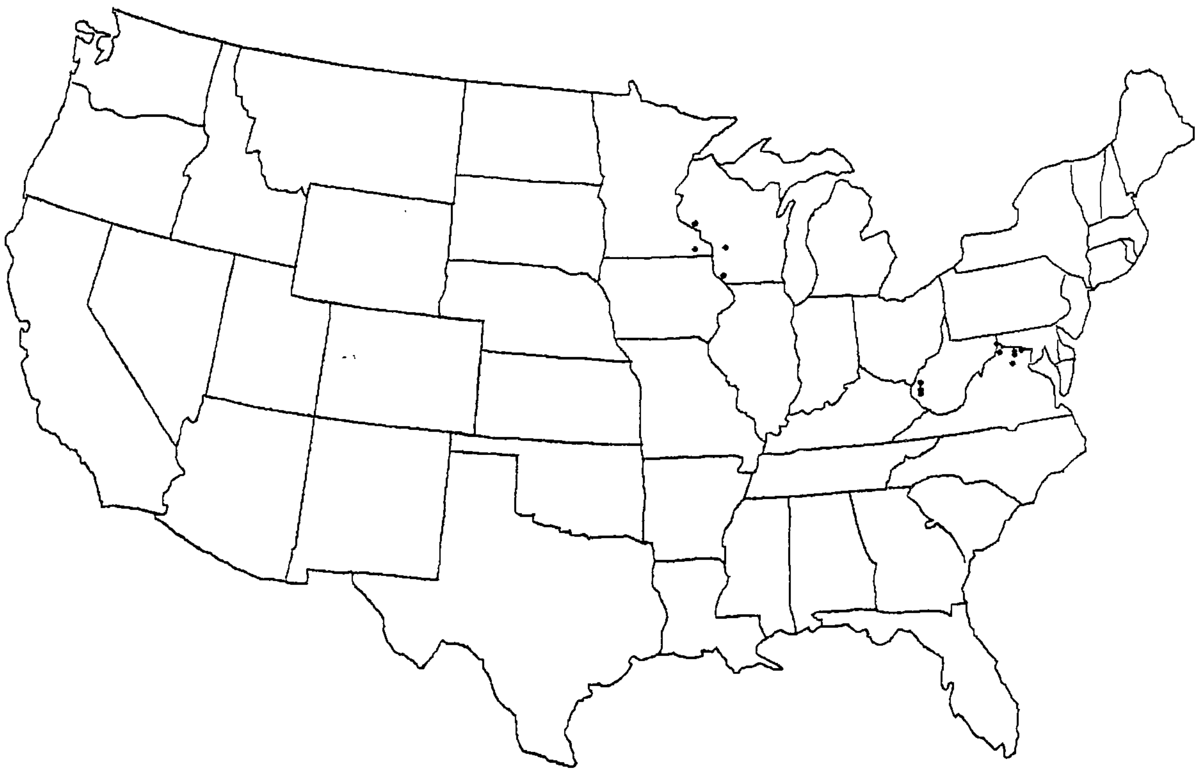

TABLE 4.19 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 18

SURFACE LAND FORM C5A 2, C5B 1, B3C 10, C4C 1, C5C 1, C4D 1, C5D 2,
D4- 2, D5- 1, D6- 2
TABLELANDS AND MOUNTAINS

STATE ID 1, MT 1, ND 3, NY 1, PA 3, SD 1, VA 1, VT 1, WA 5, WV 6

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	1641.391	479.970	636.000	1658.000	2372.000
AVERAGE SUMMER TEMP.	66.652	3.084	53.000	67.222	69.000
AVERAGE WINTER TEMP.	24.826	7.352	12.000	27.625	32.000
SUM. MORN. HUMIDITY	74.043	20.012	37.000	82.333	94.000
WIN. MORN. HUMIDITY	78.609	4.175	70.000	79.083	92.000
SUM. AFTN. HUMIDITY	50.261	13.542	27.000	57.000	65.000
WIN. AFTN. HUMIDITY	69.652	6.644	60.000	69.750	91.000

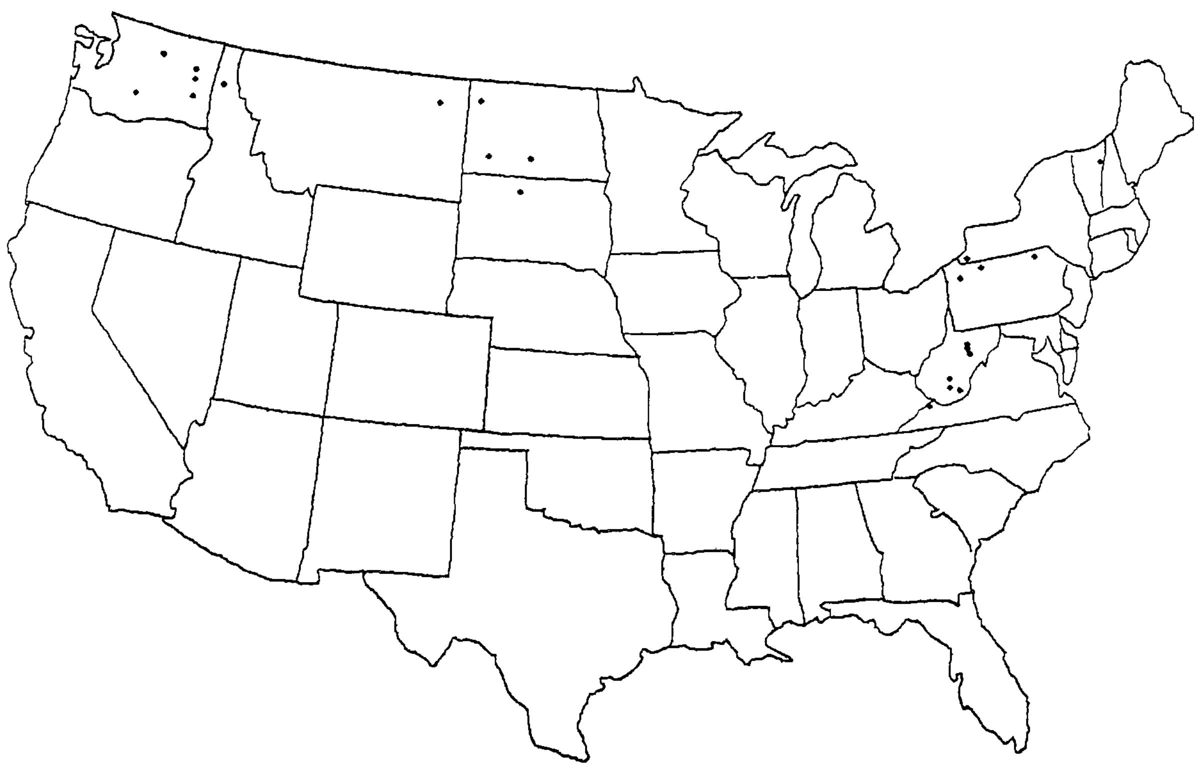

TABLE 4.20 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 19

SURFACE LAND FORM C5A 4, B2B 1, B3B 1, C2B 3, C3B 2, C4B 2, C5B 1,
B3C 2, C3C 2, C4C 4, C5C 1, B3D 3, B5D 2, C4D 2, D4- 1
OPEN HILLS AND MOUNTAINS

STATE IA 3, ID 1, KS 2, MA 1, MO 5, MT 1, NJ 1, OH 2, OR 1, PA 10, SD 1, VA 1, WA 2

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	1344.613	344.773	1000.000	1303.333	2363.000
AVERAGE SUMMER TEMP.	72.419	2.754	70.000	71.333	79.000
AVERAGE WINTER TEMP.	29.774	4.924	16.000	29.250	36.000
SUM. MORN. HUMIDITY	76.452	16.745	37.000	83.688	88.000
WIN. MORN. HUMIDITY	76.484	2.204	70.000	76.444	81.000
SUM. AFTN. HUMIDITY	51.267	9.336	26.000	55.136	57.000
WIN. AFTN. HUMIDITY	64.233	4.384	55.000	64.625	72.000

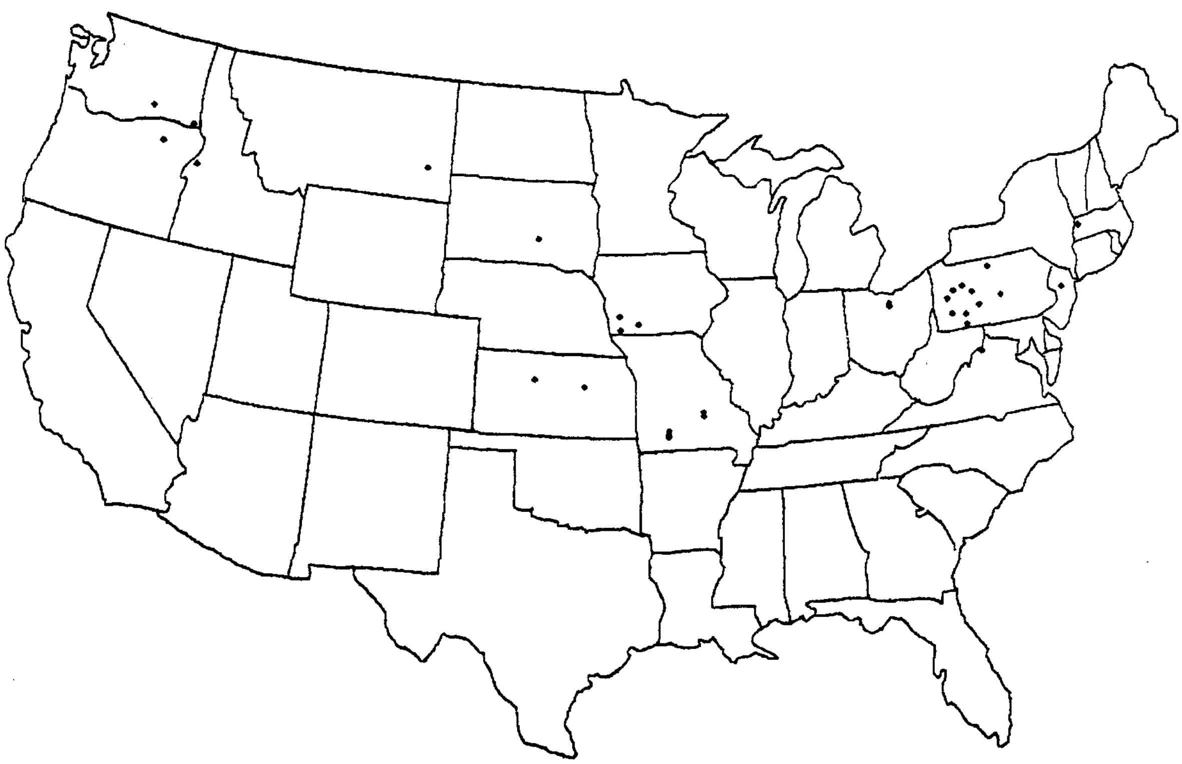

TABLE 4.21 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 2Ø

SURFACE LAND FORM B5A 7. B6A 1. B3B 1. B5B 1. C4B 1. C6B 1. B3C 2.
D4- 1. D5- 1
PLAINS WITH HIGH HILLS

STATE AR 2. AZ 6. NV 2. TX 6

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	2ØØ3.438	997.493	1Ø27.ØØØ	14Ø7.5ØØ	3917.ØØØ
AVERAGE SUMMER TEMP.	84.Ø63	3.1Ø8	8Ø.ØØØ	84.167	88.ØØØ
AVERAGE WINTER TEMP.	48.Ø63	4.5Ø9	41.ØØØ	46.25Ø	53.ØØØ
SUM. MORN. HUMIDITY	47.ØØØ	27.432	19.ØØØ	3Ø.5ØØ	87.ØØØ
WIN. MORN. HUMIDITY	53.188	18.641	37.ØØØ	42.ØØØ	81.ØØØ
SUM. AFTN. HUMIDITY	31.625	15.832	14.ØØØ	25.5ØØ	54.ØØØ
WIN. AFTN. HUMIDITY	38.875	12.759	28.ØØØ	3Ø.5ØØ	58.ØØØ

TABLE 4.22 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 21

SURFACE LAND FORM A2A 1, B5A 2, B6A 4, C5A 1, C6A 3, B3B 5, B4B 4,
B5B 4, C6B 1, B2C 2, B3C 4, B4C 1, B5C 1, B6C 1, D5- 3, D6- 1
PLAINS WITH HILLS AND MOUNTAINS

STATE AZ 3, CO 4, ID 3, MT 8, NV 5, SD 1, WV 2, WY 12

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	4832.921	1497.269	2480.000	4697.500	7741.000
AVERAGE SUMMER TEMP.	65.842	2.099	61.000	66.389	69.000
AVERAGE WINTER TEMP.	26.132	4.147	15.000	25.667	34.000
SUM. MORN. HUMIDITY	39.184	12.772	26.000	35.900	89.000
WIN. MORN. HUMIDITY	59.526	11.001	40.000	59.071	80.000
SUM. AFTN. HUMIDITY	32.658	8.684	21.000	32.500	60.000
WIN. AFTN. HUMIDITY	56.263	8.245	44.000	56.900	75.000

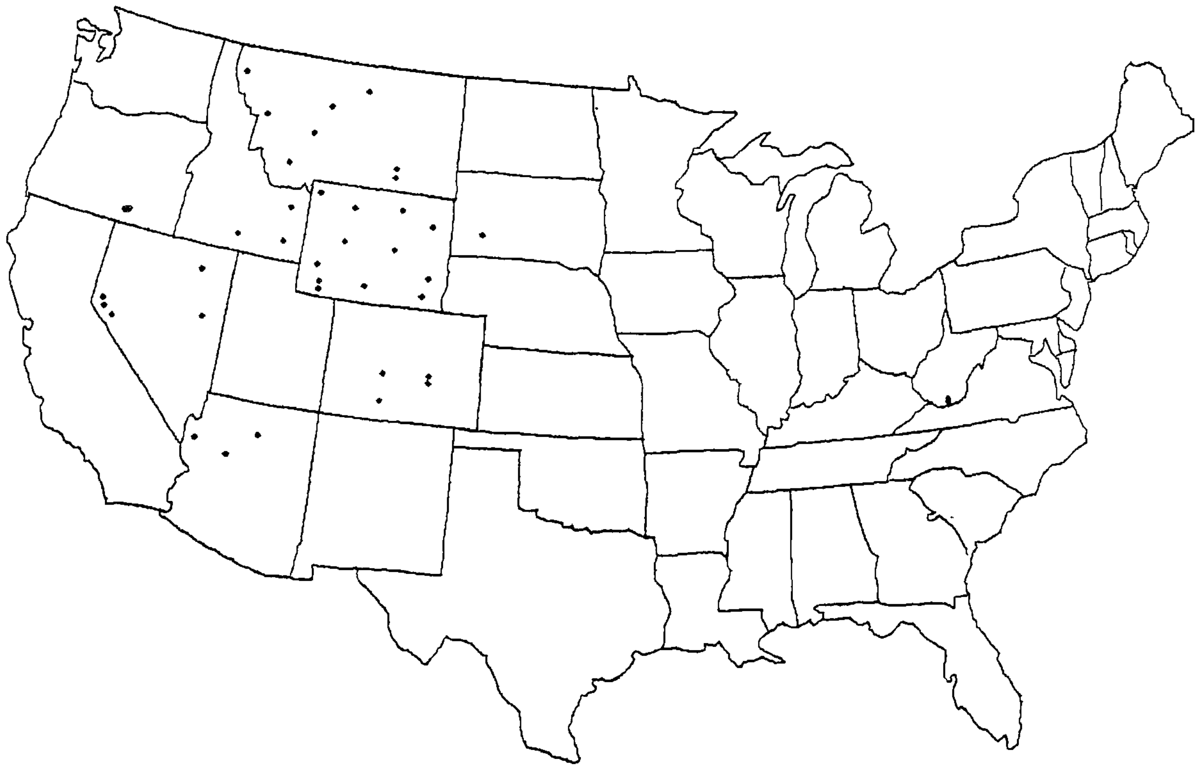

TABLE 4.23 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 22

SURFACE LAND FORM B5A 2. B6A 6. B3B 2. C6B 1. A2C 2. B3C 2. B4C 3. C3C 2. C5C 1. C6C 1. D6- 5. B2B 5. B2C 2
PLAINS WITH MOUNTAINS

STATE AZ 2. CO 13. ID 2. KS 3. NE 4. NM 1. OR 3. UT 7

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	4312.343	1095.813	2480.000	4333.750	6520.000
AVERAGE SUMMER TEMP.	71.657	2.754	64.000	70.625	77.000
AVERAGE WINTER TEMP.	30.743	2.883	23.000	31.542	38.000
SUM. MORN. HUMIDITY	39.857	17.990	24.000	35.875	84.000
WIN. MORN. HUMIDITY	60.200	13.315	42.000	60.375	86.000
SUM. AFTN. HUMIDITY	30.543	9.793	18.000	29.000	51.000
WIN. AFTN. HUMIDITY	55.457	8.269	41.000	55.063	68.000

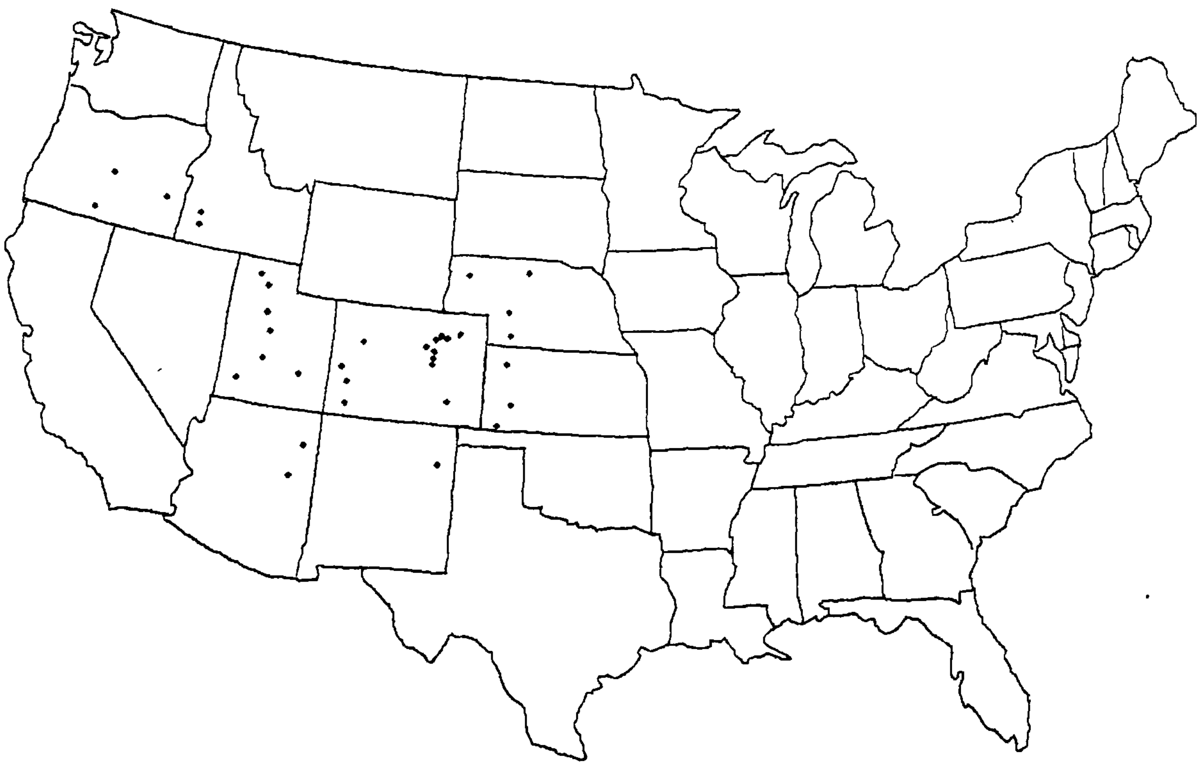

TABLE 4.24 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 23

SURFACE LAND FORM B3A 6. B4A 18. C3A 3. C4A 4. C5A 3. B3B 4. C3B 2. B3D 1. C4B 1. B2C 1. B4C 2. C3C 3
PLAINS WITH HILLS

STATE AL 10. AR 4. CA 16. GA 1. MO 2. OK 3. TN 9. VA 3

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	537.229	257.813	13.000	607.833	907.000
AVERAGE SUMMER TEMP.	75.438	3.741	70.000	77.167	80.000
AVERAGE WINTER TEMP.	46.125	7.542	37.000	42.167	57.000
SUM. MORN. HUMIDITY	77.625	14.270	56.000	86.700	90.000
WIN. MORN. HUMIDITY	70.563	13.028	50.000	78.864	83.000
SUM. AFTN. HUMIDITY	56.333	2.571	53.000	55.875	60.000
WIN. AFTN. HUMIDITY	56.917	5.511	50.000	59.577	65.000

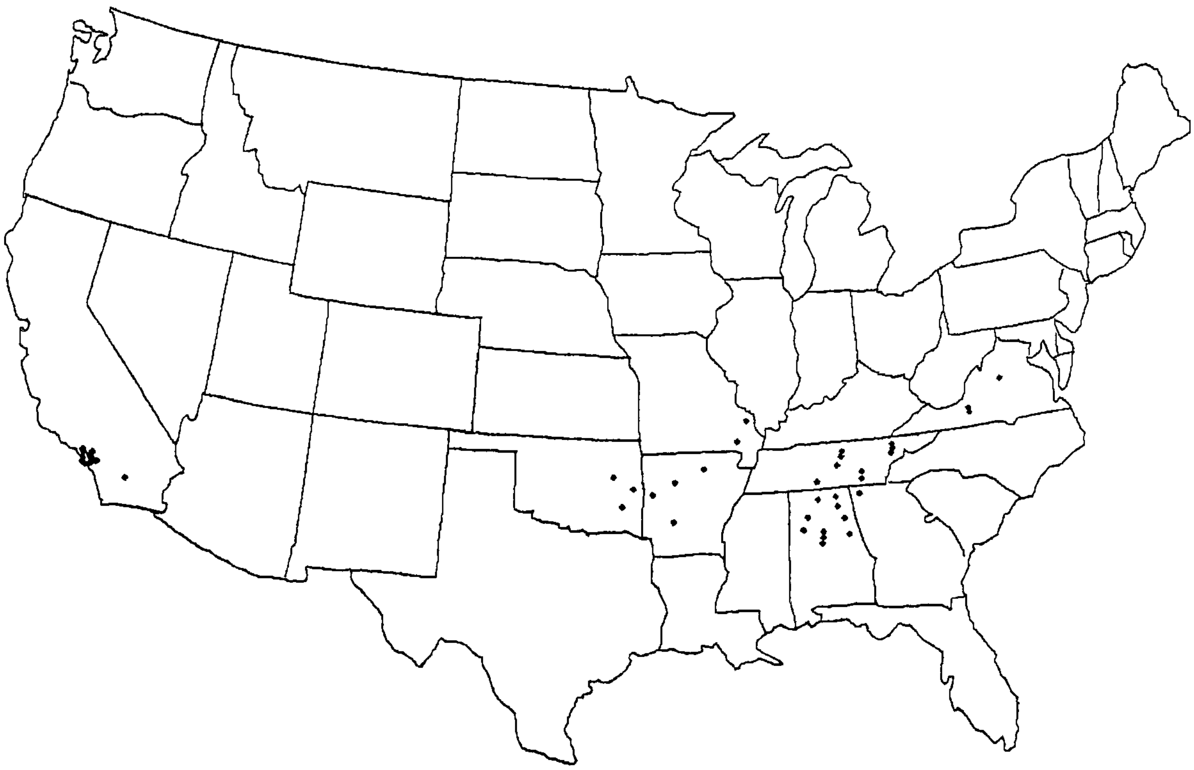

TABLE 4.25 DESCRIPTION OF TOPOGRAPHY AND METEOROLOGY IN REGION 24

SURFACE LAND FORM B6A 2. --- 4
PLAINS WITH HIGH MOUNTAINS

STATE HI 2. PR 3. VI 1

	MEAN	STD DEV	MINIMUM	MEDIAN	MAXIMUM
ELEVATION (FEET)	64.667	70.509	16.000	41.833	207.000
AVERAGE SUMMER TEMP.	79.833	2.401	75.000	80.750	81.000
AVERAGE WINTER TEMP.	73.833	1.835	71.000	74.750	75.000
SUM. MORN. HUMIDITY	76.167	5.529	65.000	78.000	80.000
WIN. MORN. HUMIDITY	79.500	1.225	77.000	79.700	80.000
SUM. AFTN. HUMIDITY	63.000	5.404	52.000	65.000	66.000
WIN. AFTN. HUMIDITY	63.500	2.345	61.000	63.000	68.000

Appendix A

AUGMENTATION DATA FORMATS

TABLE A.1 TOPO.FILE FORMAT

VARIABLE	FORMAT	COLUMNS	DESCRIPTION
STATE(4)	4A4	1- 16	NAME OF THE STATE
CITY(6)	6A4	17- 40	NAME OF THE LOCATION
ZIP	I3	41- 43	FIRST THREE DIGITS OF THE ZIP CODE
AREA	I3	46- 48	TELEPHONE AREA CODE
ELEV	I8	49- 56	ELEVATION
TOPO(3)	3A3	57- 65	SURFACE LANDFORM
POP	I10	66- 75	POPULATION COUNT
DENSI	I10	76- 85	POPULATION DENSITY
CENSUS	I10	86- 95	POPULATION SOURCE 1 - BOTH (POP. TOTAL AND POP. DENSITY) VALUES ARE FOR CITY (1975) 2 - BOTH VALUES ARE FOR COUNTY IN WHICH THE CITY IS LOCATED (1975) 3 - TOTAL POP. = CITY (1970) POP. DENSITY = COUNTY (1975) 4 - SMSA DATA (1975) HAD TO BE USED NO OTHER DATA WAS AVAILABLE 5 - NO CITY NAME USED COUNTIES (1975) WITH CORRESPONDING ZIP 6 - NO CITY NAME USED (1970) CITIES WITH CORRESPONDING ZIP AND USED COUNTY POP DENSITY FIGURES (1975)
ST	A2	97- 98	STATE ABBREVIATION
MET	I7	99-105	METEOROLOGICAL SITE NUMBER (CORRESPONDS TO METSTA IN MET.FILE)
RZIP	I4	106-109	THE ZIP CODE THAT AN AREA CODE MAPS TO
TYPE	I2	110-111	REGIONAL ZIP CODE=2, CITY ZIP CODE=1
REGION	I3	112-114	VEHICLE EXPOSURE REGION

TABLE A.2 MET.FILE FORMAT

VARIABLE	FORMAT	COLUMNS	DESCRIPTION
TYPM	A2	1- 2	METEOROLOGICAL VARIABLE TYPE C1=MAX TEMP,C2=MIN TEMP,C3=AVE TEMP H1=AM HUMIDITY,H2=PM HUMIDITY
METSTA	I6	3- 8	CLIMATIC METEOROLGICAL SITE NUMBER
WBAN	I6	9- 14	WEATHER SITE NUMBER (USED WITH TAPE DATA)
STAT	A2	16- 17	STATE ABBREVIATION OF MET SITE
LOCAT(5)	5A4	19- 38	LOCATION OF MET SITE
DATA(12)	12I4	40- 87	MONTHLY AVERAGE METEOROLOGICAL VALUES

Appendix B

LISTING OF AUGMENT, SUBROUTINES GETDATI AND DATOUT, AND LISTING OF FETCH

```
C      PROGRAM AUGMENT  810318
C
C      MAIN ROUTINE FOR DATA RETRIEVAL USING A STANDARD FORMAT.
C
C      THIS ROUTINE ASSIGNS THE REQUIRED PRIME FILES TO FORTRAN UNITS
C      AND AUGMENTS THE INPUT FILE
C
C      THE INPUT FILE WILL HAVE THE FOLLOWING STANDARD FORMAT:
C
C      VARIABLE  FORMAT     DESCRIPTION
C
C      MANUF         I4     MANUFACTURER CODE AS DEFINED BY
C                           CERTIFICATION DIVISION
C      MODEL(5)     5A4     MODEL NAME FROM INPUT FILE
C      INERWT        I5     INERTIA WEIGHT
C      IDISPL        I4     CUBIC INCH DISPLACEMENT
C      TRANSM        A2     TRANSMISSION VALUE
C      OVRDRV        A1     OVERDRIVE VALUE
C      NCYLDR        I3     NUMBER OF CYLINDERS
C      CARB       1X,A2     NUMBER OF BARRELS IN CARBURETOR
C      KLASS         I3     BODY CLASS
C      MODLYR        I3     MODEL YEAR
C      SALES      1X,A1     SALES CLASS
C      CARTRK        A3     VEHICLE CLASS
C      IZIP          I4     FIRST THREE DIGITS OF THE ZIP CODE
C      MONTH1    14X,I3     MONTH OF THE YEAR
C      IPCTY         I4     PERCENT CITY DRIVING
C      IAVGML        I4     AVERAGE DAILY MILEAGE
C      MPG(1)=CGUIDE F6.2   CITY MPG FROM GUIDE BOOK
C      MPG(2)=HGUIDE F6.2   HIGHWAY MPG FROM GUIDE BOOK
C      MPG(3)=CEMISS F6.2   CITY MPG FROM EMISSIONS TEST
C      MPG(4)=HEMISS F6.2   HIGHWAY MPG FROM EMISSIONS TEST
C      MPG(5)=CQUEST F6.2   CITY MPG FROM QUESTIONNAIRE
C      MPG(6)=HQUEST F6.2   HIGHWAY MPG FROM QUESTIONNAIRE
C      MPG(7)=AQUEST F6.2   COMBINED MPG FROM QUESTIONNAIRE
C
       IMPLICIT INTEGER*4 (A-Z)
       REAL MPG
       DIMENSION MODEL(5),TOPO(3),STATE(4),CITY(6),W(5),MPG(7)
C      OPEN UNITS 13 AND 14
C      UNIT 1 IS THE TERMINAL
       CALL FTNCMD('ASSIGN 13 TO MET.FILE ',22)
C      ASSIGN MET.FILE TO UNIT 13
       CALL FTNCMD('ASSIGN 14 TO TOPO.FILE ',23)
C      ASSIGN TOPO.FILE TO UNIT 14
C      ASSIGN UNIT 5 TO THE INPUT FILE
C      ASSIGN UNIT 12 TO THE OUTPUT FILE
       NREC=0
       WRITE(1,111)
111    FORMAT('ENTER A SOURCE CODE NUMBER')
       READ(1,*)ISOURC
19999  CONTINUE
       READ(5,701,END=19998)MANUF,MODEL,INERWT,IDISPL,TRANSM
      1  ,OVRDRV,NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,
      2  MONTH1,IPCTY,IAVGML,MPG
       NREC=NREC+1
```

```
701   FORMAT(I4,1X,5A4,I5,I4,1X,A2,A1,I3,1X,A2,I3,I3,1X,A1,
     1  A3,I4,8X,6X,I3,I4,I4,7F6.2)
      IA=0
      CALL GTDATI(IZIP,IA,MONTH1,ISTA1,ISTA2,W,STATE,CITY,ZIP,AREA,
     1  ELEV,TOPO,POP,DENS,REGION,KODE)
      CALL DATOUT(
     A  NREC,ISOURC,MANUF,MODEL,INERWT,IDISPL,TRANSM,
     1  OVRDRV,NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,POP,
     2  DENS,MONTH1,IPCTY,IAVGML,MPG(1),MPG(2),MPG(3),MPG(4),MPG(5),MPG(
     3  6),MPG(7),W(1),W(2),W(3),W(4),W(5),
     4  ELEV,TOPO,STATE,CITY,REGION)
19997 GO TO 19999
19998 CONTINUE
      CALL EXIT
      END
      SUBROUTINE GTDATI(IZ,IA,IM,JSTA1,JSTA2,W,STATE,CITY,ZIP,AREA,
     1  ELEV,FACTS,POP,DENS,REGION,KODE)
C
C     RETURN METEOROLOGICAL AND TOPOGRAPHICAL DATA FOR ZIP CODE IZ
C     OR AREA CODE IA FOR MONTH IM.
C
C     KODE IS RETURN CODE, WITH ONE OF THE FOLLOWING VALUES -
C
C     0 - ALL DATA RETURNED SUCCESSFULLY
C     1 - NO DATA FOR SPECIFIED ZIP CODE OR AREA CODE (NONE RETURNED)
C     2 - INVALID ZIP CODE AND AREA CODE (NO DATA RETURNED)
C     3 - INVALID MONTH (TOPOGRAPHICAL DATA ONLY RETURNED)
C     4 - NO METEOROLOGICAL DATA AVAILABLE (TOPOGRAPHICAL DATA RETURNED)
C
      IMPLICIT INTEGER*4 (A-Z)
      DIMENSION W(5),STATE(4),CITY(6),FACTS(3)
      COMMON /BIG/ ISTA(999),WEATH(12,5,254),ISTA1(254),ISTA2(254),
     1  STAT(4,999),CIT(6,999),ZI(999),ARE(999),ELE(999),FACT(3,999),
     2  PO(999),DEN(999),IZIP(999),REG(999)
      DATA INIT/1/,BLANK/'    '/
      IF (INIT.EQ.0) GO TO 1000
C     INITIALIZE LISTS
      INIT=0
      NZIP=908
      NMET=254
      DO 100 I=1,999
      IZIP(I)=-1
      ISTA(I)=-1
      ZI(I)=-1
      ARE(I)=-1
      ELE(I)=-1
      REG(I)=-1
      DEN(I)=-1
      PO(I)=-1
10    CONTINUE
      DO 20 J=1,3
      FACT(J,I)=BLANK
20    CONTINUE
      DO 30 J=1,4
      STAT(J,I)=BLANK
30    CONTINUE
      DO 40 J=1,6
```

```
      CIT(J,I)=BLANK
40    CONTINUE
100   CONTINUE
C     READ TOPOGRAPHICAL DATA
      DO 400 I=1,NZIP
      READ(14,703)J,(STAT(K,J),K=1,4),(CIT(K,J),K=1,6),ZI(J),ARE(J),
     1  ELE(J),(FACT(K,J),K=1,3),PO(J),DEN(J),STC,ISTA(J),IZIP(J),REG(J)
703   FORMAT(T41,I3,T1,4A4,6A4,I3,2X,I3,4X,I4,3(2X,A1),2X,I8,2X,I8,
     1  11X,A2,1X,I6,I4,T113,I2)
400   CONTINUE
C     READ METEOROLOGICAL DATA
      DO 500 I=1,NMET
      READ(13,704)(ISTA1(I),ISTA2(I),(WEATH(K,J,I),K=1,12),J=1,5)
704   FORMAT(2X,I6,1X,I5,25X,12I4)
C     CONVERT STATION NUMBERS INTO POINTERS TO MET DATA
      DO 450 J=1,999
      IF (ISTA(J).EQ.ISTA1(I)) ISTA(J)=I
450   CONTINUE
500   CONTINUE
C
1000  CONTINUE
C
      JSTA1=0
      JSTA2=0
      DO 1010 I=1,5
      W(I)=-1
1010  CONTINUE
      DO 1020 I=1,4
      STATE(I)=BLANK
1020  CONTINUE
      DO 1030 I=1,6
      CITY(I)=BLANK
1030  CONTINUE
      ZIP=-1
      AREA=-1
      ELEV=-1
      REGION=-1
      DO 1040 I=1,3
      FACTS(I)=BLANK
1040  CONTINUE
      POP=-1
      DENS=-1
      KODE=-1
      JZ=IZ
      IF (JZ.GT.0 .AND. JZ. LE.999) GO TO 1100
C     NO VALID ZIP-CODE
      IF (IA.GT.0 .AND. IA.LE.999 .AND. IZIP(IA).GT.0) GO TO 1070
C     NO VALID AREA-CODE
      KODE=2
      RETURN
C     GET USING AREA-CODE
1070  CONTINUE
      JZ=IZIP(IA)
C     GET USING ZIP-CODE (JZ)
1100  CONTINUE
C     GET TOPOGRAPHICAL DATA
      DO 1150 I=1,4
```

```
      STATE(I)=STAT(I,JZ)
1150  CONTINUE
      DO 1160 I=1,6
      CITY(I)=CIT(I,JZ)
1160  CONTINUE
      ZIP=ZI(JZ)
      AREA=ARE(JZ)
      ELEV=ELE(JZ)
      REGION=REG(JZ)
      DO 1170 I=1,3
      FACTS(I)=FACT(I,JZ)
1170  CONTINUE
      POP=PO(JZ)
      DENS=DEN(JZ)
      IF (STATE(1).EQ.BLANK) KODE=1
C     GET METEOROLOGICAL DATA
      IF (ISTA(JZ).LE.0 .OR. ISTA(JZ) .GT. NZIP) GO TO 1300
      IS=ISTA(JZ)
      JSTA1=ISTA1(IS)
      JSTA2=ISTA2(IS)
      IF (IM.GT.0 .AND. IM. LE.12) GO TO 1200
C     INVALID MONTH
      DO 1190 I=1,5
      W(I)=-1
1190  CONTINUE
      IF (KODE.LT.0) KODE=3
      RETURN
1200  CONTINUE
      DO 1250 I=1,5
      W(I)=WEATH(IM,I,IS)
1250  CONTINUE
      KODE=0
      RETURN
1300  CONTINUE
C     NO VALID METEOROLOGICAL DATA
      JSTA1=0
      JSTA2=0
      DO 1350 I=1,5
      W(I)=-1
1350  CONTINUE
      IF (KODE.LT.0) KODE=4
      RETURN
      END
      SUBROUTINE DATOUT(
     A  NREC,ISOURC,MANUF,MODEL,INERWT,IDISPL,TRANSM,
     1  OVRDRV,NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,IPOP,
     2  IPDENS,MONTH1,IPCTY,IAVGML,CGUIDE,HGUIDE,CEMISS,HEMISS,
     3  CQUEST,HQUEST,AQUEST,ITMPMX,ITMPMN,ITMPAV,IHUMAM,IHUMPM,
     4  IELEV,TOPO,STATE,CITY,IREG)
C     OUTPUT RECORD
      IMPLICIT INTEGER*4 (I-N)
      DIMENSION MODEL(5),TOPO(3),STATE(4),CITY(6)
      WRITE(12,701)ISOURC,NREC,MANUF,MODEL,INERWT,IDISPL,TRANSM,OVRDRV,
     1  NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,IPOP,IPDENS,
     2  MONTH1,IPCTY,IAVGML,CGUIDE,HGUIDE,CEMISS,HEMISS,CQUEST,
     3  HQUEST,AQUEST,ITMPMX,ITMPMN,ITMPAV,IHUMAM,IHUMPM,IELEV,
     4  TOPO,STATE,CITY,IREG
```

```
701   FORMAT(I2,I6,I4,1X,5A4,I5,I4,1X,A2,A1,I3,1X,A2,I3,I3,1X,A1,
     1 A3,I4,I8,I6,I3,I4,I4,7F6.2,3I4,2I3,I6,3(1X,A1),
     2 1X,4A4,1X,6A4,I3)
      RETURN
      END
```

```
C     PROGRAM FETCH  810219
C
C     MAIN ROUTINE FOR DATA RETRIEVAL SUBROUTINE.
C
C     THIS ROUTINE ASSIGNS THE REQUIRED PRIME FILES TO THE FORTRAN
C     UNIT NUMBERS AND TESTS THE RETRIEVAL ROUTINE.
C
C     THIS ROUTINE IS AN INTERACTIVE VALIDATION ROUTINE
C     IF DATA IS IN THE STANDARDIZED FORMAT USE THE PROGRAM AUGMENT
      IMPLICIT INTEGER*4 (A-Z)
      DIMENSION W(5),STATE(4),CITY(6),FACTS(3)
C     ASSIGN THE TERMINAL TO UNIT 1
      CALL POPEN('MET.FILE',8,1,87,9,KODE1)
C     ASSIGN THE METEOROLOGICAL FILE TO UNIT 13
      CALL POPEN('TOPO.FILE',9,1,114,10,KODE2)
C     ASSIGN THE TOPOGRAPHICAL FILE TO UNIT 14
      IF (KODE1+KODE2.GT.0) STOP 1
C     LOOP
19999 CONTINUE
      PRINT 701
701   FORMAT(/,' ENTER ZIP CODE, AREA CODE, AND MONTH')
      READ(1,*)IZ,IA,IM
C     EXIT IF (IZ.EQ.0.AND.IA.EQ.0)
      IF(IZ.EQ.0.AND.IA.EQ.0) GO TO 19998
      CALL GTDATI(IZ,IA,IM,ISTA1,ISTA2,W,STATE,CITY,ZIP,AREA,
     1 ELEV,FACTS,POP,DENS,REGION,KODE)
      PRINT 702,ISTA1,ISTA2,W,STATE,CITY,ZIP,AREA,ELEV,FACTS,POP,DENS,
     1 REGION,KODE
702   FORMAT(/,'STATION ID''S - ',I6,I6,/,'WEATHER -',5I4,/,
     1 'STATE - ',4A4,'   CITY - ',6A4,/,'ZIP - ',I3,
     2 '   AREA CODE - ',I3,/,'ELEVATION - ',I4,'   TOPO FACTORS - ',
     3 3(A1,1X),'   POPULATION - ',I8,/,'DENSITY -',I8,
     4 '   REGION -',I3,'   RETURN CODE -',I3)
C     END LOOP
19997 GO TO 19999
19998 CONTINUE
C     UNASSIGN UNITS 13 AND 14
      CALL PCLOS(9)
      CALL PCLOS(10)
      CALL EXIT
      END
```

Appendix C

FORMAT OF AUGMENTED DATA FILE

TABLE C.1 STANDARDIZED OUTPUT FORMAT

VARIABLE	FORMAT	COLUMNS	DESCRIPTION
ISOURC	F2.0	1- 2	SOURCE OF THE INPUT DATA (1=GM76,2=HS79, 3=GM75,4=FORD79,5=EF79,6=LA80,7=JD.POWER)
NREC	F6.0	3- 8	THE ABSOLUTE LOCATION OF THE RECORD IN THE SOURCE FILE
MANUF	F4.0	9- 12	MANUFACTURER CODE AS DEFINED BY CERTIFICATION DIVISION
MODEL(5)	5A4	14- 33	MODEL NAME FROM INPUT FILE
INERWT	F5.0	34- 38	INERTIA WEIGHT
IDISPL	F4.0	39- 42	CUBIC INCH DISPLACEMENT
TRANSM	A2	44- 45	TRANSMISSION VALUE
OVRDRV	A1	46- 46	OVERDRIVE VALUE
NCYLDR	F3.0	47- 49	NUMBER OF CYLINDERS
CARB	1X,A2	50- 52	NUMBER OF BARRELS IN CARBURETOR
KLASS	F3.0	53- 55	BODY CLASS
MODLYR	F3.0	56- 58	MODEL YEAR
SALES	1X,A1	59- 60	SALES CLASS (F=49-STATE,C=CALIFORNIA)
CARTRK	A3	61- 63	VEHICLE CLASS (LDV,LDT,LDD,DDT)
IZIP	F4.0	64- 67	FIRST THREE DIGITS OF THE ZIP CODE
IPOP	F8.0	68- 75	POPULATION COUNT FOR IZIP
IPDENS	F6.0	76- 81	POPULATION DENSITY (POP/SQ MI) FOR ZIP
MONTH1	F3.0	82- 84	MONTH OF THE YEAR
IPCTY	F4.0	85- 88	PERCENT CITY DRIVING
IAVGML	F4.0	89- 92	AVERAGE DAILY MILEAGE
CGUIDE	F6.2	93- 98	CITY MPG FROM GUIDE BOOK
HGUIDE	F6.2	99- 104	HIGHWAY MPG FROM GUIDE BOOK
CEMISS	F6.2	105- 110	CITY MPG FROM EMISSIONS TEST
HEMISS	F6.2	111- 116	HIGHWAY MPG FROM EMISSIONS TEST
CQUEST	F6.2	117- 122	CITY MPG FROM QUESTIONNAIRE
HQUEST	F6.2	123- 128	HIGHWAY MPG FROM QUESTIONNAIRE
AQUEST	F6.2	129- 134	COMBINED MPG FROM QUESTIONNAIRE
ITMPMX	F4.0	135- 138	MONTHLY AVERAGE MAXIMUM TEMPERATURE (DEG F)
ITMPMN	F4.0	139- 142	MONTHLY AVERAGE MINIMUM TEMPERATURE (DEG F)
ITMPAV	F4.0	143- 146	MONTHLY AVERAGE TEMPERATURE (DEG F)
IHUMAM	F3.0	147- 149	MONTHLY AVERAGE MORNING HUMIDITY (%RH)
IHUMPM	F3.0	150- 152	MONTHLY AVERAGE AFTERNOON HUMIDITY (%RH)
IELEV	F6.0	153- 158	ELEVATION (FT)
TOPO(3)	3A2	159- 164	SURFACE LANDFORM
STATE(4)	1X,4A4	165- 181	NAME OF THE STATE
CITY(6)	1X,6A4	182- 206	NAME OF THE LOCATION
IREG	F3.0	207- 209	VEHICLE EXPOSURE REGION (1-24)

TABLE C.2 STANDARDIZED INPUT FORMAT FOR DATA BASE AUGMENTATION

VARIABLE	FORMAT	DESCRIPTION
MANUF	I4	MANUFACTURER CODE AS DEFINED BY CERTIFICATION DIVISION
MODEL(5)	5A4	MODEL NAME FROM INPUT FILE
INERWT	I5	INERTIA WEIGHT
IDISPL	I4	CUBIC INCH DISPLACEMENT
TRANSM	A2	TRANSMISSION VALUE
OVRDRV	A1	OVERDRIVE VALUE
NCYLDR	I3	NUMBER OF CYLINDERS
CARB	1X,A2	NUMBER OF BARRELS IN CARBURETOR
KLASS	I3	BODY CLASS
MODLYR	I3	MODEL YEAR
SALES	1X,A1	SALES CLASS
CARTRK	A3	VEHICLE CLASS
IZIP	I4	FIRST THREE DIGITS OF THE ZIP CODE
MONTH1	14X,I3	MONTH OF THE YEAR
IPCTY	I4	PERCENT CITY DRIVING
IAVGML	I4	AVERAGE DAILY MILEAGE
MPG(1)=CGUIDE	F6.2	CITY MPG FROM GUIDE BOOK
MPG(2)=HGUIDE	F6.2	HIGHWAY MPG FROM GUIDE BOOK
MPG(3)=CEMISS	F6.2	CITY MPG FROM EMISSIONS TEST
MPG(4)=HEMISS	F6.2	HIGHWAY MPG FROM EMISSIONS TEST
MPG(5)=CQUEST	F6.2	CITY MPG FROM QUESTIONNAIRE
MPG(6)=HQUEST	F6.2	HIGHWAY MPG FROM QUESTIONNAIRE
MPG(7)=AQUEST	F6.2	COMBINED MPG FROM QUESTIONNAIRE

Appendix D

LISTING OF XFORM PROGRAM

```
C     PROGRAM XFORM  810219
C
C     MAIN ROUTINE FOR DATA TRANSFORMATION SUBROUTINES.
C
C     THIS ROUTINE ASSIGNS THE REQUIRED PRIME FILES TO FORTRAN UNITS
C     NOTE:
C     AND CALLS THE TRANSFORATION ROUTINES FOR THE VARIOUS DATA FILES.
C     THE ROUTINES WERE WRITTEN USING A FORTRAN PREPROCESSOR CALLED
C     IFTRAN. THE IFTRAN STATEMENTS ARE LEFT IN THE CODE AS COMMENTS.
C
      IMPLICIT INTEGER*4 (I-N)
CINCL I.VARS
      COMMON/VARS/NREC,ISOURC,MANUF,MODEL(5),INERWT,IDISPL,TRANSM,
     1  OVRDRV,NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,IPOP,
     2  IPOENS,MONTH1,IPCTY,IAVGML,CGUIDE,HGUIDE,CEMISS,HEMISS,
     3  CQUEST,HQUEST,AQUEST,ITMPMX,ITMPMN,ITMPAV,IHUMAM,IHUMPM,
     4  IELEV,TOPO(3),STATE(4),CITY(6),IREG,PRINT
      LOGICAL PRINT
      PRINT=.FALSE.
      CALL POPEN('OUTPUT.FILE',11,2,209,8,KODE0)
C      OPEN OUTPUT.FILE ON FORTRAN UNIT 6
      CALL POPEN('MET.FILE',8,1,87,9,KODE1)
C      OPEN MET.FILE ON FORTRAN UNIT 5
      CALL POPEN('TOPO.FILE',9,1,114,10,KODE2)
C      OPEN TOPO.FILE ON FORTRAN UNIT 5
      IF (KODE0+KODE1+KODE2.GT.0) STOP 1
C     LOOP
19999 CONTINUE
       WRITE(1, 701)
701   FORMAT(/,' ENTER DATA BASE NUMBER')
      READ(1,*)NB
C     EXIT IF (NB.LE.0)
      IF(NB.LE.0) GO TO 19998
      GO TO (1,2,3,4,5,6,7),NB
1     CONTINUE
      CALL POPEN('GM76.FILE',11,1,106,7,KODE)
C      OPEN GM76.FILE ON FORTRAN UNIT 5
      IF (KODE.NE.0) STOP 2
      CALL XFORM1
      CALL PCLOS(7)
      GO TO 10
2     CONTINUE
      CALL POPEN('FEEF.FILE',9,1,110,7,KODE)
C      OPEN FEEF.FILE ON FORTRAN UNIT 5
      IF (KODE.NE.0) STOP 2
      ISOURC=2
      CALL XFORM2
      CALL PCLOS(7)
      GO TO 10
3     CONTINUE
      CALL POPEN('GM75.FILE',9,1,118,7,KODE)
C      OPEN GM75.FILE ON FORTRAN UNIT 5
      IF (KODE.NE.0) STOP 2
      CALL XFORM3
      CALL PCLOS(7)
      GO TO 10
```

```
4     CONTINUE
      CALL POPEN('FORD.FILE',9,1,62,7,KODE)
C      OPEN FORD.FILE ON FORTRAN UNIT 5
      IF (KODE.NE.0) STOP 2
      CALL XFORM4
      CALL PCLOS(7)
      GO TO 10
5     CONTINUE
      CALL POPEN('FEHS.FILE',9,1,110,7,KODE)
C      OPEN FEHS.FILE ON FORTRAN UNIT 5
      IF (KODE.NE.0) STOP 2
      ISOURC=5
      CALL XFORM5
      CALL PCLOS(7)
      GO TO 10
6     CONTINUE
      CALL POPEN('LA.FILE',7,1,112,7,KODE)
C      OPEN LA.FILE ON FORTRAN UNIT 5
      IF (KODE.NE.0) STOP 2
      CALL XFORM6
      CALL PCLOS(7)
      GO TO 10
7     CONTINUE
      CALL POPEN('RAKULJ>A2322>MULTI>OUTPUT',25,1,80,7,KODE)
C      OPEN RAKULJ>A2322>MULTI>OUTPUT ON FORTRAN UNIT 5
      IF (KODE.NE.0) STOP 2
      CALL XFORM7
      CALL PCLOS(7)
10    CONTINUE
       WRITE(1, 771)NREC,NB
771   FORMAT(//,I6,' RECORDS TRANSFORMED FROM DATA BASE',I2)
C     END LOOP
19997 GO TO 19999
19998 CONTINUE
      CALL PCLOS(8)
      CALL PCLOS(9)
      CALL PCLOS(10)
      CALL EXIT
      END
      SUBROUTINE GTDATI(IZ,IA,IM,JSTA1,JSTA2,W,STATE,CITY,ZIP,AREA,
     1  ELEV,FACTS,POP,DENS,REGION,KODE)
C
C     RETURN METEOROLOGICAL AND TOPOLOGICAL DATA FOR ZIP CODE IZ
C     OR AREA CODE IA FOR MONTH IM.
C
C     KODE IS RETURN CODE, WITH ONE OF THE FOLLOWING VALUES -
C
C     0 - ALL DATA RETURNED SUCCESSFULLY
C     1 - NO DATA FOR SPECIFIED ZIP CODE OR AREA CODE (NONE RETURNED)
C     2 - INVALID ZIP CODE AND AREA CODE (NO DATA RETURNED)
C     3 - INVALID MONTH (TOPOLOGICAL DATA ONLY RETURNED)
C     4 - NO METEOROLOGICAL DATA AVAILABLE (TOPOLOGICAL DATA RETURNED)
C
      IMPLICIT INTEGER*4 (A-Z)
      DIMENSION W(5),STATE(4),CITY(6),FACTS(3)
      COMMON /BIG/ ISTA(999),WEATH(12,5,254),ISTA1(254),ISTA2(254),
     1  STAT(4,999),CIT(6,999),ZI(999),ARE(999),ELE(999),FACT(3,999),
```

```
-
     2  PO(999),DEN(999),IZIP(999),REG(999)
      DATA INIT/1/,BLANK/'    '/
      IF (INIT.EQ.0) GO TO 1000
C     INITIALIZE LISTS
      INIT=0
      NZIP=908
      NMET=254
      DO 100 I=1,999
      IZIP(I)=-1
      ISTA(I)=-1
      ZI(I)=-1
      ARE(I)=-1
      ELE(I)=-1
      REG(I)=-1
      DEN(I)=-1
      PO(I)=-1
10    CONTINUE
      DO 20 J=1,3
      FACT(J,I)=BLANK
20    CONTINUE
      DO 30 J=1,4
      STAT(J,I)=BLANK
30    CONTINUE
      DO 40 J=1,6
      CIT(J,I)=BLANK
40    CONTINUE
100   CONTINUE
C     READ TOPOLOGICAL DATA
      DO 400 I=1,NZIP
      READ(14,703)J,(STAT(K,J),K=1,4),(CIT(K,J),K=1,6),ZI(J),ARE(J),
     1  ELE(J),(FACT(K,J),K=1,3),PO(J),DEN(J),STC,ISTA(J),IZIP(J),REG(J)
703   FORMAT(T41,I3,T1,4A4,6A4,I3,2X,I3,4X,I4,3(2X,A1),2X,I8,2X,I8,
     1  11X,A2,1X,I6,I4,T113,I2)
400   CONTINUE
C     READ METEOROLOGICAL DATA
      DO 500 I=1,NMET
      READ(13,704)(ISTA1(I),ISTA2(I),(WEATH(K,J,I),K=1,12),J=1,5)
704   FORMAT(2X,I6,1X,I5,25X,12I4)
C     CONVERT STATION NUMBERS INTO POINTERS TO MET DATA
      DO 450 J=1,999
      IF (ISTA(J).EQ.ISTA1(I)) ISTA(J)=I
450   CONTINUE
500   CONTINUE
C
1000  CONTINUE
C
      JSTA1=0
      JSTA2=0
      DO 1010 I=1,5
      W(I)=-1
1010  CONTINUE
      DO 1020 I=1,4
      STATE(I)=BLANK
1020  CONTINUE
      DO 1030 I=1,6
      CITY(I)=BLANK
1030  CONTINUE
```

```
      ZIP=-1
      AREA=-1
      ELEV=-1
      REGION=-1
      DO 1040 I=1,3
      FACTS(I)=BLANK
1040  CONTINUE
      POP=-1
      DENS=-1
      KODE=-1
      JZ=IZ
      IF (JZ.GT.0 .AND. JZ. LE.999) GO TO 1100
C     NO VALID ZIP-CODE
      IF (IA.GT.0 .AND. IA.LE.999 .AND. IZIP(IA).GT.0) GO TO 1070
C     NO VALID AREA-CODE
      KODE=2
      RETURN
C     GET USING AREA-CODE
1070  CONTINUE
      JZ=IZIP(IA)
C     GET USING ZIP-CODE (JZ)
1100  CONTINUE
C     GET TOPOLOGICAL DATA
      DO 1150 I=1,4
      STATE(I)=STAT(I,JZ)
1150  CONTINUE
      DO 1160 I=1,6
      CITY(I)=CIT(I,JZ)
1160  CONTINUE
      ZIP=ZI(JZ)
      AREA=ARE(JZ)
      ELEV=ELE(JZ)
      REGION=REG(JZ)
      DO 1170 I=1,3
      FACTS(I)=FACT(I,JZ)
1170  CONTINUE
      POP=PO(JZ)
      DENS=DEN(JZ)
      IF (STATE(1).EQ.BLANK) KODE=1
C     GET METEOROLOGICAL DATA
      IF (ISTA(JZ).LE.0 .OR. ISTA(JZ) .GT. NZIP) GO TO 1300
      IS=ISTA(JZ)
      JSTA1=ISTA1(IS)
      JSTA2=ISTA2(IS)
      IF (IM.GT.0 .AND. IM. LE.12) GO TO 1200
C     INVALID MONTH
      DO 1190 I=1,5
      W(I)=-1
1190  CONTINUE
      IF (KODE.LT.0) KODE=3
      RETURN
1200  CONTINUE
      DO 1250 I=1,5
      W(I)=WEATH(IM,I,IS)
1250  CONTINUE
      KODE=0
      RETURN
```

```
1300  CONTINUE
C     NO VALID METEOROLOGICAL DATA
      JSTA1=0
      JSTA2=0
      DO 1350 I=1,5
      W(I)=-1
1350  CONTINUE
      IF (KODE.LT.0) KODE=4
      RETURN
      END
      SUBROUTINE DATOUT
C     OUTPUT RECORD
      IMPLICIT INTEGER*4 (I-N)
CINCL I.VARS
      COMMON/VARS/NREC,ISOURC,MANUF,MODEL(5),INERWT,IDISPL,TRANSM,
     1 OVRDRV,NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,IPOP,
     2 IPDENS,MONTH1,IPCTY,IAVGML,CGUIDE,HGUIDE,CEMISS,HEMISS,
     3 CQUEST,HQUEST,AQUEST,ITMPMX,ITMPMN,ITMPAV,IHUMAM,IHUMPM,
     4 IELEV,TOPO(3),STATE(4),CITY(6),IREG,PRINT
      LOGICAL PRINT
      WRITE(12,701)ISOURC,NREC,MANUF,MODEL,INERWT,IDISPL,TRANSM,OVRDRV,
     1 NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,IPOP,IPDENS,
     2 MONTH1,IPCTY,IAVGML,CGUIDE,HGUIDE,CEMISS,HEMISS,CQUEST,
     3 HQUEST,AQUEST,ITMPMX,ITMPMN,ITMPAV,IHUMAM,IHUMPM,IELEV,
     4 TOPO,STATE,CITY,IREG
701   FORMAT(I2,I6,I4,1X,5A4,I5,I4,1X,A2,A1,I3,1X,A2,I3,I3,1X,A1,
     1 'LD',A1,I4,I8,I6,I3,I4,I4,7F6.2,3I4,2I3,I6,3(1X,A1),
     2 1X,4A4,1X,6A4,I3)
      IF(PRINT)
     9WRITE(1, 777)ISOURC,NREC,MANUF,MODEL,INERWT,IDISPL,TRANSM,OVRDRV,
     1 NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,IPOP,IPDENS,
     2 MONTH1,IPCTY,IAVGML,CGUIDE,HGUIDE,CEMISS,HEMISS,CQUEST,
     3 HQUEST,AQUEST,ITMPMX,ITMPMN,ITMPAV,IHUMAM,IHUMPM,IELEV,
     4 IREG,TOPO,STATE,CITY
777   FORMAT(/,'SOURCE =',I2,'  SEQ =',I6,'  MANUF =',I3,'  MODEL = ',
     1 5A4,'  WEIGHT =',I5,'  CID =',I4,/,'TRANS = ',A2,
     2 '  OVRDRV = ',A1,'  NCYL =',I3,'  CARB = ',A2,'  CLASS =',I3,
     3 '  YEAR =',I3,'  SALES = ',A1,/,'CAR/TRK = ',A1,
     4 '  ZIP =',I4,'  POP =',I8,'  DENS =',I6,'  M1 =',I3,
     5 '  PCTY =',I4,/,'AVGMPD =',I4,
     6 '  CGUIDE =',F6.2,'  HGUIDE =',F6.2,'  CEMISS =',F6.2,
     7 '  HEMISS =',F6.2,/,'CQUEST =',F6.2,
     8 '  HQUEST =',F6.2,'  AQUEST =',F6.2,'  TMAX =',I4,
     9 '  TMIN =',I4,/,'TAVG =',I4,'  HUMAM =',I3,
     A '  HUMPM =',I3,'  ELEV =',I5,'  REG =',I3,'   TOPO = ',3(A1,1X),
     B /,'STATE = ',4A4,'  CITY = ',6A4)
      RETURN
      END
      SUBROUTINE POPEN(NAME,NC,MODE,NB,NFU,KODE)
C
C     OPEN FILE NAMED 'NAME' (NC CHARACTERS) FOR READING (MODE = 1),
C     WRITING (MODE=2), OR READING/WRITING (MODE = 3), WITH RECORD
C     LENGTH NB  BYTES, ON PRIMOS UNIT NUMBER NFU, RETURNING
C     KODE - 0 IF SUCCESSFUL, = 1 IF NOT.
C
C     PRIMOS UNIT=FORTRAN UNIT -4
      IMPLICIT INTEGER*4 (I-N)
```

```
      INTEGER*2 MFU,NCS,NBS,NFUS
      LOGICAL FLAG
      DIMENSION NAME(1)
CINSERT SYSCOM>A$KEYS,
      NCS=INTS(NC)
      NBS=INTS(NB)
      NFUS=INTS(NFU)+4
      KODE=0
      MFU=NFU
      FLAG=UNIT$A(MFU)
C     IF (.NOT.FLAG)
      IF(.NOT.FLAG) GO TO 19997
19996 GO TO 19998
19997 CONTINUE
      NCL=NCS
      NW=(NC+3)/4
C     IF (MODE.EQ.1)
      IF(MODE.EQ.1) GO TO 19993
19992 GO TO 19994
19993 CONTINUE
      FLAG=OPEN$A(A$READ+A$SAMF,NAME,NCS,MFU)
C     OR IF (MODE.EQ.2)
19991 GO TO 19995
19994 CONTINUE
      IF(MODE.EQ.2) GO TO 19989
19988 GO TO 19990
19989 CONTINUE
      FLAG=OPEN$A(A$WRIT+A$SAMF,NAME,NCS,MFU)
      CALL TRNC$A(MFU)
C     ELSE
19987 GO TO 19995
19990 CONTINUE
      FLAG=OPEN$A(A$RDWR+A$SAMF,NAME,NCS,MFU)
C     END IF
19995 CONTINUE
C     IF (FLAG)
      IF(FLAG) GO TO 19984
19983 GO TO 19985
19984 CONTINUE
      CALL ATTDEV(NFUS,INTS(7),MFU,NBS)
C     ELSE
19982 GO TO 19986
19985 CONTINUE
      KODE=1
C     END IF
19986 CONTINUE
C     END IF
19998 CONTINUE
19999 CONTINUE
      RETURN
      END
      SUBROUTINE PCLOS(NFU)
C     CLOSE FILE WITH PRIMOS UNIT NUMBER OF NFU
C
C     PRIMOS UNIT=FORTRAN UNIT -4
      IMPLICIT INTEGER*4 (I-N)
      INTEGER*2 MFU
```

```
      LOGICAL OPN
CINSERT SYSCOM>A$KEYS,
      MFU = NFU
      OPN = UNIT$A( MFU )
      IF( OPN ) CALL CLOS$A( MFU )
      RETURN
      END
      SUBROUTINE XFORM1
C     TRANSFORM GM7678 FILE
      IMPLICIT INTEGER*4 (I-N)
      DIMENSION CODE(100),MODL(5,100),IW(5)
CINCL I.VARS
      COMMON/VARS/NREC,ISOURC,MANUF,MODEL(5),INERWT,IDISPL,TRANSM,
     1  OVRDRV,NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,IPOP,
     2  IPDENS,MONTH1,IPCTY,IAVGML,CGUIDE,HGUIDE,CEMISS,HEMISS,
     3  CQUEST,HQUEST,AQUEST,ITMPMX,ITMPMN,ITMPAV,IHUMAM,IHUMPM,
     4  IELEV,TOPO(3),STATE(4),CITY(6),IREG,PRINT
      LOGICAL PRINT
      NREC=0
      ISOURC=1
      MANUF=40
      INERWT=-1
      OVRDRV='1'
      NCYLDR=-1
      IPCTY=-1
      CGUIDE=-1.
      HGUIDE=-1.
      CEMISS=-1.
      HEMISS=-1.
      CQUEST=-1.
      HQUEST=-1.
      CARTRK='D'
      KLASS=-1
      CALL POPEN('MODEL.FILE',10,1,23,11,KODE)
C      OPEN MODEL.FILE ON FORTRAN UNIT 5
      IF (KODE.NE.0) STOP 3
      I=0
C     LOOP
19999 CONTINUE
      I=I+1
      READ(15,700,END=1)CODE(I),(MODL(J,I),J=1,5)
700   FORMAT(A2,1X,5A4)
C     END LOOP
19997 GO TO 19999
19998 CONTINUE
1     CONTINUE
      NMODEL=I-1
      IF(PRINT)
     9 WRITE(1, 772)NMODEL
772   FORMAT(/,I3,' MODELS IN FILE')
      CALL PCLOS(11)
      IF(PRINT)
     9 WRITE(1, 703)
703   FORMAT(/,' NREC CD Y CID C TR AVGFE TOTM 1ST FILL LST FILL ZIP',/)
C     LOOP
19996 CONTINUE
      READ(11,701,END=10)DIV,IY,IDISPL,CARB,TRANSM,AQUEST,TOTM,MONTH1,
```

```
     1  ID1,IY1,M2,ID2,IY2,IZIP
701   FORMAT(A2,3X,I1,5X,I3,1X,A1,A2,4X,F5.2,8X,I5,19X,6I2,23X,I3)
      NREC=NREC+1
C     FOR (I=1 TO NMODEL WHILE DIV.NE.CODE(I))
      I=1
19991 GO TO 19992
19994 CONTINUE
      I=I+1
19992 CONTINUE
      IF(I.GT.(NMODEL)) GO TO 19993
      IF(DIV.NE.CODE(I)) GO TO 19990
19989 GO TO 19993
19990 CONTINUE
C     END FOR
19988 GO TO 19994
19993 CONTINUE
C     IF (I.GT.NMODEL)
      IF(I.GT.NMODEL) GO TO 19985
19984 GO TO 19986
19985 CONTINUE
      CALL XMITR(-INTS(5),'    ',MODEL)
C     ELSE
19983 GO TO 19987
19986 CONTINUE
      CALL XMITR(INTS(5),MODL(1,I),MODEL)
C     END IF
19987 CONTINUE
      MODLYR=70+IY
      CALL GTDATI(IZIP,0,MONTH1,JSTA1,JSTA2,IW,STATE,CITY,ZIP,AREA,
     1  IELEV,TOPO,IPOP,IPDENS,IREG,KODE)
      ITMPMX=IW(1)
      ITMPMN=IW(2)
      ITMPAV=IW(3)
      IHUMAM=IW(4)
      IHUMPM=IW(5)
      IAVGML=-1
C     IF (MONTH1.GT.0 .AND. ID1.GT.0 .AND. IY1.GT.0 .AND. M2.GT.0 .AND.
C    1    ID2.GT.0 .AND. IY2.GT.0)
      IF(
     *MONTH1.GT.0 .AND. ID1.GT.0 .AND. IY1.GT.0 .AND. M2.GT.0 .AND. ID2.
     *GT.0 .AND. IY2.GT.0
     *) GO TO 19980
19979 GO TO 19981
19980 CONTINUE
      N1=JULAN4(MONTH1,ID1,1900+IY1)
      N2=JULAN4(M2,ID2,1900+IY2)
      IF (N2.GT.N1) IAVGML=IFIX(TOTM/(N2-N1))
      IF (IAVGML.GT.999) IAVGML=-1
C     END IF
19981 CONTINUE
19982 CONTINUE
C     IF (STATE(1).EQ.'CALI')
      IF(STATE(1).EQ.'CALI') GO TO 19976
19975 GO TO 19977
19976 CONTINUE
      SALES='C'
C     ELSE
```

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19974 GO TO 19978
19977 CONTINUE
      SALES='F'
C     END IF
19978 CONTINUE
C     IF (MOD(NREC,100).EQ.0)
      IF(MOD(NREC,100).EQ.0) GO TO 19971
19970 GO TO 19972
19971 CONTINUE
      IF(PRINT)
     9 WRITE(1, 702)NREC,DIV,IY,IDISPL,CARB,TRANSM,AQUEST,TOTM,MONTH1,
     1  ID1,IY1,M2,ID2,IY2,IZIP
702   FORMAT(/,I5,1X,A2,I2,I4,1X,A1,1X,A2,F6.2,I5,6I3,I4)
C     END IF
19972 CONTINUE
19973 CONTINUE
      CALL DATOUT
C     END LOOP
19969 GO TO 19996
19995 CONTINUE
10    CONTINUE
      RETURN
      END
      SUBROUTINE XFORM2
C     THIS IS THE SAME AS XFORM5
      CALL XFORM5
      RETURN
      END
      SUBROUTINE XFORM3
C     TRANSFORM GM75 FILE
      IMPLICIT INTEGER*4 (I-N)
      DIMENSION IW(5),IX(2,15),XX(9)
CINCL I.VARS
      COMMON/VARS/NREC,ISOURC,MANUF,MODEL(5),INERWT,IDISPL,TRANSM,
     1  OVRDRV,NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,IPOP,
     2  IPDENS,MONTH1,IPCTY,IAVGML,CGUIDE,HGUIDE,CEMISS,HEMISS,
     3  CQUEST,HQUEST,AQUEST,ITMPMX,ITMPMN,ITMPAV,IHUMAM,IHUMPM,
     4  IELEV,TOPO(3),STATE(4),CITY(6),IREG,PRINT
      LOGICAL PRINT
      DATA IX/-1,'  ', 140,'1 ', 140,'2 ', -1,'  ', 231,'2 ', 250,'1 ',
     1       260,'2 ', 262,'2 ', 350,'2 ', 350,'4 ', 400,'2 ',
     2       400,'4 ', 454,'4 ', 455,'4 ', 500,'5 '/
      DATA XX/'A2','A3','M3','M4','A ','M ','M5','  ','  '/
      NREC=0
      ISOURC=3
      MANUF=40
      MODLYR=75
      CALL XMITR(-INTS(5),'     ',MODEL)
      INERWT=-1
      OVRDRV='1'
      NCYLDR=-1
      IPCTY=-1
      CGUIDE=-1.
      HGUIDE=-1.
      CEMISS=-1.
      HEMISS=-1.
      CQUEST=-1.
```

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      HQUEST=-1.
      CARTRK='D'
      KLASS=-1
      IF(PRINT)
     9 WRITE(1, 703)
703   FORMAT(/,'DV 1ST FILL LST FILL  MIL1  MIL2   FE ENG X ZIP',/)
C     LOOP
19999 CONTINUE
      READ(11,701,END=10)DIV,MONTH1,ID1,IY1,M2,ID2,IY2,MIL1,MIL2,
     1  AQUEST,IENG,IXM,IZIP
701   FORMAT(A2,6X,6I2,2I5,1X,F5.2,24X,I2,7X,I1,37X,I3)
      NREC=NREC+1
C     IF (IENG.GT.0 .AND. IENG.LE.15)
      IF(IENG.GT.0 .AND. IENG.LE.15) GO TO 19995
19994 GO TO 19996
19995 CONTINUE
      IDISPL=IX(1,IENG)
      CARB=IX(2,IENG)
C     ELSE
19993 GO TO 19997
19996 CONTINUE
      IDISPL=-1
      CARB='  '
C     END IF
19997 CONTINUE
C     IF (IXM.GT.0 .AND. IXM.LE.9)
      IF(IXM.GT.0 .AND. IXM.LE.9) GO TO 19990
19989 GO TO 19991
19990 CONTINUE
      TRANSM=XX(IXM)
C     ELSE
19988 GO TO 19992
19991 CONTINUE
      TRANSM='  '
C     END IF
19992 CONTINUE
      CALL GTDATI(IZIP,0,MONTH1,JSTA1,JSTA2,IW,STATE,CITY,ZIP,AREA,
     1  IELEV,TOPO,IPOP,IPDENS,IREG,KODE)
      ITMPMX=IW(1)
      ITMPMN=IW(2)
      ITMPAV=IW(3)
      IHUMAM=IW(4)
      IHUMPM=IW(5)
      IAVGML=-1
C     IF (MONTH1.NE.99 .AND. ID1.NE.99 .AND. IY1.NE.99 .AND. M2.NE.99
C    1    .AND. ID2.NE.99 .AND. IY2.NE.99 .AND.
C    2    MONTH1.NE.0 .AND. ID1.NE.0 .AND. IY1.NE.0 .AND. M2.NE.0
C    3    .AND. ID2.NE.0 .AND. IY2.NE.0 .AND. MIL1.NE.0 .AND.
C    4     MIL1.NE.99999 .AND. MIL2.NE.0 .AND. MIL2.NE.99999)
      IF(
     *MONTH1.NE.99 .AND. ID1.NE.99 .AND. IY1.NE.99 .AND. M2.NE.99 .AND.
     *ID2.NE.99 .AND. IY2.NE.99 .AND. MONTH1.NE.0 .AND. ID1.NE.0 .AND. I
     *Y1.NE.0 .AND. M2.NE.0 .AND. ID2.NE.0 .AND. IY2.NE.0 .AND. MIL1.NE.
     *0 .AND. MIL1.NE.99999 .AND. MIL2.NE.0 .AND. MIL2.NE.99999
     *) GO TO 19985
19984 GO TO 19986
19985 CONTINUE
```

```
      N1=JULAN4(MONTH1,ID1,1900+IY1)
      N2=JULAN4(M2,ID2,1900+IY2)
      TOTM=MIL2-MIL1
      IF (N2.GT.N1) IAVGML=IFIX(TOTM/(N2-N1))
      IF (IAVGML.GT.999) IAVGML=-1
C     END IF
19986 CONTINUE
19987 CONTINUE
C     IF (STATE(1).EQ.'CALI')
      IF(STATE(1).EQ.'CALI') GO TO 19981
19980 GO TO 19982
19981 CONTINUE
      SALES='C'
C     ELSE
19979 GO TO 19983
19982 CONTINUE
      SALES='F'
C     END IF
19983 CONTINUE
C     IF (MOD(NREC,100).EQ.0)
      IF(MOD(NREC,100).EQ.0) GO TO 19976
19975 GO TO 19977
19976 CONTINUE
      IF(PRINT)
     9 WRITE(1, 702)DIV,MONTH1,ID1,IY1,M2,ID2,IY2,MIL1,MIL2,
     1  AQUEST,IENG,IXM,IZIP,IAVGML
702   FORMAT(/,A2,6I3,2I6,1X,F5.2,I3,I2,I4,I4)
C     END IF
19977 CONTINUE
19978 CONTINUE
      CALL DATOUT
C     END LOOP
19974 GO TO 19999
19998 CONTINUE
10    CONTINUE
      RETURN
      END
      SUBROUTINE XFORM4
C     TRANSFORM FORD FILE
      IMPLICIT INTEGER*4 (I-N)
      DIMENSION IW(5),CODE(2,6)
CINCL I.VARS
      COMMON/VARS/NREC,ISOURC,MANUF,MODEL(5),INERWT,IDISPL,TRANSM,
     1  OVRDRV,NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,IPOP,
     2  IPDENS,MONTH1,IPCTY,IAVGML,CGUIDE,HGUIDE,CEMISS,HEMISS,
     3  CQUEST,HQUEST,AQUEST,ITMPMX,ITMPMN,ITMPAV,IHUMAM,IHUMPM,
     4  IELEV,TOPO(3),STATE(4),CITY(6),IREG,PRINT
      LOGICAL PRINT
      DATA CODE/'AUTO','A ', 'AOD ','A ', 'M3  ','M3', 'M4  ','M4',
     1          'M5  ','M5', 'MAN ','M '/
      NREC=0
      ISOURC=4
      MANUF=30
      MODLYR=79
      CALL XMITR(-INTS(5),'     ',MODEL)
      INERWT=-1
      NCYLDR=-1
```

```
      CARB='  '
      CGUIDE=-1.
      HGUIDE=-1.
      CEMISS=-1.
      HEMISS=-1.
      CQUEST=-1.
      HQUEST=-1.
      CARTRK='D'
      KLASS=-1
      IF(PRINT)
     9 WRITE(1, 703)
703   FORMAT(/,'MODEL    CAP XMIS AVGFE  % MILES   MO NDY AREA',/)
C     LOOP
19999 CONTINUE
      READ(11,701,ERR=9,END=10)MODEL(1),MODEL(2),ENG,XMIS,AQUEST,IPCTY,
     1 XMILES,MONTH1,NDAYS,IAREA,OVD
701   FORMAT(5X,2A4,F3.1,2X,A4,F5.1,I3,7X,F6.1,1X,I2,4X,I3,1X,I3,T21,A1)
      NREC=NREC+1
      IDISPL=61.04*ENG
C     FOR (I = 1 TO 6 WHILE XMIS.NE.CODE(1,I))
      I = 1
19994 GO TO 19995
19997 CONTINUE
      I =I +1
19995 CONTINUE
      IF(I .GT.(6)) GO TO 19996
      IF(XMIS.NE.CODE(1,I)) GO TO 19993
19992 GO TO 19996
19993 CONTINUE
C     END FOR
19991 GO TO 19997
19996 CONTINUE
C     IF (I.GT.6)
      IF(I.GT.6) GO TO 19988
19987 GO TO 19989
19988 CONTINUE
      IF(PRINT)
     9 WRITE(1, 771)NREC,XMIS
771   FORMAT(/' RECORD',I6,'  UNKNOWN TRANSMISSION CODE - ',A4)
      TRANSM='  '
C     ELSE
19986 GO TO 19990
19989 CONTINUE
      TRANSM=CODE(2,I)
C     END IF
19990 CONTINUE
C     IF (OVD.EQ.'D')
      IF(OVD.EQ.'D') GO TO 19983
19982 GO TO 19984
19983 CONTINUE
      IF(PRINT)
     9 WRITE(1, 772)NREC
772   FORMAT(/' RECORD',I6,'  OVERDRIVE.')
      OVRDRV='2'
C     ELSE
19981 GO TO 19985
19984 CONTINUE
```

```
      OVRDRV='1'
C     END IF
19985 CONTINUE
      CALL GTDATI(0,IAREA,MONTH1,JSTA1,JSTA2,IW,STATE,CITY,IZIP,AREA,
     1  IELEV,TOPO,IPOP,IPDENS,IREG,KODE)
      ITMPMX=IW(1)
      ITMPMN=IW(2)
      ITMPAV=IW(3)
      IHUMAM=IW(4)
      IHUMPM=IW(5)
      IAVGML=-1
C     IF (NDAYS.GT.0)
      IF(NDAYS.GT.0) GO TO 19978
19977 GO TO 19979
19978 CONTINUE
      IAVGML=XMILES/NDAYS
      IF (IAVGML.GT.999) IAVGML=-1
C     END IF
19979 CONTINUE
19980 CONTINUE
C     IF (STATE(1).EQ.'CALI')
      IF(STATE(1).EQ.'CALI') GO TO 19974
19973 GO TO 19975
19974 CONTINUE
      SALES='C'
C     ELSE
19972 GO TO 19976
19975 CONTINUE
      SALES='F'
C     END IF
19976 CONTINUE
C     IF (MOD(NREC,100).EQ.0)
      IF(MOD(NREC,100).EQ.0) GO TO 19969
19968 GO TO 19970
19969 CONTINUE
      IF(PRINT)
     9 WRITE(1, 702)MODEL(1),MODEL(2),ENG,XMIS,AQUEST,IPCTY,XMILES,
     1  MONTH1,NDAYS,IAREA,OVD,IAVGML
702   FORMAT(/,2A4,F4.1,1X,A4,F6.1,I3,F7.1,1X,I2,1X,I3,1X,I3,1X,A1,I4)
C     END IF
19970 CONTINUE
19971 CONTINUE
      CALL DATOUT
C     END LOOP
19967 GO TO 19999
19998 CONTINUE
10    CONTINUE
      RETURN
9     CONTINUE
      IF(PRINT)
     9 WRITE(1, 702)MODEL(1),MODEL(2),ENG,XMIS,AQUEST,IPCTY,XMILES,
     1  MONTH1,NDAYS,IAREA,OVD,IAVGML
      RETURN
      END
      SUBROUTINE XFORM5
C     NOTE THAT ZIP CODE VALUES WERE INSERTED INTO THESE FILES USING THE
C     EDIT COMMAND
```

```
C     TRANSFORM EFHS FILE
      IMPLICIT INTEGER*4 (I-N)
      DIMENSION IW(5),TCODE(2,4),KCODE(2,4),MCODE(2,21),ICODE(2,6)
CINCL I.VARS
      COMMON/VARS/NREC,ISOURC,MANUF,MODEL(5),INERWT,IDISPL,TRANSM,
     1  OVRDRV,NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,IPOP,
     2  IPDENS,MONTH1,IPCTY,IAVGML,CGUIDE,HGUIDE,CEMISS,HEMISS,
     3  CQUEST,HQUEST,AQUEST,ITMPMX,ITMPMN,ITMPAV,IHUMAM,IHUMPM,
     4  IELEV,TOPO(3),STATE(4),CITY(6),IREG,PRINT
      LOGICAL PRINT
      DATA TCODE/'AUTO','A ', 'MAN4','M4', 'MAN5','M5', 'MAN3','M3'/
      DATA KCODE/' MID',5, 'COMP',4, 'LARG',6, 'SUBC',3/
      DATA MCODE/'  VW',590,' AMC',10, 'AUDI',640, 'BUIC',40, 'CADI',40,
     1           'CHEV',40, 'CHRY',20, 'DATS',380, 'DODG',20,
     2           'FIAT',230, 'FORD',30, 'HOND',260, 'LINC',30,
     3           'MAZD',560, 'MERC',30, 'OLDS',40, 'PLYM',20,
     4           'PONT',40, 'RENA',430, 'TOYO',570, 'VOLV',600/
      DATA ICODE/'   0',-1, '  EQ',50, 'ACTY',100, 'MCTY',75,
     1           'AHWY',0, 'MHWY',25/
      NREC=0
      CALL XMITR(-INTS(5),'    ',MODEL)
      CARTRK='D'
      OVRDRV='1'
      IAVGML=-1
C     LOOP
19999 CONTINUE
      READ(11,701,END=10,ERR=9)MAKE,MODLYR,IDISPL,CARB,NCYLDR,XMIS,
     1  INERWT,MSIZE,CQUEST,HQUEST,AQUEST,IZIP,CEMISS,HEMISS,CGUIDE,
     2  HGUIDE,IPCT,MONTH1
701   FORMAT(15X,A4,3X,I2,4X,I3,4X,A1,5X,I1,9X,A4,8X,I4,20X,A4,3F6.0,/,
     1  1X,I3,4X,F5.2,4X,F5.2,17X,F2.0,4X,F2.0,25X,A4,3X,I2)
      NREC=NREC+1
      IF (CGUIDE.EQ.0) CGUIDE=-1.
      IF (HGUIDE.EQ.0) HGUIDE=-1.
      IF (CEMISS.EQ.0) CEMISS=-1.
      IF (HEMISS.EQ.0) HEMISS=-1.
      IF (CQUEST.EQ.0) CQUEST=-1.
      IF (HQUEST.EQ.0) HQUEST=-1.
      IF (AQUEST.EQ.0) AQUEST=-1.
C     FOR (I = 1 TO 4 WHILE XMIS.NE.TCODE(1,I))
      I = 1
19994 GO TO 19995
19997 CONTINUE
      I =I +1
19995 CONTINUE
      IF(I .GT.(4)) GO TO 19996
      IF(XMIS.NE.TCODE(1,I)) GO TO 19993
19992 GO TO 19996
19993 CONTINUE
C     END FOR
19991 GO TO 19997
19996 CONTINUE
C     IF (I.GT.4)
      IF(I.GT.4) GO TO 19988
19987 GO TO 19989
19988 CONTINUE
      IF(PRINT)
```

```
     9 WRITE(1, 771)NREC,XMIS
771   FORMAT(/' RECORD',I6,'   UNKNOWN TRANSMISSION CODE - ',A4)
      TRANSM=' '
C     ELSE
19986 GO TO 19990
19989 CONTINUE
      TRANSM=TCODE(2,I)
C     END IF
19990 CONTINUE
C     FOR (I = 1 TO 4 WHILE MSIZE.NE.KCODE(1,I))
      I = 1
19982 GO TO 19983
19985 CONTINUE
      I =I +1
19983 CONTINUE
      IF(I .GT.(4)) GO TO 19984
      IF(MSIZE.NE.KCODE(1,I)) GO TO 19981
19980 GO TO 19984
19981 CONTINUE
C     END FOR
19979 GO TO 19985
19984 CONTINUE
C     IF (I.GT.4)
      IF(I.GT.4) GO TO 19976
19975 GO TO 19977
19976 CONTINUE
      IF(PRINT)
     9 WRITE(1, 772)NREC,MSIZE
772   FORMAT(/' RECORD',I6,'   UNKNOWN CLASS CODE - ',A4)
      KLASS=-1
C     ELSE
19974 GO TO 19978
19977 CONTINUE
      KLASS=KCODE(2,I)
C     END IF
19978 CONTINUE
C     FOR (I = 1 TO 21 WHILE MAKE.NE.MCODE(1,I))
      I = 1
19970 GO TO 19971
19973 CONTINUE
      I =I +1
19971 CONTINUE
      IF(I .GT.(21)) GO TO 19972
      IF(MAKE.NE.MCODE(1,I)) GO TO 19969
19968 GO TO 19972
19969 CONTINUE
C     END FOR
19967 GO TO 19973
19972 CONTINUE
C     IF (I.GT.21)
      IF(I.GT.21) GO TO 19964
19963 GO TO 19965
19964 CONTINUE
      IF(PRINT)
     9 WRITE(1, 773)NREC,MAKE
773   FORMAT(/' RECORD',I6,'   UNKNOWN MAKE CODE - ',A4)
      MANUF=-1
```

```
C      ELSE
19962 GO TO 19966
19965 CONTINUE
      MANUF=MCODE(2,I)
C      END IF
19966 CONTINUE
C      FOR (I = 1 TO 6 WHILE IPCT.NE.ICODE(1,I))
      I = 1
19958 GO TO 19959
19961 CONTINUE
      I =I +1
19959 CONTINUE
      IF(I .GT.(6)) GO TO 19960
      IF(IPCT.NE.ICODE(1,I)) GO TO 19957
19956 GO TO 19960
19957 CONTINUE
C      END FOR
19955 GO TO 19961
19960 CONTINUE
C      IF (I.GT.6)
      IF(I.GT.6) GO TO 19952
19951 GO TO 19953
19952 CONTINUE
      IF(PRINT)
     9 WRITE(1, 774)NREC,IPCT
774   FORMAT(/' RECORD',I6,'   UNKNOWN USAGE CODE - ',A4)
      IPCTY=-1
C      ELSE
19950 GO TO 19954
19953 CONTINUE
      IPCTY=ICODE(2,I)
C      END IF
19954 CONTINUE
      CALL GTDATI(IZIP,0,MONTH1,JSTA1,JSTA2,IW,STATE,CITY,ZIP,AREA,
     1  IELEV,TOPO,IPOP,IPDENS,IREG,KODE)
      ITMPMX=IW(1)
      ITMPMN=IW(2)
      ITMPAV=IW(3)
      IHUMAM=IW(4)
      IHUMPM=IW(5)
C      IF (STATE(1).EQ.'CALI')
      IF(STATE(1).EQ.'CALI') GO TO 19947
19946 GO TO 19948
19947 CONTINUE
      SALES='C'
C      ELSE
19945 GO TO 19949
19948 CONTINUE
      SALES='F'
C      END IF
19949 CONTINUE
C      IF (MOD(NREC,20).EQ.0)
      IF(MOD(NREC,20).EQ.0) GO TO 19942
19941 GO TO 19943
19942 CONTINUE
      IF(PRINT)
     9 WRITE(1, 702)MAKE,MODLYR,IDISPL,CARB,NCYLDR,XMIS,
```

```
     1  INERWT,MSIZE,CQUEST,HQUEST,AQUEST,IZIP,CEMISS,HEMISS,CGUIDE,
     2  HGUIDE,IPCT,MONTH1
702   FORMAT(/,A4,1X,I2,1X,I3,1X,A1,1X,I1,1X,A4,1X,I4,1X,A4,3I3,
     1  1X,I3,1X,F5.2,1X,F5.2,1X,F4.0,1X,F4.0,1X,A4,1X,I2)
C     END IF
19943 CONTINUE
19944 CONTINUE
      CALL DATOUT
C     END LOOP
19940 GO TO 19999
19998 CONTINUE
10    CONTINUE
      RETURN
9     CONTINUE
      IF(PRINT)
     9 WRITE(1, 702)MAKE,MODLYR,IDISPL,CARB,NCYLDR,XMIS,
     1  INERWT,MSIZE,CQUEST,HQUEST,AQUEST,IZIP,CEMISS,HEMISS,CGUIDE,
     2  HGUIDE,IPCT,MONTH1
      STOP 7
      END
      SUBROUTINE XFORM6
C     NOTE THAT ZIP CODE VALUES WERE INSERTED INTO THESE FILES USING THE
C     EDIT COMMAND
C     TRANSFORM HS79 OR EF79 FILE
      IMPLICIT INTEGER*4 (I-N)
      DIMENSION IW(5),TCODE(2,4),KCODE(2,4),MCODE(2,21),ICODE(2,6)
CINCL I.VARS
      COMMON/VARS/NREC,ISOURC,MANUF,MODEL(5),INERWT,IDISPL,TRANSM,
     1  OVRDRV,NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,IPOP,
     2  IPDENS,MONTH1,IPCTY,IAVGML,CGUIDE,HGUIDE,CEMISS,HEMISS,
     3  CQUEST,HQUEST,AQUEST,ITMPMX,ITMPMN,ITMPAV,IHUMAM,IHUMPM,
     4  IELEV,TOPO(3),STATE(4),CITY(6),IREG,PRINT
      LOGICAL PRINT
      DATA TCODE/'AUTO','A ', 'MAN4','M4', 'MAN5','M5', 'MAN3','M3'/
      DATA KCODE/' MID',5, 'COMP',4, 'LARG',6, 'SUBC',3/
      DATA MCODE/'  VW',590,' AMC',10, 'AUDI',640, 'BUIC',40, 'CADI',40,
     1           'CHEV',40, 'CHRY',20, 'DATS',380, 'DODG',20,
     2           'FIAT',230, 'FORD',30, 'HOND',260, 'LINC',30,
     3           'MAZD',560, 'MERC',30, 'OLDS',40, 'PLYM',20,
     4           'PONT',40, 'RENA',430, 'TOYO',570, 'VOLV',600/
      DATA ICODE/'   0',-1, '  EQ',50, 'ACTY',100, 'MCTY',75,
     1           'AHWY',0, 'MHWY',25/
      NREC=0
      ISOURC=6
      CALL XMITR(-INTS(5),'    ',MODEL)
      CARTRK='D'
      OVRDRV='1'
      IAVGML=-1
C     LOOP
19999 CONTINUE
      READ(11,701,END=10,ERR=9)MAKE,MODLYR,IDISPL,CARB,NCYLDR,XMIS,
     1  INERWT,MSIZE,CQUEST,HQUEST,AQUEST,IZIP,CEMISS,HEMISS,CGUIDE,
     2  HGUIDE,IPCT,MONTH1
701   FORMAT(15X,A4,3X,I2,4X,I3,4X,A1,5X,I1,3X,A4,8X,I4,20X,A4,3F6.0,/,
     1  1X,I3,F5.2,9X,F4.1,4X,F2.0,4X,F2.0,25X,A4,3X,I2)
      NREC=NREC+1
      IF (CGUIDE.EQ.0) CGUIDE=-1.
```

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      IF (HGUIDE.EQ.0) HGUIDE=-1.
      IF (CEMISS.EQ.0) CEMISS=-1.
      IF (HEMISS.EQ.0) HEMISS=-1.
      IF (CQUEST.EQ.0) CQUEST=-1.
      IF (HQUEST.EQ.0) HQUEST=-1.
      IF (AQUEST.EQ.0) AQUEST=-1.
C     FOR (I = 1 TO 4 WHILE XMIS.NE.TCODE(1,I))
      I = 1
19994 GO TO 19995
19997 CONTINUE
      I =I +1
19995 CONTINUE
      IF(I .GT.(4)) GO TO 19996
      IF(XMIS.NE.TCODE(1,I)) GO TO 19993
19992 GO TO 19996
19993 CONTINUE
C     END FOR
19991 GO TO 19997
19996 CONTINUE
C     IF (I.GT.4)
      IF(I.GT.4) GO TO 19988
19987 GO TO 19989
19988 CONTINUE
      IF(PRINT)
     9 WRITE(1, 771)NREC,XMIS
771   FORMAT(/' RECORD',I6,'   UNKNOWN TRANSMISSION CODE - ',A4)
      TRANSM='  '
C     ELSE
19986 GO TO 19990
19989 CONTINUE
      TRANSM=TCODE(2,I)
C     END IF
19990 CONTINUE
C     FOR (I = 1 TO 4 WHILE MSIZE.NE.KCODE(1,I))
      I = 1
19982 GO TO 19983
19985 CONTINUE
      I =I +1
19983 CONTINUE
      IF(I .GT.(4)) GO TO 19984
      IF(MSIZE.NE.KCODE(1,I)) GO TO 19981
19980 GO TO 19984
19981 CONTINUE
C     END FOR
19979 GO TO 19985
19984 CONTINUE
C     IF (I.GT.4)
      IF(I.GT.4) GO TO 19976
19975 GO TO 19977
19976 CONTINUE
      IF(PRINT)
     9 WRITE(1, 772)NREC,MSIZE
772   FORMAT(/' RECORD',I6,'   UNKNOWN CLASS CODE - ',A4)
      KLASS=-1
C     ELSE
19974 GO TO 19978
19977 CONTINUE
```

```
      KLASS=KCODE(2,I)
C     END IF
19978 CONTINUE
C     FOR (I = 1 TO 21 WHILE MAKE.NE.MCODE(1,I))
      I = 1
19970 GO TO 19971
19973 CONTINUE
      I =I +1
19971 CONTINUE
      IF(I .GT.(21)) GO TO 19972
      IF(MAKE.NE.MCODE(1,I)) GO TO 19969
19968 GO TO 19972
19969 CONTINUE
C     END FOR
19967 GO TO 19973
19972 CONTINUE
C     IF (I.GT.21)
      IF(I.GT.21) GO TO 19964
19963 GO TO 19965
19964 CONTINUE
      IF(PRINT)
     9 WRITE(1, 773)NREC,MAKE
773   FORMAT(/' RECORD',I6,'   UNKNOWN MAKE CODE - ',A4)
      MANUF=-1
C     ELSE
19962 GO TO 19966
19965 CONTINUE
      MANUF=MCODE(2,I)
C     END IF
19966 CONTINUE
C     FOR (I = 1 TO 6 WHILE IPCT.NE.ICODE(1,I))
      I = 1
19958 GO TO 19959
19961 CONTINUE
      I =I +1
19959 CONTINUE
      IF(I .GT.(6)) GO TO 19960
      IF(IPCT.NE.ICODE(1,I)) GO TO 19957
19956 GO TO 19960
19957 CONTINUE
C     END FOR
19955 GO TO 19961
19960 CONTINUE
C     IF (I.GT.6)
      IF(I.GT.6) GO TO 19952
19951 GO TO 19953
19952 CONTINUE
      IF(PRINT)
     9 WRITE(1, 774)NREC,IPCT
774   FORMAT(/' RECORD',I6,'   UNKNOWN USAGE CODE - ',A4)
      IPCTY=-1
C     ELSE
19950 GO TO 19954
19953 CONTINUE
      IPCTY=ICODE(2,I)
C     END IF
19954 CONTINUE
```

```
      CALL GTDATI(IZIP,0,MONTH1,JSTA1,JSTA2,IW,STATE,CITY,ZIP,AREA,
     1  IELEV,TOPO,IPOP,IPDENS,IREG,KODE)
      ITMPMX=IW(1)
      ITMPMN=IW(2)
      ITMPAV=IW(3)
      IHUMAM=IW(4)
      IHUMPM=IW(5)
C     IF (STATE(1).EQ.'CALI')
      IF(STATE(1).EQ.'CALI') GO TO 19947
19946 GO TO 19948
19947 CONTINUE
      SALES='C'
C     ELSE
19945 GO TO 19949
19948 CONTINUE
      SALES='F'
C     END IF
19949 CONTINUE
C     IF (MOD(NREC,20).EQ.0)
      IF(MOD(NREC,20).EQ.0) GO TO 19942
19941 GO TO 19943
19942 CONTINUE
      IF(PRINT)
     9 WRITE(1, 702)MAKE,MODLYR,IDISPL,CARB,NCYLDR,XMIS,
     1  INERWT,MSIZE,CQUEST,HQUEST,AQUEST,IZIP,CEMISS,HEMISS,CGUIDE,
     2  HGUIDE,IPCT,MONTH1
702   FORMAT(/,A4,1X,I2,1X,I3,1X,A1,1X,I1,1X,A4,1X,I4,1X,A4,3I3,
     1  1X,I3,1X,F5.2,1X,F5.2,1X,F4.0,1X,F4.0,1X,A4,1X,I2)
C     END IF
19943 CONTINUE
19944 CONTINUE
      CALL DATOUT
C     END LOOP
19940 GO TO 19999
19998 CONTINUE
10    CONTINUE
      RETURN
9     CONTINUE
      IF(PRINT)
     9 WRITE(1, 702)MAKE,MODLYR,IDISPL,CARB,NCYLDR,XMIS,
     1  INERWT,MSIZE,CQUEST,HQUEST,AQUEST,IZIP,CEMISS,HEMISS,CGUIDE,
     2  HGUIDE,IPCT,MONTH1
      STOP 7
      END
      SUBROUTINE XFORM7
C     TRANSFORM J.D.POWERS FILE
      IMPLICIT INTEGER*4 (I-N)
      DIMENSION IW(5),TCODE(2,4),KCODE(2,3),MCODE(524),ICODE(2,12),
     1 JCODE(2,24),JMAN(1),MPGA(3),MPGI(3),MPGT(1)
CINCL I.VARS
      COMMON/VARS/NREC,ISOURC,MANUF,MODEL(5),INERWT,IDISPL,TRANSM,
     1  OVRDRV,NCYLDR,CARB,KLASS,MODLYR,SALES,CARTRK,IZIP,IPOP,
     2  IPDENS,MONTH1,IPCTY,IAVGML,CGUIDE,HGUIDE,CEMISS,HEMISS,
     3  CQUEST,HQUEST,AQUEST,ITMPMX,ITMPMN,ITMPAV,IHUMAM,IHUMPM,
     4  IELEV,TOPO(3),STATE(4),CITY(6),IREG,PRINT
      LOGICAL PRINT
      DATA TCODE/'1','A ', '2','M3', '3','M4', '4','M5'/
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      DATA KCODE/'1',4, '2',6, '3',8/
      DATA ICODE/'1',5, '2',15, '3',25, '4',35, '5',45, '6',55, '7',65,
     1           '8',75, '9',85, '0',95, 'X',0, 'Y',-1/
      DATA JCODE/'1 ',500, '2 ',1500, '3 ',2500, '4 ',3500, '5 ',4500,
     1           '6 ',5500, '7 ',6500, '8 ',7500, '9 ',8500, '0 ',9500,
     2           'X ',10500, 'Y ',11500, ' 1',12500, ' 2',13500,
     3           ' 3',14500, ' 4',15500, ' 5',18750, ' 6',21250,
     4           ' 7',23750, ' 8',27500, ' 9',32500, ' 0',35000,
     5           ' X',-365,  ' Y',-365/
      NREC=0
      CALL POPEN('M.POWER',7,1,7,13,KODE)
C      OPEN M.POWER ON FORTRAN UNIT 5
      IF (KODE.NE.0) STOP 8
C     DO (I=1,524)
      DO 19999 I=1,524
      READ(17,700)J,MCODE(I)
700   FORMAT(I3,1X,I3)
      IF (J.NE.I) STOP 9
C     END DO
19999 CONTINUE
      CALL PCLOS(13)
      ISOURC=7
      KLASS=-1
      IDISPL=-1
      CARB='  '
      OVRDRV='1'
      INERWT=-1
      CEMISS=-1.
      HEMISS=-1.
      IF(PRINT)
     9WRITE(1, 770)
770   FORMAT('MY MAN MODEL                    T C T CY CM HY MI % ZIP CGUID'
     1  ,' HGUID M',//)
      OVRDRV='1'
C     LOOP
19998 CONTINUE
      READ(11,701,END=10,ERR=9)JMDLYR,JMAN,MODEL,ISTYLE,ICYL,TRANI,
     1  MPGA,IMIL,JPCT,IZIP,CGUIDE,HGUIDE,MONTH1
701   FORMAT(15X,A1,2X,A3,26X,5A4,7X,3A1,/////,50X,3A2,7X,A2,A1,///,
     1  9X,I3,1X,2F5.2,6X,I1)
      NREC=NREC+1
      IF(PRINT)
     9WRITE(1, 771)JMDLYR,JMAN,MODEL,ISTYLE,ICYL,TRANI,
     1  MPGA,IMIL,JPCT,IZIP,CGUIDE,HGUIDE,MONTH1
771   FORMAT(/,1X,A1,1X,A3,1X,5A4,3(1X,A1),4(1X,A2),1X,A1,I4,2F6.2,I2)
C     IF (JMDLYR.EQ.'8')
      IF(JMDLYR.EQ.'8') GO TO 19994
19993 GO TO 19995
19994 CONTINUE
      MODLYR=78
C     OR IF (JMDLYR.EQ.'9')
19992 GO TO 19996
19995 CONTINUE
      IF(JMDLYR.EQ.'9') GO TO 19990
19989 GO TO 19991
19990 CONTINUE
      MODLYR=79
```

```
C     ELSE
19988 GO TO 19996
19991 CONTINUE
      MODLYR=-1
C     END IF
19996 CONTINUE
      DECODE (3,7772,JMAN,ERR=7771)IMAN
7772  FORMAT(I3)
      GO TO 7774
7771  IMAN=-1
7774  CONTINUE
C     FOR (I = 1 TO 4 WHILE TRANI.NE.TCODE(1,I))
      I = 1
19984 GO TO 19985
19987 CONTINUE
      I =I +1
19985 CONTINUE
      IF(I .GT.(4)) GO TO 19986
      IF(TRANI.NE.TCODE(1,I)) GO TO 19983
19982 GO TO 19986
19983 CONTINUE
C     END FOR
19981 GO TO 19987
19986 CONTINUE
C     IF (I.GT.4)
      IF(I.GT.4) GO TO 19978
19977 GO TO 19979
19978 CONTINUE
      IF(PRINT)
     9WRITE(1, 776)NREC,TRANI
776   FORMAT(/' RECORD',I6,'   UNKNOWN TRANSMISSION CODE - ',A1)
      TRANSM='  '
C     ELSE
19976 GO TO 19980
19979 CONTINUE
      TRANSM=TCODE(2,I)
C     END IF
19980 CONTINUE
C     IF (ISTYLE.EQ.' ')
      IF(ISTYLE.EQ.' ') GO TO 19973
19972 GO TO 19974
19973 CONTINUE
      CARTRK='D'
C     ELSE
19971 GO TO 19975
19974 CONTINUE
      CARTRK='T'
C     END IF
19975 CONTINUE
C     FOR (I = 1 TO 3 WHILE ICYL.NE.KCODE(1,I))
      I = 1
19967 GO TO 19968
19970 CONTINUE
      I =I +1
19968 CONTINUE
      IF(I .GT.(3)) GO TO 19969
      IF(ICYL.NE.KCODE(1,I)) GO TO 19966
```

```
19965 GO TO 19969
19966 CONTINUE
C     END FOR
19964 GO TO 19970
19969 CONTINUE
C     IF (I.GT.3)
      IF(I.GT.3) GO TO 19961
19960 GO TO 19962
19961 CONTINUE
      IF(PRINT)
     9WRITE(1, 7773)NREC,ICYL
7773  FORMAT(/' RECORD',I6,'   UNKNOWN CYLINDER CODE - ',A1)
      NCYLDR=-1
C     ELSE
19959 GO TO 19963
19962 CONTINUE
      NCYLDR=KCODE(2,I)
C     END IF
19963 CONTINUE
C     IF (IMAN.LT.1 .OR. IMAN.GT.524)
      IF(IMAN.LT.1 .OR. IMAN.GT.524) GO TO 19956
19955 GO TO 19957
19956 CONTINUE
      IF(PRINT)
     9WRITE(1, 772)NREC,IMAN
772   FORMAT(/' RECORD',I6,'   UNKNOWN MANUF CODE - ',I4)
      MANUF=-1
C     ELSE
19954 GO TO 19958
19957 CONTINUE
      MANUF=MCODE(IMAN)
C     END IF
19958 CONTINUE
C     FOR (I = 1 TO 12 WHILE JPCT.NE.ICODE(1,I))
      I = 1
19950 GO TO 19951
19953 CONTINUE
      I =I +1
19951 CONTINUE
      IF(I .GT.(12)) GO TO 19952
      IF(JPCT.NE.ICODE(1,I)) GO TO 19949
19948 GO TO 19952
19949 CONTINUE
C     END FOR
19947 GO TO 19953
19952 CONTINUE
C     IF (I.GT.12)
      IF(I.GT.12) GO TO 19944
19943 GO TO 19945
19944 CONTINUE
      IF(PRINT)
     9WRITE(1, 773)NREC,JPCT
773   FORMAT(/' RECORD',I6,'   UNKNOWN % CODE - ',A2)
      IPCTY=-1
C     ELSE
19942 GO TO 19946
19945 CONTINUE
```

```
      IPCTY=ICODE(2,I)
C     END IF
19946 CONTINUE
C     FOR (I = 1 TO 24 WHILE IMIL.NE.JCODE(1,I))
      I = 1
19938 GO TO 19939
19941 CONTINUE
      I =I +1
19939 CONTINUE
      IF(I .GT.(24)) GO TO 19940
      IF(IMIL.NE.JCODE(1,I)) GO TO 19937
19936 GO TO 19940
19937 CONTINUE
C     END FOR
19935 GO TO 19941
19940 CONTINUE
C     IF (I.GT.24)
      IF(I.GT.24) GO TO 19932
19931 GO TO 19933
19932 CONTINUE
      IF(PRINT)
     9WRITE(1, 774)NREC,IMIL
774   FORMAT(/' RECORD',I6,'   UNKNOWN MILEAGE CODE - ',A2)
      IAVGML=-1
C     ELSE
19930 GO TO 19934
19933 CONTINUE
      IAVGML=JCODE(2,I)/365
C     END IF
19934 CONTINUE
C     DO (I=1,3)
      DO 19929 I=1,3
      MPGT(1)=MPGA(I)
      DECODE(2,741,MPGT,ERR=7781)MPGI(I)
741   FORMAT(I2)
      GO TO 7783
7781  MPGI(I)=-1
7783  CONTINUE
C     END DO
19929 CONTINUE
      CQUEST=MPGI(1)
      AQUEST=MPGI(2)
      HQUEST=MPGI(3)
      CALL GTDATI(IZIP,0,MONTH1,JSTA1,JSTA2,IW,STATE,CITY,ZIP,AREA,
     1  IELEV,TOPO,IPOP,IPDENS,IREG,KODE)
      ITMPMX=IW(1)
      ITMPMN=IW(2)
      ITMPAV=IW(3)
      IHUMAM=IW(4)
      IHUMPM=IW(5)
C     IF (STATE(1).EQ.'CALI')
      IF(STATE(1).EQ.'CALI') GO TO 19926
19925 GO TO 19927
19926 CONTINUE
      SALES='C'
C     ELSE
19924 GO TO 19928
```

```
19927 CONTINUE
      SALES='F'
C     END IF
19928 CONTINUE
C     IF  (MOD(NREC,1000).EQ.0)
      IF(MOD(NREC,1000).EQ.0) GO TO 19921
19920 GO TO 19922
19921 CONTINUE
      IF(PRINT)
     9WRITE(1, 771)JMDLYR,JMAN,MODEL,ISTYLE,ICYL,TRANI,
     1  MPGA,IMIL,JPCT,IZIP,CGUIDE,HGUIDE,MONTH1
C     END IF
19922 CONTINUE
19923 CONTINUE
      CALL DATOUT
C     END LOOP
19919 GO TO 19998
19997 CONTINUE
10    CONTINUE
      RETURN
9     CONTINUE
      IF(PRINT)
     9WRITE(1, 771)JMDLYR,JMAN,MODEL,ISTYLE,ICYL,TRANI,
     1  MPGA,IMIL,JPCT,IZIP,CGUIDE,HGUIDE,MONTH1
      IF(PRINT)
     9WRITE(1, 7775)NREC
7775  FORMAT(/,' NREC =',I6)
      STOP 7
      END
```

Appendix E

FORMATS OF FUEL ECONOMY FILES

TABLE E.1 INPUT FORMAT FOR FE.HS79 AND FE.EF79

VARIABLE	FORMAT	RECORD	COLUMNS	DISCRIPTION
MAKE	A4	1	16- 19	MAKE OF AUTOMOBILE (ABBREVIATION)
MODLYR	F2.0	1	23- 24	MODEL YEAR
IDISPL	F3.0	1	29- 31	CUBIC INCH DISPLACEMENT
CARB	A1	1	36- 36	CARBURATION
NCYLDR	F1.0	1	42- 42	NUMBER OF CYLINDERS
XMIS	A4	1	52- 55	TRANSMISSION TYPE
INERWT	F4.0	1	64- 67	INERTIA WEIGHT
MSIZE	A4	1	88- 91	MODEL SIZE
CQUEST	F6.0	1	92- 97	CITY MPG FROM QUESTIONAIRE
HQUEST	F6.0	1	98- 103	HIGHWAY MPG FROM QUESTIONAIRE
AQUEST	F6.0	1	104- 109	COMBINED MPG FROM QUESTIONAIRE
IZIP	F3.0	2	2- 4	FIRST THREE DIGITS OF ZIP CODE
CEMISS	F5.2	2	9- 13	CITY MPG FROM EMISSIONS TEST
HEMISS	F5.2	2	18- 22	HIGHWAY MPG FROM EMISSIONS TEST
CGUIDE	F2.0	2	40- 41	CITY MPG FROM GUIDE BOOK
HGUIDE	F2.0	2	46- 47	HIGHWAY MPG FROM GUIDE BOOK
IPCT	A4	2	73- 76	PERCENT OF CITY DRIVING
MONTH1	F2.0	2	80- 81	MONTH OF THE YEAR

TABLE E.2 INPUT FORMAT FOR FE.LA80

VARIABLE	FORMAT	RECORD	COLUMNS	DISCRIPTION
MAKE	A4	1	16- 19	MAKE OF AUTOMOBILE (ABBREVIATION)
MODLYR	F2.0	1	23- 24	MODEL YEAR
IDISPL	F3.0	1	29- 31	CUBIC INCH DISPLACEMENT
CARB	A1	1	36- 36	CARBURATION
NCYLDR	F1.0	1	42- 42	NUMBER OF CYLINDERS
XMIS	A4	1	46- 49	TRANSMISSION TYPE
INERWT	F4.0	1	58- 61	INERTIA WEIGHT
MSIZE	A4	1	82- 85	MODEL SIZE
CQUEST	F6.0	1	86- 91	CITY MPG FROM QUESTIONAIRE
HQUEST	F6.0	1	92- 97	HIGHWAY MPG FROM QUESTIONAIRE
AQUEST	F6.0	1	98- 103	COMBINED MPG FROM QUESTIONAIRE
IZIP	F3.0	2	2- 4	FIRST THREE DIGITS OF ZIP CODE
CEMISS	F5.2	2	5- 9	CITY MPG FROM EMISSIONS TEST
HEMISS	F4.1	2	19- 22	HIGHWAY MPG FROM EMISSIONS TEST
CGUIDE	F2.0	2	27- 28	CITY MPG FROM GUIDE BOOK
HGUIDE	F2.0	2	33- 34	HIGHWAY MPG FROM GUIDE BOOK
IPCT	A4	2	60- 63	PERCENT OF CITY DRIVING
MONTH1	F2.0	2	67- 68	MONTH OF THE YEAR

TABLE E.3 INPUT FORMAT FOR FORD

VARIABLE	FORMAT	RECORD	COLUMNS	DISCRIPTION
MODEL(2)	2A4	1	6- 13	MODEL NAME
ENG	F3.1	1	14- 16	ENGINE TYPE
XMIS	A4	1	19- 22	TRANSMISSION TYPE
AQUEST	F5.1	1	23- 27	COMBINED MPG FROM QUESTIONAIRE
IPCTY	F3.0	1	28- 30	PERCENT OF CITY DRIVING
XMILES	F6.1	1	38- 43	NUMBER OF MILES DRIVEN
MONTH1	F2.0	1	45- 46	MONTH OF THE YEAR
NDAYS	F3.0	1	51- 53	NUMBER OF DAYS
IAREA	F3.0	1	55- 57	TELEPHONE AREA CODE
OVD	A1	1	21- 21	OVERDRIVE

TABLE E.4 INPUT FORMAT FOR GM75

VARIABLE	FORMAT	RECORD	COLUMNS	DISCRIPTION
DIV	A2	1	1- 2	DIVISION
IY	F1.0	1	6- 6	MODEL YEAR
IDISPL	F3.0	1	12- 14	CUBIC INCH DISPLACEMENT
CARB	A1	1	16- 16	CARBURATION
TRANSM	A2	1	17- 18	TRANSMISSION TYPE
AQUEST	F5.2	1	23- 27	COMBINED MPG FROM QUESTIONAIRE
TOTM	F5.0	1	36- 40	TOTAL MILES DRIVEN
MONTH1	F2.0	1	60- 61	MONTH OF THE YEAR
ID1	F2.0	1	62- 63	START DAY
IY1	F2.0	1	64- 65	START YEAR
M2	F2.0	1	66- 67	STOP MONTH
ID2	F2.0	1	68- 69	STOP DAY
IY2	F2.0	1	70- 71	STOP YEAR
IZIP	F3.0	1	95- 97	FIRST THREE DIGITS OF ZIP CODE

TABLE E.5 INPUT FORMAT FOR GM76

VARIABLE	FORMAT	RECORD	COLUMNS	DISCRIPTION
DIV	A2	1	1- 2	DIVISION
MONTH1	F2.0	1	9- 10	MONTH OF THE YEAR
ID1	F2.0	1	11- 12	START DAY
IY1	F2.0	1	13- 14	START YEAR
M2	F2.0	1	15- 16	STOP MONTH
ID2	F2.0	1	17- 18	STOP DAY
IY2	F2.0	1	19- 20	STOP YEAR
MIL1	F5.0	1	21- 25	START MILAGE
MIL2	F5.0	1	26- 30	STOP MILAGE
AQUEST	F5.2	1	32- 36	COMBINED MPG FROM QUESTIONAIRE
IENG	F2.0	1	61- 62	ENGINE TYPE
IXM	F1.0	1	70- 70	TRANSMISSION TYPE
IZIP	F3.0	1	108- 110	FIRST THREE DIGITS OF ZIP CODE

TABLE E.6 INPUT FORMAT FOR J.D.POWER

VARIABLE	FORMAT	RECORD	COLUMNS	DISCRIPTION
JMDLYR	A1	1	16- 16	MODEL YEAR
JMAN	A3	1	19- 21	MAKE CODE
MODEL(5)	5A4	1	48- 67	MODEL NAME
ISTYLE	A1	1	75- 75	BODY STYLE CODE
ICYL	A1	1	76- 76	NUMBER OF CYLINDERS
TRANI	A1	1	77- 77	TRANSMISSION TYPE
MPGA(3)	3A2	6	51- 56	MPG QUESTIONAIRE (CITY,HIGH,COMB)
IMIL	A2	6	64- 65	MILAGE
JPCT	A1	6	66- 66	PERCENT CITY DRIVING
IZIP	F3.0	9	10- 12	FIRST THREE DIGITS OF ZIP CODE
CGUIDE	F5.2	9	14- 18	CITY MPG FROM GUIDE BOOK
HGUIDE	F5.2	9	19- 23	HIGHWAY MPG FROM GUIDE BOOK
MONTH1	F1.0	9	30- 30	MONTH OF THE YEAR

Appendix F

FORMAT CHANGES IN J.D.POWER DATA BASE

Most of the codes were left in their original locations on the card. When multipunches were decoded and listed, those requiring more space need to be moved to another location,leaving a blank in the original location. Therefore blank spaces now indicate either missing data or multipunch. The following list will indicate the new location of the decoded multipunch and list a few of the other changes. In some cases the number of various multipunches were small enough so that alpha codes could be assigned to each type of multipunch that occurred in one location. These alpha codes are defined in Table F.1.

Col.	Length	Contents	Changes/Notes
CARD I			
19	3	Model Code #	Refer to code list in Table F.2
23	20	Make of New Vehicle	Written out in alphanumerics
48	20	Model of New Vehicle	Written out in alphanumerics
CARD II			
10	1	Basis for MPG Response	Refer to column 28
11	1	Basis for MPG Response	Refer to column 31
20	2	State	Rewritten as two letter State abbreviation
28	3	Basis for MPG Response	Transferred from column 10
31	1	Basis for MPG Response	Transferred from column 11 Alpha Codes used in this location: J,K,L
CARD III			
10	1	Unknown	Alpha codes used in this location: W
19	3	Model Code #	Refer to code list in Table F.2
23	20	Make of Replaced Vehicle	Written out in alphanumerics
48	20	Model of Replaced Vehicle	Written out in alphanumerics
CARD IV		NO CHANGES	
CARD V			
14	2	Number of Alternatives and/or origin of Alternatives	Expanded to two spaces in order to list multipunch
19	3	Model Code # of first alternative	Refer to code list in Table F.2
23	3	Model Code # of second alternative	" " " " " " "
27	3	Model Code # of third alternative	" " " " " " "

Col.	Length	Contents	Changes/Notes
CARD VI			
7	1	Reasons for Comparison	If blank refer to card 8 col 7
9	1	Reasons for not Comparing	" " " " card 8 col 11
14	1	Reasons for Opinion on Label	" " " " card 8 col 15
16	1	Reasons for Opinion on Label	" " " " card 8 col 19
18	1	Additional Information Desired	" " " " card 8 col 23
21	1	Source of Fuel Economy Information	" " " " card 8 col 35
60	1	Reasons for Actual MPG to be Lower	" " " " card 8 col 47
61	1	Reasons for Overstated EPA MPG	" " " " card 8 col 53
10	1	Reasons for not Comparing	Alpha Codes found in this location: U,V,W
15	1	Reasons for Opinion on Label	" " " " " " R,S,T,V,W
19	1	Additional Information Desired	" " " " " " G,V,W
22	1	Source Most Important	" " " " " " D
28	1	Sources to Locate Guide	" " " " " " M,N,W
42	1	Additional Information Needed for EPA Guide	" " " " " " G,O,V
43	1	" " " " "	" " " " " " A,L,P,Q
CARD VII			
12	2	Number of Vehicles and their Origin	If blank then no data or no multipunch in column 14
14	1	" " " " " "	If blank refer to column 12
15	4	Model Year Code	If blank refer to card 8, col 59
16	4	Model Year Code	" " " " card 8, col 63
18	1	Body Style	Alpha Codes found in this location: F
19	3	Model Code # of first Car	Refer to code list in Table F.2
23	3	Model Code # of second Car	" " " " " "
27	3	Model Code # of third Car	" " " " " "
74	1	Demographic	Alpha codes: B,R,S,V

Col.	Length	Contents	Changes/Notes
CARD VIII		ADDITIONAL CARD FOR DECODED MULTIPUNCHES	
1	5	Sequence Number	
7	3	Reasons for Comparison	Decoded multipunch from card 6, col 7
11	3	Reasons for not Comparing	" " " card 6, col 9
15	4	Reasons for Opinion on Label	" " " card 6, col 14
19	4	Reasons for Opinion on Label	" " " card 6, col 16
23	12	Additional Information Desired	Decoded multipunch from card 6, col 18 listed in column binary format. The following is the column order of the characters: Y X 0 1 2 3 4 5 6 7 8 9
35	12	Fuel Economy Information Source	Decoded multipunch from card 6, col 21 listed in column binary format column order: Y X 0 1 2 3 4 5 6 7 8 9
47	6	Reasons for Actual MPG to be Lower	Multipunch from card 6, col 60 in column binary format. column order: 1 2 3 4 5 6
53	6	Reasons for Overstated EPA MPG	Multipunch from card 6, col 61 in column binary format. column order: 1 2 3 4 5 6
59	3	Model Year Code	Multipunch from card 7, col 15
63	4	Model Year Code	" " card 7, col 16
80	1	Card Number	Always 8
CARD IX			
1	5	Sequence number	
6	3	EEA Model number	
10	3	First three digits of Zip Code	000 is missing value code
14	F5.2	City MPG from Guide Book	-1.0 is missing value code
19	F5.2	Highway MPG from Guide Book	-1.0 is missing value code
24	F5.2	Combined MPG from Guide Book	-1.0 is missing value code
30	1	Month computed from Wave Number Card 7 col. 78	0 is missing either 1 for January (wave 1), 2 for February (wave 2), 4 for April (wave 3)
80	1	Card number	Always 9

TABLE F.1 DEFINITION OF ALPHA CODES

Alpha Codes	Multipunch
A	X 0
B	Y 1
D	1 8
F	7 8
G	X 2
J	3 6
K	2 7
L	2 6
M	1 2 7 9
N	1 7
O	4 6
P	3 4
Q	0 2
R	1 5
S	1 4
T	0 1
U	3 5
V	1 3
W	1 2

TABLE F.2 MAKE/MODEL CODES FOR J.D.POWER DATA BASE
WITH PARALLEL CODES FOR EEA AND EPA

EEA	TYPE*	JDP	EPA	MAKE	MODEL
999	S	238	000		NO INFORMATION
282	S	293	090	ALFA ROMEO	SPIDER
165	S	006	010	AMC/RAMBLER	CONCORD
194	W	006	010	AMC/RAMBLER	CONCORD
001	S	007	010	AMC/RAMBLER	GREMLIN
046	S	012	010	AMC/RAMBLER	PACER
104	W	012	010	AMC/RAMBLER	PACER
262	S	015	010	AMC/RAMBLER	OTHER/UNSPEC
173	S	237	010	AMC/RAMBLER	SPIRIT DL
205	W	303	640	AUDI	FOX
002	S	303	640	AUDI	FOX
166	S	306	640	AUDI	5000
003	S	316	120	BMW	320I
004	S	317	120	BMW	530I
071	S	019	040	BUICK	CENTURY
123	W	019	040	BUICK	CENTURY
085	S	020	040	BUICK	ELECTRA
136	W	021	040	BUICK	ESTATE WAGON
136	W	023	040	BUICK	LE SABRE
086	S	023	040	BUICK	LE SABRE
174	S	024	040	BUICK	REGAL
087	S	025	040	BUICK	RIVIERA
007	S	026	040	BUICK	SKYHAWK
048	S	027	040	BUICK	SKYLARK
263	S	030	040	BUICK	OTHER/UNSPEC
264	W	032	040	CADILLAC	BROUGHAM
088	S	032	040	CADILLAC	BROUGHAM
264	W	033	040	CADILLAC	DE VILLE
088	S	033	040	CADILLAC	DE VILLE
072	S	034	040	CADILLAC	EL DORADO
050	S	035	040	CADILLAC	SEVILLE
264	S	036	040	CADILLAC	OTHER/UNSPEC
008	S	039	040	CHEVROLET	CAMARO
137	W	040	040	CHEVROLET	CAPRICE
089	S	040	040	CHEVROLET	CAPRICE
124	W	041	040	CHEVROLET	CHEVELLE
073	S	041	040	CHEVROLET	CHEVELLE
265	W	042	040	CHEVROLET	CHEVETTE
009	S	042	040	CHEVROLET	CHEVETTE
211	S	045	040	CHEVROLET	CORVETTE
089	S	046	040	CHEVROLET	IMPALA
137	W	046	040	CHEVROLET	IMPALA
073	S	047	040	CHEVROLET	MALIBU
124	W	047	040	CHEVROLET	MALIBU

* TYPE CODES:
S=SEDAN, W=STATION WAGON, P=PICKUP, V=VAN

TABLE F.2--Continued

051	S	048	040	CHEVROLET	MONTE CARLO
010	S	049	040	CHEVROLET	MONZA
256	W	049	040	CHEVROLET	MONZA
052	S	050	040	CHEVROLET	NOVA
233	W	050	040	CHEVROLET	NOVA
011	S	051	040	CHEVROLET	VEGA
331	P	052	040	CHEVROLET	BLAZER
312	P	053	040	CHEVROLET	EL CAMINO
311	P	054	040	CHEVROLET	C-10 PICKUP
381	P	057	040	CHEVROLET	OTHER/UNSPEC PICKUP
323	V	058	040	CHEVROLET	G-10 VAN
323	V	059	040	CHEVROLET	G-20 VAN
381	V	061	040	CHEVROLET	OTHER/UNSPEC VAN
265	S	062	040	CHEVROLET	OTHER/UNSPEC
265	W	062	040	CHEVROLET	OTHER/UNSPEC
300	P	384	040	CHEVROLET	LUV
074	S	064	020	CHRYSLER	CORDOBA
138	W	066	020	CHRYSLER	LE BARON
148	S	066	020	CHRYSLER	LE BARON
090	S	067	020	CHRYSLER	NEWPORT
231	S	068	020	CHRYSLER	NEW YORKER
266	S	070	020	CHRYSLER	300
266	S	071	020	CHRYSLER	OTHER/UNSPEC
266	W	071	020	CHRYSLER	OTHER/UNSPEC
012	S	341	380	DATSUN	B-210
195	W	341	380	DATSUN	B-210
013	S	343	380	DATSUN	F-10
106	W	343	380	DATSUN	F-10
017	S	346	380	DATSUN	510
196	W	346	380	DATSUN	510
015	S	349	380	DATSUN	810
197	W	349	380	DATSUN	810
172	S	350	380	DATSUN	200SX
213	S	353	380	DATSUN	280Z
213	S	354	380	DATSUN	280ZX
301	P	357	380	DATSUN	PICKUP
053	S	074	020	DODGE	ASPEN
121	W	074	020	DODGE	ASPEN
075	S	076	020	DODGE	CHARGER
145	S	079	020	DODGE	DIPLOMAT
158	W	079	020	DODGE	DIPLOMAT
268	S	080	020	DODGE	DODGE
169	S	081	020	DODGE	MAGNUM
076	S	082	020	DODGE	MONACO
149	W	083	020	DODGE	OMNI
148	S	083	020	DODGE	OMNI
313	P	086	020	DODGE	D-100 PICKUP
313	P	087	020	DODGE	D-150 PICKUP
313	P	088	020	DODGE	D-200 PICKUP
324	V	091	020	DODGE	B-100 VAN
324	V	092	020	DODGE	B-200 VAN
324	V	093	020	DODGE	B-300 VAN
384	V	094	020	DODGE	OTHER/UNSPEC VAN
268	S	095	020	DODGE	OTHER/UNSPEC
160	S	331	020	DODGE	CHALLENGER
018	S	334	020	DODGE	COLT 2-DOOR

TABLE F.2--Continued

018	S	335	020	DODGE	COLT 4-DOOR
109	W	336	020	DODGE	COLT WAGON
018	S	337	020	DODGE	COLT HATCHBACK
018	S	338	020	DODGE	COLT OTHER/UNSPEC
109	W	338	020	DODGE	COLT OTHER/UNSPEC
282	S	361	220	FERRARI	FERRARI
249	S	363	230	FIAT	X 1/9
229	S	364	230	FIAT	124
019	S	365	230	FIAT	128
020	S	366	230	FIAT	131
279	S	371	230	FIAT	OTHER/UNSPEC
146	S	101	030	FORD	FAIRMONT
157	W	101	030	FORD	FAIRMONT
055	S	105	030	FORD	GRANADA
093	S	106	030	FORD	LTD
140	W	106	030	FORD	LTD
077	S	107	030	FORD	LTD II
127	W	107	030	FORD	LTD II
022	S	109	030	FORD	MUSTANG (78)
179	S	109	030	FORD	MUSTANG (79)
022	S	110	030	FORD	MUSTANG II
023	S	111	030	FORD	PINTO
112	W	111	030	FORD	PINTO
269	W	113	030	FORD	THUNDERBIRD
056	S	113	030	FORD	THUNDERBIRD
222	P	115	030	FORD	XL
338	P	116	030	FORD	BRONCO
354	P	117	030	FORD	RANCHERO
314	P	118	030	FORD	F-100 PICKUP
314	P	119	030	FORD	F-150 PICKUP
314	P	121	030	FORD	F-350 PICKUP
325	V	121	030	FORD	F-350 PICKUP
325	V	123	030	FORD	E-100 VAN
325	V	124	030	FORD	E-150 VAN
325	V	125	030	FORD	E-250 VAN
387	V	126	030	FORD	OTHER/UNSPEC VAN
269	S	127	030	FORD	OTHER/UNSPEC
269	W	127	030	FORD	OTHER/UNSPEC
303	P	339	030	FORD	COURIER
147	S	372	030	FORD	FIESTA
363	P	129	040	GMC	CABALLERO
333	P	130	040	GMC	JIMMY
363	P	131	040	GMC	SPRINT
315	P	133	040	GMC	C-1500 PICKUP
390	P	136	040	GMC	OTHER/UNSPEC PICKUP
355	V	137	040	GMC	G-1500 VAN
390	V	140	040	GMC	OTHER/UNSPEC VAN
113	W	374	260	HONDA	CIVIC
025	S	374	260	HONDA	CIVIC
026	S	375	260	HONDA	CIVIC CVCC
113	W	375	260	HONDA	CIVIC CVCC
024	S	376	260	HONDA	ACCORD
284	S	378	260	HONDA	OTHER/UNSPEC
284	W	378	260	HONDA	OTHER/UNSPEC
341	W	152	010	JEEP	CHEROKEE
342	P	153	010	JEEP	CJ-5
342	P	155	010	JEEP	CJ-7

TABLE F.2--Continued

341	W	160	010	JEEP	OTHER/UNSPEC
342	P	160	010	JEEP	OTHER/UNSPEC
095	S	162	030	LINCOLN	CONTINENTAL
079	S	163	030	LINCOLN	MARK
188	S	164	030	LINCOLN	VERSAILLES
999	S	165	030	LINCOLN	OTHER/UNSPEC
030	S	388	560	MAZDA	GLC
153	W	388	560	MAZDA	GLC
031	W	392	560	MAZDA	RX-4
031	S	393	560	MAZDA	RX-7
304	P	398	560	MAZDA	PICKUP
062	S	409	200	MERCEDES-BENZ	280
062	S	410	200	MERCEDES-BENZ	300 ·
062	S	411	200	MERCEDES-BENZ	300-D
062	S	413	200	MERCEDES-BENZ	450
062	S	416	200	MERCEDES-BENZ	OTHER/UNSPEC
027	S	167	030	MERCURY	BOBCAT
114	W	167	030	MERCURY	BOBCAT
180	S	168	030	MERCURY	CAPRI (1979 ONLY)
080	S	171	030	MERCURY	COUGAR
270	S	173	030	MERCURY	MARAUDER
096	S	174	030	MERCURY	MARQUIS
203	W	174	030	MERCURY	MARQUIS
270	S	175	030	MERCURY	MERCURY
270	W	175	030	MERCURY	MERCURY
057	S	176	030	MERCURY	MONARCH
158	W	179	030	MERCURY	ZEPHYR
170	S	179	030	MERCURY	ZEPHYR
270	S	180	030	MERCURY	OTHER/UNSPEC
270	W	180	030	MERCURY	OTHER/UNSPEC
028	S	327	030	MERCURY	CAPRI (1978 OR EARLI
252	S	418	305	MG	MIDGET
252	S	419	305	MG	MGB
142	S	182	040	OLDSMOBILE	CUSTOM CRUISER
142	W	182	040	OLDSMOBILE	CUSTOM CRUISER
081	S	183	040	OLDSMOBILE	CUTLASS
159	W	183	040	OLDSMOBILE	CUTLASS
142	W	185	040	OLDSMOBILE	DELTA 88
098	S	185	040	OLDSMOBILE	DELTA 88
271	S	188	040	OLDSMOBILE	JETSTAR
271	W	189	040	OLDSMOBILE	OMEGA
063	S	189	040	OLDSMOBILE	OMEGA
032	S	190	040	OLDSMOBILE	STARFIRE
100	S	191	040	OLDSMOBILE	TORONADO
142	W	193	040	OLDSMOBILE	98
098	S	193	040	OLDSMOBILE	98
271	S	195	040	OLDSMOBILE	OTHER/UNSPEC
271	W	195	040	OLDSMOBILE	OTHER/UNSPEC
272	S	426	400	OPEL	COUPE
272	S	427	400	OPEL	SEDAN
272	S	432	400	OPEL	OTHER/UNSPEC
151	S	437	410	PEUGEOT	504
151	S	438	410	PEUGEOT	504-D
082	S	200	020	PLYMOUTH	FURY
150	W	201	020	PLYMOUTH	HORIZON
150	S	201	020	PLYMOUTH	HORIZON
064	S	207	020	PLYMOUTH	VOLARE

TABLE F.2--Continued

131	W	207	020	PLYMOUTH	VOLARE
335	P	208	020	PLYMOUTH	TRAILDUSTER
330	V	209	020	PLYMOUTH	VOYAGER
273	S	210	020	PLYMOUTH	OTHER/UNSPEC
273	W	210	020	PLYMOUTH	OTHER/UNSPEC
326	V	210	020	PLYMOUTH	OTHER/UNSPEC
033	S	300	020	PLYMOUTH	ARROW
305	P	300	020	PLYMOUTH	ARROW
034	S	218	040	PONTIAC	ASTRE
118	W	218	040	PONTIAC	ASTRE
144	W	219	040	PONTIAC	BONNEVILLE
102	S	219	040	PONTIAC	BONNEVILLE
144	W	220	040	PONTIAC	CATALINA
102	S	220	040	PONTIAC	CATALINA
036	S	222	040	PONTIAC	FIREBIRD-TRANS AM
083	S	223	040	PONTIAC	GRAND AM
066	S	224	040	PONTIAC	GRAND PRIX
144	S	225	040	PONTIAC	GRAND SAFARI WAGON
144	W	225	040	PONTIAC	GRAND SAFARI WAGON
083	S	228	040	PONTIAC	LEMANS
132	W	228	040	PONTIAC	LEMANS
168	S	229	040	PONTIAC	PHOENIX
035	S	232	040	PONTIAC	SUNBIRD
274	W	234	040	PONTIAC	VENTURA
067	S	234	040	PONTIAC	VENTURA
274	S	235	040	PONTIAC	OTHER/UNSPEC
253	S	442	420	PORSCHE	911
253	S	445	420	PORSCHE	924
253	S	446	420	PORSCHE	928
283	S	452	430	RENAULT	GORDINI
187	S	458	430	RENAULT	R-5 LE CAR
283	S	459	430	RENAULT	OTHER/UNSPEC
259	W	463	470	SAAB	SONNET
190	S	465	470	SAAB	99
259	S	467	470	SAAB	OTHER/UNSPEC
163	S	470	490	SAPPORO	2600
163	S	471	490	SAPPORO	OTHER/UNSPEC
037	S	473	660	SUBARU	2-DOOR
037	S	474	660	SUBARU	4-DOOR
119	W	474	660	SUBARU	4-DOOR
119	S	475	660	SUBARU	WAGON
119	W	475	660	SUBARU	WAGON
344	P	476	660	SUBARU	BRAT
037	S	477	660	SUBARU	OTHER/UNSPEC
119	W	477	660	SUBARU	OTHER/UNSPEC
038	S	480	570	TOYOTA	CELICA
039	S	481	570	TOYOTA	COROLLA
120	W	481	570	TOYOTA	COROLLA
040	S	482	570	TOYOTA	CORONA
121	W	482	570	TOYOTA	CORONA
155	W	483	570	TOYOTA	CRESSIDA
164	S	483	570	TOYOTA	CRESSIDA
346	P	484	570	TOYOTA	LAND CRUISER
317	P	486	570	TOYOTA	PICKUP (HI-LUX)
275	S	487	570	TOYOTA	OTHER/UNSPEC
275	V	487	570	TOYOTA	OTHER/UNSPEC
275	W	487	570	TOYOTA	OTHER/UNSPEC

TABLE F.2--Concluded

317	P	487	570	TOYOTA	OTHER/UNSPEC
254	S	492	305	TRIUMPH	TR-4
254	S	493	305	TRIUMPH	SPITFIRE
254	S	497	305	TRIUMPH	OTHER/UNSPEC
041	S	506	590	VOLKSWAGON	BEETLE
042	S	507	590	VOLKSWAGON	DASHER
122	W	507	590	VOLKSWAGON	DASHER
043	S	509	590	VOLKSWAGON	RABBIT
044	S	510	590	VOLKSWAGON	SCIROCCO
241	W	513	590	VOLKSWAGON	BUS/STATION WAGON
353	S	513	590	VOLKSWAGON	BUS/STATION WAGON
241	W	514	590	VOLKSWAGON	OTHER/UNSPEC
276	S	514	590	VOLKSWAGON	OTHER/UNSPEC
068	S	521	600	VOLVO	240 SERIES
133	W	521	600	VOLVO	240 SERIES
069	S	522	600	VOLVO	260 SERIES
134	W	522	600	VOLVO	260 SERIES
281	S	524	600	VOLVO	OTHER/UNSPEC
281	W	524	600	VOLVO	OTHER/UNSPEC