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16. Abstract

This research report, which updates Research Report 1279-2, is a user's guide with operating instructions for each program. The mainframe programs were developed to estimate mobile source emissions and vehicle miles traveled (VMT). The PREPIN program allows the analyst to factor a 24-hour assignment to estimate the VMT and speeds for a subject time period. The POLFAC5A program is used to apply MOBILE5a to obtain emission factors without HC species. The POLFAC5B program is used to apply MOBILE5a to obtain emission factors including HC species. The COADJ is used to add two sets of emission factors and subtract a third set of emission factors from the POLFAC5A program to produce a combined set of emission factors. RATEADJ, a special utility program, combines emission factors from three applications of the POLFAC5B program to produce a new set of emission factors. IMPSUMA facilitates the computation of emissions by using the emission factors from POLFAC5B and RATEADJ. SUMALLA sums the emission results from two or more time periods plus diurnals. IMPSUMA and SUMALLA have the additional capability of producing gridded emission estimates by vehicle type. A microcomputer program, JCFBATCH, was added to document POLFAC5B, IMPSUMA, SUMALLA, RATEADJ, and VMTSUM runs on the microcomputer and to make these runs easier.

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TEXAS MOBILE SOURCE EMISSIONS SOFTWARE VERSION 2.0
USER'S GUIDE

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Research Report 1279-9
Research Study Number 0-1279
Research Study Title: Air Pollution Implications of
Urban Transportation Investment Decisions

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IMPLEMENTATION STATEMENT

This report supports TxDOT's efforts to comply with the Federal Clean Air Act Amendments of 1990 and the associated changes to the Texas Clean Air Act. The improved analysis capabilities will assist TxDOT staff in estimating mobile source emissions and vehicle miles traveled. The analysis tools are designed for immediate implementation by TxDOT.

DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the opinions, findings, and conclusions presented herein. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration or the Texas Department of Transportation. This report does not constitute a standard, specification, or regulation. Additionally, this report is not intended for construction, bidding, or permit purposes. George B. Dresser, Ph.D., was the Principal Investigator for the project.

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INTRODUCTION

This research report presents the software PREPIN, POLFAC5A, POLFAC5B, COADJ, RATEADJ, IMPSUM, SUMALL, IMPSUMA, SUMALLA, VMTSUM, and JCFBATCH. The software was originally developed in November 1992 under a contract with the Texas Department of Transportation and was subsequently revised in January, April, July, and September 1993. As part of a contract with the Texas Natural Resource Conservation Commission (TNRCC), the IMPSUMA and SUMALLA programs were modified in February 1994 to implement a method for preparing time-of-day diurnal emission estimates and to produce time-of-day gridded emissions. The program JCFBATCH was added to produce and document multiple applications of the software using a microcomputer. The POLFAC5A program was modified to produce VOC subcomponent emission rates in March 1994. The POLFAC5A, IMPSUM, and SUMALL programs are used if diurnals are calculated from vehicles. The POLFAC5B, IMPSUMA, and SUMALLA programs are used if HC species are desired and diurnals are calculated based on VMT and a time period splits. The SUMALLA and IMPSUMA programs were modified to use the VOC subcomponents in March 1994. IMPSUMA and SUMALLA were modified to correct problems in diurnals by time period in July 1994. The RATEADJ program was added to allow more than three POLFAC5A or POLFAC5B rates to be combined. The VMTSUM program was added to produce the VMTTOT records needed for scaling diurnal emission rates by time period.

This report is presented as a user's guide; operating instructions are provided for each program. The mainframe programs were developed to estimate mobile source emissions and vehicle miles traveled (VMT). The PREPIN program allows the analyst to factor a 24-hour assignment to estimate the VMT and speeds for a subject time period. The POLFAC5A program is used to apply MOBILE5a to obtain emission factors without HC species. The POLFAC5B program is used to apply MOBILE5a to obtain emission factors including HC species. The COADJ is used to add two sets of emission factors and subtract a third set of emission factors from the POLFAC5A program to produce a combined set of emission factors. RATEADJ, a special utility program, combines emission factors from three applications of the POLFAC5B program to produce a new set of emission factors. IMPSUMA facilitates the computation of emissions by using the emission factors from POLFAC5B and RATEADJ. SUMALLA sums the emission results from two or more time periods plus diurnals. IMPSUMA and SUMALLA have the additional capability of producing gridded emission estimates by vehicle type. A microcomputer program, JCFBATCH, was added to document POLFAC5B, IMPSUMA, SUMALLA, RATEADJ, and VMTSUM runs on the microcomputer and to make these runs easier.

PREPIN

PURPOSE

The PREPIN program was developed for use in urban areas which do not have time-of-day assignments available for air quality analyses. The PREPIN program allows the analyst to factor a 24-hour assignment (produced by the Texas Large Network Assignment Package) to estimate the vehicle miles of travel (VMT) and speeds for a subject time period. For example, a 24-hour assignments can be factored to represent time periods: the morning peak hour, the afternoon peak hour, the midday travel (i.e., the travel between the morning and afternoon peak hours), and the overnight travel (i.e., the typical portion of the daily travel occurring between the afternoon peak hour and the morning peak hour). This example would require four applications of PREPIN (i.e., an application for each time period).

The user may select one of two speed model structures implemented in PREPIN. The first is the operational speed model formulations used in the Dallas-Fort Worth Region. The second is an adaptation of the speed models used in the Houston-Galveston Region. Both approaches will require user inputs for applications.

The factors which may be applied by the analyst using PREPIN are:

- HPMS Factors: The analyst may input HPMS factors (stratified by county and functional classification) which are applied to the link volumes to force the 24-hour assignment VMT to correspond to the HPMS estimate of VMT.

- Seasonal Adjustment Factors: The analyst may input seasonal adjustment factors (stratified by area type and functional classification) which are applied to the link volumes to adjust for seasonal fluctuations in VMT.

- Time-of-day Volume Factors: These analyst-supplied factors (stratified by area type and functional classification) specify the portion of the 24-hour volume expected to occur in the subject time-of-day period.

- Time-of-day Directional Split Factors: These analyst-supplied factors (stratified by area type and functional classification) specify the directional split for the link volumes in the subject time period. For example, if a 60-40 split is expected for a given functional classification within a given area type, the analyst can input a split factor of 60.0; and PREPIN will split the time-of-day volume, setting 60 percent in one direction and 40 percent in the other. PREPIN produces two link records for the link, one representing the 60 percent and the other representing the 40 percent

direction. These directional volumes are used to estimate directional volume to capacity (v/c) ratios for estimating directional speeds.

- Time-of-day Capacity Factors: These analyst-supplied factors (stratified by area type and functional classification) are applied to the 24-hour nondirectional link capacities to estimate the nondirectional capacity for the subject time period. For the computation of the directional v/c ratio, the capacity is split 50-50.

- Optional VMT Factors: These optional analyst-supplied factors (stratified by county and functional classification) are applied to the link volumes. These factors are generally not used and default to 1.0. These factors can be used in lieu of the time-of-day volume factors if the user prefers to specify the time-of-day volume factors stratified by county and functional classification rather than area type and functional classification.

- Speed Model 1 Parameters: Speed Model 1 options implemented in PREPIN are the speed model equations used by the North Central Texas Council of Governments for operational speed estimates. These models are refereed to as the "D-FW Speed Models" in this report and are discussed in detail later in the PREPIN documentation. To apply the D-FW Speed Models, the analyst must input freeflow speed factors (stratified by area type and functional classification) and Delay Equation Parameters:

  Freeflow Speed Factors: These factors are applied to the 24-hour nondirectional link speeds to estimate the freeflow speed for the subject time period. The freeflow speed is assumed to be the same in each direction.

  Delay Equation Parameters: These are the user-supplied coefficients for the delay equation for the D-FW Speed Model. Sample coefficients are provided in the detailed discussion of this model option.

  Using the directional v/c estimates and the delay equation parameters, the directional delay on each link is estimated. The delay estimates and freeflow speed estimates are used to compute the directional congested speeds.

- Speed Model 2 Parameters: Speed Model 2 option implemented in PREPIN are an adaptation of the speed model equations used by the Houston-Galveston Area Council. These models will be referred to as the "Houston Speed Models" in this report and are discussed in detail later in the PREPIN documentation. To apply the Houston speed models, the analyst must provide the following data stratified by area type and functional classification: freeflow speed factors; level-of-service (LOS) E speed factors; and Speed Reduction Factors by v/c ratio. These data are used to estimate the directional speeds on each link based of the directional v/c ratio on the link.

PREPIN produces two link records containing the directional VMT and speed estimates for each link. The link records produced by PREPIN are subsequently used as input to the IMPSUMA program.

PREPIN produces summaries of the unscaled 24-hour VMT and the final factored VMT. Summaries of the weighted average speeds (weighted by time-of-day VMT) are produced for the input link speeds, the estimated freeflow speeds, and the estimated congested speeds. A summary of the congested vehicle hours of travel is also produced.

PROGRAM STRUCTURE

PREPIN prepares link records for the IMPSUMA program. The program runs in two load modules. The first load module is Z1OUTA. This load module is also used in the Z1BUILD program for IMPACT. The input to this program is a network data set from LARGENET (not LARGENETII). This load module builds a minimum distance tree in which all zones, simultaneously, are origins of the tree. The paths in this tree determine which zone is closest by distance along the network of each node in the network. The closest zone is called the associated zone. This load module writes a record to Unit 3 containing the paths and another record containing the minimum distances. The Z1OUTA load module has no card image.

The second load module is PREPIN. The inputs to the PREPIN program are a network data set from LARGENET (not LARGENETII) with an assignment, a 24-hour Trip Matrix which was used for the assignment, various factor card images, a table of equals of zones to counties, a table of equals of zones to area type, and a data card specifying the assignment number to use for assigned link volume. This load module reads the two records written by Z1BUILD and uses these to find the associated zones for each node. This program also accepts the following input record types: Parameter, END, EQUAL, AREA, HDR1, HDR2, HPMFAC, LAST INT, SEAFAC, PERFAC, SPLIT, VMTFAC, CAPFAC, SPDFAC, and DELAY. The parameter card specifies the assignment number for the assigned link volumes. The END card marks the beginning of the county EQUAL cards. The table of equals between zones and area types is specified using AREA records. The SPDFAC cards provide for factoring speeds to freeflow speeds. The PERFAC card provides for a single time period factor to adjust VMT for the time period. The CAPFAC provides a factor to adjust link capacities to time period capacities by county and functional classification. The HPMFAC provides a set of factors to adjust link VMT to HPMS values by county and functional classification. The VMTFAC provides a factor to adjust VMT to the time period by county and functional classification. The DELAY cards specify the parameters for the delay equation used for estimating the congested speeds.

TIME-OF-DAY VOLUME AND VMT ESTIMATION PROCEDURE

The directional volumes and VMT for each link are calculated as follows:

VOL1(A,B) = VOL24(A,B) * HPMFAC(CNTY,FC) * SEAFAC(AT,CNTY) * PERFAC(AT,FC) * VMTFAC(CNTY,FC) * (SPLIT(AT,FC)/100.0)

VOL2(A,B) = VOL24(A,B) * HPMFAC(CNTY,FC) * SEAFAC(AT,CNTY) * PERFAC(AT,FC) * VMTFAC(CNTY,FC) * ((100-SPLIT(AT,FC))/100.0)

VMT1(A,B) = VOL1(A,B) * DIST(A,B)

VMT2(A,B) = VOL2(A,B) * DIST(A,B)

Where:

A,B = The A-node and B-node of the link.

CNTY = The county index obtained from the associated zone and the county EQUAL cards. PREPIN allows up to 10 counties.

AT = The area type index for the link obtained from the associated zone and the area type EQUAL cards. PREPIN allows up to 99 area types.

FC = The functional classification index; the functional classification code from the link data plus 1. The functional classification codes in the link data vary from 0 to 15.

DIST(A,B) = The link distance for link A,B in miles.

VOL24(A,B) = The link's 24-hour nondirectional assigned volume for link A,B.

VOL1(A,B) = The estimated time-of-day volume in one direction.

VOL2(A,B) = The estimated time-of-day volume in the other direction.

VMT1(A,B) = The estimated time-of-day VMT in one direction.

VMT2(A,B) = The estimated time-of-day VMT in the other direction.

HPMFAC(CNTY,FC)= The HPMS scaling factor which can be used to force

		the assigned VMT to correspond with the HPMS VMT. The default value for these factors is 1.0.
SEAFAC(AT,CNTY)=		The seasonal adjustment factor. The default value for these factors is 1.0.
PERFAC(AT,FC)	=	The time-of-day factor applied to the 24-hour nondirectional volume to estimate the nondirectional volume for the time period.
SPLIT(AT,FC)	=	The directional split parameter specifies the percentage of the nondirectional time-of-day volume expected to occur in one direction.
100-SPLIT(AT,FC)	=	The directional split parameter specifies the percentage of the nondirectional time-of-day volume expected to occur in the other direction.
VMTFAC(CNTY,FC)=		The VMTFAC are optional factors stratified by county and functional classification. They will not be used for most applications and have a default value of 1.0. They can, however, be used in place of the PERFAC if the user would prefer to specify the time-of-day factors by county and functional classification rather than area type and functional classification.

CONGESTED SPEED ESTIMATION MODELS

As noted earlier, the PREPIN software provides two options for specifying speed models to estimate operational speeds:

- Option 1 Speed Model: A model structure like the Dallas-Fort Worth Speed Model; and,
- Option 2 Speed Model: A model structure similar to the Houston Speed Model.

The following describes each of the model options.

Option 1 Speed Model (D-FW Speed Models)

The original speed model implemented in PREPIN was the Dallas-Fort Worth (D-FW) Speed

Models. The D-FW Speed Models developed by the NCTCOG are used to estimate the directional time-of-day speeds. Using the D-FW Speed Models, the directional v/c ratio on a link is used to compute the average delay per mile (in minutes) due to the level of congestion reflected in the v/c ratio. The congested directional speed is computed using the estimated directional delay and the estimated freeflow speed. For links without capacities, the freeflow speed is used. For centroid connectors, the input speed on the centroid connector is used. The following provides a more detailed description of the congested speed estimation process.

The directional v/c ratios and freeflow speeds are computed as follows:

VC1(A,B) = VOL1(A,B) / (CAP24(A,B) * CAPFAC(AT,FC) * 0.5)

VC2(A,B) = VOL2(A,B) / (CAP24(A,B) * CAPFAC(AT,FC) * 0.5)

FSPD(A,B) = SPD24 * SPDFAC(AT,FC)

Where:

A,B	=	The A-node and B-node of the link.
AT	=	The area type index for the link obtained from the associated zone and the area type EQUAL cards. PREPIN allows up to 99 area types.
FC	=	The functional classification index; the functional classification code from the link data plus 1. The functional classification codes in the link data vary from 0 to 15.
VC1(A,B)	=	The estimated time-of-day v/c ratio in one direction.
VC2(A,B)	=	The estimated time-of-day v/c ratio in the other direction.
VOL1(A,B)	=	The estimated time-of-day volume in one direction.
VOL2(A,B)	=	The estimated time-of-day volume in the other direction.
CAP24(A,B)	=	The link's 24-hour nondirectional capacity from the assignment data set.
CAPFAC(AT,FC)	=	The user-supplied factor used to estimated time-of-day nondirectional capacity from the 24-hour

		nondirectional capacity. Half of the nondirectional time-of-day capacity is used for each direction. (These factors are input via the CAPFAC records.)
FSPD(A,B)	=	Estimated freeflow speed on link A,B. The freeflow speed is assumed to be the same in both directions.
SPD24(A,B)	=	The input speed for the link data (i.e., the 24-hour input link data speed).
SPDFAC(AT,FC)	=	The user-supplied factor used to estimate time-of-day freeflow speed from the input link data speed. (These factors are input via the SPDFAC records.)

The directional delay (in minutes per mile) due to congestion is computed using a volume-delay equation. The following is the general form of the volume-delay equation used in the model:

$$Delay = Min\ [A\ e^{B(\frac{V}{C})}, M]$$

Where:

Delay	=	Congestion delay (in minutes/mile).
A & B	=	Volume-Delay Equation Coefficients (input via DELAY records).
M	=	Maximum minutes of delay per mile, read from the DELAY records.
v/c	=	Time-of-day directional v/c ratio.

Two sets of coefficients and constraints were developed by the NCTCOG for the D-FW Speed Model: one for high-capacity facilities and one for low-capacity facilities. High-capacity facilities (usually freeways) are defined as those having a capacity exceeding 3,400 vehicles per hour (one way). The volume-delay equation parameters which were developed by the NCTCOG in late 1992 for use in the D-FW air quality analyses are presented in Table P-1.

Table P-1
Volume-Delay Equation Parameters

Parameters	Parameter Values	
	High-capacity Facilities	Low-capacity Facilities
A	0.015	0.050
B	3.5	3.0
M	5.0	10.0

Because the functional classification codes used in the link data may vary from study area to study area, PREPIN requires that the user specify the desired delay equation parameters by county and functional classification.

Given the estimated directional delay (in minutes/mile) and the estimated freeflow speed, the directional congested speed can be computed as follows:

$$Congested\ speed = \frac{60}{\frac{60}{Freeflow\ speed} + Delay}$$

Tables 2 and 3 summarize the estimated hourly capacities used in the D-FW Speed Models. Similar hourly capacity estimates should be developed for the urban areas where PREPIN is being applied. One-hour capacity factors for input to PREPIN may be estimated by dividing the hourly capacities per lane by the 24-hour capacities per lane used in the 24-hour network. In the current applications of PREPIN, the capacity factors for multi-hour time periods are computed by simply multiplying the hourly capacity factors times the number of hours in the subject time period.

Table P-2*
D-FW Hourly Service Volumes per Lane **
(Divided or One-Way Roads)

Area Type	Functional Classification						
	Freeway	Principal Arterial	Minor Arterial	Collector	Local	Ramp	Frontage Road
CBD	1,800	550	550	450	450	1,100	550
Fringe	1,850	600	600	475	475	1,200	600
Urban Residential	1,875	650	625	500	500	1,250	625
Suburban Residential	1,950	725	700	550	550	1,400	700
Rural	2,000	800	750	575	575	1,500	750

* Service volumes at LOS E (the model requires LOS E service volumes or capacities).

** Source: Multimodal Transportation Analysis Process (MTAP): A Travel Demand Forecasting Model; North Central Texas Council of Governments; January 1990.

Table P-3*
D-FW Hourly Service Volumes per Lane **
(Undivided Roads)

Area Type	Functional Classification						
	Freeway	Principal Arterial	Minor Arterial	Collector	Local	Ramp	Frontage Road
CBD	N/A	500	500	400	400	1,100	500
Fringe	N/A	550	550	425	425	1,200	550
Urban Residential	N/A	600	575	450	450	1,250	575
Suburban Residential	N/A	675	625	500	500	1,400	625
Rural	N/A	725	675	525	525	1,500	675

N/A - Not Applicable

* Service volumes at LOS E (the model requires LOS E service volumes or capacities).

** Source: Multimodal Transportation Analysis Process (MTAP): A Travel Demand Forecasting Model; North Central Texas Council of Governments; January 1990.

Option 2 Speed Model (Houston Speed Models)

The original Houston Speed Models are based on speed estimation procedures suggested in a report entitled "Highway Vehicle Speed Estimation Procedures for Use in Emissions Inventories" (a draft report prepared for the EPA by Cambridge Systematics Inc. dated September 1991). The original Houston Speed Models are described in a technical memorandum entitled "Implementation and Calibration of a Speed Model for the Houston-Galveston Region" (prepared by TTI for the Houston-Galveston Area Council in March 1993). The model approach used to estimate freeway speeds in the original Houston Speed Models may be described as a "speed reduction factor" approach. In the PREPIN software, this approach is used for freeways, arterials and collectors.

The use of the "speed reduction factor" approach requires estimates of both the freeflow speed (i.e., the speed at a v/c ratio approaching 0) and the LOS E speed (i.e., the LOS E speed or the speed at a v/c ratio of 1.0). In the PREPIN version, the user provides pairs of speed factors for each functional class and area type which can be applied to the link data input speed to estimate a link's freeflow speed and LOS E speed. The user-supplied speed reduction factors are used to describe the general shape of the speed curve for v/c ratios varying from 0.0 to 1.0. These are used to estimate the speeds for v/c ratios between 0.0 and 1.0. The extensions of the models for v/c ratios exceeding one are based on the traditional BPR impedance adjustment function. The following provides a more detailed description of the congested speed estimation process.

The directional v/c ratios, freeflow speeds and LOS E speeds are computed as follows:

VC1(A,B) = VOL1(A,B) / (CAP24(A,B) * CAPFAC(AT,FC) * 0.5)

VC2(A,B) = VOL2(A,B) / (CAP24(A,B) * CAPFAC(AT,FC) * 0.5)

SPD0(A,B) = SPD24 * SPD0FAC(AT,FC)

SPD1(A,B) = SPD24 * SPD1FAC(AT,FC)

Where:

A,B	=	The A-node and B-node of the link.
AT	=	The area type index for the link obtained from the associated zone and the area type EQUAL cards. PREPIN allows up to 99 area types.
FC	=	The functional classification index; the functional classification code from the link data plus 1. The functional classification codes in the link data vary from 0 to 15.

VC1(A,B)	=	The estimated time-of-day v/c ratio in one direction.
VC2(A,B)	=	The estimated time-of-day v/c ratio in the other direction.
VOL1(A,B)	=	The estimated time-of-day volume in one direction.
VOL2(A,B)	=	The estimated time-of-day volume in the other direction.
CAP24(A,B)	=	The link's 24-hour nondirectional capacity from the assignment data set.
CAPFAC(AT,FC)	=	The user-supplied factor used to estimate time-of-day nondirectional capacity from the 24-hour nondirectional capacity. Half of the nondirectional time-of-day capacity is used for each direction. (These factors are input via the CAPFAC records.)
SPD0(A,B)	=	Estimated freeflow speed on link A,B. The freeflow speed is assumed to be the same in both directions.
SPD1(A,B)	=	Estimated LOS speed (i.e., the expected speed at a v/c ratio of 1.0) on link A,B. The LOS E speed is assumed to be the same in both directions.
SPD24(A,B)	=	The input speed for the link data (i.e., the 24-hour input link data speed).
SPD0FAC(AT,FC)	=	The user-supplied factor used to estimated time-of-day freeflow speed from the input link data speed. (These factors are input via the SD2FAC records.)
SPD1FAC(AT,FC)	=	The user-supplied factor used to estimated time-of-day LOS E speed from the input link data speed. (These factors are input via the SPD2FAC records.)

The speed factors are applied to estimate the link's freeflow speed (i.e., the speed for a v/c ratio approaching 0.0) and the LOS E speed (i.e., the speed for a v/c ratio of 1.0). The user-supplied "speed reduction factors" describe the decay from a freeflow speed to a LOS E speed for a v/c ratio of 1.0. The value of the "speed reduction factors" vary from 0.0 to 1.0. The speed model (for v/c ratios from 0.00 to 1.00) may be described as follows:

$$S_{V/C} = S_{0.0} - SRF_{V/C} * (S_{0.0} - S_{1.0})$$

Where:

$S_{V/C}$ = estimated directional speed for the forecast v/c ratio on the link in the subject direction.

$S_{0.0}$ = estimated freeflow speed for the v/c ratio equal to 0.0.

$S_{1.0}$ = estimated LOS E speed for the v/c ratio equal to 1.0.

$SRF_{V/C}$ = speed reduction factor for the forecast v/c ratio.

V/C = The forecast v/c ratio on the link. The v/c ratio can be 0.0 to 1.0. For v/c ratios greater than 1.0, the model extension discussed below is used.

The "speed reduction factors," which essentially describe the shape of the speed curve, are input to the PREPIN program by area type and functional group. The factors are input for v/c ratios from 0.0 to 1.0 in increments of 0.05. Table P-4 provides an example of a set of speed reduction factors for a freeway. The "speed reduction factors" for v/c ratios between these points are estimated by linear interpolation.

Table P-4
Sample Set of Speed Reduction Factors

V/C Ratio	Speed Reduction Factor	V/C Ratio	Speed Reduction Factor
0.00	0.00000	0.55	0.00735
0.05	0.00005	0.60	0.00860
0.10	0.00010	0.65	0.00930
0.15	0.00025	0.70	0.01000
0.20	0.00040	0.75	0.06750
0.25	0.00095	0.80	0.12500
0.30	0.00150	0.85	0.27250
0.35	0.00250	0.90	0.42000
0.40	0.00350	0.95	0.60000
0.45	0.00480	1.00	1.00000
0.50	0.00610		

Capacity data are not used for centroid connectors and intrazonals. Hence, for local streets which these represent, the freeflow speed factors and LOS E speed factors should be defined as 1.0; and the speed reduction factors should be set to 0 for all v/c entries.

Because traffic assignments can produce v/c ratios greater than 1.0, a model extension similar to that used in the Houston Speed Models is used. The extension in based on the well-known BPR model. For links with a v/c ratio greater than 1.0, the following model extension is used to estimate the link's speed:

$$S_{V/C} = S_{1.0} * (1.15/(1.0 + (0.15 * (V/C)^4)))$$

Where:

$S_{V/C}$ = estimated directional speed for the forecast v/c ratio on the link in the subject direction.

$S_{1.0}$ = estimated LOS E speed for the v/c ratio equal to 1.0.

V/C = The forecast v/c ratio on the link. The v/c ratio can be 1.0 to 1.5. For v/c ratios greater than 1.5, the speed is computed for the v/c ratio of 1.5 is used.

ESTIMATION OF INTRAZONAL TRAVEL AND SPEEDS

Intrazonal travel cannot be estimated from an assignment, since intrazonal trips are not assigned to the network. The procedure developed for IMPACT for estimating intrazonal travel was also incorporated into PREPIN. Under this approach, the following estimates are used:

INTRA = Number of intrazonal trips for the subject zone for the subject time-of-day and season. The total number of intrazonal trips for the zone is read from the assignment trip table. The HPMS factor, seasonal adjustment factor, and time-of-day factor are applied.

SPD = The average speed for intrazonal trips. The average speed for intrazonal trips is estimated by simply averaging the speeds on the zone's centroid connectors.

ATL1 = Average trip length (in minutes). This average trip length in minutes is assumed to be equal to the zone's radii value used in the trip distribution. The radii values are read from the user-supplied radii cards.

ATL2 = Average trip length (in miles). This average trip length is computed using the speed and average trip length in minutes as follows:

$$ATL2 = (SPD/60) * ATL1$$

VMT = Vehicle miles of travel for the intrazonal trips for the subject zone. The estimate of the intrazonal VMT is computed as follows:

$$VMT = INTRA * ATL2$$

PREPIN outputs a link record (for subsequent input to IMPSUMA) for the intrazonal trips for each zone. On the records, the zone number is used for both the A-node and B-node. The method to estimate the intrazonal speed and VMT is described above. Since a speed model is not applied to intrazonal travel, it is not necessary to apply directional splits.

In the speed and VMT summaries produced by PREPIN, the intrazonal travel is summarized as a separate functional classification code (i.e., functional classification code 16 which cannot be used in the link data). This separates these results from the results obtained for travel on centroid connectors. On the link records, the intrazonal records are given a functional classification code of 0 (i.e., the assumed code for centroid connectors).

Z1OUTA JCL REQUIREMENTS

The Z1OUTA program requires 2000K of region size.

DDname	Use
FT01F001	Network data set containing an assignment.
FT03F001	Data set output by Z1OUTA containing the path from the all-zone tree and the times from this tree.
FT06F001	Printed output data set.

Example Z1OUTA JCL

```
//JOBLIB  DD DSN=USR.W150.CB.LOADMOD,DISP=OLD
//Z1OUTA  EXEC PGM=Z1OUTA,REGION=2000K
//FT01F001 DD DISP=OLD,DSN=USR.W150.CB.JORT.NETWFILE
//FT03F001 DD UNIT=SYSDA,DISP=(NEW,PASS),DSN=&&ASZ,
//        SPACE=(TRK,(5,5)),DCB=(RECFM=VBS,LRECL=6228,BLKSIZE=6232)
```

//FT06F001 DD SYSOUT=A

PREPIN JCL REQUIREMENTS

The PREPIN program requires a region size of 3000K.

DDname	Use
FT01F001	Network data set containing an assignment.
FT03F001	Data set output by Z1OUTA containing the path from the all-zone tree and the times from this tree.
FT06F001	Printed output data set.
FT05F001	Input parameter cards, table of equals, etc.
FT08F001	The trip matrix used for the assignment in the format used by the Texas Large Network Assignment Models.
FT09F001	Radii cards in the same format as the Texas Trip Distribution Models.
FT19F001	File containing a header record for SIGNON.
FT20F001	Temporary data set used to copy input from Unit 19.
FT21F001	UTPS log file.
FT30F001	Optional Speed Reduction Factor Data Set (required for applications using the Option 2 Speed Model).
FT40F001	Output links containing VMT, link length, and congested speed.

Example PREPIN STEP JCL

```
//ZB1   EXEC  PGM=PREPIN4A,REGION=3000K
//STEPLIB  DD  DISP=OLD,DSN=USR.W104.CB.LOADMOD5
//FT06F001 DD    SYSOUT=A
//FT05F001 DD    *
//FT19F001 DD    *
//FT20F001 DD  UNIT=SYSDA,SPACE=(TRK,(1,1)),
//         DCB=(RECFM=FB,LRECL=80,BLKSIZE=6320)
//FT21F001 DD  DISP=OLD,DSN=USR.W104.CB.IMPCTLOG
//FT01F001  DD  DISP=OLD,DSN=USR.W150.CB.JORTS620.NETWFILE.S99931
//FT03F001 DD  UNIT=SYSDA,DISP=(OLD,PASS),DSN=&&ASZ,
//         SPACE=(TRK,(5,5)),
//         DCB=(RECFM=VBS,LRECL=6228,BLKSIZE=6232)
```

```
//FT40F001  DD  DISP=(NEW,CATLG),UNIT=DISK,SPACE=(TRK,(20,10)),
//  DSN=USR.W150.CB.JR9993S1,DCB=(RECFM=FB,LRECL=50,BLKSIZE=6300)
//FT09F001  DD  DISP=SHR,DSN=USR.W150.CB.JORTS620.JORRADII
//FT08F001  DD  DISP=OLD,DSN=USR.W150.CB.JORTS620.TOT24HR.F95991
```

PARAMETER RECORD

The PARAMETER record is the first record input to PREPIN on Unit FT05.

Name	Columns	Format	Description
(blanks)	1-10	2I5	Columns 1-10 should be blank on the PARAMETER Record
Iteration number	11-15	I5	For weighted iteration, this field left blank. Otherwise, specify the desired iteration volumes to be used.
Assignment type	16-20	L5	Logical Variable: F = ASSIGN SELF-BALANCING T = PEAK CAPACITY RESTRAINT
Default time-of-day factor	21-30	F10.0	Specifies the default value for the PERFAC time-of-day factors. The default value must be in the range of 0.01 to 10.0. If this parameter is not specified, the PERFAC default values are set to 1.0. The PERFAC factors are stratified by area type and functional classification. If a single PERFAC factor is to be used for all area types and functional classifications, the value can be simply entered as the default value; and the PERFAC records will not be needed.

LAST INTERNAL ZONE RECORD

The LAST INT record can be placed any where in the Unit FT05 input.

Name	Columns	Format	Description
LAST INT	1-8	A8	Character constant of 'LAST INT'
Last internal zone number	11-15	I5	Last Internal Zone Number. This value is needed for placing the trip ends on the intrazonal links cards.

COUNTY EQUAL RECORDS

The EQUAL records define a table of equals of associated zones to county numbers. The associated zones are found by the program Z1OUTA.

Name	Columns	Format	Description
County	1-3	I3	County number
Record type	5-9	A5	Character constant of 'EQUAL'
	11-15	I5	Centroid number[1]
	16-20	I5	Centroid number
	21-25	I5	Centroid number
	26-30	I5	Centroid number
	31-35	I5	Centroid number
	36-40	I5	Centroid number
	41-45	I5	Centroid number
	46-50	I5	Centroid number
	51-55	I5	Centroid number
	56-60	I5	Centroid number
	61-65	I5	Centroid number
	66-70	I5	Centroid number
	71-75	I5	Centroid number
	76-80	I5	Centroid number

[1] Within any EQUAL card a range may be formed by entering the centroid number of the smallest zone number in the range followed by the centroid number (the high end of the range) with a minus sign.

AREA RECORDS

The AREA records define a table of equals of associated zones to area type numbers. The associated zones are found by the program Z1OUTA.

Name	Columns	Format	Description
Area type	1-3	I3	Area type number
Record type	5-9	A5	Character constant of 'AREA '
	11-15	I5	Centroid number[2]
	16-20	I5	Centroid number
	21-25	I5	Centroid number
	26-30	I5	Centroid number
	31-35	I5	Centroid number
	36-40	I5	Centroid number
	41-45	I5	Centroid number
	46-50	I5	Centroid number
	51-55	I5	Centroid number
	56-60	I5	Centroid number
	61-65	I5	Centroid number
	66-70	I5	Centroid number
	71-75	I5	Centroid number
	76-80	I5	Centroid number

Within any AREA card a range may be formed by entering the centroid number of the smallest zone number in the range followed by the centroid number (the high end of the range) with a minus sign.

HEADER RECORDS

The two header records provide two lines of header information which is printed at the top of pages of the tabular summaries produced by PREPIN.

Name	Columns	Format	Description
Record type	1-4	A4	Character constant of 'HDR1'
Header	5-80	A76	First line of header information

Name	Columns	Format	Description
Record type	1-4	A4	Character constant of 'HDR2'
Header	5-80	A76	Second line of header information

HPMFAC RECORDS (HPMS SCALE FACTORS)

The HPMFAC records provide a method of adjusting link volumes and VMT to correspond with the HPMS estimate of VMT by county and functional classification.

Name	Columns	Format	Description
Record type	1-10	A10	Character constant of 'HPMFAC '
County	11-13	I3	County number
Functional classification	14-16	I3	Functional classification number
Scale factor	21-30	F10.4	Scale factor applied to link volumes and VMT by county number and functional classification. If not provided by the user, the default value is set to 1.0.

SEAFAC RECORDS (SEASONAL ADJUSTMENT FACTORS)

The SEAFAC records provide a method of adjusting link volumes and VMT for seasonal fluctuations by county and area type.

Name	Columns	Format	Description
Record type	1-10	A10	Character constant of 'SEAFAC '
County	11-13	I3	County number
Area type	14-16	I3	Area type number
Scale factor	21-30	F10.4	Scale factor applied to link volumes and VMT by county number and area type. If not provided by the user, the default value is set to 1.0.

VMTFAC RECORDS (VMT SCALE FACTORS)

The VMTFAC records provide an alternative method of adjusting VMT by county and functional classification. The factor is applied to adjust the link volumes and, hence, the VMT on the links.

Name	Columns	Format	Description
Record type	1-10	A10	Character constant of 'VMTFAC '
County	11-13	I3	County number
Functional classification	14-16	I3	Functional classification number
Scale factor	21-30	F10.4	Scale factor applied to link volumes and VMT by county number and functional classification. If not provided by the user, the default factors are set to 1.0

PERFAC RECORDS (TIME PERIOD VOLUME FACTORS)

The PERFAC records specify the time period volume factors (stratified by area type and functional classification) which is applied to 24-hour assigned link volumes and VMT. These factors specify the portion of the 24-hour travel expected to occur in the subject time period.

Name	Columns	Format	Description
Record type	1-10	A10	Character constant of 'PERFAC '
Area type	11-13	I3	Area type number
Functional classification	14-16	I3	Functional classification number
Scale factor	21-30	F10.4	Time-of-day scale factor for area type number and functional classification. Default value is 1.0.

SPLIT RECORDS (TIME PERIOD DIRECTIONAL SPLIT ESTIMATES)

The SPLIT records provide for the input of the typical directional splits for two-way traffic by area type and functional classification. The split factor specifies the portion of the two-way traffic on the link expected to be traveling in the peak direction.

Name	Columns	Format	Description
Record type	1-10	A10	Character constant of 'SPLIT '
Area type	11-13	I3	Area type number
Functional classification	14-16	I3	Functional classification number
Split factor	21-30	F10.4	Specifies the portion of the link volume and VMT expected to be traveling in the peak direction. The portion of travel in the off-peak direction is estimated by 1.0-split. The split is input and applied to link volumes and VMT by area type and functional classification. If not provided by the user, the default factors are set to 0.5

CAPFAC RECORDS (TIME PERIOD CAPACITY SCALE FACTORS)

The CAPFAC records provide a method of adjusting 24-hour capacities to time-of-day capacities for each area type and functional classification.

Name	Columns	Format	Description
Record type	1-10	A10	Character constant of 'CAPFAC '
Area type	11-13	I3	Area type number
Functional classification	14-16	I3	Functional classification number
Capacity factor	21-30	F10.4	Capacity scale factor for area type and functional classification number

SPDFAC RECORDS (FREEFLOW SPEED FACTORS)

The SPDFAC records are used in conjunction with the Option 1 Speed Model (i.e., the D-FW Speed Model). These records are used to input the speed factors for estimating a link's freeflow speed based on the link data input speed. The speed factor input is stratified by area type and functional classification.

Name	Columns	Format	Description
Record type	1-10	A10	Character constant of 'SPDFAC '
Area type	11-13	I3	Area type number
Functional classification	14-16	I3	Functional classification number
Freeflow speed factor	21-30	F10.4	The factor to be applied to the input link data speed to estimate the freeflow speed for links in the specified area type and functional classification

DELAY RECORDS (DELAY EQUATION PARAMETERS)

The DELAY records are used in conjunction with the Option 1 Speed Model (i.e., the D-FW Speed Model). These records provide constants for the D-FW delay equation used to calculate congested speed from the v/c ratio.

Name	Columns	Format	Description
Record type	1-10	A10	Character constant of 'DELAY '
County	11-13	I3	County number
Functional classification	14-16	I3	Functional classification number
A coefficient	21-30	F10.4	A coefficient
B coefficient	31-40	F10.4	B coefficient
M factor	41-50	F10.4	Delay upper limit

SPD2FAC RECORDS (FREEFLOW AND LOS E SPEED FACTORS)

The SPD2FAC records are used in conjunction with the Option 2 Speed Model (i.e., the Houston Speed Models). These records are used to input the speed factors for estimating a link's freeflow speed and LOS E speed (i.e., the expected speed at a v/c ratio of 1.0) based on the link data input speed. The speed factor input is stratified by area type and functional classification.

For convenience, the software provides the option of grouping area types and functional classes for the definition of speed reduction factors. The speed reduction factors are specified by SRF Area Group and SRF Road Type codes. The equivalence between the link data Area Types and the Functional Classifications and the SRF area groups and SRF Road Types are specified in the SPD2FAC records.

The presence of SPD2FAC records in the input notifies the PREPIN software that the user has selected the Option 2 Speed Model. Any SPDFAC records or DELAY records will be essentially ignored when SPD2FAC records are present in the input stream. If SPD2FAC records are provided, the PREPIN software will attempt to read the Speed Reduction Factor (SFR) data set from Unit FT30.

Name	Columns	Format	Description
Record type	1-10	A10	Character constant of 'SPD2FAC '
Area type	11-13	I3	Area type number
Functional classification	14-16	I3	Functional classification number
Freeflow speed factor	21-30	F10.4	The factor to be applied to the input link data speed to estimate the freeflow speed for links in the specified area type and functional classification.
LOS E speed factor	31-40	F10.4	The factor to be applied to the input link data speed to estimate the LOS E speed (i.e., the speed corresponding to v/c ratio of 1) for links in the specified area type and functional classification
SRF area group	41-43	I3	The SRF Area Group index for the desired set of SRF
SRF road type	44-46	I3	The SRF Road Type index for the desired set of SRFs

SPEED REDUCTION FACTOR DATA SET

The Speed Reduction Factor (SRF) data set is a user-prepared character data set required for the application of the Option 2 Speed Model (i.e., the Houston Speed Models). The records in the SRF data set are the set of 21 SRF's that describe the decay in speed from freeflow (i.e., v/c equal to 0.00) to LOS E speed (i.e., at v/c equal to 1.00). This data set should be specified in the JCL as Unit 30 (i.e., FT30). Table P-5 provides an example of the 21 SRF factors for a freeway application.

Name	Columns	Format	Description
SRF area group	1-4	1X,I3	SRF area group number. The eligible SRF Area Group numbers are 1 through 9.
SRF road type	5-7	I3	SRF road type number. The eligible SRF road type numbers are 0 through 16.
SRF 1	8-17	F9.6	SRF corresponding to a v/c ratio of 0.00. (This SRF value must be 0.00.)
SRF 2 to SRF 20	18-188	19F9.6	SRF corresponding to v/c ratios of 0.05 to 0.95 in increments of 0.05. (These SRF values should be constantly increasing within the 0.00 to 1.00 range.)
SRF 21	189-197	F9.6	SRF corresponding to a v/c ratio of 1.00. (This SRF value must be 1.00.)

LINK RECORD OUTPUT RECORDS

The link record output contains A-node, B-node, county number, functional classification number, link distance in miles, congested speed, and time period for VMT. The format of these records is (I5,1X,I5,1X,I1,1X,I2,1X,F10.2,1X,F6.2,1X,F15.2,I5,I8).

Name	Columns	Format	Description
A-node	1-5	I5	A-node of link
B-node	7-11	I5	B-node of link
County	13	I1	County number
Link group	15-16	I2	Link group number
Link length	18-27	F10.2	Link length in miles
Congested speed	29-34	F6.2	Congested speed in mph
Link VMT	36-50	F15.2	Link time period VMT
ASZ	51-55	I5	Associated Zone Number
Trip ends	56-63	I8	Trip ends for A-node. This value is only output when A-node is equal to B-node and A-node is not an external station number.

EXAMPLE SETUP FOR PREPIN

```
//JR999e JOB  ( ,60A,3,30,CB),'BELL  JORTS 99 93'
//JOBLIB  DD  DSN=USR.W104.CB.LOADMOD,DISP=OLD
//*********************************************************
//*         JORTS 99 93 TIME PERIOD 1                     *
//*********************************************************
//ZA1      EXEC  PGM=Z10UTA,REGION=2000K
//FT01F001  DD  DISP=OLD,DSN=USR.W150.CB.JORTS620.NETWFILE.S99931
//FT03F001 DD  UNIT=SYSDA,DISP=(NEW,PASS),DSN=&&ASZ,
//         SPACE=(TRK,(5,5)),DCB=(RECFM=VBS,LRECL=6228,BLKSIZE=6232)
//FT06F001 DD    SYSOUT=A
//*
//*
//ZB1   EXEC  PGM=PREPIN4A,REGION=3000K
//STEPLIB  DD  DISP=OLD,DSN=USR.W104.CB.LOADMOD5
//FT06F001 DD    SYSOUT=A
//FT19F001 DD    *
HEADER     Z1OUT 1999 JORTS ASSOCIATED ZONE FILE
//FT20F001 DD  UNIT=SYSDA,SPACE=(TRK,(1,1)),
//         DCB=(RECFM=FB,LRECL=80,BLKSIZE=6320)
//FT21F001 DD  DISP=OLD,DSN=USR.W104.CB.IMPCTLOG
//FT01F001  DD  DISP=OLD,DSN=USR.W150.CB.JORTS620.NETWFILE.S99931
//FT03F001 DD  UNIT=SYSDA,DISP=(OLD,PASS),DSN=&&ASZ,
```

```
//         SPACE=(TRK,(5,5)),
//         DCB=(RECFM=VBS,LRECL=6228,BLKSIZE=6232)
//FT40F001  DD  DISP=(NEW,CATLG),UNIT=DISK,SPACE=(TRK,(20,10)),
//  DSN=USR.W150.CB.JR9993S1,DCB=(RECFM=FB,LRECL=50,BLKSIZE=6300)
//FT09F001  DD  DISP=SHR,DSN=USR.W150.CB.JORTS620.JORRADII
//FT08F001  DD  DISP=OLD,DSN=USR.W150.CB.JORTS620.TOT24HR.F95991
//FT05F001  DD  *
                T 0.1069          MORNING PK HOUR
END
  1 EQUALS    8 -464  658 -660  663 -672
  2 EQUALS  465 -657  661 -662  677 -681
  3 EQUALS    1   -7  673 -676
  1 AREA    113  114  129
  2 AREA    109  112  127  128
  3 AREA     41  -48   50   51   54   55   73   81  -85   89   93   95   98
    .
    .
    .
  2 AREA    103  106 -108  110  111  115 -120  659
  5 AREA    675  676
  6 AREA    662 -674  677 -681
HDR1      JORTS 1999 NETWORK AND 1993 TRIPS
HDR2  MORNING PEAK HOUR (7:15AM TO 8:15AM)
LAST INT    661
DELAY       1  0          .050       3.0      10.0  LOW CAP FAC
DELAY       1  1          .015       3.5       5.0  HIGH CAP FAC
DELAY       1  2          .015       3.5       5.0  HIGH CAP FAC
DELAY       1  3          .050       3.0      10.0  LOW CAP FAC
    .
    .
    .
DELAY       3 12          .050       3.0      10.0  LOW CAP FAC
DELAY       3 13          .050       3.0      10.0  LOW CAP FAC
DELAY       3 14          .050       3.0      10.0  LOW CAP FAC
DELAY       3 15          .050       3.0      10.0  LOW CAP FAC
SEAFAC      1  1       1.06500     SUMMER O3 JEFFERSON
SEAFAC      1  2       1.06500     SUMMER O3 JEFFERSON
SEAFAC      1  3       1.06500     SUMMER O3 JEFFERSON
SEAFAC      1  4       1.06500     SUMMER O3 JEFFERSON
SEAFAC      1  5       1.06500     SUMMER O3 JEFFERSON
SEAFAC      1  6       1.06500     SUMMER O3 JEFFERSON
SEAFAC      2  1       1.06500     SUMMER O3 ORANGE
SEAFAC      2  2       1.06500     SUMMER O3 ORANGE
SEAFAC      2  3       1.06500     SUMMER O3 ORANGE
SEAFAC      2  4       1.06500     SUMMER O3 ORANGE
SEAFAC      2  5       1.06500     SUMMER O3 ORANGE
SEAFAC      2  6       1.06500     SUMMER O3 ORANGE
SEAFAC      2  1       1.08400     SUMMER O3 HARDIN
SEAFAC      2  2       1.08400     SUMMER O3 HARDIN
SEAFAC      2  3       1.08400     SUMMER O3 HARDIN
SEAFAC      2  4       1.08400     SUMMER O3 HARDIN
SEAFAC      2  5       1.08400     SUMMER O3 HARDIN
SEAFAC      2  6       1.08400     SUMMER O3 HARDIN
SPLIT       1  0         54.00 AM_PK  CBD      CENT CONN  CBD      LOCAL
SPLIT       1  1         50.00 AM_PK  CBD      IH & FRWY  CBD      INTERSTATE
SPLIT       1  2         65.00 AM_PK  CBD      MUL LN HWY CBD      OTHER PRIN AR
    .
    .
    .
SPLIT       6 11         50.00 AM_PK  RURAL    NOT USED   RURAL    DEFAULT 50-50
SPLIT       6 12         50.00 AM_PK  RURAL    NOT USED   RURAL    DEFAULT 50-50
SPLIT       6 13         50.00 AM_PK  RURAL    NOT USED   RURAL    DEFAULT 50-50
SPLIT       6 14         50.00 AM_PK  RURAL    NOT USED   RURAL    DEFAULT 50-50
SPLIT       6 15         50.00 AM_PK  RURAL    NOT USED   RURAL    DEFAULT 50-50
CAPFAC      1  0        .10000         PK HOUR          1 HRS
CAPFAC      2  0        .10000         PK HOUR          1 HRS
CAPFAC      3  0        .10000         PK HOUR          1 HRS
CAPFAC      4  0        .10000         PK HOUR          1 HRS
```

```
CAPFAC     5  0       .10000        PK HOUR          1 HRS
CAPFAC     6  0       .10000        PK HOUR          1 HRS
CAPFAC     1  1       .09048        PK HOUR          1 HRS
CAPFAC     2  1       .09299        PK HOUR          1 HRS
CAPFAC     3  1       .11896        PK HOUR          1 HRS
CAPFAC     4  1       .11057        PK HOUR          1 HRS
CAPFAC     5  1       .15175        PK HOUR          1 HRS
CAPFAC     6  1       .17524        PK HOUR          1 HRS
    .
    .
    .
CAPFAC     4 15       .10000        PK HOUR          1 HRS
CAPFAC     5 15       .10000        PK HOUR          1 HRS
CAPFAC     6 15       .10000        PK HOUR          1 HRS
SPDFAC     1  0      1.00000           JORTS 6/24/93
SPDFAC     2  0      1.00000           JORTS 6/24/93
SPDFAC     3  0      1.00000           JORTS 6/24/93
SPDFAC     4  0       .99005           JORTS 6/24/93
SPDFAC     5  0       .98760           JORTS 6/24/93
SPDFAC     6  0      1.00345           JORTS 6/24/93
SPDFAC     1  1      1.44737           JORTS 6/24/93
SPDFAC     2  1      1.44737           JORTS 6/24/93
SPDFAC     3  1      1.44670           JORTS 6/24/93
SPDFAC     4  1      1.30137           JORTS 6/24/93
SPDFAC     5  1      1.06542           JORTS 6/24/93
SPDFAC     6  1      1.22744           JORTS 6/24/93
SPDFAC     1  2       .46730           JORTS 6/24/93
    .
    .
    .
SPDFAC     2 15      1.12000           JORTS 6/24/93
SPDFAC     3 15      1.12000           JORTS 6/24/93
SPDFAC     4 15      1.12000           JORTS 6/24/93
SPDFAC     5 15      1.12000           JORTS 6/24/93
SPDFAC     6 15      1.12000           JORTS 6/24/93
```

POLFAC5A

PURPOSE

The POLFAC5A program is one of a series of programs developed by the Texas Transportation Institute to facilitate the computation of emissions. The POLFAC5A program is used to apply MOBILE5a to obtain emission factors. It provides the user the option of computing emission factors from two different years and averaging them. The emission factors are obtained for eight vehicle types and 63 speeds (i.e., 3 mph through 65 mph) for each vehicle type. Hence, there are 504 factors (i.e., 8 x 63 = 504) for each pollution type for each county. Three pollution types are computed: VOC[3], CO, and NOX. Hence, for each county there are 1,512 emission factors. These emission factors are output to an ASCII file for subsequent input to either the IMPSUM program or the COADJ program. The POLFAC5A program can be applied for a 24-hour period or for each time-of-day time period for which VMT and speed estimates are available. The emission factors from POLFAC5A (or the combined emission factors from COADJ) are applied using the IMPSUM program to estimate emissions.

To apply MOBILE5a, the POLFAC5A program reads a set of MOBILE5a data cards with either one or two scenarios. If there is one scenario card, then it runs the MOBILE5a subroutine with the scenario card modified for speeds from 3 to 65 mph in 1 mile/hour increments. POLFAC5A then writes a set of emission factor card images to Unit 25. If there are two scenarios, it runs both scenarios with speeds of 3 to 65 mph and averages the runs of the two scenarios with the same speed. The averaged emission factors are then written to Unit 25. The output from MOBILE5a is sent to Unit 9; in the example JCL, Unit 9 is set to a dummy unit with a DCB. If the printed output is desired, the dummy option is removed and SYSOUT=A and DCB = (RECFM=FBA, LRECL=133, BLKSIZE=1330) is added. The PRTFLG must be 4 if all emission factors are desired, since MOBILE5a calculates only the emission factors that it prints.

The user may select any of the five hydrocarbon types with the NMHFLG. The program will label the resulting hydrocarbon emissions rates as either THC, TOG, NMHC, VOC, or NMOG. The IMPSUM program will accept only the VOC hydrocarbon type.

DATA SETS REFERENCES

The data sets used by this program are:

DDNAME	Description of data set
STEPLIB	The load module library; program name is POLFAC
FT05F001	MOBILE5 data cards including one or two scenarios
FT06F001	Printed output from POLFAC5A
IMDATA[4]	IMDATA data supplied by EPA; read if an inspection maintenance program is used
TECH12[5]	TECH12 data supplied by EPA; read if an inspection maintenance program is used
INLEV	LEVIMP data supplied by user if PROMPT flag is 5
FT09F001	Printed output from MOBILE5
FT25F001	Emission factor card image output
FT10F001	Temporary data set used to pass MOBILE5 a set of data cards
FT98F001	Microcomputer Script file output; not used by mainframe version
FT99F001	Microcomputer Script file; not used by mainframe version

---

The user can optionally input a DDname. The DDname must begin with an alphabetic character and can be from 1 to 7 characters long including only alphabetic characters and numbers. The name can not start with FT.

The user can optionally input a DDname. The DDname must begin with an alphabetic character and can be from 1 to 7 characters long including only alphabetic characters and numbers. The name can not start with FT.

OUTPUT DATA SET

The POLFAC5A program produces 63 emission factors card images on Unit 25 which provide the emission factors for speeds from 3 to 65 mph. The format of the emission factor card images is:

Columns	Format	Contents
1-3	I3	Speed (these speeds will be integer values from 3 to 65)
5-8	A3	Type of emissions, either THC, NMHC, VOC, TOG, NMOG[6], NOX, or CO
9-80	8F9.5	Eight emission factors for vehicle types LDGV, LDGT1, LDGT2, HDGV, LDDV, LDDT, HDDV, and MC

These emission factor data are subsequently input to the program IMPSUM.

Example JCL

```
//IM3BLK JOB  (  ,60A,S59,5,CB),'BELL  POL FACTORS'
//POL  EXEC  PGM=POLFAC5A,REGION=1400K
//STEPLIB  DD  DISP=OLD,DSN=USR.W150.CB.JB.IMPSUM
//FT06F001  DD  SYSOUT=A
//TECH12  DD  DISP=OLD,DSN=USR.W104.CB.TECH12.MOB5A
//IMDATA  DD  DISP=OLD,DSN=USR.W104.CB.IMDATA.MOB5A
//FT09F001  DD  DUMMY,DCB=(RECFM=FB,LRECL=223,BLKSIZE=2230)
//FT25F001  DD  SYSOUT=A,DCB=(RECFM=FB,LRECL=80,BLKSIZE=800)  ;RATES
//FT10F001  DD  UNIT=SYSDA,SPACE=(TRK,(5,2)),
//  DCB=(RECFM=FB,LRECL=80,BLKSIZE=6320)
//FT05F001  DD  DISP=OLD,DSN=USR.W150.CB.IM3BLK.PLF2
```

Example MOBILE5A Input Data

The data set JEF90BAS.POL is shown below:

```
1          PROMPT
1 JEFFERSON COUNTY - Base Year Ozone Season 1990
1          TAMFLG  - Default: Tampering Rates
1          SPDFLG  - User input: one speed for all vehicle types
3          VMFLAG  - User input: single VMT mix for all scenario
3          MYMRFG  - User input: Reg. Distributions
1          NEWFLG  - Default: Basic exhaust emission rates
1          IMFLAG  -      no   I/M
```

Only one type of hydrocarbon is allowed per run. The hydrocarbon type of THC, NMHC, VOC, TOG, or NMOG is specified by the NMHFLG.

```
1          ALHFLG  - No additional correction factors
1          ATPFLG  -      no   atp
5          RLFLAG  - Zero-out refueling emissions
2          LOCFLG  - User input: one LAP record for all scenarios
1          TEMFLG  - MOBILE5.0 calculates exhaust temperatures
4          OUTFMT  - 80-column descriptive format
4          PRTFLG  - Print all three pollutant emission factors
1          IDLFLG  - No idle emissions calculated or printed
3          NMHFLG  - Print HC = volatile organic compounds (VOC)
1          HCFLAG  - Print total HC
.584.237.065.036.008.004.063.003 - LDGV,LDGT1,LDGT2,HDGV,LDDV,LDDT,HDDV,MC
 .060 .081 .076 .074 .074 .077 .079 .054 .053 .057  July,1990 .LDGV..MY AGES 1-10
 .051 .058 .051 .042 .026 .015 .012 .011 .008 .007  Vehicle                 11-20
 .009 .006 .006 .005 .005                           Registrations            21-25
 .070 .097 .077 .064 .071 .071 .077 .048 .060 .055           .LDGT1.MY AGES 1-10
 .038 .048 .044 .039 .027 .014 .016 .014 .012 .010                          11-20
 .014 .009 .009 .007 .007                                                   21-25
 .059 .089 .080 .036 .072 .087 .095 .062 .060 .044           .LDGT2.MY AGES 1-10
 .037 .060 .044 .050 .039 .023 .017 .014 .006 .006                          11-20
 .006 .004 .004 .003 .003                                                   21-25
 .036 .055 .052 .025 .040 .047 .059 .042 .054 .069           .HDGV..MY AGES 1-10
 .058 .078 .071 .044 .030 .046 .043 .031 .023 .012                          11-20
 .026 .017 .016 .014 .014                                                   21-25
 .060 .081 .076 .074 .074 .077 .079 .054 .053 .057           .LDDV..MY AGES 1-10
 .051 .058 .051 .042 .026 .015 .012 .011 .008 .007                          11-20
 .009 .006 .006 .005 .005                                                   21-25
 .070 .097 .077 .064 .071 .071 .077 .048 .060 .055           .LDDT..MY AGES 1-10
 .038 .048 .044 .039 .027 .014 .016 .014 .012 .010                          11-20
 .014 .009 .009 .007 .007                                                   21-25
 .022 .028 .040 .023 .062 .050 .043 .030 .056 .122           .HDDV..MY AGES 1-10
 .118 .097 .067 .045 .028 .047 .028 .028 .013 .013                          11-20
 .011 .007 .007 .006 .007                                                   21-25
 .017 .041 .049 .055 .100 .088 .055 .078 .118 .085           .MC....MY AGES 1-10
 .080 .231 .000 .000 .000 .000 .000 .000 .000 .000                          11-20
 .000 .000 .000 .000 .000                                                   21-25
Jefferson  BY Run   70. 093. 08.0 08.0 90      LAP rec: SCNME,MNTMP,MXTMP,RVP1,RVP2,RVP2SY
1 90 XXXX 85.6 20.6 27.3 20.6  7               SCN rec: RGN,CY,SPD,AMBTMP,PCCN,PCHC,PCCC,JULY
```

MICROCOMPUTER USAGE

The POLFAC5A program requires a 386, 486, or Pentium microcomputer with a math coprocessor. The computer should have at least 2 megabytes of memory. The inspection/maintenance files IMDATA.D and TECH12.D must be in the logged drive and directory or in an APPEND statement for the IMDATA.D and TECH12.D directory and in the path for the POLFAC5A.EXE file. Run time will vary by equipment, complexity of the MOBILE5a data, and output options chosen. The above example ran 72 seconds on a 486DX 33 megahertz machine using the Microsoft SMARTDRV disk caching program. If SMARTDRV is used, a check of the XMS or extended ram free should be done both before and after loading SMARTDRV to determine if 2 megabytes are free. If two scenarios are used, the time will double. If ATP and I/M programs are included, the time will be longer. If a TECH12 ATP program is included, the time will be still longer.

There are two ways to run POLFAC5A on a microcomputer. In the first method the user enters the DOS command "IMPSUM" with no parameters. In the second method the user enters the DOS command "IMPSUM <JCF> <STEP>" where <JCF> is a Job Control File and <STEP> is a Step name in the Job Control File.

JOB CONTROL FILE DESCRIPTION

The Job Control File performs a function similar to JCL on the mainframe, but it is much simpler than JCL. There are four types of records in the Job Control File. All of the records have left-justified fields with fixed starting columns. Column 1 is always a slash. Columns 2-4 are an operation field (which must be in upper case). The first two Job Control records must be a /JOB and a /LOG record. After this a /STEP record names a program to be run and a Step name. The /STEP record is followed by /FT records which name the FORTRAN data sets used by the program. Records named /C and /DOS are skipped. Any other type of record is an error. The /LOG record names an output file. For the first step of the Job Control File the /LOG file is opened as a new data set. For additional steps the /LOG file is opened in append mode so that output is added to the end of the /LOG data set. The /LOG and the /FT records provide 80 columns for the drive, path, and data set name. The data set names may be in lower case, uppercase or a mixture of upper and lower case. A flag is provided on the /FT records which allows these data sets to be opened in append mode for output data sets. The format of the Job Control File records follows.

JOB RECORD

Name	Columns	Format	Description
JOB	1-4	A4	Character constant of '/JOB'; must be in upper case
Job name	10-17	A8	The job name will be printed in the log file output
Job description	20-99	A80	The job description will be printed in the log file

LOG RECORD

Name	Columns	Format	Description
LOG	1-4	A4	Character constant of '/LOG'; must be in upper case
Append flag	9	A1	This is a flag to indicate if the file should have output added to it for the first step. If the flag is '+' then the first step output will be added to the end of the file. If the flag is anything else the file will be overwritten for the first step output. Steps after the first step will always append output to the log file.
Log file name	10-89	A80	The log file disk drive, path, and file name; follows the standard MS DOS format for a file name in a DOS command

STEP RECORD

Name	Columns	Format	Description
STEP	1-5	A5	Character constant of '/STEP'; must be in upper case
Step name	10-19	A10	Step name printed in the log file and output to the screen
Program name	20-29	A10	The program which will be executed; if program is called by a DOS command or a line in a Batch file, then this is a comment but it will appear in the log file output

DATA FILE RECORD

Name	Columns	Format	Description
FORTRAN file description	1-3	A3	Character constant of '/FT'; must be in upper case
File number	4-5	I2	The FORTRAN file number must be in the range of 1 to 97. The Job Control File subroutine uses Unit 99 to read the Job Control File and Unit 98 for the LOG file.
Append flag	9	A1	Flag to indicate if the file should have output added to it. If the flag is '+' then the output will be added to the end of the file. If the flag is anything else, the file will be overwritten.
File name	10-89	A80	The file disk drive, path, and file name; follows the standard MS DOS format for a file name in a DOS command

DOS COMMAND RECORD

Name	Columns	Format	Description
DOS command	1-4	A4	Character constant of '/DOS'; must be in upper case
DOS command value	10-89	A80	This record is skipped but will print in the log file

COMMENT RECORD

Name	Columns	Format	Description
Comment	1-3	A3	Character constant of '/C'; must be in upper case
Comment value	10-89	A80	This record is skipped but will print in the log file

POLFAC5A MICROCOMPUTER FILES

The following files are required by the microcomputer version of POLFAC5A. The file names beginning with the character "FT" are FORTRAN files. The 2-digit number following the "FT" is the FORTRAN unit number.

File Name	Append Option Available	File Name Prompt[7]	Input / Output	Description - Comments
FT05	No	Yes	Input	MOBILE5a input to POLFAC5A
FT06	Yes	Yes	Output	Printed output from POLFAC5A
FT09	Yes	No (file name set to "NUL")	Output	Printed output from the 63 or 126 runs of MOBILE5a. This file is large and is not usually needed. If POLFAC5A is run with the Job Control File option and the user leaves /FT09 record out, then the file name will default to "NUL".
FT25	Yes	Yes	Output	This is the pollution rates file output.

Example POLFAC5A Job Control File

```
/JOB     RATES5    TEST POLFAC5A WITH JOB CONTROL FILE - MOBILE5a OUTPUT NUL
/LOG     RATES5.LOG
/STEP    MEX687    POLFAC5A
/FT06    RATES5.L6
/FT09    NUL
/FT05    MEX687.POL
/FT25    MEX687.RAT
/STEP    NMEX687   POLFAC5A
/FT06   +RATES5.L6
/FT09    NUL
/FT05    NMEX687.POL
/FT25    NMEX687.RAT
/STEP    MEX699    POLFAC5A
/FT06   +RATES5.L6
/FT09    NUL
/FT05    MEX699.POL
/FT25    MEX699.RAT
/STEP    NMEX699   POLFAC5A
/FT06   +RATES5.L6
/FT09    NUL
/FT05    NMEX699.POL
/FT25    NMEX699.RAT
/STEP    JEF90BAS  POLFAC5A
/FT06   +RATES5.L6
```

The user is not prompted for a file name if the JOB CONTROL File option is used.

```
/FT09    NUL
/FT05    JEF90BAS.POL
/FT25    JEF90BAS.RAT
```

Example POLFAC5A Microcomputer Run

This example was run on a computer with 8 megabytes of ram. A ram drive using 1.5 megabytes of XMS memory is installed and also the program SMARTDRV.EXE is using 2 megabytes of XMS memory. Also a memory manager is installed.

```
c:\impsum9>polfac5a

        32-bit Power for Lahey Computer Systems
      Phar Lap's 386|DOS-Extender(tm) Version 4.1L
     Copyright (C) 1986-92 Phar Lap Software, Inc.
              Available Memory = 3224 Kb


BATCH FILE (Y/N)?n

POLFAC5A INPUT DATA SET=jef90bas.pol

POLFAC5A RATES FILE=jef90bas.rat

POLFAC5A STARTED AT:  02/03/94  15:47:54
SCENARIO  1 SPEED  3 STARTED: 15:47:54.6
SCENARIO  1 SPEED  4 STARTED: 15:47:55.7
SCENARIO  1 SPEED  5 STARTED: 15:47:56.9
SCENARIO  1 SPEED  6 STARTED: 15:47:58.0
SCENARIO  1 SPEED  7 STARTED: 15:47:59.1
                   .
                   .
                   .
SCENARIO  1 SPEED 62 STARTED: 15:49:01.5
SCENARIO  1 SPEED 63 STARTED: 15:49:02.7
SCENARIO  1 SPEED 64 STARTED: 15:49:03.8
SCENARIO  1 SPEED 65 STARTED: 15:49:05.0
POLFAC5A ENDED AT:  02/03/94  15:49:06 RUN TIME =    72 SECONDS

c:\impsum9>
```

Example Output

```
  3 VOC  20.52074 22.31578 30.19042 46.98459  1.54198  2.21365  7.34906 22.64065
  4 VOC  14.76799 16.29338 21.75100 36.37848  1.46396  2.10165  6.97724 19.76731
  5 VOC  11.58599 12.90062 17.01745 30.55119  1.39111  1.99708  6.63005 17.64391
    .
    .
    .
 63 VOC   2.46092  3.27929  3.90254  5.69563  0.32480  0.46629  1.54801  9.54342
 64 VOC   2.53424  3.38639  4.03280  5.70232  0.32509  0.46670  1.54938  9.68090
 65 VOC   2.60769  3.49362  4.16326  5.71272  0.32566  0.46752  1.55211  9.81838
  3 CO  178.61035212.24690288.48853483.49680  5.16276  6.06064 44.96612179.99255
  4 CO  135.92184162.48410220.87981441.75018  4.75807  5.58556 41.44136143.54373
  5 CO  109.54968131.04698177.41107404.49713  4.39308  5.15710 38.26247117.21025
    .
    .
    .
 63 CO   37.67552 55.06861 65.01883105.32437  0.96567  1.13362  8.41074 31.90504
 64 CO   40.56795 59.46175 70.25137109.80925  0.99267  1.16531  8.64585 34.53033
```

```
 65 CO   43.46038 63.85488 75.48392114.73725  1.02228  1.20006  8.90372 37.15561
  3 NOX   2.31466  2.57152  2.83812  4.90207  2.81461  3.29356 37.40145  0.82612
  4 NOX   2.15549  2.38542  2.65918  4.95280  2.69607  3.15484 35.82620  0.79017
  5 NOX   2.05603  2.27158  2.55188  5.00352  2.58618  3.02626 34.36606  0.76034
    .
    .
    .
 63 NOX   3.17528  3.85953  4.51484  7.94569  2.62853  3.07581 34.92872  1.58214
 64 NOX   3.26006  3.95826  4.63412  7.99641  2.74174  3.20829 36.43316  1.61675
 65 NOX   3.34484  4.05698  4.75341  8.04714  2.86390  3.35124 38.05640  1.65136
```

Files Produced or Used by the Example Run

```
--a---      3,328   6-18-93   4:00p  c:jef90bas.pol
--a---    785,963   1-31-94   3:47p  c:polfac5a.exe
--a---     45,049   2-03-94   3:47p  c:polfac5a.map
--a---     15,498   2-03-94   3:49p  c:jef90bas.rat
--a---      3,690   2-03-94   3:49p  c:temp5in
--a---      4,039   2-03-94   3:49p  c:tstout
------    569,424   3-26-93  12:00p  c:imdata.d
------    630,745   9-15-93  12:00p  c:imdata2.d
------     62,551   3-26-93  12:00p  c:tech12.d
```

The file "tstout" is the POLFAC5A printed output. The file "jef90bas.rat" is the rate output which is partially listed above. The file "temp5in" is the last input to MOBILE5a. The user can scratch the files "temp5in", and "tstout" after a run. These files will be overwritten by the next POLFAC5A run. The file "jef90bas.pol" is the input file to POLFAC5A in the above example run.

Example POLFAC5A Microcomputer Run with JCF File

This example was run on a computer with 8 megabytes of ram. A ram drive using 1.5 megabytes of XMS memory is installed. The program SMARTDRV.EXE is using 2 megabytes of XMS memory. Also a memory manager is installed. This run used the JCFBATCH microcomputer program explained later to start five POLFAC5A runs using a single Job Control File with five steps.

```
c:\impsum9\pol5>dir

 Volume in drive C is STACVOL_DSK
 Directory of  c:\impsum9\pol5\*.*

.            <DIR>      2-03-94 10:11a
..           <DIR>      2-03-94 10:11a
rates5           627    2-03-94 11:28a
mex687.pol      5658   10-04-93 10:57a
nmex687.pol     3690   10-04-93 10:57a
nmex699.pol     3688   10-04-93 10:55a
mex699.pol      5663   10-04-93 10:54a
jef90bas.pol    3328    6-18-93  4:00p
      22,654 bytes in 8 file(s)        49,152 bytes allocated
 133,455,872 bytes free

c:\impsum9\pol5>type rates5

/JOB     RATES5    TEST POLFAC5A WITH JOB CONTROL FILE - MOBILE5A OUTPUT NUL
/LOG     RATES5.LOG
/STEP    MEX687    POLFAC5A
```

```
/FT06    RATES5.L6
/FT09    NUL
/FT05    MEX687.POL
/FT25    MEX687.RAT
/STEP    NMEX687   POLFAC5A
/FT06   +RATES5.L6
/FT09    NUL
/FT05    NMEX687.POL
/FT25    NMEX687.RAT
/STEP    MEX699    POLFAC5A
/FT06   +RATES5.L6
/FT09    NUL
/FT05    MEX699.POL
/FT25    MEX699.RAT
/STEP    NMEX699   POLFAC5A
/FT06   +RATES5.L6
/FT09    NUL
/FT05    NMEX699.POL
/FT25    NMEX699.RAT
/STEP    JEF90BAS  POLFAC5A
/FT06   +RATES5.L6
/FT09    NUL
/FT05    JEF90BAS.POL
/FT25    JEF90BAS.RAT

c:\impsum9\pol5>jcfbatch rates5

        32-bit Power for Lahey Computer Systems
      Phar Lap's 386|DOS-Extender(tm) Version 4.1L
     Copyright (C) 1986-92 Phar Lap Software, Inc.
              Available Memory = 3288 Kb

c:\impsum9\pol5>&&jcf


CMD:  POLFAC5A rates5 MEX687

        32-bit Power for Lahey Computer Systems
      Phar Lap's 386|DOS-Extender(tm) Version 4.1L
     Copyright (C) 1986-92 Phar Lap Software, Inc.
              Available Memory = 3288 Kb

rates5 MEX687
SCRIPT FILE = "rates5
STEP NAME = "MEX687  "
STEP: MEX687     STARTED AT:  02/04/94  09:48:00
FILES ARE:
  5 SEQUENTIAL UNKNOWN   MEX687.POL
  6 SEQUENTIAL UNKNOWN   RATES5.L6
  9 SEQUENTIAL UNKNOWN   NUL
 25 SEQUENTIAL UNKNOWN   MEX687.RAT
 98 SEQUENTIAL UNKNOWN   RATES5.LOG
POLFAC5A STARTED AT:  02/04/94  09:48:00
SCENARIO  1 SPEED  3 STARTED: 09:48:00.5
SCENARIO  1 SPEED  4 STARTED: 09:48:01.7
SCENARIO  1 SPEED  5 STARTED: 09:48:02.9
SCENARIO  1 SPEED  6 STARTED: 09:48:04.1
SCENARIO  1 SPEED  7 STARTED: 09:48:05.3
SCENARIO  1 SPEED  8 STARTED: 09:48:06.5
                   .
                   .
                   .
SCENARIO  1 SPEED 61 STARTED: 09:49:11.2
SCENARIO  1 SPEED 62 STARTED: 09:49:12.4
```

```
SCENARIO  1 SPEED 63 STARTED: 09:49:13.6
SCENARIO  1 SPEED 64 STARTED: 09:49:14.9
SCENARIO  1 SPEED 65 STARTED: 09:49:16.1
POLFAC5A ENDED AT:  02/04/94  09:49:17 RUN TIME =    77 SECONDS


CMD:  POLFAC5A rates5 NMEX687
```

```
        32-bit Power for Lahey Computer Systems
      Phar Lap's 386|DOS-Extender(tm) Version 4.1L
     Copyright (C) 1986-92 Phar Lap Software, Inc.
              Available Memory = 3288 Kb
```

```
rates5 NMEX687
SCRIPT FILE = "rates5
STEP NAME = "NMEX687 "
STEP: NMEX687    STARTED AT:  02/04/94  09:49:19
FILES ARE:
  5 SEQUENTIAL UNKNOWN   NMEX687.POL
  6 APPEND     OLD       RATES5.L6
  9 SEQUENTIAL UNKNOWN   NUL
 25 SEQUENTIAL UNKNOWN   NMEX687.RAT
 98 APPEND     UNKNOWN   RATES5.LOG
POLFAC5A STARTED AT:  02/04/94  09:49:19
SCENARIO  1 SPEED  3 STARTED: 09:49:19.9
SCENARIO  1 SPEED  4 STARTED: 09:49:21.1
SCENARIO  1 SPEED  5 STARTED: 09:49:22.2
SCENARIO  1 SPEED  6 STARTED: 09:49:23.3
SCENARIO  1 SPEED  7 STARTED: 09:49:24.4
SCENARIO  1 SPEED  8 STARTED: 09:49:25.5
                   .
                   .
                   .
SCENARIO  1 SPEED 61 STARTED: 09:50:24.0
SCENARIO  1 SPEED 62 STARTED: 09:50:25.1
SCENARIO  1 SPEED 63 STARTED: 09:50:26.2
SCENARIO  1 SPEED 64 STARTED: 09:50:27.3
SCENARIO  1 SPEED 65 STARTED: 09:50:28.4
POLFAC5A ENDED AT:  02/04/94  09:50:29 RUN TIME =    70 SECONDS

CMD:  POLFAC5A rates5 MEX699
```

```
        32-bit Power for Lahey Computer Systems
      Phar Lap's 386|DOS-Extender(tm) Version 4.1L
     Copyright (C) 1986-92 Phar Lap Software, Inc.
              Available Memory = 3288 Kb
```

```
rates5 MEX699
SCRIPT FILE = "rates5
STEP NAME = "MEX699  "
STEP: MEX699     STARTED AT:  02/04/94  09:50:31
FILES ARE:
  5 SEQUENTIAL UNKNOWN   MEX699.POL
  6 APPEND     OLD       RATES5.L6
  9 SEQUENTIAL UNKNOWN   NUL
 25 SEQUENTIAL UNKNOWN   MEX699.RAT
 98 APPEND     UNKNOWN   RATES5.LOG
POLFAC5A STARTED AT:  02/04/94  09:50:32
SCENARIO  1 SPEED  3 STARTED: 09:50:32.1
SCENARIO  1 SPEED  4 STARTED: 09:50:33.6
SCENARIO  1 SPEED  5 STARTED: 09:50:35.3
SCENARIO  1 SPEED  6 STARTED: 09:50:36.8
SCENARIO  1 SPEED  7 STARTED: 09:50:38.4
SCENARIO  1 SPEED  8 STARTED: 09:50:40.0
```

```
                    .
                    .
                    .
SCENARIO  1 SPEED 61 STARTED: 09:52:03.5
SCENARIO  1 SPEED 62 STARTED: 09:52:05.0
SCENARIO  1 SPEED 63 STARTED: 09:52:06.6
SCENARIO  1 SPEED 64 STARTED: 09:52:08.2
SCENARIO  1 SPEED 65 STARTED: 09:52:09.8
POLFAC5A ENDED AT:  02/04/94  09:52:11 RUN TIME =    99 SECONDS

CMD:  POLFAC5A rates5 NMEX699
```

```
        32-bit Power for Lahey Computer Systems
      Phar Lap's 386|DOS-Extender(tm) Version 4.1L
     Copyright (C) 1986-92 Phar Lap Software, Inc.
              Available Memory = 3288 Kb
```

```
rates5 NMEX699
SCRIPT FILE = "rates5
STEP NAME = "NMEX699 "
STEP: NMEX699    STARTED AT:  02/04/94  09:52:13
FILES ARE:
  5 SEQUENTIAL UNKNOWN   NMEX699.POL
  6 APPEND     OLD       RATES5.L6
  9 SEQUENTIAL UNKNOWN   NUL
 25 SEQUENTIAL UNKNOWN   NMEX699.RAT
 98 APPEND     UNKNOWN   RATES5.LOG
POLFAC5A STARTED AT:  02/04/94  09:52:13
SCENARIO  1 SPEED  3 STARTED: 09:52:13.9
SCENARIO  1 SPEED  4 STARTED: 09:52:15.4
SCENARIO  1 SPEED  5 STARTED: 09:52:16.8
SCENARIO  1 SPEED  6 STARTED: 09:52:18.2
SCENARIO  1 SPEED  7 STARTED: 09:52:19.7
SCENARIO  1 SPEED  8 STARTED: 09:52:21.1
                    .
                    .
                    .
SCENARIO  1 SPEED 61 STARTED: 09:53:38.8
SCENARIO  1 SPEED 62 STARTED: 09:53:40.3
SCENARIO  1 SPEED 63 STARTED: 09:53:41.7
SCENARIO  1 SPEED 64 STARTED: 09:53:43.2
SCENARIO  1 SPEED 65 STARTED: 09:53:44.7
POLFAC5A ENDED AT:  02/04/94  09:53:46 RUN TIME =    93 SECONDS

CMD:  POLFAC5A rates5 JEF90BAS
```

```
        32-bit Power for Lahey Computer Systems
      Phar Lap's 386|DOS-Extender(tm) Version 4.1L
     Copyright (C) 1986-92 Phar Lap Software, Inc.
              Available Memory = 3288 Kb
```

```
rates5 JEF90BAS
SCRIPT FILE = "rates5
STEP NAME = "JEF90BAS"
STEP: JEF90BAS   STARTED AT:  02/04/94  09:53:48
FILES ARE:
  5 SEQUENTIAL UNKNOWN   JEF90BAS.POL
  6 APPEND     OLD       RATES5.L6
  9 SEQUENTIAL UNKNOWN   NUL
 25 SEQUENTIAL UNKNOWN   JEF90BAS.RAT
 98 APPEND     UNKNOWN   RATES5.LOG
POLFAC5A STARTED AT:  02/04/94  09:53:48
SCENARIO  1 SPEED  3 STARTED: 09:53:48.7
SCENARIO  1 SPEED  4 STARTED: 09:53:49.8
```

```
SCENARIO  1 SPEED  5 STARTED: 09:53:50.9
SCENARIO  1 SPEED  6 STARTED: 09:53:52.1
SCENARIO  1 SPEED  7 STARTED: 09:53:53.2
SCENARIO  1 SPEED  8 STARTED: 09:53:54.3
                   .
                   .
                   .
SCENARIO  1 SPEED 61 STARTED: 09:54:54.9
SCENARIO  1 SPEED 62 STARTED: 09:54:56.1
SCENARIO  1 SPEED 63 STARTED: 09:54:57.2
SCENARIO  1 SPEED 64 STARTED: 09:54:58.3
SCENARIO  1 SPEED 65 STARTED: 09:54:59.5
POLFAC5A ENDED AT:  02/04/94  09:55:00 RUN TIME =    72 SECONDS

c:\impsum9\pol5>dir

 Volume in drive C is STACVOL_DSK
 Directory of  c:\impsum9\pol5\*.*

.            <DIR>      2-03-94 10:11a
..           <DIR>      2-03-94 10:11a
jef90bas.rat    15498   2-04-94  9:55a
rates5.l6       24179   2-04-94  9:55a
rates5.log       6880   2-04-94  9:55a
temp5in          3690   2-04-94  9:55a
nmex699.rat     15498   2-04-94  9:53a
mex699.rat      15498   2-04-94  9:52a
nmex687.rat     15498   2-04-94  9:50a
mex687.rat      15498   2-04-94  9:49a
rates5            627   2-03-94 11:28a
mex687.pol       5658  10-04-93 10:57a
nmex687.pol      3690  10-04-93 10:57a
nmex699.pol      3688  10-04-93 10:55a
mex699.pol       5663  10-04-93 10:54a
jef90bas.pol     3328   6-18-93  4:00p
     134,893 bytes in 16 file(s)       172,032 bytes allocated
 133,308,416 bytes free

c:\impsum9\pol5>type rates5.log
1>> JOB: RATES5      COMMENTS: TEST POLFAC5A WITH SCRIPT FILE - MOBILE5A OUTPUT NUL
 >> STARTED AT:   02/04/94  09:48:00
-     JOB CONTROL FILE INPUT
 ------------------------------------------------------------------------------
 /JOB     RATES5    TEST POLFAC5A WITH SCRIPT FILE - MOBILE5A OUTPUT NUL
 /LOG     RATES5.LOG
 /STEP    MEX687    POLFAC5A
 /FT06    RATES5.L6
 /FT09    NUL
 /FT05    MEX687.POL
 /FT25    MEX687.RAT
 /STEP    NMEX687   POLFAC5A
 /FT06   +RATES5.L6
 /FT09    NUL
 /FT05    NMEX687.POL
 /FT25    NMEX687.RAT
 /STEP    MEX699    POLFAC5A
 /FT06   +RATES5.L6
 /FT09    NUL
 /FT05    MEX699.POL
 /FT25    MEX699.RAT
 /STEP    NMEX699   POLFAC5A
 /FT06   +RATES5.L6
 /FT09    NUL
 /FT05    NMEX699.POL
 /FT25    NMEX699.RAT
 /STEP    JEF90BAS  POLFAC5A
 /FT06   +RATES5.L6
 /FT09    NUL
```

```
 /FT05    JEF90BAS.POL
 /FT25    JEF90BAS.RAT
 ------------------------------------------------------------------------------
-STEP EXECUTION INFORMATION
-STEP: MEX687     STARTED AT:  02/04/94  09:48:00
 FILES ARE:
   5 SEQUENTIAL UNKNOWN   MEX687.POL
   6 SEQUENTIAL UNKNOWN   RATES5.L6
   9 SEQUENTIAL UNKNOWN   NUL
  25 SEQUENTIAL UNKNOWN   MEX687.RAT
  98 SEQUENTIAL UNKNOWN   RATES5.LOG
-STEP: MEX687       ENDED AT:  02/04/94  09:49:17
 ------------------------------------------------------------------------------
-STEP EXECUTION INFORMATION
-STEP: NMEX687    STARTED AT:  02/04/94  09:49:19
 FILES ARE:
   5 SEQUENTIAL UNKNOWN   NMEX687.POL
   6 APPEND     OLD       RATES5.L6
   9 SEQUENTIAL UNKNOWN   NUL
  25 SEQUENTIAL UNKNOWN   NMEX687.RAT
  98 APPEND     UNKNOWN   RATES5.LOG
-STEP: NMEX687      ENDED AT:  02/04/94  09:50:29
 ------------------------------------------------------------------------------
-STEP EXECUTION INFORMATION
-STEP: MEX699     STARTED AT:  02/04/94  09:50:31
 FILES ARE:
   5 SEQUENTIAL UNKNOWN   MEX699.POL
   6 APPEND     OLD       RATES5.L6
   9 SEQUENTIAL UNKNOWN   NUL
  25 SEQUENTIAL UNKNOWN   MEX699.RAT
  98 APPEND     UNKNOWN   RATES5.LOG
-STEP: MEX699       ENDED AT:  02/04/94  09:52:11
 ------------------------------------------------------------------------------
-STEP EXECUTION INFORMATION
-STEP: NMEX699    STARTED AT:  02/04/94  09:52:13
 FILES ARE:
   5 SEQUENTIAL UNKNOWN   NMEX699.POL
   6 APPEND     OLD       RATES5.L6
   9 SEQUENTIAL UNKNOWN   NUL
  25 SEQUENTIAL UNKNOWN   NMEX699.RAT
  98 APPEND     UNKNOWN   RATES5.LOG
-STEP: NMEX699      ENDED AT:  02/04/94  09:53:46
 ------------------------------------------------------------------------------
-STEP EXECUTION INFORMATION
-STEP: JEF90BAS   STARTED AT:  02/04/94  09:53:48
 FILES ARE:
   5 SEQUENTIAL UNKNOWN   JEF90BAS.POL
   6 APPEND     OLD       RATES5.L6
   9 SEQUENTIAL UNKNOWN   NUL
  25 SEQUENTIAL UNKNOWN   JEF90BAS.RAT
  98 APPEND     UNKNOWN   RATES5.LOG
-STEP: JEF90BAS     ENDED AT:  02/04/94  09:55:00

c:\impsum9\pol5>
c:\impsum9\pol5>
```

POLFAC5B

PURPOSE

POLFAC5B is one of a series of programs developed by the Texas Transportation Institute to facilitate the computation of emissions. POLFAC5B is used to apply MOBILE5a to obtain emission factors. It provides the user the option of computing emission factors from two different years and averaging them. The emission factors are obtained for eight vehicle types and 63 speeds (i.e., 3 mph through 65 mph) for each vehicle type. Hence, there are 2,544 or 2,552 factors (i.e., 8 x 63 = 504) for each pollution type for each county. Three major pollution types are computed: VOC[8], CO, and NOX. Six subcomponents of VOC are computed: CC (crank case HC), RNLS (running loss HC), RSTL (resting loss HC), DIRN (diurnal HC), EXHS (exhaust HC), and HTSK (hot soak HC). All of these rates are in grams/mile. Emissions which do not vary by speed are output on a single line with the speed field set to "--". Emission types which vary by speed are VOC, CO, NOX, EXHS, and RNLS. Emission types which do not vary by speed are RSTL, CC, HTSK, and DIRN. If the minimum and maximum temperatures are set to the same value then diurnal HC will be 0. If a set of rates are all zero, no data cards are output. For each POLFAC5B run there are 2,544 or 2,552 emission factors. These emission factors are output to an ASCII file for subsequent input to either the IMPSUMA program or the RATEADJ program. The POLFAC5B program can be applied for a 24-hour period or for each time-of-day time period for which VMT and speed estimates are available. The emission factors from POLFAC5B (or the combined emission factors from RATEADJ) are applied using the IMPSUMA program to estimate emissions. There are two major differences between POLFAC5A and POLFAC5B. One difference is that POLFAC5B writes each emission rate to seven digits of precision when the rates are larger than 0.1 grams/mile while POLFAC5A use a fixed format of F9.5 for each emission rate. The other major difference is that POLFAC5B produces HC subcomponent emission rates while POLFAC5A does not. These HC subcomponent emission rates are not recognized by the IMPSUM program but are necessary for the IMPSUMA program.

To apply MOBILE5a, the POLFAC5B program reads a set of MOBILE5a data cards with either one or two scenarios. If there is one scenario card, then it runs the MOBILE5a subroutine with the scenario card modified for speeds from 3 to 65 mph in 1 mile/hour increments. POLFAC5B then writes a set of emission factor card images to Unit 25. If there are two scenarios, it runs both scenarios with speeds of 3 to 65 mph and averages the runs of the two scenarios with the same speed. The averaged emission factors are then written to Unit 25. The output from MOBILE5a is sent to Unit 9; in the example JCL, Unit 9, is set to a dummy unit with a DCB. If the printed output is

---

[8] The user may select any of the five hydrocarbon types with the NMHFLG. The program will label the resulting hydrocarbon emissions rates as either THC, TOG, NMHC, VOC, or NMOG. The IMPSUM program will accept all five hydrocarbon types.

desired, the dummy option is removed, and SYSOUT=A and DCB = (RECFM=FBA, LRECL=133, BLKSIZE=1330) is added. The PRTFLG must be 4 if all emission factors are desired, since MOBILE5a calculates only the emission factors that it prints.

DATA SETS REFERENCES

The data sets used by this program are:

DDNAME	Description of data set
STEPLIB	The load module library. The program name is POLFAC5B.
FT05F001	MOBILE5 data cards including one or two scenarios
FT06F001	Printed output from POLFAC5B
IMDATA[9]	IMDATA data supplied by EPA. Read if an inspection maintenance program is used.
TECH12[10]	TECH12 data supplied by EPA. Read if an inspection maintenance program is used.
INLEV	LEVIMP data supplied by user if PROMPT flag is 5
FT09F001	Printed output from MOBILE5
FT25F001	All emission factor card image output (including diurnal)
FT26F001	Diurnal emission factors card image output
FT27F001	VMTMIX REGMIX card image output
FT10F001	Temporary data set used to pass MOBILE5 a set of data cards
FT98F001	Microcomputer job control file output. Not used by mainframe version.
FT99F001	Microcomputer job control file. Not used by mainframe version.

The user can optionally input a DDname. The DDname must begin with an alphabetic character and can be from 1 to 7 characters long including only alphabetic characters and numbers. The name can not start with FT.

The user can optionally input a DDname. The DDname must begin with an alphabetic character and can be from 1 to 7 characters long including only alphabetic characters and numbers. The name can not start with FT.

OUTPUT DATA SETS

Emission Rates

The POLFAC5B program produces 63 emission factors card images for six emission types on Unit 25 which provide the emission factors for speeds from 3 to 65 mph. Also POLFAC5B produces one emission card for three emission types which do not vary by speed. The format of the emission factor card images is:

Columns	Format	Contents
1-3	I3 or A3	Speed if emissions vary by speed; otherwise " --" (these speeds will be integer values from 3 to 65 or a character value " --")
5-8	A4	Type of emissions, either THC, NMHC, VOC, TOG, NMOG[11], NOX, CO, EXHS, RNLS, RSTL, CC, HTSK, or DIRN
9-80	8F9.5[12]	Eight emission factors for vehicle types LDGV, LDGT1, LDGT2, HDGV, LDDV, LDDT, HDDV, and MC

These emission factor data are subsequently input to the program IMPSUMA.

Diurnal Emission Rates

The POLFAC5B program writes the diurnal emission rates to two data sets. The diurnal emission rates are written to Unit 26. This data set is written so that the diurnal emission rates are available without the other emission rates when time periods are being run and a separate POLFAC5B run is made for diurnals only. The format of the emission factor card images is:

Columns	Format	Contents
1-3	I3 or A3	Speed if emissions vary by speed; otherwise "--" (these speeds will be integer values from 3 to 65 or a character value " --")

Only one type of hydrocarbon is allowed per run. The hydrocarbon type of THC, NMHC, VOC, TOG, or NMOG is specified by the NMHFLG.

The format is optimized on an element basis for a format for the most precision that will leave one blank between each element. Elements which are less than 1.0 and greater than or equal to 0.1 are written in a F9.7 format and the leading zero is set to blank.

5-8	A4	Type of emissions DIRN
9-80	8F9.5	Eight emission factors for vehicle types LDGV, LDGT1, LDGT2, HDGV, LDDV, LDDT, HDDV, and MC

The diurnal emissions factor data are combined with a time period set of emission factors and are subsequently input to IMPSUMA.

VMTMIX Output Data

The POLFAC5B program outputs VMTMIX data to Unit 27. If VMTMIX was input to POLFAC5B then this is the same as the input data; otherwise this is the VMTMIX that MOBILE5a has selected as default data.

Columns	Format	Contents
1-6	A6	"VMTMIX"
9-80	8F9.7	Eight VMT distribution values for vehicle types LDGV, LDGT1, LDGT2, HDGV, LDDV, LDDT, HDDV, and MC

REGMIX Output Data

The POLFAC5B program outputs REGMIX data to Unit 27. This is the VMTMIX that MOBILE5a has selected as default data. The REGMIX data are useful to distribute the total vehicles for an area if the total vehicle data is known but the vehicles by vehicle type are not known.

Columns	Format	Contents
1-6	A6	"REGMIX"
9-80	8F9.7	Eight registration distribution values for vehicle types LDGV, LDGT1, LDGT2, HDGV, LDDV, LDDT, HDDV, and MC

Example JCL

```
//IM3BLK JOB  (  ,60A,S59,5,CB),'BELL  POL FACTORS'
//POL  EXEC  PGM=POLFAC5B,REGION=1400K
//STEPLIB  DD  DISP=OLD,DSN=USR.W150.CB.JB.IMPSUM
//FT06F001  DD  SYSOUT=A
//TECH12  DD  DISP=OLD,DSN=USR.W104.CB.TECH12.MOB5A
//IMDATA  DD  DISP=OLD,DSN=USR.W104.CB.IMDATA.MOB5A
```

```
//FT09F001  DD  DUMMY,DCB=(RECFM=FB,LRECL=223,BLKSIZE=2230)
//FT25F001  DD  SYSOUT=A,DCB=(RECFM=FB,LRECL=80,BLKSIZE=800)  ;RATES
//FT26F001  DD DUMMY
//FT27F001  DD DUMMY
//FT10F001  DD  UNIT=SYSDA,SPACE=(TRK,(5,2)),
//  DCB=(RECFM=FB,LRECL=80,BLKSIZE=6320)
//FT05F001  DD  DISP=OLD,DSN=USR.W150.CB.IM3BLK.PLF2
```

Example MOBILE5A Input Data

The data set JEF90BAS.POL is shown below:

```
1          PROMPT
1 JEFFERSON COUNTY - Base Year Ozone Season 1990
1          TAMFLG  - Default: Tampering Rates
1          SPDFLG  - User input: one speed for all vehicle types
3          VMFLAG  - User input: single VMT mix for all scenario
3          MYMRFG  - User input: Reg. Distributions
1          NEWFLG  - Default: Basic exhaust emission rates
1          IMFLAG  -      no   I/M
1          ALHFLG  - No additional correction factors
1          ATPFLG  -      no   atp
5          RLFLAG  - Zero-out refueling emissions
2          LOCFLG  - User input: one LAP record for all scenarios
1          TEMFLG  - MOBILE5.0 calculates exhaust temperatures
4          OUTFMT  - 80-column descriptive format
4          PRTFLG  - Print all three pollutant emission factors
1          IDLFLG  - No idle emissions calculated or printed
3          NMHFLG  - Print HC = volatile organic compounds (VOC)
1          HCFLAG  - Print total HC
.584.237.065.036.008.004.063.003 - LDGV,LDGT1,LDGT2,HDGV,LDDV,LDDT,HDDV,MC
 .060 .081 .076 .074 .074 .077 .079 .054 .053 .057  July,1990 .LDGV..MY AGES 1-10
 .051 .058 .051 .042 .026 .015 .012 .011 .008 .007  Vehicle         11-20
 .009 .006 .006 .005 .005                           Registrations   21-25
 .070 .097 .077 .064 .071 .071 .077 .048 .060 .055          .LDGT1.MY AGES 1-10
 .038 .048 .044 .039 .027 .014 .016 .014 .012 .010                    11-20
 .014 .009 .009 .007 .007                                             21-25
 .059 .089 .080 .036 .072 .087 .095 .062 .060 .044          .LDGT2.MY AGES 1-10
 .037 .060 .044 .050 .039 .023 .017 .014 .006 .006                    11-20
 .006 .004 .004 .003 .003                                             21-25
 .036 .055 .052 .025 .040 .047 .059 .042 .054 .069          .HDGV..MY AGES 1-10
 .058 .078 .071 .044 .030 .046 .043 .031 .023 .012                    11-20
 .026 .017 .016 .014 .014                                             21-25
 .060 .081 .076 .074 .074 .077 .079 .054 .053 .057          .LDDV..MY AGES 1-10
 .051 .058 .051 .042 .026 .015 .012 .011 .008 .007                    11-20
 .009 .006 .006 .005 .005                                             21-25
 .070 .097 .077 .064 .071 .071 .077 .048 .060 .055          .LDDT..MY AGES 1-10
 .038 .048 .044 .039 .027 .014 .016 .014 .012 .010                    11-20
 .014 .009 .009 .007 .007                                             21-25
 .022 .028 .040 .023 .062 .050 .043 .030 .056 .122          .HDDV..MY AGES 1-10
 .118 .097 .067 .045 .028 .047 .028 .028 .013 .013                    11-20
 .011 .007 .007 .006 .007                                             21-25
 .017 .041 .049 .055 .100 .088 .055 .078 .118 .085          .MC....MY AGES 1-10
 .080 .231 .000 .000 .000 .000 .000 .000 .000 .000                    11-20
 .000 .000 .000 .000 .000                                             21-25
Jefferson  BY Run   70. 093. 08.0 08.0 90      LAP rec:SCNME,MNTMP,MXTMP,RVP1,RV
1 90 XXXX 85.6 20.6 27.3 20.6  7              SCN rec: RGN,CY,SPD,AMBTMP,PCCN,PC
```

MICROCOMPUTER USAGE

The POLFAC5B program requires a 386, 486, or Pentium microcomputer with a math coprocessor. The computer should have at least 2 megabytes of memory. The

inspection/maintenance files IMDATA.D and TECH12.D must be in the logged drive and directory or in an APPEND statement for the IMDATA.D and TECH12.D directory. The POLFAC5B.EXE file must be in the path. The file F77L.EER must be in the same directory as the POLFAC5B.EXE file. Run time will vary by equipment, complexity of the MOBILE5a data, and output options chosen. The above example ran 55 seconds on a 486DX 66 megahertz machine using the Microsoft SMARTDRV disk caching program. If SMARTDRV is used, a check of the XMS or extended ram free should be done both before and after loading SMARTDRV to determine if 2 megabytes are free. If two scenarios are used, the time will double. If ATP and I/M programs are included, the time will be longer. If a TECH12 ATP program is included, the time will be still longer.

There are two ways to run POLFAC5B on a microcomputer. In the first method the user enters the DOS command "POLFAC5B" with no parameters. In the second method, the user enters the DOS command "JCF <jcffile> where <jcffile> is a Job Control File and there is a "/STEP <stp> POLFAC5B" record in the JCF file. The term <stp> must be filled in with a step name. See the Job Control File section of this report for a description of the JCF usage.

POLFAC5B Microcomputer Files

The following files are required by the microcomputer version of POLFAC5B. The file names beginning with the character "FT" are FORTRAN files. The 2-digit number following the "FT" is the FORTRAN unit number.

File Name	Append Option Available	File Name Prompt[13]	Default File Name	Description - Comments
FT05	No	Yes		MOBILE5a input to POLFAC5B
FT06	Yes	Yes		Printed output from POLFAC5B
FT09	Yes	No	NUL	Printed output from the 63 or 126 runs of MOBILE5a. This file is large and is not usually needed
FT25	Yes	Yes		Emission rates file output
FT26	No	No	NUL	Diurnal emission rates file output
FT27	No	No	NUL	VMTMIX and REGMIX file output

[13] The user is not prompted for a file name if the Job Control File option is used.

Example POLFAC5B Job Control File

```
/JOB     RATES5    TEST POLFAC5B WITH JOB CONTROL FILE - MOBILE5A OUTPUT NUL
/LOG     RATES5.LOG
/STEP    MEX687    POLFAC5B
/FT06    RATES5.L6
/FT09    NUL
/FT05    MEX687.POL
/FT25    MEX687.RAT
/FT26    MEX687.DIU
/FT27    NUL
/STEP    NMEX687   POLFAC5B
/FT06   +RATES5.L6
/FT09    NUL
/FT05    NMEX687.POL
/FT25    NMEX687.RAT
/STEP    MEX699    POLFAC5B
/FT06   +RATES5.L6
/FT09    NUL
/FT05    MEX699.POL
/FT25    MEX699.RAT
/FT26    MEX699.DIU
/FT27    NUL
/STEP    NMEX699   POLFAC5B
/FT06   +RATES5.L6
/FT09    NUL
/FT05    NMEX699.POL
/FT25    NMEX699.RAT
/STEP    JEF90BAS  POLFAC5B
/FT06   +RATES5.L6
/FT09    NUL
/FT05    JEF90BAS.POL
/FT25    JEF90BAS.RAT
/FT26    JEF90BAS.DIU
/FT27    NUL
```

Example POLFAC5B Microcomputer Run

This example was run on a computer with 8 megabytes of ram. The program SMARTDRV.EXE is using 2 megabytes of XMS memory. A memory manager is also installed.

```
c:\impsum9\pol5>polfac5b

        32-bit Power for Lahey Computer Systems
      Phar Lap's 386|DOS-Extender(tm) Version 4.1L
     Copyright (C) 1986-92 Phar Lap Software, Inc.
              Available Memory = 4824 Kb

POLFAC5B INPUT DATA SET=jef90bas.pol

POLFAC5B RATES FILE=jef90bas.rat

POLFAC5B STARTED AT:  09/30/94  10:55:49
SCENARIO  1 SPEED  3 STARTED: 10:55:50.0
SCENARIO  1 SPEED  4 STARTED: 10:55:50.9
SCENARIO  1 SPEED  5 STARTED: 10:55:51.8
                   .
                   .
                   .
SCENARIO  1 SPEED 28 STARTED: 10:56:10.4
SCENARIO  1 SPEED 29 STARTED: 10:56:11.5
```

```
SCENARIO  1 SPEED 29 STARTED: 10:56:12.2
SCENARIO  1 SPEED 29 STARTED: 10:56:13.0
SCENARIO  1 SPEED 30 STARTED: 10:56:13.9
                    .
                    .
                    .
SCENARIO  1 SPEED 64 STARTED: 10:56:42.0
SCENARIO  1 SPEED 65 STARTED: 10:56:42.8
POLFAC5B ENDED AT:  09/30/94  10:56:44 RUN TIME =    55 SECONDS

c:\impsum9\pol5>
```

Example Output

```
  3 VOC  20.52074 22.31578 30.19042 46.98459 1.541976 2.213653 7.349065 22.64065
  4 VOC  14.76799 16.29338 21.75100 36.37848 1.463960 2.101652 6.977237 19.76731
  5 VOC  11.58599 12.90062 17.01745 30.55119 1.391114 1.997076 6.630054 17.64391
    .
    .
    .
 63 VOC  2.460917 3.279287 3.902542 5.695633 .3248034 .4662860 1.548014 9.543421
 64 VOC  2.534242 3.386389 4.032802 5.702315 .3250894 .4666966 1.549377 9.680902
 65 VOC  2.607690 3.493622 4.163258 5.712717 .3256620 .4675186 1.552107 9.818382
  3 CO   178.6104 212.2469 288.4885 483.4968 5.162760 6.060636 44.96612 179.9926
  4 CO   135.9218 162.4841 220.8798 441.7502 4.758066 5.585561 41.44136 143.5437
  5 CO   109.5497 131.0470 177.4111 404.4971 4.393083 5.157102 38.26247 117.2103
    .
    .
    .
 63 CO   37.67552 55.06861 65.01883 105.3244 .9656742 1.133618 8.410740 31.90504
 64 CO   40.56795 59.46175 70.25137 109.8092 .9926683 1.165307 8.645851 34.53033
 65 CO   43.46038 63.85488 75.48392 114.7373 1.022276 1.200064 8.903722 37.15561
  3 NOX  2.314665 2.571518 2.838125 4.902068 2.814610 3.293560 37.40145 .8261235
  4 NOX  2.155490 2.385415 2.659183 4.952796 2.696066 3.154844 35.82620 .7901746
  5 NOX  2.056031 2.271578 2.551876 5.003522 2.586185 3.026265 34.36606 .7603428
    .
    .
    .
 63 NOX  3.175281 3.859530 4.514843 7.945686 2.628527 3.075812 34.92872 1.582139
 64 NOX  3.260059 3.958256 4.634124 7.996413 2.741743 3.208293 36.43316 1.616751
 65 NOX  3.344838 4.056982 4.753406 8.047140 2.863898 3.351235 38.05640 1.651363
  3 EXHS 12.74533 14.74480 19.60635 23.61453 1.541976 2.213653 7.349065 16.10742
  4 EXHS 9.770165 11.49361 15.23107 21.55639 1.463960 2.101652 6.977237 13.23409
  5 EXHS 7.932243 9.417302 12.40805 19.71032 1.391114 1.997076 6.630054 11.11068
    .
    .
    .
 63 EXHS 1.670104 2.364121 2.830337 1.875100 .3248034 .4662860 1.548014 3.010195
 64 EXHS 1.746173 2.474152 2.964937 1.890936 .3250894 .4666966 1.549377 3.147676
 65 EXHS 1.822242 2.584182 3.099537 1.910074 .3256620 .4675186 1.552107 3.285157
  3 RNLS 7.079239 6.756310 9.657104 19.84737 .0000000 .0000000 .0000000 .0000000
  4 RNLS 4.301652 3.985108 5.592973 11.29941 .0000000 .0000000 .0000000 .0000000
  5 RNLS 2.957576 2.668654 3.682437 7.318187 .0000000 .0000000 .0000000 .0000000
    .
    .
    .
 63 RNLS .0946402 .1005005 .1452458 .2978447 .0000000 .0000000 .0000000 .0000000
 64 RNLS .0918966 .0975720 .1409058 .2886905 .0000000 .0000000 .0000000 .0000000
 65 RNLS .0892758 .0947748 .1367621 .2799544 .0000000 .0000000 .0000000 .0000000
 -- RSTL .0960832 .0864268 .0783393 .1327839 .0000000 .0000000 .0000000 .5474623
 -- CC   .0175869 .0324935 .0515771 .1027385 .0000000 .0000000 .0000000 .0000000
 -- HTSK .2799512 .2757778 .3375275 2.468712 .0000000 .0000000 .0000000 2.200313
 -- DIRN .3025513 .4199672 .4595151 .8184547 .0000000 .0000000 .0000000 3.785451
```

Files Produced or Used by the Example Run

```
------     569,424   3-26-93  12:00p  c:imdata.d
------     630,745   9-15-93  12:00p  c:imdata2.d
------      62,551   3-26-93  12:00p  c:tech12.d
------       3,328   6-18-93   4:00p  c:jef90bas.pol
--a---      26,158   9-30-94  10:56a  c:jef90bas.rat
--a---       3,690   9-30-94  10:56a  c:temp5in
--a---       4,090   9-30-94  10:56a  c:tstout
```

The file "tstout" is the POLFAC5B printed output. The file "jef90bas.rat" is the rate output which is partially listed above. The file "temp5in" is the last input to MOBILE5a. The user can scratch the files "temp5in" and "tstout" after a run. These files will be overwritten by the next POLFAC5B run. The file "jef90bas.pol" is the input file to POLFAC5B run in the above example. Units 9, 26, and 27 are opened as the file name "NUL" when POLFAC5B is run from a DOS command. The file name NUL does not save any output.

Example POLFAC5B Microcomputer Run with JCF File

This example was run on a computer with 8 megabytes of ram. The program SMARTDRV.EXE is using 2 megabytes of XMS memory. A memory manager is also installed. This run used the JCF.BAT file explained later to start five POLFAC5B runs using a single Job Control File with five steps.

```
c:\impsum9\pol5>dir

 Volume in drive C is STACVOL_DSK
 Directory of  c:\impsum9\pol5\*.*

.            <DIR>      2-03-94 10:11a
..           <DIR>      2-03-94 10:11a
rates5.jcf       842   9-30-94  8:48a
mex687.pol      5658  10-04-93 10:57a
nmex687.pol     3690  10-04-93 10:57a
nmex699.pol     3688  10-04-93 10:55a
mex699.pol      5663  10-04-93 10:54a
jef90bas.pol    3328   6-18-93  4:00p
      22,869 bytes in 8 file(s)        49,152 bytes allocated
   6,004,736 bytes free

c:\impsum9\pol5>type rates5.jcf
/JOB     RATES5    TEST POLFAC5B WITH JCF FILE - MOBILE5A OUTPUT NUL
/LOG     RATES5.LOG
/STEP    MEX687    POLFAC5B
/FT06    RATES5.L6
/FT09    NUL
/FT05    MEX687.POL
/FT25    MEX687.RAT
/FT26    MEX687.DIU
/FT27    MEX687.MIX
/STEP    NMEX687   POLFAC5B
/FT06   +RATES5.L6
/FT09    NUL
/FT05    NMEX687.POL
/FT25    NMEX687.RAT
/FT26    NMEX687.DIU
```

```
/FT27    NMEX687.MIX
/STEP    MEX699    POLFAC5B
/FT06   +RATES5.L6
/FT09    NUL
/FT05    MEX699.POL
/FT25    MEX699.RAT
/FT26    MEX699.DIU
/FT27    MEX699.MIX
/STEP    NMEX699   POLFAC5B
/FT06   +RATES5.L6
/FT09    NUL
/FT05    NMEX699.POL
/FT25    NMEX699.RAT
/FT26    NMEX699.DIU
/FT27    NMEX699.MIX
/STEP    JEF90BAS  POLFAC5B
/FT06   +RATES5.L6
/FT09    NUL
/FT05    JEF90BAS.POL
/FT25    JEF90BAS.RAT
/FT26    JEF90BAS.DIU
/FT27    JEF90BAS.MIX

c:\impsum9\pol5>jcf rates5.jcf
JCFBATCH rates5.jcf
```

```
    32-bit Power for Lahey Computer Systems
  Phar Lap's 386|DOS-Extender(tm) Version 4.1L
 Copyright (C) 1986-92 Phar Lap Software, Inc.
           Available Memory = 4824 Kb
```

```
rates5.jcf
CALL &&JCF
POLFAC5B rates5.jcf MEX687
```

```
    32-bit Power for Lahey Computer Systems
  Phar Lap's 386|DOS-Extender(tm) Version 4.1L
 Copyright (C) 1986-92 Phar Lap Software, Inc.
           Available Memory = 4824 Kb
```

```
rates5.jcf MEX687
SCRIPT FILE = "rates5.jcf
STEP NAME = "MEX687  "
STEP: MEX687     STARTED AT:  09/30/94  09:02:30
FILES ARE:
  5 SEQUENTIAL UNKNOWN   MEX687.POL
  6 SEQUENTIAL UNKNOWN   RATES5.L6
  9 SEQUENTIAL UNKNOWN   NUL
 25 SEQUENTIAL UNKNOWN   MEX687.RAT
 26 SEQUENTIAL UNKNOWN   MEX687.DIU
 27 SEQUENTIAL UNKNOWN   MEX687.MIX
 98 SEQUENTIAL UNKNOWN   RATES5.LOG
POLFAC5B STARTED AT:  09/30/94  09:02:30
SCENARIO  1 SPEED  3 STARTED: 09:02:30.4
SCENARIO  1 SPEED  4 STARTED: 09:02:31.3
SCENARIO  1 SPEED  5 STARTED: 09:02:32.2
                   .
                   .
                   .
SCENARIO  1 SPEED 28 STARTED: 09:02:52.4
WARNING DIURNALS WILL BE CALCULATED FOR 100 (F) INSTEAD OF 101.7 (F)
        BECAUSE THE MINIMUM TEMPERATURE CAN'T BE SET LARGER THAN 100 (F).
SCENARIO  1 SPEED 29 STARTED: 09:02:53.2
SCENARIO  1 SPEED 29 STARTED: 09:02:54.0
```

```
 SCENARIO  1 SPEED 29 STARTED: 09:02:54.9
 SCENARIO  1 SPEED 30 STARTED: 09:02:55.8
                    .
                    .
                    .
 SCENARIO  1 SPEED 64 STARTED: 09:03:26.1
 SCENARIO  1 SPEED 65 STARTED: 09:03:27.0
 POLFAC5B ENDED AT:  09/30/94  09:03:28 RUN TIME =    58 SECONDS
 POLFAC5B rates5.jcf NMEX687
```

```
        32-bit Power for Lahey Computer Systems
       Phar Lap's 386|DOS-Extender(tm) Version 4.1L
      Copyright (C) 1986-92 Phar Lap Software, Inc.
                Available Memory = 4824 Kb
```

```
 rates5.jcf NMEX687
 SCRIPT FILE = "rates5.jcf
 STEP NAME = "NMEX687 "
 STEP: NMEX687    STARTED AT:  09/30/94  09:03:38
 FILES ARE:
   5 SEQUENTIAL UNKNOWN   NMEX687.POL
   6 APPEND     OLD       RATES5.L6
   9 SEQUENTIAL UNKNOWN   NUL
  25 SEQUENTIAL UNKNOWN   NMEX687.RAT
  26 SEQUENTIAL UNKNOWN   NMEX687.DIU
  27 SEQUENTIAL UNKNOWN   NMEX687.MIX
  98 APPEND     UNKNOWN   RATES5.LOG
 POLFAC5B STARTED AT:  09/30/94  09:03:39
 SCENARIO  1 SPEED  3 STARTED: 09:03:39.3
 SCENARIO  1 SPEED  4 STARTED: 09:03:40.1
 SCENARIO  1 SPEED  5 STARTED: 09:03:41.0
                    .
                    .
                    .
 SCENARIO  1 SPEED 28 STARTED: 09:03:59.1
 WARNING DIURNALS WILL BE CALCULATED FOR 100 (F) INSTEAD OF 101.7 (F)
         BECAUSE THE MINIMUM TEMPERATURE CAN'T BE SET LARGER THAN 100 (F).
 SCENARIO  1 SPEED 29 STARTED: 09:04:00.0
 SCENARIO  1 SPEED 29 STARTED: 09:04:00.6
 SCENARIO  1 SPEED 29 STARTED: 09:04:01.4
 SCENARIO  1 SPEED 30 STARTED: 09:04:02.3
                    .
                    .
                    .
 SCENARIO  1 SPEED 64 STARTED: 09:04:29.6
 SCENARIO  1 SPEED 65 STARTED: 09:04:30.4
 POLFAC5B ENDED AT:  09/30/94  09:04:31 RUN TIME =    52 SECONDS
 POLFAC5B rates5.jcf MEX699
```

```
        32-bit Power for Lahey Computer Systems
       Phar Lap's 386|DOS-Extender(tm) Version 4.1L
      Copyright (C) 1986-92 Phar Lap Software, Inc.
                Available Memory = 4824 Kb
```

```
 rates5.jcf MEX699
 SCRIPT FILE = "rates5.jcf
 STEP NAME = "MEX699  "
 STEP: MEX699     STARTED AT:  09/30/94  09:04:41
 FILES ARE:
   5 SEQUENTIAL UNKNOWN   MEX699.POL
   6 APPEND     OLD       RATES5.L6
   9 SEQUENTIAL UNKNOWN   NUL
  25 SEQUENTIAL UNKNOWN   MEX699.RAT
  26 SEQUENTIAL UNKNOWN   MEX699.DIU
```

```
 27 SEQUENTIAL UNKNOWN   MEX699.MIX
 98 APPEND     UNKNOWN   RATES5.LOG
POLFAC5B STARTED AT:  09/30/94  09:04:41
SCENARIO  1 SPEED  3 STARTED: 09:04:41.8
SCENARIO  1 SPEED  4 STARTED: 09:04:42.9
SCENARIO  1 SPEED  5 STARTED: 09:04:44.0
                   .
                   .
                   .
SCENARIO  1 SPEED 28 STARTED: 09:05:10.1
WARNING DIURNALS WILL BE CALCULATED FOR 100 (F) INSTEAD OF 101.7 (F)
        BECAUSE THE MINIMUM TEMPERATURE CAN'T BE SET LARGER THAN 100 (F).
SCENARIO  1 SPEED 29 STARTED: 09:05:11.2
SCENARIO  1 SPEED 29 STARTED: 09:05:12.1
SCENARIO  1 SPEED 29 STARTED: 09:05:13.3
SCENARIO  1 SPEED 30 STARTED: 09:05:14.5
                   .
                   .
                   .
SCENARIO  1 SPEED 64 STARTED: 09:05:52.9
SCENARIO  1 SPEED 65 STARTED: 09:05:54.0
POLFAC5B ENDED AT:  09/30/94  09:05:55 RUN TIME =    74 SECONDS
POLFAC5B rates5.jcf NMEX699
```

```
      32-bit Power for Lahey Computer Systems
   Phar Lap's 386|DOS-Extender(tm) Version 4.1L
  Copyright (C) 1986-92 Phar Lap Software, Inc.
            Available Memory = 4824 Kb
```

```
rates5.jcf NMEX699
SCRIPT FILE = "rates5.jcf
STEP NAME = "NMEX699 "
STEP: NMEX699    STARTED AT:  09/30/94  09:06:09
FILES ARE:
  5 SEQUENTIAL UNKNOWN   NMEX699.POL
  6 APPEND     OLD       RATES5.L6
  9 SEQUENTIAL UNKNOWN   NUL
 25 SEQUENTIAL UNKNOWN   NMEX699.RAT
 26 SEQUENTIAL UNKNOWN   NMEX699.DIU
 27 SEQUENTIAL UNKNOWN   NMEX699.MIX
 98 APPEND     UNKNOWN   RATES5.LOG
POLFAC5B STARTED AT:  09/30/94  09:06:09
SCENARIO  1 SPEED  3 STARTED: 09:06:09.6
SCENARIO  1 SPEED  4 STARTED: 09:06:10.6
SCENARIO  1 SPEED  5 STARTED: 09:06:11.6
                   .
                   .
                   .
SCENARIO  1 SPEED 28 STARTED: 09:06:35.0
WARNING DIURNALS WILL BE CALCULATED FOR 100 (F) INSTEAD OF 101.7 (F)
        BECAUSE THE MINIMUM TEMPERATURE CAN'T BE SET LARGER THAN 100 (F).
SCENARIO  1 SPEED 29 STARTED: 09:06:36.1
SCENARIO  1 SPEED 29 STARTED: 09:06:37.0
SCENARIO  1 SPEED 29 STARTED: 09:06:38.0
SCENARIO  1 SPEED 30 STARTED: 09:06:39.1
                   .
                   .
                   .
SCENARIO  1 SPEED 64 STARTED: 09:07:14.8
SCENARIO  1 SPEED 65 STARTED: 09:07:15.9
POLFAC5B ENDED AT:  09/30/94  09:07:17 RUN TIME =    68 SECONDS
POLFAC5B rates5.jcf JEF90BAS
```

```
      32-bit Power for Lahey Computer Systems
   Phar Lap's 386|DOS-Extender(tm) Version 4.1L
  Copyright (C) 1986-92 Phar Lap Software, Inc.
            Available Memory = 4824 Kb

rates5.jcf JEF90BAS
SCRIPT FILE = "rates5.jcf
STEP NAME = "JEF90BAS"
STEP: JEF90BAS   STARTED AT:  09/30/94  09:07:28
FILES ARE:
  5 SEQUENTIAL UNKNOWN   JEF90BAS.POL
  6 APPEND     OLD       RATES5.L6
  9 SEQUENTIAL UNKNOWN   NUL
 25 SEQUENTIAL UNKNOWN   JEF90BAS.RAT
 26 SEQUENTIAL UNKNOWN   JEF90BAS.DIU
 27 SEQUENTIAL UNKNOWN   JEF90BAS.MIX
 98 APPEND     UNKNOWN   RATES5.LOG
POLFAC5B STARTED AT:  09/30/94  09:07:28
SCENARIO  1 SPEED  3 STARTED: 09:07:28.7
SCENARIO  1 SPEED  4 STARTED: 09:07:29.5
SCENARIO  1 SPEED  5 STARTED: 09:07:30.4
                   .
                   .
                   .
SCENARIO  1 SPEED 28 STARTED: 09:07:49.3
SCENARIO  1 SPEED 29 STARTED: 09:07:50.1
SCENARIO  1 SPEED 29 STARTED: 09:07:50.8
SCENARIO  1 SPEED 29 STARTED: 09:07:51.6
SCENARIO  1 SPEED 30 STARTED: 09:07:52.5
                   .
                   .
                   .
SCENARIO  1 SPEED 64 STARTED: 09:08:20.8
SCENARIO  1 SPEED 65 STARTED: 09:08:21.6
POLFAC5B ENDED AT:  09/30/94  09:08:23 RUN TIME =    55 SECONDS
DEL &&JCF.BAT
Deleting c:\impsum9\pol5\&&jcf.bat
     1 file(s) deleted

c:\impsum9\pol5>dir

 Volume in drive C is STACVOL_DSK
 Directory of  c:\impsum9\pol5\*.*

.            <DIR>      2-03-94 10:11a
..           <DIR>      2-03-94 10:11a
jef90bas.diu       82   9-30-94  9:08a
jef90bas.mix      164   9-30-94  9:08a
jef90bas.rat    26158   9-30-94  9:08a
rates5.l6       25018   9-30-94  9:08a
rates5.log       8990   9-30-94  9:08a
temp5in          3690   9-30-94  9:08a
nmex699.diu        82   9-30-94  9:07a
nmex699.mix       164   9-30-94  9:07a
nmex699.rat     26158   9-30-94  9:07a
mex699.diu         82   9-30-94  9:05a
mex699.rat      26158   9-30-94  9:05a
mex699.mix        164   9-30-94  9:05a
nmex687.diu        82   9-30-94  9:04a
nmex687.mix       164   9-30-94  9:04a
nmex687.rat     26158   9-30-94  9:04a
mex687.diu         82   9-30-94  9:03a
mex687.mix        164   9-30-94  9:03a
mex687.rat      26158   9-30-94  9:03a
rates5.jcf        842   9-30-94  8:48a
mex687.pol       5658  10-04-93 10:57a
```

```
nmex687.pol       3690  10-04-93 10:57a
nmex699.pol       3688  10-04-93 10:55a
mex699.pol        5663  10-04-93 10:54a
jef90bas.pol      3328   6-18-93  4:00p
     192,587 bytes in 26 file(s)       352,256 bytes allocated
   4,464,640 bytes free

c:\impsum9\pol5>
c:\impsum9\pol5>type rates5.log
1>> JOB: RATES5      COMMENTS: TEST POLFAC5B WITH JCF FILE - MOBILE5A OUTPUT NUL
 >> STARTED AT:   09/30/94  09:02:30
-     JOB CONTROL FILE INPUT
 ------------------------------------------------------------------------------
 /JOB     RATES5    TEST POLFAC5B WITH JCF FILE - MOBILE5A OUTPUT NUL
 /LOG     RATES5.LOG
 /STEP    MEX687    POLFAC5B
 /FT06    RATES5.L6
 /FT09    NUL
 /FT05    MEX687.POL
 /FT25    MEX687.RAT
 /FT26    MEX687.DIU
 /FT27    MEX687.MIX
 /STEP    NMEX687   POLFAC5B
 /FT06   +RATES5.L6
 /FT09    NUL
 /FT05    NMEX687.POL
 /FT25    NMEX687.RAT
 /FT26    NMEX687.DIU
 /FT27    NMEX687.MIX
 /STEP    MEX699    POLFAC5B
 /FT06   +RATES5.L6
 /FT09    NUL
 /FT05    MEX699.POL
 /FT25    MEX699.RAT
 /FT26    MEX699.DIU
 /FT27    MEX699.MIX
 /STEP    NMEX699   POLFAC5B
 /FT06   +RATES5.L6
 /FT09    NUL
 /FT05    NMEX699.POL
 /FT25    NMEX699.RAT
 /FT26    NMEX699.DIU
 /FT27    NMEX699.MIX
 /STEP    JEF90BAS  POLFAC5B
 /FT06   +RATES5.L6
 /FT09    NUL
 /FT05    JEF90BAS.POL
 /FT25    JEF90BAS.RAT
 /FT26    JEF90BAS.DIU
 /FT27    JEF90BAS.MIX
 ------------------------------------------------------------------------------
-STEP EXECUTION INFORMATION
-STEP: MEX687     STARTED AT:  09/30/94  09:02:30
 FILES ARE:
   5 SEQUENTIAL UNKNOWN   MEX687.POL
   6 SEQUENTIAL UNKNOWN   RATES5.L6
   9 SEQUENTIAL UNKNOWN   NUL
  25 SEQUENTIAL UNKNOWN   MEX687.RAT
  26 SEQUENTIAL UNKNOWN   MEX687.DIU
  27 SEQUENTIAL UNKNOWN   MEX687.MIX
  98 SEQUENTIAL UNKNOWN   RATES5.LOG
-STEP: MEX687       ENDED AT:  09/30/94  09:03:28
 ------------------------------------------------------------------------------
-STEP EXECUTION INFORMATION
-STEP: NMEX687    STARTED AT:  09/30/94  09:03:38
 FILES ARE:
   5 SEQUENTIAL UNKNOWN   NMEX687.POL
   6 APPEND     OLD       RATES5.L6
```

```
   9 SEQUENTIAL UNKNOWN   NUL
  25 SEQUENTIAL UNKNOWN   NMEX687.RAT
  26 SEQUENTIAL UNKNOWN   NMEX687.DIU
  27 SEQUENTIAL UNKNOWN   NMEX687.MIX
  98 APPEND     UNKNOWN   RATES5.LOG
-STEP: NMEX687      ENDED AT:  09/30/94  09:04:31
 --------------------------------------------------------------------------------
-STEP EXECUTION INFORMATION
-STEP: MEX699     STARTED AT:  09/30/94  09:04:41
 FILES ARE:
   5 SEQUENTIAL UNKNOWN   MEX699.POL
   6 APPEND     OLD       RATES5.L6
   9 SEQUENTIAL UNKNOWN   NUL
  25 SEQUENTIAL UNKNOWN   MEX699.RAT
  26 SEQUENTIAL UNKNOWN   MEX699.DIU
  27 SEQUENTIAL UNKNOWN   MEX699.MIX
  98 APPEND     UNKNOWN   RATES5.LOG
-STEP: MEX699       ENDED AT:  09/30/94  09:05:55
 --------------------------------------------------------------------------------
-STEP EXECUTION INFORMATION
-STEP: NMEX699    STARTED AT:  09/30/94  09:06:09
 FILES ARE:
   5 SEQUENTIAL UNKNOWN   NMEX699.POL
   6 APPEND     OLD       RATES5.L6
   9 SEQUENTIAL UNKNOWN   NUL
  25 SEQUENTIAL UNKNOWN   NMEX699.RAT
  26 SEQUENTIAL UNKNOWN   NMEX699.DIU
  27 SEQUENTIAL UNKNOWN   NMEX699.MIX
  98 APPEND     UNKNOWN   RATES5.LOG
-STEP: NMEX699      ENDED AT:  09/30/94  09:07:17
 --------------------------------------------------------------------------------
-STEP EXECUTION INFORMATION
-STEP: JEF90BAS   STARTED AT:  09/30/94  09:07:28
 FILES ARE:
   5 SEQUENTIAL UNKNOWN   JEF90BAS.POL
   6 APPEND     OLD       RATES5.L6
   9 SEQUENTIAL UNKNOWN   NUL
  25 SEQUENTIAL UNKNOWN   JEF90BAS.RAT
  26 SEQUENTIAL UNKNOWN   JEF90BAS.DIU
  27 SEQUENTIAL UNKNOWN   JEF90BAS.MIX
  98 APPEND     UNKNOWN   RATES5.LOG
-STEP: JEF90BAS     ENDED AT:  09/30/94  09:08:23
c:\impsum9\pol5>
```

COADJ

PURPOSE

COADJ, a special utility program, produces a new set of emission factors by combining the emission factors from three applications of the POLFAC5A program. The program reads the emission factors from three data sets (i.e., FT01F001, FT02F001, and FT03F001) produced by the three applications of POLFAC5A. In the typical application of COADJ, the three data sets would contain the following emission factors:

FT01F001: Emission factors from the POLFAC5A application which specified no Anti-Tampering Program and no Inspection and Maintenance Program.

FT02F001: Emission factors from the POLFAC5A application which specified an Anti-Tampering Program for model years 1968 to 1979 and Inspection and Maintenance Program.

FT03F001: Emission factors from the POLFAC5A application which specified an Anti-Tampering Program for model years 1980 to present and no Inspection and Maintenance Program.

The corresponding emission factors from FT02F001 and FT03F001 are summed, and the corresponding emission factors from FT01F001 are subtracted from the sums. The resulting set of emission factors are output on the FT04F001 data set.

To apply the program, the three input data sets (i.e., on Units 1, 2 and 3) and the output data set (on Unit 4) are specified. No other data are needed.

MICROCOMPUTER USAGE

The microcomputer version of this program is similar to the mainframe version, except there is no JCL. The program must be in the path or the current directory. The file F77L.EER must be in same directory as the program. The program asks for the names of the input and output data sets. The user can enter up to 80 characters for the drive, path, and name for each data set.

The following is the microcomputer console output from an example run of COADJ. The lower case characters were typed by the user.

```
C:\ELPASO>coadj

COADJ STARTED AT:01/06/93  09:24:16.0
INPUT POLLUTION FACTORS FILE F1 =el-co1.fac

INPUT POLLUTION FACTORS FILE F2 =el-co2.fac

INPUT POLLUTION FACTORS FILE F3 =el-co3.fac

OUTPUT POLLUTION FACTORS =el-co.f

  COADJ ENDED AT:  01/06/93  09:24:46 RUN TIME =    30 SECONDS

C:\ELPASO>dir

 VOLUME IN DRIVE C IS STACVOL_DSK
 DIRECTORY OF  C:\ELPASO\*.*

.            <DIR>      10-14-92  4:01P
..           <DIR>      10-14-92  4:01P
             .
             .
             .
EL-CO1.FAC       15498  10-20-92 10:56A
EL-CO2.FAC       15498  10-20-92 10:58A
EL-CO3.FAC       15498  10-20-92 11:00A
EL-CO.F          15498   1-06-93  9:24A
   1,441,853 BYTES IN 91 FILE(S)     1,851,392 BYTES ALLOCATED
   5,816,320 BYTES FREE

C:\ELPASO>
```

RATEADJ

PURPOSE

RATEADJ, a special utility program, produces a new set of emission factors by linearly combining the emission factors from multiple applications of POLFAC5A or POLFAC5B. The linear factors are read from Unit 5. The emission factors are read from multiple data sets (i.e., FT21F001, FT22F001, FT23F001, etc.) produced by multiple applications of POLFAC5A or POLFAC5B.

To apply the program, the multiple input data sets (N-1) (i.e., on Units 21, 22, 23, etc.) and the output data set (on Unit 3) are specified. The N factors are read from Unit 5. No other data are needed.

DATA SETS REFERENCES

The data sets used by this program are:

DDNAME	Description of data set
STEPLIB	The load module library. The program name is RATEADJ
FT03F001	POLFAC5A or POLFAC5B output calculated by RATEADJ
FT05F001	Linear adjustment factors
FT06F001	Printed output from RATEADJ
FT21F001	POLFAC5A or POLFAC5B rates to multiply by factor 2
FT22F001	POLFAC5A or POLFAC5B rates to multiply by factor 3
FT{20+N-3}F001	POLFAC5A or POLFAC5B rates to multiply by factor N - 2
FT{20+N-2}F001	POLFAC5A or POLFAC5B rates to multiply by factor N - 1
FT{20+N-1}F001	POLFAC5A or POLFAC5B rates to multiply by factor N
FT98F001	Microcomputer Job Control File output; not used by mainframe version.
FT99F001	Microcomputer Job Control File; not used by mainframe version.

OPERATION

A set of factors (N) are read from Unit 5. The number of factors read determines the number of sets of POLFAC5A or POLFAC5B input to be read. The number of input POLFAC5A or POLFAC5B data sets is N - 1 where N factor cards were input on Unit 5. The first factor read is added to the emission rates for all emission types; this constant is usually 0.0. The sum of the additional factors multiplied by the emission rates plus the first factor is applied on a record by record basis to all records in the input emission rate data sets. The input rates must all be from one type of POLFAC run, either POLFAC5A or POLFAC5B. Also if the input data are from POLFAC5B, the rates must either all include diurnal rates or all not include diurnal rates.

The program first reads the input factors and counts them. It then reads a record from each of the input rate files and checks that Columns 1-8 are the same in each of the input rate cards. It then performs the indicated linear regression on each of the 8 emission rates input from the N - 1 data sets and sums the result using double precision. It then finds the best FORMAT for each of the rate fields which will leave one blank between each field, and it copies Columns 1-8 from the input file 19+N to the output record and outputs the linear regression rates to the Unit 3 output file.

INPUT DATA FORMAT: FACTOR CARDS

Columns	Format	Contents
1-20	F20.0	Regression constant for emission factors in unit (19+N) where N is the line number in the FACTORS data set. The first factor is added and should usually be zero.

INPUT DATA FORMAT: INPUT EMISSION RATES

Columns	Format	Contents
1-8	A8	Speed and emission type
9-17	F9.*	LDGV emission rate in grams/mile
18-26	F9.*	LDGT1 emission rate in grams/mile
27-35	F9.*	LDGT2 emission rate in grams/mile
36-44	F9.*	HDGV emission rate in grams/mile
45-53	F9.*	LDDV emission rate in grams/mile
54-62	F9.*	LDDT emission rate in grams/mile
63-71	F9.*	HDDV emission rate in grams/mile
72-80	F9.*	MC emission rate in grams/mile

OUTPUT DATA FORMAT: OUTPUT EMISSION RATES

Contents	Format	Contents
1-8	A8	Speed and emission type; copied from input data
9-17	F9.*	LDGV emission rate in grams/mile
18-26	F9.*	LDGT1 emission rate in grams/mile
27-35	F9.*	LDGT2 emission rate in grams/mile
36-44	F9.*	HDGV emission rate in grams/mile
45-53	F9.*	LDDV emission rate in grams/mile
54-62	F9.*	LDDT emission rate in grams/mile
63-71	F9.*	HDDV emission rate in grams/mile
72-80	F9.*	MC emission rate in grams/mile

*The output format is determined on a cell-by-cell basis from the data so that there will be one blank column separating the emission rates.

MICROCOMPUTER USAGE

The microcomputer version of this program is similar to the mainframe version; however, except instead of JCL, there is a Job Control File (JCF). The program must be in the path or the current directory. The file F77L.EER must be in same directory as the program. To run the microcomputer version, build a JCF file and type JCF and the name of the JCF file.

Two example runs of the RATEADJ program are shown below. The first example is a command line example. The second example is a JCF example. Both test runs used the same input data. The FACTORS file is shown in the table below.

File D:\COAST\HGAC\BASE\FACTORS

```
 0.0
-1.0
 1.0
 1.0
```

DOS Command Line Microcomputer Test Run

```
c:\bell>rateadj

      32-bit Power for Lahey Computer Systems
   Phar Lap's 386|DOS-Extender(tm) Version 4.1L
  Copyright (C) 1986-92 Phar Lap Software, Inc.
            Available Memory = 6900 Kb

---------------------- INPUT DATA SETS ----------------------
RUN FACTORS FILE =d:\coast\hgac\base\factors

---------------------- OUTPUT DATA SETS ---------------------
OUTPUT RATES FILE =c:\hgc01.rat

LISTING FILE =testc.lst

------------------- LINEAR EQUATION COEFFICIENTS -------------------
RATEADJ STEP: 09/27/94   STARTED AT 09:01:27.2
EMISSION RATES = 0.000 - 1.000*RUN1 + 1.000*RUN2 + 1.000*RUN3
RUN 1 DSNAME =d:\coast\hgac\aug21\rates\harris\hr93a01.rat

RUN 2 DSNAME =d:\coast\hgac\aug21\rates\harris\hr93b01.rat

RUN 3 DSNAME =d:\coast\hgac\aug21\rates\harris\hr93c01.rat


c:\bell>
```

Microcomputer JCF Example

```
c:\bell>jcf trateadj.jcf
JCFBATCH trateadj.jcf

        32-bit Power for Lahey Computer Systems
      Phar Lap's 386|DOS-Extender(tm) Version 4.1L
     Copyright (C) 1986-92 Phar Lap Software, Inc.
              Available Memory = 6900 Kb

trateadj.jcf
CALL &&JCF
RATEADJ trateadj.jcf HRFCT01

        32-bit Power for Lahey Computer Systems
      Phar Lap's 386|DOS-Extender(tm) Version 4.1L
     Copyright (C) 1986-92 Phar Lap Software, Inc.
              Available Memory = 6900 Kb

trateadj.jcf HRFCT01
JOB CONTROL FILE = "trateadj.jcf
STEP NAME = "HRFCT01 "
STEP: HRFCT01    STARTED AT:  09/27/94  09:06:55
FILES ARE:
  3 SEQUENTIAL UNKNOWN   C:\BELL\HARRIS01.RAT
  5 SEQUENTIAL UNKNOWN   D:\COAST\HGAC\BASE\FACTORS
  6 SEQUENTIAL UNKNOWN   C:\BELL\TRATEADJ.L6
 21 SEQUENTIAL UNKNOWN   D:\COAST\HGAC\AUG21\RATES\HARRIS\HR93A01.RAT
 22 SEQUENTIAL UNKNOWN   D:\COAST\HGAC\AUG21\RATES\HARRIS\HR93B01.RAT
 23 SEQUENTIAL UNKNOWN   D:\COAST\HGAC\AUG21\RATES\HARRIS\HR93C01.RAT
 98 APPEND     UNKNOWN   C:\BELL\TRATEADJ.LOG
RATEADJ STEP: 09/27/94   STARTED AT 09:06:56.4
EMISSION RATES = 0.000 - 1.000*RUN1 + 1.000*RUN2 + 1.000*RUN3
DEL &&JCF.BAT
Deleting c:\bell\&&jcf.bat
     1 file(s) deleted

c:\bell>
```

IMPSUM

PURPOSE

IMPSUM is one of a series of programs developed by the Texas Transportation Institute to facilitate the computation of emissions. The IMPSUM program uses emission factors obtained from POLFAC5A or COADJ, the user-estimated VMT mixes, and the VMT/speed estimates to compute the emissions by county. The program uses XY coordinates to compute emissions by grid square.

The basic inputs to IMPSUM are:

1. Data specifying the number of counties in the region and their names.
2. The names of the road types used in the study. These road types are used to summarize the emission results.
3. VMT mix by county and road type.
4. Emission factors from POLFAC5A or COADJ by county.
5. Specification of the units for reporting emissions (grams, pounds or tons).
6. Link records providing the estimated VMT and speeds. For each link record, the following information must be provided: county number, road type number, VMT estimate, operational speed estimate, and centerline miles.
7. Coordinates for nodes and zones are an optional input.

To calculate the emission estimates, VMT for a link record is disaggregated by vehicle type applying the user-supplied VMT mixes. The software was designed to allow the user to input the VMT mix data by county and by roadway type within a county. The IMPSUM program uses these data to disaggregate the VMT for each link by the eight vehicle types based on the user-supplied estimate of the VMT mix for that link's county and roadway type.

The emission estimates are computed for each link by multiplying the appropriate emission factors corresponding to the link's roadway type and the link's estimated speed. For noninteger speed estimates, the emission factors are computed by interpolating between the emission factors for the integer speeds on either side of the subject speed. The interpolation is performed using the reciprocals of the corresponding speeds rather than the speeds themselves. The emission results are accumulated for each county by vehicle type and roadway type. If the GRID data card is present, then emissions are allocated to grid squares; and a grid square report is prepared.

The emissions are reported either by gram, by pound, or by ton. The limits of the program are eight counties, 21 roadway types (codes 0 to 20), and eight vehicle types. The program reads data from Units 5 and 1. The Unit 5 input contains emission factors, VMT mixes, roadway type names, county names, and a 'UNITS' record. The Unit 1 input contains the VMT and speed

estimates. All data card name fields are upper case characters.

DATA SET REFERENCES

Input Data Sets

1	=	Link Records
5	=	Data card types GRID, REF, UNITS, ROADTYPE, COUNTY, VMTMX, VOC, TOC, NMHC, TOG, NMOG, CO, and NOX.
8	=	XY Coordinates

Output Data Sets

9	=	Binary results data set for input to SUMALL. This output data set contains additional data which were not in the version of 7/29/93.
10	=	Grid square report without header lines. If not needed then put the "DUMMY" parameter on the DD statement.

OPERATION

Initialization

The input data arrays for VMT mix are set to 0. The emission factor cells are set to -1.0 to indicate missing values. Summation arrays for VHR and VMT by county, roadway type, and vehicle type are set to 0. A summation array for emissions by county, roadway type, and emission type is set to 0. A storage array for average speed by county, roadway type, and vehicle type is set to 0. The number of errors is set to 0. The county ID number is set to 1. The grid square summation array is set to 0.

Reading Unit 5 Input Data

A data card is read from Unit 5 as a character variable. A comparison is made to the data card types of GRID, REF, UNITS, ROADTYPE, COUNTY, or VMTMX. The data cards VOC, TOC, NMHC, TOG, NMOG, CO, or NOX are searched for starting in Column 5. If the data card matches one of these, it is read from the character variable with the appropriate format; and it is checked. If the data card type is COUNTY, then a new county ID number is saved. If the data card type is VMTMX, VOC, CO, or NOX, then the last county ID number will be used as an index for saving the data.

Error Checking of Unit 5 Input Data

The county number of the county ID card is checked for a range of 1 to 8. The roadway type of the roadway type name card and the VMT mix data cards are checked for a range of 0 to 20. The speed read from the VOC, TOC, NMHC, TOG, NMOG, CO, and NOX data cards is checked for a range of 3 to 65. The first occurrence of a VOC, TOC, NMHC, TOG, or NMOG data card will determine the type of HC emissions which will be reported. Only data cards of this type will accepted for HC emissions after this, and the other four HC emission rate data cards will be printed in error messages if they are input later. The number of emission constants for each county which are not missing values are summed. The number must be either 1,512 or 0. Each VMT mix is summed. Each VMT mix is then scaled to 1.0, and a warning message is written if the mix sum is less than 0.99 or greater than 1.01 before scaling. If any errors are found in the input data from Unit 5, the program prints these messages and terminates with a Stop Code of 1.

Error Checking of Unit 1 Data and Reports

The links records from Unit 1 are then processed. A check is made for a speed between 1.0 and 99. A check of the roadway type and county number is made to see if they are valid. A sum of links missing VMT mixes are kept. A sum of links missing emission factors is also kept. After all links are processed, reports are printed for VMT mix, VMT, vehicle hours of travel, VOC emission, CO emission, and NOX emission. If data were missing for VMT mixes or emission factors, error reports summing number of links by county for missing emission factors and by county and roadway type for missing VMT mixes are made. If errors in the links records were found, the program stops with a Stop 9.

Reading Unit 8 Data

The XY coordinate data are read if a GRID card was read. The node or zone number is checked for the range of 1 to 16,000; if the node or zone number is outside this range, the coordinate data are skipped.

UNIT 5 DATA CARDS

The ordering of data on the Unit 5 input is important. The only county number input is from the county ID card. The VMTMX, VOC, NOX, and CO data cards do not contain a county number. The data from these four data cards are stored using the county number from the last county ID card as an index.

GRID CARD

Columns	Format	Contents
1-5	A5	'GRID'
11	F10.0	Width and height of a grid square in coordinate units. If GRID is omitted or is zero, then the grid output will not be produced; and the XY coordinates will not be read.

REF CARD

Columns	Format	Contents
1-3	A3	'REF'
11-20	F10.0	X coordinate of southwest corner of grid area
21-30	F10.0	Y coordinate of southwest corner of grid area

UNITS CARD

Columns	Format	Contents
1-5	A5	'UNITS'
7	I1	Report units code: 1 = Grams 2 = Pounds 3 = Tons

ROADWAY TYPE NAME CARD

Columns	Format	Contents
1-8	A8	'ROADTYPE'
10-11	I2	Roadway type number (values from 0 to 20 are valid)
13-32	A20	Roadway type name

COUNTY ID CARD

Columns	Format	Contents
1-6	A6	'COUNTY'
8-9	I2	County number (values from 1 to 8 are valid)
11-22	A12	County name

VEHICLE MILES OF TRAVEL MIX CARD[14]

Columns	Format	Contents
1-5	A5	'VMTMX'
7-8	I2	Roadway type number (valid values are from 0 to 20)
9-17	F9.5	LDGV fraction of VMT
18-26	F9.5	LDGT1 fraction of VMT
27-35	F9.5	LDGT2 fraction of VMT
36-44	F9.5	HDGV fraction of VMT
45-53	F9.5	LDDV fraction of VMT
54-62	F9.5	LDDT fraction of VMT
63-71	F9.5	HDDV fraction of VMT
72-80	F9.5	MC fraction of VMT

[14] The county number from the last county ID card is used.

VOC EMISSION FACTOR CARD[15]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-7	A3	'VOC'
8	A1	blank
9-17	F9.5	LDGV VOC emission factor in grams/mile
18-26	F9.5	LDGT1 VOC emission factor in grams/mile
27-35	F9.5	LDGT2 VOC emission factor in grams/mile
36-44	F9.5	HDGV VOC emission factor in grams/mile
45-53	F9.5	LDDV VOC emission factor in grams/mile
54-62	F9.5	LDDT VOC emission factor in grams/mile
63-71	F9.5	HDDV VOC emission factor in grams/mile
72-80	F9.5	MC VOC emission factor in grams/mile

The county number from the last county ID card is used.

TOG EMISSION FACTOR CARD[16]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-7	A3	'TOG'
8	A1	blank
9-17	F9.5	LDGV TOG emission factor in grams/mile
18-26	F9.5	LDGT1 TOG emission factor in grams/mile
27-35	F9.5	LDGT2 TOG emission factor in grams/mile
36-44	F9.5	HDGV TOG emission factor in grams/mile
45-53	F9.5	LDDV TOG emission factor in grams/mile
54-62	F9.5	LDDT TOG emission factor in grams/mile
63-71	F9.5	HDDV TOG emission factor in grams/mile
72-80	F9.5	MC TOG emission factor in grams/mile

The county number from the last county ID card is used.

TOC EMISSION FACTOR CARD[17]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-7	A3	'TOC'
8	A1	blank
9-17	F9.5	LDGV TOC emission factor in grams/mile
18-26	F9.5	LDGT1 TOC emission factor in grams/mile
27-35	F9.5	LDGT2 TOC emission factor in grams/mile
36-44	F9.5	HDGV TOC emission factor in grams/mile
45-53	F9.5	LDDV TOC emission factor in grams/mile
54-62	F9.5	LDDT TOC emission factor in grams/mile
63-71	F9.5	HDDV TOC emission factor in grams/mile
72-80	F9.5	MC TOC emission factor in grams/mile

[17] The county number from the last county ID card is used.

NMHC EMISSION FACTOR CARD[18]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-8	A4	'NMHC'
9-17	F9.5	LDGV NMHC emission factor in grams/mile
18-26	F9.5	LDGT1 NMHC emission factor in grams/mile
27-35	F9.5	LDGT2 NMHC emission factor in grams/mile
36-44	F9.5	HDGV NMHC emission factor in grams/mile
45-53	F9.5	LDDV NMHC emission factor in grams/mile
54-62	F9.5	LDDT NMHC emission factor in grams/mile
63-71	F9.5	HDDV NMHC emission factor in grams/mile
72-80	F9.5	MC NMHC emission factor in grams/mile

The county number from the last county ID card is used.

NMOG EMISSION FACTOR CARD[19]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-8	A4	'NMOG'
9-17	F9.5	LDGV NMOG emission factor in grams/mile
18-26	F9.5	LDGT1 NMOG emission factor in grams/mile
27-35	F9.5	LDGT2 NMOG emission factor in grams/mile
36-44	F9.5	HDGV NMOG emission factor in grams/mile
45-53	F9.5	LDDV NMOG emission factor in grams/mile
54-62	F9.5	LDDT NMOG emission factor in grams/mile
63-71	F9.5	HDDV NMOG emission factor in grams/mile
72-80	F9.5	MC NMOG emission factor in grams/mile

The county number from the last county ID card is used.

CO EMISSION FACTOR CARD[20]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-6	A3	'CO'
7-8	A2	blank
9-17	F9.5	LDGV CO emission factor in grams/mile
18-26	F9.5	LDGT1 CO emission factor in grams/mile
27-35	F9.5	LDGT2 CO emission factor in grams/mile
36-44	F9.5	HDGV CO emission factor in grams/mile
45-53	F9.5	LDDV CO emission factor in grams/mile
54-62	F9.5	LDDT CO emission factor in grams/mile
63-71	F9.5	HDDV CO emission factor in grams/mile
72-80	F9.5	MC CO emission factor in grams/mile

The county number from the last county ID card is used.

NOX EMISSION FACTOR CARD[21]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-7	A3	'NOX'
8	A1	blank
9-17	F9.5	LDGV NOX emission factor in grams/mile
18-26	F9.5	LDGT1 NOX emission factor in grams/mile
27-35	F9.5	LDGT2 NOX emission factor in grams/mile
36-44	F9.5	HDGV NOX emission factor in grams/mile
45-53	F9.5	LDDV NOX emission factor in grams/mile
54-62	F9.5	LDDT NOX emission factor in grams/mile
63-71	F9.5	HDDV NOX emission factor in grams/mile
72-80	F9.5	MC NOX emission factor in grams/mile

The county number from the last county ID card is used.

XY COORDINATE DATA CARD

Columns	Format	Contents
1-5	I5	Node or zone number
6-15	F10.0	X coordinate of node or zone
16-25	F10.0	Y coordinate of node or zone

The suggested order of the Unit 5 data cards is:

UNIT 3 (tons)
ROADTYPE
.
.
.
COUNTY 1 ------
VMTMX
.
.
.
VOC
.
.
.
CO
.
.
.
NOX
.
.
.
COUNTY 2 ------
VMTMX
.
.
.
VOC
.
.

.
CO
.
.
.
NOX
.
.
.
(repeat for additional counties)

UNIT 1 DATA CARDS

Links Cards

Columns	Format	Description
1-5	I5	A-node
7-11	I5	B-node
13	I1	County number (1-10)
15-16	I2	Roadway type (0-20)
18-27	F10.2	Link distance in miles
29-34	F6.2	Congested speed
36-50	F15.2	VMT

The A-node and B-node fields are not used by IMPSUM.

Example JCL

```
//IMPSUMT   JOB  (W150,60A,S5,5,JB),'BELL  TEST IMPSUM'
//IMP1  EXEC  PGM=IMPSUM,REGION=1024K
//STEPLIB  DD  DISP=SHR,DSN=USR.W104.CB.JB.IMPSUM
//FT06F001 DD  SYSOUT=A
//FT05F001 DD  *
//FT01F001 DD  DISP=OLD,DSN=USR.W150.CB.JR9090S1
//FT09F001  DD  DISP=(NEW,CATLG),UNIT=DISK,SPACE=(TRK,(2,1)),
//  DSN=USR.W150.CB.JRT90901.SAV,
//  DCB=(RECFM=VBS,LRECL=6316,BLKSIZE=6320)
```

MICROCOMPUTER USAGE

The microcomputer version of this program is similar to the mainframe version, except there is no JCL. The program must be in the path or in the current directory. The file F77L.EER must be in same directory as the program. The program asks for the name of the input and output data sets. The user can enter up to 80 characters for the drive, path, and name for each data set.

The following is the microcomputer console output from an example run of IMPSUM. The lower case characters were typed by the user. The "nul" response to "GRID OUTPUT =" cause the grid output without headings to be discarded. The grid output with headings will be written to the data set "jrt96931.out" in the example below.

```
C:\JORTS\TEST>impsum

      32-bit Power for Lahey Computer Systems
     Phar Lap's 386|DOS-Extender(tm) Version 4.1L
    Copyright (C) 1986-92 Phar Lap Software, Inc.
              Available Memory = 5552 Kb

POLLUTION FACTOR FILE =s1

LINKS FILE =jr9693s1

OUTPUT FILE =jrt96931.out

GRID OUTPUT =nul

SAVE FILE =jrt96931.sav

IMPSUM STARTED AT 08/04/93            11:17:28.8

C:\JORTS\TEST>dir

 Volume in drive C is STACVOL_DSK
 Directory of C:\JORTS\TEST

S1              50903 07-15-93   4:40p
JR9693S1       479284 07-15-93   4:06p
JRT96931 OUT    46061 08-04-93  11:17a
JRT96931 SAV   130485 08-04-93  11:17a

C:\ELPASO>cc < jrt96931.out > prn[22]
```

The CC program reads a FORTRAN output file with carriage control characters and prints the file in landscape mode to an HP LaserJet II-compatible printer or to a character file. This program should not be used with printers that are not HP LaserJet II-compatible. The CC program is written in Turbo C.

SUMALL

PURPOSE

This program was written to sum the emission results from two or more time periods plus diurnals. The SUMALL program sums the results from one or more IMPSUM runs and also calculates diurnal emissions and prints the summed results in the same formats as IMPSUM with the additional diurnals for HC output. This program reads all Unit 5 data read by IMPSUM. Additionally, this program reads a parameter card specifying the number of binary result data sets to sum, diurnal rates, and the number of vehicles by vehicle type.

Emission output by grid square will be printed if the IMPSUM runs which produced the binary result data sets had grid square output. A second copy of this output without headings will be written to Unit 10. The Unit 10 output is for input to computer programs.

The diurnal rates will come from either three MOBILE5a runs or one MOBILE5a run for each county. If one run is used, specify Run 2 for the DIUW and DIUM data cards. If three runs are used, the actual rates will be calculated by summing Run 2 and 3 data and subtracting Run 1. It is assumed that the IMPSUM runs to be summed have no diurnal emissions. This is accomplished by making the minimum temperature, the maximum temperature, and the ambient temperature the same in the POLFAC5A runs.

The basic inputs to SUMALL are:

1. Data specifying the number of IMPSUM runs to sum (NSAV).
2. Data specifying the number of counties in the region and their names.
3. The names of the road types used in the study. These road types are used to summarize the emission results.
4. VMT mix by county and road type.
5. Emission factors from POLFAC5A or COADJ by county.
6. Specification of the units for reporting emissions (grams, pounds, or tons).
7. Diurnal rates and the number of vehicles by county.
8. Binary data sets which saved the results from one or more IMPSUM runs. The binary data sets produced by the IMPSUM program of version 7/29/93 are not compatible with this version of SUMALL because grid square output was added.

UNIT 5 DATA CARDS

The ordering of data on the Unit 5 input is important. The only county number input is from the county ID card. The VMTMX, VOC, NOX, and CO data cards do not contain a county number. The data from these four data cards are stored using the county number from the last county ID card as an index.

UNITS CARD

Columns	Format	Contents
1-5	A5	'UNITS'
7	I1	Report units code: 1 = Grams 2 = Pounds 3 = Tons

NSAV CARD

Columns	Format	Contents
1-4	A4	'NSAV'
11	I5	Number of "save" data sets to sum. The value can be 1 to 89. The "save" data sets will be read from Units 11, 12, etc. The number of "save" data sets may be limited by the number of DD statements that can be used in a job or a jobstep.

WEIGHTED DIURNAL EMISSION RATES CARD

Columns	Format	Contents
1-4	A4	'DIUW'
5-6	I2	Run number
7-8	I2	County number
11-18	F8.2	Weighted diurnal rate for LDGV
19-26	F8.2	Weighted diurnal rate for LDGT1
27-34	F8.2	Weighted diurnal rate for LDGT2
35-42	F8.2	Weighted diurnal rate for HDGV
43-50	F8.2	Weighted diurnal rate for LDDV
51-58	F8.2	Weighted diurnal rate for LDDT
59-66	F8.2	Weighted diurnal rate for HDDV
67-76	F8.2	Weighted diurnal rate for MC

MULTIPLE DIURNAL EMISSION RATES CARD

Columns	Format	Contents
1-4	A4	'DIUM'
5-6	I2	Run number
7-8	I2	County number
11-18	F8.2	Multiple diurnal rate for LDGV
19-26	F8.2	Multiple diurnal rate for LDGT1
27-34	F8.2	Multiple diurnal rate for LDGT2
35-42	F8.2	Multiple diurnal rate for HDGV
43-50	F8.2	Multiple diurnal rate for LDDV
51-58	F8.2	Multiple diurnal rate for LDDT
59-66	F8.2	Multiple diurnal rate for HDDV
67-76	F8.2	Multiple diurnal rate for MC

VEHICLES CARD

Columns	Format	Contents
1-4	A4	'VEH '
7-8	I2	County number
11-18	F8.2	Number of LDGV vehicles
19-26	F8.2	Number of LDGT1 vehicles
27-34	F8.2	Number of LDGT2 vehicles
35-42	F8.2	Number of HDGV vehicles
43-50	F8.2	Number of LDDV vehicles
51-58	F8.2	Number of LDDT vehicles
59-66	F8.2	Number of HDDV vehicles
67-76	F8.2	Number of MC vehicles

ROADWAY TYPE NAME CARD

Columns	Format	Contents
1-8	A8	'ROADTYPE'
10-11	I2	Roadway type number (values from 0 to 20 are valid)
13-32	A20	Roadway type name

COUNTY ID CARD

Columns	Format	Contents
1-6	A6	'COUNTY'
8-9	I2	County number (values from 1 to 8 are valid)
11-22	A12	County name

VEHICLE MILES OF TRAVEL MIX CARD[23]

Columns	Format	Contents
1-5	A5	'VMTMX'
7-8	I2	Roadway type number (valid values are from 0 to 20)
9-17	F9.5	LDGV fraction of VMT
18-26	F9.5	LDGT1 fraction of VMT
27-35	F9.5	LDGT2 fraction of VMT
36-44	F9.5	HDGV fraction of VMT
45-53	F9.5	LDDV fraction of VMT
54-62	F9.5	LDDT fraction of VMT
63-71	F9.5	HDDV fraction of VMT
72-80	F9.5	MC fraction of VMT

[23] The county number from the last county ID card is used.

VOC EMISSION FACTOR CARD[24]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-7	A3	'VOC'
8	A1	blank
9-17	F9.5	LDGV VOC emission factor in grams/mile
18-26	F9.5	LDGT1 VOC emission factor in grams/mile
27-35	F9.5	LDGT2 VOC emission factor in grams/mile
36-44	F9.5	HDGV VOC emission factor in grams/mile
45-53	F9.5	LDDV VOC emission factor in grams/mile
54-62	F9.5	LDDT VOC emission factor in grams/mile
63-71	F9.5	HDDV VOC emission factor in grams/mile
72-80	F9.5	MC VOC emission factor in grams/mile

[24] The county number from the last county ID card is used.

CO EMISSION FACTOR CARD[25]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-6	A3	'CO'
7-8	A2	blank
9-17	F9.5	LDGV CO emission factor in grams/mile
18-26	F9.5	LDGT1 CO emission factor in grams/mile
27-35	F9.5	LDGT2 CO emission factor in grams/mile
36-44	F9.5	HDGV CO emission factor in grams/mile
45-53	F9.5	LDDV CO emission factor in grams/mile
54-62	F9.5	LDDT CO emission factor in grams/mile
63-71	F9.5	HDDV CO emission factor in grams/mile
72-80	F9.5	MC CO emission factor in grams/mile

[25] The county number from the last county ID card is used.

NOX EMISSION FACTOR CARD[26]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-7	A3	'NOX'
8	A1	blank
9-17	F9.5	LDGV NOX emission factor in grams/mile
18-26	F9.5	LDGT1 NOX emission factor in grams/mile
27-35	F9.5	LDGT2 NOX emission factor in grams/mile
36-44	F9.5	HDGV NOX emission factor in grams/mile
45-53	F9.5	LDDV NOX emission factor in grams/mile
54-62	F9.5	LDDT NOX emission factor in grams/mile
63-71	F9.5	HDDV NOX emission factor in grams/mile
72-80	F9.5	MC NOX emission factor in grams/mile

SUGGESTED ORDER OF UNIT 5 DATA

UNIT 3 (tons)
NSAV 4
DIUW 1 1
DIUW 2 1
DIUW 3 1
DIUM 1 1
DIUM 2 1
DIUM 3 1
VEH 1
ROADTYPE
.
.
.

The county number from the last county ID card is used.

COUNTY 1 ------
VMTMX
.
.
.
VOC
.
.
.
CO
.
.
.
NOX
.
.
.
COUNTY 2 ------
VMTMX
.
.
.
VOC
.
.
.
CO
.
.
.
NOX
.
.
.
(repeat for additional counties)

EXAMPLE JCL

```
//SUMALL93 JOB (W150,60A,2,5,CB),'BELL  JORTS 96 93'
//SUMALL   EXEC  PGM=SUMALL2,REGION=512K
//STEPLIB  DD    DISP=OLD,DSN=USR.W104.CB.JB.IMPSUM
//FT05F001 DD  *
//FT06F001  DD  SYSOUT=A
//FT10F001  DD  DUMMY
```

```
//FT11F001  DD  DISP=OLD,DSN=USR.W150.CB.JRT96931.SAV
//FT12F001  DD  DISP=OLD,DSN=USR.W150.CB.JRT96932.SAV
//FT13F001  DD  DISP=OLD,DSN=USR.W150.CB.JRT96933.SAV
//FT14F001  DD  DISP=OLD,DSN=USR.W150.CB.JRT96934.SAV
```

EXAMPLE UNIT 5 INPUT

```
HDR1  JORTS 1996 TRIPS ON 1993 NETWORK
NSAV          4
HDR2  24 HOUR
UNITS 3
DIUW 2 3   1.67    2.81    4.83   26.81    0.00    0.00    0.00   11.77   HAR96
DIUM 2 3   6.86    8.57   10.11   33.63    0.00    0.00    0.00    0.00   HAR96
VEH    3   17946. 11785.  1119.    341.    366.    364.   121.     277.   HAR96
DIUW 2 1   1.79    2.74    5.16   21.57    0.00    0.00    0.00   11.77   JEF96
DIUM 2 1   6.99    8.50   10.35   30.34    0.00    0.00    0.00    0.00   JEF96
VEH    1   121635. 44956.  3580.   2108.   2482.   1390.   732.    2893.   JEF96
DIUW 2 2   1.72    2.84    5.02   25.77    0.00    0.00    0.00   11.77   ORA96
DIUM 2 2   6.92    8.63   10.25   33.00    0.00    0.00    0.00    0.00   ORA96
VEH    2   40056. 22205.  1730.    603.    817.    687.   253.     801.   ORA96
ROADTYPE  0 LOCAL
ROADTYPE  1 INTERSTATE HWYS & FWYS
ROADTYPE  2 MULTILANE HIGHWAYS
ROADTYPE  3 PRINCIPAL DIV. ART.
ROADTYPE  4 PRIN. UNDIV. ART.
ROADTYPE  5 MINOR DIV. ART.
ROADTYPE  6 MINOR UNDIV. ART.
ROADTYPE  7 COLLECTORS
ROADTYPE  8 FRONTAGE ROADS
ROADTYPE  9 RAMPS
COUNTY  1 JEFFERSON
VMTMX 00 0.590   0.240    0.065    0.037    0.002    0.001    0.062    0.003
    .
    .
    .
VMTMX 16 0.590   0.240    0.065    0.037    0.002    0.001    0.062    0.003
  3 VOC  10.19051 11.14644 14.16451 19.70721  1.65438  2.28766  5.47575 16.93929
    .
    .
    .
 65 VOC   1.21994  1.54062  1.84379  2.22498  0.34940  0.48315  1.15647  6.21601
  3 CO   83.64868102.35202132.10094202.95169  5.39228  6.10980 38.25746182.97807
    .
    .
    .
 65 CO   18.80666 27.46329 33.29419 48.16167  1.06772  1.20980  7.57536 38.06747
  3 NOX   2.21896  2.37885  2.61141  4.24928  2.76132  3.11727 23.65694  0.83962
    .
    .
    .
 65 NOX   2.81003  3.17711  3.61587  6.97554  2.80968  3.17185 24.07120  1.67833
COUNTY  2 ORANGE
VMTMX 00 0.590   0.240    0.065    0.037    0.002    0.001    0.062    0.003
    .
    .
    .
VMTMX 16 0.590   0.240    0.065    0.037    0.002    0.001    0.062    0.003
  3 VOC   9.59235 11.14629 13.61409 24.68542  1.63085  2.30749  6.08451 17.18773
    .
    .
    .
 65 VOC   1.13841  1.54358  1.76878  2.88477  0.34443  0.48734  1.28503  6.31517
  3 CO   77.78996103.22798126.98114271.09424  5.34957  6.15454 41.37212183.84230
    .
    .
    .
```

```
 65 CO   17.40787 27.76924 31.93053 64.33250  1.05927  1.21866  8.19210 38.24724
  3 NOX   2.07422  2.29800  2.51378  4.38235  2.74037  3.13502 27.83104  0.83962
    .
    .
    .
 65 NOX   2.62029  3.08953  3.47673  7.19399  2.78836  3.18992 28.31841  1.67834
COUNTY  3 HARDIN
VMTMX 00 0.604    0.348    0.030    0.010    0.002    0.002    0.003    0.001
    .
    .
    .
VMTMX 16 0.604    0.348    0.030    0.010    0.002    0.002    0.003    0.001
  3 VOC   9.57386 11.55715 13.06376 25.57549  1.62326  2.32586  6.52089 17.77747
    .
    .
    .
 65 VOC   1.13472  1.60077  1.69376  3.01910  0.34283  0.49122  1.37720  6.51326
  3 CO   77.17125106.30727119.75487275.50562  5.33607  6.16977 42.50887186.61420
    .
    .
    .
 65 CO   17.19089 28.51173 29.76122 65.37944  1.05659  1.22167  8.41718 38.82393
  3 NOX   2.10472  2.46660  2.49018  4.41810  2.72303  3.15332 29.79782  0.83962
    .
    .
    .
 65 NOX   2.64759  3.29341  3.41184  7.25267  2.77071  3.20854 30.31961  1.67833
```

MICROCOMPUTER USAGE

The microcomputer version of this program is similar to the mainframe version, except there is no JCL. The program must be in the path or in the current directory. The file F77L.EER must be in same directory as the program. The program asks for the name of the input and output data sets. The user can enter up to 80 characters for the drive, path, and name for each data set.

The following is the microcomputer console output from an example run of SUMALL. The lower case characters were typed by the user. The "nul" response to "GRID OUTPUT =" cause the grid output without headings to be discarded. The grid output with headings will be written to the data set "sumall.out" in the example below.

```
C:\JORTS\TEST>sumall

      32-bit Power for Lahey Computer Systems
    Phar Lap's 386|DOS-Extender(tm) Version 4.1L
  Copyright (C) 1986-92 Phar Lap Software, Inc.
            Available Memory = 5552 Kb

SUMALL INPUT =sumall.ft5
SUMALL OUTPUT =sumall.out
GRID OUTPUT =nul
SAVE  1 DATA SET =jrt96931.sav
SAVE  2 DATA SET =jrt96932.sav
SAVE  3 DATA SET =jrt96933.sav
SAVE  4 DATA SET =jrt96934.sav

C:\JORTS\TEST>dir
```

```
 Volume in drive C is STACVOL_DSK
 Directory of C:\JORTS\TEST

SUMALL   FT5      51621 07-15-93   9:22a
SUMALL   OUT      42310 07-16-93   8:18a
JRT96931 SAV      65485 07-16-93   8:17a
JRT96932 SAV      65485 07-15-93   4:58p
JRT96933 SAV      65485 07-15-93   4:59p
JRT96934 SAV      65485 07-15-93   5:00p

C:\ELPASO>cc < sumall.out > prn[27]
```

The CC program reads a FORTRAN output file with carriage control characters and prints the file in landscape mode to an HP LaserJet II-compatible printer or to a character file. This program should not be used with printers that are not HP LaserJet II-compatible. The CC program is written in Turbo C.

IMPSUMA

PURPOSE

IMPSUMA is one of a series of programs developed by the Texas Transportation Institute to facilitate the computation of emissions. The IMPSUMA program uses emission factors obtained from POLFAC5B or RATEADJ, the user-estimated VMT mixes, and the VMT/speed estimates to compute emissions by county. The program uses XY coordinates to compute emissions by grid square.

The basic inputs to IMPSUMA are:

1. Data specifying the number of counties in the region and their names.
2. The names of the road types used in the study. These road types are used to summarize the emission results.
3. VMT mix by county and road type.
4. Emission factors from POLFAC5B or RATEADJ by county; should also include 24-hour diurnal rates.
5. Specification of the units for reporting emissions (grams, pounds, or tons).
6. Link records providing the estimated VMT and speeds. For each link record, the following information must be provided: county number, road type number, VMT estimate, operational speed estimate, and centerline miles.
7. Coordinates for nodes and zones are an optional input.
8. Total VMT by county and time period (maximum of 24 time periods).
9. Diurnal scale factors by county and time period (temperature rise lagged by 2 hours for each time period is recommended).
10. A time period card.

TIME PERIOD DIURNAL RATE CALCULATIONS

A set of weighting factors for diurnals is read by county and time period from the TP-D-WT data cards. These values are scaled to sum to 1.0 by county. This creates a set of normalized diurnal weights by time period for each county. A time period card is read to select the time period. VMT totals are read from the VMTTOT data cards by county and time period. VMT is summed by county. Also the VMT weighted by the normalized TP-D-WT weights is calculated by county. A set of VMT diurnal correction factors are calculated by county. The correction factors are calculated by dividing the VMT for the county by the diurnal weighted VMT for the county. This correction factor scales the VMT to which diurnal rates are applied to the total VMT by county. The time period diurnal rates than are calculated by multiplying the 24-hour diurnal rates by the normalized

diurnal weight and the VMT correction factor for the correct county and time period. The time period diurnal rates are then added to the HC emission rates (probably VOC rates) for the same county. This is done because the time period emission rates do not have diurnal rates included. The time period emission rates come from a run of POLFAC5B with the minimum temperature, the maximum temperature, and the ambient temperature set to the same value which causes the diurnal rates to be 0. The diurnal rates input must come from a separate run of POLFAC5B and will be 24-hour diurnal rates which are scaled to time period diurnal rates as explained above.

LINK AND GRID EMISSION CALCULATIONS

To calculate the emission estimates, VMT for a link record is disaggregated by vehicle type applying the user-supplied VMT mixes. The software was designed to allow the user to input the VMT mix data by county and by roadway type within a county. The IMPSUMA program uses these data to disaggregate the VMT for each link by the eight vehicle types based on the user-supplied estimate of the VMT mix for that link's county and roadway type.

The emission estimates are computed for each link by multiplying the appropriate emission factors corresponding to the link's roadway type and the link's estimated speed. For noninteger speed estimates, the emission factors are computed by interpolating between the emission factors for the integer speeds on either side of the subject speed. The interpolation is performed using the reciprocals of the corresponding speeds rather than the speeds themselves. The emission results are accumulated for each county by vehicle type and roadway type. If the GRID data card is present, emissions are allocated to grid squares; and a grid square report is prepared. A second grid report of emissions by vehicle type is prepared and written to Unit 4 without headings. This report is also printed with headings if a "REPORT VEH-GRID" card is in the input data.

The emissions are reported either by gram, by pound, or by ton. The limits of the program are eight counties, 21 roadway types (codes 0 to 20), 24 time periods, and eight vehicle types. The program reads data from Units 5 and 1. The Unit 5 input contains emission factors, VMT mixes, roadway type names, county names, and a 'UNITS' record. The Unit 1 input contains the VMT and speed estimates. All data card name fields are upper case characters.

DATA SET REFERENCES

Input Data Sets

FORTRAN Unit Number	Minimum Record Length	Description
1	50	Link Records
5	80	Data card types HDR1, HDR2, REPORT VEH-GRID, FMTXY, GRID, REF, UNITS, ROADTYPE, COUNTY, VMTMX, VOC, TOC, NMHC, TOG, NMOG, CO, NOX, EXHS, RNLS, RSTL, CC, HTSK, and DIRN
8	25[28]	XY Coordinates

Output Data Sets

FORTRAN Unit Number	Minimum Record Length	Description
4	129	Emissions by grid square and vehicle type report without header lines. Put the "DUMMY" parameter on the DD statement if these data are not needed.
9	1348	Binary results data set for input to SUMALLA. This output data set contains additional data which were not in the October 8, 1993, version. This data set must have a record type V.
10	73	Emissions by grid square report without header lines. If not needed, put the "DUMMY" parameter on the DD statement.

If a FMTXY data card is used the record length will be different.

OPERATION

Initialization

The input data arrays for the VMT mix are set to 0. The emission factor cells are set to -1.0 to indicate missing values. Summation arrays for VHR and VMT by county, roadway type, and vehicle type are set to 0. A summation array for emissions by county, roadway type, and emission type is set to 0. A storage array for average speed by county, roadway type, and vehicle type is set to 0. The number of errors is set to 0. The county ID number is set to 1. The grid square summation array is set to 0. The grid square summation array by vehicle type is set to 0.

Reading Unit 5 Input Data

All input data cards except the emission rates are printed as they are read. A data card is read from Unit 5 as a character variable. A comparison is made between the input data starting in Column 1 and the character strings of HDR1, HDR2, FMTXY, GRID, WGTWDIU, WGTMDIU, PERIOD, VEH, DIUW, DIUM, "REPORT VEH-GRID", REF, UNITS, ROADTYPE, COUNTY, or VMTMX. If the data card matches one of these, it is read from the character variable with the appropriate format; and it is checked. If the input data did not match a character string starting in Column 1, then a comparison is made between the input data starting in Column 5 and the character strings of VOC, TOC, NMHC, TOG, NMOG, CO, or NOX. If the data card matches one of these, it is read from the character variable with the appropriate format; and it is checked. If the data card type is COUNTY, then a new county ID number is saved. If the data card type is VMTMX, VOC, CO, or NOX, then the last county ID number will be used as an index for saving the data.

Error Checking of Unit 5 Input Data

The county number of the county ID card is checked for a range of 1 to 8. The roadway type of the roadway type name card and the VMT mix data cards are checked for a range of 0 to 20. The speed read from the VOC, TOC, NMHC, TOG, NMOG, CO, and NOX data cards is checked for a range of 3 to 65. The first occurrence of a VOC, TOC, NMHC, TOG, or NMOG data card will determine the type of HC emissions which will be reported. Only data cards of this type will be accepted for HC emissions after this, and the other four HC emission rate data cards will be printed in error messages if they are input later. The number of emission constants for each county which are not missing values are summed. The number must be either 1,512 or 0. Each VMT mix is summed. Each VMT mix is then scaled to 1.0, and a warning message is written if the mix sum is less than 0.99 or greater than 1.01 before scaling. If any errors are found in the input data from Unit 5, the program prints these messages and terminates with a Stop Code of 1.

Error Checking of Unit 1 Data and Reports

The links records from Unit 1 are then processed. A check is made for a speed between 1.0 and 99. A check of the roadway type and county number is made to see if they are valid. A sum of links with incomplete VMT mixes is kept. A sum of links missing emission factors is also kept. After all links are processed, reports are printed for VMT mix, VMT, vehicle hours of travel, VOC emissions, CO emissions, and NOX emissions. If data were missing for VMT mixes or emission factors, error reports summing the number of links by county for missing emission factors and by county and roadway type for missing VMT mixes are made. If errors in the links records were found, the program stops with a Stop 9.

Reading Unit 8 Data

The XY coordinate data are read if a GRID card was read. The node or zone number is checked for the range of 1 to 16,000; if the node or zone number is outside this range, the coordinate data are skipped.

UNIT 5 DATA CARDS

The ordering of data on the Unit 5 input is important. The only county number input is from the county ID card. The VMTMX, VOC, NOX, and CO data cards do not contain a county number. The data from these four data cards are stored using the county number from the last county ID card as an index.

GRID CARD

Columns	Format	Contents
1-5	A5	'GRID'
11	F10.0	Width and height of a grid square in coordinate units. If GRID is omitted or is 0, the grid output will not be produced; and the XY coordinates will not be read.

REF CARD

Columns	Format	Contents
1-3	A3	'REF'
11-20	F10.0	X coordinate of southwest corner of grid area
21-30	F10.0	Y coordinate of southwest corner of grid area

FMTXY CARD

Columns	Format	Contents
1-5	A5	'FMTXY'
7-80	A74	Format to read a node number, an X coordinate, and a Y coordinate. The format must input an integer followed by two real numbers. The format must start with a left parenthesis and end with a right parenthesis. The format must be valid for FORTRAN 77. The default format is (I5,2F10.0).

REPORT VEH-GRID CARD[29]

Columns	Format	Contents
1-15	A15	'REPORT VEH-GRID'

UNITS CARD

Columns	Format	Contents
1-5	A5	'UNITS'
7	I1	Report units code: 1 = Grams 2 = Pounds 3 = Tons

ROADWAY TYPE NAME CARD

Columns	Format	Contents
1-8	A8	'ROADTYPE'
10-11	I2	Roadway type number (values from 0 to 20 are valid)
13-32	A20	Roadway type name

The grid report by vehicle type is not printed unless a "GRID REPORT" card is present in the input data.

COUNTY ID CARD

Columns	Format	Contents
1-6	A6	'COUNTY'
8-9	I2	County number (values from 1 to 8 are valid)
11-22	A12	County name

TIME PERIOD CARD

Columns	Format	Contents
1-6	A6	'PERIOD'
7-10	I4	Time period index for the WGTWDIU and WGTMDIU data

DIURNAL TIME PERIOD DISTRIBUTION CARD

Columns	Format	Contents
1-7	A7	'TP-D-WT'
11-13	I3	County number
14-16	I3	First time period data on this card (JFC)
17-19	I3	Last time period data on this card
21-30	F10.0	Relative time period JFC distribution value
31-40	F10.0	Relative time period JFC+1 distribution value
41-50	F10.0	Relative time period JFC+2 distribution value
51-60	F10.0	Relative time period JFC+3 distribution value
61-70	F10.0	Relative time period JFC+4 distribution value
71-80	F10.0	Relative time period JFC+5 distribution value

TIME PERIOD VMT CARD

Columns	Format	Contents
1-6	A6	'VMTTOT'
7-9	I3	Time period (1-24)
10-12	I3	First county number (JFC)
20-34	F15.2	VMT total for county JFC
35-49	F15.2	VMT total for county JFC+1[30]
50-64	F15.2	VMT total for county JFC+2
65-79	F15.2	VMT total for county JFC+3

VEHICLE MILES OF TRAVEL MIX CARD[31]

Columns	Format	Contents
1-5	A5	'VMTMX'
7-8	I2	Roadway type number (valid values are 0 to 20)
9-17	F9.5	LDGV fraction of VMT
18-26	F9.5	LDGT1 fraction of VMT
27-35	F9.5	LDGT2 fraction of VMT
36-44	F9.5	HDGV fraction of VMT
45-53	F9.5	LDDV fraction of VMT
54-62	F9.5	LDDT fraction of VMT
63-71	F9.5	HDDV fraction of VMT
72-80	F9.5	MC fraction of VMT

Blank values will not be saved.

The county number from the last county ID card is used.

VOC EMISSION FACTOR CARD[32]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-7	A3	'VOC'
8	A1	blank
9-17	F9.5	LDGV VOC emission factor in grams/mile
18-26	F9.5	LDGT1 VOC emission factor in grams/mile
27-35	F9.5	LDGT2 VOC emission factor in grams/mile
36-44	F9.5	HDGV VOC emission factor in grams/mile
45-53	F9.5	LDDV VOC emission factor in grams/mile
54-62	F9.5	LDDT VOC emission factor in grams/mile
63-71	F9.5	HDDV VOC emission factor in grams/mile
72-80	F9.5	MC VOC emission factor in grams/mile

[32] The county number from the last county ID card is used.

TOG EMISSION FACTOR CARD[33]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-7	A3	'TOG'
8	A1	blank
9-17	F9.5	LDGV TOG emission factor in grams/mile
18-26	F9.5	LDGT1 TOG emission factor in grams/mile
27-35	F9.5	LDGT2 TOG emission factor in grams/mile
36-44	F9.5	HDGV TOG emission factor in grams/mile
45-53	F9.5	LDDV TOG emission factor in grams/mile
54-62	F9.5	LDDT TOG emission factor in grams/mile
63-71	F9.5	HDDV TOG emission factor in grams/mile
72-80	F9.5	MC TOG emission factor in grams/mile

[33] The county number from the last county ID card is used.

TOC EMISSION FACTOR CARD[34]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-7	A3	'TOC'
8	A1	blank
9-17	F9.5	LDGV TOC emission factor in grams/mile
18-26	F9.5	LDGT1 TOC emission factor in grams/mile
27-35	F9.5	LDGT2 TOC emission factor in grams/mile
36-44	F9.5	HDGV TOC emission factor in grams/mile
45-53	F9.5	LDDV TOC emission factor in grams/mile
54-62	F9.5	LDDT TOC emission factor in grams/mile
63-71	F9.5	HDDV TOC emission factor in grams/mile
72-80	F9.5	MC TOC emission factor in grams/mile

[34] The county number from the last county ID card is used.

NMHC EMISSION FACTOR CARD[35]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-8	A4	'NMHC'
9-17	F9.5	LDGV NMHC emission factor in grams/mile
18-26	F9.5	LDGT1 NMHC emission factor in grams/mile
27-35	F9.5	LDGT2 NMHC emission factor in grams/mile
36-44	F9.5	HDGV NMHC emission factor in grams/mile
45-53	F9.5	LDDV NMHC emission factor in grams/mile
54-62	F9.5	LDDT NMHC emission factor in grams/mile
63-71	F9.5	HDDV NMHC emission factor in grams/mile
72-80	F9.5	MC NMHC emission factor in grams/mile

[35] The county number from the last county ID card is used.

NMOG EMISSION FACTOR CARD[36]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-8	A4	'NMOG'
9-17	F9.5	LDGV NMOG emission factor in grams/mile
18-26	F9.5	LDGT1 NMOG emission factor in grams/mile
27-35	F9.5	LDGT2 NMOG emission factor in grams/mile
36-44	F9.5	HDGV NMOG emission factor in grams/mile
45-53	F9.5	LDDV NMOG emission factor in grams/mile
54-62	F9.5	LDDT NMOG emission factor in grams/mile
63-71	F9.5	HDDV NMOG emission factor in grams/mile
72-80	F9.5	MC NMOG emission factor in grams/mile

[36] The county number from the last county ID card is used.

CO EMISSION FACTOR CARD[37]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-6	A3	'CO'
7-8	A2	blank
9-17	F9.5	LDGV CO emission factor in grams/mile
18-26	F9.5	LDGT1 CO emission factor in grams/mile
27-35	F9.5	LDGT2 CO emission factor in grams/mile
36-44	F9.5	HDGV CO emission factor in grams/mile
45-53	F9.5	LDDV CO emission factor in grams/mile
54-62	F9.5	LDDT CO emission factor in grams/mile
63-71	F9.5	HDDV CO emission factor in grams/mile
72-80	F9.5	MC CO emission factor in grams/mile

[37] The county number from the last county ID card is used.

NOX EMISSION FACTOR CARD[38]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-7	A3	'NOX'
8	A1	blank
9-17	F9.5	LDGV NOX emission factor in grams/mile
18-26	F9.5	LDGT1 NOX emission factor in grams/mile
27-35	F9.5	LDGT2 NOX emission factor in grams/mile
36-44	F9.5	HDGV NOX emission factor in grams/mile
45-53	F9.5	LDDV NOX emission factor in grams/mile
54-62	F9.5	LDDT NOX emission factor in grams/mile
63-71	F9.5	HDDV NOX emission factor in grams/mile
72-80	F9.5	MC NOX emission factor in grams/mile

[38] The county number from the last county ID card is used.

EXHAUST EMISSION FACTOR CARD[39]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65) ('--' indicates speeds from 3 to 65 mph)
4	A1	blank
5-8	A4	'EXHS'
9-17	F9.5	LDGV exhaust emission factor in grams/mile
18-26	F9.5	LDGT1 exhaust emission factor in grams/mile
27-35	F9.5	LDGT2 exhaust emission factor in grams/mile
36-44	F9.5	HDGV exhaust emission factor in grams/mile
45-53	F9.5	LDDV exhaust emission factor in grams/mile
54-62	F9.5	LDDT exhaust emission factor in grams/mile
63-71	F9.5	HDDV exhaust emission factor in grams/mile
72-80	F9.5	MC exhaust emission factor in grams/mile

[39] The county number from the last county ID card is used.

RUNNING LOSS EMISSION FACTOR CARD[40]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65) ('--' indicates speeds from 3 to 65 mph)
4	A1	blank
5-8	A4	'RNLS'
9-17	F9.5	LDGV running loss emission factor in grams/mile
18-26	F9.5	LDGT1 running loss emission factor in grams/mile
27-35	F9.5	LDGT2 running loss emission factor in grams/mile
36-44	F9.5	HDGV running loss emission factor in grams/mile
45-53	F9.5	LDDV running loss emission factor in grams/mile
54-62	F9.5	LDDT running loss emission factor in grams/mile
63-71	F9.5	HDDV running loss emission factor in grams/mile
72-80	F9.5	MC running loss emission factor in grams/mile

[40] The county number from the last county ID card is used.

RESTING LOSS HC EMISSION FACTOR CARD[41]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65) ('--' indicates speeds from 3 to 65 mph)
4	A1	blank
5-8	A4	'RSTL'
9-17	F9.5	LDGV resting loss HC emission factor in grams/mile
18-26	F9.5	LDGT1 resting loss HC emission factor in grams/mile
27-35	F9.5	LDGT2 resting loss HC emission factor in grams/mile
36-44	F9.5	HDGV resting loss HC emission factor in grams/mile
45-53	F9.5	LDDV resting loss HC emission factor in grams/mile
54-62	F9.5	LDDT resting loss HC emission factor in grams/mile
63-71	F9.5	HDDV resting loss HC emission factor in grams/mile
72-80	F9.5	MC resting loss HC emission factor in grams/mile

[41] The county number from the last county ID card is used.

CRANKCASE HC EMISSION FACTOR CARD[42]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65) ('--' indicates speeds from 3 to 65 mph)
4	A1	blank
5-8	A4	'CC '
9-17	F9.5	LDGV crankcase HC emission factor in grams/mile
18-26	F9.5	LDGT1 crankcase HC emission factor in grams/mile
27-35	F9.5	LDGT2 crankcase HC emission factor in grams/mile
36-44	F9.5	HDGV crankcase HC emission factor in grams/mile
45-53	F9.5	LDDV crankcase HC emission factor in grams/mile
54-62	F9.5	LDDT crankcase HC emission factor in grams/mile
63-71	F9.5	HDDV crankcase HC emission factor in grams/mile
72-80	F9.5	MC crankcase HC emission factor in grams/mile

[42] The county number from the last county ID card is used.

HOT SOAK HC EMISSION FACTOR CARD[43]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65) ('--' indicates speeds from 3 to 65 mph)
4	A1	blank
5-8	A4	'HTSK'
9-17	F9.5	LDGV hot soak HC emission factor in grams/mile
18-26	F9.5	LDGT1 hot soak HC emission factor in grams/mile
27-35	F9.5	LDGT2 hot soak HC emission factor in grams/mile
36-44	F9.5	HDGV hot soak HC emission factor in grams/mile
45-53	F9.5	LDDV hot soak HC emission factor in grams/mile
54-62	F9.5	LDDT hot soak HC emission factor in grams/mile
63-71	F9.5	HDDV hot soak HC emission factor in grams/mile
72-80	F9.5	MC hot soak HC emission factor in grams/mile

The county number from the last county ID card is used.

DIURNAL HC EMISSION FACTOR CARD[44]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65) ('--' indicates speeds from 3 to 65 mph)
4	A1	blank
5-8	A4	'DIRN'
9-17	F9.5	LDGV diurnal HC emission factor in grams/mile
18-26	F9.5	LDGT1 diurnal HC emission factor in grams/mile
27-35	F9.5	LDGT2 diurnal HC emission factor in grams/mile
36-44	F9.5	HDGV diurnal HC emission factor in grams/mile
45-53	F9.5	LDDV diurnal HC emission factor in grams/mile
54-62	F9.5	LDDT diurnal HC emission factor in grams/mile
63-71	F9.5	HDDV diurnal HC emission factor in grams/mile
72-80	F9.5	MC diurnal HC emission factor in grams/mile

XY COORDINATE DATA CARD

Columns	Format	Contents
1-5	I5	Node or zone number
6-15	F10.0	X coordinate of node or zone
16-25	F10.0	Y coordinate of node or zone

[44] The county number from the last county ID card is used.

The suggested order of the Unit 5 data cards is:

```
HDR1  JORTS 2016 TRIPS ON 2016 NETWORK  -  (LONG RANGE PLAN)
HDR2  AM PEAK (7:15 TO 8:15 AM) EMISSIONS
REF[45]
GRID[46]
REPORT VEH-GRID
UNIT  2  (pounds)
PERIOD   1
VMTTOT  1  1
   .
   .
   .
TP-D-WT     1  1  6
   .
   .
   .
ROADTYPE
DIUM
DIUW
VEH   .
   .
   .
COUNTY  1 ------
VMTMX
   .
   .
   .
   VOC
   .
   .
   .
   CO
   .
   .
   .
   NOX
   .
   .
   .
   EXHS
   .
   .
   .
   RNLS
   .
   .
   .
   RSTL
   .
   .
   .
   CC
   .
   .
   .
   HTSK
   .
   .
```

Optional

Optional

```
   .
   DIRN
   .
   .
   .
COUNTY  2 ------
VMTMX
   .
   .
   .
   VOC
   .
   .
   .
   CO
   .
   .
   .
   NOX
   .
   .
   .
   EXHS
   .
   .
   .
   RNLS
   .
   .
   .
   RSTL
   .
   .
   .
   CC
   .
   .
   .
   HTSK
   .
   .
   .
   DIRN
   .
   .
   .
(repeat for additional counties)
```

UNIT 1 DATA CARDS

Links Cards

Name	Columns	Format	Description
A-node	1-5	I5	A-node of link
B-node	7-11	I5	B-node of link
County	13	I1	County number
Link group	15-16	I2	Link group number
Link length	18-27	F10.2	Link length in miles
Congested speed	29-34	F6.2	Congested speed in mph
Link VMT	36-50	F15.2	Link time period VMT
ASZ	51-55	I5	Associated Zone Number[47]
Trip ends	56-63	I8	Trip ends for A-node.[48] This output is only for interzonals which are not external stations.

The A-node field, the B-node field, and the Associated Zone field are not used by IMPSUMA.

Example JCL

```
//IMPSUMT   JOB  (W150,60A,S5,5,JB),'BELL  TEST IMPSUM'
//IMP1  EXEC  PGM=IMPSUMA,REGION=2000K
//STEPLIB  DD  DISP=SHR,DSN=USR.W104.CB.JB.IMPSUM
//FT06F001 DD  SYSOUT=A
//FT05F001 DD  *
//FT01F001 DD  DISP=OLD,DSN=USR.W150.CB.JR9090S1
//FT08F001   DD   DISP=OLD,DSN=USR.W150.CB.JRT2016.JORTSXY                    //FT04F001   DD
DISP=(NEW,CATLG),UNIT=DISK,SPACE=(TRK,(5,2)),
//  DSN=USR.W150.CB.JRT90901.GRIDVEH,
//  DCB=(RECFM=FB,LRECL=130,BLKSIZE=6240)
//FT09F001  DD  DISP=(NEW,CATLG),UNIT=DISK,SPACE=(TRK,(20,2)),
//  DSN=USR.W150.CB.JRT90901.SAV,
//  DCB=(RECFM=VBS,LRECL=6316,BLKSIZE=6320)
//FT10F001  DD  DISP=(NEW,CATLG),UNIT=DISK,SPACE=(TRK,(3,2)),
//  DSN=USR.W150.CB.JRT90901.GRID,
//  DCB=(RECFM=FB,LRECL=80,BLKSIZE=6320)
```

This field is not read.

This field is not read.

MICROCOMPUTER USAGE

The microcomputer version of this program is similar to the mainframe version, except there is no JCL. This program has the capability of reading a Job Control File and a Step name to describe its data sets. The program must be in the path or in the current directory. The file F77L.EER must be in same directory as the program. The program asks for the name of the input and output data sets. The user can enter up to 80 characters for the drive, path, and name for each data set. If the DOS command IMPSUMA is entered with no parameters, the user will be prompted for file names. If the DOS command "IMPSUMA <JCF> <STEP>" is entered, then a Job Control File is processed. The field <JCF> is a Job Control File name. The field <STEP> is a Step name in the Job Control File. The program will read the Job Control File and search for the Step name. It will then use the "/FT" records following this STEP record to obtain its data set names and the append option for output data sets.

IMPSUMA Microcomputer Files

The following files are required by the microcomputer version of POLFAC5B. The file names beginning with the character "FT" are FORTRAN files. The 2-digit number following the "FT" is the FORTRAN unit number.

File Name	Append Option Available	File Name Prompt[49]	Input / Output	Description - Comments
FT01	No	Yes	Input	Link records
FT05	No	Yes	Input	IMPSUMA Unit 5 input of parameter and named data records
FT08	No	Yes	Input	XY coordinate file. This file is needed only for gridded output.
FT04	Yes	Yes	Output	Emissions by vehicle type and grid squares without headings.
FT06	Yes	Yes	Output	Printed output from IMPSUMA
FT09	No	Yes	Output	Saves the binary results including gridded results and character data for input in the SUMALLA program. This file is 818,703 bytes long.
FT10	Yes	Yes	Output	Emissions and VMT by grid squares without headings.

[49] The user is not prompted for a file name if the Job Control File option is used.

Job Control File Description

The Job Control File performs a function similar to JCL on the mainframe, but it is much simpler than JCL. There are four types of records in the Job Control File. All of the records have left-justified fields with fixed starting columns. Column 1 is always a slash. Columns 2-4 are an operation field (which must be in upper case). The first two Job Control records must be a /JOB and a /LOG record. After this a /STEP record names a program to be run and a Step name. The /STEP record is followed by /FT records which name the FORTRAN data sets used by the program. Records named /C and /DOS are skipped. Any other type of record is an error. The /LOG record names an output file. For the first step of the Job Control File the /LOG file is opened as a new data set. For additional steps the /LOG file is opened in append mode so that output is added to the end of the /LOG data set. The /LOG and the /FT records provide 80 columns for the drive, path, and data set name. The data set names may be in lower case, uppercase, or a mixture of upper and lower case. A flag is provided on the /FT records which allows these data sets to be opened in append mode for output data sets. The format of the Job Control File records follows.

JOB RECORD

Name	Columns	Format	Description
JOB	1-4	A4	Character constant of '/JOB'; must be in upper case.
Job name	10-17	A8	The Job name will be printed in the Log file output.
Job description	20-99	A80	The Job description will be printed in the Log file.

LOG RECORD

Name	Columns	Format	Description
LOG	1-4	A4	Character constant of '/LOG'; must be in upper case.
Append flag	9	A1	Flag to indicate if the file should have output added to it for the first step. If the flag is '+', the first step output will be added to the end of the file. If the flag is anything else, the file will be overwritten for the first step output. Steps after the first step will always append output to the Log file.
Log file name	10-89	A80	The Log file disk drive, path and file name. This follows the standard MS DOS format for a file name in a DOS command.

STEP RECORD

Name	Columns	Format	Description
STEP	1-5	A5	Character constant of '/STEP'; must be in upper case.
Step name	10-19	A10	The Step name printed in the Log file and output to the screen.
Program name	20-29	A10	The program which will be executed. If the program is called by a DOS command or a line in a batch file, this is a comment; but it will appear in the Log file output.

DATA FILE RECORD

Name	Columns	Format	Description
FORTRAN file description	1-3	A3	Character constant of '/FT'; must be in upper case.
File number	4-5	I2	The FORTRAN file number must be in the range of 1 to 97. The Job Control File subroutine uses Unit 99 to read the Job Control File and Unit 98 for the Log file.
Append flag	9	A1	Flag to indicate if the file should have output added to it. If the flag is '+', the output will be added to the end of the file. If the flag is anything else, the file will be overwritten.
File name	10-89	A80	The file disk drive, path, and file name. This follows the standard MS DOS format for a file name in a DOS command.

DOS COMMAND RECORD

Name	Columns	Format	Description
DOS command	1-4	A4	Character constant of '/DOS'; must be in upper case.
DOS command value	10-89	A80	This record is skipped but will print in the Log file.

COMMENT RECORD

Name	Columns	Format	Description
COMMENT	1-3	A3	Character constant of '/C'; must be in upper case.
Comment value	10-89	A80	This record is skipped but will print in the Log file.

EXAMPLE IMPSUMA JOB CONTROL FILE

The following microcomputer console output from an example run of an IMPSUMA STEP uses a Job Control File named "AUG17JRT.JCF" with a step named TIME01. The lower case characters were entered by the user. The TIME01 step of the 25-step JCF file is shown.

```
d:\coast\aug17>jcf aug17jrt.jcf

      32-bit Power for Lahey Computer Systems
    Phar Lap's 386|DOS-Extender(tm) Version 4.1L
   Copyright (C) 1986-92 Phar Lap Software, Inc.
             Available Memory = 4824 Kb

aug17jrt TIME01
SCRIPT FILE = "aug17jrt.jcf
STEP NAME = "TIME01  "
STEP: TIME01     STARTED AT:  08/15/94  10:09:27
FILES ARE:
   1 SEQUENTIAL OLD       \COAST\WEEKDAY\WKDYS01
   4 SEQUENTIAL UNKNOWN   \COAST\AUG17\GRIDV.T01
   5 SEQUENTIAL OLD       &&FT05
   6 SEQUENTIAL UNKNOWN   \COAST\AUG17\AUG17JRT.LST
   8 SEQUENTIAL OLD       \COAST\JR93XY
   9 SEQUENTIAL UNKNOWN   \COAST\AUG17\SAVE01
  10 SEQUENTIAL UNKNOWN   NUL
  98 SEQUENTIAL UNKNOWN   \COAST\AUG17\AUG17JRT.LOG
STEP: TIME01       ENDED AT:  08/15/94  10:10:18
```

```
   .
   .
   .
STEP: SUMALL       ENDED AT:  08/15/94  10:33:15
d:\coast\aug17>
```

Representative Records from File JR1616S1.TST

```
    1  2216 3  0       2.36  30.00          54.23    1
    1  2216 3  0       2.36  30.00          15.30    1
    1  2266 3  0       2.36  30.00         362.42    1
    1  2266 3  0       2.36  30.00         102.22    1
          .
          .
          .
 1907  1908 1  7       1.02  49.11          23.79  227
 1907  1908 1  7       1.02  49.29           7.93  227
 1908  1909 1  7       1.57  49.15          31.65  226
          .
          .
          .
 3062  3063 2  6       0.43  34.54         150.98  579
 3062  3063 2  6       0.43  35.33          84.92  579
    1     1 3  0       2.00  30.00          58.49    1   2620
    2     2 3  0       0.83  25.00         262.27    2  16012
          .
          .
          .
  659   659 1  0       0.07  10.00           0.69  659  24260
  660   660 1  0       0.33  25.00           0.07  660    640
  661   661 2  0       0.80  30.00           0.08  661    286
  662   662 2  0       0.00  62.00           0.00  662      0
  663   663 1  0       0.00  56.00           0.00  663      0
  664   664 1  0       0.00  56.00           0.00  664      0
          .
          .
          .
```

Representative Records from File JORTSXY

```
  7504088168.99 217109.49
  7514087421.59 217075.28
  7524086618.91 217025.28
  7534085905.72 216983.17
  7544085150.42 216933.17
    .
    .
    .
30064030619.11 139532.25
30074031106.00 140131.51
30084029849.23 140077.41
30094029549.60 138013.30
   13915536.61 267638.71
   23931040.14 276349.13
   33934515.80 265581.15
   43947856.57 264452.15
    .
    .
    .
30264005924.93 166526.34
30284026601.69 149440.74
30303983621.81 173956.05
 2213990117.30 174032.18
30314071372.27 215329.30
 2293942306.44 173325.10
```

Representative Input Records

```
HDR1  JORTS AUGUST 17, 1993 EPISODE
PERIOD   1
VMTTOT  1  1              55671.47       20871.10        2009.28
   .
   .
   .
VMTTOT 24  1              94283.28       35410.49        3438.28
GRID       2000.0
REF        350000.0   3280000.0
FMTXY(T16,I5,2F20.0)
HDR2  FIRST HOUR (0:00 AM TO 0:59 AM)
ROADTYPE  0 LOCAL
ROADTYPE  1 INTERSTATE HWYS & FWYS
ROADTYPE  2 MULTILANE HIGHWAYS
ROADTYPE  3 PRINCIPAL DIV. ART.
ROADTYPE  4 PRIN. UNDIV. ART.
ROADTYPE  5 MINOR DIV. ART.
ROADTYPE  6 MINOR UNDIV. ART.
ROADTYPE  7 COLLECTORS
ROADTYPE  8 FRONTAGE ROADS
ROADTYPE  9 RAMPS
COUNTY  1 JEFFERSON
VMTMX  0 0.566   0.251    0.082    0.036    0.004    0.004    0.056    0.001
VMTMX  1 0.543   0.185    0.069    0.076    0.004    0.003    0.119    0.001
   .
   .
   .
VMTMX 16 0.566   0.251    0.082    0.036    0.004    0.004    0.056    0.001
  3 VOC  11.27139 12.77936 16.51838 19.33987 1.634253 2.333565 6.026215 16.32712
   .
   .
   .
 65 VOC  1.586436 2.085946 2.504474 2.060059 .3451507 .4928439 1.272724 4.704600
  3 CO   122.7860 144.9620 191.1664 264.4475 5.344389 6.201406 40.60988 155.0230
   .
   .
   .
 65 CO   30.05110 41.61235 50.95449 62.75528 1.058240 1.227938 8.041145 32.25153
  3 NOX  2.321136 2.581507 2.772478 4.796636 2.840301 3.284930 29.63834 .9008751
   .
   .
   .
 65 NOX  3.138853 3.708008 4.215377 7.874063 2.890039 3.342454 30.15736 1.800787
  3 EXHS 9.235653 10.68705 14.02697 14.94777 1.634253 2.333565 6.026215 14.69369
   .
   .
   .
 65 EXHS 1.388068 1.887522 2.294763 1.209058 .3451507 .4928439 1.272724 3.071166
  3 RNLS 1.866212 1.923197 2.316528 3.594120 .0000000 .0000000 .0000000 .0000000
   .
   .
   .
 65 RNLS .0288444 .0293039 .0348323 .0530167 .0000000 .0000000 .0000000 .0000000
 -- RSTL .0705124 .0645232 .0576215 .0878686 .0000000 .0000000 .0000000 .4911959
 -- CC   .0110639 .0185234 .0229500 .0315595 .0000000 .0000000 .0000000 .0000000
 -- HTSK .0879477 .0860727 .0943071 .6785562 .0000000 .0000000 .0000000 1.142238
 -- DIRN .1414475 .1915805 .2547479 .5258722 .0000000 .0000000 .0000000 1.410394
COUNTY  2 ORANGE
VMTMX  0 0.566   0.251    0.082    0.036    0.004    0.004    0.056    0.001
VMTMX  1 0.543   0.185    0.069    0.076    0.004    0.003    0.119    0.001
   .
   .
   .
VMTMX 16 0.566   0.251    0.082    0.036    0.004    0.004    0.056    0.001
  3 VOC  11.60191 14.04585 17.44877 24.14402 1.639312 2.391980 6.658709 16.99593
```

```
   .
   .
   .
 65 VOC  1.634346 2.304357 2.631017 2.638800 .3462192 .5051810 1.406305 4.893558
  3 CO   126.7272 160.2387 202.9140 340.4229 5.353209 6.305212 43.68026 156.9948
   .
   .
   .
 65 CO   31.11115 46.26719 53.79463 80.78480 1.059987 1.248492 8.649110 32.66174
  3 NOX  2.374251 2.687849 2.859264 5.045323 2.854829 3.342993 32.80751 .9008751
   .
   .
   .
 65 NOX  3.216640 3.926722 4.402705 8.282304 2.904822 3.401535 33.38202 1.800786
  3 EXHS 9.539223 11.86224 14.86681 18.76657 1.639312 2.391980 6.658709 15.30034
   .
   .
   .
 65 EXHS 1.432613 2.092144 2.411561 1.517944 .3462192 .5051810 1.406305 3.197963
  3 RNLS 1.890130 2.001800 2.398486 4.319764 .0000000 .0000000 .0000000 .0000000
   .
   .
   .
 65 RNLS .0291792 .0304090 .0359844 .0631688 .0000000 .0000000 .0000000 .0000000
 -- RSTL .0715339 .0673356 .0586763 .1060031 .0000000 .0000000 .0000000 .5098262
 -- CC   .0113791 .0209567 .0245597 .0416635 .0000000 .0000000 .0000000 .0000000
 -- HTSK .0896409 .0935109 .1002369 .9100215 .0000000 .0000000 .0000000 1.185768
 -- DIRN .1454514 .2163911 .2760091 .6947184 .0000000 .0000000 .0000000 1.463570
COUNTY  3 HARDIN
VMTMX  0 0.566   0.251    0.082    0.036    0.004    0.004    0.056    0.001
VMTMX  1 0.543   0.185    0.069    0.076    0.004    0.003    0.119    0.001
   .
   .
   .
VMTMX 16 0.566   0.251    0.082    0.036    0.004    0.004    0.056    0.001
  3 VOC  10.86882 12.54918 15.87717 22.58792 1.622993 2.338547 7.010675 16.80357
   .
   .
   .
 65 VOC  1.529705 2.042225 2.392063 2.456942 .3427725 .4938961 1.480640 4.843205
  3 CO   118.0474 141.5497 182.4067 312.3954 5.325030 6.214989 44.62379 156.0714
   .
   .
   .
 65 CO   28.94509 40.53798 48.16662 74.13367 1.054407 1.230627 8.835936 32.46965
  3 NOX  2.280514 2.538159 2.650947 4.944427 2.830790 3.284962 34.67710 .9008753
   .
   .
   .
 65 NOX  3.065272 3.633731 4.031859 8.116674 2.880362 3.342487 35.28435 1.800787
  3 EXHS 8.865734 10.48139 13.44487 17.45235 1.622993 2.338547 7.010675 15.12080
   .
   .
   .
 65 EXHS 1.336573 1.847365 2.187239 1.411643 .3427725 .4938961 1.480640 3.160438
  3 RNLS 1.838413 1.901936 2.261532 4.151078 .0000000 .0000000 .0000000 .0000000
   .
   .
   .
 65 RNLS .0284554 .0290050 .0340591 .0608086 .0000000 .0000000 .0000000 .0000000
 -- RSTL .0694278 .0637524 .0564681 .1009716 .0000000 .0000000 .0000000 .5059564
 -- CC   .0106969 .0181655 .0221611 .0372138 .0000000 .0000000 .0000000 .0000000
 -- HTSK .0845519 .0839362 .0921357 .8463049 .0000000 .0000000 .0000000 1.176811
 -- DIRN .1339889 .1872358 .2497430 .6473007 .0000000 .0000000 .0000000 1.452393
```

SUMALLA

PURPOSE

This program was written to sum the emission results from two or more time periods plus diurnals. The SUMALLA program sums the results from one or more IMPSUMA runs. SUMALLA also calculates diurnal emissions and prints the summed results in the same formats as IMPSUMA with the additional diurnal HC output. This program reads all Unit 5 data read by IMPSUMA. Additionally, this program reads a parameter card specifying the number of binary result data sets to sum, diurnal rates, and the number of vehicles by vehicle type.

Emission output by grid square will be printed if IMPSUMA runs which produced the binary result data sets had grid square output. A second copy of this output without headings will be written to Unit 10. The Unit 10 output is for input to computer programs. Emissions by vehicle type and grid square will be output to FORTRAN Unit 4 without headings if the binary result data sets had grid square output. A second copy will be printed with headings if the "REPORT VEH-GRID" card is present and grids were run in the IMPSUMA runs.

The diurnal rates will come from either three MOBILE5a runs or one MOBILE5a run for each county. Three runs of MOBILE5a will be made if RATEADJ is being used with the POLFAC5B runs. If one run is used, Run 2 is specified for the DIUW and DIUM data cards. If three runs are used, the actual rates will be calculated by summing Run 2 and 3 data and subtracting Run 1. It is assumed that the IMPSUMA runs to be summed have no diurnal emissions. This is accomplished by making the minimum temperature, the maximum temperature, and the ambient temperature the same in the POLFAC5B runs.

The basic inputs to SUMALLA are:

1. Data specifying the number of IMPSUMA runs to sum (NSAV).
2. Data specifying the number of counties in the region and their names.
3. Names of the road types used in the study. These road types are used to summarize the emission results.
4. VMT mix by county and road type.
5. Emission factors from POLFAC5B or RATEADJ by county.
6. Specification of the units for reporting emissions (grams, pounds, or tons).
7. Diurnal rates and the number of vehicles by county. The diurnal emissions are also read from the SAVE data sets. The user should probably have only one source of emissions.
8. Binary data sets which saved the results from one or more IMPSUMA runs. The binary data sets produced by the IMPSUMA program of the October 8, 1993, version are not compatible with this version of SUMALLA, because grid square by vehicle type output was added.

UNIT 5 DATA CARDS

The ordering of data on the Unit 5 input is important. The only county number input is from the county ID card. The VMTMX, VOC, NOX, and CO data cards do not contain a county number. The data from these four data cards are stored using the county number from the last county ID card as an index.

REPORT VEH-GRID CARD[50]

Columns	Format	Contents
1-15	A15	'REPORT VEH-GRID'

UNITS CARD

Columns	Format	Contents
1-5	A5	'UNITS'
7	I1	Report units code: 1 = Grams 2 = Pounds 3 = Tons

NSAV CARD

Columns	Format	Contents
1-4	A4	'NSAV'
11	I5	Number of binary results data sets to sum. The value can have a value of 1 to 89. The save data sets will be read from Units 11, 12, etc. The number of save data sets may be limited by the number of DD statements that can be used in a job or a jobstep.

The grid report by vehicle type is not printed unless a "GRID REPORT" card is present in the input data.

WEIGHTED DIURNAL EMISSION RATES CARD

Columns	Format	Contents
1-4	A4	'DIUW'
5-6	I2	Run number
7-8	I2	County number
11-18	F8.2	Weighted diurnal rate for LDGV
19-26	F8.2	Weighted diurnal rate for LDGT1
27-34	F8.2	Weighted diurnal rate for LDGT2
35-42	F8.2	Weighted diurnal rate for HDGV
43-50	F8.2	Weighted diurnal rate for LDDV
51-58	F8.2	Weighted diurnal rate for LDDT
59-66	F8.2	Weighted diurnal rate for HDDV
67-76	F8.2	Weighted diurnal rate for MC

MULTIPLE DIURNAL EMISSION RATES CARD

Columns	Format	Contents
1-4	A4	'DIUM'
5-6	I2	Run number
7-8	I2	County number
11-18	F8.2	Multiple diurnal rate for LDGV
19-26	F8.2	Multiple diurnal rate for LDGT1
27-34	F8.2	Multiple diurnal rate for LDGT2
35-42	F8.2	Multiple diurnal rate for HDGV
43-50	F8.2	Multiple diurnal rate for LDDV
51-58	F8.2	Multiple diurnal rate for LDDT
59-66	F8.2	Multiple diurnal rate for HDDV
67-76	F8.2	Multiple diurnal rate for MC

VEHICLES CARD

Columns	Format	Contents
1-4	A4	'VEH '
7-8	I2	County number
11-18	F8.2	Number of LDGV vehicles
19-26	F8.2	Number of LDGT1 vehicles
27-34	F8.2	Number of LDGT2 vehicles
35-42	F8.2	Number of HDGV vehicles
43-50	F8.2	Number of LDDV vehicles
51-58	F8.2	Number of LDDT vehicles
59-66	F8.2	Number of HDDV vehicles
67-76	F8.2	Number of MC vehicles

ROADWAY TYPE NAME CARD

Columns	Format	Contents
1-8	A8	'ROADTYPE'
10-11	I2	Roadway type number (values from 0 to 20 are valid)
13-32	A20	Roadway type name

COUNTY ID CARD

Columns	Format	Contents
1-6	A6	'COUNTY'
8-9	I2	County number (values from 1 to 8 are valid)
11-22	A12	County name

VEHICLE MILES OF TRAVEL MIX CARD[51]

Columns	Format	Contents
1-5	A5	'VMTMX'
7-8	I2	Roadway type number (valid values are from 0 to 20)
9-17	F9.5	LDGV fraction of VMT
18-26	F9.5	LDGT1 fraction of VMT
27-35	F9.5	LDGT2 fraction of VMT
36-44	F9.5	HDGV fraction of VMT
45-53	F9.5	LDDV fraction of VMT
54-62	F9.5	LDDT fraction of VMT
63-71	F9.5	HDDV fraction of VMT
72-80	F9.5	MC fraction of VMT

[51] The county number from the last county ID card is used.

VOC EMISSION FACTOR CARD[52]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-7	A3	'VOC'
8	A1	blank
9-17	F9.5	LDGV VOC emission factor in grams/mile
18-26	F9.5	LDGT1 VOC emission factor in grams/mile
27-35	F9.5	LDGT2 VOC emission factor in grams/mile
36-44	F9.5	HDGV VOC emission factor in grams/mile
45-53	F9.5	LDDV VOC emission factor in grams/mile
54-62	F9.5	LDDT VOC emission factor in grams/mile
63-71	F9.5	HDDV VOC emission factor in grams/mile
72-80	F9.5	MC VOC emission factor in grams/mile

The county number from the last county ID card is used.

CO EMISSION FACTOR CARD[53]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-6	A3	'CO'
7-8	A2	blank
9-17	F9.5	LDGV CO emission factor in grams/mile
18-26	F9.5	LDGT1 CO emission factor in grams/mile
27-35	F9.5	LDGT2 CO emission factor in grams/mile
36-44	F9.5	HDGV CO emission factor in grams/mile
45-53	F9.5	LDDV CO emission factor in grams/mile
54-62	F9.5	LDDT CO emission factor in grams/mile
63-71	F9.5	HDDV CO emission factor in grams/mile
72-80	F9.5	MC CO emission factor in grams/mile

[53] The county number from the last county ID card is used.

NOX EMISSION FACTOR CARD[54]

Columns	Format	Contents
1-3	I3	Speed (valid values are 3 to 65)
4	A1	blank
5-7	A3	'NOX'
8	A1	blank
9-17	F9.5	LDGV NOX emission factor in grams/mile
18-26	F9.5	LDGT1 NOX emission factor in grams/mile
27-35	F9.5	LDGT2 NOX emission factor in grams/mile
36-44	F9.5	HDGV NOX emission factor in grams/mile
45-53	F9.5	LDDV NOX emission factor in grams/mile
54-62	F9.5	LDDT NOX emission factor in grams/mile
63-71	F9.5	HDDV NOX emission factor in grams/mile
72-80	F9.5	MC NOX emission factor in grams/mile

SUGGESTED ORDER OF THE UNIT 5 DATA CARDS

```
REPORT VEH-GRID
UNIT  3  (tons)
NSAV       4
DIUW 1 1
DIUW 2 1
DIUW 3 1
DIUM 1 1
DIUM 2 1
DIUM 3 1
VEH    1
ROADTYPE
   .
   .
   .
COUNTY  1 ------
VMTMX
   .
   .
   .
   VOC
   .
```

The county number from the last county ID card is used.

```
   .
   .
   CO
   .
   .
   .
   NOX
   .
   .
   .
COUNTY  2 ------
VMTMX
   .
   .
   .
   VOC
   .
   .
   .
   CO
   .
   .
   .
   NOX
   .
   .
   .
(repeat for additional counties)
```

Example JCL

```
//SUMALL93 JOB (W150,60A,2,5,CB),'BELL  JORTS 96 93'
//SUMALL   EXEC  PGM=SUMALLA,REGION=1024K
//STEPLIB  DD    DISP=OLD,DSN=USR.W104.CB.JB.IMPSUM
//FT05F001 DD  *
//FT06F001  DD  SYSOUT=A
//FT04F001  DD  DISP=(NEW,CATLG),UNIT=DISK,SPACE=(TRK,(3,2)),
//  DSN=USR.W150.CB.JRT90901.GRIDVEH.TOT24HR,
//  DCB=(RECFM=FB,LRECL=130,BLKSIZE=6240)
//FT10F001  DD  DISP=(NEW,CATLG),UNIT=DISK,SPACE=(TRK,(3,2)),
//  DSN=USR.W150.CB.JRT9090T.GRID,
//  DCB=(RECFM=FB,LRECL=80,BLKSIZE=6320)
//FT11F001  DD  DISP=OLD,DSN=USR.W150.CB.JRT96931.SAV
//FT12F001  DD  DISP=OLD,DSN=USR.W150.CB.JRT96932.SAV
//FT13F001  DD  DISP=OLD,DSN=USR.W150.CB.JRT96933.SAV
//FT14F001  DD  DISP=OLD,DSN=USR.W150.CB.JRT96934.SAV
```

Example Unit 5 Input

```
HDR1  JORTS 1996 TRIPS ON 1993 NETWORK
NSAV          4
HDR2  24 HOUR
REPORT VEH-GRID
UNITS 3
DIUW 2 3   1.67    2.81    4.83   26.81    0.00    0.00    0.00   11.77   HAR96
DIUM 2 3   6.86    8.57   10.11   33.63    0.00    0.00    0.00    0.00   HAR96
VEH    3  17946. 11785.  1119.    341.    366.    364.   121.     277.   HAR96
DIUW 2 1   1.79    2.74    5.16   21.57    0.00    0.00    0.00   11.77   JEF96
DIUM 2 1   6.99    8.50   10.35   30.34    0.00    0.00    0.00    0.00   JEF96
VEH    1 121635. 44956.  3580.   2108.   2482.   1390.   732.    2893.   JEF96
DIUW 2 2   1.72    2.84    5.02   25.77    0.00    0.00    0.00   11.77   ORA96
DIUM 2 2   6.92    8.63   10.25   33.00    0.00    0.00    0.00    0.00   ORA96
```

```
 VEH    2   40056. 22205.  1730.    603.    817.    687.   253.     801.   ORA96
 ROADTYPE  0 LOCAL
 ROADTYPE  1 INTERSTATE HWYS & FWYS
 ROADTYPE  2 MULTILANE HIGHWAYS
 ROADTYPE  3 PRINCIPAL DIV. ART.
 ROADTYPE  4 PRIN. UNDIV. ART.
 ROADTYPE  5 MINOR DIV. ART.
 ROADTYPE  6 MINOR UNDIV. ART.
 ROADTYPE  7 COLLECTORS
 ROADTYPE  8 FRONTAGE ROADS
 ROADTYPE  9 RAMPS
 COUNTY  1 JEFFERSON
 VMTMX 00 0.590   0.240    0.065    0.037    0.002    0.001    0.062    0.003
     .
     .
     .
 VMTMX 16 0.590   0.240    0.065    0.037    0.002    0.001    0.062    0.003
   3 VOC  10.19051 11.14644 14.16451 19.70721  1.65438  2.28766  5.47575 16.93929
     .
     .
     .
  65 VOC   1.21994  1.54062  1.84379  2.22498  0.34940  0.48315  1.15647  6.21601
   3 CO   83.64868102.35202132.10094202.95169  5.39228  6.10980 38.25746182.97807
     .
     .
     .
  65 CO   18.80666 27.46329 33.29419 48.16167  1.06772  1.20980  7.57536 38.06747
   3 NOX   2.21896  2.37885  2.61141  4.24928  2.76132  3.11727 23.65694  0.83962
     .
     .
     .
  65 NOX   2.81003  3.17711  3.61587  6.97554  2.80968  3.17185 24.07120  1.67833
 COUNTY  2 ORANGE
 VMTMX 00 0.590   0.240    0.065    0.037    0.002    0.001    0.062    0.003
     .
     .
     .
 VMTMX 16 0.590   0.240    0.065    0.037    0.002    0.001    0.062    0.003
   3 VOC   9.59235 11.14629 13.61409 24.68542  1.63085  2.30749  6.08451 17.18773
     .
     .
     .
  65 VOC   1.13841  1.54358  1.76878  2.88477  0.34443  0.48734  1.28503  6.31517
   3 CO   77.78996103.22798126.98114271.09424  5.34957  6.15454 41.37212183.84230
     .
     .
     .
  65 CO   17.40787 27.76924 31.93053 64.33250  1.05927  1.21866  8.19210 38.24724
   3 NOX   2.07422  2.29800  2.51378  4.38235  2.74037  3.13502 27.83104  0.83962
     .
     .
     .
  65 NOX   2.62029  3.08953  3.47673  7.19399  2.78836  3.18992 28.31841  1.67834
 COUNTY  3 HARDIN
 VMTMX 00 0.604   0.348    0.030    0.010    0.002    0.002    0.003    0.001
     .
     .
     .
 VMTMX 16 0.604   0.348    0.030    0.010    0.002    0.002    0.003    0.001
   3 VOC   9.57386 11.55715 13.06376 25.57549  1.62326  2.32586  6.52089 17.77747
     .
     .
     .
  65 VOC   1.13472  1.60077  1.69376  3.01910  0.34283  0.49122  1.37720  6.51326
   3 CO   77.17125106.30727119.75487275.50562  5.33607  6.16977 42.50887186.61420
     .
     .
     .
```

```
 65 CO   17.19089 28.51173 29.76122 65.37944  1.05659  1.22167  8.41718 38.82393
  3 NOX   2.10472  2.46660  2.49018  4.41810  2.72303  3.15332 29.79782  0.83962
    .
    .
    .
 65 NOX   2.64759  3.29341  3.41184  7.25267  2.77071  3.20854 30.31961  1.67833
```

MICROCOMPUTER USAGE

The microcomputer version of this program is similar to the mainframe version, except there is no JCL. The program must be in the path or in the current directory. The file F77L.EER must be in same directory as the program. The program asks for the name of the input and output data sets. The user can enter up to 80 characters for the drive, path, and name for each data set.

The following is the microcomputer console output from an example run of SUMALLA. The lower case characters were typed by the user. The "nul" response to "GRID OUTPUT =" causes the grid output without headings to be discarded. The grid output with headings will be written to the data set "sumall.out" in the example below:

```
C:\JORTS\TEST>sumall

        32-bit Power for Lahey Computer Systems
      Phar Lap's 386|DOS-Extender(tm) Version 4.1L
     Copyright (C) 1986-92 Phar Lap Software, Inc.
               Available Memory = 5552 Kb

SUMALLA INPUT =sumall.ft5

SUMALLA OUTPUT =sumall.out

GRID OUTPUT =nul

SAVE  1 DATA SET =jrt96931.sav
SAVE  2 DATA SET =jrt96932.sav
SAVE  3 DATA SET =jrt96933.sav
SAVE  4 DATA SET =jrt96934.sav

C:\JORTS\TEST>dir
 Volume in drive C is STACVOL_DSK
 Directory of C:\JORTS\TEST

SUMALL   FT5      51621 07-15-93   9:22a
SUMALL   OUT      42310 07-16-93   8:18a
JRT96931 SAV      65485 07-16-93   8:17a
JRT96932 SAV      65485 07-15-93   4:58p
JRT96933 SAV      65485 07-15-93   4:59p
JRT96934 SAV      65485 07-15-93   5:00p
C:\ELPASO>cc < sumall.out > prn[55]
```

The CC program reads a FORTRAN output file with carriage control characters and prints the file in landscape mode to an HP LaserJet II-compatible printer or to a character file. This program should not be used with printers that are not HP LaserJet II-compatible. The CC program is written in Turbo C.

VMTSUM

PURPOSE

This program sums the total VMT by county from the links output for multiple time periods and creates VMTTOT cards for the IMPSUMA program. The VMTTOT cards are in the correct format for the IMPSUMA program. The VMTTOT cards are necessary to calculate diurnal scaling factors.

The VMTSUM program reads a data card with the number of time periods. It then reads the link records from the PREPIN programs and sums the total VMT for each time period.

DATA SET REFERENCES

Input Data Sets

FORTRAN Unit Number	Minimum Record Length	Description
5	80	Data card type number of time periods
11	50	Link records for Time Period 1
12	50	Link records for Time Period 2
13	50	Link records for Time Period 3
10 + n	50	Link records for Time Period n
10 + n + 1	50	Link records for Time Period n + 1
10 + n + 2	50	Link records for Time Period n + 2
98	133	Microcomputer Job Control File output. Not used by mainframe version.
99	80	Microcomputer Job Control File. Not used by mainframe version.

Output Data Sets

FORTRAN Unit Number	Minimum Record Length	Description
3	79	VMTTOT Records

VMTSUM JCL REQUIREMENTS

The VMTSUM program requires a region size of 512K.

DDname	Use
FT03F001	Data set output containing the VMTTOT records from the VMTSUM program
FT06F001	Printed output data set
FT05F001	Input number of time periods record
FT11F001	PREPIN Link records for Time Period 1
FT12F001	PREPIN Link records for Time Period 2
FT13F001	PREPIN Link records for Time Period 3
FT14F001	PREPIN Link records for Time Period 4
FT15F001	PREPIN Link records for Time Period 5
FT16F001	PREPIN Link records for Time Period 6
FT17F001	PREPIN Link records for Time Period 7
FT18F001	PREPIN Link records for Time Period 8

Example VMTSUM JCL

```
//SUMVMT   EXEC  PGM=VMTSUM,REGION=512K
//STEPLIB  DD    DISP=OLD,DSN=COASTCB.LOADMOD5
```

```
//FT06F001 DD    SYSOUT=A
//FT05F001 DD    *
   24
//FT03F001 DD  UNIT=DISK,DISP=(NEW,CATLG),DSN=COASTCB.SATURDAY.VMTSUMS,
//  SPACE=(TRK,(2,1),RLSE),DCB=(RECFM=FB,LRECL=80,BLKSIZE=6320)
//FT11001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU01
//FT12001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU02
//FT13001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU03
//FT14001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU04
//FT15001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU05
//FT16001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU06
//FT17001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU07
//FT18001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU08
//FT19001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU09
//FT20001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU10
//FT21001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU11
//FT22001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU12
//FT23001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU13
//FT24001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU14
//FT25001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU15
//FT26001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU16
//FT27001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU17
//FT28001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU18
//FT29001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU19
//FT30001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU20
//FT31001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU21
//FT32001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU22
//FT33001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU23
//FT34001  DD  DSN=COASTCB.HGAC.SATURDAY.SATU24
```

Example VMTSUM JCF

```
/JOB     VMTTST    Sum VMT by Time Period for JOHRTS SATURDAY
/LOG     C:\BELL\VMTTST.LOG
/STEP    ONE       VMTSUM
/FT05    F:\COAST\SATURDAY\num24
/FT06    C:\BELL\VMTTST.LST
/FT03    F:\COAST\SATURDAY\VMTSUMS
/FT11    F:\COAST\SATURDAY\SATU01
/FT12    F:\COAST\SATURDAY\SATU02
/FT13    F:\COAST\SATURDAY\SATU03
/FT14    F:\COAST\SATURDAY\SATU04
/FT15    F:\COAST\SATURDAY\SATU05
/FT16    F:\COAST\SATURDAY\SATU06
/FT17    F:\COAST\SATURDAY\SATU07
/FT18    F:\COAST\SATURDAY\SATU08
/FT19    F:\COAST\SATURDAY\SATU09
/FT20    F:\COAST\SATURDAY\SATU10
/FT21    F:\COAST\SATURDAY\SATU11
/FT22    F:\COAST\SATURDAY\SATU12
/FT23    F:\COAST\SATURDAY\SATU13
/FT24    F:\COAST\SATURDAY\SATU14
/FT25    F:\COAST\SATURDAY\SATU15
/FT26    F:\COAST\SATURDAY\SATU16
/FT27    F:\COAST\SATURDAY\SATU17
/FT28    F:\COAST\SATURDAY\SATU18
/FT29    F:\COAST\SATURDAY\SATU19
/FT30    F:\COAST\SATURDAY\SATU20
/FT31    F:\COAST\SATURDAY\SATU21
/FT32    F:\COAST\SATURDAY\SATU22
/FT33    F:\COAST\SATURDAY\SATU23
/FT34    F:\COAST\SATURDAY\SATU24
```

NUMBER OF TIME PERIODS CARD

Columns	Format	Contents
1-5	I5	Number of time periods

VMTTOT CARD

Columns	Format	Contents
1-6	A6	'VMTTOT'
7-9	I3	Time period
10-12	I3	First county number (N) with data on this record
	T20	
20-34	F15.2	VMT for County N
35-49	F15.2	VMT for County N + 1
50-64	F15.2	VMT for County N + 2
65-79	F15.2	VMT for County N + 3

MICROCOMPUTER USAGE

```
C:\BELL>jcf vmttst.jcf
JCFBATCH vmttst.jcf
```

```
32-bit Power for Lahey Computer Systems
Phar Lap's 386|DOS-Extender(tm) Version 4.1L
Copyright (C) 1986-92 Phar Lap Software, Inc.
Available Memory = 6900 Kb
```

```
vmttst.jcf
CALL &&JCF
VMTSUM vmttst.jcf ONE
```

```
32-bit Power for Lahey Computer Systems
Phar Lap's 386|DOS-Extender(tm) Version 4.1L
Copyright (C) 1986-92 Phar Lap Software, Inc.
Available Memory = 6900 Kb
```

```
vmttst.jcf ONE
SCRIPT FILE = "vmttst.jcf
STEP NAME = "ONE     "
STEP: ONE        STARTED AT:  09/26/94  16:41:53
FILES ARE:
   3 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\VMTSUMS
   5 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\num24
   6 SEQUENTIAL UNKNOWN   C:\BELL\VMTTST.LST
  11 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU01
  12 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU02
  13 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU03
  14 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU04
  15 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU05
  16 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU06
  17 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU07
  18 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU08
  19 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU09
  20 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU10
  21 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU11
  22 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU12
  23 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU13
  24 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU14
  25 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU15
  26 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU16
  27 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU17
  28 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU18
  29 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU19
  30 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU20
  31 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU21
  32 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU22
  33 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU23
  34 SEQUENTIAL UNKNOWN   F:\COAST\SATURDAY\SATU24
  98 SEQUENTIAL UNKNOWN   C:\BELL\VMTTST.LOG
VMTSUM     STARTED AT 09/26/94            16:41:56.2
VMTTOT  1  1              125262.62       48643.63       6549.26
VMTTOT  2  1               83470.44       31447.46       3803.61
VMTTOT  3  1               58796.49       22631.92       2758.24
VMTTOT  4  1               38140.32       14528.31       1623.29
VMTTOT  5  1               42474.68       16015.35       1698.32
VMTTOT  6  1               75900.38       28645.73       3116.26
VMTTOT  7  1              137431.54       51877.71       5929.79
VMTTOT  8  1              190582.01       71909.51       8592.18
VMTTOT  9  1              260645.59       99132.05      12481.69
VMTTOT 10  1              342367.46      129652.63      16416.42
VMTTOT 11  1              375002.78      142405.11      17952.51
VMTTOT 12  1              408235.06      155254.00      19765.72
VMTTOT 13  1              392504.41      149489.13      18926.46
VMTTOT 14  1              382196.88      144471.88      17952.81
VMTTOT 15  1              390427.92      147855.44      18391.23
VMTTOT 16  1              390087.24      147715.34      18405.43
VMTTOT 17  1              401123.49      152128.29      19232.06
VMTTOT 18  1              398375.41      151875.82      19408.70
VMTTOT 19  1              390796.47      148561.35      19143.42
VMTTOT 20  1              336439.07      129293.93      17314.26
VMTTOT 21  1              258125.20      100061.84      13394.24
VMTTOT 22  1              225836.72       86820.45      11121.05
VMTTOT 23  1              194596.06       75324.25       9982.88
VMTTOT 24  1              155428.34       60594.31       8127.40
ALL VMT                  6054246.58     2306335.44     292087.23
STEP: ONE          ENDED AT:  09/26/94  16:42:58
DEL &&JCF.BAT
Deleting c:\bell\&&jcf.bat
     1 file(s) deleted

c:\bell>
```

JOB CONTROL FILE

PURPOSE

This program was written to build batch file to run a Job Control File. This program is a microcomputer program only. It works in conjunction with FORTRAN programs which accept a Job Control File and a Step name as parameters on their DOS command line. The POLFAC5B, IMPSUMA, and SUMALLA programs are the only programs which work with this program. This program accepts as input a single parameter on its DOS command line which is the Job Control File. It then reads the file and builds a batch file named &&JCF.BAT to run each step by calling the program listed on the STEP records along with the Job Control File name. The program also builds DOS commands into the batch file to build a concatenated data set by copying two or more data sets to a temporary data set. A batch file is also included to run the JCFBATCH program, execute the &&JCF.BAT file created and then delete the &&JCF.BAT file. This batch file is named JCF.BAT.

JOB CONTROL FILE DESCRIPTION

The Job Control File performs a function similar to JCL on the mainframe, but it is much simpler than JCL. There are seven types of records in the Job Control File which are recognized by JCFBATCH. All of the records have left-justified fields with fixed starting columns. Column 1 is always a slash. Columns 2-4 are an operation field (which must be in upper case). The first two Job Control records must be a /JOB and a /LOG record. After this a /STEP record names a program to be run and a Step name. The /STEP record is followed by /FT records which name the FORTRAN data sets used by the program. Records named /C which don't have a "T" in Column 3 are skipped.

Records starting with a /CT are concatenation[56] records. These records are processed by the JCFBATCH program to create a single temporary data set by copying two or more single data sets to the temporary data set name. The temporary data set name must start with the characters && and be on a preceding /FT record. The /CT records are skipped as comment records by the microcomputer program which uses the temporary data set. The disk drive where the temporary file is created must have enough space for the temporary file. The concatenation records perform the same function as concatenated data sets in JCL for the mainframe computers.

Any other type of record is an error. The /LOG record names an output file. For the first step of the Job Control File the /LOG file is opened as a new data set. For additional steps the /LOG file is opened in append mode so that output is added to the end of the /LOG data set. The /LOG and

---

The applicable definition is "being linked together in a series".

the /FT records provide 80 columns for the drive, path, and data set name. The data set names may be in lower case, uppercase, or a mixture of upper and lower case. A flag is provided on the /FT records which allows these data sets to be opened in append mode for output data sets. The format of the Job Control File records follows.

JOB RECORD

Name	Columns	Format	Description
JOB	1-4	A4	Character constant of '/JOB'; must be in upper case.
Job name	10-17	A8	Job name will be printed in the Log file output.
Job description	20-99	A80	The job description will be printed in the Log file.

LOG RECORD

Name	Columns	Format	Description
LOG	1-4	A4	Character constant of '/LOG'; must be in upper case.
Append flag	9	A1	Flag to indicate if the file should have output added to it for the first step. If the flag is '+', the first step output will be added to the end of the file. If the flag is anything else, the file will be overwritten for the first step output. Steps after the first step will always append output to the Log file.
Log file name	10-89	A80	The Log file disk drive, path and file name. This follows the standard MS DOS format for a file name in a DOS command.

STEP RECORD

Name	Columns	Format	Description
STEP	1-5	A5	Character constant of '/STEP'; must be in upper case.
Step name	10-19	A10	The Step name. It will be printed in the Log file and output to the screen.
Program name	20-29	A10	The program which will be executed. If the program is called by a DOS command or a line in a Batch file, this is a comment; but it will appear in the Log file output.

DATA FILE RECORD

Name	Columns	Format	Description
FORTRAN file description	1-3	A3	Character constant of '/FT'; must be in upper case.
File Number	4-5	I2	The FORTRAN file number must be in the range of 1 to 97.[57]
Append Flag	9	A1	This is a flag to indicate if the file should have output added to it. If the flag is '+', the output will be added to the end of the file. If the flag is anything else, the file will be overwritten.
File name	10-89	A80	The file disk drive, path, and file name. This follows the standard MS DOS format for a file name in a DOS command. If the file name starts with '&&' it is recognized as a temporary data set. There must be one or more '/CT' records immediately following this. The temporary file will be deleted are the end of the step.

The Job Control Vile subroutine uses Unit 99 to read the Job Control File and Unit 98 for the Log file.

DOS COMMAND RECORD

Name	Columns	Format	Description
DOS command	1-4	A4	Character constant of '/DOS'; must be in upper case.
DOS command value	10-89	A80	The contents of this field are inserted as a DOS command into the &&JCF.BAT file before the next program step execution.

COMMENT RECORD

Name	Columns	Format	Description
Comment	1-2	A2	Character constant of '/C'; must be in upper case. If Columns 1-3 are '/CT', the record is recognized as a concatenation data set record.
Comment value	10-89	A80	This record is skipped but will print in the Log file.

CONCATENATION RECORD

Name	Columns	Format	Description
Concatenation	1-3	A3	Character constant of '/CT'; must be in upper case.
Concatenation File Name	10-89	A80	The file disk drive, path, and file name. This follows the standard MS DOS format for a file name in a DOS command. This file will be copied on to the end of a temporary file in a preceding '/FT' record. Concatenation files are copied in order of '/CT' records.

Example Microcomputer JCF Run With 2 Steps

The following example shows a two-step POLFAC5B run. The first step has a temporary file name followed by four data sets which are concatenated and copied to the temporary file.

RATES2.JCF Input File To JCFBATCH

```
/JOB     RATES2    TWO POLFAC5B RUNS
/LOG     RATES2.LOG
/STEP    MEX687    POLFAC5B
/FT06    RATES2.OUT
/FT09    NUL
/FT05    &&MX687
/CT      MEX687.P1
/CT      MEX687.P2
/CT      MEX687.P3
/CT      MEX687.P4
/FT25    MEX687.RAT
/STEP    NMEX687   POLFAC5B
/FT06   +RATES2.OUT
/FT09    NUL
/FT05    NMEX687.POL
/FT25    NMEX687.RAT
```

&&JCF.BAT Output File From JCFBATCH

```
COPY MEX687.P1 &&MX687
COPY &&MX687+MEX687.P2
COPY &&MX687+MEX687.P3
COPY &&MX687+MEX687.P4
POLFAC5B rates2.jcf MEX687
DEL &&MX687
POLFAC5B rates2.jcf NMEX687
```

In the above example Job Control File input, a temporary file name is specified on Line 6. It is followed by four concatenation data sets. In the example output, the first file, MEX687.P1, is copied to &&MX687. Then the next three concatenation data sets are copied to the end of this file. Next the POLFAC5B program is executed for step MEX687 of the rates2.jcf Job Control File. Then the temporary data set &&MX687 is deleted. Then POLFAC5B is executed for step NMEX687 of the rates2.jcf job file control file.