

United States  
Environmental Protection  
Agency

Region II Office  
26 Federal Plaza  
New York, N.Y. 10007

EPA 902/4-79-002  
April 1979

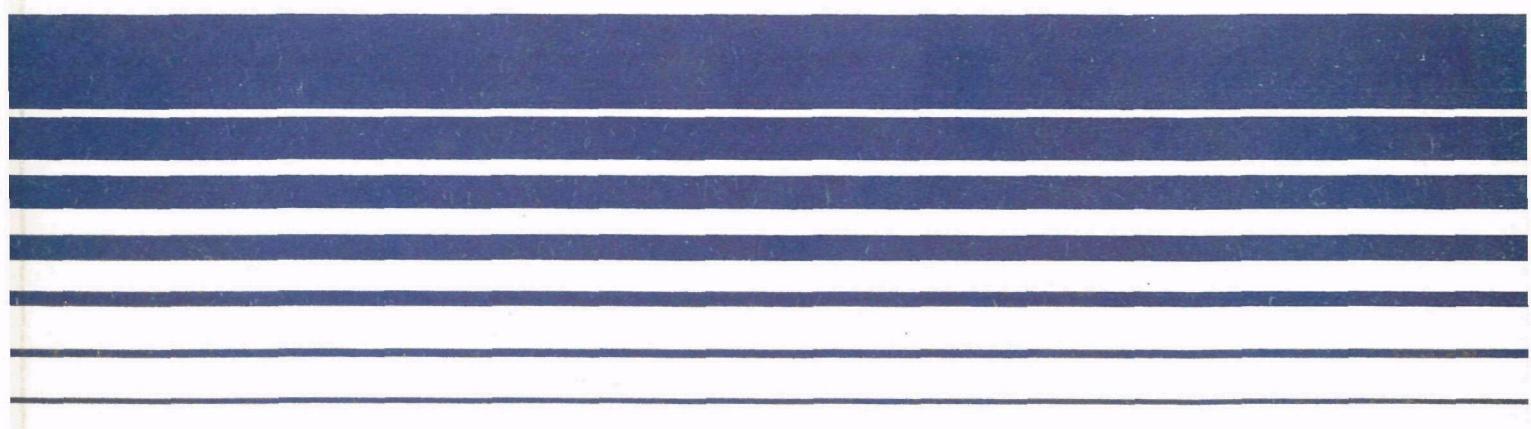
---

Air

---



# User's Guide to the NYSDOT Air Quality System



USER'S GUIDE TO THE MODIFIED  
NYSDOT AIR QUALITY SYSTEM

*Final Report*

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY  
Research Triangle Park  
North Carolina 27711

Contract No. 68-02-2539  
Task Order No. 7

Project Officer

William Beach

Prepared by

Dominic Caracciolo, Jr.

April 1979

GCA CORPORATION  
GCA/TECHNOLOGY DIVISION  
Bedford, Massachusetts

#### DISCLAIMER

This Final Report was furnished to the U.S. Environmental Protection Agency by GCA Corporation, GCA/Technology Division, Burlington Road, Bedford, Massachusetts 01730, in fulfillment of Contract No. 68-02-2539, Task Order No. 7. The opinions, findings, and conclusions expressed are those of the authors and not necessarily those of the Environmental Protection Agency. Mention of company or product names is not to be considered as an endorsement by the Environmental Protection Agency.

## ABSTRACT

This manual documents the modifications to the New York State Department of Transportation Air Quality System made by GCA/Technology Division. These modifications principally involved the inclusion of the most recent motor vehicle emission factors, as represented by the MOBILE1 program.



## CONTENTS

Abstract . . . . .	iii
Figures . . . . .	vi
Tables . . . . .	vi
1. Program Description . . . . .	1
2. Input/Output Requirements and Options . . . . .	4
Input Flags. . . . .	4
3. Software Documentation. . . . .	22
GCAINP . . . . .	22
GCAOUT . . . . .	31
Appendix	
FORTRAN Source Code . . . . .	32

## FIGURES

<u>Number</u>		<u>Page</u>
1	Sample input data . . . . .	20
2	Sample input data description . . . . .	21
3	Job file structure. . . . .	23
4	Flow-chart for main program . . . . .	24
5	Flow-chart for subroutine GCAINP. . . . .	25
6	Flow-chart for subroutine GCAOUT. . . . .	29

## TABLES

1	Factored Link File. . . . .	2
2	Input Flag Record Description . . . . .	5
3	Emission File . . . . .	8
4	Land Use File . . . . .	11
5	SYMAP File . . . . .	13
6	Required One-Time Data Description. . . . .	15
7	Program Defaults. . . . .	17

## SECTION 1

### PROGRAM DESCRIPTION

The purpose of this manual is to familiarize the user with the modifications made to the NYSDOT Air Quality System and describe input requirements and options and their effect on program execution and output.

The modifications implemented involve changes to MOBILE1 so it will accept input data from the NYSDOT Air Quality System and provide output in a form similar to the NYSDOT Air Quality System's ALGOL-based emissions program

MOBILE1 is a set of FORTRAN-based routines designed to aid in the analysis of emissions from motor vehicles. It computes emission factors for hydrocarbons (HC), Carbon Monoxide (CO), and Nitrogen Oxides ( $\text{NO}_x$ ) based on vehicle type, region, calendar year, vehicle inspection and maintenance parameters, speed, temperature, and various other parameters. For a complete list consult the MOBILE1 User's Guide.\* This manual assumes the reader is familiar with the MOBILE1 program. Moreover, users of the NYSDOT Air Quality System must be well acquainted with motor vehicle emission factor concepts to ensure intelligent use of the System.

In order to modify MOBILE1 to accept input data from the NYSDOT Air Quality System (a Factored Link File - for a description see Table 1), it was necessary to construct a new input routine (subroutine GCAINP) which would replace the standard one (subroutine INPUT). The standard MOBILE1 output routine (subroutine OUTPUT) has also been replaced by subroutine GCAOUT. The MOBILE1 main program has been replaced by a program which first calls GCAINP and then calls GCAOUT. A new subroutine has been added (EFPPMPB) to compute emission factors for lead (Pb) and particulate matter (PM).

GCAINP is responsible for reading the input flags and one-time data, initializing appropriate arrays, reading the Factored Link File, calculating emissions, printing the emissions for each link and optionally writing an Emissions file.

GCAOUT controls the printing of emissions by zone and/or district, and the optional input of a Land Use file. If the Land Use file is requested, GCAOUT calculates zonal emission densities, and at the user's option, prints them. The user also has the option of requesting a SYMAP file to be output to tape.

---

\*Cuthman, Lewis E., User's Guide to MOBILE1: Mobile Source Emissions Model, (U.S. Environmental Protection Agency, Office of Air, Noise and Radiation. Washington, D.C. August 1978.)

TABLE 1. FACTORED LINK FILE

Element No.	Description	Location	Size	Type	Picture	Comments
1	Function code	1	1	N	9	
2	Jurisdiction code	2	1	N	9	
3	District	3 - 4	2	N	99	
4	A Node	5 - 9	5	N	9(5)	Zone stored in locations 5-7
5	B Node	10 - 14	5	N	9(5)	
6	Federal Aid Code	15	1	N	9	
7	Link length	16 - 18	3	N	9v99	
8	Link type	19	1	N	9	
9	Way code	20	1	N	9	
10	Area type	21	1	N	9	
11	Political unit code	22 - 25	4	N	9(4)	
12	FILE ID	26 - 29	4	A	X(4)	
13	Planning link code	30 - 33	4	N	9(4)	
14	Filler	34 - 44	11	A	X(11)	
15	Zoned speed	45 - 46	2	N	99	
16	Halfwidth (ft)	47 - 48	2	N	99	
17	Source code	49	1	N	9	
18	Grade code	50	1	N	9	
19	Capacity	51 - 56	6	N	9(6)	
20	Average speed	57 - 58	2	N	99	24 hour
21	Volume/capacity ratio	59 - 62	4	N	9(3)v9	24 hour
22	Total volume	63 - 68	6	N	9(6)	24 hour
23	Volume, vehicle type 1	69 - 73	5	N	9(5)	24 hour
24	Volume, vehicle type 2	74 - 78	5	N	9(5)	24 hour
25	Volume, vehicle type 3	79 - 83	5	N	9(5)	24 hour
26	Volume, vehicle type 4	84 - 87	4	N	9(4)	24 hour
27	Volume, vehicle type 5	88 - 91	4	N	9(4)	24 hour
28	Volume, vehicle type 6	92 - 95	4	N	9(4)	24 hour
29	Beginning hour	96 - 97	2	N	99	Time period No. 1
30	Length of time period	98 - 99	2	N	99	Time period No. 1
31	Average speed	100-101	2	N	99	Time period No. 1
32	Volume/capacity ratio	102-107	6	N	9(5)v9	Time period No. 1
33	Total volume	108-113	6	N	9(6)	Time period No. 1
34	Volume, vehicle type 1	114-118	5	N	9(5)	Time period No. 1
35	Volume, vehicle type 2	119-123	5	N	9(5)	Time period No. 1
36	Volume, vehicle type 3	124-128	5	N	9(5)	Time period No. 1
37	Volume, vehicle type 4	129-132	4	N	9(4)	Time period No. 1
38	Volume, vehicle type 5	133-136	4	N	9(4)	Time period No. 1
39	Volume, vehicle type 6	137-140	4	N	9(4)	Time period No. 1

(continued)

TABLE 1 (continued)

Element No.	Description	Location	Size	Type	Picture	Comments
40	Beginning hour	141-142	2	N	99	Time period No. 2
41	Length of time period	143-144	2	N	99	Time period No. 2
42	Average speed	145-146	2	N	99	Time period No. 2
43	Volume/capacity ratio	147-152	6	N	9(5)v9	Time period No. 2
44	Total volume	153-158	6	N	9(6)	Time period No. 2
45	Volume, vehicle type 1	159-163	5	N	9(5)	Time period No. 2
46	Volume, vehicle type 2	164-168	5	N	9(5)	Time period No. 2
47	Volume, vehicle type 3	169-173	5	N	9(5)	Time period No. 2
48	Volume, vehicle type 4	174-177	4	N	9(4)	Time period No. 2
49	Volume, vehicle type 5	178-181	4	N	9(4)	Time period No. 2
50	Volume, vehicle type 6	182-185	4	N	9(4)	Time period No. 2
51	Beginning hour	186-187	2	N	99	Time period No. 2
52	Length of time period	188-189	2	N	99	Time period No. 3
53	Average speed	190-191	2	N	99	Time period No. 3
54	Volume/capacity ratio	192-197	6	N	9(5)v9	Time period No. 3
55	Total volume	198-203	6	N	9(6)	Time period No. 3
56	Volume, vehicle type 1	204-208	5	N	9(5)	Time period No. 3
57	Volume, vehicle type 2	209-213	5	N	9(5)	Time period No. 3
58	Volume, vehicle type 3	214-218	5	N	9(5)	Time period No. 3
59	Volume, vehicle type 4	219-222	4	N	9(4)	Time period No. 3
60	Volume, vehicle type 5	223-226	4	N	9(4)	Time period No. 3
61	Volume, vehicle type 6	227-230	4	N	9(4)	Time period No. 3
62	Filter	231-240	10	A	X(10)	

## SECTION 2

### INPUT/OUTPUT REQUIREMENTS AND OPTIONS

The input data requested by subroutines GCAINP and GCAOUT is either required or optional. The required input files consist of: (a) a card deck containing the Input Flags and Required One-Time Data and (b) a tape or disk file which contains the Factored Link data. The card deck is assigned to logical unit 5, the Factored Link file is assigned to unit 4. (See Table 1 for a description of the Factored Link file.)

The optional input files consist of the following: (a) a card deck containing Optional One-Time Data (placed between the input flag record and Required One-Time Data - consult Section 2, Optional One-Time Data, for a complete description of required order), and (b) a tape, disk or card file containing Land Use data. The unit number assigned to the Land Use file is determined by the value for input variable OUTFL5.

The only required output file is for printed output. It is permanently assigned to logical unit number 6.

Optional output files consist of the following: (a) a tape or disk file containing Emissions data and (b) a tape or disk file containing SYMAP data. The unit number assigned to the Emissions file is determined by the value of input variable OUTFL2; that for the SYMAP file from the value of input variable OUTFL9.

#### INPUT FLAGS

The Input Flags are coded on a single card which has a format of 17I1. This card is the very first record to be read by subroutine GCAINP. A tabular description of the Input Flag record can be found in Table 2.

- Column No. 1: MYMRFG

MYMRFG is a MOBILE1 flag which indicates whether the user is entering vehicle registration and/or annual mileage accrual distributions or is using the default national average distributions. If the user wishes to supply either or both distributions, additional input is required. The Optional One-Time Data section should be consulted for the placement of the additional data.

TABLE 2. INPUT FLAG RECORD DESCRIPTION

Col. No.	Variable Name	Description	Value	Action
1	MYMFLG	Flag for optional input of user registration and/or mileage accrual distributions	0 1 2 3 Other	Use default regist. and mileage dist. User supplies mileage dist. User supplies regist. dist. User supplies both dist. Error
2	ALTFLG	Flag for optional modification of model year emission factors	0 1 Other	Use default factors User modifies factors Error
3	IMFLAG	Flag to include impact of inspection maintenance program in calculations	0 1 Other	No I/M program Include I/M Error
4	ALHFLG	Flag for optional use of four special LDV correction factors: (a) air conditioning (b) vehicle loading (c) trailer towing (d) humidity (NO <sub>x</sub> only)	0 1 Other	Four factors not included Four factors are included Error
5	TRKFLG	Flag for optional use of HDV power/weight correction factor	0 1 Other	Do not use HDV factor Use HDV factor Error
6	NMMFLG	Flag to select total or nonmethane HC	0 1	Total HC Nonmethane HC
7	OUTFL0	Flag to select emission units	0 1 Other	Pounds Grams Error
8	OUTFL1	Flag to control pollutants to be printed for each link in Factored Link file	0 1 2 3 4 5 6 7 Other	Emissions not printed for each link CO NO <sub>x</sub> HC Pb PM CO, NO <sub>x</sub> , HC All Error
9	OUTFL2	Flag to control optional output of an Emissions file	0 Non-0	Emissions file not output Emissions file written to logical unit number OUTFL2
10	OUTFL3	Flag to control time periods to be printed for each zone	0 1 2 Other	Emissions not printed by zone Emissions printed for 24-hour time period only Emissions printed for all time periods Error
11	OUTFL4	Flag to control time periods to be printed for each district	0 1 2 Other	Emissions not printed by district Emissions printed for 24-hour time period only Emissions printed for all time periods Error
12	OUTFL5	Flag to control optional input of Land Use file	0 Non-0	Land Use file not input Land Use file read from logical unit number OUTFL5
13	OUTFL6	Flag to control time periods for which Zonal Emission Densities are to be printed	0 1 2 Other	Zonal Emission Densities not printed Zonal Emission Densities printed for 24-hour time period only Zonal Emission Densities printed for all time periods Error
14	OUTFL7	Flag to control which pollutants are to be printed for Zonal Emission Densities	0 1 2 3 4 5 6 7 Other	All pollutants (default) CO NO <sub>x</sub> HC Pb PM CO, NO <sub>x</sub> , HC All pollutants Error
15	OUTFL8	Flag to control density area units for Zonal Emission Densities	0 1 2 3 Other	Square feet (default) Square miles Acres Square feet Error
16	OUTFL9	Flag to control optional output of a SYMAP file	0 Non-0	SYMAP file not output SYMAP file written to logical unit number OUTFL9
17	MODE	Flag to control mode of execution in which subroutine CALNP operates	0 Non-0	Emission factors calculated for 3 mph speed increments from 5 to 60 mph; Table look-up scheme used as each link is read from Factored Link file. (No. of calls to EPICALX=152). Emission factors calculated as each link is read from Factored Link file. (No. of calls to EPICALX=4*No. of records in Factored Link file)

- Column No. 2: ALTFLG

ALTFLG is a MOBILE1 flag which indicates whether the user desires to modify any of the emission factors used in the program. At the current time MOBILE1 does not support a value of ALTFLG=1. Appendix C of the MOBILE1 User's Guide should be consulted to modify MOBILE1 and GCAINP if user-supplied emission factors are to be used.

- Column No. 3: IMFLAG

IMFLAG is a MOBILE1 flag which indicates whether the computed emission factors should include credits for an Inspection/Maintenance program. If I/M credits are to be applied, additional input is required. Consult the Optional One-Time Data section for the placement of the additional data.

- Column No. 4: ALHFLG

ALHFLG is a MOBILE1 flag which indicates whether the composite emission factor computation should include the effects of four light-duty vehicle correction factors: (a) air conditioning, (b) vehicle loading, (c) trailer towing and (d) humidity ( $\text{NO}_x$  only). If these correction factors are to be included, additional input data is required. Consult the Optional One-Time Data section for the placement of the additional data.

- Column No. 5: TRKFLG

TRKFLG is a MOBILE1 flag which indicates whether the composite emission factor computation for heavy-duty gasoline and diesel-powered vehicles should include the effect of the "additional" correction factor based on the power/weight ratios of these vehicles. If these correction factors are to be included, additional input data is required. Consult the Optional One-Time Data section for the placement of the additional data.

- Column No. 6: NMHFLG

NMHFLG is a MOBILE1 flag which indicates whether the user desires total or nonmethane HC emissions to be computed.

- Column No. 7: OUTFL0

OUTFL0 is used to select whether the emissions are to be computed in pounds (OUTFL0=0 or blank) or grams (OUTFL0=1). Any other value results in a fatal error, aborting the run.

- Column No. 8: OUTFL1

OUTFL1 controls which pollutants emissions are to be printed as each link is read from the Factored Link file. If OUTFL1 equals zero or is left blank, emissions will not be printed for each link; if OUTFL1=1, CO emissions will be printed; if OUTFL1=2, NO<sub>x</sub> emissions will be printed; if OUTFL1=3, HC emissions will be printed; if OUTFL1=4, Pb emissions will be printed; if OUTFL1=5, PM emissions will be printed, if OUTFL1=6, CO, NO<sub>x</sub> and HC emissions will be printed; if OUTFL1=7, emissions for all five pollutants will be printed. Any other value results in a fatal error, aborting the run.

- Column No. 9: OUTFL 2

OUTFL2 controls the optional output of an Emissions file. If OUTFL2 equals zero or is left blank, no Emissions file will be written; if OUTFL2 is nonzero, an Emission file will be written to the logical unit number determined by the value of OUTFL2. Note that a check is made to insure that the unit number for the Emissions file differs from that assigned to the Factored Link File (Unit 4). A further check is made to insure that the unit number assigned to the Emissions file also differs from that assigned to the optionally input Land Use file (which is defined by the value of OUTFL5). These tests are performed to protect the user from possibly writing upon an input file. See Table 3 for a description of the record format of the Emissions file.

- Column No. 10: OUTFL3

OUTFL3 controls which time periods are to be selected when emissions are printed for each zone. If OUTFL3 is zero or blank, emissions for each zone will not be printed. If OUTFL3=1, emissions will be printed for each zone for the 24-hour time period only. If OUTFL3=2, emissions will be printed for each zone for all four time periods. Any other value results in a fatal error, aborting the run. Note that emissions for all five pollutants will be printed; that is, the user has no control over the selection of pollutants.

- Column No. 11: OUTFL4

OUTFL4 controls which time periods are to be selected when emissions are printed for each district. If OUTFL4 is zero or blank, emissions for each district will not be printed. If OUTFL4=1, emissions will be printed for each district for the 24-hour time period only. If OUTFL4=2, emissions will be printed for each district for all four time periods. Any other value results in a fatal error, aborting the run. As with OUTFL3, emissions for all five pollutants will be printed.

TABLE 3. EMISSIONS FILE

Element No.	Description	Location	Size	Type	Picture	Comments
1	Function code	1	1	N	9	
2	Jurisdiction code	2	1	N	9	
3	District	3-4	2	N	99	
4	A node	5-9	5	N	9(5)	
5	B node	10-14	5	N	9(5)	
6	Federal aid code	15	1	N	9	
7	Link length	16-18	3	N	9v99	
8	Link type	19	1	N	9	
9	Way code	20	1	N	9	
10	Area type	21	1	N	9	
11	Political unit code	22-25	4	N	9(4)	
12	File ID	26-29	4	A	X(4)	
13	Planning link code	30-33	4	N	9(4)	
14	Filler	34-44	11	A	X(11)	
15	Zoned speed	45-46	2	N	99	
16	Halt width (ft)	47-48	2	N	99	
17	Source code	49	1	N	9	
18	Grade code	50	1	N	9	
19	Capacity	51-56	6	N	9(6)	
20	Average speed	57-58	2	N	99	
21	Volume/capacity ratio	59-62	4	N	99v99	
22	Volume	63-68	6	N	9(6)	
23	Unit code	69	1	N	9	
24	24 hour	70-77	8	N	9(8)	NO emissions
25	Time period No. 1	78-85	8	N	9(8)	
26	Time period No. 2	86-93	8	N	9(8)	
27	Time period No. 3	94-101	8	N	9(8)	
28	24 hour	102-109	8	N	9(8)	HC emissions
29	Time period No. 1	110-117	8	N	9(8)	
30	Time period No. 2	118-125	8	N	9(8)	
31	Time period No. 3	126-133	8	N	9(8)	
32	24 hour	134-141	8	N	9(8)	CO emissions
33	Time period No. 1	142-149	8	N	9(8)	
34	Time period No. 2	150-157	8	N	9(8)	
35	Time period No. 3	158-165	8	N	9(8)	

(continued)

TABLE 3 (continued).

Element No.	Description	Location	Size	Type	Picture	Comments
36	24 hour	166-173	8	N	9(8)	
37	Time period No. 1	174-181	8	N	9(8)	PM emissions
38	Time period No. 2	182-189	8	N	9(8)	
39	Time period No. 3	190-197	8	N	9(8)	
40	24 hour	198-205	8	N	9(8)	
41	Time period No. 1	206-213	8	N	9(8)	Pb emissions
42	Time period No. 2	214-221	8	N	9(8)	
43	Time period No. 3	222-229	8	N	9(8)	
44	Filler	230-240	11	A	X(11)	

- Column No. 12: OUTFL5

OUTFL5 controls the optional input of a Land Use File. If OUTFL5 is zero or blank, no Land Use file will be read. If OUTFL5 is nonzero, the Land Use file will be read from the logical unit number determined by the value of OUTFL5. A check is made to insure that the unit number for the Land Use file differs from those assigned to the optionally output Emissions file (OUTFL2) and the optionally output SYMAP file. The tests are performed to protect the user from possibly writing upon an input file. For a description of the record format of the Land Use file, see Table 4.

- Column 13: OUTFL6

OUTFL6 controls the time periods for which Zonal Emission Densities are to be printed. The densities are computed by dividing the zonal emissions by the total land area for that zone. The total land area is computed from data input in the Land Use file. If OUTFL6 is zero or blank, Zonal Emission Densities will not be printed. If OUTFL6=1, Zonal Emission Densities will be printed for the 24-hour time period only. If OUTFL6=2, densities for all four time periods are printed. Any other value results in a fatal error, aborting the run.

- Column 14: OUTFL7

OUTFL7 controls which pollutants are to be selected when Zonal Emission Densities are printed. If OUTFL7 is left blank or set to zero, the default of all pollutants is assumed. If OUTFL7=1, CO is printed; if OUTFL7=2, NO<sub>x</sub> is printed; if OUTFL7=3, HC is printed; if OUTFL7=4, Pb is printed; if OUTFL7=5, PM is printed; if OUTFL7=6, CO, NO<sub>x</sub> and HC densities are printed; if OUTFL7=7, densities for all five pollutants are printed. Any other value results in a fatal error, aborting the run.

- Column 15: OUTFL8

OUTFL8 controls the units of area in which Zonal Emission Densities are to be computed. If OUTFL8 is left blank or set to zero, the default of square feet is assumed. If OUTFL8=1, densities are in grams or pounds per square mile. If OUTFL8=2, densities are in grams or pounds per acre. If OUTFL8=3, densities are in grams or pounds per square foot. Any other value results in a fatal error, aborting the run. Note that the choice of grams or pounds is determined by the value of OUTFL0.

TABLE 4. LAND USE FILE

Element No.	Description	Location	Size	Type	Picture	Comments
1	District	1-2	2	N	99	
2	Zone	3-5	3	N	999	
3	Vacant land	6-13	8	N	99v9(6)	1000's of ft <sup>2</sup>
4	Residential land	14-21	8	N	99v9(6)	1000's of ft <sup>2</sup>
5	Nonresidential land	22-29	8	N	99v9(6)	1000's of ft <sup>2</sup>
6	Alternate passive land	30-37	8	N	99v9(6)	1000's of ft <sup>2</sup>
7	Filler	38-80	43	A	X(43)	

- Column 16: OUTFL9

OUTFL9 controls the optional output of a SYMAP file. If OUTFL9 is zero or blank, no SYMAP file will be written; if OUTFL9 is nonzero, a SYMAP file will be written to the logical unit number determined by the value of OUTFL9. As with the other output files, a check is made to be sure that the unit number assigned to the SYMAP file differs from those assigned to the Factored Link file (Unit 4) and the optional Land Use file (OUTFL5). For a description of the record format of the SYMAP file, see Table 5.

- Column 17: MODE

The MODE flag determines the mode of execution in which GCAINP operates. If MODE is blank or zero, GCAINP will initially set up an array of emission factors based on 3 mph speed increments between 5 and 60 mph (i.e., 5, 8, 11, ... 59 mph). As each link is processed, the emission factor for the average speed for that link will be 'looked up' in this array and emissions computed. Note that average speeds of 7, 8 and 9 mph will all use the emission factor for 8 mph; 10, 11 and 12 mph use that for 11, etc. This mode of execution results in some inaccuracy but faster execution (particularly for large Factored Link files) since MOBILE1 subroutine EFCALX is called 152 times during initialization. EFCALX is used to compute emission factors for CO, NO<sub>x</sub>, and HC.

If MODE is nonzero, EFCALX is called four times per link (once for each of the four time periods). The computed emissions are more accurate than those calculated when MODE=0, but execution time will be greatly increased. This mode of execution is suggested only if accuracy in the calculated emissions is required or if a small Factored Link file is being read.

#### Required One-Time Data

The Required One-Time Data consists of a card deck containing six records. A tabular description can be found in Table 6. The description of each card follows.

- Card No. 1: Calendar Year

Card 1 contains the last two digits of the calendar year for which emissions are to be calculated. Valid calendar years are 70 through 99. A value less than 70 will be flagged as a fatal error causing the run to be terminated. The calendar year should be coded in columns 1 and 2.

- Cards 2 through 6

Cards 2 through 6 have the same format of 4F5.0. Columns 1 through 5 contain data for the 24-hour time period; columns 6 through 10 contain data for time period 1; columns 11

TABLE 5. SYMAP FILE

Element No.	Description	Location	Size	Type	Picture	Comments
1	Zone	1-8	8	N	9(8)	
2	NO 24	9-19	11		9(1Ø)v9	Emissions in grams
3	HC 24	2Ø-3Ø				
4	CO 24	31-41				
5	PM 24	42-52				
6	Pb 24	53-63				
7	NO 1	64-74				
8	HC 1	75-85				
9	CO 1	86-96				
1Ø	PM 1	97-1Ø7				
11	Pb 1	1Ø8-118				
12	NO 2	119-129				
13	HC 2	13Ø-14Ø				
14	CO 2	141-151				
15	PM 2	152-162				
16	Pb 2	163-173				
17	NO 3	174-184				
18	HC 3	185-195				
19	CO 3	196-2Ø6				
2Ø	PM 3	2Ø7-217				
21	Pb 3	218-228				
22	NO 24	23Ø-24Ø				Emissions in pounds
23	HC 24	241-251				
24	CO 24	252-262				
25	PM 24	263-273				
26	Pb 24	274-284				
27	NO 1	285-295				
28	HC 1	296-3Ø6				
29	CO 1	3Ø7-317				
3Ø	PM 1	318-328				
31	Pb 1	329-339				
32	NO 2	34Ø-35Ø				
33	HC 2	351-361				
34	CO 2	362-372				
35	PM 2	373-383				
36	Pb 2	384-394				

(continued)

TABLE 5 (continued)

Element No.	Description	Location	Size	Type	Picture	Comments
37	NO	3	395-405	11	N	9(10)v9 Emissions in pounds
38	HC	3	406-426			
39	CO	3	417-427			
40	PM	3	428-438			
41	Pb	3	439-449			
42	NO	24	450-460			Emissions in pounds or grams/MI <sup>2</sup>
43	HC	24	461-471			(at user's option)
44	CO		472-482			
45	PM		483-493			
46	Pb		494-504			
47	NO		505-515			
48	HC		516-526			
49	CO		527-537			
50	PM		538-548			
51	Pb		549-559			
52	NO		560-570			
53	HC		571-581			
54	CO		582-592			
55	PM		593-603			
56	Pb		604-614			
57	NO		615-625			
58	HC		626-636			
59	CO		637-647			
60	PM		648-658			
61	Pb		659-669	↓	↓	↓
62	Filler		670	1	A	X

TABLE 6. REQUIRED ONE-TIME DATA DESCRIPTION

Record	Columns	Description	Format	Comments
1	1 - 2	Calendar year	12	70-CY-99
	1 - 5	Freeway hot-starts 24-hour time period	F5.0	Percent
2	6 - 10	Freeway hot-starts time period #1	F5.0	Percent
	11 - 15	Freeway hot-starts time period #2	F5.0	Percent
	16 - 20	Freeway hot starts time period #3	F5.0	Percent
	1 - 5	Nonfreeway hot-starts 24-hour time period	F5.0	Percent
3	6 - 10	Nonfreeway hot-starts time period #1	F5.0	Percent
	11 - 15	Nonfreeway hot-starts time period #2	F5.0	Percent
	16 - 20	Nonfreeway hot-starts time period #3	F5.0	Percent
	1 - 5	Freeway cold-starts 24-hour time period	F5.0	Percent
4	6 - 10	Freeway cold-starts time period #1	F5.0	Percent
	11 - 15	Freeway cold-starts time period #2	F5.0	Percent
	16 - 20	Freeway cold-starts time period #3	F5.0	Percent
	1 - 5	Nonfreeway cold-starts 24-hour time period	F5.0	Percent
5	6 - 10	Nonfreeway cold-starts time period #1	F5.0	Percent
	11 - 15	Nonfreeway cold-starts time period #2	F5.0	Percent
	16 - 20	Nonfreeway cold-starts time period #3	F5.0	Percent
	1 - 5	Ambient temperature 24-hour time period	F5.0	Degrees F $0 \leq T_p \leq 110$
6	6 - 10	Ambient temperature time period #1	F5.0	Degrees F $0 \leq T_p \leq 110$
	11 - 15	Ambient temperature time period #2	F5.0	Degrees F $0 \leq T_p \leq 110$
	16 - 20	Ambient temperature time period #3	F5.0	Degrees F $0 \leq T_p \leq 110$

through 15 contain data for time period 2, and columns 16 through 20 contain data for time period 3.

- Card No. 2: Freeway Hot-Start Data

Card 2 contains the percentage of freeway hot-starts for each of the four time periods.

- Card No. 3: Nonfreeway Hot-Start Data

Card 3 contains the percentage of nonfreeway hot-starts for each of the four time periods.

- Card No. 4: Freeway Cold-Start Data

Card 4 contains the percentage of freeway cold-starts for each of the four time periods.

- Card No. 5: Nonfreeway Cold-Start Data

Card 5 contains the percentage of nonfreeway cold-starts for each of the four time periods.

- Card No. 6: Temperature

Card 6 contains the ambient temperature ( $^{\circ}$ F) for each of the four time periods. Valid temperatures range from 0 to 110 $^{\circ}$ F. Any temperature not in this range will be flagged as invalid and the run will be terminated.

#### Optional One-Time Data

The optional One-Time Data should be included in the input deck if any of the six MOBILE1 flags are turned on. This optional data should be placed between the Input Flag record and the Required One-Time Data records. The order of the cards within the Optional One-Time Data deck is the same order in which the corresponding MOBILE1 flags appear on the Input Flag record. The flag names used are the same as those found in the MOBILE1 program so a description of the input data format will not be given in this guide. The MOBILE1 User's Guide should be consulted for the correct format.

#### Program Defaults

The original MOBILE1 input subroutine allowed the user more flexibility in setting input flags than does the current input routine GCAINP. The functions performed by these flags deal "with input formats, output formats and a few" internal modes of operation and are not required in subroutine GCAINP. They have been assigned default values in BLOCK DATA to insure that they have a defined value during execution of the program as they may be encountered in any of the subroutines containing block /FLGCOM/. A description of the default values may be found in Table 7.

TABLE 7. PROGRAM DEFAULTS

Variable	Original purpose	Default value	Reason for default
INFLAG	Select list-directed or formatted read	Ø	Not used*
SP3FLG	Select 1 or 3 input speeds	Ø	One speed read per time period per link
VMFLAG	Select optional use of user VMT mix	1	Supplied in factored link file
IFORM	Select output format	1	Not used*
PRTFLG	Select which factors are included in output	Ø	HC, CO, NO <sub>x</sub> included
ICEVFG	Controls listing of evaporative HC	1	Evaporative HC computed
IDLFLG	Controls output of idle factors	1	No idle output
UNFFLG	Select optional unformatted output	Ø	Not used*
IREJN	Select low altitude, California or high altitude	1	Low altitude

\* The original purpose of the flag was to control input or output formats. It is not used in any of the other subroutines, but a default value has been assigned for consistency.

### Summary of Fatal Errors

Most of the input data required by the program is edit-checked for valid values before any processing of the Factored Link File is attempted. The MOBILE1 flags are first checked; if any of the flags are in error, a message will be printed indicating the total number in error. Note that the program does not indicate which of the flags are in error. The user should consult Table 2 for valid values.

Whether or not errors were detected in the MOBILE1 flags, the program will check the values of OUTFL0 through OUTFL9. As with the MOBILE1 flags, if any is in error a message will be printed stating how many are in error. Table 2 should again be consulted for valid values.

One-Time data will be read next. Optional One-Time data is read first if any is supplied; these values are not edit-checked. The Required One-Time data is read next. The calendar year is checked (Card 1) to be sure the value is between 70 and 99, inclusive. The ambient temperatures for each of the time periods (Card 6) is checked to be sure they are in the range of 0 to 110°F.

Upon reading Card 6 of the Required One-Time data the program will test to see if there were any errors in the input data. If no errors were detected, processing will continue; otherwise the run is terminated.

The following conditions will also cause abnormal termination during the input process:

1. Premature end of file.
2. Emissions file and/or SYMAP file having the same logical unit number as the Factored Link file.
3. Emissions file and/or SYMAP file having the same logical unit number as the Land Use file.

Once the program begins reading the Factored Link file, it will continue to edit-check the data in the file. If an error exists in the file, a warning message will be printed and the record (link) in error will be skipped; but processing of the file will continue. Warning messages will be printed upon detection of the following errors:

1. Negative district or zone.
2. Link type of 0 or 7.

Within each link, data for each of the four time periods is also checked. A negative or zero average speed for the time period results in the emissions for that time period being set to 0. An average speed less than 5 mph will be set to 5 mph; an average speed greater than 60 mph will be set to 60 mph.

If the total vehicle volume for a given time period is negative or zero, the emissions for that time period will be set to  $\emptyset$ . Messages will be provided if any of the above conditions exists.

#### Sample Data

A sample card deck may be found in Figure 1. Card 1 contains the MOBILE1 flags, OUTFL0 through OUTFL9 and the MODE flag. Card 2 is the calendar year. Cards 3 through 6 contain the freeway and nonfreeway hot and cold start percentages (see Table 6 for description) and Card 7 contains the ambient temperatures by time period. For clarity, the resultant output from the program is presented in Figure 2.



## INPUT DATA VALUES

```
MYMRFG = 0
ALTFLG = 0
IMFLAG = 0
ALHFLG = 0
TRKFLG = 0
NMHFLG = 0
OUTFL0 = 0      EMISSIONS TO BE COMPUTED IN LBS
OUTFL1 = 7      EMISSIONS WILL BE PRINTED FOR EACH LINK FOR CO NOX HC PH PM
OUTFL2 = 0      EMISSIONS FILE WILL NOT BE WRITTEN
OUTFL3 = 2      EMISSIONS WILL BE PRINTED BY ZONE FOR ALL TIME PERIODS
OUTFL4 = 2      EMISSIONS WILL BE PRINTED BY DISTRICT FOR ALL TIME PERIODS
OUTFL5 = 3      LAND USE FILE WILL BE READ FROM UNIT 3
OUTFL6 = 2      ZONAL EMISSION DENSITIES WILL BE PRINTED FOR ALL TIME PERIODS
OUTFL7 = 1      ZONAL EMISSION DENSITIES WILL BE PRINTED FOR CO
OUTFL8 = 0      IF ZONAL EMISSION DENSITIES ARE PRINTED, DEFAULT OF UNITS/SQFT WILL BE ASSUMED
OUTFL9 = 0      NO SYMAP FILE WILL BE WRITTEN
    MUDE = 1      EMISSIONS WILL BE COMPUTED FOR EACH LINK USING EMISSION FACTORS FOR GIVEN SPEED
CALENDAR YEAR = 77
    HOT START DATA (    FREEWAY) =    79.    80.    81.    82.
    HOT START DATA (NON-FREEWAY) =    80.    80.    80.    80.
    COLD START DATA (    FREEWAY) =    21.    20.    19.    18.
    COLD START DATA (NON-FREEWAY) =    20.    20.    20.    20.
    TEMPERATURES FOR TIME PERIODS =    70.    65.    70.    78.
```

Figure 2. Sample input data description.

SECTION 3  
SOFTWARE DOCUMENTATION

This section of the manual will give a brief description of the flow of subroutines GCAINP and GCAOUT. See Figures 3 through 6 for flow-charts of the routines. Appendix A contains the GCA version of the source code.

GCAINP

Subroutine GCAINP first reads in the Input Flag record, prints the input values of all the flags as well as a descriptive statement about the course of action to be followed for the 'OUT' flags only. Any values in error will be recorded by the routine and a message will be printed stating how many flags are in error. Note that particular flags will not be referenced; it is the responsibility of the user to locate any flags in error. Even if errors exists, GCAINP will continue and read any Optional One-Time data (the values are not printed by GCAINP) followed by all Required One-Time data (six records). The Required One-Time data will also be checked for errors. If errors exist in either the MOBILE1 or OUT flags or in the Required One-Time data, processing will stop. No attempt to return to the main program is made.

When GCAINP is satisfied that all card input data is correct, it begins processing by calling MOBILE1 subroutines TFCALX, INITEX and LDVIMX (if requested). A test is then made to determine which mode of operation was requested. If the averaging mode was requested, GCAINP will initialize array EMX by calling subroutine EFCALX 152 times. The subscripts of EMX are based on the following: time period (4), type of link (2), speed (19), modal split (6), and pollutant (3). EMX stores emission factors based on 3 mph speed increments ranging from 5 to 60 mph. Note that there is space for only three pollutants (CO, NO<sub>x</sub>, HC) since EFCALX does not compute emission factors for PM and Pb.

GCAINP then reads a record from the Link file and checks for valid district zone and link type. Valid link type codes are 1, 2 and 8 (nonfreeway) and 3 through 6, and 9 (freeway). Codes 0 and 7 are invalid. If any of the above is invalid, the link is completely skipped, and a message is printed stating why the link was rejected. GCAINP then sets up necessary data for EFCALX (arrays LNKDTA and MS) and again checks the mode of execution. If the averaging scheme is utilized, a table look-up into array EMX is performed. If not, EFCALX will be called to compute emission factors. The program will then call subroutine EFPMPPB to calculate emission factors for PM and Pb. At the present time this call has been disabled by "commenting it out" since the emission factor calculation is not being implemented. Emissions for each of the five pollutants is then calculated (gms) by multiplying the emission factor

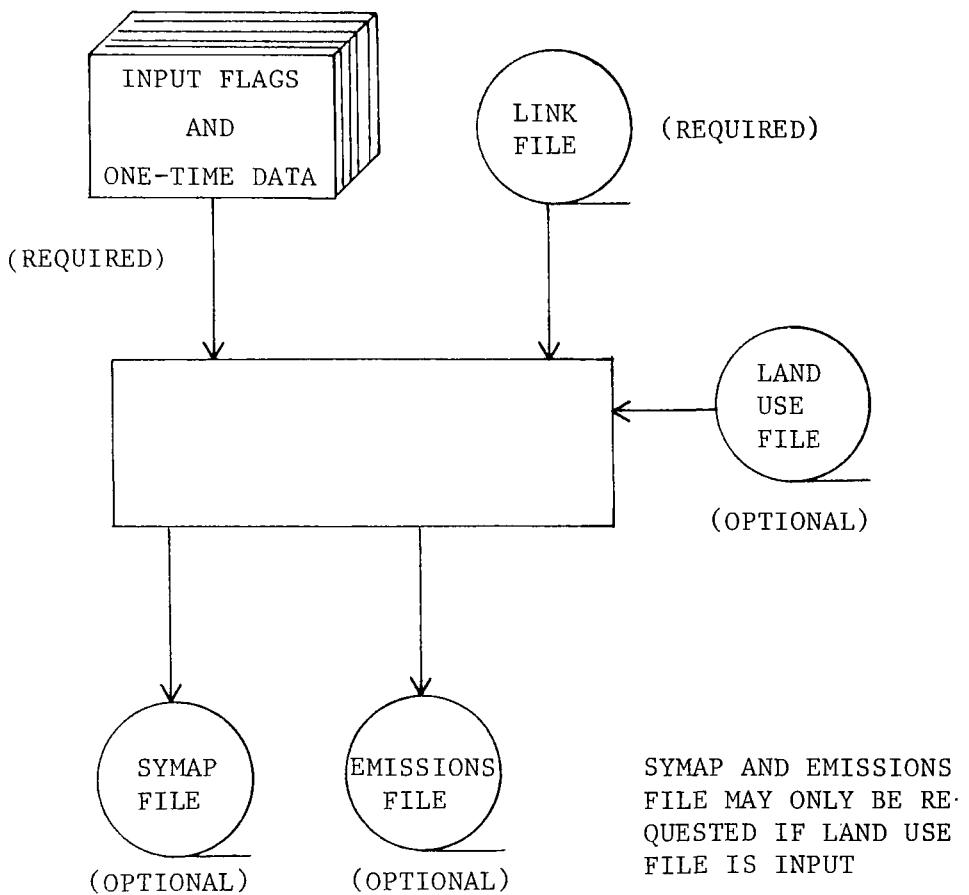


Figure 3. Job file structure.

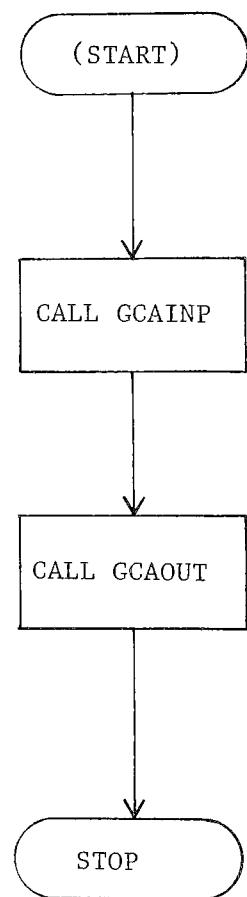


Figure 4. Flow-chart for main program.

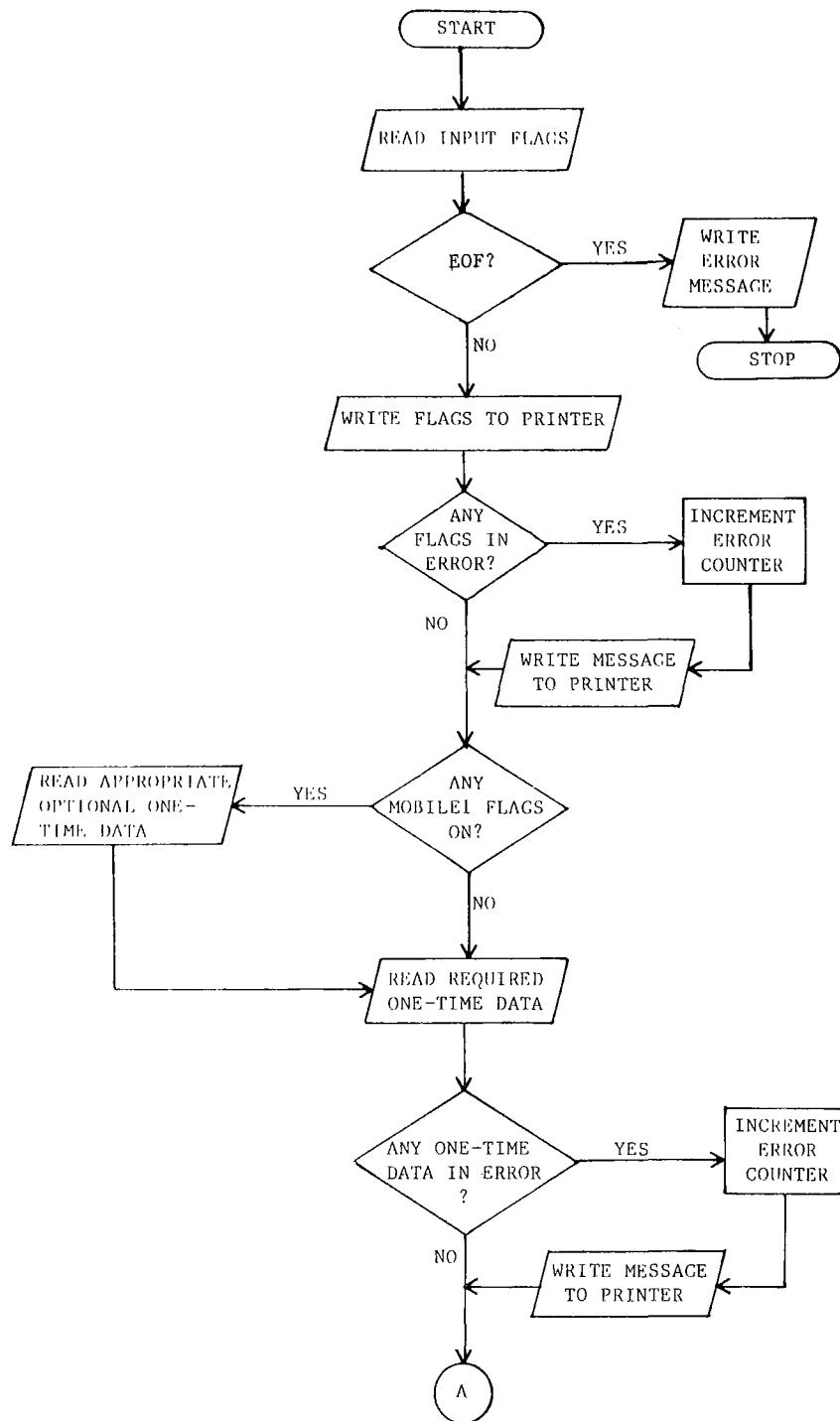


Figure 5. Flow-chart for subroutine GCAINP.

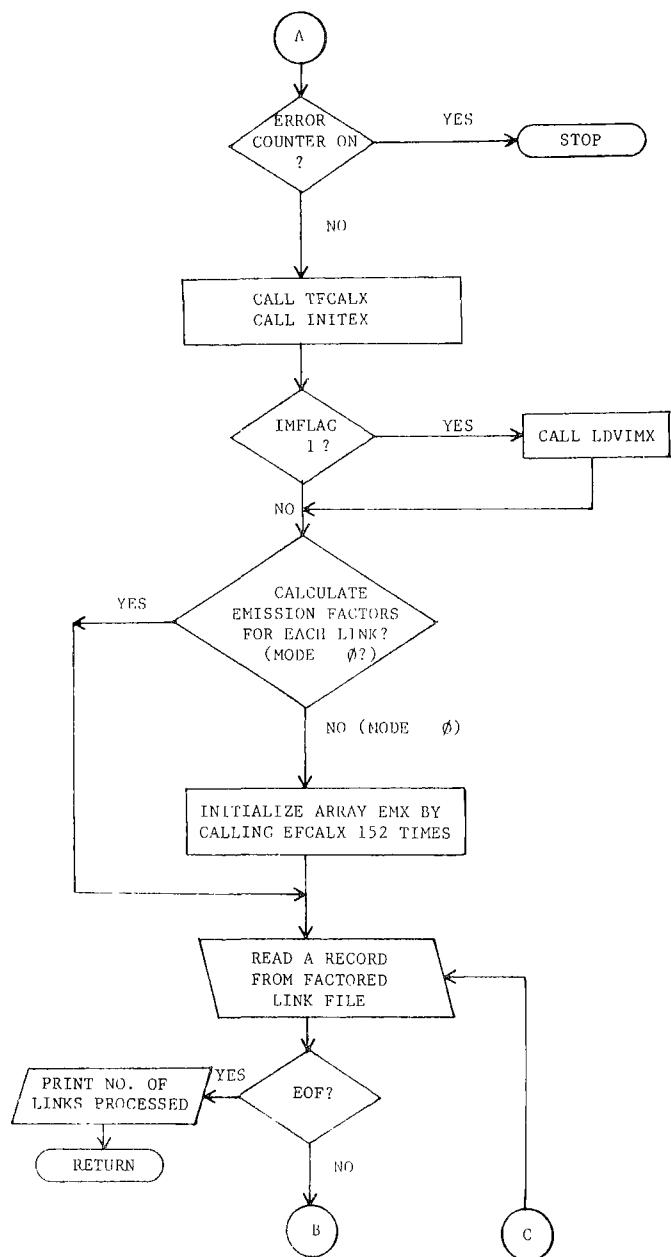


Figure 5 (continued). Flow-chart for subroutine GCAINP

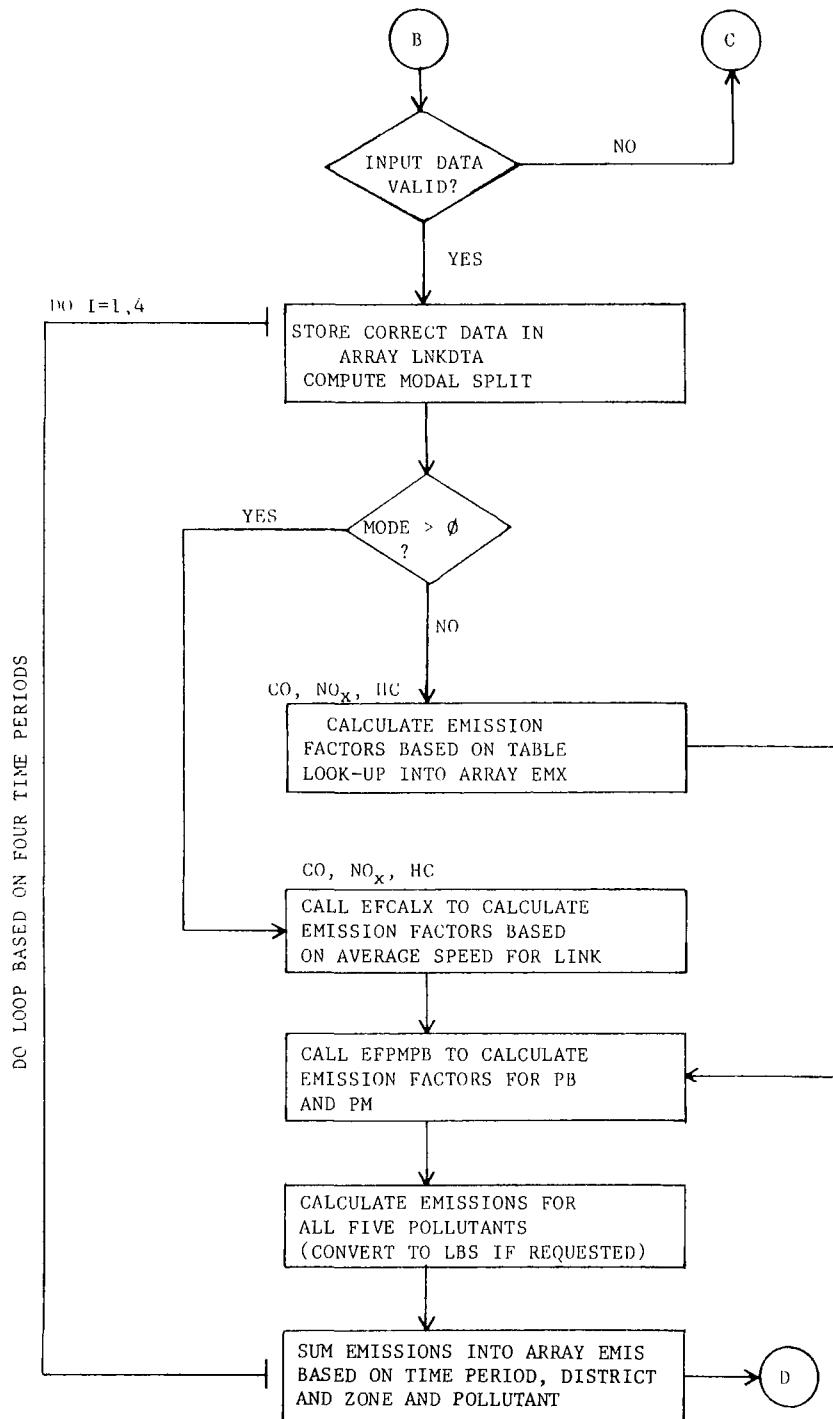


Figure 5 (continued). Flow-chart for subroutine GCAINP

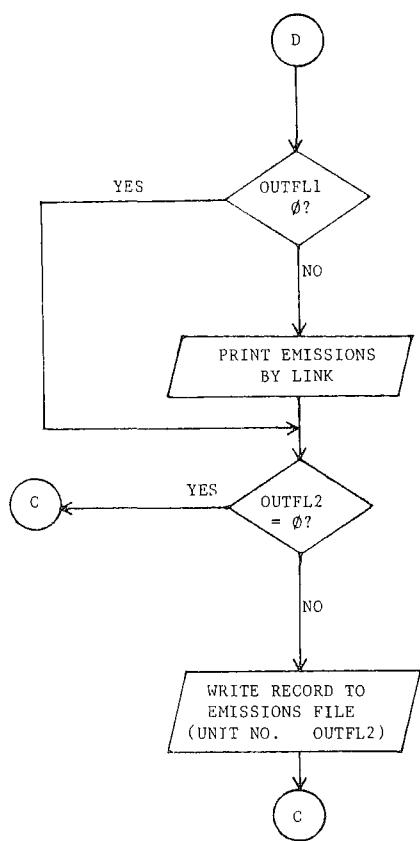


Figure 5 (continued). Flow-chart for subroutine GCAINP

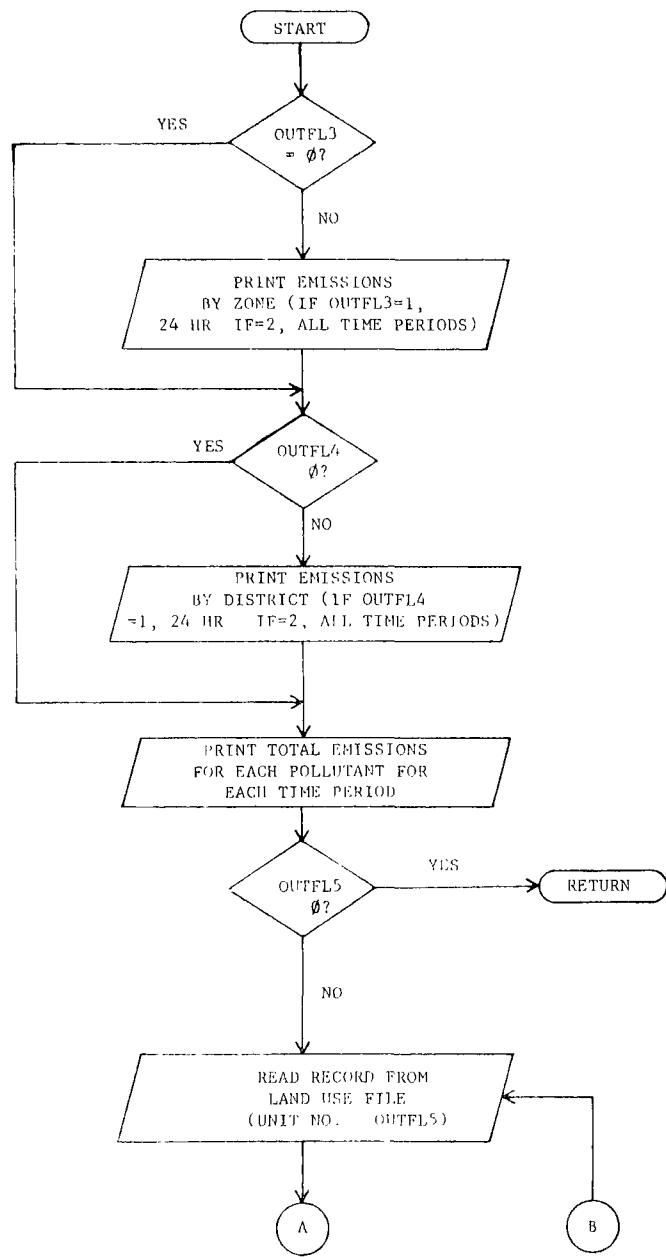


Figure 6. Flow-chart for subroutine GCAOUT

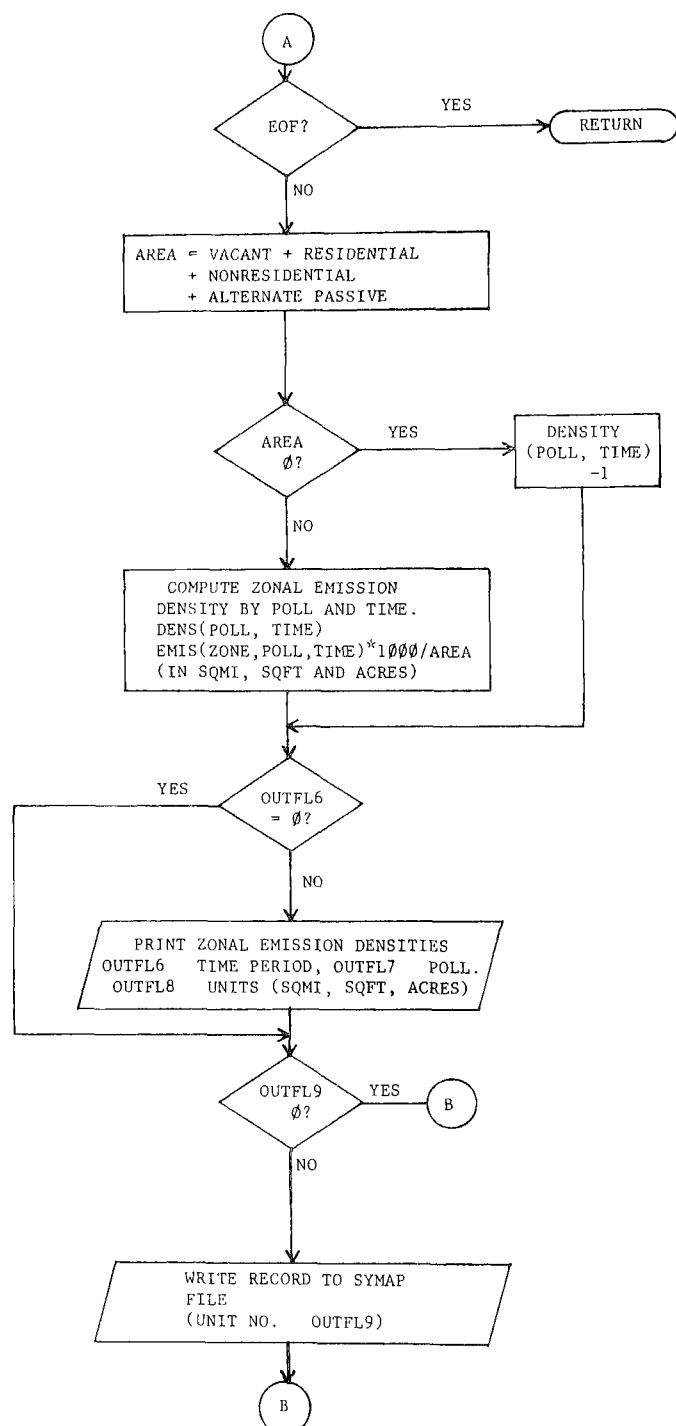


Figure 6 (continued). Flow-chart for subroutine GCAOUT

times the link length times the total volume. They are stored in array CALCEM whose subscripts depend on the number of pollutants (5) and the number of time periods (4). The computed emissions are then summed by zone and district into array EMIS. The subscripts are (1100, 5, 4). Since valid zones range from 0 to 999, emissions for each of the zones is stored in EMIS (1, j, k) through EMIS (1000, j, k); 1 being zone 0, 1000 being zone 999. Districts range from 0 to 99 and the emissions for each of the districts occupies locations EMIS (1001, j, k) through EMIS (1100, j, k). The j-subscript is for pollutants, the k-subscript for time periods. Note that the calculation of emissions takes place for each of the four time periods.

The remainder of GCAINP is concerned with printing the emissions for each link and writing records to the optional Emissions file. A return is then made to the main program.

#### GCAOUT

Subroutine GCAOUT is mainly concerned with printing requested output. It begins by optionally printing emissions by zone and/or district. The user selects all time periods or the 24-hour time period only. Note that only zones and districts will be printed which have nonzero emissions for any of the five pollutants. Total emissions are then calculated and printed for all four time periods by looping through the district portion of array EMIS (EMIS (1001, m, k) through EMIS (1100, j, k)). The user has no control over this printout.

GCAOUT then reads the optional Land Use file. If none is to be read, a return is made to the main program. The Land Use file is used to compute Zonal Emission Densities. If a SYMAP file is being written, then GCAOUT will compute Zonal Emission Densities for each of the four time periods. If no SYMAP file is requested, GCAOUT bases the number of time periods for which densities are to be calculated on whether there is a request for printout for all time periods or the 24-hour period only.

Densities are computed only for zones-and districts which are read from the Land Use file. They are computed in three units: grams or pounds per square mile, per square foot and per acre. The option of grams or pounds depends on the value of OUTFL0.

Zonal Emission Densities may then be printed for one, some or all of the pollutants and for the 24-hour or all the time periods. The last function of GCAOUT is to write individual records to the SYMAP file. Records are written only for the zones which are read in from the Land Use File.

APPENDIX  
FORTRAN SOURCE CODE

FORTRAN IV G1 RELEASE 2.0                          MAIN                          DATE = 78332                          12/17/45                          PAGE 0001

C                          DATA SET PTNYDT                  AT LEVEL 007 AS OF 11/28/78                          00000000  
C\*\*\*\*\*MAIN PGM TO TEST MODIFICATIONS TO MOBILE1                          00000010  
C                          00000020  
0001                          CALL GCAINP                          00000030  
0002                          CALL GCAOUT                          00000040  
0003                          STOP                                  00000050  
0004                          END                                  00000060

FORTRAN IV G1 RELEASE 2.0 BLK DATA DATE = 78332 12/17/45 PAGE 0001

```

0001      BLOCK DATA          000000070
C*****THIS BLOCK DATA TO BE USED WITH GCA MODIFICATIONS 000000080
C-----000000090
0002      COMMON /FLGCOM/ ALTFLG,ALHFLG,TRKFLG,IRDFLG,SP3FLG,NMHFLG,IDLFLG, 00000100
1 INFLAG,VMFLAG,UNFFLG,MYMRFG,IMFLG,ICEVFG,PRTFLG,IFORM 00000110
0003      INTEGER ALTFLG,ALHFLG,TRKFLG,SP3FLG,VMFLAG,UNFFLG,PRTFLG 00000120
0004      COMMON /REGCOM/ IREJN 00000130
0005      COMMON /GADTA/ EMIS(1100,5,4),COLDST(2,4),HOTST(2,4),TEMPTP(4) 00000140
0006      COMMON /GCALNK/ FUNCCD,JURIS,DIST,ZONE,NUDEA,NUDEB,FEDAID,LNKLEN, 00000150
1 LNKtyp,WAYCOD,AREATY,POLUNT,FILEID,PLANLK,ZONSPD,HALFWD,SRCCOD, 00000160
2 GRACCD,CAPAC,AVGSPD(4),VCR(4),TOTVOL(4),VOLVT1(4),VOLVT2(4), 00000170
3 VOLVT3(4),VOLVT4(4),VOLVT5(4),VOLVT6(4),BEGHR(4),LENTIM(4) 00000180
0007      INTEGER FUNCCD,DIST,ZONE,FEDAID,WAYCOD,AREATY,POLUNT,FILEID, 00000190
1 PLANLK,ZONSPD,HALFWD,SRCCOD,GRACCD,CAPAC,AVGSPD,VCR,TOTVOL, 00000200
2 VOLVT1,VOLVT2,VOLVT3,VOLVT4,VOLVT5,VOLVT6,BEGHR 00000210
0008      COMMON /GCAIO/ LINKFL,NCRDRD,NPRNTR 00000220
0009      COMMON /GCAWRK/ IEMISS(5,4),CALCEM(5,4),IUNITS(2),IDPOLL(5), 00000230
1 JHOUR(4),IDENS(3) 00000240
0010      DATA INFLAG,SP3FLG,VMFLAG,IFORM,PRTFLG,ICEVFG,IDLFLG, 00000250
1 UNFFLG /2*0,2*1,0,2*1,0/ 00000260
0011      DATA IREJN /1/ 00000270
0012      DATA CALCEM,EMIS /20*0.0,11000*0.0,11000*0.0/ 00000280
0013      DATA BEGHR(1),LENTIM(1) /2*0/ 00000290
0014      DATA IUNITS /2HLB,2HGM/ 00000300
0015      DATA IDENS /4HSQM,4HACRE,4HSQFT/ 00000310
0016      DATA LINKFL,NCRDRD,NPRNTR /4,5,6/ 00000320
0017      DATA JHOUR /24,12,3/ 00000330
0018      DATA IDPOLL /4HCO ,4HNOX ,4HHC ,4HPB ,4HPM / 00000340
C-----00000350
0019      END 00000360

```

FORTRAN IV G1 RELEASE 2.0

EFPMPB

DATE = 78332

12/17/45

PAGE 0001

0001 SUBROUTINE EFPMPB(EMF) 00005230  
0002 C----- 00005240  
0002 DIMENSION EMF(2) 00005250  
0002 C----- 00005260  
0003 C\*\*\*\*\*DUMMY ROUTINE TO COMPUTE PM AND PB EMISSION FACTORS 00005270  
0003 I\*1 00005280  
0004 RETURN 00005290  
0005 END 00005300

FORTRAN IV GI RELEASE 2.0 GCAINP DATE = 78338 15/21/79  
 0001 SUBROUTINE GCAINP 00000370  
 C\*\*\*\*\*  
 C D. CARACCIOLI JR. 00000380  
 C GCA TECHNOLOGY DIVISION 00000390  
 C BURLINGTON RD. 00000400  
 C REDFORD MA. 01730 00000410  
 C 617-275-9000 00000420  
 C BURROUGHS 85700 \* IBM 370/158 00000430  
 C----- 00000440  
 C----- 00000450  
 C----- 00000460  
 0002 COMMON /SP1COM/ SP1,SPAV 00000470  
 0003 COMMON /IMCOM/ ICYIM,ISTRIN,IMTELG,MODYR1,MODYR2 00000480  
 0004 COMMON /MMCCM/ MYM,MYR,TF 00000490  
 0005 COMMON /JUNK1/ AC,XLOAD,TRAILR,AHSHUM 00000500  
 0006 COMMON /JUNK2/ HGWGT,HDWGT,HGCID,HDCID 00000510  
 0007 REAL XLOAD(3),MYM(20,6),MYR(20,6),TF(20,6) 00000520  
 0008 COMMON /FLGCOM/ ALTFLG,ALHFLG,TRKFLG,IRDFLG,SP3FLG,NMHFLG,IDLFLG, 00000530  
 ! INFLAG,VMFLAG,UNFFLG,MMYRFG,IMFLG,ICEVFG,PRTFLG,IFORM 00000540  
 0009 COMMON /LNKCOM/ SPD,TEMP,PCCO,PCHS,PCCC,MS 00000550  
 0010 COMMON /ALTCOM/ NYALT,ALTOD 00000560  
 0011 INTEGER ALHFLG,TRKFLG,ALTOD(4,20),CY,SP3FLG,UNFFLG,PRTFLG 00000570  
 0012 REAL EFRETM(3,6),WTEDEF(3),LNKDTA(7),SPD(3),MS(6),COMCCC(6) 00000580  
 0013 REAL IDLRTM(3,6),IDLWTD(3),CCRETM(6) 00000590  
 0014 COMMON /GCADTA/ EMIS(1100,5,4),COLDST(2,4),HCTST(2,4),TFMPTP(4) 00000600  
 0015 COMMON /GCAFGLG/ OUTFL0,OUTFL1,OUTFL2,OUTFL3,OUTFL4,OUTFL5,OUTFL6, 00000610  
 ! OUTFL7,OUTFL8,OUTFL9 00000620  
 0016 INTEGER OUTFL0,OUTFL1,OUTFL2,OUTFL3,OUTFL4,OUTFL5,OUTFL6,OUTFL7, 00000630  
 ! OUTFL8,OUTFL9 00000640  
 0017 COMMON /GCALNK/ FUNCCD,JURIS,DIST,ZONE,NODEA,NODEB,FEDAID,LNKLEN, 00000650  
 ! LNKTYP,WAYCOD,AREATY,POLUNT,FILEID,PLANLK,ZCNSPD,HALFWD,SRCUD, 00000660  
 2 GRADCD,CAPAC,AVGSPD(4),VCR(4),TOTVOL(4),VOLVT1(4),VOLVT2(4), 00000670  
 3 VOLVT3(4),VOLVT4(4),VOLVT5(4),VOLVT6(4),BEGHR(4),LENTIM(4) 00000680  
 0018 INTEGER FUNCCD,DIST,ZONE,FEDAID,WAYCOD,AREATY,POLUNT,FILEID, 00000690  
 ! PLANLK,ZCNSPD,HALFWD,SRCUD,GRADCD,CAPAC,AVGSPD,VCR,TOTVOL, 00000700  
 2 VOLVT1,VOLVT2,VOLVT3,VOLVT4,VOLVT5,VOLVT6,BEGHR 00000710  
 COMMON /GCAIO/ LINKFL,NCRDRD,NPRNTR 00000720  
 COMMON /GCAWRK/ IEMISS(5,4),CALCEM(5,4),IUNITS(2),IDPOLL(5), 00000730  
 ! JHOUR(4),IDENS(3) 00000740  
 0021 LOGICAL LINKSW 00000750  
 C EXPLANATION OF EMX SUBSCRIPTS 00000760  
 C EMX(TIME PERIOD,LINK TYPE,SPEED,MODAL SPLIT,POLLUTANT) 00000770  
 0022 DIMENSION EMX(4,2,19,6,3) 00000780  
 0023 DATA NERR1,NERR2,NERR3 /3\*0/ 00000790  
 0024 DATA NRECEM /0/ 00000800  
 0025 DATA NPAGE,LINES /1,0/ 00000810  
 C----- 00000820  
 C VERSION 1.0 SEP 78 00000830  
 C VERSION 1.1 NOV 78 00000840

```

0001      SUBROUTINE GCAINP          00000370
C*****D. CARACCIOLU JR.          00000380
C      GCIA/TECHNOLOGY DIVISION   00000390
C      BURLINGTON RD.           00000400
C      BEDFORD MA. 01730         00000410
C      617-275-9000              00000420
C*****BURROUGHS 85700 * IBM 370/158 00000430
C*****                                         00000440
C-----                                         00000450
C-----                                         00000460
0002      COMMON /SPICOM/ SPI,SPAV 00000470
0003      COMMON /IMCOM/ ICYIM,ISTRIN,IMTFLG,MODYR1,MODYR2 00000480
0004      COMMON /HYMCOM/ HYM,MYR,TF 00000490
0005      COMMON /JUNK1/ AC,XLOAD,TRAILR,ABSHUM 00000500
0006      COMMON /JUNK2/ HOGAT,HOGIT,HGLID,HDCID 00000510
0007      REAL XLOAD(3),HYM(20,6),MYR(20,6),TF(20,6) 00000520
0008      COMMON /FLUCOM/ ALTFLG,ALHFLG,TRKFLG,IRDFLG,SP3FLG,NMFLLG,IDLFLG, 00000530
1 INFLAG,VMFLAG,UNFFLG,MYMRFG,IMFLG,ICEVFG,PRTFLG,IFORM 00000540
COMMON /LNKCOM/ SPD,TEMP,PCCO,PCMS,PCCC,MS 00000550
0010      COMMON /ALTCOM/ NMALT,ALTKOD 00000560
0011      INTEGER ALHFLG,TRKFLG,ALTKOD(4,20),CY,SP3FLG,UNFFLG,PRTFLG 00000570
0012      REAL EFRETM(3,6),TEDEF(3),LNADTA(7),SPD(3),MS(6),COMCCC(6) 00000580
0013      REAL IDLWTD(3),CCRETM(6) 00000590
0014      COMMON /GCADTA/ EM1S(1100,5,4),COLDST(2,4),HOTST(2,4),TEMPTP(4) 00000600
0015      COMMON /GCAFGL/ OUTFL0,OUTFL1,OUTFL2,OUTFL3,OUTFL4,OUTFL5,OUTFL6, 00000610
1 OUTFL7,OUTFL8,OUTFL9 00000620
0016      INTEGER OUTFL0,OUTFL1,OUTFL2,OUTFL3,OUTFL4,OUTFL5,OUTFL6,OUTFL7, 00000630
1 OUTFL8,OUTFL9 00000640
0017      COMMON /CALNKA/ FUNCCD,JURIS,DIST,ZONE,NODFA,NODEB,FEDAIID,LNKLEN, 00000650
1 LNKTYYP,KAYCDU,AREATY,POLUNT,FILEID,PLANLK,ZONSPD,HALFWD,SRCCOD, 00000660
2 GRADCO,CAPAC,AVGSPD(4),VCR(4),TOTVOL(4),VOLVT1(4),VOLVT2(4), 00000670
3 VOLVT3(4),VOLVT4(4),VOLVT5(4),VOLVT6(4),BEGHR(4),LENTIM(4) 00000680
0018      INTEGER FUNCCD,DIST,ZONE,FEDAIID,KAYCDU,AREATY,POLUNT,FILEID, 00000690
1 PLANLK,ZONSPD,HALFWD,SRCCOD,GRADCO,CAPAC,AVGSPD,VCR,TOTVOL, 00000700
2 VOLVT1,VOLVT2,VOLVT3,VOLVT4,VOLVT5,VOLVT6,BEGHR 00000710
COMMON /GCALI/ LINKFL,NCRDRO,NPRNTR 00000720
COMMON /GCANR/ IEMISS(5,4),CALCEM(5,4),IUMITS(2),IPOLL(5), 00000730
1 JHJUJK(4),IDENS(3) 00000740
LOGICAL LI,ASA 00000750
C      EXPLANATION OF EMX SUBSCRIPTS-
C      EMX(TIME PERIOD,LINK TYPE,SPEED,MODAL SPLIT,POLLUTA.T) 00000760
C      DIMENSION EMX(4,219,6,3) 00000770
0022      DATA NERR1,NERR2,NERR3 /3*0/ 00000780
0023      DATA NRECEM /0/ 00000790
0024      DATA IPAGE,LINES /1,0/ 00000800
0025      DATA IPAGE,LINES /1,0/ 00000810
C-----                                         00000820
C      VERSION 1.0      SEP 78 00000830
C      VERSION 1.1      NOV 78 00000840

```

FORTRAN IV G1 RELEASE 2.0      GCAINP      DATE = 79089      09/21/50      PAGE 0002

C  
C  
C\*\*\*\*\*READ INPUT FLAGS AND ECHO ON PRINTER  
0026    WRITE(NPRNTR,7900)    00000850  
0027    READ(NCRDRD,7000,END=999)MYMRFG,ALTFLG,IMFLAG,ALHFLG,TRKFLG,  
      1 NMHFLG,OUTFL0,OUTFL1,OUTFL2,OUTFL3,OUTFL4,OUTFL5,OUTFL6,OUTFL7,  
      2 OUTFL8,OUTFL9,MODE    00000860  
0028    WRITE(NPRNTR,7961)MYMRFG    00000870  
0029    WRITE(NPRNTR,7962)ALTFLG    00000880  
0030    WRITE(NPRNTR,7963)IMFLAG    00000890  
0031    WRITE(NPRNTR,7964)ALHFLG    00000900  
0032    WRITE(NPRNTR,7965)TRKFLG    00000910  
0033    WRITE(NPRNTR,7966)NMHFLG    00000920  
0034    IF(MYMRFG .GT. 3)NERR1=NERR1+1    00000930  
0035    IF(ALTFLG .GT. 1)NERR1=NERR1+1    00000940  
0036    IF(IMFLAG .GT. 1)NERR1=NERR1+1    00000950  
0037    IF(ALHFLG .GT. 1)NERR1=NERR1+1    00000960  
0038    IF(TRKFLG .GT. 1)NERR1=NERR1+1    00000970  
0039    IF(NMHFLG .GT. 1)NERR1=NERR1+1    00000980  
0040    IF(NERR1 .GT. 0)WRITE(NPRNTR,7901)NERR1                                  00000990  
C  
0041    WRITE(NPRNTR,7967)OUTFL0    00001000  
0042    IF(OUTFL0 .EQ. 0 .OR. OUTFL0 .EQ. 1)WRITE(NPRNTR,7500)IUVITS  
      1 (OUTFL0+1)    00001010  
0043    WRITE(NPRNTR,7968)OUTFL1    00001020  
0044    IF(OUTFL1 .EQ. 0)WRITE(NPRNTR,7510)    00001030  
0045    IF(OUTFL1 .GE. 1 .AND. OUTFL1 .LE. 5)WRITE(NPRNTR,7511)IDPULL  
      1 (OUTFL1)    00001040  
0046    IF(OUTFL1 .EQ. 6)WRITE(NPRNTR,7511)(IDPOLL(KP),KP=1,3)                  00001050  
0047    IF(OUTFL1 .EQ. 7)WRITE(NPRNTR,7511)(IDPOLL(KP),KP=1,5)                          00001060  
0048    WRITE(NPRNTR,7969)OUTFL2    00001070  
0049    IF(OUTFL2 .EQ. 0)WRITE(NPRNTR,7520)    00001080  
0050    IF(OUTFL2 .GT. 0)WRITE(NPRNTR,7521)OUTFL2    00001090  
0051    WRITE(NPRNTR,7970)OUTFL3    00001100  
0052    IF(OUTFL3 .EQ. 0)WRITE(NPRNTR,7530)    00001110  
0053    IF(OUTFL3 .EQ. 1)WRITE(NPRNTR,7531)    00001120  
0054    IF(OUTFL3 .EQ. 2)WRITE(NPRNTR,7532)    00001130  
0055    WRITE(NPRNTR,7971)OUTFL4    00001140  
0056    IF(OUTFL4 .EQ. 0)WRITE(NPRNTR,7540)    00001150  
0057    IF(OUTFL4 .EQ. 1)WRITE(NPRNTR,7541)    00001160  
0058    IF(OUTFL4 .EQ. 2)WRITE(NPRNTR,7542)    00001170  
0059    WRITE(NPRNTR,7972)OUTFL5    00001180  
0060    IF(OUTFL5 .EQ. 0)WRITE(NPRNTR,7550)    00001190  
0061    IF(OUTFL5 .GT. 0)WRITE(NPRNTR,7551)OUTFL5    00001200  
0062    WRITE(NPRNTR,7973)OUTFL6    00001210  
0063    IF(OUTFL6 .EQ. 0)WRITE(NPRNTR,7560)    00001220  
0064    IF(OUTFL6 .EQ. 1)WRITE(NPRNTR,7561)    00001230  
0065    IF(OUTFL6 .EQ. 2)WRITE(NPRNTR,7562)    00001240  
    00001250  
    00001260  
    00001270  
    00001280  
    00001290  
    00001300  
    00001310  
    00001320

```

0066      WRITE(NPRNTR,7974)OUTFL7          00001330
0067      IF(OUTFL7 .EQ. 0)WRITE(NPRNTR,7570) 00001340
0068      IF(OUTFL7 .GE. 1 .AND. OUTFL7 .LE. 5)WRITE(NPRNTR,7571)IDPOLL
1 (OUTFL7)                                     00001350
0069      IF(OUTFL7 .EQ. 6)WRITE(NPRNTR,7571)(IDPOLL(KP),KP=1,3) 00001360
0070      IF(OUTFL7 .EQ. 7)WRITE(NPRNTR,7571)(IDPOLL(KP),KP=1,5) 00001370
0071      WRITE(NPRNTR,7975)OUTFL8          00001380
0072      IF(OUTFL8 .EQ. 0)WRITE(NPRNTR,7580)IDENS(3)           00001390
0073      IF(OUTFL8 .GE. 1 .AND. OUTFL8 .LE. 3)WRITE(NPRNTR,7581)IDENS
1 (OUTFL8)                                     00001400
0074      WRITE(NPRNTR,7976)OUTFL9          00001410
0075      IF(OUTFL9 .EQ. 0)WRITE(NPRNTR,7590)           00001420
0076      IF(OUTFL9 .GT. 0)WRITE(NPRNTR,7591)OUTFL9
LINKSW=.FALSE.                                00001430
0077      IF(MODE .NE. 0)LINKSW=.TRUE.           00001440
0078      IF(LINKSW)WRITE(NPRNTR,7490)MODE          00001450
0079      IF(.NOT. LINKSW)WRITE(NPRNTR,7495)MODE          00001460
0080      IF(.NOT. LINKSW)WRITE(NPRNTR,7495)MODE          00001470
C
0081      IF(OUTFL0 .GT. 1)NERR2=NERR2+1          00001480
0082      IF(OUTFL1 .GT. 7)NERR2=NERR2+1          00001490
0083      IF(OUTFL3 .GT. 2)NERR2=NERR2+1          00001500
0084      IF(OUTFL4 .GT. 2)NERR2=NERR2+1          00001510
0085      IF(OUTFL6 .GT. 2)NERR2=NERR2+1          00001520
0086      IF(OUTFL7 .GT. 7)NERR2=NERR2+1          00001530
0087      IF(OUTFL8 .GT. 3)NERR2=NERR2+1          00001540
0088      IF(LINKFL .NE. OUTFL2 .AND. LINKFL .NE. OUTFL9)GO TO 50 00001550
0089      WRITE(NPRNTR,7910)                      00001560
0090      NERR2=NERR2+1                          00001570
0091      50 IF(OUTFL5 .EQ. 0)GO TO 55          00001580
0092      IF(OUTFL5 .NE. OUTFL2 .AND. OUTFL5 .NE. OUTFL9)GO TO 55
WRITE(NPRNTR,7915)                           00001590
0093      NERR2=NERR2+1                          00001600
0094      55 CONTINUE                            00001610
0095      IF(.NOT.NERR2 .GT. 0)WRITE(NPRNTR,7961)NERR2
C*****READ IN ONE-TIME DATA                 00001620
0097      IF(MYMRFG .EQ. 1 .OR. MYMRFG .EQ. 3)READ(NCRDRD,7010,END=990)MYM 00001630
0098      IF(MYMRFG .EQ. 2 .OR. MYMRFG .EQ. 3)READ(NCRURD,7010,END=990)MYR 00001640
C
0099      IF(IMFLAG .EQ. 1)READ(NCRDRD,7021,END=990)ICYIN,ISTRIN,IVTFLG,
1 XDYR1,MDYR2                                  00001650
C
0100      IF(ALHFLG .EQ. 1)READ(NCRDRD,7030,END=990)AC,XLOAD,TRAILR,ABSHUM 00001660
C
0101      IF(TRKFLG .EQ. 1)READ(NCRDRD,7040,END=990)HGWGT,HDMGT,HGCID,HDCID 00001670
C
0102      READ(NCRDRD,7052,END=995)CY             00001680
0103      WRITE(NPRNTR,7930)CY                   00001690
0104      IF(CY .GE. 70)GO TO 65                  00001700

```

FORTRAN IV G1 RELEASE 2.0

GCAINP

DATE # 79089

09/21/50

PAGE 0004

```

0105      WRITE(NPRNTR,7904)          00001810
0106      NERR3=NERR3+1           00001820
0107      65 CONTINUE
0108      C   FREEWAY = (1,Y)
0109      C   NON-FREEWAY = (2,Y)
0110      READ(NCRDRD,7050,END=995)(HOTST(1,K),K=1,4) 00001860
0111      WRITE(NPRNTR,7931)(HOTST(1,K),K=1,4)         00001870
0112      READ(NCRDRD,7050,END=995)(HOTST(2,K),K=1,4) 00001880
0113      WRITE(NPRNTR,7932)(HOTST(2,K),K=1,4)         00001890
0114      READ(NCRDRD,7050,END=995)(COLDST(1,K),K=1,4) 00001900
0115      WRITE(NPRNTR,7933)(COLDST(1,K),K=1,4)         00001910
0116      READ(NCRDRD,7050,END=995)(COLDST(2,K),K=1,4) 00001920
0117      WRITE(NPRNTR,7934)(COLDST(2,K),K=1,4)         00001930
0118      READ(NCRDRD,7050,END=995)TEMPTP            00001940
0119      WRITE(NPRNTR,7935)TEMPTP                  00001950
0120      DD 70 K=1,4                         00001960
0121      IF(TEMPTP(K) .GE. 0.0 .AND. TEMPTP(K) .LE. 110.0)GO TO 70 00001970
0122      NERR3=NERR3+1
0123      WRITE(NPRNTR,7905)JHOUR(K)                00001990
0124      70 CONTINUE
0125      C   IF(NERR1 .GT. 0 .OR. NERR2 .GT. 0 .OR. NERR3 .GT. 0)GO TO 9999 00002000
0126      C   00002010
0127      C   CALL TFCALX                      00002020
0128      C   CALL INITEX(NMYALT,ALTKOD)        00002030
0129      C   IF(IMFLAG .EQ. 1)CALL LDVIMX       00002040
0130      C   00002050
0131      C   IF(LINKS)GO TO 90                 00002060
0132      C   ****MODIFICATION TO ELIMINATE 4 CALLS/LINK TO EFCALX (PERFORMED 00002070
0133      C   IF MODE = 0 ON INPUT (LINKS = FALSE))
0134      C   DD 77 KT=1,4                     00002080
0135      C   DD 77 KF=1,2                     00002090
0136      C   DD 77 KS=1,14                     00002100
0137      C   AVSPDX=FLOAT(KS*3+2)           00002110
0138      C   LNKDTA(1)=AVSPDX               00002120
0139      C   LNKDTA(2)=AVSPDX               00002130
0140      C   LNKDTA(3)=AVSPDX               00002140
0141      C   LNKDTA(4)=TEMPTP(KT)          00002150
0142      C   LNKDTA(5)=COLDST(KF,KT)        00002160
0143      C   LNKDTA(6)=HOTST(KF,KT)         00002170
0144      C   LNKDTA(7)=COLDST(KF,KT)         00002180
0145      C   SPI=AVSPDX                   00002190
0146      C   CALL EFCALX(CY,LNKDTA,MS,EFRETH,ATEDEF,CCRETH,IDLRTM,IDLATO) 00002200
0147      C   DD 77 KMS=1,6                   00002210
0148      C   DD 77 KP=1,3                   00002220
0149      C   ENX(KT,KF,KS,KMS,KP)=EFRETH(KP,KNS) 00002230
0150      C   00002240
0151      C   00002250
0152      C   00002260
0153      C   00002270
0154      C   77 CONTINUE

```

```

0145      90 CONTINUE                               00002290
        C
        **** READ FACTURED LINK FILE (ALL ELEMENTS READ AS INTEGER) 00002300
0146          NLINKS=0                                00002310
0147          NBAD=0                                00002320
0148          500 READ(LINKFL,7100,END=2000)FUNCCD,JURIS,DIST,ZONE,NODEA,NODEB, 00002330
           1 FEDID,LNKLEN,LNKTYP,NAYCDD,AREATY,POLUNT,FILEID,PLANLK,ZONSPD, 00002340
           2 HALFWD,SRCCOD,GRACCD,CAPAC,AVGSPD(),VCR(),TOTVOL(),VOLVT1(), 00002350
           3 VOLVT2(),VOLVT3(),VOLVT4(),VOLVT5(),VOLVT6(),(BEGHR(K), 00002360
           4 LENTIM(K),AVGSPD(K),VCR(K),TOTVOL(K),VOLVT1(K),VOLVT2(K), 00002370
           5 VOLVT3(K),VOLVT4(K),VOLVT5(K),VOLVT6(K),K=2,4) 00002380
0149          NERRI=0                                00002390
0150          NLINKS=NLINKS+1                          00002400
        C
0151          IF(DIST .GE. 0)GO TO 550                00002410
0152          WRITE(NPRNTR,7980)NLINKS,NODEA,NODEB,DIST 00002420
0153          NERRI=1                                00002430
0154          550 IF(ZONE .GE. 0)GO TO 600                00002440
0155          WRITE(NPRNTR,7981)NLINKS,NODEA,NODEB,ZONE 00002450
0156          NERRI=1                                00002460
0157          600 IF(LNKTYP .NE. 0 .AND. LNKTYP .NE. 7)GO TO 650 00002470
0158          WRITE(NPRNTR,7982)NLINKS,NODEA,NODEB,LNKTYP 00002480
0159          NERRI=1                                00002490
0160          650 INDXFR=1                            00002500
0161          IF(NERRI .EQ. 0)GO TO 675                00002510
0162          NBAD=NBAD+1                           00002520
0163          GO TO 500                                00002530
        C     CHECK IF FREEWAY OR NON-FREEWAY LINK       00002540
0164          675 INDXFR=1                            00002550
0165          IF(LNKTYP .EQ. 1 .OR. LNKTYP .EQ. 2 .OR. LNKTYP .EQ. 8)INDXFR=2 00002560
0166          INDXZN=ZONE+    1                         00002570
0167          INDXDS=DIST+1001                         00002580
        C
        **** COMPUTE EMISSIONS FOR EACH TIME PERIOD 00002590
0168          70 1000 KTIME=1,4                         00002600
0169          IF(AVGSPD(KTIME) .GT. 0)GO TO 800        00002610
0170          WRITE(NPRNTR,7950)NLINKS,NODEA,NODEB,AVGSPD(KTIME),JHOUR(KTIME) 00002620
0171          DO 790 KP=1,5                            00002630
0172          CALCEM(KP,KTIME)=0.0                      00002640
0173          790 CONTINUE                            00002650
0174          GO TO 1000                            00002660
0175          800 IF(AVGSPD(KTIME) .GE. 5)GO TO 810        00002670
0176          WRITE(NPRNTR,7951)NLINKS,NODEA,NODEB,AVGSPD(KTIME),JHOUR(KTIME) 00002680
0177          AVGSPD(KTIME)=5                         00002690
0178          GO TO 890                            00002700
0179          810 IF(AVGSPD(KTIME) .LE. 0)GO TO 890        00002710
0180          WRITE(NPRNTR,7952)NLINKS,NODEA,NODEB,AVGSPD(KTIME),JHOUR(KTIME) 00002720
0181          AVGSPD(KTIME)=60                         00002730

```

FORTRAN IV G1 RELEASE 2.0

GCAINP

DATE # 79089

09/21/50

PAGE 0006

```

0182      890 CONTINUE                               00002770
          C   COMPILE APPROPRIATE INPUT DATA FOR EFCALX 00002780
0183      LNKDTA(1)=AVGSPD(KTIME)                  00002790
0184      LNKDTA(2)=AVGSPD(KTIME)                  00002800
0185      LNKDTA(3)=AVGSPD(KTIME)                  00002810
0186      LNKDTA(4)=TEMPTP(KTIME)                  00002820
0187      LNKDTA(5)=COLDST(INDXFR,KTIME)           00002830
0188      LNKDTA(6)=HOTST(INDXFR,KTIME)            00002840
0189      LNKDTA(7)=COLDST(INDXFR,KTIME)           00002850
          C
          C   COMPUTE VMT MIX (MODAL SPLIT) FOR TIME PERIOD 00002860
0190      IF(TOTVOL(KTIME) .GT. 0)GO TO 895         00002880
0191      WRITE(NPRNTR,7983)NLINKS,NUDEA,NUDEB,JHOUR(KTIME) 00002890
0192      DO 892 KP=1,5                            00002891
0193      CALCEM(KP,KTIME)=0.0                      00002892
0194      892 CONTINUE                           00002893
0195      GO TO 1000                           00002900
0196      895 CONTINUE                           00002910
0197      MS(1)=FLOAT(VOLVLT1(KTIME))/FLOAT(TOTVOL(KTIME)) 00002920
0198      MS(4)=FLOAT(VOLVLT2(KTIME))/FLOAT(TOTVOL(KTIME)) 00002930
0199      MS(5)=FLOAT(VOLVLT3(KTIME))/FLOAT(TOTVOL(KTIME)) 00002940
0200      MS(2)=FLOAT(VOLVLT4(KTIME))/FLOAT(TOTVOL(KTIME)) 00002950
0201      MS(3)=FLOAT(VOLVLT5(KTIME))/FLOAT(TOTVOL(KTIME)) 00002960
0202      MS(6)=FLOAT(VOLVLT6(KTIME))/FLOAT(TOTVOL(KTIME)) 00002970
          C
          *****DETERMINE MODE OF EXECUTION           00002980
0203      IF(LINKSA)GO TO 898                     00002990
          C
          C   JSE EMISSION FACTOR FOR NEAREST SPEED 00003000
          C   4,5,6 = 5    7,8,9 = 8    10,11,12 = 11   ETC. 00003010
0204      ISPD=(AVGSPD(KTIME)=1)/3                00003020
0205      DO 896 KPUL=1,3                         00003030
0206      ATEDEF(KPUL)=0.0                      00003040
0207      DO 896 KMS=1,6                         00003050
0208      ATEDEF(^PUL)=ATEDEF(KPUL)+VS(KMS)*EMX(KTIME,INDXFR,ISPD,KMS,KPUL) 00003060
0209      896 CONTINUE                           00003070
0210      GO TO 899                           00003080
          C
          898 CONTINUE                           00003090
          SP1=AVGSPD(KTIME)                      00003100
          C   COMPUTE EMISSION FACTORS FOR HC, CO, NOX 00003110
0213      CALL EFCALX(CY,LNKDTA,VS,EFRETM,ATEDEF,CCRETM,IDLRTM,IDLWTD) 00003120
          C   COMPUTE EMISSION FACTORS FOR PM & PB 00003130
          C   EMF(1) = PM   EMF(2) = PH             00003140
0214      899 CONTINUE                           00003150
          C*** CALL EFPMF4(EMF)                   00003160
          C
          RLENTH=FLOAT(LNKLEN)/100.0            00003170

```

FORTRAN IV G1 RELEASE 2.0

GCAINP

DATE # 79089

09/21/50

PAGE 0007

```

0216      VEHLNK*FLOAT(TOTVOL(KTIME))*RLENGTH          00003220
          C      -CO-
0217      CALCEN(1,KTIME)=VEHLNK*WTEDEF(2)           00003230
0218      IF(OUTFL0 .EQ. 0)CALCEN(1,KTIME)=CALCEN(1,KTIME)/453.59 00003240
          C      -NUX-
0219      CALCEN(2,KTIME)=VEHLNK*WTEDEF(3)           00003250
0220      IF(OUTFL0 .EQ. 0)CALCEN(2,KTIME)=CALCEN(2,KTIME)/453.59 00003260
          C      -HC-
0221      CALCEN(3,KTIME)=VEHLNK*WTEDEF(1)           00003270
0222      IF(OUTFL0 .EQ. 0)CALCEN(3,KTIME)=CALCEN(3,KTIME)/453.59 00003280
          C      -PM-
0223      **** CALCEN(4,KTIME)=VEHLNK*EMF(2)           00003290
0224      **** IF(OUTFL0 .EQ. 0)CALCEN(4,KTIME)=CALCEN(4,KTIME)/453.59 00003300
          C      -PN-
0225      **** CALCEN(5,KTIME)=VEHLNK*EMF(1)           00003310
0226      **** IF(OUTFL0 .EQ. 0)CALCEN(5,KTIME)=CALCEN(5,KTIME)/453.59 00003320
0227      CALCEN(5,KTIME)=0.0                           00003330
          C      ACCUMULATE EMISSIONS BY ZONE & DISTRICT 00003340
0228      DO 900 KPULL=1,5                            00003350
0229      IF(CALCEN(KPULL,KTIME) .EQ. 0.0)GO TO 900 00003360
0230      EMIS(INDXZN,KPULL,KTIME)=EMIS(INDXZN,KPULL,KTIME)+CALCEN(KPULL, 00003370
0231      1 KTIME)                                     00003380
0232      EMIS(INDXDS,KPULL,KTIME)=EMIS(INDXDS,KPULL,KTIME)+CALCEN(KPULL, 00003390
0233      1 KTIME)                                     00003400
0234      900 CONTINUE                                 00003410
0235      1000 CONTINUE                               00003420
          C
          C
0236      *****PRINT EMISSIONS FOR EACH LINK IF REQUESTED 00003430
0237      IF(OUTFL1 .EQ. 0)GO TO 1500                 00003440
0238      IF(LINES .EQ. 0)WRITE(NPRNTK,7800)IUNITS(OUTFLU+1),NPAGE, 00003450
0239      1 (BEGHR(K),LENTIM(K),KT=1,4)               00003460
0240      IF(OUTFL1 .LT. 6)LINES=LINES+3              00003470
0241      IF(OUTFL1 .EQ. 6)LINES=LINES+5              00003480
0242      IF(OUTFL1 .EQ. 7)LINES=LINES+7              00003490
0243      IF(LINES .LE. 50)GO TO 1500                 00003500
0244      LINES=LINES-50                             00003510
0245      NPAGE=NPAGE+1                            00003520
0246      WRITE(NPRNTK,7800)IUNITS(OUTFLU+1),NPAGE,(BEGHR(K),LENTIM(K), 00003530
0247      1 KT=1,4)                                     00003540
0248      1300 IF(OUTFL1 .LT. 6)                      00003550
0249      1 WRITE(NPRNTK,7810)DIST,NOSEA,NOEB,RLENGTH,LNKTYP,AREATY,FILEID, 00003560
0250      2 ZONSPC,HALFWD,GRAIN,O,CAPAC,             00003570
0251      3 (TOTVOL(KT),KT=1,4),(IDPDL(OUTFL1),CALCEN(OUTFL1,KT),KT=1,4) 00003580
0252      KPULL=5                                     00003590
0253      IF(OUTFL1 .EQ. 7)KPULL=5                  00003600
          C

```

FORTRAN IV 61 RELEASE 2.0 GCAINP DATE # 79089 09/21/50 PAGE 0008

0243            IF(OUTFL1 .GT. 5)  
1 WRITE(NPRNTR,7810)DIST,NUDEA,NUDEB,RLENTH,LNK1YP,AREATY,FILEID,  
2 ZONSPD,HALFWD,GRACD,CAPAC,  
3 ((TOTVOL(KT),KT=1,4),((IDPOLL(KP),CALCEM(KP,KT),KT=1,4),KP=1,KPOLL))  
4 )  
C  
C  
C\*\*\*\*\*WRITE RECORD TO EMISSIONS FILE IF REQUESTED  
0244            1500 IF(OUTFL2 .EQ. 0)GO TO 500  
0245            IVCR=VCR(1)\*10  
0246            IF(IVCR .LE. 9999)GO TO 1550  
0247            NR=NRECEM+1  
0248            WRITE(NPRNTR,7938)NR  
0249            IVCR=9999  
0250            1550 CONTINUE  
0251            DO 1600 J=1,4  
0252            DO 1600 I=1,5  
0253            IEMISS(I,J)=CALCEM(I,J)+0.5  
0254            1600 CONTINUE  
C  
0255            WRITE(OUTFL2,7600)FUNCCD,JURIS,DIST,NUDEA,NUDEB,FEDAID,LNKLEN,  
1 LNK1YP,NAYCOD,AREATY,POLUNT,FILEID,PLANLK,ZUNSPD,HALFWD,SHCCOD,  
2 GRACD,CAPAC,AVGSPD(1),IVCR,TOTVOL(1),OUTFL0,  
3 ((IEMISS(KP,KT),KT=1,4),KP=1,5)  
NRECEM=NRECEM+1  
0256            GO TO 500  
C  
0257            PRINT NUMBER OF LINKS PROCESSED  
2000 WRITE(NPRNTR,7700)NLINKS,NBAD  
0258            IF(OUTFL2 .GT. 0)WRITE(NPRNTR,7710)NRECEM  
0259            RETURN  
C  
C  
C\*\*\*\*\*FATAL ERRORS  
0260            990 WRITE(NPRNTR,7941)  
0261            GO TO 9999  
0262            995 WRITE(NPRNTR,7942)  
0263            GO TO 9999  
0264            999 WRITE(NPRNTR,7940)  
C\*\*\*\*\*END OF JOB  
0265            9999 WRITE(NPRNTR,7999)  
0266            STOP  
C  
C  
C  
0267            7000 FORMAT(17I1)  
0268            7010 FORMAT(2)F4.1)  
0269            7020 FORMAT(12,I1,I2,I1,I1,I1,I2,I1,I2)  
0270            7030 FORMAT(6F4.3)

FORTRAN IV G1 RELEASE 2.0

GCAINP

DATE # 79089

09/21/50

PAGE 0009

0272 7040 FORMAT(4FS,0) 00004180  
0273 7050 FORMAT(4F5.0) 00004190  
0274 7052 FORMAT(I2) 00004200  
0275 7100 FORMAT(2I1,12,13,I5,2I5,I1,I5,3I1,I4,A4,I4,11X,2I2,2I1,I6,I2,  
1 I4,I6,3I5,3I4,3(3I2,2I6,3I5,3I4)) 00004210  
0276 7490 FORMAT(10H MODE = ,I2,4X,79HEMISSIONS WILL BE COMPUTED FOR EACH 00004230  
1LINK USING EMISSION FACTORS FOR GIVEN SPEED) 00004240  
0277 7495 FORMAT(10H MODE = ,I2,4X,95HEMISSIONS WILL BE COMPUTED FOR EACH 00004250  
1LINK USING EMISSION FACTORS FOR NEAREST SPEED IN 3 MPH INC.) 00004260  
0278 7500 FORMAT(1H+,15X,28HEMISSIONS TO BE COMPUTED IN ,A2,1HS) 00004270  
0279 7510 FORMAT(1H+,15X,43HEMISSIONS WILL NOT BE PRINTED FOR EACH LINK) 00004280  
0280 7511 FORMAT(1H+,15X,44HEMISSIONS WILL BE PRINTED FOR EACH LINK FOR ,  
1 SA4) 00004290  
0281 7520 FORMAT(1H+,15X,34HEMISSIONS FILE WILL NOT BE WRITTEN) 00004310  
0282 7521 FORMAT(1H+,15X,39HEMISSIONS FILE WILL BE WRITTEN TO UNIT ,I2) 00004320  
0283 7530 FORMAT(1H+,15X,37HEMISSIONS WILL NOT BE PRINTED BY ZONE) 00004330  
0284 7531 FORMAT(1H+,15X,60HEMISSIONS WILL BE PRINTED BY ZONE FOR 24 HR TIME 00004340  
1 PERIOD ONLY) 00004350  
0285 7532 FORMAT(1H+,15X,54HEMISSIONS WILL BE PRINTED BY ZONE FOR ALL TIME P00004360  
1ERIODS) 00004370  
0286 7540 FORMAT(1H+,15X,41HEMISSIONS WILL NOT BE PRINTED BY DISTRICT) 00004380  
0287 7541 FORMAT(1H+,15X,64HEMISSIONS WILL BE PRINTED BY DISTRICT FOR 24 HR 00004390  
1TIME PERIOD ONLY) 00004400  
0288 7542 FORMAT(1H+,15X,58HEMISSIONS WILL BE PRINTED BY DISTRICT FOR ALL T100004410  
1ME PERIODS) 00004420  
0289 7550 FORMAT(1H+,15X,30HLAND USE FILE WILL NOT BE READ) 00004430  
0290 7551 FORMAT(1H+,15X,37HLAND USE FILE WILL BE READ FROM UNIT ,I2) 00004440  
0291 7560 FORMAT(1H+,15X,44HZONAL EMISSION DENSITIES WILL NOT BE PRINTED) 00004450  
0292 7561 FORMAT(1H+,15X,70-ZONAL EMISSION DENSITIES WILL BE PRINTED FOR 24 00004460  
1 HOUR TIME PERIOD ONLY) 00004470  
0293 7562 FORMAT(1H+,15X,61HZONAL EMISSION DENSITIES WILL BE PRINTED FOR ALL00004480  
1 TIME PERIODS) 00004490  
0294 7570 FORMAT(1H+,15X,82HIF ZONAL EMISSION DENSITIES ARE PRINTED, DEFAULT00004500  
1 OF ALL POLLUTANTS WILL BE ASSUMED) 00004510  
0295 7571 FORMAT(1H+,15X,45HZONAL EMISSION DENSITIES WILL BE PRINTED FOR ,  
1 SA4) 00004520  
0296 7580 FORMAT(1H+,15X,58HIF ZONAL EMISSION DENSITIES ARE PRINTED, DEFAULT00004540  
1 OF UNITS/,A4,16H WILL BE ASSUMED) 00004550  
0297 7581 FORMAT(1H+,15X,50HZONAL EMISSION DENSITIES WILL BE PRINTED IN UNIT00004560  
1S/,A4) 00004570  
0298 7590 FORMAT(1H+,15X,29HND SYMAP FILE WILL BE WRITTEN) 00004580  
0299 7591 FORMAT(1H+,15X,36HSYMAP FILE IS TO BE WRITTEN TO UNIT ,I2) 00004590  
0300 7600 FORMAT(2I1,12,2I5,I1,I3,3I1,I4,A4,I4,11X,2I2,2I1,I6,I2,I4,  
1 I6,I1,20I8,11X) 00004610  
0301 7700 FORMAT(40H1\*\*\*\*\*EOF ENCOUNTERED IN LINK FILE\*\*\*\* /  
1 34H0 NUMBER OF LINKS PROCESSED = ,I7/ 00004620  
2 34H0 NUMBER OF LINKS SKIPPED = ,I7) 00004630  
0302 7710 FORMAT(52H0 NUMBER OF RECORDS WRITTEN TO EMISSIONS FILE = ,I7)00004650

FORTRAN IV G1 RELEASE 2.0 GCAINP DATE E 79089 09/21/50 PAGE 0010

```

0303      7800 FORMAT(1H1,40X,34HFACTORED LINK DATA = EMISSIONS IN ,A2,1HS,34X, 00004660
           1 SHPAGE ,I4//21X,107HL A FILE ZN   G CAPAC. ***** 24 HOUR ***** 00004670
           2----- T.P. 1 ----- T.P. 2 ----- T.P. 3 -----/1X,00004680
           3 36H D ANODE BNODE LL T T ID SP HW C,7X,4( BH BEGINS ,I2, 7H L00004690
           LENGTH ,I2,2X)/45X,4(21H POLL EMISSIONS )/ ) 00004700
0304      7810 FORMAT(/1X,I2,2(1X,I5),1X,F4.2,2(1X,I1),1X,A4,2(1X,I2),1X,I1,1X,I600004710
           1,4(3X,9HVOLUME = ,16,3X) / (44X,4(1X,A4,F15.1,1X))) 00004720
0305      7900 FORMAT(1M1,30X,17HINPUT DATA VALUES //) 00004730
0306      7901 FORMAT(15H0*****ERROR IN ,I2,24H OF THE ABOVE FLAGS*****) 00004740
0307      7904 FORMAT(52H *****ERROR - CALENDAR YEAR RANGE IS 70 THRU 99*****) 00004750
0308      7905 FORMAT(54H *****ERROR - TEMP RANGE IS 0-110 DEG F = TIME PERIOD , 00004760
           1 I2, 6H *****) 00004770
0309      7910 FORMAT(83H *****ERROR - EMISSIONS FILE AND/OR SYMAP FILE HAVE SAME00004780
           1 UNIT NO. AS LINK FILE*****) 00004790
0310      7915 FORMAT(67H *****ERROR - EMISSIONS FILE AND/OR SYMAP FILE HAVE SAME00004800
           1 UNIT NO. AS LAND USE FILE*****) 00004810
0311      7930 FORMAT(17H CALENDAR YEAR = ,I2) 00004820
0312      7931 FORMAT(33H HUT START DATA ( FREEWAY ) = ,4F6.0) 00004830
0313      7932 FORMAT(33H HOT START DATA (NON-FREEWAY) = ,4F6.0) 00004840
0314      7933 FORMAT(33H COLD START DATA ( FREEWAY ) = ,4F6.0) 00004850
0315      7934 FORMAT(33H COLD START DATA (NON-FREEWAY) = ,4F6.0) 00004860
0316      7935 FORMAT(33H TEMPERATURES FOR TIME PERIODS = ,4F6.0) 00004870
0317      7936 FORMAT(38H0*****ERROR - EMISSIONS FILE REC. NU. ,I5,43H VEH CAP RA00004880
           1T1D TRUNCATED - SET TO 9999*****) 00004890
0318      7940 FORMAT(57H0*****UNEXPECTED EOF ENCOUNTERED READING INPUT FLAGS****00004900
           1*) 00004910
0319      7941 FORMAT(67H0*****UNEXPECTED EOF ENCOUNTERED READING MOBILE1 UNE-TIM00004920
           1E DATA*****) 00004930
0320      7942 FORMAT(74H0*****UNEXPECTED EOF ENCOUNTERED READING HUT/COLD START 00004940
           1UNE-TIME DATA*****) 00004950
0321      7950 FORMAT( 1H REC. NO.: ,I4, 8H ANODE: ,I5, 8H BNODE: ,I5,16H AVERAGE00004960
           1E SPEED: ,I2,26H IN ERROR FOR TIME PERIOD ,I2,21H EMISSIONS SET T000004970
           2 0.0) 00004980
0322      7951 FORMAT( 1H REC. NO.: ,I4, 8H ANODE: ,I5, 8H BNODE: ,I5,16H AVERAGE00004990
           1E SPEED: ,I2,29H LESS THAN 5 FOR TIME PERIOD ,I2,15H SPEED SET TO 00005000
           25) 00005010
0323      7952 FORMAT( 1H REC. NO.: ,I4, 8H ANODE: ,I5, 8H BNODE: ,I5,16H AVERAGE00005020
           1E SPEED: ,I2,33H GREATER THAN 60 FOR TIME PERIOD ,I2,16H SPEED SET00005030
           2 T 60) 00005040
0324      7961 FORMAT(10H YYYYFLG = ,I2) 00005050
0325      7962 FORMAT(10H ALTFLG = ,I2) 00005060
0326      7963 FORMAT(10H IMFLAG = ,I2) 00005070
0327      7964 FORMAT(10H ALHFLG = ,I2) 00005080
0328      7965 FORMAT(10H TRKFLG = ,I2) 00005090
0329      7966 FORMAT(10H GMHFLG = ,I2) 00005100
0330      7967 FORMAT(10H CUTFL1 = ,I2) 00005110
0331      7968 FORMAT(10H CUTFL1 = ,I2) 00005120
0332      7969 FORMAT(10H CUTFL2 = ,I2) 00005130

```

FORTRAN IV G1 RELEASE 2.0      GCAINP      DATE = 79089      09/21/50      PAGE 0011

47  
0333      7970 FORMAT(10H OUTFL3 = ,I2)      00005140  
0334      7971 FORMAT(10H OUTFL4 = ,I2)      00005150  
0335      7972 FORMAT(10H OUTFL5 = ,I2)      00005160  
0336      7973 FORMAT(10H OUTFL6 = ,I2)      00005170  
0337      7974 FORMAT(10H OUTFL7 = ,I2)      00005180  
0338      7975 FORMAT(10H OUTFL8 = ,I2)      00005190  
0339      7976 FORMAT(10H OUTFL9 = ,I2)      00005200  
0340      7980 FORMAT( 11H REC, NO.: ,I4, 8H ANODE: ,I5, 8H BNODE: ,I5, 7H DIST: 00005210  
              1,I2, 24H IN ERROR - LINK SKIPPED)      00005220  
0341      7981 FORMAT( 11H REC, NO.: ,I4, 8H ANODE: ,I5, 8H BNODE: ,I5, 7H ZONE: 00005230  
              1,I3, 24H IN ERROR - LINK SKIPPED)      00005240  
0342      7982 FORMAT( 11H REC, NO.: ,I4, 8H ANODE: ,I5, 8H BNODE: ,I5,12H LINK T00005250  
              1YPE: ,I1, 24H IN ERROR - LINK SKIPPED)      00005260  
0343      7983 FORMAT( 11H REC, NO.: ,I4, 8H ANODE: ,I5, 8H BNODE: ,I5,39H TOTAL 00005270  
              1VOLUME IN ERROR FOR TIME PERIOD ,I2)      00005280  
0344      7999 FORMAT(21H\*\*\*\*\*END OF JOB\*\*\*\*\*)  
              E.D      00005290  
0345                               00005300

FORTRAN IV G1 RELEASE 2.0

GCADUT

DATE = 78332

12/17/45

PAGE 0001

```

0001      SUBROUTINE GCADUT                               00005310
C*****                                                 00005320
C          D. CARACCINO JR.                           00005330
C          GCA/TECHNOLOGY DIVISION                   00005340
C          BURLINGTON RD.                            00005350
C          BEDFORD MA. 01730                          00005360
C          617-275-9000                             00005370
C*****                                                 00005380
C          BURROUGHS 85700 + IBM 370/15A              00005390
C-----                                         00005400
0002      COMMON /GCALNK/ FUNCCD,JURIS,DIST,ZONE,NUDEA,NODEB,FEDAID,LNKLEN, 00005410
1 LNKtyp,WAYCOD,AREATY,POLUNT,FILEID,PLANLK,ZONSPD,HALFWD,SRCCOD, 00005420
2 GRACCD,CAPAC,AVGSPD(4),VCR(4),TCTVOL(4),VOLVT1(4),VOLVT2(4), 00005430
3 VOLVT3(4),VOLVT4(4),VOLVT5(4),VOLVT6(4),BEGHRC(4),LENTIM(4) 00005440
0003      INTEGER FUNCCD,DIST,ZONE,FEDAID,WAYCOD,AREATY,POLUNT,FILEID, 00005450
1 PLANLK,ZONSPD,HALFWD,SRCCOD,GRACCD,CAPAC,AVGSPD,VCR,TOTVOL, 00005460
2 VOLVT1,VOLVT2,VOLVT3,VOLVT4,VOLVT5,VOLVT6,BEGHRC 00005470
COMMON /GCADTA/ EMIS(1100,5,4),COLST(2,4),HOTST(2,4),TEMPTP(4) 00005480
COMMON /GCAWRK/ IEMISS(5,4),CALCEM(5,4),IUNITS(2),IDPOLL(5), 00005490
1 JHOUR(4),IDENS(3)                                     00005500
0006      COMMON /GCAFGLG/ OUTFL0,OUTFL1,OUTFL2,OUTFL3,OUTFL4,OUTFL5,OUTFL6, 00005510
1 OUTFL7,OUTFL8,OUTFL9                                00005520
0007      INTEGER OUTFL0,OUTFL1,OUTFL2,OUTFL3,OUTFL4,OUTFL5,OUTFL6,OUTFL7, 00005530
1 OUTFL8,OUTFL9                                     00005540
0008      COMMON /GCCAO/ LINKFL,NCRORD,NPRNTR           00005550
0009      REAL NCRRES                                    00005560
0010      DIMENSION DENS(3,5,4),JTYPE(2)                00005570
0011      DIMENSION JGMS(20),JLBS(20)                  00005580
0012      DIMENSION SUM(5,4)                           00005590
0013      DATA SUM /20*0.0/                         00005600
0014      DATA JTYPE /4HZONE,4HDIST/                  00005610
C-----                                         00005620
C          VERSION 1.0      SEP 78                      00005630
C                                         00005640
C          CHECK FLAG7 & FLAG8 FOR ZERO VALUES. IF SO, DEFAULT TO 00005650
C          DEFINED VALUES.                           00005660
0015      IF(OUTFL7 .EQ. 0)OUTFL7=7                  00005670
0016      IF(OUTFL8 .EQ. 0)OUTFL8=3                  00005680
0017      NSYMAP#0                                     00005690
C                                         00005700
C*****PRINT EMISSIONS BY ZONE                      00005710
0018      IF(OUTFL3 .EQ. 0)GO TO 1050                00005720
0019      KTIME=1                                     00005730
0020      IF(OUTFL3 .EQ. 2)KTIME=4                  00005740
C                                         00005750
0021      DO 1000 KT#1,KTIME                         00005760
0022      LINES#0                                     00005770
0023      NPAGE#1                                    00005780

```

FORTRAN IV G1 RELEASE 2.0

GCADUT

DATE = 78332

12/17/45

PAGE 0002

0024            WRITE(NPRNTR,7500)JTYPE(1),NPAGE,JHOUR(KT),BEGHR(KT),LENTIM(KT),  
          1 IUNITS(OUTFL0+1),JTYPE(1),IDPOLL            00005790  
0025            DU 900 KZ=1,1000                        00005800  
0026            DO 800 KP=1,5                        00005810  
0027            IF(EMIS(KZ,KP,KT) .GT. 0.0)GO TO 850            00005820  
0028            800 CONTINUE                        00005830  
0029            GO TO 900                        00005840  
C    00005850  
0030            850 LINES=LINES+1                    00005860  
0031            JZONE=KZ-1                        00005870  
0032            IF(MOD(LINES,50) .NE. 0)GO TO 875            00005880  
0033            NPAGE=NPAGE+1                        00005890  
0034            WRITE(NPRNTR,7500)JTYPE(1),NPAGE,JHOUR(KT),BEGHR(KT),  
          1 IUNITS(OUTFL0+1),JTYPE(1),IDPOLL            00005900  
0035            875 WRITE(NPRNTR,7510)JZONE,(EMIS(KZ,KP,KT),KP=1,5)            00005910  
0036            900 CONTINUE                        00005920  
0037            1000 CONTINUE                        00005930  
C    00005940  
C    00005950  
C\*\*\*\*\*PRINT EMISSIONS BY DISTRICT                00005960  
0038            1050 IF(OUTFL4 .EQ. 0)GO TO 2010            00005970  
0039                                                   00005980  
0040                                                   00005990  
0041                                                   00006000  
0042                                                   00006010  
0043                                                   00006020  
0044                                                   00006030  
0045                                                   00006040  
0046                                                   00006050  
0047                                                   00006060  
0048                                                   00006070  
0049                                                   00006080  
C    00006090  
0050                                                   00006100  
0051                                                   00006110  
0052                                                   00006120  
0053                                                   00006130  
0054                                                   00006140  
0055                                                   00006150  
0056                                                   00006160  
0057                                                   00006170  
C    00006180  
0058                                                   00006190  
0059                                                   00006200  
0060                                                   00006210  
0061                                                   00006220  
C    00006230  
C    00006240  
C\*\*\*\*\*PRINT TOTAL EMISSIONS FOR EACH TIME PERIOD FOR EACH POLLUTANT            00006250  
C    00006260

FORTRAN IV G1 RELEASE 2.0 GCADUT DATE = 78332 12/17/45 PAGE 0003

0058 2010 NPAGE=1 00006270  
0059 DO 2025 KT=1,4 00006280  
0060 DO 2025 KP=1,5 00006290  
0061 DO 2025 KD=1001,1100 00006300  
0062 SUM(KP,KT)=SUM(KP,KT)+EMIS(KD,KP,KT) 00006310  
0063 2025 CONTINUE 00006320  
C 00006330  
0064 WRITE(NPRNTR,7900)IUNITS(OUTFLG+1),NPAGE,IPULL,JHOUR(1), 00006340  
1 (SUM(KP,1),KP=1,5), (JHOUR(KT),BEGHR(KT),LENTIM(KT),(SUM(KP,KT), 00006350  
2 KP=1,5),KT=2,4) 00006360  
C 00006370  
0065 IF(OUTFLS .NE. 0)GO TO 2050 00006380  
0066 WRITE(NPRNTR,7999) 00006390  
0067 RETURN 00006400  
C 00006410  
0068 2050 NLAND=0 00006420  
0069 LINES=0 00006430  
0070 NPAGE=1 00006440  
C 00006450  
0071 KPULL=5 00006460  
0072 IF(OUTFL7 .EQ. 6)KPULL=3 00006470  
C 00006480  
C BASE THE NUMBER OF TIME PERIODS FOR WHICH DENSITIES ARE 00006490  
C TO BE COMPUTED ON REQUEST FOR SYMAP FILE 00006500  
0073 KTIME=4 00006510  
0074 IF(OUTFL9 .GT. 0)GO TO 2060 00006520  
C 00006530  
C NO SYMAP FILE REQUESTED. BASE # OF TIME PERIODS ON OUTFL6 00006540  
0075 IF((OUTFL6 .EQ. 0)GO TO 9999 00006550  
0076 IF(OUTFL6 .EQ. 1)KTIME=1 00006560  
C\*\*\*\*\*READ LAND USE FILE 00006570  
C 00006580  
C 00006590  
0077 2060 READ(OUTFL5,7000,END=5000)DIST,ZONE,VACANT,RESDEN,NONRES,ALTPAS 00006600  
0078 NLAND=NLAND+1 00006610  
0079 KZ=ZONE+1 00006620  
0080 AREA=VACANT + RESDEN + NONRES + ALTPAS 00006630  
C 00006640  
C DENS(1,Y,Z) - DENSITY IN UNITS/SQ MI 00006650  
C DENS(2,Y,Z) - DENSITY IN UNITS/ACRE 00006660  
C DENS(3,Y,Z) - DENSITY IN UNITS/SQ FT 00006670  
0081 DO 3000 KT=1,KTIME 00006680  
0082 DO 3000 KP=1,5 00006690  
0083 DENS(1,KP,KT)=-1.0 00006700  
0084 DENS(2,KP,KT)=-1.0 00006710  
0085 DENS(3,KP,KT)=-1.0 00006720  
0086 IF(AREA .EQ. 0.0)GO TO 3000 00006730  
0087 DENS(3,KP,KT)=EMIS(KZ,KP,KT)\*1000.0/AREA 00006740

FORTRAN IV G1 RELEASE 2.0 GEAGUT DATE # 78332 12/17/45 PAGE 0004

0088           DENS(2,KP,KT)\*DENS(3,KP,KT)/43560.0           00006750  
0089           DENS(1,KP,KT)\*DENS(2,KP,KT)/640.0           00006760  
0090        3000 CONTINUE    00006770  
C    00006780  
C    00006790  
0091        IF(OUTFL6.EQ.0) GO TO 4000                    00006791  
0092        IF(OUTFL7.GT. 5)GO TO 3050                    00006800  
C    00006810  
C\*\*\*\*\*ONE POLLUTANT TO BE PRINTED                        00006820  
C    00006830  
0093        IF(LINES .EQ. 0)WRITE(NPRNTR,7700)IUNITS(OUTFL8+1),IDENS(OUTFL8),  
1 NPAGE,IPOLL(OUTFL7)                                      00006840  
0094        IF(OUTFL6 .EQ. 1)LINES=LINES+2                00006850  
0095        IF(OUTFL6 .EQ. 2)LINES=LINES+5                00006860  
0096        IF(MOD(LINES,50) .NE. 0)GO TO 3020            00006870  
0097        NPAGE=NPAGE+1                                    00006880  
0098        WRITE(NPRNTR,7700)IUNITS(OUTFL8+1),IDENS(OUTFL8),NPAGE,  
1 IPOLL(OUTFL7)    00006890  
C    00006910  
0099        3020 IF(OUTFL6 .EQ. 1)WRITE(NPRNTR,7710)ZONE,JHOUR(1),  
1 DENS(OUTFL8,OUTFL7,1)                                    00006920  
0100        IF(OUTFL6 .EQ. 2)WRITE(NPRNTR,7720)ZONE,JHOUR(1),  
1 DENS(OUTFL8,OUTFL7,1),(JHOUR(KT),BEGHR(KT),LENTIM(KT),  
2 DENS(OUTFL8,OUTFL7,KT),KT=2,4)                        00006930  
0101        GO TO 4000                                        00006940  
C    00006950  
C\*\*\*\*\*MULTIPLE POLLUTANTS TO BE PRINTED                00006960  
C    00006970  
0102        3050 IF(LINES .EQ. 0)WRITE(NPRNTR,7700)IUNITS(OUTFL8+1),IDENS(OUTFL8),  
1 NPAGE,(IPOLL(KP),KP=1,KPOLL)                        00006980  
0103        IF(OUTFL6 .EQ. 1)LINES=LINES+2                00006990  
0104        IF(OUTFL6 .EQ. 2)LINES=LINES+5                00007000  
0105        IF(MOD(LINES,50) .NE. 0)GO TO 3070            00007010  
0106        NPAGE=NPAGE+1                                    00007020  
0107        WRITE(NPRNTR,7700)IUNITS(OUTFL8+1),IDENS(OUTFL8),NPAGE,(IPOLL(KP)  
1 ,KP=1,KPOLL)    00007030  
C    00007040  
0108        3070 WRITE(NPRNTR,7710)ZONE,JHOUR(1),(DENS(OUTFL8,KP,1),KP=1,KPOLL)    00007050  
0109        IF(OUTFL6 .NE. 2)GO TO 4000                    00007060  
0110        DO 3090 KT=2,4                                    00007070  
0111        WRITE(NPRNTR,7770)JHOUR(KT),BEGHR(KT),LENTIM(KT),  
1 (DENS(OUTFL8,KP,KT),KP=1,KPOLL)                        00007080  
0112        3090 CONTINUE                                      00007090  
C    00007100  
C    00007110  
C\*\*\*\*\*WRITE SYMAP FILE                                        00007120  
0113        4000 IF(OUTFL9 .EQ. 0) GO TO 2060            00007130  
0114        I#1    00007140  
  00007150  
  00007160  
  00007170  
  00007180  
  00007190  
  00007200  
  00007210

FORTRAN IV G1 RELEASE 2.0 GCAOUT DATE = 78332 12/17/45 PAGE 0005  
 0115 IF(OUTFL0 .EQ. 1)GO TO 4100 00007220  
 C  
 C EMISSIONS ARE CURRENTLY IN LBS 00007230  
 0116 DO 4050 KT=1,4 00007240  
 C -NOX- 00007250  
 0117 JLBS(I)=EMIS(KZ,2,KT)\*10.0 +0.5 00007260  
 0118 JGMS(I)=EMIS(KZ,2,KT)\*4535.9 +0.5 00007270  
 0119 I=I+1 00007280  
 C -HC- 00007290  
 0120 JLBS(I)=EMIS(KZ,3,KT)\*10.0 +0.5 00007300  
 0121 JGMS(I)=EMIS(KZ,3,KT)\*4535.9 +0.5 00007310  
 0122 I=I+1 00007320  
 C -CO- 00007330  
 0123 JLBS(I)=EMIS(KZ,1,KT)\*10.0 +0.5 00007340  
 0124 JGMS(I)=EMIS(KZ,1,KT)\*4535.9 +0.5 00007350  
 0125 I=I+1 00007360  
 C -PM- 00007370  
 0126 JLBS(I)=EMIS(KZ,5,KT)\*10.0 +0.5 00007380  
 0127 JGMS(I)=EMIS(KZ,5,KT)\*4535.9 +0.5 00007390  
 0128 I=I+1 00007400  
 C -PB- 00007410  
 0129 JLBS(I)=EMIS(KZ,4,KT)\*10.0 +0.5 00007420  
 0130 JGMS(I)=EMIS(KZ,4,KT)\*4535.9 +0.5 00007430  
 0131 I=I+1 00007440  
 0132 4050 CONTINUE 00007450  
 0133 GO TO 4200 00007460  
 C  
 C EMISSIONS ARE IN GMS 00007470  
 0134 4100 DO 4150 KT=1,4 00007480  
 C -NOX- 00007490  
 0135 JGMS(I)=EMIS(KZ,2,KT)\*10.0 +0.5 00007500  
 0136 JLBS(I)=EMIS(KZ,2,KT)\*10.0/453.59 +0.5 00007510  
 0137 I=I+1 00007520  
 C -HC- 00007530  
 0138 JGMS(I)=EMIS(KZ,3,KT)\*10.0 +0.5 00007540  
 0139 JLBS(I)=EMIS(KZ,3,KT)\*10.0/453.59 +0.5 00007550  
 0140 I=I+1 00007560  
 C -CO- 00007570  
 0141 JGMS(I)=EMIS(KZ,1,KT)\*10.0 +0.5 00007580  
 0142 JLBS(I)=EMIS(KZ,1,KT)\*10.0/453.59 +0.5 00007590  
 0143 I=I+1 00007600  
 C -PM- 00007610  
 0144 JGMS(I)=EMIS(KZ,5,KT)\*10.0 +0.5 00007620  
 0145 JLBS(I)=EMIS(KZ,5,KT)\*10.0/453.59 +0.5 00007630  
 0146 I=I+1 00007640  
 C -PB- 00007650  
 0147 JGMS(I)=EMIS(KZ,4,KT)\*10.0 +0.5 00007660  
 0148 JLBS(I)=EMIS(KZ,4,KT)\*10.0/453.59 +0.5 00007670  
 00007680  
 00007690

FORTRAN I, CI RELEASE 2.0      LFORMAT      DATE = 7H332      12/17/45      PAGE 2006  
 0149      I=1+1      00007700  
 0150      4150 CONTINUE      00007710  
 C      00007720  
 0151      4200 DO 4250 KT\*1,4      00007730  
 C      00007740  
 0152      IEMISS(1,KT)=DENS(1,2,KT)\*10.0 + 0.5      00007750  
 C      -HC-      00007760  
 0153      IEMISS(2,KT)=DENS(1,3,KT)\*10.0 + 0.5      00007770  
 C      -CO-      00007780  
 0154      IEMISS(3,KT)=DENS(1,1,KT)\*10.0 + 0.5      00007790  
 C      -PM-      00007800  
 0155      IEMISS(4,KT)=DENS(1,5,KT)\*10.0 + 0.5      00007810  
 C      -PB-      00007820  
 0156      IEMISS(5,KT)=DENS(1,4,KT)\*10.0 + 0.5      00007830  
 0157      4250 CONTINUE      00007840  
 0158      4300 WRITE(OUTFL9,7800)ZONE,JGMS,JLBS,((IEMISS(KP,KT),KP=1,5),KT=1,4)      00007850  
 0159      NSYMAP=NSYMAP+1      00007860  
 0160      GO TO 2050      00007870  
 C      00007880  
 C      00007890  
 0161      5000 WRITE(NPRNTR,7600)NLAND      00007900  
 0162      IF(OUTFL9 .GT. 0)WRITE(NPRNTR,7650)NSYMAP      00007910  
 0163      9999 RETURN      00007920  
 C      00007930  
 C      00007940  
 C      00007950  
 C      00007960  
 0164      7000 FORMAT(I2,I3,4F8.6)      00007970  
 0165      7500 FORMAT(1H1,40X,24HSUMMARY OF EMISSIONS BY ,A4,50X,5HPAGE ,I4//  
           1           30X,14HTIME PERIOD = ,12,4X,17HBEGINNING HOUR = ,I2,  
           2           4X,15HLENGTH (HRS) = ,12 / 45X,13HEMISSIONS IN ,A2,1HS //  
           3           1X,A4,1X,5(6X,A4,10X)/)      00007980  
 0166      7510 FORMAT(1X,13.2X,5(5X,1PE15.9))      00007990  
 0167      7600 FORMAT(43H1\*\*\*\*\*EOF ENCOUNTERED ON LAND USE FILE\*\*\*\*\*/  
           1           31H0           NUMBER OF RECORDS READ = ,17)      00008000  
 0168      7650 FORMAT(48H0           NUMBER OF RECORDS WRITTEN TO SYMAP FILE = ,I7)      00008010  
 0169      7700 FORMAT(1H1,40X,38HZONAL EMISSION DENSITY = EMISSIONS IN ,A2,  
           1           2HS/,A4,22X,5HPAGE ,I4//  
           2           21H ZONE --TIME PERIOD--,7X,4(A4,16X),A4)      00008020  
 0170      7710 FORMAT(/2X,12,6X,I2, 5H HOUR,4X,5(5X,1PE15.9))      00008030  
 0171      7720 FORMAT(/2X,12,6X,I2, 5H HOUR,4X, 5X,1PE15.9 /  
           1(/5X,1H#,I1,5H BEG ,12,5H LEN ,I2,5X,1PE15.9))      00008040  
 0172      7770 FORMAT(5X,1H#,I1,5H BEG ,I2,5H LEN ,I2,5(5X,1PE15.9))      00008050  
 0173      7800 FORMAT(18,60I11,2X)      00008060  
 0174      7900 FORMAT(1H1,50X,19HTOTAL EMISSIONS IN ,A2,1HS,38X,5HPAGE ,I4//  
           1           6X,11HTIME PERIOD,2X,5(7X,A4,9X)//  
           2           8X,I2,5H HOUR,4X,5(5X,1PE15.9)//  
           3(3X,1H#,I1,5H BEG ,I2,5H LEN ,I2,5(5X,1PE15.9)//))      00008070

FORTRAN IV G1 RELEASE 2.0

GCAOUT

DATE # 78332

12/17/45

PAGE 0007

0175  
0176

7999 FORMAT(22H0\*\*\*\*\*END OF LIST\*\*\*\*\*)  
END

00008180  
00008190

**TECHNICAL REPORT DATA**  
*(Please read Instructions on the reverse before completing)*

1. REPORT NO. 902/4-79-002	2.	3. RECIPIENT'S ACCESSION NO.	
4. TITLE AND SUBTITLE  USER'S GUIDE TO THE NYSDOT AIR QUALITY SYSTEM		5. REPORT DATE April 1979	
		6. PERFORMING ORGANIZATION CODE	
7. AUTHOR(S) F. Benesh Dominic Caracciolo, Jr.		8. PERFORMING ORGANIZATION REPORT NO. GCA-TR-78-67-G	
9. PERFORMING ORGANIZATION NAME AND ADDRESS GCA/Technology Division Burlington Road Bedford, Massachusetts 01730		10. PROGRAM ELEMENT NO.	
		11. CONTRACT/GRANT NO.	
12. SPONSORING AGENCY NAME AND ADDRESS U.S. ENVIRONMENTAL PROTECTION AGENCY Region II 26 Federal Plaza New York, New York 10007		13. TYPE OF REPORT AND PERIOD COVERED	
		14. SPONSORING AGENCY CODE	
15. SUPPLEMENTARY NOTES			
16. ABSTRACT  This manual documents the modifications to the New York State Department of Transportation Air Quality System made by GCA/Technology Division. These modifications principally involved the inclusion of the most recent motor vehicle emission factors, as represented by the MOBILE1 program.			
17. KEY WORDS AND DOCUMENT ANALYSIS			
a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Mobile Source Emissions MOBILE1			
18. DISTRIBUTION STATEMENT UNLIMITED		19. SECURITY CLASS ( <i>This Report</i> ) UNCLASSIFIED	21. NO. OF PAGES 61
		20. SECURITY CLASS ( <i>This page</i> ) UNCLASSIFIED	22. PRICE