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16. Abstract <p>The original TEXIN model, which was previously developed to predict carbon monoxide concentrations near simple intersections, had several restrictions which inhibited its use in many realistic cases. The model was expanded to include modeling capabilities of four-way stop intersections. The CMA Operations and Design Procedure traffic algorithm was added to allow for more accurate representation of T-intersections. The addition of the EPA emissions model, MOBILE3, enables the user to more accurately estimate source strength. The new calculational methodologies and algorithms present in MOBILE3, including vehicle anti-tampering and inspection/maintenance programs, greatly enhance the capabilities of the model. The TEXIN2 model employs a short-cut emissions algorithm for users who do not wish to use MOBILE3.</p> <p>This report is intended to assist the analyst in the execution of the TEXIN2 model. A brief description of the model is first given. Next, the input data required by the model are presented. Finally, several illustrative examples are presented. These examples should be able to answer most questions concerning the use of the program. The user that requires additional information on <del>the</del> TEXIN2 model should consult TTI Research Report 283-3F.</p>			
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**User's Guide to the TEXIN2 Model  
A Model for Predicting Carbon Monoxide  
Concentrations Near Intersections**

by

**J. A. Bullin  
J. J. Korpics  
M. W. Hlavinka**

**Texas Transportation Institute  
Texas A&M University System  
College Station, Texas 77843**

Sponsored by

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**Vehicle Emissions from Roadways**

**August 8, 1986**

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## METRIC CONVERSION FACTORS

### Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km

### LENGTH

Symbol	When You Know	Multiply by	To Find	Symbol
in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.8	square meters	m <sup>2</sup>
mi <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>
	acres	0.4	hectares	ha

### AREA

### MASS (weight)

Symbol	When You Know	Multiply by	To Find	Symbol
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t

### VOLUME

Symbol	When You Know	Multiply by	To Find	Symbol
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.76	cubic meters	m <sup>3</sup>

### TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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### Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi

### LENGTH

Symbol	When You Know	Multiply by	To Find	Symbol
cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	square kilometers	0.4	square miles	mi <sup>2</sup>
ha	hectares (10,000 m <sup>2</sup> )	2.5	acres	

### AREA

### MASS (weight)

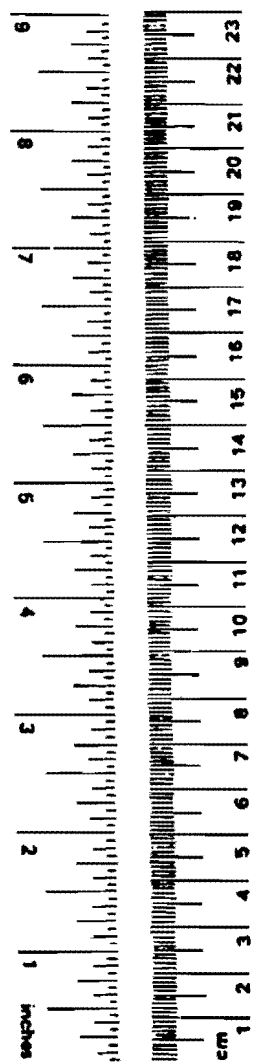
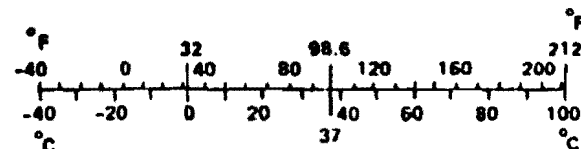
Symbol	When You Know	Multiply by	To Find	Symbol
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	

### VOLUME

Symbol	When You Know	Multiply by	To Find	Symbol
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>

### TEMPERATURE (exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F
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\* 1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13.10:286.

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## **Implementation**

The original Texas Intersection Model has been revised in order to generalize its capabilities. The new model, TEXIN2, is capable of modeling carbon monoxide concentrations near virtually any intersection of interest to transportation engineers except street canyon scenarios. The model is available at a modest cost from the Texas Transportation Institute by contacting Dr. Jerry A. Bullin at (409) 845-3361.

## **Disclaimer**

The contents of this report reflect the view of the authors who are responsible for the facts and the data presented herein. The contents do not necessarily reflect the official view or policies of the Federal Highway Administration, nor does this report constitute a standard, specification, or regulation.

## **Acknowledgements**

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## Summary

The original TEXIN model, which was previously developed to predict carbon monoxide concentrations near simple intersections, had several restrictions which inhibited its use in many realistic cases. The model was expanded to include modeling capabilities of four-way stop intersections. The CMA Operations and Design Procedure traffic algorithm was added to allow for more accurate representation of T-intersections. The addition of the EPA emissions model, MOBILE3, enables the user to more accurately estimate source strength. The new calculational methodologies and algorithms present in MOBILE3, including vehicle anti-tampering and inspection/maintenance programs, greatly enhance the capabilities of the model. The TEXIN2 model employs a short-cut emissions algorithm for users who do not wish to use MOBILE3.

This report is intended to assist the analyst in the execution of the TEXIN2 model. A brief description of the model is first given. Next, the input data required by the model are presented. Finally, several illustrative examples are presented. These examples should be able to answer most questions concerning the use of the program. The user that requires additional information on the TEXIN2 model should consult TTI Research Report No. 283-3F.

The TEXIN2 model is available for public distribution at a modest cost. The model may be obtained from the following address:

Dr. Jerry A. Bullin  
Texas Transportation Institute  
Department of Chemical Engineering  
Zachry Engineering Center  
Texas A&M University  
College Station, Texas 77843  
(409) 845-3361

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## Chapter 1

### Introduction

The prediction of carbon monoxide concentrations near roadway intersections represents a serious and challenging problem in air pollution research. In many geographical regions, the major portion of carbon monoxide in the environment is attributable to vehicular emissions. Moreover, busy intersections create local *hot spots*, or areas of high carbon monoxide concentrations.

Considering the higher pollution levels at roadway intersections, there exists a great need for accurate, efficient, predictive models of carbon monoxide levels in these scenarios. However most investigative work has been directed towards modeling pollutants emitted along straight roadways, where the traffic is well-defined and flows uniformly at constant speeds. This scenario is extremely inappropriate for intersections. A simple conversion from straight line predictions to roadway intersections cannot be implemented due to the marked differences in traffic behavior. Some vehicles are able to cruise through intersections at relatively constant speeds, as in the case of a green traffic signal with no traffic impedence. However, many others must accelerate, decelerate, and/or idle while at a complete stop. Such behavior produces much higher emissions which are released at unsteady rates. These rates depend, in part, on the rate of acceleration or deceleration, as well as the duration of these transient phases.

Other factors which complicate predictive models deal with the effects of intersection geometry on traffic flow. If the intersection is signalized, the traffic signal may be fully actuated, semi-actuated, or unactuated, each requiring separate consideration. Exclusive left-hand turn lanes, one-way streets, and minor side streets affect the turning patterns and channelization of traffic, making it much more difficult to predict the resulting pollutant levels. These and other factors apply to even the simplest intersection scenarios.

The TEXIN2 Model is a tool intended to provide an improved perspective in the evaluation of pollution impacts from intersections considering temporal and spacial variations of traffic, emissions, meteorology, the nature of receptors, and their relation to local intersection air quality.

This User's Guide briefly describes the TEXIN2 Model and its use. The input procedures are outlined in detail, the possible outputs are discussed, and several illustrative examples are presented.

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## Chapter 2

### Model Description

The TEXIN2<sup>1</sup> Model is a revised version of the FORTRAN computer program, TEXIN<sup>2</sup>, which emphasizes convenient user application and minimal computer time, yet proves to be more accurate than most intersection models. The program follows a general three-step process:

- (1) Estimation of traffic parameters.
- (2) Estimation and distribution of vehicle emissions.
- (3) Modeling downwind dispersion of pollutants.

As shown in the general flow diagram in Figure 1, the TEXIN2 model requires a minimal set of four types of geometrical, meteorological, and traffic related inputs.

The TEXIN2 model is versatile enough to handle most intersection geometries which would be encountered by traffic engineers. The range of application for the model spans the case of a simple at-grade intersection with four right angle corners to the case of a major intersection with curved legs and several nearby side streets. Signalized and unsignalized intersections can be modeled, as well as four-way stop intersections. One-way streets and T-intersections, where one leg of the intersection is *missing*, are also easily modeled. The fact that TEXIN2 is not applicable to *street canyon* scenarios should be noted.

The first function performed by the program is that of a traffic flow analysis. Initially, the traffic flow on the major intersection is evaluated, and subsequently any minor intersections are handled.

Traffic parameters are calculated using either the modified Planning or Operations and Design procedures of the Critical Movement Analysis (CMA)<sup>3</sup> for signalized intersections. A corresponding procedure is used to develop the traffic parameters of unsignalized intersections. These traffic parameters, including the intersection Level of Service and the stopped delay associated with this Level of Service, are then used to calculate several other traffic parameters of interest such as approach delay, time in queue, percent of vehicles stopping, and queue lengths.

Basically, the difference between the two traffic algorithms concern the different adjustment factors present in the CMA Operations and Design algorithm. These adjustment factors tend to decrease the capacity of a given intersection. Therefore, the Operations and Design technique will occasionally calculate that an intersection is over capacity while the Planning procedure indicates that the intersection is below full capacity.

Research has provided adjustment factors for a number of elements that affect traffic flow and hence modify critical volumes. These elements are:

- (1) Left turns

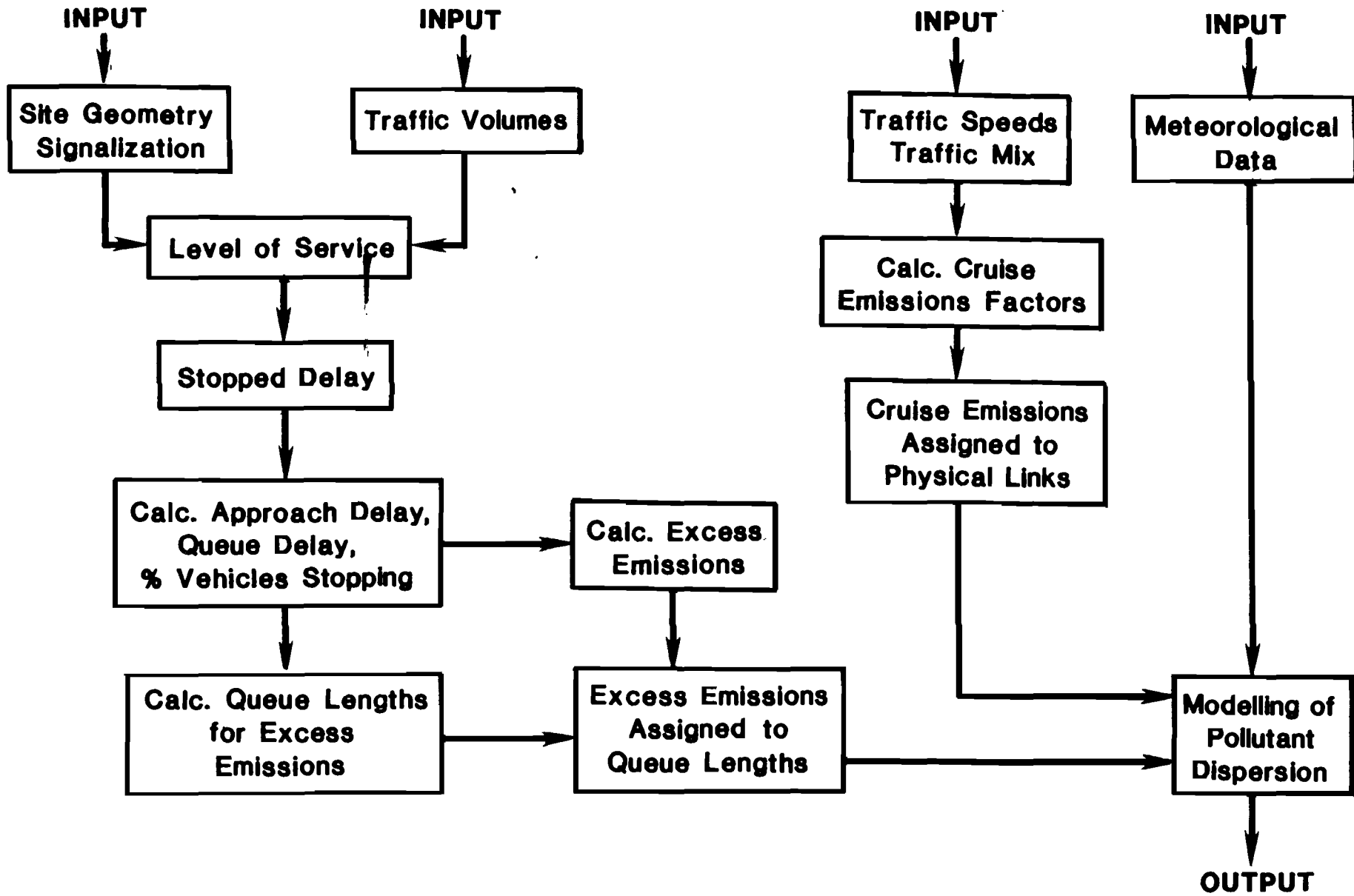


Figure 1

Flow Diagram of the TEXIN2 Model

- (2) Bus and truck volume
- (3) Peaking characteristics
- (4) Lane width
- (5) Bus stop operations
- (6) Right turns with pedestrian activity
- (7) Parking activity

In the TEXIN2 Model, the CMA Planning procedure utilizes only the left turn adjustment factor, while the CMA Operations and Design procedure uses the first four adjustment factors listed above with no additional user input. In both algorithms, left turns are treated in detail for the simple reason that left turns have a large impact on intersection capacity. This effect is created using passenger car equivalency (PCE) values. PCE values are multiplicative adjustment factors applied to the left turning traffic volumes.

The second function performed by TEXIN2 is the estimation of vehicle emissions. The emissions are modeled as the sum of two components: cruise and excess emissions. Cruise emissions and excess emissions are released by free-flowing and delayed vehicles, respectively. Initially, cruise emissions are assumed to be released along the entire length of each intersection leg. The emissions are subsequently redistributed to better reflect actual traffic movement. A modified version of the MOBILE3 program is used to estimate cruise emissions and an idle emission factor, while excess emissions are calculated using procedures suggested by Ismart.<sup>4</sup> As an alternative, a *short-cut* method combining the MOBILE3 estimation of the idle emission factor with values for individual vehicle emission rates based on speed, temperature, percent hot/cold starts, and the vehicle scenario is available to the user.<sup>5</sup>

As used in TEXIN2, the MOBILE3 program provides inspection/maintenance (I/M) and anti-tampering program (ATP) options. To conserve computer time, several sizable portions of the extremely large MOBILE3 program were deleted, namely the nitrogen oxide and hydrocarbon emission factors modeling and user supplied corrections to the emission rates. Since the MOBILE3 program does not allow for California scenarios, the California data and options from the MOBILE2<sup>6</sup> program were added to the emission routine.

The MOBILE3 I/M program allows the user to apply I/M credits to the basic exhaust emission levels. The emission reduction credits attributable to an I/M program vary according to the program type. The additional inputs required to use this option are described in the Input/Output section of this chapter. The inclusion of I/M capabilities greatly increases the versatility of TEXIN2.

To compensate for the significant increase in tampering and its effect on fleet emission rates, MOBILE3 includes a correction term which alters individual vehicle emission rates. Using this capability, the basic emission rates are calculated for untampered vehicles and the effects of tampering

are included as offsets to those values. The tampering offsets are estimated from the percentage of vehicles being tampered with at a given time and the effects of such tampering. These offsets grow linearly with mileage due to the observation that the frequency of tampering increases as cars age and accumulate more mileage. Tampering effects are assumed to be independent of the mileage at which the vehicle was disabled. The types of tampering which are included in the TEXIN2 model are:

- (1) Misfueling (not applicable to fuel inlet disablement)
- (2) Fuel inlet disablement
- (3) Catalyst removal
- (4) Air pump

Where applicable, any number of the tampering types may apply to light-duty gasoline vehicles, light-duty gasoline trucks, and heavy-duty gasoline vehicles. The default tampering frequencies are based on national averages and differ for I/M and non-I/M areas. The user may also use local rates as approved by the MOBILE3 technical support staff.<sup>7</sup>

Anti-tampering programs (ATP) may also be utilized using credits assigned to emission rates. The program allows for most types of ATP's which are discussed in the EPA technical report EPA-AA-TSS-83-10.<sup>8</sup> The MOBILE3 User's Guide<sup>7</sup> and program include credits for anti-tampering programs which inspect annually, biennially, upon change of ownership, or by random audits of 1%, 2%, and 5% of the vehicle fleet. These ATP programs<sup>7</sup> are listed in Appendix B of this report for convenience. Each option may include the inspection of a combination of one or more items, some of which the EPA has determined credits for:

- (1) Air pump only
- (2) Air pump and catalyst
- (3) Air pump and catalyst and fuel inlet
- (4) Air pump ~~and catalyst~~ and lead deposit test
- (5) Catalyst only
- (6) Catalyst and fuel inlet
- (7) Catalyst and fuel inlet and lead deposit test

The MOBILE3 User's Guide clearly states that the user should consult the EPA before implementing the ATP option.

The ATP involves a much different approach to the calculation of emission rates. First, the emission rates are calculated for the entire vehicle fleet assuming no anti-tampering program is in effect. Two separate trials follow which calculate the effects of the ATP on the 1968 to 1979 and 1980 to 2020 fleets, respectively. These three values are then used to calculate the final emission

factors applicable to the particular scenario. In essence, MOBILE3 is called on to perform three separate trials for each run of TEXIN2 which implements the ATP option.

A *short-cut* method was developed as an option to using the modified, yet time-consuming, version of MOBILE3. The method was developed by combining portions of MOBILE3 with alternative cruise emission factors. The cruise emission factors are interpolated from the FHWA values<sup>5</sup> and adjusted for ambient temperature and the percent of hot/cold starts. This adjustment is actually an incremental change in light-duty vehicle carbon monoxide emissions which is added to the initial base value.

In TEXIN2, once the emissions have been assigned to the appropriate links and pseudolinks as described above, a redistribution of emissions is enacted. Cruise emissions are treated separately from idle emissions and excess emissions due to acceleration and deceleration. Also, due to the different methods involved in analyzing traffic flow for signalized and unsignalized intersections, each type of intersection is approached separately.

Idle emissions are assigned to the appropriate pseudolink and, since no traffic movement is involved, no redistribution is necessary. As modeled in TEXIN, excess emissions due to slowing, stopping, and accelerating are assigned to the pseudolink consistent with the approach link. In TEXIN2, the emissions due to slowing and stopping are applied to this pseudolink, while emissions due to acceleration are spread to the pseudolink upon which the vehicle exits the intersection. This keeps the distribution of these excess emissions consistent with the traffic flow.

Cruise emissions are also redistributed according to traffic flow. TEXIN makes no adjustment for the fact that vehicles tend to *hover* about the intersection as they turn. Patterson<sup>9</sup> noted that emission profiles peak at the stop line and fall off rapidly toward the midblock due to the greater time spent near the stop line. Cohen<sup>10</sup> also cites the nature of vehicle flow as a contributing factor to this emission profile. To account for this, the cruise emissions of the four major links are modified in the TEXIN2 model as described below.

In addition to the emissions from inbound and outbound traffic on each respective leg, emissions due to vehicles turning are also included. The fraction of vehicles turning left and right are assumed to either cruise through the turn at 10 mph from an initial spot in the queue or slow down to 10 mph on the approach before making the turn. The proportions used are equivalent to the fraction stopping and one minus the fraction stopping, respectively. These proportions are equally distributed along the pseudolinks of the approach and exit legs of the turning vehicle.

The subsequent dispersion of emissions is finally modeled using the Gaussian dispersion model, CALINE3.<sup>11</sup> Several minor modifications were made to the CALINE3 program, namely, to the input/output routines so that the model could handle the constructed pseudolinks. Additionally, a modification raising the emission source height at very low wind speeds extended the applicability of the CALINE3 to wind speeds below 1 m/sec.

## **Input/Output Summary**

The input requirements for TEXIN2 can be divided into four general categories: link description, receptor coordinates, meteorological conditions, and vehicle scenario. Additional parameters are needed if the user employs the inspection/maintenance and anti-tampering options. The procedure for supplying the parameter values is incumbent upon the correct mapping of the intersection onto an  $x - y$  Cartesian coordinate system: the center of the intersection should be placed at the origin of the coordinate system, and the northernmost leg aligned with the  $y$ -axis.

The first input required by the model deals with physical descriptions of the individual legs of the major intersection as well as the minor side streets. Since the TEXIN2 Model treats each leg as a link, individual lanes need not be addressed. Parameters required to fully describe each link are normally available and include:

- (1) Coordinates in the  $x - y$  system
- (2) Width of entire link
- (3) Link type (*i.e.*, at grade, fill, bridge, *etc.*)
- (4) Traffic volume
- (5) Average vehicular speed of non-delayed vehicles
- (6) The number of approach and turning lanes
- (7) Estimated percentage of cars turning right and left
- (8) Source (link) height
- (9) Width of through and left turn lanes

Certain physical aspects of the intersection operation must also be specified, such as the number of signal phases, left-turn phases, and cycle length.

The remaining input parameters concern the receptors, meteorological conditions, and vehicular scenario. The Cartesian coordinates, including height, must be specified for each receptor. Various meteorological conditions which need to be specified consist of wind speed, wind direction (measured clockwise with respect to the  $y$ -axis), stability class, temperature, mixing height, and ambient carbon monoxide concentration. Surface roughness estimates and averaging time are required by the dispersion subroutines. In addition, the percentage of hot/cold starts must be specified in order to estimate emissions.

Additional input is required to implement various available user options. For example, users that wish to implement local values for mileage accrual and/or registration distribution will need to supply those data. The VMT mix may be specified in place of the national default values. To use the inspection/maintenance program option, additional input involves:

- (1) The year of the I/M program implementation
- (2) Stringency level of the I/M program

- (3) **Mechanic training as a part of the effectiveness of the program**
- (4) **Earliest and latest model year included in the program**
- (5) **Type of vehicles affected by I/M**
- (6) **The type of I/M test (and its associated standards) implemented for 1981 and later light-duty gas vehicles**

The anti-tampering option involves the following parameters:

- (1) **The year of the ATP implementation**
- (2) **First and last model year included in the ATP**
- (3) **Vehicle classes covered by the ATP**
- (4) **Type of ATP and associated credit rates**
- (5) **Tampering rates**

Users that wish to use air conditioning, extra loading, or trailer towing correction factors will need to supply the following data:

- (1) **Fractions of LDGV, LDGT1, and LDGT2 vehicles carrying an extra 500 lb load**
- (2) **Fraction of LDGV (or LDGV, LDGT1, and LDGT2) vehicles towing a trailer**
- (3) **Wet and dry bulb temperatures**

The primary output of TEXIN2 is the predicted carbon monoxide concentrations for each receptor. Additional output which can also be printed include the carbon monoxide concentrations at the receptors as contributed by each link and pseudolink, summary of input data, the composite emission factors and idle emission rates, the excess emission factors, and the traffic parameters of interest, such as queue length, stopped delay per vehicle, and volume to capacity ratio. Specific details and examples of the input/output format follows in the next chapters.

\_\_\_\_\_



## Chapter 3

### Model Implementation

This chapter gives the basic formats of the data that are required in the use of the TEXIN2 model. Illustrative examples are presented in the next chapter.

#### A. Input Procedure

The TEXIN2 program requires at most 13 types of input cards. They are (in order):

- (1) Heading card (one card)
- (2) Flags card (one card)
- (3) Input file name cards (FORTRAN77 Version Only)
- (4) Link description cards (one card per link)
- (5) Receptor location cards (one card per receptor)
- (6) Meteorological conditions card (one card)
- (7) Zero-mile tampering levels and deterioration rates (8 or 16 cards if required)
- (8) Mileage accrual/registration distribution cards (16 or 32 cards if required)
- (9) Inspection/maintenance program parameters (one card if required)
- (10) Vehicle scenario card (one card)
- (11) Optional air conditioning, extra loading, and towing corrections (if required)
- (12) ATP program characteristics (2 cards if required)
- (13) Idle emission factor estimate (one card if required)

The input sequence of the data is presented in Table 1 and Figure 2 and is described below. As shown in the table, all the input data are formatted according to standard FORTRAN conventions. (It is especially important to note that all integer values are right justified.) All data in Table 1 are read from logical unit number (LUN) 5. Items 1, 2, 4, 5, 6, and 10 above are the only required records for each simulation.

#### B. Heading Card

The first card processed is the Heading card. Eighty spaces are available for the job title. This card may contain any combination of alphanumeric characters.

#### C. Flags Card

The second input card is the Flags card. The first 21 spaces are for the seven 3-digit integer variables *VMFLAG*, *PRTFLG*, *INTFLG*, *NR*, *NNDL*, *NDL*, and *NP*. The purpose of these variables is as follows:

- (1) Option flag for the VMT mix:

**Table 1**  
**Input Data for the TEXIN2 Model**

Variable(s)	Type	FORMAT	Units
1. Heading Card (1 Card) <i>HEAD</i>	REAL*4	20A4	—
2. Flags Card (1 Card) <i>VMFLAG, PRFLAG, INTFLAG, NR,</i> <i>NNDL, NDL, NP</i> <i>CY</i> <i>TAMFLAG, IMFLAG, EMFLAG, CMAFG,</i> <i>TFLAG, MYMRFG, ALHFLAG, WCFLAG</i>	INTEGER REAL*4 INTEGER	7I3 F4.0 8I2	— sec —
3. Input File Name Cards (FORTRAN77 Version Only) <sup>†</sup> <i>FILENM</i>	<i>EMFLAG = 4</i> CHARACTER*80	A80	—
4. Link Description Cards (Physical Links + <i>NNDL</i> + <i>NDL</i> Cards) <i>LA</i> <i>XL1, YL1,</i> <i>XL2, YL2</i> <i>TYP</i> <i>WL, HL</i> <i>VPHI</i> <i>VSP</i> <i>NLN, NLTL, NRTL</i> <i>FLT, FRT</i> <i>LTF LG</i> <i>THWIDE, LTWIDE</i>	INTEGER REAL*4 REAL*4 REAL*4 REAL*4 REAL*4 INTEGER REAL*4 INTEGER REAL*4	I3 4F7.0 A2 2F4.0 F6.0 F4.0 3I2 2F5.0 I3 2F5.0	— m — m veh/hr mph — — — m
5. Receptor Location Cards ( <i>NR</i> Cards) <i>XR, YR, ZR</i>	REAL*4	3F7.0	m
6. Meteorological Conditions Card (1 Card) <i>U</i> <i>BRG</i> <i>AMBT</i> <i>CLAS</i> <i>MIXH</i> <i>AMB</i> <i>Z0</i> <i>ATIM</i>	REAL*4 REAL*4 REAL*4 INTEGER REAL*4 REAL*4 REAL*4 REAL*4	F5.0 F5.0 F5.0 I2 F6.0 F6.0 F6.0 F6.0	m/sec deg °F — m ppm cm min
7. Zero-Mile Tampering Levels and Deterioration Rates <i>TAMFLAG = 0</i> Zero-Mile Levels (4 or 8 cards) Deterioration Rates (4 or 8 cards)	REAL*4 REAL*4	7F8.4 7F9.5	— —
8. Mileage/Registration Distribution Data <i>MYMRFG &gt; 1</i>	REAL*4	10F5.3	—

**Table 1 (Continued)**  
**Input Data for the TEXIN2 Model**

Variable(s)	Type	FORMAT	Units
9. Inspection/Maintenance Program Parameters <i>IMFLAG</i> > 0			
<i>ICYIM, ISTRIN</i>	INTEGER	2(I2,1X)	—
<i>IMTFLG</i>	INTEGER	I1,1X	—
<i>MODYR1, MODYR2</i>	INTEGER	2(I2,1X)	—
<i>ILDT, ITEST, ICUTS</i>	INTEGER	3(I1,1X)	—
10. Vehicle Scenario Card (1 Card)			
<i>IREJN</i>	INTEGER	I1	—
<i>ICY</i>	INTEGER	I3	—
<i>PCCN, PCHC, PCCC</i>	REAL*4	3F6.0	%
<i>VMTMIX</i> (8 values)	REAL*4	8F6.0	—
11. Optional Correction Factors ( <i>ALHFLG</i> > 1)			
<i>AC</i>	REAL*4	F4.3	—
<i>XLOAD</i>	REAL*4	3F4.3	—
<i>TRAILR</i> ( <i>ALHFLG</i> = 2)	REAL*4	F4.3	—
<i>TRAILR</i> ( <i>ALHFLG</i> = 3)	REAL*4	3F4.3	—
<i>DB, WB</i>	REAL*4	2F4.1	°F
12. ATP Program Characteristics (2 records if <i>EMFLG</i> = 4) <sup>†</sup>			
<i>LAPSY, LAP1ST, LAPLST</i>	INTEGER	3(I2,1X)	—
<i>LVTFLG</i>	INTEGER	4I1	—
13. Idle Emission Factor Estimate <i>EMFLG</i> = 2	REAL*4	F6.2	gm/min

†See Appendix A for further details.

C. COMMENT	CONTINUATION		DATA PROCESSING CENTER		PROBLEM: TEXIN2 User's Guide Example 1		PAGE 1 OF 3																
	5	6	TEXAS A & M UNIVERSITY		PROGRAMMER: M. W. Hlavinka		DATE 6/12/86																
			FORTRAN			STATEMENT																	
	5	6	7	20	30	40	50	60	70	72	73	80											
	HEADING CARD		—		80 ALPHANUMERIC CHARACTERS (1 CARD)		20A4																
	FLAGS CARD (1 CARD)		7I3,F4.0,7I2																				
	<del>VMFLAG</del>	<del>PRIFLG</del>	<del>MPFLG</del>	<del>NR</del>	<del>MNDL</del>	<del>NBL</del>	<del>NR</del>	<del>CV</del>	<del>FMFLG</del>	<del>MMFLG</del>	<del>EMFLG</del>	<del>CMAYG</del>	<del>PLAG</del>	<del>MTMFG</del>	<del>ALHFLG</del>	<del>WCTFLAG</del>							
	0	2	1	2	0	0	8	80.	1	0	3	0	0	1	1	1							
	FILE NAMES CARD (IF REQUIRED)		ALL ARE A80																				
	LINK DESCRIPTION CARDS (PHYSICAL LINKS + NNDL + NDL CARDS)																						
	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>	<del>AL</del>							
	1		0.		0.		0.	1000.	AG15.0	0.		950.	45.	2	1	0	.25	.15	1	3.	66	3.	66
	2		0.		0.		1000.		AG15.0	0.		1250.	35.	2	1	0	.15	.10	1	3.	66	3.	66
	3		0.		0.		0.	-1000.	AG15.0	0.		950.	45.	2	1	0	.25	.15	1	3.	66	3.	66
	4		0.		0.		-1000.		AG15.0	0.		1250.	35.	2	1	0	.15	.10	1	3.	66	3.	66

Figure 2

Alignment for TEXIN2 Input Data

C. COMMENT	CONTINUATION		DATA PROCESSING CENTER			PROBLEM TEXIN2 User's Guide Example 1			PAGE 2 OF 3			
	5	6	TEXAS A & M UNIVERSITY			PROGRAMMER M. W. Hlavinka			DATE 6/12/86			
	FORTRAN			STATEMENT								
	5	6	7	20	30	40	50	60	70	72	73	80
	RECEPTOR LOCATION CARDS (NR CARDS)			3F7.0								
	/	/	/	/	/	/	/	/	/	/	/	/
		20.		20.		2.						
		-20.		20.		2.						
	METEOROLOGICAL CONDITIONS CARD (1 CARD)			3F5.0, I2, 4F6.0								
	/	/	/	/	/	/	/	/	/	/	/	/
	U	BRG	AMBT	CLAS	MINH	AMB	SR	ATAM				
	3.	135.	68.	4	1000.	0.	150.	60.				
	ZERO-MILE TAMPERING LEVELS & DETERIORATION RATES (8 OR 16 CARDS)			TAMFLG=0								
	MILEAGE/REGISTRATION DISTRIBUTION DATA (16 OR 32 CARDS)			MYMRF G ≥ 2 10F5.3								
	INSPECTION/MAINTENANCE PROGRAM PARAMETERS (1 CARD)			IMFLAG ≥ 1								
	/	/	/	/	/	/	/	/	/	/	/	/
	ICLIM	ISTATN	IMTFLG	MODPRI	MODYR2	RLDT	RTST	RCUTS				

Figure 2

Alignment for TEXIN2 Input Data (Continued)

C. COMMENT	CONTINUATION		DATA PROCESSING CENTER		PROBLEM: TEXIN2 User's Guide Example 1		PAGE 3 OF 3				
	5	6	TEXAS A & M UNIVERSITY		PROGRAMMER: M.W. Hlavinka		DATE 6/12/86				
	FORTRAN				STATEMENT						
	5	7	20	30	40	50	60	70	72	73	80
	VEHICLE SCENARIO CARD (1 CARD) I1, I3, I11 F6. Q										
	<del>TRAIL</del>	<del>PCFN</del>	<del>PCMC</del>	<del>PCPC</del>	<del>LOG1</del>	<del>LOG2</del>	<del>LOG3</del>	<del>LOG4</del>	<del>LOG5</del>	<del>LOG6</del>	<del>LOG7</del>
1	80	25.	35.	25.							
	OPTIONAL A/C-EXTRA LOADING-TRAILER TOWING CORRECTIONS ALHFLG=2 5F4.3										
	<del>AC</del>	<del>XLOAD(1)</del>	<del>XLOAD(2)</del>	<del>XLOAD(3)</del>	<del>TRAILER(1)</del>						
	OPTIONAL A/C-EXTRA LOADING-TRAILER TOWING CORRECTIONS ALHFLG=3 7F4.3, 2F4.1										
	<del>AC</del>	<del>XLOAD(1)</del>	<del>XLOAD(2)</del>	<del>XLOAD(3)</del>	<del>TRAILER(1)</del>	<del>TRAILER(2)</del>	<del>TRAILER(3)</del>	<del>OB</del>	<del>WB</del>		
	ATP CHARACTERISTICS RECORDS (2 REQUIRED IF EMFLG=4) 3(I2, I X), 4I1										
	<del>LAPST</del>	<del>LAPST</del>	<del>LAPST</del>	<del>L1</del>	<del>L2</del>	<del>L3</del>	<del>L4</del>	<del>L5</del>	<del>L6</del>	<del>L7</del>	<del>L8</del>

Figure 2

Alignment for TEXIN2 Input Data (Continued)

*VMFLAG*: 0 = MOBILE3 default VMT mix  
1 = user supplied VMT mix

- (2) Output option flag (see the output section discussion for further detail):

*PRTFLG*: 0 = abbreviated output  
1 = basic output  
2 = extended output

- (3) Option flag for the type of intersection:

*INTFLG*: 0 = unsignalized intersection  
1 = signalized intersection  
2 = 4-way 4 × 4 stop with traffic analysis output  
3 = 4-way 4 × 4 stop

- (4) Number of pollutant receptors, *NR* (maximum of 20).

- (5) Number of additional links (other than the four intersection links) on which the traffic incurs no delay, *NNDL* (e.g., extensions of an intersection link to account for a curve in the road).

- (6) Number of additional links on which the traffic incurs delay, *NDL* (e.g., side streets controlled by stop or yield signs).

- (7) Number of phases, *NP* (zero for an unsignalized intersection).

The next variable on the Flags card is the signal cycle length, *CY*, in seconds.

The next 16 spaces are for eight 2-digit integer variables *TAMFLG*, *IMFLAG*, *EMFLG*, *CMAFG*, *TFLAG*, *MYMRFG*, *ALHFLG*, and *WCFLAG*. The purpose of these variables is as follows:

- (1) Flag for tampering data type:

*TAMFLG*: 0 = user-supplied data  
1 = MOBILE3 default data

- (2) Inspection/maintenance flag:

*IMFLAG*: 0 = No I/M  
1 = I/M invoked (minimal I/M data required)  
2 = I/M invoked

- (3) Emissions model flag (see Appendix A):

*EMFLG*: 1 = short-cut method with idle emission factor generated internally  
2 = short-cut method with user-supplied idle emission factor  
3 = MOBILE3 model without ATP  
4 = MOBILE3 model with ATP

- (4) Traffic algorithm flag:

*CMAFG*: 0 = CMA Planning procedure  
1 = CMA Operations and Design procedure

(5) T-intersection flag:

*TFLAG*: 0 = 4-leg intersection

1 = T-intersection with the north leg *missing*

2 = T-intersection with the east leg *missing*

3 = T-intersection with the south leg *missing*

4 = T-intersection with the west leg *missing*

(6) Mileage accrual and registration distribution flag:

*MYMRF*G: 1 = default registration/mileage accrual distributions

2 = user-supplied mileage accumulation distributions

3 = user-supplied registration distributions

4 = user-supplied registration and mileage accrual distributions

(7) Optional air conditioning, extra loading, and towing records flag:

*ALHFLG*: 1 = no optional correction factors

2 = 5 optional correction factors

3 = 9 optional correction factors

(8) Worst case wind angle search flag:

*WCFLAG*: 1 = no worst case wind angle search

2 = invoke a worst case wind angle search for each receptor (limited output)

3 = invoke a worst case wind angle search for each receptor (full output)

For further information on the use of anti-tampering programs, the reader is referred to Appendix A.

#### D. Input File Name Cards (FORTRAN77 Version Only)

The next type of input data is used to associate logical unit numbers required to read the ATP data. These file names are read by the subroutine, OPENER. If the subroutine does not conform to installation standards, the user should modify the routine or comment the code and calling statement so that it is ignored by the compiler. For further information on these cards, consult Appendix A and Examples 2 and 3.

#### E. Link Description Cards

The next type of input card is the Link Description Card. The number of Link Description cards depends upon the intersection configuration. CALINE3 treats the entire roadway as a link with uniform emissions within a mixing zone centered along the physical centerline of the link (roadway) rather than each lane as an individual link. Thus, the TEXIN2 program does the same. To model the various intersection configurations, the TEXIN2 model recognizes three different types of links:

- (1) Intersection links representing the four legs of the major intersection (there are usually four of these cards—for a T-intersection there would not be a card for the *missing* leg).



- (2) Links on which the traffic incurs no delay, such as connecting links approximating curves in the roadway significantly distant from the intersection to be free of delay (there must be *NNDL* number of these cards).
- (3) Links on which the traffic incurs delay, such as side streets controlled by stop or yield signs (there must be *NDL* number of these cards).

Table 1 gives the input data sequence (and format) for the Link Description cards. Not all of these data are necessary for each type of link. Any unnecessary parameters may be omitted from the Link Description cards (see Example 2).

In determining the geometrical inputs to the TEXIN2 program, a localized  $x - y$  coordinate system is assumed for the intersection locale with the origin of the coordinate system placed at the approximate physical center of the intersection. The positive  $y$ -axis is then taken as being aligned with due north. (This is an arbitrary assignment, but must be adhered to for all geometric inputs.)

The first four Link Description cards are for the four intersection links with the first card for the north leg, the second for the east leg, the third for the south leg, and the fourth for the west leg. **This sequence must be followed for proper traffic evaluation.** The Link Description cards contain the following data:

- (1) The link association number. For the four intersection links, this is simply the link number where:

*LA*: 1 = North  
 2 = East  
 3 = South  
 4 = West

For *NNDL* and *NDL* links, *LA* is the intersection link with which the link is associated.

- (2) The endpoints of the intersection end of the link, *XL1* and *YL1*. These should be at the approximate center of the intersection for the four intersection links.
- (3) The endpoints of the upstream end of the link, *XL2* and *YL2*.
- (4) Type of link:
 

*TYP*: AG = At-grade  
 FL = Fill  
 DP = Depressed  
 BR = Bridge
- (5) The actual width of the roadway excluding the width of the shoulders, *WL*.
- (6) The source emission height, *HL* (zero for at-grade scenarios).
- (7) The number of vehicles/hour *approaching* the intersection on the link, *VPHI*.
- (8) The average speed of non-delayed vehicles on the link, *VSP*.

- (9) The number of *approach* lanes on the link, *NLN*. Included in this parameter are any exclusive right-turn lanes that do not allow right turns on red.
- (10) The number of *exclusive* left-turn lanes on the link, *NLTL*.
- (11) The number of *exclusive* right-turn lanes on the link, *NRTL*. This figure only includes those lanes that allow right turns on red.
- (12) The fraction of vehicles turning left on the link, *FLT*.
- (13) The fraction of vehicles turning right on the link, *FRT*.
- (14) Flag indicating left turn signalization for the link or the type of control for the minor street in unsignalized intersections:
  - LTFLG*: 0 = No left turn phase (signalized intersection)
  - 0 = Yield control (unsignalized intersection)
  - 1 = Left turn phase (signalized intersection)
  - 1 = Stop control (unsignalized intersection)
- (15) The width of the lanes used for through traffic, *THWIDE*. If more than one lane is used per approach, this value is the average of all approach lane widths.
- (16) The width of the exclusive left turn lanes, *LTWIDE*. If more than one exclusive left turn lane is available, this value is the average of the left turn lane widths.

For unsignalized intersections, the major roadway (*i.e.*, the roadway with the right-of-way) must align with the north-south direction (links 1 and 3), and the flag, *LTFLG*, indicates whether the minor street is controlled by a yield (0) or stop (1) sign. The program is *not* capable of modeling an uncontrolled intersection.

The TEXIN2 model may be used to model emissions from T-intersections. A T-intersection is handled by simply omitting the card which corresponds to the *missing* leg. Additionally, the fraction of vehicles turning on the other three legs must be such that no traffic leaves the intersection on the missing leg.

If there are any links on which the traffic does not incur delay, the Link Description cards for these are supplied next. The data on these cards begin with the link association number, *LA*, and end with the source emission height, *HL*. The link association number simply associates the particular link and other variables with one of the four intersection links. There should be *NNDL* of these cards and no particular sequencing of the data is necessary (see Example 2).

Next, Link Description cards for any minor streets on which the traffic incurs delay are inputted. The cards must contain all the data from *LA* to *LTFLG*. The link association number, *LA*, indicates which of the intersection links the particular link intersects. The endpoints *XL1* and *YL1*, are the endpoints of the intersection end of the minor link. Again, the flag, *LTFLG*, is zero for yield control and one for stop control on the minor link. The remaining variables are as defined

previously (see Example 3). Minor streets can only be modeled if they intersect one of the four intersection links; however, if they do not intersect one of these links, they are presumably at a large enough distance away from the intersection that their contribution to the air quality in the immediate vicinity is negligible.

#### F. Receptor Location Cards

The next type of input card is the Receptor Location card. These cards are illustrated in Table 1 and Figure 2. One card is needed for each receptor, and thus, there must be  $NR$  of these cards in any order. The Receptor Location card contains the coordinates  $XR$  and  $YR$  (with respect to the localized  $x - y$  coordinate system), as well as the height,  $ZR$ , of the receptor.

#### G. Meteorological Conditions Card

The next type of input card is the Meteorological Conditions card. Only one card is necessary per simulation. Table 1 gives the input data sequence to be followed and the data format. This card contains the following data:

- (1) The wind speed,  $U$  (m/sec).
- (2) The wind angle with respect to the positive  $y$ -axis (Link 1),  $BRG$  (e.g., a wind from due east would be entered as  $90^\circ$ ). If a worst case wind angle search is invoked,  $BRG$  represents the wind angle increment used in determining the worst case wind angles for each receptor.
- (3) The ambient temperature,  $AMBT$  ( $^\circ F$ ).
- (4) The Pasquill stability class,  $CLAS$  (A = 1 to F = 6).
- (5) The atmospheric mixing height,  $MIXH$  (m).
- (6) The ambient background concentration,  $AMB$  (ppm).
- (7) The surface roughness,  $Z0$  (cm).
- (8) The averaging time,  $ATIM$  (min).

To determine atmospheric stability, the nomograph presented in Figure 3 is suggested.<sup>12</sup> Surface roughness may be estimated by use of the values given by Myrup and Ranzieri<sup>11</sup> presented in Table 2. A value of 1000 m is recommended for the mixing height in the absence of better data.

#### H. Zero-Mile Tampering Levels and Deterioration Rates

The zero-mile tampering levels and deterioration rates are required when MOBILE3 is being used as the emissions model and  $TAMFLG = 0$ . Data for user supplied tampering rates will depend upon the inspection/maintenance program requested. If an inspection/maintenance program is not invoked and user supplied tampering effects are to be included, the user will need to supply 8

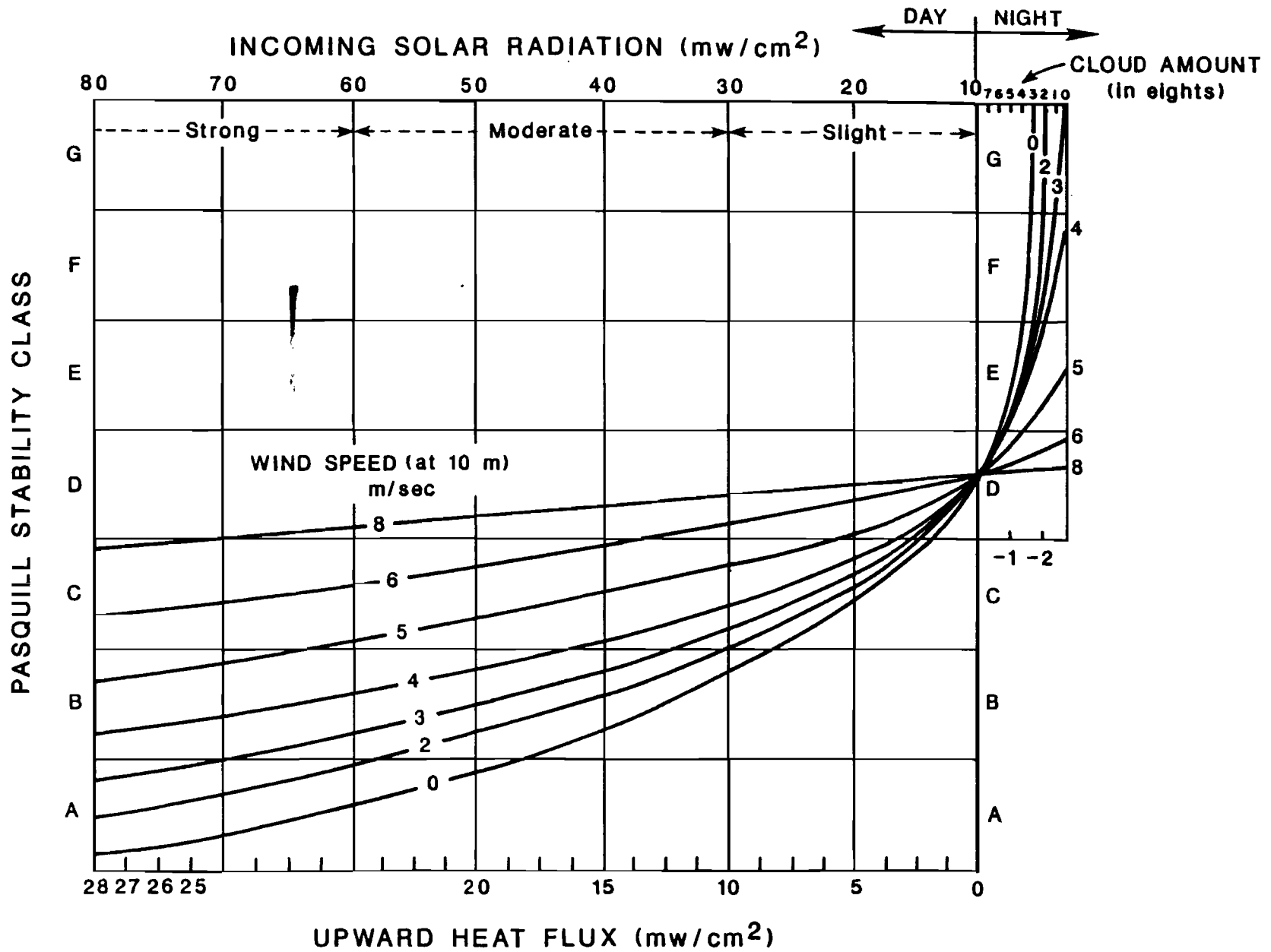


Figure 3

.Stability Class Curves for the TEXIN2 Model

**Table 2**  
**Surface Roughnesses for Various Types of Terrain<sup>11</sup>**

Type of Surface	Roughness $z_0$ (cm)
Smooth mud flats	0.001
Tarmac (pavement)	0.002
Dry lake bed	0.003
Smooth desert	0.03
Grass	
(5-6 cm)	0.75
(4 cm)	0.14
Alfalfa (15.2 cm)	2.72
Grass	11.4
Wheat (60 cm)	22
Corn (220 cm)	74
Citrus orchard	198
Fir forest	283
City land-use:	
Single-family residential	108
Apartment residential	370
Office	175
Central-business district	321
Park	127

tampering rate records. There are two records for each of the four vehicle types that tampering data affect. These records are for zero-mile tampering levels and the percent of tampering increase per 10,000 miles. Tampering is applied to the following vehicle classes: LDGV, LDGT1, LDGT2, and HDGV. The first set of records in the tampering data are the zero-mile levels for each vehicle class. The second set of records in the tampering data file are for the tampering deterioration rates. With no inspection/maintenance, there are four records in each of these sets. However, if inspection/maintenance is invoked, tampering rates for I/M cases must be included in the data file. The I/M records will follow the corresponding record for the non-I/M case. Therefore, there will be a total of 16 records when an inspection/maintenance program is selected along with user supplied tampering data. The FORMAT statement for reading the zero-mile levels is 7F8.4 and the FORMAT for reading the deterioration rates is 7F9.5. The MOBILE3 default tampering data are in BLOCK DATA Subprogram 17 of TEXIN2 for those users who wish to see an example of the layout of the tampering data.

#### **I. Mileage Accrual/Registration Distribution Cards**

The mileage accrual/registration distribution cards are used when local values of those data are available. The model expects these cards in the input data when  $MYMRFG > 1$ . When  $MYMRFG = 2$ , 16 mileage accrual records must be inserted at this point. Similarly, when  $MYMRFG = 3$ , 16 registration distribution records are placed at this location. When  $MYMRFG = 4$ , the user must specify both 16 mileage accrual records and 16 registration distribution records with the mileage accrual records being first. The FORMAT statement for each of these records is 10F5.3.

#### **J. Inspection/Maintenance Program Parameters**

The data in the inspection/maintenance record can contain two different types of records depending on the value of  $IMFLAG$ . The first type ( $IMFLAG = 1$ ) requires less user input than the second and uses the MOBILE2<sup>6</sup> I/M credits. The required data for I/M programs are presented below:

- (1) Last two digits of the year of the I/M program implementation,  $ICYIM$  (60-99, 00-20)
- (2) Stringency level of the I/M program,  $ISTRIN$  (10-50)
- (3) Mechanic training flag indicating whether mechanic training is an integral part of the I/M program:  
 $IMTFLG$  : 1 = No mechanic training part of I/M  
          2 = Mechanic training part of I/M
- (4) Earliest model year included in the I/M program,  $MODYR1$  (41-99, 00-20)

(5) Latest year model included in the I/M program, *MODYR2* (41-99, 00-20, but not earlier than the value in item 4)

(6) The type of vehicles to be affected by the I/M:

*ILDT* : 1 = LDGV  
2 = LDGV and LDGT1  
3 = LDGV and LDGT2  
4 = LDGV and LDGT1 and LDGT2

(7) The type of I/M test being implemented for 1981 and later light duty vehicles:

*ITEST* : 1 = Idle test  
2 = Two-speed idle test  
3 = Loaded test

(8) The standards used in conjunction with the I/M short test for 1981 and later light duty vehicles:

*ICUTS* : 1 = 0.5% CO  
2 = 1.2% CO  
3 = 3.0% CO

The format statement for this record is: 2(I2,1X),I1,1X,2(I2,1X),3(I1,1X). If *IMFLAG* is set to one, the user must specify the first five of the above parameters. If *IMFLAG* is two, all of the above parameters must be specified. Setting *IMFLAG* = 1 corresponds to the following: *ILDT* = 1, *ITEST* = 1, and *ICUTS* = 3.

#### K. Vehicle Scenario Card

The next input card required is the Vehicle Scenario card. The data on this card are described in Table 1 and are illustrated in Figure 2. Only one card is needed per simulation. The card contains the following information:

(1) The region being modeled:

*IREJN*: 1 = Low altitude, non-California  
2 = High altitude, non-California  
~~3~~ = Low altitude, California.

(2) The last two digits of the calendar year being modeled, *ICY*.

(3) The percent of non-catalyst equipped vehicles in the cold start mode, *PCCN*.

(4) The percent of catalyst equipped vehicles in the hot start mode, *PCHC*.

(5) The percent of catalyst equipped vehicles in the cold start mode, *PCCC*.

(6) The VMT mix for the eight individual MOBILE3 vehicle types:

LDGV: Light duty gasoline vehicles  
LDGT1: Light duty gasoline trucks with a gross vehicle weight rating (GVWR)  
of less than 6001 lbs

- LDGT2: Light duty gasoline trucks with a gross vehicle weight rating (GVWR) of less than 8501 lbs
- HDGV: Heavy duty gasoline vehicles
- LDDV: Light duty Diesel vehicles
- LDDT: Light duty Diesel trucks
- HDDV: Heavy duty Diesel vehicles
- MC: Motorcycles.

The VMT mix is only needed if a value of one (1) is inputted for *VMFLAG* on the Flags card. If the VMT mix is not supplied, the MOBILE3 default VMT mix will be utilized. For those users that desire to use the MOBILE3 percent hot/cold starts, enter 20.6%, 27.3%, and 20.6% for *PCCN*, *PCHC*, and *PCCC*, respectively.

#### L. Optional Air Conditioning, Extra Loading, and Towing Corrections

The optional emission factor correction cards are required when *ALHFLG* > 1. When *ALHFLG* > 1 the following data are needed:

- (1) AC usage factor. This factor is used as a toggle switch for air conditioning adjustments. When *AC* is greater than zero (but less than or equal to 1), MOBILE3 calculates the percentage of vehicles with AC in use.
- (2) Extra loading fractions. Three extra loading fractions (for LDGV, LDGT1, and LDGT2) are required when *ALHFLG* > 1. These values are the fractions of each vehicle type with an extra 500 lb load. These fractions must be in the range of zero through one.
- (3) Trailer towing fractions. When *ALHFLG* = 2, this value is the fraction of light duty vehicles and trucks towing a trailer. When *ALHFLG* = 3, there are three separate towing fractions, one for each vehicle type (LDGV, LDGT1, and LDGT2).
- (4) Dry bulb temperature in °F (*ALHFLG* = 3).
- (5) Wet bulb temperature in °F (*ALHFLG* = 3).

When *ALHFLG* = 2 and air conditioning corrections are applied (as indicated by  $0 < AC \leq 1$ ), the dry and wet bulb temperatures default to 85°F and 75°F (about 63% relative humidity at 1 atm), respectively. Note that the dry bulb temperature must never be less than the wet bulb temperature. Furthermore, the range on the temperature is 0°F to 110°F. The format statement for this record is 5F4.3 when *ALHFLG* = 2 and 7F4.3,2F4.1 when *ALHFLG* = 3.

#### M. ATP Program Characteristics Records

These records must be the last cards for an individual run when *EMFLG* = 4. As stated in the previous chapter, the ATP program option requires three trials of MOBILE3. The first of these does not consider ATP data. The second is for the 1968 to 1979 vehicle fleets. The last is for the 1980 to 2020 vehicle fleets. When an ATP program is employed, the two records that describe each ATP program must contain the following information:



- (1) Last two digits of the year of ATP implementation, *LAPSY* (60-99, 00-20)
- (2) First model year to be included in the ATP, *LAP1ST* (41-99, 00-20)
- (3) Last model year to be included in the ATP, *LAPLST* (41-99, 00-20)
- (4) Vehicle classes covered by the ATP (*LVTFLG*). If a vehicle class is covered, the value must be two. If the class is not covered, the value must be set to one. Four vehicle classes can be covered by an ATP: LDGV, LDGT1, LDGT2, and HDGV. The values for each class are given in that order without any spaces between the numbers.

Further information on the implementation of anti-tampering programs is given in Appendix A. The format statement for this record is I2,1X,I2,1X,I2,1X,I4.

#### **N. Idle Emission Factor Estimate Card**

The idle emission factor record must be present when *EMFLG* = 2. Under these conditions, the user is using the short-cut emissions routine with the idle emission factor being specified. This emission rate is in gm/min.

#### **O. Additional Notes Concerning Multiple Simulations with TEXIN2**

The TEXIN2 model is capable of running multiple simulations without total program restart. This is done by simply appending the input for all subsequent runs to the bottom of the main input file attached to logical unit number (LUN) five of the model. Each run should be treated as if it were the only simulation desired. The model contains a subroutine called RESET that is used to change all modified parameters (*e.g.*, the VMT mix) back to the default parameters before executing any subsequent simulation. Furthermore, any external file opened to satisfy MOBILE3 options is closed before the next run. Therefore, each TEXIN2 run that uses a MOBILE3 option requiring an external file will need to specify the file name in the input data of that run. The use of these external files is explained in Appendix A.

#### **P. Discussion of Output**

The output from the TEXIN2 model is variable, depending on the value inputted on the Flags card for the integer variable, *PRTFLG*. Three different output formats are available. They are:

- (1) The abbreviated output (*PRTFLG* = 0)
- (2) The basic output (*PRTFLG* = 1)
- (3) The extended output (*PRTFLG* = 2).

The abbreviated output consists of a summary of the input meteorological and intersection parameters as well as a listing of the pollutant concentration at each receptor. In addition, the basic output also contains a summary of all the input data to the program, including the MOBILE3 options invoked, as well as a description section for both the physical links and constructed

pseudolinks. The extended output contains all that is included in the abbreviated and basic outputs along with a section summarizing the intersection traffic flow analyses, including the volume to capacity ratio ( $V/C$ ), stopped delay per vehicle, etc. The extended output also includes the MOBILE3 emission factors and the contribution from each link to the pollutant concentration at each receptor.

For a four-way stop, the type of output is controlled by both *INTFLG* and *PRTFLG*. With *INTFLG* = 2, the model will print a traffic analysis report for the intersection. This analysis will not be printed for *INTFLG* = 3. Extended output for the 4-way stop configuration may be obtained with *PRTFLG* = 2 as in the other scenarios. Requesting extended output will generate a report on the link contributions to the pollutant estimates.

If a worst case wind angle analysis is desired, the sections containing the contribution from each link to the receptor concentrations and the receptor concentrations for a specific wind angle are not printed. For the worst case option, these sections have been replaced by a section containing the angles that yield the highest carbon monoxide concentrations for each receptor. The resulting carbon monoxide concentrations for each of these wind angles are also printed. If *WCFLAG* = 3 the output will include predictions at each wind angle increment. For this case, the amount of output will depend upon the value chosen for *BRG*.

## Chapter 4

### TEXIN2 Examples

Six examples have been prepared and are presented in order to facilitate the understanding of the capabilities and use of the TEXIN2 model. Many of the cards in the example input data contain comments near the end of the record. These comments are solely to aid in understanding the input sequence. They are not read by the model and hence do not affect the output.

#### A. Example One

The first example is the simple case of an intersection with four right angle corners. All four legs extend 1000 m from the intersection and are geometrically identical having two approach lanes, one exclusive left turn lane, and no right turn lanes. Each leg is 15 m wide and the area may be considered an at-grade scenario. The simulated intersection is presented in Figure 4. All major link numbers are circled on the overhead view.

The input cards for example one are presented in Figure 5. The first two cards are the Heading and the Flags cards. Note that *VMFLAG* is zero indicating that the MOBILE3 default VMT mix is to be used. Flag *INTFLG* is set to one indicating a signalized intersection. Extended output is required so *PRTFLG* is set to two. The carbon monoxide concentration at two receptors ( $NR = 2$ ) is desired and no additional links are needed in the simulation ( $NNDL = NDL = 0$ ). The signalization is eight phase ( $NP = 8$ ) with an 80 sec cycle length ( $CY = 80.$ ). The MOBILE3 emissions routine without anti-tampering programs is used to estimate the emissions ( $EMFLG = 3$ ). No I/M program is to be invoked ( $IMFLAG = 0$ ) and national default tampering rates are employed ( $TAMFLG = 1$ ). Since the example is not modeling a T-intersection, *TFLAG* is set to zero. *CMAFG* is assigned a value of zero for the CMA Planning procedure. *MYMRFG* is set to one indicating that MOBILE3 default mileage accrual and registration distributions are to be employed. No optional correction factors are used so  $ALHFLG = 1$  and the worst case wind angle analysis has been disabled by setting  $WCFLAG = 1$ .

The next four cards are Link Description cards which describe the four intersection legs. Note that *XL1* and *YL1* are the endpoints at the intersection end of the link (*i.e.*, (0., 0.)) for all four links in this simulation), and that *XL2* and *YL2* are the upstream end of the links, 1000 m from the origin (*i.e.*, (0., +1000.), (+1000., 0.), (0., -1000.), and (-1000., 0.) for links one through four, respectively). The links are all at-grade ( $TYP = AG$  and  $HL = 0.0$ ) and 15 m in width ( $WL = 15.0$ ). All four links have two approach lanes ( $NLN = 2$ ), one exclusive left turn lane ( $NLTL = 1$ ), and no exclusive right turn lanes ( $NRTL = 0$ ). A value of unity is given on each card for the integer variable *LTFLG*, indicating a left turn phase for all four approaches. The lane width for both through and left turn lanes is set to the standard width of 3.66 m (12 ft) on

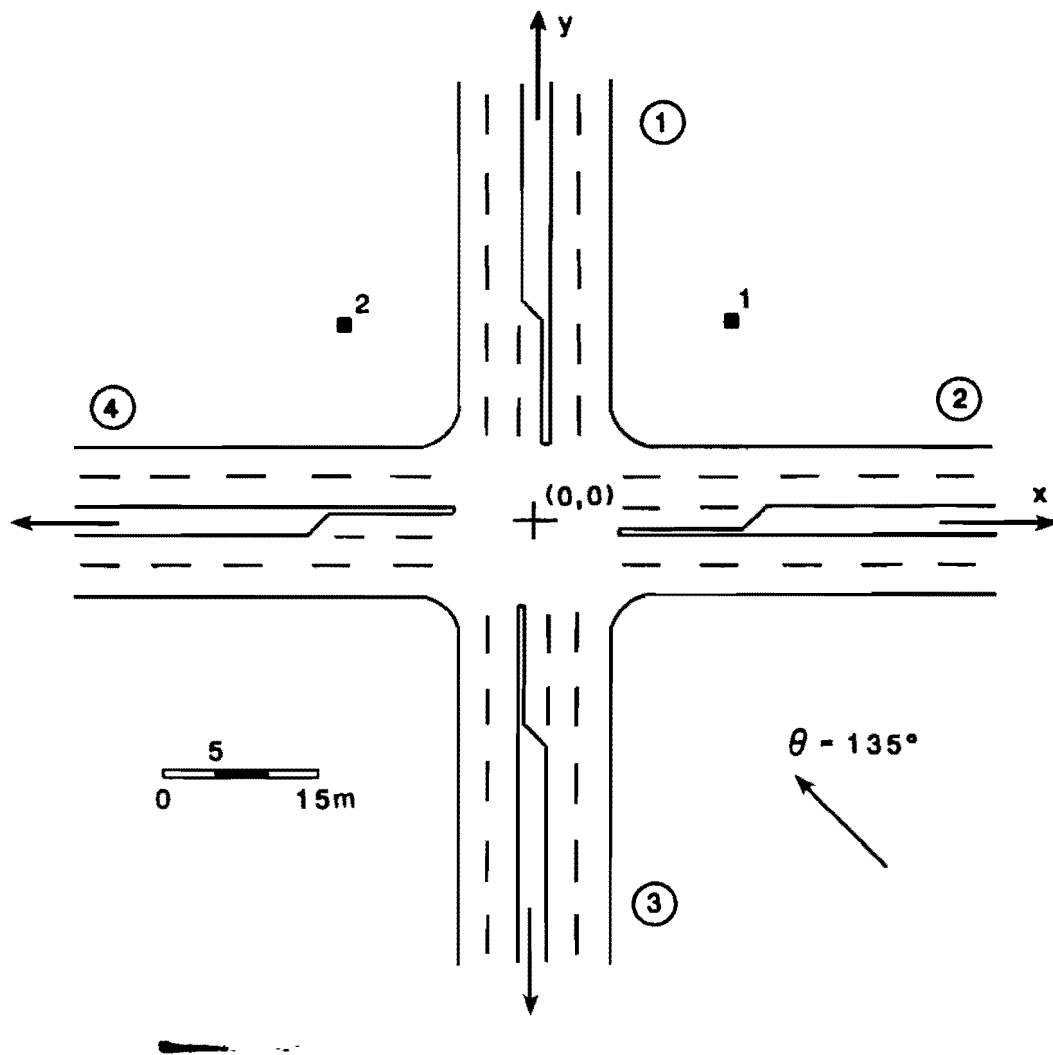


Figure 4

Overhead View of the Intersection in Example 1

all legs. The approach volumes, vehicle speeds, and fractions of left and right turning vehicles for the individual links are as given on the Link Description cards in Figure 5; thus, for the first link: traffic volume on link,  $VPHI = 950.$ ; vehicle speed,  $VSP = 45.$ ; fraction left turning,  $FLT = 0.25$ ; fraction right turning,  $FRT = 0.15$ .

Since there are no additional links to be modeled ( $NNDL = NDL = 0$ ), the next input cards are the Receptor Location cards giving the geometric coordinates of the two receptors. There is one card per receptor. For the first card (receptor  $x$ ,  $y$ ,  $z$ -coordinates),  $XR = +20.$ ,  $YR = +20.$ , and  $ZR = 2.$ , and for the second receptor,  $XR = -20.$ ,  $YR = +20.$ , and  $ZR = 2$ . Following this record is the Meteorological Conditions card. The wind speed is 3 m/sec ( $U = 3.0$ ). The wind direction measured clockwise from the positive  $y$ -axis is  $135^\circ$  ( $BRG = 135.$ ). The ambient temperature is  $68^\circ\text{F}$  ( $AMBT = 68.0$ ) and the atmospheric stability class is D ( $CLAS = 4$ ). The mixing height is taken as 1000 m ( $MIXH = 1000.$ ), the background concentration as zero ( $AMB = 0.0$ ), the surface roughness as 150 cm ( $ZO = 150.0$ ), and the averaging time as 60 min ( $ATIM = 60.0$ ). These data are illustrated in Figure 5.

The final card is the Vehicle Scenario card. The region being modeled is a low-altitude, non-California region ( $IREJN = 1$ ). The year being modeled is 1980, thus  $ICY = 80$ . The percentages of hot/cold starts are:  $PCCN = 25.0$ ,  $PCHC = 35.0$ , and  $PCCC = 25.0$ . Since  $VMFLAG$  was set to zero on the flags card, no VMT mix data are supplied by the user.

Figure 6 gives the output from Example One in the extended format. The first section gives the run title and a summary of the meteorological and intersection parameters. Next, the MOBILE3 emission factor and traffic flow data are summarized. Following this are the traffic parameters for each link. The predicted carbon monoxide concentrations at the receptors (including the background concentration) are presented in the final section of the output.

```

User's Guide Example One for the TEXIN2 Model—Signalized Intersection
0 2 1 2 0 0 8 80. 1 0 3 0 0 1 1 1
1 0. 0. 0. 1000. AG15.0 0. 950. 45. 2 1 0 .25 .15 1 3.66 3.66
2 0. 0. 1000. 0. AG15.0 0. 1250. 35. 2 1 0 .15 .10 1 3.66 3.66
3 0. 0. 0. -1000. AG15.0 0. 950. 45. 2 1 0 .25 .15 1 3.66 3.66
4 0. 0. 0. -1000. 0. AG15.0 0. 1250. 35. 2 1 0 .15 .10 1 3.66 3.66
20. 20. 2.
-20. 20. 2.
3. 135. 68. 4 1000. 0. 150. 60.
1 80 25. 35. 25.
Flags Card
Receptor 1: XR, YR, ZR
Receptor 1: XR, YR, ZR
Meteorological Conditions
Vehicle Scenario

```

Figure 5  
Input Data Cards Used in Example 1

\*\*\*\*\* TAMU INTERSECTION MODEL --- TEXIN2 \*\*\*\*\*

TITLE: User's Guide Example One for the TEXIN2 Model--Signalized Intersection

METEOROLOGICAL CONDITIONS:

Wind Speed = 3.0 m/s                      Stability Class = 4 (D)                      Surface Roughness = 150. cm  
 Wind Bearing = 135. deg                      Mixing Height = 1000. m                      Averaging Time = 60. min  
 Temperature = 68.0 F                      Ambient Concentration = 0.0 ppm

INTERSECTION INFORMATION:

Type = Signalized                      Cycle Length = 80.0 sec                      Signal Phases = 8  
 Delay Links = 0                      Non-Delay Links = 0                      TFLAG = 0  
 Intersection Calculation Procedure: CMA Planning

-----LINK SUMMARY-----

<u>Link</u>	<u>Type</u>	<u>Width</u>	<u>Height</u>	<u>VPHI</u>	<u>VSP</u>	<u>NLN</u>	<u>NLTL</u>	<u>NRTL</u>	<u>FLT</u>	<u>FRT</u>	<u>LTFLG</u>	<u>THWIDE</u>	<u>LTWIDE</u>
1	AG	15.0	0.0	950.	45.0	2	1	0	.2500	.1500	1	3.66	3.66
2	AG	15.0	0.0	1250.	35.0	2	1	0	.1500	.1000	1	3.66	3.66
3	AG	15.0	0.0	950.	45.0	2	1	0	.2500	.1500	1	3.66	3.66
4	AG	15.0	0.0	1250.	35.0	2	1	0	.1500	.1000	1	3.66	3.66

Figure 6

TEXIN2 Output for Example 1

-----MOBILE3 EMISSION CALCULATIONS-----

User supplied VMT mix: No  
Anti-tampering program: No

User supplied Tampering data: No  
User supplied mileage accrual: No

Inspection/Maintenance: No  
User supplied registration data: No

-----MOBILE3 EMISSION FACTORS (GRAMS CO/VEHICLE MILE)-----

Scenario: Region = 1                      Vehicle Mix: LDGV = 0.666                      LDDV = 0.005  
 Year = 1980                                      LDGT1= 0.133                      LDDT = 0.001  
 PCCN = 25.0                                      LDGT2= 0.088                      HDDV = 0.060  
 PCHC = 35.0                                      HDGV = 0.040                      MC = 0.007  
 PCCC = 25.0  
 Altitude= 500.0 ft

Speed	LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	LDGT	All Modes
45.0	22.0	29.8	37.5	90.7	0.7	1.1	7.1	15.7	32.8	26.1
35.0	27.9	36.6	47.2	100.3	0.8	1.3	8.3	19.2	40.8	32.3
10.0	94.6	117.9	165.9	337.1	2.5	4.2	27.0	62.2	137.0	108.8

MOBILE3 IDLE EMISSION RATE (GRAMS CO/MIN)

LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	LDGT	All Modes
12.6	13.2	14.6	9.4	0.2	0.3	0.9	3.7	13.8	11.9

Figure 6

TEXIN2 Output for Example 1 (Continued)

33  
13



-----TRAFFIC FLOW ANALYSIS (MAJOR INTERSECTION - SIGNALIZED)-----

Volume/Capacity= 0.95  
 Stopped Delay= 37.7 sec/veh  
 Approach Delay= 51.0 sec/veh  
 Time in Queue= 47.7 sec/veh  
 Fraction Stopping= 0.80

Fraction of Excess  
 Emissions Due to:  
 Vehicles Idling= 0.32  
 Vehicles Turning= 0.06  
 Vehicles Stopping & Slowing= 0.61

-----LINK DESCRIPTION-----

Link	XL1	YL1	XL2	YL2	Length	VEH/HR	Speed	MGM CO/M-SEC
1	0.0	0.0	0.0	1000.0	1000.0	1832.	45.0	8.26
2	0.0	0.0	1000.0	0.0	1000.0	2567.	35.0	14.30
3	0.0	0.0	0.0	-1000.0	1000.0	1832.	45.0	8.26
4	0.0	0.0	-1000.0	0.0	1000.0	2567.	35.0	14.30
5	0.0	0.0	0.0	67.4	67.4	1832.	45.0	86.93
6	0.0	0.0	88.7	0.0	88.7	2567.	35.0	95.33
7	0.0	0.0	0.0	-67.4	67.4	1832.	45.0	86.93
8	0.0	0.0	-88.7	0.0	88.7	2567.	35.0	95.33

Figure 6

TEXIN2 Output for Example 1 (Continued)

-----LINK POLLUTANT CONTRIBUTION-----

Contribution from each link to pollutant concentration at receptor 1:

Link Number:	1	2	3	4	5	6	7	8
Contribution (ppm):	0.0	0.8	0.0	0.0	0.0	5.3	0.0	0.0

Contribution from each link to pollutant concentration at receptor 2:

Link Number:	1	2	3	4	5	6	7	8
Contribution (ppm):	0.3	0.4	0.2	0.5	2.8	2.4	2.1	3.1

-----RECEPTOR DESCRIPTION AND MODEL PREDICTIONS-----

<u>Receptor</u>	<u>XR</u>	<u>YR</u>	<u>ZR</u>	<u>CO (ppm)*</u>
1	20.0	20.0	2.0	6.1
2	-20.0	20.0	2.0	11.8

\*Includes Background Ambient Concentration of 0.0 ppm

Figure 6

TEXIN2 Output for Example 1 (Continued)

## B. Example Two

The second example is an unsignalized intersection that illustrates the ability of the model to simulate curved roadways. This example also presents the use of some of the MOBILE3 options. The intersection corresponding to this example is given in Figure 7.

A value of one for *VMFLAG* (user-supplied VMT mix), two for *PRTFLG* (extended output), and zero for *INTFLG* is placed on the Flags card. Since six additional links are required to model the curved sections of the roadway, *NNDL* is set to six. Since the intersection is not signalized, *NP* and *CY* are set to zero. Pollutant concentrations at three receptors (*NR* = 3) are desired and there are no additional links on which traffic incurs delay (*NDL* = 0). Since the intersection is unsignalized, *CMAFG* has no effect on the model. Therefore, *CMAFG* may be set to either zero or one. The intersection has four major links (*TFLAG* = 0). A MOBILE3 anti-tampering program is to be used and a user-supplied registration distribution (*MYMRFG* = 3) is employed. The anti-tampering program for the 1968–1979 span is presented in Figure 9 and the program for the 1980–2020 span is presented in Figure 10. The registration distribution data are presented in the data file (Figure 8) before the vehicle scenario card. No optional correction factors are used in this example (*ALHFLG* = 1) and the worst case wind angle analysis is not being used (*WCFLAG* = 1).

The next two cards are for subroutine OPENER (see Appendix A). These two cards contain the file names of the data for the ATP. The first file name corresponds to the 1968–1979 ATP data and the last file name corresponds to the 1980–2020 data. Complete details on the use of MOBILE3 ATP data are given in Appendix A. The anti-tampering programs used in this example are extracted from Appendix B on pages B-28 and B-34 for the early and late programs, respectively.

The next four cards are the Link Description cards. For an unsignalized intersection, the coordinate system must be chosen so that the major road lies along the *y*-axis (and thus assigned to links one and three). Traffic on the major roadway is assumed to not incur delay (except for left-turning vehicles). Values of *LTFLG* are not significant for the major road (links 1 and 3), but are necessary for the minor road (links 2 and 4). A value of one is given for *LTFLG* for the minor road indicating stop sign controlled approaches. The next six cards are for the additional links required to fit the curves. The first variable on each of these cards is *LA*, the link association number, and indicates from which of the four intersection links the additional links extend. In this example, three of the links have *LA* = 2 and three have *LA* = 4 since they are extensions of the minor road. Since the traffic on these links is assumed to incur no delay, they must be sufficiently distant from the intersection. The variables *VPHI* and *LTFLG* are not needed for the *NNDL* links and are omitted from the Link Description cards.

Following the Receptor Location and Meteorological Conditions card are the user-specified registration distributions. There must be a total of 16 of these records. If mileage accrual data

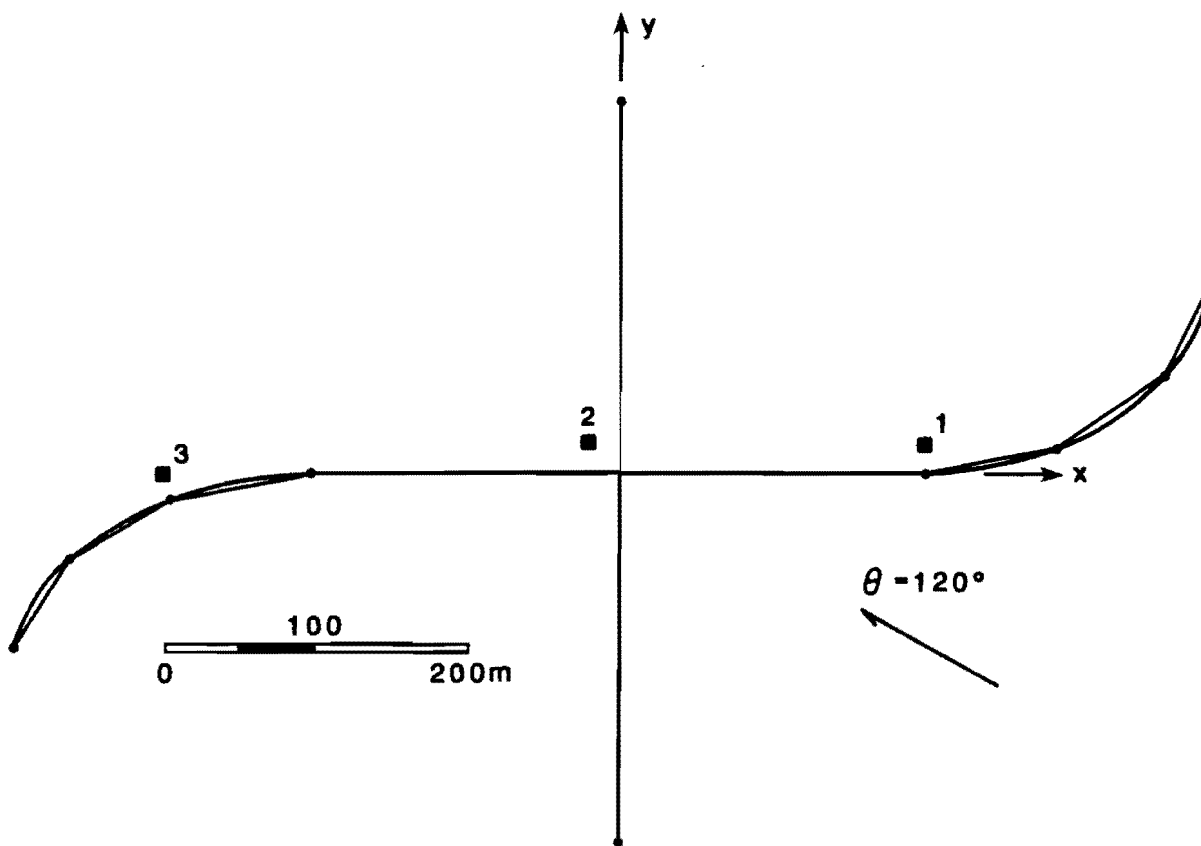


Figure 7  
Overhead View of the Intersection in Example 2

User's Guide Example Two for the TEXIN2 Model—Curved Roadways

```

1 2 0 3 6 0 0 0. 1 0 4 0 0 3 1 1      Flags Card
ATP49
ATP51
1      0.      0.      0.      400.AG17.5 0.      450. 35. 2 1 0 .10 .10 0 3.66 3.66
2      0.      0.      200.      0.AG14.0 0.      100. 35. 1 0 0 .20 .15 1 3.66 3.66
3      0.      0.      0.      -400.AG17.5 0.      350. 35. 2 1 0 .10 .10 0 3.66 3.66
4      0.      0.      -200.      0.AG14.0 0.      125. 35. 1 0 0 .20 .15 1 3.66 3.66
2      200.      0.      285.      20.AG14.0 0.      NNDL Link
2      285.      20.      360.      70.AG14.0 0.      NNDL Link
2      360.      70.      390.      130.AG14.0 0.      NNDL Link
4     -200.      0.      -295.      -20.AG14.0 0.      NNDL Link
4     -295.      -20.      -360.      -60.AG14.0 0.      NNDL Link
4     -360.      -60.      -400.      -120.AG14.0 0.      NNDL Link
      200.      20.      2.      Receptor 1: XR, YR, ZR
      -20.      20.      2.      Receptor 2: XR, YR, ZR
     -300.      0.      2.      Receptor 3: XR, YR, ZR
      2. 120. 68. 3 1000.      0. 150. 60.      Meteorological Conditions
0.0650.0830.0980.0970.0850.0990.0970.0840.0690.044 JULMYR.LDGV..my ages 1-10
0.0430.0370.0260.0200.0150.0110.0080.0060.0050.008 .LDGV..my ages 11-20
0.0680.0870.1120.0950.0670.0930.0860.0770.0590.036 .LDGT1.my ages 1-10
0.0410.0360.0280.0240.0200.0170.0140.0100.0080.022 .LDGT1.my ages 11-20
0.0760.0980.1260.1070.0750.1040.0970.0830.0610.036 .LDGT2.my ages 1-10
0.0360.0280.0190.0150.0110.0080.0060.0040.0030.007 .LDGT2.my ages 11-20
0.0330.0570.1040.1050.1010.1250.1000.0750.0470.046 .HDGV..my ages 1-10
0.0470.0410.0280.0180.0100.0080.0070.0060.0050.037 .HDGV..my ages 11-20
0.0650.0830.0980.0970.0850.0990.0970.0840.0690.044 .LDDV..my ages 1-10
0.0430.0370.0260.0200.0150.0110.0080.0060.0050.008 .LDDV..my ages 11-20
0.0680.0870.1120.0950.0670.0930.0860.0770.0590.036 .LDDT..my ages 1-10
0.0410.0360.0280.0240.0200.0170.0140.0100.0080.022 .LDDT..my ages 11-20
0.0360.0440.0850.1260.0930.1180.0980.1030.0470.058 .HDDV..my ages 1-10
0.0490.0450.0290.0170.0090.0070.0060.0050.0040.023 .HDDV..my ages 11-20
0.1330.1450.1380.1160.1230.1140.0690.0440.0240.009 .MC...my ages 1-10
0.0850.0000.0000.0000.0000.0000.0000.0000.0000.000 .MC...my ages 11-20
1 75 39.2 44.5 37.8 .747 .126 .081 .022 .004 .001 .012 .007
84 68 79 2221      ATP params: 1968-1979
84 80 20 2221      ATP params: 1980-2020

```

Figure 8  
Input Data Cards Used in Example 2

```

4
**
**
** ANNUAL : INSPECT AIR PUMP, CANISTER & PCV
**
0.20 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/CAT (PREVIOUS)
.00 0.20 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/NCK
.00 .00 0.20 .00 .00 .00 .00 .00 .00 .00 .00 AIR/TNK
.00 .00 .00 0.20 .00 .00 .00 .00 .00 .00 .00 AIR/CAT/NCK
.00 .00 .00 .00 0.20 .00 .00 .00 .00 .00 .00 AIR/CAT/TNK
.00 .00 .00 0.80 .00 1.00 .00 .00 .00 .00 .00 CAT/NCK
.00 .00 .00 .00 0.80 .00 1.00 .00 .00 .00 .00 CAT/TNK
.00 .00 .00 .00 .00 .00 .00 0.20 .00 .00 .00 AIR
0.80 .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 CAT
.00 0.80 .00 .00 .00 .00 .00 .00 .00 1.00 .00 NCK
.00 .00 0.80 .00 .00 .00 .00 .00 .00 .00 1.00 TNK
0.20 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/CAT (SUBSEQUENT)
.00 0.20 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/NCK
.00 .00 0.20 .00 .00 .00 .00 .00 .00 .00 .00 AIR/TNK
.00 .00 .00 0.20 .00 .00 .00 .00 .00 .00 .00 AIR/CAT/NCK
.00 .00 .00 .00 0.20 .00 .00 .00 .00 .00 .00 AIR/CAT/TNK
.00 .00 .00 0.80 .00 1.00 .00 .00 .00 .00 .00 CAT/NCK
.00 .00 .00 .00 0.80 .00 1.00 .00 .00 .00 .00 CAT/TNK
.00 .00 .00 .00 .00 .00 .00 0.20 .00 .00 .00 AIR
0.80 .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 CAT
.00 0.80 .00 .00 .00 .00 .00 .00 .00 1.00 .00 NCK
.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 TNK

```

Figure 9  
1968-1979 MOBILE3 Anti-Tampering Program

```

4
**
** ANNUAL : INSPECT AIR PUMP, CATALYST, FUEL INLET (AND PLUMBESMO),
**          CANISTER & PCV
**
0.05 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/CAT (PREVIOUS)
.00 0.20 .00 0.15 .00 .00 .00 .00 .00 .00 .00 AIR/NCK
.00 .00 0.20 .00 0.15 .00 .00 .00 .00 .00 .00 AIR/TNK
.00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 .00 AIR/CAT/NCK
.00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 AIR/CAT/TNK
.00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 CAT/NCK
.00 .00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 CAT/TNK
0.15 .00 .00 .00 .00 .00 .00 0.20 .00 .00 .00 AIR
.00 .00 .00 .00 .00 .00 .00 .00 0.05 .00 .00 CAT
.00 0.05 .00 0.05 .00 0.20 .00 .00 .00 0.25 .00 NCK
.00 .00 0.05 .00 0.05 .00 0.20 .00 .00 .00 0.25 TNK
0.05 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/CAT (SUBSEQUENT)
.00 0.15 .00 0.10 .00 .00 .00 .00 .00 .00 .00 AIR/NCK
.00 .00 0.15 .00 0.10 .00 .00 .00 .00 .00 .00 AIR/TNK
.00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 .00 AIR/CAT/NCK
.00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 AIR/CAT/TNK
.00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 CAT/NCK
.00 .00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 CAT/TNK
0.15 0.05 0.05 0.05 0.05 .00 .00 0.20 .00 .00 .00 AIR
.00 .00 .00 .00 .00 .00 .00 .00 0.05 .00 .00 CAT
.00 .00 .00 .00 .00 0.10 .00 .00 .00 0.15 .00 NCK
.00 .00 .00 .00 .00 .00 0.10 .00 .00 .00 0.15 TNK

```

Figure 10  
1980-2020 MOBILE3 Anti-Tampering Program

were also to be supplied, the user would need to place those 16 records immediately before the registration distribution data. The next card is the Vehicle Scenario card. Since a value of one was placed on the Flags card, the user must specify a VMT mix. For this example: LDGV = .747, LDGT1 = .126, LDGT2 = .081, HDGV = .022, LDDV = .004, LDDT = .001, HDDV = .012, and MC = .007. Following the vehicle scenario card are the two anti-tampering characteristics records. The first record describes the first ATP and the second record the second ATP.

The output from this example is presented in Figure 11. The first item on the output is a summary of the meteorological and intersection input data. Next, the MOBILE3 emission data are printed along with the anti-tampering program characteristics and comments. A traffic flow analysis of the major intersection then follows along with link descriptions and finally, the receptor pollutant concentrations.



\*\*\*\*\* TAMU INTERSECTION MODEL --- TEXIN2 \*\*\*\*\*

TITLE: User's Guide Example Two for the TEXIN2 Model--Curved Roadways

METEDROLOGICAL CONDITIONS:

Wind Speed = 2.0 m/s                      Stability Class = 3 (C)                      Surface Roughness = 150. cm  
 Wind Bearing = 120. deg                      Mixing Height = 1000. m                      Averaging Time = 60. min  
 Temperature = 68.0 F                      Ambient Concentration = 0.0 ppm

INTERSECTION INFORMATION:

Type = Unsignalized                      Cycle Length = 0.0 sec                      Signal Phases = 0  
 Delay Links = 0                      Non-Delay Links = 6                      TFLAG = 0

-----LINK SUMMARY-----

Link	Type	Width	Height	VPHI	VSP	NLN	NLTL	NRTL	FLT	FRT	LTFLG	THWIDE	LTWIDE
1	AG	17.5	0.0	450.	35.0	2	1	0	.1000	.1000	0	3.66	3.66
2	AG	14.0	0.0	100.	35.0	1	0	0	.2000	.1500	1	3.66	3.66
3	AG	17.5	0.0	350.	35.0	2	1	0	.1000	.1000	0	3.66	3.66
4	AG	14.0	0.0	125.	35.0	1	0	0	.2000	.1500	1	3.66	3.66

Figure 11

TEXIN2 Output for Example 2

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-----MOBILE3 EMISSION CALCULATIONS-----

User supplied VMT mix: Yes  
 Anti-tampering program: Yes

User supplied Tampering data: No  
 User supplied mileage accrual: No

Inspection/Maintenance: No  
 User supplied registration data: Yes

-----MOBILE3 EMISSION FACTORS (GRAMS CO/VEHICLE MILE)-----

Scenario: Region = 1                      Vehicle Mix: LDGV = 0.747                      LDDV = 0.004  
           Year = 1975                      LDGT1= 0.126                      LDDT = 0.001  
           PCCN = 39.2                      LDGT2= 0.081                      HDDV = 0.012  
           PCHC = 44.5                      HDGV = 0.022                      MC = 0.007  
           PCCC = 37.8  
           Altitude= 500.0 ft

Speed	LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	LDGT	All Modes
35.0	49.3	51.3	64.8	124.3	0.8	1.4	8.6	27.8	56.6	51.6
10.0	162.3	169.4	215.6	417.7	2.7	4.6	27.8	74.8	187.4	170.1

MOBILE3 IDLE EMISSION RATE (GRAMS CO/MIN)

LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	LDGT	All Modes
16.0	16.7	17.0	14.6	0.1	0.3	1.0	4.5	16.8	15.8

Figure 11

TEXIN2 Output for Example 2 (Continued)

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-----MOBILE3 Anti-Tampering Program Data-----

Start year (January 1): 1984

First model year covered: 1968

Last model year covered: 1979

Vehicle types covered: LDGV , LDGT1, LDGT2

\*\*

\*\*

\*\* ANNUAL : INSPECT AIR PUMP, CANISTER & PCV

\*\*

-----MOBILE3 EMISSION FACTORS (GRAMS CO/VEHICLE MILE)-----

<u>Speed</u>	<u>LDGV</u>	<u>LDGT1</u>	<u>LDGT2</u>	<u>HDGV</u>	<u>LDDV</u>	<u>LDDT</u>	<u>HDDV</u>	<u>MC</u>	<u>LDGT</u>	<u>All Modes</u>
35.0	49.3	51.3	64.8	124.3	0.8	1.4	8.6	27.8	56.6	51.6
10.0	162.3	169.4	215.6	417.7	2.7	4.6	27.8	74.8	187.4	170.1

MOBILE3 IDLE EMISSION RATE (GRAMS CO/MIN)

<u>LDGV</u>	<u>LDGT1</u>	<u>LDGT2</u>	<u>HDGV</u>	<u>LDDV</u>	<u>LDDT</u>	<u>HDDV</u>	<u>MC</u>	<u>LDGT</u>	<u>All Modes</u>
16.0	16.7	17.0	14.6	0.1	0.3	1.0	4.5	16.8	15.8

Figure 11

TEXIN2 Output for Example 2 (Continued)

-----MOBILE3 Anti-Tampering Program Data-----

Start year (January 1): 1984      First model year covered: 1980      Last model year covered: 2020

Vehicle types covered:      LDGV , LDGT1, LDGT2

\*\*  
 \*\* ANNUAL : INSPECT AIR PUMP, CATALYST, FUEL INLET (AND PLUMBESMO),  
 \*\*            CANISTER & PCV  
 \*\*

-----MOBILE3 EMISSION FACTORS (GRAMS CO/VEHICLE MILE)-----

Speed	LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	LDGT	All Modes
35.0	49.3	51.3	64.8	124.3	0.8	1.4	8.6	27.8	56.6	51.6
10.0	162.3	169.4	215.6	417.7	2.7	4.6	27.8	74.8	187.4	170.1

MOBILE3 IDLE EMISSION RATE (GRAMS CO/MIN)

LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	LDGT	All Modes
16.0	16.7	17.0	14.6	0.1	0.3	1.0	4.5	16.8	15.8

Figure 11

TEXIN2 Output for Example 2 (Continued)

-----TRAFFIC FLOW ANALYSIS (MAJOR INTERSECTION - UNSIGNALIZED)-----

For Link 1: Reserve Capacity= 729. veh Stopped Delay= 0.0 sec/veh Approach Delay= 1.3 sec/veh Time in Queue= 0.0 sec/veh Fraction Stopping= 0.00	Fraction of Excess Emissions Due to: Vehicles Idling= 0.00 Vehicles Turning= 0.05 Vehicles Stopping & Slowing= 0.95
For Link 2: Reserve Capacity= 106. veh Stopped Delay= 33.6 sec/veh Approach Delay= 45.5 sec/veh Time in Queue= 42.5 sec/veh Fraction Stopping= 1.00	Fraction of Excess Emissions Due to: Vehicles Idling= 0.30 Vehicles Turning= 0.01 Vehicles Stopping & Slowing= 0.69
For Link 3: Reserve Capacity= 659. veh Stopped Delay= 0.5 sec/veh Approach Delay= 1.9 sec/veh Time in Queue= 0.0 sec/veh Fraction Stopping= 0.00	Fraction of Excess Emissions Due to: Vehicles Idling= 0.01 Vehicles Turning= 0.05 Vehicles Stopping & Slowing= 0.94
For Link 4: Reserve Capacity= 89. veh Stopped Delay= 34.7 sec/veh Approach Delay= 47.0 sec/veh Time in Queue= 43.8 sec/veh Fraction Stopping= 1.00	Fraction of Excess Emissions Due to: Vehicles Idling= 0.34 Vehicles Turning= 0.01 Vehicles Stopping & Slowing= 0.64

Figure 11

TEXIN2 Output for Example 2 (Continued)

-----LINK DESCRIPTION-----

<u>Link</u>	<u>XL1</u>	<u>YL1</u>	<u>XL2</u>	<u>YL2</u>	<u>Length</u>	<u>VEH/HR</u>	<u>Speed</u>	<u>MGM CO/M-SEC</u>
1	0.0	0.0	0.0	400.0	400.0	770.	35.0	6.86
2	0.0	0.0	200.0	0.0	200.0	261.	35.0	2.33
3	0.0	0.0	0.0	-400.0	400.0	749.	35.0	6.67
4	0.0	0.0	-200.0	0.0	200.0	270.	35.0	2.40
5	0.0	0.0	0.0	8.0	8.0	770.	35.0	20.41
6	0.0	0.0	8.0	0.0	8.0	261.	35.0	102.79
7	0.0	0.0	0.0	-8.0	8.0	749.	35.0	20.19
8	0.0	0.0	-12.0	0.0	12.0	270.	35.0	77.39
9	200.0	0.0	285.0	20.0	87.3	261.	35.0	2.33
10	285.0	20.0	360.0	70.0	90.1	261.	35.0	2.33
11	360.0	70.0	390.0	130.0	67.1	261.	35.0	2.33
12	-200.0	0.0	-295.0	-20.0	97.1	270.	35.0	2.40
13	-295.0	-20.0	-360.0	-60.0	76.3	270.	35.0	2.40
14	-360.0	-60.0	-400.0	-120.0	72.1	270.	35.0	2.40

**Figure 11**

**TEXIN2 Output for Example 2 (Continued)**

-----LINK POLLUTANT CONTRIBUTION-----

Contribution from each link to pollutant concentration at receptor 1:

Link Number:	1	2	3	4	5	6	7	8	9	10
Contribution (ppm):	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0

Link Number:	11	12	13	14
Contribution (ppm):	0.0	0.0	0.0	0.0

Contribution from each link to pollutant concentration at receptor 2:

Link Number:	1	2	3	4	5	6	7	8	9	10
Contribution (ppm):	0.4	0.1	0.1	0.1	0.3	1.1	0.2	1.3	0.0	0.0

Link Number:	11	12	13	14
Contribution (ppm):	0.0	0.0	0.0	0.0

Contribution from each link to pollutant concentration at receptor 3:

Link Number:	1	2	3	4	5	6	7	8	9	10
Contribution (ppm):	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Link Number:	11	12	13	14
Contribution (ppm):	0.0	0.2	0.0	0.0

-----RECEPTOR DESCRIPTION AND MODEL PREDICTIONS-----

Receptor	XR	YR	ZR	CO (ppm)*
1	200.0	20.0	2.0	0.2
2	-20.0	20.0	2.0	3.6
3	-300.0	0.0	2.0	0.3

\*Includes Background Ambient Concentration of 0.0 ppm

\*\*\*\*\*  
**Figure 11**

**TEXIN2 Output for Example 2 (Continued)**

### C. Example Three

The third example illustrates the ability of TEXIN2 to model several minor unsignalized intersections in conjunction with the major intersection. The MOBILE3 routine is again used and all of its available options are employed. The intersection geometry is presented in Figure 12 (the major roadways are darkest) and the input data in Figure 13. Three additional links are necessary to model the minor intersections. Traffic on these links will incur delay, and thus, they are considered *NDL* links ( $NDL = 3$ ).

Since all of the available MOBILE3 options are used, the following flags are set accordingly:  $VMFLAG = 1$ ,  $TAMFLG = 0$ ,  $IMFLAG = 1$ ,  $EMFLG = 4$ ,  $MYMRFG = 3$ , and  $ALHFLG = 3$ . The anti-tampering data are the same as that used in the previous example and is presented in Figures 9 and 10. The major intersection is signalized ( $INTFLG = 1$ ) with  $NP = 5$  and  $CY = 100$ . The CMA Operations and Design procedure ( $CMAFG = 1$ ) is to be used. For a four leg intersection,  $TFLAG$  is set to zero. The worst case wind angle analysis is not invoked for this example ( $WCFLAG = 1$ ) but is illustrated for the same intersection in Example 6.

The next two records are for subroutine OPENER (see Appendix A). These records bind files containing anti-tampering program data to the program as in Example 2.

The Link Description cards follow the file name cards. The links for the four major intersection legs are first described. In this example, links 2 and 4 have exclusive left turn lanes with protected greens while links 1 and 3 have neither exclusive left turn lanes or protected greens. Again, all lane widths are set to 3.66 m. Records describing the three additional links follow the cards for the major links. The first variable on each of these cards is the link association number,  $LA$ , which indicates which leg of the intersection the minor road intersects. For the minor roadway which intersects (and terminates at) the positive  $x$ -axis, a value of two (corresponding to link 2) is selected for the integer variable. For the minor roadway which intersects (and crosses) the negative  $x$ -axis, two links are necessary for the simulation and both have values of four for  $LA$ . Note that like the four intersection links, the values  $XL1$  and  $YL1$  for the three additional links correspond to the intersection end of the link. The minor roadway intersecting the positive  $x$ -axis is controlled by a yield sign ( $LTFLG = 0$ ). The other minor roadway is controlled by a stop sign ( $LTFLG = 1$ ). Each roadway actually extends further than shown in Figure 12.

The next cards are the receptor location cards, the meteorological conditions card, and the tampering data cards. The tampering data are, in essence, the MOBILE3 default tampering rates. The next group of 16 records consist of the vehicle registration distribution data. The next data are the inspection/maintenance program parameters. Since  $IMFLAG = 1$ , MOBILE2 I/M credits are to be used and five values must be specified on this card. For the present example:  $ICYIM = 78$ ,  $ISTRIN = 20$ ,  $IMTFLG = 1$ ,  $MODYR1 = 75$ , and  $MODYR2 = 83$  while  $ILLDT = 1$ ,  $ITEST = 1$ , and  $ICUTS = 3$  by default. The next card in the input file is the



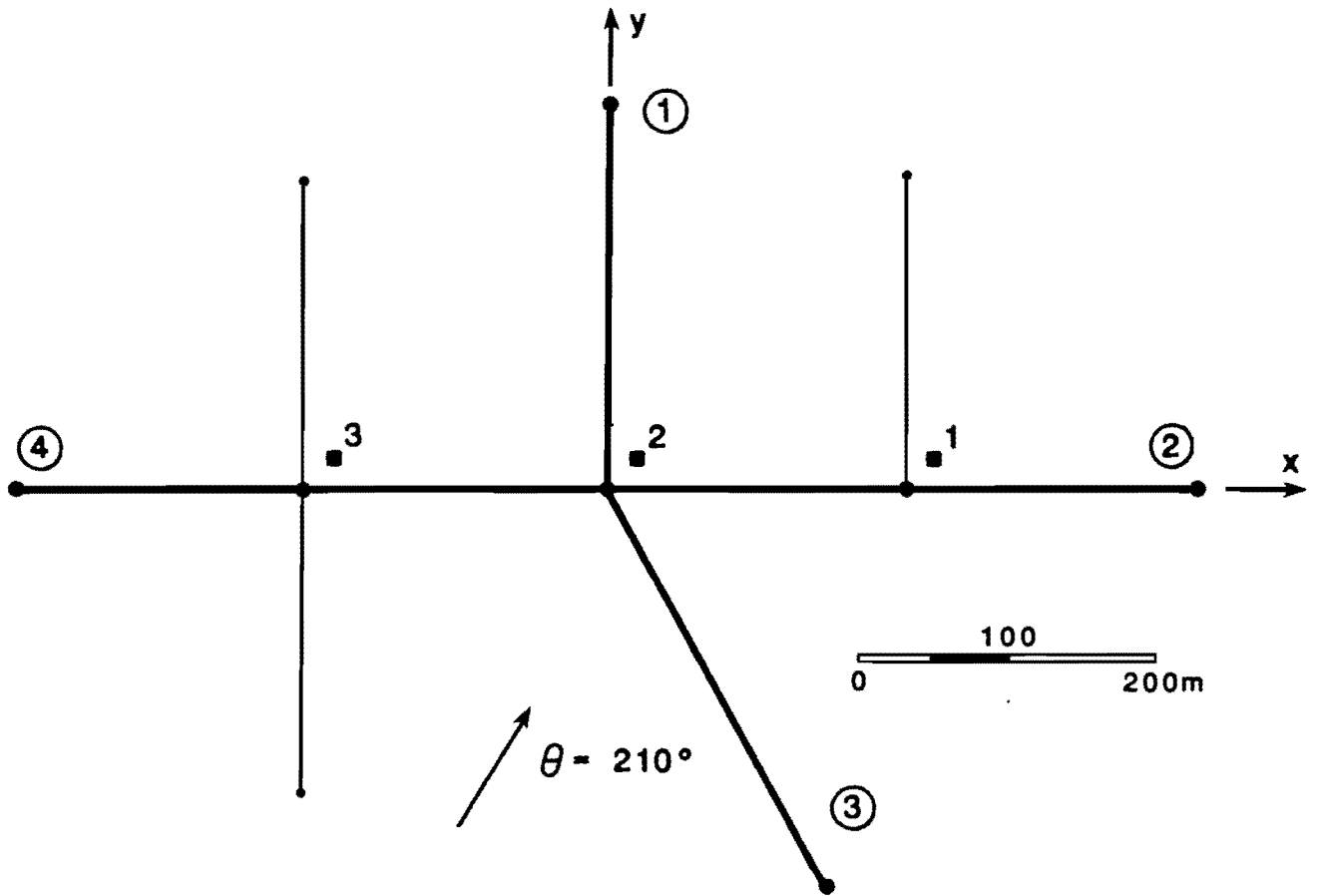


Figure 12  
Overhead View of the Intersection in Example 3

User's Guide Example Three for the TEXIN2 Model—Multiple Intersections

```

1 2 1 3 0 3 5100. 0 1 4 1 0 3 3 1      Flags Card
ATP49
ATP51
1      0.      0.      0.      1000. AG15.0 0.      300. 45. 2 0 0 .10 .05 0 3.66 3.66
2      0.      0.      1000. 0. AG17.0 0.      700. 45. 2 1 0 .15 .20 1 3.66 3.66
3      0.      0.      500.  -866. AG15.0 0.      275. 45. 2 0 0 .05 .15 0 3.66 3.66
4      0.      0.     -1000. 0. AG17.0 0.      650. 45. 2 1 0 .10 .10 1 3.66 3.66
4     -200. 0.     -200. 1000. AG14.0 0.      70. 35. 1 0 0 .10 .40 1 NDL Link
4     -200. 0.     -200. -1000. AG14.0 0.      60. 35. 1 0 0 .05 .45 1 NDL Link
2      200. 0.      200. 1000. AG 8.0 0.      65. 35. 1 0 0 .35 .65 0 NDL Link
220.    20.    2.
20.    20.    2.
-180.  20.    2.
2.5 210. 68. 3 1000. 0. 150. 60.
-.0271 -.0195 -.0143 .0165 -.0006 -.0048 .0002 ZMLTAM.LDGV..no I/M
-.0101 -.0011 -.0077 .0382 -.0006 -.0048 .0002 .I/M
.0489 .1353 .1101 .0696 .0502 .0377 .0308 .LDGT1.no I/M
-.0100 .0332 .0470 .0699 .0502 .0377 .0308 .I/M
.0489 .1353 .1101 .0696 .0502 .0377 .0308 .LDGT2.I/M
-.0100 .0332 .0470 .0699 .0502 .0377 .0308 .no I/M
.0489 .1353 .1101 .0696 .0502 .0377 .0308 .HDGV..no I/M
-.0100 .0332 .0470 .0699 .0502 .0377 .0308 .I/M
.02652 .01611 .02022 .00559 .02199 .00335 .00248DRTAM.V1.no I/M
.01111 .00459 .01000 -.00211 .02199 .00335 .00248 .I/M
.02652 .01611 .02022 .00559 .02199 .00335 .00248 .LDGT1.no I/M
.01111 .00459 .01000 -.00211 .02199 .00335 .00248 .I/M
.02652 .01611 .02022 .00559 .02199 .00335 .00248 .LDGT2.no I/M
.01111 .00459 .01000 -.00211 .02199 .00335 .00248 .I/M
.02652 .01611 .02022 .00559 .02199 .00335 .00248 .HDGV.no I/M
.01111 .00459 .01000 -.00211 .02199 .00335 .00248 .I/M
0.0650.0830.0980.0970.0850.0990.0970.0840.0690.044 JULMYR.LDGV..my ages 1-10
0.0430.0370.0260.0200.0150.0110.0080.0060.0050.008 .LDGV..my ages 11-20
0.0680.0870.1120.0950.0670.0930.0860.0770.0590.036 .LDGT1.my ages 1-10
0.0410.0360.0280.0240.0200.0170.0140.0100.0080.022 .LDGT1.my ages 11-20
0.0760.0980.1260.1070.0750.1040.0970.0830.0610.036 .LDGT2.my ages 1-10
0.0360.0280.0190.0150.0110.0080.0060.0040.0030.007 .LDGT2.my ages 11-20
0.0330.0570.1040.1050.1010.1250.1000.0750.0470.046 .HDGV..my ages 1-10
0.0470.0410.0280.0180.0100.0080.0070.0060.0050.037 .HDGV..my ages 11-20
0.0650.0830.0980.0970.0850.0990.0970.0840.0690.044 .LDDV..my ages 1-10
0.0430.0370.0260.0200.0150.0110.0080.0060.0050.008 .LDDV..my ages 11-20
0.0680.0870.1120.0950.0670.0930.0860.0770.0590.036 .LDDT..my ages 1-10
0.0410.0360.0280.0240.0200.0170.0140.0100.0080.022 .LDDT..my ages 11-20
0.0360.0440.0850.1260.0930.1180.0980.1030.0470.056 .HDDV..my ages 1-10
0.0490.0450.0290.0170.0090.0070.0060.0050.0040.023 .HDDV..my ages 11-20
0.1330.1450.1380.1160.1230.1140.0690.0440.0240.009 .MC...my ages 1-10
0.0850.0000.0000.0000.0000.0000.0000.0000.0000.000 .MC...my ages 11-20
78 20 1 75 83
1 81 21.5 30.6 29.4 .743 .127 .082 .020 .007 .001 .012 .008
0.40 .08 .12 .14 .09 .10 .15 85. 65.
84 68 79 2221
84 80 20 2221
I/M parameters
Optional correction factors
ATP params: 1968-1979
ATP params: 1980-2020

```

Figure 13  
Input Data Cards Used in Example 3

vehicle scenario card followed by the optional air conditioning, extra loading, and trailer towing corrections card. In this example, air conditioning correction factors are switched on by setting  $AC = 0.40$ . The fractions of LDGV, LDGT1, and LDGT2 with extra 500 lb loads are .08, .12, and .14, respectively. The fractions of LDGV, LDGT1, and LDGT2 towing trailers are .09, .10, and .15, respectively. The dry bulb temperature is 85°F and the wet bulb temperature is 65°F. The last two records in this example are the ATP characteristics records and serve the same purpose as those in Example 2.

Figure 14 illustrates the output from Example Three. Again, the first data on the output are the run title along with a summary of the meteorological and intersection input data. The MOBILE3 data then follow along with details concerning all of the options invoked. Traffic flow analyses of the major and minor intersection follow the emissions data. Finally, the details of the various links and the receptor carbon monoxide concentrations are printed.

\*\*\*\*\* TAMU INTERSECTION MODEL --- TEXIN2 \*\*\*\*\*

TITLE: User's Guide Example Three for the TEXIN2 Model--Multiple Intersections

METEOROLOGICAL CONDITIONS:

Wind Speed = 2.5 m/s	Stability Class = 3 (C)	Surface Roughness = 150. cm
Wind Bearing = 210. deg	Mixing Height = 1000. m	Averaging Time = 60. min
Temperature = 68.0 F	Ambient Concentration = 0.0 ppm	

INTERSECTION INFORMATION:

Type = Signalized	Cycle Length = 100.0 sec	Signal Phases = 5
Delay Links = 3	Non-Delay Links = 0	TFLAG = 0

Intersection Calculational Procedure: CMA Operations & Design

-----LINK SUMMARY-----

Link	Type	Width	Height	VPHI	VSP	NLN	NLTL	NRTL	FLT	FRT	LTFLG	THWIDE	LTWIDE
1	AG	15.0	0.0	300.	45.0	2	0	0	.1000	.0500	0	3.66	3.66
2	AG	17.0	0.0	700.	45.0	2	1	0	.1500	.2000	1	3.66	3.66
3	AG	15.0	0.0	275.	45.0	2	0	0	.0500	.1500	0	3.66	3.66
4	AG	17.0	0.0	650.	45.0	2	1	0	.1000	.1000	1	3.66	3.66

Figure 14

TEXIN2 Output for Example 3

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-----MOBILE3 EMISSION CALCULATIONS-----

COMMENT: A/C correction factor will be calculated. Value of inputted AC usage parameter is ignored.

User supplied VMT mix: Yes  
Anti-tampering program: Yes

User supplied Tampering data: Yes  
User supplied mileage accrual: No

Inspection/Maintenance: Yes  
User supplied registration data: Yes

-----MOBILE3 REPLACEMENT TAMPERING AND MISFUELING RATES-----

Non-I/M Case

Component	<u>LDGV</u>		<u>LDGT1</u>		<u>LDGT2</u>		<u>HDGV</u>	
	<u>ZML</u>	<u>DET</u>	<u>ZML</u>	<u>DET</u>	<u>ZML</u>	<u>DET</u>	<u>ZML</u>	<u>DET</u>
Air Pump	-0.0271	0.02652	0.0489	0.02652	0.0489	0.02652	0.0489	0.02652
Catalyst	-0.0195	0.01611	0.1353	0.01611	0.1353	0.01611	0.1353	0.01611
Fuel Inlet	-0.0143	0.02022	0.1101	0.02022	0.1101	0.02022	0.1101	0.02022
Other Misfueling	0.0165	0.00559	0.0696	0.00559	0.0696	0.00559	0.0696	0.00559
EGR System	-0.0006	0.02199	0.0502	0.02199	0.0502	0.02199	0.0502	0.02199
Evap Canister	-0.0048	0.00335	0.0377	0.00335	0.0377	0.00335	0.0377	0.00335
PCV System	0.0002	0.00248	0.0308	0.00248	0.0308	0.00248	0.0308	0.00248

I/M Case

Component	<u>LDGV</u>		<u>LDGT1</u>		<u>LDGT2</u>		<u>HDGV</u>	
	<u>ZML</u>	<u>DET</u>	<u>ZML</u>	<u>DET</u>	<u>ZML</u>	<u>DET</u>	<u>ZML</u>	<u>DET</u>
Air Pump	-0.0101	0.01111	-0.0100	0.01111	-0.0100	0.01111	-0.0100	0.01111
Catalyst	-0.0011	0.00459	0.0332	0.00459	0.0332	0.00459	0.0332	0.00459
Fuel Inlet	-0.0077	0.01000	0.0470	0.01000	0.0470	0.01000	0.0470	0.01000
Other Misfueling	0.0382	-0.00211	0.0699	-0.00211	0.0699	-0.00211	0.0699	-0.00211
EGR System	-0.0006	0.02199	0.0502	0.02199	0.0502	0.02199	0.0502	0.02199
Evap Canister	-0.0048	0.00335	0.0377	0.00335	0.0377	0.00335	0.0377	0.00335
PCV System	0.0002	0.00248	0.0308	0.00248	0.0308	0.00248	0.0308	0.00248

Figure 14

TEXIN2 Output for Example 3 (Continued)

-----MOBILE3 INSPECTION/MAINTENANCE PROGRAM-----

Start year (January 1): 78  
 First model year covered: 75

Pre-1981 MYR stringency rate: 20%

Mechanic training program?: No  
 Last model year covered: 83

Vehicle types covered: LDGV

1981 & later MYR test type: Idle  
 1981 & later MYR test cutpoints: 3.0% ICD

-----MOBILE3 EMISSION FACTORS (GRAMS CO/VEHICLE MILE)-----

Scenario: Region = 1                      Vehicle Mix: LDGV = 0.743                      LDDV = 0.007  
           Year = 1981                      LDGT1 = 0.127                      LDDT = 0.001  
           PCCN = 21.5                      LDGT2 = 0.082                      HDDV = 0.012  
           PCHC = 30.6                      HDGV = 0.020                      MC = 0.008  
           PCCC = 29.4  
           Altitude = 500.0 ft

A/C Corrections---AC (DB / WB (F)): 0.5 ( 85.0 / 65.0)  
 Extra Load (LDGV / LDGT1 / LDGT2): 0.080 / 0.120 / 0.140  
 Trailer in low (LDGV / LDGT1 / LDGT2): 0.090 / 0.100 / 0.150

Speed	LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	LDGT	All Modes
45.0	20.9	32.7	35.0	92.6	0.7	1.1	7.6	13.1	33.6	24.6
35.0	27.0	41.3	46.2	102.3	0.8	1.2	8.9	16.3	43.2	31.4
10.0	92.8	136.2	175.6	344.0	2.5	4.0	28.8	55.1	151.7	108.4

MOBILE3 IDLE EMISSION RATE (GRAMS CO/MIN)

LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	LDGT	All Modes
11.7	11.2	11.4	9.1	0.2	0.3	1.0	3.3	11.3	11.3

Figure 14

TEXIN2 Output for Example 3 (Continued)

-----MOBILE3 Anti-Tampering Program Data-----

Start year (January 1): 1984                      First model year covered: 1968                      Last model year covered: 1979

Vehicle types covered:      LDGV , LDGT1, LDGT2

\*\*  
\*\*  
\*\* ANNUAL : INSPECT AIR PUMP, CANISTER & PCV  
\*\*

-----MOBILE3 EMISSION FACTORS (GRAMS CO/VEHICLE MILE)-----

<u>Speed</u>	<u>LDGV</u>	<u>LDGT1</u>	<u>LDGT2</u>	<u>HDGV</u>	<u>LDDV</u>	<u>LDDT</u>	<u>HDDV</u>	<u>MC</u>	<u>LDGT</u>	<u>All Modes</u>
45.0	20.9	32.7	35.0	92.6	0.7	1.1	7.6	13.1	33.6	24.6
35.0	27.0	41.3	46.2	102.3	0.8	1.2	8.9	16.3	43.2	31.4
10.0	92.8	136.2	175.6	344.0	2.5	4.0	28.8	55.1	151.7	108.4

MOBILE3 IDLE EMISSION RATE (GRAMS CO/MIN)

<u>LDGV</u>	<u>LDGT1</u>	<u>LDGT2</u>	<u>HDGV</u>	<u>LDDV</u>	<u>LDDT</u>	<u>HDDV</u>	<u>MC</u>	<u>LDGT</u>	<u>All Modes</u>
11.7	11.2	11.4	9.1	0.2	0.3	1.0	3.3	11.3	11.3

Figure 14

TEXIN2 Output for Example 3 (Continued)

-----MOBILE3 Anti-Tampering Program Data-----

Start year (January 1): 1984

First model year covered: 1980

Last model year covered: 2020

Vehicle types covered: LDGV , LDGT1, LDGT2

\*\*

\*\* ANNUAL : INSPECT AIR PUMP, CATALYST, FUEL INLET (AND PLUMBTESMO),  
CANISTER & PCV

\*\*

-----MOBILE3 EMISSION FACTORS (GRAMS CO/VEHICLE MILE)-----

<u>Speed</u>	<u>LDGV</u>	<u>LDGT1</u>	<u>LDGT2</u>	<u>HDGV</u>	<u>LDDV</u>	<u>LDDT</u>	<u>HDDV</u>	<u>MC</u>	<u>LDGT</u>	<u>All Modes</u>
45.0	20.9	32.7	35.0	92.6	0.7	1.1	7.6	13.1	33.6	24.6
35.0	27.0	41.3	46.2	102.3	0.8	1.2	8.9	16.3	43.2	31.4
10.0	92.8	136.2	175.6	344.0	2.5	4.0	28.8	55.1	151.7	108.4

MOBILE3 IDLE EMISSION RATE (GRAMS CO/MIN)

<u>LDGV</u>	<u>LDGT1</u>	<u>LDGT2</u>	<u>HDGV</u>	<u>LDDV</u>	<u>LDDT</u>	<u>HDDV</u>	<u>MC</u>	<u>LDGT</u>	<u>All Modes</u>
11.7	11.2	11.4	9.1	0.2	0.3	1.0	3.3	11.3	11.3

Figure 14

TEXIN2 Output for Example 3 (Continued)



-----TRAFFIC FLOW ANALYSIS (MAJOR INTERSECTION - SIGNALIZED)-----

Volume/Capacity= 0.45  
Stopped Delay= 12.0 sec/veh  
Approach Delay= 17.1 sec/veh  
Time in Queue= 14.7 sec/veh  
Fraction Stopping= 0.54

Fraction of Excess  
Emissions Due to:  
Vehicles Idling= 0.15  
Vehicles Turning= 0.06  
Vehicles Stopping & Slowing= 0.79

-----TRAFFIC FLOW ANALYSIS (MINOR INTERSECTION(S) - UNSIGNALIZED)-----

For Link 9:

Reserve Capacity= 16. veh  
Stopped Delay= 39.0 sec/veh  
Approach Delay= 52.7 sec/veh  
Time in Queue= 49.4 sec/veh  
Fraction Stopping= 1.00

Fraction of Excess  
Emissions Due to:  
Vehicles Slowing= 0.11  
Vehicles Stopping= 0.50  
Vehicles Idling= 0.39

For Link 10:

Reserve Capacity= 37. veh  
Stopped Delay= 37.8 sec/veh  
Approach Delay= 51.1 sec/veh  
Time in Queue= 47.8 sec/veh  
Fraction Stopping= 1.00

Fraction of Excess  
Emissions Due to:  
Vehicles Slowing= 0.11  
Vehicles Stopping= 0.50  
Vehicles Idling= 0.38

For Link 11:

Reserve Capacity= 35. veh  
Stopped Delay= 37.9 sec/veh  
Approach Delay= 51.1 sec/veh  
Time in Queue= 47.9 sec/veh  
Fraction Stopping= 0.80

Fraction of Excess  
Emissions Due to:  
Vehicles Slowing= 0.17  
Vehicles Stopping= 0.42  
Vehicles Idling= 0.40

Figure 14

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-----LINK DESCRIPTION-----

Link	XL1	YL1	XL2	YL2	Length	VEH/HR	Speed	MGM CO/M-SEC
1	0.0	0.0	0.0	1000.0	1000.0	725.	45.0	3.08
2	0.0	0.0	1000.0	0.0	1000.0	1291.	45.0	5.49
3	0.0	0.0	500.0	-866.0	1000.0	700.	45.0	2.98
4	0.0	0.0	-1000.0	0.0	1000.0	1134.	45.0	4.82
5	0.0	0.0	0.0	17.9	17.9	725.	45.0	71.15
6	0.0	0.0	41.8	0.0	41.8	1291.	45.0	71.05
7	0.0	0.0	8.2	-14.2	16.4	700.	45.0	71.02
8	0.0	0.0	-38.8	0.0	38.8	1134.	45.0	60.33
9	-200.0	0.0	-200.0	1000.0	1000.0	140.	35.0	0.76
10	-200.0	0.0	-200.0	-1000.0	1000.0	120.	35.0	0.65
11	200.0	0.0	200.0	1000.0	1000.0	130.	35.0	0.70
12	-200.0	0.0	-200.0	35.0	35.0	140.	35.0	10.44
13	-200.0	0.0	-200.0	-13.1	13.1	120.	35.0	23.48
14	200.0	0.0	200.0	14.7	14.7	130.	35.0	21.68

Figure 14

TEXIN2 Output for Example 3 (Continued)

-----LINK POLLUTANT CONTRIBUTION-----

Contribution from each link to pollutant concentration at receptor 1:

Link Number:	1	2	3	4	5	6	7	8	9	10
Contribution (ppm):	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Link Number:	11	12	13	14
Contribution (ppm):	0.0	0.0	0.0	0.3

Contribution from each link to pollutant concentration at receptor 2:

Link Number:	1	2	3	4	5	6	7	8	9	10
Contribution (ppm):	0.1	0.2	0.1	0.1	1.5	3.1	1.3	0.9	0.0	0.0

Link Number:	11	12	13	14
Contribution (ppm):	0.0	0.0	0.0	0.0

Contribution from each link to pollutant concentration at receptor 3:

Link Number:	1	2	3	4	5	6	7	8	9	10
Contribution (ppm):	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0

Link Number:	11	12	13	14
Contribution (ppm):	0.0	0.2	0.3	0.0

-----RECEPTOR DESCRIPTION AND MODEL PREDICTIONS-----

Receptor	<u>XR</u>	<u>YR</u>	<u>ZR</u>	<u>CO (ppm)*</u>
1	220.0	20.0	2.0	0.6
2	20.0	20.0	2.0	7.3
3	-180.0	20.0	2.0	0.8

\*Includes Background Ambient Concentration of 0.0 ppm

.....

Figure 14

TEXIN2 Output for Example 3 (Continued)

#### D. Example Four

The fourth example illustrates the use of the TEXIN2 model in simulating signalized T-intersections. The geometry used is shown in Figure 15. The input data are summarized in Figure 16. The default VMT mix is to be used so  $VMFLAG$  is taken as zero. Extended output is desired ( $PRTFLG = 2$ ), and as stated above, the intersection is signalized ( $INTFLG = 1$ ). The model is to estimate the concentration at three receptors ( $NR = 3$ ). There are no additional links for this run ( $NNDL = NDL = 0$ ). The intersection is a three phase junction ( $NP = 3$ ) with a cycle length of 60 seconds ( $CY = 60$ ). The short-cut emissions model is to be used without internal idle emission factor estimation ( $EMFLG = 2$ ,  $TAMFLG = 1$ ,  $IMFLAG = 0$ ,  $MYMRFG = 1$ , and  $ALHFLG = 1$ ). The estimate of the idle emission factor is located on the last record in the input of Figure 16. If internal idle emission factor estimation were desired, the user would simply omit the estimated factor and set  $EMFLG = 1$ . The CMA Operations and Design algorithm is to be employed ( $CMAFG = 1$ ) and, since the west leg of the T-intersection is missing,  $TFLAG$  is taken as four.

Since  $EMFLG = 2$ , no file name records are needed. Therefore, the next data are the Link Description records. The intersection is an at-grade location with each link being 18 m wide. Link 1 has four approach lanes, link 2 has three approach lanes, and link 3 has two approach lanes. The number of exclusive left-turn lanes for the links are 2, 1, and 0, respectively. Link 2 has two exclusive right-turn lanes and link 3 has one. The fractions of vehicles turning left for links 1, 2, and 3 are 0.40, 0.40, and 0.0, while the fractions of vehicles turning right are 0.0, 0.60, and 0.20, respectively. Link 1 is left-turn signalized, so  $LTFLG$  is set to one for this link.

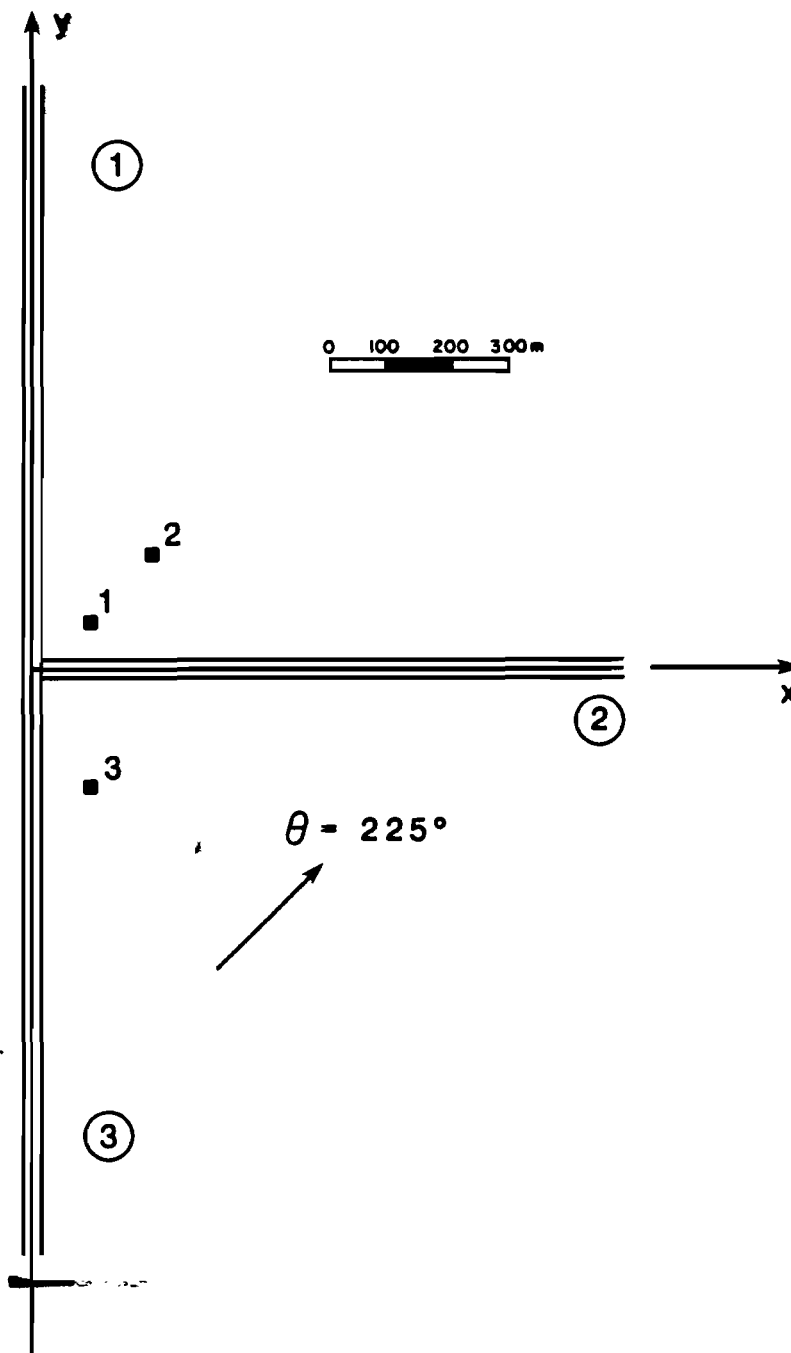


Figure 15  
Overhead View of the Intersection in Example 4

```

User's Guide Example 4 for the TEXIN2 Model—A T-Intersection
0 2 1 3 0 0 3 60. 1 0 2 1 4 1 1 1      Flags Card
1      0.      0.      0. 1000.AG18.0 0. 1250. 40. 4 2 0 .40 .00 1 3.66 3.66
2      0.      0. 1000.      0.AG18.0 0. 950. 35. 3 1 2 .40 .60 0 3.66 3.66
3      0.      0.      0. -200.AG18.0 0. 1100. 40. 2 0 1 .00 .20 0 3.66 3.66
100. 100. 2.      Receptor 1: XR, YR, ZR
200. 200. 2.      Receptor 2: XR, YR, ZR
100. -200. 2.      Receptor 3: XR, YR, ZR
2. 225. 80. 4 1000. 0. 175. 60. Meteorological Conditions
1 83 25. 35. 25. Vehicle Scenario
13.0 Idle Emission Factor Estimate

```

Figure 16  
Input Data Cards Used in Example 4

\*\*\*\*\* TAMU INTERSECTION MODEL --- TEXIN2 \*\*\*\*\*

TITLE: User's Guide Example 4 for the TEXIN2 Model---A T-Intersection

METEOROLOGICAL CONDITIONS:

Wind Speed = 2.0 m/s                      Stability Class = 4 (D)                      Surface Roughness = 175. cm  
 Wind Bearing = 225. deg                  Mixing Height = 1000. m                      Averaging Time = 60. min  
 Temperature = 80.0 F                      Ambient Concentration = 0.0 ppm

INTERSECTION INFORMATION:

Type = Signalized                      Cycle Length = 60.0 sec                      Signal Phases = 3  
 Delay Links = 0                      Non-Delay Links = 0                      TFLAG = 4  
 Intersection Calculational Procedure: CMA Operations & Design

-----LINK SUMMARY-----

<u>Link</u>	<u>Type</u>	<u>Width</u>	<u>Height</u>	<u>VPHI</u>	<u>VSP</u>	<u>NLN</u>	<u>NLTL</u>	<u>NRTL</u>	<u>FLT</u>	<u>FRT</u>	<u>LTFLG</u>	<u>THWIDE</u>	<u>LTWIDE</u>
1	AG	18.0	0.0	1250.	40.0	4	2	0	.4000	.0000	1	3.66	3.66
2	AG	18.0	0.0	950.	35.0	3	1	2	.4000	.6000	0	3.66	3.66
3	AG	18.0	0.0	1100.	40.0	2	0	1	.0000	.2000	0	3.66	3.66
4	-----Missing T Leg-----												

Figure 17

TEXIN2 Output for Example 4

-----TRAFFIC FLOW ANALYSIS (MAJOR INTERSECTION - SIGNALIZED)-----

Volume/Capacity= 0.80  
 Stopped Delay= 28.2 sec/veh  
 Approach Delay= 38.4 sec/veh  
 Time in Queue= 35.5 sec/veh  
 Fraction Stopping= 0.73

Fraction of Excess  
 Emissions Due to:  
 Vehicles Idling= 0.25  
 Vehicles Turning= 0.07  
 Vehicles Stopping & Slowing= 0.68

-----LINK DESCRIPTION-----

Link	XL1	YL1	XL2	YL2	Length	VEH/HR	Speed	MGM CO/M-SEC
1	0.0	0.0	0.0	1000.0	1000.0	2700.	40.0	12.84
2	0.0	0.0	1000.0	0.0	1000.0	1670.	35.0	8.65
3	0.0	0.0	0.0	-200.0	200.0	2230.	40.0	10.61
4	-----Missing T Leg-----							
5	0.0	0.0	0.0	30.4	30.4	2700.	40.0	201.83
6	0.0	0.0	30.8	0.0	30.8	1670.	35.0	220.61
7	0.0	0.0	0.0	-53.6	53.6	2230.	40.0	171.58
8	-----Missing T Leg-----							

Figure 17

TEXIN2 Output for Example 4 (Continued)



-----LINK POLLUTANT CONTRIBUTION-----

Contribution from each link to pollutant concentration at receptor 1:

Link Number:	1	2	3	4	5	6	7	8
Contribution (ppm):	0.2	0.1	0.1	0.0	1.6	1.7	1.6	0.0

Contribution from each link to pollutant concentration at receptor 2:

Link Number:	1	2	3	4	5	6	7	8
Contribution (ppm):	0.1	0.1	0.1	0.0	0.5	0.6	0.6	0.0

Contribution from each link to pollutant concentration at receptor 3:

Link Number:	1	2	3	4	5	6	7	8
Contribution (ppm):	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

-----RECEPTOR DESCRIPTION AND MODEL PREDICTIONS-----

Receptor	<u>XR</u>	<u>YR</u>	<u>ZR</u>	<u>CO (ppm)*</u>
1	100.0	100.0	2.0	5.3
2	200.0	200.0	2.0	2.0
3	100.0	-200.0	2.0	0.0

\*Includes Background Ambient Concentration of 0.0 ppm

.....

Figure 17

TEXIN2 Output for Example 4 (Continued)

### E. Example Five

Example five illustrates the use of the model in predicting carbon monoxide concentrations at 4-way stop intersections. The intersection being modeled is illustrated in Figure 18. The intersection is a basic  $4 \times 4$  4-way stop with left and right turns legal only from the left and right approach lanes, respectively. Special attention should be drawn to the fact that the emissions model for the 4-way stop intersection was developed for only  $4 \times 4$  intersections (those with 2 approach lanes on each major leg).<sup>13</sup>

In accord with the emissions routine,<sup>13</sup> the links for the intersection in Figure 18 are taken to be 100 ft (30.5 m). *INTFLG* is set to two in the data in Figure 19 indicating that the output should contain a traffic analysis. Since *PRTFLG* = 2, the model will generate a section summarizing the link contributions to the concentration estimates. Since the emissions model does not use either the short-cut emissions model or the MOBILE3 program, all MOBILE3 flags except for the VMT mix are set so that the default data are used (as in Example 4). The VMT mix information is used to calculate the fraction of trucks for the area and hence does affect the emissions model and in this example is supplied to override the default data. This also means that *VMFLAG* is set equal to one. The fractions of left turning vehicles are .15, .20, .20, and .10, while the fractions of right turning vehicles are .10, .15, .10, and .15, on links 1, 2, 3, and 4, respectively. Traffic volumes are included on the Link Description Cards as in the previous examples. The number of additional links for which traffic incurs no delay is 28 corresponding to the distance needed to step out at 100 ft increments to the end of the major links (800 ft).

The output from this simulation is presented in Figure 20. The output consists of the same data present in the other examples along with a summary of approach responses for the links.

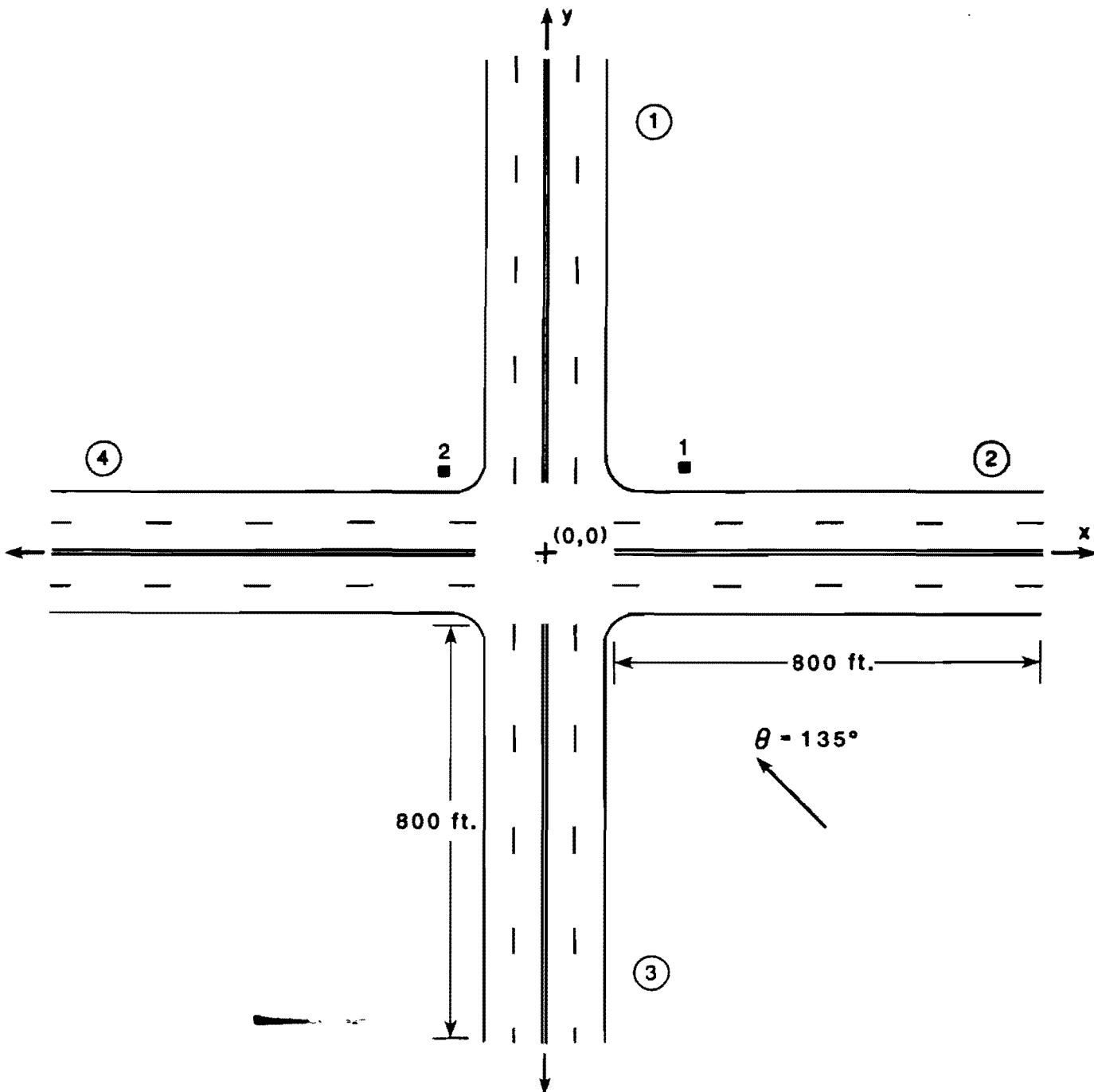


Figure 18  
Overhead View of the Intersection in Example 5



\*\*\*\*\* TAMU INTERSECTION MODEL --- TEXIN2 \*\*\*\*\*

TITLE: User's Guide Example 5 for the TEXIN2 Model--4-Way Stop Intersections (4X4 ONLY)

METEOROLOGICAL CONDITIONS:

Wind Speed = 2.0 m/s                      Stability Class = 3 (C)                      Surface Roughness = 150. cm  
 Wind Bearing = 135. deg                  Mixing Height = 1000. m                      Averaging Time = 60. min  
 Temperature = 68.0 F                      Ambient Concentration = 0.0 ppm

INTERSECTION INFORMATION:

Type = 4X4 Stop                              Cycle Length = 0.0 sec                      Signal Phases = 0  
 Delay Links = 0                              Non-Delay Links = 28                      TFLAG = 0

-----LINK SUMMARY-----

<u>Link</u>	<u>Type</u>	<u>Width</u>	<u>Height</u>	<u>VPHI</u>	<u>VSP</u>	<u>NLN</u>	<u>NLTL</u>	<u>NRTL</u>	<u>FLT</u>	<u>FRT</u>	<u>LTFLG</u>	<u>THWIDE</u>	<u>LTWIDE</u>
1	AG	17.5	0.0	150.	35.0	2	0	0	.1500	.1000	0	3.66	3.66
2	AG	14.0	0.0	500.	35.0	2	0	0	.2000	.1500	0	3.66	3.66
3	AG	17.5	0.0	250.	35.0	2	0	0	.2000	.1000	0	3.66	3.66
4	AG	14.0	0.0	325.	35.0	2	0	0	.1000	.1500	0	3.66	3.66

Figure 20

TEXIN2 Output for Example 5

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SUMMARY OF APPROACH RESPONSES FOR THE 4-WAY STOP INTERSECTION FOR LINK 1:

ATDA=	12.12 S/VEH	ASDA=	6.28 S/VEH
ATDL=	0.00 S/VEH	ASDL=	0.00 S/VEH
ATDR=	12.37 S/VEH	ASDR=	6.12 S/VEH
ATDS=	11.98 S/VEH	ASDS=	6.42 S/VEH
QAVG=	4.48 M	QMAX=	14.08 M

SUMMARY OF APPROACH RESPONSES FOR THE 4-WAY STOP INTERSECTION FOR LINK 2:

ATDA=	12.56 S/VEH	ASDA=	6.52 S/VEH
ATDL=	14.18 S/VEH	ASDL=	6.48 S/VEH
ATDR=	12.29 S/VEH	ASDR=	6.12 S/VEH
ATDS=	12.68 S/VEH	ASDS=	6.86 S/VEH
QAVG=	4.64 M	QMAX=	19.52 M

SUMMARY OF APPROACH RESPONSES FOR THE 4-WAY STOP INTERSECTION FOR LINK 3:

ATDA=	12.34 S/VEH	ASDA=	6.40 S/VEH
ATDL=	7.09 S/VEH	ASDL=	3.24 S/VEH
ATDR=	12.33 S/VEH	ASDR=	6.12 S/VEH
ATDS=	12.33 S/VEH	ASDS=	6.64 S/VEH
QAVG=	4.56 M	QMAX=	16.80 M

SUMMARY OF APPROACH RESPONSES FOR THE 4-WAY STOP INTERSECTION FOR LINK 4:

ATDA=	12.12 S/VEH	ASDA=	6.28 S/VEH
ATDL=	0.00 S/VEH	ASDL=	0.00 S/VEH
ATDR=	12.37 S/VEH	ASDR=	6.12 S/VEH
ATDS=	11.98 S/VEH	ASDS=	6.42 S/VEH
QAVG=	4.48 M	QMAX=	14.08 M

---

Figure 20

TEXIN2 Output for Example 5 (Continued)

-----LINK DESCRIPTION-----

Link	XL1	YL1	XL2	YL2	Length	VEH/HR	Speed	MGM CO/M-SEC
1	0.0	0.0	0.0	30.5	30.5	432.	35.0	5.37
2	0.0	0.0	30.5	0.0	30.5	791.	35.0	5.70
3	0.0	0.0	0.0	-30.5	30.5	511.	35.0	5.38
4	0.0	0.0	-30.5	0.0	30.5	715.	35.0	6.00
5	0.0	0.0	0.0	4.5	4.5	432.	0.0	0.00
6	0.0	0.0	4.6	0.0	4.6	791.	0.0	0.00
7	0.0	0.0	0.0	-4.6	4.6	511.	0.0	0.00
8	0.0	0.0	-4.5	0.0	4.5	715.	0.0	0.00
9	0.0	30.5	0.0	61.0	30.5	432.	0.0	1.65
10	0.0	61.0	0.0	91.5	30.5	432.	0.0	1.65
11	0.0	91.5	0.0	122.0	30.5	432.	0.0	1.65
12	0.0	122.0	0.0	152.5	30.5	432.	0.0	1.65
13	0.0	152.5	0.0	183.0	30.5	432.	0.0	1.65
14	0.0	183.0	0.0	213.5	30.5	432.	0.0	1.65
15	0.0	213.5	0.0	244.0	30.5	432.	0.0	1.65
16	30.5	0.0	61.0	0.0	30.5	791.	0.0	1.65
17	61.0	0.0	91.5	0.0	30.5	791.	0.0	1.65
18	91.5	0.0	122.0	0.0	30.5	791.	0.0	1.65

Figure 20

TEXIN2 Output for Example 5 (Continued)

19	122.0	0.0	152.5	0.0	30.5	791.	0.0	1.65
20	152.5	0.0	183.0	0.0	30.5	791.	0.0	1.65
21	183.0	0.0	213.5	0.0	30.5	791.	0.0	1.65
22	213.5	0.0	244.0	0.0	30.5	791.	0.0	1.65
23	0.0	-30.5	0.0	-61.0	30.5	511.	0.0	1.65
24	0.0	-61.0	0.0	-91.5	30.5	511.	0.0	1.65
25	0.0	-91.5	0.0	-122.0	30.5	511.	0.0	1.65
26	0.0	-122.0	0.0	-152.5	30.5	511.	0.0	1.65
27	0.0	-152.5	0.0	-183.0	30.5	511.	0.0	1.65
28	0.0	-183.0	0.0	-213.5	30.5	511.	0.0	1.65
29	0.0	-213.5	0.0	-244.0	30.5	511.	0.0	1.65
30	-30.5	0.0	-61.0	0.0	30.5	715.	0.0	1.65
31	-61.0	0.0	-91.5	0.0	30.5	715.	0.0	1.65
32	-91.5	0.0	-122.0	0.0	30.5	715.	0.0	1.65
33	-122.0	0.0	-152.5	0.0	30.5	715.	0.0	1.65
34	-152.5	0.0	-183.0	0.0	30.5	715.	0.0	1.65
35	-183.0	0.0	-213.5	0.0	30.5	715.	0.0	1.65
36	-213.5	0.0	-244.0	0.0	30.5	715.	0.0	1.65

---

**Figure 20**

**TEXIN2 Output for Example 5 (Continued)**



-----LINK POLLUTANT CONTRIBUTION-----

Contribution from each link to pollutant concentration at receptor 1:

Link Number:	1	2	3	4	5	6	7	8	9	10
Contribution (ppm):	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Link Number:	11	12	13	14	15	16	17	18	19	20
Contribution (ppm):	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0

Link Number:	21	22	23	24	25	26	27	28	29	30
Contribution (ppm):	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Link Number:	31	32	33	34	35	36
Contribution (ppm):	0.0	0.0	0.0	0.0	0.0	0.0

Contribution from each link to pollutant concentration at receptor 2:

Link Number:	1	2	3	4	5	6	7	8	9	10
Contribution (ppm):	0.2	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0

Link Number:	11	12	13	14	15	16	17	18	19	20
Contribution (ppm):	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Link Number:	21	22	23	24	25	26	27	28	29	30
Contribution (ppm):	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Link Number:	31	32	33	34	35	36
Contribution (ppm):	0.0	0.0	0.0	0.0	0.0	0.0

Figure 20

TEXIN2 Output for Example 5 (Continued)



-----RECEPTOR DESCRIPTION AND MODEL PREDICTIONS-----

<u>Receptor</u>	<u>XR</u>	<u>YR</u>	<u>ZR</u>	<u>CO (ppm) *</u>
1	50.0	20.0	2.0	0.1
2	-20.0	20.0	2.0	0.6

\*Includes Background Ambient Concentration of 0.0 ppm

.....\*

**Figure 20**  
**TEXIN2 Output for Example 5 (Continued)**

## F. Example Six

The final example presented in this guide illustrates the worst case wind angle search capabilities of the model. The intersection being modeled is the same intersection presented in Example 3 (Figure 12). Again MOBILE3 is invoked along with all MOBILE3 options.

In order to perform the worst case wind angle analysis, *WCFLAG* must be set to 2 or 3. If *WCFLAG* = 2 as in this example, only the worst case wind angles will be printed. For *WCFLAG* = 3, the worst case wind angles are printed along with the carbon monoxide concentrations for each receptor at each wind angle increment specified by *BRG*. In this example, *BRG* on the meteorological conditions card has been set to 5.0. This indicates that the model will search for the wind angle that yields the highest carbon monoxide concentration at each receptor by starting at 0° and incrementing by 5° to 360°. In order to realize the effect of the anti-tampering programs, the modeling year (*ICY*) was changed to 2000. All other input to the model are exactly the same as that in Example 3. These data are illustrated in Figure 21 and the anti-tampering programs in Figures 9 and 10 for the early and late coverage years, respectively.

The output for Example 6 is presented in Figure 22. The emission rates predicted by each MOBILE3 trial differ due to the anti-tampering programs. There is no summary of the link contributions to each receptor and no model predictions for a specific wind angle. These sections have been replaced by the wind angles that result in the highest carbon monoxide concentration for each receptor along with the worst case concentrations.

User's Guide Example Six for the TEXIN2 Model—Worst Case Wind Angle Analysis

```

1 2 1 3 0 3 5100. 0 1 4 1 0 3 3 2      Flags Card
ATP49
ATP51
1 0. 0. 0. 1000.AG15.0 0. 300. 45. 2 0 0 .10 .05 0 3.66 3.66
2 0. 0. 1000. 0.AG17.0 0. 700. 45. 2 1 0 .15 .20 1 3.66 3.66
3 0. 0. 500. -866.AG15.0 0. 275. 45. 2 0 0 .05 .15 0 3.66 3.66
4 0. 0. -1000. 0.AG17.0 0. 650. 45. 2 1 0 .10 .10 1 3.66 3.66
4 -200. 0. -200. 1000.AG14.0 0. 70. 35. 1 0 0 .10 .40 1 NDL Link
4 -200. 0. -200. -1000.AG14.0 0. 60. 35. 1 0 0 .05 .45 1 NDL Link
2 200. 0. 200. 1000.AG 8.0 0. 65. 35. 1 0 0 .35 .65 0 NDL Link
220. 20. 2. Receptor 1: XR, YR, ZR
20. 20. 2. Receptor 2: XR, YR, ZR
-180. 20. 2. Receptor 3: XR, YR, ZR
2.5 5. 68. 3 1000. 0. 150. 60. Meteorological Conditions
-.0271 -.0195 -.0143 .0165 -.0006 -.0048 .0002 ZMLTAM.LDGV..no I/M
-.0101 -.0011 -.0077 .0382 -.0006 -.0048 .0002 .I/M
.0489 .1353 .1101 .0696 .0502 .0377 .0308 .LDGT1.no I/M
-.0100 .0332 .0470 .0699 .0502 .0377 .0308 .I/M
.0489 .1353 .1101 .0696 .0502 .0377 .0308 .LDGT2.I/M
-.0100 .0332 .0470 .0699 .0502 .0377 .0308 .no I/M
.0489 .1353 .1101 .0696 .0502 .0377 .0308 .HDGV..no I/M
-.0100 .0332 .0470 .0699 .0502 .0377 .0308 .I/M
.02652 .01611 .02022 .00559 .02199 .00335 .00248DRTAM.V1.no I/M
.01111 .00459 .01000 -.00211 .02199 .00335 .00248 .I/M
.02652 .01611 .02022 .00559 .02199 .00335 .00248 .LDGT1.no I/M
.01111 .00459 .01000 -.00211 .02199 .00335 .00248 .I/M
.02652 .01611 .02022 .00559 .02199 .00335 .00248 .LDGT2.no I/M
.01111 .00459 .01000 -.00211 .02199 .00335 .00248 .I/M
.02652 .01611 .02022 .00559 .02199 .00335 .00248 .HDGV.no I/M
.01111 .00459 .01000 -.00211 .02199 .00335 .00248 .I/M
0.0650.0830.0980.0970.0850.0990.0970.0840.0690.044 JULMYR.LDGV..my ages 1-10
0.0430.0370.0260.0200.0150.0110.0080.0060.0050.008 .LDGV..my ages 11-20
0.0680.0870.1120.0950.0670.0930.0860.0770.0590.036 .LDGT1.my ages 1-10
0.0410.0360.0280.0240.0200.0170.0140.0100.0080.022 .LDGT1.my ages 11-20
0.0760.0980.1260.1070.0750.1040.0970.0830.0610.036 .LDGT2.my ages 1-10
0.0360.0280.0190.0150.0110.0080.0060.0040.0030.007 .LDGT2.my ages 11-20
0.0330.0570.1040.1050.1010.1250.1000.0750.0470.046 .HDGV..my ages 1-10
0.0470.0410.0280.0180.0100.0080.0070.0060.0050.037 .HDGV..my ages 11-20
0.0650.0830.0980.0970.0850.0990.0970.0840.0690.044 .LDDV..my ages 1-10
0.0430.0370.0260.0200.0150.0110.0080.0060.0050.008 .LDDV..my ages 11-20
0.0680.0870.1120.0950.0670.0930.0860.0770.0590.036 .LDDT..my ages 1-10
0.0410.0360.0280.0240.0200.0170.0140.0100.0080.022 .LDDT..my ages 11-20
0.0360.0440.0850.1260.0930.1180.0980.1030.0470.056 .HDDV..my ages 1-10
0.0490.0450.0290.0170.0090.0070.0060.0050.0040.023 .HDDV..my ages 11-20
0.1330.1450.1380.1160.1230.1140.0690.0440.0240.009 .MC...my ages 1-10
0.0850.0000.0000.0000.0000.0000.0000.0000.0000.000 .MC...my ages 11-20
78 20 1 75 83 I/M parameters
1 00 21.5 30.6 29.4 .743 .127 .082 .020 .007 .001 .012 .008
0.40 .08 .12 .14 .09 .10 .15 85. 65. Optional correction factors
84 88 79 2221 ATP params: 1968-1979
84 80 20 2221 ATP params: 1980-2020

```

Figure 21  
Input Data Cards Used in Example 6

\*\*\*\*\* TAMU INTERSECTION MODEL --- TEXIN2 \*\*\*\*\*

TITLE: User's Guide Example Six for the TEXIN2 Model--Worst Case Wind Angle Analysis

METEOROLOGICAL CONDITIONS:

Wind Speed = 2.5 m/s	Stability Class = 3 (C)	Surface Roughness = 150. cm
Wind Bearing = 5. deg	Mixing Height = 1000. m	Averaging Time = 60. min
Temperature = 68.0 F	Ambient Concentration = 0.0 ppm	

COMMENT: Wind angle will be incremented from 0 to 360 deg by 5.0 deg for worst case analysis.

INTERSECTION INFORMATION:

Type = Signalized	Cycle Length = 100.0 sec	Signal Phases = 5
Delay Links = 3	Non-Delay Links = 0	TFLAG = 0

Intersection Computational Procedure: CMA Operations & Design

-----LINK SUMMARY-----

<u>Link</u>	<u>Type</u>	<u>Width</u>	<u>Height</u>	<u>VPHI</u>	<u>VSP</u>	<u>NLN</u>	<u>NLTL</u>	<u>NRTL</u>	<u>FLT</u>	<u>FRT</u>	<u>LTFLG</u>	<u>THWIDE</u>	<u>LTWIDE</u>
1	AG	15.0	0.0	300.	45.0	2	0	0	.1000	.0500	0	3.66	3.66
2	AG	17.0	0.0	700.	45.0	2	1	0	.1500	.2000	1	3.66	3.66
3	AG	15.0	0.0	275.	45.0	2	0	0	.0500	.1500	0	3.66	3.66
4	AG	17.0	0.0	650.	45.0	2	1	0	.1000	.1000	1	3.66	3.66

Figure 22

TEXIN2 Output for Example 6

-----MOBILE3 EMISSION CALCULATIONS-----

COMMENT: A/C correction factor will be calculated. Value of inputted AC usage parameter is ignored.

User supplied VMT mix: Yes  
Anti-tampering program: Yes

User supplied Tampering data: Yes  
User supplied mileage accrual: No

Inspection/Maintenance: Yes  
User supplied registration data: Yes

-----MOBILE3 REPLACEMENT TAMPERING AND MISFUELING RATES-----

Non-I/M Case

Component	LDGV		LDGT1		LDGT2		HDGV	
	ZML	DET	ZML	DET	ZML	DET	ZML	DET
Air Pump	-0.0271	0.02652	0.0489	0.02652	0.0489	0.02652	0.0489	0.02652
Catalyst	-0.0195	0.01611	0.1353	0.01611	0.1353	0.01611	0.1353	0.01611
Fuel Inlet	-0.0143	0.02022	0.1101	0.02022	0.1101	0.02022	0.1101	0.02022
Other Misfueling	0.0165	0.00559	0.0696	0.00559	0.0696	0.00559	0.0696	0.00559
EGR System	-0.0006	0.02199	0.0502	0.02199	0.0502	0.02199	0.0502	0.02199
Evap Canister	-0.0048	0.00335	0.0377	0.00335	0.0377	0.00335	0.0377	0.00335
PCV System	0.0002	0.00248	0.0308	0.00248	0.0308	0.00248	0.0308	0.00248

I/M Case

Component	LDGV		LDGT1		LDGT2		HDGV	
	ZML	DET	ZML	DET	ZML	DET	ZML	DET
Air Pump	-0.0101	0.01111	-0.0100	0.01111	-0.0100	0.01111	-0.0100	0.01111
Catalyst	-0.0011	0.00459	0.0332	0.00459	0.0332	0.00459	0.0332	0.00459
Fuel Inlet	-0.0077	0.01000	0.0470	0.01000	0.0470	0.01000	0.0470	0.01000
Other Misfueling	0.0382	-0.00211	0.0699	-0.00211	0.0699	-0.00211	0.0699	-0.00211
EGR System	-0.0006	0.02199	0.0502	0.02199	0.0502	0.02199	0.0502	0.02199
Evap Canister	-0.0048	0.00335	0.0377	0.00335	0.0377	0.00335	0.0377	0.00335
PCV System	0.0002	0.00248	0.0308	0.00248	0.0308	0.00248	0.0308	0.00248

Figure 22

TEXIN2 Output for Example 6 (Continued)

-----MOBILE3 INSPECTION/MAINTENANCE PROGRAM-----

Start year (January 1): 78  
 First model year covered: 75

Pre-1981 MYR stringency rate: 20%

Mechanic training program?: No  
 Last model year covered: 83

Vehicle types covered: LDGV  
 1981 & later MYR test type: Idle  
 1981 & later MYR test cutpoints: 3.0% ICO

-----MOBILE3 EMISSION FACTORS (GRAMS CO/VEHICLE MILE)-----

Scenario: Region = 1                      Vehicle Mix: LDGV = 0.743                      LDDV = 0.007  
 Year = 2000                                      LDGT1 = 0.127                      LDDT = 0.001  
 PCCN = 21.5                                      LDGT2 = 0.082                      HDDV = 0.012  
 PCHC = 30.6                                      HDGV = 0.020                      MC = 0.008  
 PCCC = 29.4  
 Altitude = 500.0 ft

A/C Corrections---AC (DB / WB (F)): 0.5 ( 85.0 / 65.0)  
 Extra Load (LDGV / LDGT1 / LDGT2): 0.080 / 0.120 / 0.140  
 Trailer in Tow (LDGV / LDGT1 / LDGT2): 0.090 / 0.100 / 0.150

Speed	LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	LDGT	All Modes
45.0	8.7	12.5	13.6	14.9	0.7	0.8	5.1	9.0	12.9	9.6
35.0	13.4	19.5	21.1	16.4	0.8	0.9	5.9	11.6	20.1	14.7
10.0	40.1	59.3	63.6	55.3	2.6	3.0	19.2	43.9	61.0	44.3

MOBILE3 IDLE EMISSION RATE (GRAMS CO/MIN)

LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	LDGT	All Modes
5.9	1.6	1.5	1.7	0.2	0.4	0.9	2.5	1.6	4.8

Figure 22

TEXIN2 Output for Example 6 (Continued)

-----MOBILE3 Anti-Tampering Program Data-----

Start year (January 1): 1974                      First model year covered: 1968                      Last model year covered: 1979

Vehicle types covered:            LDGV , LDGT1, LDGT2

\*\*  
\*\*  
\*\* ANNUAL : INSPECT AIR PUMP, CANISTER & PCV  
\*\*

-----MOBILE3 EMISSION FACTORS (GRAMS CO/VEHICLE MILE)-----

<u>Speed</u>	<u>LDGV</u>	<u>LDGT1</u>	<u>LDGT2</u>	<u>HDGV</u>	<u>LDDV</u>	<u>LDDT</u>	<u>HDDV</u>	<u>MC</u>	<u>LDGT</u>	<u>All Modes</u>
45.0	8.7	12.5	13.6	14.9	0.7	0.8	5.1	9.0	12.9	9.6
35.0	13.4	19.5	21.1	16.4	0.8	0.9	5.9	11.6	20.1	14.7
10.0	40.1	59.3	63.6	55.3	2.6	3.0	19.2	43.9	61.0	44.3

MOBILE3 IDLE EMISSION RATE (GRAMS CO/MIN)

<u>LDGV</u>	<u>LDGT1</u>	<u>LDGT2</u>	<u>HDGV</u>	<u>LDDV</u>	<u>LDDT</u>	<u>HDDV</u>	<u>MC</u>	<u>LDGT</u>	<u>All Modes</u>
5.9	1.6	1.5	1.7	0.2	0.4	0.9	2.5	1.6	4.8

Figure 22

TEXIN2 Output for Example 6 (Continued)



-----MOBILE3 Anti-Tampering Program Data-----

Start year (January 1): 1984                      First model year covered: 1980                      Last model year covered: 2020

Vehicle types covered:            LDGV , LDGT1, LDGT2

\*\*  
 \*\* ANNUAL : INSPECT AIR PUMP, CATALYST, FUEL INLET (AND PLUMBESMO),  
 \*\* CANISTER & PCV  
 \*\*

-----MOBILE3 EMISSION FACTORS (GRAMS CO/VEHICLE MILE)-----

<u>Speed</u>	<u>LDGV</u>	<u>LDGT1</u>	<u>LDGT2</u>	<u>HDGV</u>	<u>LDDV</u>	<u>LDDT</u>	<u>HDDV</u>	<u>MC</u>	<u>LDGT</u>	<u>All Modes</u>
45.0	7.4	8.6	9.3	14.9	0.7	0.8	5.1	9.0	8.8	7.8
35.0	11.5	13.3	14.4	16.4	0.8	0.9	5.9	11.6	13.8	11.9
10.0	34.4	40.7	43.4	55.3	2.6	3.0	19.2	43.9	41.8	36.0

MOBILE3 IDLE EMISSION RATE (GRAMS CO/MIN)

<u>LDGV</u>	<u>LDGT1</u>	<u>LDGT2</u>	<u>HDGV</u>	<u>LDDV</u>	<u>LDDT</u>	<u>HDDV</u>	<u>MC</u>	<u>LDGT</u>	<u>All Modes</u>
5.9	1.6	1.5	1.7	0.2	0.4	0.9	2.5	1.6	4.8

Figure 22

TEXIN2 Output for Example 6 (Continued)

-----TRAFFIC FLOW ANALYSIS (MAJOR INTERSECTION - SIGNALIZED)-----

Volume/Capacity= 0.45  
Stopped Delay= 12.0 sec/veh  
Approach Delay= 17.1 sec/veh  
Time in Queue= 14.7 sec/veh  
Fraction Stopping= 0.54

Fraction of Excess  
Emissions Due to:  
Vehicles Idling= 0.19  
Vehicles Turning= 0.06  
Vehicles Stopping & Slowing= 0.75

-----TRAFFIC FLOW ANALYSIS (MINOR INTERSECTION(S) - UNSIGNALIZED)-----

For Link 9:

Reserve Capacity= 16. veh  
Stopped Delay= 39.0 sec/veh  
Approach Delay= 52.7 sec/veh  
Time in Queue= 49.4 sec/veh  
Fraction Stopping= 1.00

Fraction of Excess  
Emissions Due to:  
Vehicles Slowing= 0.10  
Vehicles Stopping= 0.44  
Vehicles Idling= 0.46

For Link 10:

Reserve Capacity= 37. veh  
Stopped Delay= 37.8 sec/veh  
Approach Delay= 51.1 sec/veh  
Time in Queue= 47.8 sec/veh  
Fraction Stopping= 1.00

Fraction of Excess  
Emissions Due to:  
Vehicles Slowing= 0.10  
Vehicles Stopping= 0.45  
Vehicles Idling= 0.45

For Link 11:

Reserve Capacity= 35. veh  
Stopped Delay= 37.9 sec/veh  
Approach Delay= 51.1 sec/veh  
Time in Queue= 47.9 sec/veh  
Fraction Stopping= 0.80

Fraction of Excess  
Emissions Due to:  
Vehicles Slowing= 0.15  
Vehicles Stopping= 0.37  
Vehicles Idling= 0.47

Figure 22

TEXIN2 Output for Example 6 (Continued)

-----LINK DESCRIPTION-----

<u>Link</u>	<u>YL1</u>	<u>YL1</u>	<u>XL2</u>	<u>YL2</u>	<u>Length</u>	<u>VEH/HR</u>	<u>Speed</u>	<u>MGM CD/M-SEC</u>
1	0.0	0.0	0.0	1000.0	1000.0	725.	45.0	0.98
2	0.0	0.0	1000.0	0.0	1000.0	1291	45.0	1.74
3	0.0	0.0	500.0	-866.0	1000.0	700.	45.0	0.94
4	0.0	0.0	-1000.0	0.0	1000.0	1134.	45.0	1.53
5	0.0	0.0	0.0	17.9	17.9	725.	45.0	23.66
6	0.0	0.0	41.8	0.0	41.8	1291.	45.0	23.63
7	0.0	0.0	8.2	-14.2	16.4	700.	45.0	23.62
8	0.0	0.0	-38.8	0.0	38.8	1134.	45.0	20.23
9	-200.0	0.0	-200.0	1000.0	1000.0	140.	35.0	0.29
10	-200.0	0.0	-200.0	-1000.0	1000.0	120.	35.0	0.25
11	200.0	0.0	200.0	1000.0	1000.0	130.	35.0	0.27
12	-200.0	0.0	-200.0	35.0	35.0	140.	35.0	3.74
13	-200.0	0.0	-200.0	-13.1	13.1	120.	35.0	8.39
14	200.0	0.0	200.0	14.7	14.7	130.	35.0	7.79

**Figure 22**

**TEXIN2 Output for Example 6 (Continued)**



-----TEXIN2 WORST CASE WIND ANGLE ANALYSIS-----

<u>Receptor</u>	<u>XR</u>	<u>YR</u>	<u>ZR</u>	<u>Angle (deg)</u>	<u>CO (ppm)*</u>
1	220.0	20.0	2.0	225.0	0.3
2	20.0	20.0	2.0	225.0	2.5
3	-180.0	20.0	2.0	240.0	0.4

\*Includes Background Ambient Concentration of 0.0 ppm

\*\*\*\*\*

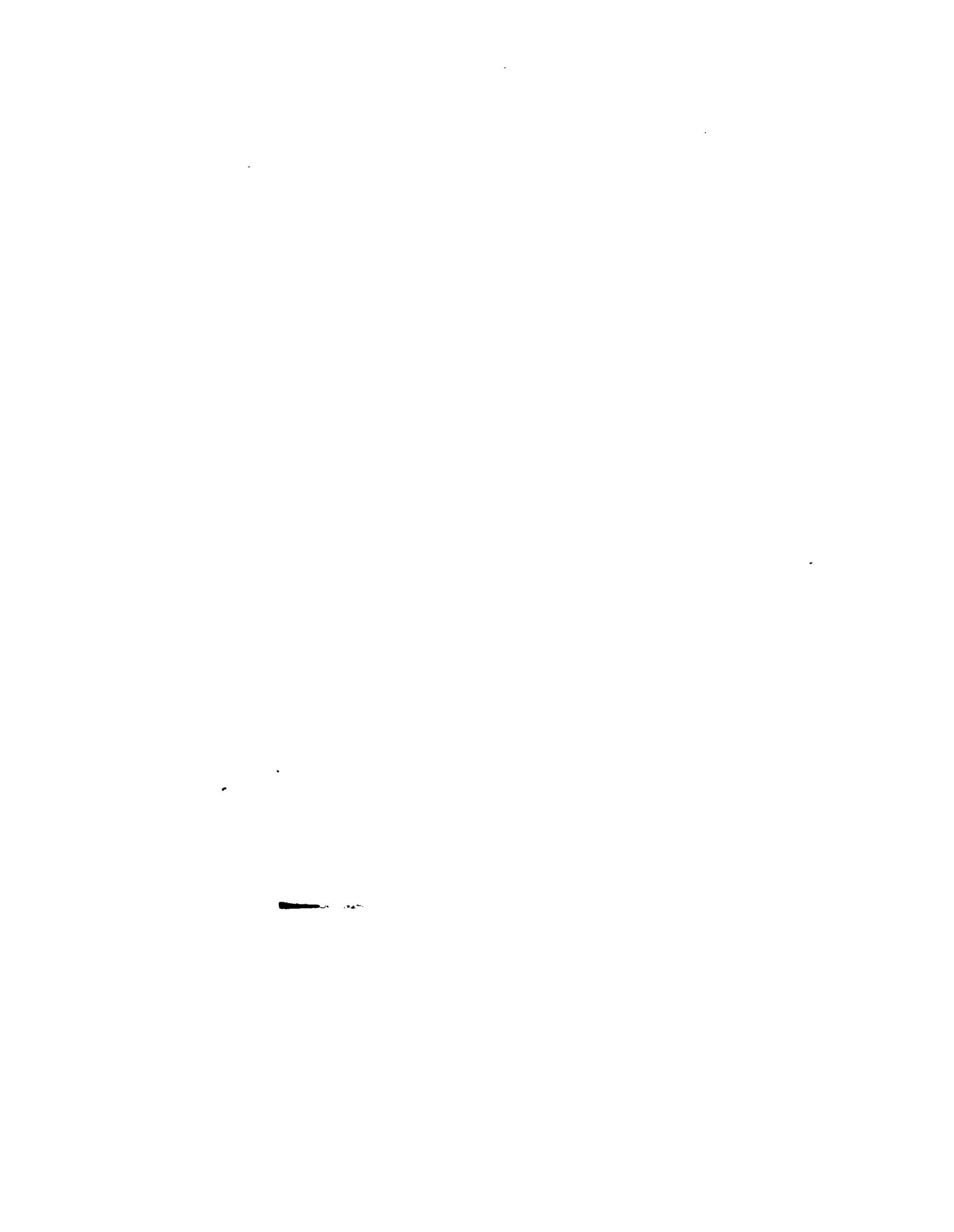
**Figure 22**  
**TEXIN2 Output for Example 6 (Continued)**

## References

\_\_\_\_\_

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## **Nomenclature and Variable Definitions**

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## Nomenclature and Variable Definitions

- AC* = Air conditioning usage factor. Toggles AC correction on input.
- AG* = at-Grade intersection scenario
- AMB* = Background pollutant concentration (ppm)
- AMBT* = Ambient temperature (°F)
- ASDA* = Average stop delay of all vehicles on inbound approach (sec/veh)
- ASDL* = Average stop delay of left turns on inbound approach (sec/veh)
- ASDR* = Average stop delay of right turns on inbound approach (sec/veh)
- ASDS* = Average stop delay of straights on inbound approach (sec/veh)
- ATDA* = Average total delay of all vehicles on inbound approach (sec/veh)
- ATDL* = Average total delay of left turns on inbound approach (sec/veh)
- ATDR* = Average total delay of right turns on inbound approach (sec/veh)
- ATDS* = Average total delay of straights on inbound approach (sec/veh)
- ATIM* = Dispersion model averaging time (min)
- ATP* = MOBILE3 anti-tampering program
- BR* = Bridge intersection scenario
- BRG* = Wind angle (deg)
- CLAS* = Integer describing the atmospheric stability class (A = 1 to F = 6)
- CMAFG* = Flag that sets either the CMA Operations and Design procedure or the CMA Planning procedure
- CY* = Signal cycle length (sec)
- DB* = Dry bulb temperature (°F)
- DP* = Depressed intersection scenario
- EMFLG* = Flag indicating the type of emission routine to execute
- FILENM* = File name used to associate logical unit numbers with certain emission program options
- FL* = Fill intersection scenario
- FLT* = Fraction of left turning vehicles
- FRT* = Fraction of right turning vehicles
- HDDV* = Heavy duty Diesel vehicles
- HEAD* = TEXIN2 user-supplied simulation title
- HL* = Link height (m)
- ICUTS* = Standards used in conjunction with the I/M short test for 1981 and later light duty vehicles
- ICY* = Last two digits of the calendar year currently being modeled

*ICYIM* = Last two digits of the year of I/M implementation  
*ILDT* = Type of vehicles affected by an I/M  
*IMFLAG* = Variable that specifies the use of MOBILE3 inspection/maintenance programs  
*IMTFLG* = Mechanic training flag for I/M programs  
*INTFLG* = Flag that sets the type of intersection being modeled  
*IREJN* = Variable that describes the region of the United States being modeled  
*ISTRIN* = Stringency level of an I/M program  
*ITEST* = Type of I/M test implemented for 1981 and later light duty vehicles  
*LA* = Link association number  
*LAPSY* = Last two digits of the year of ATP implementation  
*LAP1ST* = First model year to be included in an ATP  
*LAPLST* = Last model year to be included in an ATP  
*LDDT* = Light duty Diesel trucks  
*LDDV* = Light duty Diesel vehicles  
*LDGT1* = Light duty gasoline trucks with a gross vehicle weight rating (GVWR) of less than 6001 lbs  
*LDGT2* = Light duty gasoline trucks with a gross vehicle weight rating (GVWR) of less than 8501 lbs  
*LDGV* = Light duty gasoline vehicles  
*LTFLG* = Specifies left turn signalization for a link  
*LTWIDE* = Average width of an exclusive left turn lane (m)  
*LUN* = FORTRAN logical unit number  
*LVTFLG* = Vehicle classes covered by an ATP  
*MC* = Motorcycles  
*MIXH* = Atmospheric mixing height (m)  
*MODYR1* = Earliest model year included in an I/M program  
*MODYR2* = Latest model year included in an I/M program  
*MYMRFG* = Flag that specifies the use of MOBILE3 mileage accrual and registration distribution data  
*NDL* = Links on which traffic incurs delay  
*NLN* = Number of approach lanes on the link  
*NLTL* = Number of exclusive left-turn lanes on the link  
*NNDL* = Links on which traffic incurs no delay  
*NP* = Number of intersection signal phases  
*NR* = Number of receptors being modeled  
*NRTL* = Number of exclusive right-turn lanes on the link

*PCCC* = Percent VMT accumulated in the cold start mode by catalyst equipped vehicles  
*PCCN* = Percent VMT accumulated in the cold start mode by non-catalyst equipped vehicles  
*PCE* = Passenger car equivalency  
*PCHC* = Percent VMT accumulated in the hot start mode by catalyst equipped vehicles  
*PRTFLG* = Flag dictating the type of output required  
*QAVG* = Average queue length on approach (Number of vehicles)  
*QMAX* = Maximum queue length on approach (Number of vehicles)  
*TAMFLG* = Flag indicating whether the user is supplying tampering data  
*TFLAG* = Flag that pertains to T-intersections  
*THWIDE* = Average width of a lane used by through traffic (m)  
*TRAILR* = Fraction of light duty vehicles towing a trailer  
*TYP* = Variable indicating the type of intersection  
*U* = Wind speed (m/sec)  
*VMFLAG* = Flag indicating whether the user supplies the VMT mix  
*VMTMIX* = VMT mix distribution  
*VPHI* = Traffic volume on a link (veh/hr)  
*VSP* = Vehicle speed on a link (mph)  
*WB* = Wet bulb temperature (°F)  
*WCFLAG* = Worst case wind angle analysis flag  
*WL* = Width of a leg (m)  
*XLOAD* = Fraction of light duty vehicles carrying an extra 500 lb load  
*XL1* = *x*-endpoint of the intersection end of the minor link  
*XL2* = *x*-endpoint of a minor link corresponding to *XL1*  
*XR* = *x*-coordinate of a receptor (m)  
*YL1* = *y*-endpoint of the intersection end of the minor link  
*YL2* = *y*-endpoint of a minor link corresponding to *XL2*  
*YR* = *y*-coordinate of a receptor (m)  
*ZR* = *z*-coordinate of a receptor (m)  
*Z0* = Surface roughness (cm)



## **Appendix A**

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## Appendix A

### Implementation of Emission Routine Options

The purpose of this appendix is to acquaint the user with the various emission routine options available in the TEXIN2 model. A complete understanding of this appendix is required in order to properly implement the options. The various emission routine options are controlled by the flags: *VMFLAG*, *TAMFLG*, *IMFLAG*, *EMFLG*, *MYMRFG*, and *ALHFLG*. The use of an anti-tampering (ATP) program requires the user to bind two external files to FORTRAN logical unit numbers 49 and 51. An anti-tampering program is used when  $EMFLG = 4$ . The following discussion is applicable only to the MOBILE3 emission routine ( $EMFLG \geq 3$ ).

Data on VMT mix, tampering zero-mile levels and deterioration rates, mileage accrual/registration distribution, inspection/maintenance programs, and optional air conditioning, extra loading, and trailer towing corrections may be specified without attaching additional files. VMT data are specified on the vehicle scenario record. Tampering zero-mile levels and deterioration rates as well as mileage accrual/registration data are supplied after the meteorological conditions record. Tampering data are required when  $TAMFLG = 0$ . In order to specify mileage accrual rates, *MYMRFG* must be set to either two or four. In order to specify registration distributions, *MYMRFG* must be set to either three or four. The required records are then inserted immediately after the tampering data. There are 16 records for both mileage accrual and registration distribution. If the user is specifying both accrual and registration ( $MYMRFG = 4$ ), the mileage accrual rates must be entered first. Optional air conditioning, extra loading, and trailer towing correction factor data are placed immediately following the vehicle scenario record.

Figure A1 illustrates the subroutine OPENER found in TEXIN2. This routine uses the read file names to associate the ATP data files with logical unit numbers through the FORTRAN OPEN statement. If an ATP program is being used with MOBILE3, the user simply places the file name containing the early ATP data on the first file name record and the file name containing the late ATP data on the second file name record. If the subroutine does not conform to installation standards, the user may comment the code and the calling statement in the main program so that the compiler ignores the code during compilation. Furthermore, the main program has an OPEN statement commented upon shipment. This statement is used for attaching logical unit number 5 to the model. All flags, link descriptions, etc., are read from this unit.

Subroutine OPENER will attach the early ATP data to logical unit number (LUN) 49 and the late ATP data to LUN 51. The first record in any ATP data should indicate the number of lines of descriptive comments present in the data. The next lines should include any comments that are desired on the output. These comments will be printed on the output if  $PRTFLG \geq 1$ . There are the same number of comments as the integer on the first record indicates. The following 22

C				TXN07590
	SUBROUTINE OPENER (BEGIN,*)			TXN07591
C				TXN07592
C	This subroutine attaches the required logical unit numbers to			TXN07593
C	read file names. These file names should be in the following			TXN07594
C	order:			TXN07595
C				TXN07596
C	File	LUN	Description	TXN07597
C				TXN07598
C	1	49	ATP program credit matrices	TXN07599
C			First year range covered (EMFLG.EQ.4)	TXN07600
C	2	51	ATP program credit matrices	TXN07601
C			Second year range covered (EMFLG.EQ.4)	TXN07602
C				TXN07603
C	If this routine does not correspond to the installation's procedures,			TXN07604
C	the user will have to make the proper adjustments. Usually with			TXN07605
C	IBM compatible mainframes, the user will attach the unit numbers			TXN07606
C	via the proper Job Control Language. This routine may be deleted			TXN07607
C	or commented if not needed. If BEGIN=1, this routine opens the			TXN07608
C	required files; if BEGIN=0, the routine closes the files.			TXN07609
C				TXN07610
	INTEGER ATPFLG,EMFLG,TFLAG,CMAFG,BEGIN,ALHFLG			TXN07611
C				TXN07612
	CHARACTER*80 FILENM			TXN07613
C				TXN07614
	COMMON/FLAGS2/MYMRFG,NEWFLG,IMFLAG,ALHFLG,ATPFLG			TXN07615
	COMMON/FLAGS4/IDAFL,EMFLG,INTFLG,TFLAG,CMAFG			TXN07616
C				TXN07617
C	Read the proper file names from unit 5 and open the files.			TXN07618
C				TXN07619
	10 FORMAT(A80)			TXN07620
	IF(EMFLG.NE.4) GO TO 20			TXN07621
C				TXN07622
C	Open logical unit #49 for first range ATP credit matrices.			TXN07623
C				TXN07624
	LUN=49			TXN07625
	IF (BEGIN.EQ.1) READ (5,10,ERR=9999) FILENM			TXN07626
	IF (BEGIN.EQ.1) OPEN (UNIT=LUN,FILE=FILENM,ERR=9999)			TXN07627
	IF (BEGIN.EQ.0) CLOSE (LUN)			TXN07628
C				TXN07629
C	Open logical unit #51 for second range ATP credit matrices.			TXN07630
	LUN=51			TXN07631
	IF (BEGIN.EQ.1) READ (5,10,ERR=9999) FILENM			TXN07632
	IF (BEGIN.EQ.1) OPEN (UNIT=LUN,FILE=FILENM,ERR=9999)			TXN07633
	IF (BEGIN.EQ.0) CLOSE (LUN)			TXN07634
C				TXN07635
C	Return to caller.			TXN07636
C				TXN07637
	20 RETURN			TXN07638
C				TXN07639
C	If an error occurred in an attempt to open a file, print an			TXN07640
C	error message.			TXN07641
C				TXN07642
	9999 WRITE (6,7000) LUN			TXN07643
	7000 FORMAT('0',T6,' ***ERROR*** COULD NOT OPEN FILE FOR LUN ',I2)			TXN07644
	RETURN			TXN07645
	END			TXN07646

Figure A1

TEXIN2 Subroutine OPENER

records consist of the data pertinent to carbon monoxide emissions calculation. These data include the first and third group of eleven records of the credit matrices present in the MOBILE3 User's Guide<sup>7</sup> (see Example 2). There are 109 ATP routines listed in the MOBILE3 User's Guide. For convenience, these routines have also been included in Appendix B of this guide and the TEXIN2 distribution tape. The user should consult the EPA before using any ATP.

The OPENER subroutine is also responsible for closing all opened external files. The subroutine is passed a variable called *BEGIN*. When *BEGIN* is set to zero, the routine closes the opened files. If *BEGIN* is set to one, the routine opens the required files.

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**Appendix B**  
**EPA Anti-Tampering Programs**  
**Table of Contents**

Program Type	Description of Inspection	Line Numbers	Page
Annual	Inspect Air Pump Only	1-50	B-1
Annual	Inspect Catalyst Only	51-100	B-2
Annual	Inspect Air Pump & Catalyst	101-150	B-3
Annual (Non-I/M)	Inspect Catalyst & Fuel Inlet	151-200	B-4
Annual (Non-I/M)	Inspect Air Pump, Catalyst & Fuel Inlet	201-250	B-5
Annual	Inspect Catalyst & Fuel Inlet (and Plumbtesmo)	251-300	B-6
Annual	Inspect Air Pump, Catalyst & Fuel Inlet (and Plumbtesmo)	301-350	B-7
Annual (I/M)	Inspect Catalyst & Fuel Inlet	351-400	B-8
Annual (I/M)	Inspect Air Pump, Catalyst & Fuel Inlet	401-450	B-9
Annual	Inspect Air Pump & Canister	451-500	B-10
Annual	Inspect Catalyst & Canister	501-550	B-11
Annual	Inspect Air Pump, Catalyst & Canister	551-600	B-12
Annual (Non-I/M)	Inspect Catalyst, Fuel Inlet & Canister	601-650	B-13
Annual (Non-I/M)	Inspect Air Pump, Catalyst, Fuel Inlet & Canister	651-700	B-14
Annual	Inspect Catalyst, Fuel Inlet (and Plumbtesmo) & Canister	701-750	B-15
Annual	Inspect Air Pump, Catalyst, Fuel Inlet (and Plumbtesmo) & Canister	751-800	B-16
Annual (I/M)	Inspect Catalyst, Fuel Inlet & Canister	801-850	B-17
Annual (I/M)	Inspect Air Pump, Catalyst, Fuel Inlet & Canister	851-900	B-18
Annual	Inspect Air Pump & PCV	901-950	B-19
Annual	Inspect Catalyst & PCV	951-1000	B-20
Annual	Inspect Air Pump, Catalyst & PCV	1001-1050	B-21
Annual (Non-I/M)	Inspect Catalyst, Fuel Inlet & PCV	1051-1100	B-22
Annual (Non-I/M)	Inspect Air Pump, Catalyst, Fuel Inlet & PCV	1101-1150	B-23

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## Appendix B

**EPA Anti-Tampering Programs  
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Program Type	Description of Inspection	Line Numbers	Page
Annual	Inspect Catalyst, Fuel Inlet (and Plumbtesmo) & PCV	1151-1200	B-24
Annual	Inspect Air Pump, Catalyst, Fuel Inlet (and Plumbtesmo) & PCV	1201-1250	B-25
Annual (I/M)	Inspect Catalyst, Fuel Inlet & PCV	1251-1300	B-26
Annual (I/M)	Inspect Air Pump, Catalyst, Fuel Inlet & PCV	1301-1350	B-27
Annual	Inspect Air Pump, Canister & PCV	1351-1400	B-28
Annual	Inspect Catalyst, Canister & PCV	1401-1450	B-29
Annual	Inspect Air Pump, Catalyst, Canister & PCV	1451-1500	B-30
Annual (Non-I/M)	Inspect Catalyst, Fuel Inlet, Canister & PCV	1501-1550	B-31
Annual (non-I/M)	Inspect Air Pump, Catalyst, Fuel Inlet, Canister & PCV	1551-1600	B-32
Annual	Inspect Catalyst, Fuel Inlet (and Plumbtesmo), Canister & PCV	1601-1650	B-33
Annual	Inspect Air Pump, Catalyst, Fuel Inlet (and Plumbtesmo), Canister & PCV	1651-1700	B-34
Annual (I/M)	Inspect Catalyst, Fuel Inlet & Canister & PCV	1701-1750	B-35
Annual (I/M)	Inspect Air Pump, Catalyst, Fuel Inlet & Canister & PCV	1751-1800	B-36
Biennial	Inspect Air Pump Only	1801-1850	B-37
Biennial	Inspect Catalyst Only	1851-1900	B-38
Biennial	<del>Inspect</del> Air Pump & Catalyst	1901-1950	B-39
Biennial (Non-I/M)	Inspect Catalyst & Fuel Inlet	1951-2000	B-40
Biennial (Non-I/M)	Inspect Air Pump, Catalyst & Fuel Inlet	2001-2050	B-41
Biennial	Inspect Catalyst & Fuel Inlet (and Plumbtesmo)	2051-2100	B-42
Biennial	Inspect Air Pump, Catalyst & Fuel Inlet (and Plumbtesmo)	2101-2150	B-43
Biennial (I/M)	Inspect Catalyst & Fuel Inlet	2151-2200	B-44
Biennial (I/M)	Inspect Air Pump, Catalyst & Fuel Inlet	2201-2250	B-45
Biennial	Inspect Air Pump & Canister	2251-2300	B-46
Biennial	Inspect Catalyst & Canister	2301-2350	B-47



**EPA Anti-Tampering Programs  
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Program Type	Description of Inspection	Line Numbers	Page
Biennial	Inspect Air Pump, Catalyst & Canister	2351-2400	B-48
Biennial (Non-I/M)	Inspect Catalyst, Fuel Inlet & Canister	2401-2450	B-49
Biennial (Non-I/M)	Inspect Air Pump, Catalyst, Fuel Inlet & Canister	2451-2500	B-50
Biennial	Inspect Catalyst, Fuel Inlet (and Plumbtesmo) & Canister	2501-2550	B-51
Biennial	Inspect Air Pump, Catalyst, Fuel Inlet (and Plumbtesmo) & Canister	2551-2600	B-52
Biennial (I/M)	Inspect Catalyst, Fuel Inlet & Canister	2601-2650	B-53
Biennial (I/M)	Inspect Air Pump, Catalyst, Fuel Inlet & Canister	2651-2700	B-54
Biennial	Inspect Air Pump & PCV	2701-2750	B-55
Biennial	Inspect Catalyst & PCV	2751-2800	B-56
Biennial	Inspect Air Pump, Catalyst & PCV	2801-2850	B-57
Biennial (Non-I/M)	Inspect Catalyst, Fuel Inlet & PCV	2851-2900	B-58
Biennial (Non-I/M)	Inspect Air Pump, Catalyst, Fuel Inlet & PCV	2901-2950	B-59
Biennial	Inspect Catalyst, Fuel Inlet (and Plumbtesmo) & PCV	2951-3000	B-60
Biennial	Inspect Air Pump, Catalyst, Fuel Inlet (and Plumbtesmo) & PCV	3001-3050	B-61
Biennial (I/M)	Inspect Catalyst, Fuel Inlet & PCV	3051-3100	B-62
Biennial (I/M)	Inspect Air Pump, Catalyst, Fuel Inlet & PCV	3101-3150	B-63
Biennial	Inspect Air Pump, Canister & PCV	3151-3200	B-64
Biennial	Inspect Catalyst, Canister & PCV	3201-3250	B-65
Biennial	Inspect Air Pump, Catalyst, Canister & PCV	3251-3300	B-66
Biennial (Non-I/M)	Inspect Catalyst, Fuel Inlet, Canister & PCV	3301-3350	B-67
Biennial (non-I/M)	Inspect Air Pump, Catalyst, Fuel Inlet, Canister & PCV	3351-3400	B-68
Biennial	Inspect Catalyst, Fuel Inlet (and Plumbtesmo), Canister & PCV	3401-3450	B-69

**EPA Anti-Tampering Programs  
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Biennial (I/M)	Inspect Catalyst, Fuel Inlet & Canister & PCV	3501-3550	B-71
Biennial (I/M)	Inspect Air Pump, Catalyst, Fuel Inlet & Canister & PCV	3551-3600	B-72
Change of Ownership	Inspect Air Pump Only	3601-3650	B-73
Change of Ownership	Inspect Catalyst Only	3651-3700	B-74
Change of Ownership	Inspect Air Pump & Catalyst	3701-3750	B-75
Change of Ownership (Non-I/M)	Inspect Catalyst & Fuel Inlet	3751-3800	B-76
Change of Ownership (Non-I/M)	Inspect Air Pump, Catalyst & Fuel Inlet	3801-3850	B-77
Change of Ownership	Inspect Catalyst & Fuel Inlet (and Plumbtesmo)	3851-3900	B-78
Change of Ownership	Inspect Air Pump, Catalyst & Fuel Inlet (and Plumbtesmo)	3901-3950	B-79
Change of Ownership (I/M)	Inspect Catalyst & Fuel Inlet	3951-4000	B-80
Change of Ownership (I/M)	Inspect Air Pump, Catalyst & Fuel Inlet	4001-4050	B-81
Random Audit (1%)	Inspect Air Pump Only	4051-4100	B-82
Random Audit (1%)	Inspect Catalyst Only	4101-4150	B-83
Random Audit (1%)	Inspect Air Pump & Catalyst	4151-4200	B-84
Random Audit (1%) (Non-I/M)	Inspect Catalyst & Fuel Inlet	4201-4250	B-85
Random Audit (1%) (Non-I/M)	Inspect Air Pump, Catalyst & Fuel Inlet	4251-4300	B-86
Random Audit (1%)	Inspect Catalyst & Fuel Inlet (and Plumbtesmo)	4301-4350	B-87
Random Audit (1%)	Inspect Air Pump, Catalyst & Fuel Inlet (and Plumbtesmo)	4351-4400	B-88
Random Audit (1%) (I/M)	Inspect Catalyst & Fuel Inlet	4401-4450	B-89
Random Audit (1%) (I/M)	Inspect Air Pump, Catalyst & Fuel Inlet	4451-4500	B-90
Random Audit (2%)	Inspect Air Pump Only	4501-4550	B-91
Random Audit (2%)	Inspect Catalyst Only	4551-4600	B-92
Random Audit (2%)	Inspect Air Pump & Catalyst	4601-4650	B-93

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Random Audit (2%) (Non-I/M)	Inspect Catalyst & Fuel Inlet	4651-4700	B-94
Random Audit (2%) (Non-I/M)	Inspect Air Pump, Catalyst & Fuel Inlet	4701-4750	B-95
Random Audit (2%)	Inspect Catalyst & Fuel Inlet (and Plumbtesmo)	4751-4800	B-96
Random Audit (2%)	Inspect Air Pump, Catalyst & Fuel Inlet (and Plumbtesmo)	4801-4850	B-97
Random Audit (2%) (I/M)	Inspect Catalyst & Fuel Inlet	4851-4900	B-98
Random Audit (2%) (I/M)	Inspect Air Pump, Catalyst & Fuel Inlet	4901-4950	B-99
Random Audit (5%)	Inspect Air Pump Only	4951-5000	B-100
Random Audit (5%)	Inspect Catalyst Only	5001-5050	B-101
Random Audit (5%)	Inspect Air Pump & Catalyst	5051-5100	B-102
Random Audit (5%) (Non-I/M)	Inspect Catalyst & Fuel Inlet	5101-5150	B-103
Random Audit (5%) (Non-I/M)	Inspect Air Pump, Catalyst & Fuel Inlet	5151-5200	B-104
Random Audit (5%)	Inspect Catalyst & Fuel Inlet (and Plumbtesmo)	5201-5250	B-105
Random Audit (5%)	Inspect Air Pump, Catalyst & Fuel Inlet (and Plumbtesmo)	5251-5300	B-106
Random Audit (5%) (I/M)	Inspect Catalyst & Fuel Inlet	5301-5350	B-107
Random Audit (5%) (I/M)	Inspect Air Pump, Catalyst & Fuel Inlet	5351-5400	B-108
No Program	No Reductions	5401-5450	B-109









































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851 4
852 **
853 ** ANNUAL : INSPECT AIR PUMP, CATALYST, FUEL INLET & CANISTER
854 ** (I/M AREAS ONLY)
855 **
856 0.30 1.00 0.30 1.00 EVAP/PCV
857 0.05 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/CAT (PREVIOUS)
858 .00 0.20 .00 0.15 .00 .00 .00 .00 .00 .00 .00 AIR/NCK
859 .00 .00 0.20 .00 0.15 .00 .00 .00 .00 .00 .00 AIR/TNK
860 .00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 .00 AIR/CAT/NCK
861 .00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 AIR/CAT/TNK
862 .00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 CAT/NCK
863 .00 .00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 CAT/TNK
864 0.15 .00 .00 .00 .00 .00 .00 0.20 .00 .00 .00 AIR
865 .00 .00 .00 .00 .00 .00 .00 .00 0.05 .00 .00 CAT
866 .00 0.47 .00 0.21 .00 0.36 .00 .00 .00 0.67 .00 NCK
867 .00 .00 0.80 .00 0.80 .00 0.95 .00 .00 .00 1.00 TNK
868 1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT (PREVIOUS)
869 .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/NCK
870 .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/TNK
871 .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT/NCK
872 .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 EGR/CAT/TNK
873 .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 CAT/NCK
874 .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 CAT/TNK
875 .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 EGR
876 .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 CAT
877 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 NCK
878 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 TNK
879 0.05 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/CAT (SUBSEQUENT)
880 .00 0.20 .00 0.15 .00 .00 .00 .00 .00 .00 .00 AIR/NCK
881 .00 .00 0.20 .00 0.15 .00 .00 .00 .00 .00 .00 AIR/TNK
882 .00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 .00 AIR/CAT/NCK
883 .00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 AIR/CAT/TNK
884 .00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 CAT/NCK
885 .00 .00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 CAT/TNK
886 0.15 .00 .00 .00 .00 .00 .00 0.20 .00 .00 .00 AIR
887 .00 .00 .00 .00 .00 .00 .00 .00 0.05 .00 .00 CAT
888 .00 0.10 .00 0.10 .00 0.25 .00 .00 .00 0.30 .00 NCK
889 .00 .00 0.80 .00 0.80 .00 0.95 .00 .00 .00 1.00 TNK
890 1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT (SUBSEQUENT)
891 .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/NCK
892 .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/TNK
893 .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT/NCK
894 .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 EGR/CAT/TNK
895 .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 CAT/NCK
896 .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 CAT/TNK
897 .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 EGR
898 .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 CAT
899 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 NCK
900 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 TNK

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1551      4
1552      **
1553      ** ANNUAL : INSPECT AIR PUMP, CATALYST, FUEL INLET, CANISTER & PCV
1554      **              (NON-I/M AREAS ONLY)
1555      **
1556      0.30 0.30 0.30 0.30                                EVAP/PCV
1557      0.05 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/CAT (PREVIOUS)
1558      .00 0.20 .00 0.15 .00 .00 .00 .00 .00 .00 .00 AIR/NCK
1559      .00 .00 0.20 .00 0.15 .00 .00 .00 .00 .00 .00 AIR/TNK
1560      .00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 .00 AIR/CAT/NCK
1561      .00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 AIR/CAT/TNK
1562      .00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 CAT/NCK
1563      .00 .00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 CAT/TNK
1564      0.15 .00 .00 .00 .00 .00 .00 0.20 .00 .00 .00 AIR
1565      .00 .00 .00 .00 .00 .00 .00 .00 0.05 .00 .00 CAT
1566      .00 0.63 .00 0.47 .00 0.62 .00 .00 .00 0.83 .00 NCK
1567      .00 .00 0.80 .00 0.80 .00 0.95 .00 .00 .00 1.00 TNK
1568      1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT (PREVIOUS)
1569      .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/NCK
1570      .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/TNK
1571      .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT/NCK
1572      .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 EGR/CAT/TNK
1573      .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 CAT/NCK
1574      .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 CAT/TNK
1575      .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 EGR
1576      .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 CAT
1577      .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 NCK
1578      .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 TNK
1579      0.05 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/CAT (PREVIOUS)
1580      .00 0.20 .00 0.15 .00 .00 .00 .00 .00 .00 .00 AIR/NCK
1581      .00 .00 0.20 .00 0.15 .00 .00 .00 .00 .00 .00 AIR/TNK
1582      .00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 .00 AIR/CAT/NCK
1583      .00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 AIR/CAT/TNK
1584      .00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 CAT/NCK
1585      .00 .00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 CAT/TNK
1586      0.15 .00 .00 .00 .00 .00 .00 0.20 .00 .00 .00 AIR
1587      .00 .00 .00 .00 .00 .00 .00 .00 0.05 .00 .00 CAT
1588      .00 0.50 .00 0.50 .00 0.65 .00 .00 .00 0.70 .00 NCK
1589      .00 .00 0.80 .00 0.80 .00 0.95 .00 .00 .00 1.00 TNK
1590      1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT (SUBSEQUENT)
1591      .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/NCK
1592      .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/TNK
1593      .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT/NCK
1594      .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 EGR/CAT/TNK
1595      .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 CAT/NCK
1596      .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 CAT/TNK
1597      .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 EGR
1598      .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 CAT
1599      .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 NCK
1600      .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 TNK

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4001      4
4002      **
4003      ** CHNG-OF-OWN : INSPECT AIR PUMP, CATALYST & FUEL INLET ONLY
4004      ** (I/M AREAS ONLY)
4005      **
4006      1.00 1.00 1.00 1.00                                EVAP/PCV
4007      0.54 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/CAT (PREVIOUS)
4008      .00 0.66 .00 0.12 .00 .00 .00 .00 .00 .00 .00 AIR/NCK
4009      .00 .00 0.66 .00 0.12 .00 .00 .00 .00 .00 .00 AIR/TNK
4010      .00 .00 .00 0.54 .00 .00 .00 .00 .00 .00 .00 AIR/CAT/NCK
4011      .00 .00 .00 .00 0.54 .00 .00 .00 .00 .00 .00 AIR/CAT/TNK
4012      .00 .00 .00 .00 .00 0.54 .00 .00 .00 .00 .00 CAT/NCK
4013      .00 .00 .00 .00 .00 .00 0.54 .00 .00 .00 .00 CAT/TNK
4014      0.12 .00 .00 .00 .00 .00 .00 0.66 .00 .00 .00 AIR
4015      .00 .00 .00 .00 .00 .00 .00 .00 0.54 .00 .00 CAT
4016      .00 0.18 .00 0.06 .00 0.18 .00 .00 .00 0.84 .00 NCK
4017      .00 .00 0.34 .00 0.34 .00 0.46 .00 .00 .00 1.00 TNK
4018      1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT (PREVIOUS)
4019      .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/NCK
4020      .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/TNK
4021      .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT/NCK
4022      .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 EGR/CAT/TNK
4023      .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 CAT/NCK
4024      .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 CAT/TNK
4025      .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 EGR
4026      .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 CAT
4027      .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 NCK
4028      .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 TNK
4029      0.05 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/CAT (PREVIOUS)
4030      .00 0.30 .00 0.25 .00 .00 .00 .00 .00 .00 .00 AIR/NCK
4031      .00 .00 0.30 .00 0.25 .00 .00 .00 .00 .00 .00 AIR/TNK
4032      .00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 .00 AIR/CAT/NCK
4033      .00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 .00 AIR/CAT/TNK
4034      .00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 .00 CAT/NCK
4035      .00 .00 .00 .00 .00 .00 0.05 .00 .00 .00 .00 CAT/TNK
4036      0.25 .00 .00 .00 .00 .00 .00 0.30 .00 .00 .00 AIR
4037      .00 .00 .00 .00 .00 .00 .00 .00 0.05 .00 .00 CAT
4038      .00 .00 .00 .00 .00 0.25 .00 .00 .00 0.30 .00 NCK
4039      .00 .00 0.70 .00 0.70 .00 0.95 .00 .00 .00 1.00 TNK
4040      1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT (SUBSEQUENT)
4041      .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/NCK
4042      .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/TNK
4043      .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT/NCK
4044      .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 EGR/CAT/TNK
4045      .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 CAT/NCK
4046      .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 CAT/TNK
4047      .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 EGR
4048      .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 CAT
4049      .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 NCK
4050      .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 TNK

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4451      4
4452      **
4453      ** 1% AUDIT : INSPECT AIR PUMP, CATALYST & FUEL INLET ONLY
4454      **                (I/M AREAS ONLY)
4455      **
4456      1.00 1.00 1.00 1.00                                EVAP/PCV
4457      0.96 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/CAT (PREVIOUS)
4458      .00 0.97 .00 0.01 .00 .00 .00 .00 .00 .00 .00 AIR/NCK
4459      .00 .00 0.97 .00 0.01 .00 .00 .00 .00 .00 .00 AIR/TNK
4460      .00 .00 .00 0.96 .00 .00 .00 .00 .00 .00 .00 AIR/CAT/NCK
4461      .00 .00 .00 .00 0.96 .00 .00 .00 .00 .00 .00 AIR/CAT/TNK
4462      .00 .00 .00 .00 .00 0.96 .00 .00 .00 .00 .00 CAT/NCK
4463      .00 .00 .00 .00 .00 .00 0.96 .00 .00 .00 .00 CAT/TNK
4464      0.01 .00 .00 .00 .00 .00 .00 0.97 .00 .00 .00 AIR
4465      .00 .00 .00 .00 .00 .00 .00 0.96 .00 .00 .00 CAT
4466      .00 0.02 .00 0.01 .00 0.02 .00 .00 .00 0.99 .00 NCK
4467      .00 .00 0.03 .00 0.03 .00 0.04 .00 .00 .00 1.00 TNK
4468      1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT (PREVIOUS)
4469      .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/NCK
4470      .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/TNK
4471      .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT/NCK
4472      .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 EGR/CAT/TNK
4473      .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 CAT/NCK
4474      .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 CAT/TNK
4475      .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 EGR
4476      .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 CAT
4477      .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 NCK
4478      .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 TNK
4479      0.76 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 AIR/CAT (PREVIOUS)
4480      .00 0.82 .00 0.06 .00 .00 .00 .00 .00 .00 .00 AIR/NCK
4481      .00 .00 0.82 .00 0.06 .00 .00 .00 .00 .00 .00 AIR/TNK
4482      .00 .00 .00 0.76 .00 .00 .00 .00 .00 .00 .00 AIR/CAT/NCK
4483      .00 .00 .00 .00 0.76 .00 .00 .00 .00 .00 .00 AIR/CAT/TNK
4484      .00 .00 .00 .00 .00 0.76 .00 .00 .00 .00 .00 CAT/NCK
4485      .00 .00 .00 .00 .00 .00 0.76 .00 .00 .00 .00 CAT/TNK
4486      0.06 .00 .00 .00 .00 .00 .00 0.82 .00 .00 .00 AIR
4487      .00 .00 .00 .00 .00 .00 .00 .00 0.76 .00 .00 CAT
4488      .00 .00 .00 .00 .00 0.06 .00 .00 .00 0.82 .00 NCK
4489      .00 .00 0.18 .00 0.18 .00 0.24 .00 .00 .00 1.00 TNK
4490      1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT (SUBSEQUENT)
4491      .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/NCK
4492      .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 .00 EGR/TNK
4493      .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 .00 EGR/CAT/NCK
4494      .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 .00 EGR/CAT/TNK
4495      .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 .00 CAT/NCK
4496      .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 .00 CAT/TNK
4497      .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 .00 EGR
4498      .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 .00 CAT
4499      .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 .00 NCK
4500      .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.00 TNK

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## Appendix C

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## Appendix C

### Contents of the TEXIN2 Distribution Tape

This appendix briefly discusses the contents of the TEXIN2 distribution tape. Unless a special request is made, the TEXIN2 tape will contain the files listed in Table C1. The recording characteristics of each file are also presented.

The first file on the tape contains the source code to the TEXIN2 model. Next are the data files for the five examples presented in this User's Guide along with the anti-tampering program data for Examples 2, 3 and 6. The results from each example follows the last example data file. The last file on the tape contains the anti-tampering programs supplied by the EPA with MOBILE3. These programs are presented in Appendix B for convenience. The user should first verify that the results presented on the tape can be obtained using the example data files on the tape before attempting any actual simulations.

Unless a special request is made, all files on the tape are coded in EBCDIC (Extended Binary-Coded-Decimal Interchange Code). All data files and the program source code record lengths are 80 bytes with block sizes of 4000 bytes. The output files from the model (14-19) have record lengths of 133 bytes and block sizes of 1330 bytes.

**Table C1**  
**Texas Intersection Model (TEXIN2)**

Texas Transportation Institute  
Texas A&M University System  
College Station, Texas 77843  
(409) 845-3361

File	Version	Contents	RECFM	LRECL	BLKSIZE	Code
01	2	TEXIN2 FOR 77	FB	80	4000	EBCDIC
02	2	Example 1	FB	80	4000	EBCDIC
03	2	Example 2	FB	80	4000	EBCDIC
04	2	Example 2 LUN49	FB	80	4000	EBCDIC
05	2	Example 2 LUN51	FB	80	4000	EBCDIC
06	2	Example 3	FB	80	4000	EBCDIC
07	2	Example 3 LUN49	FB	80	4000	EBCDIC
08	2	Example 3 LUN51	FB	80	4000	EBCDIC
09	2	Example 4	FB	80	4000	EBCDIC
10	2	Example 5	FB	80	4000	EBCDIC
11	2	Example 6	FB	80	4000	EBCDIC
12	2	Example 6 LUN49	FB	80	4000	EBCDIC
13	2	Example 6 LUN51	FB	80	4000	EBCDIC
14	2	Result 1	FBA	133	1330	EBCDIC
15	2	Result 2	FBA	133	1330	EBCDIC
16	2	Result 3	FBA	133	1330	EBCDIC
17	2	Result 4	FBA	133	1330	EBCDIC
18	2	Result 5	FBA	133	1330	EBCDIC
19	2	Result 6	FBA	133	1330	EBCDIC
20	2	ATP Data	FB	80	4000	EBCDIC

NOTE: Tape is unlabelled at 1600 bpi

## Appendix D

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## Appendix D

### TEXIN2 Diagnostic Messages

This appendix lists the various diagnostic messages that may be printed by TEXIN2. A brief description of the message is also given in most cases.

#### Flags Card Diagnostic Messages

**\*\*ERROR\*\* FLAGS MUST HAVE VALUE OF ZERO, ONE, TWO, THREE, OR FOUR**

All flags read by the program must be in the range of zero through four, inclusive. This error could also be due to a value of *LTF LG* on the Link Description Cards greater than one.

**\*\*ERROR\*\* CYCLE LENGTH MUST BE GREATER THAN ZERO**

The signal cycle length must be greater than zero for a signalized intersection.

**\*\*WARNING\*\* Too many links inputted**

The model is currently capable of handling up to 40 links. These 40 links include the four major intersection links, all *NNDL* and *N DL* links, and four pseudolinks that are internally constructed by the model.

**\*\*WARNING\*\* Number of receptors must not be greater than 20**

The value assigned to *NP* on the flags card is greater than 20. The program is currently dimensioned to handle up to 20 receptors.

#### Link Description Cards Diagnostic Messages

**\*\*ERROR\*\* SUM OF LEFT AND RIGHT TURNING VEHICLE FRACTIONS CANNOT BE GREATER THAN ONE**

The sum of the left ~~and right~~ turn fractions on one of the inputted links is greater than one.

**\*\*ERROR\*\* ALL VEHICLES IN T-SECTION ARE NOT TURNING**

The sum of the left and right turn fractions for the leg opposite of the missing leg of a T-intersection is not equal to one.

**\*\*ERROR\*\* LANE ASSOCIATION NUMBER IS INCORRECT- MUST BE BETWEEN ONE THROUGH FOUR, INCLUSIVE**

The value of *LA* for a link is not in the range between one and four, inclusive.

**\*\*ERROR\*\* INCORRECT LINK TYPE**

The type of link on a link description card is not one of the following: AG (at-grade), DP (depressed section), FL (fill section), or BR (bridge).

**\*\*WARNING\*\*** Mixing width should be greater than 10 meters

The value of *WL* for one of the links is less than 4 m. TEXIN2 automatically adds six meters to each link width to account for shoulder width.

**\*\*WARNING\*\*** Vehicle speed must be between 5 and 55 mph

The value entered for vehicle speed on a link is not between 5 and 55 mph.

### **Meteorological Conditions Diagnostic Messages**

**\*\*ERROR\*\*** WIND SPEED MUST BE GREATER THAN ZERO

The wind speed must be greater than 0 m/sec.

**\*\*ERROR\*\*** WIND ANGLE INCREMENT IS INVALID FOR WORST CASE WIND ANGLE SEARCH

The value of *BRG* on the meteorological conditions card must be greater than zero when a worst case wind angle search is invoked.

**\*\*ERROR\*\*** WIND DIRECTION MUST BE BETWEEN 0 AND 360 DEG

The wind direction must be between 0° and 360°.

**\*\*WARNING\*\*** Stability class must be between 1 and 6

The Pasquill stability class entered is not between 1 (A) and 6 (F).

**\*\*WARNING\*\*** Mixing height = 'value of *MIXH*' m

The mixing height inputted into the model is less than 10 m.

**\*\*WARNING\*\*** Surface roughness should be between 3 and 400 cm

The surface roughness should be between 3 and 400 cm, inclusive.

**\*\*WARNING\*\*** Averaging time should be between 3 and 120 minutes

The averaging time should be between 3 and 120 minutes, inclusive.

**\*\*WARNING\*\*** Ambient CO concentration is less than zero

The value entered for the background CO concentration is less than zero.

**COMMENT: Wind angle will be incremented from 0 to 360 deg by 'value of BRG' deg for worst case analysis**

A worst case wind angle analysis has been invoked and the search will proceed at the stated wind angle increment.

#### **Mileage/Registration Distribution Diagnostic Messages**

**\*\*ERROR\*\* 'value of AMAR(JDX,IV)' NEGATIVE MODEL YEAR MILEAGE**

User supplied mileage accrual data for model year JDX and vehicle type IV is negative.

**\*\*ERROR\*\* 'value of JULMYR(JDX,IV)' NEGATIVE MODEL YEAR REGISTRATION**

The model year registration fraction is negative. This number should be between zero and one, inclusive, since it represents the fraction of all vehicles in the fleet of a given age.

**\*\*ERROR\*\* MYR OF LDDV NOT EQUAL TO LDGV FOR JDX 'value of JDX'**

**\*\*ERROR\*\* MYR OF LDDT NOT EQUAL TO LDGV FOR JDX 'value of JDX'**

The user has entered a different registration distribution for LDGV's than for LDDV's or for LDGT1's than LDDT's. The registration mix for the total LDV (or LDT) fleet is to be input twice for the gasoline powered and diesel powered vehicles (or trucks). MOBILE3 has an internal function that apportions total registrations into the separate gasoline and diesel powered groups. Thus, it is assumed that in MOBILE3 (and TEXIN2) that LDDV's will replace some of their LDG counterparts and will be used in the same way.

**WARNING: 'value of CHKMYR' MYR sum not = 1. (will normalize)**

Sum of the model year registration fractions for a given vehicle type do not sum to one. If the model year age registration fractions do not sum to one, TEXIN2 will normalize the fractions accordingly.

**WARNING: 'value of JULMYR(JDX,IV)' registration with zero mileage**

**WARNING: 'value of AMAR(JDX,IV)' mileage with zero registration**

For a given vehicle age, vehicles either do not accumulate mileage, yet make up a fraction of the fleet, or do not make up a fraction of the fleet but accumulate mileage. If a mileage accrual rate or a registration fraction is zero, both should be zero.

#### **Vehicle Scenario Card Diagnostic Messages**

**\*\*ERROR\*\* REGION MUST BE BETWEEN 1 AND 3, INCLUSIVE**

The value placed on the vehicle scenario card for *IREJN* is not between one and three, inclusive.

**\*\*ERROR\*\* PCHC + PCCC (= 'value of PCHC + PCCC') MUST BE BETWEEN 0 AND 100**

The sum of the hot/cold starts for vehicles equipped with catalysts must be in the range of 0–100%.

**\*\*ERROR\*\*** PCHC+PCCC–PCCN (= 'value of PCHC+PCCC–PCCN') MUST BE BETWEEN 0 AND 100

The sum of hot/cold starts for vehicles equipped with catalysts less those without catalysts must be in the 0–100% range.

**\*\*ERROR\*\*** VEHICLE MIX DOES NOT SUM TO 1.000

The sum of the VMT entered when  $VMFLAG = 1$  is not equal to one.

### **Optional Correction Factors Diagnostic Messages**

**WARNING:** 'value of AC' out of bounds for AC (0. to 1.)

The value entered for AC on the optional correction factors card is not between zero to one, inclusive.

**WARNING:** 'value of XLOAD' out of bounds for extra load (0. to 1.)

A value entered for the fraction of vehicles carrying an extra 500 lb load is not in the range of zero to one, inclusive.

**WARNING:** 'value of TRAILR' out of bounds for trailers (0. to 1.)

A trailer towing fraction is not in the range of zero to one, inclusive.

**WARNING:** 'value of temperature' valid temperature is 0-110 deg.

The wet and dry bulb temperatures must be between 0°F and 110°F, inclusive.

**WARNING:** WB temp cannot be greater than DB temp.

The value entered for the wet bulb temperature is greater than the value entered for the dry bulb temperature.

**COMMENT:** A/C correction factor will be calculated. Value of inputted AC usage parameter is ignored.

This message appears if a value for air conditioning usage other than zero is entered. The air conditioning usage is a function of the temperature. Therefore, the A/C usage calculated in MOBILE3 may vary from the value read.

### **Traffic Algorithm Diagnostic Messages**

**\*\*WARNING\*\*** CMA Planning Procedure will be used to reduce V/C = 'value of V/C'

The CMA Operations and Design Procedure has calculated that the volume to capacity ratio,  $V/C$ , is greater than one for a signalized intersection. Since the CMA Planning Procedure is not as stringent, it will be used in an attempt to lower the ratio.

**\*\*WARNING\*\*** According to the CMA Planning Procedure, intersection volume greater than capacity,  $V/C = \text{'value of } V/C\text{'}$

The CMA Planning Procedure has calculated that the volume to capacity ratio,  $V/C$ , is greater than one for a signalized intersection. Stopped delay is calculated depending on the value of  $V/C$  in this case.

**\*\*WARNING\*\*** Link 'link number' is over capacity

The traffic algorithm has calculated that the given link is over capacity. This link may be a part of the major intersection if the intersection is unsignalized. If the major intersection is signalized, this link is one of the *NDL* links.

#### **Tampering Data Diagnostic Messages**

**WARNING:** 'value of ZEROML' out of bounds for tampering rate intercept (up to 1.0)

The zero-mileage level of tampering cannot exceed 100% (1.0 as a fraction) of the fleet, for each tampering type and vehicle type.

#### **Inspection/Maintenance Program Diagnostic Messages**

**\*\*ERROR\*\*** ISTRIN IS OUT OF RANGE 10 TO 50

The stringency of the I/M program for 1980 and earlier LDV's is not between 10 and 50, inclusive.

**\*\*ERROR\*\*** IMTFLG IS OUT OF RANGE 1 TO 2

The mechanics training flag must be equal to 1 or 2.

**\*\*ERROR\*\*** MODYR1 CANNOT BE GREATER THAN MODYR2

According to the I/M parameters card, the first model year in an I/M program is greater than the last model year in an I/M program.

**ILDT IS OUT OF RANGE 1 TO 4**

Value for the vehicle types to which the I/M is applied is not between 1 and 4.

**ITEST IS OUT OF RANGE 1 TO 3**

Value of the I/M Technology IV+ short test type flag is not 1, 2, or 3.

### **ICUTS IS OUT OF RANGE 1 TO 3**

Value of the I/M Technology IV+ cutpoint flag is not 1, 2, or 3.

### **Anti-Tampering Program Diagnostic Messages**

**\*\*ERROR\*\* COULD NOT OPEN FILE FOR LUN 'value of LUN'**

An error occurred when the program attempted to open the ATP credits file associated with logical unit number LUN.

**\*\*ERROR\*\* LVT IS OUT OF RANGE 1 TO 2**

A value entered for the ATP vehicle class inclusion flag is not 1 or 2.

**\*\*ERROR\*\* RATE IS OUT OF RANGE 0 TO 1**

Value entered as an exhaust ATP effectiveness rate is not in the range 0.0 to 1.0. These rates act as percentage credits, and hence must be nonnegative and not exceed unity.

**\*\*ERROR\*\* AER MATRIX FILE COLUMN SUM OUT OF RANGE 0 TO 1**

Each column of both of the exhaust ATP effectiveness rate matrices in the ATP data file must sum to a nonnegative value not greater than one.

**END-OF-FILE RETURN ON READ OF UNIT 'unit number' (ATP EFFECTIVENESS RATES).  
RUN ABORTED.**

An end-of-file condition was encountered while reading the ATP credit matrices before all needed data were read. The logical unit number corresponding to the error is listed in the diagnostic message.

**ERROR RETURN ON READ OF UNIT 'unit number' (ATP EFFECTIVENESS RATES). RUN  
ABORTED.**

An error was encountered while attempting to read the ATP credit matrices. The error was encountered on the indicated logical unit number.

### **Miscellaneous MOBILE3 Diagnostic Messages**

**\*\*ERROR\*\* EFFTP $\geq$ 0 AND GSFRAC=0 FOR VEHICLE TYPE 'value of IV'**

Vehicle type described by IV has a positive FTP emission factor and a zero fleet sales fraction.

**\*\*ERROR\*\* EFFTP $\leq$ 0 AND VMTMIX $>$ 0 FOR VEHICLE TYPE 'value of IV'**

No exhaust emissions exist for the vehicle type described by IV, but vehicles of that type have accumulated a nonzero fraction of the total vehicle fleet mileage.

**\*\*ERROR\*\* EFIDLE $\geq$ 0 AND GSFRAC=0 FOR VEHICLE TYPE 'value of IV'**

The vehicle type described by IV has a positive idle emission factor and a zero fleet sales fraction.

**\*\*ERROR\*\* EFIDLE $\leq$ 0 AND VMTMIX $>$ 0 FOR VEHICLE TYPE 'value of IV'**

No idle emissions exist for the vehicle type referred to by IV, but the vehicles of that type have accumulated a nonzero fraction of the total vehicle fleet mileage.

**\*\*ERROR\*\* 'year' NOT IN RANGE OF YEARS 'year1' TO 'year2'**

A year used internally by TEXIN2 is not in the range of year1 to year2, inclusive.

**\*\*\* Default used for 'year' in index function 'function name'**

This message indicates a default exit has been taken from an index function. One or more of the associated year/year's position pairs is in error. The program must be corrected and recompiled before another run.

**PROGRAM TERMINATING DUE TO ERROR**

This message is written any time the program is about to abnormally terminate. The diagnostic messages that precede this message will normally indicate the problem.

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